

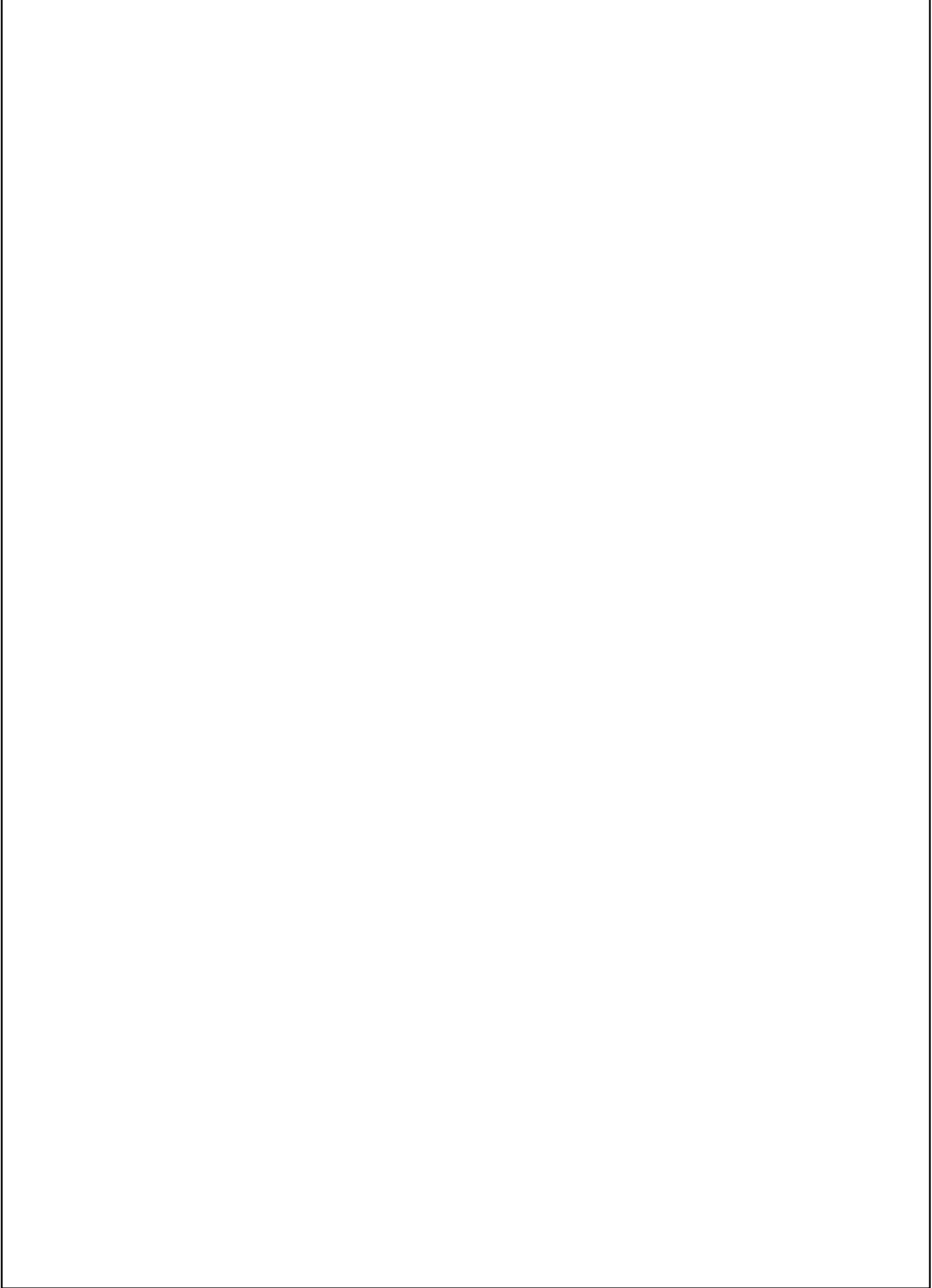
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Appendix:

Instruction manual "ProMinent® gamma/ 5a"

Brochure with measuring sheet "ProMinent® mikro g/5a"





Note:

The type identification plate displayed here is identical to that of the supplied pump thus facilitating distinct allocation between the operating instructions and pump. Please enter the type identification code specified under „Type“ on the type identification plate in the blank line below. In order to find the description of the properties of the delivered pump quickly and reliably, mark the identification code features concerning your pump in the following table.

Fix type identification plate here

MG5a							
-------------	--	--	--	--	--	--	--

Series:

MG5a = mikro g/5
 Version a

Pump size: Section 4

1st and 2nd figure =
 Backpressure (bar)
 3rd to 6th figure =
 Capacity (ml/h)
 400150
 180600
 061500
 Material TT....
 max. 10 bar backpressure

Material: Section 4

SS 1= Stainless steel material No. 1.4571, with PTFE packing, pure white
 SS 2= Stainless steel material No. 1.4571 with PTFE packing, graphite
 SS 3 = Stainless steel with Bal-Seal seal
 TT 1= PTFE + 25 % carbon with PTFE packing, pure white
 TT 2= PTFE + 25 % carbon with PTFE packing, graphite
 TT 3= PTFE + 25 % carbon with Bal-Seal seal

Valve spring:

0 = No spring
 1 = With 2 valve springs
 1.4571 0,1 bar

Transparent cover version:

0 = Standard
 1 = With lock

Electrical connection:

power cable 2 m long
 A = 230 V ±10 % 50/60 Hz Euro plug
 B = 230 V ±10 % 50/60 Hz Swiss plug
 C = 230 V ±10 % 50/60 Hz Australian plug
 D = 115 V ±10 % 50/60 Hz USA plug
☐ = Special version

Control type:

1 = Option type
 2 = Option type with LCD lighting

Control variant:

0 = Manual + external + pause
 1 = As 0 + Analog 0...20 mA, 4...20 mA
 2 = As 0 + Analog 0 - 60 mV, 0 - 1 V, 0 - 10 V
☐ = Special version

Pulse control:

0 = Without pulse control
 1 = With pulse control

Timer:

Separate operating instructions
 0 = Without timer
 1 = With timer

Relay switching mode:

0 = No relay
 1 = Fault indicating relay, releasing
 2 = Pacing relay, operating
 3 = Fault indicating relay, operating
 4 = Timer relay, operating

Please observe the parts of the operating instructions concerning your particular device.

1 Operating the pump

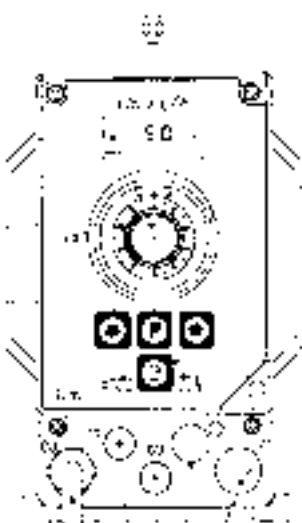
1.1 Sectional drawing and legend

- 1 LCD read out
- 2 Stroke length adjusting knob
- 3 Program selector key
- 4 Up/Down keys
- 5 Stop/Start key
- 6 Pulse indicating & pilot light, yellow
- 7 Fault/lack of chemical indicating light, red
- 8 Power supply
- 9 Connector for "External/Analog" and remote "on/of" control with dummy connector
- 10 Float switch connector, and dummy connector
- 11 Connector for flow monitor - not available
- 12 Connection thread (PG 9) for relay output and plug
- 13 Housing
- 14 Long stroke solenoid
- 15 Liquid end with suction and discharge connectors
- 17 Back-pressure valve with bleeding (17a)
- 18 Dampener
- 19 PTFE plunger packing or Bal Seal
- 20 Oxide ceramics metering plunger
- 21 Head disk
- 23 Electronic control with microprocessor
- 24 Fuse
- 25 Short description

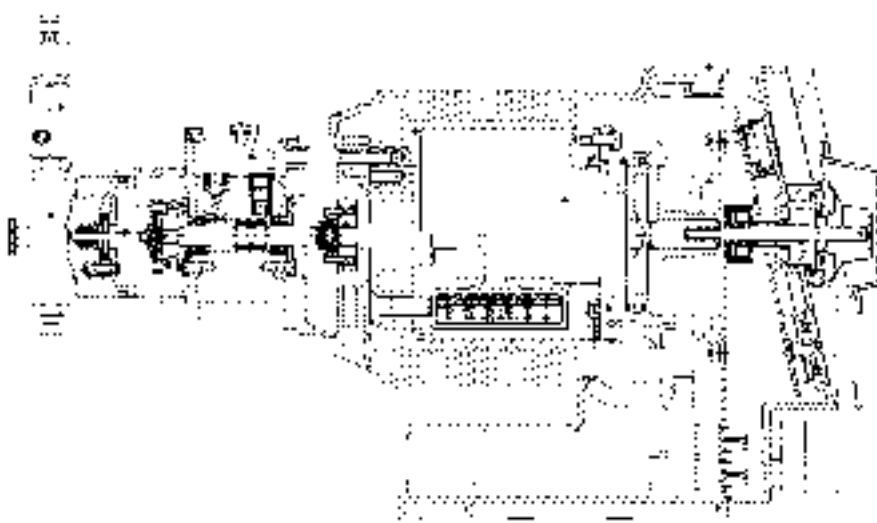
6 4 2 1

3 5 7 17a 17 15 19 20 18 21










14 13 24 23 25




8 9 10 11 12




1.2 Explanation of symbols on pump front panel


	Stroke length adjustment
	Enclosure rating IP 65
	Pilot and pulse indicating light /Pacing relay - optional
	Fault indication
	Power supply
	Connector for external/analog and remote On/Off control
	Float switch connector
	Connector for flow monitor (curr. not available)
	Relay output for peripheral systems

2 Safety instructions

 **Warning:**
Pumps must be accessible at all times for operation and service. Accesses may not be closed off or blocked!

 **Warning:**
If hazardous or unknown metering media are used, always first empty out the liquid end and rinse it out for maintenance and repair work!

Observe the safety data sheets of the metering fluids!


 **Warning:**
When metering dangerous or unknown fluids, protective clothing must be worn when working on the liquid end (glasses, gloves)!

Attention:
Only set the stroke length when the pump is running when the setting bolt of the metering stroke is briefly relieved!

Please note:
Only use the gripper rings and hose nozzles specified for the respective hose diameter as well as original hoses with specified hose dimensions and wall thickness as otherwise the stability of the connection is not guaranteed!

Avoid reducing the hose sizes!

For long lines and highly viscous media a higher line diameter or a pulsation dampener should be used!

 **Caution:**
Max. operating pressure 6 bar for 1/8" and 1/6" PTFE lines, applicable to plug-on system on pipe connection nipple as on mikro g/5a and gamma/ 4 SK pumps.

3 General description

3.1 Description of function and operation

ProMinent® mikro g/5a solenoid-driven plunger-type metering pump for liquid media consists of the following components:

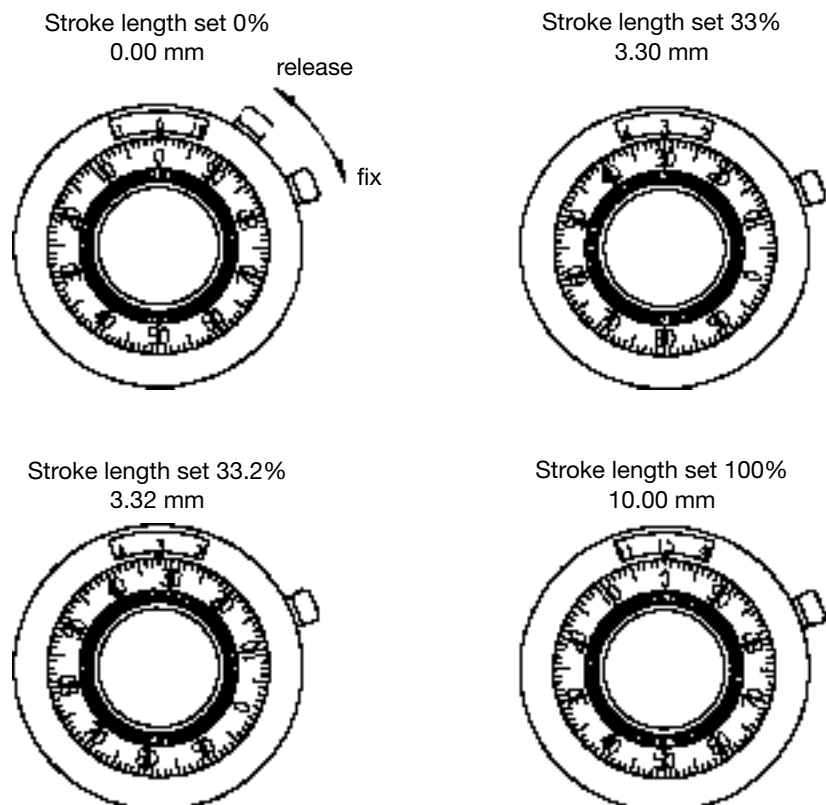
Power end

- Housing (13)
- Long stroke solenoid (14)
- Electronic control with microprocessor (23)
- Dampener (18)
- Stroke adjustment (2)

Feeding end

- Liquid end with suction and discharge connectors (15)
- Metering plunger (20)
- Back pressure valve (17)

The pump output has a pulsating flow profile. For every pulse generated by the electronic circuit a magnetic field is built up in the solenoid coil, and the moveable supported thrust piece and armature are attracted. The pump plunger displaces the media in the liquid end through the discharge valve and the balls of the suction valve close. When the pulse ends the magnetic field becomes de-energised and the thrust piece with armature and plunger is returned to its original position by means of a spring. This causes the media to be sucked into the liquid end, the balls on the discharge side are closed - suction stroke. The oil dampening guarantees an equal stroke movement for the full stroke length and thus precise metering even with varying working pressure. The flow output per stroke can be present in a range of 100-2% by means of the stroke length adjusting knob. The stroke length is maximum 10.00 mm.



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Important: Changes to the stroke length should only be made while the pump is operating, when the adjustment bolt is temporarily relieved during the metering stroke.

In the internally controlled, or manual mode, the stroking rate can be varied with the keys (4) from 0-50 strokes per minute. The settings can be repeated with quartz accuracy. The output flow is proportional to the stroking rate. The operation and programming takes place as described in the enclosed instruction manual "ProMinent® gamma/ 5a". For the mikro g/5a however the maximum number of strokes per minute is 50 as opposed to 120 as maximum metering rate and the flow monitor is omitted.

Operating instructions:

Instruction manual "ProMinent® gamma/ 5a" page 50-73,

Terminal plan page 35

Typical installations page 27-31

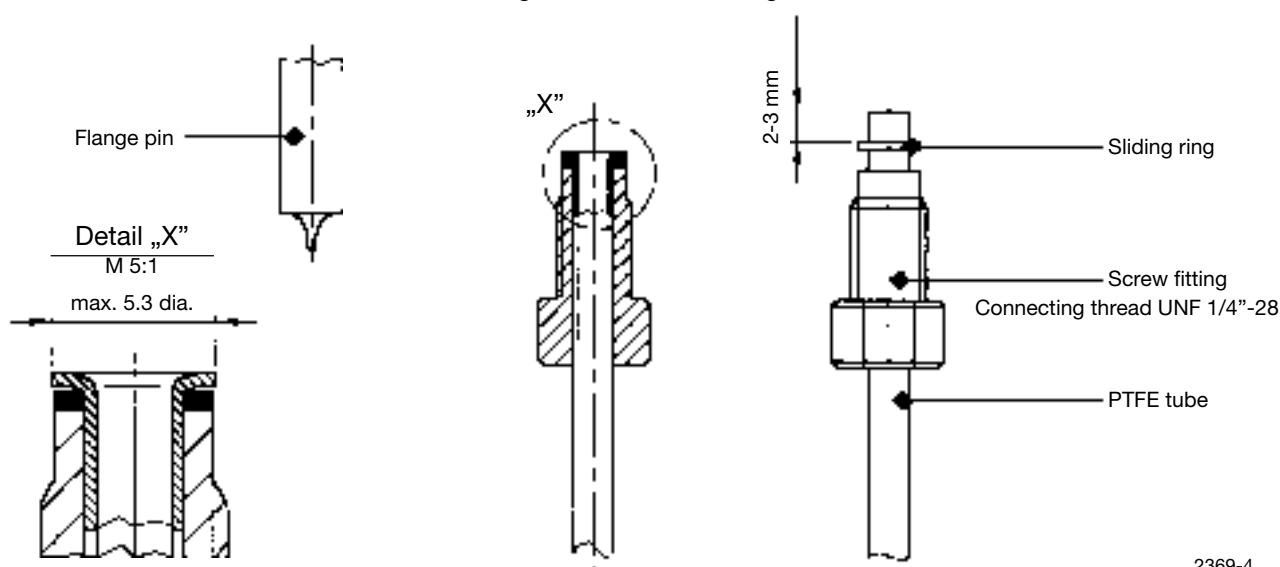
3.2 Connection and initial operation

Screw the back pressure valve onto the liquid end. Assemble the metering pump on a chemical tank or a bracket using screws and washers with a 5 mm diameter. The valves of the liquid end must always be in a vertical position in order for them to operate smoothly.

Connect suction and discharge lines.

Installing PTFE tubing on PTFE liquid end

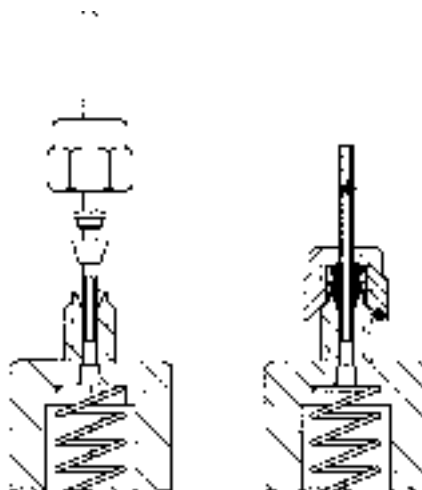
Push screw fitting and sliding ring onto PTFE tube. Heat up the flange pin which comes with the delivery package to approx. 60-80 °C. Then press the tube with screw fitting and sliding ring onto the warm flange pin. To press it on a non-slip sand paper or similar can be used. Please note: The tube should not be bent in doing so. Connecting thread for screw fitting UNF 1/4"-28.



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Installation of VA piping

When laying piping the VA piping length must be adjusted and fitted on the space available. To cut piping lines it is best to use a piping cutter. For connection to the feeding end first remove the PTFE tube with nipple. Push terminal nut, thrust collar and bracing ring onto the pipe. Push the end of the pipe right into the bore. Then place the thrust collar and the bracing ring on the connection. Screw on terminal nut and tighten.



VA-pipe 1/8" or 1/16"

Thrust collar 1/8" or 1/16"

Bracing ring 1/8" or 1/16"

Terminal nut 1/8" or 1/16"

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If present connect the float switch or contact/control cable to the pump after removing the dummy connector or protective cap. The connectors for the contact/control cable (9) and float switch (10) must be occupied at all times either by a shunted dummy connector or by the connected control or signal cable and float switch. For this reason dummy connectors should be kept once they have been removed. Set the desired flow output using the respective nomogram (see technical data). Select the desired electronic function in accordance with the following description:

Sucking and bleeding:

Plug in power into mains socket and set stroke length to 10.00 mm. Then press the "STOP" key (5) to avoid uncontrolled pumping. Loosen bleed screw (17a) on the back pressure valve (half a turn). Start automatic quick-priming by simultaneously pressing the Up and Down keys (4). Keep the keys depressed until the media comes out of the liquid end. Close the bleed screw.

Important: Do not allow the pump to run dry for a long period as otherwise the plunger is subjected to increased wear.

Important: Particular care must be taken during the initial operation procedure to ensure that only Bal-Seal seals are used on pumps for metering demineralised water (TT3, SS3).

Note: If the metering pump is equipped with valve springs, the intake line must be filled during initial operation. Self-priming is not possible!

3.3 Operating conditions and directions for use

The admissible ambient temperature is -10 °C (only for media with a freezing point < -10 °C) up to + 45 °C. If higher temperatures are to be used, the maximum stroke rate must be lowered from the maximum frequency, for each degree C by approx. 2 strokes per minute.

Relative humidity: 10-92 %, not condensing.

If the pump has been disconnected from the power supply, even after years the pump always returns to the last mode selected when it is switched on again.

On/off switching by means of connection function is possible with the universal control cable and voltage-free contact. Switching elements with voltage-free contact or transistor with open collector. The contact load is approx. 0.5 mA at 5V.

If the pump is to be connected parallel with an inductive power consumer, such as a solenoid valve or an electric motor, the metering pump must be electrically isolated when other loads are switched on. The power supply must therefore take place via an auxiliary contactor or a relay. If this is not possible a varistor (part no. 71.09.12.7) or a RC combination (0.22 µF/ 470 Ohm) must be connected parallel to render the harmful induced voltage of the power consumer harmless.

Suction capacity

The maximum suction lift of the ProMinent® mikro g/ 5a metering pump with the liquid end filled is 4-6 m depending on the type of pump (see technical data). The suction capacity with the liquid end empty is lower (see technical data). The pump cannot prime against a head.

If the pump feeds into a pressurised system and has accidentally sucked in some air, this air will only be compressed in the liquid end and no feeding will take place. In this case the bleed screw on the back-pressure valve is opened about half a turn and is bled by quick priming (simultaneously pressing the Up and Down keys) until the suction line and liquid end are filled, free of bubbles. Then retighten the bleed screw.

If a float switch with early warning is used, the pump will switch into the early warning status if the first switch point is reached. When the second switch point is reached (after about 20 mm) the pump switches off so that no air can enter the line system or the liquid end.

There is opening pressure at the suction and, if the fluid level in the chemical tank in the operating mode is located above the metering pump and if there is a pressure-loaded suction line. In this case the back-pressure should be so high that a minimum differential pressure of 1.5 bar exists. Otherwise an additional back-pressure valve or a spring-loaded injection valve with an appropriate opening pressure is to be used.

Important: A back-pressure valve or a spring-loaded injection valve is not a device which closes absolutely tightly. For this reason the suction side must be fitted with an isolating valve which is closed when the pump is at a stillstand.

In order to change an output flow which has been set and possibly confirmed by calibration and to return to the exact same original value, changing the stroking rate is an option as this is digitally processed and reacts totally linear without mechanics.

3.4 Minor faults, causes and remedies

Pump does not prime in spite of full stroke movement and proper air bleeding:

Crystalline deposits due to valves drying out. Take suction hose temporarily out of the chemical tank and rinse out feeding and well. If there is no improvement disassemble valves and clean them.

Pump does not move, yellow LED does not illuminate, no indication in the LCD readout:

Check the mains voltage. Have the fuse checked by authorised customer service personnel and if necessary have it exchanged.

Caution: Only use types which suit the voltage shown on the name plate. If the fault cannot be remedied by replacing the fuse, have the electronic circuit or whole pump checked in the factory.

No flow output although yellow indicating light is flashing:

The stroke length is set to zero or too low a value. Increase stroke length by means of the stroke adjusting knob (2). Air could have been trapped in the liquid end. This can be remedied by bleeding as described in section "Suction capacity" (2.3).

Red fault indicating light goes on:

Take note of the flashing fault annunciation on the display.

Further hints see instruction manual g/5a.

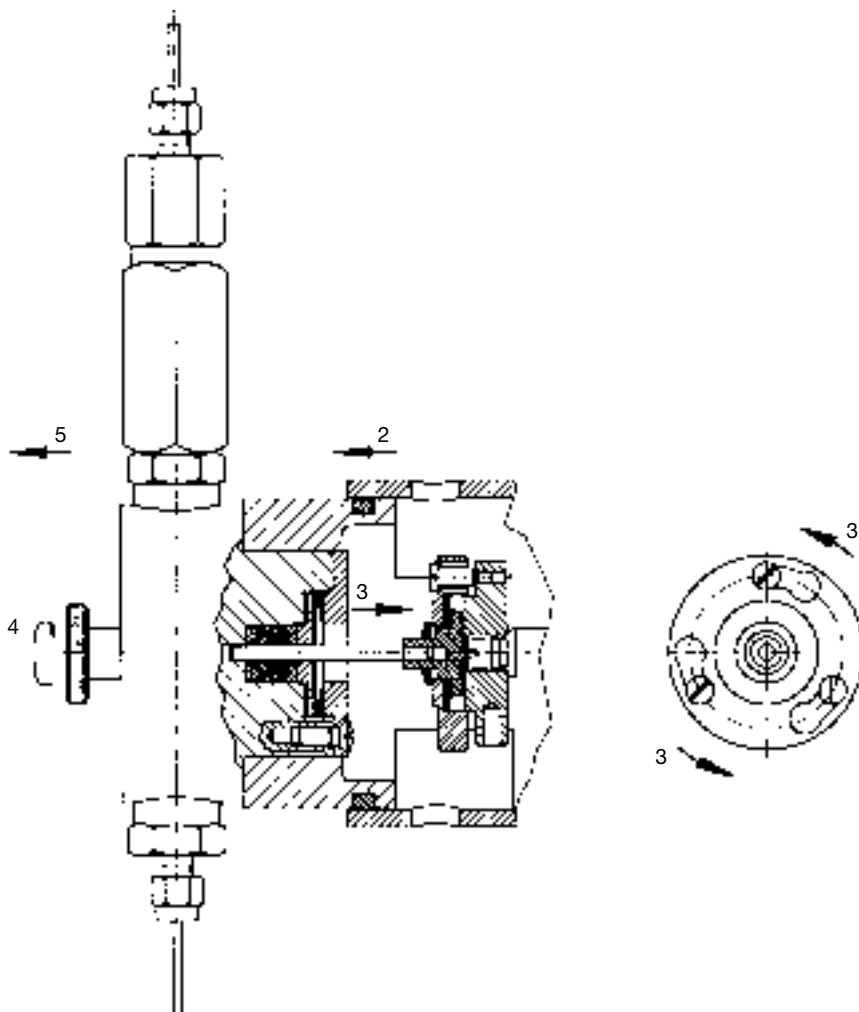
Float switch does not switch off the metering pump when the minimum filling level is reached:

Float is blocked: Remove deposits and clean float.

Other information for operating and maintenance

Changing liquid end and plunger

1. While the pump is working set the stroke length to zero, this blocks the plunger
2. Push the sliding lock to the front, over the plunger coupling.
3. Disconnect plunger bayonet coupling by pressing and turning to the left.
4. Loosen the knurled screws in front of the liquid end.
5. The liquid end together with the plunger can be pulled off.
6. Install the new or cleaned end in reverse sequence.



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Parts subject to wear

In spite of carefully choosing materials and the optimum design of the seals they can possibly become defective. The plunger V packings are prestressed with disc springs from the side turned away from the medium so that an automatic adjustment of the V packing takes place until it is finally worn down. Under certain circumstances the V packing can also become untight if this has not yet worn down. It can for example take place due to deposits from carbon abrasion from the V packing onto the plunger, e.g. during prolonged metering with water with high surface tension. When the metering plunger sealing is not tight the leaking medium drops out of the mounting flange between the liquid head and housing.

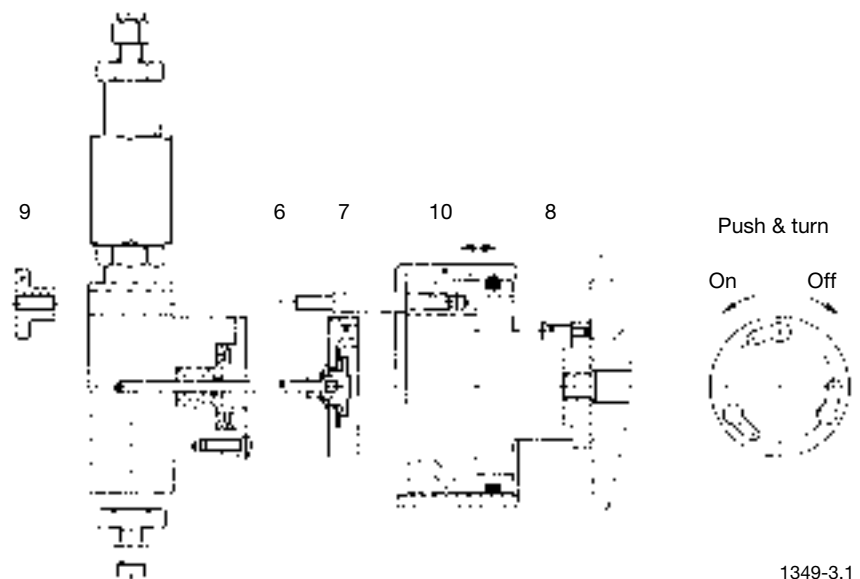
Remedy:

- a) Let the metering pump feed dichloromethane or acetone, the impurity then sorts itself out, the plunger sealing is once again intact.
- b) If this is not successful the V packing is worn out and must be replaced by a new one.
- c) Trouble shooting

If there is no flow from the metering pump due to an unknown reason the nearest disturbance source is first to be tracked down. Switch on the pump, set maximum stroke length and stroke frequency, push the sliding lock of the liquid end to the front. If a stroke movement takes place, the fault must be sought in the liquid end. Loosen the bleed screw on the back-pressure valve. If this is unsuccessful the valve must be rinsed with the appropriate media as described above. If there is no stroke movement at the plunger the electronic circuit is probably faulty. In this case change the fuse, if necessary the control must be changed at the factory or on location.

3.5 Installing the liquid end/feeding end plunger packing (Drawing 1349-3.1)

1. Set the stroke length to 100%.
2. Push on the liquid end, before doing this carefully pull out plunger (6) so far so that the coupling disc (7) with its longitudinal holes extends over the heads of the coupling screws (8).
3. Tighten the knurling screws (9). The liquid end is fastened.
4. Latch the coupling discs (7) on the coupling screws by pressing close and simultaneously turning to the right. Caution - do not twist the plunger - danger of it breaking!
5. Check the function, push back the protective liner (10).



1349-3.1

Installation of packing and plunger (Drawing 2811-3)

- 1. Push V packing set (1) with the opening to the front into the liquid end.
- 2. Fit pressure disc (2).
- 3. Fit adjusting washer (3) if necessary.
- 4. Load the disc spring (4) in opposite surfaces.
- 5. Assemble clamping disc (5), loosely screw in screws (6) by hand.
Do not tighten!
- 6. Carefully insert plunger (7).

If the liquid head is to be stored then it should be in this condition.

Before installation on the pump and reuse

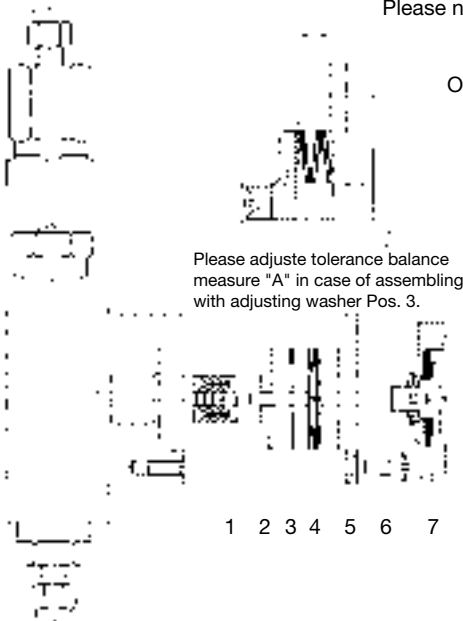
With the plunger (7) inserted, screw in screws (6) crosswise onto the clamping disc (5) until they touch. The liquid end is now ready to operate.

Important!

The plunger may no longer be pulled out of the liquid end when the clamping disc is tightened. If however this should happen the screws (5) must first be loosened before the plunger can be pushed into the liquid end.

Attention!
Please note arrangement of spring-washer.

Only type 2.5/50 TT1, TT2

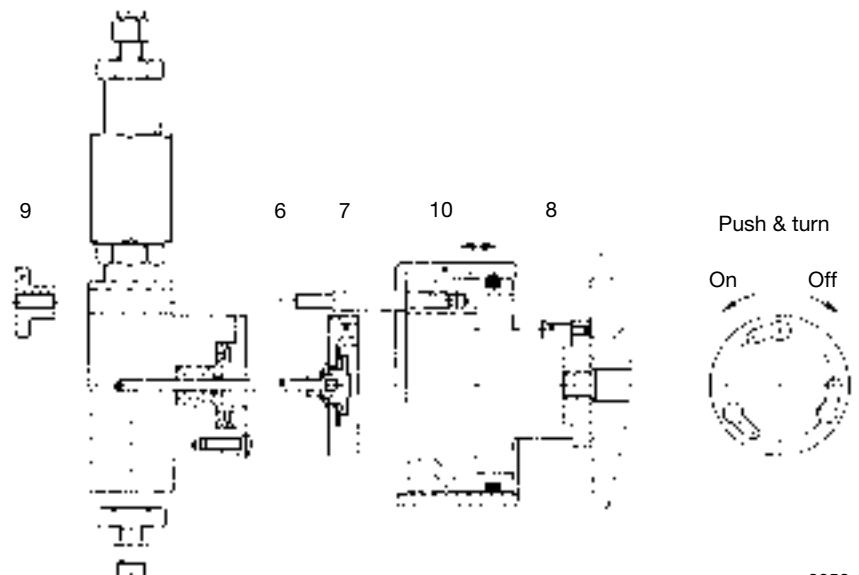


Type	Dimension „A”	
	TT1, TT2	SS1, SS2
Ø 2.5/ 50	2.9 ^{+0.1}	3.9 ^{+0.1}
Ø 5.0/200	3.2 ^{+0.1}	3.7 ^{+0.1}
Ø 8.0/500	3.2 ^{+0.1}	3.2 ^{+0.1}

2811-3

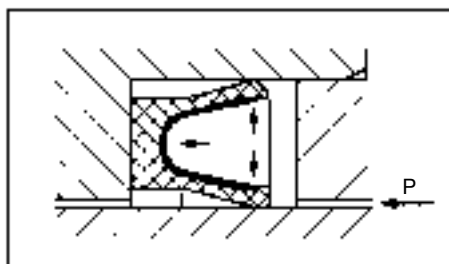
3.6 Installation of liquid end / feeding end Bal Seal (Drawing 2053-3)

1. Set the stroke length to 100%.
2. Push the liquid end, before doing this carefully pull out plunger (6) so far that the coupling disc (7) with its longitudinal holes extends over the heads of the coupling screws (8).
3. Tighten the knurling screws (9). The liquid end is thus fastened.
4. Latch the coupling discs (7) on the coupling screws (8) by pressing close and simultaneously turning to the right. Caution - do not twist the plunger - danger of it breaking!
5. Check the function, push back the protective liner (10).



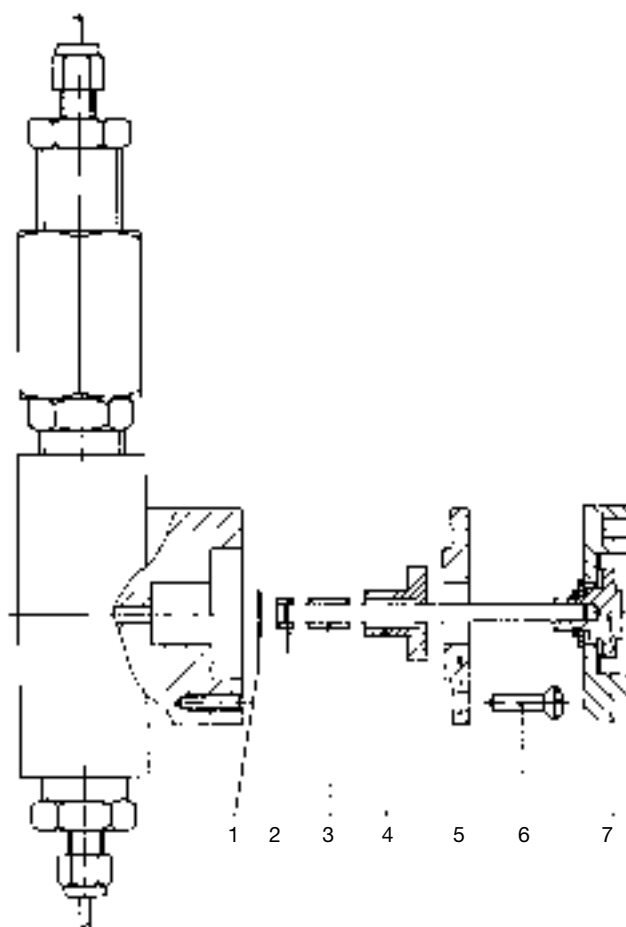
3.7 Installation of axial plunger sealing Bal Seal and plunger

1. Insert guide liner (3) into sealing sleeve (4).
2. Insert axial plunger sealing (2) into sealing bushing (4).
Caution: Observe insertion position!



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3. Insert seal (1) in the liquid end.
Push sealing sleeve with guide liner and axial plunger sealing Bal Seal into liquid end.
4. Put on clamping disc (5). Screw in screws (5) crosswise until they touch.
5. Carefully insert plunger (7).



2052-3.1

4 Capacity, technical data and nomograms

4.1 Determining the capacity

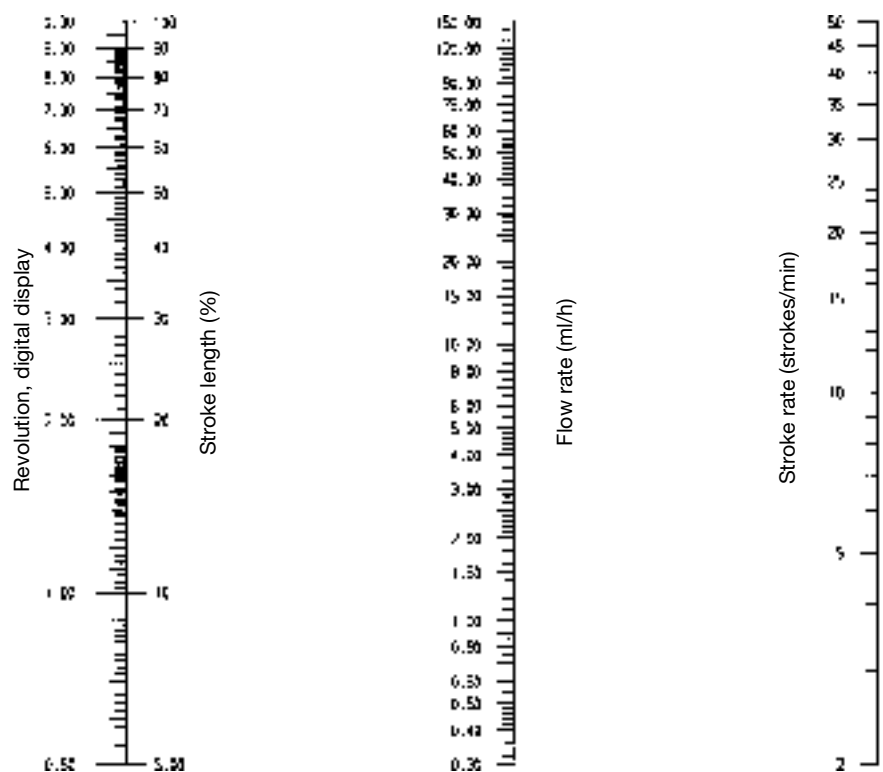
Please note: In order to obtain a balanced setting, the connection line should be as horizontal as possible, but however choose a somewhat longer stroke length with a straight numerical value. For high viscosity media and media tending to emit vapours and fumes select a large stroke length and a low rate. For precise metering the stroke length should not be below 2%.

Take the value for the stroke length from the left scale "Setting stroke length" and for the stroke rate from the "Setting stroke rate" on the right.

Set the metering pump accordingly, adjusting the stroke length only once the pump is operating.

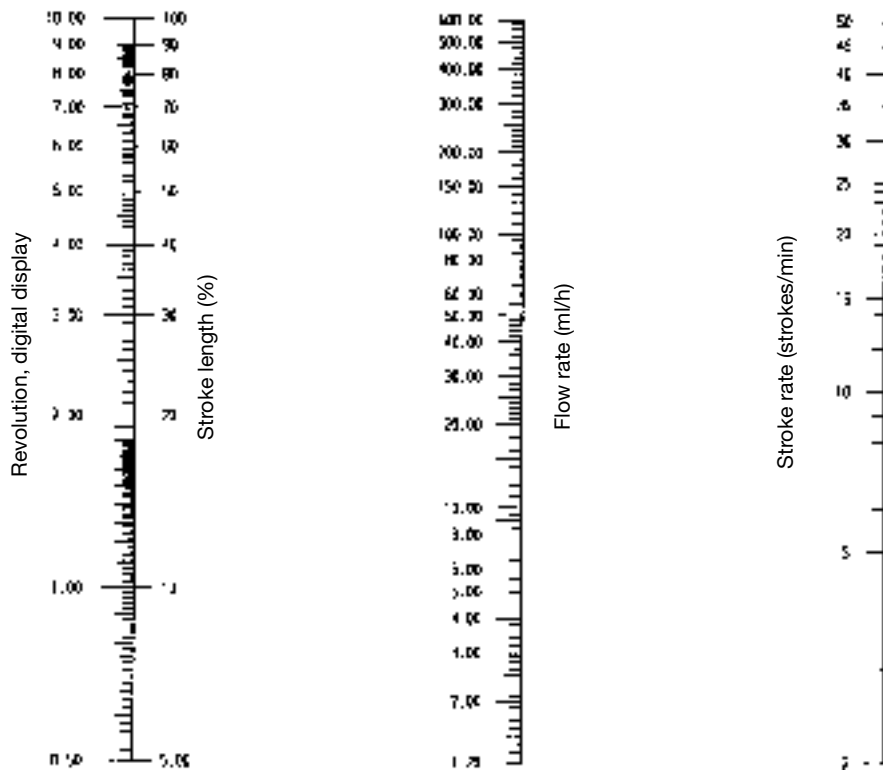
The measurements of the flow rate have been carried out with water.

4.2 Nomogram for determining flow output
of the ProMinent® mikro g/5a, Type 400150



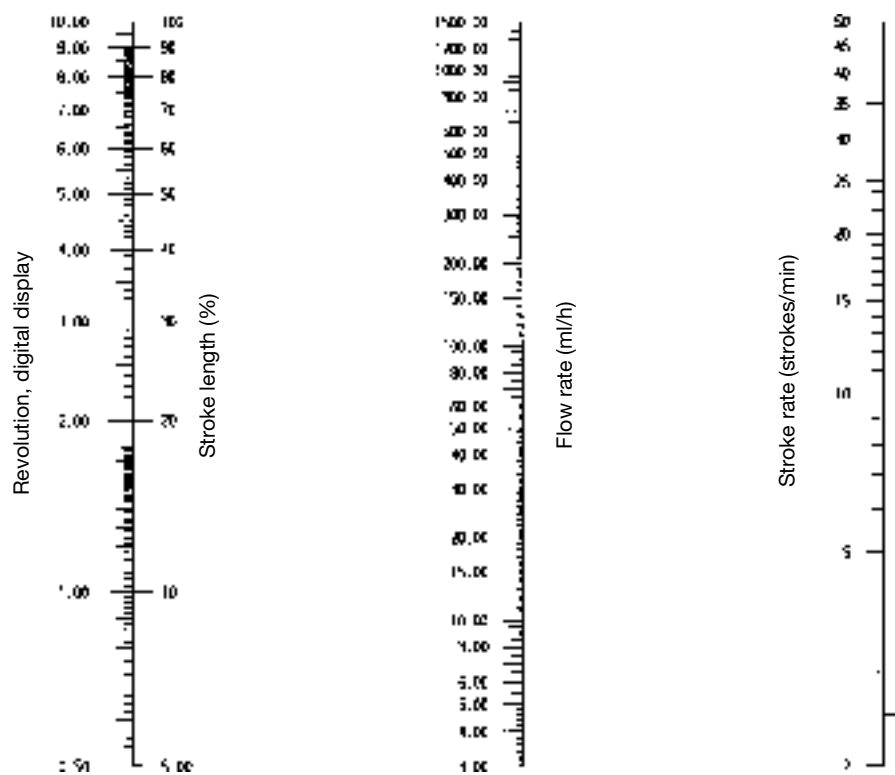
2748-4

Nomogram for the determining flow output
of the ProMinent® mikro g/5a, Type 180600



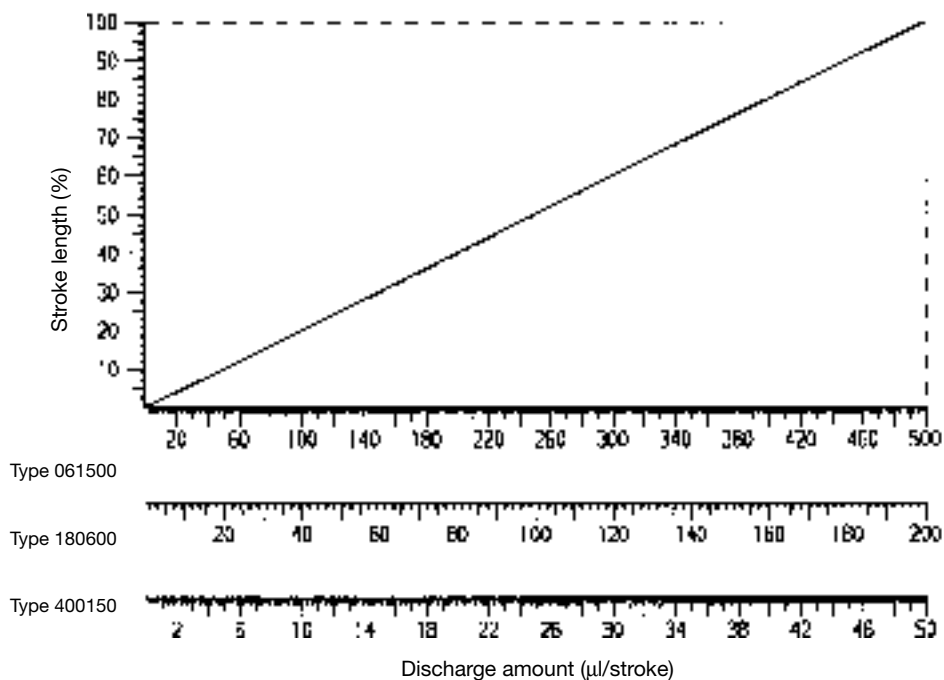
2749-4

Nomogram for determining flow output of the ProMinent® mikro g/5a, Type 061500



2750-4

Diagram for determining the flow rate relative to stroke length



2440-4.1

4.3 Performance data mikro g/5a

Pump type		400150	180600	061500
Plunger diameter/ Stroke volume	mm/ μ l	2.5/50	5/200	8/500
at max. pressure	bar	40	18	6
max. output flow (at 50 strokes/min., 100% stroke)	ml/h	150	600	1500
	μ l/strokes	50	200	500
Suction lift	mWC	6	6	4
Priming lift***	mWC	1	3	3
Permis. open. press. suction end	bar	25*	10*	3
Back-pressure valve Head pressure	bar	2.5	2.5	1.5

* = PTFE version max. 10 bar

** NPSH nec. = minimum nec. pressure on suction
end of the metering pump
(NPSH) = **Net Positive Suction Head**

*** = Priming lifts with clean and wetted valves with water and suction line
as specified.

Metering accuracy: The reproducibility of the metering is better than $\pm 0,5\%$ of
the value set in the stroke length range of 10% to 100% under defined and
constant conditions and correct installation.

4.4 Electrical data and enclosure rating mikro g/5a

Solenoid diameter:	mm	90
Max. stroke rate:	strokes/min.	50
Current consumption at dosing impulsion:		
230 V version	A	0.28
115 V version	A	0.54
Mean power consumption:		
230 V version	watts	31
115 V version	watts	23
Fuse:		
230 V version	0.2 ATT	Little fuse, Part no. 712034
115 V version	0.4 ATT	Little fuse, Part no. 712036
Power supply:		
	230 V version $\pm 10\%$, 50/60 Hz	
	115 V version $\pm 10\%$, 50/60 Hz	
Control voltage:	5 V	
Minimum duration of pacing pulse (external control):	20 ms	
Contact load:	1 mA	
Enclosure rating:	IP 65	

Further hints see instruction manual g/5a.

4.5 Pump specific data mikro g/5a

Pump type		400150	180600	061500	
Connectors discharge and suction side	Steel vers. Pipe o/d.	dia.1.5	dia.1.5	dia. 3.175	
	PTFE vers. Tube o/d x i/d	1.75 x 1.15	1.75x 1.15	3.2 x 2.4	
Shipping weight net without packaging (kg) (with packaging + 1.5 kg)	PTFE	5.6	5.6	5.6	
	Stainl. Steel	5.9	5.9	5.9	
Dimensions:		S...	T...	S...	T...
Length	(mm)	371	371	371	373
Width	(mm)	124	124	124	124
Height	(mm)	224	227	224	235

Materials in contact with the medium

	Stainless Steel vers.	PTFE version
Liquid end	1.4571	Carbon loaded PTFE
Valves & connectors	1.4571	Carbon loaded PTFE
Valve ball	Ruby	Ruby
Valve face	Ceramic	Ceramic
Metering plunger	Ceramic	Ceramic
Valve seal	PTFE	PTFE
Plunger sealing	PTFE (SS1) PTFE+ graphite (SS2) Bal Seal (SS3)	PTFE (TT1) PTFE+ graphite (TT2) Bal Seal (TT3)

Subject to technical alterations.

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