AC Input/Low-Power Consumption, Variable Flow

EMR Series

<Additional Information>
● Technical reference ➜ Page H-1
● Regulations & Standards ➜ Page I-2

CE

● For detailed information about regulations and standards, please see the Oriental Motor website.

Reduced power consumption and speed control operation are achieved through the use of a built-in high efficiency brushless motor.
Power consumption and noise can be reduced by appropriately adjusting the air flow.
In addition to the lightweight design, finger guards are pre-equipped for easy installation.

Features

Power Consumption Reduced by Up to 42% (Comparing conventional products at 60 Hz to the **EMR** Series at rated speed)

By using brushless motors, power consumption is greatly reduced compared to conventional models, while having the same characteristics.
Also, these same characteristics can be achieved regardless of what frequency is used.

◇Specification Comparison

Item \ Product	Conventional Product*1 50/60 Hz	**EMR** Series
		
Power Consumption [W]	37/50	29 (4～38)*2*3
Speed [r/min]	2720/2930	3000 (500～3500)*3
Max. Air Flow [m³/min]	8.2/8.9	9 (1～10)*3
Max. Static Pressure [Pa]	149/157	154 (3～200)*3
Noise Level [dB(A)]	59/61	55 (28～64)*3

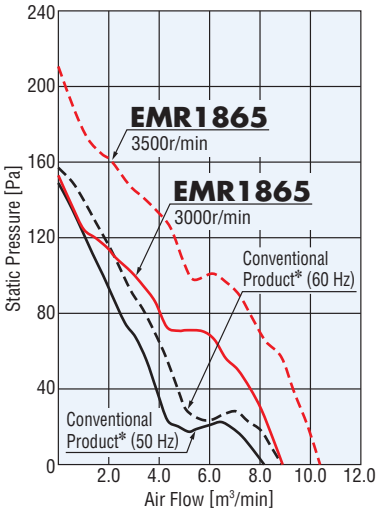
Reduced by Approx. 21～42%

Same Characteristics

Reduced by 4～6 dB(A)

*1 The specifications of conventional product are the reference value with **MR18-DC** with installed finger guards (**FG18D**) on the both sides of the fan.
*2 Reference value
*3 The specifications in the parenthesis indicate the value under speed control.

◇Characteristics Comparison



*MR18-DC with installed finger guards (**FG18D**) on the both sides of the fan.

Energy Savings and Noise Reduction Achieved with Air Flow Adjustment

The speed control enables you to not only utilize a wide range of air flow, but also adjust the air flow as necessary to reduce power consumption and noise.

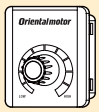
◇Selectable Operating Methods

Constant Speed Operation	Two-Speed Operation	
3000 r/min	3000 r/min or 500 r/min	3000 r/min or External Speed Setting*1 (500~3500 r/min)

Speed Control Operation

500~3500 r/min

The setting methods are shown below.

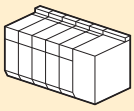


External Speed Potentiometer (Sold separately) 0~20 kΩ

or

External DC Voltage*2 0~5 VDC

or



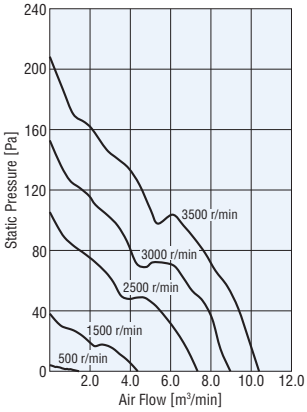
External PWM Signal*2 Duty 0~100%

*1 Set by the external speed potentiometer (sold separately), the external DC voltage, or the external PWM signal.

*2 Not supplied.

◇Air Flow – Static Pressure Characteristics (Reference values)

(When the finger guards are attached to both sides.)

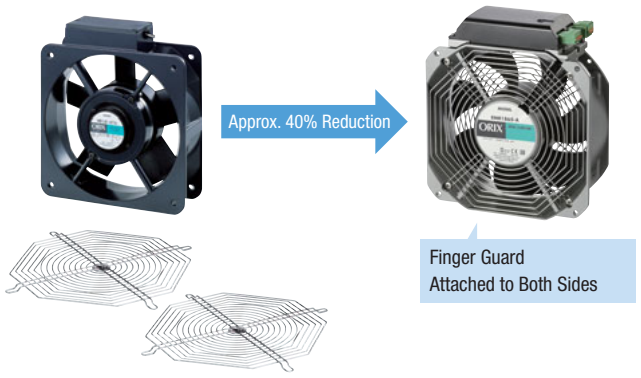


Speed r/min	Max. Air Flow m³/min	Max. Static Pressure Pa	Power Consumption W	Noise Level dB (A)
3500	10.4	211	38	59
3000	9.0	154	26	55
2500	7.2	105	17	50
1500	4.4	38	7	37
500	1.4	4	4	27

Air Flow Adjustment ↓ Energy Savings ↓ Noise Reduction ↓

Approx. 40% Mass Reduction

The compact and powerful brushless motor has considerably less mass than conventional products.



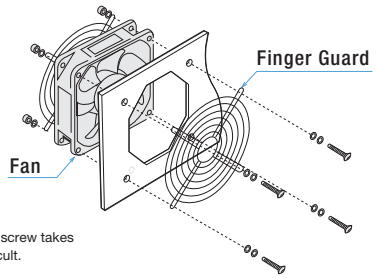
Conventional Product* 2.2 kg

EMR Series 1.3 kg

* **MR18-DC** with installed finger guards (**FG18D**) on the both sides of the fan.

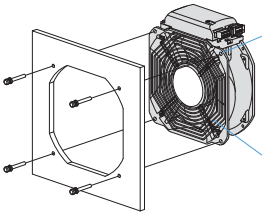
Installation is Easy with the Pre-Attached Finger Guards

[Installation of a Conventional Product]



●Assembling multiple parts by screw takes time, and replacement is difficult.

[Installation of the **EMR** Series]



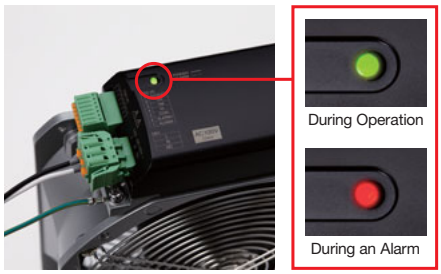
Tapped Hole
Can be installed without nuts.

Finger Guards Attached to Both Sides
Attaching the finger guards is not required.
Made of stainless steel resistant to rust.

Alarm Function Equipped, Fan Status Indicated by LED

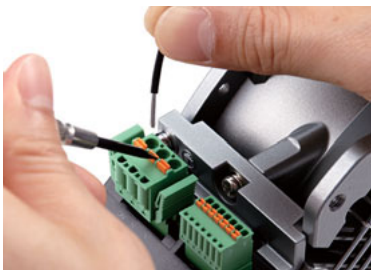
An alarm is output when the rotation slows down or another abnormality occurs with the fan. The LED lights up in green under normal conditions and blinks in red under abnormal conditions. The status of the fan can be checked by the LED.

■Alarm Types
- Low Speed
- Overcurrent
- Sensor Error
- Overvoltage
- Undervoltage

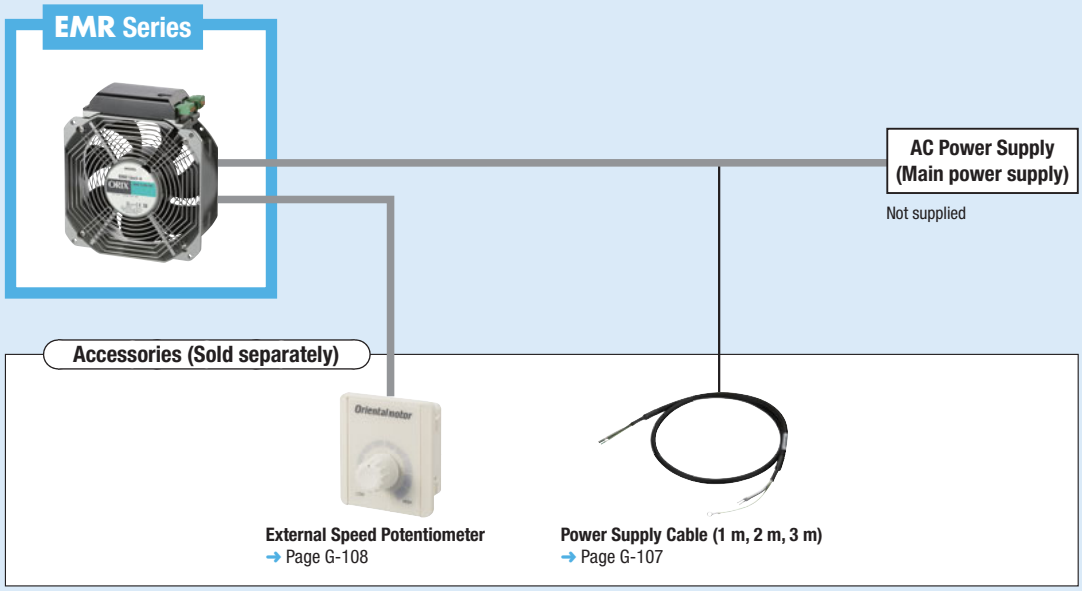


Simple Wiring

Soldering and crimping tools are not required for connecting the main power supply to the I/O signal connector. The wiring can be performed by just inserting the lead wires.



System Configuration



●Example of System Configuration

Fan		Sold Separately External Speed Potentiometer
EMR1865-C	+	**PAVR2-20K**
€264.00		€17.00

● The system configuration shown above is an example. Other combinations are also available.

Product Number

EMR 18 65 - C
① ② ③ ④

①	Series	**EMR**: **EMR** Series
②	Frame Size	**18**: 180 mm
③	Frame Thickness	**65**: 65 mm
④	Rated Voltage	**C**: Single-Phase, Three-Phase 200-240 VAC

EMR Series

□180 mm – 65 mm Thick

With Alarm
Operating Voltage Range: ±10%
Overheat Protection: Built-in Overheat Protection Circuit
Color
Frame: Metallic Gray Blades, Driver Cover: Black
Materials
Frame: Die Cast Aluminum
Blades: Polycarbonate (Flammability grade V-0)
Finger Guard: Stainless Steel

Overview, Product Series
Axial Flow Fans
AC Input Energy Saving EMU
AC Input Energy Saving, Variable Flow EMR
AC Input Compact Size MU
AC Input Long-Life MRE
DC Input MDS MD
DC Input Alarm MDA
DC Input Long-Life MDE
Centrifugal Blowers
AC Input MB DC Input MBD
Cross Flow Fans
AC Input MF DC Input MFD
Accessories
Installation

Specifications

Rated

CE

Product Name	Rated Voltage VAC	Frequency Hz	Rated Input Current A	Power Consumption W	Rated Speed r/min	Max. Air Flow m^3/min	Max. Static Pressure Pa	Noise Level dB(A)	Estimated Life*1 h
EMR1865-C	Single-Phase 200-240 Three-Phase 200-240	50/60	Single-Phase: 0.39 Three-Phase: 0.22	29	3000	9.0	154	55	40000

*1 The estimated life was calculated using the rated voltage, rated speed, maximum air flow, at 60°C, and the formula for the life of the bearing grease.
● Values for maximum air flow and maximum static pressure were measured by the double chamber method.
● Noise level was measured at the A-weighted sound pressure level at a distance of 1 m from the intake side of fan.

Speed Control*2

Product Name	Rated Voltage VAC	Frequency Hz	Max. Input Current*3 A	Power Consumption*3 W	Speed Range r/min	Max. Air Flow Range m^3/min	Max. Static Pressure Range Pa	Noise Level Range dB(A)
EMR1865-C	Single-Phase 200-240 Three-Phase 200-240	50/60	Single-Phase: 0.8 Three-Phase: 0.4	58	500～3500	1～10	3～200	28～64

*2 To control the speed, an external speed potentiometer (sold separately), an external DC voltage, or an external PWM signal is required.
*3 This value applies when the speed is 3500 r/min, at the maximum static pressure.

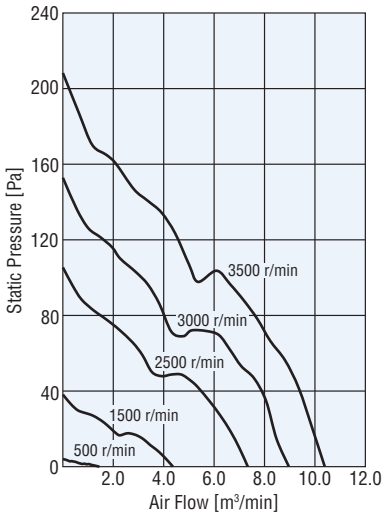
Product Line

Product Name	List Price
EMR1865-C	€264.00

The following items are included with the product.
Fan, Installation Screws (M5×16 mm), Operating Manual

Air Flow – Static Pressure Characteristics

(The characteristics are applicable for the fan only.)



Speed r/min	Max. Air Flow m^3/min	Max. Static Pressure Pa	Power Consumption W	Noise Level dB(A)
3500	10.4	211	38	59
3000	9.0	154	26	55
2500	7.2	105	17	50
1500	4.4	38	7	37
500	1.4	4	4	27

□80 mm
□92 mm
□104 mm
□119 (120) mm
□140 mm
□160 mm
□180 mm
□200 mm

Alarm Functions/Alarm Specifications

Alarm Functions

When the following protective functions are activated, the alarm is output, and the LED blinks red.

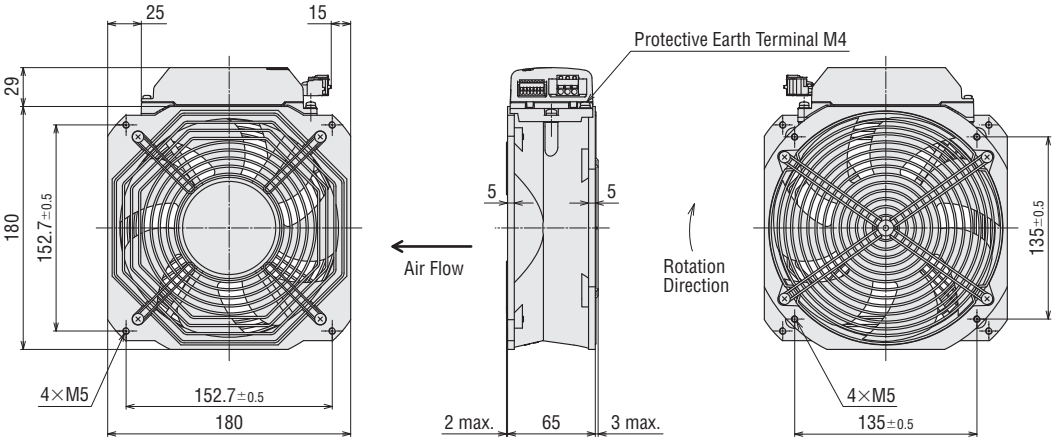
Name	Description	Delay Time
Low Speed	Activated when the speed becomes less than 70 % of the setting speed. The fan keeps rotating.	Built-In and Starting Delay Time: 10 sec. or less (The alarm function starts monitoring within 0.5 seconds of being turned on.)
Overvoltage*	Activated when the main power supply exceeds the specified value. The fan will stop. (Single-Phase 100～120 VAC Input: 133 V Single-Phase, Three-Phase 200～240 VAC Input: 265 V)	
Undervoltage*	Activated when the main power supply is below the specified value. The fan will stop. (Single-Phase 100～120 VAC Input: 80 V Single-Phase, Three-Phase 200～240 VAC Input: 160 V)	
Overcurrent	Activated when an excessive current flows to the driver due to a ground fault, etc. The fan will stop.	Built-In and Starting Delay Time: 0.1 sec. or less (The alarm function starts monitoring within 0.5 seconds of being turned on.)
Sensor Error*	Activated when the cable between the fan and the driver is disconnected or when the sensor wire of the cable breaks during operation. The fan will stop.	

* When the cause of the alarm is resolved and operation returns to normal, the fan will start rotating.

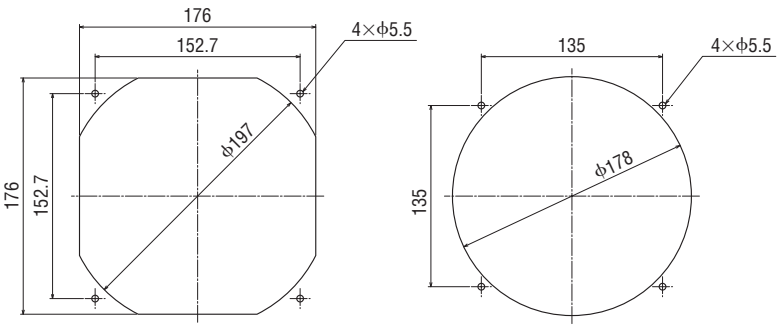
● Alarm specifications ② ➜ Page G-13

Dimensions Unit: mm

Mass: 1.3 kg



Panel Cut-Out Unit: mm

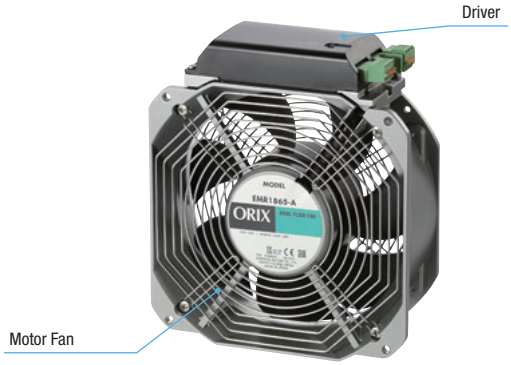


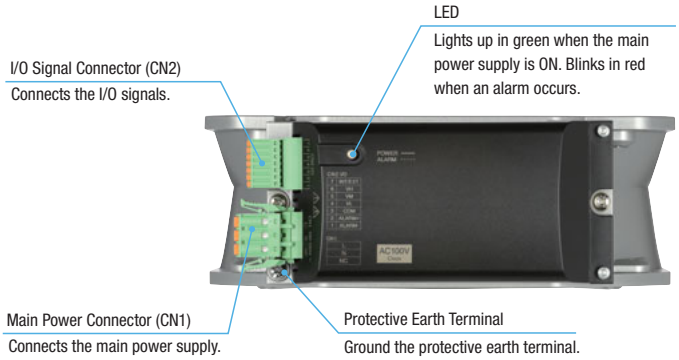
Outlet Side

Intake Side

Connection and Operation

Names and Functions of Fan Parts

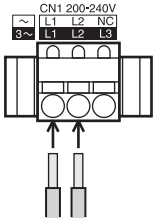




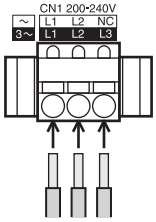
Connection Diagrams

◇Main Power Connector (CN1)

• Single-Phase 200-240 VAC



•Three-Phase 200-240 VAC

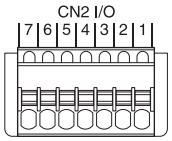


•Applicable Lead Wire Size
AWG18~14 (0.75~2.0 mm²)

◇I/O Signal Connector (CN2)

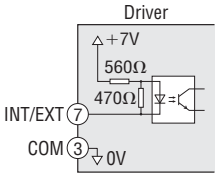
Pin No.	Terminal Name	Function	Description
7	INT/EXT	Speed Set Input	It is possible to switch between the rated speed 3000 r/min and the speed set by external speed setting input.
6	VH	External Speed Set Input	Connect when the speed is set externally.
5	VM		
4	VL		
3	COM	Input Signal Common (0V)	Input signal common
2	ALARM+	Alarm Output	Turns OFF when an alarm is activated. (Normally closed)
1	ALARM−		

✻The pins of No. 3 and No. 4 are connected inside the driver.

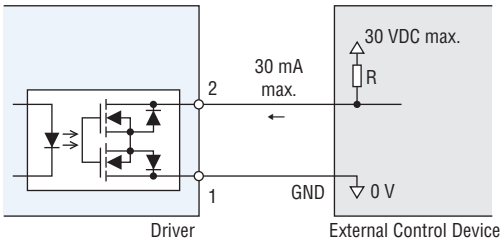


•Applicable Lead Wire Size
AWG26~20 (0.14~0.5 mm²)

◇Input Circuit



◇Output Circuit



Constant Speed Operation

The fan rotates at rated speed, 3000 r/min, when power is ON.

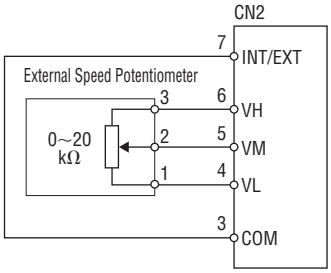
Variable Flow Operation

Speed Setting Range: 500~3500 r/min

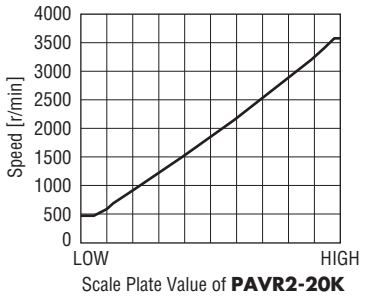
When the No. 3 and No. 7 pins for CN2 have short-circuited, the speed that set externally is activated.

◇Setting by External Speed Potentiometer (Sold separately)

●Wiring Diagrams



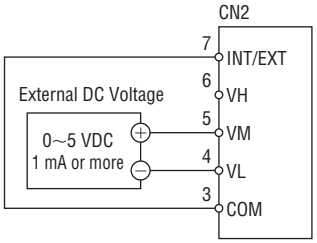
External Speed Potentiometer Scale – Speed Characteristics (Representative values)



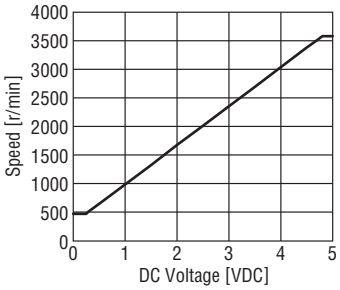
Scale Plate Value of **PAVR2-20K**

◇Setting by External DC Voltage

●Wiring Diagrams



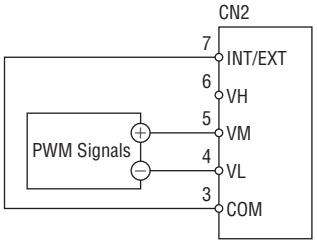
External DC Voltage – Speed Characteristics (Representative values)



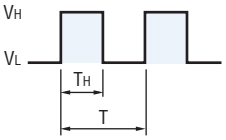
◇Setting by External PWM Signals

The speed changes according to the duty ratio of the input pulse signals.

●Wiring Diagrams



●Input Signal Specifications

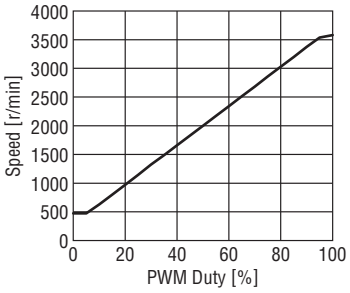


$$\text{PWM Duty (\%)} = \frac{T_H}{T} \times 100$$

$$\text{PWM Frequency 25 (kHz)} = \frac{1}{T}$$

V_H = 4.75 ~ 5.25 V
V_L = 0 ~ 0.4 V

PWM Duty – Speed Characteristics (Representative values)

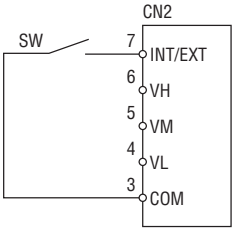


●2 Speed Control

Speed can be selectable by switching the external signals (switch or relay, etc.).

◇Switching only by External Signal

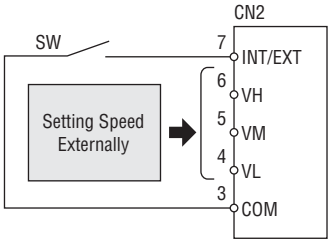
●Wiring Diagrams



SW	Speed
OFF	3000 r/min
ON	500 r/min

◇Switching to External Speed Setting with External Signals

●Wiring Diagrams



It is possible to switch between the speed 3000 r/min and the speed set by external speed setting, as shown in the figure on the left.

SW	Speed
OFF	3000 r/min
ON	External Speed Setting

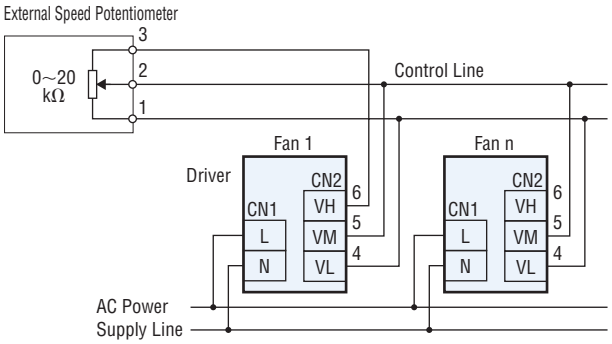
●Parallel-Fan Control

Multiple fans can be operated at the same speed using single external speed potentiometer, DC voltage or external PWM signals.

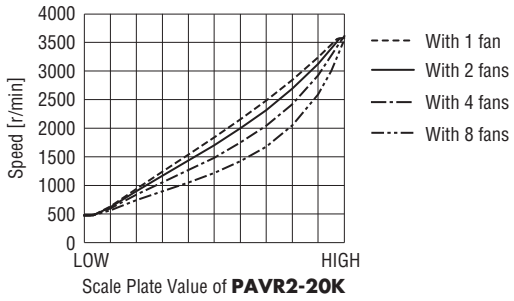
✻Please connect pin No. 3 and pin No. 7 of CN2 of each fan to validate the external speed setting.

◇Using an External Speed Potentiometer

Parallel-fan operation using the external speed potentiometer should be performed with a maximum of 8 fans.



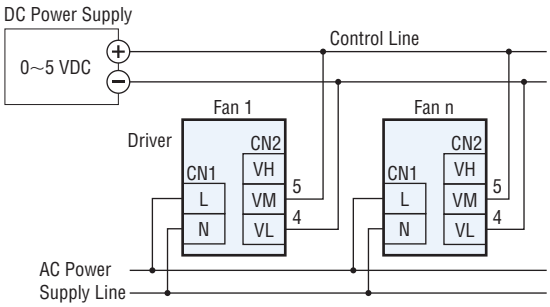
External Speed Potentiometer Scale – Speed Characteristics (Representative values)



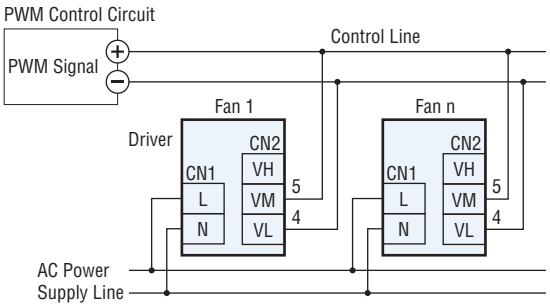
◇Using an External Voltage or an External PWM Signals

The number of connected fans will be limited depending on the current capacity of the external DC power supply or the external PWM signals.

●By External DC Power Supply



●By External PWM Signals



The Calculation Method of the Current Capacity (I) when the Number of Fans Connected is n

Current capacity (I) = 1 × n (mA)

Example: When connecting two fans

Current capacity (I) = 1 × 2 = 2 (mA)

■Accessories

Product	Product Name	List Price	Page
External Speed Potentiometer	**PAVR2-20K**	€17.00	G-108
Power Supply Cables	**CC01AC03N**	€10.00	G-107
	CC02AC03N	€15.00	
	CC03AC03N	€20.00	
	CC01AC04N	€10.00	G-107
	CC02AC04N	€15.00	
	CC03AC04N	€20.00	