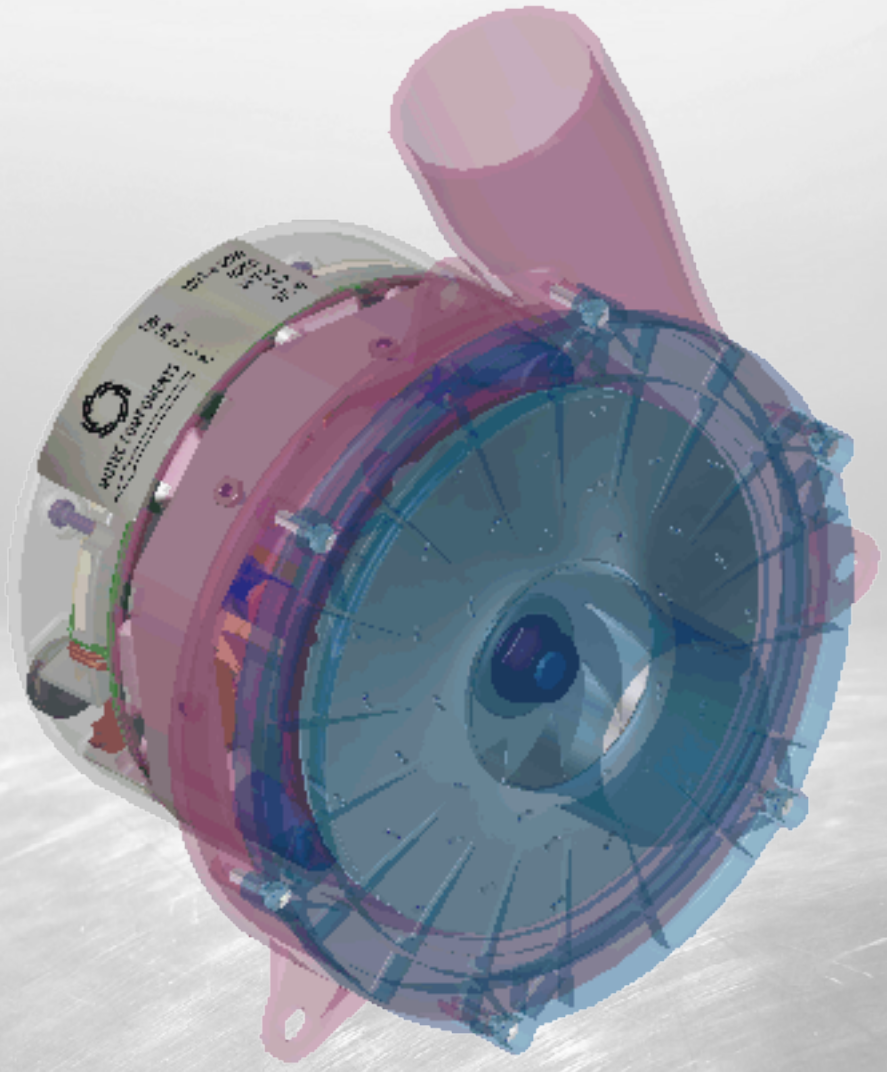
Scavenging Blowers and Fans for the Industry and Defense



Designed to meet the requirements of modern high-performance machinery and vehicles

Content

BLOWER

Know How
As a result of many years of experience in development and production, we are in the position to offer to our customers complete solutions in the transmission of gaseous media. We work as service provider and supplier for numerous large and medium-sized international companies. In recent years, we have created innovative solutions together with our customers, which have also been filed as patents.
Quality: BORSERINI SRL is certified according DIN EN ISO 9001:2015

OEM

As a specialist in flow technology for gaseous media, actiro develops and manufactures OEM products for a range of large companies. The industries include safety engineering, machine construction, medical technology and environmental protection equipment. Our customers profit from our competence in building electric motors and in the design of blowers. As well as blowers, actiro also develops and manufactures system solutions with integrated blowers.

Our services

Development and design of individual blowers according to customer requirements
Project management for the customer

Prototyping

Documentation and tests in our laboratory
Certification to customer specifications
Preparation for series production and support in producing QM measures

Product

Individual blowers and complete system solutions with blowers
The customer receives a testable unit

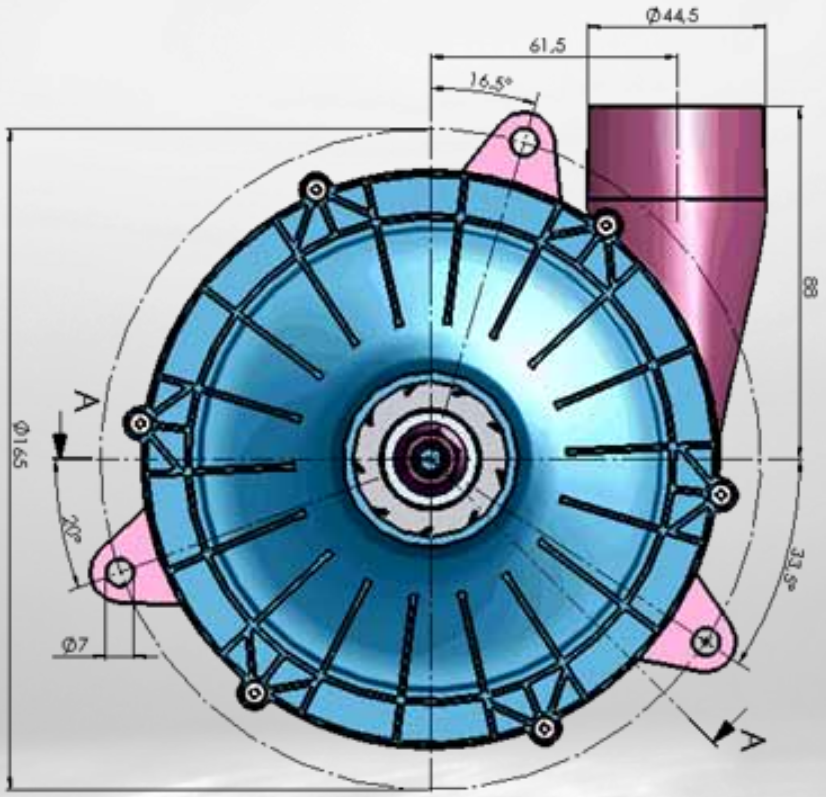
Standard High-Performance Blowers

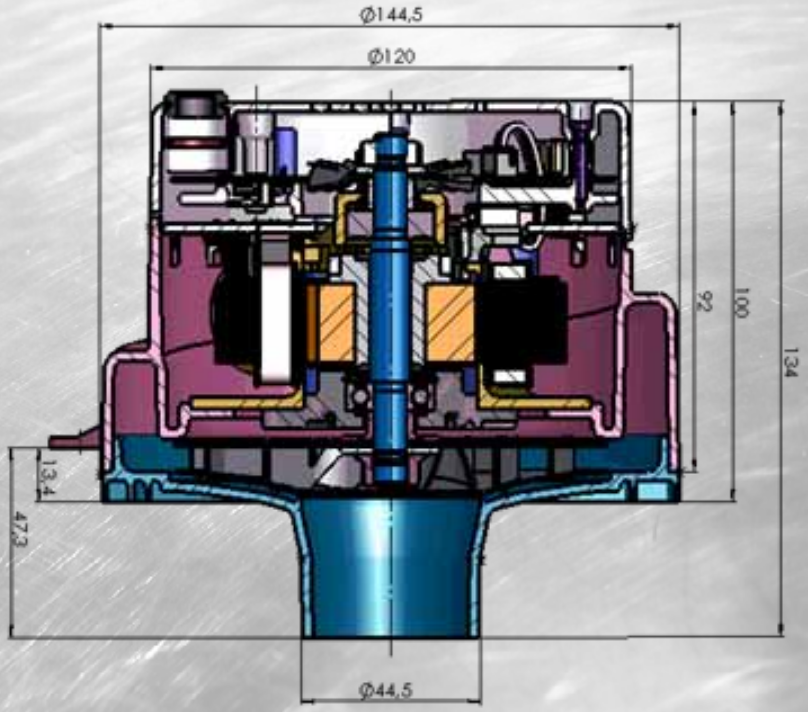
The high-performance blowers are based on the SR technology developed by actiro. The SR motors are brushless motors, which are predestined for operation at high revolutions. The rotor has no winding and also no working magnets, which could move or be damaged at high centrifugal forces and temperatures. The rotor package consists of laminated electrical sheets and is extremely resistant to loads and positionally stable. Rotor imbalances do not increase in the course of operation. The SR motor from actiro has a patented special characteristic: an adjustable gap between stator and rotor. With very good centring of the rotor, this enables a corresponding improvement in performance of the motor.

Description of "Low Voltage" single phase blower range

1. Mechanical construction

The blowers in the "Low Voltage" model range consist of a one stage radial blower with a tangential air outlet and an axial air intake. A direct current supply is used, and depending on the type, the voltage is between 12V and 48V. Drive is by means of an integrated self-commutated single phase SR motor. This motor is maintenance-free and therefore achieves a significantly longer working life than commutator motors. The simple construction of the rotor permits high rotational speeds which give the blower an excellent output/ volume ratio.
For geometric data, please refer to dimensional drawing. The air intake and outlet diameter is 39.5 mm (opening). The blower has a weight of approx. 1.4 kg





TYPES OVERVIEW

Model	Supply Voltage	Power Requirement	Current	Max Air Flow l/sec	Max Pressure KPa	Information Sheet	Connection Configura-tion	Constant Speed Control	Connection	A-Bearing	Housing	Fuse Required
R-0420-48V-1041-0	48V	420W	8.7A	45	70	3	D	X	Control voltage analogue	sealed	sealed	10 A time-lag IEC 60127-2-5
R-0195-24V-1041-1	24V	195W	8.2A	34	66	2	B		Control voltage ana-logue / sep. control-ler voltage	sealed		10 A time-lag IEC 60127-2-5
	12V/24V	48W	4A	19	24	6						6.3 A time-lag IEC 60127-2-5
R-0195-24V-1041-2	24V	195W	8.2A	34	66	2	D		Control voltage analogue	sealed	sealed	10 A time-lag IEC 60127-2-5
R-0510-48V-1041-3	48V	510W	11A	46	138	7	D		Control voltage analogue	sealed	sealed	12.5 A time-lag 6.3x32 Type 189140, Siba
R-0195-24V-1041-4	24V	195	8.2A	34	66	2	G		Control voltage Potentiometer	sealed	sealed	10 A time-lag IEC 60127-2-5
R-0510-48V-1041-5	48V	510	11A	46	138	7	G		Control voltage Potentiometer	sealed		12.5 A time-lag 6.3x32 Type 189140, Siba
R-0195-24V-1041-6	24V	195W	8.2A	34	66	2	J		Control voltage PWM 5V 5 kHz	sealed	sealed short inlet	10 A time-lag IEC 60127-2-5
R-0195-24V-1041-7	24V	195W	8.2A	34	66	2	M		Only supply voltage	sealed	sealed	10 A time-lag IEC 60127-2-5
R-0420-48V-1041-8	48V	420W	8.7A	45	70	3	G	X	Control voltage Potentiometer	sealed	sealed	10 A time-lag IEC 60127-2-5
R-048-12V-1041-9	12V	48W	4A	19	24	6	D		Control voltage analogue	sealed	sealed	6.3 A time-lag IEC 60127-2-5
R-0425-24V-1042-10	24V	195W	8.2A	34	66	2	C		Contacts for switch	sealed	sealed	10 A time-lag IEC 60127-2-5

TYPES OVERVIEW

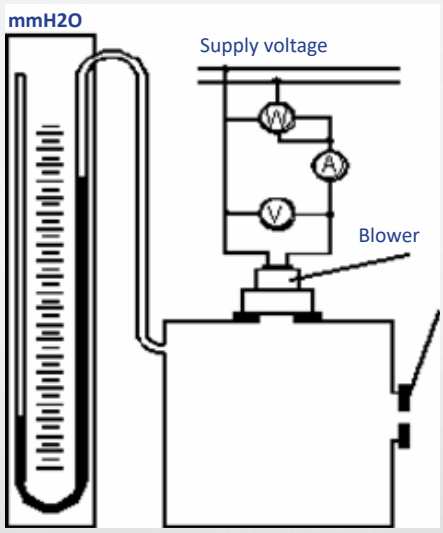
Model	Supply Voltage	Power Requirement	Current	Max Air Flow l/sec	Max Pressure KPa	Information Sheet	Connection Configura-tion	Constant Speed Control	Connection	A-Bearing	Housing	Fuse Required
R-0425-24V-1042-1	24V	425W	17.7A	43	112	1	B		Control voltage ana-logue / sep. controller voltage	sealed		20 A time-lag 6.3x32 Type 189140, Siba
	12V/24V	90W	7.5A	25	46	5						10 A time-lag IEC 60127-2-5
R-0425-24V-1042-2	24V	425W	17.7A	43	112	1	D		Control voltage analogue	sealed	sealed	20 A time-lag 6.3x32 Type 189140, Siba
R-0425-24V-1042-3	24V	425W	17.7A	43	112	1	E		Control voltage ana-logue / sep. controller voltage	sealed	sealed	10 A time-lag IEC 60127-2-5
	12V/24V	90W	7.5A	25	46	5						10 A time-lag IEC 60127-2-5
R-0425-24V-1042-4	24V	425W	17.7A	43	112	1	D		Control voltage Analog	sealed		20 A time-lag 6.3x32 Type 189140, Siba
R-0425-24V-1042-5	24V	425W	17.7A	43	112	1	B		Control voltage ana-logue / sep. controller voltage	sealed		12.5 A time-lag 6.3x32 Type 189140, Siba
	12V/24V	90W	7.5A	25	46	5						10 A time-lag IEC 60127-2-5
R-0425-24V-1042-6	24V	425W	17.7A	43	112	1	C		Switch Connection	sealed	sealed	20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V/24V-1042-7	12V/24V	185W	15.4A	29.3	46	8	K		Control voltage ana-logue / sep. controller voltage	sealed		20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V/24V-1042-8	12V/24V	185W	15.4A	29.3	46	8	E		Control voltage ana-logue / sep. controller voltage	sealed		20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V/24V-1042-9	12V/24V	185W	15.4A	29.3	46	8	E		Control voltage ana-logue / sep. controller voltage	sealed		20 A time-lag 6.3x32 Type 189140, Siba

TYPES OVERVIEW

Model	Supply Voltage	Power Requirement	Current	Max Air Flow l/sec	Max Pressure KPa	Information Sheet	Connection Configura-tion	Constant Speed Control	Connection	A-Bearing	Housing	Fuse Required
R-0425-24V-1042-10	24V	425W	17.7A	43	112	1	M		Only supply voltage	sealed		20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V-1042-11	12V	185W	15.4A	43	43	8	N		Contacts for switch DC/DC converter	sealed	sealed	20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V/24V-1042-12	12V/24V	185W	15.4A	43	43	8	O		Contacts for switch / sep. controller voltage	sealed	sealed	10 A time-lag IEC 60127-2-5
R-048-12V-1042-13	12V	48W	4A	43	24	6	D		Control voltage Analog	sealed		20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V-1042-14	12V	185W	15.4A	43	43	8	P		Control voltage analogue DC/DC converter	sealed		12.5 A time-lag 6.3x32 Type 189140, Siba
R-0425-24V-1042-15	24V	425W	17.7A	43	112	1	G		Control Coltage Potentiometer	sealed	sealed	20 A time-lag 6.3x32 Type 189140, Siba
R-0425-24V-1042-16	24V	425W	17.7A	29.3	112	1	J		Control Voltage PMW 5V 5 kHx	sealed		20 A time-lag 6.3x32 Type 189140, Siba
R-0185-12V-1042-17	12V	185W	29.3A	29.3	43	8	G		Control Coltage Potentiometer DC/DC converter	sealed		20 A time-lag 6.3x32 Type 189140, Siba

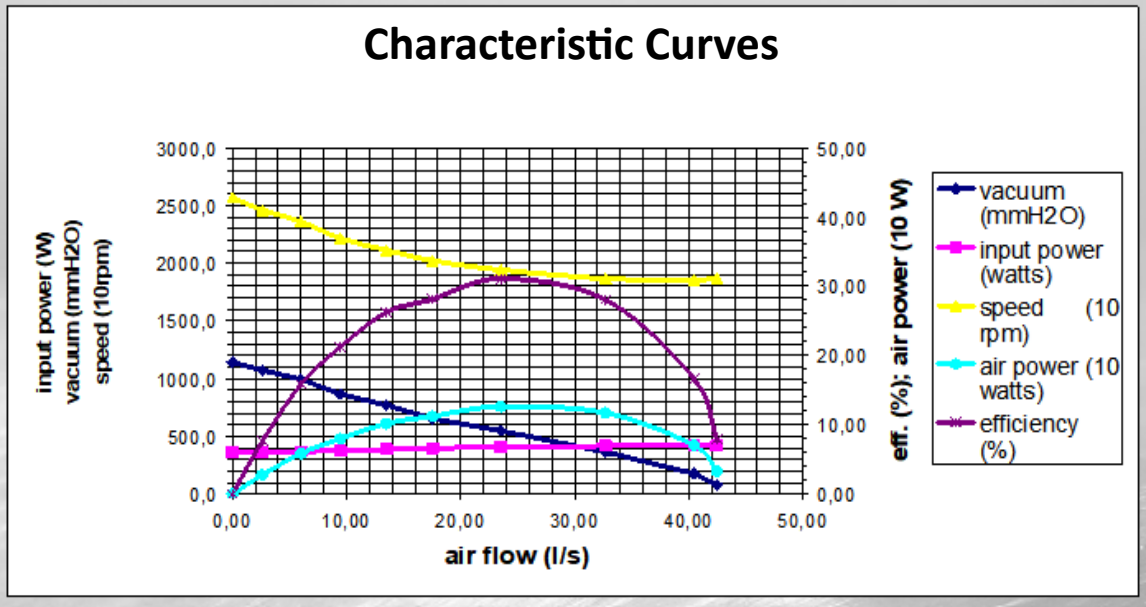
2. Parameters

The parameters of the blowers correspond to the values given in the table above, depending on the model.
The medium being propelled is air at room temperature. These characteristic curves were recorded in suction mode with full level control at 10V, maximum deflection of potential, and the nominal voltage given in the table (measured directly at the connections).
The test set-up corresponds to IEC 312. The values have been converted to normal conditions (20°C, 1014mbar). The performance data given corresponds to that for a typical blower. Because of normal manufacturing variations, the values for individual blowers may vary from the data for a typical blower. The main test set-up is shown in the following diagram:



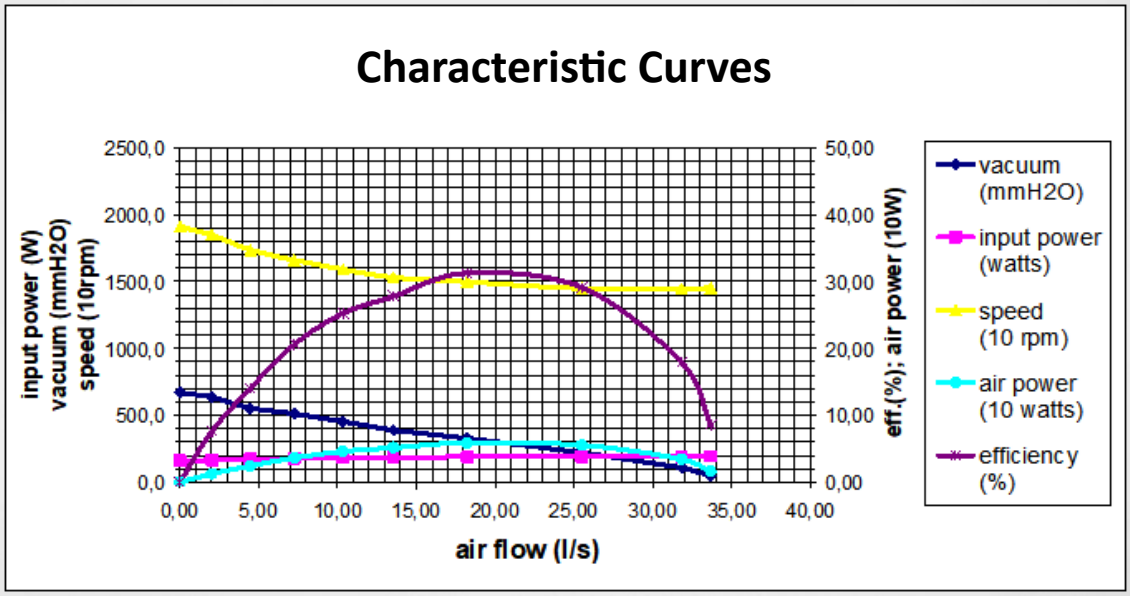
Main Test Setup

Information sheet 1 (high output, 24V)



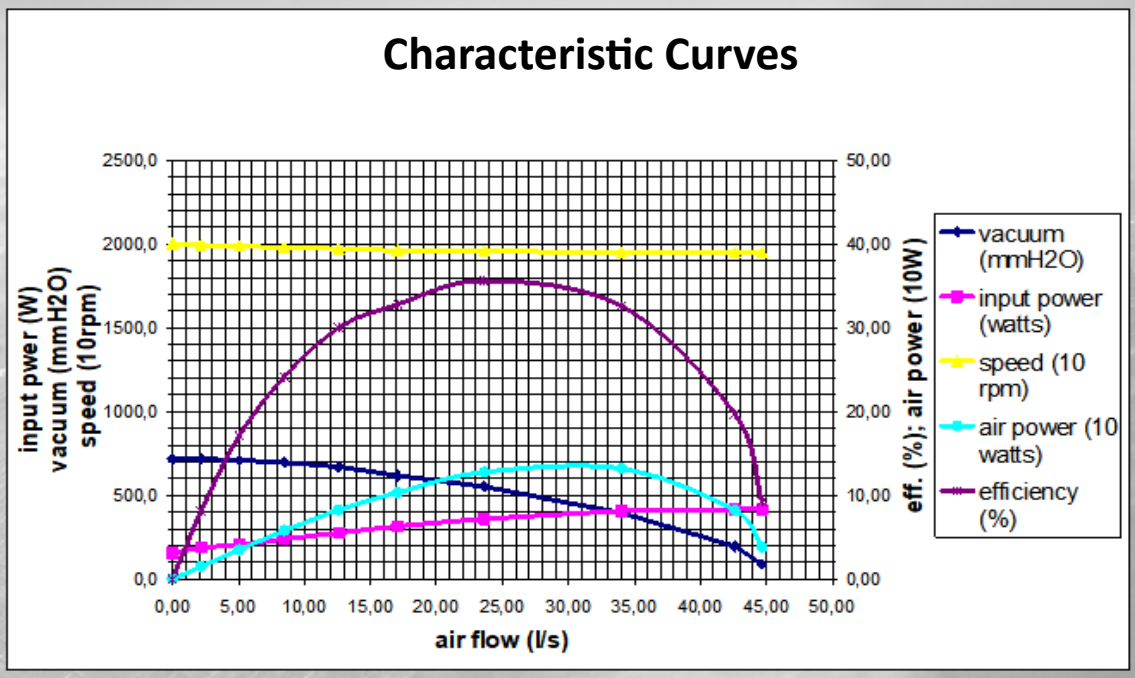
orifice (mm)	speed (rpm)	vacuum corrected (mm H2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	18665	79.9	42.46	17.54	421	33.28	7.90
40	18552	177.2	40.47	17.63	423	70.35	16.63
30	18660	365.8	32.70	17.42	418	117.30	28.06
23	19429	548.1	23.53	16.96	407	126.49	31.08
19	20222	653.7	17.54	16.63	399	112.41	28.17
16	21136	769.4	13.49	16.17	388	101.80	26.24
13	22162	865.7	9.45	15.75	378	80.21	21.22
10	23591	993.8	5.99	15.33	368	58.37	15.86
6.5	24613	1073.7	2.63	15.04	361	27.70	7.67
0	25667	1143.4	0.00	15.17	364	0.00	0.00

Information sheet 2 (Reduced output, 24V)



orifice (mm)	speed (rpm)	vacuum corrected (mmH2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	14534	50.2	33.66	8.05	193	16.57	8.59
40	14458	109.6	31.83	7.96	191	34.23	17.92
30	14481	222.4	25.50	7.96	191	55.60	29.11
23	14980	328.9	18.23	7.83	188	58.80	31.28
19	15325	389.4	13.53	7.75	186	51.68	27.79
16	15907	452.9	10.35	7.58	182	45.98	25.26
13	16622	512.4	7.27	7.38	177	36.52	20.63
10	17388	551.3	4.46	7.17	172	24.12	14.02
6.5	18489	637.4	2.03	6.92	166	12.67	7.63
0	19140	672.2	0.00	6.71	161	0.00	0.00

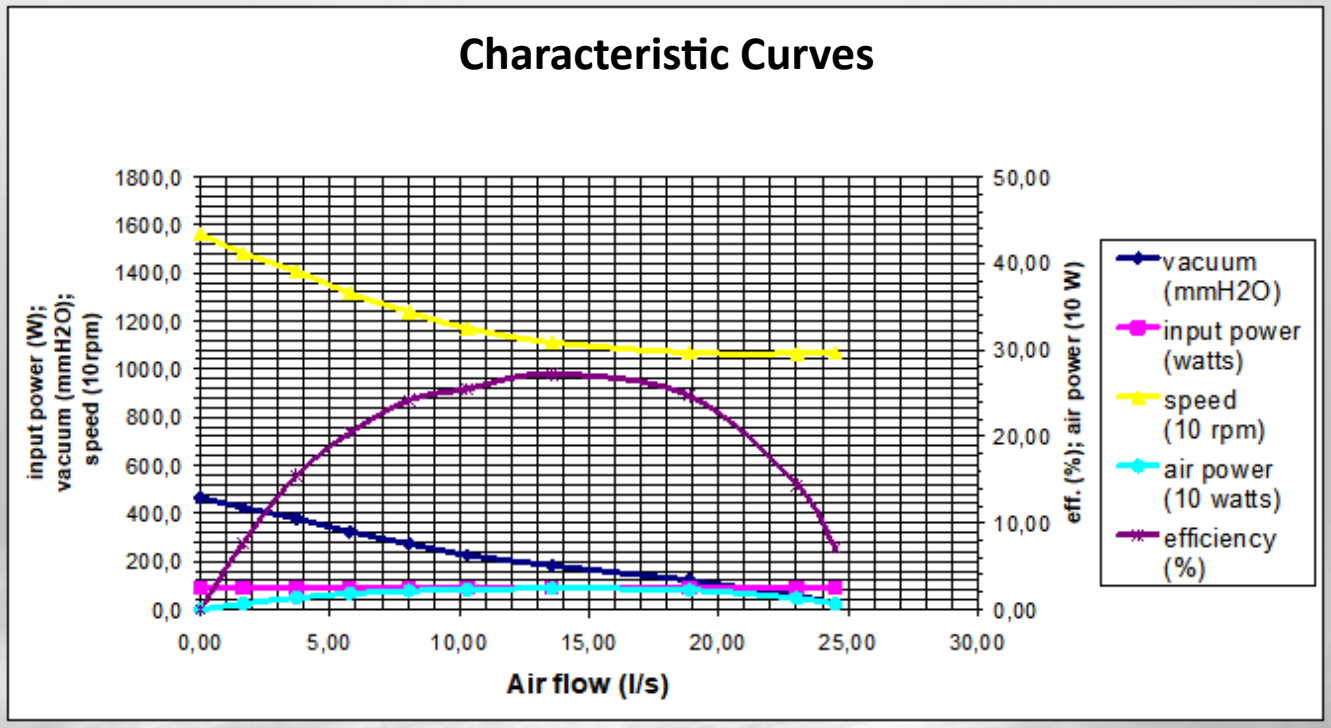
Information sheet 3 (48V)



Information sheet 3 (48V) cont'd

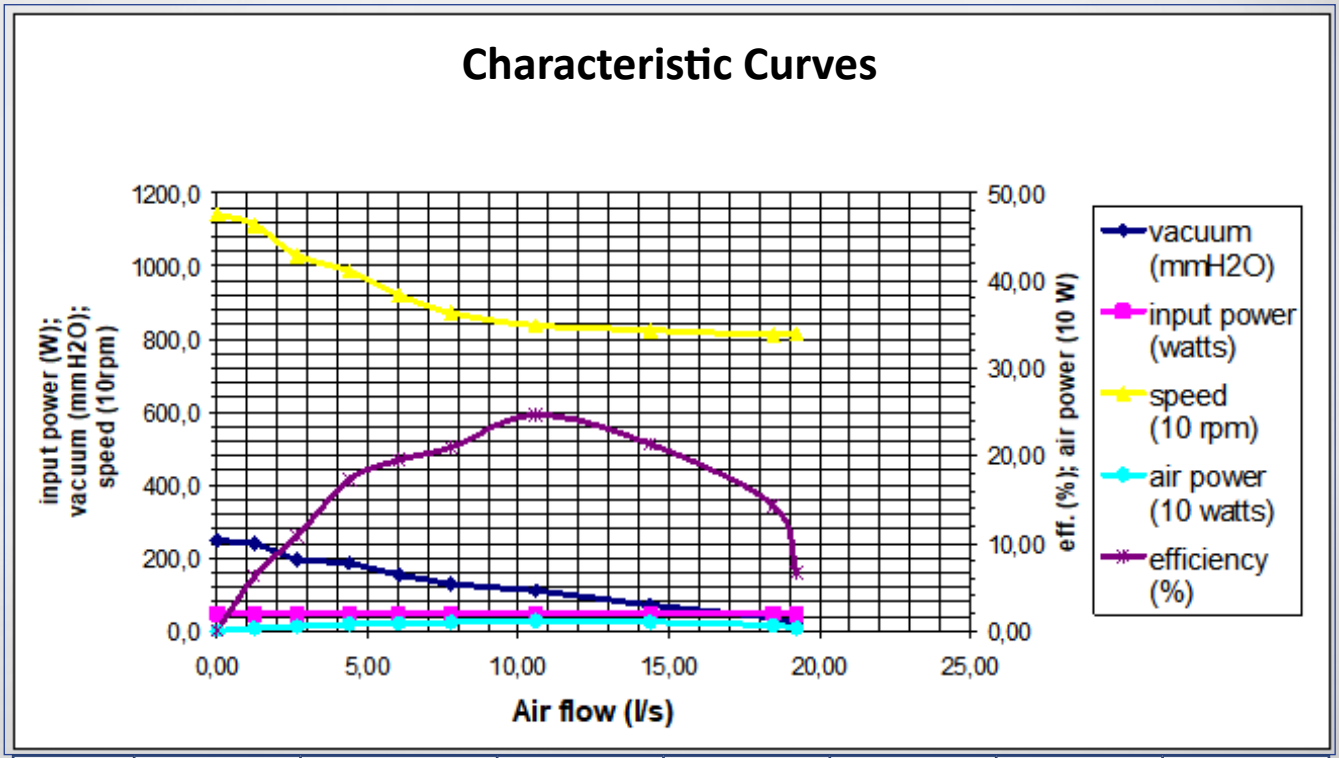
orifice (mm)	speed (rpm)	vacuum corrected (mmH2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency (%)
50	19497	88.4	44.66	8.67	416	38.73	9.31
40	19501	196.4	42.60	8.67	416	82.04	19.72
30	19498	395.8	34.02	8.44	405	132.06	32.61
23	19579	552.1	23.62	7.48	359	127.86	35.62
19	19626	617.9	17.05	6.56	315	103.31	32.80
16	19724	670.3	12.59	5.75	276	82.78	29.99
13	19800	697.1	8.48	5.00	240	57.95	24.15
10	19866	708.4	5.06	4.27	205	35.13	17.14
6.5	19943	718.6	2.15	3.90	187	15.17	8.11
0	20027	716.6	0.00	3.25	156	0.00	0.00

Information sheet 5 (12V)



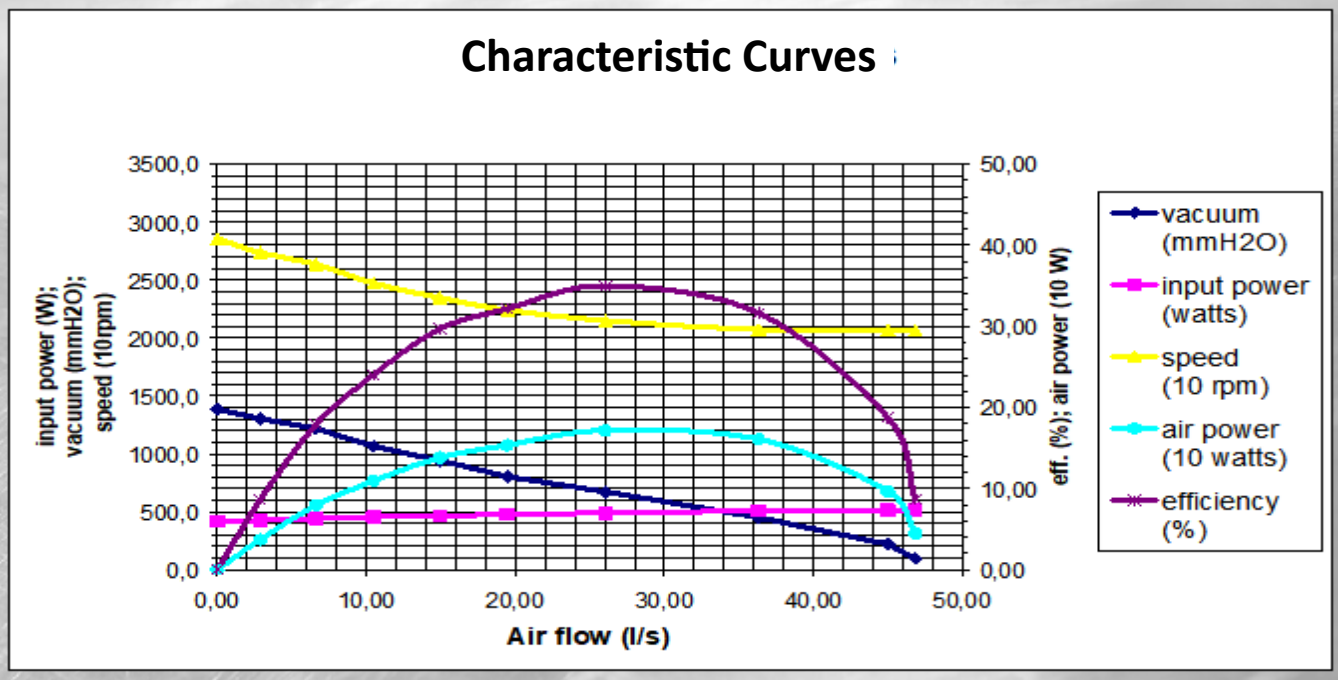
orifice (mm)	speed (rpm)	vacuum corrected (mmH2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	10679	26.6	24.51	7.5	89.6	6.40	7.14
40	10648	57.3	23.02	7.5	89.8	12.94	14.41
30	10685	121.8	18.87	7.6	91.3	22.55	24.70
23	11114	182.2	13.57	7.4	89.1	24.25	27.22
19	11703	225.2	10.29	7.4	89.2	22.74	25.49
16	12377	273.4	8.04	7.4	89.1	21.56	24.20
13	13159	322.5	5.77	7.5	89.5	18.24	20.38
10	14077	379.8	3.70	7.4	89	13.79	15.50
6.5	14817	422.8	1.65	7.4	89	6.84	7.69
0	15639	464.8	0.00	7.5	89.7	0.00	0.00

Information sheet 6 (reduced output, 12V)



orifice (mm)	speed (rpm)	vacuum corrected (mmH2O)	air flow (l/s)	current (A)	input ower (W)	air power (W)	efficiency %
50	8155	16.4	19.23	4	46.5	3.09	6.65
40	8114	36.9	18.46	4	46.6	6.68	14.33
30	8247	70.7	14.38	4	46.7	9.97	21.35
23	8371	110.7	10.57	4	46.5	11.48	24.68
19	8718	128.1	7.76	4	46.5	9.75	20.97
16	9219	153.7	6.03	4	46.5	9.09	19.55
13	9859	186.5	4.39	4	46.5	8.02	17.25
10	10296	194.7	2.65	4	46.6	5.06	10.86
6.5	11126	239.8	1.24	4	46.8	2.92	6.25
0	11418	248.0	0.00	4	46.8	0.00	0.00

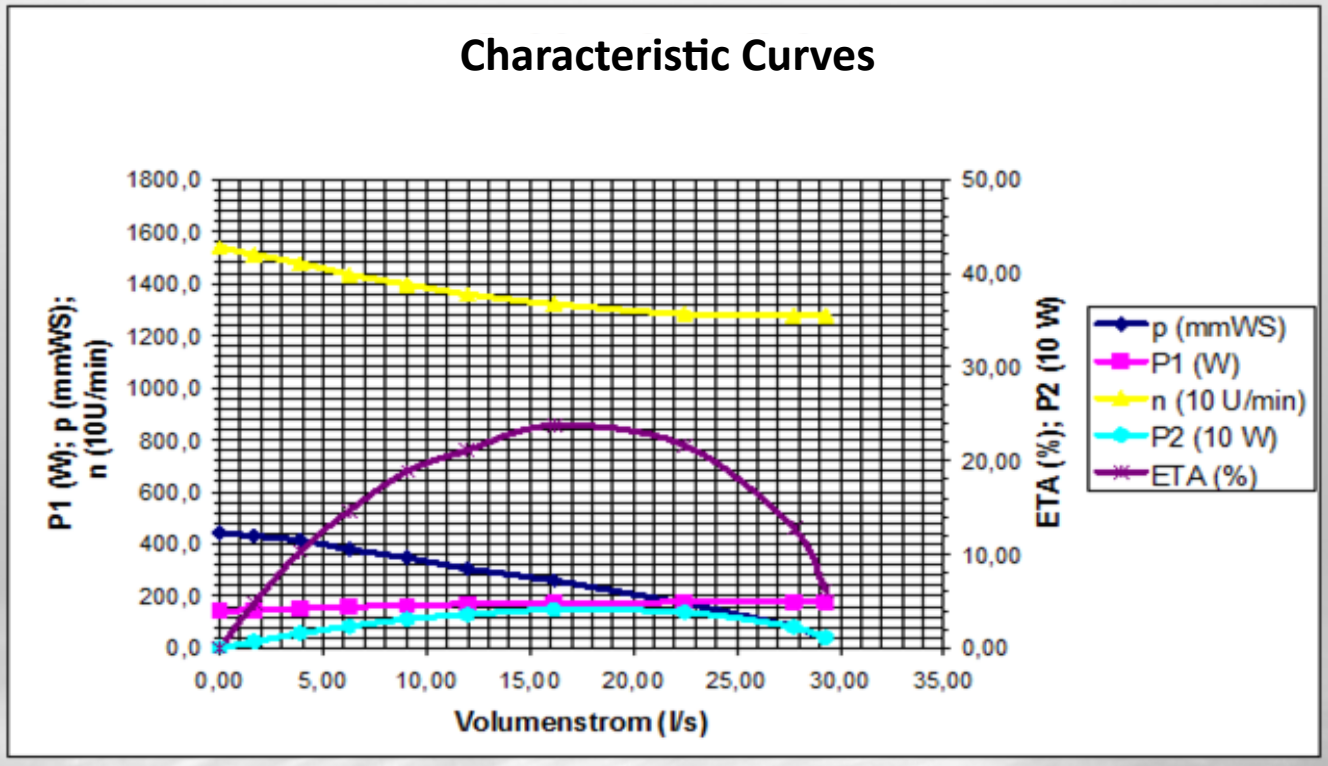
Information sheet 7 (without constant rpm control)



Information sheet 7 (without constant rpm control) cont'd

orifice (mm)	speed (rpm)	vacuum corrected (mmH2O)	air flow (l/s)	current (A)	input power (W)	Air power (W)	efficiency %
50	20622	95.1	46.32	11.12	510	43.19	8.47
40	20611	214.4	44.52	11.2	511	93.62	18.32
30	20642	445.1	36.08	11.06	505	157.45	31.18
23	21607	677.7	26.17	10.92	501	173.90	34.71
19	22435	807.2	19.49	10.52	487	154.26	31.67
16	23434	949.8	14.99	10.25	475	139.63	29.39
13	24725	1081.3	10.56	9.98	463	111.96	24.18
10	26137	1228.0	6.66	9.69	459	80.18	17.47
6.5	27359	1308.9	2.90	9.5	443	37.28	8.41
0	28309	1388.8	0.00	9.24	434	0.00	0.00

Information sheet 8 (increased output, 12V)



orifice (mm)	speed (rpm)	vacuum rrected (mmH2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	12784	38,0	29,29	15,4	177	10,92	6,17
40	12784	83,2	27,73	15,2	177	22,64	12,79
30	12834	172,6	22,47	15,2	176	38,04	21,61
23	13201	258,9	16,17	14,9	173	41,07	23,74
19	13581	304,2	11,96	14,5	169	35,68	21,11
16	13960	347,3	9,06	14,1	164	30,87	18,83
13	14347	379,2	6,25	13,6	159	23,25	14,62
10	14784	415,1	3,87	13	153	15,76	10,30
6.5	15109	430,6	1,67	12,5	147	7,03	4,78
0	15387	444,9	0,00	12,2	142	0,00	0,00

3. Electrical connection

The blowers should be operated at the indicated voltages. The supply should be free of interferences and should permit relatively high currents (in spite of inrush current limitation for the motor, inrush currents are relatively high and can result in a voltage drop). The 24V supply voltage and the separate 24V supply for the control electronics must lie within a range of 16V to 32V. If the voltage is less than 16V, the controller will be switched off. The 48V voltage must lie within a range of 40V to 57V. In principle the blower must first be connected to the voltage supply, and then switched on via the switch or via the potentiometer or via the control voltage input. The blower's standby current is typically less than 150mA (at 24V). At 48V the standby current is less than100mA.
When the blower is connected to the supply voltage, it should be ensured that 4 x 1000µF internal capacitors are connected in parallel to the connection leads. These capacitors are charged when the operating voltage is applied, and may still be charged after disconnecting.
The blower's voltage supply is to be protected with a fuse according to the table on page 2 or page 3.

3.1 Control voltage input

The control voltage input can be either an analogue voltage input (0 to 10V) or as a PWM input (12V, 10kHz, galvanically isolated). At a voltage between 0 and approx. 1.8V the blower stops. At a voltage of 10V or 100% pulse width, the blower operates at maximum power; apart from the control voltage, this depends on the loading of the blower and the actual operating voltage applied. Depending on the connection configuration, the control voltage input (Vs) can be directly biased with 0 to 10V, or this input is applied via a switch to the internal supply voltage of 10V, or a control voltage can be generated without additional electronics by means of a potentiometer and the internal supply voltage. When operating with a potentiometer or a switch, it should be noted that the internal supply voltage of 10V (10mA) is not short circuit proof, and faulty wiring can result in damage to the internal controller. It is recommended to connect a 1kOhm resistance in series to the control voltage input in order to protect the control voltage input against short-term overvoltage (>10V).

3.2 Rotational speed output

The rotational speed output can be an analogue or a PWM output. The voltage range of the analogue rotational speed output is between 0 and 10V, where 10V corresponds to a rotational speed of 50,000 rpm. The PWM output works with 10kHz. 100% pulse width also corresponds to 50,000 rpm.
The PWM output is an "open collector" output and should not be loaded with a current of more than 90mA.

3.3 Status signals and protective switching

The blower has various protective switchings:

- Undervoltage cut-out
- Overcurrent limitation
- Temperature protection
- Blocking protection

3.3.1 Undervoltage cut-out

If the voltage drops below a programmed minimum value, the blower cuts out. If this value is exceeded, the blower automatically switches on again.

3.3.2 Overcurrent limitation

If the internally defined current value is exceeded, the output stage is stopped, and is immediately restarted when the current falls below this value. A corresponding signal can be derived (“open collector” output, max. 90mA). It is normal for this signal to be triggered during rapid acceleration or during start-up.

3.3.3 Temperature protection

If an internal temperature limit value is exceeded, the output of the blower is reduced in order to maintain the cooling function and to reduce self-heating. If the temperature falls back below the internal limit, the blower goes back again to the output set by the rotational speed input. A corresponding signal can be derived (“open collector” output, max. 90mA).

3.3.4 Blocking protection

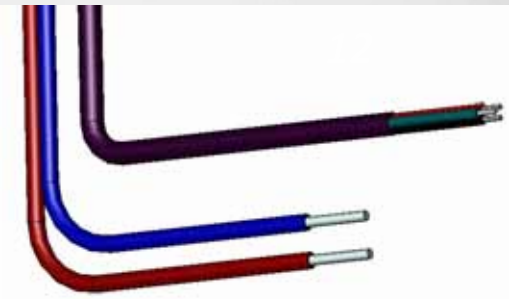
If an overcurrent is detected for longer than 1s or an overcurrent occurs twice within a short period, the motor is switched off. The motor can be operated again only after the blockage has been removed and the voltage has been disconnected.

If required, an additional voltage (5V; 100mA) can be taken off for the supply of other additional electronic components. This voltage cannot be assumed to be “safe” unless the motor supply voltage is also “safe”. It is recommended to dejam the additional leads by means of a ferrite ring core or a split ferrite.

Connection configuration A

- red 2,5mm² — Supply voltage (+)
- blue 2.5mm² — Supply voltage (- or GND)

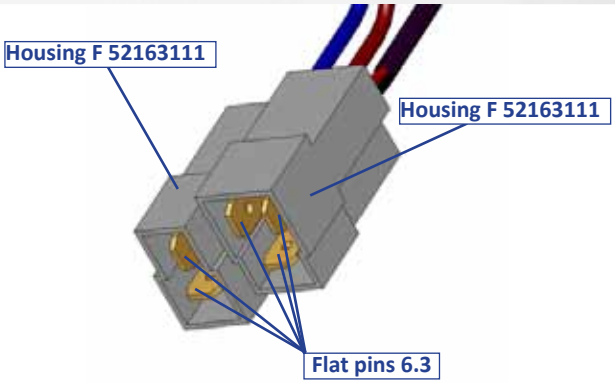
- red 0.14mm² — Control voltage input (0 to10V)
- black 0.14mm² — GND
- green 0.14mm² — Rotational speed output

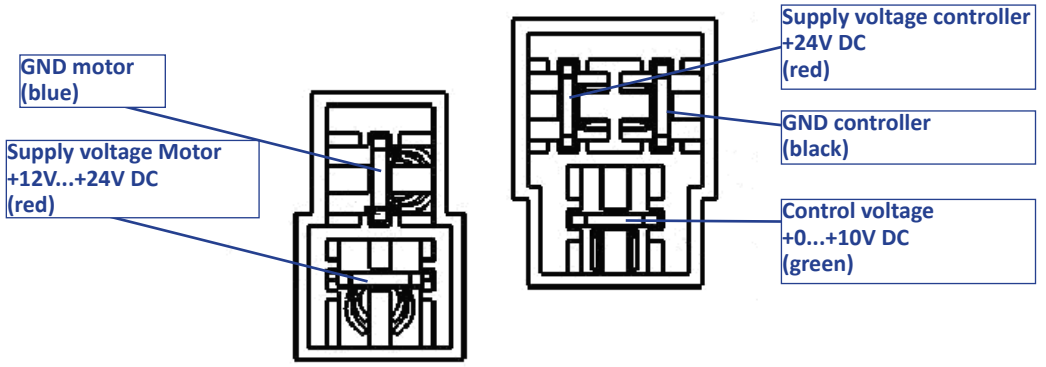


Connection configuration B

- red 2,5mm² — Supply voltage (+12 to 24V)
- blue 2.5mm² — Supply voltage (- or GND)

- red 0.14mm² — Supply voltage for controller 24V
- black 0.14mm² — GND
- green 0.14mm² — Control voltage input (0 to10V)

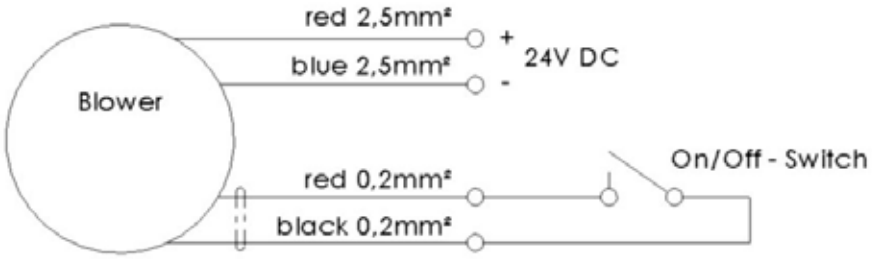




Connection configuration C

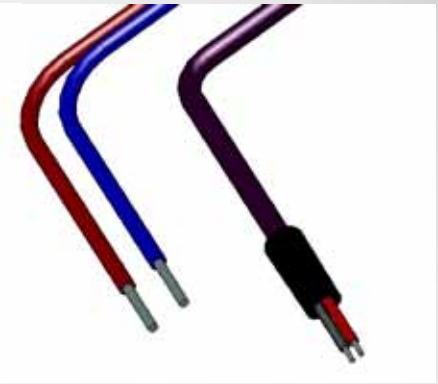
- red 2,5mm² — --o-- + +24V DC
- blue 2.5mm² — --o-- -

- red 0.2mm² — --o--
- black 0.2mm² — --o--



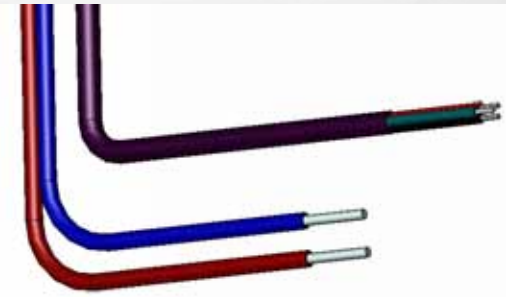
Connection configuration D

- red 2,5mm²	Supply voltage (+)
- blue 2.5mm²	Supply voltage (- or GND)
- red 0.14mm²	Control voltage input (0 to10V)
- black 0.14mm²	GND



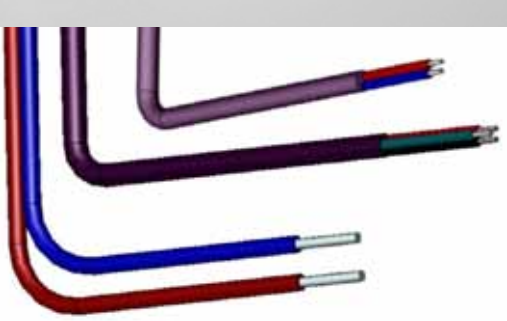
Connection configuration E

- red 2,5mm²	Supply voltage (+12 to 24V)
- blue 2.5mm²	Supply voltage (- or GND)
- red 0.14mm²	Supply voltage for controller 24V
- black 0.14mm²	GND
- green 0.14mm²	Control voltage input (0 to 10V)



Connection configuration F

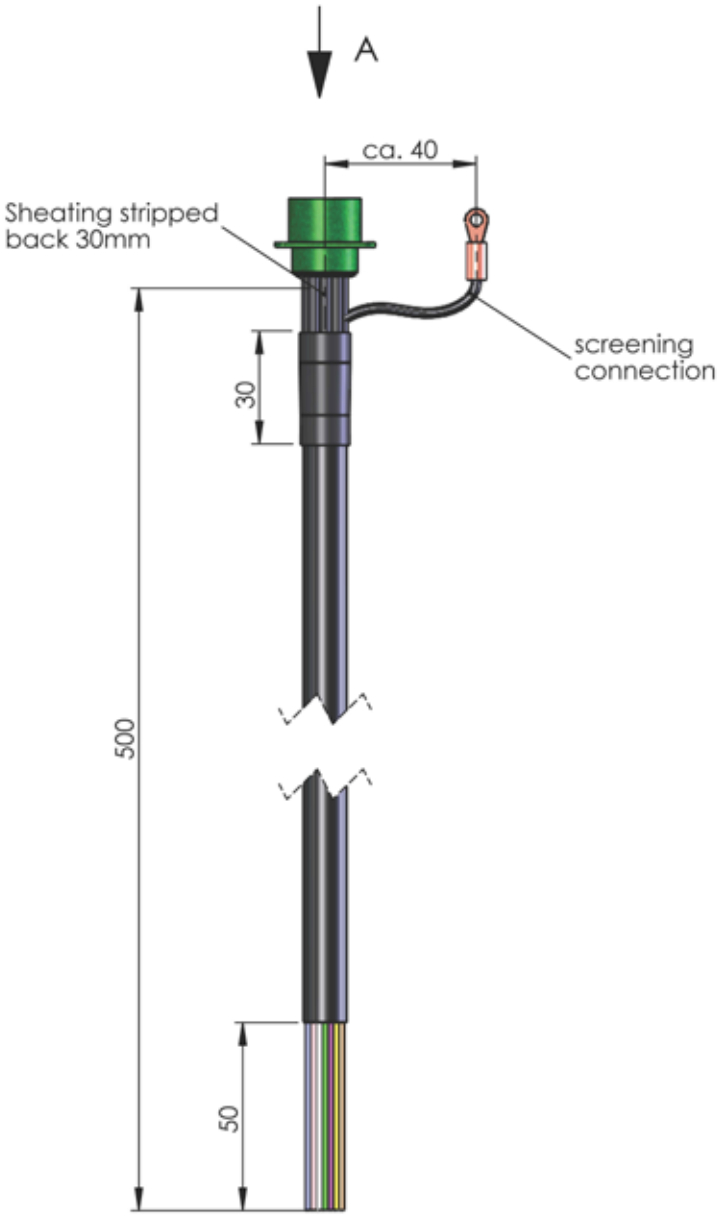
- red 2,5mm²	Supply voltage (+12 to 24V)
- blue 2.5mm²	Supply voltage (- or GND)
- red 0.14mm²	Supply voltage for controller 24V
- black 0.14mm²	GND
- green 0.14mm²	Control voltage input (0 to 10V)
- red 0,14mm²	Rotational speed output (Hall signal)
- blue 0.14mm²	Rotational speed output (GND)



Connection configuration G

- red 2,5mm²	Supply voltage (+12 to 24V)
- blue 2.5mm²	Supply voltage (- or GND)
- red 0.14mm²	Supply voltage for controller 24V
- black 0.14mm²	GND
- green 0.14mm²	Control voltage input (0 to 10V)

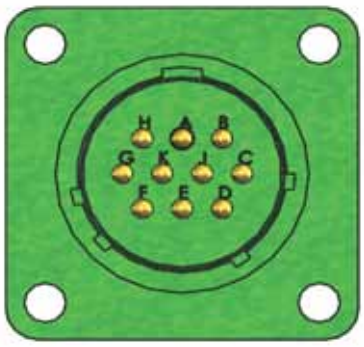
Connection configuration H



PIN	Color	Function
A	Red	-(12V-24V Motor)
B	White	+(12V-24V Motor)
C	Violet	+(12V-24V Motor)
D	Brown	+(12V-24V Motor)
E	Green	- (12V-24V Motor)
F	Yellow	+(24V CTRL)
G	Pink	- (24V CTRL)
H	Blue	Speed-In (0-10V)
J	Black	-(12V-24V Motor)
K		

Connector:
SOURIAU p/n 851 02E 12-10 P 50

A (2 : 1)



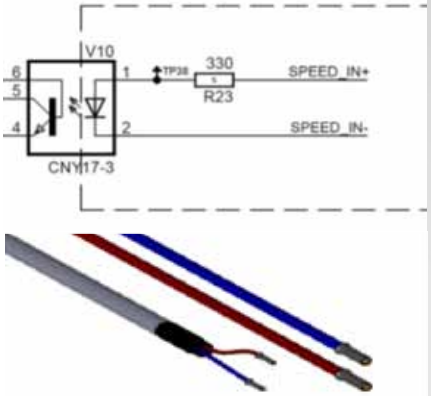
Connection configuration I

- red 2,5mm²	Supply voltage (+)
- blue 2.5mm²	Supply voltage (- or GND)
- red 0.2mm²	Control voltage input (0 to10V)
- black 0.2mm²	GND
- green 0.2mm²	overtemperature signal (@ overheating switch to GND; open collector, max. 90 mA)
- red 0.2mm²	+5V (max. 90mA)

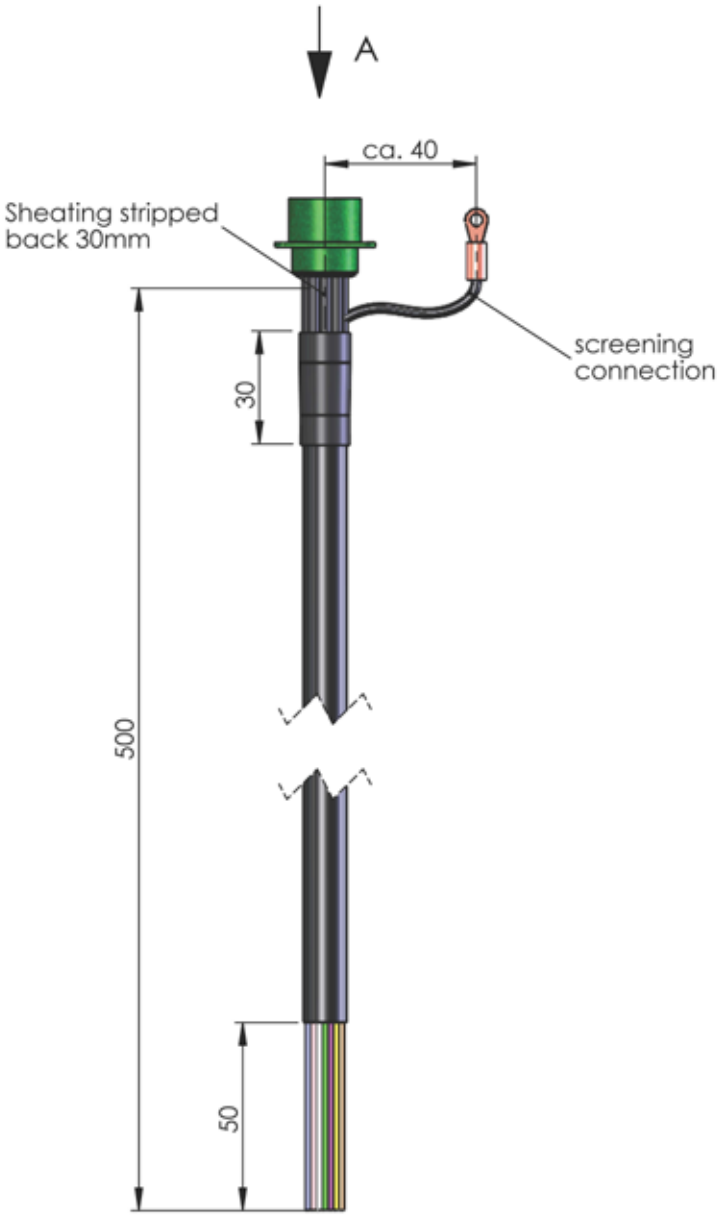
Connection configuration J

- red 2,5mm²	Supply voltage (+)
- blue 2.5mm²	Supply voltage (- or GND)
- red 0,2mm²	PWM-signal input 5V 5kHz (SPEED_IN+)
- blue 0,2mm²	PWM-GND (SPEED_IN-)

The PWM-signal is galvanically isolated from the other signals.
The preferred PWM-input is 5V 5kHz (current approx. 11mA).

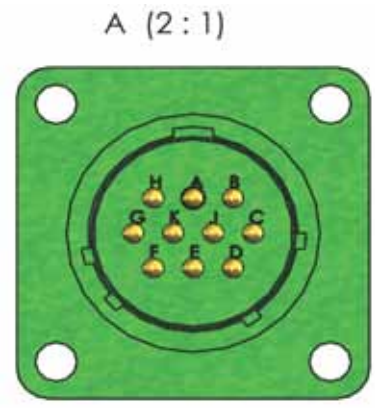


Connection configuration K



PIN	Color	Function
A	Red	-(12V Motor)
B	White	+(12V Motor)
C	Violet	+(12V Motor)
D	Brown	+(12V Motor)
E	Green	- (12V Motor)
F	Yellow	+(24V Motor)
G	Pink	- (24V Motor)
H	Blue	Speed-In (0-10V)
J	Black	-(12V Motor)
K		

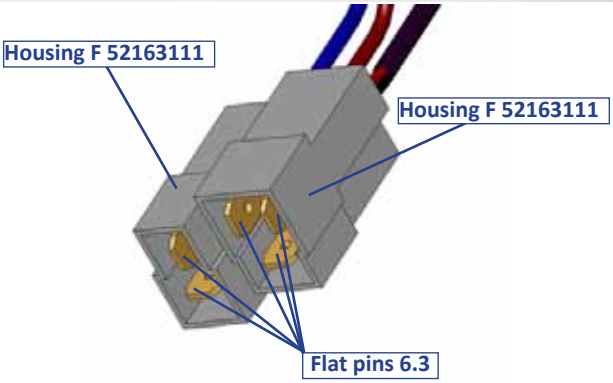
Connector:
SOURIAU p/n 851 02E 12-10 P 50



Connection configuration L

- red 2,5mm² — Supply voltage (+12V)
- blue 2.5mm² — Supply voltage (- or GND)

- red 0,2mm² — Supply voltage Controller 24V
- black0,2mm² — GND
- green 0,2mm² — contol voltage input (0-10V)



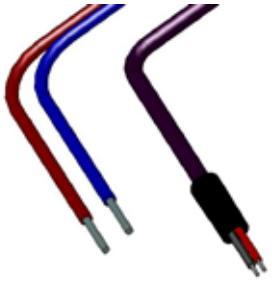
Connection configuration M

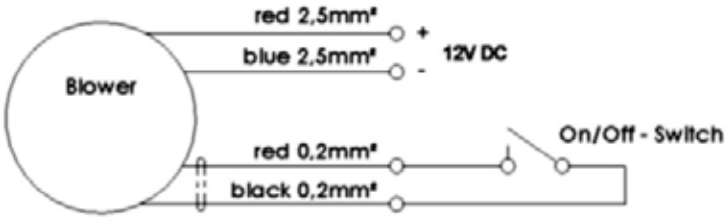
- red 2,5mm² — Supply voltage (+24V)
- blue 2.5mm² — Supply voltage (- or GND)

Connection configuration N

- red 2,5mm² --o-- +
- blue 2.5mm² --o-- -

- red 0.2mm² --o--
- black 0.2mm² --o--

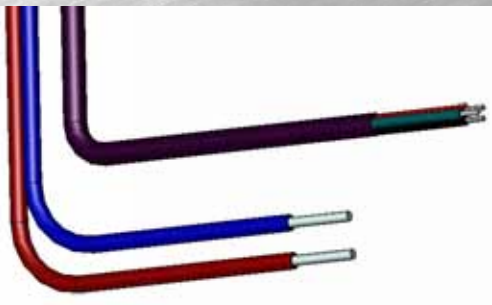




Connection configuration O

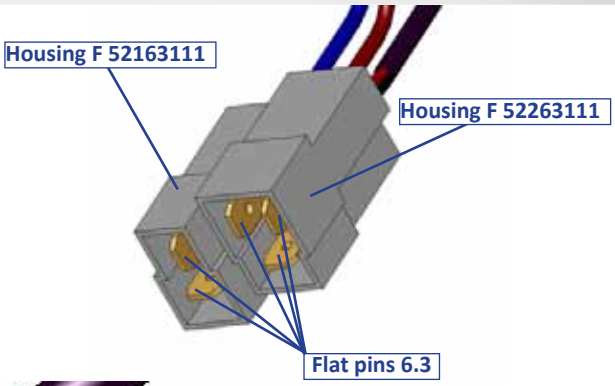
- red 2,5mm² — Supply voltage (+)
- blue 2.5mm² — Supply voltage (- or GND)

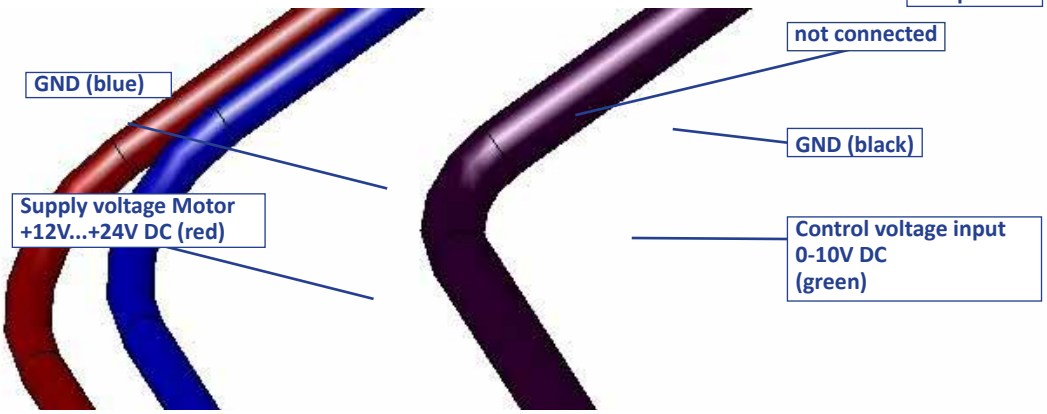
- red 0.14mm² — internal reference voltage 10V (switch)
- black 0.14mm² — supply voltage Controller 24V
- green 0.14mm² — Control voltage input (0- 10V) (switch)



Connection configuration

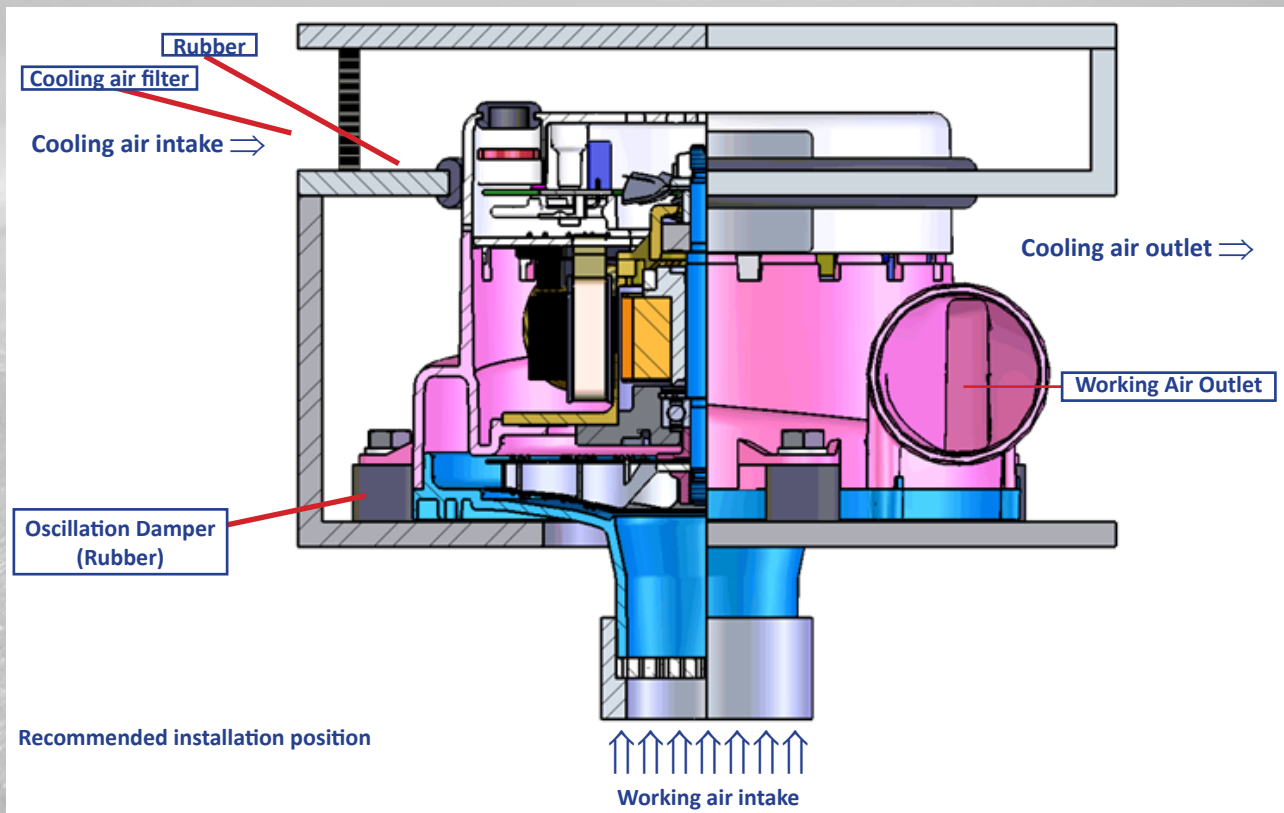
- red 2,5mm²	Supply voltage (+12 to 24V)
- blue 2.5mm²	Supply voltage (- or GND)
- black 0.14mm²	GND
- green 0.14mm²	Control voltage input (0 to10V)





4. Mechanical connection

Optimally, the blower is operated with a vertical axis of rotation and the intake opening on the underside.
The intake opening must be protected from contact by a grille or similar measures (Danger of injury!). The blower should be firmly fixed in place using the 3 flanges and 7 mm drillings, as there can be a strong moment of reaction due to the relatively high start-up moment of the motor.



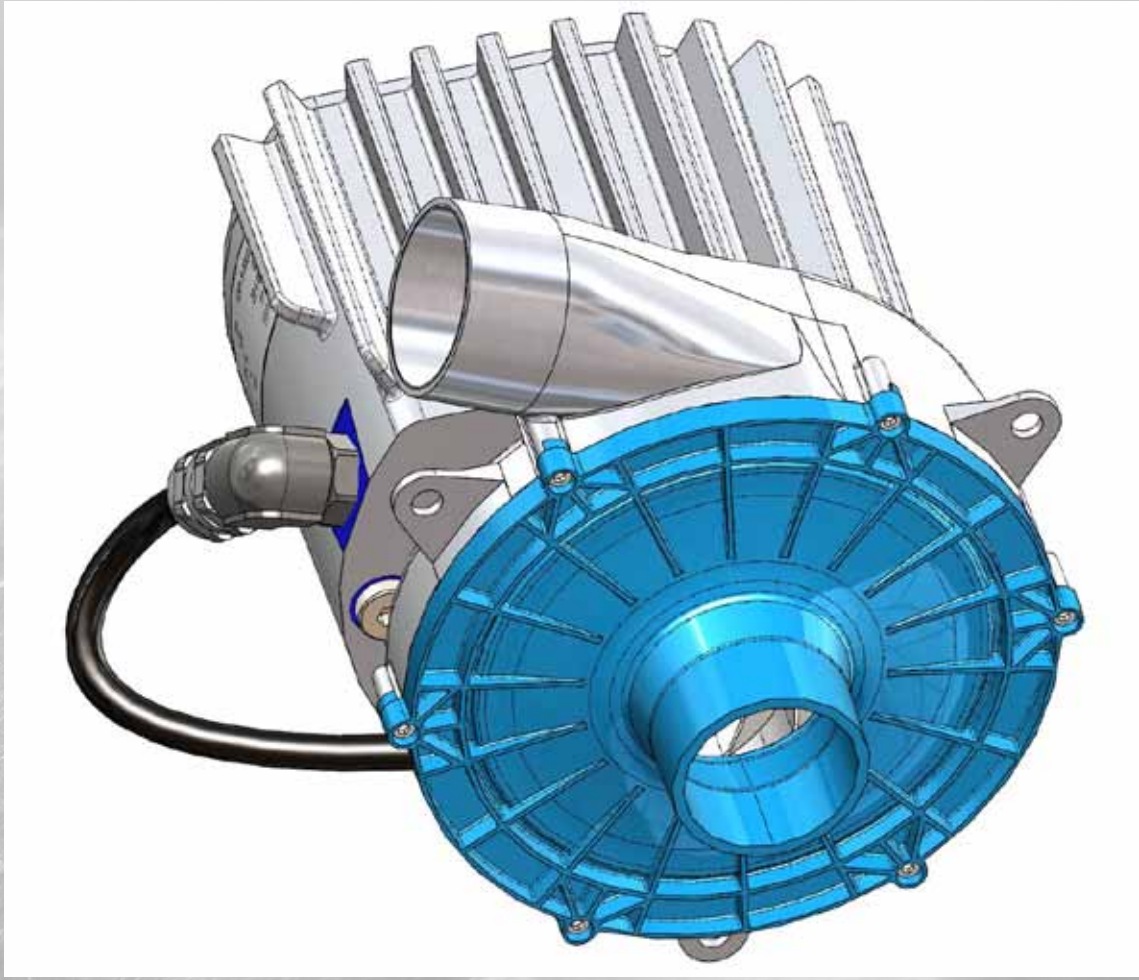
5. Miscellaneous operating instructions

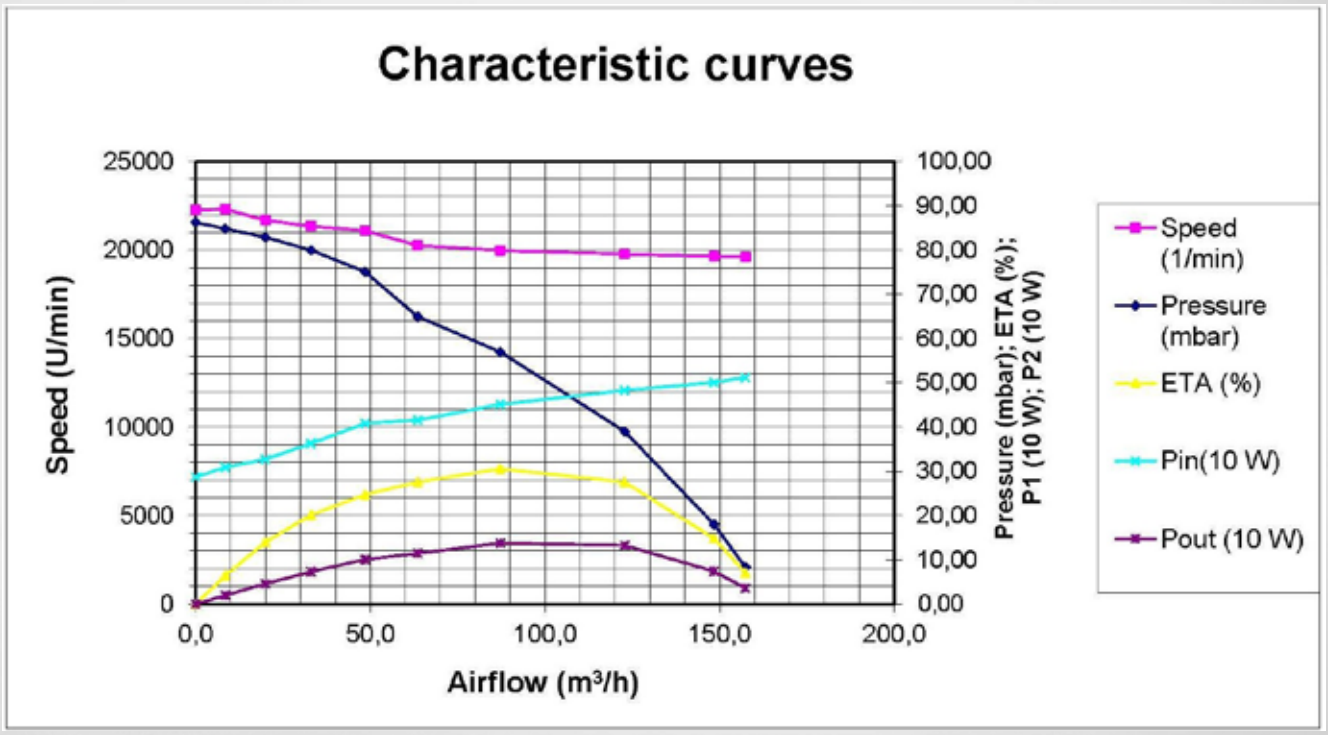
The blower is designed to work in a temperature range between -10°C and +40°C. Other temperature ranges are possible subject to testing and agreement.
The intake and outlet of cooling air should be arranged in such a way that a thermal short circuit does not occur. The cooling air should be free of dust and foreign bodies so as to avoid the build-up of damaging deposits on the inside of the blower. A filter ahead of the air intake is recommended.
The blowers are designed to protection class III, overvoltage category 1, contamination grade 2, and have degree of protection IP 20.
The coils are assigned insulation class F (ICL F).
The blower should be protected against water spray and condensed air moisture. The blower should not be exposed to corrosive gases or to liquids with alkaline or acid properties.
The working air must also be free of foreign bodies in order to prevent damage to the blower wheel, which rotates at high speed. Dust and moisture can have a negative effect on the blower's working life.
If repairs are necessary, these may be carried out only by the manufacturer.
The blower must not be opened, as this action, or modification, or incorrectly executed repairs can result in hazards to life and limb.
The blower is not designed and cannot be used for life-maintaining systems.
The number of hours that the blower has operated is determined electronically.

"Low Voltage" Single-Phase Blower
1045 Full Sealed Range

1. Mechanical construction

The blower R-0500-16-32V-1045-6 is one stage radial blower with a tangential air outlet and an axial air intake. A direct current supply is used, and depending on the type, the voltage is between 16V and 32V. Drive is an integrated conventional 3-phase BLDC motor. This motor is maintenance-free and therefore achieves a significantly longer working life than commutator motors.
For geometric data, please refer to dimensional drawing. The blower has a weight of approx. 3.8 kg

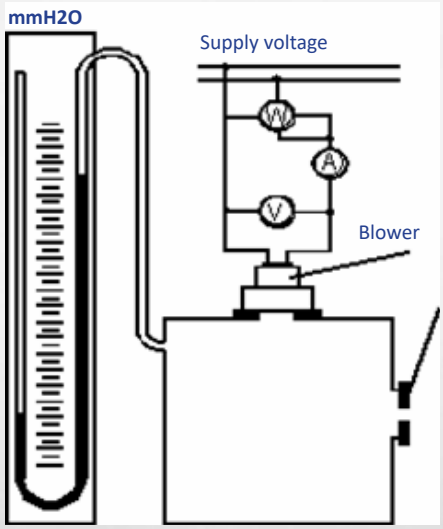




orifice (mm)	speed (rpm)	vacuum corrected (mm H2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	19608	84.7	43.72	18.8	512	36.32	7.09
40	19639	183.9	41.22	18.5	501	74.34	14.84
30	19763	397.7	34.10	17.9	483	133.02	27.54
23	19967	580.6	24.22	16.6	451	137.89	30.58
19	20255	662.2	17.65	15.3	416	114.63	27.55
16	21089	765.5	13.46	14.7	408	101.03	24.76
13	21343	815.1	9.17	13.2	363	73.28	20.19
10	21675	845.1	5.52	11.9	327	45.77	14.00
6.5	22306	864.7	2.36	11.1	309	20.02	6.48
0	22258	879.2	0.00	10.3	287	0.00	0.00

2. Parameters

The parameters of the blowers correspond to the values given in the table above, depending on the model.
The medium being propelled is air at room temperature. These characteristic curves were recorded in suction mode with full level control at 10V, maximum deflection of potential, and the nominal voltage given in the table (measured directly at the connections).
The test set-up corresponds to IEC 312. The values have been converted to normal conditions (20°C, 1014mbar). The performance data given corresponds to that for a typical blower. Because of normal manufacturing variations, the values for individual blowers may vary from the data for a typical blower. The main test set-up is shown in the following diagram:



Main Test Setup

3. Electrical connection

The blowers should be operated at the indicated voltages. The supply should be free of interferences and should permit relatively high currents (in spite of inrush current limitation for the motor, inrush currents are relatively high and can result in a voltage drop). The 24V supply voltage must lie within a range of 16V to 32V. If the voltage is less than 16V, the controller will be switched off. When the blower is connected to the supply voltage, it should be ensured that internal capacitors are connected in parallel to the connection leads. These capacitors are charged when the operating voltage is applied, and may still be charged after disconnecting.

3.1 Control voltage input

The control voltage input can be either an analogue voltage input (0 to 10V). At a voltage between 0 and approx. 1.8V the blower stops. At a voltage of 10V, the blower operates at maximum power; apart from the control voltage, this depends on the loading of the blower and the actual operating voltage applied. Depending on the connection configuration, the control voltage input (Vs) can be directly biased with 0 to 10V, or this input is applied via a switch to the internal supply voltage of 10V, or a control voltage can be generated without additional electronics by means of a potentiometer and the internal supply voltage. When operating with a potentiometer or a switch, it should be noted that the internal supply voltage of 10V (10mA) is not short circuit proof, and faulty wiring can result in damage to the internal controller. It is recommended to connect a 1kOhm resistance in series to the control voltage input in order to protect the control voltage input against short-term overvoltage (>10V).

3.2 Status signals and protective switching

The blower has various protective switchings:

- Undervoltage cut-out
- Overcurrent limitation
- Temperature protection
- Blocking protection

3.2.1 Overvoltage cut-out

If the voltage drops below a programmed minimum value, the blower cuts out. If this value is exceeded, the blower automatically switches on again.

3.2.2 Overcurrent limitation

If the internally defined current value is exceeded, the output stage is stopped, and is immediately restarted when the current falls below this value.

3.2.3 Temperature protection

If an internal temperature limit value is exceeded, the output of the blower is reduced in order to maintain the cooling function and to reduce self-heating. If the temperature falls back below the internal limit, the blower goes back again to the output set by the rotational speed input.

3.2.4 Bloking protection

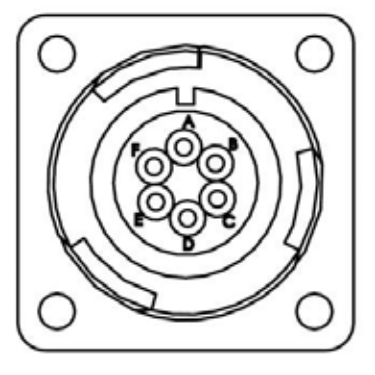
If an overcurrent is detected for longer than 1s or an overcurrent occurs twice within a short period, the motor is switched off. The motor can be operated again only after the blockage has been removed and the voltage has been disconnected.

If required, an additional voltage (5V; 100mA) can be taken off for the supply of other additional electronic components. This voltage cannot be assumed to be “safe” unless the motor supply voltage is also “safe”. It is recommended to dejam the additional leads by means of a ferrite ring core or a split ferrite.

Connection configuration (example)

- **Pin 1 Supply voltage (+28 V)**
- **Pin 2 Supply voltage (0 V)**

- **Pin 3 Reference voltage (10 V)**
- **Pin 4 Speed In (0-10 V)**
- **Pin 5 Signal GND**



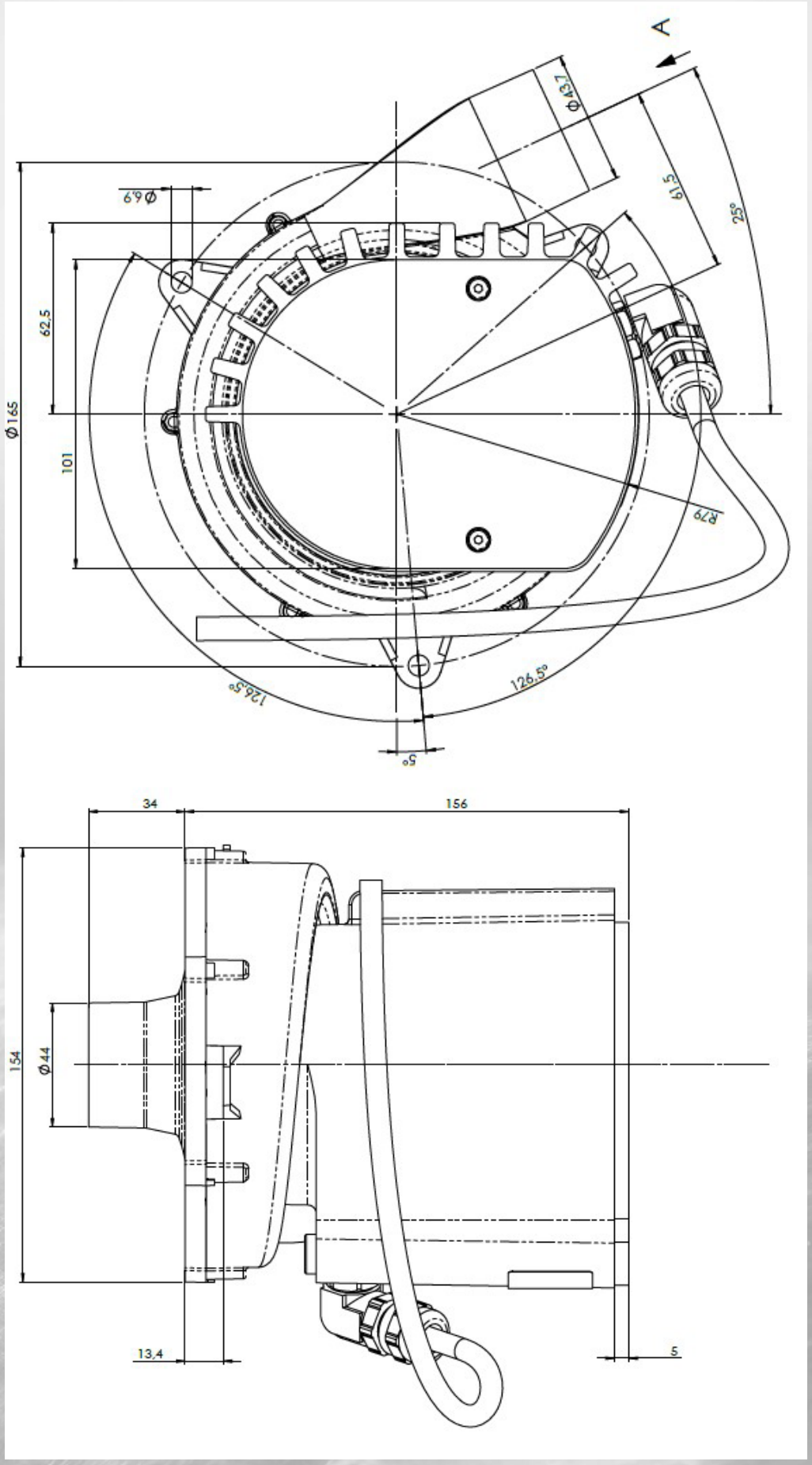
4. Mechanical connection

Optimally, the blower is operated with a vertical axis of rotation and the intake opening on the underside.
The intake opening must be protected from contact by a grille or similar measures (Danger of injury!). The blower should be firmly fixed in place using the 3 flanges and 7 mm drillings, as there can be a strong moment of reaction due to the relatively high start-up moment of the motor.

5. Noise level

The measured noise level of this blower type is lower than 72 dB

6. Dimensions



1. Scope and General
1.1 Introduction

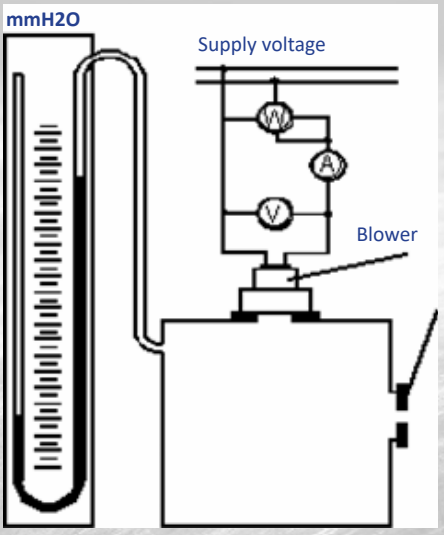
The blowers of the “MIL 1088” series are single-stage centrifugal blowers with axial air inlet and tangential air outlet (see Fig. 1). The drive is provided by an integrated, self-commutated 3-phase BLDC motor with integrated control electronics.
Depending on the operating point, the speed of the fans is approximately between 10,000 and 13,000 rpm with a power input of approximately 875W. The mass of the blower is approx. 7.5 kg.
The blowers are designed for use in military vehicles with the usual wiring system of
24V ... 28V designed and meets the EMC requirements of MIL-STD 461 G and vibration and shock requirements of MIL-STD 810 G and AECTP 400 Rev 3.
The corresponding tests performed are documented on the drawings.

1.2 Type overview

Drawing number	R-0500-28V-1088-1	R-0800-28V-1084-1	R-0800-28V-1084-4
Designation		suction fan complete 6 pole	exhaust fan complete 6 pin
air outlet	Tangential	Tangential	Tangential
Connection diagram	B	A	A
Performance data	Datasheet 1	Datasheet 2	Datasheet 3
Special features		Run command Status signal Reverse polarity protection	Run command Status signal Reverse polarity protection Noise optimized

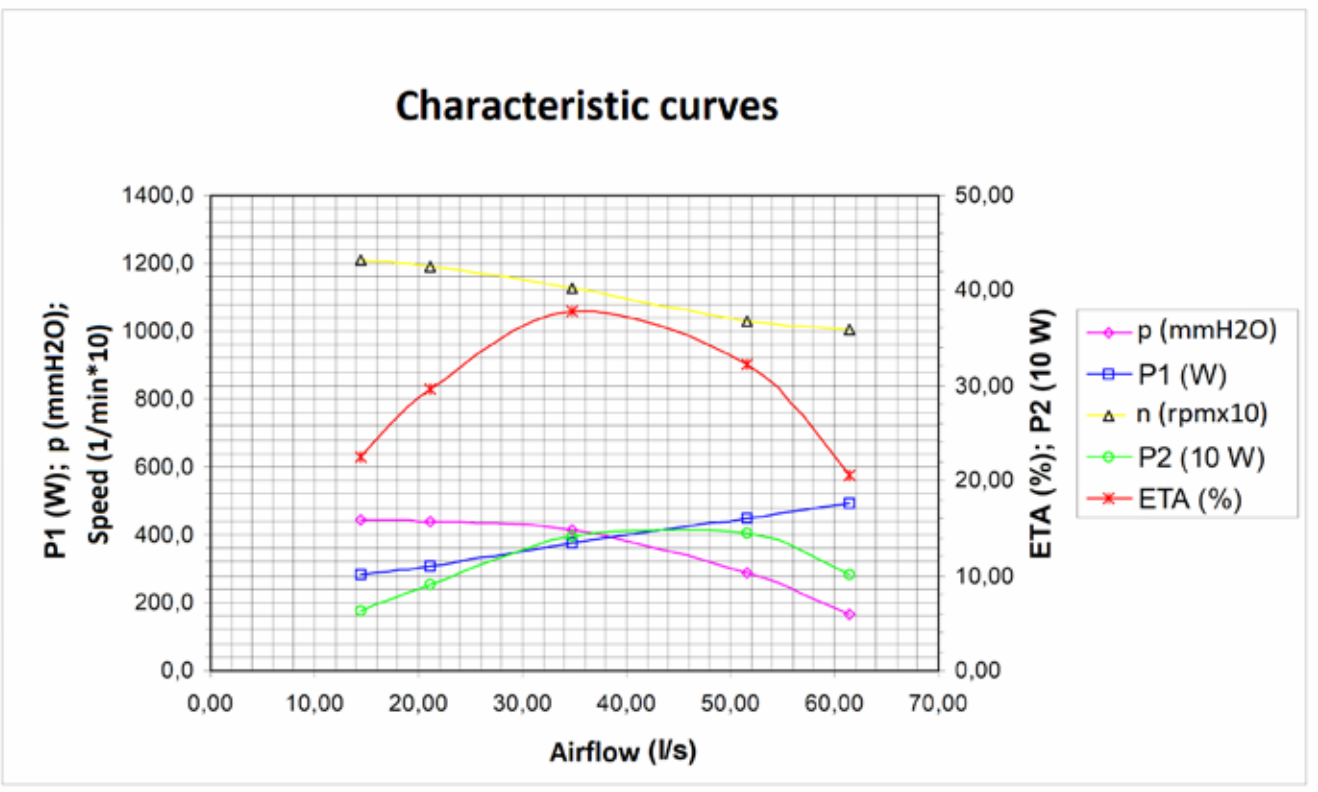
2. Parameters

The parameters of the blowers correspond to the values given in the table above, depending on the model.
The medium being propelled is air at room temperature. These characteristic curves were recorded in suction mode with full level control at 10V, maximum deflection of potential, and the nominal voltage given in the table (measured directly at the connections).
The test set-up corresponds to IEC 312. The values have been converted to normal conditions (20°C, 1014mbar). The performance data given corresponds to that for a typical blower. Because of normal manufacturing variations, the values for individual blowers may vary from the data for a typical blower. The main test set-up is shown in the following diagram:



Main Test Setup

2.1 Datasheet for blowers R-0500-28V-1088-0



orifice (mm)	speed (rpm)	vacuum corrected (mm H2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	10035	167.5	61.48	17.9	492.25	101.00	20.52
40	10303	287.3	51.53	16.4	451.00	145.19	32.19
30	11290	414.2	34.80	13.6	374.00	141.37	37.80
23	11881	440.6	21.10	11.2	308.00	91.16	29.60
19	12080	444.7	14.46	10.2	280.50	63.07	22.49

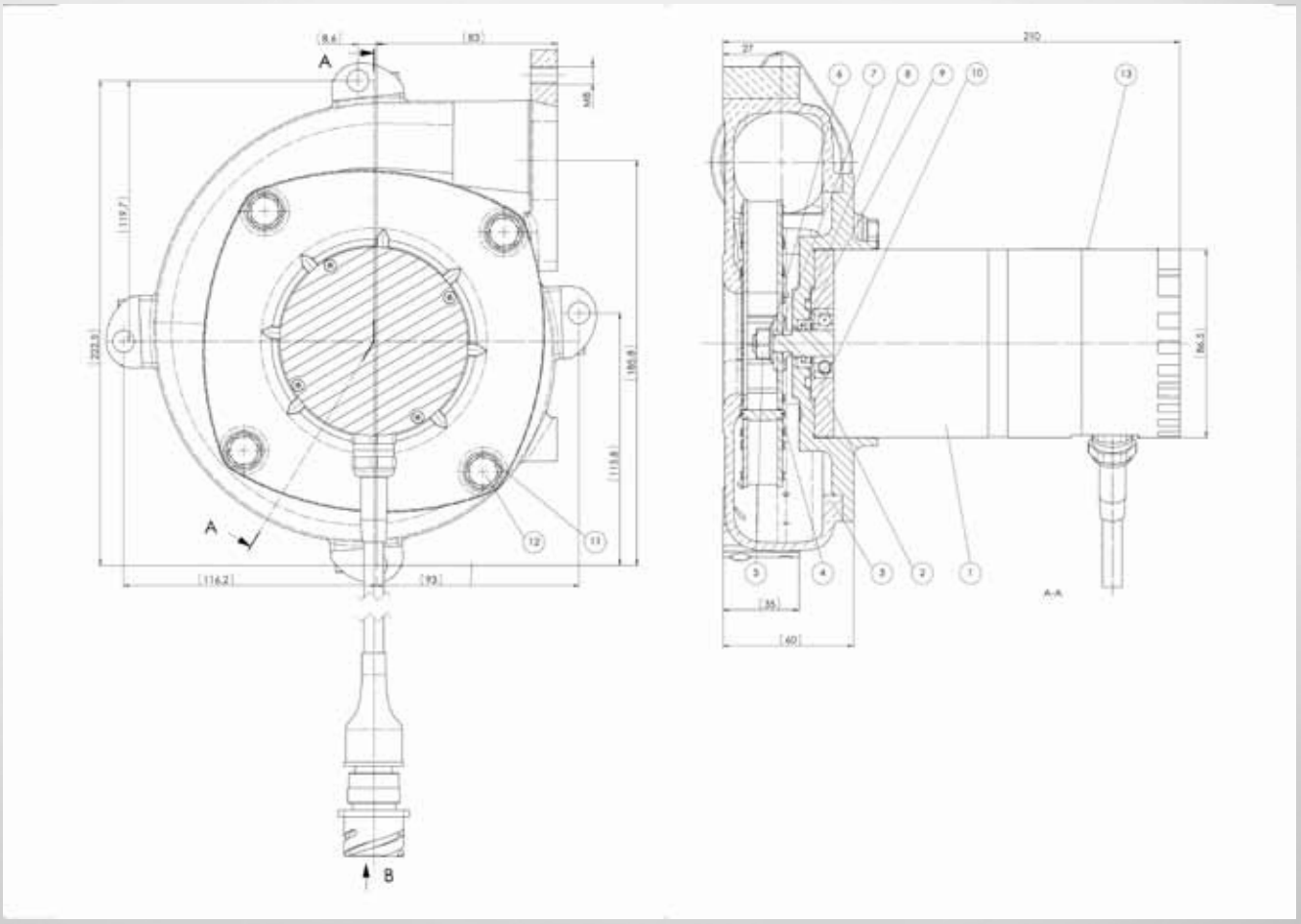
Compliances:

This blower has been tested and comply with the following MIL-STD:

EMI
MIL-STD 461G:
CE102, CS101, CS114, CS115, CS116, RE102, RS103

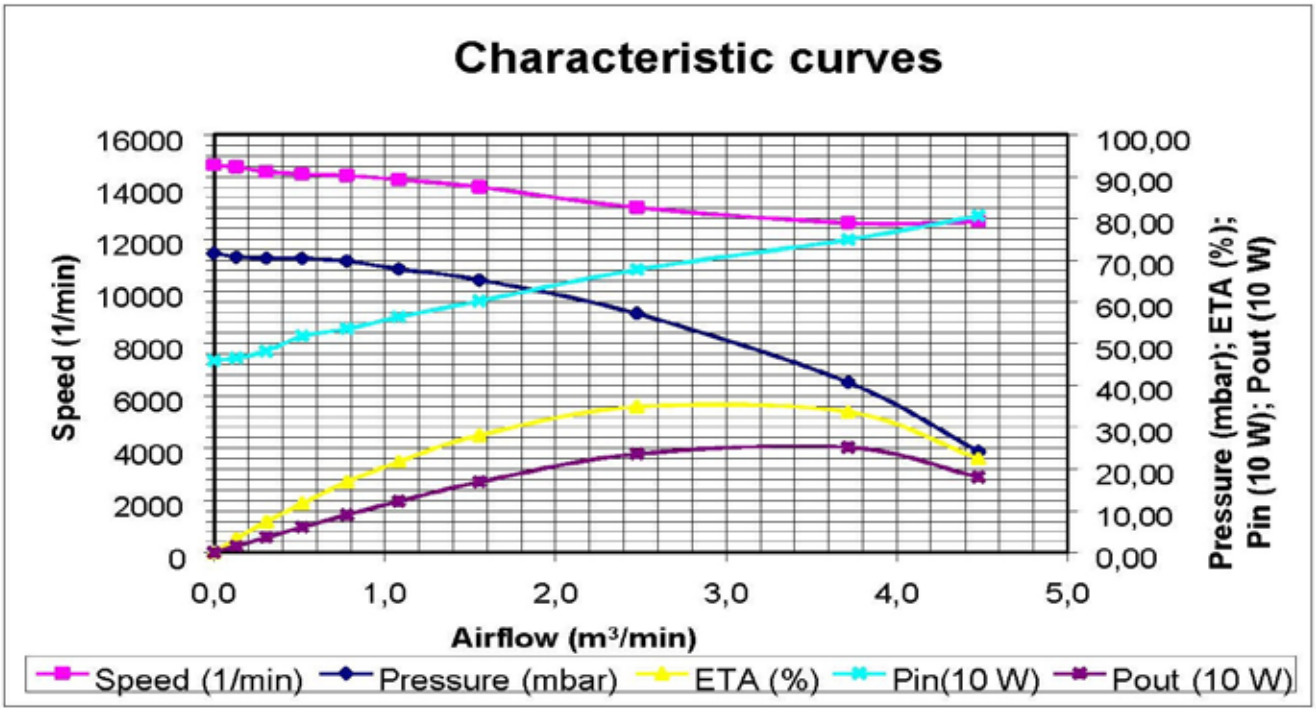
VIBRATION SHOCK
MIL-STD 810G

NATO AECTP 400 Rev3
Simulated Long-Life testingat increasing random vibration level



The way the blower housing is designed allows it to be fixed using different fixing options; the eyelets for 8 mm diameter screws, if unsused, are all removable in order to reduce the overall dimensions to a minimum.

2.2 Datasheet 1 for blowers R-0800-28V-1084-1



orifice (mm)	speed (rpm)	vacuum corrected (mm H2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	12672	24.22	74.65	29.5	806	180.82	22.43
40	12623	40.71	61.94	27.2	749	252.11	33.66
30	13214	57.19	41.29	24.6	677	236.16	34.88
23	13994	65.23	25.92	22.1	602	169.09	28.09
19	14278	67.84	18.04	20.5	564	122.39	21.70
16	14432	69.75	12.97	19.5	535	90.48	16.91
13	14488	70.36	8.60	18.8	518	60.51	11.68
10	14585	70.46	5.09	17.7	482	35.88	7.44
6.5	14768	70.76	2.16	17.1	465	15.26	3.28
0	14837	71.66	0.00	16.8	460	0.00	0.00

Service Conditions

Operating Voltage: 27.5V
Current Consumption: 28A
Speed: ca. 12500 rpm
Input: 760 W
Service Temperature: -40°C ÷ 100°C
Inlet temperature: max 54°C
Weight: 7.5 Kg

Compliances:

This blower has been tested and comply with the following MIL-STD:

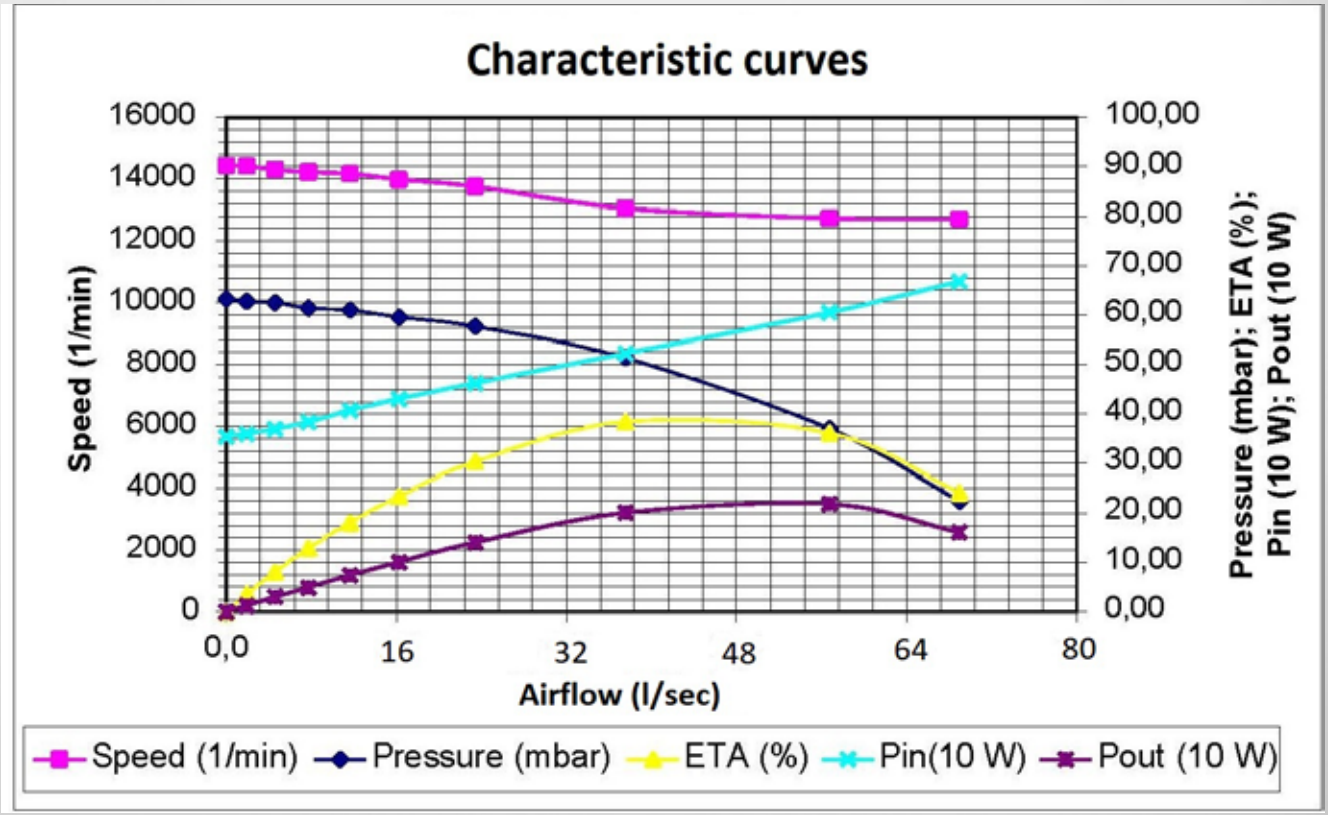
EMI

MIL-STD 461F:
CE102 10kHz - 10MHz,
CS101 0,03kHz - 5kHz Curve#2 FIGURE CS101-1
5kHz -150kHz Curve#2 FIGURE CS101-1,
CS114 10kHz - 2MHz Curve#4 FIGURE CS114-1
2MHz - 200MHz Curve#4 FIGURE CS114-1,
RE102 2MHz - 1GHz
RS103 0,01MHz - 2MHz 20V/m (see MIL-STD-461D)
2MHz - 1GHz 50V/m (see MIL-STD-461F)

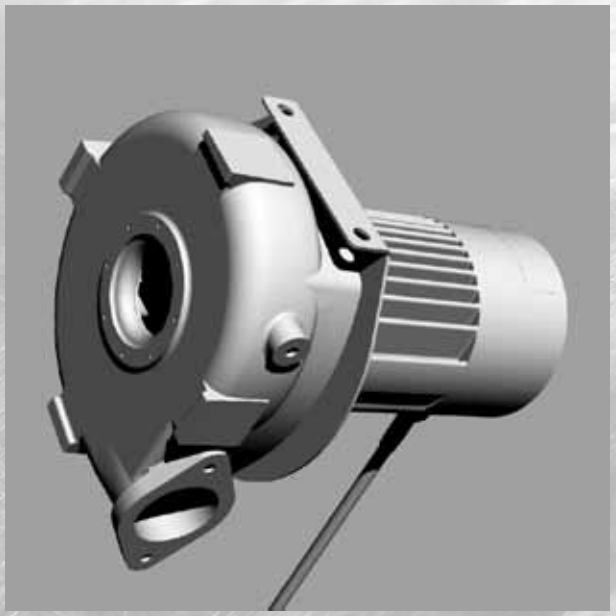
ENVIRONMENTAL

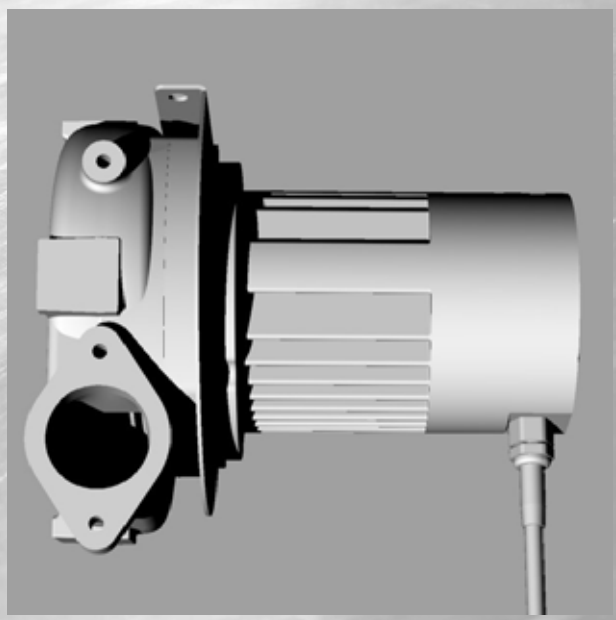
VIBRATION: MIL-STD 810E TAB.514.4 ALL
SHOCK: MIL-STD-810E TAB. 516.4-1 10g/6ms; 500g/0,5ms

2.3 Datasheet 2 for blowers R-0800-28V-1084-4



orifice (mm)	speed (rpm)	vacuum corrected (mm H2O)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
50	12715	228.7	71.84	24.1	668	161.14	24.12
40	12739	377.8	59.09	22	605	218.94	36.19
30	13053	523.8	39.14	19.1	523	201.06	38.44
23	13757	588.2	24.38	16.9	463	140.60	30.37
19	13982	607.6	16.91	15.7	431	100.74	23.37
16	14168	621.9	12.13	14.9	408	73.97	18.13
13	14216	626.0	8.03	14	384	49.32	12.84
10	14299	637.2	4.80	13.5	370	29.97	8.10
6.5	14414	640.3	2.03	13.1	360	12.75	3.54
0	14434	645.4	0.00	12.9	355	0.00	0.00





3. Electrical connection

3.1 Connection diagram A for R-0800-28V-1084-1 and R-0800-28V-1084-4

Wire number pin function
1 A +27.5 V
2 B +27.5 V
3 C 0 V
4 D 0 V
5 E Control Voltage 0-5V - (Input)
6 F GND Signal
7 G Reference Voltage 5V - (Output)
Screen Housing EMC shield

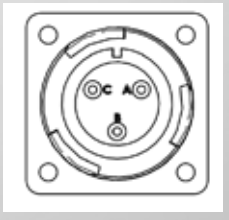
The standard configuration currently provide:

Control Voltage	Power (W)	Power (%)	Pressure (Pa)	%)Speed (rpm)
0	**68**	**9.1**	**0.7**	**17**
2	**117**	**15.7**	**2.8**	**33.8**
3.2	**254**	**34.1**	**8.9**	**59.8**
4.8	**744**	**100**	**24.7**	**100**

The connector on the blower is a plug VG95234N1-16S-1PN (shielded version) from ITT Canon
Female counterpart VG95234T-16S-1SN.

3.2 Connection diagram B for R-0500-28V-1088-0

Wire number pin function
1 A +27.5 V
2 B 0 V
3 C free



The connector on the blower is a VG95234U1-16-10PN or alternatively CA00COM-E16-10P-B44-03

3.3 Notes on the electrical connection

The housing ground is not galvanically connected to the 0V connections. If present, the shield of the connecting cable is galvanically connected to the housing ground.
If 2 pins are provided for a function, both pins are too use to prevent overloading the connector.
The external connecting cables must be dimensioned according to the current consumption.

4. Protection functions

4.1 Stalling protection

If 20 seconds after starting (start signal or operating voltage) or later the speed is below 50 rpm, the motor switches off. Reset is done by de-energizing.

4.2 undervoltage shutdown

If the operating voltage drops below approx. 15V, the motor switches off. From about 16V, the engine tries to start again independently.

4.3 overvoltage shutdown

If the operating voltage rises above approx. 33V, the motor switches off. Self-starting occurs when the voltage has fallen back to about 32V. The fan is voltage-protected up to at least 40V.

4.4 Reverse polarity protection

All types have reverse polarity protection (see type overview in table 1). These blowers are protected against reverse polarity (or reverse voltage) up to more than 100V.

4.5 Thermal protection

At 120 ° C on the internal temperature sensor, the motor shuts down in throttled mode (7000 rpm); After cooling down by approx. 3K (at the temperature sensor), the motor is switched back to full power or speed specification.

4.6 Watchdog

When the internal watchdog responds, the controller automatically performs a RESET.

5. Other operating instructions

The blowers are designed for an ambient temperature range of -40 °C to + 100 °C, whereby the intake temperature at the blower inlet must not exceed 54 °C. At short notice (max. 30 min), ambient temperatures up to 120 °C are permitted.

A possible repair may only be carried out by the manufacturer. The motor and electronic parts should not be opened as this, as well as modifications or non-professional repairs can lead to health and life hazards.

The integration of the blower into a suitable application may only be carried out by expert personnel.

We recommend a preventive replacement or maintenance after 2000 hours.

6. List of abbreviations and index

BLDC motor	=	Brushless DC motor (brushless DC motor)
IEC	=	International Electrotechnical Commission (a standardization body)
EMC	=	Electromagnetic compatibility
Watchdog	=	Check hardware in the microcontroller, it checks whether all procedures in the seen timeframe expire.
Diaphragm	=	Orifice diameter at the fan test bench
n	=	speed
p corrected	=	Suction pressure (negative pressure) at the fan test bench converted to 20 ° C and ambient air pressure of 1014mbar
V	=	Flow rate (airflow)
I	=	Current consumption of the blower at rated voltage
Pin	=	electrical power consumption
Pout	=	pneumatic power output
ϑ (ETA)	=	efficiency (ratio of input power to output power)

28 V BLDC Blower 1072 Compact Axial fan for Defense Applications

1. Scope and General
1.1 Introduction

The blowers of the “A... 1072-x” series are single-stage axial blowers (see Fig. 1). The drive is provided by an integrated, self-commutated 3-phase BLDC motor with integrated control electronics.

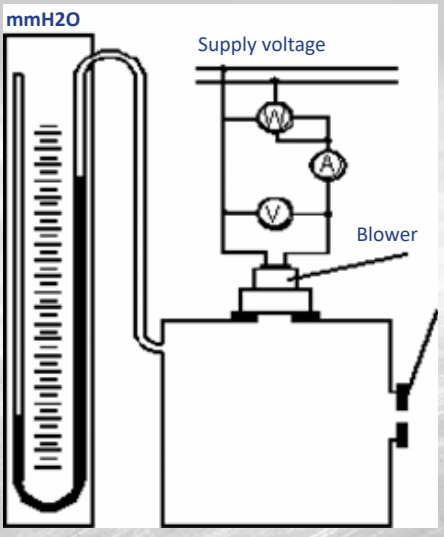
The blowers are designed for use in military vehicles with the usual wiring system of
24V ... 28V designed and meets the EMC requirements of MIL-STD 461 G and vibration and shock requirements of MIL-STD 810 G and AECTP 400 Rev 3.

1.2 Type overview

Drawing number	PCF1007391	PCF1007391	PCF1011864
Designation	A-0100-28V-1072-4CS	A-0150-28V-1072-3	A-0150-28V-1072-2VS
air outlet	Axial	Axial	Axial
Connection diagram	B	B	A
Performance data	Datasheet 1	Datasheet 2	Datasheet 3
Special features		Run command Status signal Reverse polarity protection	Run command Status signal Reverse polarity protection Noise optimized

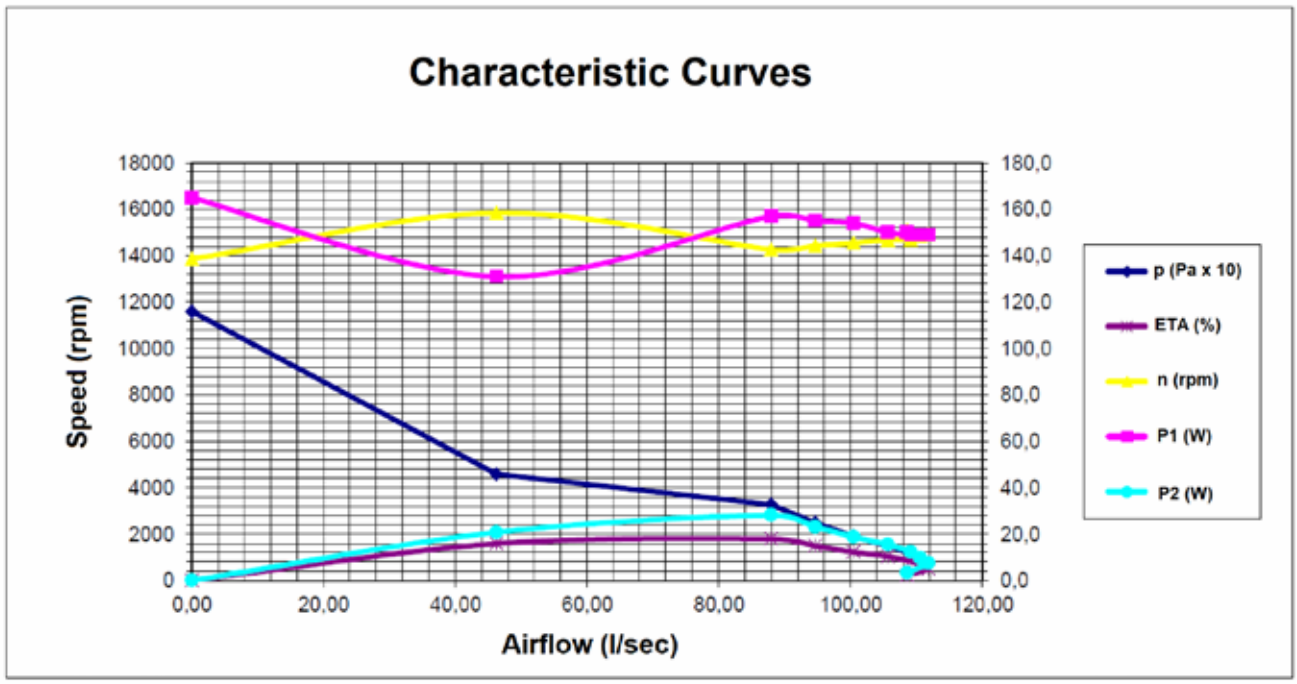
2. Parameters

The parameters of the blowers correspond to the values provided, depending on the model.
The medium being propelled is air at room temperature. These characteristic curves were recorded in suction mode with full level control at 10V (for the Variable Speed Versions), maximum deflection of potential, and the nominal voltage given in the table (measured directly at the connections).
The test set-up corresponds to IEC 312. The values have been converted to normal conditions (20°C, 1014mbar). The performance data given corresponds to that for a typical blower. Because of normal manufacturing variations, the values for individual blowers may vary from the data for a typical blower. The main test set-up is shown in the following diagram:

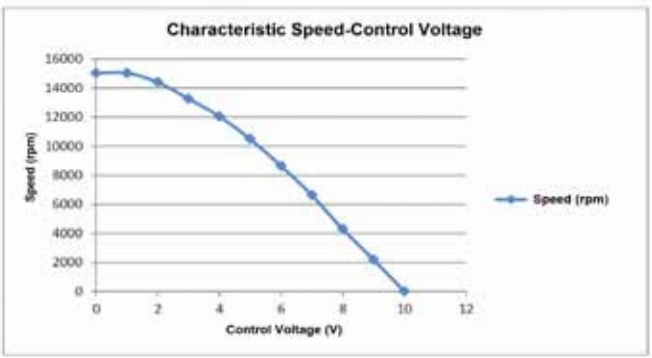


Main Test Setup

2.1 Datasheet for blowers A-0150-28V-1072-2VS



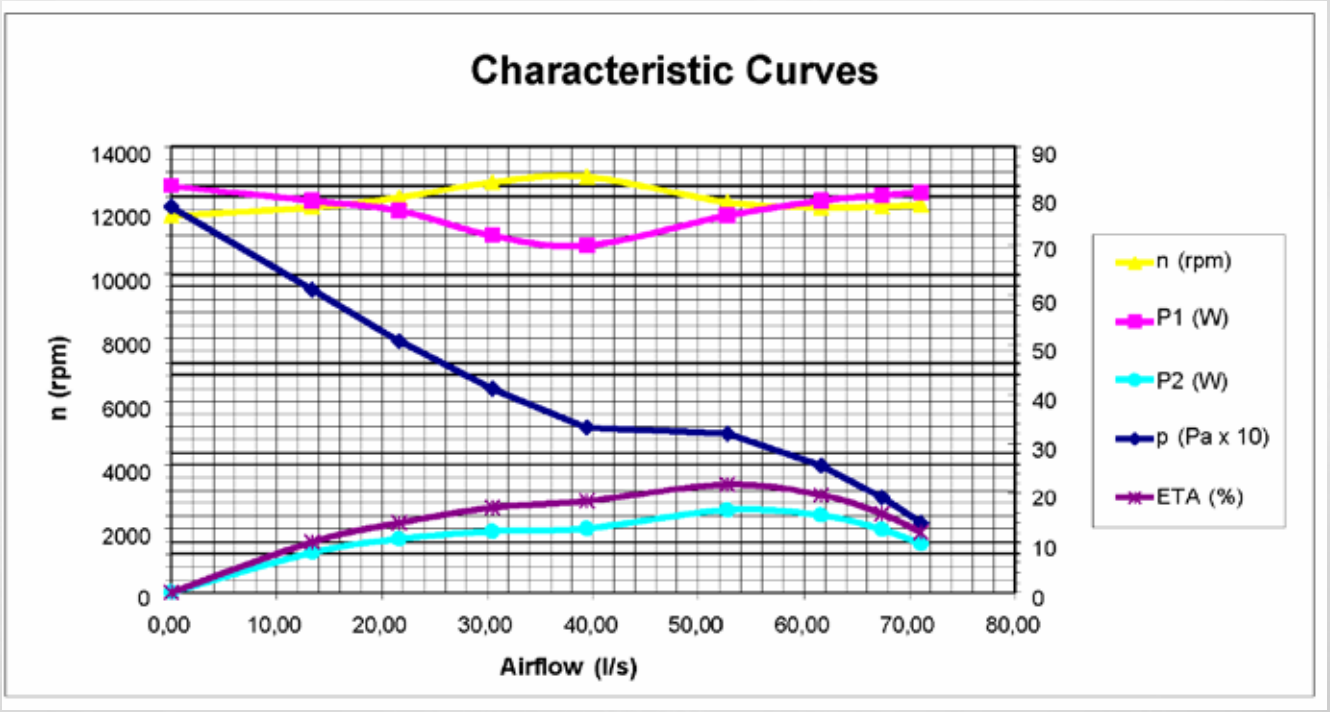
orifice (mm)	speed (rpm)	vacuum corrected (Pa)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
180	15204	27	100,85	7,00	148,00	2,65	1,79
150	15130	56	101,10	6,90	147,00	5,55	3,77
140	14983	71	99,15	6,80	149,00	6,89	4,63
130	14759	95	99,00	7,00	152,00	9,23	6,07
120	14688	124	96,20	7,00	153,00	11,66	7,62
110	14573	164	93,10	7,00	154,00	14,97	9,72
100	14520	210	87,07	7,10	156,00	17,93	11,49
90	14383	285	82,17	7,10	157,00	22,97	14,63
60	16277	437	45,21	5,60	125,00	19,36	15,49
0	14815	1160	0,00	6,90	151,00	0,00	0,00



Control Voltage (V)	speed (rpm)	Current (A)	Power (W)
0	15041	6.88	151
1	15037	6.85	149
2	14408	5.92	127
3	13262	4.77	97
4	12050	3.66	68
5	10490	2.63	46
6	8639	1.78	27
7	6630	1.07	14
8	4291	0.45	5.5
8.6***	2211	0.15	2.1
9	2190	0.15	2.1
9.6	2111	0.14	2
9.7**	0	0.03	0.89
10	0	0.03	0.89

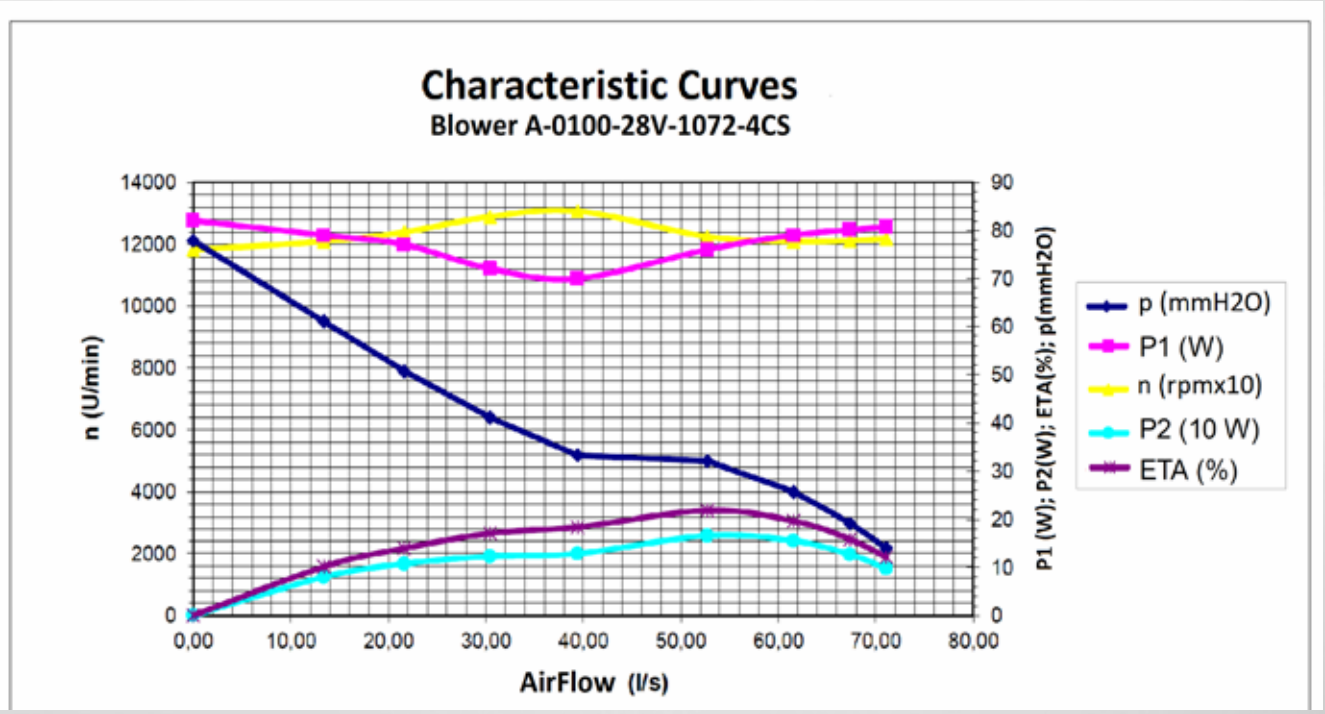
** Switch-off point with increasing voltage
*** Switch-on Point with decreasing voltage

2.1 Datasheet for blowers A-0100-28V-1072-3VS

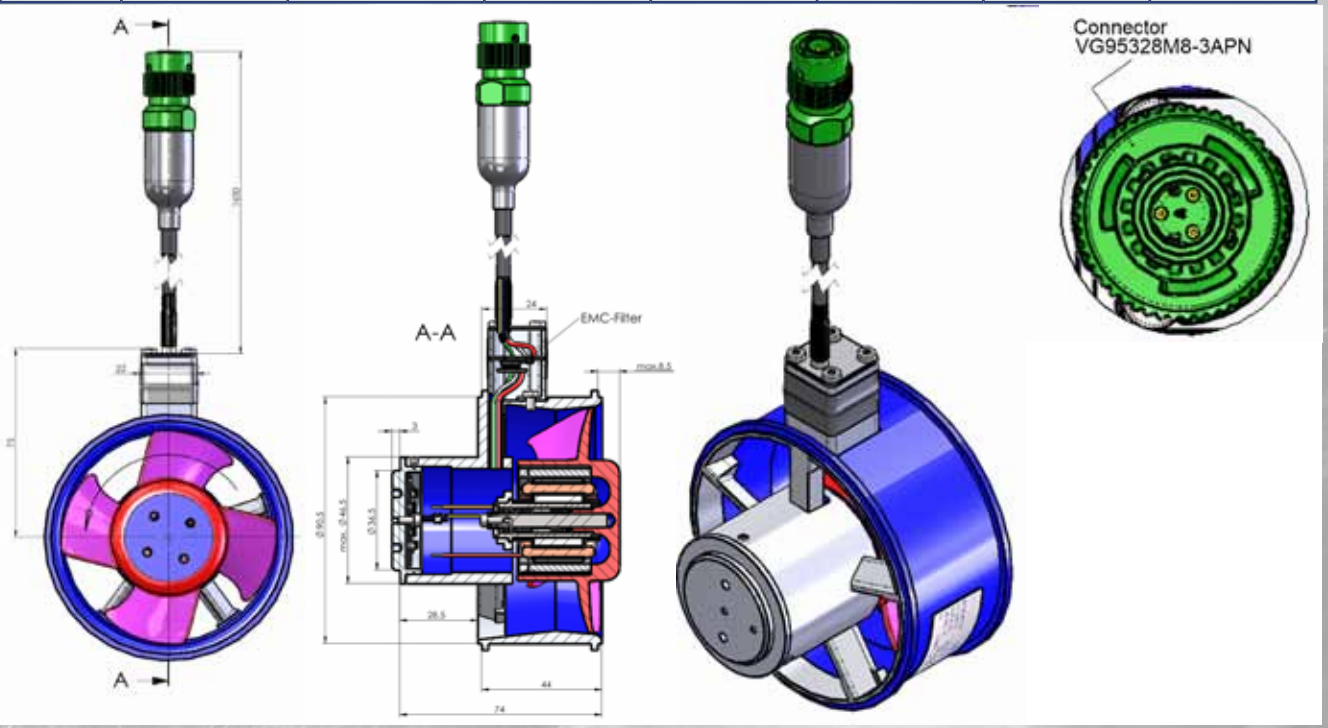


orifice (mm)	speed (rpm)	vacuum corrected (Pa)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
100	12305	145	72,38	4,10	85,00	10,30	12,12
90	12292	197	68,24	4,10	86,00	13,16	15,30
80	12209	268	62,91	4,10	84,00	16,51	19,66
70	12471	325	53,10	4,00	83,00	16,94	20,41
60	13188	342	39,99	3,70	75,00	13,40	17,87
50	12970	416	30,63	3,70	76,00	12,49	16,44
40	12443	512	21,74	3,90	81,00	10,91	13,47
30	12144	616	13,42	4,10	84,00	8,10	9,64
0	11830	784	0,00	4,20	86,00	0,00	0,00

2.1 Datasheet for blower A-0100-28V-1072-4CS



orifice (mm)	speed (rpm)	vacuum corrected (Pa)	air flow (l/s)	current (A)	input power (W)	air power (W)	efficiency %
100	12162	140	71.10	3.94	80,70	9,76	12,10
90	12110	192	67,38	4.00	80,10	12,66	15,81
80	12077	257	61,61	3.95	79,00	15,51	19,63
70	12243	321	52,72	3,80	76,00	16,58	21,81
60	13059	333	39,45	3,40	70,00	12,87	18,38
50	12884	411	30,46	3,50	72,00	12,28	17,06
40	12391	507	21,65	3,80	77,00	10,76	13,98
30	12083	611	13,37	3,9	79,00	8,10	10,14
0	11818	778	0,00	4,10	82,00	0,00	0,00



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