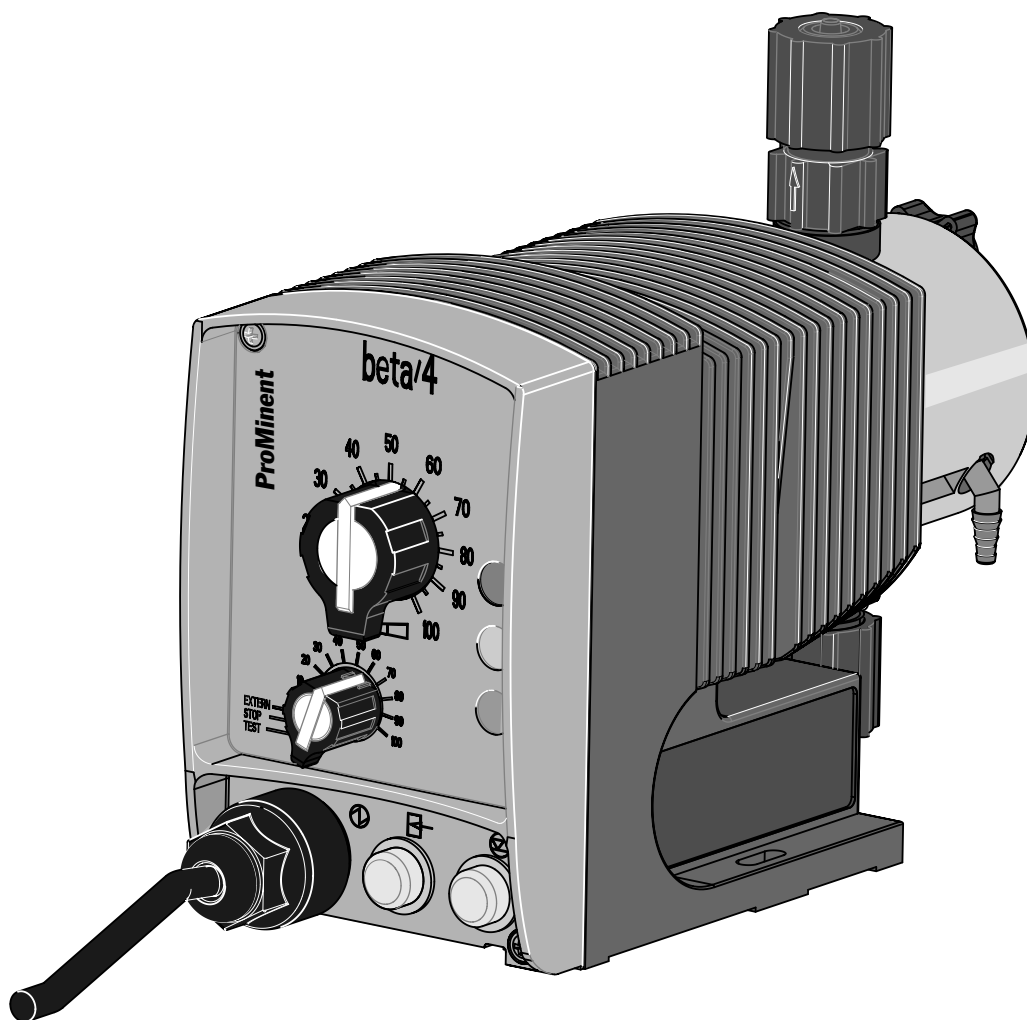


# Operating Instructions Manual

## Solenoid Dosing Pump

### Beta® BT4a and BT5a



BT4A \_\_\_\_\_

BT5A \_\_\_\_\_

Please enter identcode of the device here.

Two sets of operating instructions are required for the safe and correct use of the metering pumps:

The product specific operating instructions manual  
and the "General Operating Instructions ProMinent® Solenoid Metering Pumps".

**The two are valid only when read in conjunction with one another.**

**Please read the Operating Instructions manual through completely before commissioning this equipment.  
Do not discard! The operator shall be liable for any damage caused by installation or operating errors!**

Publishing details:

Operating Instructions for Solenoid Dosing Pump ProMinent® Beta®  
© ProMinent Dosiertechnik GmbH, 1998

Address:

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69123 Heidelberg  
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Subject to technical modifications

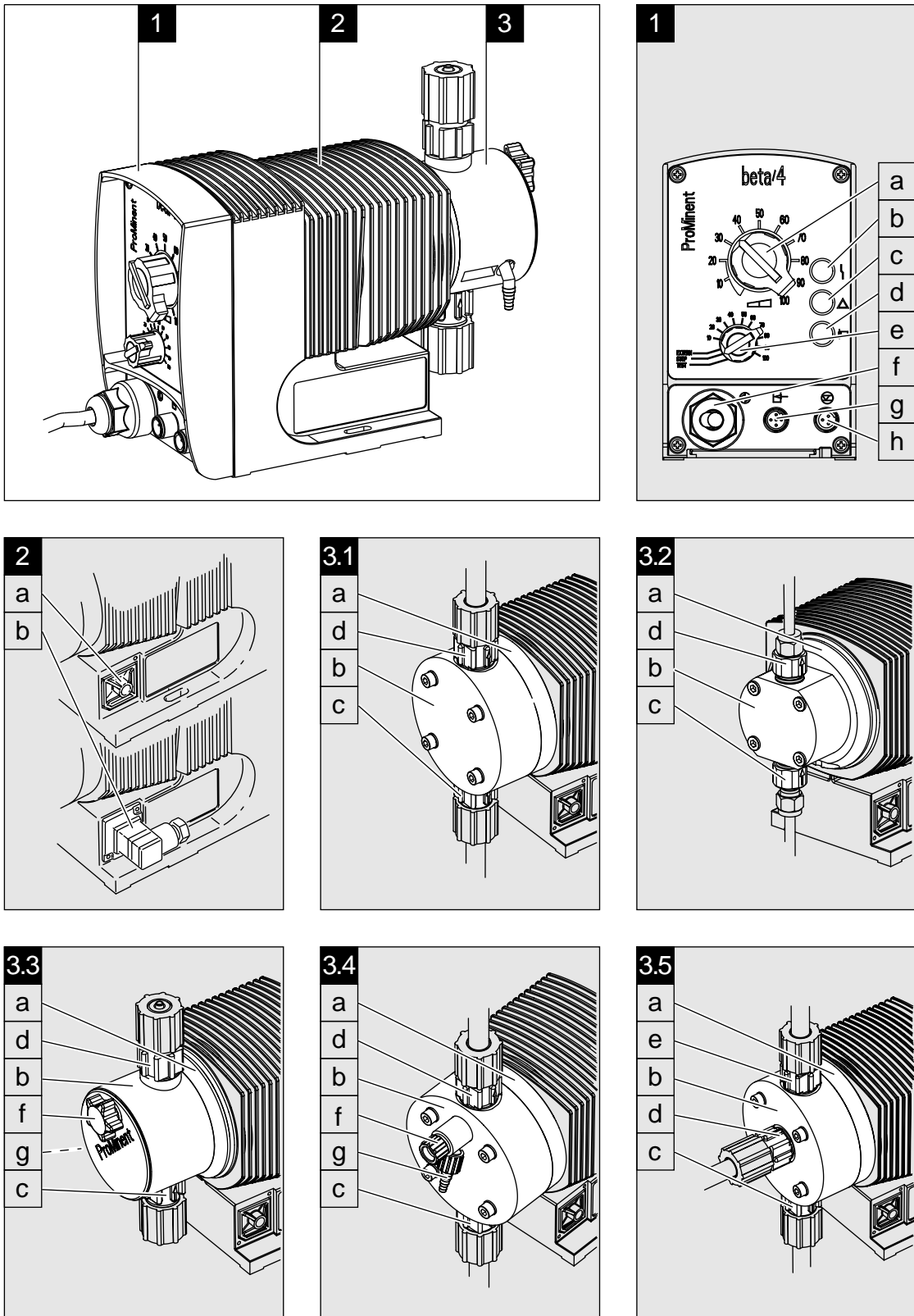


Fig. 01

## Major Components

### 1 Control unit

- 1a Stroke length adjustment knob
- 1b Red LED display, fault indicator
- 1c Yellow LED display, warning indicator
- 1d Green LED display, operating status
- 1e Multifunction switch
- 1f Mains connector
- 1g External operating terminal
- 1h Float switch connector

### 2 Power end

- 2a Relay insertion point
- 2b Optional relay

### 3 Liquid end

- 3.1 Liquid end without bleed valve, with/without valve spring
  - 3.2 Liquid end without bleed valve, with/without valve spring
  - 3.3 Liquid end with bleed valve, with/without valve spring (PP-version)
  - 3.4 Liquid end with bleed valve, with/without valve spring (NP-version)
  - 3.5 Self-degassing liquid end
- 3a Liquid end back plate
  - 3b Liquid end
  - 3c Suction connection
  - 3d Discharge connection
  - 3e Bleed valve connection (self degassing liquid ends)
  - 3f Bleeding/fine bleeding valve
  - 3g Bypass tubing nozzle

## General User Information:

This operating instructions manual contains the product descriptions in the main text.

- main points
- instructions

and safety information are indicated by pictograms (see chap. 2).

### **NOTE**

**Working guidelines.**

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## 1 Application

The pumps in the ProMinent® Beta® series are microprocessor controlled solenoid metering pumps.

*Liquid media* They offer highly accurate reproducible metering in the dosing of liquid chemicals in pressurised pipe systems and into open and closed containers.

*Compatibility* Specified components/accessories in the Beta® pump series are compatible with those in the CONCEPT, gamma-Classic and gamma series as follows:

- Signal cable: gamma/Vario two core, and four core for "external" function
- Two stage float switch (gamma/Vario)
- gamma discharge line
- Standard gamma connector set
- gamma wall mounting bracket
- Feed container and fixing plates
- Total height (distance between suction and discharge line connectors)
- Distance between the connectors and mounting holes on the pump
- Identical accessories used, e.g. back pressure valves, multifunction valves and flushing apparatus.

### Correct use of equipment

- The Beta® may be used only to meter liquids.
- The pump is not designed for use with gaseous chemicals or suspended solids.
- Take care when using aggressive chemicals that the materials used in the pump are resistant to those chemicals (see ProMinent® Chemical Resistance List in the product catalogue or under [www.prominent.com](http://www.prominent.com)).
- All other applications or modifications are prohibited.
- The pump may only be used for applications which correspond to the technical data and specifications described in the operating instructions manual.
- The pump is not designed for use in explosion-hazardous locations.
- The Beta® should be operated by suitably trained and authorised personnel only.

## 2 Safety

### 2.1 Identification of the notes on safety

The following terms are used in the present operating instructions to indicate the various severity levels of the danger:

**WARNING:** *Characterizes a possibly hazardous situation. Your life is in danger and there is a danger of serious injury if these notes are disregarded!*

**CAUTION:** *Characterizes a possibly hazardous situation. There is a danger of slight or minor injury or damage to property if these notes are disregarded.*

The following warning signs are used in the present operating instructions to indicate different types of danger:



**Warning of danger area.**

## 2.2 Safety Guidelines



### **WARNING**

- In emergencies the pump should be switched off immediately! Disconnect the power cable from the power supply!
- Do not dispatch pumps which are designed for use with radioactive chemicals!
- When using pumps with flammable chemicals, observe the relevant regulations concerning the transport and storage of flammable fluids (Ex, Vo, Vb F)!
- When installing outside Germany, always observe relevant national regulations!
- Combining ProMinent® metering pumps with parts not approved and tested by ProMinent is not permissible. It can cause injury or damage to persons or materials for which we cannot accept liability!



### **CAUTION**

- Pumps must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!
- The pumps and peripherals must be serviced and repaired by qualified and authorised persons only!
- Always de-pressurise the liquid end prior to working on a pump!
- Empty and rinse the liquid end before working on a pump which has been used with hazardous or unknown chemicals!
- Always read chemical safety data!
- Always wear protective clothing when handling hazardous or unknown chemicals!

## 2.3 Sound intensity level

The sound intensity level is < 70 dB (A) at maximum stroke, maximum stroke rate, maximum back pressure (water) in accordance with DIN EN 12639 (Metering Pump Noise Measurement)

## 2.4 EC Declaration of Conformity

**EC Declaration of Conformity**

We,

**ProMinent Dosiertechnik GmbH  
Im Schuhmachergewann 5 - 11  
D - 69123 Heidelberg**

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.

Any modification to the product not approved by us will invalidate this declaration.

Product description : ***Metering pump, series Beta /\_a***

Product type : ***BT4a .... , BT5a ....***

Serial number : ***see type identification plate on device***

Relevant EC regulations : ***EC - machine directive (98/37/EC)  
EC - low voltage directive (2006/95/EC)  
EC - EMC - directive (2004/108/EC)***

Harmonised standards used,  
in particular ***EN ISO 12100-1, EN ISO 12100-2, EN 809,  
EN 60335-1, EN 60335-2-41, EN 50106, EN 55014,  
EN 61000-3-3, EN 61000-4-2/3/4/5/6/11, EN 61000-6-1/2***

Date/manufacturer's signature : ***13.07.2007*** *Dr. Johannes Hartfiel*

The undersigned : ***Dr. Johannes Hartfiel, assistant development manager***



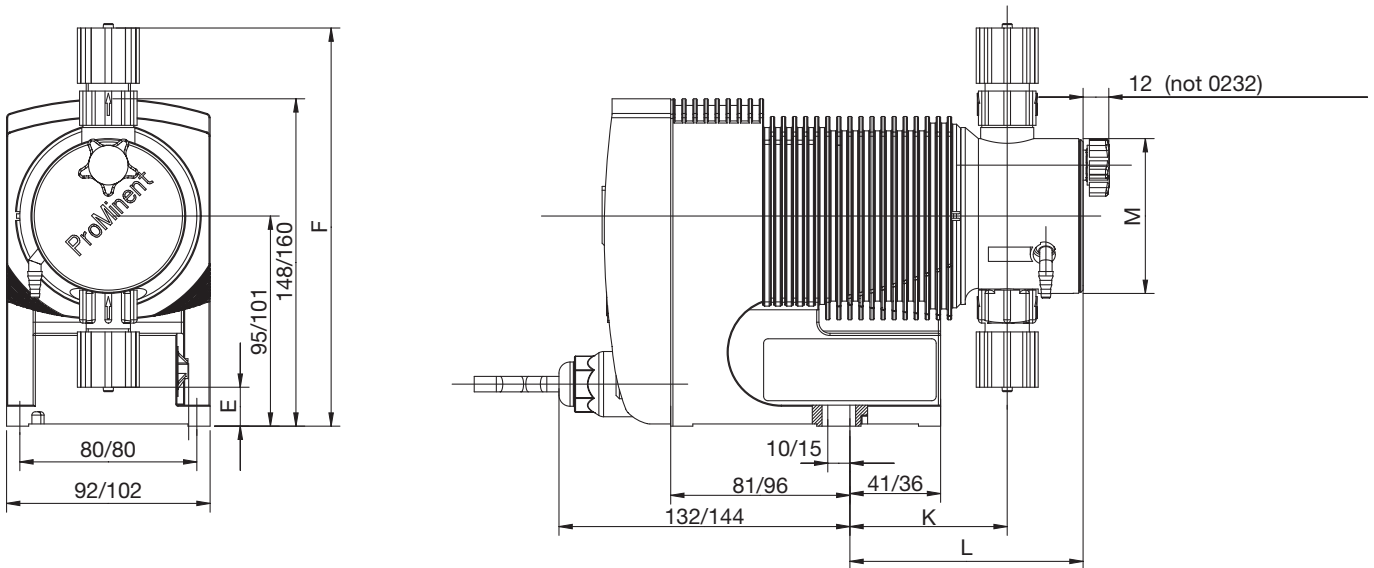
### 3 Design and Function

<i>Main components</i>	Operating panel Power end Liquid end
<i>Operating Principle</i>	Chemical feed occurs as a result of pulsed deflections of the dosing diaphragm within the liquid end, which causes pressure differentiation between the suction side, the liquid end cavity and the discharge side. The pressure differentiation causes the suction and discharge self-acting valves to open and close, resulting in chemical feed.  The dosing diaphragm is driven by an electromagnet, which is stimulated and controlled by a microprocessor.
<i>Pump Capacity</i>	The feed rate is determined by the stroke length and stroking rate.  The stroke length is adjustable between 0 % and 100 % using the stroke length adjustment knob. However reproducibility is only technically practicable in the adjustment range of between 30 % and 100 %.  Stroking rate is adjustable in 10 % steps between 0 % and 100 % using the multifunction switch. This gives a higher rate of reproducible metering accuracy.
<i>Operating Modes</i>	Operating modes are selected using the multifunction switch.  Three LED displays indicate operating and fault status.  <b>Internal operating mode: "Manual":</b> Stroking rate is manually adjustable in 10 % steps via the multifunction switch.  <b>"External" operating mode:</b> Allows adjustment of individual strokes via the external operating mode terminal by means of contact or semi-operating devices.
<i>Functions</i>	<b>"Auxiliary Frequency" function:</b> Enables activation of optionally selectable and programmable stroking rate, controlled via the external operating mode terminal. This stroking rate overrides "Manual" and "External" operating modes. In the standard version the "Auxiliary Frequency" function is programmed to 100 % stroking rate.  <b>"Pause" function:</b> The external operating terminal can be used to operate a remote pump stop function.  <b>"Stop" function:</b> This function allows the pump to be deactivated without disconnecting from the power supply.  <b>"Test" function:</b> This function checks the priming function of the pump. The switch setting "Test" on the multifunction switch is self-locking.
<i>Self-degassing</i>	Self-degassing metering pumps are used in closed discharge lines to create suction and to direct trapped air to bypass lines, and/or remove gas emitted by gaseous chemicals during operation, independently of existing back pressure. Installing a back pressure valve ensures precise chemical feed can be achieved, even when operating under atmospheric pressure.
<i>Options</i>	The float switch connector can be used to connect a two stage float switch. There is also optionally available a relay terminal for an alarm indicating relay, and a switch output which is synchronised to each stroke.



## 4.2 Sizes and Weights

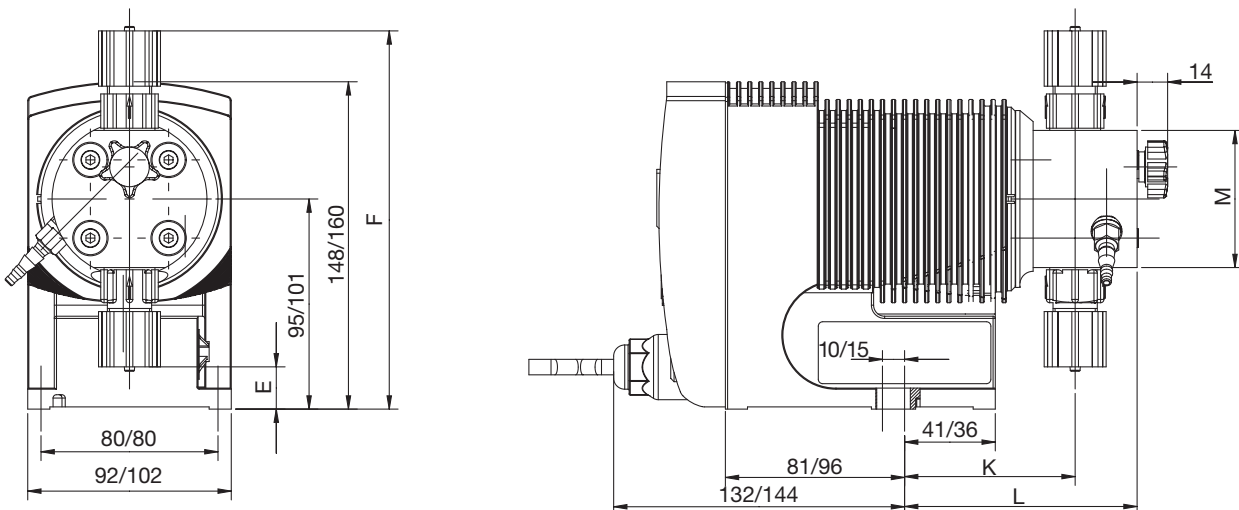
Materials option: PP



Dimensions Beta®/ 4 / Beta®/ 5

	Beta®/ 4				Beta®/ 5			
	1000 – 1602	1005	0708 – 0413	0220	1605	1008 – 0713	0420	0232
E	17	7	9	9	13	15	15	5
F	180	187	185	185	193	191	191	197
K	71	71	74	76	71	74	76	76
L	106	105	108	110	105	108	110	91
M	Ø 70	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 110

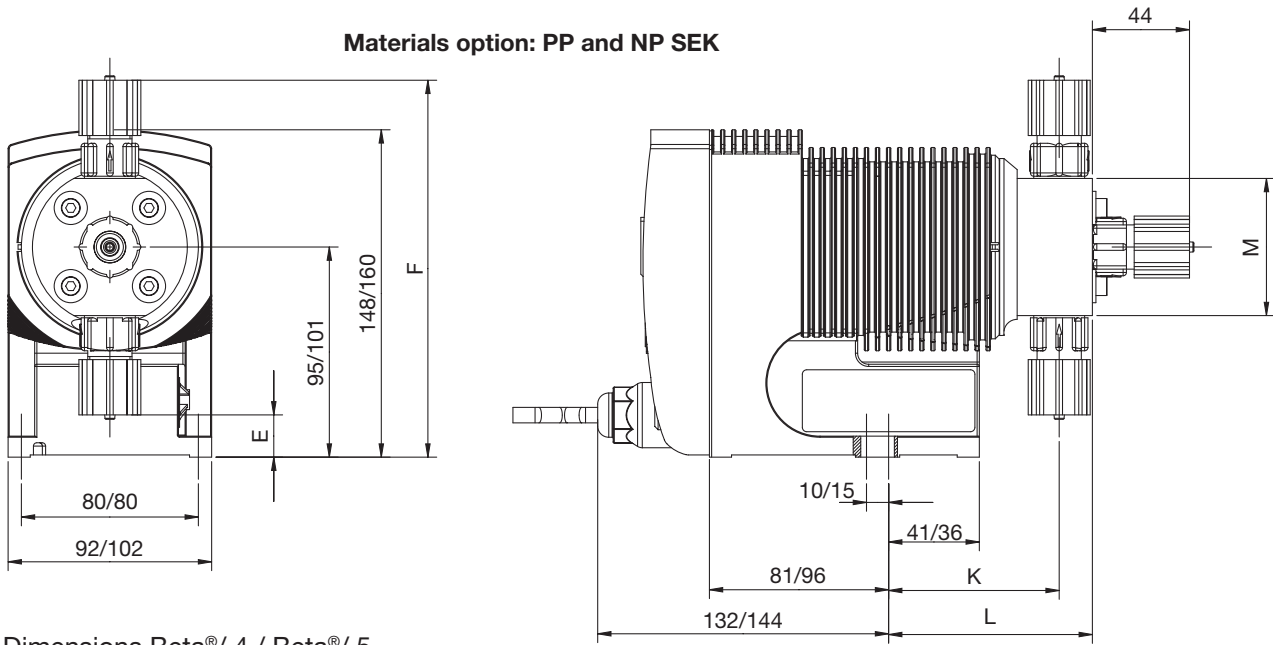
Materials option: NP



Dimensions Beta®/ 4 / Beta®/ 5

	Beta®/ 4					Beta®/ 5			
	1000 – 1601	1602	1005	0708	0413 – 0220	1605	1008	0713 – 0420	0232
E	19	17	10	9	9	16	15	15	5
F	171	173	180	181	181	186	187	187	197
K	77	77	74	74	76	74	74	76	76
L	105	105	102	102	104	102	102	104	91
M	62 (Ø 70)	66 (Ø 70)	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 110

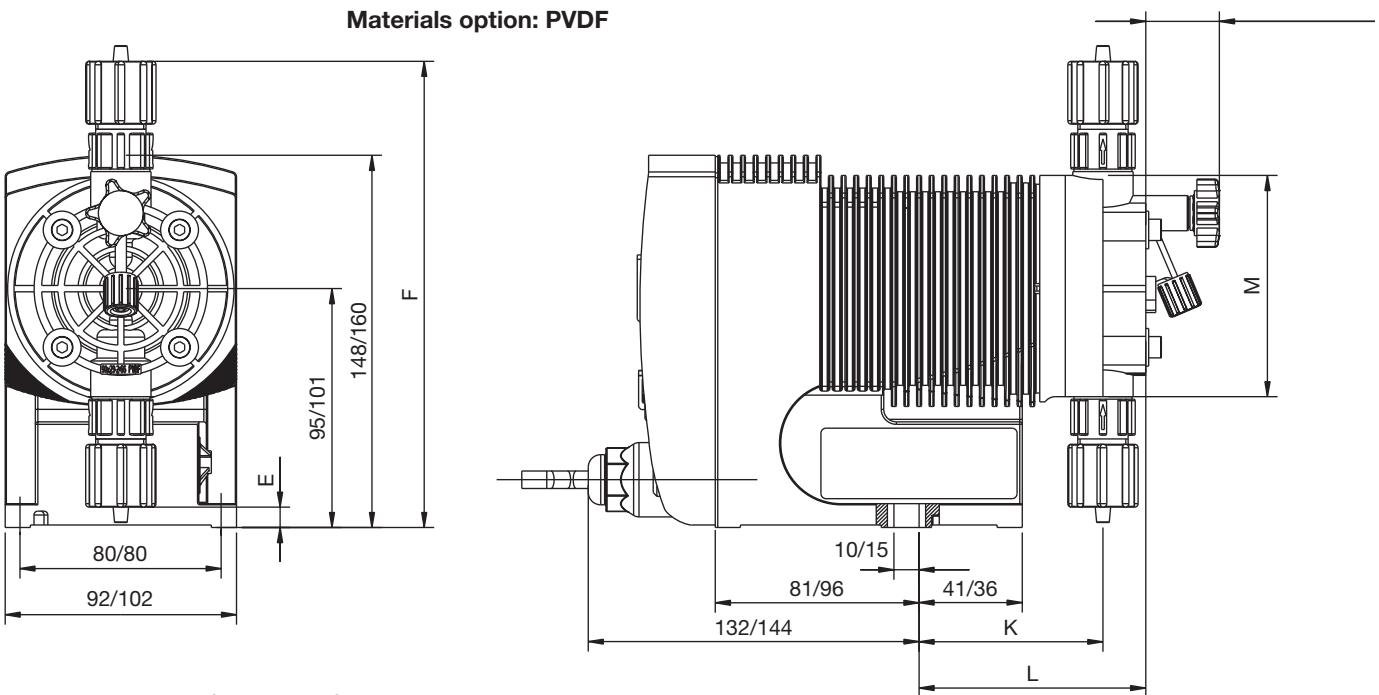
Materials option: PP and NP SEK



Dimensions Beta® / 4 / Beta® / 5

	Beta® / 4					Beta® / 5		
	1601 – 1602	1602	1005	0708	0413 – 0220	1605	1008	0713 – 0420
E	19	17	10	9	9	16	15	15
F	171	173	180	181	181	186	187	187
K	77	77	74	74	76	74	74	76
L	92	92	89	89	91	89	89	91
M	62 (Ø 70)	66 (Ø 70)	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90

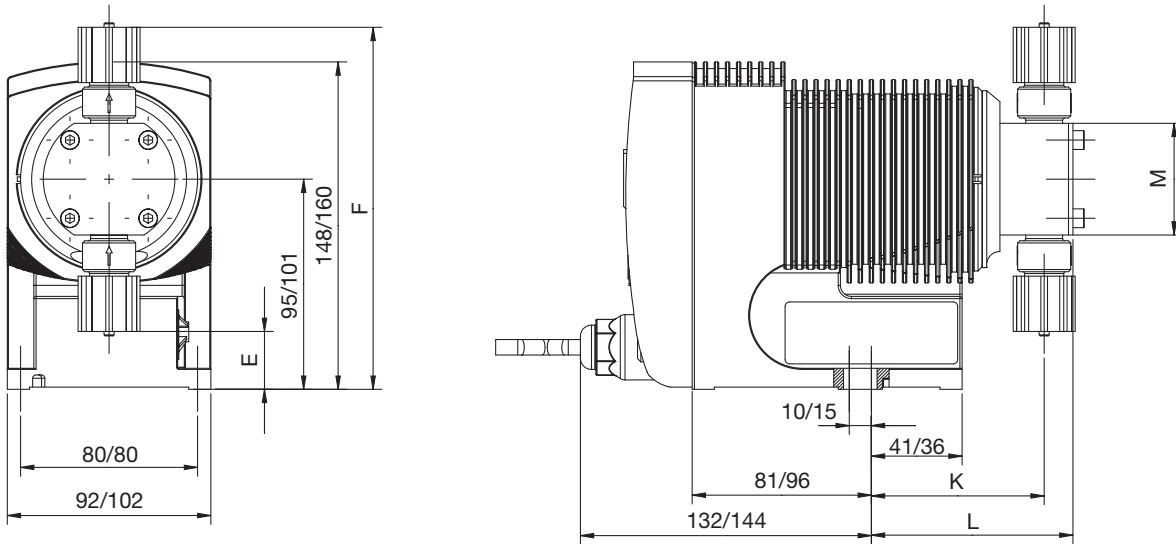
Materials option: PVDF



Dimensions Beta® / 4 / Beta® / 5

	1000-1602	1005	0708-0413	0220	1605	0408-0713	0420	0232
E	19	8	8	8	14	14	14	4
F	179	185	185	185	191	191	191	198
K	71	71	73	75	71	73	75	76
L	84	88	90	92	88	90	92	93
M	Ø 70	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 90	Ø 110

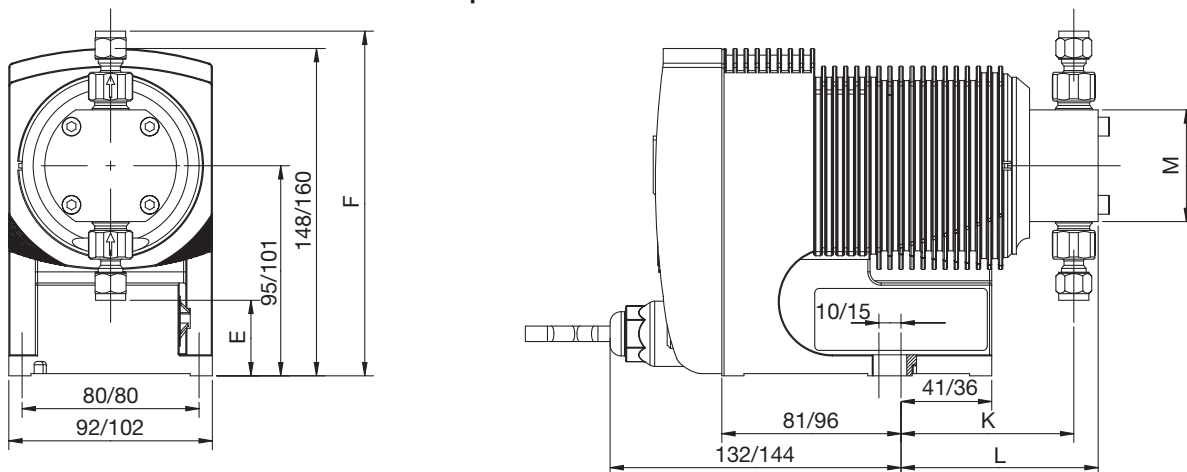
Materials option: TT



Dimensions Beta®/ 4 / Beta®/ 5

	Beta®/ 4				Beta®/ 5		
	1000 – 1601	1602	1005	0708 – 0220	1605	1008 – 0420	0232
<b>E</b>	26	19	17	-13	23	-7	-15
<b>F</b>	164	172	173	203	179	209	217
<b>K</b>	78	72	75	77	75	77	78
<b>L</b>	91	91	90	95	90	95	95
<b>M</b>	51 (Ø 60)	66 (Ø 70)	68 (Ø 80)	81 (Ø 85)	68 (Ø 80)	81 (Ø 85)	96 (Ø 100)

Materials option: SS



Dimensions Beta®/ 4 / Beta®/ 5

	Beta®/ 4					Beta®/ 5			
	1000 – 1601	1602	1005	0708 – 0413	0220	1605	1008 – 0713	0420	0232
<b>E</b>	34	27	25	-8	-9	31	-2	-3	-10
<b>F</b>	156	164	165	198	199	171	203	204	212
<b>K</b>	78	72	75	77	77	75	77	77	78
<b>L</b>	89	89	88	91	93	88	91	93	93
<b>M</b>	51 (Ø 60)	66 (Ø 70)	68 (Ø 80)	81 (Ø 85)	81 (Ø 85)	68 (Ø 80)	81 (Ø 85)	81 (Ø 85)	96 (Ø 100)

### 4.3 Capacity Data

Beta®/ 4 at 180 strokes/minute and 100 % stroke length

Pump type	Max. Pump capacity at maximum back pressure			Max. pump capacity at medium back pressure			Connector size oØ x iØ	Suction lift* m WG	Priming lift** m WG	Permissible admission pressure bar	Shipping weight PP, NP, PV, TT/SS approx. kg
	bar	l/h	ml/stroke	bar	l/h	ml/stroke					
1000	10	0.74	0.07	5	0.82	0.076	6x4	6	1.8	8	2.9 / 3.6
0700	7	0.8	0.07	3.5	0.9	0.08	6x4	6	1.8	8	2.9 / 3.6
0400	4	0.84	0.08	2	1.1	0.105	6x4	6	1.8	8	2.9 / 3.6
1601	16	1.1	0.10	8	1.4	0.13	6x4	6	2.0	8	2.9 / 3.6
1001	10	1.3	0.12	5	1.5	0.14	6x4	6	2.0	8	2.9 / 3.6
0701	7	1.4	0.13	3.5	1.6	0.15	6x4	6	2.0	8	2.9 / 3.6
0401	4	1.5	0.14	2	2.3	0.21	6x4	6	2.0	8	2.9 / 3.6
1602	16	2.1	0.19	8	2.5	0.24	6x4	6	2.5	5.5	2.9 / 3.6
1002	10	2.4	0.22	5	2.8	0.25	6x4	6	2.5	5.5	2.9 / 3.6
0702	7	2.6	0.24	3.5	3.0	0.28	6x4	6	2.5	5.5	2.9 / 3.6
0402	4	2.8	0.26	2	4.0	0.37	6x4	6	2.5	5.5	2.9 / 3.6
1005	10	4.4	0.41	5	5.0	0.46	8x5****	5	3.0	3	3.1 / 4.5
0705	7	4.7	0.44	3.5	5.4	0.50	8x5****	5	3.0	3	3.1 / 4.5
0405	4	5.3	0.49	2	7.1	0.66	8x5****	6	3.0	3	3.1 / 4.5
0708	7	7.1	0.66	3.5	8.4	0.78	8x5	4	2.0	2	3.1 / 4.5
0408	4	8.3	0.77	2	10.6	0.98	8x5	4	2.0	2	3.1 / 4.5
0413	4	12.3	1.14	2	14.2	1.31	8x5	3	2.5	1.5	3.1 / 4.5
0220	2	19.0	1.76	1	20.9	1.94	12x9	2	2.0	1	3.1 / 4.5

Beta®/ \*\*\* - self-degassing types at 180 strokes/minute and 100 % stroke length

Pump type	Max. Pump capacity at maximum back pressure			Max. pump capacity at medium back pressure			Connector size oØ x iØ	Suction lift* m WG	Priming lift** m WG	Permissible admission pressure bar	Shipping weight PP, NP approx. kg
	bar	l/h	ml/stroke	bar	l/h	ml/stroke					
1601	16	0.59	0.055	8	0.78	0.072	6x4	–	1.8	0.5	2.9
1001	10	0.72	0.067	5	0.84	0.078	6x4	–	1.8	0.5	2.9
0701	7	0.84	0.078	3.5	0.84	0.078	6x4	–	1.8	0.5	2.9
0401	4	0.9	0.083	2	1.02	0.09	6x4	–	1.8	0.5	2.9
1602	16	1.4	0.13	8	1.74	0.16	6x4	–	2.1	0.5	2.9
1002	10	1.7	0.16	5	2.0	0.18	6x4	–	2.1	0.5	2.9
0702	7	1.8	0.17	3.5	2.1	0.19	6x4	–	2.1	0.5	2.9
0402	4	2.1	0.19	2	2.2	0.20	6x4	–	2.1	0.5	2.9
1005	10	3.6	0.33	5	4.0	0.37	8x5	–	2.7	0.5	3.1
0705	7	3.9	0.36	3.5	4.3	0.40	8x5	–	2.7	0.5	3.1
0405	4	4.2	0.39	2	4.4	0.41	8x5	–	2.7	0.5	3.1
0708	7	6.6	0.61	3.5	7.5	0.69	8x5	–	2.0	0.5	3.1
0408	4	7.5	0.69	2	8.1	0.75	8x5	–	2.0	0.5	3.1
0413	4	10.8	1.00	2	12.6	1.17	8x5	–	2.5	0.5	3.1
0220	2	16.2	1.50	1	18.0	1.67	12x9	–	2.0	0.5	3.1

\* Suction lift when suction line and liquid end are full.

\*\* Priming lift when valves are clean and have been wetted. Intake head at 100 % stroke length and free run-off or vent valve open.

\*\*\* The feed rates are minimum feed rates and relat to water.

\*\*\*\* For 6 x 4 mm stainless steel version.

Beta®/ 5 at 180 strokes/minute and 100 % stroke length

Pump type	Max. Pump capacity at maximum back pressure			Max. pump capacity at medium back pressure			Connector size oØ x iØ	Suction lift*	Priming lift**	Permissible admission pressure	Shipping weight PP, NP, PV, TT/SS approx. kg
	bar	l/h	ml/stroke	bar	l/h	ml/stroke					
1605	16	4.1	0.38	8	4.9	0.45	8x5****	4.0	3.0	3	4.5 / 5.9
1008	10	6.8	0.63	5	8.3	0.76	8x5	3.0	3.0	2	4.5 / 5.9
0713	7	11.0	1.02	3.5	13.1	1.21	8x5	3.0	3.0	1.5	4.5 / 5.9
0420	4	17.1	1.58	2	19.1	1.77	12x9	3.0	3.0	1	5.5 / 8.6
0232	2	32.0	2.96	1	36.2	3.35	12x9	2.0	2.0	0.8	5.5 / 8.6

Beta®/ 5\*\*\* - self-degassing types at 180 strokes/minute and 100 % stroke length

Pump type	Max. Pump capacity at maximum back pressure			Max. pump capacity at medium back pressure			Connector size oØ x iØ	Suction lift*	Priming lift**	Permissible admission pressure	Shipping weight PP, NP approx. kg
	bar	l/h	ml/stroke	bar	l/h	ml/stroke					
1605	16	3.3	0.31	8	3.8	0.35	8x5	–	3.0	0.5	4.5
1008	10	6.3	0.58	5	7.5	0.69	8x5	–	3.0	0.5	4.5
0713	7	10.5	0.97	3.5	12.3	1.14	8x5	–	2.5	0.5	4.5
0420	4	15.6	1.44	2	17.4	1.61	12x9	–	2.5	0.5	4.5

\* Suction lift when suction line and liquid end are full.

\*\* Priming lift when valves are clean and have been wetted. Intake head at 100 % stroke length and free run-off or vent valve open.

\*\*\* The feed rates are minimum feed rates and relat to water at 20 °C.

\*\*\*\* For 6 x 4 mm stainless steel version.

#### 4.4 Reproducibility

*Reproducible metering accuracy* -5 % to +10 % at max. stroke length and max. back pressure for versions in all materials.

*Reproducibility* ±2 % under constant conditions and at minimum 30 % stroke length.

As the self-bleeding pump is used with outgassing media and in application with gas-bubbles, the metering accuracy and reproducibility cannot be indicated.

The recommended min. stroke length for selfbleeding dosing pumps is 50 %.

#### 4.5 Viscosity

The metering pumps are intended for use with liquids with a viscosity of up to:

- max. 200 mPas for standard liquid end
- max. 500 mPas for spring valves
- max. 50 mPas for self-degassing metering pumps.

#### 4.6 Materials Information

Version	Liquid end	Valves	Seals	Valve Balls
PPE	Polypropylene	Polypropylene	EPDM	ceramic
PPB	Polypropylene	Polypropylene	FPM	ceramic
NPE	Acrylic	PVC	EPDM	ceramic
NPB	Acrylic	PVC	FPM	ceramic
PVT	PVDF	PTFE with carbon	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	stainless steel No. 1.4571	stainless steel No. 1.4571	PTFE	ceramic

FPM = Fluorine Rubber

#### 4.7 Electrical Data

- Version: 200-230 V ±10 %, 50/60 Hz

230 V/AC Version	Beta®/ 4	Beta®/ 5
Nominal capacity:	17 W	22 W
Current (I eff)	0.2 A	0.3 A
Peak current:	1.2 A	2.8 A
Peak switching current:	15 A for < 1 ms	15 A for < 1 ms
Fuse:	0.8 AT	0.8 AT



- Version: 100-115 V ±10 %, 50/60 Hz

115 V/AC Version	Beta®/ 4	Beta®/ 5
Nominal capacity:	17 W	22 W
Current (I eff)	0.5 A	0.8 A
Peak current:	4.0 A	6.5 A
Peak switching current:	15 A for < 1 ms	15 A for < 1 ms
Fuse:	0.8 AT	0.8 AT

- Version: 100-230 V ±10 %, 50/60 Hz

100-230 V/AC Version	Beta®/ 4	Beta®/ 5
Nominal capacity:	17 W	22 W
Current (I eff)	0.5 ... 0.2 A	0.8 ... 0.3 A
Peak current:	4.2 - 1.3 A	5.9 - 2.3 A
Peak switching current:	15 A for < 1 ms	15 A for < 1 ms
Fuse:	0.8 AT	0.8 AT

*Note* Only use fuses carrying VDE, UL and CSA authorisation, e.g. type 19195 from Fa. Wickmann as given in IEC publication 127 - 2/3.

#### 4.8 Environmental Conditions

*Temperatures* Storage and transport temperature: -10 °C ... +50 °C

Maximum dosing media temperatures depending on material:

Material Type:	PP	PVC	Acrylic	PVDF	PTFE	Stainless steel
Permissible temperature continuous operation at max. back pressure:	50 °C	45 °C*	45 °C	50 °C	50 °C	50 °C
Permissible temperature short term, max. 15 min. operation at max. back pressure of 2 bar:	100 °C	60 °C	60 °C	120 °C	120 °C	120 °C
Minimum dosing media temperature:	-10°C					
ambient temperature during operation:	-10 through +45°C*					

\*for material acrylic glass

Under extreme conditions such as max. medium temperature, max. stroke rate and max. backpressure leaks may occur at the liquid end at ambient temperatures above 35 °C.

*Climate* Permissible relative humidity: 92 % non-condensing  
Corresponding to humidity and fluctuations in climate: FW 24 according to DIN 50016

*Enclosure rating* Contact and humidity enclosure: IP 65 according to IEC 529, EN 60529, DIN VDE 0470 part 1

*Noise level* Noise level: < 70 dB(A) within 1 m distance according to EN 12639

*Electrical safety requirements* Safety class 1 – mains connector with earth lead

## 5 Removal of Packaging

- Removal of packaging*
- ▶ Retain the packaging. It can be used to return the pump in case of repair or for guarantee purposes.
  - ▶ Compare delivery note with contents of packaging.
  - ▶ Check that the details given on the metering pump device label correspond with your ordering details!
  - ▶ Should you experience any problems, contact your ProMinent branch or supplier!
  - ▶ Give the identity code and serial number, which you will find on the device label, in the event of goods returns or when ordering replacement parts. This will ensure correct identification of the pump type and material version.
- Included in Delivery*
- Metering pump with mains cable
  - Operating instructions manual with conformity declaration, with accessories if applicable

## 6 Electrical Installation



### WARNING

- **WARNING – Risk of electric shock – This pump is supplied with a grounding conductor and grounding-type attachment plug. To reduce the risk of electric shock, be certain that it is connected only to a properly grounding-type receptacle.**
- **Observe the relevant national regulations when installing the pump outside Germany!**
- **Do not connect power supply to external terminals!**
- **Make sure that the power supply corresponds to the details on the device label! When connecting in parallel with inductive consumers a separate switch contact, e.g. relay or contactor should be fitted!**



### CAUTION

- **The electronic system of the pump can be destroyed if the pump is connected incorrectly! When connecting the 5P universal control cable for external contact control, do not connect the grey wire instead of the white one! At first, the pump functions without any faults, however, the electronic system of the pump will be destroyed after approx. 10 million strokes!**
- **The universal signal cable, the external/contact cable and the liquid level monitoring cable may not be less than 1.20 m. Cable recognition will otherwise be lost.**

*Mains connection* The pump is connected via the fixed mains cable to the correct power supply.

*ON/Off switching* The pump should only be able to be disconnected from the power by

- removing the plug from the socket
- via the "stop" setting on the multifunction switch
- remote stop via an external cable (see 7.1).

*Connecting in parallel* If the pump is connected to the power in parallel with inductive consumers, e.g. (solenoid valve, motor), they must be electrically isolated from these items to prevent damage from induction voltages when switching off.

- ▶ Fit separate contacts, power supply via contactor relay or relay.

If this is not possible, then:

- ▶ Parallel connection via varistor (order number 710912) or an RC circuit (0.22  $\mu$ F/220  $\Omega$ , order number 710802).

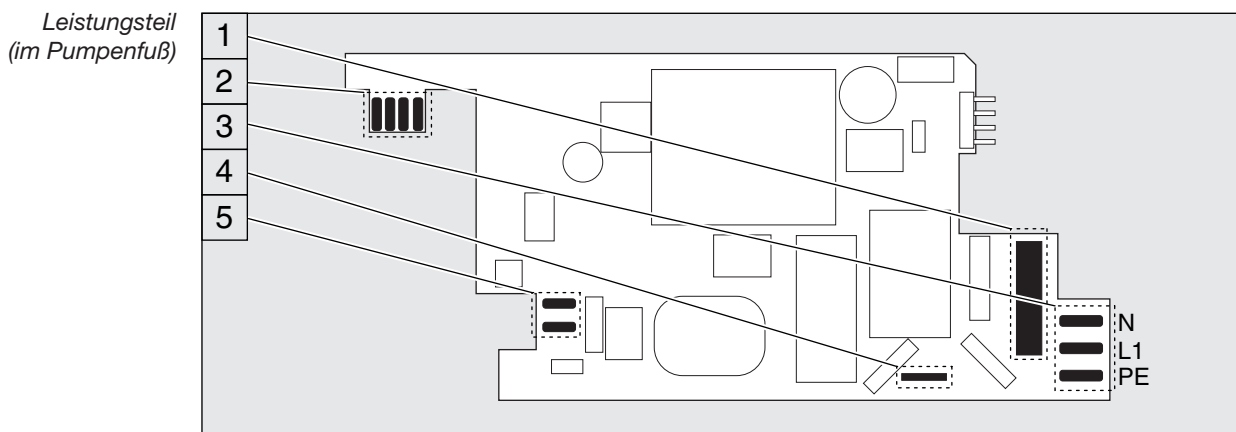


Fig. 06

- |                            |                       |
|----------------------------|-----------------------|
| 1 Fuse                     | 4 Solenoid earth lead |
| 2 Optional relay connector | 5 Solenoid connector  |
| 3 Mains connector          |                       |

*Option fault indicating relay*

Contact	VDE-cable	CSA-cable
NO	white	white
NC	green	red
C	brown	black

*Option fault indicating and pacing relay*

NO (fault indicating relay)	yellow	–
C (fault indicating relay)	green	–
NO (pacing relay)	white	–
C (pacing relay)	brown	–

## 7 Operation and Settings

### 7.1 Operating Components and Functions

**Stroke length adjustment knob** The stroke length is continuously adjustable between 0 % and 100 % via the stroke length adjustment knob. Reproducibility is only technically practicable in the adjustment range of between 30 % and 100 % however.

**Multifunction switch** The multifunction switch (1e) is used to select the operating mode and to set the stroking rate. The following operating modes are selected using the multifunction switch:

- Stop
- External
- Manual (to set stroking rate in 10 % steps)
- Test (priming suction function)

**External operating terminal** The "terminal for external operating" is a five channel connector. It is compatible with two and four channel signal cables used previously. The "auxiliary frequency" function can be used only with the five channel cable, however.



**CAUTION**

- **The electronic system of the pump can be destroyed if the pump is connected incorrectly! When connecting the 5P universal control cable for external contact control, do not connect the grey wire instead of the white one! At first, the pump functions without any faults, however, the electronic system of the pump will be destroyed after approx. 10 million strokes!**

Pump configuration

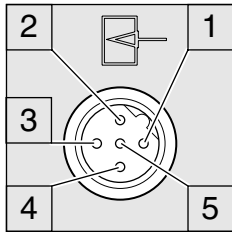


Fig. 07

Electrical Interface:

- Open contact voltage: approx. +5 V
- Input resistance: 10 kΩ
- Control: volt free contact (0.5 mA at +5 V).  
or: semi conductor switch (residual voltage < 0.7 V)
- minimum contact duration: ≥ 20 ms

Plug configuration

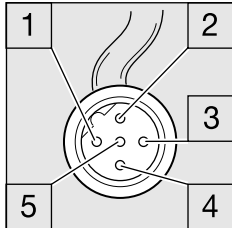


Fig. 08

Function	2channel cable	4channel cable	5channel cable
pin 1 pause	bridge to pin 4	brown	brown
pin 2 external	brown	white	white
pin 3 not configured	–	blue	blue
pin 4 reference potential (earth)	white	black	black
pin 5 auxiliary frequency	–	–	grey

**”Pause“ Function**

The pump runs when

- There is no cable connected (e.g. pin 1 free)
- The cable is connected and the contact is earthed (pins 1 and 4 connected).

The pump does not run when

- The cable is connected and the contact is open (pins 1 and 4 not connected).

**”External“ Operating Mode**

A dosing stroke is triggered when a contact is made for a minimum of 20 ms with pin 2 (external) and pin 4 (earth), and the ”pause“ input is at pin 4 (earth).

**Operating Characteristic Variations: Changing from ”External“ to ”Manual“**

The operation of the Beta® pump when changing from ”external“ to ”manual“ options (when external cable is connected) takes two forms:

Identity code: ”control type“

- 0: no lock  
”External“ and ”manual“ operating modes can be activated at any time. All pump functions correspond to the texts on the multifunction switch and the pre set operating mode. The pump operates in ”manual“ mode even when external cable is connected. This is the standard version.
- 1: with lock  
The ”external“ operating mode is only available when external cable is connected. The ”manual“ function is only available when the cable is removed.

**Altering External Frequency Function (Auxiliary Frequency)**

This function switches the pump over to a pre-programmed frequency, as long as the correct input is connected to pin 4 (reference potential) and the pump is not in ”pause“ or ”stop“ modes. The ”auxiliary frequency“ function overrides a manually set operating frequency and also ”external“ operating mode.

If the ”auxiliary frequency“ function and the ”pause“ function are both active the pump stops. In the standard version this function is programmed to 100 % stroking rate.

**Connecting float switch** It is possible to fit a two stage float switch to activate early warning and limit switch functions.

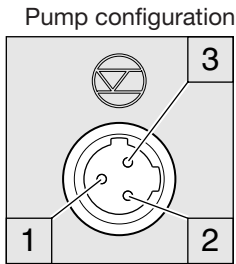


Fig. 09

**Electrical Interface:**

- Open contact voltage: approx. +5 V
- Input resistance: 10 kΩ
- Control: volt free contact (0.5 mA at +5 V).  
or: semi conductor switch (residual voltage < 0.7 V)

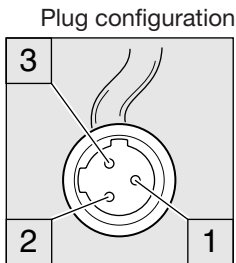


Fig. 10

**Function**

- pin 1 reference potential (earth)
- pin 2 minimum warning indication
- pin 3 minimum fault (switches off)

**3channel cable**

- black
- blue
- brown

**Function and fault indicators**

A signal is sent to the pump (minimum warning or minimum fault) when the liquid level in the chemical feed tank drops below specific levels.

Three LED displays act as the function and fault indicators.

**Green LED indicator, operating display**

This LED illuminates briefly when a discharge stroke is activated.

**Yellow LED indicator, warning indicator**

This LED lights up when the liquid level drops below the first float switch triggering level.

**Red LED indicator, fault indicator**

This LED lights up when liquid levels reach the fault indicating level (20 mm remaining in chemical feed tank)

It also flashes to indicate undefined operating status.

**Relay**

**Relay output, fault indicating**

An alarm relay can be ordered as an option. It switches in case of faults. Whether it drops out or picks up in case of fault was preselected via the Identcode.

If the alarm relay is refitted, it drops out in case of fault as standard. The relay board is fully operative after insertion (see section 7.2).

**Electrical interface:**

- Contact load: 250 V/2 A 50/60 Hz
- Operating life: > 200.000 switch functions

VDE cable	CSA cable	Contact
white	white	NO (normally open)
green	red	NC (normally closed)
brown	black	C (common)

**Fault signal output and pacing signal output**

Two semi conductor switches are available to order as signal output and pacing relay.

These outputs are electrically isolated by optical couplers.

The pulse output of the pump drives an open collector transistor interfaced to the input device. This option may be retrofitted, the connector cable is plugged in.

**Electrical interface:**

**For semi-conductor switch**

- Residual voltage: < 0.4 Volt at I<sub>c</sub> = 1 mA
- Maximum current: < 100 mA
- Max. voltage: 24 V DC
- Pacing relay pulse length: approx. 100 ms

**For relay output**

- Contact load: 24 V/100 mA 50/60 Hz
- Operating life: > 200.000 switch functions

**VDE cable**

yellow  
green  
white  
brown

**Contact**

NO (normally open)  
C (common)  
NO (normally open)  
C (common)

**Relay**

Fault indicating relay  
Fault indicating relay  
Pacing relay  
Pacing relay

**7.2 Beta® Relay Retrofit Kit**

Part No. 1002526 - Alarm relay Beta®

Part No. 1002528 - Alarm and pacing relay Beta®

- 1 complete relay board with 2 fastening screws
- 2 additional fastening screws
- 1 complete relay cable with socket
- 1 seal

*Press-out relay opening*



**WARNING**

**Disconnect Beta® from the mains power supply and rinse liquid end before commencing work!**



**CAUTION**

**When preparing the opening, ensure that the punch is not forced through the entire pump base!**

**Pump circuits may become damaged.**

- ▶ Place the Beta® on a firm surface with the relay opening press-out section at the top. (see fig. 11a)
- ▶ Place a punch (dia. 8-15 mm) in the centre of the relay opening press-out section, and strike briefly and sharply with a hammer (approx. 250 g).
- ▶ If necessary clean up the edges of the opening.
- ▶ Remove the pressed out section from the Beta®.

*Inserting the relay component*

- ▶ Hold the relay component with your right hand gripping the left and right hand edges of the relay cover, and tilt the front end slightly to the left (see fig. 11b)
- ▶ Push the relay component through the relay opening, holding the upper corner of the lower edge against the guide rail on the pump base, until the contact of the relay component has reached the controller contact. (See fig. 11b test: can you still move the end of the circuit back and forth?)
- ▶ Gently push the relay component right into the opening.
- ▶ Screw the relay cover firmly onto the housing using the screws provided.
- ▶ Insert the relay cable plug seal into the relay cover and screw on the plug (see 11c).
- ▶ The pump is programmed ex factory to “alarm relay drop-out action” and, if fitted, “pacing relay pick-up action“. The pump can be reprogrammed at the Heidelberg plant if any other switching function is required.

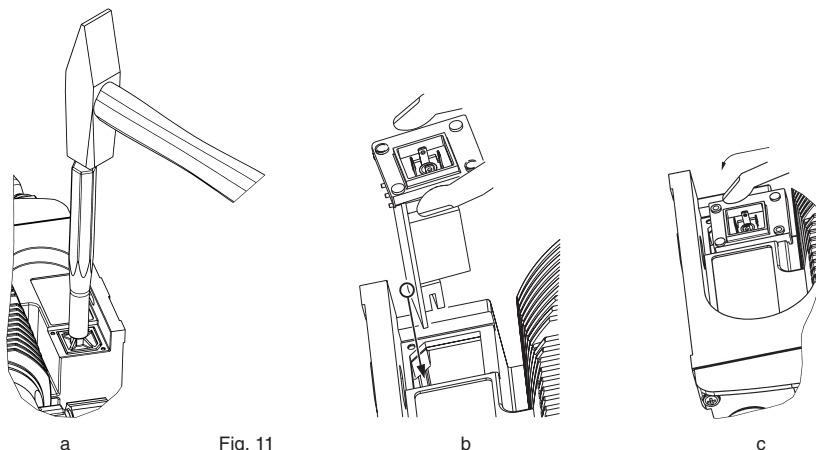
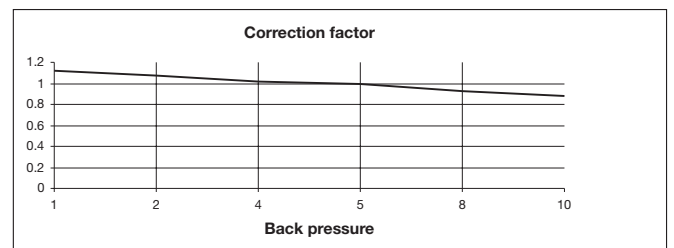
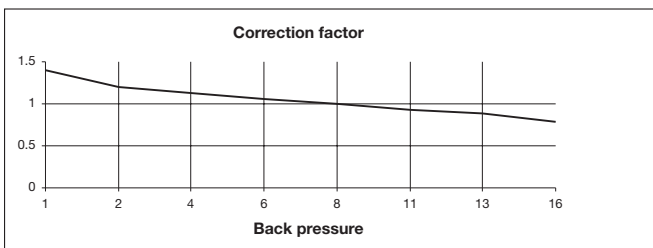
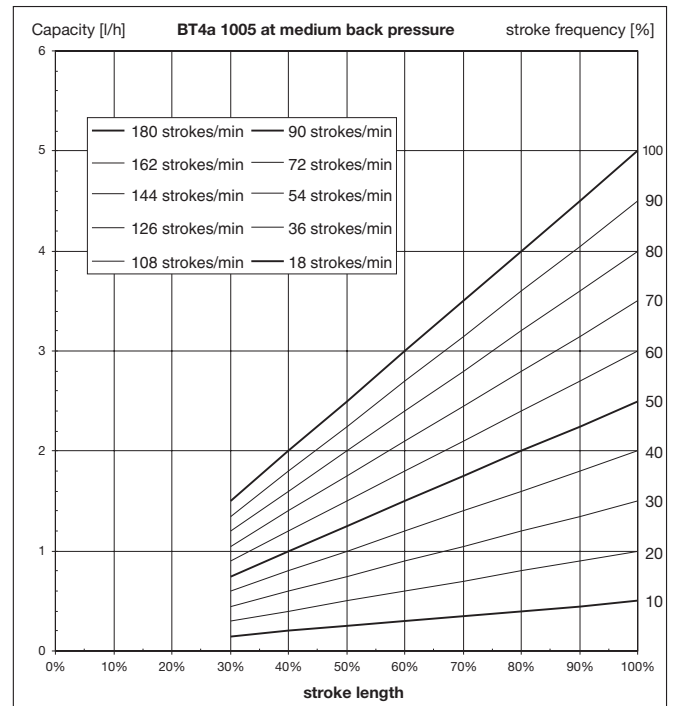
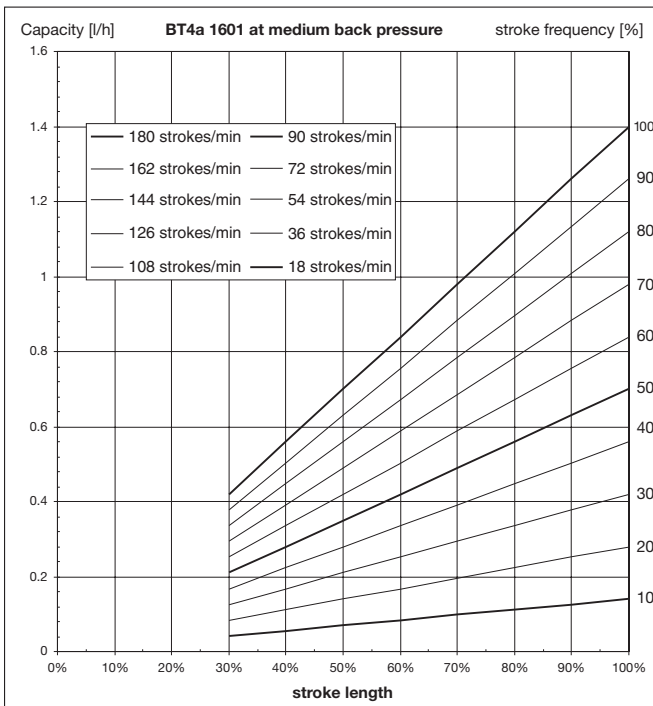
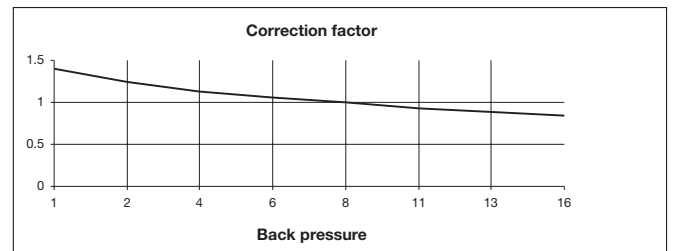
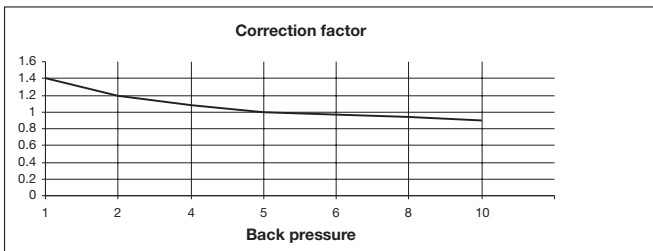
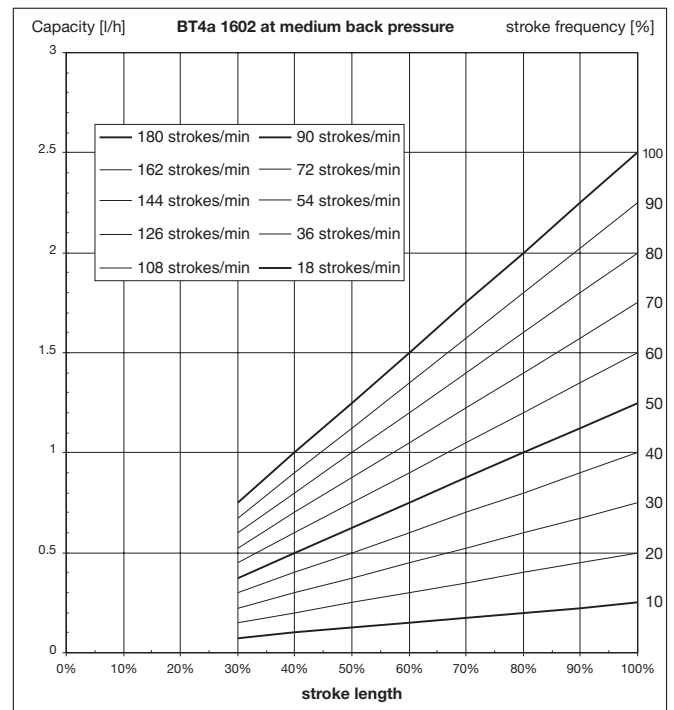
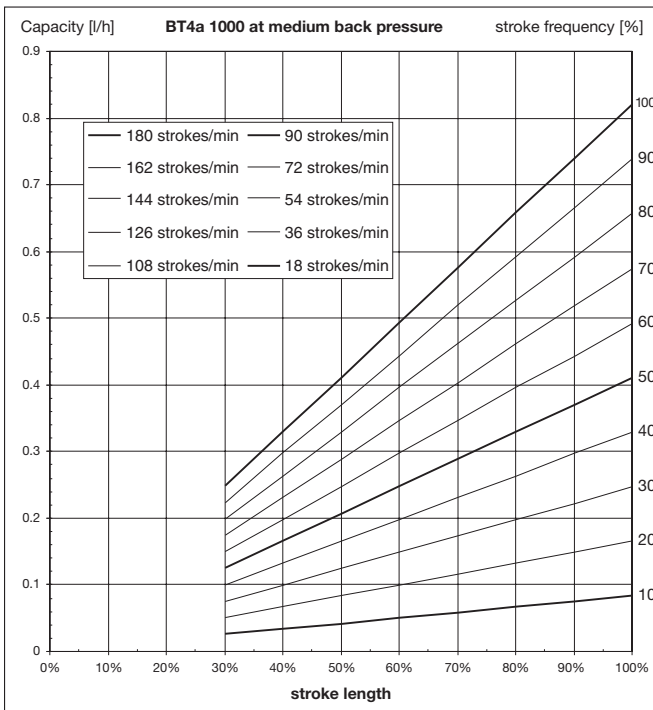
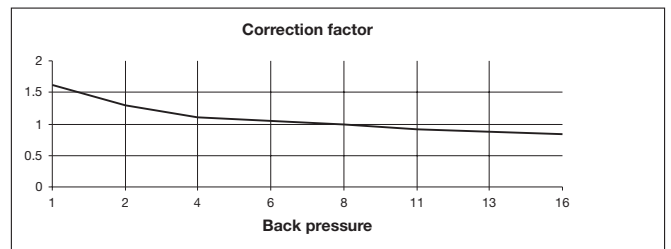
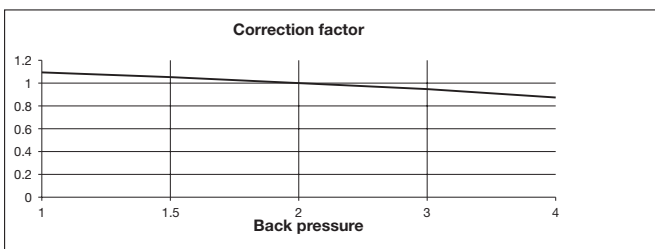
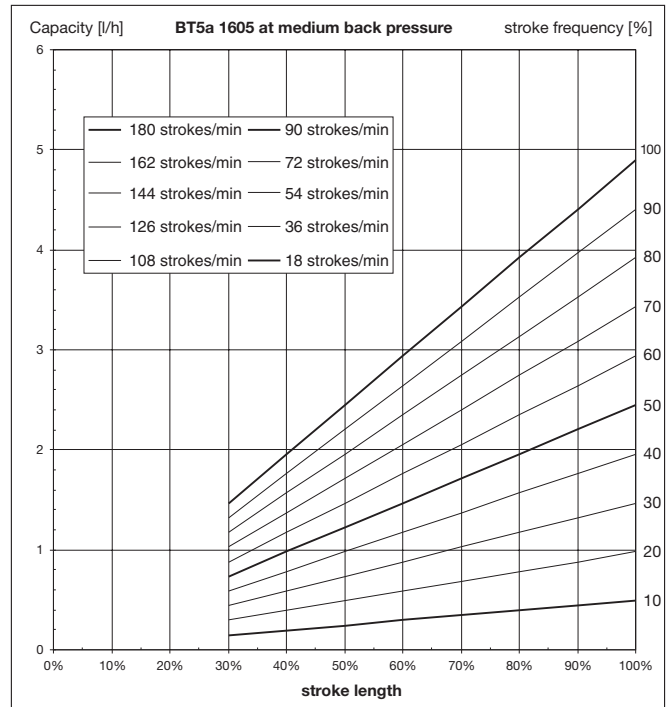
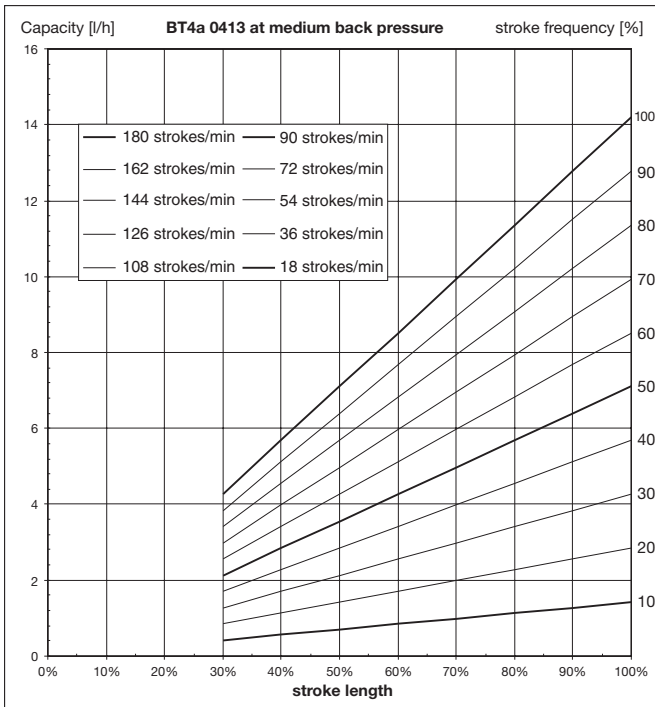
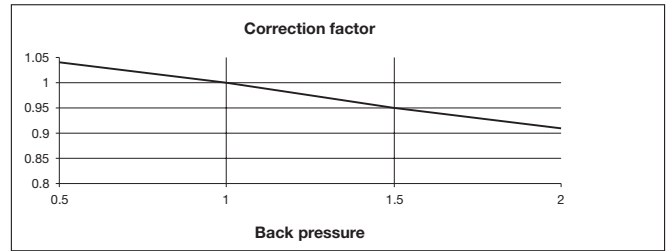
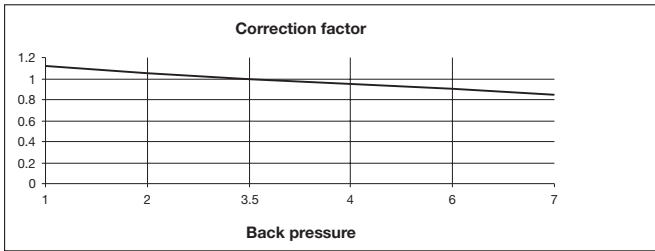
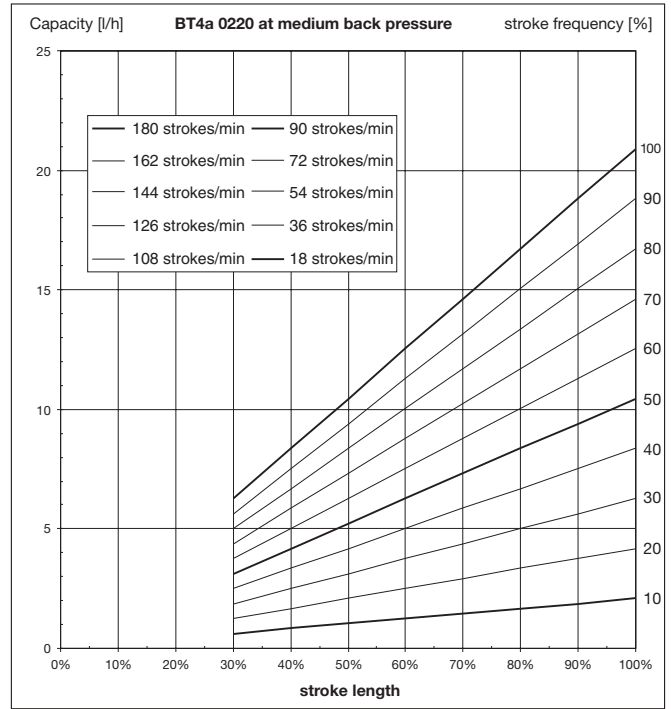
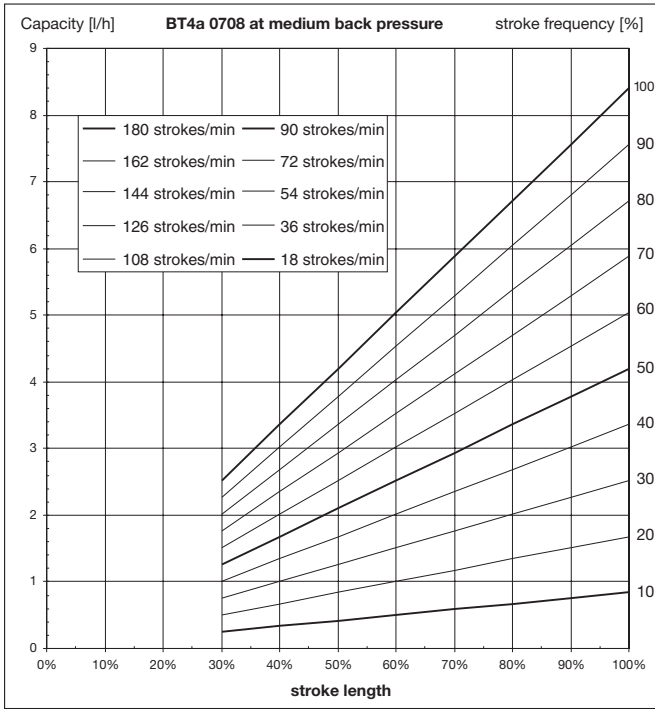
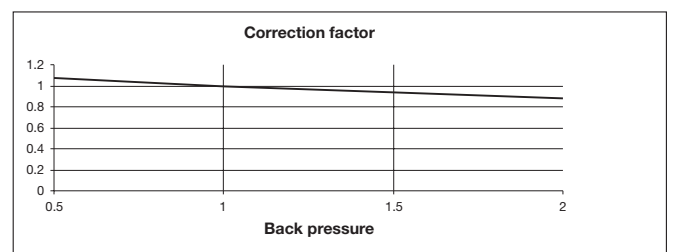
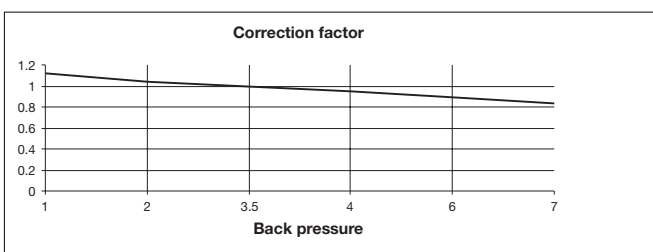
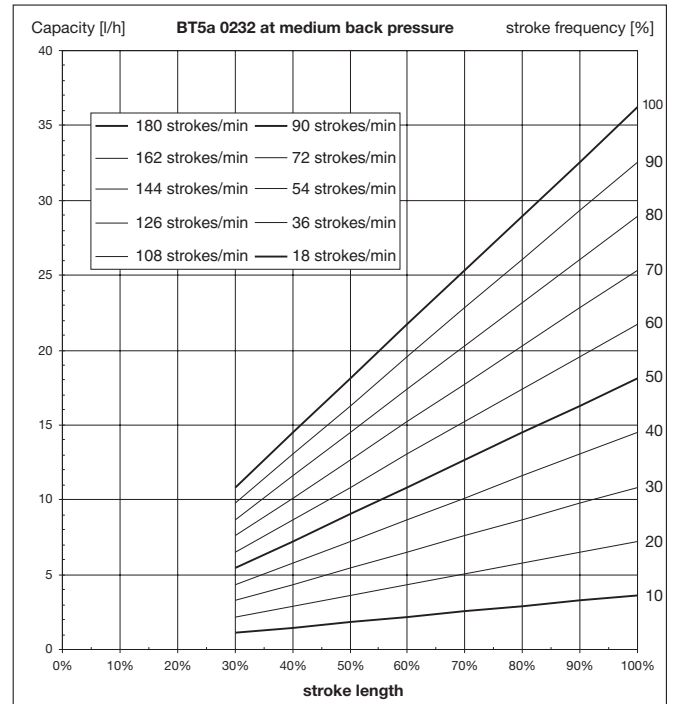
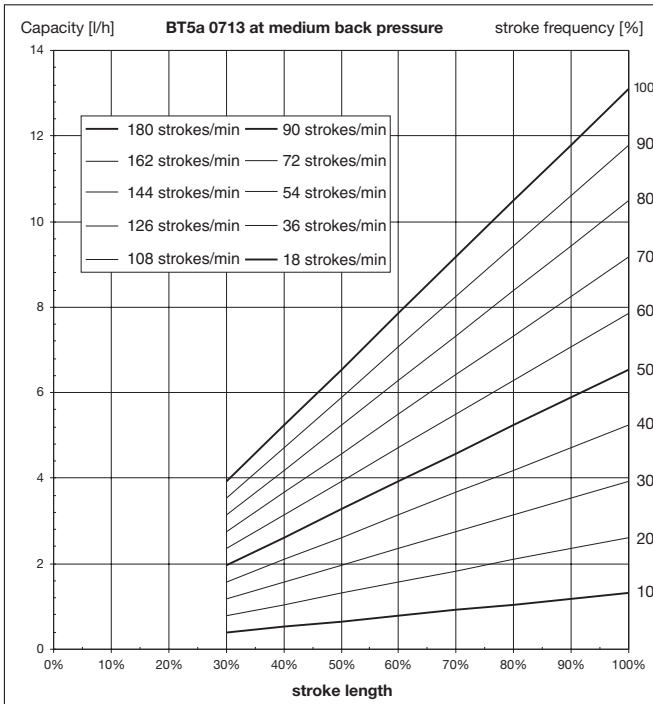
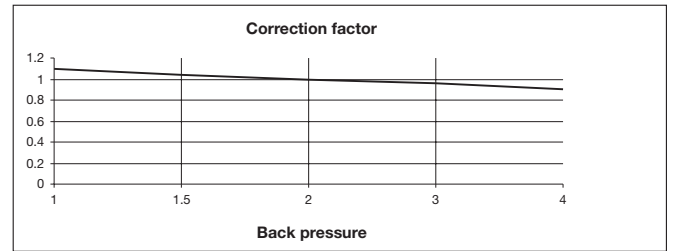
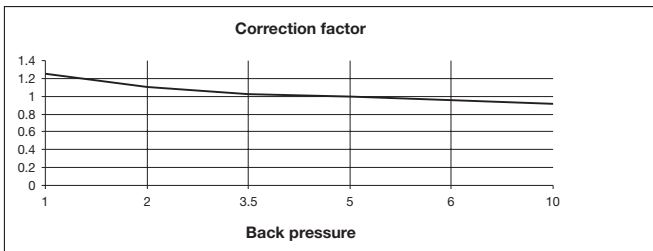
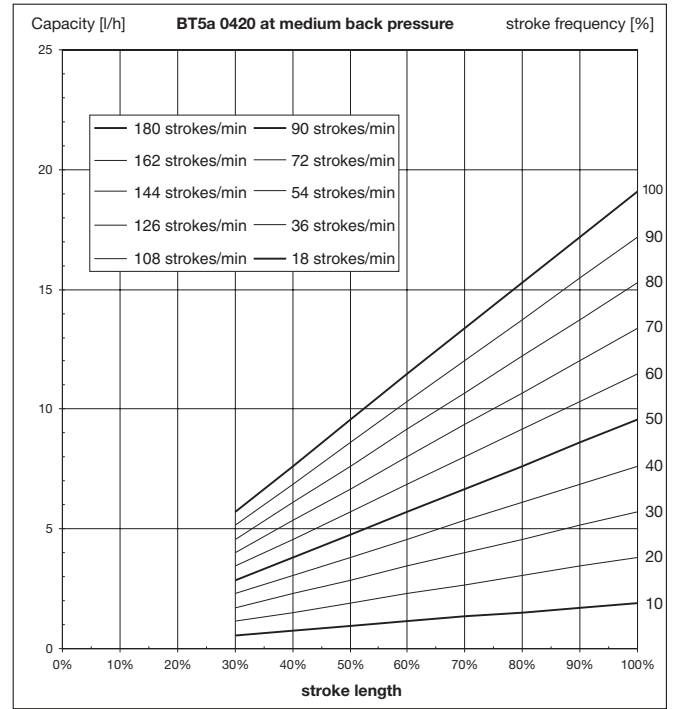
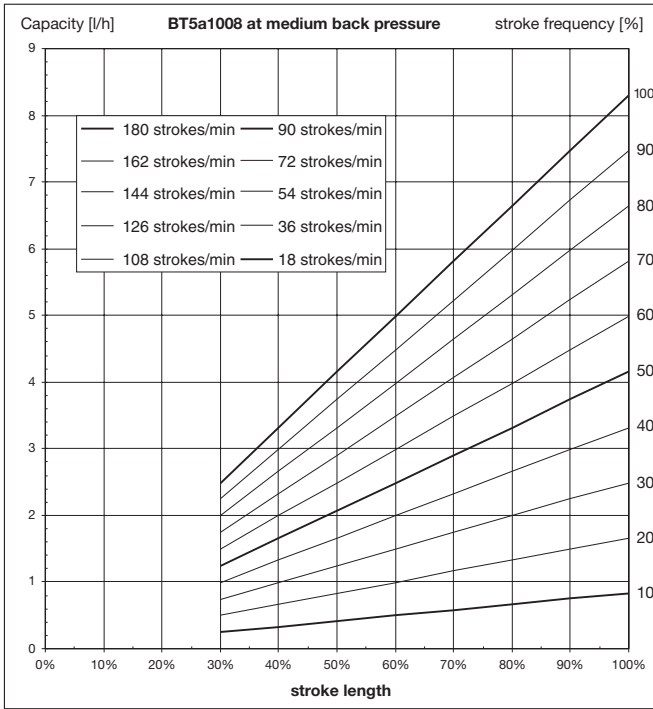


Fig. 11









## 8 Maintenance

- Maintenance intervals*
- Every quarter, when subject to normal usage (continuous operation - approx. 30 %).
  - Shorter intervals when subject to heavier usage (e.g. continuous operation).

*Maintenance actions* Standard liquid ends:

- ▶ Check the diaphragm for damage (see section 9).
- ▶ Check chemical seepage at vent hole.
- ▶ Check that the discharge tubing is connected firmly to the liquid end.
- ▶ Check that discharge and suction valves are firmly fixed.
- ▶ Check that the liquid end is generally watertight (especially vent hole! See fig. 13).
- ▶ Check for correct feed: run the Beta® run for a short period (press both arrow keys together).
- ▶ Check electrical connections for wear.
- ▶ Check that liquid end screws are fastened tightly (on coarse/fine bleeding versions, first remove knob and cover).

Screw fastening torque: 4.5 to 5 Nm

### NOTE

- **For PP liquid end, check fastening torque every quarter!**

Additionally, for liquid ends with coarse/fine bleed function and SEK type:

- Check that the bypass tubing is connected firmly to the liquid end
- Check that the bleed valve is firmly fixed in place
- Examine the discharge and bypass tubing for kinks
- Check that the coarse/fine bleed function is working correctly

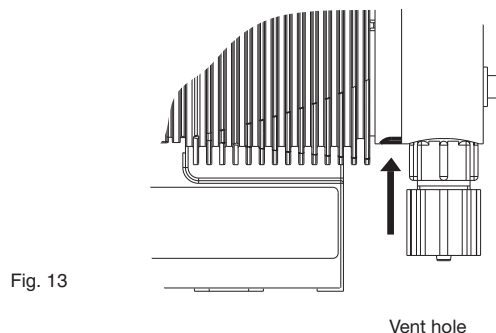


Fig. 13

## 9 Repairs

### NOTE

**Repair work that may be carried out by authorised personnel only, or on factory premises:**

- **Replacement of damaged mains cables.**
- **Replacement of fuses and electronic controller.**

Please contact your nearest ProMinent branch or representative!

Only send the equipment for repair or maintenance in a cleaned condition and with the liquid end flushed. However, should any safety precautions be necessary even after careful draining and cleaning of the equipment, the required information must be listed in the Safety Declaration! The Safety Declaration forms part of the inspection/repair contract.

Maintenance or repair work will only be carried out if a Safety Declaration - correctly and fully completed by an authorised and qualified member of the Operator's staff - is available.

A copy of the form is included in the "General operating instructions for ProMinent soleniod dosing pumps" or can be downloaded at [www.prominent.com](http://www.prominent.com).

**WARNING**

Pumps used for radioactive materials cannot be returned to ProMinent after use! They will not be accepted by ProMinent!

**Repairs:** These should only be carried out by qualified personnel (in accordance with Safety section):

- Cleaning the valve
- Changing the diaphragm

**WARNING**

- Always take suitable precautions when using hazardous chemicals!
- Ensure equipment is de-pressurised.

**NOTE**

Take the exploded drawings annexed to the help.

*Cleaning the discharge valve (PP, NP) for types 1000, 1005, 1605, 1601, 1602*

**NOTE**

- Discharge and suction valves are different! Dismantle one after the other to avoid confusion.
- Only use new parts, which fit your valve (in shape and chemical resistance)!
- The pump must be reset after replacing a valve.
- Insert an Allen key or similar into the smaller hole of the pressure connector and push out the valve inserts.

*Cleaning the suction valve (PP, NP) for types 1000, 1005, 1605, 1601, 1602*

A suction valve is designed almost similar to a pressure valve.

Take care however that:

- both valve inserts are actually identical,
- an additional spacer is found under the valve inserts,
- in the liquid end a shaped seal 1 is used instead of an O-ring,
- the flow direction of the suction connection is reversed as for the pressure connector.

*Cleaning the discharge valve (PP, PC, NP) for types 0708, 1008, 0220, 0420, 0413, 0713, 0232*

**NOTE**

- Discharge and suction valves are different! Dismantle one after the other to avoid confusion!
- Only use new parts, which fit your valve (in shape and chemical resistance)!
- The pump must be reset after replacing a valve.
- Insert an Allen key or similar into the smaller hole of the pressure connector and push out the valve inserts.

*Cleaning the suction valve (PP, NP) for types 0708, 1008, 0220, 0420, 0413, 0713, 0232*

A suction valve is designed almost similar to a pressure valve. Please ensure, however, that:

- the shaped seal is placed in the suction connector,
- only the O-ring is inserted into the liquid end and not the shaped seal,
- the flow direction for the suction connector is reversed as for the pressure connector.

### Change diaphragm **WARNING**



- **Always take suitable precautions when using hazardous chemicals!**
- **Ensure that the equipment is de-pressurised!**

- ▶ Empty the liquid end (turn the unit upside down and let the feed chemical run out, rinse with a suitable material: rinse the liquid end thoroughly after use with hazardous materials!).
- ▶ When Beta® is running set the stroke length to 0 % (the drive axis is then set).
- ▶ Switch off the Beta®.
- ▶ Unscrew the hydraulic connectors from the discharge and suction side.
- ▶ For versions with coarse/fine bleed function: firstly pull out the coarse/fine bleed (knob), then lift off the cover from the liquid end using a screwdriver.
- ▶ Remove the screws (1).

For pump types 0220, 0232 and 0420 see the following page (4 holes on the diaphragm rim)!

### Standard types

- ▶ Loosen the liquid end (2) and the top plate (4) from the pump housing (6) (loosen only!).
- ▶ Hold the housing (6) in one hand and with the other, clamp the diaphragm (3) between the liquid end (2) and the top plate (4); release the diaphragm (3) from the drive spindle with a light anticlockwise turn of the liquid end (2) and top plate (4).
- ▶ Unscrew the diaphragm (3) completely from the drive spindle.
- ▶ Remove the top plate (4) from the housing (6).
- ▶ Check the condition of the safety diaphragm (5) and replace if necessary.
- ▶ Push the safety diaphragm (5) onto the drive axle until the outer edge is flush with the pump housing (6) - do not push further!
- ▶ Screw the new diaphragm (3) carefully up to the stop on the drive axis – this must be exact to ensure correct metering!
- ▶ Screw the diaphragm (3) tight once more.
- ▶ Position the top plate (4) on the pump housing (6).



### CAUTION

- **The leakage hole must point downwards when the pump is fully assembled (see fig. 13)**
- **Position the top plate correctly on the pump housing. Do not distort the top plate on the pump housing, otherwise the safety diaphragm (5) will not fit.**
- ▶ Lay the diaphragm (3) into the top plate (4).
- ▶ Hold the top plate and screw the diaphragm (3) in a clockwise direction until it is firmly in position (you will feel the resistance of the return spring).



### CAUTION

- **Do not overtighten the diaphragm (particularly on type 1601).**
- **The top plate must remain in position to prevent the safety diaphragm (5) from distorting.**
- ▶ Adjust the stroke to 100 %.
- ▶ Position the liquid end (2) with the screws (1) on the diaphragm (3) and the top plate (4) (the priming connector must point downwards once the pump is fully assembled). Screw on screws (1) lightly and tighten (starting torque, see below).
- ▶ For versions with coarse/fine bleed function, ensure that the liquid end cover engages in the liquid end, then push the coarse/fine bleed vent (knob) into the liquid end.

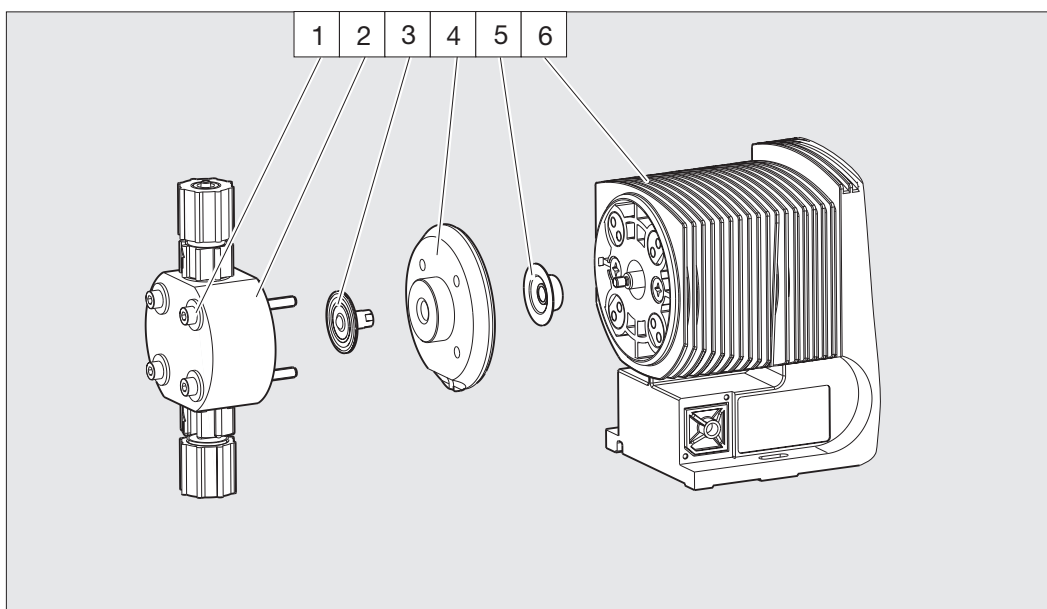


Fig. 18

- 1 Screws
- 2 Liquid end
- 3 Diaphragm
- 4 Top plate
- 5 Safety diaphragm
- 6 Pump housing

**NOTE**

- Check the screw torques after 24 hours in operation.
- For PP liquid ends check the screw torques again after three months.

Screw torques: 4.5 to 5 Nm

*Liquid ends - types 0220, 0232 and 0420*

- ▶ Remove liquid end (2) from the pump by unscrewing screws (1) (see Fig. 30).  
Type 0230 only: remove the screws from the back plate (4) below the diaphragm (3).  
Screw liquid end (2) back on – the screws (1) should still project into the holes of the diaphragm (3) but not into the liquid end.
- ▶ Take hold of the pump housing (6) and use the other hand to clamp the diaphragm (3) between the liquid end (2) and the back plate (4). Loosen the diaphragm (3) from the drive axis by lightly turning the liquid end (2) and the back plate (4) anticlockwise.
- ▶ Draw the liquid end (2) with the screws (1) out of the diaphragm (3) and unscrew it completely from the drive axis.
- ▶ Remove the back plate (4) from the housing (6).
- ▶ Check the condition of the safety diaphragm (5) and replace it if necessary.
- ▶ Push the safety diaphragm (5) onto the drive axle until the outer edge is flush with the pump housing (6) - do not push further!
- ▶ Screw the new diaphragm (3) carefully up to the stop on the drive axis – this must be exact to ensure correct metering!
- ▶ Check whether the holes in the diaphragm (3) are flush with the holes in the pump housing (6).
- ▶ If not, start the pump and set the stroke length to 100 %.
- ▶ When the pump is running, turn the diaphragm (3) slowly in a clockwise direction until the four holes in the diaphragm are flush with those on the pump housing (6).
- ▶ Hold the diaphragm (3) in this position, set the stroke length to 0 % and stop the pump.
- ▶ Screw the diaphragm (3) tight once more.
- ▶ Position the top plate (4) on the pump housing (6).  
Only for Type 0232: Screw down the head disk (4) with the screws.



**CAUTION**

- The leakage hole must point downwards when the pump is fully assembled (see fig. 13).
  - Position the top plate correctly onto the pump housing. Do not distort the top plate on the pump housing, otherwise the safety diaphragm will not fit.
- ▶ Adjust the stroke to 100 %.
- ▶ Lay the diaphragm (3) into the top plate (4).
- ▶ Hold the top plate and screw the diaphragm (3) in a clockwise direction until it is firmly in position (you will feel the resistance of the return spring).



**CAUTION**

- Do not overtighten the diaphragm.
  - The top plate must remain in position to prevent the safety diaphragm from distorting.
- ▶ Position the liquid end (2) with the screws (1) on the diaphragm (3) and the top plate (4) (the priming connector must point downwards once the pump is fully assembled). Screw on screws (1) lightly and tighten (starting torque, see above).
- ▶ For coarse/fine bleed versions: ensure the liquid end cover engages in the liquid end, then push the coarse/fine bleed (knob) into the liquid end.

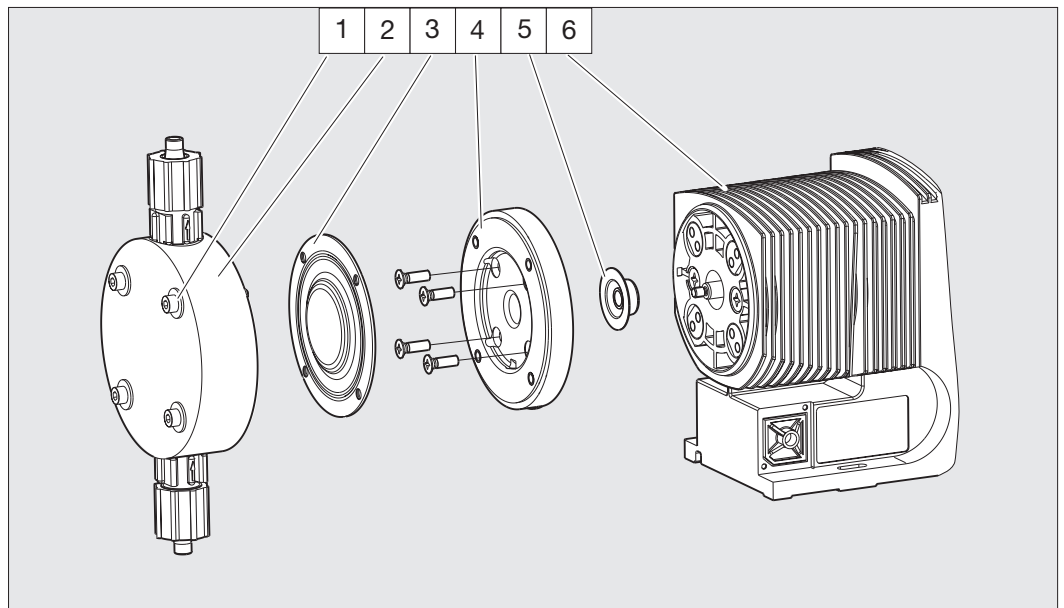


Fig. 19

- 1 Screws
- 2 Liquid end
- 3 Diaphragm
- 4 Top plate
- 5 Safety diaphragm
- 6 Pump housing

**NOTE**

- Check the screw torque after 24 hours in operation!
- For PP liquid ends recheck the screw torque after three months!

Screw torques: 4.5 to 5 Nm

## 10 Troubleshooting



### CAUTION

- **Wear protective goggles and clothing when working with hazardous chemicals!**
- **Please observe the safety information sheets for dosing media!**
- **Always de-pressurise the liquid end prior to working on a pump!**

#### **Pump is not priming even at full stroke length, and open bleed valve.**

*Reason* Crystalline deposits on the ball seat because valve has dried out.

- Remedy*
- ▶ Detach suction tubing from chemical feed container and rinse liquid end thoroughly.
  - ▶ If this fails, dismantle valves and clean.

#### **Green LED display (operating display) not lit**

*Reason* Power supply not connected, or incorrect power supply.

- Remedy*
- ▶ Connect to correct power supply according to the details on the device label.

*Reason* Fuse is defective.

- Remedy*
- ▶ Contact your ProMinent branch or supplier!

#### **Yellow LED display (warning indicator) is lit**

*Reason* Liquid level in the feed tank has reached the first float-switch trigger level.

- Remedy*
- ▶ Refill chemical tank.

#### **Red LED display (fault indicator) is lit**

*Reason* Liquid level in the feed tank has reached the fault float-switch trigger level (20 mm from empty).

- Remedy*
- ▶ Refill chemical tank.

#### **Red LED display (fault indicator) is flashing**

*Reason* Pump operating mode is undefined.

- Remedy*
- ▶ Select the required operating mode.

#### **Liquid is leaking from back plate**

*Reason* There is a faulty seal between the liquid end and the diaphragm.

- Remedy*
- ▶ Tighten screws in the liquid end.
  - ▶ If this fails, replace diaphragm.

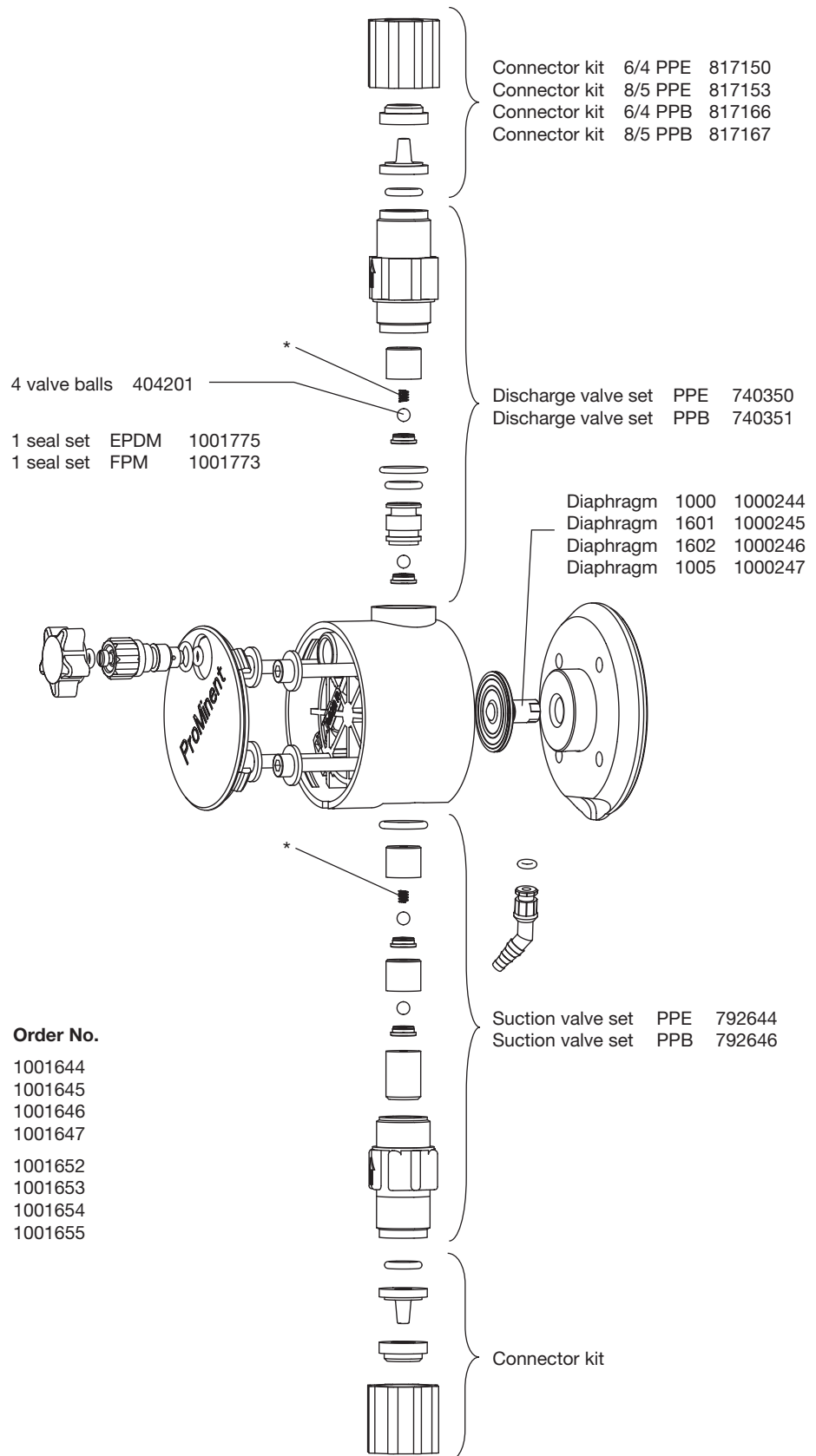
## 11 Decommissioning, Dismantling and Disposal

### NOTE

- **When dismantling a pump, clean thoroughly, paying particular attention to the liquid end in order to remove all traces of chemicals and dirt.**
- **When disposing of a pump it must be broken down into separate material types. All parts must be sent for recycling or for correct disposal according to current legal waste disposal requirements.**

Cleaned, chemical-free pumps may be returned to your ProMinent branch for disposal.

Liquid end 1000 - 1005 (1605)  
PP with coarse/fine bleed



Spare parts kits for:

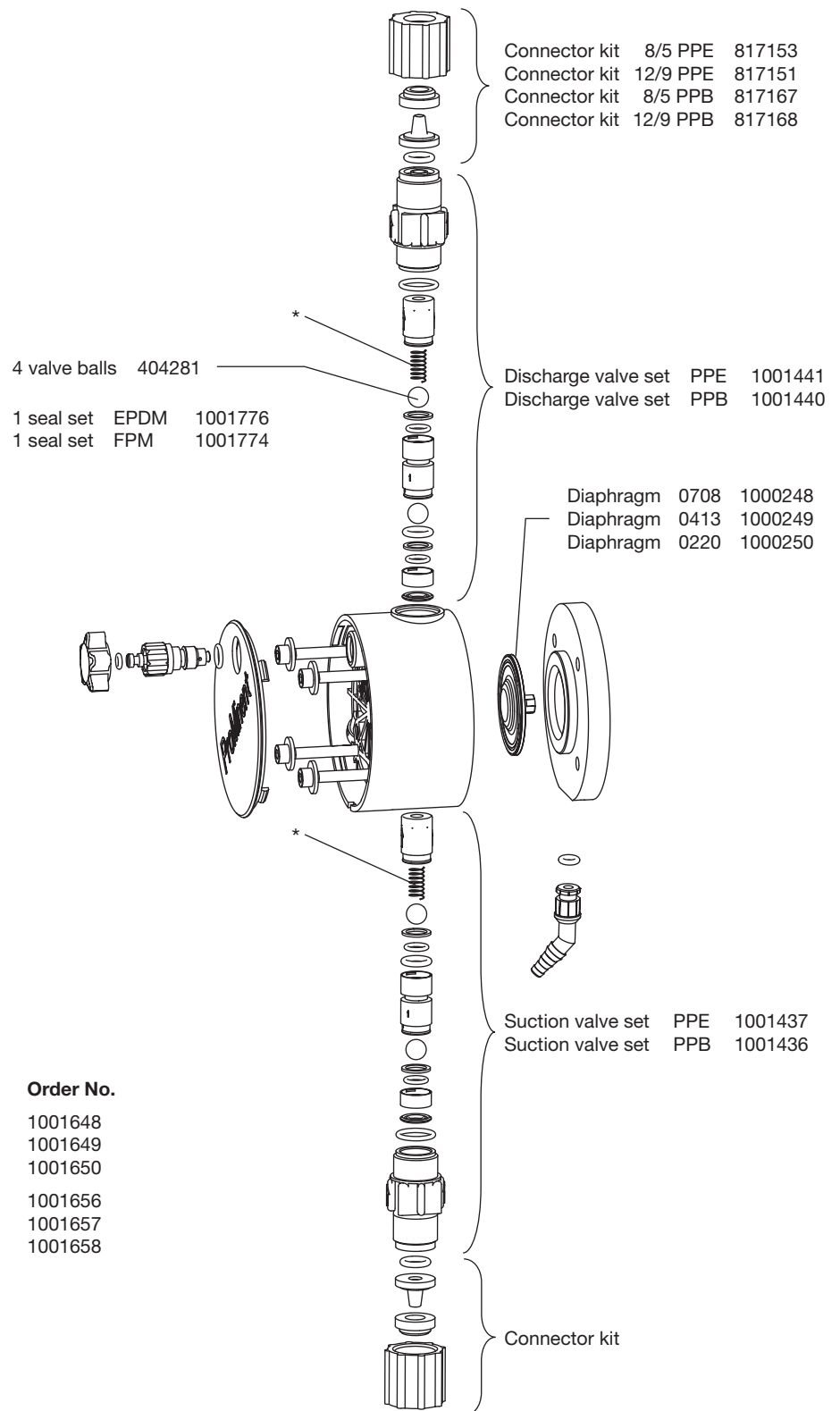
Type	Material	Order No.
1000	PPE	1001644
1601	PPE	1001645
1602	PPE	1001646
1005 (1605)	PPE	1001647
1000	PPB	1001652
1601	PPB	1001653
1602	PPB	1001654
1005 (1605)	PPB	1001655

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.



Liquid end 0708 (1008) - 0220 (0420)  
PP with coarse/fine bleed



Spare parts kits for:

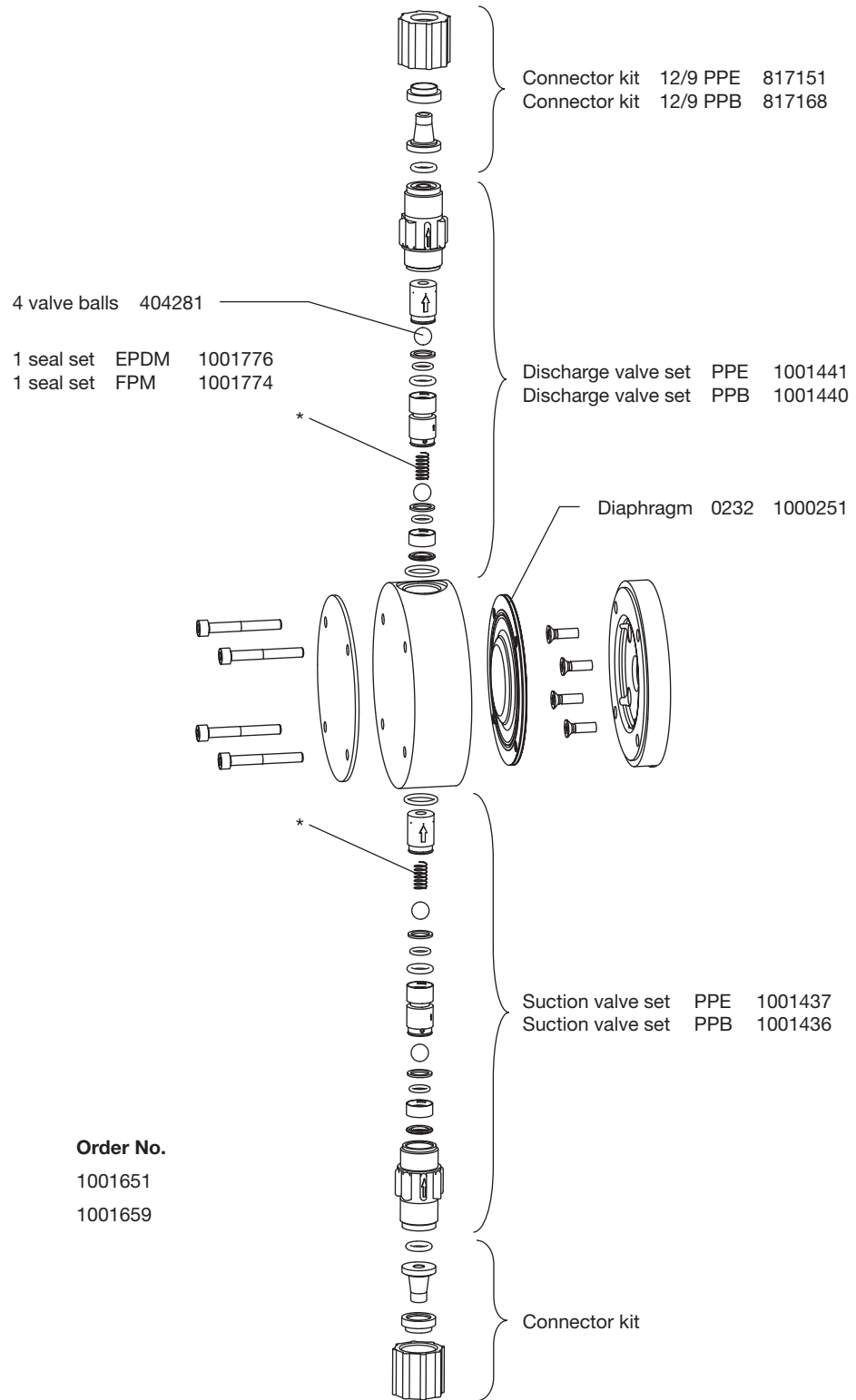
Type	Material	Order No.
0708 (1008)	PPE	1001648
0413 (0713)	PPE	1001649
0220 (0420)	PPE	1001650
0708 (1008)	PPB	1001656
0413 (0713)	PPB	1001657
0220 (0420)	PPB	1001658

The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

Liquid end 0232  
PP without coarse/fine bleed



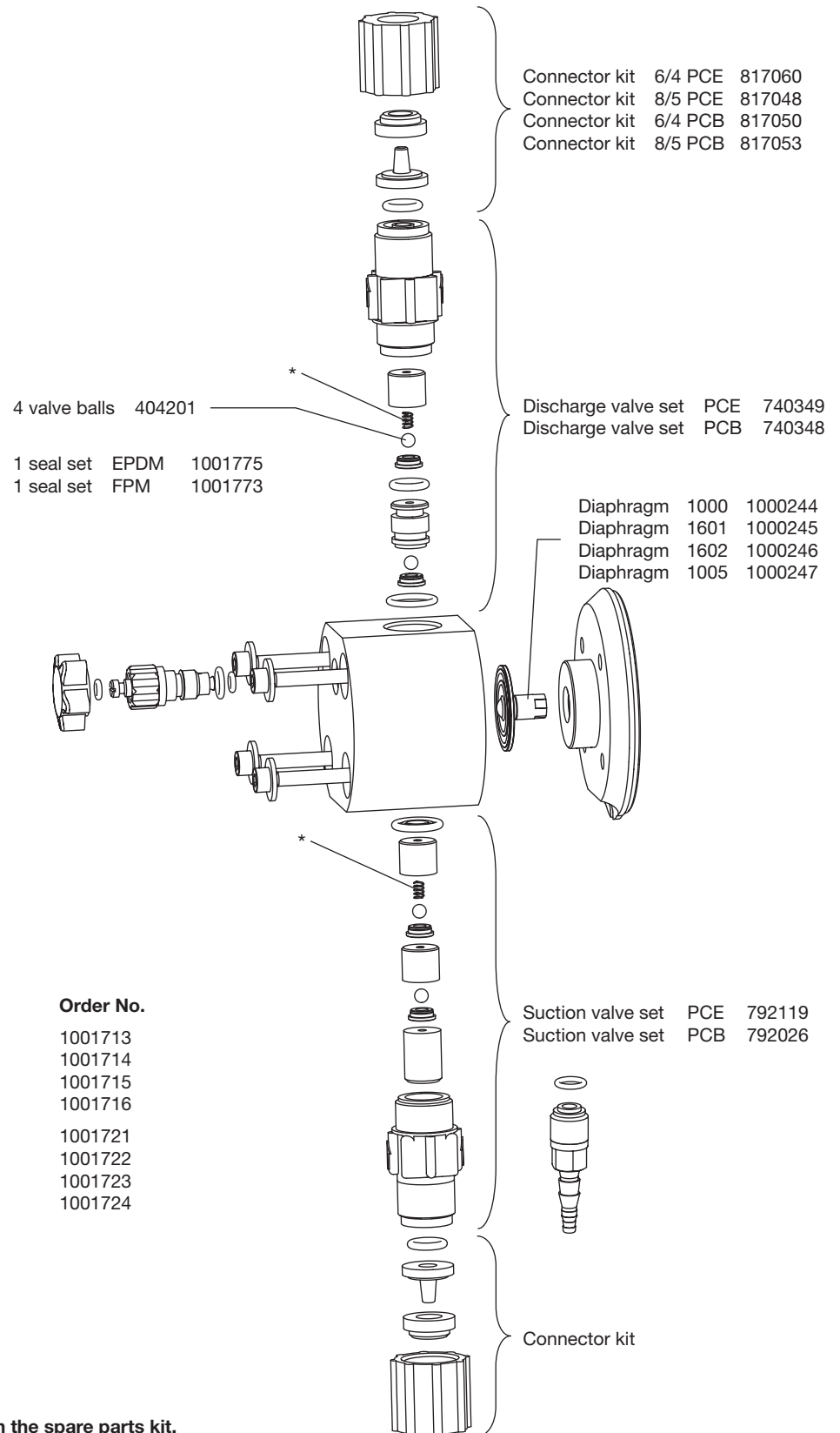
Spare parts kits for:

Type	Material	Order No.
0232	PPE	1001651
0232	PPB	1001659

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.

Liquid end 1000 - 1005 (1605)  
NP with coarse/fine bleed



Spare parts kits for:

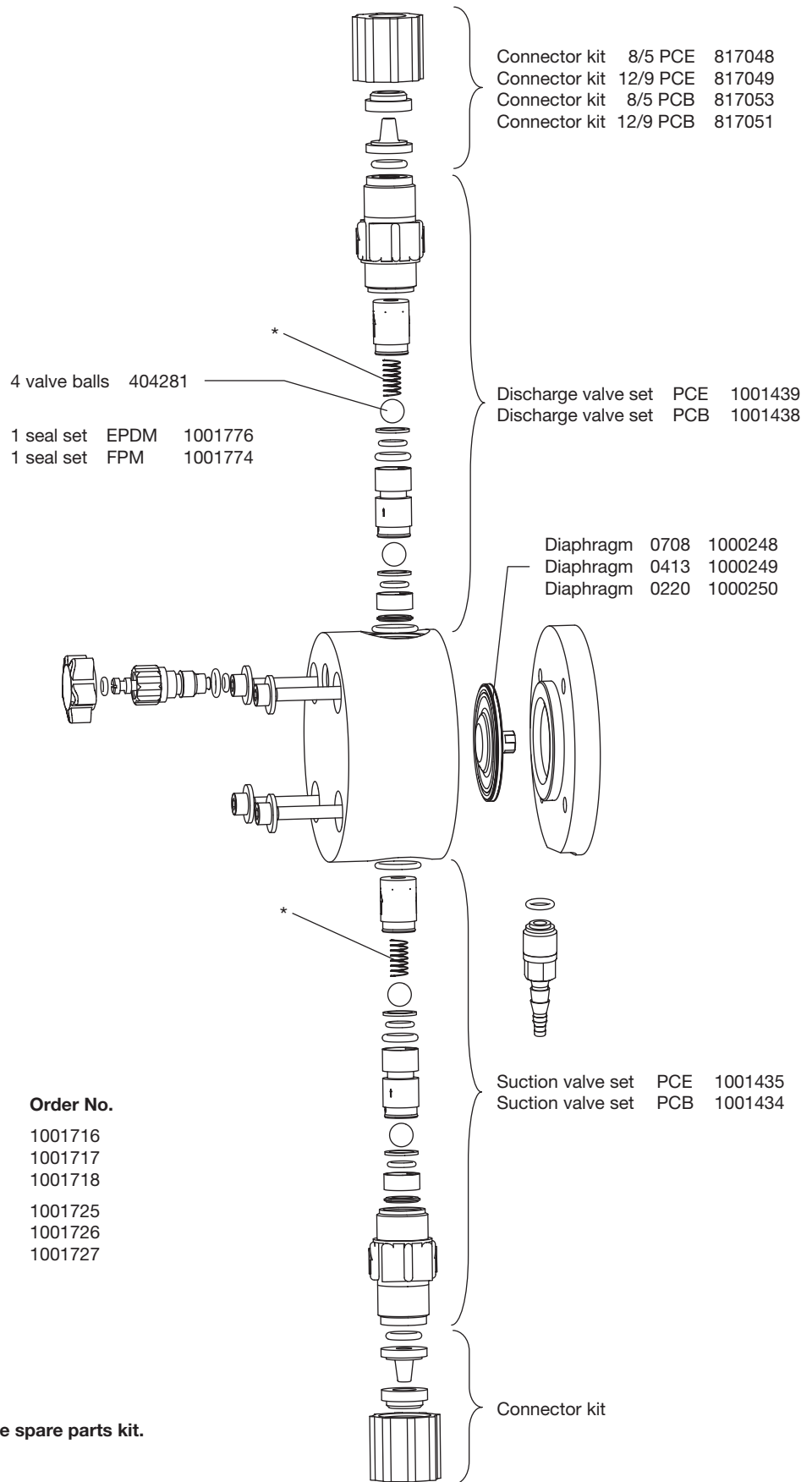
Type	Material	Order No.
1000	NPE	1001713
1601	NPE	1001714
1602	NPE	1001715
1005 (1605)	NPE	1001716
1000	NPB	1001721
1601	NPB	1001722
1602	NPB	1001723
1005 (1605)	NPB	1001724

The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

Liquid end 0708 (1008) - 0220 (0420)  
NP with coarse/fine bleed



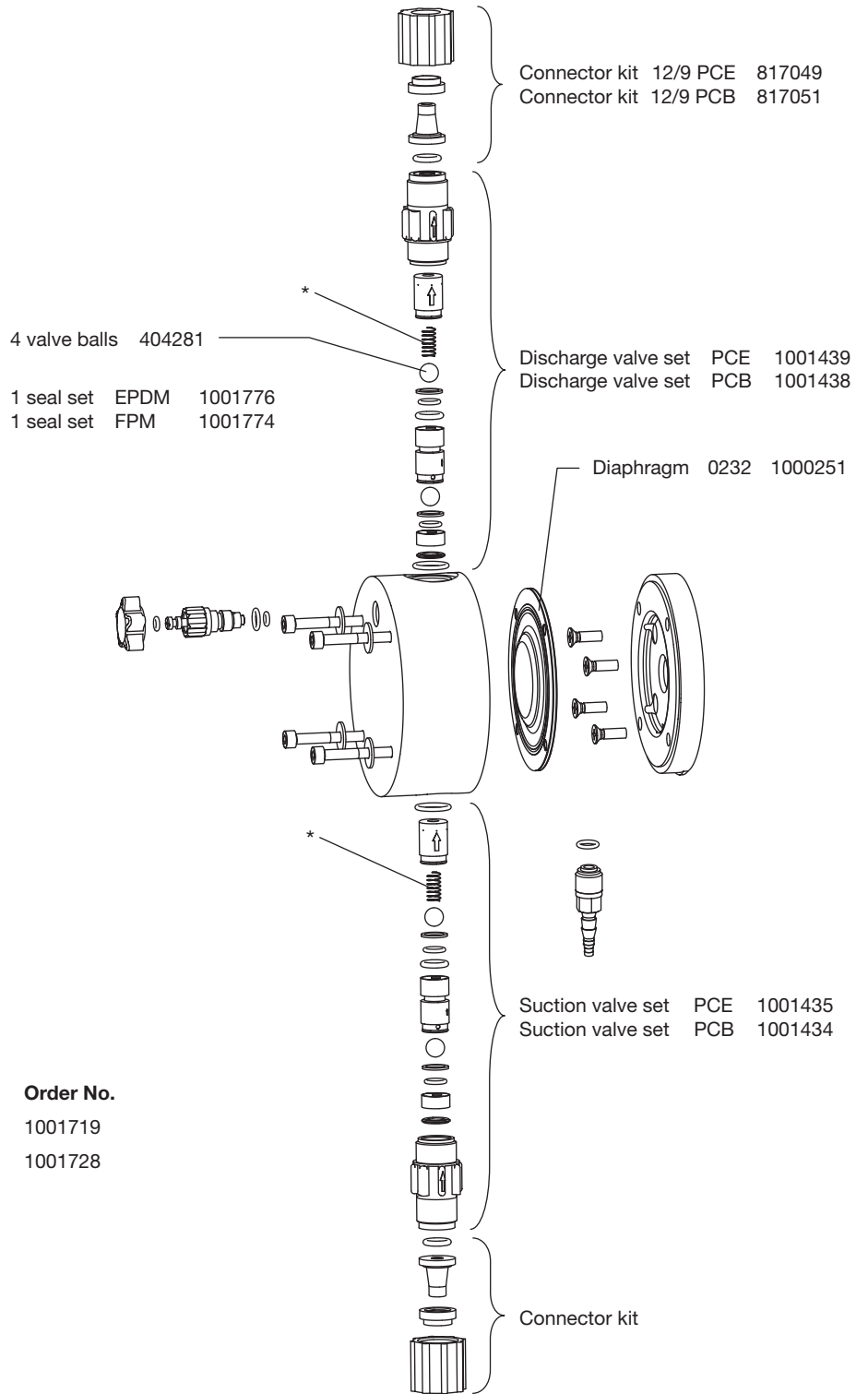
Spare parts kits for:

Type	Material	Order No.
0708 (1008)	NPE	1001716
0413 (0713)	NPE	1001717
0220 (0420)	NPE	1001718
0708 (1008)	NPB	1001725
0413 (0713)	NPB	1001726
0220 (0420)	NPB	1001727

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.

Liquid end 0232  
NP with coarse/fine bleed



Spare parts kits for:

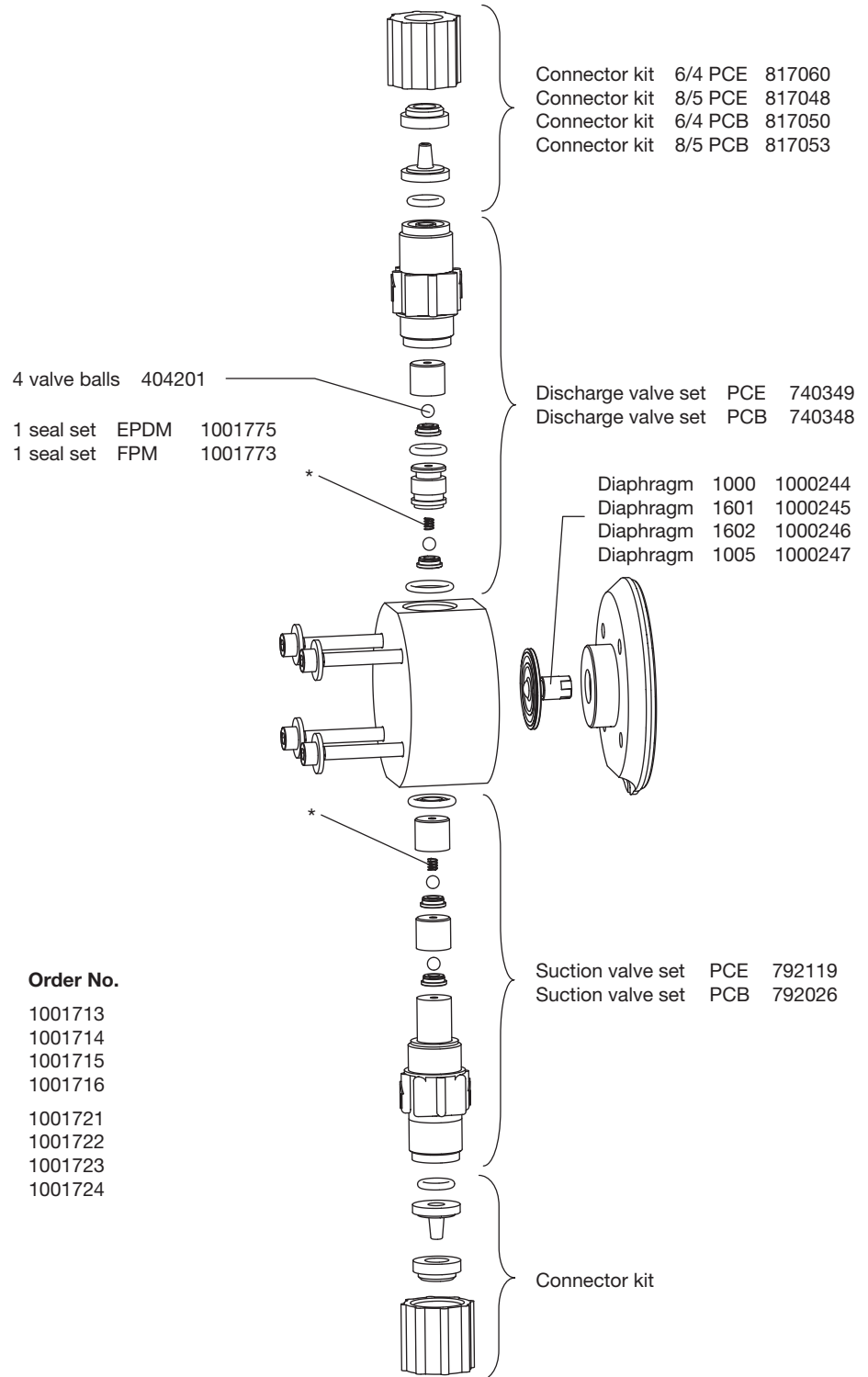
Type	Material	Order No.
0232	NPE	1001719
0232	NPB	1001728

The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

Liquid end 1000 - 1005 (1605)  
NP without coarse/fine bleed



Spare parts kits for:

Type	Material	Order No.
1000	NPE	1001713
1601	NPE	1001714
1602	NPE	1001715
1005 (1605)	NPE	1001716
1000	NPB	1001721
1601	NPB	1001722
1602	NPB	1001723
1005 (1605)	NPB	1001724

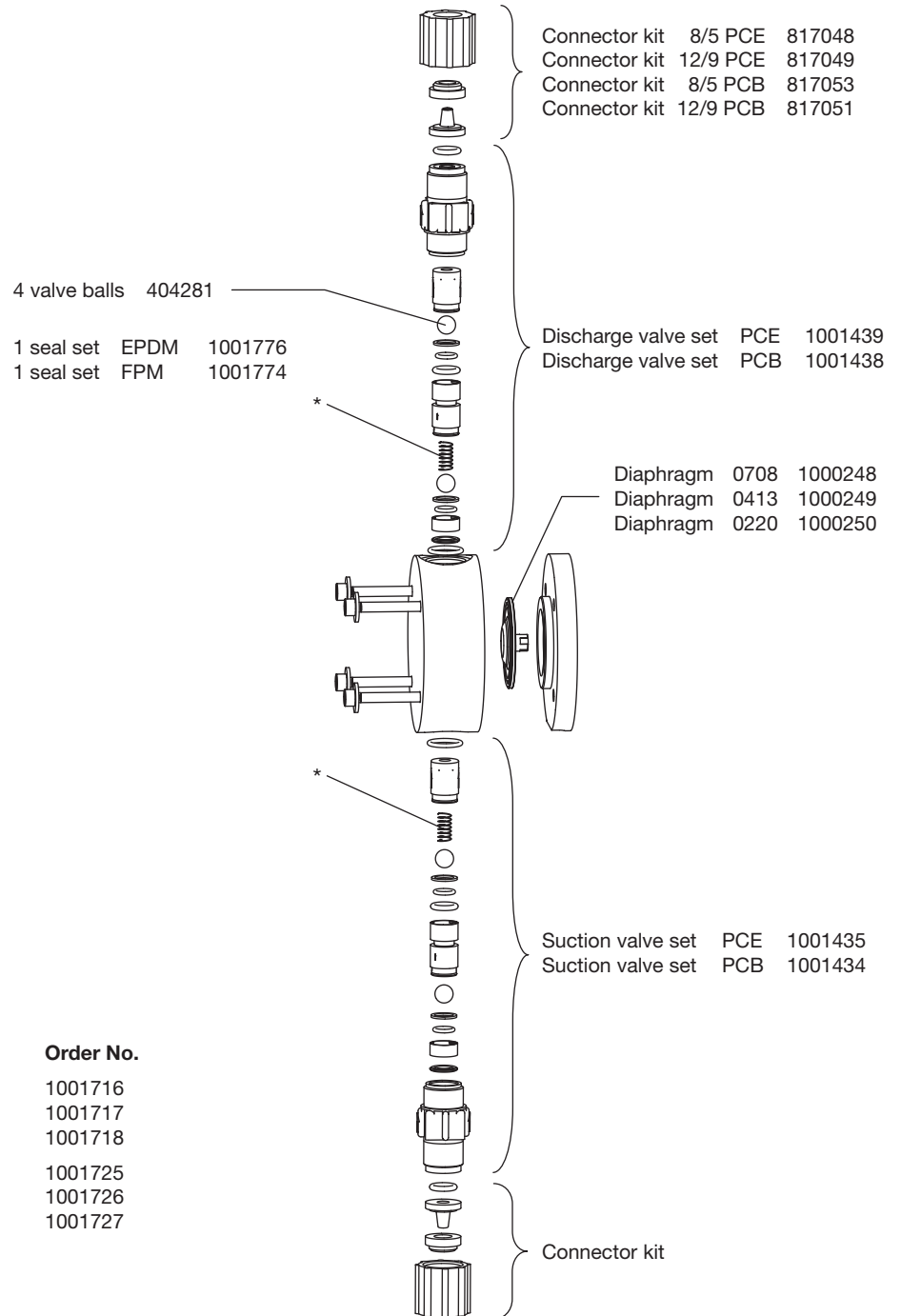
The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

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Liquid end 0708 (1008) - 0220 (0420)  
NP without coarse/fine bleed



Spare parts kits for:

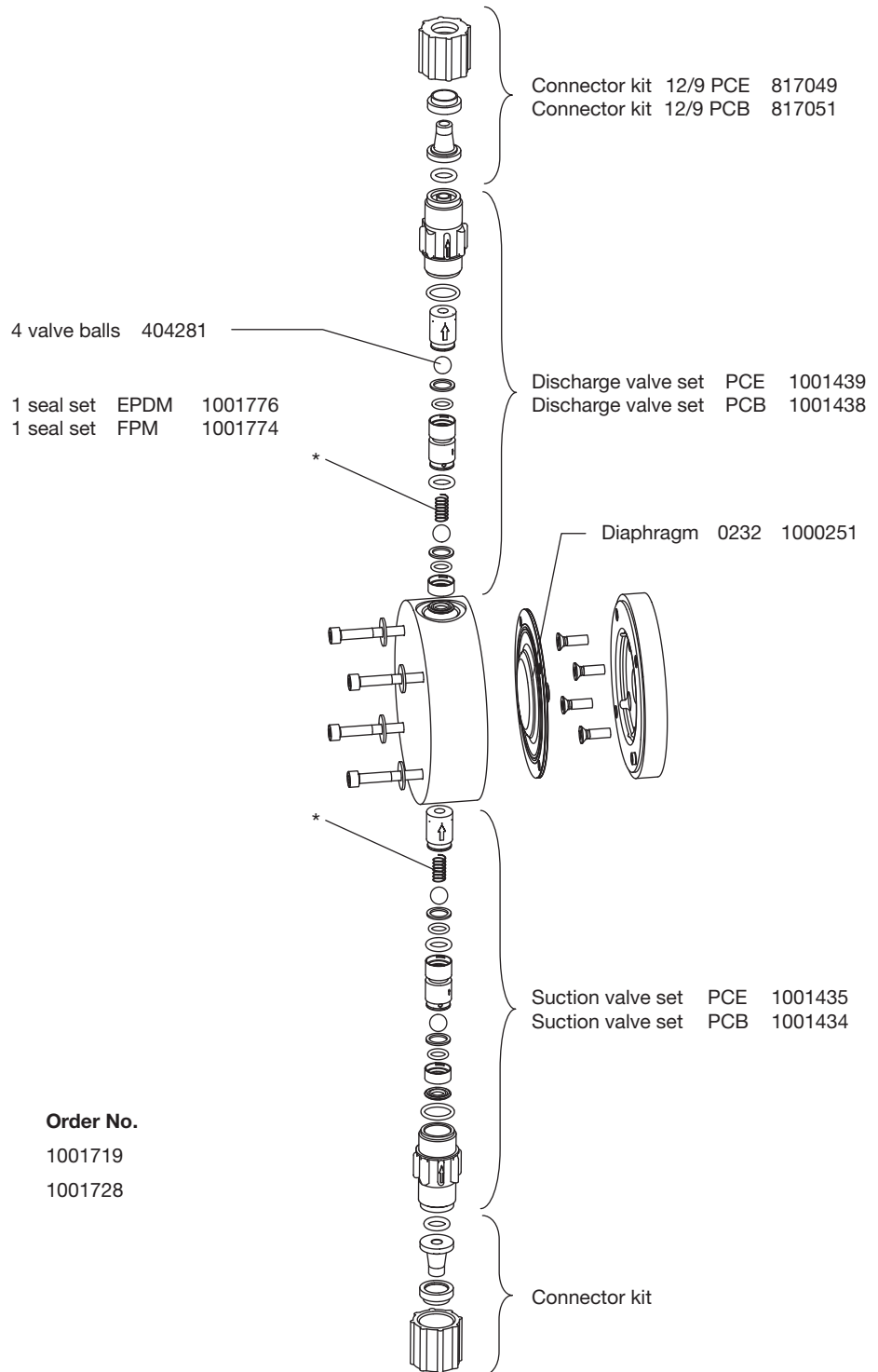
Type	Material	Order No.
0708 (1008)	NPE	1001716
0413 (0713)	NPE	1001717
0220 (0420)	NPE	1001718
0708 (1008)	NPB	1001725
0413 (0713)	NPB	1001726
0220 (0420)	NPB	1001727

The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

Liquid end 0232  
NP without coarse/fine bleed



Spare parts kits for:

Type	Material	Order No.
0232	NPE	1001719
0232	NPB	1001728

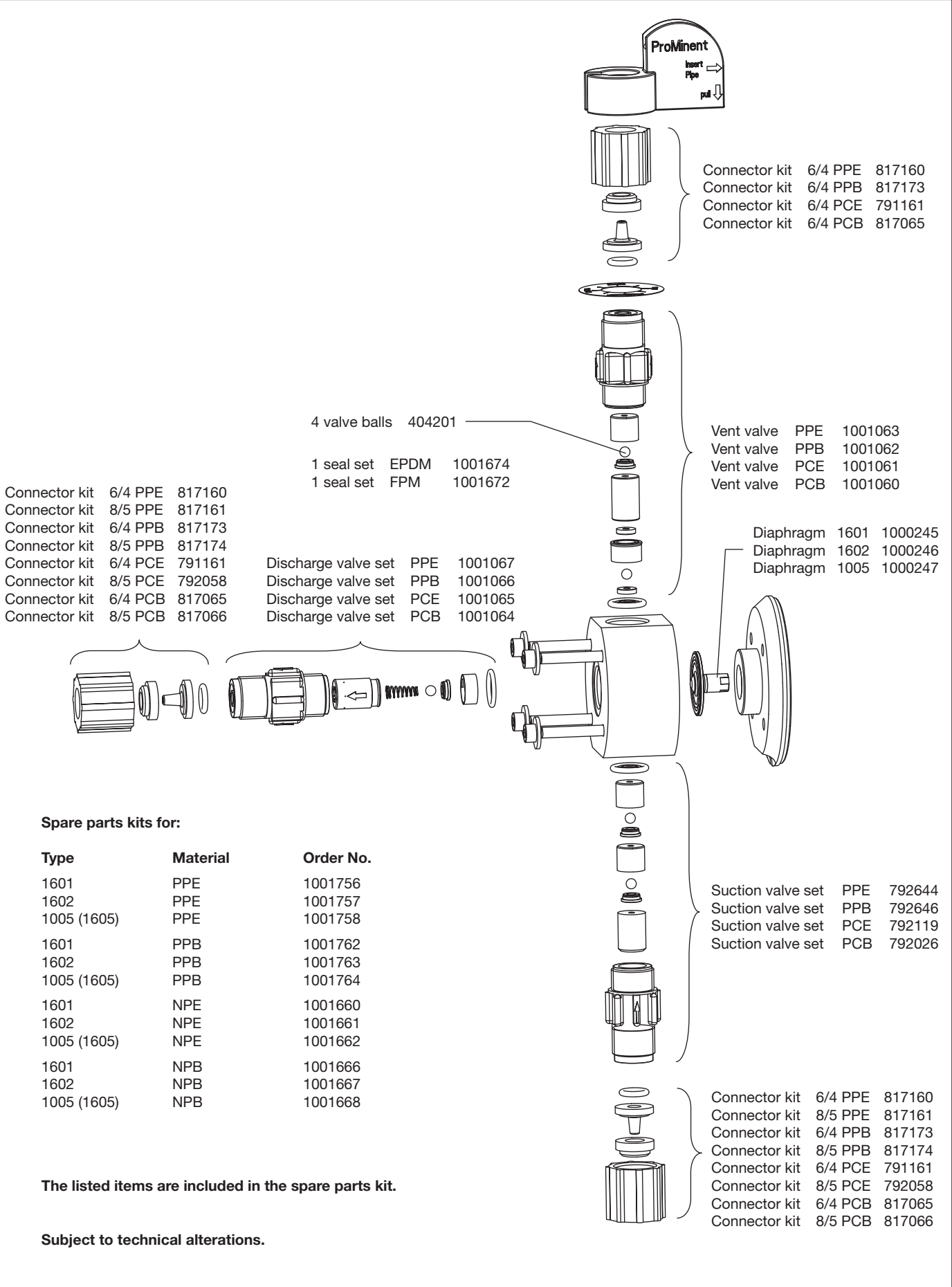
The listed items are included in the spare parts kit.

\* Customer accessories

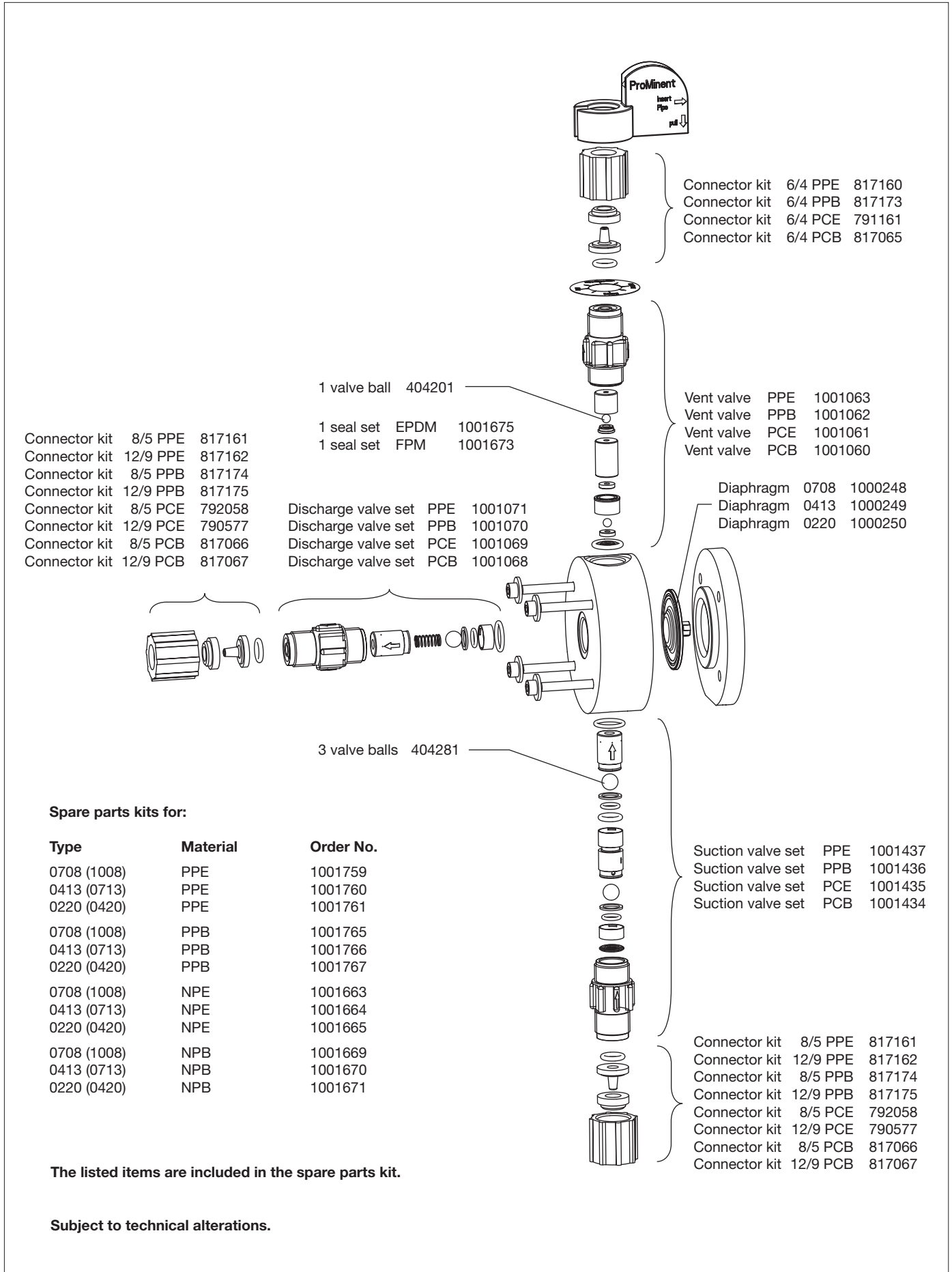
Subject to technical alterations.



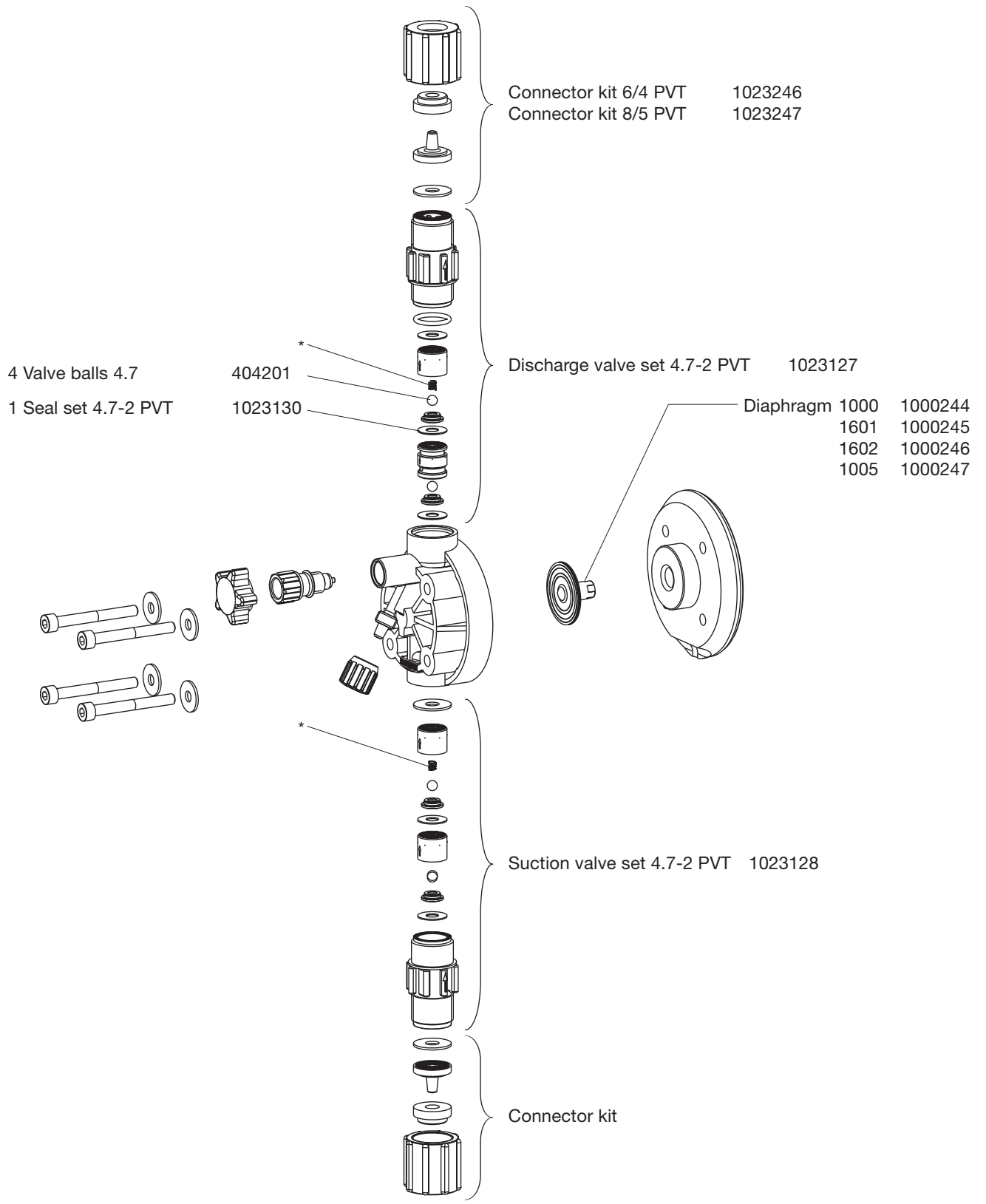
Liquid end 1601 - 1005 (1605)  
PP / NP self-degassing



Liquid end 0708 (1008) - 0220 (0420)  
PP / NP self-degassing



Liquid end 1000-1005 (1605)  
PVT with degassing

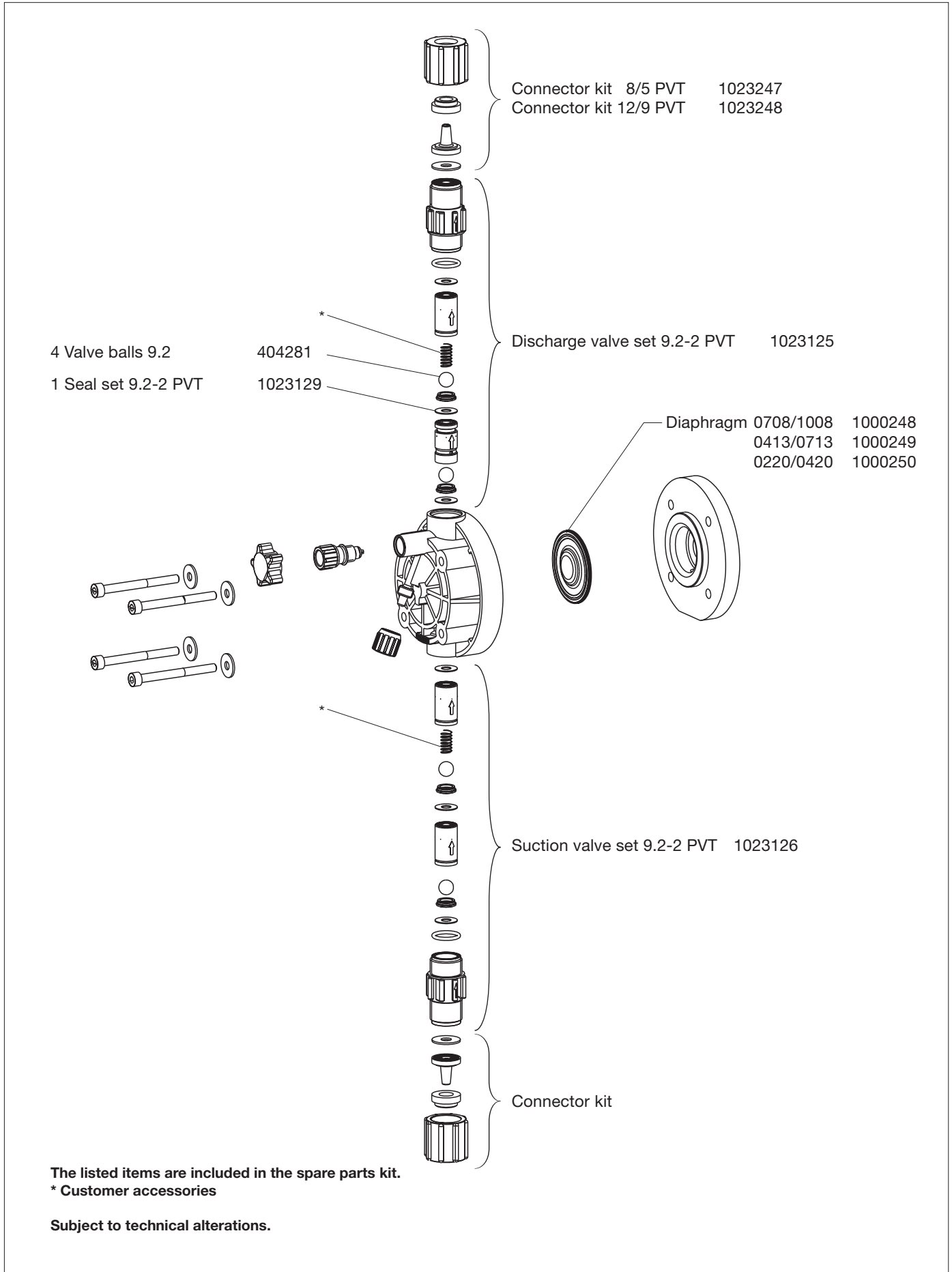


The listed items are included in the spare parts kit.

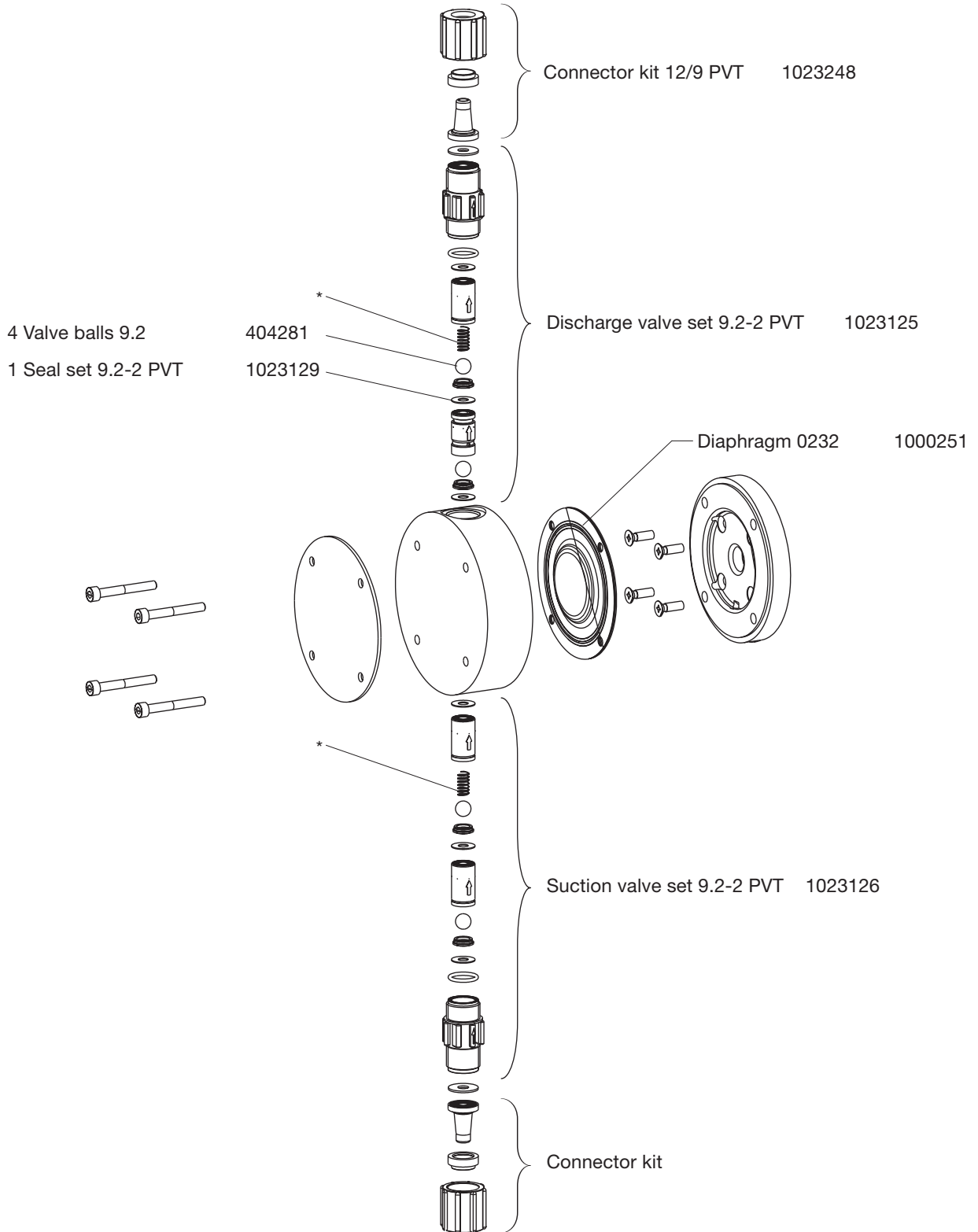
\* Customer accessories

Subject to technical alterations.

Liquid end 0708 (1008) – 0220 (0420)  
PVT with degassing



Liquid end 0232  
without degassing

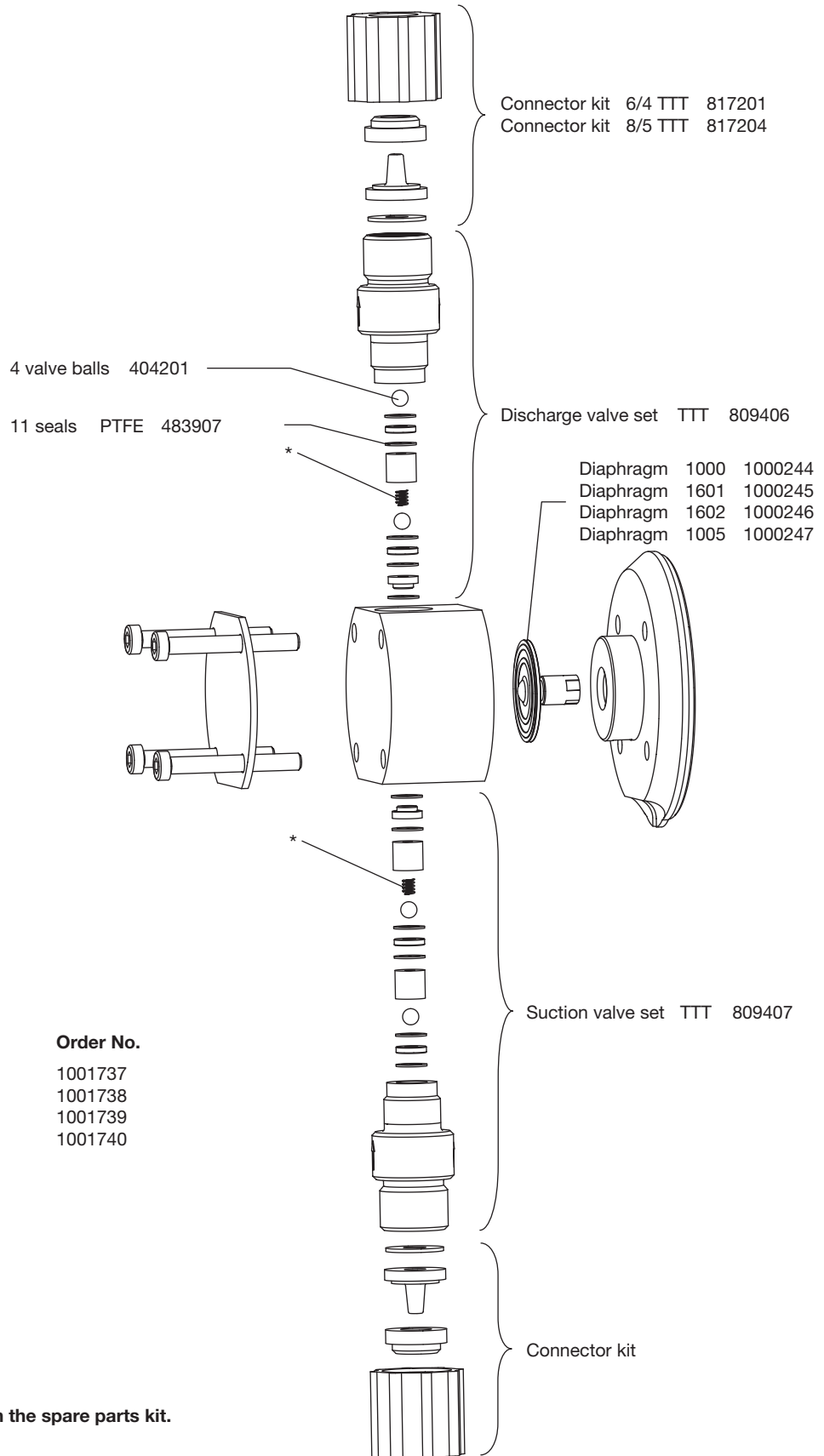


The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

Liquid end 1000 - 1005 (1605)  
TT



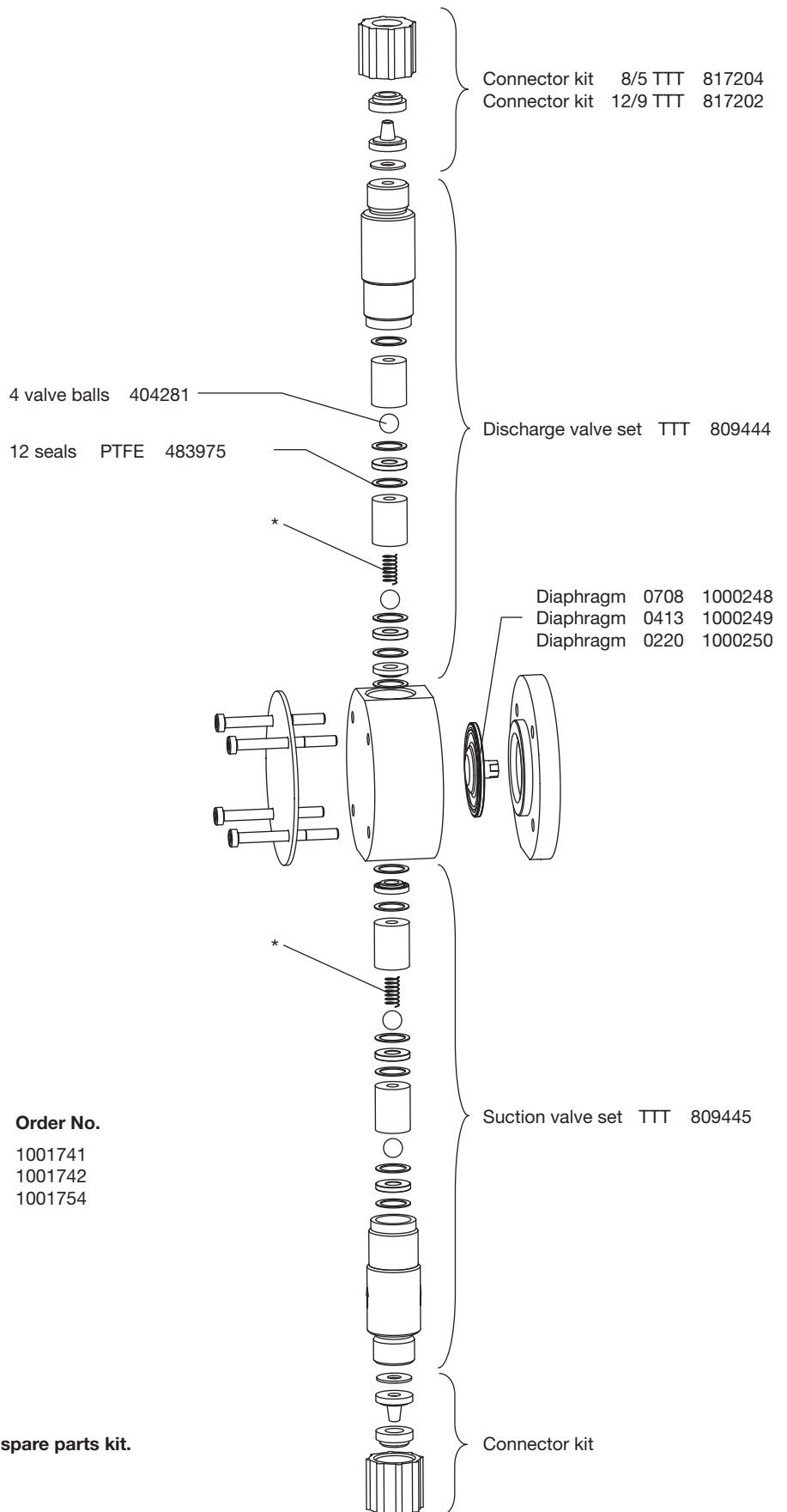
Spare parts kits for:

Type	Material	Order No.
1000	TTT	1001737
1601	TTT	1001738
1602	TTT	1001739
1005 (1605)	TTT	1001740

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.

Liquid end 0708 (1008) - 0220 (0420)  
TT



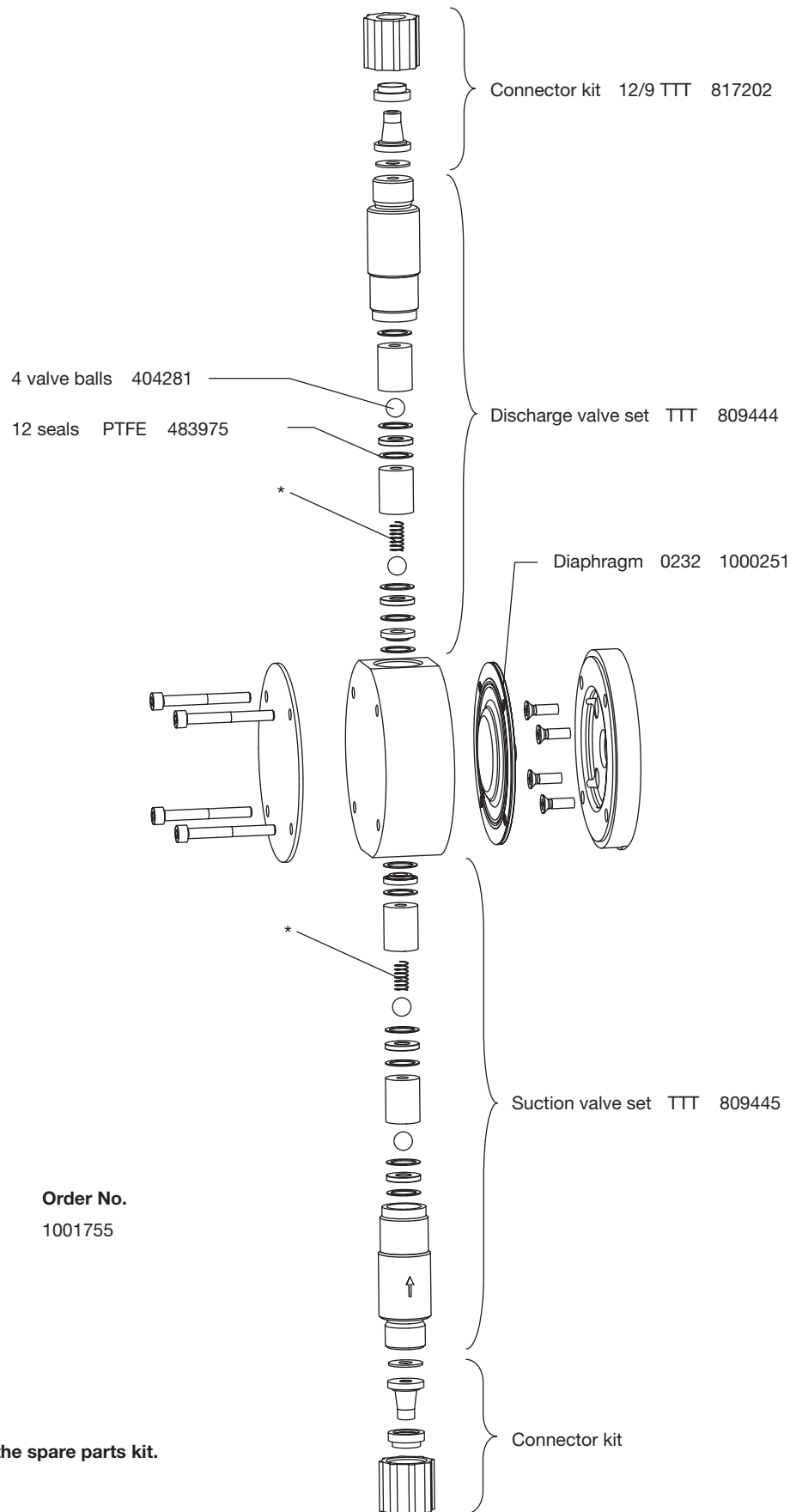
Spare parts kits for:

Type	Material	Order No.
0708 (1008)	TTT	1001741
0413 (0713)	TTT	1001742
0220 (0420)	TTT	1001754

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.

Liquid end 0232  
TT



Spare parts kits for:

Type	Material	Order No.
0232	TTT	1001755

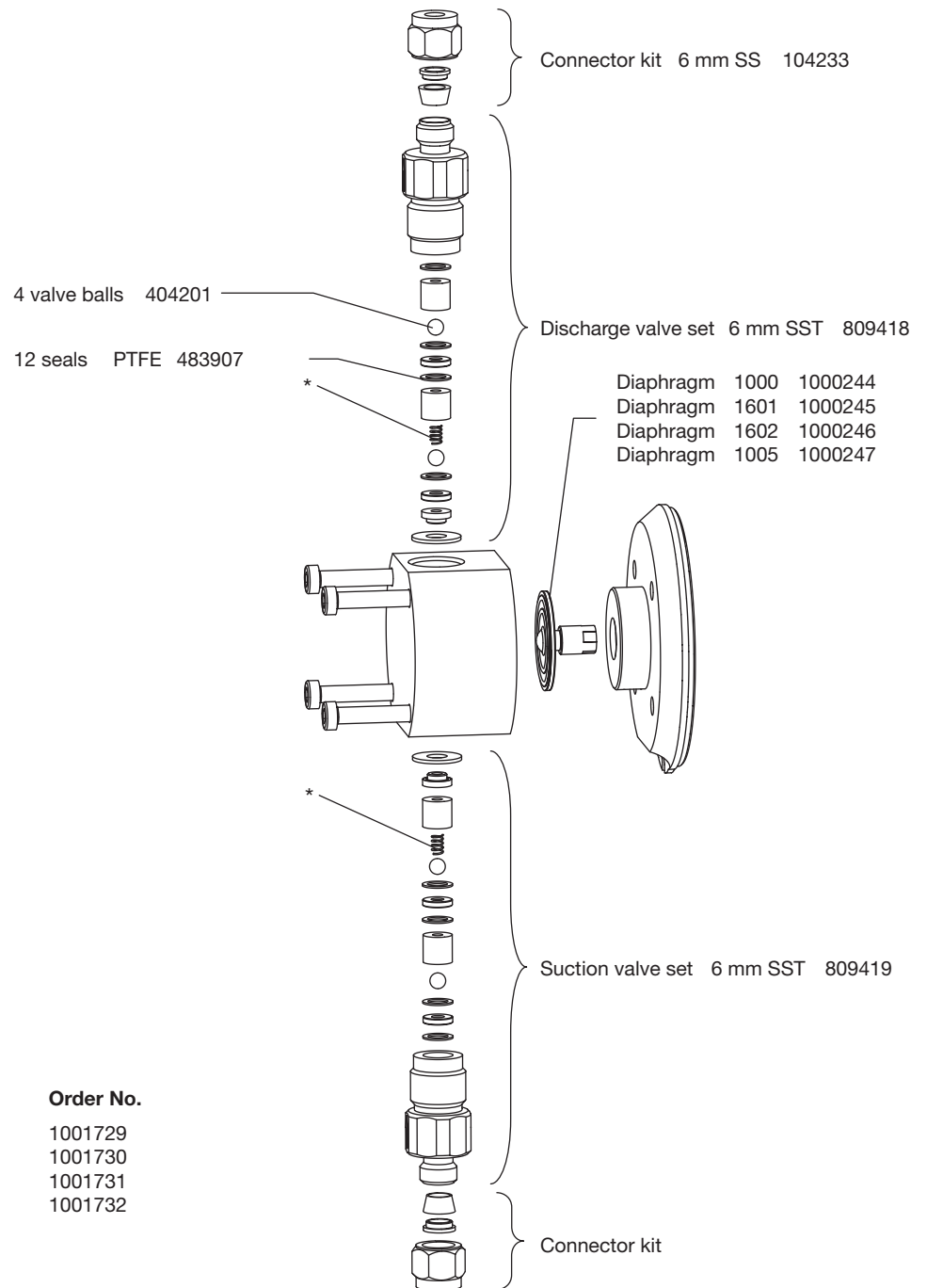
The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.

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Liquid end 1000 - 1005 (1605)  
SS



Spare parts kits for:

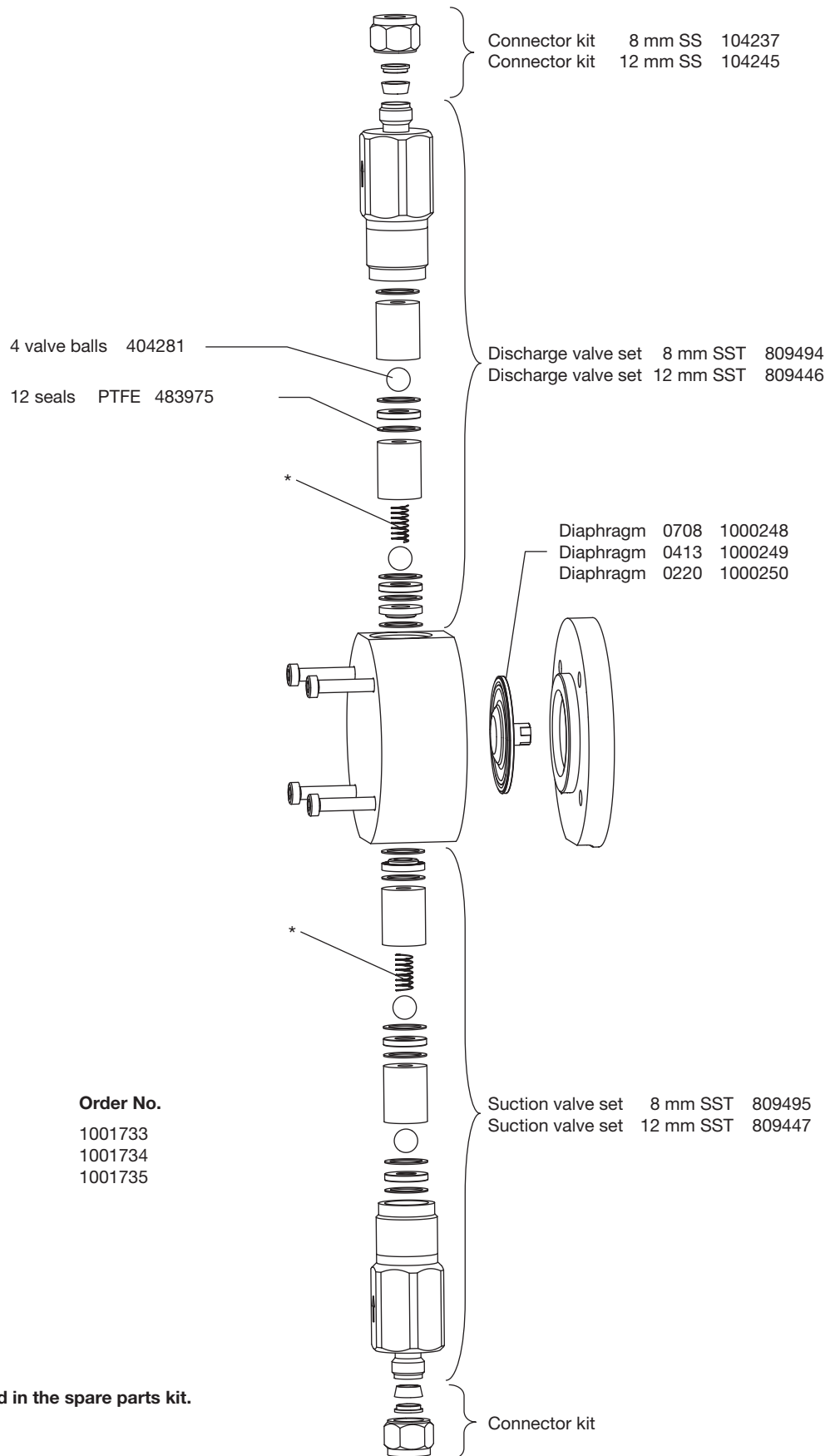
Type	Material	Order No.
1000	SST	1001729
1601	SST	1001730
1602	SST	1001731
1005 (1605)	SST	1001732

The listed items are included in the spare parts kit.

\* Customer accessories

Subject to technical alterations.

Liquid end 0708 (1008) - 0220 (0420)  
SS



Spare parts kits for:

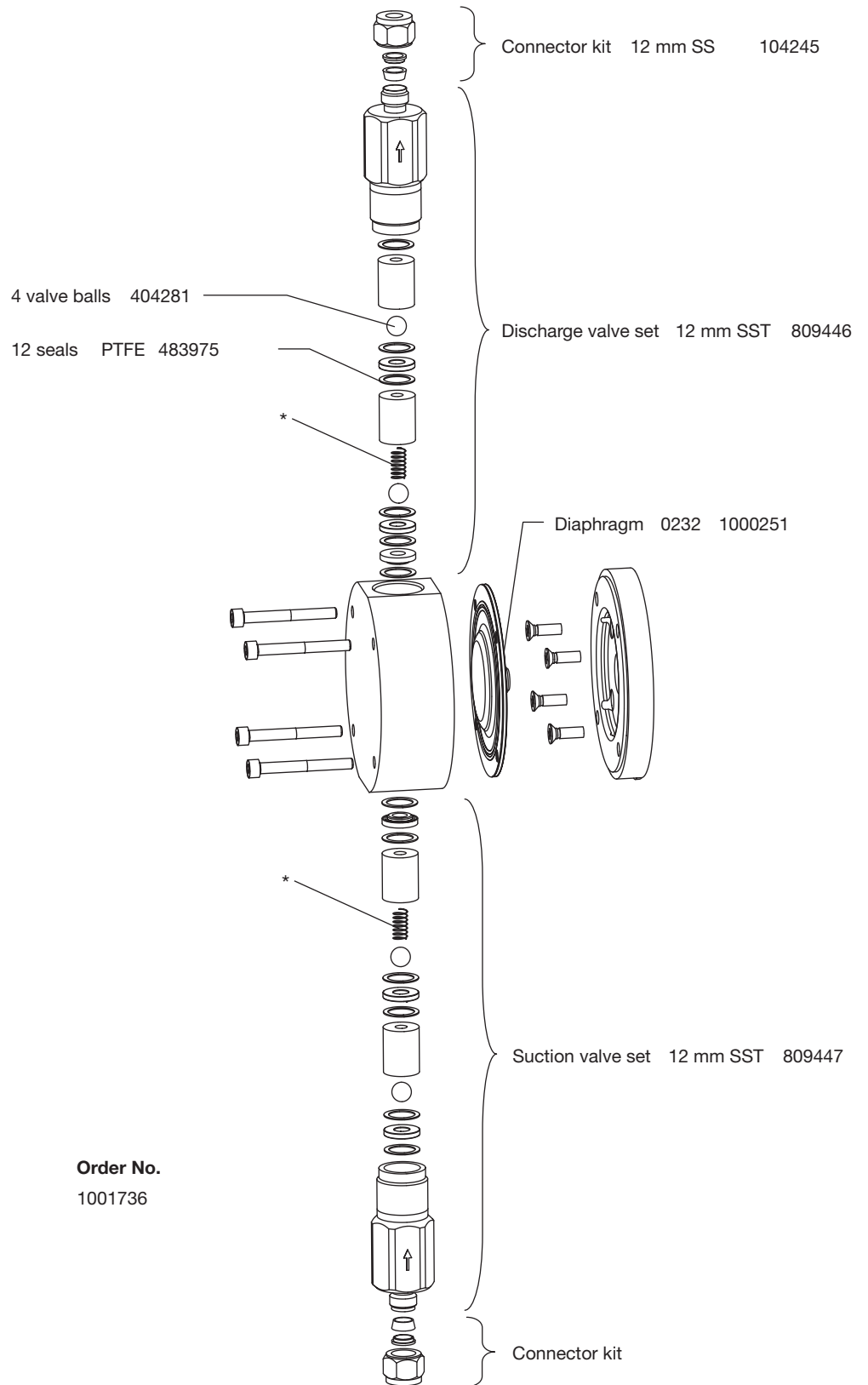
Type	Material	Order No.
0708 (1008)	SST	1001733
0413 (0713)	SST	1001734
0220 (0420)	SST	1001735

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.

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Liquid end 0232  
SS



Spare parts kits for:

Type	Material	Order No.
0232	SST	1001736

The listed items are included in the spare parts kit.  
\* Customer accessories

Subject to technical alterations.





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