

# SMART Digital S

DIGITAL DOSING up to 30 l/h

**DDA, DDC, DDE**

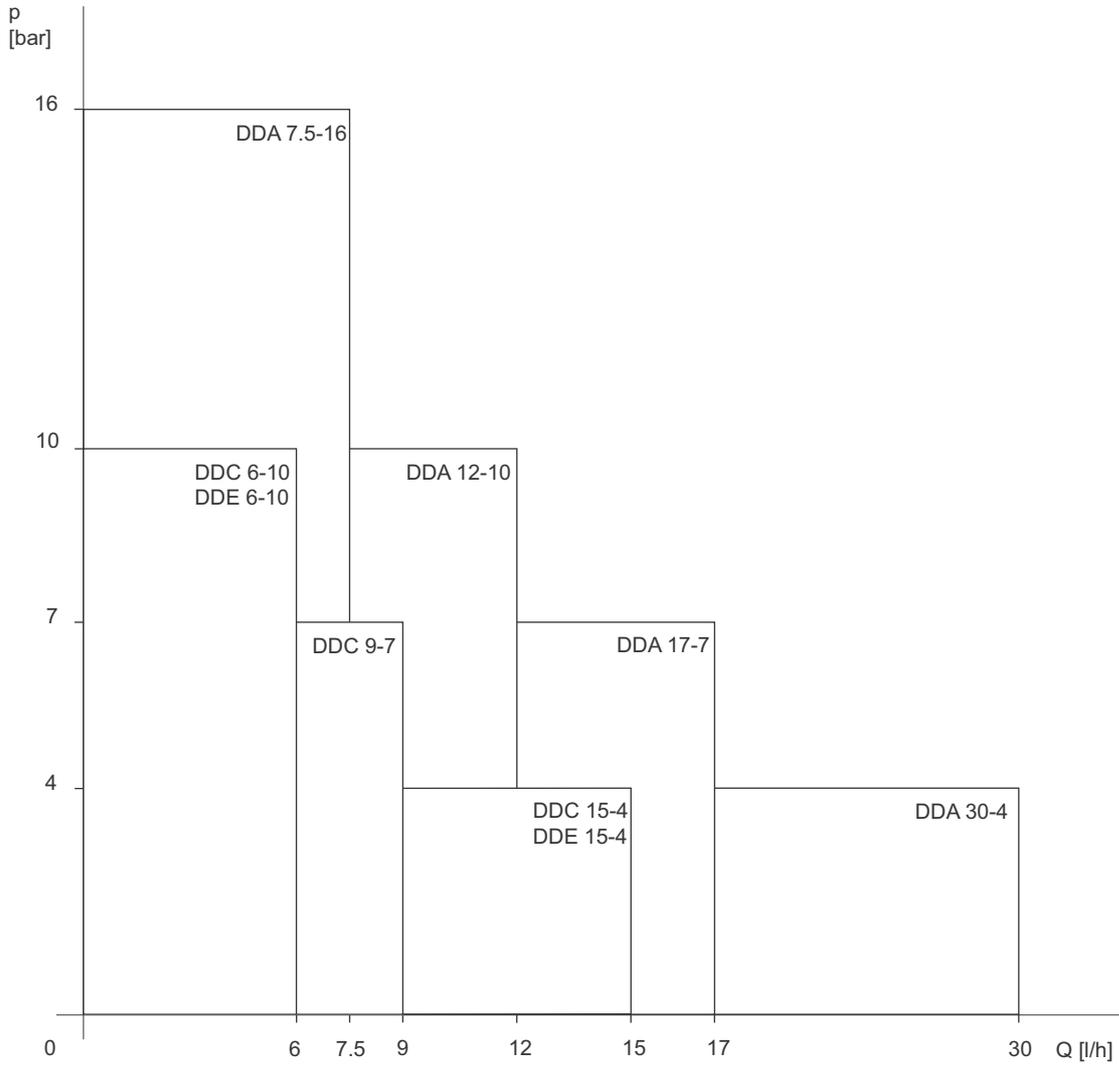
Pumps and accessories



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# 1. General data

## Performance range



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Fig. 1 Performance range

## Features at a glance



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Fig. 2 DDA, DDC, DDE

### Digital Dosing™

The SMART Digital S generation DDA, DDC and DDE with powerful variable-speed stepper motor brings state-of-the-art technology to perfection. Combined expert knowledge and the patented solutions set future standards. Traditional technologies such as stroke length or stroke frequency adjustment with synchronous motor or solenoid drive become a thing of the past.

#### Unique flexibility with only a few variants

The included click-stop mounting plate makes the pump more flexible. Three different positions are possible without using any additional accessories, such as wall brackets. Service and pump exchange can now be done easily and fast just by clicking the pump in and out of the mounting plate.

The control cube on the DDA and DDC pump can be lifted and turned easily into three different positions: front, left or right.



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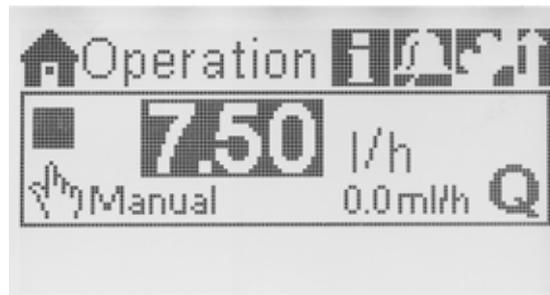
Fig. 3 Modularity of the control cube

A turn-down ratio of up to 1:3000, a wide supply voltage range (100-240 V; 50/60 Hz), combined connection sets and other features reduce the models and variants to a minimum.

#### Precise and easy setting / usability and interaction

The operator can easily install the pump and set it to discharge exactly the quantity of dosing liquid required for the application. In the display, the setting of the pump is read out directly, the flow is shown in ml/h, l/h, or gph.

The click wheel (turn-and-push knob) and the graphical LC display with plain-text menu in more than 25 languages make commissioning and operation intuitive. As the LCD is backlit in different colours, the pump status can be seen from a distance (traffic-light concept).



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Fig. 4 Display DDA, DDC

Thanks to a variety of operation modes, signal inputs and outputs, the pump can easily be integrated into every process.

#### Advanced process reliability

An intelligent drive and microprocessor control ensures that dosing is performed precisely and with low pulsation, even if the pump is dosing high-viscosity or degassing liquids. Malfunctions, caused e.g. by air bubbles, are detected quickly by the maintenance-free FlowControl system and then displayed in the alarm menu.

The AutoFlowAdapt function automatically adjusts the pump according to the process conditions, e.g. varying backpressure. The integrated flow measurement makes additional monitoring and control equipment redundant.

#### Designed to save costs

In general, the investment for a dosing pump installation is low compared to its life cycle costs including the cost of the chemicals. The following features make the SMART Digital S DDA, DDC and DDE pumps contribute to low life cycle costs:

- No underdosing or overdosing due to high dosing accuracy and FlowControl
- Longer maintenance intervals thanks to the universal chemical resistance of the full-PTFE diaphragm
- Reduced energy consumption thanks to state-of-the-art drive technology.

**Three application-oriented type ranges**

DDA: High-end pump range for extended flow and pressure ranges with sensor-based FlowControl and measurement functions for challenging industrial applications, e.g.

- Process water
- Food and beverage
- Ultrafiltration and reverse osmosis
- Pulp and paper
- Boiler feed water
- CIP (Cleaning-In-Place).

DDC: User-friendly pump range with standard inputs and outputs for common applications, e.g.

- Drinking water
- Waste water
- Swimming pool water
- Cooling tower
- Chemical industry.

DDE: Low-budget pump range with basic functions including manual operation or control via PLC for OEM applications, e.g.

- Car wash
- Irrigation.

## 2. Identification

### Type key

Example: DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G

#### Type range

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G  
 DDA  
 DDC  
 DDE

#### Max. flow [l/h]

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G

#### Maximum pressure [bar]

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G

#### Control variant

DDA 7.5-16 **AR**-PP/V/C-F-3 1 U2U2 F G  
 B Basic (DDE)  
 P B with pulse mode (DDE)  
 PR P with relay output (DDE)  
 A Standard (DDC)  
 AR A with alarm relay and analog input (DDA, DDC)  
 FC AR with FlowControl (DDA)  
 FCM FC with flow measurement (DDA)

#### Dosing head variant

DDA 7.5-16 AR-**PP**-V/C-F-3 1 U2U2 F G  
 PP Polypropylene  
 PVC Polyvinyl chloride\*\*  
 PV PVDF (polyvinylidene fluoride)  
 SS Stainless steel 1.4401

#### Gasket material

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G  
 E EPDM  
 V FKM  
 T PTFE

#### Valve ball material

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G  
 C Ceramic  
 SS Stainless steel 1.4401

#### Control cube position

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G  
 F Front-mounted (change to left and right possible)  
 X No control cube (DDE)

#### Supply voltage

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G  
 3 1 x 100-240 V, 50/60 Hz

#### Valve type

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F G  
 1 Standard  
 2 Spring-loaded  
 0.1 bar suction opening pressure  
 0.1 bar discharge opening pressure

#### Connection, suction/discharge

DDA 7.5-16 AR-PP/V/C-F-3 1 **U2U2** F G  
 U2U2 Union nut G 5/8" with parts for hose connection 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm  
 U7U7 Union nut G 5/8" with parts for hose connection 0.17" x 1/4"; 1/4" x 3/8"; 3/8" x 1/2"  
 AA Union nut G 5/8" with threaded connection Rp 1/4", internal thread  
 VV Union nut G 5/8" with threaded connection 1/4" NPT, internal thread  
 XX No connections included

I001\* Hose 4/6 mm (up to 7.5 l/h, 13 bar)  
 I002\* Hose 9/12 mm (up to 60 l/h, 9 bar)  
 I003\* Hose 0.17" x 1/4" (up to 7.5 l/h, 13 bar)  
 I004\* Hose 3/8" x 1/2" (up to 60 l/h, 10 bar)

#### Mains plug

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 **F** G  
 F EU  
 B USA, Canada  
 G UK  
 I Australia, New Zealand  
 E Switzerland  
 J Japan  
 L Argentina

#### Design/approval

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 **F G**  
 G Grundfos red  
 A Grundfos green  
 B Grundfos black  
 X Neutral/black  
 C China approval

#### Special variant

DDA 7.5-16 AR-PP/V/C-F-3 1 U2U2 F **GC3**  
 C3 Inspection Certificate 3.1 (EN 10204)

\* Installation set: Including 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm)

\*\* PVC dosing heads only up to 10 bar

### 3. Functions

#### Overview of functions

Control variant:	DDA			DDC		DDE		
	FCM	FC	AR	AR	A	PR	P	B
<b>General</b>								
Digital Dosing: Internal stroke speed and frequency control	•	•	•	•	•	•	•	•
Mounting plate (basic/wall mounting)	•	•	•	•	•	•	•	•
<b>Control panel, see page 9</b>								
Control cube mountable in three positions: front, left, right	•	•	•	•	•			
Control panel position: front-fitted						•	•	•
Transparent protective cover for control elements	•	•	•	•	•			
Capacity setting in millilitres, litres or US-gallons	•	•	•	•	•			
Graphical display with background light in four colours for status indication: white, green, yellow, red	•	•	•	•	•			
Plain-text menu in different languages	•	•	•	•	•			
Turn-and-push knob (click wheel) for easy navigation	•	•	•	•	•			
Capacity adjustment knob (0.1 - 100 %)						•	•	•
Start/Stop key	•	•	•	•	•			
100 % key (deaeration)	•	•	•	•	•	•	•	
Operation mode switch (manual/pulse)						•	•	
<b>Operation modes, see page 11</b>								
Manual speed control	•	•	•	•	•	•	•	•
Pulse control in ml/pulse	•	•	•	•	•			
Pulse control (1:n)						•	•	
Analog control 0/4-20 mA	•	•	•	•	•			
Batch control (pulse-based)	•	•	•					
Dosing timer cycle	•	•	•					
Dosing timer week	•	•	•					
Fieldbus control	•	•	•					
<b>Functions, see page 13</b>								
Auto deaeration also during pump standby	•	•	•					
FlowControl system with selective fault diagnosis	•	•						
Pressure monitoring (min/max)	•	•						
Flow measurement	•							
AutoFlowAdapt	•							
SlowMode (anti-cavitation)	•	•	•	•	•			
Calibration mode	•	•	•	•	•			
Scaling of analog input	•	•	•					
Service information display	•	•	•	•	•			
Relay setting: alarm, warning, stroke signal, pump dosing, pulse input*	•	•	•	•		•		
Relay setting (additionally): timer cycle, timer week	•	•	•					
<b>Inputs/outputs, see page 14</b>								
Input for external stop	•	•	•	•	•	•	•	
Input for pulse control	•	•	•	•	•	•	•	
Input for analog 0/4-20 mA control	•	•	•	•				
Input for low-level signal	•	•	•	•	•	•	•	
Input for empty tank signal	•	•	•	•	•	•	•	
Output relay (2 relays)	•	•	•	•		•		
Output analog 0/4-20 mA	•	•	•					
Input/Output for GENIbus	•	•	•					
Input/Output for E-box (e.g. E-box 150 with Profibus DP)	•	•	•					

\* DDE-PR: relay 1: alarm; relay 2: low-level signal, stroke signal, pulse input

## Functional description

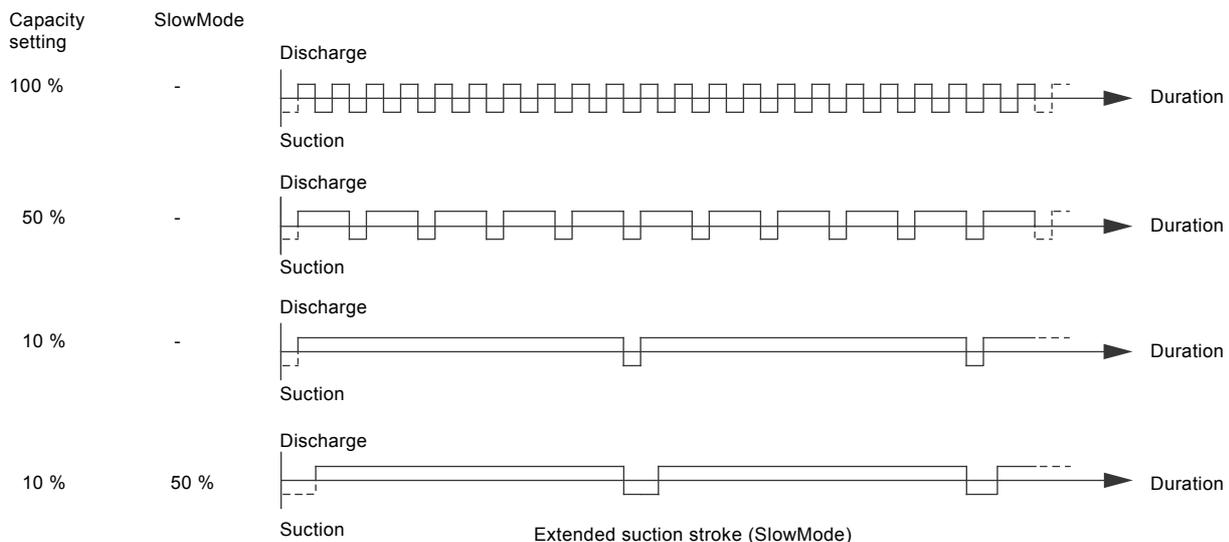
The electronically controlled variable-speed motor (stepper motor) of the DDA, DDC and DDE pumps provides optimum control of the stroke speed.

The duration of each discharge stroke varies according to the capacity set, resulting in optimum discharge flow in any operating situation, while the duration of each suction stroke is constant (see figure below).

The advantages are as follows:

- The pump always operates at full stroke length, irrespective of the capacity set; this ensures optimum accuracy, priming and suction.
- A capacity range of up to 1:3000 (turn-down ratio) reduces variants and spare parts.
- Smooth and continuous dosing ensuring an optimum mixing ratio at the injection point without needing static mixers.
- Significant reduction of pressure peaks, preventing mechanical stress on wearing parts such as diaphragm, tubes, connections, resulting in extended maintenance intervals.
- The installation is less affected by long suction and discharge lines.
- Easier dosing of high-viscosity and degassing liquids (SlowMode).

The optimum dosing control shown below takes place in any operation mode.



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**Fig. 5** Relation between stroke-frequency adjustment and capacity

### Control cube DDA and DDC

DDA and DDC pumps are supplied with front-mounted control cube. The position of the control cube can easily be changed by unfastening 2 screws, lifting the cube, turning it to the left or to the right and fastening both screws again.

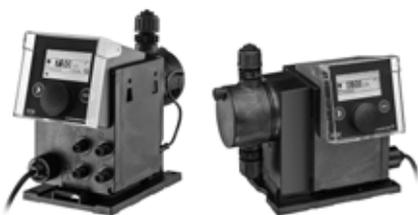


Fig. 6 Two of three possible control cube positions

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### Operating elements DDA and DDC

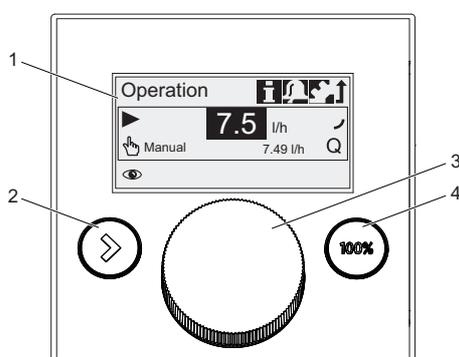


Fig. 7 Operating elements DDA and DDC

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Pos.	Description
1	Graphical LC display
2	[Start/Stop] key
3	Click wheel
4	[100%] key

The click wheel guides the user quickly and easily through the plain-text menu.

If the maximum capacity is required over a short period of time, for example during start-up, press the 100 % key. To set the pump to run for a specific number of seconds at maximum capacity, press the 100 % key and turn the click wheel clockwise simultaneously.

### Operating elements DDE

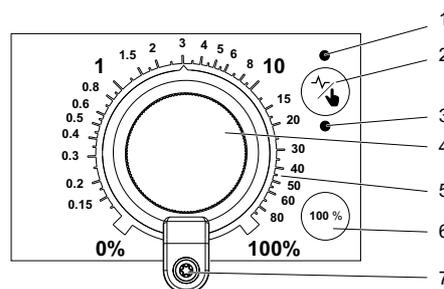


Fig. 8 Operating elements DDE

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Pos.	Description
1	Status LED pulse (DDE-PR and DDE-P)
2	Operation mode switch (DDE-PR and DDE-P)
3	Status LED manual
4	Capacity adjustment knob
5	Logarithmic scale
6	100 % key (DDE-PR and DDE-P)
7	Mechanical lock

With the capacity adjustment knob the capacity of the pump can easily be adjusted in % of the maximum flow.

*Applies to DDE-PR, DDE-P*

When holding down the operation mode switch, the pump changes from manual operation to pulse mode or vice versa.

If the maximum capacity is required over a short period of time, for example during start-up, press the 100 % key.

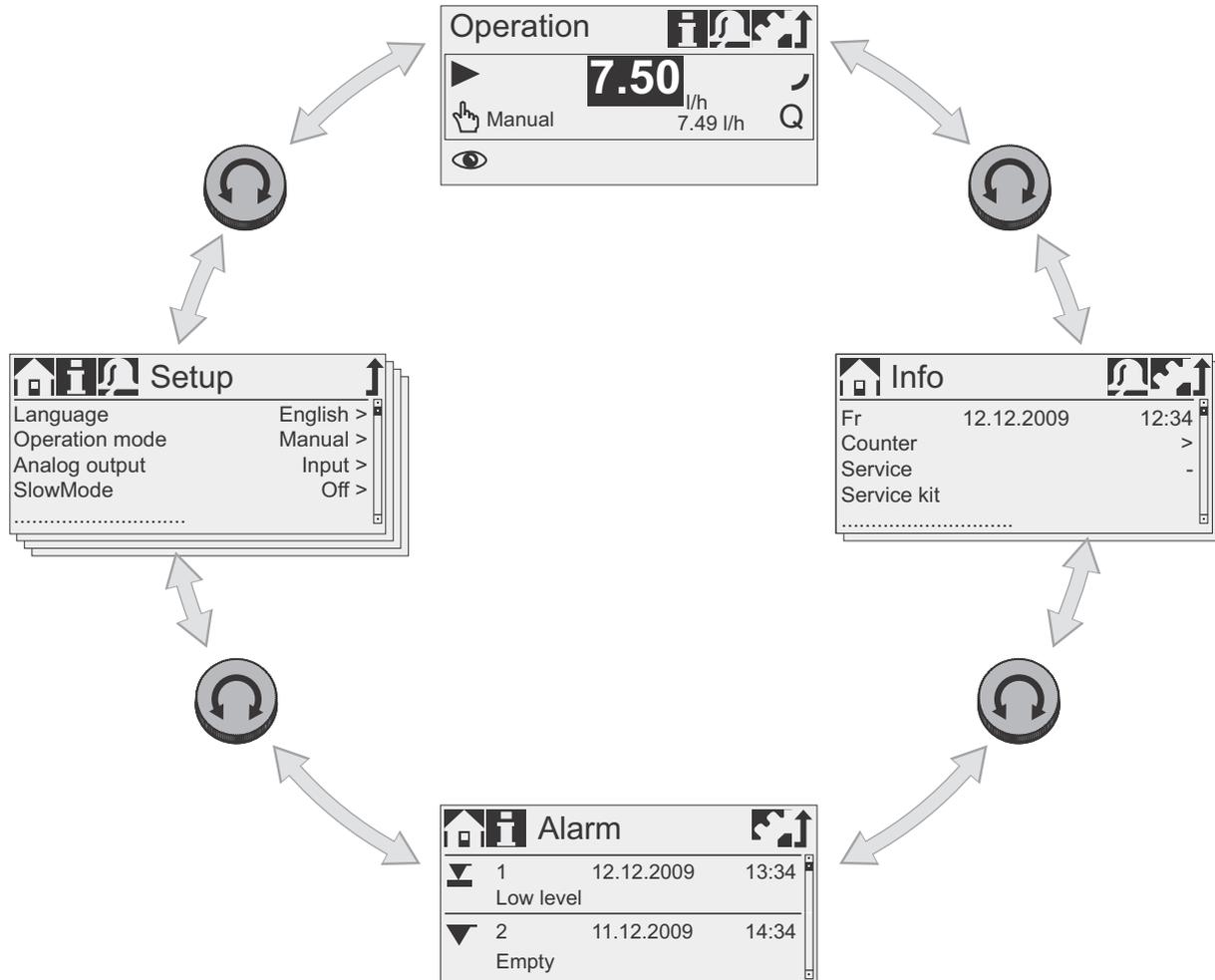
Depending on the selected operation mode, the respective status LED (pulse or manual) is activated according to the following table:

LED colour	Pump status
Green (flashing)	Stopped
Green	Running
Red-green (flashing)	External stop
Yellow	Low level (warning)
Red	Empty tank (alarm)
Red (flashing)	Motor blocked (alarm)

## Menu

The DDA and DDC dosing pumps feature a user-friendly plain-text menu. The menu consists of 4 tabs: Operation; Info; Alarm; Setup. During initial start-up, all menu text appears in the English language. The menu can be set to display other languages.

This example applies to DDA pumps:



**Fig. 9** Menu overview (example of main menus)

The menu text appears in more than 25 languages on a big graphical display, backlit in four different colours according to the traffic light concept.

Display	Fault	Pump status		
White	-	Stop ■	Standby	
Green	-			Running ►
Yellow	Warning	Stop ■	Standby	Running ►
Red	Alarm	Stop ■	Standby	

## Operation modes

### Manual control

The pump ensures constant dosing according to the quantity set in l/h or ml/h or gph by means of the click wheel. The pump automatically changes between the measuring units.

#### Setting range

Pump type	Setting range*	
	From [l/h]	To [l/h]
DDA 7.5-16	0.0025	7.5
DDA 12-10	0.0120	12.0
DDA 17-7	0.0170	17.0
DDA 30-4	0.0300	30.0
DDC 6-10	0.0060	6.0
DDC 9-7	0.0090	9.0
DDC 15-4	0.0150	15.0
DDE 6-10	0.0060	6.0
DDE 15-4	0.0150	15.0

\* When the SlowMode function is enabled the max. flow is reduced (see page 13)

### Pulse control

The pump doses in proportion to an external potential-free pulse signal, for example from a water meter. There is no direct relation between pulses and dosing strokes. The pump automatically calculates its optimal speed to ensure that the required quantity is dosed for each incoming pulse.

Applies to DDA and DDC

The quantity to be dosed is set in ml/pulse. The pump adjusts its speed according to two factors:

- the frequency of external pulses
- the set quantity per pulse.

#### Setting range

Pump type	Setting range [ml/pulse]
DDA 7.5-16	0.0015 - 14.9
DDA 12-10	0.0029 - 29.0
DDA 17-7	0.0031 - 31.0
DDA 30-4	0.0062 - 62.0
DDC 6-10	0.0016 - 16.2
DDC 9-7	0.0017 - 16.8
DDC 15-4	0.0032 - 31.6

The frequency of external pulses is multiplied by the set quantity. If the product exceeds the maximum flow of the pump, a maximum of 65,000 pulses can be stored for later processing with the Memory pulse function, when activated.

Applies to DDE-PR, DDE-P control variant

The dosing quantity per pulse is adjusted with the adjustment knob according to the scale from 0.1 to 100 % of the stroke volume. The pump adjusts its speed according to two factors:

- the frequency of external pulses
- the set percentage of stroke volume.

#### Setting range, DDE-PR, DDE-P

Pump type	Setting range [ml/pulse]
DDE 6-10	0.0008 - 0.81
DDE 15-4	0.0016 - 1.58

### Analog 0/4-20 mA control

Applies to DDA and DDC-AR control variant

The pump ensures dosing according to an external analog signal. The dosed capacity is proportional to the input value in mA.

Operation mode	Input signal	Dosing capacity
4-20	≤ 4.1 mA	0 %
	≥ 19.8 mA	100 %
0-20	≤ 0.1 mA	0 %
	≥ 19.8 mA	100 %

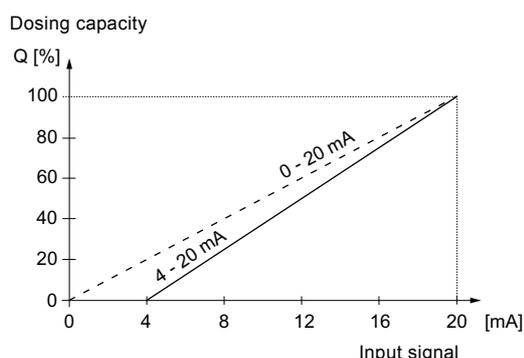


Fig. 10 0/4-20 mA control

Applies to DDA

With the analog scaling function, the curve can be individually drawn between two arbitrary points:  $I_1/Q_1$  and  $I_2/Q_2$ .

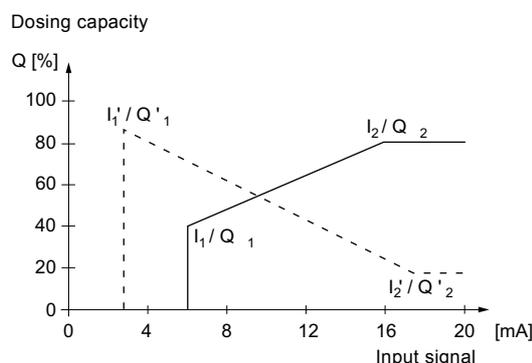


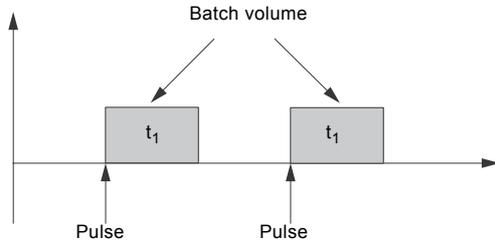
Fig. 11 Analog scaling

### Pulse-based batch control



Applies to DDA

The set quantity is dosed in batches within the set dosing time ( $t_1$ ). A batch is dosed every time the pump receives an external pulse. If the pump receives new pulses before a batch is completed, these pulses will be ignored. In the event of interrupts such as external stop or alarm, incoming pulses will also be ignored. After ending of the interrupts, a new batch will be dosed with the next incoming pulse.



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Fig. 12 Pulse-based batch control

#### Setting range

Pump type	Setting range		
	From [ml/batch]	To [l/batch]	Resolution [ml]*
DDA 7.5-16	0.74	999	0.09
DDA 12-10	1.45	999	0.18
DDA 17-7	1.55	999	0.19
DDA 30-4	3.10	999	0.39

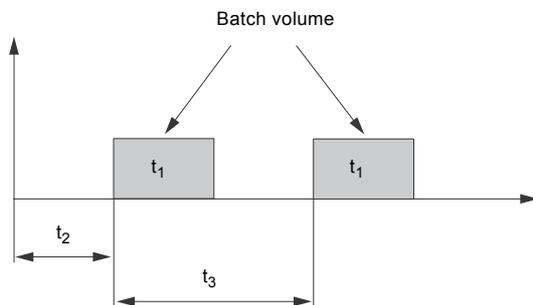
\* Due to the digital motor control, down to 1/8 of the dosing volume can be dosed.

### Dosing timer cycle



Applies to DDA

After a start delay ( $t_2$ ) the set batch volume is repeatedly dosed in the set cycle time ( $t_3$ ). The dosing time ( $t_1$ ) can be adjusted. Batch dosing is stopped during any interrupt, e.g. power supply failure or external stop while the time continues running in the background (real-time clock). After ending of the interrupt, batch dosing proceeds according to the current status in the timeline.



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Fig. 13 Dosing timer cycle

#### Setting range

The batch volume setting range corresponds to the pulse-based batch control setting range.

### Dosing timer week

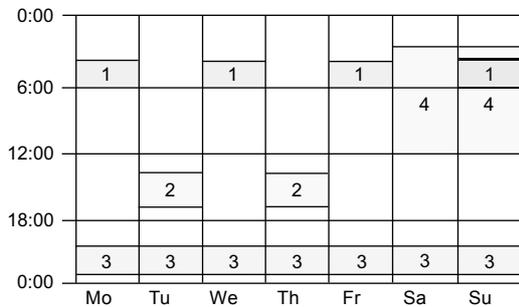


Applies to DDA

The integrated real-time clock features also batch dosing based on a weekly period. There is a maximum of 16 procedures per week. Each dosing procedure consists of:

- Batch volume
- Dosing time
- Start time
- 1 to 7 weekdays (Monday to Sunday).

In case several procedures are overlapping, the procedure with the highest flow rate has the highest priority. Batch dosing is stopped during any interrupt, e.g. power supply failure or external stop, while the time continues running in the background (real-time clock). After ending of the interrupt, batch dosing proceeds according to the current status in the timeline.



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Fig. 14 Dosing timer week (example with 4 procedures)

#### Setting range

The batch volume setting range corresponds to the pulse-based batch control setting range.

## Functions

### SlowMode



Applies to DDA, DDC

When the SlowMode function (anti-cavitation) is selected, the pump extends and smooths its suction stroke. This results in a softer suction stroke.

The SlowMode function is used in these situations:

- when pumping high-viscosity liquids
- when pumping degassing liquids
- when the suction line is long
- when the suction lift is high.

Depending on the application, the motor speed during the suction stroke can be reduced individually to approximately 50 % or 25 % of the normal motor speed.

The maximum pump capacity is reduced accordingly. See pages 25 and 26 for further details.

### Auto deaeration



Applies to DDA

The auto deaeration function avoids breakdown of the dosing process due to air-locking, when dosing degassing liquids such as sodium hypochlorite. During long dosing breaks, e.g. at the weekend or overnight, air-bubbles can form in the suction line and get into the dosing head. If too much air is in the dosing head, and the dosing process is started again, no liquid will be dosed (air-lock). Software-controlled diaphragm movements at regular intervals encourage the air bubbles to rise and finally to be displaced out of the dosing head.

These movements are executed

- when the pump is not stopped and
- during dosing breaks (e.g. external stop or no incoming pulses).

### Calibration

Applies to DDA and DDC

The pump is calibrated in the factory at the nominal pressure of the respective pump type (see maximum pressure Technical data page 25, 26). After start-up, the dosing pump can be calibrated for the actual installation to ensure that the displayed value (ml, l or gph) is correct. A calibration program in the setup menu facilitates this process. The AutoFlowAdapt function keeps the dosing precision (DDA-FCM control variant), even if the backpressure changes.

For the description of the AutoFlowAdapt function, see page 18.

### External stop



Applies to DDA, DDC, DDE-PR, DDE-P

With the external stop function, the pump can be stopped from a remote place via an external contact. It is not recommended to switch on and off the power supply as it was usual when working with a conventional dosing pump. When working with microprocessor-controlled digital dosing pumps, the external stop signal has to be used, in order to keep the optimal dosing precision and to prevent damages to the electronics.

When activating the external stop signal, the pump changes from running ► to standby ||. The operation display shows an activated external stop ► ||.

The signal input can be set to normally open (default) or normally closed contact.

### Counters

Applies to DDA and DDC

The pump displays resettable and non-resettable counters in the info menu tab.

Counter	Description	Resettable
Volume	Accumulated dosed quantity in litres or US gallons	Yes
Operating hours	Accumulated number of operating hours (power-on)	No
Motor runtime	Accumulated number of motor runtime hours	No
Strokes	Accumulated number of dosing strokes	No
Power on/off	Accumulated number of times the mains supply has been switched on	No

## Service display



Applies to DDA, DDC

Due to the optimised construction and the smooth digital dosing principle, the service periods are more than twice as long, if compared to conventional pumps. However, the wear parts have to be exchanged in regular intervals in order to keep the dosing precision and the process reliability at a high level. The service display in the pump shows when service of the wear parts is required. The displayed service kit product number makes service more convenient. The following information is displayed in the Info display:

Display	Description	
Service	- Soon Now	No service required Order parts for service soon Service must be performed now
Service kit	8-digit Grundfos product number	The service kit contains all parts needed for standard maintenance: diaphragm + valves
Reset service system		After performing the service, reset the system

The following service messages appear, depending on what happens first:

Display	Motor runtime [h]	Regular intervals [months]*
Service soon	7,500	23
Service now	8,000	24

\* Applies to DDA only

In case of difficult liquids the service intervals can be shorter and service has to be performed earlier.

## Level control



Applies to DDA, DDC, DDE-PR and DDE-P

The pump can be connected to a dual level control unit for monitoring of the chemical level in the tank. The pump can react to two level signals:

Level sensors	Pump reaction*	
	DDA, DDC	DDE-PR, DDE-P
Low-level signal	<ul style="list-style-type: none"> <li>Display is yellow (Warning)</li> <li> is flashing</li> <li>Pump continues running</li> </ul>	<ul style="list-style-type: none"> <li>LED lights up in yellow</li> <li>Pump continues running</li> </ul>
Empty tank signal	<ul style="list-style-type: none"> <li>Display is red (Alarm)</li> <li> is flashing</li> <li>Pump stops</li> </ul>	<ul style="list-style-type: none"> <li>LED lights up in red</li> <li>Pump stops</li> </ul>

\* Depending on the pump model and settings, the relay outputs can be activated (see [Relay output](#), page 14)

## Relay output

Applies to DDA, DDC-AR and DDE-PR

The pump can activate 2 external signals by means of built-in relays switched via internal potential-free contacts. Depending on the process control requirements, the following relay output settings can be chosen:

Applies to DDA and DDC-AR

Signal		Description
Relay 1	Relay 2	
Alarm*	Alarm	Display red, pump stopped (e.g. empty tank signal, etc.)
Warning*	Warning	Display yellow, pump running (low level signal, etc.)
Stroke signal	Stroke signal	Every completed stroke
Pump dosing	Pump dosing*	Pump is running and dosing
Pulse input	Pulse input	Every pulse coming in from pulse input
Bus control	Bus control	Set by a command in the Bus communication function (page 15) (only DDA)
	Timer cycle	Timer can be set in menu: on-time, cycle-time, start delay (only DDA)
	Timer week	Timer can be set in menu: procedure, on-time, start time and weekdays (only DDA)
Contact type		
NO*	NO*	Normally Open Contact
NC	NC	Normally Closed Contact

\* default setting

Applies to DDE-PR control variant

Signal		Description
Relay 1	Relay 2	
Alarm*		Empty tank, motor blocked
	Low level*	Low level tank
	Stroke signal	Every completed stroke
	Pulse input	Every pulse coming in from pulse input
Contact type		
NO*	NO*	Normally Open Contact
NC	NC	Normally Closed Contact

\* default setting

### Analog output

Applies to DDA

In addition to the analog input (operation mode: analog 0/4-20 mA) the pump is also equipped with an analog 0/4-20 mA output signal. Depending on the process control requirements, the following analog output settings are available:

Setting	Description of analog output signal	Control variant		
		FCM	FC	AR
Output = Input	Analog feedback signal (not for master-slave application). The analog input signal is mapped 1:1 to the analog output.	X	X	X
Actual flow	Flow measured in the dosing head (Flow Measurement page 18)	X	X*	X*
Backpressure	Backpressure measured in the dosing head (Pressure monitoring page 18)	X	X	
Bus control	Set by a command in the bus communication (see below)	X	X	X

\* Output signal is calculated based on motor speed and pump status (target flow rate).

### Bus communication

BUS

Applies to DDA

The pump is equipped with a built-in module for GENIbus communication. With the additional E-Box module (please see page 36) the pump can be integrated into a fieldbus network.

The bus communication possibilities enable remote monitoring and setting via the fieldbus system.



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Fig. 15 DDA with E-box

### Key lock and mechanical lock



Applies to DDA, DDC

To protect the pump from maloperation, a key lock can be set by entering a 4-digit PIN-code. When the pump is locked, it is still possible to navigate through the menus Alarm  and Info  and to acknowledge alarms. Two levels of protection are available:

- Settings: the keys  and  are still available.
- Settings + keys: the keys  and  are also locked.

For temporary (2 minutes) or final deactivation the preset 4-digit pin-code has to be entered again.

Applies to DDE

The adjustment knob can be locked with a locking screw to fix the current setting.

### Basic settings

Applies to DDA, DDC

With load factory settings, the pump can be reset to the default settings. In addition, with save customer settings, the current configuration of the pump is stored and can be activated later by load customer settings. The latest saved configuration is stored in the memory.

### Units

Applies to DDA, DDC

It is possible to select metric units (litre/millilitre/bar) or US units (US gallons/psi). Depending on the operation mode and menu, the following units are displayed:

Operation mode/Function	Metric units	US units
Manual control	ml/h or l/h	gph
Pulse control	ml/ 	ml/ 
Analog 0/4-20 mA control	ml/h or l/h	gph
Batch control (pulse- or timer-based)	ml or l	gal
Calibration	ml	ml
Volume counter	l	gal
Pressure monitoring	bar	psi

## Additional display

Applies to DDA, DDC

The additional display function provides further useful status information, e.g. the target flow rate as well as the actual flow rate. The value is shown in the operation display  together with the corresponding symbol.

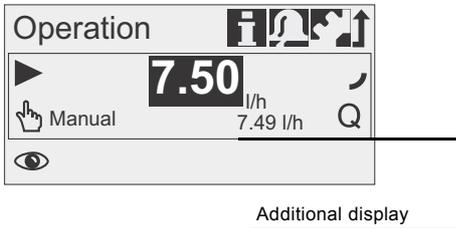


Fig. 16 Additional display

The following additional information can be selected:

Settings	Description
	Depending on the operation mode:
	 Actual flow (manual, pulse) <sup>1)</sup>
Default display	 Target flow (pulse)
	 Input current (analog) <sup>4)</sup>
	 Remaining batch volume (batch, timer) <sup>3)</sup>
	 Time until next batch (timer) <sup>3)</sup>
Dosed volume	 Total dosed volume (Counters see page 13)
Actual flow	 Actually measured flow <sup>1)</sup>
Backpressure	 Current backpressure in the dosing head <sup>2)</sup>

1) Only DDA-FCM control variant

2) Only DDA-FCM/FC control variant

3) Only DDA pumps

4) Only DDA pumps and DDC-AR control variant

## FlowControl

Applies to DDA-FC/FCM



TM04 1641 2617

Fig. 17 DDA FlowControl

The pump monitors the dosing process of liquids when the FlowControl function is activated. Although the pump is still operating, some influences such as air bubbles may cause reduced flow rates or even stop the dosing process. For optimal process safety and reliability, the activated FlowControl function immediately detects and displays the following malfunctions:

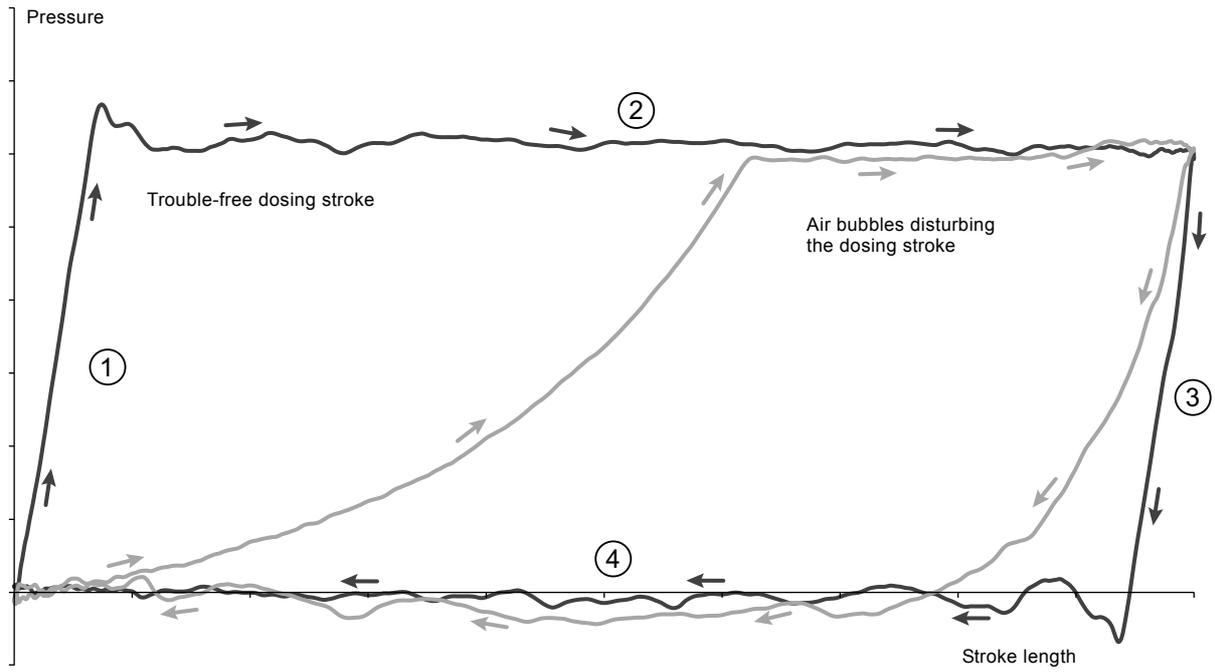
- Overpressure
- Discharge line burst
- Air bubbles in the dosing head
- Cavitation at the suction side
- Suction valve leakage
- Discharge valve leakage.

The unique FlowControl is based on an intelligent and maintenance-free sensor integrated in the dosing head. During the dosing process, the sensor measures the actual pressure and sends the measured value to the microprocessor in the pump. An internal indicator diagram is generated combining the actual pressure value with the diaphragm position (stroke length). With it, the dosing process is monitored, as the different malfunctions can immediately be detected due to their specific deviations in the curve.

Compressible air bubbles, for instance, will reduce the discharge phase and the stroke volume (see fig. 18).

The sensitivity and the delay of the FlowControl function can be adjusted individually.

FlowControl requires a minimum backpressure of 2 bar. Grundfos recommend an additional spring-loaded valve (approx. 3 bar) on the discharge side for dosing low capacities (< 1 l/h) (please see page 46).



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Fig. 18 Indicator diagram

1	Compression phase
2	Discharge phase
3	Expansion phase
4	Suction phase

## Pressure monitoring

*Applies to DDA-FC/FCM*

The integrated pressure sensor measures the actual pressure of the system, which is shown in the display. A maximum pressure can be set. If the pressure in the system exceeds the set maximum (e.g. caused by a closed valve), the pressure monitoring function stops the dosing process immediately. As soon as the backpressure falls below the set maximum, the dosing process is continued. In case the pressure drops below the minimum limit (e.g. caused by a burst discharge line) the pump stops and major chemical spills are prevented.

### Pressure setting range

Pump type	Fixed min. pressure [bar]*	Adjustable max. pressure [bar]**
DDA 7.5-16	< 2	3 ... 17 (default)
DDA 12-10	< 2	3 ... 11 (default)
DDA 17-7	< 2	3 ... 8 (default)
DDA 30-4	< 2	3 ... 5 (default)

\* Can be either set as a warning (pump keeps running) or as an alarm (pump stops)

\*\* The adjustable max. pressure is equivalent to the max. operating pressure plus 1 bar

## Flow measurement

*Applies to DDA-FCM*

The pump can precisely measure and display the actual dosing flow. Via the analog 0/4-20 mA output, the actual flow signal can easily be integrated in any process control system, without needing any additional measurement equipment.

The Flow measurement function is based on an indicator diagram as described in FlowControl (page 16). Accumulating the length of each discharge stroke phase and multiplying it with the stroke frequency results in the displayed actual flow. Any malfunctions, such as air bubbles or lower backpressure, will result in a reduced or increased actual flow rate. When the AutoFlowAdapt function (page 18) is activated, the pump compensates these influences by correcting the stroke speed.

## AutoFlowAdapt

*Applies to DDA-FCM*

When activating the AutoFlowAdapt function even environmental changes will be compensated, so that the required target flow rate will be achieved.

The integrated AutoFlowAdapt makes additional monitoring and control devices redundant.

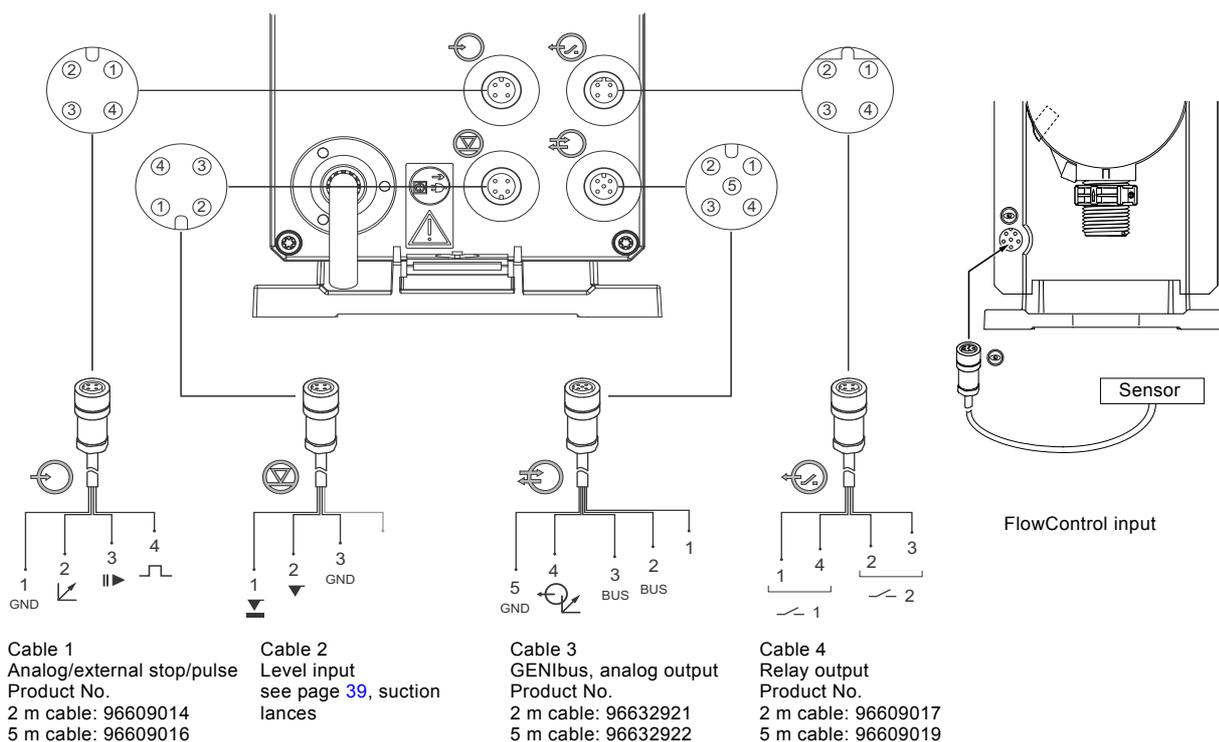
The AutoFlowAdapt function is based on:

- FlowControl: malfunctions are detected
- Pressure monitoring: system pressure changes are detected
- Flow measurement: deviations in the target flow are detected.

### Examples:

- FlowControl detects air bubbles in the system. Due to a special motor drive strategy and a certain speed increase, the pump will try to keep the flow rate constant. This is especially important when dosing degassing liquids.
- In general, increasing system pressure reduces the stroke volume whereas falling system pressure increases the stroke volume. The AutoFlowAdapt function compensates this by automatically and continuously adapting the motor speed. Despite fluctuating system pressure, dosing accuracy is maintained.

### Wiring diagram, DDA



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**Table 1: Analog, external stop and pulse input**

Function	Pin holes				Plug type
	1/brown	2/white	3/blue	4/black	
Analog	GND/ (-) mA	(+) mA			mA signal
External stop	GND		X		Contact
Pulse	GND			X	Contact

**Table 2: Level input**

Function	Pin holes				Plug type
	1	2	3	4	
Low level	X		GND		Contact
Empty tank		X	GND		Contact

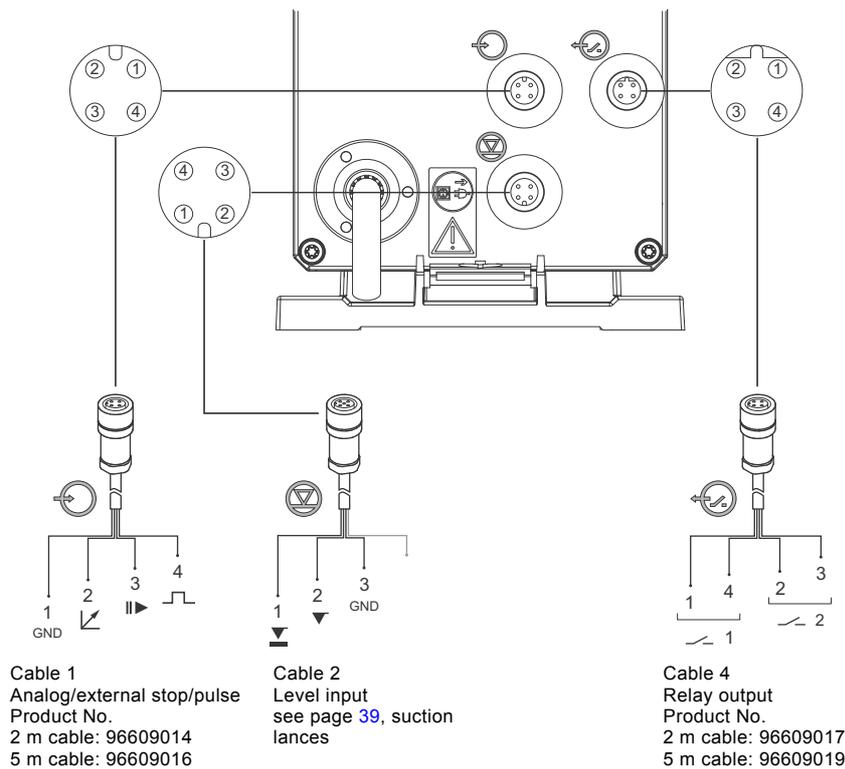
**Table 3: GENIbus, analog output**

Function	Pin holes					Plug type
	1/brown	2/white	3/blue	4/black	5/yellow-green	
GENIbus	+30 V	GENI bus A	GENI bus B		GND	Bus
Analog output				(+) mA	GND/ (-) mA	mA signal

**Table 4: Relay output**

Function	Pin holes				Plug type
	1/brown	2/white	3/blue	4/black	
Relay 1	X			X	Contact
Relay 2		X	X		Contact

## Wiring diagram, DDC



TM04 1531 1010

## Cable 1: Analog, external stop and pulse input

Function	Pin holes				Plug type
	1/brown	2/white	3/blue	4/black	
Analog*	GND/ (-) mA	(+) mA			mA signal
External stop	GND		X		Contact
Pulse	GND			X	Contact

## Cable 2: Level input

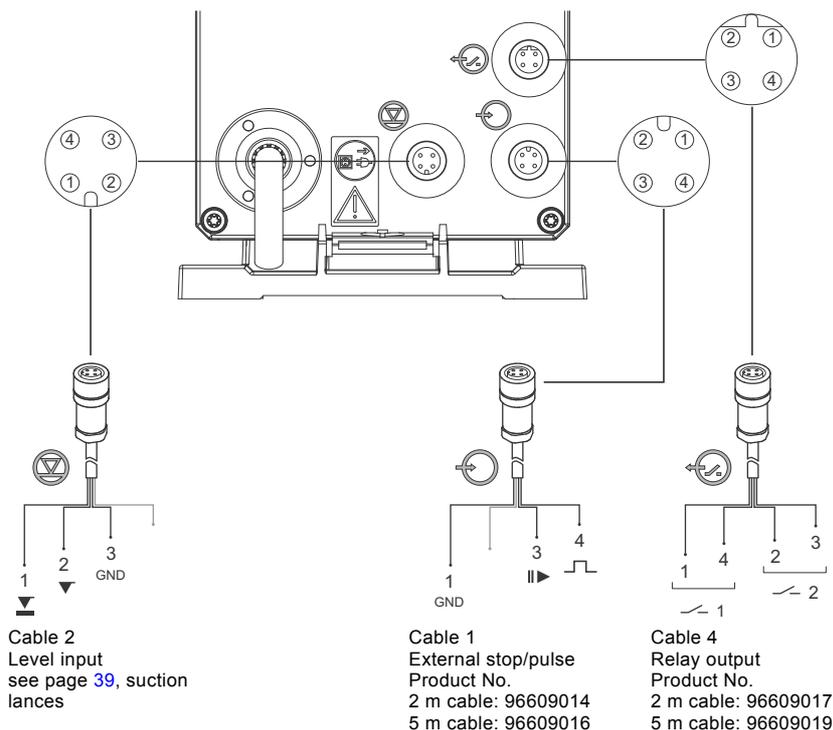
Function	Pin holes				Plug type
	1	2	3	4	
Low level	X		GND		Contact
Empty tank		X	GND		Contact

## Cable 4: Relay output\*

Function	Pin holes				Plug type
	1/brown	2/white	3/blue	4/black	
Relay 1	X			X	Contact
Relay 2		X	X		Contact

\* applies to DDC-AR

### Wiring diagram, DDE-PR, -P



TM04 1597 0312

#### Cable 1: External stop and pulse input

Function	Pin holes				Plug type
	1/brown	2/white	3/blue	4/black	
External stop	GND		X		Contact
Pulse	GND			X	Contact

#### Cable 2: Level input

Function	Pin holes				Plug type
	1	2	3	4	
Low level	X		GND		Contact
Empty tank		X	GND		Contact

#### Cable 4: Relay output\*

Function	Pin holes				Plug type
	1/brown	2/white	3/blue	4/black	
Relay 1 (Alarm)	X			X	Contact
Relay 2 (see page 14)		X	X		Contact

\* applies to DDE-PR

## 4. Construction

### DDA and DDC

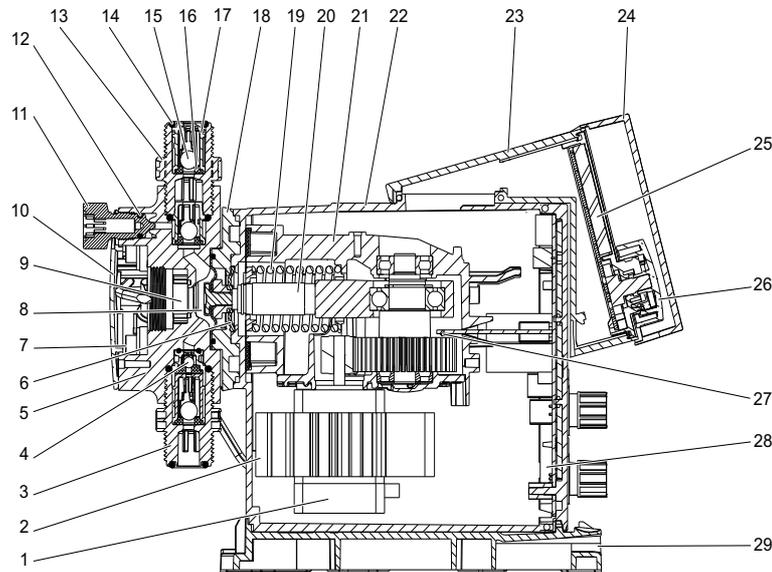


Fig. 19 Sectional drawing, DDA

TM04 1533 1010

#### Construction

The DDA and DDC pumps are motor-driven diaphragm dosing pumps consisting of the following main parts:

**Dosing head:** Patented design with a minimum of clearance space optimised for degassing liquids. With integrated deaeration valve for priming and venting complete with connection for a 4/6 mm or 0.17" x 1/4" tubing. DDA-FCM/FC pumps have an integrated pressure sensor in the dosing head.

**Valves:** Double-ball discharge and suction valve\* design for less clearance space - optimised for degassing liquids. Spring-loaded valves for higher viscosities are available as an option.

**Connections:** Robust and easy-to-use connection packages for various sizes of tubing or pipes.

**Diaphragm:** Full PTFE diaphragm designed for long life and universal chemical resistance.

**Flange:** With separation chamber, safety diaphragm and drain hole.

**Drive unit:** Positive return crank with patented noiseless spur gear drive, energy recovery spring for high efficiency (only DDA), stepper motor, all mounted in a robust gear housing.

**Control cube:** Containing operation electronics with display, keys, click-wheel and protective cover.

**Housing:** Containing drive unit and power electronics with robust signal sockets. The housing can be clicked on the mounting plate.

#### Material specification

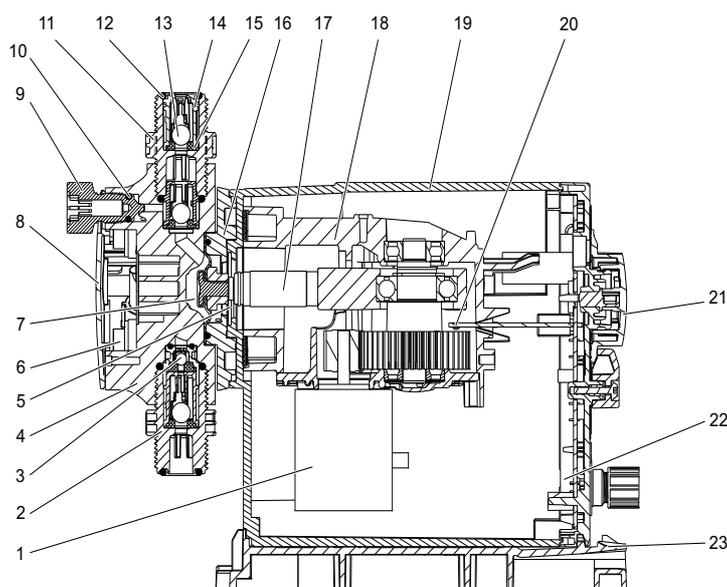
Pos.	Description	Material options
1	Stepper motor	-
2	Cooling element**	Aluminium
3	Suction valve, complete***	-
4	Valve ball, DN 4*	Ceramic Al <sub>2</sub> O <sub>3</sub> 99.5 %, SS 1.4401
5	Dosing head	PP, PVC, PVDF, SS 1.4435
6	Safety diaphragm	EPDM
7	Dosing head screw	SS 1.4301
8	Diaphragm	full PTFE
9	Pressure sensor	-
10	Dosing head cover	PP, SS 1.4301
11	Deaeration valve	PP, PVC, PVDF
12	Deaeration valve O-ring	EPDM/FKM
13	Discharge valve, complete***	-
14	Discharge valve O-ring	EPDM, FKM, PTFE
15	Discharge valve ball, DN 8	Ceramic Al <sub>2</sub> O <sub>3</sub> 99.5 %, SS 1.4401
16	Discharge valve seat	EPDM, FKM, PTFE
17	Discharge valve ball cage	PP, PVC, PVDF, SS 1.4435
18	Flange	PPO/PS 20 % gf
19	Energy recovery spring**	EN 10270-2/VD SiCr
20	Connecting rod	PA 6.6 30 % gf
21	Gear box	PPO/PS 20 % gf
22	Housing	PPO/PS 20 % gf
23	Control cube	PPO/PS 20 % gf
24	Display cover	PC
25	Operation PCB	-
26	Click wheel	PPO/PS 20 % gf
27	Hall sensor	-
28	Power PCB	-
29	Mounting plate	PPO/PS 20 % gf

\* Only for pumps up to 7.5 l/h with standard valves

\*\* Only for DDA

\*\*\* Pump can be supplied with spring-loaded valves (Material: Tantal)

## DDE



TM04 1609 1710

Fig. 20 Sectional drawing, DDE

## Construction

The DDE pump is a motor-driven diaphragm dosing pump consisting of the following main parts:

**Dosing head:** Patented design with a minimum of clearance space optimised for degassing liquids. With integrated deaeration valve for priming and venting complete with connection for a 4/6 mm or 0.17" x 1/4" tubing.

**Valves:** Double-ball discharge and suction valve\* design for less clearance space - optimised for degassing liquids. Spring-loaded valves for higher viscosities are available as an option.

**Connections:** Robust and easy-to-use connection packages for various sizes of tubing or pipes.

**Diaphragm:** Full PTFE diaphragm designed for long life and universal chemical resistance.

**Flange:** With separation chamber, safety diaphragm and drain hole.

**Drive unit:** Positive return crank with patented noiseless spur gear drive, stepper motor, all mounted in a robust gear housing.

**Housing:** Containing drive unit, control panel and electronics with robust signal sockets. The housing can be clicked on the mounting plate.

## Material specification

Pos.	Description	Material options
1	Stepper motor	-
2	Suction valve, complete**	-
3	Valve ball, DN 4*	Ceramic Al <sub>2</sub> O <sub>3</sub> 99.5 %, SS 1.4401
4	Dosing head	PP, PVC, PVDF, SS 1.4435
5	Safety diaphragm	EPDM
6	Dosing head screw	SS 1.4301
7	Diaphragm	full PTFE
8	Dosing head cover	PP, SS 1.4301
9	Deaeration valve	PP, PVC, PVDF
10	Deaeration valve O-ring	EPDM/FKM
11	Discharge valve, complete**	-
12	Discharge valve O-ring	EPDM, FKM, PTFE
13	Discharge valve ball, DN 8	Ceramic Al <sub>2</sub> O <sub>3</sub> 99.5 %, SS 1.4401
14	Discharge valve ball cage	PP, PVC, PVDF, SS 1.4435
15	Discharge valve seat	EPDM, FKM, PTFE
16	Flange	PPO/PS 20 % gf
17	Connecting rod	PA 6.6 30 % gf
18	Gear box	PPO/PS 20 % gf
19	Housing	PPO/PS 20 % gf
20	Hall sensor	-
21	Capacity adjustment knob	PPO/PS 20 % gf
22	Power PCB	-
23	Mounting plate	PPO/PS 20 % gf

\* Only for pumps up to 6 l/h with standard valves

\*\* Pump can be supplied with spring-loaded valves (Material: Tantal)

## 5. Dimensions

### DDA and DDC

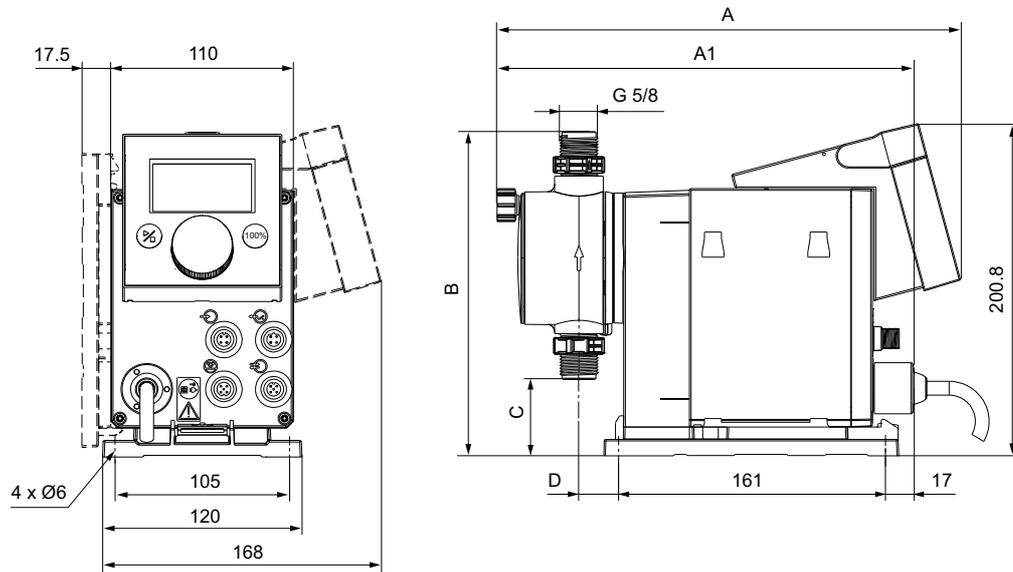


Fig. 21 DDA and DDC with front-fitted or side-fitted control cube

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### DDE

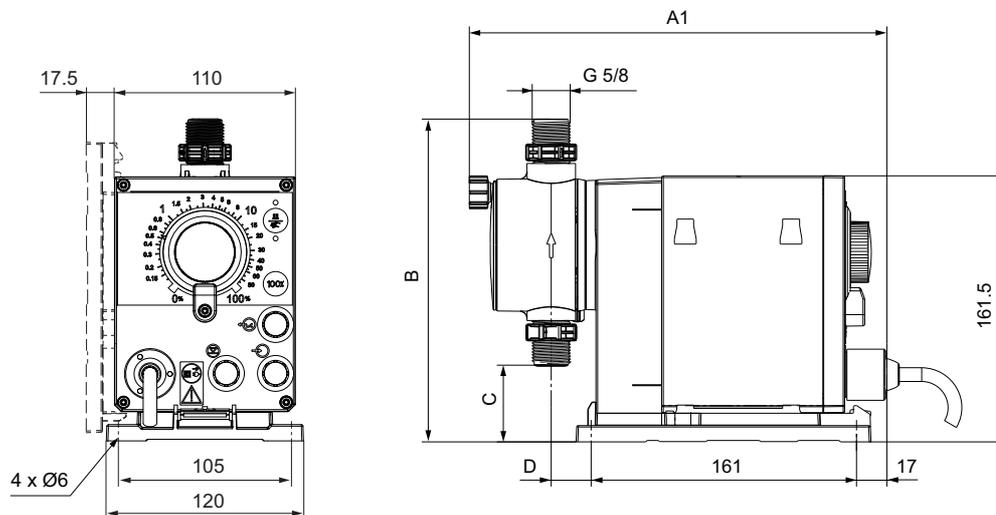


Fig. 22 DDE-PR with front-fitted control elements

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Pump type	A [mm]	A1 [mm]	B [mm]	C [mm]	D [mm]
DDA 7.5-16 DDC 6-10 DDC 9-7 DDE 6-10	280	251	196	46.5	24
DDA 12-10 DDA 17-7 DDC 15-4 DDE 15-4	280	251	200.5	39.5	24
DDA 30-4	295	267	204.5	35.5	38.5

## 6. Technical data

### DDA

DDA		7.5-16	12-10	17-7	30-4	
	Turn-down ratio (setting range)	[1:X]	3000	1000	1000	1000
	Max. dosing capacity	[l/h]	7.5	12.0	17.0	30.0
		[gph]	2.0	3.1	4.5	8.0
	Max. dosing capacity with SlowMode 50 %	[l/h]	3.75	6.00	8.50	15.00
		[gph]	1.00	1.55	2.25	4.00
	Max. dosing capacity with SlowMode 25 %	[l/h]	1.88	3.00	4.25	7.50
		[gph]	0.50	0.78	1.13	2.00
	Min. dosing capacity	[l/h]	0.0025	0.0120	0.0170	0.0300
		[gph]	0.0007	0.0031	0.0045	0.0080
	Max. operating pressure	[bar]	16★	10	7	4
		[psi]	230	150	100	60
	Max. stroke frequency <sup>1)</sup>	[strokes/min]	190	155	205	180
	Stroke volume	[ml]	0.74	1.45	1.55	3.10
<b>Mechanical data</b>	Accuracy of repeatability	[%]	± 1			
	Max. suction lift during operation <sup>2)</sup>	[m]	6			
	Max. suction lift when priming with wet valves <sup>2)</sup>	[m]	2	3	3	2
	Min. pressure difference between suction and discharge side	[bar]	1 (FC and FCM: 2)			
	Max. inlet pressure, suction side	[bar]	2			
	Max. viscosity in SlowMode 25 % with spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	2500	2500	2000	1500
	Max. viscosity in SlowMode 50 % with spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	1800	1300	1300	600
	Max. viscosity without SlowMode with spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	600	500	500	200
	Max. viscosity without spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	50	300	300	150
	Min. internal hose/pipe diameter suction/discharge side <sup>4), 2)</sup>	[mm]	4	6	6	9
	Min. internal hose/pipe diameter suction/discharge side (high viscosity) <sup>4)</sup>	[mm]	9			
	Min./Max. liquid temperature	[°C]	-10/45			
	Min./Max. ambient temperature	[°C]	0/45			
	<b>Electrical data</b>	Voltage	[V]	100-240 V, 50/60 Hz		
Length of mains cable		[m]	1.5			
Max. inrush current for 2 ms at 100 V		[A]	8			
Max. inrush current for 2 ms at 230 V		[A]	25			
Max. power consumption P <sub>1</sub>		[W]	24 <sup>5)</sup>			
Enclosure class			IP65, Nema 4X			
Electrical safety class			II			
<b>Signal input</b>	Max. load low-level / empty tank / pulse / external stop input		12 V, 5 mA			
	Min. pulse length	[ms]	5			
	Max. pulse frequency	[Hz]	100			
	Impedance at analog 0/4-20 mA input	[Ω]	15			
	Accuracy of analog input (full-scale value)	[%]	± 1.5			
	Min. resolution of analog input	[mA]	0.05			
	Max. resistance in level/pulse circuit	[Ω]	1000			
<b>Signal output</b>	Max. ohmic load on relay output	[A]	0.5			
	Max. voltage on relay/analog output	[V]	30 VDC/30 VAC			
	Impedance at 0/4-20 mA analog output	[Ω]	500			
	Accuracy of analog output (full-scale value)	[%]	± 1.5			
	Min. resolution of analog output	[mA]	0.02			
<b>Weight/size</b>	Weight (PVC, PP, PVDF)	[kg]	2.4	2.4	2.6	2.6
	Weight (stainless steel)	[kg]	3.2	3.2	3.2	4.0
	Diaphragm diameter	[mm]	44	50	50	74
<b>Sound pressure</b>	Max. sound pressure level	[dB(A)]	60			
<b>Approvals</b>		CE, CB, CSA-US, NSF61, EAC, ACS, C-Tick				

1) The maximum stroke frequency varies depending on calibration

★ Max. pressure for PVC version: 10 bar

2) Data is based on measurements with water

3) Maximum suction lift: 1 m, dosing capacity reduced (approx. 30 %)

4) Length of suction line: 1.5 m, length of discharge line: 10 m (at max. viscosity)

5) With E-box

## DDC

DDC		6-10	9-7	15-4	
	Turn-down ratio (setting range)	[1:X]	1000	1000	
	Max. dosing capacity	[l/h]	6.0	9.0	
		[gph]	1.5	2.4	
	Max. dosing capacity with SlowMode 50 %	[l/h]	3.00	4.50	
		[gph]	0.75	1.20	
	Max. dosing capacity with SlowMode 25 %	[l/h]	1.50	2.25	
		[gph]	0.38	0.60	
	Min. dosing capacity	[l/h]	0.0060	0.0090	
		[gph]	0.0015	0.0024	
	Max. operating pressure	[bar]	10	7	
		[psi]	150	100	
	Max. stroke frequency <sup>1)</sup>	[strokes/min]	140	200	
	Stroke volume	[ml]	0.81	0.84	
Mechanical data	Accuracy of repeatability	[%]	± 1		
	Max. suction lift during operation <sup>2)</sup>	[m]	6		
	Max. suction lift when priming with wet valves <sup>2)</sup>	[m]	2	2	3
	Min. pressure difference between suction and discharge side	[bar]	1		
	Max. inlet pressure, suction side	[bar]	2		
	Max. viscosity in SlowMode 25 % with spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	2500	2000	2000
	Max. viscosity in SlowMode 50 % with spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	1800	1300	1300
	Max. viscosity without SlowMode with spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	600	500	500
	Max. viscosity without spring-loaded valves <sup>3)</sup>	[mPas] (= cP)	50	50	300
	Min. internal hose/pipe diameter suction/discharge side <sup>4), 2)</sup>	[mm]	4	6	6
	Min. internal hose/pipe diameter suction/discharge side (high viscosity <sup>4)</sup>	[mm]	9		
	Min./Max. liquid temperature	[°C]	-10/45		
	Min./Max. ambient temperature	[°C]	0/45		
	Electrical data	Voltage AC	[V]	100-240 V, 50/60 Hz	
Length of mains cable		[m]	1.5		
Max. inrush current for 2 ms at 100 V		[A]	8		
Max. inrush current for 2 ms at 230 V		[A]	25		
Max. power consumption P <sub>1</sub>		[W]	22		
Enclosure class			IP65, Nema 4X		
Electrical safety class		II			
Signal input	Max. load low-level / empty tank / pulse / external stop input		12 V, 5 mA		
	Min. pulse length	[ms]	5		
	Max. pulse frequency	[Hz]	100		
	Impedance at analog 0/4-20 mA input	[Ω]	15		
	Accuracy of analog input (full-scale value)	[%]	± 1.5		
	Min. resolution of analog input	[mA]	0.05		
	Max. resistance in level/pulse circuit	[Ω]	1000		
Signal output	Max. ohmic load on relay output	[A]	0.5		
	Max. voltage on relay output	[V]	30 VDC/30 VAC		
Weight/size	Weight (PVC, PP, PVDF)	[kg]	2.4	2.4	
	Weight (stainless steel)	[kg]	3.2	3.2	
	Diaphragm diameter	[mm]	44	50	
Sound pressure	Max. sound pressure level	[dB(A)]	60		
Approvals		CE, CB, CSA-US, NSF61, EAC, C-Tick			

1) The maximum stroke frequency varies depending on calibration

2) Data is based on measurements with water

3) Maximum suction lift: 1 m, dosing capacity reduced (approx. 30 %)

4) Length of suction line: 1.5 m, length of discharge line: 10 m (at max. viscosity)

## DDE

DDE		6-10	15-4	
	Turn-down ratio (setting range)	[1:X]	1000	
	Max. dosing capacity	[l/h]	6.0	
		[gph]	1.5	
	Min. dosing capacity	[l/h]	0.0060	
		[gph]	0.0015	
	Max. pressure	[bar]	10	
		[psi]	150	
	Max. stroke frequency	[strokes/min]	140	
	Stroke volume	[ml]	0.81	
	Accuracy of repeatability	[%]	± 5	
Mechanical data	Max. suction lift during operation <sup>1)</sup>	[m]	6	
	Max. suction lift when priming with wet valves <sup>1)</sup>	[m]	2	
	Min. pressure difference between suction and discharge side	[bar]	1	
	Max. inlet pressure, suction side	[bar]	2	
	Max. viscosity with spring-loaded valves <sup>2)</sup>	[mPas] (= cP)	600	
	Max. viscosity without spring-loaded valves <sup>2)</sup>	[mPas] (= cP)	50	
	Min. internal hose/pipe diameter suction/discharge side <sup>1), 3)</sup>	[mm]	4	
	Min. internal hose/pipe diameter suction/discharge side (HV) <sup>3)</sup>	[mm]	9	
	Min./Max. liquid temperature	[°C]	-10/45	
	Min./Max. ambient temperature	[°C]	0/45	
	Electrical data	Voltage	[V]	100-240 V, 50/60 Hz
		Length of mains cable	[m]	1.5
Max. inrush current for 2 ms at 100 V		[A]	8	
Max. inrush current for 2 ms at 230 V		[A]	25	
Max. power consumption P <sub>1</sub>		[W]	19	
Enclosure class			IP65, Nema 4X	
Signal input	Electrical safety class		II	
	Max. load low-level / empty tank / pulse / external stop input		12 V, 5 mA	
	Min. pulse length	[ms]	5	
	Max. pulse frequency	[Hz]	100	
Signal output	Max. resistance in level/pulse circuit	[Ω]	1000	
	Max. ohmic load on relay output	[A]	0.5	
Weight/size	Max. voltage on relay output	[V]	30 VDC/30 VAC	
	Weight (PVC, PP, PVDF)	[kg]	2.4	
	Weight (stainless steel)	[kg]	3.2	
Sound pressure	Diaphragm diameter	[mm]	44	
	Max. sound pressure level	[dB(A)]	60	

## Approvals

CE, CB, CSA-US, NSF61, EAC, C-Tick

1) Data is based on measurements with water

2) Maximum suction lift: 1 m, dosing capacity reduced (approx. 30 %)

3) Length of suction line: 1.5 m, length of discharge line: 10 m (at max. viscosity)

## 7. Pump selection

### DDA, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)

Mains plug: EU

Valves: Standard

Connection set: U2U2 / I001 / AA (see [Type key](#) on page 6)

Max. flow [l/h]	Max. pressure [bar]	Materials			Installation set*	Type designation**	Product number			
		Dosing head	Gaskets	Valve balls			AR	FC	FCM	
7.5	16	PP	EPDM	Ceramic	No	DDA 7.5-16 AR-PP/E/C-F-31U2U2FG	97721938	97721972	97722006	
					Yes	DDA 7.5-16 AR-PP/E/C-F-31I001FG	97721939	97721973	97722007	
			FKM	Ceramic	No	DDA 7.5-16 AR-PP/V/C-F-31U2U2FG	97721942	97721976	97722010	
					Yes	DDA 7.5-16 AR-PP/V/C-F-31I001FG	97721943	97721977	97722011	
			PVC***	EPDM	Ceramic	No	DDA 7.5-16 AR-PVC/E/C-F-31U2U2FG	97721946	97721980	97722014
						Yes	DDA 7.5-16 AR-PVC/E/C-F-31I001FG	97721947	97721981	97722015
		FKM	Ceramic	No	DDA 7.5-16 AR-PVC/V/C-F-31U2U2FG	97721950	97721984	97722018		
				Yes	DDA 7.5-16 AR-PVC/V/C-F-31I001FG	97721951	97721985	97722019		
		PVDF	PTFE	Ceramic	No	DDA 7.5-16 AR-PV/T/C-F-31U2U2FG	97721966	97722000	97722034	
					Yes	DDA 7.5-16 AR-PV/T/C-F-31I001FG	97721967	97722001	97722035	
		SS	PTFE	SS 1.4401	No	DDA 7.5-16 AR-SS/T/SS-F-31AAFG	97721970	97722004	97722038	
		12	10	PP	EPDM	Ceramic	No	DDA 12-10 AR-PP/E/C-F-31U2U2FG	97722040	97722074
Yes	DDA 12-10 AR-PP/E/C-F-31I002FG						97722041	97722075	97722109	
FKM	Ceramic				No	DDA 12-10 AR-PP/V/C-F-31U2U2FG	97722044	97722078	97722112	
					Yes	DDA 12-10 AR-PP/V/C-F-31I002FG	97722045	97722079	97722113	
PVC	EPDM				Ceramic	No	DDA 12-10 AR-PVC/E/C-F-31U2U2FG	97722048	97722082	97722116
						Yes	DDA 12-10 AR-PVC/E/C-F-31I002FG	97722049	97722083	97722117
FKM	Ceramic			No	DDA 12-10 AR-PVC/V/C-F-31U2U2FG	97722052	97722086	97722120		
				Yes	DDA 12-10 AR-PVC/V/C-F-31I002FG	97722053	97722087	97722121		
PVDF	PTFE			Ceramic	No	DDA 12-10 AR-PV/T/C-F-31U2U2FG	97722068	97722102	97722136	
					Yes	DDA 12-10 AR-PV/T/C-F-31I002FG	97722069	97722103	97722137	
SS	PTFE			SS 1.4401	No	DDA 12-10 AR-SS/T/SS-F-31AAFG	97722072	97722106	97722140	
17	7			PP	EPDM	Ceramic	No	DDA 17-7 AR-PP/E/C-F-31U2U2FG	97722142	97722176
		Yes	DDA 17-7 AR-PP/E/C-F-31I002FG				97722143	97722177	97722211	
		FKM	Ceramic		No	DDA 17-7 AR-PP/V/C-F-31U2U2FG	97722146	97722180	97722214	
					Yes	DDA 17-7 AR-PP/V/C-F-31I002FG	97722147	97722181	97722215	
		PVC	EPDM		Ceramic	No	DDA 17-7 AR-PVC/E/C-F-31U2U2FG	97722150	97722184	97722218
						Yes	DDA 17-7 AR-PVC/E/C-F-31I002FG	97722151	97722185	97722219
		FKM	Ceramic	No	DDA 17-7 AR-PVC/V/C-F-31U2U2FG	97722154	97722188	97722222		
				Yes	DDA 17-7 AR-PVC/V/C-F-31I002FG	97722155	97722189	97722223		
		PVDF	PTFE	Ceramic	No	DDA 17-7 AR-PV/T/C-F-31U2U2FG	97722170	97722204	97722238	
					Yes	DDA 17-7 AR-PV/T/C-F-31I002FG	97722171	97722205	97722239	
		SS	PTFE	SS 1.4401	No	DDA 17-7 AR-SS/T/SS-F-31AAFG	97722174	97722208	97722242	
		30	4	PP	EPDM	Ceramic	No	DDA 30-4 AR-PP/E/C-F-31U2U2FG	97722244	97722278
Yes	DDA 30-4 AR-PP/E/C-F-31I002FG						97722245	97722279	97722314	
FKM	Ceramic				No	DDA 30-4 AR-PP/V/C-F-31U2U2FG	97722248	97722282	97722317	
					Yes	DDA 30-4 AR-PP/V/C-F-31I002FG	97722249	97722283	97722318	
PVC	EPDM				Ceramic	No	DDA 30-4 AR-PVC/E/C-F-31U2U2FG	97722252	97722286	97722331
						Yes	DDA 30-4 AR-PVC/E/C-F-31I002FG	97722253	97722288	97722332
FKM	Ceramic			No	DDA 30-4 AR-PVC/V/C-F-31U2U2FG	97722256	97722291	97722335		
				Yes	DDA 30-4 AR-PVC/V/C-F-31I002FG	97722257	97722292	97722336		
PVDF	PTFE			Ceramic	No	DDA 30-4 AR-PV/T/C-F-31U2U2FG	97722272	97722307	97722351	
					Yes	DDA 30-4 AR-PV/T/C-F-31I002FG	97722273	97722308	97722352	
SS	PTFE			SS 1.4401	No	DDA 30-4 AR-SS/T/SS-F-31AAFG	97722276	97722311	97722355	

\* Installation set includes: 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm)

\*\* Also available in **FC**- and **FCM**-control version

\*\*\* PVC dosing heads only up to 10 bar

**DDC, standard range**

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)

Mains plug: EU

Valves: Standard

Connection set: U2U2 / I001 / AA (see [Type key](#) on page 6)

Max. flow [l/h]	Max. pressure [bar]	Materials			Installation set*	Type designation**	Product number		
		Dosing head	Gaskets	Valve balls			A	AR	
6	10	PP	EPDM	Ceramic	No	DDC 6-10 A-PP/E/C-F-31U2U2FG	97721324	97721358	
					Yes	DDC 6-10 A-PP/E/C-F-31I001FG	97721325	97721359	
			FKM	Ceramic	No	DDC 6-10 A-PP/V/C-F-31U2U2FG	97721328	97721362	
					Yes	DDC 6-10 A-PP/V/C-F-31I001FG	97721329	97721363	
			PVC	EPDM	Ceramic	No	DDC 6-10 A-PVC/E/C-F-31U2U2FG	97721332	97721366
						Yes	DDC 6-10 A-PVC/E/C-F-31I001FG	97721333	97721367
		FKM	Ceramic	No	DDC 6-10 A-PVC/V/C-F-31U2U2FG	97721336	97721370		
				Yes	DDC 6-10 A-PVC/V/C-F-31I001FG	97721337	97721371		
		PVDF	PTFE	Ceramic	No	DDC 6-10 A-PV/T/C-F-31U2U2FG	97721352	97721387	
					Yes	DDC 6-10 A-PV/T/C-F-31I001FG	97721353	97721388	
		SS	PTFE	SS 1.4401	No	DDC 6-10 A-SS/T/SS-F-31AAFG	97721356	97721391	
		9	7	PP	EPDM	Ceramic	No	DDC 9-7 A-PP/E/C-F-31U2U2FG	97721393
Yes	DDC 9-7 A-PP/E/C-F-31I002FG						97721394	97721428	
FKM	Ceramic				No	DDC 9-7 A-PP/V/C-F-31U2U2FG	97721397	97721431	
					Yes	DDC 9-7 A-PP/V/C-F-31I002FG	97721398	97721432	
PVC	EPDM				Ceramic	No	DDC 9-7 A-PVC/E/C-F-31U2U2FG	97721401	97721435
						Yes	DDC 9-7 A-PVC/E/C-F-31I002FG	97721402	97721436
FKM	Ceramic			No	DDC 9-7 A-PVC/V/C-F-31U2U2FG	97721405	97721439		
				Yes	DDC 9-7 A-PVC/V/C-F-31I002FG	97721406	97721440		
PVDF	PTFE			Ceramic	No	DDC 9-7 A-PV/T/C-F-31U2U2FG	97721421	97721455	
					Yes	DDC 9-7 A-PV/T/C-F-31I002FG	97721422	97721456	
SS	PTFE			SS 1.4401	No	DDC 9-7 A-SS/T/SS-F-31AAFG	97721425	97721459	
15	4			PP	EPDM	Ceramic	No	DDC 15-4 A-PP/E/C-F-31U2U2FG	97721461
		Yes	DDC 15-4 A-PP/E/C-F-31I002FG				97721462	97721496	
		FKM	Ceramic		No	DDC 15-4 A-PP/V/C-F-31U2U2FG	97721465	97721499	
					Yes	DDC 15-4 A-PP/V/C-F-31I002FG	97721466	97721500	
		PVC	EPDM		Ceramic	No	DDC 15-4 A-PVC/E/C-F-31U2U2FG	97721469	97721503
						Yes	DDC 15-4 A-PVC/E/C-F-31I002FG	97721470	97721504
		FKM	Ceramic	No	DDC 15-4 A-PVC/V/C-F-31U2U2FG	97721473	97721507		
				Yes	DDC 15-4 A-PVC/V/C-F-31I002FG	97721474	97721508		
		PVDF	PTFE	Ceramic	No	DDC 15-4 A-PV/T/C-F-31U2U2FG	97721489	97721523	
					Yes	DDC 15-4 A-PV/T/C-F-31I002FG	97721490	97721524	
		SS	PTFE	SS 1.4401	No	DDC 15-4 A-SS/T/SS-F-31AAFG	97721493	97721527	

\* Installation set includes: 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm)

\*\* Also available in AR-control version

## DDE, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)

Mains plug: EU

Valves: Standard

Connection set: U2U2 / I001 / AA (see [Type key](#) on page 6)

Max. flow [l/h]	Max. pressure [bar]	Dosing head	Materials		Installation set*	Type designation**	Product number			
			Gaskets	Valve balls			B	P	PR	
6	10	PP	EPDM	Ceramic	No	DDE 6-10 B-PP/E/C-X-31U2U2FG	97720905	97720949	98147240	
					Yes	DDE 6-10 B-PP/E/C-X-31I001FG	97720906	97720950	98147261	
			FKM	Ceramic	No	DDE 6-10 B-PP/V/C-X-31U2U2FG	97720909	97720953	98147264	
					Yes	DDE 6-10 B-PP/V/C-X-31I001FG	97720910	97720954	98147265	
			PVC	EPDM	Ceramic	No	DDE 6-10 B-PVC/E/C-X-31U2U2FG	97720923	97720957	98147268
						Yes	DDE 6-10 B-PVC/E/C-X-31I001FG	97720924	97720958	98147269
		FKM	Ceramic	No	DDE 6-10 B-PVC/V/C-X-31U2U2FG	97720927	97720961	98147272		
				Yes	DDE 6-10 B-PVC/V/C-X-31I001FG	97720928	97720962	98147273		
		PVDF	PTFE	Ceramic	No	DDE 6-10 B-PV/T/C-X-31U2U2FG	97720943	97720977	98147288	
					Yes	DDE 6-10 B-PV/T/C-X-31I001FG	97720944	97720978	98147289	
		SS	PTFE	SS 1.4401	No	DDE 6-10 B-SS/T/SS-X-31AAFG	97720947	97720981	98147292	
		15	4	PP	EPDM	Ceramic	No	DDE 15-4 B-PP/E/C-X-31U2U2FG	97720983	97721017
Yes	DDE 15-4 B-PP/E/C-X-31I002FG						97720984	97721018	98147295	
FKM	Ceramic				No	DDE 15-4 B-PP/V/C-X-31U2U2FG	97720987	97721021	98147298	
					Yes	DDE 15-4 B-PP/V/C-X-31I002FG	97720988	97721022	98147299	
PVC	EPDM				Ceramic	No	DDE 15-4 B-PVC/E/C-X-31U2U2FG	97720991	97721025	98147302
						Yes	DDE 15-4 B-PVC/E/C-X-31I002FG	97720992	97721026	98147303
FKM	Ceramic			No	DDE 15-4 B-PVC/V/C-X-31U2U2FG	97720995	97721029	98147306		
				Yes	DDE 15-4 B-PVC/V/C-X-31I002FG	97720996	97721030	98147307		
PVDF	PTFE			Ceramic	No	DDE 15-4 B-PV/T/C-X-31U2U2FG	97721011	97721045	98147322	
					Yes	DDE 15-4 B-PV/T/C-X-31I002FG	97721012	97721046	98147323	
SS	PTFE			SS 1.4401	No	DDE 15-4 B-SS/T/SS-X-31AAFG	97721015	97721049	98147326	

\* Installation set includes: 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm)

\*\* Also available in **P-** and **PR-**control version

## DDA, DDC, DDE, non-standard range

Key to the three following tables:

<b>Maximum flow - pressure</b>	[l/h] - [bar]
<b>Control variant</b>	B: Basic (DDE)
	P: B with pulse mode (DDE)
	PR: P with relay output (DDE)
	A: Standard (DDC)
	AR: A with alarm relay and analog input (DDA, DDC)
	FC: AR with FlowControl (DDA)
	FCM: FC with flow measurement (DDA)
<b>Materials</b>	<b>Dosing head</b>
	PP: PP
	PVC: PVC (PVC dosing heads only up to 10 bar)
	PV: PVDF
	SS: Stainless steel 1.4401
	<b>Gaskets</b>
	E: EPDM
	V: FKM
	T: PTFE
	<b>Valve balls</b>
C: Ceramic	
SS: Stainless steel 1.4401	
<b>Control cube position</b>	F: Front-mounted (change to left and right possible)
	X: No control cube (DDE)
<b>Supply voltage</b>	3: 1 x 100-240 V, 50/60 Hz
<b>Valve type</b>	1: Standard
	2: Spring-loaded (HV version)
<b>Connection / Installation set</b>	<b>Suction / discharge connection</b>
	U2U2: Union nut G 5/8" with parts for hose connection 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm
	U7U7: Union nut G 5/8" with parts for hose connection 0.17" x 1/4"; 1/4" x 3/8"; 3/8" x 1/2"
	AA: Union nut G 5/8" with threaded connection Rp 1/4", internal thread
	VV: Union nut G 5/8" with threaded connection 1/4" NPT, internal thread
	XX: No connections included
	<b>Installation set*</b>
	I001: 4/6 mm (up to 7.5 l/h, 13 bar)
	I002: 9/12 mm (up to 60 l/h, 9 bar)
	I003: 0.17" x 1/4" (up to 7.5 l/h, 13 bar)
I004: 3/8" x 1/2" (up to 60 l/h, 10 bar)	
<b>Mains plug</b>	F: EU
	B: USA, Canada
	G: UK
	I: Australia, New Zealand
	E: Switzerland
	J: Japan
	L: Argentina
<b>Design</b>	G: Grundfos red
	A: Grundfos green
	B: Grundfos black
	X: Neutral/black
	C: China approval
<b>Special variant</b>	C3: Inspection Certificate 3.1 (EN 10204)

\* Installation set includes 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm)

## DDA

Max. flow - press.	Control variant	Materials			Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design	Special variant				
		Head	Gaskets	Balls											
7.5-16	AR FC FCM	PP	E V	C	F	3	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G A B X C	C3				
		PVC	E V	C											
		PV	V T	C											
12-10 17-7 30-4	AR FC FCM	SS	T	SS	F	3	1 2	AA VV XX							
		PP	E V	C								F	3	1 2	U2U2 U7U7 XX I002 I004
		PVC	E V	C											
PV	V T	C													
		SS	T	SS	F	3	1 2	AA VV XX							

## DDC

Max. flow - press.	Control variant	Materials			Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design	Special variant				
		Head	Gaskets	Balls											
6-10	A AR	PP	E V	C	F	3	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G A B X C	C3				
		PVC	E V	C											
		PV	V T	C											
9-7 15-4	A AR	SS	T	SS	F	3	1 2	AA VV XX							
		PP	E V	C								F	3	1 2	U2U2 U7U7 XX I002 I004
		PVC	E V	C											
PV	V T	C													
		SS	T	SS	F	3	1 2	AA VV XX							

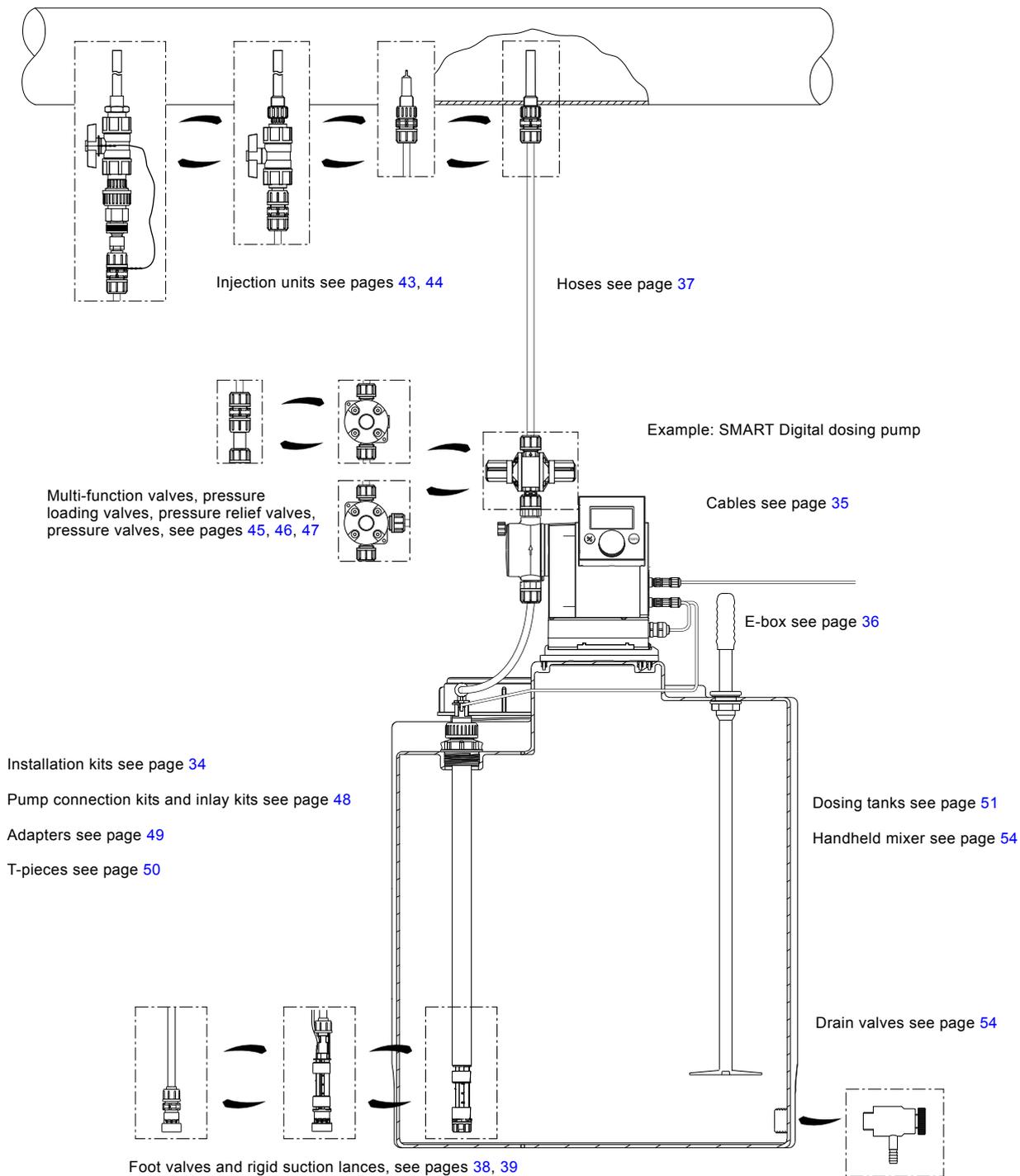
## DDE

Max. flow - press.	Control variant	Materials			Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design	Special variant				
		Head	Gaskets	Balls											
6-10	B P PR	PP	E V	C	X	3	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G A B X C	C3				
		PVC	E V	C											
		PV	V T	C											
15-4	B P PR	SS	T	SS	X	3	1 2	AA VV XX							
		PP	E V	C								X	3	1 2	U2U2 U7U7 XX I002 I004
		PVC	E V	C											
PV	V T	C													
		SS	T	SS	X	3	1 2	AA VV XX							

## 8. Accessories for small dosing pumps up to 60 l/h

### Accessories overview

Grundfos offer a comprehensive range of accessories covering every need when dosing with Grundfos pumps.



TM04 1599 0312

Fig. 23 Dosing pump with accessories

## Installation kits for dosing pumps

An installation kit includes the following parts:

- Injection unit with spring-loaded non-return valve (see page 43)
- PE outlet hose, 6 m
- PVC inlet hose, 2 m
- PVC deaeration hose, 2 m
- PE foot valve with strainer and weight, without or with level indication (see page 38).



Fig. 24 Installation kit with foot valve without level indication

TM04 1600 0312



Fig. 25 Installation kit with foot valve with level indication

TM04 8469 0512

### Technical data

Max. flow rate* [l/h]	Max. pressure [bar]	Size		Material of injection unit			Product number	
		Inlet / outlet hose [mm]	Deaeration hose [mm]	Body	Gasket	Ball	Foot valve without level indication	Foot valve with level indication
7.5	13	4/6	4/6	PP	FKM	Ceramic	95730440	95730464
					EPDM	Ceramic	95730441	95730465
					FKM	Ceramic	95730442	95730466
				PVC	EPDM	Ceramic	95730443	95730467
					PTFE	Ceramic	95730444	95730468
					FKM	Ceramic	95730445	95730469
				PVDF	EPDM	Ceramic	95730446	95730470
					PTFE	Ceramic	95730447	95730471
					FKM	Ceramic	95730448	95730472
30	12	6/9	4/6	PP	EPDM	Ceramic	95730449	95730473
					FKM	Ceramic	95730450	95730474
					EPDM	Ceramic	95730451	95730475
				PVC	PTFE	Ceramic	95730452	95730476
					FKM	Ceramic	95730453	95730477
					EPDM	Ceramic	95730454	95730478
				PVDF	PTFE	Ceramic	95730455	95730479
					FKM	Ceramic	95730456	95730480
					EPDM	Ceramic	95730457	95730481
60	9	9/12	4/6	PP	FKM	Ceramic	95730458	95730482
					EPDM	Ceramic	95730459	95730483
					PTFE	Ceramic	95730460	95730484
				PVC	FKM	Ceramic	95730461	95730485
					EPDM	Ceramic	95730462	95730486
					PTFE	Ceramic	95730463	95730487
				PVDF	EPDM	Ceramic	95730462	95730486
					PTFE	Ceramic	95730463	95730487

\* Viscosity similar to water

## Cables and plugs

The listed cables and plugs are suitable for the connection of a pump to external control devices, such as process controllers, flow meters, start/stop contacts and level sensors.



TM04 8267 0411

Fig. 26 Cable and plug

### Technical data

- Cable material: PVC, 0.34 mm<sup>2</sup>
- Plug size: M 12

Socket	Application	Pins	Plug type	Cable length [m]	Product number	
	Input	Analog pulse External stop	4	Straight	2	96609014
					5	96609016
				Angled	No cable	96698715
					2	96693246
	Input	Low level Empty tank	4	Straight	No cable	96698715
	Output	Analog	5	Straight	2	96632921
					5	96632922
				Angled	No cable	96609031
					2	96699697
	Output	Relay 1 Relay 2	4	Straight	2	96609017
					5	96609019
				Angled	No cable	96696198
					2	96698716

## E-box for SMART digital S DDA

The Grundfos E-box (Extension Box) is a Plug & Play fieldbus communication interface for the integration of SMART Digital S DDA dosing pumps (up to 30 l/h) into a fieldbus network. Fieldbus communication allows to use the DDA dosing pump in industrial automation systems (PLC; SCADA), where advanced remote control and monitoring functions are required:

- Remote control of all settings, such as operation mode, flow rate, etc.
- Remote monitoring of all parameters, such as measured flow, pressure, faults with cause, etc.

The E-box contains a standard Grundfos CIM communication interface module for data transmission between a fieldbus network and a Grundfos pump.

SMART digital S DDA dosing pumps can be retrofitted easily with the E-box: it is simply placed between the pump and the mounting plate. The E-box has a connecting cable that is plugged directly into the pump.

Description	Product number
E-box 150 Profibus DP	97513994
E-box 200 Modbus RTU	98563350
E-box 500 Ethernet	99171932



Fig. 27 E-box

### Dimensions

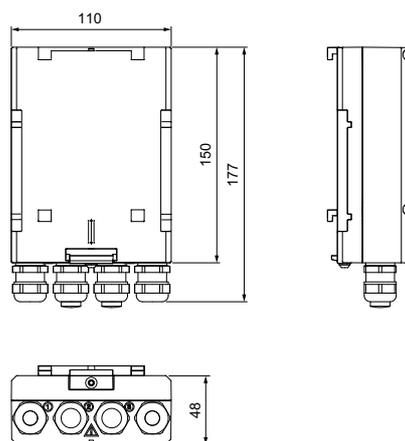


Fig. 28 E-box, dimensions

### General data

Supply voltage	30 VDC, $\pm 10\%$ (via M 12 plug of DDA)	
Max. power consumption	5 W	
Max. relative humidity	96 %	
Pollution degree	2	
Enclosure class	IP65 according to IEC 60529 NEMA 4X	
Electrical safety class	3	
Min./max. ambient temperature	0/45 °C	
Approvals	CE, CB, CSA-US, RCM	
Weight	0.4 kg	
GENIbus connection (E-box to pump)	Data protocol	GENIbus
	GENIbus connection type	Three-wire RS-485
	Transmission speed	9.6 kbits/s
	Cable length	160 mm

### E-box 150 Profibus DP

Required pump software for retrofitting	V2.5 or higher
Profibus implementation class	DP-V0
Connection type	RS-485, two-wire (lines: A, B)
Recommended cable type	Screened, double-twisted pair conductor cross-section: 0.34 - 1 mm <sup>2</sup> AWG: 22-17
Maximum cable length	100 m at 12000 kbits/s 1200 m at 9.6 kbits/s
Slave address (set in DDA display)	1-126
Line termination (set via DIP switches)	On/off
Supported data rates	9.6 - 12000 kbits/s
GSD file for system integration: <a href="http://net.grundfos.com/qr/i/GRUN0CD9">http://net.grundfos.com/qr/i/GRUN0CD9</a>	

### E-box 200 Modbus RTU

Required pump software for retrofitting	V2.5 or higher
Connection type	RS-485, two-wire + common
Recommended cable type	Screened, twisted pair conductor cross-section: 0.20 - 0.25 mm <sup>2</sup> AWG: 24-23
Maximum cable length	1200 m
Slave address (set in DDA display)	1-247
Line termination (set via DIP switches)	On/off
Supported data rates	9600 / 19200 / 38400 bits/s

### E-box 500 Ethernet

Required pump software for retrofitting	V2.5 or higher
Ethernet protocol	PROFINET IO / Modbus TCP (selected via rotary switch)
Application layer	DHCP, HTTP, Ping, FTP, SMTP, SNTP, Modbus TCP
Transport layer	TCP
Internet layer	Internet protocol V4 (IPv4)
Link layer	ARP, media access control (Ethernet)
Recommended cable type	Screened/unscreened, twisted-pair cables, CAT5, CAT5e or CAT6
Maximum cable length	100 m at 10/100 Mbits/s
Supported data rates	10 / 100 Mbits/s

TM04 8455 0312

TM04 8454 0312

## Hoses

Hoses in various materials, sizes and lengths for small dosing pumps.



TM04 8268 0411

Fig. 29 Hoses

### Technical data

Max. flow rate* [l/h]	Size (internal/external diameter) [mm]	Material	Max. pressure at 20 °C [bar]	Length [m]	Product number		
7.5	4/6	PE	13	3	91835676		
				10	91836504		
				50	91835680		
		PVC	0.5	3	96701733		
				10	96702133		
				50	96727418		
		ETFE	20	3	95730337		
				10	95730338		
				50	95730339		
17	5/8	PE	13	3	95730888		
				10	96727393		
				50	95730889		
		PE	12	3	96727409		
				10	96727412		
				50	96727415		
30	6/9	PVC	0.5	3	95730334		
				10	95730335		
				50	95730336		
		ETFE	20	3	95730340		
				10	95730341		
				50	95730342		
		60	9/12	PVC, textile-reinforced	23	3	96693751
						10	96653571
						50	91835686
PE	9			3	96727395		
				10	96705657		
				50	96727398		
60	9/12	PVC	0.5	3	96727434		
				10	95730890		
				50	95724702		
		ETFE	13	3	95730343		
				10	95730344		
				50	95730345		

\* Viscosity similar to water

## Foot valves FV

Foot valves are installed at the lower end of the inlet hose. They are available either without level indication or with low-level and empty-tank indication.

Foot valves include:

- Weight
- Strainer (mesh size approx. 0.8 mm)
- Non-return valve
- Hose connection set: 4/6 mm, 6/9 mm, 6/12 mm and 9/12 mm
- Pipe connection set: threaded, Rp 1/4", internal thread (stainless steel).

Foot valves with low-level and empty-tank indication include additionally:

- Reed-switch unit with two floaters
- 5 metres of cable with PE jacket
- M 12 plug to connect DDA, DDC, DDE or DDI dosing pump
- PE cap, Ø58 mm, for assembly in Grundfos cylindrical tanks, or for use with tank adapters.

The contact type of the low-level and empty-tank indication is factory-set to NO. The contact type can be set to NC by turning the floaters upside down.

Electrical data of the level indication:

- Max. voltage: 48 V
- Max. current: 0.5 A
- Max. load: 10 VA



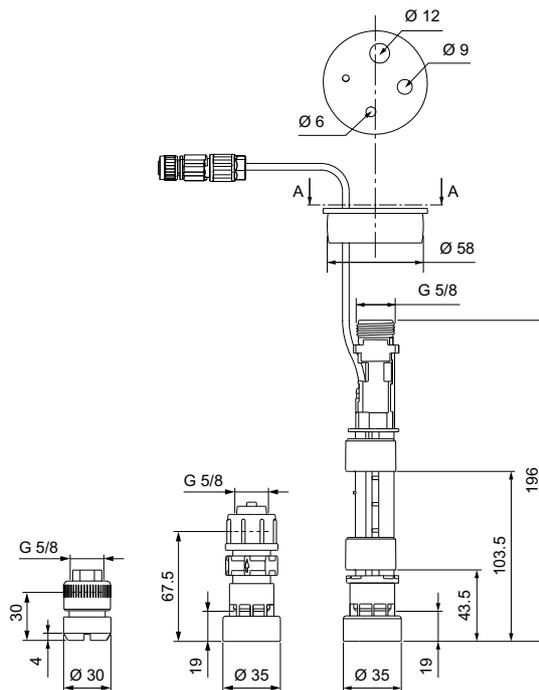
TM04 8476 0512

**Fig. 30** Foot valves: without level indication (left), with level indication (right)

### Technical data

Max. flow rate [l/h]	Material			Product number	
	Body	Gasket	Ball	Without level indication	With level indication
60	PE	FKM, EPDM	Ceramic	98070951	98070966
		PTFE	Ceramic	98070952	98070967
	PVDF	FKM, EPDM	Ceramic	98070953	98070968
		PTFE	Ceramic	98070954	98070969
	SS	PTFE	SS	98070963	-

### Dimensions



TM04 8461 0312

**Fig. 31** Foot valves: stainless-steel (left), PE or PVDF (centre and right)

## Rigid suction lances RSL

Grundfos offer a comprehensive range of rigid suction lances for a variety of chemical containers.

Rigid suction lances are installed at the lower end of the inlet hose. They are available either without level indication or with low-level and empty-tank indication. Their immersion depth is adjustable.

Rigid suction lances include:

- Strainer (mesh size approx. 0.8 mm)
- Non-return valve
- Hose connection set: 4/6 mm, 6/9 mm, 6/12 mm and 9/12 mm
- Adjustable tank connection with holes for e.g. relief line.

Rigid suction lances with low-level and empty-tank indication include additionally:

- Reed-switch unit with 2 floaters
- 5 metres of cable with PE jacket
- M 12 plug to connect DDA, DDC, DDE or DDI dosing pump.

The contact type of the low-level and empty-tank indication is factory-set to NO. The contact type can be set to NC by turning the floaters upside down.

Electrical data of the level indication:

- Max. voltage: 48 V
- Max. current: 0.5 A
- Max. load: 10 VA



Fig. 32 Rigid suction lance

TM04 8458 0312

## Dimensions

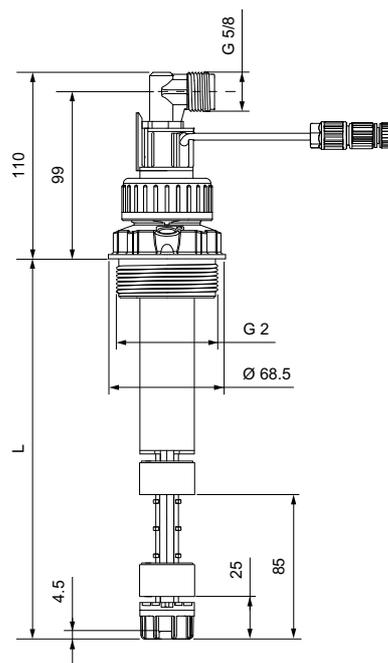


Fig. 33 Rigid suction lance

TM04 8460 0312

## Dimensions / Selection

For dosing tank type	Tank volume [l]	Recommended immersion depth (L) [mm]
Grundfos cylindrical tank (see page 52)	40	400
	60	500
	100	690
	200	690
	300	980
	500	1100
Grundfos square tank (see page 51)*	100	690
	120	820
L-ring drum*	220	980
Steel drum*	216	980
Standard jerricans according to EN 12712*	12, 33 (large cap)	400
	25, 30, 33	500
	60	690
IBC*	all sizes	1200

\* Suitable adapters see page 41

## Technical data

Max. flow rate [l/h]	Max. immersion depth* [mm]	Material			Product number	
		Body	Gasket	Ball	RSL without level indication	RSL with level indication
60	400	PE	FKM, EPDM	Ceramic	98070978	98071074
			PTFE	Ceramic	98070979	98071075
		PVDF	FKM, EPDM	Ceramic	98070980	98071076
			PTFE	Ceramic	98070981	98071077
	500	PE	FKM, EPDM	Ceramic	98070990	98071086
			PTFE	Ceramic	98070991	98071087
		PVDF	FKM, EPDM	Ceramic	98070992	98071088
			PTFE	Ceramic	98070993	98071089
	570	PE	FKM, EPDM	Ceramic	98071002	98071098
			PTFE	Ceramic	98071003	98071099
		PVDF	FKM, EPDM	Ceramic	98071004	98071100
			PTFE	Ceramic	98071005	98071101
	690	PE	FKM, EPDM	Ceramic	98071014	98071110
			PTFE	Ceramic	98071015	98071111
		PVDF	FKM, EPDM	Ceramic	98071016	98071112
			PTFE	Ceramic	98071017	98071113
	820	PE	FKM, EPDM	Ceramic	98071026	98071122
			PTFE	Ceramic	98071027	98071123
		PVDF	FKM, EPDM	Ceramic	98071028	98071124
			PTFE	Ceramic	98071029	98071125
	980	PE	FKM, EPDM	Ceramic	98071038	98071134
			PTFE	Ceramic	98071039	98071135
		PVDF	FKM, EPDM	Ceramic	98071040	98071136
			PTFE	Ceramic	98071041	98071137
1100	PE	FKM, EPDM	Ceramic	98071050	98071146	
		PTFE	Ceramic	98071051	98071147	
	PVDF	FKM, EPDM	Ceramic	98071052	98071148	
		PTFE	Ceramic	98071053	98071149	
1200	PE	FKM, EPDM	Ceramic	98071062	98071158	
		PTFE	Ceramic	98071063	98071159	
	PVDF	FKM, EPDM	Ceramic	98071064	98071160	
		PTFE	Ceramic	98071065	98071161	

\* Minimum immersion depth for all sizes: approx. 140 mm

## Accessories for suction lances and foot valves with level indication

### Adapters for containers

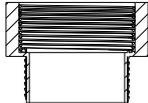
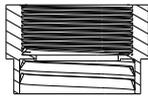
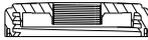
These adapters allow the installation of standard rigid suction lances (G 2" thread) and foot valves with level indication (PE cap) on different types of containers.



TM04 8506 0712

Fig. 34 Adapters for containers

### Technical data

Adapter type	For container type	Remark	Product number
	TM04 8470 0512 Containers without threaded opening, e.g. 100-litre square tank or 1000-litre cylindrical tank	PVC, grey	98071170
	TM04 8471 0512 Containers with 2" NPT threaded opening	PVC, grey	98156690
	Drums with S 70 x 6 coarse thread (MAUSER 2")	PE, blue	98071171
	Drums with S 56 x 4 coarse thread (TriSure®)	PE, orange	98071172
	TM04 8473 0512 Jerricans with small opening (approx. Ø36), according to EN 12713	PE, green	98071173
	Jerricans with medium-sized opening (approx. Ø45), according to EN 12713	PE, yellow	98071174
	Jerricans with large opening (approx. Ø57), according to EN 12713	PE, brown	98071175
	US containers with bung hole of 63 mm (ASTM International)	PE, white	98071176
	TM04 8472 0512 IBC (Intermediate Bulk Container) with opening of Ø150 mm, S 160 x 7	PE, black	98071177

## Emission protection kits

Gas emitted by liquid in a container can cause bad odour and corrosion. Emission protection kits help avoid such problems. Rigid suction lances can be retrofitted with emission protection kits.

Two variants are available:

- Emission protection kit with snifting valve: no gas can escape from the container, but air can be drawn in.
- Emission protection kit for use with filter: gas can escape from the container and air can be drawn in. The kit can be connected to a filter by means of a 4/6 mm hose.

Emission protection kits include:

- Gasket for the tank adapter
- Snifting valve or hose nipple 4/6 mm (hose is not included)
- Gasket for the cable outlet.

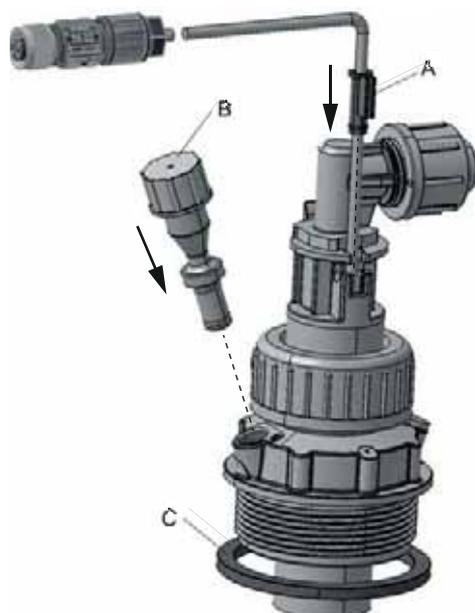


Fig. 35 Emission protection kit

Position	Description
A	Gasket for the cable outlet
B	Air valve
C	Gasket for the tank adapter

## Order data

Variant	Product number
Emission protection kit with snifting valve	98071178
Emission protection kit for use with filter	98071179

## M 12-plug-to-flat-plug adapter

The adapter allows to connect rigid suction lances or foot valves with level indication to pumps with a level input designed for flat plugs (e.g. DMX and DMH with AR control unit).

## Order data

Description	Product number
M 12-plug-to-flat-plug adapter	96635010

## Injection units

Injection units connect the dosing line with the process line. They ensure a minimum counterpressure of 0.7 bar and avoid backflow of the dosing liquid.

In general, they include:

- Injection pipe. PP, PVC and PVDF versions can be shortened.
- Spring-loaded non-return valve with Tantal spring.
- Hose connection set: 4/6 mm, 6/9 mm, 6/12 mm, and 9/12 mm.
- Pipe connection set: threaded, Rp 1/4", internal thread (stainless steel).

## Standard injection units

### Dimensions

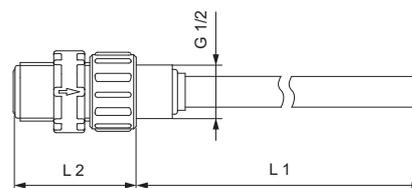


Fig. 36 Standard injection unit, PP, PVC, and PVDF version

TM04 8280 0411

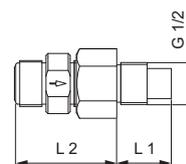


Fig. 37 Standard injection unit, stainless-steel version

TM04 8281 0411

### Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Body	Gasket	Ball	L 1 [mm]	L 2 [mm]	
60	16	PP	FKM	Ceramic	100	47	95730904
			EPDM	Ceramic	100	47	95730908
		PVC	FKM	Ceramic	100	47	95730912
			EPDM	Ceramic	100	47	95730916
		PVDF	PTFE	Ceramic	100	47	95730920
			FKM	Ceramic	100	47	95730924
	100	Stainless steel	EPDM	Ceramic	100	47	95730928
			PTFE	Ceramic	100	47	95730932
		PVC	PTFE	Stainless steel	27	50	95730936
			FKM	Ceramic	300	47	95730940
			EPDM	Ceramic	300	47	95730944
			PTFE	Ceramic	300	47	95730948

## Injection units with lip valve

Injection units with lip valve are typically used to add sodium hypochlorite solution to water with a high carbonate content. The FKM lip prevents crystallisation and blocking caused by alkali carbonate reactions at the point of injection.

### Dimensions

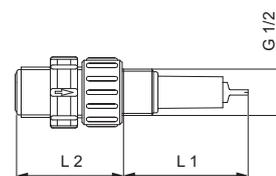


Fig. 38 Injection unit with lip valve

TM04 8282 0411

### Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Body	Gasket	Ball	L 1 [mm]	L 2 [mm]	
60	16	PVC	FKM	Ceramic	55	59	95730964

## Injection units with ball valve

Injection units with ball valve are used for applications where the injection point must be closable. The ball valve is placed between the injection pipe and the spring-loaded non-return valve. Thus, the dosing line can be completely disconnected from the process. The non-return valve can be disassembled and cleaned without stopping the process and emptying the process line.

### Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Body	Gasket	Ball	L 1 [mm]	L 2 [mm]	
60	16	PVC	FKM	Ceramic	100	183	95730952
			EPDM	Ceramic	100	183	95730956
	64	Stainless steel	PTFE	Stainless steel	27	138	95730960

## Injection units with removable injection pipe

Injection units with removable injection pipe are used where regular cleaning of the injection pipe is required. The injection pipe can be removed from the process line without stopping the process water flow. The injection point can be closed with the integrated ball valve. The immersion depth of the injection pipe can be adjusted.

### Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Body	Gasket	Ball	L 1 [mm]	L 2 [mm]	
60	10	PVC	FKM	Ceramic	185	280	95730968
			EPDM	Ceramic	185	280	95730972

## Hot-injection units with ball valve

Hot-injection units with ball valve can be used for direct injection of the dosing medium into processes with a high process water temperature of up to 120 °C. Hot-injection units have a stainless-steel injection pipe and a bendable stainless-steel cooling pipe of 1 metre. The stainless-steel ball valve is installed between the injection pipe and the cooling pipe. The cooling pipe separates the hot parts from the non-return valve and the dosing line.

### Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Body	Gasket	Ball	L 1 [mm]	L 2 [mm]	
60	16	PVDF	PTFE	Ceramic	27	1158	95730976
	64	Stainless steel	PTFE	Stainless steel	27	1158	95730980

### Dimensions

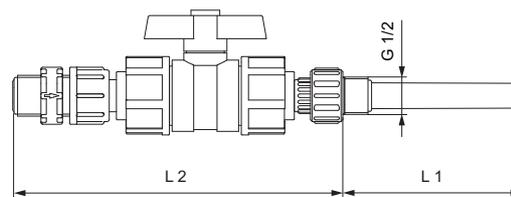


Fig. 39 Injection unit with ball valve

TM04 8284 0411

### Dimensions

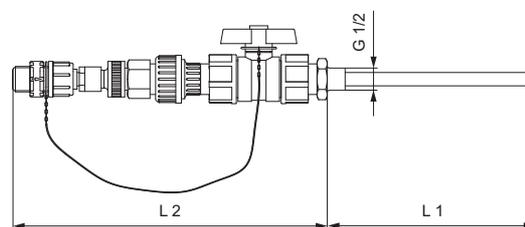


Fig. 40 Injection unit with removable injection pipe

TM04 8285 0411

### Dimensions

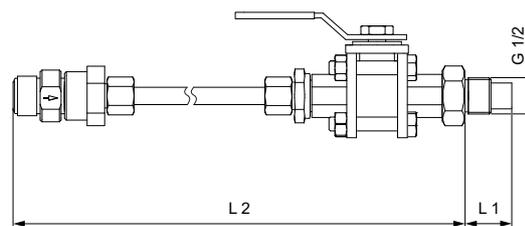


Fig. 41 Hot-injection unit with ball valve

TM04 8286 0411

## Multi-function valves, pressure relief valves, pressure loading valves

Multi-function valves combine the functions of pressure relief valves and pressure loading valves. In addition, they allow deaeration of the pump and emptying of the outlet line for maintenance.

Pressure relief valves protect the pump and the outlet-side installations against excessive pressure. All pressurised dosing installations should include a pressure relief valve.

Pressure loading valves maintain a certain counterpressure for the dosing pump.

They are used in the following applications:

- too low counterpressure or no counterpressure at all
- fluctuating system pressure with outlet-side pulsation damper.
- To prevent syphoning, when the inlet pressure is higher than the counterpressure.



TM04 8287 0411

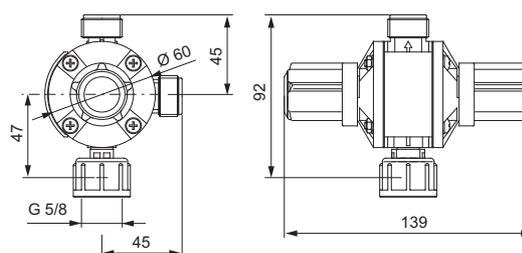
Fig. 42 Multi-function valve, pressure relief valve, pressure loading valve

## Multi-function valves

A multi-function valve is mounted directly on the pump outlet side. The top connection is for the outlet line, the side connection leads the relief liquid back into the tank.

- Loading pressure, adjustable from 1 to 4 bar, is factory-set to 3 bar.
- Relief pressure, adjustable from 7 to 16 bar, is factory-set to 10 bar or 16 bar.
- Maximum operating pressure: 16 bar.
- Hose connection set: 4/6 mm, 6/9 mm, 6/12 mm, and 9/12 mm.

### Dimensions



TM04 8288 0411

Fig. 43 Multi-function valve

### Technical data

Max. flow rate [l/h]	Material				Product number		
	Body	Connections	Gasket	Diaphragm	Relief pressure 10 bar	Relief pressure 16 bar	
60	PVDF	PP	FKM	PTFE	95704585	95730821	
			EPDM	PTFE	95704591	95730822	
		PVC	FKM	PTFE	95730807	95730823	
			EPDM	PTFE	95730808	95730824	
		PVDF	PVDF	PTFE	PTFE	95730809	95730825
				FKM	PTFE	95730810	95730826
				EPDM	PTFE	95730811	95730827
				PTFE	PTFE	95730812	95730828

## Pressure relief valves PRV

Pressure relief valves are installed in the outlet line near the pump using the 2 in-line connections. The side connection leads the relief liquid back into the tank.

- Relief pressure, adjustable from 5 to 10 bar, is factory-set to 10 bar, or
- Relief pressure, adjustable from 7 to 16 bar, is factory-set to 16 bar.
- Maximum operating pressure: 16 bar.
- Hose connection set: 4/6 mm, 6/9 mm, 6/12 mm, and 9/12 mm.
- Pipe connection set: threaded, Rp 1/4", internal thread (stainless steel).

### Technical data

Max. flow rate [l/h]	Material			Product number	
	Diaphragm	Body and connections	Gasket	Relief pressure 10 bar	Relief pressure 16 bar
60	PTFE	PP	FKM / EPDM	95730757	95730773
		PVC	FKM / EPDM	95730758	95730774
			PTFE	95730759	95730775
		PVDF	FKM / EPDM	95730760	95730776
			PTFE	95730761	95730777
Stainless steel	No gaskets	95730771	95730783		

### Dimensions

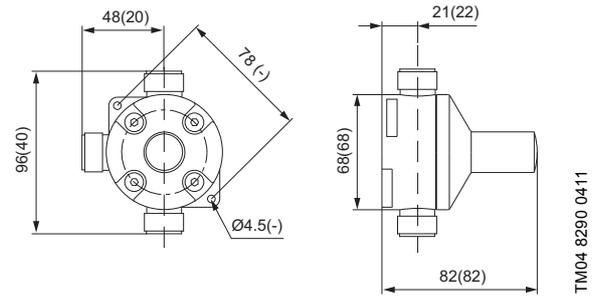


Fig. 44 Pressure relief valve. Dimensions in brackets apply to stainless-steel version.

## Pressure loading valves PLV

Pressure loading valves are installed in the outlet line after the pressure relief valve, and after the pulsation damper, if fitted.

- Loading pressure, adjustable from 1 to 5 bar, is factory-set to 3 bar.
- Maximum operating pressure: 16 bar.
- Hose connection set: 4/6 mm, 6/9 mm, 6/12 mm, and 9/12 mm.
- Pipe connection set: threaded, Rp 1/4", internal thread (stainless steel).

### Dimensions

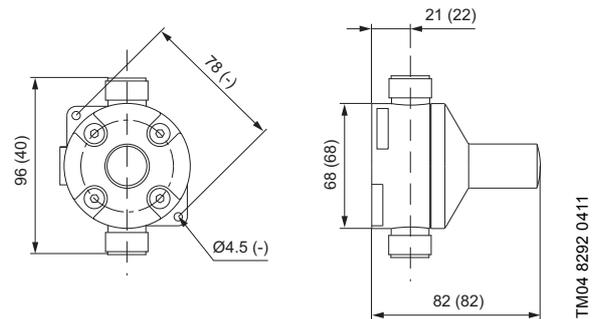


Fig. 45 Pressure loading valve. Dimensions in brackets apply to stainless-steel version.

### Technical data

Max. flow rate [l/h]	Material			Product number
	Diaphragm	Body and connections	Gasket	
60	PTFE	PP	FKM / EPDM	95730741
		PVC	FKM / EPDM	95730742
			PTFE	95730743
		PVDF	FKM / EPDM	95730744
			PTFE	95730745
Stainless steel	No gaskets	95730751		

**Pressure valves**

Pressure valves provide a constant counterpressure of 3 bar. They are particularly required for DDA-FC or DDA-FCM pumps at very small flow rates.

Pressure valves are installed either directly on the pump outlet side, or on the pressure relief valve.

- Loading pressure: 3 bar, not adjustable.
- Maximum system pressure: 16 bar.
- Spring material: Alloy C-4 (NiMo16CrTi, material number 2.4610).
- No connections included.

**Dimensions**

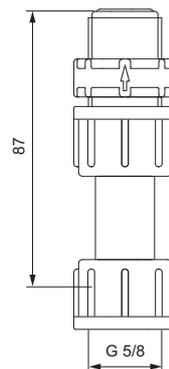


Fig. 46 Pressure valve

TM04 8293 0411

**Technical data**

Max. flow rate [l/h]	Material			Product number
	Ball	Body	Gaskets	
60	Ceramic	PP	FKM	95730325
			EPDM	95730326
		PVC	FKM	95730327
			EPDM	95730328
			PTFE	95730329
		PVDF	FKM	95730330
	EPDM		95730331	
	Stainless steel	Stainless steel	PTFE	95730332
			PTFE	95730333

## Pump connection kits and inlay kits

Retrofit pump connection kits and inlay kits for the integration of Grundfos standard dosing pumps into installations with various sizes of hoses or pipes.

A pump connection kit includes:

- 1 set of inlays
- 1 union nut.

The inlay kits are used to connect pumps and accessories to pipes or hoses that differ from Grundfos standard sizes.

An inlay kit includes:

- 2 sets of inlays.

### Technical data

Connection type	Size	Material	Product number		
			Connection kit	Inlay kit	
Hose (cone and ring)	4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	PP	97691902	-	
		PVC	97691903	-	
		PVDF	97691904	-	
	0.17" x 1/4", 1/4" x 3/8", 3/8" x 1/2"	PP	97691905	-	
		PVC	97691906	-	
		PVDF	97691907	-	
Hose (cone and ring)	4/6 mm, or 0.17" x 1/4"	PP	97702474	95730984	
		PVC	97702485	95730720	
		PVDF	97702495	95730729	
	4/9 mm	PP	98153922	98153977	
		PVC	98153944	98154006	
		PVDF	98153949	98154029	
	5/8 mm	PP	97702475	95730711	
		PVC	97702486	95730721	
		PVDF	97702496	95730730	
	6/8 mm	PP	97702476	95730712	
		PVC	97702487	95730722	
		PVDF	97702497	95730731	
	6/9 mm	PP	97702477	95730713	
		PVC	97702488	95730723	
		PVDF	97702498	95730732	
	6/12 mm	PP	97702478	95730714	
		PVC	97702489	95730724	
		PVDF	97702499	95730733	
	9/12 mm	PP	97702479	95730715	
		PVC	97702490	95730725	
		PVDF	97702500	95730734	
	1/4" x 3/8	PP	97702482	95730718	
		PVC	97702492	95730727	
		PVDF	97702503	95730737	
	3/8" x 1/2"	PP	97702483	95730719	
		PVC	97702493	95730728	
		PVDF	97702504	95730738	
	Hose (cutting ring type)	1/8" x 1/4"	PP	97702481	95730717
			PVDF	97702502	95730736
	Pipe welding	External diameter 16 mm	PP	97702480	95730716
Pipe cementing	Internal diameter 12 mm	PVDF	97702501	95730735	
Pipe, external thread	1/2" NPT	PVC	97702491	95730726	
		PP	97702484	-	
		PVC	97702494	-	
		PVDF	97702505	-	
Pipe, internal thread	1/4"	Stainless steel	97702508	-	
	Rp 1/4"	Stainless steel	97702472	95730739	
	1/4" NPT	Stainless steel	97702473	95730740	
Pipe (cutting ring type)	4/6 mm	Stainless steel	97702506	-	
	8/10 mm	Stainless steel	97702507	-	



Fig. 47 Left: pump connection kit; right: inlay kit

## Adapters

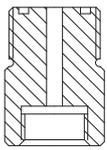
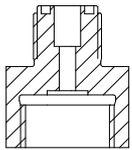
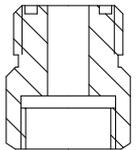
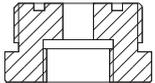
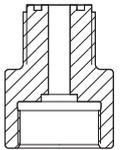
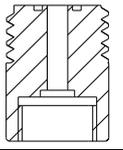
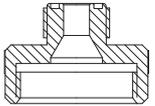
### Threaded adapters

Threaded adapters are used to convert between different threaded connection sizes.

A threaded adapter kit includes:

- 1 adapter
- 1 O-ring.

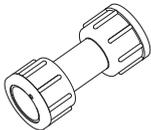
#### Technical data

Type	Threaded connection size		Material		Product number	
	Internal thread	External thread	Body	Gaskets		
	TM04 8296 0411	G 3/8"	G 5/8"	PP	FKM / EPDM	95730407
				PVC	FKM / EPDM	95730408
					PTFE	95730409
				PVDF	FKM / EPDM	95730410
	TM04 8297 0411	G 5/8"	G 3/8"	PP	FKM / EPDM	95730412
				PVC	FKM / EPDM	95730413
					PTFE	95730414
				PVDF	FKM / EPDM	95730415
	TM04 8298 0411	G 5/8"	G 3/4"	PP	FKM / EPDM	95730417
				PVC	FKM / EPDM	95730418
					PTFE	95730419
				PVDF	FKM / EPDM	95730420
	TM04 8299 0411	G 5/8"	G 1 1/4"	PP	FKM / EPDM	95730422
				PVC	FKM / EPDM	95730423
					PTFE	95730424
				PVDF	FKM / EPDM	95730425
	TM04 8300 0411	G 5/8"	M 20 x 1.5	PP	FKM / EPDM	95730427
				PVC	FKM / EPDM	95730428
					PTFE	95730429
				PVDF	FKM / EPDM	95730430
	TM04 8475 0612	G 5/8"	M 30 x 3.5	PVDF	FKM / EPDM	98154048
					PTFE	98154054
	TM04 8301 0411	G 1 1/4"	G 5/8"	PP	FKM / EPDM	95730432
				PVC	FKM / EPDM	95730433
					PTFE	95730434
				PVDF	FKM / EPDM	95730435
					PTFE	95730436

### Union nut adapters

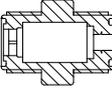
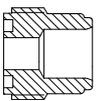
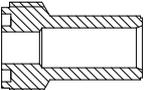
Union nut adapters consist of a rigid pipe with union nuts on both ends. They have neither gaskets nor glued or welded connections.

#### Technical data

Type	Threaded connection size		Material	Product number	
	Internal thread	Internal thread	Body		
	TM04 8306 0411	G 5/8"	G 5/8"	PVC	95730437
				PP	95730438
				PVDF	95730439

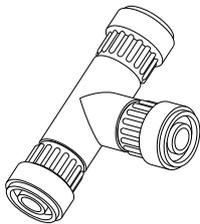
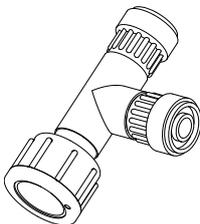
## Hose-to-hose and hose-to-pipe adapters

## Technical data

Type	Description	Connections		Material		Product number	
		Side 1	Side 2	Body and connections	Gaskets		
	Valve body with two external threads G 5/8"	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	Without	Threaded Rp 1/4	PP	FKM / EPDM	95730367
					PVC	FKM / EPDM	95730368
						PTFE	95730369
					PVDF	FKM / EPDM	95730370
						PTFE	95730371
					PP	FKM / EPDM	95730356
					PVC	FKM / EPDM	95730357
						PTFE	95730358
					PVDF	FKM / EPDM	95730359
						PTFE	95730360
		Without	Threaded Rp 1/4	Stainless steel	PTFE	95730361	
	Pipe cementing end on one side, external thread G 5/8" on the other side	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	Without	Internal Ø12 mm	PVC	FKM / EPDM	95730378
						PTFE	95730379
					PVC	FKM / EPDM	95730365
						PTFE	95730366
	Pipe welding end on one side, external thread G 5/8" on the other side	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	Without	External Ø16 mm	PP	FKM / EPDM	95730377
					PVDF	FKM / EPDM	95730380
						PTFE	95730381
					PP	FKM / EPDM	95730362
					PVDF	FKM / EPDM	95730363
						PTFE	95730364

## T-pieces

## Technical data

Type	Description	Connections			Material		Product number	
		Bottom	Top	Side	Body and connections	Gaskets		
	Three external threads G 5/8"	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	-	Without	-	PP	FKM / EPDM	95730387
						PVC	FKM / EPDM	95730388
							PTFE	95730389
						PVDF	FKM / EPDM	95730390
							PTFE	95730391
						PP	FKM / EPDM	95730346
						PVC	FKM / EPDM	95730347
							PTFE	95730348
						PVDF	FKM / EPDM	95730349
							PTFE	95730350
	Two male threads G 5/8", one internal connection with union nut	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	Union nut G 5/8"	Without	Without	PP	FKM / EPDM	95730397
						PVC	FKM / EPDM	95730398
							PTFE	95730399
						PVDF	FKM / EPDM	95730400
							PTFE	95730401
						PP	FKM / EPDM	95730351
						PVC	FKM / EPDM	95730352
							PTFE	95730353
						PVDF	FKM / EPDM	95730354
	PTFE	95730355						

## Dosing tanks

### Square tank, 100 litres

The closed, square tank has a screw cap and a mounting platform for one pump or two pumps in parallel.

The pump mounting platform is higher than the screw cap to protect pumps and connections when filling chemicals into the tank.

- Tank material: MDPE
- Weight: 15 kg
- Wall thickness: 4 mm
- Liquid temperature: -20 °C to +45 °C.

SMART Digital S pumps can be fitted directly on the mounting platform by means of brass inserts moulded into the platform. For other pumps a bracket is required.

The square tank is prepared for a G 3/4" drain valve.

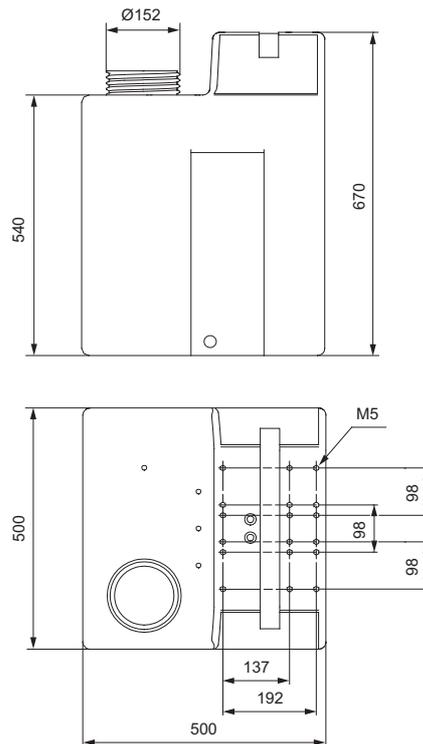
When using a rigid suction lance in the tank, choose the counter nut for fixing (see page 41).



Fig. 48 Square tank

TM04 8307 0411

### Dimensions



TM04 8308 0411

Fig. 49 Square tank, dimensions

### Order data

Tank volume [l]	Product number
100	96489271

## Cylindrical tanks

Cylindrical tanks are available transparent or black. They have a litre scale and a black screw cap.

- Tank material: LLDPE, UV-stabilised
- Liquid temperature: -20 °C to +45 °C.

All cylindrical tanks are prepared for a G 3/4" opening for a drain valve, and have a screw plug (PE/EPDM).

The cylindrical tanks with volumes of 60, 100, 200, 300 and 500 litres include additionally:

- Threaded M 6 inserts for the assembly of a SMART Digital S, a DDI, or a DMX model 221 dosing pump. For other pumps a bracket is required.
- A G 2" opening for a rigid suction lance or a foot valve, closed with a screw plug
- A flange for an electric stirrer with threaded inserts
- Threaded M 6 inserts at the bottom part for floor mounting with a set of floor-mounting brackets (see page 54).



Fig. 50 Cylindrical tank, 60 litres

TM04 8468 0412

### Technical data

Tank volume [l]	Prepared for direct assembly of an electric stirrer	Weight [kg]	Product number	
			Transparent	Black
40	-	3.4	96688081	95701166
60	-	5.5	98148805	98149053
	Yes	5.5	98150038	98150040
100	-	7.5	98149057	98149082
	Yes	7.5	98150051	98150052
200	-	11.5	98149215	98149224
	Yes	11.5	98150053	98150054
300	-	13	98149245	98149252
	Yes	13	98150055	98150056
500	-	28	98149266	98149269
	Yes	28	98150057	98150058
1000	-	40	96688086	95706305
	Yes, with reinforced beam	48	98173675	98173752

### Dimensions

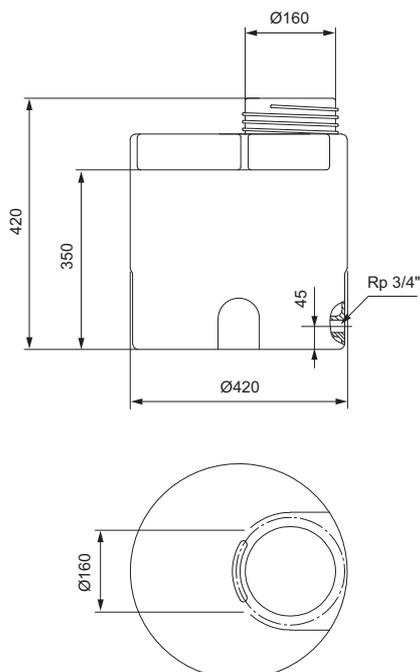


Fig. 51 Cylindrical tank, 40 litres

TM04 8310 0411

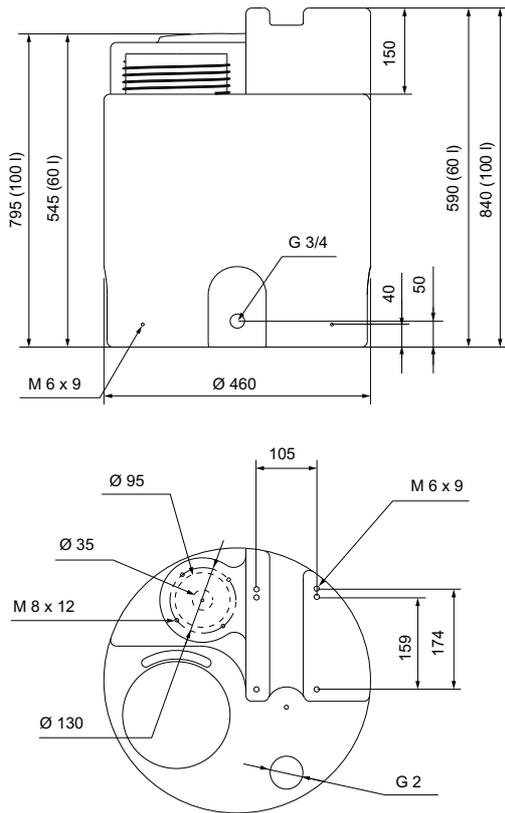


Fig. 52 Cylindrical tank, 60 and 100 litres

TM04 8465 0412

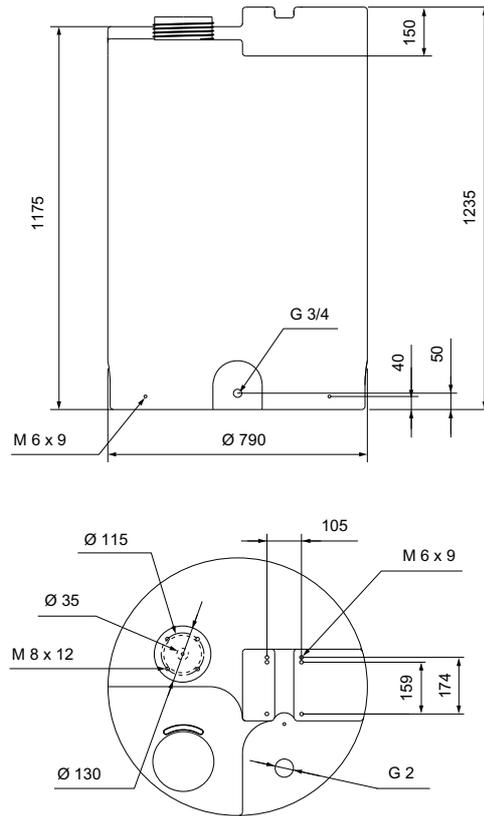


Fig. 54 Cylindrical tank, 500 litres

TM04 8467 0412

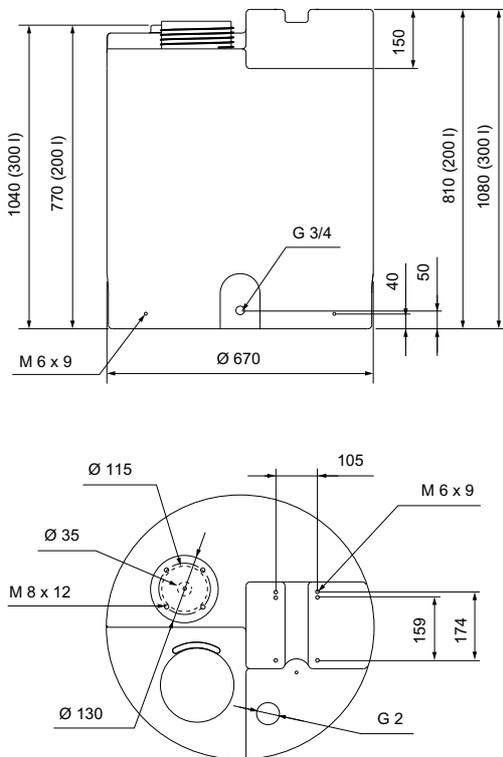


Fig. 53 Cylindrical tank, 200 and 300 litres

TM04 8466 0412

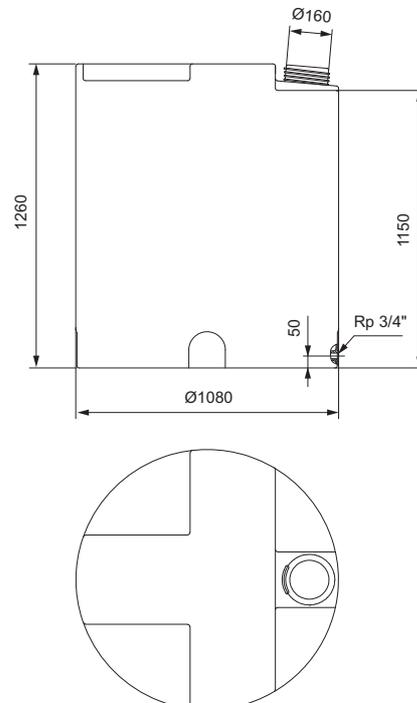


Fig. 55 Cylindrical tank, 1000 litres

TM04 8315 0411

## Collecting tray

The collecting tray is available in several sizes to suit the respective dosing tank size. It collects chemicals that might leak out of the tank, and protects the environment.

- Material: PE
- Colour: transparent.

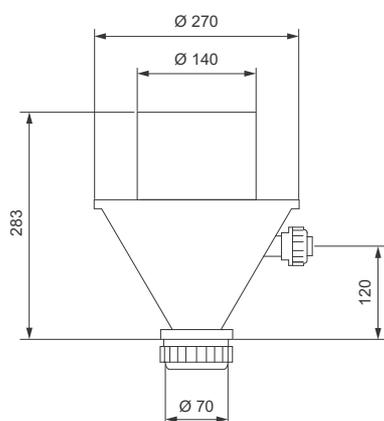


TM04 8316 0411

Fig. 56 Collecting tray

For tank size [l]	Volume [l]	Dimensions (diameter x height) [mm]	Product number
60	80	500 x 545	96726831
100	120	500 x 700	96726832
200	210	770 x 595	98150059
300	400	770 x 960	96726834
500	500	860 x 980	95701272
1000	1000	1150 x 1080	96726836

## Accessories for dosing tanks



TM04 8318 0411

Fig. 57 Dissolving hopper, dimensions



TM04 8477 0512

Fig. 58 Handheld mixer

### Technical data

Description	Specifications	Material	Product number
Drain valve for installation in the threaded sleeve of the dosing tank	Dosing tank connection G 3/4"	PVC	96689132
Ventilation valve	Spring-loaded, opening pressure 0.05 bar	PVC / FKM / glass	96694401
Dissolving hopper for washing powders into the dosing tank	Dosing tank connection: DN 40 through-bolt; water connection: G 5/4", with union nut and inlay for PVC pipe (cementing diameter 25 mm)	PVC	96726979
Handheld mixer for use in dosing tanks	Shaft length 1200 mm, length can be adapted to the corresponding dosing tank, with DN 15 through-bolt for connection at the dosing tank	PE	98133793
Set of floor-mounting brackets	4 floor-mounting brackets with fixing screws		98149921
Set of screws for mounting a pump on a 100-litre square tank	For pump types DDA, DDC, DDE	Stainless steel	95730862
Set of screws for mounting a pump on a 60-, 100-, 200-, 300-, or a 500-litre cylindrical tank	For pump types DDA, DDC, DDE, DDI, DMX model 221	Stainless steel	98159495
Set of screws for mounting a pump on a 40-litre or a 1000-litre cylindrical tank	For pump types DDA, DDC, DDE, DDI, DMX model 221	PP	95730864

## Water meter

The in-line water meter with potential-free pulse signal is suitable for use in flow-proportional dosing applications.

- Qn 1.5 and Qn 2.5 meters are of the multi-jet, dry dial type, for cold water up to 30 °C, or hot water up to 90 °C.
- Qn 15 meters and up are of the helical vane type, for cold water up to 50 °C, or hot water up to 120 °C.
- Max. pressure: 16 bar.

If the water meter is connected directly to the pump pulse input, use a control plug (PN 96698715).

- Qn 1.5 to Qn 15 meters are threaded.
- Qn 40 to Qn 150 meters are flanged.
- Cable length: 3 m.



Fig. 59 Water meter

TM04 8317 0411

Qn [m <sup>3</sup> /h]	Pulse rate [l/pulse]	Maximum short-period capacity [m <sup>3</sup> /h]	Maximum pressure [bar]	Transitional capacity with error ± 2 % [l/h]	Minimum capacity with error ± 5 % [l/h]	Product number			
						Maximum water temperature			
						30 °C	50 °C	90 °C	120 °C
1.5*	1	3	16	120	50	96446846	-	96446897	-
2.5*	2.5	5	16	200	70	96446847	-	96446898	-
15*	10	30	16	3000	450	-	96446848	-	96446899
1.5*	0.25	3	16	120	50	96482640	-	96482643	-
2.5*	0.25	5	16	200	70	96482641	-	96482644	-
15*	2.5	30	16	3000	450	96482642	-	96482645	-
40**	100	80	10	4000	700	-	96446849	-	96446900
60**	25	120	10	6000	1200	-	96446850	-	96446901
150**	100	300	10	12000	3000	-	96446851	-	96446902

\* Maximum load, Reed contact: 30 VAC/VDC, 0.2 A.

\*\* Maximum load, Namur contact: 8-12 VDC, 1 kOhm (requires external power supply).

### Dimensions

Size	Connections	Installation kit connection	Port-to-port length [mm]	Port-to-port length incl. kit [mm]
<b>Threaded connection</b>				
Qn 1.5	G 3/4"	G 1/2"	165	245
Qn 2.5	G 1"	G 3/4"	190	288
Qn 15	G 2.5	G 2"	300	438
<b>Flanged connection</b>				
Qn 40	DN 80		225	-
Qn 60	DN 100		250	-
Qn 150	DN 150		300	-

## 9. Pumped liquids

The resistance table below is intended as a general guide for material resistance (at room temperature), and does not replace testing of the chemicals and pump materials under specific working conditions.

The data shown are based on information from various sources available, but many factors (purity, temperature, abrasive particles, etc.) may affect the chemical resistance of a given material.

**Note:** Some of the liquids in this table may be toxic, corrosive or hazardous. Please be careful when handling these liquids.

Pumped liquid (20 °C)			Material								
			Dosing head				Gasket			Ball	PE (Accessories)
Description	Chemical formula	Concentration %	PP	PVDF	SS 1.4401	PVC	FKM	EPDM	PTFE	Ceramic	
			Acetic acid	CH <sub>3</sub> COOH	25	•	•	•	•	-	•
60	•	•			•	•	-	•	•	•	
85	•	•			○	-	-	-	•	•	-
Aluminium chloride	AlCl <sub>3</sub>	40	•	•	-	•	•	•	•	•	
Aluminium sulphate	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	60	•	•	•	•	•	•	•	•	
Ammonia, aqueous	NH <sub>4</sub> OH	28	•	-	•	•	-	•	•	•	
Calcium hydroxide ★ <sup>7</sup>	Ca(OH) <sub>2</sub>		•	•	•	•	•	•	•	•	
Calcium hypochlorite	Ca(OCl) <sub>2</sub>	20	○	•	-	•	•	•	•	•	
		10	•	•	•	•	•	•	•	•	
		30	-	•	-	•	•	○	•	•	
Chromic acid	H <sub>2</sub> CrO <sub>4</sub>	50	-	•	-	•	•	-	•	•	
		30	•	•	•	•	•	•	•	•	
Copper sulphate	CuSO <sub>4</sub>	30	•	•	•	•	•	•	•	•	
Ferric chloride ★ <sup>3</sup>	FeCl <sub>3</sub>	60	•	•	-	•	•	•	•	•	
Ferric sulphate ★ <sup>3</sup>	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	60	•	•	○	•	•	•	•	•	
Ferrous chloride	FeCl <sub>2</sub>	40	•	•	-	•	•	•	•	•	
Ferrous sulphate	FeSO <sub>4</sub>	50	•	•	•	•	•	•	•	•	
Fluosilicic acid	H <sub>2</sub> SiF <sub>6</sub>	40	•	•	○	•	-	○	•	•	
Hydrochloric acid	HCl	< 25	•	•	-	•	•	•	•	•	
		25-37	•	•	-	•	•	○	•	•	
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	30	•	•	•	•	•	•	•	•	
		30	•	•	•	•	•	•	•	•	
Nitric acid	HNO <sub>3</sub>	40	○	•	•	•	•	-	•	•	
		70	-	•	•	-	•	-	•	○	
Peracetic acid	CH <sub>3</sub> COOOH	5-15	○	•	○	○	-	-	•	○	
Potassium hydroxide	KOH	50	•	-	•	•	-	•	•	•	
Potassium permanganate	KMnO <sub>4</sub>	10	•	•	•	•	○	•	•	•	
Sodium chlorate	NaClO <sub>3</sub>	30	•	•	•	•	•	•	•	•	
Sodium chloride	NaCl	30	•	•	-	•	•	•	•	•	
Sodium chlorite	NaClO <sub>2</sub>	20	•	•	-	○	•	•	•	•	
		30	•	•	•	•	○	•	•	•	
Sodium hydroxide	NaOH	50	•	•	•	•	-	•	•	•	
		12-15	-	•	-	•	•	•	•	•	
Sodium hypochlorite	NaClO	12-15	-	•	-	•	•	•	•	•	
Sodium sulphide	Na <sub>2</sub> S	30	•	•	•	•	•	•	•	•	
Sodium sulphite	Na <sub>2</sub> SO <sub>3</sub>	20	•	•	•	•	•	•	•	•	
Sodium thiosulfate	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	10	•	•	•	•	•	•	•	•	
Sulphurous acid	H <sub>2</sub> SO <sub>3</sub>	6	•	•	•	•	•	•	•	•	
		< 80	•	•	-	•	•	○	•	•	
		80-96	○	•	-	•	•	-	•	-	
Sulphuric acid ★ <sup>4</sup>	H <sub>2</sub> SO <sub>4</sub>	98	-	•	•	-	○	-	•	-	

• Resistant

★<sup>3</sup>Risk of crystallisation.

○ Limited resistance

★<sup>4</sup>Reacts violently with water and generates much heat.  
(Pump should be absolutely dry before dosing sulphuric acid.)

- Not resistant

★<sup>7</sup>Once the pump is stopped, calcium hydroxide will sediment rapidly.

Further information:

<http://product-selection.grundfos.com/liquids.html>

# 10. Grundfos Product Center

Online search and sizing tool to help you make the right choice.

<http://product-selection.grundfos.com>



**SIZING** enables you to size a pump based on entered data and selection choices.

**REPLACEMENT** enables you to find a replacement product. Search results will include information on

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.

The screenshot shows the Grundfos Product Center website. At the top, there is a navigation bar with the logo and menu items: HOME, FIND PRODUCT, COMPARE, YOUR PROJECTS, SAVED ITEMS, and HELP. Below this is a search bar with a 'SEARCH' button. The main content area features four large buttons: 'SIZING' (Enter pump sizing), 'CATALOGUE' (Products and services), 'REPLACEMENT' (Replace an old pump with a new), and 'LIQUIDS' (Find pump by liquid). Below these buttons is the 'QUICK SIZING' tool, which includes input fields for 'Flow (Q)\*' and 'Head (H)\*', a 'Select what to size by' section with radio buttons for 'Size by application', 'Size by pump design', and 'Size by pump family', and a 'START SIZING' button. At the bottom of the tool, there are options for 'ADVANCED SIZING' with checkboxes for 'Advanced sizing by application' and 'Guided selection'.

**CATALOGUE** gives you access to the Grundfos product catalogue.

**LIQUIDS** enables you to find pumps designed for aggressive, flammable or other special liquids.

## All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

## Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

Subject to alterations.

be think innovate

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