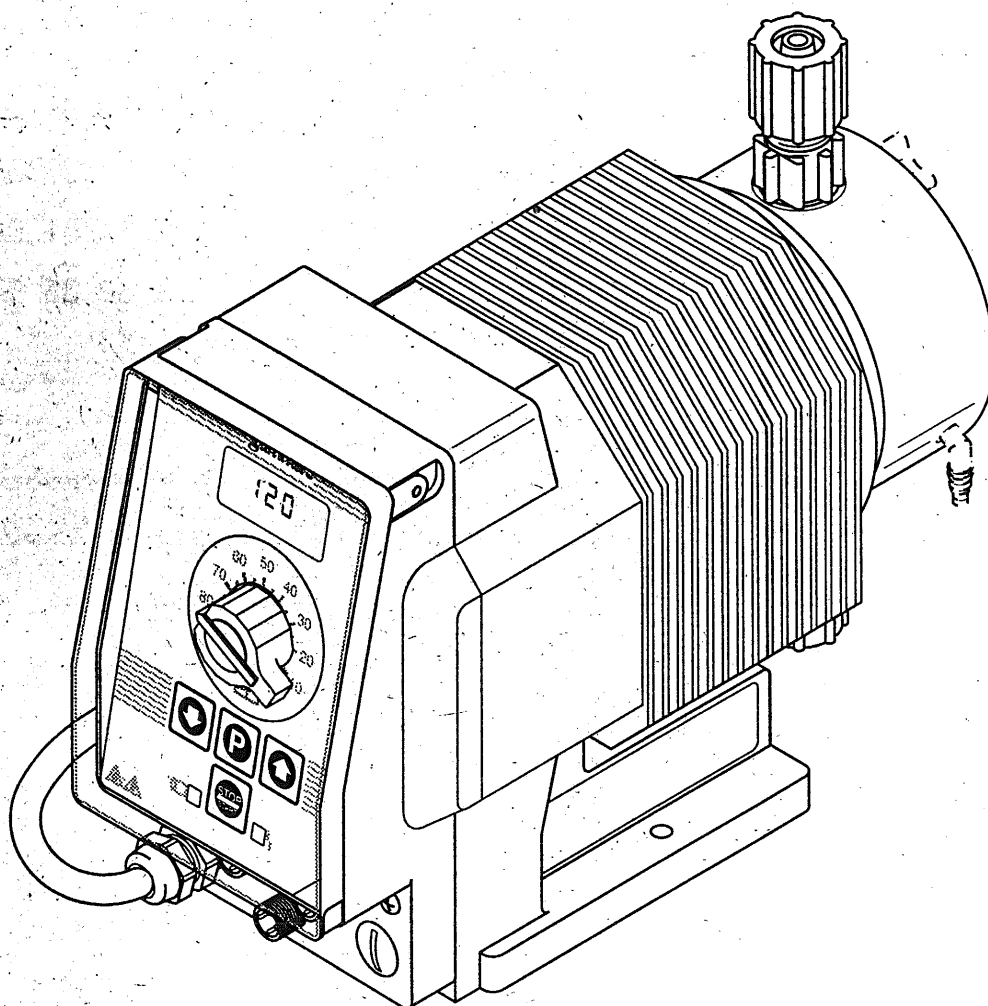


Operating Instructions

Metering Pump

ProMinent® gamma G/5a

G/5a-001-D



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!

PM-BA-150 • Pt. no. 98.13.13.0

Explanation of Devices and Operating Parts

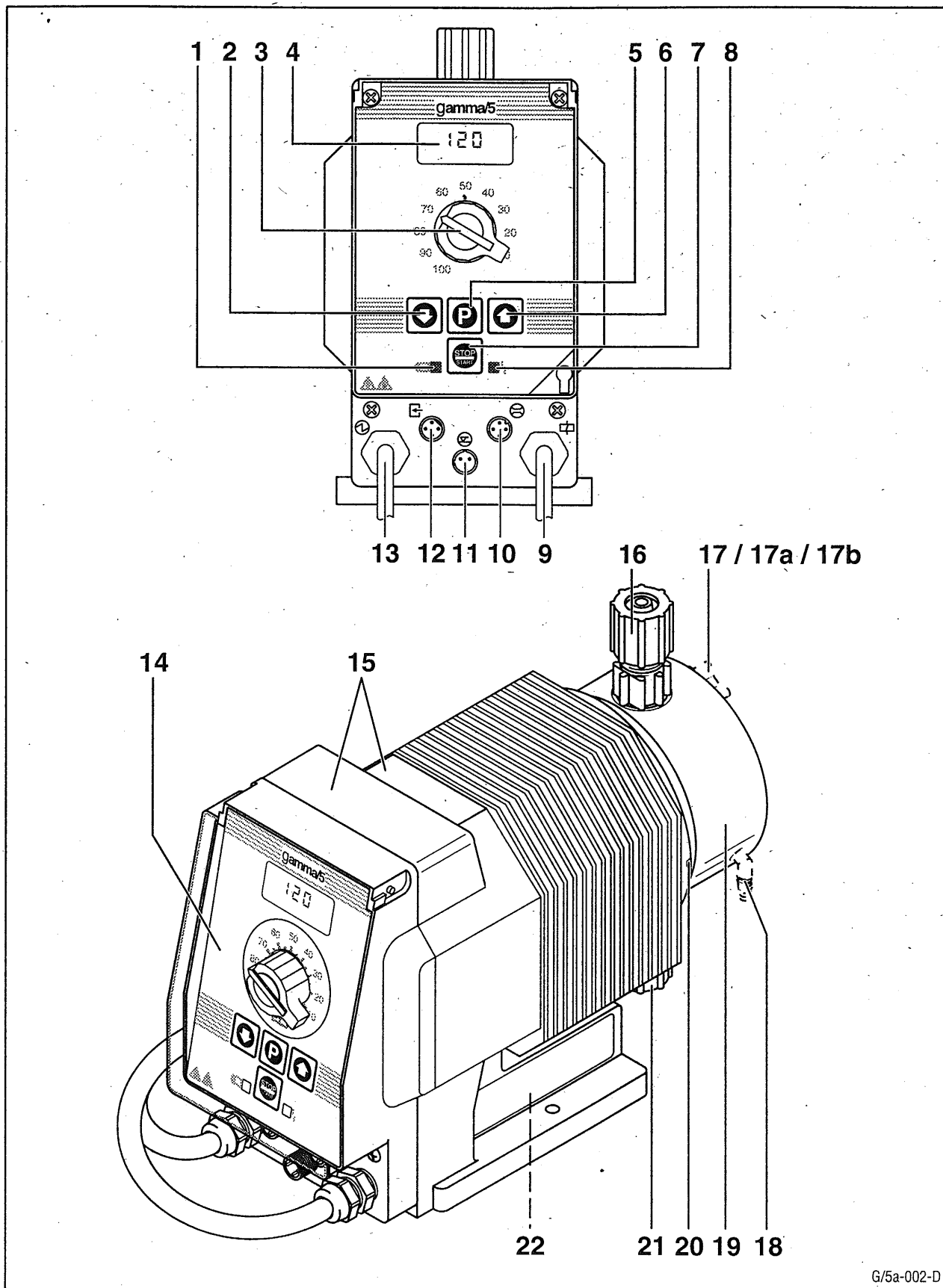
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on pages:

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Device Overview/Control Elements



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General Notes for Users

i General notes for users

These operating instructions describe the technical data and functioning of the G/5a metering pump, provide comprehensive safety instructions and are arranged in clear operational steps, as explained in the following examples.

Equipment descriptions are indicated by normal text:

Analogue signals such as current signals 0/4 - 20 mA or voltage signals adjustable from 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 screw in the screw so far until the screw head still projects 3.5 to 4 mm.

References are shown by arrows and bold texts:

> Detailed description from 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 obtain a fixed hose connection if you pull shortly on the line connected to the liquid end and subsequently retighten the union nut hand-tight!

Mains 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.

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Functions

2.2 Functions

2.2.1 The mechanics

<i>The enclosure</i>	Highest protection against chemical attacks, dust and spray water by means of glass-fibre reinforced plastic. Robust, shock-proof, low weight and an enclosure rating to IP 65.
<i>The solenoid drive</i>	<p>Conventional pump drives consist of an electric motor with gears and many moving parts.</p> <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 1.25 mm.</p> <p>The stroke length adjusting mechanism is connected directly to the solenoid. Thus a most accurate stroke length adjustment is possible without locking and self- adjustment.</p>
<i>The pump diaphragm</i>	A DEVELOPAN® composite pump diaphragm with long service life of fabric-reinforced high-quality EPDM with a vulcanised steel core and PTFE Teflon coating on the media-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 (NP)- PTFE (TT)- stainless steel 1.4571 (SS) <p>Additionally types 1602 to 0417 (PP and NP) have a combined bleed valve with fine adjustment.</p> <p>Especially for highly viscous materials, liquid ends from the HV series are available in</p> <ul style="list-style-type: none">- polypropylene (PP4) <p>with extended flow cross section and larger, springloaded single ball valves.</p>
<i>Operating voltages</i>	Gamma metering pumps are available for 230 and 115 V mains voltages. Wide voltage ranges are accepted: from 207 to 254 V in the upper and from 108 to 135 V in the lower range: for mains frequencies from 50 to 60 Hz.
<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 alarm is issued.
<i>Lighting</i>	The optional illumination of the LCD display (4) guarantees that the display can be easily read even in bad light conditions.

Introduction/Functions

1 Introduction

ProMinent® gamma 5a are microprocessor-controlled, solenoid-driven diaphragm metering pumps capable of dialogue for metering fluids.

Sophisticated mechanics, state-of-the art control technology, easy uniform operation with user guidance in plain language, maximum operational safety thanks to diagnosis of external error sources too, almost unlimited adaption possibilities to process automation systems, self-monitoring of the metering capacity and high metering safety in the capacity range of 2 to 30 l/h at a maximum counter pressure of 16 to 2 bar.

2 Functions

2.1 Functional principle

Gamma 5a metering pumps predominantly consist of

a **pump drive**

with enclosure, stroke solenoid and electronic microprocessor control

and a **liquid end**

with liquid end, suction and pressure connection, pump diaphragm and intermediate disk.

The feeding procedure takes place in batches. The stroke length is max. 1.25 mm.

For every pulse which comes from the electronics a magnetic field builds up in the field coil and a moveable mounted pressure piece is attracted.

In doing so the pump diaphragm displaces the medium in the liquid end by means of a pressure valve, and the valve on the suction side closes.

After the switch-on pulse is terminated the magnetic field de-energises, the pressure piece from the stroke solenoid is reset by the recuperating spring and the diaphragm returns to the initial position. The pressure side is closed. In this way the medium is sucked into the liquid end (suction stroke).

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

The metering pumps can be retrofitted to suit the customer's specific needs (options).

Functions

2.2.3 Options

The versions listed below can be obtained from ProMinent individually or as a freely combinable package.

Analog Control

Analogue 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.

For example, in the event of a cable rupture (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 entered on ordering with the identity code.

> **Detailed description from page 62**

Pulse Control

Pulse Control is used for adapting the gamma metering pump to all types of pacers and for saving additional control devices.

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

Pulse set-down and step-up

By entering a factor in the range from 0.01 to 9999 the step-down or step-up 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 from page 67**

Display "f"

Displays the stroking rate in 0 to 120 (100) strokes/min.

> **Detailed description from page 69**

Predetermining counter "N↔"

The predetermined number of strokes can be called up 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 from page 69**

Stroke counter "N"

The stroke counter in all operating modes counts the strokes executed and shows these on the display (4). A maximum of 19,998 strokes can be counted, after this the display starts at 1 again.

> **Detailed description from page 69**

Memory "Mem"

A memory with a storage capacity of 65,535 ($2^{16}-1$) pulses or strokes can be additionally switched on. Thus incoming pulses can be registered and worked off.

> **Detailed description from page 71**

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, brown and black wires are not connected with each other. When the contact is closed the pump operates, brown and black wires are connected with each other.

> Detailed description from page 58

Internal operation "Manual"

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

The stroking rate can be set with the keys (2 or 6) from 120 (100) to 0 strokes/min. The number is displayed on the display (4).

> Detailed description from page 54 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 (100) strokes/min are possible - there is no danger of overdriving.

Please note:

The stroking rate set in the internal operation "Manual" is valid for the external operation "Contact" as max. stroking rate.

> Detailed description from page 55

Metering monitoring "flow"

Gamma metering pumps check their own performance. After the assembly 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 the pump stops.

> Detailed description from page 58

Float switch

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

The pump switches off only once the level has dropped another 30 mm.

A fault annunciation relay can be switched as an option.

> Detailed description from page 56

Technical Data

3 Technical data

<i>Gamma 5a, type</i>	1602	1605	1006	1006 HV	1310	1310 HV	0613	0813	0813 HV	0417	0423	0230
<i>Capacity (l/h)</i>	2.09	4.74	5.83	5.83	9.54	9.54	13.1	13.3	13.3	17.4	22.5	30.3
<i>Capacity (ml/stroke)</i>	0.29	0.79	0.81	0.81	1.59	1.59	1.82	2.21	2.21	2.42	3.75	4.21
<i>at max. counter pressure (bar)</i>	16	16	10	10	13	10	6	8	8	3.5	3.5	2
<i>Capacity (l/h)</i>	2.74	5.76	7.06	7.06	10.8	10.8	14.9	14.6	14.6	17.9	24.6	34.5
<i>Capacity (ml/stroke)</i>	0.38	0.96	0.98	0.98	1.8	1.8	2.08	2.44	2.44	2.48	4.1	4.8
<i>at med. counter pressure (bar)</i>	8	8	5	5	6	5	3	4	4	2	2	1
<i>Suction lift (m WC)</i>	6	6	6	6	6	6	5.5	6	6	4.5	5	2.5
<i>Priming lift at 100% stroke length (m)**</i>	1.0	1.3	1.3	-	1.9	-	1.9	2.0	-	2.0	1.8	1.8
<i>Max. pressure suction side (bar)</i>	8.0	3.5	3.5	3.5	2.0	2.0	2.0	1.5	1.5	1.5	0.8	0.8
<i>Max. stroking rate (strokes/min)</i>	120	100	120	120	100	100	120	100	100	120	100	120
<i>Liquid end version***</i>	-	-	PP	PP	-	PP	PP	PP	PP	PP	PP	PP
	NP	NP	NP	-	NP	-	NP	NP	-	NP	NP	NP
<i>with suction and discharge connections***</i>	-	-	TT	-	-	-	TT	TT	-	TT	TT	TT
	SS	SS	SS	-	SS	-	SS	SS	-	SS	SS	SS
<i>Connection size o.ø x i.ø (mm)</i>	8x5	8x5	8x5	DN15	8x5	DN15	8x5	12x9	DN15	12x9	DN10	DN10
<i>Medium power drain at max. 120 strokes/min (W)</i>	54	-	*54	54	-	-	54	-	-	54	-	54
<i>at max. 100 strokes/min (W)</i>	-	77	-	-	77	77	-	77	77	-	77	-
<i>Peak power drain at discharge stroke (A)</i>	2.1	3.1	2.1	2.1	3.1	3.1	2.1	3.1	3.1	2.1	3.1	2.1
<i>Shipping weight. PP. NP. TT (kg)</i>	4.6	6.7	4.6	5.1	6.9	7.4	4.8	6.9	7.4	4.8	8.0	5.9
<i>Shipping weight. SS (kg)</i>	5.8	7.9	5.8	-	8.5	-	6.4	8.5	-	6.4	11.4	9.3

**) Priming lifts with clean dampened valves for water and suction line as specified.

*** Media-contacted materials for version

	PP1	PP2	PP4 ¹⁾	NP1	TT1	SS...
<i>Liquid end</i>	polypropylene	polypropylene	polypropylene	Plexiglas	PTFE with carbon	stainless steel ²⁾
<i>Suction/discharge connection</i>	polypropylene	polypropylene	polypropylene	PVC	PTFE with carbon	stainless steel ²⁾
<i>Seals</i>	EPDM	Viton	EPDM	Viton	PTFE	PTFE
<i>Balls</i>	ceramic	ceramic	ceramic	ceramic	ceramic	ceramic

¹⁾PP4 with Hast. C valve springs, ²⁾ material no. 1.4571

DEVELOPAN® = pump diaphragm with PTFE layer

Plexiglas® and Viton® (FKM) are registered trademarks

Functions

Relay output (9) This is used for remote transfer of alarm messages 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:

Collective fault indication For the level early warning and final switch off, metering monitor, system error annunciation, fuse and mains failure annunciation. Function: relay de-energises in the event of an alarm.

Alarm relay For the level early warning and final switch off, metering monitor and system error message. Function: relay energises in the event of an alarm.

Pacing relay With contact pacing parallel to the discharge stroke of the metering solenoid. Contact duration 150 ms.

Timer relay Switches parallel to 31 different metering times (from 1 minute to up to 24 hours), repeating daily or weekly.

> **Detailed description from page 72**

Technical Data

<i>Metering deviances</i>	For all material versions -5% to +15%
<i>Reproducibility of the metering</i>	When used according to the instructions of the operating instructions $\pm 2\%$
<i>Permissible ambient temperature</i>	-10 °C to +45 °C
<i>Resolution of the stroke setting</i>	1:20
<i>Power supply</i>	230 V $\pm 10\%$; 115 V $\pm 10\%$, 50/60 Hz
<i>Voltage range</i>	207 to 254 V: 108 to 135 V
<i>Enclosure rating</i>	IP 65
<i>Insulation class</i>	F
<i>Control function</i>	<ul style="list-style-type: none">- Voltage level with open contact : approx. +5 V- Impedance : 10 kohm- Control : With voltage-free contact or semiconductor control with a residual voltage of < 700 mV, the contact load is approx. 0.5 mA at +5 V.
<i>Contact input</i>	<ul style="list-style-type: none">- Voltage level with open contact : approx. +5 V- Impedance : 10 kOhm- Control : With voltage-free contact or semiconductor control with a residual voltage of < 700 mV, the contact load is approx. 0.5 mA at +5 V.- Max. pulse freq. : 40 pulses/sec- Necessary contact duration : 20 ms
<i>Option Analog - current</i>	<ul style="list-style-type: none">- Burden : approx. 70 ohm- max. input current : 50 mA

Accessories

6.3 Foot valves

With suction filter and ball check valve for connection at the end of the suction line.

6.4 Injection valves

With spring-loaded ball check valve for metering into open or closed systems and for fastening the discharge line; assembly direct to the liquid end.

6.5 Injection lances

For metering into large pipe cross sections and for preventing blockages for media which effloresce.

6.6 Back-pressure valves

For accurate metering at low counter pressure or as relief safety valve.

6.7 Accumulators

For pulsation dampening e.g. for long discharge lines.

6.8 Metering monitors

For monitoring the actual metering quantity. 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 disposable drums or supply tanks.

6.10 Supply tanks

From 35 to 1000 l content with lockable screw cap and necessary accessories.

6.11 Manual/electric stirrers

For mixing and preparing metering solutions.

6.12 Console

For stable mounting of the pump.

6.13 ProMinent "Remote Control"

Type G5Ra consisting of gamma 5 metering pump and remote control part. With this the metering pump can be controlled and operated from up to 100 m via the remote control part.

Tests/Accessories

5 Tests for your safety

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



G/5a-004-D

Screening

Confirmation of the manufacturer/importer

We herewith confirm that the

metering pump G/5a, MG5a, AG5a, AMGa

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 ass.) 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 foreign 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 2 m connection cable

6.2 Control cables

Order no. 70.77.18.3 4-wire, 2 m, universal control cable

Order no. 70.77.02.7 2-wire, 2 m, remote contact cable

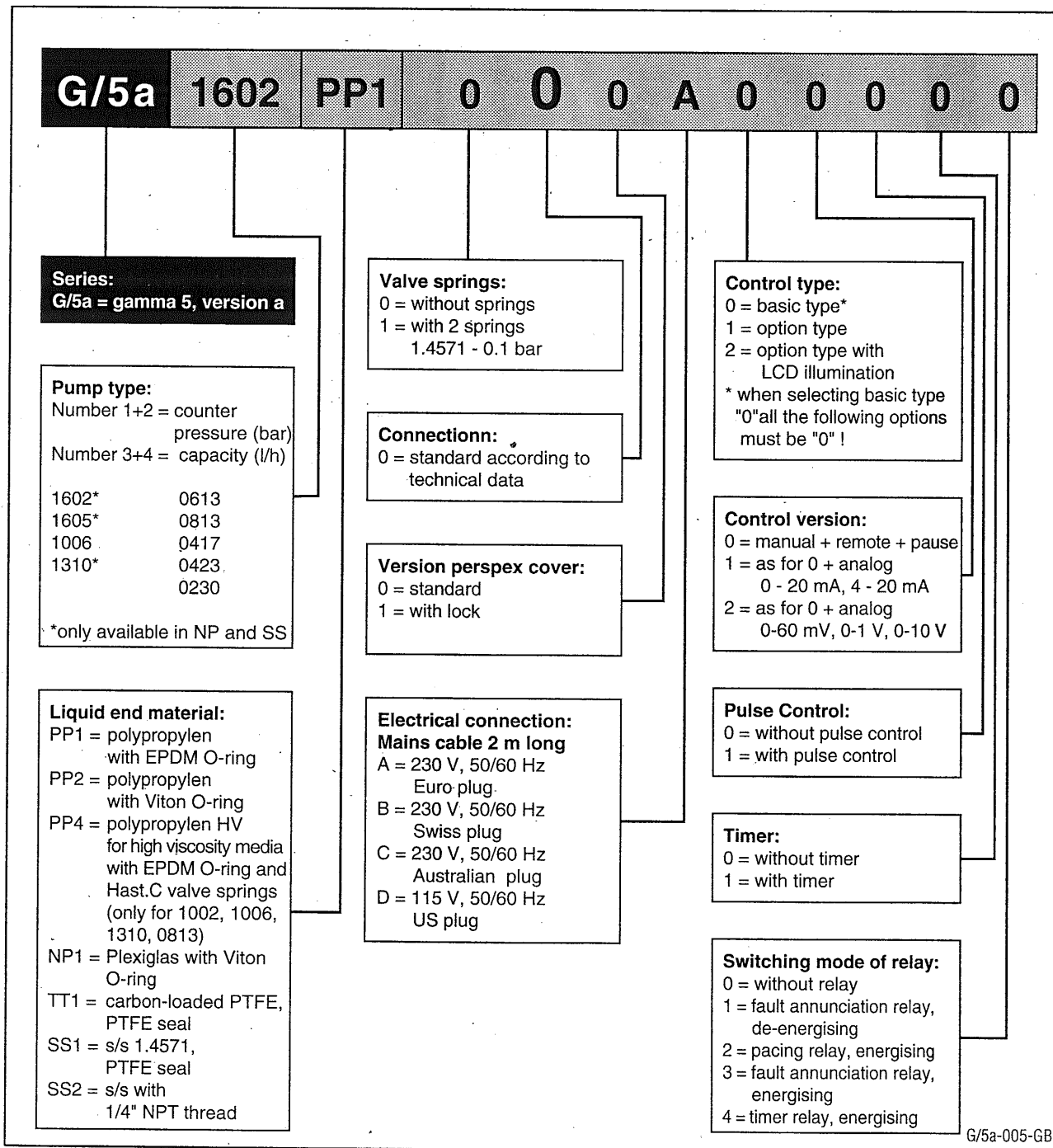
Order Specifications

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



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 safety data sheets of the metering fluids!



WARNING:

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

ATTENTION

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

PLEASE NOTE:

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

Avoid reducing the hose sizes!

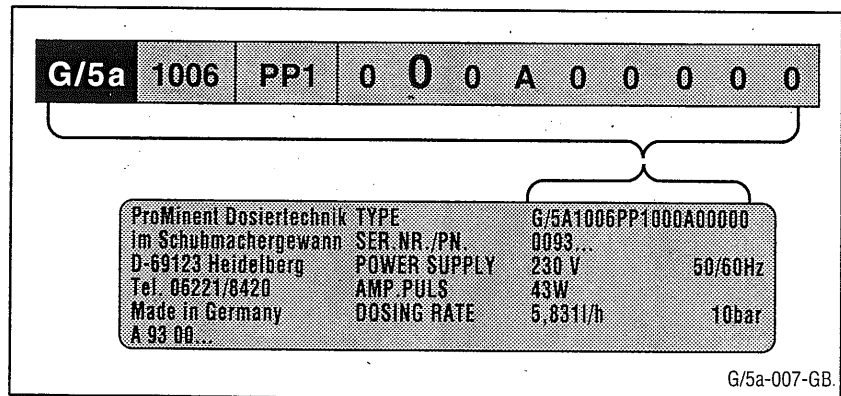
For long lines and highly viscous media the next highest line diameter or a pulsation dampener should be used!

Unpacking

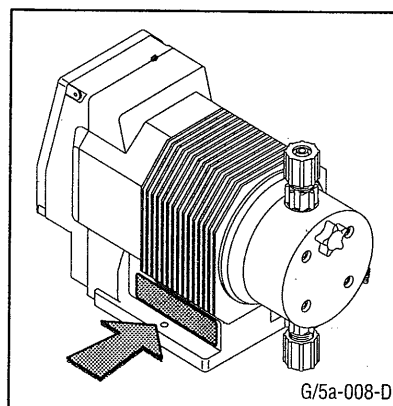
ATTENTION:

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

If they do not, immediately notify the ProMinent subsidiary or representative responsible for you (addresses can be found on the back page/page 88 of these operating instructions).



Each gamma 5 metering pump is provided with an identification plate. This can be found on the base of the pump.

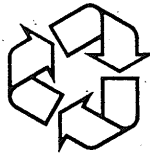


In addition to the technical basic data the IDENTITY CODE and the serial no. are specified. Both numbers are to be stated during any enquiry or when ordering spare parts as they permit a clear identification of the pump type and material variant.

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

Unpacking

9 Unpacking



Secondary packaging

ATTENTION:

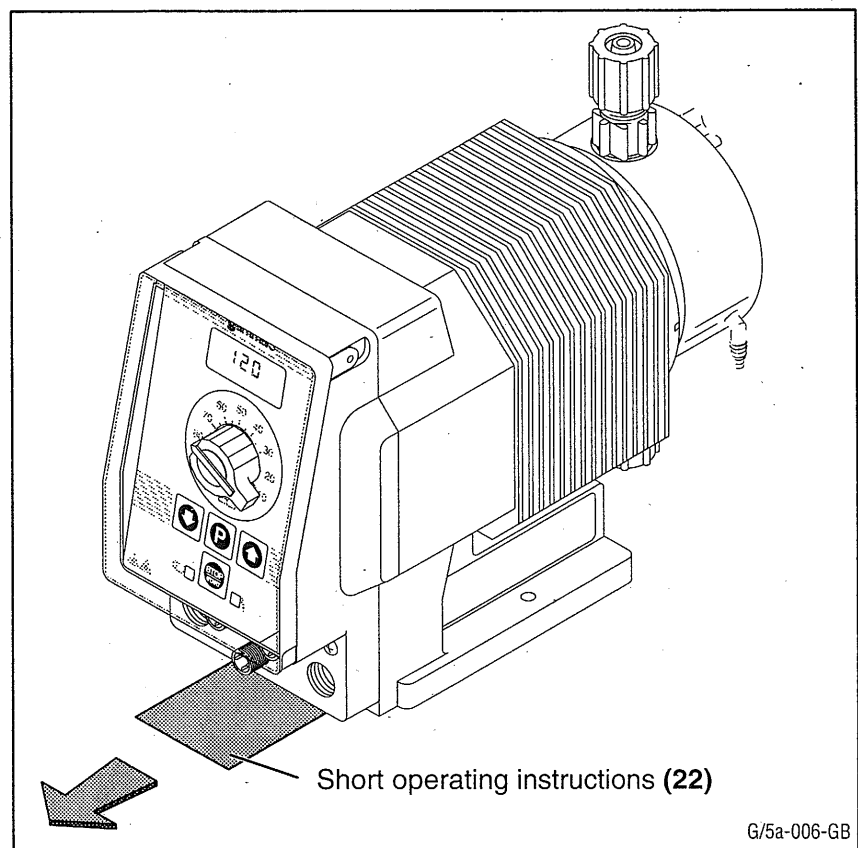
Polystyrene parts are special refuse and may not be mixed with domestic refuse, and must be disposed of separately (special refuse collection points)!

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!

Please first compare your delivery note with the contents of the package.

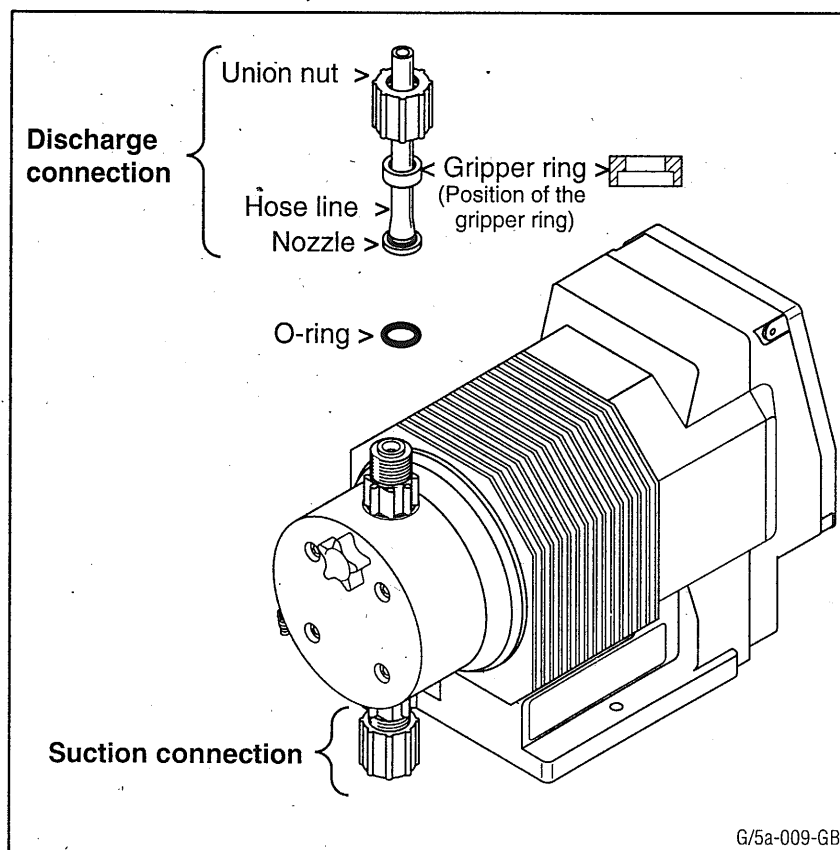
Scope of delivery

- Metering pump with mains 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.



G/5a-006-GB

Installation



- 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

- 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 for several connections shorten the hose end approx. 10 mm by cutting it straight.

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!

- Push on the hose and simultaneously tighten the union nut.

Installation

IDENTITY CODE

Serial number

Place of installation

- Metering application

Commissioning

10 Installation

10.1 Installing the pump: mechanical part

10.1.1 Pump installation with console or tank

- Assemble metering pump onto a container or a console with screws and washers (dia. 6 mm).

PLEASE NOTE:

The pump must be fastened in such a way that no vibrations can arise!

The valves of the liquid end must always be kept upright in order to guarantee that they function smoothly!

10.1.2 Connection of suction/discharge line to the pump

PLEASE NOTE:

Suction and discharge lines must always be laid 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 media we recommend a bleeding with backfeed to the tank! Additionally, an isolating valve should be provided at the discharge and suction side!

Installation

- 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 feculence shorten the free end of the suction line so far that the foot valve is hanging at least 50 mm over the floor of the container.

10.1.4 Installation discharge line (general information)

ATTENTION:

Lay 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)!



WARNING:

When operating the metering pump against a closed isolating valve on the discharge side, the counter pressure can reach thrice the max. permissible counter pressure!

As a result the discharge line can burst!

In order to prevent this, a relief valve is recommended which limits the max. permissible counter pressure!

10.1.5 Installation bypass bleed line

Liquid end with bleed valve

For the liquid end versions NP and PP up to type 0417 a bleed valve (17) with bypass (18) is present on the liquid end.

- Plug on hose line with 4 mm interior dia. (max. 6mm) onto the bypass hose nozzle, preferably use PVC soft 6 x 4 mm.
- For PE lines this should be secured against slipping off for example by using a quick fastening cable clamp.
- Lead the free end of the line back into the supply tank.
- Connect the discharge line directly to the discharge connection and to the injection valve.

Installation

PLEASE NOTE:

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

Stainless steel pipe connections

Stainless steel pipe connections:

- Push up the union nut and the gripper ring on to the pipe so that they project approx. 10 mm.
- Insert the pipe into the valve until the stop and initially tighten the union nut with your fingers.

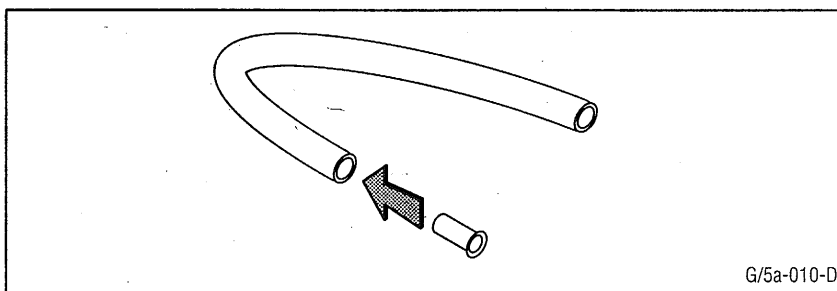
For **initial assembly** continue to tighten the union nut another 1 1/4 turns.

When **remounting** tighten 1/4 turn further.

PE/PTFE lines

PE/PTFE lines:

- When connecting to stainless steel valves additionally insert a stainless steel ferrule into the plastic hose.



Order no. 35.93.65.4

Ferrule for hose 6x4 mm

Order no. 35.93.66.2

Ferrule for hose 8x5 mm

Order no. 35.93.68.8

Ferrule for hose 12x9 mm

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 underpressure arising when sucking does not reach the steam pressure of the media to be fed!

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

For bends use arcs and not angles if possible!

Please note:

Too high underpressure on the suction side in extreme cases leads to the fluid column tearing or an incomplete return stroke!

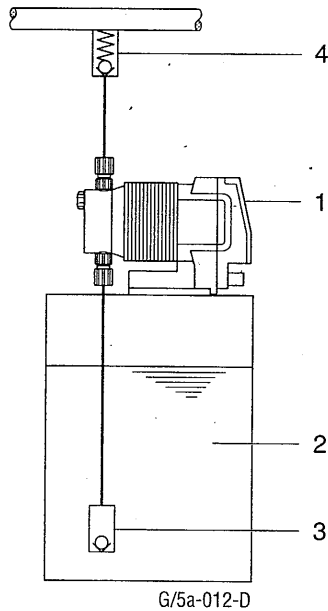
NB:

Height (h) x density (d) ≤ max. suction lift in mWC!

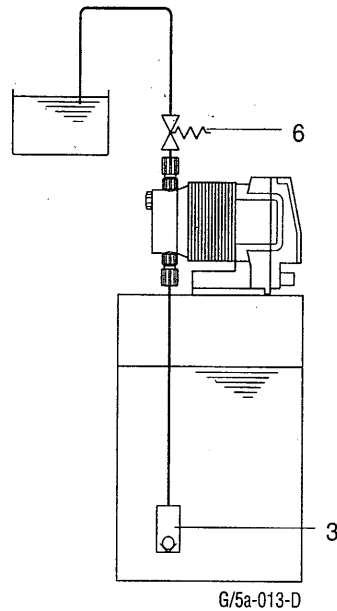
Installation

Correct installation:

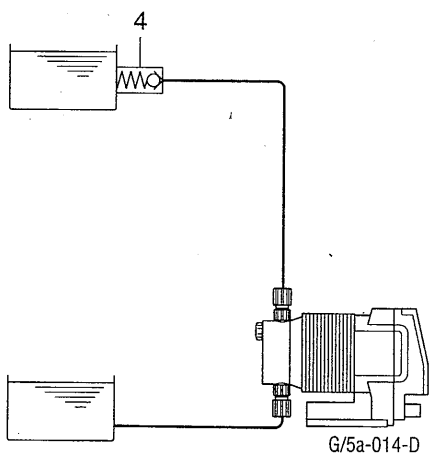
1) Standard installation



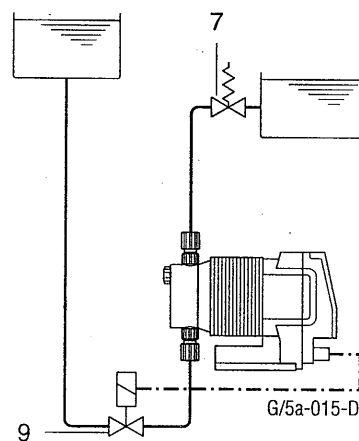
2a) Atmospheric discharge and **low** head



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



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



Installation

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

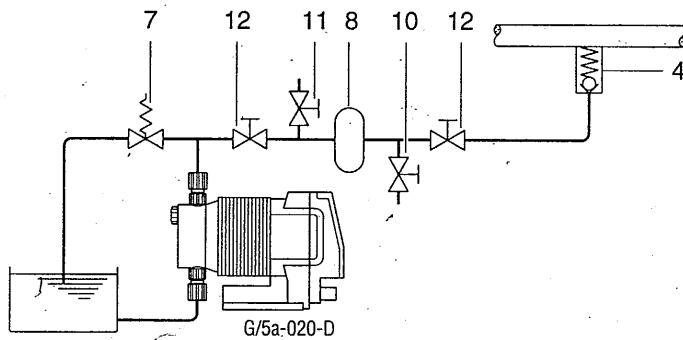
Important:

Height (h) x density (d) ≤ max. suction lift in mWC!

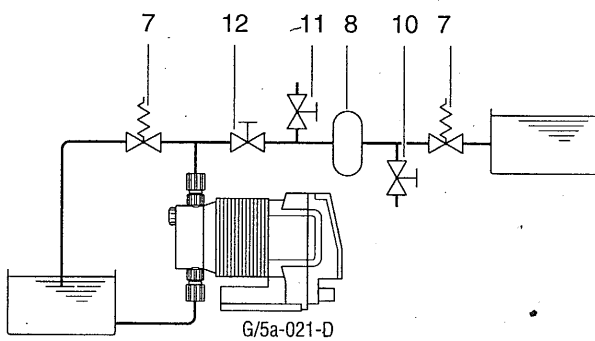
<i>Gamma 5a, type</i>	1602	1605 HV	1006	1006 HV	1310	1310	0613	0813	0813 HV	0417	0423	0230
<i>Priming lift at 100% stroke length (m)</i>	1.0	1.3	1.3	-	1.9	-	1.9	2.0	-	2.0	1.8	1.8
<i>Suction lift (mWC) with liquid end filled</i>	6.0	6.0	6.0	6.0	6.0	6.0	5.5	6.0	6.0	4.5	5.0	2.5

Installation

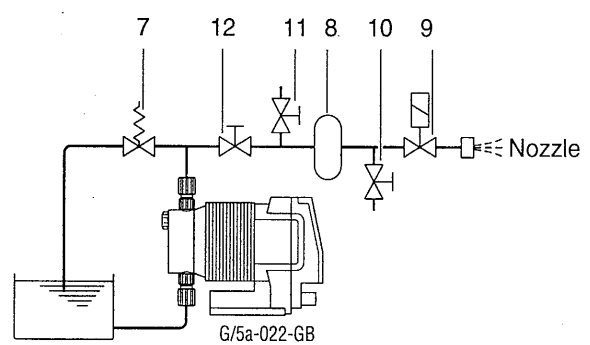
- 6 For pulsation-free metering
a) into discharge lines



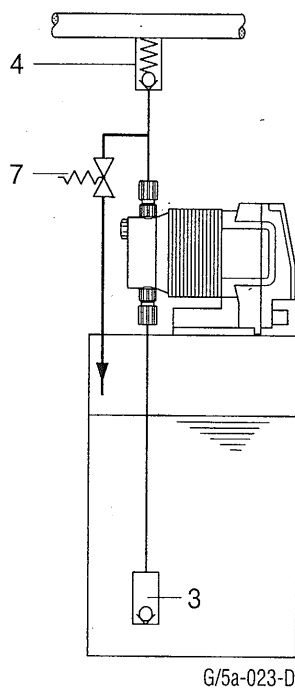
- b) into an atmospheric system



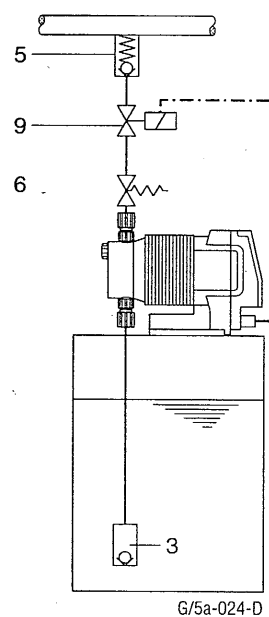
- c) without overfeeding



- 7) To protect against overpressure

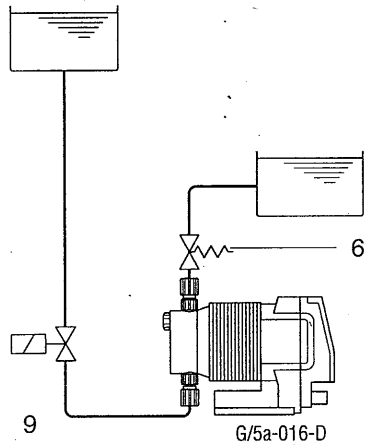


- 8) Metering into vacuum

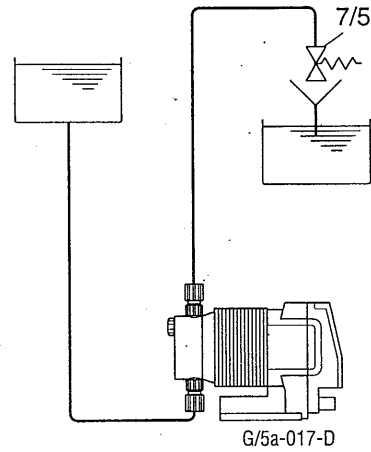


Installation

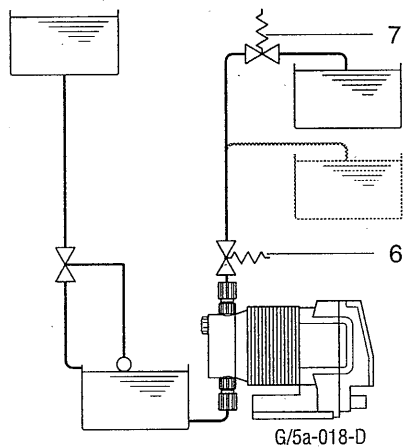
3b) With back pressure on the suction side and **low** discharge head



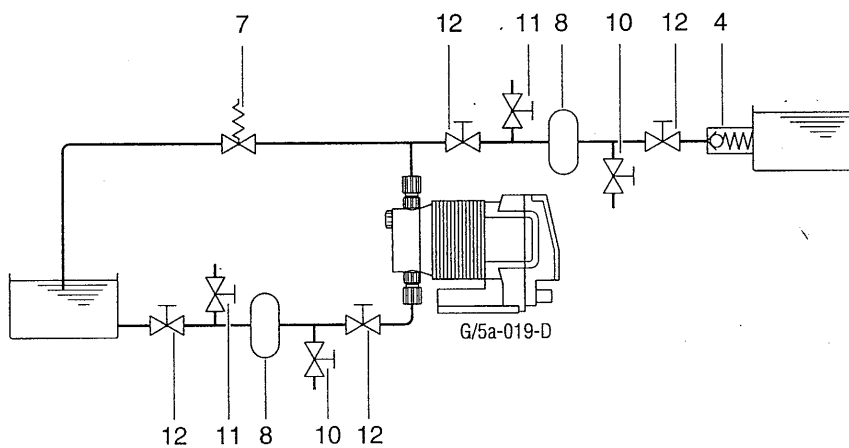
4a) Installation to safely prevent siphoning of hazardous media



4b) Installation to safely prevent siphoning of hazardous media



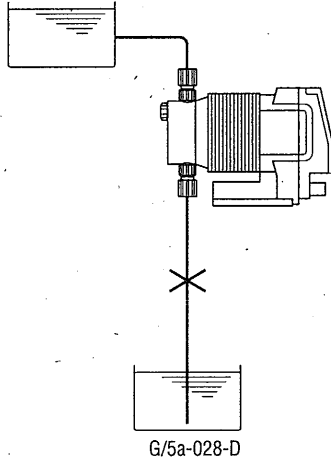
5) With long suction or discharge lines



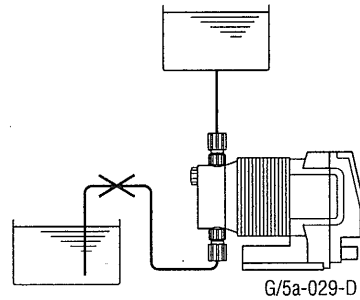
Installation

Incorrect installation:

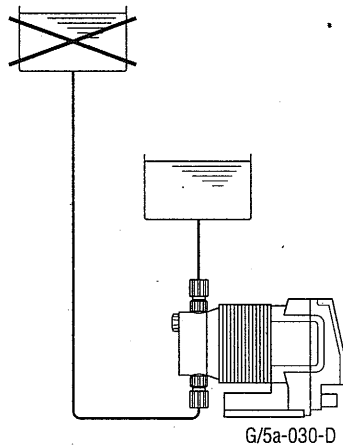
12) Suction line too high



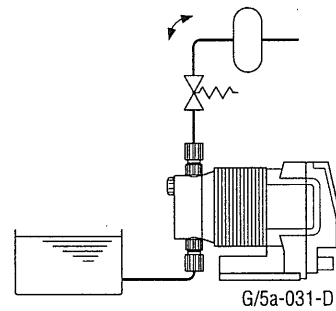
13) Suction line cannot be bled



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

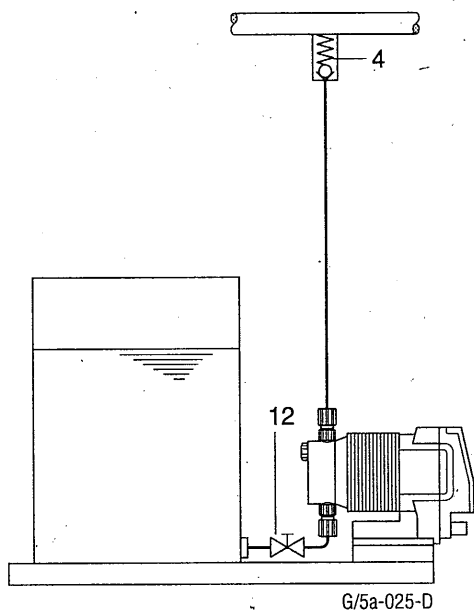


15) Accumulator ineffective

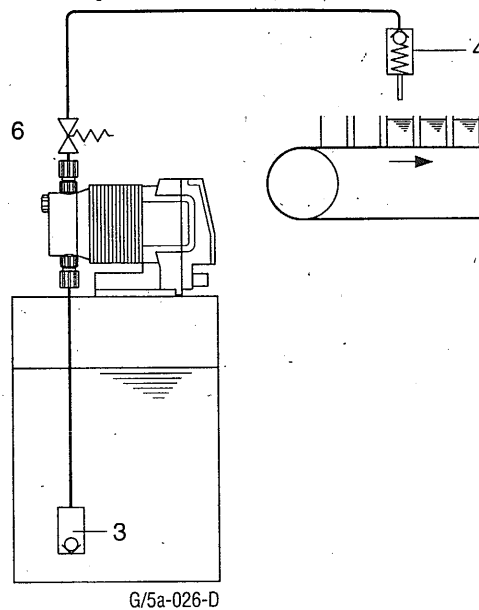


Installation

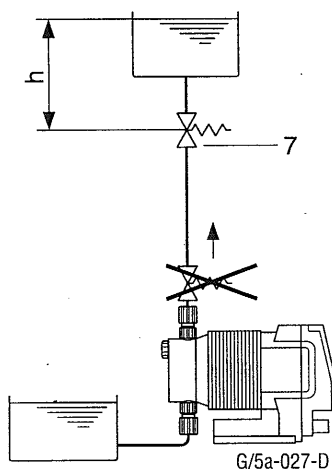
9) With media tending to emit fumes and vapours



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/s²)

Rho density of the medium to be fed (kg/dm³)

Installation

10.2.2 Operating modes

Manual (internal operation)

The pump operates with the stroking rate set manually. This is set between 0 and 120 (100) strokes per min. using the  and  keys.

Analog


Controlling the pump from an analogue signal, e.g. 4-20 mA. 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 programming the pump. Pin allocation see page 35.

Contact (external operation)

Controlling the pump via voltage-free contacts (e.g. water meters). For 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 programming the pump. Pin allocation see page 35.

10.2.3 Functions superior to the 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"

Switching the pump on and off via the "PAUSE" control function using a universal cable and voltage-free contact. Pin allocation see page 35.

Empty message "LEVEL"

Connection possibility of a two-stage float switch. If the level of the fluid in the supply container sinks to approx. 30 mm above minimum an early warning is issued. For the "fault annunciation relay" option the built-in relay switches and the pump continues to operate. If the level sinks any lower the pump is stopped. Pin allocation see page 35.

Option "Timer"

With the timer released the pump can only meter during the switch-on times set.

Installation

10.2 Installation pump: electrical part

10.2.1 Electrical connection (general instructions)



WARNING:

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

Mains voltage

Mains voltage:

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

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

PLEASE NOTE:


Frequent switching on and off only via the voltage-free control function "START/STOP"!

Switching on and off via the mains supply only when voltage-free control is not possible!

Voltage-free contact

Switch element 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

Analogue control signals

- The voltage of the analogue control signals must be separated.
- After switching off the pump from the mains this always restarts in the last operating mode set (even after being disconnected from the mains 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 metering monitor to the pump after removing the protective cover from the connection socket (10).
- If present, connect the float switch to the pump after removing the function plug from the connection socket (11).
- If present, connect the contact/control cable to the pump after removing the function plug from the connection socket (12).

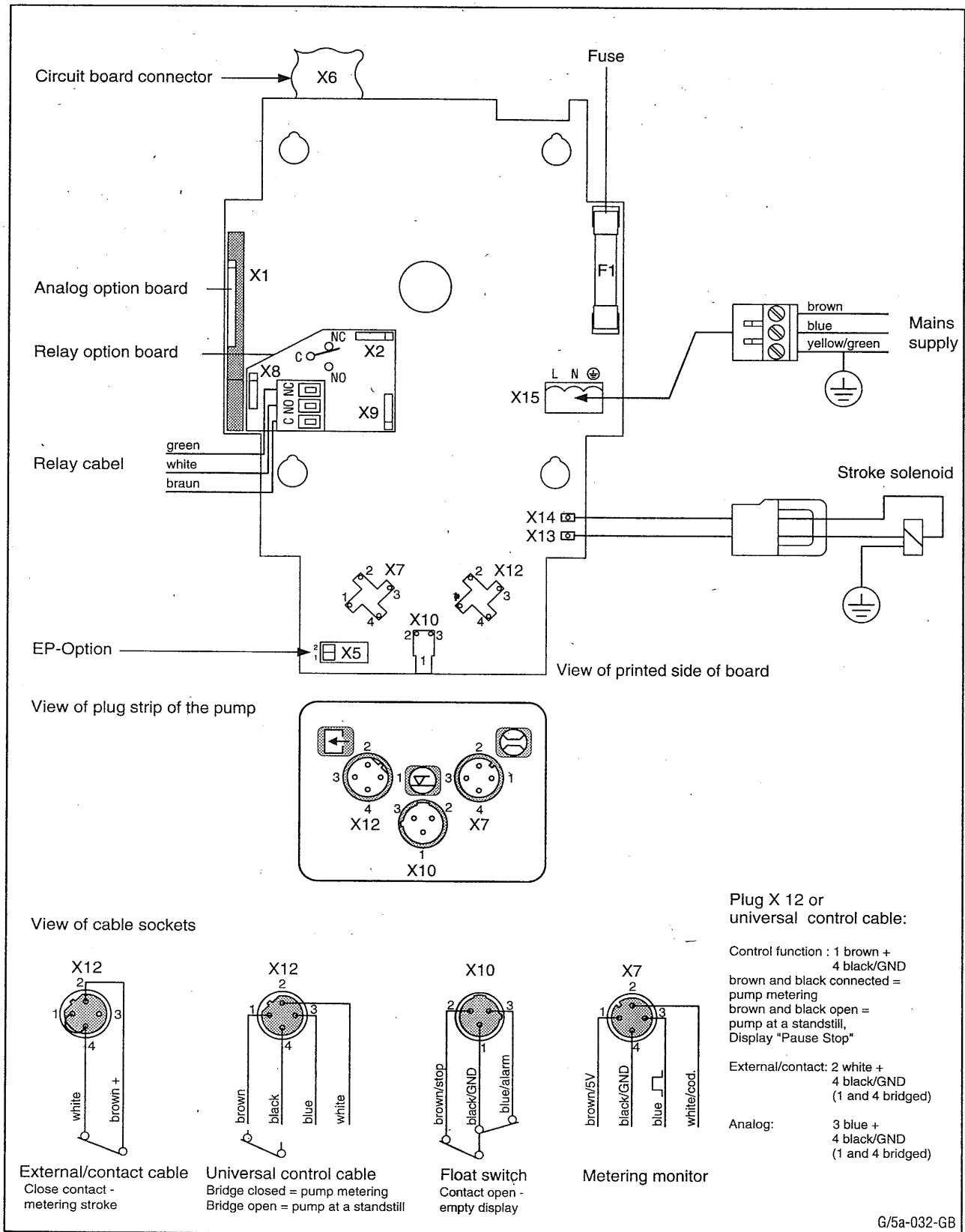
PLEASE NOTE:

The connection sockets (11 and 12) must always be used! Either by the function plug, by means of a built-in shorting bar or by means of a float switch or contact/control cable!

Always keep the function plug for reuse after you have removed it!

Installation

10.2.5 Wiring diagram



G/5a-032-GB

Installation

10.2.4 Parallel connection

If in exceptional cases the mains 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 own contacts must be provided for the pump.

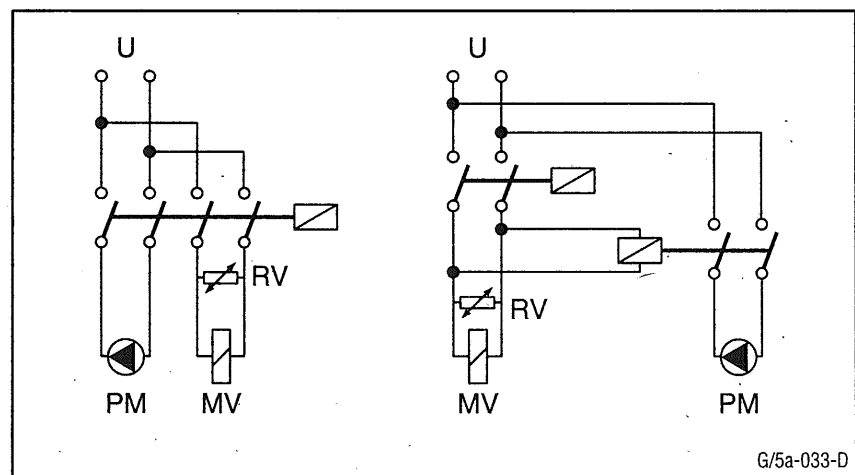
The power supply must take place over an auxiliary contactor or a relay.

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 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

Commissioning

*Liquid end without bleed valve
version TT, SS and from*

- DN 10 Connect discharge line to liquid end, however not to injection valve.
- Operate metering pump with stroke length/stroking rate 100% and 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.

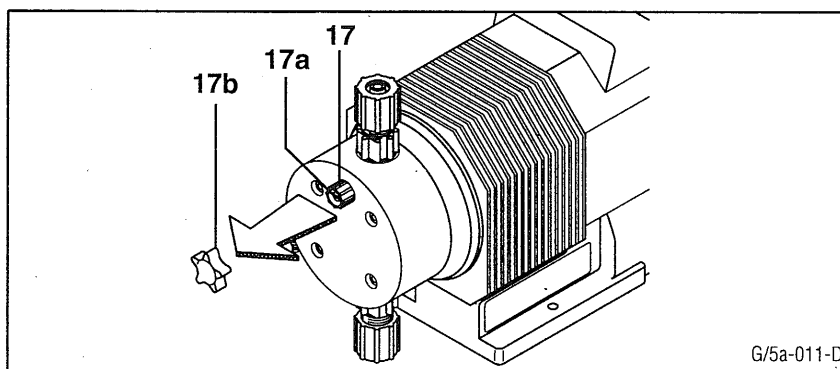
- Now fasten the discharge line to the injection valve.

*Installation instructions/
commissioning
HV version (PP4)*

- For long suction and discharge lines with low flow resistance, use fittings and mounting parts, e.g. arcs instead of angles, install pulsation dampener near the metering pump; increase diameter by one nominal width.
- Initial priming and bleeding is made difficult by the valves and valve springs still being dry. Therefore select as short a priming lift as possible or bleed the liquid end with influx or response pressure on the suction side. If this is not successful, we recommend the following procedure: unscrew the discharge connection, press away the ball from the O-ring seat and fill the liquid end with water or suitable fluid. After this assemble the discharge connection without the valve spring, push a short length of PVC hose (approx. 100 mm) onto the hose nozzle and fill with water halfway. Let the pipe operate at max. stroke length until the metering is visible in the hose. Then re-insert the valve spring. In order to prevent tilting, insert a mandrel with an approx. diameter of 4 mm through the head valve and thus keep the spring in the central position. Reconnect the discharge line, the pump is ready to operate.
- If the capacity is reduced, we recommend working with a longer stroke length and decreased stroking rate.

*Liquid end PP, NP
with bleed valve*

- If possible proceed as for version TT, SS and from DN 10. If this is not possible,
- connect the discharge line to the liquid end and the injection valve.



G/5a-011-D

Coarse bleeding

- Open bleed valve (17) by turning it anti-clockwise.
- Now the passage is open for coarse suction bleeding via the bypass.

Commissioning

11 Commissioning

11.1 General instructions



WARNING:

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

For media 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 rinse with a suitable agent via the suction connection from above.

ATTENTION:

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

11.2 Operating conditions

Permissible ambient temperature

-10 °C to +45 °C

up to +50 °C with short time operation up to 1 hour operating time at max. stroking rate;

above +45 °C continuous operation the max. stroking rate must be lowered for each 1 °C by approx. 3 strokes per minute from the max. stroking rate.

Relative humidity

10 to 92%, non-condensing

*Permissible media temperature
in the liquid end*

Material	Long term at max. permissible counter pressure	Short term max. 15 mins. at 2 bar
NP	45 °C	60 °C
PP	50 °C	100 °C
TT	50 °C	120 °C
SS	50 °C	120 °C

PLEASE NOTE:

A brief excess of the specified temperatures is for example only permissible for sterilisation or rinsing with hot water!

11.3 Suction capacity/bleeding

The max. priming lift of the gamma 5a metering pump with dampened valves is between 1.0 and 2.0 mWC depending on the type.

The pump cannot prime against a head.

The suction lift with the liquid end filled and bled is between 2.5 - 6 mWC depending on the type of pump.

Commissioning

Accurate metering is only possible if the counter pressure remains fairly constant; this should be above 1 bar.

When metering with atmospheric discharge, an injection valve with 0.5 bar response pressure should be assembled at the end of the line. Or a back-pressure valve should be assembled directly onto the liquid end in order to create and maintain a counter pressure of approx. 1.5 bar.

If the level of the fluid of the supply tank is above the pump in operating condition, the response pressure is on the suction side. In this case the counter pressure should be so high that a minimum differential pressure of 1.5 bar exists. If this is not the case a back-pressure valve or a spring-loaded injection valve with the respective response pressure 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 is to be installed which is closed when the pump is idle.

An output flow once set and possibly confirmed by calibration can be reproduced exactly by setting the stroking rate. This is processed digitally and reacts without mechanics absolutely linear. Thus an excellent reproducibility 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)!

Due to the characteristic data of the gamma 5 metering pump higher capacities can occur until the operating temperature is reached.

Commissioning

- Start the pump with stroke length/stroking rate at 100% and discharge line free of pressure 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 slightly emit gases the fine bleeding (17) can be set continuously for liquid ends with bleed valves:

- For this purpose after pulling off the attached star handle (17b) open the screw (17a) inside the bleed valve with a screwdriver approx. 1 turn anti-clockwise.
- This results in a partial flow of the metering quantity constantly being returned to the supply tank!
- The backfeed quantity should be approx. 20% of the metering quantity!
- The media must be fluid and without solid particles.



Warning!

The above mentioned measures do not guarantee any totally reliable metering after the pump has been idle! It is essential that regular checks are carried out.

PLEASE NOTE:

If the backfeed 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 M5 x 45, M5 x 60 and M5 x 70: 4.5 to 5 Nm!

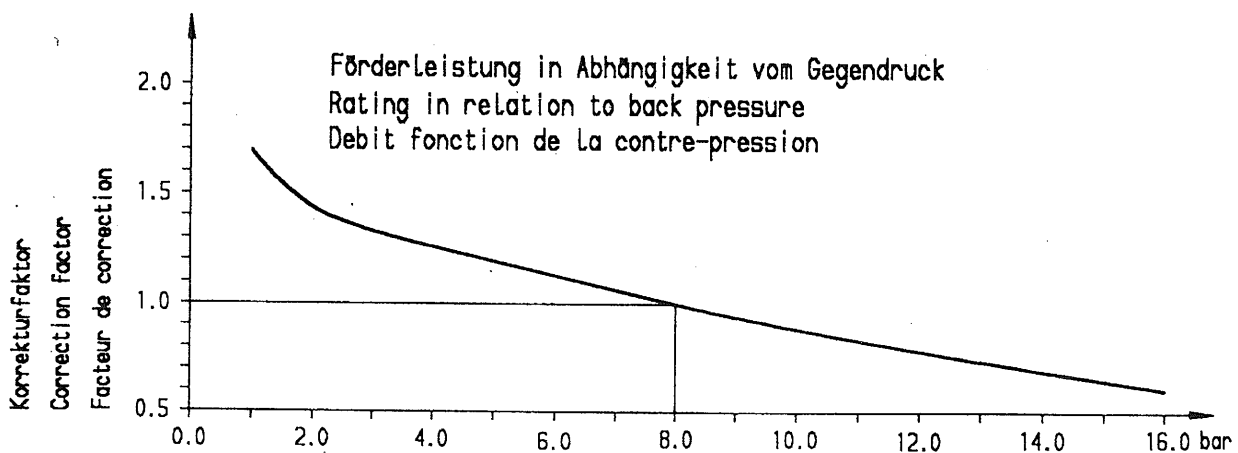
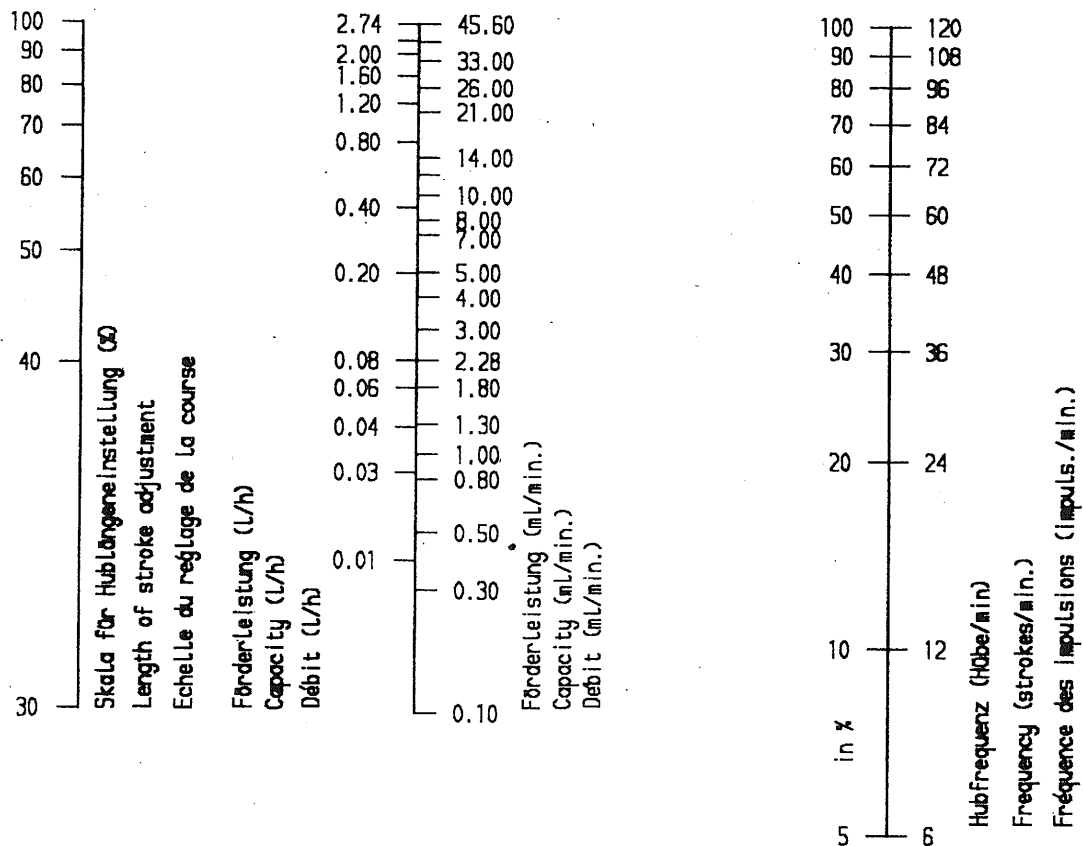
11.4 Metering accuracy

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

When conditions remain unchanged (same counter pressure, same stroke length, stroking rate, operating temperature, mains voltage, suction lift, medium temperature, same medium, and same diameter/length/material of the line) the metering reproducibility is $\leq \pm 2\%$ during short periods and for a stroke length setting of at least 30% in accordance with the following instructions.

Commissioning

11.5.2 Nomogram 1602





G/5a-034-D

Commissioning

11.5 Determining the capacity by means of nomograms

11.5.1 General information

- Lower diagram*
 - Turn to the page with the nomogram of your pump type and determine the correction factor required.
 - On the lower diagram "Capacity in relation to back pressure" mark your back pressure present.
 - Starting from the value determined (bar) 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.
- Middle scale*
 - Enter your result in l/h or ml/min in the middle scale "Capacity ...".
 - Take a ruler and draw a horizontal 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 from page 53

PLEASE NOTE:

In order to obtain a balanced setting draw a horizontal 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 accurate metering the stroke length should not drop below 30%!

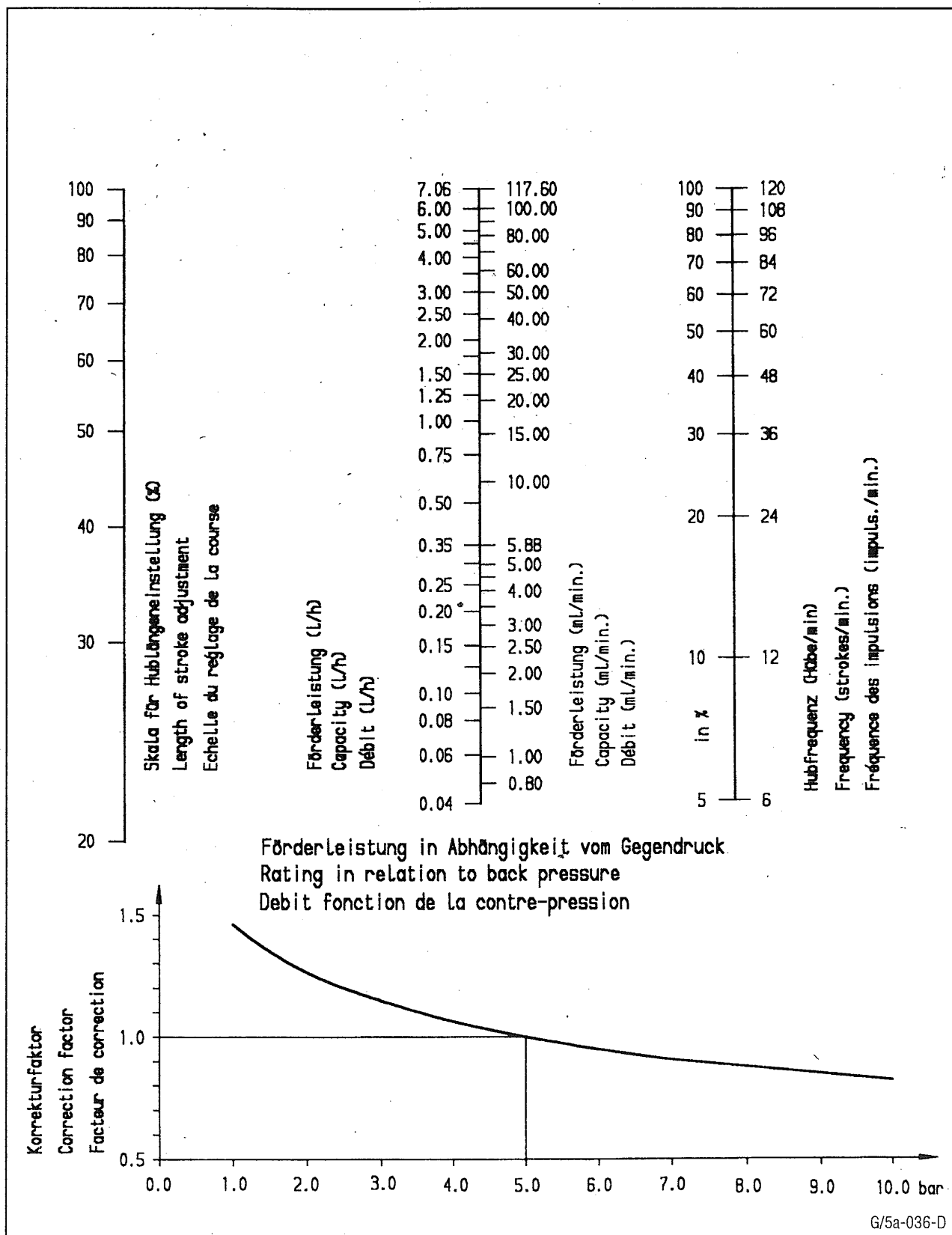
Determining accurate metering:

- Determine the capacity to be attained on the suction side of the metering pump with a measuring cylinder or by balancing.
- If necessary correct the pump setting.

The measurements to determine the capacity for the following nomograms 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%

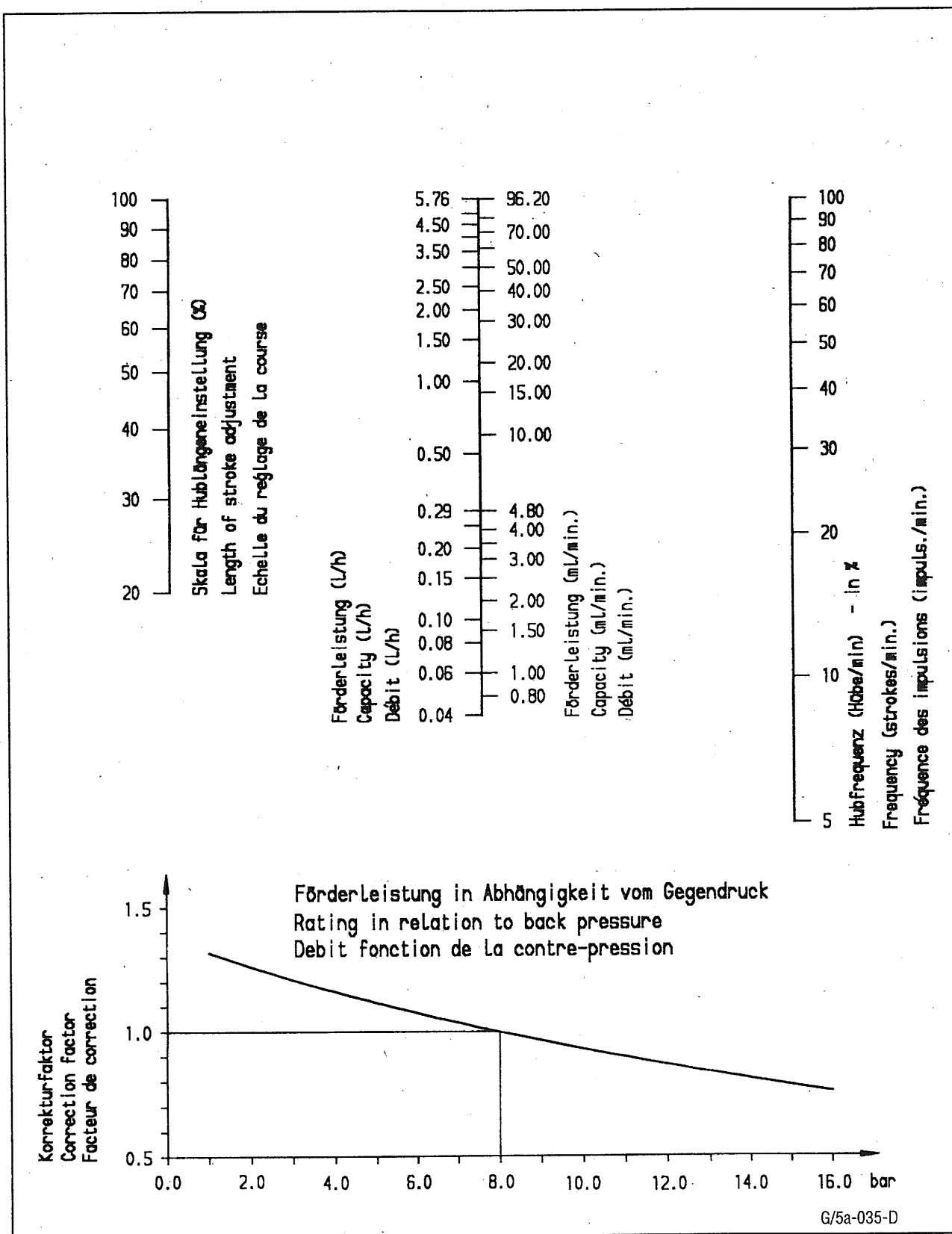
Commissioning

11.5.4 Nomogram 1006



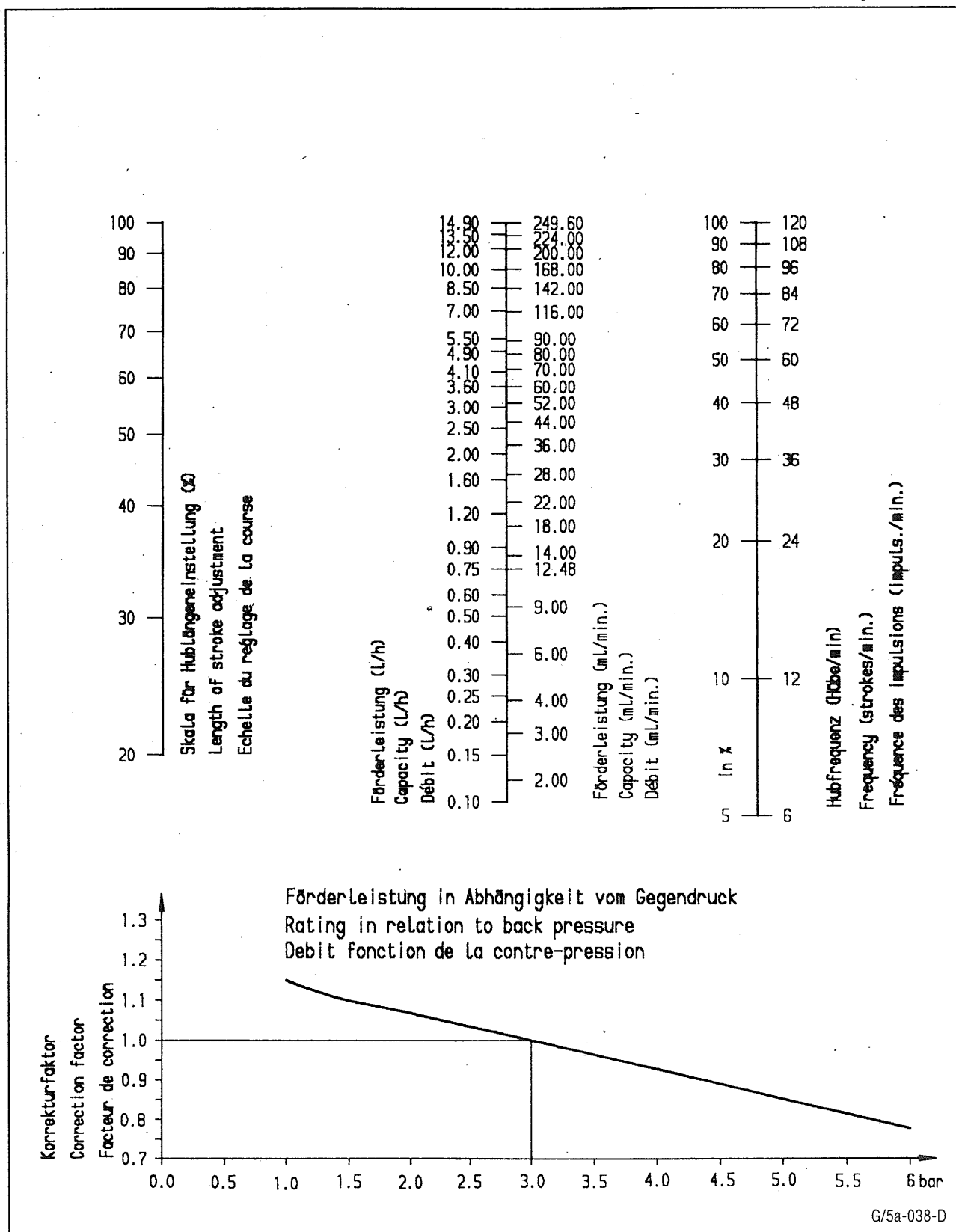
Commissioning

11.5.3 Nomogram 1605



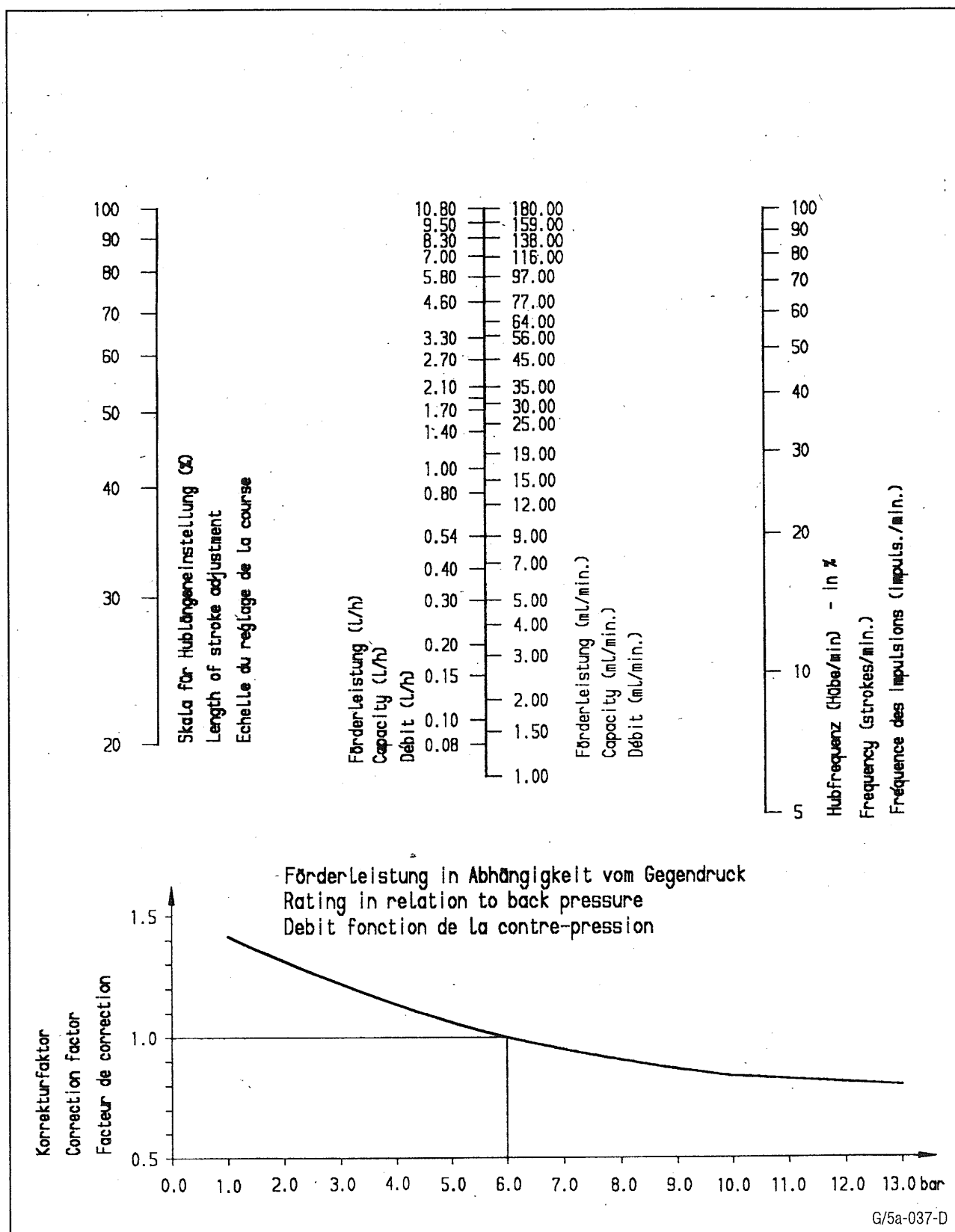
Commissioning

11.5.6 Nomogram 0613



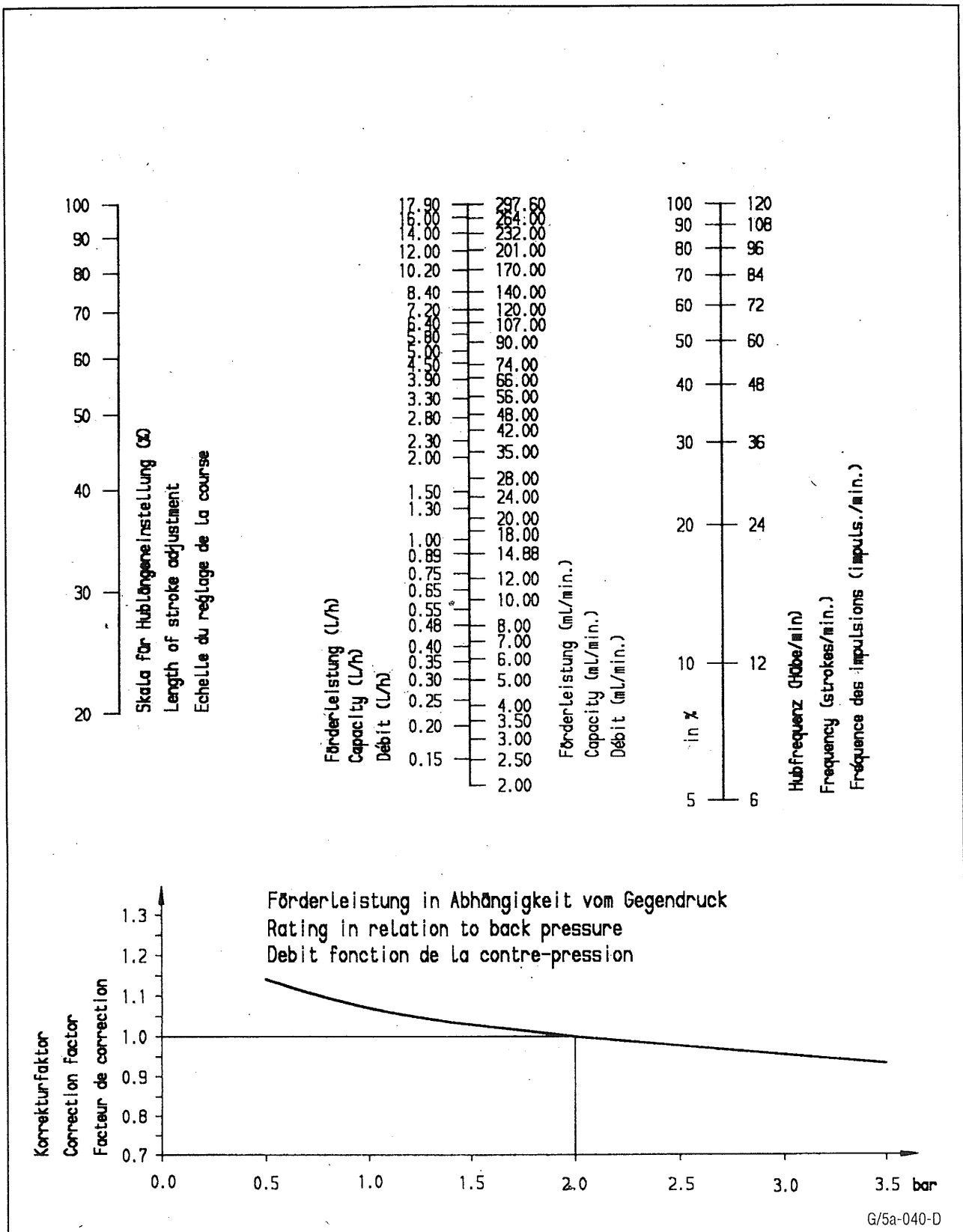
Commissioning

11.5.5 Nomogram 1310



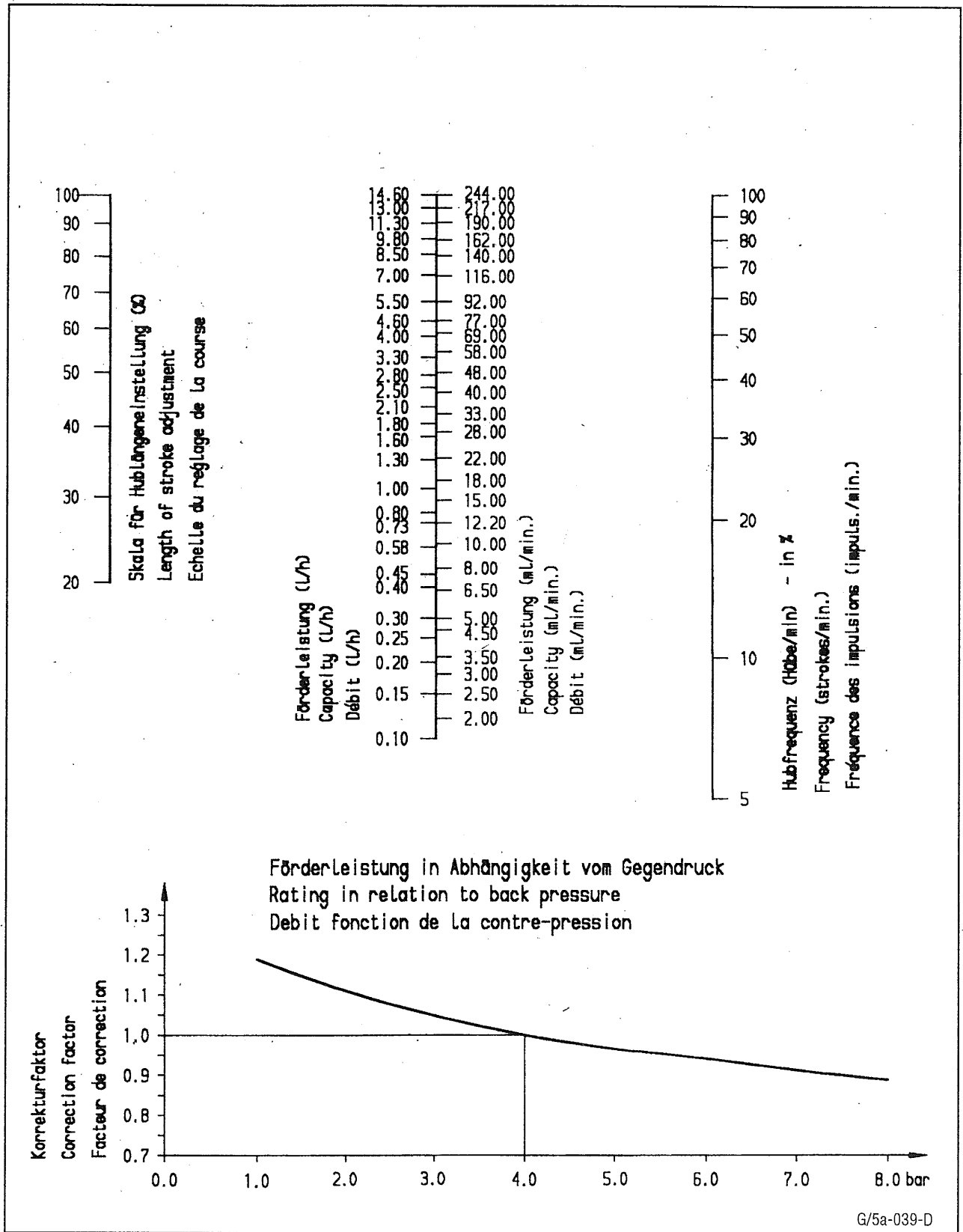
Commissioning

11.5.8 Nomogram 0417



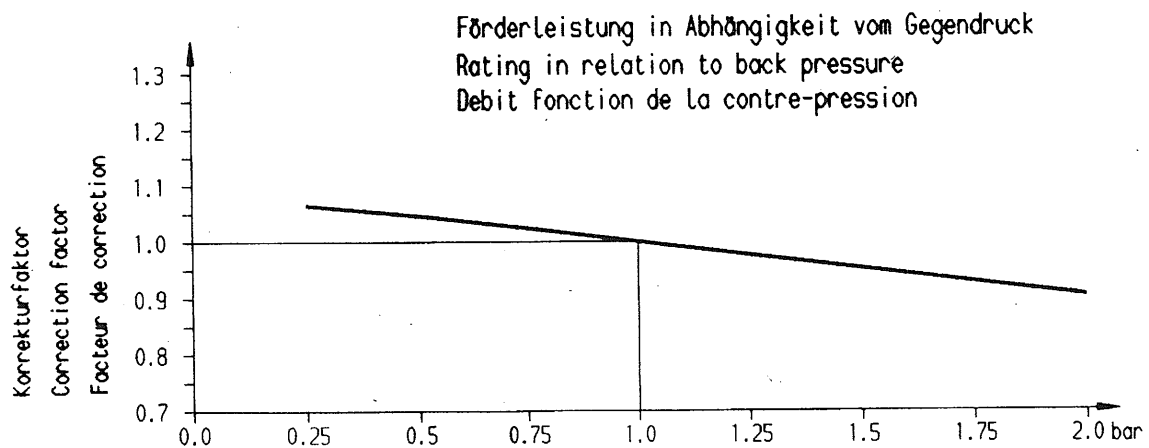
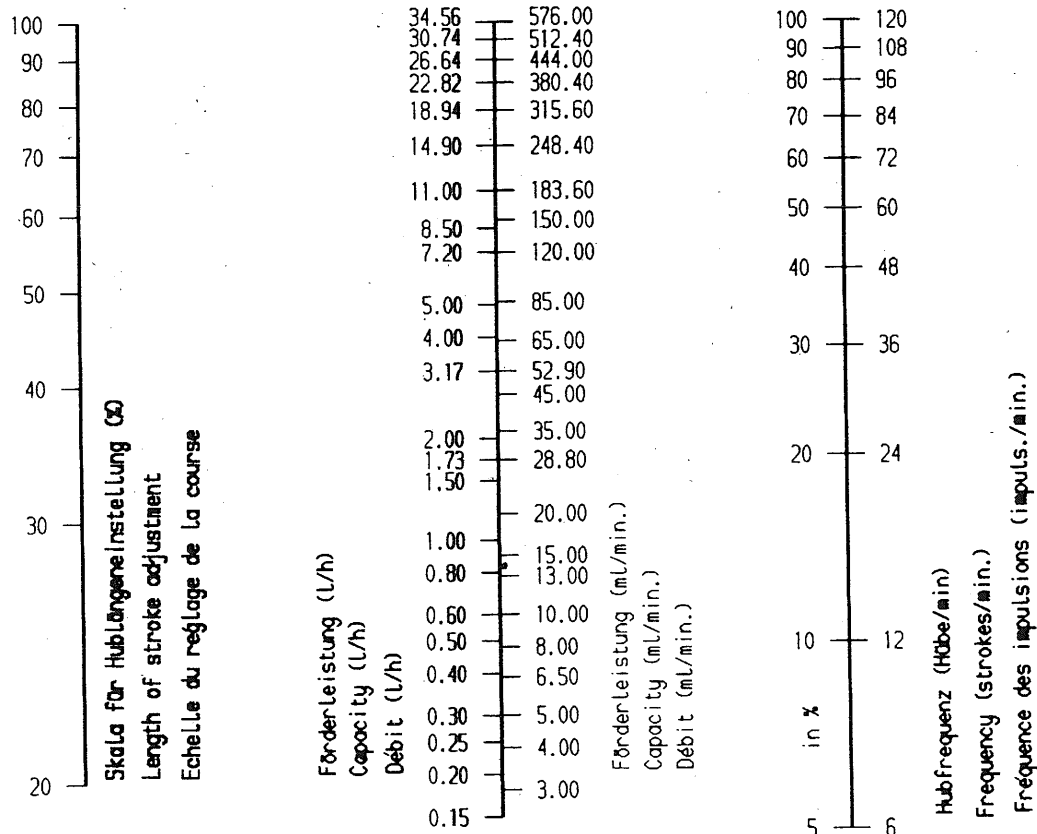
Commissioning

11.5.7 Nomogram 0813



Commissioning

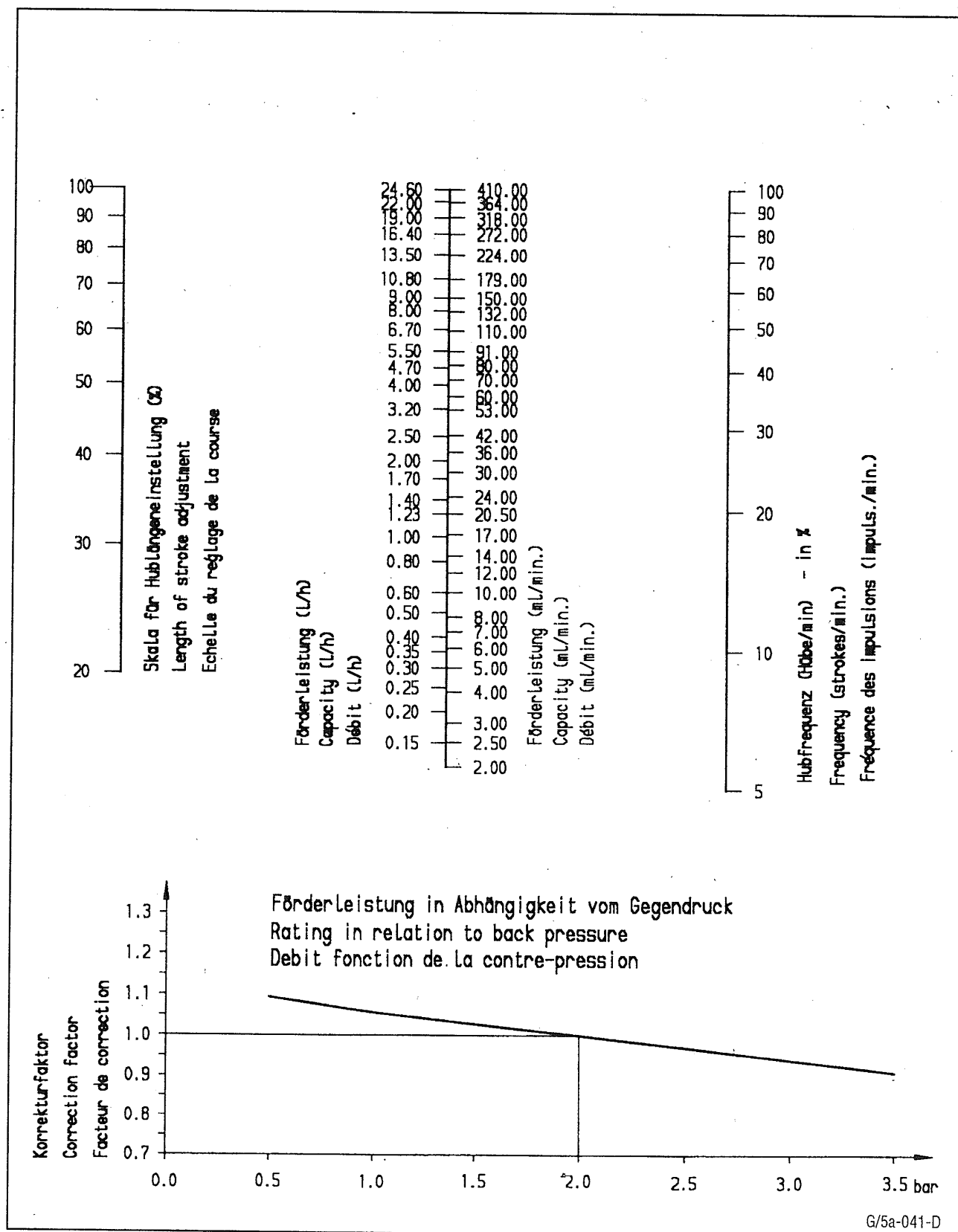
11.5.10 Nomogram 0230



G/5a-042-D

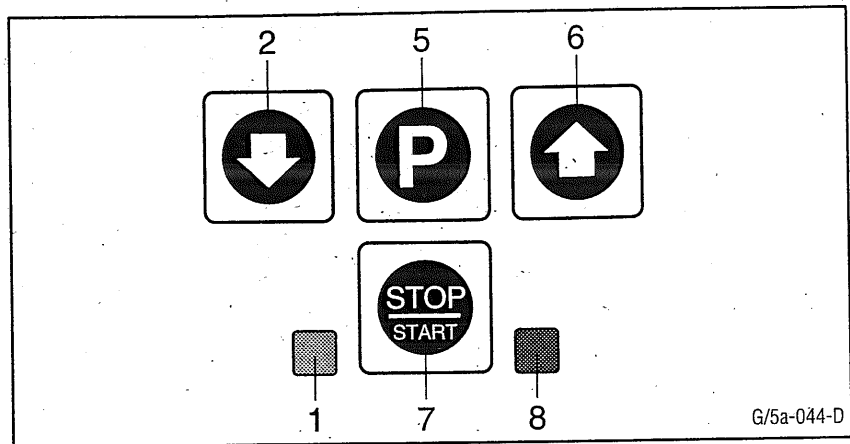
Commissioning

11.5.9 Nomogram 0423



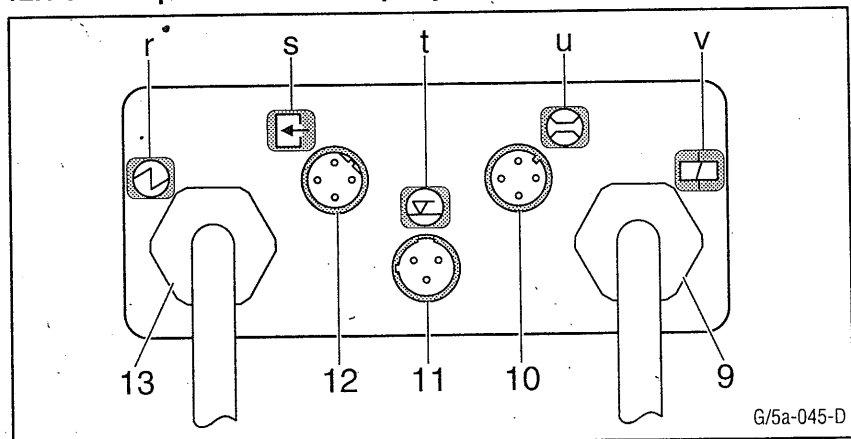
Operation

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



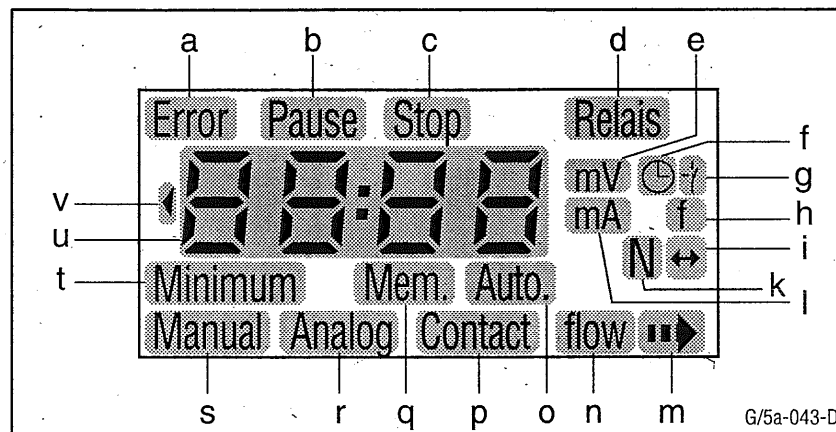
- r = Identification mains connection
- s = Identification remote control
- t = Identification float switch
- u = Identification metering monitor
- v = Identification relay output
- 9 = Relay output
- 10 = Connection socket for metering monitor
- 11 = Connection socket for float switch (with function plug)
- 12 = Connection socket for remote control; contacts, analogue signal and control function on/off.
- 13 = Mains connection

Operation

12 Operation

12.1 Explanation of the operating and display elements

12.1.1 Display






- a = Display or an error message "Error"
- b = Pump stopped using "Pause" control function
- c = Pump stopped manually with key (7)
- d = Display "Relay" is activated
- e = Voltage range selection "mV" or "V"
- f = Display of the time
- fg = Timer operation \ominus -7
- h = Display of the stroking rate or "E" in "Contact" operation
- i + k = display of the pulse step-up or step-down ratio
- k = Stroke count "N"
- l = Signal range selection "mA"
- m = Saving new settings
- n = Activating metering monitor "flow"
- o + c = Display for automatic pump stop in timer operation
- p = Pump set to "Contact" operation
- q = Display memory operation "mem"
- r = Pump set to "Analog" operation
- 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 "↓"
- a + i = No mains supply of the metering pump, error in the data transfer line



Operation (Basic Version)

12.3 Operating functions basic version


12.3.1 Starting the pump

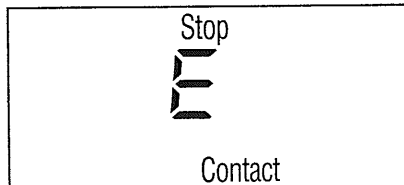
- Plug the mains plug into the socket.
- Open the view window (14).
- Set the stroke length to 100% with the stroke adjustment knob (3).
- Press the  key in order to avoid uncontrolled feeding.
- Only for NP and PP pumps: Open bleed valve (17) max. 1 turn anti-clockwise.
- Only for SS and TT pumps: Loosen the discharge line at the injection valve.
- Simultaneously press the   keys and start automatic quick priming.
- Press the keys so long until the medium has completely filled the liquid end free of bubbles - this can be recognised by the fact that the medium becomes visible in the bleed or discharge line.
- Close bleed valve (NP/PP) or fasten the discharge line again to the injection valve (SS/TT).


PLEASE NOTE:

By simultaneously pressing the   keys the pump operates in all operating conditions with maximum stroking rate in order to guarantee a safe and fast priming!

12.3.2 Stopping the metering

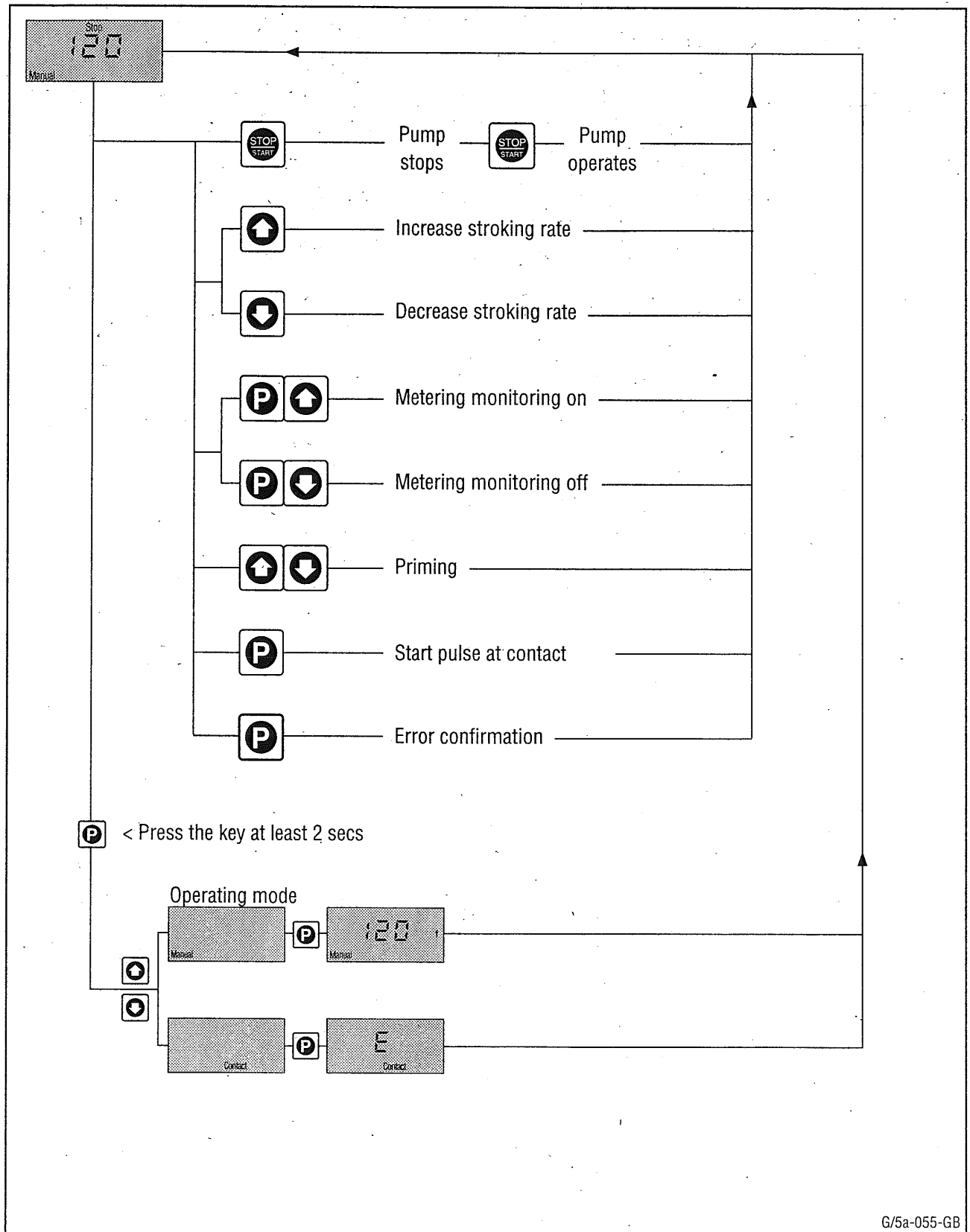
The metering can be interrupted at any time by pressing the  key - "Stop" then appears in the display.



By pressing the  key the metering is started again.

Operation (Basic Version)

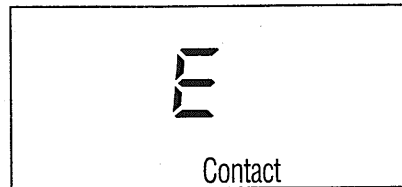
12.2 Overview operating diagram



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).



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 mains voltage to the control cable!

Please note:


The stroking rate set in "Manual" operation results in the max. stroking rate in "Contact" operation. If no frequency reduction is desired the max. stroking rate of 120/100 s/min is to be set in "Manual" operation before switching over to "Contact" operation.

For the external control of the pump you require the 4-pole universal cable or the 2-pole remote cable which is plugged into the connection socket (12) and screwed down.

Plugging in is only possible in one certain position!

The brown and black wires of the 4-pole cable are to be bridged; otherwise the pump stops and "Pause Stop" appears in the display.

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 strokes per minute (for the pump types 1605, 1310, 0813 and 0423: 100 strokes per minute).

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

If only external control is planned this can also take place with a 2-wire remote cable - whereby the bridge is within the plug.

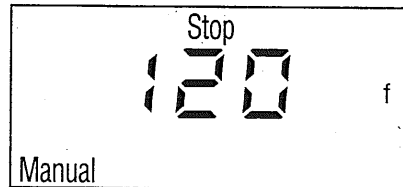
Operation (Basic Version)


12.3.3 Internal "Manual" operation

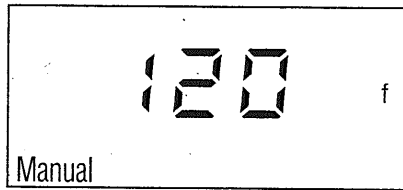
PLEASE NOTE:



If no float switch or control cable is connected both the function plugs must remain plugged in at the inputs (11) and (12).

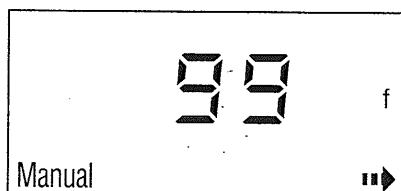
- After the pump is started the yellow pilot light (1) lights up and the following display appears (factory setting):




- Press the  key.
- The pump now operates with the max. stroking rate displayed e.g. 120 (100) strokes per minute.

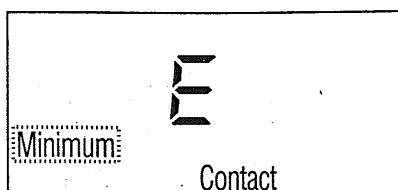


- The yellow pilot light (1) goes out for a short moment while the stroke is being performed.
- With the   keys the desired stroking rate can be precisely set with quartz-like accuracy e.g. 99 strokes per minute.

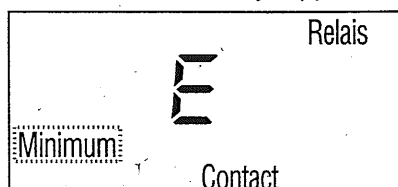


- After every change of the stroking rate or when changing the program, an arrow  in the lower right hand corner of the display flashes for about five seconds.
- When this period has elapsed the new setting is saved; if the mains plug is pulled within five seconds the new setting is disregarded.

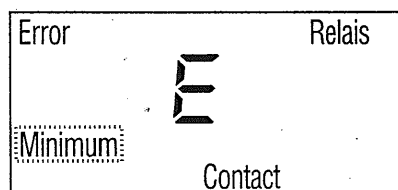
Operation (Basic Version)



If the option "Fault annunciation relay de-energising" was selected this relay which is normally energised in standard operation de-energises and enables a visual or acoustic warning signal to be issued. Then the additional word "Relay" appears in the display.



If 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" appears additionally in the display



PLEASE NOTE:

If single-stage float switches already present should be used, 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:

In order that the correct function (for empty warning "Contact open") is provided, the float of the single-stage float switch must be removed from the stay tube and turned by 180°!

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


PLEASE NOTE:

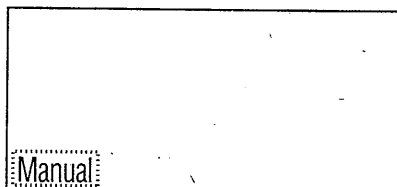
If the float cable plug is pulled out from input (11) or the cable is disconnected "Error" appears in the display and "Minimum" flashes; if the option fault annunciation relay is fitted the word "Relay" also appears.

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

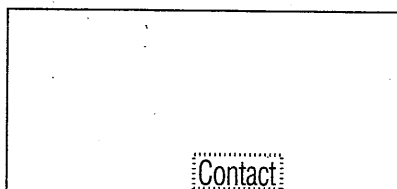
Operation (Basic Version)


Switching to "Contact" operation:

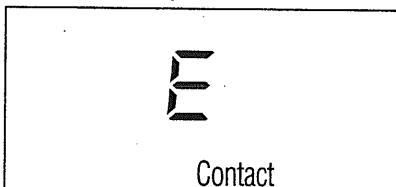
- Press the  key for about two seconds.
- "Manual" flashes in the display.



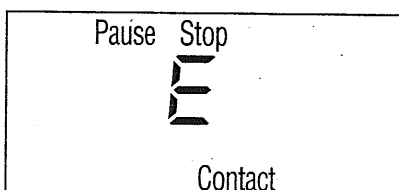
- Switch over to "Contact" operation with the   keys.



- 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.

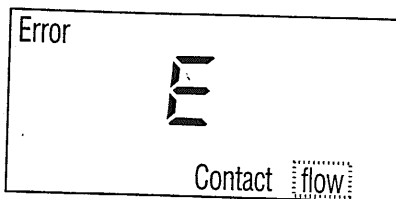


12.3.5 Connecting a float switch

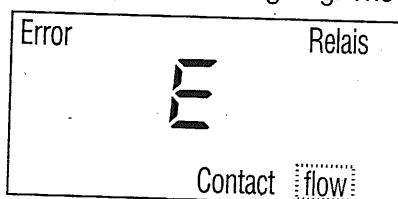
The two-stage float switch is capable of issuing an early warning if lack of chemical is imminent. Thus the chemical supply tank can be refilled before the pump finally switches off (second stage).



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

Operation (Basic Version)



If additionally the relay option "Fault annunciation relay de-energising" was selected the relay de-energises to issue the alarm or energises for "switching mode" energising. The word "Relay" appears in the display.



- By simultaneously pressing the  - and  key the monitoring function can be turned off.
- By removing the function plug from the socket (10) it is automatically turned off.

12.3.8 Error messages - 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.

Error message "Error flow"

Possible cause: No or too little metering

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)

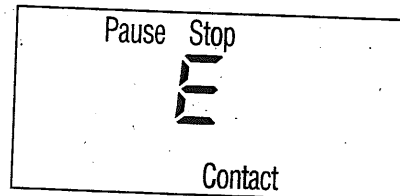
Entire display continues to flash: • The pump must be sent back to the factory to be checked.


Operation (Basic Version)

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

If the pump is to be switched voltage-free the brown and black wires of the 4-wire universal cable are bridged for operation and opened for stop.

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



- If the  key is pressed the "Pause" display goes out. "Stop" continues to be displayed, the pump remains stopped.



PLEASE NOTE:

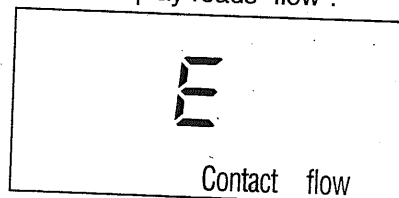
Due to safety reasons the pump also stops if the cable is removed or disconnected, for instance in case of a cable rupture.

If the pump is to operate without control function, the function plug must always be plugged into input (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 which is available as an option is to be screwed down onto the discharge valve of the liquid end, the connector is to be plugged into input (10) and screwed tight.

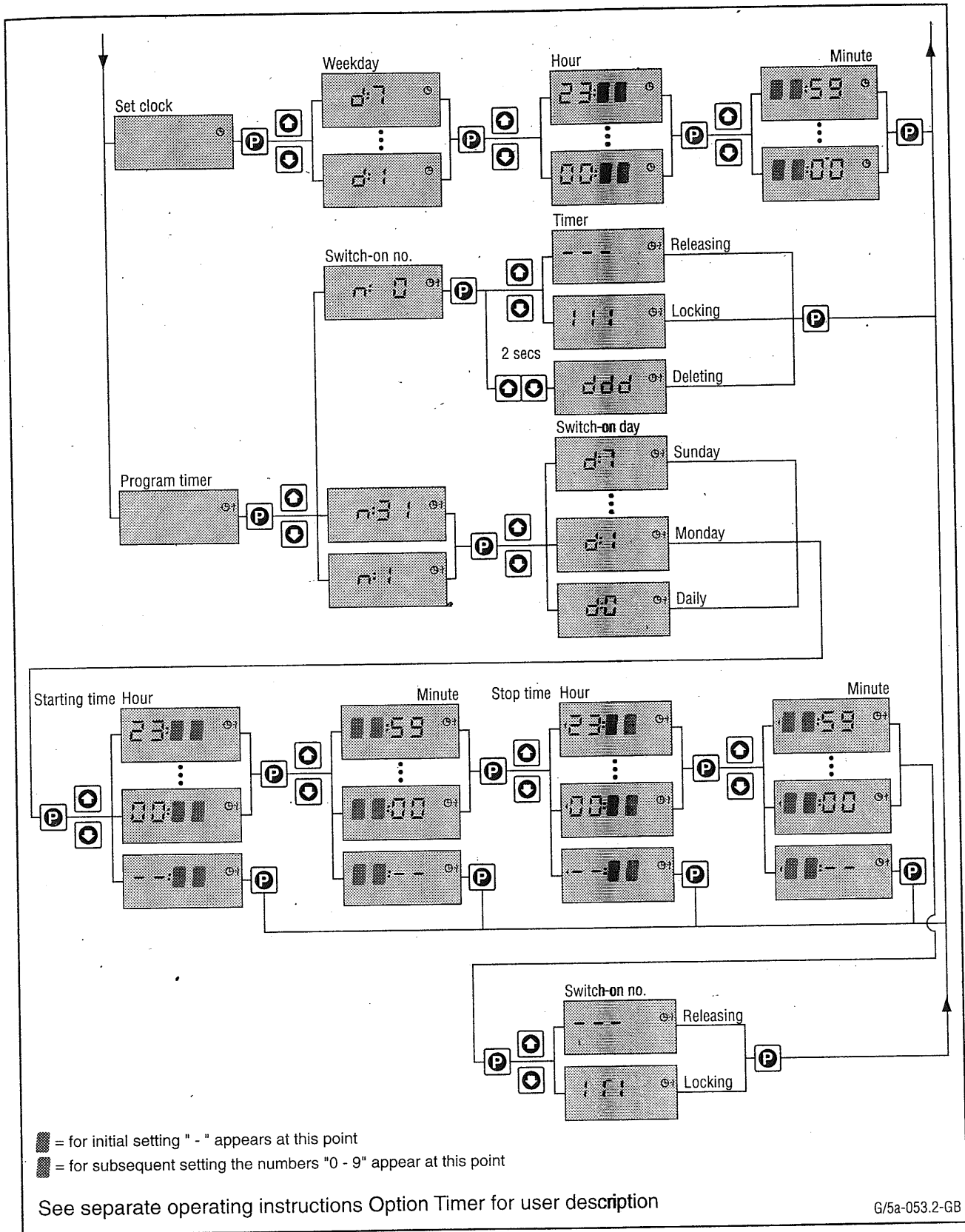
- Activate the metering monitor by pressing the  - and  keys simultaneously. Precondition: The metering monitor is plugged into socket (10).
The display reads "flow".



Normally every stroke performed is registered by the flow monitor by the LED lighting up briefly and fed back to the pump.

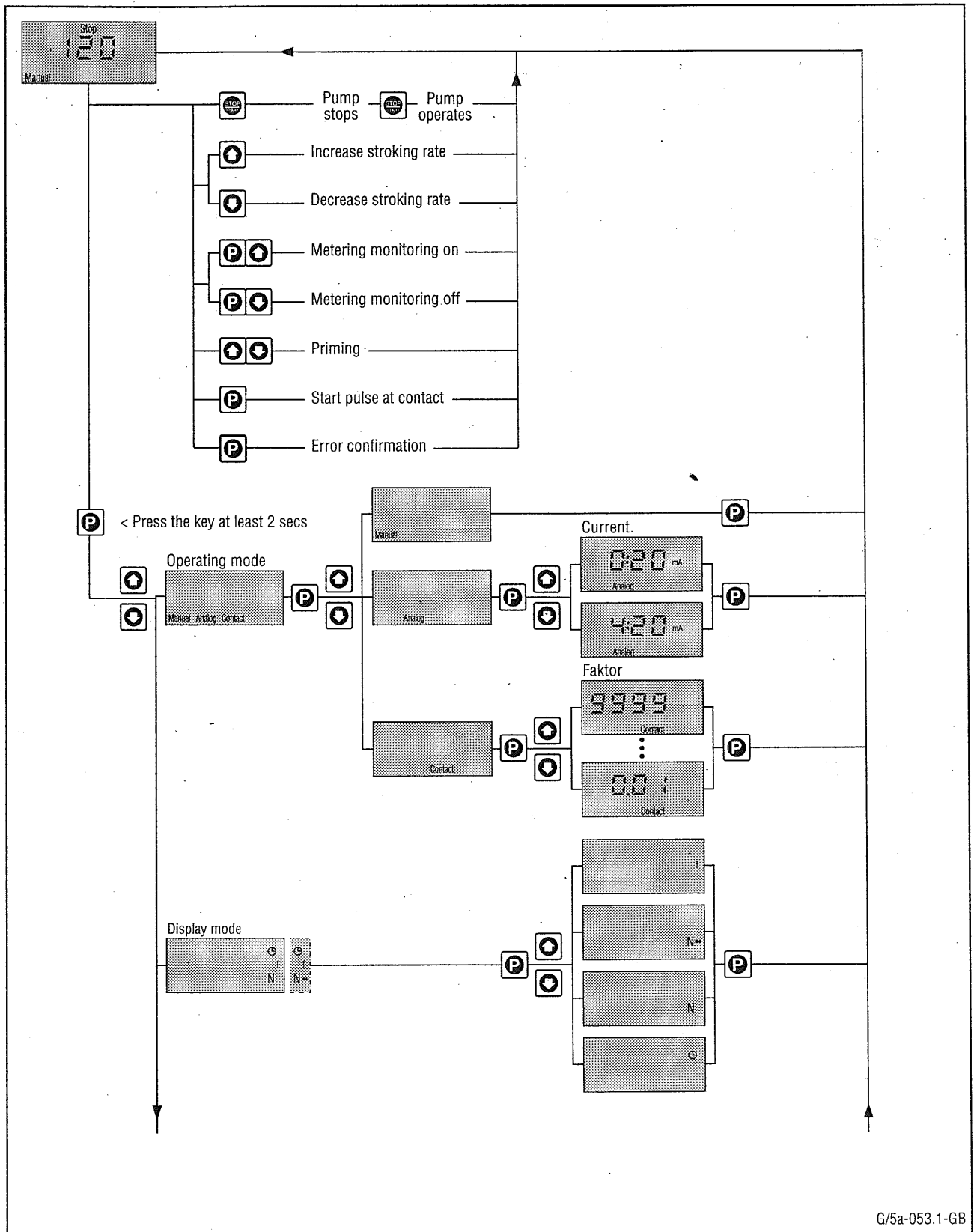
If the feedback signal is missing eight times in succession (no or too little metering) the error message "Error" appears in the display and the "flow" symbol flashes.

Operation (Option Version)



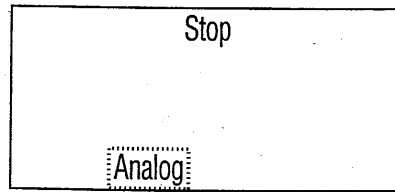
Operation (Option Version)

12.4 Overview operating scheme (option version)

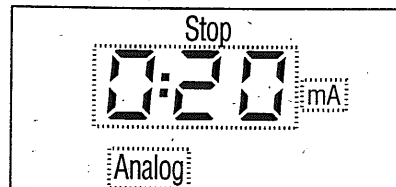



G/5a-053.1-GB

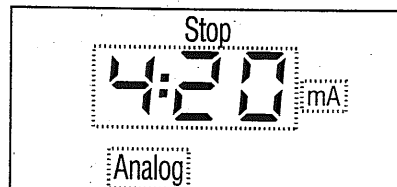
Operation (Option Version)



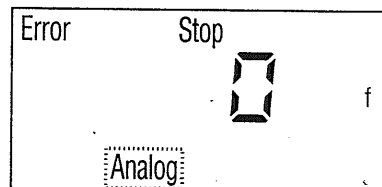
- Press the **P** key and select the setting for the signal range "mA".




- Set the signal range desired with the  key, e.g



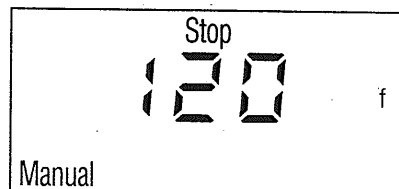
- Confirm with the **P** key.
- For the 0 mA signal you obtain the display stroking rate (rokes/min) and the error message "Error" with "Analog" flashing and the control signal is below 4 mA.



The pump is designed for voltage signals:

- Stop the pump with the  key.

Display



Press the **P** key for 2 seconds and select the following display with

the  key:

Operation (Option Version)

12.5 Operation (option version)

12.5.1 Analog control

Analogue signals such as current signals 0/4-20 mA or voltage signals which can be switched over from 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 analogue 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:

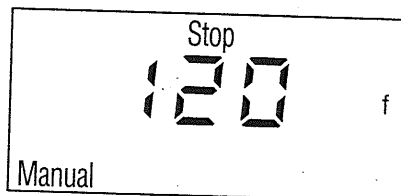
100% stroking rate in analogue operation corresponds to the number of strokes per minute laid down in "Manual" operation!



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 per minute can be executed and displayed!

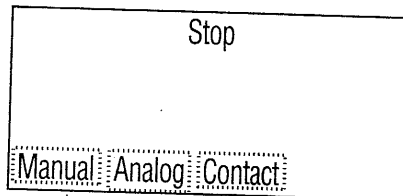
Selection of the signal range:



- Stop the pump with the  key -

Display



- Press the  key for two seconds and with the  key select the following display:

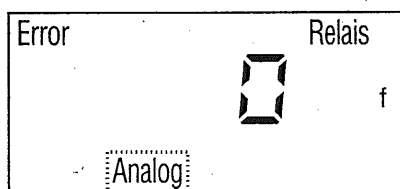


- Press the  key and with the  key select "Analog".

Operation (Option Version)

Error message "Error Analog":

The advantage of a "life-zero" operation (for example of a 4-20 mA signal) is the fact that the metering pump reports the failure of this signal or if it drops below the value set (e.g. in the event of a cable rupture) as an error e.g.:



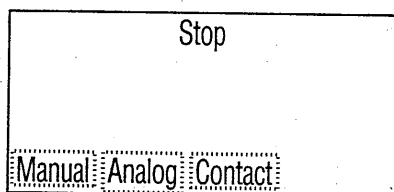
In order to acknowledge the error message at least 4 mA must be applied at the signal current input, after this the pump starts again independently and the error display "Error" and the flashing "Analog" go off.



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

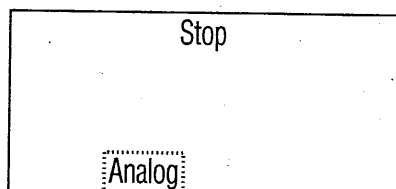
This fault annunciation relay then takes over the alarm annunciation from the optional fault annunciation relay of the metering pump and switches the metering pump off using the control function "Pause/stop".

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.

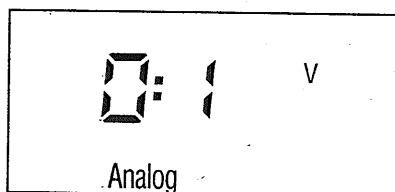
Operation (Option Version)





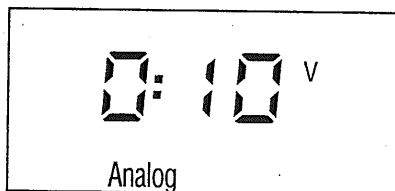
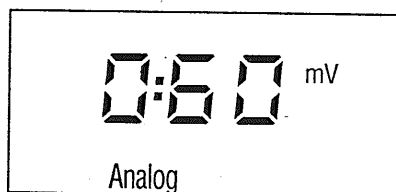
- Press the  key and with the  key select "Analog".




- Press the  key.



- With the  or  key additionally the following ranges can be selected:



- Confirm the desired range with the  key.


Operation (Option Version)

Pulse step-down/step-up:

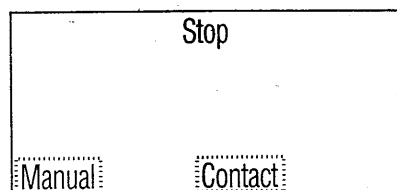
This function enables the number of pulses received to be divided by a factor of 0.01 to 1.00 or multiplied by 1.00 to 9999.

As a result for example 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.

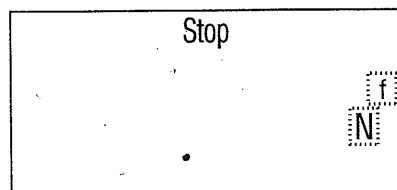
To set:



- Press the  key approx. 2 seconds.

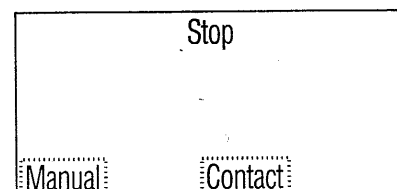
The display






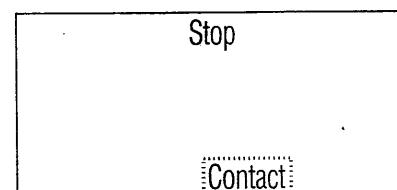
- or




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



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



- Confirm with the  key.

Operation (Option Version)

12.5.2 Pulse Control

When the factor smaller than 1.00 is entered a step-down results, for the factor larger than 1.00 a step-up takes place.

Factor setting range 0.01 to 9999.

Example table:

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

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

Factor	Pulse Pulses (sequence)	Metering stroke Metering strokes (sequence)
0.01	100	1
0.10	10	1
0.25	4	1
0.33	3.03 (33 • 3 - 1 • 4)	1
0.40	2.5 (2 - 3)	1
0.50	2	1
0.75	1.33 (1 - 1 - 2)	1
1.00	1	1
1.25	1	1.25 (1 - 1 - 1 - 2)
1.50	1	1.5 (1 - 2)
2.00	1	2
2.50	1	2.5 (2 - 3)
25.0	1	25
9999	1	9999

If one does not obtain an integer result on 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.

Thus on average for injection operation the precise metering amount according to the factor results.

With the Pulse Control option the following functions are possible:

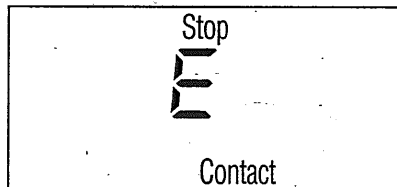
- Pulse step-down with factor 0.01 - 1.00
- Pulse step-up (preselection) with factor 1.00 - 9999
- Memory "Mem"
- Display of the step-down or step-up factor "N↔"
- Stroke counter device "N" (also available for Analog variant)

Operation (Option Version)

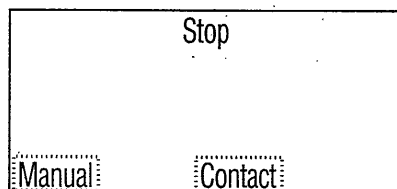
Selection of the display functions "f", "N↔" oder "N":


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.

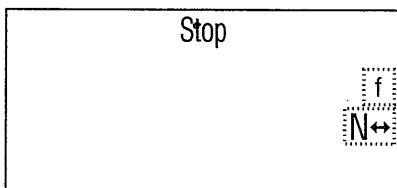
Display




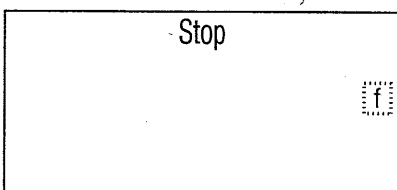
- Press the  key approx. 2 seconds



- Press the  key for display function.



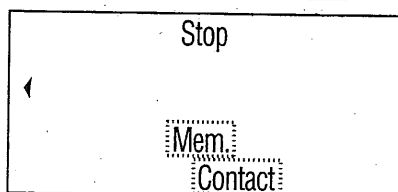
- Confirm with 




"f" specifies the stroking rate in 0 to 120 (100) strokes per min.

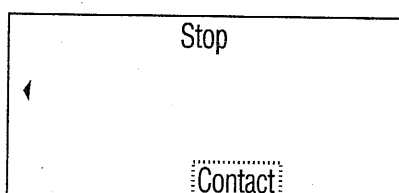
Operation (Option Version)

- Press the  or  key.





The "◀" setting in the display enables the activation of the memory function memory "Mem".

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




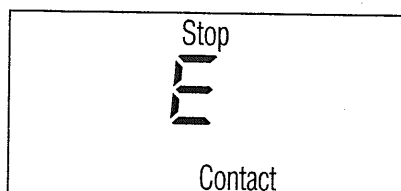
- Confirm with ,
the factor set, e.g. 1.00 is displayed.



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



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




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 interpreted as preselection operation.

After starting via an external contact 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 jumps back to the preselected stroking rate.

If a further start contact takes place before the strokes to be executed are executed, the preselected number of strokes are executed again.

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

Please note:

As for the preselection operation without memory the internal memory of the pump is not active a reset takes place when executing any functions which result in a 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 faster pulses than 2 per second to be saved which can then be worked off later as discharge strokes with the stroking rate set in "Manual" operation.

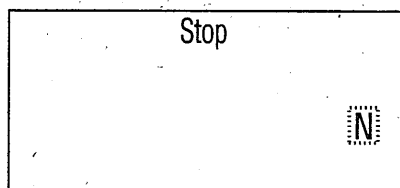
A maximum of 65535 pulses at factor 1.00 are saved. The number of pulses which can be saved depends on the factor and results for example at factor 0.01 in a total of 6553500 pulses or at factor 100 in a total of 655 pulses.

An error message "Error" takes place in the event of a higher number of pulses if the memory capacity is exceeded, the "Mem" display flashes and the pump is stopped.


Maximum pulse frequency 40 pulses/s, necessary contact duration 20 ms.

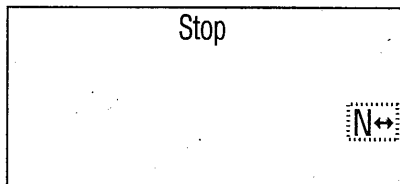
Operation (Option Version)



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

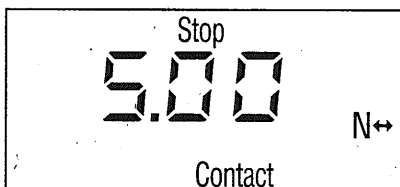


Stroke counter "N" counts the strokes executed in all operating modes. A maximum of 9999 can be counted. After that the display starts again at 1. The excess strokes are indicated by a "↔" in the display.

- Set display function "↔" with the  key.



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



Operation (Option Version)

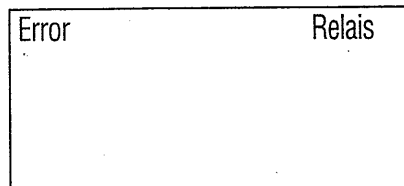
b) Timer has been released but the pump is stopped using the timer because no switch-on period is active.

-> Timer relay is de-energised.

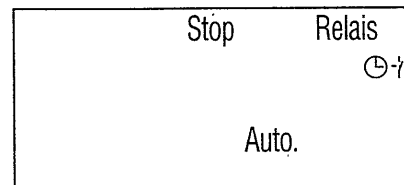
c) Timer has been locked.

-> Timer relay is energised.

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



Display in the event of an automatic pump stop as timer relay



Technical data:

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

Relay cable 2 m long (3 x 0.75 mm²), permanently connected.

Operation (Option Version)

12.5.4 Relay option

The relay can be designed selectively in switching mode no. 1 to no. 4 (ordering specification takes place via identity code).

Only one function is always present and it is not possible to switch to another switching mode.

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

As a collective fault for early level warning and final switch-off, metering monitoring, fuse and mains failure reporting as well as a system error.

Function: Relay for alarm de-energising

PLEASE NOTE:

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

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

Switching mode no. 2: "Pacing relay energising"

For issuing a contact parallel to the metering stroke of the stroke solenoid.

Contact duration approx. 150 ms.

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

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

Function: Relay energising in the event of an alarm

Switching mode no. 4: "Timer relay energising"

The timer relay is functionally independent 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.
 - > Timer relay is energised.

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.

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. In doing so 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 anti-clockwise.

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

13 Maintenance




WARNING

Metering pumps and their peripheral devices may only be serviced by trained personnel and authorised 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 leakage bore at the intermediate disk (dampness can indicate a diaphragm rupture)
- that the pump is feeding correctly - for this purpose briefly operate the pump in priming operation (simultaneously pressing the  and



key).

14 Trouble shooting/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 this in our product catalogue under "Spare parts kit for gamma/5"!



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 (glasses, gloves)!



WARNING:

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

Always empty and rinse the liquid end!

Observe the safety data sheets of the metering fluid!

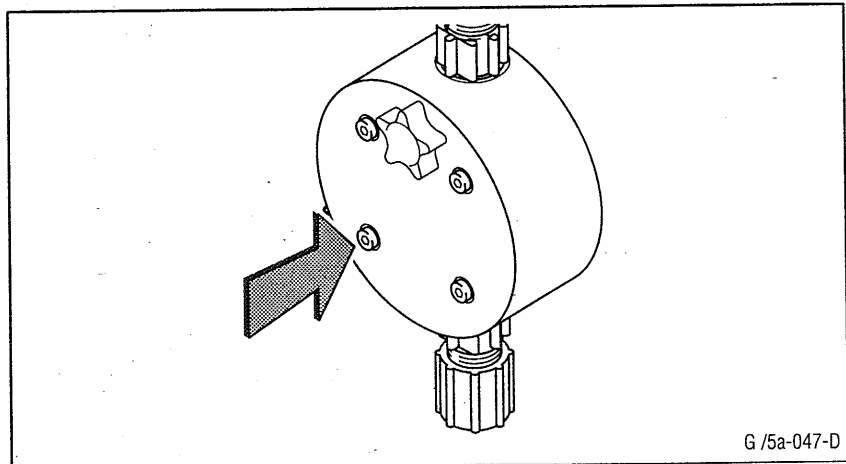
Troubleshooting/Eliminating Errors

14.1.5 Fluid is leaking at the intermediate disk

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

Remedy:

- Tighten the screws (arrow) in the liquid end crosswise.



G /5a-047-D

ATTENTION:

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

Torques for screws

*M5 x 45, M5 x 60 and M5 x 70: **4.5 to 5 Nm!***

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 quarter of a year!

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

PLEASE NOTE:

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

PLEASE NOTE:

When using abrasive media the service life of the diaphragm is restricted and the diaphragm must be checked more often!

The installation of a diaphragm rupture warning is recommended in this case!

Troubleshooting/Eliminating Errors

Please note:

For pumps with level switch and early warning:

In this case, air can normally neither enter the pipe system nor the liquid end as the pump switches to early warning when the first switching point is reached: when the second switching point is reached (after a path of 30 mm) the pump switches itself off.

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

Remedy:


- The error message acknowledges itself by filling up the supply container.
- Check whether the function plug level (11) is plugged in.

Error message "Error flow"

Possible cause:

No or too little metering

Remedy:


- Briefly press the  key or execute the control function "Pause/Stop" (remote on/off).
- If the error message appears again bleed the liquid end and increase the stroke length.

Complete display flashes

Possible cause:

System error

Remedy:

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

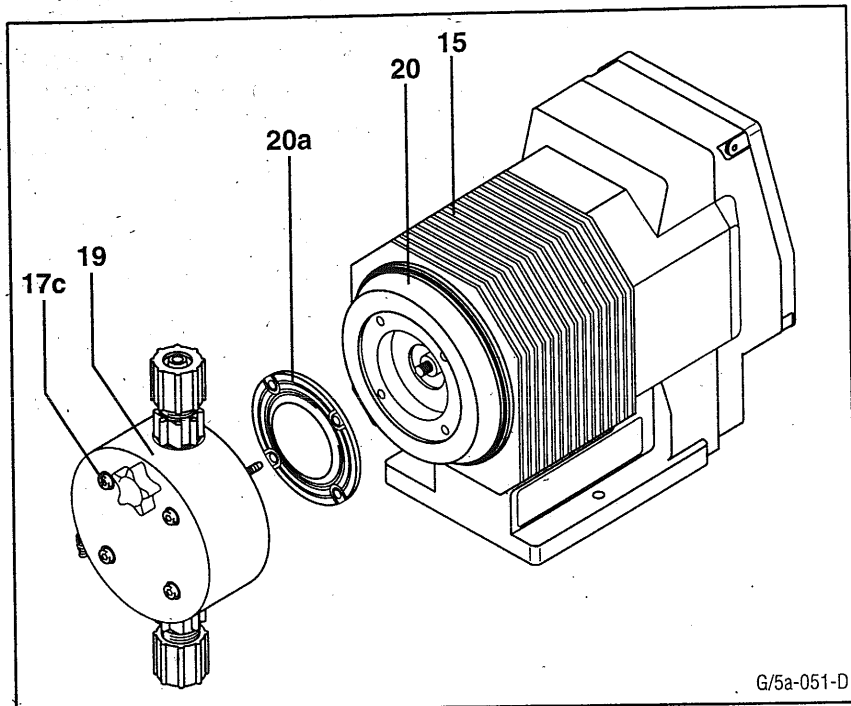
Complete display continues to flash

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

> **Also see chapter 15/page 82 for information about this.**

Troubleshooting/Eliminating Errors

- Now pull the liquid end with the screws out of the diaphragm and completely unscrew this from the drive axle.
- Remove the intermediate disk (20) from the enclosure (15).



- Screw on a new diaphragm (20a) to the stop of the drive axle (15a) and check the threads are smooth.
- Unscrew the diaphragm again from the drive axle.
- Replace the intermediate disk onto the enclosure again.
- Insert the diaphragm into the intermediate disk and screw on 2 thread turns.

ATTENTION:

Turn the diaphragm in such a way that the 4 bores of the diaphragm and intermediate disk match precisely!

The drain opening of the intermediate disk must point downwards!

- Place the liquid end (suction connection must point downwards!) with screws onto the diaphragm and intermediate disk 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 so long until the diaphragm is sitting tightly (the twist resistance of the recuperating spring can be felt).

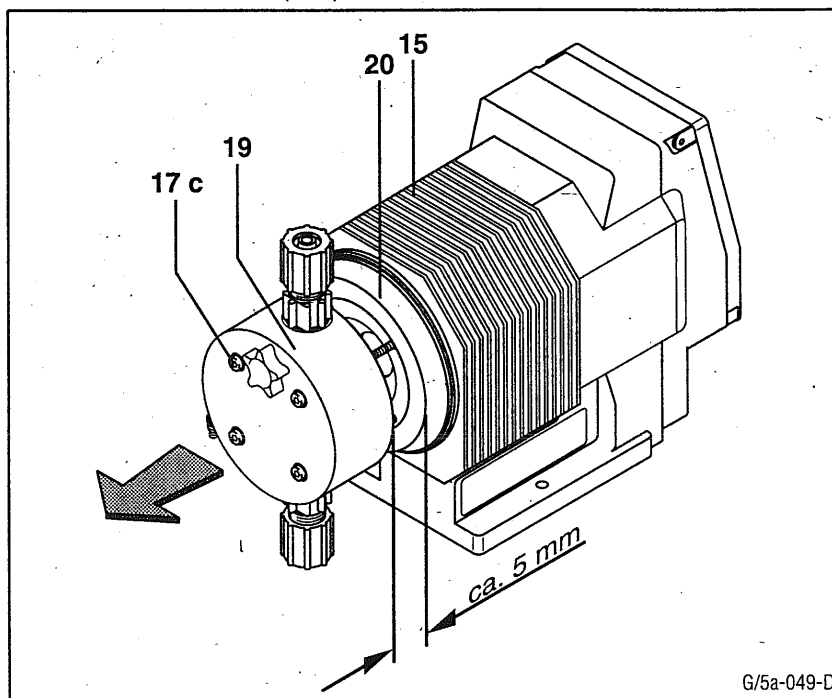
ATTENTION:

Do not overturn the diaphragm!

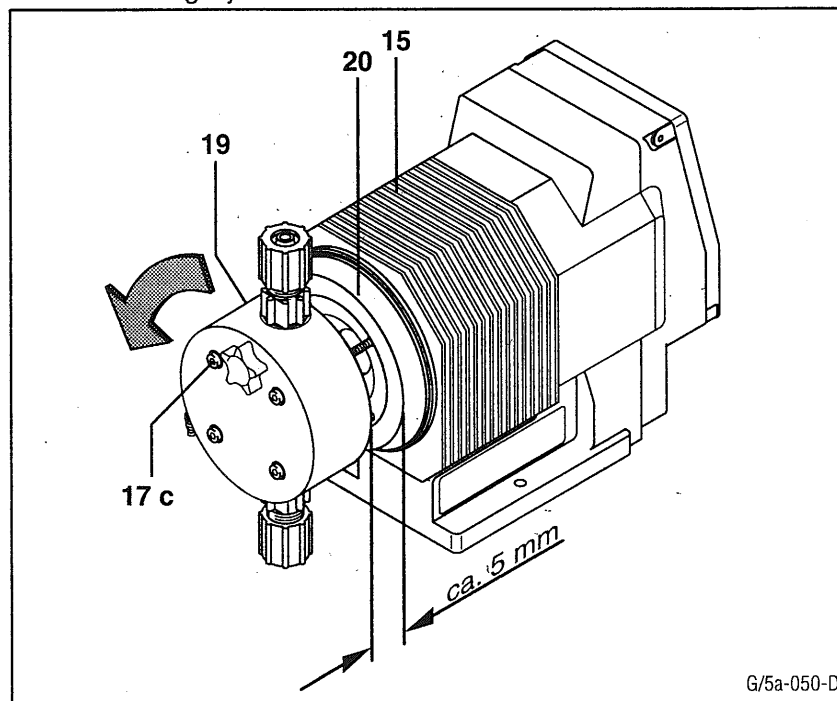
Troubleshooting/Eliminating Errors

Exchanging the pump diaphragm

- With the pump running, set the stroke length with the revolving knob (3) to "0".
- Remove the screws (17c).



- Pull out the liquid end (19) with screws from the intermediate disk (20) and pump enclosure (15) (approx. 5 mm) until no resistance can be felt from the screws.
- Hold the housing (15) in your left hand and with your right hand unscrew the diaphragm (20a) and the intermediate disk (20) with the screws (17c) of the drive axle (15a) by turning the liquid end (19) to the left with a slight jerk.



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 mains voltage is being applied.

Remedy:

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

Other possible cause: Faulty fuse

Remedy:

- Have the fuse checked by an authorised customer service and if necessary have it exchanged.

PLEASE NOTE:

Only use the correct fuses of the manufacturer!

Type Littlefuse, super slow, dimensions 6.3 x 32 mm

For pump types 1602, 1006, 0613, 0417, 0230:

Version 230 V -

fuse 0.5 A, ATT, order no. 71.20.37.1

Version 115 V -

fuse 1.0 A, ATT, order no. 71.20.52.0

For pump types 1605, 1310, 0813, 0423:

Version 230 V -

fuse 0.7 A, ATT, order no. 71.20.51.2

Version 115 V

fuse 1.25 A, ATT, order no. 71.20.38.9

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

> See chap. 15/page 82 for more information

14.2.2 Mains connection line (system cable) damaged

Remedy:

- Have the connection line exchanged by an authorised customer service!

PLEASE NOTE:

Only use the manufacturer's correct connection lines with Euro plug.

For all gamma pump types:

Order no. 81.85.26.6

For all other mains cables see list of spare parts!

Troubleshooting/Eliminating Errors

- Set the stroke length to 100% with the knob (3), and with the metering pump running turn the complete liquid end so long to the right until the suction connection points downwards vertically.
- Stop the pump.
- Then tighten the 4 screws (17c) crosswise.

ATTENTION:

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

Torques for screws

M5 x 45, M5 x 60 and M5 x 70: 4.5 to 5 Nm!

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 quarter of a year.

- 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 (safety regulations of the employers' insurance associations: VBG 4 and ZH 1/11)!



DANGER:

Before opening the pump pull out the mains 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 authorised persons!

Disposal of old parts

16 Disposal of old parts



WARNING:

***Never throw metering pumps in the bin (domestic refuse).
Plastic and mechanical parts are special waste and must be recycled!***

Abfg, AbfRestberwV

Waste (old parts) is to be disposed of in an "orderly manner for the common good especially the protection of the environment". Therefore old parts have to be disposed of in accordance with the (German) Waste Avoidance and Waste Management Act (Abfg) or recycled in accordance with the (German) Waste and Residual Materials Monitoring Act (AbfRestberwV).

Taking back old parts

If you should not find any appropriate collection point the ProMinent subsidiary or representative responsible for you will take back your old parts for a small fee (addresses can be found at the back/page 88 of these operating instructions)!

Repair

15 Repair



WARNING:

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

Customer service

Inform your customer service responsible!

Or contact the ProMinent subsidiary or representative responsible for you.

(Addresses can be found on the back page/page 88 of these operating instructions)!



WARNING:

Pumps for radioactive media

Pumps for radioactive media may not be sent.

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 industrial entrepreneurs to protect their employees or people and the environment against damaging effects from handling hazardous substances!

An inspection or repair of pumps and their parts therefore only takes place if a correctly and completely filled in certificate confirming the quality as being recognised as safe can be submitted by authorised and qualified specialists of the pump operator!

If in spite of emptying and cleaning the pump carefully, safety measures are necessary, the necessary information must be listed in the certificate confirming the pump is recognised as being safe!

The certificate confirming the pump is recognised as being safe is a 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 contract due to other reasons. Pumps which were operated with materials with a radioactive load are not accepted as a general rule!

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.



Please complete in full !

Warranty application for metering pumps

No.

Company Tel. no.: Date:

Address:

Clerk (customer):

Order no.: Delivery date:

Pump type/
identity code: Serial no.:

Short description of fault:

.....
.....
.....

Type of fault:

1 Mechanical fault

- ☐ Unusual wear
- ☐ Parts subject to wear
- ☐ Rupture/other damage
- ☐ Corrosion
- ☐ Damage during transport

2 Electrical fault

- ☐ Connections such as plugs or cables loose
- ☐ Operating elements (e.g. switches)
- ☐ Control

3 Leakage

- ☐ Connections
- ☐ Liquid end

4 No or poor capacity

- ☐ Diaphragm defective
- ☐ Other

Application conditions of ProMinent pumps:

Location/system description:

Pump accessories used:

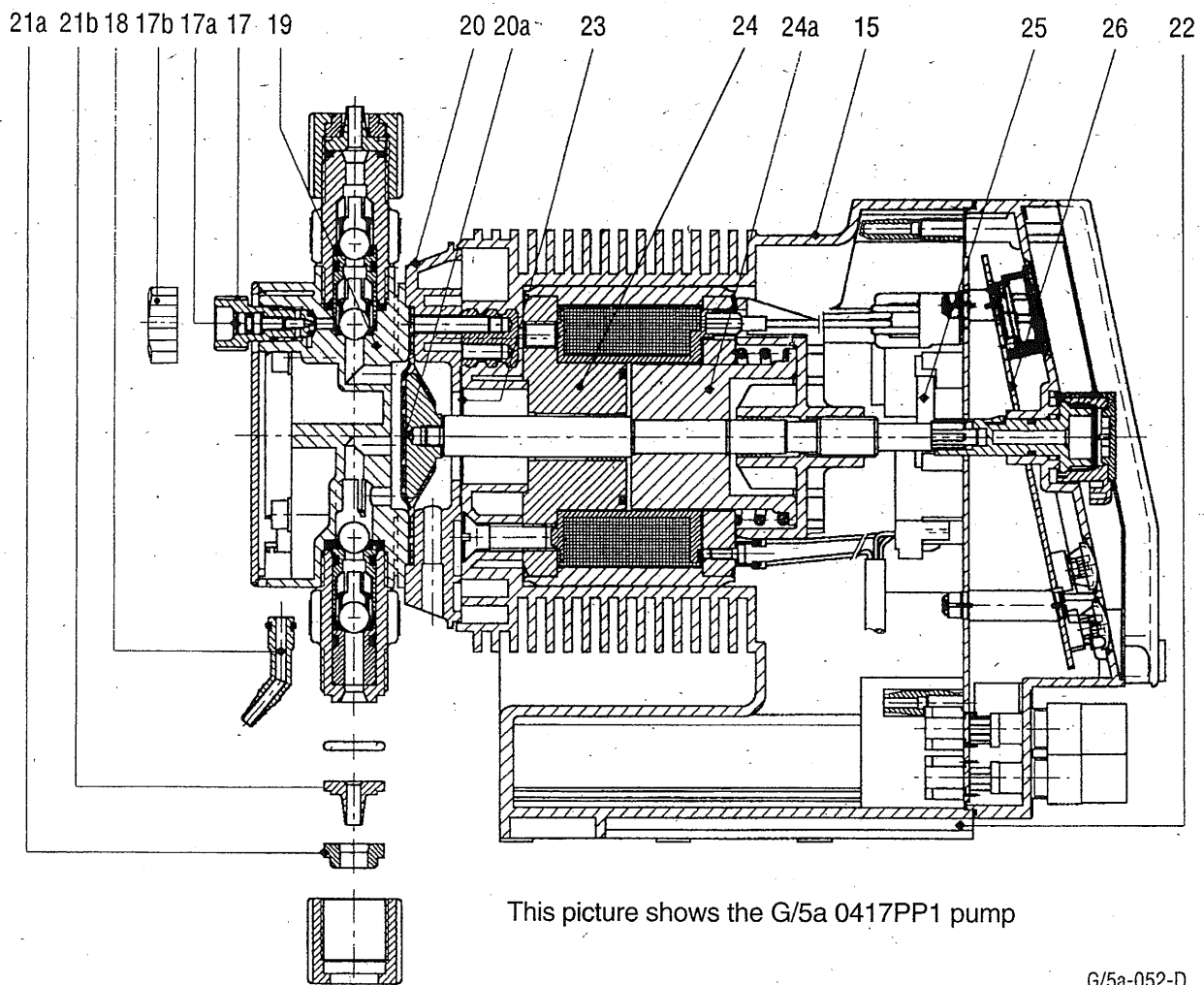
.....
.....

Commissioning (date):

Running time (approx. operating hours):

Please specify set-up data and enclose sketch of the system.

Appendix/Cross Section of Pump



This picture shows the G/5a 0417PP1 pump

G/5a-052-D

- 15 Enclosure
- 17 Bleed valve
- 17a Fine bleed screw
- 17b Star handle
- 18 Bypass hose nozzle
- 19 Liquid end with suction and discharge connection
- 20 Intermediate disk with leakage bore
- 20a Pump diaphragm with steel core and PTFE layer
- 21a Gripper ring
- 21b Hose nozzle
- 22 Pocket for short operating instructions
- 23 Gasket
- 24 Short stroke solenoid
- 24a Pressure piece
- 25 Fuse
- 26 Electronic control with microprocessor