

## 5 series piston diaphragm pumps



High dosing accuracy of +/- 1% (linear adjustable)

Flow rates from 0,065 to 2 x 1650 l/h

Back pressure up to 300 bar

Overload protection through integrated hydraulic valve

High process reliability thanks to multi-layer diaphragm

CE, EAC, API675, ATEX



# 5 series piston diaphragm pumps

## sera piston diaphragm pumps

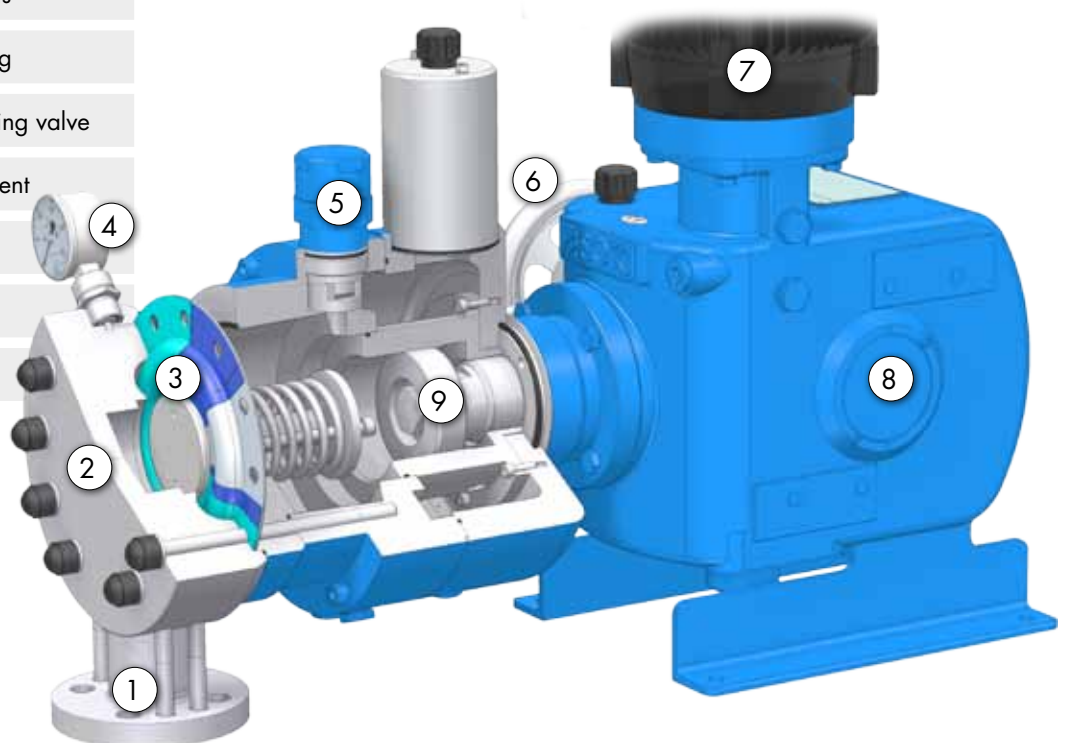
The 509.1, 510.1 and 511.1 series transmit the stroke movement of the mechanically linked piston to the multilayer diaphragms hydraulically. An integrated compensating valve guarantees outstanding dosing accuracy and optimal overload protection. The capacity can be varied via the stroke length, for which an adjusting eccentric is used.

### Advantages at a glance

- Wide range of applications thanks to output ranging between 0.065 l/h and 2 x 1650 l/h with back pressure of up to 300 bar
- Exact dosing quantities thanks to the use of adjusting eccentric gears with harmonic motion sequence
- High operating reliability thanks to the advanced materials technology behind the hydraulically operated multilayer diaphragm
- Display of the diaphragm status by integrated diaphragm monitoring system.
- Integrated overpressure protection with internal pressure relief valve
- Other areas of application thanks to extensive accessories and design in accordance with ATEX and API standards
- Efficient IE2 motors (0.75kW motors and above) in accordance with EuP Directive as standard
- Optimal, customised design for almost any application thanks to standard modules from the **sera** range
- Leak-free dosing and therefore maximum safety for production and the environment. Suitable for hazardous, toxic and flammable fluids as a result
- CE and EAC conformity certificates
- Tested to internationally recognised standards

## R 510.1 KM

- |   |                              |
|---|------------------------------|
| 1 | Suction valve                |
| 2 | Pump body                    |
| 3 | Multilayer diaphragms        |
| 4 | Diaphragm monitoring         |
| 5 | Hydraulic compensating valve |
| 6 | Stroke length adjustment     |
| 7 | Driving motor                |
| 8 | Stroke mechanism             |
| 9 | Piston                       |





# Applications and areas of use



## OIL & GAS

- Pumping oil and natural gas (onshore/offshore)
- Dosing of chemicals, such as oxygen binders and corrosion inhibitors
- Dosing of defoaming solutions, biocides for preventing bacteria and nitrate to stop H<sub>2</sub>S formation
- Dosing of flocculants and methanol for oil separation

## REFINERIES

- Crude oil processing, e.g. chemical desalination
- Dosing of defoaming solutions and corrosion inhibitors
- Dosing of caustic soda and stabilisers



## PETROCHEMICALS

- Dosing of chemicals for fission processes to convert hydrocarbons
- Dosing of phosphates, amines and bleaching agents
- Dosing of defoaming solutions in distillation and lubricants in reforming processes

## CHEMICALS

- Manufacture of fertilisers (ammonia and urea plants)
- Nitrate applications
- Chlor-alkali electrolysis
- Sulphuric acid processes
- Dosing of urea
- Dosing of ammonia
- Dosing of solvents



## POWER STATIONS

- Boiler feed water treatment
- Flue gas desulphurisation
- Dosing of ammonia solutions and hydrazine/levoxin
- Dosing of lyes and acids for water treatment
- Dosing of urea and ammonia for denitrification

## ENERGY

- Biogas production
- Dosing of bio fuels
- Dosing of phosphoric acid as a catalyst



## PHARMACEUTICALS & COSMETICS

- Enzyme production
- Dosing of caustic soda, nitric acid and hydrogen peroxide for CIP processes
- Dosing of additives

## Materials

The high quality of the materials guarantees long-term, operationally reliable use.

### Pump bodies and valves

1.4571

### Valve balls

1.4401

### Valve seals

FEP coated

### Working diaphragms

PTFE (3-layer)

Other materials such as Hastelloy, Duplex, PVDF on request.

## Drive

The drive unit consists of a reliable motor brand, coupled with a stroke mechanism in a robust cast housing.

**sera** cast housings cope with even the harshest conditions. Material thickness and surface treatment withstand even chemical attacks and are designed in accordance with EN ISO 12944.

## Connections

The pumps are installed in pipelines by means of threaded connections (ISO 228 or NPT) or flange connections (DIN or ANSI).

## Control

The flow rate of the piston diaphragm pump can be constant or controlled continuously.

Manual flow rate adjustment with:

- Changes to stroke length by means of eccentricity adjustment device
- Reproducibility +/- 1% at 10 - 100% stroke length

Automatic flow rate adjustment, depending on analogue input signals, with:

- Three-phase motors with frequency converter for stroke frequency adjustment
- Actuators with positioning controllers for stroke length adjustment

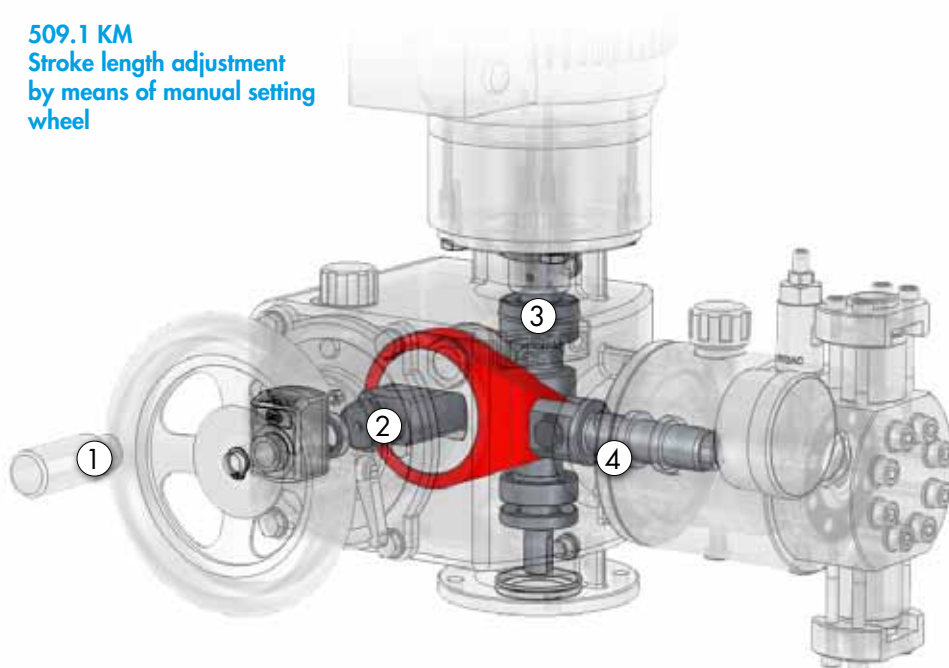
## Special designs

We offer an individual solution for special dosing tasks: duplex or triplex design, heating or cooling devices for the pump body.

## Accessories

We supply all of the accessories required for optimal installation of dosing pumps, including pulsation dampers, safety valves, dosing tanks, flow controllers, and so on.

### 509.1 KM Stroke length adjustment by means of manual setting wheel



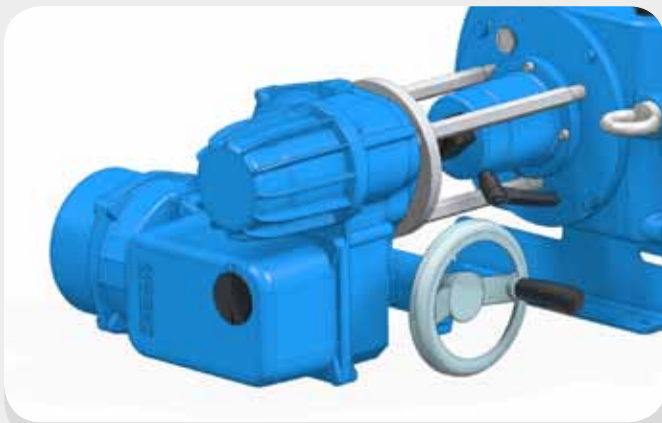
1 Setting wheel

2 Eccentric shaft

3 Driven shaft

4 Piston

# Options



## Electric actuator for stroke length adjustment

The electric actuator allows automatic stroke length adjustment by means of a control unit, making manual setting a thing of the past.

The actuator turns the eccentricity adjustment device in and out to the flow rate required.

## Optical diaphragm monitoring

If the operating diaphragms are damaged, the medium follows through a hole under pressure to the signal pressure gauge and causes a needle deflection.



## Diaphragm monitoring with pressure switch

If the diaphragms are damaged, pressure builds up in the pressure switch. The signal produced can then be processed.

## Stroke frequency sensor

**sera** dosing pumps are oscillating positive displacement pumps with a precisely defined stroke volume per pump stroke. The stroke frequency sensor records the individual pump strokes and sends the information for every stroke to the evaluation unit.



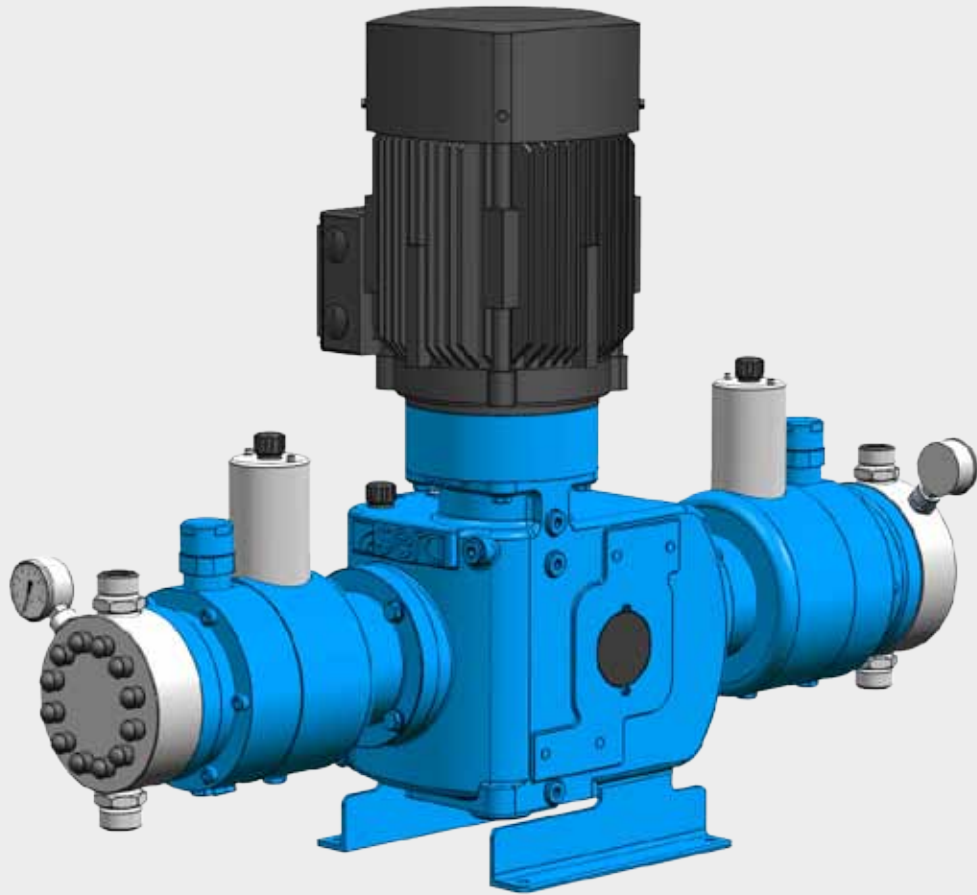
# Customer-focused design comprising intelligent building blocks



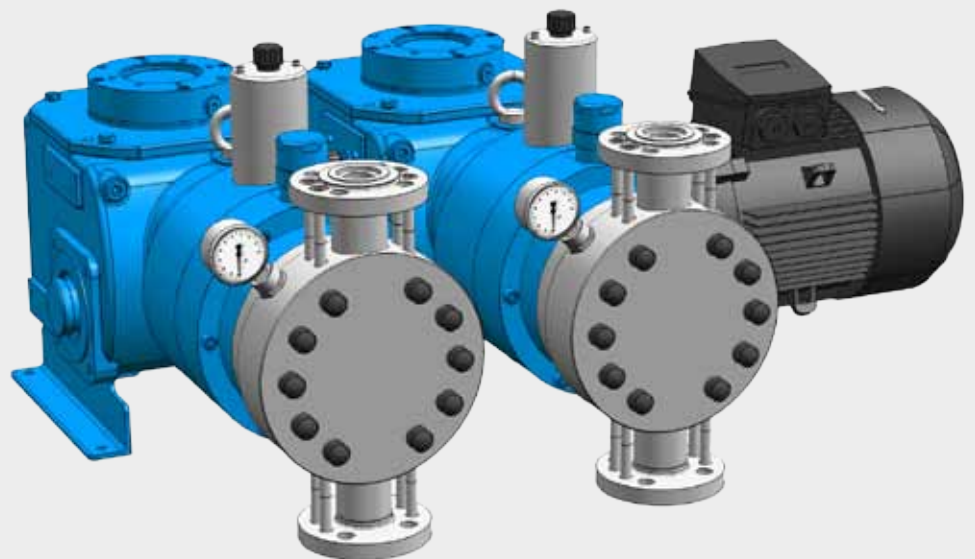
Piston diaphragm pumps in modular design through adaptation of pump bodies or the combination of motor housings

- Solutions for various process requirements
- Design based on individual elements
- Combination of different sizes possible
- Suitable for dosing mixtures
- Low pulsation thanks to overlapping component currents

BOXER model for twice the power!



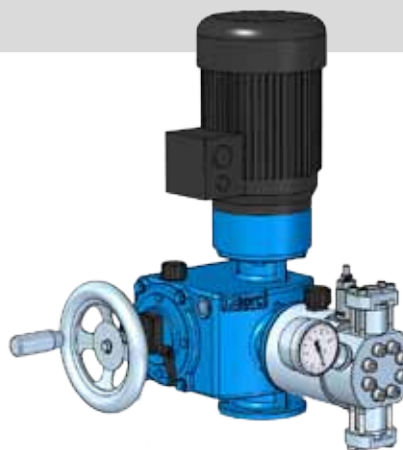
DUPLEX or TRIPLEX model for greater power with low pulsation, optimal adaptation to the available space!



# Technical specifications R509.1 KM (basic model)

Other types available on request

Piston diaphragm pump R 509.1 KM



## Pump specifications

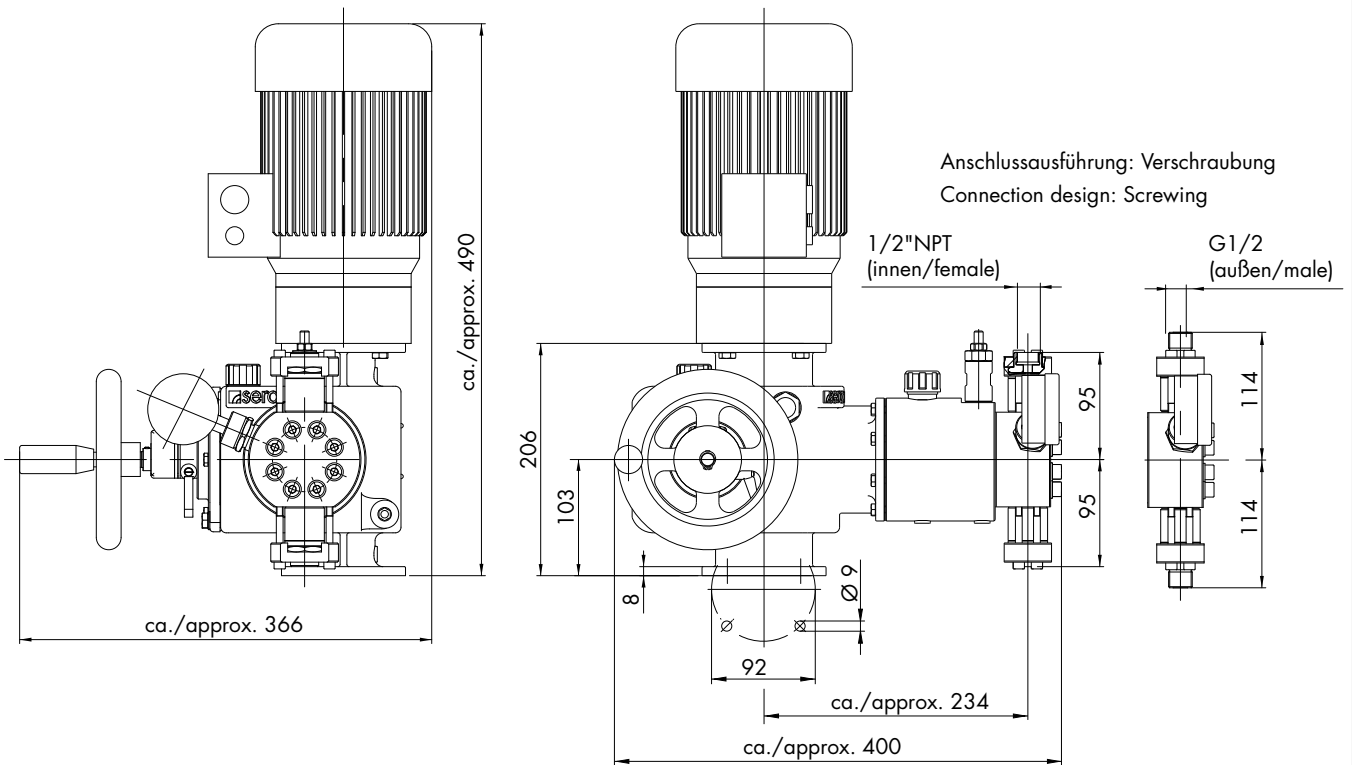
Type	Maximum permitted pressure at pump outlet  p <sub>2</sub> max. bar	Nominal flow rate <sup>(1)</sup>  Q <sub>N</sub> at p <sub>2</sub> max.			Suction height  max. mWs	Permitted pressure at pump inlet  min./max. bar	Recommended nominal width for connecting lines  DN	Nominal stroke frequency		Weight  approx. kg	Stroke length  max. mm
		50 Hz	60 Hz	ml/stroke				50 Hz	60 Hz		
		l/h	l/h					rpm	rpm		
R509.1-6.5KM	300	0 - 6,5	0 - 8	0,8	3	-0,2 / 20	5	168	202	43	14
R509.1-18KM	250	0 - 18	0 - 22	2,3	3	-0,2 / 20	5	168	202	43	14
R509.1-28KM	140	0 - 28	0 - 34	3,6	3	-0,2 / 20	8	168	202	50	14
R509.1-74KM	67	0 - 74	0 - 89	9,5	3	-0,3 / 20	8	168	202	50	14

## Motor specifications

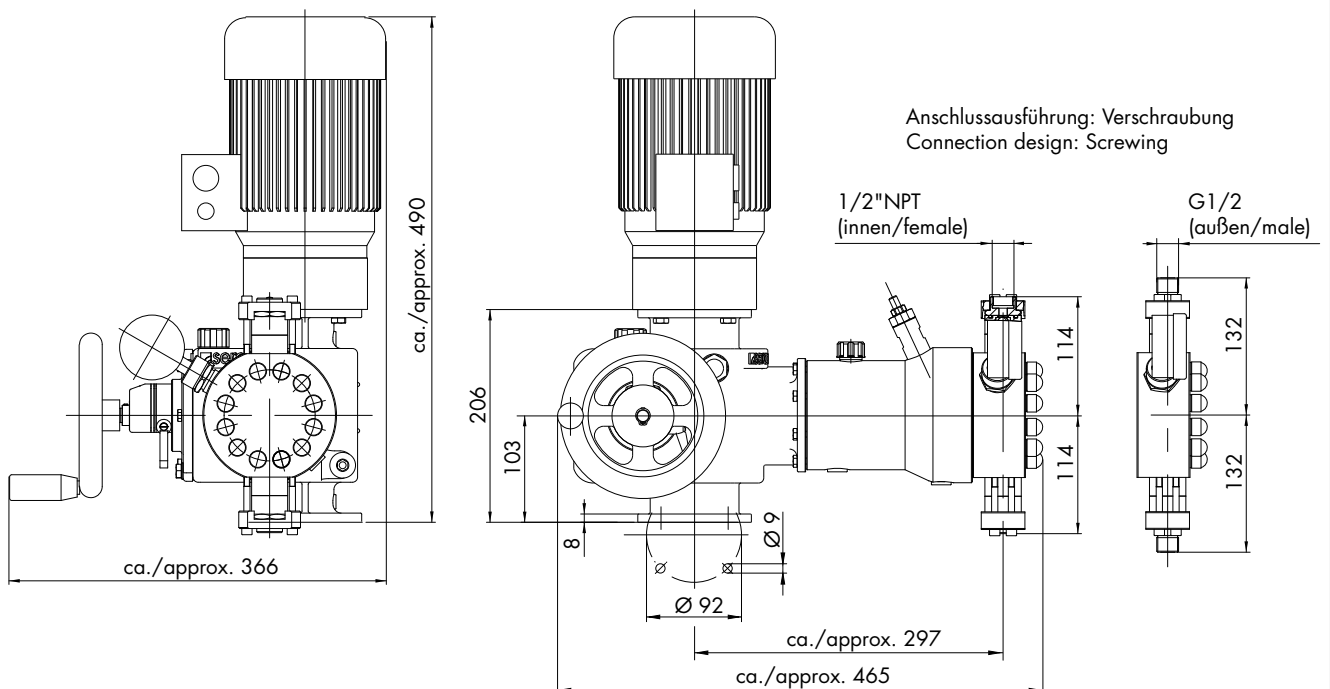
Type	Motor output  kW	Frequency  Hz	Voltage		Rated current		Insulation class  ISO	Protection class  IP	Frequency range with frequency converter operation  Hz
			50 Hz	60 Hz	50 Hz (400V)	60 Hz (460V)			
			V ~ 3	V ~ 3	A	A			
R509.1-6.5KM	0.55	50/60	230/400V ± 5%	460 V ± 5%	1.46	1.48	F	55	30 - 60
R509.1-20KM	0.55	50/60	230/400V ± 5%	460 V ± 5%	1.46	1.48	F	55	30 - 60
R509.1-38KM	0.55	50/60	230/400V ± 5%	460 V ± 5%	1.46	1.48	F	55	30 - 60
R509.1-81KM	0.55	50/60	230/400V ± 5%	460 V ± 5%	1.46	1.48	F	55	30 - 60



## R509.1-6.5 KM / R509.1-20 KM



## R509.1-38 KM / R509.1-81 KM



# Technical specifications R510.1 KM (basic model)

Other types available on request

Piston diaphragm pump R 510.1-...KM



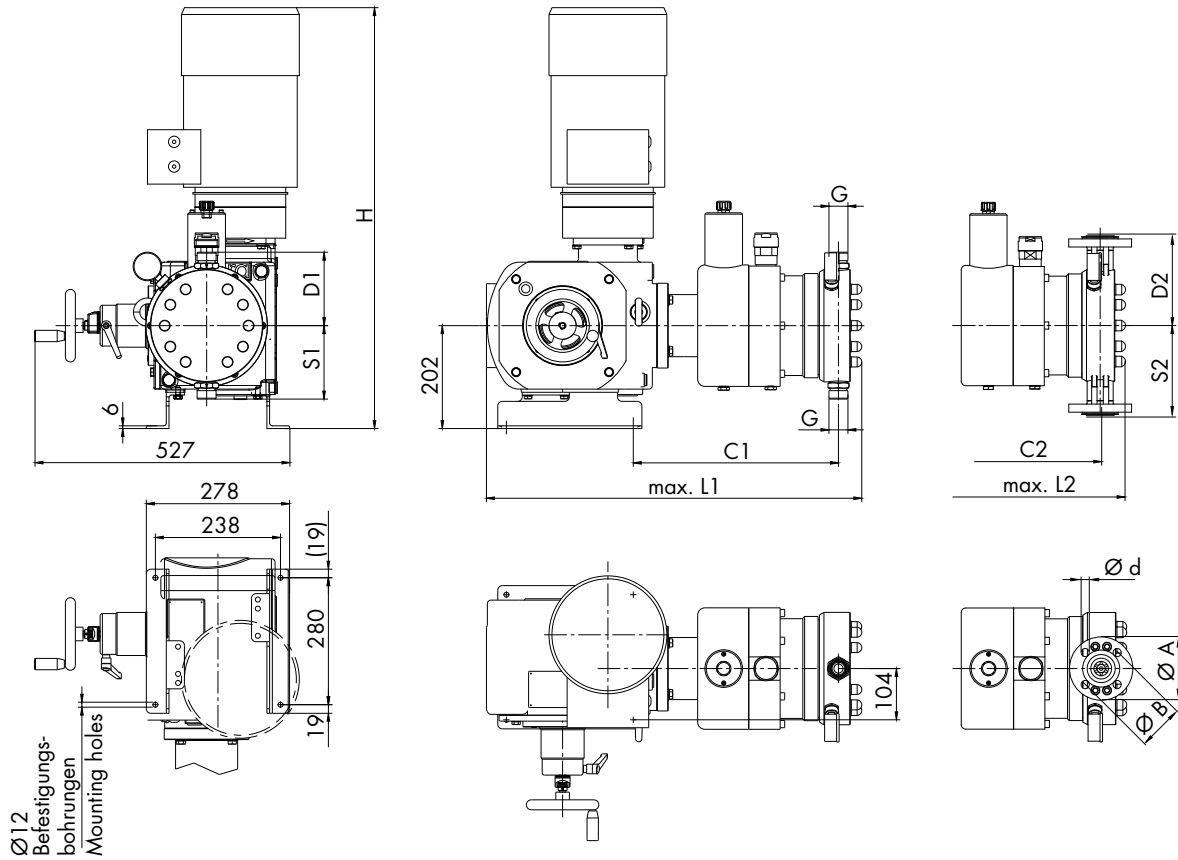
## Pump specifications

Type	Maximum permitted pressure at pump outlet $p_2$ max. bar	Nominal flow rate <sup>(1)</sup> $Q_N$ at $p_2$ max.			Suction height max. mWs	Permitted pressure at pump inlet min./max. bar	Recommended nominal width for connecting lines DN	Nominal stroke frequency		Weight approx. kg	Stroke length max. mm
		50 Hz	60 Hz	ml/stroke				50 Hz	60 Hz		
		l/h	l/h					rpm	rpm		
R510.1-65KM	180	65	78	8.3	3	-0.3/ 20	10	130	156	120	20
R510.1-150KM	80	150	180	19.2	3	-0.3/ 20	20	130	156	130	20
R510.1-300KM	45	300	360	38.5	3	-0.3/ 20	20	130	156	130	20
R510.1-700KM	22	700	840	89.7	3	-0.3/ 20	20	130	156	145	20
R510.1-850KM	16	850	1020	109	3	-0.3/ 20	32	130	156	160	20
R510.1-1100KM	13	1100	1320	141	3	-0.3/ 20	32	130	156	160	20

## Motor specifications

Type	Motor output kW	Frequency Hz	Voltage		Rated current		Insulation class ISO	Protection class IP	Frequency range with frequency converter operation Hz
			50 Hz	60 Hz	50 Hz (400V)	60 Hz (460V)			
			V ~ 3	V ~ 3	A	A			
R510.1-65 KM + <	1.5	50/60	230/400	460 ± 5%	3.3	3.3	F	55	20 - 60

R510.1-65 KM / R510.1-150 KM /  
R510.1-300 KM / R510.1-700 KM / R510.1-850 KM / R510.1-1100 KM



Type	External thread					
	H	G	C1	L1	S1	D1
R510.1-65KM	712	G3/4	310	646	97	104
R510.1-150 KM	712	G 1 1/4	347	696	128	128
R510.1-300 KM	712	G 1 1/4	359	705	138	138
R510.1-700 KM	712	G 1 1/4	359	705	138	138
R510.1-850 KM	712	only available in flange design				
R510.1-1100 KM	712					

Type	Flange in accordance with DIN 1092-1									Flange in accordance with ANSI								
	A	B	d	C2	L2	S2	D2	DN	PN	A	B	d	C2	L2	S2	D2	Flange	
R510.1-65KM	125	85	18	383	769	124	124	10	320	133	88.9	22.4	383	773	138	138	1/2"	2500 lbs
R510.1-150 KM	130	90	18	400	789	162	162	15	320	133	88.9	22.4	400	791	173	173	1/2"	2500 lbs
R510.1-300 KM	130	90	18	410	799	169	169	20	100	130	88.9	22.4	410	799	177	177	3/4"	1500 lbs
R510.1-700 KM	130	90	18	410	799	169	169	20	100	130	88.9	22.4	410	799	177	177	3/4"	1500 lbs
R510.1-850 KM	140	100	18	449	843	195	195	32	40	133	98.4	19	449	840	203	203	1 1/4"	600 lbs
R510.1-1100 KM	140	100	18	449	843	195	195	32	40	133	98.4	19	449	840	203	203	1 1/4"	600 lbs

# Technical specifications R511.1 KM (basic model)

Other types available on request

Piston diaphragm pump R 511.1-... KM

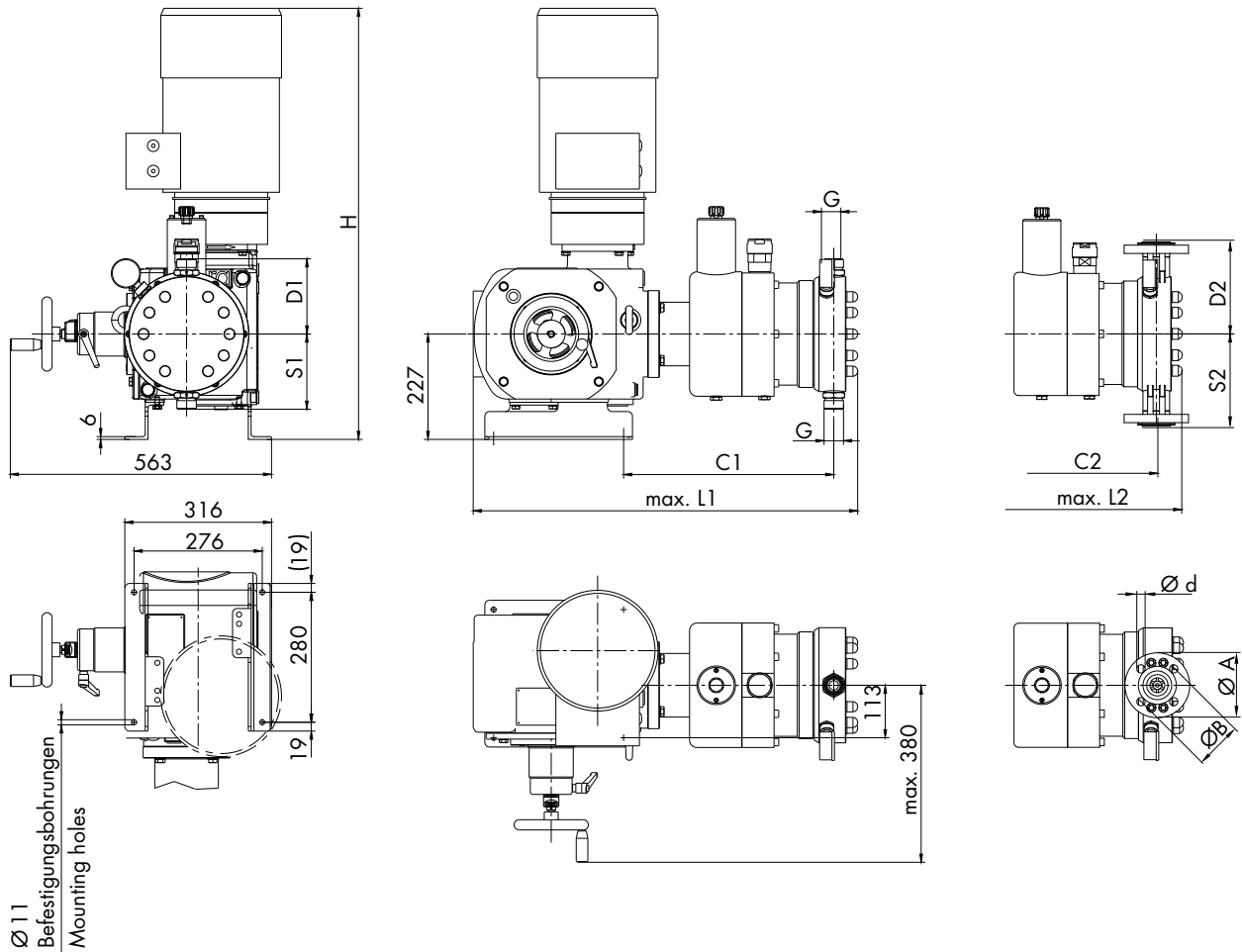


## Pump specifications

Type	Maximum permitted pressure at pump outlet $p_2$ max. bar	Nominal flow rate <sup>(1)</sup> $Q_N$ at $p_2$ max.			Suction height max. mWs	Permitted pressure at pump inlet min./max. bar	Recommended nominal width for connecting lines DN	Nominal stroke frequency		Weight approx. kg	Stroke length max. mm
		50 Hz	60 Hz	ml/stroke				50 Hz	60 Hz		
		l/h	l/h					rpm	rpm		
R511.1-100KM	220	0 - 100	0 - 120	13.3	3	-0.3/ 20	15	125	150	190	32
R511.1-220KM	160	0 - 220	0 - 264	29.3	3	-0.3/ 20	15	125	150	220	32
R511.1-440KM	85	0 - 440	0 - 528	58.6	3	-0.3/ 20	20	125	150	240	32
R511.1-900KM	40	0 - 900	0 - 1080	120.0	3	-0.3/ 20	32	125	150	270	32
R511.1-1450KM	25	0 - 1450	0 - 1740	193.3	3	-0.3/ 20	32	125	150	270	32
R511.1-1650KM	20	0 - 1650	-	253.3	3	-0.3/ 20	32	125	150	280	32

## Motor specifications

Type	Motor output kW	Frequency Hz	Voltage		Rated current		Insulation class ISO	Protection class IP	Frequency range with frequency converter operation Hz
			50 Hz	60 Hz	50 Hz (400V)	60 Hz (460V)			
			V ~ 3	V ~ 3	A	A			
R511.1-100KM	4	50/60	400 - 690 ± 5%	460 ± 5%	8.2	8.0	F	55	20 - 60
R511.1-220KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	11.4	10.8	F	55	20 - 60
R511.1-440KM	7.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20 - 60
R511.1-900KM	7.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20 - 60
R511.1-1450KM	7.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20 - 60
R511.1-1650KM	7.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20 - 60



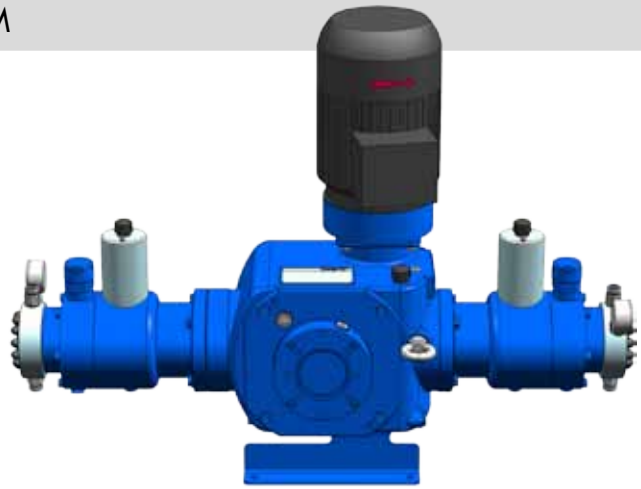
Type	H	External thread				
		G	C1	L1	S1	D1
R511.1-100 KM	808	G ¾	368	729	97	104
R511.1-220 KM	873	G 1¼	402	775	128	128
R511.1-440 KM	873	G 1¼	412	783	138	138
R511.1-900 KM	873					
R511.1-1450 KM	873					
R511.1-1650 KM	873					

only available in flange design

Type	Flange in accordance with DIN 1092-1									Flange in accordance with ANSI								
	A	B	d	C2	L2	S2	D2	DN	PN	A	B	d	C2	L2	S2	D2	Flange	
R511.1-100 KM	125	85	18	383	769	124	124	10	320	133	88.9	7/8"	383	773	138	138	½"	2500 lbs
R511.1-220 KM	130	90	18	400	789	162	162	15	320	133	88.9	7/8"	400	791	173	173	½"	2500 lbs
R511.1-440 KM	130	90	18	410	799	169	169	20	100	130	88.9	7/8"	410	799	177	177	¾"	1500 lbs
R511.1-900 KM	140	100	18	449	843	195	195	32	40	133	98.4	3/4"	449	840	203	203	1¼"	600 lbs
R511.1-1450 KM	140	100	18	449	843	195	195	32	40	133	98.4	3/4"	449	840	203	203	1¼"	600 lbs
R511.1-1650 KM	140	100	18	449	843	195	195	32	40	133	98.4	3/4"	449	840	203	203	1¼"	600 lbs

# Technical specifications XM 511.1 KM (basis model) Other types available on request

## Piston diaphragm pump XM 511.1-... KM



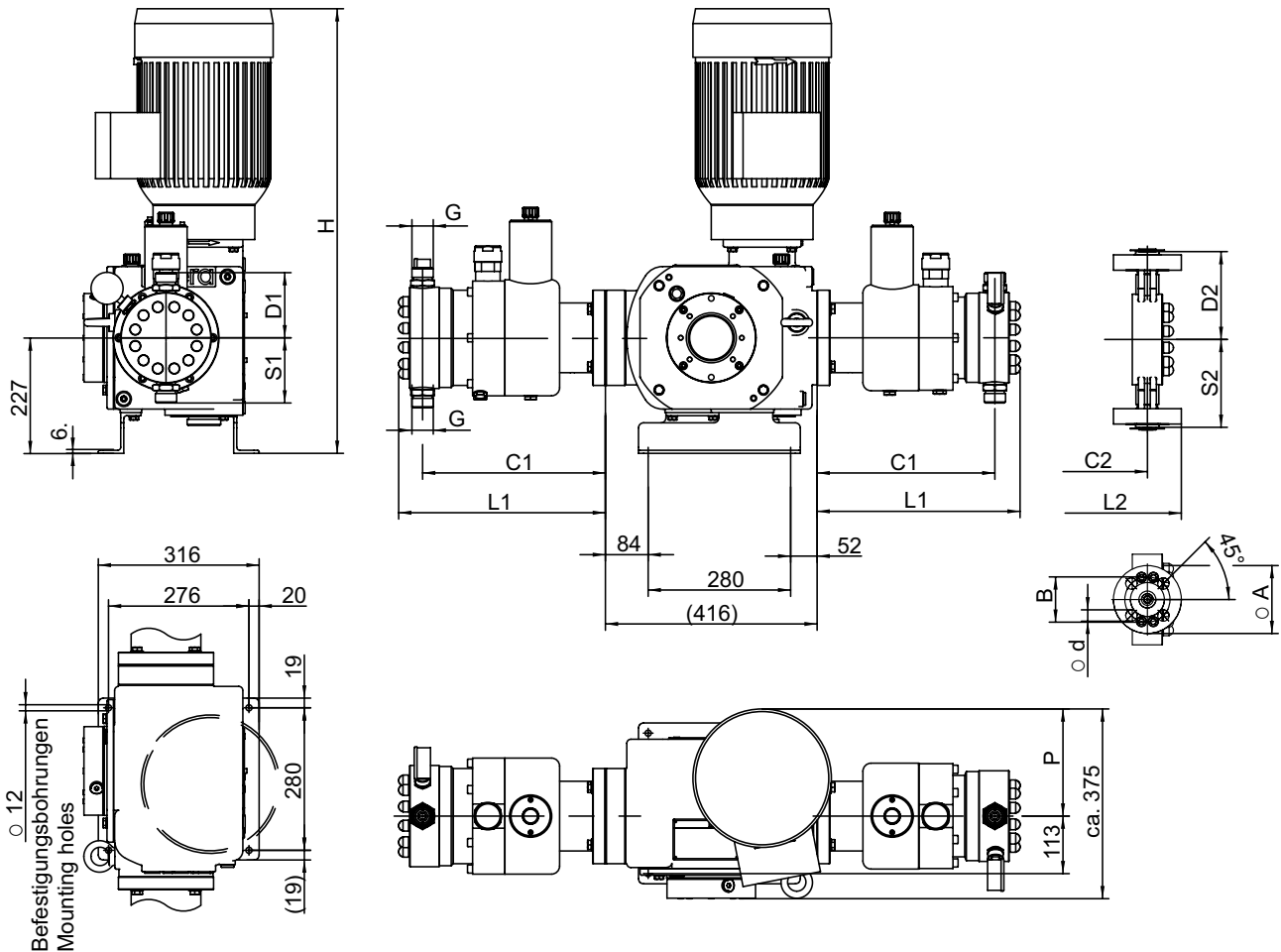
### Pump specifications

Type	Maximum permitted pressure at pump outlet $p_2$ max. bar	Nominal flow rate <sup>(1)</sup> $Q_N$ at $p_2$ max.			Suction height max. mWs	Permitted pressure at pump inlet min./max. bar	Recommended nominal width for connecting lines DN	Nominal stroke frequency		Weight approx. kg	Stroke length max. mm
		50 Hz	60 Hz	ml/stroke				50 Hz	60 Hz		
		l/h	l/h					rpm	rpm		
XM511.1-100KM	220	2 x 100	2 x 120	2 x 13.3	3	-0.3/ 20	15	125	150	263	32
XM511.1-220KM	160	2 x 220	2 x 264	2 x 29.3	3	-0.3/ 20	15	125	150	297	32
XM511.1-440KM	85	2 x 440	2 x 528	2 x 58.6	3	-0.3/ 20	20	125	150	341	32
XM511.1-900KM	40	2 x 900	2 x 1080	2 x 120.0	3	-0.3/ 20	32	125	150	385	32
XM511.1-1450KM	25	2 x 1450	2 x 1740	2 x 193.3	3	-0.3/ 20	32	125	150	385	32
XM511.1-1650KM	20	2 x 1650	-	2 x 220.0	3	-0.3/ 20	32	125	150	385	32

### Motor specifications

Type	Motor output kW	Frequency Hz	Voltage		Rated current		Insulation class ISO	Protection class IP	Frequency range with frequency converter operation Hz
			50 Hz	60 Hz	50 Hz (400V)	60 Hz (460V)			
			V ~ 3	V ~ 3	A	A			
XM511.1-100KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	8.2	8.0	F	55	20-60
XM511.1-220KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	11.4	10.8	F	55	20-60
XM511.1-440KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20-60
XM511.1-900KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20-60
XM511.1-1450KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20-60
XM511.1-1650KM	5.5	50/60	400 - 690 ± 5%	460 ± 5%	14.8	14.6	F	55	20-60

XM511.1-100 KM / XM511.1-220 KM / XM511.1-440 KM / XM511.1-900 KM / XM511.1-1450 KM / XM511.1-1650 KM



Type	H	External thread				
		G	C1	L1	S1	D1
XM511.1-100 KM	808	G ¾	368	729	97	104
XM511.1-220 KM	873	G 1¼	402	775	128	128
XM511.1-440 KM	873	G 1¼	412	783	138	138
XM511.1-900 KM	873	only available in flange design				
XM511.1-1450 KM	873					
XM511.1-1650 KM	873					

Type	Flange in accordance with DIN 1092-1									Flange in accordance with ANSI								
	A	B	d	C2	L2	S2	D2	DN	PN	A	B	d	C2	L2	S2	D2	Flange	
XM511.1-100 KM	125	85	18	383	769	124	124	10	320	133	88.9	7/8"	383	773	138	138	½"	2500 lbs
XM511.1-220 KM	130	90	18	400	789	162	162	15	320	133	88.9	7/8"	400	791	173	173	½"	2500 lbs
XM511.1-440 KM	130	90	18	410	799	169	169	20	100	130	88.9	7/8"	410	799	177	177	¾"	1500 lbs
XM511.1-900 KM	140	100	18	449	843	195	195	32	40	133	98.4	3/4"	449	840	203	203	1¼"	600 lbs
XM511.1-1450 KM	140	100	18	449	843	195	195	32	40	133	98.4	3/4"	449	840	203	203	1¼"	600 lbs
XM511.1-1650 KM	140	100	18	449	843	195	195	32	40	133	98.4	3/4"	449	840	203	203	1¼"	600 lbs

# Dosing skids

Thanks to our extensive accessories, the intelligent combination of the **sera** modular design and our experience in system construction, we are able to offer complete dosing skids and package units. Our strengths lie in customised design, including competence in detailed engineering, production, assembly and project-specific documentation. Simple implementation into the planning of your entire system is made possible by extensive CAD data.



## Dosing skid for corrosion inhibitor

- ATEX, API675, EAC
- 54 l/h, up to 160 bar
- Pulsation damper fitted
- Electric actuator for integration into PCS

## Dosing skid for trisodium phosphate

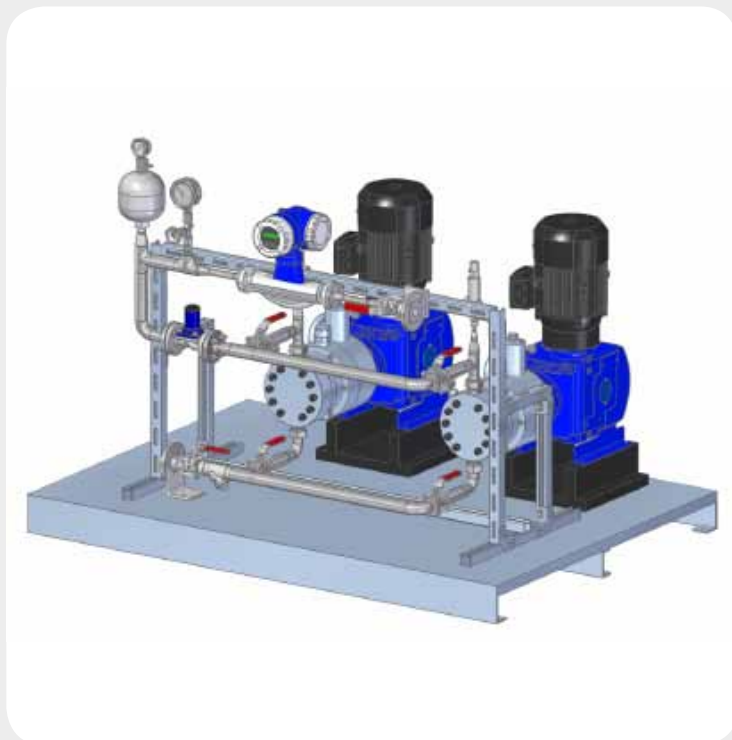
- ATEX, API675
- 37 l/h, up to 180 bar
- Storage tank 200 l
- Piping with pulsation damper, pressure measurement and safety valve





## Dosing skid for methanol

- ATEX
- Standby pump
- 1450 l/h, up to 25 bar
- Piping with safety valves, pulsation damper, pressure measurement device and mass flowmeter



# Dosing skids



## Dosing skid for trisodium phosphate

- 20 l/h, up to 140 bar
- Storage tank 200 l
- 2 dosing lines, each with a standby pump
- Piping with pulsation damper, pressure measurement, safety valve and automatic flushing device
- Complete system with on-site control and communication with PCS

## Dosing skid for methanol

- 4 x 400 l/h, up to 10 bar
- Common suction pipe with automatic valves
- Piping with pulsation damper, excess flow valve and check valve
- Complete system with stainless steel base frame, drip tray and leakage monitoring



# For our customers on-site worldwide

With our headquarters in Germany and subsidiaries in England, Spain and South Africa, as well as a global sales and service network with over 30 representatives abroad in more than 80 countries all over the world, **sera** guarantees optimal customer care on site.



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