INSTALLATION, MAINTENANCE AND USER'S GUIDE

FAN WITH ELECTRONICALLY COMMUTATED EXTERNAL-ROTOR MOTOR

Fan Code:

0309-4-3000

Fan type : R09R-30SPS-ES25C-03B07

📖 **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.

Table of Contents :

Symbols :


WARNING - to indicate warning situation


NOTE - indicate valuable information

01 SAFETY

When unpacking the unit, hold the blades close to the center (maximum stability) or hold the motor housing and lift it out very gently and carefully. Shocks have to be avoided by all means! Wear safety shoes and cut-resistant 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 intended solely as a built-in component and should not be operated otherwise. Sufficient protection against accidental contact according to the machinery directive 2006/42/CE has to be safeguarded, especially for the rotating parts. Should there be a malfunction, it still must be ensured that the parts breaking off or flying away cannot cause serious damage or bodily harm.

The method of fixing stated is not to depend on the use of adhesives since they are not considered to be a reliable fixing means.

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. Make sure that the unit is insulated.

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!

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

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

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.

R09 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 fan may only be operated when it is installed as intended & instructed, and when safety is ensured by safety equipment according to EN 13857 or by other protection measures.

The manufacturer of the end application is responsible for keeping to the Electromagnetic compatibility (EMC) guideline 2014/30/EC.

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

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 fan is intended to be connected to electrical power supply system with earthed neutral e.g. of type TN, TT.

The fan is 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).

Typical features

Variable Speed - setting via linear voltage input (0-10V) or PWM signal or other common ways.

High efficiency throughout the entire speed range.

Low-noise operation across the entire speed range.

Integrated EMC filter.

Sensor power supply 10VDC, max. 10mA.

Maintenance free ball-bearings and dynamically balanced rotating parts.

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

03 OPERATING CONDITIONS

The fan is 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 (windings and electronic) temperature-rise should be checked.

Figures on the motor name-plate refer to nominal values according to rules specified - marked on the nameplate (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 5W .

DIMENSIONS

Nominal diameter: 300 mm - see Appendix - technical drawing : VENTILATOR / R09R-30SPS-ES25C-03B07

Weight: 3 kg

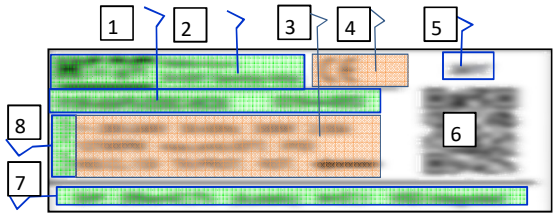
NOMINAL DATA - defined according to ' MAX. LOAD '

Phase:	1~
Nominal Voltage:	230 V
Operating Voltage range:	200-253 V
Frequency:	50-60 Hz
Input power:	165 W
Nominal current:	1,35 A
Rotational speed:	2140 RPM
Operating amb. temperature range:	-25°C .. +60°C
Max. operating pressure, p_{sF}:	150 Pa
Altitude:	2000 m
Insulation class:	130
Protection provided by PE:	Class I .
Overvoltage category (OVC):	II .
Operating humidity ambinet:	up to 95% (non condensing).

ErP DATA

(1) Overall Efficiency, η_{es}:	50,3 %
(2) Installation category:	A
(3) Efficiency category:	static
(4) Efficiency grade, N:	61,6
(5) Variable speed drive:	INTEGRATED
(6) Year of manufacture:	indicated on the nameplate (field No.5)
(7) Manufacturer:	indicated on the nameplate (field No.2)
(8) Product model / type:	R09R-30SPS-ES25C-03B07
(9) Power Input, P_e:	160 W
(9) Airflow volume, q_v:	1756 m³/h
(9) Pressure Increase, p_{sF}:	152 Pa
(10) Rotational Speed, n:	2147 RPM
(11) Specific ratio:	1,002

An example of a label and explanation of the content:



1. Fan type and code
2. Trade mark and manufacturer address
3. Nominal values (Voltage, frequency, Electric Power, Current...)
4. Certification marks
5. Date of production (week of the year/year)
6. QR code which includes code number, production date, serial number and link to website.
7. Data acc. to EU regulation 327/2011 (ErP)
8. NOTE INDICATE TO WHICH STANDARD/RULES CORESPOND DATA ON THE NAMEPLATE:

- **EN 60335-1** : Name-plate data are made according to standard EN 60335-1, Household and similar electrical appliances – Safety – Part 1, Articles 10.1 and 10.2 :
  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.
  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 established at a point of nominal load according to standard for Rotational electrical

04 INSTALLATION AND CONNECTION

Mechanical installation:

This unit should only be installed by a qualified technician. First install the device on the application, than connect the protective earth!

Do not install the fan on an unstable surface. Inspect the motor bearings for proper operation prior to installation.

The method of fixing stated is not to depend on the use of adhesives since they are not considered to be a reliable fixing means.

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

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 M5 at 90° on diameter 360 mm as indicated on enclosed technical drawing so that the protection grill prevents access to rotating parts and so that the evaporator housing prevents access of water from the front side. 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.

Electrical installation:

Main electrical installation must be protected against short circuit with e.g. circuit breaker: max.16A, 400Vac, Type B and installation must be constructed properly according to valid national directives.

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.

This product can cause a d.c. current in the protective earthing conductor. Where a residual current-operated protective device (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of Type B+ is allowed on the supply side of this product and recommended sensitivity is 300mA with short time delayed intervention.

The electrical connection must correspond to the enclosed connection diagram.

If the supply cord is damaged, it must be replaced by a manufacturer or by a manufacturer-qualified personnel with a special cord or assembly available from the manufacturer or its service agent in order to avoid a hazard.

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

Power-supply leads and control leads of this unit should not be routed or in parallel with distance less than 5cm. Control leads must be sufficient insulated with reinforced insulation (separate cables). Try to maintain as much distance between them as possible (recommended distance > 5cm).

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

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

Before putting into operation, check the resistance of protective-earth circuit of the entire application. Cross-sectional area and material of PE conductor may be the same as cross-sectional of phase conductor or see guide regarding earthing according to appropriate standard for end application .

CONNECTING DIAGRAM : See appended technical drawing - CONNECTING DIAGRAM 0302-0-0008

POWER CIRCUIT : L1-brown, N-blue, PE-green/yellow

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

CONTROL CIRCUIT:

0-10V analog input: yellow (0-10V), blue (GND)
Sensor supply: red(+10V), blue (GND)
Tach-out: white (T), blue (GND)

WARNING : Leakage current exceeds 1,15mA.

Short circuit rating: <10kA .

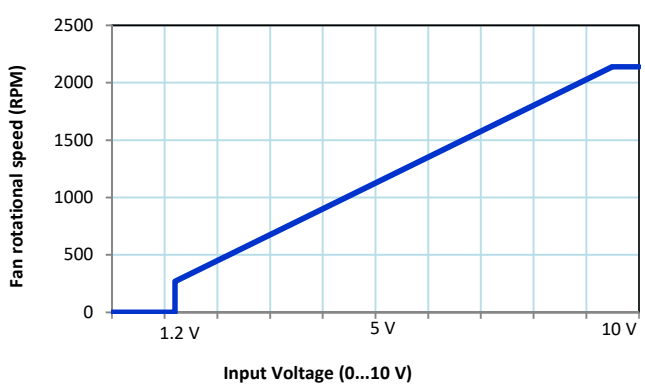
05 SPEED CONTROL

Rotation speed of a variable speed fan can be controlled by various signals:

- Linear voltage input (0-10V) or current input (4-20mA) or PWM input (PWM duty cycle 0-100%).

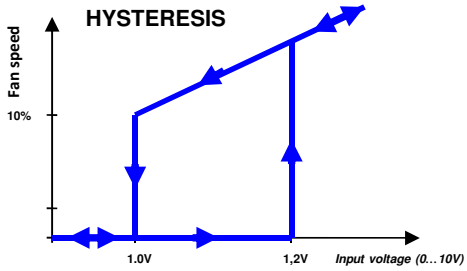
Linear voltage input is the most common and it is described below. The current input is also widely used, where long cables are necessary. PWM input is used for electromagnetic noisy environments. PWM signal must be in square form with polarity the same as for linear voltage input (see connection diagram). PWM duty cycle 0-100% correspond to 0-10V linear voltage input if the amplitude of the PWM voltage is Vp=10V. Amplitude of PWM signal must not exceed 12Vp.

LINEAR VOLTAGE INPUT:



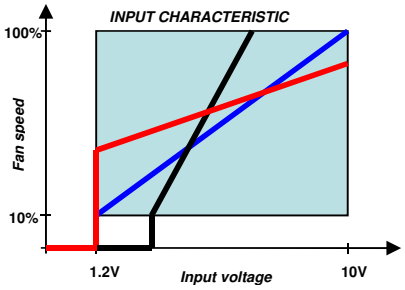
Speed of a fan increases linearly with input voltage.

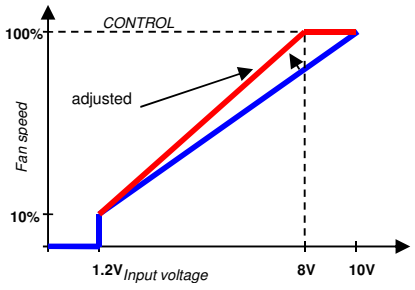
The fan operates in two different modes:
0-1.2 V..... Standby or stop mode
1.2-10 V..... Run mode
1.0-1.2V .....Hysteresis

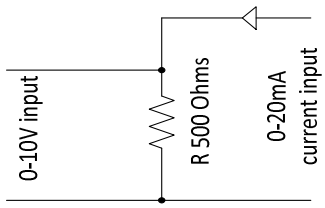


In order to prevent cycling from standby to run mode or run to standby mode a small hysteresis is implemented. The default value is approximately 200mV. Hysteresis can be factory-adjusted in order to achieve customer requirements.

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.







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

06 PUTTING INTO OPERATION

Before first start you should check:

a. Appropriate installation and electrical connection, especially resistance of the protective-earth (PE) circuit (max. 100mΩ).

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 DIAGNOSTICS & TROUBLESHOOTING

Fan does not start or run :
Possible causes: missing power (no line voltage), low voltage (under 140V), missing or inadequate control signal, extremely thermally or mechanically overloaded or fan failure (short circuit of electronic or windings).
Check line voltage, check value and polarity of control signal, check that rotor is free to rotate.

Fan runs with half of desired speed:
Possible causes: Low supply voltage, inadequate control signal or fan overheating.
Check line voltage, check control signal, check temperature and sufficient airflow of cooling air or loss of motor cooling.

Attention !

In the event of fan failure is detected (short/open in circuit of electronics/windings), never try to repair the fan, but replace it with new one or return it to the manufacturer for repair or replacement.

08 PROTECTIVE FEATURES

Short-circuit protection:

The motor and electronic controller are protected against short-circuit by built-in 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 140V, the motor will be switched off electronically in stand-by mode. When mains voltage returns to correct value, the motor will restart automatically.
In the specific case, the undervoltage protection may switch off the fan to stand-by mode, for example, fan running or testing at high pressure drop and low voltage.

Over temperature protection:

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

09 MAINTENANCE, SERVICE AND CLEANING

Before any maintaining, celaning 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.

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.

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

Cleaning

Regular inspection is 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 fans 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 to 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.

Permissible transport / storage temperature range: -40°C .. +80°C.
Permissible transport / storage humidity : 5 - 95%.

11 INFORMATION FOR DISASSEMBLY AND USE ACCORDING TO COMMISION REG. EU 327/2011 AND ROHS DIRECTIVE

(12) Disposal at product end-of-life must be carried out environmentally friendly and in compliance with regulations applicable in your country.
Disassembly must be carried out professionally, environmentally friendly and safety by or supervised by appropriately qualified personnel. Safety precautions must be observed as some parts may fly away or be heavy and for that reasons could results in fatal or serious injury or material damage.

Design of the product enables simple decomposition of all components. Main plastic components are appropriate marked for proper further handling and disposal, other components are mostly made of steel, ferrite magnets, copper, aluminium or are electronic components. Ferrite magnets can be disposed of as a steel or iron while the electronic components must be disposed as electronic scrap.

(13) 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.

(14) Fan energy efficiency data is determined from fan efficiency measured using standardized airways acc. to ISO 5801 using long inlet cone and fan holder.

Only environment friendly, recyclable materials according to RoHS2 (2011/65/EU) and REACH (EC1907/2006) directive are used in the product. The product does not contain rare earth magnets.

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.

The manufacturer will not accept liability for any resulting damages caused by the non-observance of this manual or any unauthorized modification to the system.