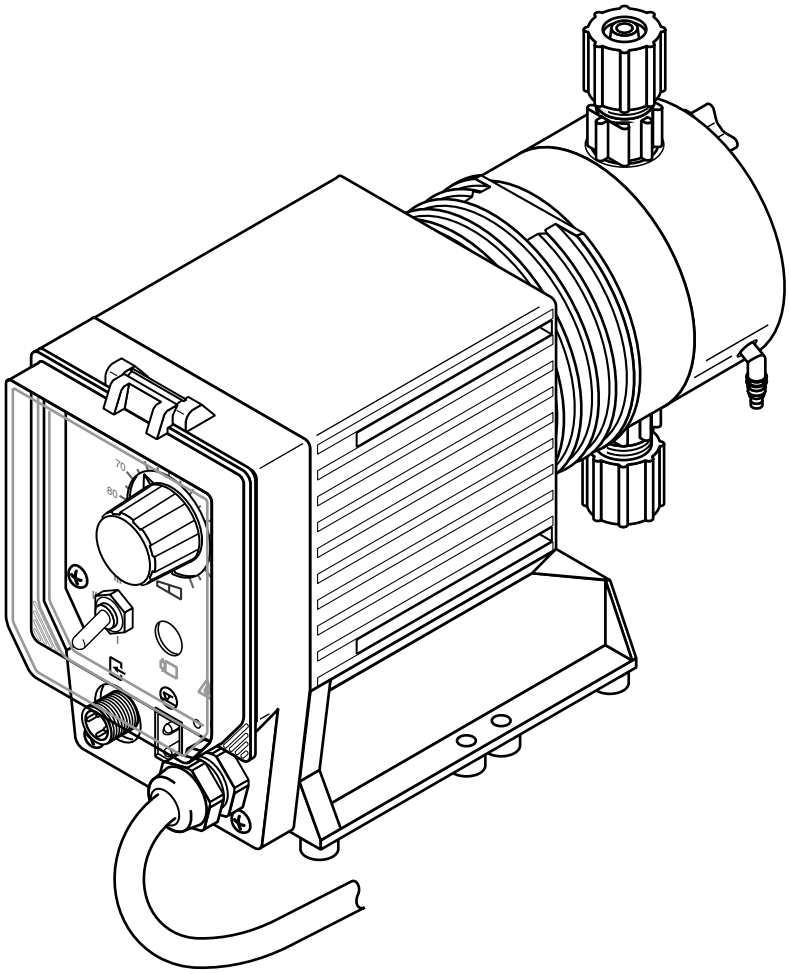
Operating Instructions

Metering Pump

ProMinent® CONCEPT b



Affix type identification plate here!

Please completly read through these operating instructions first! · Do not discard!

The warranty shall be invalidated by damage caused by operating errors!

Part No. 981766 **ProMinent Dosiertechnik GmbH · 69123 Heidelberg · Germany** BA CO 006 06/99 GB

Key to Devices and Components

Detailed description of parts on Pages:

Imprint

Operating Instructions CONCEPT b

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Subject to modifications

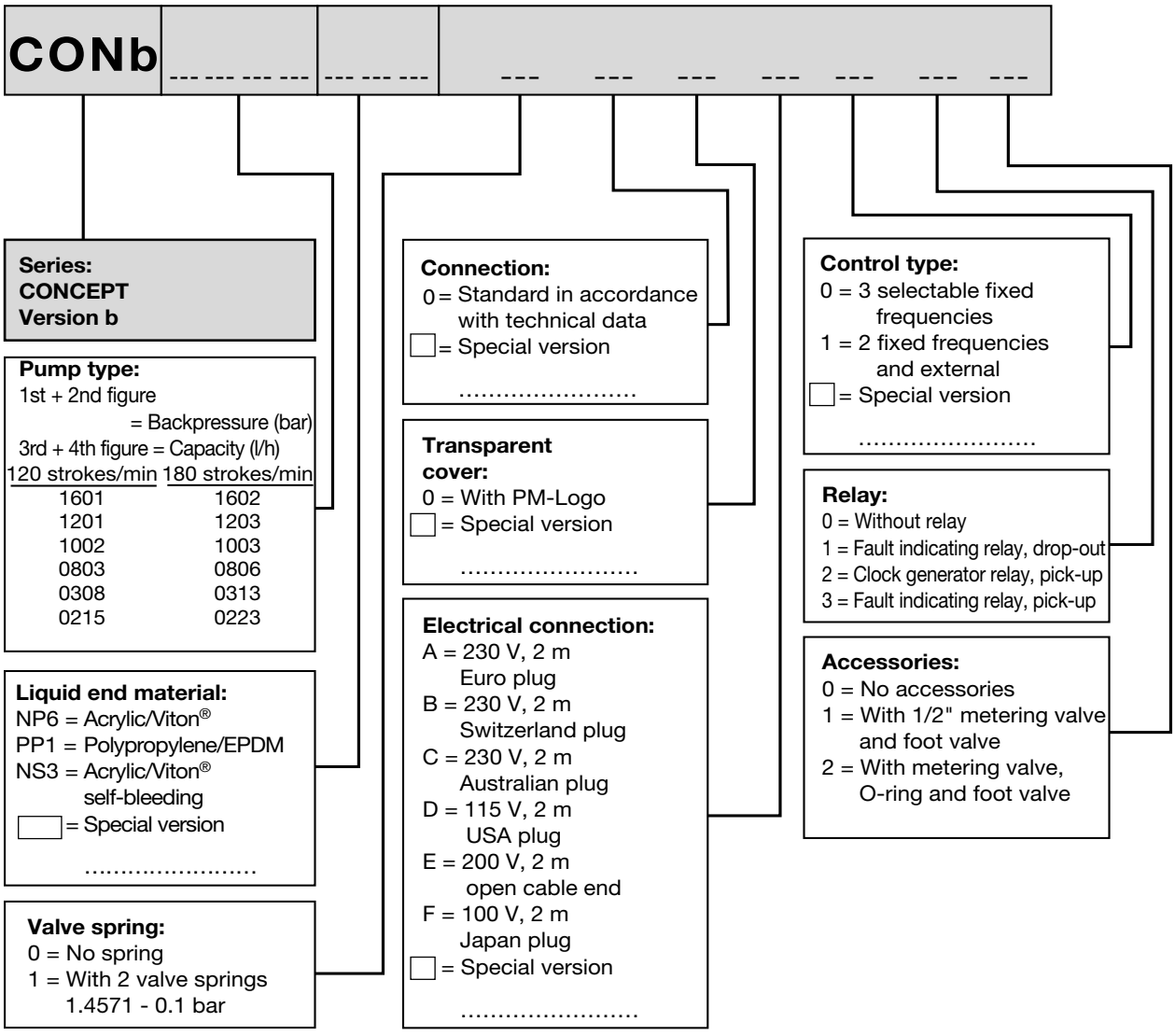
Type setting/DTP:
Bartha Docuteam, D-64625 Bensheim
Issue 06/99

Printed in the F.R. Germany

Device Identification/Identity Code

The type identification plate affixed on the cover page is identical to that of the supplied pump thus establishing distinct allocation between the operating instructions and the pump. Please enter the identity code as specified under "Type" on the type identification plate in the grey box below.

IDENTITY CODE



Viton® is a registered trademark of DuPont Dow Elastomers.

Contents

1 Foreword

The ProMinent® CONCEPT is a microprocessor-controlled short-stroke solenoid-operated diaphragm-type metering pump for metering liquid, non-combustible media.

2 Functions

2.1 Brief Description of Functions

Metering is based on a pulsating action. For each pulse coming from the electronic control, the solenoid energizes and completes a stroke of max. 1.25 mm. The diaphragm, stabilized by a steel core, displaces the medium in the liquid end, the balls on the intake side are pressed against their seat while the balls on the delivery side open, thus releasing the medium for metering. The solenoid is deactivated on completion of the stroke and returned to its initial position by a spring. In so doing, the valve on the delivery end closes while the valve on the intake side opens so as to draw medium into the liquid end. The safety diaphragm protects the leadthrough in the housing from dust and moisture.

The solenoid-operated, diaphragm-type metering pump covers a capacity range from approx. 0.9 l/h to 23 l/h (litre specifications at max. stroke length and max. stroke rate) at a max. backpressure of 1.5 bar to 16 bar. The delivery capacity can be adjusted on the basis of the stroke length by means of a rotary knob and the stroke rate by means of a switch. The various operating statuses are indicated by an LED for operation and empty/fault signal.

The pump features a connection facility for a single-stage level switch. In addition to the internal mode of operation, external activation is also possible via floating contacts.

3 Technical Data

3.1 General Data

Metering deviations	All material versions –5 % to +15 %
Metering reproducibility	When used in accordance with operating instructions ±2 %
Permissible ambient temperature	-10 °C to +45 °C
Electrical connection	230 V, 50/60 Hz, +6 %, –10 %
	115 V, 50/60 Hz, +6 %, –10 %
Mean power intake	Refer to type identification plate
Max. current consumption	Refer to type identification plate
Type of enclosure	IP 65
Insulation class	F

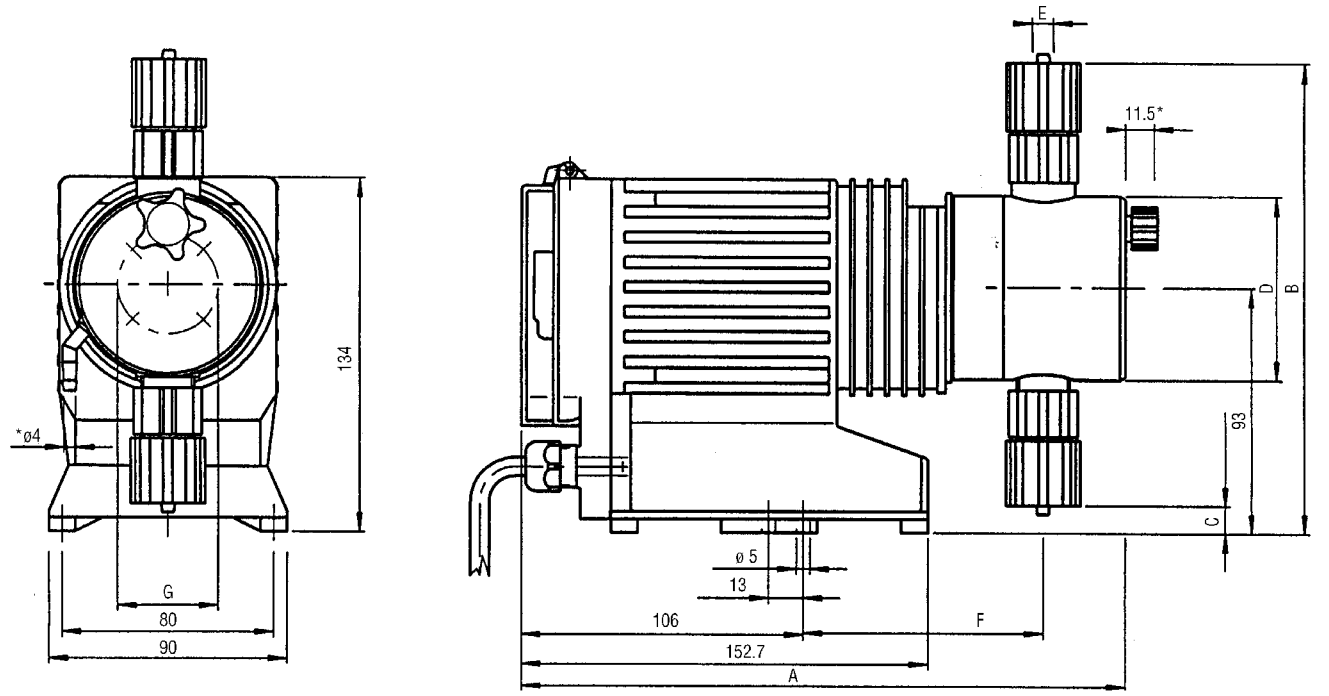
External contact activation:	
Necessary contact duration	20 ms
Contact load	5 V; 0.5 mA
Contact load	
Fault indicating relay (option)	250 V; 2 A
Contact load	
Clock generator relay (option)	42 V; 0.1 A

3.2 Capacity Data

Pump type *Pump type CONb* *with 120 strokes/minute*	1601	1201	0803	1002	0308	0215
Max. capacity (l/h)	1.0	1.7	3.4	2.3	8.4	14.8
Capacity (ml/stroke)	0.14	0.24	0.48	0.32	1.17	2.05
At max. backpressure (bar)	16	12	8	10	3	1.5
Max. capacity (l/h)	1.2	1.9	3.8	2.6	9.1	15.80
Capacity (ml/stroke)	0.17	0.27	0.53	0.36	1.23	2.20
At mean backpressure (bar)	8.0	6.0	4.0	5.0	1.5	1.0
Stroke rate (strokes/min)	120	120	120	120	120	120
Connection size 0 ø x i ø (mm)	6x4	6x4	6x4	8x5	8x5	12x9
Suction head (m water column)	6.0	6.0	3.0	6.0	6.0	1.5
Intake head (m water column)	1.8	2.5	2.8	2.0	1.8	1.5
Permissible admission pressure intake side (bar)	8.0	5.5	3.0	3.0	1.5	0.8

Pump type *CONb with 180 strokes/min*	1602	1203	0806	1003	0313	0223
Max. capacity (l/h)	1.5	2.5	5.3	3.4	13.0	23.0
Capacity (ml/stroke)	0.14	0.24	0.48	0.31	1.20	2.13
At max. backpressure (bar)	16	12	8	10	3	1.5
Max. capacity (l/h)	1.8	2.9	5.6	3.7	15.5	25.5
Capacity (ml/stroke)	0.17	0.27	0.53	0.34	1.43	2.36
At mean backpressure (bar)	8.0	6.0	4.0	5,0	1.5	1.0
Stroke rate (strokes/min)	180	180	180	180	180	180
Connection size 0 ø x i ø (mm)	6x4	6x4	6x4	8x5	8x5	12x9
Suction head (m water column)	6.0	6.0	3.0	6.0	6.0	1.5
Intake head (m water column)	1.8	2.5	2.8	2.0	1.8	1.5
Permissible admission pressure intake side (bar)	8.0	5.5	3.0	3.0	1.5	0.8

4 Installation Dimensions



CONb		A	B	C	D	E	F	G
1601, 1201	*PP*	225	180	11	70	6x4	88	38
1602, 1203	*NP*	223	173	13	70	6x4	88	38
0803, 0806	*PP*	225	180	11	70	6x4	88	38
	NP	223	173	13	70	6x4	88	38
1002, 1003	*PP*	218	180	11	70	8x5	83	50
	NP	216	181	5	85	8x5	83	50
0308, 0313	*PP*	218	180	11	70	8x5	82	50
	NP	216	181	5	85	8x5	82	50
0215, 0223	*PP*	218	191	0	90	12x9	83	66
	NP	216	189	–3	100	12x9	83	66

EC Declaration of Conformity

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

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.
Any modification to the product not approved by us will invalidate this declaration.

Product description:	**Metering pump, Series CONCEPT**
Product type:	**CONb.... ,**
Serial number:	**see type identification plate overleaf and on device**
Relevant EC regulations:	**EC-machine regulation (89/392/EEC) subsequently 93/44/EEC** **EC-low voltage regulation (73/23/EEC)** **EC-EMC-regulation 89/336/EEC subsequently 92/31/EEC**
Harmonised standards used, in particular:	**EN 292-1 , EN 292-2 , EN 809** **EN 60335-1 A6 , EN 60335-2-41** **EN 50081-1/2 , EN 50082-1/2 , EN 55014** **EN 60555-2 , EN 60555-3**
National standards and technical specifications used, in particular:	**DIN VDE 0700 T1** **DIN VDE 0700 T41** **DIN VDE 0700 T500** **CSA Standard C 22.2 No. 0-M 91 (115 V-Version)** **CSA Standard C 22.2 No. 108-M 89 (115 V-Version)**
Date/manufacturer's signature:	*28.03.1996* .....
The undersigned:	*Mister Manfred Hüholt, factury manager*

6 Safety Notes

ProMinent® metering pumps must not be assembled with parts which have not been tested and recommended by ProMinent otherwise this can lead to injury to persons and damage to property for which no liability will be accepted!

Pumps must be accessible at all times to facilitate operation and maintenance. Access points must not be obstructed or blocked!

When metering hazardous or unknown liquids, always wear safety clothing (safety goggles, gloves) when working on the liquid end!

Before carrying out any maintenance and repair work always drain off and flush out the liquid end first if hazardous or unknown metered media are used! Observe data sheets of metered liquids!

The metering pump can contain water residue in the liquid end as the result of testing at the factory! If handling media which must not come in contact with water, all traces of water must be removed from the liquid end before start-up! For this purpose, turn the pump through 180 ° and drain off the liquid end then flush with a suitable medium from above via the intake connection.

Always depressurize the delivery line first before carrying out any work on the pump! Always discharge and flush liquid end! Observe safety data sheets for metered liquid!

WARNING:
When operating the metering pump against a closed shut-off element on the delivery side, the resulting pressure buildup can reach a multiple of the maximum permissible backpressure!
This can cause the delivery line to burst!
To avoid this, it is advisable to install a ProMinent multifunction valve which limits the maximum pressure which can be reached!

The stroke length should only be set with the pump in operation – when the load on the metering stroke setting pin is relieved temporarily – only use the clamping rings and hose sockets intended for the relevant hose diameter as well as original hoses with the specified hose size and wall thicknesses otherwise the stability and durability of the connection will not be guaranteed!

Avoid reducing hose sizes!

The next higher line cross-section or a pulsation damper should be used for longer lines and high-viscosity media.

DANGER:

Only qualified electricians are permitted to carry out electrical repairs (safety regulations of Employer's Liability Insurance Association: VBG 4 and ZH 1/11)!

DANGER:

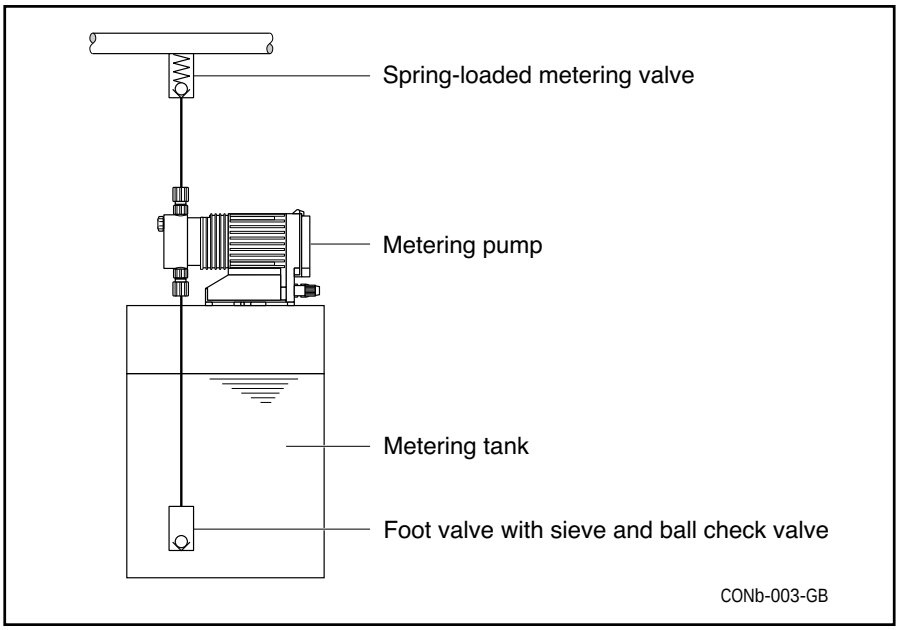
Disconnect power plug or power supply line before opening the pump! Isolate relay option if applicable! Check to ensure power is disconnected! Secure pump while carrying out repairs to ensure it cannot be switched on unintentionally!

WARNING:

Only specially trained and authorized personnel are permitted to carry out repairs on metering pumps!

7 Installation

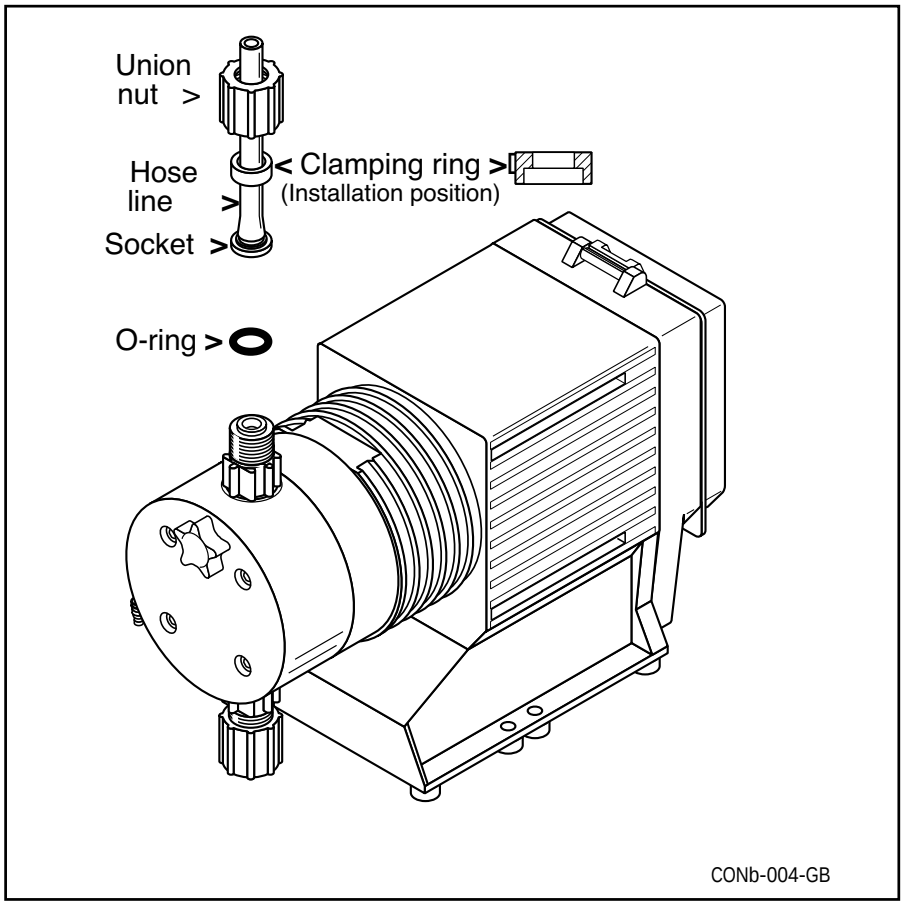
7.1 Pump Installation



- Mount metering pump on a tank or support bracket with bolts and U-washers (Ø 5 mm).
- To ensure efficient operation, the valves of the liquid end must always be positioned vertically.
- Shorten intake lines such that the foot valve hangs approx. 10 – 30 mm (approx. 50 mm for heavily soiled metering solutions) over the bottom of the tank.
- Install delivery line and metering valve, pressure retension valve for free outlet.

7.2 Hose Connections

- Fit union nut and clamping ring over hose line.
- Push the hose end, cut at right angles, onto socket as far as it will go.
- Slightly widen hose end if necessary.
- Shorten hose end at right angles by approx. 10 mm for connecting several times.
- Press on hose and firmly tighten union nut.



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7.3 Installation of Bypass Bleeder Line

Liquid end with bleeder valve

The bleeder valve **(10)** with bypass **(11)** is provided on the liquid end in the versions NP and PP up to Type 0417.

- Fit 4 mm inside Ø (max. 6 mm) hose on to bypass hose socket, preferably use 6 x 4 mm soft PVC.
- If PE lines are used, secure with a cable tie to prevent slipping.
- Insert free end of hose line in metering tank.
- Connect delivery line directly to delivery connection and metering valve.

7.4 Electrical Connections

7.4.1 Connection of Control Cable and Level Switch

- If applicable, connect level switch to connection socket **(5)** on the pump.
- If provided, connect contact/control cable or universal control cable to the pump connection socket **(6)**.

  2-core contact control cable

  If the 2-core contact control cable is connected, the pump is switched over to external mode by the pressures "1–4" in the clutch. In addition, the frequency selector switch **(1)** must be set to position "1" .

  4-core universal control cable

  If the 4-core universal control cable is used, the brown and black cores for changeover to external mode should be connected by wire jumpers. If necessary, the pump can be stopped potential-free in internal mode with the aid of this circuit or the frequency changeover (blue core).

7.4.2 Mains Power Connection

- Connect mains power plug in the socket provided

  ATTENTION:

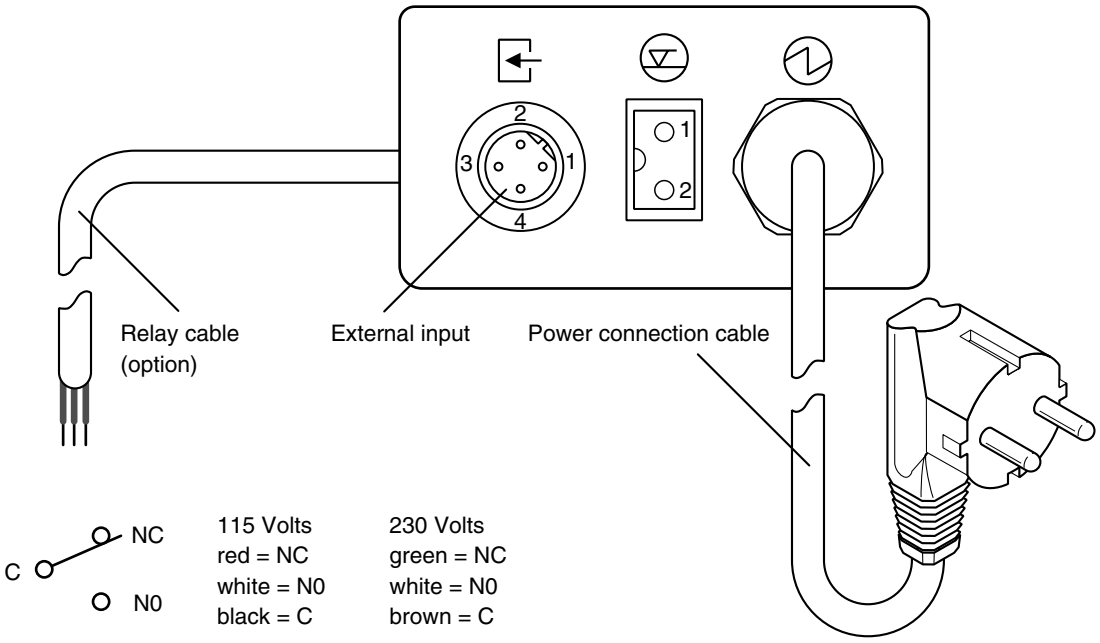
  Take particular care to ensure that the mains voltage agrees with ratings on the type identification plate. A separate switching contact, e.g. relay or contactor should be provided for parallel connection with inductive loads.

7.5 Start-Up

- In order to prime the metering pump, if necessary, remove external cable, set stroke length knob **(2)** to 100 % and stroke rate setting knob **(1)** to III.
- Open bleeder valve by approx. 1 turn.
- Allow pump to run until a little of the chemical is visible in the delivery line or emerges at the bleeder valve.
- On metering pumps without a bleeder valve, the delivery line must be released at the liquid end or a multifunction valve should be used.
- After priming, close bleeder valve **(10)** or resecure delivery line at metering valve.

7.6 Wiring Diagram

View of connector block on pump



115 Volts	230 Volts
red = NC	green = NC
white = N0	white = N0
black = C	brown = C

Socket assignments:

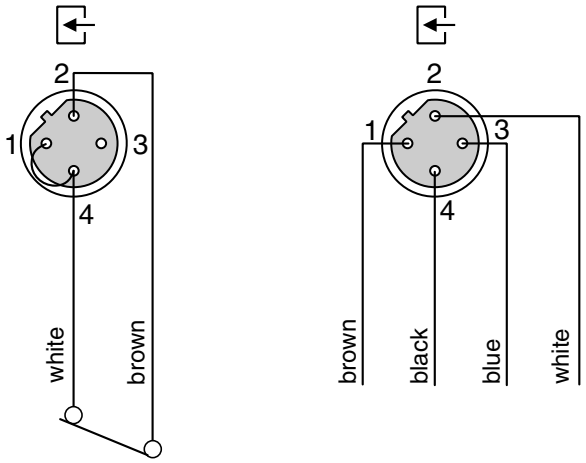
External activation :

1 = External switchover (+5 V)
2 = External contact (+5 V)
3 = Floating frequency switchover to F3
4 = GND

Level switch :

1 = End cutout (+5 V)
2 = GND

View of cable sockets on control cable (2-pin or 4-pin) or on level switch connection cable



External/contact cable:

Close contact -
metering stroke

Universal control cable:

External switchover: 1 brown + 4 black/GND
brown + black connected = Pump in external mode, brown + black open = Pump meters in internal mode

External/contact: 2 white + 4 black/GND
Close contact - metering stroke (1 and 4 connected by jumper)

Frequency changeover: 3 blue + 4 black/GND
Close contact - pump operates with F3

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7.7 Determining Delivery Capacity by Means of Diagrams

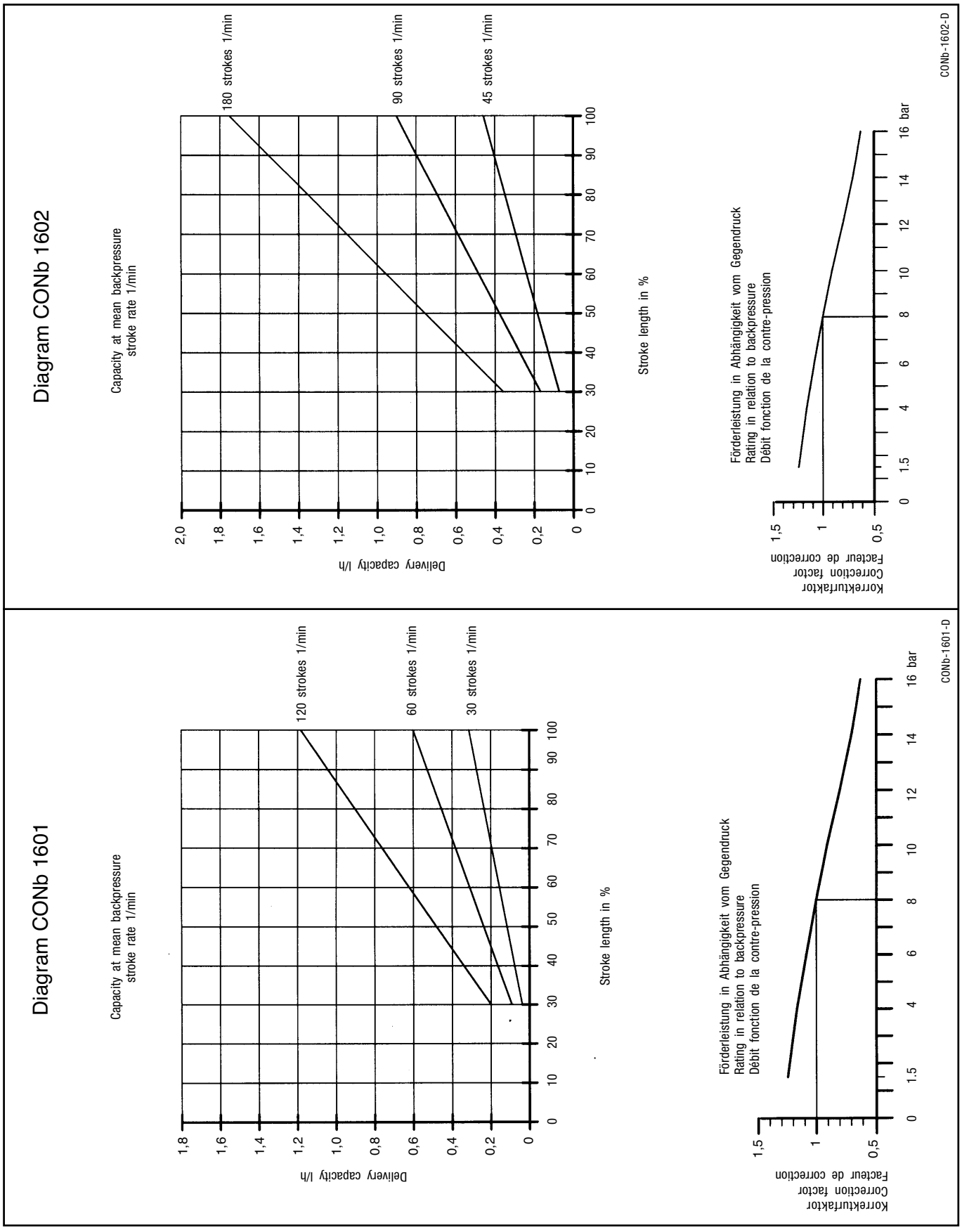
7.7.1 General

1. Determine required delivery capacity.
2. Determine correction factor in accordance with the diagram "Capacity as a Function of Backpressure".
3. Divide required delivery capacity by correction factor.
4. Find calculated value on the vertical scale in the diagram "Capacity at Mean Backpressure" and draw a horizontal line from this point over the entire diagram.
5. Draw a vertical line from the point of intersection with the frequency characteristic curve down to the stroke length scale. Read off the stroke length.
6. Set determined stroke length on the pump.
7. Set pump frequency rate on the pump as indicated at the point of intersection on the frequency curve.
8. If the horizontal line intersects two frequency characteristic curves starting from the capacity scale in the diagram "Capacity at Mean Backpressure", if there are no other compelling reasons, the lower frequency should be selected for the sake of metering accuracy.
9. The result obtained in this way is a reference value. To obtain accurate metering, the delivery capacity must be monitored and corrected if necessary.
10. Refer to Technical Data for metering accuracy.
11. The capacity data are referred to water, the correction factor was determined at a stroke length of 70 %.

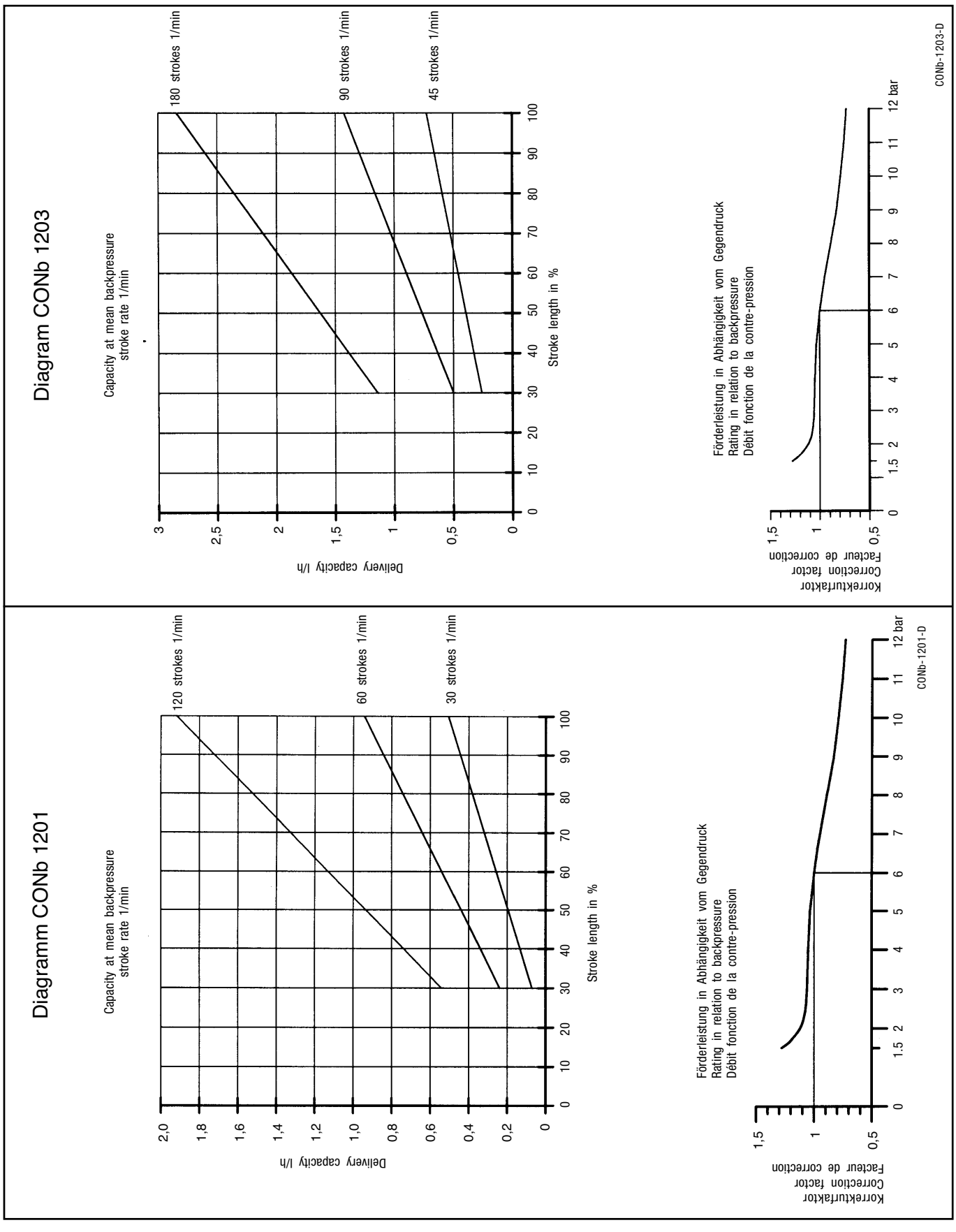
Example: Metering pump Type 1201

- Required metering capacity 0.7 l/h at 8 bar
- Correction factor at 8 bar in accordance with diagram = 0.85
  Delivery capacity for diagram = 0.7 l/h/0.85 = 0.82
- The horizontal line drawn at 0.82 l/h intersects two frequency characteristic curves. The frequency curve which results in the highest stroke length should be selected. Here in this example this is the frequency characteristic curve with 60 strokes/min. Set this frequency on the pump.
- The value obtained for the stroke length is 92 %.
- Diagrams for examples (refer to Pages 15 to 20).

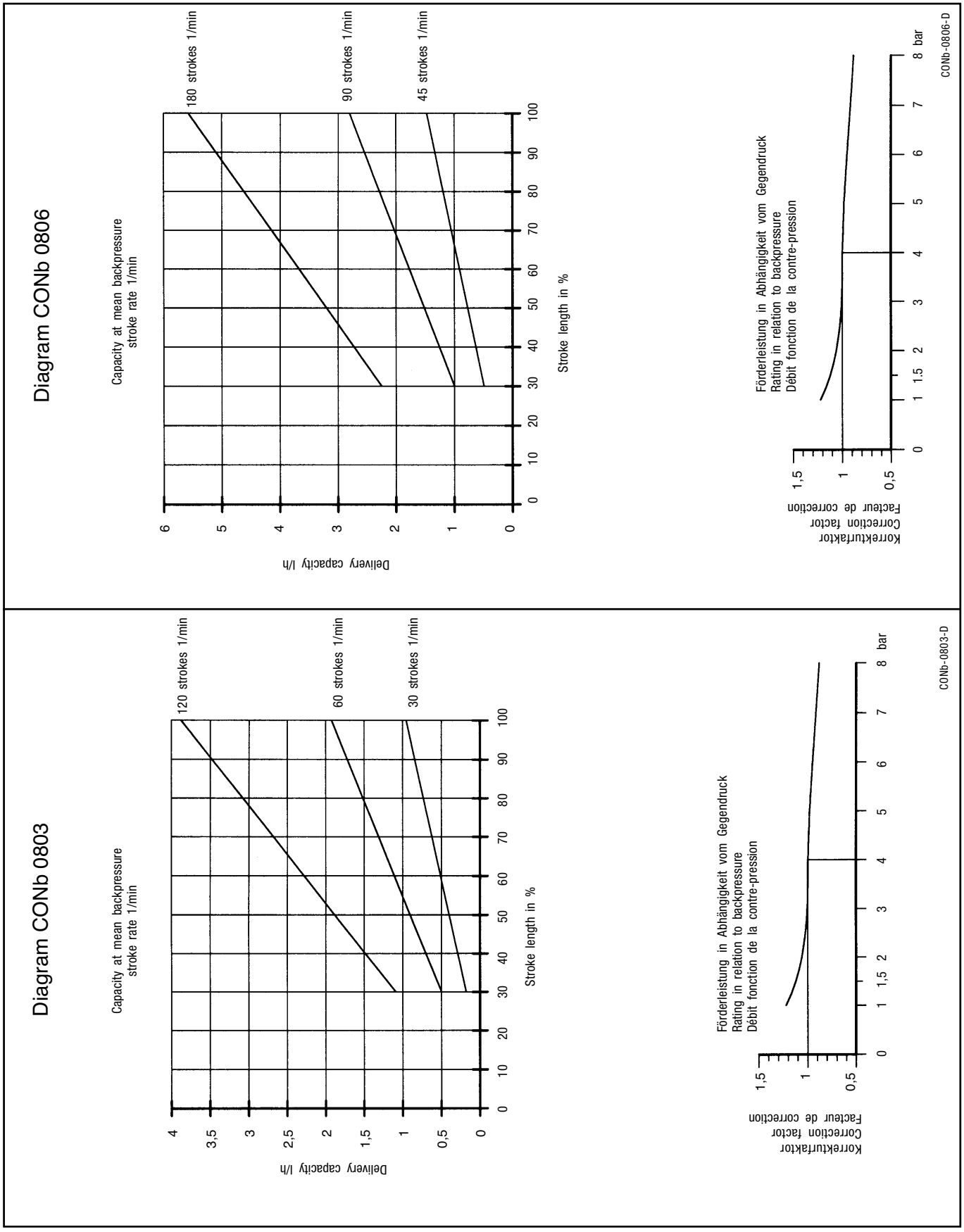
7.7.2 Diagram 1601, 1602



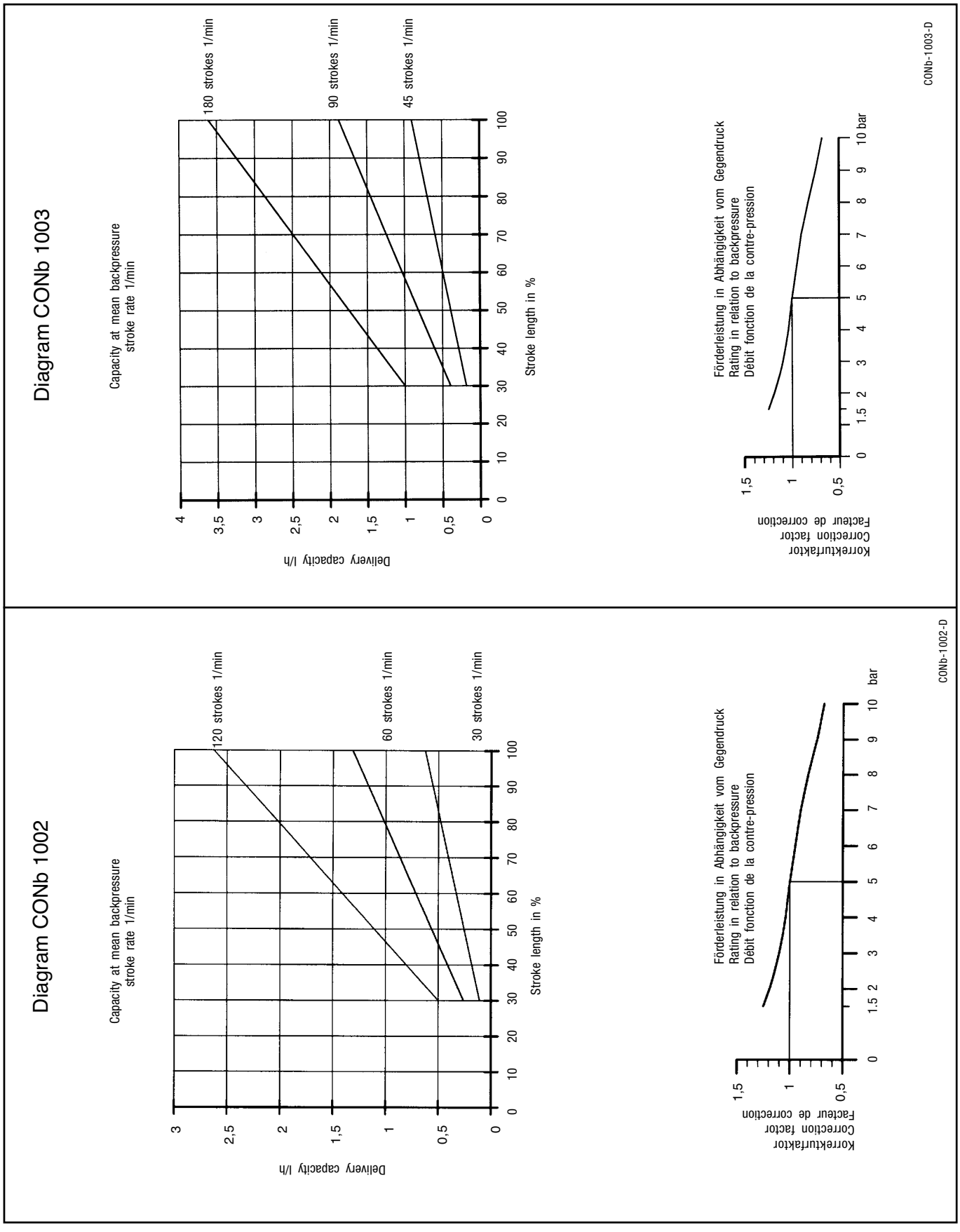
7.7.3 Diagram 1201, 1203



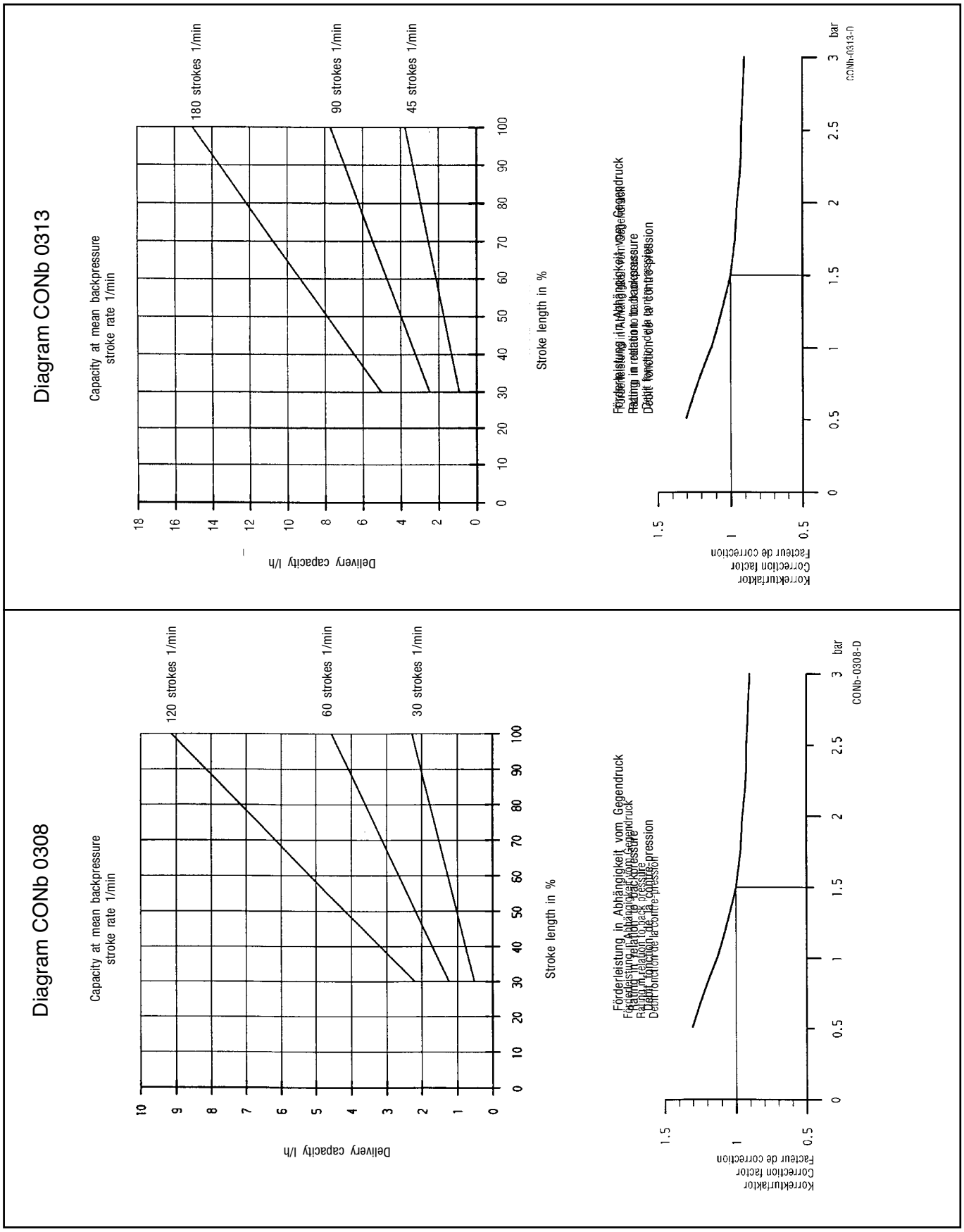
7.7.4 Diagram 0803, 0806



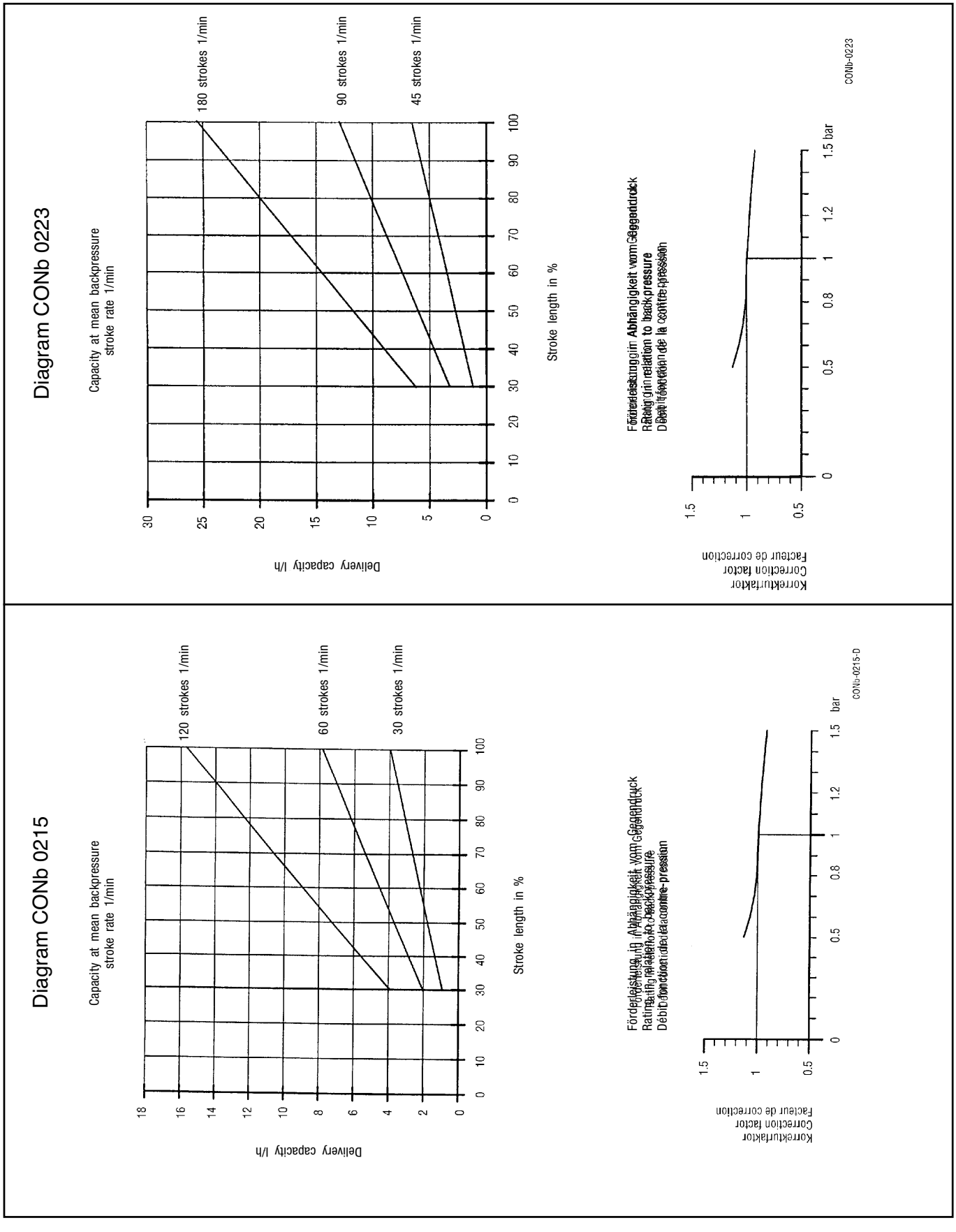
7.7.5 Diagram 1002, 1003



7.7.6 Diagram 0308, 0313



7.7.7 Diagram 0215, 0223



8 Operation and Setting

8.1 Stroke Length Setting

This setting is determined by means of a diagram (refer to Page 15 to 20) and set with the stroke length setting knob **(2)**.

8.2 Pump Frequencies (Rates)

The stroke rate is set by means of the frequency selector switch **(1)**:

Setting III corresponds to 100 %, setting II 50 % and setting I, depending on type of control, 25 % or 0 % stroke rate

Control type	III	II	I	External
0	120/180	60/90	30/45	–
1	120/180	60/90	0	+

8.3 What is the Result of Incorrect Operation?

The control cable must be disconnected when priming externally activated pumps. Overmetering may occur if this cable is not reconnected after priming. This could lead to serious damage in certain applications, e.g. disinfection of drinking water with chlorine bleaching agent.

The LED **(3)** lights orange if an illogical setting is made on the pump, e.g. external connector **(6)** is plugged in and switch **(1)** is set in position II or III.

9 Maintenance

Maintenance of the CONCEPT metering pump is restricted to checking

- the liquid end screws (firm fit)
- the delivery lines (firm fit)
- the head and intake valves (firm fit)
- the leakage hole at the end disc (moisture can indicate diaphragm failure)

10 Troubleshooting

Breakdown assistance
In order to be able to repair a small breakdown at any time, we recommend to always keep a spare parts kit in stock - consisting of diaphragm, valves, balls and seals. See Page 26 for order information.

No pump intake despite full stroke movement and venting
Possible cause:
Crystalline deposits caused by valves drying out

Remedy:
- Remove intake hose out of metering tank and thoroughly flush out liquid end
- If this provides no improvement, remove and clean valves
- The valve seat in the intake and head valve can be pressed out with a 3 mm ø drift.

Warning lamp (3) lights red
Possible cause:
Chemical deficiency

Remedy:
- The fault signal is acknowledged automatically by filling the supply tank

Warning lamp (3) lights orange
Possible cause:
- External cable connected and
  frequency selector switch not set to position I.

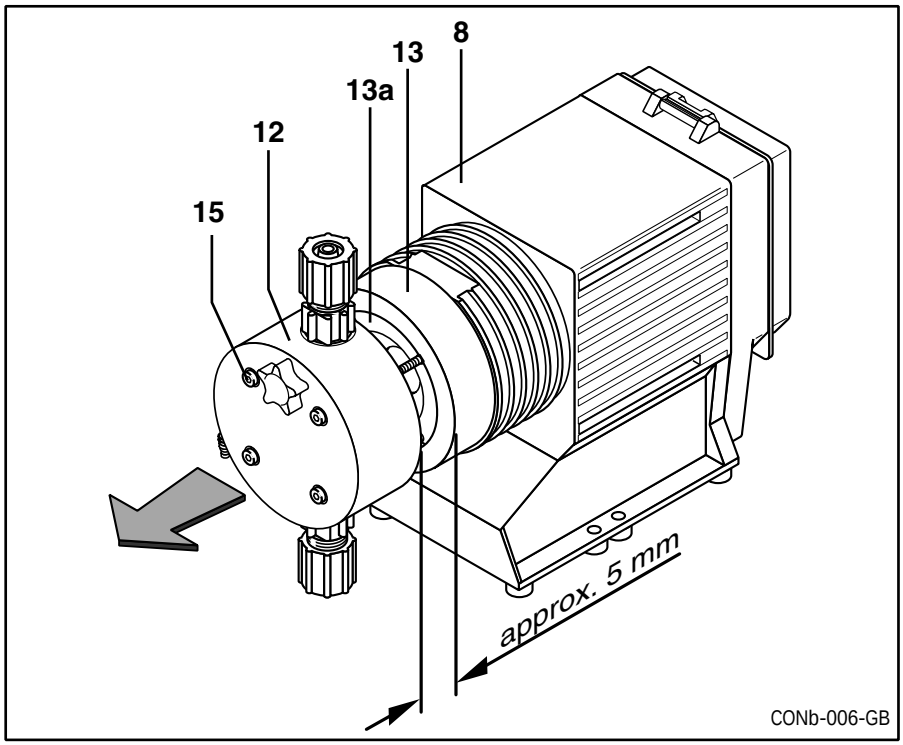
Remedy:
- If external mode is required, set frequency selector switch to position I.
- If internal mode is required, disconnect external control cable.

Liquid emerges at head end
Possible cause:
Delivery unit leaking at metering diaphragm

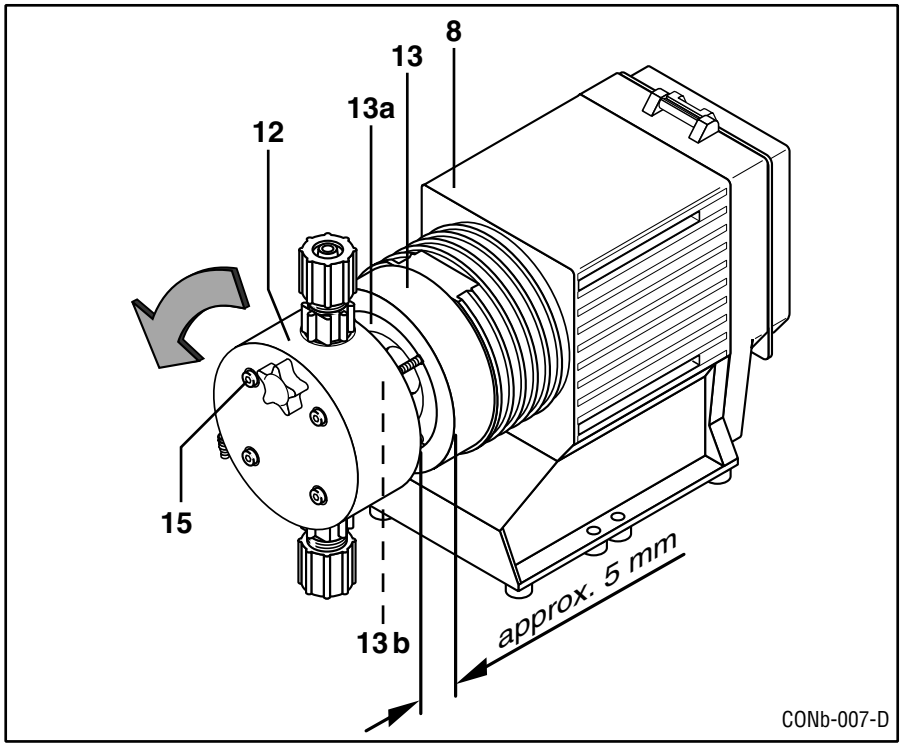
Remedy:
- Retighten screws in liquid end crosswise.
- If liquid still leaks out this indicates the diaphragm has failed and must be replaced.

Replacing metering diaphragm

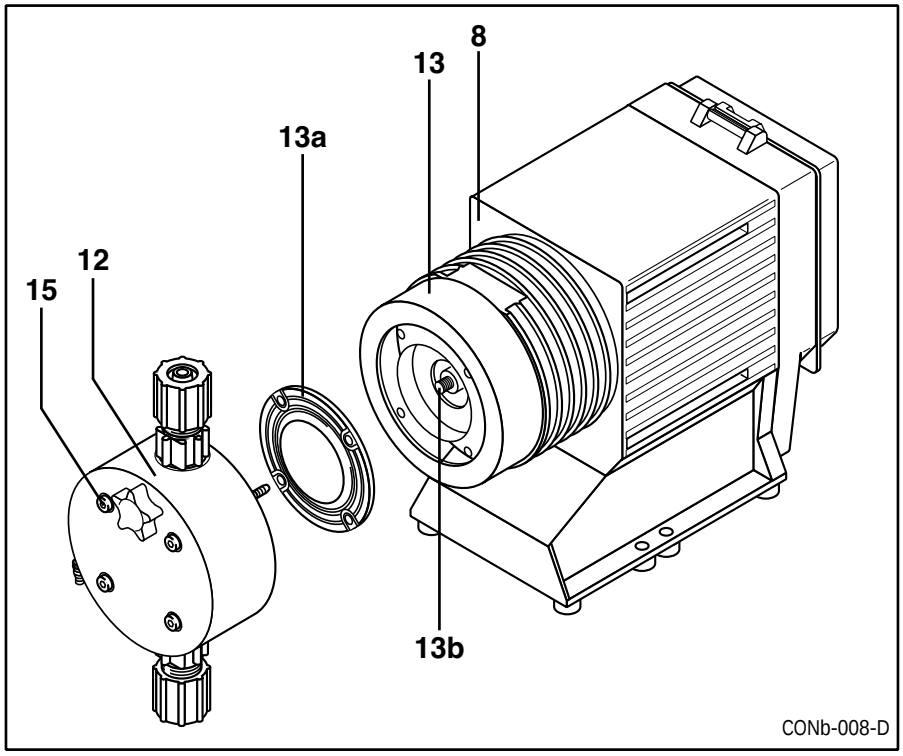
- With pump in operation, set stroke length to "0" with rotary knob **(2)**
- Release screws **(15)**



- Pull liquid end **(12)** together with screws out of end disc **(13)** and pump housing **(8)** (approx. 5 mm) until the screws no longer offer any resistance when turning the liquid end.
- Hold housing **(8)** in the left hand and release diaphragm **(13a)** with the right hand by lightly jolting liquid end **(12)** together with end disc **(13)** in counterclockwise direction and release screws **(15)** from drive spindle **(13b).**



- Now pull liquid end together with screws out of diaphragm and unscrew the entire assembly from the drive spindle.
- Remove diaphragm **(13a)** from end disc **(13**).



- Screw on new diaphragm **(13a)** as far as it will go on drive spindle **(13b)** and check thread movement.
- Once again remove diaphragm from drive spindle.
- Fit end disc on housing.
- Insert diaphragm in end disc and screw on by 2 thread turn

ATTENTION:

Turn diaphragm such that the 4 holes in the diaphragm and end disc are precisely aligned! The outlet in the end disc must face downward!

- Fit liquid end (intake connection must face downward!) with screws on to diaphragm and end disc (once again leave approx. 5 mm space between liquid end and end disc) such that the parts can still be turned.
- Now slowly turn parts in clockwise direction until diaphragm is firmly fitted (resistance of return spring can be felt)

ATTENTION:

Do not overturn diaphragm, particularly in Type 1601!

- Set stroke length to 100 % with rotary knob **(2)** and, with metering pump running, slowly turn the complete delivery unit in clockwise direction until the intake connection faces vertically downward.
- Stop pump.
- Tighten 4 screws **(15)** crosswise.

ATTENTION:

Observe screw tightening torques!

Tightening torque for screws
M4: **2.5 to 3 Nm**
M5: **4.5 to 5 Nm**

NOTE:

Check the tightening torque of the liquid end screws after 24 hours of operation!

Additionally check the tightening torques on PP pumps every 3 months!

- Set required stroke length with pump in operation.

11 Repair

Return the metering pump for repair only in a clean condition with the liquid end flushed clean.

Pumps which are used for metering radioactive media must not be shipped!

12 Spare Parts

In order to repair small breakdowns at any time we recommend to always keep a spare parts kit in stock. This kit contains the following wearing or spare parts:

1 Intake valve, complete
1 Head valve, complete
1 Set of seals
1 Metering diaphragm
1 Set of connection parts

Additionally for NS 3 (self-bleeding) version:

1 Bleeder valve, complete
1 Connection for delivery side or bypass

Spare parts kit for

Pump type:	Order number
1601/1602 PP1	74.03.61.1
1201/1203 PP1	74.03.80.1
0803/0806 PP1	74.03.84.3
1002/1003 PP1	74.03.88.4
0308/0313 PP1	74.04.97.3
0215/0223 PP1	74.04.99.9
1601/1602 NP6	74.05.51.7
1201/1203 NP6	74.05.52.5
0803/0806 NP6	74.05.53.3
1002/1003 NP6	74.05.54.1
0308/0313 NP6	74.05.55.8
0215/0223 NP6	74.05.56.6
1601/1602 NS3	79.20.33.3
1201/1203 NS3	79.20.34.1
0803/0806 NS3	79.20.35.8
1002/1003 NS3	79.20.36.6

Notes