

# iSTEP

## STEPPER MOTOR PUMP



PUMPE TYPE

**iSTEP XS 7**

**iSTEP S 20**

**iSTEP XS 15**

**iSTEP S 30**

**iSTEP S 40**

**iSTEP S 50**

**i NOTE**

Record the exact type and serial number here ► can be read off the type plate on the pump.  
These data are important in the case of queries or for ordering spare and/or wear parts and must always be stated.

TYPE:

SERIAL NO:

**i NOTE**

Keep the operating manual for future use!

**⚠ ATTENTION**

Subject to technical modifications!

**Quality notes**

The **sera** quality management and quality assurance system is certified in accordance with DIN EN ISO 9001:2015.  
The **sera** product complies with the applicable safety requirements and accident prevention regulations.

## About this instructions

Special notes in these instructions are marked with text and danger symbols.

### NOTE

Notes or instructions that facilitate work and ensure a safe operation.

### ATTENTION

The non-observance of these safety instructions can result in malfunctions or material damages.

### WARNING

The non-observance of these safety instructions can lead to material damages and personal injuries.



Note on the additional instructions „SAFETY INSTRUCTIONS SI01“.

These technical manual is divided into the following main parts:

Hauptbereiche	Seite
TRANSPORT & STORAGE	page 6
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TECHNICAL DATA	page 11
ASSEMBLY / INSTALLATION	page 20
OPERATION	page 28
ELECTRICAL CONNECTION	page 29
MAINTENANCE	page 30
FAULT ANALYSIS / CORRECTIVE ACTION	page 35
SHUT-DOWN / DISPOSAL	page 37
CLEARANCE CERTIFICATE	page 38

Depending on the pump type (see order confirmation) the following additional instructions are included:

Control Pro	TM15
Control Pro+	TM04
INTERFACE MODULE PROFIBUS	TM05
INTERFACE MODULE PROFINET	TM07



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### WARNING

Observe and follow the safety instructions by all means.  
See the additional instructions „SAFETY INSTRUCTIONS“.  
Man, machine and environment are endangered if the safety instructions are not observed.



### General

**sera** products are checked for perfect condition and function previous to shipment.  
Check for transport damage immediately after arrival of goods. If damage is found, this is to be reported immediately to the responsible carrier and the manufacturer.

### Storage

An undamaged packaging protects the unit during storage and should only be opened when the product is installed.  
Proper storage increases the service life of the product and includes prevention of negative influences such as heat, moisture, dust, chemicals etc.

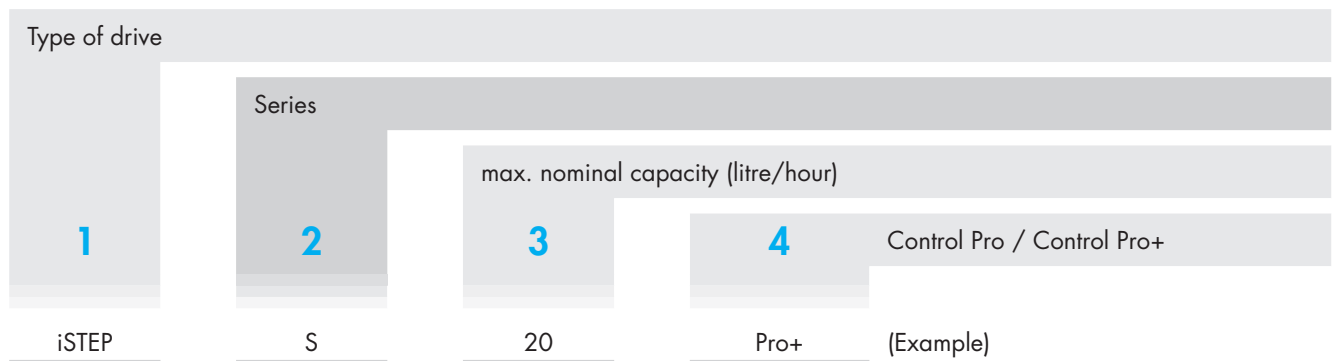
The following storage specifications are to be observed:

- Storage place: cool, dry, dustfree and slightly ventilated
- Storage temperature and relative air humidity see Chapter „TECHNICAL DATA“.
- The maximum storage time for the standard packaging is 12 months.

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

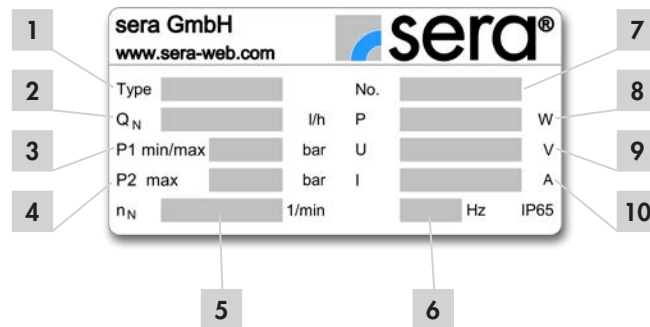
Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants and similar in the storage room.

## Type key



## Type plate

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



No.	Designation
1	Pump type
2	Nominal flow rate Delivery volume of the pump at rated pressure with media similar to water.
3	Minimum/maximum permissible pressure in the pump inlet Minimum/maximum permissible pressure in the inlet cross section which the pump can be used for. Please consider that pressure depends on rotation speed, flow rate, temperature and static pressure at the inlet.
4	Maximum permissible pressure in the pump outlet Maximum permissible pressure in the outlet cross section which the pump can be used for. Please consider that pressure depends on rotation speed, flow rate, temperature and static pressure at the outlet.
5	Nominal stroke frequency
6	Rated frequency
7	Serial number of the pump
8	Max. power consumption
9	Max. operating voltage
10	Max. current consumption (iSTEP S)

**Notes attached to the product**

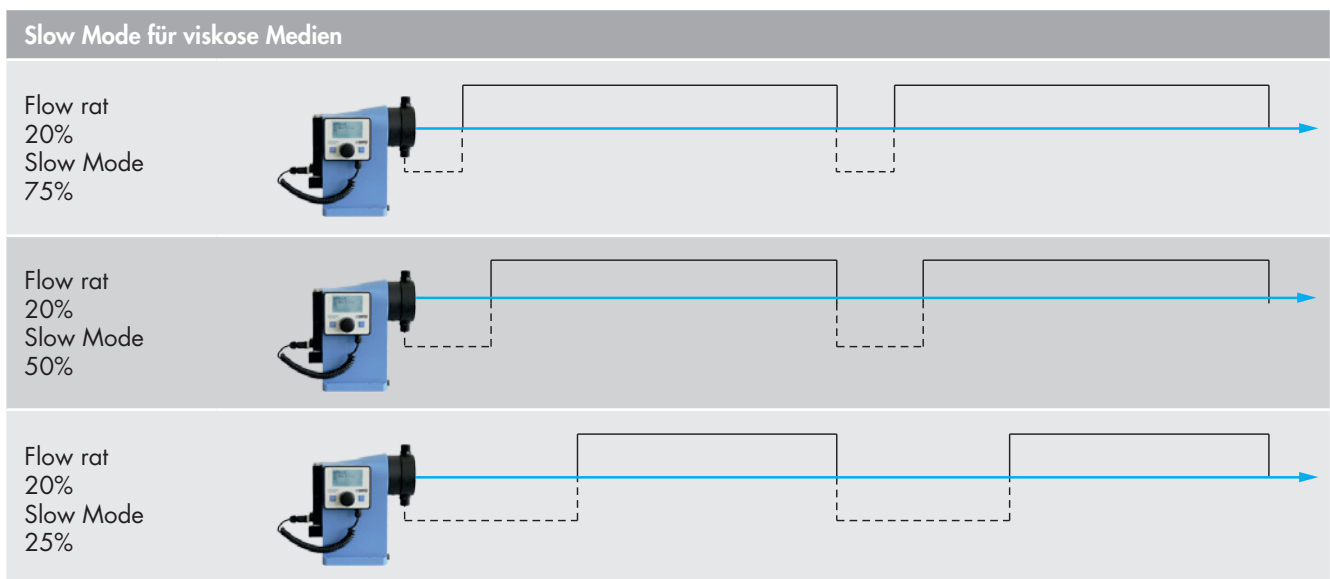
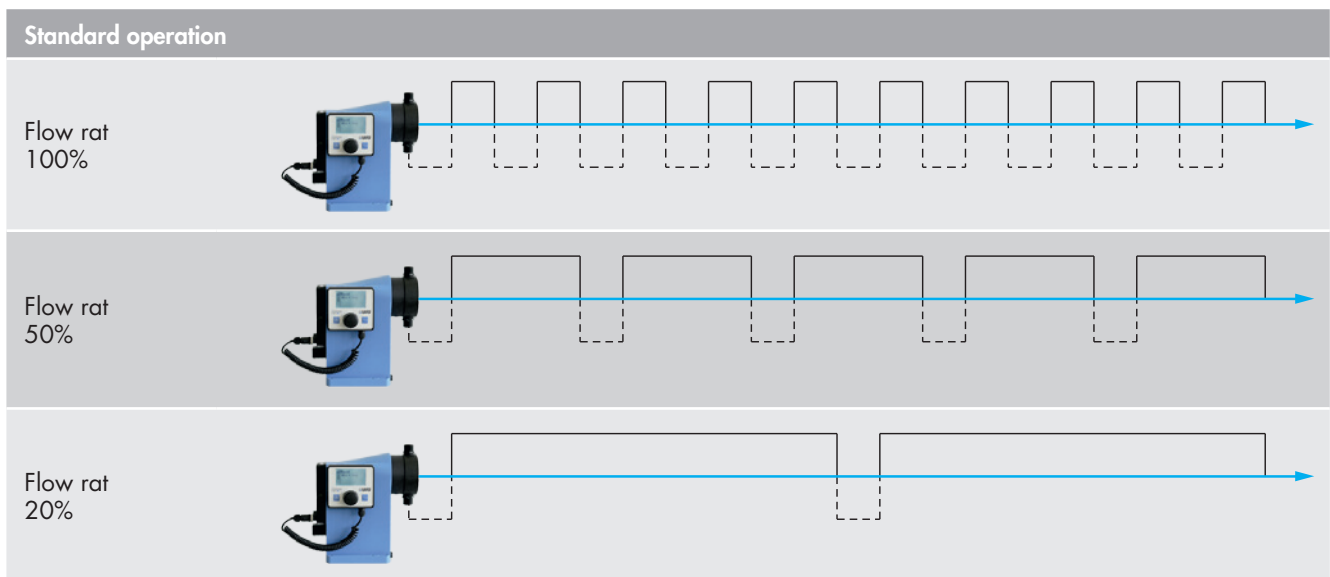
Symbols which are directly attached to the pump, e.g. arrows for direction of rotation or symbols for fluid connections are to be observed and kept in legible condition.

**Materials**

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

**Delivery characteristic**

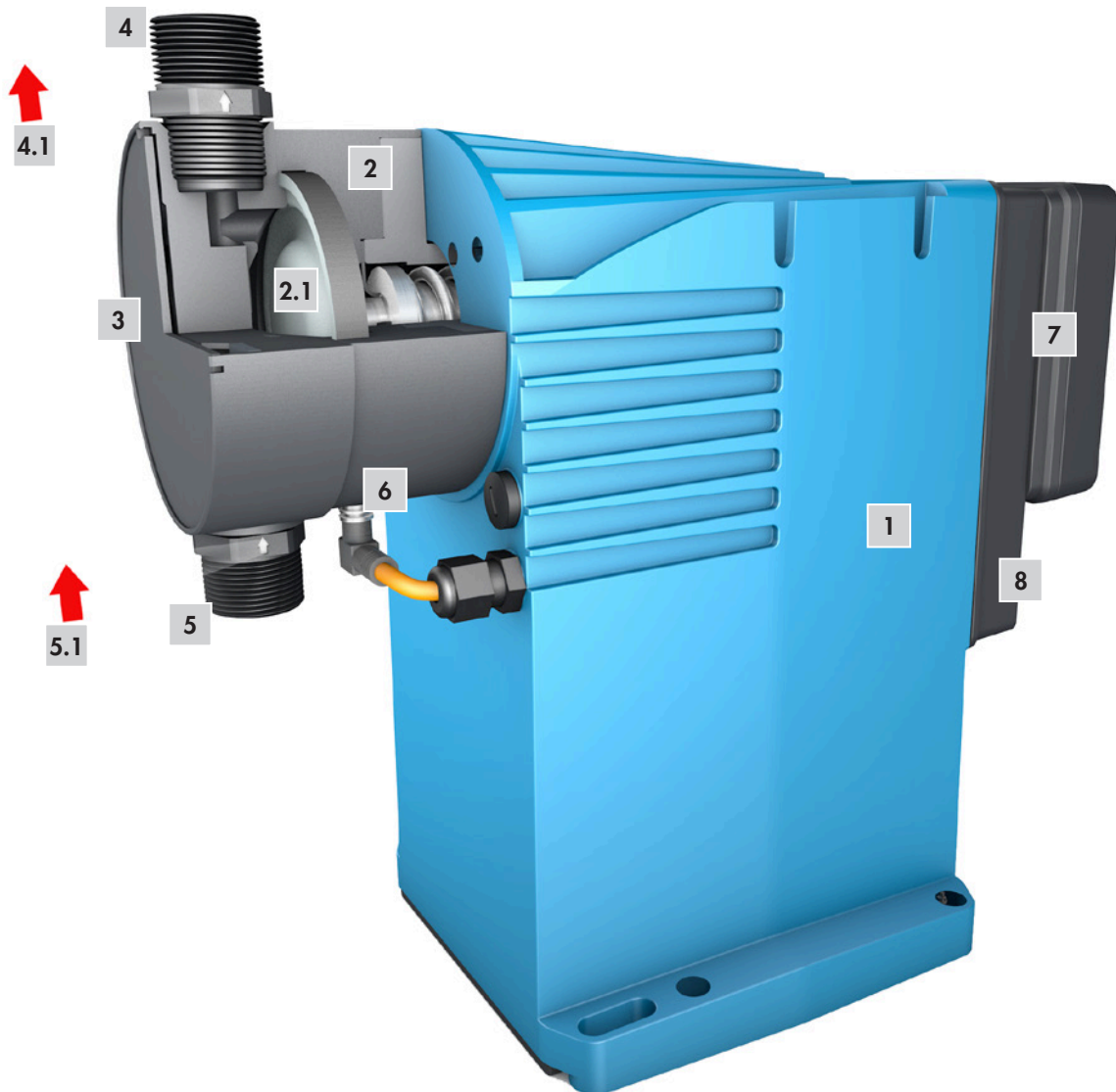
The stepper motor pump iSTEP can perform the pressure and suction strokes at different speeds. For low delivery volumes, the pump runs the suction stroke at maximum speed and adjusts the speed of the pressure stroke to the desired delivery volume. A constant flow rate is achieved that enables gentle dosing with low pulsation.





**sera** pumps are run-dry safe oscillating displacement pumps that are characterised by high tightness of the dosing head. The fluid is conveyed by a deformable diaphragm.

### Components of the pump



#### Stroke mechanism (1)

The stroke mechanism of the sera stepper motor pump consists of a straight slider crank mechanism that converts the rotary movement of the stepped motor into a linear movement. The control of the stepper motor is performed by the electronics integrated in the stroke mechanism.

#### Assembly pump (2)

The pumped medium is conveyed by an elastic drive diaphragm (2.1). The stroke movement of the drive diaphragm is transferred to the pumped medium by the oscillating eccentric and the push rod. This results in the suction and pressure stroke.

#### Pump body (3)

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.

### Suction / Pressure valve (4/5)

vertical position. The condition of the valves has a deciding effect on the operating capability of the pump. Valves must be exchanged as complete units. When replacing the valves it is important to check the flow direction (4.1/5.1).

#### ATTENTION

Pressure valve above; Suction valve below!

### Diaphragm rupture monitoring device (6)

iSTEP stepper motor pumps are equipped with a conductive diaphragm monitoring device.

#### ATTENTION

The sensitivity of the diaphragm rupture electrode can be adapted to the conductivity of the medium via the electronics (see the technical manual of the control). Preset ex works to 50% approx. 45  $\mu\text{S}/\text{cm}$ .

The diaphragm monitoring device MBE-02 is mounted in the base ring and permanently connected to the electronics in the drive housing.

#### ATTENTION

The pumped medium must have a minimum conductivity of at least 5  $\mu\text{S}/\text{cm}$ !

### Electronics Pro+ with removable control element (7)

Among other things, the electronics enable the proportional dosing via analogue signals 4 ... 20 mA or contact signals with the possibility of pulse division or pulse multiplication.

The graphical display shows information about the current status of the pump.

A connection for flow monitoring or flow rate measurement and an „empty“ signal with pre-alarm and dry run alarm are available as standard.

### Electronics Pro (8)

The electronics enable the pulse division or pulse multiplication.

The graphical display shows information about the current status of the pump.

A connection for „empty“ signal with pre-alarm and dry run alarm are available as standard.

PUMP DATA			iSTEP XS 7	iSTEP XS 15
Permissible pressure $p_{2max}$ at the pump outlet	bar		10	7
Nominal capacity QN at $p_{2max}$	l/h		7	15
Capacity min. (1:1000)	l/h		0,007	0,015
Quantity per stroke	ml/Stroke	(100%)	0,61	1,47
Max. suction height	mWS		3	3
Min./max. permissible pressure at the pump inlet	bar	$p_{1min/max}$	-0,3/0,5	-0,3/0,5
Recommended nominal diameter DN of the connecting pipes	mm		3	5
Nominal stroke frequency	1/min		190	170
Weight approx.	kg	plastic	3,6	3,6
		stainless steel	4,0	4,0
Setting range			1:1000	1:1000
Max. dosing capacity Slow Mode 75%	l/h		6	12,9
	%		86,3	86,3
Max. dosing capacity Slow Mode 50%	l/h		4,7	10,2
	%		67,8	67,8
Max. dosing capacity Slow Mode 25%	l/h		2,9	6,2
	%		41,2	41,2
Accuracy of repeatability	%		± 1%	± 1%
Stroke length	mm		3	3
Diaphragm diameter	mm		36	44

## TECHNICAL DATA

PUMP DATA			iSTEP S 20	iSTEP S 30	iSTEP S 40	iSTEP S 50
Permissible pressure p <sub>2max.</sub> at the pump outlet	bar		10	7	6	3
Nominal capacity QN at p <sub>2 max.</sub>	l/h	50/60 Hz	20	30	40	50
Capacity min. (1:1000)	l/h	50/60 Hz	0,02	0,03	0,04	0,05
Capacity min. (1:100)*	l/h	50/60 Hz	0,2	0,3	0,4	0,5
Quantity per stroke	ml/stroke	(100%)	1,75	3,33	3,51	4,39
Max. suction height	mWC		3	3	3	3
Min./max. permissible pressure at the pump inlet	bar	p <sub>1min/max</sub>	-0,3/0,5	-0,3/0,5	-0,3/0,5	-0,3/0,5
Recommended nominal diameter DN of the connecting pipes	mm		5	5	5	8
Nominal stroke frequency	1/min	50/60 Hz	190	150	190	190
Weight approx	kg	plastic	7,3	7,3	7,3	7,4
		stainless steel	7,9	8,5	8,5	8,7
		1.4435	9,0	11,7	11,7	11,8
Setting range			1:1000			
Max. dosing capacity Slow Mode 75%	l/h		17,3	25,8	34,3	43,4
	%		86,3	86,3	86,3	86,3
Max. dosing capacity Slow Mode 50%	l/h		13,5	20,1	26,6	34,0
	%		67,8	67,8	67,8	67,8
Max. dosing capacity Slow Mode 25%	l/h		8,3	12,0	16,0	20,6
	%		41,2	41,2	41,2	41,2
Accuracy of repeatability	%		± 5%	± 5%	± 5%	± 5%
Stroke length	mm		3,5	3,5	3,5	3,5
Diaphragm diameter	mm		44	64	64	78

\*for material 1.4435

ELECTRICAL DATA		iSTEP XS...
Power consumption	W	45
Voltage	V	100 - 240 AC
Frequency	Hz	50/60
Insulation class	ISO	F
Recommended fuse	(circuit breaker)	C10A
Enclosure		IP65
Certifications		CE, TR

ELECTRICAL DATA		iSTEP S...
Power consumption	W	75
Voltage	V	110 - 240 AC
Frequency	Hz	50/60
Insulation class	ISO	F
Recommended fuse	(circuit breaker)	C10A
Enclosure		IP65
Certifications		CE, TR

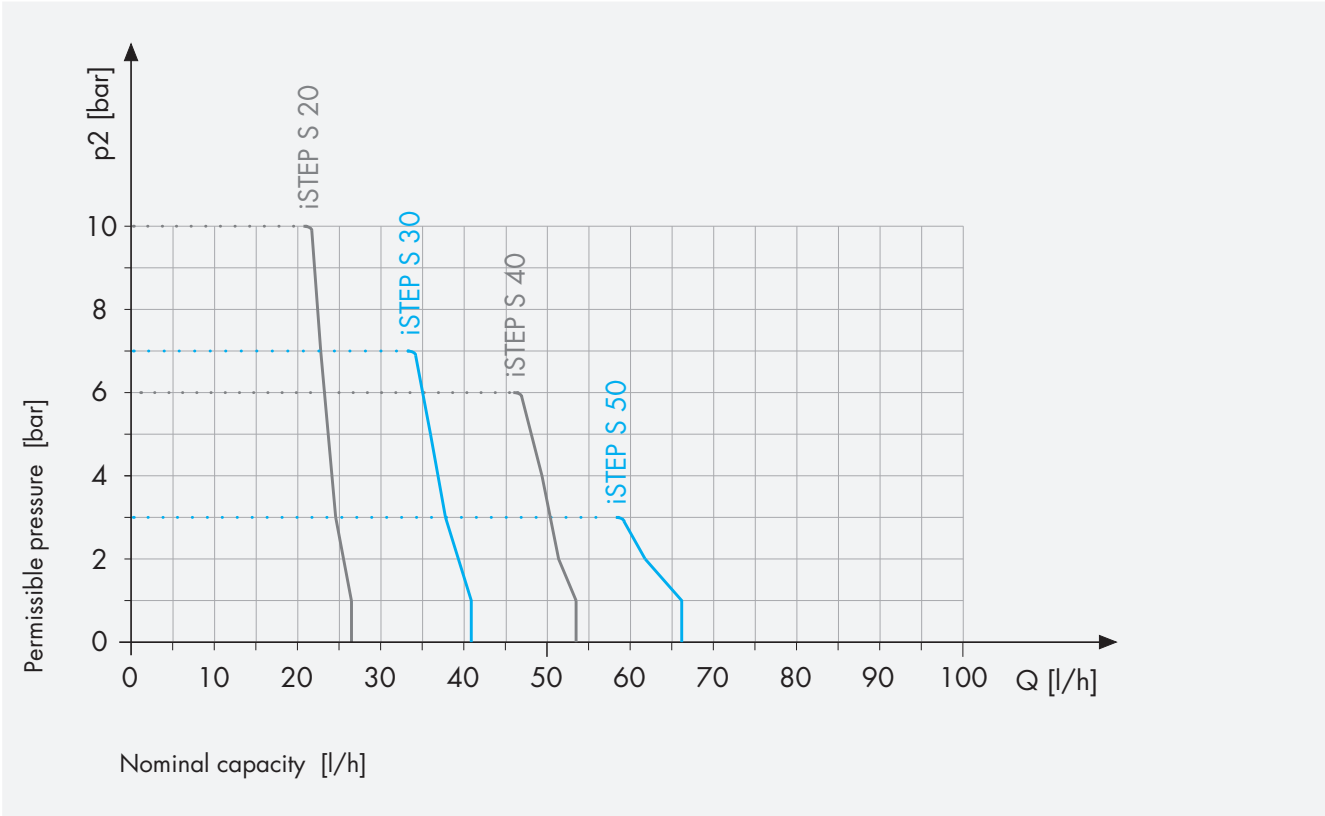
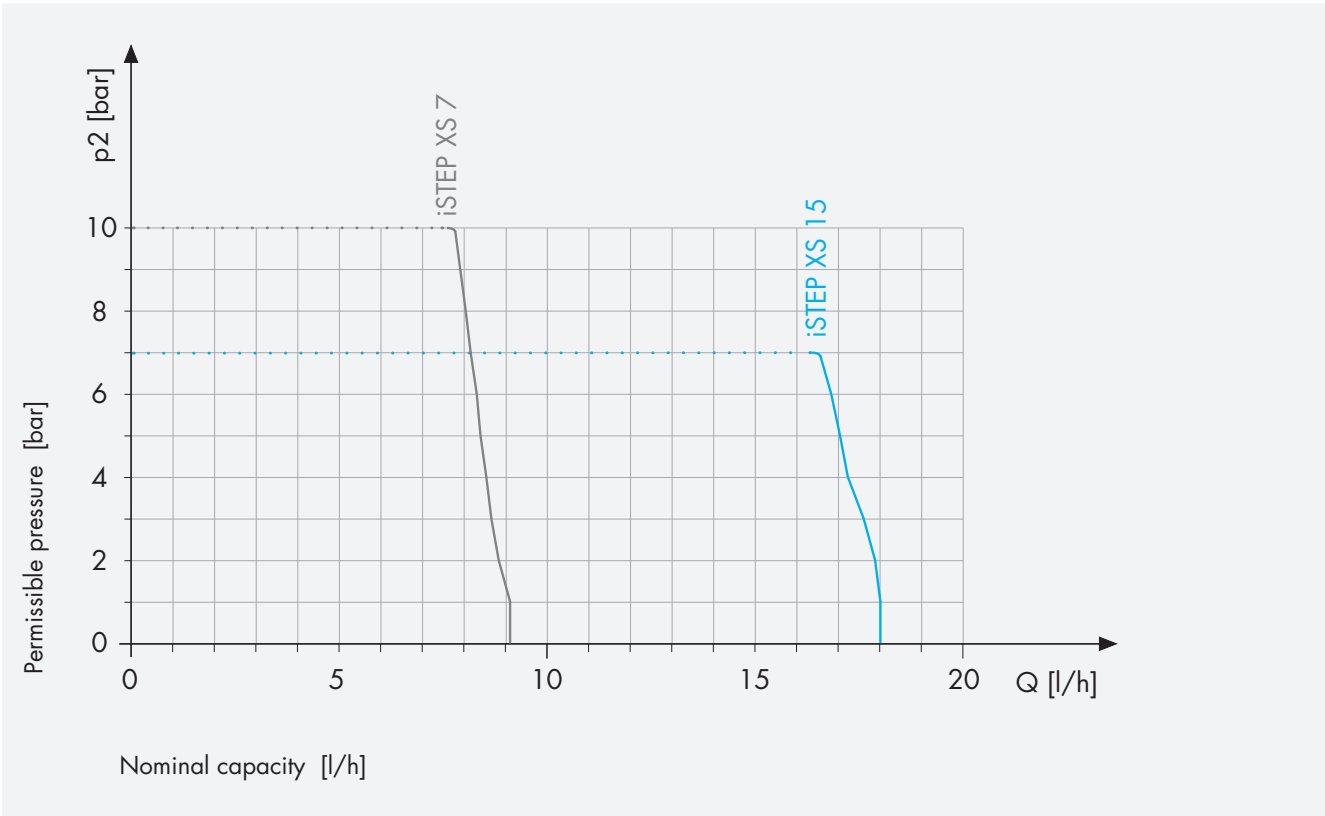
**i NOTE**

For further electrical data, see the operating instructions of the controll.

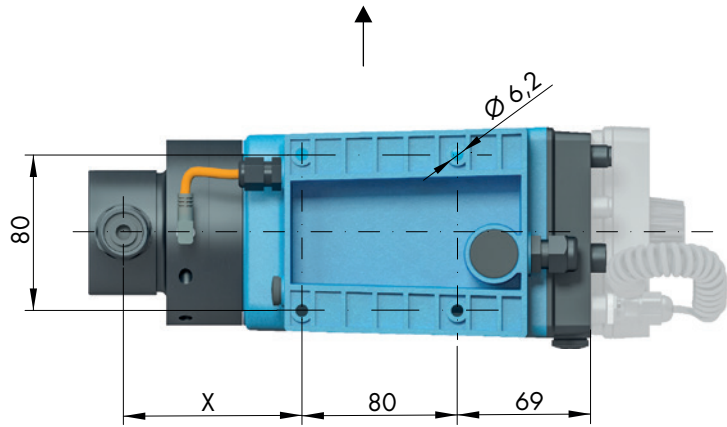
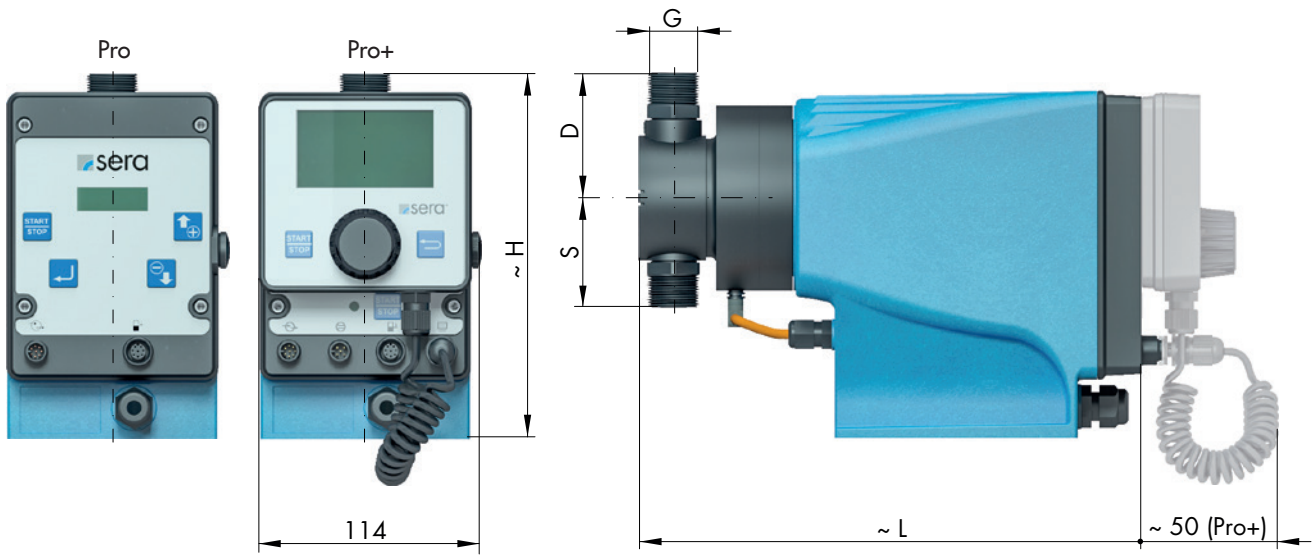
## TECHNICAL DATA

NOISE MEASUREMENT		iSTEP XS	iSTEP S
Max. sound pressure at max. burden		45 - 50 dB(A)	50 - 65 dB(A)
AMBIENT CONDITIONS		iSTEP XS	iSTEP S
Max. installation altitude above sea level		2000 m	1000 m
Max. relative air humidity		< 90%	< 90%
VISCOSITY, PUMPED MEDIUM			
Max. viscosity with non-spring-loaded valves		100 mPas (=cP)	
Medium state	solids max.	5%	
	grain size	30 µm	
TEMPERATURE DATA			
Max. liquid temperature		60 °C	
Min. liquid temperature		10 °C	
Max. operating temperature		40 °C	
Min. operating temperature		0 °C	
Max. storage temperature		40 °C	
Min. storage temperature		0 °C	

Characteristics



Dimensions iSTEP XS

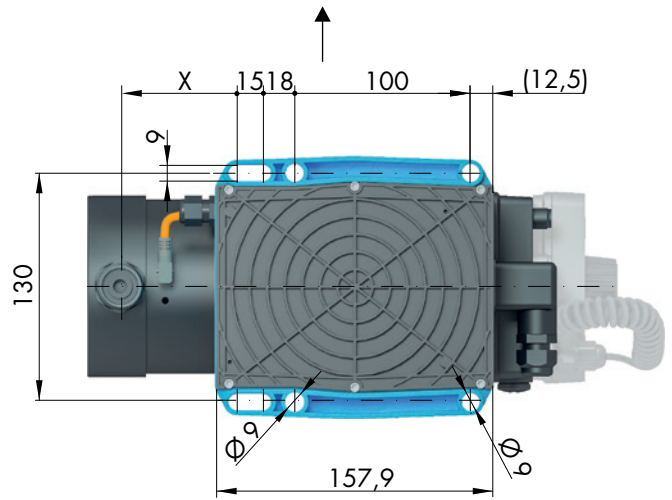
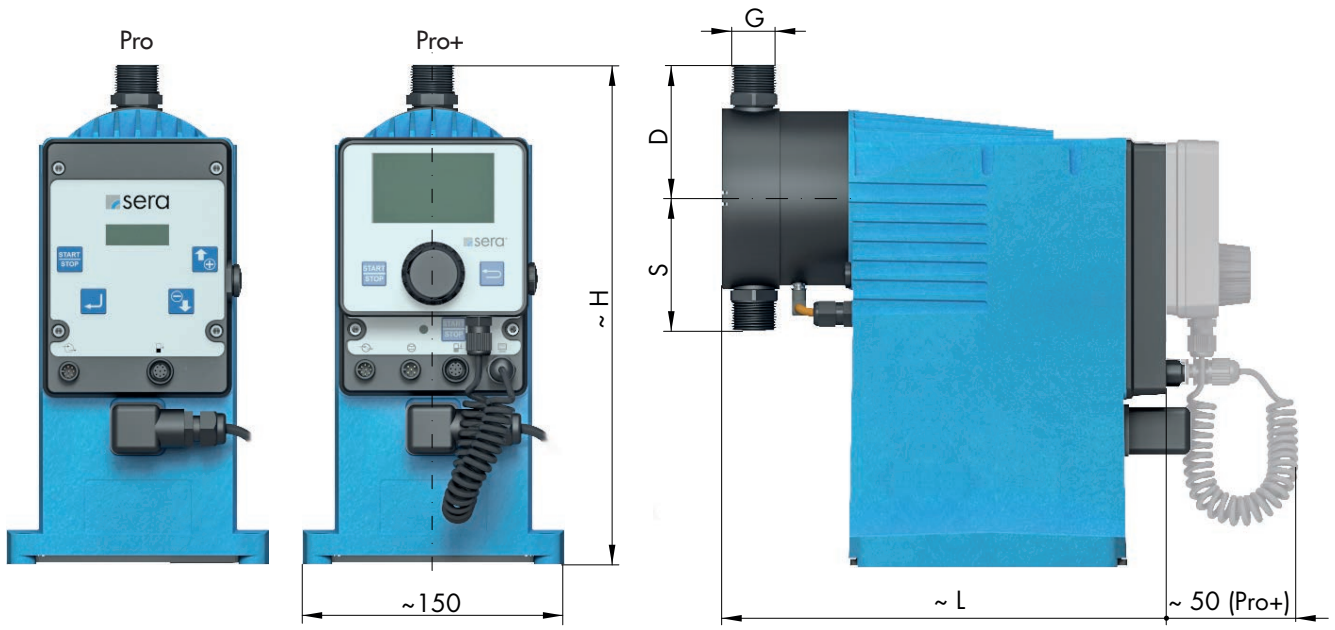




SUCTION VALVES		iSTEP XS 7	iSTEP XS 15
<b>DN</b>	Nominal weight	3	5
<b>G</b>	Connection thread	PVC, PP-/PVDF-FRP, 1.4571 G3/4	G3/4
<b>S</b>	Double valves	PVC 57	65
<b>S</b>	Double valves	PP-/PVDF-FRP 56	57
<b>S</b>	Double valves	1.4571 57	65
PRESSURE VALVES			
<b>DN</b>	Nominal weight	3	5
<b>G</b>	Connection thread	PVC, PP-/PVDF-FRP, 1.4571 G3/4	G3/4
<b>D</b>	Double valves	PVC 57	65
<b>D</b>	Double valves	PP-/PVDF-FRP 64	65
<b>D</b>	Double valves	1.4571 57	65
TOTAL HEIGHT			
<b>H</b>		PVC 180	188
<b>H</b>		PP-/PVDF-FRP 187	188
<b>H</b>		1.4571 180	188
TOTAL LENGTH			
<b>L</b>		PVC 260	264
<b>L</b>		PP-/PVDF-FRP 260	265
<b>L</b>		1.4571 260	264
CONNECTION			
<b>X</b>		PVC-U 87,3	90,8
<b>X</b>		PP-/PVDF-GFK 87,8	91,8
<b>X</b>		1.4571 87,3	90,8

(Dimensions in mm)

Dimensions iSTEP S



SUCTION VALVES		iSTEP S 20	iSTEP S 30	iSTEP S 40	iSTEP S 50
<b>DN</b>	Nominal weight	5	5	5	8
<b>G</b>	Connection thread	PVC, PP-/PVDF-FRP, 1.4571	G3/4	G3/4	G3/4
<b>G</b>	Connection thread	1.4435	Rd28x1/8"	Rd28x1/8"	Rd28x1/8"
<b>S</b>	Double valves	PVC	65	72	72
<b>S</b>	Double valves	PP-/PVDF-FRP	56,6	69,6	69,6
<b>S</b>	Double valves	1.4571	65	72	72
<b>S</b>	Double valves	1.4435	122,5	122,5	122,5
PRESSURE VALVES					
<b>DN</b>	Nominal weight	5	5	5	8
<b>G</b>	Connection thread	PVC, PP-/PVDF-FRP, 1.4571	G3/4	G3/4	G3/4
<b>G</b>	Connection thread	1.4435	Rd28x1/8"	Rd28x1/8"	Rd28x1/8"
<b>D</b>	Double valves	PVC	65	72	72
<b>D</b>	Double valves	PP-/PVDF-FRP	64,6	69,6	69,6
<b>D</b>	Double valves	1.4571	65	72	72
<b>D</b>	Double valves	1.4435	122,5	122,5	122,5
TOTAL HEIGHT					
<b>H</b>	PVC	275	282	282	285
<b>H</b>	PP-/PVDF-FRP	275	280	280	286
<b>H</b>	1.4571	275	282	282	286
<b>H</b>	1.4435	333	333	333	333
TOTAL LENGTH					
<b>L</b>	PVC	270	275	275	275
<b>L</b>	PP-/PVDF-FRP	270	270	270	270
<b>L</b>	1.4571	270	275	275	275
<b>L</b>	1.4435	295	295	295	295
CONNECTION					
<b>X</b>	PVC-U	66,4	67,3	67,3	67,3
<b>X</b>	PP-/PVDF-GFK	67,4	67,3	67,3	67,3
<b>X</b>	1.4571	66,4	67,3	67,3	67,3
<b>X</b>	1.4435	77,9	79,6	79,6	79,6

(Dimensions in mm)



### WARNING

Observe and follow the safety instructions by all means.  
See the additional instructions „SAFETY INSTRUCTIONS“.  
Man, machine and environment are endangered if the safety instructions are not observed.



### NOTE

Pump design data for dosing and its temperature can be found in the order confirmation.



### NOTE

Operating conditions:  
Ambient temperature, relative air humidity and max. installation altitude ► see chapter „Technical data“.

- The standard model of the pump is only approved for installation in dry areas in a non-aggressive atmosphere.
- Protect the pump from heat sources, direct sunlight and UV light.
- See “Dimensions” chapter for dimensions of the pump connections and fixing holes.
- Fixing the pump with at least four bolts above the pump base is required for safe operation.
- Install the pump so 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 so 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 can be easily dismantled if required.
- Design the nominal diameters of the downstream piping and the valves installed in 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 piping system, it is recommended to provide connections for pressure measurement fittings (e.g. manometers) near the suction and pressure ports.
- Drain valves must be provided.
- Before connecting the pipes, remove the plastic caps on the suction and pressure ports of the pump.
- Check the fastening bolts for the pump body for tightness and tighten if necessary, see chapter “Overview of the tightening torques”.
- Connect pipes to the pump so that there are no forces acting on the pump, such as e.g. misalignment, weight or strain of the pipe.
- Keep the suction pipes 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.
- Display devices must be easily accessible and readable.

In order to avoid cavitation, overload or excessive delivery, the following points should be noted:

- Avoid high suction heights.
- Keep pipes as short as possible.
- Select sufficiently large nominal diameters.
- Avoid unnecessary choke points.
- Install a pulsation damper.
- Install overpressure protection.
- Install a pressure-sustaining valve, if necessary
- Provide feed line for outgassing media.



### WARNING

The pump with a control is only designed for operation outside Ex-zones!

**SUCTION SIDE (1)**

The following fittings can be used on the suction side:

**1.1** Line strainer



**1.2** Suction aid Siphon vessel



**1.3** Suction lance



**1.4** Multifunction device



**1.5** Dosing set



**1.6** Foot valve



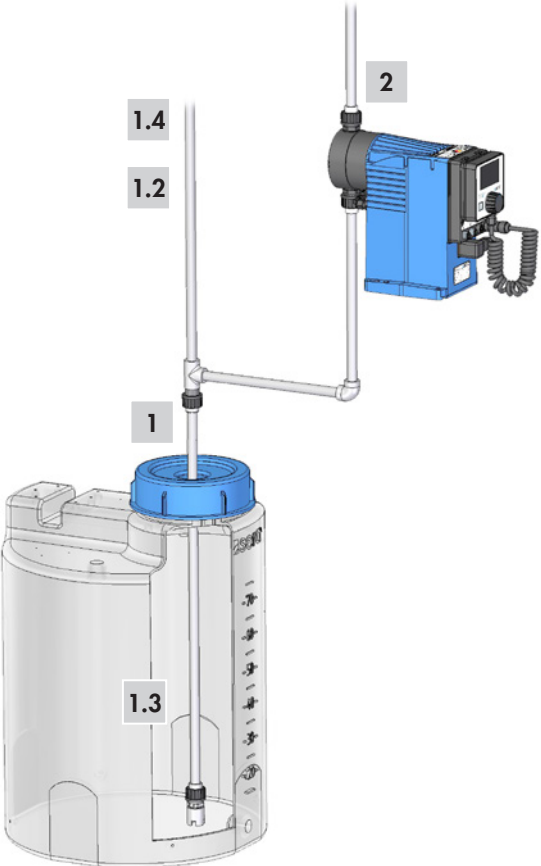
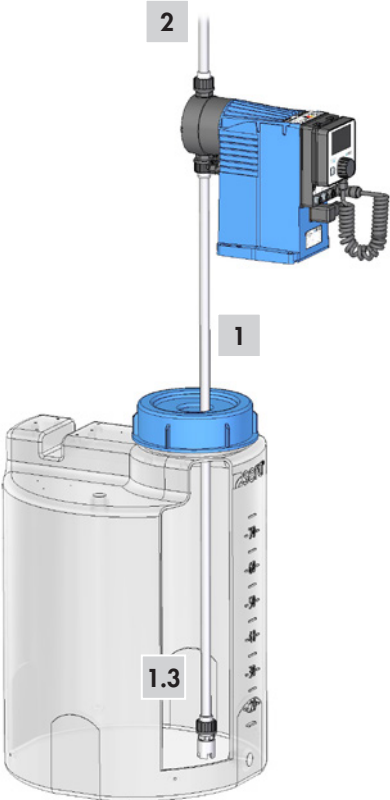
**1.7** Flow monitor



**1.8** Flow meter



**1.9** Shut-off valve



**PRESSURE SIDE (2)**

The following fittings can be used on the pressure side:

**2.1** Vent valve



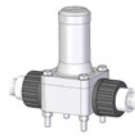
**2.2** Injection fitting



**2.3** Pulsation damper



**2.4** Diaphragm relief valve



**2.5** Diaphragm pressure keeping valve



**2.6** Multifunction valve



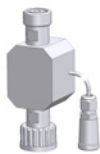
**2.7** Dosing set



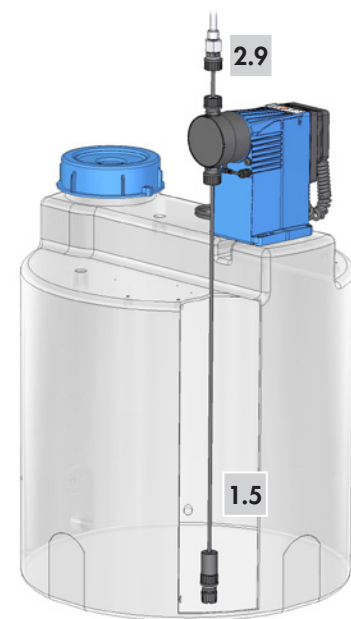
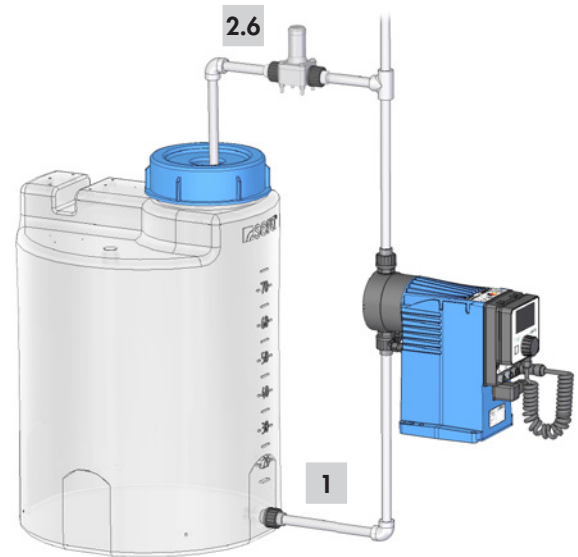
**2.8** Dosing valve



**2.9** Flow meter



**2.10** Shut-off valve



## SUCTION SIDE (1)

### Line Strainer (1.1)

Connect suction line slightly above the bottom of the tank and install a line strainer (0.1 – 0.5 mm mesh size – depending on valve nominal diameter of the pump).



### ATTENTION

If impurities are not removed, this results in malfunctions of the pump and the system.

### Suction aid / siphon vessel (1.2)

For high tanks without connection on the bottom of the tank ► install suction aid / siphon vessel. Thereby, pay attention to accelerating pressures which may be generated in a long suction pipe.

### Suction lance (1.3)

Install a suction lance for removal of chemicals from tanks and barrels. The integrated foot valve prevents the backflow of the suctioned medium. The suction lances are equipped with a level switch for „empty“ signal.

### Multifunction device (1.4)

The multifunction device is installed in the suction side piping of the pump and is used for determination of the delivery rate of pumps under real operating conditions.

The device can be filled either using a pending tank volume (communicating container) or using a hand vacuum pump.

### Dosing set (1.5)

The dosing set consists of dosing hose, threaded hose coupling and dosing valve (pressure side) and foot valve (suction side).

### Foot valve (1.6)

To prevent running dry of the suction line ► install foot valve (check valve) at the end of the suction line.

### Flow monitor (1.7)

To record the flow rate of the pump ► install flow monitor. The application range is restricted to media that are similar to water. The flow monitor is screwed upright on the suction port of the pump and connected to the pump electronics via the input for flow monitoring.

**Flow meter (1.8)**

For measurement and monitoring of the flow rate ► install flow meter.

The application range is restricted to media that are similar to water. The flow meter is screwed upright on the suction port of the pump and connected to the pump electronics via the input for flow monitoring.

**Performance limits of flow meters on the suction site**

	SLOWMODE	8010.1	8011.1	8012.1	8013.1	8014.1
iSTEP XS 7	off	■	■	■	■	
	75%	■	■	■		
	50%	■	■	■		
	25%	■				
iSTEP XS 15	off	■	■	■	■	■
	75%	■	■	■	■	
	50%	■	■	■	■	
	25%	■	■	■		
iSTEP S 20	off		■	■	■	■
	75%	■	■	■	■	■
	50%	■	■	■	■	
	25%	■	■	■		
iSTEP S 30	off		■		■	■
	75%		■		■	■
	50%	■	■	■	■	■
	25%	■	■	■	■	
iSTEP S 40	off		■		■	■
	75%		■		■	■
	50%		■	■	■	■
	25%	■	■	■	■	■
iSTEP S 50	off					■
	75%					■
	50%				■	■
	25%	■	■	■	■	■



## PRESSURE SIDE (2)

### Vent valve (2.1)

If air can be drawn in due to falling liquid level in the suction tank and at the same time delivered to a pressurised line or against a pressure-sustaining valve ► install vent valve in the pressure line.

#### NOTE

The delivery flow can be interrupted if there is air in the suction line!

### Injection fitting (2.2)

Install an injection fitting that routes into a main line to prevent the backflow of the pumped medium in the dosing line.

#### WARNING

Unwanted mixing in the dosing line occurs if any possible backflow from the main line is not prevented.

### Pulsation damper (2.3)

Damping of the pulsation by installation of pulsation dampers if:

- a low-pulsation delivery flow is desired for process reasons,
- acceleration forces caused by the piping geometry must be removed.

Install pulsation damper as close as possible to the pump head.

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

#### WARNING

Undamped acceleration forces can result in the following faults / damage:

- flow rate fluctuations
- dosing errors
- pressure surges
- valve shocks
- increased wear on the suction and pressure sides of the pump
- mechanical destruction of the pump
- leaks and valve shocks if the permissible maximum pressure on the pump pressure side is exceeded
- damage to the piping and its installed fittings

### Diaphragm relief valve (2.4)

If the permissible pressure in the system can be exceeded by closing any shut-off valve or by clogging of the line ► install diaphragm relief valve.

When using an external overflow valve, the following is applicable for the return line:

- Route the return line sloping downward into the storage tank which is under atmospheric pressure or into an open drainage channel.
- Or connect directly to the pump suction line, but only if there is no check valve in the suction line (e.g. foot valve of a suction lance).

### ATTENTION

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

### WARNING

An overpressure protection device (e.g. relief valve) must generally be provided if the permissible operating pressure can be exceeded.

### ATTENTION

If the permissible operating pressure is exceeded and the pump is not equipped with overpressure protection, the pump will be damaged.

### WARNING

The pumped medium can spray out if the pump is damaged.

## Diaphragm pressure-keeping valve (2.5)

If dosing into a main line with negative pressure ► install pressure-keeping valve in the dosing line.

### ATTENTION

It must be ensured during the installation that excess delivery (due to positive pressure difference ( $\geq > 1$  bar) between pressure and suction sides) is avoided.

## Multifunction valve (2.6)

The multifunction valve provides the following functions:

- pressure-keeping valve function,
- overflow valve function,
- pressure relief function,
- venting.

The multifunction valve is mounted directly on the pump pressure port.

## Dosing set (2.7)

The dosing set consists of dosing hose, threaded hose coupling and dosing valve (pressure side) and foot valve (suction side).

## Dosing valve (2.8)

Installation of the dosing valve prevents the liquid from the system to be treated being able to penetrate into the dosing line.

## Flow meter (2.9)

For measurement and monitoring of the flow rate ► install flow meter.

The application range is restricted to media that are similar to water. The flow meter is screwed upright on the pressure port of the pump and connected to the pump electronics via the input for flow monitoring.

## Performance limits of flow meters on the pressure site

		min. - max. flow capacity l/h				
	SLOWMODE	8010.1	8011.1	8012.1	8013.1	8014.1
iSTEP XS 7	off	1,6 - 7,0	3,0 - 7,0	4,3 - 7,0	6,5 - 7,0	-
	75%	1,6 - 6,0	2,7 - 6,0	3,9 - 6,0	5,7 - 6,0	-
	50%	1,5 - 4,6	2,5 - 4,6	3,3 - 4,6	4,5 - 4,6	-
	25%	1,3 - 2,8	1,8 - 2,8	2,3 - 2,8	2,7 - 2,8	-
iSTEP XS 15	off	1,8 - 15,0	3,3 - 15,0	5,1 - 15,0	8,7 - 15,0	13,4 - 15,0
	75%	1,8 - 12,8	3,2 - 12,8	4,8 - 12,8	7,95 - 12,8	11,7 - 12,8
	50%	1,7 - 9,9	3,0 - 9,9	4,4 - 9,9	6,8 - 9,9	9,3 - 9,9
	25%	1,5 - 6,0	2,6 - 6,0	3,5 - 6,0	4,7 - 6,0	5,9 - 6,0
iSTEP S 20	off	2 - 19	3 - 20	5 - 20	9 - 20	14 - 20
	75%	2 - 16	3 - 17	5 - 17	8 - 17	13 - 17
	50%	2 - 13	3 - 13	5 - 13	7 - 13	11 - 13
	25%	2 - 7	3 - 8	4 - 8	6 - 8	7 - 8
iSTEP S 30	off	2 - 21	3 - 30	5 - 14	8 - 30	13 - 30
	75%	2 - 18	3 - 25	5 - 21	8 - 25	13 - 25
	50%	2 - 15	3 - 19	4 - 17	7 - 19	12 - 19
	25%	2 - 10	3 - 12	4 - 11	6 - 12	9 - 12
iSTEP S 40	off	2 - 23	3 - 40	5 - 28	9 - 40	16 - 40
	75%	2 - 21	3 - 34	5 - 25	8 - 34	15 - 34
	50%	2 - 18	3 - 26	5 - 21	8 - 26	13 - 26
	25%	2 - 12	3 - 16	4 - 13	7 - 16	10 - 16
iSTEP S 50	off	2 - 17	2 - 17	4 - 21	6 - 34	11 - 40
	75%	2 - 16	2 - 16	4 - 19	6 - 29	10 - 34
	50%	2 - 14	2 - 14	3 - 16	6 - 23	10 - 26
	25%	2 - 10	2 - 10	3 - 11	5 - 14	8 - 16

### Operation in Ex-zone



#### WARNING

The pump with a control is only designed for operation outside Ex-zonest!

### Start-up



#### WARNING

Observe and follow the safety instructions by all means.  
See the additional instructions „SAFETY INSTRUCTIONS“.  
Man, machine and environment are endangered if the safety instructions are not observed.



Adequate fastening at the pump foot and compliance with the operating parameters specified in the technical data are required for the operation of the pump.

Checks before every start-up:

- Check all connections for tightness.
- Tighten fixing bolts of the pump body with the specified tightening torques (see „Overview of the tightening torques“ chapter).
- Check of the electrical connections.
- Check of the mains voltage on the rating plate with the local conditions.

 **WARNING**

Observe and follow the safety instructions by all means.  
See the additional instructions „SAFETY INSTRUCTIONS“.  
Man, machine and environment are endangered if the safety instructions are not observed.

 **NOTE**

Operating voltage range see chapter „TECHNICAL DATA“.

 **NOTE**

Electrical interfaces see the additional operation instructions for the CONTROL.

 **ATTENTION****Pump with a control:**

The pump restarts in the selected operating mode with the specified parameters after switching on again or after restoration of the power supply following a power failure.



## WARNING

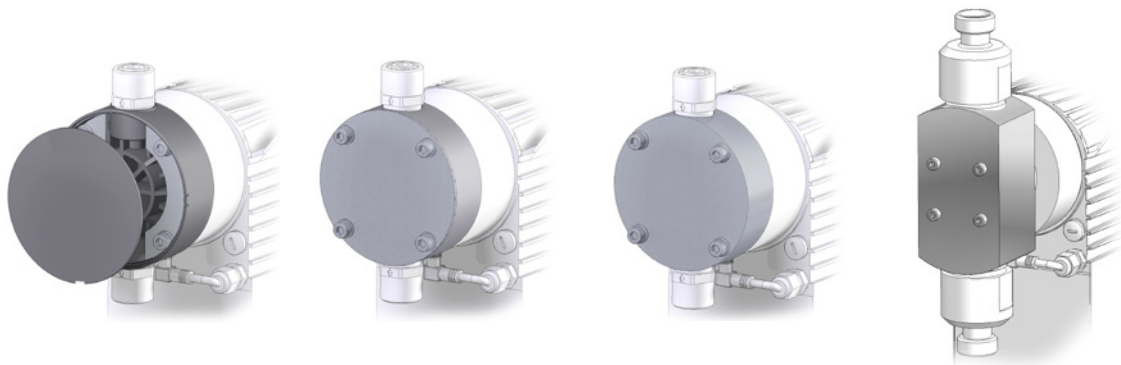
Observe and follow the safety instructions by all means.  
See the additional instructions „SAFETY INSTRUCTIONS“.  
Man, machine and environment are endangered if the safety instructions are not observed.



Check the following at regular intervals:

- Tight fit of piping.
- 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 mounting screws, please see Chapter „Overview of the tightening torques“.
- Additionally with motor pumps: Check oil level regularly (oil eye).

### Overview of the tightening torques



	Pump body ... FRP	Pump body PVC	Pump body 1.4571	Pump body 1.4435
	Nm			
iSTEP XS 7	4	4	4	-
iSTEP XS 15	4	4	4	-
iSTEP S 20	4	4,5	4	4
iSTEP S 30	5	6	5	5
iSTEP S 40	5	6	5	5
iSTEP S 50	5	6	5	5

## Changing the Diaphragm

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.

After 3000 operating hours or at the latest after one year, a service message requiring diaphragm replacement is shown on the graphical display of the pump with a control (see additional instructions of the control). An earlier diaphragm replacement can be necessary depending on the medium and the application area.

### WARNING

#### **Pump with a control:**

Observe the instructions on the graphical display for the replacement of wear parts!

### WARNING

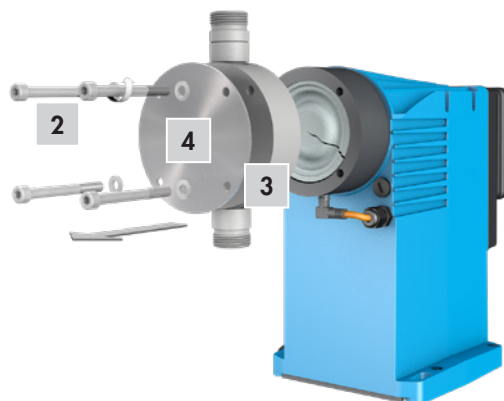
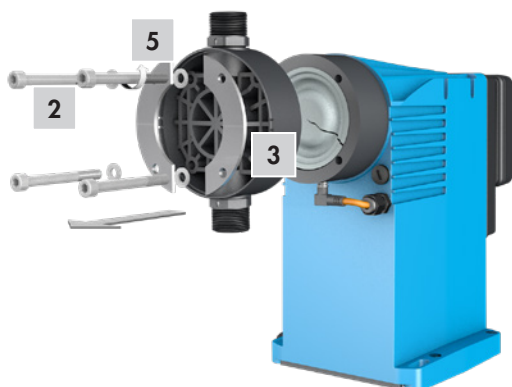
The diaphragm must be in the front end position for correct diaphragm replacement.

Diaphragm replacement must be called up via the menu of the controller (System ► Maintenance ► Diaphragm replacement) ► see documentation of the controller.

- Remove cover plate (1) of the pump body (FRP design).

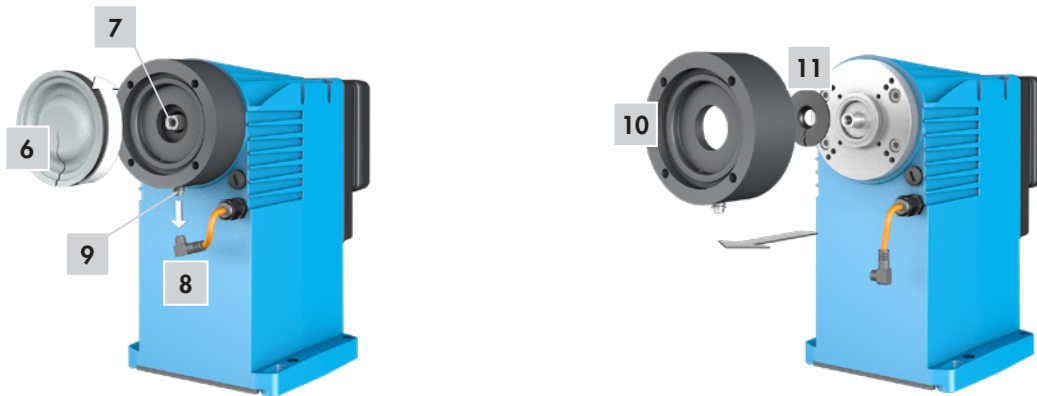


- Loosen fixing bolts (2) on the pump body.
- Remove pump body (3), front plate (4) (PVC design) or insertion plates (5) (FRP design) to the front.



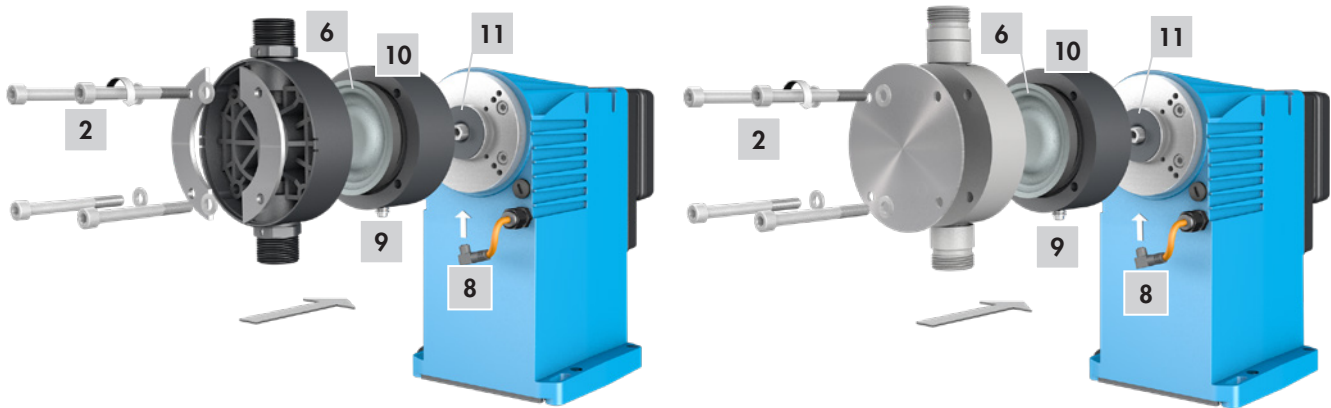
## MAINTENANCE

- Disconnect the connector (8) of the membrane rupture electrode (9).
- Unscrew drive diaphragm (6) from the push rod (7).
- Remove the base ring (10) and flat seal (11).



### Reassemble in reverse order:

- Fit new flat seal (11) and the base ring (10).
- Screw on new diaphragm (6) hand-tight.
- Observe tightening torques of the fixing bolts (2); see chapter „Overview of the tightening torques“.
- When assembling the pump body, please note: suction valve below, pressure valve above!
- Attach the connector (8) to the membrane rupture electrode (9).



Connect the suction and pressure lines as well as the electrical connection of the dosing pump. The dosing pump is operational again after executing the instructions on the graphical display.



## Spare and wear parts

The following parts are considered as wear parts of the dosing pump:

- Diaphragm (Diaphragm kit)
- Flat seal (Diaphragm kit)
- Diaphragm rupture electrode
- Valves kit (included o-ring kit)
- O-ring kit

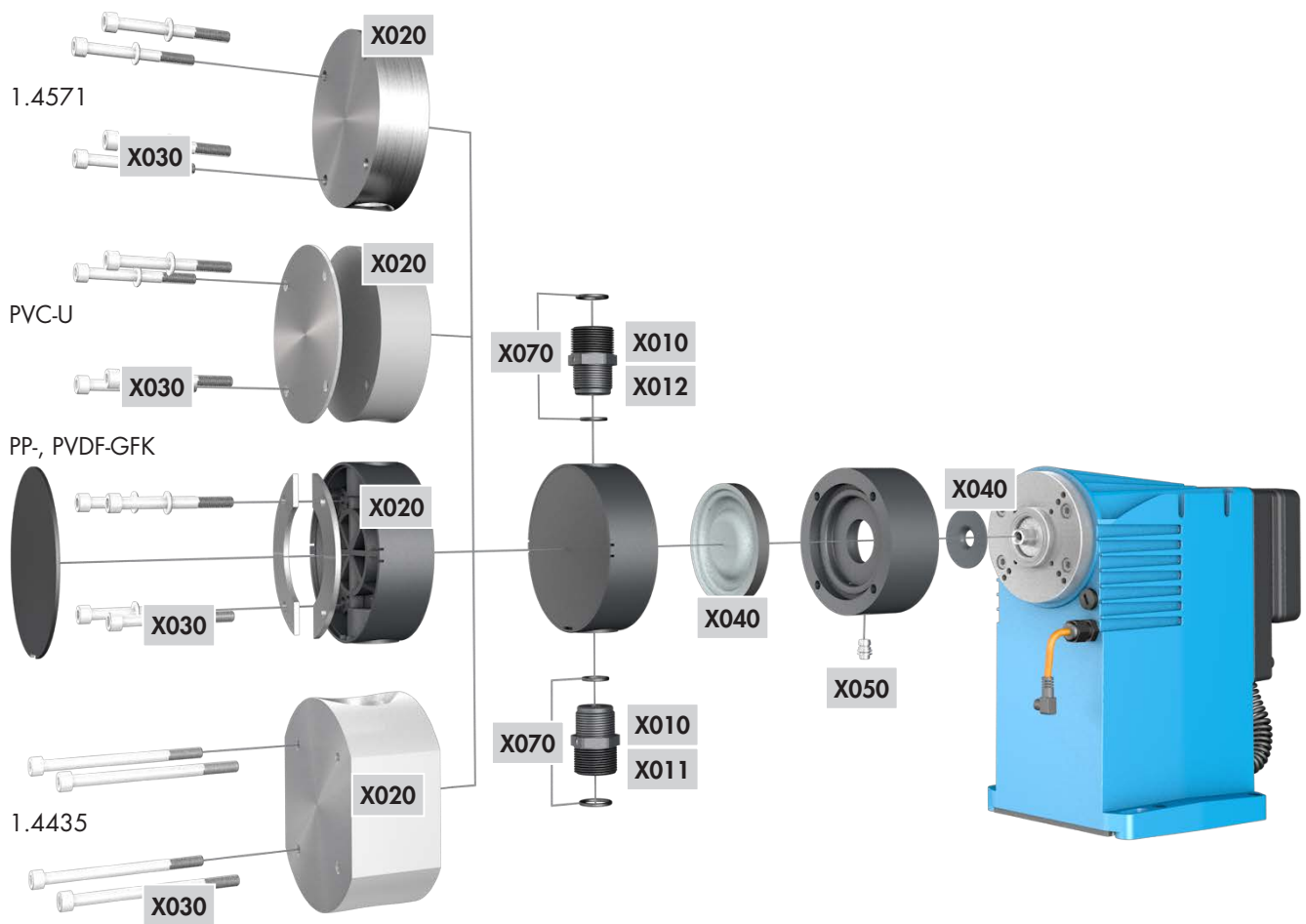
Depending on their use and period of use, wear parts must be replaced at regular intervals in order to ensure reliable functioning of the dosing pump.

**sera** recommends replacement of wear parts after 3000 operating hours or at least once per year.

In the event of premature diaphragm rupture caused by harsh operating conditions, switch off the dosing pump and replace the drive diaphragm (in accordance with „Diaphragm replacement“ chapter)..

The following parts are considered as spare parts of the dosing pump:

- Pump body kit (included mounting kit)
- Mounting kit



Pos.	Kit	Materials	consisting of
X010	Valves	PVC-U; PP-FRP; PVDF-FRP	Suction valve Pressure valve O-ring kit
X011	Suction valve	1.4571; 1.4435	Suction valve O-ring kit
X012	Pressure valve	1.4571; 1.4435	Pressure valve O-ring kit
X020	Pump body	PVC-U	Pump body Front plate Mounting kit
X020	Pump body	PVC-U; PP-FRP; PVDF-FRP	Pump body Cover plate Insertion plates (iSTEP S) Mounting kit
X020	Pump body	1.4571; 1.4435	Pump body Mounting kit
X030	Mounting		Screws, complete
X040	Diaphragm		Drive diaphragm Flat seal
X050	Diaphragm rupture electrode		
X070	O-rings		

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 based the instructions in the tables.

**i NOTE**  
 Analysis of the error messages in the display for the pumps with a control ► see the operation instructions of the control!

Fault type										Possible cause	Corrective action					
Corrective action!	Display, LED not lit! ► Pump with control	Motor does not start! ► diaphragm pump	Damage to stroke mechanism / drive!	Pump does not draw in!	Pump does not deliver!	Flow rate is not reached!	Delivery head is not reached!	Flow rate fluctuates!	Maximum permissible flow rate exceeded!	Pipe oscillates heavily!	Too high noise development!	Service life of the drive diaphragm too low!	Drive is overloaded (periodically occurring noises)!	Leakage on pump head!		
			■	■	■										Suction height too high.	Reduce suction height or suction resistance.
			■	■	■			■							Suction pipe leaking.	Check seals, tighten pipe connections.
			■	■							■	■	■		Shut-off valves in piping closed.	Open shut-off valves or check opening state ► check pump for possible damage.
			■	■	■										No pumped medium in storage tank.	Fill storage tank.
			■	■	■	■	■								Pump valves leaking.	Remove and clean valves.
			■	■		■	■								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.
			■	■	■	■	■						■		Electrical data of the pump do not match mains data.	Check order data. Check electrical installation. Adjust motor to the network on site (for diaphragm pumps).
				■	■	■	■		■		■	■	■		Backpressure too high.	Measure pressure with manometer directly above pressure valve if possible and compare with permissible backpressure.
			■	■	■	■	■								Foreign matter in the pump valves.	Remove and clean valves.
							■	■							Pressure on suction side higher than at the end of the pressure pipe.	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 sides with manometer and compare with design data ► install a pulsation damper if necessary.
												■	■		Materials coming into contact with the medium not suitable for the pumped medium.	Check whether the pumped medium matches the design data and select other materials if necessary.

## FAULT ANALYSIS / CORRECTIVE ACTION

Corrective action!	Display, LED not lit!	Pump with control	Motor does not start!	diaphragm pump	Damage to stroke mechanism / drive!	Pump does not draw in!	Pump does not deliver!	Flow rate is not reached!	Delivery head is not reached!	Flow rate fluctuates!	Maximum permissible flow rate exceeded!	Pipe oscillates heavily!	Too high noise development!	Service life of the drive diaphragm too low!	Drive is overloaded (periodically occurring noises)!	Leakage on pump head!	Possible cause	Corrective action
						■		■	■	■							Viscosity of the pumped medium too high.	Check viscosity of the pumped medium and compare with design data ► reduce concentration or increase temperature if necessary.
							■	■		■							Pumped medium is outgassing in the suction pipe and/or the pump body.	Check geodetic conditions and compare with data of the pumped medium. Operate pump with suction side supply, reduce temperature of the pumped medium.
						■											Air in suction line while pressure is present on the pressure side.	Vent pressure side.
	■																Power supply failed / switched off.	Restore power supply.
						■	■	■	■	■							Pipe connections leaking.	Tighten connections according to type of material. Be careful with plastic ► risk of fracture!!
						■	■										Pumped medium frozen in pipe.	Remove pump and check for possible damage - increase temperature of the pumped medium.
■	■						■										No mains power connection.	Connect mains power supply.
						■											Pump valves dry.	Moisten pump body and valves. Open vent valve.
						■	■	■								■	Temperature too low.	Check flowability of the dosing medium. Temperature of the medium see „Technical data“.
						■	■	■	■	■					■	■	Diaphragm rupture.	Replace the diaphragm according to the descriptions in Chapter „Replacing the diaphragm“.
■																	Reversible thermal fuse of the pump has tripped.	Let temperature of the pump cool down. Check ambient temperature.
	■																Fuse in electronics blown. ► Pump with control	Return pump for repair.
						■	■	■	■								Compensating valve not adjusted to operating conditions. ► diaphragm pump KM	Set compensating valve according to operating conditions. ► diaphragm pump KM

**WARNING**

Observe and follow the safety instructions by all means.  
See the additional instructions „SAFETY INSTRUCTIONS“.  
Man, machine and environment are endangered if the safety instructions are not observed.

**Shut-down**

- Switch off piston diaphragm pump.
- Rinse pump head and remove pumped medium; make sure that the rinsing agent is suitable for pumped medium and pump head.

**Disposal**

- Shut-down system. Please see “Shut-down”.

**Dismantling and transport**

- Shut-down system. Please see “Shut-down”.
- Remove all fluid residues from pump body, clean thoroughly, neutralize and decontaminate.
- Package unit and ship.

**NOTE**

A clearance certificate must be filled in when systems are returned to the manufacturer.  
Acceptance will be rejected if this clearance certificate is not attached.

**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!

## CLEARANCE CERTIFICATE

### **i** NOTE

Inspection / repair of machines and machine parts is only carried out after the clearance certificate was filled in correctly and completely by authorized and qualified personnel.

### **i** NOTE

Acceptance will be refused if parts are returned to the manufacturer without a proper clearance certificate.

All industrial companies are obligated by the legal provisions for occupational health, e.g. the workplaces ordinances, the Ordinance on Hazardous Substances, the regulations for prevention of accidents and the environmental protection regulations such as the Waste Management Act and the German Household Water Act to protect their employees or man and the environment from detrimental effects when handling hazardous substances.

Should special safety precautions be necessary despite careful draining and cleaning of the product the necessary information are to be provided.

Machines which are operated with radioactive media shall only be inspected and/or repaired in the safety area of the owner by a **sera** specialized fitter.


The clearance certificate is part of the inspection-/repair order.  
**sera** reserves the right to refuse acceptance of the order for other reasons.

## DOWNLOAD

Clearance certificate

Or directly scan the QR code opposite:



Clearance Certificate 

**RECIPIENT**


**sera ProDos GmbH**  
Wareneingang z. Hd. Abt. Service  
sera Straße 1  
D-34376 Immenhausen/Hessen

**SENDER**

Company:	<input type="text"/>	Phone:	<input type="text"/>
Contact partner:	<input type="text"/>	Fax:	<input type="text"/>
Street address:	<input type="text"/>	E-Mail:	<input type="text"/>
Postcode, City:	<input type="text"/>	Your order number:	<input type="text"/>

We confirm that we have entered the information in this clearance certificate (decontamination certificate) correctly and completely and that the returned parts have been carefully cleaned.  
The parts sent in are therefore free of residues in dangerous quantities.

<input type="text"/>	<input type="text"/>	<input type="text"/>
Place, Date	Department	Signature (and company stamp)

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Original

Business name and full address of the manufacturer:

**sera GmbH**, sera-Straße 1, D - 34376 Immenhausen

Name and address of the person authorised to compile the technical file:

Sabine Morell, sera-Straße 1, D – 34376 Immenhausen

Description and identification of the machinery:

Stepper motor pump for dosing fluids for industrial applications.

iSTEP XS 7 Pro+ / Pro	iSTEP XS 15 Pro+ / Pro
iSTEP S 20 Pro+ / Pro	iSTEP S 30 Pro+ / Pro
iSTEP S 40 Pro+ / Pro	iSTEP S 50 Pro+ / Pro

The machinery fulfils all the relevant provisions of this Directive:

2006/42/EC	Machinery
2014/30/EU	Electromagnetic compatibility
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Where appropriate, harmonised standards used:

DIN EN ISO 12100:2010	DIN EN 809:2012-10
DIN EN IEC 61000-6-2:2019-11	DIN EN 55011:2018-05
DIN EN 61000-3-2:2015-03	DIN EN 61000-3-3:2014-03
DIN EN IEC 63000:2019-05	

Place and date of the declaration: Immenhausen, 01.11.2021

Identity and signature of the person empowered to draw up the declaration on behalf of the manufacturer or his authorised representative:

The block contains the 'sera GmbH' logo and address (34376 Immenhausen) in blue text, followed by a handwritten signature in black ink. Below the signature, the name 'S. Morell' and title 'Quality Management' are printed in black.

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34376 Immenhausen  
S. Morell  
Quality Management

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