

Vacuum units for profile extrusion

BluSystems –
reduced energy consumption,
easy installation and simple operation

Blu Systems



speck | 

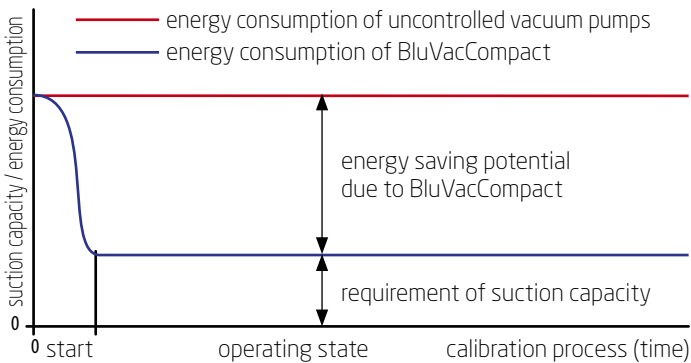
Energy saving and function

Intelligent vacuum units reduce operating costs

Leakage air supply is wasted energy

The vacuum and discharge pumps are responsible for most of the power consumption in calibration tables. Up to now, they have been selected based on the high suction capacity requirement during the start-up process for calibration.

To achieve the significantly lower suction capacity requirement in the subsequent operating state, systems are still used which supply leakage air or which throttle the vacuum pumps on the suction side. The electrical power consumption of the vacuum pumps remains consistently high - a completely unnecessary waste of energy.



Energy saving with BluSystems

The enormous energy saving with BluSystems is achieved by not adding leakage air. If smaller suction volumes or a lower vacuum is required after the profile has been calibrated, an internal control automatically reduces the speed of the electric motors, thereby lowering both the vacuum generation and the electrical power consumption. This demand-based vacuum generation saves large amounts of energy during the production process, which can run over several days in some cases.

The pressure level set on the calibration tools by the machine operator is monitored and maintained automatically through the ongoing pressure measurements and speed adjustments. Process-related pressure fluctuations are compensated with no intervention from the machine operator.

A second energy-saving effect is also achieved with the reduced operating water cooling requirements, because, at reduced speeds, the vacuum pumps also introduce less energy into the operating water.

Maximum efficiency

The biggest energy efficiency with BluSystems vacuum units is achieved by:

- » Using optimized tools, which manage without the use of leakage air as far as possible
- » Selecting the correct size and type of vacuum unit
- » Using the shortest possible suction lines with a suitable diameter

The saving – a calculation example from practice

Sector: Window profile extrusion

With preproduction series models of BluVac vacuum units, a renowned window profile manufacturer achieved an average saving of 67 %. An existing extrusion line was upgraded.

Before Range with 3 uncontrolled vacuum pumps, type VN 125, electrical power consumption (P1) $3 \times 5.2 \text{ kW} = 15.6 \text{ kW}$

After Range with 3 BluVac vacuum units, electrical power consumption (P1) $3 \times 1.1 \text{ kW} = 3.3 \text{ kW}$

The reduced power consumption of 12.3 kW resulted in a saving of 49,200 kWh with an estimated 4,000 operating hours a year.

With an estimated € 0.20 per kWh, **this is a saving of € 9,840,- per year.**

The lower operating water consumption of BluVac vacuum units also results in reduced energy consumption for operating water cooling.

The calibration process is automated by the integrated control.

BluVac vacuum units therefore pay for themselves quickly.

Vacuum units for profile extrusion

BluSystems from Speck Pumpen

Reduced energy consumption

Renowned manufacturers of window profiles confirm: Compared with a conventional vacuum pump, BluSystems vacuum units save between 60 % and 90 % of the energy consumption.

The enormous saving is achieved through the leakage-air free and demand-based vacuum generation based on constant pressure measurement and speed regulation of the electric motors.

Simple installation

BluSystems has a modular design and includes different types of vacuum units in various sizes. Parallel operation with conventional vacuum pumps and other systems is no problem at all.

Thanks to the decentralised concept, users can upgrade their existing extrusion lines easily without extensive and costly conversion work. Existing pumps or systems can be replaced with BluVac or BluLine vacuum units.

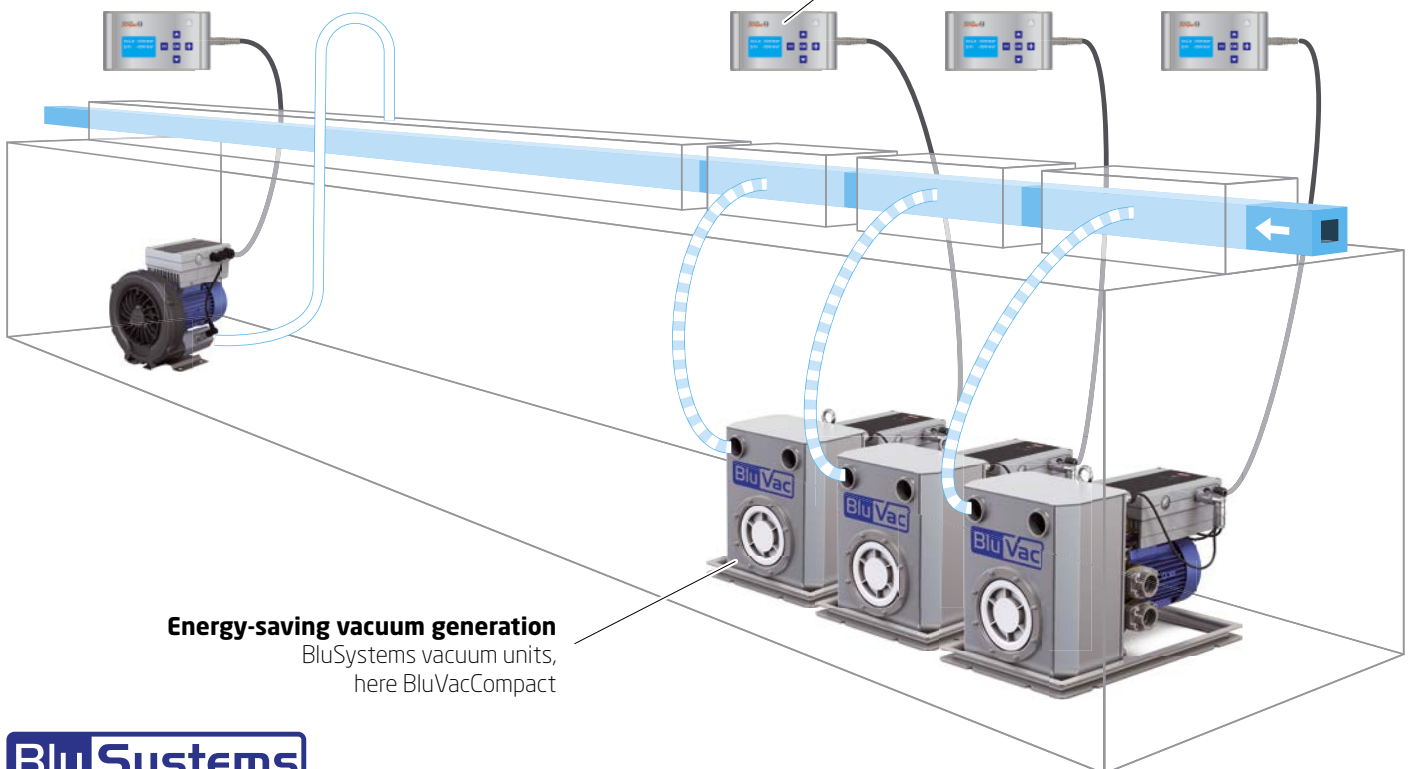
For plant manufacturers, interfaces are also available for PLC controls and BluVac vacuum units as so-called cartridge inserts without separators.

Easy operation

Set the vacuum on the operating panel and you're done. The control ensures that the pressure level is constantly maintained. The machine operator no longer needs to monitor the process for the most part.

Simple control of vacuum units

BluSystems control unit, here standard operating panel



Energy-saving vacuum generation

BluSystems vacuum units, here BluVacCompact



BluSystems – one system for a variety of applications

Combine vacuum units to suit your requirements

Each profile has its own unique features - dry calibration, wet calibration. The need for different pressure levels and different suction volumes calls for specific solutions to ensure that the calibration table is optimally equipped.

With BluSystems from Speck, you can choose from four types of vacuum unit with different characteristics and in various sizes and find the best solution for your needs. If you want to use existing vacuum tanks in your calibration table, for example, the decentralized BluVacD vacuum unit is also available.



BluVacCompact (BluVacC)

Type: VI-...-BVC
Vacuum units with integrated separator, second generation in more compact design

- » Extraction of air-water mixes
- » max. -930 mbar relative
- » max. 105 m³/h output
- » min. 6 m³/h water discharge

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BluLine

Type: VN-...-BL
Vacuum units with vacuum pumps from the VN series

- » Extraction of air with high levels of water
- » max. -930 mbar relative
- » max. 150 m³/h output
- » max. 4 m³/h water discharge

Page 8



BluLine

Type: VG-...-BL
Vacuum units with vacuum pumps from the VG series

- » Extraction of air with low levels of water
- » max. -930 mbar relative
- » max. 145 m³/h output
- » max. 2.5 m³/h water discharge

Page 10



BluLine

Type: VB-...-BL
Vacuum units with side channel compressors from the VB series

- » Extraction of moist air
- » max. -260 mbar relative
- » max. 500 m³/h output

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BluVacDezentral (BluVacD)

Decentralized vacuum units for plant-side separators
Combination of vacuum pump/side channel compressor and a discharge pump

- » Parallel extraction of air and water from a plant-side separator (e.g. vacuum tank) in the calibration table
- » max. 30 m³/h water discharge

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BluSystems control

Simple control of vacuum units



Setting the vacuum

The machine operator sets the desired relative vacuum (setpoint value) on the control unit – the BluSystems control panel is shown here. The control ensures that the pressure level remains constant from this point (just / actual value).

Three operating modes

The software offers three different operating modes depending on the process phase and requirements.

Manual mode is the mode for the start-up process with major pressure fluctuations and a high suction capacity requirement. The machine operator adapts the required suction volume to the motor frequency here via the manual setting.

If the required suction capacity drops and the fluctuations become lower at the end of the start-up process, the system is switched to automatic mode. The control now ensures that the pressure level is constantly maintained. The demand-based vacuum generation results in a significant energy saving.

The automatic mode with frequency control is a quality assurance function, which was developed in cooperation with users. The software detects sudden and unintentional air leakage or infiltrated air occurring during the running process (e.g. through holes in the profile) and reacts with a warning message and/or by switching to manual mode with constant motor speed.

Additional software functions

- » Storage and display of operating and consumption data
- » Visual warning in the display and/or with warning lights in the event of malfunctions
- » Master-slave function when several vacuum units are connected at a pressure level.



BluSystems operating panel - standard control unit

- » Suitable for retrofitting of unregulated calibration tables/vacuum applications
- » Suitable for new construction of controlled calibration tables/vacuum applications
- » One operating panel to control up to 5 vacuum units or alternatively one operating panel per vacuum unit
- » Simple, robust and cost-effective



BluSystems PLC interface - interface for PLC controls

- » Suitable for retrofitting or new construction of centrally controlled calibration tables/vacuum applications
- » Control of up to 8 vacuum units
- » Universally applicable



BluSystems PLC panel with touchscreen and memory

- » Suitable for retrofitting from decentrally controlled to centrally controlled calibration tables/vacuum applications
- » Suitable for new construction of centrally controlled calibration tables/vacuum applications
- » Control of up to 8 vacuum units
- » Status overview of all vacuum units at a glance



BluSystems Software library

- » Suitable for retrofitting or new construction of centrally controlled calibration tables/vacuum applications
- » Customer integration of pump control using software library
- » Compatible with B&R and Siemens controllers
- » Control of any number of vacuum units depending on the system load of the PLC
- » Simple, integrable and free of charge

For detailed specifications see 16.

For examples of different connection options for operating panels and vacuum units see 17.

BluVacCompact

VI-...-BVC – vacuum units with integrated separator - second generation

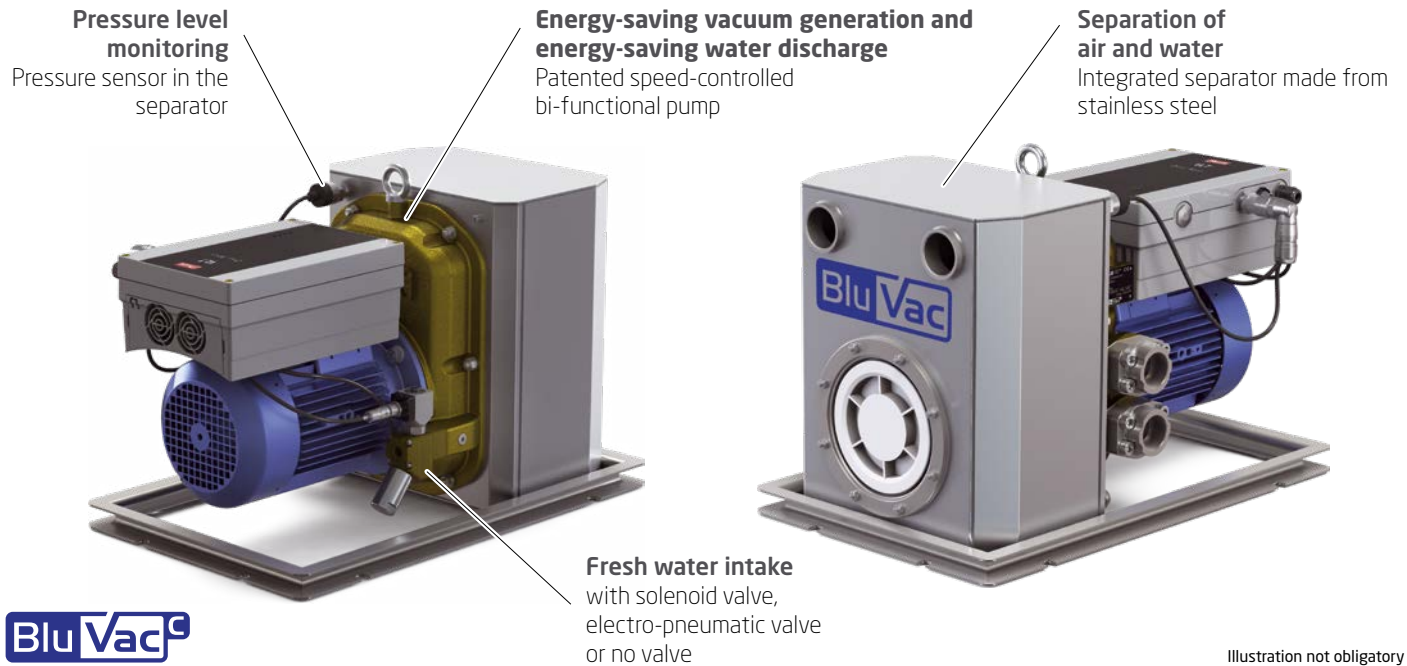


Illustration not obligatory

Type	max. relative vacuum	max. suction capacity	min. delivery of water
VI-55-BVC	-930 mbar	60 m³/h	6 m³/h
VI-130-BVC	-930 mbar	105 m³/h	6 m³/h

Use
Extraction of air-water mixes

General
BluVacCompact vacuum units are further developed, second generation vacuum units. They are much more compact and robust compared with the first generation, while offering the same performance.

The vacuum units with mechanical seals are available in rust-free materials and cast iron.

Function
The machine operator sets the desired vacuum (setpoint) with the control unit. Air and water are discharged separately.

A pressure sensor in the separator above the water level constantly records the actual vacuum (actual value). Based on these pressure measurements, the frequency converter automatically regulates the set pressure level by adapting the motor speed.

The sensor-free regulation of the water level in the separator takes place via the special design of the bi-functional pump. The water discharge starts when the vacuum generation begins.

The energy saving
The high energy saving is achieved through the demand-based vacuum generation. The cooling requirements for operating water are also reduced. Two sizes enable the system to be designed optimally to suit your suction volume requirements..

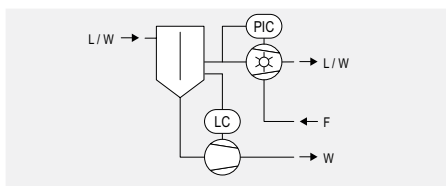
Installation and retrofitting
BluVacCompact can replace existing water-bearing vacuum pumps (e.g. VN series) or conventional vacuum pumps.

BluVacCompact can also replace existing BluVac vacuum units from the first generation - the rail width, connections and capacity are identical.

The footprint is approximately the same as that of a conventional vacuum pump and installation is just as easy as with a vacuum pump.

Control units
See page 5

Fresh water supply
See page 18



PIC Pressure Indicate Control
Pressure display and control

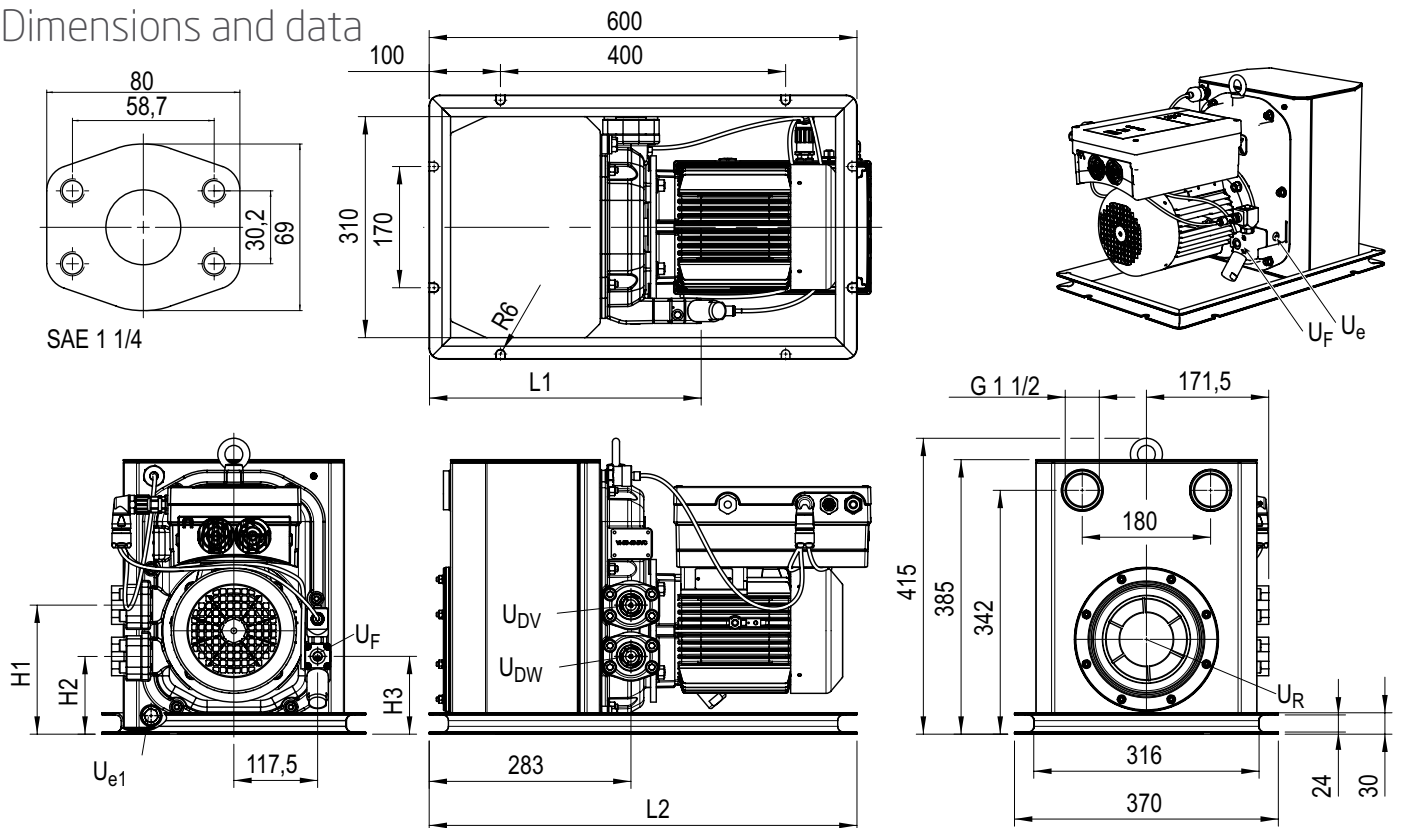
LC Liquid Control
Filling level control

L Air

W Water

F Operating / fresh water

Dimensions and data



Type	Frame size	Dimensions					Weight	
		L1	L2	H1	H2	H3	kg	lbs
VI-55-BVC	90	381.5	620	181	109	109	67	148
VI-130-BVC	100	382.5	687	185	113	119	93	205

Connections

U _{DV}	SAE 1 1/4	Pressure connection vacuum pump
U _{DW}	SAE 1 1/4	Pressure connection water discharge pump
U _e	G 1/8	Connection for drainage (drainage fresh liquid supply)
U _{e1}	G 1/2	Connection for drainage (drainage separator)
U _F	G 1/4	Connection for fresh liquid supply of the vacuum pump
U _R	Ø 121 mm	Inspection opening

BluLine

VN-...-BL – vacuum units with vacuum pumps from the VN series

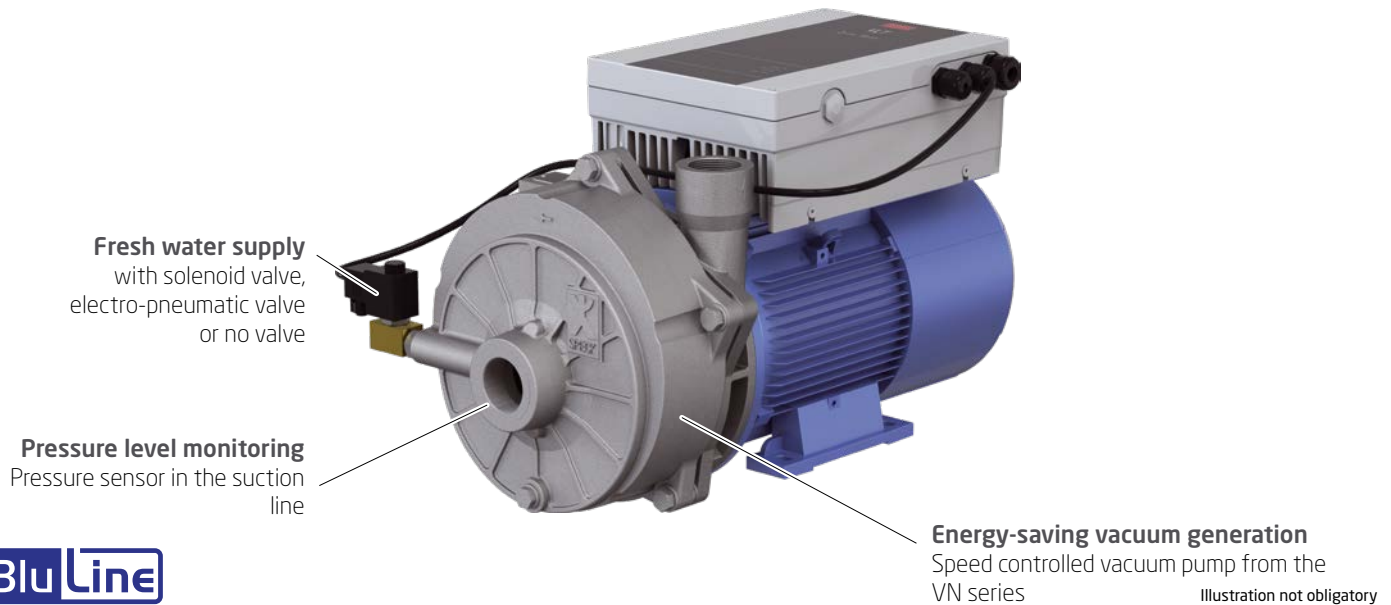


Illustration not obligatory

Type	max. relative vacuum	max. suction capacity	max. delivery of water
VN-95-BL	-930 mbar	115 m³/h	4 m³/h
VN-125-BL	-930 mbar	150 m³/h	4 m³/h

Use
Extraction of air with high levels of water

General
The reliable VN type pumps are patented single-stage pumps with hub control. The vacuum units with mechanical seals are available in cast iron or stainless steel.

Function
The hub control with valve flaps enables water to be pumped in much higher quantities compared with a conventional vacuum pump.

The machine operator sets the desired vacuum (setpoint) with the control unit. A pressure sensor in the suction line constantly records the vacuum (actual value). Based on these pressure measurements, the frequency converter automatically regulates the set pressure level by adapting the motor speed.

Installation and retrofitting
BluLine vacuum units with VN type vacuum pumps can replace existing comparable vacuum pumps. The supplied pressure sensor is installed on the suction line.

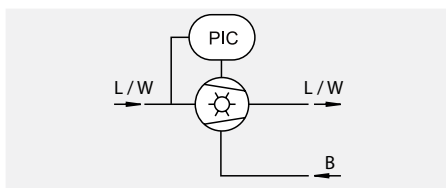
Existing uncontrolled VN type pumps can be upgraded to BluLine designs providing the motor is suitable.

Control units
See page 5

Fresh water supply
See page 18

The water discharge in this case is always connected with the vacuum generation.

The energy saving
The energy saving is achieved through the demand-based vacuum generation. The cooling requirements for operating water are also reduced. Two sizes with four motor rated powers enable the system to be designed optimally to suit your suction volume requirements.



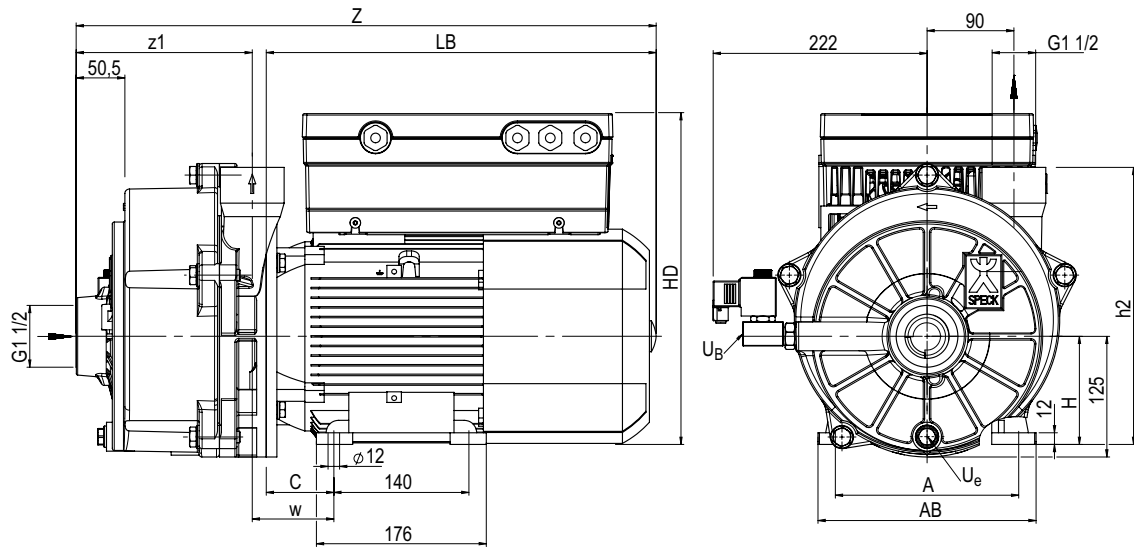
PIC Pressure Indicate Control
Pressure display and control

L Air

W Water

B Operating / fresh water

Dimensions and data



Type	FS	Dimensions										Connections		Weight	
		A	AB	C	H	HD	LB	h2	w	z	z1	U _B	U _e	kg	lbs
VN-95-BL	100	160	196	63	100	313	421	275	78	598	163	G1/2	G3/8	90	200
VN-125-BL	112	190	226	70	112	343	404	287	85	601	183	G1/2	G3/8	93	205

Connections

- U_B Connection for operating liquid
- U_e Connection for drainage (screw plug)

BluLine

VG-...-BL – vacuum units with vacuum pumps from the VG series

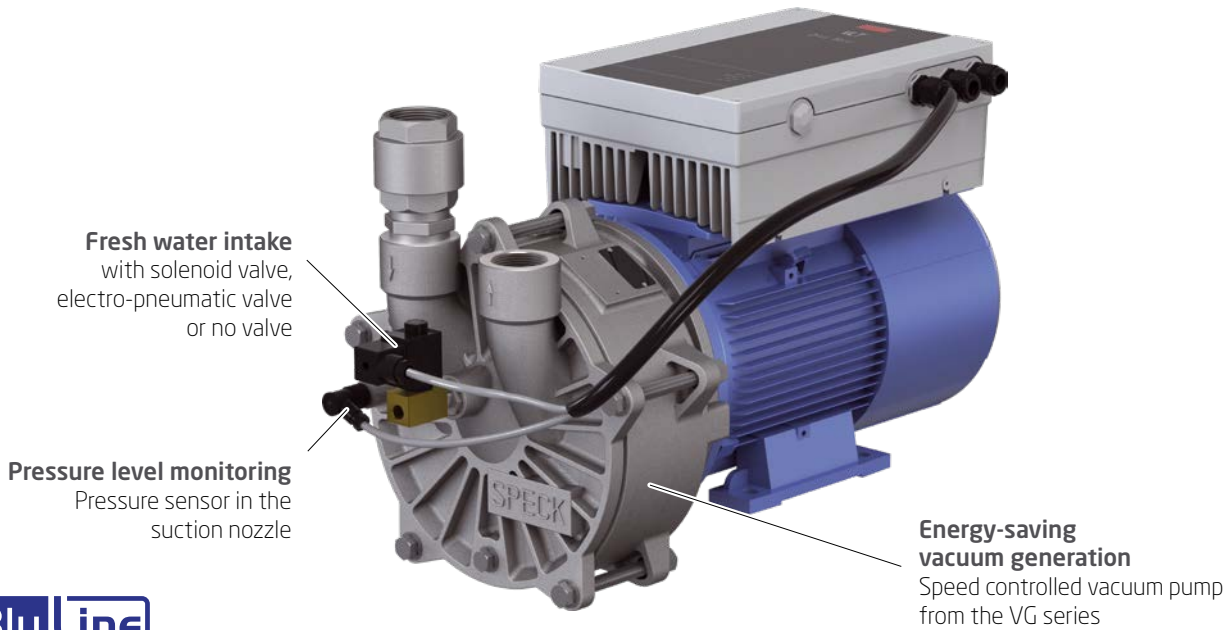


Illustration not obligatory



Type	max. relative vacuum	max. suction capacity	max. delivery of water
VG-30-BL	-930 mbar	34 m³/h	0.4 m³/h
VG-55-BL	-930 mbar	57 m³/h	0.4 m³/h
VG-95-BL	-930 mbar	82 m³/h	2.2 m³/h
VG-130-BL	-930 mbar	120 m³/h	2.4 m³/h
VG-155-BL	-960 mbar	146 m³/h	2.5 m³/h

Use

Extraction of air with low levels of water or no water

General

The tried-and-tested VG type single-stage pumps are extremely low-maintenance due to the valve-free design with no dead space. The vacuum units with mechanical seals are available in cast iron or stainless steel.

Function

The machine operator sets the desired vacuum (setpoint) with the control unit. A pressure sensor in the suction nozzle constantly records the vacuum (actual value).

Based on these pressure measurements, the frequency converter automatically regulates the pressure level set by the machine operator by adapting the motor speed.

The water discharge in this case is always connected with the vacuum generation.

The energy saving

The energy saving is achieved through the demand-based vacuum generation. The cooling requirements for operating water are also reduced.

Five sizes with six motor rated powers enable the system to be designed optimally to suit your suction volume requirements.

Installation and retrofitting

BluLine vacuum units with VG type vacuum pumps can replace existing comparable vacuum pumps.

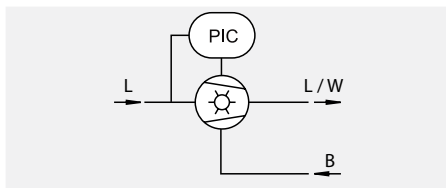
Existing uncontrolled VG type pumps can be upgraded to BluLine designs providing the motor is suitable.

Control units

See page 5

Fresh water supply

See page 18



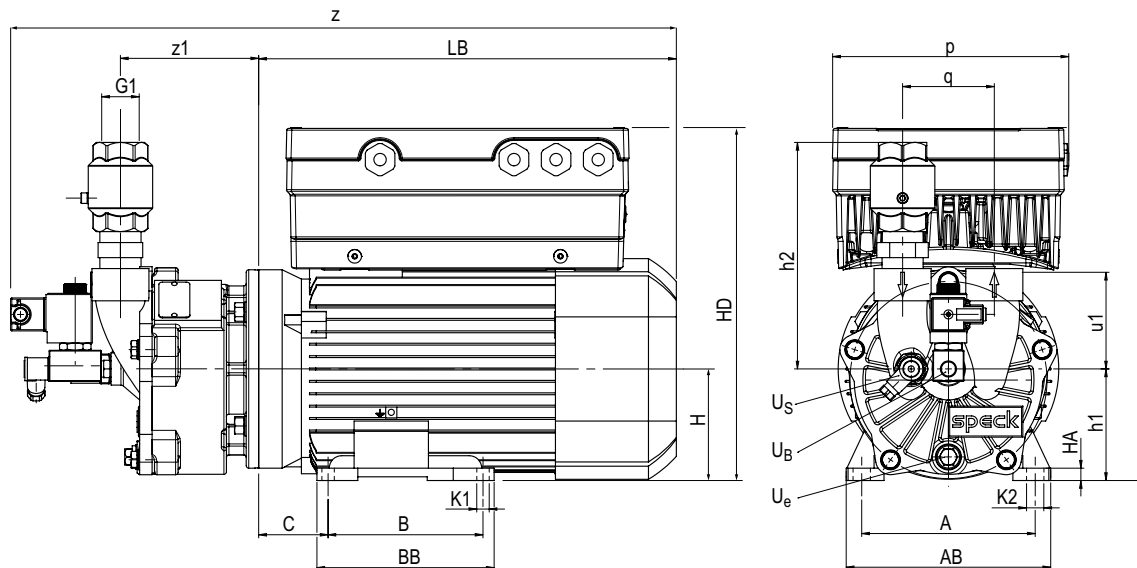
PIC Pressure Indicate Control
Pressure display and control

L Air

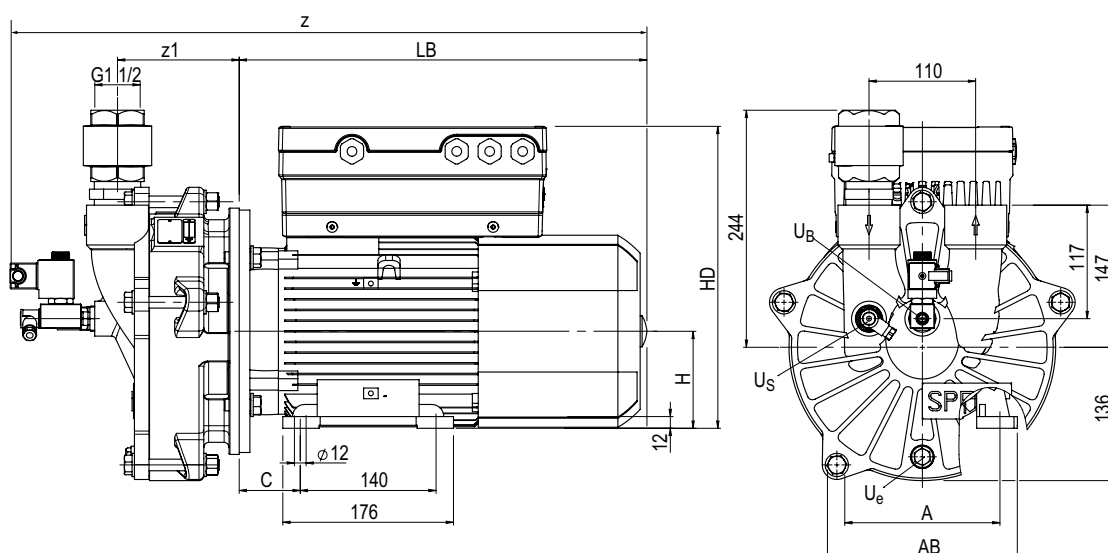
W Water

B Operating / fresh water

Dimensions and data



Type	FS	Dimensions														Connections			Weight					
		A	AB	B	BB	C	H	HA	HD	K1	K2	LB	h1	h2	p	q	u1	z	z1	U _B	U _e	U _L	kg	lbs
VG-30-BL	80	125	150	100	118	50	80	8	267	9,5	13,5	293	80	180	166	70	78	477	96	G1/4	G1/4	G1/4	27	60
VG-55-BL	90	140	165	125	143	56	90	10	285	10	14	337	90	183	191	74	78	537	112	G1/4	G1/4	G1/4	36	79



Type	FS	Dimensions							Connections			Weight		
		A	AB	C	H	HD	LB	z	z1	U _B	U _e	U _L	kg	lbs
VG-95-BL	100	160	196	63	100	320	421	656	125,5	G1/4	G3/8	G1/4	73	160
VG-130-BL	100	160	196	63	100	320	421	665	134,5	G1/4	G3/8	G1/4	82	181
VG-155-BL	112	190	226	70	112	343	404	666	151,5	G1/2	G3/8	G1/4	95	209

Connections

U _B	Connection for operating liquid
U _e	Connection for drainage (screw plug)
U _s	Connection for pressure sensor

BluLine

VB-...-BL – Vacuum units with side channel compressors from the VB series



Moisture-optimized bearing area

Significantly longer service life than conventional side channel compressors

Energy-saving vacuum generation

Speed-controlled side channel compressor from the VB series

Pressure level monitoring

Pressure sensor in the suction connection



Illustration not obligatory

Type	max. relative vacuum	max. suction capacity
VB-140-BL	-210 mbar	170 m³/h
VB-210-BL	-260 mbar	255 m³/h
VB-415-BL	-260 mbar	500 m³/h

Use
Extraction of moist air

General
Side channel compressors from the VB series are optimized in the bearing area for moist operating conditions. This means that they achieve a higher service life compared with conventional side channel compressors. The side channel compressors with rotary shaft seal are available in die-cast aluminium with an anti-corrosion coating on all parts which come into contact with media.

Function
The machine operator sets the desired vacuum (setpoint) with the control unit. A pressure sensor in the suction nozzle constantly records the vacuum (actual value).

Based on these pressure measurements, the frequency converter automatically regulates the pressure level set by the machine operator by adapting the motor speed.

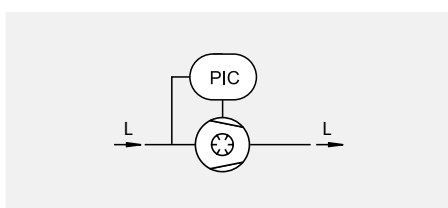
The energy saving
The energy saving is achieved through the demand-based vacuum generation.

Three sizes enable optimal design to suit the supply demands.

Installation and retrofitting
BluLine vacuum units with VB type side channel compressors can replace existing comparable side channel compressors.

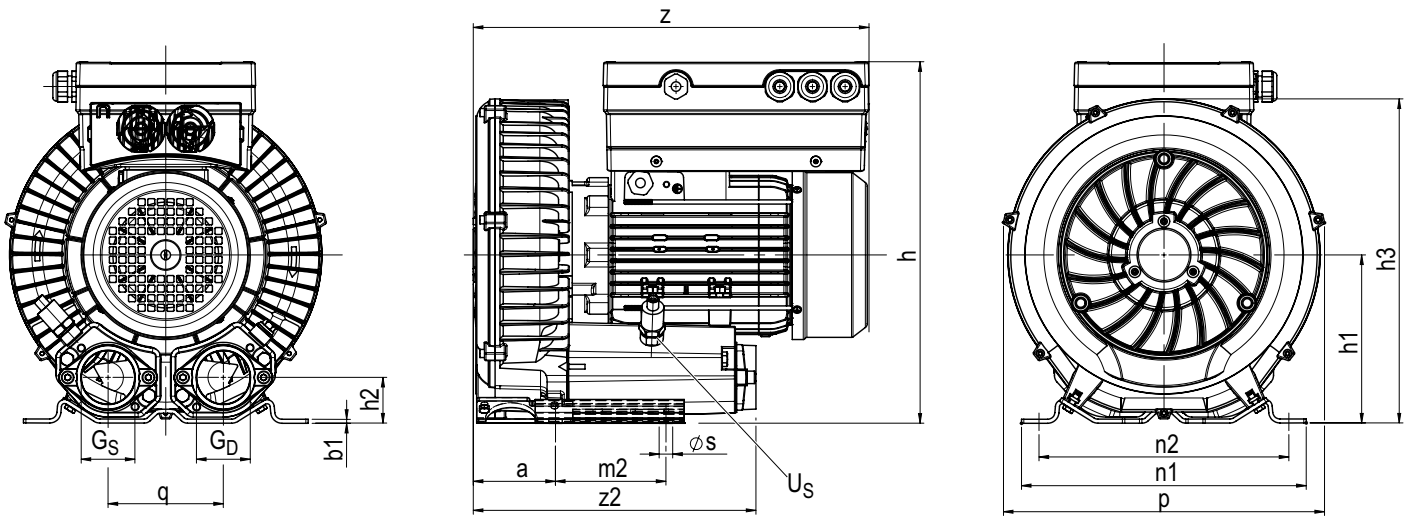
Existing uncontrolled VB type side channel compressors can be upgraded to BluLine designs providing the motor is suitable.

Control units
See page 5



PIC Pressure Indicate Control
Pressure display and control
L Air

Dimensions and data



Type	FS	Dimensions														Connections		Weight	
		a	b1	h	h1	h2	h3	m2	n1	n2	q	s	p	z	z2	G_S	G_D	kg	lbs
VB-140-BL	80	75	3,0	347	153	47	302	95	257	225	113	12	287	342	240	G1 1/2	G1 1/2	25	55
VB-210-BL	90	86	4,2	376	175	48	338	115	297	260	120	14	334	412	294	G2	G2	35	77
VB-415-BL	100	119	4,5	408	196	52	383	140	325	290	125	15	382	486	362	G2	G2	55	121

BluVacD

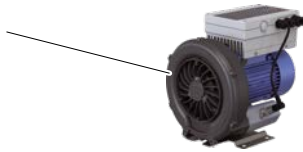
Decentralized vacuum units for plant-side separators

Energy-saving vacuum generation

Speed-controlled vacuum pump



or
speed-controlled side channel compressor



Energy-saving water discharge

Speed-controlled discharge pump from the ME-...-BVD series

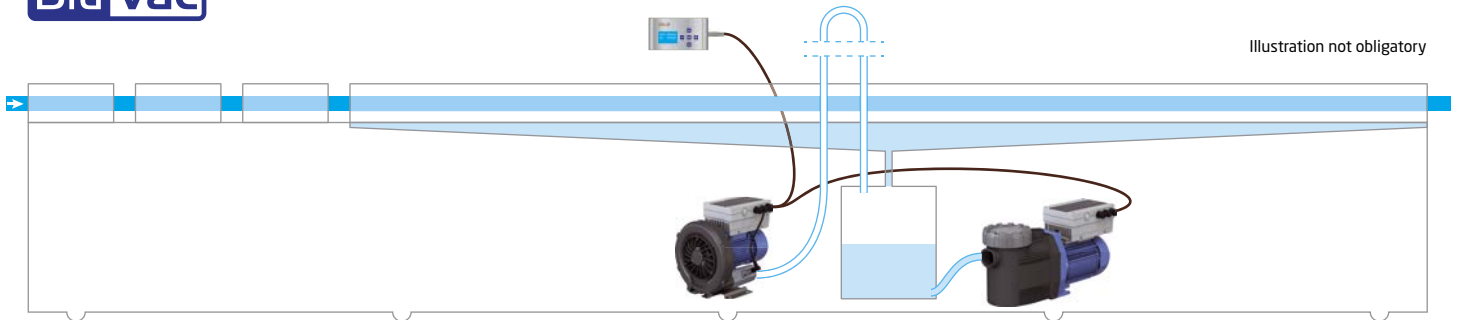


Illustration not obligatory

Type	
VB-...-BVD	Performance data as VB-...-BL, see page 12
VG-...-BVD	Performance data as VG-...-BL, see page 10

Type	Control range	max. total head	max. delivery of water
ME-90-15-BVD	0 – 60 Hz	22.4 m	26.4 m³/h
ME-90-20-BVD	0 – 60 Hz	25.0 m	30.3 m³/h

Use

Extraction of air and water from a plant-side separator (e.g. vacuum tank) in the calibration table

General

The vacuum is generated with type VG-...-BVD vacuum pumps or with a type VB-...-BVD side channel compressor depending on the required pressure level.

The water discharge takes place with type ME-...-BVD water pumps. The water pumps with mechanical seal are available in rust-free plastic design.

Function

Both pumps are connected with a data cable and controlled with a control unit.

The machine operator sets the desired vacuum (setpoint) with the control unit. The pressure control takes place based on continuous pressure measurements (actual value) and the adaptation of the motor speeds.

The water level control in the plant-side separator or vacuum tank takes place based on a hydrostatic filling level measurement in the vacuum tank.

The frequency converter controls the filling level automatically based on these measurements by adapting the motor speed of the discharge pump. The water discharge takes place independently from the vacuum generation.

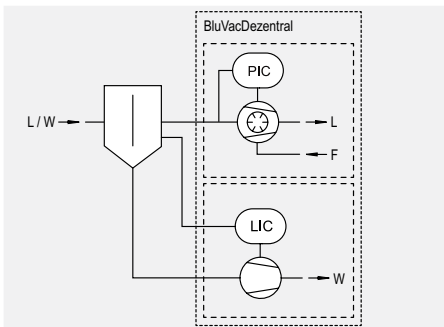
The energy saving

The energy saving is achieved with the demand-based vacuum generation and the demand-based water discharge based on pressure measurements.

The different sizes of vacuum pumps, side channel compressors and water pumps available enable the system to be optimally designed to suit your suction volume and water delivery requirements.

Installation and retrofitting

The decentralised vacuum units can be retrofitted easily. Piping and mounting the fill level sensor is simple.



PIC Pressure Indicate Control
Pressure display and control

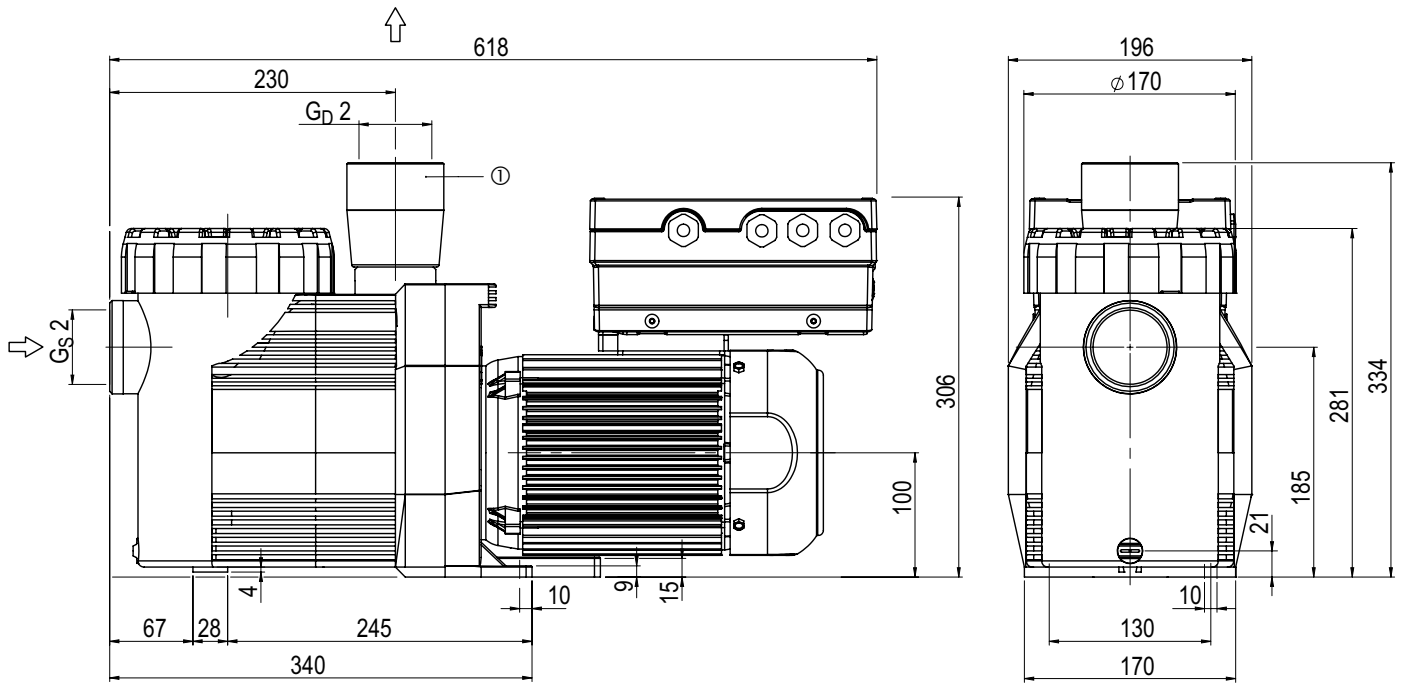
LIC Liquid Indicate Control
Filling level display and control

L Air

W Water

F Operating / fresh water

Dimensions and data



	Weight	
	kg	lbs
ME-90-15-BVD	25	55
ME-90-20-BVD	25	55

Control



	BluSystems operating panel - standard control unit	BluSystems PLC interface - interface for PLC controls	BluSystems PLC panel with touchscreen and memory	BluSystems Software library
Application	Conversion to controlled vacuum units New construction of a controlled application	New construction, retrofitting of a centrally controlled application	New construction of a centrally controlled application Conversion to central pump control	New construction, retrofitting of a centrally controlled application
Properties	Direct reading of actual and setpoint value, adjustment of the setpoint value with only a few key inputs Feedback on current pump and process data, as well as status and error messages Simple, robust and cost-effective	Transfer of current pump and process data, as well as status and error messages Control via setpoint and control word Universal use for any master PLC with Profibus interface	Status overview of all connected vacuum units at a glance Memory of up to 15 pressure level combinations possible Integrated flashing warning light for alarm messages such as dry running and system faults	Customer integration of the pump control using the software library Arbitrary instantiation of the function module for each individual vacuum unit Compatible with controllers B&R X20CP1301, Siemens Simatic S7-1500, Siemens Simatic S7-300, Siemens Simatic ET 200SP (others on request) Example projects available Simple, integrable and free of charge
Number of controlled vacuum units	5 per control panel, alternatively 1 control panel per Vacuum unit	8	8	Any number, depending on the system load of the PLC
Display and operation	LCD display, 40 mm x 73 mm, Robust keys	Plant-side	Robust industrial touchscreen, 118 mm x 90 mm	Plant-side
Protection class	IP 65	IP 20	IP 65	-
Transmission protocol to the pump (hardware)	FC protocol / Modbus RTU (RS-485)	FC protocol / Modbus RTU (RS-485)	FC protocol / Modbus RTU (RS-485)	FC protocol / Modbus RTU (RS-485)
Interface to higher-level control system	None	PROFIBUS slave (others on request)	Ethernet based (on request)	-
Additional hardware	Various connection cables Optional flashing warning light	Various connection cables	Various connection cables	Various connection cables One serial interface of the system manufacturer per vacuum unit

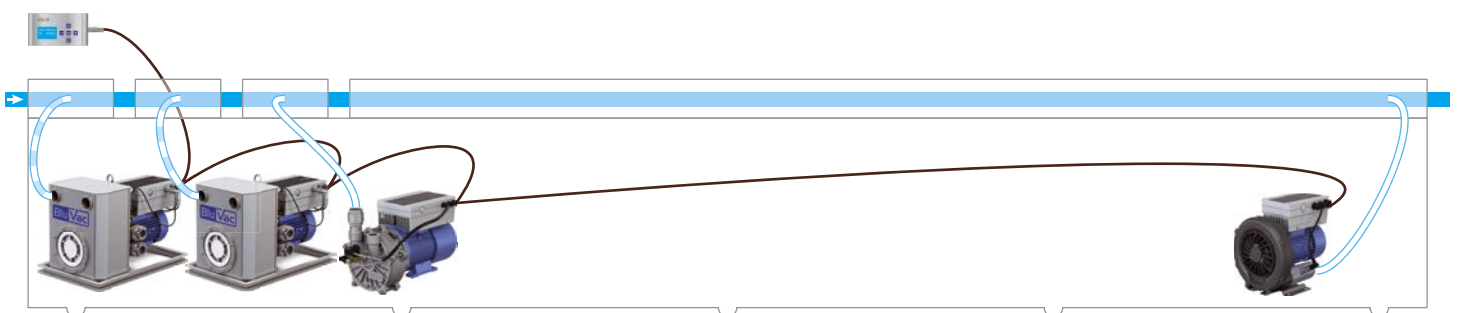
Other

Download: <https://www.speck.de/en/downloads/blusystems-software/>

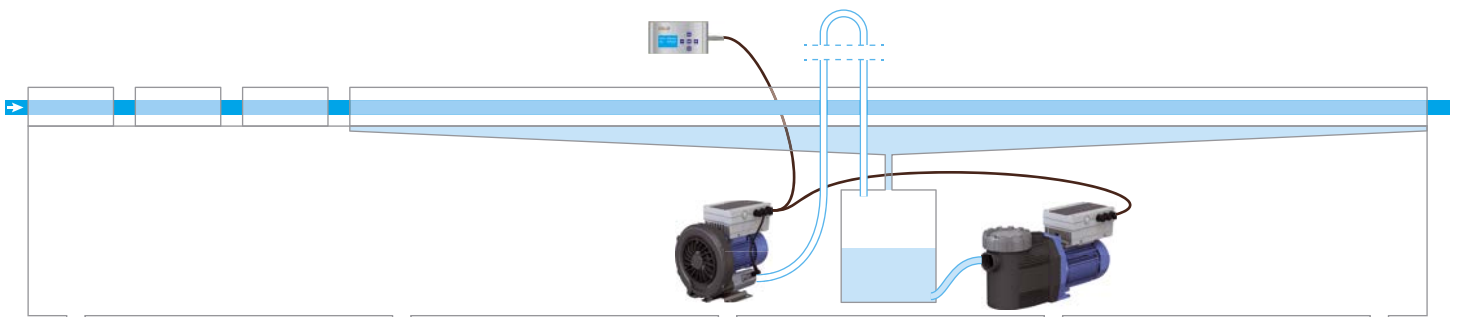
Installation examples



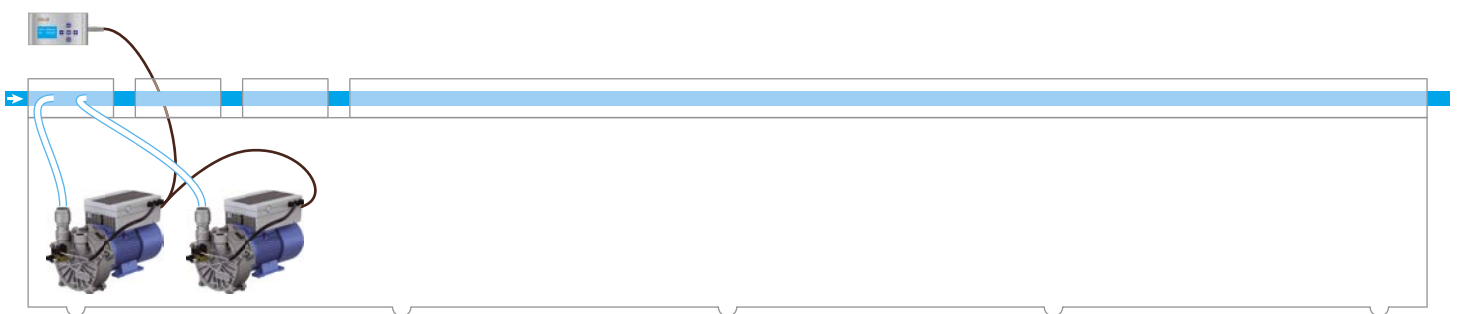
Installation example for one operating panel per vacuum unit



Installation example for controlling multiple vacuum units with one operating panel



Installation example of a decentralised vacuum unit for plant-side separators (vacuum tanks) - here with side channel compressor



Installation example for controlling a pressure level with two vacuum units via the software function master slave

Fresh water supply

Three options for vacuum units with vacuum pumps

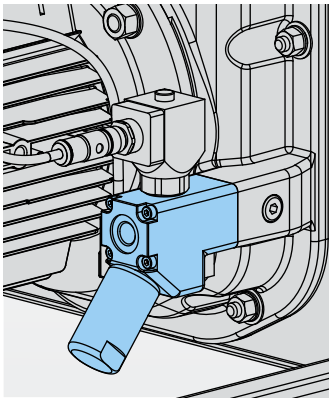
Fresh water supply with pressurised water and valves

The fresh water supply with pressurised water and valves guarantees optimal accuracy during vacuum control, as the entered fresh water quantity always remains constant.

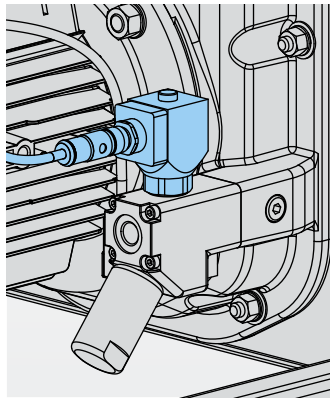
After the vacuum unit is started, the valve on the fresh water connection opens automatically at the same time and supplies the pump with fresh water.

An optional flow sensor protects the vacuum unit from damage if a problem-free fresh water supply cannot be guaranteed. This is the case, for example, with a water supply without or with inadequate pressure boosting systems and / or with pressure fluctuations. If the fresh water intake is insufficient or if the fresh water intake fails, the software stops the vacuum unit and prevents the mechanical seal from running dry.

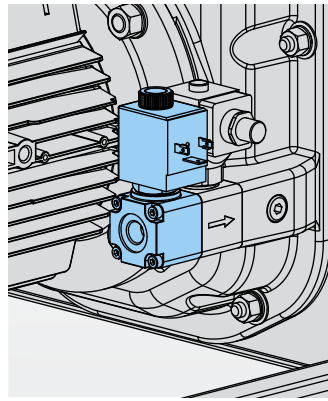
For problem-free operation, it has also proven to be beneficial to install a filter before the valve with a mesh size of 300, which is maintained regularly.



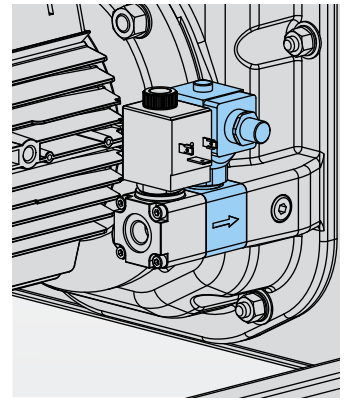
Electro-pneumatic valve



Optional flow sensor with electro-pneumatic valve



Solenoid valve



Optional flow sensor with solenoid valve

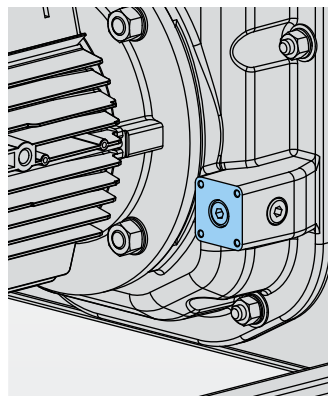
Valve types

	Electro-pneumatic valve	Solenoid valves - two versions	
Type / Water pressure	2 – 6 bar	2 – 6 bar	0.5 – 2 bar
Fresh water quality	low contamination	no contamination	no contamination
Pressurised air connection	3.5 – 8 bar	–	–
Filter (300 µm) before valve	recommended	highly recommended	highly recommended
Flow sensor	optional / recommended	optional / recommended	optional / recommended
Power supply	24 V	230 V	230 V

Valve-free fresh water supply from controlled liquid supply

The fresh water supply with controlled liquid supply is standard with conventional vacuum pumps in industrial systems. It is suitable for processes where the relative vacuum level is at least -250 mbar.

The vacuum pump takes its fresh water automatically from a water vessel, with a level 300 mm above the centre of the shaft.



Valve-free design



Speck Pumpen Vakuumentchnik GmbH & Co. KG
Postfach 1453 · 91142 Roth / Germany
Regensburger Ring 6-8 · 91154 Roth / Germany
Tel.: +49 (0) 91 71 809 - 0
Fax: +49 (0) 91 71 809 - 10
info@speck.de
www.speck.de