Operating Instructions Manual

ProMinent® gamma/ L
Solenoid Metering Pump

GALA ____ ___ _ _ _ _ _ _ _ _ _ _ _

Please enter ident code of the device here

Please read the operating instructions through completely before commissioning this equipment! Do not discard!
Any part which has been subject to misuse is excluded from the warranty!

Printing:
Operating Instructions ProMinent® gamma/ L

Address:
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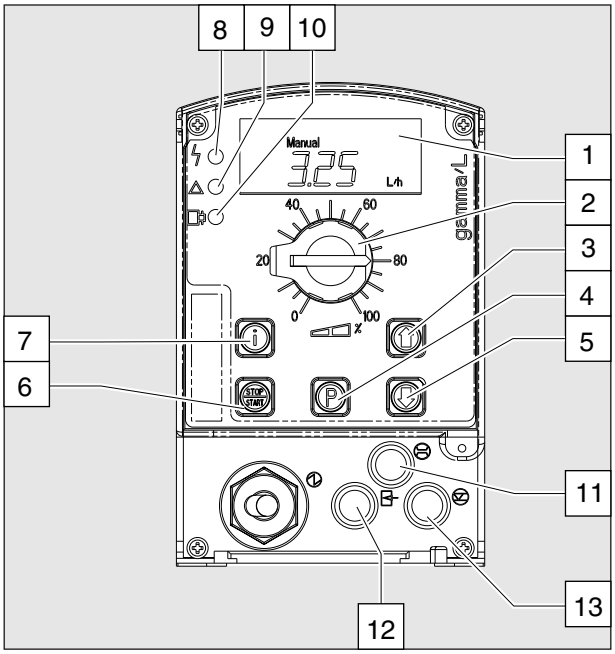
Subject to technical alteration.

Please fold out this page!

Control elements: overview



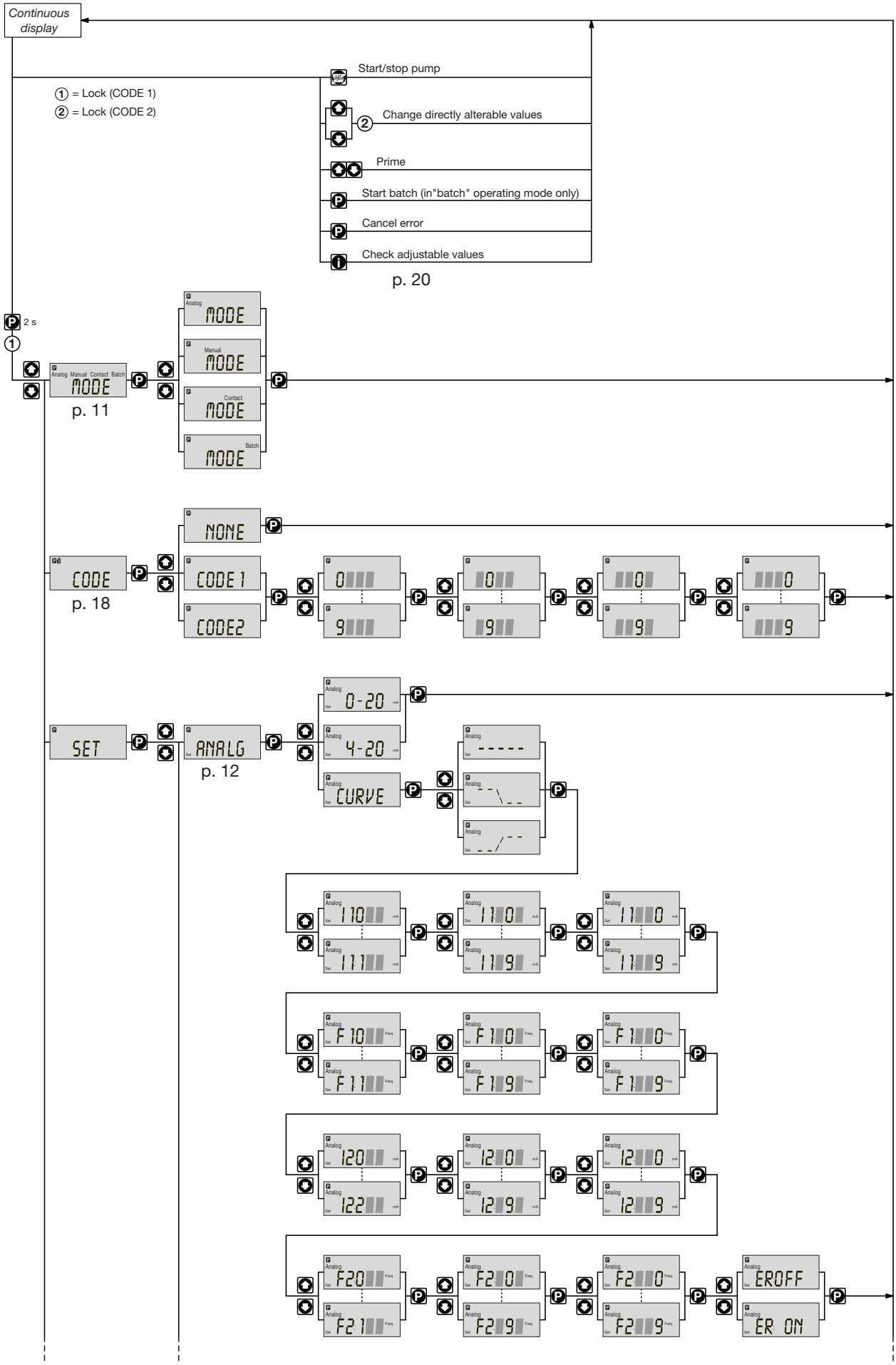
1 LCD display
2 Stroke length adjusting knob
3 UP key
4 P key
5 DOWN key
6 STOP/START key
7 i key
8 Fault indicator (red)
9 Warning indicator (yellow)
10 Operating indicator (green)

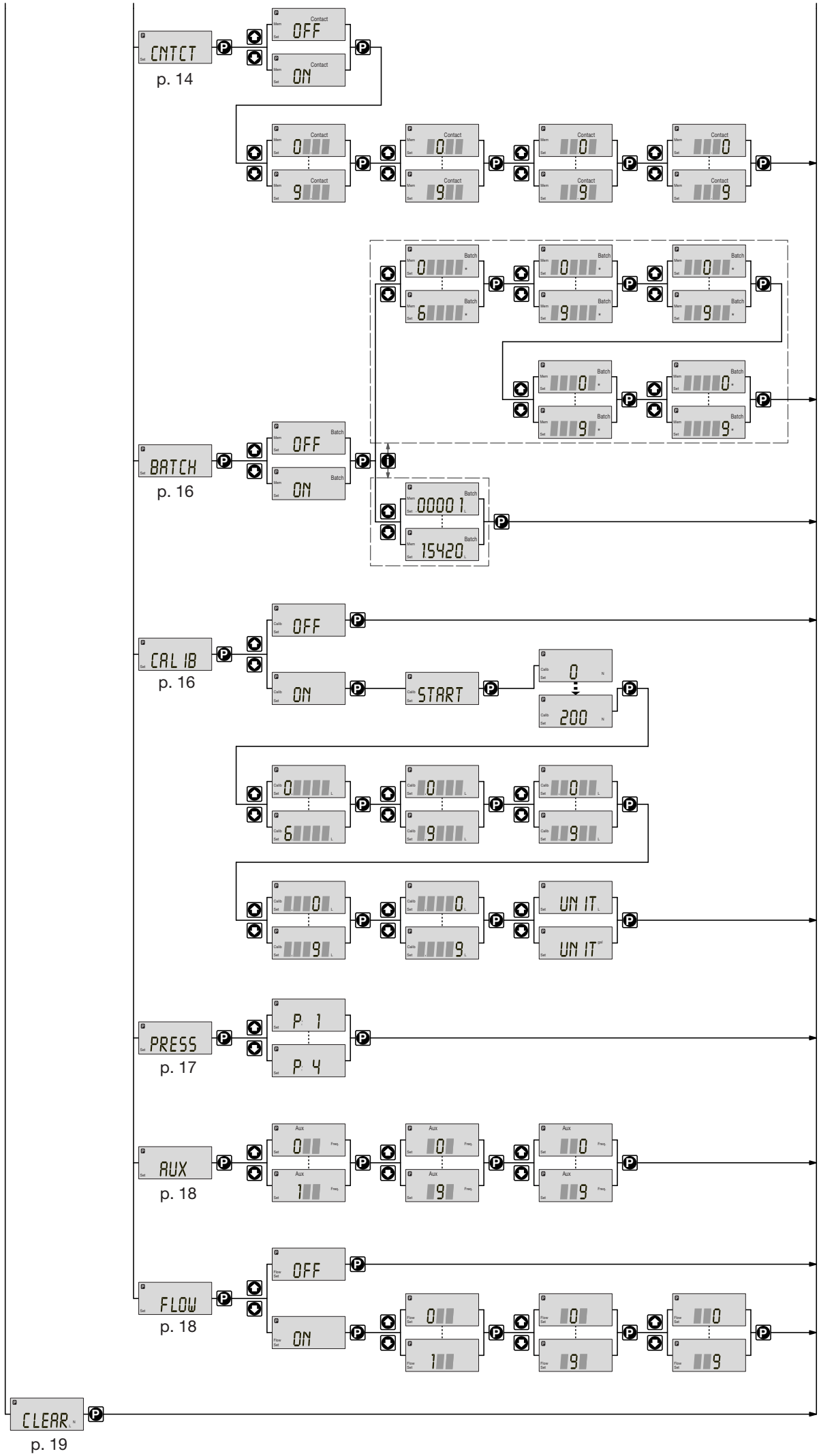
11 “Dosing monitor” terminal
12 “External control” terminal
13 “Float switch” terminal

Key functions

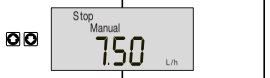
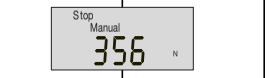
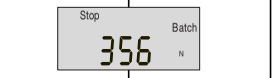
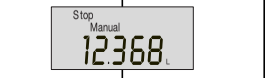
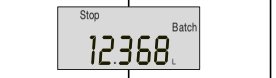
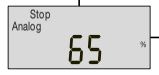
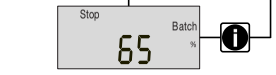
	In continuous display mode (operating)	In settings mode (settings)
STOP/START key		
Press briefly	Stop pump, start pump	Stop pump, start pump
P key		
Press briefly	Start batch (in “batch” operating mode only), Cancel error	Confirm entry- jump to next menu option or continuous display
Press for 2 s	Change to settings mode	---
Press for 3 s	---	Jump to continuous display
Press for 10 s	Display software version	---
Press for 15 s	Load factory settings (calibration)	---
i key		
Press x1	Toggle between continuous displays	Toggle between “change individual digits” and change a figure"
Press x2	---	For “change individual digits”: jumps to first digit
Arrow keys UP and DOWN		
Press x1 (until “Set” appears)	Change directly alterable values	Select other settings, change individual digit or figure
Press simultaneously	Prime	---

Operating-/Settings Diagram




CNTCT
p. 14
Contact
OFF
ON
0
9
BATCH
p. 16
Batch
OFF
ON
00001
15420
CALIB
p. 16
Calib
OFF
ON
START
0
200
UNIT
PRESS
p. 17
P 1
P 4
AUX
p. 18
Aux
Freq.
1
FLOW
p. 18
Flow
CLEAR
p. 19

Continuous display

Continuous display	Operating mode "**Analog**" 0-20 mA	Operating mode "**Manual**"	Operating mode "**Contact**" with memory and tansfer factor 5	Operating mode "**Batch**" with memory and tansfer factor 5
Stroke rate				
Feed rate				
Total stroke number				
Total litres (feed quantity)				
"External" display				
Signal current				
Strokes remaining				
Batch size/ Litres remaining				
Factor				
Stroke length				

⏣⏣ = UP and/or DOWN arrow keys, directly alterable values

"Mem" appears only when "memory" function activated

Table of Contents

Identcode

Please enter the identity code on the device label into the grey box below

GALA — **Series gamma/ L, version a**

Type	Capacity bar	Capacity l/h	
1000	10	0.74	Solenoid ∅ 70/M70
1601	16	1.1	
1602	16	2.1	
1005	10	4.4	
0708	7	7.1	
0413	4	12.3	
0220	2	19.0	
1605	16	4.1	Solenoid ∅ 85/M85
1008	10	6.8	
0713	7	11.0	
0420	4	17.1	
0232	2	32.0	

Material version:

PPE	Polypropylene/EPDM
PPB	Polypropylene/FPM (Viton®)
NPE	Acrylic glass/EPDM
NPB	Acrylic glass/FPM (Viton®)
PVT	PVDF/PTFE
TTT	PTFE/PTFE
SST	Stainless steel 1.4571/PTFE

Liquid end version:

0	Non-bleed, no valve spring, for NP, TT and SS only
1	Non-bleed, with valve spring, for NP, TT and SS only
2	Bleed function, no valve spring for PP, NP, PV, not type 0232
3	Bleed function, no valve spring for PP, NP, PV, not type 0232
4	No-vent with valve springs for highly viscous media
9	Self bleed function, for PP, NP, not for type 1000 and 0232

Hydraulic connection:

0	Standard connector as indicated in technical data
5	12/6 hose connector, pressure side only
9	10/4 hose connector, pressure side only

Version:

0	With ProMinent® logo

Power supply:

U	100 - 230 V, ±10 %, 50/60 Hz
M	12...24 V DC (only M 70)
N	24 V DC (only M 85)
P	24 V AC

Cable and plug:

A	2 m Euro
B	2 m Swiss
C	2 m Australian
D	2 m USA
1	2 m open end

Relay:

0	No relay
1	Fault indicating relay, (N/C) changeover relay
3	Fault indicating relay, (N/O) changeover relay
4	As 1 + pacing relay, (1 input each)
5	As 3 + pacing relay, (1 input each)

Accessories:

0	No accessories
1	Foot and dosing valve,, 2 m PVC suction tube, 5 m PE discharge tubing, PP, PC, and NP only
2	As 0 + calibrating cylinder
3	As 1 + calibrating cylinder

Control variants:

0	Manual + external 1:1
1	Manual + external with pulse control
2	Manual + external 1:1 with analogue current
3	Manual + external with pulse control + analogue current
4	as 0 + timer
5	as 3 + timer
P	as 3 + Profibus®

Access code:

0	No access code
1	Access code

Dosing monitoring:

0	Pulse input
1	Input for continuous contact

Pause/level:

0	Pause N/C level N/C

Viton® (FPM) is a registered trademark of DuPont Dow Elastomers.

GALA _____ ___ _ _ **0** _ _ _ _ _ _ _ **0**

General User Guidelines

Please read through the following user Guidelines. Familiarity with these points ensures optimum use of the operating instructions.

On the fold-out page after the title page you will find the overviews “control elements and key functions” and “operating/settings diagrams”.
You will find it useful to open out the “control elements and key functions” overview as you read this instruction manual.

Key points in the text are indicated as follows:

- Enumerated points
- ▶ Hints

Working Guidelines:

NOTE

Guidelines are intended to make your work easier.

Safety Guidelines:

WARNING

Describes a potentially dangerous situation.
Could result in loss of life or serious injury if preventative measures are not taken.

CAUTION

Describes a potentially dangerous situation.
Could result in lesser injuries or damage to property if preventative measures are not taken.

IMPORTANT

Describes a potentially threatening situation.
Could result in damage to property if preventative measures are not taken.

The name plate affixed to the title page is identical to that on the gamma/ L pump supplied. This facilitates matching the correct operating instructions manual to the correct pump.

Please quote the identity code and the serial number, which you will find on the name plate, in any subsequent correspondence or when ordering spare parts. This will ensure accurate identification of the pump type and material version.

1 About This Pump

The pumps in the ProMinent® gamma/ L pump series are microprocessor controlled solenoid dosing pumps with the following special features:

- The feed rate can be displayed in l/h and/or gal/h (calibrated), or in strokes/min.
- The stroke rate is continuously adjustable and is displayed in the LCD display.
- Stroke rate adjustment is digitally accurate and is displayed in the LCD display.
- The rated pressure of the gamma/ L can be adapted to individual systems.
- Two pumps can be controlled in different ways via the same standard signal.
- Large, illuminated LCD display

The hydraulic parts of the gamma/ L are identical to those of the Beta®.

2 Safety

Correct use

The gamma/ L must be used for liquids only!

The gamma/ L may be used only in compliance with the technical data and specifications given in the operating instructions!

It is forbidden to use the gamma/ L for any other purpose, or to modify it in any way!

The gamma/ L is not suitable for dosing gases or solids!

The gamma/ L must be used by trained and authorised personnel only!

Safety Guidelines

WARNING

- **As soon as the gamma/ L is connected to the electricity supply it may commence pumping!**
  Avoid leakage of hazardous chemicals in this case!
  If this should occur, then press the STOP/START key or disconnect the gamma/ L from the power supply immediately!
- **The gamma/ L cannot be switched to a current-free status! In the event of an electrical accident, disconnect cable from the mains power supply!**
- **Disconnect cable from the mains power supply before commencing work on the gamma/ L!**
- **Always depressurise liquid end before commencing work on the gamma/ L!**
- **Empty and rinse out the liquid end before commencing work on the gamma/ L after use with hazardous or unknown chemicals!**
- **Pumps for radioactive materials may not be returned to ProMinent after use!**

CAUTION

- **It is not permitted to assemble and install ProMinent® dosing pumps with non-original parts unless these have been checked and recommended by ProMinent. It can result in harm to persons and property for which no liability will be accepted!**
- **When dosing aggressive materials, check the resistance of the pump materials (see ProMinent® resistance list in the product catalogue!)**
- **If another liquid end size is installed the pump must be reprogrammed on factory premises!**
- **Observe applicable national directives during installation!**

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)

3 Storage, Transport and Unpacking

Transport and store the gamma/ L in the original packaging!

Protect the packed gamma/ L from moisture and the effects of chemicals!

Environmental conditions for storage and transport:

Storage and transport temperature: -10 bis +50 °C
Humidity: < 92 % relative humidity

Check that the delivery is complete:

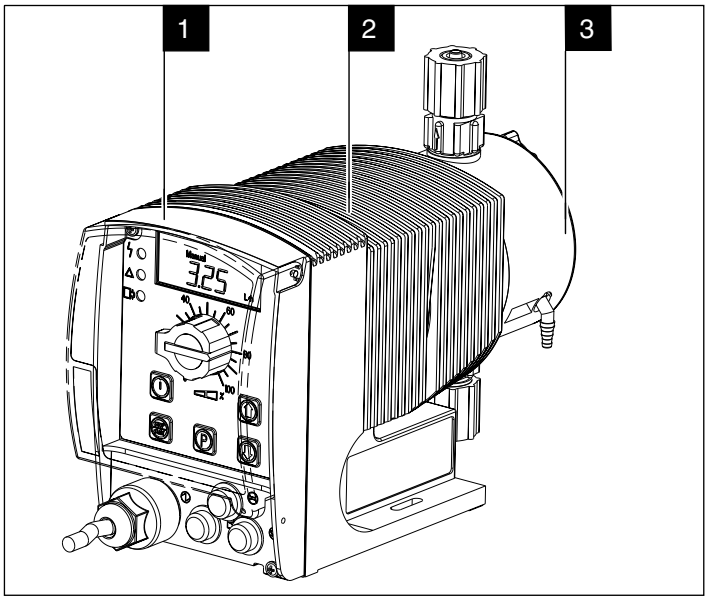
Delivery range

- Dosing pump with mains lead
- Operating instructions manual with EU conformity declaration
- Accessories if applicable

4 Device Overview and Control elements

When reading this section it is helpful to fold out the overview “Control elements and key functions”!

4.1 Device overview



1 Control unit
2 Power end
3 Liquid end

Fig. 01

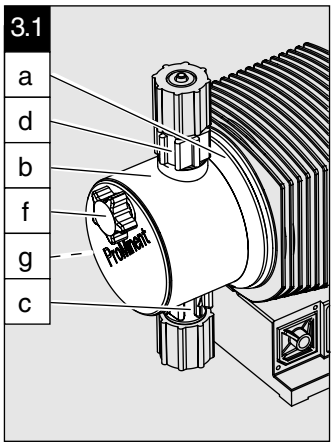


Fig. 02

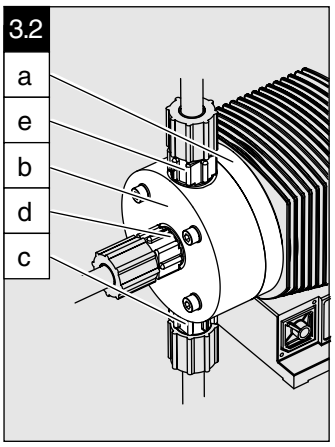


Fig. 03

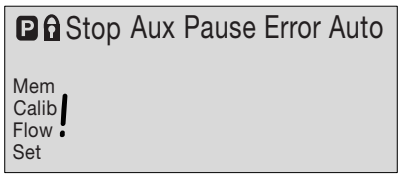
a Backplate
b Liquid end
c Suction valve
d Discharge valve
e Bleed valve
f Coarse/fine bleed valve
g Bypass hose nozzle

4.2 Control elements

Please acquaint yourself with the gamma/ L control elements with the help of the “control elements and key functions” overview!

Indicators

The LCD display supports the operation and setting of the gamma/ L with a range of indicators:



The indicators are interpreted as follows:

Symbol for P key:	The gamma/ L is in settings mode.
Close symbol:	In a continuous display: lock (if code has been set). In settings mode: indicates access to code menu.
Stop:	The gamma/ L has been stopped using the STOP/START key.
Aux:	The gamma/ L is pumping at the auxiliary frequency. In AUX menu: the gamma/ L is in the AUX menu.
Pause:	The gamma/ L has been stopped using the “pause” function (external).
Error:	A fault has occurred and the pump has been stopped.
Auto:	The gamma/ L is in “Auto“ operating mode. Depending on the Ident-code this means that the gamma/ L can be controlled using PROFIBUS® or the timer (as a comparison see the relevant supplementary instructions).
Mem:	An additional “memory” function has been set in the “contact” and “batch” operating modes. In CNTCT or BATCH menus (“mem” flashes): the memory function can be set
Calib:	The gamma/ L is in the CALIB menu. In a continuous display (“calib” flashes”): Deviation in stroke length of more than 10 degrees (e.g. a stroke length of 40 % when set at less than 30 % or greater than 50 %) from the value at the time of calibration.
Flow:	The gamma/ L is in the FLOW menu.
Set:	The gamma/ L is in the SET menu.
Command symbol:	The number of strokes reached is above the maximum value (99999) that can be shown in the LCD display

NOTE

The pump gamma/ L only displays the metering output in l or l/h or in gal or gal/h when calibrated.

5 Function Description

Function principle

Dosing takes place as follows: the dosing diaphragm is forced into the liquid end; the pressure in the liquid end causes the suction valve to close and the chemical flows out of the liquid end through the discharge valve. The dosing diaphragm is then forced back out of the liquid end. The vacuum in the liquid end causes the discharge valve to close and fresh chemical flows into the suction valve in the liquid end. This concludes one operating cycle.

The dosing diaphragm is driven by an electronically controlled electrical solenoid.

Feed rate

The feed rate is determined by the stroke length and the stroke rate.

The stroke length is set between 0 - 100 % using the stroke length adjusting knob.
Optimum dosing reproducibility is achieved by setting the stroke length to between 30 - 100 % (SEK type: 50 - 100 %)!

The stroke rate is set using the arrow keys (not in “analogue” operating mode) to between 0 - 180 strokes/min.

Self-bleed function

Pumps with self-bleed function (= SEK types) can operate a prime action even when the discharge tubing is closed, discharging existing air through a bypass valve. These pumps can release gas even during operation, irrespective of the actual operating pressure.

An in-built pressure maintenance valve allows accurate dosing even in depressurised states.

Operating modes

Operating modes are selected using the MODE menu (depending upon identity code, some operating modes may be absent).

"Analog" operating mode: (Identity code, control variant: analogue current)
The stroke rate is controlled via an analogue electrical signal via the "external control" terminal.
Signal processing is pre-selected at the controller.

"Manual" operating mode: (Identity code, control variant: manual, standard function)
The stroke rate is controlled manually via the controller.

"Contact" operating mode:
(Identity code, control variant: external 1:1 / external with pulse control)
This operating mode offers the opportunity to make fine adjustments with small increase/ decrease factors. Dosing can be activated by a pulse via the "external control" terminal or by a semiconductor element. With the "pulse control" option it is possible to pre-set a feed quantity (batch) or number of strokes (factor 0.01 to 99.99) via the control unit.

"Batch" operating function:
(Identity code, control variant, external 1:1 / external with pulse control)
This operating mode offers the option of working with larger transfer factors (up to 65535). Metering can be triggered by pressing the P key or a pulse from the "external control" terminal via a contact or semiconductor element.
A batching quantity or number of strokes can be pre-selected via the control unit.

Operating mode "PROFIBUS®": (Ident code, control variant: profibus®)
This operating mode offers the possibility to control the pump via PROFIBUS® (see "supplemental instructions for ProMinent gamma/ L and ProMinent Sigma versions with "PROFIBUS®").

Functions The following functions can be selected using the SET menu:

"Calibrate" function:
The gamma/ L can be operated in all operating modes including in calibrating mode.
The corresponding continuous displays can show the actual feed quantity or the feed rate.
Calibration is maintained within the stroke frequency range 0 - 180 strokes/min.
Calibration is also maintained when a stroke frequency is altered up to ±10 %.

"Pressure level" function:
It is possible to set different pressure levels.

"Auxiliary frequency" function:
It is possible to set a stroke rate in the SET menu, which may be activated via the "external control" terminal. This auxiliary frequency overrides all other pre-set stroke rate frequencies.

"Flow" function:
Stops the gamma/ L when the flow is insufficient.
In the SET menu, the number of failed strokes is entered after which the pump will be turned off.

The following functions are available as standard:

"Float switch" function:
Information on the liquid level in the feed chemical container is transmitted to the gamma/ L. This option requires the installation of a 2-stage float switch. This is connected to the "float switch" terminal.

"Pause" function:
The gamma/ L can be stopped by remote control via the "external control" terminal.
The "pause" function operates only via the "external control" terminal.

The following functions are activated by keystrokes:

"Stop" function:
The gamma/ L can be stopped by pressing the STOP/START key without disconnecting from the mains power supply.

"Prime" function:
Priming (short term feed at maximum frequency) is activated by pressing both arrow keys at the same time (in "Str oke rate" permanent display).

Optional relay

The gamma/ L has two connection options.

‘Fault indicating relay” option:
In the event of fault signals, warning signals or float switch activation signals, connects an electrical circuit to trigger alarm sirens etc. The relay is retrofitted via an aperture in the power end.

‘Fault indicating and pacing relay” option:
Along with the fault indicating relay, the pacing relay produces a contact for every stroke.
The relay is retrofitted via an aperture in the power end.

Function and error indicators

The operating and error status is shown via the three LEDs and the “error” indicator on the LCD (see also section 11):

LCD indicator

If a fault occurs “error” will appear along with an additional fault warning.

LED indicator

Operating indicator (green)
This indicator is lit as long as the gamma/ L is operating correctly.
It stops briefly with each stroke.

Warning indicator (yellow)
This warning light appears if the gamma/ L electronics detect a situation that could lead to a fault, e.g. “liquid levels low 1st stage”.

Warning indicator (red)
This warning light appears if a fault occurs, e.g. “liquid levels low 2nd stage”.

Hierarchy of operating modes, functions and fault statuses

The different operating modes, functions and fault statuses each have a differing effect on whether and how the gamma/ L functions. These effects are given below:

1. **Prime**
2. **Fault, stop, pause**
3. **Auxiliary frequency**
4. **Manual, analogue, contact, batch**

to:

1. “Prime” can take place in the permanent “Stoke rate” display in any pump mode (as long as it is operational).
2. “Fault”, “stop” and “pause” stop all system parts up to “prime”.
3. The stroke frequency of the “auxiliary frequency“ always has precedence over the stroke frequency, which is set by an operating mode listed under 4.

6 Assembly and Installation

6.1 Electrical installation

WARNING

- **Installation must be carried out by a trained engineer!**
- **Disconnect gamma/ L from mains power supply during installation!**
- **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 applicable national directives when installing the dosing pumps!**
- **When connecting with parallel inductive power consumers a switch contact must be fitted, e.g. relay or contactor!**

IMPORTANT

The universal signal cable, the external/connecting cable and the liquid level monitoring cable should never be shortened to less than 1.20 m, otherwise the cable identification system will fail.

Connection to mains power supply

Connect the gamma/ L to the mains power supply using the mains lead

Parallel connection to inductive power consumers

If the gamma/ L is connected to the mains in parallel with inductive power consumers (e.g. solenoid valve, motor) they must be electrically isolated. This will avoid damage caused by induction and voltage surges when switching off.

▶ Fit individual contacts for the gamma/ L and supply power via auxiliary contactor or relay.

If this is not possible, then:

▶ Connect a varistor in parallel (order number 710912) or an RC circuit, 0.22 µF/220 Ω (order number 710802).

Power element (in base of pump)

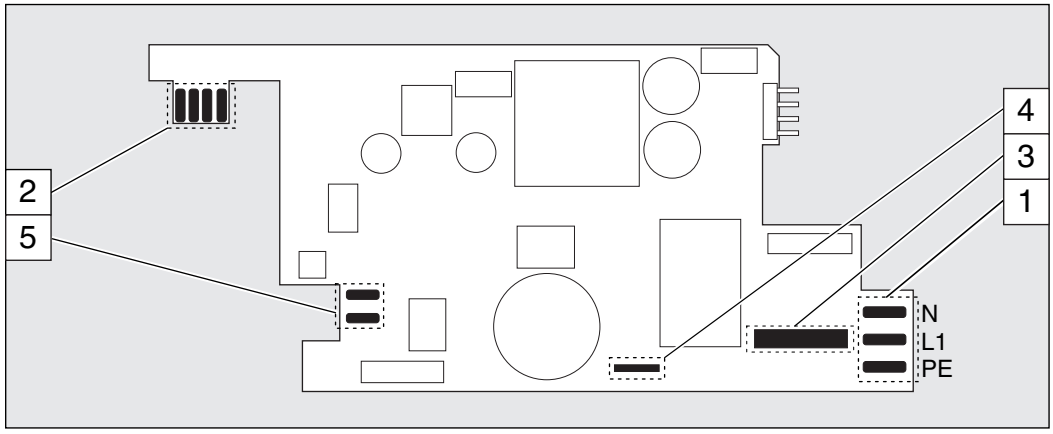


Fig. 04

1 Mains terminal
2 Relay circuit terminal
3 Fuse
4 Solenoid earth lead terminal
5 Solenoid terminal

"External control" terminal

The "external control" terminal is a five pin in-built terminal. It is compatible with the two and four core cables used previously.
The "auxiliary frequency" function is only available with a five core cable.

gamma/ L configuration

Electrical interface for "external contact" - "pause" - "auxiliary frequency":

- Voltage when contacts open: approx. 5 V
- Input resistance: 10 kΩ
- Control: voltage free contact (load: 0.5 mA at 5 V),
  or: Semiconductor switch (residual voltage < 0.7 V)
- Maximum pulse frequency: 25 pulses/s
- Required pulse duration: ≥ 20 ms

Electrical interface for "external analogue":

- Input load resistance: approx. 120 Ω
- Maximum current at input: 50 mA

gamma/ L configuration

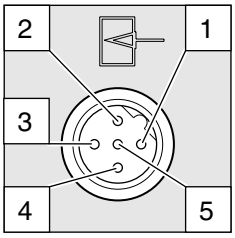


Fig. 05

Pin	Function	2 core cable	4 core cable	5 core cable
Pin 1	Pause	Jumped at pin 4	Brown	Brown
Pin 2	External contact	Brown	White	White
Pin 3	External analogue	–	Blue	Blue
Pin 4	Earth	White	Black	Black
Pin 5	Auxiliary frequency	–	–	Grey

Plug configuration

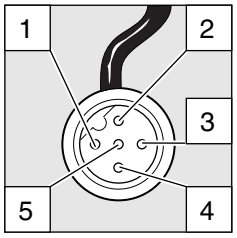


Fig. 06

"Pause" function
The gamma/ L is not operating when
- The cable is connected and pins 1 and 4 are free.

The gamma/ L is operating when
- The cable is connected and pins 1 and 4 are connected.
- There is no cable connected (pin 1 is free).

"Contact" and "Batch" operating modes
One or more discharge strokes are triggered when pin 2 and pin 4 are connected to one another for at least 20 ms.
Otherwise, pin 1 and pin 4 must be connected.

"Analogue" operating mode
The stroke frequency of the gamma/ L is controlled via an electrical signal. The electrical signal is applied between pins 3 and 4.
Otherwise, pin 1 and pin 4 must be connected.

"Auxiliary frequency" function
The gamma/ L runs at a pre-set stroke rate when pin 5 and pin 4 are connected to one another.
Otherwise, pin 1 and pin 4 must be connected.
The factory setting for this function is 180 strokes.

NOTE

For function and operating mode hierarchy, see section 5!

Connecting two gamma/ L pumps in series
Connect two gamma/ L pumps in series as follows if you wish to control both via **one** electrical signal in the "analog" operating mode (see section 7.4.2):

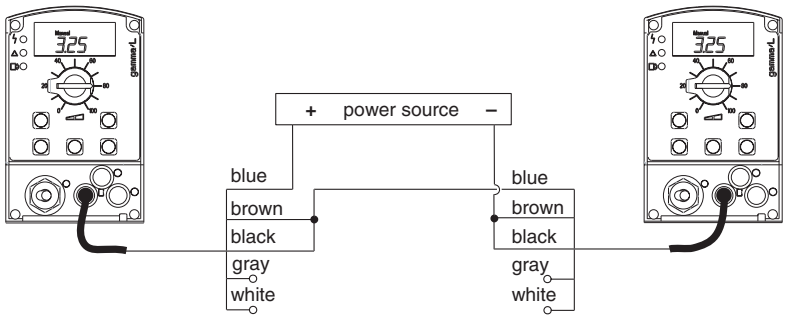


Fig. 07

"Float switch" terminal

Optional fitting of a 2-stage float switch with prior warning and limit switch capacity.

gamma/ L configuration

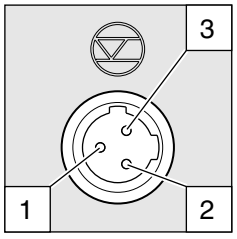


Fig. 08

Electrical interface:

• Voltage when contacts open:	approx. +5 V
• Input resistance:	10 kΩ
• Controller:	voltage free contact (load: 0.5 mA at + 5V),
or:	semiconductor switch (residual voltage < 0.7 V)

Plug configuration

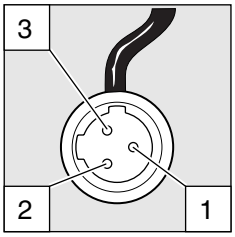


Fig. 09

Function		3 core cable
Pin 1	Earth	black
Pin 2	Minimum prior warning	blue
Pin 3	Minimum limit switch	brown

"Dosing monitor" terminal

Optional connection of dosing monitor.

gamma/ L configuration

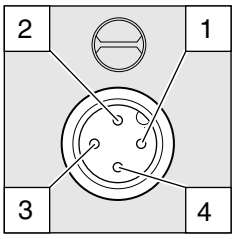


Fig. 10

Electrical interface:

- Voltage when contacts open: approx. +5 V
- Input resistance: 10 kΩ
- Controller: voltage free contact (load: 0.5 mA at +5 V)

Plug configuration

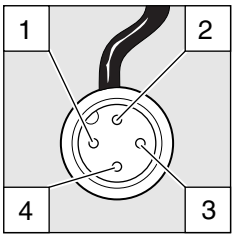


Fig. 11

Function		4 core cable
Pin 1	Power supply (5V)	brown
Pin 2	Encoding	white
Pin 3	Response	blue
Pin 4	Earth	black

Relay

"Fault indicating relay" output

A fault indicating relay may be ordered optionally. It is used as the signal output when a pump fault has been detected and to indicate the prior warning signal "liquid level low, stage 1" and the fault signal "liquid level low, stage 2".
Allocation of signal types to "N/O" and "N/C" relay states is selected on the basis of the identity code descriptors.
The relay can be retrofitted and is ready to operate after inserting the relay component (see section 6.2).

The gamma/ L is delivered ex works with default settings for a N/C relay. If an alternative switch function is required the gamma/ L can be reprogrammed at ProMinent.

Electrical interface

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

"Fault indicating relay and pacing relay" output

A fault indicating relay and pacing relay output may be ordered optionally. The pacing relay output is electrically isolated via an optical coupler with a semiconductor switch. The second switch is a relay as for the "fault indicating relay" variant.
The fault indicating / pacing relay can be retrofitted (see section 6.2).

The gamma/ L is delivered ex works with default settings for a N/C fault indicating relay and a N/O pacing relay. If an alternative switch function is required the gamma/ L can be reprogrammed at ProMinent.

Electrical interface

For semiconductor switch

- Residual voltage: < 0,4 Volt at I_C = 1 mA
- Maximum voltage: < 100 mA
- Maximum current: 24 V/DC
- Pacing relay pulse duration: approx. 100 ms

For relay output

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

Relay cable contact configuration

"Fault indicating relay" option

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

"Fault indicating relay and pacing relay" option

VDE cable	Contact	Relay
yellow	NO (normally open)	Fault indicating relay
green	C (common)	Fault indicating relay
white	NO (normally open)	Pacing relay
brown	C (common)	Pacing relay

6.2 Retrofitting relays

Delivery range:
1 relay circuit set with 2 screw fasteners
1 relay cable set with socket
1 seal

Press-out relay opening

WARNING

Disconnect gamma/ L from the mains power supply and rinse liquid end before commencing work (see section 12)!

IMPORTANT

When preparing the opening, ensure that the punch is not forced through the entire pump base!
Pump circuits may become damaged.

- Place the gamma/ L on a firm surface with the relay opening press-out section at the top (see fig. 12:a)
- 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 gamma/ L

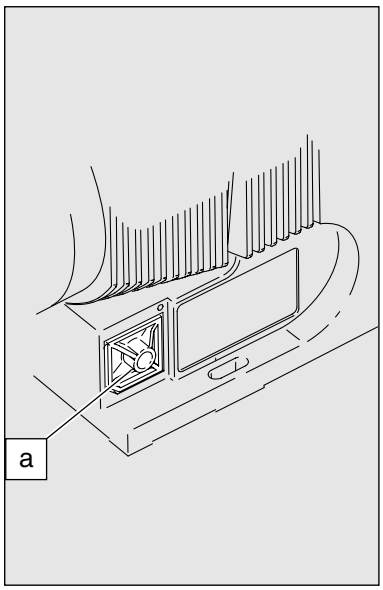


Fig. 12

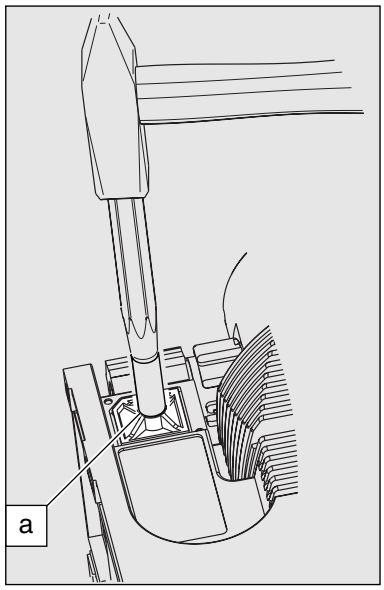


Fig. 13

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. 14)
- ▶ 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. 15: 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 fig. 16)

The gamma/ L is delivered ex works with default settings for a N/C fault indicating relay and a N/O pacing relay. If an alternative switch function is required the gamma/ L can be reprogrammed at ProMinent.

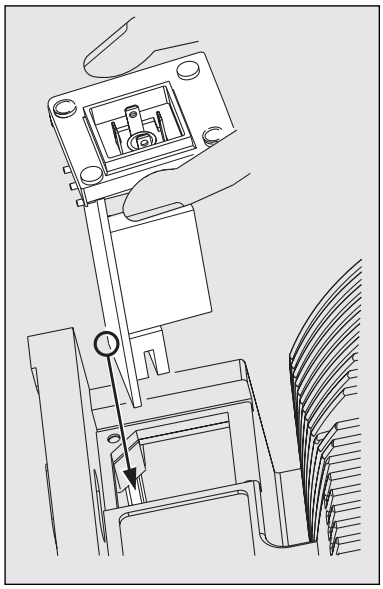


Fig. 14

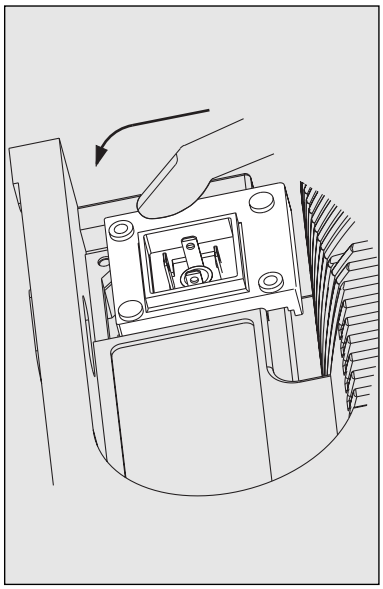


Fig. 15

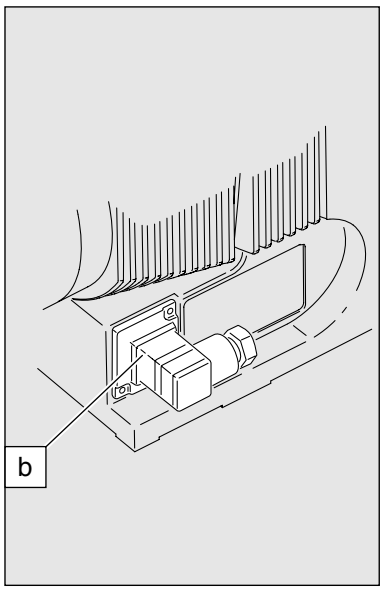


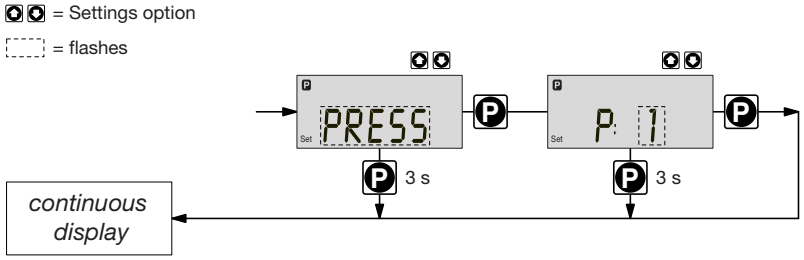
Fig. 16

7 Settings

NOTE

- **Open out the fold-out page following the title page fully! There you will find the overviews "control elements and key functions" and "operating/settings diagram".**
- **If no keys are pressed within a period of 1 minute, the gamma/ L will return to a continuous display.**

Basic information for setting up the gamma/ L

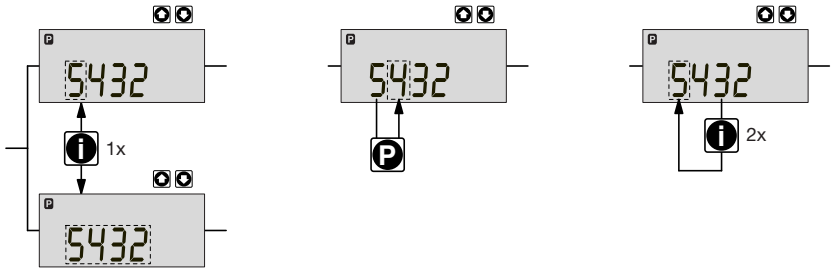


Confirm entries

Press the P key briefly;
you will automatically move to the next menu option or to a continuous display.

Exit menu option without confirming

Press the P key for 3 s:
The entry is cancelled and you will return to a continuous display.



Incremental change Iof a value

Press the i key 1x;
you can toggle between altering the digits of a value (“change individual digits” = standard) or incremental alteration of a value (“change a figure”).

Change adjustable values

Press UP or DOWN arrow key;
The flashing digit or figure will start to increase or decrease incrementally.

Confirm adjustable values

For “change individual digits”: confirm each digit using the P key. When the last digit has been confirmed you will automatically move to the next menu option or to a continuous display.

For “change a figure”; press the P key 1x; you will simultaneously move to the next menu option or to a continuous display.

Correct wrongly set digits

Press the i key 2x;
you will go back to the first digit.

7.1 Check adjustable values

Before setting up the gamma/ L you can check the current settings of adjustable values.

Press the i key (“i” as in “info”) when the gamma/ L is in continuous display mode (There is no P key symbol in the LCD display):

Each time you press the i key you will see a different continuous display. The number of continuous displays depends upon the identity code, the selected operating mode and the connected accessories (see overview “continuous displays”).

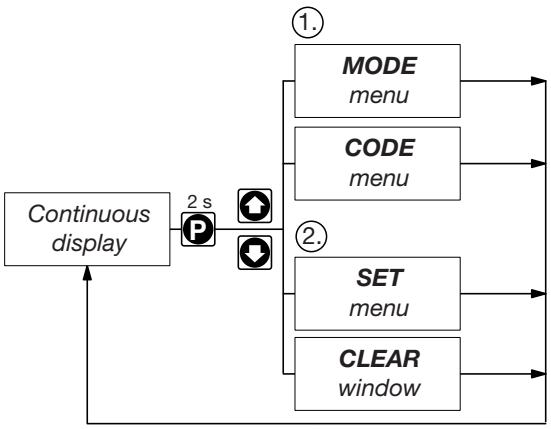
7.2 Change to settings mode

If you hold down the P key for 2 seconds in any continuous display, the gamma/ L will change to the settings mode.
If CODE 1 is set, the code must be entered after pressing the P key.

The following menu options appear first in the settings mode (see also overview “operating/ settings diagram”):

- MODE menu
- CODE menu (optional)
- SET menu
- CLEAR window

In order to adapt the gamma/ L to your process requirements you must:

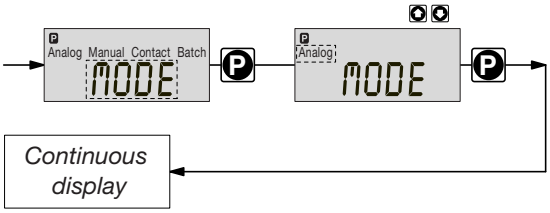


1. Select the operating mode in the MODE menu
2. Adjust settings to this operating mode in the SET menu

7.3 Select operating mode (MODE menu)

The following operating modes are selected via the MODE menu (depending upon identity code, some operating modes may be absent):

- Manual: for operation by hand
  (Identity code, control variant: manual, standard option)
- Analogue: for electronic control
  (Identity code, control variant: analogue current)
- Contact: for contact operation
  (Identity code, control variant: external 1:1 / external with pulse control)
- Batch: for batch operation
  (Identity code, control variant: external with pulse control)



7.4 Settings for operating mode (SET menu)

In the SET menu you can adjust various settings depending upon the selected operating mode.
The following programmable function settings menus appear in all operating modes:

- Calibrate (CALIB menu)
- Pressure levels (PRESS menu)
- Auxiliary frequency (AUX menu)
- Flow (FLOW menu, available only if flow monitor is connected)

See also section 7.5!
Further settings menus depend upon the selected operating mode.

7.4.1 Settings for “manual” operating mode

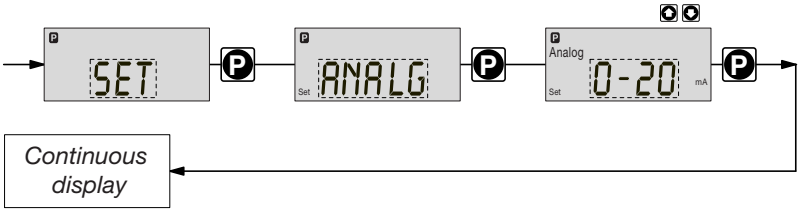
There are no other settings menus in the overall SET menu for the “manual” operating mode apart from those described in 7.5.

7.4.2 Settings for “analogue” operating mode (ANALG menu)

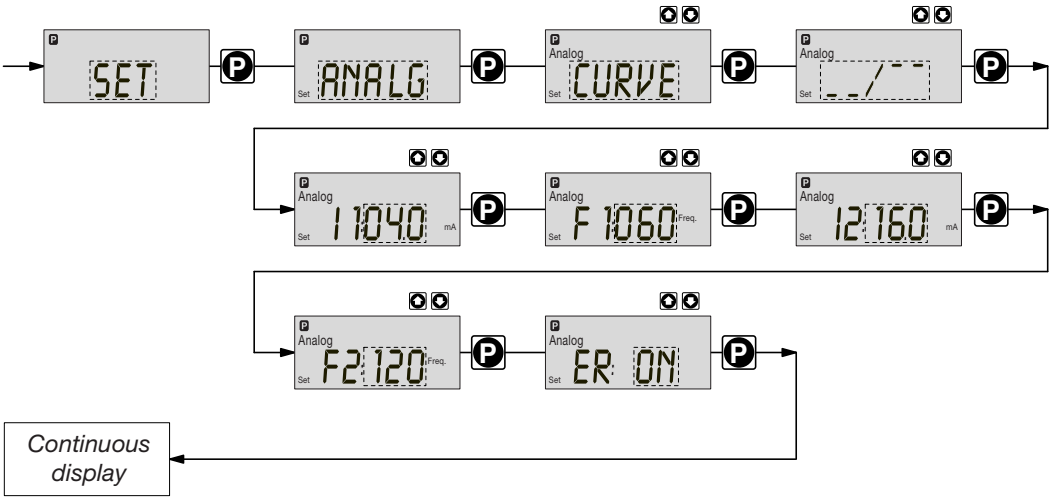
In addition to those settings menus described in 7.5, there is an additional ANALG menu in the overall SET menu for the “analogue” operating mode.

The stroke rate is controlled by an analogue electrical signal via the “external control” terminal.
You can select three signal-processing methods:

- 0 - 20 mA: at 0 mA the gamma/ L does not operate
  at 20 mA the gamma/ L operates at max. stroke rate
  Between these two extremes the stroke rate is proportional to the electrical signal.



- 4 - 20 mA: at 4 mA the gamma/ L does not operate
  at 20 mA the gamma/ L operates at max. stroke rate
  Between these two extremes the stroke rate is proportional to the electrical signal.
  For signals of below 3.8 mA a fault will be detected and the gamma/ L will stop (e.g. cable break).
- Curve: In the “curve” processing mode you can programme the gamma/ L ratios.
  There are 3 options available:
  - ----- = straight line
  - --__ = lower band
  - __/-- = upper band



Straight line:

The following symbol appears in the LCD display: ----- .
You can enter any stroke frequency ratio for the gamma/ L in proportion to the electrical signal. You must enter two points P1 (I1, F1) and P2 (I2, F2). F1 is the stroke rate at which the pump should operate at current I1: the straight line and the ratio are fixed accordingly:

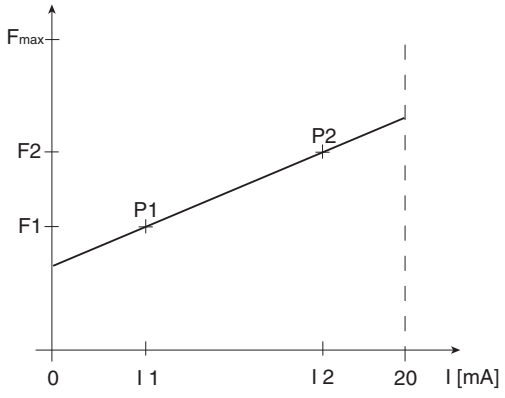


Fig. 17

NOTE

Draw a diagram like the one above - with values for (I1, F1) and (I2, F2) - in order to set the gamma/ L to your required stroke rate!

Lower/upper band:

This processing mode allows you to control a pump via an electrical signal as shown in the diagrams below.

You may also control two pumps for different feed chemicals from a single signal (e.g. one acid pump and one alkali pump from a pH sensor signal). The pumps must be connected electrically in series (see wiring plan in section 6.1).

Lower band
e.g. Alkali pump

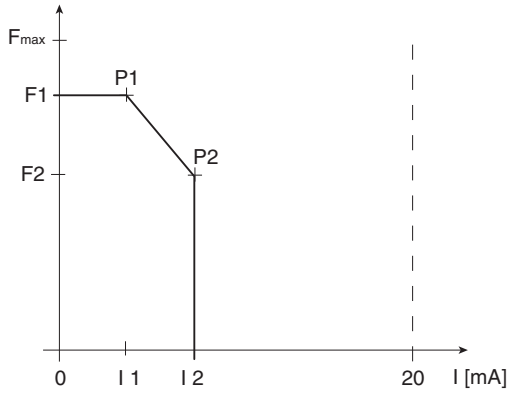


Fig. 18

Upper band
e.g. acid pump

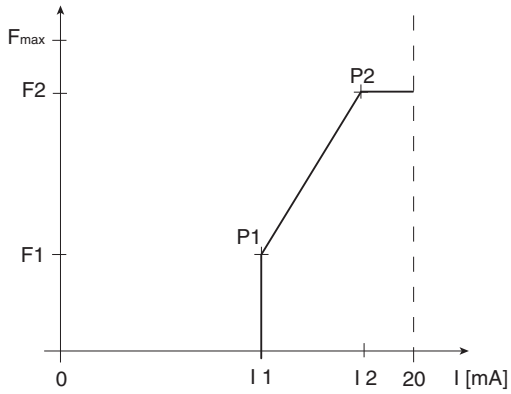


Fig. 19

Lower band:

The symbol appears in the LCD display. The gamma/ L will operate below I1 at F1. Above I2, the gamma/ L ceases to operate. Between I1 and I2 the stroke rate is between F1 and F2, proportional to the signal current.

Upper band:

The signal appears in the LCD display. The gamma/ L will cease to operate below I1. Above I2, the gamma/ L will operate at F2. Between I1 and I2 the stroke rate between is F1 and F2, proportional to the signal current.

The smallest processable difference between I1 and I2 is 4 mA.

Error processing

In the “ER” (error) menu option you can activate an error processing function for the “curve” mode. An error message appears for signals below 3.8 mA and the gamma/ L stops.

7.4.3 Settings for “contact” operating mode (CONTCT menu)

In addition to those settings menus described in 7.5, there is an additional CONTCT in the overall SET menu for the “contact” operating mode.

The operating mode “contact” allows you to activate a single stroke or a series of strokes. The strokes can be activated by a pulse or via the “external control” terminal. This operating mode is intended to transfer input pulses into a reduction (break) or small increase in strokes.

IMPORTANT

When switching to another operating mode the factor is reset to “1”.

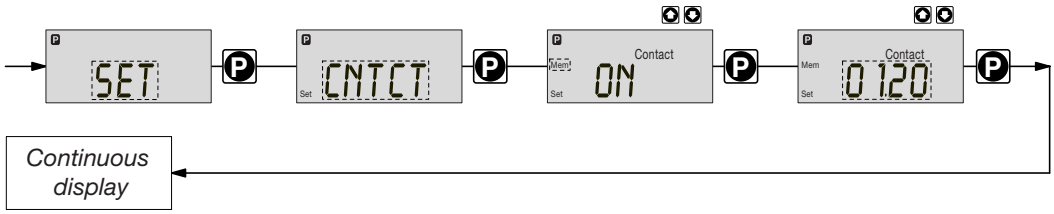
The following versions are available:

- Contact - identity code: external 1:1
- Contact - identity code: external with pulse control

Contact –identity code: external 1:1

In the “contact - identity code: external 1:1” version the gamma/ L makes precisely 1 stroke per pulse (identity code: external 1:1). No entry possible.

Contact –identity code: external with pulse control
In the “contact - identity code: external with external pulse control” you can enter the number of pulses after which a stroke should be carried out. “Contact - identity code: external with external pulse control” is intended for small dosing quantities.



The number of strokes per pulse depends upon the factor, which you can enter. This allows you to vary to a certain extent the input pulses by a factor of 1.01 to 99.99 and/or reduce by a factor of 0.01 to 0.99:
“Number of strokes activated = factor x number of input pulses”

Examples

	Factor	Pulse (sequential)	Stroke number (sequential)
Increase	1	1	1
	2	1	2
	25	1	25
	99,99	1	99,99
	1.50	1	1.5 (1 / 2)
	1.25	1	1.25 (1 / 1 / 1 / 2)
Reduction	1	1	1
	0.50	2	1
	0.10	10	1
	0.01	100	1
	0.25	4	1
	0.40	2.5 (3 / 2)	(1 / 1)
	0.75	1.33 (2 / 1 / 1)	(1 / 1 / 1)

Explanation of increase

At a factor of 1 For every 1 pulse, 1 stroke is activated
At a factor of 2 For every 1 pulse, 2 strokes are activated
At a factor of 25 For every 1 pulse, 25 strokes are activated

Explanation of decrease

At a factor of 1 After 1 pulse, 1 stroke is activated
At a factor of 0.5 After 2 pulses, 1 stroke is activated
At a factor of 0.1 After 10 pulses, 1 stroke is activated
At a factor of 0.75 After 2 pulses, 1 stroke is activated,
then after 1 pulse, 1 stroke is activated,
then after 2 pulses, 1 stroke is activated etc.

NOTE

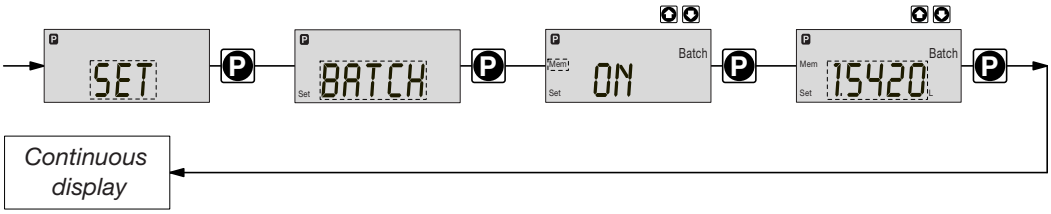
If a remainder occurs when the factor is processed, the gamma/ L counts up the remainder values. When the sum reaches or exceeds “1” the gamma/ L will activate a stroke. This ensures that the stroke number corresponds exactly to the factor throughout the dosing operation.

The number of input pulses which have not been processed are stored by the gamma/ L in the stroke memory. When the STOP/START key is pressed or the “pause” function is activated, the stroke memory is deleted (this can be avoided using the “memory” extension function, see below).
The “contact - identity code: external with pulse control” version allows optimum adaptation of the gamma/ L, in conjunction with e.g. water contact meters, to any process.

‘Memory” extension function
The “memory” extension function can be optionally activated (“mem” appears in the LCD display). When “Memory“ is activated, the gamma/ L adds up the unused excess strokes, up to the stroke memory’s maximum capacity of 65535 strokes. If the maximum capacity is exceeded the pump will malfunction.

7.4.4 Settings for "batch" operating mode (BATCH menu)

In addition to those settings menus described in 7.5, there is an additional BATCH menu in the overall SET menu for the "batch" operating mode.



The "batch" operating mode is a variant of the "contact" operating mode (see 7.4.3).
You can pre-select a stroke number (no breaks, whole numbers only from 1 to 65535) as well as a feed quantity (batch). To switch between entries for "stroke number" and "feed quantity" press the i key 1x in the corresponding menu option (see also overview "operating/settings diagram", fold-out page).
The "batch" operating mode is intended for large dosing quantities.

Metering is activated by pressing the P key or via a pulse from the "external control" terminal.

The number of input pulses which have not been processed are stored by the gamma/ L in the stroke memory. The stroke memory is limited to the batch size if "Memory" is not activated (with "Memory" this is 65535 strokes). You can clear it by changing to a different operating mode.

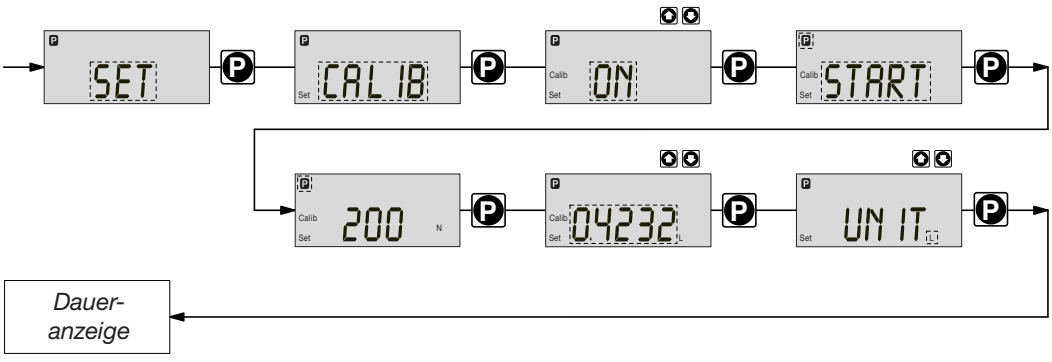
"Memory" extension function
The "memory" extension function can be optionally activated ("mem" appears in the LCD display). When "Memory" is activated, the gamma/ L adds up the unused excess strokes, up to the stroke memory's maximum capacity of 65535 strokes. If the maximum capacity is exceeded the pump will malfunction.

7.5 Settings for programmable functions (SET menu)

The following programmable function settings menus appear in all operating modes:

- Calibrate (CALIB menu)
- Pressure levels (PRESS menu)
- Auxiliary frequency (AUX menu)
- Flow (FLOW menu, available only if flow monitor is connected)

7.5.1 Settings for "calibration" function (CALIB menu)



The gamma/ L can also run in calibration mode. The corresponding continuous displays show the current dosing quantities or the feed rate.

Calibration is maintained when a stroke rate is altered up to ±10 degrees (where the stroke length is set at 40 %, the range is 30-50 %). If the stroke rate is altered more than ±10 degrees the yellow warning light is lit, the continuous display flashes and the flashing message "calib" appears.

NOTE

- **Do not go below 30 % stroke length (SEK type: 50 %).**
  This will significantly affect accuracy of calibration.
- **Calibration becomes increasingly accurate the more strokes made by the gamma/ L during calibration (recommended: at least 200 strokes).**

WARNING

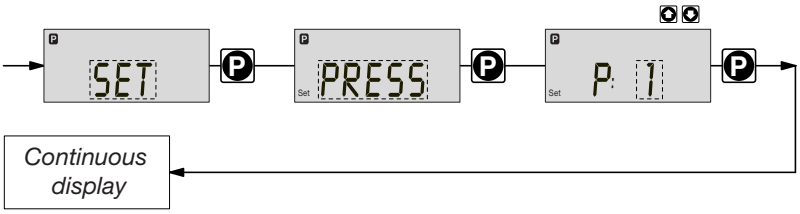
- **If using a hazardous feed chemical, the following setting instructions ensure adequate safety precautions have been taken!**

Calibration

- ▶ Insert the suction tube into a measuring cylinder containing the feed chemical - the discharge tubing must also be correctly installed (operating pressure, …!)
- ▶ Suck up the feed chemical (press both arrow keys at the same time) when the suction tube is empty
- ▶ Note the liquid level in the measuring cylinder and the stroke length
- ▶ Select the CALIB menu and go to the first menu option using the P key
- ▶ Select “ON” using an arrow key and change to the next menu option using the P key
- ▶ To commence calibration, press the P key. The gamma/ L starts to pump and displays the number of strokes (“STOP” appears at regular intervals) (the gamma/ L works at the stroke frequency set under “MANUAL“).
- ▶ After a sufficient number of strokes, stop the gamma/ L with the P key
- ▶ Calculate the dosed quantity (difference between the original quantity and the quantity remaining)
- ▶ Enter this quantity in the next menu and then go to the next menu option using the P key
- ▶ Select the unit (“L” or “gal”) in the “UNIT” menu with an arrow key

The gamma/ L is calibrated.
The corresponding continuous displays show the calibrated values.
The total stroke number and total litres are set during calibration to “0”.
The gamma/ L is in the STOP state.

7.5.2 Settings for the ‘pressure levels” function (PRESS menu)



The programmable function “pressure levels” is used to reduce the rated pressure of the gamma/ L.

CAUTION

- **The rated pressure can be considerably exceeded at stroke lengths of below 100 %!**
  The rated pressure relates to a stroke length of 100 %.
- **If another liquid end size is installed the pump must be reprogrammed on factory premises!**
- **Select as large a rated pressure as required and as small as possible!**
  This will increase system safety (reduces the risk of the tubing bursting when blocked)!
  This also protects the diaphragm and saves electricity.

NOTE

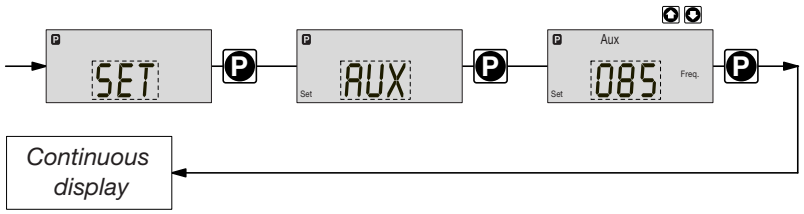
If installing another liquid end size the pump must be reprogrammed on factory premises.

The following rated pressures can be selected for these liquid end sizes (rated pressure in bar):

Liquid end size	Pressure level 1	Pressure level 2	Pressure level 3	Pressure level 4
1601, 1602, 1605	4	7	10	16
1000, 1005, 1008	4	7	10	
0708, 0713	4	7		

No adjustments can be made for pump types 0413, 0420, 0220, 0232.

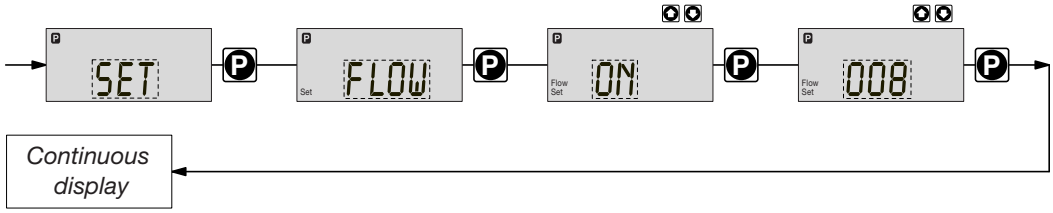
7.5.3 Settings for "auxiliary frequency" function (AUX menu)



The programmable function "auxiliary frequency" allows switching to a different stroke frequency, which can be set in the AUX menu. It can be activated via the "external control" terminal. When the auxiliary frequency is activated, "aux" appears in the LCD display.

This auxiliary frequency overrides the current stroke frequency set for the selected operating mode.

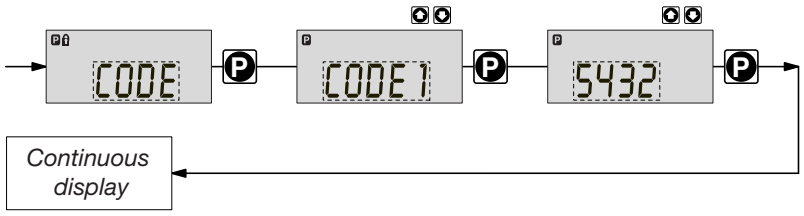
7.5.4 Settings for the 'flow' function (FLOW menu)



The flow menu only appears when a dosing monitor is connected to the "dosing monitor" terminal. This dosing monitor registers each discharge stroke of the gamma/ L at the discharge connector and transmits it back to the gamma/ L. If this response transmission is serially omitted for a period set in the FLOW menu (due to failure or below-minimum dosing) the gamma/ L stops.

7.6 Setting code (CODE menu)

The code menu is used to select whether you want to prevent access to parts of the settings options.



In the first menu option you can choose CODE 1 or CODE 2 (both use the same number).

- Select CODE 1 to prevent access to the settings mode (① in the overview "operating/ settings diagram", fold-out page). In the next menu option, enter the number you wish

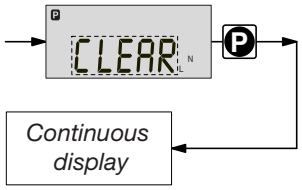
to use as the code.

- Select CODE 2 to prevent access to the settings options for directly alterable values in the continuous displays (② in the overview “operating/settings diagram”, fold-out page). In the next menu option, enter the number you wish to use as the code.
- Select NONE to remove a pre-set security lock.

7.7 Cancel total stroke number or total litres (CLEAR window)

In the CLEAR window you can delete the stored total stroke number and simultaneously the total litres (= set to “0”). You may then press the P key briefly to exit this window.

The values displayed are counted incrementally from the point of commissioning the pump, or from the last delete action.



8 Operating

This section describes all operating options available to you when the gamma/ L is in continuous display mode (no P key symbol in the LCD display).

NOTE

- **Open out the fold-out page following the title page fully! There you will find the overviews “control elements and key functions” and “operating/settings diagram”.**
- **Look at the overview “continuous displays”. This page shows you which displays are available in which operating mode, and which values are directly alterable in the corresponding continuous displays.**

8.1 Manual operation

Set stroke length

Stroke length is continually adjustable within a range of 0 - 100 %.
The recommended stroke length range, which will practically guarantee technical reproducibility, is 30 - 100 % (SEK type: 50 - 100 %).

The following operating options are available via the different keys (see also figure on the next page):

Stop/Start gamma/ L

To stop gamma/ L: press STOP/START key.
To start gamma/ L: press STOP/START key.

Start batch

Press the P key briefly in “batch” operating mode.

Load factory settings

Press the P key for 15 s only if you wish to load factory calibration settings!
Current settings will be deleted.

Change to settings mode

When you press the P key for 2 s in any continuous display the gamma/ L will change to settings mode (see section 7).
If CODE 1 is set, the code must be entered after pressing the P key.

Check adjustable values

Each time you press the i key you will see a different continuous display.
The number of continuous displays depends upon the identity code, the selected operating mode and the connected accessories.

Change directly alterable values

To change a value (see below) directly in the corresponding continuous display, press one of the arrow keys until “set” appears in the LCD display. The delay has been programmed in to prevent inadvertent changing of values.

If CODE 2 has been set, this code must be entered after pressing the arrow key.

Directly alterable values are as follows:

Stroke rate In “manual”, “contact” and “batch” operating modes:
The stroke rate can be altered in the “stroke rate” display.

Feed rate In “manual” operating mode
The feed rate can be altered in the “feed rate” display.

Factor The factor is the number of strokes activated by an external pulse or a press of the P key (in “batch” mode only).

In “batch” operating mode:

You can alter the factor from the “remaining strokes” display.

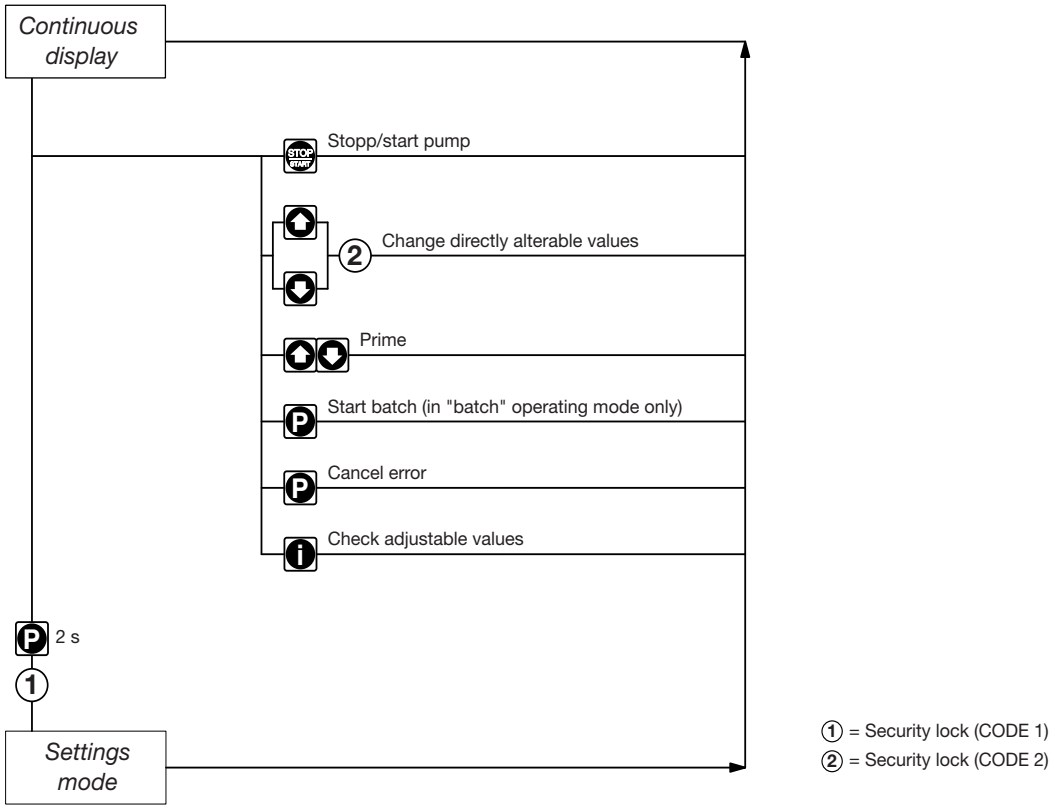
The gamma/ L returns to the original continuous display a few seconds after the factor has been reset.

Batch size In “batch” operating mode:
The batch size can by changed from the “batch size/remaining litres” display.
The gamma/ L returns to the original continuous display a few seconds after the batch size has been reset.

Priming The “priming” function is activated by pressing both arrow keys at the same time in “Stroke rate” permanent display.

Cancel error Error messages are cancelled by pressing the P key briefly.

Display programme versions Press on the P key for 10 seconds to display the programme versions.
Example: “V 1052“ + X 1010“.
Release the key on “LOAD 3“ immediately.



8.2 Remote control

It is possible to control the gamma/ L remotely via a signal cable or PROFIBUS® (see section 6.1 and section 7, "Supplementary Instructions for ProMinent® gamma/ L and ProMinent® Sigma versions with PROFIBUS®" and plant documentation).

9 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 10)
- ▶ 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. 20)
- ▶ Check for correct feed: run the gamma/ L 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**

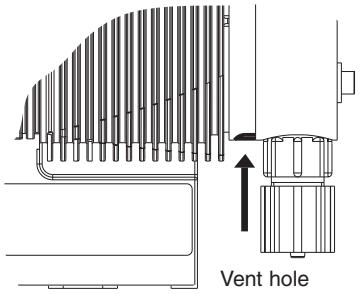


Fig. 20 Vent hole

10 Repairs

NOTE

Repair work 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!

When sending the pump for repair make sure it is clean and that the liquid end has been thoroughly rinsed out (see section 12)! If, despite careful emptying and cleaning, safety precautions are still required for handling the gamma/ L, the necessary information must be entered in the safety declaration!
The safety declaration is a component of the inspection/repair order.
An inspection or repair can only be carried out when a safety declaration has been correctly and completely filled out by an authorised and qualified member of staff from the company operating the pump.

A form is included in the appendix.

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 explosion drawings annexed t 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 sucction valve (PP, NP) for types 1000, 1005, 1605, 1601, 1602

Dismantling, cleaning and reassembly of the suction valve is practically the same as for a discharge valve.

Notice however that:

- both valve inserts are actually identical
- an additional spacer is found under the valve inserts
- in the liquid end a shaped seal 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, 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

Dismantling, cleaning and reassembly of the suction valve is practically the same as for a discharge valve.

Notice however that:

- an additional spacer is found under the valve inserts
- in the liquid end the O-ring is used, not the shaped seal
- the flow direction of the suction connection 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 gamma/ L is running set the stroke length to 0 % (the drive axis is then set).
- ▶ Switch off the gamma/ L.
- ▶ 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)!

Supply unit types, except 0220, 0232 and 0420

- ▶ 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) only as far onto the drive axis until it lies flat on the pump housing (6) – no 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).

IMPORTANT

- **The leakage hole must point downwards when the pump is fully assembled (see fig. 20).**
- **Position the top plate (4) correctly on the pump housing (6). 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 (4) and screw the diaphragm (3) in a clockwise direction until it is firmly in position (you will feel the resistance of the return spring).

IMPORTANT

- **Do not overtighten the diaphragm (3) (particularly on type 1601).**
- **The top plate (4) must remain in position to prevent the safety diaphragm (5) from distorting.**

- ▶ Place 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.

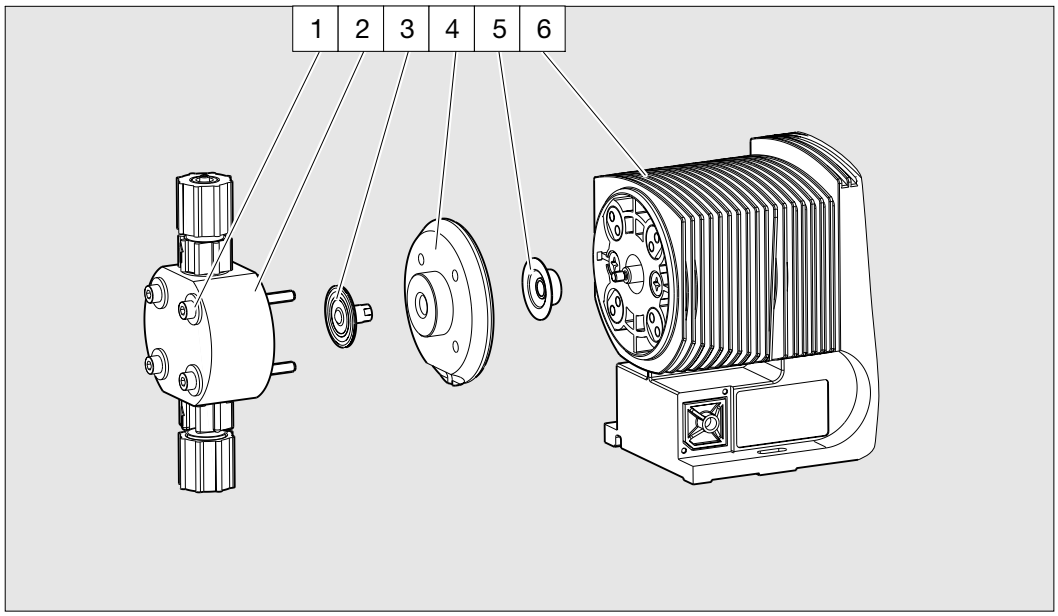


Fig. 21

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 the metering head (2) with the screw (1) from the pump (see fig. 22).
  Only type 0232: Remove the screws of the set disk (4) below the diaphragm (3).
  The screws (1) should fit in the holes of the diaphragm (3), but not on the set disk.
- ▶ Hold the housing (6) in one hand and with the other hand, 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 anti-clockwise turn of the liquid end (2) and top plate (4).
- ▶ Remove the liquid end (2) with screws (1) from of the diaphragm and unscrew completely from the drive spindle.
- ▶ Remove the top plate (4) from the housing (6).
- ▶ Check the condition of the safety diaphragm (5) and replace it necessary.
- ▶ Push the safety diaphragm (5) only as far onto the drive axis until it lies flat on the pump housing (6) – no further!
- ▶ Screw the new diaphragm (3) carefully up to the stop on the drive axis – this must be exact to ensure correct metering!
- ▶ Check that the holes in the diaphragm are aligned with those in the pump housing.
- ▶ 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 type 0232: Mount the set disk (4) with the screws.

IMPORTANT

- **The leakage hole must point downwards when the pump is fully assembled (see fig. 20).**
- **Position the top plate (4) correctly on the pump housing (6). 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).

IMPORTANT

- **Do not overtighten the diaphragm (3).**
- **The top plate (4) must remain in position to prevent the safety diaphragm (5) 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.

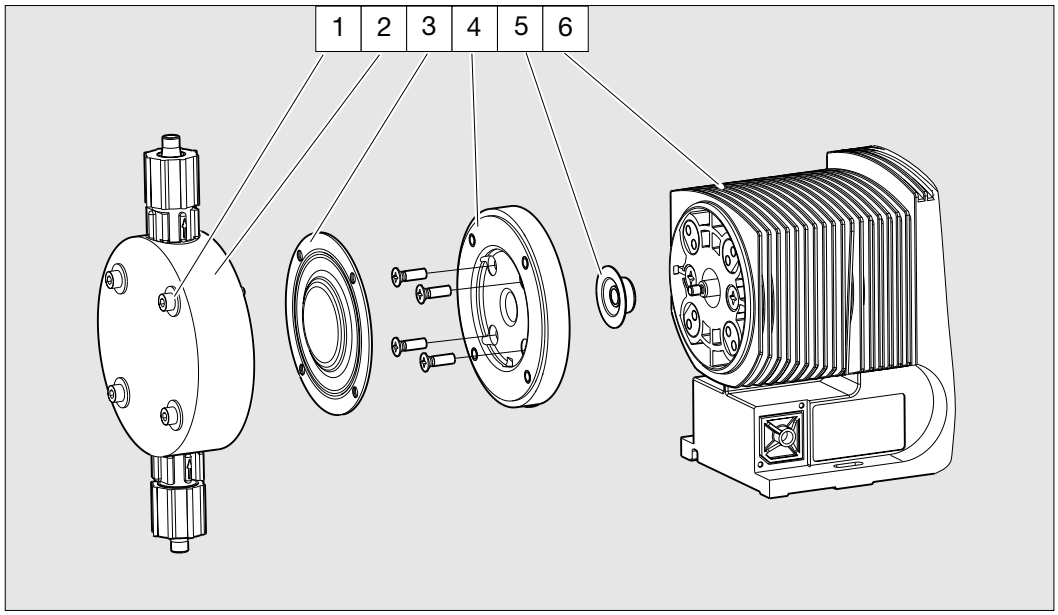


Fig. 22

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!**

11 Troubleshooting

WARNING

- **Always take suitable precautions when using hazardous chemicals!**
- **Ensure the equipment is de-pressurised before working on the pump!**

gamma/ L does not prime despite full stroke and bleed function

Cause Crystalline deposits on the ball seat because valves have dried out

Remedy
- ▶ Remove the suction sleeve from the chemical supply container and rinse out the liquid end thoroughly
- ▶ If still unsuccessful, dismantle valves and clean (see section 9)

Fluid is seeping from the top plate

Cause The liquid end is not sealed against the pump diaphragm

Remedy
- ▶ Tighten screws in the liquid end (see section 9)
- ▶ If unsuccessful, replace the diaphragm (see section 10)

Green LED indicator (operating display) is not lit

Cause Incorrect or no mains voltage

Remedy
- ▶ Use the recommended mains voltage as given in the voltage specification on the nameplate

Error Messages

Red LED display is lit, "Error" appears and "MINIM" flashes in the display

Cause Fluid level in the chemical storage tank has reached "liquid level low, stage 2"

Remedy
- ▶ Fill the chemical supply container

Red LED display is lit, "Error" appears and "ANALG" flashes in the display

Cause gamma/ L is in "analogue" operating mode, a fault routine has been programmed in the ANALG menu and the operating current has fallen below 3.8 mA

Remedy
- ▶ Remedy low operating current
- ▶ Switch fault routine "OFF" (see Section 7.4.2.)

Red LED display is lit, "Error" appears and "CNTCT" flashes in the display

Cause gamma/ L is in "contact" or "batch" operating mode and the extended function "memory" has been set.
In addition a very large factor has been entered, too many contacts have been input or the P-key has been pressed too often, resulting in an overflow of the stroke memory.

Remedy
- ▶ Press the P-key, saved data will be deleted
- ▶ Change gamma/ L set up

Red LED display is lit, "Error" appears and "FLOW" flashes in the display

Cause Dosing monitor not properly connected

Remedy
- ▶ Connect dosing monitor properly
- ▶ Press P-key

Cause Dosing monitor has reported more defective strokes than have been set in the FLOW menu

Remedy
- ▶ Press P-key
- ▶ Investigate the cause and remedy

Red LED display is lit, "Error" appears and "Mem" flashes in the display

Cause Stroke memory full

Remedy
- ▶ Remove cause
- ▶ Press P-key (Consider the consequences this will have on your process)

All other Errors

Please contact your ProMinent branch or representative!

Fault Signals

Yellow LED display is lit

Cause Liquid level in chemical storage tank has reached “liquid level low, stage 1”

Remedy
- ▶ Fill chemical storage tank

Yellow LED Display is lit and “calib” flashes

Cause The pump is calibrated and the stroke length deviates by more than ±10 % from the value at the time of calibration.

Remedy
- ▶ Reset the stroke length or calibrate the pump again to the desired stroke length

12 Decommissioning and Disposal

Decommissioning

WARNING

- **When decommissioning the gamma/ L the housing and, in particular, the liquid end must be thoroughly cleaned to remove chemicals and dirt!**
- **Always take suitable precautions when using hazardous chemicals!**
- **Ensure that the equipment is de-pressurised!**

- ▶ Disconnect the gamma/ L from the power supply
- ▶ Empty the liquid end by turning the gamma/ L upside down and allow the feed chemical to pour out
- ▶ Rinse the liquid end with a suitable material, thoroughly rinse the liquid end after use with hazardous materials!

If decommissioning is only temporary, maintain the correct storage conditions:

Storage temperature: -10 to +50 °C

Air humidity: < 92 % relative humidity

Disposal

IMPORTANT

Electronic waste is classified as special waste!

Please observe all locally applicable directives!

13 Technical Data

13.1 Performance data and weights

gamma/ L at 180 strokes/minute and 100 % stroke length

Liquid end type	Max. feed rate at maximum operating pressure			max. feed rate at medium operating pressure			Connector size outer ∅ x inner∅	Suction-lift*	Priming-lift**	Admmis. priming pressure	Ship. Wt[1]
	bar	l/h	ml/str.	bar	l/h	ml/str.	mm	m Wg	m Wg	bar	approx. kg
1000	10	0,74	0,09	5	0,82	0,076	6x4	6	1,8	8	2,9 / 3,6
1601	16	1,1	0,10	8	1,4	0,13	6x4	6	2	8	2,9 / 3,6
1602	16	2,1	0,19	8	2,5	0,24	6x4	6	2	5,5	2,9 / 3,6
1005	10	4,4	0,41	5	5,0	0,46	8x5****	5	3	3	3,1 / 4,5
0708	7	7,1	0,66	3,5	8,4	0,78	8x5	6	2	2	3,1 / 4,5
0413	4	12,3	1,14	2	14,2	1,31	8x5	3	2	1,5	3,1 / 4,5
0220	2	19,0	1,76	1	20,9	1,94	12x9	2	2	1	3,1 / 4,5
1605	16	4,1	0,38	8	4,9	0,45	8x5****	4	3	3	4,5 / 5,9
1008	10	6,8	0,63	5	8,3	0,76	8x5	3	3	2	4,5 / 5,9
0713	7	11,0	1,02	3,5	13,1	1,21	8x5	3	3	1,5	4,5 / 5,9
0420	4	17,1	1,58	2	19,1	1,77	12x9	3	3	1	5,5 / 8,6
0232	2	32,0	2,96	1	36,2	3,35	12x9	2	2	0,8	5,5 / 8,6

gamma/ L with self-degassing liquid end * ** at 180 strokes/minute and 100 % stroke length

Liquid end type	Max. feed rate at maximum operating pressure			max. feed rate at medium operating pressure			Connector size outer ∅ x inner∅	Suction-lift*	Priming-lift**	Admmis. priming pressure	Ship. Wt[1]
	bar	l/h	ml/str.	bar	l/h	ml/str.	mm	m Wg	m Wg	bar	approx. kg
1601	16	0,59	0,055	8	0,78	0,072	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
1005	10	3,6	0,33	5	4,0	0,37	8x5	-	2,7	0,5	3,1
0708	7	6,6	0,61	3,5	7,5	0,69	8x5	-	2	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	0,5	3,1
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

* Lift when suction line and liquid end are full

** Priming lift with clean and wetted valves, priming lift at 100% stroke length and free flow or opened bleed valve

*** The feed rate values are for minimum feed rates, based on water at 20° C

**** For material versions SST : 6 x 4 mm

[1] For material versions PPE, PPB, NPE, NPB, PVT, TTT/SST

[2] For material versions PPE, PPB, NPE, NPB

13.2 Dosing reproducibility

Standard Liquid ends

Dosing precision -5 to +10 % at max. stroke length and max. operating pressure for all materials.

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

Self-degassing liquid ends

Since self-degassing liquid ends are filled with air bubbles when in contact with gaseous chemicals and when in operation, no dosing reproducibility values can be given.
The recommended minimum stroke length with self-degassing liquid ends is 50 %.

13.3 Viscosity

The liquid ends are designed for liquids up to a maximum viscosity of

- 200 mPas for standard liquid ends
- 500 mPas for valves with springs
- 50 mPas for self-degassing liquid ends

13.4 Materials Data Liquid ends

Version	Liquid end	Valves	Seals	Balls
PPE	PP	PP	EPDM	Ceramic
PPB	PP	PP	FPM (Viton®)	Ceramic
NPE	Acrylic glass	PVC	EPDM	Ceramic
NPE	Acrylic glass	PVC	FPM (Viton®)	Ceramic
PVT	PVDF	PTFE with carbon	PTFE	Ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	Ceramic
SST	Stainless steel 1.4571	Stainless steel 1.4571	PTFE	Ceramic

Viton® (FPM) is a registered trade mark of DuPont Dow Elastomers.

Pump

Housing	Polyphenylene ether (PPE with glass fibre)
Cover	Polycarbonate
Electronics	Electronic components

13.5 Electrical Data

Version: 100 - 230 V ±10 %, 50/60 Hz

Varants 100 - 230 V/AC	gamma/ L M70	gamma/ L M85
Power rating	17 W	22 W
Rated current	0,7 A	1 A
Switch on peak current	15 A (for approx. 1 ms)	15 A (for approx. 1 ms)
Fuse	0,8 AT	0,8 AT

Note Fuses must display VDE, UL and CSA certification, e.g. type 19195 from Wickmann in accordance with IEC publication 127 - 2/3

13.6 Ambient conditions

Temperatures

Storage and transport temperatures: -10 to +50 °C
Feed chemical temperature: -10 to +35 °C
Ambient temperature when in operation: -10 to +45 °C (drive and control)

Maximum ambient temperatures for liquid ends depending on material type:

max. ambient temperature	PPE, PPB	NPE, NPB	PVT	TTT	SST
Long-term at max. operating pressure	50 °C	45 °C	50 °C	50 °C	50 °C
Short term (max. 15 min) at max. 2 bar	100 °C	60 °C	120 °C	120 °C	120 °C

* Under extreme conditions such as maximum dosing temperatures, maximum stroke frequency and maximum operating pressure, leakage can occur on the liquid end at an ambient temperature of 35 °C.

Climate

Permissible air humidity: 92 % relative humidity, not condensing
Moist and fluctuating air conditions: FW 24 in accordance with DIN 50016

13.7 Enclosure rating and safety class

Enclosure Rating

Contact and moisture enclosure rating:
IP 65 in accordance with IEC 529, EN 60529, DIN VDE 0470 Part 1

Safety Requirements

Safety Class 1 - Mains connection with earth lead

13.8 Compatibility

The hydraulic parts of the gamma/ L are identical to those of the Beta®.

The following components and accessories for pumps from the product ranges Beta®, CONCEPT, gamma-Classic and gamma are all compatible:

- gamma/Vario signal cable; 2-, 4- and 5 core for “external” function
- 2 stage float switch (gamma/Vario)
- Discharge tubing diameters
- Standard gamma connector set
- gamma wall bracket
- Chemical feed containers and mounting plates
- Total height (distance between suction and discharge connector)
- Distance between the connectors and locating holes on the pumps
- Accessories such as pressure back pressure valve, multifunctional valve, dosing monitor and rinsing equipment

PPE, PPB material versions

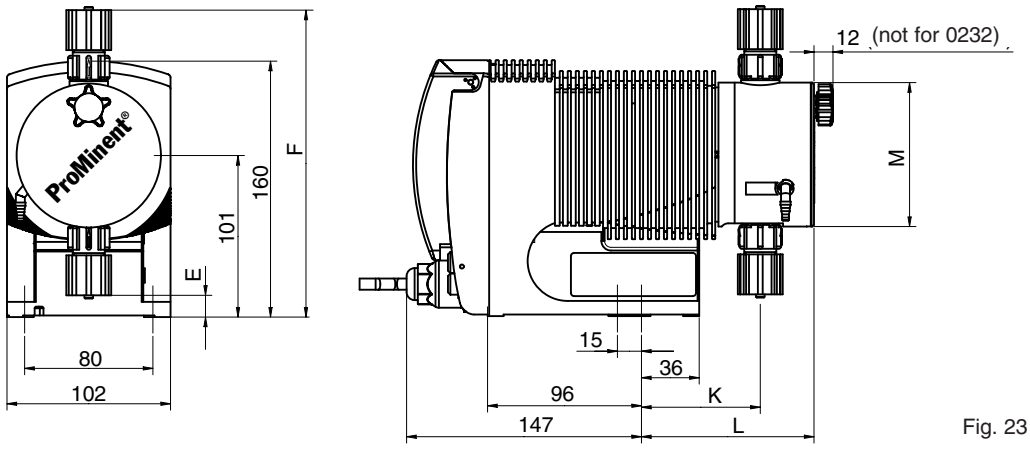


Fig. 23

Dimensions in mm

	gamma/ L M70				gamma/ L M85			
	1000 - 1602	1005	0708 - 0413	0220	1605	1008 - 0713	0420	0232
E	23	13	15	15	13	15	15	5
F	186	193	191	191	193	191	191	197
K	71	71	74	76	71	74	76	76
L	106	105	108	110	105	108	110	91
M	∅ 70	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 110

NPE, NPB material versions (non bleed)

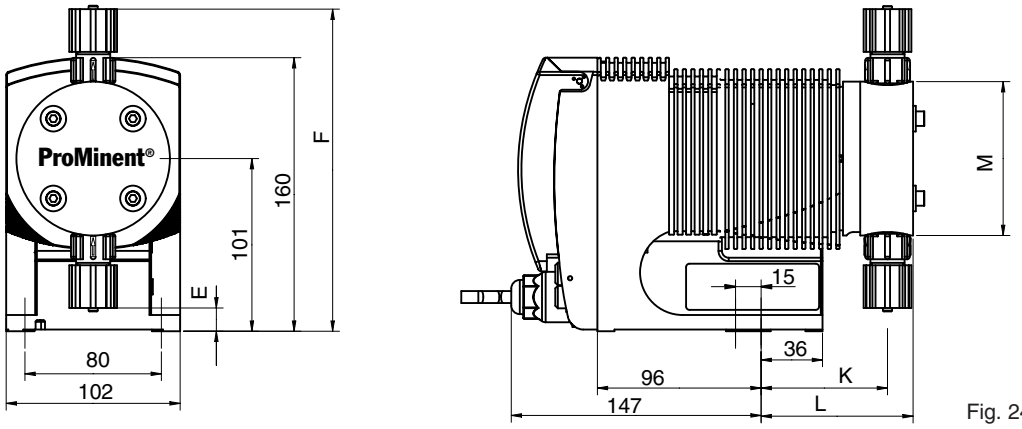


Fig. 24

Dimensions in mm

	gamma/ L M70					gamma/ L M85			
	1000 - 1601	1602	1005	0708	0413 - 0220	1605	1008 - 0713	0420	0232
E	25	23	16	15	15	16	15	15	5
F	177	179	188	189	189	188	189	189	199
K	77	77	74	74	76	74	74	76	76
L	92	92	89	89	91	89	89	91	91
M	62 (∅ 70)	66 (∅ 70)	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 110

NPE, NPB material versions (with bleed function)

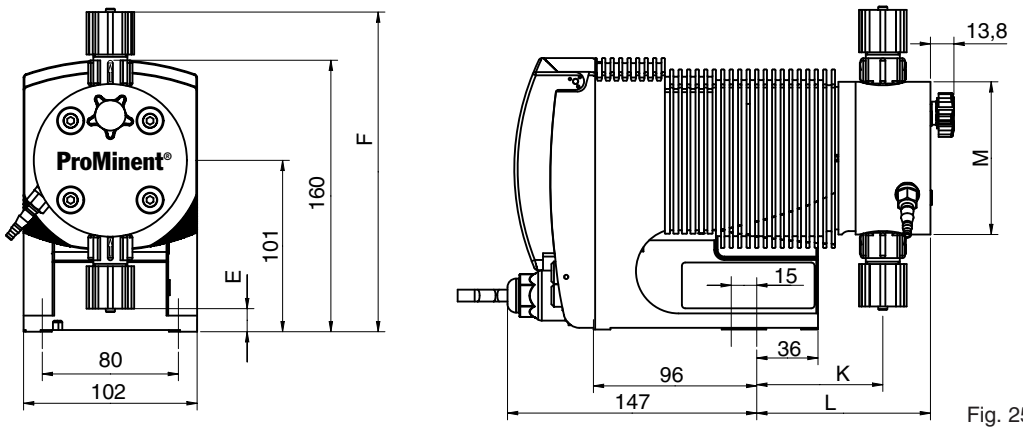


Fig. 25

Dimensions in mm

	gamma/ L M70					gamma/ L M85			
	1000 - 1601	1602	1005	0708	0413 - 0220	1605	1008 - 0713	0420	0232
E	25	23	16	13	15	16	13	15	5
F	177	179	188	189	189	188	189	189	199
K	77	77	74	74	76	74	74	76	76
L	105	105	102	102	104	102	102	104	105
M	62 (∅ 70)	66 (∅ 70)	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 110

PPE, PPB, NPE, NPB, SEK material versions

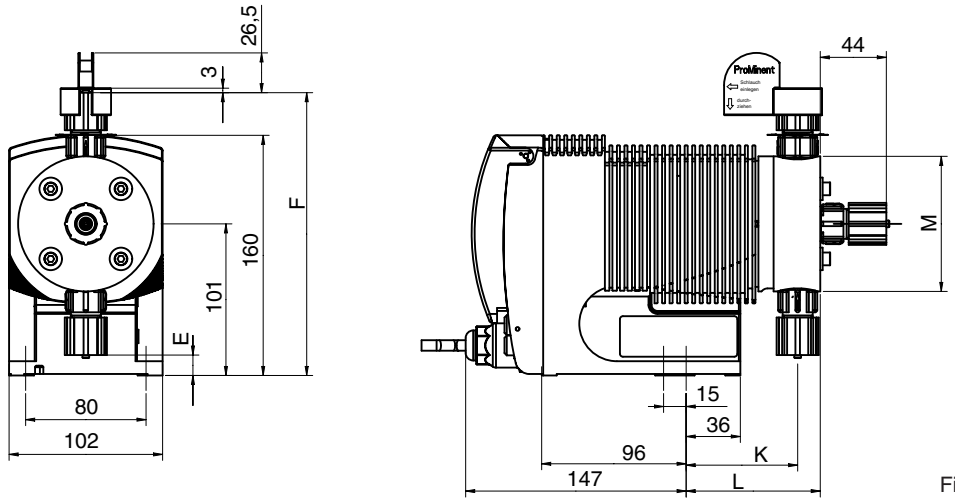


Fig. 26

Dimensions in mm

	gamma/ L M70					gamma/ L M85		
	1601	1602	1005	0708	0413 - 0220	1008 - 0713	0420	0232
E	25	23	16	15	15	16	15	15
F	177	179	188	189	189	188	189	189
K	77	77	74	74	76	74	74	76
L	92	92	89	89	91	89	89	91
M	62 (∅ 60)	66 (∅ 70)	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90

PVDF material version

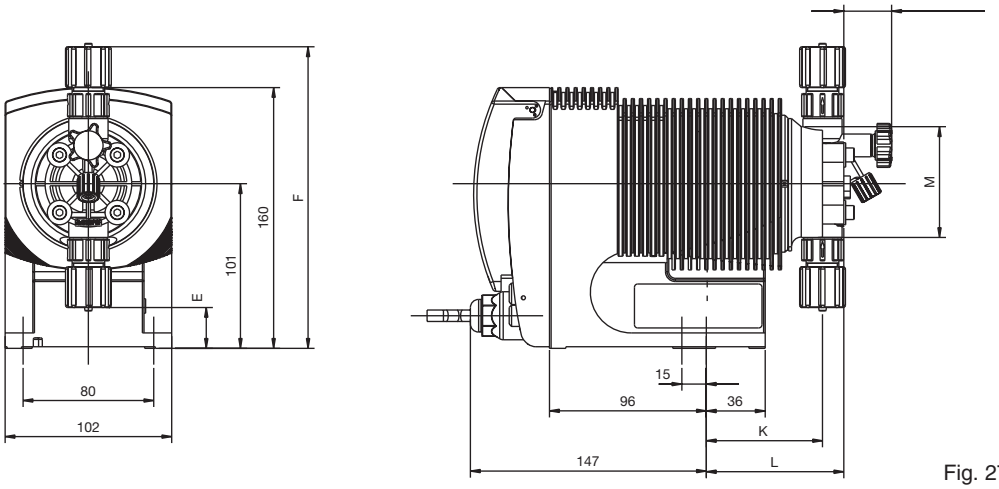


Fig. 27

Dimensions in mm

	gamma/ L M70				gamma/ L M85			
	1000 - 1602	1005	0708 - 0413	0220	1605	0408 - 0713	0420	0232
E	25	14	14	14	14	14	14	4
F	185	191	191	191	191	191	191	198
K	71	71	73	75	71	73	75	76
L	84	88	90	92	88	90	92	93
M	∅ 70	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90	∅ 90

TTT material version

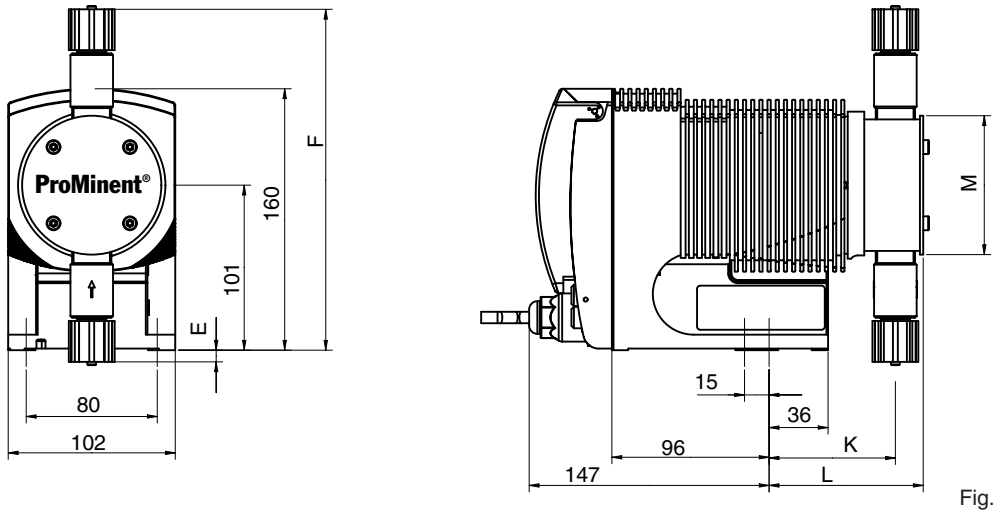


Fig. 28

Dimensions in mm

	gamma/ L M70				gamma/ L M85		
	1000 - 1601	1602	1005	0708 - 0220	1605	1008 - 0420	0232
E	32	25	23	-7	23	-7	-15
F	170	178	179	209	179	209	217
K	78	72	75	77	75	77	78
L	91	87	90	95	90	95	97
M	51 (∅ 60)	66 (∅ 70)	68 (∅ 80)	81 (∅ 85)	68 (∅ 80)	81 (∅ 85)	96 (∅ 100)

SST material version

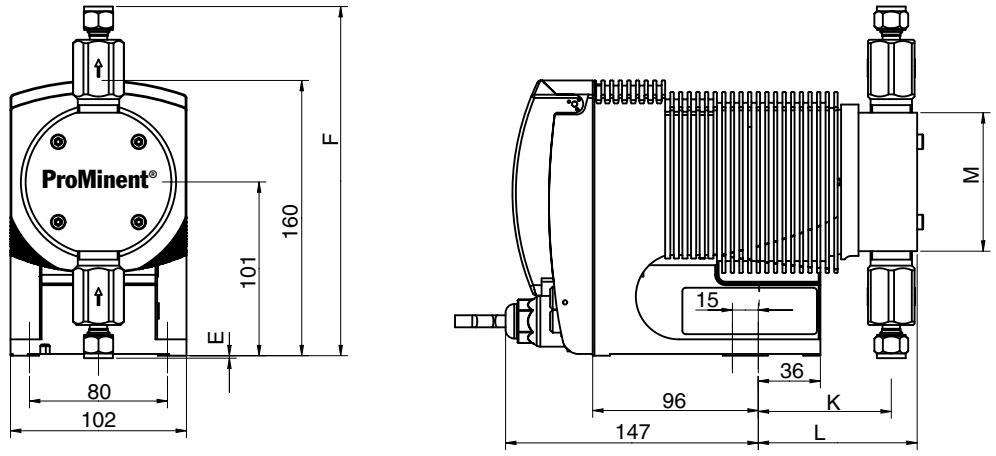
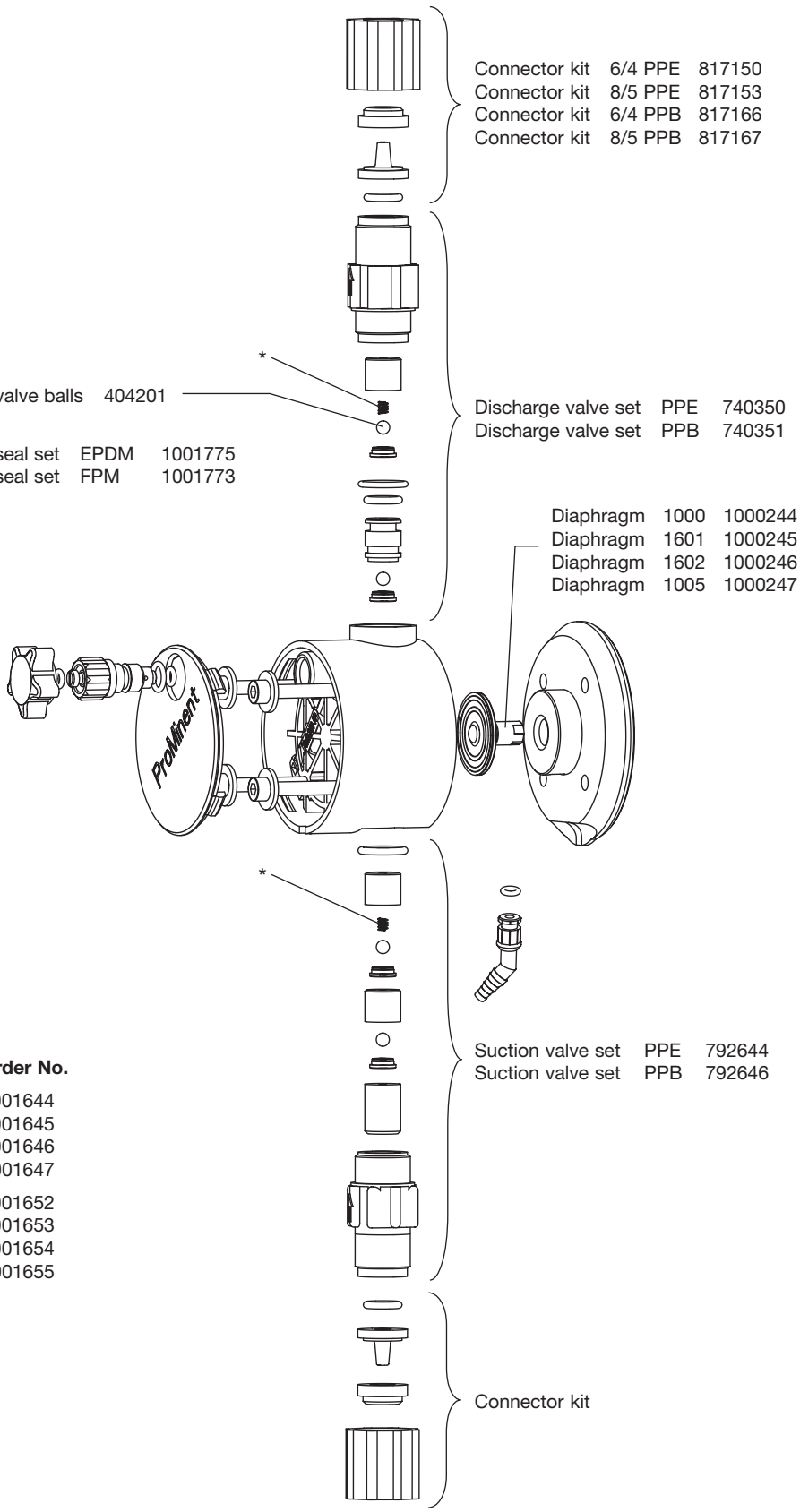


Fig. 29

Dimensions in mm

	gamma/ L M70					gamma/ L M85			
	1000 - 1601	**1602**	**1005**	**0708 -0413**	**0220**	**1605**	**1008 - 0713**	**0420**	**0232**
E	40	33	31	-2	-3	31	-2	-3	-10
F	162	170	171	203	204	171	203	204	212
K	78	72	75	77	77	75	77	77	78
L	89	85	88	93	93	88	93	93	95
M	51 (∅ 60)	66 (∅ 70)	68 (∅ 80)	81 (∅ 85)	81 (∅ 85)	81 (∅ 80)	81 (∅ 85)	81 (∅ 85)	96 (∅ 100)

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



Spare parts kits for:

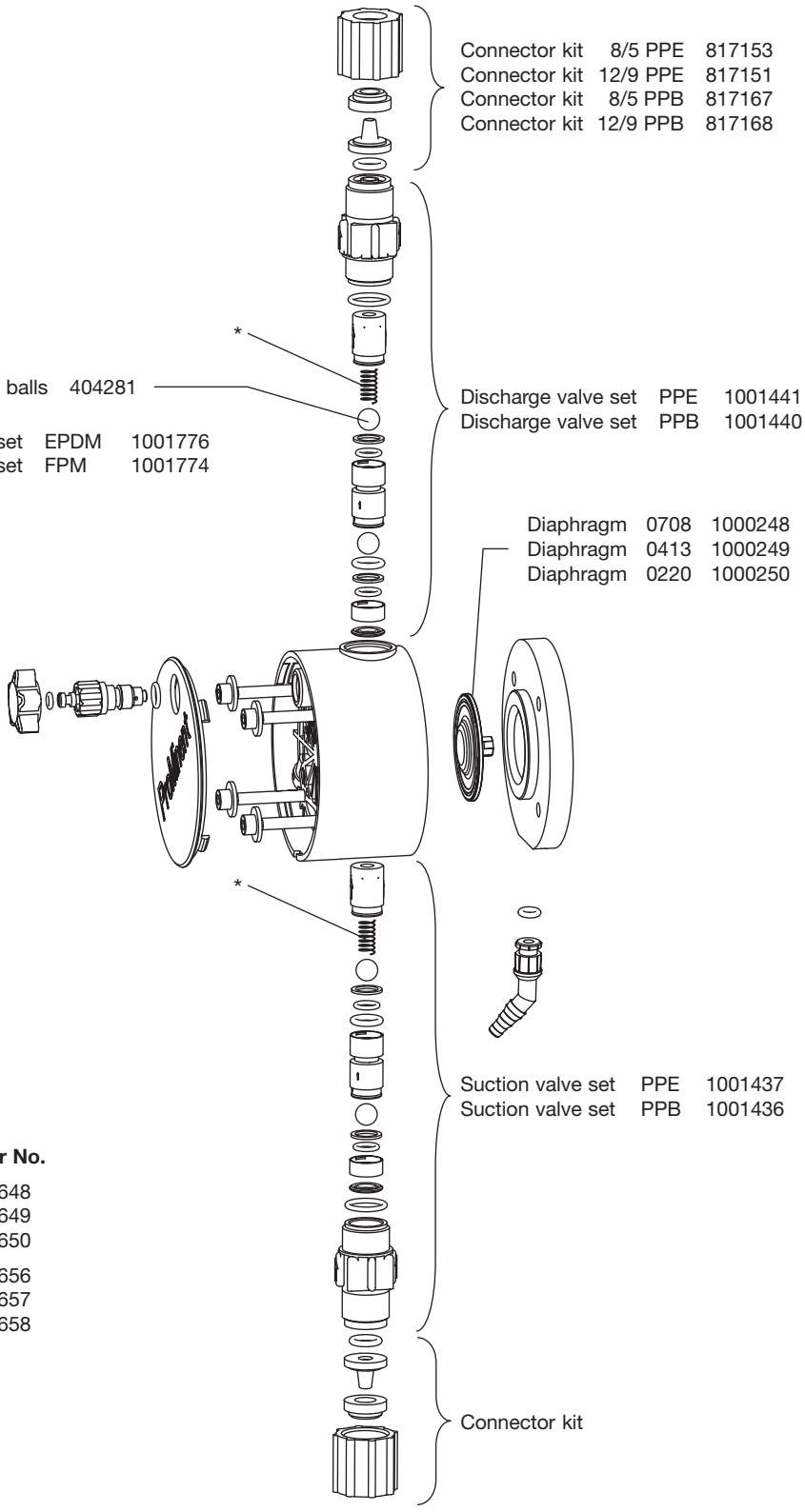
Type	Material	Order No.
1000	PPE	1001644
1601	PPE	1001645
1602	PPE	1001646
1005 (1605)	PPE	1001647
1000	PPB	1001652
1601	PPB	1001653
1602	PPB	1001654
1005 (1605)	PPB	1001655

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

Subject to technical alterations.

60_07-104_00_18-04_2

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



Spare parts kits for:

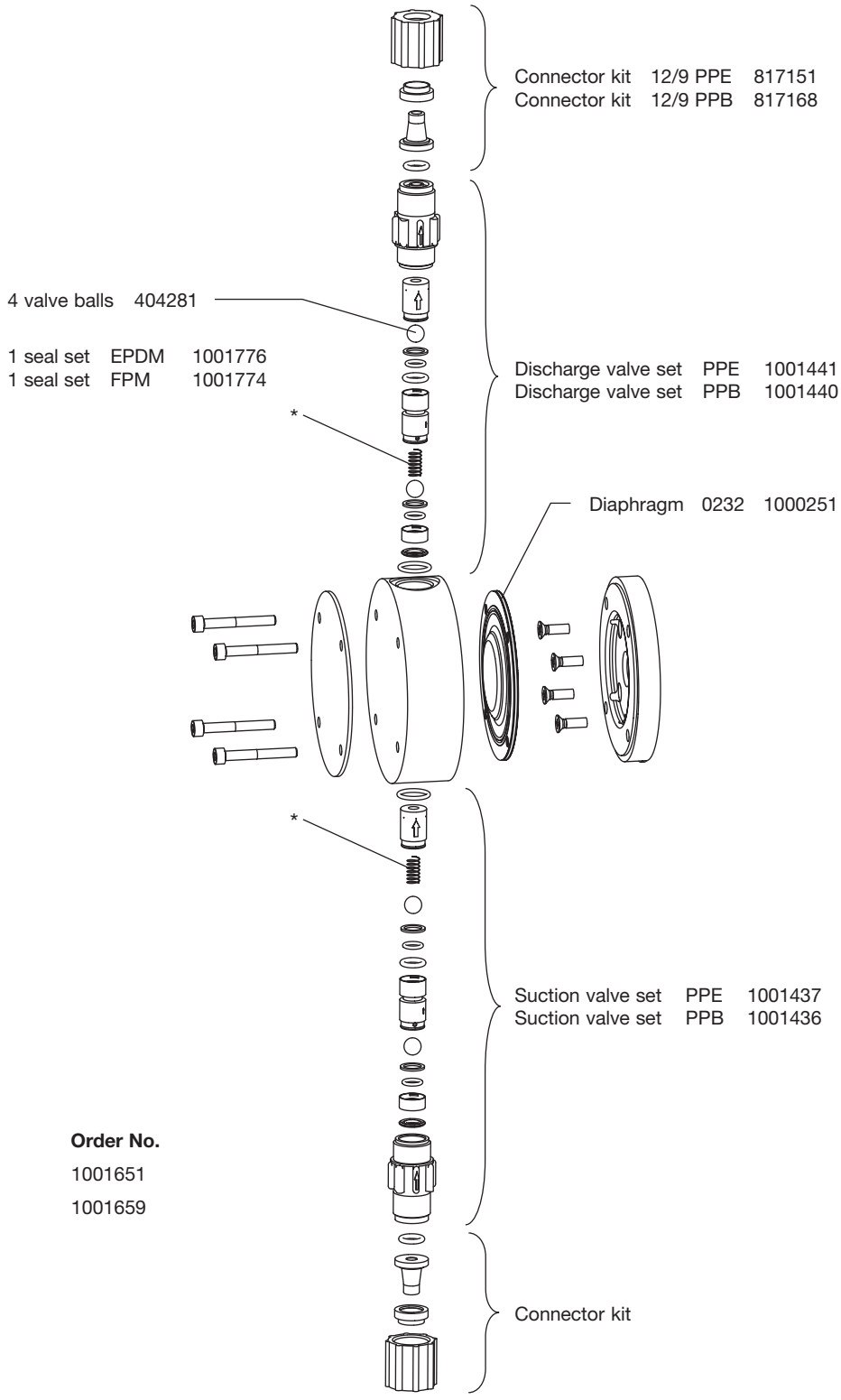
Type	Material	Order No.
0708 (1008)	PPE	1001648
0413 (0713)	PPE	1001649
0220 (0420)	PPE	1001650
0708 (1008)	PPB	1001656
0413 (0713)	PPB	1001657
0220 (0420)	PPB	1001658

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

Subject to technical alterations.

60_07-104_00_19-04_2

Liquid end 0232
PP without coarse/fine bleed



Spare parts kits for:

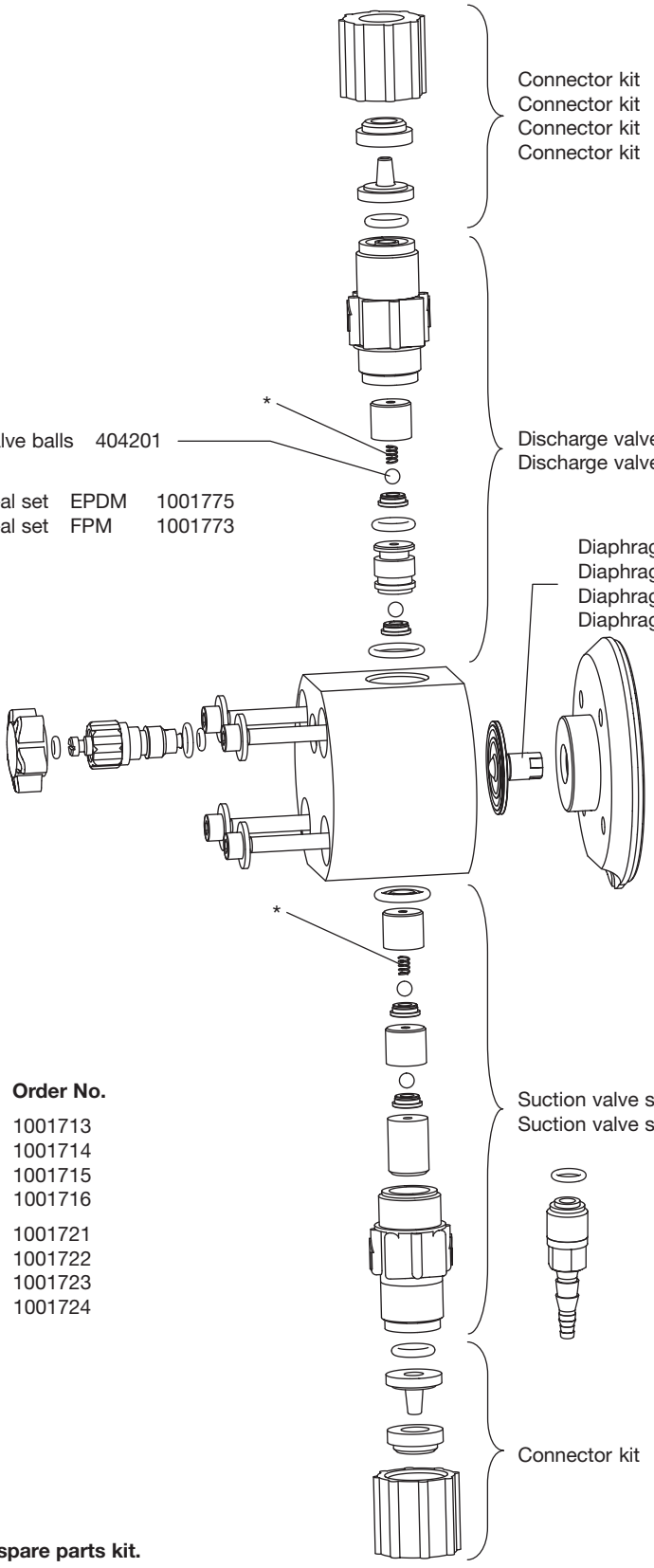
Type	Material	Order No.
0232	PPE	1001651
0232	PPB	1001659

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

Subject to technical alterations.

60_07-104_00_40-04_2

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



Spare parts kits for:

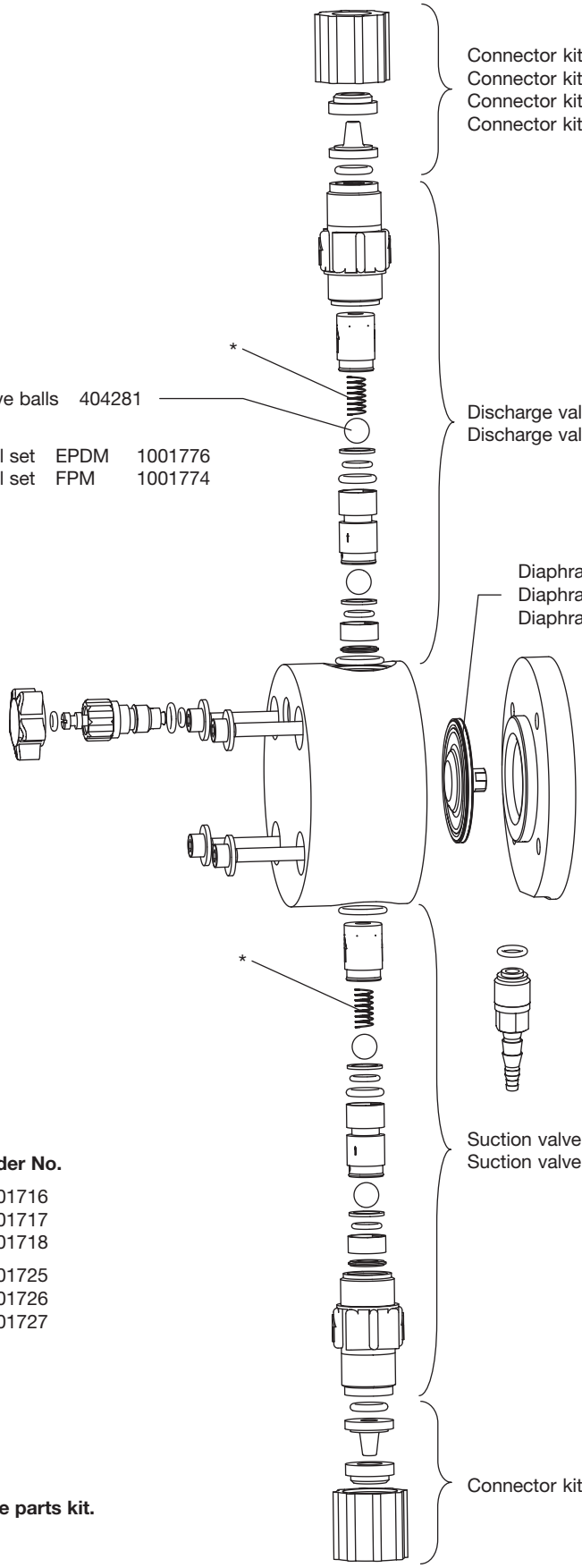
Type	Material	Order No.
1000	NPE	1001713
1601	NPE	1001714
1602	NPE	1001715
1005 (1605)	NPE	1001716
1000	NPB	1001721
1601	NPB	1001722
1602	NPB	1001723
1005 (1605)	NPB	1001724

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

Subject to technical alterations.

60_07-104_00_23-04_2

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



Spare parts kits for:

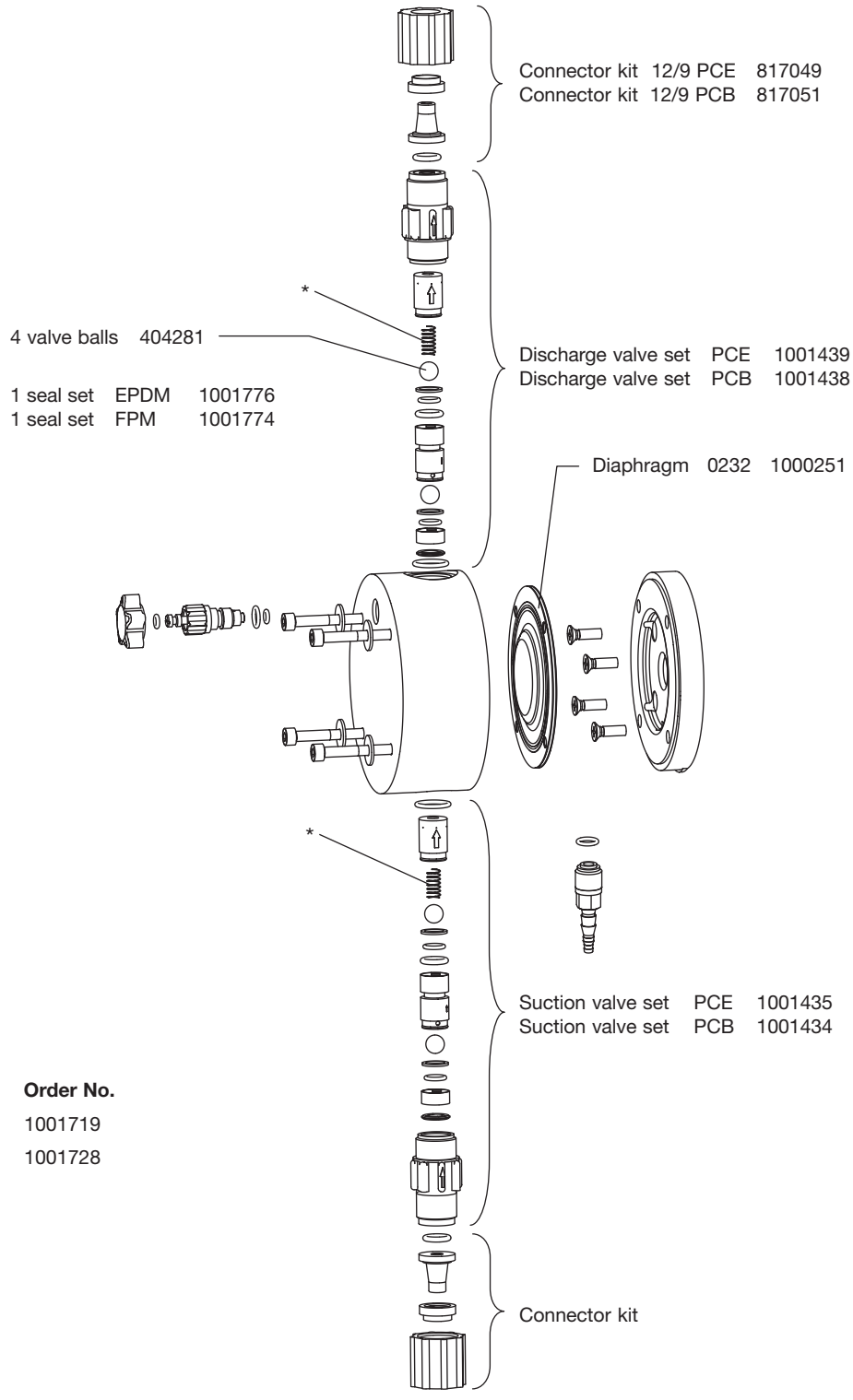
Type	Material	Order No.
0708 (1008)	NPE	1001716
0413 (0713)	NPE	1001717
0220 (0420)	NPE	1001718
0708 (1008)	NPB	1001725
0413 (0713)	NPB	1001726
0220 (0420)	NPB	1001727

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

Subject to technical alterations.

60_07-104_00_24-04_2

Liquid end 0232
NP with coarse/fine bleed



Spare parts kits for:

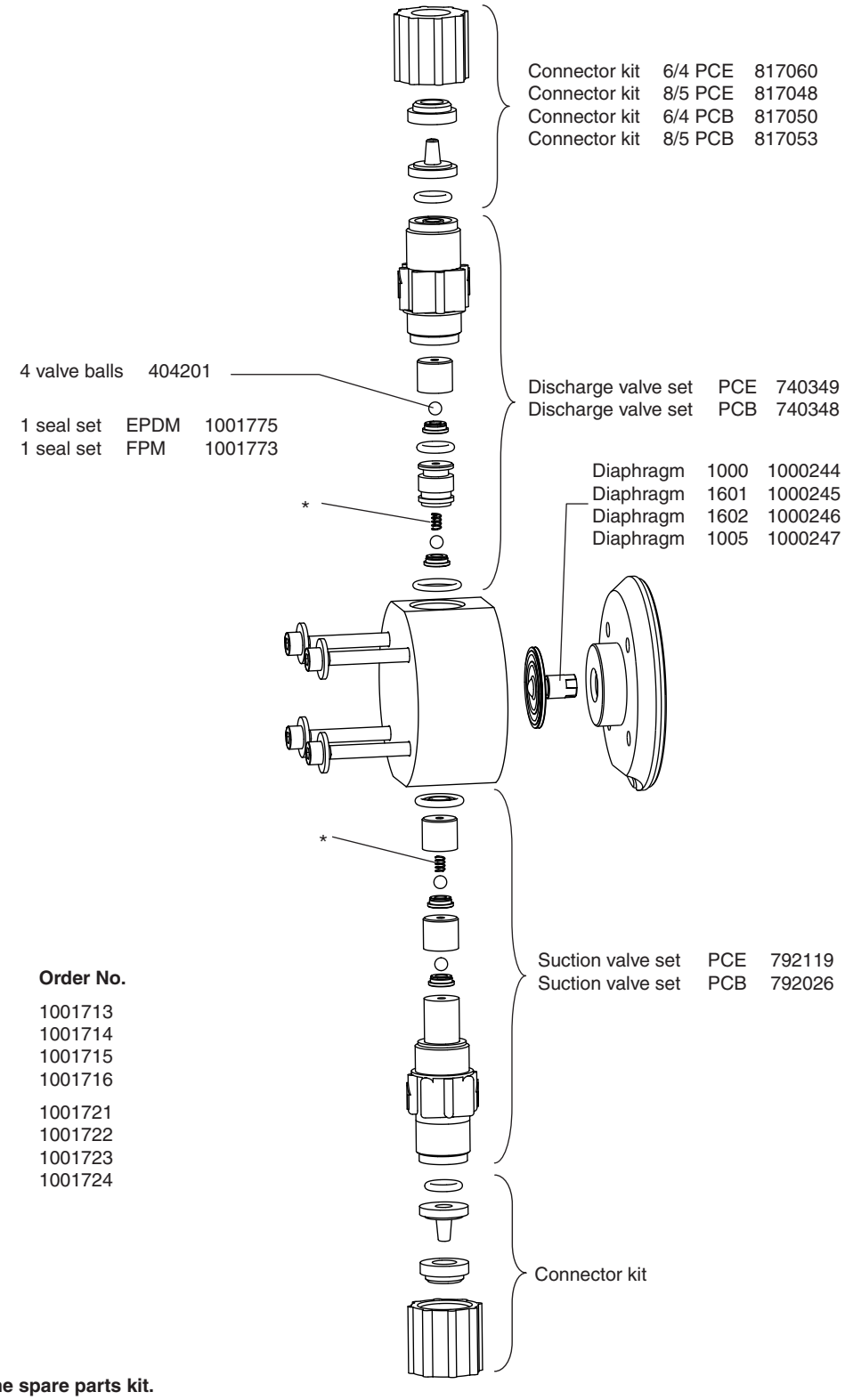
Type	Material	Order No.
0232	NPE	1001719
0232	NPB	1001728

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

Subject to technical alterations.

60_07-104_00_34-04_2

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



Spare parts kit for:

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

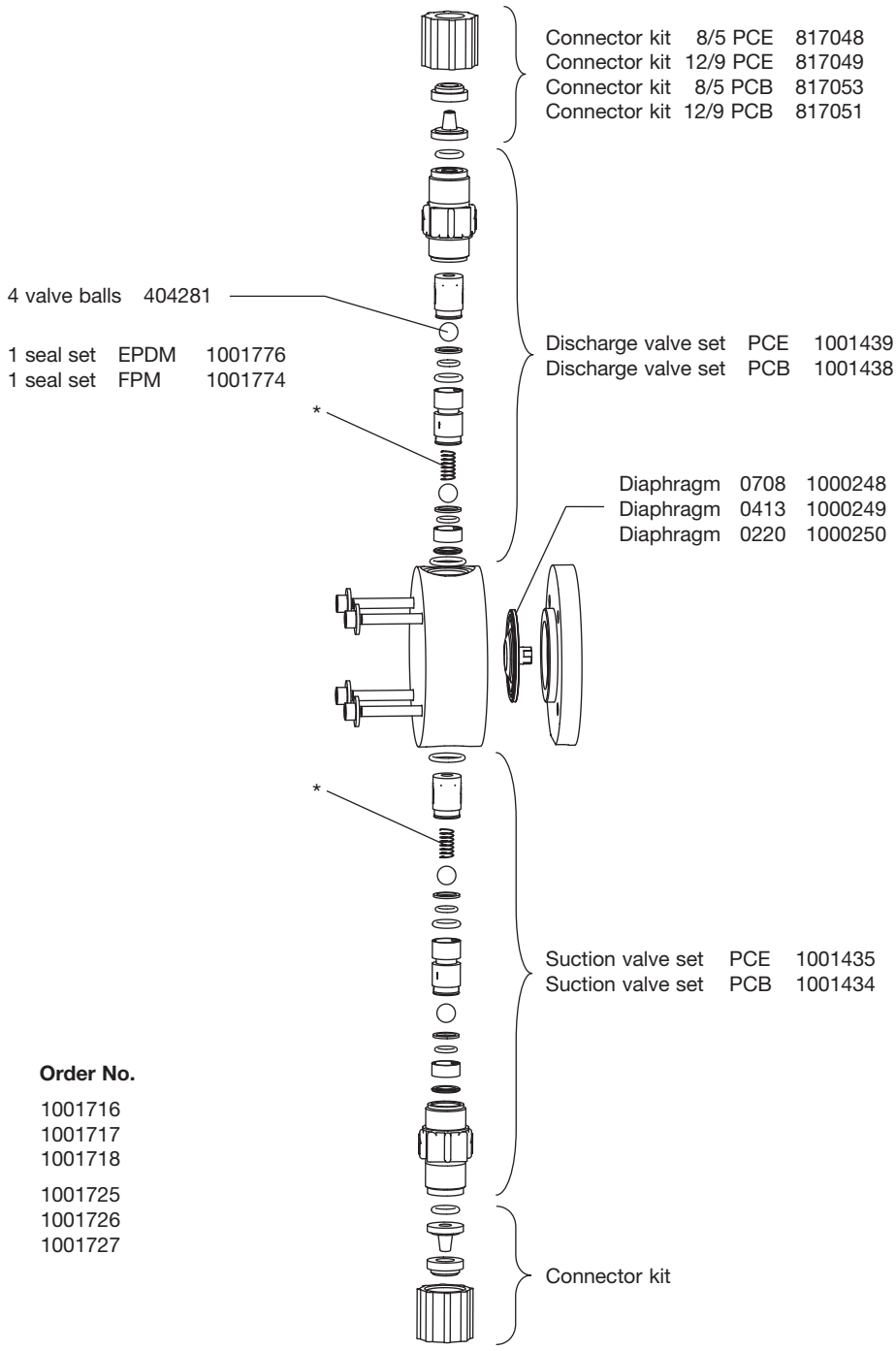
The listed items are included in the spare parts kit.

*** Custumer accessories**

Subject to technical alternations.

60_07-104_00_21-04_2

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



Spare parts kits for:

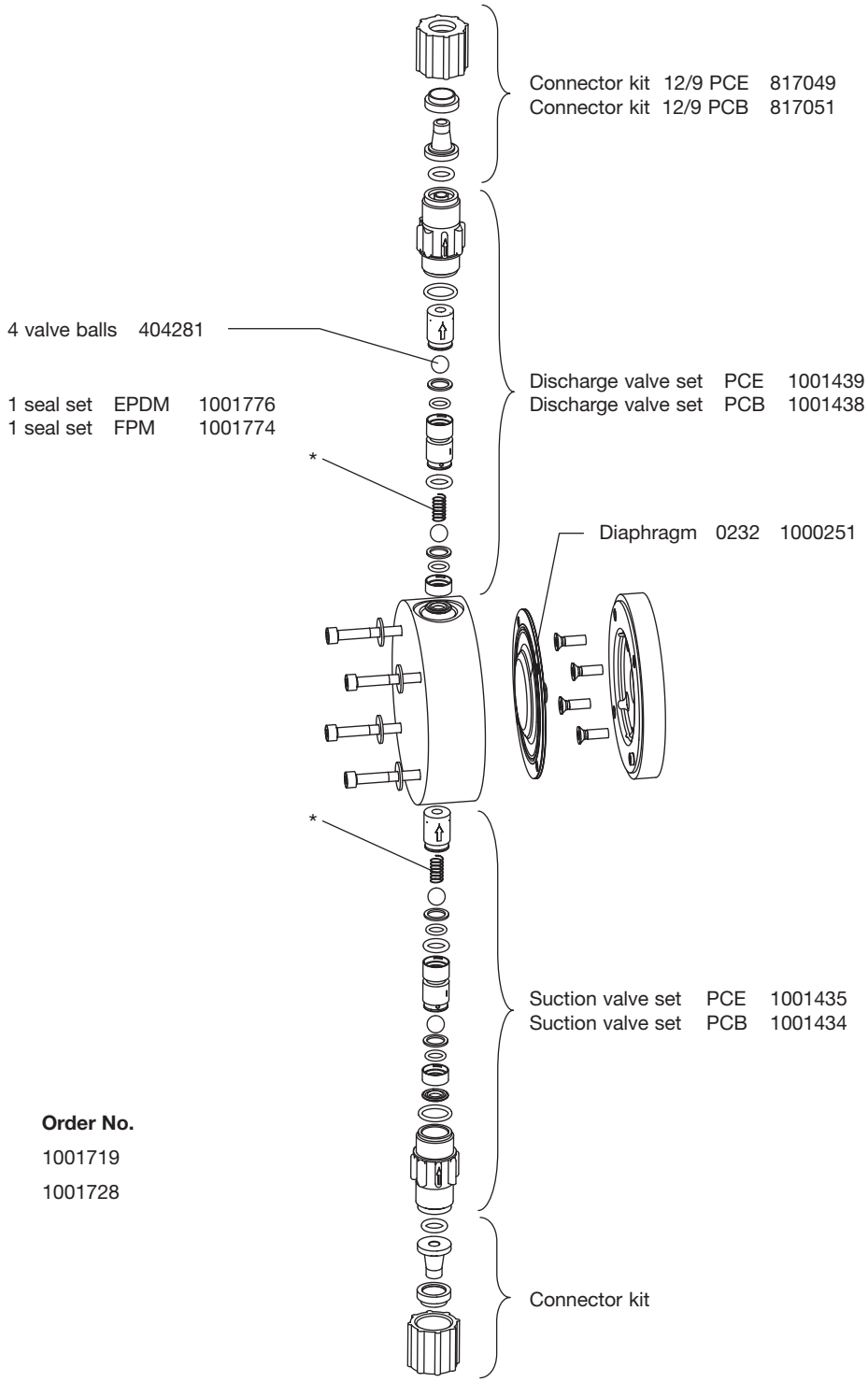
Type	Material	Order No.
0708 (1008)	NPE	1001716
0413 (0713)	NPE	1001717
0220 (0420)	NPE	1001718
0708 (1008)	NPB	1001725
0413 (0713)	NPB	1001726
0220 (0420)	NPB	1001727

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

Subject to technical alterations.

60_07-104_00_22-04_2

Liquid end 0232
NP without coarse/fine bleed



Spare parts kits for:

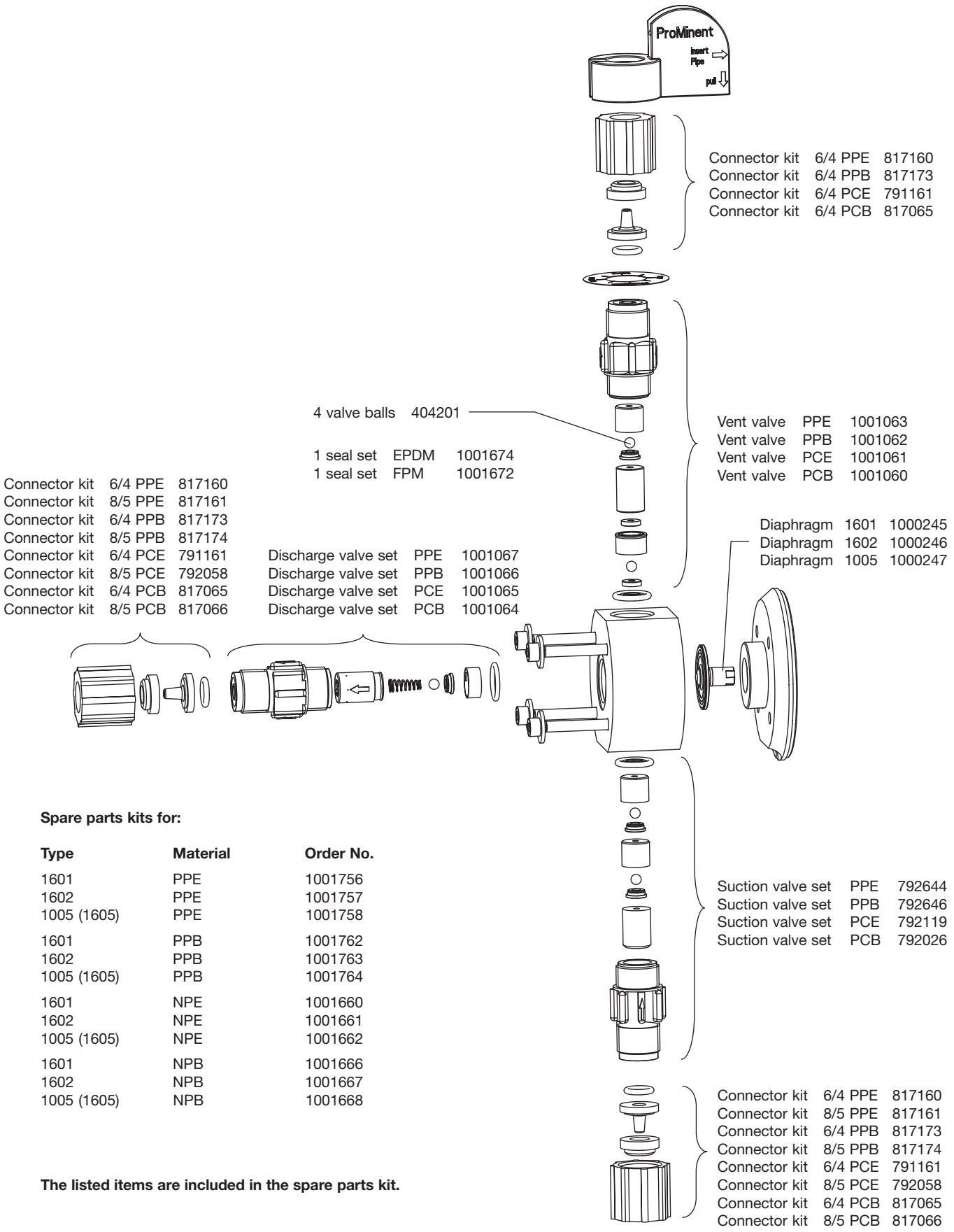
Type	Material	Order No.
0232	NPE	1001719
0232	NPB	1001728

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

Subject to technical alterations.

60_07-104_00_20-04_2

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



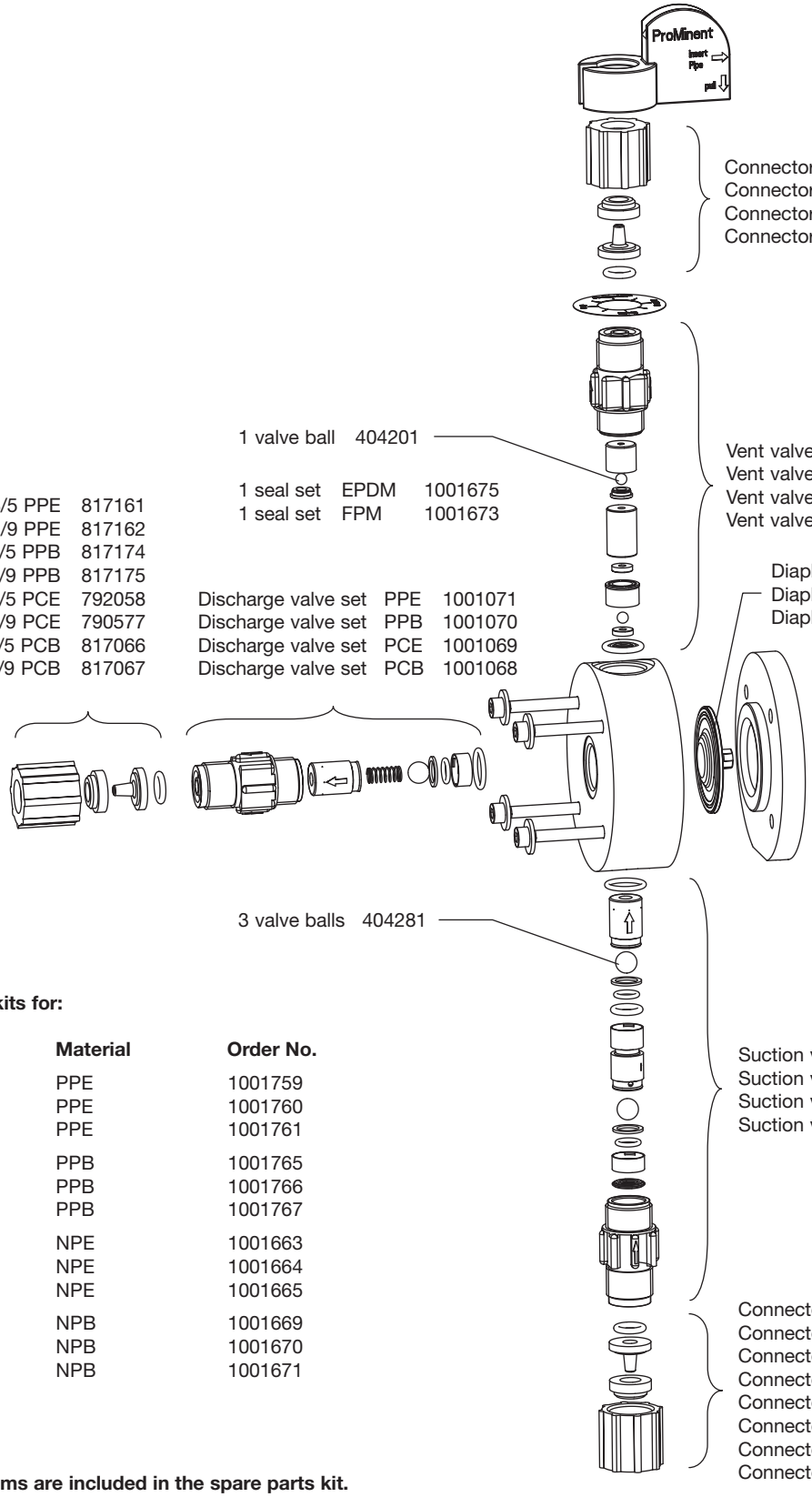
Spare parts kits for:

Type	Material	Order No.
1601	PPE	1001756
1602	PPE	1001757
1005 (1605)	PPE	1001758
1601	PPB	1001762
1602	PPB	1001763
1005 (1605)	PPB	1001764
1601	NPE	1001660
1602	NPE	1001661
1005 (1605)	NPE	1001662
1601	NPB	1001666
1602	NPB	1001667
1005 (1605)	NPB	1001668

The listed items are included in the spare parts kit.

Subject to technical alterations.

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



Connector kit 6/4 PPE 817160
Connector kit 6/4 PPB 817173
Connector kit 6/4 PCE 791161
Connector kit 6/4 PCB 817065

1 valve ball 404201

1 seal set EPDM 1001675
1 seal set FPM 1001673

Vent valve PPE 1001063
Vent valve PPB 1001062
Vent valve PCE 1001061
Vent valve PCB 1001060

Diaphragm 0708 1000248
Diaphragm 0413 1000249
Diaphragm 0220 1000250

Connector kit 8/5 PPE 817161
Connector kit 12/9 PPE 817162
Connector kit 8/5 PPB 817174
Connector kit 12/9 PPB 817175
Connector kit 8/5 PCE 792058
Connector kit 12/9 PCE 790577
Connector kit 8/5 PCB 817066
Connector kit 12/9 PCB 817067

Discharge valve set PPE 1001071
Discharge valve set PPB 1001070
Discharge valve set PCE 1001069
Discharge valve set PCB 1001068

3 valve balls 404281

Suction valve set PPE 1001437
Suction valve set PPB 1001436
Suction valve set PCE 1001435
Suction valve set PCB 1001434

Connector kit 8/5 PPE 817161
Connector kit 12/9 PPE 817162
Connector kit 8/5 PPB 817174
Connector kit 12/9 PPB 817175
Connector kit 8/5 PCE 792058
Connector kit 12/9 PCE 790577
Connector kit 8/5 PCB 817066
Connector kit 12/9 PCB 817067

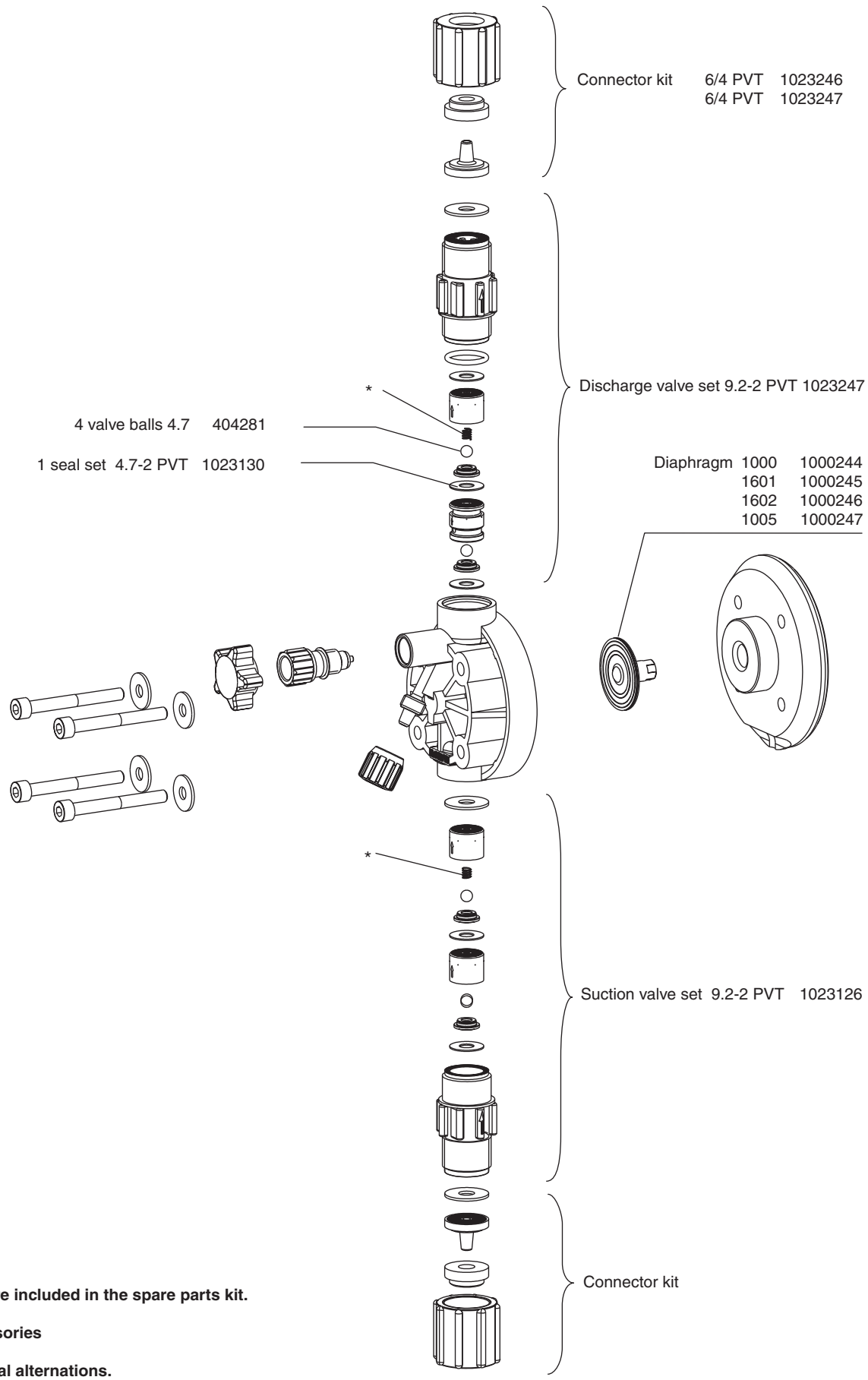
Spare parts kits for:

Type	Material	Order No.
0708 (1008)	PPE	1001759
0413 (0713)	PPE	1001760
0220 (0420)	PPE	1001761
0708 (1008)	PPB	1001765
0413 (0713)	PPB	1001766
0220 (0420)	PPB	1001767
0708 (1008)	NPE	1001663
0413 (0713)	NPE	1001664
0220 (0420)	NPE	1001665
0708 (1008)	NPB	1001669
0413 (0713)	NPB	1001670
0220 (0420)	NPB	1001671

The listed items are included in the spare parts kit.

Subject to technical alterations.

Liquid end 1000-1005 (1605)
PVT with bleed

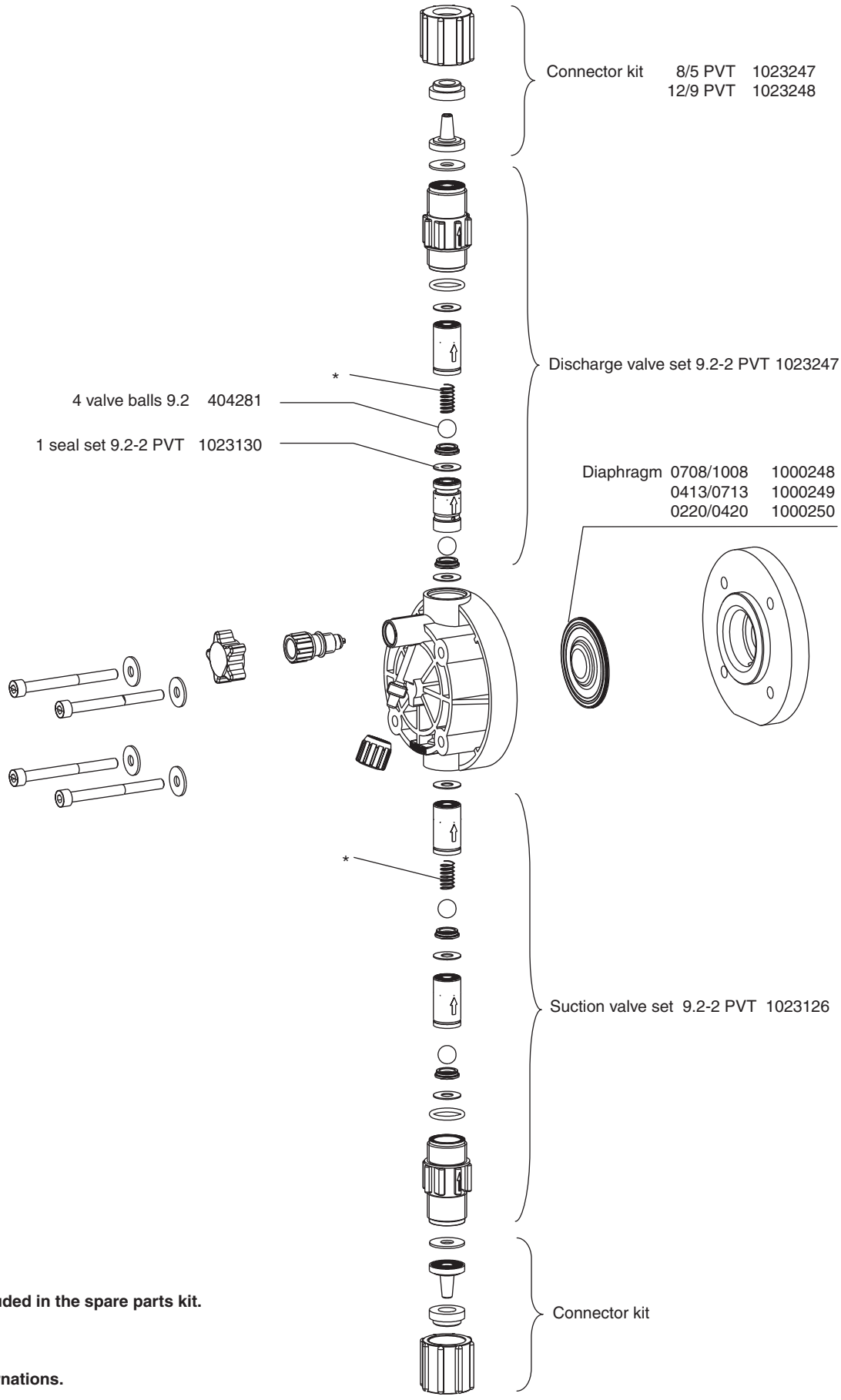


The listed items are included in the spare parts kit.

*** Custumer accessories**

Subject to technical alternations.

Liquid end 0708 (1008) - 0220 (0420)
PVT with bleed

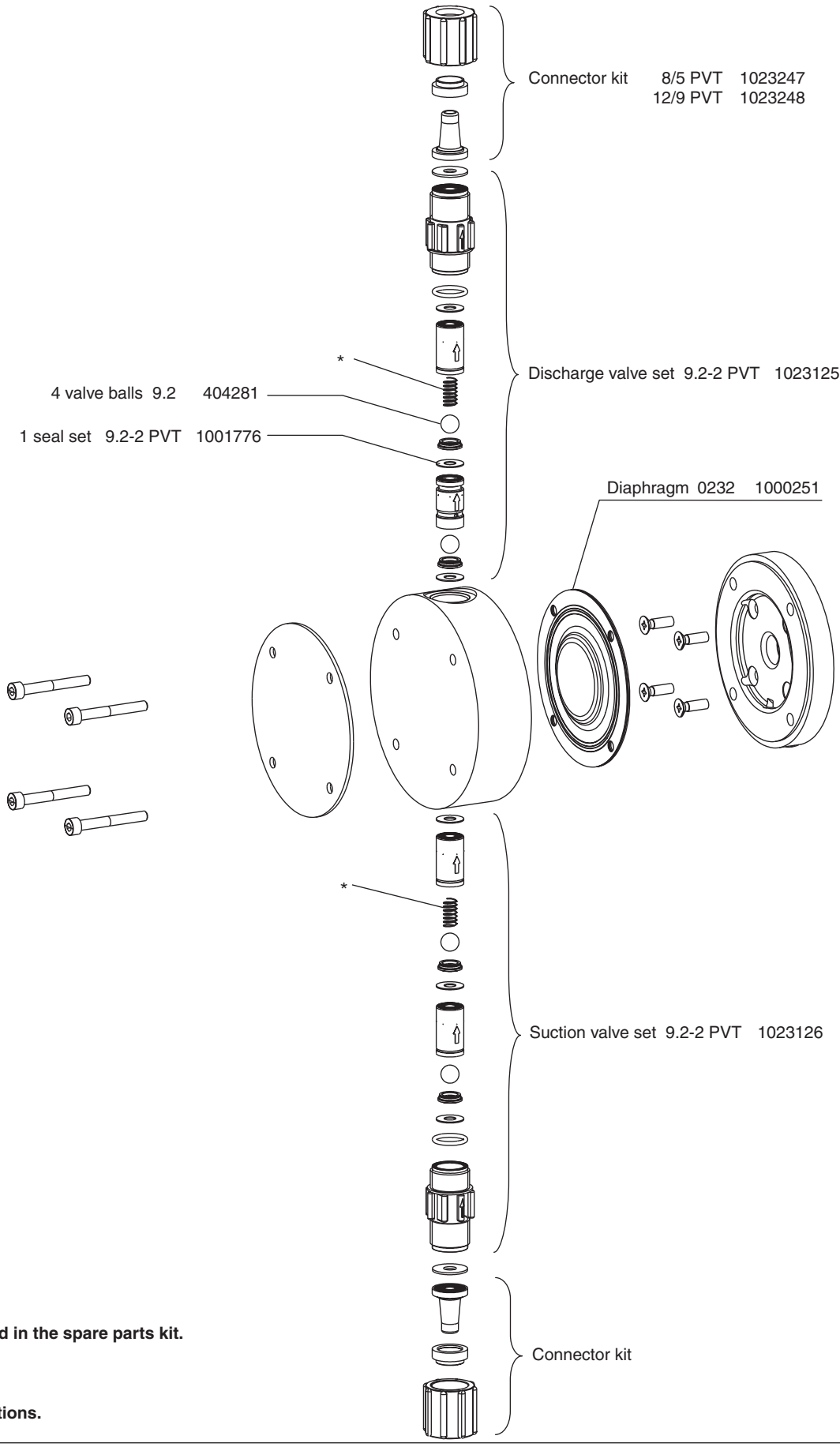


The listed items are included in the spare parts kit.

*** Custumer accessories**

Subject to technical alternations.

Liquid end 0232
PVT without bleed

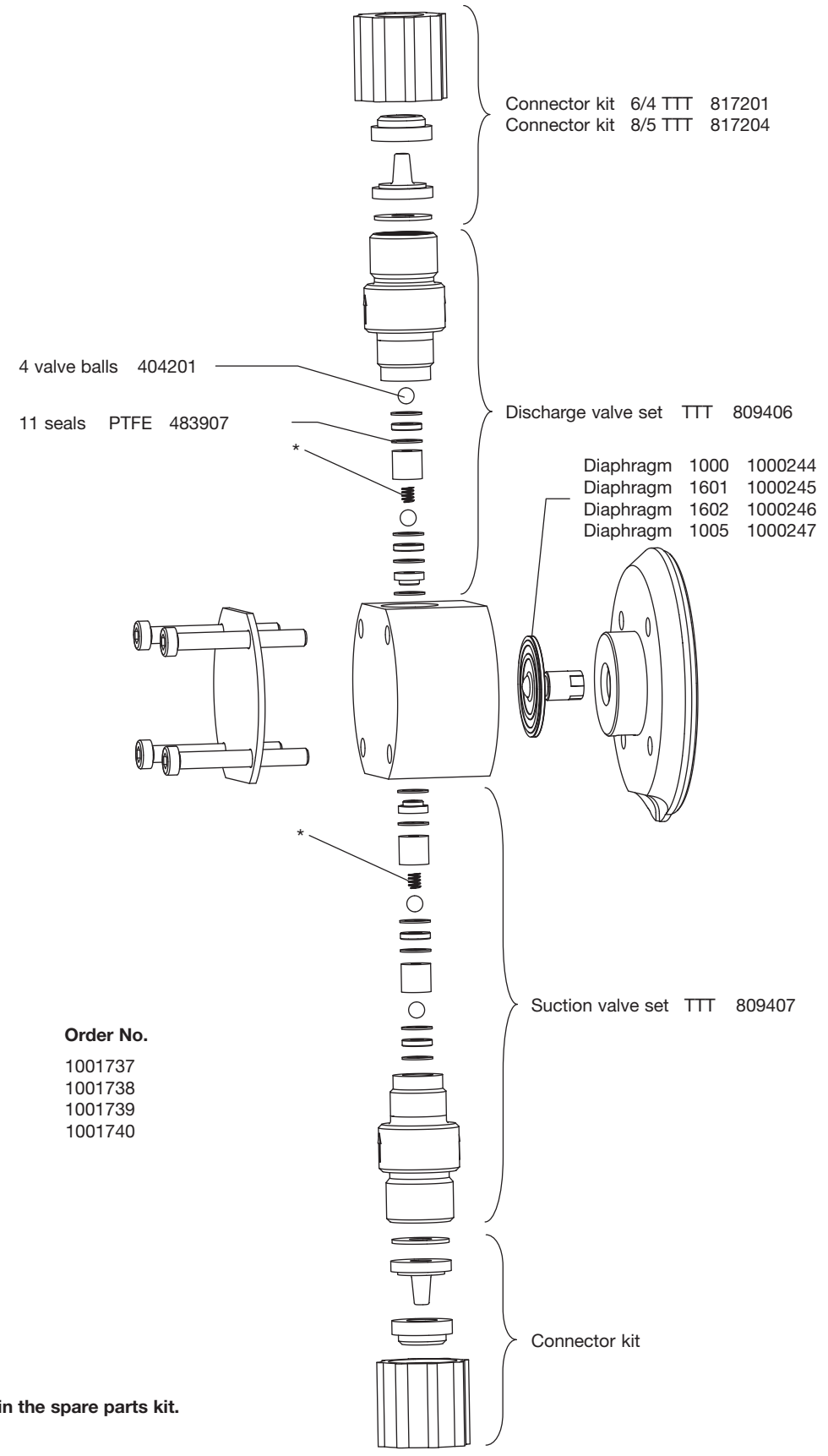


The listed items are included in the spare parts kit.

*** Custumer accessories**

Subject to technical alternations.

Liquid end 1000 - 1005 (1605)
TT



Spare parts kits for:

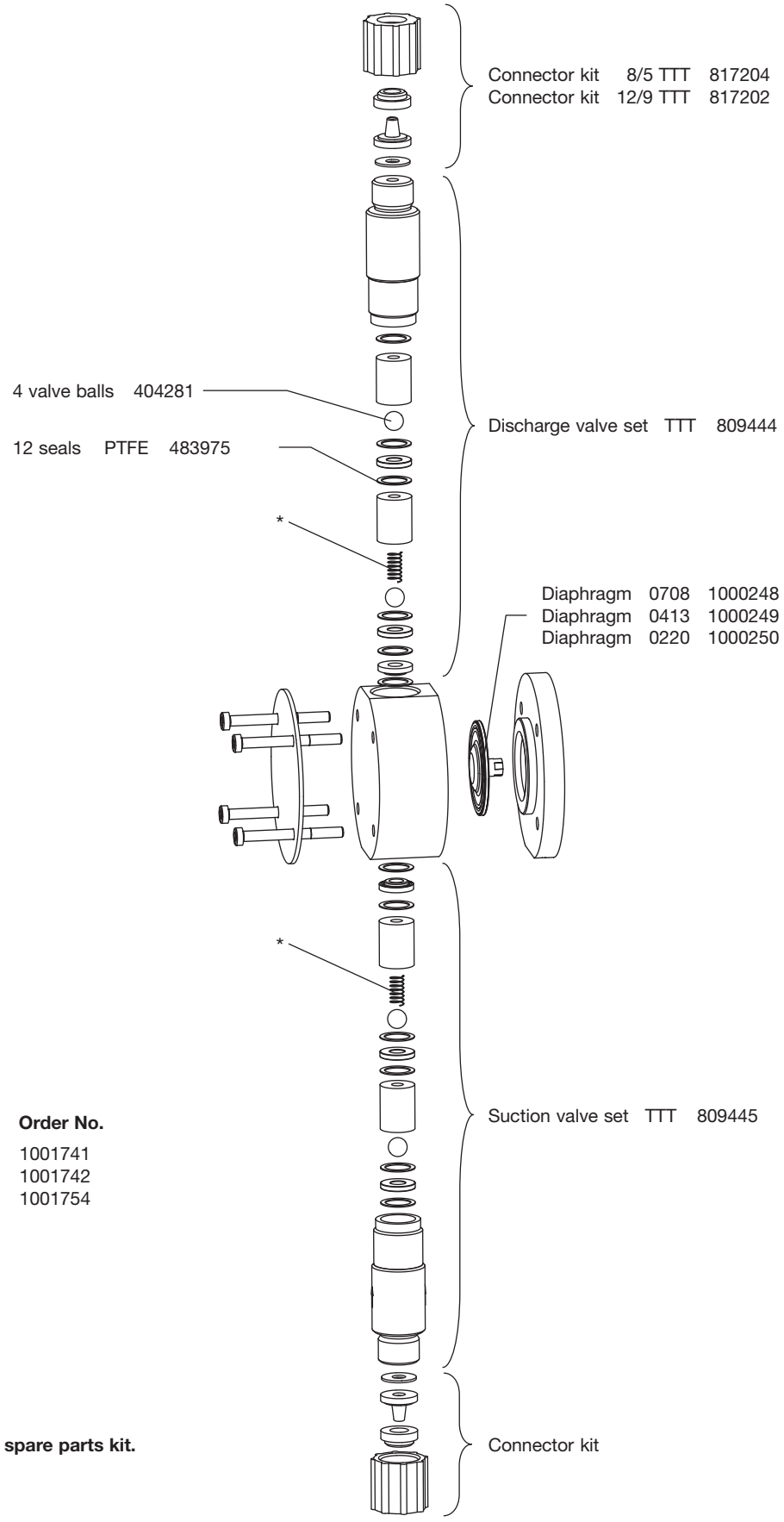
Type	Material	Order No.
1000	TTT	1001737
1601	TTT	1001738
1602	TTT	1001739
1005 (1605)	TTT	1001740

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

Subject to technical alterations.

60_07-104_00_29-04_2

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



Spare parts kits for:

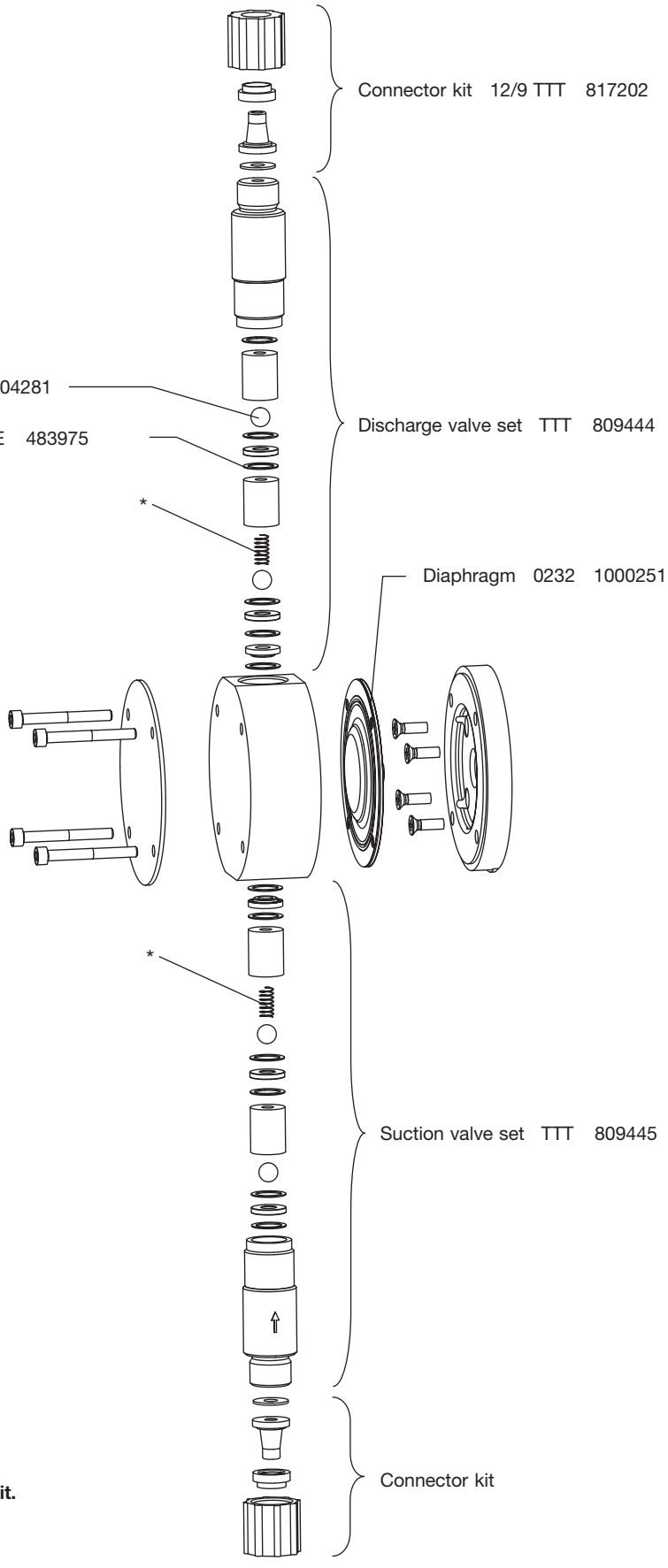
Type	Material	Order No.
0708 (1008)	TTT	1001741
0413 (0713)	TTT	1001742
0220 (0420)	TTT	1001754

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

Subject to technical alterations.

60_07-104_00_30-04_2

Liquid end 0232
TT



Spare parts kits for:

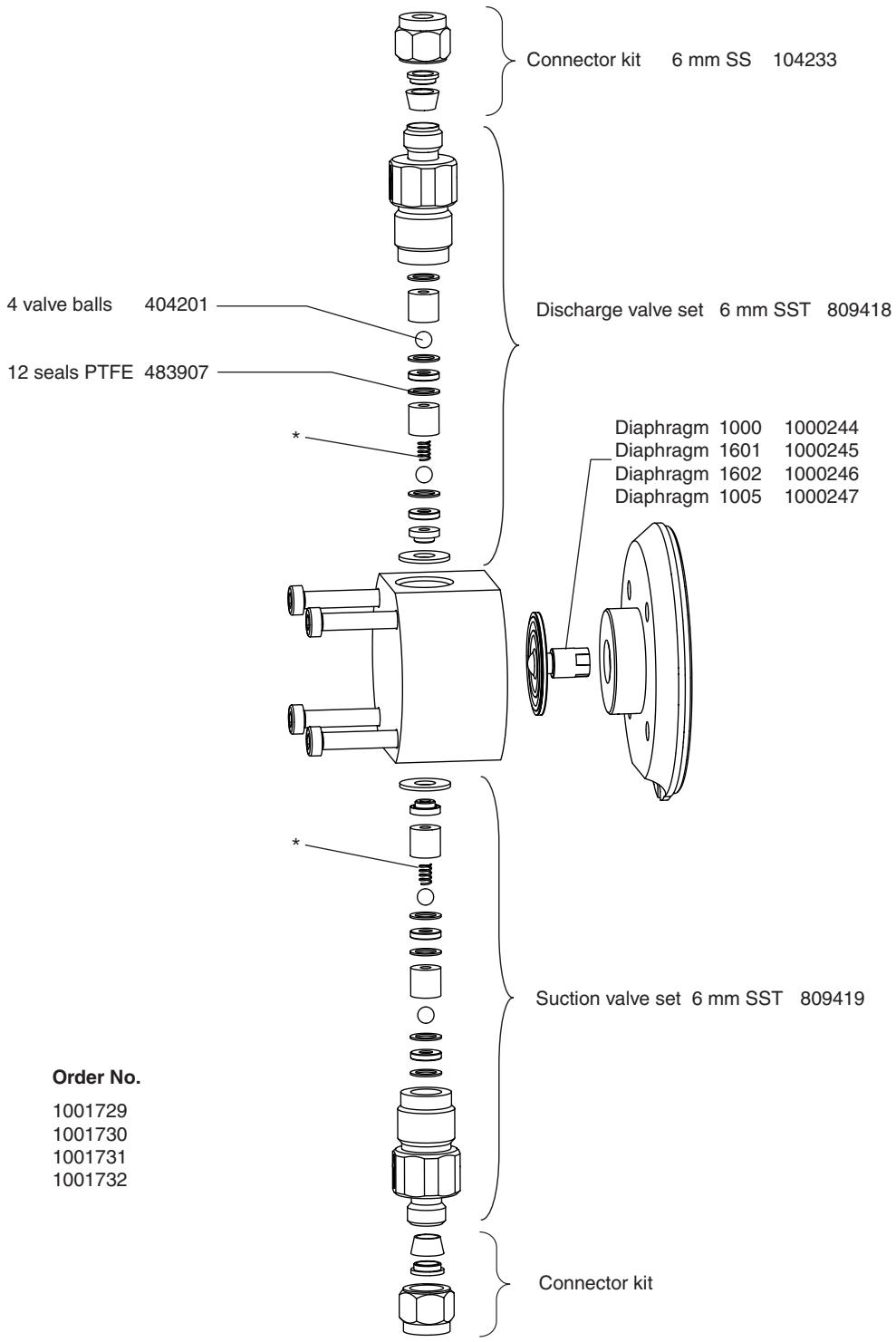
Type	Material	Order No.
0232	TTT	1001755

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

Subject to technical alterations.

60_07-104_00_35-04_2

Liquid end 1000 - 1005 (1605)
SS



Spare parts kits for:

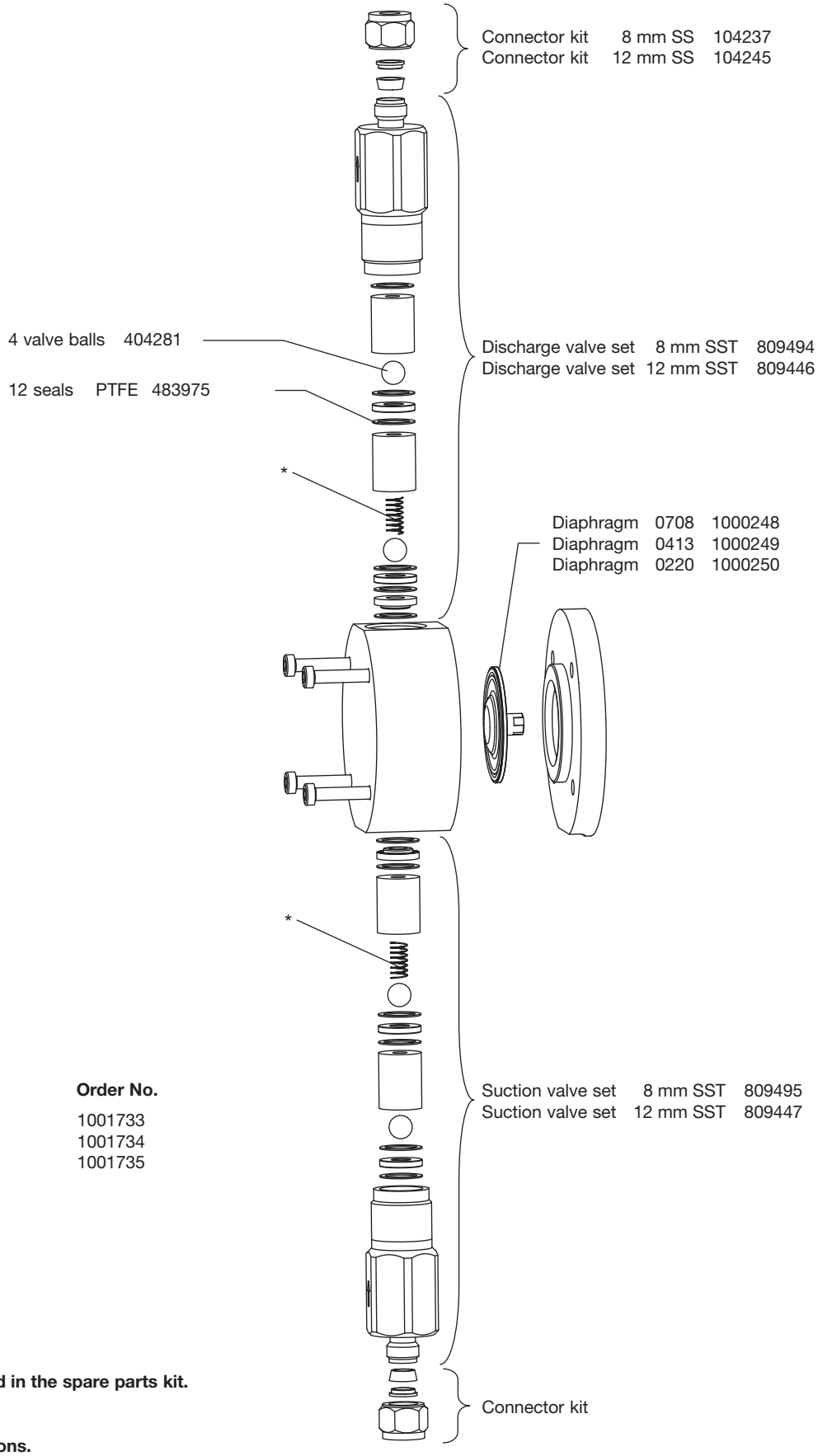
Type	Material	Order No.
1000	SST	1001729
1601	SST	1001730
1602	SST	1001731
1005 (1605)	SST	1001732

The listed items are included in the spare part kit.

*** Custumer accessories.**

Subject to technical alterations.

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



Spare parts kits for:

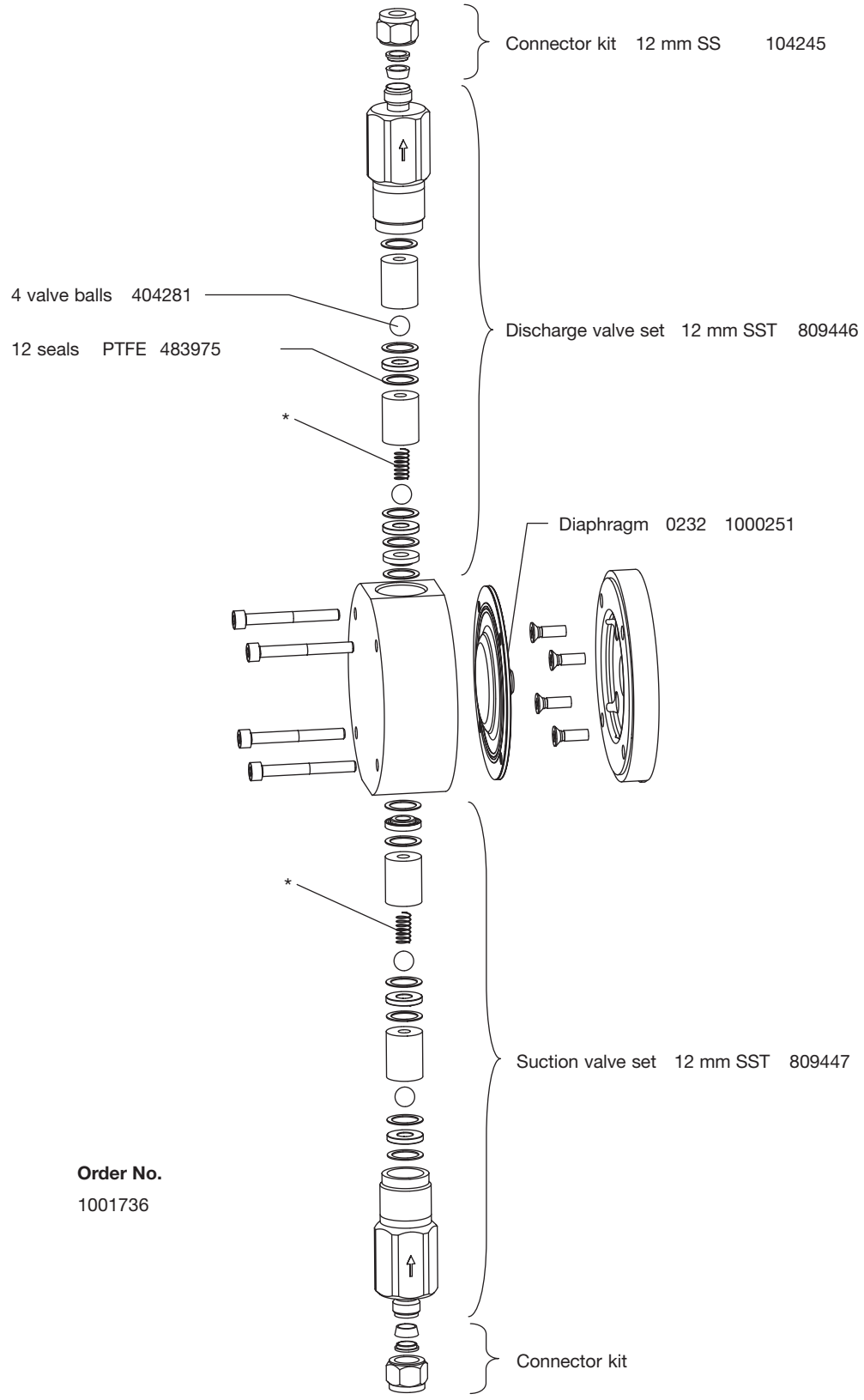
Type	Material	Order No.
0708 (1008)	SST	1001733
0413 (0713)	SST	1001734
0220 (0420)	SST	1001735

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

Subject to technical alterations.

60_07-104_00_26-04_2

Liquid end 0232
SS



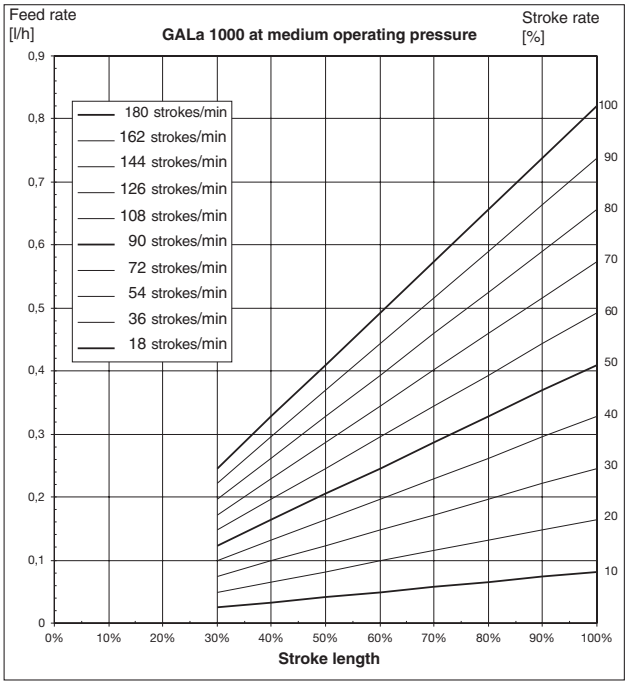
Spare parts kits for:

Type	Material	Order No.
0232	SST	1001736

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

Subject to technical alterations.

60_07-104_00_36-04_2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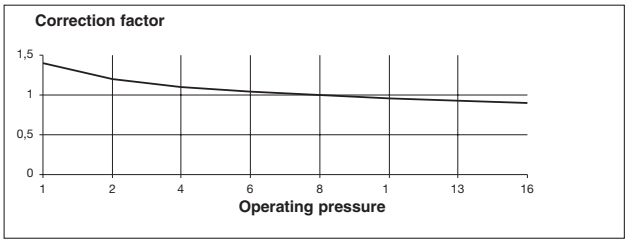
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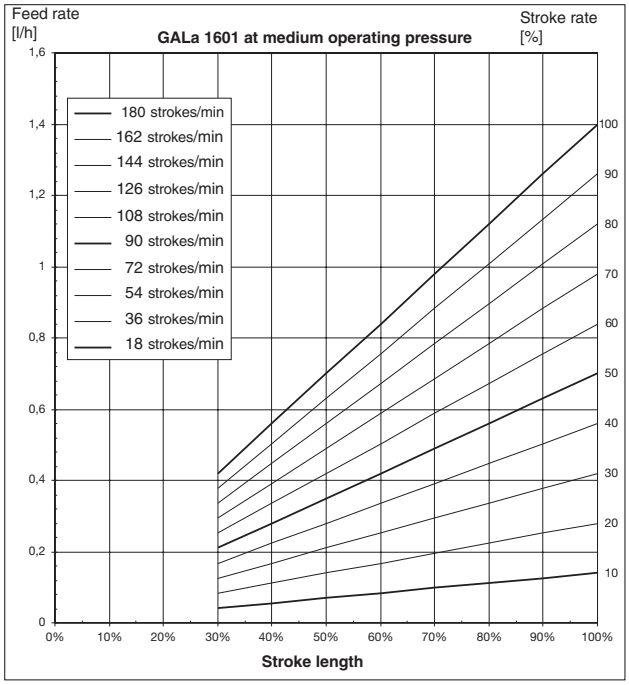
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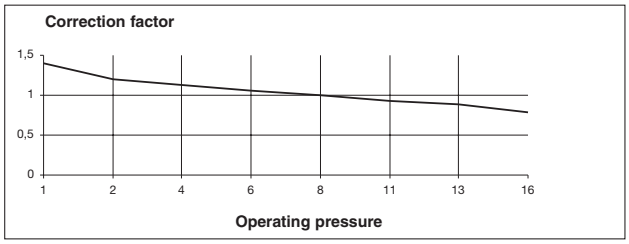
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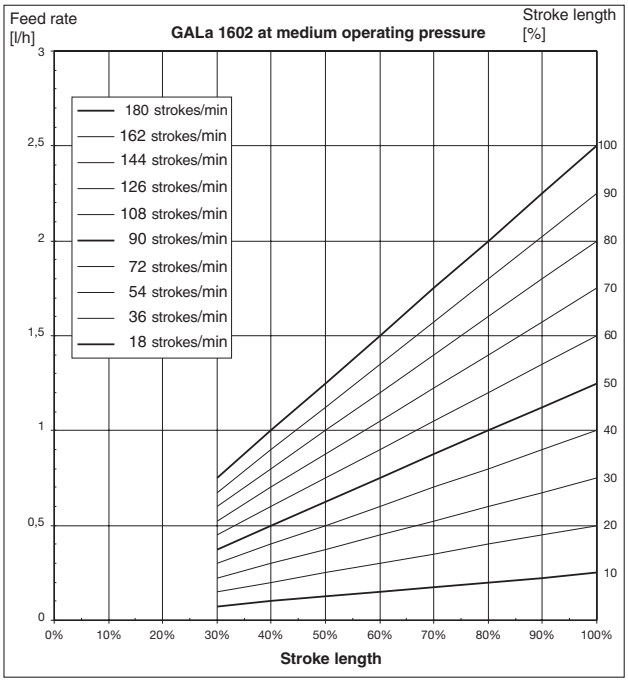
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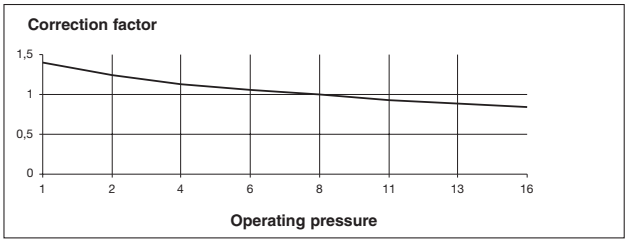
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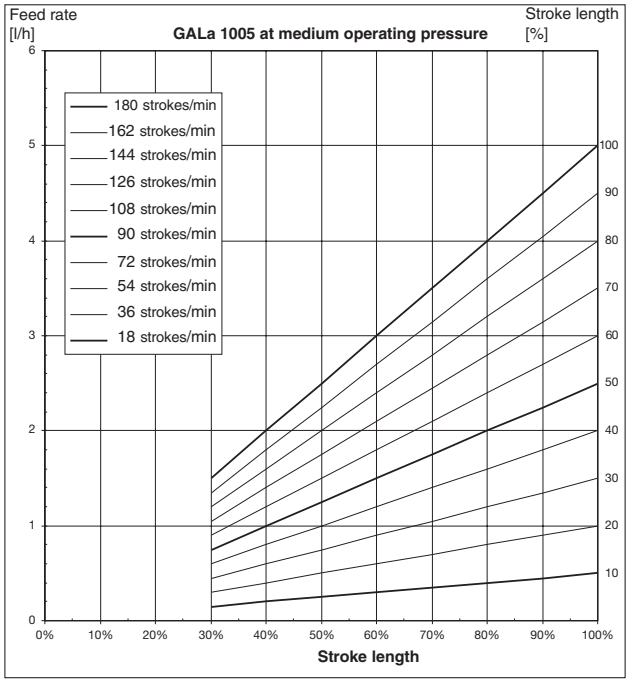
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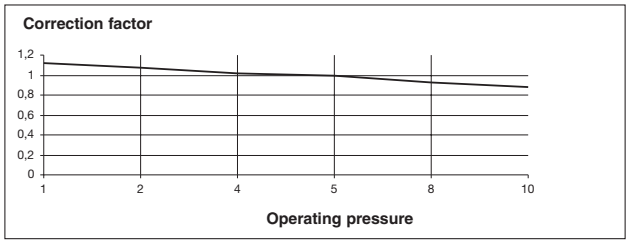
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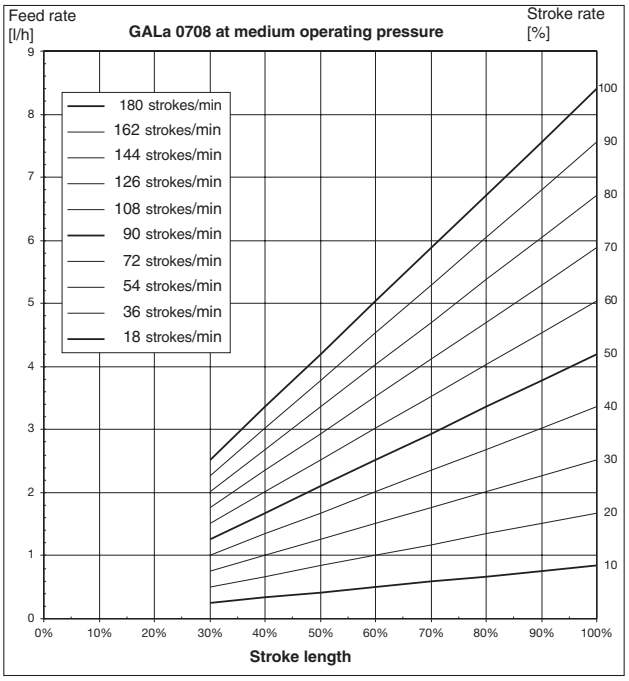
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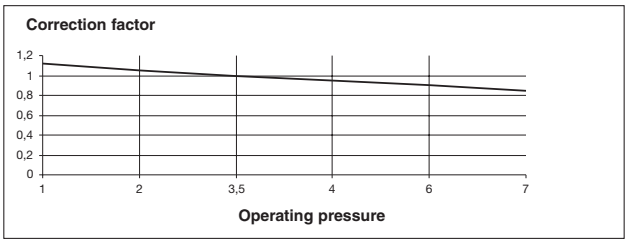
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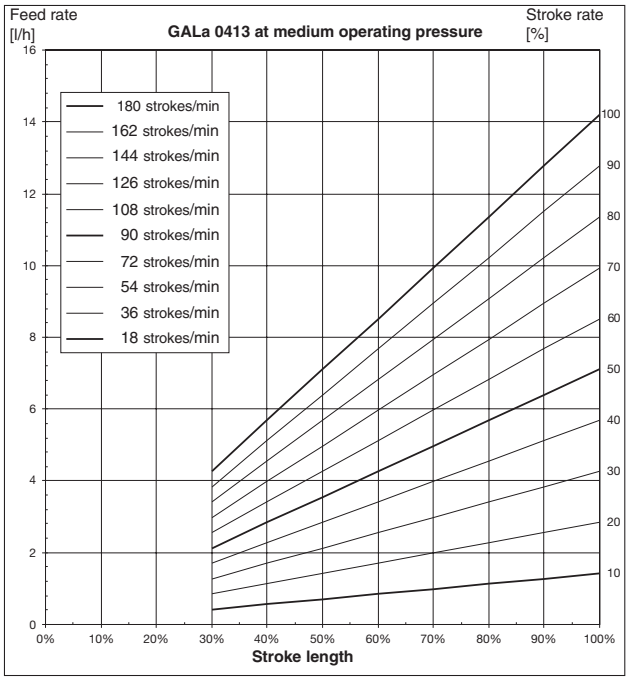
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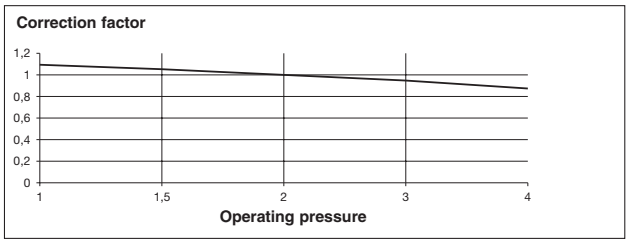
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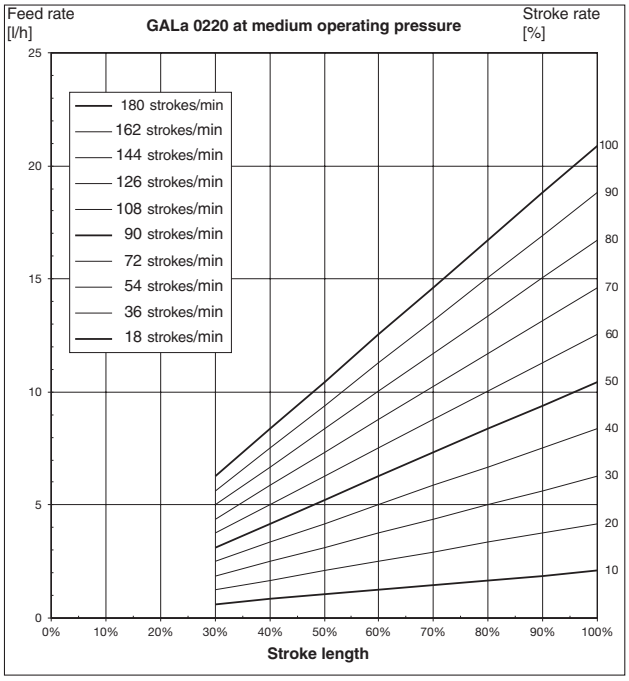
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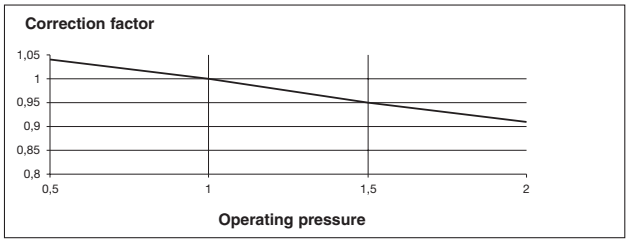
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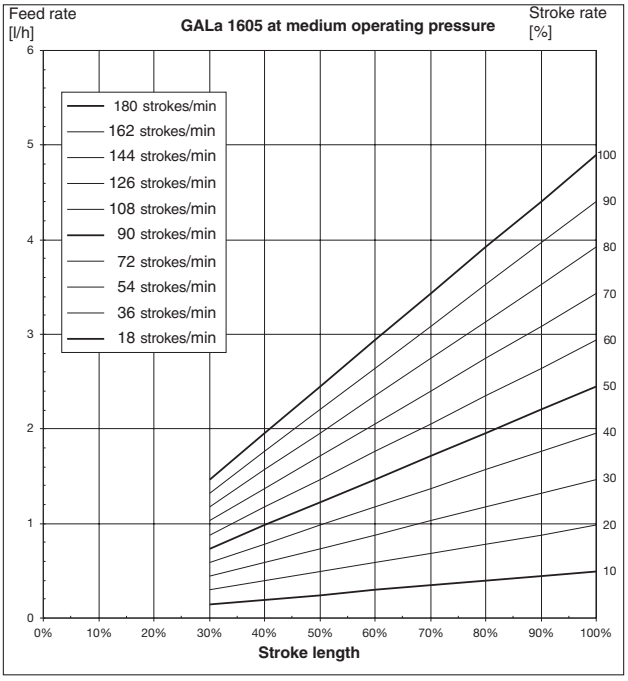
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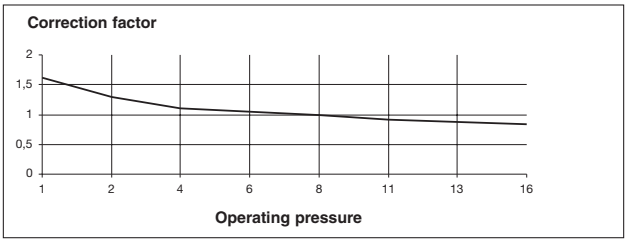
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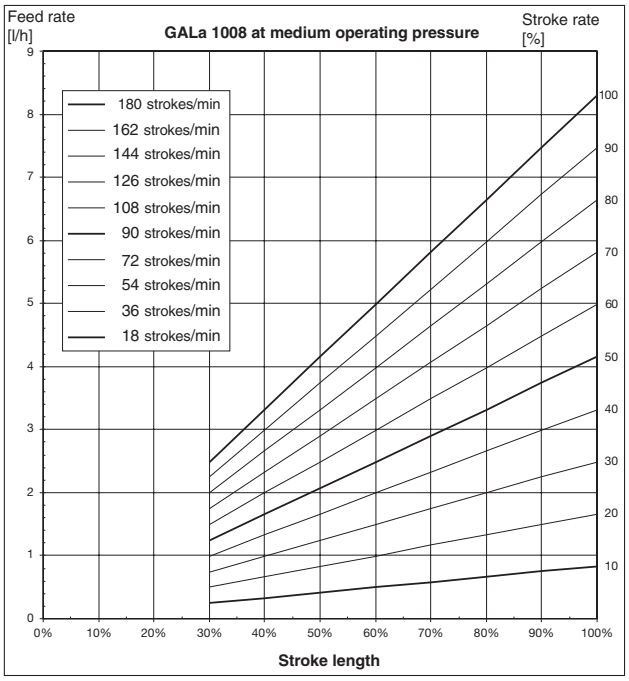
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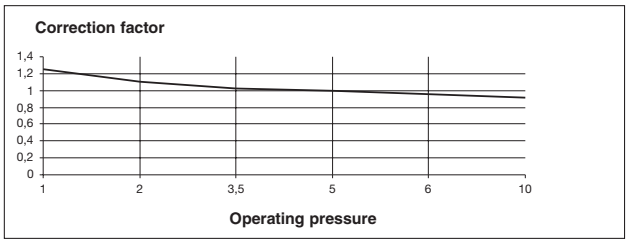
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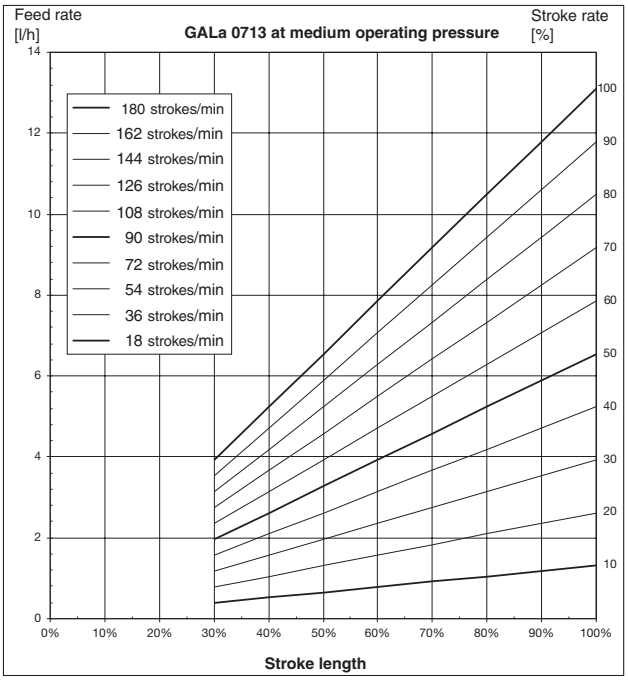
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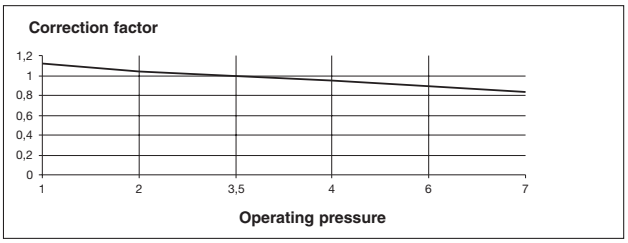
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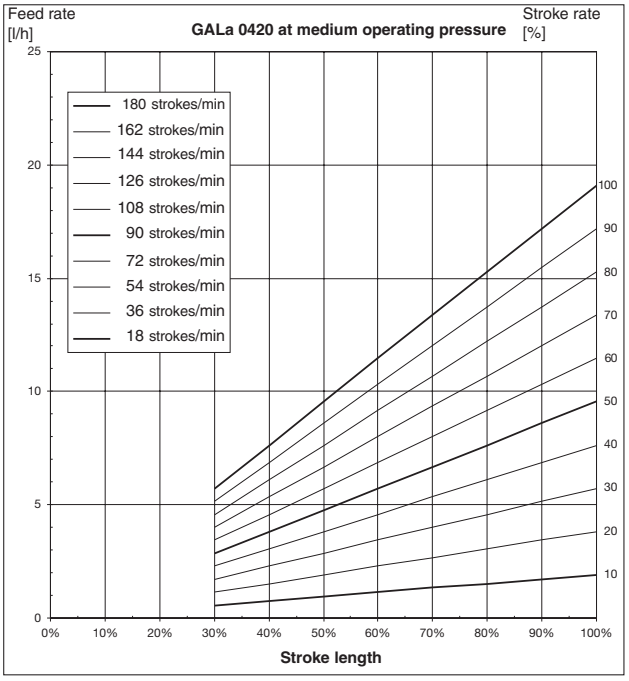
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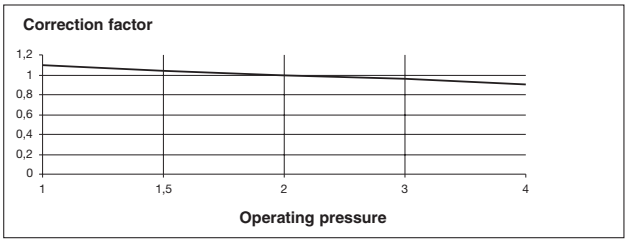
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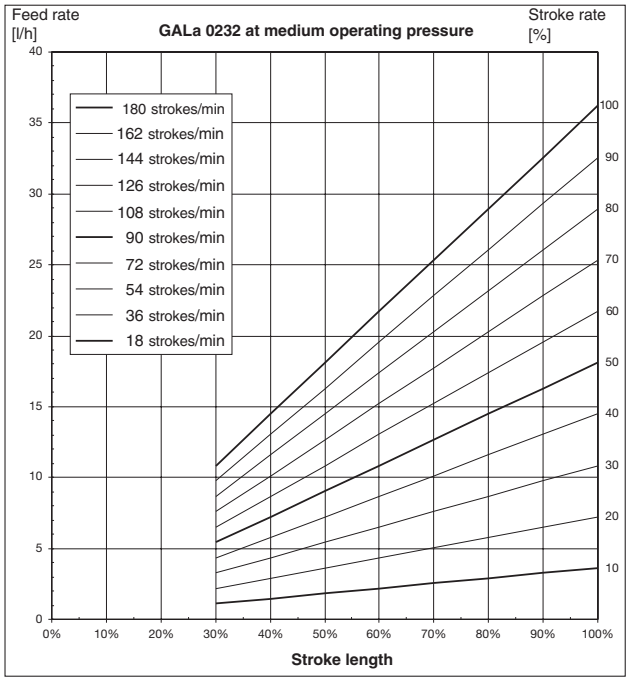
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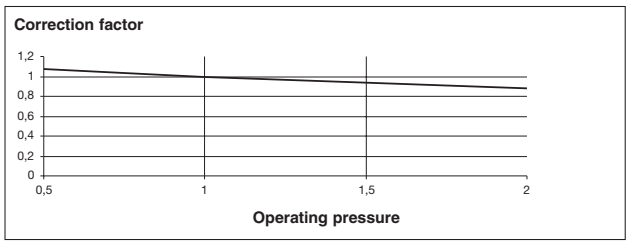
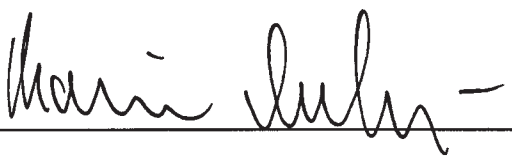

Correction factor
Operating pressure

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 Gamma L***
Product type :	***GALa***
Serial number :	***see type identification plate on device***
Relevant EC directives :	***EC - machine directive 98/37/EC*** ***EC - low voltage directive 73/23/EEC*** ***EC - EMC - directive (89/336/EEC) subsequently 92/31 EEC***
Harmonised standards used, in particular :	***DIN EN 292-1, DIN EN 292-2, DIN EN 809*** ***DIN EN 60335-1, DIN EN 60335-2-41, DIN EN 50106*** ***DIN EN 50081-1/2, DIN EN 55011, DIN EN 61000-3-3*** ***DIN EN 50082-1/2, DIN EN 61000-4-2/3/4/5/6/11***
National standards and other technical specifications used, in particular :	***DIN VDE 0700 T1*** ***DIN VDE 0700 T41*** ***DIN VDE 0700 T500*** ***IEC 1000-3-3, IEC 1000-4-2/3/4/5/6/11***
Date/manufacturer´s signature :	***02. Nov 99*** 
The undersigned :	*Dr. Rainer V. Dulger, Executive Vice President R&D and Production*