vacuubrand

Technology for Vacuum Systems

CONTROL MODULE

VAC 24 SEVEN

Instructions for use

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.

Manufacturer:

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
GERMANY

Phone:
Head office: +49 9342 808-0
Sales: +49 9342 808-5550
Service: +49 9342 808-5660

Fax: +49 9342 808-5555
Email:info@vacuubrand.com
Web: www.vacuubrand.com

*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 a modular manual compiled in a binder.

1.1 User information

1.1.1 Descriptions of the control module

In this section of the manual, you will find descriptions for the ***control module*** of the vacuum pumping unit.

Manual module	Content
VAC 24seven_Control	Control module Control unit for VAC 24seven

⇨ Read this manual thoroughly and completely before putting the product into operation.

⇨ Observe the safety information in the system description VAC 24seven_System.

1.1.2 Safety

Intended use

Intended use

The control module is part of the VAC 24seven vacuum pumping unit and is designed for the vacuum control and power supply of connected pump modules. The control module is intended as a connection box for approved VACUU BUS components. Other connections, such as USB-A and RJ45 (Ethernet), are provided for remote control through approved communication protocols.

Any other use is considered improper use.

Only use the control module if it is in perfect working condition.

1.1.3 In this manual

Information about the manual

- A VACUU SELECT vacuum controller is installed in the control module. For easier readability, the term controller is used for the designation VACUU SELECT vacuum controller.
- The illustrations in this manual are only intended to facilitate comprehension.
- We reserve the right to make technical and design changes in the course of continuous product improvement.

1.2 Symbols and icons

Symbols and icons are used in this manual to help you understand descriptions more easily.

Explanation of symbols and icons

✓	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.

Explanation of symbols for the controller

	Message: Warning		Message: Error
	Acoustic signal – signal sound/warning sound.		
	Frequency of beeping, frequency of acoustic signal		

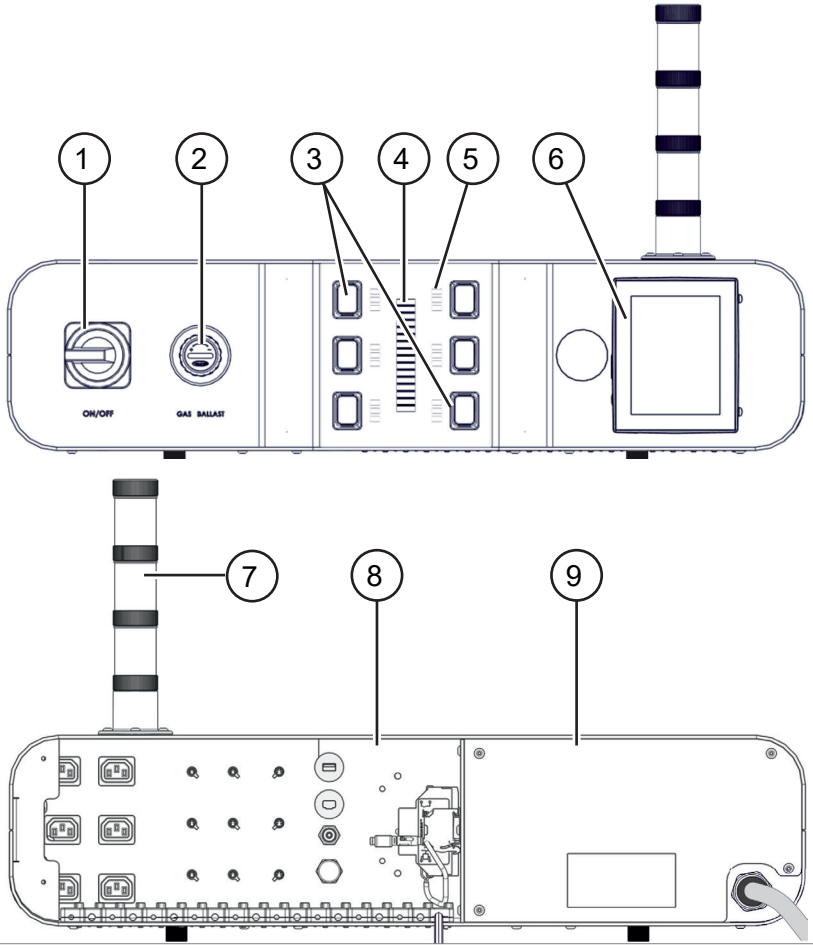
2 Description of control module

2.1 Product description

View of control module VAC 24seven

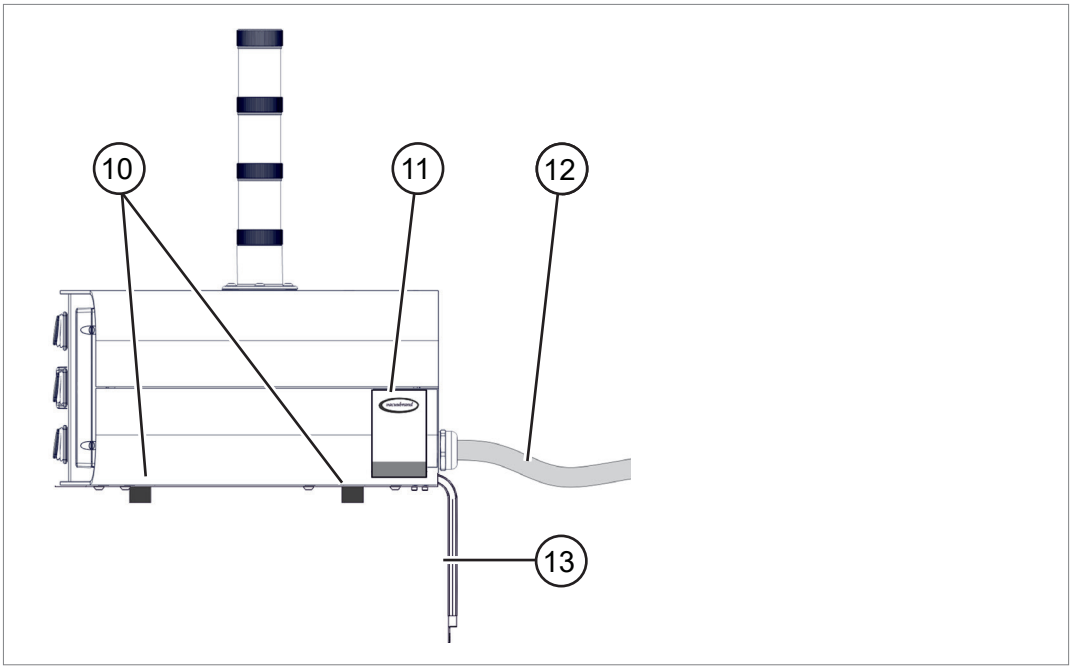
Front view

Rear view



1	Main switch ON/OFF
2	Gas ballast valve
3	Rocker switch – vacuum pumps ON/OFF (6x)
4	Bar graph – speed vacuum pumps
5	LED displays (6x): ▸ Traffic light arrangement – vacuum pump status
6	VACUU·SELECT vacuum controller
7	Light column – H1 (red/orange/green)
8	View without cover: Mains connection vacuum pumps, connections VACUU-BUS, Ethernet, USB-A, digital I/O module (= connection for error message from/to external), PE earth connection for pump module(s), gas ballast
9	View with cover: Terminals of power supply cable + fuses

Side view



10	Adjustable feet
11	Rating plate

IMPORTANT!

The power supply cable may only be connected to the power supply by a qualified electrician.

12	Power supply cable + strain relief
13	Grounding – PE connection to pump module(s)

2.2 Function description

Control module in general

Functions of the control module

The ***control module*** controls the vacuum control and the demand-based speed control of up to three ***pump modules***.

The control module is switched on via the main switch. Individual rocker switches switch the diaphragm pumps on and off.

Status display for monitoring

The operating status of the vacuum pumps is indicated by a light column and by the status LEDs on the front.

Speed display

LEDs for indicating the pump speed are located in the center of the control module. All connected vacuum pumps run at the same speed.

Vacuum control

The vacuum control is taken over by the integrated VACUU SELECT controller. The current pressure is measured by an external vacuum sensor installed on the process, e.g., VSK 3000, which transmits the measured value to the controller. Depending on the demand, the controller regulates the speed of the vacuum pumps and thus the vacuum. All diaphragm pumps are monitored and controlled individually; it is possible to remove individual pumps during operation.

The controller is operated via a graphical user interface.

VACUU SELECT remote control

The VACUU SELECT supports communication via Modbus TCP and RS-232. This enables you to remotely monitor and control the controller from a central location, for example directly with a PC or via PLC in a process control system with a host computer.

Connection options are available on the rear of the control module via Ethernet and USB-A.

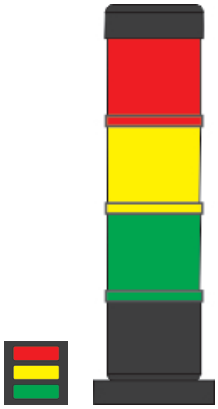
→ For operation, please read the enclosed manuals for the controller and the interfaces.

3 Display and operating elements

VAC 24seven control module

3.1 Display elements (signal lights)

3.1.1 Light column+ LEDs (red/orange/green)



Pump status (traffic light arrangement)

Color	Description
RED	**Error** Operation stopped ▸ Error message - vacuum pump(s), e.g., motor overheating, vacuum sensor defective or disconnected, option: external error pending.
ORANGE flashing	**Warning** Operation with error ▸ Error - vacuum pump(s), at least one vacuum pump still running.
ORANGE	**Warning** Operation with error ▸ No communication with vacuum pump, e.g., a vacuum pump switched off for maintenance purposes.
GREEN	**Normal display** Operation OK ▸ Connected vacuum pump(s) ready/running, everything OK.

Under certain circumstances, individual display elements may respond with a delay. An error is present if display elements do not respond.

⇨ Use the lamp test function to check the function.

3.1.2 LEDs (green)

Power and activity display (bar graph)

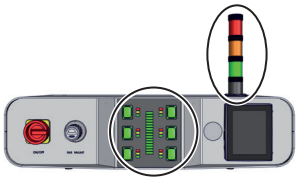
Color	Description
GREEN	**LEDs on** ▸ Speed > 1 – 100 %
GRAY	**LEDs off** ▸ Speed 0 %, all vacuum pumps stopped or switched off.

3.1.3 Rocker switch light

Rocker switch illuminated green

Color	Description
GREEN	**Light on** ▸ Switch position I: Vacuum pump switched on
GRAY	**Light off** ▸ Switch position 0: Vacuum pump switched off

3.1.4 Lamp test function



Controlled signal lamps

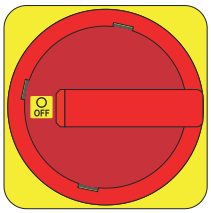
Immediately after switching on the ***control module***, all signal lights are activated for approx. 2 seconds.

All LEDs, illuminated switches and the light column are switched on briefly, allowing the function of the signal lights to be checked.

3.2 Operating elements

The operating elements of the control module are located on the front.

3.2.1 Main switch



Main switch

Switch position	Description
ON	**Switch on the control module** ▸ Control module on
OFF	**Switch off the control module** ▸ Control module off

When turned to OFF, the vacuum pumping unit comes to an immediate standstill.

In the OFF position, the main switch can be padlocked to prevent the vacuum pumping unit from being switched on again.

3.2.2 Gas ballast valve

Gas ballast valve

Direction of rotation	Description
+	**Open gas ballast valve** ▸ Gas ballast open/on
–	**Close gas ballast valve** ▸ Gas ballast closed/off

Open/close gas ballast, e.g., for inert gas supply, if condensing vapors are pumped.

3.2.3 Rocker switch

Rocker switch

Switch position	Description
0	**Switch off individual vacuum pump** ▸ Vacuum pump off
I	**Switch on individual vacuum pump** ▸ Vacuum pump on

3.2.4 VACUU·SELECT vacuum controller


VACUU·SELECT

Description
VACUU·SELECT vacuum controller ▸ Start/stop vacuum control ▸ Preselect type of operation ▸ Read error messages

4 Operation

4.1 Control module

The control module offers the following operating options:

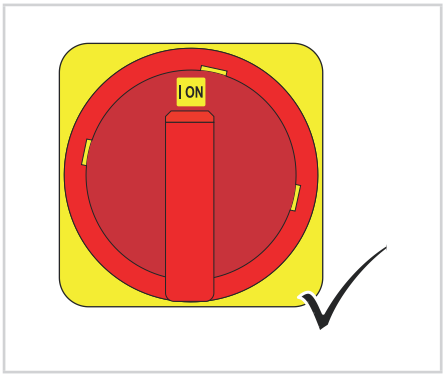
- Switch on/off the vacuum pumping unit,
- Switch vacuum pumps on/off individually,
- Control gas ballast supply.

Vacuum control is taken over entirely by the integrated controller. The controller has a display-guided menu control. All operating steps required for vacuum control must therefore be executed on the controller.

4.1.1 Switch on/off the vacuum pumping unit

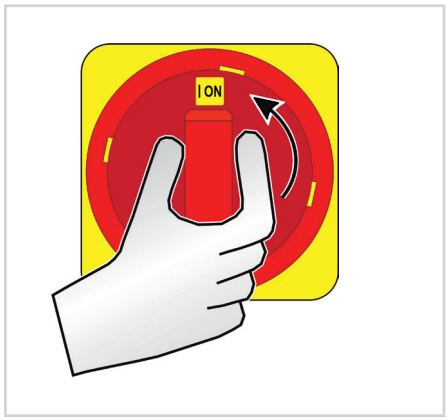
Switch on the control module

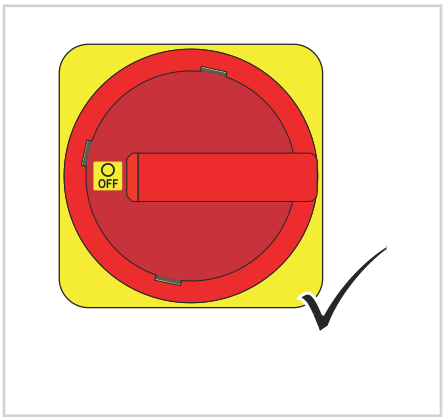
Switch on vacuum pumping unit via control module



Switch off the control module

Switch off vacuum pumping unit via control module





☑ Control module + pump module switched off

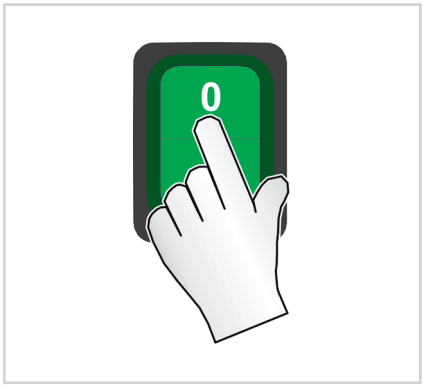
4.1.2 Switch on/off vacuum pump

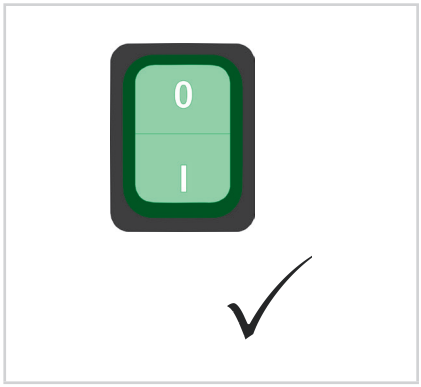
After switching on the control module, it may first be necessary to switch on the vacuum pumps of a pump module.

If maintenance must be performed, the vacuum pump of a pump module can be switched off, removed, and serviced separately. After reinstallation, the serviced vacuum pump can be switched on again via the rocker switch.

Switch on vacuum pump

Switch on individual vacuum pump

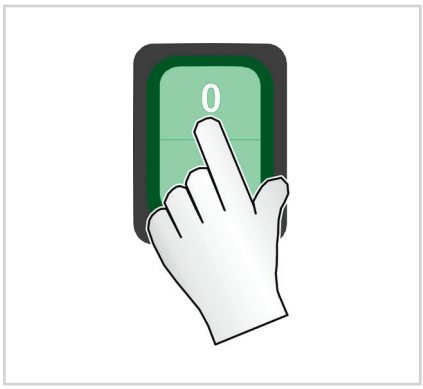


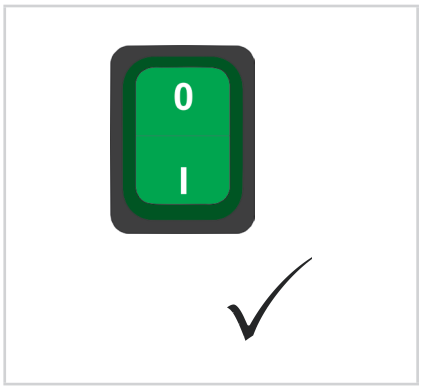


- ☑ Rocker switch lights up.
- ☑ Vacuum pump switched on.

Switch off vacuum pump

Switch off individual vacuum pump





- ☑ Rocker switch does not light up.
- ☑ Vacuum pump switched off.

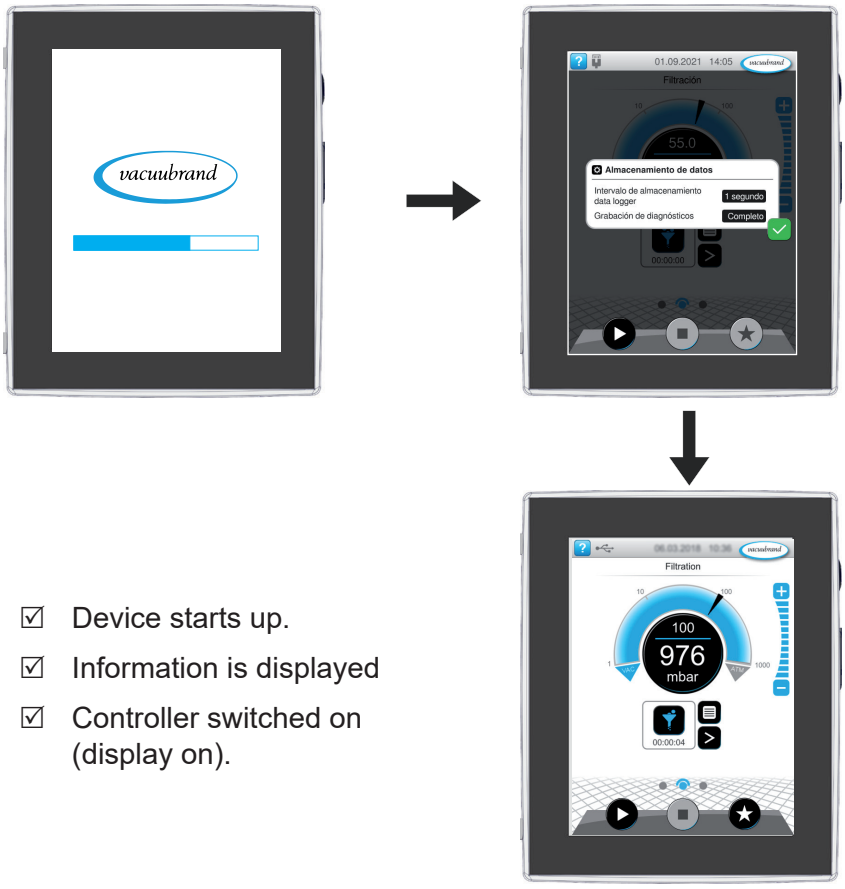
4.2 Switch on/off controller

The controller in the control module can be switched on and off separately when the main switch is on.

Switch on controller

Switch on controller

⇨ Briefly press the ON/OFF button on the controller



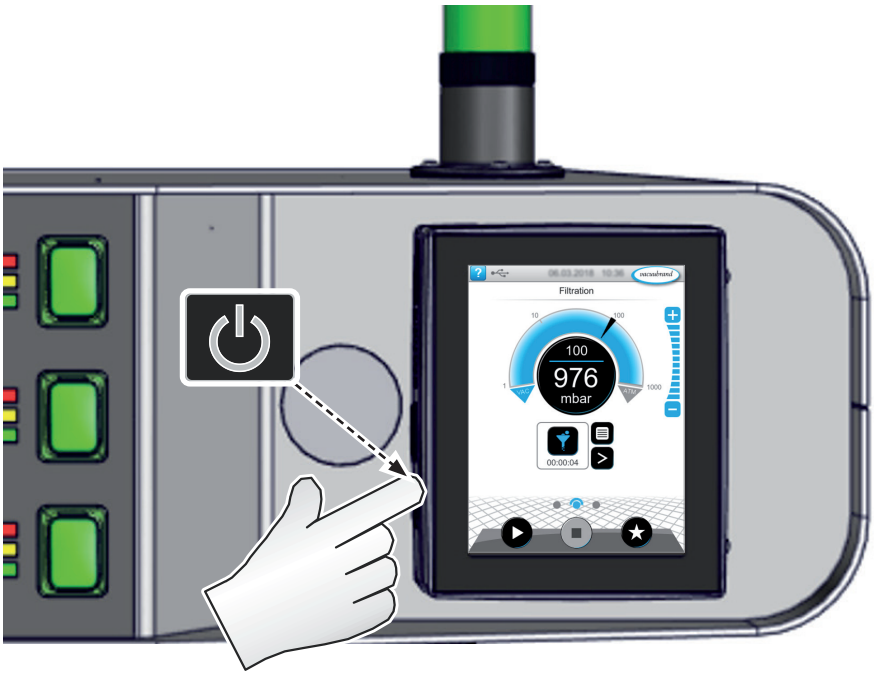
☑ Device starts up.

☑ Information is displayed

☑ Controller switched on (display on).

Switch off controller

Switch off controller



⇨ Press and hold the ON/OFF button on the controller for about 3 seconds and confirm the pop-up.

☑ Controller switched off (display off).

If the control module is switched off via the main switch and the controller was still on, then the controller starts automatically the next time the main switch is switched on.

5 Error remedy

Technical support

Technical support

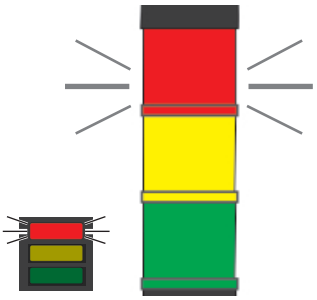
For technical assistance or in the event of an error, please contact our Service Department.

⇨ To identify errors and potential remedies, please refer to the *Error – Cause – Remedy* tables in the manuals for the control module and in the manual of the controller

5.1 Error indication of the control module

5.1.1 Light column and status LED

Error indication on the control module



Color	*Description*		**Error effect**
RED H1	**Error**	▸ Error message of all vacuum pumps, e.g., all vacuum pumps switched off; ▸ Vacuum sensor defective or disconnected; ▸ Option: External error pending.	Operation stopped
RED LED	**Error**	Error message of vacuum pump, e.g., motor overheating	Defective vacuum pump stopped
ORANGE flashing H1	**Warning**	Error message of vacuum pump(s), at least one vacuum pump still running.	Operation with error
ORANGE H1	**Warning**	No communication with vacuum pump	Operation with error
ORANGE LED	**Note**	Vacuum pump switched off, e.g., for maintenance purposes.	Vacuum pump switched off

5.1.2 Error indication on controller

Error indication

Error indication on the controller

Symbol	Description
	*Error indication* ▸ Indication in the case of error or warning. ▸ Tap to display text and acknowledge the error.

Color	Description
Yellow	*Warning* ▸ Indicates persisting error; process continues to run. ▸ Warnings are automatically reset after remedying the error.
Red	Error ▸ Indicates persisting error; process stops. ▸ The process can only be restarted after the error has been remedied and the error message has been acknowledged.

Sound	Description
	*Warning or error* ▸ Shows that an error or warning is present. ▸ Active while error status persists.

5.2 Controller reset

Auto-reset – error resets itself automatically

Automatic reset
Warning, yellow

The following error messages are automatically reset after the error has been eliminated:

- Overpressure
- Measurement of negative pressure value (underrange)

Active reset[1] – eliminate and acknowledge error

Reset after action
Error, red

Some of the error messages must be reset after the error has been eliminated. Different actions are required depending on the priority of the error.

⇨ Press the *plain text message or blue warning triangle* to actively reset the following error messages:

- Error, all vacuum pumps stopped
- Error in-line solenoid valve
- Error coolant valve
- Vacuum sensor disconnected
- Error message from external has triggered via digital I/O module with configuration *Error*
- Level sensor triggered

1 -> Required to restart operation.

5.3 Error – Cause – Remedy (control module)

Error-Cause-Remedy

Error	▸ Possible cause	✓ Remedy	Personnel
Sensitive process not controllable	▸ Speed too high ▸ Pumping speed too high	✓ Reduce speed	Operator, specialist
Frequent error messages of connected components	▸ Multiple controllers connected. ▸ Multiple VACUU BUS components of the same type have the same address.	✓ Use only one controller within a VACUU BUS system. ✓ Perform VACUU BUS component recognition on the controller.	Resp. specialist
Pressure reading incorrect	▸ Moisture inside the vacuum sensor. ▸ Vacuum sensor dirty. ▸ Vacuum sensor not calibrated. ▸ Vacuum sensor calibrated incorrectly.	✓ Determine and eliminate source of moisture. ✓ Allow vacuum sensor to dry, e.g., by pumping down. ✓ Clean vacuum sensor. ✓ (Re)calibrate vacuum sensor.	Operator, specialist
External error	▸ An external error occurred, the digital I/O module relayed the error to the controller ⇨ Vacuum pumping unit stopped.	✓ Eliminate external error in the system. ✓ Active reset of the error message on the controller.	Specialist, resp. specialist
Error message, VACUU·BUS accessory not available	▸ VACUU BUS accessory no longer connected. ▸ VACUU BUS accessory still active as a component in the controller.	✓ If removed for a prolonged period, perform VACUU·BUS component recognition at the controller.	Operator, specialist
Error vacuum pump (vacuum pump LED red)	▸ Motor overheated ⇨ defective vacuum pump stopped. ▸ Air supply to vacuum pumps insufficient. ▸ Vacuum pump defective.	✓ Allow the vacuum pump to cool down. ✓ Check the reason why the vacuum pump is overheating and eliminate the cause, e.g., ensure sufficient air supply. ✓ Replace defective vacuum pump.	Specialist, resp. specialist
		✓ Perform a pump reset to reset the error message: ✓ Switch off the rocker switch of the faulty vacuum pump. ✓ Wait until the LED changes from red to orange. ✓ Switch on the rocker switch of the faulty vacuum pump.	

Error-Cause-Remedy

Error	▸ Possible cause	✓ Remedy	Personnel
No display	▸ Power supply failed. ▸ Power plug not correctly plugged in or pulled out. ▸ Main switch switched off. ▸ VACUU·BUS plug-in connection or cables defective or not connected. ▸ Controller switched off or defective. ▸ Device fuse tripped.	✓ Have the power supply checked and restored by a qualified electrician. ✓ Check power connection and cable. ✓ Send in the control module.	Specialist, resp. specialist

5.4 Error message from external

Error messages from external system components can only be reset after the error has been remedied. The vacuum pumping unit is stopped for the duration of the external error.

⇨ Eliminate the external error and

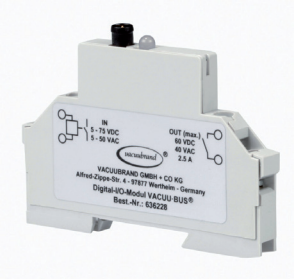
⇨ reset the error message on the controller.

IMPORTANT!

Error messages from external are displayed on the controller as plain text, color display, and acoustic alert.

The light column lights up with a continuous red light.

Vacuum control is stopped for the duration of the error. The error must be actively reset.



The digital I/O module on the rear of the control module is provided for the connection of external error messages.

⇨ If the connection for external error messages is not required, a 24 V signal cable (internal) must be connected, otherwise an error message is permanently displayed and the pumping unit is stopped.

6 Appendix

6.1 Technical information

6.1.1 Technical data

Technical data

Control module VAC 24seven		(US)
Dimensions mm (l x w x h)	385 mm x 775 mm x 449 mm 15 inches x 31 inches x 18 inches	
Weight	16 kg	35 3 lb

Ambient conditions		(US)
Working temperature	10–45 °C	50–113°F
Storage/transport temperature	-10–60 °C	14–140°F
Altitude, max.	2000 m über NHN	6562 ft above sea level
Relative humidity	30–85 %, non condensing	
Pollution degree	2	
Protection class IP (IEC 60529)	IP42	
Protection type (UL 50E)	Type 2	
Impact energy	5 J	
Prevent condensation or contamination from dust		

Electrical data		(US)
Mains connection	400 V/50–60 Hz, 16 A	208–240 V/50– 60 Hz, 1 phase, 30 A
Overvoltage category	II	
Voltage tolerance range	360-440 V	187-264 V
Backup fuse	16 A	30 A
Connection line up to 50 m	2.5 mm2	AWG 10
Total connected load	~6 kVA	
Vacuum controller	VACUU·SELECT, integrated	
Interfaces	USB-A Ethernet VACUU·BUS *IN: 5 – 75 VDC or *IN: 5 – 50 VAC *OUT: 60 VDC or 40 VAC, 2.5 A IN/OUT: 0 – 10 V (option)	
Remote control (LAN)	VACUU·CONTROL; Firmware 1.10	

* connection for external fault message on VACUU·BUS digital I/O module

Technical data

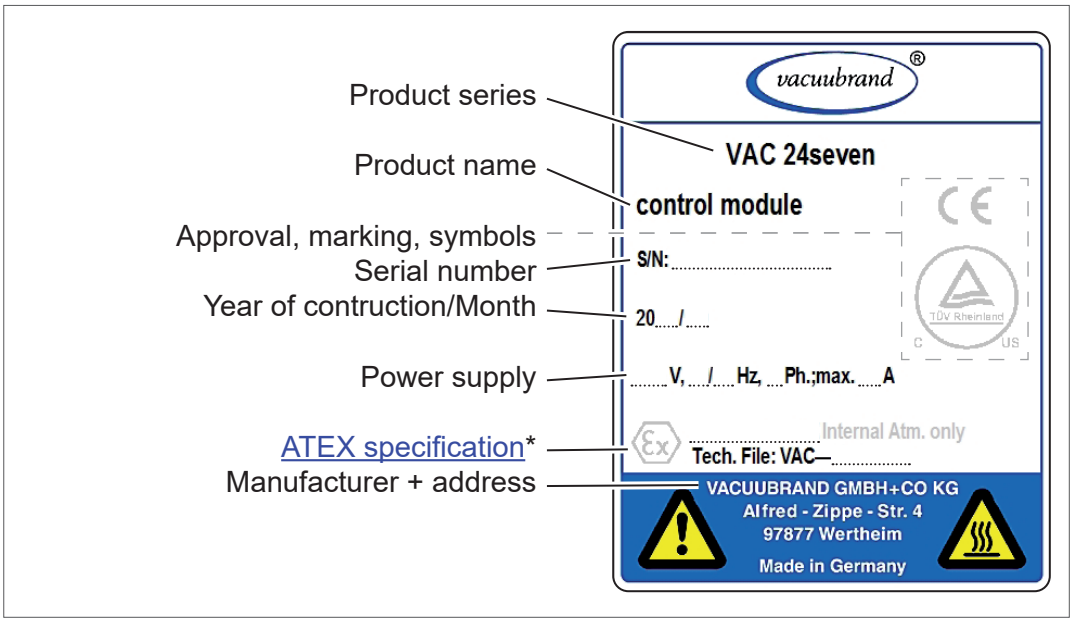
Other connections		
Gas ballast	10/8 mm	
VACUU·SELECT display		
Type	LC display (LCD)	
Brightness control	yes	
Language switching	yes	
Pressure display	switchable: mbar, Torr, hPa	
Vacuum sensor VSK 3000, external		(US)
Upper measurement limit	1060 mbar	795 Torr
Lower measurement limit	0.1 mbar	0.1 Torr
Cable length of vacuum sensor, external	2 m (max. 30 m)	6.5 ft (max. 98.5 ft)
Measuring connection, vacuum sensor	KF DN 16	KF DN 16
Control range, max.	1060–0.1 mbar	795–0.1 Torr
Resolution	0.1 mbar	0.1 Torr
Maximum admissible pressure, absolute	1,5 bar	1125 Torr
Maximum admissible media temperature (gas):		
short-term	80 °C	176°F
Continuous operation	45 °C	113 °F
Measurement uncertainty	< ±1 mbar	< ±0.75 Torr
Temperature coefficient	< ±0.07 mbar/K	< ±0.05 Torr/K
Venting option		
Maximum admissible pressure, absolute	1,2 bar	900 Torr

6.1.2 Rating plate

- ⇨ In the event of an error, make a note of the type and serial number on the rating plate.
- ⇨ When contacting our Service Department, please provide the type and serial number from the rating plate. This will allow us to provide you with specific support and advice for your device.

Control module rating plate

Rating plate, general



* *Indicating documentation, group and category, marking G (gas), type of protection, explosion group, temperature class (see also: Approval for ATEX equipment category).*

6.1.3 Wetted materials

Wetted materials VSK 3000

Component	Wetted materials
Vacuum sensor VSK 3000	Aluminum oxide ceramic
Sensor mount, measuring chamber	PPS, glass fiber reinforced
Sealing ring at the sensor	chemically resistant fluorelastomer
Hose nozzle	PP
Clamping ring	PA
Small flange	Stainless steel or PP

6.2 Ordering information

Accessories	Order no.
DAkkS calibration with first delivery	20900214
DAkkS recalibration	20900215
Adapter cable, USB to RS-232, 1 m	20637838
RS-232C null modem cable, 2x socket Sub-D 9-pin, 1.5 m	20637837
Autostart extension kit	20683250

VACUU·BUS peripheral devices		Order no.
Vacuum sensor	VSK 3000	20636657
Vacuum gauge	VACUU·VIEW	20683220
Vacuum valve (in-line solenoid valve)		
	VV-B 15C, KF 25	20674215
Coolant valve	VKW-B	20674220
Venting valve	VBM-B	20674217
	VACUU·SELECT Sensor	20700020
...I/O module	Digital... IN: 5-75 VDC / OUT: 60 VDC (2.5 A) IN: 5-50 VAC / OUT: 40 VAC (2.5 A)	20636228
	Analog... IN: 0-10 V / OUT: 0-10 V	20636229
	Analog... IN: 4-20 mA / OUT: 0-10 V	20635425
Level sensor	for 500 ml round bottom flask	20699908
Extension cable	VACUU·BUS 0.5 m	20612875
	VACUU·BUS 2 m	20612552
	VACUU·BUS 10 m	22618493
VACUU·BUS Y adapter		20636656

6.3 Index

6.4 Declaration of incorporation (EU)

Einbauerklärung für Maschinen
Declaration of Incorporation of the Machinery
Déclaration d'incorporation des machines

Hersteller / Manufacturer / Fabricant:

VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hiermit erklärt der Hersteller, dass die unvollständige Maschine konform ist mit den Bestimmungen dieser Richtlinien:

Hereby the manufacturer declares that the incomplete machinery is in conformity with the following directives:

Par la présente, le fabricant déclare que la quasi-machine est conforme aux directives:

2014/35/EU (NRL), 2014/34/EU (ATEX-RL), 2015/863 (RoHS-2), 2011/65/EU

Vakuumpumpstand / Vacuum pumping unit / Groupe de pompage

Typ / Type / Type: VAC 24seven control module

Artikelnummer / Order number / Numéro d'article: 20745006 (20745005)

Seriennummer / Serial number / Numéro de série: Siehe Typenschild / See rating plate / Voir plaque signalétique

Angewandte harmonisierte Normen / Harmonized standards applied / Normes harmonisées utilisées:

DIN EN ISO 12100:2011, IEC 61010-1:2010 (Ed. 3) / DIN EN 61010-1:2020, DIN EN 1127-1:2019, DIN EN IEC 63000:2019, DIN EN ISO 80079-36:2016.

Die technische Dokumentation nach Anhang VII B wurde erstellt. Der Hersteller verpflichtet sich, die technische Dokumentation zur unvollständigen Maschine den zuständigen Stellen in Papierform auf Verlangen zu übermitteln.

Die Inbetriebnahme dieser unvollständigen Maschine ist so lange untersagt, bis festgestellt wurde, dass die Maschine, in die sie eingebaut werden soll, den Bestimmungen der EG-Richtlinie Maschinen, den harmonisierten Normen, europäischen Normen oder den entsprechenden nationalen Normen entspricht.

The technical documentation in accordance with annex VII B has been compiled. The manufacturer undertakes to submit the technical documentation relating to the incomplete machine to relevant national authorities as paper mold on request.

This incomplete machine must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the EC Machinery Directive, the harmonized standards, European stand-ards, or the relevant national standards.

La documentation technique selon l'annexe VII B a été établie. Le fabricant s'engange à remettre la documentation technique concernant la quasi-machine aux services compétents sous forme papier à leur demande.

La mise en service de cette quasi-machine est interdite tant qu'il n'a pas été constaté que la machine dans laquelle elle doit être incorporée est conforme aux dispositions de la directive CE Machines, aux normes harmonisées, aux normes européennes ou aux normes nationales correspondantes.

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person authorised to compile the technical file / Personne autorisée à constituer le dossier technique: Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Ort, Datum / place, date / lieu, date: Wertheim, 29.11.2021

(Dr. Constantin Schöler)
Geschäftsführer / Managing Director / Gérant

(J. Kaibel)
Technischer Leiter / Technical Director / Directeur technique

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim

Tel.: +49 9342 808-0
Fax: +49 9342 808-5555
E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

6.5 Declaration of incorporation (UK)

Declaration of incorporation of partly completed machinery

Manufacturer:

VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hereby the manufacturer declares that the incomplete machinery is in conformity with the following directives:

- Electrical Equipment (Safety) Regulations 2016 (S.I. 2016 No. 1101, as amended by S.I. 2019 No. 696)
- The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016 No. 1107, as amended by S.I. 2019 No. 696)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012 No. 3032)

Product / Type: Vacuum pumping unit / VAC 24seven control module

Order number: 20745006 (20745005)

Serial number: see rating plate

Harmonized standards applied:

EN ISO 12100:2010, EN 61010-1:2010+A1:2019, IEC 61010-1:2010 (Ed. 3), EN 1127-1:2019, EN IEC 63000:2018, EN ISO 80079-36:2016

The technical documentation in accordance with annex VII has been compiled. The manufacturer undertakes to submit the technical documentation relating to the incomplete machine to relevant national authorities as paper mold on request.

This incomplete machine must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive, the harmonized standards or the relevant national standards.

Person authorised to compile the technical file:
Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Place, date: Wertheim, 29.11.2021

(Dr. Constantin Schöler)
Managing Director

(J. Kaibel)
Technical Director

VACUUBRAND GMBH + CO KG

Alfred-Zippe-Str. 4
97877 Wertheim

Tel.: +49 9342 808-0
Fax: +49 9342 808-5555
E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

vacuubrand

Technology for Vacuum Systems

Manufacturer:

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
GERMANY

Phone:
Head office: +49 9342 808-0
Sales: +49 9342 808-5550
Service: +49 9342 808-5660

Fax: +49 9342 808-5555
Email:info@vacuubrand.com
Web: www.vacuubrand.com

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