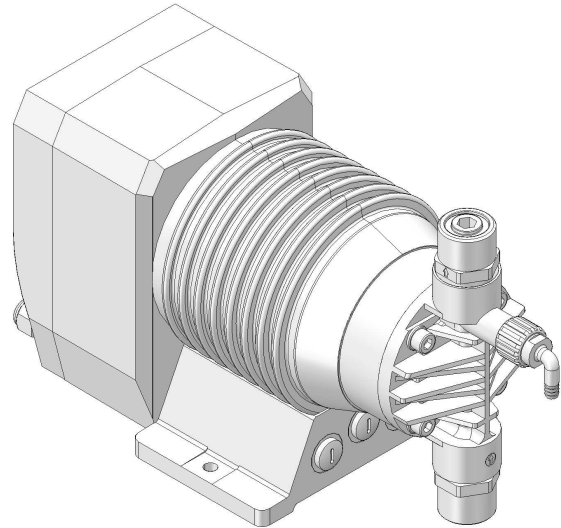


**Operating Instructions**

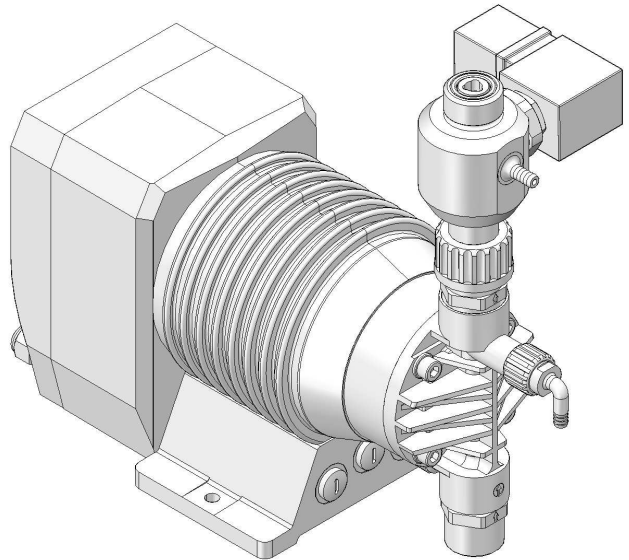
**Product:** Solenoid diaphragm pump

- Type:**
- R 204.1 – 0,4 e
  - R 204.1 – 1,2 e
  - R 204.1 – 2,4 e
  - R 204.1 – 6,0 e
  - R 204.1 – 7,0 e
  - R 204.1 – 10 e
  - R 204.1 – 14 e
  - R 204.1 – 25 e
  - R 204.1 – 30 e
  - R 204.1 – 35 e



**Product:** Self ventilating Solenoid diaphragm pump

- Type:**
- RS 204.1 – 0,4 e
  - RS 204.1 – 1,2 e
  - RS 204.1 – 2,4 e
  - RS 204.1 – 6,0 e
  - RS 204.1 – 7,0 e
  - RS 204.1 – 10 e
  - RS 204.1 – 14 e
  - RS 204.1 – 25 e
  - RS 204.1 – 30 e
  - RS 204.1 – 35 e



Please state here the exact type and serial number of your pump. (can be read off the type plate on the pump)
<b>Type:</b>
<b>Serial No.:</b>
These data are important in case of queries or for ordering spare and wearing parts and must absolutely be stated.

**Manufacturer:**

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GmbH + Co. Betriebs-KG**  
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**CAUTION !**



**Keep the operating instructions for future application!**

## Operating Instructions

### Table of contents:

1	General.....	4	6	Technical specifications.....	10
2	Types.....	4	6.1	Dimensions R 204.1 .....	10
2.1	Type code.....	4	6.2	Dimensions RS 204.1.....	12
2.2	Type plate.....	4	6.3	Technical data.....	14
2.3	Materials.....	5	6.4	Usable stroke length range with self-ventilation .....	16
2.4	Viscosity, pumped medium .....	5	7	Functional description.....	18
2.5	Dosing range .....	5	7.1	General .....	18
2.6	Noise measurement.....	5	7.2	Components of the solenoid diaphragm pump R/RS 204.1 .....	18
3	Safety instructions .....	5	7.2.1	Built-in pump / Motor housing.....	18
3.1	Note on quality.....	5	7.2.2	Pump body.....	19
3.2	Marking of notes .....	5	7.2.3	Manual vent valve (only FRP-execution R 204.1-1,2e - ...-14e, RS 204.1-6,0 - ...-14e).....	19
3.2.1	Marking of notes in these operating instructions.....	5	7.2.4	Electronics (with control panel).....	19
3.2.2	Marking of notes on the product.....	5	7.2.5	Suction / pressure valve .....	20
3.3	Personnel qualification and training.....	5	7.2.6	Automatic ventilation device (RS- design).....	20
3.4	Dangers in case of inobservance of the safety instructions .....	5	8	Assembly / Installation.....	21
3.5	Safety conscious working.....	6	8.1	Installation instructions .....	21
3.6	Safety instructions for the owner / operator .....	6	8.1.1	Provide overpressure protection.....	22
3.7	Safety instructions for maintenance-, inspection and installation work .....	6	8.1.2	Prevent a backflow of the pumped medium .....	23
3.8	Arbitrary modification and spare parts production ...	6	8.1.3	Eliminate undesired siphoning.....	23
3.9	Improper operations.....	6	8.1.4	How to ensure an gas-free suction.....	24
3.10	Intended use.....	6	8.1.5	Install the empty-tank alarm .....	24
3.11	Personal protection for maintenance and service....	6	8.1.6	How to avoid an emptying of the suction line .....	25
4	Transport and intermediate storage .....	7	8.1.7	Line strainer .....	25
4.1	General.....	7	8.1.8	Suction via a siphon pipe.....	26
4.2	Storage.....	7	8.1.9	In case of slightly degassing dosing media .....	26
5	Components of the solenoid diaphragm pump .....	8	8.1.10	Damping of the pulsation .....	27
5.1	R 204.1.....	8	9	Electrical connections.....	28
5.2	RS 204.1.....	9	9.1	Electric supply .....	28
			9.2	Connecting the control cables .....	29
			9.2.1	Pulse input .....	30
			9.2.2	Analog input .....	30
			9.2.3	External stop input .....	30
			9.2.4	Level input with pre-alarm and dry run .....	30
			10	Operation .....	31
			10.1	Operating elements .....	31
			10.2	LED operation indicators .....	31
			10.3	Key operation .....	31
			10.4	Stroke length adjustment.....	31
			10.5	Stroke frequency adjustment.....	32
			10.6	Configuring the level input .....	32

## Operating Instructions

---

10.7	Venting settings (only with RS 204.1).....	33
10.7.1	Manual venting .....	33
10.7.2	Venting after switching on the pump .....	34
10.7.3	Cyclical venting.....	34
10.7.4	Switching off the venting.....	35
11	Maintenance .....	35
11.1	Wearing parts .....	35
11.2	Spare parts .....	35
11.3	Spare and wearing parts .....	36
11.3.1	Solenoid diaphragm pump R 204.1-0,4e ... -14e .....	36
11.3.2	Solenoid diaphragm pump R 204.1-25e ...-35e .....	37
11.3.3	Solenoid diaphragm pump RS 204.1-0,4e ... -14e.....	38
11.3.4	Solenoid diaphragm pump RS 204.1-25e ....-35e.....	39
11.4	Changing working diaphragm.....	40
12	Fault analysis and corrective action .....	41
13	Foreseeable misuse.....	43
13.1	Transport .....	43
13.2	Assembly and installation.....	43
13.3	Start-up.....	43
13.4	Operation.....	43
13.5	Maintenance / Repair .....	43
13.6	Cleaning .....	44
13.7	Shut-down .....	44
13.8	Disassembly .....	44
13.9	Disposal.....	44
14	Shut-down .....	44
15	Disposal.....	44
15.1	Dismantling and transport .....	44
15.2	Complete disposal .....	44

## Operating Instructions

### 1 General

Before commissioning and during operation of the **sera** – solenoid diaphragm pump the respective regulations valid at the place of installation are to be observed.

The **sera** solenoid diaphragm pump is delivered ready for installation. Carefully read these instructions and especially the safety instructions herein contained before installation and initial start-up of the pump.

### 2 Types

#### 2.1 Type code

**Example:**

Solenoid diaphragm pump type **R 204.1-10e**

R	204.1	10	e
---	-------	----	---

Pump control

**R** manually controlled  
**RS** self ventilating

R	204.1	10	e
---	-------	----	---

Indication of model range/stroke mechanism

R	204.1	10	e
---	-------	----	---

Indication of nominal delivery rate

This number states the nominal delivery rate in litres/hour.  
(standard version referring to water)

R	204.1	10	e
---	-------	----	---

Indication of the pump design

**e** single solenoid diaphragm pump

### 2.2 Type plate

Each **sera** solenoid diaphragm pump is factory provided with a type plate. The following information can be found on this type plate.

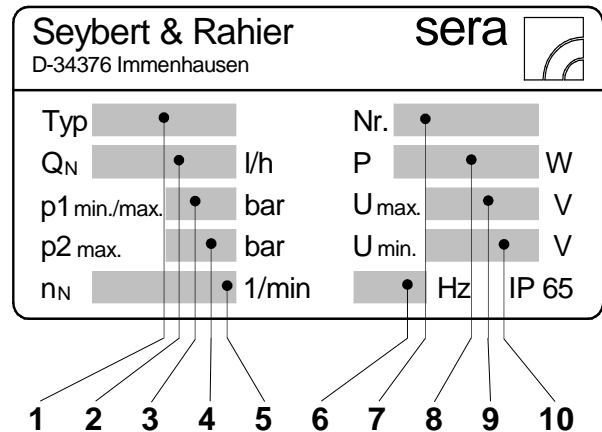


Fig. 01 Type plate

Explanation of the indications on the type plate		
1	Type	<b>Pump type</b>
2	$Q_N$ l/h	<b>Nominal delivery rate</b> Delivery rate which the pump was ordered for, based on the stroke frequency $n_N$ , the nominal delivery height $p_{2max}$ and the delivery medium stated in the supply contract.
3	$p_{1min/max}$ [bar]	<b>Minimum/maximum permissible pressure in the pump inlet</b> Minimum/maximum permissible pressure in the inlet cross section which the pump can be used for. Please consider that pressure depends on rotation speed, delivery rate, temperature and static pressure at the inlet.
4	$p_{2max}$ [bar]	<b>Maximum permissible pressure in the pump outlet</b> Maximum permissible pressure in the outlet cross section which the pump can be used for. Please consider that pressure depends on rotation speed, delivery rate, temperature and static pressure at the outlet.
5	$n_N$ 1/min	<b>Nominal stroke frequency</b>
6	[Hz]	<b>Frequency</b>
7	No.	<b>Serial number of the pump</b>
8	P [W]	<b>Middle power draw</b>
9	U max. [V]	<b>max. operating voltage</b>
10	U min. [V]	<b>min. operating voltage</b>

Table 01 Explanation of type plate

## Operating Instructions

### 2.3 Materials

The materials used are stated in the order confirmation and the product description.

### 2.4 Viscosity, pumped medium

The solenoid diaphragm pump is suitable for fluids with viscosities < 100 mPas.

### 2.5 Dosing range

The flow capacity of the solenoid diaphragm pump can be controlled manually via the stroke length adjustment and/or stroke frequency adjustment (0... 100 %).

The linear dosing range depends on the pump type and is between 20%...100% or 30%...100%.

### 2.6 Noise measurement

According to DIN 45635 the sound pressure level measured of the solenoid diaphragm pumps is approx. 58 dB (A).

## 3 Safety instructions

### 3.1 Note on quality

Observance of these operating instructions and, in particular, the safety instructions, helps to

- avoid dangers to persons, machines, and environment
- increase the reliability and service life of the pump and the entire system
- reduce repair cost and downtime.

The **sera** quality management and quality assurance system for pumps, systems, fittings, and compressors is certified according to ISO 9001:2008.

The **sera** solenoid diaphragm pump complies with the valid safety requirements and accident prevention regulations.

#### **CAUTION !**



Always keep these operating instructions within reach at the place of installation of the pump.

#### **CAUTION !**



Pay attention to the safety data sheet of the pumped medium! The owner must take corresponding accident prevention measures to protect operating personnel from danger through the pumped media used!

### 3.2 Marking of notes

#### 3.2.1 Marking of notes in these operating instructions

Special notes in these operating instructions are marked with the general danger symbol



(safety symbol in compliance with DIN 4844 – W9)

The safety sign appears in the following cases:

- If improper observance or non-observance of the operating manual, work instructions, specified operating procedures and similar can lead to personal injury or accidents.
- If improper observance or non-observance of the operating manual, work instructions, specified operating procedures and similar can lead to damage to property.
- Due to danger of causticization personnel must wear protective clothing (safety goggles, safety gloves and safety apron) for maintenance and repair work on parts which come into contact with hazardous products or for changing the containers.

#### 3.2.2 Marking of notes on the product

Symbols which are directly attached to the pump, e.g. arrows for direction of rotation or symbols for fluid connections are to be observed and kept in legible condition.

### 3.3 Personnel qualification and training

The personnel who operate, maintain, inspect and install the solenoid diaphragm pump must be suitably qualified. Range of responsibility, and supervision of the personnel are to be clearly defined by the owner. If the personnel do not have the knowledge required it is to be trained and instructed accordingly. If required such a training can be carried out by the manufacturer /supplier upon order of the owner. The owner must also ensure that the personnel have understood the operating instructions.

### 3.4 Dangers in case of inobservance of the safety instructions

Inobservance of these safety instructions can result in danger to persons, hazards to the environment and damage to the pump.

Inobservance can result in:

- Failure of important functions of the pump/system
- Inobservance of prescribed methods for maintenance and servicing
- Danger to persons through electrical, mechanical and chemical influences
- Hazards to the environment through leaking dangerous media

## Operating Instructions

### 3.5 Safety conscious working

The safety instructions specified in this operating manual, the national regulations for accident prevention, the safety regulations for the pumped medium valid at the place of installation as well as internal working-, operating-, and safety instructions of the owner are to be observed.

### 3.6 Safety instructions for the owner / operator

Leaking pumped media must be disposed off in such a way that any danger to persons and hazards to the environment are excluded. The legal regulations are to be observed. Dangers through electrical energy are to be precluded.

### 3.7 Safety instructions for maintenance-, inspection and installation work

The owner must ensure that all maintenance-, inspection- and installation work are exclusively carried out by authorized and qualified personnel who have read the operating instructions carefully.

The spare parts used must comply with the requirements of the respective operating instructions.

All screwed connections and connections may only be removed when the system is not under pressure.

### 3.8 Arbitrary modification and spare parts production

Modification to and changement of the pump is only permitted after previous agreement of the manufacturer. Original spare parts and accessories approved by the manufacturer increase safety.

#### **CAUTION !**



If non-approved parts are used or if the pump is modified arbitrarily the manufacturer refuses any liability claims.

### 3.9 Improper operations

Operating safety of the supplied diaphragm pump is only guaranteed if the product is used as intended, according to the descriptions in Chapter 3.10 of these operating instructions.

### 3.10 Intended use

The **sera** – diaphragm pump is only to be deployed according to the intended purpose stated in the product description and the acceptance test certificate.

If the solenoid diaphragm pump is to be used for other applications, then the suitability of the pump for the new operating conditions must be discussed with **sera** beforehand!

Criteria for the proper use of the solenoid diaphragm pump are:

- Observe characteristics of the pumped medium (please see safety- and product data sheet of the pumped medium used – the safety data sheet is to be provided by the supplier / owner of the pumped medium)
- Resistance of the materials which come into contact with the pumped medium
- Operating conditions at the place of installation
- Pressure and temperature of the pumped medium
- Voltage supply

### 3.11 Personal protection for maintenance and service

In order to avoid risks to health, the provisions of the German Ordinance on Hazardous Substances (GefStoffV) (§14 Safety Data Sheet) and relevant national safety regulations for the pumped medium must strictly be adhered to.

In case of an incident pay attention to the following leaking media:

- fluids
- vapours
- noise emissions (sound level)

Emissions are to be monitored by corresponding monitoring systems.

#### **CAUTION !**



Wear protective clothing, gloves, and a face protecting and breathing mask.

#### **CAUTION !**



Personal protective equipment must be provided by the owner!

## Operating Instructions

---

### 4 Transport and intermediate storage

#### 4.1 General

Before shipment **sera** - products are checked for proper condition and functioning.

The customer has to check the product for transport damage immediately after receipt. Any damage detected is to be reported immediately to the carrier and the supplier.

#### **CAUTION !**



**The packaging material must be disposed of appropriately!**

#### 4.2 Storage

An undamaged packaging protects the unit during subsequent storage and should only be opened when the solenoid diaphragm pump is installed.

Proper storage increases the service life of the solenoid diaphragm pump and comprises prevention of negative influences such as heat, humidity, dust, chemicals etc.

The following storage instructions are to be observed:

- Storage place: cool, dry, dust-free and slightly ventilated
- Storage temperatures between +2°C and +40°C
- Relative air humidity not more than 50%.
- The maximum storage time for the standard system is 12 months.

If these values are exceeded, products should be sealed in foil and protected from condensation water with a suitable desiccant.

Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants and similar in the storage room.

## Operating Instructions

### 5 Components of the solenoid diaphragm pump

#### 5.1 R 204.1

The solenoid diaphragm pump may be composed of the following (main) components:

- Motor housing with stroke magnet
- Electronics with operating panel
- Built-in pump
- Pump body
- Valves

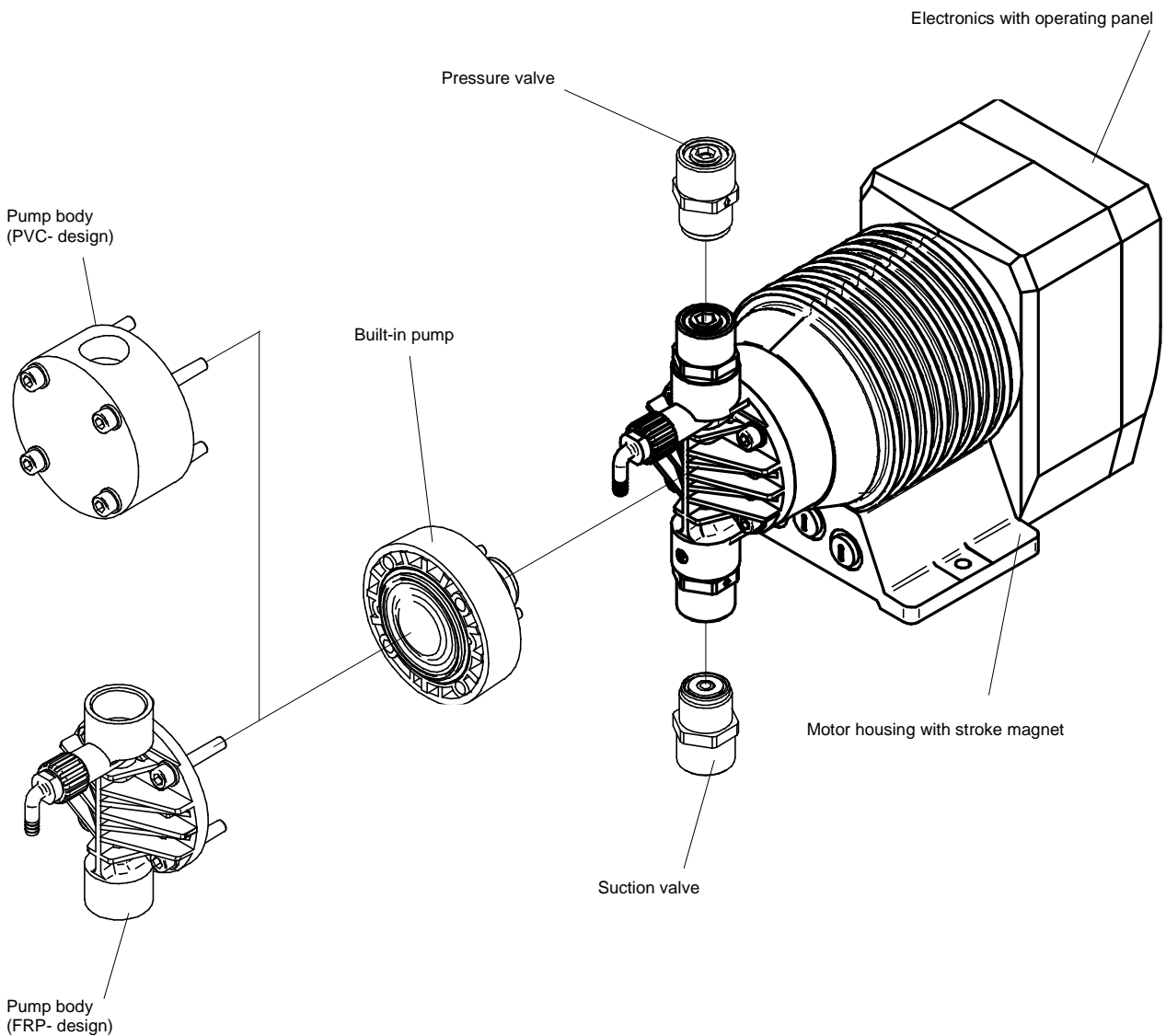


Fig. 02 Overview of the components R 204.1

## Operating Instructions

### 5.2 RS 204.1

The self ventilating solenoid diaphragm pump may be composed of the following (main) components:

- Motor housing with stroke magnet
- Electronics with operating panel
- Built-in pump
- Pump body
- Valves
- Vent valve

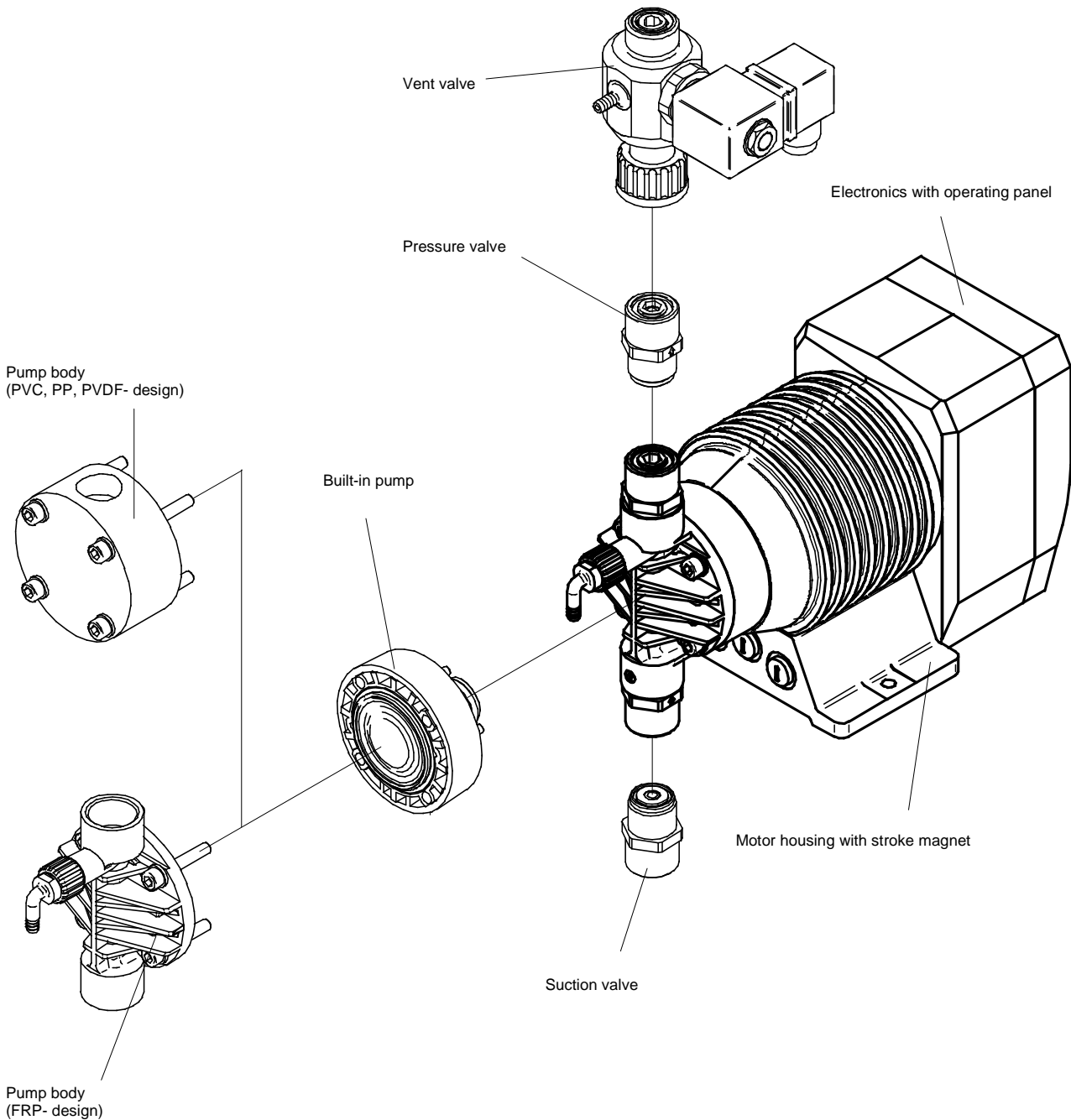
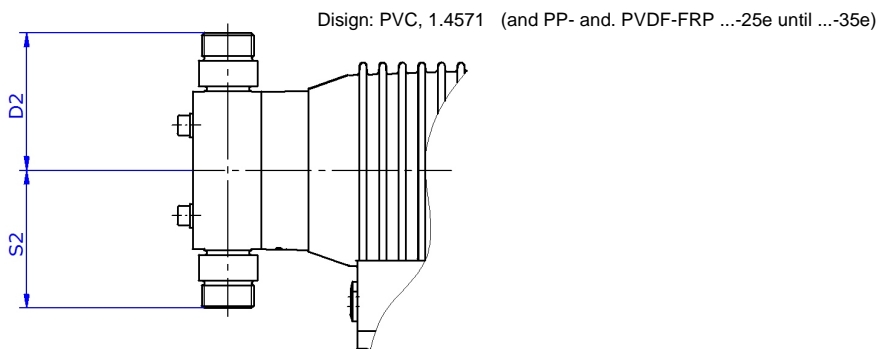
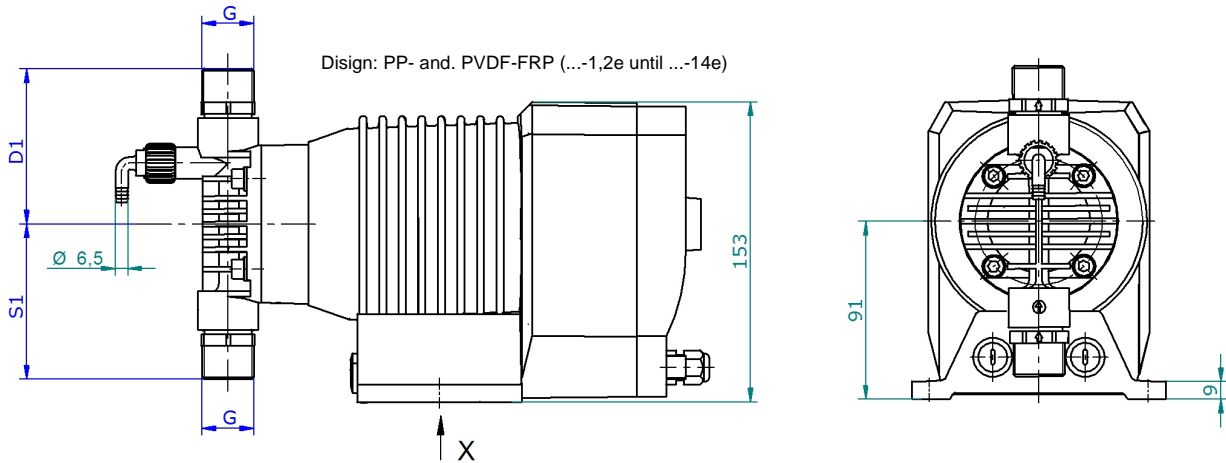


Fig. 03 Overview of the components RS 204.1

Operating Instructions

6 Technical specifications

6.1 Dimensions R 204.1



View X

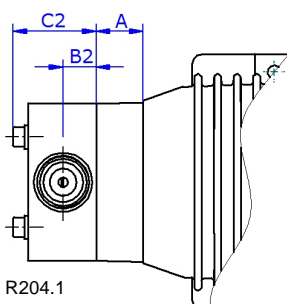
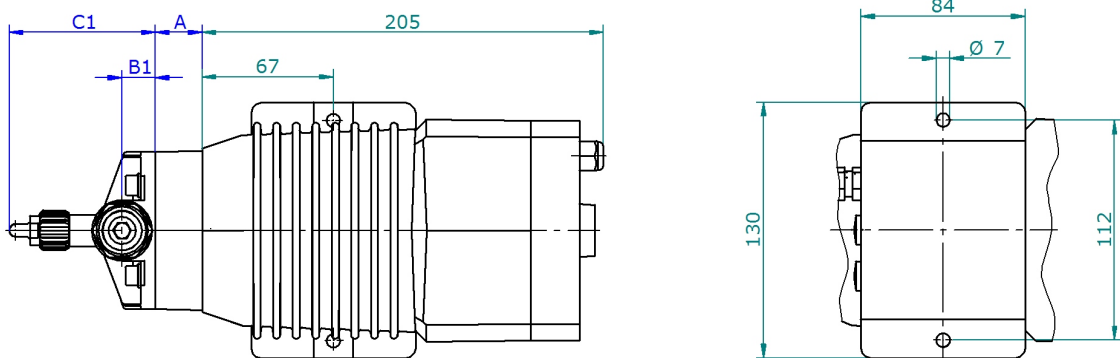


Fig. 04 Dimensions R204.1

Operating Instructions

Table 02  
Dimensions

All dimensions in mm!

			Solenoid diaphragm pump										
			R 204.1 – 0,4 e	R 204.1 – 1,2 e	R 204.1 – 2,4 e	R 204.1 – 6,0 e	R 204.1 – 7,0 e	R 204.1 – 10 e	R 204.1 – 14 e	R 204.1 – 25 e	R 204.1 – 30 e	R 204.1 – 35 e	
Valves	S1	Double valve PP-FRP, PVDF-FRP	---	80	80	80	80	80	80	---	---	---	
		Double valve PP-FRP, PVDF-FRP	---	---	---	---	---	---	---	75	75	75	
	S2	Single valve PVC	---	---	---	---	---	---	---	78	78	78	
		Chamber valve PVC, 1.4571	---	70	70	70	70	70	70	---	---	---	
		Double valve 1.4571/1.4581	---	---	---	---	---	---	---	76	76	76	
		Double valve PP, PVC, PVDF	65	---	---	---	---	---	---	---	---	---	
		D1	Double valve PP-FRP, PVDF-FRP	---	80	80	80	80	80	80	---	---	---
	D2	Double valve PP-FRP, PVDF-FRP	---	---	---	---	---	---	---	75	75	75	
		Single valve PVC	---	---	---	---	---	---	---	85	85	85	
		Chamber valve PVC, 1.4571	---	70	70	70	70	70	70	---	---	---	
		Double valve 1.4571/1.4581	---	---	---	---	---	---	---	76	76	76	
		Double valve PP, PVC, PVDF	65	---	---	---	---	---	---	---	---	---	
	G	Connection thread Suction/pressure valve	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	
	Built-in pump	A	Built-in pump	24	24	24	24	24	24	24	26	26	26
	Pump body (PB)	B1	Centre of valve thread (FRP-design)	---	17	17	17	17	17	17	15	15	15
Centre of valve thread			17	17	17	17	17	17	17	18	18	18	
C1		PB (FRP-design)	---	75	75	75	75	75	75	---	---	---	
		C2	PB (FRP-design)	---	---	---	---	---	---	---	33	33	33
			Pump body	43	43	43	43	43	43	43	41	41	41
Stroke mechanism	a.o. Dimensions for fastening of the pump		see Fig. 04										

Operating Instructions

6.2 Dimensions RS 204.1

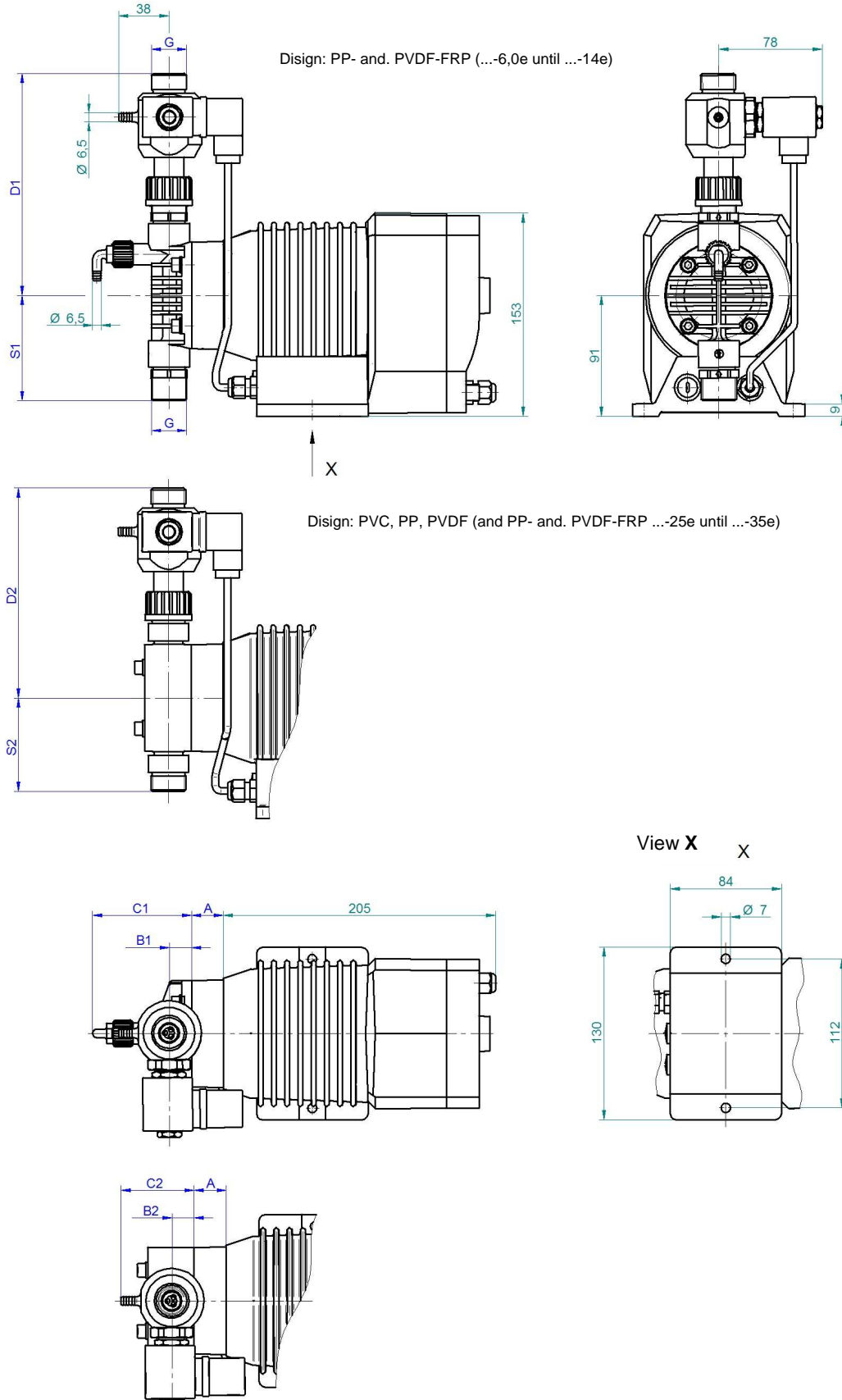


Fig. 05 Dimensions RS 204.1

Operating Instructions

Table 03  
Dimensions

All dimensions in mm!

			Solenoid diaphragm pump										
			RS 204.1 – 0,4 e	RS 204.1 – 1,2 e	RS 204.1 – 2,4 e	RS 204.1 – 6,0 e	RS 204.1 – 7,0 e	RS 204.1 – 10 e	RS 204.1 – 14 e	RS 204.1 – 25 e	RS 204.1 – 30 e	RS 204.1 – 35 e	
Valves	S1	Double valve PP-FRP, PVDF-FRP	---	---	---	80	80	80	80	---	---	---	
		Double valve PP-FRP, PVDF-FRP	---	---	---	---	---	---	---	75	75	75	
	S2	Chamber valve PVC, PP, PVDF	---	70	70	70	70	70	70	70	---	---	---
		Single valve PVC	---	---	---	---	---	---	---	---	78	78	78
		Double valve PP, PVC, PVDF	65	---	---	---	---	---	---	---	---	---	---
	D1	Double valve PP-FRP, PVDF-FRP with vent valve	---	---	---	168	168	168	168	168	---	---	---
		Double valve PP-FRP, PVDF-FRP with vent valve	---	---	---	---	---	---	---	---	163	163	163
		Chamber valve PVC, PP, PVDF with vent valve	---	158	158	158	158	158	158	158	---	---	---
		Single valve PVC with vent valve	---	---	---	---	---	---	---	---	173	173	173
		Double valve PP, PVC, PVDF with vent valve	153	---	---	---	---	---	---	---	---	---	---
	G	Connection thread Suction/pressure valve	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾
	Built-in pump	A	Built-in pump	24	24	24	24	24	24	24	26	26	26
Pump body (PB)	B1	Centre of valve thread (FRP-design)	---	---	---	17	17	17	17	15	15	15	
		Centre of valve thread	17	17	17	17	17	17	17	17	18	18	18
	C1	PB (FRP-design)	---	---	---	75	75	75	75	75	---	---	---
		PB (FRP-design)	---	---	---	---	---	---	---	---	33	33	33
		PB (PVC, PP, PVDF- design)	43	43	43	43	43	43	43	43	41	41	41
Stroke mechanism		a.o. Dimensions for fasten- ing of the pump	see Fig. 05										

## Operating Instructions

### 6.3 Technical data

Type	Pump data								
	Diaphragm diameter	Nominal delivery rate adjustable by stroke length adjustment and stroke frequency adjustment		Maximum permissible pressure in the pump outlet	Minimum / maximum permissible pressure in the pump inlet	Maximum suction height <sup>1)</sup>	Inlet / outlet nominal width	Nominal stroke frequency	Maximum stroke length
		Q <sub>N</sub> l/h	Q <sub>N</sub> ml/Hub						
mm	50 / 60 Hz		bar	bar	m	mm	50 / 60 Hz	mm	
R 204.1-0,4 e	26	0-0,4 <sup>2)</sup>	0-0,04	10	-0,2/0	2	4	150	1,5
R 204.1-1,2 e	26	0-1,2 <sup>2)</sup>	0-0,13	10	-0,3/0	3	5	150	1,5
R 204.1-2,4 e	30	0-2,4 <sup>2)</sup>	0-0,27	10	-0,3/0	3	5	150	1,5
R 204.1-6,0 e	42	0-6,0 <sup>3)</sup>	0-0,67	6	-0,3/0	3	5	150	1,5
R 204.1-7,0 e	42	0-7,0 <sup>3)</sup>	0-0,78	10	-0,3/0	3	5	150	1,5
R 204.1-10 e	52	0-10 <sup>3)</sup>	0-1,11	6	-0,3/0	3	5	150	1,5
R 204.1-14 e	52	0-14 <sup>3)</sup>	0-1,56	3	-0,3/0	3	5	150	1,5
R 204.1-25 e	74	0-25 <sup>3)</sup>	0-2,78	3	-0,3/0	3	10	150	1,5
R 204.1-30 e	74	0-30 <sup>3)</sup>	0-3,33	2,5	-0,3/0	3	10	150	1,5
R 204.1-35 e	74	0-35 <sup>3)</sup>	0-3,89	1,5	-0,3/0	3	10	150	1,5

Table 04 Technical data / Pump data

- 1) Achievable height with media similar to water
- 2) Linear dosing range at a stroke length between 30% and 100%
- 3) Linear dosing range at a stroke length between 20% and 100%

Type	Pump data										
	Diaphragm diameter	Nominal delivery rate adjustable by stroke length adjustment and stroke frequency adjustment		Maximum permissible pressure in the pump outlet	Minimum / maximum permissible pressure in the pump inlet	Maximum suction height <sup>1)</sup>	Inlet nominal width	Outlet nominal width	Nominal stroke frequency	Maximum stroke length	Usable stroke length range with self-ventilation
		Q <sub>N</sub> l/h	Q <sub>N</sub> ml/stroke								
mm	50 / 60 Hz		bar	bar	m	mm	mm	50 / 60 Hz	mm	%	
RS 204.1-0,4 e	26	0-0,4 <sup>2)</sup>	0-0,04	10	-0,1/0	1	4	4	150	1,5	80-100
RS 204.1-1,2 e	26	0-1,2 <sup>2)</sup>	0-0,13	10	-0,15/0	1,5	4	5	150	1,5	80-100
RS 204.1-2,4 e	30	0-2,4 <sup>2)</sup>	0-0,27	10	-0,2/0	2	4	5	150	1,5	80-100
RS 204.1-6,0 e	42	0-6,0 <sup>3)</sup>	0-0,67	6	-0,3/0	3	4	5	150	1,5	70-100
RS 204.1-7,0 e	42	0-7,0 <sup>3)</sup>	0-0,78	10	-0,3/0	3	4	5	150	1,5	70-100
RS 204.1-10 e	52	0-10 <sup>3)</sup>	0-1,11	6	-0,3/0	3	4	5	150	1,5	60-100
RS 204.1-14 e	52	0-14 <sup>3)</sup>	0-1,56	3	-0,3/0	3	4	5	150	1,5	60-100
RS 204.1-25 e	74	0-25 <sup>3)</sup>	0-2,78	3	-0,3/0	3	5	10	150	1,5	60-100
RS 204.1-30 e	74	0-30 <sup>3)</sup>	0-3,33	2,5	-0,3/0	3	5	10	150	1,5	60-100
RS 204.1-35 e	74	0-35 <sup>3)</sup>	0-3,89	1,5	-0,3/0	3	5	10	150	1,5	60-100

Table 05 Technical data / Pump data

- 1) Achievable height with media similar to water
- 2) Linear dosing range at a stroke length between 30% and 100%
- 3) Linear dosing range at a stroke length between 20% and 100%
- 3) With the first suctioning, the stroke length has to be set to 100 % and the vent valve has to be opened

## Operating Instructions

Type	Drive				Weight <sup>1)</sup> approx. kg
	Solenoid diameter	Middle power draw	Nominal voltage	Frequency	
	mm	W	V	Hz	
R 204.1-0,4 e	65	20	100-240	50/60	2,6
R 204.1-1,2 e	65	20	100-240	50/60	3,1
R 204.1-2,4 e	75	26	100-240	50/60	4,1
R 204.1-6,0 e	75	26	100-240	50/60	4,1
R 204.1-7,0 e	90	33	100-240	50/60	4,8
R 204.1-10 e	90	33	100-240	50/60	4,8
R 204.1-14 e	75	26	100-240	50/60	4,1
R 204.1-25 e	90	33	100-240	50/60	5,1
R 204.1-30 e	90	33	100-240	50/60	5,1
R 204.1-35 e	90	33	100-240	50/60	5,1

Table. 06 Technical data / drive

<sup>1)</sup> standard-design

Type	Drive				Weight <sup>1)</sup> approx. kg
	Solenoid diameter	Middle power draw	Nominal voltage <sup>2)</sup>	Frequency	
	mm	W	V	Hz	
RS 204.1-0,4 e	65	20	190-240	50/60	3,0
RS 204.1-1,2 e	65	20	190-240	50/60	3,1
RS 204.1-2,4 e	75	26	190-240	50/60	4,1
RS 204.1-6,0 e	75	26	190-240	50/60	4,1
RS 204.1-7,0 e	90	33	190-240	50/60	4,8
RS 204.1-10 e	90	33	190-240	50/60	4,8
RS 204.1-14 e	75	26	190-240	50/60	4,1
RS 204.1-25 e	90	33	190-240	50/60	5,1
RS 204.1-30 e	90	33	190-240	50/60	5,1
RS 204.1-35 e	90	33	190-240	50/60	5,1

Table. 07 Technical data / drive

<sup>1)</sup> standard-design

<sup>2)</sup> other available operating voltages: 100...120V, 50 or 60 Hz

## Additional data for electronics

Type	Electronics data							
	Inlet voltage / Control input	Current consumption during stroke (230 V)	Recommended fuse	Min. contact signal time Min. distance between pulses	Analogue input resistance	Digital Output	Protection category	Thermal class
R/RS 204.1-...	5...30 V DC	max. 1,0 A	C2A Circuit breaker	55 ms	100 Ω	PNP, internal supply max. 15V DC, 50 mA external supply max. 30V DC, 350 mA	IP 65	F

Table. 08 Electronics data

Operating Instructions

6.4 Usable stroke length range with self-ventilation

Pump type: RS 204.1-1,2e

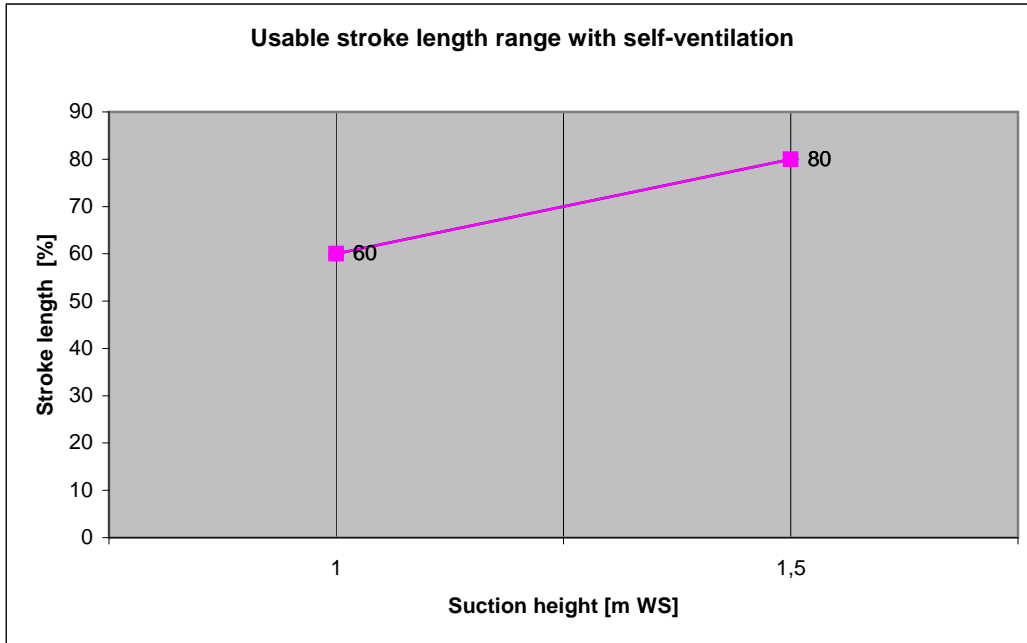


Fig. 06

The dosing pump sucks independently between diagram value and 100 % of the stroke length. The diagram describes the operating range of the stroke length of pump type RS.

Pump type: RS 204.1-2,4e

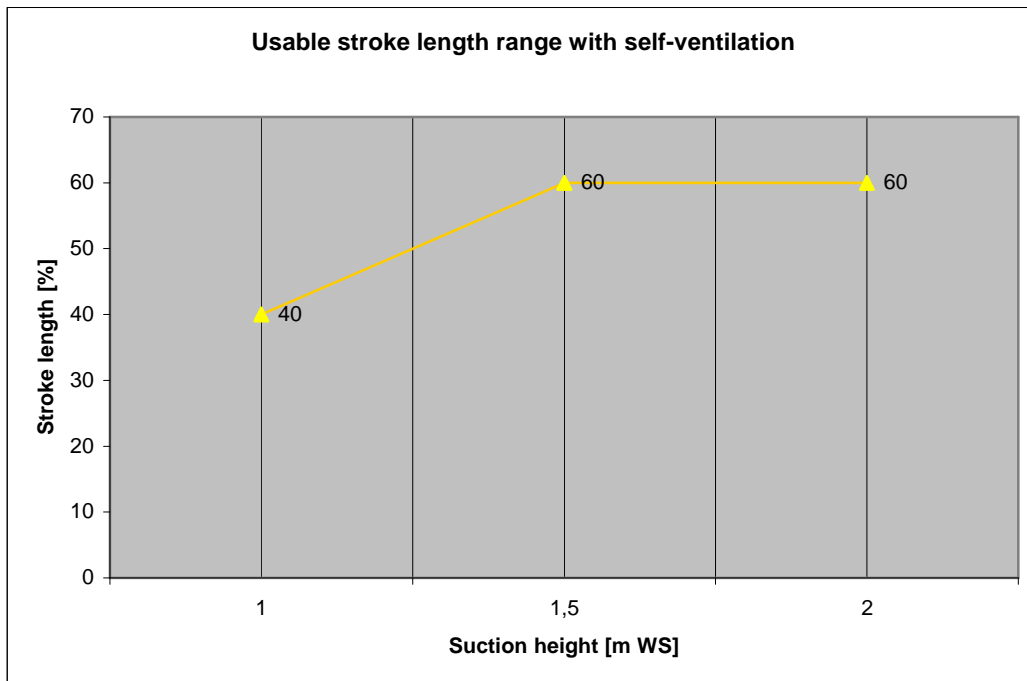


Fig. 07

The dosing pump sucks independently between diagram value and 100 % of the stroke length. The diagram describes the operating range of the stroke length of pump type RS.

Operating Instructions

Pump type: RS 204.1-6,0e  
RS 204.1-7,0e  
RS 204.1-10e  
RS 204.1-14e  
RS 204.1-25e  
RS 204.1-30e  
RS 204.1-35e

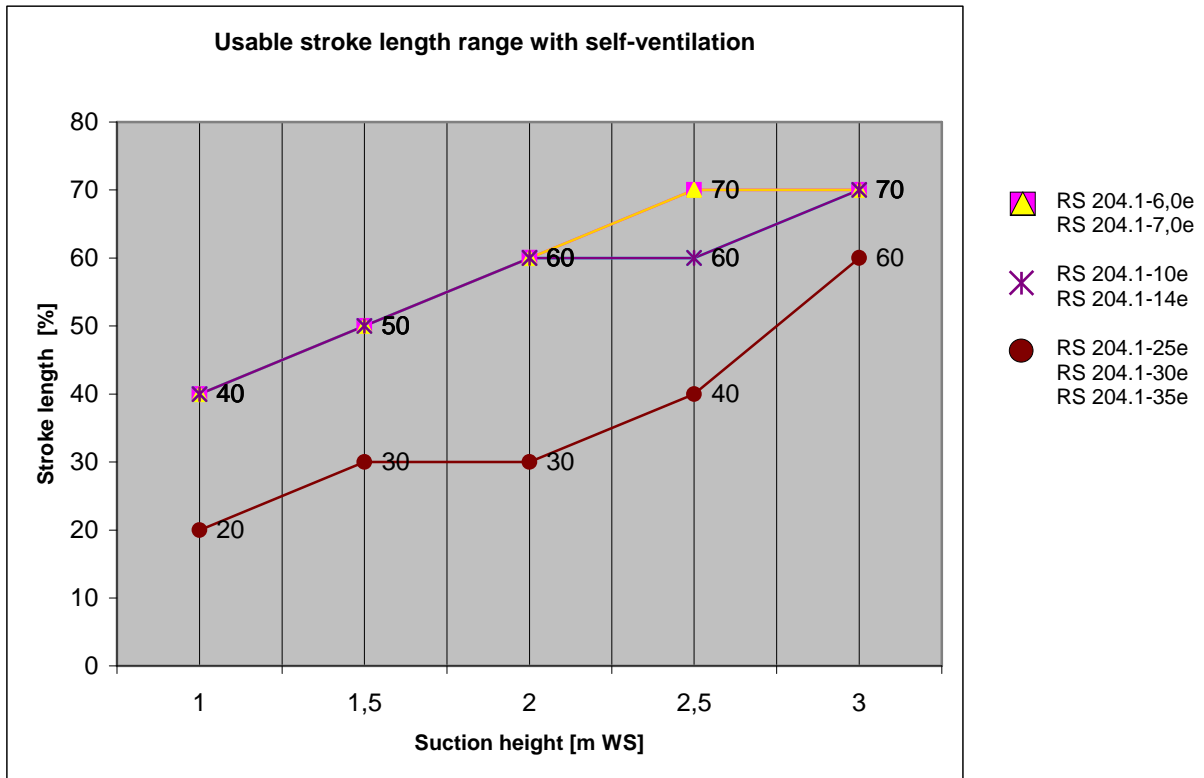


Fig. 08

The dosing pump sucks independently between diagram value and 100 % of the stroke length.  
The diagram describes the operating range of the stroke length of pump type RS.

**CAUTION!**



Note the usable stroke length acc. to the preceding diagrams.  
Priming problems may arise if these values are fallen below.

**Operating Instructions**

**7 Functional description**

**7.1 General**

sera solenoid diaphragm pumps R/RS 204.1 are self-priming and run-dry safe oscillating displacement pumps that are characterised by high tightness of the dosing head.

The flow capacity of the solenoid diaphragm pump R 204.1 can be controlled manually via the stroke length adjustment 0...100% (RS 204.1 see chapter 6.4 "Usable stroke length range with self-ventilation") and/or stroke frequency adjustment 0...100%.

Solenoid diaphragm pumps consist of the following (main) components:

- Motor housing with stroke magnet
- Electronics with connection / operating panel
- Built-in pump
- Pump body
- Manual vent valve (only by R 204.1 - 1,2e... - 14e, RS 204.1-6,0e... - 14e in FRP-design)
- Suction and pressure valve

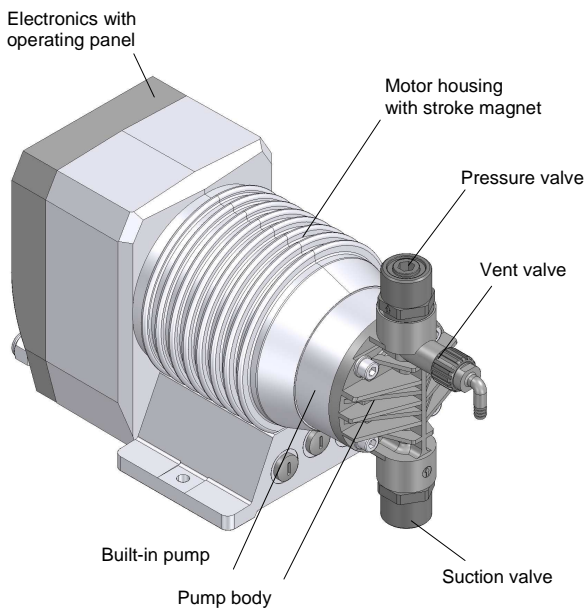


Fig. 09 (Components of solenoid diaphragm pump)

**7.2 Components of the solenoid diaphragm pump R/RS 204.1**

**7.2.1 Built-in pump / Motor housing**

**Function**

The liquid is conveyed by a deformable drive diaphragm. This drive diaphragm is connected to the drive magnet via a connecting rod which results in a deflection of the suction and pressure stroke (see Fig. 10).

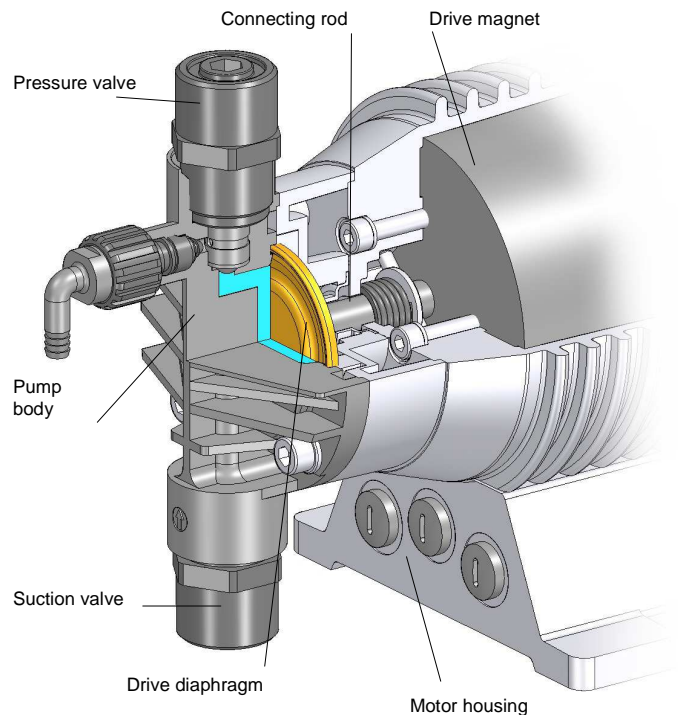


Fig.10 Functional principle

**Operating Instructions**

**7.2.2 Pump body**

Depending on the applied backpressure, movements of the plastic pump body in elastic materials are possible. This does not affect the pumps's service life or operational reliability.

**7.2.3 Manual vent valve (only FRP-execution R 204.1-1,2e - ...-14e, RS 204.1-6,0 - ...-14e)**

**Function**

The vent valve is used to release the manual pressure in the pump body during commissioning. Open vent valve when pump primes first time. When vent valve is opened gas including medium escapes into the feedback line. The vent valve must be closed again as soon as only medium without gas constituent escapes. The pump now feeds the medium into the pressure line. Open again for another ventilation. The vent valve consists of a vent screw with integrated hose nozzle, which must be fitted with a hose (inside diameter 6 mm) as feedback line (see Fig. 11). The leaking medium incl. the gas admixtures must be disposed off properly

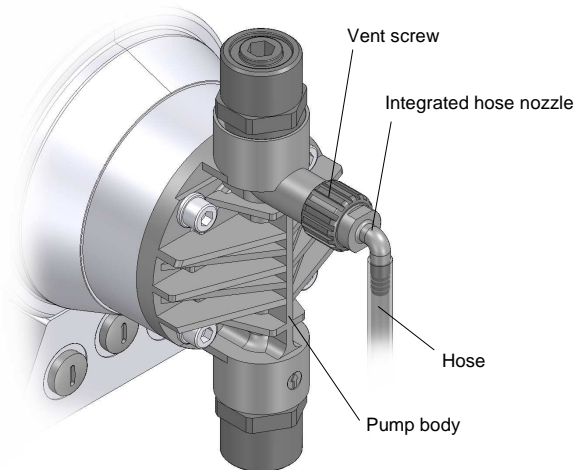




Fig. 11 Vent valve

The vent screw is inserted during normal operation.

**CAUTION!** 

Open vent screw with **great caution** and perform **max. 1 turn**. Take care that the **tightness of the thread is still guaranteed**.

**ACHTUNG !** 

The vent screw must always be closed during the driving process.

**7.2.4 Electronics (with control panel)**

The electronics enable, among others, the proportional dosing via analog signals 4 ... 20mA.

The three LEDs serve for indicating warning signals, errors and the current status of the dosing pump (see Fig. 12). An indicator "empty" along with pre-alarm and dry run indicators is installed as standard.



Fig. 12 Electronics

## Operating Instructions

### 7.2.5 Suction / pressure valve

The pump valves are always ball valves which can only function properly when they are installed in a vertical position. The condition of the valves is decisive for the operational behaviour of the pump. The valves should only be exchanged completely. Pay attention to the flow direction when installing the valves (see Fig. 13).

#### **CAUTION !**

**Pressure valve above, suction valve below!**

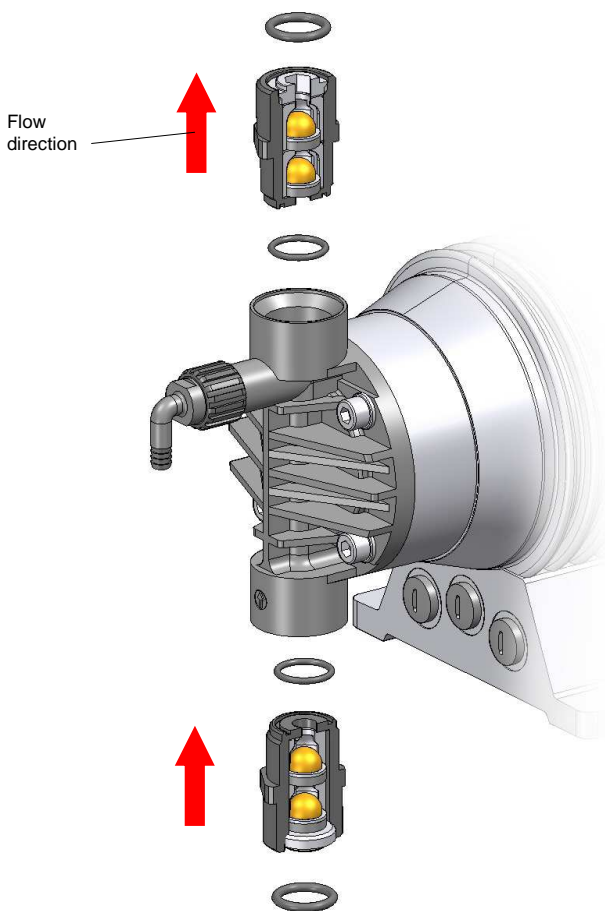


Fig. 13 Double valves, for example. PVDF-FRP

### 7.2.6 Automatic ventilation device (RS-design)

The self-venting controlled magnetic diaphragm pumps of the series RS 204.1 are equipped with a vent valve which is installed on the pump pressure nozzle and which cannot be retrofitted.

The pump vents the dosing head of the pump and the suction line, either externally or manually controlled or automatically at a predefined interval.

The vent valve consists of a combination of a check valve, which should prevent a back-flow of the medium, and a solenoid valve (see Fig. 14). When the controlled solenoid valve opens the spring-loaded rotor with attached seal is lifted from the valve seat and pressure is relieved from the space between the pump valve and the integrated check valve. Thus pump and the pipes on the suction side can be vented without pressure.

Please note that the required stroke volume is covered by the usable stroke length range.

#### **CAUTION !**

**Always install the pump above the suction tank and lay the return pipe with descending gradient to the suction tank!**

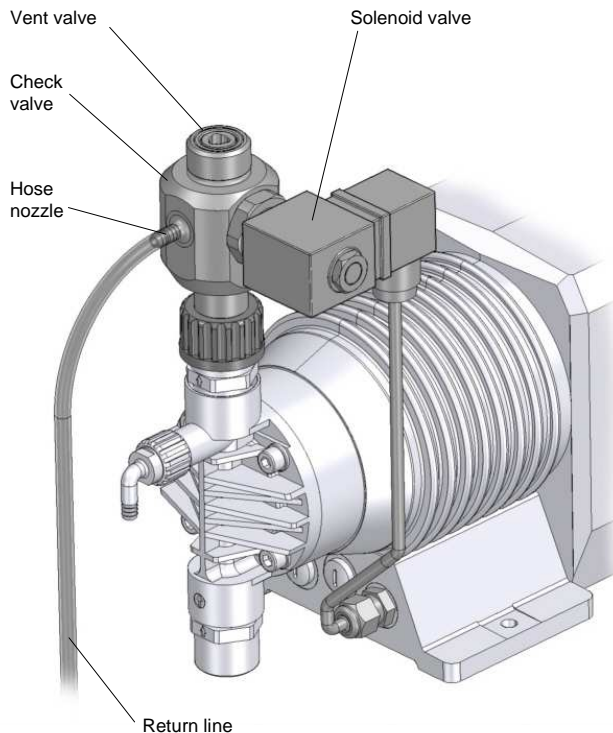


Fig. 14 Vent valve, controllable

## Operating Instructions

### 8 Assembly / Installation

#### 8.1 Installation instructions

- The standard model of the pump is only approved for installation in dry rooms in a non-aggressive atmosphere, at temperatures between +2°C and +40°C and at permitted humidity until approx. 90%.
- Protect the pump against any sources of heat and against the direct irradiation of sun and ultraviolet light
- For dimensions of the pump connections and fixing holes, see Fig. 04/05, Table. 02/03

#### **CAUTION !**

When the R/RS 204.1 is installed next to a pump of series C/CS 204.1 or C/CS 409.2 a minimum distance of 100 mm between the pumps (motor housings) has to be kept!

- Install the pump in such a way that there is no vibration and no tension and that it is aligned precisely.
- Install the pump at the optimum possible operating height. Mount the pump in such a way that the valves are vertical.
- Ensure that there is sufficient space around the pump body and the suction and pressure valve so that these parts may be easily dismantled, if required.
- Mount the pump in such a way that electronics, operating panel and electric connections are easy accessible.
- Design the nominal diameters of the downstream pipes and of the connections built into the system to be the same size or larger than the nominal inlet and outlet diameters of the pump.
- To check the pressure ratios in the pipe system, we recommend to provide for connections for pressure gauges (e.g. manometers) near the suction and pressure sockets.
- Drain cocks are to be provided.
- Prior to connecting the pipes, remove the plastic caps on the suction and pressure sockets of the pump. (see Fig.15).
- Check that the fixing screws for the pump body are tightly fitted and, if necessary, retighten.
- With RS pumps or pumps with manual venting, connect a hose for reflow of the pumped medium.

#### **CAUTION !**



The pump is designed for operation in non-hazardous areas!

Tightening torques of the fixing screws	
R/RS 204.1-0,4 e	5,0 Nm
R/RS 204.1-1,2 e	
R/RS 204.1-2,4 e	
R/RS 204.1-6,0 e	
R/RS 204.1-7,0 e	
R/RS 204.1-10 e	
R/RS 204.1-14 e	6,0 Nm
R/RS 204.1-25 e	
R/RS 204.1-30 e	
R/RS 204.1-35 e	

Table 09 Tightening torques

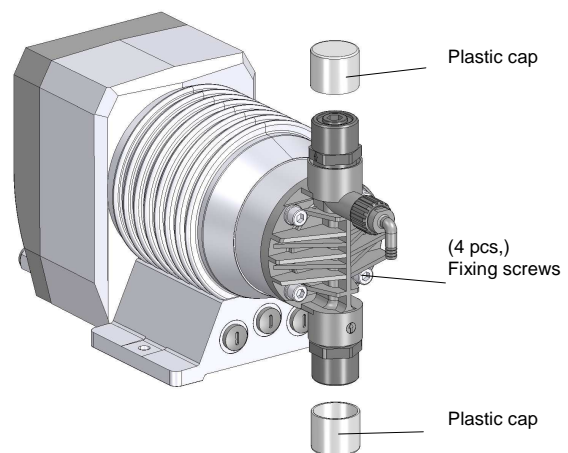


Fig. 15 Solenoid diaphragm pump with plastic caps

- Connect pipes to the pump in such a way that there are no forces acting on the pump, such as e.g. misalignment, weight or stress of the pipe.
- Keep the suction lines as short as possible.
- Use pressure- and medium-resistant hoses / pipes.
- All pipes and containers connected to the pump must comply with the regulations and must be cleaned, tension-free and intact.

#### **CAUTION !**



If toxic, crystallizing or corrosive liquids are conveyed the pipe system is to be equipped with facilities for emptying, cleaning and rinsing with an appropriate medium, if necessary.

#### **CAUTION !**



Mount the solenoid diaphragm pump in such a way that leaking medium cannot cause any damage.

## Operating Instructions

In order to avoid cavitation, overloading and excessive delivery, the following points should be noted:

- avoid high suction heights
- keep pipes as short as possible
- choose sufficiently large nominal diameters
- avoid unnecessary choke points
- install a pulsation damper
- install a pressure relief
- install a pressure keeping valve, if necessary
- in the case of degassing media, provide for a supply respectively use the CS-series.

### **CAUTION !**



The operator must provide for appropriate protective measures (collecting basin, diaphragm rupture electrode) in the supply pipe so that the container does not drain off in case of a diaphragm rupture.

### 8.1.1 Provide overpressure protection

if the permissible pressure in the pump head may be exceeded, e.g. when a shut-off valve is closed or if the line is blocked:

- install overflow valve (Fig. 16)

When using an overflow valve, please note for the return line:

- lead the overflow line with descending gradient in the storage tank which is under atmospheric pressure or in an open drain gutter
- or connect the overflow line directly to the pump suction line, but only if there is no check valve inside the suction line (e.g. foot valve of a suction lance) (please see Fig. 17).

### **CAUTION !**



Shut-off valves must not be closed when the pump is running!

### **CAUTION !**



Provide an overpressure protection (e.g. overflow valve) if the permissible operating pressure may be exceeded.

### **CAUTION !**



If the permissible operating pressure is exceeded and the pump is not equipped with an overpressure protection the pump and the piping may be damaged.

### **CAUTION !**



The pumped medium may spout out if the pump is damaged.

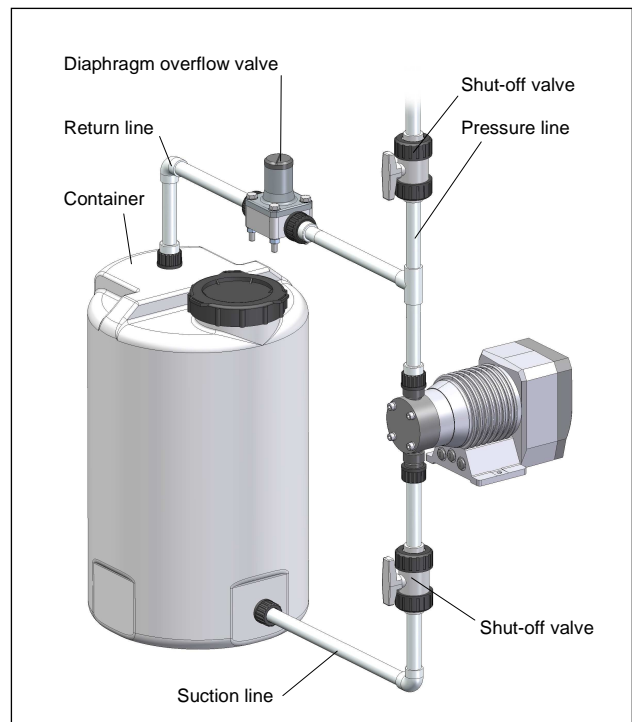


Fig. 16 System with (external) overflow valve

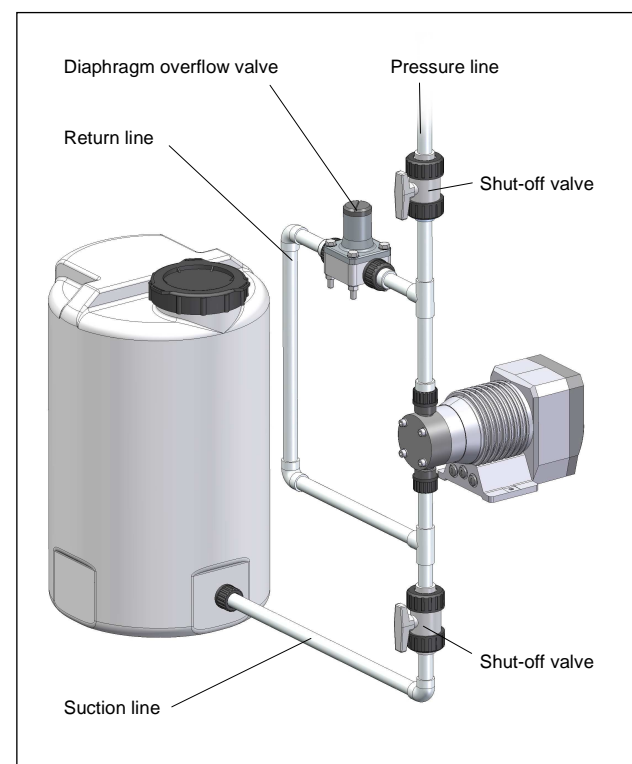


Fig. 17 System with (external) overflow valve

## Operating Instructions

### 8.1.2 Prevent a backflow of the pumped medium

if the dosing line is linked with a main line:

- install an injection fitting (dosing valve).

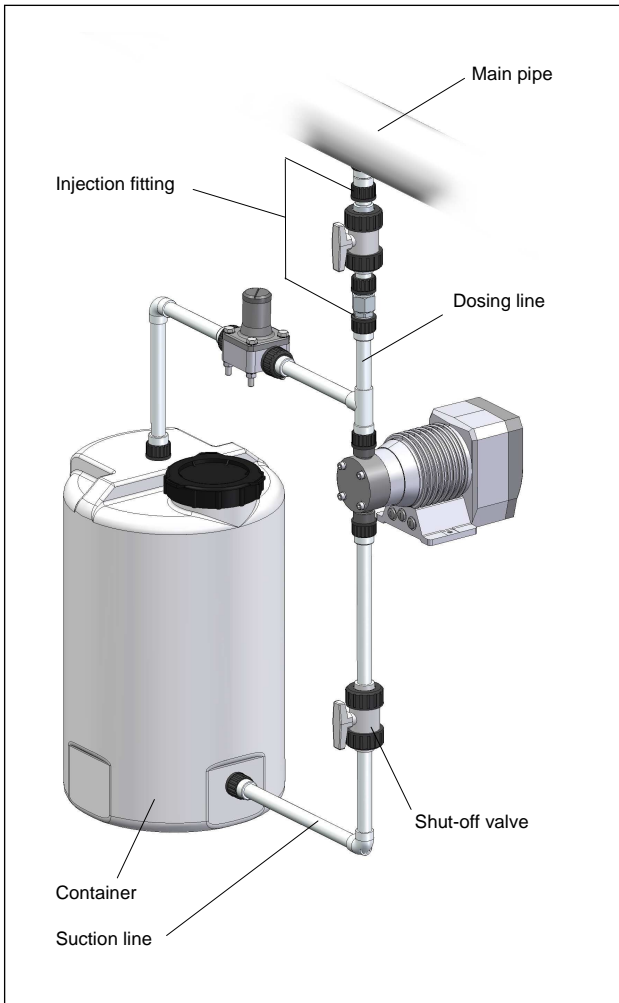


Fig. 18 Installing an injection fitting

#### **CAUTION !**

The contents in the dosing line is mixed unintentionally if a backflow from the main pipe is not prevented.



#### **CAUTION !**

Note / avoid chemical reactions during a backflow.



### 8.1.3 Eliminate undesired siphoning

when dosing into a main line with negative pressure:

- install a pressure keeping valve in the dosing line.

#### **CAUTION !**

When installing the pump it is to be ensured that an excess supply (due to a positive pressure difference  $\geq 1$  bar) between pressure and suction side) is avoided.

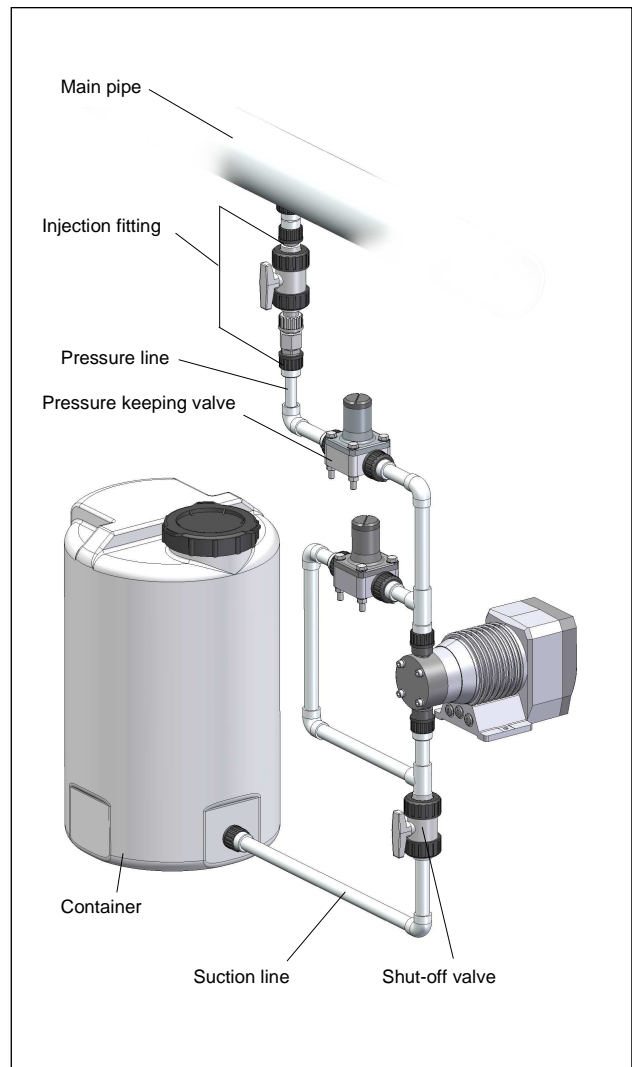


Fig. 19 Installing a pressure keeping valve

## Operating Instructions

### 8.1.4 How to ensure an gas-free suction

If slightly degassing media are conveyed and the medium is pumped in a pressurised pipe or against a pressure keeping valve:

- the RS 204.1 series should be employed
- the nominal width of the suction line shall not exceed the input nominal width with RS-design.
- Consider usable stroke length range with self-ventilation (see chapter 6.4).

#### **CAUTION !**



The delivery flow may be interrupted if air/gas enters the suction line!

#### **CAUTION !**



In the case of media which are lightly crystallizing when they come in contact with air, the return line should be laid with a loop. Thus a contact between the medium and air in the outlet area of the vent valve is prevented..

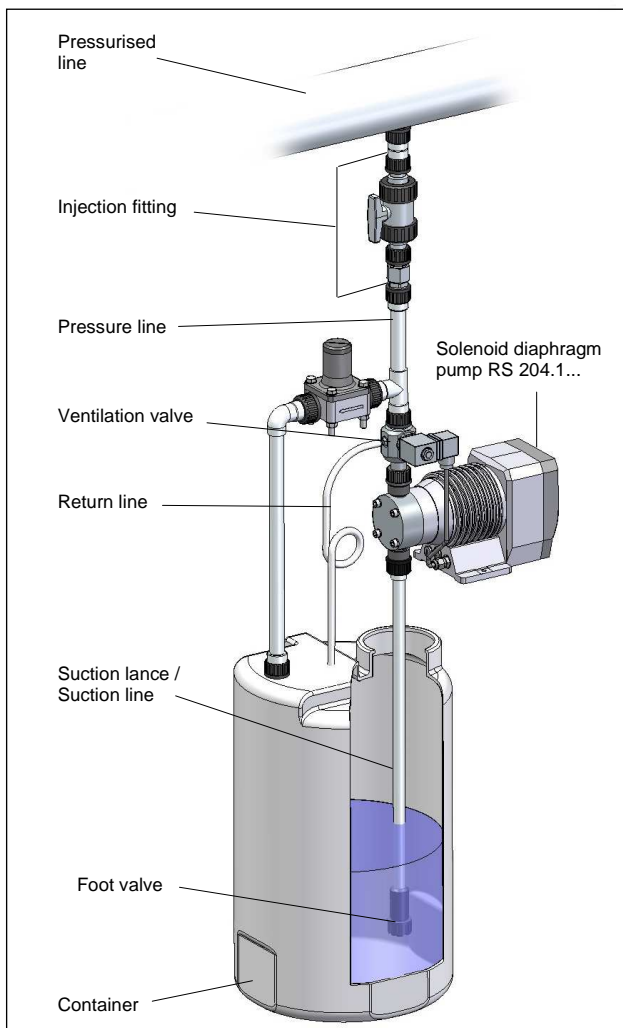


Fig. 20 Installing a ventilation valve

### 8.1.5 Install the empty-tank alarm

so that the tank is refilled before air is drawn in

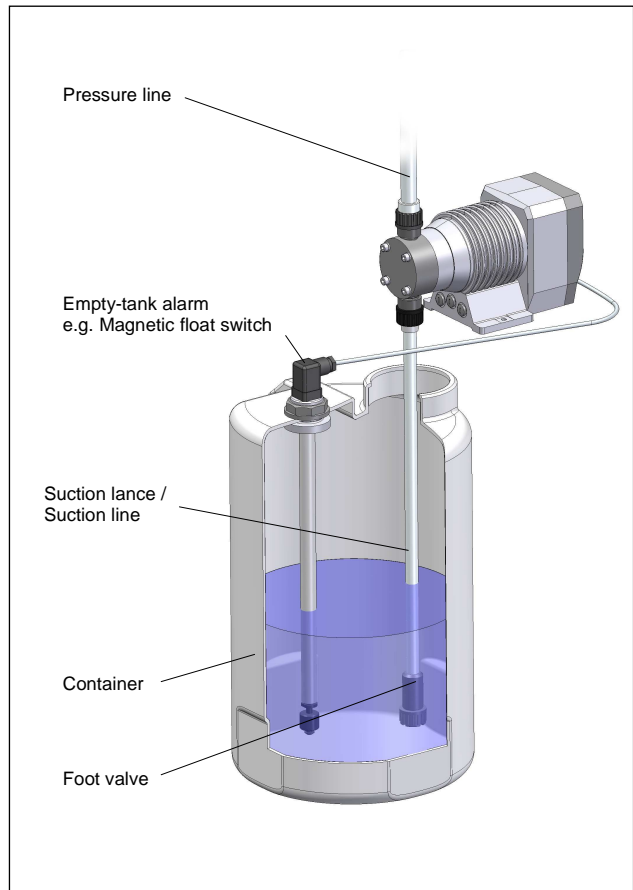


Fig. 21 Installing an empty-tank alarm

#### **CAUTION !**



The delivery flow may be interrupted if air enters the suction line!

## Operating Instructions

### 8.1.6 How to avoid an emptying of the suction line

- Install a foot valve at the end of the suction line.

Based on calculations, the dimension 'H' may not exceed the number that is equal to the specified maximum suction height of the pump divided by the density of the pumped medium and under consideration of mass acceleration and viscosity of the medium.

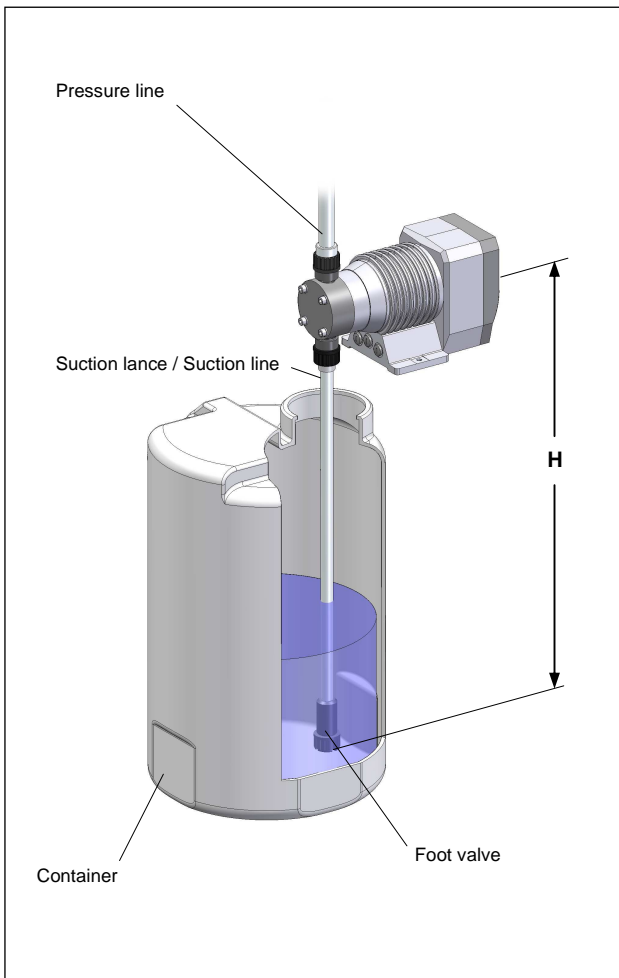


Fig. 22 Avoiding an emptying of the suction line

### 8.1.7 Line strainer

Connect the suction line slightly above the bottom of the tank and install a line strainer ( $\leq 0,1\text{mm}$  – aperture size – depending on nominal width of the valve).

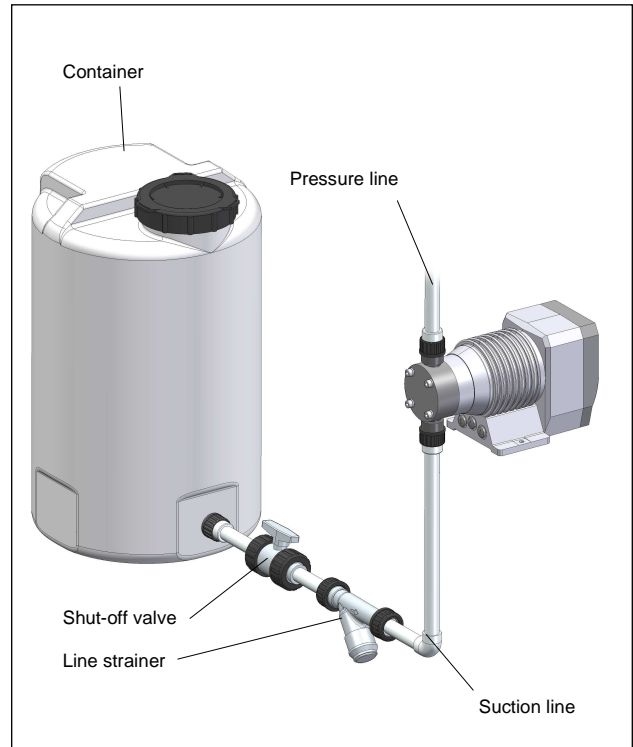


Fig. 23 Installing a line strainer

### **CAUTION !**



If contaminations are not removed this may result in malfunctions of the pump and the system.

## Operating Instructions

### 8.1.8 Suction via a siphon pipe

for use with high tanks without connection on the bottom of the tank:

- Install a siphon tank.
- Pay attention to acceleration pressures which may be generated in a long suction line.

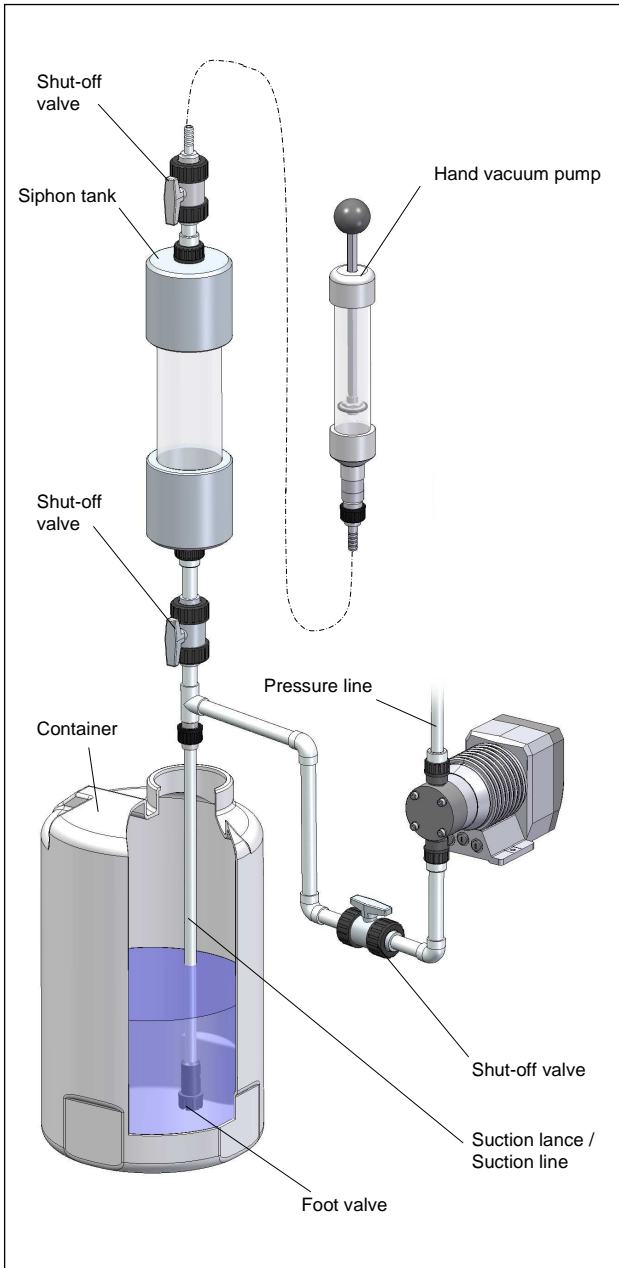


Fig. 24 Installing a siphon tank (sera - fitting)

### 8.1.9 In case of slightly degassing dosing media

- Install the pump in such a way that it can be operated with a supply line.

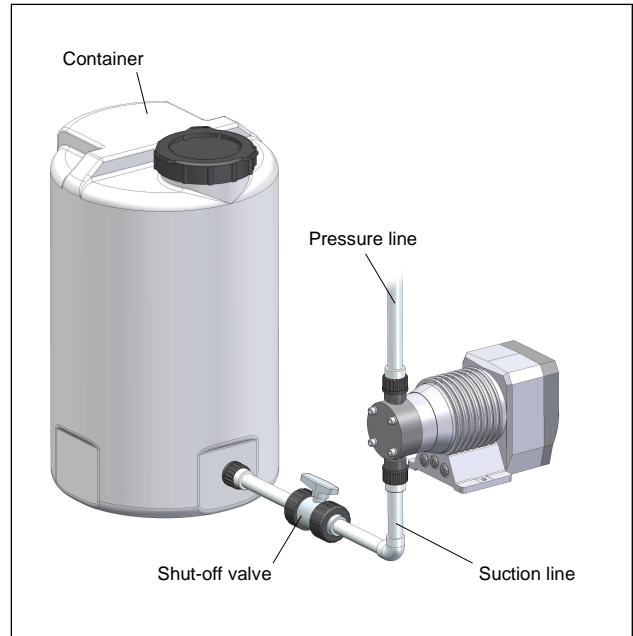


Fig. 25 Installation with supply line

- respectively use the RS 204.1

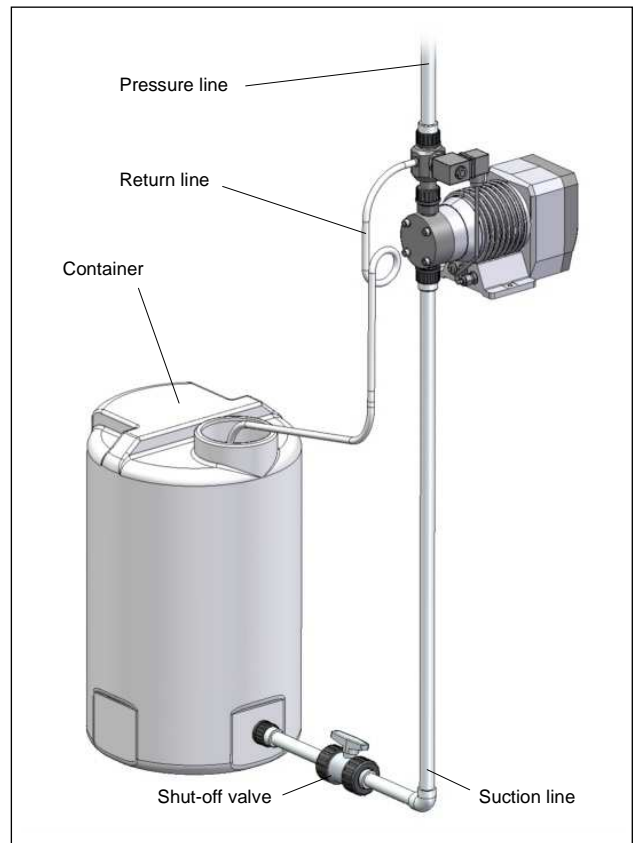


Fig. 26 Installation self ventilating solenoid diaphragm pump

Operating Instructions

**CAUTION !**



The RS 204.1 should always be installed above the tank so that there is no backpressure at the outlet of the automatic ventilating device.

**8.1.10 Damping of the pulsation**

by installing pulsation dampers if:

for procedural reasons, a pulsation-poor delivery rate is desired.

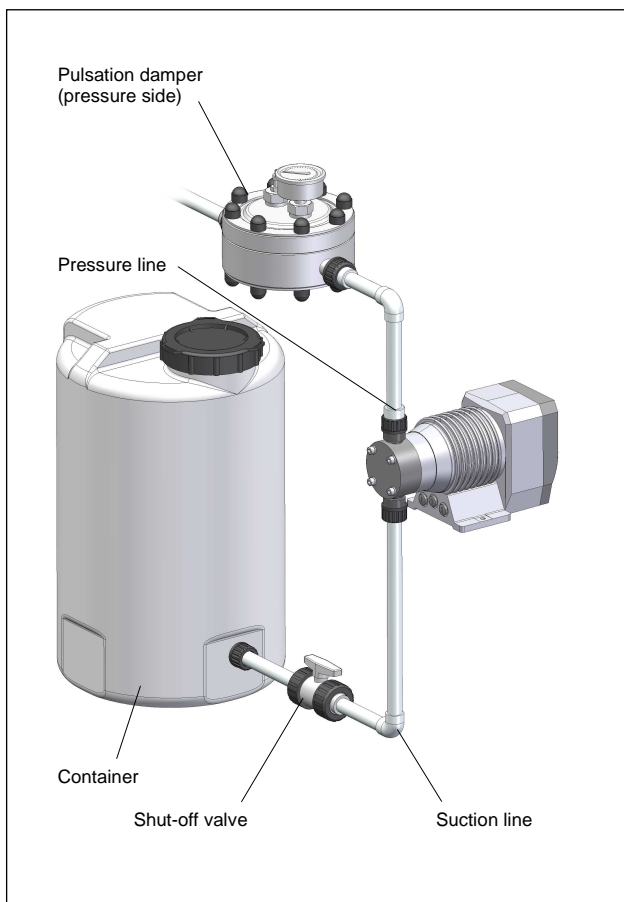


Fig. 27 Installing a pulsation damper (I)

Acceleration forces which arise due to the pipe geometry must be reduced.

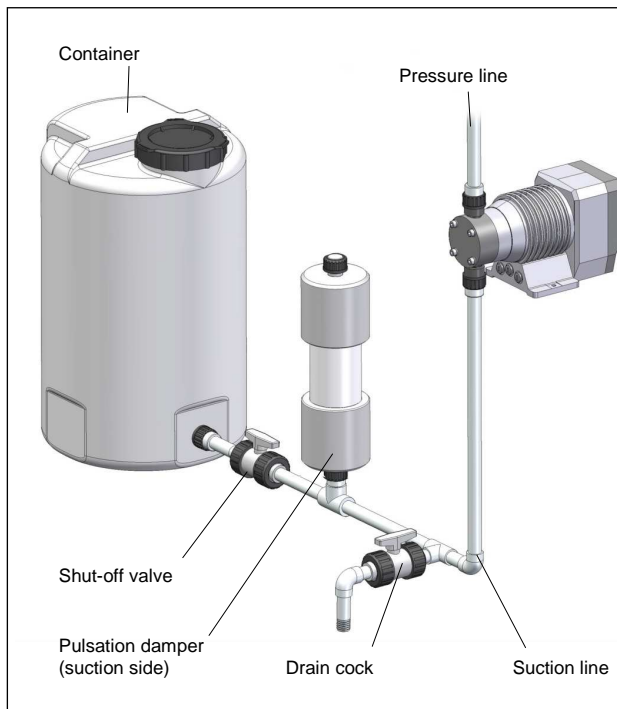


Fig. 28 Installing a pulsation damper (II)

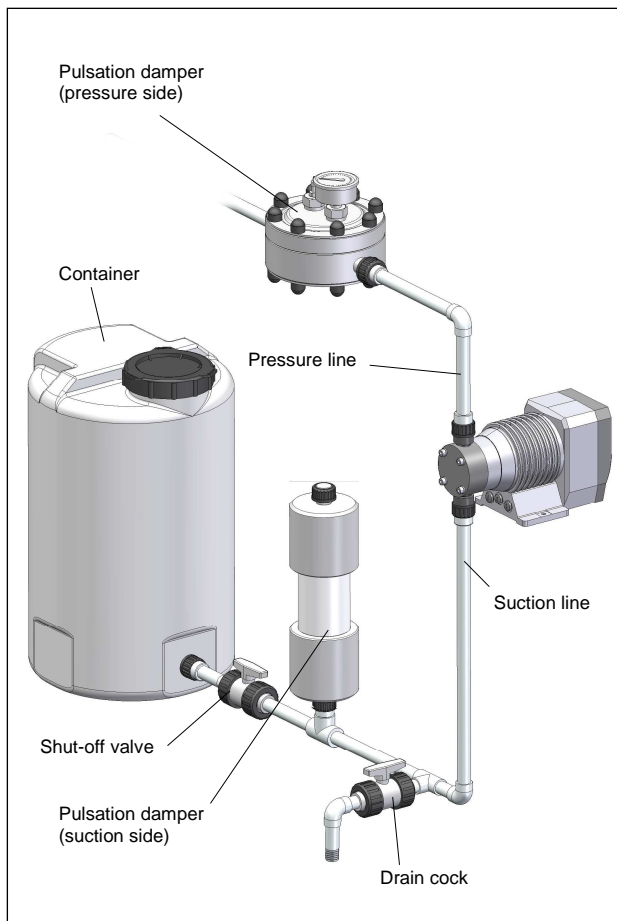


Fig. 29 Installing a pulsation damper (III)

Operating Instructions

**CAUTION !**



Undamped acceleration forces may lead to the following faults / damage:

- delivery rate fluctuations
- dosing errors
- pressure surges
- valve wobbles
- increased wear on the suction- and pressure side of the pump;

mechanical damage of the pump  
leakage and valve wobbles if the permissible maximum pressure on the pump pressure side is exceeded.

Installation of suction and/or pressure pulsation damper near the pump head.

- If both pulsation damper and pressure keeping valve should be integrated install the pressure keeping valve between pump and pulsation damper.

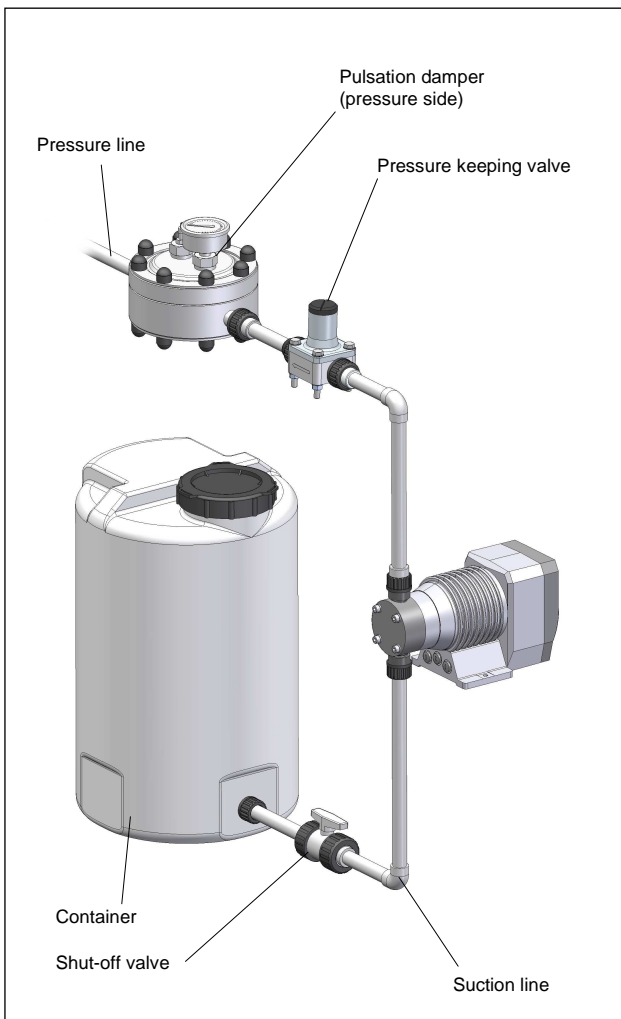


Fig. 30 Installing a pulsation damper and a pressure keeping valve

**9 Electrical connections**

**9.1 Electric supply**

The **sera** – magnetic diaphragm pump is delivered ready for installation. Standard delivery includes a 2m power cable with Euro plug. The **standard version R 204.1** of the dosing pump is designed for an operating voltage range of 100 – 240V, 50/60Hz.

**CAUTION !**



The self-venting version RS 204.1 has a limited operating voltage range. The specifications on the type plate must absolutely be adhered to!

The RS 204.1 is available in three versions:

- 190 – 240V, 50/60Hz
- 100 – 120V, 50Hz
- 100 – 120V, 60Hz

**CAUTION!**



Switching the voltage supply on and off temporarily is to be avoided!

**CAUTION !**



The pump restarts in the selected operating mode after the power supply was switched on or a power supply recovery following a mains failure!

Symbol:

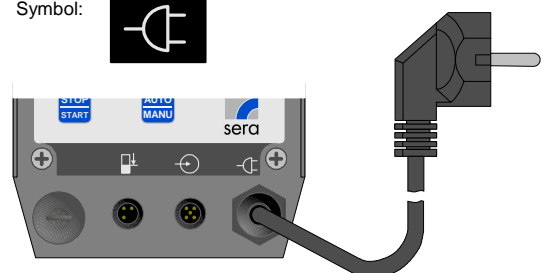


Fig. 31 (Electric supply)

**CAUTION !**

Only operate the pump when it is connected to an earthed power supply!

Operating Instructions

9.2 Connecting the control cables

The connections for the control cables are on the back of the pump, below the control panel.

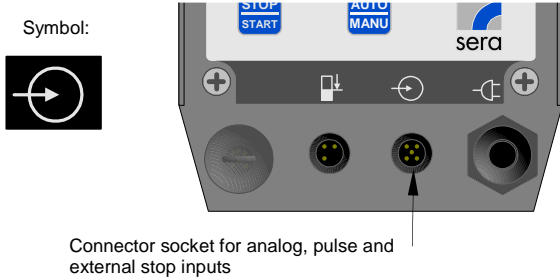


Fig. 32 (Connection of control inputs)


**NOTE !**   
The control cables are not included in the standard delivery (optionally available). The leads of the connecting cables are colour coded.


Table 10 shows the identification of the leads of the optionally available 5-pin control cable.

Lead colour	Pin	Function
brown	1	Analog input (+)
white	2	Pulse input
blue	3	External stop input
black	4	Signal + / 5 V DC
grey or green-yellow	5	Earth

Tab. 10 (Identification of the leads of the control cable)

There are 4 possibilities for the external control (Auto operation) of the dosing pump:

- Pulse mode
- Pulse mode with external stop
- Analog mode 4-20mA
- Analog mode 4-20mA with external stop

**NOTE !**   
The analog input has priority when pulse and analog input are activated simultaneously; this means that the applied pulse signal will not be evaluated. If the analog signal is < 4mA, then the pulses received at the pulse input will be evaluated and applied.

The digital inputs (pulse and external stop) can not only be switched by a potential-free contact signal (see Fig. 33) but also **directly via a control voltage signal** (e.g. 24V DC).

This enables, for example, the direct connection of a programmable logic controller to the dosing pump (see Fig. 34).

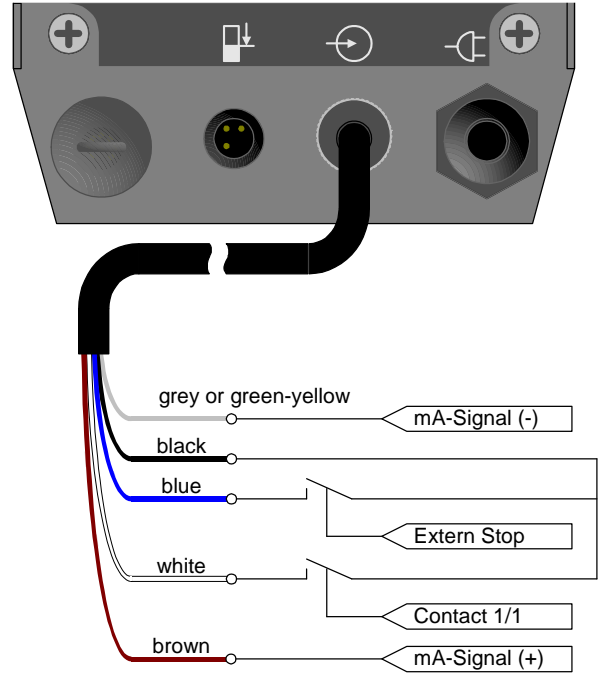


Fig. 33 (Pin assignment of control inputs)

Fig. 34 shows exemplarily the direct activation of the digital inputs (pulse and external stop) via a control voltage signal (in this case: 24V DC) of a programmable logic controller.

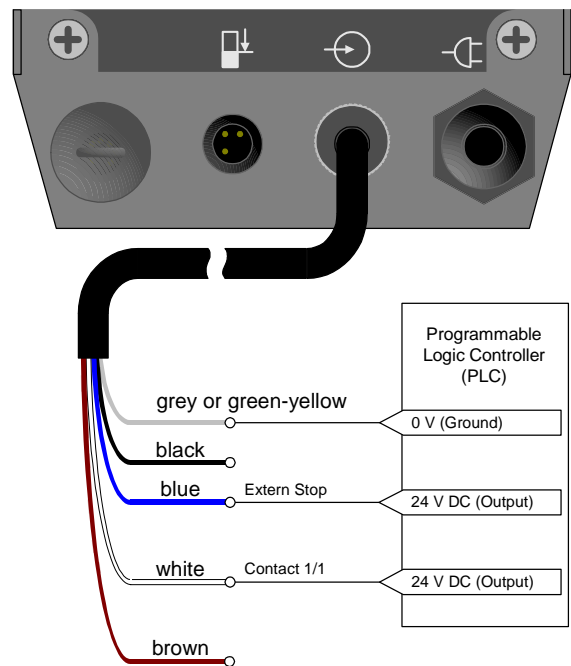


Fig. 34 (Direct activation of the digital inputs via control voltage signal of a programmable logic controller)

## Operating Instructions

### **CAUTION !**



The maximum voltage withstand capability of the inputs is 30V DC.

### **CAUTION !**



The maximum current withstand capability of the inputs is 50mA.

### **CAUTION !**



The signal + connection pin (lead colour: black) is **not** short-circuit proof! In case of a short-circuit, the control electronics may get damaged!  
Therefore, please make absolutely sure that the signal + connection pin is not connected with the earth connection (lead colour: grey)!

### 9.2.1 Pulse input

The pump can be activated via a pulse signal (Fig. 33 / Fig. 34). Each input signal will trigger the magnetic diaphragm pump to perform a stroke.

### **NOTE !**



Each input signal will trigger the magnetic diaphragm pump to perform a stroke.  
The pulse transmitter (e.g. the contact water meter) must be set accordingly.

### **CAUTION !**



The minimum pulse length is 50ms. If smaller pulse lengths are present, then the pulses might not be recognised by the control electronics.

### **CAUTION !**



The frequency of the incoming pulses must not exceed the maximum stroke frequency of the pump (= 150 l/min).

### 9.2.2 Analog input

The pump can be activated via an analog signal (4-20mA) (Fig. 33).

A signal with a control current of 4mA corresponds to 0% stroke frequency, a signal with 20mA corresponds to 100% stroke frequency. In this range, the stroke frequency behaves proportionally to the control current (Fig. 35).

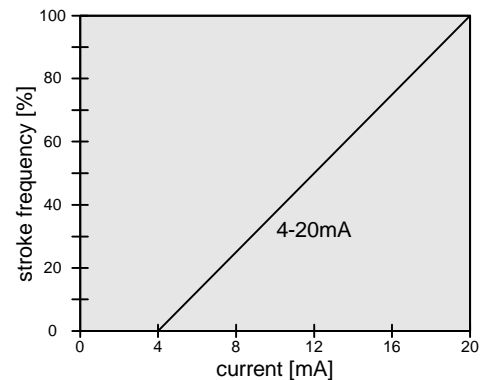


Fig. 35 (Stroke frequency in dependency of a control current of 4-20mA)

### 9.2.3 External stop input

Using the external stop input, the dosing pump can be stopped via an external signal, no matter which operating mode the pump is in.

While the signal is present, the pump will be stopped. When the external stop signal is removed, the pump will run with the preset stroke frequency (depending on the operating mode).

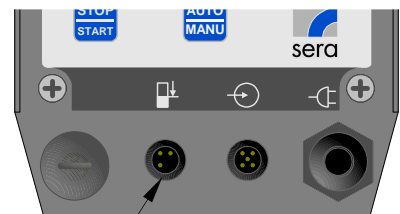
### 9.2.4 Level input with pre-alarm and dry run

### **NOTE !**



Pre-alarm and dry run are connected to the same jack.  
When leaving the factory, both inputs are preset to "closing when floating down".  
However, if necessary, they can be freely configured (see Chapter 3.6).

Symbol:



Jack for level input

Fig. 36 (Jack for level input)

Suction lances that are compatible with types R/C 203 or C 408.1/409.1 can be connected to the pump using an adapter plug M8/M12, 3-pin (Item No. 90025005).

## Operating Instructions

### 10 Operation

#### 10.1 Operating elements

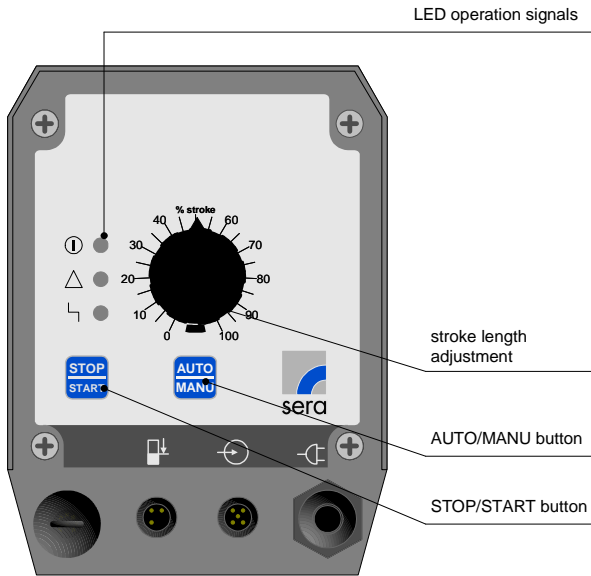
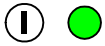


Fig. 37 (Electronics control panel)

#### 10.2 LED operation indicators

Three light-emitting diodes (LED) indicate the status of the pump.

##### Green: Operation and stroke indicator



In Auto mode, the green LED indicates the operational readiness of the pump. It works in combination with a stroke indicator; during pump operation, the LED flashes in accordance with the current stroke frequency.

##### Yellow: Operation and pre-alarm indicator



In manual operation, the yellow LED lights steadily. If the level monitoring is connected, the pre-alarm is indicated by a flashing yellow LED.

##### Red: Stop and dry run indicator



If the pump was stopped (manually or via external stop), then the red LED lights steadily. If the level monitoring is connected, the dry run is indicated by a flashing red LED. In case of type **RS 204.1**, the red LED lights also when the vent valve opens.

	Green LED	Yellow LED	Red LED
Manual operation	On	On	On
Level pre-alarm		Flashes	
Dry run			Flashes
External stop			On
Manual stop			On
Ready (Auto mode)	On		
Stroke confirmation	Flashes		
Venting <sup>(1)</sup>	Flashes		On
No mains			

<sup>(1)</sup> = only with type RS 204.1

Tab. 11 (Overview of LED indicators)

#### NOTE !



The "dry run" error message suppresses the "pre-alarm" message. This means that if the pump runs dry while the 2-stage level monitoring is activated, then only the red LED will flash.

#### 10.3 Key operation

Operation of the pump is performed with 2 keys:



STOP/START key

After connection to the power supply, the pump is switched ON/OFF using the STOP/START key.



AUTO/MANU key

The AUTO/MANU key is used for selecting between Manual and Auto operation (external control). In case of type **RS 204.1**, this key is also used to activate manual venting (see Chapter 10.7.1).

#### 10.4 Stroke length adjustment

Using the knob for stroke length adjustment, you can mechanically adjust the effective stroke to a value between 0...100%.

#### CAUTION !



Stroke length adjustment may only be performed while the pump is running.

Operating Instructions

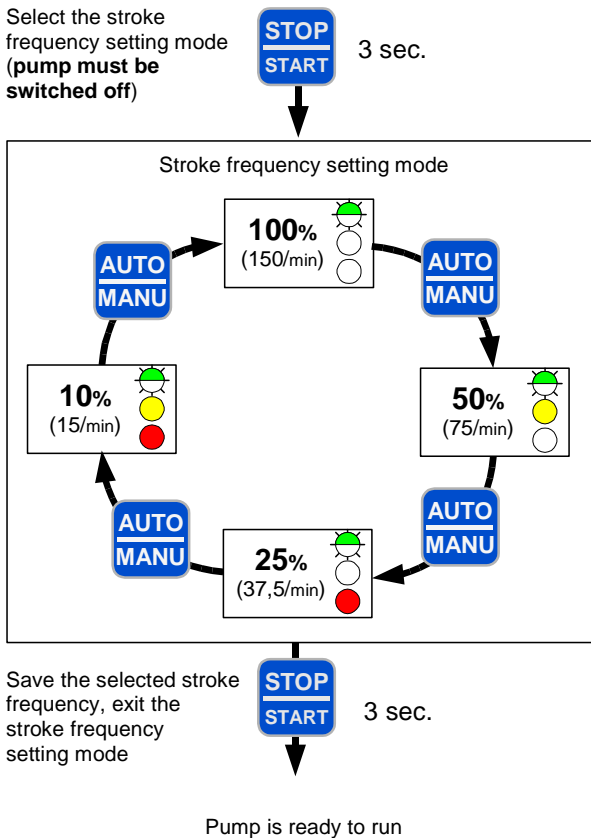
10.5 Stroke frequency adjustment

Stroke frequency of the pump can be set to 4 different stages. In the stroke frequency setting mode, the green LED flashes and the selected stroke frequency is indicated by the yellow and red LEDs.

Stroke frequency	Green LED	Yellow LED	Red LED
100% (150 strokes/min)	Flashes		
50% (75 strokes/min)	Flashes	On	
25% (37.5 strokes/min)	Flashes		On
10% (15 strokes/min)	Flashes	On	On

Tab. 12 (4-stage stroke frequency setting)

To select the stroke frequency, use the keys as described in the following diagram:



10.6 Configuring the level input

When leaving the factory, the level input is configured as follows

- Pre-alarm = NO (closing when floating down)
- Dry run = NO (closing when floating down)

The level input can be freely configured. In the level input setting mode, the yellow LED flashes and the selected configuration is indicated by the green and red LEDs.

Config.	Pre-alarm / dry run	Green LED	Yellow LED	Red LED
1	NO / NO		Flashes	
2	NO / NC	On	Flashes	
3	NC / NC	On	Flashes	On

Tab. 13 (Configuration of the level input)

Config. 1

When leaving the factory, this configuration is preset. A 1- or 2-stage level monitoring with “closing when floating down” contacts (pre-alarm and dry run or dry run only) can be connected.

Config. 2

This configuration must be selected when a 1-stage level monitoring with “opening when floating down” contact (dry run only) is connected.

Config. 3

This configuration must be selected when a 2-stage level monitoring with “opening when floating down” contacts (pre-alarm and dry run) is connected.

**CAUTION !**



Configuration of the level input can only be performed while the pump is switched off.

**CAUTION !**

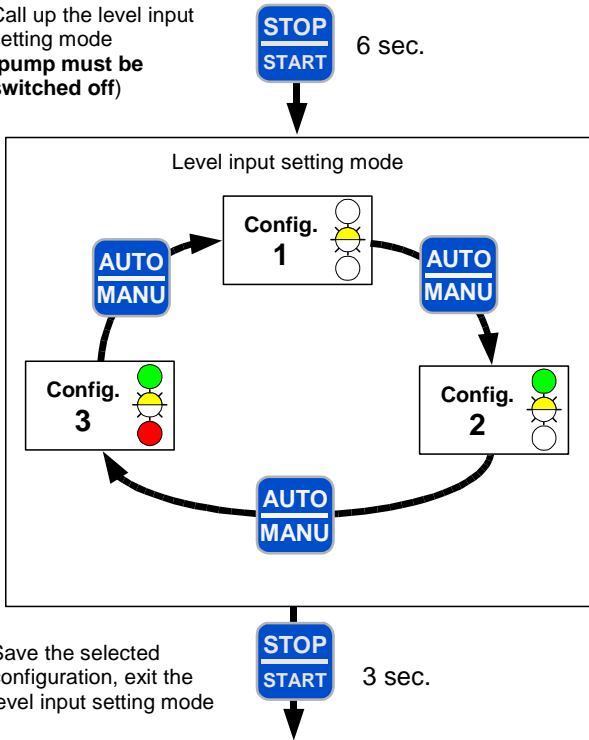


Stroke frequency can only be changed while the pump is switched off.

## Operating Instructions

To configure the level input, use the keys as described in the following diagram

Call up the level input setting mode (pump must be switched off)



Save the selected configuration, exit the level input setting mode

Pump is ready to run

### 10.7 Venting settings (only with RS 204.1)

There are three venting modes:

- Manual venting
- Venting after switching on the pump
- Cyclical venting

#### Manual venting

This mode is always activated, which means that venting using the AUTO/MANU key (see Chapter 10.7.1) is possible at any time, no matter whether additional venting modes are activated and regardless of which operation mode the pump is in.

#### Venting when switching on the pump

In this mode, venting is performed once, namely directly after the pump has been switched on (operation of the STOP/START key). Venting time is set upon activation of this mode (see Chapter 10.7.2).

Moreover, this mode allows the external control of the vent valve via the external stop input. After having removed the external stop signal, the pump will vent for the preset time.

For deactivating the mode, please see the description in Chapter 10.7.4.

#### Cyclical venting

In this mode, venting is cyclically repeated after a predetermined pause time. Venting time and pause time duration are set upon activation of this mode (see Chapter 10.7.3).

For deactivating the mode, please see the description in Chapter 10.7.4.

#### NOTE !



Venting is always performed with 100% stroke frequency – regardless of the preset stroke frequency!

#### CAUTION !



After pump and suction line have been vented, there might be the possibility (depending on the backpressure) that small fluid quantities are already conveyed into the pressure line although the vent valve is still open. The venting period must therefore be coordinated with the possible gas volume on the suction side of the pump.

#### NOTE !



In all operating modes of the venting valve the maximum venting time is 5 min and the minimum interval time is 15 min!

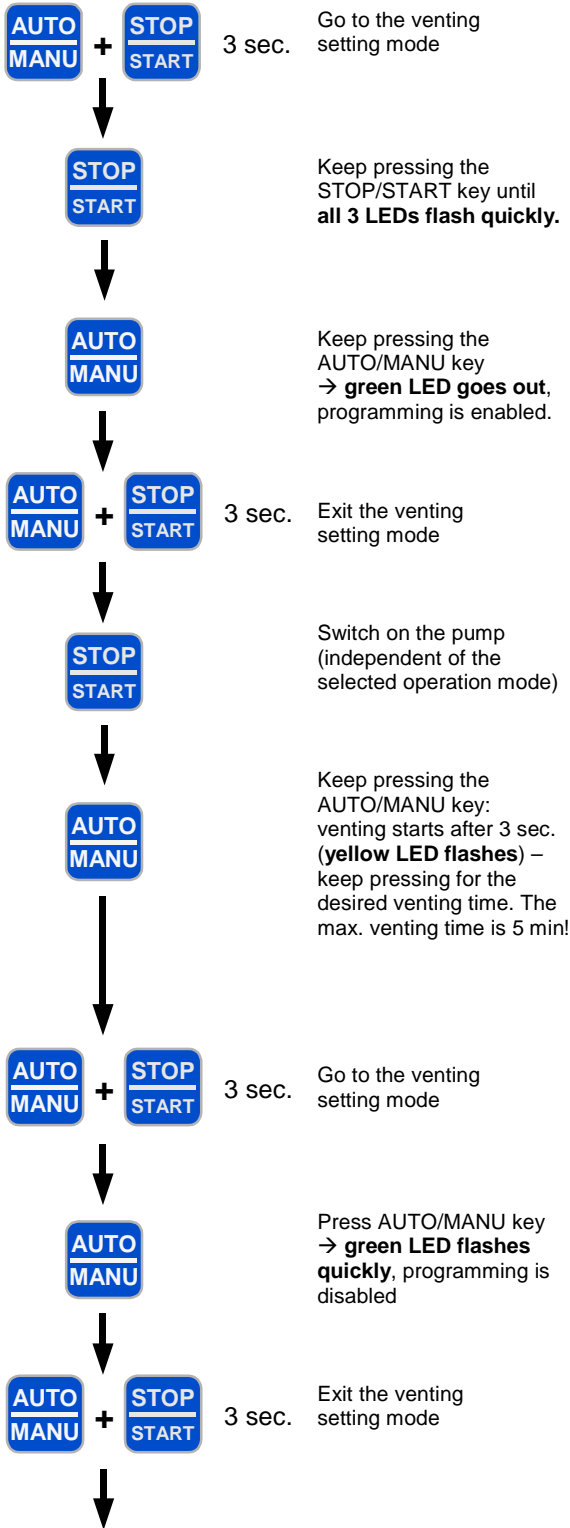
### 10.7.1 Manual venting

The manual operation of the vent valve is done using the AUTO/MANU key. Venting does not start until the key is pressed for 3 sec. Venting remains active as long as the key is pressed. After releasing the key, the venting will be stopped.

Operating Instructions

10.7.2 Venting after switching on the pump

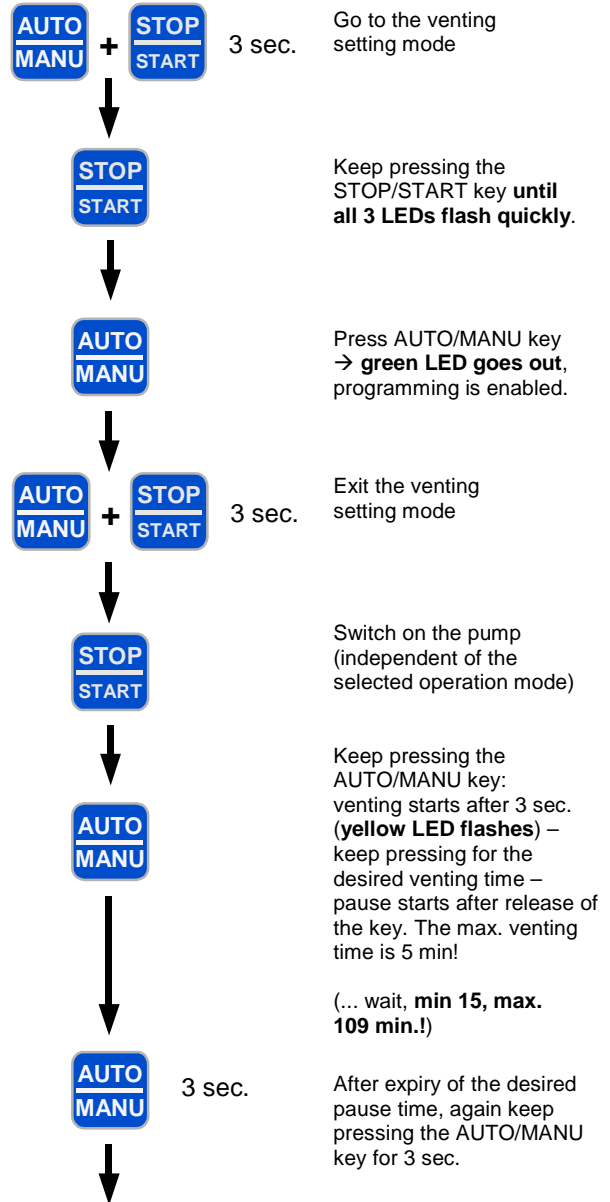
Venting after switching on the pump is set and activated as described in the following diagram:



“Venting after switching on” is activated, programming is completed and the pump starts venting! If necessary, again switch off the pump using the STOP/START key.

10.7.3 Cyclical venting

Cyclical venting is set and activated as described in the following diagram:



Cyclical venting is activated, programming is completed and the pump starts venting! If necessary, again switch off the pump using the STOP/START key.

**CAUTION !**

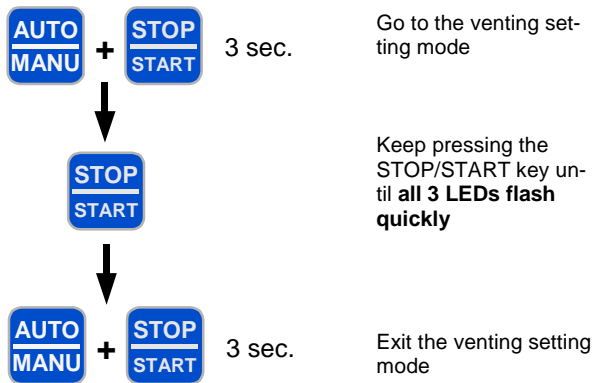


The minimum adjustable interval time between venting cycles is 15 min.  
The maximum adjustable pause between venting cycles is 109 min. If, in the venting setting mode, the key is pressed longer, then no cyclical venting will be set.

## Operating Instructions

### 10.7.4 Switching off the venting

To deactivate the previously set venting mode, use the keys as described in the following diagram:



## 11 Maintenance

### CAUTION !



Before starting maintenance work make sure the spare and wearing parts as well as the utilities required are available. Place / deposit components in such a way that any damage is prevented.

### CAUTION !



Check the wearing parts for proper functioning at regular intervals and replace, if necessary.

The following checks should be carried out at regular intervals:

- tight fit of the the pipework
- tight fit of pressure and suction valve
- proper condition of the electrical connections
- tight fit of the screws for fastening the pump body (check this at least every three months)  
For the tightening torques of the fixing screws, please see Chapter 8.1 "Installation".

Repairs on the stroke mechanism may only be performed by **sera**.

### 11.1 Wearing parts

Depending on their use and period of use, wearing parts must be replaced at regular intervals in order to ensure a safe function of the solenoid diaphragm pump.

We recommend to replace the drive diaphragm after 3000 operating hours or at least once a year.

In case of a premature diaphragm rupture caused by hard operating conditions, switch off the solenoid diaphragm pump and replace the drive diaphragm (see Chapter 10.4).

As an option, the solenoid diaphragm pump can be equipped with a diaphragm rupture monitoring device MBE-... (please see Chapter 7.2.7).

The following parts are considered as wearing parts of the solenoid diaphragm pump:

- Drive diaphragm
- Suction valve
- Suction valve

### 11.2 Spare parts

The following parts are considered as spare parts of the solenoid diaphragm pump:

- Pump body
- Vent valve (only with FRP-design, R 204.1-1,2e...-14e, RS 204.1-6,0e ...-14e)
- Automatic ventilation device (RS 204.1)

Operating Instructions

11.3 Spare and wearing parts

11.3.1 Solenoid diaphragm pump R 204.1-0,4e ... -14e

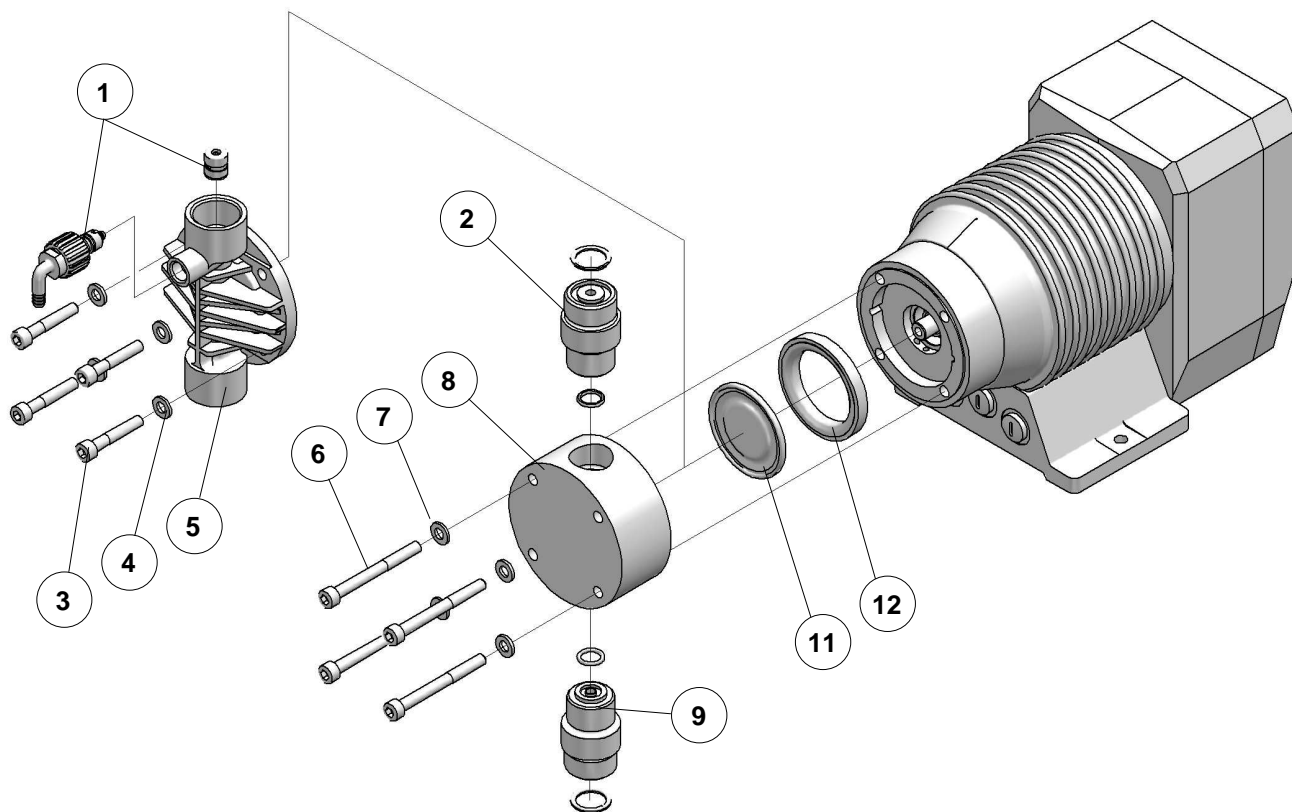


Fig. 38 Spare- and wearing parts R 204.1-0,4e ... -14e

Overview of the spare and wearing part kits

Solenoid diaphragm pump R 204.1-0,4e ... -14e

Suction valve (kit)	
Item	Designation
9	Suction valve (incl. o-rings)

Pressure valve (kit)	
Item	Designation
2	Pressure valve (incl. o-rings)

Diaphragm kit	
Item	Designation
11	Drive diaphragm
12	Insert

Pump body kit (FRP-design)	
Item	Designation
1	Vent valve
3	Cheese head screw(s)
4	Disk(s)
5	Pump body

Pump body kit (1.4571-, PVC-design)	
Item	Designation
6	Cheese head screw(s)
7	Disk(s)
8	Pump body

Operating Instructions

11.3.2 Solenoid diaphragm pump R 204.1-25e ....-35e

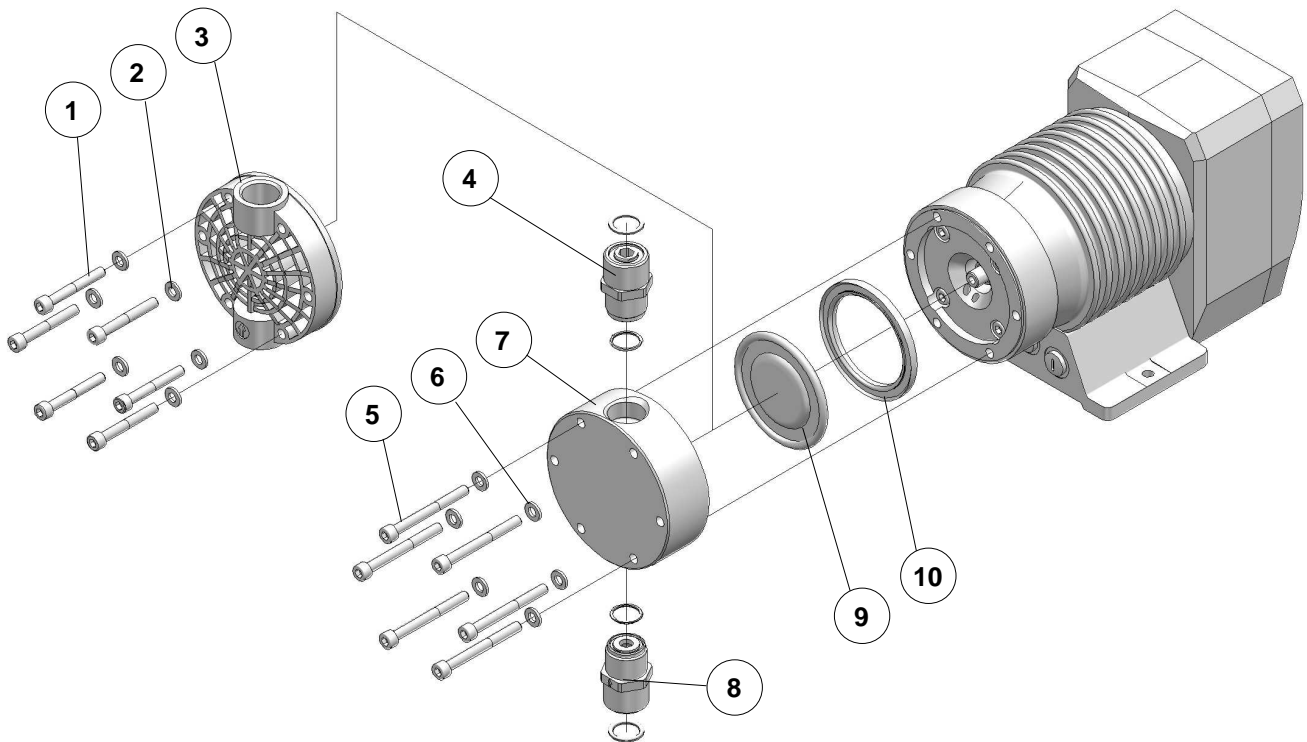


Fig. 39 Spare- and wearing parts R 204.1-25e ....-35e

Overview of the spare and wearing part kits  
Solenoïd diaphragm pump R 204.1-25e ....-35e

Suction valve (kit)	
Item	Designation
8	Suction valve (incl. o-rings)

Pressure valve (kit)	
Item	Designation
4	Pressure valve (incl. o-rings)

Diaphragm kit	
Item	Designation
9	Drive diaphragm
10	Insert

Pump body kit (FRP-design)	
Item	Designation
1	Cheese head screw(s)
2	Disk(s)
3	Pump body

Pump body kit (1.4571-, PVC-design)	
Item	Designation
5	Cheese head screw(s)
6	Disk(s)
7	Pump body

Operating Instructions

11.3.3 Solenoid diaphragm pump RS 204.1-0,4e ... -14e

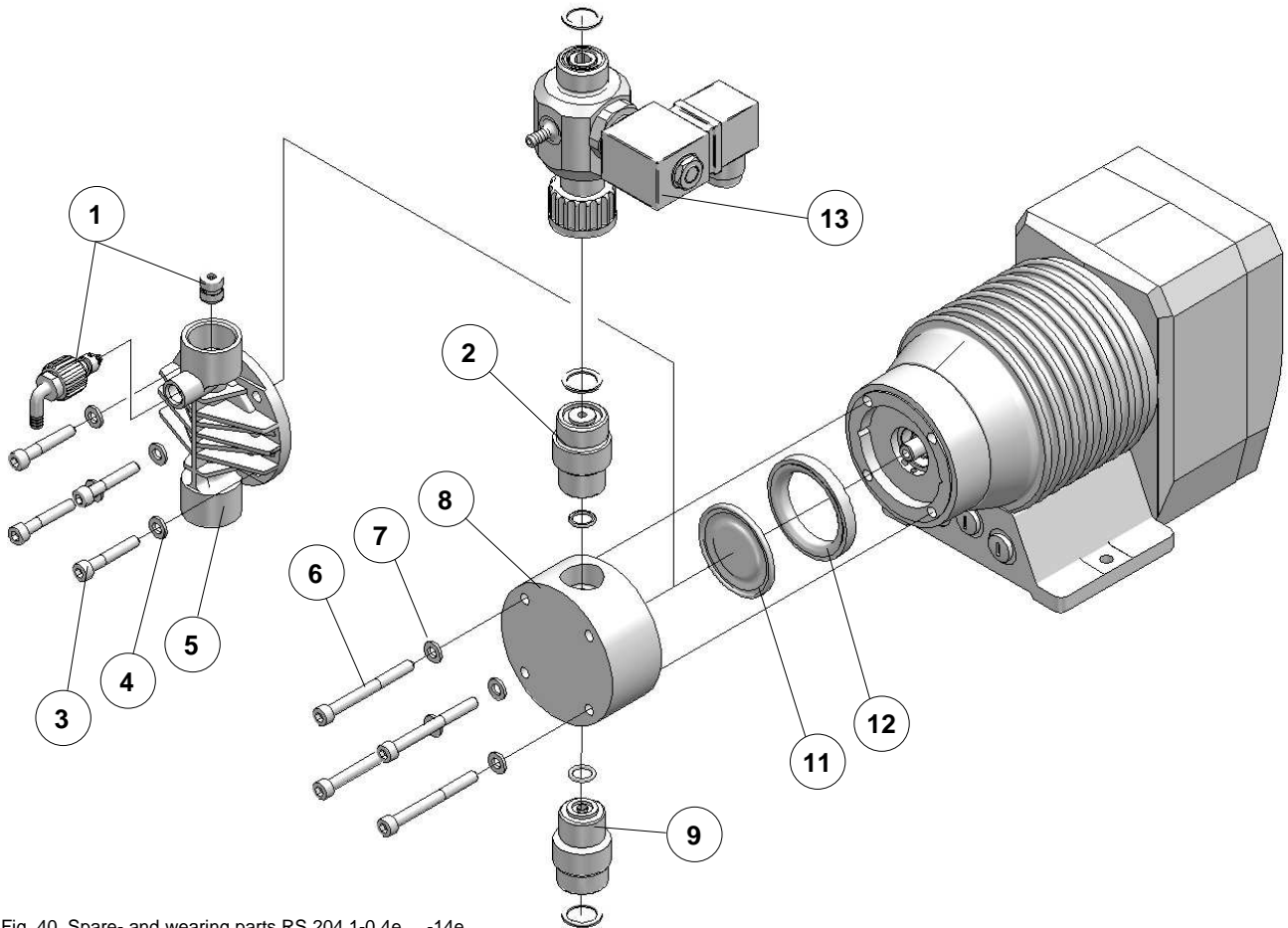


Fig. 40 Spare- and wearing parts RS 204.1-0,4e ... -14e

Overview of the spare and wearing part kits

Solenoid diaphragm pump RS 204.1-0,4e ... -14e

Suction valve (kit)	
Item	Designation
9	Suction valve (incl. o-rings)

Pressure valve (kit)	
Item	Designation
2	Pressure valve (incl. o-rings)

Diaphragm kit	
Item	Designation
11	Drive diaphragm
12	Insert

Pump body kit (FRP-design)	
Item	Designation
1	Vent valve
3	Cheese head screw(s)
4	Disk(s)
5	Pump body

Pump body kit (PVC, PP, PVDF-design)	
Item	Designation
6	Cheese head screw(s)
7	Disk(s)
8	Pump body

Automatic ventilation device kit	
Item	Designation
13	Automatic ventilation device (incl. o-ring)

Operating Instructions

11.3.4 Solenoid diaphragm pump RS 204.1-25e ....-35e

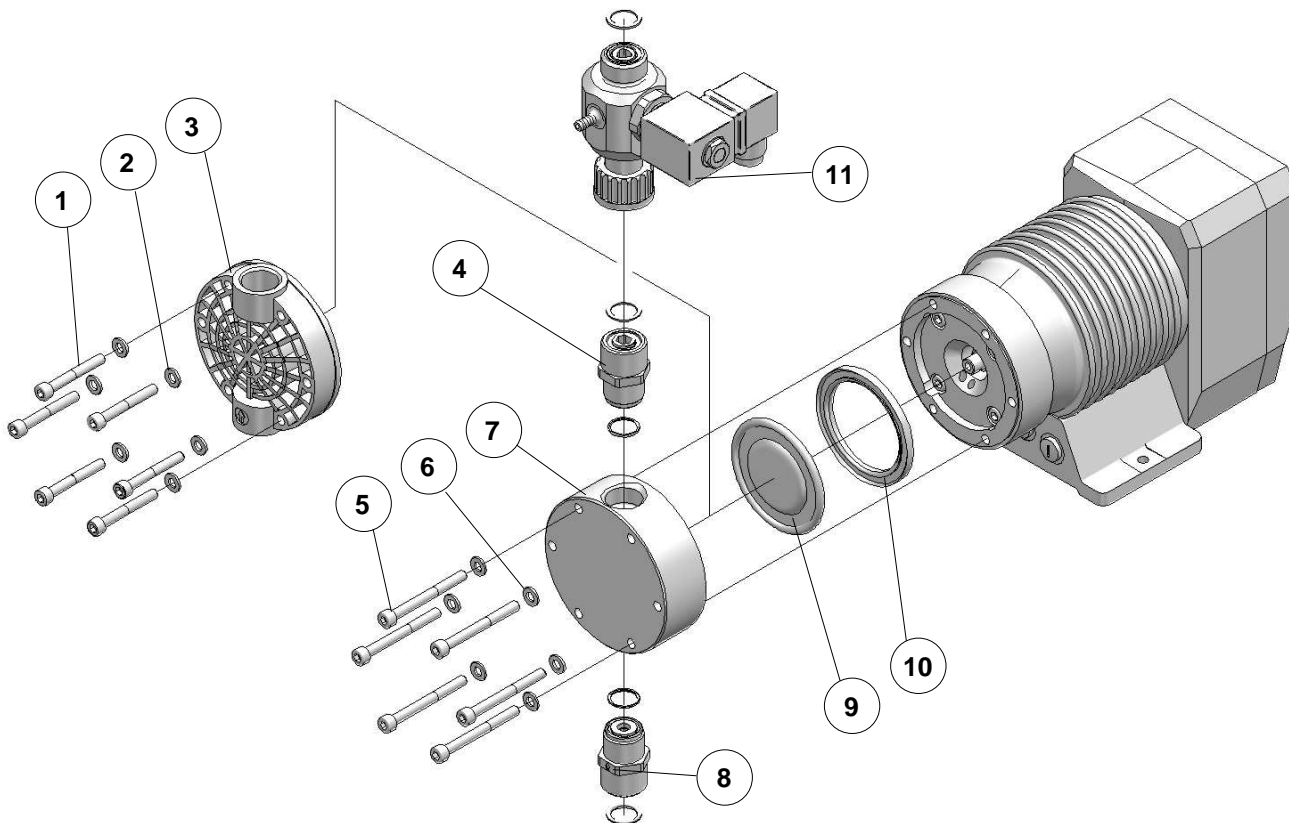


Fig. 41 Spare- and wearing parts RS 204.1-25e ....-35e

Overview of the spare and wearing part kits  
Solenoïd diaphragm pump RS 204.1-25e ....-35e

Suction valve (kit)	
Item	Designation
8	Suction valve (incl. o-rings)

Pressure valve (kit)	
Item	Designation
4	Pressure valve (incl. o-rings)

Diaphragm kit	
Item	Designation
9	Drive diaphragm
10	Insert

Pump body kit (FRP-design)	
Item	Designation
1	Cheese head screw(s)
2	Disk(s)
3	Pump body

Pump body kit (PVC-design)	
Item	Designation
5	Cheese head screw(s)
6	Disk(s)
7	Pump body

Automatic ventilation device kit	
Item	Designation
11	Automatic ventilation device (incl. o-ring)

## Operating Instructions

### 11.4 Changing working diaphragm

#### General

In order to ensure a correct function of the diaphragm pump and to fulfil the required safety and protective provisions it is absolutely necessary to check and replace the diaphragms at regular intervals.

#### **CAUTION !**



For replacing the diaphragm, the system must be **depressurised!**

#### **CAUTION !**



Prior to replacing the diaphragm, empty the pump and, if necessary, rinse it with appropriate fluid in order to avoid contact with aggressive and/or toxic media!

- Interrupt the power supply during the maintenance / repair of the pump and secure against unintentional or unauthorized starting.
- Take appropriate protective measures: wear protective clothing, breathing mask and safety goggles. Prepare a container with appropriate fluid right beside the pump for being able to remove splashes of the pumped medium.
- Use an appropriate detergent to rinse the solenoid diaphragm pump until no residues of the pumped medium remain in the pump body. Otherwise, pumped medium may leak when disassembling the pump. Collect the rinsed liquid in a safe way (avoid contact with it) and dispose of it in an environmentally compatible way. This measure is also necessary if the solenoid diaphragm pump should be returned for repair.

#### Replacement of the working diaphragm:

- Loosen suction and pressure lines of pump
- Make a note of the current setting of the stroke length
- Set stroke length to 0 %
- Screw out fixing screws of pump body (take off with disks)
- Remove pump body (with valves) to the front (see Fig.42)

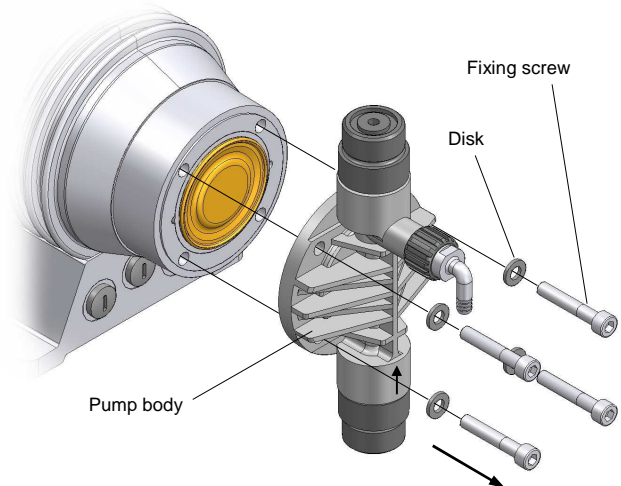


Fig. 42 (Disassembly of pump body)

## Operating Instructions

- Unscrew working diaphragm from connecting rod (see Fig. 43)

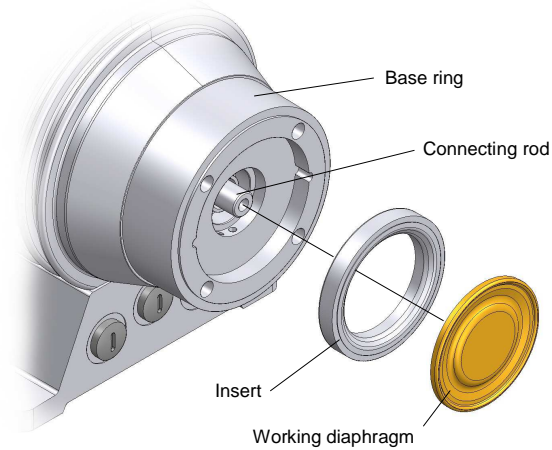


Fig. 43 (Disassembly of working diaphragm)

- Screw working diaphragm onto connecting rod
- Set stroke length to 50 %
- Put pump body onto base ring. Tighten fixing screws crosswise with correct torque (see Chapter. 8.1 / Table.09).
- When mounting the pump body please note:

**CAUTION !**



**Pressure valve above; suction valve below !**

(Consider the direction of the arrows on the valves, described in Chapter 7.2.5)

- Note direction of arrow on pump body
- Fix suction and pressure line
- Reset original stroke length
- Apply voltage
- The solenoid diaphragm pump is ready for operation

## 12 Fault analysis and corrective action

**sera** - products are sophisticated technical products which are only shipped after having been thoroughly tested and checked at our factory.

Should there be any faults, these can be detected and rectified easily and quickly if the steps in Table 14 are carried out.

Operating Instructions

Fault analysis and corrective action

Fault type										Possible cause	Corrective action			
The magnetic diaphragm pump does not run	The operation indicator lamp (LED) does not light up	Solenoid diaphragm pump does not draw in	Solenoid diaphragm pump does not deliver	Delivery rate is not reached	Delivery height is not reached	Delivery rate fluctuates	Maximum delivery rate exceeded	Pipe oscillates heavily	High noise development	Low service life of the drive diaphragm	Drive is overloaded	Leakage on pump head		
		●	●	●									Suction height too high	Reduce suction height or suction resistance.
		●	●	●		●							Suction line leaky	Check gaskets, tighten pipe connections
		●	●							●	●	●	Shut-off valves in pipe closed	Open shut-off valves or check opening – check pump for damage
		●	●	●									No conveying medium in store tank	Fill store tank
		●	●	●	●	●							Pump valves leaky	Remove valves and clean
		●	●		●	●							Pump valves (ball seats) damaged	Remove and clean valves, check function; replace valves if necessary
		●	●										Pump valves incorrectly mounted or valve balls missing	Check installation position and completeness – replace missing parts or install correctly
		●	●	●		●							Filter in suction line clogged	Clean filter
		●	●	●									No stroke movement of the drive diaphragm	Increase stroke frequency / stroke length; check connecting rod motion.
			●	●	●	●					●		Electric data of the stroke magnet do not match mains data	Check order data. Check electric installation.
			●	●	●	●		●		●	●	●	Counter-pressure too high	Measure pressure with manometer directly above pressure valve and compare with permissible counter-pressure
		●	●	●	●	●							Foreign matter in pump valves	Remove and clean valves
					●	●	●						Pressure on suction side higher than at the end of the pressure line	Check geodetic conditions, install float valve or pressure keeping valve if necessary
					●	●	●	●	●	●	●	●	Acceleration height too high due to pipe geometry	Check acceleration height on suction- and pressure side with manometer and compare with design data – install a pulsation damper if necessary
										●		●	Material which is in contact with the medium not suitable for the pumped medium	Check whether the pumped medium corresponds with the design data and select other materials if necessary
		●		●	●	●							Too high viscosity of the pumped medium	Check viscosity of the pumped medium and compare with the design data – reduce concentration or increase temperature if necessary
			●	●	●	●							Pumped medium outgasses in suction line and/or pump body	Check geodetic conditions and compare with the data of the pumped medium. Operate pump with suction side supply, reduce temperature of the pumped medium.
		●											Air in suction line while pressure applied to the pressure valve ball	Vent pressure side resp. open vent valve (only FRP-design, see chap. 7.2.3).
●													Reversible thermal fuse of the solenoid has triggered	Wait until temperature of the solenoid has lowered. Check ambient temperature.
		●	●	●	●	●						●	Pipe connections leaky	Tighten connection according to type of material. Be careful with plastic – risk of fracture
		●	●										Pumped medium frozen in pipe	Remove solenoid diaphragm pump and check for damage – increase temperature of the pumped medium
	●												Fuse in the electronics blown	Have fuse replaced by qualified personnel, contact the manufacturer if necessary..
	●												The electric power supply has failed/been switched off	Restore the electric power supply.
●	●		●										No mains connection	Supply voltage
				●									Home position misadjusted	Reset stroke length.
		●											Pump valves are dry	Moisten pump body and valves. Open vent valve.

Table 14 Fault analysis and corrective action

## Operating Instructions

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### 13 Foreseeable misuse

The following misuse is assigned to the life cycles of the machine.

#### **CAUTION !**



**Misuse can result in danger to the operating personnel!**

#### 13.1 Transport

- Tipping behavior during transport, loading and unloading ignored.
- Weight for lifting underestimated.

#### 13.2 Assembly and installation

- Power supply not fuse protected (no fuse/fuse too large, power supply not conforming to standards).
- No or improper fastening material of the pump.
- Improper connection of the pressure pipes, wrong material i.e. PTFE tape and unsuitable connection pieces.
- Liquid pipes confused.
- Threads overturned/damaged.
- Pipes bent during connection in order to compensate for alignment errors.
- Supply voltage connected without earthed conductor.
- Socket for safe disconnection of the power supply difficult to reach.
- Mains plug cut off (direct connection), safe disconnection impossible. Safe disconnection e.g. by 2-pin main switch. Wrong connecting cables for supply voltage (cross-section too small, wrong insulation).
- Parts damaged (e.g. vent valve, flow meter broken off).
- Wrongly dimensioned pressure and suction pipe.
- Incorrect dimensioned and improperly fastened pump panel (panel broken off).
- Electronics opened in order to connect the mains cable directly to the power supply → electric shock or damage to the electronics.
- The pumped medium is conveyed into the environment in the case of pumps with automatic or manual vent valve if the return pipe was improperly fitted or not fitted at all. „Danger for the operator“.

#### 13.3 Start-up

- Cover on vent openings (e.g. motor).
- Suction or pressure pipes closed (i.e. foreign matters, particle size, stop valves).
- Operation without connected return pipe of the vent valve.
- Start-up with damaged system.
- Wrong parameterization of the pump → inadvertent start.
- Control cable and power cable laid in parallel → malfunctions due to EMC.

#### 13.4 Operation

- Fault message ignored → faulty dosing / process error.
- Pipes hit, pulsation damper not used → damage to the pipes, medium is leaking.
- Pumped medium contains particles or is contaminated.
- External fuse bridged → no cut off in case of an error.
- Ground wire removed → no cut off by fuse in case of an error, supply voltage directly at the housing.
- Insufficient lighting of the working place.
- Arbitrary modification of the pump (valves, internal fuse, ...).
- Suction height too high, pump capacity too low → process error.

#### 13.5 Maintenance / Repair

- Works carried out which are not described in the operating instructions (works on the stroke mechanism and the built-in pump, electronics opened).
- Prescribed maintenance schedules ignored.
- Use of wrong spare parts/oils (e.g. no **sera** original spare parts, wrong viscosity).
- Improper mounting of spare and wearing parts (e.g. wrong tightening torque for pump body).
- Oil level not checked.
- Use of cables with damaged insulation.
- No shut down / no protection against a restart before maintenance work.
- Pumped medium or utilities during an oil change insufficiently removed.
- Restart without sufficient fastening.
- Valves confused.
- Sensor pipes confused.
- Pipes not connected (e.g. suction- and pressure pipes, gas pipes).
- Gaskets damaged, medium is leaking.
- Gaskets not fitted, medium is leaking.
- Wearing of unsuitable protective clothing / no protective clothing at all.
- Operation of an uncleaned system.
- Pumped medium contaminated with oil.
- Poorly ventilated room.

## Operating Instructions

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### 13.6 Cleaning

- Wrong rinsing medium (material changed, reaction with the medium).
- Wrong cleaning agent (material changed, reaction with the medium).
- Cleaning agent remains in the system (material changed, reaction with the medium).
- Protective clothing insufficient or missing.
- Use of unsuitable cleaning utensils (material changed, mechanical damage by high pressure cleaner).
- Untrained personnel.
- Vent openings clogged.
- Parts torn off.
- Sensors damaged.
- Non-observance of the safety data sheet.
- Control elements actuated.
- Poorly ventilated room.

### 13.7 Shut-down

- Pumped medium not completely removed.
- Disassembly of pipes with the pump running/with residual pressure.
- Disconnection of the electrical connections in a wrong sequence (ground wire first).
- Disconnection from the power supply not ensured → danger through electricity.
- Poorly ventilated room.

### 13.8 Disassembly

- Residues of the pumped medium and utilities in the system.
- Use of wrong disassembly tools.
- Wrong or no protective clothing at all.
- Poorly ventilated room.

### 13.9 Disposal

- Improper disposal of the pumped medium, utilities and materials.
- No marking of hazardous media.
- Wrong disposal of the electronics .

### 14 Shut-down

Switch the solenoid diaphragm pump off.

Rinse pump head to remove the pumped medium and make sure that the detergent is suitable for the pumped medium and the material of the pump head.

### 15 Disposal

Shut-down system. Please see "Shut-down".

#### 15.1 Dismantling and transport

- Remove all fluid residues, clean thoroughly, neutralize and decontaminate.
- Package unit and ship.

#### 15.2 Complete disposal

- Remove all fluid residues from unit.
- Drain off lubricants and dispose of according to regulations!
- Dismount materials and send them to a suitable waste disposal company!

#### **CAUTION !**



**The signor is responsible for damage caused by leaking lubricants and fluids!**

**Operating Instructions**

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**Notes:**

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**Notes:**

