SMART Digital

DDA, DDC, DDE

DIGITAL DOSING
pumps and accessories

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1. General data

Performance range

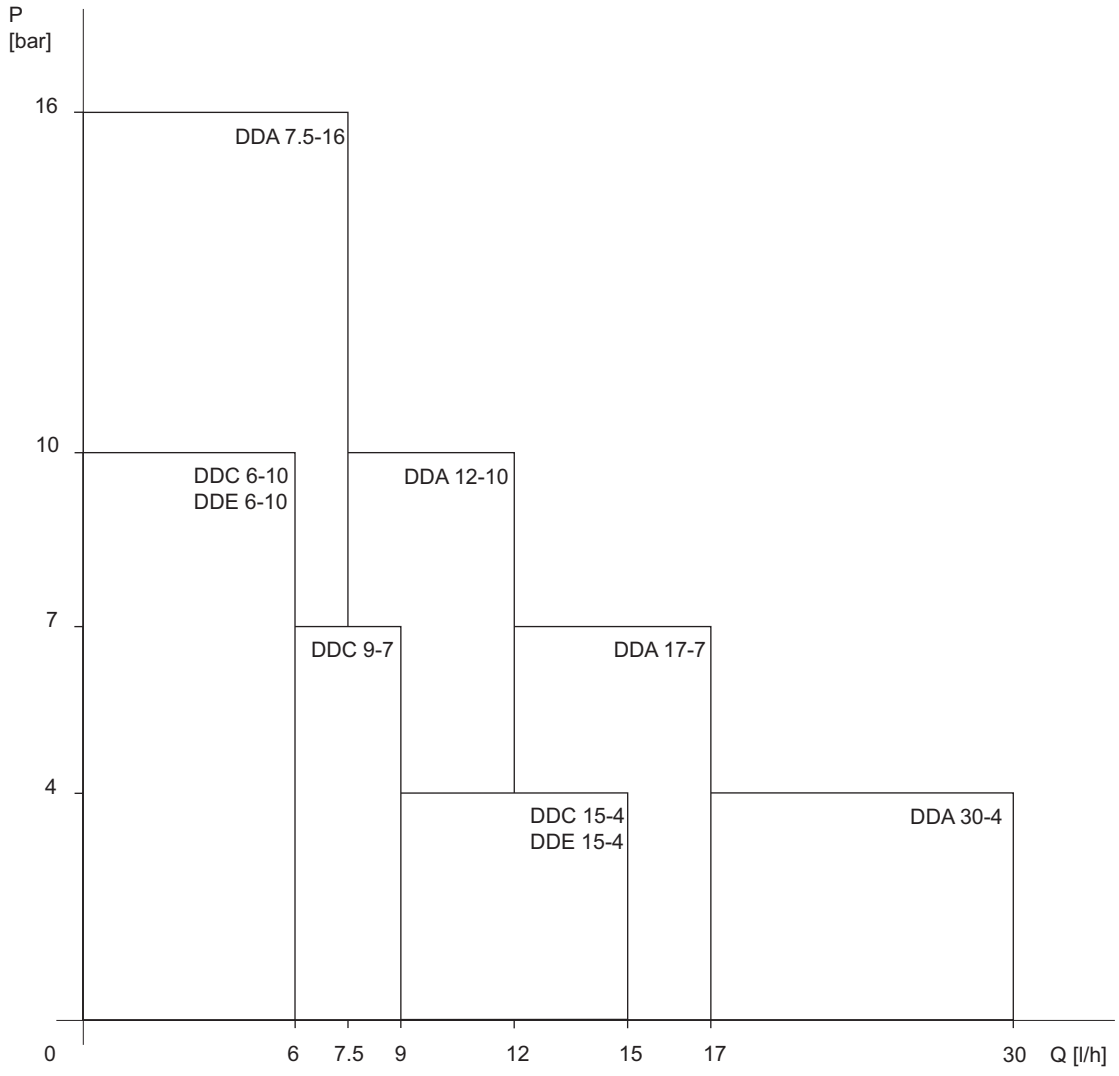

Fig. 1 Performance range

Features at a glance

TM04 8240 0312

Fig. 2 DDA, DDC, DDE

Digital Dosing™

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

Unique flexibility with only a few variants

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

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

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Fig. 3 Modularity of the control cube

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

Precise and easy setting / usability and interaction

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

The click wheel (turn-and-push knob) and the graphical LC display with plain-text menu in more than 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).

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Fig. 4 Display DDA, DDC

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

Advanced process reliability

An intelligent drive and microprocessor control ensures that dosing is performed precisely and with low pulsation, even if the pump is dosing high-viscosity or degassing liquids. Malfunctions, caused e.g. by air bubbles, are detected quickly by the maintenance-free FlowControl system and then displayed in the alarm menu. The AutoFlowAdapt function automatically adjusts the pump according to the process conditions, e.g. varying backpressure. The integrated flow measurement makes additional monitoring and control equipment redundant.

Designed to save costs

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

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

Three application-oriented type ranges

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

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

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

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

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

- Car wash
- Irrigation.

2. Identification

Type key

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

Type range

DDA

DDC

DDE

Maximum flow [l/h]

Maximum pressure [bar]

Control variant

B	Basic (DDE)
P	B with pulse mode (DDE)
PR	P with relay output (DDE)
A	Standard (DDC)
AR	A with alarm relay and analog input (DDA, DDC)
FC	AR with FlowControl (DDA)
FCM	FC with flow measurement (DDA)

Dosing head variant

PP	Polypropylene
PVC	Polyvinyl chloride**
PV	PVDF (polyvinylidene fluoride)
SS	Stainless steel 1.4401

Gasket material

E	EPDM
V	FKM
T	PTFE

Valve ball material

C	Ceramic
SS	Stainless steel 1.4401

Control cube position

F	Front-mounted (change to left and right possible)
X	No control cube (DDE)

Supply voltage

3	1 x 100-240 V, 50/60 Hz
I	24-48 VDC (DDC)***

Valve type

1	Standard
2	Spring-loaded 0.1 bar suction opening pressure 0.1 bar discharge opening pressure

Installation set*

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

Connection, suction/discharge

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, NPT 1/4", female (SS)
XX	No connection

Mains plug

F	EU
B	USA, Canada
G	UK
I	Australia, New Zealand, Taiwan
E	Switzerland
J	Japan
L	Argentina
X	No plug (only 24-48 VDC)***

Design

G	Grundfos

Special variant

C3	Inspection Certificate 3.1 (EN 10204)

* 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 2013

3. Functions

Overview of functions

	DDA			DDC		DDE		
	 TM04 1636 2110			 TM04 1637 2110		 TM04 8241 0312		
Control variant:	**FCM**	**FC**	**AR**	**AR**	**A**	**PR**	**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 (deaearation)	●	●	●	●	●	●	●	
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, pulse input*	●	●	●	●		●		
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 (e.g. E-box 150 with Profibus DP)	●	●	●					

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

Functional description

The electronically controlled variable-speed motor (stepper motor) of the DDA, DDC and DDE pumps provides optimum control of the stroke speed. The duration of each discharge stroke varies according to the capacity set, resulting in optimum discharge flow in any operating situation, while the duration of each suction stroke is constant (see figure below).

The advantages are as follows:

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

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

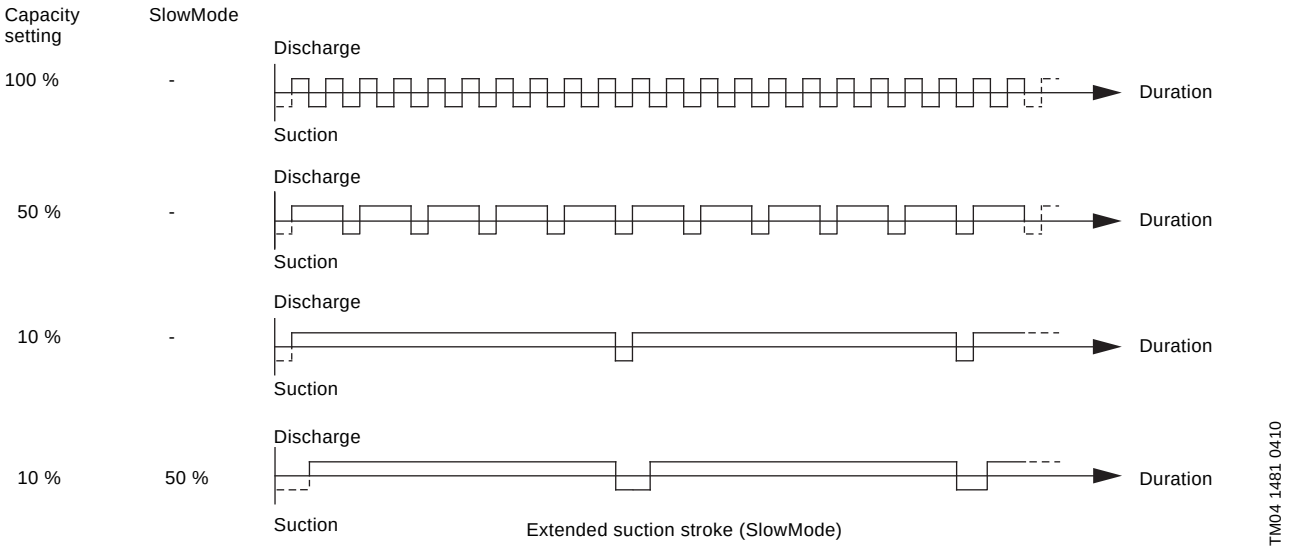

Fig. 5 Relation between stroke-frequency adjustment and capacity

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.

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

Operating elements DDA and DDC

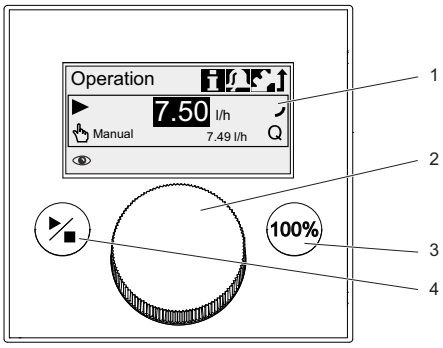

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Fig. 7 Operating elements DDA and DDC

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

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

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

Operating elements DDE

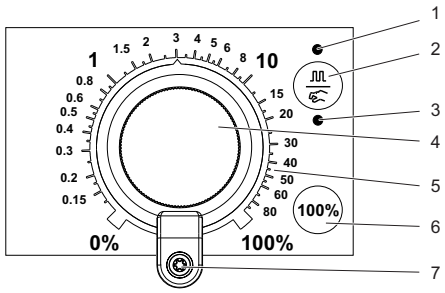

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Fig. 8 Operating elements DDE

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

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

Applies to DDE-PR, DDE-P

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

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

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

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

Menu

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

This example applies to DDA pumps:

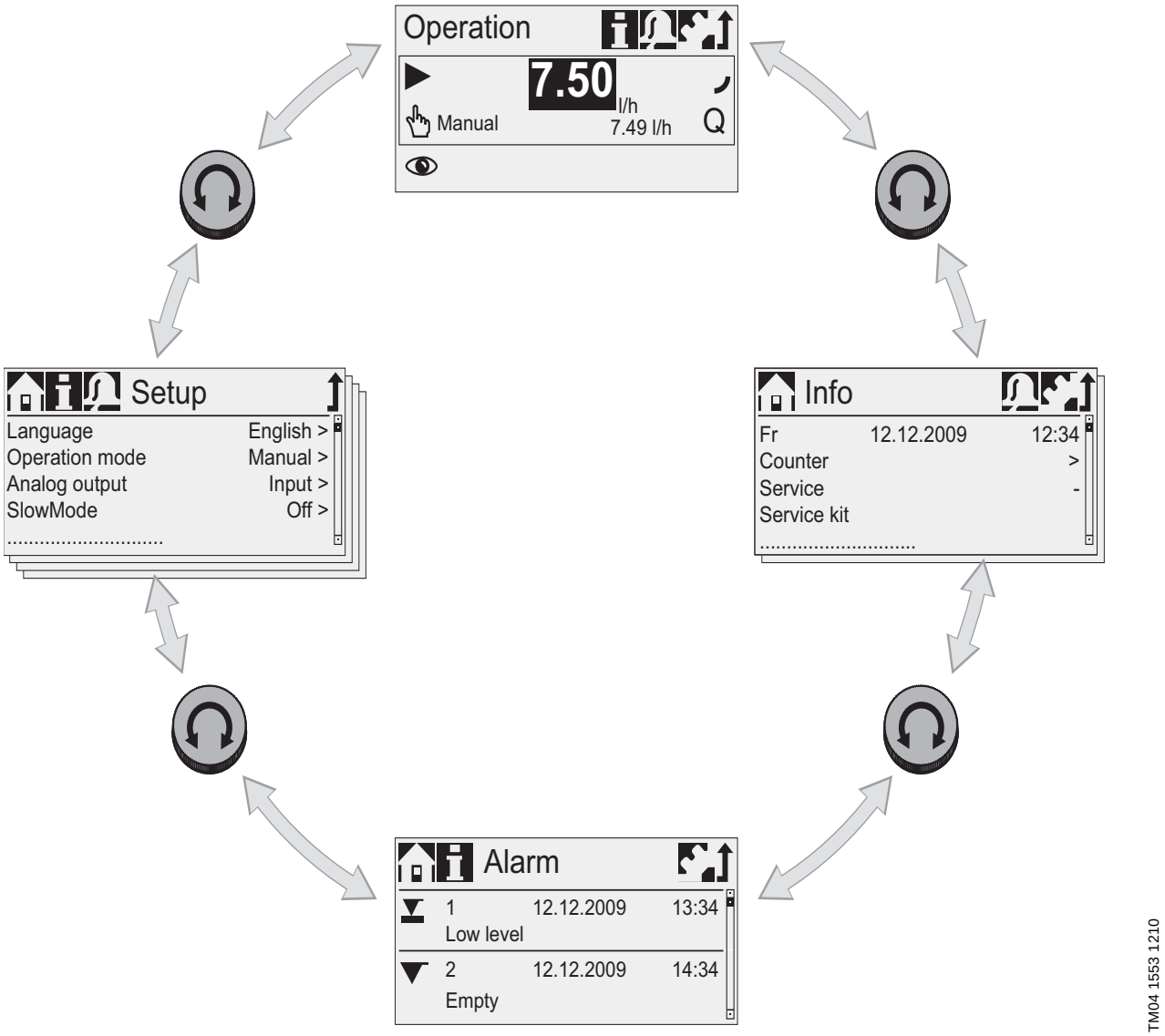


Fig. 9 Menu overview (example of main menus)

The menu text appears in 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 ‖

Operation modes

Manual control

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

Setting range

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

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

Pulse control

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

Applies to DDA and DDC

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

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

Setting range

Pump type	Setting range [ml/pulse]
DDA 7.5-16	0.0015 - 14.8
DDA 12-10	0.0029 - 29.0
DDA 17-7	0.0031 - 31.0
DDA 30-4	0.0062 - 62.0
DDC 6-10	0.0016 - 16.2
DDC 9-7	0.0017 - 16.8
DDC 15-4	0.0032 - 31.6

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

Applies to DDE-PR, DDE-P control variant

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

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

Setting range, DDE-PR, DDE-P

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

Analog 0/4-20 mA control

Applies to DDA and DDC-AR control variant

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

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

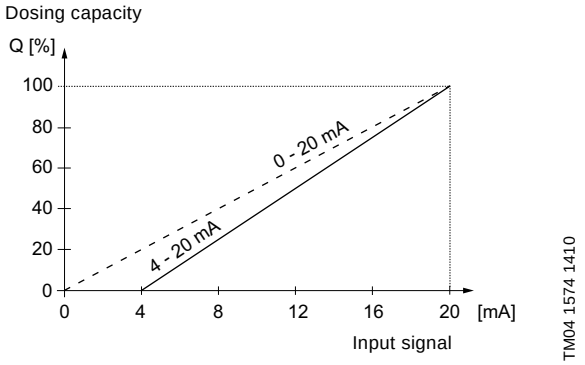


Fig. 10 0/4-20 mA control

Applies to DDA

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

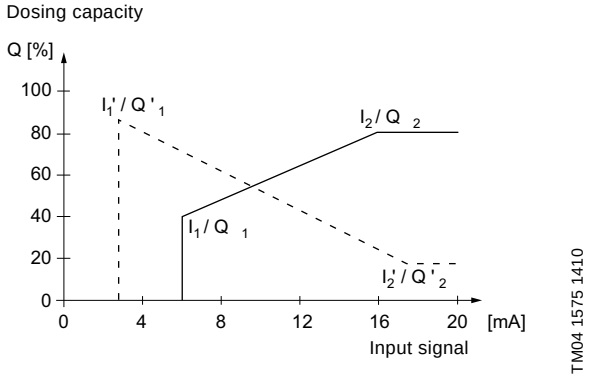


Fig. 11 Analog scaling

Pulse-based batch control

Applies to DDA

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

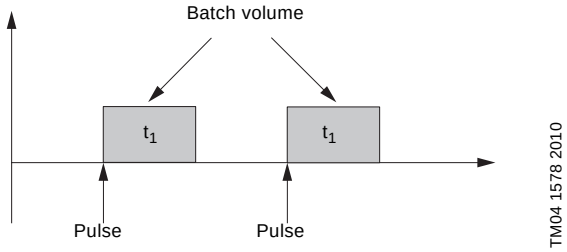


Fig. 12 Pulse-based batch control

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.

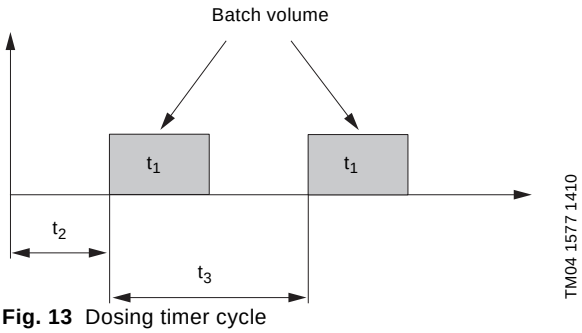


Fig. 13 Dosing timer cycle

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.

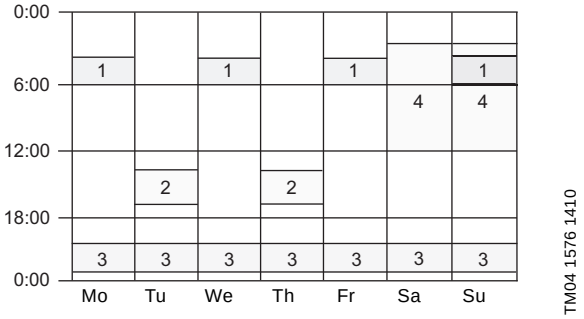


Fig. 14 Dosing timer week (example with 4 procedures)

Setting range

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

Functions

SlowMode

Applies to DDA, DDC

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

The SlowMode function is used in these situations:

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

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

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

Auto deaeration

Applies to DDA

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

These movements are executed

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

Calibration

Applies to DDA and DDC

The pump is calibrated in the factory at the nominal pressure of the respective pump type (see maximum pressure Technical data page 25, 26). After start-up, the dosing pump can be calibrated for the actual installation to ensure that the displayed value (ml, l or gph) is correct. A calibration program in the setup menu facilitates this process. The AutoFlowAdapt function keeps the dosing precision (DDA-FCM control variant), even if the backpressure changes. For the description of the AutoFlowAdapt function, see page 18.

External stop

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

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

When activating the external stop contact, the pump changes from running ▶ to standby ❚❚. The operation display shows an activated external stop ▶❚❚.
The signal input can be set to normally open (default) or normally closed contact.

Counters

Applies to DDA and DDC

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

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

Service display

Applies to DDA, DDC

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

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

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

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

* Applies to DDA only

In case of difficult liquids, e.g. with abrasive particles, the service intervals can be shorter and service has to be performed earlier.

Level control

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

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

Level sensors	Pump reaction*	
	DDA, DDC	DDE-PR, DDE-P
Low-level signal	• Display is yellow (Warning) • ▼ is flashing • Pump continues running	• LED lights up in yellow • Pump continues running
Empty tank signal	• Display is red (Alarm) • ▼ is flashing • Pump stops	• LED lights up in red • Pump stops

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

Relay output

Applies to DDA, DDC-AR and DDE-PR control variant

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

Applies to DDA and DDC-AR control variant

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

* default setting

Applies to DDE-PR control variant

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

* default setting

Analog output

Applies to DDA

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

Setting	Description of analog output signal	Control variant		
		FCM	FC	AR
Output = Input	Mapped 1:1 to the analog input, e.g. used in master-slave applications	X	X	X
Actual flow	Flow measured in the dosing head (Flow Measurement page 18)	X	X*	X*
Backpressure	Backpressure measured in the dosing head (Pressure monitoring page 18)	X	X	
Bus control	Set by a command in the bus communication (see below)	X	X	X

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

Bus communication

BUS

Applies to DDA

The pump is equipped with a built-in module for GENIbus communication. With the additional E-Box 150 module (please see page 36) the pump can be integrated into a Profibus DP network.

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

TM04 1640 2110

Fig. 15 DDA with E-box

Key lock and mechanical lock

Applies to DDA, DDC

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

- Settings: the keys and 100% are still available.
- Settings + keys: the keys and 100% 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.

Basic settings

Applies to DDA, DDC

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

Units

Applies to DDA, DDC

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

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

Additional display

Applies to DDA, DDC

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

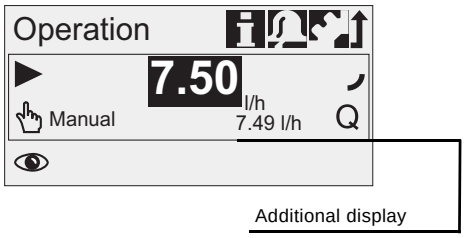


Fig. 16 Additional display

The following additional information can be selected:

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

[1] Only DDA-FCM control variant
[2] Only DDA-FCM/FC control variant
[3] Only DDA pumps
[4] Only DDA pumps and DDC-AR control variant

FlowControl

Applies to DDA-FC/FCM control variant

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 45).

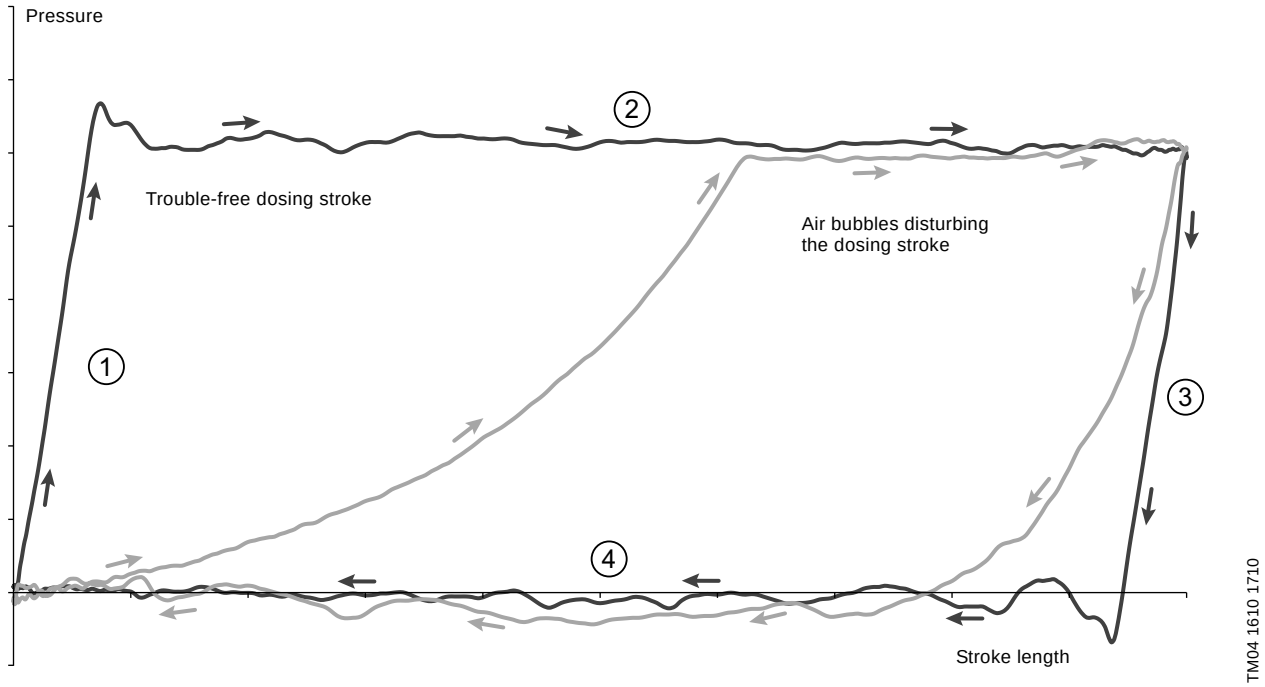


Fig. 18 Indicator diagram

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 speed.

AutoFlowAdapt

Applies to DDA-FCM control variant

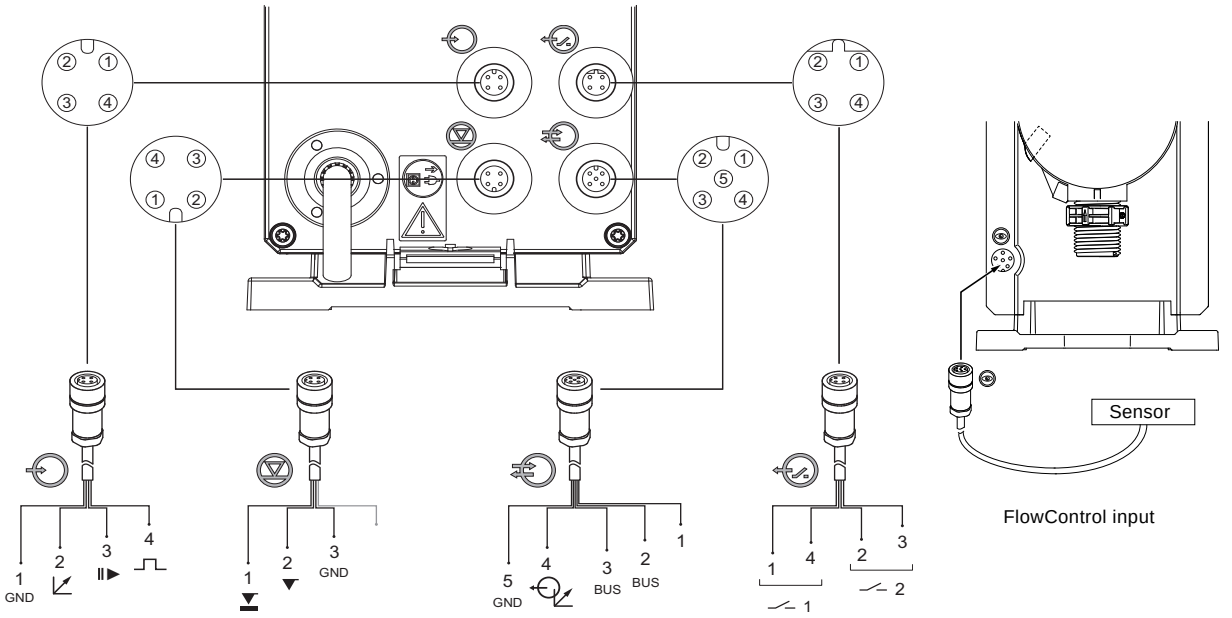
When activating the AutoFlowAdapt function even environmental changes will be compensated, so that the required target flow rate will be achieved.
The integrated AutoFlowAdapt makes additional monitoring and control devices redundant.
The AutoFlowAdapt function is based on:

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

Examples:

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

Wiring diagram, DDA



FlowControl input

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

Cable 2
Level input
see page 39, suction lances

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

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

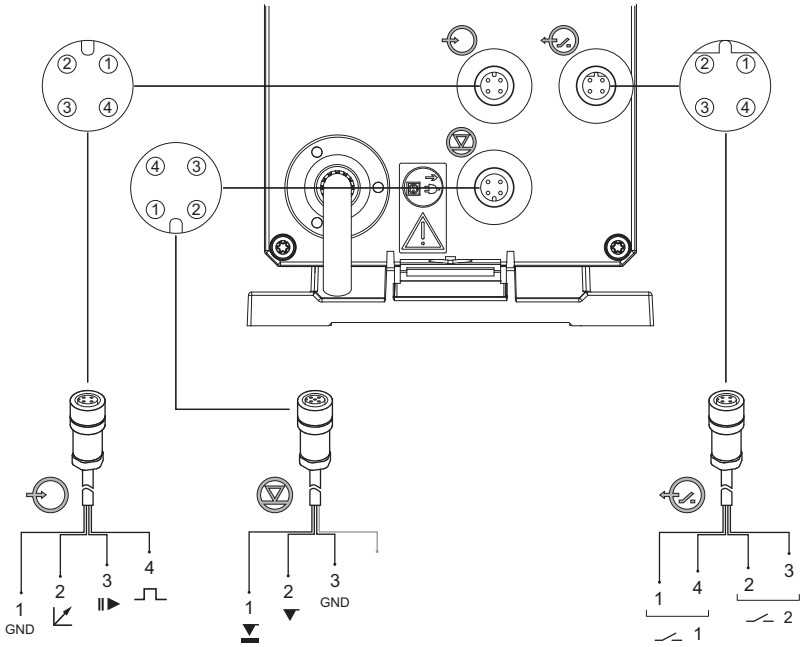
Cable 3: GENIbus, analog output

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



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

Cable 2
Level input
see page 39, suction lances

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

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Cable 1: Analog, external stop and pulse input

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

Cable 2: Level input

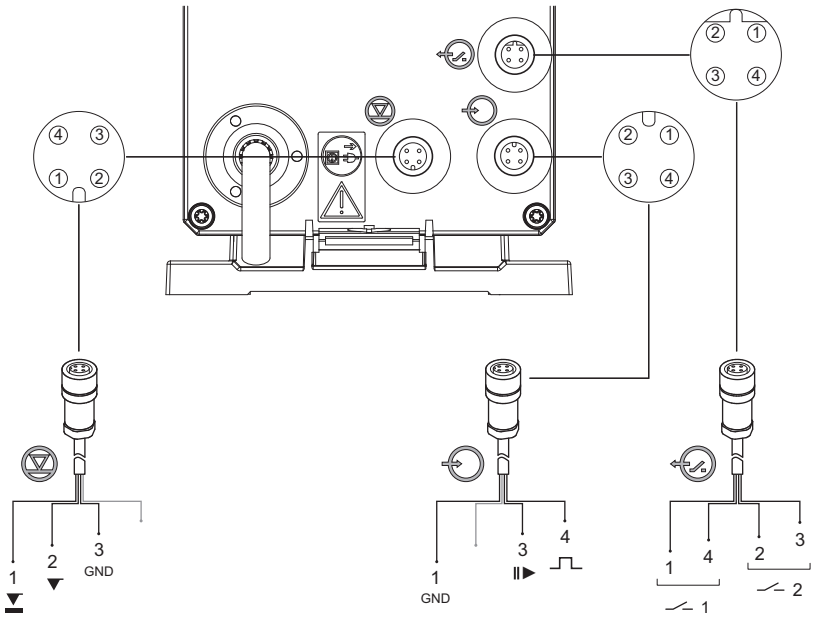
Function	Pin holes				Plug type
	1	2	3	4	
Low level	X		GND		Contact
Empty tank		X	GND		Contact

Cable 4: Relay output*

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

* applies to DDC-AR control variant

Wiring diagram, DDE-PR, -P



Cable 2
Level input
see page 39, suction lances

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

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

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Cable 1: External stop and pulse input

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

Cable 2: Level input

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

Cable 4: Relay output*

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

* applies to DDE-PR control variant

4. Construction

DDA and DDC

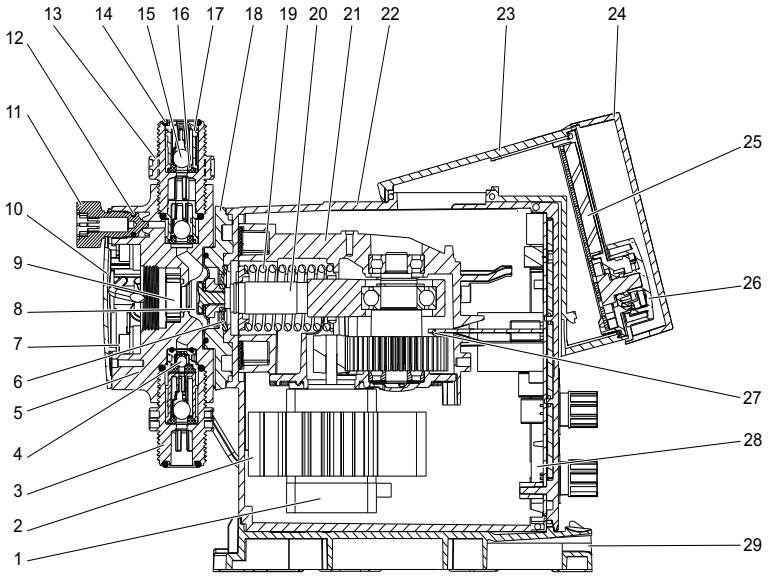

Fig. 19 Sectional drawing, DDA

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_2O_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_2O_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

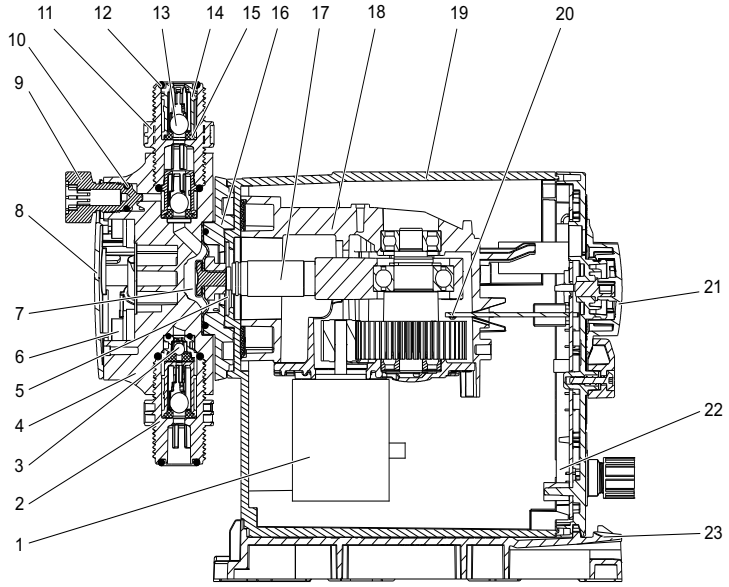

Fig. 20 Sectional drawing, DDE

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_2O_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_2O_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

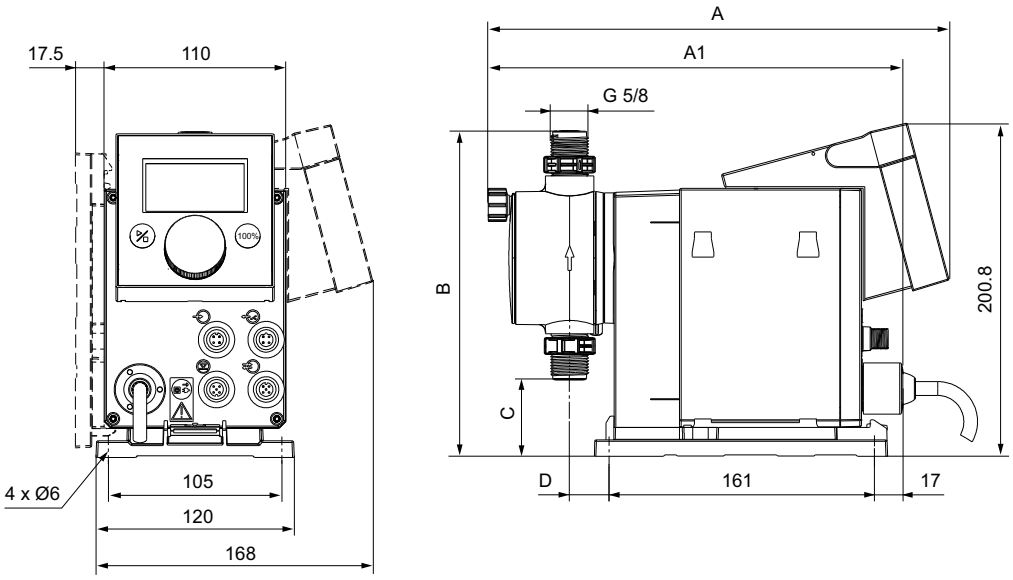

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Fig. 21 DDA and DDC with front-fitted or side-fitted control cube

DDE

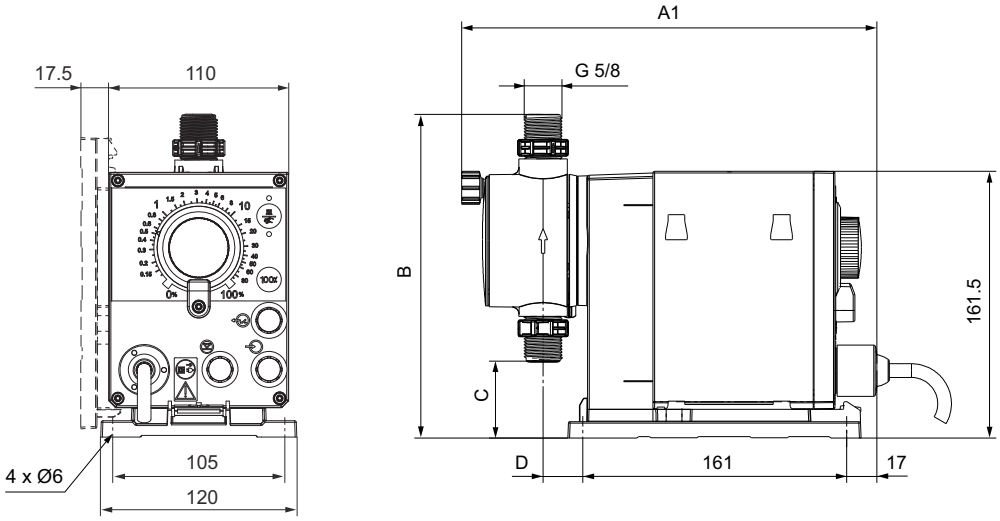

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Fig. 22 DDE-PR with front-fitted control elements

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
Mechanical data	Turndown ratio (setting range)	[1:X]	3000	1000	1000	1000
	Max. dosing capacity	[l/h]	7.5	12.0	17.0	30.0
		[gph]	2.0	3.1	4.5	8.0
	Max. dosing capacity with SlowMode 50 %	[l/h]	3.75	6.00	8.50	15.00
		[gph]	1.00	1.55	2.25	4.00
	Max. dosing capacity with SlowMode 25 %	[l/h]	1.88	3.00	4.25	7.50
		[gph]	0.50	0.78	1.13	2.00
	Min. dosing capacity	[l/h]	0.0025	0.0120	0.0170	0.0300
		[gph]	0.0007	0.0031	0.0045	0.0080
	Max. operating pressure	[bar]	16	10	7	4
		[psi]	230	150	100	60
	Max. stroke frequency [1)]	[strokes/min]	190	155	205	180
	Stroke volume	[ml]	0.74	1.45	1.55	3.10
	Accuracy of repeatability	[%]	± 1			
	Max. suction lift during operation [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
	Weight (stainless steel)	[kg]	3.2	3.2		4.0
	Diaphragm diameter	[mm]	44	50		74
Sound pressure	Max. sound pressure level	[dB(A)]	60			
Approvals			CE, CB, CSA-US, NSF61, GOST, C-Tick			

1) The maximum stroke frequency varies depending on calibration

2) Data is based on measurements with water

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

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

5) With E-box

DDC

Data			6-10	9-7	15-4
Mechanical data	Turndown ratio (setting range)	[1:X]	1000	1000	1000
	Max. dosing capacity	[l/h]	6.0	9.0	15.0
		[gph]	1.5	2.4	4.0
	Max. dosing capacity with SlowMode 50 %	[l/h]	3.00	4.50	7.50
		[gph]	0.75	1.20	2.00
	Max. dosing capacity with SlowMode 25 %	[l/h]	1.50	2.25	3.75
		[gph]	0.38	0.60	1.00
	Min. dosing capacity	[l/h]	0.0060	0.0090	0.0150
		[gph]	0.0015	0.0024	0.0040
	Max. operating pressure	[bar]	10	7	4
		[psi]	150	100	60
	Max. stroke frequency [1]	[strokes/min]	140	200	180
	Stroke volume	[ml]	0.81	0.84	1.58
	Accuracy of repeatability	[%]		± 1	
	Max. suction lift during operation [2]	[m]		6	
	Max. suction lift when priming with wet valves [2]	[m]	2	2	3
	Min. pressure difference between suction and discharge side	[bar]		1	
	Max. inlet pressure, suction side	[bar]		2	
	Max. viscosity in SlowMode 25 % with spring-loaded valves [3]	[mPas] (= cP)	2500	2000	2000
	Max. viscosity in SlowMode 50 % with spring-loaded valves [3]	[mPas] (= cP)	1800	1300	1300
	Max. viscosity without SlowMode with spring-loaded valves [3]	[mPas] (= cP)	600	500	500
	Max. viscosity without spring-loaded valves [3]	[mPas] (= cP)	50	50	300
	Min. internal hose/pipe diameter suction/discharge side [4, 2]	[mm]	4	6	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	
Electrical data	Voltage AC	[V]		100-240 V, 50/60 Hz	
	Voltage DC (option)	[V]		24-48 VDC	
	Length of mains cable	[m]		1.5	
	Max. inrush current for 2 ms at 100 V	[A]		8	
	Max. inrush current for 2 ms at 230 V	[A]		25	
	Max. power consumption P_1	[W]		22	
	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 output	[V]		30 VDC/30 VAC	
Weight/size	Weight (PVC, PP, PVDF)	[kg]		2.4	2.4
	Weight (stainless steel)	[kg]		3.2	3.2
	Diaphragm diameter	[mm]		44	50
Sound pressure	Max. sound pressure level	[dB(A)]		60	
Approvals				CE, CB, CSA-US, NSF61, GOST, C-Tick	

1) The maximum stroke frequency varies depending on calibration

2) Data is based on measurements with water

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

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

DDE

Data			6-10	15-4
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 [1)]	[m]	6	
	Max. suction lift when priming with wet valves [1)]	[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 [2)]	[mPas] (= cP)	600	500
	Max. viscosity without spring-loaded valves [2)]	[mPas] (= cP)	50	50
	Min. internal hose/pipe diameter suction/discharge side [1), 3)]	[mm]	4	6
	Min. internal hose/pipe diameter suction/discharge side (HV) [3)]	[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	Max. load low-level / empty tank / pulse / external stop input		12 V, 5 mA	
	Min. pulse length	[ms]	5	
	Max. pulse frequency	[Hz]	100	
	Max. resistance in level/pulse circuit	[Ω]	1000	
Signal output	Max. ohmic load on relay output	[A]	0.5	
	Max. voltage on relay output	[V]	30 VDC/30 VAC	
Weight/size	Weight (PVC, PP, PVDF)	[kg]	2.4	2.4
	Weight (stainless steel)	[kg]	3.2	3.2
	Diaphragm diameter	[mm]	44	50
Sound pressure	Max. sound pressure level	[dB(A)]	60	
Approvals			CE, CB, CSA-US, NSF61, GOST, C-Tick	

1) Data is based on measurements with water

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

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

7. Pump selection

DDA, standard range

Power supply: 1 x 100-240 V, 50/60 Hz (switch mode)
Mains plug: 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	97721427
					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	97721495
					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	PR
6	10	PP	EPDM	Ceramic	No	DDE 6-10 **B**-PP/E/C-X-31U2U2FG	97720905	97720949	98147240
					Yes	DDE 6-10 **B**-PP/E/C-X-31I001FG	97720906	97720950	98147261
			FKM	Ceramic	No	DDE 6-10 **B**-PP/V/C-X-31U2U2FG	97720909	97720953	98147264
					Yes	DDE 6-10 **B**-PP/V/C-X-31I001FG	97720910	97720954	98147265
		PVC	EPDM	Ceramic	No	DDE 6-10 **B**-PVC/E/C-X-31U2U2FG	97720923	97720957	98147268
					Yes	DDE 6-10 **B**-PVC/E/C-X-31I001FG	97720924	97720958	98147269
			FKM	Ceramic	No	DDE 6-10 **B**-PVC/V/C-X-31U2U2FG	97720927	97720961	98147272
					Yes	DDE 6-10 **B**-PVC/V/C-X-31I001FG	97720928	97720962	98147273
		PVDF	PTFE	Ceramic	No	DDE 6-10 **B**-PV/T/C-X-31U2U2FG	97720943	97720977	98147288
					Yes	DDE 6-10 **B**-PV/T/C-X-31I001FG	97720944	97720978	98147289
		SS	PTFE	SS 1.4401	No	DDE 6-10 **B**-SS/T/SS-X-31AAFG	97720947	97720981	98147292
15	4	PP	EPDM	Ceramic	No	DDE 15-4 **B**-PP/E/C-X-31U2U2FG	97720983	97721017	98147294
					Yes	DDE 15-4 **B**-PP/E/C-X-31I002FG	97720984	97721018	98147295
			FKM	Ceramic	No	DDE 15-4 **B**-PP/V/C-X-31U2U2FG	97720987	97721021	98147298
					Yes	DDE 15-4 **B**-PP/V/C-X-31I002FG	97720988	97721022	98147299
		PVC	EPDM	Ceramic	No	DDE 15-4 **B**-PVC/E/C-X-31U2U2FG	97720991	97721025	98147302
					Yes	DDE 15-4 **B**-PVC/E/C-X-31I002FG	97720992	97721026	98147303
			FKM	Ceramic	No	DDE 15-4 **B**-PVC/V/C-X-31U2U2FG	97720995	97721029	98147306
					Yes	DDE 15-4 **B**-PVC/V/C-X-31I002FG	97720996	97721030	98147307
		PVDF	PTFE	Ceramic	No	DDE 15-4 **B**-PV/T/C-X-31U2U2FG	97721011	97721045	98147322
					Yes	DDE 15-4 **B**-PV/T/C-X-31I002FG	97721012	97721046	98147323
		SS	PTFE	SS 1.4401	No	DDE 15-4 **B**-SS/T/SS-X-31AAFG	97721015	97721049	98147326

* Installation set includes: 2 pump connections, foot valve, injection unit, 6 m PE discharge hose, 2 m PVC suction hose, 2 m PVC deaeration hose (4/6 mm)
** Also available in **P-** and **PR-**control version

DDA, DDC, DDE, non-standard range

Key to the designations of the three following tables:

Max. flow, press.	Control variant	Materials of dosing head, gaskets and valve balls	Control cube position	Supply voltage	Valve type	Connection / Installation set	Mains plug	Design	Special variant
[l/h] - [bar]	See page 7	*Head:* PP: Polypropylene PVC: Polyvinyl chloride** PV: PVDF SS: Stainless steel 1.4401 *Gaskets:* E: EPDM V: FKM T: PTFE *Valve balls:* C: Ceramic SS: Stainless steel 1.4401	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)	*Suction/discharge connection:* 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 *Installation set** 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	F: EU B: USA, Canada G: UK I: Australia, New Zealand, Taiwan E: Switzerland Japan J: Argentina L: No plug X: (only 24-48 VDC)	G: Grundfos	C3: Inspection Certificate 3.1 (EN 10204)

* Installation set includes 2 pump connections, foot valve, injection unit, 6 m PE discharge 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	Special variant
		Head	Gaskets	Balls							
7.5-16	AR FC FCM	PP	E V	C	F	3	1 2	U2U2 U7U7 XX I001 I003	F B G I E J L	G	C3
		PVC PV	E 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 PV	E V T	C							
		SS	T	SS	F	3	1 2	AA VV XX			

DDC

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

8. Accessories

Accessories overview

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

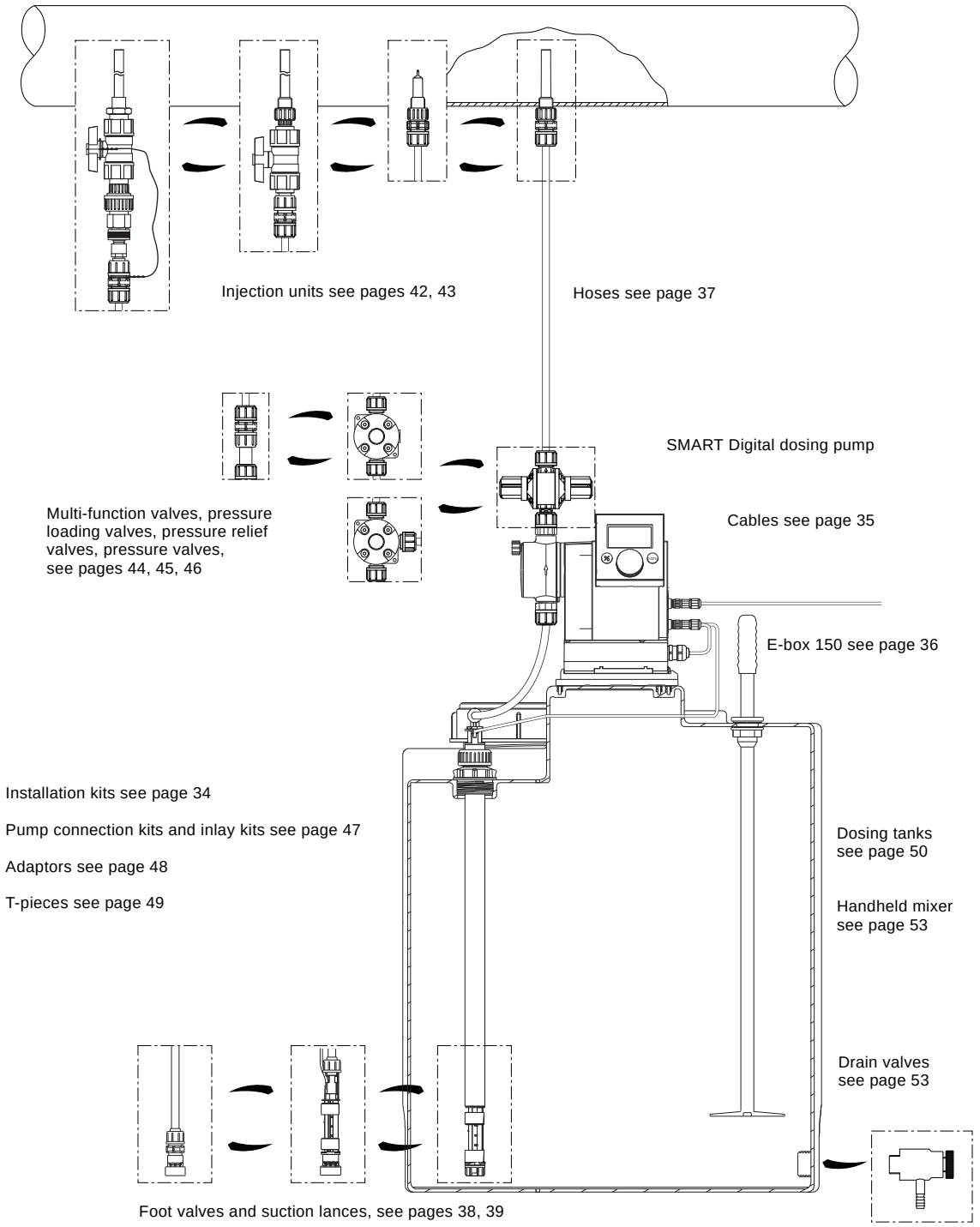
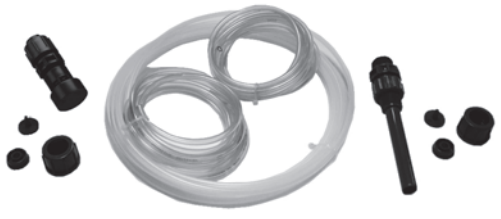


Fig. 23 SMART Digital pump with accessories

Installation kits for dosing pumps

An installation kit includes the following parts:

- Injection unit with spring-loaded non-return valve (see page 42)
- PE discharge hose, 6 m
- PVC suction hose, 2 m
- PVC deaeration hose, 2 m
- Foot valve with strainer and weight, without or with level indication (see page 38).



TM04 1600 0312

Fig. 24 Installation kit with foot valve without level indication

TM04 8469 0512

Fig. 25 Installation kit with foot valve with level indication

Technical data

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

* Viscosity similar to water

Cables and plugs

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

- Cable material: PVC, 0.34 mm^2
- Plug type: M 12.

Fig. 26 Cable and plug

Technical data

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

E-box 150 Profibus

The Grundfos E-box 150 (E-box = Extension Box) is a Plug & Play Profibus fieldbus communication interface for the integration of SMART Digital DDA dosing pumps into a Profibus DP network. Fieldbus communication allows to use the DDA dosing pump in industrial automation systems (PLC; SCADA), where advanced remote control and monitoring functions are required:

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

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

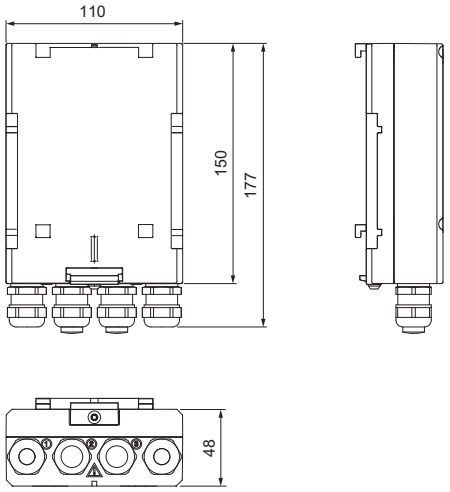
DDA dosing pumps can be retrofitted easily with the E-box 150: it is simply placed between the pump and the mounting plate (DDA software version V2.10 or higher required). The E-box 150 has a connecting cable to plug into the pump directly.

Description	Product number
E-box 150	97513994

TM04 8455 0312

Fig. 27 E-box

Dimensions



TM04 8454 0312

Fig. 28 E-box, dimensions

Technical data

E-box data	Supply voltage	30 VDC, ± 10 % (via M 12 plug of DDA)
	Max. power consumption	5 W
	Cable length	160 mm
	Max. relative humidity	96 %
	Pollution degree	2
	Enclosure class	IP 65 according to IEC 60529 NEMA 4X
	Electrical safety class	3
	Min. / max. ambient temperature	0/45 °C
	Approvals	CE, CB, CSA-US, GOST, C-Tick
GENIbus connection	Data protocol	GENIbus
	GENIbus connection type	Three-wire RS-485
	Transmission speed	9.6 kbits/s
Profibus specifications	Data protocol	Profibus DP
	Profibus implementation class	DP-V0
	Profibus connection type	Two-wire RS-485 (lines: A, B)
	Recommended cable type	Screened, double-twisted pair conductor cross-section: 0.25 - 1 mm^2 AWG: 24-18
	Maximum cable length	100 m at 12000 kbits/s 1200 m at 9.6 kbits/s
	Slave address (set in DDA display)	1-126
	Line termination (set via DIP switches)	On/off
	Supported data rates	9.6 kbits/s to 12000 kbits/s

Hoses

Hoses are available in various materials, sizes and lengths.

TM04 8268 0411

Fig. 29 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
		PVC	0.5	3	96701733
				10	96702133
				50	96727418
		ETFE	20	3	95730337
				10	95730338
				50	95730339
17	5/8	PE	13	3	95730888
				10	96727393
				50	95730889
30	6/9	PE	12	3	96727409
				10	96727412
				50	96727415
		PVC	0.5	3	95730334
				10	95730335
				50	95730336
		ETFE	20	3	95730340
				10	95730341
				50	95730342
	6/12	PVC, textile-reinforced	23	3	96693751
				10	96653571
				50	91835686
60	9/12	PE	9	3	96727395
				10	96705657
				50	96727398
		PVC	0.5	3	96727434
				10	96727434
				50	95724702
		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 hose. They are available either without level indication or with low-level and empty-tank indication.

Foot valves include:

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

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

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

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

Electrical data of the level indication:

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

Fig. 30 Left: foot valve without level indication; right: foot valve with level indication

Dimensions

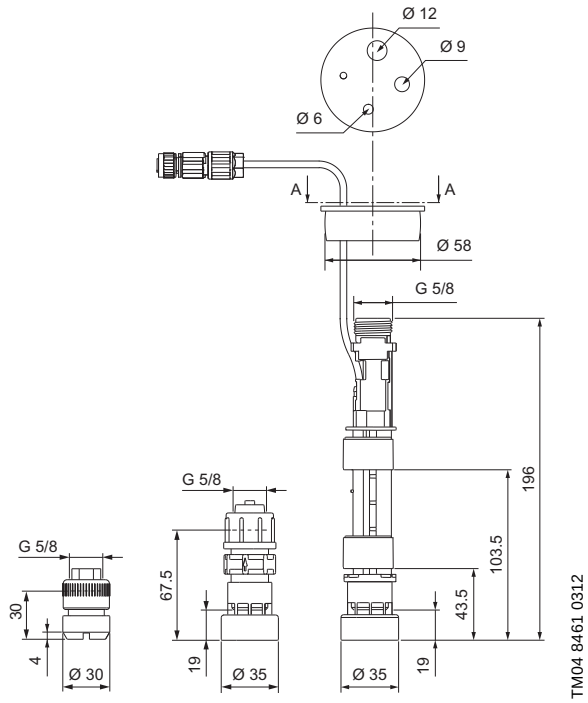


Fig. 31 Left: stainless-steel foot valve; centre and right: PE or PVDF foot valve, dimensions

Technical data

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

Suction lances

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

Suction lances include:

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

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

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

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

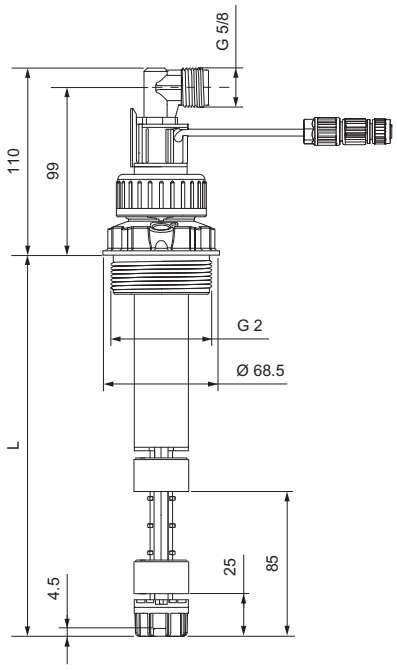
Electrical data of the level indication:

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

TM04 8458 0312

Fig. 32 Suction lance

Dimensions



TM04 8460 0312

Fig. 33 Suction lance, dimensions

Dimensions / Selection

For dosing tank type	Tank volume [l]	Recommended immersion depth (L) [mm]
Grundfos cylindrical tank (see page 51)	40	400
	60	500
	100	690
	200	690
	300	980
	500	1100
	1000	1200
Grundfos square tank (see page 50)*	100	690
L-ring drum*	120	820
	220	980
Steel drum*	216	980
Standard jerricans according to EN 12712*	12, 33 (large cap)	400
	25, 30, 33	500
	60	690
IBC*	all sizes	1200

* suitable adaptors see page 41

Technical data

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

* minimum immersion depth for all sizes: approx. 140 mm

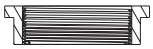
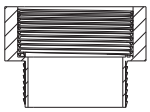
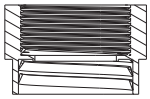
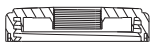
Accessories for suction lances and foot valves with level indication

Adaptors for containers

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

TM04 8506 0712

Technical data

Adaptor type		for container type	Remark	Product No.
	TM04 8470 0512	counter nut for tanks without threaded opening, e.g. 100-litre square tank or 1000-litre cylindrical tank	PVC, grey	98071170
	TM04 8471 0512	containers with 2" NPT threaded opening	PVC, grey	98156690
		drums with S 70 x 6 coarse thread (MAUSER 2")	PE, blue	98071171
		drums with S 56 x 4 coarse thread (TriSure®)	PE, orange	98071172
	TM04 8473 0512	jerricans with small opening (approx. ∅36), according to EN 12713	PE, green	98071173
		jerricans with medium-sized opening (approx. ∅45), according to EN 12713	PE, yellow	98071174
		jerricans with large opening (approx. ∅57), according to EN 12713	PE, brown	98071175
		US containers with bung hole of 63 mm (ASTM International)	PE, white	98071176
	TM04 8472 0512	IBC (Intermediate Bulk Container) with opening of ∅150 mm, S 160 x 7	PE, black	98071177

Emission protection kits

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

Two variants are available:

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

They include:

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

Order data

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

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

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

Order data

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

Injection units

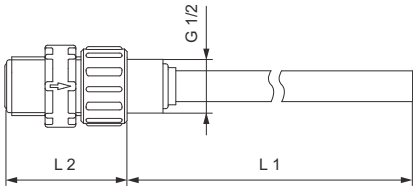
Injection units connect the dosing line with the process line. They ensure a minimum backpressure of 0.7 bar, and avoid backflow of the dosing liquid.

In general, they include:

- Injection pipe. PP, PVC and PVDF versions can be shortened.
- Spring-loaded non-return valve with Tantal spring.
- 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).

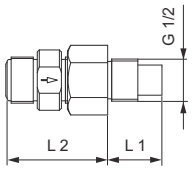
Standard injection units

Dimensions



TM04 8280 0411

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



TM04 8281 0411

Fig. 35 Standard injection unit, stainless-steel version

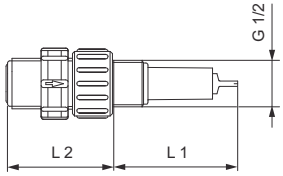
Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Housing	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
			PTFE	Ceramic	100	47	95730920
		PVDF	FKM	Ceramic	100	47	95730924
			EPDM	Ceramic	100	47	95730928
			PTFE	Ceramic	100	47	95730932
	100	Stainless steel	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. 36 Injection unit with lip valve

Technical data

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

Injection units with ball valve

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

Dimensions

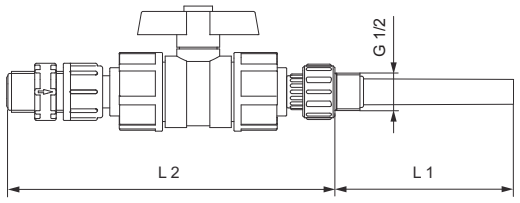


Fig. 37 Injection unit with ball valve

Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Housing	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 where regular cleaning of the injection pipe is required. The construction allows the withdrawal of the injection unit from the process line and the cleaning of it, without stopping the water flow. The injection point can be closed with the integrated ball valve. The immersion depth of the injection pipe can be adjusted.

Dimensions

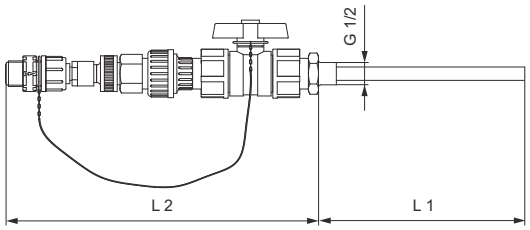


Fig. 38 Injection unit, withdrawable for cleaning

Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Housing	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

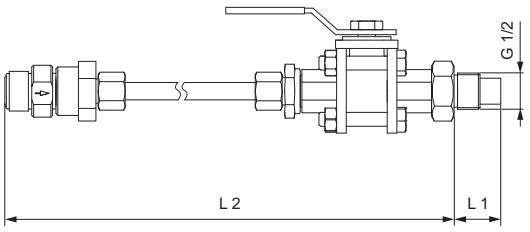


Fig. 39 Hot-injection unit with ball valve

Technical data

Max. flow rate [l/h]	Max. pressure [bar]	Material			Dimensions		Product number
		Housing	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 pressure. 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.

TM04 8287 0411

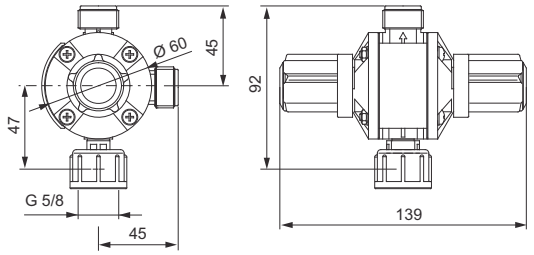
Fig. 40 Multi-function valve, pressure relief valve, pressure loading valve

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, is factory-set to 3 bar.
- Relief pressure, adjustable from 7 to 16 bar, is factory-set to 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



TM04 8288 0411

Fig. 41 Multi-function valve

Technical data

Max. flow rate [l/h]	Material				Product number	
	Housing	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
			PTFE	PTFE	95730809	95730825
		PVDF	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, is factory-set to 10 bar, or
- Relief pressure, adjustable from 7 to 16 bar, is factory-set to 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

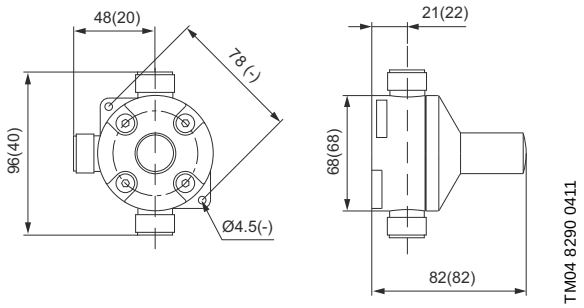


Fig. 42 Pressure relief valve. Dimensions in brackets apply to stainless-steel version.

Technical data

Max. flow rate [l/h]	Material			Product number	
	Diaphragm	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, adjustable from 1 to 5 bar, is factory-set to 3 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

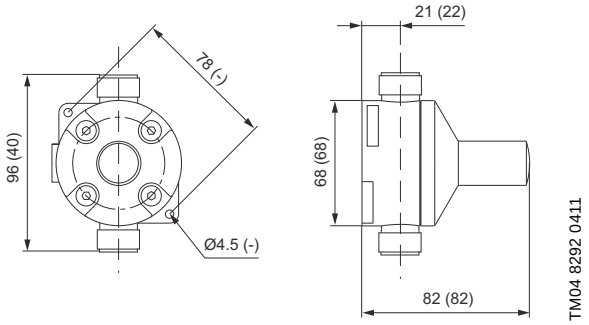


Fig. 43 Pressure loading valve. Dimensions in brackets apply to stainless-steel version.

Technical data

Max. flow rate [l/h]	Material			Product number
	Diaphragm	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, is not adjustable.
- Maximum system pressure: 16 bar.
- Spring material: Alloy C-4 (NiMo16CrTi, material number 2.4610).
- No connections included.

Dimensions

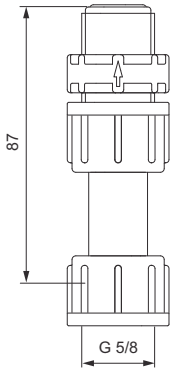


Fig. 44 Pressure valve

Technical data

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

TM04 8294 0411

TM04 8295 0411

Fig. 45 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" x 1/4", 1/4" x 3/8", 3/8" x 1/2"	PP	97691905	-
		PVC	97691906	-
		PVDF	97691907	-
Hose (cone and ring)	4/6 mm, or 0.17" x 1/4"	PP	97702474	95730984
		PVC	97702485	95730720
		PVDF	97702495	95730729
	4/9 mm	PP	98153922	98153977
		PVC	98153944	98154006
		PVDF	98153949	98154029
	5/8 mm	PP	97702475	95730711
		PVC	97702486	95730721
		PVDF	97702496	95730730
	6/8 mm	PP	97702476	95730712
		PVC	97702487	95730722
		PVDF	97702497	95730731
	6/9 mm	PP	97702477	95730713
		PVC	97702488	95730723
		PVDF	97702498	95730732
	6/12 mm	PP	97702478	95730714
		PVC	97702489	95730724
		PVDF	97702499	95730733
	9/12 mm	PP	97702479	95730715
		PVC	97702490	95730725
		PVDF	97702500	95730734
	1/4" x 3/8	PP	97702482	95730718
		PVC	97702492	95730727
		PVDF	97702503	95730737
	3/8" x 1/2"	PP	97702483	95730719
		PVC	97702493	95730728
		PVDF	97702504	95730738
Hose (cutting ring type)	1/8" x 1/4"	PP	97702481	95730717
		PVDF	97702502	95730736
Pipe welding	External diameter 16 mm	PP	97702480	95730716
		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

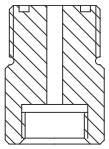
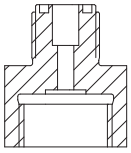
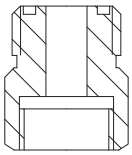
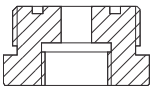
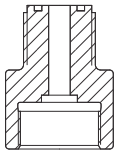
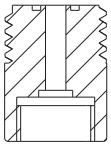
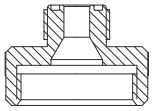
Threaded adaptors

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

A threaded adaptor kit includes:

- 1 adaptor
- 1 O-ring.

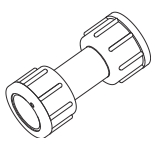
Technical data

Type		Threaded connection size		Material		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	M 20 x 1.5	PP	FKM / EPDM	95730427
				PVC	FKM / EPDM	95730428
					PTFE	95730429
				PVDF	FKM / EPDM	95730430
					PTFE	95730431
	TM04 8475 0612	G 5/8	M 30 x 3.5	PVDF	FKM / EPDM	98154048
					PTFE	98154054
	TM04 8301 0411	G 1 1/4	G 5/8	PP	FKM / EPDM	95730432
				PVC	FKM / EPDM	95730433
					PTFE	95730434
				PVDF	FKM / EPDM	95730435
					PTFE	95730436

Union nut adaptors

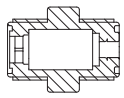
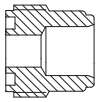
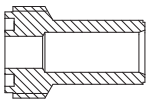
Union nut adaptors consist of a rigid pipe with union nuts on both ends. They have neither gaskets nor glued or welded connections.

Technical data

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

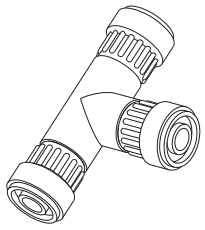
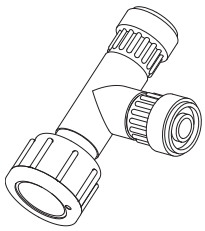
Hose-to-hose and hose-to-pipe adaptors

Technical data

Type	Description	Connections		Material		Product number
		Side 1	Side 2	Housing and connections	Gaskets	
 TM04 8302 0411	Valve housing with two male threads G 5/8	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm		PP	FKM / EPDM	95730367
				PVC	FKM / EPDM	95730368
					PTFE	95730369
				PVDF	FKM / EPDM	95730370
					PTFE	95730371
		Without		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
 TM04 8360 0711	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 ∅12 mm	PVC	FKM / EPDM	95730378
					PTFE	95730379
		Without	Internal ∅12 mm	PVC	FKM / EPDM	95730365
					PTFE	95730366
 TM04 8303 0411	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 ∅16 mm	PP	FKM / EPDM	95730377
				PVDF	FKM / EPDM	95730380
					PTFE	95730381
		Without	External ∅16 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	
 TM04 8304 0411	Three male threads G 5/8	For hoses 4/6 mm, 6/9 mm, 6/12 mm, 9/12 mm			PP	FKM / EPDM	95730387
					PVC	FKM / EPDM	95730388
						PTFE	95730389
					PVDF	FKM / EPDM	95730390
						PTFE	95730391
		-	Without	-	PP	FKM / EPDM	95730346
					PVC	FKM / EPDM	95730347
						PTFE	95730348
					PVDF	FKM / EPDM	95730349
						PTFE	95730350
 TM04 8305 0411	Two male threads G 5/8, one female connection with union nut	Union nut G 5/8	Without	For 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

Dosing tanks

Square tank, 100 litres

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

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

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

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

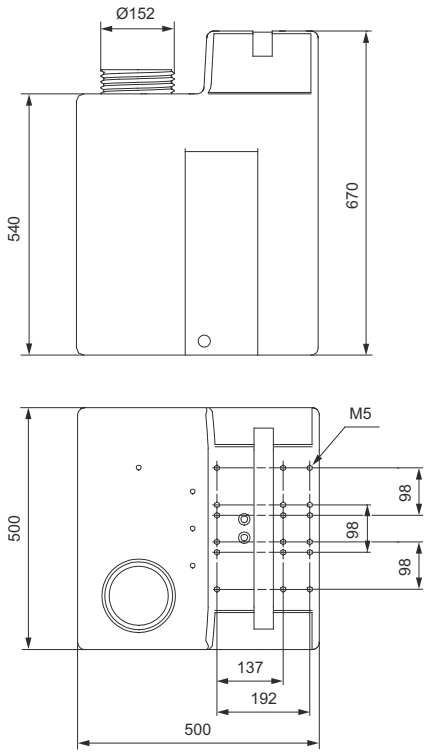
The square tank is prepared for a G 3/4 drain valve.

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

TM04 8307 0411

Fig. 46 Square tank

Dimensions



TM04 8308 0411

Fig. 47 Square tank, dimensions

Order data

Tank volume [l]	Product number
100	96489271

Cylindrical tanks

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

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

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

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

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

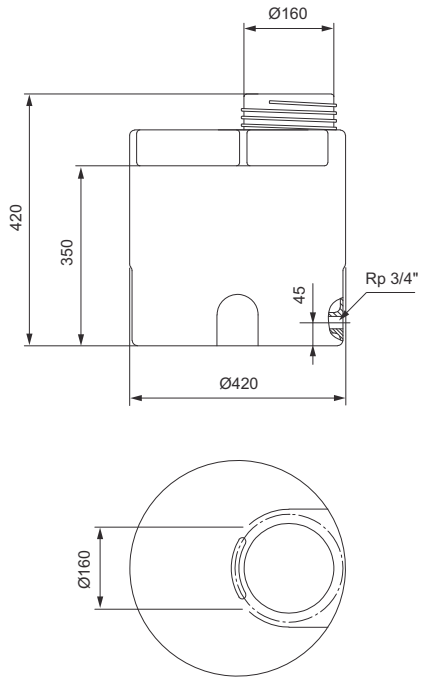
TM04 8468 0412

Fig. 48 Cylindrical tank, 60 litres

Technical data

Tank volume [l]	Prepared for direct assembly of an electric mixer	Weight [kg]	Product number	
			Transparent	Black
40	-	3.4	96688081	95701166
60	-	5.5	98148805	98149053
	yes	5.5	98150038	98150040
100	-	7.5	98149057	98149082
	yes	7.5	98150051	98150052
200	-	11.5	98149215	98149224
	yes	11.5	98150053	98150054
300	-	13	98149245	98149252
	yes	13	98150055	98150056
500	-	28	98149266	98149269
	yes	28	98150057	98150058
1000	-	40	96688086	95706305
	yes, with reinforced beam	48	96689131	95704476

Dimensions



TM04 8310 0411

Fig. 49 Cylindrical tank, 40 litres

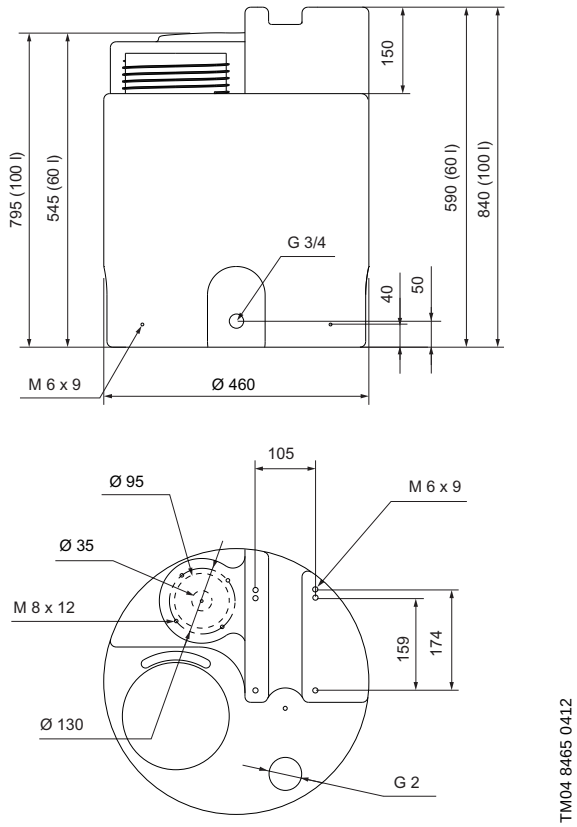


Fig. 50 Cylindrical tank, 60 and 100 litres

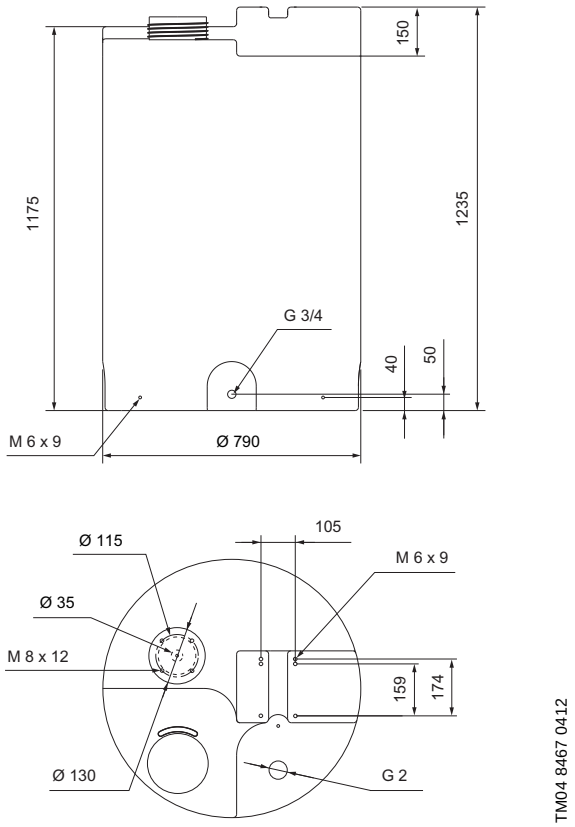


Fig. 52 Cylindrical tank, 500 litres

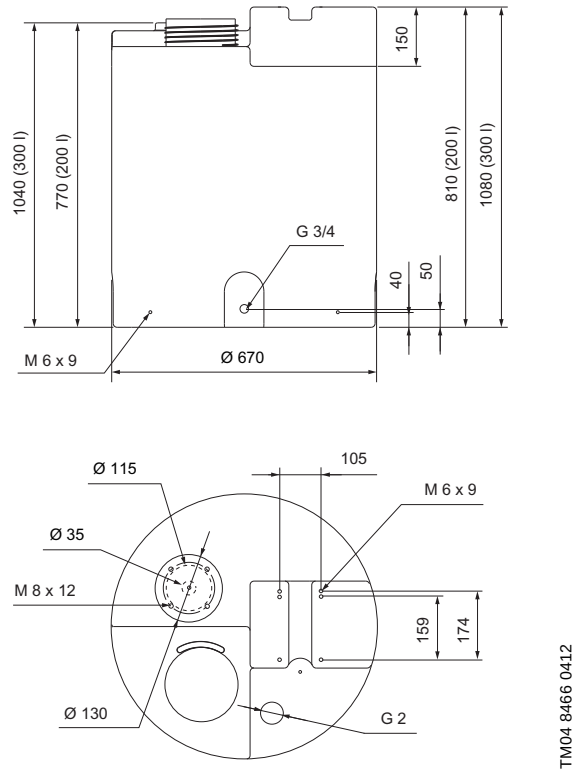


Fig. 51 Cylindrical tank, 200 and 300 litres

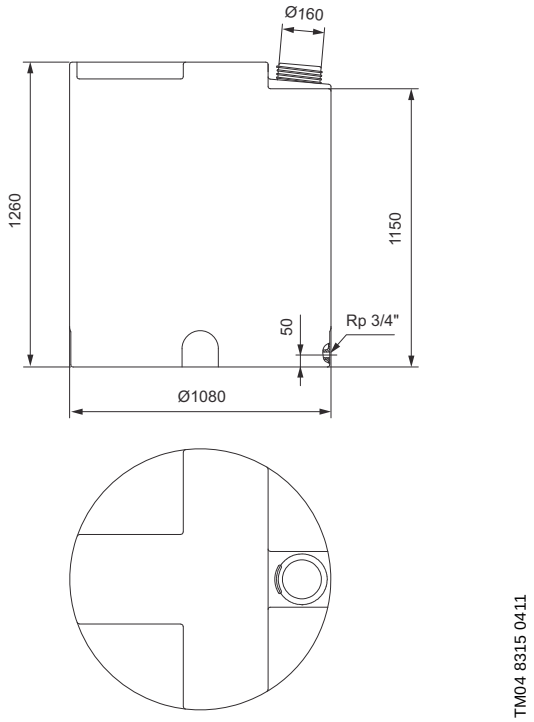


Fig. 53 Cylindrical tank, 1000 litres

Collecting tray

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

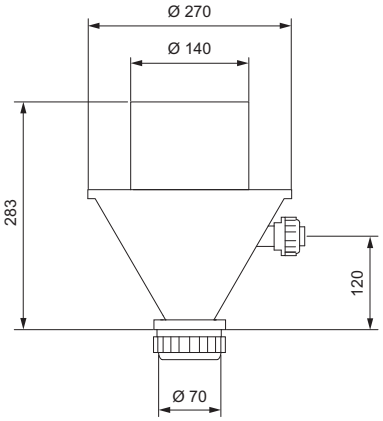
- Material: PE
- Colour: transparent.

TM04 8316 0411

Fig. 54 Collecting tray

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

Accessories for dosing tanks



TM04 8318 0411

Fig. 55 Dissolving hopper, dimensions

TM04 8477 0512

Fig. 56 Handheld mixer

Technical data

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

Water meter

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

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

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

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

TM04 8317 0411

Fig. 57 Water meter

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	Connections	Installation kit connection	Port-to-port length [mm]	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

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_3COOH	25	●	●	●	●	–	●	●	●	●
		60	●	●	●	●	–	●	●	●	●
		85	●	●	❍	–	–	–	●	●	–
Aluminium chloride	$AlCl_3$	40	●	●	–	●	●	●	●	●	●
Aluminium sulphate	$Al_2(SO_4)_3$	60	●	●	●	●	●	●	●	●	●
Ammonia, aqueous	NH_4OH	28	●	●	●	●	–	●	●	●	●
Calcium hydroxide★[7]	$Ca(OH)_2$		●	●	●	●	●	●	●	●	●
Calcium hypochlorite	$Ca(OCl)_2$	20	❍	●	–	●	●	●	●	●	●
Chromic acid	H_2CrO_4	10	●	●	●	●	●	●	●	●	●
		30	–	●	–	●	●	❍	●	●	●
		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_2SiF_6	40	●	●	❍	●	–	❍	●	●	●
Hydrochloric acid	HCl	< 25	●	●	–	●	●	●	●	●	●
		25-37	●	●	–	●	●	❍	●	●	●
Hydrogen peroxide	H_2O_2	30	●	●	●	●	●	●	●	●	●
Nitric acid	HNO_3	30	●	●	●	●	●	●	●	●	●
		40	❍	●	●	●	●	–	●	●	●
		70	–	●	●	–	●	–	●	●	❍
Peracetic acid	CH_3COOOH	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_2S	30	●	●	●	●	●	●	●	●	●
Sodium sulphite	Na_2SO_3	20	●	●	●	●	●	●	●	●	●
Sodium thiosulfate	$Na_2S_2O_3$	10	●	●	●	●	●	●	●	●	●
Sulphurous acid	H_2SO_3	6	●	●	●	●	●	●	●	●	●
Sulphuric acid★[4]	H_2SO_4	< 80	●	●	–	●	●	❍	●	●	●
		80-96	❍	●	–	●	●	–	●	●	–
		98	–	●	●	–	❍	–	●	●	–

● Resistant

❍ Limited resistance

– Not resistant

★[3] Risk of crystallisation.

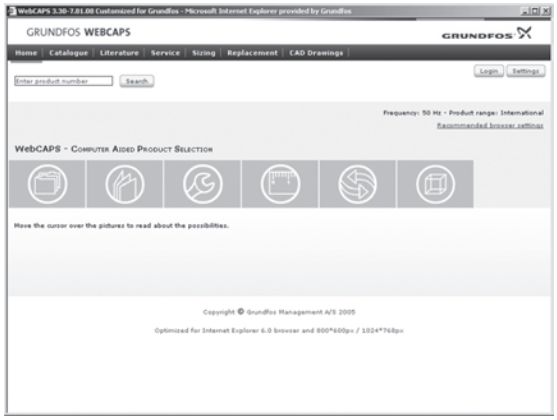
★[4] Reacts violently with water and generates much heat. (Pump should be absolutely dry before dosing sulphuric acid.)

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

For further information, see 'Pumped liquid guide'.

10. Further product documentation

WebCAPS



WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

WebCAPS contains detailed information on more than 185 000 Grundfos products in more than 20 languages.

In WebCAPS, all information is divided into 6 sections:

- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.

Catalogue

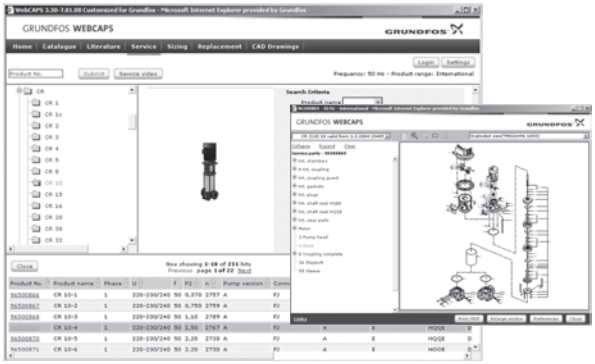
With a starting point in areas of applications and pump types, this section contains

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

Literature

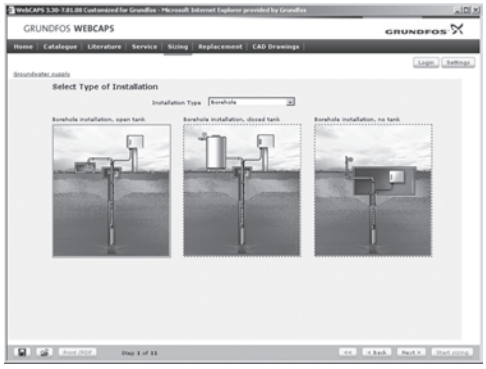
In this section you can access all the lastest documents of a given pump, such as

- data booklets
- Installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures, etc.



Service

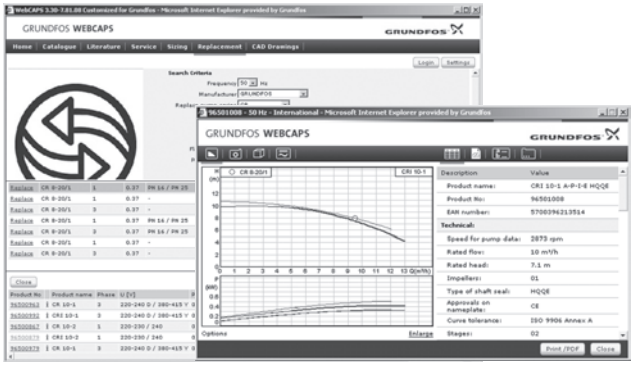
This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and cancelled Grundfos pumps.
Furthermore, this section contains service videos showing you how to replace service parts.



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. 58 WinCAPS CD-ROM

WinCAPS is a **Win**dows-based **C**omputer **A**ided **P**roduct **S**election program containing detailed informtion 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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