

# SMART Digital

DDA, DDC, DDE

## DIGITAL DOSING

pumps and accessories



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# 1. General data

## Performance range

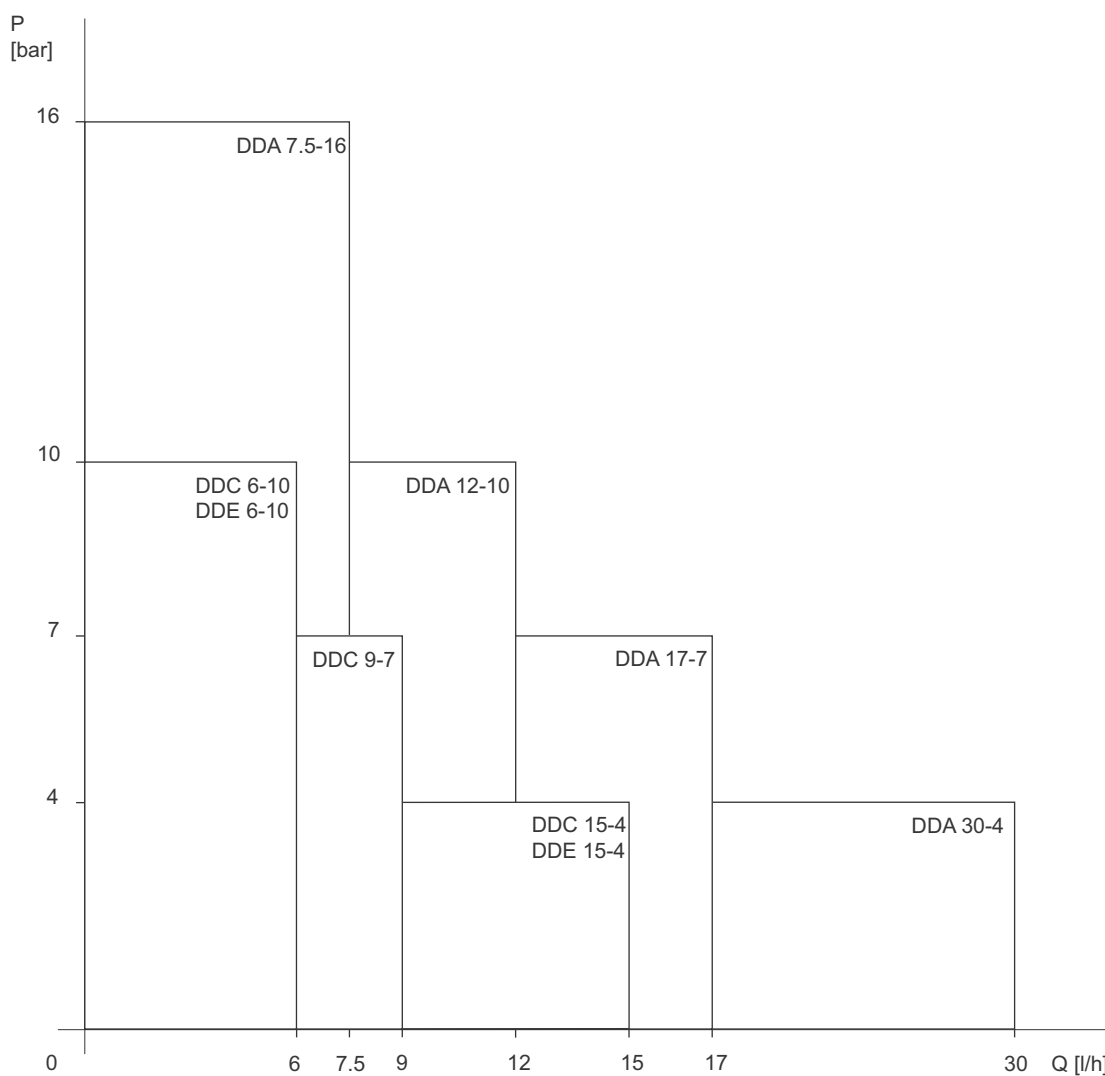


Fig. 1 Performance range

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## Features at a glance



Fig. 2 DDA, DDC, DDE

### Digital Dosing™

The SMART Digital generation DDA, DDC and DDE with powerful variable-speed stepper motor brings state-of-the-art technology to perfection. Combined expert knowledge and the new patented solutions set future standards. Traditional technologies such as stroke length / 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 new 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.



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 20 languages make commissioning and operation intuitive. As the LCD is backlit in different colors, the pump status can be seen from a distance (traffic-light concept).



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 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 U7U7 F G**

<p><b>Type range</b></p> <p>DDA DDC DDE</p> <p><b>Maximum flow [l/h]</b></p> <p><b>Maximum pressure [bar]</b></p> <p><b>Control variant</b></p> <p>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)</p> <p><b>Dosing head variant</b></p> <p>PP Polypropylene PVC Polyvinyl chloride** PV PVDF (polyvinylidene fluoride) SS Stainless steel 1.4401</p> <p><b>Gasket material</b></p> <p>E EPDM V FKM T PTFE</p> <p><b>Valve ball material</b></p> <p>C Ceramic SS Stainless steel 1.4401</p> <p><b>Control cube position</b></p> <p>F Front-mounted (change to left and right possible) X No control cube (DDE)</p>	<p><b>Special variant</b></p> <p>C3 Inspection Certificate 3.1 (EN 10204)</p> <p><b>Design</b></p> <p>G Grundfos</p> <p><b>Mains plug</b></p> <p>F EU B USA, Canada G UK I Australia, New Zealand, Taiwan E Switzerland J Japan L Argentina X No plug (only 24-48 VDC)***</p> <p><b>Connection, suction/discharge</b></p> <p>U2U2 Tubing 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm U7U7 Tubing 0.17" x 1/4"; 1/4" x 3/8"; 3/8" x 1/2" AA Threaded, Rp 1/4", female (SS) VV Threaded, NPT 1/4", female (SS) XX No connection</p> <p><b>Installation set*</b></p> <p>I001 Tubing 4/6 mm (up to 7.5 l/h, 13 bar) I002 Tubing 9/12 mm (up to 60 l/h, 9 bar) I003 Tubing 0.17" x 1/4" (up to 7.5 l/h, 13 bar) I004 Tubing 3/8" x 1/2" (up to 60 l/h, 10 bar)</p> <p><b>Valve type</b></p> <p>1 Standard 2 Spring-loaded</p> <p>0.1 bar suction opening pressure 0.1 bar discharge opening pressure</p> <p><b>Supply voltage</b></p> <p>3 1 x 100-240 V, 50/60 Hz I 24-48 VDC (DDC)***</p>
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\* Including 2 pump connections, foot valve, injection unit, 6 m PE discharge tubing, 2 m PVC suction tubing, 2 m PVC deaeration tubing (4/6 mm)

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

\*\*\* Planned for 2013

### 3. Functions

#### Overview of functions

	 Control variant: 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 milliliters, liters or US-gallons	•	•	•	•	•			
Graphical display with background light in four colors 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

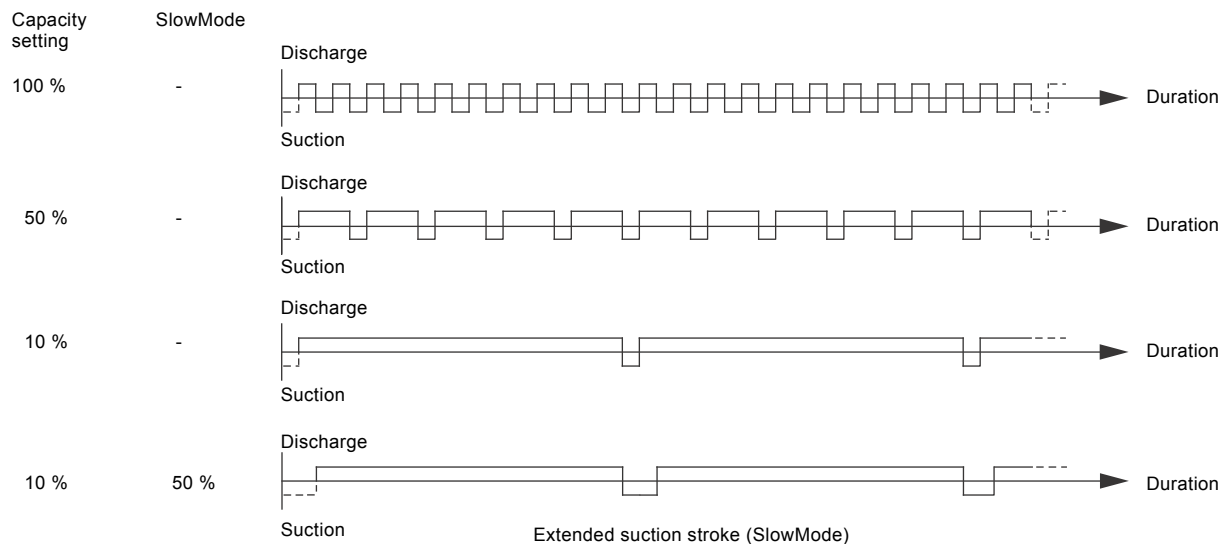
## Functional description

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 (turndown 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.



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

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### 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: at the front or at the left or at the right of the pump

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### Operating elements DDA and DDC

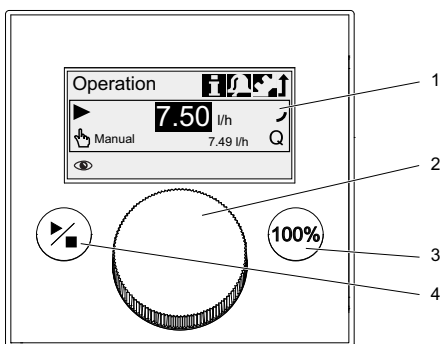


Fig. 7 Operating elements DDA and DDC

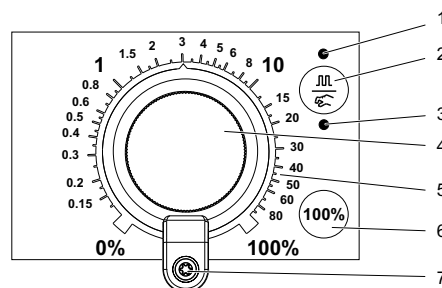
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Pos.	Description
1	Graphical LC display
2	Click wheel
3	100 % key (deaeration)
4	Start/Stop key

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



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Fig. 8 Operating elements DDE

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.

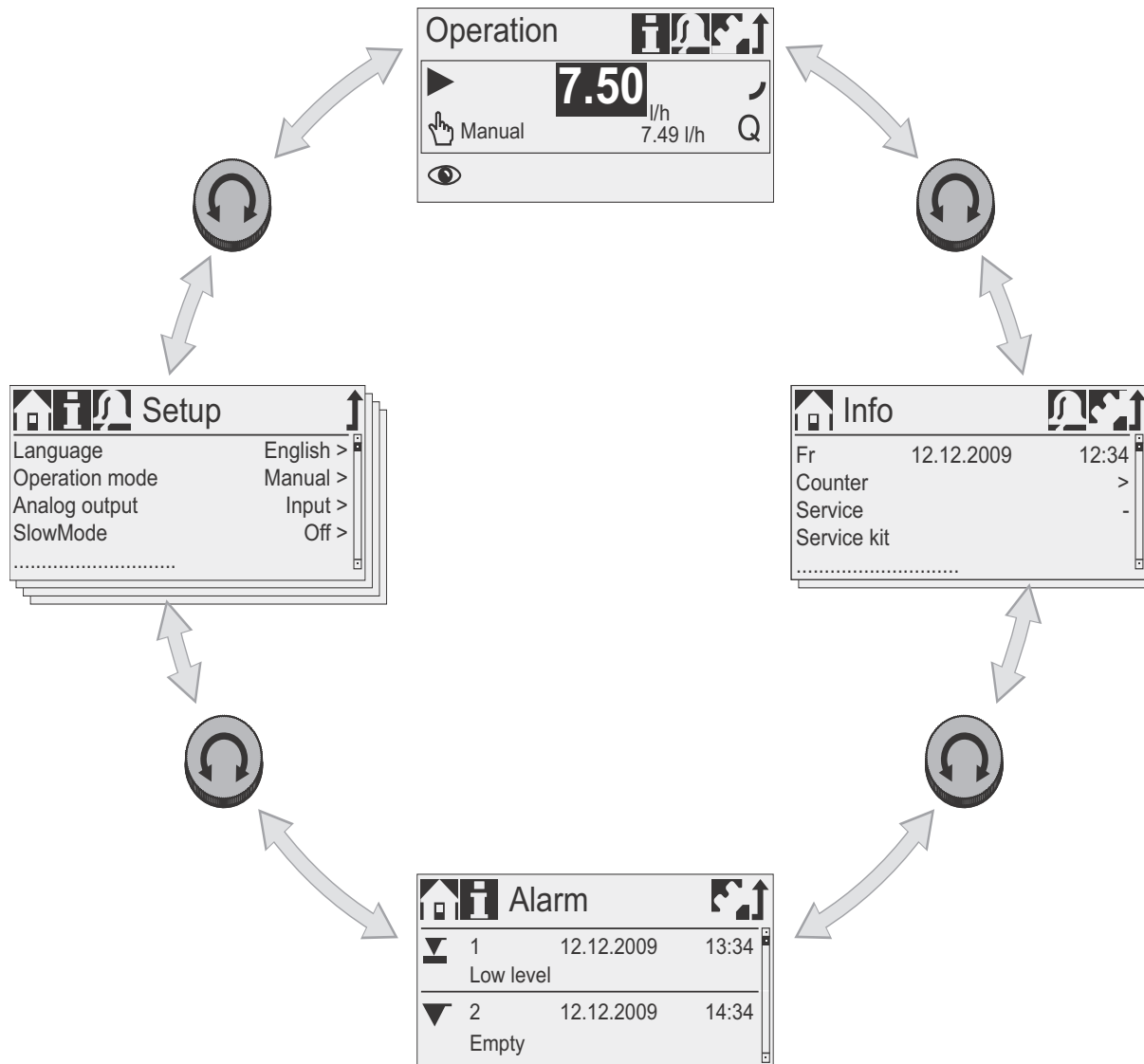
Depending on the selected operation mode, the respective status LED (pulse or manual) is activated according to the following table:

LED color	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 up to 29 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

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## 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 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 - 14.8
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

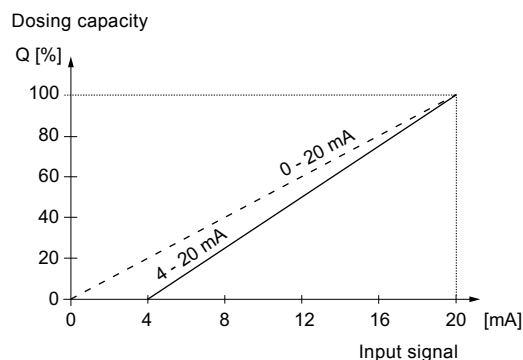
### Analog 0/4-20 mA control



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 %

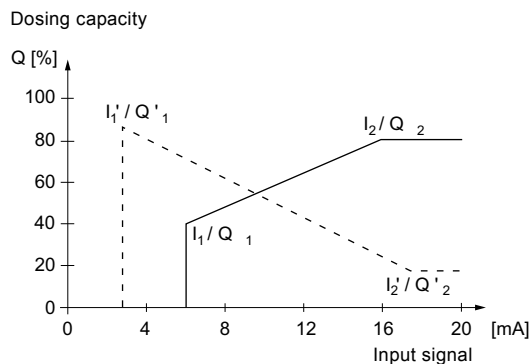


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Fig. 10 0/4-20 mA control

Applies to DDA

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



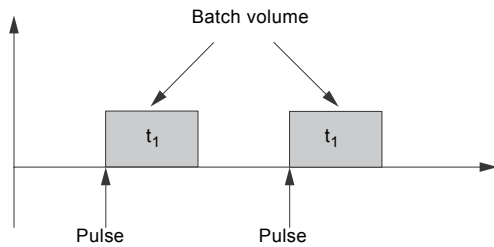
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Fig. 11 Analog scaling

### 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

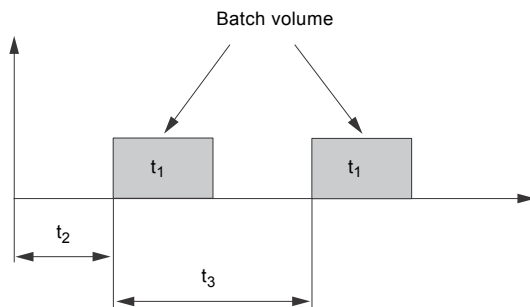
Pump type	Setting range		
	From [ml/batch]	To [l/batch]	Resolution* [ml]
DDA 7.5-16	0.74	999	0.09
DDA 12-10	1.45	999	0.18
DDA 17-7	1.55	999	0.19
DDA 30-4	3.10	999	0.39

\* 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.

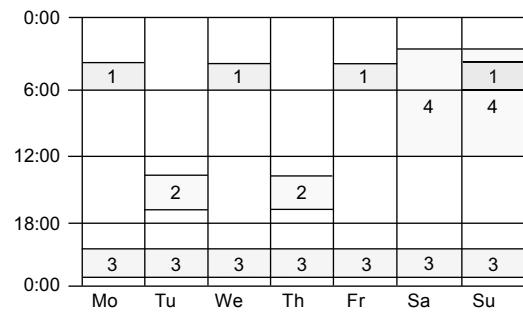
### Dosing timer week

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 control variant*

With the external stop function, the pump can be stopped from a remote place by an external contact signal. 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 contact, 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 **i** menu tab.

Counter	Description	Resettable
Volume	Accumulated dosed quantity in liters 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 optimized 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 material 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, e.g. with abrasive particles, 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 control variant

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 control variant

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	Mapped 1:1 to the analog input, e.g. used in master-slave applications	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 150 module (see page 36) the pump can be integrated into a Profibus DP network.

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





Fig. 15 DDA with E-box





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## 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 (liter/milliliter/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.

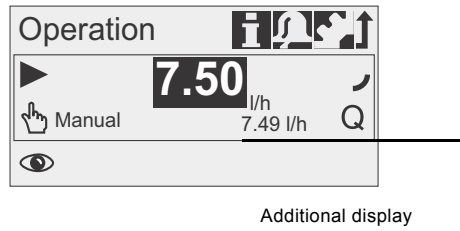










Fig. 16 Additional display

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 control variant



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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:

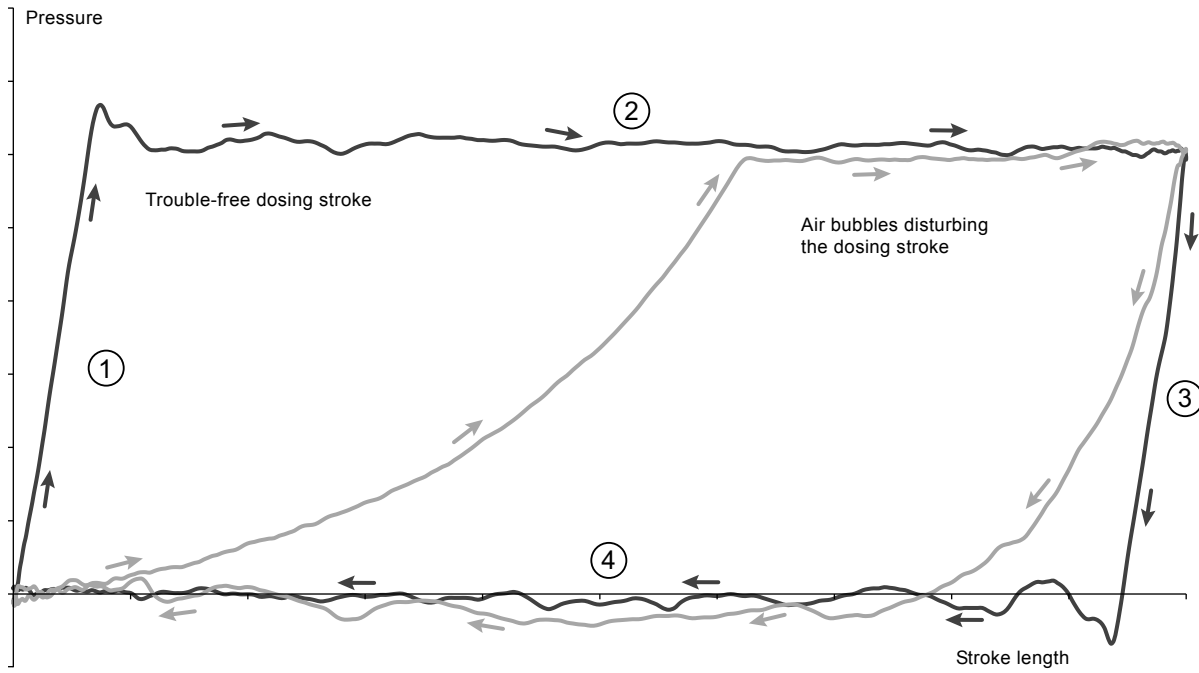
- Overpressure
- Discharge line burst
- Air bubbles in the dosing head
- Cavitation at the suction side
- Suction valve leakage
- Discharge valve leakage.

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) (see page 44).





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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 control variant*

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 control variant*

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 control variant*

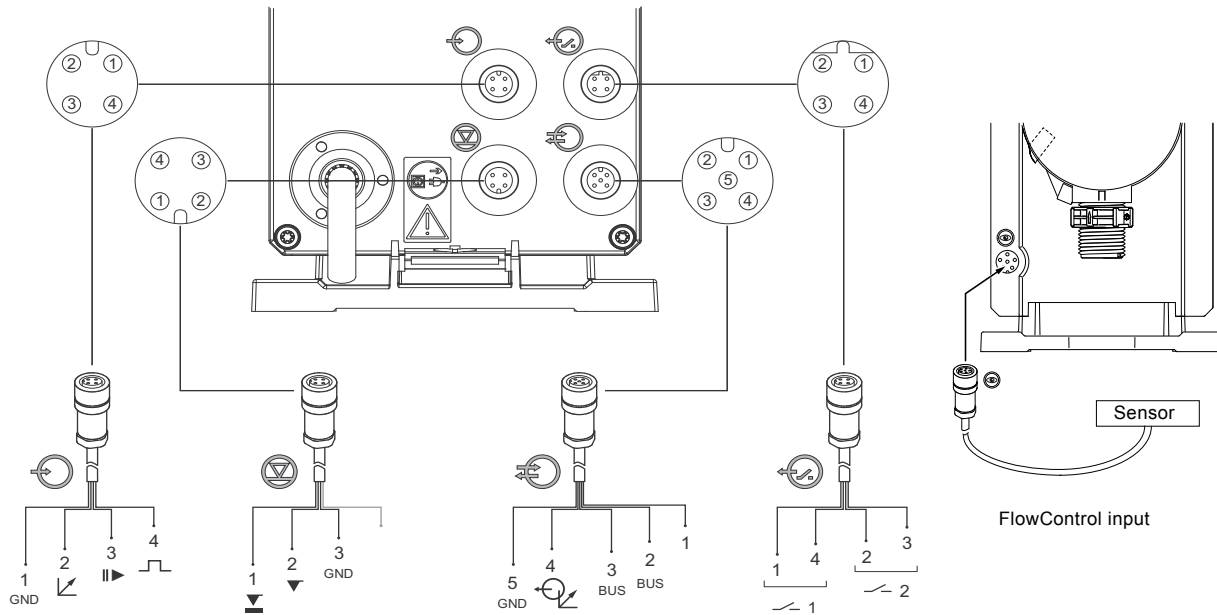
When activating the AutoFlowAdapt function even environmental changes will be compensated, so that the required target flow rate will be achieved. The integrated AutoFlowAdapt makes additional monitoring and control devices redundant. The AutoFlowAdapt function is based on:

- 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



**Cable 1**  
Analog/external stop/pulse  
Material No.  
2 m cable: 96609014  
5 m cable: 96609016

**Cable 2**  
Level input  
see page 38xx, suction  
lances

**Cable 3**  
GENIbus, analog output  
Material No.  
2 m cable: 96632921  
5 m cable: 96632922

**Cable 4**  
Relay output  
Material No.  
2 m cable: 96609017  
5 m cable: 96609019

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**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

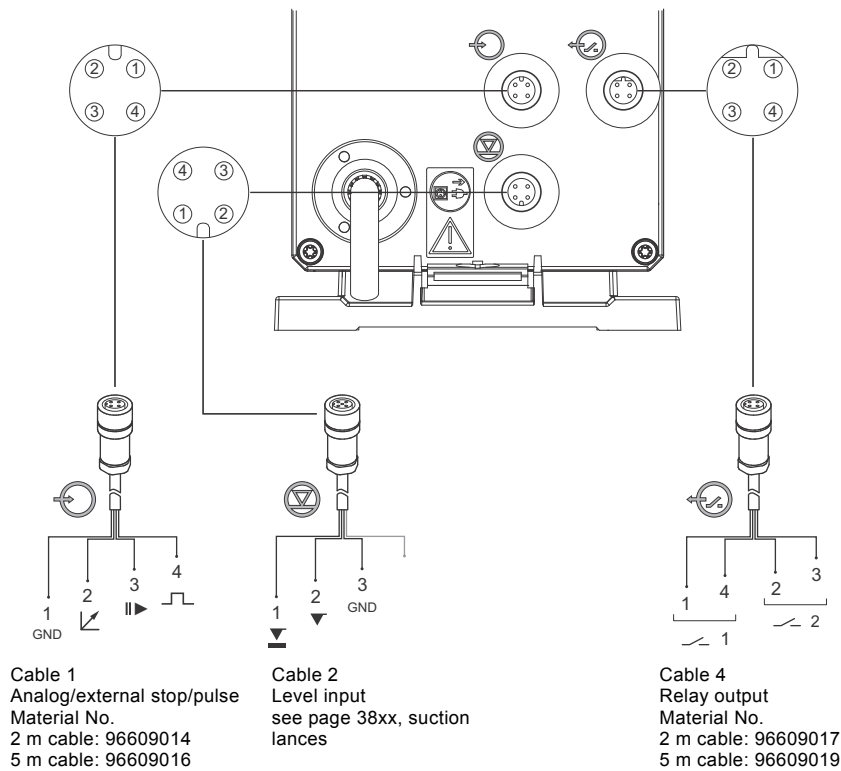
**Cable 3: GENIbus, analog output**

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

**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

## Wiring diagram, DDC



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**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**

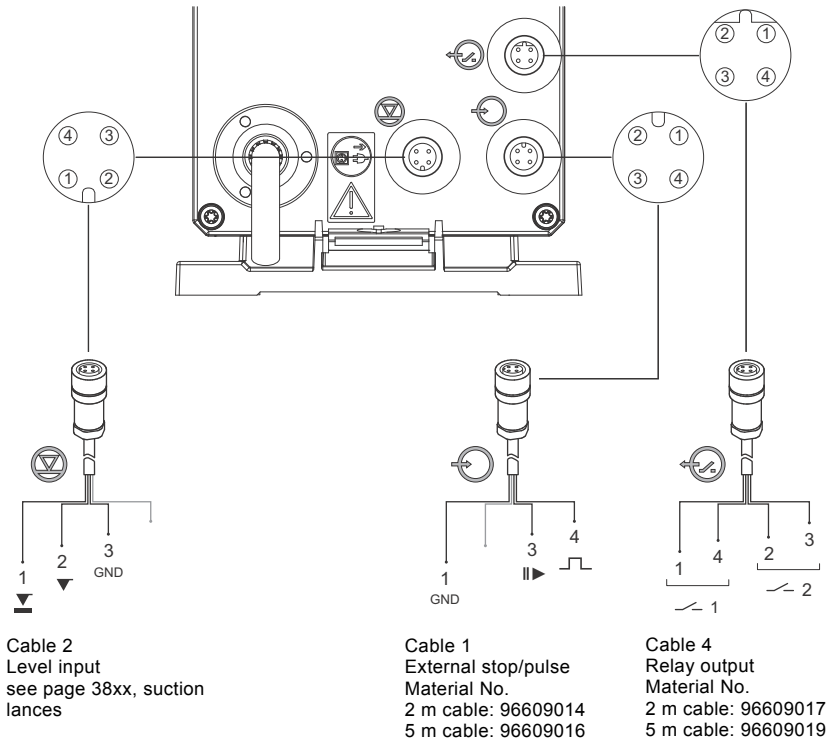
	Function	Pin holes				Plug type
		1	2	3	4	
	Low level	X		GND		Contact
	Empty tank		X	GND		Contact

**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 control variant

### 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 control variant

## 4. Construction

### DDA and DDC

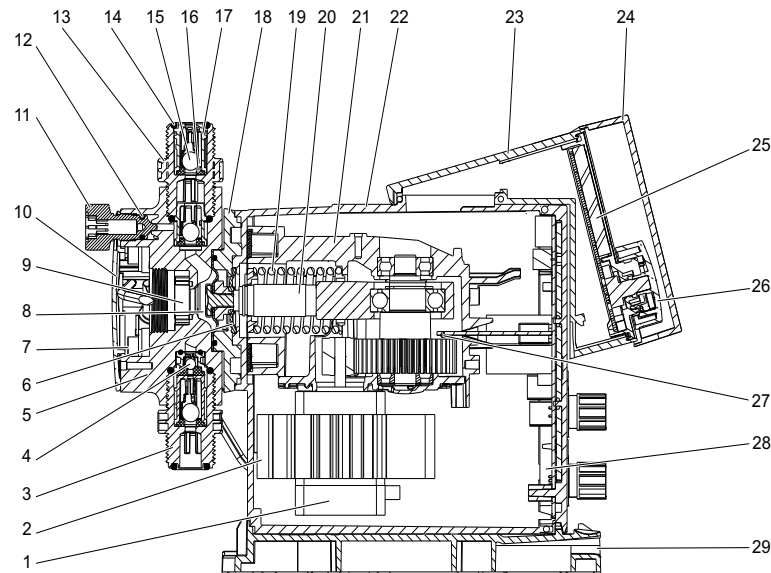


Fig. 19 Sectional drawing, DDA

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 optimized 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 - optimized 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

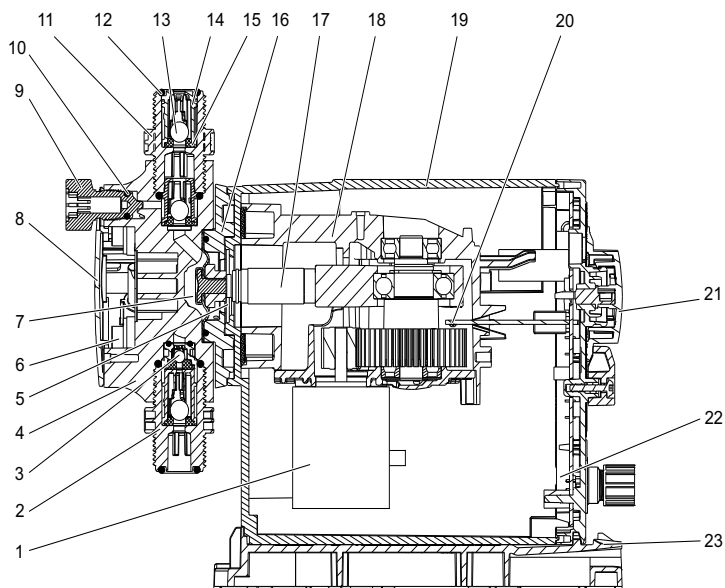
Pos.	Description	Material options
1	Stepper motor	-
2	Cooling element**	Aluminium
3	Suction valve, complete***	-
4	Valve ball, DN 4*	Ceramic Al <sub>2</sub> O <sub>3</sub> 99.5 %, SS 1.4401
5	Dosing head	PP, PVC, PVDF, SS 1.4435
6	Safety diaphragm	EPDM
7	Dosing head screw	SS 1.4301
8	Diaphragm	full PTFE
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



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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 optimized 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 - optimized 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

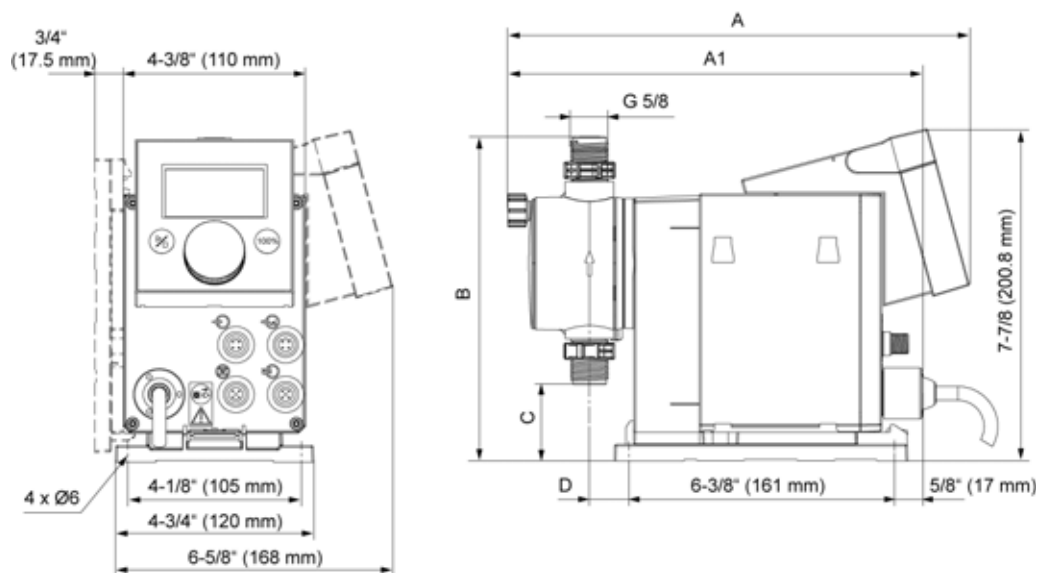


Fig. 21 DDA and DDC with front-fitted or side-fitted control cube

### DDE

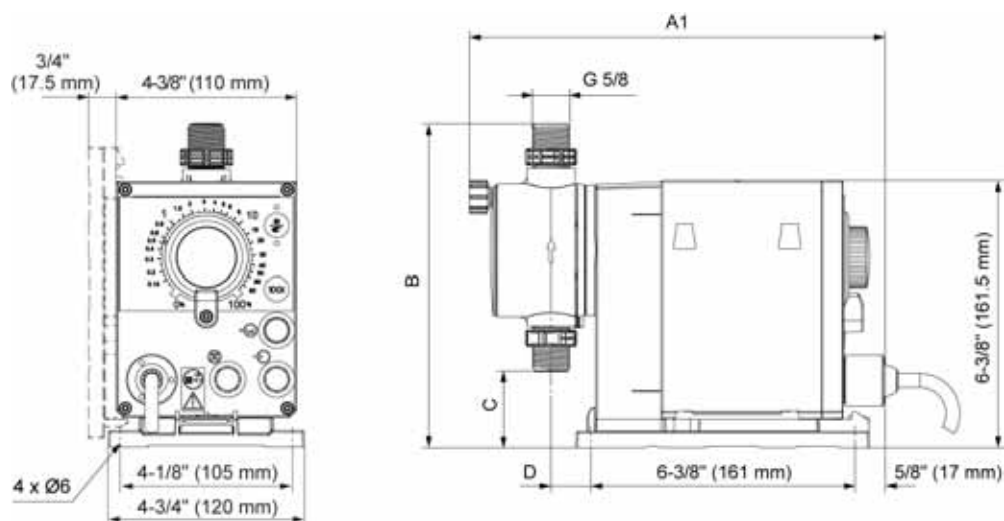


Fig. 22 DDE-PR with front-fitted control elements

Pump type	A [In.]	A1 [In.]	B [In.]	C [In.]	D [In.]
DDA 7.5-16 DDC 6-10 DDC 9-7 DDE 6-10	11 (280 mm)	9-7/8 (251 mm)	7-3/4 (196 mm)	1-7/8 (46.5 mm)	7/8 (24 mm)
DDA 12-10 DDA 17-7 DDC 15-4 DDE 15-4	11 (280 mm)	9-7/8 (251 mm)	7-7/8 (200.5 mm)	1-1/2 (39.5 mm)	7/8 (24 mm)
DDA 30-4	11-5/8 (295 mm)	10-1/2 (267 mm)	8 (204.5 mm)	1-3/8 (35.5 mm)	1-1/2 (38.5 mm)

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## 6. Technical data

### DDA

Data		7.5-16	12-10	17-7	30-4	
Mechanical data	Turndown 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
	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 tubing/pipe diameter suction/discharge side <sup>4), 2)</sup>	[mm]	4	6	6	9	
Min. internal tubing/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	[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		IP 65, 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			
	Max. resistance in level/pulse circuit	[Ω]	1000			
Signal output	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			
Weight/size	Weight (PVC, PP, PVDF)	[kg]	2.4	2.4	2.6	
	Weight (stainless steel)	[kg]	3.2	3.2	4.0	
	Diaphragm diameter	[mm]	44	50	74	
Sound pressure	Max. sound pressure level	[dB(A)]	60			
Approvals		CE, CB, CSA-US, NSF61, GOST, 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)

5) With E-box

## DDC

Data		6-10	9-7	15-4	
Data	Turndown ratio (setting range)	[1:X]	1000	1000	1000
		[l/h]	6.0	9.0	15.0
	Max. dosing capacity	[gph]	1.5	2.4	4.0
		[l/h]	3.00	4.50	7.50
	Max. dosing capacity with SlowMode 50 %	[gph]	0.75	1.20	2.00
		[l/h]	1.50	2.25	3.75
	Max. dosing capacity with SlowMode 25 %	[gph]	0.38	0.60	1.00
		[l/h]	0.0060	0.0090	0.0150
	Min. dosing capacity	[gph]	0.0015	0.0024	0.0040
		[bar]	10	7	4
Mechanical data	Max. operating pressure	[psi]	150	100	60
	Max. stroke frequency <sup>1)</sup>	[strokes/min]	140	200	180
	Stroke volume	[ml]	0.81	0.84	1.58
	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 tubing/pipe diameter suction/discharge side <sup>4), 2)</sup>	[mm]	4	6	6
	Min. internal tubing/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	
Voltage DC (option)		[V]	24-48 VDC		
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		
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		
	Impedance at analog 0/4-20 mA input	[Ω]	15		
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	2.4	
	Weight (stainless steel)	[kg]	3.2	3.2	
Sound pressure	Diaphragm diameter	[mm]	44	50	
	Max. sound pressure level	[dB(A)]	60		

## Approvals

CE, CB, CSA-US, NSF61, GOST, 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

Data		6-10	15-4
	Turndown ratio (setting range)	[1:X]	1000
		[l/h]	6.0
	Max. dosing capacity	[gph]	1.5
		[l/h]	0.0060
	Min. dosing capacity	[gph]	0.0015
		[bar]	10
	Max. pressure	[psi]	150
	Max. stroke frequency	[strokes/min]	140
	Stroke volume	[ml]	0.81
			1.58
Mechanical data	Accuracy of repeatability	[%]	± 5
	Max. suction lift during operation <sup>1)</sup>	[m]	6
	Max. suction lift when priming with wet valves <sup>1)</sup>	[m]	2
			3
	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
			500
	Max. viscosity without spring-loaded valves <sup>2)</sup>	[mPas] (= cP)	50
			50
	Min. internal tubing/pipe diameter suction/discharge side <sup>1), 3)</sup>	[mm]	4
		6	
Min. internal tubing/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
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
	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, GOST, 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: USA, Canada  
 Connection set: Tube, 0.17" x 1/4", 1/4" x 3/8", 3/8" x 1/2"  
 Connection SS: Threaded, NPT 1/4", female

Max. flow [l/h]	Max. pressure [bar]	Materials			Installation set*	Type key**	Material 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-31U7U7BG	97722357	97722391	97722425	
					Yes	DDA 7.5-16 AR-PP/E/C-F-31I003BG	97722358	97722392	97722426	
			FKM	Ceramic	No	DDA 7.5-16 AR-PP/V/C-F-31U7U7BG	97722361	97722395	97722429	
					Yes	DDA 7.5-16 AR-PP/V/C-F-31I003BG	97722362	97722396	97722430	
			PVC Only up to 150 psi	EPDM	Ceramic	No	DDA 7.5-16 AR-PVC/E/C-F-31U7U7BG	97722365	97722399	97722433
						Yes	DDA 7.5-16 AR-PVC/E/C-F-31I003BG	97722366	97722400	97722434
		FKM	Ceramic	No	DDA 7.5-16 AR-PVC/V/C-F-31U7U7BG	97722369	97722403	97722437		
				Yes	DDA 7.5-16 AR-PVC/V/C-F-31I003BG	97722370	97722404	97722438		
		PVDF	PTFE	Ceramic	No	DDA 7.5-16 AR-PV/T/C-F-31U7U7BG	97722385	97722419	97722453	
					Yes	DDA 7.5-16 AR-PV/T/C-F-31I003BG	97722386	97722420	97722454	
		SS	PTFE	SS 1.4401	No	DDA 7.5-16 AR-SS/T/SS-F-31VVVBG	97722389	97722423	97722457	
		12	10	PVC Only up to 150 psi	EPDM	Ceramic	No	DDA 12-10 AR-PVC/E/C-F-31U7U7BG	97722467	97722501
Yes	DDA 12-10 AR-PVC/E/C-F-31I004BG						97722468	97722502	97722536	
FKM	Ceramic				No	DDA 12-10 AR-PVC/V/C-F-31U7U7BG	97722471	97722505	97722539	
					Yes	DDA 12-10 AR-PVC/V/C-F-31I004BG	97722472	97722506	97722540	
PTFE	Ceramic				No	DDA 12-10 AR-PVC/T/C-F-31U7U7BG	97722475	97722509	97722543	
					Yes	DDA 12-10 AR-PVC/T/C-F-31I004BG	97722476	97722510	97722544	
PVDF	EPDM			Ceramic	No	DDA 12-10 AR-PV/E/C-F-31U7U7BG	97722479	97722513	97722547	
					Yes	DDA 12-10 AR-PV/E/C-F-31I004BG	97722480	97722514	97722548	
	FKM			Ceramic	No	DDA 12-10 AR-PV/V/C-F-31U7U7BG	97722483	97722517	97722551	
					Yes	DDA 12-10 AR-PV/V/C-F-31I004BG	97722484	97722518	97722552	
	PTFE			Ceramic	No	DDA 12-10 AR-PV/T/C-F-31U7U7BG	97722487	97722521	97722555	
					Yes	DDA 12-10 AR-PV/T/C-F-31I004BG	97722488	97722522	97722556	
SS	PTFE	SS 1.4401	No	DDA 12-10 AR-SS/T/SS-F-31VVVBG	97722491	97722525	97722559			
17	7	PVC Only up to 150 psi	EPDM	Ceramic	No	DDA 17-7 AR-PVC/E/C-F-31U7U7BG	97722569	97722604	97722638	
					Yes	DDA 17-7 AR-PVC/E/C-F-31I004BG	97722570	97722605	97722639	
			FKM	Ceramic	No	DDA 17-7 AR-PVC/V/C-F-31U7U7BG	97722574	97722608	97722642	
					Yes	DDA 17-7 AR-PVC/V/C-F-31I004BG	97722575	97722609	97722643	
			PTFE	Ceramic	No	DDA 17-7 AR-PVC/T/C-F-31U7U7BG	97722578	97722612	97722646	
					Yes	DDA 17-7 AR-PVC/T/C-F-31I004BG	97722579	97722613	97722647	
		PVDF	EPDM	Ceramic	No	DDA 17-7 AR-PV/E/C-F-31U7U7BG	97722582	97722616	97722650	
					Yes	DDA 17-7 AR-PV/E/C-F-31I004BG	97722583	97722617	97722651	
			FKM	Ceramic	No	DDA 17-7 AR-PV/V/C-F-31U7U7BG	97722586	97722620	97722654	
					Yes	DDA 17-7 AR-PV/V/C-F-31I004BG	97722587	97722621	97722655	
			PTFE	Ceramic	No	DDA 17-7 AR-PV/T/C-F-31U7U7BG	97722590	97722624	97722658	
					Yes	DDA 17-7 AR-PV/T/C-F-31I004BG	97722591	97722625	97722659	
SS	PTFE	SS 1.4401	No	DDA 17-7 AR-SS/T/SS-F-31VVVBG	97722594	97722628	97722662			
30	4	PVC Only up to 150 psi	EPDM	Ceramic	No	DDA 30-4 AR-PVC/E/C-F-31U7U7BG	97722672	97722706	97722740	
					Yes	DDA 30-4 AR-PVC/E/C-F-31I004BG	97722673	97722707	97722741	
			FKM	Ceramic	No	DDA 30-4 AR-PVC/V/C-F-31U7U7BG	97722676	97722710	97722744	
					Yes	DDA 30-4 AR-PVC/V/C-F-31I004BG	97722677	97722711	97722745	
			PTFE	Ceramic	No	DDA 30-4 AR-PVC/T/C-F-31U7U7BG	97722680	97722714	97722748	
					Yes	DDA 30-4 AR-PVC/T/C-F-31I004BG	97722681	97722715	97722749	
		PVDF	EPDM	Ceramic	No	DDA 30-4 AR-PV/E/C-F-31U7U7BG	97722684	97722718	97722752	
					Yes	DDA 30-4 AR-PV/E/C-F-31I004BG	97722685	97722719	97722753	
			FKM	Ceramic	No	DDA 30-4 AR-PV/V/C-F-31U7U7BG	97722688	97722722	97722756	
					Yes	DDA 30-4 AR-PV/V/C-F-31I004BG	97722689	97722723	97722757	
			PTFE	Ceramic	No	DDA 30-4 AR-PV/T/C-F-31U7U7BG	97722692	97722726	97722760	
					Yes	DDA 30-4 AR-PV/T/C-F-31I004BG	97722693	97722727	97722761	
SS	PTFE	SS.1.4401	No	DDA 30-4 AR-SS/T/SS-F-31VVVBG	97722696	97722730	97722764			

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

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

## DDC, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)  
 Mains plug: USA, Canada  
 Connection set: Tube, 0.17" x 1/4", 1/4" x 3/8", 3/8" x 1/2"  
 Connection SS: Threaded, NPT 1/4", female

Max. flow [l/h]	Max. pressure [bar]	Dosing head	Materials		Installation set*	Type key**	Material number			
			Gaskets	Valve balls			A	AR		
6	10	PVC Only up to 150 psi	EPDM	Ceramic	No	DDC 6-10 A-PVC/E/C-F-31U7U7BG	97721537	97721571		
					Yes	DDC 6-10 A-PVC/E/C-F-31I003BG	97721538	97721572		
			FKM	Ceramic	No	DDC 6-10 A-PVC/N/C-F-31U7U7BG	97721541	97721575		
					Yes	DDC 6-10 A-PVC/N/C-F-31I003BG	97721542	97721576		
			PTFE	Ceramic	No	DDC 6-10 A-PVC/T/C-F-31U7U7BG	97721545	97721579		
					Yes	DDC 6-10 A-PVC/T/C-F-31I003BG	97721546	97721580		
			PVDF	EPDM	Ceramic	No	DDC 6-10 A-PV/E/C-F-31U7U7BG	97721549	97721583	
						Yes	DDC 6-10 A-PV/E/C-F-31I003BG	97721550	97721584	
		FKM		Ceramic	No	DDC 6-10 A-PV/N/C-F-31U7U7BG	97721553	97721587		
					Yes	DDC 6-10 A-PV/N/C-F-31I003BG	97721554	97721588		
		PTFE	Ceramic	No	DDC 6-10 A-PV/T/C-F-31U7U7BG	97721557	97721591			
				Yes	DDC 6-10 A-PV/T/C-F-31I003BG	97721558	97721592			
		SS	PTFE	SS 1.4401	No	DDC 6-10 A-SS/T/SS-F-31VVBG	97721561	97721595		
		9	7	PVC Only up to 150 psi	EPDM	Ceramic	No	DDC 9-7 A-PVC/E/C-F-31U7U7BG	97721605	97721639
							Yes	DDC 9-7 A-PVC/E/C-F-31I004BG	97721606	97721640
					FKM	Ceramic	No	DDC 9-7 A-PVC/N/C-F-31U7U7BG	97721609	97721643
Yes	DDC 9-7 A-PVC/N/C-F-31I004BG						97721610	97721644		
PTFE	Ceramic				No	DDC 9-7 A-PVC/T/C-F-31U7U7BG	97721613	97721647		
					Yes	DDC 9-7 A-PVC/T/C-F-31I004BG	97721614	97721648		
PVDF	EPDM				Ceramic	No	DDC 9-7 A-PV/E/C-F-31U7U7BG	97721617	97721651	
						Yes	DDC 9-7 A-PV/E/C-F-31I004BG	97721618	97721652	
	FKM			Ceramic	No	DDC 9-7 A-PV/N/C-F-31U7U7BG	97721621	97721655		
					Yes	DDC 9-7 A-PV/N/C-F-31I004BG	97721622	97721656		
PTFE	Ceramic			No	DDC 9-7 A-PV/T/C-F-31U7U7BG	97721625	97721659			
				Yes	DDC 9-7 A-PV/T/C-F-31I004BG	97721626	97721660			
SS	PTFE			SS 1.4401	No	DDC 9-7 A-SS/T/SS-F-31VVBG	97721629	97721663		
15	4			PVC Only up to 150 psi	EPDM	Ceramic	No	DDC 15-4 A-PVC/E/C-F-31U7U7BG	97721673	97721707
							Yes	DDC 15-4 A-PVC/E/C-F-31I004BG	97721674	97721708
					FKM	Ceramic	No	DDC 15-4 A-PVC/N/C-F-31U7U7BG	97721677	97721711
		Yes	DDC 15-4 A-PVC/N/C-F-31I004BG				97721678	97721712		
		PTFE	Ceramic		No	DDC 15-4 A-PVC/T/C-F-31U7U7BG	97721681	97721715		
					Yes	DDC 15-4 A-PVC/T/C-F-31I004BG	97721682	97721716		
		PVDF	EPDM		Ceramic	No	DDC 15-4 A-PV/E/C-F-31U7U7BG	97721685	97721719	
						Yes	DDC 15-4 A-PV/E/C-F-31I004BG	97721686	97721720	
			FKM	Ceramic	No	DDC 15-4 A-PV/N/C-F-31U7U7BG	97721689	97721723		
					Yes	DDC 15-4 A-PV/N/C-F-31I004BG	97721690	97721724		
		PTFE	Ceramic	No	DDC 15-4 A-PV/T/C-F-31U7U7BG	97721693	97721727			
				Yes	DDC 15-4 A-PV/T/C-F-31I004BG	97721694	97721728			
		SS	PTFE	SS.1.4401	No	DDC 15-4 A-SS/T/SS-F-31VVBG	97721697	97721731		

\* Installation set includes: 2 pump connections, foot valve, injection unit, 6 m PE discharge tube, 2 m PVC suction tube, 2 m PVC vent tube (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: USA, Canada

Connection set: Tube, 0.17" x 1/4", 1/4" x 3/8", 3/8" x 1/2"

Connection SS: Threaded, NPT 1/4", female

Max. flow [l/h]	Max. pressure [bar]	Materials			Installation set*	Type key**	Material number		
		Dosing head	Gaskets	Valve balls			B	P	PR
6	10	PVC Only up to 150 psi	EPDM	Ceramic	No	DE 6-10 B-PVC/E/C-X-31U7U7BG	97721059	97721093	98147336
					Yes	DDE 6-10 B-PVC/E/C-X-31I003BG	97721060	97721094	98147337
			FKM	Ceramic	No	DDE 6-10 B-PVC/N/C-X-31U7U7BG	97721063	97721097	98147340
					Yes	DDE 6-10 B-PVC/N/C-X-31I003BG	97721064	97721098	98147341
			PTFE	Ceramic	No	DDE 6-10 B-PVC/T/C-X-31U7U7BG	97721067	97721101	98147346
					Yes	DDE 6-10 B-PVC/T/C-X-31I003BG	97721068	97721102	98147347
		PVDF	EPDM	Ceramic	No	DDE 6-10 B-PV/E/C-X-31U7U7BG	97721071	97721105	98147348
					Yes	DDE 6-10 B-PV/E/C-X-31I003BG	97721072	97721106	98147349
			FKM	Ceramic	No	DDE 6-10 B-PV/V/C-X-31U7U7BG	97721075	97721109	98147332
					Yes	DDE 6-10 B-PV/V/C-X-31I003BG	97721076	97721110	98147333
			PTFE	Ceramic	No	DDE 6-10 B-PV/T/C-X-31U7U7BG	97721079	97721113	98147356
					Yes	DDE 6-10 B-PV/T/C-X-31I003BG	97721080	97721114	98147357
		SS	PTFE	SS 1.4401	No	DDE 6-10 B-SS/T/SS-X-31VVBG	97721083	97721117	98147360
		15	4	PVC Only up to 150 psi	EPDM	Ceramic	No	DDE 15-4 B-PVC/E/C-X-31U7U7BG	97721127
Yes	DDE 15-4 B-PVC/E/C-X-31I004BG						97721128	97721162	98147371
FKM	Ceramic				No	DDE 15-4 B-PVC/N/C-X-31U7U7BG	97721131	97721165	98147374
					Yes	DDE 15-4 B-PVC/N/C-X-31I004BG	97721132	97721166	98147375
PTFE	Ceramic				No	DDE 15-4 B-PVC/T/C-X-31U7U7BG	97721135	97721169	98147378
					Yes	DDE 15-4 B-PVC/T/C-X-31I004BG	97721136	97721170	98147379
PVDF	EPDM			Ceramic	No	DDE 15-4 B-PV/E/C-X-31U7U7BG	97721139	97721173	98147382
					Yes	DDE 15-4 B-PV/E/C-X-31I004BG	97721140	97721174	98147383
	FKM			Ceramic	No	DDE 15-4 B-PV/V/C-X-31U7U7BG	97721143	97721177	98147386
					Yes	DDE 15-4 B-PV/V/C-X-31I004BG	97721144	97721178	98147387
	PTFE			Ceramic	No	DDE 15-4 B-PV/T/C-X-31U7U7BG	97721147	97721181	98147390
					Yes	DDE 15-4 B-PV/T/C-X-31I004BG	97721148	97721182	98147391
SS	PTFE			SS 1.4401	No	DDE 15-4 B-SS/T/SS-X-31VVBG	97721151	97721186	98147394

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

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

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

Key to the designations of the three following tables:

Max. flow, press.	Control variant	Materials of dosing head, gaskets and valve balls	Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design	Special variant
[l/h] - [bar]	See page 6	<p><b>Head:</b>                      PP: Polypropylene                      PVC: Polyvinyl chloride**                      PV: PVDF                      SS: Stainless steel 1.4401</p> <p><b>Gaskets:</b>                      E: EPDM                      V: FKM                      T: PTFE</p> <p><b>Valve balls:</b>                      C: Ceramic                      SS: Stainless steel 1.4401</p>	F: Front-mounted (change to left and right possible)  X: No control cube (only DDE)	3: 1 x 100-240 V, 50/60 Hz  I: 24-48 VDC (DDC)	1: Standard  2: Spring-loaded (HV version)	<p><i>Suction/discharge connection:</i>                      U2U2: Tubing, 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm                      U7U7: Tubing, 0.17" x 1/4", 1/4" x 3/8", 3/8" x 1/2"                      AA: Threaded, Rp 1/4", female (SS)                      VV: Threaded, NPT1/4", female (SS)                      XX: Without connection</p> <p><i>Installation set*</i>                      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</p>	F: EU B: USA, Canada G: UK I: Australia, New Zealand, Taiwan  E: Switzerland Japan J: Argentina L: No plug X: (only 24-48 VDC)	G: Grundfos	C3: Inspection Certificate 3.1 (EN 10204)

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

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

### 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	C3
		PVC	E V T	C							
		PV									
		SS	T	SS	F	3	1 2	AA VV XX			
12-10 17-7 30-4	AR FC FCM	PP	E V	C	F	3	1 2	U2U2 U7U7 XX I002 I004	F B G I E J L	G	C3
		PVC	E V T	C							
		PV									
		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 I	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G	C3
		PVC	E V T	C							
		PV									
		SS	T	SS	F	3 I	1 2	AA VV XX			
9-7 15-4	A AR	PP	E V	C	F	3 I	1 2	U2U2 U7U7 XX I002 I004	F B G I E J L	G	C3
		PVC	E V T	C							
		PV									
		SS	T	SS	F	3 I	1 2	AA VV XX			

## DDE

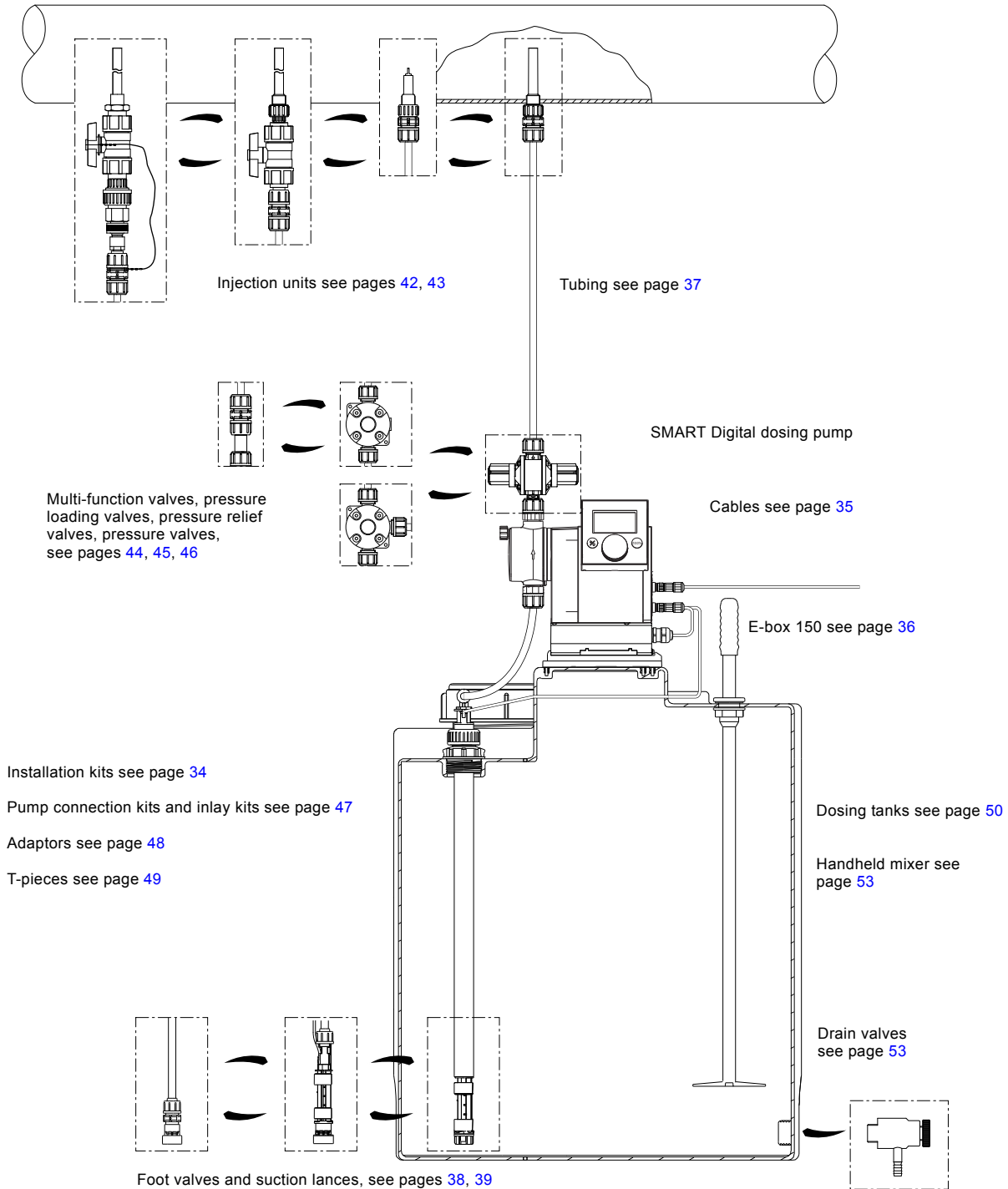
Max. flow, press.	Control variant	Materials			Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design	Special variant
		Head	Gaskets	Balls							
6-10	B P PR	PP	E V	C	X	3	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G	C3
		PVC	E V T	C							
		PV									
		SS	T	SS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



# 8. Accessories

## Accessories overview

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



TM04 1599 0312

Fig. 23 SMART Digital 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 42)
- PE discharge tubing, 19.7 ft.
- PVC suction tubing, 6.5 ft.
- PVC deaeration tubing, 6.5 ft.
- 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* [gph]	Size		Material of foot valve / injection unit			Material number				
	Suction / discharge tubing [in.]	Deaeration tubing [in.]	Housing	Gasket	Ball	Foot valve without level indication	Foot valve with level indication			
2	0.17x1/4	0.17x1/4	PP	FKM	Ceramic	95730488	95730512			
				EPDM	Ceramic	95730489	95730513			
			PVC	FKM	Ceramic	95730490	95730514			
				EPDM	Ceramic	95730491	95730515			
				PTFE	Ceramic	95730492	95730516			
				FKM	Ceramic	95730493	95730517			
			PVDF	EPDM	Ceramic	95730494	95730518			
				PTFE	Ceramic	95730495	95730519			
			8	1/4x3/8	0.17x1/4	PP	FKM	Ceramic	95730496	95730520
							EPDM	Ceramic	95730497	95730521
						PVC	FKM	Ceramic	95730498	95730522
							EPDM	Ceramic	95760499	95730523
PTFE	Ceramic	95730500					95730524			
FKM	Ceramic	95730501					95730525			
PVDF	EPDM	Ceramic				95730502	95730526			
	PTFE	Ceramic				95730503	95730527			
15.85	3/8x1/2	0.17x1/4				PP	FKM	Ceramic	95730504	95730528
							EPDM	Ceramic	95730505	95730529
						PVC	FKM	Ceramic	95730506	95730530
							EPDM	Ceramic	95730507	95730531
			PTFE	Ceramic	95730508		95730532			
			FKM	Ceramic	95730509		95730533			
			PVDF	EPDM	Ceramic	95730510	95730534			
				PTFE	Ceramic	95730511	95730535			

\* Viscosity similar to water

## Cables and plugs

Cables and plugs are used for the connection of the dosing pump to external control devices, such as process controllers, flow meters, level control units, etc.

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



TM04 8267 0411

Fig. 26 Cable and plug

### Technical data

Socket	Application		Pins	Plug type	Cable length [ft. (m)]	Material number
	Input	Analog pulse External stop	4	Straight	6.5 (2)	96609014
					16.4 (5)	96609016
				No cable		96698715
				Angled	6.5 (2)	96693246
	Input	Low level Empty tank	4	Straight	No cable	96698715
	Output	Analog GENibus	5	Straight	6.5 (2)	96632921
					16.4 (5)	96632922
				No cable		96609031
				Angled	6.5 (2)	96699697
	Output	Relay 1 Relay 2	4	Straight	6.5 (2)	96609017
					16.4 (5)	96609019
				No cable		96696198
				Angled	6.5 (2)	96698716

## E-box 150 Profibus

The Grundfos E-box 150 (E-box = Extension Box) is a Plug & Play Profibus fieldbus communication interface for the integration of SMART Digital DDA dosing pumps into a Profibus DP 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, e.g. operation mode, flow rate, etc.
- Remote monitoring of all parameters, e.g. measured flow, pressure, faults with cause, etc.

The E-box 150 contains a standard Grundfos CIM 150 communication interface module for data transmission between a Profibus DP network and a Grundfos pump. System integration is straightforward with the standard GSD file ([www.grundfosalldos.com](http://www.grundfosalldos.com)).

DDA dosing pumps can be retrofitted easily with the E-box 150: it is simply placed between the pump and the mounting plate (DDA software version V2.10 or higher required). The E-box 150 has a connecting cable to plug into the pump directly.

Description	Material number
E-box 150	97513994



Fig. 27 E-box

### Dimensions

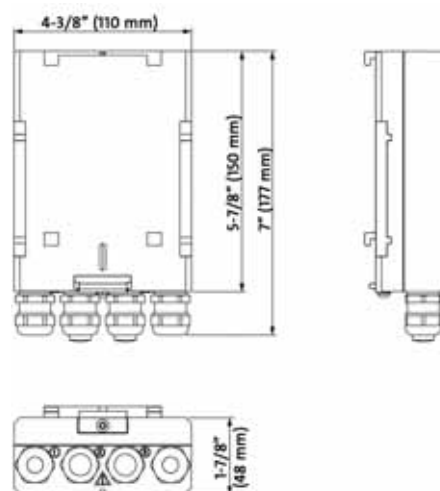


Fig. 28 E-box, dimensions

### Technical data

<b>E-box data</b>	Supply voltage	30 VDC, $\pm 10\%$ (via M 12 plug of DDA)
	Max. power consumption	5 W
	Cable length	6.29" [160 mm]
	Max. relative humidity	96 %
	Pollution degree	2
	Enclosure class	IP 65 according to IEC 60529 NEMA 4X
	Electrical safety class	3
	Min. / max. ambient temperature	0/45 °C
	Approvals	CE, CB, CSA-US, GOST, C-Tick
	<b>GENIbus connection</b>	Data protocol
GENIbus connection type		Three-wire RS-485
Transmission speed		9.6 kbits/s
<b>Profibus specifications</b>	Data protocol	Profibus DP
	Profibus implementation class	DP-V0
	Profibus connection type	Two-wire RS-485 (lines: A, B)
	Recommended cable type	Screened, double-twisted pair conductor cross-section: 0.25 - 1 mm <sup>2</sup> AWG: 24-18
	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 kbits/s to 12000 kbits/s

TM04 8455 0312

TM04 8454\_US 0113

## Tubing

Tubing is available in various materials, sizes and lengths.



TM04 8268 0411

Fig. 29 Tubing

### Technical data

Inner/outer diameter [in]	Material	Maximum pressure [psi]	Length [ft.]	Material Number
0.125 x 1/4	PVC	85	20	91127749
0.125 x 1/4	PVC	85	100	98257648
	PVC	73	100	91127750
1/4 x 3/8	PE	192	20	91127825
			100	91127751
	ETFE	290	100	91127753
3/8 x 1/2	PE	123	20	91127826
			100	91127752

## Foot valves

Foot valves are installed at the lower end of the suction tubing. 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
- Tubing connection set: 0.17"x1/4", 1/4"x3/8" and 3/8"x1/2"
- Pipe connection set: threaded, 1/4" NPT, female (stainless steel).

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

- Reed-switch unit with two floaters
- 5 meters of cable with PE jacket
- M 12 plug to connect DDA, DDC, DDE or DDI dosing pump
- PE cap,  $\varnothing 58$  mm, for assembly in Grundfos cylindrical tanks, or for use with tank adaptors.

The switch mode of the low-level and empty-tank indication is factory-set to NO. The switch mode 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. 30 Left: foot valve without level indication; right: foot valve with level indication

TM04 8476 0512

## Dimensions

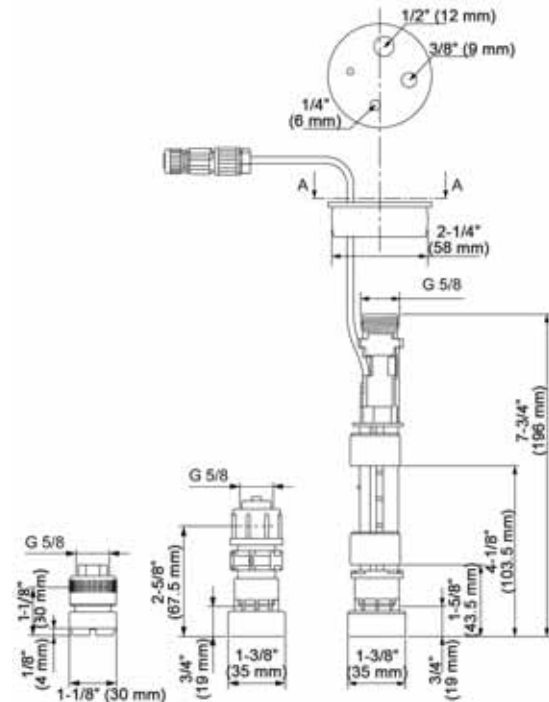


Fig. 31 Left: stainless-steel foot valve; center and right: PE or PVDF foot valve, dimensions

TM04 8461\_US 0113

## Technical data

Max. flow rate [gph]	Housing	Material			Material number	
		Gasket	Ball	without level indication	with level indication	
15.85	PE	FKM, EPDM	Ceramic	98070955	98070970	
		PTFE	Ceramic	98070956	98070971	
	PVDF	FKM, EPDM	Ceramic	98070957	98070972	
		PTFE	Ceramic	98070958	98070973	
	SS	PTFE	SS	98070964	-	

## Suction lances

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

Suction lances include:

- Strainer (mesh size approx. 0.8 mm)
- Non-return valve
- Tubing connection set: 0.17"x1/4", 1/4"x3/8" and 3/8"x1/2"
- Adjustable tank connection with holes for e.g. relief line.

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

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

The switch mode of the low-level and empty-tank indication is factory-set to NO. The switch mode 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 Suction lance

TM04 84458 0312

## Dimensions

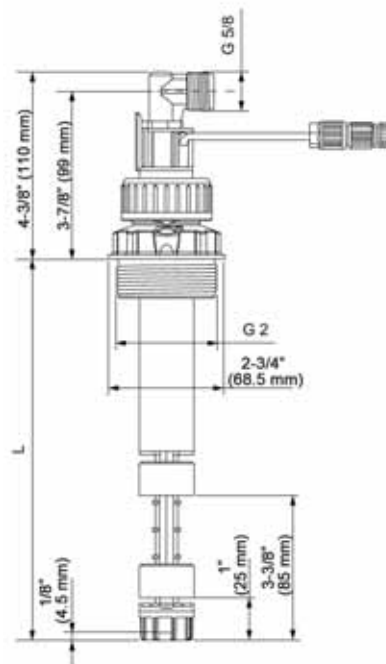


Fig. 33 Suction lance, dimensions

TM04 8460\_US 0113

## Dimensions / Selection

For dosing tank type	Tank volume Gal. [l]	Recommended immersion depth (L) [in. (mm)]
Grundfos cylindrical tank (see page 51)	60	19-1/2 [500]
	100	27-1/8 [690]
	200	27-1/8 [690]
	300	38-1/2 [980]
	500	43-1/4 [1100]
	1000	47-1/4 [1200]
Grundfos square tank (see page 50)*	100	27-1/8 [690]
L-ring drum*	32 [120]	32-1/4 [820]
	58 [220]	38-1/2 [980]
Steel drum*	57 [216]	38-1/2 [980]
Standard jerricans according to EN 12712*	3, 9 [12, 33 large cap]	15-3/4 [400]
	7, 8, 9 [25, 30, 33]	19-1/2 [500]
	16 [60]	27-1/8 [690]
IBC*	all sizes	47-1/4 [1200]

\* suitable adaptors see page 41

## Technical data

Max. flow rate [gph]	Max. immersion depth* [in. (mm)]	Housing	Material		Material number	
			Gasket	Ball	without level indication	with level indication
15.85	15-3/4 (400)	PE	FKM, EPDM	Ceramic	98070982	98071078
			PTFE	Ceramic	98070983	98071079
		PVDF	FKM, EPDM	Ceramic	98070984	98071080
			PTFE	Ceramic	98070985	98071081
	19-1/2 (500)	PE	FKM, EPDM	Ceramic	98070994	98071090
			PTFE	Ceramic	98070995	98071091
		PVDF	FKM, EPDM	Ceramic	98070996	98071092
			PTFE	Ceramic	98070997	98071093
	22-3/8 (570)	PE	FKM, EPDM	Ceramic	98071006	98071102
			PTFE	Ceramic	98071007	98071103
		PVDF	FKM, EPDM	Ceramic	98071008	98071104
			PTFE	Ceramic	98071009	98071105
	27-1/8 (690)	PE	FKM, EPDM	Ceramic	98071018	98071114
			PTFE	Ceramic	98071019	98071115
		PVDF	FKM, EPDM	Ceramic	98071020	98071116
			PTFE	Ceramic	98071021	98071117
	32-1/4 (820)	PE	FKM, EPDM	Ceramic	98071030	98071126
			PTFE	Ceramic	98071031	98071127
		PVDF	FKM, EPDM	Ceramic	98071032	98071128
			PTFE	Ceramic	98071033	98071129
	38-1/2 (980)	PE	FKM, EPDM	Ceramic	98071042	98071138
			PTFE	Ceramic	98071043	98071139
		PVDF	FKM, EPDM	Ceramic	98071044	98071140
			PTFE	Ceramic	98071045	98071141
43-1/4 (1100)	PE	FKM, EPDM	Ceramic	98071054	98071150	
		PTFE	Ceramic	98071055	98071151	
	PVDF	FKM, EPDM	Ceramic	98071056	98071152	
		PTFE	Ceramic	98071057	98071153	
47-1/4 (1200)	PE	FKM, EPDM	Ceramic	98071066	98071162	
		PTFE	Ceramic	98071067	98071163	
	PVDF	FKM, EPDM	Ceramic	98071068	98071164	
		PTFE	Ceramic	98071069	98071165	

\* minimum immersion depth for all sizes: approx. 5-1/2" (140 mm)



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


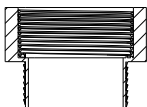

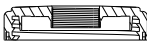
### Adaptors for containers

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



TM04 8506 0712

### Technical data

Adaptor type	For container type	Remark	Material No.
	TM04 8470 0512 counter nut for tanks without threaded opening, e.g. 100-liter square tank or 1000-liter 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 odor and corrosion. Emission protection kits help avoid such problems. Suction lances can be retrofitted with emission protection kits.

Two variants are available:

- Emission protection kit with sniffling 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 tubing.

They include:

- gasket for the tank adaptor
- sniffling valve or tubing nipple 4/6 mm (tubing is not included)
- gasket for the cable outlet.

### Order data

Variant	Remark	Material number
Emission protection kit with sniffling valve	can be retrofitted	98071178
Emission protection kit for use with filter	can be retrofitted	98071179

### M-12-plug-to-flat-plug adaptor

The adaptor allows to connect 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	Material number
M-12-plug-to-flat-plug adaptor	96635010

## Injection units

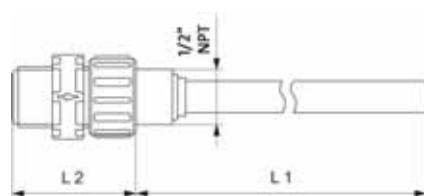
Injection units connect the dosing line with the process line. They ensure a minimum backpressure of 0.7 bar, and avoid backflow of the dosing liquid.

In general, they include:

- Injection pipe. PP, PVC and PVDF versions can be shortened.
- Spring-loaded non-return valve with Tantal spring.
- Tubing connection set: 0.17" x 1/4", 1/4" x 3/8" and 3/8" x 1/2".
- Stainless steel inlet pipe connection: 1/4" female NPT.

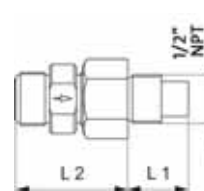
### Standard injection units

#### Dimensions



TM04 8280 0411\_US

Fig. 34 Standard injection unit, PP, PVC, and PVDF version



TM04 8281 0411\_US

Fig. 35 Standard injection unit, stainless-steel version

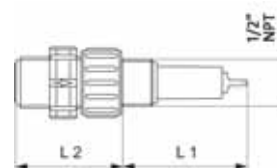
#### Technical data

Max. flow rate [gph]	Max. pressure [psi]	Housing	Material			Dimensions		Material number
			Gasket	Ball		L 1 In. [mm]	L 2 In. [mm]	
15.85	232	PP	FKM	Ceramic	3-7/8 [100]	1-7/8 [47]	95730906	
			EPDM	Ceramic	3-7/8 [100]	1-7/8 [47]	95730910	
		PVC	FKM	Ceramic	3-7/8 [100]	1-7/8 [47]	95730914	
			EPDM	Ceramic	3-7/8 [100]	1-7/8 [47]	95730918	
		PVDF	PTFE	Ceramic	3-7/8 [100]	1-7/8 [47]	95730922	
			FKM	Ceramic	3-7/8 [100]	1-7/8 [47]	95730926	
	1450	Stainless steel	EPDM	Ceramic	3-7/8 [100]	1-7/8 [47]	95730930	
			PTFE	Ceramic	3-7/8 [100]	1-7/8 [47]	95730934	
		PVC	PTFE	Stainless steel	1-1/8 [27]	2 [50]	95730938	
			FKM	Ceramic	11-3/4 [300]	1-7/8 [47]	95730942	
			EPDM	Ceramic	11-3/4 [300]	1-7/8 [47]	95730946	
			PTFE	Ceramic	11-3/4 [300]	1-7/8 [47]	95730950	

### 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 crystallization and blocking caused by alkali carbonate reactions at the point of injection.

#### Dimensions



TM04 8282 0411\_US

Fig. 36 Injection unit with lip valve

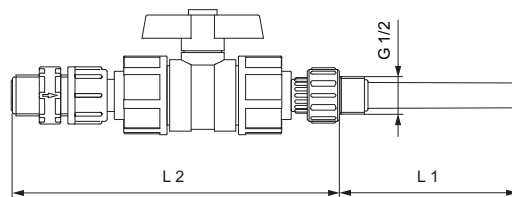
#### Technical data

Max. flow rate [gph]	Max. pressure [psi]	Housing	Material			Dimensions		Material number
			Gasket	Ball		L 1 [in.(mm)]	L 2 [in. (mm)]	
15.85	232	PVC	FKM	Ceramic	2 1/8 [55]	2 3/8 [59]	95730966	

### 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.

#### Dimensions



TM04 8284 0411

Fig. 37 Injection unit with ball valve

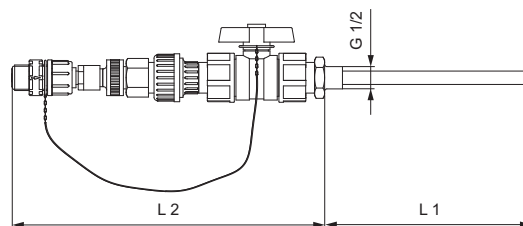
#### Technical data

Max. flow rate [gph]	Max. pressure [psi]	Housing	Material		Dimensions		Material number
			Gasket	Ball	L 1 [in. (mm)]	L 2 [in. (mm)]	
15.85	232	PVC	FKM	Ceramic	3-7/8 (100)	7-1/4 (183)	95730954
			EPDM	Ceramic	3-7/8 (100)	7-1/4 (183)	95730958
	928	Stainless steel	PTFE	Stainless steel	1-1/8 (27)	5-1/2 (138)	95730962

### Injection units, withdrawable for cleaning

These injection units are used where regular cleaning of the injection pipe is required. The construction allows the withdrawal of the injection unit from the process line and the cleaning of it, without stopping the water flow. The injection point can be closed with the integrated ball valve. The immersion depth of the injection pipe can be adjusted.

#### Dimensions



TM04 8285 0411

Fig. 38 Injection unit, withdrawable for cleaning

#### Technical data

Max. flow rate [gph]	Max. pressure [psi]	Housing	Material		Dimensions		Material number
			Gasket	Ball	L 1 [in. (mm)]	L 2 [in. (mm)]	
15.85	145	PVC	FKM	Ceramic	7-1/4 (185)	11 (280)	95730970
			EPDM	Ceramic	7-1/4 (185)	11 (280)	95730974

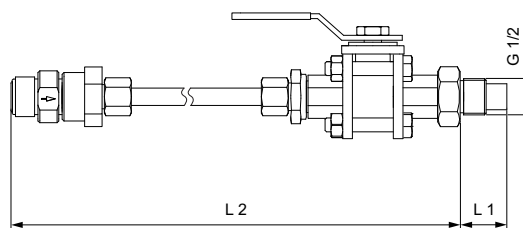
### Hot-injection units with ball valve

Hot-injection units with ball valve can be used for direct injection of dosing liquid into processes with a temperature of up to 248 °F.

In addition, these injection units include:

- Injection pipe, stainless steel.
- Ball valve installed between the injection pipe and the cooling pipe, stainless steel.
- Bendable cooling pipe, stainless steel, length 1 m.

#### Dimensions



TM04 8286 0411

Fig. 39 Hot-injection unit with ball valve

#### Technical data

Max. flow rate [gph]	Max. pressure [psi]	Housing	Material		Dimensions		Material number
			Gasket	Ball	L 1 [in. (mm)]	L 2 [in. (mm)]	
15.85	232	PVDF	PTFE	Ceramic	1-1/8 (27)	45-1/2 (1158)	95730978
	928	Stainless steel	PTFE	Stainless steel	1-1/8 (27)	45-1/2 (1158)	95730982

## 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 discharge line for maintenance.

Pressure relief valves, or safety valves, protect the pump and the discharge installations against excessive pressure. All pressurized dosing installations should include a pressure relief valve.

Pressure loading valves maintain a certain backpressure for the pump. They are used in applications with too low backpressure or no backpressure at all. Pressure loading valves are also used to prevent siphoning, when the admission pressure is higher than the backpressure. They provide a constant backpressure for the dosing pump when the system pressure is fluctuating.



Fig. 40 Multi-function valve, pressure relief valve, pressure loading valve

TM04 8287 04-11

### Multi-function valves

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

- Loading pressure, adjustable from 14.5 to 58 psi, is factory-set to 43.5 psi.
- Relief pressure, adjustable from 101 to 232 psi, is factory-set to 145 psi.
- Maximum system pressure 232 psi.
- Tubing connection set: 0.17"x1/4", 1/4"x3/8" and 3/8"x1/2".

### Dimensions

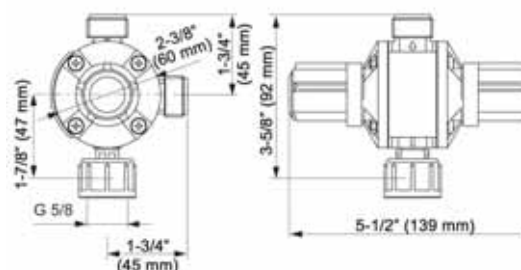


Fig. 41 Multi-function valve

TM04 8288\_US 0113

### Technical data

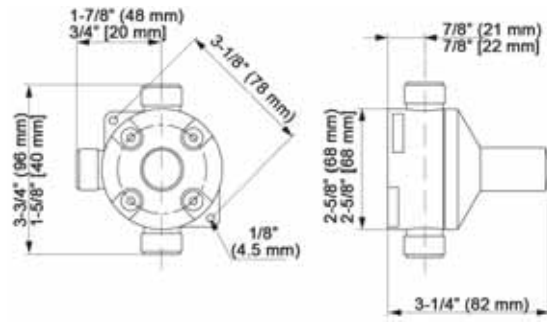
Max. flow rate [gph]	Housing	Material			Material number	
		Connections	Gasket	Diaphragm	Relief pressure 10 bar	
15.85	PVDF	PP	FKM	PTFE	95730813	
			EPDM	PTFE	95730814	
		PVC	FKM	PTFE	95730815	
			EPDM	PTFE	95730816	
		PVDF	FKM	PTFE	PTFE	95730817
				EPDM	PTFE	95730818
			PTFE	EPDM	PTFE	95730819
				PTFE	PTFE	95730820

### Pressure relief valves

Pressure relief valves are installed in the discharge 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 72.5 to 145 psi, is factory-set to 145 psi, or
- Maximum system pressure 232 psi.
- Tubing connection set: 0.17"x1/4", 1/4"x3/8" and 3/8"x1/2".
- Pipe connection set: threaded, 1/4" NPT, female (stainless steel).

### Dimensions



TM04 8290\_US 0113

Fig. 42 Pressure relief valve. Dimensions in brackets apply to stainless-steel version.

### Technical data

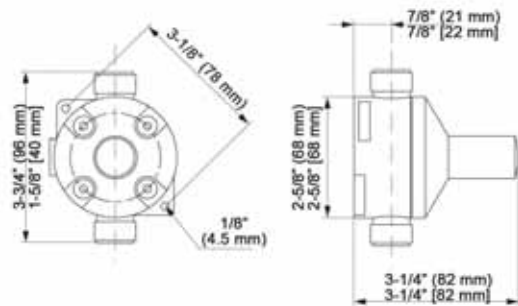
Max. flow rate [gph]	Diaphragm	Material		Material number
		Housing and connections	Gasket	
15.85	PTFE	PP	FKM / EPDM	95730762
		PVC	FKM / EPDM	95730763
		PVDF	PTFE	95730764
			FKM / EPDM	95730765
		Stainless steel	No gaskets	95730772

### Pressure loading valves

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

- Loading pressure, adjustable from 14.5 to 72.5 psi, is factory-set to 43.5 psi.
- Maximum system pressure: 232 psi.
- Tubing connection set: 0.17"x1/4", 1/4"x3/8" and 3/8"x1/2"
- Pipe connection set: threaded, 1/4" NPT, female (stainless steel).

### Dimensions



TM04 8292\_US 0113

Fig. 43 Pressure loading valve. Dimensions in brackets apply to stainless-steel version.

### Technical data

Max. flow rate [gph]	Diaphragm	Material		Material number
		Housing and connections	Gasket	
15.85	PTFE	PP	FKM / EPDM	95730746
		PVC	FKM / EPDM	95730747
		PVDF	PTFE	95730748
			FKM / EPDM	95730749
		Stainless steel	No gaskets	95730752

## Pressure valves

Pressure valves provide a constant backpressure 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 discharge side, or on the pressure relief valve.

- Loading pressure, 43.5 psi, is not adjustable.
- Maximum system pressure: 232 psi.
- Spring material: Alloy C-4 (NiMo16CrTi, material number 2.4610).
- No connections included.

## Dimensions

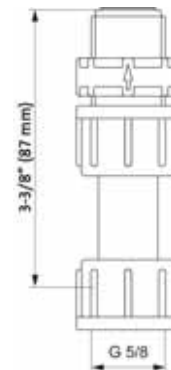


Fig. 44 Pressure valve

TM04 8293\_US 0113

## Technical data

Max. flow rate [gph]	Material			Material number
	Ball	Housing	Gaskets	
15.85	Ceramic	PP	FKM	95730325
			EPDM	95730326
		PVC	FKM	95730327
			EPDM	95730328
	Stainless steel	PVDF	PTFE	95730329
			FKM	95730330
		Stainless steel	EPDM	95730331
			PTFE	95730332
			PTFE	95730333

## Pump connection kits and inlay kits

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

A pump connection kit includes:

- 1 set of inlays
- 1 union nut.

An inlay kit includes:

- 2 sets of inlays.



Fig. 45 Left: pump connection kit; right: inlay kit

### Technical data

Connection type	Size	Material	Material number	
			Connection kit	Inlay kit
Tubing (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	-
Tubing (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	
Tubing (cutting ring type)	1/8" x 1/4"	PP	97702481	95730717
		PVDF	97702502	95730736
Pipe welding	External diameter 16 mm	PP	97702480	95730716
		PVDF	97702501	95730735
Pipe cementing	Internal diameter 12 mm	PVC	97702491	95730726
Pipe, threaded, male	1/2" NPT	PP	97702484	-
		PVC	97702494	-
		PVDF	97702505	-
Pipe, threaded, female	Rp 1/4"	Stainless steel	97702508	-
	1/4" NPT	Stainless steel	97702472	95730739
		Stainless steel	97702473	95730740
Pipe (cutting ring type)	4/6 mm	Stainless steel	97702506	-
	8/10 mm	Stainless steel	97702507	-

## Adaptors

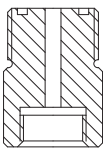
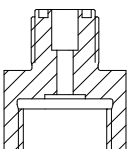
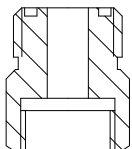
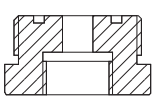
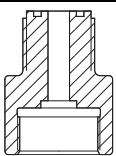
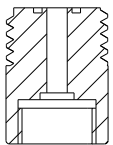
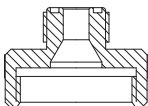
### Threaded adaptors

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

A threaded adaptor kit includes:

- 1 adaptor
- 1 O-ring.


#### Technical data

Type	Threaded connection size		Material		Material number	
	Female	Male	Housing	Gaskets		
	TM04 8296 0411	G 3/8	G 5/8	PP	FKM / EPDM	95730407
				PVC	FKM / EPDM	95730408
				PVDF	PTFE	95730409
	TM04 8297 0411	G 5/8	G 3/8	PP	FKM / EPDM	95730412
				PVC	FKM / EPDM	95730413
				PVDF	PTFE	95730414
	TM04 8298 0411	G 5/8	G 3/4	PP	FKM / EPDM	95730417
				PVC	FKM / EPDM	95730418
				PVDF	PTFE	95730419
	TM04 8299 0411	G 5/8	G 1 1/4	PP	FKM / EPDM	95730422
				PVC	FKM / EPDM	95730423
				PVDF	PTFE	95730424
	TM04 8300 0411	G 5/8	M 20 x 1.5	PP	FKM / EPDM	95730427
				PVC	FKM / EPDM	95730428
				PVDF	PTFE	95730429
	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
				PVDF	PTFE	95730434
					FKM / EPDM	95730435
					PTFE	95730436

### Union nut adaptors

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

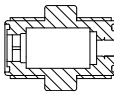
#### Technical data

Type	Threaded connection size		Material Housing	Material number	
	Female	Female			
	TM04 8306 0411	G 5/8	G 5/8	PVC	95730437
				PP	95730438
				PVDF	95730439



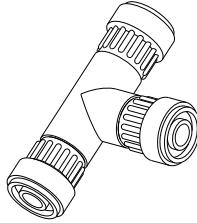
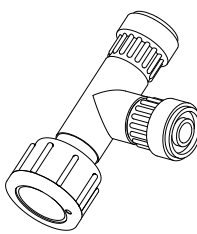
## Tubing-to-tubing and tubing-to-pipe adaptors

### Technical data

Type	Description	Connections		Material		Material number
		Side 1	Side 2	Housing and connections	Gaskets	
 TM04 8302 0411	Valve housing with two male threads G 5/8	For tubing 0.17"x1/4", 1/4"x3/8", 3/8"x1/2"	Without	PP	FKM / EPDM	95730372
				PVC	FKM / EPDM	95730373
					PTFE	95730374
				PVDF	FKM / EPDM	95730375
					PTFE	95730376
				PP	FKM / EPDM	95730356
		PVC	FKM / EPDM	95730357		
			PTFE	95730358		
		PVDF	FKM / EPDM	95730359		
			PTFE	95730360		
	Without	Threaded 1/4" NPT	Stainless steel	PTFE	95730710	

## T-pieces

### Technical data

Type	Description	Connections			Material		Material number	
		Bottom	Top	Side	Housing and connections	Gaskets		
 TM04 8304 0411	Three male threads G 5/8	For tubing 0.17"x1/4", 1/4"x3/8", 3/8"x1/2"	-	Without	-	PP	FKM / EPDM	95730392
						PVC	FKM / EPDM	95730393
							PTFE	95730394
						PVDF	FKM / EPDM	95730395
							PTFE	95730396
						PP	FKM / EPDM	95730346
		PVC	FKM / EPDM	95730347				
			PTFE	95730348				
		PVDF	FKM / EPDM	95730349				
			PTFE	95730350				
 TM04 8305 0411	Two male threads G 5/8, one female connection with union nut	Union nut G 5/8	Without	For tubing 0.17"x1/4", 1/4"x3/8", 3/8"x1/2"	Without	PP	FKM / EPDM	95730402
						PVC	FKM / EPDM	95730403
							PTFE	95730404
						PVDF	FKM / EPDM	95730405
							PTFE	95730406
		PP	FKM / EPDM	95730351				
		PVC	FKM / EPDM	95730352				
			PTFE	95730353				
		PVDF	FKM / EPDM	95730354				
			PTFE	95730355				

## Dosing tanks

### Square tank, 100 liters

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: -4 °F (-20 °C) to 113 °F (45 °C).

SMART Digital pumps can be fitted directly on the mounting platform by means of brass inserts moulded into the platform.

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

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



Fig. 46 Square tank

TM04 8307 0411

### Dimensions

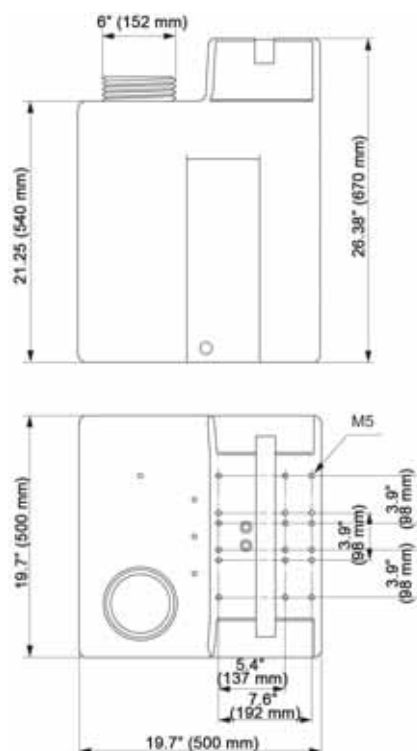


Fig. 47 Square tank, dimensions

### Order data

Tank volume [l]	Material number
26 gal. (100L)	96489271

TM04 8308\_US 0113

### Cylindrical tanks

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

- Tank material: LLDPE, UV-stabilized
- Liquid temperature: -4 °F (-20 °C) to 113 °F (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 liters include additionally:

- Threaded M 6 inserts for the assembly of a SMART Digital, a DDI, or a DMX model 221 dosing pump
- A G 2 opening for a suction lance or a foot valve, closed with a screw plug
- A flange for an electric mixer with threaded inserts
- Threaded M 6 inserts at the bottom part for floor mounting with a set of floor-mounting brackets (see page 53).



TM04 8468 0412

Fig. 48 Cylindrical tank, 60L (16 gal.)

### Technical data

Tank volume Gal. [L]	Type	Material	Weight [lbs.]	Material Number
15 [60L]	Cylindrical	PE	12.2	98148805
26 [100L]			16.5	98149057
53 [200L]			25.4	98149215
79 [300L]			28.7	98149245
132 [500L]			61.7	98149266
264 [1000L]			88.2	96688086

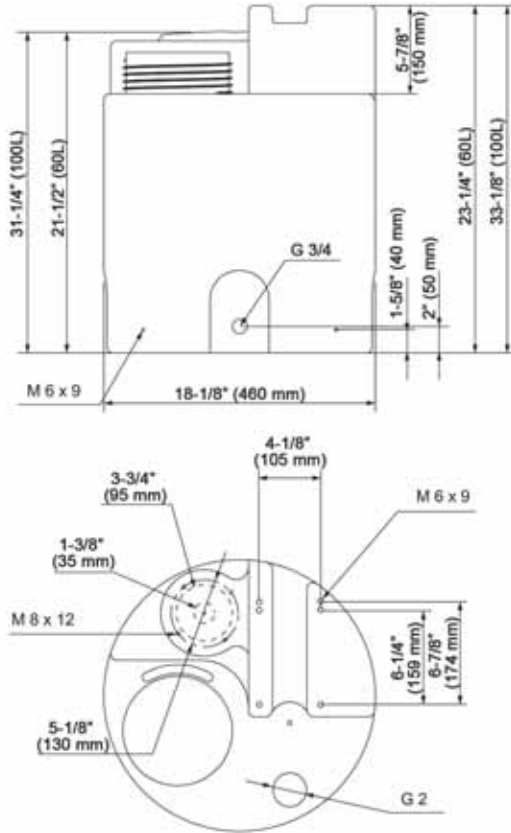


Fig. 49 Cylindrical tank, 15 gal. [60L] and 26 gal. [98L]

TM04 8465\_US 0113

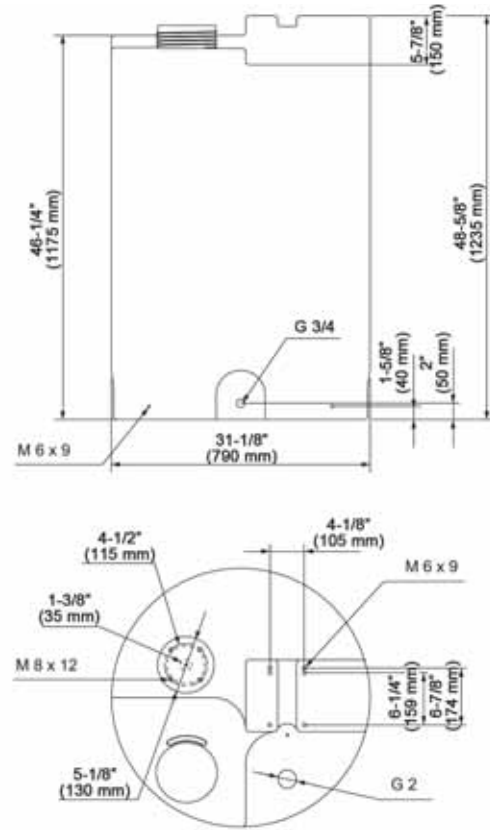


Fig. 51 Cylindrical tank, 132 gal. [500L]

TM04 8467\_US 0113

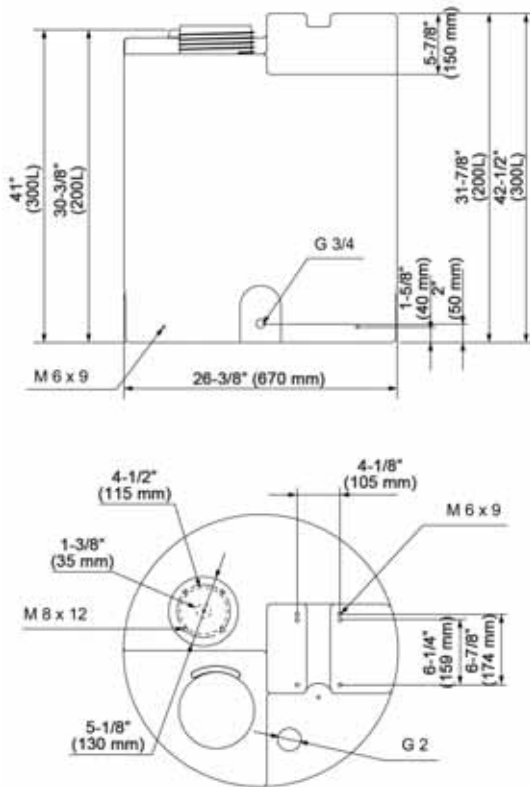


Fig. 50 Cylindrical tank, 53 gal. [200L] and 79 gal. [300L]

TM04 8466\_US 0113

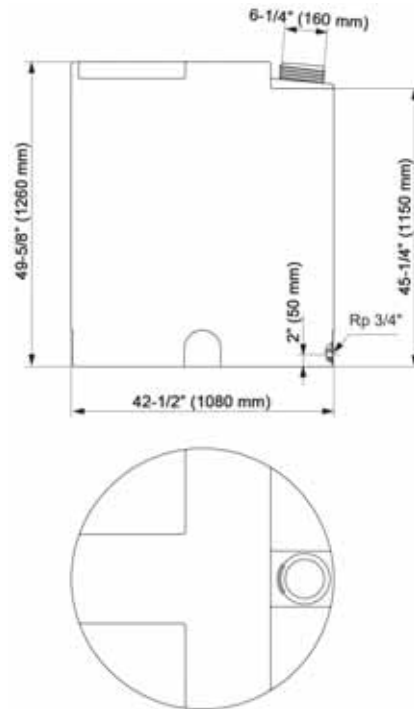
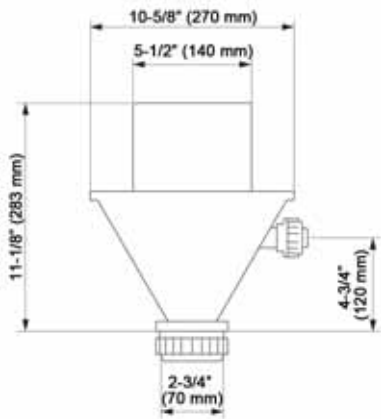


Fig. 52 Cylindrical tank, 264 gal. [1000L]

TM04 8315\_US 0113

## Accessories for dosing tanks



TM04 8318\_US 0113

Fig. 53 Dissolving hopper, dimensions



TM04 8477 0512

Fig. 54 Handheld mixer

### Technical data

Description	Specifications	Material	Material 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-liter 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-liter 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-liter or a 1000-liter cylindrical tank	for pump types DDA, DDC, DDE, DDI, DMX model 221	PP	95730864

## 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.

**Note:** Please be careful when handling these liquids.

Pumped liquid (20 °C)			Material								
			Dosing head				Gasket			Ball	Acc.
Description	Chemical formula	Concentration %	PP	PVDF	SS 1.4401	PVC	FKM	EPDM	PTFE	Ceramic	PE
			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	–	•	–	•	•	○	•	•	•
		50	–	•	–	•	•	–	•	•	•
Copper sulphate	CuSO <sub>4</sub>	30	•	•	•	•	•	•	•	•	
Ferric chloride ★ <sup>3</sup>	FeCl <sub>3</sub>	100	•	•	–	•	•	•	•	•	
Ferric sulphate ★ <sup>3</sup>	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	100	•	•	○	•	•	•	•	•	
Ferrous chloride	FeCl <sub>2</sub>	100	•	•	–	•	•	•	•	•	
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	–	•	•	–	•	–	•	•	○
		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	•	•	–	○	•	•	•	•	
Sodium hydroxide	NaOH	30	•	•	•	•	○	•	•	•	•
		50	•	•	•	•	–	•	•	•	•
Sodium hypochlorite	NaOCl	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 crystallization.

○ Limited resistance

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

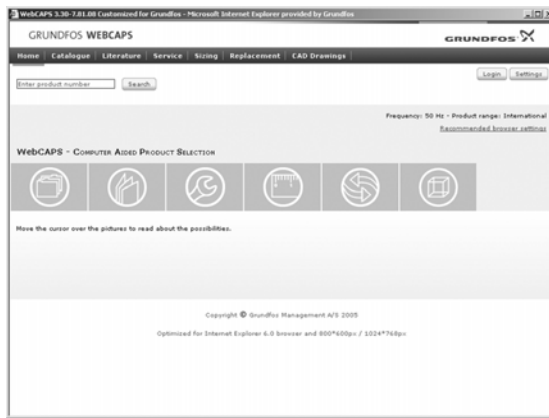
– Not resistant

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

For further information, see "Pumped liquid guide".

# 10. Further product information

## WebCAPS

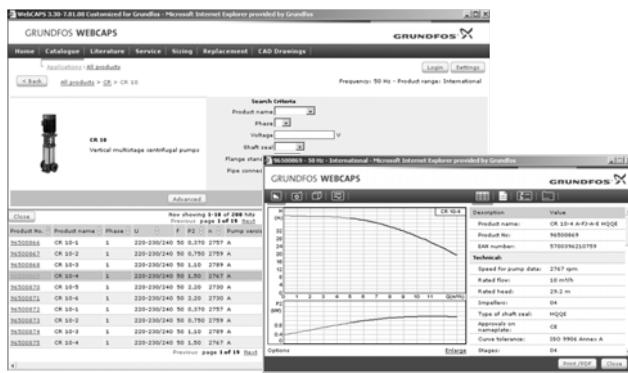


WebCAPS is a **Web-based Computer Aided Product Selection** program available on [www.grundfos.us](http://www.grundfos.us).

WebCAPS contains detailed information on more than 220,000 Grundfos products in more than 30 languages.

Information in WebCAPS is divided into six sections:

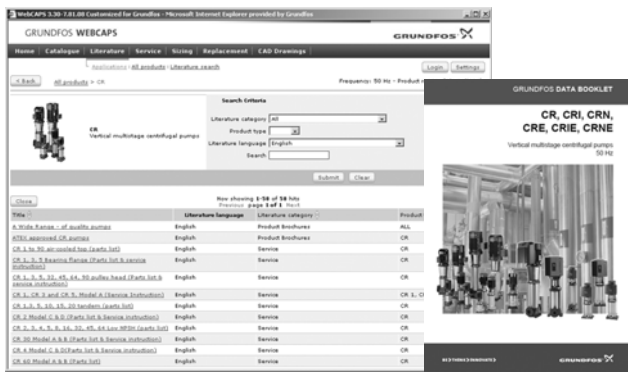
- catalog
- literature
- service
- sizing
- replacement
- cad drawings.



### Catalog

Based on fields of application and pump types, this section contains the following:

- technical data
- curves (QH, Eff, P1, P2, etc.) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



### Literature

This section contains all the latest documents of a given pump, such as

- data booklets
- installation and operating instructions
- service documentation, such as service kit catalog and service kit instructions
- quick guides
- product brochures.



### Service

This section contains an easy-to-use interactive service catalog. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.

Furthermore, the section contains service videos showing you how to replace service parts.



**Sizing**

This section is based on different fields of application and installation examples and gives easy step-by-step instructions in how to size a product:

- Select the most suitable and efficient pump for your installation.
- Carry out advanced calculations based on energy, consumption, payback periods, load profiles, life cycle costs, etc.
- Analyze your selected pump via the built-in life cycle cost tool.
- Determine the flow velocity in wastewater applications, etc.



**Replacement**

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump. The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.



**CAD drawings**

In this section, it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

- 2-dimensional drawings:
- .dxf, wireframe drawings
  - .dwg, wireframe drawings.
- 3-dimensional drawings:
- .dwg, wireframe drawings (without surfaces)
  - .stp, solid drawings (with surfaces)
  - .eprt, E-drawings.

**WinCAPS**



Fig. 55 WinCAPS DVD

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 220,000 Grundfos products in more than 30 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no internet connection is available.

WinCAPS is available on DVD and updated once a year.



## Grundfos GO

### Mobile solution for professionals on the GO!

Grundfos GO is the mobile tool box for professional users on the go. It is the most comprehensive platform for mobile pump control and pump selection including sizing, replacement and documentation. It offers intuitive, handheld assistance and access to Grundfos online tools, and it saves valuable time for reporting and data collection.



The image shows three smartphones standing upright, each displaying the Grundfos GO app interface. The interface features a graph with a curve and several control buttons. A fourth smartphone is lying flat in front of them. To the right of the phones are two QR codes. The top QR code is accompanied by a black button with the text "GET IT ON Google play". The bottom QR code is accompanied by a black button with the text "Available on the App Store".

Subject to alterations.

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