vacuubrand

Technology for
Vacuum Systems

Analog Module

Analog I/O module 0-10 V/0-10 V VACUU·BUS®

Instructions for use

Original instructions EN

OI no.: 20901506

Original instructions
Keep for further use!

This manual is only to be used and distributed in its complete and original form. It is strictly the user's responsibility to carefully check the validity of this manual with respect to the product.

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*Thank you for purchasing this product from **VACUUBRAND GMBH + CO KG**. You have chosen a modern and technically high quality product.*

TABLE OF CONTENTS

1 About this document

This manual is part of your product.

1.1 User information

Safety

Instructions for use and safety

- Read this manual thoroughly and completely before using the product.
- Keep this manual in an easily accessible location.
- Correct use of the product is essential for safe operation. Comply with all safety information provided!
- In addition to the information in this manual, adhere to the accident prevention regulations and industrial safety regulations applicable in the country of use.

General

General information

- For easier readability, the general term ***I/O module*** is sometimes used instead of the product name ***Analog-I/O-module***.
- The illustrations in this manual are only intended to facilitate comprehension.
- We reserve the right to make technical changes in the course of continuous product improvement.

Contact

Contact us

- If your manual is incomplete, you can request a replacement. Alternatively, you can use our download portal: www.vacuubrand.com
- You are welcome to contact us at any time in writing or by telephone if you would like more information, have questions about the product or wish to share feedback with us.
- When contacting our service department, have the name of the product to hand → *see label on the product.*

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1.2 Display conventions

Warning notice

Display conventions

NOTE

Indicates a potentially harmful situation.

Disregarding the situation could result in damage to property.

Additional notes

IMPORTANT!

⇨ Information or specific recommendation which must be observed.

⇨ Important information for trouble-free operation of your product.

Helpful tips + tricks
Additional information

Symbols

Symbols and icons

This manual uses symbols and icons. Safety symbols indicate specific risks associated with handling the product. Symbols and icons are designed to help you identify risks more easily.

Safety symbols

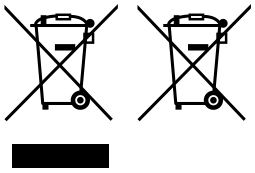
General warning symbol.

Danger: electricity.

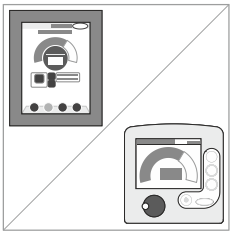
Additional symbols and icons

Information

✓	Positive example – **Do this!** Result – **OK**	✗	Negative example – **Don't do this!**
	Refers to content in this manual.		Refers to content in other supplementary documents.



Electric/electronic devices must not be disposed of in the domestic waste at the end of their service life.



Symbol for VACUUBRAND vacuum controllers and vacuum gauges.

→ *For further symbols, see: **Action symbols on page 26***

Prompt to perform a step or take action

Instructions (single step)

⇨ Perform the step described.

☑ Result of action

Instructions (multiple steps)

1. First step
2. Next step

☑ Result of action

Perform the steps in the order described.

1.3 Term definitions

Product-specific terms

... I/O module	The ... I/O module is an interface for use between peripheral devices and ***VACUU·BUS®***-enabled vacuum controllers or vacuum gauges. Through connection to an I/O module, peripheral devices such as sensors, valves, data loggers, programmable logic controllers (PLC), etc. can be integrated into the **VACUUBRAND** ***VACUU·BUS®*** system as a client. Analog-I/O-module operating principle The module continuously processes signals within a voltage range of 0-10 V DC. *On request, modules with 4-20 mA are also available, e.g., for long signal lines.*
DCP 3000	Vacuum gauge
CVC 3000	Vacuum controller, controller
VACUU·BUS®	Bus system from **VACUUBRAND** for communication between peripheral devices with ***VACUU·BUS®***-enabled gauges and controllers. The maximum admissible cable length is 30 m.
VACUU·BUS® address	Address which enables the ***VACUU·BUS®*** client to be unambiguously assigned within the bus system, e.g., for connecting multiple sensors with the same measurement range.
VACUU·BUS® client	Peripheral device or component with ***VACUU·BUS®*** port, which is integrated in the bus system, e.g., sensors, valves, I/O modules, etc.
VACUU·BUS® configuration	Using a vacuum controller or vacuum gauge to assign a new ***VACUU·BUS®*** address to a ***VACUU·BUS®*** component.
VACUU·SELECT®	Vacuum controller, controller with touchscreen; consisting of operating panel and vacuum sensor.
VACUU·BUS® connector	4-pin round connector for the bus system from **VACUUBRAND**.
VARIO® control	High precision vacuum control through controlling the speed of ***VARIO®*** diaphragm pumps or ***VARIO®*** chemistry diaphragm pumps.

2 Safety information

The information in this chapter must be observed by everyone who works with the product described here.

Only use the product if it is in proper working condition.

2.1 Intended use

Intended use

The *Analog-I/O-module* is an analog interface. It has been developed as an accessory for *VACUU·BUS*®-enabled vacuum controllers and vacuum gauges and is designed for installation in a control panel or control cabinet.

By configuring it with a vacuum controller or vacuum gauge, an I/O module can be assigned a specific function → *see also table: 7.4 Functional overview on page 42*.

The I/O module may only be used indoors in a non-explosive atmosphere. Connection is only permissible for the intended components, using protective extra-low voltage.

Any other use is considered improper use.

2.2 Improper use

Improper use includes:

Improper use

- Using the product contrary to its intended use.
- Operating the product despite obvious errors.
- Connecting inadmissible equipment.
- Operating the product under inadmissible operating and ambient conditions.

2.3 General safety information

2.3.1 Safety precautions

Safety precautions

- ⇨ Use the device only if you have understood its function and the information in this manual.
- ⇨ Repairs must only be carried out by the manufacturer's service department or the local distributor.
- ⇨ Always be conscious of safety and work in a safe manner.

- ⇨ Observe instructions issued by the operator, and national regulations on accident prevention and industrial safety.

2.3.2 Target group

Personnel and competence

Electric devices may only be assembled and installed by qualified electricians.

Changes to the configuration in the vacuum controller or vacuum gauge may only be carried out by persons authorized by the operator to perform such tasks.

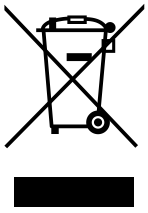
2.4 Disposal

NOTE

Incorrect disposal of electronic components can cause environmental pollution.

Used electronic devices contain harmful substances that can cause damage to the environment or human health. Disused electrical devices also contain valuable raw materials, which can be recovered for reuse if the device is disposed of correctly within the recycling process.

End users are legally obliged to take used electric and electronic devices to a licensed collection point.



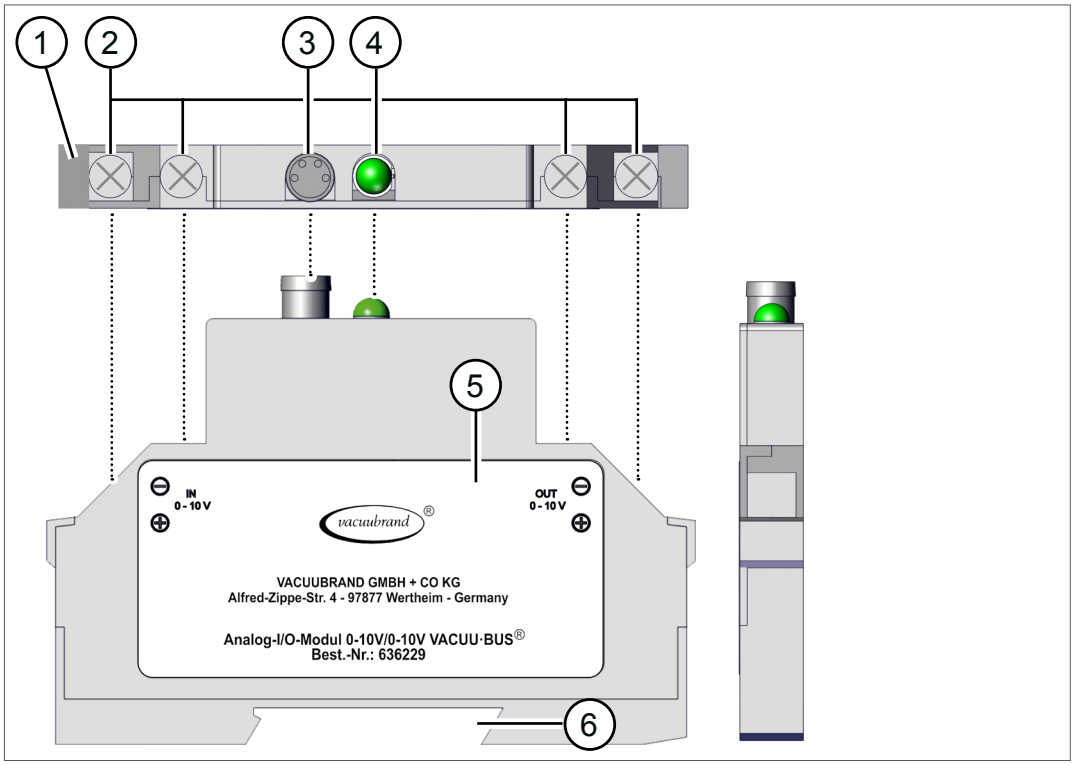
- ⇨ Correctly dispose of all electronic scrap and electric components at the end of their service life.
- ⇨ Observe the national regulations regarding disposal and environmental protection.

3 Product description

3.1 Product view

Analog-I/O-module

I/O module (different views)



1	***VACUU·BUS®*** Analog-I/O-module 0-10 V
2	Terminals, screw terminals 0.5-2.5 mm^2 ▸ IN: input signal 0-10 V ▸ OUT: output signal 0-10 V
3	Connection for ***VACUU·BUS®*** extension cable
4	LED – status indicator ▸ Green: operation ▸ Red: error
5	Product label with connection diagram
6	Recess for installation on a mounting rail

3.2 Controller/gauge system requirements

Firmware

Firmware version

VACUUBRAND peripheral devices	from version
VACUU·SELECT vacuum controller	V1.00 / V1.00
Vacuum controller CVC 3000	1.47
Vacuum gauge DCP 3000	1.20

3.3 Operating principle

3.3.1 Analog VACUU·BUS® interface

VACUU·BUS® interface to controller/gauge

The Analog-I/O-module is an interface that converts analog input signals into ***VACUU·BUS®*** signals and output signals from the vacuum controller (or vacuum gauge) into analog output signals. The voltage range for analog signals at IN/OUT is 0-10 V DC.

3.3.2 Possible functions of I/O module

If required, an I/O module can be assigned a different function by changing the ***VACUU·BUS®*** address = component configuration or configuration.

Addresses and possible functions

Functions paired with address

Analog-I/O-module address in		Function
CVC (DCP)	VACUU·SELECT	
Vakuum _	I/O VACUUM OUT	Read actual vacuum as analog voltage
Drehzahl	I/O SPEED OUT	Read actual speed as analog voltage
SollVak.	I/O VACUUM	Specify vacuum setpoint and read actual vacuum as analog voltage
SollDreh.	I/O SPEED	Specify speed setpoint and read actual speed as analog voltage
VarioX_	VARIO _	Specify speed as analog voltage
Var-SP_	VARIO-SP _	Specify speed as analog voltage
VSK _	VS-C _	VACUU·BUS adapter for ceramic diaphragm vacuum sensor
Ref. _	VS-REF _	VACUU·BUS adapter for ceramic diaphragm vacuum sensor as reference sensor

3.3.3 Actual vacuum function (delivered condition)

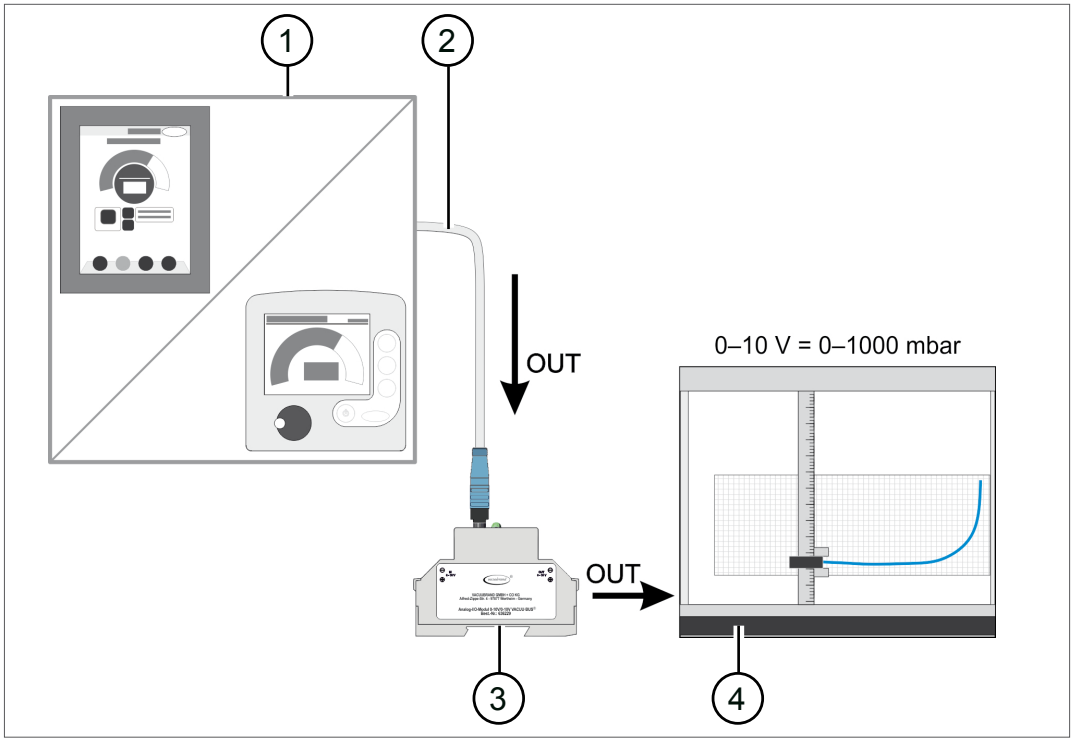
On delivery, the I/O module is configured to allow peripherals to be connected to the module, e.g., a data logger to record the actual vacuum.

Reading the actual vacuum

→ Example

VACUU·BUS® address:
VACUU·SELECT
I/O VACUUM OUT

CVC/DCP
Vacuum



Description

1	Vacuum controller or vacuum gauge ▸ Application (mode): all
2	VACUU·BUS® extension cable
3	VACUU·BUS® Analog-I/O-module 0-10 V ▸ Output signal OUT = Output voltage 0-10 V → Actual vacuum 0-1000 mbar
4	Recording device, e.g., data logger

⇨ For conversion, see chapter:
7.3 Calculation formulas for voltage/pressure on page 41

4 Installation and connection

NOTE

Residual risk due to component failure in the system.

There is a residual risk of failure with all electronic components. This can leave the device in an undefined state.

⇨ Always provide a suitable safety measure to bring the equipment or system into a safe state in the event of a failure.

IMPORTANT!

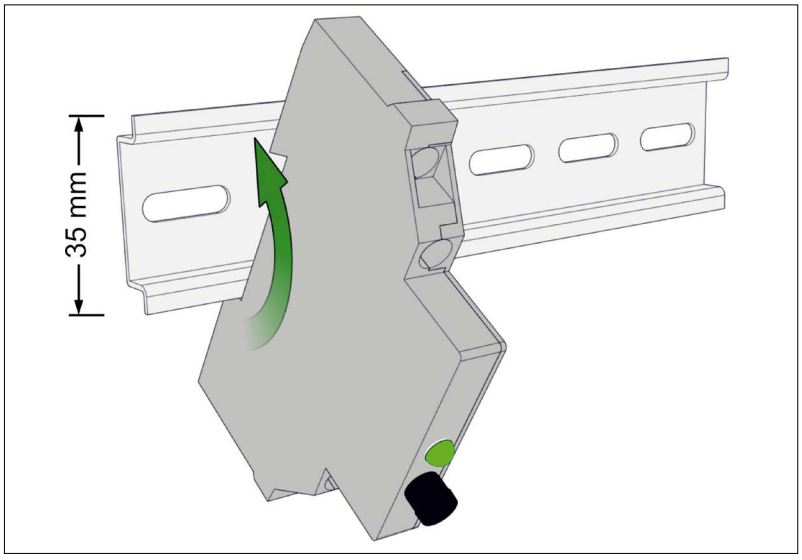
⇨ The installation and connection may only be carried out by a qualified electrician.

⇨ Establish voltage free conditions before working with power lines.

4.1 Installation

Installing the I/O module

Installation



⇨ Clip the I/O module onto a 35 mm mounting rail, e.g., in a control cabinet or a distribution box.

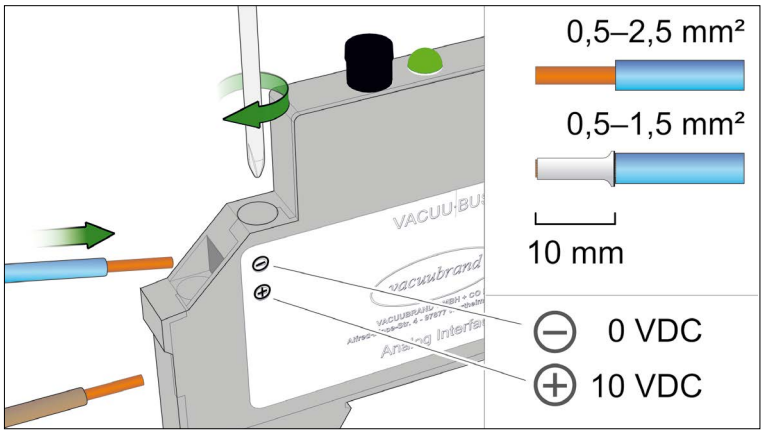
4.2 Connection

IMPORTANT! The Analog-I/O-module is only suitable for connecting extra low voltage 0-10 V DC.

⇨ Ensure correct polarity during connection.

Connecting the I/O module

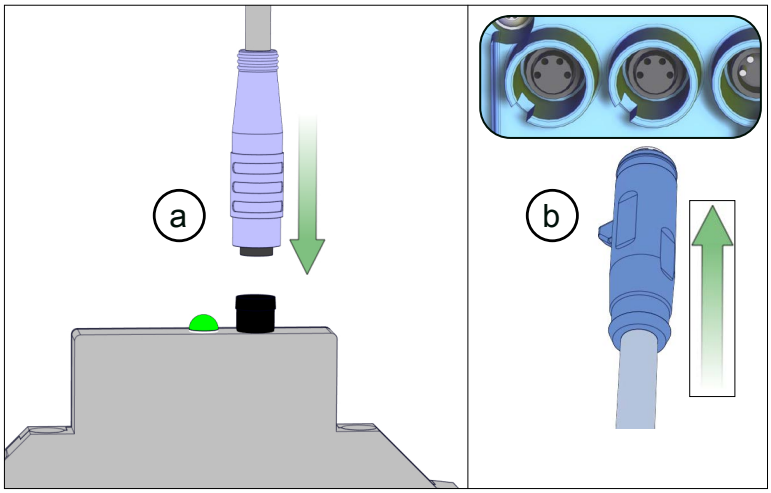
Electrical connection



1. Strip the cable ends as depicted.
2. Secure the cable ends in the connection terminals.

Connecting the I/O module to the vacuum controller

Connection to vacuum controller or vacuum gauge



1. Switch off the vacuum controller.
2. Plug the *VACUU·BUS*® extension cable **(a)** into the connection on the I/O module.
3. Plug the other end of the extension cable **(b)** into the *VACUU·BUS*® port on the back of the vacuum controller casing.
4. Switch the vacuum controller on if you want to use the I/O module for reading the actual vacuum. No address configuration is required.
5. Only when used with VACUU·SELECT:
   Carry out *component recognition,* as described in chapter: *5.1.3 Configuration with VACUU·SELECT on page 20 to 23*.

   ☑ I/O module ready for operation.

5 Component configuration and functions

Definition Configuration/ address configuration

Configuration means assigning a specific address to a *VACUU·BUS*® component, with the help of a vacuum controller or vacuum gauge.

As a *VACUU·BUS*® component, the I/O module has a range of addresses and/or functions available. This means an I/O module can be configured for a particular application by changing the *VACUU·BUS*® address.

Examples

If a different address is selected on the vacuum controller, e.g., the address I/O SPEED OUT on the VACUU·SELECT, or Speed on the CVC 3000, the controller issues the actual speed via the I/O module. This can then be read and recorded by a connected data logger.

If a new address is selected on the vacuum controller, e.g., the address VS-C 2 on the VACUU·SELECT, or VSK2 on the CVC 3000, the controller recognizes that a second capacitive vacuum sensor is connected via the I/O module. In this manner, vacuum sensors can easily be integrated into the *VACUU·BUS*® system.

→ On this, see also: *7.4 Functional overview on page 42*

The vacuum controller or vacuum gauge automatically recognizes the new function via the configured address.

New *VACUU·BUS*® address = New function.

Only one address (function) can ever be assigned to an I/O module.

The address is not fixed. It can be adjusted if required, although is isn't designed for continuous changing.

If additional functions are needed simultaneously, use additional I/O modules.

5.1 Configuration addresses

Depending on the type of controller, different approaches and addresses must be observed during configuration.

5.1.1 Address overview

Possible addresses

Overview of possible addresses

VACUU·BUS® address			Connection		Can be configured with	
CVC (DCP)	VACUU·SELECT	Address range, max.	IN	OUT	Controller**	DCP
Vacuum*	I/O VACUUM OUT*	1	-	0-10 V	●	●
Drehzahl	I/O SPEED OUT	1	-	0-10 V	●	-
SollVak.	I/O VACUUM	1	0-10 V	0-10 V	●	-
SollDreh.	I/O SPEED	1	0-10 V	0-10 V	●	-
VarioX_	VARIO _	1-4	-	0-10 V	●	-
Var-SP_	VARIO-SP _	1-8	-	0-10 V	●	-
VSK _	VS-C _	1-4	0-10 V	-	●	●
Ref. _	VS-REF _	1-4	0-10 V	-	●	●

** = Delivered condition (configuration ex works)*

*** = VACUU·SELECT or CVC 3000*

5.1.2 Preparing for configuration

An I/O module can only be assigned one individual new function.

IMPORTANT!

- ⇨ Switch off the vacuum controller.
- ⇨ Remove all ***VACUU·BUS®*** connectors, apart from the power plug.
- ⇨ Connect only the I/O module for which the address is to be changed.
- ⇨ If the address is to be changed on several I/O modules, this can only be done one after the other. Allocate the address to each individual I/O module separately.
- ⇨ It is irrelevant for address configuration whether jumper wires are connected to IN or OUT.

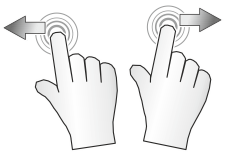
5.1.3 Configuration with VACUU·SELECT

Action symbols

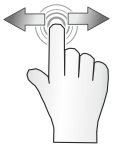
Gesture symbols for touchscreen operation

Touch, tap

Press and hold

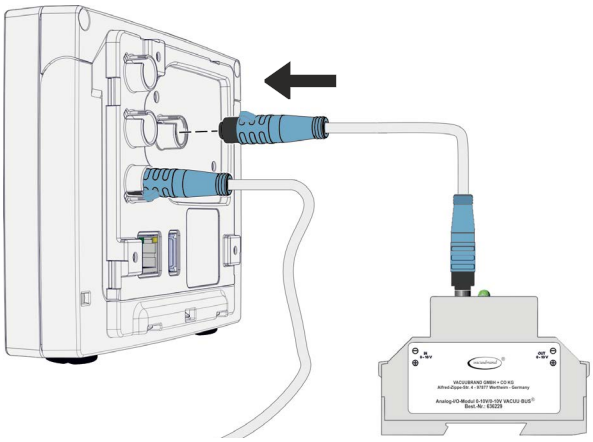


Tap and swipe in the indicated direction

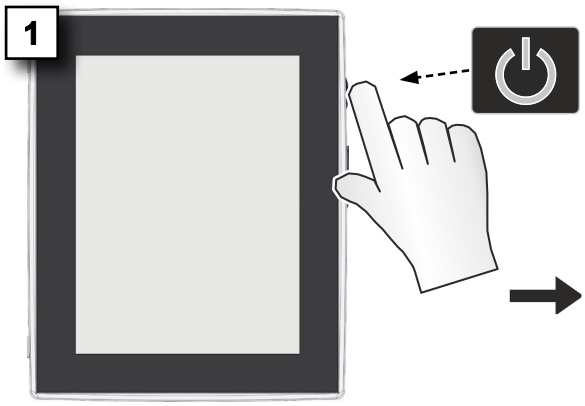


Swipe left or right; both possible

Connecting the I/O module



Switch on the VACUU·SELECT



1. Briefly press the ON/OFF button on the controller.

   ☑ Device boots up

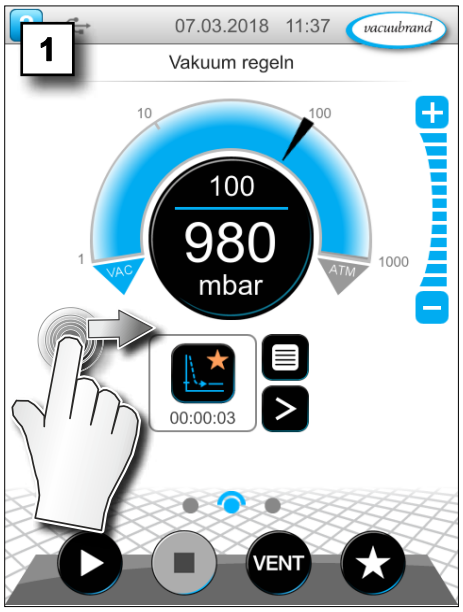
2. Confirm the *Data storage* info pop up.

   ☑ The process screen is shown

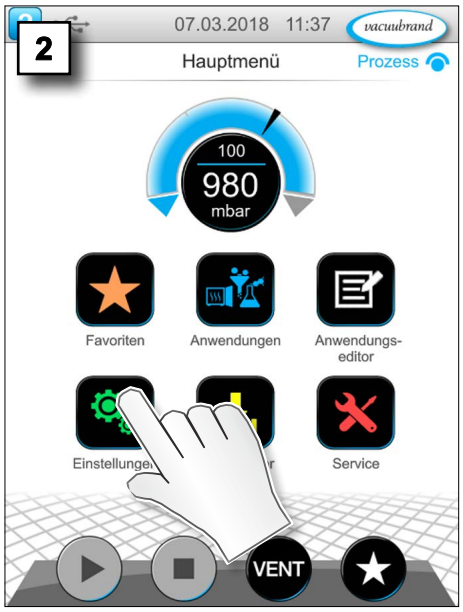
Calling up the VACUU·BUS submenu

Menu path *Process screen/Main menu/Settings/Administration/VACUU·BUS*

→ Example Configuration with VACUU·SELECT

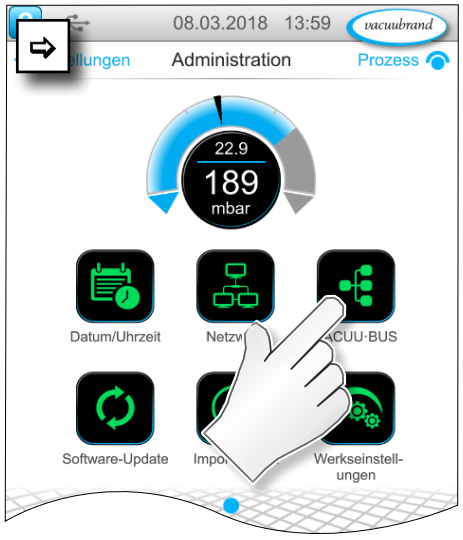


1. Swipe right on the display.



2. Tap on *Settings*.

3. Tap on *Administration*.



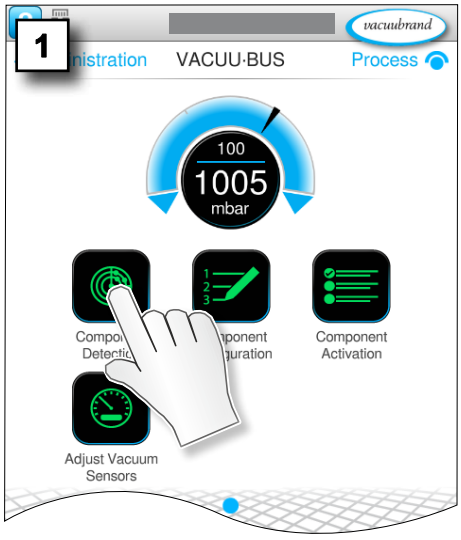
4. Tap on *VACUU·BUS*.

→ Example Configuration with VACUU·SELECT

☑ *VACUU·BUS* submenu

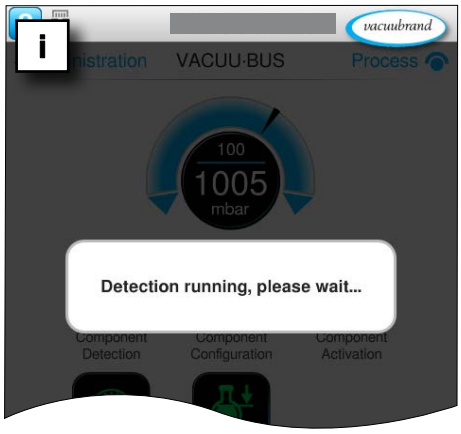
Scanning and recognizing a VACUU·BUS component

How to configure an address in the VACUU·SELECT

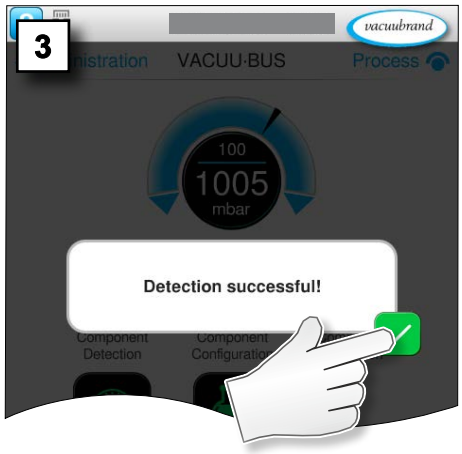


1. Tap on *Component recognition*.

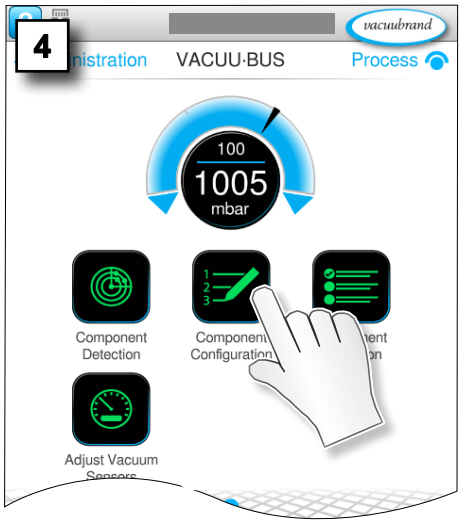
2. Tap on the tick icon.



⇨ Feedback message.



3. Tap on the tick icon.

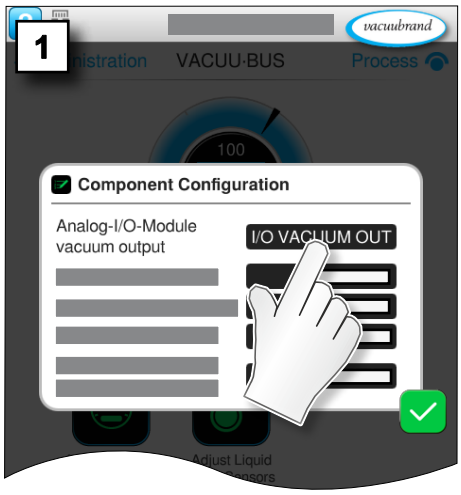


4. Tap on *Component configuration*.

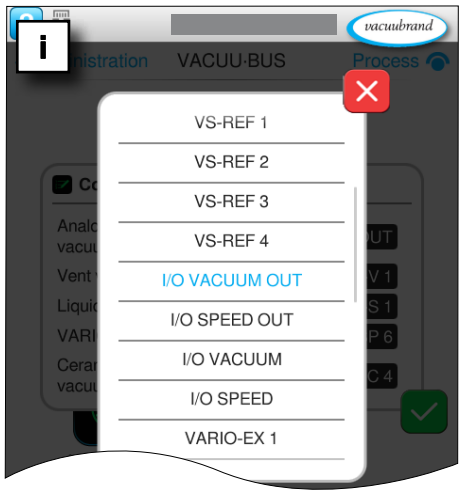
☑ I/O module is listed under *Component configuration*.

Reconfiguring I/O module

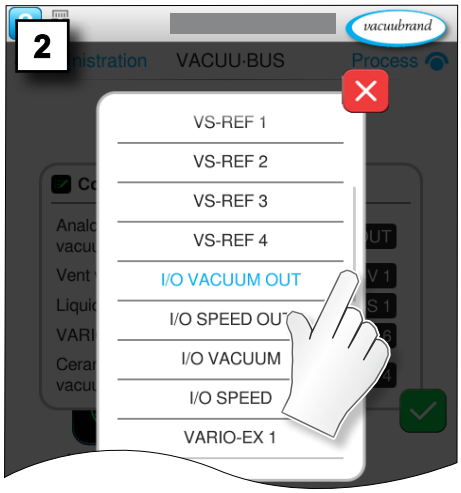
→ Example
Assigning new address



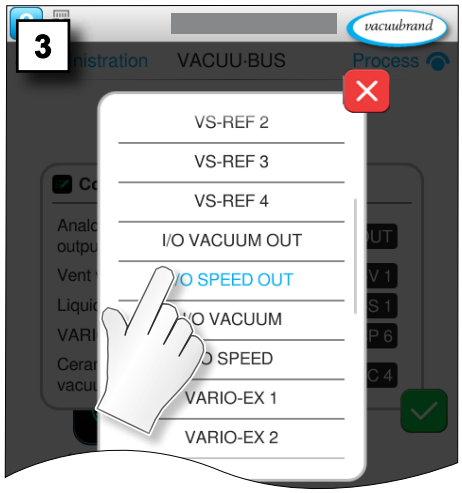
1. Tap on black text field.



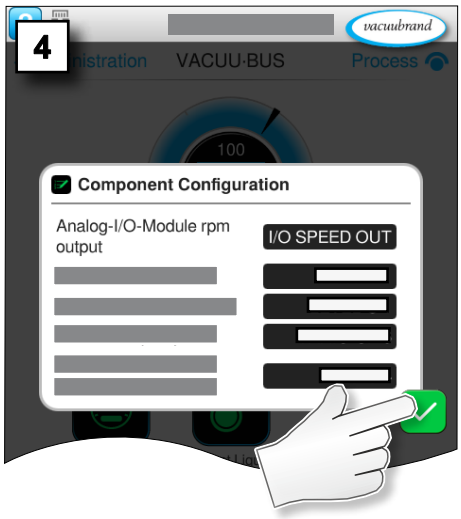
⇨ List of possible VACUU·BUS addresses is shown.



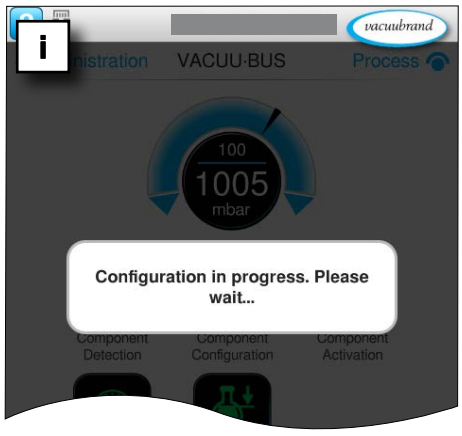
2. Scroll through the list.



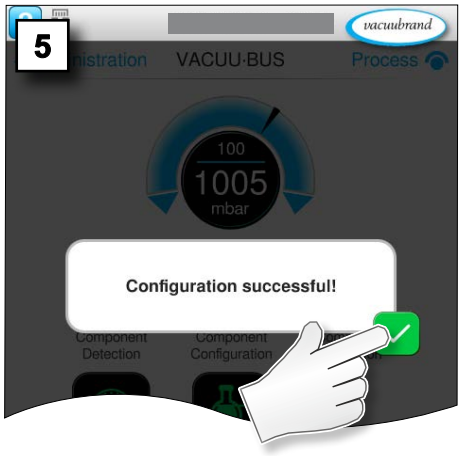
3. Select required VACUU·BUS address and tap on it.



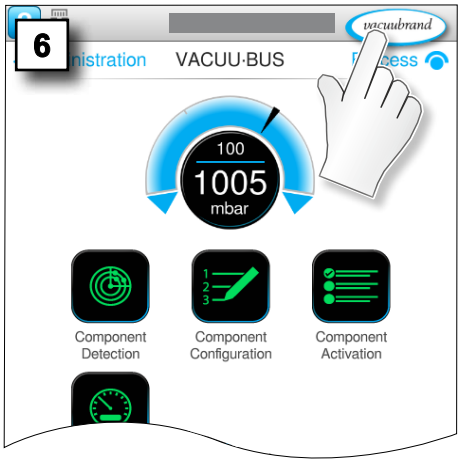
4. Tap on the tick icon.



⇨ Feedback message.



5. Tap on the tick icon.



6. Tap on the logo = back to process screen.

New ***VACUU·BUS***® address for the I/O module = I/O SPEED

- ☑ External control unit specifies speed setpoint to IN.
- ☑ Actual speed is issued to OUT on PLC or data logger.

5.1.4 Configuration with CVC 3000

Action symbols

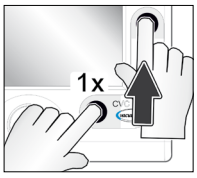
Gesture symbols for CVC operation

Press key or rotary button.

Turn rotary button.

* **Press and hold** key.

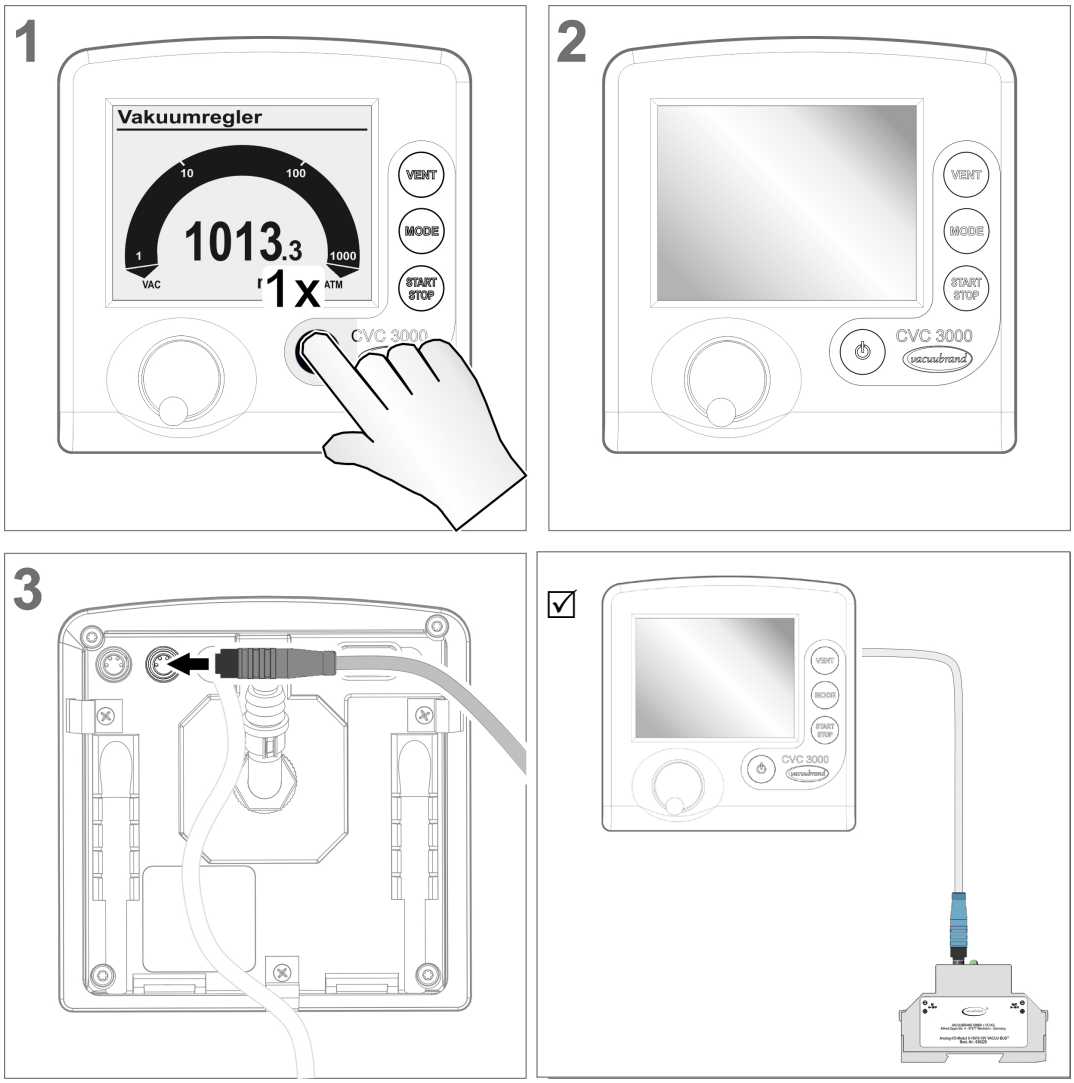
Press and turn rotary button.



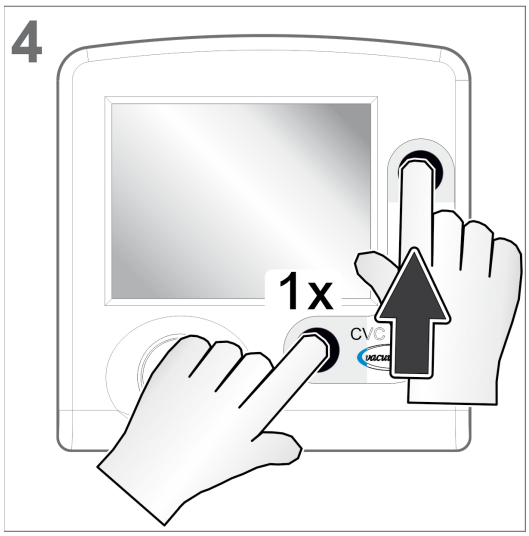
** If shown like this in the diagram: First press and hold the key that needs to be held, and only then briefly press the combination key.*

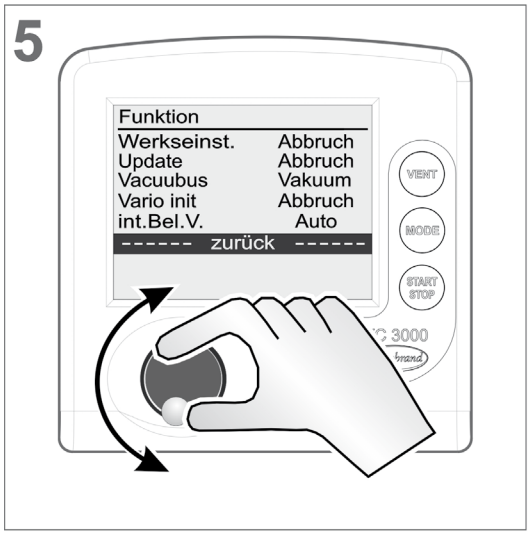
Configuration with CVC 3000

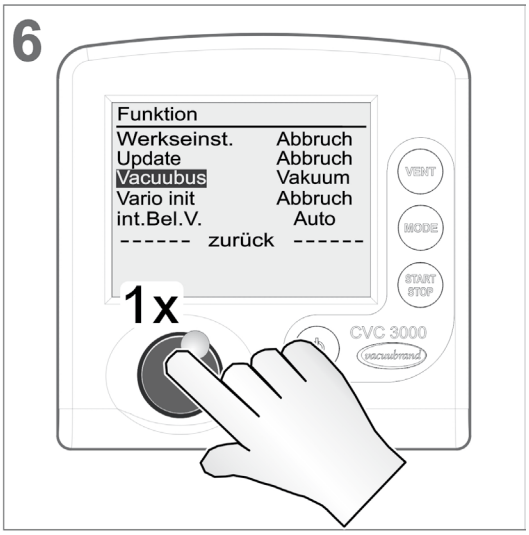
How to configure an address in the CVC 3000

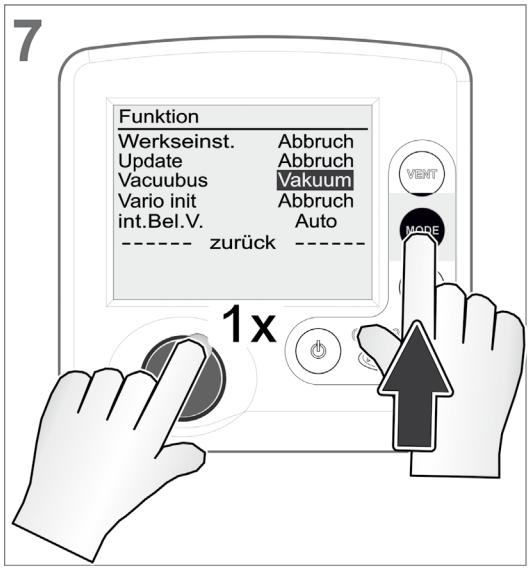


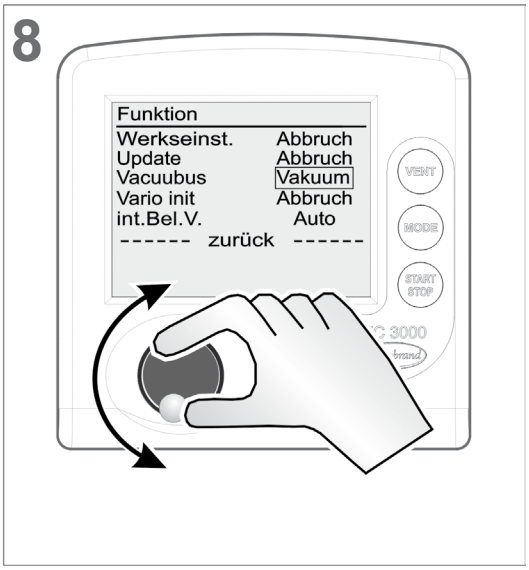
→ Example Configuration with CVC 3000

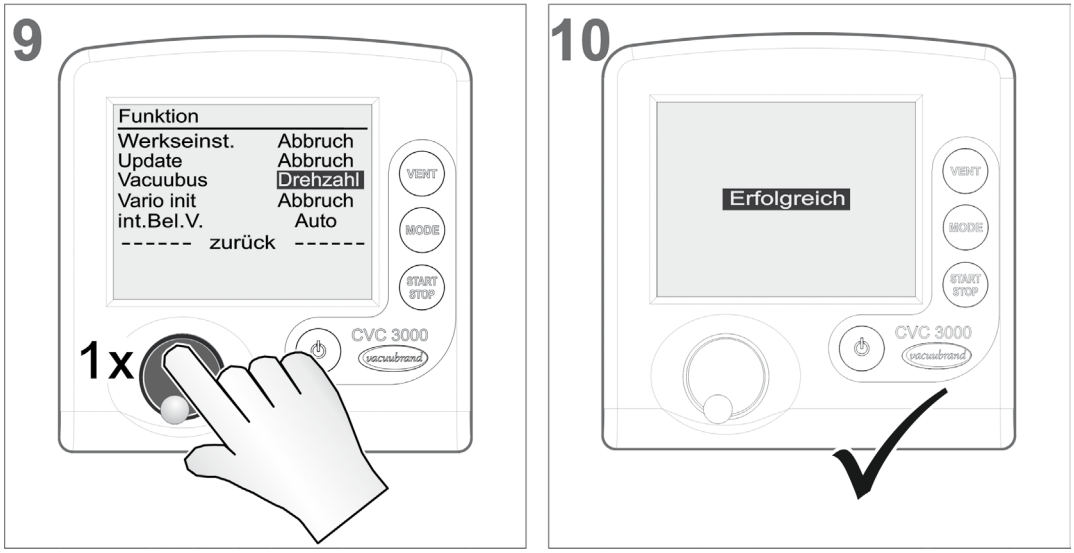












☑ New *VACUU·BUS*® address for the I/O module = Speed

☑ A data logger connected to the Analog-I/O-module now records the actual speed.

5.2 Explanation of assigned function

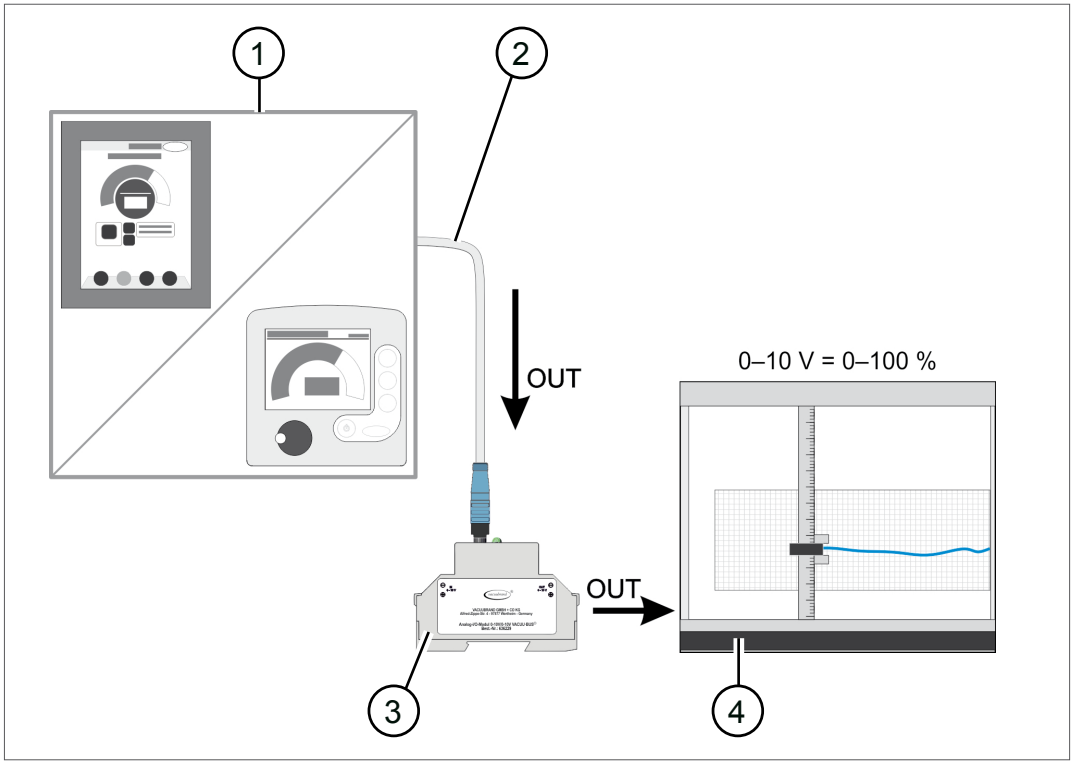
5.2.1 Actual speed

Reading the actual speed

→ Example

VACUU·BUS® address:
VACUU·SELECT
I/O SPEED OUT

CVC
Drehzahl



Description

1	Vacuum controller ▸ Application (mode): all
2	VACUU·BUS® extension cable
3	VACUU·BUS® Analog-I/O-module 0-10 V ▸ Output signal OUT = Output voltage 0-10 V → Actual speed 0-100 %
4	Evaluation device, e.g., data logger, PLC, voltmeter

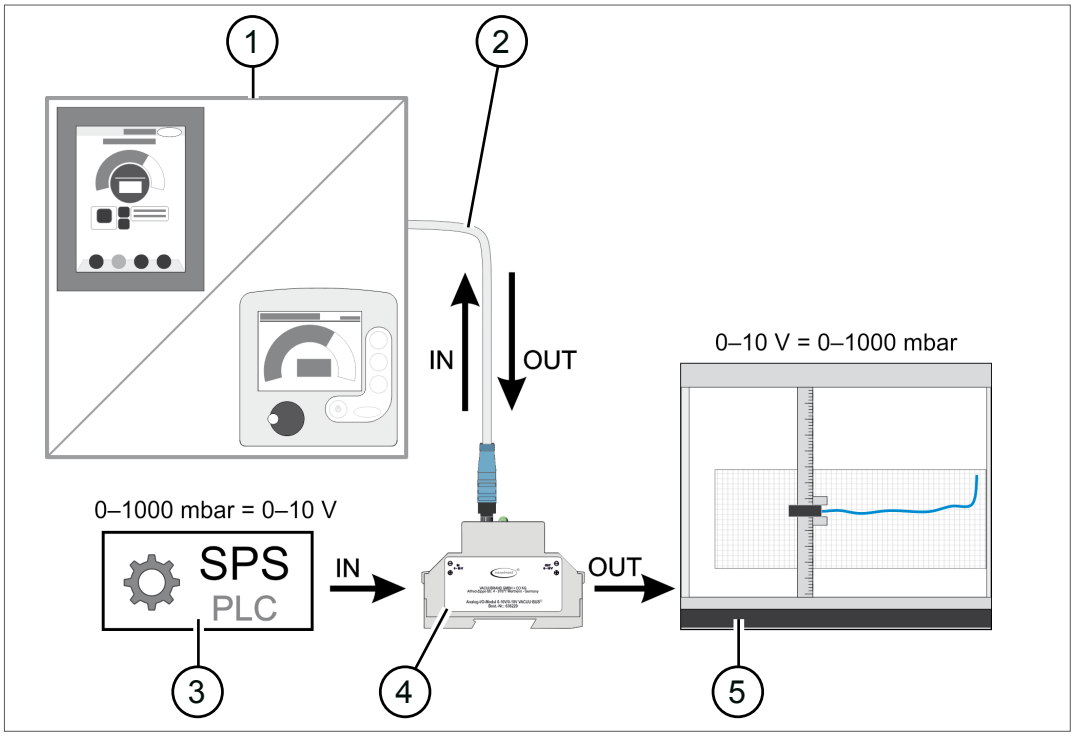
5.2.2 Vacuum setpoint

Specify vacuum setpoint and read actual vacuum

→ Example

VACUU·BUS® address:
VACUU·SELECT
I/O VACUUM

CVC
SollVak.



1	Vacuum controller ▸ Application (mode): Vacuum controller
2	VACUU·BUS® extension cable
3	Vacuum setpoint is specified by external system control, e.g., PLC controller. The specified setpoint has priority over specified values at the controller.
4	VACUU·BUS® Analog-I/O-module 0-10 V ▸ Input signal IN = Input voltage 0-10 V → Setpoint vacuum 0-1000 mbar ▸ Output signal OUT = Output voltage 0-10 V → Actual vacuum 0-1000 mbar
5	Evaluation device, e.g., data logger, PLC, voltmeter

IMPORTANT! The external control unit (master) specifies the vacuum setpoint to the vacuum controller (slave). Adjusting the vacuum at the controller is not possible – though other control parameters can still be adjusted.

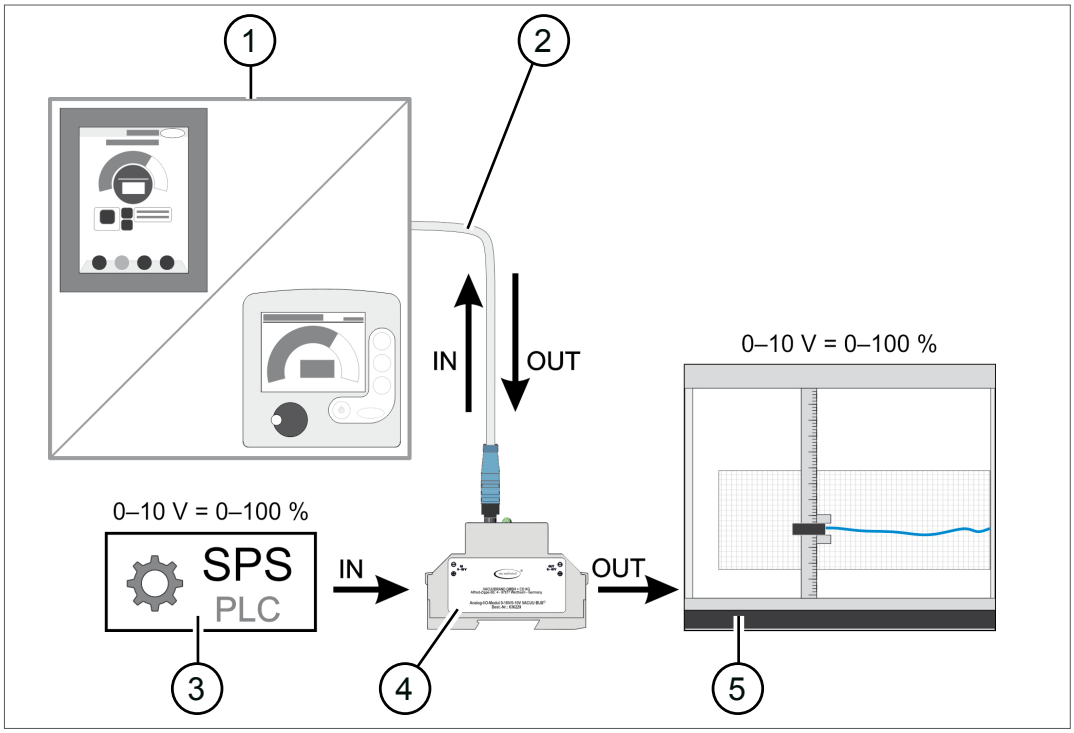
5.2.3 Speed setpoint

Specifying the speed setpoint and reading the actual speed

→ Example

VACUU·BUS® address:
VACUU·SELECT
I/O SPEED

CVC
SollDreh.



1	Vacuum controller ▸ Application (mode): Pump down
2	VACUU·BUS® extension cable
3	Speed setpoint is specified by external system control, e.g., PLC controller. The specified setpoint has priority over specified values at the controller.
4	VACUU·BUS® Analog-I/O-module 0-10 V ▸ Input signal IN = Input voltage 0-10 V → Setpoint speed 0-100 % ▸ Output signal OUT = Output voltage 0-10 V → Actual speed 0-100 %
5	Evaluation device, e.g., data logger, PLC, voltmeter

IMPORTANT! The external control unit (master) specifies the speed setpoint for the vacuum pump to the vacuum controller (slave). Adjusting the speed at the controller is not possible – though other control parameters can still be adjusted.

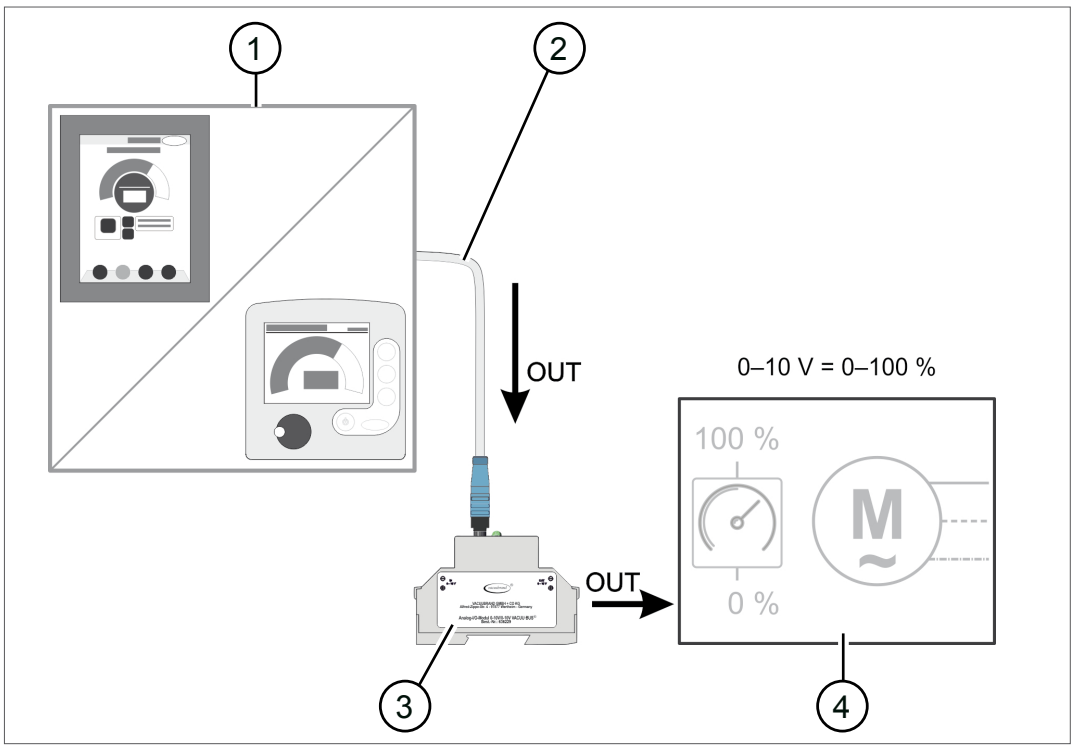
5.2.4 VARIO pump

Specifying the speed for a VARIO pump

→ Example

VACUU·BUS® address:
VACUU·SELECT
VARIO_

CVC
VarioX_



1	Vacuum controller ▸ Application (mode): Vacuum controller, pump down
2	VACUU·BUS® extension cable
3	VACUU·BUS® Analog-I/O-module 0-10 V ▸ Output signal OUT = Output voltage 0-10 V → Speed setting 0-100 %
4	Motor control, e.g., speed controller of a vacuum pump

5.2.5 VARIO-SP pump

Specifying the speed for a VARIO-SP pump

VACUU·BUS® address:
VACUU·SELECT
VARIO-SP_

CVC
Var-SP_

Connection and function as with VarioX. The difference to the VARIO pump lies in the different drive parameters for the VARIO-SP.

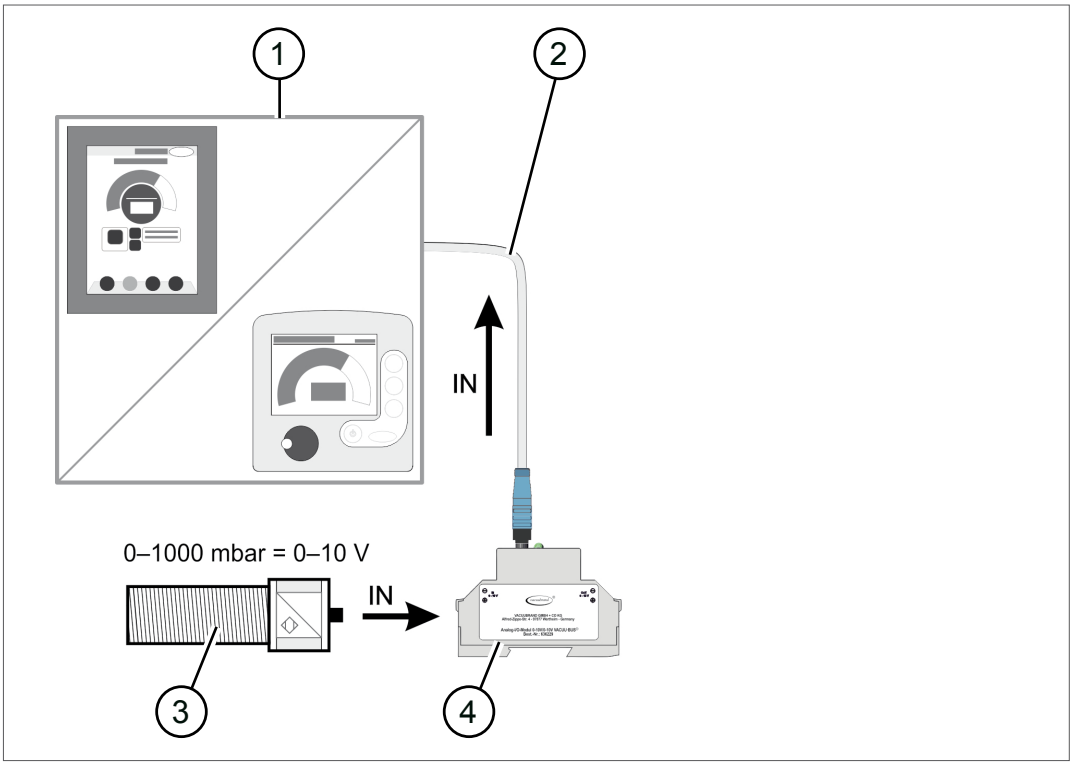
5.2.6 Vacuum sensor

Connecting a vacuum sensor

→ Example

VACUU·BUS® address:
VACUU·SELECT
VS-C_

CVC/DCP
VSK_



Description

1	Vacuum controller or vacuum gauge ▸ Application (mode): all
2	VACUU·BUS® extension cable
3	Vacuum sensor – rough vacuum 0-1000 mbar
4	VACUU·BUS® Analog-I/O-module 0-10 V ▸ Input signal IN = Input voltage 0-10 V → Measured value 0-1000 mbar

** A vacuum sensor without VACUU·BUS interface can only be calibrated to atmosphere and end vacuum.*

5.2.7 Reference sensor

VACUU·BUS® address:
VACUU·SELECT
VS-REF_

CVC
Ref._

Connecting a reference sensor

Connection and function as with vacuum sensor, except that the evaluation is carried out as a reference sensor. The reference sensor serves as a comparison sensor and cannot be used to control the vacuum.

6 Status and error signals

6.1 LED signals

Meaning of the LED signals

LED status display

LED	Status	Description
 Green	**On**	I/O module operating normally
	Flashing	Pressure greater > 1000 mbar
	Off	I/O module is off or does not respond through *VACUU·BUS*® (controller switched off, power supply interrupted, etc.)

LED	Status	Description
 Red	**On**	Input signal more than 10 % too high
	Off	No error.

6.2 Error

IMPORTANT! Opening or altering the component is not permitted. Repairs may only be carried out by the manufacturer.

Steps to take in the event of an error

Errors: what to do

⇨ In the event of damage or recognizable malfunction, immediately take the I/O module out of operation.

⇨ Never repair the I/O module yourself. Replace it with an equivalent I/O module.

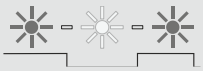
Technical support[1]

Technical support

For technical assistance or in the event of an error, please contact our Service Department.

1 -> Phone: +49 9342 808-5660, fax: +49 9342 808-5555, service@vacuubrand.com

Error messages on the CVC 3000

Icon flashing 	Error and meaning	Signal sound *for acoustic alert* On
	▸ Analog-I/O-module	12x 

Error messages on the VACUU·SELECT

Error messages in the VACUU·SELECT are shown in plain text. Please read the associated manual.

Error remedy

Error	▸ Possible cause	✓ Remedy
Analog-I/O-module	▸ Plug pulled out ▸ Plug-in connection loose ▸ ***VACUU·BUS*** cable defective ▸ I/O module permanently removed	✓ Check the plug-in connection and cable ✓ Replace defective components ✓ CVC 3000/DCP 3000: Load factory settings if I/O module was permanently removed. **CAUTION!** Save stored programs prior to loading the factory settings. ✓ VACUU·SELECT: Carry out component detection.

6.3 FAQ – Frequently asked questions

FAQ

Does a reset to factory settings on the vacuum controller (or vacuum gauge) also reset the address in the I/O module?

No, the factory settings have no influence on the address in the I/O module.

What does *VACUU·BUS* configuration mean?

Assigning a different function to the I/O module by changing the *VACUU·BUS*® address.

How many simultaneous functions does an I/O module have?

An I/O module always only has one function, which was assigned to it through configuration.

How can I use multiple functions in parallel?

Use multiple I/O modules, each with the relevant required function, e.g., vacuum + VSK = 2x Analog-I/O-module.

How many I/O modules can I connect?

You can connect as many I/O modules as there are free suitable addresses in the vacuum controller (or vacuum gauge). For example, address VSK 1-4 allows the connection of up to 4 Analog-I/O-modules, configured as VSK.

Can the vacuum controller (or vacuum gauge) be switched on while I connect an I/O module?

CVC 3000/DCP 3000: No, the device should be switched off while an I/O module is being connected.
VACUU·SELECT: Yes, the device can be switched on.

Is it necessary for address configuration to disconnect the IN/OUT 0-10 V DC connections from the I/O module?

No, these can remain connected to the I/O module, i.e. voltage can be present.

Is it necessary for address configuration to unplug other VACUU·BUS® components from the vacuum controller (or vacuum gauge)?

Yes, as the device shows the preset address in the relevant menu, which facilitates the configuration of the I/O module.

FAQ

How do I reset a fault message on the vacuum controller (or vacuum gauge) that was triggered by an I/O module?

Check the plug-in connection. If that is in good working order, the I/O module could be defective. In this event, stop using the defective I/O module and replace it.

How do I reset a fault message on the vacuum controller (or vacuum gauge), after an I/O module has been permanently removed?

Reset the CVC 3000 to the factory settings.
Carry out component recognition on the VACUU·SELECT.

Do both sides IN/OUT have to be connected?

Depending on the configuration and the preset function, it may be that only IN or only OUT are connected, or both.

What can I do if the function isn't implemented or the I/O module isn't recognized?

Briefly switch the CVC 3000 (or DCP 3000) off and then back on, so that the scan for the VACUU·BUS clients is carried out once more. The function should then be recognized.
Carry out component recognition on the VACUU·SELECT.

Will the I/O module function if it is directly connected to a plug-in power supply?

No, the I/O module only functions with a vacuum controller (or vacuum gauge) with VACUU·BUS support.

Can a sensor without VACUU·BUS also be calibrated to a reference vacuum?

No, a sensor without VACUU·BUS can only be calibrated to the end vacuum (< 0.1 mbar/0.1 Torr).

Why are there different terms, for example vacuum controller and vacuum controlling?

These differences are device-related. The meaning in both cases is the control of vacuum.

7 Appendix

7.1 Technical information

Product designation
Analog-I/O-Modul 0-10V *VACUU·BUS*®

7.1.1 Technical data

Technical data

Ambient conditions		(US)
Working temperature	10-40 °C	50-104 °F
Storage/transport temperature	-10-60 °C	14-140 °F
Max. operating altitude	3000 m above sea level	9840 ft above sea level
Relative humidity	30-85 %, non-condensing	
Prevent condensation or contamination from dust, liquids or corrosive gases		

Electrical data	
Signal input IN / Signal output OUT	0-10 V DC extra low voltage
Input impedance	10 kOhm
Input current, max.	35 mA
Input voltage, max.	60 V DC
Resolution, input	10 mV
Output current, max.	30 mA
Output voltage	0-10 V DC
Resolution, output	2.5 mV
Power consumption, max.	50 mA
Supply via VACUU·BUS®	24 V DC
Protection class	IP 20
Interface	VACUU·BUS®
Status display	Twin LED red/green

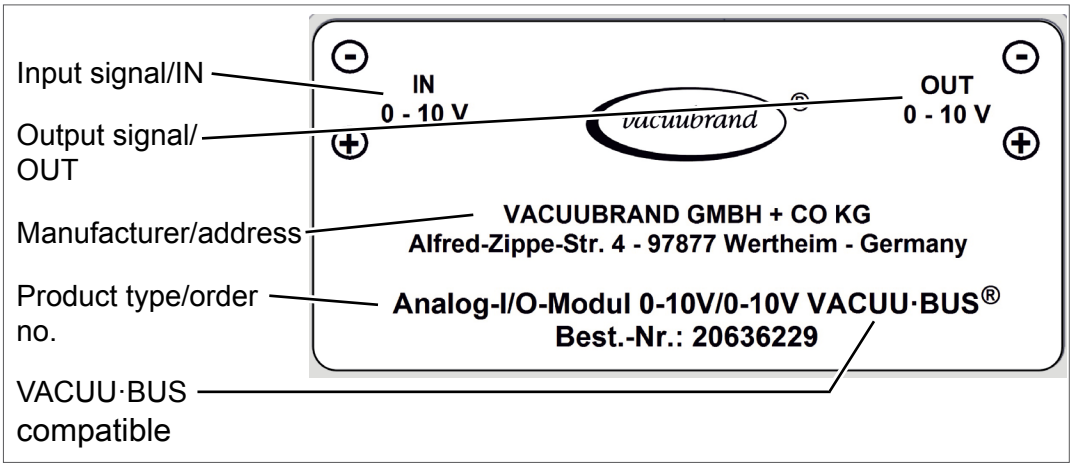
Technical data

Housing data	
Housing material	PC GF, light gray
Housing fastening	Snap fastening on top hat rail EN 50 022
Outside dimensions	8.8 x 89 x 58 mm
Number of terminals	4 terminal screws (plus minus)
Min. connection cross-section	0.5 mm^2
Max. connection cross-section	2x 2.5 mm^2, solid 2x 1.5 mm^2, wire with sleeve

7.1.2 Product label

General product label

Description Product label



When contacting our service department, provide the product type together with a short error description.

This will allow us to provide you with specific support and advice for your device.

7.2 Ordering information

Ordering information

I/O module	Order no.
Analog-I/O-module 0-10 V/0-10 V *VACUU·BUS*®	20636229
VACUU·BUS® extension cable, 2 m	20612552
Instructions for use	20901506

Sources of supply

International sales offices and distribution

Purchase original accessories and original spare parts from a subsidiary of **VACUUBRAND GMBH + CO KG** or your local distributor.

Information about our complete product range is available in the current product catalog.

Your local distributor or **VACUUBRAND GMBH + CO KG** sales office is available to assist you with orders, questions on vacuum control and optimal accessories.

7.3 Calculation formulas for voltage/pressure

The conversion of the output voltage into a vacuum value is relative to the vacuum sensor used, its measuring range and type.

⇨ Please use the calculation formulas below for determining the vacuum value.

Calculation formulas for vacuum value (pressure value)

Calculation formulas Analog-I/O-module for voltage in pressure value

Output signal *(V DC)*	**Calculation formula** **[p]** = mbar (or Torr) **[U]** = V DC	**Valid for sensor type**	**Conversion to vacuum value**
0-10	$p = U \times 100$	▪ VSK 3000 ▪ Internal vacuum sensor CVC 3000 ▪ VACUU·VIEW ▪ VACUU·SELECT Sensor ▪ Other	0-1000 mbar (0-750 Torr)
0.5-9.5*	$p = 10^{\frac{U - 0,5}{1,5} - 3}$	▪ VSP 3000 ▪ VACUU·VIEW extended ▪ Other	10^{-3}-1000 mbar (7.5×10^{-4} -750 Torr)
0.75-9.75**	$p = 10^{\frac{U - 0,75}{0,75} - 9}$	▪ MPT 100 ▪ MPT 200 ▪ Other	5×10^{-9} -1000 mbar (7.5×10^{2} –3.7×10^{-9} Torr)

* *logarithmically, with scaling of 1.5 V per decade*
⇨ in total 6 decades of 10^{-3}-1000 mbar,
example formula for Excel: =POWER(10;((A1 - 0.5)/1.5)-3)

** *logarithmically, with scaling of 0.75 V per decade*
⇨ in total 12 decades of 5×10^{-9}-1000 mbar,
example formula for Excel: =POWER(10;((A1 - 0.75)/0.75)-9)

7.4 Functional overview

An I/O module can only ever be assigned one function.

Analog-I/O-module address			**Signals**			**VACUU·SELECT, CVC 3000 modes**				**DCP 3000**
CVC (DCP)	VACUU·SELECT	Description	IN	OUT		Pump down	Vacuum controller	Automatic mode	VACUULAN	
Vakuum _	I/O VACUUM OUT	Read actual vacuums as analog voltage	---	0-10 V	Actual vacuum 0-1000 mbar	•	•	•	•	•
Drehzahl	I/O SPEED OUT	Read actual speed as analog voltage	---	0-10 V	Actual speed 0-100 %	•	•	•	•	•
SollVak.	I/O VACUUM	Specify vacuum setpoint and read actual vacuum as analog voltage	0-10 V	0-10 V	Vacuum setpoint 0-1000 mbar Actual vacuum 0-1000 mbar		•			
SollDreh.	I/O SPEED	Specify speed setpoint and read actual speed as analog voltage	0-10 V	0-10 V	Speed setpoint 0-100 % Actual speed 0-100 %	•				
VarioX_	VARIO _	Specify speed as analog voltage	---	0-10 V	Speed control for vacuum pump	•	•			
Var-SP_	VARIO-SP _	Specify speed as analog voltage	---	0-10 V	Speed control for vacuum pump e.g., PC 3001 series	•	•			
VSK _	VS-C _	VACUU·BUS adapter for capacitive vacuum sensor	0-10 V	---	0-1000 mbar	•	•	•	•	•
Ref. _	VS-REF _	VACUU·BUS adapter for capacitive vacuum sensor as reference sensor	0-10 V	---	0-1000 mbar	•	•	•	•	•

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7.5 Index

7.6 Declaration of Conformity 符合性声明 – China RoHS 2

VACUUBRAND GMBH + CO KG has made reasonable efforts to ensure that hazardous materials and substances may not be used in its products.
In order to determine the concentration of hazardous substances in all homogeneous materials of the subassemblies, a “Product Conformity Assessment” (PCA) procedure was performed. As defined in GB/T 26572 the “Maximum Concentration Value” limits (MCV) apply to these restricted substances:

- Lead (Pb): 0.1%
- Mercury (Hg): 0.1%
- Cadmium (Cd): 0.01%
- Hexavalent chromium (Cr(+VI)): 0.1%
- Polybrominated biphenlys (PBB): 0.1%
- Polybrominated diphenyl ether (PBDE): 0.1%

Environmentally Friendly Use Period (EFUP)

EFUP defines the period in years during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions. During normal use by the user such electrical and electronic products will not result in serious environmental pollution, cause serious bodily injury or damage to the user’s assets.
The Environmentally Friendly Use Period for VACUUBRAND products is 40 years.

此表格是按照SJ/T 11364-2014中规定所制定的。
This table is created according to SJ/T 11364-2014.

MATERIAL CONTENT DECLARATION FOR VACUUBRAND PRODUCTS							
	有毒有害物质或元素 Hazardous substances						
部件名称 Part name	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr(+VI)	多溴联苯 PBB	多溴二苯醚 PBDE	环保期限标识 EFUP
包装 Packaging	O	O	O	O	O	O	
塑料外壳 / 组件 Plastic housing / parts	O	O	O	O	O	O	
真空油 Vacuum oil	O	O	O	O	O	O	
电池 Battery	O	O	O	O	O	O	
玻璃 Glass	X	O	O	O	O	O	
电子电气组件 Electrical and electronic parts	X	O	O	O	O	O	
控制器 / 测量设备 Controller / measuring device	X	O	O	O	O	O	
金属外壳 / 组件 Metal housing / parts	X	O	O	O	O	O	
电机 Motor	X	O	O	O	O	O	
配件 Accessories	X	O	O	O	O	O	

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注释： 此表格适用于所有产品。以上列出的元件或组件不一定都属于所附产品的组成。
Note: Table applies to all products. Some of the components or parts listed above may not be part of the enclosed product.

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
O: Indicates that the above mentioned hazardous substance contained in all homogeneous materials of the part is below the required limit as defined in GB/T 26572.

X: 表示该有毒有害物质至少在该部件某一均质材料中的含量超出GB/T 26572规定的限量要求。
X: Indicates that the above mentioned hazardous substance contained in at least one of the homogeneous materials of this part is above the required limit as defined in GB/T 26572.

除上表所示信息外，还需声明的是，这些部件并非是有意用铅（Pb）、 汞 （Hg）、铬（Cd）、六价铬（Cr(+VI)）、多溴联苯（PBB）或多溴二苯醚（PBDE）来制造的。
Apart from the disclosures in the above table, the subassemblies are not intentionally manufactured or formulated with lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr+VI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

Products manufactured by VACUUBRAND may enter into further devices (e.g., rotary evaporator) or can be used together with other appliances (e.g., usage as booster pumps).
With these products and appliances in particular, please note the EFUP labeled on these products.
VACUUBRAND will not take responsibility for the EFUP of those products and appliances.

Place, date: Wertheim, 06/04/2020

(Dr. F. Gitmans)
Managing Director

i.A.

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Technology for Vacuum Systems

– TDD2 – © VACUUBRAND GMBH + CO KG – 2019

Version: 20901506_EN Analog-I-O-Vsel V1.4 060420

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