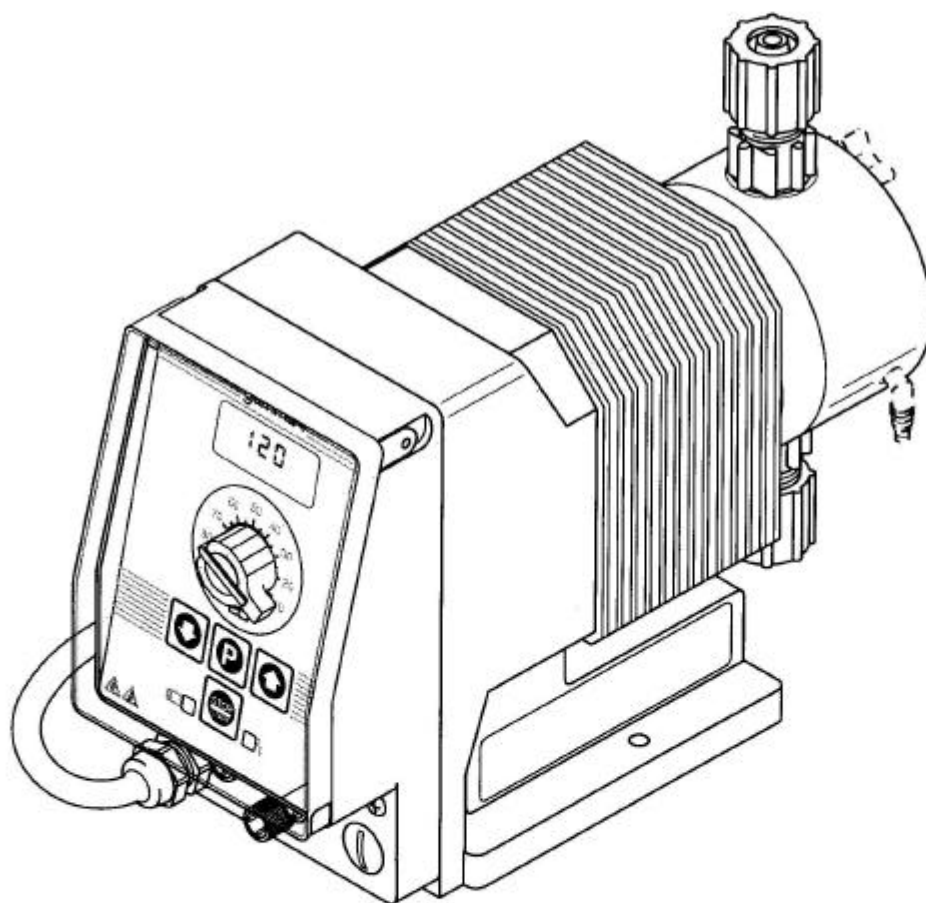


Operating Instructions

Metering Pump

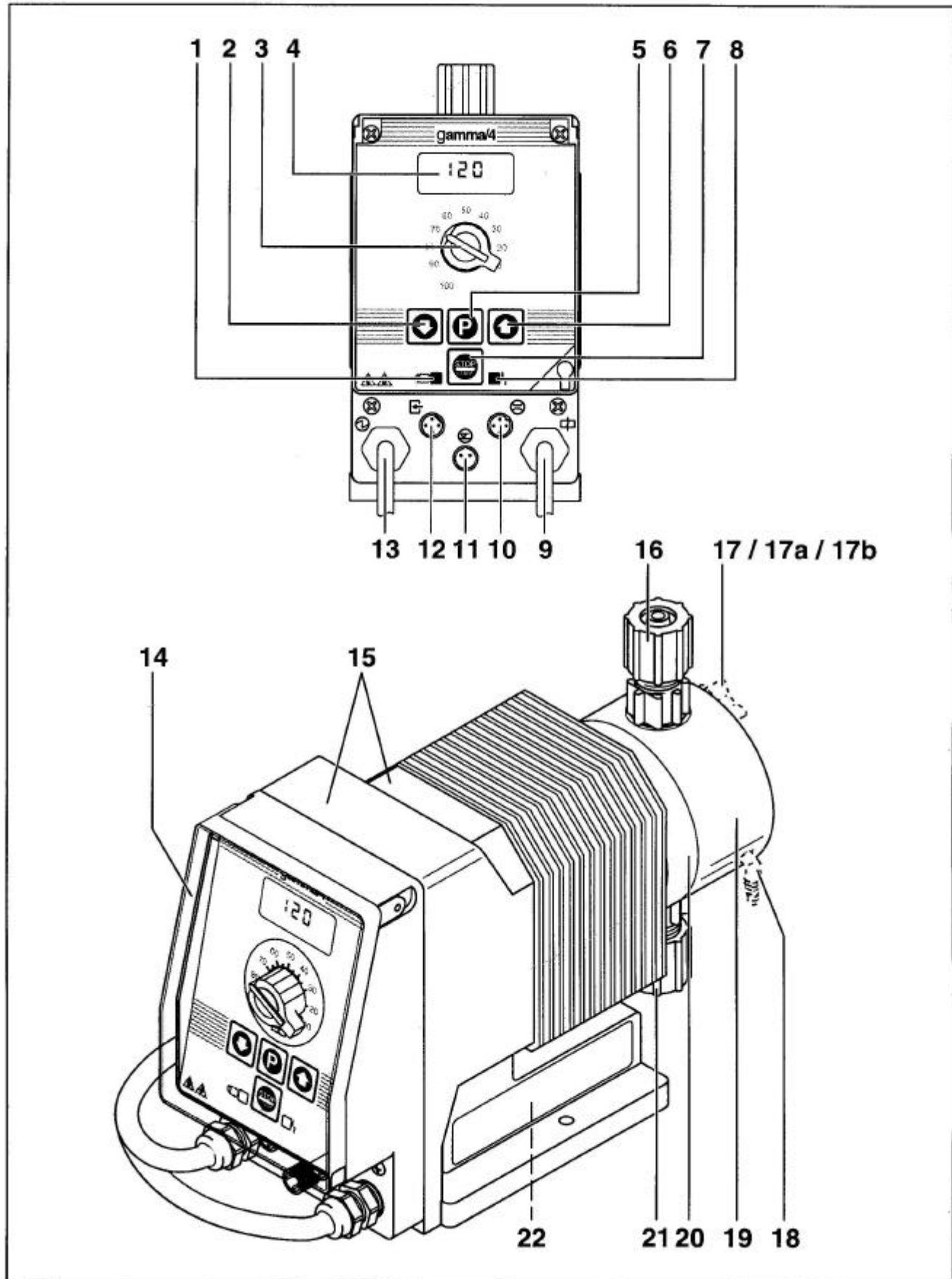
ProMinent® gamma G/4b



Please first read the operating instructions from cover to cover! • Do not throw them away!
The warranty does not cover damages due to faulty operation!

ProMinent Fluid Controls, Inc.
Pittsburgh, PA 412/787-2484

Device Overview/Control Elements



Explanation of Devices and Operating Parts

More detailed information
on pages:

1	Pulse/pilot light (yellow)	49, 73, 79
2	Down key	49 ff.
3	Stroke length adjustment knob	–
4	LCD display field	48
5	Program selection key	49 ff.
6	Up key	49 ff.
7	Stop/start key	49 ff.
8	Display light for empty display and fault annunciation (red)	49, 54, 74
9	Connection thread PG-9 for relay output (with blank plug)	49
10	Connection socket metering monitor	31, 34, 49, 56
11	Connection socket for float switch (with function plug)	31, 34, 49, 51, 56
12	On/off control (with function plug)	31, 34, 51, 55, 56
13	Main power supply	31
14	View window	–
15	Enclosure	–
16	Pressure valve	23, 27-30
19	Liquid end	74-78
20	Back plate with weep hole	74-78
21	Suction valve	23, 27-30
22	Short operating instructions	–

Only for PP and NP version:

17	Bleed valve	–
17 a	Fine bleed valve	–
17 b	Star handle	–
18	Bypass tube nozzle	–

Operating Instructions gamma 4b metering Pump
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Contents

	Page
General notes for users	7
1 Introduction	8
2 Functions	8
2.1 Functional principle	8
2.2 Functions	9
2.2.1 The mechanics	9
2.2.2 The setting range	10
2.2.3 Options	11
3 Technical data	13
4 Installation dimensions	15
5 Tests for your safety	16
6 Accessories	16
6.1 Float switch	16
6.2 Control cables	17
6.3 Foot valves	17
6.4 Injection valves	17
6.5 Injection lances	17
6.6 Backpressure valves	17
6.7 Accumulators	17
6.8 Metering monitors	17
6.9 Suction lances	17
6.10 Supply tanks	17
6.11 Manual/electric stirrers	17
6.12 Console	17
6.13 ProMinent "Remote Control"	17
7 SAFETY INSTRUCTIONS	18
8 Order specifications	19
9 Unpacking	20
10 Installation	22
10.1 Installing the pump: mechanical part	22
10.1.1 Pump installation with mounting bracket or tank	22
10.1.2 Connection of suction/discharge line to the pump	22
10.1.3 Installation suction line (general instructions)	24
10.1.4 Installation discharge line (general information)	25
10.1.5 Installation bypass bleed line	25
10.1.6 Installation examples	26
Correct installation	27
Incorrect installation	30

Contents

	<u>Page</u>
10.2 Installation of pump: electrical	31
10.2.1 Electrical connection (general instructions)	31
10.2.2 Operating modes	32
10.2.3. Functions common to all operating modes	32
10.2.4 Parallel connection	33
10.2.5 Wiring diagram	34
11 Start Up	35
11.1 General instructions	35
11.2 Operating conditions	35
11.3 Priming	35
11.4 Metering Repeatability	37
11.5 Determining the capacity by means of nomographs	38
11.5.1 General information	38
11.5.2 Nomograph 1000	40
11.5.3 Nomograph 1601	41
11.5.4 Nomograph 1201	42
11.5.5 Nomograph 0703	43
11.5.6 Nomograph 1002	44
11.5.7 Nomograph 0308	45
11.5.8 Nomograph 0215	46
12 Operation	47
12.1 Explanation of the operating and display elements	48
12.1.1 Display	48
12.1.2 Control panel: keys and display lamps	49
12.1.3 Multiple connector strip. Symbols and connections	49
12.2 Overview operating diagram	50
12.3 Operating functions basic version	50
12.3.1 Starting the pump	50
12.3.2 Stopping the pumping	50
12.3.3 Internal "Manual" operation	51
12.3.4 External "Contact" operation	52
12.3.5 Connecting a float switch	53
12.3.6 Remote on/off control ("Pause" control function)	55
12.3.7 Metering monitor "flow"	55
12.3.8 Error messages - acknowledging error messages	56
12.4 Overview operating scheme (option version)	59
12.5 Operation: Analog control or with Pulse Multiplier/Divider ...	61
12.5.1 Analog control	61
12.5.2 Pulse Multiplier/Divider	65

Contents

	<u>Page</u>
12.5.3 Preselection operation and memory	69
12.5.4 Relay option	70
Switching mode no. 1:	
"Fault annunciation relay de-energizing"	70
Switching mode no. 2:	
"Pacing relay energizing"	70
Switching mode no. 3:	
"Fault annunciation relay energizing"	70
Switching mode no. 4:	
"Timer relay energizing"	71
13 Maintenance	72
14 Troubleshooting/eliminating errors	72
14.1 Errors you can eliminate yourself	72
14.1.1 Pump does not prime in spite of full stroke movement and bleeding	73
14.1.2 Float switch does not switch the metering pump off at minimum chemical level	73
14.1.3 Pump does not meter although yellow display lamp (1) flashes	73
14.1.4 Red warning lamp (8) lights up - "Error" readout on display (4) flashes	74
14.1.5 Fluid is leaking at the back-plate	75
14.1.6 Exchanging the complete liquid end	78
14.2 Errors which require customer service assistance	78
14.2.1 Pump does not move, yellow display light (1) does not light up, no readout on the display (4)	79
14.2.2 Main power cable damaged	79
15 Repair	80
Appendix/cross section of pump	81
Warranty application	82
Installation Data	83
Safety certificate	84
Layout	85

General Notes for Users

How to use this manual.

These operating instructions describe the technical data and functioning of the G/4b metering pump, provide comprehensive safety instructions and are arranged in clear, operational steps.

Equipment descriptions are indicated by normal text:

Analog signals such as current signals, e.g. 0/4 - 20 mA, or voltage signals, e.g. 0 - 60 mV; 0 - 1 V and 0 - 10 V can be used for direct proportional control of the stroking rate.

Operations/activities to be performed are shown by bullets:

- Press in dowel and insert the screw until the screw head still projects .14 to .16 inches (3.5 to 4 mm).

References are shown by arrows and bold texts:

> **Detailed description on page 61**

Safety precautions are indented, in bold italics and provided with a warning symbol:



WARNING:

The metering pump can still contain water from the factory test!

Work instructions are indented and set in italics:

PLEASE NOTE:

You ensure a fixed hose connection if you pull slightly on the line connected to the liquid end and subsequently retighten the union nut hand-tight!

Power supply

Key words to enable the relevant part of the text to be quickly located are given in italics and arranged to the left of the text.

Introduction/Functions

1 Introduction

ProMinent® gamma/4b models are microprocessor-controlled, solenoid-driven diaphragm metering pumps for metering fluids.

They offer sophisticated mechanics, state-of-the-art control technology, easy operation with user guidance in plain language. Maximum operational safety is ensured thanks to diagnosis of external error sources. Almost unlimited adaptability to process automation systems, self-monitoring of the metering output and high metering safety are provided in the capacity range of 0.05 to 6.07 g/h (0.2 to 23 l/h) at a maximum backpressure of 232 to 21.75 psig (16 to 1.5 bar).

2 Functions

2.1 Functional principle

Gamma/4b metering pumps predominantly consist of:

a pump drive

with enclosure, stroke solenoid and electronic microprocessor control.

a liquid end

with suction and discharge connection, pump diaphragm and back plate (intermediate disk), separating the drive and liquid end.

The metering procedure takes place in discrete pulses. The maximum stroke length is 0.05 inches (1.25 mm).

For every pulse, coming from the electronics, a magnetic field builds up in the field coil and a moveable mounted armature retracts, compressing the return spring.

The pump diaphragm displaces the fluid in the liquid end by means of a discharge valve and the valve on the suction side closes.

After the switch-on pulse is terminated, the magnetic field de-energizes, the armature from the stroke solenoid reciprocates back the return spring and the diaphragm returns to the initial position. The discharge valve is closed and fluid is sucked into the liquid end (suction stroke).

The capacity per stroke can be adjusted via the stroke length adjustment knob (3).

Functions

2.2 Functions

2.2.1 The mechanics

<i>The enclosure</i>	Offers highest protection against chemical attacks, dust and water spray by means of glass-fiber reinforced plastic; tough, shock-proof, low weight and an enclosure rating of NEMA 4X (IP 65).
<i>The solenoid drive</i>	<p>The ProMinent solenoid drive has only one moving part, the armature. This is a low-maintenance short-stroke solenoid with a new type of noise suppression and a maximum stroke length of 0.05" (1.25 mm.)</p> <p>The stroke length adjusting mechanism is connected directly to the solenoid. Thus a very accurate stroke length adjustment is possible without a locking device, and the pump cannot shift stroke length due to vibration.</p>
<i>The pump diaphragm</i>	A DEVELOPAN® composite pump diaphragm, with long service life, is made of fabric-reinforced, high-quality, made of EPDM material with a vulcanized steel core and PTFE Teflon coating on the fluid-contacted side.
<i>The liquid end</i>	<p>Liquid ends for gamma pumps are available in four material versions:</p> <ul style="list-style-type: none">- polypropylene (PP)- Plexiglas (acrylic) (NP)- Graphite-filled PTFE (TT)- Type 316 stainless steel (SS) <p>Additionally, material versions PP and NP have a combined priming/ bleed valve with fine adjustment.</p> <p>Designed for highly viscous materials, liquid ends from the HV series are available in:</p> <ul style="list-style-type: none">- polypropylene (PP4/PP5) <p>...with enlarged flow cross section and larger, spring loaded single ball valves.</p>
<i>Operating voltages</i>	Gamma metering pumps are available in 115 and 230 V. Wide voltage ranges are accepted: from 108 to 135 V in the lower range and from 207 to 257 V in the upper range, for frequencies from 50 to 60 Hz. Output is the same whether operated on 50Hz or 60Hz power.
<i>Self-monitoring</i>	The electronic control system is continuously self-monitoring. In the event of a system error in the microprocessor, the pump is switched off and an LED alarm is issued.
<i>Lighting</i>	The illumination of the LCD display (4) guarantees that the display can be easily read even in bad light conditions.

Functions

2.2.2 The setting range

"Pause" control

By means of the universal control cable, the pump can be switched on and off voltage-free. The control function operates according to the zero signal current: when the contact is open the pump is idle; in "pause" mode, the brown and black wires are not connected with each other. When the contact is closed, the pump operates and the brown and black wires are connected with each other.

The pause control may be used with each of the functions described below.

> **Detailed description on page 55.**

Internal operation "Manual"

The setting of the stroke volume takes place using the stroke length knob **(3)**. This can be set from 0 - 100% up to a maximum of 0.05 inches (1.25 mm). Accurate metering is achieved from 30% stroke length and up.

The stroking rate can be set with the keys **(2 or 6)** from 120 (180) (depending on pumps ordered) to 0 strokes/min. The number is shown on the display **(4)**.

> **Detailed description on page 51 onwards.**

External operation "Contact"

The stroke cycle of the gamma pump can also be controlled externally (e.g. via a water meter contact). The connection takes place with a control cable at the connection socket **(12)**. Each incoming pulse corresponds to one metering stroke. A max. of 120 (180) strokes/min are possible. There is no danger of overdriving (except models 1605, 1310, 0813 and 0423 have a maximum frequency of 100 strokes/min.).

Please note:

Whatever stroking rate is set in the internal operation "Manual" is the maximum stroke rate possible for external operation in "Contact" mode.

> **Detailed description on page 52.**

Monitoring "flow"

Gamma metering pumps can check their own performance. After the installation of an optional metering monitor on the liquid end **(19)** and activation, every complete metering stroke is recorded and passed on to the pump electronics. If the correct metering amount is not present eight times in a row, the pump stops and an LED alarm is issued.

> **Detailed description on page 55.**

Float switch

By attaching the two-stage float switch to the socket **(11)**, the supply of fluid in the source tank is monitored. When a minimum level is reached, an early warning is issued, however the pump continues to operate.

The pump switches off only when the level has dropped another 1.2 inches (30 mm).

An optional fault annunciation relay can be switched as an option to

Functions

alert the operator of any of the above system problems.

> **Detailed description on page 53.**

2.2.3 Options

The options listed below can be selected individually or in any combination.

Analog Control

Analog signals can be used for proportional control of the stroking rate. The stroking rate is varied between 0 and 100% according to the 0/4 - 20 mA signal. The maximum stroke rate set in "manual" mode becomes the maximum stroke rate in "Analog".

In the event of a loss of signal, (input signal < 4 mA) an alarm message is issued and the pump switches off. Other input signals (0-1 V, 0-10 V, 0-60 mV) can be selected when ordering with the identity code.

> **Detailed description on page 60.**

Pulse Control

Pulse control is used for adapting the gamma metering pump to all types of pacers, eliminating need for additional control devices.

The following functions listed below can be set using the keypad:

Pulse multiplier and divider

By entering a factor in the range from 0.01 to 9,999 the step-down (divider) or step-up (multiplier) ratio can be set.

Example:

Step-down with factor 0.01 :	100 pulses =	1 metering stroke
Step-down with factor 0.25 :	4 pulses =	1 metering stroke
Step-down with factor 1 :	1 pulse =	1 metering stroke
Step-up with factor 4 :	1 pulse =	4 metering strokes
Step-up with factor 9999 :	1 pulse =	9999 metering strokes

> **Detailed description on page 65.**

Display "f"

Displays the stroking rate in 0 to 120 (180) strokes/min.

> **Detailed description on page 67.**

Predetermining counter "N↔"

The predetermined number of strokes up to 9999, can be issued by means of a voltage-free contact or the P key (5). The strokes still to be executed are shown on the display (4) subtracting.

> **Detailed description on page 67.**

Stroke counter "N"

The stroke counter in all operating modes counts the strokes executed and shows these on the display (4). A maximum of 9,999 strokes can be counted, after this the display starts at 1 again.

> **Detailed description on page 67.**

Memory "Mem"

A memory with a storage capacity of 65,535 ($2^{16}-1$) pulses or strokes

Functions

can be additionally switched on. Thus incoming pulses can be registered and worked off.

> **Detailed description on page 69.**

<i>Relay output (9)</i>	This is used for remote transfer of alarm messages, pump status, or as a pacer for remote control e.g. of a second ProMinent metering pump in synchronous pacing operation. The relay output can be used for:
<i>Collective fault indication</i>	For the source tank low level early warning and final switch off, metering monitor, lack of flow, system error annunciation, fuse and power failure annunciation, or loss of pacing signal. Function: relay de-energizes in the event of an alarm.
<i>Pacing relay</i>	For contact pacing in parallel with the discharge stroke of the metering solenoid. Contact duration 150 ms.
<i>Alarm relay</i>	For the source tank low level early warning and final switch off, metering monitor lack of flow and system error message. Function: relay energizes in the event of an alarm.
<i>Timer relay</i>	For switching parallel up to 31 different metering events (from 1 minute up to 24 hours), repeating daily or weekly (available only with timer option on pump).

> **Detailed description on page 70.**

Technical Data

3 Technical Data

Pump version	Capacity at Maximum Backpressure				Capacity at Maximum Backpressure			
	psig (bar)	GPH	(l/h)	ml/stroke	psig (bar)	GPH	(l/h)	ml/stroke
g/4b								
1000	145 (10)	0.05 (0.20)		0.027	73 (5)	0.07 (0.27)		0.038
1001	145 (10)	0.09 (0.30)		0.027	73 (5)	0.11 (0.42)		0.038
1601	232 (16)	0.26 (1.00)		0.14	116 (8)	0.32 (1.20)		0.17
1602	232 (16)	0.40 (1.5)		0.14	116 (8)	0.48 (1.80)		0.17
1201	174 (12)	0.45 (1.70)		0.24	87 (6)	0.50 (1.90)		0.27
1203	174 (12)	0.66 (2.5)		0.24	87 (6)	0.77 (2.9)		0.27
0803	116 (8)	0.90 (3.40)		0.48	58 (4)	1.00 (3.8)		0.53
0806	116 (8)	1.40 (5.3)		0.48	58 (4)	1.48 (5.6)		0.53
1002	145 (10)	0.61 (2.3)		0.32	73 (5)	0.69 (2.60)		0.36
1003	145 (10)	0.90 (3.4)		0.31	73 (5)	0.98 (3.7)		0.34
0308	47 (3.0)	2.22 (8.40)		1.27	21 (1.5)	2.40 (9.10)		1.27
0313	43.5 (3)	3.43 (13.0)		1.20	21 (1.5)	4.09 (15.5)		1.43
0215	21 (1.5)	3.91 (14.8)		2.05	14 (1)	4.20 (15.8)		2.20
0223	21 (1.5)	6.08 (23.0)		2.13	14 (1)	6.74 (25.5)		2.36

PP4/PP5 gamma metering pumps for viscous fluids

g/4b								
1002	145 (10)	0.45 (1.72)		0.24	73 (5)	0.66 (2.5)		0.34
1003	145 (10)	0.79 (3.0)		0.28	73 (5)	0.90 (3.4)		0.34

Pump Version	Maximum Stoking Rate spm	Standard Suction/ Discharge Connectors* O.D. x I.D. inches	Pre- Primed Suction Lift ft. (m)	Shipping Weight	
				lbs.	(kg)
g/4b					
1000	120	1/4 x 3/16	4.9 (1.5)	6.0-7.1	(2.7-3.4)
1001	180	1/4 x 3/16	4.9 (1.5)	6.0-7.1	(2.7-3.4)
1601	120	1/4 x 3/16	9.8 (3)	6.0-7.1	(2.7-3.4)
1602	180	1/4 x 3/16	19.7 (6)	6.0-7.1	(2.7-3.4)
1201	120	1/4 x 3/16	13.1 (4)	6.0-7.1	(2.7-3.4)
1203	180	1/4 x 3/16	19.7 (6)	6.0-7.1	(2.7-3.4)
0803	120	1/4 x 3/16	16.4 (5)	6.0-7.1	(2.7-3.4)
0806	180	1/4 x 3/16	9.8 (3)	6.0-7.1	(2.7-3.4)
1002	120	1/2 x 3/8	16.4 (5)	6.2-7.9	(2.9-4.1)
1003	180	1/2 x 3/8	19.7 (6)	6.2-7.9	(2.9-4.1)
0308	120	1/2 x 3/8	8.2 (2.5)	6.2-7.9	(2.9-4.1)
0313	180	1/2 x 3/8	19.7 (6)	6.2-7.9	(2.9-4.1)
0215	120	1/2 x 3/8	6.6 (2)	6.2-7.9	(3.1-4.7)
0223	180	1/2 x 3/8	4.9 (1.5)	6.8-10.4	(3.1-4.7)

PP4/PP5 gamma metering pumps for viscous fluids

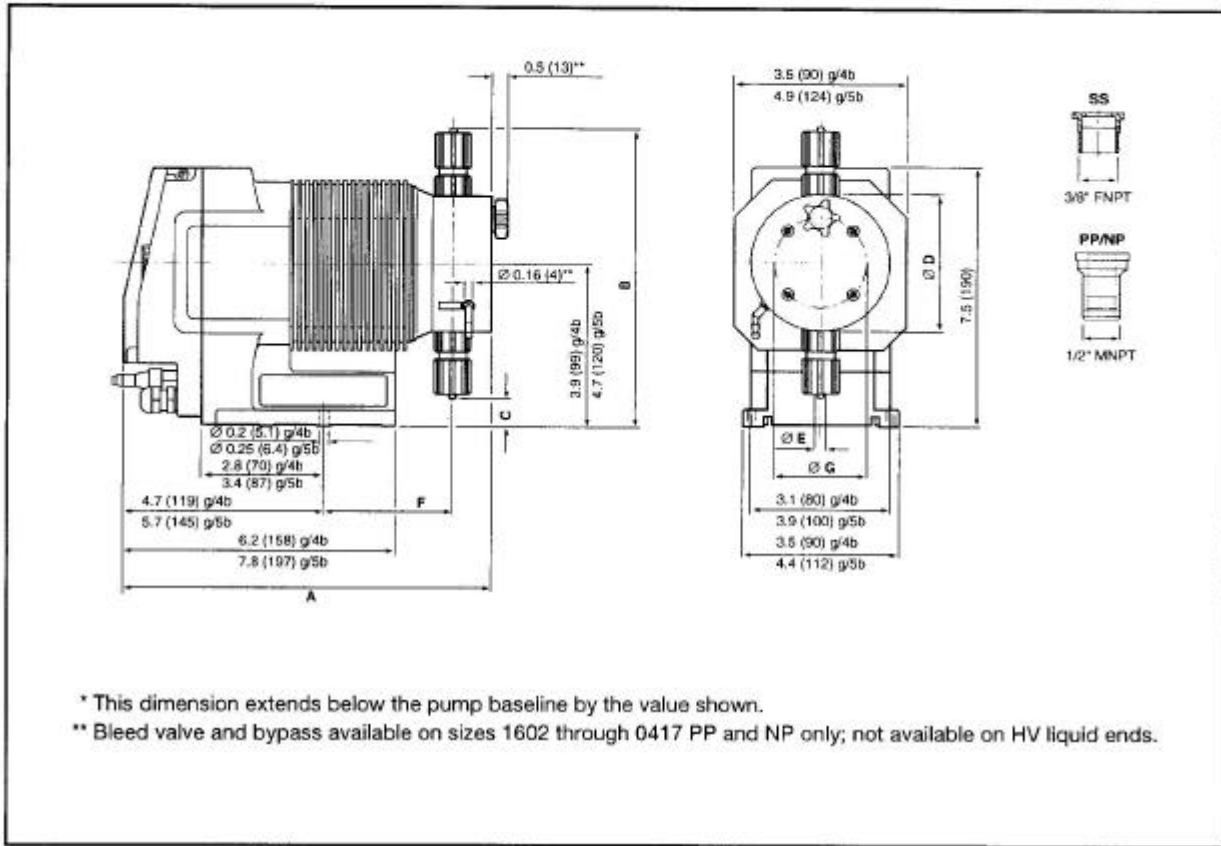
g/4b					
1002	120	1/2 MNPT	9.4 (2.9)	6.2	(3.2)
1003	180	1/2 MNPT	0 (0)	6.2	(3.2)

Technical Data

Maximum stroke length:	0.05" (1.25 mm) [except 0.026" (0.65 mm) on pump type 1000]		
Materials of construction			
Housing:	Glass-filled Luranyl™ (PPE)		
Diaphragm:	PTFE faced EPDM with steel core and Nylon reinforcement		
Liquid end options:	Polypropylene, Acrylic/PVC, PTFE, 316 SS		
Enclosure rating:	NEMA 4X (IP 65), transparent front cover standard		
Insulation class:	F		
Check valves:	Double ball (except single ball on PP4, PP5 models and all version 0423 and 0230 pumps)		
Standard production test:	Capacity at maximum pressure on all pumps is tested prior to shipment.		
Capacity test criteria:	-5% to +15%		
Reproducibility of the metering:	When used according to the operating instructions ±2%		
Power cord:	6 foot (2 m) 2 wire + ground		
Relay cable (optional):	6 foot (2 m) 3 wire		
Relay load:	250 V / 2 A		
Ambient temperature range:	14°F (-10°C) to 113°F (45°C)		
Max. fluid operating temperatures:	<u>Material</u>	<u>Constant</u>	<u>Short Term</u>
	Acrylic/PVC	113°F (45°C)	140°F (60°C)
	Polypropylene	122°F (50°C)	212°F (100°C)
	PTFE	122°F (50°C)	248°F (120°C)
	316 SS	122°F (50°C)	248°F (120°C)
Average power drain at maximum stroking rate (Watts) / peak current drain at pump stroke (Amps)			
g/4b:	115 VAC, 50/60 Hz: 16W/1.5A (120 spm models); 24W/1.5A (180 spm) 230 VAC, 50/60 Hz: 25W/0.9A (120 spm models); 38W/0.9A (180 spm)		
g/5b:	115 VAC, 50/60 Hz: 47W/4.1A (120 spm models), 65W/6.7A (100 spm) 230 VAC, 50/60 Hz: 61W/2.1A (120 spm models), 83W/3.1A (100 spm)		
Remote pause and/or Contact input			
Voltage level with open contact:	Approximately +5 VDC supply voltage		
Impedance:	10 kOhm		
Controlling Contact:	With form-C dry contact, or with semiconductor sink logic control (NPN), not source logic (PNP). With a residual voltage of <700 mV, the contact load is approximately 0.5 mA at +5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used).		
Max. pulse input frequency:	40 pulses/sec		
Max. pulse memory:	65,535 pulses		
Necessary contact duration:	20 ms		
Analog - Current input burden:	Approximately 70 Ohm		
Max. allowable input current:	50 mA		
Service factor:	1.15 (98-132 VAC or 195 to 264 VAC) Note: performance is the same on 50 or 60 Hz power		
Warranty:	Two years on drive, one year on liquid end		
Industry standards:	CSA, CE		
Max. solids size in fluid:	Pumps with 1/4" (4.7 mm) valves: 15µ; Pumps with 1/2" (9.2 mm) valves: 50µ		
Valve threads:	√ NP, PP and TT (except PP4/PP5 and 0423/0230); M20 x 1.5 (tubing adapter supplied) √ NP, PP and TT 0423/0230, and g/4a 1002 PP4/PP5; DN10 (1/2" MNPT adapter supplied) √ PP4/PP5 1006, 1310 and 0813; DN15 (1/2" MNPT adapter supplied) √ SS (except 0423/0230); 1/4" FNPT √ SS 0423/0230; 3/8" FNPT		

Installation Dimensions

4 Installation dimensions



gamma/4b		A	B	C	D	E	F	G
1000/1001	PP	9.1 (232)	7.3 (186)	0.7 (17)	2.8 (70)	1/4 x 3/16	3.2 (81)	1.5 (38)
1601/1602	NP	9.1 (230)	7.0 (179)	0.7 (19)	2.8 (70)	1/4 x 3/16	3.2 (81)	1.5 (38)
1201/1203	TT	8.4 (213)	6.8 (173)	1.0 (25)	2.4 (60)	1/4 x 3/16	3.1 (79)	1.5 (38)
	SS	8.3 (211)	6.5 (164)	1.3 (34)	2.4 (60)	1/4 FNPT	3.1 (79)	1.5 (38)
	SK	8.3 (211)	6.4 (162)	1.4 (36)	2.4 (60)	1/8, 1/16	3.1 (79)	1.5 (38)
0803/0806	PP	9.1 (232)	7.3 (186)	0.7 (17)	2.8 (70)	1/4 x 3/16	3.2 (81)	1.5 (38)
	NP	9.1 (230)	7.0 (179)	0.7 (19)	2.8 (70)	1/4 x 3/16	3.2 (81)	1.5 (38)
	TT	8.4 (213)	7.0 (178)	0.8 (20)	2.8 (70)	1/4 x 3/16	3.1 (79)	1.5 (38)
	SS	8.3 (211)	6.7 (169)	1.1 (29)	2.8 (70)	1/4 FNPT	3.1 (79)	1.5 (38)
1002/1003	PP	8.9 (225)	7.3 (186)	0.7 (17)	2.8 (70)	1/2 x 3/8	3.0 (76)	2.0 (50)
0308/0313	NP	8.8 (223)	7.4 (187)	0.4 (11)	3.3 (85)	1/2 x 3/8	3.0 (76)	2.0 (50)
	TT	8.5 (216)	8.1 (206)	0.3 (8)*	3.1 (80)	1/2 x 3/8	3.1 (79)	2.0 (50)
	SS	8.4 (214)	8.1 (206)	0.3 (8)*	3.1 (80)	1/4 FNPT	3.0 (77)	2.0 (50)
0215/0223	PP	8.9 (225)	7.8 (197)	0.2 (6)	3.5 (90)	1/2 x 3/8	3.0 (76)	2.6 (66)
	NP	8.8 (223)	7.7 (195)	0.1 (3)	3.9 (100)	1/2 x 3/8	3.0 (76)	2.6 (66)
	TT	8.5 (216)	8.4 (214)	0.6 (16)*	3.7 (95)	1/2 x 3/8	3.1 (79)	2.6 (66)
	SS	8.4 (214)	8.2 (209)	0.4 (11)*	3.7 (95)	1/4 FNPT	3.0 (77)	2.6 (66)
1002/1003	PP4/PP5	8.4 (214)	6.8 (172)	0.2 (4)*	2.8 (70)	1/2 MNPT	2.4 (60)	2.0 (50)

Dimensions are in inches, rounded to nearest 1/10".
Dimensions within parentheses () are in millimeters.

Tests/Accessories

5 Tests for your safety

TÜV/GS Tested and approved according to DIN VDE 0700 part 1 and part 236 TÜV/GS.



Screening

Confirmation of the manufacturer/importer

We herewith confirm that the

metering pump G/4b, AG4b

is screened in accordance with the regulations of

VDE 0871 B, Official Bulletin 163/1984, order 1046 and 1045.

The German Federal Post Office has been informed that this system has been put on the market and has been granted the entitlement for the series to be tested to ensure it meets the regulations.

ProMinent Dosiertechnik GmbH

(Name of the manufacturer/importer)

BG Chemie (Employers insurance assoc.) Test according to ZH 1/109 (closed refilling and metering systems - basic rules for the acceptance) passed in connection with the appropriate liquid end version.

6 Accessories



WARNING

ProMinent metering pumps may not be assembled with aftermarket parts which have not been tested and recommended by ProMinent. Failure to observe this may result in personal injury and damage to property for which no liability is accepted!

6.1 Float switch

order no. 14.20.93.4 Two-stage with 6.5 ft (2 m) connection cable.

Accessories

6.2 Control cables

order no. 70.77.18.3

4-wire, 6.5 ft. (2 m), universal control cable for remote pause, external contact or external analog input.

6.3 Foot valves

With suction filter and ball check valve for connection at the end of the suction line to prevent loss of prime.

6.4 Injection valves

With spring-loaded ball check valve for metering into open or closed systems and for fastening the discharge line.

6.5 Injection lances

For metering into large pipe cross sections.

6.6 Backpressure valves

For accurate metering at low back pressure, for antisiphon protection or as pressure relief safety valve when teed off of discharge line.

6.7 Accumulators/Pulsation Dampeners

For pulsation dampening on long suction or discharge lines.

6.8 Metering monitors

For monitoring the actual metering quantity and ensuring flow. After eight incomplete metering strokes an error message is issued and the metering pump switches off.

6.9 Suction lances

With foot valve and float switch for drums or supply tanks. Rigid tube prevents suction line getting caught in mixer.

6.10 Supply tanks

From 30 to 500 gallons capacity with lockable screw cap and necessary accessories.

6.11 Manual/electric mixers

For mixing and preparing metering solutions.

6.12 Mounting brackets

For stable wall mounting of the pump.

6.13 ProMinent® "Remote Control"

Type G4Ra consisting of gamma/4 metering pump and remote control panel. With this the metering pump can be controlled and operated from up to 326 feet (100 m) away via the remote control panel.

SAFETY INSTRUCTIONS

7 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 materials' safety data sheets of the fluids pumped!



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, or the stability of the connection is not guaranteed!

Avoid reducing the hose sizes!

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

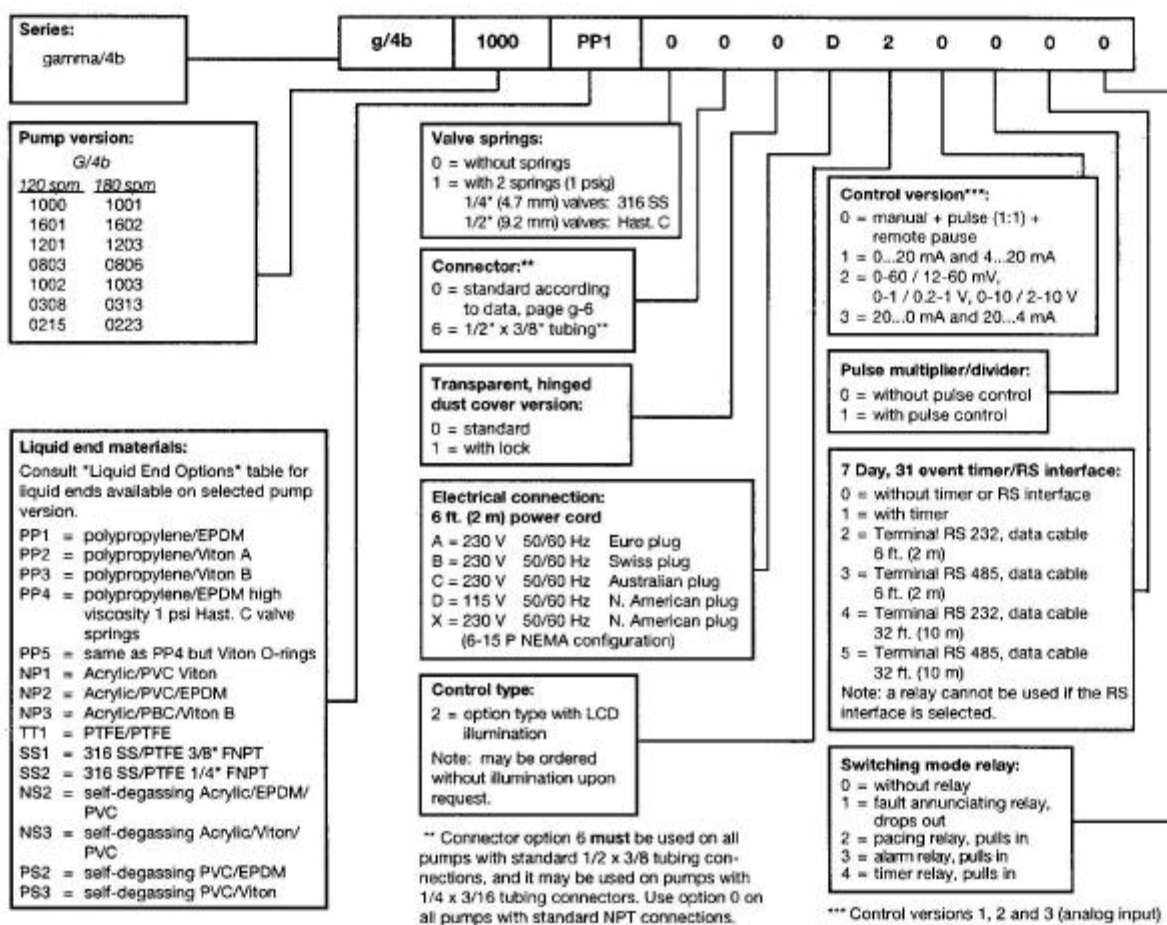
Order Specifications

8 Order specifications

The following table provides an overview of the pump features which can be ordered using the IDENTITY CODE.

The type of pump with counter pressure and capacity, the liquid end material, the valve spring, the connection, the version, the electrical connection and type of plug, the control type and the control version, pulse control, timer and switching mode relay can be selected.

IDENTITY CODE



Unpacking

9 Unpacking

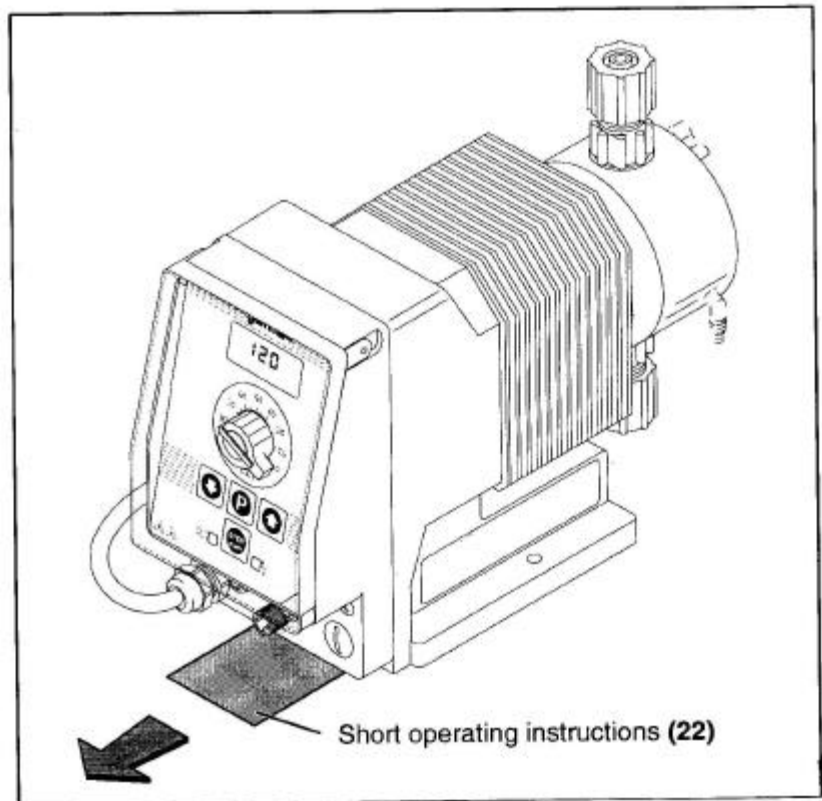
Secondary packaging

It is best if you keep secondary packaging complete with the polystyrene so that you can send the metering pump back in the event of repair or warranty cases!

Compare your packing slip with the contents of the package.

Scope of delivery

- Metering pump with power cable and plug.
- Connection set for hose/pipe connection in accordance with the identity code.
- Operating instruction and short instructions - pushed into the base of the pump.

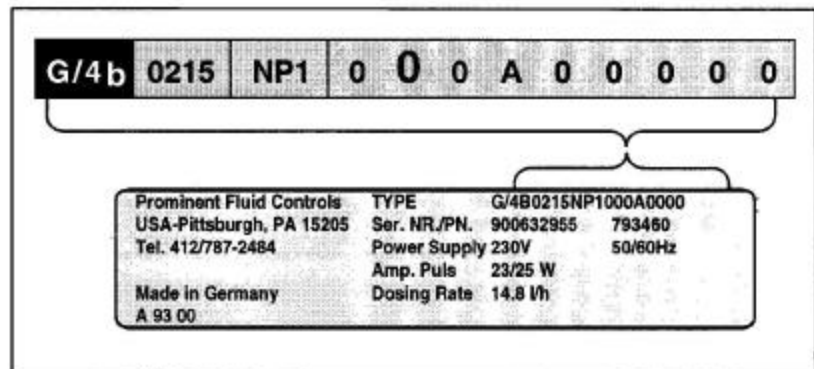


ATTENTION:

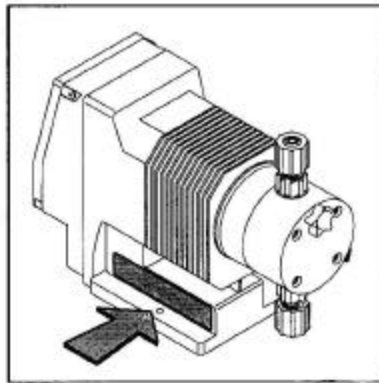
Check that the details on the identification plate match the order details!

If they do not, immediately notify the ProMinent office or representative. (Addresses can be found on the front page of these operating instructions.)

Unpacking



Each gamma/4 metering pump is provided with an identification plate. This can be found on the base of the pump.



In addition to the technical basic data the IDENTITY CODE and the serial no. are specified. Both numbers are to be stated during any inquiry or when ordering spare parts, as they permit a clear identification of the pump type and material option.

Please make a note of the following details of the pump delivered so that these are always available when required:

IDENTITY CODE

Serial number

Place of installation

Metering application

Startup Date

Installation

10 Installation

10.1 Installing the pump: mechanical part

10.1.1 Pump installation with mounting bracket or tank

- Assemble metering pump onto a container or a mounting bracket with 1/4" (5mm) bolts, nuts and washers.

PLEASE NOTE:

The pump must be fastened to eliminate vibrations.

The check valves of the liquid end must always be kept upright to ensure that they function smoothly!

10.1.2 Connection of suction/discharge line to the pump

PLEASE NOTE:

Suction and discharge lines must always be piped in such a way that a stress-free connection at the liquid end is ensured.

Lines must be fastened so that no vibrations can arise!

PLEASE NOTE:

When metering extremely aggressive or dangerous fluids we recommend a bleed valve with backfeed to the tank! Additionally, an isolating valve should be provided at the discharge and suction side!

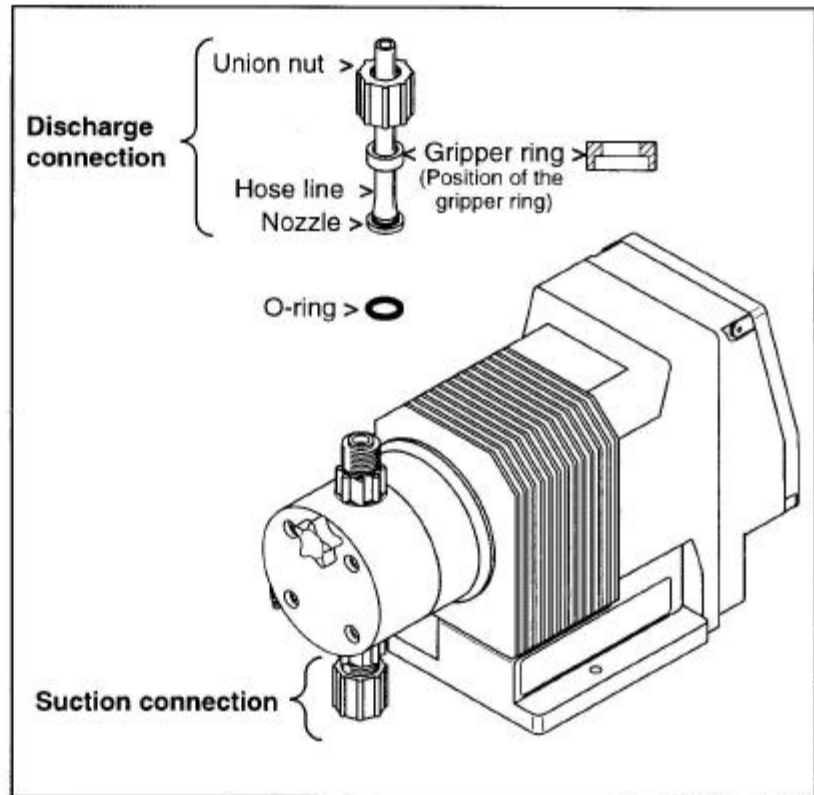
- Lay lines in such a way so that if necessary the pump and lines can be removed to the side.
- If the suction/discharge connection is closed with a plug please remove this.
- Attach the suction line to the suction connection.
- Attach the discharge line to the discharge connection.

Hose lines

Hose lines:

- Pull the union nut and gripper ring over the hose line.
- Push the hose end, cut straight, onto the nozzle up to the stop.
- If necessary widen the hose end a little.
- If used repeatedly, shorten the hose end approx. 1 inch by cutting it straight.

Installation



PLEASE NOTE:

Only use the gripper rings and hose nozzles for the respective hose diameter as well as original hoses with specified hose dimensions and wall thickness. If this is not observed the stability of the connection is not guaranteed!

Avoid reducing the hose sizes!

For long lines and viscous media the next highest line diameter should be used!

- Fit the O-ring on the pump's suction or discharge valve.
- Push on the hose and simultaneously tighten the union nut.

PLEASE NOTE:

You obtain a better hose connection if you pull on the line connected to the liquid end and subsequently retighten the union nut "hand-tight"!

Installation

NPT Threaded Pipe NPT connections:

- Slide union nut over NPT insert
- Thread NPT insert to mating NPT suction or discharge pipe, using Teflon thread tape.
- Insert O-ring between NPT insert and pump check valve.
- Hand tighten the union nut.

10.1.3 Installation suction line (general instructions)

Please note:

Keep the suction line as short as possible!

Size the diameter and length so that the vacuum arising when pumping does not reach the vapor pressure of the fluid to be fed!

The suction line must be piped ascending in order to prevent air bubbles from forming!

For bends use arcs and not angles if possible!

Please note:

Too high vacuum on the suction side in extreme cases leads to cavitation or an incomplete return stroke!

Note:

Height (h) x specific gravity (s.g.) ≤ max. suction lift in ftWC!

- Assemble foot valve.
- For this purpose shorten the free suction line end so far that the foot valve is hanging just above the floor of the container.
- For metering solutions with impurities or solids, shorten the free end of the suction line so that the foot valve is hanging at least 2 inches (50mm) above the floor of the container.

10.1.4 Installation discharge line (general information)

ATTENTION:

Pipe the discharge line in such a way that pressure peaks during the metering stroke do not exceed the maximum permissible operating pressure (if necessary use a relief valve)!

Installation



WARNING:

When operating the metering pump against a closed isolating valve on the discharge side, the actual developed back pressure can reach three times the rated maximum pressure!

As a result the discharge line can burst!

In order to prevent this, a relief valve is recommended which limits the maximum permissible back pressure!

- Connect the discharge line directly to the discharge connection and to the injection valve.

10.1.5 Installation of bypass bleed line

Liquid end with bleed valve

For the liquid end versions NP and PP (except PP4/PP5), a bleed valve (17) with bypass (18) is present on the liquid end.

- Plug on hose line with 1/4" (4 mm) interior diameter onto the bypass hose barb.
- This should be secured against slipping off by using a quick fastening hose clamp.
- Lead the free end of the line back into the supply tank, above the maximum fluid level in the tank.

10.1.6 Installation examples

Explanation of the individual elements:

- 1 Metering pump
- 2 Supply tank
- 3 Foot valve with strainer and ball check valve
- 4 Injection valve, spring-loaded
- 5 Injection valve with reinforced spring
- 6 Back-pressure valve TYPE DK (liquid end assembly)
- 7 Back-pressure valve TYPE DL (discharge line installation)
- 8 Accumulator
- 9 Solenoid valve
- 10 Drain valve
- 11 Bleed valve
- 12 Isolating valve

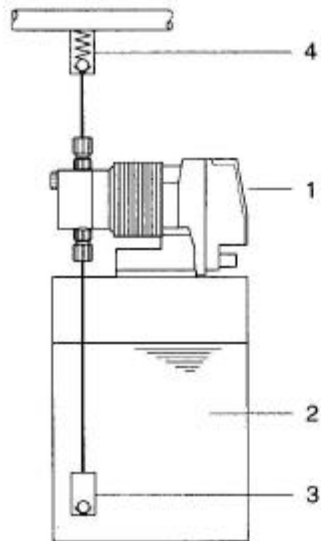
Important:

Height (h) x specific gravity (s.g.) ≤ max. suction lift in ftWC!

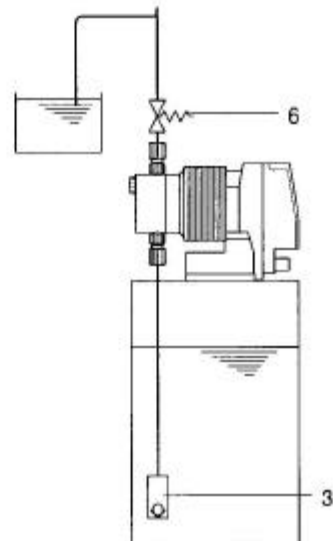
Installation

Correct installation:

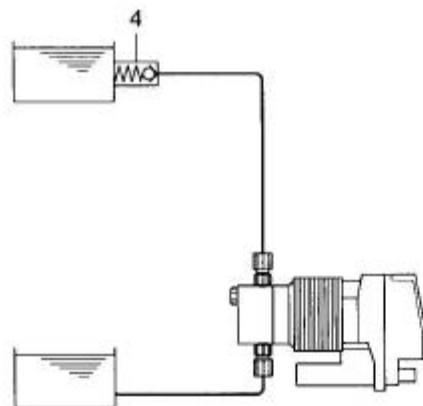
1) Standard installation



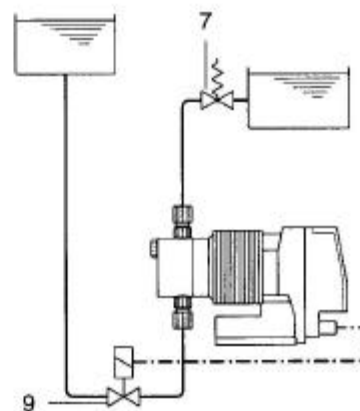
2a) Atmospheric discharge and **low** head



2b) Atmospheric discharge and **large** head

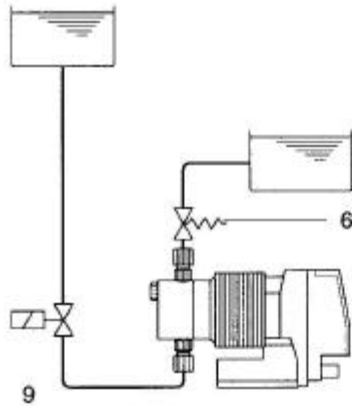


3a) With backpressure on the suction side and **large** discharge head

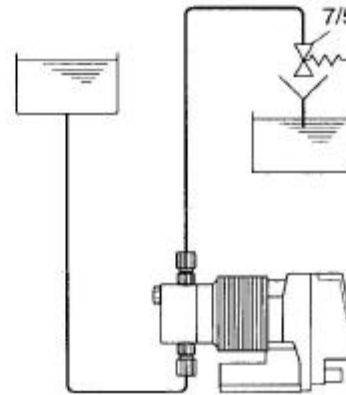


Installation

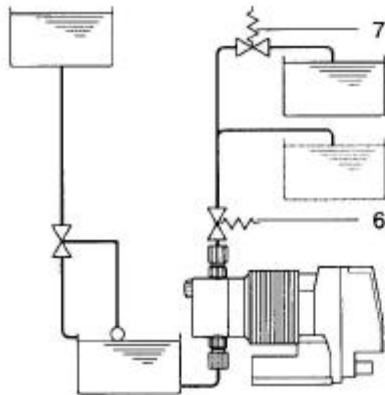
3b) With backpressure on the suction side and **low** discharge head



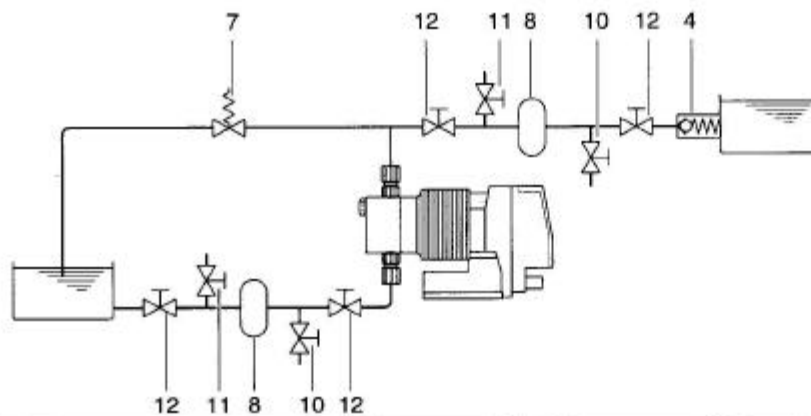
4a) Installation to safely prevent siphoning of hazardous media



4b) Installation to safely prevent siphoning of hazardous media

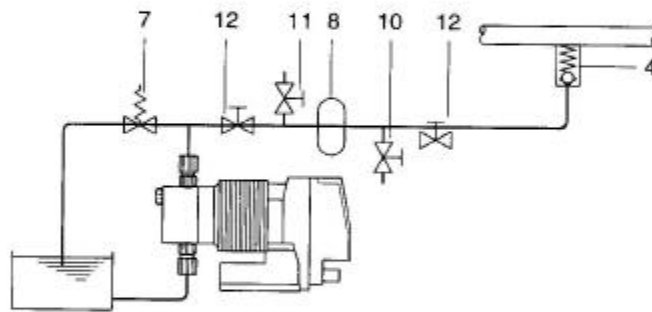


5) With long suction or discharge lines

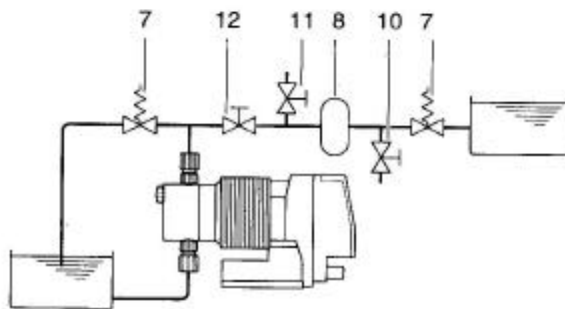


Installation

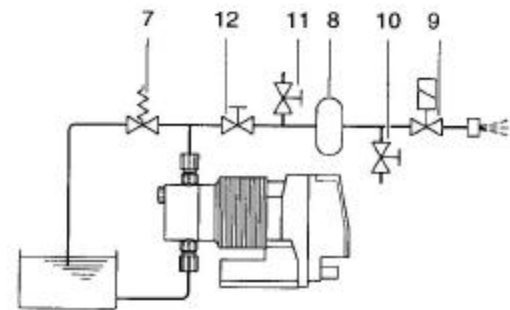
- 6 For pulsation-free metering
a) into discharge lines



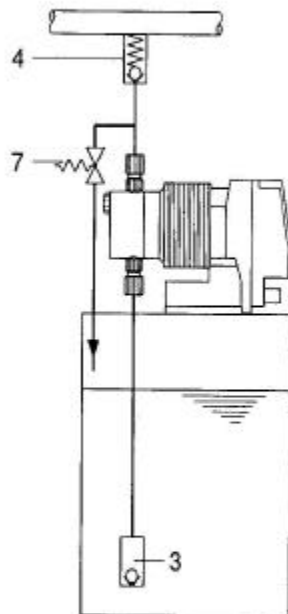
- b) into an atmospheric system



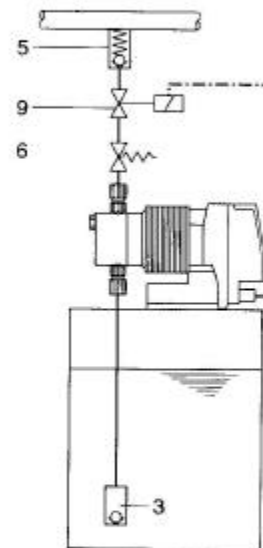
- c) without overfeeding



- 7) To protect against overpressure

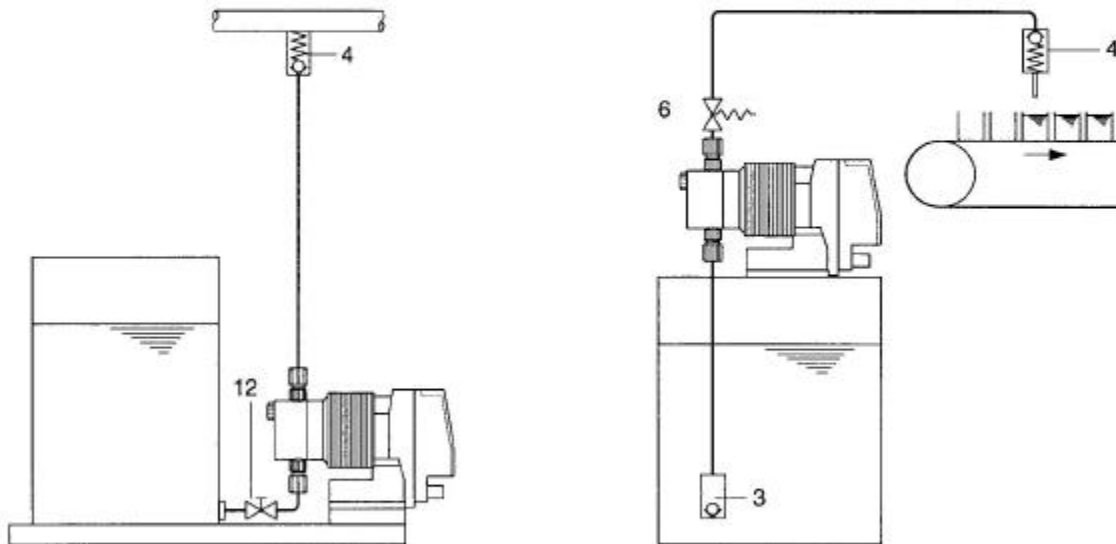


- 8) Metering into vacuum

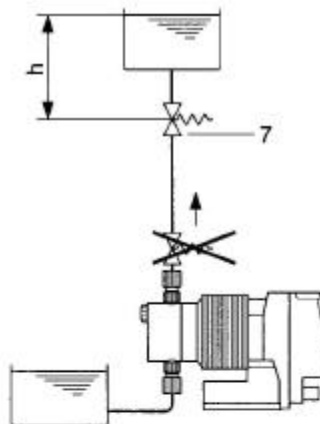


Installation

9) With media tending to emit fumes and vapours 10) Pulse type individual metering



11) Here BPV correct



Calculation of the max. permissible line height h_{max} above the back-pressure valve:

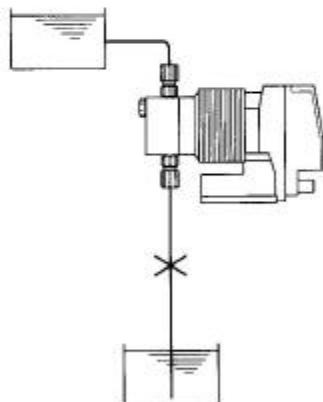
$$h_{max} \leq \frac{P \times 14.3}{\text{Rho} \times g}$$

h_{max} Max. line height (m)
 P pre-stress pressure set (bar)
 g gravitation constant (10 m/s^2)
 Rho density of the medium to be fed (kg/dm^3)

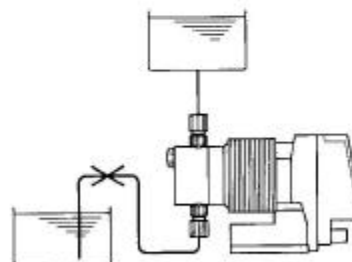
Installation

Incorrect installation:

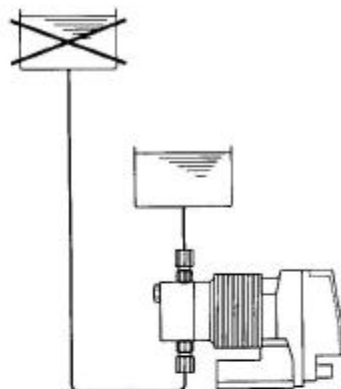
12) Suction line too high



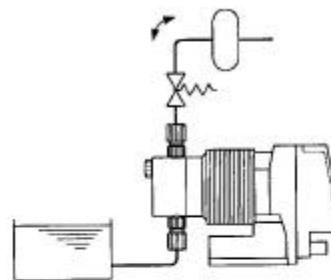
13) Suction line cannot be bled



14) Free flow, media will be gravity-fed through pump



15) Accumulator ineffective



Installation

10.2 Installation of pump: electrical

10.2.1 Electrical connection (general instructions)



WARNING:

Only connect the pump to the power supply with the correct plug!

Line voltage Line voltage:

115 V \pm 10%, 50/60 Hz (limit range min. 108 and max. 135 V)


or 230 V \pm 10%, 50/60 Hz (limit range min. 207 and max. 254 V)

PLEASE NOTE:

For frequent switching on and off, use the voltage-free pause control function "START/STOP" with the universal control cable.

Switch on and off via the main power supply only when voltage-free control is not possible!

Voltage-free contact Switch element is a voltage-free contact, e.g. switch, reed relay, optocoupler or open collector with residual voltage < 700 mV; contact load approx. 0.5 mA at 5V.

- Analog control signals*
- The voltage of the analog control signals must be separated.
 - After switching off the pump from the main power supply, this always restarts in the last operating mode set (even after being disconnected from power for several years).
 - If when doing so the whole LCD display **(4)** flashes, stop this by pressing the  key.
 - If present, connect the connection cable for the metering monitor to the pump after removing the protective cover from the connection socket **(10)**.
 - If present, connect the float switch cable to the pump after removing the function plug from the connection socket **(11)**. Do not discard plug.
 - If present, connect the contact/control cable to the pump after removing the function plug from the connection socket **(12)**. Do not discard plug.

PLEASE NOTE:


*The connection sockets **(11 and 12)** must always be used! Either the function plug, with built-in shorting bar (jumper) or the float switch or contact/control cable must be connected or the pump will go into fault mode.*

Installation

Always keep the function plug for reuse after you have removed it! The "ears" on the function plug allow it to be hooked onto the float switch or control cable. Call ProMinent for replacement function plugs if lost.

10.2.2 Operating modes

Manual (internal operation)

The pump operates with the stroking rate set manually. This is set between 0 and 120 (180) strokes per min. using the  and



keys.

Analog


You may control the pump from an analog signal, e.g. 4-20 mA, if the analog option is present. The stroking rate is set proportional to the control signal. The maximum stroking rate is the number of pulses which is set in manual operation before switching to contact mode. For wiring diagram see page 35.

Contact (external operation)

You may control the pump via voltage-free contacts (e.g. water meters). With the "pulse control" option the incoming pulses can be stepped up or stepped down. The maximum stroking rate is the number of pulses which is set in manual operation before switching to contact mode. For wiring diagram see page 35.

10.2.3 Functions common to all operating modes

Start/stop key

The pump can be stopped at any time by pressing the  key and started again with the last setting by pressing this key again.

Control function "PAUSE"

Switch the pump on and off via the "PAUSE" control function using a universal cable and voltage-free contact. For wiring diagram see page 35.

Tank empty message "LEVEL"

Connection of a two-stage float switch is possible. If the level of the fluid in the supply container drops to approx. 1-1/8 inch (30 mm) above minimum, an early warning is issued via display of "Error" and "minimum" on the LCD screen, and illumination of a red LED. With the "fault annunciation relay" option, the built-in relay switches and the pump continues to operate. If the level drops another 3/4" the pump is stopped. For wiring diagram see page 35.

Installation

Option "Timer"

With the timer activated, the pump can only meter during the switch-on times set. In timer mode, the pump may be externally controlled by pulse or analog signals during the "on" time, or the frequency may be constant as in manual mode.

10.2.4 Parallel connection

If, in exceptional cases, the main voltage of the pump has to be connected in parallel with an inductive load (e.g. solenoid, motor or similar), it must be possible for the metering pump to be separated electrically from these when the other loads are switched off. Therefore separate contacts must be provided for the pump.

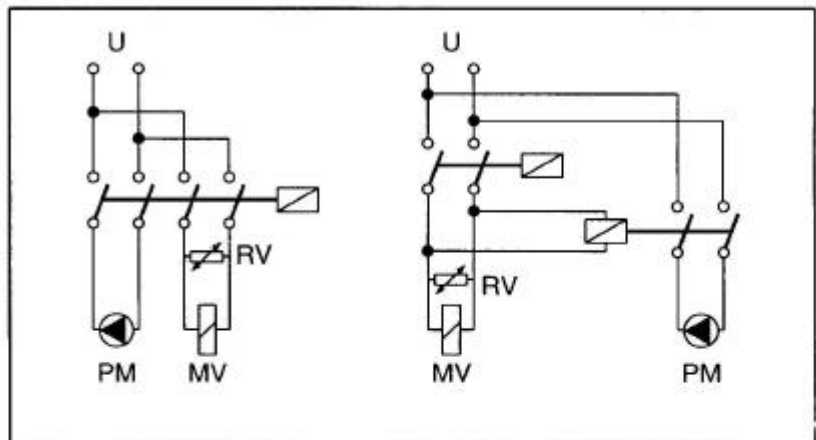
The power supply must take place over an auxiliary contactor or a relay.

If this is not possible

- a varistor RV (order no. 71.09.12.7)
- or an RC combination (0.22 μ F/220 ohm, order no. 71.08.02.0)

must be connected in parallel to render the induced voltage harmless.

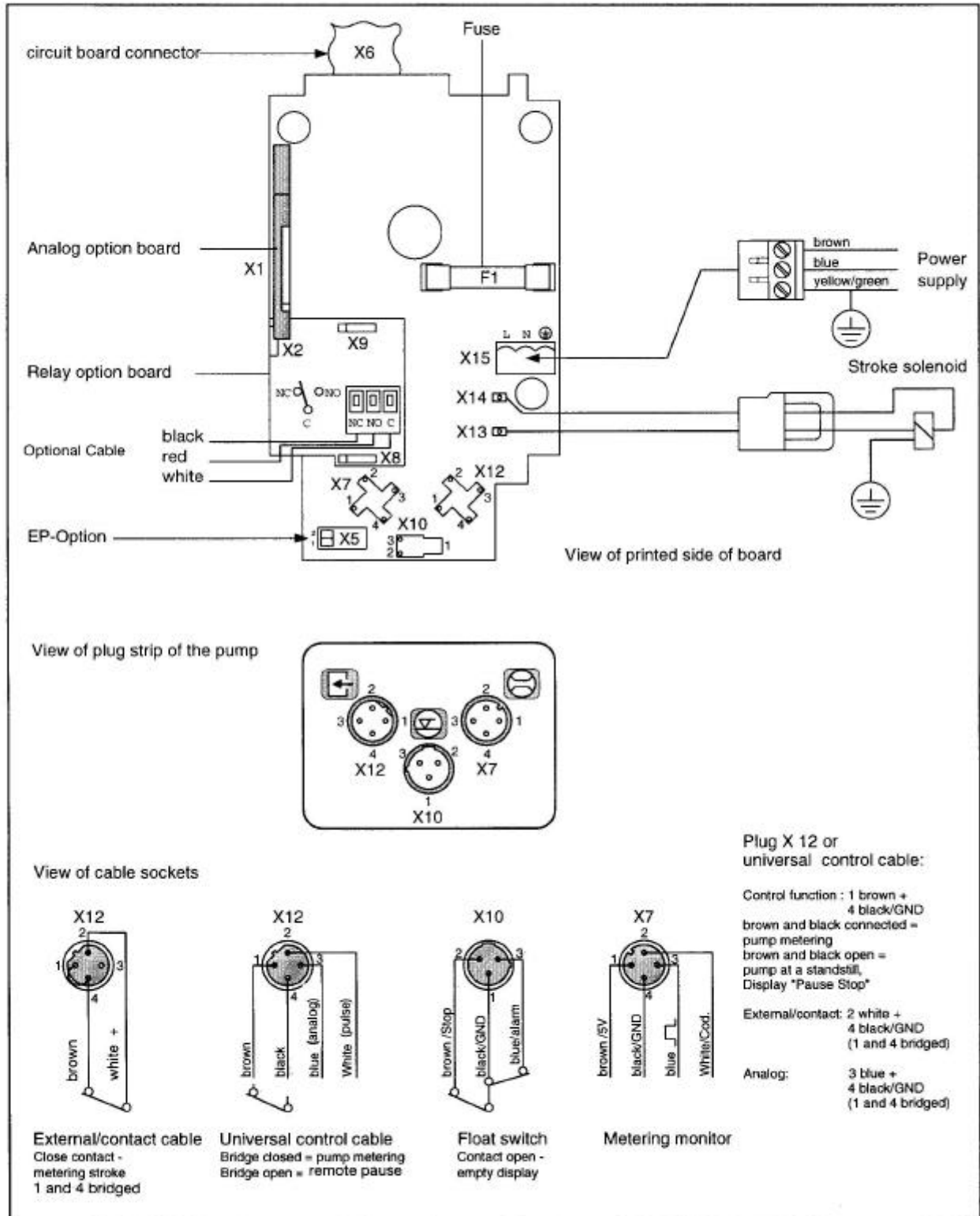
Isolation may be by means of a multi-pole contactor or switch, if the inductive load P_{MV} is < 20 W, the pump PM and the load MV could have a common control contact.



U supply voltage
MV solenoid valve, motor or similar
PM ProMinent metering pump
RV Varistor

Installation

10.2.5 Wiring diagram



Start Up

11 Start Up

11.1 General instructions



WARNING:

The metering pump may still contain water in the liquid end from the test at the factory!

For fluids which may not come into contact with water, the water must be emptied before the pump is used. For this purpose turn the pump 180 ° and empty the liquid end, then flush with a suitable agent through the suction connection from above.

ATTENTION:

Only set the stroke length when the pump is running and when the setting bolt of the metering stroke is briefly relieved.

11.2 Operating conditions

Permissible ambient temperature

-14 °F to +113 °F (-10 °C to +45 °C)

Up to 122 °F (+50 °C) with short time operation up to 1 hour operating time at max. stroking rate.

Above +113 °F (+45 °C) continuous operation, the max. stroking rate must be lowered by approx. 3 strokes per minute from the max. stroking rate of 120 (180) strokes per minute for each 1 °C over 45 °C.

Relative humidity

Optimal humidity is 10 to 92%, non-condensing

*Permissible media temperature
in the liquid end*

Material	Long term at max. rated back pressure	Short term max. 15 mins. at 29 psig (2 bar)
NP	113°F (45 °C)	140°F (60 °C)
PP	122°F (50 °C)	212°F (100 °C)
TT	122°F (50 °C)	248°F (120 °C)
SS	122°F (50 °C)	248°F (120 °C)

PLEASE NOTE:

The specified temperatures may be briefly exceeded, for example, for sterilization or rinsing with hot water!

11.3 Priming



The max. priming lift of the gamma 4b metering pump with wetted valves is between 1.6 and 9.2 ftWC (0.5 and 2.8 mWC) depending on the type.

The pump cannot prime against backpressure.

The suction lift with the liquid end filled and bled is between 4.9 and 19.7 ftWC (1.5 - 6 mWC) depending on the type of pump.

Start Up

Liquid end without bleed valve version TT, SS

- Connect discharge line to liquid end, however not to injection valve.
- Operate metering pump with stroke length/stroking rate set at 100%, and with a pressure-free discharge line by simultaneously pressing the  and  -keys until the medium has completely filled the liquid end without any bubbles.

This can be verified by the medium being visible in the discharge line or when it comes out of the discharge line.

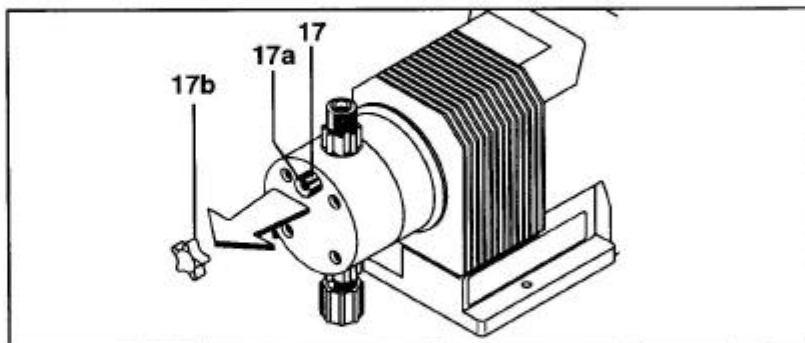
- Now fasten the discharge line to the injection valve.

High Viscosity (HV) version (PP4/ PP5) or pumps with optional springs

- For long suction and discharge lines use fittings and mounting parts with low flow resistance, e.g. arcs instead of angles; install pulsation dampener near the metering pump; increase pipe diameter by one nominal width.
- Initial priming and bleeding is made difficult by the spring loaded check valves. Therefore select as short a priming lift as possible or fill the liquid end with pressure on the suction side or vacuum on the discharge side. If this is not successful, we recommend the following procedure: remove the suction line and fill with water or suitable fluid. Then unscrew the discharge check valve and fill the liquid end with water or suitable fluid. Let the pump operate at max. stroke length until the fluid is visible in the hose.
- If the capacity is to be reduced, we recommend working with a longer stroke length and decreased stroking rate.

Liquid end PP, NP with bleed valve



- Priming for PP or NP versions is the same as versions TT or SS, or may be done with the bleed valve, as follows.
- Connect the suction and discharge lines to the liquid end and the foot and injection valves.
- Connect flexible bypass tube to hose barb on liquid end and fix with small hoseclamp. Insert other end of tube into suction tank to allow return flow of fluid.



Coarse bleeding

- Open priming valve (17) by turning it counter-clockwise.
- Now the passage is open for priming via the bypass, even when operating against system pressure.

Start Up

- Start the pump with stroke length/stroking rate at 100% by simultaneously pressing the  and  keys until the medium has completely filled the liquid end and is free of bubbles. This can be verified by the medium being visible in the discharge or bleed line.
- Close the bleed valve. The metering pump is ready to operate.

Fine bleeding

For media which tend to emit gases (such as hydrogen peroxide or sodium hypochlorite), continuous fine bleeding can be set for liquid ends with bleed valves:

- After pulling off the attached star handle (17b), if present, open the screw (17a) inside the bleed valve with a screwdriver approx. 1 turn counter-clockwise.
- This results in a partial flow of the fluid and gas constantly being returned to the supply tank through the bypass line.
- The bypass flow should be approx. 20% of the metered flow.
- The media must be fluid and without solid particles which could clog the bleed valve.



Warning!

The bleed valve does not guarantee totally reliable metering after the pump has been idle! It is essential that regular checks are carried out.

PLEASE NOTE:

If the bypass line ends above the fluid level, the fine bleeding valve operates as a vacuum breaker and prevents the supply tank from being sucked empty if vacuum occurs in the discharge line!

After approx. 24 operating hours the screws in the liquid end are to be tightened crosswise.

Attention

It is essential that the torque for the screws is observed. Torque for screws M4 : 16 lb./inches, M5 : 17 lb./inches

11.4 Metering Repeatability

All details are related to metering capacity measurements with water at a temperature of 68°F (20 °C).

When conditions remain unchanged (same back pressure, same stroke length, stroking rate, operating temperature, voltage, suction lift, fluid temperature, same fluid, and same diameter/length/material of the line) the metering repeatability is $\leq \pm 2\%$ during short periods

Start Up

and for a stroke length setting of at least 30% in accordance with the following instructions.

Accurate metering is only possible if the backpressure remains fairly constant; this should be above 15 psig (1 bar).

When metering with atmospheric pressure discharge, an injection valve with 7 psig (0.5 bar) response pressure should be installed at the end of the line, or a backpressure valve should be installed to create and maintain a backpressure of at least 21 psig (1.5 bar).

If the level of the fluid of the supply tank is above the pump in operating condition or if the suction line is under pressure, the back pressure should be set at least equal to 21 psig (1.5 bar) plus the suction pressure. A back-pressure valve or a spring-loaded injection valve with the respective backpressure should be used.

PLEASE NOTE:

A back-pressure valve or a spring-loaded injection valve is not an absolutely leakproof isolating valve!

Therefore, on the suction side, an isolating valve must be installed which is closed when the pump is idle; when there is positive suction pressure.

An output flow set and confirmed by calibration can be changed exactly by setting the stroking rate. This is processed digitally and reacts absolutely linear. Thus, excellent repeatability is ensured.

ATTENTION:

For accurate metering please observe the following:

The metering capacity of the pump was determined in warm operating condition (min. 3 hours continuous operation at maximum stroking rate)!

With the gamma/4 metering pump higher capacities can occur until the operating temperature is reached.



11.5 Determining the capacity by means of nomographs

11.5.1 General information

Lower diagram

- Turn to the page with the nomograph of your pump type and determine the correction factor required.
- On the lower diagram "Capacity in relation to back pressure" mark your operating back pressure.
- Starting from the value determined proceed upwards vertically until the curve and then horizontally to the left - now you can read off the correction factor.
- Divide the capacity required by the correction factor determined - you now have the capacity in l/h or ml/min.

Start Up

- Middle scale*
- Enter your result in l/h or ml/min in the middle scale "Capacity ...".
 - Take a ruler and draw a line through the capacity marked to both the outside scales. In doing so choose an integer value as high as possible for the stroke length. On the right hand scale you obtain the respective stroking rate.
- Left scale*
- On the left scale "Stroke length adjustment..." read off the value for the stroke length and set this at the pump with the stroke adjustment knob (3).
- Right scale*
- On the right scale "Stroking rate setting..." read off the value for the stroking rate and set this at the pump with the  or  key.

> **Detailed description on page 51**

PLEASE NOTE:

In order to obtain a balanced setting draw a line through the next highest stroke length with an even number!

For high viscosity media and media tending to emit gases select a large stroke length and a correspondingly low stroking rate!

For a good mixing effect choose a short stroke length and a high stroking rate!

For repeatable metering the stroke length should not drop below 30%!

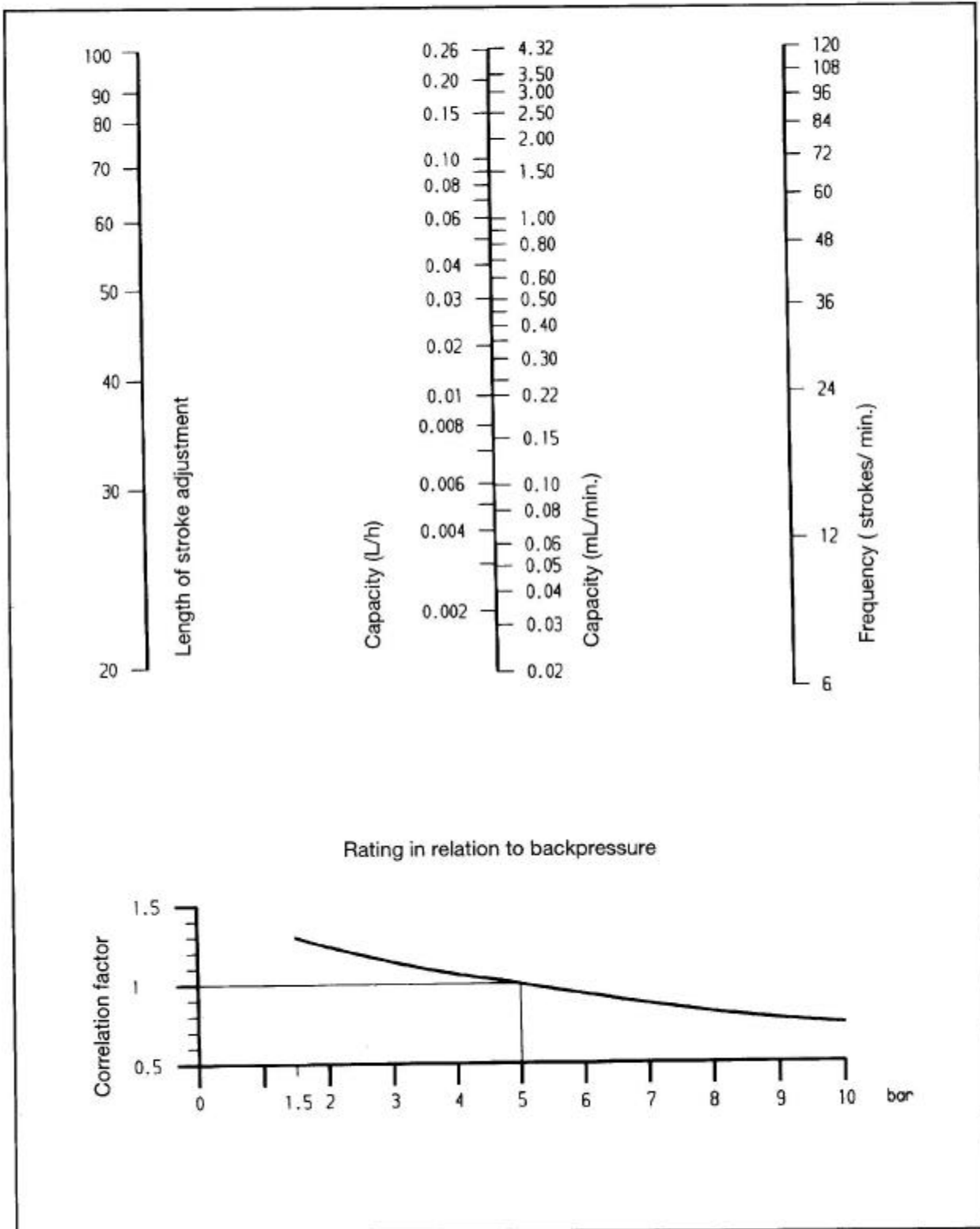
Determining repeatable metering: calibration

- Determine the actual capacity at system pressure and with the process fluid on the suction side of the metering pump by measuring flow over time with a graduated cylinder or with a balance. Divide the flowrate by the number of strokes per that time period to obtain actual capacity per stroke.
- If necessary correct the pump setting.

The measurements to determine the capacity for the following nomographs were carried out with water and the correction factor determined at a stroke length with 70%; variation of the capacity for all material versions -5% – +15%.

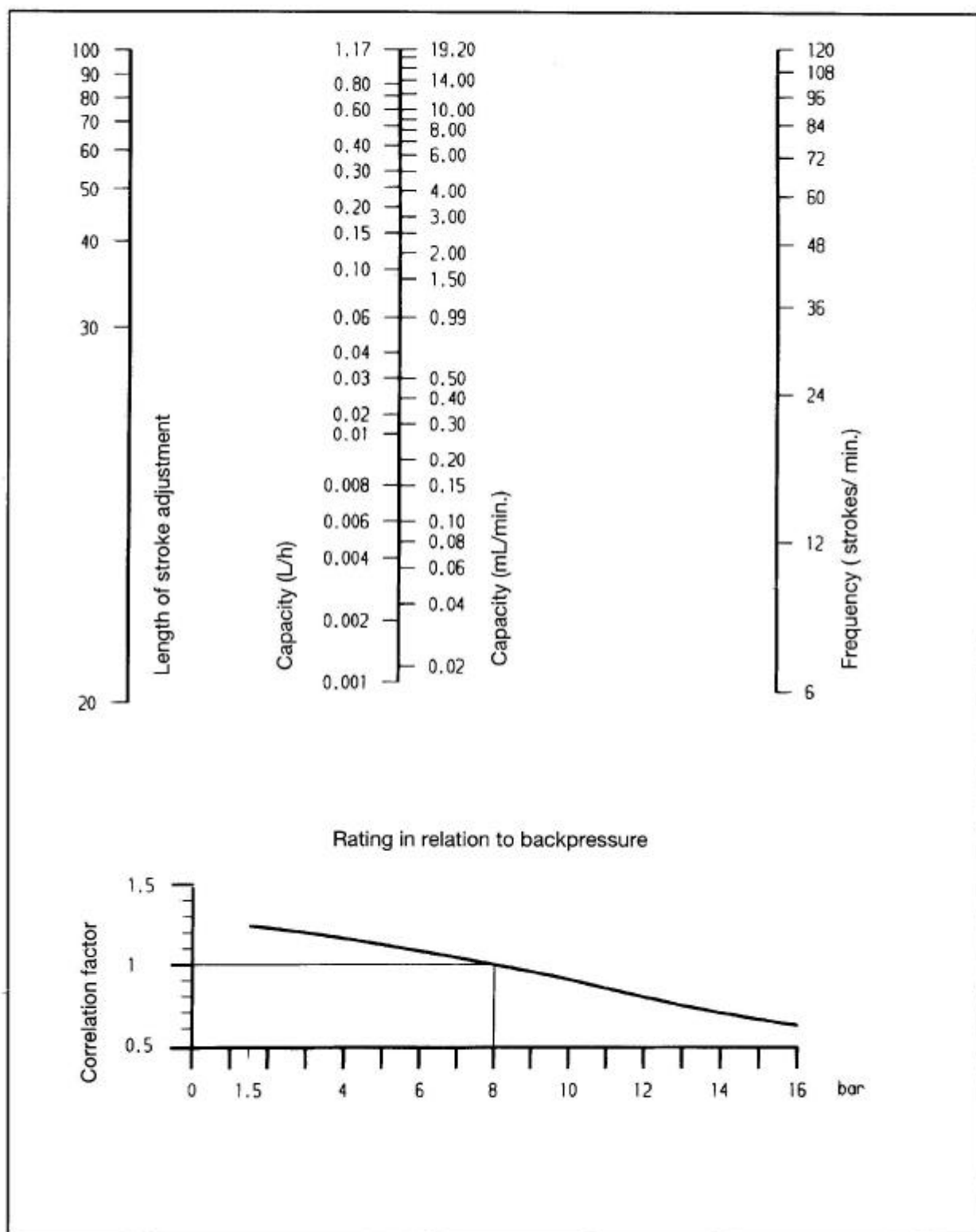
Start Up

11.5.2 Nomograph 1000



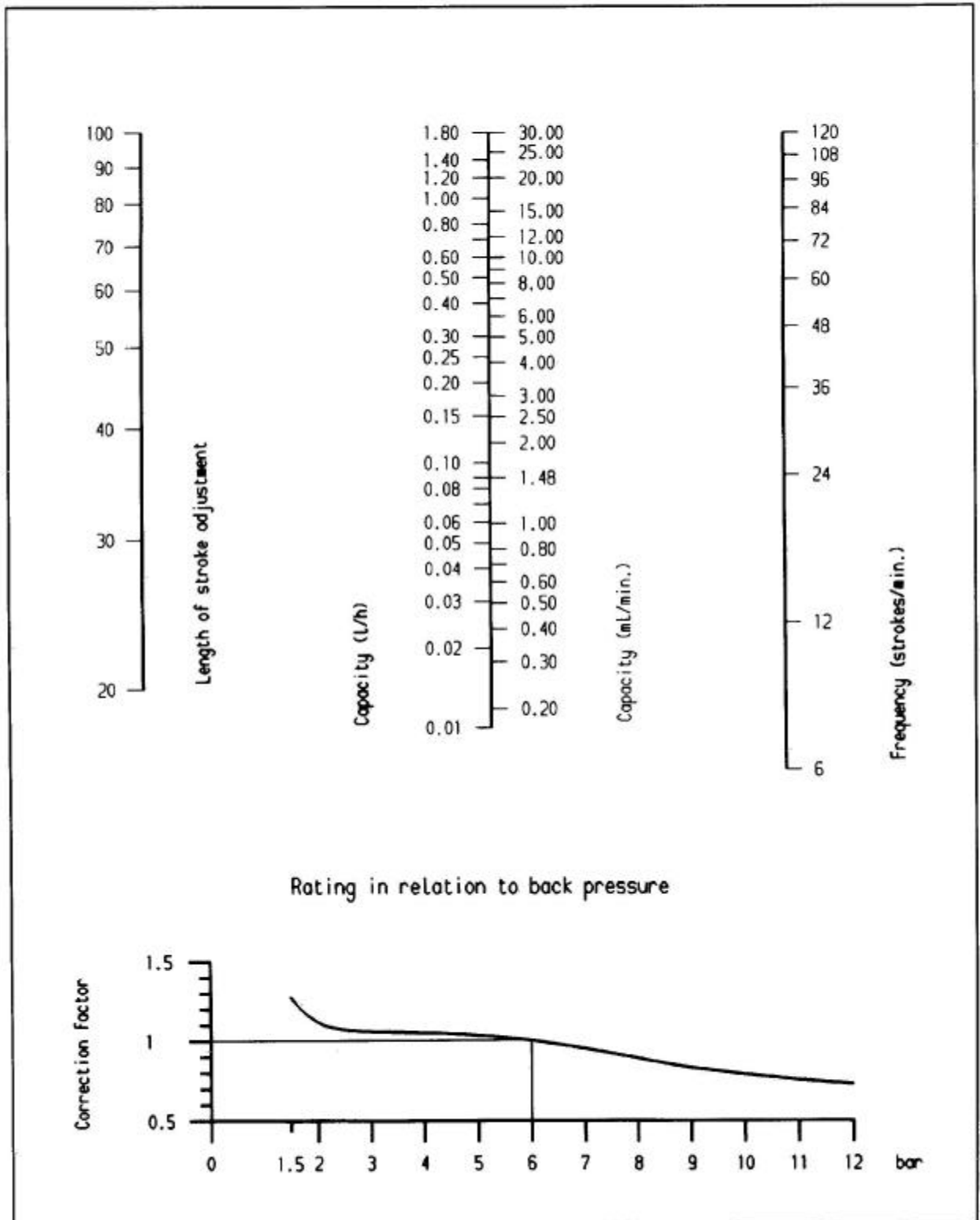
Start Up

11.5.3 Nomogram 1601



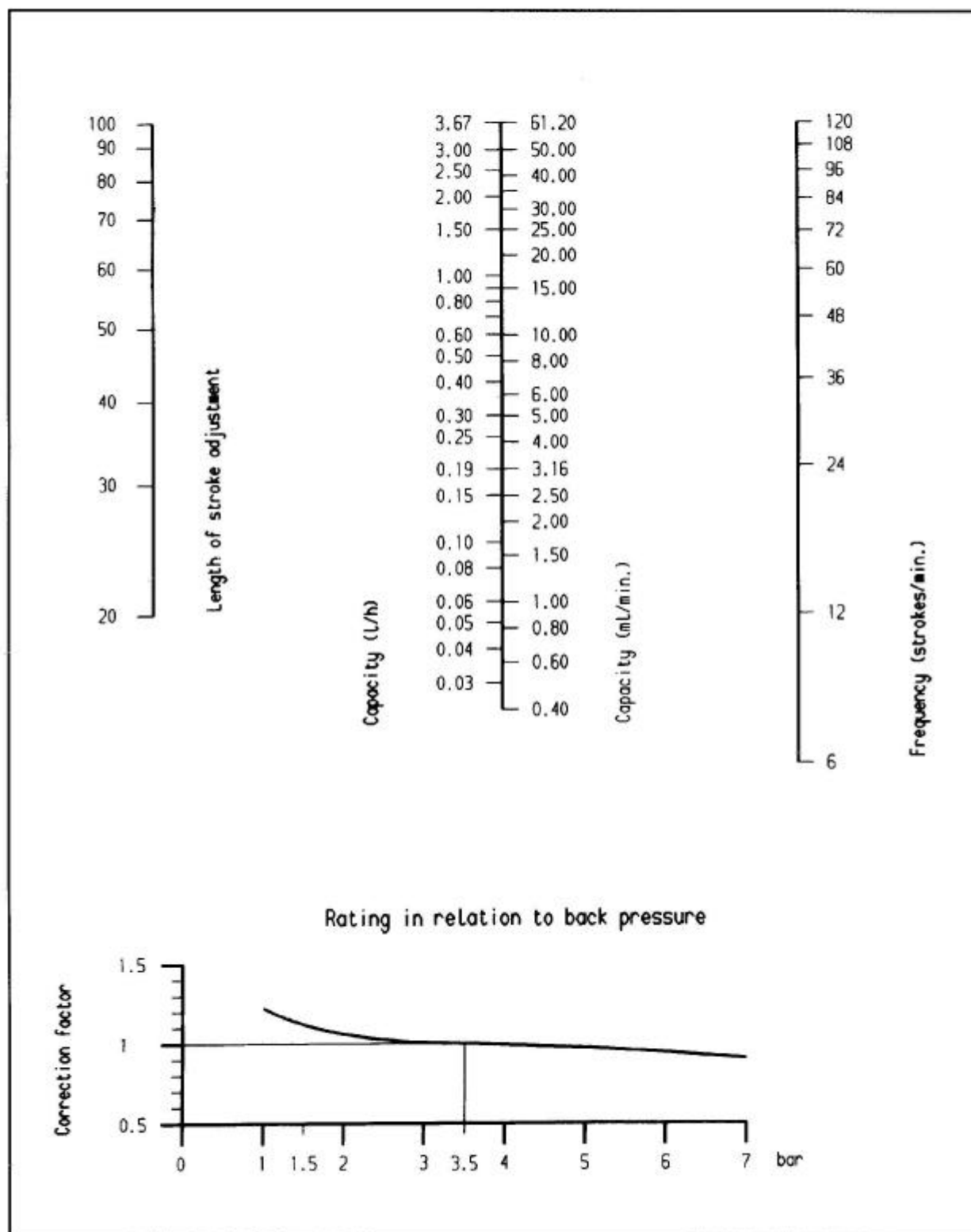
Start Up

11.5.4 Nomogram 1201



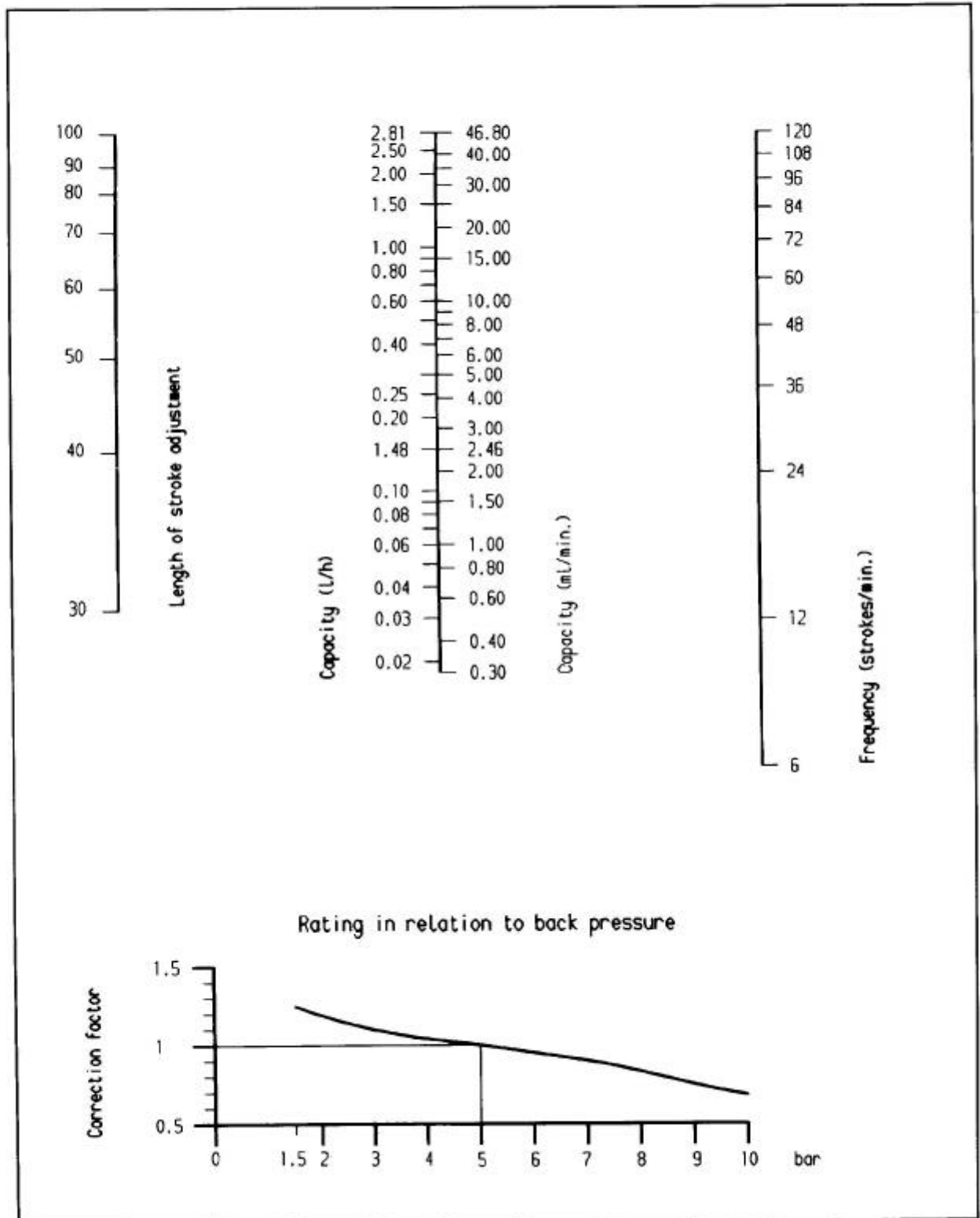
Start Up

11.5.5 Nomogram 0803



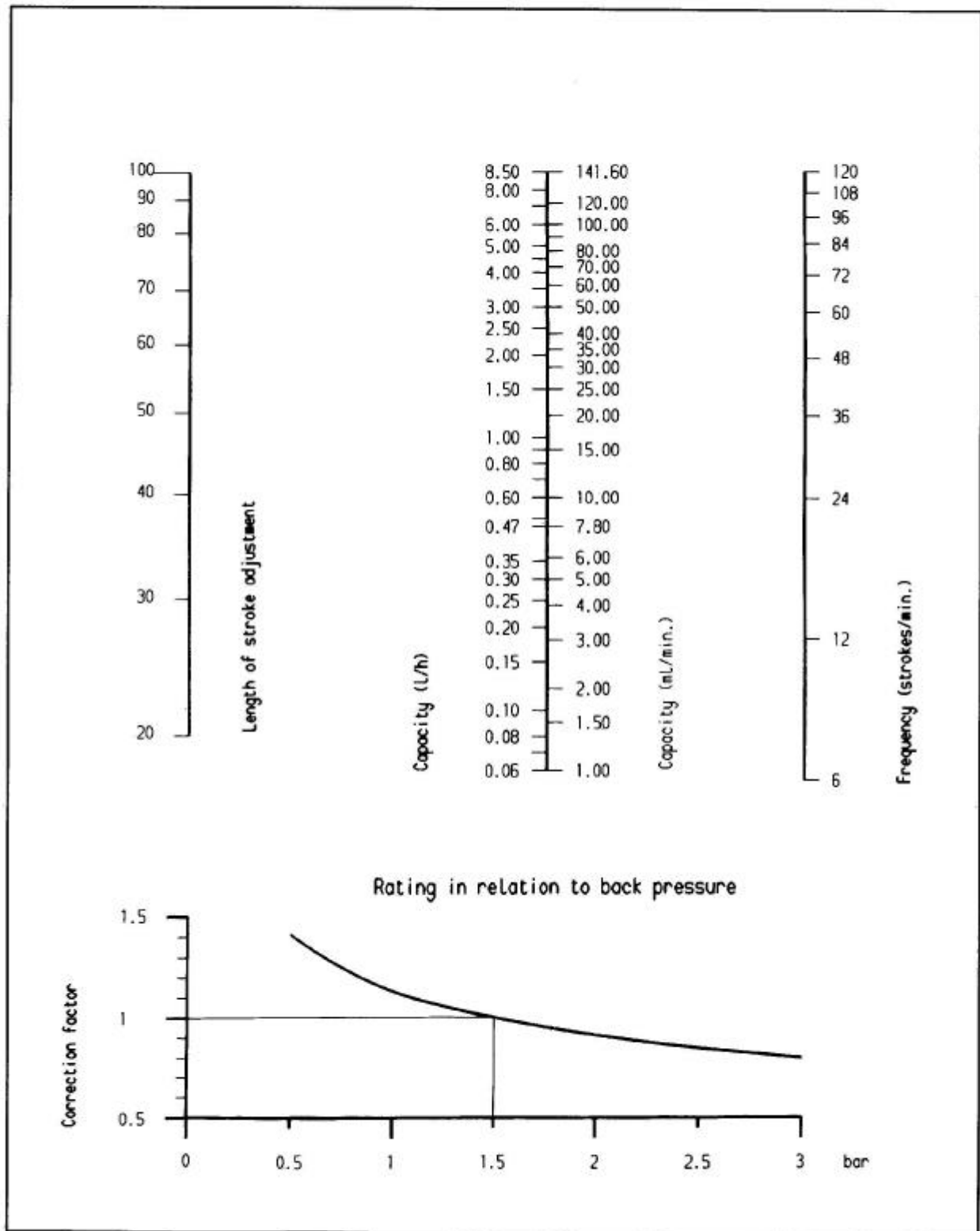
Start Up

11.5.6 Nomogram 1002



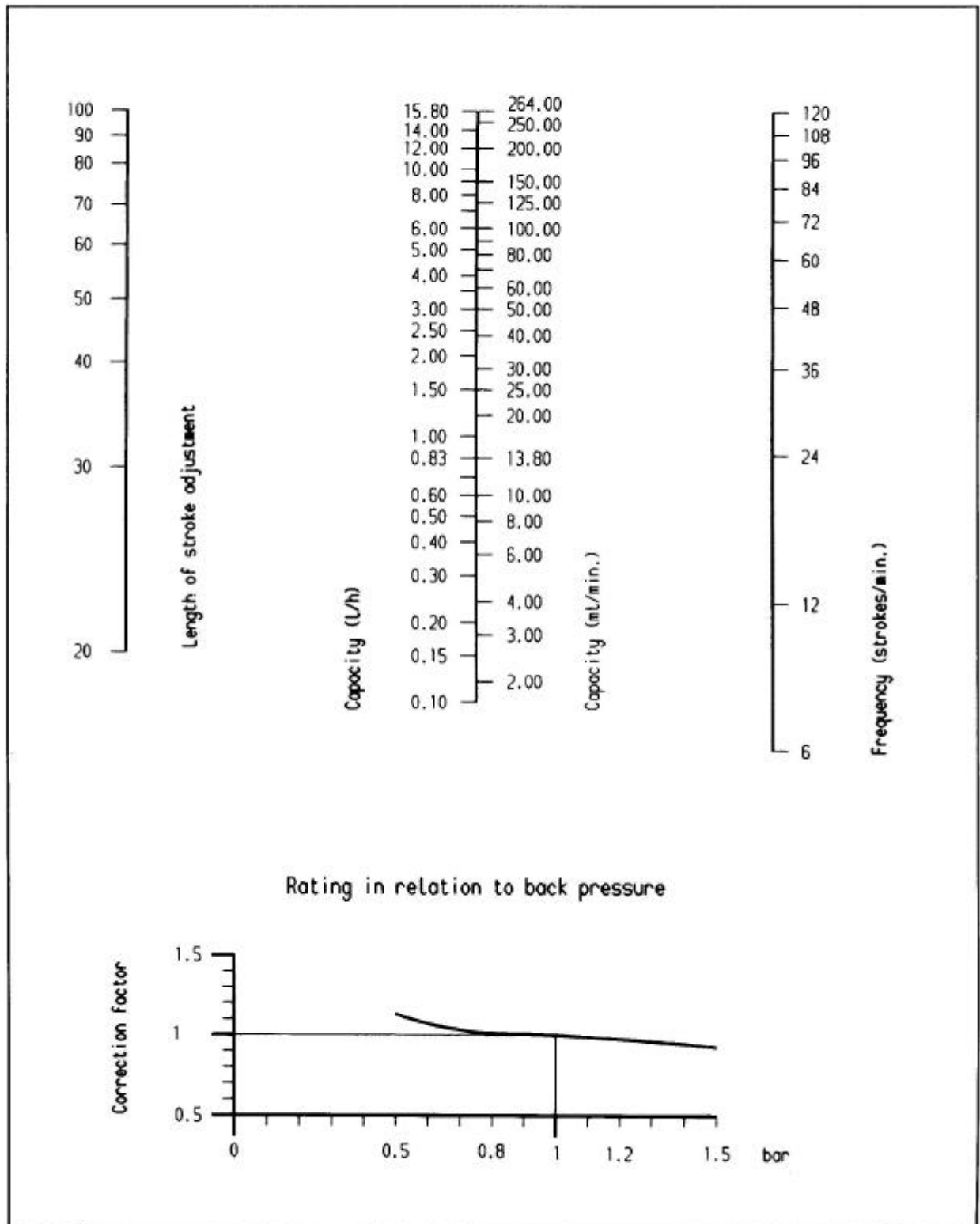
Start Up

11.5.7 Nomogram 0308



Start Up

11.5.8 Nomogram 0215

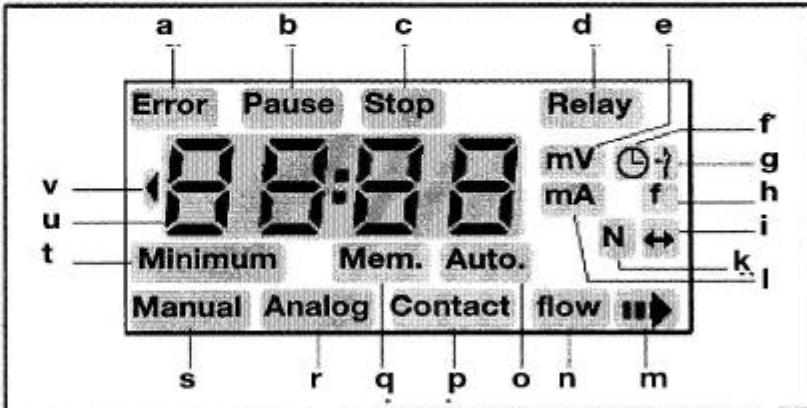



Operation

12 Operation

12.1 Explanation of the operating and display elements

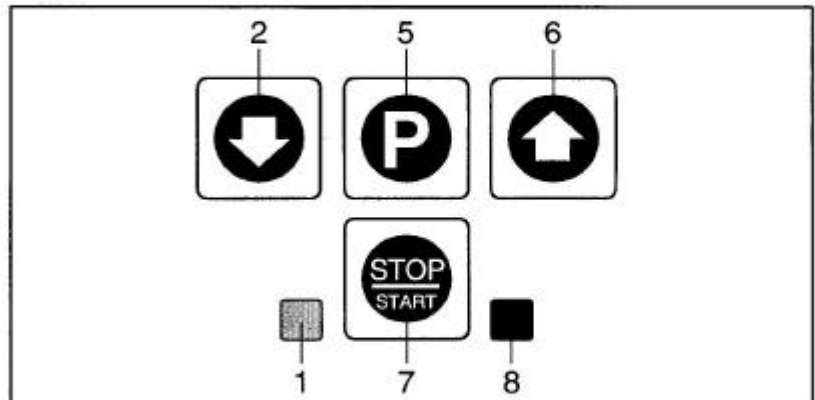
12.1.1 Display



- a = Display error message "Error"
- b = Pump stopped using "Pause" control function
- c = Pump stopped manually with key (7)
- d = Display "Relay" is activated (with relay option only)
- e = Voltage range selection "mV" or "V" (with analog option only)
- f = Display of the time
- fg = Timer operation  (with timer option only)
- h = Display of the stroking rate or "E" in "Contact" operation
- i + k = display of the pulse step-up or step-down ratio (with pulse multiplier/divider option only)
- k = Stroke count "N"
- l = Signal range selection "mA" (with analog option only)
- m = Saving new settings
- n = Activating metering monitor "flow" (with optional metering monitor only)
- o + c = Display for automatic pump stop in timer operation (with timer option only)
- p = Pump set to "Contact" operation
- q = Display memory operation "mem" (with pulse multiplier/divider option only)
- r = Pump set to "Analog" operation (with analog option only)
- s = Pump set to "Manual" operation
- t = Display for lack of chemical "Minimum" (precondition: float switch connected)
- u = Display of the number values set
- v = Display for excess stroke counting and for switch-off time "⏏" (with pulse multiplier/divider or timer options only)
- a + i = No power supply to the metering pump; error in the data transfer line (Remote Control)

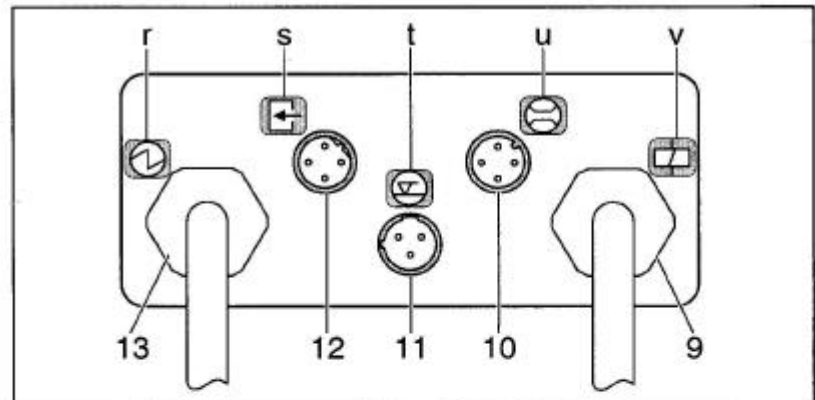
Operation

12.1.2 Control panel: keys and display lamps



- 1 = Pulse/pilot display (yellow)
- 2 = Stroke frequency down key
- 5 = Program selection key
- 6 = Stroke frequency up key
- 7 = Stop/Start key
- 8 = Display lamp (red) for empty display and fault annunciation

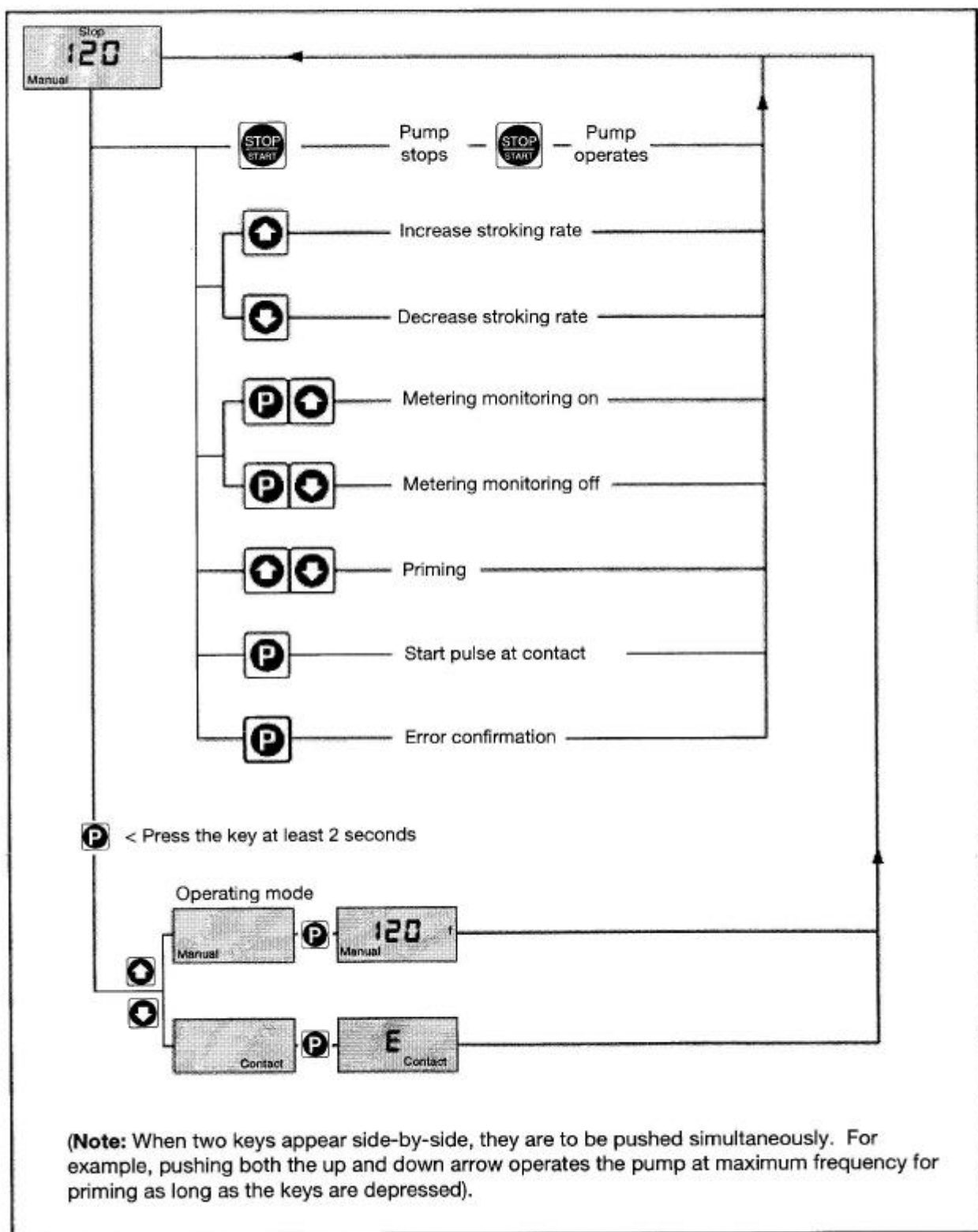
12.1.3 Multiple connector strip. Symbols and connections



- r = Identification of power connection
- s = Identification of remote control cable connection
- t = Identification of float switch cable connection
- u = Identification of metering monitor cable connection
- v = Identification of optional relay output
- 9 = Relay output (optional)
- 10 = Connection socket for metering monitor
- 11 = Connection socket for float switch (with function plug)
- 12 = Connection socket for remote pause control; contact or analog signal.
- 13 = Power connection

Operation (Basic Version)




12.2 Overview operating diagram





Operation (Basic Version)

12.3 Operating functions basic version


12.3.1 Starting the pump

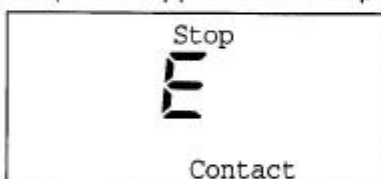
- Plug the power cord into the appropriate grounded socket.
- Open the view window (14).
- Set the stroke length to 100% with the stroke adjustment knob (3).
- Press the  key to stop the pump ("stop" appears on screen).
- Only for NP and PP pumps: Open bleed valve (17) max. 1 turn counter-clockwise.
- Only for SS and TT pumps: Loosen the discharge line at the injection valve or open bleed valve on discharge line, if present.
- Simultaneously press the   keys and start priming.
- Press the keys until the fluid has completely filled the liquid end free of bubbles (when the fluid becomes visible in the bleed or discharge line).
- Close bleed valve (NP/PP), or fasten the discharge line again to the injection valve or close bleed valve, if present (SS/TT).


PLEASE NOTE:

By simultaneously pressing the   keys, the pump operates in all operating conditions with maximum stroking rate for safe and fast priming!

12.3.2 Stopping the pump

The pumping can be interrupted at any time by pressing the  key. "Stop" then appears in the display.



By pressing the  key, the metering is started again.

Operation (Basic Version)


12.3.3 Internal "Manual" operation

PLEASE NOTE:



If no float switch or control cable is connected to the pump, both the function plugs must remain plugged in at the inputs [(11) and (12)]. These plugs have jumpers that complete a circuit. If removed, the pump will stop and an error message will appear.

- After the pump is started, the yellow pilot light (1) lights up and the following display appears (factory setting):




- Press the  key to start.
- The pump now operates with the stroking rate displayed, e.g. 120 strokes per minute. Some models maximum is 100 or 180 strokes per minute.



- The yellow pilot light (1) goes out for a moment while the stroke is being performed.
- With the   keys, the desired stroking rate can be precisely set with quartz-like accuracy, (e.g. 99 strokes per minute).



- After every change of the stroking rate or when changing the program, an arrow  in the lower right hand corner of the display flashes for about five seconds.
- When this period has elapsed, the new setting is saved in memory. If the power plug is pulled while the arrow flashes, the new setting is disregarded.

Operation (Basic Version)

12.3.4 External "Contact" operation

The external (remote) control of the pump can take place via voltage-free contacts (e.g. pulse-type water meters, reed relay), or a transistor in open collector switching (e.g. optocoupler).



The "E" indicates external control. **It is not an error message.**

PLEASE NOTE:

The minimum pulse duration is 20 ms; for transistor control the residual voltage must not exceed 700 mV!



WARNING:


Do not connect the main power voltage to the control cable!

Please note:

The stroking rate set in "Manual" operation results in the max. stroking rate in "Contact" operation. If frequency reduction is desired, the max. stroking rate is to be set in "Manual" operation before switching over to "Contact" operation.

Required external control of the pump are the 4- wire universal cable or the 2-wire remote cable which is plugged into the connection socket **(12)** and screwed down. A ridge in the plug matches a notch in the socket to ensure the correct wiring.

If the remote pause function is not used, the brown and black wires of the 4-wire cable are to be connected; otherwise, the pump stops and "Pause Stop" appears in the display. If the remote pause is to be used, connect the brown and black wires to a latching switch, as shown in the wiring diagram.


By temporarily closing the white wire with the bridged brown/black wire or briefly touching the  key, a metering stroke can be caused. The maximum stroking sequence is 120 (180) strokes per minute.

If more pulses than the maximum stroke rate come in these are ignored by the pump in order to avoid an overloading.

If only external control is planned, without remote pause, this can also take place with a 2-wire remote cable - whereby the bridge is within the plug.

Operation (Basic Version)


Switching to "Contact" operation:

- Press the  key for about two seconds.
- "Manual" flashes in the display.



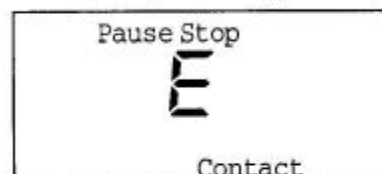
- Switch over to "Contact" operation with the   key.



- Confirm with the  key.
- The display shows that you have switched over to "E" external "Contact" operation.



- The pump was stopped using the "Pause" control function.



12.3.5 Connecting a float switch

The two-stage float switch is capable of issuing an early warning if lack of chemical is imminent. Thus the chemical supply tank can be refilled before the pump finally switches off (second stage).

If the fluid level in the chemical tank drops to the first stage of the float switch the display (4) flashes "Minimum" and the red LED (8) lights up.

Operation (Basic Version)



If the option "Fault annunciation relay, drops out" (ident code option #1) was included, this relay, which is normally energized in standard operation, de-energizes and enables a visual or acoustic warning signal to be issued. If the option "Fault annunciation relay, pulls in" (ident code option #3) was included, this relay, which is normally de-energized in standard operation, energizes; then the additional word "Relais" appears in the display.



If the tank is not refilled and the second stage of the float switch is activated (tank empty) the metering stops; the yellow pulse/pilot display (1) then lights up continuously, the error message "Error" also appears in the display. If a fault relay is present, it continues to announce the fault.



PLEASE NOTE:

If single-stage float switches with 2-wire flat connectors are already present, adapter cables are available as a transition!

Adapter cable with flat connector: order no. 80.83.12.3

Adapter cable with jack: order no. 80.83.13.1

ATTENTION:

If using the single-stage float switch, the float must be removed from the stay tube (by removing a retaining ring) and rotated by 180 °!

Before plugging in the 3-pole float cable plug the function plug must be pulled out from level input (11)!

PLEASE NOTE:

If the float cable plug is pulled out from input (11) or the cable is disconnected, "Error" appears in the display and "Minimum" flashes. If the option fault annunciation relay is fitted the word "Relais" also appears.

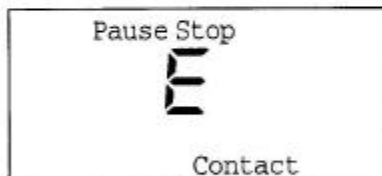
When the float plug or function plug is connected, the alarm message is turned off if there is sufficient fluid!


Operation (Basic Version)

12.3.6 Remote on/off control ("Pause" control function)

If the pump is to be remotely switched off (paused) voltage-free, the brown and black wires of the 4-wire universal cable are bridged together for operation (usually by a latching push-button switch) and opened for the pump to halt function.

If the wires are not bridged, the metering stops and the display reads "Pause Stop".



- If the  key is pressed, "Pause" is no longer displayed. "Stop" appears, the pump remains stopped.



PLEASE NOTE:

Due to safety reasons, the pump also stops if the cable is removed or disconnected, in case the cable is cut.

If the pump is to operate without the remote pause control function, the function plug must always be plugged into socket, (12) or in the case of external control as mentioned above, the black and brown wires of the 4-wire control cable must be bridged.

12.3.7 Metering monitor "flow"

The flow monitor, optional, is to be screwed down onto the discharge valve of the liquid end, and the connector is to be plugged into the input (10) and screwed tight.

- Activate the metering monitor by pressing the  and  keys simultaneously until the display reads "flow".
Precondition: The metering monitor is plugged into socket (10).



With the pump operating, slide the flow monitor housing up or down until the red LED lights with every stroke; the LED lights and is counted

Operation (Basic Version)



each time by the pump.

If the feedback signal is missing eight times in succession (too little or no flow), the "Error" message appears in the display and the "flow" symbol flashes.



Additionally, if the relay option #1 "Fault annunciation relay drops out" was selected, the relay de-energizes to issue the alarm, or if the relay option #3 "Fault annunciation relay pulls in" was selected, it energizes for alarm or "switching mode" energizing. The word "Relais" appears in the display.



- The flow monitor is sensitive to changes in the volume of fluid pumped with each stroke. If the pump stroke is changed, the metering monitor must be adjusted again until the red LED lights with every stroke.
- By simultaneously pressing the  and  keys, the flow monitoring function can be turned off.
- By removing the flow monitor plug from the socket, **(10)** the flow monitor is automatically turned off.
- The flow is designed for waterlike fluids. High viscosity or specific gravity fluids may cause difficulty.

12.3.8 Acknowledging "Error" messages

PLEASE NOTE:

Watch flashing error message on display (4)!

Check whether the function plugs (11/12) are plugged in or cable plug (10) is correctly connected!

Error message "Error Minimum"

Possible cause: Lack of chemical

Remedy:

- The error message confirms itself by filling up the supply tank.

Operation (Basic Version)

Error message "Error flow"

Possible cause: No or too little metering when using the metering monitor.


Remedy:

- Briefly pressing the  key or executing the control function "Pause/Stop" (remote on/off)

Entire display flashes

Possible cause: System error

Remedy:

- Briefly pressing the  key or executing the control function "Pause/Stop" (remote on/off)

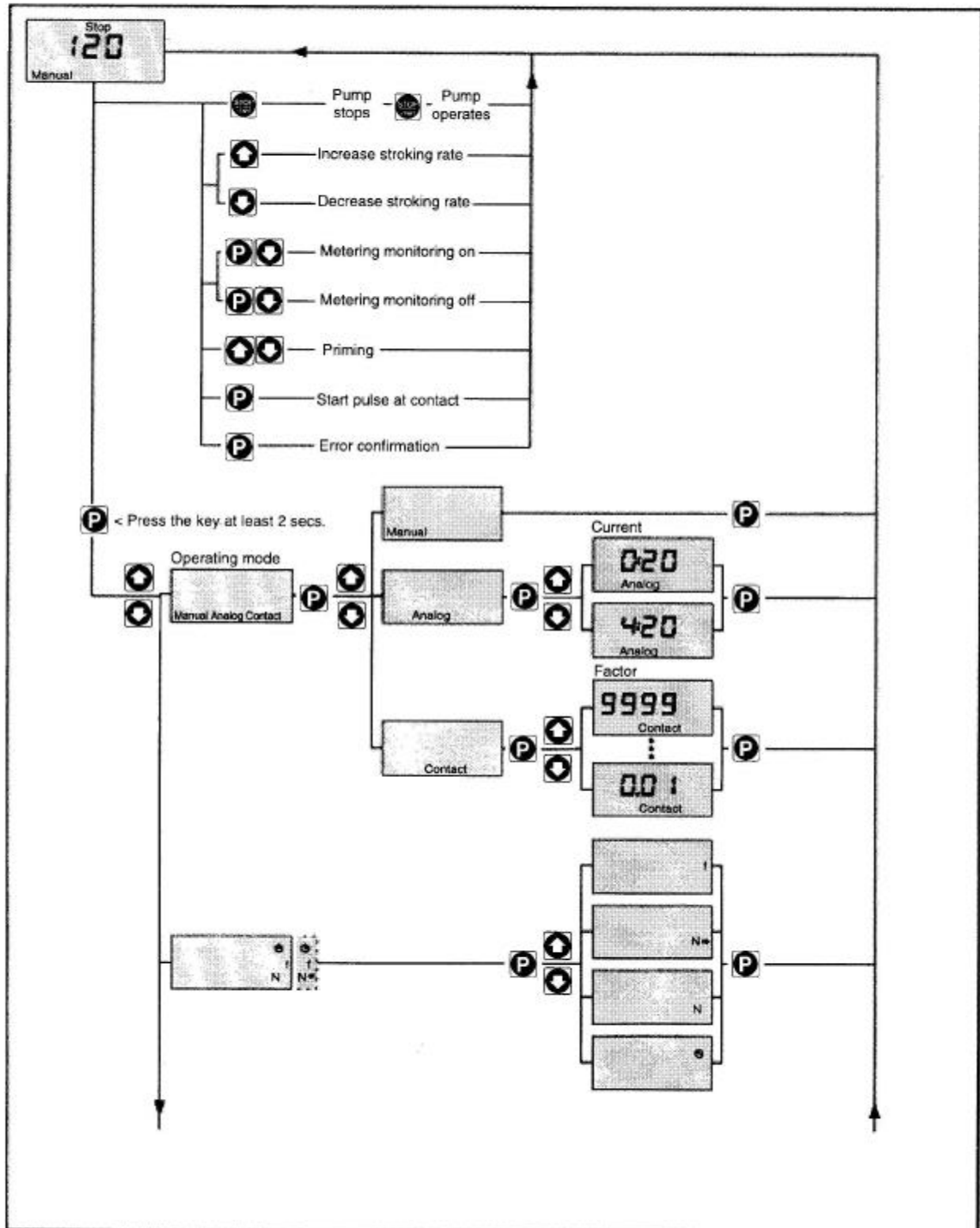
Entire display continues to flash:

- The pump must be sent back to the factory to be checked.

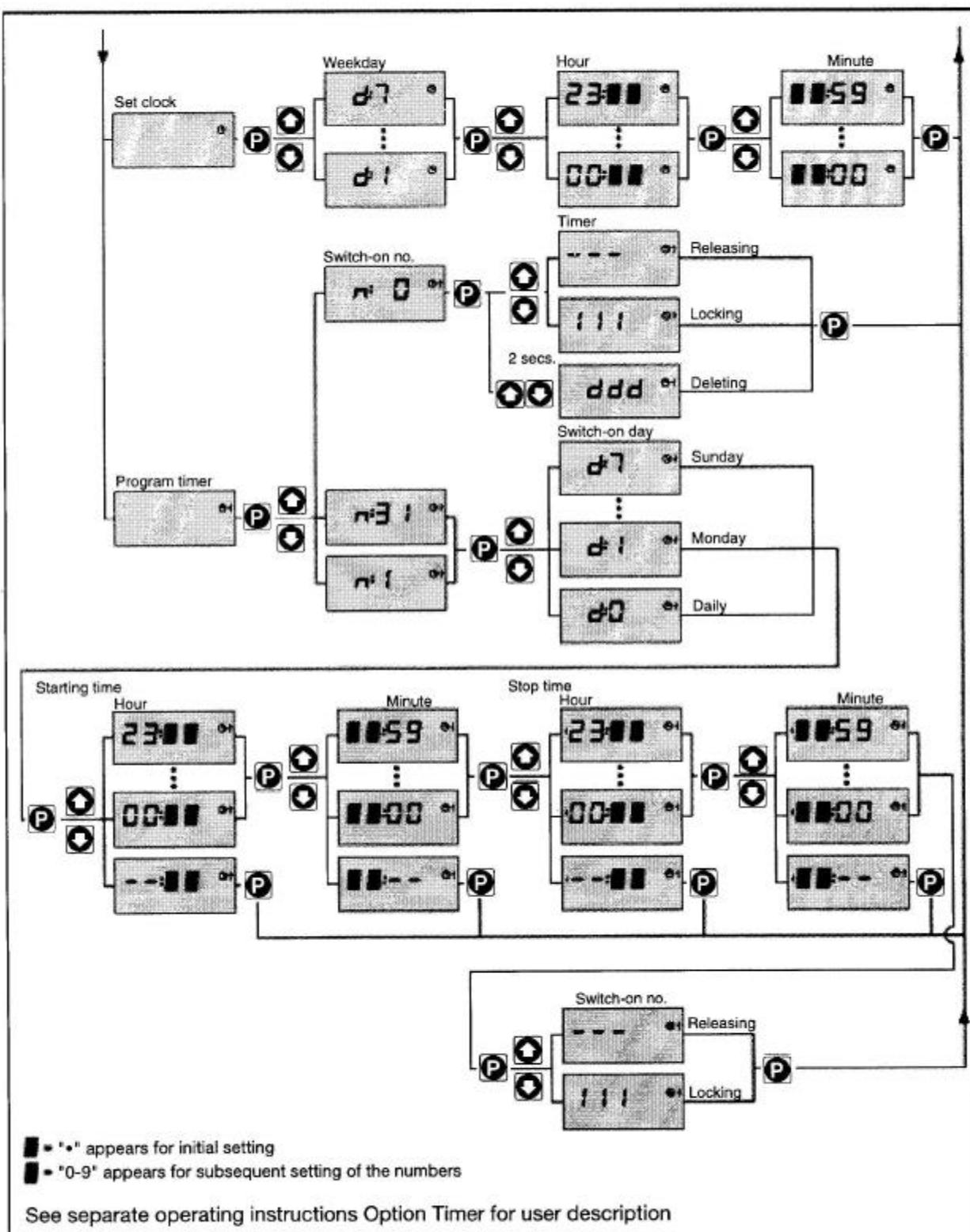
"E" appears on screen:

- Not an error message. **"E" indicates external contact operation.**

Operation (Option Version)



Operation (Option Version)



Operation (Option Version)

12.4 Overview operating scheme (option version)

12.5 Operation: Analog Control or with Pulse Multiplier/Divider

12.5.1 Analog control

Analog signals such as current signals (0/4-20 mA) or voltage signals (0-60 mV, 0-1 V and 0-10 V) can be used for direct proportional control of the stroking rate.



Warning

The voltage of analog control signals must be separated!


Specify whether current or voltage signal is desired using the identity code. The reverse proportional function e.g. 20 - 4/0 mA or 60 - 0 mV, 1 - 0 V, 10 - 0 V is available as a special option.

PLEASE NOTE:

100% stroking rate in analog operation corresponds to the number of strokes per minute set in "Manual" operation!



If for example in "Manual" operation the stroking rate was reduced to 10 strokes/min., in the "Analog" operation at maximum input variable only these 10 strokes/minute can be executed and displayed!

Selection of the signal range:

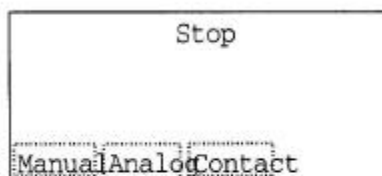
- Stop the pump with the  key -



Display

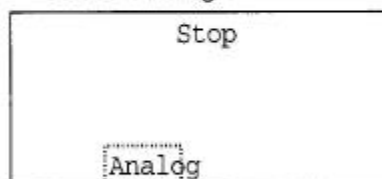



- Press the  key for two seconds until "Manual" blinks, and with the  key select the following display:

Operation (Option Version)




- Press the  key to lock in that screen, and with the  key select "Analog".




- Press the  key to lock in "Analog" and select the setting for the signal range "mA".




- Set the signal range desired with the  key.



- Confirm with the  key.
- For the 0 mA signal you obtain the display stroking rate 0 strokes/min and the error message "Error" with "Analog" flashing as the control signal is below 4 mA. The pump will operate when a mA signal is received by the pump.





If the pump is designed for voltage signals:

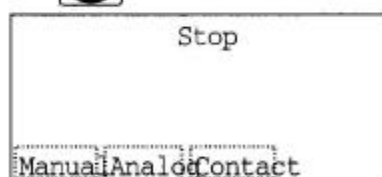
- Stop the pump with the  key.



Operation (Option Version)

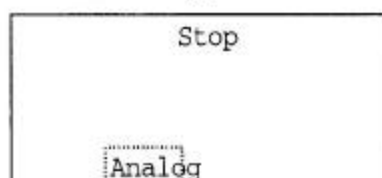
Display



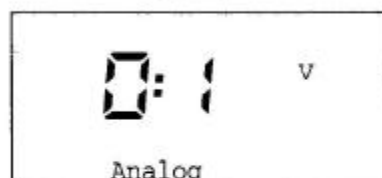
Press the  key for 2 seconds and select the following display with the  key:





- Press the  key to lock in the screen and with the  key select "Analog".



- Press the  key to confirm.



- Using the  or  key, the following ranges can be selected:



Operation (Option Version)



- Confirm the desired range with the  key.

Error message "Error Analog":

The advantage of a 4-20 mA signal is the metering pump reports the failure of this signal or if it drops below the 4mA value (e.g. in the event of a cable break) as an error as shown:



In order to eliminate the error message, at least 4 mA must be applied at the signal current input. After the pump starts again, the "Error" display and the flashing "Analog" go off.

If, however, after an error message the metering pump is supposed to remain in the "Error/stop" mode for application - specific reasons and not continue to feed automatically from 4 mA, the customer must fit a suitable automatic relay to support this function.

The fault annunciation relay then takes over the alarm annunciation from the optional fault annunciation relay of the metering pump and switches the metering pump off using the control function "Pause/stop".

For releasing the metering the automatic relay must then be released again and the "Pause/stop" control function must be revoked via the control cable.

Operation (Option Version)

12.5.2 Pulse Multiplier/Divider

The basic gamma/b allows activation by pulse input where 1 pulse = 1 pump stroke. With the optional pulse multiplier, one pulse can generate multiple strokes. As a divider, multiple pulses can generate 1 stroke.

When a factor smaller than 1.00 is entered, a step-down (divider) results; for a factor larger than 1.00, a step-up (multiplier) takes place.

Factor settings range from 0.01 to 9999.

Example table:

Pulse step-down (factor < 1), 1 metering stroke results after x pulses ($x = \frac{1}{c}$)

Pulse step-up (factor > 1), 1 pulse results in x metering strokes ($x = \frac{c}{1}$)

Factor	Pulses (sequence) to get 1 stroke	Metering strokes (sequence)
0.01	100	Metering strokes (sequence) in relation to pulse input
0.10	10	
0.25	4	
0.33	3.03 (4, 33 x 3)	
0.40	2.5 (3,2)	
0.50	2	
0.75	1.33 (2,1,1)	
1.00		
1.25		1.25 (1,1,1,2)
1.50		1.5 (1,2)
2.00		2
2.50		2.5 (2,3)
25.0		25
9999		9999

If an integer does not result by dividing by the factor, in the microprocessor the residual amount after the decimal point is added up and an additional stroke is executed as soon as the result reaches or exceeds the value 1.

On average, for injection operation, the precise metering amount is delivered according to the factor results.

With the Pulse Control option, the following functions are possible:

- Pulse step-down with factor 0.01 - 1.00
- Pulse step-up (preselection) with factor 1.00 - 9999; may be used as predetermining counter to deliver precise quantities in batch applications with one pulse input.

Operation (Option Version)


- Memory "Mem"
- Memory "Mem"
- Display of the step-down or step-up factor "N↔"
- Stroke counter device "N" (also available for Analog control)

Pulse step-down/step-up:

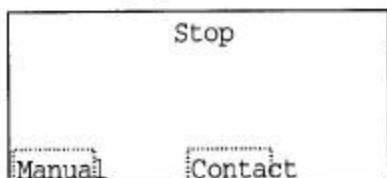
This function enables the number of pulses received to be divided by a factor of 0.01 to 1.00 or multiplied by 1.00 to 9999.

In connection with pulse-type water meters, the pump can be tuned into a process in an optimum manner or be operated by displaying the step-up factor "N↔" as predetermining counter.

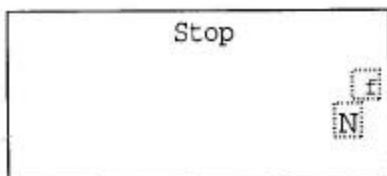
To set:



- Press the  key approx. 2 seconds.

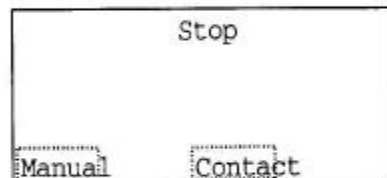
The display



- or

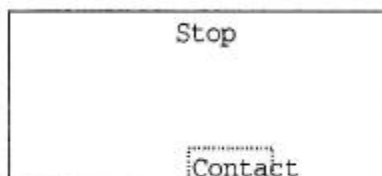





- Press the  or  key until "Manual" and "Contact" can be selected.



- Confirm with the  key.
- Press the  or  key until "Contact" appears.


Operation (Option Version)

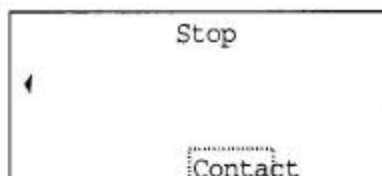



- Confirm with the  key.
- Press the  or  key.



The "←" setting in the display enables the activation of the memory function, "Mem". This function is useful when the incoming pulse rate exceeds the stroke rate of the pumps, yet to deliver chemical for every incoming pulse is needed. With memory activated, excess pulses are stored in memory and worked off later.

- When no longer desired switch "Mem" off with the  key.




- Confirm with ,
- the factor e.g. 1.00 is displayed.



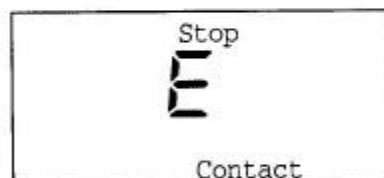
- Pressing the  or  key enables a factor of 5 to be set; i.e. with every incoming pulse, the pump executes five strokes.

Operation (Option Version)



- Confirm with .

Display "E" for external (remote) control in "Contact" operation.



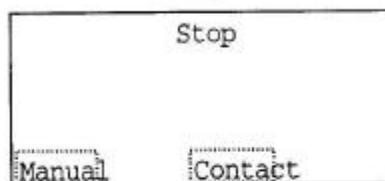
Selection of the display functions "f", "N↔" and "N":


So that the factor "N↔" of the step-up ratio, e.g. 5.00, is always displayed or the metering strokes executed are counted by being added on (stroke counter "N"), the following settings should be carried out.

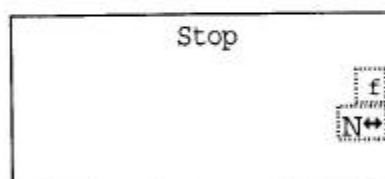
Display




- Press the  key approx. 2 seconds.

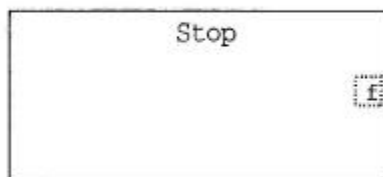


- Press the  key for display function.



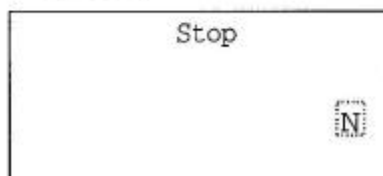
Operation (Option Version)

- Confirm with .




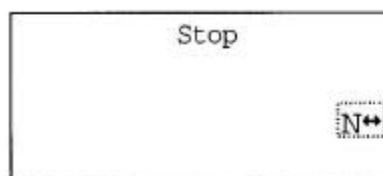
"f" specifies the stroking rate in 0 to 120 strokes per min. in manual mode, but it has no function in contact mode.



- By pressing the the  key several times, "N↔" or "N" is selected.



Stroke counter "N" counts the strokes executed in all operating modes. A maximum of 9999 can be counted. After, the display starts again at 1. The excess strokes are indicated by a "◀" in the display.

- Set display function "N↔" with the  key.



- Confirm with .
- After starting via an external contact or after briefly pressing the  key, 5 metering strokes of the stroking rate preselected in "Manual" operation are worked off and displayed in a subtracting order.




Operation (Option Version)

12.5.3 Preselection operation and memory

Preselection operation

The setting previously described (pulse step-up "Contact" and "N↔" with factor > 1), can also be operated as a predetermining counter to deliver a preset number of strokes.

After starting via an external contact (pulse) or the  key, the preselected no. of strokes are counted down on the display. When the "1" is reached, the pump stops and the display resets back to the preselected number.

If a further start contact (pulse) takes place before all of the strokes to be executed are completed, the remaining strokes are not executed and the pump resets.

If the memory function "Mem" has been activated, with every start contact the preselected number of strokes is added.

Please note:

When using the preselection operation without memory, the internal memory of the pump is not active and a reset takes place when executing any functions which result in the pump stopping. The display jumps back to the preselected number of strokes and must be started again via a remote contact or by

pressing the  key.

Memory operation "Mem"

The memory function enables the pump to accept incoming pulses at a rate of up to 40 per second. They are then worked off later as discharge strokes with the stroking rate set in "Manual" operation.

A maximum of 65,535 pulses at factor 1.00 are saved. The number of pulses which can be saved depends on the factor and results in, for example, factor of 0.01, a total of 6,553,500 pulses or at factor 100 total of 655 pulses.

An "Error" message takes place in the event the memory capacity is exceeded, the "Mem" display flashes and the pump is stopped.

Maximum input pulse frequency, 40 pulses/second; necessary contact duration 20 ms.

12.5.4 Relay option

Any of four relay options may be ordered with the pump (ordering specification takes place via identity code). The function of the relay

Operation (Option Version)

is to activate external audible, visual alarm or operation signals, pace additional pumps or activate external accessory items such as solenoid valves or backup metering pumps.

Only one relay option is possible per pump, and it is not possible to switch to another switching mode.

Switching mode no. 1: "Fault annunciation relay de-energizing"

Used as a collective fault indicator for early low level warning and final low level switch-off, metering monitoring, fuse and power failure reporting as well as a system error.

Function: Relay for alarm de-energizing

PLEASE NOTE:

For version no. 1, care should be taken that even when the power is switched off the pump, the relay de-energizes and an alarm is issued!

The main power supply line and the alarm annunciation should be locked with each other: if when the power is switched off, no alarm message should take place!

Switching mode no. 2: "Pacing relay energizing"

For issuing a contact (pulse) parallel to the metering stroke of the stroke solenoid. Allows a second "slave" pump to be paced by the main pump.

Contact duration approx. 150 ms.

Switching mode no. 3: "Fault annunciation relay energizing"

Used as an alarm relay for low level early warning and low level final switch-off, metering monitoring and system error.

Function: Relay energizing in the event of an alarm

Switching mode no. 4: "Timer relay energising"

The timer relay is functionally dependent of the metering times set using the timer function (switching periods), and can be used for simultaneously controlling a second metering pump or other electrical devices.

The timer relay is paced in the 3 following operating cases:

- a) The timer was released and the pump meters within an active switching period.

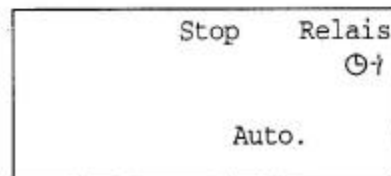
Operation (Option Version)

- > Timer relay is energized.
- b) Timer has been released but the pump has stopped using the timer because no switch-on period is active.
 - > Timer relay is de-energized.
- c) Timer has been locked.
 - > Timer relay is energized.

Display in the event of an alarm annunciation as fault annunciation relay



Display in the event of an automatic pump halt as timer relay.



Technical data:

Center-zero relay, contact load 250 V /2 A (ohmic load).

Relay cable 6 ft (2 m) long (3 conductor, 0.75 mm), permanently connected.

13 Maintenance





WARNING

Metering pumps and their peripheral devices may only be serviced by trained and authorized persons!

PLEASE NOTE:

Service intervals: every three months, shorter intervals under heavy load (e.g. continuous operation)!

The maintenance of the gamma metering pump is limited to checking

- the liquid end screws (tightness)
- the discharge lines (tightness)
- the discharge and suction valves (tightness)
- The weep hole at the back-plate (wetness can indicate a diaphragm rupture)
- the pump is feeding correctly - for this purpose briefly operate the pump in priming operation (simultaneously pressing the  and  key).

14 Troubleshooting/eliminating errors

14.1 Errors you can eliminate yourself

PLEASE NOTE:

In order to be able to eliminate small errors at any time, we recommend that you always have a set of spare parts - consisting of diaphragms, valves, balls, seals and fuses!

You can find the order nos. for these in our product catalog under "Spare parts kit for gamma/4"!



WARNING:

For maintenance and repair work, always rinse out the liquid end first if dangerous or unknown media are used!



WARNING:

When metering dangerous or unknown fluids, protective clothing must be worn when working on the liquid end (safety glasses, rubber gloves, rubber aprons)



WARNING:

Always relieve the discharge line of pressure first before working on the pump!

Always empty and rinse the liquid end!

Observe the material safety data sheets of the metered fluid!

Troubleshooting/Eliminating Errors

ATTENTION:

Only set the stroke length when the pump is running and when the setting bolt of the metering stroke is briefly relieved of pressure.

14.1.1 Pump does not prime in spite of full stroke movement and bleeding

Possible cause: Crystalline deposits due to dried out valves

- Remedy:*
- Remove suction hose from the supply tank and rinse the liquid end well.
 - If there is no improvement, the valves should be disassembled and cleaned.
 - The valve insert in the suction and discharge valve can be pushed out with a 3 mm punch.

14.1.2 Float switch does not switch the metering pump off at minimum chemical level

Possible cause: Float is blocked.

- Remedy:*
- Remove deposits and clean float.



14.1.3 Pump does not meter although yellow display lamp (1) flashes

Possible cause: The stroke length is set to "zero" or no value is set.

- Remedy:*
- Increase the stroke length with the adjustment knob (3).



Other possible cause: Air is trapped in the liquid end.

- Remedy for SS and TT pumps:*
- Relieve the discharge line of pressure using the overflow or relief valve, or by releasing the discharge line at the injection valve or discharge connection of the pump. Protective clothing, glasses, gloves, are to be worn.

- Bleed by quick priming - simultaneously press the  and  keys until the suction line and liquid end are filled free of bubbles.

- Remedy for NP and PP pumps:*
- Do not loosen the discharge line as the bleed valve is present.
 - Open the bleed valve (17) by max. 1 turn counter-clockwise.

Troubleshooting/Eliminating Errors

- Quick priming - simultaneously press the  and  keys until the suction line and liquid end are filled free of bubbles.
- Close the bleed valve.

Please note:

For pumps with two-stage level switch:

Air cannot normally enter the suction line or the liquid end as the pump switches to early warning (flashes "Minimum") when the first switching point is reached. When the second switching point is reached, after a drop of 30 mm in the chemical tank, the pump switches itself off before sucking air into the line.

14.1.4 Red warning lamp (8) lights up - "Error" readout on display (4) flashes


Error message "Error minimum"

Possible cause: Lack of chemicals or function plug missing

- Remedy:*
- If the float switch is used, the error message ends by filling up the supply container.
 - If the float switch is not used, check whether the function plug level (11) is plugged in.


Error message "Error flow"

Possible cause: If the flow monitor is used, no or too little metering.

- Remedy:*
- Briefly press the  key or execute the control function "Pause/Stop" (remote on/off) to restart pump.
 - If the error message appears again, bleed the liquid end and increase the stroke length. Adjustment of the flow monitor may be required.

Complete display flashes

Possible cause: System error

- Remedy:*
- Briefly press the  key or execute the control function "Pause/Stop" (remote on/off) to restart pump.

Complete display continues to flash The pump must be sent to the factory to be checked.

> **See chapter 15 / page 80 for more information.**

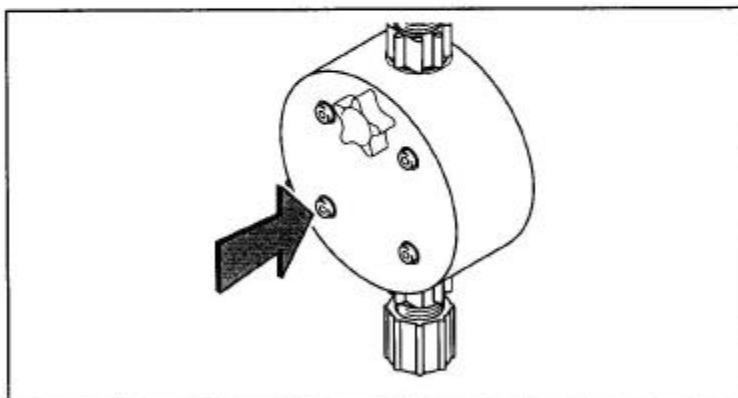
Troubleshooting/Eliminating Errors

14.1.5 Fluid is leaking at the back-plate

Possible cause: The liquid end is not tight at the pump diaphragm.

Remedy:

- Tighten the screws (arrow) in the liquid end in an alternating pattern.



ATTENTION:

It is essential that the torques for the screws are observed!

Torques for screws:

*M4: **16 lb./inches***

*M5: **17 lb./inches***

PLEASE NOTE:

The torque of the liquid end screws is to be checked after 24 hours of operation!

For PP pumps the torques are to be checked additionally every three months!

- If fluid is still leaking, the diaphragm has ruptured and must be replaced

PLEASE NOTE:

The pump diaphragm is a part subject to wear - its service life depends on back pressure in the system, operating temperature, and qualities of the fluid to be metered!

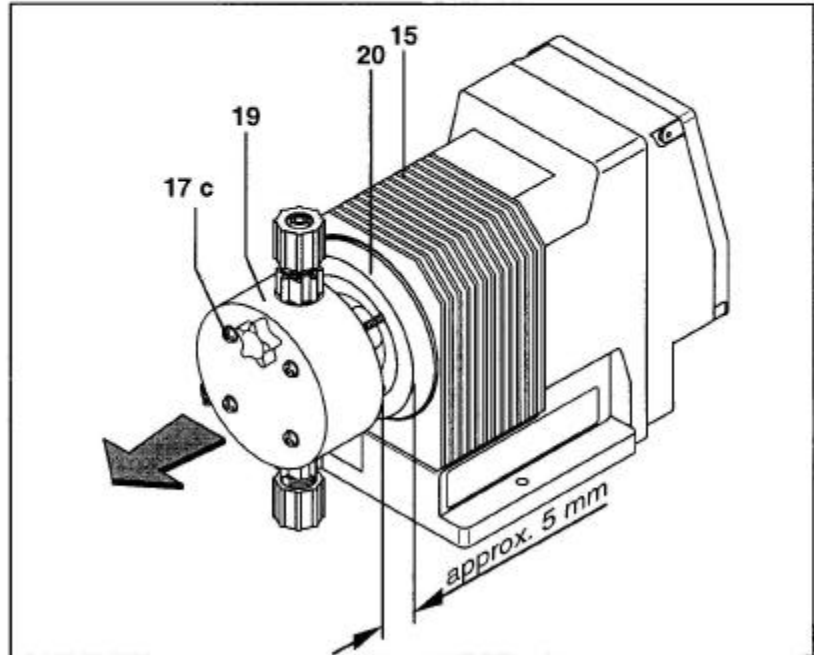
PLEASE NOTE:

When using abrasive media, the service life of the diaphragm is reduced and the diaphragm must be checked more often!
The installation of a diaphragm failure detector, available from ProMinent, is recommended in this case!

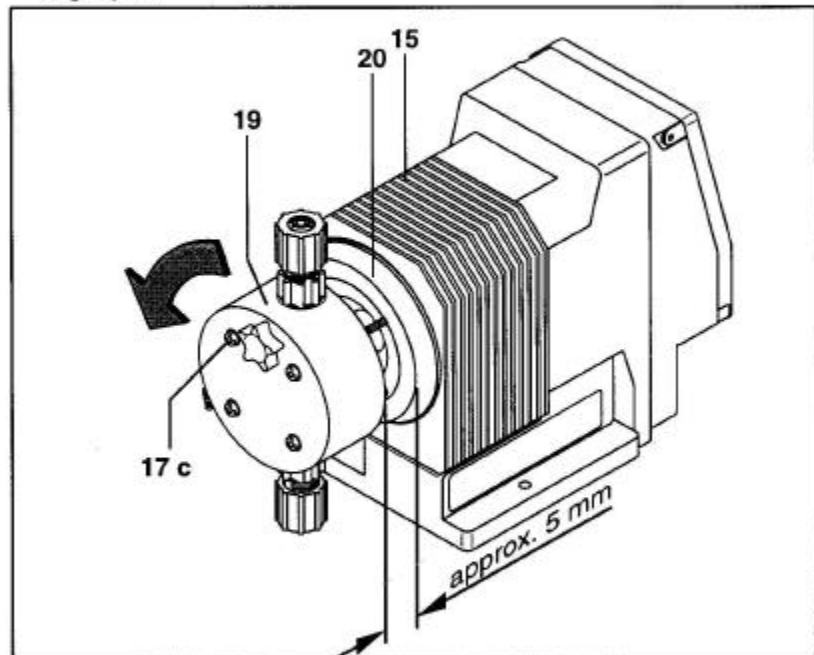
Troubleshooting/Eliminating Errors

Replacing the pump diaphragm:

- With the pump running, set the stroke length with the knob (3) to "0". Stop the pump, and disconnect the power supply.
- Loosen the screws (17c).

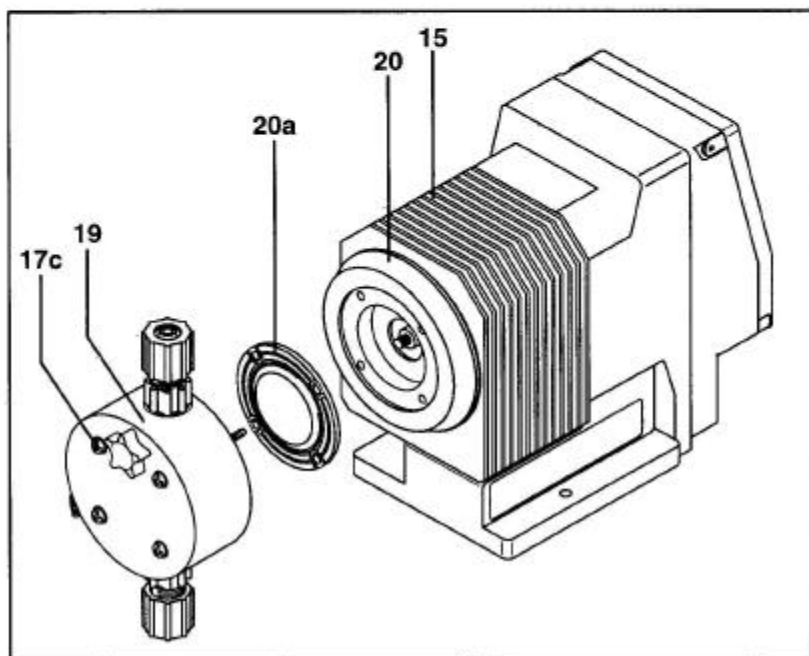


- Pull out the liquid end (19) with screws from the back-plate (20) and pump enclosure (15) (approx. 5 mm) until no resistance can be felt from the screws. Do not remove the liquid end completely.
- Hold the housing (15) in one hand and with the other hand, unscrew the diaphragm (20a) and the back-plate (20) with the screws (17c) still in place (15a) by turning the liquid end (19) to the left with a slight jerk.



Troubleshooting/Eliminating Errors

- Now pull the liquid end with the screws out of the diaphragm and completely unscrew this from the solenoid shaft.
- Remove the back-plate (20) from the enclosure (15). Clean any residual chemical from exposed parts.



- Screw on a new diaphragm (20a) to the stop of the solenoid shaft (15a) and check that the threads are smooth.
- Unscrew the diaphragm again from the solenoid shaft.
- Replace the back-plate onto the enclosure again.
- Insert the diaphragm into the back-plate and screw on 2 thread turns.

ATTENTION:

Turn the diaphragm in such a way that the 4 holes of the diaphragm and back-plate match precisely!

The drain opening (weep hole) of the back-plate must point downwards!

- Place the liquid end with screws onto the diaphragm and back-plate so far that the parts can still be turned (again leave approx. 5 mm distance between the liquid end and the intermediate disk!).
- Now turn the parts clockwise until the diaphragm is sitting tightly (the twist resistance of the solenoid return spring can be felt).

ATTENTION:

Do not overtighten the diaphragm, especially types 1000 and 1601!

Troubleshooting/Eliminating Errors

- Set the stroke length to 100% with the knob (3), and with the metering pump running, turn the complete liquid end to the right until the discharge connection points upwards vertically (arrows on the suction/discharge valves point in direction of fluid flow).
- Stop the pump.
- Tighten the 4 screws (17c) in an alternating pattern.

ATTENTION:

It is essential that the torques for the screws are observed!

Torques for screws:

M4: 16 lb./inches

M5: 17 lb./inches

PLEASE NOTE:

The torque of the liquid end screws is to be checked after 24 hours operation!

For PP pumps, the torques are to be checked additionally every three months.

- With the pump running, set the stroke length desired.

14.1.6 Exchanging the complete liquid end

PLEASE NOTE:

Complete liquid ends are delivered with the bleed valve open!

After priming and bleeding, the fine bleeding screw (17a) and the bleed valve (17) must be tightened!

Check that the suction and discharge valves fit firmly!

14.2 Errors which require customer service assistance



DANGER:

Electrical repairs may only be carried out by trained electricians!



DANGER:

Before opening the pump, pull out the power plug or cut off the power supply!

Check that the pump is voltage-free!

During the repair work, it is essential that it is not possible for the pump to be switched on again!



WARNING:

Metering pumps may only be repaired by trained and authorized persons!

Troubleshooting/Eliminating Errors

14.2.1 Pump does not move, yellow display light (1) does not light up, no readout on the display (4)

Possible cause: Incorrect voltage is being applied.

Remedy:

- Use the specified voltage according to the voltage specification on the name plate.

Other possible cause: Faulty fuse

Remedy:

- Have the fuse checked by an authorized repair technician and if necessary have it replaced.

PLEASE NOTE:

Only use the correct original equipment fuses!

Type Littlefuse, super slow, dimensions 6.3 x 32 mm

Version 115 V -

fuse 0.5 ATT, order no. 71.20.37.1

Version 230 V -

fuse 0.25 ATT, order no. 71.20.35.5

- If the error cannot be corrected by changing the fuse the pump must be checked in the factory.

> See chap. 15 / page 80 for more information

14.2.2 Main power cable damaged

Remedy:

- Have the power cable replaced by an authorized repair technician.

Repair

15 Repair



WARNING:

Metering pumps may only be repaired by trained and authorized persons!

Customer service

Inform your nearest local authorized distributor.

Or contact the nearest ProMinent subsidiary or representative.

(Addresses can be found on the back page of these operating instructions)!



WARNING:

Pumps for radioactive media

Pumps for radioactive media may not be sent to ProMinent for repair!

PLEASE NOTE:

Only send the metering pump back for repair once it has been cleaned and the liquid end has been rinsed!

PLEASE NOTE:

The legal regulations for occupational safety[e.g. the regulation governing places of work, hazardous substances, the prevention of accidents and environmental protection regulations (law governing waste or water resources)] oblige all companies to protect their employees or people and the environment against damaging effects from handling hazardous substances!

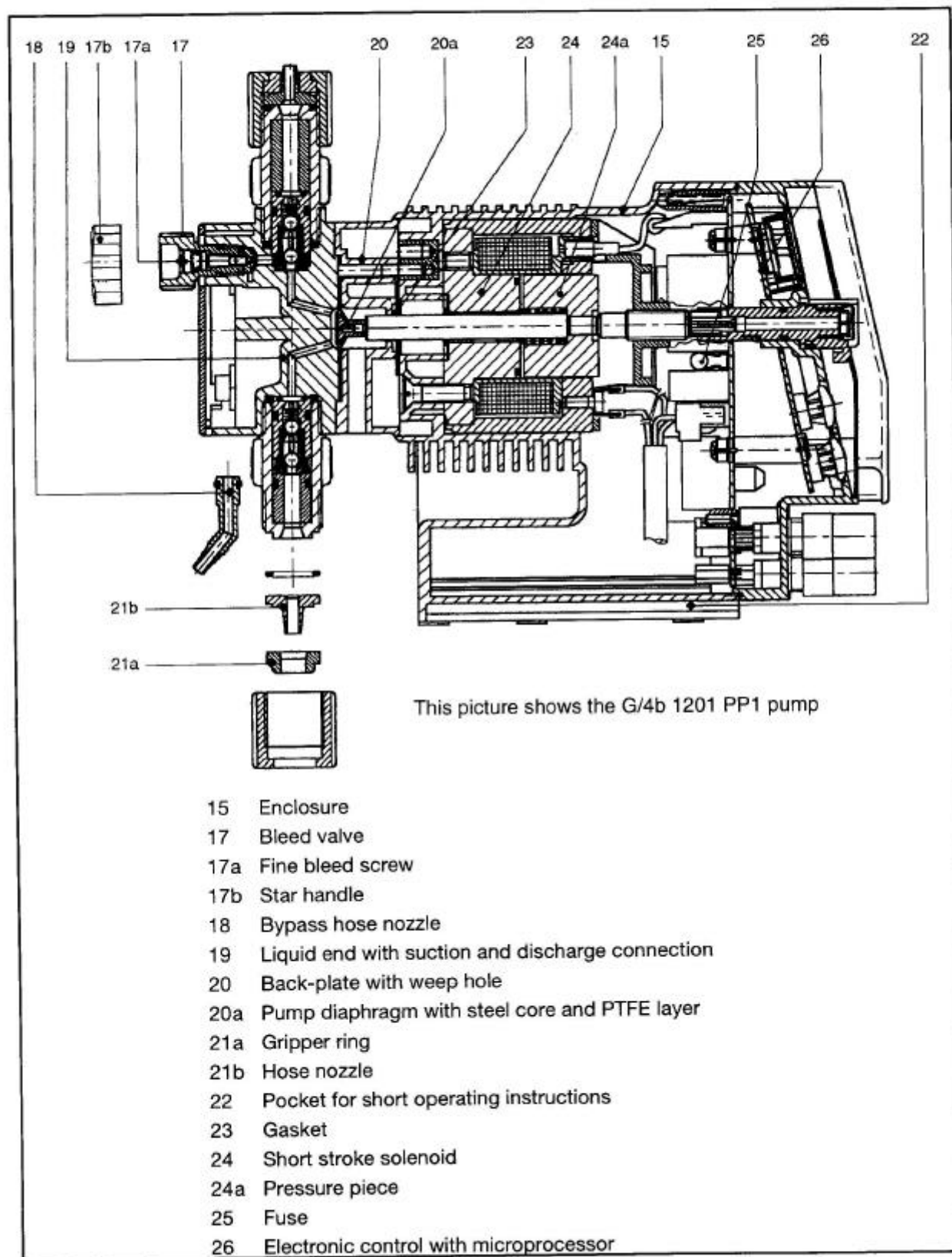
ProMinent will only work on pumps returned with a signed safety certificate.

In addition to emptying and cleaning the pump carefully, safety measures are necessary; the following information must be listed in the certificate confirming the pump is recognized as being safe! This can be found in part of the inspection/repair contract.

There is a standard form at the end of these operating instructions for this purpose!

We reserve the right not to accept the pump for repair. Pumps which were operated with materials with a radioactive load are not accepted as a general rule!

Appendix/Cross Section of Pump



Warranty Application

Please copy and send in with the pump.

If the pump breaks down within the warranty period please clean the pump and send it back along with the fully completed warranty application and safety sheet.



Please complete in full !	
Warranty application for metering pumps	No.
Company Tel. no.: Date: Address: Your name: Order no.: Delivery date: Pump type/ identity code: Serial no.:	
Short description of fault:	
Type of fault:	
1 Mechanical fault <input type="checkbox"/> Unusual wear <input type="checkbox"/> Parts subject to wear <input type="checkbox"/> Rupture/other damage <input type="checkbox"/> Corrosion <input type="checkbox"/> Damage during transport	2 Electrical fault <input type="checkbox"/> Connections such as plugs or cables loose <input type="checkbox"/> Operating elements (e.g. switches) <input type="checkbox"/> Control
3 Leakage <input type="checkbox"/> Connections <input type="checkbox"/> Liquid end	4 No or poor capacity <input type="checkbox"/> Diaphragm defective <input type="checkbox"/> Other
Application conditions of ProMinent pumps: Location/system description: Pump accessories used: Start Up (date): Running time (approx. operating hours): Please specify set-up data and enclose sketch of the system.	

Installation Data

Customer: _____																								
Project no: _____	Date: _____	<input type="checkbox"/>	Sketch enclosed: _____																					
Metering pump <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 40%;">Type</td> <td style="width: 10%;">-</td> <td style="width: 50%;">_____</td> </tr> <tr> <td>Capacity</td> <td>gph</td> <td>_____</td> </tr> <tr> <td>Stroking rate</td> <td>s/min.</td> <td>_____</td> </tr> <tr> <td>Stroke length</td> <td>%</td> <td>_____</td> </tr> <tr> <td>Valve spring pressure suction side</td> <td>psig</td> <td>_____</td> </tr> <tr> <td>Valve spring pressure discharge side</td> <td>psig</td> <td>_____</td> </tr> </table>				Type	-	_____	Capacity	gph	_____	Stroking rate	s/min.	_____	Stroke length	%	_____	Valve spring pressure suction side	psig	_____	Valve spring pressure discharge side	psig	_____			
Type	-	_____																						
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Valve spring pressure suction side	psig	_____																						
Valve spring pressure discharge side	psig	_____																						
Medium (fluid) <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 40%;">Chemical, concentration</td> <td style="width: 10%;">%</td> <td style="width: 50%;">_____ / _____</td> </tr> <tr> <td>Percent solids/size of particle</td> <td>%/mm</td> <td>_____ / _____</td> </tr> <tr> <td>Material solid/hardness</td> <td>Mohs</td> <td>_____</td> </tr> <tr> <td>Dynamic viscosity</td> <td>cP</td> <td>_____</td> </tr> <tr> <td>Specific Gravity</td> <td></td> <td>_____</td> </tr> <tr> <td>Vapor pressure at operating temperature</td> <td>psig/°F</td> <td>_____ / _____</td> </tr> </table>				Chemical, concentration	%	_____ / _____	Percent solids/size of particle	%/mm	_____ / _____	Material solid/hardness	Mohs	_____	Dynamic viscosity	cP	_____	Specific Gravity		_____	Vapor pressure at operating temperature	psig/°F	_____ / _____			
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System suction side <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 40%;">Positive suction head?</td> <td style="width: 10%;">yes/no/ft</td> <td style="width: 50%;">_____</td> </tr> <tr> <td>ID of suction line</td> <td>in.</td> <td>_____ / _____</td> </tr> <tr> <td>Suction lift min/max</td> <td>ft.</td> <td>_____ / _____</td> </tr> <tr> <td>Length of suction line</td> <td>ft.</td> <td>_____</td> </tr> <tr> <td>Number of angles/valves</td> <td></td> <td>_____</td> </tr> <tr> <td>Accumulator?</td> <td><input type="checkbox"/></td> <td>_____ </td> </tr> <tr> <td>Pulsation Dampener?</td> <td><input type="checkbox"/></td> <td>_____ </td> </tr> </table>				Positive suction head?	yes/no/ft	_____	ID of suction line	in.	_____ / _____	Suction lift min/max	ft.	_____ / _____	Length of suction line	ft.	_____	Number of angles/valves		_____	Accumulator?	<input type="checkbox"/>	_____	Pulsation Dampener?	<input type="checkbox"/>	_____
Positive suction head?	yes/no/ft	_____																						
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Suction lift min/max	ft.	_____ / _____																						
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Number of angles/valves		_____																						
Accumulator?	<input type="checkbox"/>	_____																						
Pulsation Dampener?	<input type="checkbox"/>	_____																						
System discharge side <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 40%;">Static system pressure min/max.</td> <td style="width: 10%;">psig</td> <td style="width: 50%;">_____ / _____</td> </tr> <tr> <td>ID of discharge line</td> <td>in.</td> <td>_____</td> </tr> <tr> <td>Length discharge line</td> <td>ft.</td> <td>_____</td> </tr> <tr> <td>Back pressure valve?</td> <td>yes/no</td> <td>_____</td> </tr> <tr> <td>Number angles/valves</td> <td></td> <td>_____</td> </tr> <tr> <td>Accumulator?</td> <td><input type="checkbox"/></td> <td>_____ </td> </tr> <tr> <td>Pulsation Dampener?</td> <td><input type="checkbox"/></td> <td>_____ </td> </tr> </table>				Static system pressure min/max.	psig	_____ / _____	ID of discharge line	in.	_____	Length discharge line	ft.	_____	Back pressure valve?	yes/no	_____	Number angles/valves		_____	Accumulator?	<input type="checkbox"/>	_____	Pulsation Dampener?	<input type="checkbox"/>	_____
Static system pressure min/max.	psig	_____ / _____																						
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Length discharge line	ft.	_____																						
Back pressure valve?	yes/no	_____																						
Number angles/valves		_____																						
Accumulator?	<input type="checkbox"/>	_____																						
Pulsation Dampener?	<input type="checkbox"/>	_____																						

Safety Certificate

Please copy and send in with the pump!

Safety Certificate

We herewith certify that the enclosed device

Type:

Serial-no.:

is free of

- **chemical**
- **biological or**
- **radioactive substances**

which are a health hazard.

The device has been thoroughly cleaned before being shipped.

Fluid which was pumped:

Signature

Date

Layout

Customer:

Project No.:

Date:

