SPAL AUTOMOTIVE

HIGH-PERFORMANCE SEALED BRUSHLESS MOTOR FANS & BLOWERS

12V - 24V dc/cc

SPAL AUTOMOTIVE

We have always set ourselves the highest standards. We are convinced that quality, innovation and service are, and always will be, the main cornerstones of our history and culture. On these cornerstones, SPAL has built up its credibility over the years, presenting itself as the ideal partner for designing, manufacturing and marketing ventilation solutions for oil/engine cooling and HVAC systems for all means of transport and mobile equipment.

Alessandro Spaggiari

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12-V

The fan models are listed by decreasing fan diameter, and within the same diameter, in decreasing power rate.

It is customer's responsibility to verify that the selected product and/or the one we suggest from our catalogue suits the technical requirements and working conditions according to customer's application.

In case you are unable to find a suitable fan for your application, please contact us and we will help you find the best solution for your specific requirements. Upon request, we will support you in co-designing and developing new products and solutions.

Our technical specification are purely indicative and might change without any previous notice.

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24-V

SPAL AUTOMOTIVE

HIGH-PERFORMANCE SEALED BRUSHLESS MOTOR FANS & BLOWERS

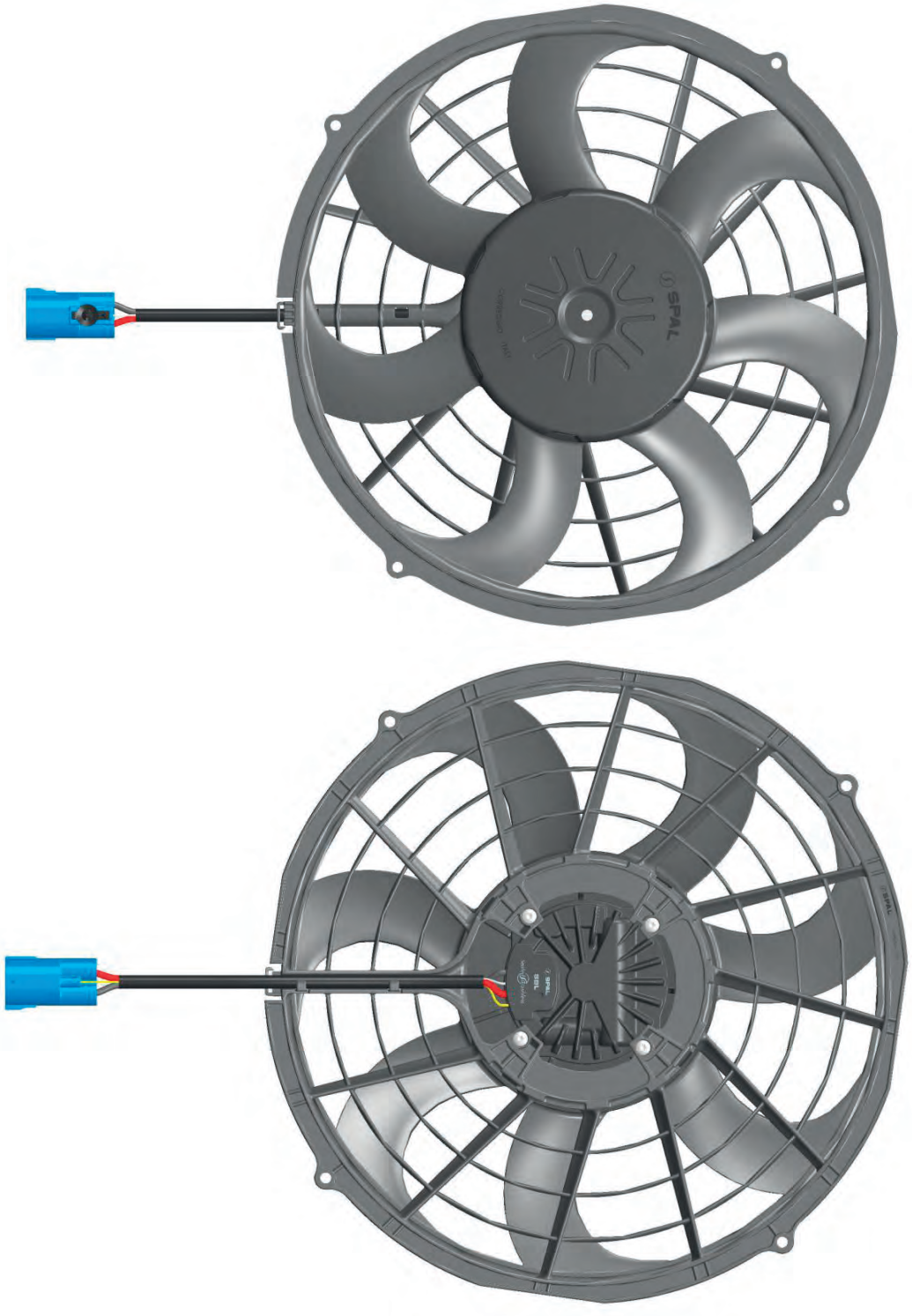
12-V

12-V

SPAL AUTOMOTIVE

Ø 405 mm
Ø 16”

VA97-ABL322P/N-103A



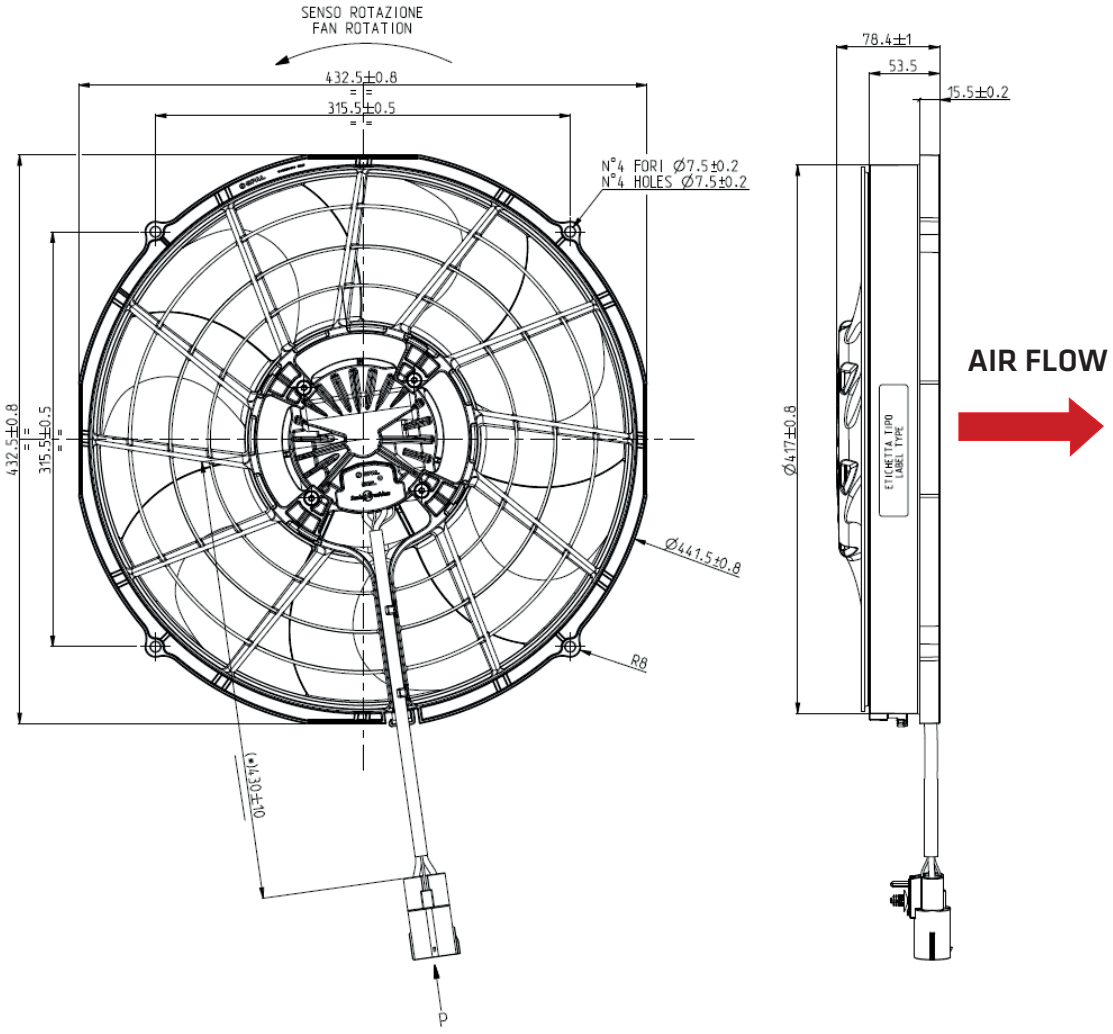
Motor designed for **IP6K9K** and **IP68** protection

VA97-ABL322P/N-103A

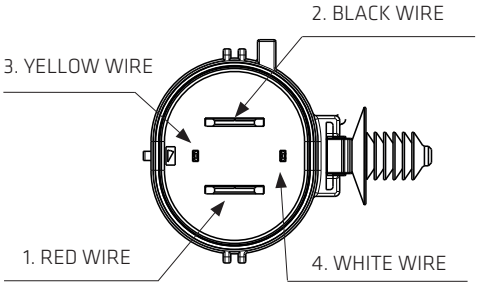
Ø 405 mm
Ø 16”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



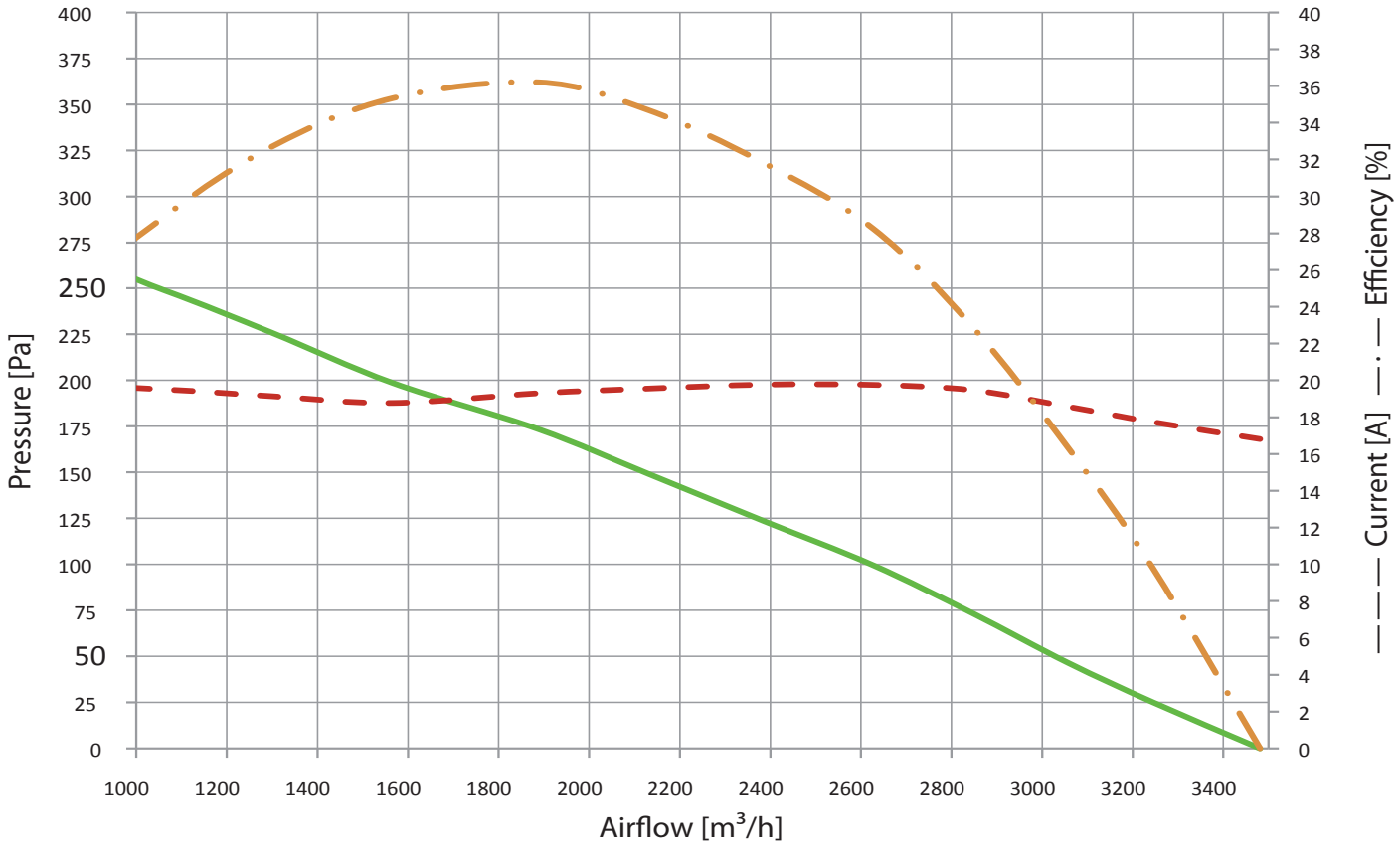
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7158-3035	7158-3035	7158-3030-50	7158-3030-50
Pin p/n	7114-3250	7114-3250	7114-4102-02	7114-4102-02
Section [mm2]	6.0	6.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 405 mm
Ø 16”

VA97-ABL322P/N-103A

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	2350
Min fan speed	rpm	600
Sound pressure level	dBA	71.2 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.7
Operating supply voltage range	V	9.0 .. 16.0 at the Drive Connector
Supply voltage to reach max speed	V	13.0 .. 16.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +115
Speed derating threshold	°C	+105 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	10
Load dump protection (Pulse 5b)	V	35 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity

Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.

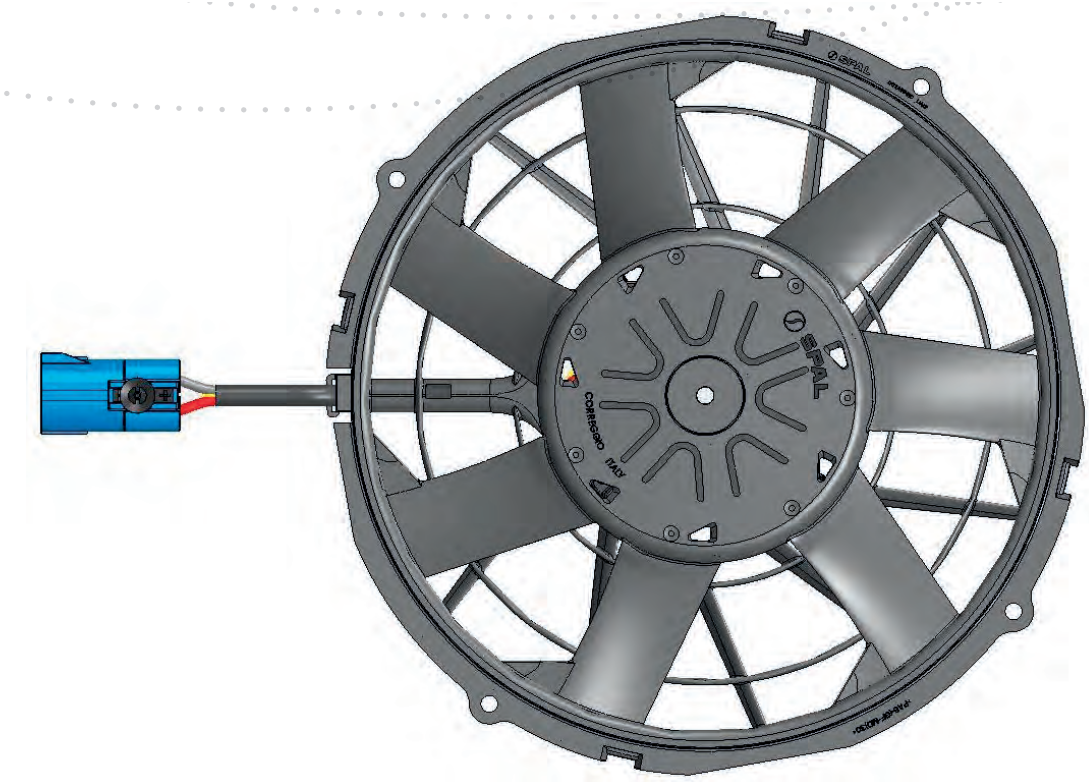
VA97-ABL322P/N-103A

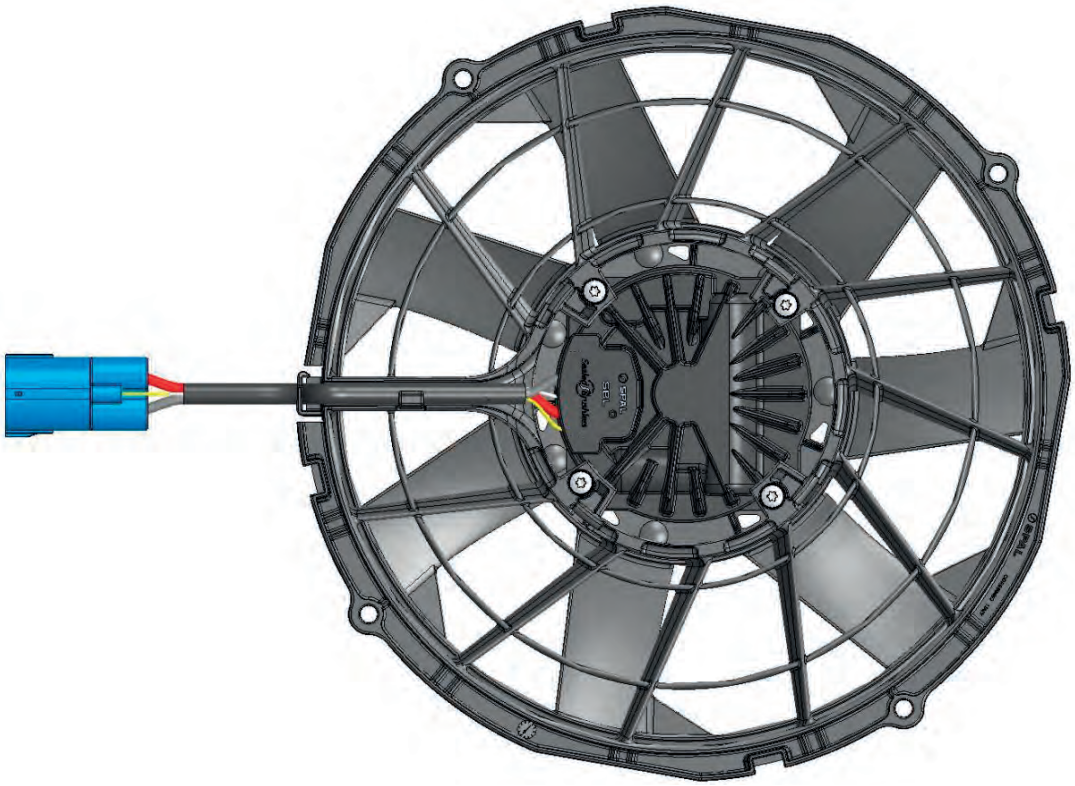
Ø 405 mm
Ø 16”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	4.8	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 305 mm
Ø 12”

VA89-ABL320P/N-94A





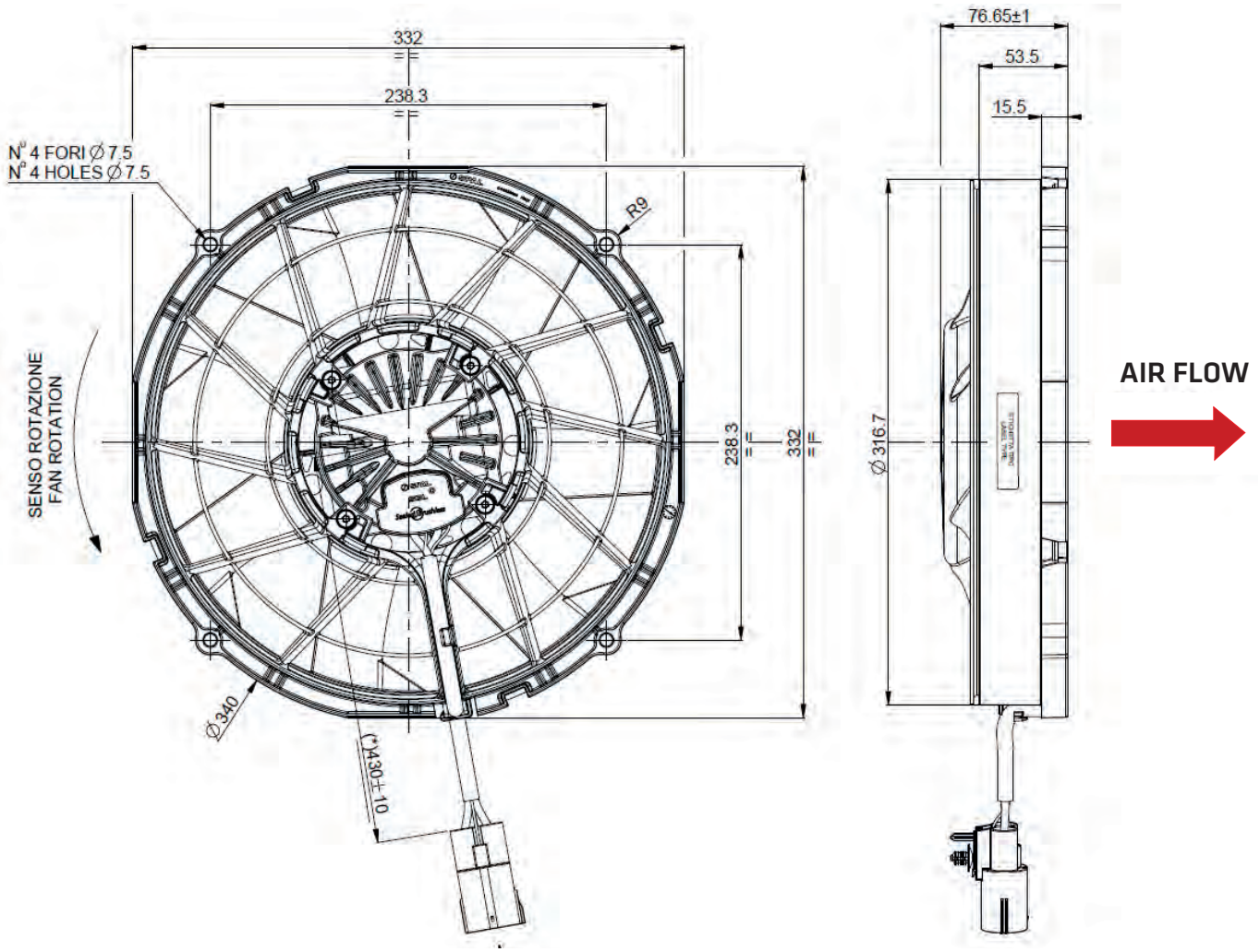
Motor designed for **IP6K9K** and **IP68** protection

VA89-ABL320P/N-94A

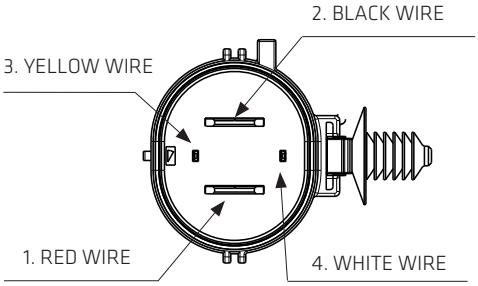
Ø 305 mm
Ø 12”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



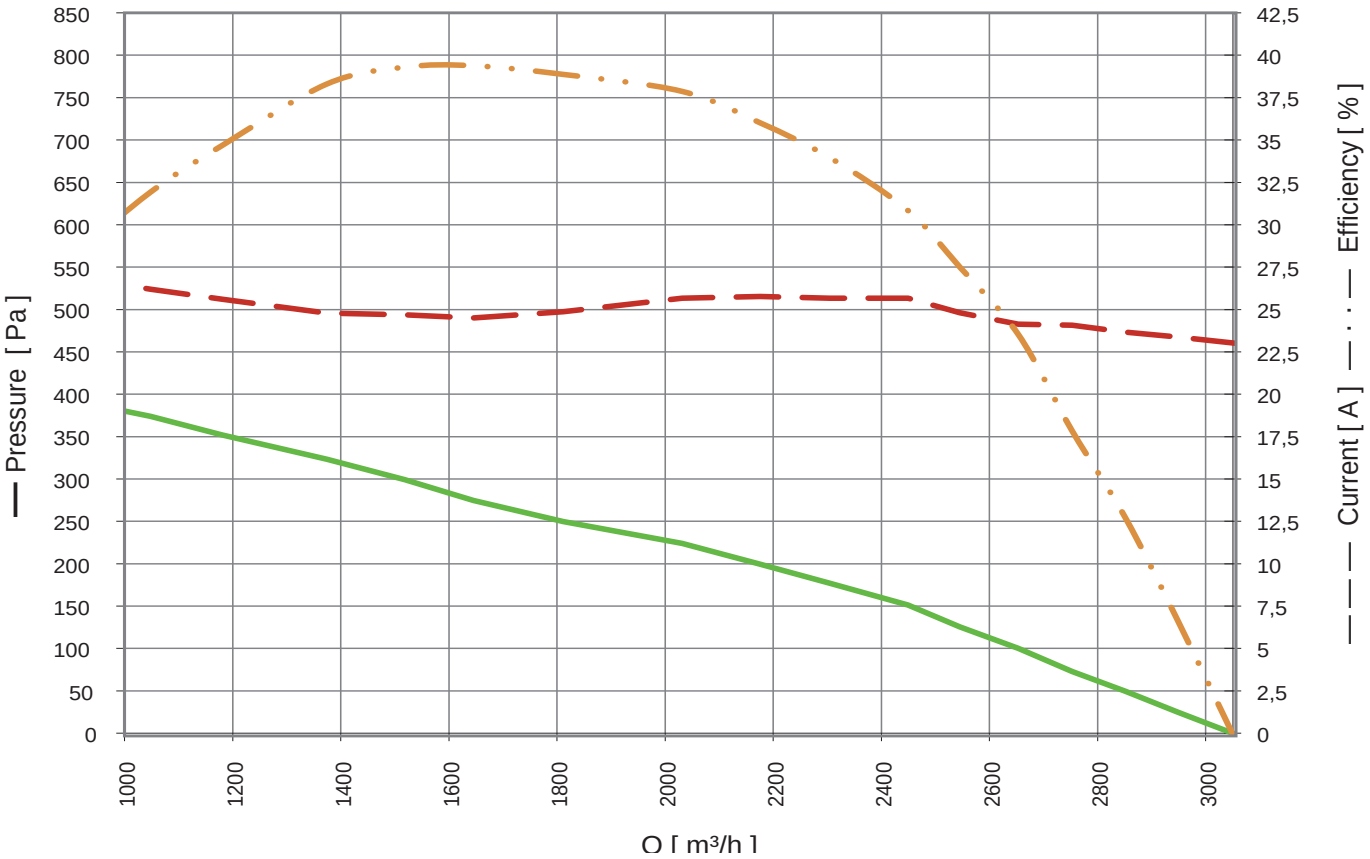
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7158-3035	7158-3035	7158-3030-50	7158-3030-50
Pin p/n	7114-3250	7114-3250	7114-4102-02	7114-4102-02
Section [mm2]	6.0	6.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 305 mm
Ø 12”

VA89-ABL320P/N-94A

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	3500
Min fan speed	rpm	900
Sound pressure level	dBA	77 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.25
Operating supply voltage range	V	9.0 .. 16.0 at the Drive Connector
Supply voltage to reach max speed	V	13.0 .. 16.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +115
Speed derating threshold	°C	+105 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	10
Load dump protection (Pulse 5b)	V	35 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

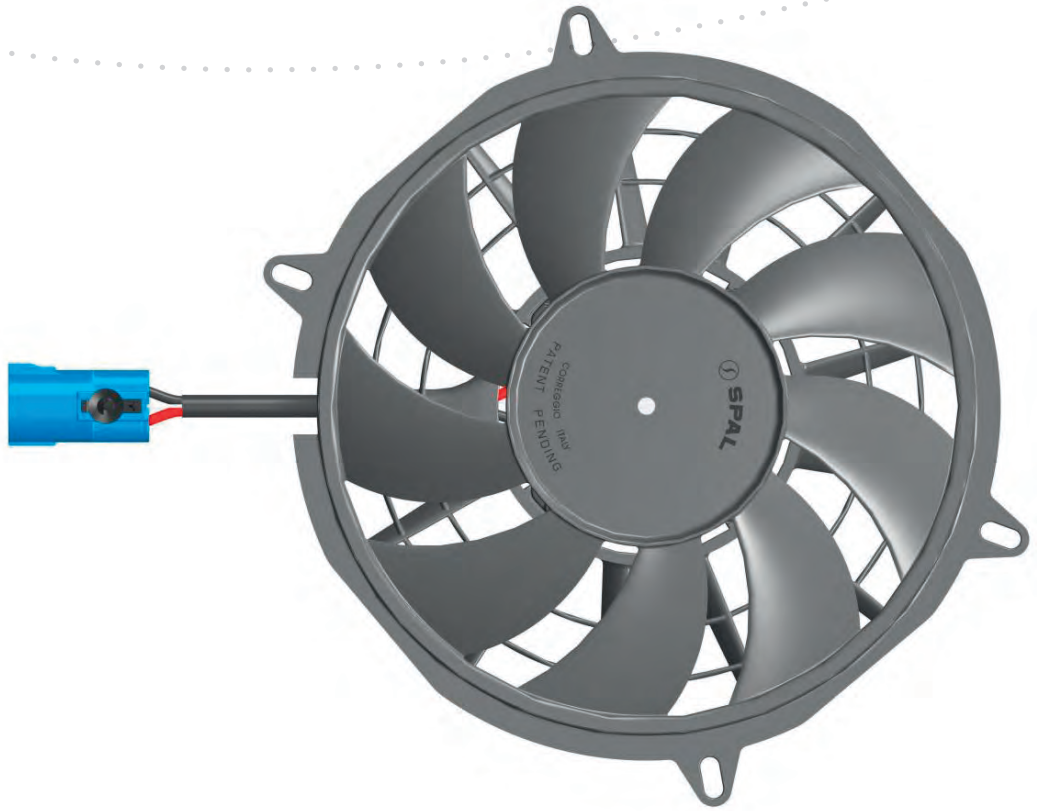
VA89-ABL320P/N-94A

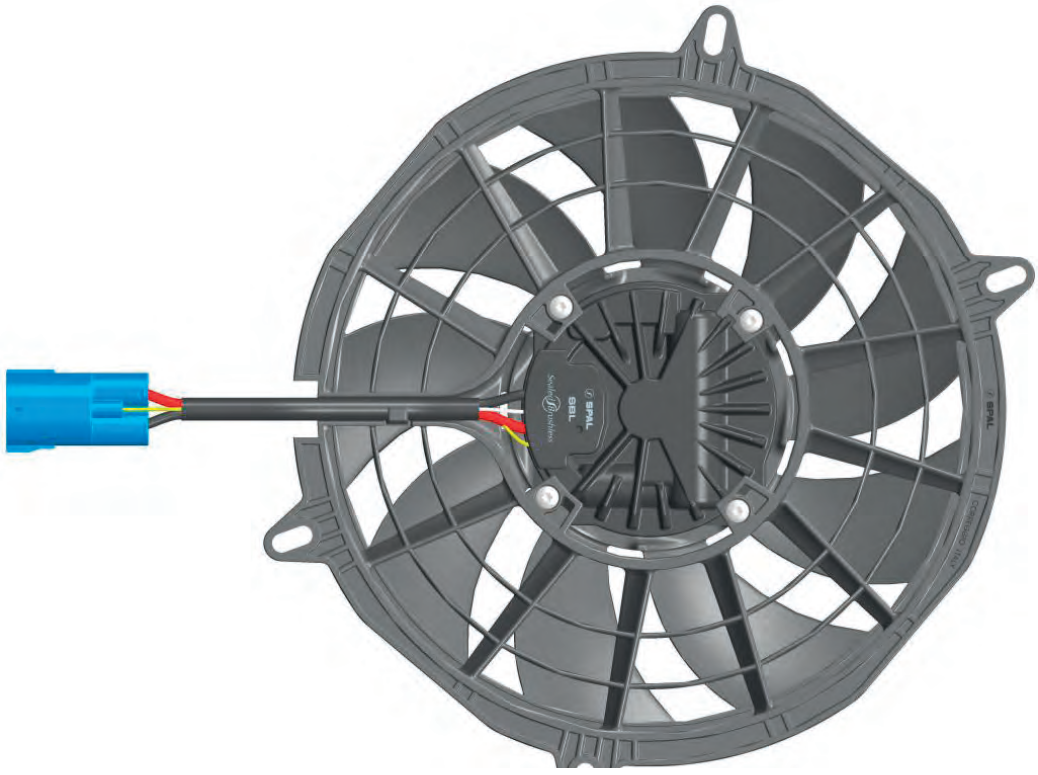
Ø 305 mm
Ø 12”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	4.8	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 280 mm
Ø 11”

VA99-ABL315P/N-101A/SH





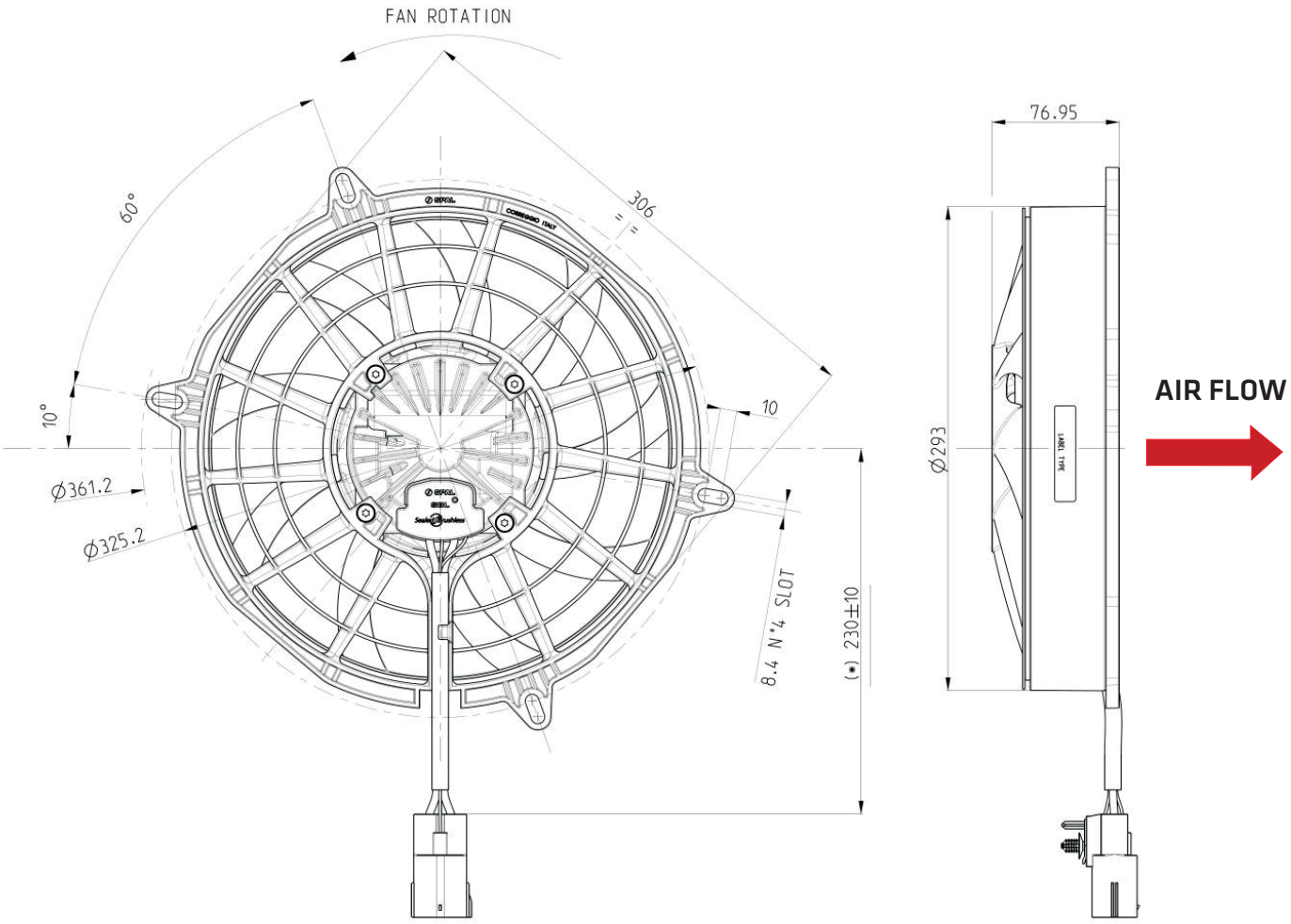
Motor designed for **IP6K9K** and **IP68** protection

VA99-ABL315P/N-101A/SH

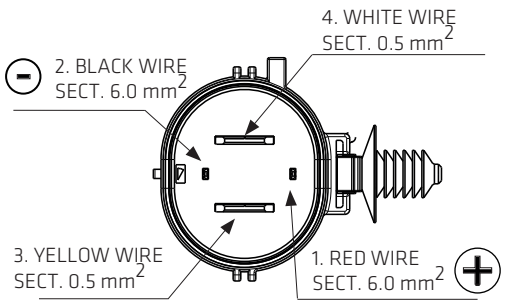
Ø 280 mm
Ø 11”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



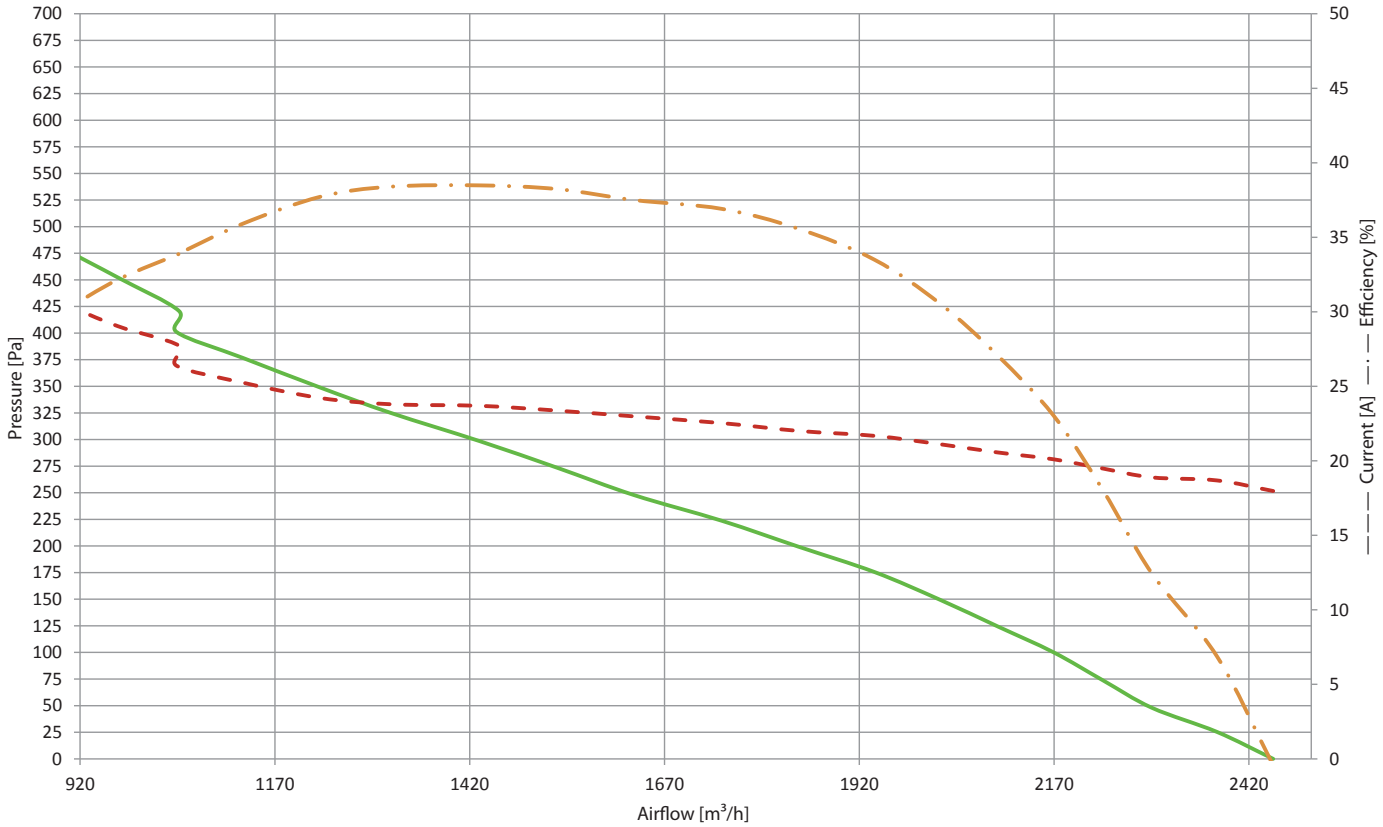
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7158-3035	7158-3035	7158-3030-50	7158-3030-50
Pin p/n	7114-3250	7114-3250	7114-4102-02	7114-4102-02
Section [mm2]	6.0	6.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 280 mm
Ø 11”

VA99-ABL315P/N-101A/SH

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	3800
Min fan speed	rpm	950
Sound pressure level	dBA	73.8 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.20
Operating supply voltage range	V	9.0 .. 16.0 at the Drive Connector
Supply voltage to reach max speed	V	13.0 .. 16.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. + 120
Speed derating threshold	°C	+105 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	15.0
Load dump protection (Pulse 5b)	V	35 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity

Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.

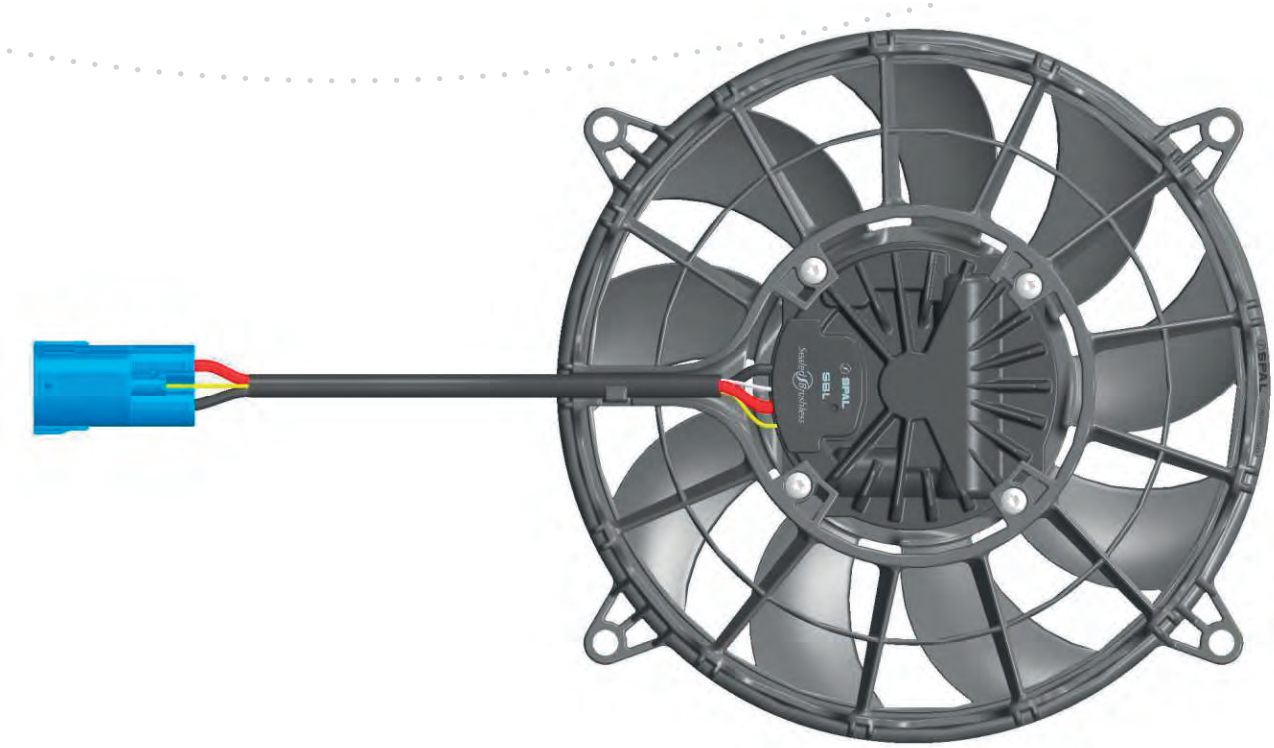
VA99-ABL315P/N-101A/SH

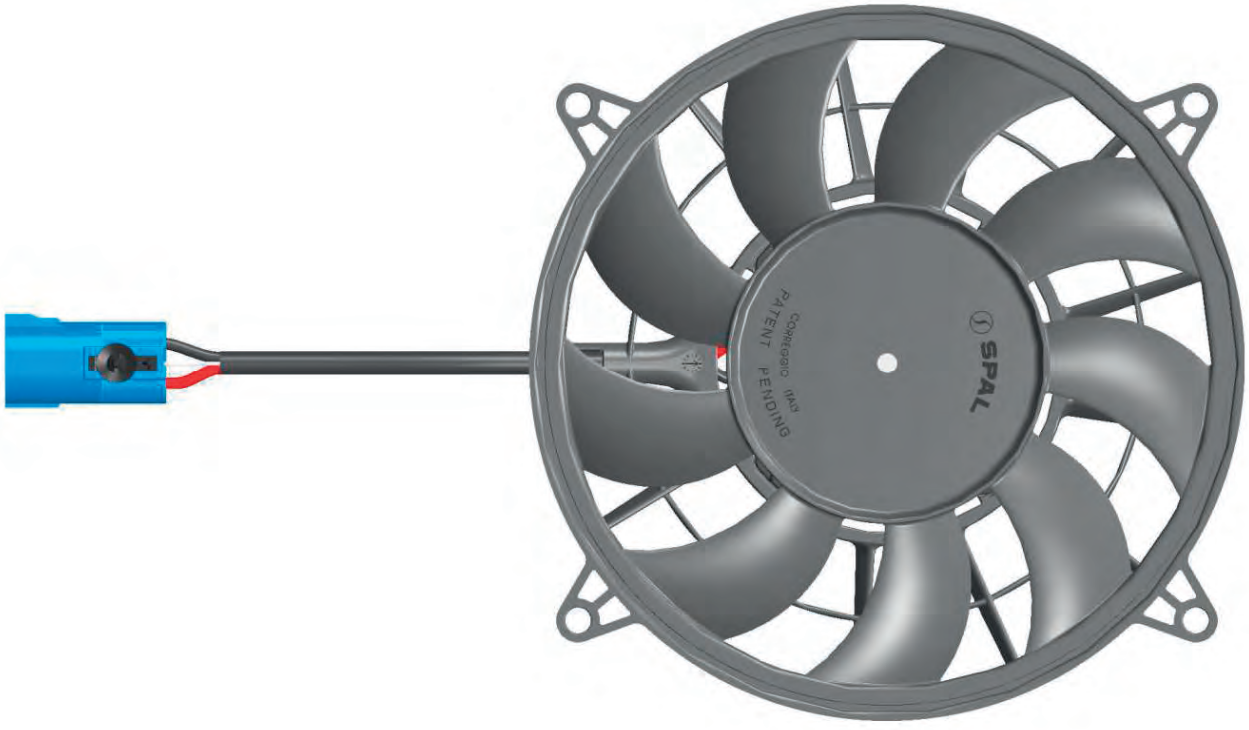
Ø 280 mm
Ø 11”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	4.8	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 255 mm
Ø 10”

VA109-ABL321P/N-109A/SH





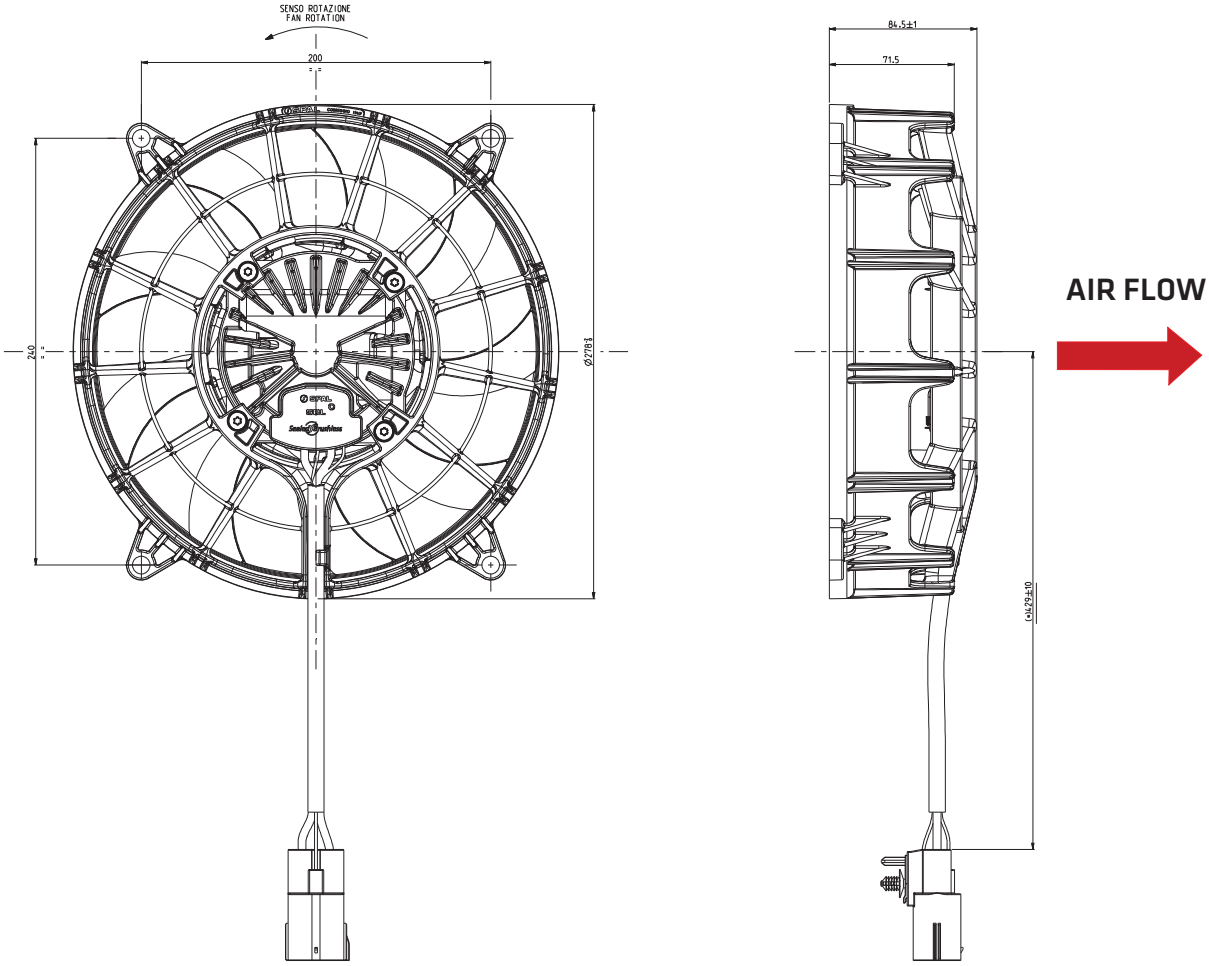
Motor designed for **IP6K9K** and **IP68** protection

VA109-ABL321P/N-109A/SH

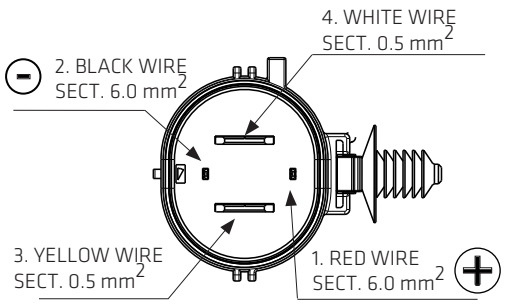
Ø 255 mm
Ø 10”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



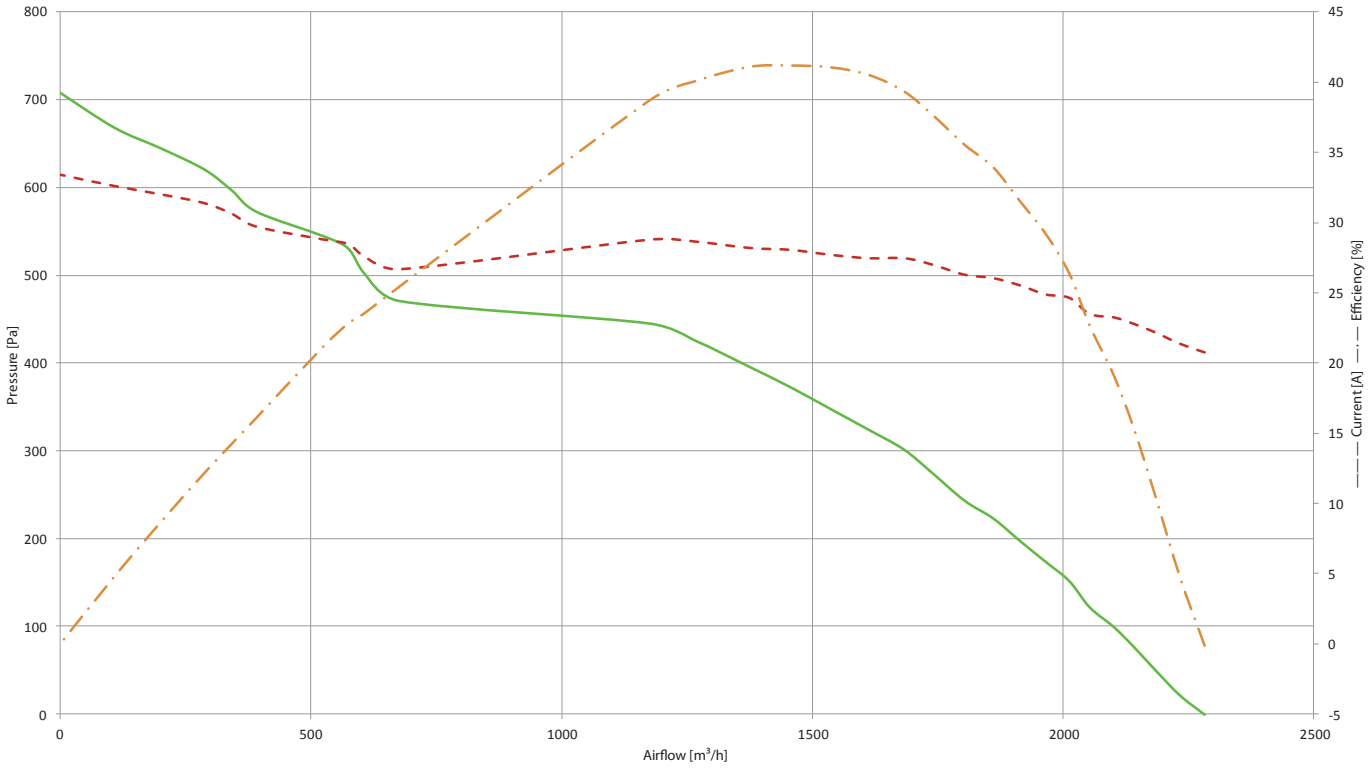
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7158-3035	7158-3035	7158-3030-50	7158-3030-50
Pin p/n	7114-3250	7114-3250	7114-4102-02	7114-4102-02
Section [mm2]	6.0	6.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 255 mm
Ø 10”

VA109-ABL321P/N-109A/SH

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	4000
Min fan speed	rpm	1000
Sound pressure level	dBA	75.6 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.0
Operating supply voltage range	V	9.0 .. 16.0 at the Drive Connector
Supply voltage to reach max speed	V	13.0 .. 16.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. + 115
Speed derating threshold	°C	+105 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	14
Load dump protection (Pulse 5b)	V	35 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

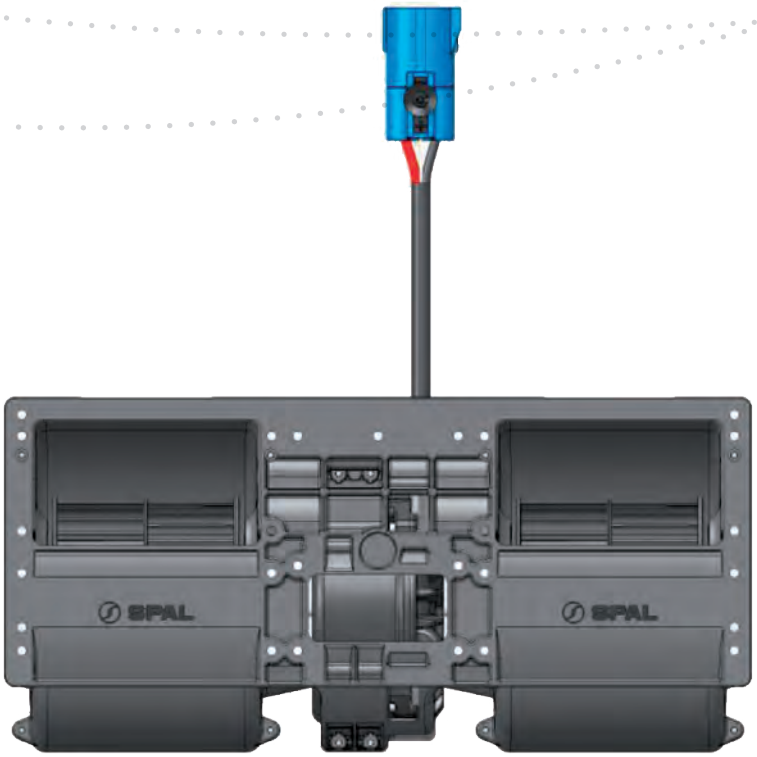
VA109-ABL321P/N-109A/SH

Ø 255 mm
Ø 10”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	4.8	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

020

020-ABL313P/N-95

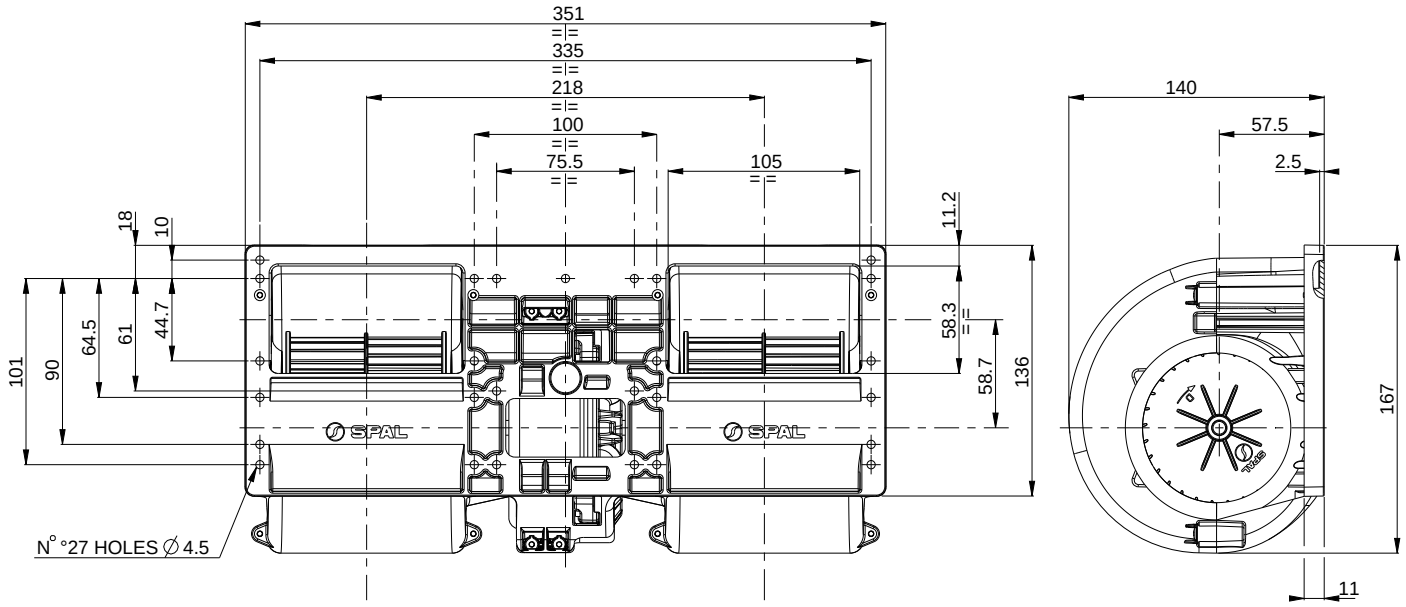


Motor designed for **IP6K9K** and **IP68** protection

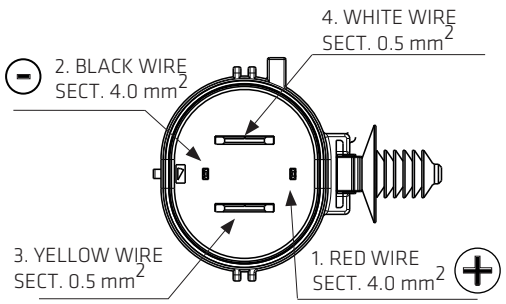
020-ABL313P/N-95

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



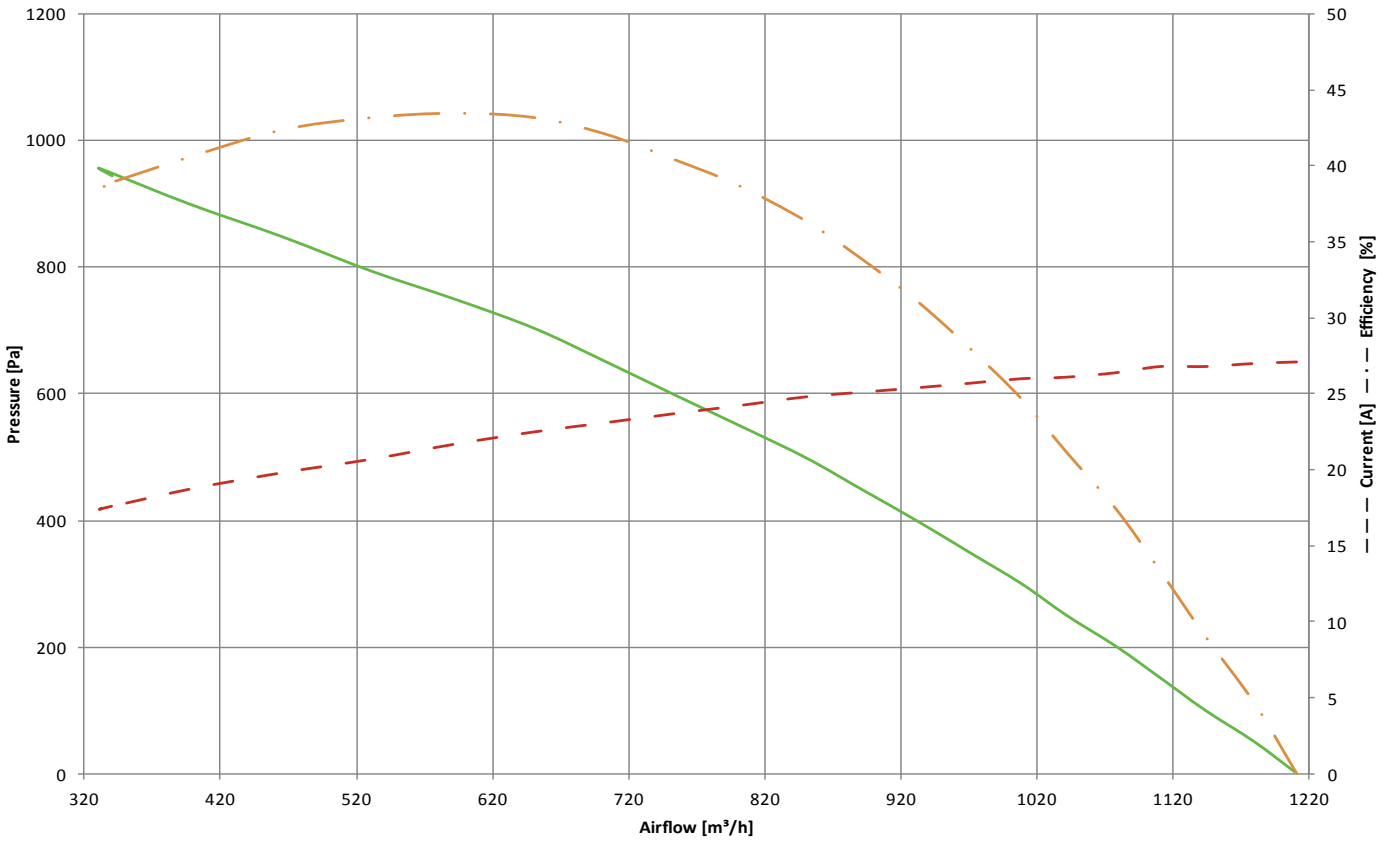
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

020

020-ABL313P/N-95

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	3680
Min fan speed	rpm	1100
Sound pressure level	dBA	73.1 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.7
Operating supply voltage range	V	9.0 .. 16.0 at the Drive Connector
Supply voltage to reach max speed	V	13.0 .. 16.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +95
Speed derating threshold	°C	+85 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	13
Load dump protection (Pulse 5b)	V	35 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	4.8	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

SPAL AUTOMOTIVE

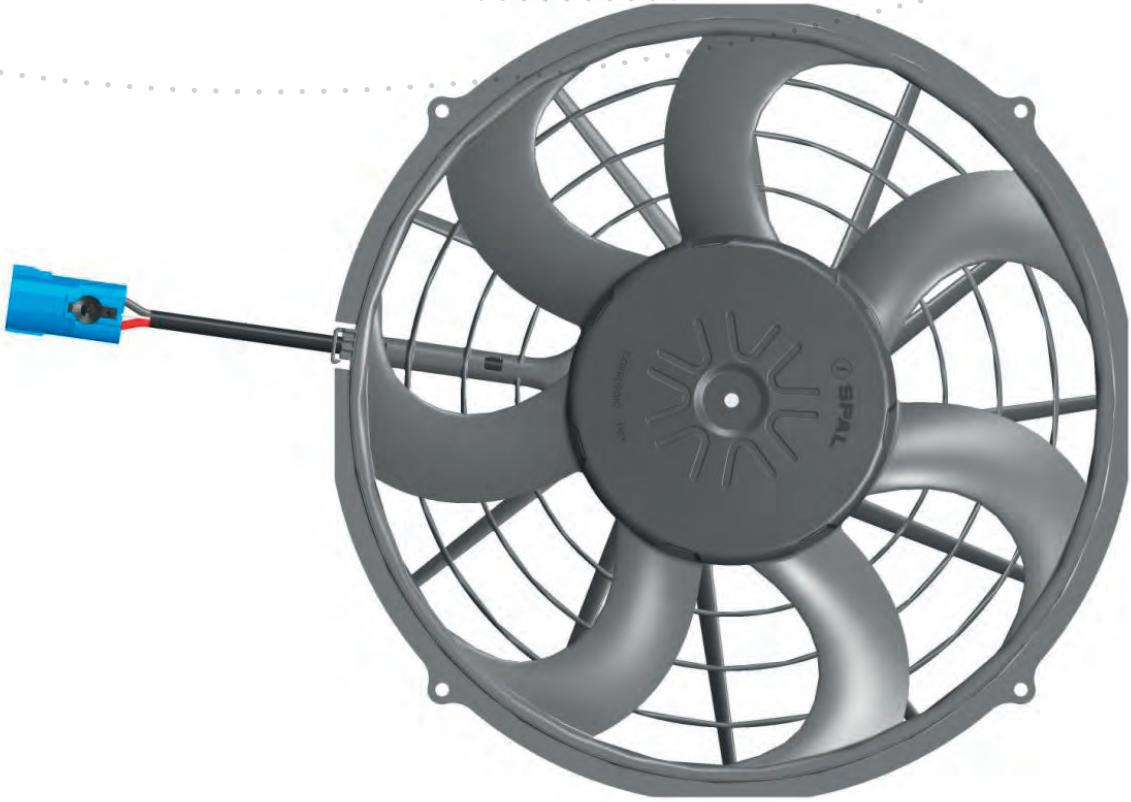
HIGH-PERFORMANCE SEALED BRUSHLESS MOTOR FANS & BLOWERS

24-V

24-V

Ø 405 mm
Ø 16”

VA97-BBL339P/N-103A



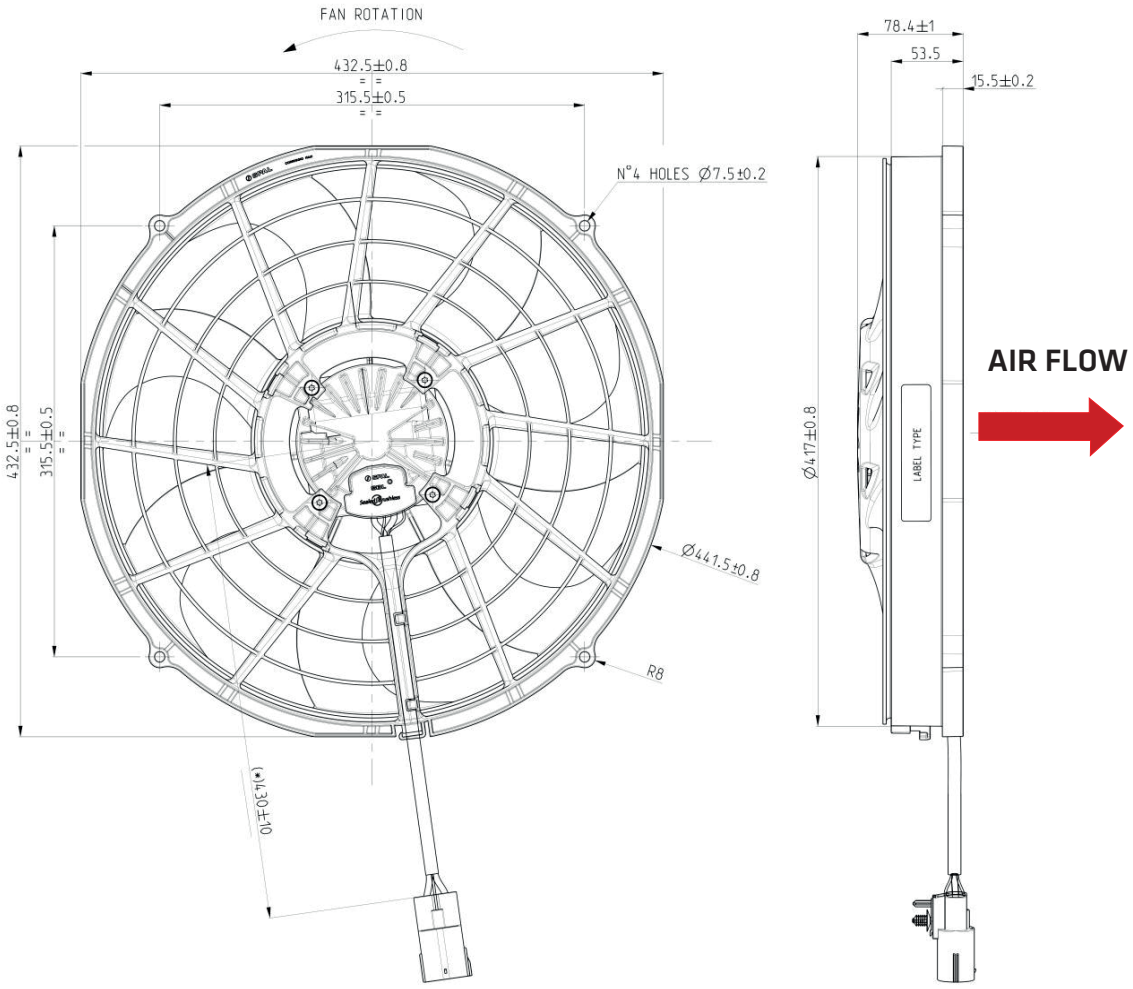
Motor designed for **IP6K9K** and **IP68** protection

VA97-BBL339P/N-103A

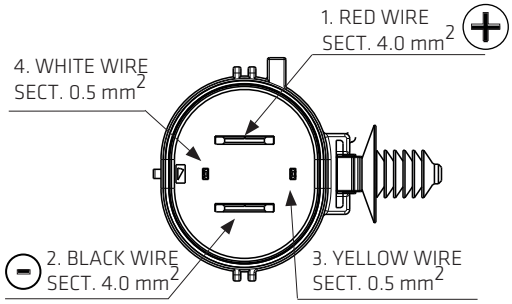
Ø 405 mm
Ø 16”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



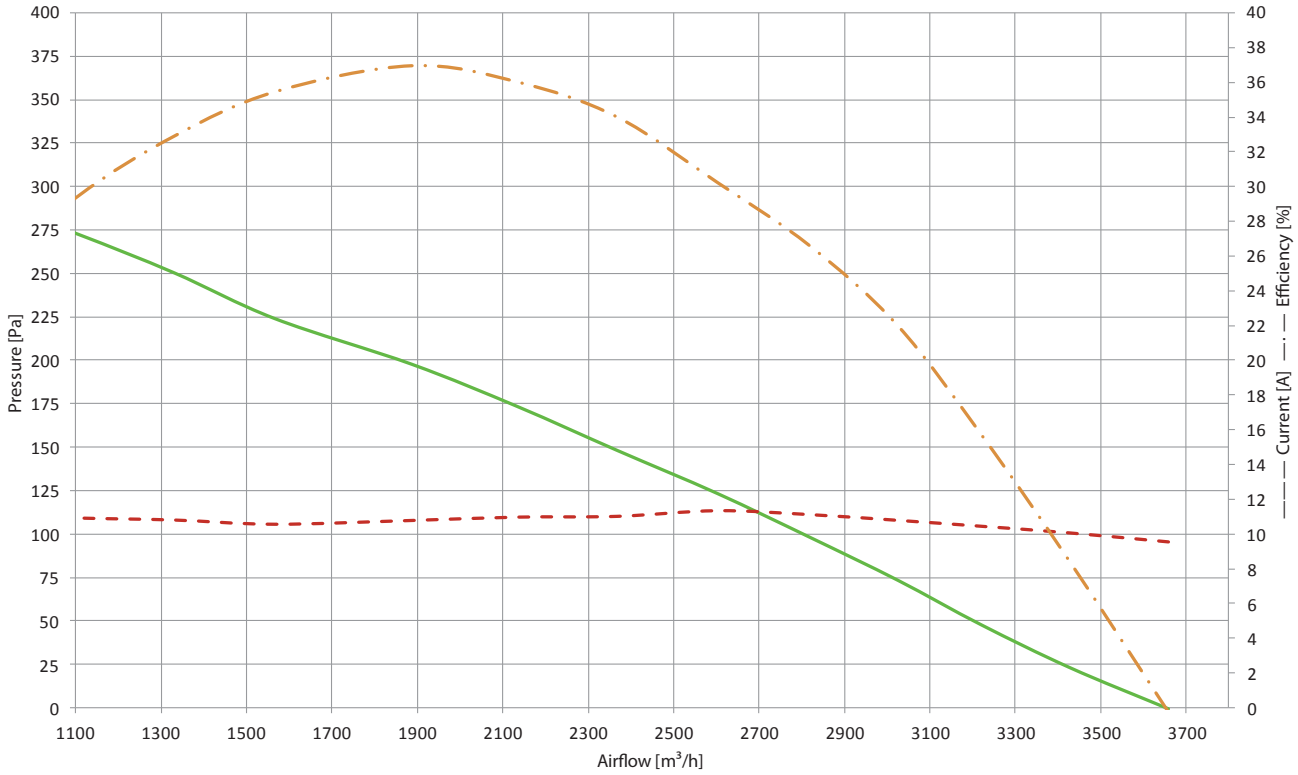
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 405 mm
Ø 16”

VA97-BBL339P/N-103A

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	2450
Min fan speed	rpm	600
Sound pressure level	dBA	72.8 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.80
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +95
Speed derating threshold	°C	+85 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	17
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

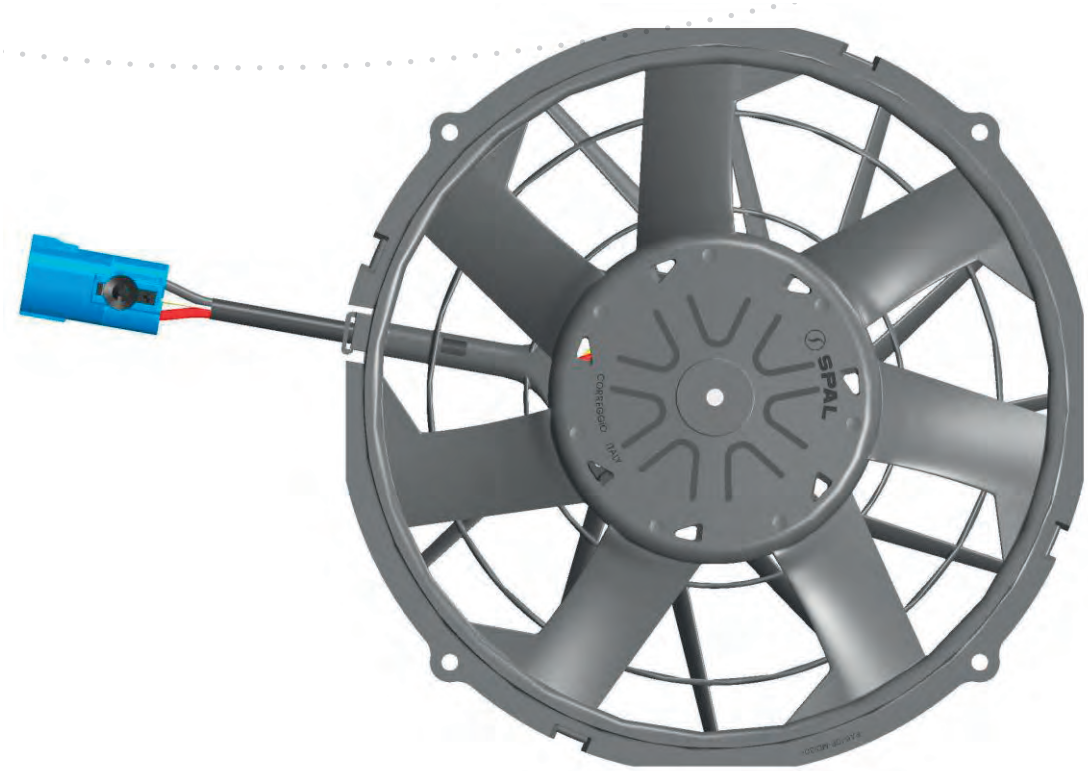
VA97-BBL339P/N-103A

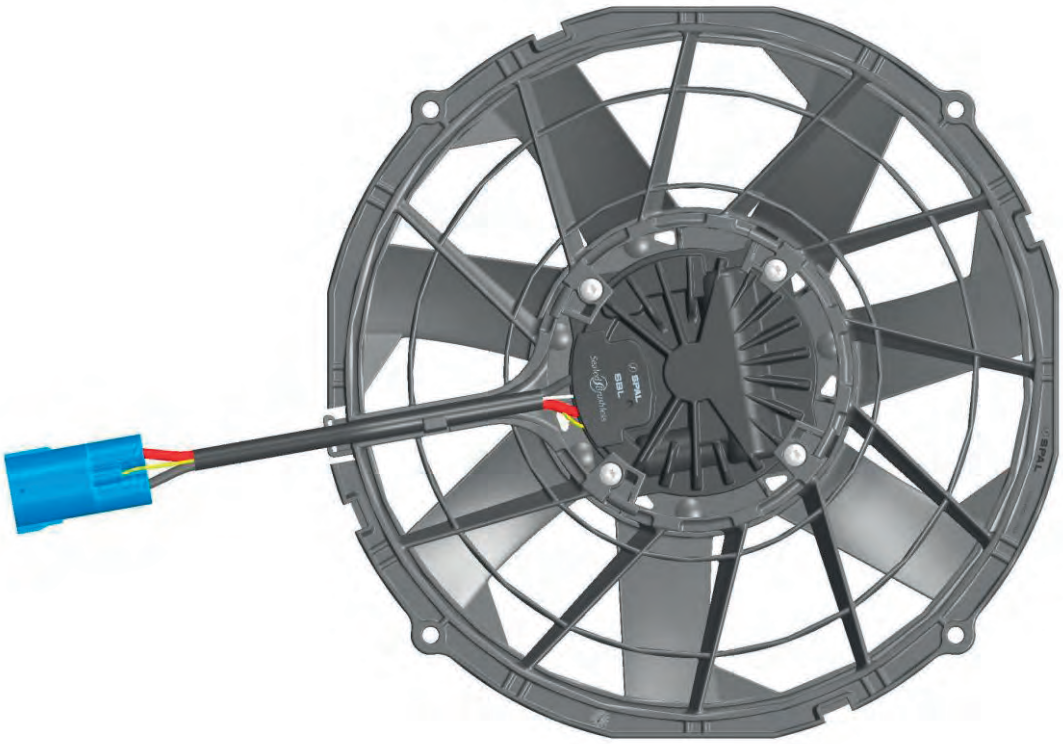
Ø 405 mm
Ø 16”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 305 mm
Ø 12”

VA89-BBL328P/N-94A





Motor designed for **IP6K9K** and **IP68** protection

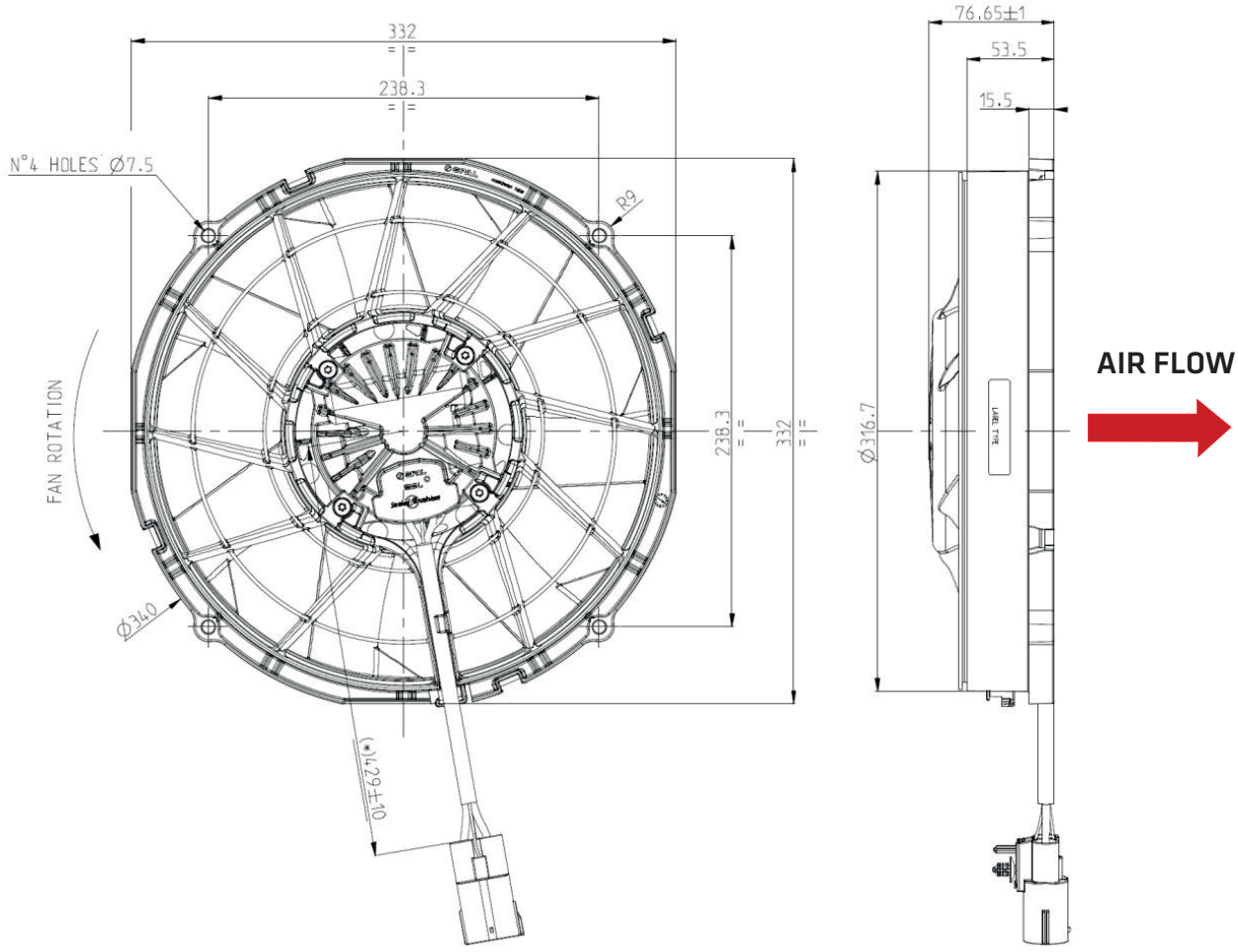
24-V

VA89-BBL328P/N-94A

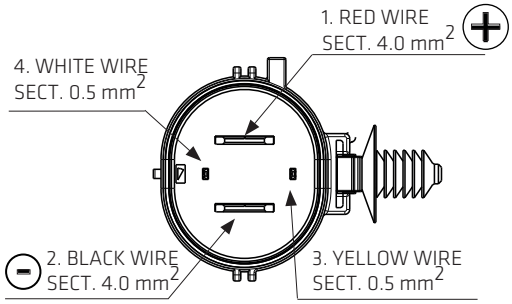
Ø 305 mm
Ø 12”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



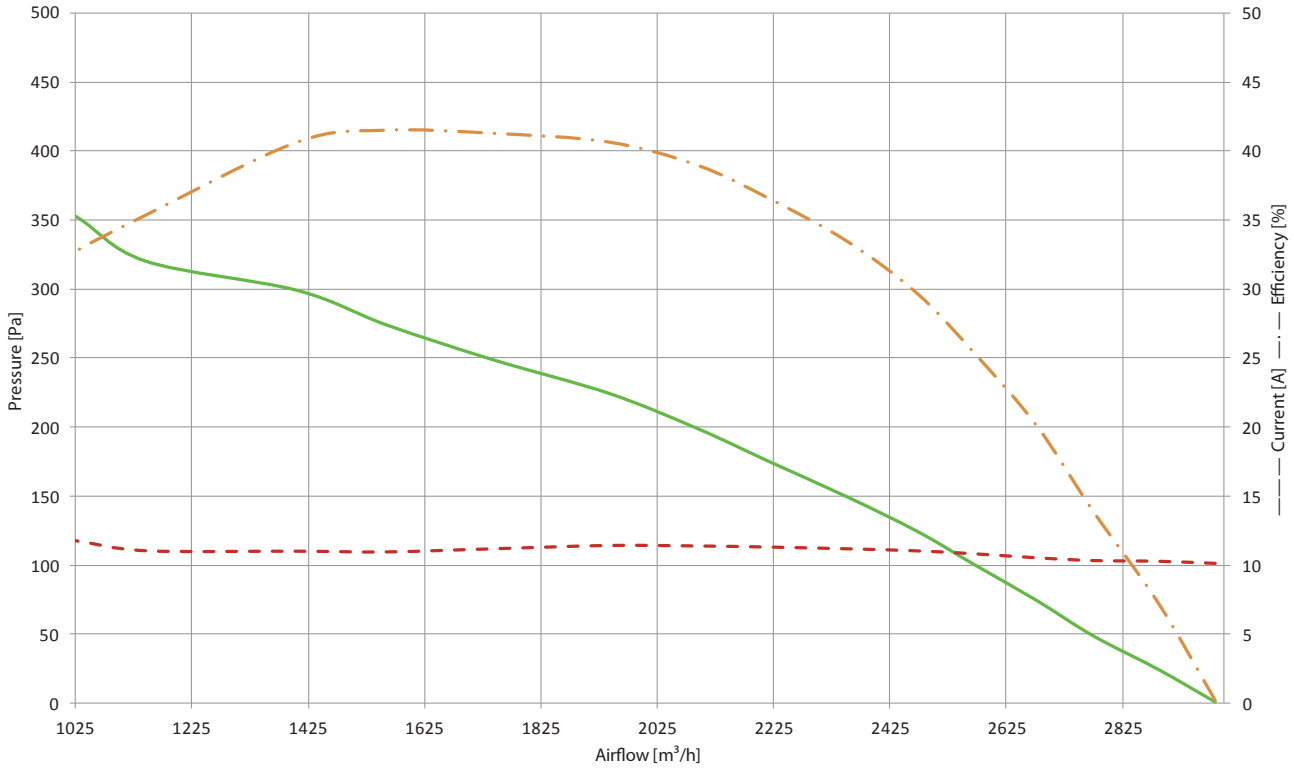
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 305 mm
Ø 12”

VA89-BBL328P/N-94A

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	3400
Min fan speed	rpm	850
Sound pressure level	dBA	75.7 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.30
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +110
Speed derating threshold	°C	+95 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	11
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

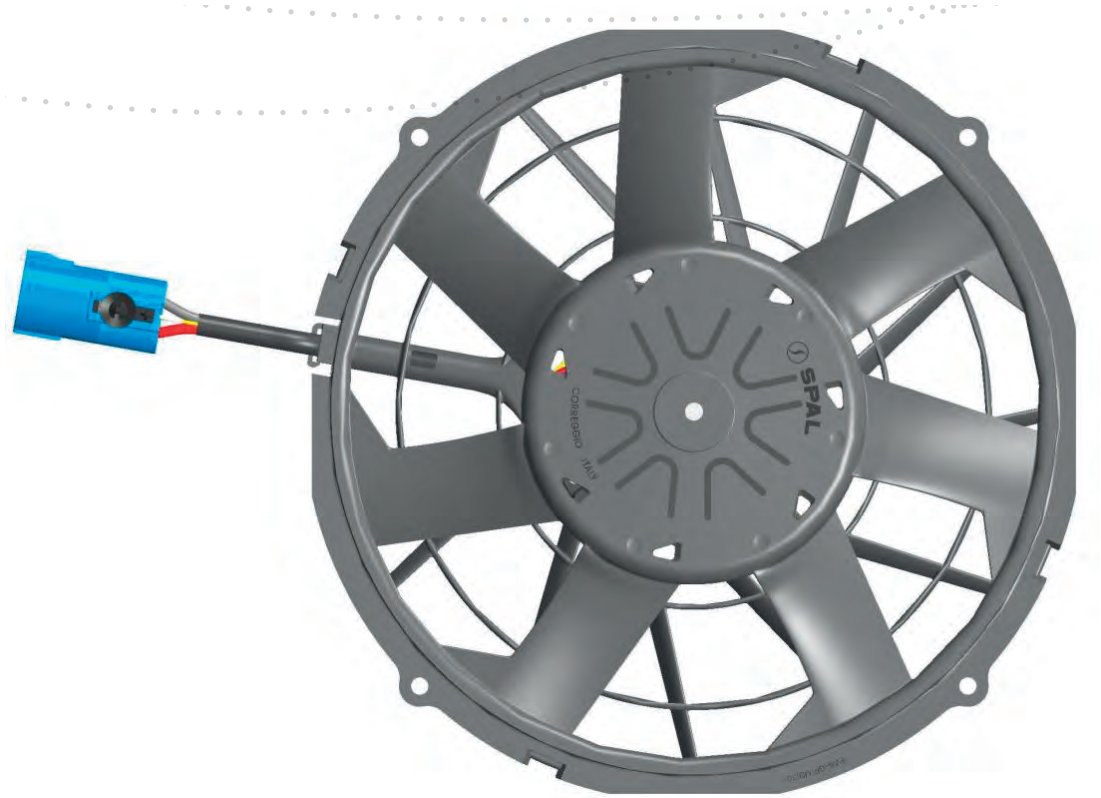
VA89-BBL328P/N-94A

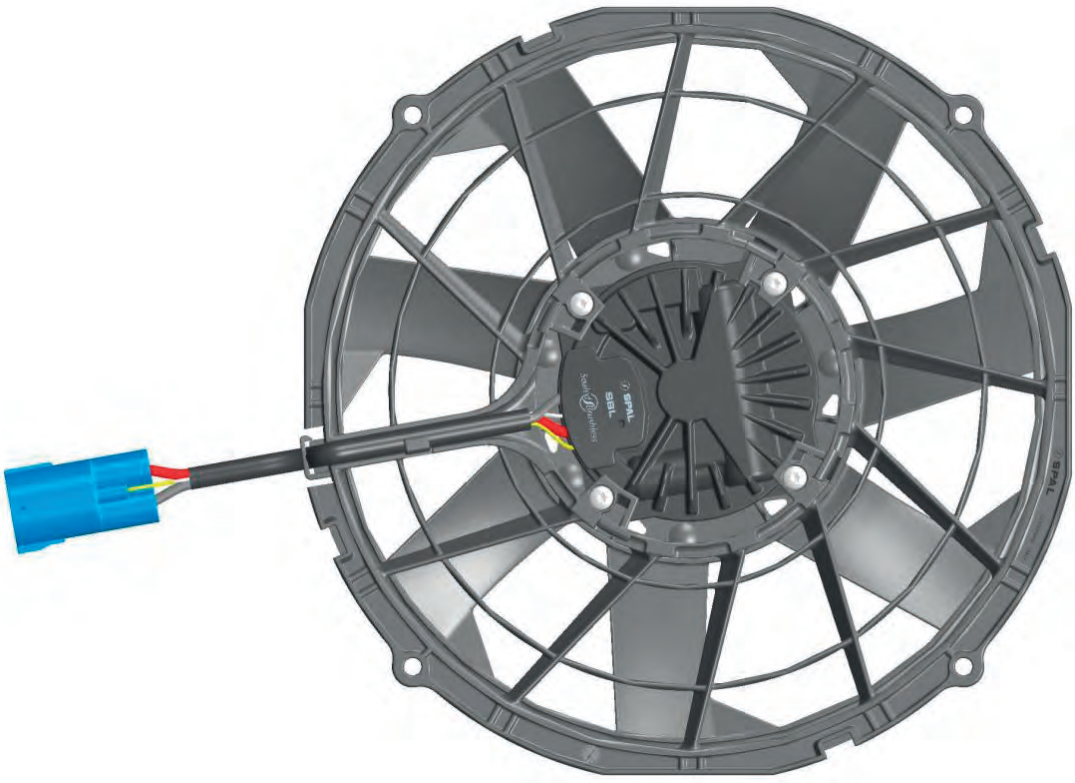
Ø 305 mm
Ø 12”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 305 mm
Ø 12”

VA89-BBL338P/N-94A





Motor designed for **IP6K9K** and **IP68** protection

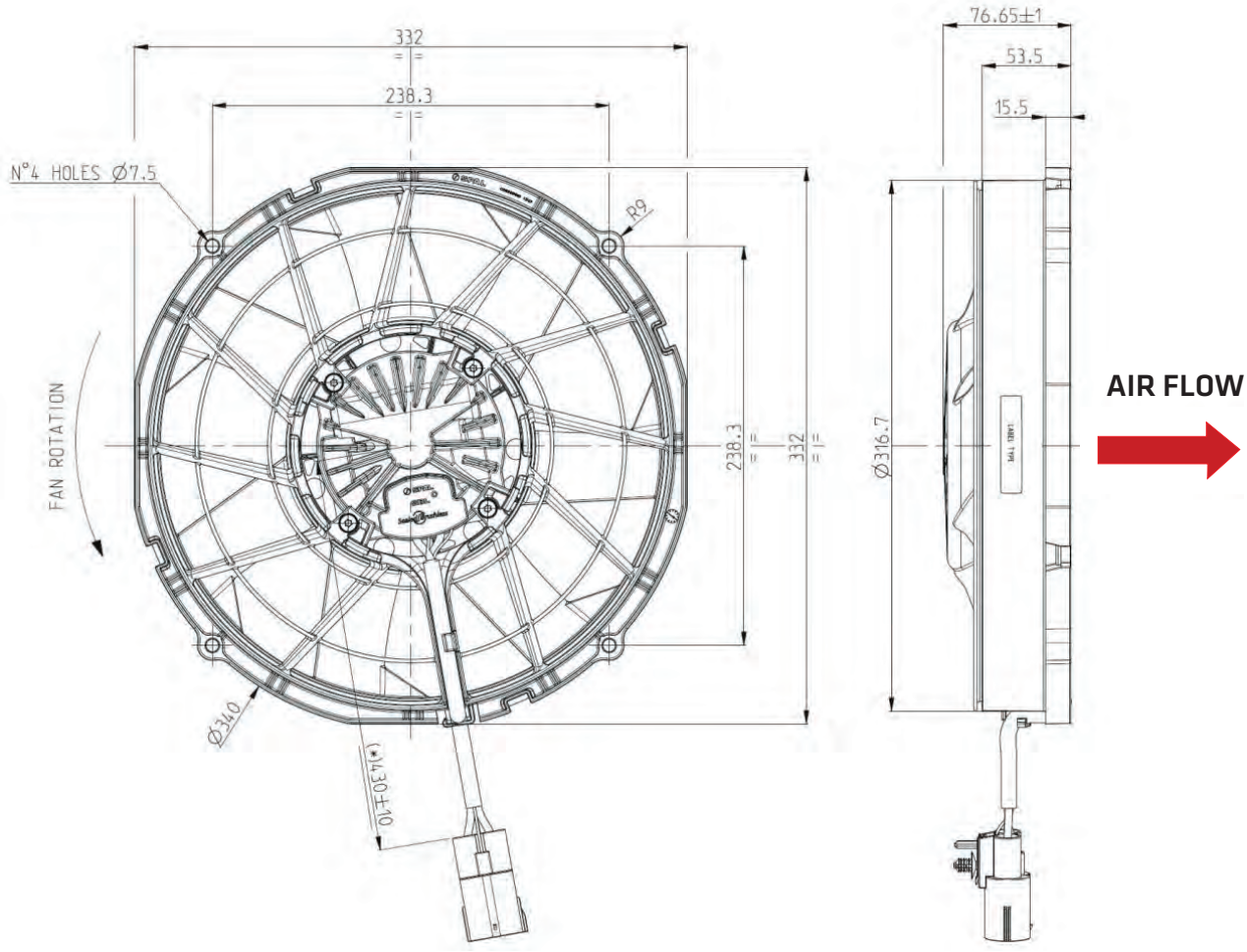
24-V

VA89-BBL338P/N-94A

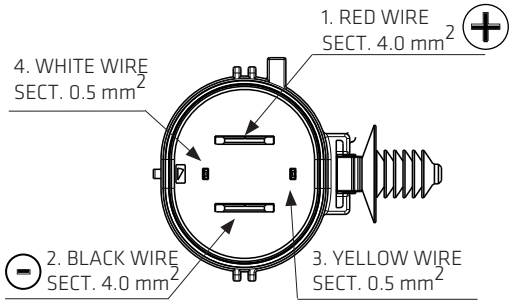
Ø 305 mm
Ø 12”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



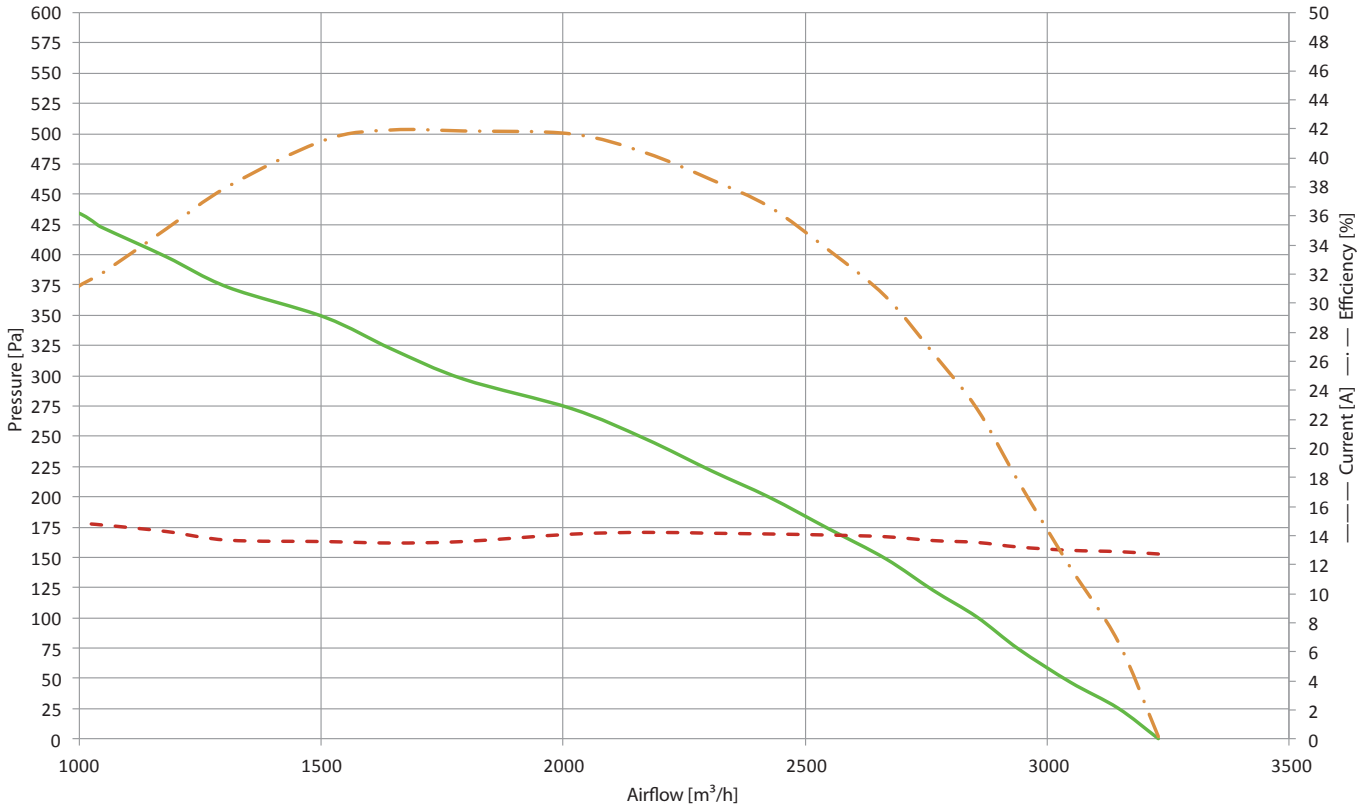
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 305 mm
Ø 12”

VA89-BBL338P/N-94A

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	3650
Min fan speed	rpm	900
Sound pressure level	dBA	78 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.20
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +95
Speed derating threshold	°C	+85 (*)
Storage temperature range	°C	-40 .. +120
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	15
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

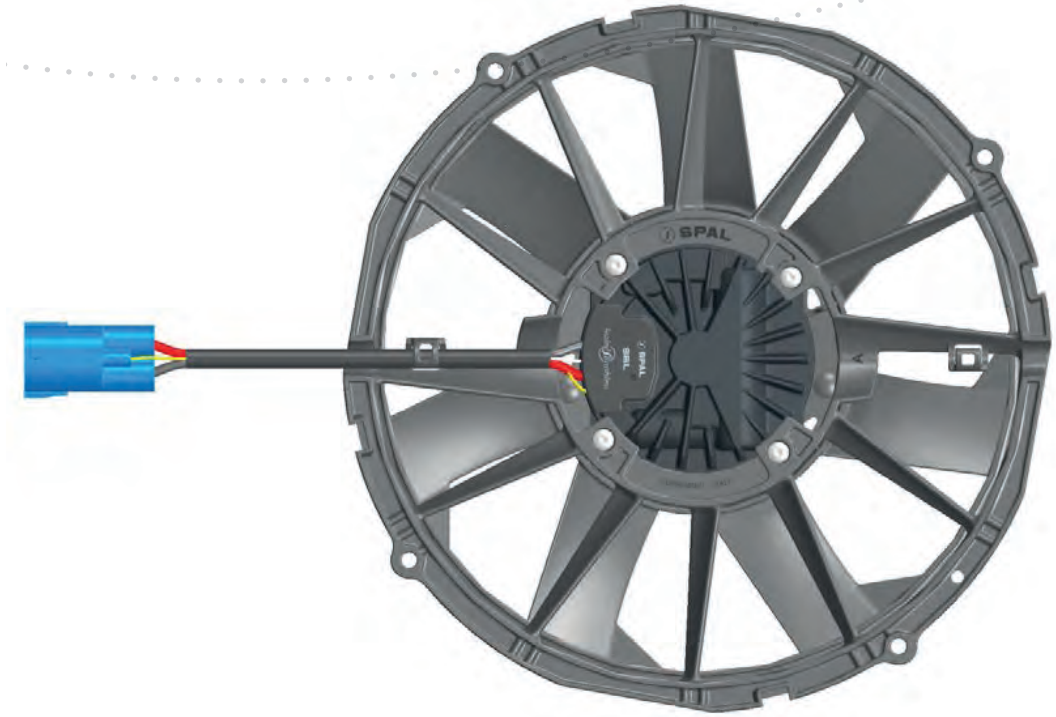
VA89-BBL338P/N-94A

Ø 305 mm
Ø 12”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 305 mm
Ø 12”

VA113-BBL504P/N-94A



Motor designed for **IP6K9K** and **IP68** protection

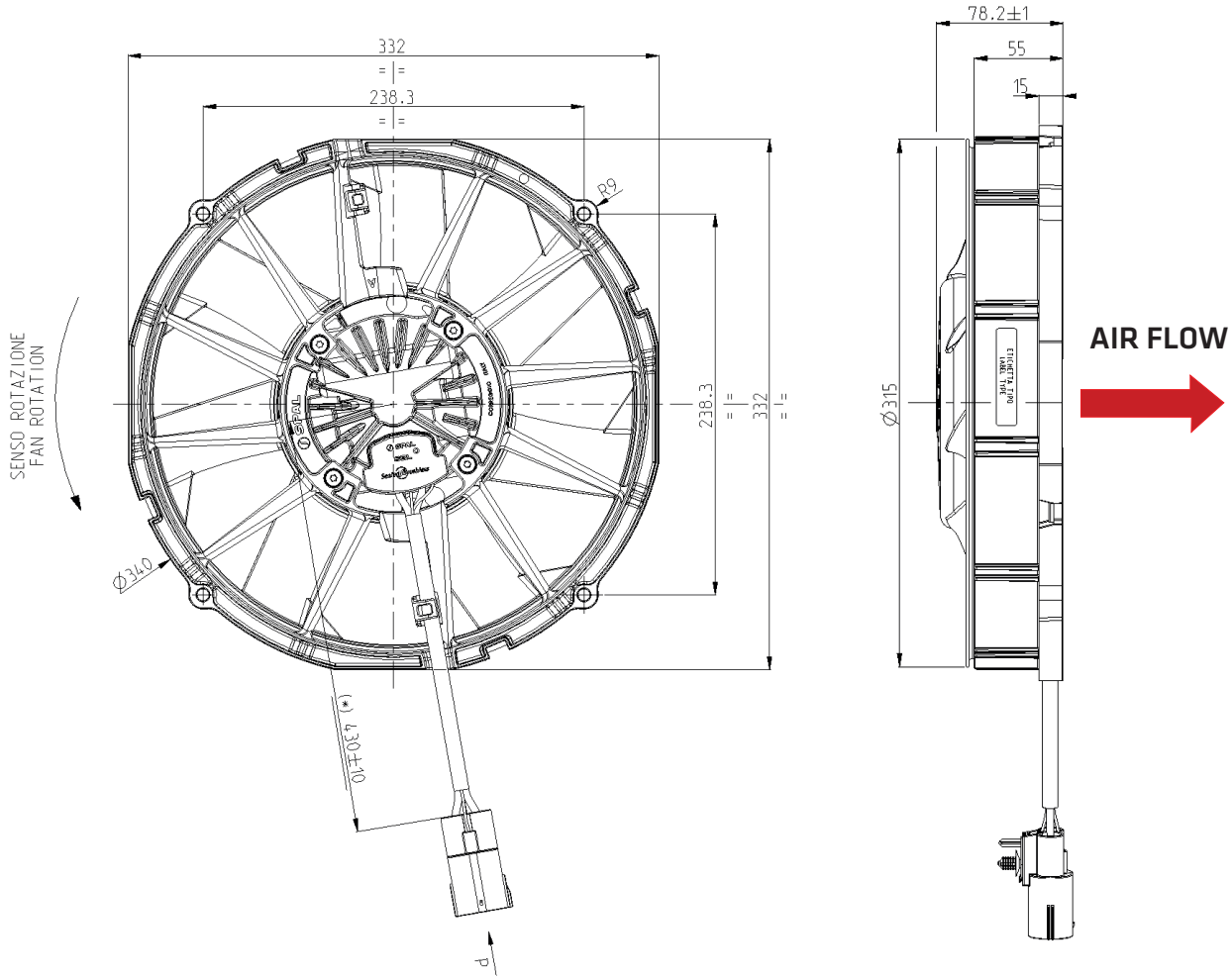
24-V

VA113-BBL504P/N-94A

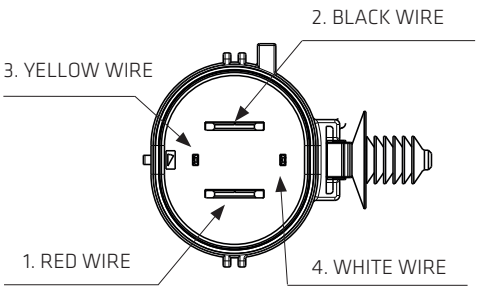
Ø 305 mm
Ø 12”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



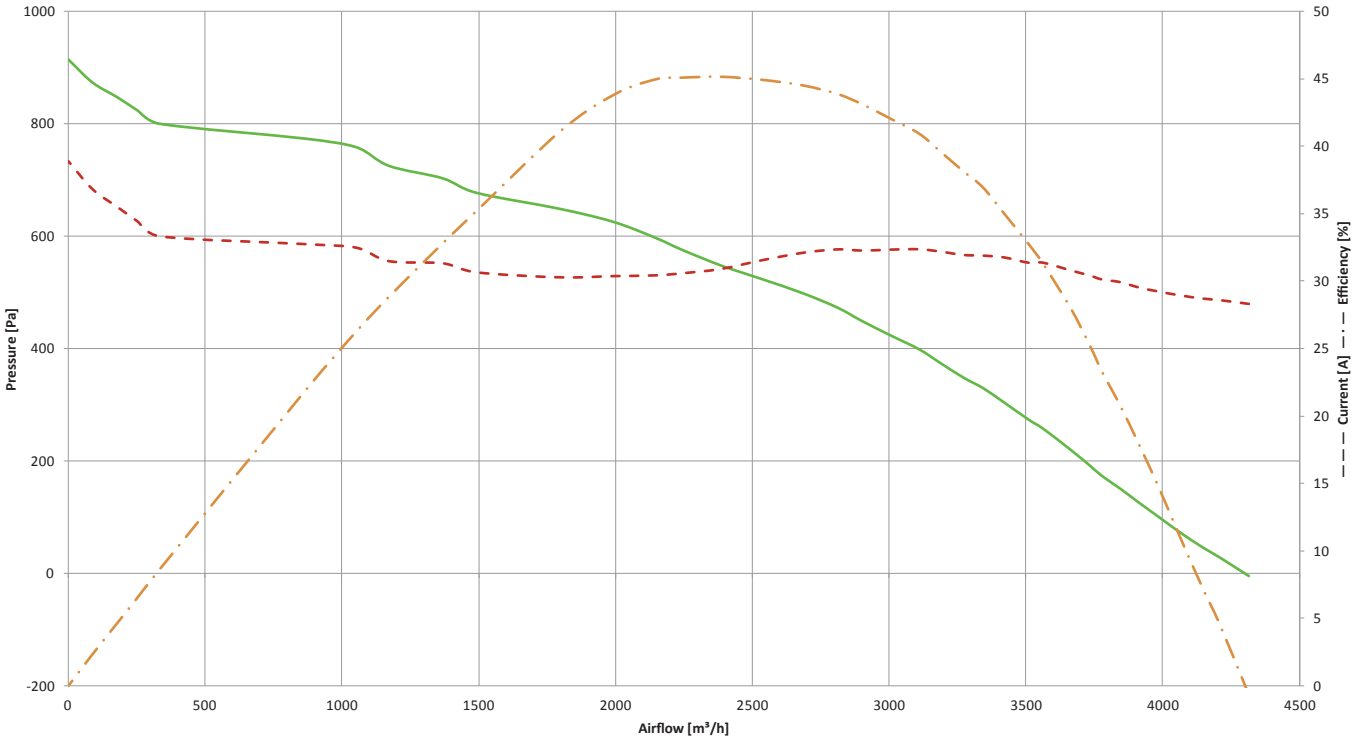
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7158-3035	7158-3035	7158-3030-50	7158-3030-50
Pin p/n	7114-3250	7114-3250	7114-4102-02	7114-4102-02
Section [mm2]	6.0	6.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 305 mm
Ø 12”

VA113-BBL504P/N-94A

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	4750
Min fan speed	rpm	1200
Sound pressure level	dBA	85.6 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.6
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +110
Speed derating threshold	°C	+65 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	10
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

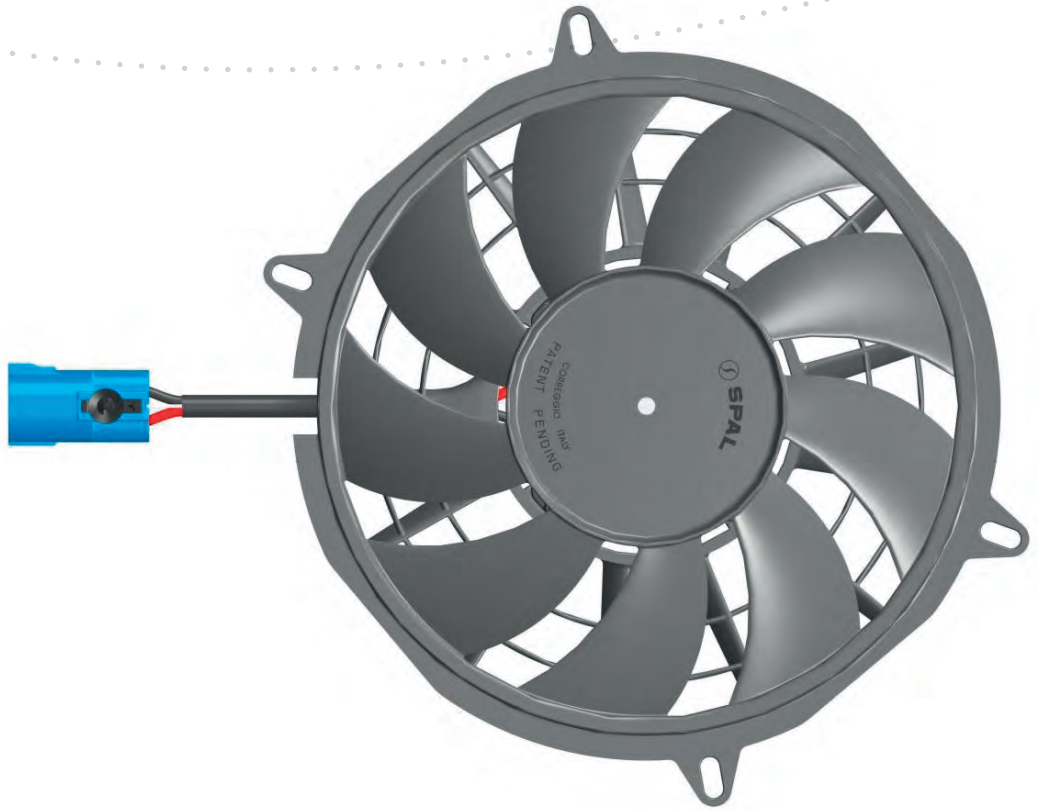
VA113-BBL504P/N-94A

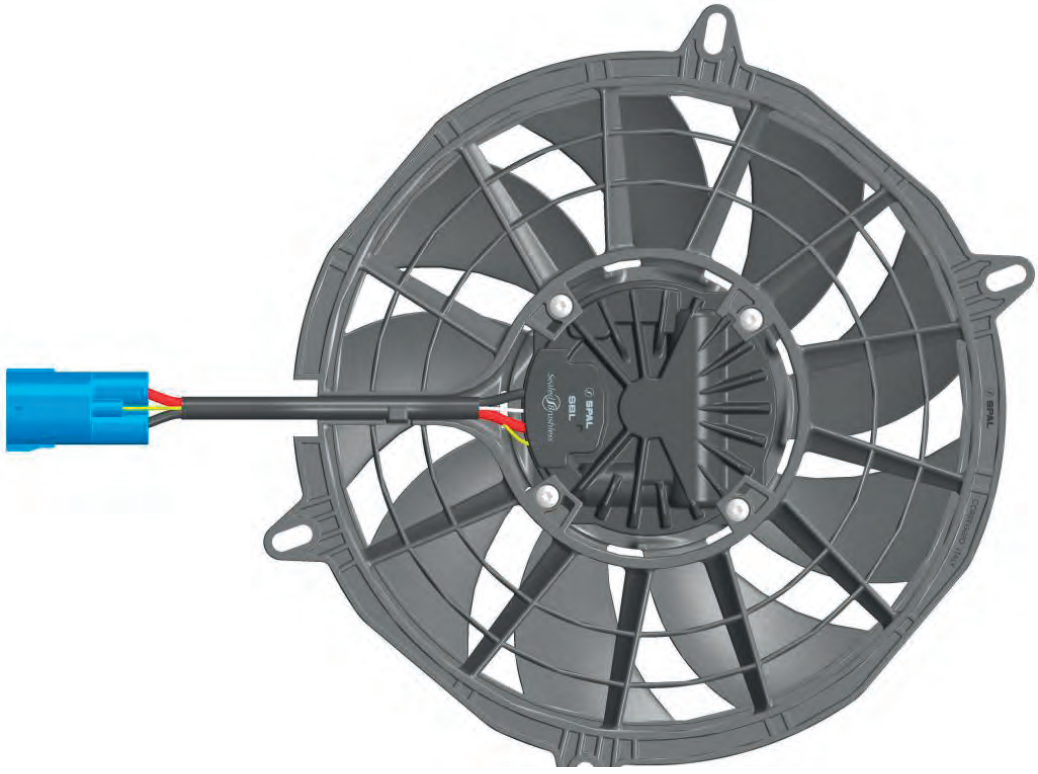
Ø 305 mm
Ø 12”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 280 mm
Ø 11”

VA99-BBL324P/N-101A/SH





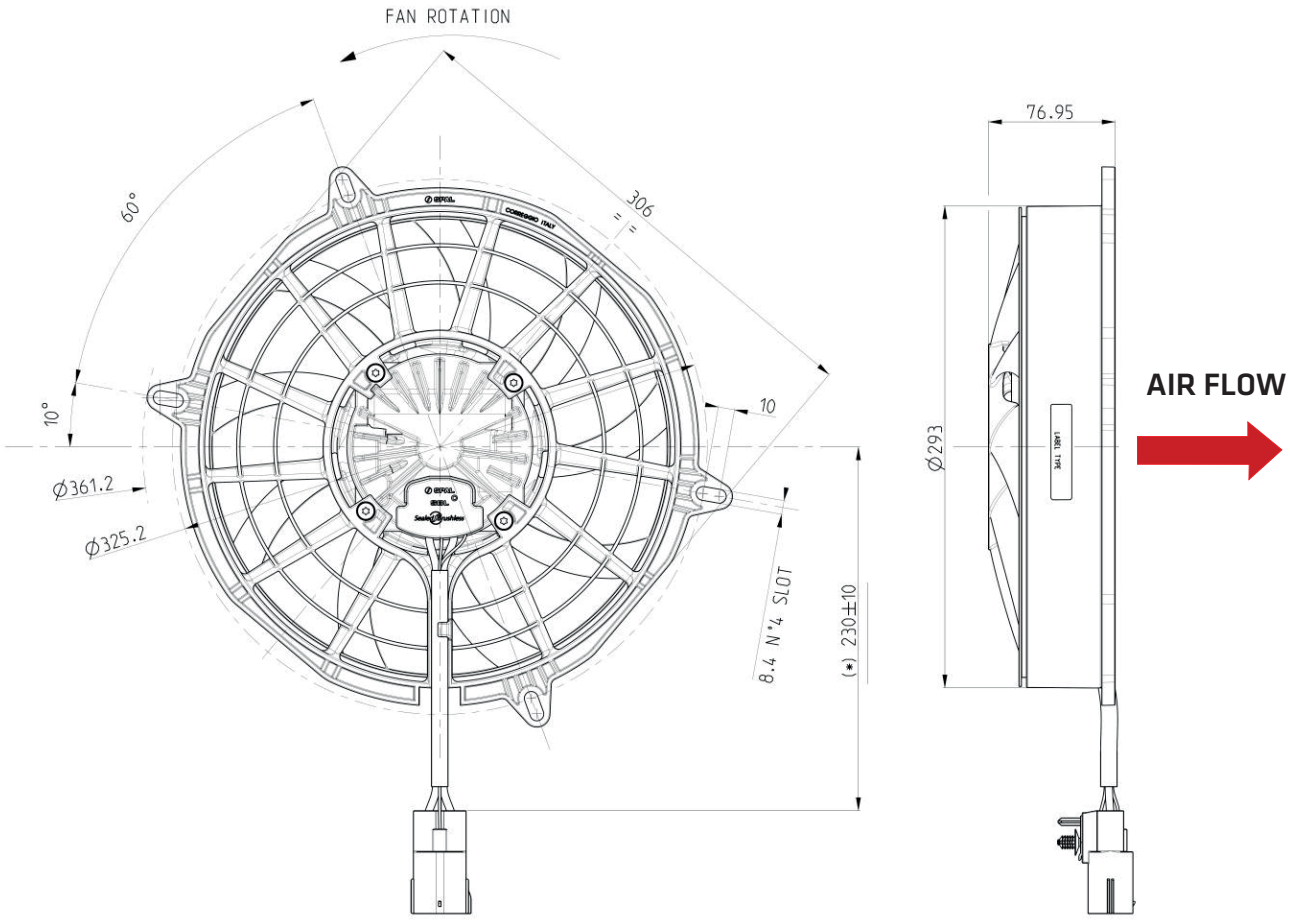
Motor designed for **IP6K9K** and **IP68** protection

VA99-BBL324P/N-101A/SH

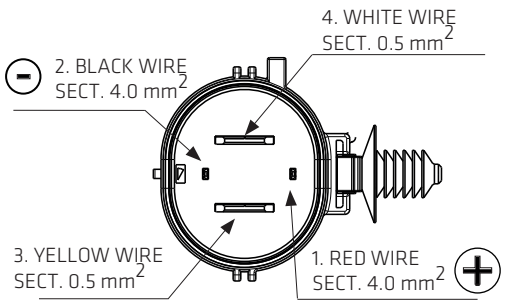
Ø 280 mm
Ø 11”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



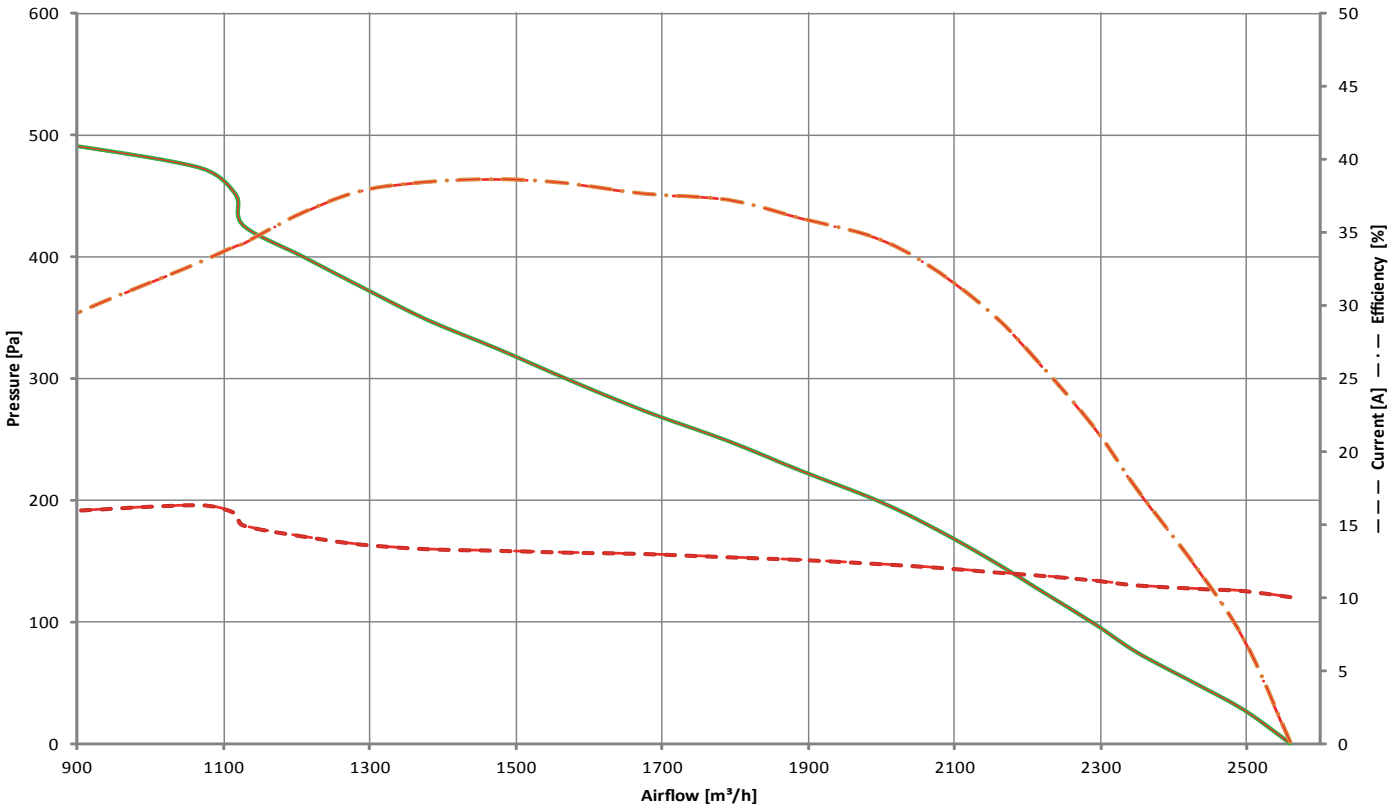
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 280 mm
Ø 11”

VA99-BBL324P/N-101A/SH

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	4000
Min fan speed	rpm	1000
Sound pressure level	dBA	74.8 at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.0
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +95
Speed derating threshold	°C	+85 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	14
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

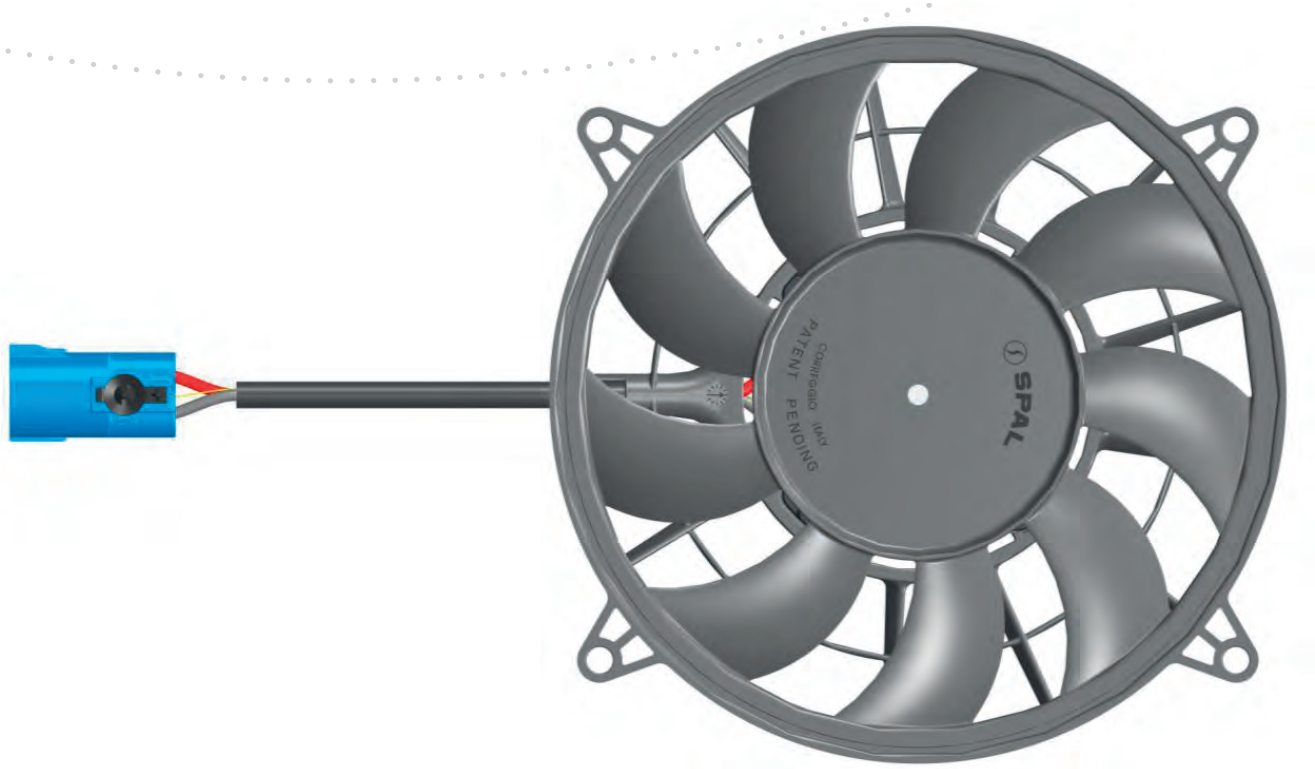
VA99-BBL324P/N-101A/SH

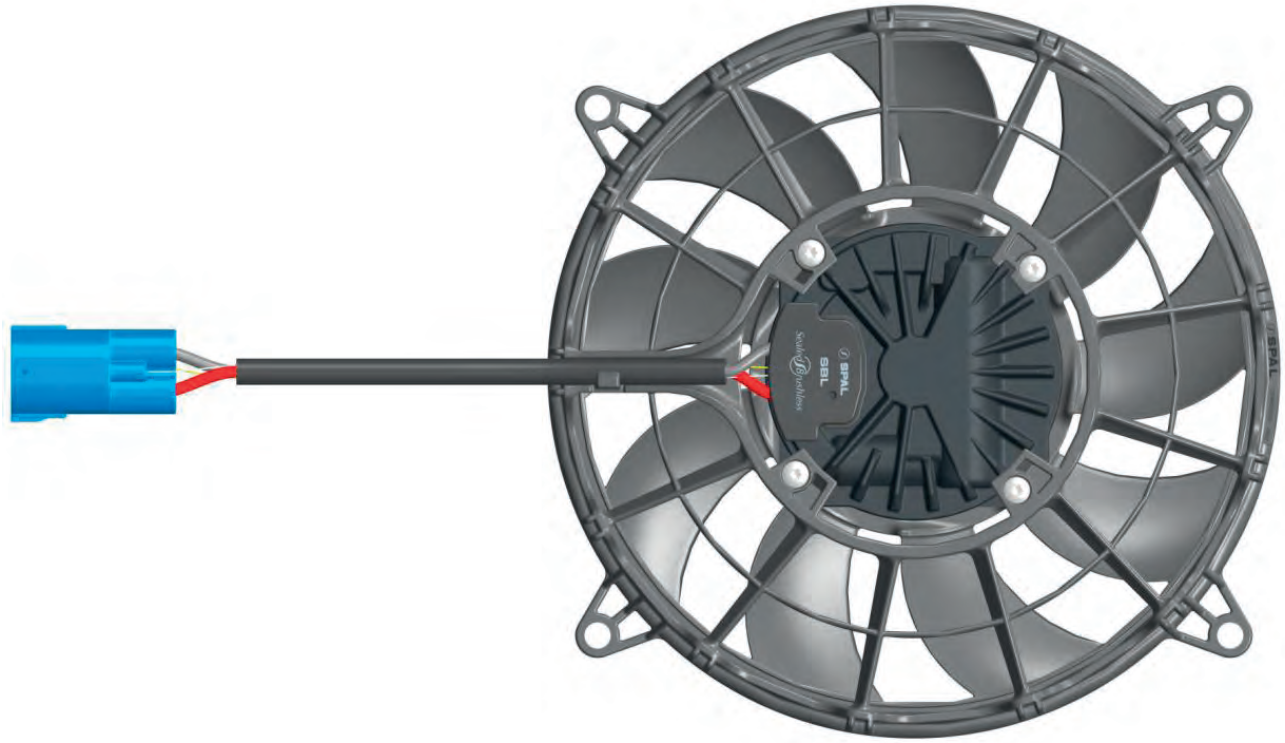
Ø 280 mm
Ø 11”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

Ø 255 mm
Ø 10”

VA109-BBL330P/N-109A/SH





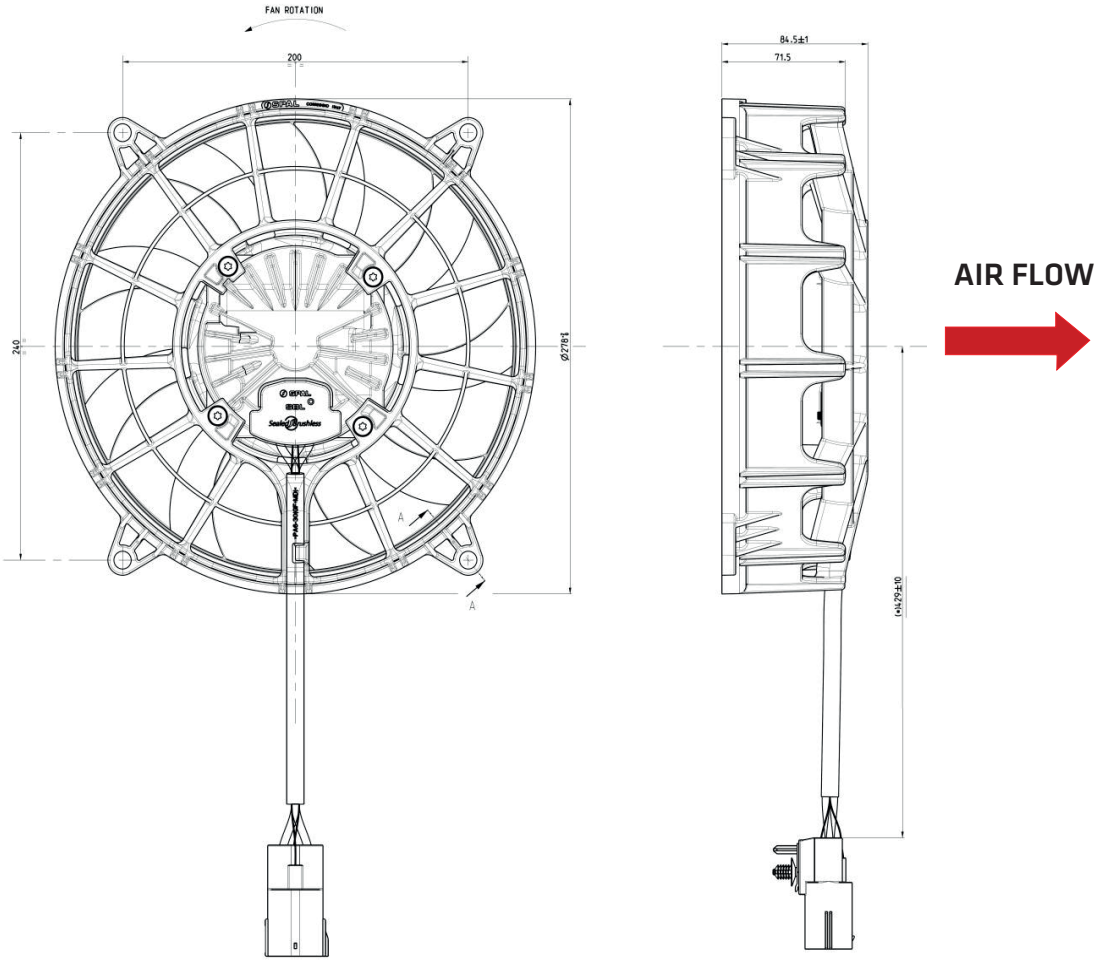
Motor designed for **IP6K9K** and **IP68** protection

VA109-BBL330P/N-109A/SH

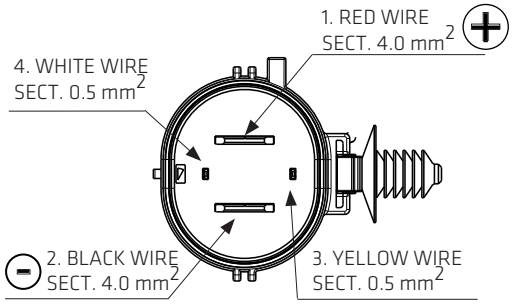
Ø 255 mm
Ø 10”

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90



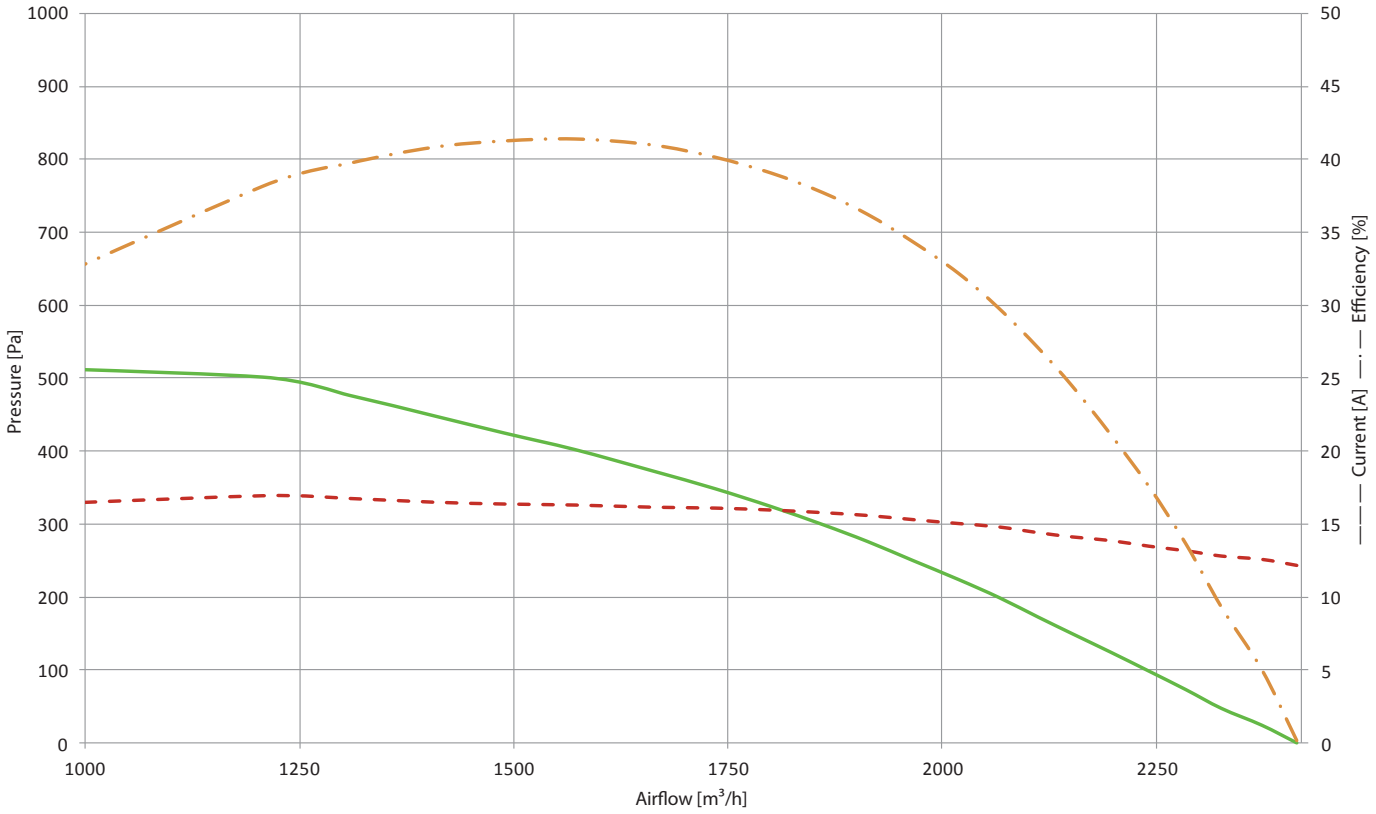
Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

Ø 255 mm
Ø 10”

VA109-BBL330P/N-109A/SH

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m³/h=0.59 cfm

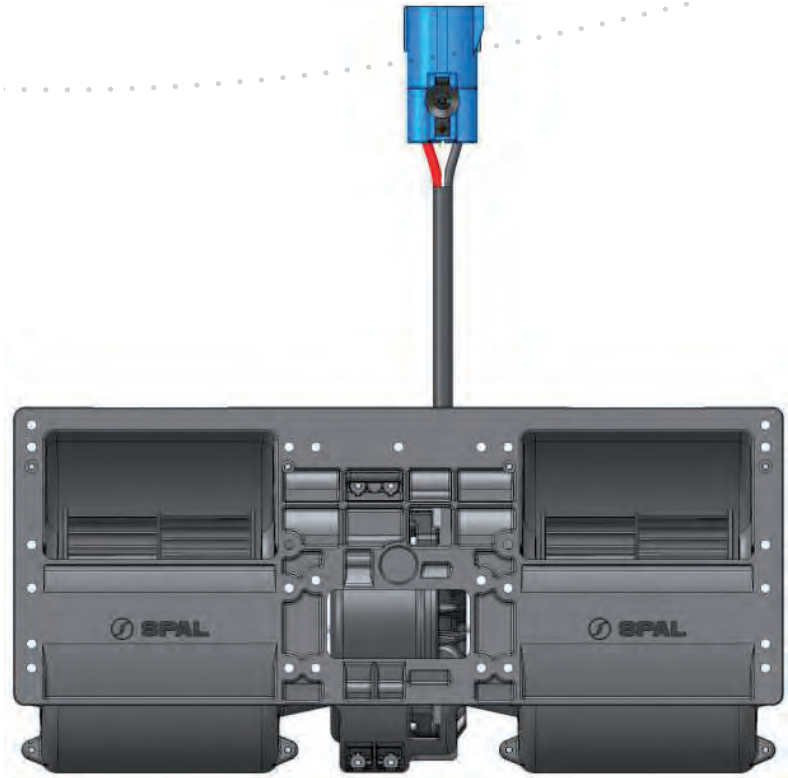
Features		
Max fan speed	rpm	4300
Min fan speed	rpm	1100
Sound pressure level	dBA	78 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.0
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +95
Speed derating threshold	°C	+85 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Time from 0 rpm to max speed	s	14
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

VA109-BBL330P/N-109A/SH

Ø 255 mm
Ø 10”

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup

020 020-BBL331P/N-95

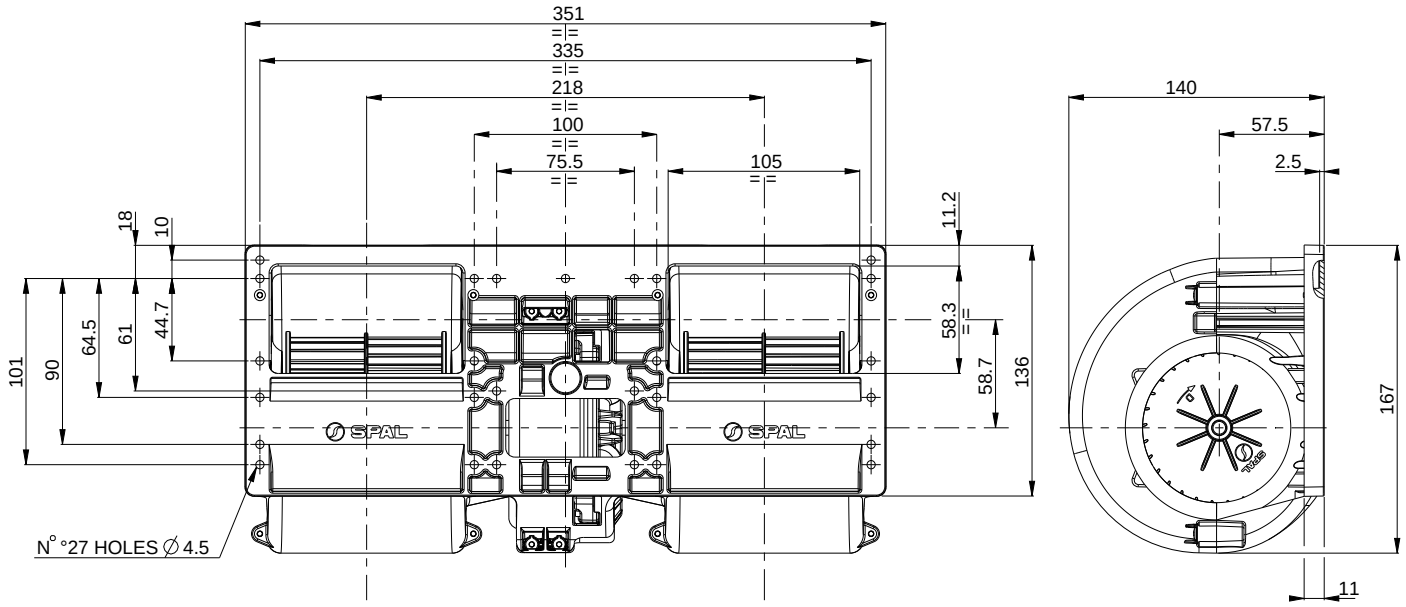


Motor designed for **IP6K9K** and **IP68** protection

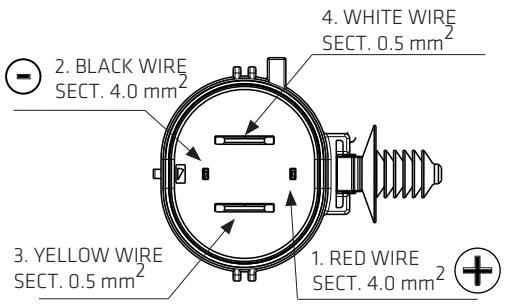
020-BBL331P/N-95

Drawing

All dimensions are expressed in mm. Use M6 screws for fixing – nominal tightening torque 4 Nm



Connector:YAZAKI HYBRID (USCAR-2 compliant) - Part number: 7282-8497-90

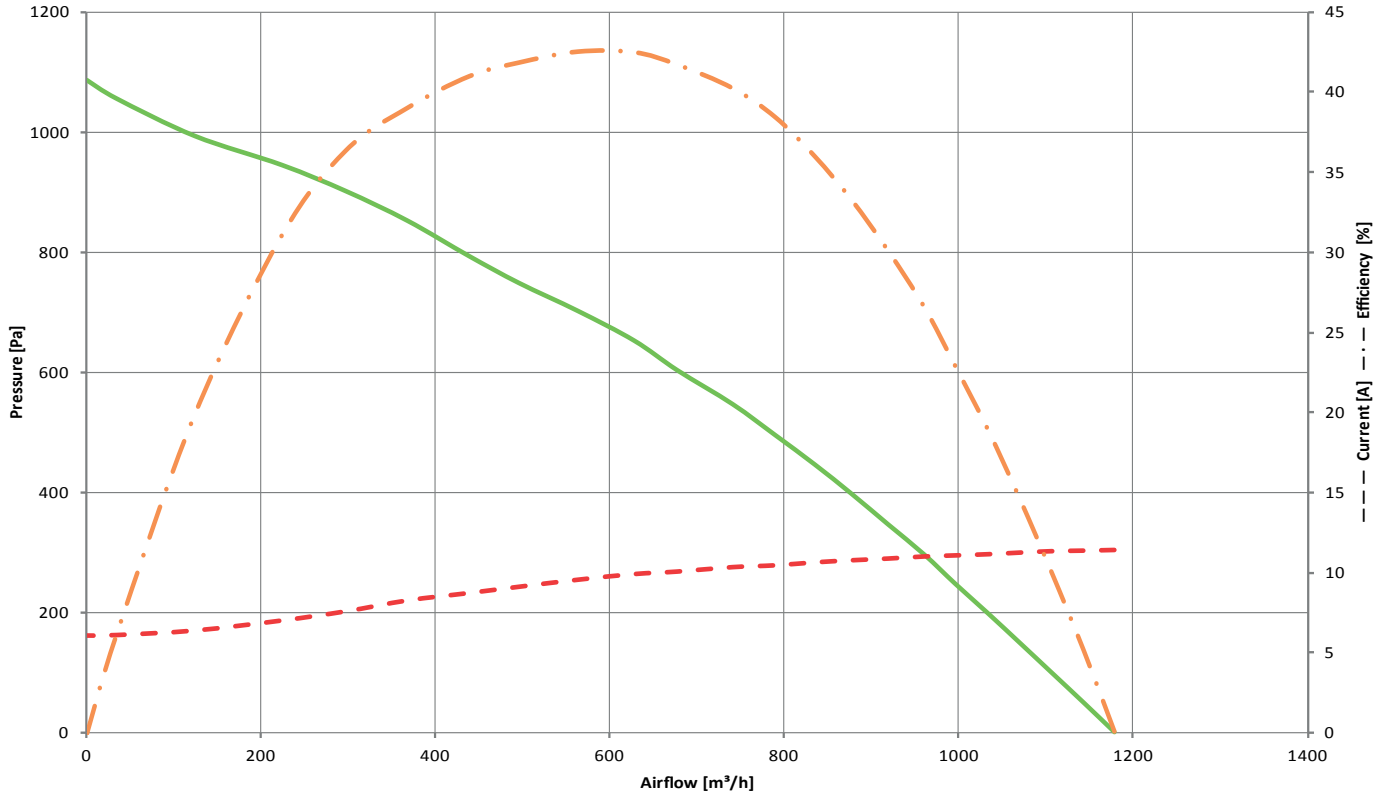


Identification	+D	-D	A	PWM* / E*
Pin number	1	2	3	4
Wire Color	red	black	yellow	white
Sealing p/n	7157-3582-90	7157-3582-90	7158-3030-50	7158-3030-50
Pin p/n	7114-3251	7114-3251	7114-4102-02	7114-4102-02
Section [mm2]	4.0	4.0	0.5	0.5

NOTE: YAZAKI connector counterpart available upon request (see page 67)

020 020-BBL331P/N-95

Axial fan performance curve



Pressure: 1Pa=0.04 inH_2O Airflow: 1m^3/h=0.59 cfm

Features		
Max fan speed	rpm	3574
Min fan speed	rpm	887
Sound pressure level	dBA	72.8 - at 1 m ± 0.005 m from the fan module- lateral side
Weight	Kg	2.3
Operating supply voltage range	V	16.0 .. 32.0 at the Drive Connector
Supply voltage to reach max speed	V	26.0 .. 32.0 at the drive Connector
Operating ambient temperature range	°C	-40 .. +95
Speed derating threshold	°C	+85 (*)
Storage temperature range	°C	-40 .. +125
Lifetime	h	up to 40000 hours depending on mission profile
Load dump protection (Pulse 5b)	V	65 - Pulse peak voltage (U_S *) - ISO16750-2:2010
Reverse polarity protection		ISO 16750-1 functional status class C - device fully functional after correcting the polarity
Notes (*): Few minutes ambient temperature transients do not engage the derating owing to the thermal inertia of the system. Overloads may anticipate derating.		

Digital PWM input / active low: PWM*/E* parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Denomination**
PWM* / E* frequency range	50	100	500	Hz	fPWM
PWM* / E* duty cycle range	0		100	%	dcmin .. dcmax
PWM* / E* high level voltage	UB * 0.65			V	UPWMH
PWM* / E* low level voltage			UB * 0.40	V	UPWML
PWM* / E* resolution		1		%	dcresol
PWM* / E* accuracy		1		%	dcaccu
PWM* / E* current	-10 %	5.5	+10 %	mA	IPWM*
PWM* / E* wakeup pulse	150			µs	Twakeup


SPAL

SPAL AUTOMOTIVE

PRODUCT SPECIFICATION

SPAL AUTOMOTIVE

PROTECTIONS

There are the following cases where the Drive will go into Failure mode and stop the Drive:

1. Drive blocked
2. Drive overheated
3. Drive overloaded
4. Under voltage
5. Over voltage
6. Over current
7. Internal Drive failure

MOTOR CONTROL INTERFACE

8 different interface control strategies for flexible and smart motor control

Mode description	Mode	+D	-D	PWM* / E*	A	Pins	
On / off to minus	1	+	-D	-	+		4
On / off to plus	2	+D	-	-	+		4
On / off with enable low	3	+	-	E*	+		4
Analog control 1	4	+	-D	-	analog		4
Analog control 2	5	+D	-	-	analog		4
Analog control with enable low	6	+	-	E*	analog		4
Digital control	7	+	-	PWM	n.c.	3	
Mixed analog / digital control	8	+	-	PWM	analog		4

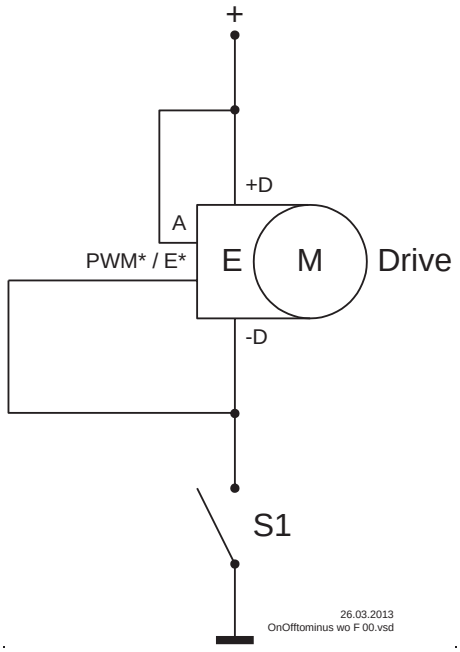
+D	:	Drive positive supply
-D	:	Drive negative supply
PWM* / E*	:	PWM input / low active enable input
A	:	analog input
+	:	connected to plus
-	:	connected to minus
analog	:	analog voltage signal
PWM	:	PWM signal
n. c.	:	not connected
+D	:	switch of the Drive positive supply to plus
-D	:	switch of the Drive negative supply to minus / GND
E*	:	switch active low enable input to minus / GND

INTERFACE MODE 1: ON / OFF TO MINUS

To realize the mode On / off to minus with the Drive Interface for Catalog Product 12 V it is necessary to put

- A to +D and
- PWM* / E* to -D.

When the switch S1 is switched on the Drive goes after the initialization of the electronics to full speed.
This mode can be used if the CCU which controls the Drive has limited capabilities or does not even exist. The Drive is just switched on and off via any power switch like a relay, MOS FET, or even just a switch.
The appropriate current rating for this “switch” has to be dimensioned according to the current consumption of the Drive.

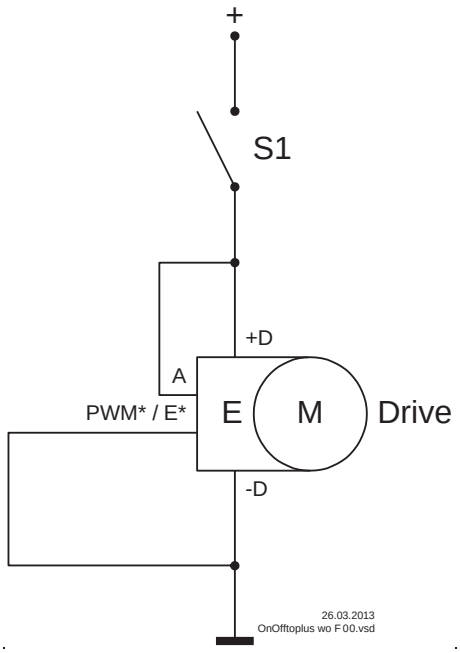


INTERFACE MODE 2: ON / OFF TO PLUS

To realize the mode On / off to plus with the Drive Interface for Catalog Product 12 V it is necessary to put

- A to +D and
- PWM* / E* to -D.

When the switch S1 is switched on the Drive goes after the initialization of the electronics to full speed.
This mode can be used if the CCU which controls the Drive has limited capabilities or does not even exist. The Drive is just switched on and off via any power switch like a relay, MOS FET, or even just a switch.
The appropriate current rating for this “switch” has to be dimensioned according to the current consumption of the Drive.

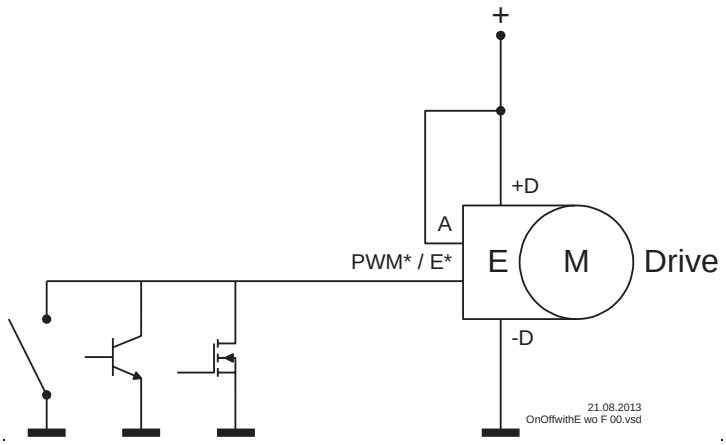


INTERFACE MODE 3: ON / OFF WITH ENABLE LOW

To realize the mode On / off with enable low with the Drive Interface for Catalog Product 12 V it is necessary

- A to +D and
- to use PWM* / E* as an low active enable.

In mode 3 the Drive can stay always on supply voltage and is controlled by a low current enable input which can be driven by simple low cost low side signal driver in the CCU. When the enable input PWM* / E* goes to high, the Drive goes after a short time into the quiescent current mode. When the enable pin PWM* / E* is driven low, the Drive goes to full speed after the initialization of the electronics. This mode can be used if the CCU which controls the Drive has limited capabilities or does not even exist. The appropriate sink current rating of the driver for the enable pin PWM* / E* has to be dimensioned according to the current consumption of the pin PWM* / E*. The circuit structure to drive the pin PWM* / E* can be any active low "open collector" Typical circuitry.

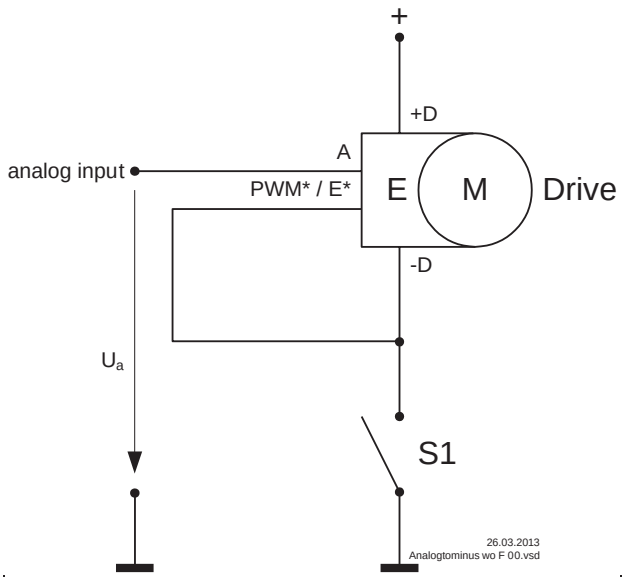


INTERFACE MODE 4: ANALOG CONTROL 1

To realize the mode Analog control 1 with the Drive Interface for Catalog Product 12 V it is necessary

- to use A as an analog input and
- to put PWM* / E* to -D.

When the switch S1 is switched on the Drive goes after the initialization of the electronics to the speed requested by the analog input A. The appropriate current rating for this "switch" has to be dimensioned according to the current consumption of the Drive.

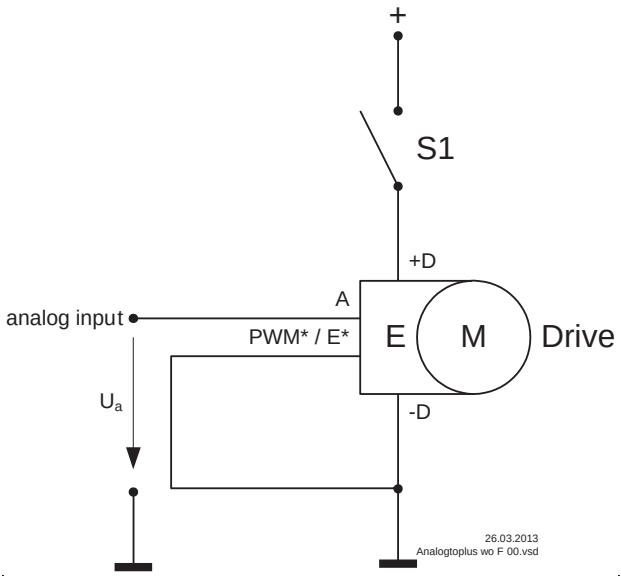


INTERFACE MODE 5: ANALOG CONTROL 2

To realize the mode Analog control 2 with the Drive Interface for Catalog Product 12 V it is necessary
- to use A as an analog input and
- to put PWM* / E* to -D.

When the switch S1 is switched on the Drive goes after the initialization of the electronics to the speed requested by the analog input A.

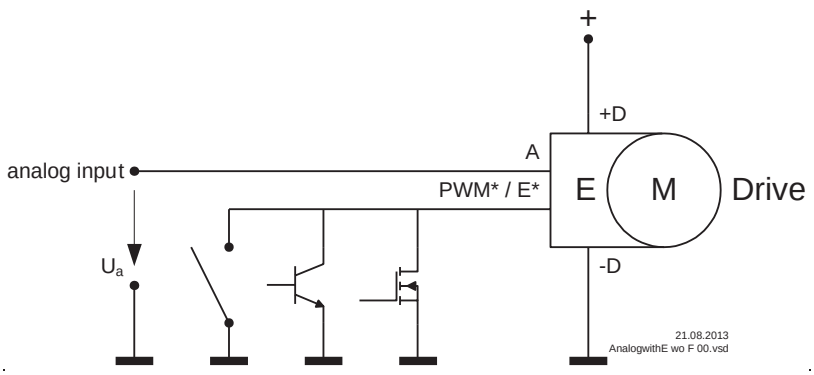
The appropriate current rating for this "switch" has to be dimensioned according to the current consumption of the Drive.



INTERFACE MODE 6: ANALOG CONTROL WITH ENABLE LOW

To realize the mode Analog control with enable low with the Drive Interface for Catalog Product 12 V it is necessary
- to use A as an analog input and
- to use PWM* / E* as a low active enable.

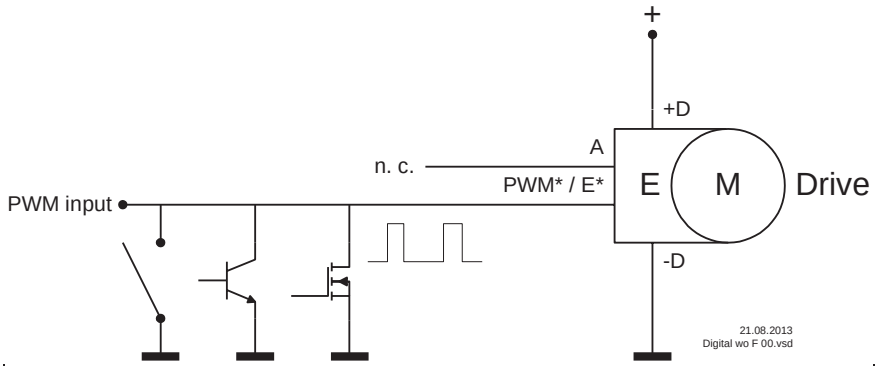
In mode 6 the Drive can stay always on supply voltage and is controlled by a low current enable input which can be driven by simple low cost low side signal driver in the CCU. When the enable input PWM* / E* goes to high, the Drive goes after a short time into the quiescent current mode.
When the enable pin PWM* / E* is driven low, the Drive goes to the speed requested by the analog input A after the initialization of the electronics. The appropriate sink current rating of the driver for the enable pin PWM* / E* has to be dimensioned according to the current consumption of the pin PWM* / E*.
The circuit structure to drive the pin PWM* / E* can be any active low "open collector" Typical circuitry
In this operating mode the supply voltage plus is usually connected permanently. To run the Drive first the pin PWM* / E* has to be connected to supply voltage minus and afterwards the Drive speed can be then controlled with an analog voltage on the pin A.



INTERFACE MODE 7: DIGITAL CONTROL

To realize the mode Digital control with the Drive Interface for Catalog Product 12 V it is necessary
- to apply a PWM signal on the pin PWM* / E*.

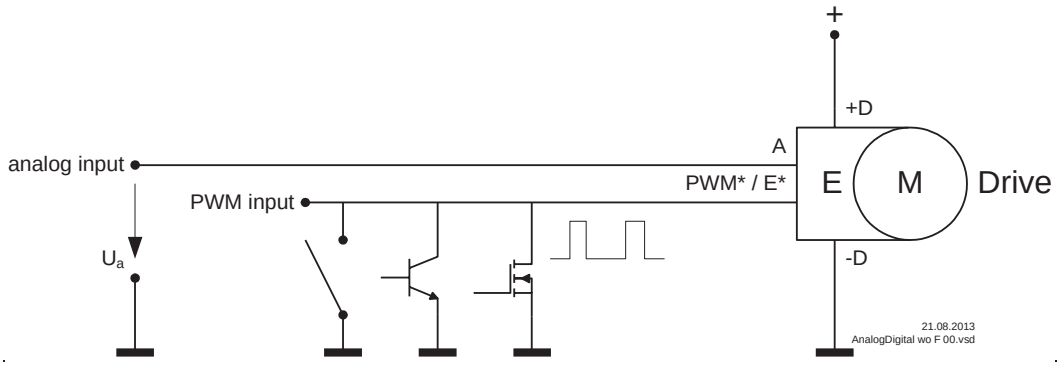
In mode 7 the Drive can stay always on supply voltage and is controlled by a low current PWM and enable PWM* / E* input which can be driven by simple low cost low side signal driver in the CCU. When the enable input PWM* / E* goes to high, the Drive goes after a short time into the quiescent current mode. When the enable pin PWM* / E* is driven with PWM, the Drive goes to the speed requested by the duty cycle after the initialization of the electronics. The appropriate sink current rating of the driver for the enable pin PWM* / E* has to be dimensioned according to the current consumption of the pin PWM* / E*.
The circuit structure to drive the pin PWM* / E* can be any active low "open collector" Typical circuitry In this operating mode the supply voltage plus is usually connected permanently. To run the Drive on the pin PWM* / E* a PWM signal has to be applied and with the duty cycle of the PWM signal the Drive speed can be then controlled.



INTERFACE MODE 8: MIXED ANALOG / DIGITAL CONTROL

To realize the mode Mixed analog / digital control with the Drive Interface for Catalog Product 12 V it is necessary
- to use A as an analog input and
- to apply a PWM signal on the pin PWM* / E*.

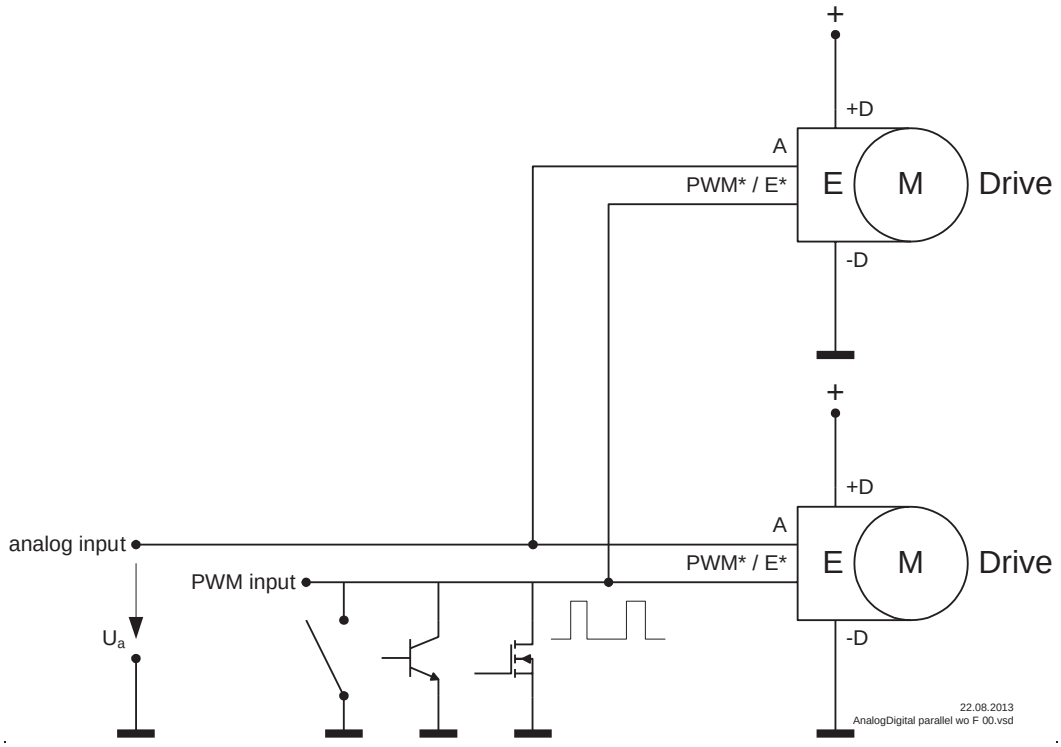
In mode 8 the Drive can stay always on supply voltage and is controlled by a low current PWM and enable PWM* / E* input which can be driven by simple low cost low side signal driver in the CCU. When the enable input PWM* / E* goes to high, the Drive goes after a short time into the quiescent current mode. When the enable pin PWM* / E* is driven low (switched to supply voltage minus), the Drive goes to the speed requested by the analog input A after the initialization of the electronics (if the electronics is not already activated). When the enable pin PWM* / E* is driven with PWM, the Drive goes to the speed requested by the duty cycle after the initialization of the electronics (if the electronics is not already activated). The appropriate sink current rating of the driver for the enable pin PWM* / E* has to be dimensioned according to the current consumption of the pin PWM* / E*. The circuit structure to drive the pin PWM* / E* can be any active low "open collector" Typical circuitry.



In this operating mode the supply voltage plus is usually connected permanently. To run the Drive on the pin PWM* / E* a PWM signal has to be applied and with the duty cycle of the PWM signal the Drive speed can be then controlled. If the pin PWM* / E* is switched to supply voltage minus the Drive speed can be then controlled with an analog voltage on the pin A.
So a mixed control with either digital or analog input is possible. The priority has the digital PWM signal.

INTERFACE PARALLEL CONFIGURATION

The Drives can be used in a parallel configuration in the PWM driven modes as well as in analog driven modes and also in the combines analog / PWM mode in such a way that the control lines are connected in parallel as shown in Figure for the example of two Drives.



There is no limitation from the Drive's point of view in paralleling them. Nevertheless from the CCU's point of view for dimensioning the driver stage which controls digitally via the PWM* / E* inputs of the Drives or which controls analog via the A inputs of the Drives the speed of the Drives it has to be considered that all of the Drives needs a certain current each (see Table 6 and Table 7). The output driver stage of the CCU needs to capable of driving minimum the input currents of PWM* / E* and / or A times the number of the Drives.

FUSE PROTECTION

An automotive fuse according ISO8820 part 3 must be used in the application wire harness. Depending on the application of the fan, it will be necessary to define and verify the correct fuse level by the customer (due to the length of the vehicle cable harness, cross section of the power wires, fuse type).

POWER SUPPLY RESIDUAL RIPPLE

The maximum value of power supply rms ripple acceptable for the Drive is 1 %. In case of application with high residual ripple values, please contact SPAL in order to find the suitable solution for your specific requirements.

STANDARDS AND DIRECTIVES

The product complies with the following standard / directives

Standard Code	Description
72/245/EC and updates	Automotive EMC directive
ECE Reg. 10-03 and updates	Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility
2002/95/EC RoHS	Restriction of Hazardous Substances Directive
2000/53/EC and updates	End-of Life Vehicle 2000/53/EC

SEALING

Motor designed for **IP6K9K** and **IP68** protection

SPAL AUTOMOTIVE

ACCESSORIES

ACCESSORIES ON REQUEST

SPAL p/n 30130709 – Additional protection guard for VA89 and VA113 shroud

30130709	Fitting

YAZAKI CONNECTOR COUNTERPART

SPAL p/n 30130628 Complet Connector Counterpart. Kit available upon request.

The Kit includes:

Corresponding Yazaki component PN	Notes	Qty
7283-8497-90	Male Connector	1
7158-3032-60	Seal gasket 1,5 [mm]	1
7116-3251	Female Fast-on terminal	2
7157-3582-90	Seal gasket Ø 2,5-3,5 [mm] for cables	2
7116-3250	Female Fast-on terminal	2
7158-3035	Seal gasket Ø 4-5 [mm] for cables	2
7157-3581-80	Seal gasket Ø 4,75-5,65 [mm] for cables	2
7116-3285-02	Female Fast-on terminal	2
7158-3036-70	Seal gasket Ø 5,5-6,5 [mm] for cables	2
7116-4103-02	Female Fast-on terminal	2
7158-3031-90	Seal gasket Ø 1,6-2,2 [mm] for cables	2
7116-4102-02	Female Fast-on terminal	2
7158-3030-50	Seal gasket Ø 1,2-1,7 [mm] for cables	2
7147-8925-30	Connector fixing hook	1

SPAL AUTOMOTIVE

This catalogue replaces all the previous one.

Our technical specification are purely indicative and might change without any previous notice.

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