

IKA

designed for scientists

IKA VACSTAR digital



Operating instructions

Source language: German

EN 5

使用说明

ZH 19

사용 설명서

KO 33

取扱説明書

JA 47

คำแนะนำการใช้งาน

TH 61

Petunjuk pengoperasian

ID 75

Device setup



Ref.	Description	EN
A	Handle	
B	Display	
C	Rotating/pressing knob	
D	Main switch (on/off)	

参考	说明	ZH
A	手柄	
B	显示屏	
C	旋钮/按钮	
D	主开关(开/关)	

Ref.	説明	JA
A	ハンドル	
B	ディスプレイ	
C	回転/押下ノブ	
D	メインスイッチ(オン/オフ)	

참조	설명	KO
A	손잡이	
B	Display(디스플레이)	
C	회전/누름 손잡이	
D	메인 스위치(켜기/끄기)	

Nilai	Keterangan	ID
A	Pegangan	
B	Tampilan	
C	Kenop berputar/tekan	
D	Sakelar utama (on/off)	

การอ้างอิง	คำอธิบาย	TH
A	ที่จับ	
B	จอแสดงผล	
C	ปุ่มหมุน/ปุ่มกด	
D	สวิตช์หลัก (เปิด/ปิด)	



Fig. 1

Ref.	Description	EN
E	Handle securing screw	
F	Vacuum controller VC 10 stand hole	
G	Stand securing screw	
H	Fan / ventilation slit	
I	Hose connection for suction line d= 8 mm (INLET)	
J	Accessory fastening (emission condenser)	
K	Connection for vacuum controller VC 10 (Mini DIN)	
L	USB interface	
M	RS 232 interface	
N	Water valve connection	
O	Hose connection for pressure line d= 8 mm (OUTLET)	
P	Power supply cable connection	

参考	说明	ZH
E	手柄固定螺丝	
F	真空控制器 VC 10 立柱孔	
G	立柱锁紧螺丝	
H	风扇/散热槽	
I	吸引管线软管连接 d= 8 mm (INLET)	
J	选配件紧固(冷凝装置)	
K	真空控制器 VC 10 连接 (Mini DIN)	
L	USB 接口	
M	RS 232 接口	
N	水阀连接	
O	压力线路软管连接 d= 8 mm (出口)	
P	电源线连接	

Ref.	説明	JA
E	ハンドル固定ネジ	
F	真空コントローラ VC 10 スタンド ホール	
G	スタンド固定ネジ	
H	ファン/換気スリット	
I	吸い込みライン d= 8 mm (入口) 用ホース接続	
J	アクセサリ留め具 (放出コンデンサ)	
K	真空コントローラ VC 10 (ミニ DIN) 用接続	
L	USB インタフェース	
M	RS 232 インタフェース	
N	水バルブ接続	
O	圧力ライン d= 8 mm (出口) 用ホース接続	
P	電源ケーブル接続	

Nilai	Keterangan	ID
E	Sekrup pengencang pegangan	
F	Lubangudukan kontroler vacuum VC 10	
G	Sekrup pengencangudukan	
H	Kipas / celah ventilasi	
I	Sambungan selang untuk saluran penyedot d= 8 mm (INLET)	
J	Pengencangan aksesoris (kondensor emisi)	
K	Sambungan untuk kontroler vacuum VC 10 (Mini DIN)	
L	Antarmuka USB	
M	Antarmuka RS 232	
N	Sambungan katup air	
O	Sambungan selang untuk saluran tekanan d= 8 mm (INLET)	
P	Sambungan kabel catu daya	

참조	설명	KO
E	핸들 고정 나사	
F	진공 컨트롤러 VC 10 스탠드 구멍	
G	스탠드 고정 나사	
H	팬/통풍 슬릿	
I	흡입 라인용 호스 연결 d= 8 mm(주입구)	
J	부속품 고정(방출 칠러)	
K	진공 컨트롤러 VC 10용 연결(미니 DIN)	
L	USB 인터페이스	
M	RS 232 인터페이스	
N	용수 밸브 연결	
O	압력 라인용 호스 연결 d= 8 mm(배출구)	
P	전원 공급 케이블 연결	

การอ้างอิง	คำอธิบาย	TH
E	สกรูยึดที่จับ	
F	รูสำหรับขาคั่งตัวควบคุมสุญญากาศ VC 10	
G	สกรูยึดขาตั้ง	
H	ช่องพัดลม / ช่องระบายอากาศ	
I	จุดต่อท่ออ่อนสำหรับสายดูด d= 8 mm (ทางเข้า)	
J	ตัวยึดอุปกรณ์เสริม (ตัวควบแน่นสำหรับการปล่อย)	
K	จุดต่อตัวควบคุมสุญญากาศ VC 10 (Mini DIN)	
L	ส่วนติดต่อ USB	
M	ส่วนติดต่อ RS 232	
N	จุดต่อวาล์วน้ำ	
O	จุดต่อท่ออ่อนสำหรับสายแรงดัน d= 8 mm (ทางออก)	
P	จุดต่อสายของแหล่งจ่ายกำลัง	

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Declaration of conformity

We declare under our sole responsibility that the product to which this declaration relates is in conformity with directives 2014/35/EU, 2006/42/EC, 2014/30/EU and 2011/65/EU and conforms with the following standards or normative documents: EN 61010-1, EN 60529, EN 61326-1 and EN ISO 12100.
A copy of the complete EU Declaration of Conformity can be requested at sales@ika.com.

Explication of warning symbols

- DANGER

Indicates an (extremely) hazardous situation, which, if not avoided, will result in death, serious injury.
- WARNING

Indicates a potentially hazardous situation, which, if not avoided, can result in death, serious injury.
- CAUTION

Indicates a potentially hazardous situation, which, if not avoided, can result in injury.
- NOTE

Indicates practices which, if not avoided, can result in equipment damage.

Warranty

According to **IKA**'s Terms and Conditions of sale and delivery, this product is covered by a warranty for a period of 24 months. Please contact your dealer for any warranty claims. If you wish, you can send the device directly to our factory. Please provide the sales invoice and state the reasons for your guarantee claim. In this case, you are responsible for shipping and handling costs.

The warranty does not cover wearing parts, nor defects that are the result of improper use, insufficient care and maintenance or failure to follow the instructions in this operating manual.

Safety instructions

For your protection

NOTE

Please read the instruction manual in full before use and follow the safety instructions.

- Keep the instruction manual in a place where it can be accessed easily.
- Ensure that only trained staff use the device.
- Be sure to comply with all safety instructions, directives and all matters of health, safety and accident prevention in the workplace.
- The device and all parts of the device must not be used on people or animals.

DANGER

Always wear personal protective equipment in accordance with the hazard class of the media being worked with - otherwise there are dangers due to spraying liquids, and release of toxic or flammable gases.

- Do not expose human or animal body parts to vacuum.
- Do not work with the device underwater or underground.

Device configuration

DANGER

The vacuum pump IKA VACSTAR digital is not designed to be set up in potentially explosive atmospheres.

- Set up the device in accordance with the chapter “Setting up” and connect the connection lines and interfaces as described.
- Set up the device on a stable, even, non-flammable surface.

- Never work with a faulty or incorrectly connected device.
- Set up the vacuum pumps in appropriate and functioning extractor hoods, or set up an exhaust gas line to them. Ensure that the exhaust gas line cannot be kinked! The maximum permitted exhaust gas line length is 2 metres.
- Prevent occurrence of explosive mixtures; if appropriate connect inert gas for ventilation and/or thinning.

Accessories

- Safe operation can only be ensured when working with accessories as described in the “Accessories” section.
- Carefully observe the operating instructions for additional devices (e.g. rotary evaporators, vacuum controllers), with which the vacuum pump IKA VACSTAR digital is operated.
- The pressure at the gas inlet and outlet must not exceed 1100 mbar.

- Elastic elements may be pressed together under vacuum.
- Only use flexible hose lines.
- Observe your emergency measures for power failure and ensure that the device is put in a safe state (see the chapter: Commissioning, Operating mode).

Work with the device

DANGER

You can prevent the release of solvent vapours into the atmosphere using a downstream emission condenser.

The vacuum pump is not suitable for use with self-igniting materials, materials that are flammable without an air supply, or explosive materials.

Do not operate the pump while it is open. Otherwise there is a danger of severe injuries as a hand may be pulled into the moving parts.

WARNING

Inhaling or coming into contact with media such as poisonous liquids, gases, spray mists, vapours, dusts or biological materials can endanger the health of the user. Ensure that all connections are well sealed and free of leaks if you are working with such media.

- The vacuum pump IKA VACSTAR digital must only be operated under the conditions described in the chapter “Technical data”.
- Prevent release of the materials listed above. Take measures to protect staff and the environment.

- Pay attention to possible interactions or chemical or physical reactions when working with media at reduced pressure and increased temperature.
- There can be electrostatic processes between the medium and the device which can lead to direct danger.
- Some medium may be released due to the residual leakage rate of the device.
- Before commissioning check that all the housing parts are present and fastened to the device.
- Do not lift the pump if the handle is loose and the handle securing screw (E) is loose or missing!
- Only switch the pump on if the pump is standing vertically.
- Connect the hose connections (INLET-OUTLET) and interfaces in accordance with the labelling on the device and the operating instructions.
- Ensure that the temperature of the evacuated medium is below its ignition temperature. The pumping process (compression) increases the temperature of the medium additionally.
- Ensure that vapours containing solvent can be sucked into the pump.
- Do not use the pump to create pressure.
- Observe the permitted pressure at the inlet and outlet side; see the chapter “Technical data”.
- The gas flow must only be regulated/throttled in the suction-side line.
- Use a solenoid valve or a check valve in the suction line if there are several load units.
- When using an emission condenser ensure that the coolant is flowing freely.

Protection of the device

WARNING

Ensure that the substances used with the device are compatible with the materials of the device parts that come into contact with the product; see the chapter “Product contact parts”.

CAUTION

The specified settings on the rating plate must coincide with the actual power supply.

- The device is only disconnected from the power supply when the power or device plug is removed.
- The socket for the power supply cable must be easy to access.
- Covers or parts that can be removed from the device without tools must later be ref

Correct use

Use

⚠ WARNING

The device must not be used for:
- **evacuating biological habitats,**
- **evacuating explosive, corrosive or similar gases,**
- **throughput/use of liquids**

The device is not suitable for:
- **pumping up objects**
- **pumping liquids**
- **use in potentially explosive atmospheres**
- **underwater**
- **underground**

The laboratory diaphragm vacuum pump **IKA VACSTAR** digital is used together with other laboratory devices to create a vacuum. For specific vacuum control, an additional vacuum controller **IKA VC 10** or **IKA** rotary evaporator **RV 10** auto is required.

Standalone operation
The vacuum pump can be operated without a controller. The delivery capacity can be set using the adjustable speed. Generally speaking, the smaller the volume to be evacuated, the lower the speed should be. The final pressure is not controlled.

Operation with accessories
Along with the accessories recommended by **IKA**, the vacuum pump **IKA VACSTAR** digital is suitable for controlled evacuation to a specified final pressure e.g. for operating an **IKA** rotary evaporator. It can also be used for classical separation, filtration or drying in the laboratory.
With an appropriate vacuum controller (e.g. VC 10) or with a rotary evaporator (e.g. RV 10 auto), the VACSTAR digital can be operated automatically, for automatic boiling point detection, scheduled pressure-time curves or programs from the solvent library, for example.
Intended use: Tabletop device

Area of use (only indoors)

The device is suitable for use in residential areas and all other areas.
The safety of the user cannot be ensured:
• if the device is used in conjunctions with accessories not made or recommended by the manufacturer!

- if modifications are made to the device or parts of the device by third parties!
- if the device is operated in contravention of the safety instructions!

Useful information

⚠ DANGER

You can prevent the release of solvent vapours into the atmosphere using a **downstream emission condenser**.

⚠ CAUTION

Special care must be taken when working with gas mixtures that include condensable gases (e.g. solvents). If diaphragm pumps are used with such gases they condense in the pump's air flow. This leads to a build-up of pressure in the vacuum chamber, which in turn influences the effectiveness and service life of the diaphragms and valves.

If liquid or condensate enters the vacuum chambers, the specified minimum working pressure is no longer achieved.

To protect the inner valves and diaphragms against liquid, use an upstream condensate separator, such as a Woulff bottle.

⚠ CAUTION

It is generally recommended that you run the pump with no load at the end of the process (no-load operation, approx. 3 up to max. 5 minutes) to dispel any residues in the pump.

If applicable, vent the recipient. To do this, remove the suction line during manual operation.

⚠ NOTE

Observe the operating instructions of the relevant devices.

Diaphragm vacuum pumps are oscillating displacement pumps. The diaphragms expand the volume of the vacuum chamber to produce an underpressure, which sucks air into the chamber. The air is then pressed out of the vacuum chamber by subsequent compression. Changes between the inlet and outlet are controlled by diaphragm valves.
The physical unit for pressure is 1 Pascal [Pa]. However people often still use the unit millibar [mbar] colloquially.
1 mbar = 100 Pa
1 bar = 10⁵ Pa
1 Pa = 10⁻⁵ bar
1 Pa = 0.01 mbar

A distinction is made between different ranges in vacuum technology.

Rough vacuum:	10 ⁵ to 10 ² Pa	(1000 to 1 mbar)
Fine vacuum:	10 ² to 10 ⁻¹ Pa	(1 to 10 ⁻³ mbar)
High vacuum:	10 ⁻¹ to 10 ⁻⁵ Pa	(10 ⁻³ to 10 ⁻⁷ mbar)
Ultra high vacuum	< 10 ⁻⁵ Pa	(< 10 ⁻⁷ mbar)

The periodic movements of the diaphragms create a vacuum at the pump inlet. Diaphragm vacuum pumps work with a rough vacuum of up to 10² Pa. Lower pressures cannot be achieved with these pumps.
To create fine, high and ultra high vacuums, oil-sealed vacuum pumps, screw pumps, diffusion pumps or turbomolecular pumps must be used

Connection of interfaces

NOTE

Observe the relevant connections (see Fig. 1).

O: Hose connection d= 8 mm OUTLET

Link this connection to the emission condenser with a vacuum hose, or fit a sound absorber to the end.

NOTE

Put the end of the hose in the extractor hood!

Check there is a free outlet on the pressurised side!

Do not use a throttle on the pressurised side and do not close the outlet! Connect the exhaust line to this connection.

K: Connection for vacuum controller VC 10 (Mini DIN)

You can connect the vacuum pump and the vacuum controller VC 10 or the rotary evaporator RV10 auto with the analogue connection cable for precise speed-controlled vacuum control. The vacuum controller detects the pump and switches to speed-vacuum control mode. Two-position control is deactivated. L: USB interface

Connect the vacuum pump IKA VACSTAR digital to a PC with a USB A - USB B cable. Any device software updates can be loaded using the IKA FUT software tool.

M: RS 232 interface

You can connect the IKA VACSTAR digital vacuum pump to a PC using an RS 232 interface cable. The pump can be operated in conjunction with other devices with labworldsoft® laboratory device software. For further information see the chapter "Interfaces and outputs".

N: Water valve connection

Connect the optional water throttle valve RV 10.5001 to the diaphragm vacuum pump. The water flow to the emission condenser is controlled using the water valve. The valve is opened as soon as the pump is switched on.

I: Hose connection for suction line d= 8 mm INLET

Connect the suction line to this connection. Link this connection to the recipient (rotary evaporator condenser, laboratory reactor etc.) with a vacuum hose.

P: Power supply cable connection

Check that the voltage information on the rating plate matches your mains supply. Connect the power supply cable to supply electricity.

IKA VACSTAR digital with vacuum controller VC 10

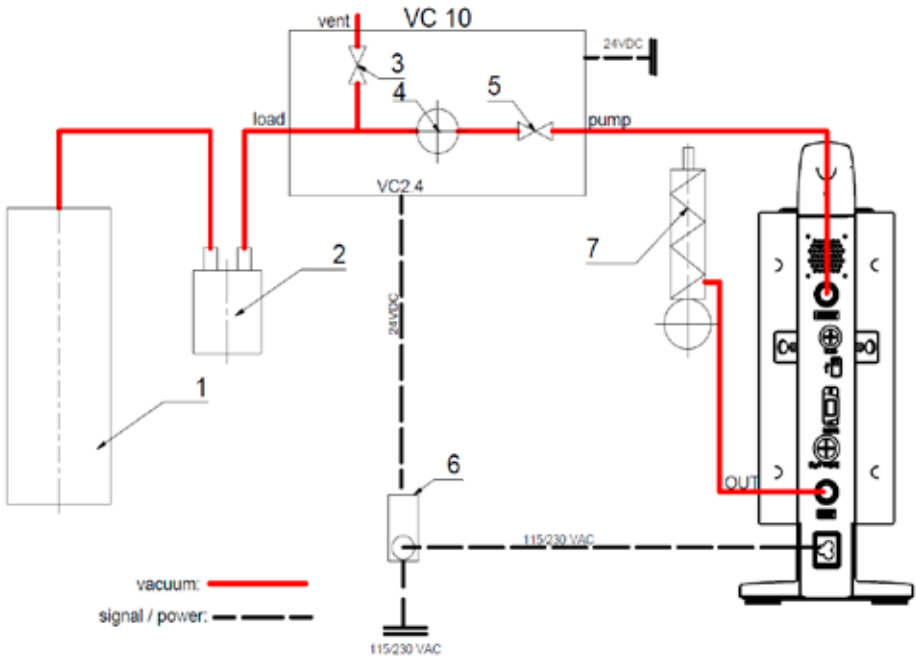
NOTE

Cannot be operated with optional water valve RV 10.5001 in conjunction with VC 2.4.

Refer to the operating instructions for the vacuum controller VC 10!

When the target value is reached, the suction line is closed by the vacuum valve integrated in the VC 10. The pump speed can be changed by manually setting the speed.

- 1 Recipient (load, e.g. rotary evaporator, reactor)
- 2 Vacuum separator (e.g. Woulff bottle)
- 3 Vent valve
- 4 Pressure sensor
- 5 Vacuum valve/ball valve
- 6 Pump cut-out unit VC 2.4
- 7 Emission condenser



Speed regulation

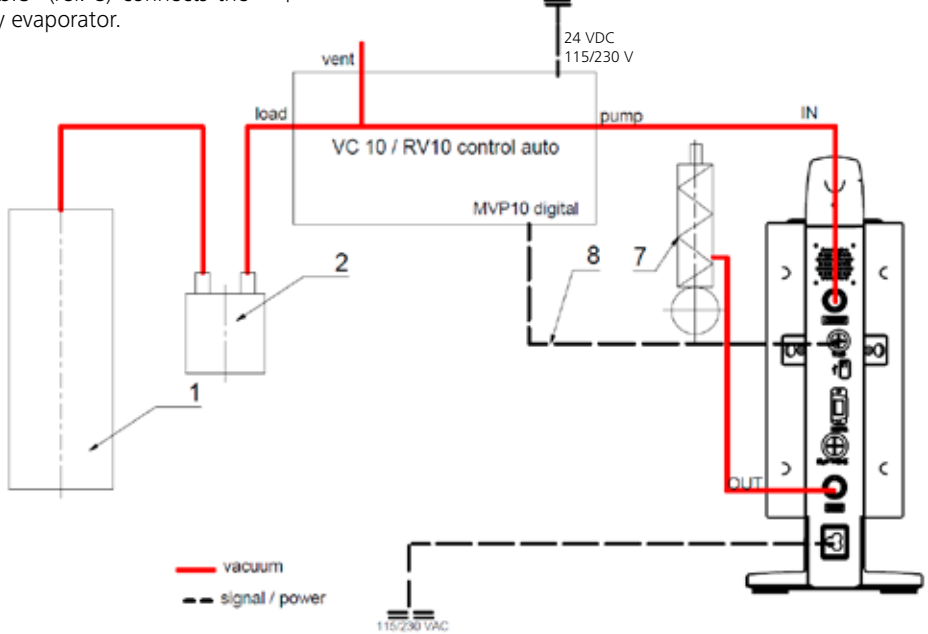
IKA VACSTAR digital with vacuum controller VC 10 or rotary evaporator RV 10 auto

NOTE

Observe the operating instructions for the devices.

Automatic setting of the operating mode "Speed regulation" as soon as the analogue connecting cable (ref. 8) connects the pump with the vacuum controller or rotary evaporator.

When the target value is reached, the pump speed is automatically reduced to a minimum of "0 rpm". Once the target value is reached, the pump applies suction according to the leakage rate of the vacuum system. Automatic boiling point recognition is possible.



Commissioning



NOTE

Observe the operating instructions for the devices.

Check if the voltage specified on the type plate matches the available mains voltage. If these conditions are met, the device is ready for operation when it is plugged in to the mains.



The socket used must be earthed (grounded contact).

Otherwise safe operation is not guaranteed or the device may be damaged.
Observe the ambient conditions indicated under “Technical data”.

Switching on

- Switch on the device using the main switch (D). All display segments are shown to enable a visual check.

8.8.8.8.

- Software version number display (e.g. vers. 1.00).

0.03

- Operating mode display (A; B). (Factory setting: Operating mode A)

A

The operating mode can be changed when you switch on the device.

Operating mode A:

In this operating mode, the set target value is not saved when the current run comes to an end or the device is switched off. No automatic restart after mains power is cut off.

Operating mode B:

In this operating mode, the set target value is saved when the current run comes to an end or the device is switched off, and the value can be changed.

Operating mode B is required particularly in combination with the pump cut-out unit VC 2.4.

Automatic restart after mains power is cut off.

Changing operating mode:

- Press the rotating/pressing knob (C) and switch on the device at the main switch (D) at the same time to change between the two operating modes.

A

b

In standalone operation or two-position operation in combination with the vacuum controller VC 10 the target speed can be set by turning the rotating/pressing knob (C). Push to start the pump and push again to stop it. A flashing light on the display (B) indicates when the device is running.

Switching on with several interfaces

If the pump is operated via the analogue connecting cable with the vacuum controller VC 10 or the rotary evaporator RV 10 auto, “VC 10” is shown on the display.

VC 10

If the vacuum controller is connected to a PC, “PC” is shown on the display (B).

PC

Switching off

Switch off the device using the main switch (D).



Unplug the appliance from the mains socket to disconnect it from the mains.

Interfaces and outputs



NOTE

Please comply with the system requirements together with the operating instructions and help section included with the software.

The device can be operated in “Remote” mode via an RS 232 or USB interface using the laboratory software labworldsoft®. The RS 232 interface (M) at the back of the device is fitted with a 9-pole SUB-D jack

Accessories: PC 1.1 cable (device to PC)
Required for connecting the 9-pin socket to a PC.

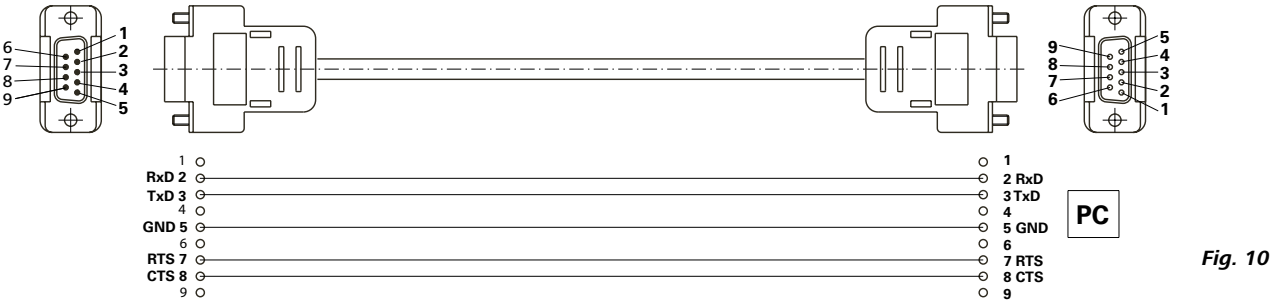


Fig. 10

USB A - USB B cable
Required for connecting the USB interface (L) to a PC.

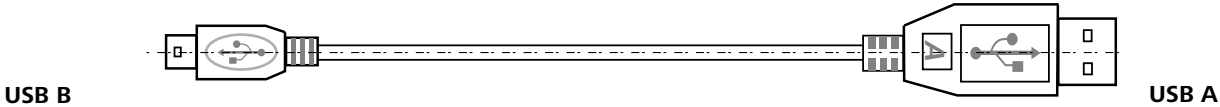


Fig. 11

Connecting cable
Required for connecting VC 10 and RV 10 auto with the diaphragm vacuum pump **IKA** VACSTAR digital (speed operation).

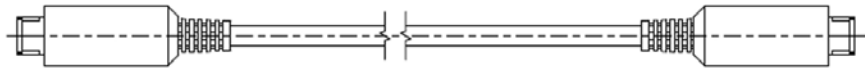


Fig. 12

Maintenance and cleaning

The device is maintenance-free. It is only subject to the natural wear and tear of components and their statistical failure rate.

Cleaning

For cleaning disconnect the mains plug!
Use only cleaning agents which have been approved by IKA to clean IKA devices.
These are water (with tenside) and isopropanol.
Wear protective gloves during cleaning the devices.
Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.
Do not allow moisture to get into the device when cleaning.
Before using another than the recommended method for cleaning or decontamination, the user must ascertain with IKA that this method does not destroy the device.

Spare parts order

When ordering spare parts, please give:

- device type.
- serial number, see type plate.
- position number and description of spare part, see www.ika.com.

Repair

Please only send devices in for repair that have been cleaned and are free of materials which might present health hazards.

For repair, please request the “**Safety Declaration (Decontamination Certificate)**” from IKA or use the download printout of it from IKA website at www.ika.com.

If your appliance requires repair, return it in its original packaging. Storage packaging is not sufficient when sending the device - also use appropriate transport packaging.

Error codes

If an error occurs, this is shown in an error on the display (B), e.g. Error 4.
Proceed as follows:

- Switch the device off on the device switch,
- Take corrective measure,
- Switch device back on.

Error	Cause	Reason	Solution
Er 3	Overheat	The pump does not run	Switch off the pump, disconnect it from the mains, let it cool down.
Er 4	Motor blocked/overload	The pump does not run	Switch off the pump, disconnect it from the mains Let the pump cool down. Ventilate the vacuum system to normal pressure.
Er 8	Hall sensor defective	The pump does not run	Service
Er 9	BLP self-test/EEPROM error	The pump does not run	Service
Er 10	Outlet Choked	The pump does not run	User needs to check the outlet
Er 11	Membrane stuck	The pump does not run	Air the pump and run at low speed for self-cleaning
Er 12	Connection problem	The pump does not run	Service: check the motor cable connection

In the event that the fault cannot be eliminated using the measures described or another error code is displayed:

- Please contact the Service Department,
- Send the device and a brief description of the fault.

Accessories

- Vacuum controller **IKA** VC 10
- Vacuum control valve **IKA** VCV 1 and VCV 2
- Check valve **IKA** VC 10.300
- Vacuum hose **IKA** VH.SI

Technical data

	Base unit	Value
Delivery capacity max.	m³/h	1.32
Delivery capacity max.	L/min	22
Final pressure	mbar	2
Suction steps		4
Cylinder		4
Connection diameter suction side	mm	8
Connection diameter pressure side	mm	8
Gas ballast valve		no
Inlet pressure min.	mbar	2
Inlet pressure max.	mbar	1030
Boiling point recognition		no
Solvent library		no
Two-position control		yes
Analogue speed-vacuum control		yes
Speed setting option		rotating/pressing knob
Speed min.	rpm	285
Speed max.	rpm	1200
Display		LED
Vacuum sensor		no
Vent valve		no
Condensate separator		no
Emission condenser		no
Volume at minimum pressure	dB(A)	54
Product contact material		PTFE, FFPM, PPS, NBR
Housing material		Cast alu, coated
Appropriate for clean room		no
Explosion-proof		no
Width	mm	150
Depth	mm	370
Height	mm	375
Weight	kg	11.5
Permissible ambient conditions		5 °C to 31 °C at 80 % relative humidity. 32 °C to 40 °C decreasing linearly to a maximum 50 % relative humidity.
Protection class according to DIN EN 60529		IP 20
RS 232 interface		yes
USB interface		yes
Analogue output		no
Voltage	V	100-240
Frequency	Hz	50/60
Power consumption	W	130
Standby power consumption	W	1.5

	Base unit	Value
Protection class		I
Overvoltage category		II
Degree of contamination		2
Use above max. sea level	m	2000
Firmware update		yes
Note		
Protective earth conductor	The protective earth conductor (PE) is not connected to the metal housing. (Internally encapsulated DC power supply)	

Average values.
Subject to technical changes!

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符合性声明

我公司自行负责声明相关产品符合 2014/35/EU、2006/42/EG、2014/30/EU 和 2011/65/EU 指令，并符合以下标准或规范性文档：EN 61010-1、EN 60529、EN 61326-1 和 EN ISO 12100。
可向 sales@ika.com 索取合法的欧盟符合性声明副本。

警示符号说明

 危险	表示会产生直接伤害的情况，如果不加以避免将导致死亡或严重人身伤害。
 警告	表示会产生潜在伤害的情况，如果不加以避免将导致死亡或严重人身伤害。
 小心	表示会产生潜在伤害的情况，如果不加以避免将导致人身伤害。
 注意	提示实际应用，如果不加以避免将导致仪器受损。

保修

根据 IKA 公司保修规定本机保修 2 年。保修期内如果有任何问题请联络您的供货商，您也可以将仪器附发票和故障说明直接发至我们公司，经我方事先确认后运费由贵方承担。

保修不包括零件的自然磨损，也不适用于由于过失，不当操作或者未按使用说明书使用和维护引起的损坏。

正确使用

使用

警告

仪器不得用于：

- 排空生物栖息环境，

- 排空爆炸性、腐蚀性或类似气体，

- 液体生产/使用！

仪器不适合：

- 泵送物体

- 泵送液体

- 用于潜在爆炸性环境

- 水下

- 地下

实验室隔膜真空泵 **IKA** VACSTAR digital 用于结合其他实验室仪器创造真空。

具体的真空控制需要额外的真空控制器 **IKA** VC 10 或 **IKA** 旋转蒸发器 RV 10 auto。

使用区域 (仅室内)

仪器适合用于居住区域和所有其他区域。

如果出现以下情况, 无法保证用户的安全：

结合非制造商制造或推荐的选配件使用仪器！

如果第三方对仪器或仪器零件做了改装！

如果违反安全说明操作仪器！

实用信息

危险

您可使用二次冷凝装置避免溶剂蒸汽释放到大气。

小心

处理包含可冷凝气体 (例如溶剂) 的气体混合物时要特别小心。如果在这种气体中使用隔膜泵, 则会在泵气流中冷凝。这会导致真空室中压力增加, 从而影响隔膜和阀门的效果和使用寿命。

注意

如果液体或冷凝物进入真空室, 则无法达到指定的最小工作压力。

为避免液体进入内阀和隔膜, 请在上游使用冷凝分离器, 例如多颈瓶。

小心

通常建议在流程最后让泵空运行 (无负载运行, 约 3 到最多 5 分钟) 以排出泵中的所有残留物。

如果可以, 将真空管拔掉, 让真空泵空抽, 进行泵清洁。

遵守相关仪器的使用说明。

注意

隔膜真空泵是往复泵。隔膜扩展到真空室的体积产生负压, 从而将空气吸入真空室。然后随后的压力将空气从真空室压出。入口和出口的更换是由隔膜阀控制的。压力的物理单位是 1 帕斯卡 [Pa]。但人们口头上仍然经常使用单位毫巴 [mbar]。

1 mbar = 100 Pa

1 bar = 10⁵ Pa

1 Pa = 10⁻⁵ bar

1 Pa = 0.01 mbar

真空技术的各种范围是有区别的。

低真空：10 ⁵ 到 10 ² Pa	(1000 - 1 mbar)
中真空：10 ² 到 10 ⁻¹ Pa	(1 - 10 ⁻³ mbar)
高真空：10 ⁻¹ 到 10 ⁻⁵ Pa	(10 ⁻³ - 10 ⁻⁷ mbar)
超高真空 < 10 ⁻⁵ Pa	(< 10 ⁻⁷ mbar)

这意味着, 如果压力降低, 则正常运行时的工作噪音较少。也可安装带消音器的排气管降低噪音。

以可控速度自动运行时, 泵达到目标值后即降低速度。如果整个系统的泄漏率足够低, 速度甚至可设置为“零”。

结合真空控制器 VC 10 或带集成真空控制器 RV 10 auto 的旋转蒸发器使用时, 泵也可用于真空的“双位控制” (阀控制) 或“模拟速度控制”。

隔膜定期移动会在泵入口形成一个真空。隔膜真空泵的大约真空为最高 10² Pa。这些泵无法获得较低的压力。

为生成中、高和超高真空, 必须使用油封真空泵, 例如螺杆泵、扩散泵或涡轮分子泵。隔膜真空泵在这些环境下通常用作初级阶段的泵。

压缩和释放空气压力会产生噪音。传输的空气越少, 泵越安静。

双位控制

一旦达到目标值, 真空泵停止工作。因为检测压力值的时间、与目标值比较的时间、真空阀关闭时间是真空泵停止工作时间有延迟, 所以很容易会低于设定的目标值。如果系统中的压力因自然泄漏率而上升, 则真空泵继续工作。

双位真空控制示意图

模拟速度控制

通过此种控制, 当测得的压力越来越接近目标值时, 泵的速度会逐渐降低, 吸力也就随之降低。一旦达到目标值, 则该泵仅依据系统的泄漏率运行。这样可以实现安静的运行、精密的真空控制和延长活动泵零件的使用寿命。采用这种控制时, 可以进行沸点准确地自动识别, 即系统在自动模式下达到并保持溶剂的沸点。

速度真空控制示意图

各接口的连接

注意 注意相关连接 (见 Fig. 1)。

O:软管连接 d= 8 mm (出口)
使用真空软管将此接头连接到二次冷凝装置, 或在末端安装一个消音器。

注意 软管尾端插入通风系统!
确保高压侧的出口流畅!

不要在高压侧使用节流阀, 也不要关闭出口! 将排气线路连接到此接头。

K:真空控制器 VC 10 连接 (Mini DIN)
您可使用模拟连接线 连接真空泵和真空控制器 VC 10 或旋转蒸发器 RV10 auto 以实现精密的速控真空控制。真空控制器检测泵并切换至速控真空控制模式。双位控制被禁用。

L:USB 接口
使用 USB A - USB B 线将真空泵 IKA VACSTAR digital 连接到计算机。使用 IKA FUT 软件工具可以安装任何仪器软件更新。

M:RS 232 接口
可以使用 RS 232 信号线将 IKA VACSTAR digital 真空控制器连至一台 PC。此泵可以与使用 labworldsoft® 实验室仪器软件的其他仪器联合运行。有关更多信息, 请参阅“接口和输出”一章。

N:水阀连接
将选配的水节流阀 RV 10.5001 连接到隔膜真空泵。冷凝装置的水流是使用水阀控制的。泵打开时该阀门即打开。

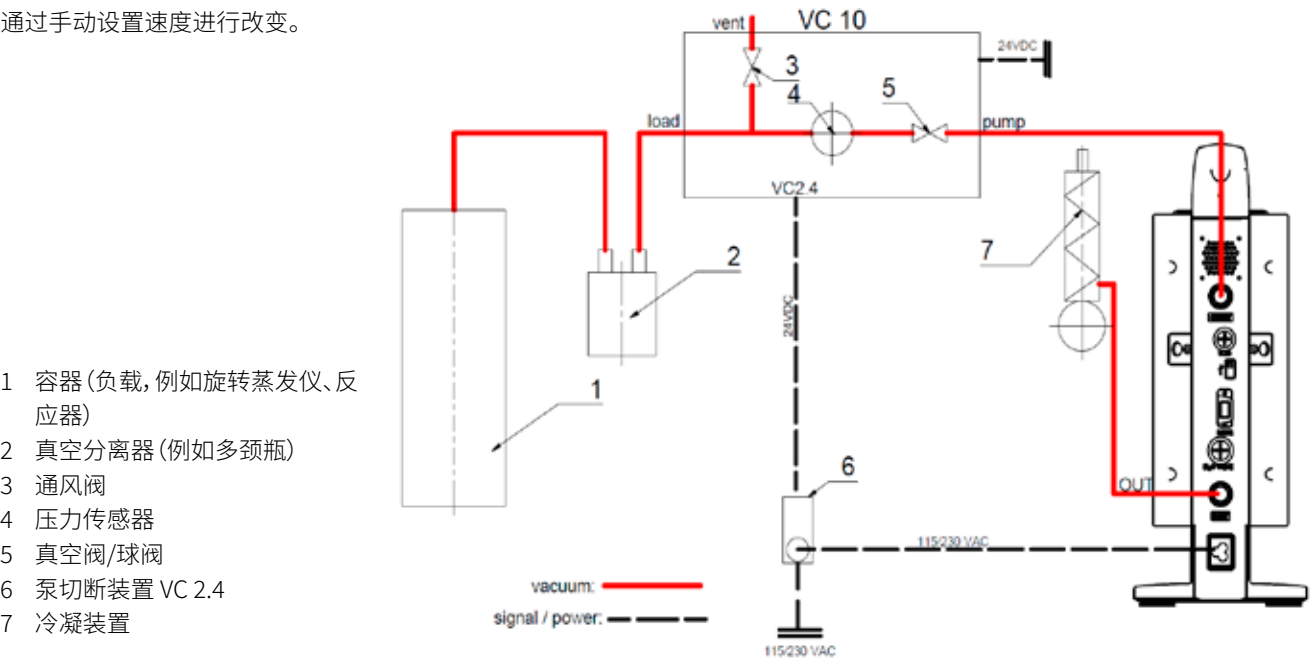
I:吸气管线 d= 8 mm 入口的软管连接
将吸气线路连接到此接头。
通过真空软管将此接头连接到容器 (旋转蒸发器冷凝器、实验室反应器等)。

P:电源线连接
检查铭牌上的电压信息是否与您的电源一致。将电源线连接到电源。

IKA VACSTAR digital 带真空控制器 VC 10

注意 无法结合 VC 2.4 与选配的水阀 RV 10.5001 一起运行。
请参阅真空控制器 VC 10 的使用说明!

一旦达到设定的目标值, VC 10 中的真空阀关闭。泵的速度可以通过手动设置速度进行改变。



选配件:PC 1.1 信号线(连接仪器与 PC)

本信号线用来连接 RS 232 接口与 PC。

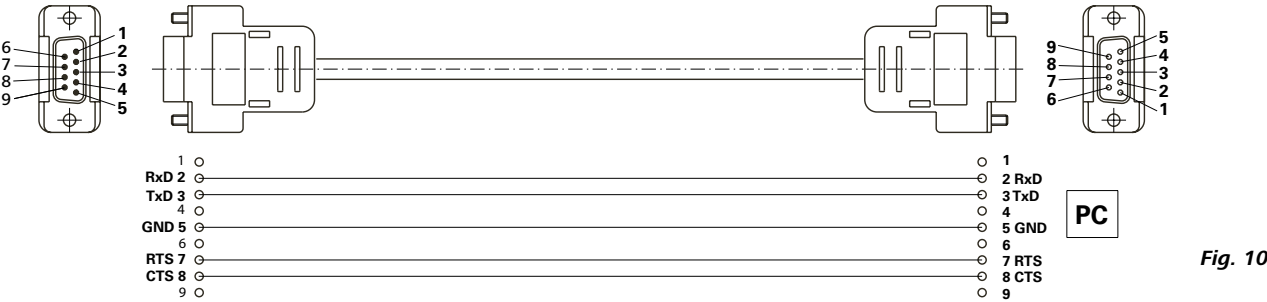


Fig. 10

USB A - USB B 信号线

连接 USB 接口 (L) 到 PC 时所需。

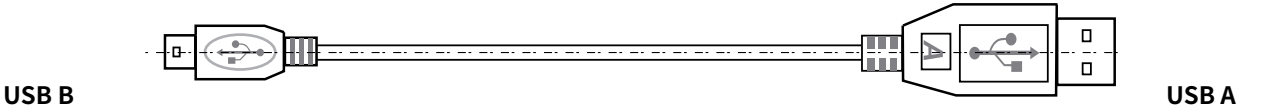


Fig. 11

连接信号线

连接 VC 10 和 RV 10 auto 到隔膜真空泵 IKA VACSTAR digital (速度模式) 时所需。

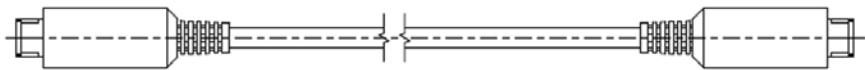


Fig. 12

清洁与维护

本仪器无需特别维护。仪器只会发生备件的自然磨损以及磨损后可能引起偶尔的失效。

清洁

清洁仪器须断开电源！
清洁 IKA 仪器时请仅用 IKA 公司认可的清洁剂: 含活性剂的水溶液和异丙醇
清洁仪器时请佩戴防护手套。
清洁时, 请勿将电子仪器放置于清洁剂中。
清洁时, 请勿让潮气进入仪器。
当采用其他非 IKA 推荐的方法清洁时, 请先向 IKA 确认清洁方法不会损坏仪器。

订购备件

订购备件时, 需提供:

- 机器型号
- 序列号, 见铭牌
- 备件的名称和编号, 详见 www.ika.com

维修

在送检您的仪器之前, 请先清洁并确保仪器内无任何对人健康有害的物料残留。

维修时, 请向 IKA 公司索取 “**消除污染证明**” 或从官方网站 (www.ika.com) 下载打印。

如需维修服务, 请使用原包装箱妥善包装后将仪器寄回。如原包装不存在时请采用合适的包装。

错误代码

如果出现错误, 则会显示在显示屏 (B) 上, 例如 Error 4。
按照以下步骤处理:

- 使用电源开关关闭仪器,
- 执行故障排除措施,
- 重启仪器。

错误	原因	影响	解决方案
Er 3	过热	泵不运行	关闭泵, 断开其电源, 让其冷却。
Er 4	电机堵塞/过载	泵不运行	关闭泵, 断开其电源 让泵冷却。 为真空系统通风到正常压力。
Er 8	霍尔传感器缺陷	泵不运行	联系维修部门。
Er 9	BLP 自检/EEPROM 错误	泵不运行	联系维修部门。
Er 10	排气口堵塞	泵不运行	检查排气口。
Er 11	隔膜粘住	泵不运行	让泵连接空气并低速运转进行自清洁。
Er 12	连接故障	泵不运行	联系维修部门: 检查马达电源线的连接。

如果上述方式无法排除仪器故障或者出现其他错误代码, 请采取如下措施:

- 联系 IKA 公司维修部门;
- 将仪器附故障说明发送至 IKA 公司检视维修。

选配件

- 真空控制器 IKA VC 10
- 真空控制阀 IKA VCV 1 和 VCV 2
- 止回阀 IKA VC 10.300

技术参数

	单位	值
最大输送能力	m³/h	1.32
最大输送能力	L/min	22
最终压力	mbar	2
吸力等级		4
气缸		4
吸入侧连接直径	mm	8
压力侧连接直径	mm	8
气镇阀		无
最小入口压力	mbar	2
最大输入压力	mbar	1030
沸点识别		无
溶剂库		无
双位控制		是
模拟速度真空控制		是
速度设置选项		旋钮/按钮
最小速度	rpm	285
最大速度	rpm	1200
显示屏		LED
真空传感器		无
排气阀		无
冷凝分离器		无
二次冷凝装置		无
与介质接触的材质		PTFE, FFPM, PPS, NBR
外壳材料		铸铝, 涂层
适合无尘室		无
防爆功能		无
宽	mm	150
深	mm	370
高	mm	375
重量	kg	11.5
允许周边条件		5 °C至31 °C, 相对湿度80%。 32 °C至40 °C, 线性下降到最大50%的相对湿度。
防护等级 DIN EN 60529		IP 20
RS 232 接口		是
USB 接口		是
模拟输出		无
电压	V	100-240
频率	Hz	50/60
功耗	W	130
待机状态下输入功率	W	1.5

	单位	值
防护等级		I
过压类别		II
耐污染等级		2
最高操作海拔	m	2000
固件更新		是
注意:		
保护接地导体	保护接地导体(PE)未连接至金属外壳。(内封装直流电源)	

平均值。
取决于技术变化!

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경고 기호

위험

방지하지 않을 경우 사망, 심각한 부상을 초래하는 (극심한) 위험 상황을 나타냅니다.

경고

방지하지 않을 경우 사망, 심각한 부상을 초래할 수 있는 잠재적인 위험 상황을 나타냅니다.

주의

방지하지 않을 경우 부상을 초래할 수 있는 잠재적인 위험 상황을 나타냅니다.

참고

방지하지 않을 경우 장비 손상을 초래할 수 있는 사례를 나타냅니다.

품질 보증

IKA의 판매 및 배송 약관에 따라 본 제품에는 24개월 동안 보증이 적용됩니다. 보증 청구에 대해서는 해당 지역 딜러에 문의하십시오. 원하는 경우, 장치를 직접 본사의 공장으로 보낼 수 있습니다. 판매 거래명세서를 첨부하고 보증 청구 사유를 명시해 주십시오. 이 경우, 배송비와 취급 비용은 사용자가 부담합니다.

품질 보증은 마모된 부품에는 적용되지 않으며 부적절한 사용, 불충분한 관리 또는 본 사용 설명서의 지침에 따라 유지관리를 수행하지 않아 발생한 고장에도 적용되지 않습니다.

부속품: PC 1.1 케이블(장치와 PC 연결)
9-핀 소켓을 PC에 연결할 때 필요합니다.

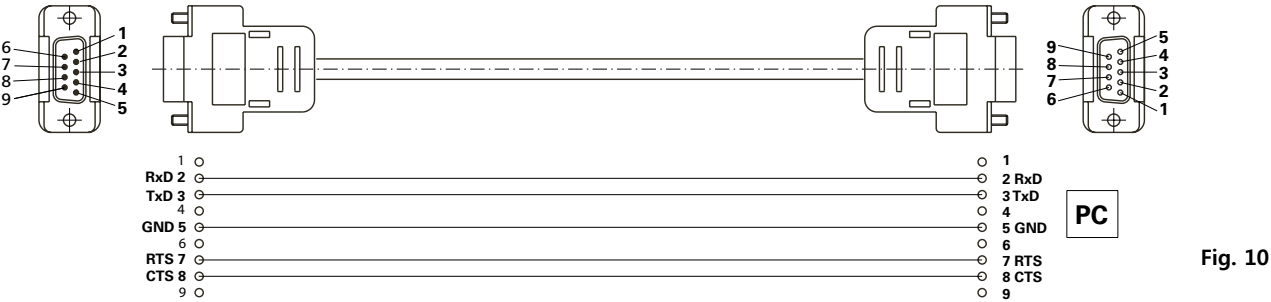


Fig. 10

USB A - USB B 케이블
USB 인터페이스(L)를 PC에 연결할 때 필요합니다.

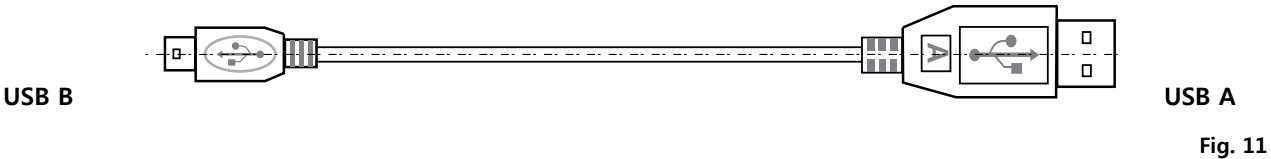


Fig. 11

연결 케이블
VC 10 및 RV 10 auto를 IKA VACSTAR digital 격판 진공 펌프(속도 조작)에 연결할 때 필요합니다.



유지관리 및 세척

이 장치는 유지보수가 필요하지 않습니다. 구성품의 연적 마모 및 전단이나 통계적장애율만이 적용됩니다.

세척

세척 전에 주전원 콘센트에서 장치를 분리하십시오.

IKA가 승인한 세척제를 사용하여 IKA 기기를 세척하십시오.

해당 세척제는 물(계면활성제 포함)과 이소프로판올이 해당합니다.

기기 세척 중에는 보호 장갑을 착용하십시오.

세척을 목적으로 전기 장치를 세척제 안에 넣을 수 없습니다.

세척 시 장치 안으로 수분이 유입되지 않게 하십시오.

세척 또는 오염 제거에 권장되는 것 이외의 방법을 사용하기 전에 해당 방법으로 장치가 손상되지 않는지를 사용자가 IKA에 확인해야 합니다.

예비 부품 주문

예비 부품 주문 시 다음 정보도 제공해 주십시오:

- 기기 유형,
- 일련 번호, 유형판 참조,
- 예비 부품의 위치 번호 및 설명, www.ika.com 참조.

수리

장치의 수리가 필요한 경우, 세척 후 건강상의 위험이 존재할 수 있는 물질이 없는상 태일 때만 장치를 보내십시오.

이를 위해, “오염 및 위해성 보고서” 양식을 사용하십시오. 이 양식은 IKA에서 받거나 IKA 웹사이트 (www.ika.com)에서 인쇄 버전을 다운로드할 수 있습니다.

기기의 수리가 필요한 경우, 원래 포장재에 넣어 보내주십시오. 일반 보관용 포장은 기기를 보내기에 적절치 않으므로 운송용 포장을 하여 보내주시기 바랍니다.

오류 코드

오류가 발생하면 디스플레이(B)에 오류가 표시됩니다(예: 오류 4). 다음과 같이 진행하십시오.

- 장치 스위치에서 장치를 끕니다.
- 정정 조치를 수행합니다.
- 장치의 스위치를 다시 켭니다.

오류	원인	이유	해결책
Er 3	과열	펌프가 가동되지 않음	펌프를 끄고 메인에서 분리한 다음, 펌프를 식

기술 데이터

	기본 유닛	값
최대 전달 용량	m³/h	1.32
최대 전달 용량	L/min	22
최종 압력	mbar	2
흡입 단계		4
실린더		4
흡입측 연결 지름	mm	8
압력측 연결 지름	mm	8
가스 밸러스트 밸브		없음
주입구 압력 최소	mbar	2
주입구 압력 최대	mbar	1030
끓는점 인식		없음
용제 라이브러리		없음
2-위치 제어		예
아날로그 속도-진공 제어		예
속도 설정 옵션		회전/누름 손잡이
최소 속도	rpm	285
최대 속도	rpm	1200
Display(디스플레이)		LED
진공 센서		없음
환기 밸브		없음
응축물 분리기		없음
방출 칠러		없음
제품 접촉 재질		PTFE, FFPM, PPS, NBR
하우징 재질		캐스트 알루미늄, 코팅
세척실에 적합		없음
방폭형		없음
폭	mm	150
깊이	mm	370
높이	mm	375
중량	kg	11.5
허용되는 주변 조건		5 °C ~ 31 °C, 80% 상대 습도 32 °C ~ 40 °C, 최대 50% 상대 습도까지 선형 으로 감소
DIN EN 60529에 따른 보호 등급		IP 20
RS 232 인터페이스		예
USB 인터페이스		예
아날로그 출력		없음
전압	V	100–240
Frequency	Hz	50/60
소비 전력	W	130
대기 전원 소비	W	1.5

	기본 유닛	값
보호 등급		I
과전압 범주		II
오염 등급		2
최대 해발고도	m	2000
펌웨어 업데이트		예
참고		
보호 접지 도체	보호 접지 도체(PE)가 금속 하우징에 연결되지 않음(내부 절연형 DC 전원 공급)	

평균값.
기술 사양은 바뀔 수 있음

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警告シンボル

 危険	(極めて)危険な状況を示します。回避しないと、死亡や重傷をもたらします。
 警告	危険を生じる可能性のある状況を示します。回避しないと、死亡や重傷をもたらす可能性があります。
 注意	危険を生じる可能性のある状況を示します。回避しないと、傷害をもたらす可能性があります。
 注記	回避しないと、機器に損害を与える可能性がある実践を示します。

保証

販売と納品に関する**IKA**の利用規約に従って、本製品は24か月間保証によってカバーされます。保証上のクレームについてはディーラーにご連絡ください。ご希望の場合、お使いのデバイスを弊社の工場へ直接送っていただけます。販売時のインボイスを提供し、保証に関するクレームの理由を説明してください。この場合、出荷と取り扱いのためのコストは負担していただきます。

この保証は摩耗するパーツはカバーしません。また、不適切な使用や、不十分な手入れおよびメンテナンスによる不具合、または本取扱説明書の説明に従わなかったことによる障害もカバーしません。

技術データ		
	ベース単位	値
最大供給能力	m³/h	1.32
最大供給能力	L/min	22
最終圧力	mbar	2
吸引ステップ		4
シリンダー		4
吸引側の接続直径	mm	8
圧力側の接続直径	mm	8
ガスバラストバルブ		なし
最小入口圧力	mbar	2
最大入口圧力	mbar	1030
沸点認識		なし
溶媒ライブラリ		なし
2点コントロール		あり
アナログ速度・真空コントロール		あり
速度設定オプション		回転/押下ノブ
最小速度	rpm	285
最大速度	rpm	1200
ディスプレイ		LED
真空センサー		なし
ベントバルブ		なし
復水セパレータ		なし
放出コンデンサ		なし
製品接触パーツ		PTFE、FFPM、PPS、NBR
ハウジング材料		鋳造アルミニウム、コーティング済み
クリーンルームに適切		なし
防爆仕様		なし
幅	mm	150
奥行き	mm	370
高さ	mm	375
重量	kg	11.5
許可できる使用環境		相対湿度80% (5℃から31℃時) 最大相対湿度50%まで直線的に減少(32℃から41℃時)
DIN EN 60529 による保護クラス		IP 20
RS 232 インタフェース		あり
USB インタフェース		あり
アナログ出力		なし
電圧	V	100-240
周波数	Hz	50/60
消費電力	W	130
スタンバイ消費電力	W	1.5

	基本単位	値
保護クラス		I
過電圧カテゴリ		II
汚れの程度		2
最高海面高で使用	m	2000
ファームウェアのアップデートツール		あり
注記		
保護接地線	保護接地線 (PE) は金属ハウジングに接続されていません (DC電源の内部のカプセルに入っています)	

平均値。
技術上の変更が行われる場合があります

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การยืนยันความเข้ากันได้

เราขอยืนยันภายใต้ความรับผิดชอบแต่เพียงผู้เดียวของเราว่า ผลิตภัณฑ์นี้สอดคล้องกับระเบียบ 2014/35/EU, 2006/42/EC, 2014/30/EU และ 2011/65/EU และเป็นไปตามมาตรฐานหรือเอกสารกฎเกณฑ์ต่อไปนี้: EN 61010-1, EN 60529, EN 61326-1 และ EN ISO 12100.

สัญลักษณ์เตือน

-  **อันตราย**
- แสดงสถานการณ์ที่เป็นอันตราย (อย่างมาก) หากไม่หลีกเลี่ยงจะส่งผลให้เกิดการเสียชีวิต หรือการบาดเจ็บอย่างรุนแรง
-  **คำเตือน**
- แสดงถึงสถานการณ์ที่เป็นอันตรายที่เป็นไปได้ซึ่งหากไม่หลีกเลี่ยงสามารถทำให้เกิดการเสียชีวิต การบาดเจ็บร้ายแรงได้
-  **ข้อควรระวัง**
- แสดงถึงสถานการณ์ที่เป็นอันตรายที่เป็นไปได้ซึ่งหากไม่หลีกเลี่ยงสามารถมีผลให้เกิดการบาดเจ็บได้
-  **หมายเหตุ**
- แสดงถึงการปฏิบัติซึ่งหากไม่หลีกเลี่ยงจะสามารถทำให้เกิดความเสียหายต่ออุปกรณ์ได้

การรับประกัน

ตามข้อกำหนดและเงื่อนไขการขายและการส่งมอบของ **IKA** ผลิตภัณฑ์นี้มีการรับประกันเป็นระยะเวลา 24 เดือน กรุณาติดต่อผู้ค้าเพื่อการเรียกร้องสิทธิการรับประกัน คุณสามารถส่งเครื่องมือไปยังโรงงานของเราได้โดยตรงหากคุณต้องการ กรุณาให้ใบแจ้งหนี้ของการขายและระบุเหตุผลในการเรียกร้องสิทธิการรับประกันของคุณ ในกรณีนี้คุณจะเป็นผู้รับผิดชอบค่าจัดส่งและค่าดำเนินการ

การรับประกันไม่ครอบคลุมชิ้นส่วนที่สึกหรอหรือการชำรุดที่เป็นผลมาจากการใช้ที่ไม่เหมาะสม การดูแลรักษาที่ไม่เพียงพอหรือการไม่ปฏิบัติตามข้อแนะนำในคู่มือการใช้งานฉบับนี้

ข้อมูลด้านเทคนิค		
	หน่วยพื้นฐาน	ค่า
ความจุการนำส่งสูงสุด	m³/h	1.32
ความจุการนำส่งสูงสุด	L/min	22
ความดันสุดท้าย	mbar	2
ขั้นตอนการดูด		4
กระบอก		4
เส้นผ่าศูนย์กลางของการต่อต้านการดูด	mm	8
เส้นผ่าศูนย์กลางของการต่อต้านความดัน	mm	8
วาล์วก๊าซบัลลาสต์		ไม่
ความดันต่ำสุดสำหรับทางเข้า	mbar	2
ความดันสูงสุดสำหรับทางเข้า	mbar	1,030
การรับรู้จุดเดือด		ไม่
ห้องสมุดตัวทำละลาย		ไม่
การควบคุมสองตำแหน่ง		ใช่
การควบคุมสัญญาณความเร็วแบบแอนาล็อก		ใช่
ตัวเลือกการตั้งค่าความเร็ว		ปุ่มหมุน/ปุ่มกด
ความเร็วต่ำสุด	rpm	285
ความเร็วสูงสุด	rpm	1,200
จอแสดงผล		LED
เซนเซอร์สัญญาณ		ไม่
วาล์วระบาย		ไม่
ตัวแยกของเหลวจากการควบแน่น		ไม่
ตัวควบแน่นการปล่อย		ไม่
วัสดุที่สัมผัสผลิตภัณฑ์		PTFE, FFPM, PPS, NBR
วัสดุตัวเรือน		อะลูมิเนียมหล่อ, เคลือบ
เหมาะสมสำหรับห้องสะอาด		ไม่
กันระเบิด		ไม่
กว้าง	mm	150
ลึก	mm	370
ความสูง	mm	375
น้ำหนัก	kg	11.5
อุณหภูมิโดยรอบที่อนุญาตได้		5 °C ถึง 31 °C ที่ความชื้นสัมพัทธ์ 80% 32 °C ถึง 40 °C ที่ลดลงเป็นเส้นตรงต่อ ความชื้นสัมพัทธ์สูงสุด 50%
ประเภทการปกป้องตาม DIN EN 60529		IP 20
ส่วนติดต่อ RS 232		ใช่
ส่วนติดต่อ USB		ใช่
เอาต์พุตแบบแอนาล็อก		ไม่
แรงดันไฟฟ้า	V	100-240
ความถี่	Hz	50/60
การใช้กำลังไฟฟ้า	W	130
การใช้กำลังไฟฟ้าขณะแสดงนดบายด์	W	1.5

	หน่วยพื้นฐาน	ค่า
ประเภทการปกป้อง		I
ประเภทของการแรงดันไฟฟ้าเกิน		II
ระดับของการปนเปื้อน		2
ใช้เหนือระดับน้ำทะเลสูงสุด	m	2,000
อัปเดตสำหรับเฟิร์มแวร์		ใช่
หมายเหตุ		
สายดินป้องกัน	สายดินป้องกัน (PE) ไม่ได้เชื่อมต่อกับส่วนครอบโลหะ (แหล่งจ่ายไฟฟ้ากระแสตรงที่อยู่ภายในแคปซูลภายใน)	

ค่าเฉลี่ย
อาจมีการเปลี่ยนแปลงทางเทคนิค

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Pernyataan konformitas

Kami nyatakan bahwa tanggung jawab kami atas produk ini sejalan dengan peraturan 2014/35/EU, 2006/42/EC, 2014/30/EU dan 2011/65/EU selaras dengan standar atau dokumen-dokumen standar: EN 61010-1, EN 60529, EN 61326-1 dan EN ISO 12100.

Simbol garansi

-  **BAHAYA**
- Menunjukkan adanya situasi (amat) berbahaya yang sebentar-sebentar timbul, yang, jika tidak dihindari, akan berakibat kematian, cedera serius.
-  **PERINGATAN**
- Menunjukkan adanya potensi situasi berbahaya, yang, jika tidak dihindari, akan berakibat kematian, cedera serius.
-  **KEHATI-HATIAN**
- Menunjukkan adanya potensi situasi berbahaya, yang, jika tidak dihindari, akan berakibat cedera.
-  **CATATAN**
- Menunjukkan praktik-praktik yang, jika tidak dihindari, bisa menimbulkan kerusakan peralatan.

Garansi

Sesuai dengan Syarat dan Ketentuan **IKA** dalam hal penjualan dan pengiriman, produk ini ditanggung oleh garansi dalam jangka waktu 24 bulan. Silakan hubungi dealer Anda untuk segala klaim garansi. Jika Anda mau, Anda bisa mengirimkan perangkat secara langsung ke pabrik kami. Sertakan faktur penjualan dan sampaikan alasan atas klaim garansi Anda. Dalam hal ini, Anda menanggung biaya pengiriman dan penanganan.

Garansi tidak mencakup suku cadang yang aus, atau kerusakan karena penggunaan yang tidak tepat, kurangnya perawatan dan pemeliharaan atau ketidakpatuhan terhadap petunjuk dalam buku petunjuk pengoperasian ini.

Data teknis

	Unit dasar	Nilai
Kapasitas pengiriman maks.	m ³ /h	1.32
Kapasitas pengiriman maks.	L/min	22
Tekanan akhir	mbar	2
Langkah-langkah penyedotan		4
Silinder		4
Sisi penyedotan diameter sambungan	mm	8
Sisi tekanan diameter sambungan	mm	8
Katup balas gas		tidak
Tekanan minimal inlet	mbar	2
Tekanan maksimal inlet	mbar	1030
Pengenalan titik didih		tidak
Pustaka larutan		tidak
Kontrol dua posisi		ya
Kontrol kecepatan-vacuum analog		ya
Pilihan pengaturan kecepatan		kenop berputar/tekan
Kecepatan min.	rpm	285
Kecepatan maks.	rpm	1200
Tampilan		LED
Sensor vacuum		tidak
Katup pembuangan		tidak
Pemisah hasil kondensasi		tidak
Kondensor emisi		tidak
Bahan kontak produk		PTFE, FFPM, PPS, NBR
Bahan rumahan		Alu tuang, dilapisi
Cocok untuk ruang bersih		tidak
Tahan ledakan		tidak
Lebar	mm	150
Kedalaman	mm	370
Tinggi	mm	375
Berat	kg	11.5
Suhu selingkung yang diizinkan		5 °C hingga 31 °C pada kelembapan relatif 80 % 32 °C hingga 40 °C menurun secara linera pada kelembapan relatif maksimum 50 %
Golongan perlindungan sesuai dengan DIN EN 60529		IP 20
Antarmuka RS 232		ya
Antarmuka USB		ya
Output analog		tidak
Voltase	V	100-240
Frekuensi	Hz	50/60
Konsumsi daya	W	130
Konsumsi daya siaga	W	1.5

	Unit dasar	Nilai
Golongan pelindung		I
Kategori kelebihan voltase		II
Kadar kontaminasi		2
Gunakan ketinggian laut maks. di atas	m	2000
Pembaruan firmware		ya
Catatan		
Konduktor tanah pelindung	Konduktor tanah pelindung (PE) tidak tersambung ke rumahan logam (catu daya DC yang dibungkus secara internal)	

Nilai rata-rata.
Mengikuti perubahan teknis!



designed for scientists

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