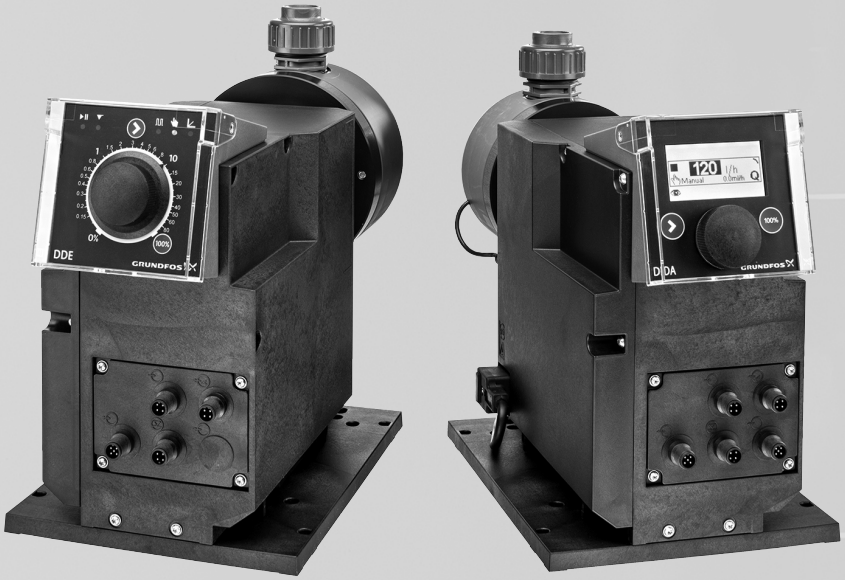
SMART Digital XL

DIGITAL DOSING from 60 to 200 l/h

DDA, DDE

Pumps and accessories



GRUNDFOS

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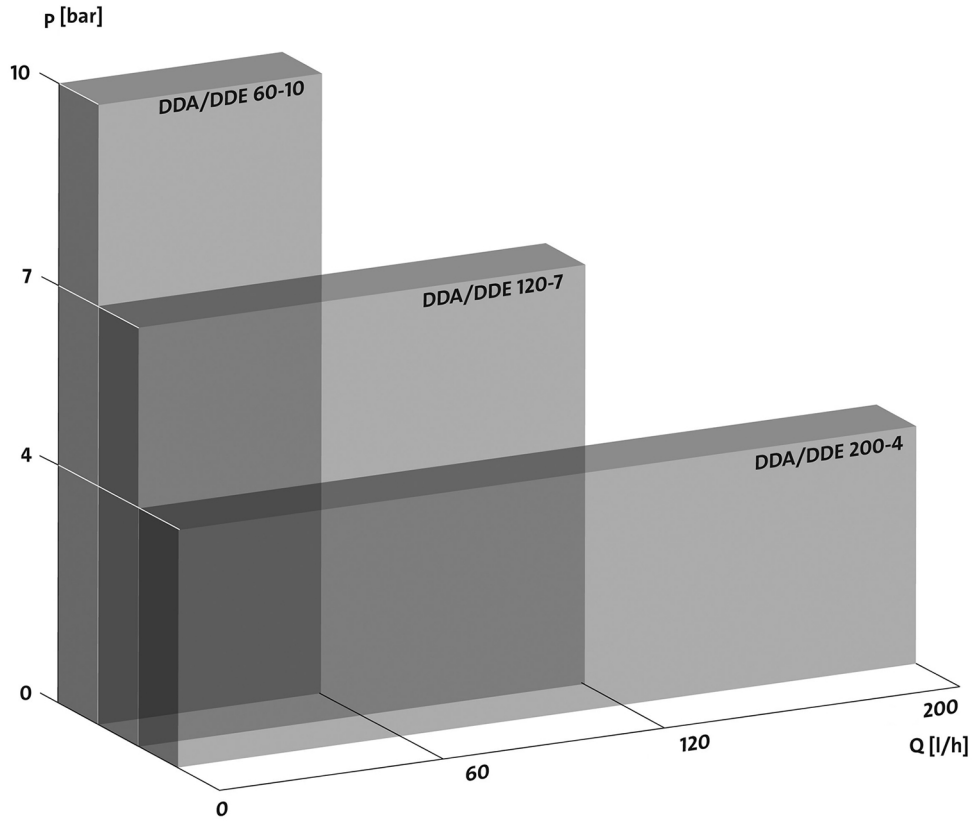
1. General data

Performance range



Performance range

Features at a glance

TM067328

DDA, DDE

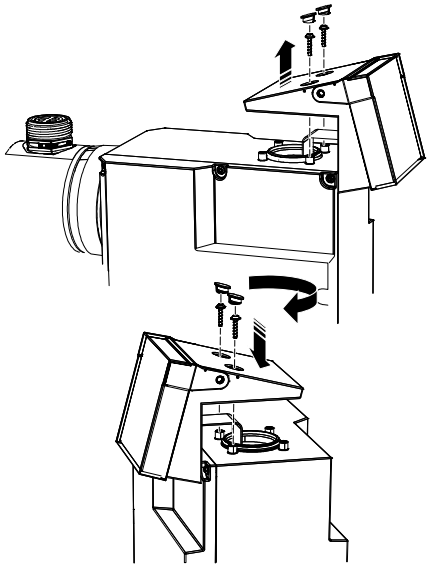
Digital Dosing™

The SMART Digital XL generation DDA and DDE with powerful PMS (Permanent Magnet Synchronous) motor brings state-of-the-art technology to perfection. Combined expert knowledge and patented solutions set future standards. Traditional technologies, such as stroke length or stroke frequency adjustment with asynchronous motor, become a thing of the past.

Unique flexibility with only a few variants

The included mounting plate makes the pump more flexible. Service and pump exchange is easy and fast: just dismantle the pump from the mounting plate by removing two screws.

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



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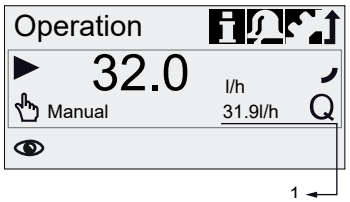
Modularity of the control cube

A turn-down ratio of 1:800, 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 of the DDA pump, 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 up to 28 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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Display DDA

Pos.	Description
1	Additional display

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 by air bubbles for example, 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, such as 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 XL DDA and DDE pumps contribute to low life cycle costs:

- no underdosing or overdosing due to high dosing accuracy and FlowControl
- longer maintenance intervals due to the universal chemical resistance of the double full-PTFE diaphragm
- reduced energy consumption due to state-of-the-art drive technology.

Two application-oriented type ranges

DDA is the high-end pump range for extended flow and pressure ranges with sensor-based FlowControl and measurement functions for challenging industrial applications, such as:

- drinking water treatment
- wastewater treatment
- boiler water treatment
- cooling water treatment
- process water treatment
- chemical industry
- ultrafiltration process and reverse osmosis
- food and beverage industry
- paper and pulp industry.

DDE is the economical pump range with basic functions including manual operation or control via PLC for OEM applications, such as:

- drinking water treatment
- wastewater treatment
- boiler water treatment
- cooling water treatment
- process water treatment
- chemical industry
- ultrafiltration process and reverse osmosis

- food and beverage industry
- paper and pulp industry
- irrigation
- swimming pool water.

2. Type key

The type key is used to identify the precise pump and is not used for configuration purposes.

Type	
DDA60-10FCM-PVC/V/C-F-31U3U3FGC3	
DDA	
DDE	

Nominal dosing capacity [l/h]	
DDA**60**-10FCM-PVC/V/C-F-31U3U3FGC3	

Max. pressure [bar]	
DDA60-**10**FCM-PVC/V/C-F-31U3U3FGC3	

Control variant	
DDA60-10**FCM**-PVC/V/C-F-31U3U3FGC3	
B	Basic (only DDE)
AR	DDA: Alarm relay DDE: B with pulse mode, analog mode and alarm relay
FCM	AR + FlowControl function

Dosing head variant	
DDA60-10FCM-**PVC**/V/C-F-31U3U3FGC3	
PV	Polyvinylidene fluoride (PVDF)
SS	Stainless steel 1.4435
PVC	Polyvinyl chloride
PV-L	PV with Diaphragm Leakage Detection (DLD)
SS-L	SS with Diaphragm Leakage Detection (DLD)
PVC-L	PVC with Diaphragm Leakage Detection (DLD)

Gasket material	
DDA60-10FCM-PVC/**V**/C-F-31U3U3FGC3	
E	EPDM
V	FKM
T	PTFE

Valve ball material	
DDA60-10FCM-PVC/V/**C**-F-31U3U3FGC3	
SS	Stainless steel 1.4401
C	Ceramic (up to DN 20)

Control Cube	
DDA60-10FCM-PVC/V/C-**F**-31U3U3FGC3	
F	Front-mounted (change to left or right is possible)

Supply voltage	
DDA60-10FCM-PVC/V/C-F-**3**1U3U3FGC3	
3	100-240 V 50/60 Hz single phase

Valve type	
DDA60-10FCM-PVC/V/C-F-3**1**U3U3FGC3	
1	Standard valves, not spring-loaded
2	Spring-loaded valve

Connection, inlet/outlet	
DDA60-10FCM-PVC/V/C-F-31**U3U3**FGC3	
U3U3	2 × Union nut G5/4 2 × Hose connector 19/20 mm 2 × Hose clamp 2 × Pipe connector 25 mm
A1A1	2 × Union nut G5/4 2 × Inlay internal thread Rp3/4 (SS)
A3A3	2 × Union nut G5/4 (SS) 2 × Inlay internal thread 3/4 NPT (SS)
A7A7	2 × Union nut G5/4 2 × Inlay internal thread 3/4 NPT

Power plug	
DDA60-10FCM-PVC/V/C-F-31U3U3**F**GC3	
F	EU (Schuko)
B	USA, Canada
G	UK
I	Australia, New Zealand, Taiwan
E	Switzerland
J	Japan
L	Argentina

Pump design	
DDA60-10FCM-PVC/V/C-F-31U3U3F**G**C3	
G	Grundfos red
A	Grundfos green
B	Grundfos black
X	Neutral/black

Special variant	
DDA60-10FCM-PVC/V/C-F-31U3U3FG**C3**	
Standard	
C3	Inspection certificate 3.1 (EN 10204)

3. Functions overview

Overview of functions

General

	DDA		DDE	
Control variant:	FCM	AR	AR	B
Digital Dosing: Internal stroke speed control and frequency control	●	●	●	●
Mounting plate	●	●	●	●

Control panel

	DDA		DDE	
Control variant:	FCM	AR	AR	B
Control cube mountable in three positions: front, left, right	●	●	●	●
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	●	●		
LEDs for operation mode, warning and alarm			●	●
Plain-text menu in different languages	●	●		
Turn-and-push knob (click wheel) for easy navigation	●	●		
Capacity adjusting knob (0.125 - 100 %)			●	●
Start/Stop key	●	●		
100 % key (de-aeration)	●	●	●	
Operation mode key (manual/pulse/analog)			●	

Operation modes

	DDA		DDE	
Control variant:	FCM	AR	AR	B
Manual speed control	●	●	●	●
Pulse control in ml/pulse	●	●		
Pulse control (1:n)			●	
Analog control 4-20 mA			●	
Analog control 0/4-20 mA	●	●		
Batch control (pulse-based)	●	●		
Dosing timer cycle	●	●		
Dosing timer week	●	●		
Fieldbus control	●	●		

Functions

	DDA		DDE	
Control variant:	FCM	AR	AR	B
Auto de-aeration also during pump standby	●	●		
FlowControl system with selective fault diagnosis	●			
Pressure monitoring (min/max)	●			
Flow measurement	●			
AutoFlowAdapt	●			
Stop after power failure	●	●		
SlowMode (anti-cavitation)	●	●		
Calibration mode	●	●		
Full scaling of analog input	●	●		
Scaling of maximum analog input			●	
Service information display	●	●		
Relay setting: alarm, warning, stroke signal, pump dosing, pulse input [1)]	●	●	●	
Relay setting (additionally): timer cycle, timer week	●	●		

1) DDE-AR: relay 1: alarm; relay 2: low-level signal, stroke signal, pulse input

Related information

Operating elements, DDA
Operating elements DDE
External stop

Functional description

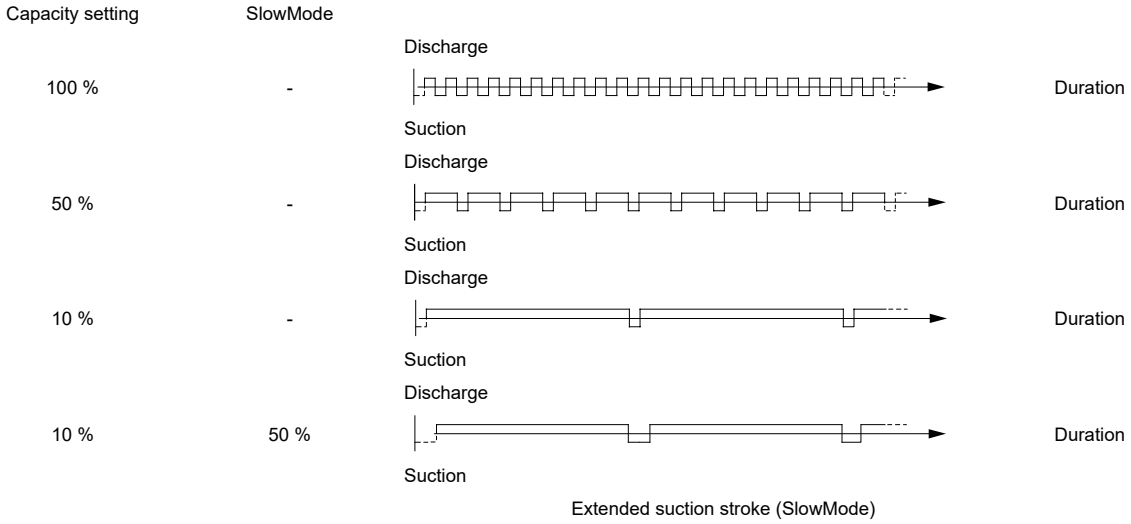
The electronically controlled PMS (Permanent Magnet Synchronous) motor of the DDA and DDE pumps provides optimum control of the stroke speed. The duration of each discharge stroke varies according to the capacity set, resulting in optimum dosing flow in any operating situation, while the duration of 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, which ensures optimum accuracy, priming and suction.
- A capacity range of 1:800 (turn-down ratio) results in less variants and spare parts.
- Smooth and continuous dosing ensures an optimum mixing ratio at the injection point without static mixers.
- Pressure peaks are significantly reduced, preventing mechanical stress on wearing parts, such as the diaphragm, tubes, connections, resulting in extended maintenance intervals.
- The installation is less affected by long inlet and outlet lines.
- Dosing of high-viscosity and degassing liquids (SlowMode) is easier.

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

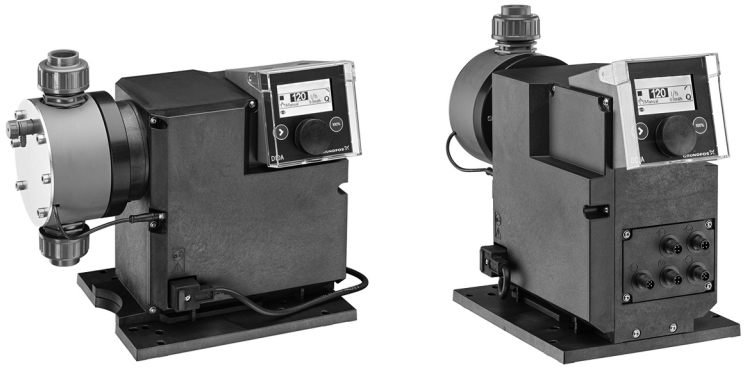
Relation between stroke-frequency adjustment and capacity



Operating elements

Operating elements, DDA

The pump is supplied with front-mounted control cube. The position of the control cube can easily be changed by unfastening two screws, lifting the cube, turning it to the left or right, and fastening both screws again.



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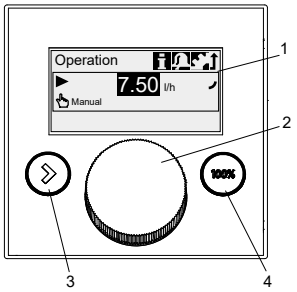
Two of three possible control cube positions



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Operating elements DDA

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

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

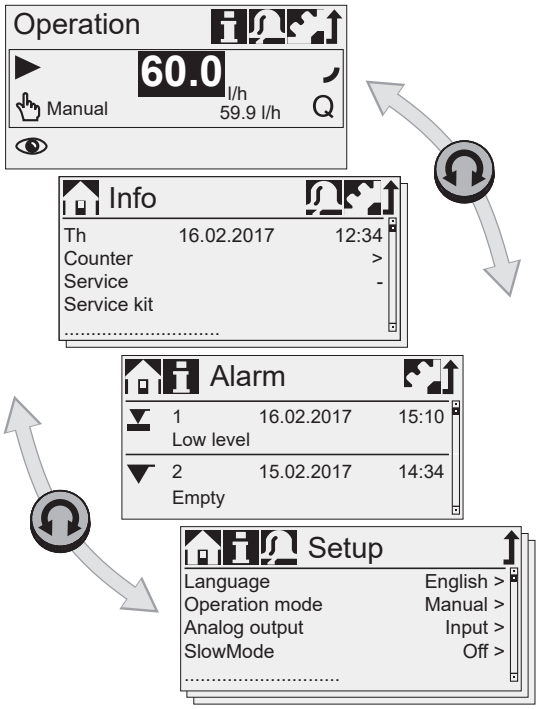
If maximum capacity is required over a short period of time, for example during startup, press the 100% key. To set the pump to run for a specific number of seconds at maximum capacity, press the 100% key and turn the click wheel clockwise simultaneously.

Menu

The DDA dosing pumps feature a user-friendly plain-text menu. The menu consists of 4 tabs: Operation, Info, Alarm, Setup.

During initial startup, menu text appears in English. The menu can be set to display other languages.

The following example applies to DDA pumps:



Menu overview (example of main menus)

The menu text appears in up to 28 languages on a big graphical display, backlit in four different colours according to the traffic light concept.

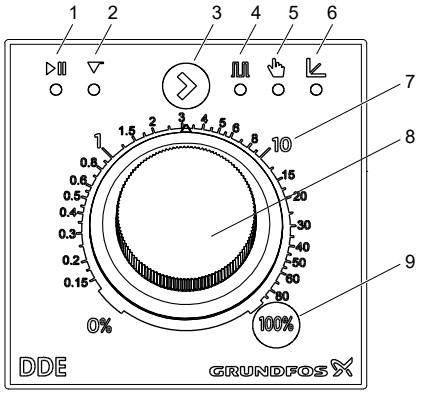
Display	Fault		Pump status	
White	-	Stop	Standby	
Green	-			Running
Yellow	Warning	Stop	Standby	Running
Red	Alarm	Stop	Standby	

Operating elements DDE

The pump is supplied with front-mounted control cube. The position of the control cube can easily be changed by unfastening two screws, lifting the cube, turning it to the left or right, and fastening both screws again.

TM067309

Two of three possible control cube positions



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Operating elements DDE

With the capacity adjusting knob, the capacity of the pump can easily be adjusted in percentage of the maximum flow. Due to the logarithmic increase of the percent values, even small dosing capacities can be set accurately.

Pos.	Description	Control variant	
		B	AR
	Status LEDs:		
1	Active alarm (red)	•	•
	External stop (red)		•
2	Tank level (yellow)		•
3	[Operation mode] key		•
	Operation mode LEDs (green):		
4	Pulse		•
5	Manual	•	•
6	Analog		•
7	Logarithmic scale	•	•
8	Capacity adjusting knob	•	•
9	[100%] key		•

LEDs (DDE-B)

The LEDs indicate the following operating statuses and faults:

LED status		Pump status	Description
▷II	☝		
Off	On	Running	
Off	Flashing	Stop	The capacity is adjusted to 0 %.
Flashing	Off	Standby [2)]	An alarm is active.

2) For some alarms, the pump tries to restart periodically.

Keys and LEDs (DDE-AR)

When pressing and holding down the 100% key, the pump doses at 100 % for a certain time. The 100% key can be used for de-aeration, for example.

The Operation mode key is used for changing the operation mode. See section Changing the operation mode.

The operation mode LEDs indicate the active operation mode. Only one operation mode can be active at a time.

Together with the status LEDs, the operation mode LEDs indicate the following statuses and faults:

LED status					Pump status	Description
▷II	▽	⎍	☝	⌞		
-	-	-	●	-	Running	
-	-	-	❍	-	Stop	The capacity is adjusted to 0 %.
-	-	●	-	-	Running	
-	-	❍	-	-	Standby	There are no incoming pulses.
-	-	-	-	●	Running	
-	-	-	-	❍	Standby	The analog signal is < 4.1 mA.
-	❍	●			Running	There is low-level in the tank.
-	●	❍			Standby	The tank is empty.
●	-	❍			Standby	The external stop is activated.
❍	-	-			Standby [3)]	An alarm is active.

3) For some alarms, the pump tries to restart periodically.

● = LED on

❍ = LED flashing

- = LED off

Operation modes

Manual control

This section applies to the DDA.

In this operation mode, the pump constantly doses the dosing flow set with the click wheel. The dosing flow is set in l/h or ml/h. The pump automatically switches between the units. Alternatively, the display can be reset to US units (gph).

Setting range

Pump type	Setting range [4]	
	From [l/h]	To [l/h]
DDA 60-10	0.075	60
DDA 120-7	0.15	120
DDA 200-4	0.25	200

4) When the SlowMode function is enabled, the maximum flow is reduced (see section SlowMode).

This section applies to the DDE-AR control variant.

In this operation mode, the pump constantly doses the dosing quantity set by the adjusting knob.

The setting range depends on the pump type.

Setting range

Pump type	**Setting range**	
	[l/h]	**[gph]**
DDE 60-10	0.075 - 60	0.0197 - 15.8
DDE 120-7	0.15 - 120	0.04 - 32
DDE 200-4	0.25 - 200	0.066 - 52.8

Related information

SlowMode

Pulse control

This section applies to the DDA.

In this operation mode, the pump doses the set dosing volume for each incoming (potential-free) pulse, for example, from a water meter. There is no direct relation between pulses and dosing strokes. The pump automatically calculates the optimum stroke frequency for dosing the set volume per pulse.

The calculation is based on the following factors:

- the frequency of external pulses
- the set dosing volume per pulse.

The quantity to be dosed is set in ml/pulse.

Setting range

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

Type	**Setting range [ml/pulse]**
DDA 60-10	0.0111 - 111
DDA 120-7	0.0232 - 232
DDA 200-4	0.0386 - 386

This section applies to the DDE-AR control variant.

In this operation mode, the pump doses the set dosing volume for each incoming (potential-free) pulse, for example, from a water meter. The pump automatically calculates the optimum stroke frequency for dosing the set volume per pulse.

The calculation is based on the following factors:

- the frequency of external pulses
- the set stroke volume in percent.

The dosing quantity per pulse is set by the adjusting knob to a value between 0.125 % and 100 % of the stroke volume.

Setting range

The frequency of incoming pulses is multiplied by the set dosing volume. If the pump receives more pulses than it can process at the maximum dosing flow, it runs at the maximum stroke frequency in continuous operation. Excess pulses are ignored.

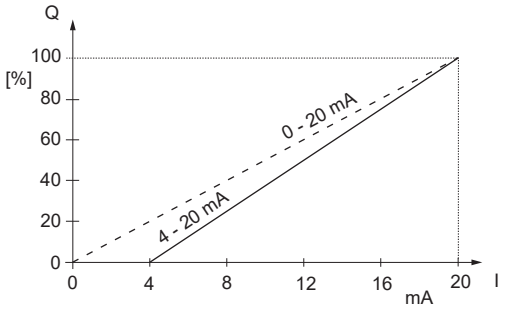
Type	Setting range [ml/pulse]
DDE 60-10	0.0070 - 5.56
DDE 120-7	0.0145 - 11.58
DDE 200-4	0.0242 - 19.3

Analog 0/4-20 mA control

This section applies to the DDA.

In this operation mode, the pump doses according to the external analog signal. The dosing volume is proportional to the signal input value in mA.

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



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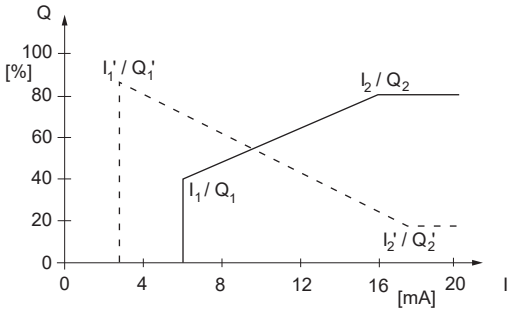
Pos.	Description
Q	Dosing capacity
I	Input signal

0/4-20 mA control

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



TM041575

Pos.	Description
Q	Dosing capacity
I	Input signal

Analog scaling

This section applies to the DDE-AR control variant.

In this operation mode, the pump doses according to the external analog signal. The dosing volume is proportional to the signal input value in mA. The input signal must be 4-20 mA.

The maximum dosing volume can be changed via the capacity adjusting knob.

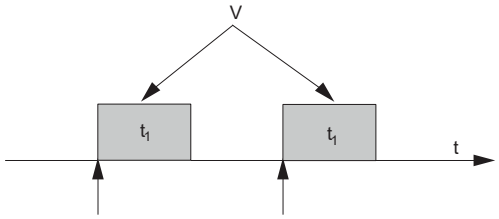
Example:

Set capacity [%]	Input signal [mA]	Dosing flow [%]
100	≤ 4.1	0
	≥ 19.8	100
50	≤ 4.1	0
	≥ 19.8	50
1	≤ 4.1	0
	≥ 19.8	1

Pulse-based batch control

This section applies to the 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 are ignored. In the event of interrupts, such as external stop or alarm, incoming pulses are also ignored. After the interrupt ends, a new batch is dosed with the next incoming pulse.



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Pos.	Description
P	Pulse
V	Batch volume
t	Time

Pulse-based batch control

Setting range

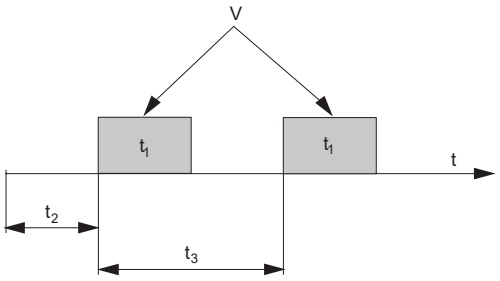
Pump type	Setting range		
	From [ml/batch]	To [l/batch]	Resolution [ml] [5]
DDA 60-10	5.56	999	0.694
DDA 120-7	11.6	999	1.45
DDA 200-4	19.3	999	2.41

[5] Thanks to the digital motor control, dosing quantities with a resolution of up to 1/8 of the dosing stroke volume can be dosed.

Dosing timer cycle

This section applies to the 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, such as power supply failure or external stop, while the time continues running in the background (real-time clock). After the interrupt ends, batch dosing proceeds according to the current status in the timeline.



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Pos.	Description
V	Batch volume

Pos.	Description
t	Time

Dosing timer cycle

Setting range

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

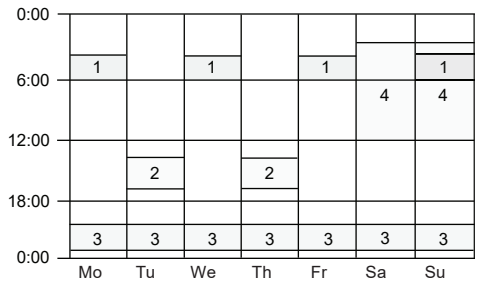
Dosing timer week

This section applies to the DDA.

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

- batch volume
- dosing time
- start time
- 1 to 7 weekdays (Monday to Sunday).

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



TM041576

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

This section applies to the DDA.

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 the following 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 section DDA for further details.

Related information

DDA

Stop after power failure

This section applies to the DDA.

The **Stop after power failure** function is used to prevent the pump from performing a reference movement and start dosing when the power supply is switched on or re-established after a power failure.

A reference movement is performed every time the power supply is switched on. With the reference movement, the pump identifies the exact diaphragm position to ensure accurate dosing. Depending on the initial diaphragm position, the reference movement can dose a small amount of dosing medium into the process. To avoid this, you can enable the **Stop after power failure** function.

The function is disabled by default.

When the function is enabled:

- The pump stops and displays an alarm when the power supply is switched on. The pump performs the reference movement after the user acknowledges the alarm.
- Functions which require the reference movement are deactivated until the reference movement is performed. These functions are the following:
  - **Auto de-aeration**
  - **FlowControl**
  - Moving the diaphragm into service position
  - Volume counter.

Auto de-aeration

This section applies to the DDA.

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

These movements are executed in the following conditions:

- when the pump is not stopped
- during dosing breaks (for example, external stop or no incoming pulse).

Calibration

This section applies to the DDA.

The pump is calibrated in the factory at the nominal pressure of the respective pump type (see Technical data section for DDA and DDC for the maximum pressure). 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 section AutoFlowAdapt.

Related information

AutoFlowAdapt

DDA

External stop

With the external stop function, the pump can be stopped remotely via an external contact. We do not recommend that you 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 to keep the optimal dosing precision and prevent damages to the electronics.

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

In case of DDE-AR, an activated external stop is indicated by the respective LED. See section Keys and LEDs (DDE-AR).

Related information

Keys and LEDs (DDE-AR)

Counters

This section applies to the DDA.

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

This section applies to the DDA.

Due to the optimised construction and the smooth digital dosing principle, the service periods are more than twice as long as that of conventional pumps. However, the wear parts have to be exchanged at regular intervals to keep the dosing precision and 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 presented in the Info display:

Display		Description
Service	-	No service is required.
	Soon	Order parts for service soon.
	Now	Service must be performed now.
Service kit	8-digit Grundfos product number	The service kit contains all parts needed for standard maintenance: diaphragm and 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

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

Level control

This section applies to the DDA, DDE-AR control variant.

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

Level sensors	Pump reaction [6]
▼	The LED lights up in yellow.
Low-level signal	The pump continues running.
▼	The LED lights up in red.
Empty tank signal	The pump stops.

6) Depending on the pump model and settings, the relay outputs can be activated, see section Relay output.

Related information

Relay output

Relay output

This section applies to the DDA, DDE-AR variant.

The pump can switch two external signals using installed relays. The relay outputs are potential-free.

Depending on the process control requirements, the following relay output settings can be selected:

For the DDA:

Signal		Description
Relay 1	**Relay 2**	
Alarm [7]	Alarm	The display is red, the pump stops (for example Empty signal).
Warning [7]	Warning	The display is yellow, the pump is running (for example Low-level signal).
Stroke signal [8]	Stroke signal [8]	It signals each incoming pulse from pulse input.
Pump dosing	Pump dosing [7]	The pump is running and dosing.
Pulse input [9]	Pulse input [9]	It signals each incoming pulse from pulse input.
Bus control	Bus control	It is activated by a command in the bus communication. See section Bus communication (only DDA).
	Timer cycle	The timer set in the menu: on-time, cycle-time, start delay
	Timer week	The timer set in the menu: procedure, on-time, start time and weekdays
Contact type		
NO [7]	NO [7]	Normally Open Contact
NC	NC	Normally Closed Contact

[7] It is a default setting.

[8] Continuous operation of the relays on a high frequency reduces the relay lifetime significantly.

[9] The correct transmission of incoming pulses can only be guaranteed up to a pulse frequency of 5 Hz.

For the DDE-AR control variant:

Signal		**Description**
Relay 1	**Relay 2**	
Alarm [10]		Empty tank, motor blocked
	Low level [10]	Low level tank
	Stroke signal	Every completed stroke
	Pulse input	Every pulse coming in from pulse input
Contact type		
NO [10]	NO [10]	Normally Open Contact
NC	NC	Normally Closed Contact

[10] It is a default setting.

Related information

Bus communication

Analog output

This section applies to the 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	**AR**
Output = Input	Analog feedback signal (not for master-slave application) The analog input signal is mapped 1:1 to the analog output.	X	X
Actual flow	It is measured in the dosing head, see section Flow measurement.	X	X [11]
Backpressure	It is measured in the dosing head, see section Pressure monitoring.	X	
Bus control	It is set by a command in the Bus communication, see section Bus communication.	X	X

[11] Output signal is calculated based on motor speed and pump status (target flow rate).

Related information

Flow measurement

Pressure monitoring

Bus communication

This section applies to the DDA.

The pump can be connected to a Grundfos CIU (Communication Interface Unit) equipped with one of the following CIM (Communication Interface Module):

- CIM150 Profibus
- CIM200 Modbus
- CIM260 3G/4G/SMS
- CIM280 3G/4G/GRM/GIC
- CIM500 Ethernet.

For internal communication between the CIU and the dosing pump, GENIbus is used.

Key lock

This section applies to the DDA.

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 acknowledge alarms. Two levels of protection are available:

- Settings: the start/stop key and 100% key are still available.
- Settings + keys: the start/stop key and 100% key are also locked.

For temporary, that is, 2-minute, or final deactivation, the preset 4-digit PIN-code has to be entered again.

Basic settings

This section applies to the DDA.

The pump can be reset to the default settings. Additionally, the current configuration of the pump can be stored and activated later. The latest saved configuration is stored in the memory.

Units

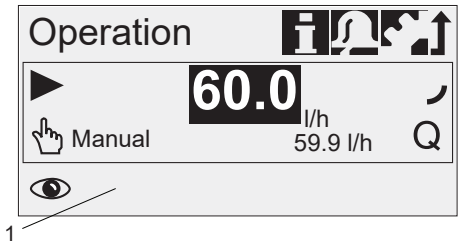
This section applies to the DDA.

Metric units (litres/millilitres/bar) or US units (US gallons/PSI) can be selected. According to the operation mode and menu, the following units of measurement are displayed:

Operation mode / function	Metric units	US units
Manual	ml/h, l/h	gph
Pulse	ml/⊓	ml/⊓
Analog 0-20mA, **Analog 4-20mA**	ml/h, l/h	gph
Batch (**Pulse**, **Timer**)	ml, l	gal
Calibration	ml	ml
Volume counter	l	gal
Pressure monitoring	bar	psi

Additional display

The additional display function provides useful status information, for example, the target flow rate or the actual flow rate. The value is shown in the operation display together with the corresponding symbol.



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Additional display (1)

The following information can be selected for the additional display (1):

Settings		Description
		Depending on the operation mode:
Default display	Q	Actual flow (manual, pulse) [12]
	Q	Target flow (pulse)
		Input current (analog)
		Remaining batch volume (batch, timer)
		Time until next batch (timer)
Dosed volume	V	Total dosed volume, see section Counters
Actual flow	Q	Actually measured flow [12]
Backpressure	P	Current backpressure in the dosing head [12]

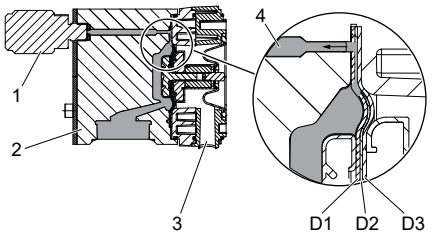
12) Only in DDA-FCM control variant

Diaphragm leakage detection (optional)

This section applies to the DDA-AR control variant.

Pumps with diaphragm leakage detection (DLD) have a special dosing head with a special diaphragm and a pressure switch. The pressure switch is fitted and connected to the pump on delivery.

For pumps with diaphragm leakage detection, the pressure differential between suction and discharge side must be at least 2 bar (29 psi).



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Diaphragm leakage detection

Pos.	Components
1	Pressure switch
2	Dosing head
3	Drain opening
4	Dosing medium
D1	Working diaphragm
D2	Signal diaphragm (intermediate layer)
D3	Protective diaphragm

In case the working diaphragm is leaky:

- Dosing medium (4) penetrates between working diaphragm (D1) and protective diaphragm (D3), and is transferred to the pressure switch (1) through the signal diaphragm (D2).

- On the next discharge stroke, the increasing pressure activates the pressure switch (1).
- The pump indicates an alarm and stops.

The pump provides two relay outputs that can be used to trigger an external alarm.

Replace the diaphragm as soon as possible after a diaphragm leakage was detected.

If both the working diaphragm (D1) and the protective diaphragm (D3) are damaged, dosing liquid escapes from the drain opening (3) on the dosing head.

FlowControl

This section applies to the DDA-FCM control variant.

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DDA with FlowControl

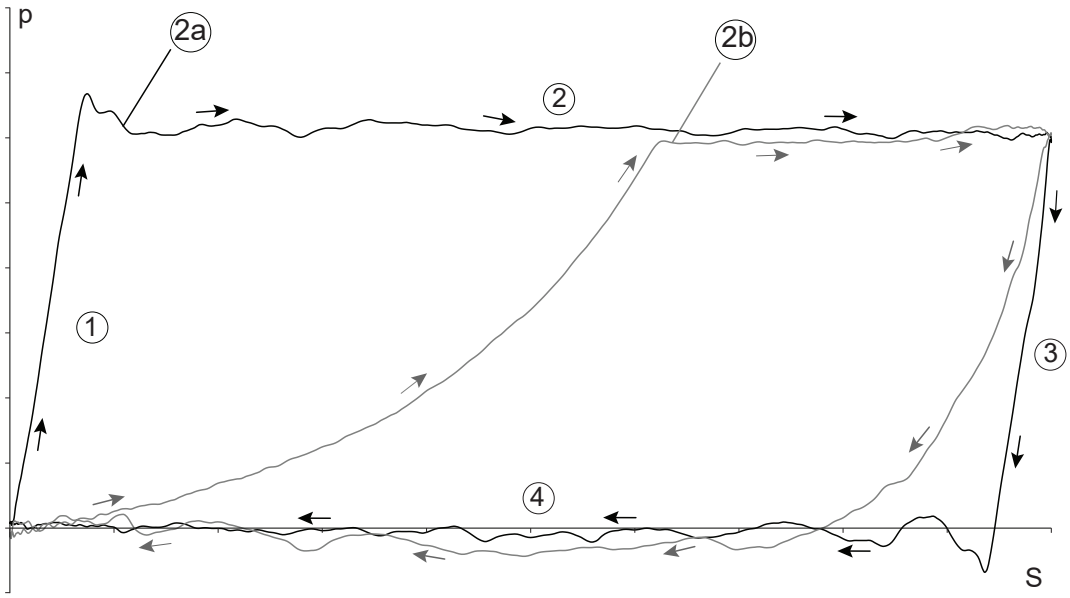
The pump monitors the dosing process of liquids when the FlowControl function is activated. While the pump operates, some influences, such as air bubbles, may cause reduced flow rates or even stop the dosing process. For optimal process safety and reliability, the activated FlowControl function immediately 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). 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, reduce the discharge phase and the stroke volume.

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

FlowControl requires a minimum backpressure of 2 bar. Grundfos recommends an additional pressure valve (PV) on the discharge side for dosing low capacities, that is, below 1 l/h.



Indicator diagram

Pos.	Description
p	Pressure
S	Stroke length
1	Compression phase
2	Discharge phase
2a	Trouble-free dosing stroke
2b	Air bubbles disturbing the dosing stroke
3	Expansion phase
4	Suction phase

Pressure monitoring

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, for example, if there is 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 continues. In case the pressure drops below the minimum limit, for example, if an outlet line bursts, the pump stops and major chemical spills are prevented.

Pressure setting range

Pump type	Fixed min. pressure [bar] [13)]	Adjustable max. pressure [bar] [14)]
DDA 60-10	2	3-11 (default)
DDA 120-7	2	3-8 (default)
DDA 200-4	2	3-5 (default)

13) It can be either set as a warning (pump keeps running) or as an alarm (pump stops).

14) The adjustable maximum pressure is equivalent to the maximum operating pressure plus 1 bar.

Flow measurement

This section applies to the 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 any additional measurement equipment.

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

AutoFlowAdapt

This section applies to the DDA-FCM control variant.

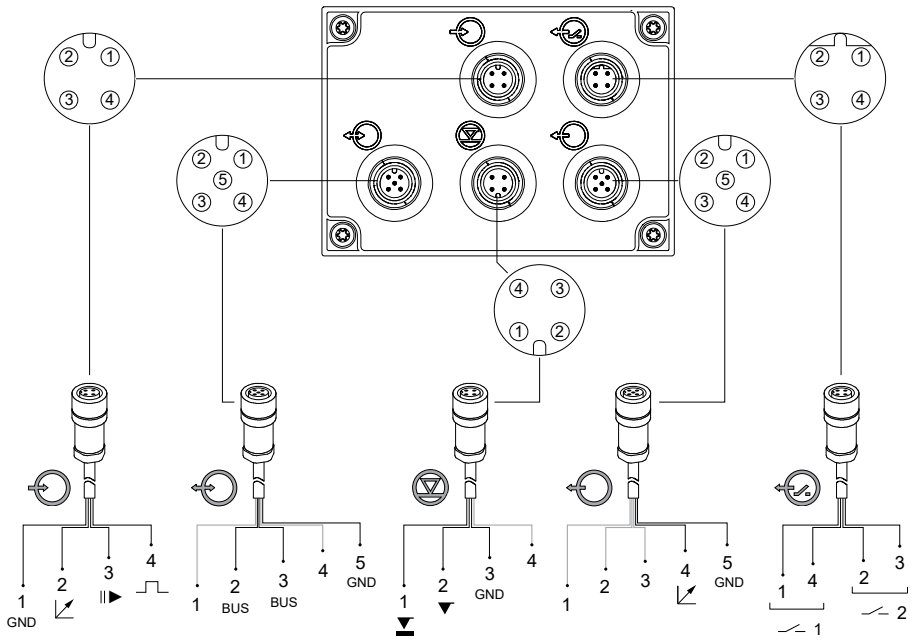
When activating the AutoFlowAdapt function, even environmental changes are compensated so that the required target flow rate is achieved. The integrated AutoFlowAdapt makes additional monitoring and control devices redundant. The AutoFlowAdapt function is based on the following factors:

- 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 tries to keep the flow rate constant. This is especially important when dosing degassing liquids.
- In general, increasing system pressure reduces the stroke volume whereas falling system pressure increases the stroke volume. The AutoFlowAdapt function compensates this by automatically and continuously adapting the motor speed. Despite fluctuating system pressure, dosing accuracy is maintained.

Wiring diagram, DDA



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Input: Analog, External stop, Pulse

Function	Pins			
	1/brown	2/white	3/blue	4/black
Analog	GND/(-) mA	(+) mA		
External stop	GND		X	
Pulse	GND			X

Level signals: Empty signal, Low-level signal

Function	Pins			
	1	2	3	4
Low-level signal	X		GND	
Empty signal		X	GND	

Analog output

Function	Pins				
	1/brown	2/white	3/blue	4/black	5/yellow/green
Analog output				(+) mA	GND/(-) mA

GENIbus

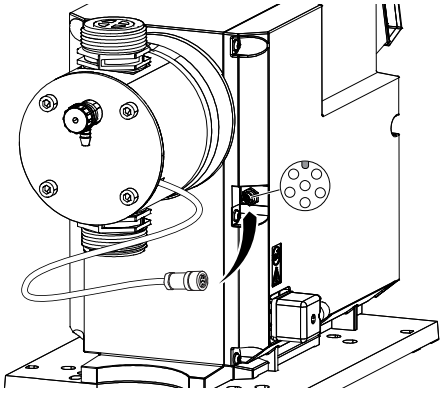
Function	Pins				
	1	2/brown	3/blue	4	5/black
GENIbus		RS-485 A	RS-485 B		GENIbus Y

Relay outputs

	Function	Pins			
		1/brown	2/white	3/blue	4/black
	Relay 1	X			X
	Relay 2		X	X	

	Cable 1 Analog/external stop/ pulse	Cable 2 Level input	Cable 3 Analog output	Cable 4 GENIbus	Cable 5 Relay outputs
Product No.	• 2 m cable: 96609014 • 5 m cable: 96609016	See section about suction lances in Accessories.	• 2 m cable: 96632921 • 5 m cable: 96632922	• 3 m cable: 98589048	• 2 m cable: 96609017 • 5 m cable: 96609019

FlowControl signal connection (DDA-FCM)



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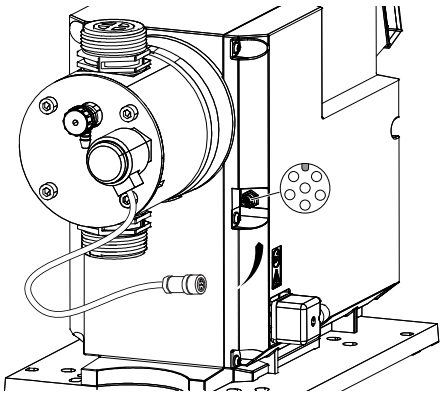
DLD signal connection (optional for DDA-AR)



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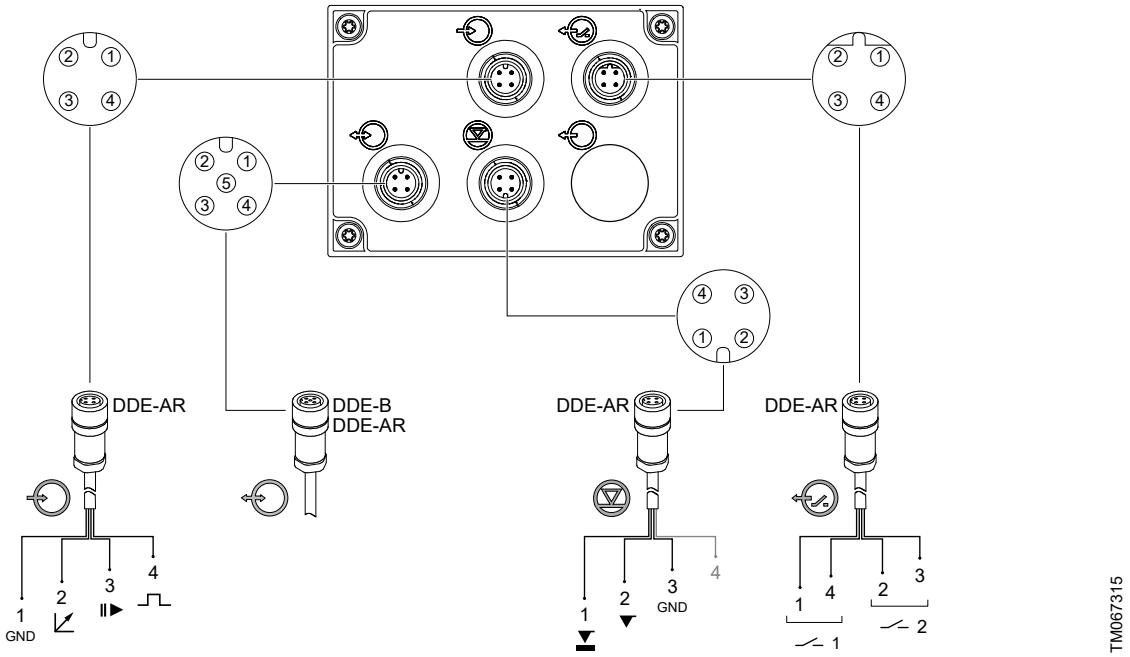
Related information

Rigid suction lances RSL

Wiring diagram, DDE



Input: Analog, External stop, Pulse

	Function	Pins			
		1/brown	2/white	3/blue	4/black
	Analog	GND/(-) mA	(+) mA		
	External stop	GND		X	
	Pulse	GND			X

Level signals: Empty signal, Low-level signal

	Function	Pins			
		1	2	3	4
	Low-level signal	X		GND	
	Empty signal		X	GND	

Service

	Function	
	Service connection	(only for Grundfos service)

Relay outputs

	Function	Pins			
		1/brown	2/white	3/blue	4/black
	Relay 1	X			X
	Relay 2		X	X	

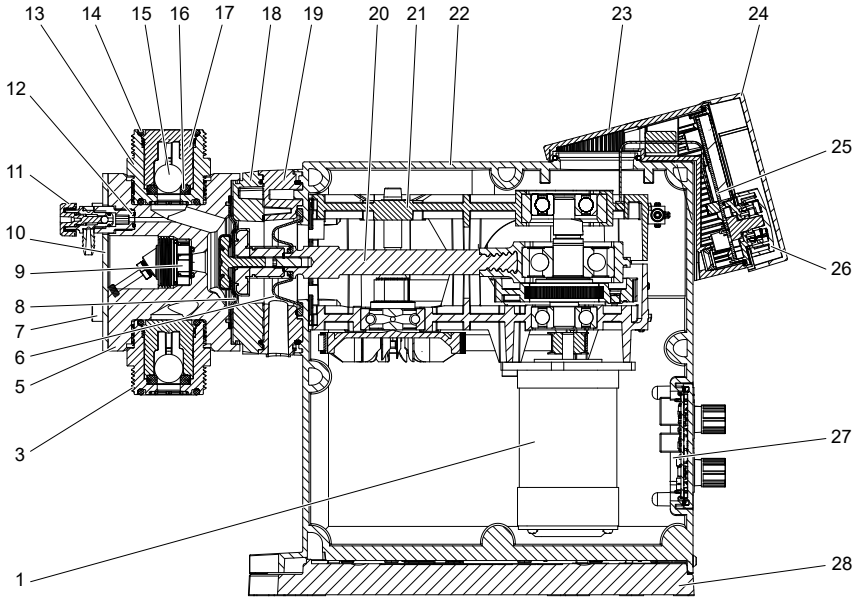
	Cable 1 Analog/external stop/pulse	Cable 2 Level input	Cable 4 Relay output
Product No.	• 2 m cable: 96609014 • 5 m cable: 96609016	See section about suction lances in Accessories.	• 2 m cable: 96609017 • 5 m cable: 96609019

Related information

Rigid suction lances RSL

4. Construction

DDA



Sectional drawing, DDA 60-10

Construction

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

Dosing head: It has a patented design with a minimum of clearance space optimised for degassing liquids. It is supplied with integrated de-aeration valve for priming and venting complete with connection for a DN 20 tubing. DDA-FCM pumps have an integrated pressure sensor in the dosing head.

Valves: The discharge and suction valve design allows for less clearance space, which is optimal for degassing liquids. Spring-loaded valves for higher viscosities are available as an option.

Connections: The robust and easy-to-use connection packages are optimal for various sizes of hoses or pipes.

Diaphragm: The double full-PTFE diaphragm is designed for long life and universal chemical resistance.

Flange: The flange is offered with separation chamber, safety diaphragm and drain hole.

Drive unit: It has a positive return crank with double-stage belt drive, energy recovery spring for high efficiency (only 120-7 and 200-4 pump versions), PMS motor, all mounted in a robust gear housing.

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

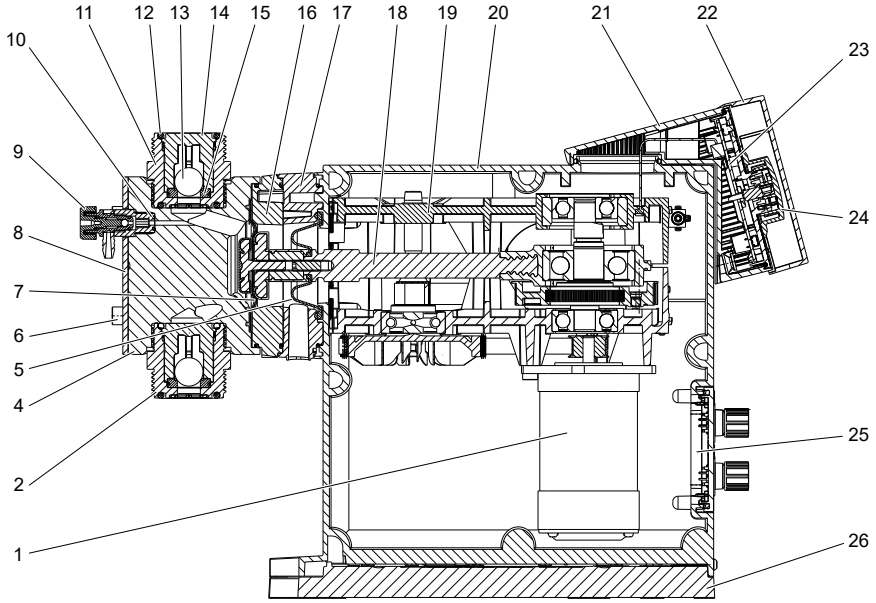
Housing: It contains drive unit and power electronics with robust signal sockets. The housing can be installed on the mounting plate with two screws.

Material specification

Pos.	Description	Material options
1	PMS motor	-
3	Suction valve, complete [15)]	-
5	Dosing head	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	SS 1.4301
11	De-aeration valve	PVC, PVDF
12	De-aeration valve O-ring	EPDM/FKM
13	Discharge valve, complete [15)]	-
14	Discharge valve O-ring	EPDM, FKM, PTFE
15	Discharge valve ball, DN 20	Ceramic Al_2O_3 99.5 %, SS 1.4401
16	Discharge valve seat	EPDM, FKM, PTFE
17	Discharge valve housing and ball cage	PP, PVC, PVDF, SS 1.4435
18	Intermediate ring	PPO/PS 20 % gf
19	Pump head flange	Aluminium alloy 3.2315
20	Connecting rod	1.4401
21	Gear box	PPE/PA 30 % gf
22	Housing	PPE/PS 20 % gf
23	Control cube	PPE/PS 20 % gf
24	Display cover	PC
25	HMI PCB	-
26	Click wheel	PPE/PS 20 % gf
27	Input/output PCB	-
28	Mounting plate	PPE/PS 20 % gf
-	Energy recovery spring	Spring steel EN 10270-1-SH

[15)] The pump can be supplied with spring-loaded valves, material: 2.4610 (Alloy C-4).

DDE



Sectional drawing, DDE 60-10

Construction

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

Dosing head: It has a patented design with a minimum of clearance space optimised for degassing liquids. It is supplied with integrated de-aeration valve for priming and venting complete with connection for a DN 20 tubing.

Valves: The discharge and suction valve design allows for less clearance space, which is optimal for degassing liquids. Spring-loaded valves for higher viscosities are available as an option.

Connections: The robust and easy-to-use connection packages are optimal for various sizes of hoses or pipes.

Diaphragm: The double full-PTFE diaphragm is designed for long life and universal chemical resistance.

Flange: The flange is offered with separation chamber, safety diaphragm and drain hole.

Drive unit: It has a positive return crank with double-stage belt drive, energy recovery spring for high efficiency (only 120-7 and 200-4 pump versions), PMS motor, all mounted in a robust gear housing.

Control cube: It contains keys, LEDs, capacity adjusting knob and protective cover.

Housing: It contains drive unit, control panel and electronics with robust signal sockets. The housing can be installed on the mounting plate with two screws.

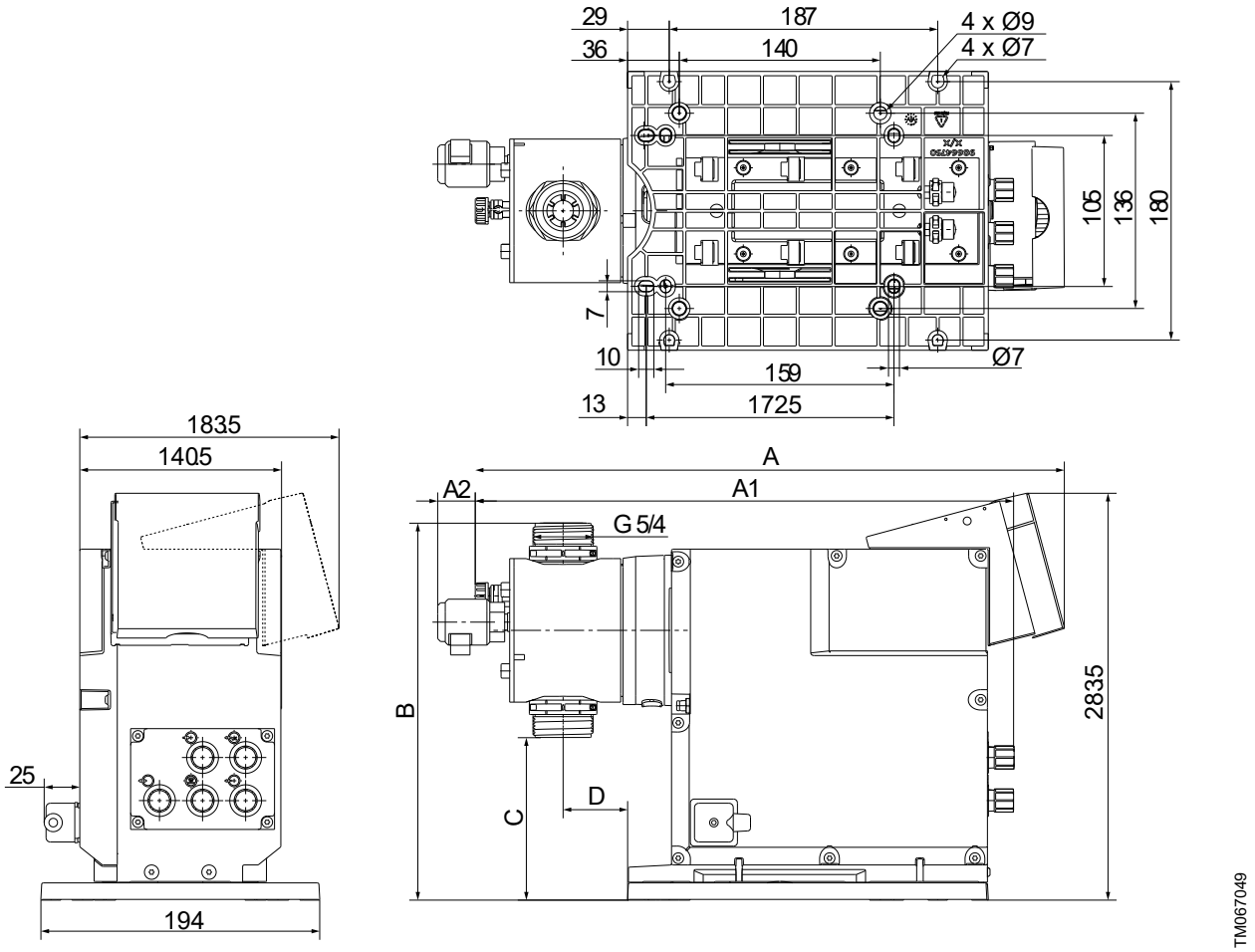
Material specification

Pos.	Description	Material options
1	PMS motor	-
2	Suction valve, complete [16)]	-
4	Dosing head	PVC, PVDF, SS 1.4435
5	Safety diaphragm	EPDM
6	Dosing head screw	SS 1.4301
7	Diaphragm	full PTFE
8	Dosing head cover	SS 1.4301
9	De-aeration valve	PVC, PVDF
10	De-aeration valve O-ring	EPDM/FKM
11	Discharge valve, complete [16)]	-
12	Discharge valve O-ring	EPDM, FKM, PTFE
13	Discharge valve ball, DN 20	Ceramic Al_2O_3 99.5 %, SS 1.4401
14	Discharge valve housing and ball cage	PP, PVC, PVDF, SS 1.4435
15	Discharge valve seat	EPDM, FKM, PTFE
16	Intermediate ring	PPO/PS 20 % gf
17	Pump head flange	Aluminium alloy 3.2315
18	Connecting rod	1.4401
19	Gear box	PPE/PA 30 % gf
20	Housing	PPE/PS 20 % gf
21	Control cube	PPE/PS 20 % gf
22	Display cover	PC
23	HMI PCB	-
24	Capacity adjusting knob	PPE/PS 20 % gf
25	Input/output PCB	-
26	Mounting plate	PPE/PS 20 % gf
-	Energy recovery spring	Spring steel EN 10270-1-SH

16) The pump can be supplied with spring-loaded valves, material: 2.4610 (Alloy C-4).

5. Dimensions

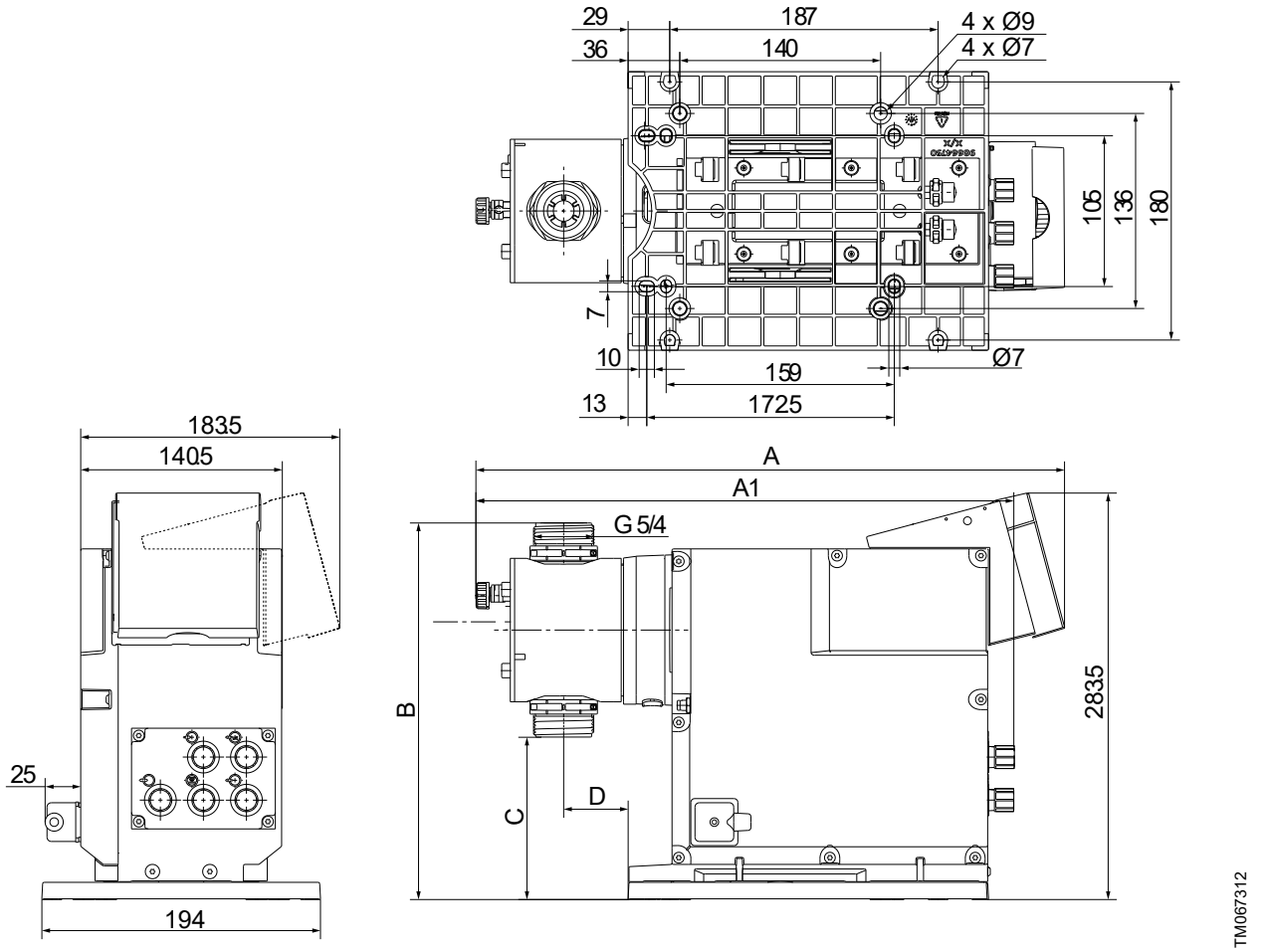
Dimensions, SMART XL DDA



Dimensions in mm.

Pump type	Dosing head material	A [mm]	A1 [mm]	A2 [mm]	B [mm]	C [mm]	D [mm]
DDA 60-10	PVC/PV	410	374	26	263	112	45
DDA 60-10	SS	405	364	-	263	112	45
DDA 120-7	PVC/PV	410	374	26	276.5	97	45
DDA 120-7	SS	405	364	-	276.5	97	45
DDA 200-4	PVC/PV	410	374	26	287.5	88	45
DDA 200-4	SS	405	364	-	287.5	88	45

Dimensions, SMART XL DDE



Dimensions in mm.

Pump type	Dosing head material	A [mm]	A1 [mm]	B [mm]	C [mm]	D [mm]
DDE 60-10	PVC/PV	410	374	263	112	45
DDE 60-10	SS	405	364	263	112	45
DDE 120-7	PVC/PV	410	374	276.5	97	45
DDE 120-7	SS	405	364	276.5	97	45
DDE 200-4	PVC/PV	410	374	287.5	88	45
DDE 200-4	SS	405	364	287.5	88	45

6. Technical data

Technical data, SMART XL DDA

Mechanical data		60-10	120-7	200-4
Turn-down ratio (setting range)	[1:X]	800	800	800
Max. dosing capacity	[l/h]	60	120	200
	[gph]	15.8	32	52.8
Max. dosing capacity with SlowMode 50 %	[l/h]	30	60	100
	[gph]	7.9	16	26.4
Max. dosing capacity with SlowMode 25 %	[l/h]	15	30	50
	[gph]	3.95	8	13.2
Min. dosing capacity	[l/h]	0.075	0.15	0.25
	[gph]	0.0197	0.04	0.066
Max. operating pressure (back pressure)	[bar]	10	7	4
	[psi]	145	101	58
Max. stroke frequency [17)]	[strokes/min]	196	188	188
Stroke volume	[ml]	5.56	11.58	19.3
Accuracy of repeatability	[%]		± 1.5 (of setpoint)	
Max. suction lift during operation [18)]	[m]		3	
Max. suction lift when priming with wet valves [18)]	[m]		1.5	
Min. pressure differential between suction and discharge side	[bar]		1 [19)]	
	[psi]		14.5 [19)]	
Max. inlet pressure, suction side	[bar]		2	
	[psi]		29	
Max. viscosity in SlowMode 25 % with springloaded valves [20)]	[mPas] (= cP)	3000	3000	3000
Max. viscosity in SlowMode 50% with springloaded valves [20)]	[mPas] (= cP)	2000	1500	1000
Max. viscosity without SlowMode with springloaded valves [20)]	[mPas] (= cP)	1000	1000	500
Max. viscosity without spring-loaded valves [20)]	[mPas] (= cP)		100	
Min. internal hose/pipe diameter suction/discharge side [20) 21)]	[mm]		19	
Min. internal hose/pipe diameter suction/discharge side (high viscosity) [21)]	[mm]		19	
Min./max. liquid temperature (PVDF, SS)	[°C]		0 / 50	
Min./max. liquid temperature (PVC)	[°C]		0 / 40	
Min./max. ambient temperature	[°C]		0 / 45	
Min./max. storage temperature (PVDF, SS)	[°C]		-20 / 70	
Min./max. storage temperature (PVC)	[°C]		-20 / 45	
Max. relative humidity (non-condensing)	[%]		90	
Max. altitude above sea level	[m]		2000	

17) The maximum stroke frequency varies depending on calibration.

18) Data is based on measurements with water.

19) For FCM control variant and for pumps with diaphragm leakage detection, the pressure differential must be at least 2 bar (29 psi).

20) The maximum suction lift is 1 m, dosing capacity reduced (approx. 30 %).

21) The length of suction line is 1.5 m, the length of discharge line is 10 m (at maximum viscosity).

Electrical data		60-10	120-7	200-4
Voltage	[V]		100-240 V ± 10 %, 50/60 Hz	
Length of power cable	[m]		1.5	
Max. inrush current for 2 ms (100 V)	[A]		35	
Max. inrush current for 2 ms (240 V)	[A]		70	
Max. power consumption P_1	[W]		62	
Enclosure class			IP65, Type 4x	
Electrical safety class			I	
Pollution degree			2	

Signal input		60-10	120-7	200-4
Max. load for level input			12 V, 5 mA	
Max. load for pulse input			12 V, 5 mA	
Max. load for **External stop** input			12 V, 5 mA	
Min. pulse length	[ms]		5	
Max. pulse frequency	[Hz]		100	
Impedance at 0/4-20 mA analog input	[Ω]		15	
Accuracy of analog input (full-scale value)	[%]		± 0.5	
Min. resolution of analog input	[mA]		0.02	
Max. loop resistance in external circuit	[Ω]		150	

Signal output		60-10	120-7	200-4
Max. resistive load on relay output	[A]		0.5	
Max. voltage on relay/analog output	[V]		30 VDC / 30 VAC	
Max. loop resistance in external circuit of the 0/4-20 mA analog output	[Ω]		500	
Accuracy of analog output (full-scale value)	[%]		± 0.5	
Min. resolution of analog output	[mA]		0.02	

Weight and size		60-10	120-7	200-4
Weight (PVC, PVDF)	[kg]	6.7	7.9	8.9
Weight (stainless steel)	[kg]	7.2	8.3	9.1
Diaphragm diameter	[mm]	74	97	117

Sound pressure		60-10	120-7	200-4
Max. sound pressure level	[dB(A)]		80	

Approvals CE, CSA-US, NSF61, EAC, ACS, RCM

Technical data, SMART XL DDE

Mechanical data		60-10	120-7	200-4
Turn-down ratio (setting range)	[1:X]	800	800	800
Max. dosing capacity	[l/h]	60	120	200
	[gph]	15.8	32	52.8
Min. dosing capacity	[l/h]	0.075	0.15	0.25
	[gph]	0.0197	0.04	0.066
Max. operating pressure	[strokes/min]	196	188	188
Stroke volume	[ml]	5.56	11.58	19.3
Accuracy of repeatability	[%]		± 5 (of setpoint)	
Max. suction lift during operation [22)]	[m]		3	
Max. suction lift when priming with wet valves [22)]	[m]		1.5	
Min. pressure differential between suction and discharge side	[bar]		1	
	[psi]		45	
Max. inlet pressure, suction side	[bar]		2	
	[psi]		29	
Max. viscosity with spring-loaded valves [23)]	[mPas] (= cP)	1000	1000	1000
Max. viscosity without spring-loaded valves [23)]	[mPas] (= cP)		100	
Min. internal hose/pipe diameter suction/discharge side	[mm]		19	
Min. internal hose/pipe diameter suction/discharge side (high viscosity) [24)]	[mm]		19	
Min. / Max. liquid temperature (PVDF, SS)	[°C]		0 / 50	
Min. / Max. liquid temperature (PVC)	[°C]		0 / 40	
Min./max. ambient temperature	[°C]		0 / 45	
Min. / Max. storage temperature (PVDF, SS)	[°C]		-20 / 70	
Min. / Max. storage temperature (PVC)	[°C]		-20 / 45	
Max. relative humidity (non-condensing)	[%]		90	
Max. altitude above sea level	[m]		2000	

22) Data are based on measurements with water.

23) The maximum suction lift is 1 m, the dosing capacity is reduced (approx. 30 %).

24) The length of suction line is 1.5 m, the length of discharge line is 10 m (at maximum viscosity).

Electrical data		60-10	120-7	200-4
Voltage	[V]		100-240 V ± 10 %, 50/60 Hz	
Length of power cable	[m]		1.5	
Max. inrush current for 2 ms (100 V)	[A]		35	
Max. inrush current for 2 ms (240 V)	[A]		70	
Max. power consumption P_1	[W]		62	
Enclosure class			IP65, Type 4x	
Electrical safety class			I	
Pollution degree			2	

Signal input		60-10	120-7	200-4
Max. load for level input			12 V, 5 mA	
Max. load for pulse input			12 V, 5 mA	
Max. load for external stop input			12 V, 5 mA	
Min. pulse length	[ms]		5	
Max. pulse frequency	[Hz]		100	
Max. loop resistance in external circuit	[Ω]		150	
Impedance at 4-20 mA analog input	[Ω]		15	
Accuracy of analog input (full-scale value)	[%]		± 0.5	
Min. resolution of analog input	[mA]		0.02	

Signal output		60-10	120-7	200-4
Max. resistive load on relay output	[A]		0.5	

Signal output		60-10	120-7	200-4
Max. voltage on relay output	[V]		30 VDC / 30 VAC	

Signal input		60-10	120-7	200-4
Weight (PVC, PVDF)	[kg]	6.7	7.9	8.9
Weight (stainless steel)	[kg]	7.2	8.3	9.1
Diaphragm diameter	[mm]	74	97	117

Sound pressure		60-10	120-7	200-4
Max. sound pressure level	[dB(A)]		80	

Approvals: CE, CSA-US, NSF61, EAC, ACS, RCM

Technical data for CIP (Clean-In-Place) applications

Short-term temperature limits for maximum 40 minutes at maximum 2 bar operating pressure:

Max. liquid temperature for dosing head material PVDF	[°C]	85
Max. liquid temperature for dosing head material stainless steel	[°C]	120

7. Pump selection

General recommendations for installation

- Installing a filter in the inlet line protects the entire installation against dirt and reduces the risk of leakage.
- A pressure-relief valve (PRV) must be installed in the outlet line to provide protection against impermissibly high pressure.
- For pipe installations and for hose installations where the pump is operated with 75 % or over of its dosing capacity, a pulsation damper (DB/DBG) should be installed downstream the pump.
- Only for control variant DDA-FCM, for discharge quantities below 1 l/h, we recommend using a pressure valve (PV) on the outlet side for the safe generation of the necessary differential pressure (2 bar).

DDA, standard range

Supply voltage:	100-240 V, 50/60 Hz single phase
Mains plug:	EU (Schuko)
Valves:	Standard
Connection sets:	U3U3: 2x union nut G 5/4, 2x hose connector 19/20 mm, 2x hose clamp, 2x pipe connector 25 mm
	A1A1: 2x union nut G 5/4 (SS), 2x inlay internal thread Rp 3/4 (SS)

Max. dosing capacity [l/h]	Max. operating pressure [bar]	Control variant	Materials			Type designation	Product number
			Pump head	Gaskets	Valve ball		
60	10	AR	PVC	EPDM	Ceramic	DDA 60-10 AR-PVC/E/C-F-31U3U3FG	99159370
				FKM	Ceramic	DDA 60-10 AR-PVC/V/C-F-31U3U3FG	99159371
			PVDF	EPDM	Ceramic	DDA 60-10 AR-PV/E/C-F-31U3U3FG	99159372
				PTFE	Ceramic	DDA 60-10 AR-PV/T/C-F-31U3U3FG	99159373
				FKM	Ceramic	DDA 60-10 AR-PV/V/C-F-31U3U3FG	99159374
			SS	FKM	SS	DDA 60-10 AR-SS/V/SS-F-31A1A1FG	99159375
				PTFE	SS	DDA 60-10 AR-SS/T/SS-F-31A1A1FG	99159376
60	10	FCM	PVC	EPDM	Ceramic	DDA 60-10 FCM-PVC/E/C-F-31U3U3FG	99159377
				FKM	Ceramic	DDA 60-10 FCM-PVC/V/C-F-31U3U3FG	99159378
			PVDF	EPDM	Ceramic	DDA 60-10 FCM-PV/E/C-F-31U3U3FG	99159379
				PTFE	Ceramic	DDA 60-10 FCM-PV/T/C-F-31U3U3FG	99159380
				FKM	Ceramic	DDA 60-10 FCM-PV/V/C-F-31U3U3FG	99159381
			SS	FKM	SS	DDA 60-10 FCM-SS/V/SS-F-31A1A1FG	99159382
				PTFE	SS	DDA 60-10 FCM-SS/T/SS-F-31A1A1FG	99159383
120	7	AR	PVC	EPDM	Ceramic	DDA 120-7 AR-PVC/E/C-F-31U3U3FG	99159384
				FKM	Ceramic	DDA 120-7 AR-PVC/V/C-F-31U3U3FG	99159385
			PVDF	EPDM	Ceramic	DDA 120-7 AR-PV/E/C-F-31U3U3FG	99159386
				PTFE	Ceramic	DDA 120-7 AR-PV/T/C-F-31U3U3FG	99159387
				FKM	Ceramic	DDA 120-7 AR-PV/V/C-F-31U3U3FG	99159388
			SS	FKM	SS	DDA 120-7 AR-SS/V/SS-F-31A1A1FG	99159389
				PTFE	SS	DDA 120-7 AR-SS/T/SS-F-31A1A1FG	99159390
120	7	FCM	PVC	EPDM	Ceramic	DDA 120-7 FCM-PVC/E/C-F-31U3U3FG	99159391
				FKM	Ceramic	DDA 120-7 FCM-PVC/V/C-F-31U3U3FG	99159392
			PVDF	EPDM	Ceramic	DDA 120-7 FCM-PV/E/C-F-31U3U3FG	99159393
				PTFE	Ceramic	DDA 120-7 FCM-PV/T/C-F-31U3U3FG	99159394
				FKM	Ceramic	DDA 120-7 FCM-PV/V/C-F-31U3U3FG	99159395
			SS	FKM	SS	DDA 120-7 FCM-SS/V/SS-F-31A1A1FG	99159396
				PTFE	SS	DDA 120-7 FCM-SS/T/SS-F-31A1A1FG	99159397

Max. dosing capacity [l/h]	Max. operating pressure [bar]	Control variant	Materials			Type designation	Product number
			Pump head	Gaskets	Valve ball		
200	4	AR	PVC	EPDM	Ceramic	DDA 200-4 AR-PVC/E/C-F-31U3U3FG	99159398
				FKM	Ceramic	DDA 200-4 AR-PVC/V/C-F-31U3U3FG	99159399
			PVDF	EPDM	Ceramic	DDA 200-4 AR-PV/E/C-F-31U3U3FG	99159400
				PTFE	Ceramic	DDA 200-4 AR-PV/T/C-F-31U3U3FG	99159401
				FKM	Ceramic	DDA 200-4 AR-PV/V/C-F-31U3U3FG	99159402
			SS	FKM	SS	DDA 200-4 AR-SS/V/SS-F-31A1A1FG	99159403
				PTFE	SS	DDA 200-4 AR-SS/T/SS-F-31A1A1FG	99159404
200	4	FCM	PVC	EPDM	Ceramic	DDA 200-4 FCM-PVC/E/C-F-31U3U3FG	99159405
				FKM	Ceramic	DDA 200-4 FCM-PVC/V/C-F-31U3U3FG	99159406
			PVDF	EPDM	Ceramic	DDA 200-4 FCM-PV/E/C-F-31U3U3FG	99159407
				PTFE	Ceramic	DDA 200-4 FCM-PV/T/C-F-31U3U3FG	99159408
				FKM	Ceramic	DDA 200-4 FCM-PV/V/C-F-31U3U3FG	99159409
			SS	FKM	SS	DDA 200-4 FCM-SS/V/SS-F-31A1A1FG	99159410
				PTFE	SS	DDA 200-4 FCM-SS/T/SS-F-31A1A1FG	99159411

DDE, standard range

Supply voltage:	100-240 V, 50/60 Hz single phase
Mains plug:	EU (Schuko)
Valves:	Standard
Connection sets:	U3U3: 2x union nut G 5/4, 2x hose connector 19/20 mm, 2x hose clamp, 2x pipe connector 25 mm
	A1A1: 2x union nut G 5/4 (SS), 2x inlay internal thread Rp 3/4 (SS)

Max. dosing capacity [l/h]	Max. operating pressure [bar]	Control variant	Materials			Type designation	Product number
			Pump head	Gaskets	Valve ball		
60	10	B	PVC	EPDM	Ceramic	DDE 60-10 B-PVC/E/C-F-31U3U3FG	99159328
				FKM	Ceramic	DDE 60-10 B-PVC/V/C-F-31U3U3FG	99159329
			PVDF	EPDM	Ceramic	DDE 60-10 B-PV/E/C-F-31U3U3FG	99159330
				PTFE	Ceramic	DDE 60-10 B-PV/T/C-F-31U3U3FG	99159331
				FKM	Ceramic	DDE 60-10 B-PV/V/C-F-31U3U3FG	99159332
			SS	FKM	SS	DDE 60-10 B-SS/V/SS-F-31A1A1FG	99159333
				PTFE	SS	DDE 60-10 B-SS/T/SS-F-31A1A1FG	99159334
60	10	AR	PVC	EPDM	Ceramic	DDE 60-10 AR-PVC/E/C-F-31U3U3FG	99159335
				FKM	Ceramic	DDE 60-10 AR-PVC/V/C-F-31U3U3FG	99159336
			PVDF	EPDM	Ceramic	DDE 60-10 AR-PV/E/C-F-31U3U3FG	99159337
				PTFE	Ceramic	DDE 60-10 AR-PV/T/C-F-31U3U3FG	99159338
				FKM	Ceramic	DDE 60-10 AR-PV/V/C-F-31U3U3FG	99159339
			SS	FKM	SS	DDE 60-10 AR-SS/V/SS-F-31A1A1FG	99159340
				PTFE	SS	DDE 60-10 AR-SS/T/SS-F-31A1A1FG	99159341
120	7	B	PVC	EPDM	Ceramic	DDE 120-7 B-PVC/E/C-F-31U3U3FG	99159342
				FKM	Ceramic	DDE 120-7 B-PVC/V/C-F-31U3U3FG	99159343
			PVDF	EPDM	Ceramic	DDE 120-7 B-PV/E/C-F-31U3U3FG	99159344
				PTFE	Ceramic	DDE 120-7 B-PV/T/C-F-31U3U3FG	99159345
				FKM	Ceramic	DDE 120-7 B-PV/V/C-F-31U3U3FG	99159346
			SS	FKM	SS	DDE 120-7 B-SS/V/SS-F-31A1A1FG	99159347
				PTFE	SS	DDE 120-7 B-SS/T/SS-F-31A1A1FG	99159348
120	7	AR	PVC	EPDM	Ceramic	DDE 120-7 AR-PVC/E/C-F-31U3U3FG	99159349
				FKM	Ceramic	DDE 120-7 AR-PVC/V/C-F-31U3U3FG	99159350
			PVDF	EPDM	Ceramic	DDE 120-7 AR-PV/E/C-F-31U3U3FG	99159351
				PTFE	Ceramic	DDE 120-7 AR-PV/T/C-F-31U3U3FG	99159352
				FKM	Ceramic	DDE 120-7 AR-PV/V/C-F-31U3U3FG	99159353
			SS	FKM	SS	DDE 120-7 AR-SS/V/SS-F-31A1A1FG	99159354
				PTFE	SS	DDE 120-7 AR-SS/T/SS-F-31A1A1FG	99159355

Max. dosing capacity [l/h]	Max. operating pressure [bar]	Control variant	Materials			Type designation	Product number
			Pump head	Gaskets	Valve ball		
200	4	B	PVC	EPDM	Ceramic	DDE 200-4 B-PVC/E/C-F-31U3U3FG	99159356
				FKM	Ceramic	DDE 200-4 B-PVC/V/C-F-31U3U3FG	99159357
			PVDF	EPDM	Ceramic	DDE 200-4 B-PV/E/C-F-31U3U3FG	99159358
				PTFE	Ceramic	DDE 200-4 B-PV/T/C-F-31U3U3FG	99159359
				FKM	Ceramic	DDE 200-4 B-PV/V/C-F-31U3U3FG	99159360
			SS	FKM	SS	DDE 200-4 B-SS/V/SS-F-31A1A1FG	99159361
				PTFE	SS	DDE 200-4 B-SS/T/SS-F-31A1A1FG	99159362
200	4	AR	PVC	EPDM	Ceramic	DDE 200-4 AR-PVC/E/C-F-31U3U3FG	99159363
				FKM	Ceramic	DDE 200-4 AR-PVC/V/C-F-31U3U3FG	99159364
			PVDF	EPDM	Ceramic	DDE 200-4 AR-PV/E/C-F-31U3U3FG	99159365
				PTFE	Ceramic	DDE 200-4 AR-PV/T/C-F-31U3U3FG	99159366
				FKM	Ceramic	DDE 200-4 AR-PV/V/C-F-31U3U3FG	99159367
			SS	FKM	SS	DDE 200-4 AR-SS/V/SS-F-31A1A1FG	99159368
				PTFE	SS	DDE 200-4 AR-SS/T/SS-F-31A1A1FG	99159369

DDA, DDE, non-standard range

The codes used in the following tables are explained in the type key, see section Type key.

Related information

2. Type key

DDA

Max. flow - press.	Control variant	DLD function	Materials			Control cube position	Supply voltage	Valve type	Connection inlet / outlet	Mains plug	Design	Special variant
			Head	Gaskets	Balls							
60-10 120-7 200-4	AR	NO	PVC PV	E V T	C	F	3	1 2	U3U3 A7A7	F B G I E J L	G	C3
			SS	E V T	SS	F	3	1 2	A1A1 A3A3			
		YES	PVC-L PV-L	E V T	C	F	3	1 2	U3U3 A7A7			
			SS-L	E V T	SS	F	3	1 2	A1A1 A3A3			
	FCM	NO	PVC PV	E V T	C	F	3	1 2	U3U3 A7A7			
			SS	E V T	SS	F	3	1 2	A1A1 A3A3			

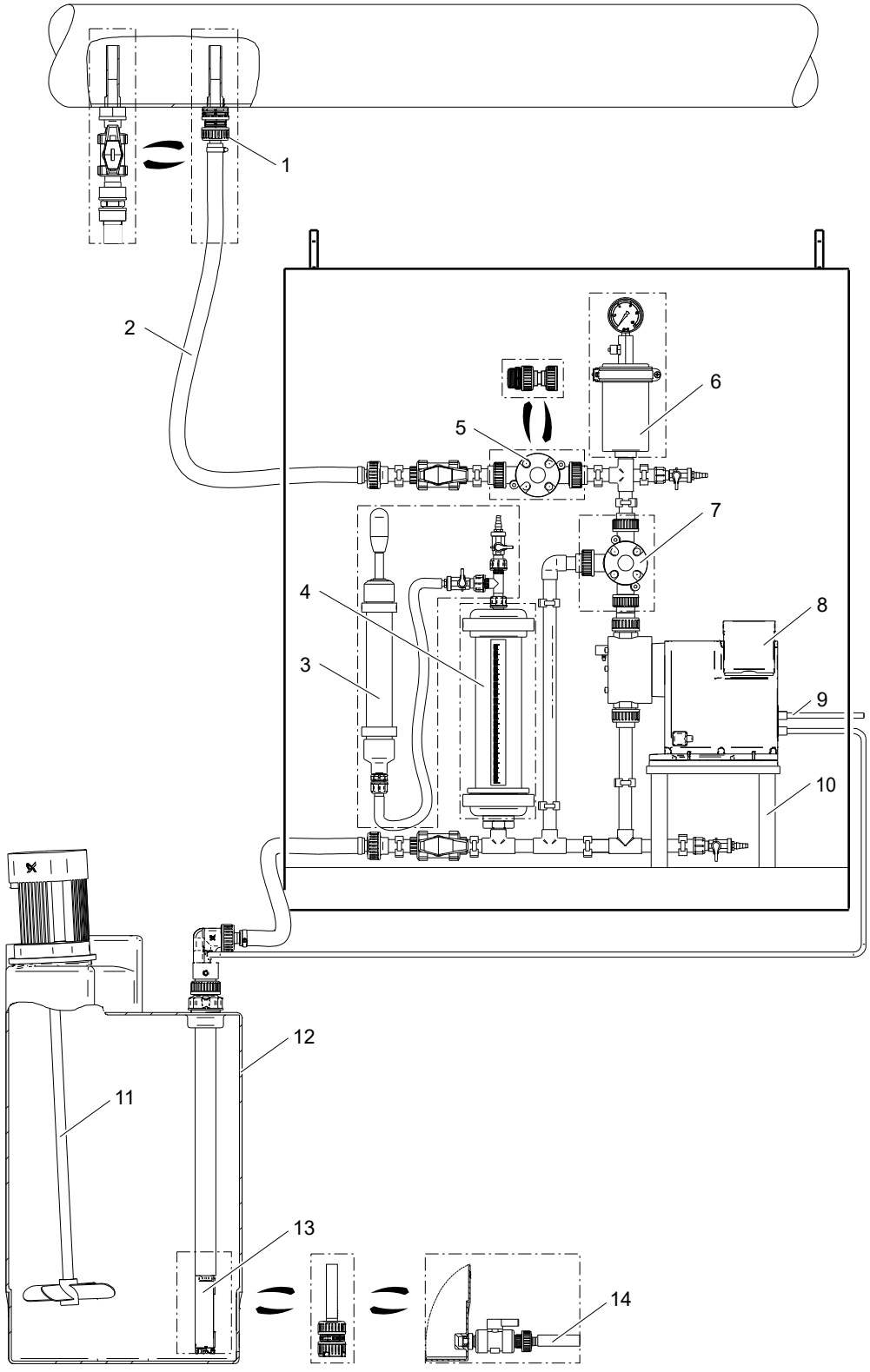
DDE

Max. flow - press.	Control variant	DLD function	Materials			Control cube position	Supply voltage	Valve type	Connection inlet / outlet	Mains plug	Design	Special variant
			Head	Gaskets	Balls							
60-10 120-7 200-4	B AR	NO	PVC PV	E V T	C	F	3	1 2	U3U3 A7A7	F B G I E J L	G	C3
			SS	E V T	SS	F	3	1 2	A1A1 A3A3			

8. Hydraulic accessories for pump connection size G 5/4

Overview of accessories for pump connection size G 5/4

Grundfos offers a comprehensive range of accessories covering every need in the dosing area.



Pos.	Description	See section
1	Injection units	Order data for injection units for pump connection size G 5/4
2	Hoses	Hoses for pump connection size G 5/4
3	Vacuum pump	Order data for pulsation dampers CSD, pump connection size G 5/4
4	Pulsation dampers CSD	
5	Pressure valves	Order data for pressure valves PV for pump connection size G 5/4
6	Pulsation dampers DBG	Order data for pulsation dampers DB and DBG, pump connection size G 5/4
7	Pressure-relief valves, pressure-loading valves	Order data for pressure-relief valves PRV for pump connection size G 5/4 Order data for pressure-loading valves PLV for pump connection size G 5/4
8	Example: SMART Digital XL dosing pump	
9	Cables and plugs	Cables and plugs for pump connection size G 5/4
10	Wall brackets	Pump mounting accessories
11	Electrical stirrers	Electric stirrers
12	Dosing tanks	Square tank Cylindrical tanks
13	Rigid suction lances and foot valves	Order data for rigid suction lances RSL with connection size G 5/4 Order data for foot valves FV with connection size G 5/4
14	Withdrawal devices	Tank accessories
-	Accessories for hydraulic connection	Pump connection kits and inlay kits for pump connection size G 5/4 Threaded adapters G 5/4 Adapters G 5/4 Preassembled accessories set for SMART Digital XL

Related information

Hoses for pump connection size G 5/4
Foot valves FV
Rigid suction lances RSL
Adapters for container connection
Injection units
Pressure-relief valves PRV
Pressure-loading valves PLV
Pulsation dampers and calibration columns
Pulsation dampers DB and DBG, pump connection size G 5/4
Pulsation dampers CSD, pump connection size G 5/4
Threaded adapters G 5/4
Pump connection kits and inlay kits
Preassembled accessories set for SMART Digital XL
Square tank, 100 litres
Cylindrical tanks
Electric stirrers
Tank accessories
Pump mounting accessories
Cables and plugs for dosing pumps

Hoses for pump connection size G 5/4

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

The pump connection size is G 5/4.

TM048268

Hoses

Technical data

The flow rate values apply to liquids with a viscosity similar to water.

Max. flow rate [l/h]	Size (internal/external diameter) [mm]	Material	Max. pressure at 20 °C [bar]	Length [m]	Product number
200	13/20	PVC, textile-reinforced	15	3	96727423
				10	96727420
				50	96692592
460	19/27	PVC, textile-reinforced	12	3	96727426
				10	96696200
				50	96695788
	19 / 24.6	PVC, reinforced with a plastic spiral	7	3	99168771

Foot valves FV

Foot valves FV are installed at the lower end of the inlet hose and they are suitable for the extraction of chemicals from unpressurised containers.

Foot valves G 5/4 have no level indication.

The delivery includes:

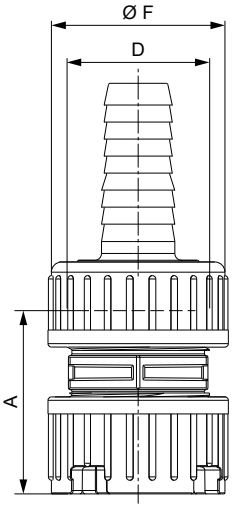
- strainer (mesh size approx. 0.8 mm)
- non-return valve
- hose and pipe connection set:
  - for hoses with internal diameter 19 or 20 mm
  - for pipes with external diameter 25 mm (PE includes PVC inlay, PVDF includes PVDF inlay)
- pipe connection set: threaded, Rp 3/4, internal thread (stainless steel).

Note: When using the foot valves with hose installation, a rigid pipe should be slipped over the hose to keep the suction line straight and upright in the tank.

TM068427

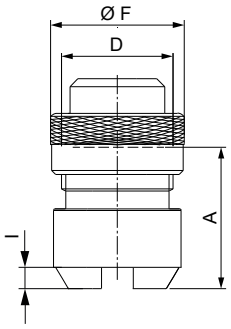
Foot valve, connection size G 5/4

Dimensions



TM085825

Foot valve FV (PE, PVDF)



TM077219

Foot valve FV (stainless steel)

Material	ØF [mm]	A [mm]	l [mm]	D
PE, PVDF	53	57	8	G 5/4
SS	50	57	8	G 5/4

Technical data

The flow rate values apply to liquids with a viscosity similar to water.

Max. flow rate [l/h]	Material			Product number
	Body	Gasket	Ball	
460	PE	FKM / EPDM	Ceramic	99168633
		PTFE	Ceramic	99168635
	PVDF	FKM / EPDM	Ceramic	99168636
		PTFE	Ceramic	99168649
	SS [25)]	PTFE	SS [26)]	99170593

25) Stainless steel 1.4571, 1.4435, 1.4305

26) Stainless steel 1.4401

Rigid suction lances RSL

Grundfos offers a comprehensive range of rigid suction lances for a variety of chemical containers. Rigid suction lances RSL are suitable for the following applications:

- extraction of chemicals from unpressurised containers
- monitoring of liquid level in the chemical container (versions with two-step level indication).

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

The delivery includes:

- strainer (mesh size approx. 2.2 mm)
- non-return valve
- hose and pipe connection set:
  - for hoses with internal diameter 19 or 20 mm
  - for PVC pipes with external diameter 25 mm
- adjustable tank connection with holes for a de-aeration line.

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

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

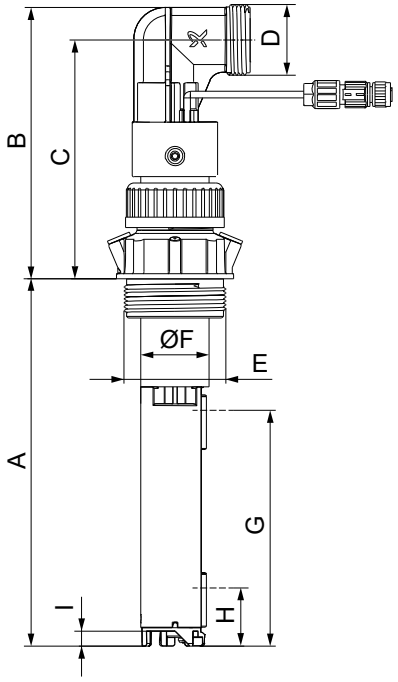
The contact type of the low-level and empty-tank indication is factory-set to NO. The contact type can be set to NC by turning the floaters upside down. Electrical data of the level indication:

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

TM068423

Rigid suction lance, connection size G 5/4

Dimensions



TM068130

Rigid suction lance

A [mm]	B [mm]	C [mm]	D	E	ØF [mm]	G[mm]	H[mm]	I [mm]
500	159	140	G 5/4	G 2	40	138	34	8.7
690								
980								
1200								

27) Switching level for water

Selection

Type	Tank volume [l]	Recommended immersion depth (A) [mm]
Grundfos cylindrical tank	60	500
	100	690
	200	690
	300	980
	500	1200
	1000	1200
Grundfos square tank	100	690
L-ring drum	120	980
	220	980
Steel drum	216	980
Standard jerricans according to EN 12712	33 (large cap)	500
	25, 30, 33	500
	60	690
IBC	all sizes	1200

Technical data

The flow rate values apply to liquids with a viscosity similar to water.

Max. flow rate [l/h]	Max. immersion depth [mm]	Material			Product number	
		Body	Gasket	Ball	RSL without level indication	RSL with level indication
460	500	PE	FKM, EPDM	Ceramic	99199363	99161410
			PTFE	Ceramic	99199364	99161411
	690	PE	FKM, EPDM	Ceramic	99199365	99161412
			PTFE	Ceramic	99199366	99161943
	980	PE	FKM, EPDM	Ceramic	99199367	99161944
			PTFE	Ceramic	99199368	99161945
	1200	PE	FKM, EPDM	Ceramic	99199369	99161946
			PTFE	Ceramic	99199370	99161947

Accessories for rigid suction lances RSL

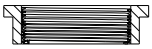
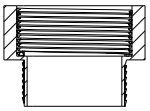
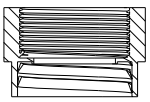
Adapters for container connection

These adapters allow the installation of standard rigid suction lances (G 2 thread) on different types of containers.

TM048506

Adapters for containers

Technical data

Type	For container type	Material	Product number
	Counter nut for tanks without threaded opening, for example, 100-litre square tank or 1000-litre cylindrical tank	PVC, grey	98071170
	Containers with 2 NPT threaded opening	PVC, grey	98156690
	Drums with S 70 × 6 coarse thread (MAUSER 2")	PE, blue	98071171
	Drums with S 56 × 4 coarse thread (TriSure®)	PE, orange	98071172
	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
	IBC (Intermediate Bulk Container) with opening of ∅150 mm, S 160 × 7	PE, black	98071177

Emission protection kits

Gas emitted by liquid in a container can cause bad odour and corrosion. Emission protection kits help avoid such problems.

Rigid suction lances can be retrofitted with emission protection kits.

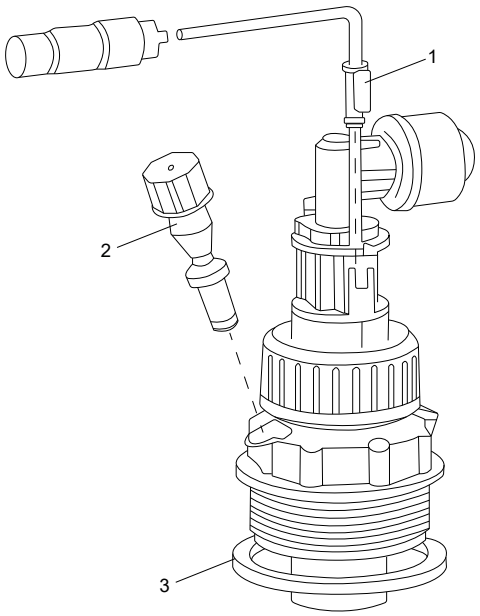
Two variants are available:

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

Emission protection kits include:

- gasket for the tank adapter
- snifting valve or hose nipple 4/6 mm (hose is not included)

- gasket for the cable outlet.



TM069068

Emission protection kit

Pos.	Description
1	Gasket for the cable outlet
2	Snifting valve
3	Gasket for the tank adapter

M 12-plug-to-flat-plug adapter

The adapter allows for connecting rigid suction lances or foot valves with level indication to pumps with a level input designed for flat plugs, for example, the DMX and the DMH with AR control unit.

Order data

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

Order data

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

Injection units

Injection units for medium-sized dosing pumps with G 5/4 connections ensure a minimum counterpressure of 0.7 bar.
The delivery includes:

- Injection pipe
  - immersion depth: 120 mm
  - PP, PVC and PVDF versions can be shortened
- Spring-loaded non-return valve with alloy C-4 spring
- Hose and pipe connection set (PVC, PP, PVDF):
  - for hoses with internal diameter 19 or 20 mm
  - for pipes with external diameter 25 mm
- Pipe connection set (Stainless steel): threaded, Rp 3/4, internal thread

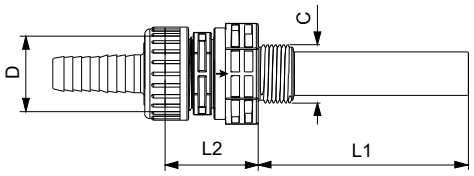
Standard injection units

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

TM068428

Standard injection unit

Dimensions of standard injection units



TM069844

C	L2 [mm]	L1 [mm]	D
G 1	53	120	G 5/4

Technical data of standard injection units

Max. flow rate: 460 l/h

The flow rate values apply to liquids with a viscosity similar to water.

Max. pressure [bar]	Material			Product number
	Body	Gasket	Ball	
10	PVC	FKM	Ceramic	99168657
		EPDM	Ceramic	99168658
		PTFE	Ceramic	99169217
	PP	FKM	Ceramic	99169220
		EPDM	Ceramic	99169223
	PVDF	FKM	Ceramic	99169227
		EPDM	Ceramic	99169228
		PTFE	Ceramic	99169229
16	Stainless steel	PTFE	Stainless steel	99169230

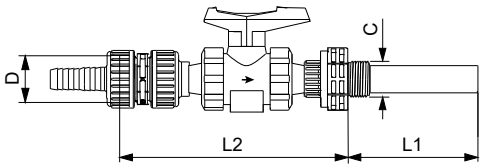
Injection units with ball valve

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.

- The dosing line can be completely disconnected from the process.
- The non-return valve can be dismantled and cleaned without stopping the process and emptying the process line.

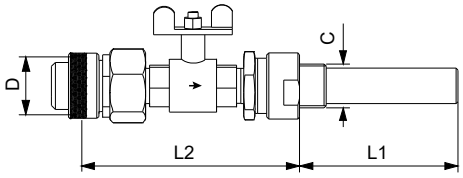
TM068429

Dimensions of injection units with ball valve



TM069843

Body material: PVC



TM069842

Body material: Stainless steel

Material	C	L2 [mm]	L1 [mm]	D
PVC	G 1	210	120	G 5/4
Stainless steel	G 1	165.5	120	G 5/4

Technical data of injection units with ball valve

Max. flow rate: 460 l/h

Max. pressure: 10 bar

The flow rate values apply to liquids with a viscosity similar to water.

Material			Product number
Body	Gasket	Ball	
PVC	FKM	Ceramic	99206582
	EPDM	Ceramic	99206585
Stainless steel	PTFE	Stainless steel	99206586

Pressure-relief valves and pressure-loading valves

Pressure-relief valves PRV

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

TM068421

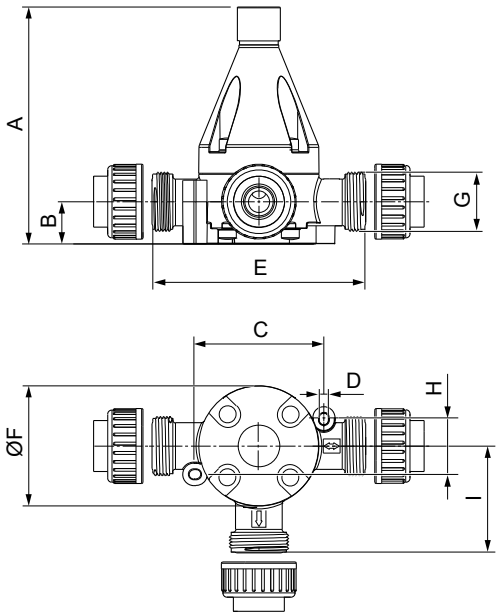
Pressure-relief valve PRV, G 5/4

Pressure-relief valves PRV for medium-sized dosing pumps with G 5/4 connections are installed in the discharge line near the pump using the two in-line connections. The side connection leads the relief liquid back into the tank.

- Relief pressure:
  - factory-set to 10 bar approximately
  - adjustable from 3 to 10 bar.
- Max. operating pressure: 10 bar.
- Max. flow rate: 460 l/h.
  - The flow rate values apply to liquids with a viscosity similar to water.
- Hose and pipe connection set (PVC, PP, PVDF):
  - for hoses with internal diameter 19 or 20 mm
  - for pipes with external diameter 25 mm.
- Pipe connection set (Stainless steel): threaded, Rp 3/4, internal thread.

Dimensions of pressure-relief valves

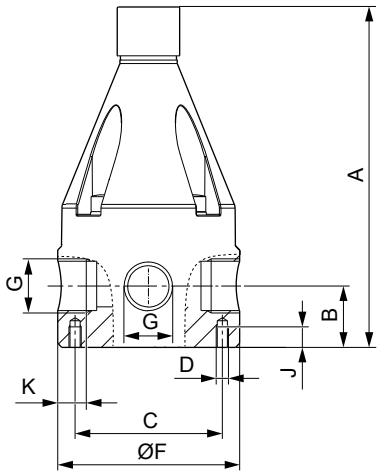
Dimensions of PP, PVC, PVDF pressure-relief valves



TM068077

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	ØF [mm]	G	H [mm]	I [mm]
168	30	92	6.5	150	85	G 5/4	40	75

Dimensions of stainless-steel pressure-relief valves



A [mm]	B [mm]	C [mm]	D	ØF [mm]	G	J [mm]	K [mm]
167	30	63	M 6	89	Rp 3/4	10	17.5

Technical data for pressure-relief valves

Material		Product number
Body	Gaskets	
PVC	FKM / EPDM	99131032
	PTFE	99141139
PP	FKM / EPDM	99141197
PVDF	FKM / EPDM	99141212
	PTFE	99141224
Stainless steel	-	99141228

Pressure-loading valves PLV

Pressure-loading valves PLV maintain a constant counterpressure for the dosing pump. They are used in the following applications:

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

Pressure-loading valves are installed in the outlet line.

- Loading pressure:
  - factory-set to approximately 3 bar
  - adjustable from 3 to 10 bar.
- Max. operating pressure: 10 bar.
- Max. flow rate: 460 l/h.
  - The flow rate values apply to liquids with a viscosity similar to water.
- Hose and pipe connection set (PVC, PP, PVDF):
  - for hoses with internal diameter 19 or 20 mm
  - for pipes with external diameter 25 mm.
- Pipe connection set (Stainless steel): threaded, Rp 3/4, internal thread.

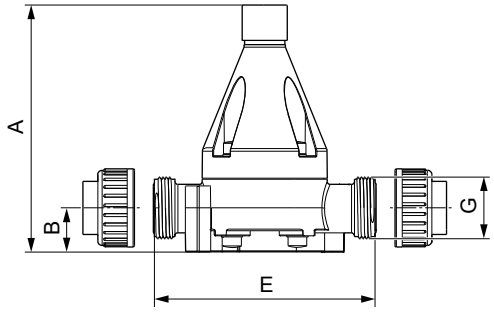
Pressure-loading valves should not be used as shut-off valves.

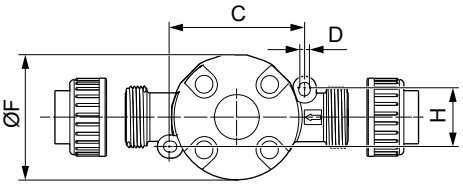
TM068422

Pressure-loading valve PLV, G 5/4

Dimensions

Dimensions of PP, PVC, PVDF pressure-loading valves

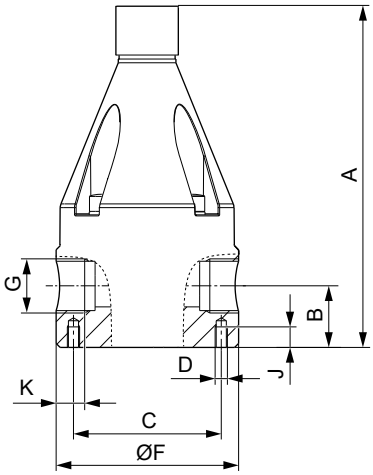




TM068090

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G	H [mm]
168	30	92	6.5	150	85	G 5/4	40

Dimensions of stainless-steel pressure-loading valves



TM068246

A [mm]	B [mm]	C [mm]	D	F [mm]	G	J [mm]	K [mm]
167	30	63	M 6	89	Rp 3/4	10	17.5

Technical data

Material		Product number
Body	Gaskets	
PVC	FKM / EPDM	99132186
	PTFE	99140593
PP	FKM / EPDM	99140610
PVDF	FKM / EPDM	99140646
	PTFE	99140651
Stainless steel	-	99135772

Pressure valves PV

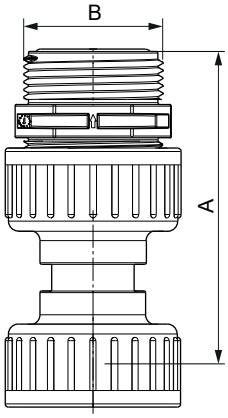
Pressure valves PV provide a constant counterpressure of 3 bar.

They are required for SMART Digital XL DDA-FCM pumps at very small flow rates.

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

- Loading pressure: 3 bar, not adjustable.
- Max. operating pressure: 10 bar.
- Max. flow rate: 200 l/h.
  - The flow rate values apply to liquids with a viscosity similar to water.
- Spring material: Alloy C-4.
- No connections included.

Dimensions



TM068404

Pressure valve PV

A [mm]	B
94	G 5/4

Technical data

Material			Product number
Body	Ball	Gasket	
PVC	Ceramic	EPDM	99229021
		FKM	99229033
PVDF	Ceramic	EPDM	99229018
		FKM	99229020
Stainless steel	Stainless steel	PTFE	99229034

Pulsation dampers and calibration columns

Pulsation dampers are used to even out the pulsating flow and pressure produced by positive displacement pumps like diaphragm dosing pumps. They can be installed before and after the pump.

Discharge-side pulsation dampers DB and DBG

Pulsation dampers DB and DBG have a separating diaphragm and are intended for the outlet side of the dosing pump. They are designed especially for installations with long outlet lines with a small diameter, or with rigid pipes. The pulsation dampers optimise the dosing accuracy and protect the pump and the outlet line against pressure surges.

Pulsation dampers DB and DBG have an air or nitrogen cushion inside which is separated from the dosing medium by a separating diaphragm. This keeps the preload pressure stable for a long time and avoids that air or nitrogen is dissolved in the dosing medium.

In PVC, PP, and stainless steel pulsation dampers, an FKM or EPDM bladder is used as separating diaphragm, in PVDF pulsation dampers, a PTFE bellows is used as separating diaphragm.

Pulsation dampers DBG include a pressure gauge for easy setting of the correct pressure. Pulsation dampers DB have no pressure gauge.

Grundfos SMART Digital dosing pumps do not require a DB or DBG pulsation damper if the flow rate is limited to 75 % of the maximum dosing capacity. In rigid pipe installations, the flow rate without pulsation damper should not exceed 50 % of the maximum dosing capacity.

If the counterpressure in the system is low or fluctuating, the installation of a pressure-loading valve PLV after the pulsation damper may be required to optimise its function.

TM068424

Discharge-side pulsation damper DBG

Suction-side pulsation dampers CSD with calibration scale

Pulsation dampers CSD are installed on the suction side of the dosing pump. They can be used for multiple pumps that are supplied by the same inlet line.

Pulsation dampers CSD help ensure the accuracy of dosing pumps which is highly dependent on proper suction conditions. In installations with long inlet lines or inlet lines with a small diameter, we recommend using a CSD pulsation damper.

Pulsation dampers CSD have a transparent PVC cylinder with a fine volume scale. When combined with a shut-off valve in the inlet line, they can also be used for calibration or flow measurement. In installations without flooded suction, the optional manual vacuum pump kit simplifies startup of the dosing pump.

TM066450

Suction-side pulsation dampers CSD with calibration scale

Calibration columns

Calibration columns have a graduated glass cylinder with a fine scale. A shut-off valve on the lower end can disconnect them from the inlet-side installation during normal operation.

One calibration column can be used for multiple pumps that are supplied by the same inlet line.

Calibration columns must not be used as pulsation dampers.

Sizing guide for pulsation dampers and calibration columns, pump connection size G 5/4

Look up your pump type in the table. Find the required pulsation damper or calibration column volume in the respective table column.

Pump type	Pump stroke volume [ml]	Required volume [l]		
		DB / DBG	CSD	Calibration column
DDA / DDE 60-10	5.56	0.3 - 0.36	1.5	2.0
DDA / DDE 120-7	11.58			
DDA / DDE 200-4	19.3			

Pulsation dampers CSD, pump connection size G 5/4

- They are prepared for pipe gluing connection with spigot (D) or socket (d).
- Calibration is possible by installing a T-piece and a shut-off valve.
- In installations without flooded suction, the optional manual vacuum pump kit simplifies the startup of the dosing pump. See section Manual vacuum pump kit for pulsation damper CSD.

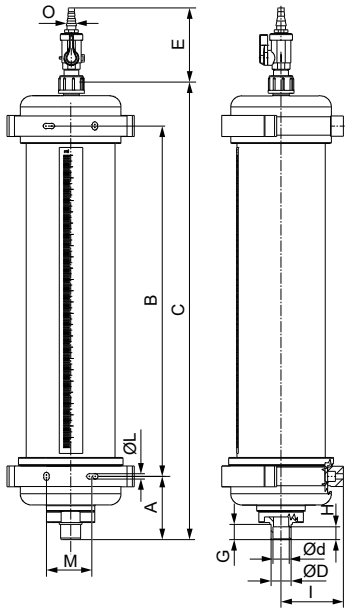
The delivery includes:

- sight glass with calibration scale
- aeration valve
- material for wall mounting.

Related information

Manual vacuum pump kit for pulsation damper CSD

Dimensions



Suction-side pulsation dampers CSD with calibration scale

Damper volume [l]	A [mm]	B [mm]	C [mm]	ØD/Ød [mm]	E [mm]	G [mm]	H [mm]	I [mm]	ØL [mm]	M [mm]	O [mm]
1.5	75	343	465	25/20	92	19	16	70	6.5	40	8-13
3.0	79	435	568	25/20	92	19	16	78		60	

Technical data

Max. operating pressure: 2 bar.

Damper volume [l]	Max. pump stroke volume [ml]	Max. number of pumps with max. stroke volume	Scale division [ml]	Material			Product number
				Body	Sight glass	Gasket	
1.5	19	3	20	PVC	PVC	FKM / EPDM	99188854
						PTFE	99217403
3.0	45	2	25	PVC	PVC	FKM / EPDM	99190807
						PTFE	99217406

Calibration columns, pump connection size G 5/4

Calibration columns are intended for flow measurement or calibration of dosing pumps. They must be isolated from the pipework during normal operation.

The volume in the calibration column can supply the largest suitable pump for approximately 30 seconds.

The delivery includes:

- glass cylinder with acrylic outer shield
- aeration valve on top
- shut-off valve on the bottom.

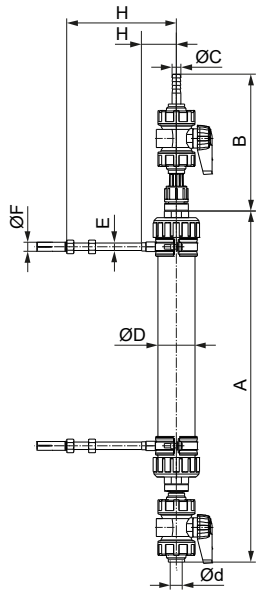
In installations without flooded suction, the optional manual vacuum pump kit simplifies the startup of the dosing pump. See section Manual vacuum pump kit for pulsation damper CSD.

Calibration columns must not be used as pulsation dampers.

Related information

Manual vacuum pump kit for calibration columns

Dimensions



TM068405

Calibration column

Volume [l]	Body	A [mm]	B [mm]	ØC [mm]	ØD [mm]	E	ØF [mm]	H [mm]
2.0	PVDF	675	188	12	101.6	M 10	12	78-182
	SS	657	148					
4.0	PVDF	795	188	12	132	M 10	12	92-196
	SS	777	148					

Technical data

Volume [l]	Max. pump stroke volume [ml]	Scale division [ml]	Connection Ød		Material		Product number
			[mm]		Body	Gasket	
2.0	19	20	25	-	PVDF	FKM	99224309
			-	G 1	SS	FKM	99224310
					SS	EPDM	99224311
4.0	45	25	25	-	PVDF	FKM	99224312
			-	G 1	SS	FKM	99224313
					SS	EPDM	99224314

Pulsation dampers DB and DBG, pump connection size G 5/4

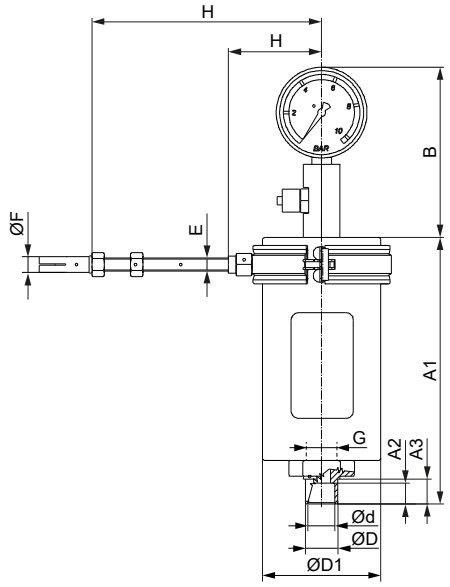
We recommend using one pulsation damper per dosing pump.
Preload pressure: 2.7 bar.

- The delivery includes material for wall mounting.
- PVC versions are prepared for pipe gluing connection with spigot (D) or socket (d).
- PVDF and PP versions are prepared for pipe welding connection with spigot (D) or socket (d).
- Pulsation dampers DBG include a pressure gauge.

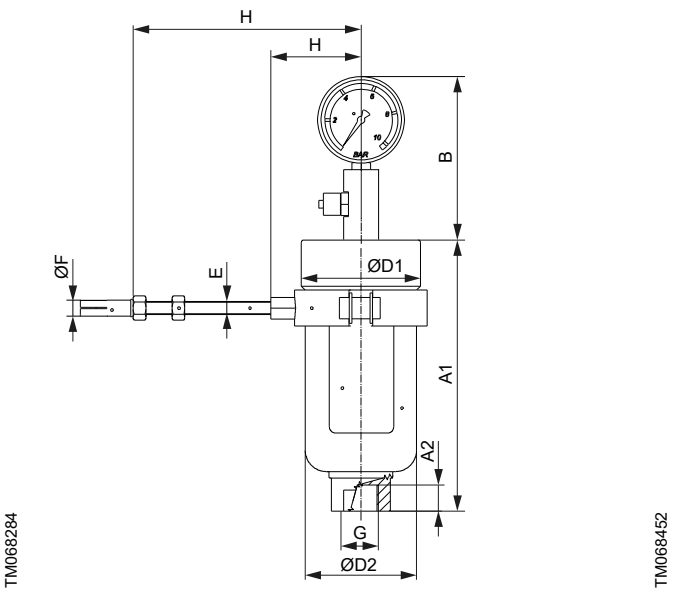
Related information

Order data for filling devices for pulsation dampers DB and DBG
Tyre-valve adapter for pulsation dampers DB and DBG
Pressure gauges for discharge-side pulsation dampers with separating diaphragm

Dimensions



Pulsation damper DBG, PVC version



Pulsation damper DBG, stainless steel version

B [mm]	ØF [mm]	E
129	12	M 10

Damper volume [l]	Body material	Connections		A1 [mm]	A2 [mm]	A3 [mm]	ØD1 [mm]	ØD2 [mm]	H [mm]
		ØD/Ød [mm]	G Internal thread						
0.3	PVDF	25/20	G 3/4	267	20	25	84	63	58-175
0.36	PVC, PP	25/20	G 3/4	203	20	25	90	-	71-175
	SS [28)]	-	G 1/2	161	16	-	85	-	67-171
0.65	PVC, PP	25/20	G 3/4	263	20	25	100	-	78-152
	SS [28)]	-	G 3/4	205	20	-	90	84	67-171
0.7	PVDF	25/20	G 3/4	138	20	25	98	84	67-171

[28)] Stainless steel 1.4404

Technical data

Damper volume [l]	Max. pump stroke volume [ml]	Connections		Material		Type DB		Type DBG	
		ØD/Ød [mm]	G Internal thread	Body	Gasket	Max. operating pressure [bar]	Product number	Max. operating pressure [bar]	Product number
0.36	19	25/20	G 3/4	PVC	FKM	10	99202662	10	99202687
					EPDM	10	99202663	10	99202688
				PP	FKM	10	99202664	10	99202689
					EPDM	10	99202665	10	99202690
		-	G 1/2	SS	FKM	180	99202667	25	99202692
					EPDM	180	99202669	25	99202693
0.3	19	25/20	G 3/4	PVDF	PTFE	20	99202666	20	99202691
0.65	45	25/20	G 3/4	PVC	FKM	10	99202670	10	99202694
					EPDM	10	99202671	10	99202695
				PP	FKM	10	99202672	10	99202696
					EPDM	10	99202673	10	99202697
		-	G 3/4	SS	FKM	50	99202675	25	99202699
					EPDM	50	99202676	25	99202700
0.7	45	25/20	G 3/4	PVDF	PTFE	20	99202674	20	99202698

Accessories for hydraulic connection

Pump connection kits and inlay kits

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

A pump connection kit includes:

- 1 set of inlays
- 1 union nut.

TM068425

Pump connection kit

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

An inlay kit contains two sets of inlays.

TM068430

Inlay kit

Technical data

Application	Connection type	For hose/pipe size		Connector type key code	Material	Product number	
		Internal	External			Connection kit	Inlay kit
Hose connection	Nipple and clamp	19/20 mm	-	U3	PP	99082037	-
Pipe connection	Gluing or welding inlay	-	25 mm		PVC	99082038	-
					PVDF	99082039	-
Hose connection	Cone and ring	13 mm	20 mm	A6	PVC	91835696	99170747
Hose connection	Nipple and clamp	19/20 mm or 3/4"	-	Q	PP	99169576	99169735
					PVC	99169603	99169740
					PVDF	99169728	99169738
Pipe connection	Welding inlay	-	25 mm	B4	PP	91835697	99171119
					PVDF	91835698	99171146
Pipe connection	Gluing inlay	-	25 mm	B0	PVC	96701989	99171177
			3/4" pipe (US) or 26.6 mm (BS)	C7	PVC	99170858	99171222
Pipe connection	External thread	3/4 NPT		A7	PVC	99082040	99171707
					PP	99082041	99171776
					PVDF	99082042	99171793

Application	Connection type	For hose/pipe size		Connector type key code	Material	Product number	
		Internal	External			Connection kit	Inlay kit
Pipe connection	Internal thread	Rp 3/4		A1	PP	99082043	99182104
					PVDF	99082044	99182109
					SS [29]	99082045	99182114
					Alloy C-4 [30]	99082046	99182136
		3/4 NPT		A3	PP	99082047	99174974
					PVDF	99082048	99175004
					SS [29]	99082049	99175015
					Alloy C-4 [30]	99082050	99175031
Pipe connection	Cutting-ring type	19 mm	22 mm	C3	SS [29]	96727555	-

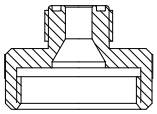
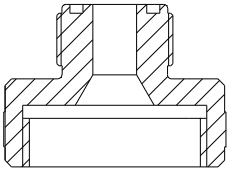
[29] Union nut: SS 1.4401, inlay: SS 1.4571

[30] 2.4610 (Alloy C-4)

Threaded adapters G 5/4

With threaded adapters, different sizes of threaded connections can be connected. A threaded adapter includes a gasket.

Technical data

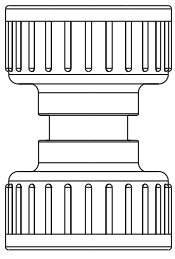
Type	Threaded connection size		Material		Product number
	Internal thread	External thread	Body	Gaskets	
	G 5/4	G 5/8	PP	FKM / EPDM	95730432
			PVC	FKM / EPDM	95730433
				PTFE	95730434
			PVDF	FKM / EPDM	95730435
				PTFE	95730436
	G 5/4	G 3/4	PP	FKM / EPDM	99227512
			PVC	FKM / EPDM	99227511
				PTFE	99228197
			PVDF	FKM / EPDM	99227829
				PTFE	99227533

Union nut adapters

With a union nut adapter, a pressure-loading valve PLV or a pressure-relief valve PRV can be mounted directly on the pump outlet valve.

Union nut adapters consist of a rigid pipe with union nuts on both ends.

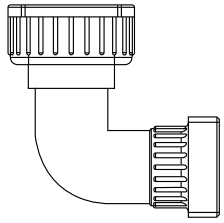
Technical data

Type	Threaded connection size		Body material	Product number
	Internal thread	Internal thread		
	G 5/4	G 5/4	PP	99228667
			PVC	99228665
			PVDF	99228669

Elbow adapter

An elbow adapter can be installed if the space on the suction side of the pump is confined.

Technical data

Type	Threaded connection size		Body material	Product number
	Internal thread	External thread		
	G 5/4	G 5/4	PVC	99168768

Preassembled accessories set for SMART Digital XL

The preassembled accessories set includes a pressure-loading valve, a pressure-relief valve and a pulsation damper, as well as mounting material for a SMART Digital XL DDA or DDE pump.

The mounting material includes a bracket with screws and washers. The bracket can be mounted to a wall or directly on a Grundfos dosing tank. Suitable tank sizes are 200 l, 300 l, 500 l and 1000 l.

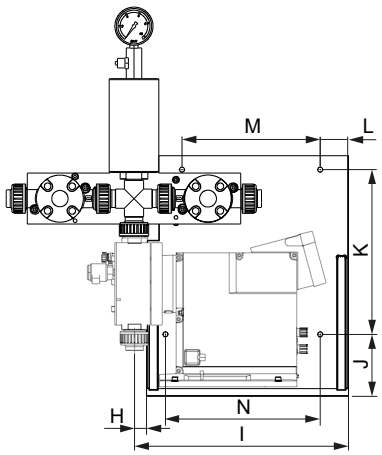
The main components of the outlet-side assembly are the following:

- pressure-loading valve PLV, preset to approximately 3 bar loading pressure (adjustable to up to 10 bar)
- pressure-relief valve PRV, preset to approximately 6 bar relief pressure (adjustable to up to 10 bar)
- pulsation damper DBG with a volume of 0.36 l, with pressure gauge, preloaded to 2.7 bar (preloadable to up to 8 bar)
- optionally without pulsation damper, in which case the following must be observed:
  - For installation with rigid pipes, the pump must be limited to 50 % of its maximum dosing capacity.
  - For installation with hoses, the pump must be limited to 75 % of its maximum dosing capacity.

Technical data

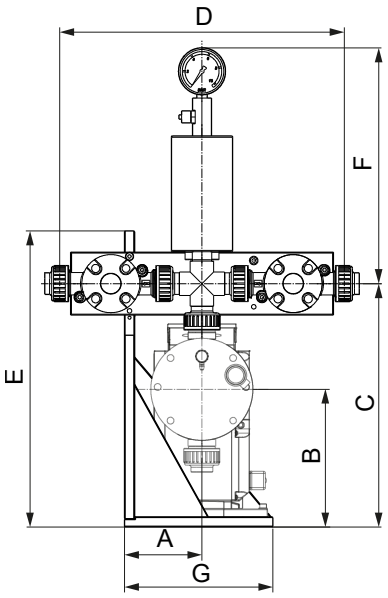
Variant	Material		Product number
	Body	Gaskets	
With pulsation damper	PVC	FKM	99211372
		EPDM	99211483
Without pulsation damper	PVC	FKM	99211484
		EPDM	99211485

Dimensions



Preassembled accessories set in side view

TM068419



TM068420

Preassembled accessories set in back view

A [mm]	B [mm]	C [mm]			D [mm]	E [mm]
		DDA / DDE 60-10	DDA / DDE 120-7	DDA / DDE 200-4		
117	203	332.5	348	358	410	435

F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L [mm]	M [mm]	N [mm]
346.5	218	20	385	112	298	51	234	280

9. General accessories

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.

Characteristics of the tank:

- Tank material: MDPE
- weight: 15 kg
- wall thickness: 4 mm
- liquid temperature: -20 °C to +45 °C.

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

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

When using a rigid suction lance in the tank, choose the counter nut for fixing, see section Adapters for containers.

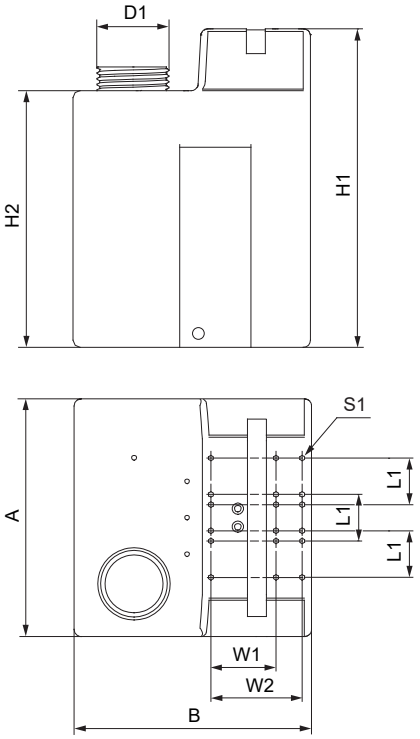
TM048307

Square tank

Related information

Tank accessories
Filling devices for pulsation dampers DB and DBG
Pressure gauges for discharge-side pulsation dampers with separating diaphragm

Dimensions



Square tank, dimensions

H1 [mm]	H2 [mm]	D1 [mm]	A [mm]	B [mm]	L1 [mm]	W1 [mm]	W2 [mm]	S1
670	540	⌀152	500	500	98	137	192	M 5

Order data

Tank volume [l]	Product number
100	96489271

Cylindrical tanks

Dosing tanks are intended for storing and dosing liquids. Different tank accessories can be mounted directly to the tank.
Cylindrical tanks are available in transparent or black. They have a litre scale and a black screw cap.
Characteristics of the tank:

- Tank volume: 40-1000 l
- 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 or EPDM).
The cylindrical tanks with volumes of 60, 100, 200, 300 and 500 litres additionally include the following:

- threaded M 6 inserts for the direct assembly of a dosing pump
- G 2 opening for a rigid suction lance or a foot valve, closed with a screw plug
- threaded M 6 inserts at the bottom part for floor mounting with a set of floor-mounting brackets
- flange for an electric stirrer with threaded inserts.

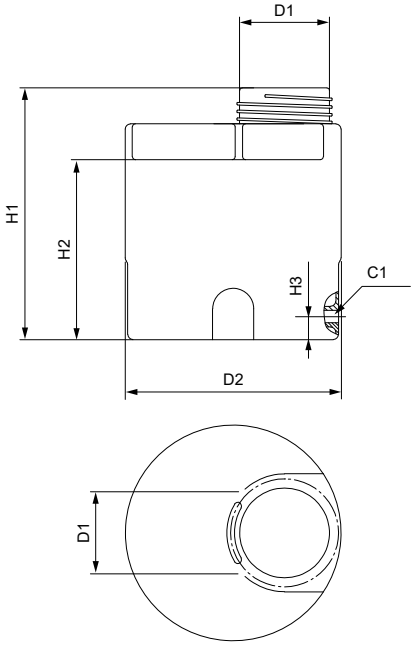
The cylindrical tanks with volumes of 60, 100, 200, 300, 500 and 1000 litres can optionally be prepared for direct assembly of an electric stirrer:

- with opening for electric stirrer (60-500 l)
- with opening and reinforced beam for holding an electric stirrer (1000 l).

TM048468

Cylindrical tank, 60 litres

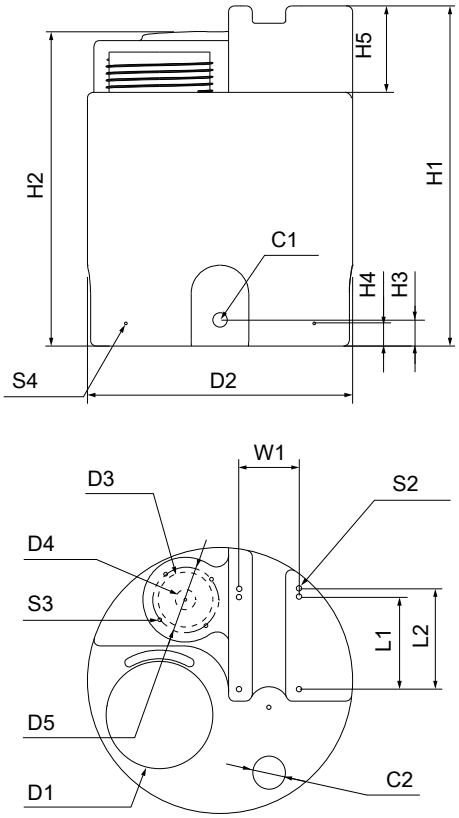
Dimensions of cylindrical tank, 40 litres



TM069773

H1 [mm]	H2 [mm]	H3 [mm]	D1 [mm]	D2 [mm]	C1
420	350	45	∅160	∅420	Rp 3/4

Dimensions of cylindrical tank, 60 and 100 litres

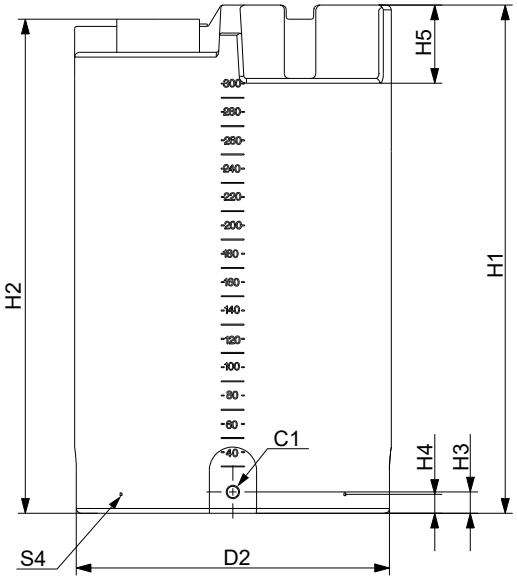


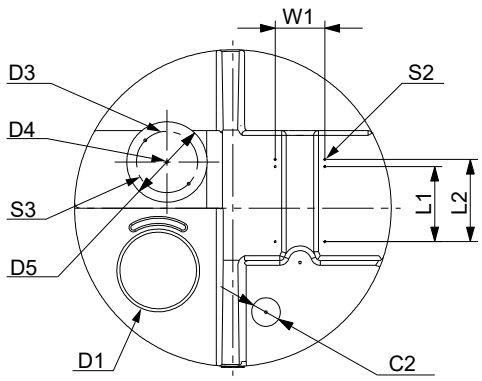
Tank volume: 60 l		Tank volume: 100 l	
H1 [mm]	**H2 [mm]**	**H1 [mm]**	**H2 [mm]**
590	545	840	795

H3 [mm]	H4 [mm]	H5 [mm]	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	D5 [mm]
50	40	150	∅160	∅460	∅95	∅35	∅130

C1	C2	L1 [mm]	L2 [mm]	W1 [mm]	S2	S3	S4
G 3/4	G 2	159	174	105	M 6 × 9	M 8 × 12	M 6 × 9

Dimensions of cylindrical tank, 200 and 300 litres





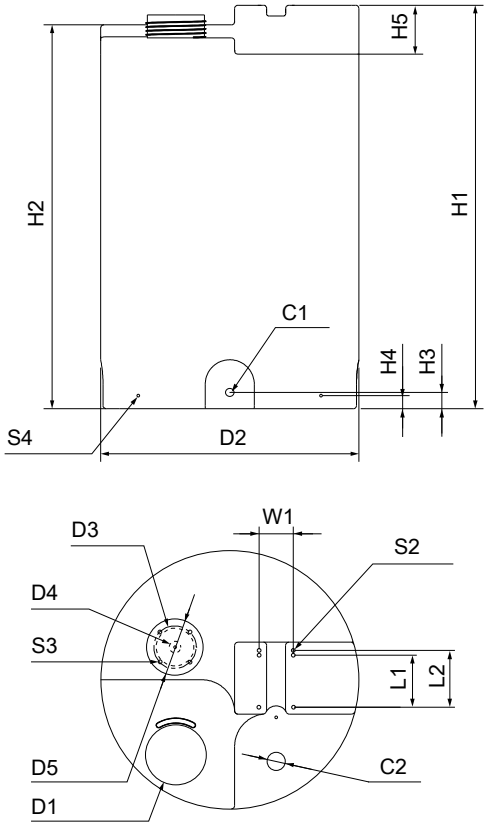
TM086236

Tank volume: 200 l		Tank volume: 300 l	
H1 [mm]	**H2 [mm]**	**H1 [mm]**	**H2 [mm]**
810	770	1080	1040

H3 [mm]	H4 [mm]	H5 [mm]	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	D5 [mm]
50	40	150	∅160	∅670	∅115	∅35	∅130

C1 [mm]	C2	L1 [mm]	L2 [mm]	W1 [mm]	S2	S3	S4
G 3/4	G 2	159	174	105	M 6 × 9	M 8 × 12	M 6 × 9

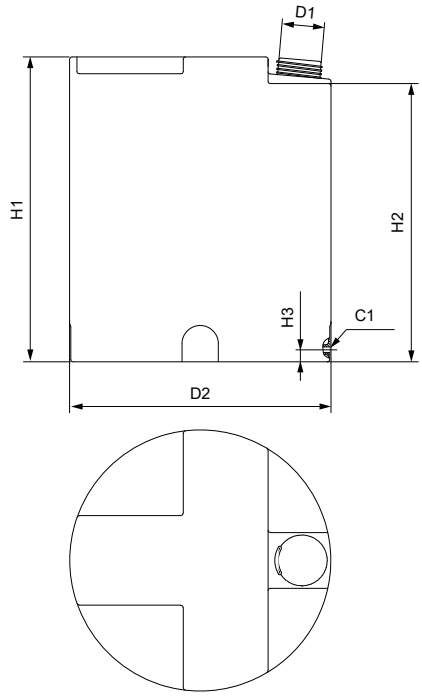
Dimensions of cylindrical tank, 500 litres



H1 [mm]	H2 [mm]	H3 [mm]	H4 [mm]	H5 [mm]	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	D5 [mm]
1235	1175	50	40	150	∅160	∅790	∅115	∅35	∅130

C1	C2	L1 [mm]	L2 [mm]	W1 [mm]	S2	S3	S4
G 3/4	G 2	159	174	105	M 6 × 9	M 8 × 12	M 6 × 9

Dimensions of cylindrical tank, 1000 litres



TM069777

H1 [mm]	H2 [mm]	H3 [mm]	D1 [mm]	D2 [mm]	C1
1260	1150	50	∅160	∅1080	G 3/4

Technical data

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

Related information

Tank accessories

Pump mounting accessories

Tank accessories

Floor-mounting brackets

The floor-mounting brackets can be mounted to the floor and fixed with screws into the threaded M 6 inserts at the bottom part of a cylindrical tank.

TM087079

Set of floor-mounting brackets

Description	Product number
Set of 4 floor-mounting brackets with fixing screws	98149921

Collecting tray

A collecting tray collects chemicals that might leak out of the cylindrical tank, and protects the environment. Collecting trays are available in several sizes, and have the following characteristics:

- material: PE
- colour: transparent.

TM048316

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

Dissolving hopper

A dissolving hopper serves as a funnel where granulated materials, such as powders, can be dissolved and then added to the dosing tank.

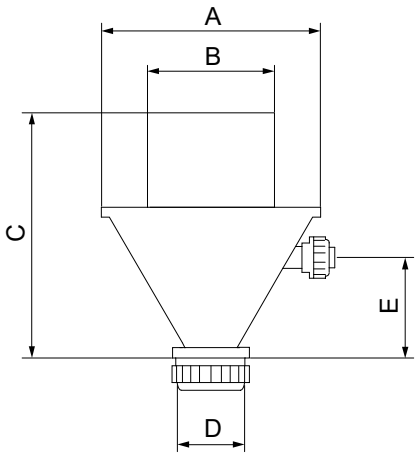
Characteristics:

- Material: PVC
- dosing tank connection: DN 40 through-bolt
- water connection: G 5/4
- with union nut and inlay for PVC pipe (cementing diameter 25 mm).

Order data

Description	Product number
Dissolving hopper	96726979

Dimensions of dissolving hopper



TM069778

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
∅270	∅140	283	∅70	120

Handheld mixer

A handheld mixer is used for mixing in dosing tanks.

Characteristics:

- Material: PE
- shaft length 1200 mm, length can be adapted to the corresponding dosing tank
- DN 15 through-bolt for connection in the dosing tank.

TM048477

Description	Product number
Handheld mixer	98133793

Drain valve

A drain valve is for installation in the threaded sleeve of the dosing tank.

Characteristics:

- Material: PVC
- dosing tank connection: G 3/4.

TM087077

Drain valve

Description	Product number
Drain valve	96689132

Ventilation valve

A spring-loaded ventilation valve can be installed either for aeration or de-aeration of the dosing tank.

Opening pressure: 0.05 bar.

TM087078

Ventilation valve

Description	Material			Product number
	Body	Gasket	Ball	
Ventilation valve	PVC	FKM	Glass	96694401

Electric stirrers

Electric stirrers are intended for mixing and dissolving non-abrasive, non-inflammable and non-explosive liquids. They ensure that the liquid in the dosing tank is mixed constantly. With a frequency of 50 Hz, they run at approximately 1500 rpm. Various types are available for tanks from 60 litres up to 1000 litres. Electric stirrers are suitable for liquids with low to medium viscosity.

The following types of electric stirrers are available:

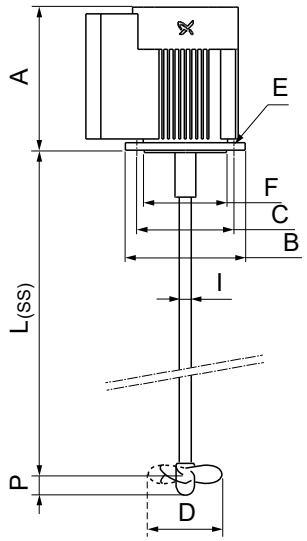
- stainless steel version (SS)
- PP-coated stainless steel version (PP)
- PP-coated stainless steel version with sealing flange (PP-S).

Technical data

Type			Product number	
Tank volume [l]	Nominal shaft length [mm]	Material	Single-phase motor	Three-phase motor
60	450	SS	98164569	98165309
		PP	98164573	98165310
		PP-S	98164575	98165318
100	690	SS	98164606	98165355
		PP	98164607	98165357
		PP-S	98164609	98165382
200	700	SS	98164987	98165385
		PP	98164990	98165386
		PP-S	98165152	98165391

Type			Product number	
Tank volume [l]	Nominal shaft length [mm]	Material	Single-phase motor	Three-phase motor
300	950	SS	98165172	98165393
		PP	98165175	98165432
		PP-S	98165177	98165433
500	1100	SS	98165253	98165435
		PP	98165258	98165436
		PP-S	98165259	98165437
1000	1150	SS	98165287	98165439
		PP	98165290	98165440
		PP-S	98165304	98165451

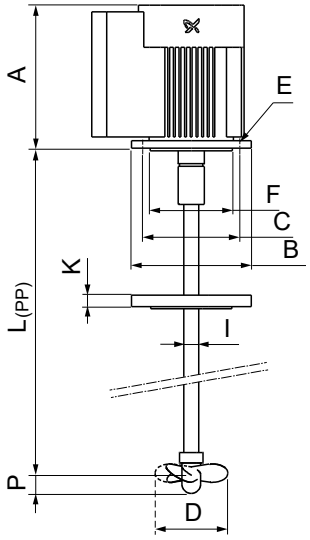
Dimensions



TM069780

Electric stirrer, stainless steel version

Tank volume [l]	$L_{(SS)}$ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	P [mm]	I [mm]
60	450	210	140	115	88	9	95	25	16
100	691	210	140	115	88	9	95	25	16
200	698	191	160	130	100	9	110	25	16
300	950	191	160	130	100	9	110	25	16
500	1100	191	160	130	125	9	110	28	16
1000	1150	231	200	165	125	11	130	28	16



TM069781

Electric stirrer, PP version with sealing flange

Tank volume [l]	$L_{(PP)}$ [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	P [mm]	I [mm]	K [mm]
60	452	210	140	115	88	9	95	25	20	15
100	693	210	140	115	88	9	95	25	20	15
200	700	191	160	130	100	9	110	25	20	15
300	952	191	160	130	100	9	110	25	20	15
500	1102	191	160	130	125	9	110	28	20	15
1000	1152	231	200	165	125	11	130	28	20	15

Motor data of electric stirrers

Tank volume [l]	Power rating [kW]	Motor phases	Voltage [V]	Frequency [Hz]	Enclosure class	Insulation class
60, 100	0.09	1	220-240	50/60	IP65	F
		3	220-240 / 380-420 (440-480)	50/60 (60)		
200, 300, 500	0.25	1	220-230	50	IP55	
		3	220-240 / 380-415	50/60		
1000	0.55	1	220-230	50		
		3	220-240 / 380-415	50/60		

Level-control unit for electric stirrer protection

Grundfos level-control units are suitable for dosing pumps with input for level control. The contact type of the reed switch unit is factory-set to NO. The contact type can be set to NC by turning the floater(s).

Characteristics:

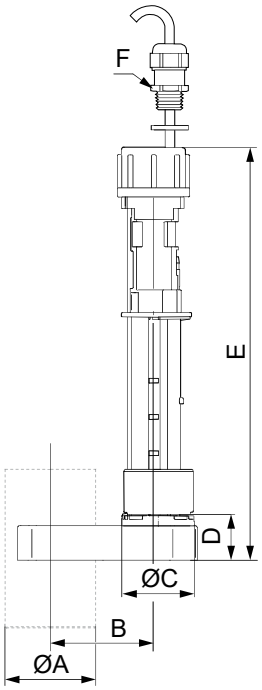
- Max. voltage: 48 V
- Max. current: 0.5 A.
- Max. load: 10 VA.

Level-control units for electric stirrer protection are used with rigid suction lances RSL. They are clipped to the rigid suction lances at the required switch-off height above the stirrer propeller. Level-control units can also be used for overfill protection or as an additional tank level indication.

The delivery includes:

- reed switch unit with 1 floater
- 5 m cable with PE jacket and open wire ends
- clip for diameter 32 mm or 40 mm
- cable gland for mounting at the tank top.

Dimensions



Level-control unit for electric stirrer protection

ØA [mm]	B [mm]	ØC [mm]	D [mm]	E [mm]	F
40	47.5	32	20	182	M 12 × 1.5
32	43	32	28	190	M 12 × 1.5

Technical data

Description	Material	For RSL with connection size	ØA [mm]	Product number
Level-control unit for electric stirrer protection	PE	G 5/8	32	98306210
		G 5/4, G 2	40	99174140

Flexible level-control unit

Grundfos level-control units are suitable for dosing pumps with input for level control. The contact type of the reed switch unit is factory-set to NO. The contact type can be set to NC by turning the floater(s).

Characteristics:

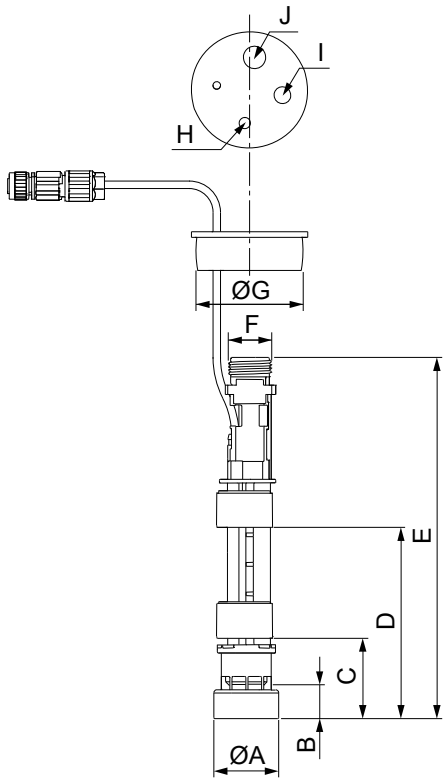
- Max. voltage: 48 V
- Max. current: 0.5 A
- Max. load: 10 VA.

The flexible level-control unit is suitable for dosing pumps with level-control input and provides 2 level switches.

The delivery includes:

- reed switch unit with 2 floaters
- 5 m of cable with PE jacket and M 12 plug
- weight that keeps the level-control unit in an upright position at the tank bottom
- PE cap, ⌀58 mm, for assembly in Grundfos cylindrical tanks, or for use with tank adapters.

Dimensions



Flexible level control unit

ØA [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	ØG [mm]	H [mm]	I [mm]	J [mm]
35	19	43.5	103.5	196	G 5/8	58	6	9	12

Technical data

Description	Material	Product number
Flexible level-control unit PE	PE	98375695

Pump mounting accessories

Wall brackets

Wall brackets with installation material are for mounting a pump on a wall.

Description	Pump type	Material	Product number
Wall brackets with installation material	DMX 226, DMH 251 / 252 / 253, DME 60-10 / 150-4, SMART Digital XL DDA / DDE	PE	99211245

Accessories for pulsation dampers and calibration columns

Filling devices for pulsation dampers DB and DBG

Filling devices make the adjustment of the preload pressure of pulsation dampers easy. A filling device can be connected to the filling valve of a pulsation damper and to a local compressed-air source or a nitrogen bottle. When the pressure is adjusted, the filling device can be removed.

Order data for filling devices for pulsation dampers DB and DBG

Filling devices are available with different pressure gauges.

A set includes a filling device with pressure gauge and a hose with connections for a nitrogen bottle.

Hose connections:

- Nitrogen bottle: W24.3 × 1 1/4"
- filling device: G 1/4.

TM070019

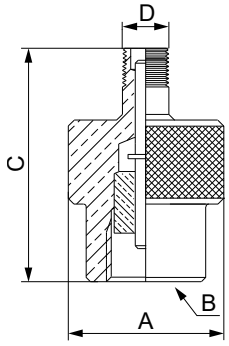
Filling device

Description	Height[mm]	Max. operating pressure [bar]	Product number
Filling device with hose	136	25	96727342
		60	96727343
		160	96727344
		250	96727345

Tyre-valve adapter for pulsation dampers DB and DBG

A tyre-valve adapter allows for using of a common air pump with tyre valve connector for filling pulsation dampers DB and DBG with air.

Dimensions



TM069619

Tyre-valve adapter

A [mm]	B	C [mm]	D [mm]
25	G 1/4	38	Vg 8

Technical data

Description	Max. operating pressure [bar]	Product number
Tyre-valve adapter, for use in conjunction with compressed-air filling device or pressure gauge	8	96727332

Pressure gauges for discharge-side pulsation dampers with separating diaphragm

The following pressure gauges suit all sizes of discharge-side pulsation dampers with separating diaphragm. Select your suitable variant according to the maximum pressure of the pulsation damper.

Description	Max. pressure [bar]	Product number
Pressure gauge for discharge-side pulsation damper with separating diaphragm	10	95730263
	25	95730264
	60	98031543
	160	98031544
	250	98031545

Manual vacuum pump kit for pulsation damper CSD

In installations without flooded suction, the pulsation damper CSD can be filled by the manual vacuum pump kit. This makes startup of the dosing pump easier and prepares the pulsation damper CSD for calibration of the pump.

The delivery includes:

- ball valve, connection G 5/8
- T-piece, connection G 5/8
- hose
- manual vacuum pump
- holder for wall mounting.

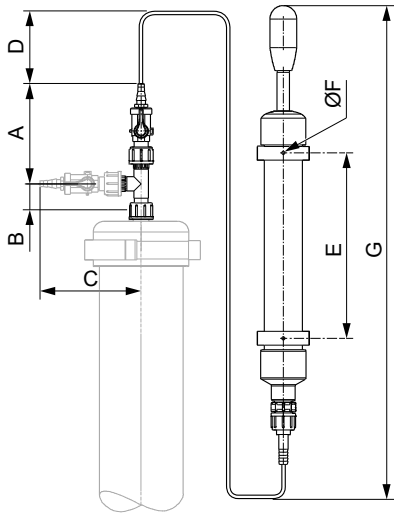
Materials:

- vacuum pump: PVC
- ball valve and T-piece: PVC
- Gasket: FKM.

TM068426

Manual vacuum pump kit

Dimensions



TM069603

Manual vacuum pump kit

A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	ØF [mm]	G [mm]
131	34	132.5	50	242	6.2	675-875

Order data

Description	Product number
Manual vacuum pump kit	99218131

Manual vacuum pump kit for calibration columns

In installations without flooded suction, the calibration column can be filled by the manual vacuum pump kit. This makes startup of the dosing pump easier and prepares the calibration column for pump calibration.

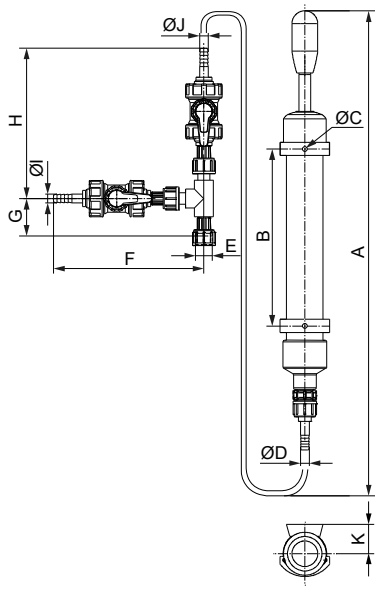
The delivery includes:

- ball valve, connection G 5/8
- T-piece, connection G 5/8
- hose
- manual vacuum pump
- holder for wall mounting.

Material:

- manual vacuum pump: PVC
- ball valve and T-piece: PVDF
- Gasket: FKM.

Dimensions



TM068412

Manual vacuum pump kit for calibration columns

A [mm]	B [mm]	ØC [mm]	ØD [mm]	E	F [mm]	G [mm]	H [mm]	ØI/ØJ [mm]	K [mm]
700-875	242	6.1	12	G 5/8	206	51	206	12	40

Order data

Description	Product number
Manual vacuum pump kit for calibration columns	99226934

Cables and plugs for dosing pumps

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

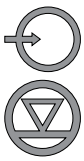
TM048267

Cable and plugs

Cables and plugs for pump connection size G 5/4

Characteristics:

- Cable material: PVC, 0.34 mm^2
- plug size: M 12.

Socket (DDA, DDE)	Socket (DMX, DMH, DDI)		Application		Pins	Plug type	Cable length [m]	Product number
	4		Input	Analog, Pulse, External stop	4	Straight	2	96609014
							5	96609016
							No cable	96698715
						Angled	2	96693246
	3		Output	Relay	4	Straight	2	96609017
							5	96609019
							No cable	96696198
						Angled	2	96698716
	2		Output	Analog	5	Straight	2	96632921
							5	96632922
							No cable	96609031
						Angled	2	96699697
	5	DDI	Input	Low level, Empty tank	4	Straight	No cable	96698715
-	5	DMX / DMH AR	Input	Low level, Empty tank	3	Straight, with soldered cable	No cable	96630345
			Adapter, flat-round	Low level, Empty tank	4		No cable	96635010
-	6	DDI	Profibus	Y-connector			No cable	96693735
				Terminating resistor			No cable	96693737
			Input, Output	GENIbus	5	Straight	3	98589048
	4/5		Extension cable	Analog, Pulse, External stop, Low level, Empty tank	4	Straight	2	96483235
-			Mains connection for DDI, DDA, DDE	110-240 VAC	3	Angled	No cable	96698717

Water meters

The in-line water meter with potential-free pulse signal is suitable for use in flow-proportional dosing applications. If the water meter is connected directly to the pump pulse input, use a control plug (product number 96698715).

Types of water meters:

- Qn 1.5 and Qn 2.5 water 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 water meters and up are of the helical vane type, for cold water up to 30 °C or 50 °C, or hot water up to 90 °C or 120 °C.
- Qn 1.5 to Qn 15 water meters have the following characteristics:
  - threaded connections
  - cable length: 3 m
  - maximum pressure: 16 bar
  - maximum load, reed contact: 30 VAC/VDC, 0.2 A.
- Qn 40 to Qn 150 water meters have the following characteristics:
  - flange connections
  - cable length: 3 m
  - maximum pressure: 10 bar
  - maximum load, NAMUR contact: 8-12 VDC, 1 kOhm (requires external power supply).

TM048317

Water meter

Technical data

Qn [m^3/h]	Pulse rate [l/pulse]	Product number			
		Max. liquid temperature [°C]			
		30	50	90	120
1.5	1	96446846	-	96446897	-
1.5	0.25	96482640	-	96482643	-
2.5	2.5	96446847	-	96446898	-
2.5	0.25	96482641	-	96482644	-
15	2.5	96482642	-	96482645	-
15	10	-	96446848	-	96446899
40	100	-	96446849	-	96446900
60	25	-	96446850	-	96446901
150	100	-	96446851	-	96446902

Capacity

Qn [m^3/h]	Pulse rate [l/ pulse]	Maximum short-period capacity [m^3/h]	Transitional capacity with error ± 2 % [l/h]	Minimum capacity with error ± 5 % [l/h]
1.5	1	3	120	50
1.5	0.25	3	120	50
2.5	2.5	5	200	70
2.5	0.25	5	200	70
15	2.5	30	3000	450
15	10	30	3000	450
40	100	80	4000	700
60	25	120	6000	1200
150	100	300	12000	3000

Dimensions of water meters with threaded connections, Qn 1.5 to Qn 15

Qn [m^3/h]	Connections		Port to port length [mm]	
	Water meter	Installation kit	Excluding kit	Including kit
1.5	G 3/4	G 1/2	165	245
2.5	G 1	G 3/4	190	288
15	G 2.5	G 2	300	438

Dimensions of water meters with flanged connections, Qn 40 to Qn 150

Qn [m^3/h]	Connections	Port to port length [mm]
40	DN 80	225
60	DN 100	250
150	DN 150	300

10. 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, such as purity, temperature, abrasive particles, may affect the chemical resistance of a given material.

Some of the liquids in this table may be toxic, corrosive or hazardous. Be careful when handling these liquids.

● = Resistant

❍ = Limitedly resistant

- = Not resistant

Pumped liquid (20 °C)			Material								
			Dosing head				Gasket			Ball	
Description	Chemical formula	Concentration %	PP	PVDF	SS 1.4435	PVC	FKM	EPDM	PTFE	Ceramic	PE (Accessories)
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 [31]	$Ca(OH)_2$		●	●	●	●	●	●	●	●	●
Calcium hypochlorite	$Ca(OCl)_2$	20	❍	●	-	●	●	●	●	●	●
Chlorine dioxide	ClO_2	3	-	●	-	●	●	-	●	●	-
Chromic acid	H_2CrO_4	10	●	●	●	●	●	●	●	●	●
		30	-	●	-	●	●	❍	●	●	●
		50	-	●	-	●	●	-	●	●	●
Copper sulphate	$CuSO_4$	30	●	●	●	●	●	●	●	●	●
Ferric chloride [32]	$FeCl_3$	60	●	●	-	●	●	●	●	●	●
Ferric sulphate [32]	$Fe_2(SO_4)_3$	60	●	●	❍	●	●	●	●	●	●
Ferrous chloride	$FeCl_2$	40	●	●	-	●	●	●	●	●	●
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 (commercial)	NaClO	12-15	-	●	-	●	●	●	●	●	●
Sodium hypochlorite (produced by electrolysis system)	NaClO	0,8	-	●	-	-	●	●	●	●	❍
Sodium sulphide	Na_2S	30	●	●	●	●	●	●	●	●	●
Sodium sulphite	Na_2SO_3	20	●	●	●	●	●	●	●	●	●
Sodium thiosulfate	$Na_2S_2O_3$	10	●	●	●	●	●	●	●	●	●

Pumped liquid (20 °C)			Material								
			Dosing head				Gasket			Ball	
Description	Chemical formula	Concentration %	PP	PVDF	SS 1.4435	PVC	FKM	EPDM	PTFE	Ceramic	PE (Accessories)
Sulphurous acid	H_2SO_3	6	●	●	●	●	●	●	●	●	●
Sulphuric acid [33]	H_2SO_4	< 80	●	●	-	●	●	❍	●	●	●
		80-96	❍	●	-	●	●	-	●	●	-
		98	-	●	●	-	❍	-	●	●	-

31) Once the pump stops, calcium hydroxide sediments rapidly.

32) There is risk of crystallisation.

33) It reacts violently with water and generates much heat. (The pump should be absolutely dry before dosing Sulphuric acid.)

Further information:

https://product-selection.grundfos.com/pumped-liquid-guide

11. Grundfos Product Center

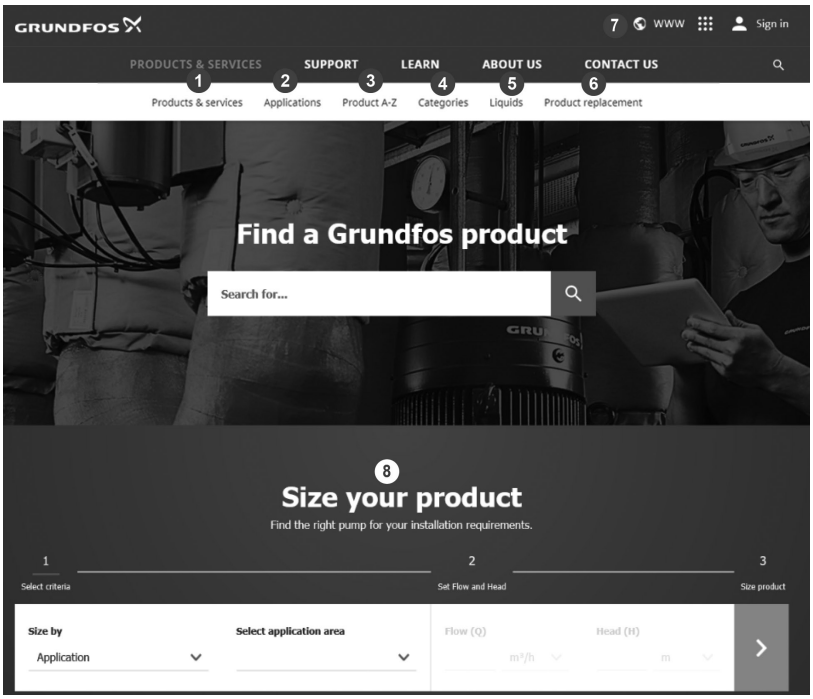
Online search and sizing tool to help you make the right choice.
From the international view, you can select your specific country to view the product range available to you.
International view: *https://product-selection.grundfos.com*

All the information you need in one place

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

Downloads

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



When you select your country, you will see the menus below. Note that some menus may not be available depending on the country.
Example: *https://product-selection.grundfos.com/uk*

Pos.	Description
1	**Products & services** enables you to find products and documents by typing a product number or name into the search field.
2	**Applications** enables you to choose an application to see how Grundfos can help you design and optimise your system.
3	**Products A-Z** enables you to look through a list of all the Grundfos products.
4	**Categories** enables you to look for a product category.
5	**Liquids** enables you to find pumps designed for aggressive, flammable or other special liquids.
6	**Product replacement** enables you to find a suitable replacement.
7	**WWW** enables you to select the country, which changes the language, the available product range and the structure of the website.
8	**Sizing** enables you to size a product based on your application and operating conditions.

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GRUNDFOS Holding A/S
Poul Due Jensens Vej 7
DK-8850 Bjerringbro
Tel: +45 87 50 14 00
www.grundfos.com