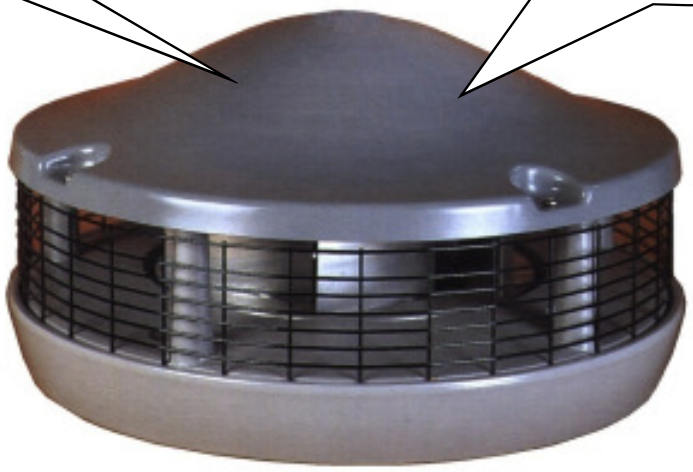
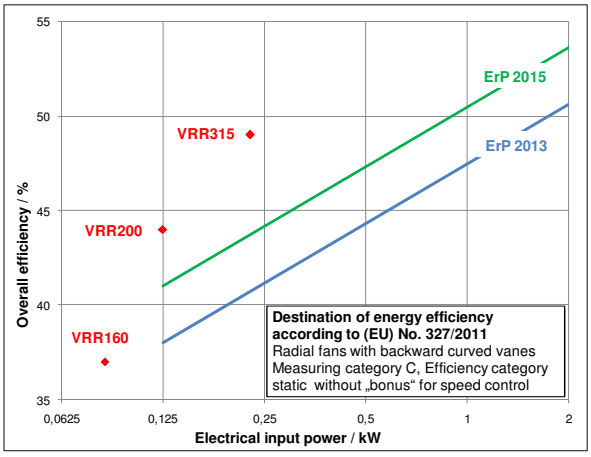
Central ventilation with EC-technology
Roof fans VRR/ALM-EC

Electronic regulation
completely integrated into the fan

maximum energy efficiency
fan excels requirements of ErP-Regulation according to (EU) No. 327/2011 level 2 (2015)



energy-saving



The **VRR / ALM - EC** presented by MIETZSCH company are roof fans for apartment ventilation with maximum energy efficiency:

The fans excel the requirements of ErP-Regulation according to (EU) No. 327/2011 level 2 (2015).

Fans with ac motors often dont accieve these requirements and therefore are not to be used.

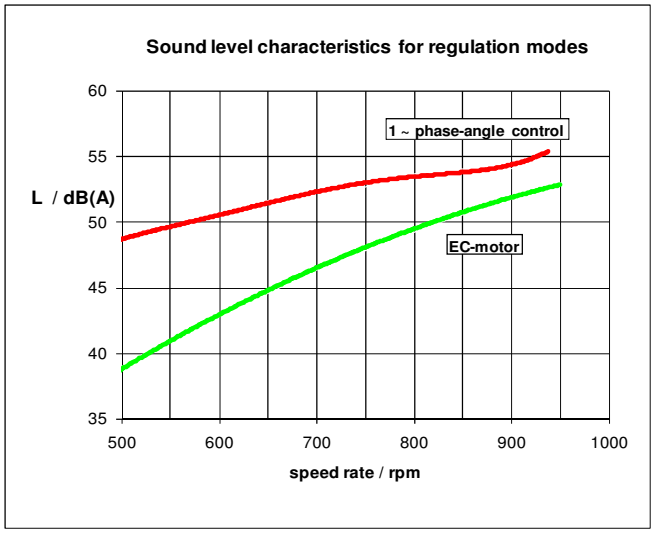
The dominant advantage of the EC motor mainly becomes manifest in partial-load regime. With speed reduction of 50 % (base ventilation), it consumes no more than about one third of energy required for phase-angle control.

soundproofed

Apartment ventilation often leads to noise annoyance even if relevant regulations are observed.

Electronic control by phase cutting again proves to be disadvantageous in such cases. Non-sinusoidal voltage often generates additional noise in the motor that may lead to problems especially at low speed rates, i.e. at night.

The accompanying example proves that the EC motor has acoustical properties which, too, are clearly better. Fan sound level is primarily determined by stream noise.



compact

Installation of a controlled or regulated state-of-the-art ventilation plant cannot be easier. Components required for the particular design - such as control unit, controller, adjustable potentiometer, pressure measuring probe, timer and temperature switch - have been arranged with permanent wiring in the fan. Additional devices are not required for operation.
The only things to do: fan mounting on the roof base and connection to 230 V power supply.

APPLICATION IN APARTMENT VENTILATION

Progressive improvement of heat insulation of buildings leads to increasing importance of energy required for machine-operated ventilation. It is a fact that ventilation heat loss of a plant is many times greater than the fan energy required for air transport. Consequently, closest attention has still to be paid to ventilation tailored to the needs which, on the one hand, meets the demands of hygiene and building physics and, on the other hand, avoids "overventilation". This is the reason why several methods are used to change over to higher ventilation requirements as depending on air humidity and pollution by harmful substances.
In addition to this ventilation meeting demands better and better, minimizing of additional energy consumption, that of the fan in particular, is getting increasingly important. Its evaluation is usually based on the following performance coefficient:

Φ_{el} = **electric power / volume flow** W / (m³/h)

Calculation of performance requires all devices needed for ventilation (fan, controller, thermoelectric exhaust valves etc.) to be considered. A central exhaust air plant with a VRR 315/ALM-EC-DR has been checked in an examination by the Institute of Preservation and Modernization of Buildings, Berlin College of Technology. The following performance coefficients have been found:

Φ_{el} = **0,082** with 100 % base ventilation (90 m³ / (h A apartment)) and

Φ_{el} = **0,096** with 75 % base ventilation and 25 % demand ventilation(120 m³ / (h A apartment))

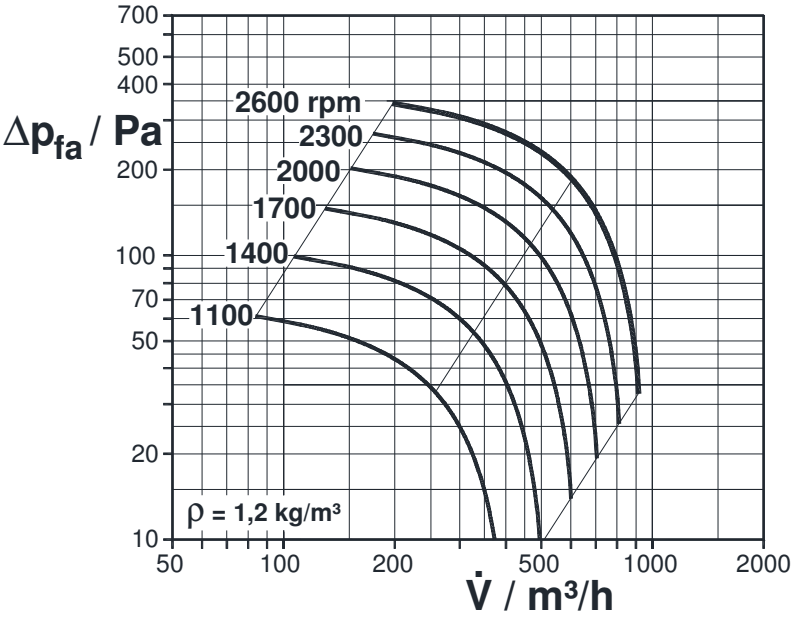
Costs for electric energy required for ventilating an apartment with this plant are about 22.00 EUR/a (referred to 0.27 EUR/kWh). This amount, undoubtedly an optimum, is clearly exceeded by many systems employed today in practical application. Especially plants with single fans may consume more than four times this energy.
The low performance coefficients result from the high free-blow fan efficiency and the outstanding control characteristic of the EC motor. Apartment ventilation means long-time fan operation with reduced performance and is a typical application of the EC motor.

GENERAL TECHNICAL DESCRIPTION

The fans of series VRR/ALM-EC have been developed on the basis of the proven roof fan series VRR. Consequently, all connection dimensions, materials used, colours and the ventilation accessories are identical with those of standard series VRR/ALM (see VRR user information).
Control and regulation devices and necessary operating elements have been arranged easily accessible under the fan hood so that the unit is conveniently brought into service with little installation effort.

Roof fans with EC motor
VRR160/ALM-EC

PERFORMANCE



Working range

- Stable regime in entire characteristic range
- Parallel connection possible
- 100 % control by in motor integrated EC controller
- Permissible temperature -25°C ... 40°C

Accessories

Installation plate, Deflection ring, roof upstand, sound absorbing upstands, foundation plate, hinged roof upstand etc. Potentiometer POT10K for external predetermination of reference input values

DESIGNS

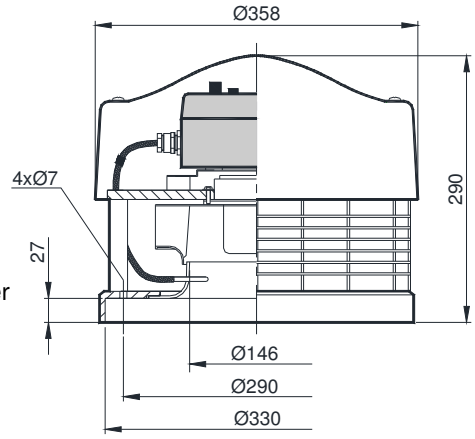
VRR160/ALM-EC **Standard design**
Operation with maximum speed and with external signal 0 ... 10 V or via external potentiometer POT10K
I/O switch

VRR160/ALM-EC-DS **Speed rate setting**
Speed control with potentiometer under fan hood
I/O switch

VRR160/ALM-EC-ZS **Time control**
Control device for base and demand ventilation (individually adjustable)
Clock timer with daily and weekly program
Changeover MANUAL/AUTOMATIC

VRR160/ALM-EC-DR **Pressure control**
With pressure measuring probe, pressure transmitter and pressure controller
Integrated night service lowering, external control of a second rated value, Start/Stop switch, Manual/Normal operation, centralized fault indication

PRINCIPAL DIMENSIONS



MOTOR / MOTOR PROTECTION

- Drive by electronically commutated external rotor motor (EC controller integrated in EC motor)
- Motor protection integrated in motor (no external fault indications)
- Input 0 ... 10 V DC
- Voltage source 10 V, maximum 1.1 mA (for potentiometer)
- EMC emitted interference according to IEC 61000-6-2 (residential area)

PERFORMANCE DATA

fan type	motor type	speed rpm	nominal current A	electrical power kW	weight kg	L_{A3m} dB(A)	L_{WA} dB(A)	$L_{WA\text{-}Okt}$ / dB(A) 63	125	250	500	1000	2000	4000	8000
VRR 160/ ALM-EC	**EC-Motor** rated voltage 1~230 V/50 Hz IP 44	1100	0,45	0,011	7,0	29	47	27	38	39	39	41	40	36	22
		1400		0,015		32	50	29	41	42	43	43	42	41	25
		1700		0,025		36	54	33	44	46	48	47	46	44	33
		2000		0,040		40	58	37	47	50	53	51	49	47	37
		2300		0,059		43	61	40	50	53	57	54	51	49	42
		2600		0,084		45	63	42	51	55	60	55	52	51	46

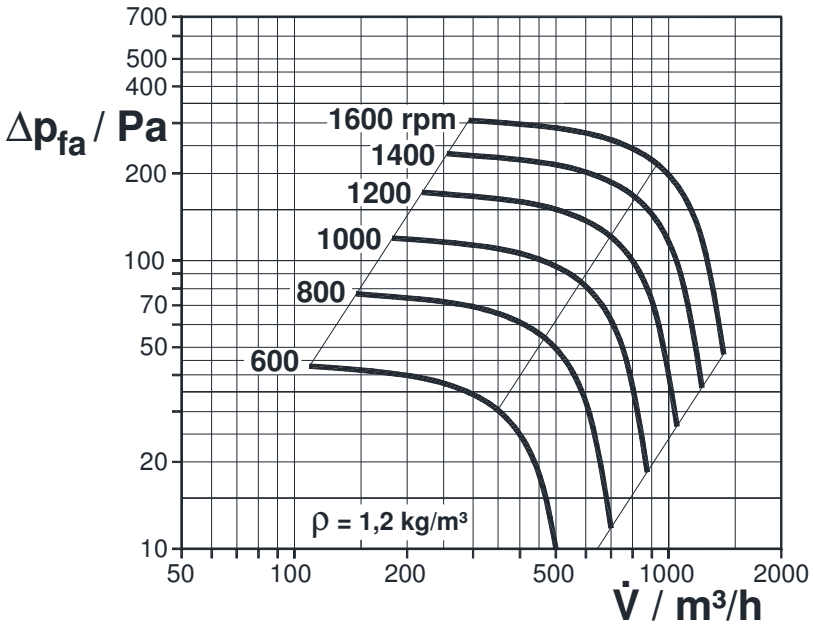
L_{A3m} = A - weighted sound pressure level at distance of 3 m from fan center

L_{WA} = A - weighted sound power level in duct

$L_{WA\text{-}Okt}$ = A - weighted octave-band sound power level in duct

Roof fans with EC motor
VRR200/ALM-EC

PERFORMANCE



Working range

- Stable regime in entire characteristic range
- Parallel connection possible
- 100 % control by in motor integrated EC controller
- Permissible temperature -25°C ... 40°C

Accessories

Foundation ring, deflection ring, roof upstand, sound absorbing upstands, foundation plate, hinged roof upstand etc. Potentiometer POT10K for external predetermination of reference input values

DESIGNS

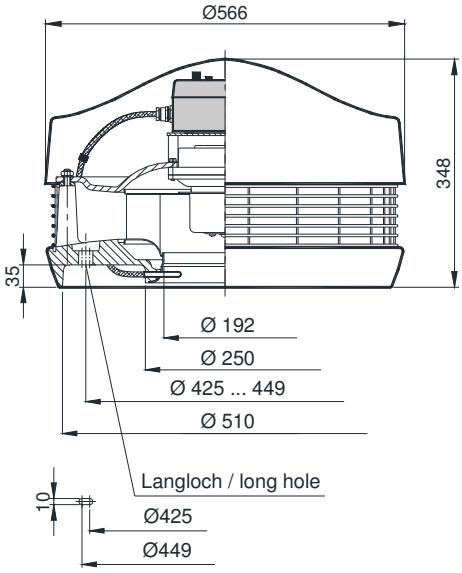
VRR200/ALM-EC **Standard design**
Operation with maximum speed and with external signal 0 ... 10 V or via external potentiometer POT10K
I/O switch

VRR200/ALM-EC-DS **Speed rate setting**
Speed control with potentiometer under fan hood
I/O switch

VRR200/ALM-EC-ZS **Time control**
Base and demand ventilation (individually adjustable by potentiometers)
Clock timer with daily and weekly program
Changeover MANUAL/AUTOMATIC

VRR200/ALM-EC-DR **Pressure control**
With pressure measuring probe, pressure transmitter and pressure controller
Integrated night service lowering, external control of a second rated value, Start/Stop switch, Manual/Normal operation, centralized fault indication

PRINCIPAL DIMENSIONS



MOTOR / MOTOR PROTECTION

- Drive by electronically commutated external rotor motor (EC controller integrated in EC motor)
- Motor protection integrated in motor (relay output, open if fault occurs)
- Input 0 ... 10 V DC
- Voltage source 10V, maximum 10mA (for potentiometer)
- EMC emitted interference according to IEC 61000-6-2 (residential area)

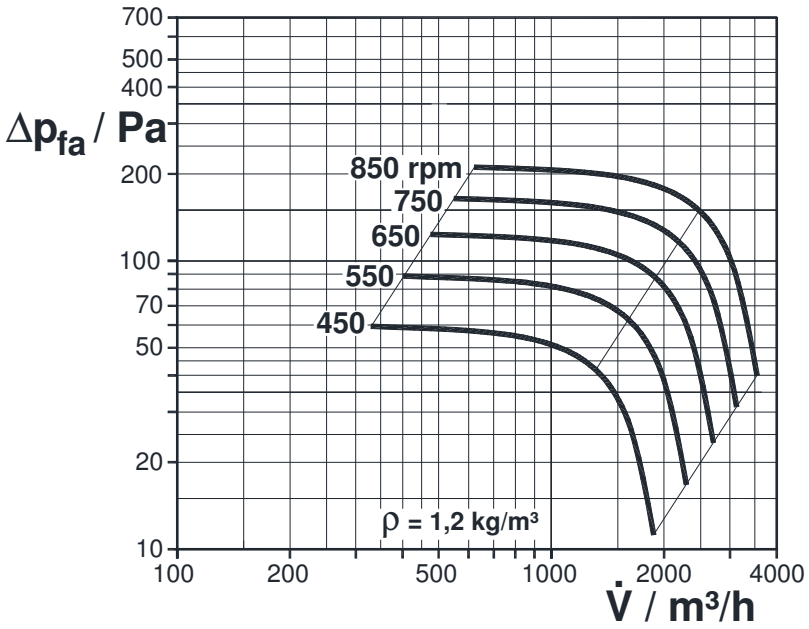
PERFORMANCE DATA

fan type	motor type	speed rpm	nominal current A	electrical power kW	weight kg	L_{A3m} dB(A)	L_{WA} dB(A)	$L_{WA\text{-}Okt}$ / dB(A) 63	125	250	500	1000	2000	4000	8000
VRR 200/ ALM-EC	EC-Motor rated voltage **1~230 V/50 Hz** IP 44	600	0,55	0,016	12,0	31	48	31	41	42	43	40	32	27	20
		800		0,024		37	54	38	47	48	48	47	40	35	20
		1000		0,038		41	58	39	50	52	52	51	47	41	20
		1200		0,057		44	61	42	53	55	56	54	50	46	20
		1400		0,084		47	64	44	57	58	58	57	51	48	23
		1600		0,119		49	66	46	59	60	61	59	53	51	27

L_{A3m} = A - weighted sound pressure level at distance of 3 m from fan center
L_{WA} = A - weighted sound power level in duct
$L_{WA\text{-}Okt}$ = A - weighted octave-band sound power level in duct

Roof fans with EC motor
VRR315/ALM-EC

PERFORMANCE



Working range

- Stable regime in entire characteristic range
- Parallel connection possible
- 100 % control by in motor integrated EC controller
- Permissible temperature -25 °C ... 40 °C

Accessories

Foundation ring, deflection ring, roof upstand, sound absorbing upstands, foundation plate, hinged roof upstand etc. Potentiometer POT10K for external predetermination of reference input values

DESIGNS

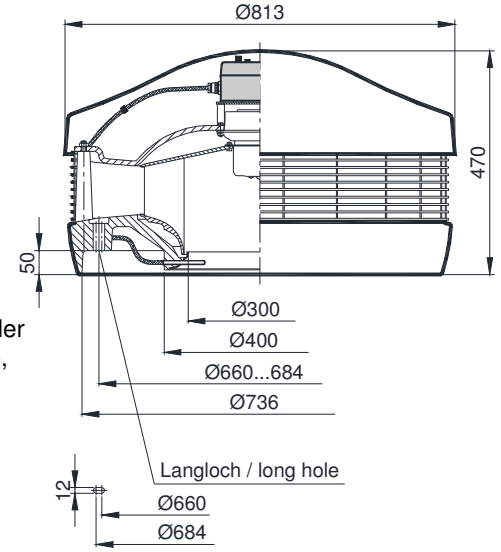
VRR315/ALM-EC **Standard design**
Operation with maximum speed and with external signal 0 ... 10 V or via external potentiometer POT10K

VRR315/ALM-EC-DS **Speed rate setting**
Speed control with potentiometer under fan hood
I/O switch

VRR315/ALM-EC-ZS **Time control**
Base and demand ventilation (individually adjustable by potentiometers)
Clock timer with daily and weekly program
Changeover MANUAL/AUTOMATIC

VRR315/ALM-EC-DR **Pressure control**
with pressure measuring probe, pressure transmitter and pressure controller
Integrated night service lowering, external control of a second rated value, Start/Stop switch, Manual/Normal operation, centralized fault indication

PRINCIPAL DIMENSIONS



MOTOR / MOTOR PROTECTION

- Drive by electronically commutated external rotor motor (EC controller integrated in EC motor)
- Motor protection integrated in motor (relay output, open if fault occurs)
- Input 0 ... 10 V DC
- Voltage source 10V, maximum 10mA (for potentiometer)
- EMC emitted interference according to IEC 61000-6-2 (residential area)

PERFORMANCE DATA

fan type	motor type	speed rpm	nominal current A	electrical power kW	weight kg	L_{A3m} dB(A)	L_{WA} dB(A)	L_{WA-Okt} / dB(A) 63	125	250	500	1000	2000	4000	8000
		450		0,033		35	52	35	44	44	45	46	42	34	30
VRR 315/	**EC-Motor**	550		0,059		38	55	39	49	47	47	48	46	37	26
ALM-EC	rated voltage	650	0,87	0,093	25,0	42	59	44	53	51	52	52	48	40	30
	1~230 V/50 Hz	750		0,139		45	62	47	57	55	55	55	52	45	33
	IP 44	850		0,198		48	65	50	59	59	58	58	55	50	36

L_{A3m} = A - weighted sound pressure level at distance of 3 m from fan center

L_{WA} = A - weighted sound power level in duct L_{WA-Okt} = A - weighted octave-band sound power level in duct

no.	quantity	specification	160 EC 	individual price EUR	Total price EUR

Roof fans with EC motor

Mietzsch Lufttechnik - VRR160/ALM-EC

Object:

Impeller with vanes curved backward
with balancing quality G 6.3 according to ISO 1940,

Flat hood and base of hardly inflammable polypropylene (PPs)
axially sucking on one side, standard colour platinum-grey (RAL 7036)
all materials with inflammation and burning properties of class B 2 according to DIN 4102

Intake nozzle of plastic material shaped aerodynamically

Direct drive by electronically commutated external rotor motor (EC motor)
EC controller integrated in motor
input 0 ... 10 V DC
integrated motor protection prevents from overload
EMC emitted interference according to IEC 61000-6-2 (residential area)

Fan optionally with horizontal or vertical blowout

Safety demands according to VDMA 24 167

Design (please mark with cross if applicable)

☐	EC	regime with maximum speed or with external signal 0 ... 10 V
☐	EC-DS	speed control with potentiometer under fan hood
☐	EC-ZS	time control with controller for day/night service
☐	EC-DR	pressure control with pressure measuring probe, transmitter and controller

VRR 160 / ALM - EC- _ _ _ _

Nominal size
Design

Volumetric flow	:		m^3/h
Pressure increase free blow out	:		Pa
Temperatur e of medium conveyed	:	40	°C
Nominal size	:	160	
Motor input power	:	0,084	kW
Voltage / Frequency	:	230	V 50 Hz
Rated motor currant	:	0,45	A
Fan speed	:	2600	rpm
Sound level L_{A3m}	:	45	dB(A)
Weight	:	7	kg

Media / use:

Accessories and special equipment

- Mounting plate MPL
- Deflector ring UR
- Elastic connector, tensioning ring, non-return flap
- Upstands: roof upstand DAS, sound-absorbing upstand SDS
  foundation plate FPL, hinged roof upstand DKS
- Potentiometer POT10K for external predetermination of reference input values
- Time/temperature control for external control of a second rated value (design EC-DR)

- Other accessories

no.	quantity	specification	200 EC 	individual price EUR	Total price EUR

Roof fans with EC motor

Mietzsch Lufttechnik - VRR200/ALM-EC

Object:

Impeller with vanes curved backward
with balancing quality G 6.3 according to ISO 1940,

flat hood of PPs, lower section of structural polyurethane foam free of CFC
axially sucking on one side, standard colour platinum-grey (RAL 7036)
all materials with fire behaviour class B 2 according to DIN 4102

intake nozzle of synthetic material shaped aerodynamically
reduction of exit losses by integrated radial diffuser

direct drive by electronically commutated external rotor motor (EC motor)
EC controller integrated in motor
input 0 ... 10 V DC
integrated motor protection prevents from overload (with relay output)
EMC emitted interference according to IEC 61000-6-2 (residential area)

fan blowing out horizontally, vertically to choice

safety demands according to VDMA 24 167

Design (please mark with cross if applicable)

☐	EC	regime with maximum speed or with external signal 0 ... 10 V
☐	EC-DS	speed control with potentiometer under fan hood
☐	EC-ZS	time control with controller for day/night service
☐	EC-DR	pressure control with pressure measuring probe, pressure transmitter and controller

VRR 200 / ALM - EC- _ _ _ _

Nominal size
Design

Volumetric flow	:		m^3/h
Pressure increase free blow out	:		Pa
Temperatur e of medium conveyed	:	40	°C
Nominal size	:	200	
Motor input power	:	0,119	kW
Voltage / Frequency	:	230	V 50 Hz
Rated motor currant	:	0,55	A
Fan speed	:	1600	rpm
Sound level L_{A3m}	:	49	dB(A)
Weight	:	12	kg

Media / use:

Accessories and special equipment

- Foudation ring FR
- Deflectorring UR
- Elastic connector, tensioning ring, non-return flap
- Upstands: roof upstand DAS, sound-absorbing upstand SDS
  foundation plate FPL, hinged roof upstand DKS
- Potentiometer POT10K for external predetermination of reference input values
- Time/temperature control for external control of a second rated value (design EC-DR)

- Other accessories

no.	quantity	specification	315 EC 	individual price EUR	Total price EUR

Roof fans with EC motor

Mietzsch Lufttechnik - VRR315/ALM-EC

Object:

Impeller with vanes curved backward
with balancing quality G 6.3 according to ISO 1940,

flat hood of PPs, lower section of structural polyurethane foam free of CFC
axially sucking on one side, standard colour platinum-grey (RAL 7036)
all materials with fire behaviour class B 2 according to DIN 4102

intake nozzle of synthetic material shaped aerodynamically
reduction of exit losses by integrated radial diffuser

direct drive by electronically commutated external rotor motor (EC motor)
EC controller integrated in motor
input 0 ... 10 V DC
integrated motor protection prevents from overload (with relay output)
EMC emitted interference according to IEC 61000-6-2 (residential area)

fan blowing out horizontally, vertically to choice

safety demands according to VDMA 24 167

Design (please mark with cross if applicable)

☐	EC	regime with maximum speed or with external signal 0 ... 10 V
☐	EC-DS	speed control with potentiometer under fan hood
☐	EC-ZS	time control with controller for day/night service
☐	EC-DR	pressure control with pressure measuring probe, pressure transmitter and controller

VRR 315 / ALM - EC- _ _ _ _

Nominal size
Design

Volumetric flow	:		m^3/h
Pressure increase free blow out	:		Pa
Temperatur e of medium conveyed	:	40	°C
Nominal size	:	315	
Motor input power	:	0,198	kW
Voltage / Frequency	:	230	V 50 Hz
Rated motor currant	:	0,87	A
Fan speed	:	850	rpm
Sound level L_{A3m}	:	48	dB(A)
Weight	:	25	kg

Media / use:

Accessories and special equipment

- Foudation ring FR
- Deflectorring UR
- Elastic connector, tensioning ring, non-return flap
- Upstands: roof upstand DAS, sound-absorbing upstand SDS
  foundation plate FPL, hinged roof upstand DKS
- Potentiometer POT10K for external predetermination of reference input values
- Time/temperature control for external control of a second rated value (design EC-DR)

- Other accessories