

SMART Digital

DDA, DDC, DDE

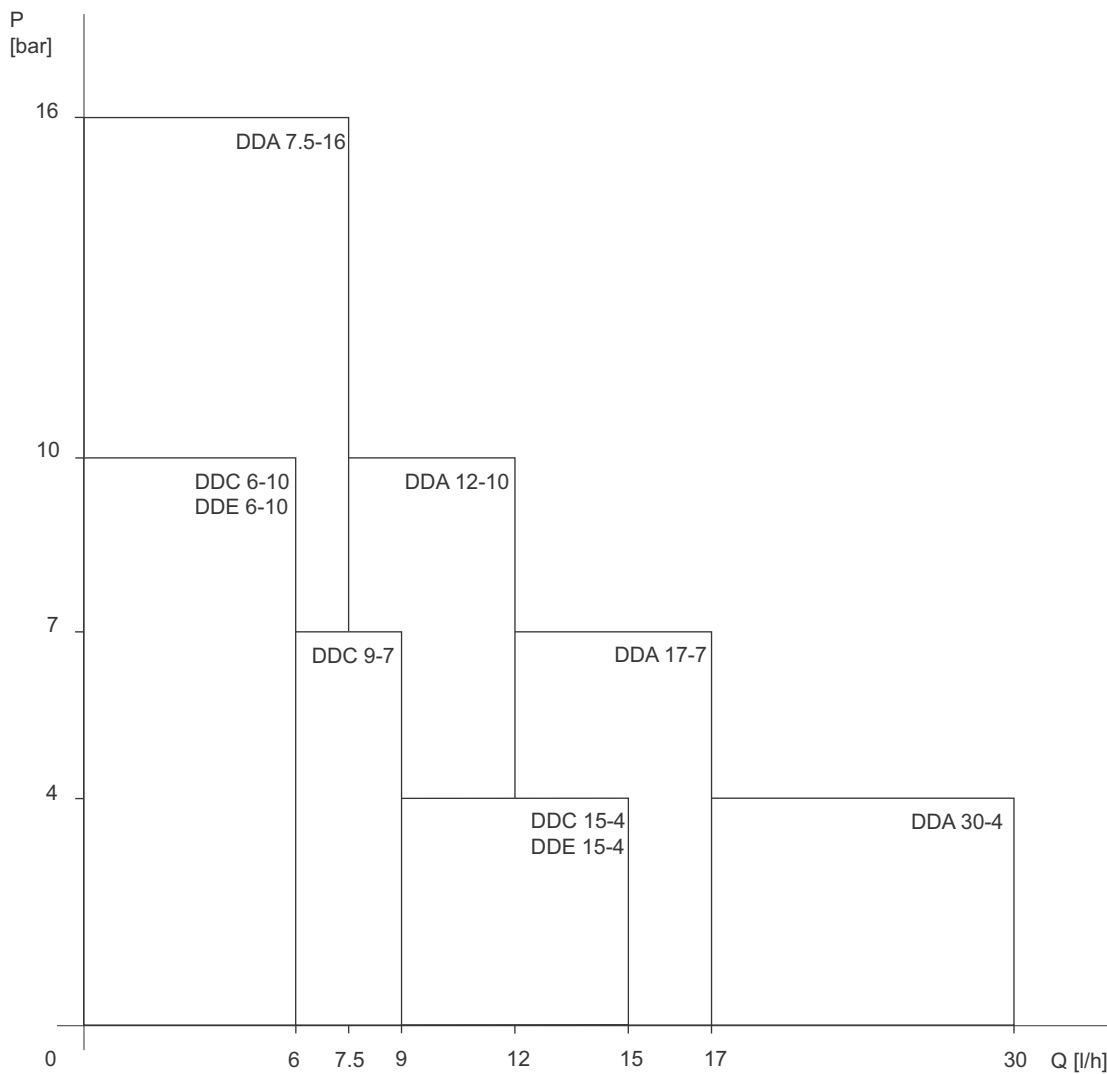
DIGITAL DOSING
pumps and accessories



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1. General data

Performance range



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Fig. 1 Performance range

Features at a glance



Fig. 2 DDA, DDC, DDE

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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

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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 colours, the pump status can be seen from a distance (traffic-light concept).

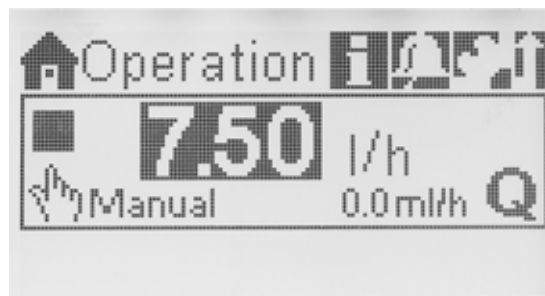


Fig. 4 Display DDA, DDC

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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 (Clean-In-Place).

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

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

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

- Car wash
- Irrigation.

2. Identification

Type key

Example:		DDA 7.5- 16 AR- PP /V /C -F -3 1 U2U2 F G	
Type range		Design	
DDE		G Grundfos Alldos	
DDC			
DDA			
Maximum flow [l/h]		Mains plug	
Maximum pressure [bar]		F EU	
Control variant		B USA, Canada	
B	Basic (DDE)	G UK	
P	B with pulse mode (DDE)	I Australia, New Zealand, Taiwan	
A	Standard (DDC)	E Switzerland	
AR	A with alarm relay and analog input	J Japan	
FC	AR with FlowControl (DDA)	L Argentina	
FCM	FC with flow measurement (DDA)	X No plug (only 24-48 VDC)***	
Dosing head variant		Connection, suction/discharge	
PP	Polypropylene	U2U2 Hose 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	
PVC	Polyvinyl chloride**	U7U7 Hose 0.17" x 1/4"; 1/4" x 3/8"; 3/8" x 1/2"	
PV	PVDF (polyvinylidene fluoride)	AA Threaded, Rp 1/4", female (SS)	
SS	Stainless steel 1.4401	VV Threaded, NPT 1/4", female (SS)	
Gasket material		XX No connection	
E	EPDM	Installation set*	
V	FKM	I001 Hose 4/6 mm (up to 7.5 l/h, 13 bar)	
T	PTFE	I002 Hose 9/12 mm (up to 60 l/h, 9 bar)	
Valve ball material		I003 Hose 0.17" x 1/4" (up to 7.5 l/h, 13 bar)	
C	Ceramic	I004 Hose 3/8" x 1/2" (up to 60 l/h, 10 bar)	
SS	Stainless steel 1.4401	Valve type	
Control cube position		1 Standard	
F	Front-mounted (change to left and right possible)	2 Spring-loaded	
X	No control cube (DDE)	0.1 bar suction opening pressure	
		0.1 bar discharge opening pressure	
		Supply voltage	
		3 1 x 100-240 V, 50/60 Hz	
		I 24-48 VDC (DDC)***	




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

** PVC dosing heads only up to 10 bar

*** Planned for 09/2011

3. Functions

Overview of functions

	DDA			DDC		DDE	
							
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Control variant:	FCM	FC	AR	AR	A	P	B
General							
Digital Dosing: Internal stroke speed and frequency control	•	•	•	•	•	•	•
Mounting plate (basic/wall mounting)	•	•	•	•	•	•	•
Control panel, see page 9							
Control cube mountable in three positions: front, left, right	•	•	•	•	•		
Control panel position: front-fitted						•	•
Transparent protective cover for control elements	•	•	•	•	•		
Capacity setting in millilitres, litres or US-gallons	•	•	•	•	•		
Graphical display with background light in four colours for status indication: white, green, yellow, red	•	•	•	•	•		
Plain-text menu in different languages	•	•	•	•	•		
Turn-and-push knob (click wheel) for easy navigation	•	•	•	•	•		
Capacity adjustment knob (0.1 - 100 %)						•	•
Start/Stop key	•	•	•	•	•		
100 % key (deaeration)	•	•	•	•	•		
Operation mode switch (manual/pulse)						•	
Operation modes, see page 11							
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	•	•	•				
Functions, see page 13							
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	•	•	•	•			
Relay setting (additionally): timer cycle, timer week	•	•	•				
Inputs/outputs, see page 14							
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 (Profibus DP or additional alarm relays)*	•	•	•				

* Planned for 09/2011

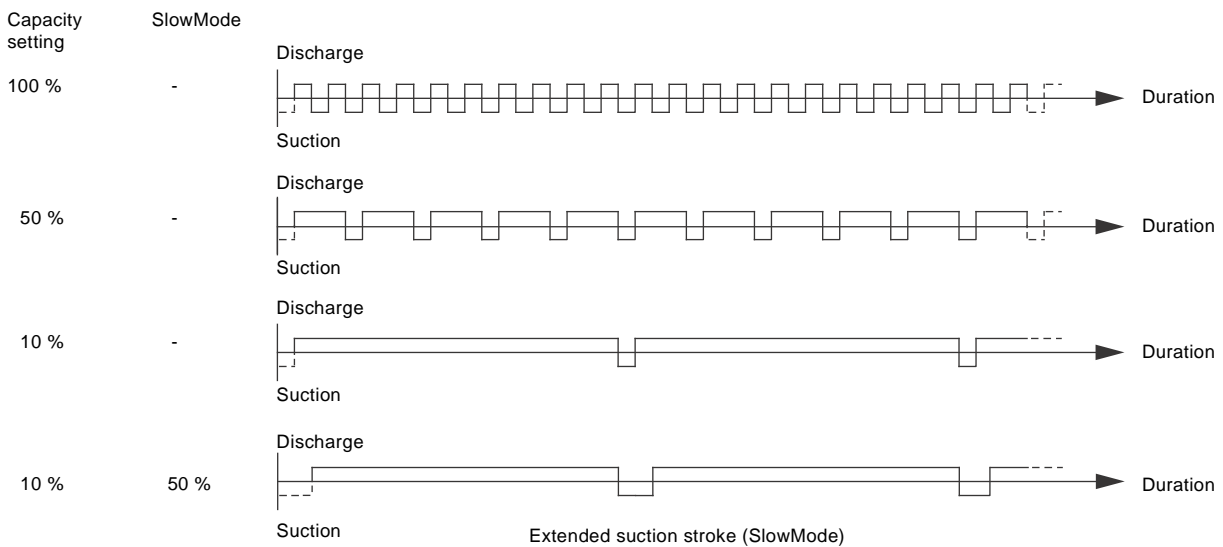
Functional description

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.



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Fig. 5 Relation between stroke-frequency adjustment and capacity

Control cube DDA and DDC

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



Fig. 6 Two of three possible control cube positions: at the front or at the left or at the right of the pump

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Operating elements DDA and DDC

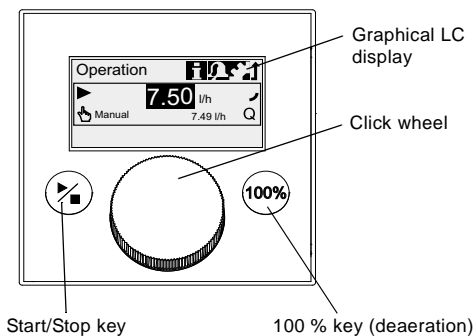


Fig. 7 Operating elements DDA and DDC

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.

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Operating elements DDE

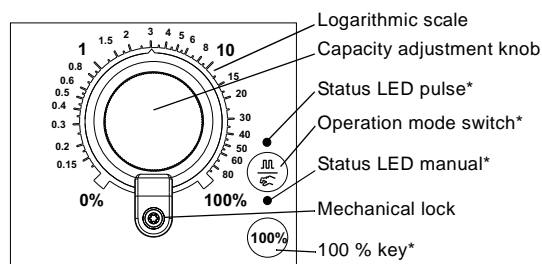


Fig. 8 Operating elements DDE

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

* Applies to DDE-P

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

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

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

LED colour	Pump status
Green (flashing)	Stopped
Green	Running
Yellow	External Stopped
Red	Empty tank (alarm)
Red (flashing)	Motor blocked (alarm)

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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:

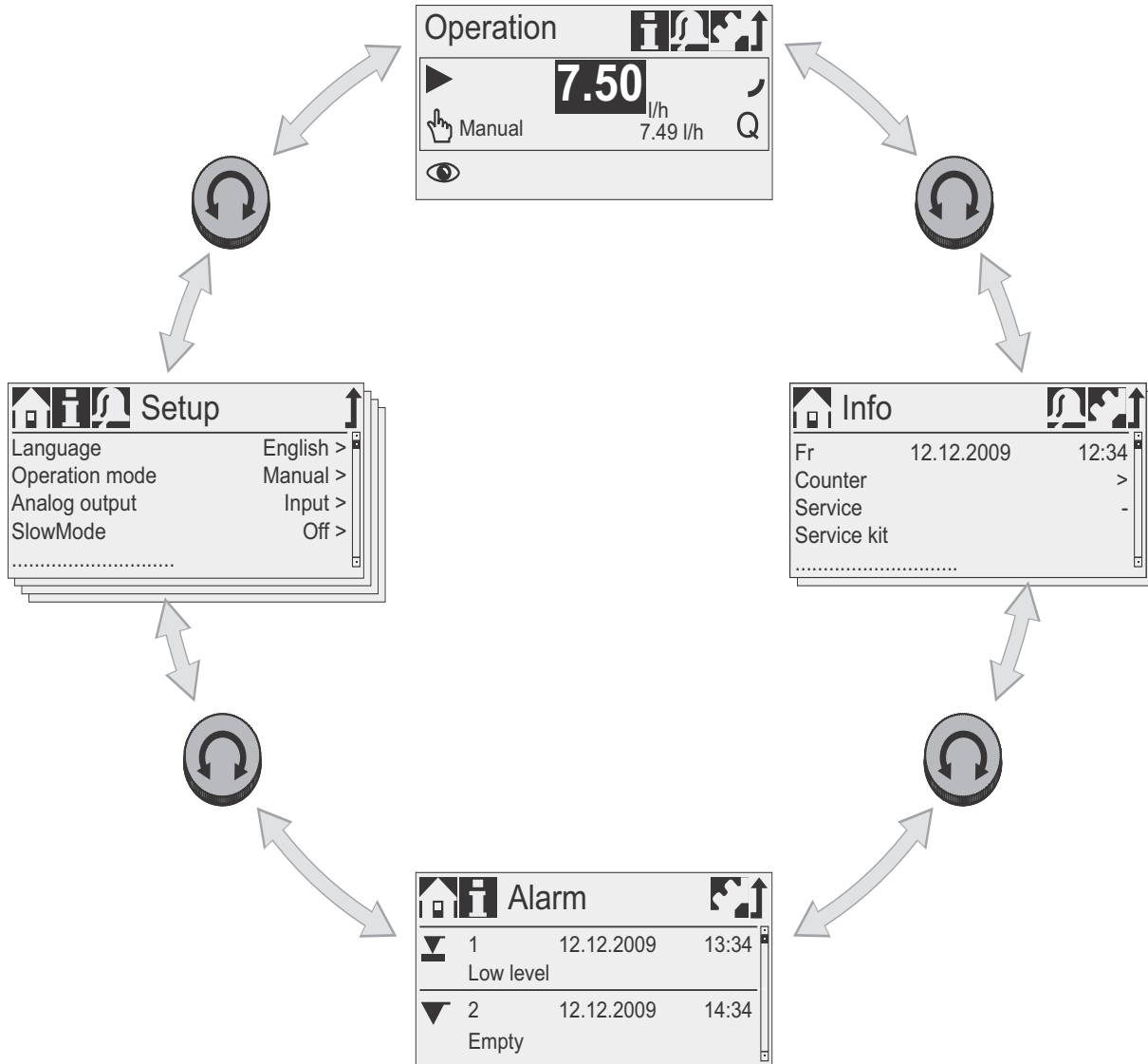


Fig. 9 Menu overview (example of main menus)

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-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-P

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

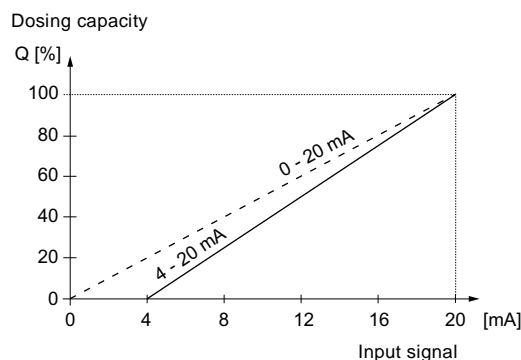
Analog 0/4-20 mA control

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 %

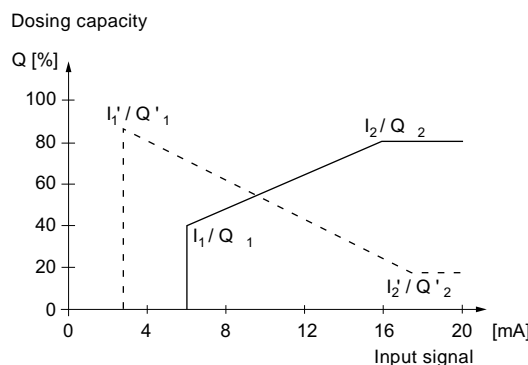


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Fig. 10 0/4-20 mA control

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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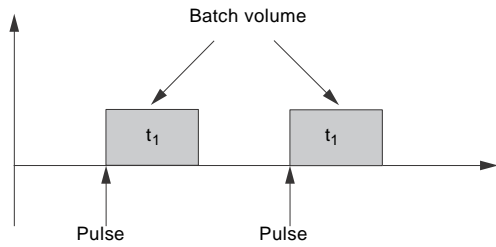
Fig. 11 Analog scaling

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

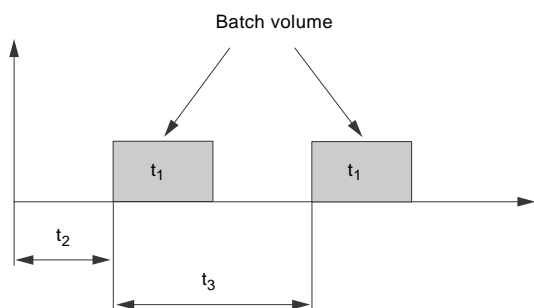
* Due to the digital motor control, down to 1/8 of the dosing volume can be dosed.

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

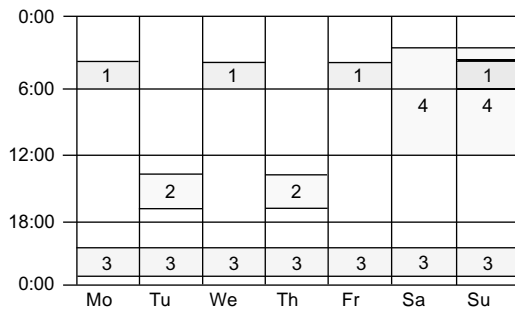
Applies to DDA



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 and 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 menu tab.

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

Service display

Applies to DDA, DDC



Due to the 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
Service kit	8-digit Grundfos product number
Reset service 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 and DDC



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*
Low-level signal (pre-empty)	<ul style="list-style-type: none"> • Display is yellow (Warning) • is flashing • Pump continues running
Empty tank signal	<ul style="list-style-type: none"> • Display is red (Alarm) • is flashing • Pump stops

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

Applies to DDE-P control variant

The pump can be connected to a one-level control unit (empty tank signal). The pump reacts with a red LED and the pump stops in case the tank runs empty.

Relay output

Applies to DDA and DDC-AR 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:

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
Bus control	Bus control	Set by a command in the Bus communication function (page 15)
	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

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

Applies to DDA

The pump is equipped with a built-in module for Genibus communication*. With the additional E-Box module (extension box: retrofit possible) the pump can be integrated in a Profibus DP network.

The bus communication possibilities enable remote monitoring and setting via the fieldbus system. The Profibus GSD-file can be downloaded from www.grundfosalldos.com.

* planned for 09/2011



Fig. 15 DDA with E-box

BUS

Basic settings

Applies to DDA, DDC

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

Units

Applies to DDA, DDC

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



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





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Key lock and mechanical lock

Applies to DDA and 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 pre-set 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.

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.

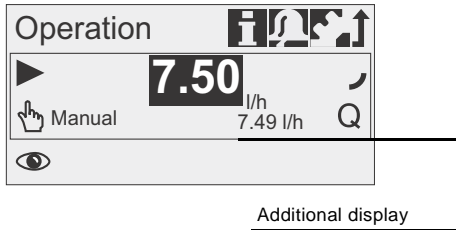










Fig. 16 Additional display

The following additional information can be selected:

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

¹⁾ Only DDA-FCM control variant

²⁾ Only DDA-FCM/FC control variant

³⁾ Only DDA pumps control variant

⁴⁾ Only DDA pumps and DDC-AR control variant

FlowControl

Applies to DDA-FC/FCM control variant



TM04 1641 2110

Fig. 17 DDA FlowControl

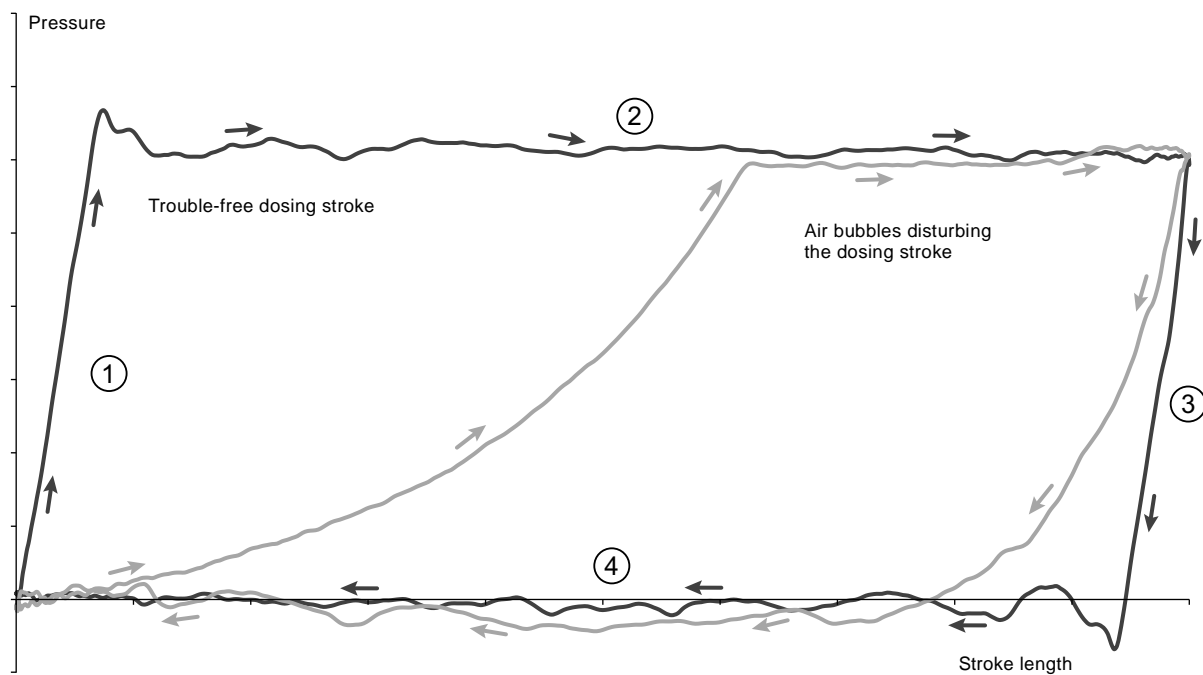
The pump monitors the dosing process of liquids when the FlowControl function is activated. Although the pump is still operating, some influences such as air bubbles may cause reduced flow rates or even stop the dosing process. For optimal process safety and reliability, the activated FlowControl function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

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

The unique FlowControl is based on an intelligent and maintenance-free sensor integrated in the dosing head. During the dosing process, the sensor measures the actual pressure and sends the measured value to the microprocessor in the pump. An internal indicator diagram is generated combining the actual pressure value with the diaphragm position (stroke length). With it, the dosing process is monitored, as the different malfunctions can immediately be detected due to their specific deviations in the curve. Compressible air bubbles, for instance, will reduce the discharge phase and the stroke volume (see fig. 18).

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

FlowControl requires a minimum backpressure of 2 bar. Grundfos recommend an additional spring-loaded valve (approx. 3 bar) on the discharge side for dosing low capacities (< 1 l/h) (please see page 33, section Accessories).



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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 Flow control (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 frequency.

AutoFlowAdapt

Applies to DDA-FCM control variant

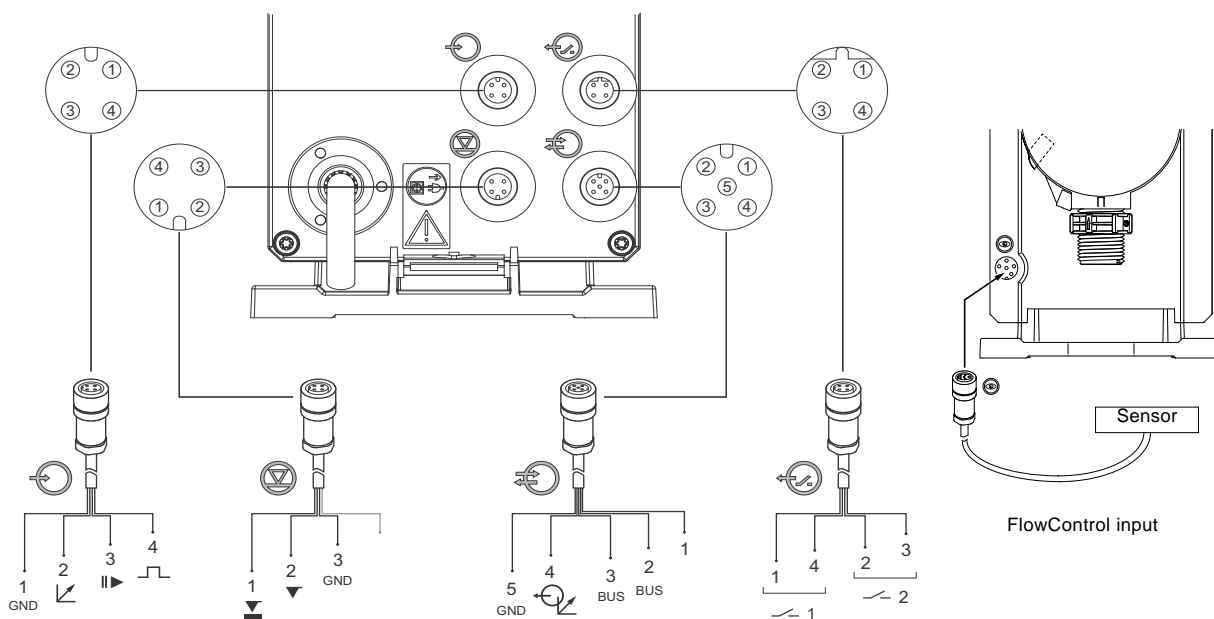
When activating the AutoFlowAdapt function even environmental changes will be compensated, so that the required target flow rate will be achieved. The integrated AutoFlowAdapt makes additional monitoring and control devices redundant. The AutoFlowAdapt function is based on:

- 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
Product No.
2 m cable: 96609014
5 m cable: 96609016

Cable 2
Level input
see page 38, suction
lines

Cable 3
Genibus, analog output
Product No.
2 m cable: 96632921
5 m cable: 96632922

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

TM04 1121 0110; TM04 1552 1210

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

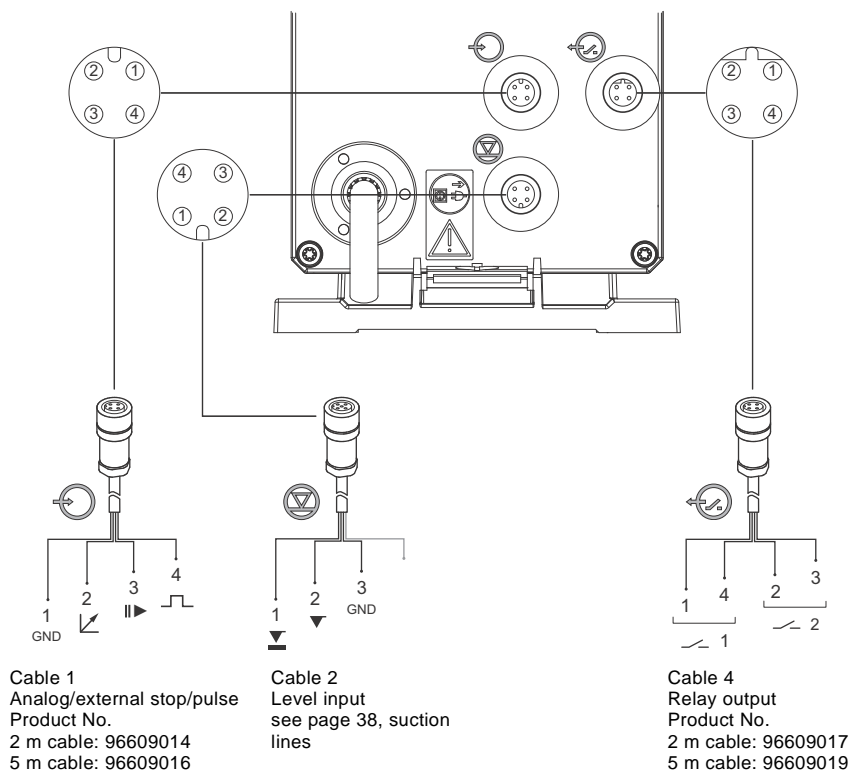
Cable 3: Genibus, analog output

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

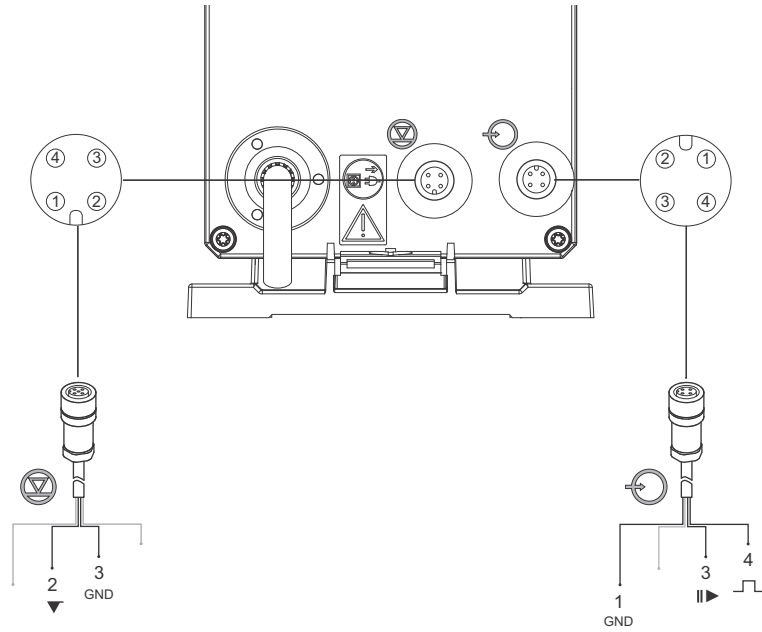
Function	Pin holes				Plug type
	1	2	3	4	
Low level	X		GND		Contact
Empty tank		X	GND		Contact

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-P



Cable 2
Level input
see page 38, suction
lines

Cable 1
External stop/pulse
Product No.
2 m cable: 96609014
5 m cable: 96609016

TM04 1532 1010

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

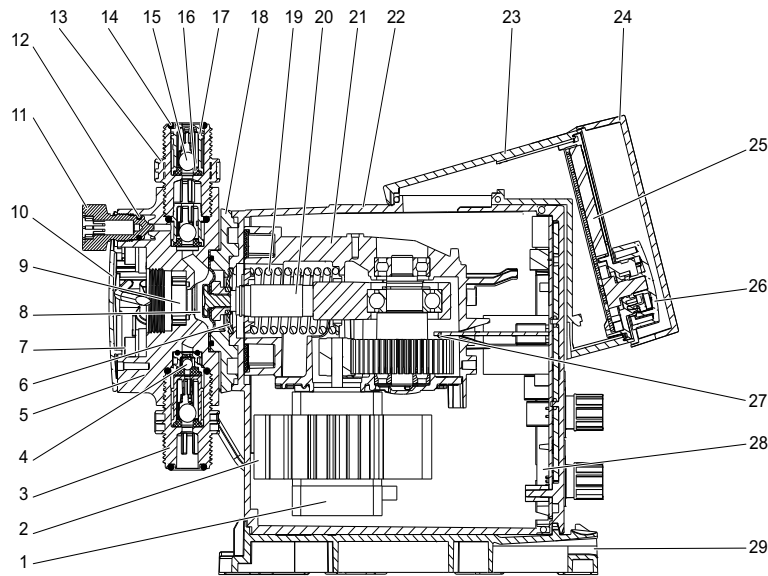
Cable 2: Level input*

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

* applies to DDE-P control variant

4. Construction

DDA and DDC



TM04 1533 1010

Fig. 19 Sectional drawing, DDA

Construction

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

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

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

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

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

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

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

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

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

Material specification

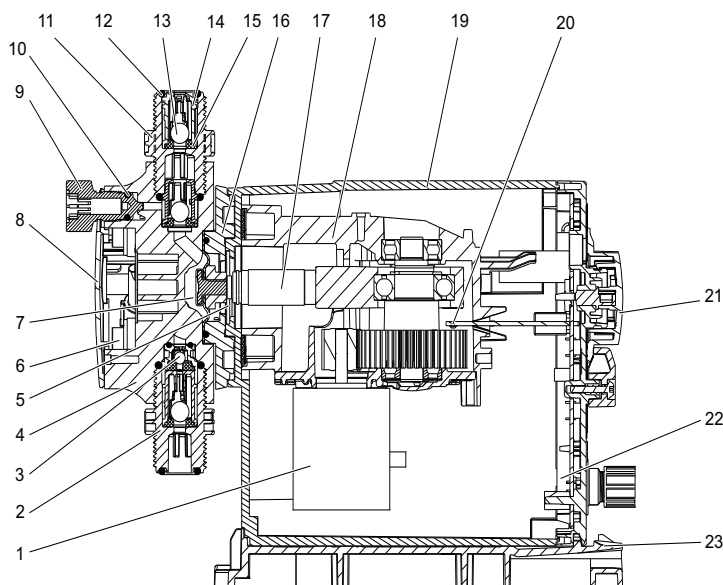
Pos.	Description	Material options
1	Stepper motor	–
2	Cooling element**	Aluminium
3	Suction valve, complete***	–
4	Valve ball, DN 4*	Ceramic Al ₂ O ₃ 99.5 %, SS 1.4401
5	Dosing head	PP, PVC, PVDF, SS 1.4435
6	Safety diaphragm	EPDM
7	Dosing head screw	SS 1.4301
8	Diaphragm	full PTFE
9	Pressure sensor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

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

** Only for DDA

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

DDE



TM04 1609 1710

Fig. 20 Sectional drawing, DDE

Construction

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

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

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

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

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

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

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

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

Material specification

Pos.	Description	Material options
1	Stepper motor	–
2	Suction valve, complete**	–
3	Valve ball, DN 4*	Ceramic Al ₂ O ₃ 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 ₂ O ₃ 99.5 %, SS 1.4401
14	Discharge valve ball cage	PP, PVC, PVDF, SS 1.4435
15	Discharge valve seat	EPDM, FKM, PTFE
16	Flange	PPO/PS 20 % gf
17	Connecting rod	PA 6.6 30 % gf
18	Gear box	PPO/PS 20 % gf
19	Housing	PPO/PS 20 % gf
20	Hall sensor	–
21	Capacity adjustment knob	PPO/PS 20 % gf
22	Power PCB	–
23	Mounting plate	PPO/PS 20 % gf

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

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

5. Dimensions

DDA and DDC

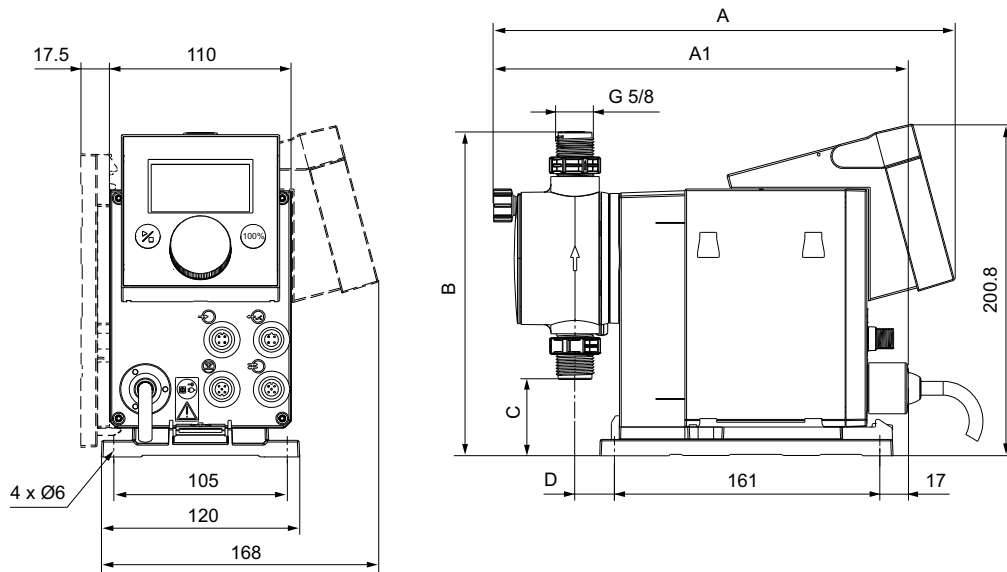


Fig. 21 DDA and DDC with front-fitted or side-fitted control cube

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DDE

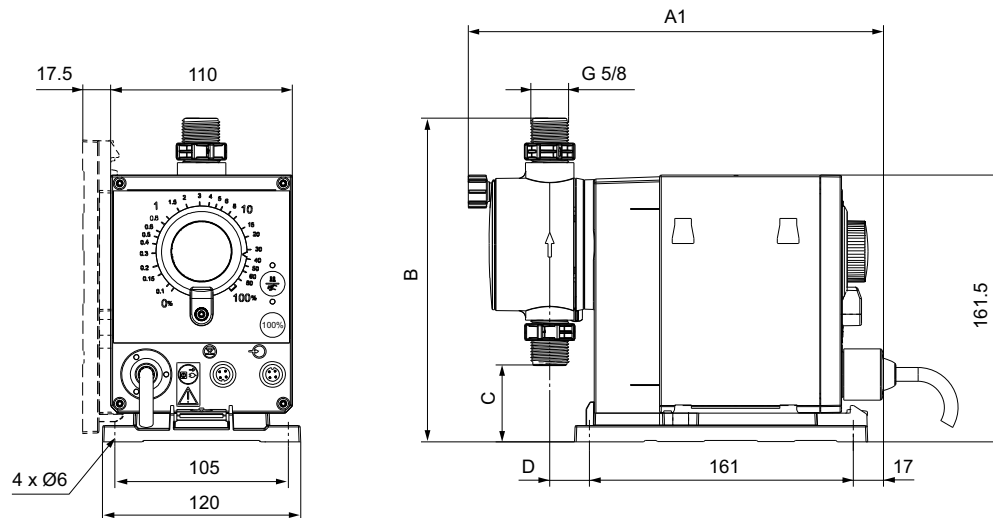


Fig. 22 DDE front fitted control elements

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

6. Technical data

DDA

Data		7.5-16	12-10	17-7	30-4	
	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 ¹⁾	[strokes/min]	190	155	205	180
	Stroke volume	[ml]	0.74	1.45	1.55	3.10
Mechanical data	Accuracy of repeatability	[%]	± 1			
	Max. suction lift during operation ²⁾	[m]	6			
	Max. suction lift when priming with wet valves ²⁾	[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 ³⁾	[mPas] (= cP)	2500	2500	2000	1500
	Max. viscosity in SlowMode 50 % with spring-loaded valves ³⁾	[mPas] (= cP)	1800	1300	1300	600
	Max. viscosity without SlowMode with spring-loaded valves ³⁾	[mPas] (= cP)	600	500	500	200
	Max. viscosity without spring-loaded valves ³⁾	[mPas] (= cP)	50	300	300	150
	Min. internal hose/pipe diameter suction/discharge side ^{4), 2)}	[mm]	4	6	6	9
	Min. internal hose/pipe diameter suction/discharge side (high viscosity) ⁴⁾	[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 ₁	[W]	24 ⁵⁾			
	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	2.6
	Weight (stainless steel)	[kg]	3.2	3.2	3.2	4.0
	Diaphragm diameter	[mm]	44	50	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 hose: 1.5 m, length of discharge hose: 10 m (at max. viscosity)

5) With E-box

DDC

Data		6-10	9-7	15-4
	Turndown ratio (setting range)	[1:X]	1000	1000
	Max. dosing capacity	[l/h]	6.0	9.0
		[gph]	1.5	2.4
	Max. dosing capacity with SlowMode 50 %	[l/h]	3.00	4.50
		[gph]	0.75	1.20
	Max. dosing capacity with SlowMode 25 %	[l/h]	1.50	2.25
		[gph]	0.38	0.60
	Min. dosing capacity	[l/h]	0.0060	0.0090
		[gph]	0.0015	0.0024
	Max. operating pressure	[bar]	10	7
		[psi]	150	100
	Max. stroke frequency ¹⁾	[strokes/min]	140	200
	Stroke volume	[ml]	0.81	0.84
	Accuracy of repeatability	[%]	± 1	
	Max. suction lift during operation ²⁾	[m]	6	
	Max. suction lift when priming with wet valves ²⁾	[m]	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 ³⁾	[mPas] (= cP)	2500	2000
	Max. viscosity in SlowMode 50 % with spring-loaded valves ³⁾	[mPas] (= cP)	1800	1300
	Max. viscosity without SlowMode with spring-loaded valves ³⁾	[mPas] (= cP)	600	500
	Max. viscosity without spring-loaded valves ³⁾	[mPas] (= cP)	50	300
	Min. internal hose/pipe diameter suction/discharge side ^{4), 2)}	[mm]	4	6
	Min. internal hose/pipe diameter suction/discharge side (high viscosity) ⁴⁾	[mm]	9	
	Min./Max. liquid temperature	[°C]	-10/45	
	Min./Max. ambient temperature	[°C]	0/45	
	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 ₁	[W]	22	
	Enclosure class		IP 65, Nema 4X	
	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	
	Max. resistance in level/pulse circuit	[Ω]	1000	
	Max. ohmic load on relay output	[A]	0.5	
	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
	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 hose: 1.5 m, length of discharge hose: 10 m (at max. viscosity)

DDE

Data		6-10	15-4	
Mechanical data	Turndown ratio (setting range)	[1:X]	1000	1000
	Max. dosing capacity	[l/h]	6.0	15.0
		[gph]	1.5	4.0
	Min. dosing capacity	[l/h]	0.0060	0.0150
		[gph]	0.0015	0.0040
	Max. pressure	[bar]	10	4
		[psi]	150	60
	Max. stroke frequency	[strokes/min]	140	180
	Stroke volume	[ml]	0.81	1.58
	Accuracy of repeatability	[%]	± 5	
	Max. suction lift during operation ²⁾	[m]	6	
	Max. suction lift when priming with wet valves ²⁾	[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 ³⁾	[mPas] (= cP)	600	500
	Max. viscosity without spring-loaded valves ³⁾	[mPas] (= cP)	50	50
	Min. internal hose/pipe diameter suction/discharge side ^{4), 2)}	[mm]	4	6
Min. internal hose/pipe diameter suction/discharge side (HV) ⁴⁾	[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 ₁	[W]	19	
	Enclosure class		IP 65, Nema 4X	
Electrical safety class		II		
Signal input ¹⁾	Max. load 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	
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) Applies to DDE-P control variant

2) Data is based on measurements with water

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

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

7. Pump selection

DDA, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)
 Mains plug: EU
 Valves: Standard
 Connection set: Hose, 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm (PVC, PP, PVDF)
 Threaded, Rp 1/4", female (SS)

Max. flow [l/h]	Max. pressure [bar]	Materials			Installation set*	Type designation**	Product number				
		Dosing head	Gaskets	Valve balls			AR	FC	FCM		
7.5	16	PP	EPDM	Ceramic	No	DDA 7.5-16 AR-PP/E/C-F-31U2U2FG	97721938	97721972	97722006		
					Yes	DDA 7.5-16 AR-PP/E/C-F-31I001FG	97721939	97721973	97722007		
			FKM	Ceramic	No	DDA 7.5-16 AR-PP/V/C-F-31U2U2FG	97721942	97721976	97722010		
					Yes	DDA 7.5-16 AR-PP/V/C-F-31I001FG	97721943	97721977	97722011		
			PVC***	EPDM	Ceramic	No	DDA 7.5-16 AR-PVC/E/C-F-31U2U2FG	97721946	97721980	97722014	
						Yes	DDA 7.5-16 AR-PVC/E/C-F-31I001FG	97721947	97721981	97722015	
		FKM		Ceramic	No	DDA 7.5-16 AR-PVC/V/C-F-31U2U2FG	97721950	97721984	97722018		
					Yes	DDA 7.5-16 AR-PVC/V/C-F-31I001FG	97721951	97721985	97722019		
		PVDF	PTFE	Ceramic	No	DDA 7.5-16 AR-PV/T/C-F-31U2U2FG	97721966	97722000	97722034		
					Yes	DDA 7.5-16 AR-PV/T/C-F-31I001FG	97721967	97722001	97722035		
		SS	PTFE	SS 1.4401	No	DDA 7.5-16 AR-SS/T/SS-F-31AAFG	97721970	97722004	97722038		
		12	10	PP	EPDM	Ceramic	No	DDA 12-10 AR-PP/E/C-F-31U2U2FG	97722040	97722074	97722108
							Yes	DDA 12-10 AR-PP/E/C-F-31I002FG	97722041	97722075	97722109
					FKM	Ceramic	No	DDA 12-10 AR-PP/V/C-F-31U2U2FG	97722044	97722078	97722112
Yes	DDA 12-10 AR-PP/V/C-F-31I002FG						97722045	97722079	97722113		
PVC	EPDM				Ceramic	No	DDA 12-10 AR-PVC/E/C-F-31U2U2FG	97722048	97722082	97722116	
						Yes	DDA 12-10 AR-PVC/E/C-F-31I002FG	97722049	97722083	97722117	
	FKM			Ceramic	No	DDA 12-10 AR-PVC/V/C-F-31U2U2FG	97722052	97722086	97722120		
					Yes	DDA 12-10 AR-PVC/V/C-F-31I002FG	97722053	97722087	97722121		
PVDF	PTFE			Ceramic	No	DDA 12-10 AR-PV/T/C-F-31U2U2FG	97722068	97722102	97722136		
					Yes	DDA 12-10 AR-PV/T/C-F-31I002FG	97722069	97722103	97722137		
SS	PTFE			SS 1.4401	No	DDA 12-10 AR-SS/T/SS-F-31AAFG	97722072	97722106	97722140		
17	7			PP	EPDM	Ceramic	No	DDA 17-7 AR-PP/E/C-F-31U2U2FG	97722142	97722176	97722210
							Yes	DDA 17-7 AR-PP/E/C-F-31I002FG	97722143	97722177	97722211
					FKM	Ceramic	No	DDA 17-7 AR-PP/V/C-F-31U2U2FG	97722146	97722180	97722214
		Yes	DDA 17-7 AR-PP/V/C-F-31I002FG				97722147	97722181	97722215		
		PVC	EPDM		Ceramic	No	DDA 17-7 AR-PVC/E/C-F-31U2U2FG	97722150	97722184	97722218	
						Yes	DDA 17-7 AR-PVC/E/C-F-31I002FG	97722151	97722185	97722219	
			FKM	Ceramic	No	DDA 17-7 AR-PVC/V/C-F-31U2U2FG	97722154	97722188	97722222		
					Yes	DDA 17-7 AR-PVC/V/C-F-31I002FG	97722155	97722189	97722223		
		PVDF	PTFE	Ceramic	No	DDA 17-7 AR-PV/T/C-F-31U2U2FG	97722170	97722204	97722238		
					Yes	DDA 17-7 AR-PV/T/C-F-31I002FG	97722171	97722205	97722239		
		SS	PTFE	SS 1.4401	No	DDA 17-7 AR-SS/T/SS-F-31AAFG	97722174	97722208	97722242		
		30	4	PP	EPDM	Ceramic	No	DDA 30-4 AR-PP/E/C-F-31U2U2FG	97722244	97722278	97722313
							Yes	DDA 30-4 AR-PP/E/C-F-31I002FG	97722245	97722279	97722314
					FKM	Ceramic	No	DDA 30-4 AR-PP/V/C-F-31U2U2FG	97722248	97722282	97722317
Yes	DDA 30-4 AR-PP/V/C-F-31I002FG						97722249	97722283	97722318		
PVC	EPDM				Ceramic	No	DDA 30-4 AR-PVC/E/C-F-31U2U2FG	97722252	97722286	97722331	
						Yes	DDA 30-4 AR-PVC/E/C-F-31I002FG	97722253	97722288	97722332	
	FKM			Ceramic	No	DDA 30-4 AR-PVC/V/C-F-31U2U2FG	97722256	97722291	97722335		
					Yes	DDA 30-4 AR-PVC/V/C-F-31I002FG	97722257	97722292	97722336		
PVDF	PTFE			Ceramic	No	DDA 30-4 AR-PV/T/C-F-31U2U2FG	97722272	97722307	97722351		
					Yes	DDA 30-4 AR-PV/T/C-F-31I002FG	97722273	97722308	97722352		
SS	PTFE			SS 1.4401	No	DDA 30-4 AR-SS/T/SS-F-31AAFG	97722276	97722311	97722355		

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

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

*** PVC dosing heads only up to 10 bar

DDC, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)
 Mains plug: EU
 Valves: Standard
 Connection set: Hose, 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm (PVC, PP, PVDF)
 Threaded, Rp 1/4", female (SS)

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

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

** Also available in AR-control version

DDE, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)
 Mains plug: EU
 Valves: Standard
 Connection set: Hose, 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm (PVC, PP, PVDF)
 Threaded, Rp 1/4", female (SS)

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

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

** Also available in P-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
[l/h] - [bar]	See page 7	<p>Head: PP: Polypropylene PVC: Polyvinyl chloride** PV: PVDF SS: Stainless steel 1.4401</p> <p>Gaskets: E: EPDM V: FKM T: PTFE</p> <p>Valve balls: 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>Suction/discharge connection:</p> <p>U2U2: Hose, 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm U7U7: Hose, 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>Installation set*</p> <p>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 J: Japan L: Argentina X: No plug	G: Grundfos Alldos

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

** 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
		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
		PVC	E V	C						
		PV	V T	C						
		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		
		PVC	E V	C						
		PV	V T	C						
		SS	T	SS	F	3	1 2	AA VV XX		

DDC

Max. flow & press.	Control variant	Materials			Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design
		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
		PVC	E V	C						
		PV	V T	C						
		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		
		PVC	E V	C						
		PV	V T	C						
		SS	T	SS	F	3 I	1 2	AA VV XX		

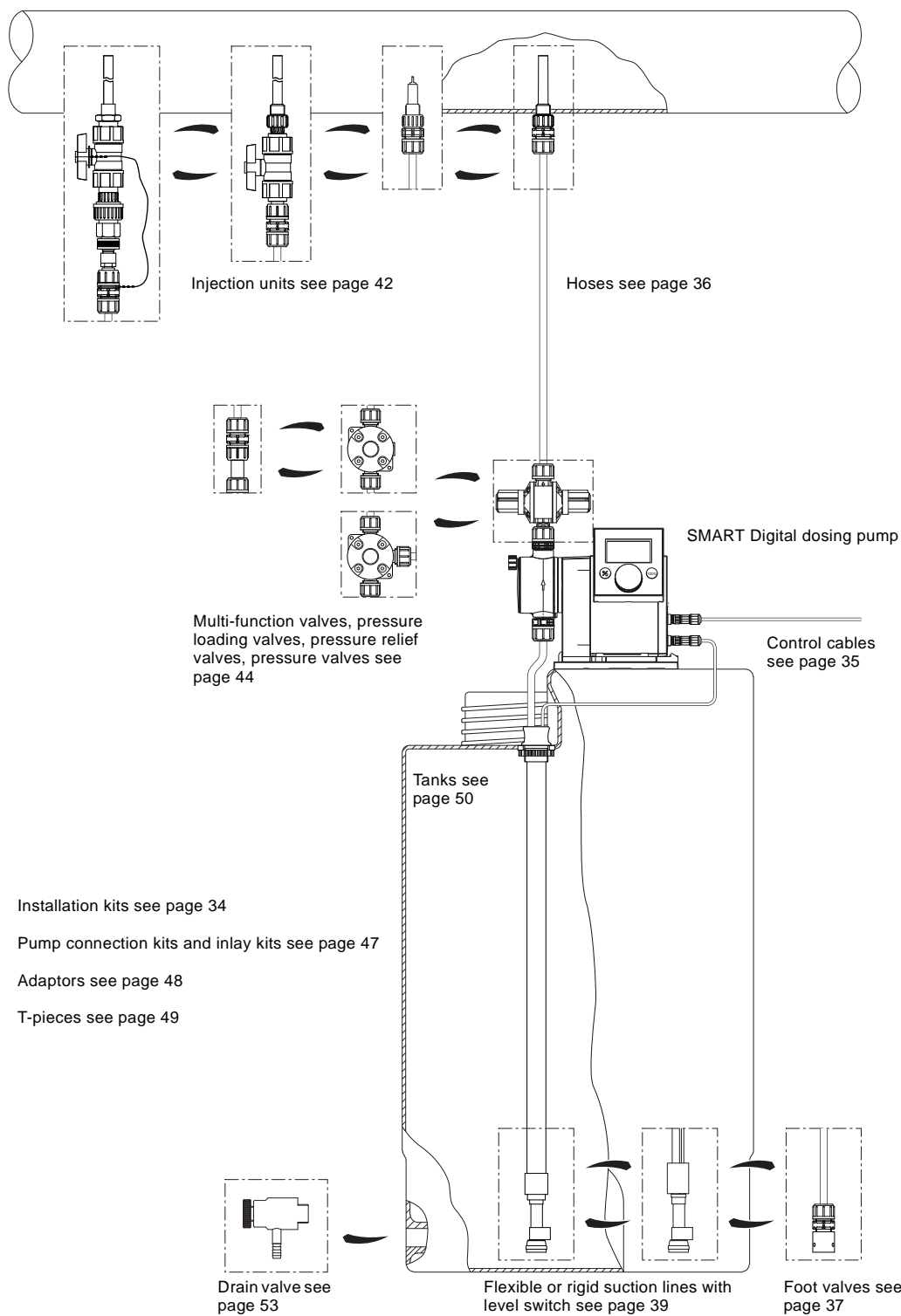
DDE

Max. flow & press.	Control variant	Materials			Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design
		Head	Gaskets	Balls						
6-10	B P	PP	E V	C	X	3	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G
		PVC	E V	C						
		PV	V T							
		SS	T	SS	X	3	1 2	AA VV XX		
15-4	B P	PP	E V	C	X	3	1 2	U2U2 U7U7 XX I002 I004		
		PVC	E V	C						
		PV	V T							
		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 8265 0411

Fig. 23 SMART Digital pump with accessories

Installation kits for dosing pumps

An installation kit includes the following parts:

- Foot valve with strainer and ceramic weight
- Injection unit with spring-loaded nonreturn valve
- PE discharge hose, 6 m
- PVC suction hose, 2 m
- PVC deaeration hose, 2 m



TM04 8266 0411

Fig. 24 Installation kit

Technical data

Max. flow rate* [l/h]	Max. pressure [bar]	Size		Material foot valve / injection unit			Product number
		Suction / discharge hose [mm]	Deaeration hose [mm]	Housing	Gasket	Ball	
7.5 l/h	13 bar	4/6 mm	4/6 mm	PP	FKM	Ceramic	95730440
					EPDM	Ceramic	95730441
					FKM	Ceramic	95730442
				PVC	EPDM	Ceramic	95730443
					PTFE	Ceramic	95730444
					FKM	Ceramic	95730445
				PVDF	EPDM	Ceramic	95730446
					PTFE	Ceramic	95730447
					FKM	Ceramic	95730448
30 l/h	12 bar	6/9 mm	4/6 mm	PP	EPDM	Ceramic	95730449
					FKM	Ceramic	95730450
					EPDM	Ceramic	95730451
				PVC	PTFE	Ceramic	95730452
					FKM	Ceramic	95730453
					EPDM	Ceramic	95730454
				PVDF	PTFE	Ceramic	95730455
					FKM	Ceramic	95730456
					EPDM	Ceramic	95730457
60 l/h	9 bar	9/12 mm	4/6 mm	PP	FKM	Ceramic	95730458
					EPDM	Ceramic	95730459
					FKM	Ceramic	95730460
				PVD	EPDM	Ceramic	95730461
					PTFE	Ceramic	95730462
					FKM	Ceramic	95730463
				PVDF	EPDM	Ceramic	95730464
					PTFE	Ceramic	95730465
					FKM	Ceramic	95730466

* 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 mm²
- Plug type: M 12



TM04 8267 04 11

Fig. 25 Cable and plug

Technical data

Socket	Application	Pins	Plug type	Cable length [m]	Product number	
	Input	Analog Pulse External stop	Straight	2	96609014	
				5	96609016	
			Angled	No cable	96698715	
				2	96695976	
	Input	Low level Empty tank	4	Straight	No cable	96698715
	Output	Analog Genibus	Straight	2	96632921	
				5	96632922	
			Angled	No cable	96609031	
				2	96699697	
	Output	Relay 1 Relay 2	Straight	2	96609017	
				5	96609019	
			Angled	No cable	96696198	
				2	96698716	

Hoses

Hoses are available in various materials, sizes and lengths.



TM04 8288 04 11

Fig. 26 Hoses

Technical data

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

* Viscosity similar to water

Foot valves

Foot valves are installed at the lower end of the suction hoses. They are supplied complete with nonreturn valve, strainer, ceramic weight, and hose connection.



Fig. 27 Foot valve, up to 60 l/h

Dimensions

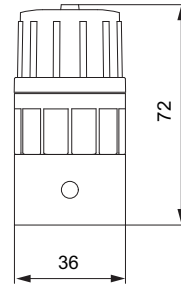


Fig. 28 Foot valve, up to 60 l/h, dimensions

TM04 8269 0411

TM04 8270 0411

Technical data

Max. flow rate [l/h]	Hose connection size [mm]	Material of valve			Product number
		Housing	Gasket	Ball	
7.5	4/6	PP	EPDM	Ceramic	96440526
		PP	FKM	Ceramic	96446860
		PVDF	FKM	Ceramic	96440529
30	6/9	PP	EPDM	Ceramic	96440527
		PP	FKM	Ceramic	96446861
		PVDF	FKM	Ceramic	96440530
		PVDF	PTFE	Ceramic	96641624
60	9/12	PP	EPDM	Ceramic	96440528
		PP	FKM	Ceramic	96446865
		PVDF	FKM	Ceramic	96440531
		PVDF	PTFE	Ceramic	96634711

Flexible suction lines

Flexible suction lines include:

- Foot valve with strainer and ceramic weight
- Two level sensors: low-level and empty-tank, NO contact type
- Suction hose
- Level sensor cable with PE jacket and M12 plug
- PE plug, diameter 46 mm.

Flexible suction lines should not be used together with agitators.



Fig. 29 Flexible suction line

TM04 8271 0411

Dimensions

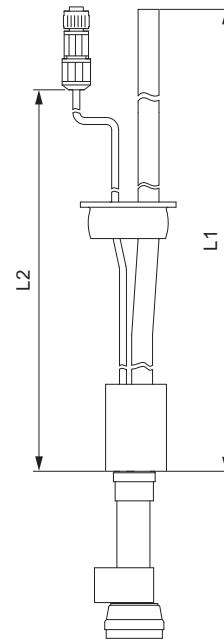


Fig. 30 Flexible suction line, dimensions

TM04 8272 0411

Version	Hose length (L 1) [m]	Cable length (L 2) [m]
Short	1.50	2.00
Long	5.00	10.00

Technical data

Max. flow rate [l/h]	Hose		Material			Product number	
	Size [mm]	Material	Housing	Ball	Short version	Long version	
7.5	4/6	PE	PVC	Glass	95703074	95712297	
			PP	Glass	95705264	95702948	
		PTFE	PVDF	PTFE	95702016	95717088	
30	6/12	PVC	PVC	Glass	95701068	95700415	
	6/9	PE	PP	Glass	95717091	95717092	
60	9/12	PE	PVC	Glass	96728762	96736679	
			PP	Glass	96728760	95717093	

Rigid suction lines

Rigid suction lines include:

- Foot valve with strainer
- Two level sensors: low-level and empty-tank, NO contact type
- Suction hose with protective pipe
- Level sensor cable with PE jacket and M12 plug

Rigid suction lines are available in different versions for diverse applications.

Rigid suction lines for tanks

Rigid suction lines for tanks are intended for installation in cylindrical Grundfos standard tanks. The length of the suction line is adapted to the respective tank. Rigid suction lines can be used in tanks with agitators, because they are fixed with an included nut to the top of the tank.

Rigid suction lines for canisters

Rigid suction lines for canisters are supplied with a cap to fit plastic canisters according to EN 12712/12713. The cap size and the maximum immersion depth are suitable for canister sizes between 20 and 60 litres.

Rigid suction lines for drums

Rigid suction lines for drums can easily be removed, if the drum has to be replaced. The drum adaptor has G2 and S70x6 threads, and fits the bung holes of most of the standard chemical drums. The position of the adaptor is adjustable, and the maximum immersion depth (1100 mm) suits common drum heights.



Fig. 31 Rigid suction line for stationary tanks

TM04 8273 0411



Fig. 32 Rigid suction line for canisters

TM04 8274 0411



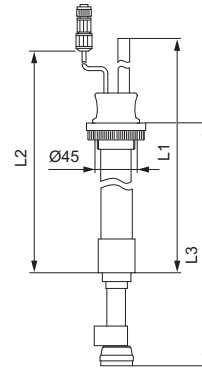
Fig. 33 Rigid suction line for drums

TM04 8275 0411

Rigid suction lines for tanks

Dimensions

For Grundfos tank size [l]	Length of		Immersion depth (L3) [mm]
	Hose (L1) [m]	Cable (L2) [m]	
75	1.50	2.00	500
100	1.50	2.00	660
200	1.50	2.00	750
300	3.00	10.00	900
500	3.00	10.00	1030
1000	3.00	10.00	1100



TM04 8276 0411

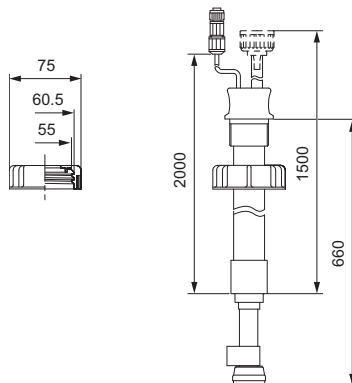
Fig. 34 Rigid suction line for tanks

Technical data

Max. flow rate [l/h]	Hose		Material foot valve and protective pipe			Product number of suction line for tank size					
	Size [mm]	Material	Housing	Ball	75 l	100 l	200 l	300 l	500 l	1000 l	
7.5	4/6	PE	PVC	Glass	95717190	95709297	95717191	96295854	96295855	96295856	
			PP	Glass	95717195	95717197	95717194	95717200	95717201	95717203	
		PTFE	PVDF	PTFE	95717419	95717420	95717421	95717422	95717423	95717424	
30	6/12	PVC	PVC	Glass	95712019	95709270	95702931	95707065	95713366	95703303	
		PE	PP	Glass	95717220	95717221	95717222	95717223	95717224	95717225	
60	9/12	PE	PVC	Glass	95711455	95705407	95700619	95712023	96728781	96728776	
			PP	Glass	95717226	96728783	95716391	95717228	95710858	95717229	
		PTFE	PVDF	PTFE	95717234	95717235	95717236	95717237	95714951	95714919	

Rigid suction lines for canisters

Dimensions



TM04 8277 0411 / TM04 8278 0411

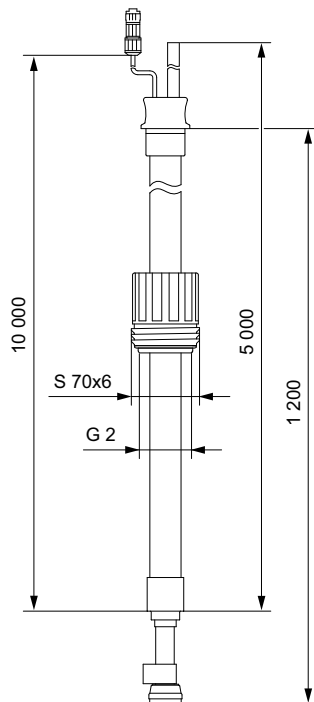
Fig. 35 Rigid suction line for canisters

Technical data

Max. flow rate [l/h]	Hose		Material			Product number
	Size [mm]	Material	Housing	Ball		
7.5	4/6	PE	PVC	Glass	95712065	
		PTFE	PVDF	Glass	95717239	
30	6/12	PVC	PVC	PTFE	95717240	
		PE	PP	Glass	95712082	
60	9/12	PE	PVC	Glass	95717243	
			PP	Glass	96728795	
		PTFE	PVDF	PTFE	95717244	
					95723759	

Rigid suction lines with drum adaptors

Dimensions



TM04 8279 0411

Fig. 36 Rigid suction line for drums

Technical data

Max. flow rate [l/h]	Hose		Material			Product number
	Size [mm]	Material	Housing	Ball		
7.5	4/6	PE	PVC	Glass	95713443	
		PTFE	PP	Glass	95717094	
30	6/12	PVC	PVDF	PTFE	95723755	
	6/9	PE	PVC	Glass	95715015	
60	9/12	PE	PP	Glass	95716845	
		PTFE	PVC	Glass	95709173	
	9/12	PE	PP	Glass	95717096	
		PTFE	PVDF	PTFE	95723757	

Injection units

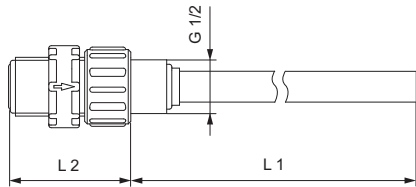
Injection units connect the dosing line with the process line. They ensure a minimum backpressure of 0.7 bar, and avoid backflow of the dosing liquid.

In general, they include:

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

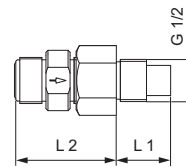
Standard injection units

Dimensions



TM04 8280 0411

Fig. 37 Standard injection unit, PP, PVC, and PVDF version



TM04 8281 0411

Fig. 38 Standard injection unit, stainless-steel version

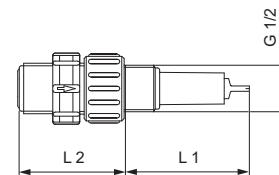
Technical data

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

Injection units with lip valve

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

Dimensions



TM04 8282 0411

Fig. 39 Injection unit with lip valve

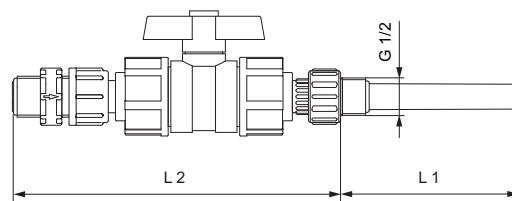
Technical data

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

Injection units with ball valve

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

Dimensions



TM04 8284 0411

Fig. 40 Injection unit with ball valve

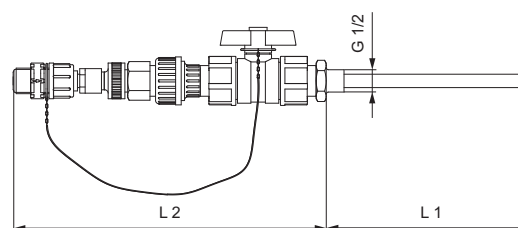
Technical data

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

Injection units, withdrawable for cleaning

These injection units are used when regular cleaning of the injection pipe is required. Their construction allows to withdraw the injection unit from the process line and to clean 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. 41 Injection unit, withdrawable for cleaning

Technical data

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

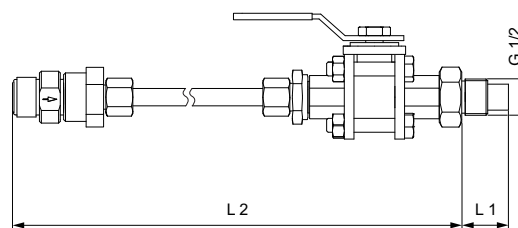
Hot-injection units with ball valve

Hot-injection units with ball valve can be used for direct injection of dosing liquid into processes with a temperature of up to 120 °C.

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. 42 Hot-injection unit with ball valve

Technical data

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

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 pressures. All pressurised 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 syphoning, 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. 43 Multi-function valve, pressure relief valve, pressure loading valve

TM04 8287 0411

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

Dimensions

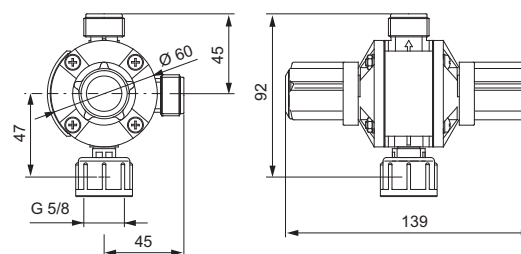


Fig. 44 Multi-function valve

TM04 8288 0411

Technical data

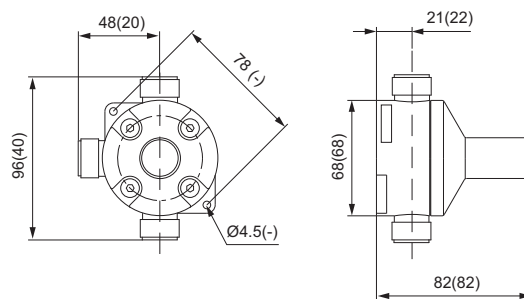
Max. flow rate [l/h]	Housing	Material of			Product number	
		Connections	Gasket	Diaphragm	Relief pressure 10 bar	Relief pressure 16 bar
60	PVDF	PP	FKM	PTFE	95704585	95730821
			EPDM	PTFE	95704591	95730822
		PVC	FKM	PTFE	95730807	95730823
			EPDM	PTFE	95730808	95730824
		PVDF	PTFE	PTFE	95730809	95730825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

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

Dimensions



TM04 8290 0411

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

Technical data

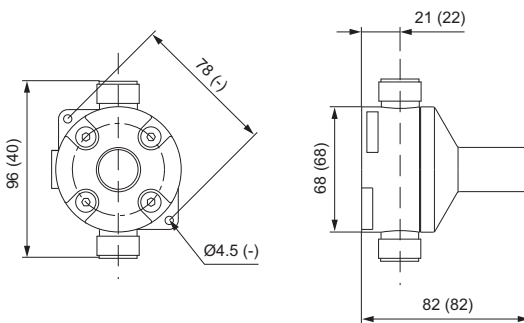
Max. flow rate [l/h]	Diaphragm	Material		Product number	
		Housing and connections	Gasket	Relief pressure 10 bar	Relief pressure 16 bar
60	PTFE	PP	FKM / EPDM	95730757	95730773
		PVC	FKM / EPDM	95730758	95730774
			PTFE	95730759	95730775
		PVDF	FKM / EPDM	95730760	95730776
			PTFE	95730761	95730777
Stainless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

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

Dimensions



TM04 8292 0411

Fig. 46 Pressure loading valve. Dimensions in brackets apply to stainless-steel version.

Technical data

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

Pressure valves

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

Dimensions

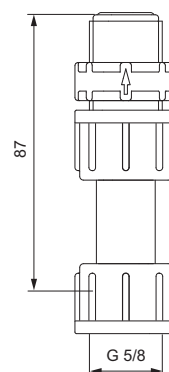


Fig. 47 Pressure valve

TM04 8293 0411

Technical data

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

Pump connection kits and inlay kits

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

A pump connection kit includes:

- 1 set of inlays, 1 union nut

An inlay kit includes:

- 2 sets of inlays



Fig. 48 Left: pump connection kit; right: inlay kit

Technical data

Connection type	Size	Material	Product number	
			Connection kit	Inlay kit
Hose (cone and ring)	4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	PP	97691902	-
		PVC	97691903	-
		PVDF	97691904	-
	0.17"x1/4", 1/4"x3/8", 3/8"x1/2"	PP	97691905	-
		PVC	97691906	-
		PVDF	97691907	-
Hose (cone and ring)	4/6 mm, or 0.17"x1/4"	PP	97702474	95730984
		PVC	97702485	95730720
		PVDF	97702495	95730729
	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"x3/8	PP	97702482	95730718
		PVC	97702492	95730727
		PVDF	97702503	95730737
	3/8"x1/2"	PP	97702483	95730719
		PVC	97702493	95730728
		PVDF	97702504	95730738
Hose (cutting ring type)	1/8"x1/4"	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	-
		Stainless steel	97702508	-
Pipe, threaded, female	Rp 1/4"	Stainless steel	97702472	95730739
	1/4" NPT	Stainless steel	97702473	95730740
Pipe (cutting ring type)	4/6 mm	Stainless steel	97702506	-
	8/10 mm	Stainless steel	97702507	-

Adaptors

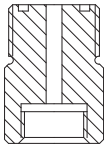
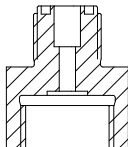
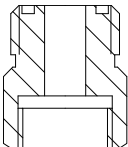
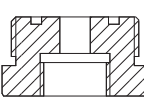
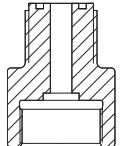
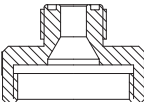
Threaded adaptors

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

A threaded adaptor kit includes:

- 1 adaptor
- 1 O-ring

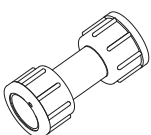
Technical data

Type	Threaded connection size		Material of		Product number	
	Female	Male	Housing	Gaskets		
	TM04 8296 0411	G 3/8	G 5/8	PP	FKM / EPDM	95730407
				PVC	FKM / EPDM	95730408
					PTFE	95730409
				PVDF	FKM / EPDM	95730410
					PTFE	95730411
	TM04 8297 0411	G 5/8	G 3/8	PP	FKM / EPDM	95730412
				PVC	FKM / EPDM	95730413
					PTFE	95730414
				PVDF	FKM / EPDM	95730415
					PTFE	95730416
	TM04 8298 0411	G 5/8	G 3/4	PP	FKM / EPDM	95730417
				PVC	FKM / EPDM	95730418
					PTFE	95730419
				PVDF	FKM / EPDM	95730420
					PTFE	95730421
	TM04 8299 0411	G 5/8	G 1 1/4	PP	FKM / EPDM	95730422
				PVC	FKM / EPDM	95730423
					PTFE	95730424
				PVDF	FKM / EPDM	95730425
					PTFE	95730426
	TM04 8300 0411	G 5/8	M20 x 1.5	PP	FKM / EPDM	95730427
				PVC	FKM / EPDM	95730428
					PTFE	95730429
				PVDF	FKM / EPDM	95730430
					PTFE	95730431
	TM04 8301 0411	G 1 1/4	G 5/8	PP	FKM / EPDM	95730432
				PVC	FKM / EPDM	95730433
					PTFE	95730434
				PVDF	FKM / EPDM	95730435
					PTFE	95730436

Union nut adaptors

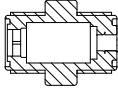

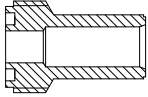
Union nut adaptors consist of a rigid pipe with union nuts on both ends. They have neither gaskets nor glued or welded connections.

Technical data

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

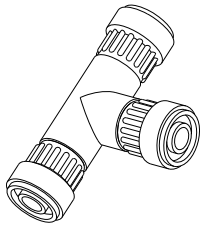
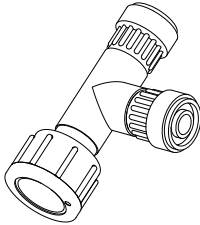
Hose-to-hose and hose-to-pipe adaptors

Technical data

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

T-pieces

Technical data

Type	Description	Connections			Material		Product number
		Bottom	Top	Side	Housing and connections	Gaskets	
	3 male threads G 5/8	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	-	Without	PP	FKM / EPDM	95730387
					PVC	FKM / EPDM	95730388
						PTFE	95730389
					PVDF	FKM / EPDM	95730390
						PTFE	95730391
					PP	FKM / EPDM	95730346
		PVC	FKM / EPDM	95730347			
			PTFE	95730348			
		PVDF	FKM / EPDM	95730349			
				PTFE	95730350		
	2 male threads G 5/8, 1 female connection with union nut	Union nut G 5/8	Without	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm	PP	FKM / EPDM	95730397
					PVC	FKM / EPDM	95730398
						PTFE	95730399
					PVDF	FKM / EPDM	95730400
				PTFE	95730401		
			Without	PP	FKM / EPDM	95730351	
				PVC	FKM / EPDM	95730352	
					PTFE	95730353	
		PVDF	FKM / EPDM	95730354			
				PTFE	95730355		

Tanks

Square tank, 100 litres

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

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

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

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

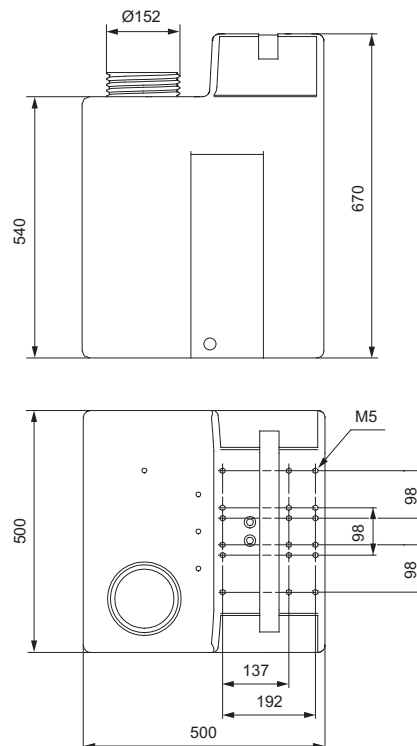
The square tank is prepared for a 3/4" Rp drain valve. When using a rigid suction line in the tank, choose the length for a 75-litre cylindrical tank.



Fig. 49 Square tank

TM04 8307 0411

Dimensions



TM04 8308 0411

Fig. 50 Square tank, dimensions

Order data

Tank size [l]	Product number
100	96489271

Cylindrical tanks

The closed cylindrical tanks are transparent and have a screw cap.

- Tank material: PE
- Liquid temperature: -20 °C to +45 °C
- Wall thickness: 4.5 mm



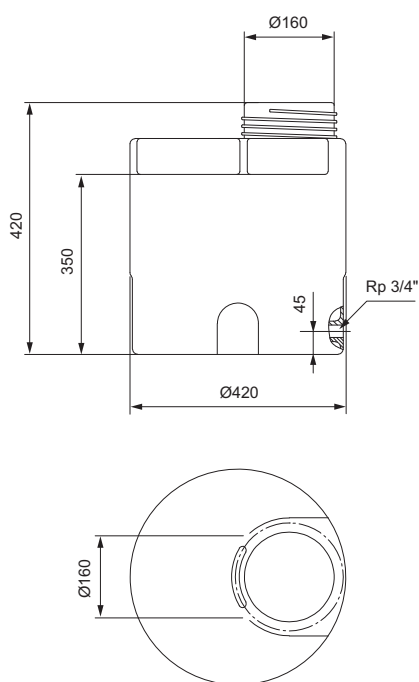
TM04 8309 0411

Fig. 51 Cylindrical tank

Technical data

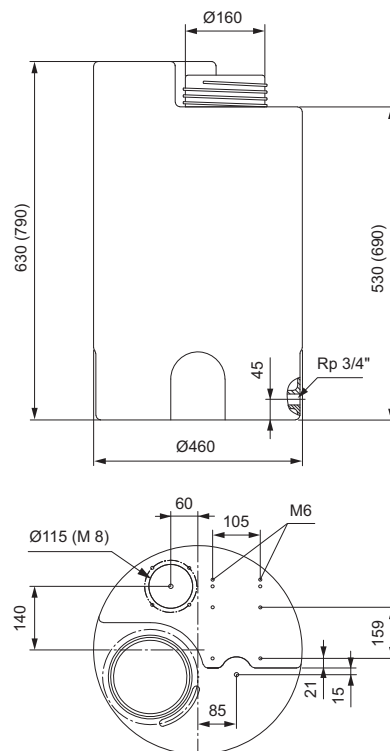
Tank size [l]	Remark	Weight [kg]	Product number
40	Without inserts	3.4 kg	96688081
75	With inserts for mounting SMART Digital pumps	6.0 kg	96688082
100	With inserts for mounting SMART Digital pumps	7.5 kg	91836501
200	With inserts for mounting SMART Digital pumps	12 kg	96690348
300	Without inserts	13 kg	96688084
500	Without inserts	24 kg	96690349
	Reinforced for mounting an agitator, without inserts	28 kg	96688085
1000	Without inserts	40 kg	96688086
	Reinforced for mounting an agitator, without inserts	48 kg	96689131

Dimensions



TM04 8310 0411

Fig. 52 Cylindrical tank, 40 litres



TM04 8311 0411

Fig. 53 Cylindrical tank, 75 and 100 litres.
Dimensions in brackets apply to 100-litre tank.

Dimensions

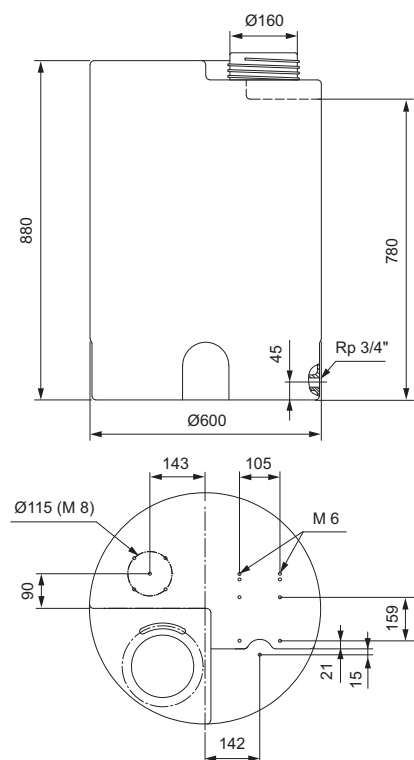


Fig. 54 Cylindrical tank, 200 litres

TM04 8312 0411

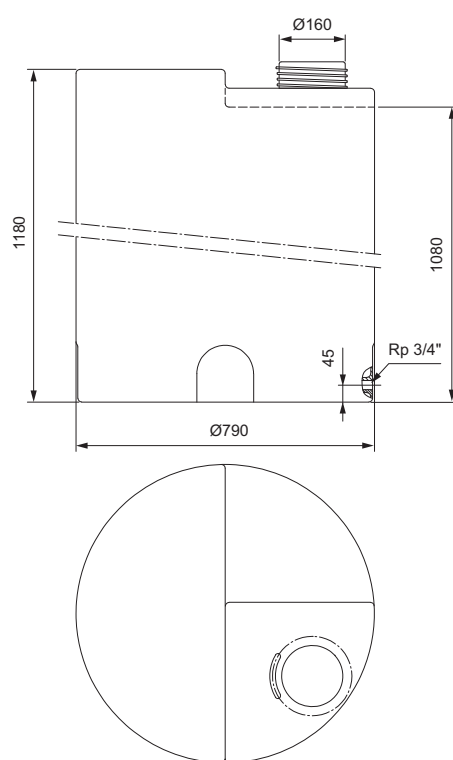


Fig. 56 Cylindrical tank, 500 litres

TM04 8314 0411

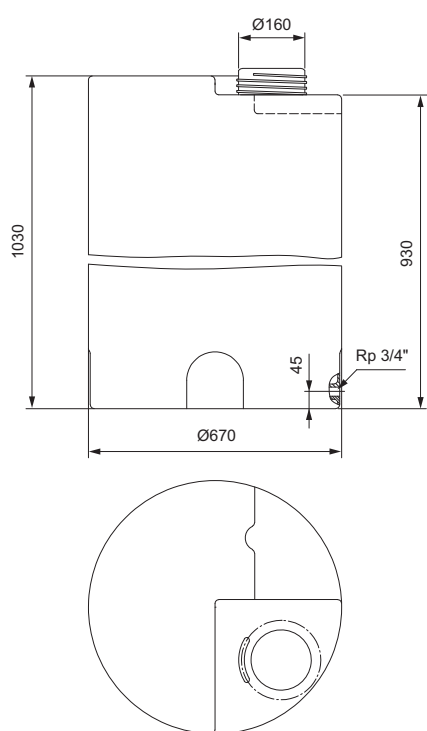


Fig. 55 Cylindrical tank, 300 litres

TM04 8313 0411

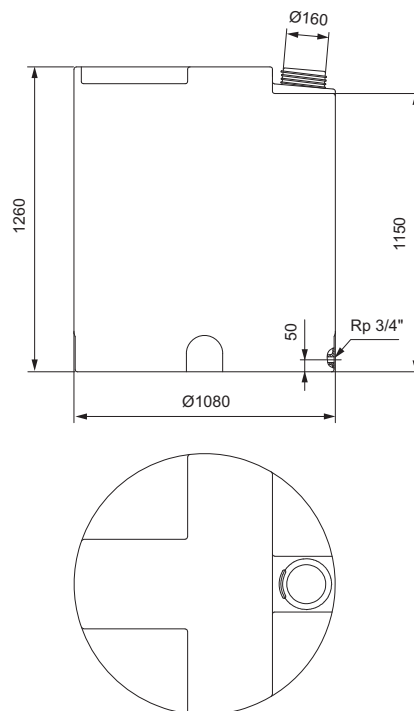


Fig. 57 Cylindrical tank, 1000 litres

TM04 8315 0411

Catchment tray (bund)

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

- Material: PE
- Colour: transparent

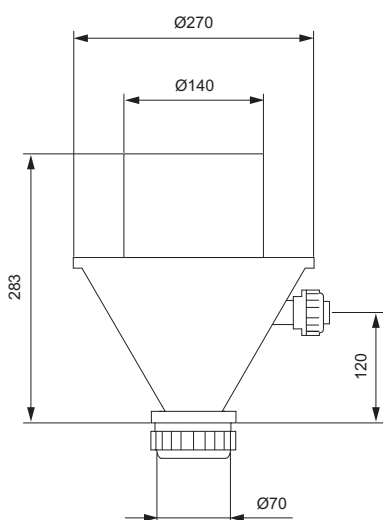


TM04 8316 0411

Fig. 58 Catchment tray (bund)

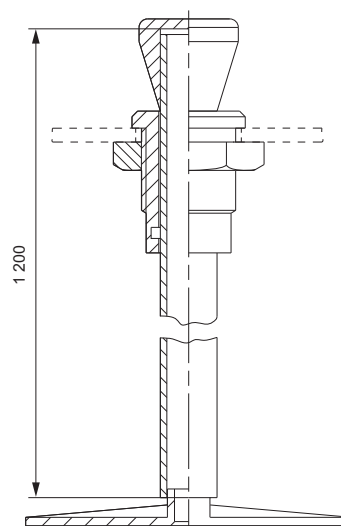
For tank size [l]	Volume [l]	Dimensions (diameter x height) [mm]	Product number
75	80	500 x 545	96726831
100	120	500 x 700	96726832
200	210	655 x 730	95701212
300	400	770 x 960	96726834
500	500	860 x 980	95701272
1000	1000	1150 x 1080	96726836

Accessories for dosing tanks



TM04 8318 0411

Fig. 59 Dissolving hopper, dimensions



TM04 8319 0411

Fig. 60 Hand mixer, dimensions

Technical data

Description	Specifications	Material	Product number
Drain valve for installation in the threaded sleeve of the dosing tank	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	With DN 40 through-bolt for connection at the dosing tank, connection thread with DN 20 adhesive coupling on the side for connection at 25 x 1.9 mm PVC pipe for water		96726979
Hand mixer for mixing chemicals in a tank	Shaft length 1200 mm, can be adapted to the corresponding tank, hand knob is not glued on	PVC	96295947
Set of screws for mounting a SMART Digital pump on a 100-litre square tank		Stainless steel	95730862
Set of screws for mounting a SMART Digital pump on a 75-litre, a 100-litre, or a 200-litre cylindrical tank		Stainless steel	95730863
Set of screws for mounting a SMART Digital pump on a 300-litre, a 500-litre, or a 1000-litre cylindrical tank		PP	95730864

Water meter

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

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

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

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



Fig. 61 Water meter

TM04 8317 0411

Qn [m³/h]	Pulse rate [l/pulse]	Maximum short-period capacity [m³/h]	Maximum pressure [bar]	Transitional capacity with error ± 2 [l/h]	Minimum capacity with error ±5 % [l/h]	Product number			
						Maximum water temperature			
						30 °C	50 °C	90 °C	120 °C
1.5*	1	3	16	120	50	96446846	-	96446897	-
2.5*	2.5	5	16	200	70	96446847	-	96446898	-
15*	10	30	16	3000	450	-	96446848	-	96446899
1.5*	0.25	3	16	120	50	96482640	-	96482643	-
2.5*	0.25	5	16	200	70	96482641	-	96482644	-
15*	2.5	30	16	3000	450	96482642	-	96482645	-
40**	100	80	10	4000	700	-	96446849	-	96446900
60**	25	120	10	6000	1200	-	96446850	-	96446901
150**	100	300	10	12000	3000	-	96446851	-	96446902

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

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

Dimensions

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

9. Pumped liquids

List of 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 ₃ COOH	25	●	●	●	●	-	●
60	●	●			●	●	-	●	●	●	●
85	●	●			○	-	-	-	●	●	-
Aluminium chloride	AlCl ₃	40	●	●	-	●	●	●	●	●	
Aluminium sulphate	Al ₂ (SO ₄) ₃	60	●	●	●	●	●	●	●	●	
Ammonia, aqueous	NH ₄ OH	28	●	●	●	●	-	●	●	●	
Calcium hydroxide★ ⁷	Ca(OH) ₂		●	●	●	●	●	●	●	●	
Calcium hypochlorite	Ca(OCl) ₂	20	○	●	-	●	●	●	●	●	
		10	●	●	●	●	●	●	●	●	
		30	-	●	-	●	●	○	●	●	
Chromic acid	H ₂ CrO ₄	50	-	●	-	●	●	-	●	●	
Copper sulphate	CuSO ₄	30	●	●	●	●	●	●	●	●	
Ferric chloride★ ³	FeCl ₃	100	●	●	-	●	●	●	●	●	
Ferric sulphate★ ³	Fe ₂ (SO ₄) ₃	100	●	●	○	●	●	●	●	●	
Ferrous chloride	FeCl ₂	100	●	●	-	●	●	●	●	●	
Ferrous sulphate	FeSO ₄	50	●	●	●	●	●	●	●	●	
Fluosilicic acid	H ₂ SiF ₆	40	●	●	○	●	-	○	●	●	
Hydrochloric acid	HCl	< 25	●	●	-	●	●	●	●	●	
		25-37	●	●	-	●	●	○	●	●	
Hydrogen peroxide	H ₂ O ₂	30	●	●	●	●	●	●	●	●	
Nitric acid	HNO ₃	30	●	●	●	●	●	●	●	●	
		40	○	●	●	●	●	-	●	●	
		70	-	●	●	-	●	-	●	○	
Peracetic acid	CH ₃ COOOH	5-15	○	●	○	○	-	○	●	○	
Potassium hydroxide	KOH	50	●	-	●	●	-	●	●	●	
Potassium permanganate	KMnO ₄	10	●	●	●	●	○	●	●	●	
Sodium chlorate	NaClO ₃	30	●	●	●	●	●	●	●	●	
Sodium chloride	NaCl	30	●	●	-	●	●	●	●	●	
Sodium chlorite	NaClO ₂	20	●	●	-	○	●	●	●	●	
Sodium hydroxide	NaOH	30	●	●	●	●	○	●	●	●	
		50	●	●	●	●	-	●	●	●	
Sodium hypochlorite	NaOCl	12-15	-	●	-	●	●	●	●	●	
Sodium sulphide	Na ₂ S	30	●	●	●	●	●	●	●	●	
Sodium sulphite	Na ₂ SO ₃	20	●	●	●	●	●	●	●	●	
Sodium thiosulfate	Na ₂ S ₂ O ₃	10	●	●	●	●	●	●	●	●	
Sulphurous acid	H ₂ SO ₃	6	●	●	●	●	●	●	●	●	
Sulphuric acid★ ⁴	H ₂ SO ₄	< 80	●	●	-	●	●	○	●	●	
		80-96	○	●	-	●	●	-	●	-	
		98	-	●	●	-	○	-	●	-	

● Resistant

★³ Risk of crystallisation.

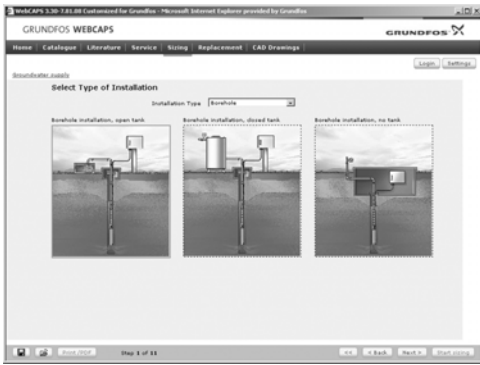
○ Limited resistance

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

- Not resistant

★⁷ Once the pump is stopped, calcium hydroxide will sediment rapidly.

For further information see 'Pumped liquid guide'



Sizing

With a starting point in different application areas and installation examples, this section gives easy step-by-step instructions in how to

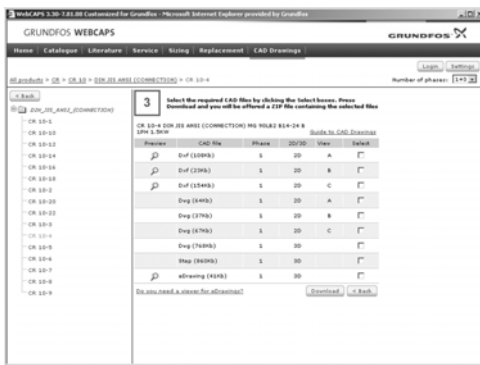
- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, lifecycle costs, etc.
- analyse your selected pump via the built-in lifecycle cost tool
- determine the flow velocity in wastewater applications, etc.



Replacement

In this section you find a guide to select and compare 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. After having specified the installed pump, the guide suggests 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.

The following 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. 62 WinCAPS CD-ROM

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 185,000 Grundfos products in more than 22 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 CD-ROM and updated once a year.

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ECM: 1073601

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