

Operation Manual (EN)
Translation of the german original manual

Diaphragm pump

Model:

► MPC 090 E



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EC Declaration of Conformity

Important Information

1 Important Information

1.1 General Information

The **Diaphragm Pump MPC 090 E** conforms to the following directives:

2006 / 42 / EC	Machinery Directive
2014 / 30 / EU	Electromagnetic Compatibility Directive

The CE sign is located on the rating plate. Observe the binding national and local regulations when fitting the pump into installations!

1.2 Target Groups

This Operating Manual is intended for the personnel planning, operating and maintaining Diaphragm Pump.

This group of people includes:

- Designers and fitters of vacuum apparatus,
- Employees working on commercial laboratory and industrial vacuum technology applications and
- Service personnel for diaphragm pumps

The personnel operating and maintaining the diaphragm pump must have the technical competence required to perform the work that has to be done. The user must authorize the operating personnel to do the work that has to be done. The personnel must have read and understood the complete Operating Manual before using the diaphragm pump. The Operating Manual must be kept at the place of use and be available to the personnel when required.

1.3 Intended Use

- The layout of the diaphragm pump must be appropriate for the conditions of use. The user bears the sole responsibility for this.
- The diaphragm pump may only be operated under the conditions stated
 - in the "Technical Data" section,
 - on the type plate, and
 - in the technical specification for the order concerned.
- Diaphragm pumps are approved for extracting, pumping and compressing gases and vapours. If these gases and vapours are toxic or explosive, then the user must observe the currently valid safety regulations for this application. Special Models of diaphragm pumps are available for aggressive and explosive gas mixtures.

1.4 Use for an Unauthorized Purpose

It is forbidden to use the pump for applications deviating from the technical data stated on the type plate or the conditions stated in the supply contract, or to operate it with missing or defective protective devices.

1.5 Safety Devices


Measures such as the following are for the safety of the operating personnel:

- electrical connection with a protective conductor
- main switch

The diaphragm pump must not be operated without these elements.

1.6 Meaning of the Warning notes

Take note of the warning notices. They are in the following box:

	CAUTION ! / WARNING !
Hazard which may lead to serious injuries or material damage.	

1.7 Product Standards, Safety Regulations

The Diaphragm Pump meets the following product standards:

DIN EN ISO 12100:2011-03	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN ISO 13857:2008-06	Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
DIN EN 1012-2:2011-12	Compressors and vacuum pumps - Safety requirements - Part 2: Vacuum pumps
DIN EN ISO 2151:2009-01	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
DIN EN 60204-1:2014-10	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
DIN EN 61000-6-2:2011-06 DIN EN 61000-6-4:2011-09	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments Part 6-4: Generic standards - Emission standard for industrial environments
DIN EN 61010-1/A1:2015-04	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
DIN EN 50110-1:2014-02	Operation of electrical installations
Directive 2012/19/EU	Electrical and electronics - old devices (WEEE)
Directive 2011/65/EU	Dangerous materials in electrical and electronics devices (RoHS II)
China - RoHS II	Environment protection law - China 2016-01

The following additional safety regulations apply in the FR Germany:

BGV A3	Electrical equipment and operating materials
VBG 5	Power-driven machines
BGR 120	Guidelines for laboratories
BGI 798	Hazard assessment in the laboratory
BGG 919 (VBG 16)	Accident prevention regulations for "compressors"
BGR 189 (BGR 195;192;197)	Use of protective working clothes

Observe the standards and regulations applying in your country when you use the diaphragm pump.

Basic Safety Instructions

2 Basic Safety Instructions

2.1 General Information

Warning notices must be observed. Disregarding them may lead to damage to health and property.

The diaphragm pump must be operated by personnel who can detect impending dangers and take action to prevent them from materialising.

The manufacturer or authorized authorised workshops will only service or maintain the diaphragm pump if it is accompanied by a fully completed damage report. Precise information about the contamination (also negative information if necessary) and thorough cleaning of the diaphragm pump are legally binding parts of the contract.


Contaminated diaphragm pumps and their individual parts must be disposed of in accordance with the legal regulations.

The local regulations apply in foreign countries.

2.2 Electricity

The diaphragm pump of operation mode S1 is not supplied.


When the location of operation mode S1 devices is changed, please note that the testing must be repeated in accordance with DIN EN 0105, DIN EN 0702 and BGV A2. The local regulations apply in foreign countries.

	CAUTION !
The connecting cable must not be damaged!	

2.3 Mechanical Systems

Improper use can lead to injuries or material damage. Observe the following instructions:

- Only operate the diaphragm pump with hoses of the specified dimensions.
- The maximum permissible pressure of 1 bar at the suction connection must not be exceeded.
- Hazardous substances must be separated out as far as this is technically possible before they reach the pump.
- External mechanical stresses and vibrations must not be transmitted to the pump. Only use flexible laboratory hose DN 8 for connecting diaphragm pumps.
- The overpressure generated at the pressure port must not exceed 1 bar.
- The pump must not be used to suck up fluids. Lay the exhaust pipe so that it slopes downwards, so allowing condensate to flow out of the pump. Collect the condensate and dispose of it in an environmentally compatible manner.
- Prevent dyes exuding.
- Maintain near the venting slots a space of least 20 mm between the pump and adjacent parts in order to enable the pump to cool.

	CAUTION !
Solid particles in the pumping medium impair the pumping action and can lead to damage. Prevent solid particles penetrating into the pump.	

2.4 Hazardous Substances

The operating company bears the responsibility for the use of the diaphragm pump. Hazardous substances in the gases to be pumped can cause personal injuries and property damage. Pay attention to the warning notices for handling hazardous substances. The local regulations apply in foreign countries.

Combustible Gases

Examine before switching on whether that can form gas combustible gas/air mixtures which can be promoted! Consider the regulations of the guideline 1999/92/EC.

Aggressive gases

In the case of particularly aggressive gases or products, the materials used for the pump parts in contact with gas must be assessed (*as described in chapter 3.5*).

Poisonous gases

Use the separator (Vacuum Regulator) when pumping poisonous or harmful gases. Prevent such substances from leaking out of the appliance or pump. Treat these substances according to the applicable environmental protection regulations.

Test the strength and leak-tightness of the connecting lines and the connected apparatus. Prevent environmental poisons, e.g. mercury, getting into the diaphragm pumps.

Fulfil the requirements, for example:

- German Hazardous Substances Regulation (GefStoffV) of 01. December 2010
- Regulation 2016/1179/EU
(Classification, Packaging and Labelling of hazardous substances),
- Manufacturer's safety data sheets on hazardous substances.

2.5 High Temperatures

The diaphragm pump may heat up as a result of the temperature of the gas being pumped and through compression heat.

Prevent the following maximum permissible temperatures from being exceeded.

- + 40 °C for the environment, and
- + 60 °C for the gas to be pumped.

Description

3 Description

3.1 Design

The diaphragm pump consists of a pump body, a drive motor and a casing. The pump body consists of an eccentric shaft, two connecting rod and two pump heads. Each pump head contains a diaphragm and two work valves. The pump heads are in each case to A and B-sides shaft end of the motor. The pump heads are driven via the motor and the eccentric shaft with a connecting rod. The pump is in a closed casing.

The suction connector **(1)** is located directly on the dosing block, and is designed as a hose nozzle DN 6. Between suction connection **(1)** and pump the gases become over a separator with manometer and metering valve **(3)** led. On the exhaust - hose nozzle DN 6 **(2)** is mounted an exhaust damper. This can also be withdrawn as required.

The electrical connection to the pump becomes over the plug connector **(4)** the plug power pack manufactured (input voltage 90 - 260 V). The diaphragm pump is switched on and off at the ON/OFF switch **(5)**.

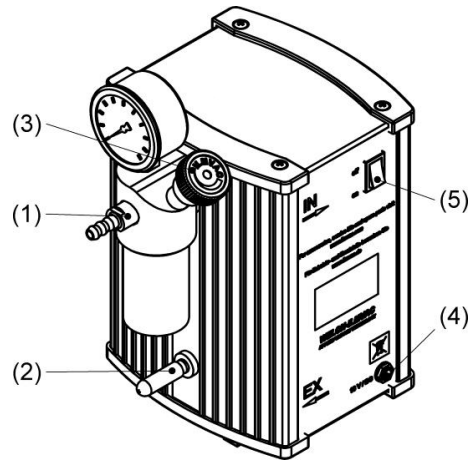


Fig. 1 Diaphragm pump MPC 090 E

3.2 Principle of Operation

Motor, eccentric shaft and connecting rod set the diaphragms in stroke movement. This changes the size of the space between the diaphragms and pump head (pump chamber). Increasing the size of the pump chamber opens the inlet valve while the outlet valve is closed (gases are sucked in).

Decreasing the size of the pump chamber switches the valves over and ejects the gas through the exhaust outlet.

The valves are actuated by the gas being pumped.

A large proportion of condensate in the diaphragm pump minimizes the suction performance and the ultimate pressure that can be achieved.

3.3 Areas of Application

The Diaphragm pump is intended for:

- Pumping and compressing neutral and aggressive gases and vapours according to the resistance of the indicated materials.
- Generating a vacuum down to an ultimate pressure 100 mbar.
- Use in physical and chemical laboratories in trade and industry.
- Use for vacuum filtration and vacuum drying, and other vacuum technology applications.

3.4 Pump head circuitry

One-stage (E):	Both pump heads are connected in parallel.
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3.5 Materials of the medium-affecting pump parts

Component	Materials Chemical model (resistant to aggressive gases)
Seal	EPDM
Hose nozzle / Connecting element	PP
Valve	FKM
Diaphragm	PTFE layer foil
Hose / Separator	PVC
Connection head / Pump head	Ryton

Special designs:

Special diaphragm pumps can be supplied after consultation with the manufacturer or for a corresponding supply contract.

3.6 Scope of Delivery

The scope of delivery is specified in the supply contract.

Technical Data

4 Technical Data

4.1 Dimensional drawing

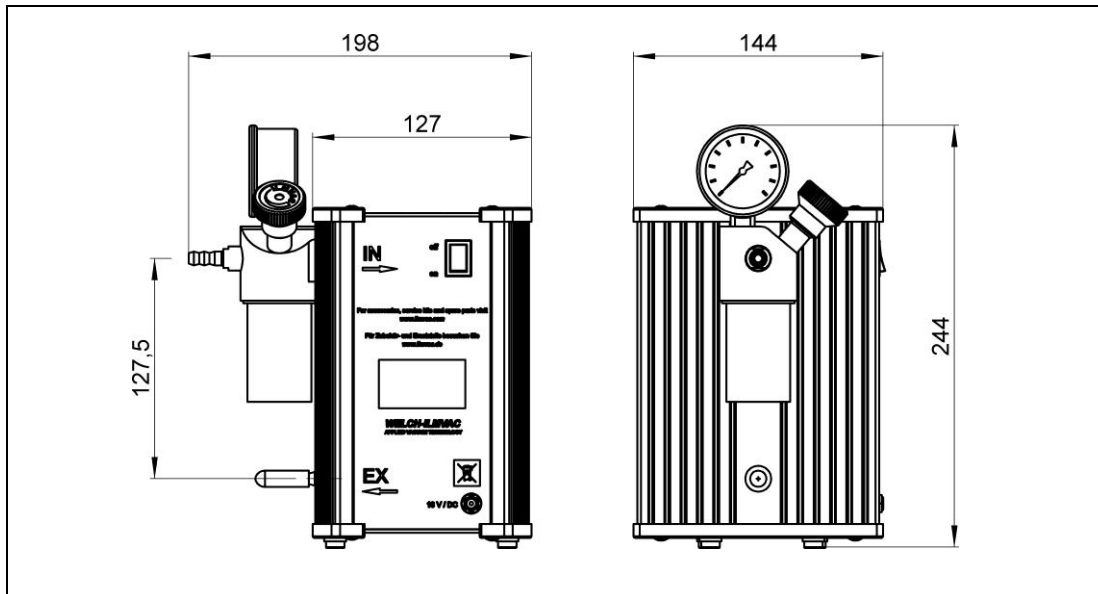


Fig. 2 Dimensional drawing

4.2 Intake Pressure / Pumping Speed – Diagram

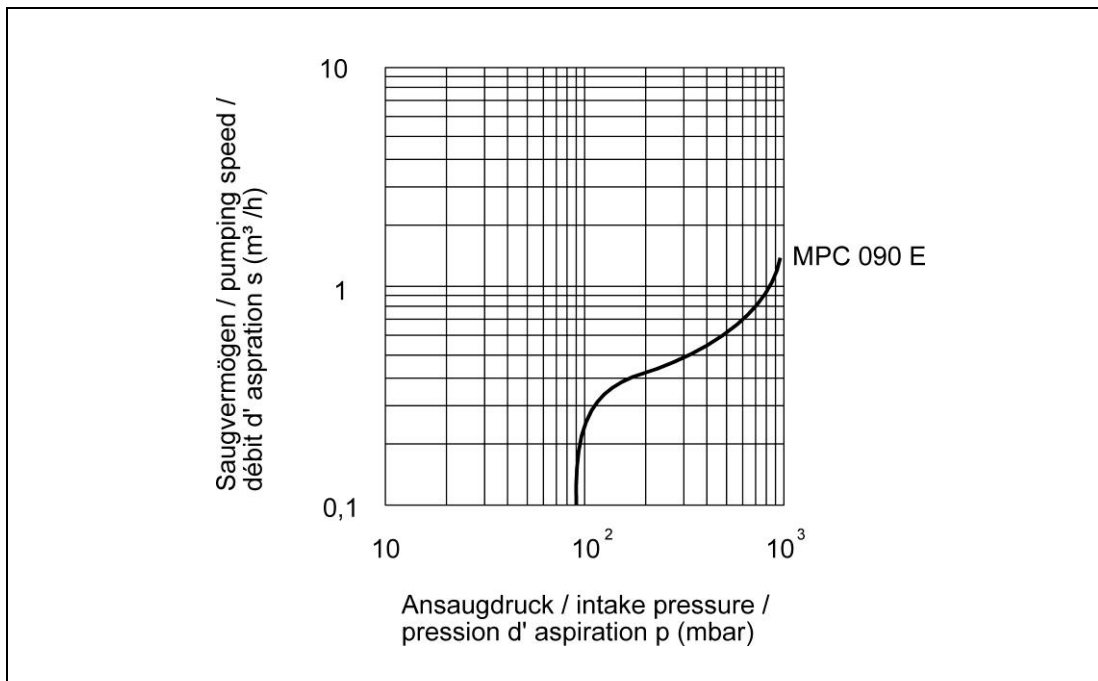


Fig. 3 Intake Pressure / Pumping Speed – Diagram

4.3 Device data

Parameter	Unit	Data
Pumping speed DIN 28432	m ³ / h	1.0
	l / min	10
Ultimate pressure	mbar	100
Max. inlet pressure	bar	1
Max. outlet pressure		unpressurised
Intake port	-	Hose nozzle DN 6 for hose inside diameter 6 mm
Pressure port		Hose nozzle DN 6 for hose inside diameter 6 mm with exhaust damper (<i>removable</i>)
Ambient temperature	°C	+ 10 to + 40
Max. operating gas temperature		+ 60
Bearing	-	maintenance-free
Reference surface sound pressure level DIN EN ISO 2151	dB (A)	< 45
Voltage, Frequency	-	18 V DC
		90...260 V AC, 50/60 Hz power pack
Rated current	A / W	1.2 A (19V DC) / 20 W (230V AC)
Type of protection DIN EN 60529	-	IP 44
Motor / Class of insulation DIN EN 60034-1		DC / F (160°C)
Weight	kg	2.7
Dimensions W/D/H (without separator)	mm	144 / 198 (127) / 244
Order number	-	412021

<i>Power pack:</i>		
Input	V; Hz	90 – 260; 50/60
Output	V DC; A	18; 3
Characteristics	-	GS / cUL / EN55022 Class B CISPR / FCC Class B
Change – Connecting plugs	-	UL / CEE / US

The information presented in this material is based on technical data and test results of nominal units. It is believed to be accurate and reliable and is offered as an aid to help in the selection of products. It is the responsibility of the user to determine the suitability of the product for the intended use and the user assumes all risk and liability whatsoever in connection therewith. Gardner Denver Thomas GmbH does not warrant, guarantee or assume any obligation or liability in connection with this information.

Installation and Operation

5 Installation and Operation

5.1 Unpacking

Carefully unpack the diaphragm pump.

Check the pump for:

- Transport damage,
- Conformity with the specifications of the supply contract (Model, electrical supply data),
- Completeness of the delivery.

Please inform us without delay if there are discrepancies between the delivery and the contractually agreed scope of delivery, or if damage is detected.

Please take note of the general terms of business of the manufacturing firm.

In case of a claim under warranty, the device must be returned in packaging that is suitable for protecting it during transport.

5.2 Installation, Connection, Operation

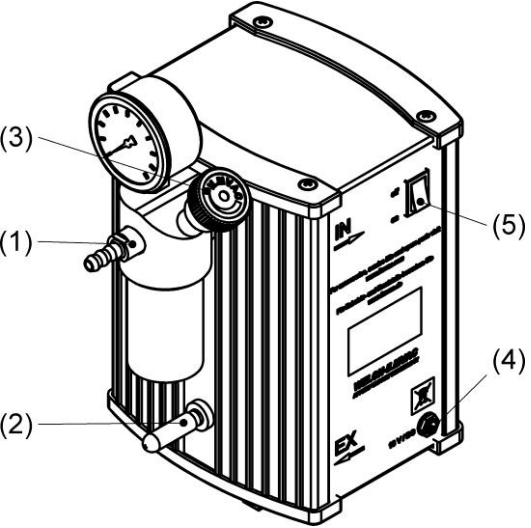
1.	Set the diaphragm pump on a flat and horizontal surface.	
2.	Connect the NW 6 vacuum connector to the suction port (1) at the dosing block (3). (Exhaust side (2): hose nozzle NW 6 with removable exhaust damper)	
3.	For the plug system the respective plug to connect (contained in the scope of supply) is to be selected and with the plug power pack (4).	
4.	Connect the diaphragm pump with the plug power pack and the electrical supply (4).	
5.	The diaphragm pump is switched on and off at the ON/OFF switch (5).	

Fig. 4 Connections



CAUTION !

Observe the basic safety instructions when using the pump.

5.3 Storage

The pumps are to be stored in a low-dust, interior room within the temperature range from + 5 to + 40 °C and at a relative air humidity < 90%.

Leave the protective elements on the suction and pressure ports. Another equally good protection may be used. The interior of the pump heads must be dry and free of condensates.

The interior of the pump heads must be dry and free of condensates.

5.4 Scrap Disposal



CAUTION !

The Diaphragm pumps must be disposed of in accordance with the 2012/19/EU guideline and the specific national regulations.

Contaminated diaphragm pumps must be decontaminated according to the laws.


Maintenance and Servicing


6 Maintenance and Servicing

6.1 General Requirements

- Check the pump daily for unusual running noises and heat building up on the surface of the pump.
- Check the electrical and vacuum connections regularly.

6.2 Maintenance Performed by the User


	WARNING !
<p>Only perform the work that is described here, and that which is permitted to be done by the user. All other maintenance and service work may only be performed by the manufacturer or a dealer authorized by him. Beware of the pump parts being possibly contaminated by hazardous substances. Wear protective clothing if there is contamination.</p>	

	WARNING !
<p>Before opening the pump unplug it from the mains.</p>	

Tools required:

Tool kit: Order no. 402109, consists of:

- Order no. 826801-7 Allen key size 3
- Order no. 826801-4 Cross-head screwdriver, size 2

	WARNING !
<p>Renew defective parts, if necessary! Wear protective gloves! Parts must be renewed at the intervals stated in this Operating Manual or as specified by the user internally! Do not clean with compressed air!</p>	

6.2.1 Disassembly for the change of the built-in diaphragm pump 827730

1. Disconnect the power supply and ensure that it cannot be switched on again.
2. Remove the 4 visible screws with a cross-head screwdriver, size 2.
3. Open the cover of the casing.
4. Solve then the hose connector.
5. Separate the electrical connection between pump motor and power switch.
6. Remove at the attaching bracket of the built-in pump the 4 cylinder head screws by means of allen key size 3 now.
7. Exchange the built-in pump.

6.2.2 Assembly


- Assembly takes place in the reverse order to disassembly.

6.2.3 Test

- Connect the pump to the electrical supply.
- Connect a vacuum measuring device to the suction connector and measure the ultimate pressure. If the device is working properly, then the figure stated in the technical data must be attained within a maximum of one minute.
- The pump must not make any abnormal noises.


6.3 Maintenance by the Manufacturer

Repairs and maintenance going beyond the extent of the work described *in chapter 6.2* or reconditioning or modification may only be performed by the manufacturer or authorized workshops.

	CAUTION !
The user shall be liable for the consequences of an incorrect damage report or a contaminated pump. The statements in the damage report are legally binding.	

6.4 Damage Report

You find the form of the damage report to the Download on our web page in the menu "service" and "Downloads". www.welchvacuum.com
If you should not have an entrance to the Internet, you can request the form also gladly with us, under phone +49 3677 604 0.

	CAUTION !
Incomplete or incorrectly completed damage reports may endanger the service personnel! Give full information in the damage report, in particular regarding a possible contaminating of the sensor.	

Troubleshooting

7 Troubleshooting


Only manufacturing firm and authorized service workshops may work on the diaphragm pump and their accessories during the warranty period.

Trouble	Cause	Remedy	
		by:	with:
Vacuum pump does not start	No power supply	Qualified electrician	Exchange – power pack
	Motor defective		Exchange – built-in diaphragm pump
Vacuum pump does not generate a vacuum or only an inadequate one	Connected apparatus, separator of the pump and/or connecting elements leaking	User or Service workshop	Identify and seal the leak, replace the seals and/or hoses if necessary.
	Vacuum pump leaking		Check the hose connections between the pump heads, replace the hoses and/or fittings if necessary.
	Pump head leaking		Exchange – built-in diaphragm pump
	Diaphragm defective		
	Valve defective		
	Vacuum pump dirty		
	Valves dirty		

8 Spare Parts Overview

The spare parts lists contain all the spare parts and all the information necessary for ordering.

When ordering, please quote the description, quantity, serial number and order number!

	CAUTION !
We are not liable for any damage caused by the installation of any parts not supplied by the manufacturer.	

8.1 Spare parts view

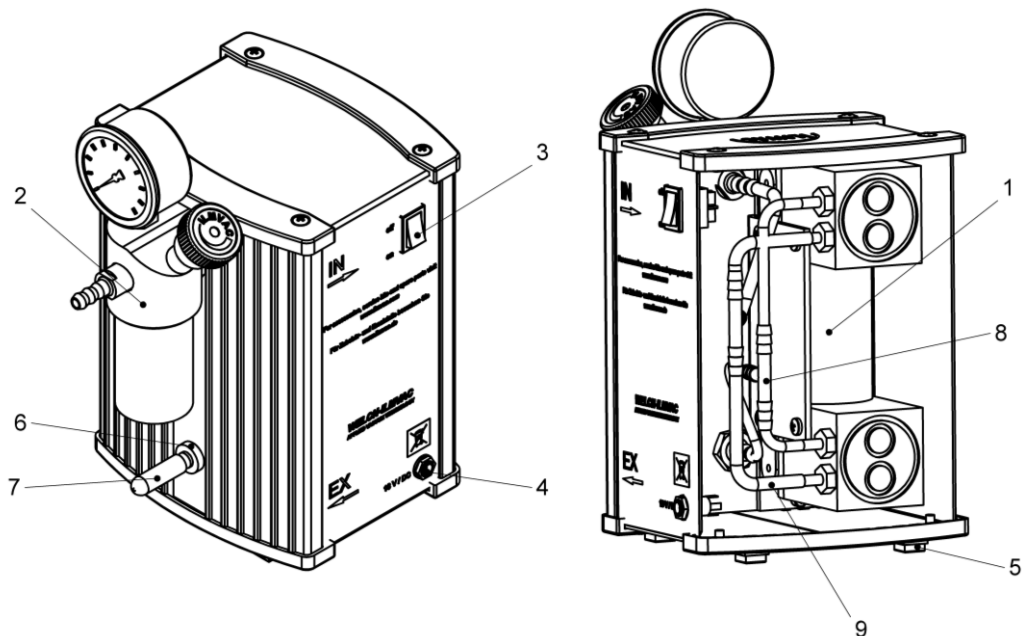


Fig. 5 Spare parts – front- and rear view (without rear panel)


8.1.1 Spare parts list

Item	Designation	Piece	Order no.
1	Built-in diaphragm pump 827730	1	827730
2	Vacuum Regulator with dial gauge (analogue)	1	700458-02
3	Rocker switch green	1	825186-3
4	Panel jack	1	825253
5	Casing foot	4	829122
6	Hose nozzle PP, DN 6 – female thread 1/8"	1	710630
7	Exhaust damper	1	410132
8	PVDF T-fitting (hose connector) 6	2	829925-01
9	PVC hose 6 x 2 mm	0.3 m	828330-01
-	Plug power pack (CEE, UK, US), extern	1	827406-02

EG - Konformitätserklärung

EC Declaration of Conformity / CE Déclaration de Conformité

DIN EN ISO / IEC 17050

(de) Hiermit erklären wir	 by Gardner Denver	Gardner Denver Thomas GmbH Am Vogelherd 20 98693 Ilmenau Germany	T +49 3677 604 0 F +49 3677 604 131 welch.emea@gardnerdenver.com www.welchvacuum.com
unter eigener Verantwortung, dass nachstehendes Produkt aufgrund seiner Konzipierung und Bauart sowie in den von uns in Verkehr gebrachten Unterlagen den nachfolgend aufgeführten EG-Richtlinien und Normen entspricht. Bei einer nicht mit uns abgestimmten Änderung des Produkts verliert diese Erklärung ihre Gültigkeit.			
(en) We (Gardner Denver Thomas GmbH) herewith declare under our sole responsibility that the product described below is in accordance with the following Directives standards and other technical specifications regarding design and version when delivered from our factory. This declaration becomes invalid whenever the product has been modified without our consent.			
(fr) Nous (Gardner Denver Thomas GmbH) certifions par la présente, que le produit décrit ci-après est conforme, tant dans sa conception que dans sa réalisation, aux normes de sécurité et d'hygiène exigées par les standards de la CE. En cas de modification du produit sans notre accord, cette déclaration devient caduque.			

Bezeichnung des Produkts (Pumpen / Pumpstände) Description of product (pumps / pump systems) Description du produit (pompes / pompe systèmes)	Membranpumpe / Diaphragm pump / Pompe à membrane MPC 090 E
Artikel-Nr. / Fabrication No. / No. de fabrication	412021
Baujahr / Year of manufacture / Année de fabrication	2017

Das Produkt entspricht folgenden Richtlinien und Normen: / The product is in conformity with the following Directives and standards: / Le produit est conforme aux directives et standards suivants:		
X	2006/42/EG	Maschinenrichtlinie / EC machinery directive / directive CE sur les machines (17.05.2006)
	2014/34/EU	ATEX-Richtlinie für Verwendungen in explosionsgefährdeten Bereichen, Anhang III / ATEX Directive for applications in hazardous areas, Annex III
X	2014/30/EU	Elektromagnetische Verträglichkeit / EC Electromagnetic Compatibility Directive / Directive CE relative à la compatibilité électromagnétique
X	2011/65/EU	Gefährliche Stoffe in Elektro- und Elektronikgeräten (RoHS II) / Dangerous materials in electrical and electronics devices (RoHS II) / Substances dangereuses dans les appareils électriques et électroniques (RoHS II)
X	2012/19/EU	Elektro- und Elektronik - Altgeräte (WEEE) / Electrical and electronics - old devices (WEEE) / Électro et électronique - appareils de contrôle (WEEE)
X	China - RoHS II	Umweltschutzgesetz - China 2016-01 / Environment protection law / Loi sur la protection de l'environnement

Angewandte harmonisierte Normen: / Applied harmonized standards: / Standards appliquées et harmonisées:		
	DIN EN 1127-1: 2011-10	Explosionsfähige Atmosphären - Explosionsschutz - Teil 1: Grundlagen und Methodik / Explosive atmospheres - Explosion prevention and protection - part 1: Basic concepts and methodology / Atmosphères explosives - Protection contre les explosions - partie 1: prescriptions et méthodologie
	DIN EN 13463-1: 2009-07	Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 1: Grundlagen und Anforderungen / Non-electrical equipment for use in potentially explosive atmospheres - part 1: Basic method and requirements / Appareils non électriques destinés à être utilisés en atmosphères explosibles - partie 1: prescriptions et méthodologie
	DIN EN 13463-5: 2011-10	Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 5: Schutz durch konstruktive Sicherheit 'c' / Non-electrical equipment for use in potentially explosive atmospheres - part 5: Protection by constructional safety 'c' / Appareils non électriques destinés à être utilisés en atmosphères explosibles - partie 5: protection par sécurité de construction « c »
X	DIN EN ISO 12100: 2011-03	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze Risikobeurteilung und Risikominderung / Safety of machinery - General principles for design - Risk assessment and risk reduction / Sécurité des machines - / Principes généraux pour l'évaluation des risques et la réduction des risques
X	DIN EN ISO 13857: 2008-06	Sicherheit von Maschinen - Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen / Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs / Sécurité des machines - Distances de sécurité empêchant les membres supérieurs et inférieurs d'atteindre les zones dangereuses
X	DIN EN 1012-2: 2011-12	Kompressoren und Vakuumpumpen - Sicherheitsanforderungen - Teil 2: Vakuumpumpen / Compressors and vacuum pumps - Safety requirements - part 2: Vacuum pumps / Compresseurs et pompes à vide - Exigences de sécurité - partie 2: pompes à vide
X	DIN EN ISO 2151: 2009-01	Akustik - Geräuschmessnorm für Kompressoren und Vakuumpumpen - Verfahren der Genauigkeitsklasse 2 / Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2) / Acoustique - norme de mesure des émissions pour les compresseurs et les pompes à vide - Procédé de classe de précision 2
X	DIN EN 60204-1: 2014-10	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen / Safety of machinery - Electrical equipment of machines - part 1: General requirements / Sécurité des machines - Equipement électrique des machines - partie 1: Prescriptions générales
X	EN 61000-6-2: 2011-06	Elektromagnetische Verträglichkeit (EMV) - Teil 6-2: Fachgrundnormen - Störfestigkeit für Industriebereiche / Electromagnetic compatibility (EMC) - part 6-2: Generic standards - Immunity for industrial environments / Compatibilité électromagnétique (EMV) - partie 6-2: Normes génériques - Immunité pour les environnements industriels
X	EN 61000-6-4: 2011-09	Elektromagnetische Verträglichkeit (EMV) - Teil 6-4: Fachgrundnormen - Störaussendung für Industriebereiche / Electromagnetic compatibility (EMC) - part 6-4: Generic standards - Emission standard for industrial environments environments / Compatibilité électromagnétique - partie 6-4: Normes génériques - Emissions de parasites pour les activités industrielles
X	DIN EN 50110-1: 2014-02	Betrieb von elektrischen Anlagen / Operation of electrical installations / Fonctionnement des installations électriques
X	DIN EN 61010-1/A1:2015-04	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 1: Allgemeine Anforderungen / Safety requirements for electrical equipment for measurement, control and laboratory use - part 1: General requirements / Consignes de sécurité pour les appareils électriques de mesure, de commande, de régulation ou de laboratoire - partie 1: Prescriptions générales

Datum / Data	2017-02-16	
Qualitätsbeauftragter / Quality representative / Délégué de qualité	Name / Name / Nom Gerd Reinhardt	
Produktmanager / Product manager / Directeur de produit	Name / Name / Nom Oliver Fickert	