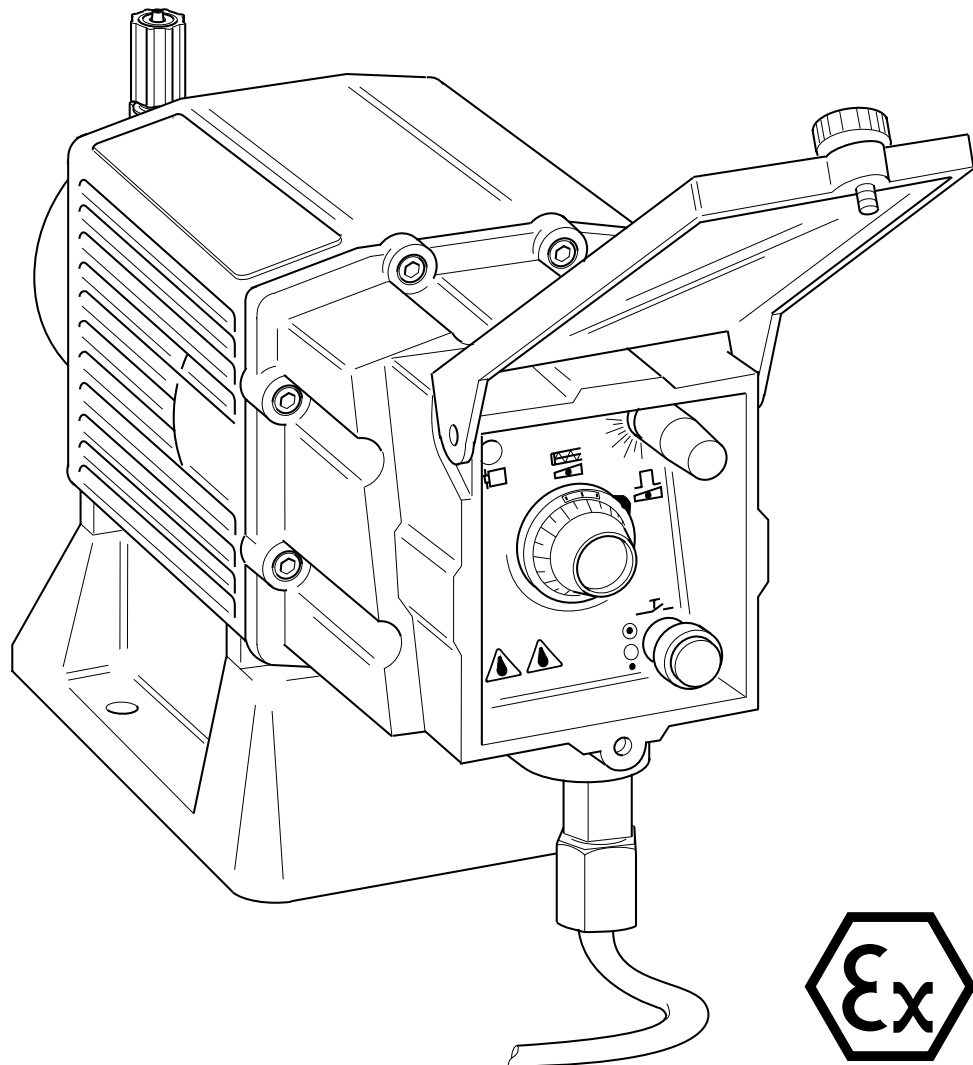


# Operating Instructions

## Metering Pump ProMinent EXtronic® EXBa

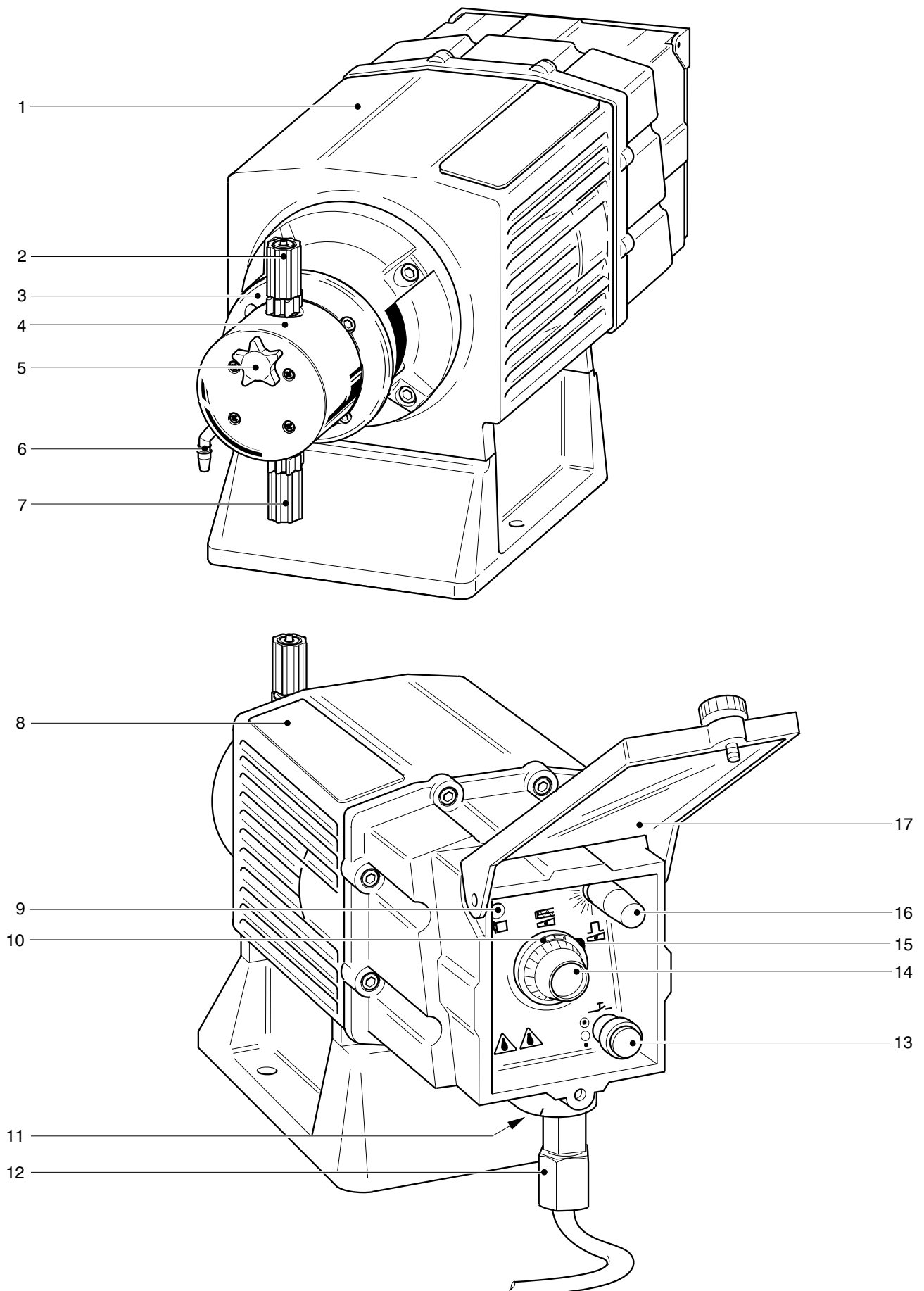


Type identification plate

**Please carefully read through these operating instructions in full! Do not discard!  
Damaged caused by incorrect operation will invalidate the guarantee!**



View of Metering Pump



## **Description of Functional Elements**

- 1 Drive unit with electronic control and solenoid
- 2 Delivery connection
- 3 End ring
- 4 Liquid end
- 5 Vent valve  
(only on types 1000 - 0417 NP and PP, refer to identity code on Page 4)
- 6 Socket for bypass hose  
(only on types 1000 - 0417 NP and PP, refer to identity code on Page 4)
- 7 Intake connection
- 8 Type identification plate
- 9 Lamp for operation/pulse indication
- 10 Inspection window
- 11 External connection
- 12 Power connection
- 13 Power switch
- 14 Control for stroke length
- 15 Locking lever
- 16 Control for stroke rate
- 17 Transparent cover

**Imprint:**

Operating Instructions for Metering Pump ProMinent EXtronic® EXBa  
© ProMinent Dosiertechnik GmbH, 1995

ProMinent Dosiertechnik GmbH  
Im Schuhmachergewann 5-11  
69123 Heidelberg  
P.O. Box 101760  
69007 Heidelberg  
Germany  
[info@prominent.com](mailto:info@prominent.com)  
[www.prominent.com](http://www.prominent.com)

Subject to technical modifications.

### Notes for User

These operating instructions contain product descriptions in straight text

- Itemisations
- Instructions

and safety notes identified with pictograms:



#### **WARNING!**

*There is a danger to life and limb or a risk of serious injury if the notes on safety are disregarded!*



#### **CAUTION!**

*There is a risk of injury and damage to property if the notes on safety are disregarded!*



#### **ATTENTION!**

*There is a risk of damage to property if the notes on safety are disregarded!*



#### **NOTICE!**

*Notes on disposal.*



#### **IMPORTANT!**

*Notes on working procedures.*

## Contents

Metering Pump Applications	
<b>1 Safety</b>	<b>1</b>
1.1 Notes on Safety	1
1.2 Reference Guidelines/Standards	2
1.3 Tests and Approvals	2
EC-Declaration of Conformity	3
<b>2 Design and Function</b>	<b>4</b>
<b>3 Technical Data</b>	<b>5</b>
3.1 Identity Code	5
3.2 Dimensions and Weights	6
3.3 Capacity Data	7
3.4 Accuracies	8
3.5 Material Specifications	8
3.6 Electrical Data	8
3.7 Mechanical Data of Cables Used	9
3.8 Ambient Conditions	9
<b>4 Unpacking</b>	<b>10</b>
<b>5 Mounting and Installation</b>	<b>10</b>
5.1 Installing Metering Pump	10
5.2 Installing Hose Lines	10
5.2.1 Installing the Intake Line	12
5.2.2 Installing the Delivery Line	12
5.2.3 Installing the Bypass Vent Line	12
5.3 Installation Examples, Mechanical/Hydraulic	13
5.4 Electrical Installation	15
5.5 Installation Examples, Electrical	16
5.6 Notes on intrinsically safe installation in the USA	19
<b>6 Operation</b>	<b>20</b>
6.1 Start-up	20
6.2 Determining the Delivery Capacity	21
6.3 Nomograms	22
6.4 Setting the Delivery Capacity	29
<b>7 Maintenance</b>	<b>30</b>
<b>8 Repairs</b>	<b>30</b>
<b>9 Malfunctions</b>	<b>31</b>
9.1 Operation/Pulse Indicator does not Light, no Stroke Movement	31
9.2 Pump Intake no Longer Operable	31
9.3 Despite Full Stroke Movement and Venting	31
9.4 Liquid Emerges from End Ring	31
<b>10 Used Part Disposal</b>	<b>33</b>
Annex	
Installation data	34
Guarantee Claim	35
Declaration of complete safety	36

The corresponding BVS declarations of conformity will be supplied with the product.

### Metering Pump Applications

The ProMinent EXtronic® EXBa is an electronically controlled, explosion-proof diaphragm metering pump with a short-stroke solenoid.

*Liquid media* The pump is used for metering liquid media:

- In hazardous locations, zone I of Explosion Group II C (EXBaE and EXBaS) corresponding to EN guidelines
- For firedamp-proof mining applications, Explosion Group I (EXBaS) corresponding to EN guidelines
- In hazardous locations Class I, Div. 1, Group B, C and D in accordance with FM and CSA guidelines

Liquid ends made of various materials cover virtually all applications:

- Polypropylene (PP)
- PVC
- Acrylic
- PTFE-Teflon®
- Stainless steel

*Gas-emitting media* Self-venting liquid ends made of Acrylic or PVC are available for metering gas-emitting media.

*Combustible media* The "SB" version of the liquid end is recommended for combustible media while the "TX" version is recommended for combustible and also very aggressive media.



#### **ATTENTION!**

*The pump is not designed to meter gaseous media as well as solids.*

*Voltages* Versions are available for various voltages and frequencies:  
230 V, 115 V, 500 V, 100 V and 200 V;  
50/60 Hz.

*Compatibility* The ProMinent EXtronic® EXBa is a continuation of the former EXtronic series: The external dimensions and securing holes are identical and the hydraulic accessories of these series can be used. The liquid ends are compatible with the other diaphragm metering pumps with the exception of the "SB" and the "TX" version (refer to identity code, Page 4).



# 1 Safety

## 1.1 Notes on Safety



### **WARNING!**

- *Immediately switch off the pump in the case of emergency!  
Use the pump power switch or an emergency stop switch in your working environment!*
- *Pumps for radioactive medium must not be shipped!*
- *When using the metering pump to meter combustible media, observe the regulations concerning transport and storage of combustible liquids (Ex Vo, Vb F)!*
- *Observe the "Ordinance governing electrical installations in explosion-proof rooms" (Elex V) and DIN VDE 0165 or 0118 "Installing electrical equipment in hazardous locations" when installing the metering pump!*
- *The permissible values in accordance with DIN EN 50020 must be maintained for installation of control types 4, 5, 6 „intrinsically safe“.*
- *Observe applicable national regulations for installation abroad.*
- *The specifications in accordance with Drawing 13\_10-200\_97\_00-44 must be complied with for installation of control types 4, 5, 6 „intrinsically safe" in the USA.*



### **CAUTION!**

- *Pumps must be accessible at all times to facilitate operation and maintenance.  
Do not obstruct or block access routes!*
- *Only specially trained and authorized persons are permitted to maintain and repair metering pumps and their peripheral equipment!*
- *Always depressurize the liquid end first before carrying out any work on the pump!*
- *If hazardous or unknown metering media are used, discharge and flush the liquid end before carrying out any work on the pump!*
- *Observe the safety data sheets of the metering liquids!*
- *Always wear protective clothing (goggles, gloves) when handling hazardous or unknown liquids! This applies in particular to working on the liquid end!*
- *Assembly of ProMinent® metering pumps with parts not tested and approved by ProMinent is prohibited and can result in damage to persons and property, for which no liability will be accepted!*



### **ATTENTION!**

- *Adjust the stroke length only with the pump running when the load on the stroke length setting pin is relieved temporarily!  
Release the lock before adjusting the stroke length!*
- *Only use clamping rings and hose sockets suitable for the relevant hose diameter as well as genuine ProMinent hoses with the specified hose dimensions and wall thickness, otherwise the stability of the connection cannot be guaranteed!*



### **IMPORTANT!**

- *Avoid reducing the hose sizes!*
- *Use the next higher pipe cross-section or a pulsation damper for long hose lines and media with higher viscosity!*

## 1.2 Reference Guidelines/Standards

<i>EC Guidelines</i>	<p>EC Machinery Guideline (89/392/EEC) subsequently 93/44 EEC</p> <p>EC Low Voltage Guidelines (73/23/EEC)</p> <p>EC EMC Guidelines (89/336/EEC) subsequently 92/31 EEC</p>
<i>International standards</i>	<p><b>Explosion protection:</b> Pressure-proof encapsulation and intrinsic safety (option) in accordance with EN 50014, 50018, 50020</p> <p><b>Electrotechnical safety:</b> FMR, Class No. 3600ff ("FM" version) flameproof and intrinsically safe C.S.A 22.2 No. 30 ("CSA" version) flameproof EN 60335-1 corresponds to IEC 335-1 EN 60335-2-41 corresponds to IEC 335-2-41</p> <p><b>Electromagnetic compatibility (EMC):</b> Emitted interference EN 50081-1, EN 50081-2 Interference immunity EN 50082-1, EN 50082-2</p>
<i>German standards</i>	<p><b>Electrotechnical safety:</b> Safety of electrical devices, in accordance with DIN VDE 0700 Part 1 corresponds to EN 60335-1 and IEC 335-1 DIN VDE 0700 Part 41, corresponds to EN 60335-2-41 and IEC 335-2-41 Creepage distances and clearances, in accordance with VDE 0110</p> <p><b>Interference suppression:</b> Protection class B, in accordance with DIN VDE 0871</p> <p><b>Shock-hazard and moisture protection IP 65</b> in accordance with DIN 0470 from 11/92, corresponds to EN 60529 (1991) and IEC 529 (1989)</p>

## 1.3 Tests and Approvals

<i>Explosion protection</i>	You will find the Conformity Certificates of DMT Gesellschaft für Forschung und Prüfung mbH (DMT Research and Test) Division for Safety of Electrical Equipment, Mining Testing for all Voltages in the Annex.
-----------------------------	--

Country	Type/ Version	Explosion protection	Type of explosion protection	Approval department/ Test No.
Europe, EG	EXBaE	EEx „d“ Gr. IIC	EEx d IIC T6	DMT-BVS/95.D.2021
Europe, EG	EXBaE, intrinsically safe	EEx „d, i“ Gr. IIC	EEx d (i,a) IIC T6	DMT-BVS/95.D.2021 X
Europe, EG	EXBaS	EEx „d“ Gr. I	EEx d I	DMT-BVS/94.C.1095 X
Europe, EG	EXBaS	EEx „d“ Gr. IIC	EEx d IIC T6	DMT-BVS/94.C.2055
USA	EXBaE	flameproof	Class I, Div.1, Group B, C and D	FMRC/J.I.1B1A1.AE
USA	EXBaE intrinsically safe	i.s. safe	Class I, Div.1,  Group A, B, C and D	FMRC/J.I.4D6A0.AX
Canada	EXBaE	flameproof	Class I, Div.1, Group B, C and D	CSA./LR 111554
Australia	EXBaE	Ex „d“	EEx d IIC T6 IP65 Classe I Zone 1	LOSC/AUS EX 3535

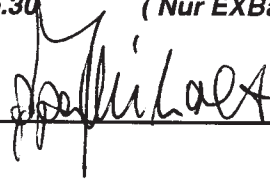
## EC Declaration of Conformity

We,

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

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

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

Product description:	<i>Metering pump , Series Extronic / a</i>
Product type:	<i>EXBa ...</i>
Serial number:	<i>see type identification plate overleaf and on device</i>
Relevant EC regulations:	<i>EC - machine regulation (89/392/EEC)</i> <i>subsequently 93/44/EEC</i> <i>EC - low voltage regulation (73/23/EEC)</i> <i>EC - EMC - regulation 89/336/EEC</i> <i>subsequently 92/31/EEC</i>
Harmonised standards used, in particular:	<i>EN 292-1 , EN 292-2 , EN 809</i> <i>EN 50014 , EN 50018 , EN 50020</i> <i>EN 60335-1 , EN 60335-2-41</i> <i>EN 50081-1/2 , EN 50082-1/2 , EN 55014</i> <i>EN 61000-3-2 , EN 61000-3-3</i>
National standards and other technical specifications used, in particular:	<i>DIN VDE 0700 T1 , IEC 335-1</i> <i>DIN VDE 0700 T41 , IEC 335-2-41</i> <i>DIN VDE 0700 T500</i> <i>VDE 0110</i> <i>IEC 1000-3-2 , IEC 1000-3-3</i> <i>FMR ,Class No.3600 ff. ( Nur EXBaE Ausf. "FM" )</i> <i>CSA 22.2 No.30 ( Nur EXBaE Ausf. "CSA" )</i>
Date/manufacturer's signature:	<i>16.05.1997</i> 
The undersigned:	<i>Mister Manfred Hüholt , factory manager</i>

## 2 Design and Function

You will find the view of the metering pump and the description of the function units on the fold-out page of the cover.

The metering pump ProMinent EXtronic® consists of the main components

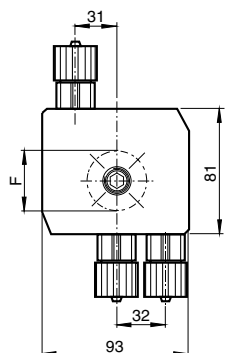
<i>Drive unit (1)</i>	With electronic control and solenoid, power connection (10) and external/analog connection (11);
<i>Delivery unit</i>	End ring (3) with diaphragm which is stabilised by a steel core. Liquid end (4) with delivery connection (2) and intake connection (7), on types 1000-0417 NP and PP with bypass hose socket (6) and vent valve (5);
<i>Operator control unit</i>	With lamp for operation/pulse indication (9), power switch (13), control knob for stroke length (14) with inspection window (10), locking lever (15), control knob for stroke frequency (rate) (16) and transparent cover (17).  Metering is based on the pulse burst principle:
<i>Functional principle</i>	A pulse produces a magnetic field around the solenoid, the solenoid attracts a moving thrust piece, as a result, the diaphragm displaces the medium in the liquid end via a pressure control valve, the valve closes on the intake side.  The magnetic field decays on completion of the switch-on pulse, the thrust piece of the solenoid is reset by a reset spring, the diaphragm returns to its initial position, thus initiating an intake stroke, which closes the pressure valve and the media is drawn in on the intake side.
<i>Delivery capacity</i>	The delivery capacity is determined by the stroke length and the stroke frequency (rate).  The stroke length can be adjusted infinitely variable with the control knob for stroke length (14) during operation from 100 % to 10 % and then locked. The maximum stroke length is 1.25 mm, 0.63 mm for type EXBa_1000.  A setting of 0 to 110 (120) stroke/min can be set manually with the control knob for stroke frequency (rate) (16).  At a maximum stroke length and rate and a max. backpressure of 1.5 bar to 25 bar, the diaphragm-operated metering pumps deliver at a rate of 0.2 l/h to 60 l/h.
<i>Versions</i>	"Internal" version: The control pulse is generated internally, stroke length and stroke frequency (rate) can be adjusted manually with the control knobs on the operator control unit.  "External" version: The control pulse is generated externally from potential-free or semiconductor contacts and routed via the external/analog input of the drive unit; examples are contact-type water meters or DULCOMETER® control systems.  "Analog" version: An external analog signal is supplied via the external/analog input of the drive unit; the stroke frequency changes proportional to the 0-20 mA or 4-20 mA signal.  In the "external" and "analog" versions, the pumps of the type series EXBaE with external/analog input are available "intrinsically safe" [i,a] or "not intrinsically safe", of type series EXBaS with external/analog input "not intrinsically safe".

### 3 Technical Data

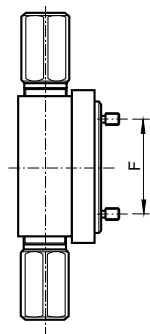
#### 3.1 Identity Code

EXBa	Series ProMinent EXtronic® Version a									
Type of enclosure										
E		Explosion-proof								
S		Firedamp, explosion-proof (permissible liquid end material: Stainless steel and PTFE)								
Pump types										
1000		1601		1201		0803		1st and 2nd digit: Backpressure [bar]		
1002		0308		2502*		1006		3rd and 4th digit: Capacity [l/h]		
0613		0417		2505*		1310**		*) Type 2502 and 2505 only available in versions "SS" and "SB"		
0814		0430		0260		**) Type 1310 only available in versions "NP", "PP4", "SS" and "SB"				
Liquid end material										
NP1		Acrylic with vent, FPM-A O-ring								
NP3		Acrylic with vent, FPM-B O-ring								
NS3		Acrylic self-degassing, Viton-B O-ring								
PP1		PP with vent, EPDM O-ring								
PP4		PP without vent/HV, EPDM O-ring								
PS3		PVC self-degassing, FPM-B O-ring								
SB1		Stainless steel* with internal thread Rp 1/4 or 1/2								

### 3.2 Dimensions and Weights

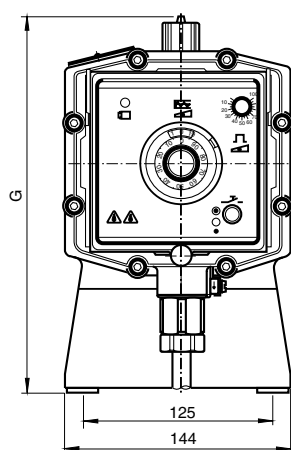
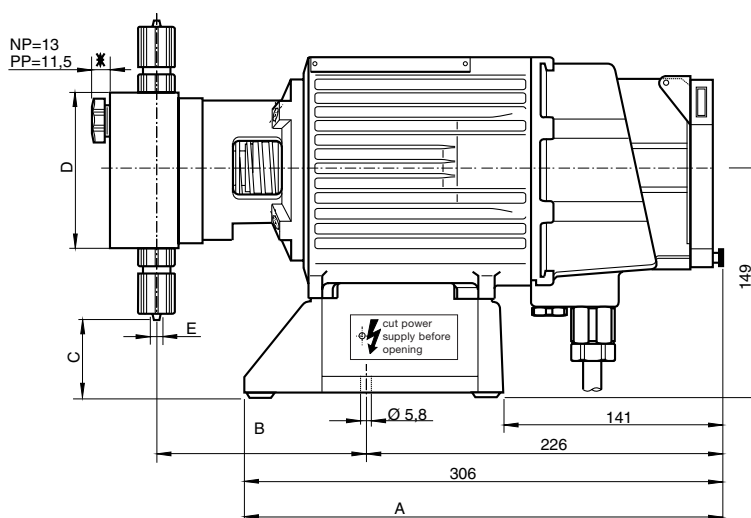


Version „NS, PS“



Version „SB“

\*) Vent valve and bypass  
only on types 1000 - 0417 NP and PP



ProMinent EXtronic® EXBa		Dimension in mm						
Pump type / material		A	B	C	ø D	E	ø F	G
1000, 1601, 1201, 0803	NP1	391	136	69	70	6x4	38	229
1002, 0308, 2502, 2505, 1006	NP3	391	136	61	85	8x5	50	237
1310, 0613		391	136	52	100	8x5	66	244
0814, 0417		391	136	52	100	12x9	66	244
0430		381	137	46	135	DN10	117	304
0260		398	142	-16	135	DN15	117	314
1000, 1601, 1201, 0803	PP1	393	136	67	70	6x4	38	236
1002, 0308, 1006		393	136	67	70	8x5	50	236
0613		393	136	57	90	8x5	66	246
0814, 0417		393	136	57	90	12x9	66	246
0430		381	137	46	135	DN10	117	304
0260		398	142	-16	135	DN15	117	314
1002	PP4	389	138	46	85	DN10	50	222
1006		398	145	76	85	DN15	50	222
1310		398	145	76	85	DN15	66	222
0814		398	145	69	100	DN15	66	229
1000, 1601, 1201	TT1	378	134	75	60	6x4	38	223
0803		378	134	70	70	6x4	38	228
1002, 0308, 1006		388	138	42	80	8x5	50	256
0613		388	138	32	95	8x5	66	266
0814, 0417		388	138	32	95	12x9	66	266
0430		388	137	35	135	DN10	117	263
0260		398	142	31	135	DN15	117	268
1000, 1601, 1201	SS1	376	134	84	60	6x5	38	214
0803		376	134	79	70	6x5	38	219
1002, 0308, 2502, 2505, 1006		386	138	48	80	8x7	50	250
1310, 0613		386	138	39	95	8x7	66	259
0814, 0417		386	138	39	95	12x10	66	259
0430		386	137	35	135	DN10	117	263
0260		390	142	28	135	DN15	117	271
1000	SB1	373	134	87	70	Rp 1/4	38	211
1601, 1201, 0803	TX1	373	134	79	85	Rp 1/4	38	219
1002, 0308, 2502, 2505, 1006		381	138	56	80	Rp 1/4	50	242
1310, 0613		381	138	48	95	Rp 1/4	66	250
0814, 0417		381	138	48	95	Rp 1/4	66	250
0430		381	138	22	145	Rp 1/4	117	275
0260		383	139	27	145	Rp 1/2	117	279
1601, 1201, 0803	NS3	383	136	67	*	6x4	38	243
1002		383	136	67	*	6x4	50	243
1601, 1201, 0803	PS3	383	136	67	*	6x4	38	243
1002		383	136	67	*	6x4	50	243

\*) see drawing

Pump type	Material	Weight	
		EXBaE	EXBaS
1000, 1601, 1201, 0803, 1002, 0308	NP1, PP1, TT1, TX1/ SS1, SB1	app. 12/16 kg	app. 26/30 kg
2502, 1006, 0613, 0417	NP1, PP1, TT1, TX1/ SS1, SB1	app. 13/17 kg	app. 27/31 kg
2505, 1310, 0814, 0430, 0260	NP1, PP1, TT1, TX1/ SS1, SB1	app. 16/20 kg	app. 30/34 kg
1002, 1006/1310, 0814	PP4 (HV)	app. 12/16 kg	
1601, 1201, 0803, 1002	NS3, PS3, PC5	app. 12 kg	

### 3.3 Capacity Data

Pump type	max. Capacity at max. backpressure			max. Capacity at medium backpressure			Stroke rate	Connection size o Ø x i Ø	Suction lift *	Priming lift **	Perm. ad-mission pres. intake side
EXBa	bar	l/h	ml/stroke	bar	l/h	ml/stroke	strokes/min	mm	m Wc	m Wc	bar
1000	10	0.19	0.026	5	0.3	0.042	120	6x4	1.5	0.5	8.0
1601	16	1.00	0.14	8	1.3	0.18	120	6x4	6	1.8	8.0
1201	12	1.70	0.23	6	2.0	0.28	120	6x4	6	2.5	5.5
0803	8	3.70	0.51	4	3.9	0.54	120	6x4	3	2.8	3.0
1002	10	2.30	0.31	5	2.7	0.38	120	8x5	6	1.0	3.0
0308	3	8.60	1.20	1.5	10.3	1.43	120	8x5	4	1.8	1.5
2502	25	2.00	0.28	20	2.2	0.31	120	8x5	6	1.0	8.0
2505	25	4.20	0.64	20	4.8	0.73	110	8x5	6	1.3	3.5
1006	10	6.00	0.83	5	7.2	1.00	120	8x5	6	1.3	3.5
1310	13	10.50	1.59	6	11.9	1.80	110	8x5	6	1.9	2.0
0613	6	13.10	1.82	3	14.9	2.07	120	8x5	5.5	1.9	2.0
0814	8	14.00	2.12	5	15.4	2.33	110	12x9	6	2.0	1.5
0417	3.5	17.40	2.42	2	17.9	2.49	120	12x9	4.5	2.0	1.5
0430	3.5	27.00	4.09	2	29.5	4.47	110	DN10	5	1.8	0.8
0260	1.5	60.00	9.09	-	-	-	110	DN15	1.5	1.5	0.8
Type 252, 2505, 1310 only in version NP and SS											
Metering pump for high viscosity media „HV“											
EXBa	bar	l/h	ml/stroke	bar	l/h	ml/stroke	strokes/min	mm	m Wc	m Wc	bar
1601PC5	16	0.75	0,104	8	0.98	0.14	120	12x9 USA	6	-	8
1002	10	2.30	0.31	5	2.7	0.38	120	DN10	1	-	3.0
1006	10	6.00	0.83	5	7.2	1.00	120	DN15	1.3	-	3.5
1310	10	10.50	1.59	6	11.9	1.80	110	DN15	1.9	-	2.0
0814	8	14.00	2.12	5	15.4	2.33	110	DN15	2	-	1.5
Metering pump with self-degassing liquid end ***											
EXBa	bar	l/h	ml/stroke	bar	l/h	ml/stroke	strokes/min	mm	m Wc	m Wc	bar
1601	16	0,66	0,09	-	-	-	120	6x4	-	1.8	0.2
1201	12	1.0	0.14	-	-	-	120	6x4	-	2.0	0.2
0803	8	2.4	0.33	-	-	-	120	6x4	-	2.8	0.2
1002	10	1.8	0.25	-	-	-	120	6x4	-	2.0	0.2

\*) Suction lift: with intake line filled

\*\*) P riming lift: with intake line not filled

\*\*\*) The specified performance data are guaranteed minimum values determined with water at room temperature.

### 3.4 Accuracies

<i>Reproducibility</i>	-5 % +15 % at max. stroke length and max. backpressure, in all material versions.
<i>Metering accuracy</i>	Better than $\pm 2$ % under constant conditions and min. 30 % stroke length; observe following notes: <ul style="list-style-type: none"> <li>• All specifications refer to metering measurements with water at 20 °C.</li> <li>• Constant backpressure, above 1 bar if possible.</li> <li>• If metering takes place via a free outlet, a pressure retention valve must be used to generate a backpressure of min. 1.5 bar (refer to the installation examples).</li> <li>• Wherever possible, lay intake and metering lines with a constant ascent.</li> <li>• If the liquid level of the supply tank is above the pump during operation, admission pressure will be applied on the intake side; in this case, the backpressure should be so high that there is a minimum differential pressure of 1.5 bar otherwise a pressure retention valve or a spring-loaded injection valve with corresponding admission pressure must be used.</li> </ul>



#### IMPORTANT!

*A pressure retention valve or a spring-loaded injection valve is not an absolutely tight-closing shut-off element. For this reason, an intake valve which is closed when the metering pump is at a standstill, must be installed if admission pressure is applied on the intake side.*

### 3.5 Material Specifications

	PP1	PP4	PC5	NP1/NP3	NS3	PS3	TT1/TX1	SS_
<i>Liquid end</i>	Polypropylene	Polypropylene	PVC	Acrylic	Acrylic	PVC	PTFE with carbon	Stainless steel 1.4571
<i>Intake-/ delivery connection</i>	Polypropylene	Polypropylene	PVC	PVC	PVC	PVC	PTFE with carbon	Stainless steel 1.4571
<i>Seals</i>	EPDM	EPDM	FPM-A	FPM-A/B	FPM-B	FPM-B	PTFE	PTFE
<i>Balls Ø 6-Ø 12</i>	Ceramic	—	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
<i>Balls DN10–DN15</i>	Duran	Ceramic	—	Duran	—	—	Ceramic	1.4401

Type 1000 with ceramic seat rings in all material versions  
PP4 with Hastelloy C valve springs  
DEVELOPAN® metering diaphragm with PTFE base in all versions  
FPM-A (Viton-A), FPM-B (Viton-B) and Duran (laboratory glass) are registered trademarks.

### 3.6 Electrical Data

	1000, 1601, 1201, 0803, 1002, 0308					2502, 1006, 0613, 0417, 1006					2505, 1310, 0814, 0430, 0260				
<i>Power connection</i>	100 V	115 V	200 V	230 V	500 V	100 V	115 V	200 V	230 V	500 V	100 V	115 V	200 V	230 V	500 V
<i>Max. current input*</i>	2.5 A	1.5 A	1.1 A	0.9 A	0.3 A	4.2 A	4.1 A	2.2 A	2.1 A	0.7 A	5.6 A	5.5 A	2.8 A	3.1 A	0.7 A
<i>Mean power consumption**</i> at 50 Hz	20 W	15 W	25 W	23 W	20 W	37 W	44 W	41 W	54 W	35 W	51 W	63 W	50 W	77 W	43 W
at 60 Hz	22 W	17 W	27 W	25 W	20 W	39 W	47 W	44 W	61 W	35 W	55 W	65 W	55 W	83 W	43 W

\*) Current intake at metering pulse

\*\*) At max. stroke frequency (rate)



#### ATTENTION!

*Observe the safety requirements in the intrinsically safe power circuit!*

<i>Intrinsically safe power circuit</i>	Max. possible short-circuit current	$I_K = 93$ mA
	Max. possible voltage	$U_Z = 28$ V
	Max. permissible inductance	$L_a = 4$ mH
	Max. permissible capacitance	$C_a = 70$ nF



<i>Contact input</i>	Voltage level at open contact	approx. +4.8 V
	Max. pulse frequency	see stroke rate
	Necessary contact duration	20 ms
	Contact load	approx. 1 mA at 4.8 V
<i>Analog input</i>	Max. permissible load current	$I_L = 30 \text{ mA}$
	Max. permissible connection voltage	$U_E = 24 \text{ V}$
	Load resistance not intrinsically safe	$R = 70 \Omega$
	Load resistance intrinsically safe	$R = 475 \Omega$

**Entity Parameters in accordance with FMR approval for USA:**

	max. possible voltage	max. possible short-circuit current	max. permissible capacitance	max. permissible inductance
Terminal 13 (2) to Ground:	$V_{oc} = 28 \text{ V}$	$I_{sc} = 93 \text{ mA}$	$C_a = 0.14 \mu\text{F}$	$L_a = 4.38 \text{ mH}$
Terminal 23 (1) to Ground:	$V_{oc} = 28 \text{ V}$	$I_{sc} = 0 \text{ mA}$	$C_a = 0.13 \mu\text{F}$	$L_a = 5.50 \text{ mH}$
Terminal 13 to 23:	$V_t = 29.75 \text{ V}$	$I_t = 93 \text{ mA}$	$C_a = 0.12 \mu\text{F}$	$L_a = 4.38 \text{ mH}$

**3.7 Mechanical Data of Cables Used**

Pump type	Voltage V	Cable	Cable type	Colour	Ø mm
EXBaE	up to 250	power supply cable	H 07 RNF 3G1.5	black	10.0
EXBaE	> 250	power supply cable	NSSHÖU 3x1.5	yellow	12.5
EXBaS	all	power supply cable	NSSHÖU 3x1.5 +3x1,5/3E	yellow	14.0
EXBaE	< 60	external/analog cable	Ölflex 110	grey	6.3
EXBaE (ia)	< 60	external/analog cable	Ölflex EB	blue	5.9
EXBaS	< 60	external/analog cable	L-YY (zg) Y	grey	11.4

The "FM" and "CSAV" versions of H07 RNF up to 500 V feature a line lead-in fitting with a 1/2" NPT internal thread for connection to the North American system of lines.

**3.8 Ambient Conditions**

<i>Temperatures</i>	Permissible storage temperature	-20 °C to +50 °C
	Permissible storage temperature	-20 °C to +45 °C
	Permissible medium temperature	-10 °C to +35 °C (in accordance with IEC 335-2-41)

Temperature compatibility of material versions

Material	PP	NP	TT/TX	SS
long-term at max. backpressure	50 °C	45 °C	50 °C	50 °C
max. 15 min at max. 2 bar	100 °C	60 °C	120 °C	120 °C

<i>Climate</i>	Permissible humidity	92 % no condensation
	Load in moist changeable climate	FW 24 in accordance with DIN 50016

*Type of enclosure* IP 65

*Sound pressure level* ≤ 70 dB (A), 1 m distance

### 4 Unpacking



#### **NOTICE!**

*Polystyrene parts are recyclable. They do not belong in the household waste!*

- Unpacking*
- It is advisable to keep the outside packing complete with the polystyrene parts in order to be able to return the metering pump in the case of repairs and warranty claims.
  - Compare your delivery note with the packed contents.
  - Check whether the data on the type identification plate (8) of the metering pump agree with your order data!
  - Should any problems arise, contact your ProMinent dealer or representative. You will find the addresses on the back page of these operating instructions.
  - Always specify the identity code and the serial number which you will find on the type identification plate when making any inquiries or ordering spare parts. In this way, the pump type and material variants can be clearly identified.

- Scope of delivery*
- Metering pump with power cable
  - Operating instructions with conformity certificate

### 5 Mounting and Installation



#### **WARNING!**

- *When installing the metering pump, observe the "Ordinance governing Electrical Installations in Explosion-Proof Rooms" (Ex V) and DIN DE 0165 or 0118 "Installing Electrical Installations in Hazardous Locations"!*
- *Observe the regulations governing transport and storage of combustible liquids (Ex Vo, Vb F) when using the metering pump to meter combustible media!*
- *Observe valid national regulations when installing the pump abroad!*
- *Remove all traces of water from the liquid end before starting operation with media which must not come in contact with water! The metering pump may still have water residue in the liquid end from the tests carried out at the factory.*

#### 5.1 Installing Metering Pump



##### **IMPORTANT!**

- *Secure the pump such that no vibrations can occur.*
  - *Ensure free access to facilitate operation and maintenance.*
  - *The valves of the liquid end must be in vertical position!*
- The metering pump must be secured with screws and washers Ø 6 mm on a horizontal, firm base.

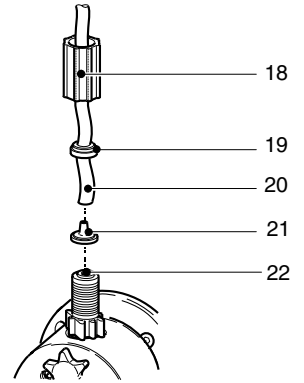
#### 5.2 Installing Hose Lines



##### **IMPORTANT!**

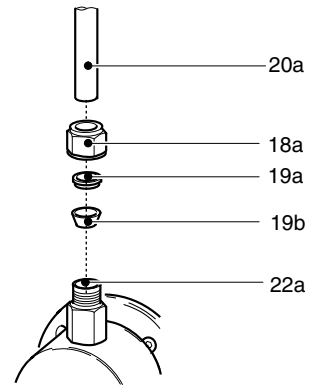
- *Lay and secure intake and delivery lines such that they cannot chafe.*
- *Lay intake and delivery lines such that they are free of mechanical stress.*
- *Arrange all lines such that the pump and liquid end can be removed laterally if required.*
- *When metering extremely aggressive or hazardous media, a venting facility with return into the supply tank as well as a shut-off valve must be provided on the delivery and intake sides.*
- *Ensure all connections are tight:  
only use the clamping rings and hose sockets as specified for the relevant hose diameter, only use original hoses with specified hose dimensions and wall thickness.*
- *Avoid reductions in hose sizes: use the next higher line cross-section for long hose lines and viscous media or install a compressed air vessel or diaphragm pulsation damper!*

- Fitting hose lines:*
- Remove plug if fitted in the intake/delivery connection.
  - Cut end of hose straight.
  - Fit union nut (18) and clamping ring (19) over hose (20).
  - Fit end of hose as far as it will go over socket (21) widen end if necessary.
  - Fit hose (20) with socket (21) on to valve (22).
  - Clamp hose connection:  
Firmly tighten union nut (18) while at the same time pressing down hose (20).
  - Retighten hose connection:  
Pull the hose line secured at the liquid end and then tighten the union nut (18) once again.



- 18 Union nut  
19 Clamping ring  
20 Hose  
21 Socket  
22 Valve

- Fitting stainless steel pipe connections:*
- Fit union nut (18a) and clamping rings (19a and 19b) on to pipe (20a) with a projection of approx. 10 mm.
  - Fit pipe (20a) as far as it will go into valve (22a).
  - Firmly tighten union nut (18a).



- 18a Union nut  
19a Rear clamping ring  
19b Front clamping ring  
20a Pipe  
22a Valve

- Fitting PE or PTFE lines on stainless steel valves:*
- Additionally fit a stainless steel support sleeve in the plastic sleeve.

- Connection parts for TX1 version:*
- The intake and delivery connections of material version TX1 are equipped with an Rp 1/4 internal thread. We recommend the use of commercially available screw-in fittings with G 1/4 inch external thread, e.g. available from

EM-Technik GmbH  
Industriestraße 2  
D-67133 Maxdorf  
Tel. +49 (0 62 37) 407-0  
Fax +49 (0 62 37) 16 28

Pump type	Fitting Type	Material	for Hose
1000, 1601, 1201, 0803, 1002	1.0100.31 DN 4/6	PVDF	6/4
0308, 1006, 0613, 0814, 0417	1.0100.31 DN 8/12	PVDF	12/8*

\*) Hose 12/8 in PTFE is available from EM-Technik.

### 5.2.1 Installing the Intake Line



#### IMPORTANT!

- The intake line should be as short as possible.
- Fit intake line in upright position in order to avoid air bubbles forming.
- Wherever possible use pipe bends and not elbows for bends in the intake line.
- Select cross section and length such that the vacuum which occurs during intake does not reach the vapour pressure of the medium to be metered. In extreme cases, excessively high vacuum on the intake side is reflected in collapse of the liquid column or by an incomplete return stroke.
- Do not exceed the permissible admission pressure on the intake side.
- Note: Suction lift x medium density  $\leq$  max. suction lift in m water column
- Refer to the installation examples.

Installing foot valve

- Cut the free end of the intake line to size such that the foot valve just hangs over the bottom of the tank. In the case of metered solutions with impurities or bottom deposits, the foot valve should be located at an adequate distance above the tank bottom or bottom deposits.

### 5.2.2 Installing the Delivery Line



#### ATTENTION!

- A multiple of the maximum operating pressure can build up if the metering pump is operated against a closed shut-off element on the delivery side. This can cause the delivery line to burst! An overflow valve should be installed in order to avoid this, e.g. a ProMinent multi-function valve.
- Install the delivery line such that the pressure peaks during the metering stroke do not exceed the max. permissible operating pressure. Check length and cross-section. If necessary, install an overflow valve, compressed air vessel or diaphragm pulsation damper.
- Refer to installation examples!

When metering with atmospheric discharge, an metering valve with 0.5 bar response pressure should be mounted at the end of the line. Or a back-pressure valve should be mounted 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 end. In this case the counter-pressure should be sufficiently high such that a minimum differential pressure of 1.5 bar exists. If this is not the case a back-pressure valve or a spring-loaded metering valve with the respective response pressure should be used.



#### IMPORTANT!

*A back-pressure valve or a spring-loaded metering valve is not an absolutely leakproof shut-off device!*

On the suction end a stop valve is therefore to be installed which is closed when the metering pump is idle.










### 5.2.3 Installing the Bypass Vent Line

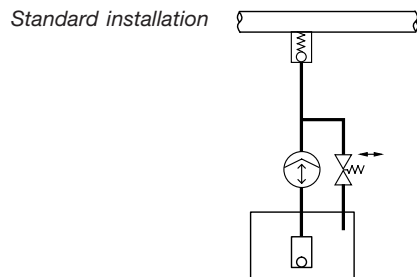
The liquid end of the pump types 1000 - 0417 NP and PP is equipped with a vent valve (5) with bypass (6).

The admission pressure on the intake side must be at least the same pressure as in the bypass line. Operation is not possible with admission pressure in the bypass and no pressure on the intake side

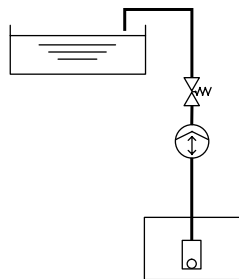
- Fit hose line with  $\varnothing_{\text{internal}} = 4 \text{ mm}$  (max. 6 mm) on to bypass hose socket, PVC-soft 6x4 is recommended.
- Secure PE lines with a cable tie to prevent them slipping.
- Route the free end of the line back into the metering tank.
- Cut the bypass line to size such that it is not submerged in the metering medium.

### 5.3 Installation Examples, Mechanical/Hydraulic

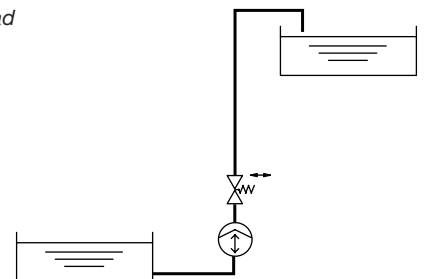
<b>Symbols</b>		Oscillating diaphragm metering pump		Injection valve
		Foot valve		Pressure retention valve/ overflow valve
		Shut-off valve		Pressure retention valve (adjustable)
		Pressure gauge		Compressed air vessel
		Solenoid Valve (closed when pump switched off)		



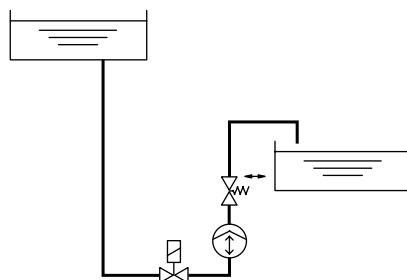
*Metering with free outlet and small delivery head*



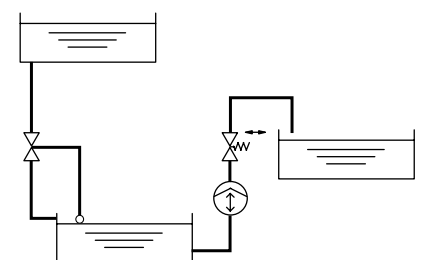
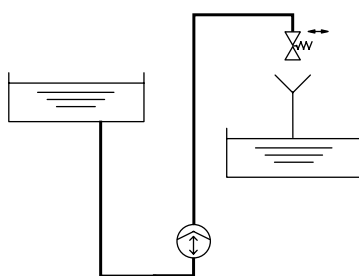
*... and large delivery head*



*... and admission pressure on intake side*



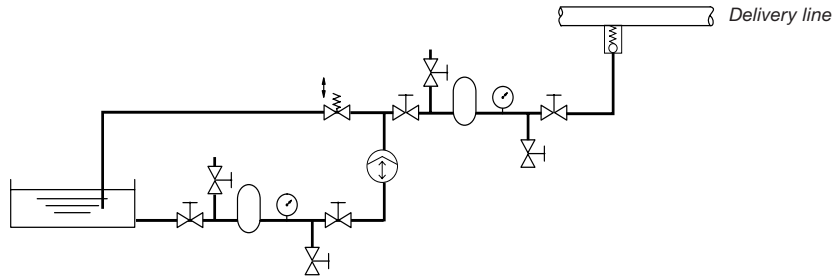
*Installation to avoid lift-through of hazardous media*



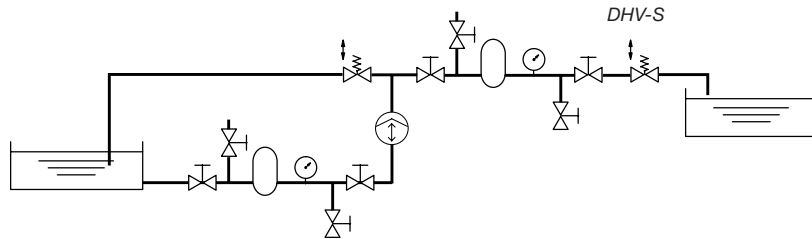
## Mounting and Installation

Installation together with air vessel with long lines and for low-pulsation metering

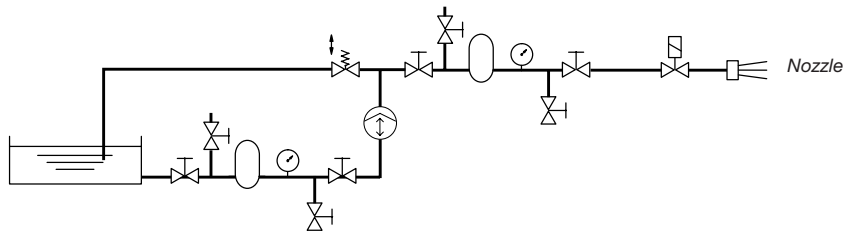
... in a delivery line



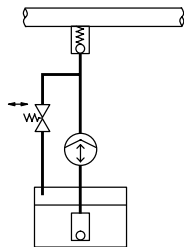
... with free outlet



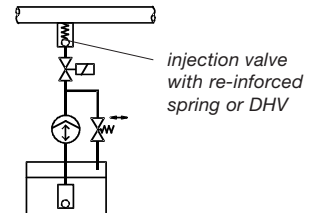
... without after-running



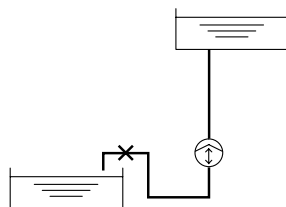
To protect against overpressure



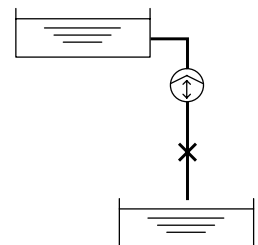
Metering in vacuum or intake line



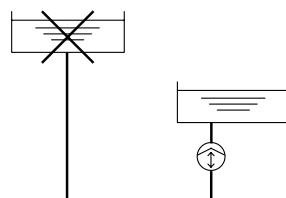
**Do not install like this:**  
Intake line cannot be vented!



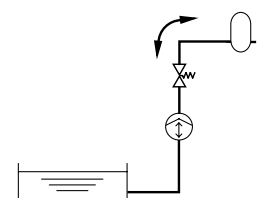
**Do not install like this:**  
Intake line too high!



**Do not install like this:**  
Free flow!



**Do not install like this:**  
Compressed air vessel not effective!

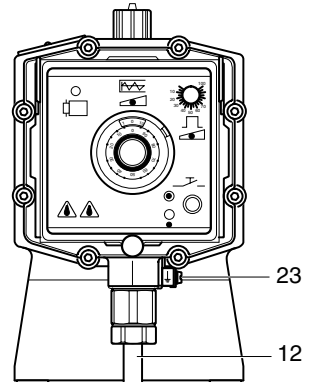


## 5.4 Electrical Installation



### ATTENTION!

- Only authorized persons are permitted to carry out electrical installation of the metering pump!
- When installing the metering pump, observe the "Ordinance governing Electrical Installations in Explosion-Proof Rooms" (Elex V) and DIN VDE 0165 or 0118 "Installing Electrical Installations in Hazardous Locations". Observe applicable national regulations when installing the pump abroad!
- The permissible values in accordance with DIN EN 50020 must be maintained for installation of control types 4, 5, 6 „intrinsically safe“
- Intrinsically-safe installation must be carried out and checked by a qualified expert!
- Do not connect power supply to the external connection (11)!
- The specifications in accordance with Drawing 13\_10-200\_97\_00-44 must be complied with for installation of control types 4, 5, 6 „intrinsically safe“ in the USA.

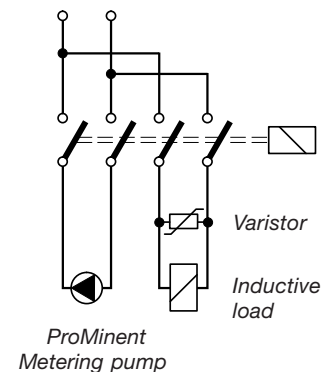
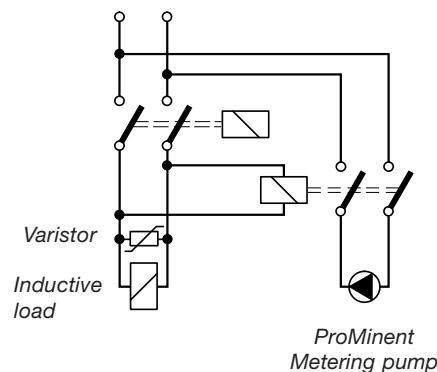


- 12 Power connection  
23 Connection terminal for potential equalisation

**Power connection** Refer to 3.6 Electrical Data  
The connection terminal (23) for the potential equalisation line is located on the housing next to the power supply connections (12).

**Induction voltage** If the pump is connected to the power supply parallel to inductive loads (e.g. solenoid valve, motor), it must be electrically isolated from these loads in order to avoid damage caused by induction voltages when switching off.

- Use several contacts for power supply via auxiliary contactor or relay.
- In the 100-V- to 230-V-versions, connect a varistor ( $U_N = 275 \text{ V}$ ) or RC-element ( $0,22 \text{ } \mu\text{F}/220 \text{ } \Omega$ ) in parallel.



**Switching on** With power switch (13), a power switch must be provided by the customer for the 500 V version.

**ProMinent®**

Connection of external/analog-cable:

1: Input+, black (1)

2: Input-, black (2)

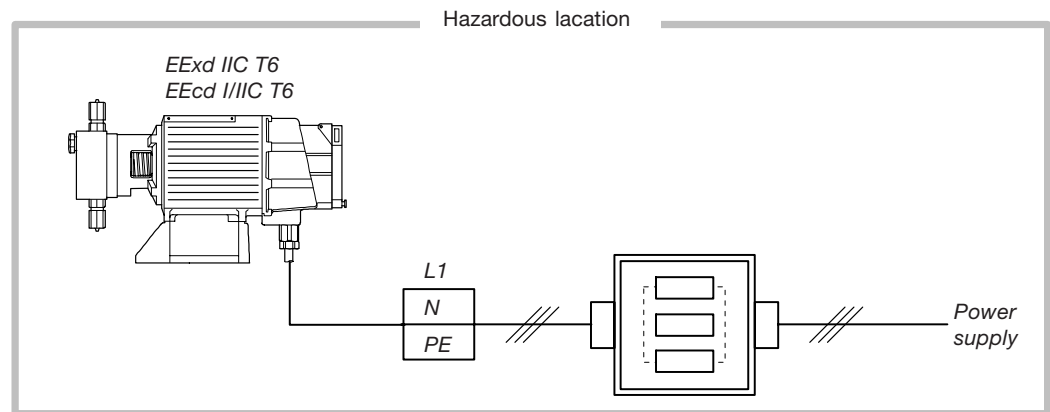
1: Input+, blue



*This version additionally features a black conductor which has no function:*

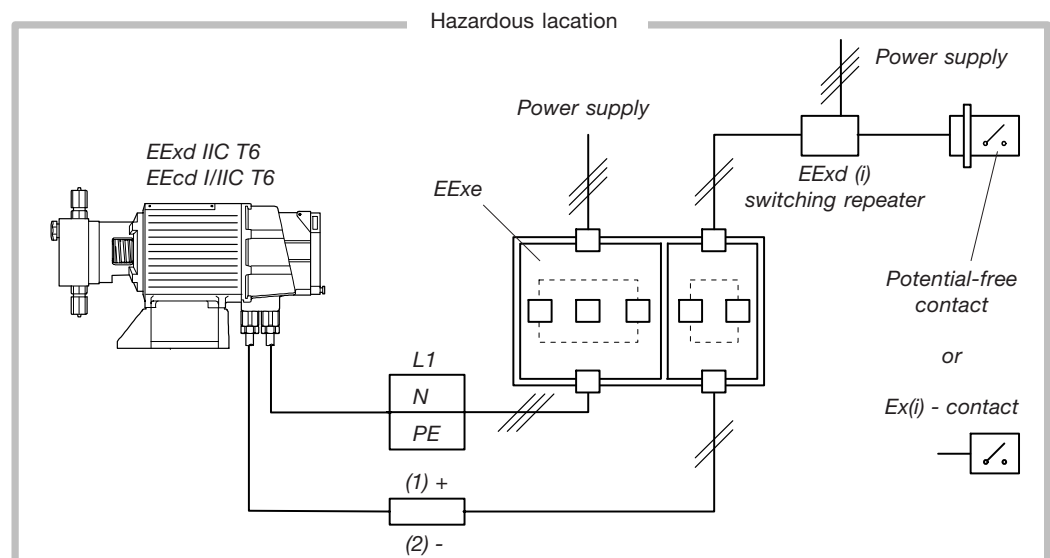
*Twist together the three individual concentric protective conductors, cover with yellow/green*

Metering pump EXBaS  
internal

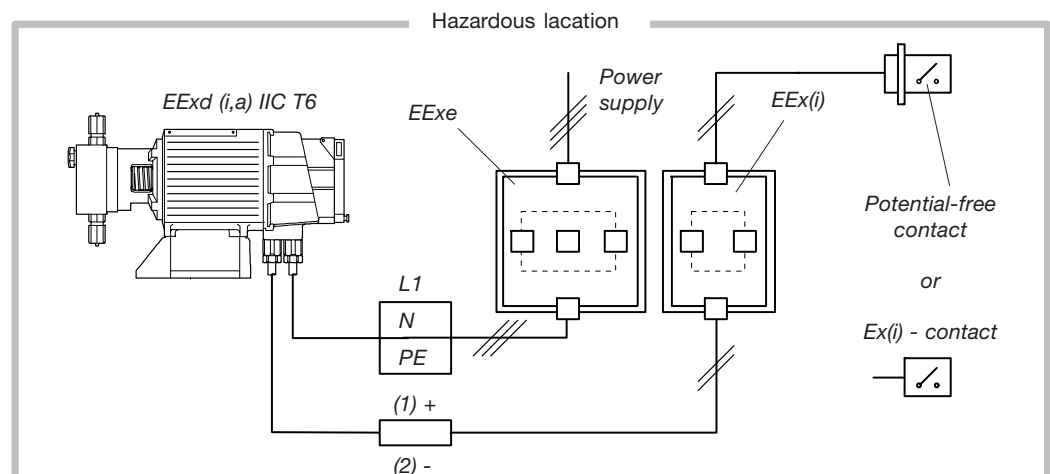


Metering pump EXBaE  
external  
not intrinsically safe

Metering pump EXBaS  
external  
not intrinsically safe



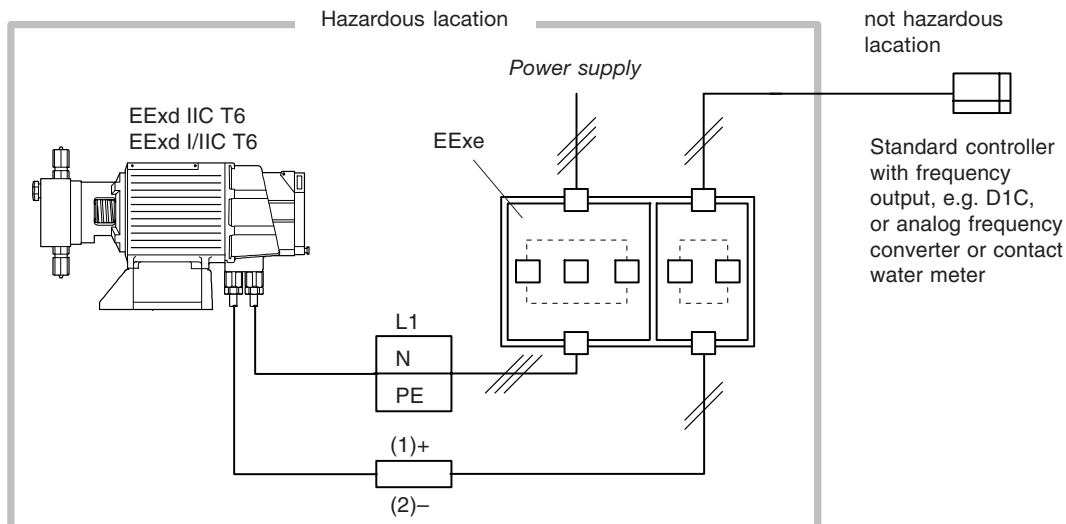
Metering pump EXBaE  
external  
intrinsically safe



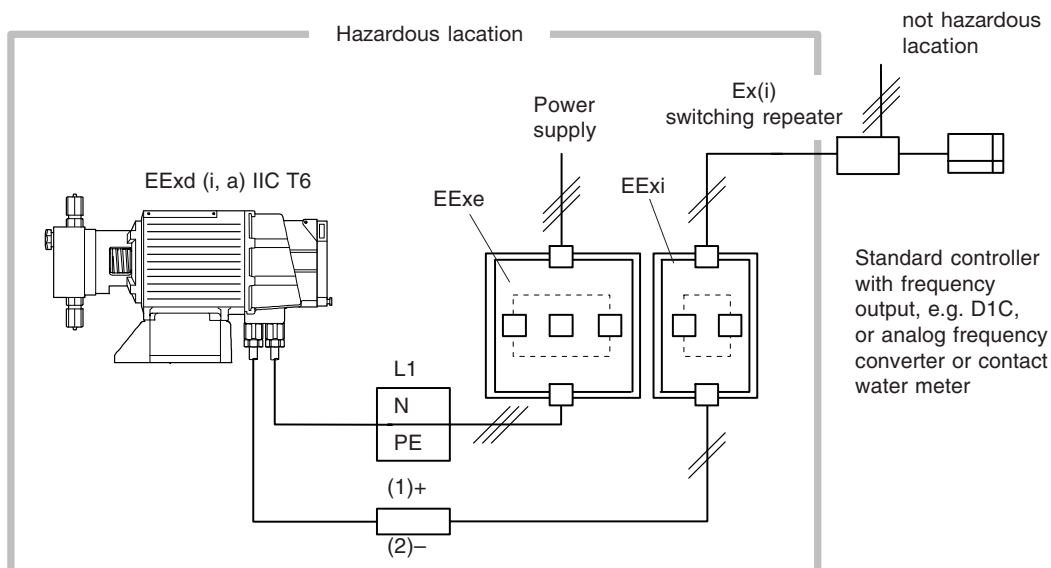


Controlling device  
not in hazardous location:  
Metering pump EXBaE  
external  
not intrinsically safe

Metering pump EXBaS  
external  
not intrinsically safe

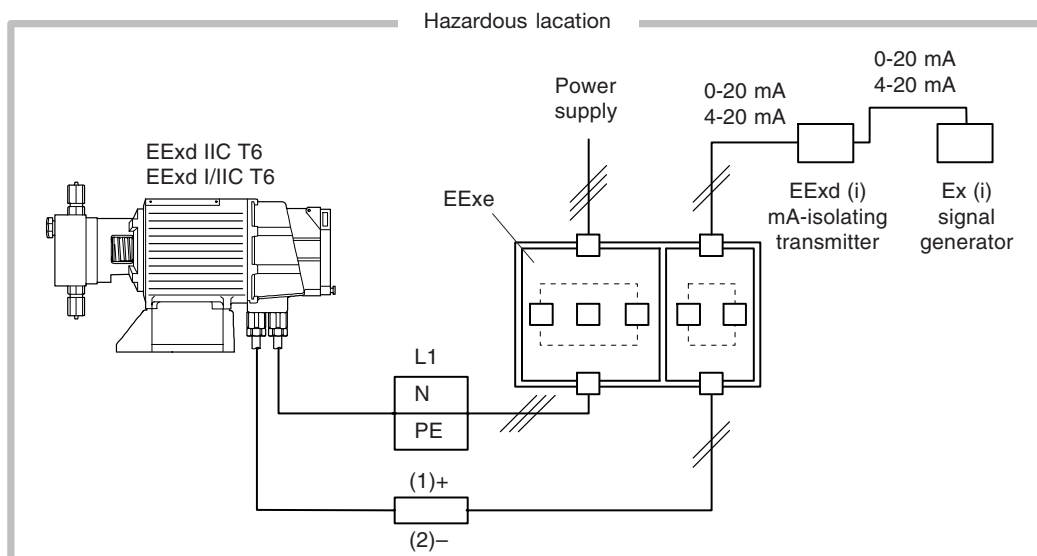


Controlling device  
not in hazardous location:  
Metering pump EXBaE  
external  
intrinsically safe



Controlling device in  
hazardous location:  
Metering pump EXBaE  
analog  
not intrinsically safe

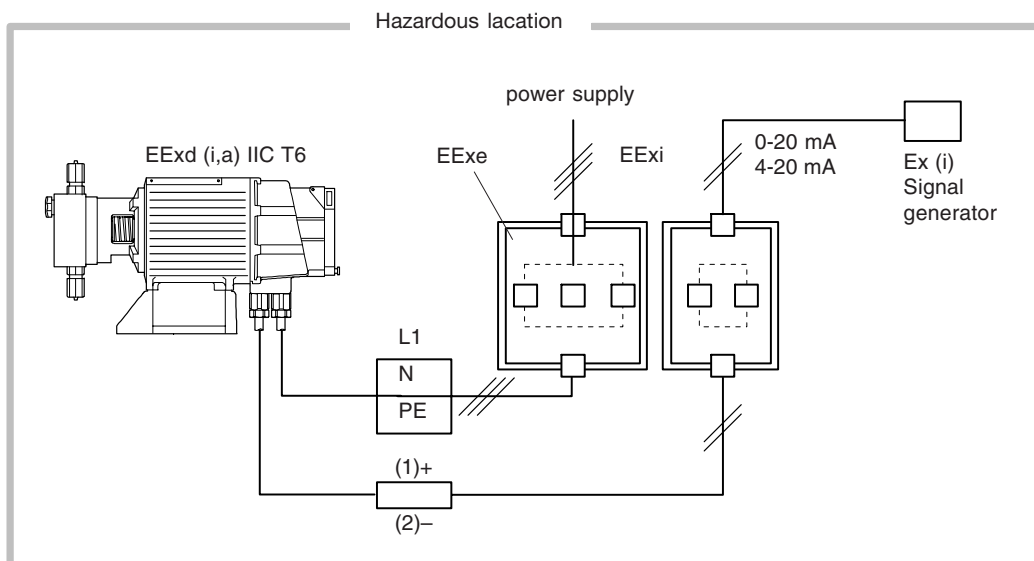
Metering pump EXBaS  
analog  
not intrinsically safe



## Mounting and Installation

Controlling device **in** hazardous location:

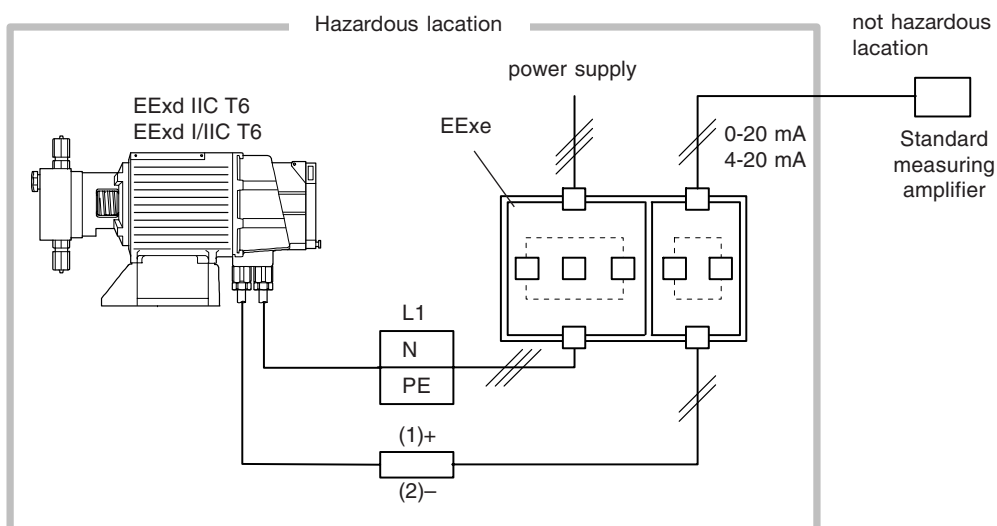
Metering pump EXBaE  
analog  
intrinsically safe



Controlling device **not in** hazardous location:

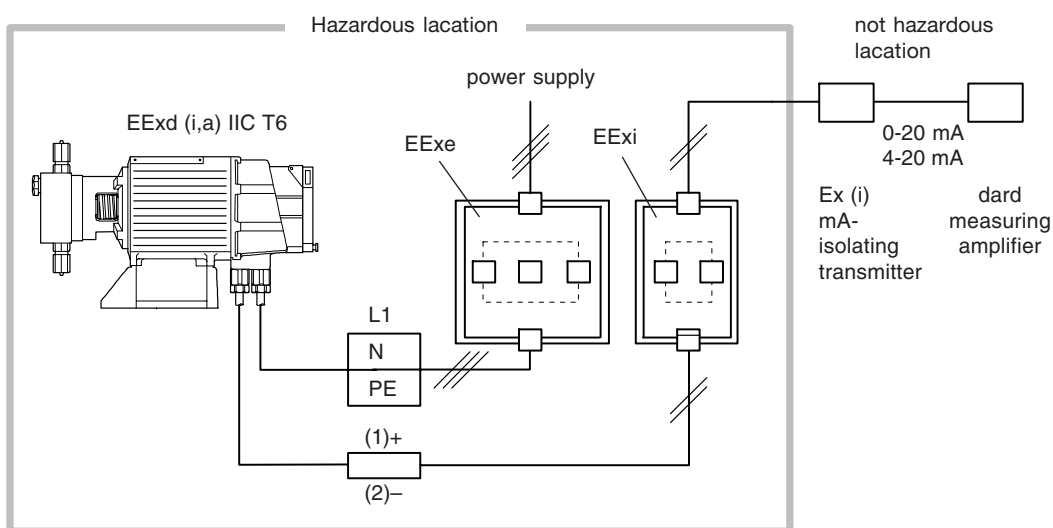
Metering pump EXBaE  
analog  
not intrinsically safe

Metering pump EXBaS  
analog  
not intrinsically safe



Controlling device **not in** hazardous location:

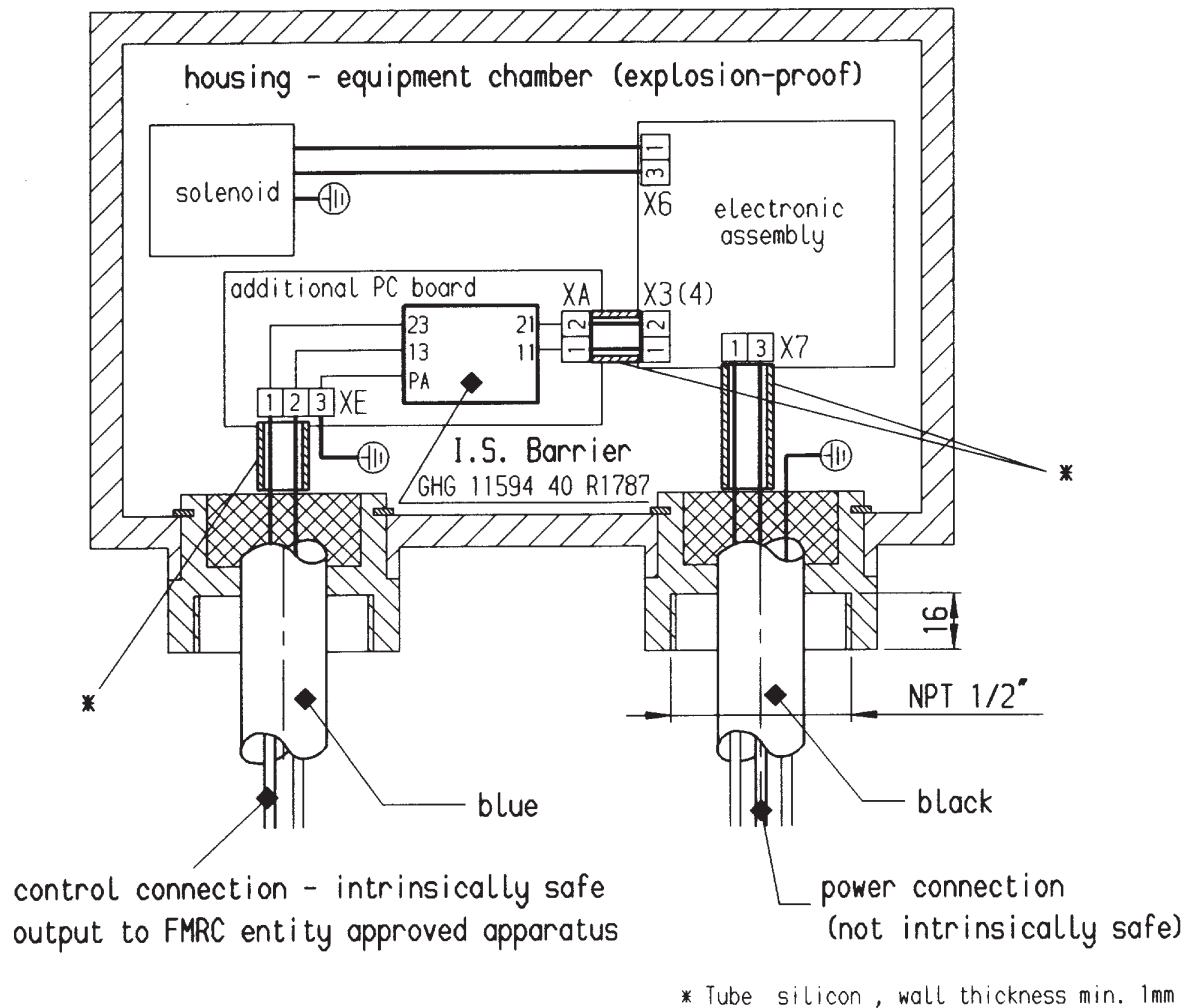
Metering pump EXBaE  
analog  
intrinsically safe



## 5.6 Notes on intrinsically safe installation in the USA

Methods of installation EXBaE with intrinsically safe outputs  
Explosionproof for Class I Div. 1, Grp. A,B,C and D

control system type vers. 4,5,6 (intrinsically safe output)



Entity parameters:

Terminal 13 to ground:  $V_{OC}=28V$ ,  $I_{SC}=93mA$ ,  $C_o=0,14\mu F$ ,  $L_o=4.38mH$

Terminal 23 to ground:  $V_{OC}=28V$ ,  $I_{SC}=0mA$ ,  $C_o=0,13\mu F$ ,  $L_o=5.5mH$

Terminal 13 to 23 :  $V_t=29,75V$ ,  $I_t=93mA$ ,  $C_o=0,12\mu F$ ,  $L_o=4.38mH$

No changes to this drawing, unless approved by FMRC

Fig.: 13\_10-200\_97\_00-44

## 6 Operation

### 6.1 Start-Up



#### **WARNING!**

- Always wear protective goggles and protective clothing when handling hazardous media!
- The metering pump may still contain water residue in the liquid end from the tests carried out at the factory. All water must be removed from the liquid end before start-up in the case of media which must not come in contact with water!



#### **IMPORTANT!**

- Carry out all settings only with the pump in operation.  
Release the lock before adjusting the stroke length!
- The intake head with the liquid end empty is dependent on the stroke volume:  
The pump intake should be set at stroke length = 100 %. Select the intake head correspondingly smaller if the pump is to be discharged at a lower setting without changing the stroke length and is to be placed into operation again self-priming.
- Pump intake is not possible against backpressure.
- Absolutely reliable metering cannot be guaranteed after a pump down period.  
Regular monitoring is necessary!

- Before start-up
- Check function of pressure relief valves.
  - Check pump connections and pipe connections for leaks.

Remove water from liquid end when handling media which must not come in contact with water

- Turn pump through 180°.
- Empty liquid end.
- Flush with a suitable medium from above through the intake connection.

Filling liquid end liquid end without vent valve

- Connect intake line but do not yet connect the delivery line to the liquid end.
  - Switch on pump with power switch (13) and operate at max. stroke length and stroke rate until liquid end is filled completely and free of bubbles.
  - Switch off pump with power switch (13).
  - Connect delivery line to liquid end.
- The pump is now ready for operation.

Filling liquid end liquid end with vent valve and bypass

- Rough venting
- Connect intake and delivery line to liquid end.
  - Connect bypass line.
  - Open vent valve (5) by one turn of the star knob in counterclockwise direction; the routes for rough venting via the bypass (6) is now clear.
  - Switch on pump with power switch (13) and operate at max. stroke length and stroke rate until liquid end is filled completely and free of bubbles (when the medium is visible in the venting or metering line).
  - Close vent valve.
  - Switch off pump with power switch (13).
- The pump is now ready for operation.

Setting fine vent metering gas-emitting media



#### **IMPORTANT!**

- A part of the metered quantity is constantly routed back into the supply tank.  
The return quantity should be approx. 20 % of the metered quantity.
- The media must be low-viscous (thin-bodied) and without solids.
- If the return flow line ends above the liquid level, the precision vent valve acts as a vacuum breaker and prevents discharge of the supply tank if a vacuum builds up in the metering line.
- Retighten the screws in the liquid end after 24 hours of operation.
- Remove star knob from vent valve (5).
- Using a screwdriver, turn screw in vent valve approx. 1 turn in counterclockwise direction.
- Fit star knob on vent valve (5).

*Venting liquid end HV version* Initial intake and venting is impaired to a certain extent by the valves and valve springs which are still dry. Therefore select the shortest possible intake head or vent the liquid end with inlet or admission pressure on the intake side. If not successful, shortly operate pump without valve spring in the pressure valve:

- Unscrew delivery connection and press away ball from O-ring.
- Fill liquid end with water or suitable liquid.
- Fit delivery connection without valve spring.
- Fit short piece of PVC hose (100 mm) on to hose socket, half fill with water.
- Operate pump at max. stroke length until metering is visible in the hose.
- Re-install valve spring – avoid twisting by fitting an approx. 4 mm Ø drift through the pressure valve in order to hold the spring in the centre position.
- Reconnect delivery line.

*Venting liquid end when pump delivers in a pressure system and has drawn in air*

- Set venting on delivery side: Release metering line or open vent valve.
- Switch on pump and vent at stroke length 100 %.

## 6.2 Determining the Delivery Capacity

The actual delivery capacity is dependent on the stroke length, stroke frequency (rate) and backpressure in the metering line. The relationship between capacity/stroke length/stroke frequency (rate) is illustrated in the nomogram for each type of pump. A correction factor can be read off from the diagram which shows the change in capacity referred to backpressure.

The measurements for determining the nomograms were conducted with water and the correction factor was determined at a stroke length of 70 %. The capacity scatter over all material versions is -5 % to +15 %.

- Diagram*
- Select the required capacity within the value range of the pump type (see capacity data).
  - Select the nomogram and diagram of the pump type.
  - Mark the backpressure in the metering system on the abscissa and read off the corresponding correction factor on the ordinate.
  - Divide the required capacity by the correction factor.

- Nomogram*
- Using a ruler, mark the determined capacity on the middle scale of the nomogram.
  - Draw a line across all three scales – as horizontal as possible, however, such that the line intersects at least one of the two outer scales; where possible, select a graduation with a large value on the stroke length scale.

The point of intersection of the line with the right-hand scale shows the stroke frequency (rate) to be set, the point of intersection of the line with the left-hand scale shows the stroke length to be set.

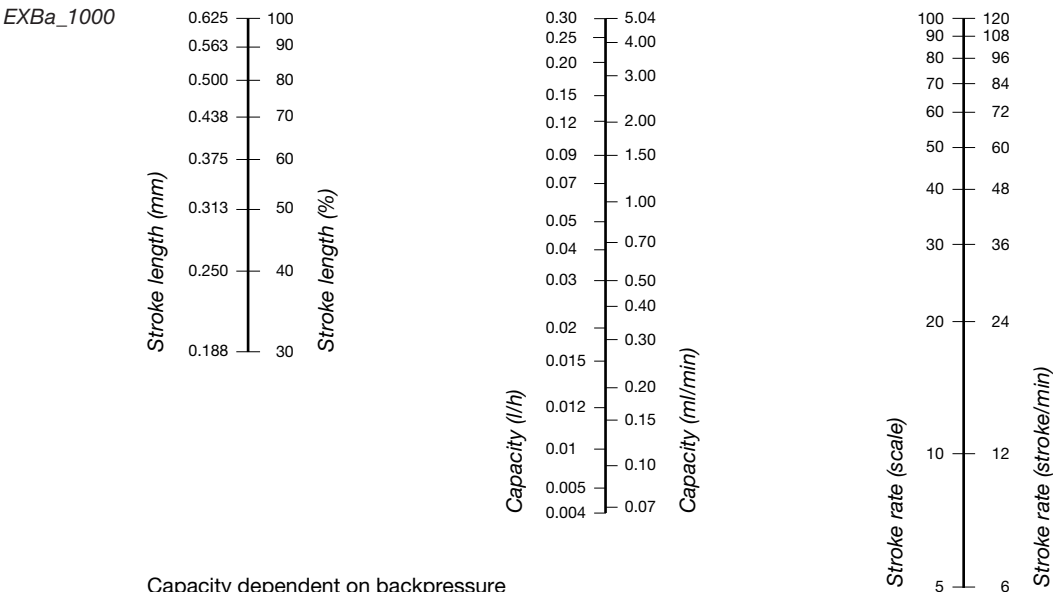
<i>Example Type EXBa_1310</i>	Capacity with mean backpressure:	11.9 l/h (see capacity data)
	Required capacity:	6 l/h
	Backpressure:	8 bar
	→ Correction factor as per diagram:	0.9
	→ Capacity to be set:	<u>6 l/h</u>
		$0.9 = 6.66 \text{ l/h}$
	→ Stroke length as per nomogram:	80 %
	→ Stroke rate as per nomogram:	80 stroke/min



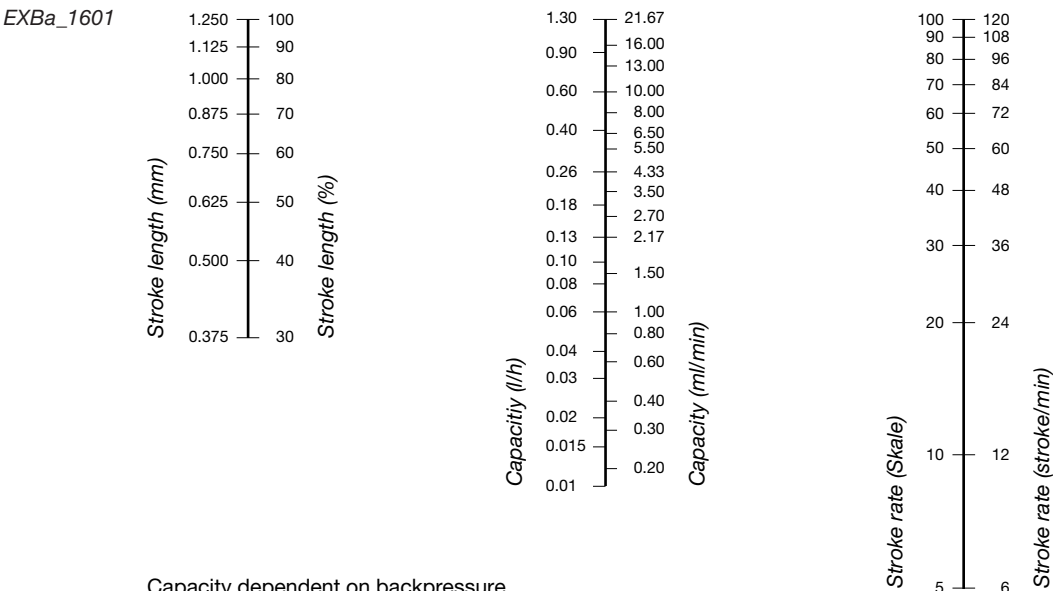
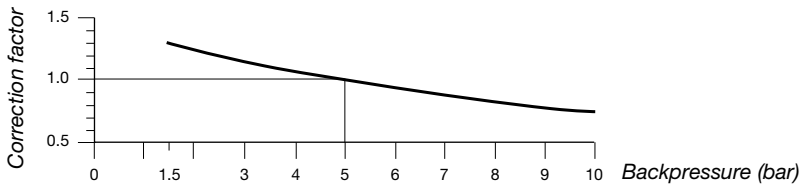
### IMPORTANT!

- Select large stroke length and low stroke rate for highly viscous and gas-emitting media.
- Use self-venting liquid end for gas-emitting media with viscosity  $\leq 20 \text{ mPa s}$ .
- Select a shorter stroke length and high stroke rate for effective mixing.
- at max. pressure stroke length
  - $\geq 60 \%$  for type 1601,
  - $\geq 40 \%$  for types 1201 and 1002,
  - $\geq 20 \%$  for type 0803;
 the stroke length can be reduced further at lower pressure.
- Set the stroke length greater for pumps with the precision vent open.

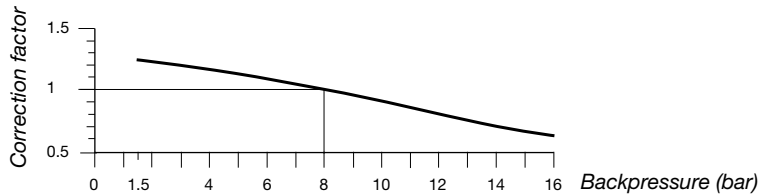
6.3 Nomograms



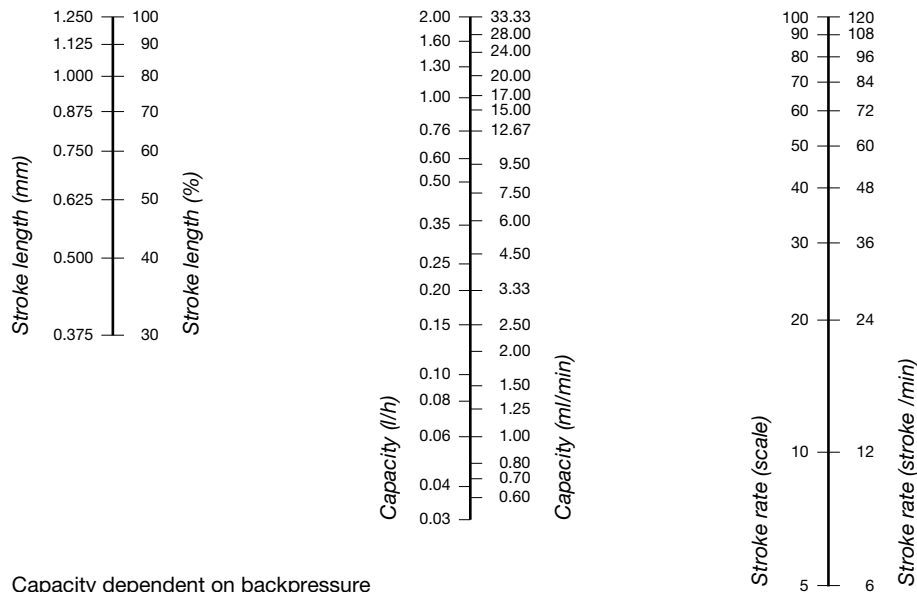
Capacity dependent on backpressure  
Capacity 0.30 l/h at medium backpressure of 5 bar  
Capacity 0.23 l/h at max. backpressure of 10 bar



Capacity dependent on backpressure  
Capacity 1.30 l/h at medium backpressure of 8 bar  
Capacity 1.00 l/h at max. backpressure of 16 bar

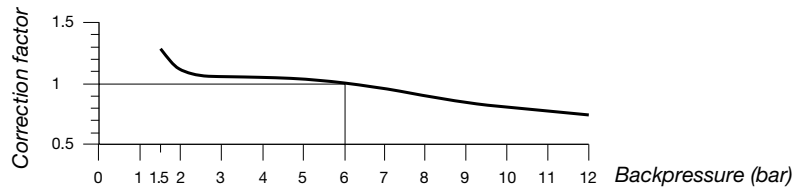


EXBa\_1201

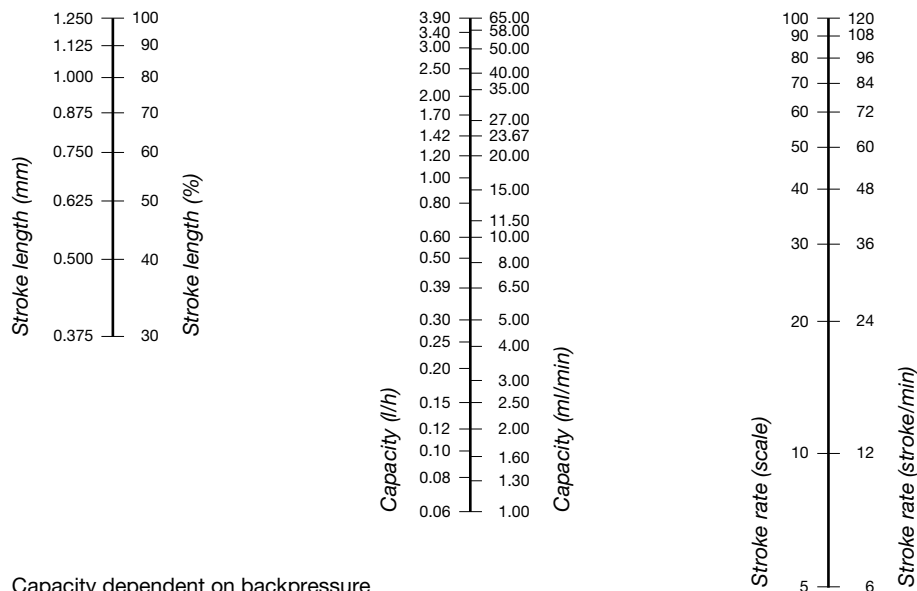


Capacity dependent on backpressure

Capacity 2.00 l/h at medium backpressure of 6 bar  
Capacity 1.70 l/h at max. backpressure of 12 bar

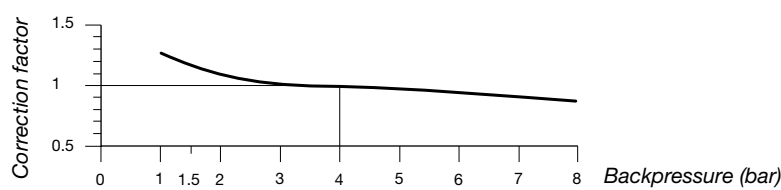


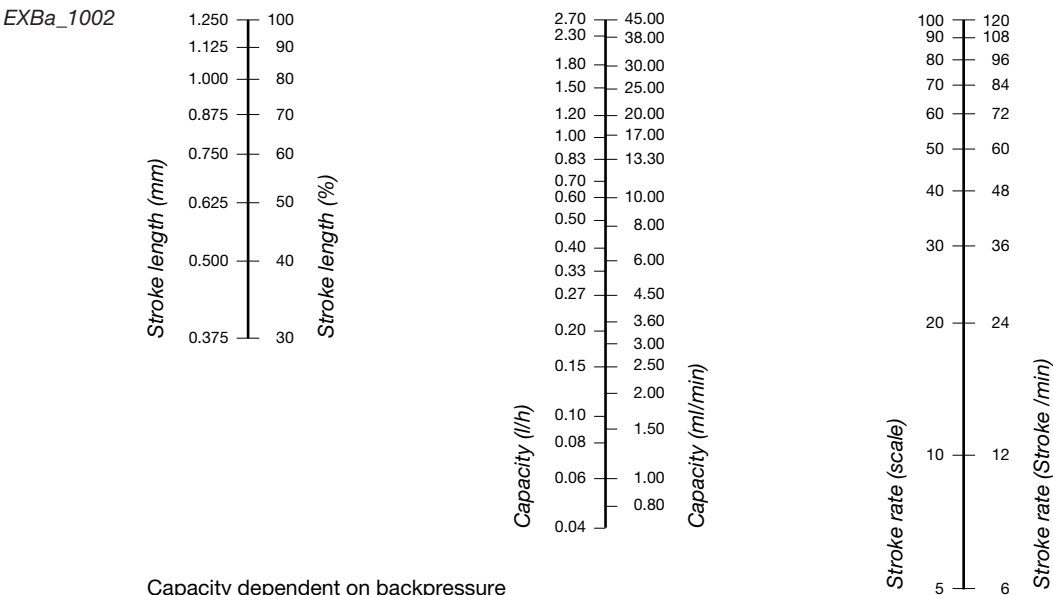
EXBa\_0803



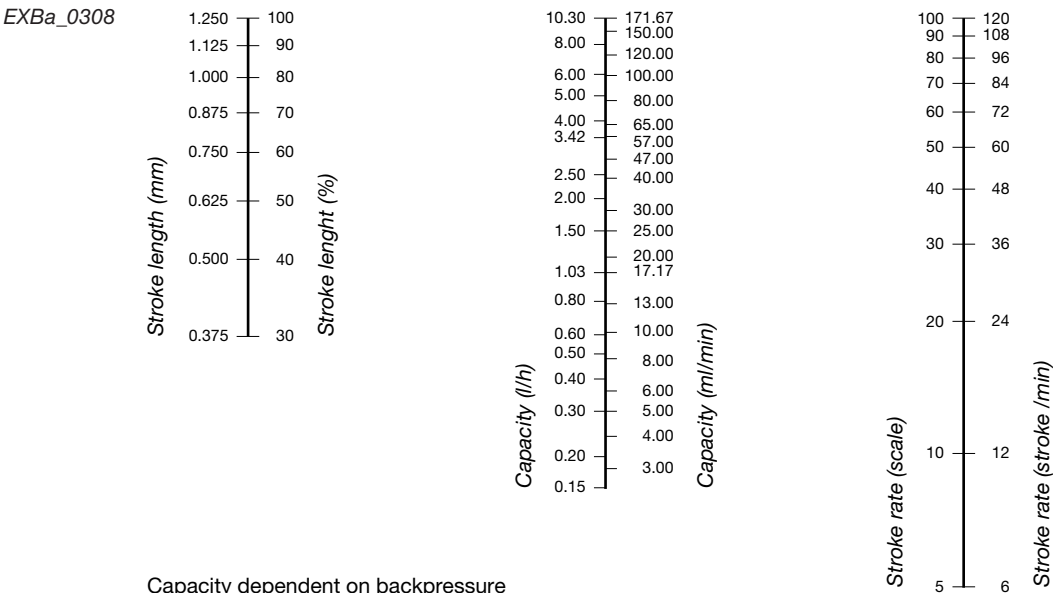
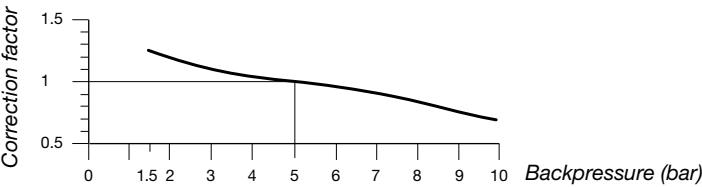
Capacity dependent on backpressure

Capacity 3.90 l/h at medium backpressure of 4 bar  
Capacity 3.70 l/h at max. backpressure of 8 bar

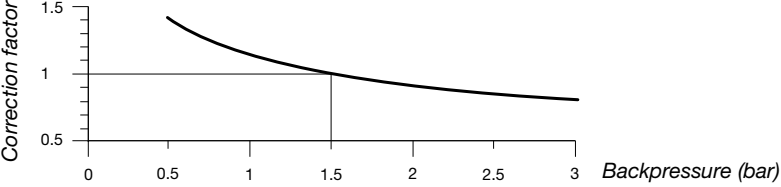




Capacity dependent on backpressure  
Capacity 2.70 l/h at medium backpressure of 5 bar  
Capacity 2.30 l/h at max. backpressure of 10 bar

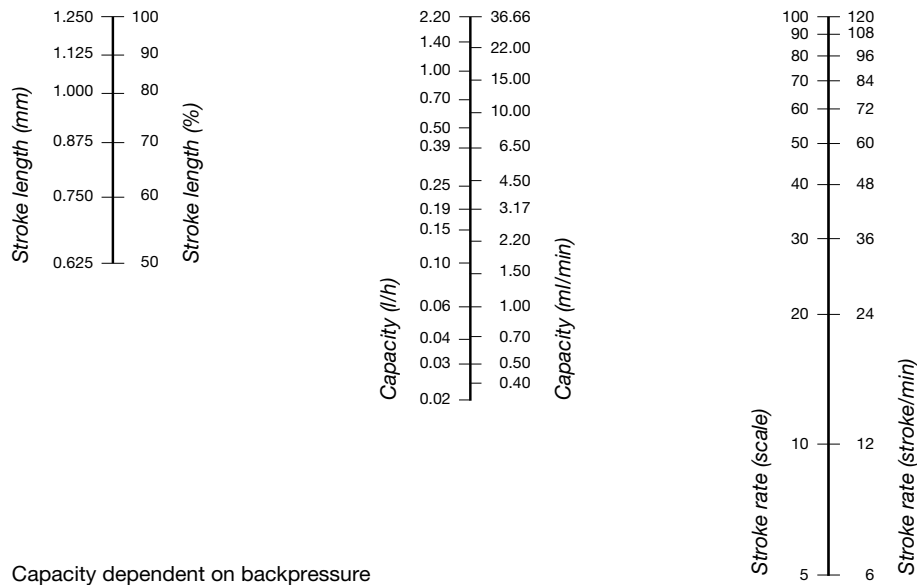


Capacity dependent on backpressure  
Capacity 10.30 l/h at medium backpressure of 1.5 bar  
Capacity 8.70 l/h at max. backpressure of 3 bar

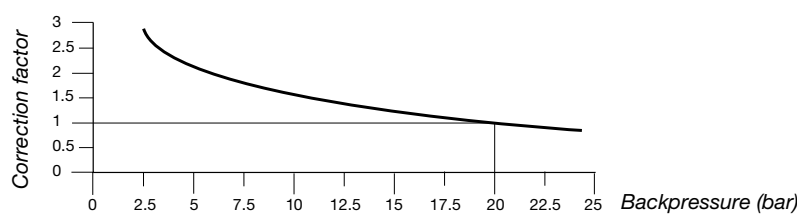




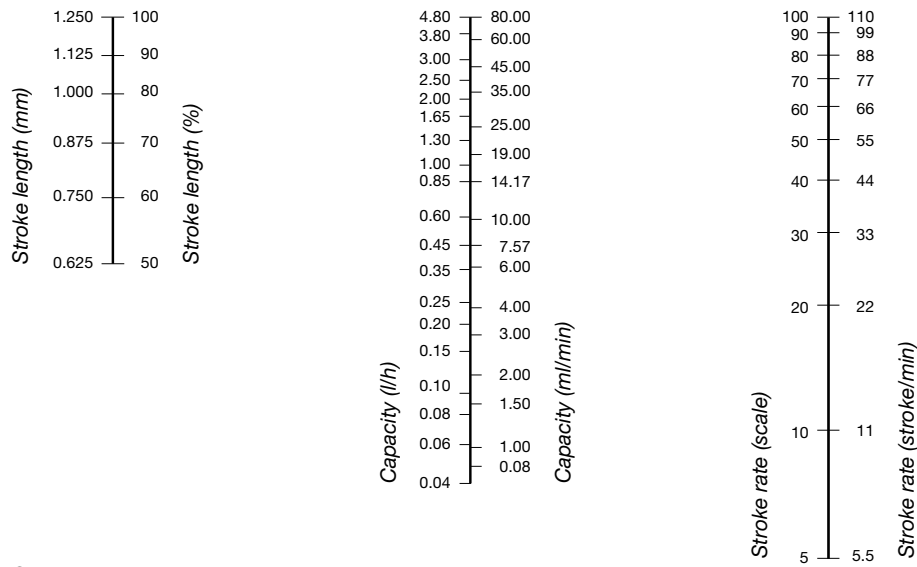
EXBa\_2502



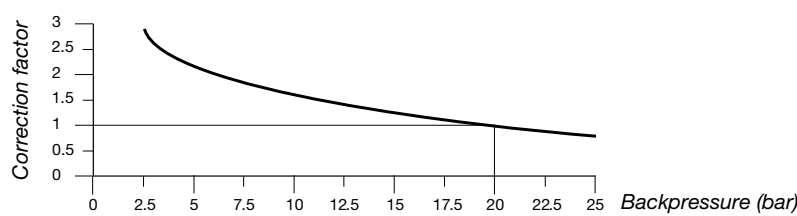
Capacity dependent on backpressure  
Capacity 2.20 l/h at medium backpressure of 20 bar  
Capacity 2.00 l/h at max. backpressure of 25 bar

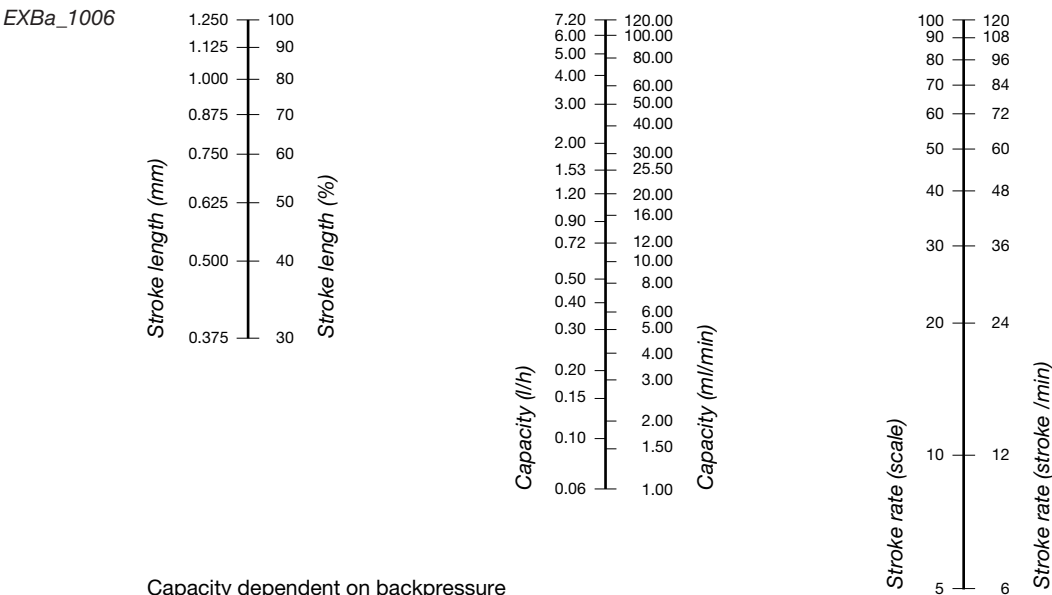


EXBa\_2505



Capacity dependent on backpressure  
Capacity 4.80 l/h at medium backpressure of 20 bar  
Capacity 4.20 l/h at max. backpressure of 25 bar

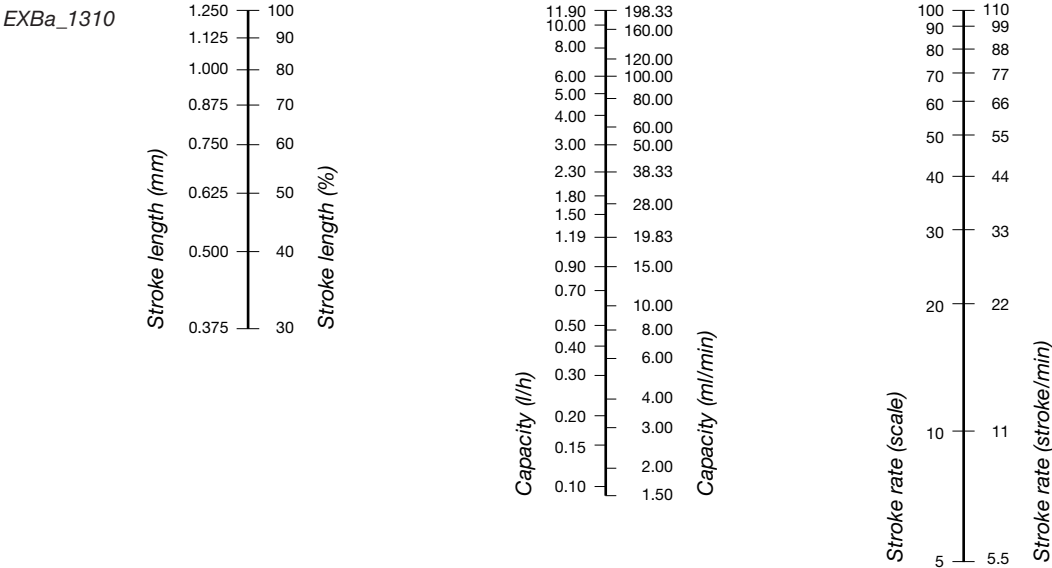
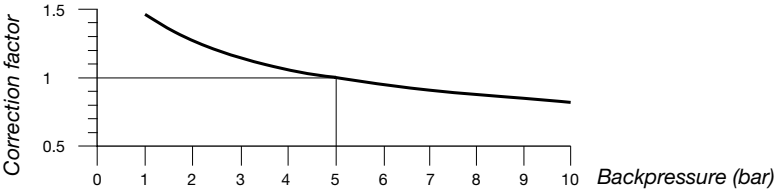




Capacity dependent on backpressure

Capacity 7.20 l/h at medium backpressure of 5 bar

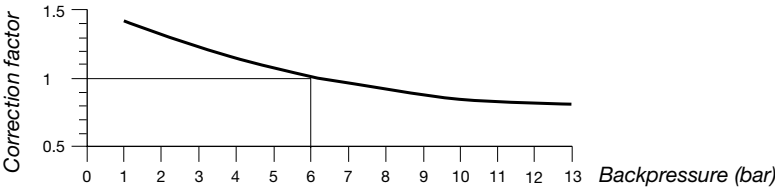
Capacity 6.00 l/h at max. backpressure of 10 bar



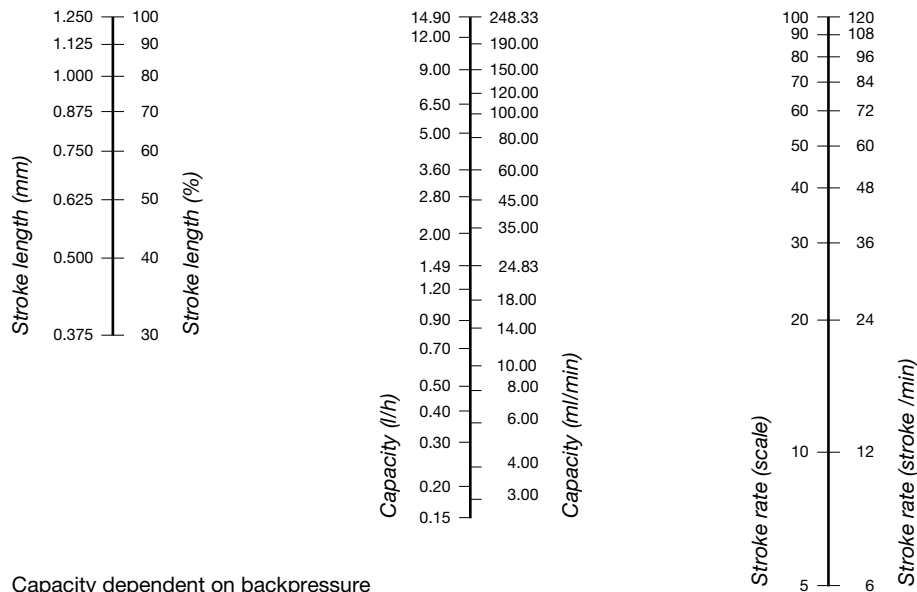
Capacity dependent on backpressure

Capacity 11.90 l/h at medium backpressure of 6 bar

Capacity 10.50 l/h at max. backpressure of 13 bar



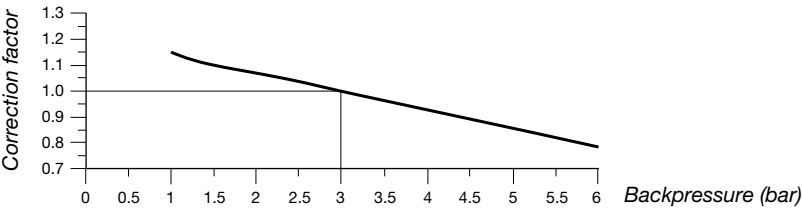
EXBa\_0613



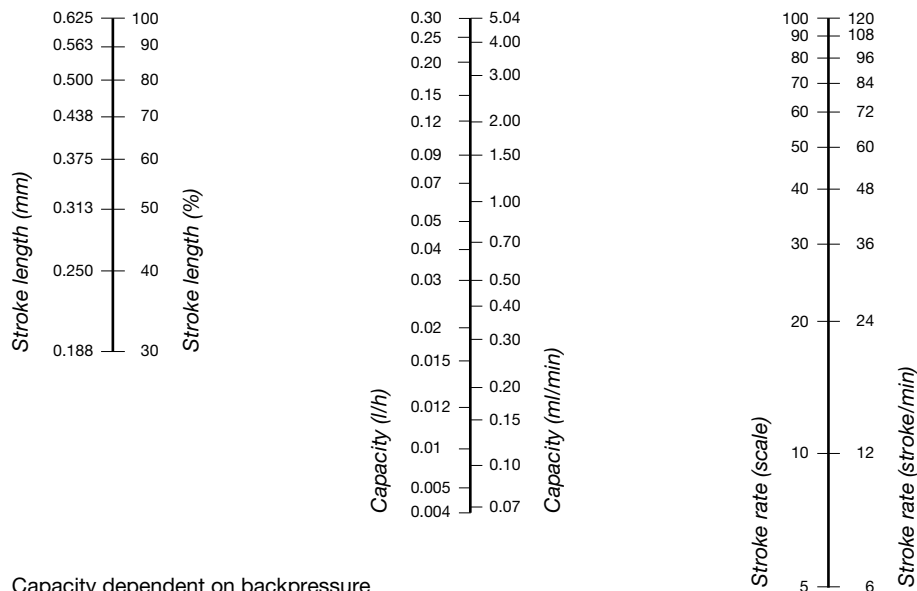
Capacity dependent on backpressure

Capacity 14.90 l/h at medium backpressure of 3 bar

Capacity 13.10 l/h at medium backpressure of 6 bar



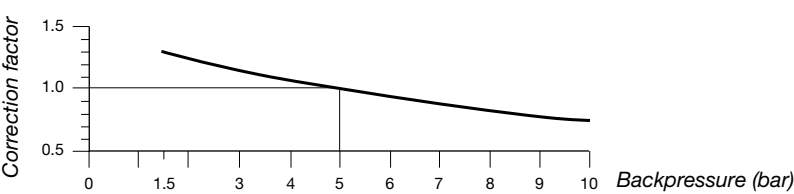
EXBa\_0814

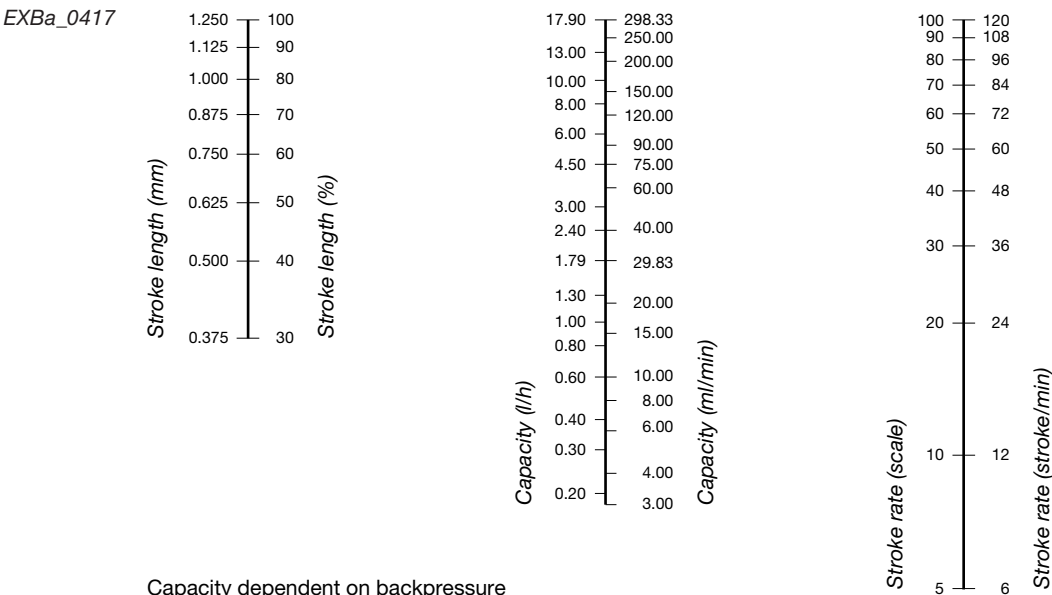


Capacity dependent on backpressure

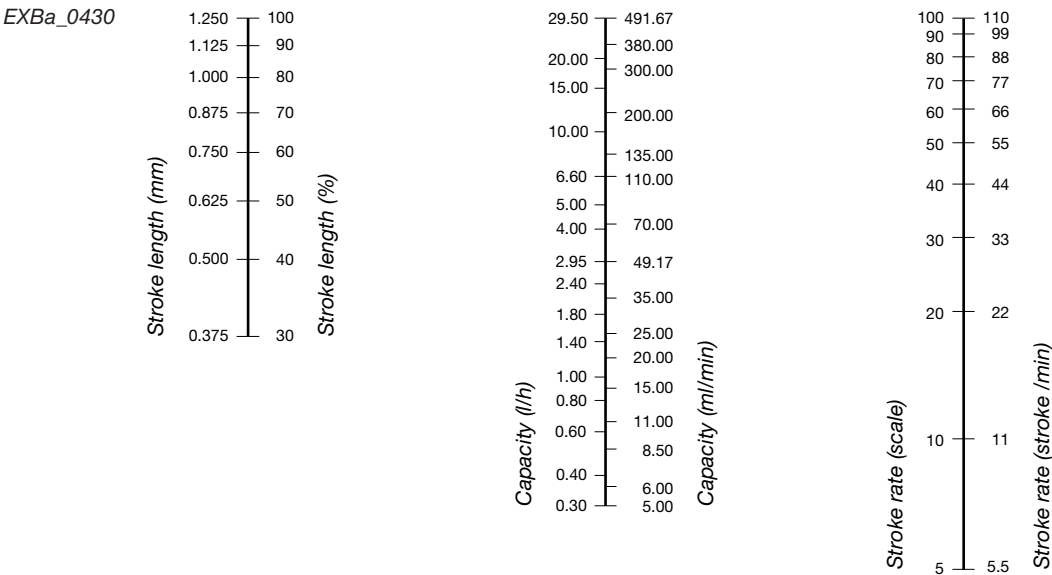
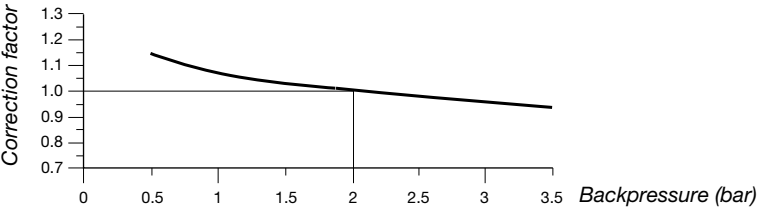
Capacity 0.30 l/h at medium backpressure of 5 bar

Capacity 0.23 l/h at max. backpressure of 10 bar

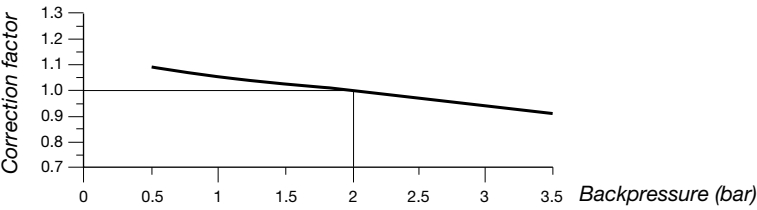




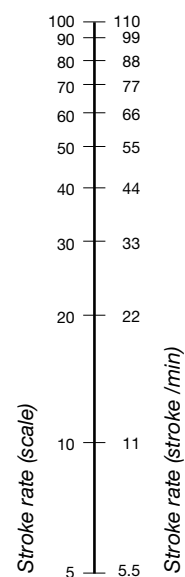
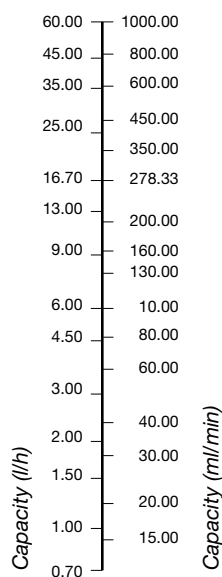
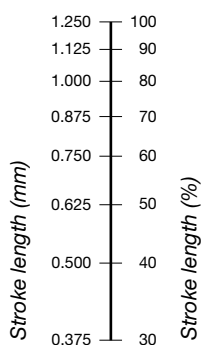
Capacity dependent on backpressure  
Capacity 17.90 l/h at medium Backpressure of 2 bar  
Capacity 17.40 l/h at medium Backpressure of 3.5 bar



Capacity dependent on backpressure  
Capacity 29.50 l/h at medium backpressure of 2 bar  
Capacity 27.00 l/h at max. backpressure of 3.5 bar



EXBa\_0260



Capacity 60.00 l/h at max. backpressure of 1.5 bar

## 6.4 Setting the Delivery Capacity



### IMPORTANT!

*Adjust the stroke length only with the pump running!*

*The adjustment of the stroke length control knob will be varied if the stroke length control knob (14) is turned without previously releasing the lock (15).*

*Defective metering is possible if the notes on setting are disregarded.*

Installation and commissioning of the pump are concluded.

The setting values have been determined by means of nomograms.

Switching on



- Switch on pump with power switch (13).
- Open transparent cover

Setting stroke length



- Release the lock before setting the stroke length: Press up the locking lever (15).
- Adjust determined stroke length with the control knob (14) the ring scale on the control knob (14) has a graduation of 0.01 mm, the stroke length is indicated in mm in the inspection window (10). The total setting range for the stroke length is 0 to 1.25 mm (0.63 mm for pump type 1000), i.e. only the settings 0 and 1 are possible in the inspection window (10).
- Lock stroke length control knob (14): Press down locking lever (15).

Setting stroke rate



- Adjust determined stroke rate with the control knob (16); on graduation line corresponds to 1 stroke/min.

Correction for accurate metering

- Determine delivery capacity on the intake side of the metering pump with a measuring cylinder or by weighing.
- Correct pump setting.

### 7 Maintenance



#### **ATTENTION!**

*Only authorized persons are permitted to carry out maintenance on EXtronic®-metering pumps.*



#### **ATTENTION!**

*Always wear protective goggles and protective clothing when handling hazardous media!*

#### *Maintenance jobs*

- Check firm fit of liquid end screws; retighten screws in liquid end after 24 hours of operation.
- Check firm fit of metering lines.
- Check firm fit of pressure valve and intake valve.
- Check entire delivery unit for leaks.
- Check correct pump delivery capacity: Briefly operate pump in intake mode.

For self-venting liquid end:

- Check firm fit of bypass line and of connection.
- Check firm fit of spring-loaded pressure valve.
- Check vent function.

#### *Maintenance intervals*

Every 3 months

Shorter intervals for operation under heavy load (e.g. permanent operation)

### 8 Repairs



#### **ATTENTION!**

*Always wear protective goggles and protective clothing when handling hazardous media.*



#### **WARNING!**

*The following repair measures on EXtronic®-metering pumps must only be carried out by specially trained persons or by the manufacturer:*

- Replace ex-relevant parts.
- Replace damaged power connection cable.
- Replace fuses and electronic control.
- Repairs on metering pumps for combustible media, also in the area of the liquid end.

*Conversion to different capacities, material or type of control are only possible at the manufacturer's factory. Please contact your ProMinent dealer or representative.*

*You will find the addresses on the back page of these operating instructions.*

*Send back the metering pump for repair only in a clean condition and with the liquid end flushed clean!*



#### **WARNING!**

*Pumps for radioactive medium must not be shipped!*



#### **IMPORTANT!**

*Only use genuine spare parts!*



#### **IMPORTANT!**

*Legal regulations governing the protection of labour oblige all companies to protect their employees from the damaging effects of handling hazardous substances. Inspection or repair of pumps and their parts can only be carried out if a declaration of complete safety has been submitted completed correctly and in full by an authorized and qualified person of the pump operator!*

*If, despite careful discharge and cleaning of the pump, safety precautions are still necessary, the necessary information must be stipulated in the declaration of complete safety. The declaration of complete safety is a part of the inspection/repair order.*

*You will find a form at the end of these operating instructions..*

## 9 Malfunctions



### ATTENTION!

- Always wear protective goggles and protective clothing when handling hazardous media.
- Observe the safety data sheets of the metering liquids.
- Discharge liquid end and, if necessary, flush with a neutral agent.
- First decompressurize the metering line before carrying out any work on the pump.

### 9.1 Operation/Pulse Indicator does not Light, No Stroke Movement

- Cause* **Incorrect mains voltage applied**  
*Remedy* ➤ Use specified mains voltage in accordance with voltage rating on type identification plate.
- Cause* **Fuse is defective**  
*Remedy* ➤ Contact your ProMinent dealer or representative.  
 You will find the addresses on the back page of these operating instructions.

### 9.2 Pump Intake no Longer Operable Despite Full Stroke Movement and Venting

- Cause* **Crystalline deposits on ball seat caused by valves drying out**  
*Remedy* ➤ Remove intake hose from metering tank.  
 ➤ Open vent valve.  
 ➤ Flush liquid end well through.  
 ➤ If not successful, remove and clean valves.

### 9.3 Pump no Longer Meters Although Operation/Pulse Indicator Lights

- Possible Cause* **Medium level in tank too low.**  
*Remedy* ➤ Top up.
- Possible Cause* **Stroke length set too small**  
*Remedy* ➤ Increase stroke length with control knob (14)
- Possible Cause* **Air trapped in liquid end**  
*Remedy Liquid end without vent:* ➤ Set venting on delivery side via overflow or pressure relief valve or release metering line at injection valve or pressure connection.  
 ➤ Switch on pump and vent at stroke length of 100 %
- Liquid end with vent:* ➤ Open vent valve (5) by max. 1 turn in counterclockwise direction.  
 ➤ Pump intake until intake line and liquid end are filled free of bubbles.  
 ➤ Close vent valve (5).

### 9.4 Liquid Emerges from end ring

- Possible Cause* **Delivery unit leaking at diaphragm**  
*Remedy* ➤ Retighten screws (24) crosswise in liquid end.



### ATTENTION!

Observe tightening torques:

For M4 screw → 2.5–3 Nm

For M5 screw → 4.5–5 Nm

Check tightening torques after 24 hours of operation!

Additionally check tightening torques every 3 months for PP version!

*Possible cause* If liquid still emerges from liquid end, the **diaphragm is torn** and must be replaced.

The service life of the metering diaphragm is dependent on

- system backpressure
- operating temperature
- properties of medium to be metered

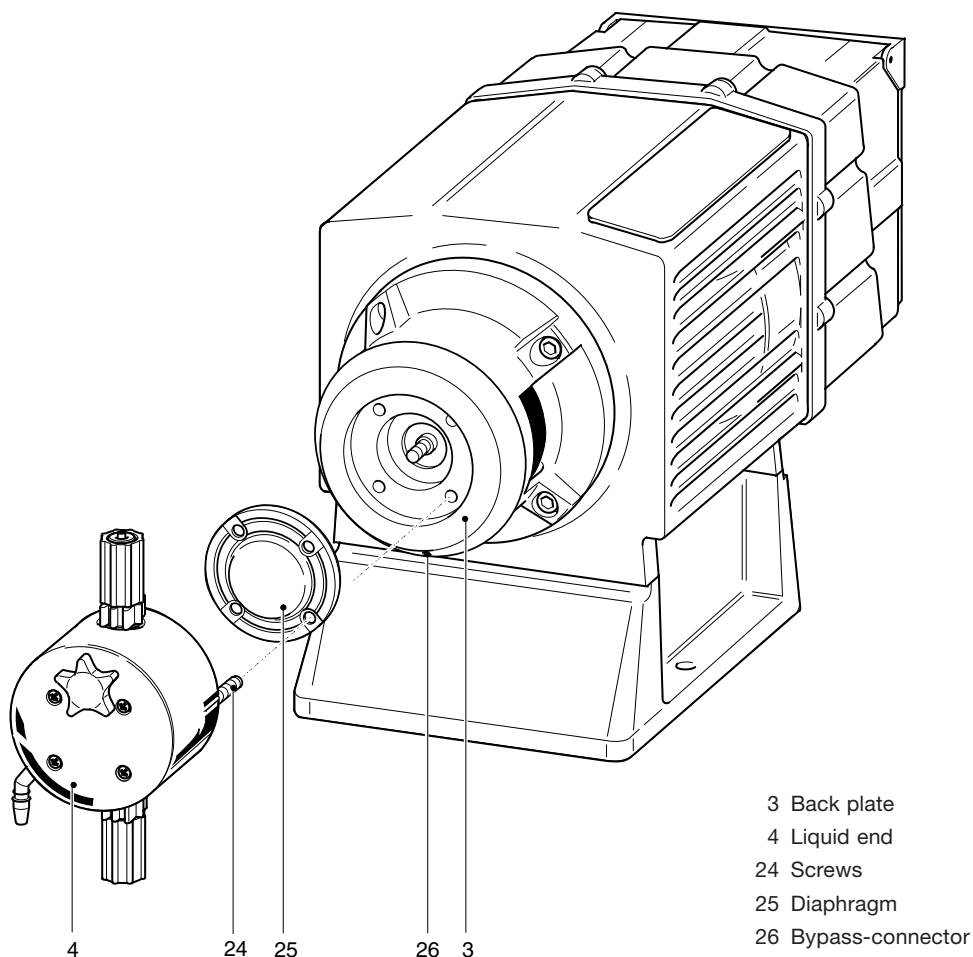
The service life of the diaphragms is restricted in the case of abrasive media.

- Remedy*
- Flush liquid end of hazardous media: For this purpose force water or suitable flushing agent with a spray bottle through the intake connection of the liquid end.
  - With pump running, set stroke length with control knob (14) to "0".
  - Switch off pump.
  - Release screws (24).
  - Pull liquid end (4) with screws (24) out of end ring (3) and pump housing by approx. 5 mm until resistance can no longer be felt through screws (24) when turning the liquid end (4).
  - Hold housing and end ring (3) in left hand and turn liquid end (4) in counterclockwise direction so that the diaphragm (25) is released from the drive shaft.
  - Pull liquid end (4) with screws (24) out of diaphragm (25).
  - Completely unscrew diaphragm (25) from drive shaft.
  - Check condition of thread by screwing the new diaphragm on to the drive shaft as far as it will go and then screwing it off again.
  - Re-install end ring (3) in housing.
  - Fit diaphragm (25) in end ring (3) and screw on by 2 thread turns.



### ATTENTION!

Turning diaphragm (25) such that the 4 holes of the diaphragm (25) and end ring (3) are precisely aligned! The outlet opening (26) of the end ring (3) must face downward.





- Fit liquid end (4) with screws (24) on diaphragm (25) and end ring (3) such that the parts can still turn (approx. 5 mm spacing between liquid end and end ring); the intake connection must face downwards.
- Now slowly turn parts in clockwise direction until the torsional resistance of the return spring can be felt and the diaphragm is fitted firmly.

**ATTENTION!**

*Do not turn diaphragm too far!*

- Switch on pump.
- Set stroke length with control knob (14) to 100 % and turn the complete delivery unit in clockwise direction until the intake connection faces vertically downward.
- Switch off pump.
- Now tighten the 4 screws (24) crosswise.

**ATTENTION!**

*Observe tightening torques:*

*For M4 screws → 2.5 - 3 Nm*

*For M5 screws → 4.5 - 5 Nm*

*Check tightening torques after 24 hours of operation.*

*Additionally check tightening torques every 3 months for PP version!*

## **10 Used Part Disposal**

**NOTICE!**

*Metering pumps do not belong in the household waste!*

*Dispose of used parts in accordance with the law governing the avoidance and disposal of waste (Abfg) or in accordance with the waste and residual material monitoring ordinance governing the re-use of materials.*

Your ProMinent dealer or representative will accept all used parts for a small cover charge. You will find the addresses on the back page of these operating instructions.

## Installation data

Customer: .....			
Project No.: .....		Date: .....	<input type="checkbox"/> Drawing enclosed .....
<b>Metering pump</b>	Type	–	.....
	Capacity	l/h	.....
	Stroke rate	stroke/min	.....
	Stroke length	%	.....
	Valve spring pressure, intake side	bar	.....
	Valve spring pressure, delivery side	bar	.....
<b>Medium</b>	Description/ Concentration	– / %	..... / .....
	Percentage solids/ grain size	% / mm	..... / .....
	Solid material / hardness	– / (Mohs-Skala)	.....
	Dynamic viscosity	mPa s (cP)	.....
	Density	kg /m <sup>3</sup>	.....
	Vapour pressure at operating temp.	bar /°C	.....
<b>System, intake side</b>	Pressure in intake tank	bar	.....
	Nominal diameter intake line	DN / mm	..... / .....
	Intake head min/max	m	..... / .....
	Supply head min/max	m	..... / .....
	Intake line length min/max	m	.....
	Number of bracket/valves	–	.....
	Pulsation damper	<input type="checkbox"/>	Diaphragm accumulator ..... ltr.
		<input type="checkbox"/>	Pressure vessel ..... ltr.
<b>System, delivery side</b>	Static system pressure min/max	bar	..... / .....
	Nominal diameter of delivery line	DN / mm	.....
	Delivery line length	m	.....
	Delivery head	m	.....
	Number of brackets/valve	–	.....
	Pulsation damper	<input type="checkbox"/>	Diaphragm accumulator ..... ltr.
	<input type="checkbox"/>	Pressure vessel ..... ltr.	

Please copy and send in with the pump

**In the case of failure of the metering pump within the guarantee period, please return the metering pump in a cleaned condition with the guarantee claim completed in full.**



Please complete in full!

<b>Guarantee claim for metering pumps</b>	<b>No.</b>
Company: ..... Tel.-No.: ..... Date: ..... Address: ..... Person responsible (customer): ..... Order No.: ..... Date of delivery: ..... Pump type/ Identity code: ..... Serial No.: .....	
<b>Brief description of fault:</b> ..... ..... ..... .....	
<b>Type of fault</b> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><u>1 Mechanical fault</u></p> <p><input type="checkbox"/> Abnormal wear</p> <p><input type="checkbox"/> Wearing parts</p> <p><input type="checkbox"/> Breakage/ other damage</p> <p><input type="checkbox"/> Corrosion</p> <p><input type="checkbox"/> Damage during transport</p> </div> <div style="width: 48%;"> <p><u>2 Electrical fault</u></p> <p><input type="checkbox"/> Connections such as connector or cable loose</p> <p><input type="checkbox"/> Operating elements (e.g. switches)</p> <p><input type="checkbox"/> Control</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 48%;"> <p><u>3 Leakage</u></p> <p><input type="checkbox"/> Connections</p> <p><input type="checkbox"/> Liquid end</p> </div> <div style="width: 48%;"> <p><u>4 None or poor delivery capacity</u></p> <p><input type="checkbox"/> Diaphragm defective</p> <p><input type="checkbox"/> Others</p> </div> </div>	
<b>Operating conditions of ProMinent® -pumps</b> Place of installation/ system description: ..... Pump accessories used: ..... ..... ..... Commissioning (date): ..... Running period (approx. duty hours): ..... Please specify installation data and enclose system drawing	

Please copy and send in with the pump

**Declaration of Complete Dafety**

**We hereby assure that the enclosed device**

Type .....

Serial No.: .....

**is free of**

- **Chemical**
- **biological or**
- **radioactive Substances**

**which are harmful to health.**

**The device was cleaned thoroughly before despatch.**

\_\_\_\_\_  
Date / signature

\_\_\_\_\_  
Company stamp