

# DDI

DIGITAL DOSING™



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## DDI 209

DIGITAL DOSING

up to 20 l/h



GrA3479

Fig. 1 DDI 209

### The difference is digital

The Grundfos Alldos DDI range was created because accurate dosing demands precision. But it need not be hard work. These compact units combine perfect precision with a user interface that lets you set the dosing rate you want directly on the unit – without spending time on complicated calculations beforehand. Available materials include PVC, PVDF, polypropylene and stainless steel 1.4401.

### The DDI AR: Taking diaphragm dosing pumps to the next level

The DDI AR series is the backbone of the overall DDI range. Its innovative drive technology combines a powerful stepper motor with integrated contact signal control to bring you smoother, more accurate dosing. The user interface gives you a full range of options for customising the dosing process.

### Does the hard work for you

The DDI range eliminates the need for extensive calculation work associated with other dosing equipment. You will not need to work out how many strokes per minute are necessary to give you the desired dosing rate – simply enter the figure you want in the user interface, and the DDI does the work for you.

### Smooth dosing through variable speed

The Grundfos Alldos DDI never rushes things. It has an ingenious stepper motor that extends the discharge phase throughout the full period between suction phases. In other words, it automatically adjusts the dosing speed to provide the right amount of additive at all times. No jerky movements here – just smooth, even dosing.

### Full stroke length at all times

The Grundfos Alldos DDI uses a full stroke length every time, thereby eliminating potential disruptive factors such as gas build-up. Rather than adjusting the stroke length by shortening it to suit dosing demand, the Grundfos Alldos DDI carefully times each full stroke to ensure even concentrations of additive in your media.

### Turndown ratio 1:100

The DDI range is designed to give you superior flexibility and accuracy with as few product variants as possible. That is why you can adjust dosing rates within a 1:100 scale without any loss of dosing accuracy: the DDI series can dose additive in quantities down to 0.025 l/h with perfect precision – and evidence of this precision can be provided at any time while the pump is running.

### Flow monitor checks for malfunctions - optional

The unique flow monitor detects any dosing errors on both the suction and pressure sides and immediately emits an error message if anything is wrong. It can also check for excess pressure: Just enter the maximum counter pressure allowed (in bar) and leave everything to the DDI. If the pressure is exceeded, the pump stops.

### Fieldbus communication available

The DDI is also available with a PROFIBUS DP interface.

### Switch-mode power supply

DDI pumps can be used worldwide within the range of 100-240 VAC, 50/60 Hz.

### Reliable dosing of viscous media

When you wish to dose viscous media, many conventional dosing pumps struggle to maintain reliability. By contrast, the DDI series has a special "slow mode" function which decelerates the suction stroke. This maintains reliable dosing.

### Examples of applications

- industrial and municipal water treatment
- industrial cleaning
- polymer feed
- paper production/paper finishing
- optical technology and chip production
- chemical industry
- Cleaning-In-Place (CIP) and disinfection
- galvanic and surface treatment
- air conditioning/water treatment in cooling towers
- reverse-osmosis systems
- semi-conductor industry.

## DDI 222

DIGITAL DOSING

up to 150 l/h



GrA3486

Fig. 2 DDI 222

The DDI series is firmly established on the dosing pump market with its combination of innovative drive technology and integrated microelectronics. Users appreciate how they can simply enter the required dosing rate in litres per hour and let the DDI handle the rest.

### Flow monitor checks for malfunctions (optional)

The unique flow monitor detects any dosing errors on both the suction and pressure sides and immediately emits an error message if anything is wrong. It can also check for excess pressure: Just enter the maximum counter pressure allowed (in bar) and leave everything to the DDI. If the pressure is exceeded, the pump stops.

### Double diaphragm for optimum process reliability

Some processes must never be interrupted - not even in the event of a diaphragm rupture. The DDI is equipped with a double diaphragm system. If the diaphragm fails, the DDI will continue dosing thanks to the protective diaphragm.

### Diaphragm leak detection (optional)

If the pump is supplied with diaphragm leak detection, a differential pressure sensor will send an error signal as notification to replace the diaphragm.

### Turndown ratio of 1:800

The DDI 222 has a turndown ratio ten times better than that of conventional equipment. This allows us to create a complete pump series with just one motor, one gearing system, and two pump head sizes. You get the precision you want every time - and need only a minimum of spare parts and storage capacity.

### Compact design

DDI pumps are smaller and quieter than conventional pumps in their class, making them easy to install anywhere. Order your DDI with the control and display interface on the side or front as you wish.

### Full stroke length every time

The DDI series use a full stroke length every time - a feature unique to Grundfos Alldos dosing pumps. Each stroke is carefully timed to bring you even concentrations in the system and optimum priming throughout the entire operating range.

### Brushless DC motor

The drive solution used in the DDI series ensures very smooth, continuous dosing even as it keeps energy consumption at a record low.

### Anti-cavitation function

The "slow mode" settings systematically reduce the suction stroke so that difficult, viscous media are dosed with smooth precision. When set at 60% of the maximum dosing rate, the DDI can dose media with a viscosity of up to 1,000 [mPa s] at 40%, it will handle extremely viscous media up to 2600 [mPa s]. You no longer need external dilution or treatment systems, but can dose chemicals directly and with no waste.

### Fieldbus communication available

The DDI is also available with a PROFIBUS DP interface.

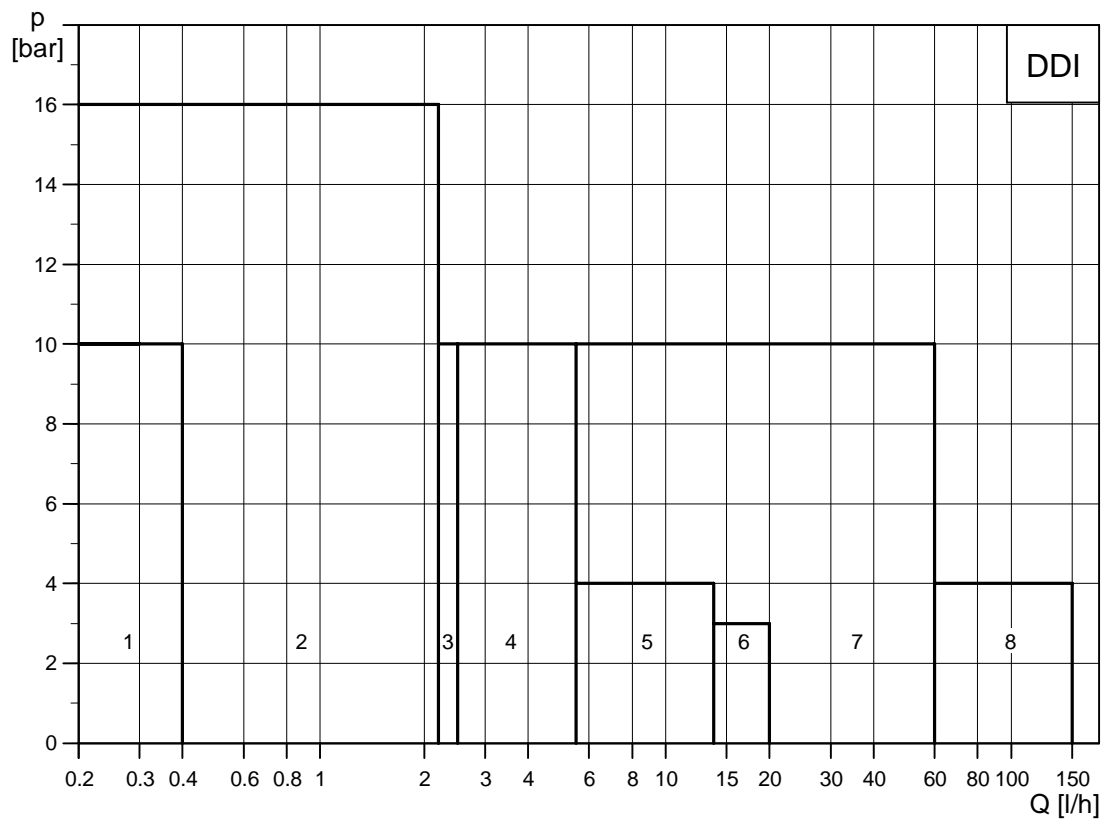
### Switch-mode power supply

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### Examples of applications

- industrial and municipal water treatment
- industrial cleaning
- polymer feed
- paper production/paper finishing
- optical technology and chip production
- chemical industry
- Cleaning-In-Place (CIP) and disinfection
- galvanic and surface treatment
- air conditioning/water treatment in cooling towers
- reverse-osmosis systems
- semi-conductor industry.

## DDI

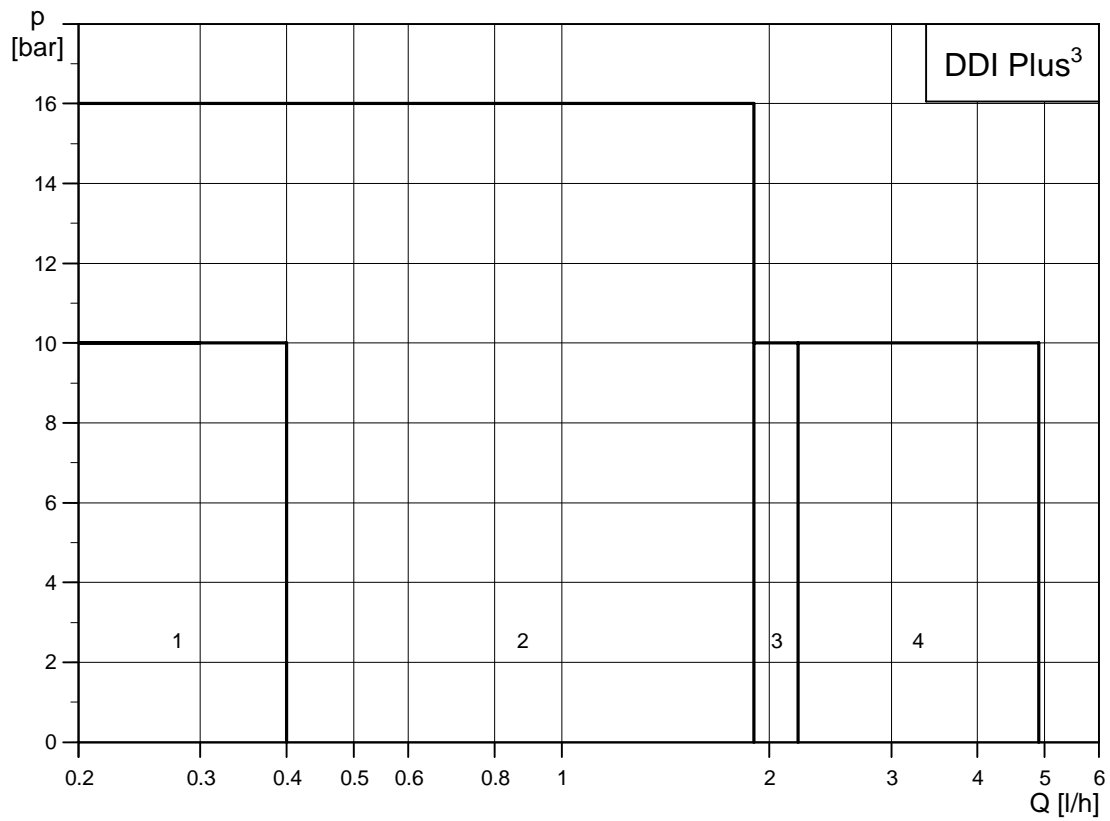


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**Fig. 3** Performance range, DDI

Pos.	Pump	Model
1	DDI 0.4-10	209
2	DDI 2.2-16	209
3	DDI 2.5-10	209
4	DDI 6.0-10	209
5	DDI 13.8-4	209
6	DDI 20-3	209
7	DDI 60-10	222
8	DDI 150-4	222

## DDI 209 with Plus<sup>3</sup>



TM103 8263 0907

**Fig. 4** Performance range, DDI 209 with Plus<sup>3</sup>

Pos.	Pump	Model
1	DDI 0.4-10	209 with Plus <sup>3</sup>
2	DDI 2.2-16	209 with Plus <sup>3</sup>
3	DDI 2.5-10	209 with Plus <sup>3</sup>
4	DDI 6.0-10	209 with Plus <sup>3</sup>

## Type key

Example:	DDI	2-	16	AR	PVC	/V	/G	-F	-3	1	3	B1	B
<b>Type range</b>													
DDI													
<b>Size</b>													
<b>Control variant</b>													
AR	Standard												
AF	AR with flow monitor												
AP	AR with PROFIBUS												
APF	AR with flow monitor and PROFIBUS												
<b>Dosing head variant</b>													
PP	Polypropylene												
PV	PVDF (polyvinylidene fluoride)												
PVC	Polyvinyl chloride												
SS	Stainless steel, DIN 1.4401												
PP-P3	PP + Plus <sup>3</sup>												
PVC-P3	PVC + Plus <sup>3</sup>												
PP-L	PP + Integrated diaphragm leak detection												
PV-L	PV + Integrated diaphragm leak detection												
PVC-L	PVC + Integrated diaphragm leak detection												
SS-L	SS + Integrated diaphragm leak detection												
<b>Gasket material</b>													
E	EPDM												
V	FKM												
T	PTFE												
<b>Valve ball material</b>													
C	Ceramic												
G	Glass												
T	PTFE												
SS	Stainless steel, DIN 1.4401												
<b>Control panel position</b>													
F	Front-mounted												
S	Side-mounted												
T	Top-mounted												
<b>Mains plug</b>													
F	EU (Schuko)												
B	USA, Canada												
I	Australia, New Zealand, Taiwan												
E	Switzerland												
X	Without plug												
<b>Connection, suction/discharge</b>													
B6	Pipe, 4/6 mm												
3	Tube, 4/6 mm												
A5	Tube, 5/8 mm												
4	Tube, 6/9 mm												
6	Tube, 9/12 mm												
Q	Tube, 19/27 mm												
C4	Tube, 1/8" / 1/4"												
R	Tube, 1/4" / 3/8"												
S	Tube, 3/8" / 1/2"												
A	Threaded, Rp 1/4												
A1	Threaded, Rp 3/4, female												
V	Threaded, 1/4" NPT												
A9	Threaded, 1/2" NPT, male												
A3	Threaded, 3/4" NPT, female												
A7	Threaded, 3/4" NPT, male												
B1	Tube, 6/12 mm/cementing diameter, 12 mm												
B2	Tube, 13/20 mm/cementing diameter, 25 mm												
B3	Welding diameter, 16 mm												
B4	Welding diameter, 25 mm												
<b>Valve type</b>													
1	Standard Spring-loaded												
2	0.05 bar suction opening pressure 0.05 bar discharge opening pressure												
3	Spring-loaded 0.05 bar suction opening pressure 0.8 bar discharge opening pressure												
4	Spring-loaded discharge 0.8 bar discharge opening pressure												
5	For abrasive media (SS only)												
6	Spring-loaded discharge (DN 20, balls in SS, DIN 1.4401) 0.8 bar discharge opening pressure												
<b>Supply voltage</b>													
3	1 x 100-240 V, 50/60 Hz												
I	24 VDC												

## Control variants

Features	Control variants			
	AR	AF	AP	APF
Flow monitor		•		•
PROFIBUS communication			•	•



Fig. 5 DDI 209



Fig. 6 DDI 222

## Options

Pump	Control variants			
	Standard	AR with flow monitor	AR with PROFIBUS	AR with flow monitor and PROFIBUS
	AR	AF	AP	APF
DDI 0.4-10	•	•	•	•
DDI 2.2-16	•	•	•	•
DDI 2.5-10	•	•	•	•
DDI 6.0-10	•	•	•	•
DDI 13.8-4	•	•	•	•
DDI 20-3	•	•	•	•
DDI 60-10	•	•	•	•
DDI 150-4	•	•	•	•

Pump	Pump heads			Additional options		
	AR + Plus <sup>3</sup>	AF + Plus <sup>3</sup>	Diaphragm leak detection	— Top control panel	Spring-loaded valves (HV)	24 V DC motor
DDI 0.4-10	•	•	•	•	•	•
DDI 2.2-16	•	•	•	•	•	•
DDI 2.5-10	•	•	•	•	•	•
DDI 6.0-10	•	•	•	•	•	•
DDI 13.8-4			•	•	•	•
DDI 20-3			•	•	•	•
DDI 60-10			•		•	
DDI 150-4			•		•	



## Capacity control

The stepper motor of the DDI 209 provides full control of the stroke speed.

The DDI 222 has an EC motor (brushless DC motor) and electronic power control. See page 24.

As shown in the figure below, the duration of each suction stroke is constant (while the duration of each discharge stroke varies according to the set capacity).

This has many advantages:

- The full stroke length reduces gas build-up in the dosing head.
- Even and constant dosing ensures an optimum mixing ratio at the injection point.
- Significant reduction of pressure surges prevents mechanical stress on diaphragm, tubes, connections and other dosing parts.
- The installation is less affected by long suction and discharge lines.
- Dosing of highly viscous and volatile media is easier.

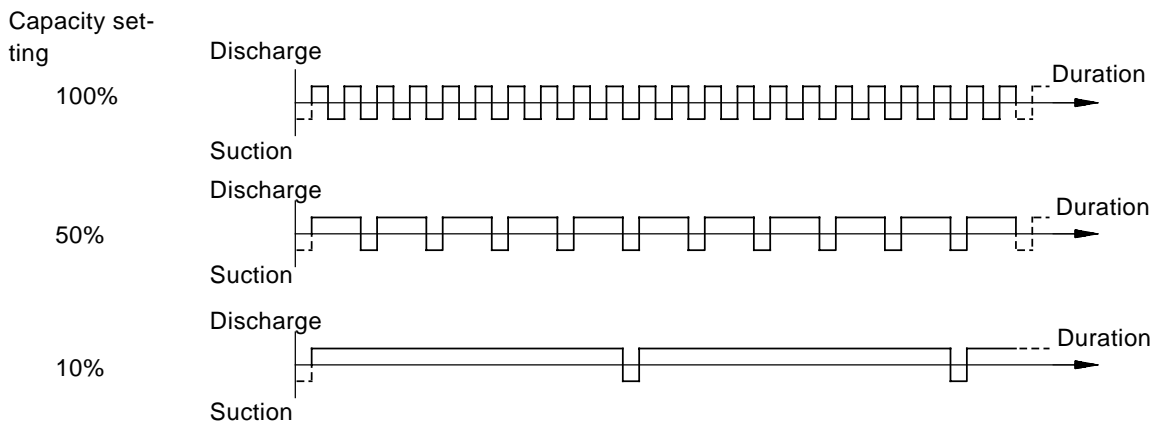


Fig. 7 Relation between discharge stroke speed and capacity

TM03 2074 3505

## Control panel

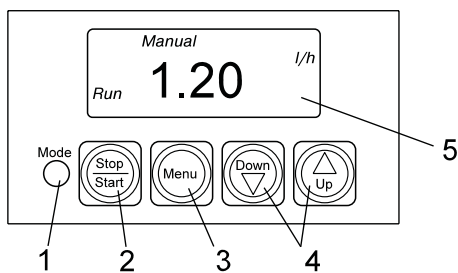


Fig. 8 DDI control panel

TM03 4455 2106

### Legend

Pos.	Component
1	<b>Mode</b> (light-emitting diode): <ul style="list-style-type: none"> <li>• Red light indicates that the pump has stopped.</li> <li>• Green light indicates that the pump has started; the light is briefly off during a suction stroke.</li> <li>• Yellow light indicates that the pump has been switched off remotely.</li> <li>• Red light is flashing in case of an error signal.</li> <li>• Light is off when the pump is in menu mode.</li> </ul>
2	<b>Start/stop</b> (button): <ul style="list-style-type: none"> <li>• Press the button to start and stop the pump.</li> </ul>
3	<b>Menu</b> (button): <ul style="list-style-type: none"> <li>• Press the button to switch between operating modes.</li> </ul>
4	<b>Down/Up</b> (button): <ul style="list-style-type: none"> <li>• Press the button to change the values in the display.</li> </ul>
5	LCD display

## Menu

### Menu, first level

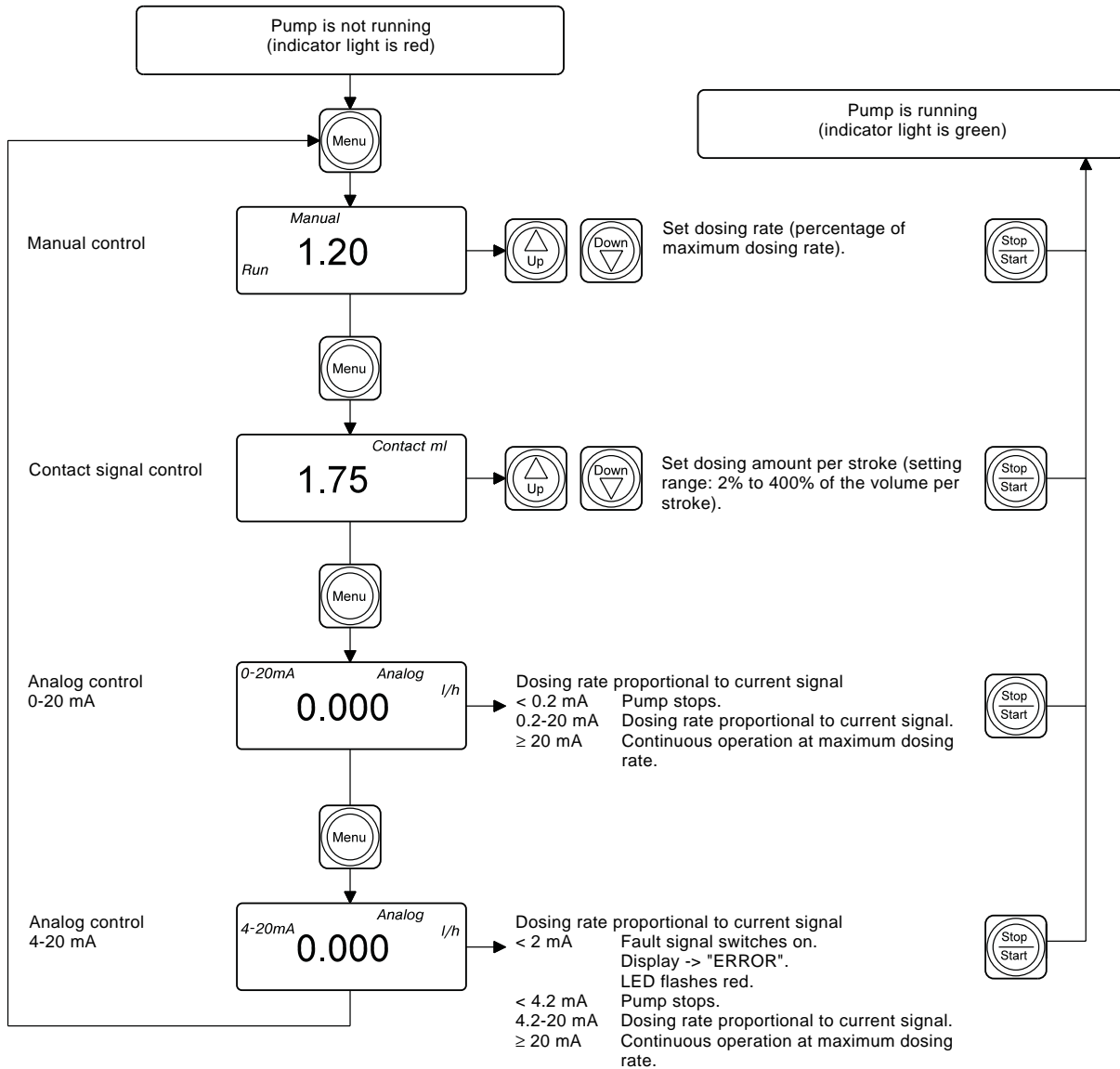
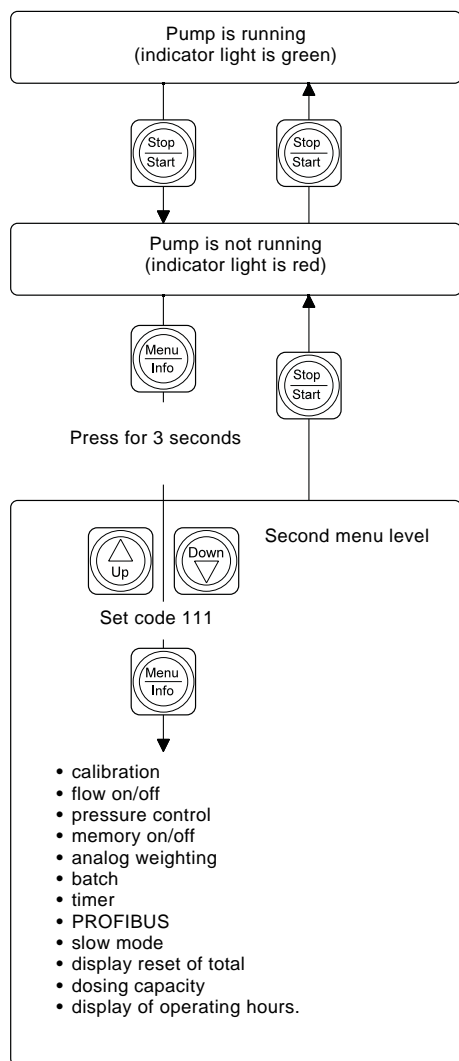


Fig. 9 Menu, first level

TM03 4453 2106

## Menu, second level

See the pump installation and operating instructions for a detailed overview and instructions for navigating the menu.



TM03 4454 2106

**Fig. 10** Menu, second level

## Menu, third level

The third level is for setting the pump type and the dosing flow measuring unit (l/h or gal/h) as well as inputs and outputs.

## Operating modes

### Manual control

In manual control mode, set the flow rate in the display.

### Pulse control

For each pulse received at the contact input of the pump (for example from a water meter with reed contact output), the pump doses the set quantity. The memory can store a maximum of 65,000 pulses for later processing.

### Analog control

The dosed quantity is proportional to the current input signal of 0-20 mA or 4-20 mA.

### Batch mode

In batch mode, a defined batch quantity is dosed with a defined flow. The dosing of a batch can be triggered manually and by pulse.

### Timer batch

The set batch quantity is dosed with a preset interval.

### Slow mode

In slow mode, the pumps slow down the suction stroke. This reduces cavitation when dosing viscous media.

Slow mode can be activated in any operating mode.

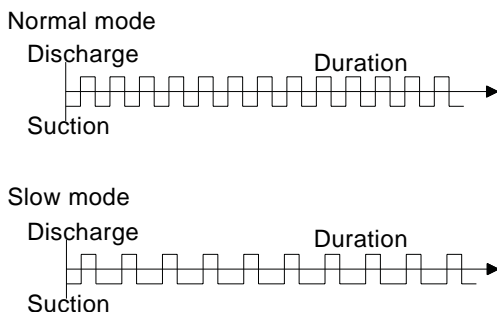


Fig. 11 Slow mode vs. normal operation

TM03 4456 2106

## Other options

A system for detecting liquid behind the diaphragm can be installed as an option. In the event of a leak or diaphragm failure, the controller can trigger an alarm and/or switch off the pump.

Pumps with diaphragm leak detection have a special dosing head flange for inserting an opto-electronic sensor. The diaphragm leak detection sensor is installed from factory.

The opto-electronic sensor contains these elements:

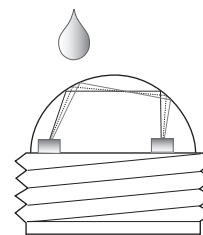
- infrared transmitter
- infrared receiver.

### Leak-detection opto-sensor

In case of a leak in the diaphragm, these events take place:

- The medium penetrates the dosing head flange.
- Light refraction changes.
- The sensor emits a signal.

The electronics switch two contacts, which can be used, for example, to trigger an alarm signal or to switch off the pump.



TM03 3626 0506

Fig. 12 Leak-detection opto-sensor

### Tank-level control

The pumps feature two-stage tank-empty signal. This requires a separate tank-empty sensor not included with the pump.

### Flow monitor (option)

This unit monitors the dosing process and emits a pulse for each suction stroke. The unit is only suitable for aqueous media with a maximum viscosity of 5 [mPa s].

## Electronic lock

The pump can be locked to prevent it from being stopped manually. When this function is activated (service level), the pump starts running with the current settings and cannot be stopped by means of the [Start/Stop] button.

It is still possible to acknowledge error messages by pressing [Start/Stop].

To stop the pump when the electronic lock is activated, do as follows:

- If the remote switching on/off is active (the plug is inserted), switch off the pump remotely.
- Disconnect the pump from the power supply.

## Calibration

The dosing flow display is factory-set to an operating counter pressure of 3 bar. Calibration can be used to set the pump flow to the current operating conditions.

## Remote switching on/off

The pump can be switched off remotely from a control room or similar remote location.

If the pump is switched off remotely, it does not respond to any input signals or to operator inputs.

Exceptions:

- The pump can still be stopped manually by pressing [Start/Stop].
- The pump can still be set to run continuously by pressing and holding down [Start/Stop].

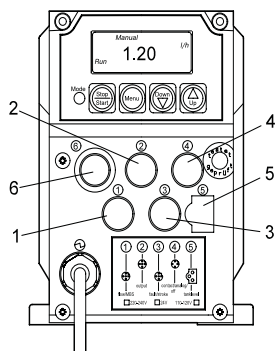
When the pump is switched off remotely, the following takes place:

- "Stop" is indicated in the display.
- The yellow indicator light illuminates.
- The pump returns to the state it was in before it was switched off. For example, if it was previously in "Stop" mode, the pump returns to this mode when switched on again.

## PROFIBUS

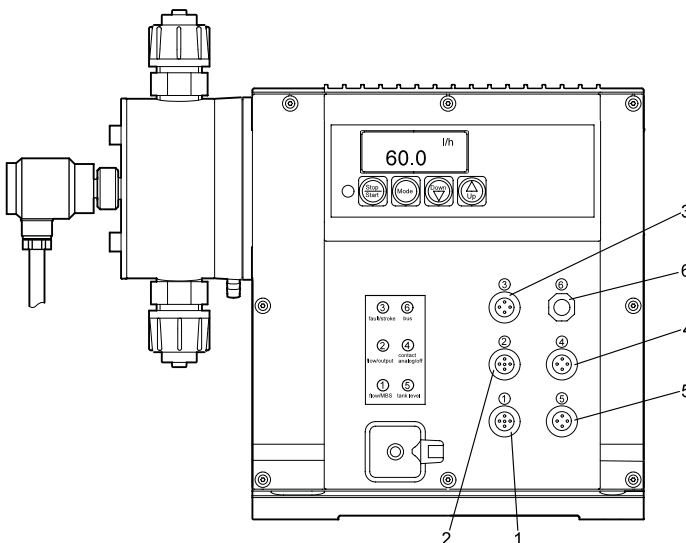
The DDI is also available with a PROFIBUS DP interface.

## Connectors



TM03 4452 2106

Fig. 13 Connectors on the DDI 209



TM03 4780 2806

Fig. 14 Connectors on the DDI 222

## Legend

Socket	Description
1	Leak detection (flow monitor).
2	Current output (indicates the current dosing flow). Flow monitor.
3	Electrically isolated output for stroke/pulse signal or tank-empty pre-alert signal and error signal.
4	Remote on/off. Contact input. Current input.
5	Tank-empty signal. Tank-empty pre-alert and tank-empty signal.
6	PROFIBUS (option). Only used when the PROFIBUS option is selected.

## General description

The DDI range of pumps are digitally controlled dosing pumps.

### DDI 209

The DDI 209 are electronic stepper-motor-driven pumps. The rotation of the motor generates the discharge stroke via an eccentric. The suction stroke is performed by a spring.

The control panel can be top- or side-mounted.

The DDI 209 is available in a range of versions.

The various head types available have these features:

- manual deaeration valve
- Plus<sup>3</sup> system (P3)
- diaphragm leak detection.

The DDI 209 AR has these optional features:

- flow monitor
- interface for PROFIBUS (AP).

### DDI 209 with manual deaeration valve

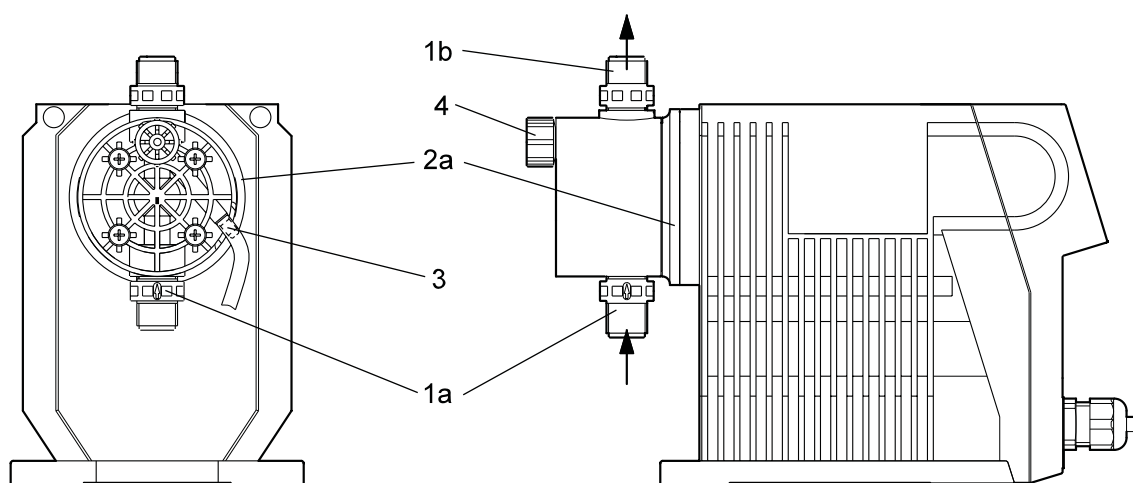


Fig. 15 Main components, DDI 209 with manual deaeration valve

### Legend

Pos.	Component
1a	Suction valve
1b	Discharge valve
2a	Dosing head with manual deaeration valve
3	Connection for deaeration tubing
4	Screw to open/close the deaeration valve

### DDI 222

The DDI 222 is driven by a low-energy and brushless DC motor. The speed of the motor is reduced by means of belt drive (toothed belts). The DDI 222 suction and discharge strokes are generated by the motor.

The control panel can be front- or side-mounted.

TM03 3723 0806

## DDI 222

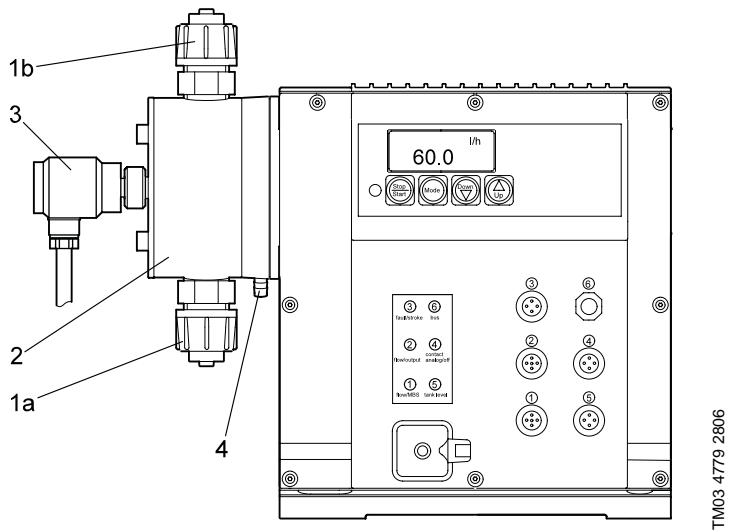


Fig. 16 Main components, DDI 222

### Legend

Pos.	Component
1a	Suction valve
1b	Discharge valve
2	Dosing head
3	Leak detection pressure switch
4	Outlet joint for use in case of diaphragm leak



## DDI 209 with Plus<sup>3</sup> system

The DDI 209 with Plus<sup>3</sup> system has auto-deaeration and calibration system for moderately volatile media (such as sodium hypochlorite).

(Applies to sizes DDI 0.4-10 to DDI 5.5-10)

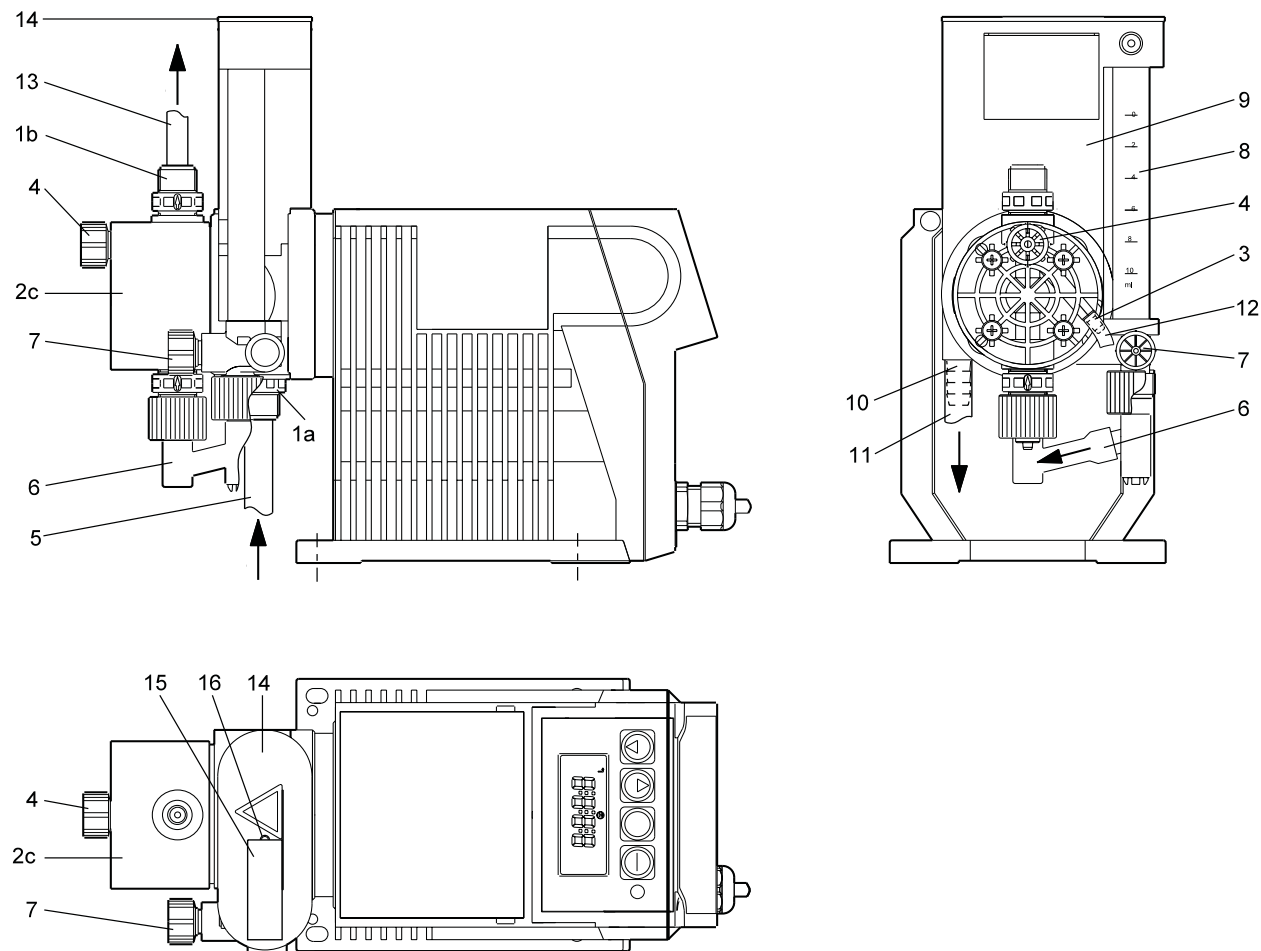


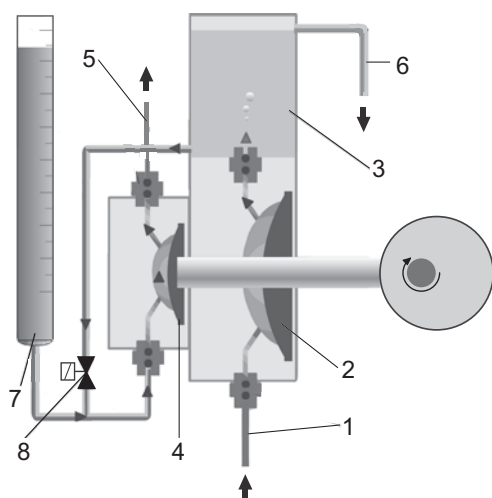
Fig. 17 Main components, DDI 209 with Plus<sup>3</sup> (P3) system

### Legend

Pos.	Component
1a	Suction valve
1b	Discharge valve
2c	Dosing head Plus <sup>3</sup> system
3	Connection for deaeration line
4	Deaeration screw
5	Suction line from the tank
6	Line from the calibration tube (pos. 8) to the dosing head
7	Isolating valve at the calibration tube (pos. 8)
8	Calibration tube
9	Priming chamber
10	Connection for overflow line (pos. 11)
11	Overflow line to the tank (PVC tube 8/11)
12	Deaeration line to the tank
13	Dosing line (discharge line)
14	Cover
15	Adhesive label
16	Deaeration hole

TM03 3727 0806

## Functional principle of the Plus<sup>3</sup> system



TM03 4500 2206

Fig. 18 Functional principle of the Plus<sup>3</sup> system

### Legend

Pos.	Component
1	Inlet from tank
2	Conveying diaphragm
3	Priming/deaeration chamber
4	Dosing diaphragm
5	Discharge to the process line
6	Deaeration bypass
7	Calibration tube
8	Calibration valve

### Operation of the Plus<sup>3</sup> system

- The conveying diaphragm (pos. 2) draws a large volume of medium from the supply tank (pos. 1) and pumps it into the priming/deaeration chamber (pos. 3).
- Any gas bubbles in the medium are vented to the atmosphere in the priming chamber.
- The separate, working diaphragm (pos. 4) pumps the medium into the process line (pos. 5).
- Any excess medium is returned to the tank via the deaeration bypass (pos. 6).
- The integrated calibration column (pos. 7) and calibration valve (pos. 8) allow precise adjustment of the flow while the pump is running.

Designed especially for volatile chemicals, the double-diaphragm system offers high process accuracy and cost-efficient operation.

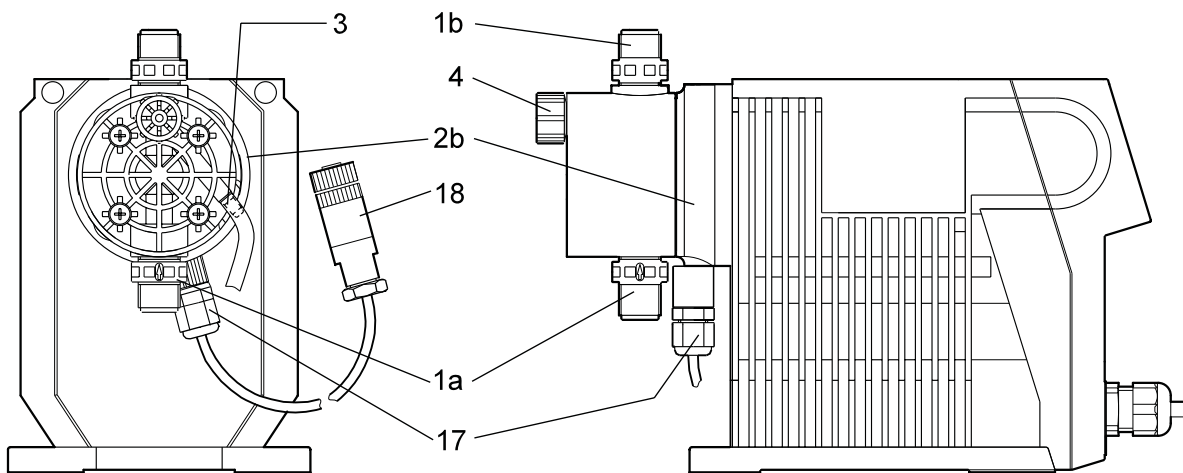
As an additional feature of the Plus<sup>3</sup> system, the priming chamber allows the pump to be in a suction lift configuration. This permits the exchange of chemical tanks without interrupting the chemical discharge to the system.

### Spring-loaded valves

The pump head can be supplied with spring-loaded valves for improved performance when handling viscous media. Some of these valves have a larger nominal width and incorporate adapters.

**Note:** The suction and discharge dimensions of the pump may change when the pump is fitted with spring-loaded valves.

## DDI with diaphragm leak detection



TM03 3725 0806

**Fig. 19** Main components, DDI 209, with diaphragm leak detection

### Legend

Pos.	Component
1a	Suction valve
1b	Discharge valve
2b	Dosing head with flange for diaphragm leak signal
3	Connection for deaeration line
4	Deaeration screw for manual deaeration
17	Opto-sensor
18	M12 plug for socket 1

## Dimensions

DDI 209

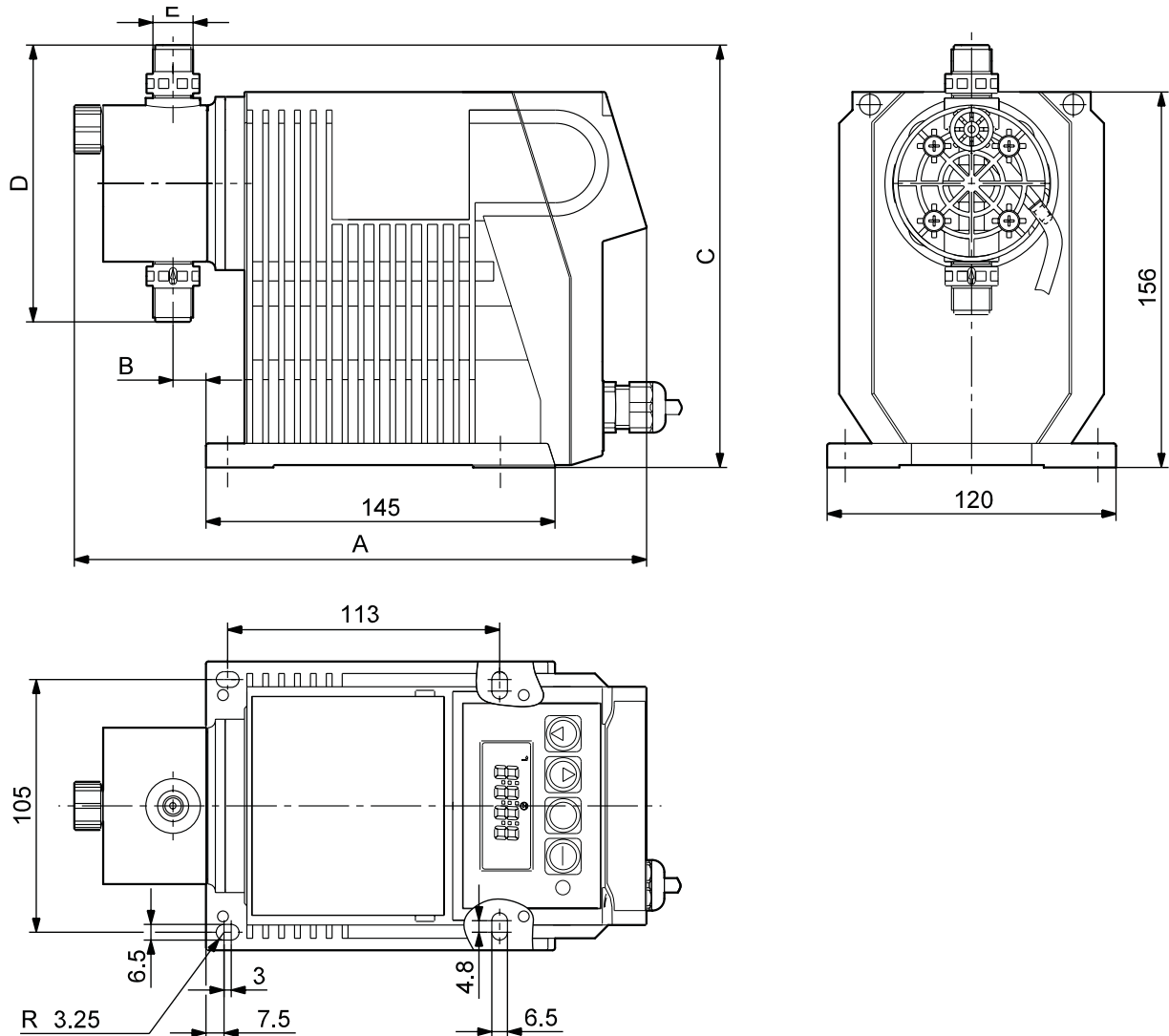


Fig. 20 Dimensions, DDI 209

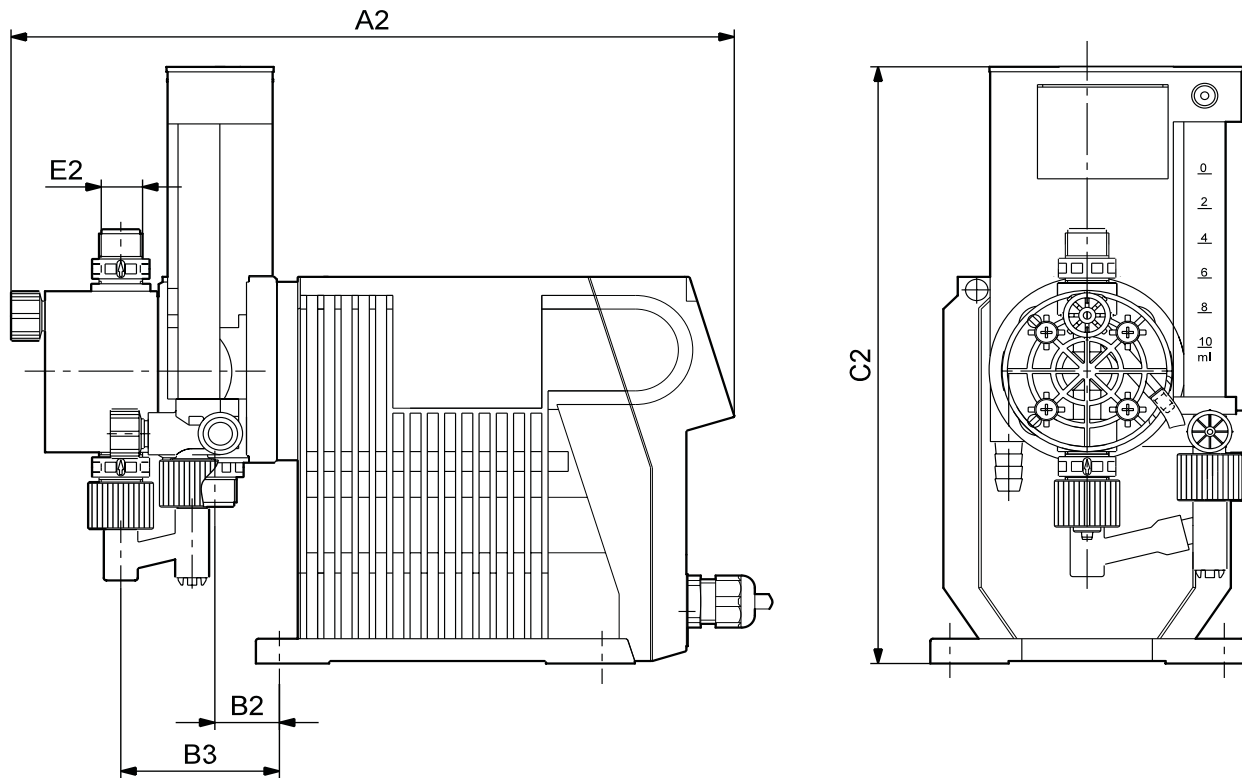
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## Dimensions

Pump	Model	A [mm]	B [mm]	C [mm]	D [mm]	E	C HV* [mm]	D HV* [mm]	E HV*
DDI 0.4-10	209	239	23	175.5	112	G 3/8	175.5	112	G 3/8
DDI 2.2-16	209	239	23	175.5	112	G 3/8	207.5	176	G 5/8
DDI 2.5-10	209	239	23	175.5	112	G 3/8	207.5	176	G 5/8
DDI 5.5-10	209	239	23	175.5	112	G 3/8	207.5	176	G 5/8
DDI 13.8-4	209	240	29	185	133	G 5/8	185	133	G 5/8
DDI 20-3	209	240	29	185	133	G 5/8	185	133	G 5/8

\* Adjusted dimensions for high-viscosity option

## DDI 209 with Plus<sup>3</sup> system



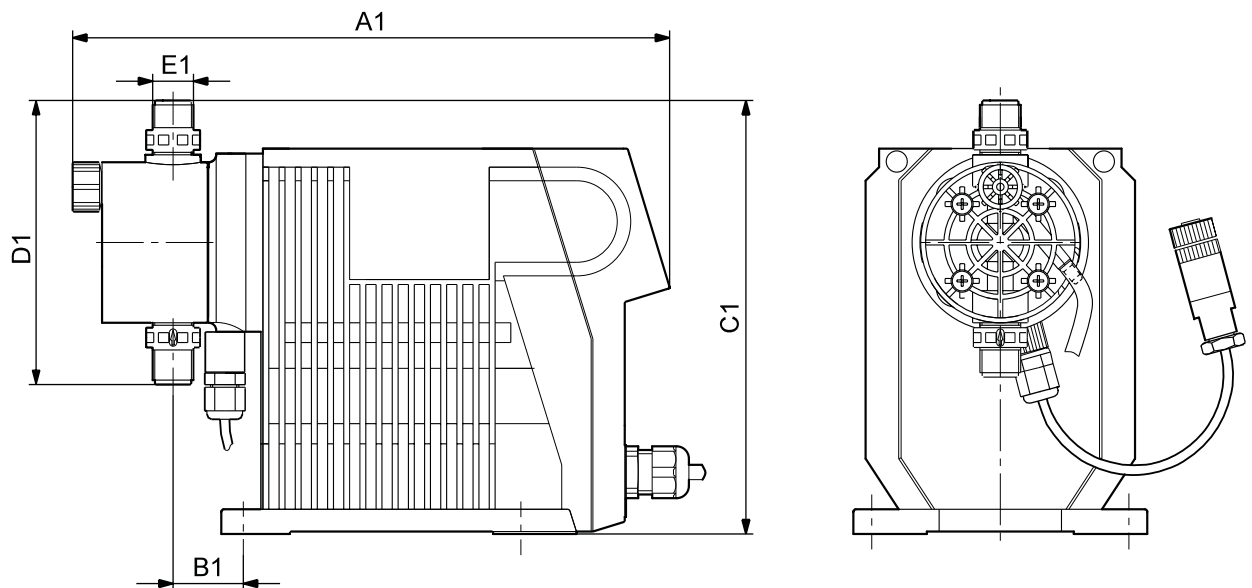
TM03 3726 0806

Fig. 21 DDI 209 with Plus<sup>3</sup> system

### Dimensions

Pump	Model	A2 [mm]	B2 [mm]	B3 [mm]	C2 [mm]	E2
DDI 0.4-10	209	276	25	61	240	G 3/8
DDI 2.2-16	209	276	25	61	240	G 3/8
DDI 2.5-10	209	276	25	61	240	G 3/8
DDI 5.5-10	209	276	25	61	240	G 3/8
DDI 13.8-4	209	-	-	-	-	-
DDI 20-3	209	-	-	-	-	-

## DDI 209 with diaphragm leak detection



TM03 3724 0806

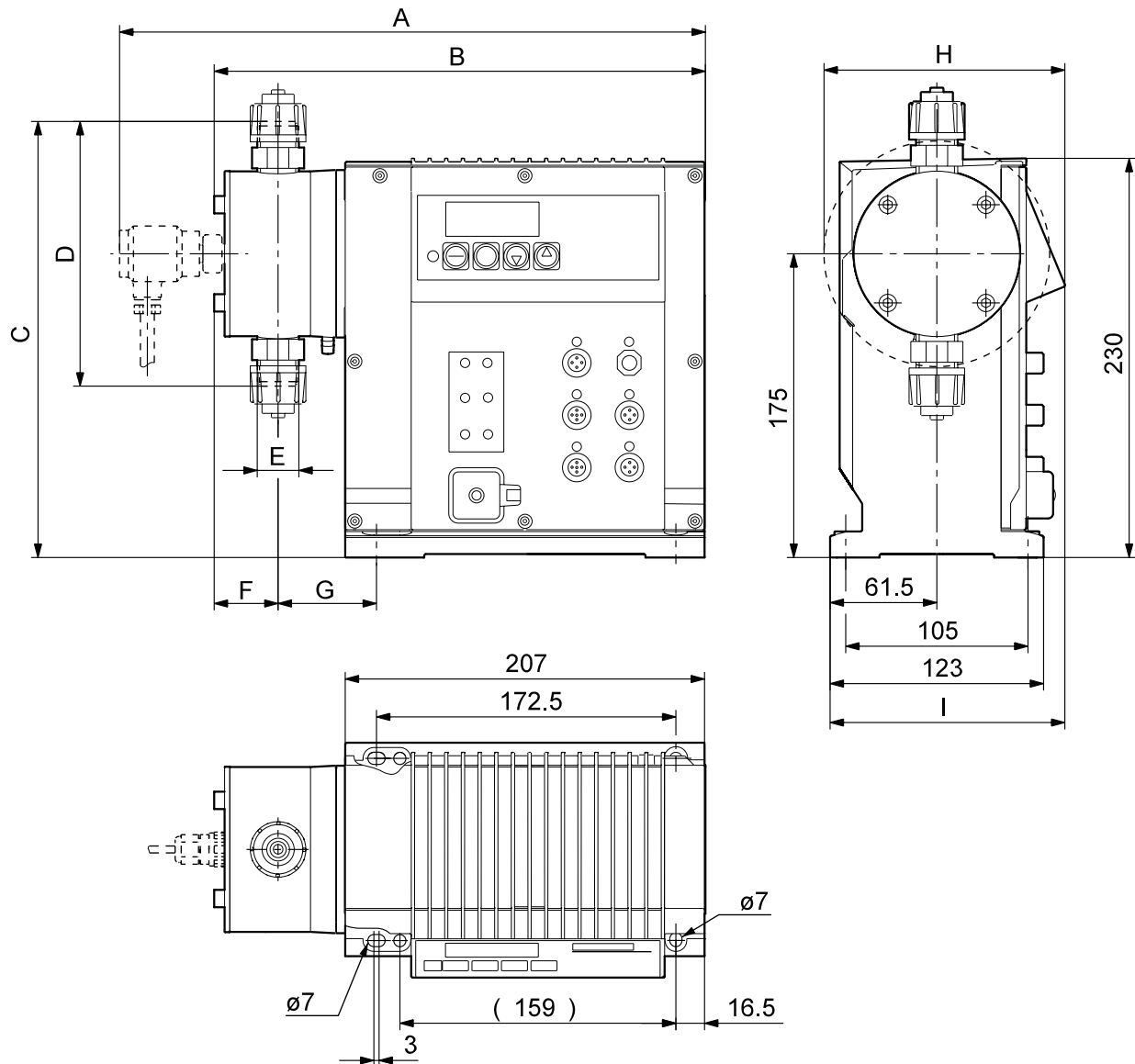
Fig. 22 DDI 209 with diaphragm leak detection

### Dimensions

Pump	Model	A1 [mm]	B1 [mm]	C1 [mm]	D1 [mm]	E1	C1 HV* [mm]	D1 HV* [mm]	E1 HV*
DDI 0.4-10	209	250	34	175.5	112	G 3/8	175.5	112	G 3/8
DDI 2.2-16	209	250	34	175.5	112	G 3/8	207.5	176	G 5/8
DDI 2.5-10	209	250	34	175.5	112	G 3/8	207.5	176	G 5/8
DDI 5.5-10	209	250	34	175.5	112	G 3/8	207.5	176	G 5/8
DDI 13.8-4	209	251	40	185	133	G 5/8	185	133	G 5/8
DDI 20-3	209	251	40	185	133	G 5/8	185	133	G 5/8

\* Adjusted dimensions for high-viscosity option

## DDI 222



TM03 4603 2306

Fig. 23 Dimensions, DDI 222

### Dimensions

Pump	Model	A [mm]	B [mm]	C [mm]	D [mm]	E	F [mm]	G [mm]	H [mm]	I [mm]	C HV* [mm]	D HV* [mm]	E HV* [mm]	F HV* [mm]	G HV* [mm]
DDI 60-10	222	326	272	252	153	R 5/8	26	58	-	137	246	143	R 1 1/4	39	90
DDI 150-4	222	372	315	265	179	R 1 1/4	39	90	139	137	265	179	R 1 1/4	39	90

\* Adjusted dimensions for high-viscosity option

## Performance data

### DDI 209

Pump	Model	Vstroke [cm <sup>3</sup> ]	Max. pressure <sup>1)</sup> [bar]	Normal operation		Slow mode		Max. stroke rate [strokes/min]
				Capacity <sup>2)</sup> [l/h]	Capacity <sup>2)</sup> With Plus <sup>3)</sup> system [l/h]	Capacity <sup>2)</sup> [l/h]	Capacity <sup>2)</sup> With Plus <sup>3)</sup> system [l/h]	
DDI 0.4-10	209	0.069	10	0.4*	0.4*	0.26	0.27	180
DDI 2.2-16	209	0.276	16	2.2	1.9	1.5	1.3	180
DDI 2.5-10	209	0.276	10	2.5	2.2	1.7	1.4	180
DDI 5.5-10	209	0.587	10	5.5	4.9	3.7	3.2	180
DDI 13.8-4	209	1.36	4	13.8	-	9.2	-	180
DDI 20-3	209	1.95	3	20.0	-	13.3	-	180

1) Observe the maximum permissible temperatures. When dosing viscous media, observe the maximum permissible viscosity.

2) The maximum dosing flow of HV type pumps is reduced by up to 10%.

\* At counter pressures below 10 bar, the maximum dosing flow of the DDI 0.4-10 gradually increases to a maximum of 1 l/h.

The maximum capacity is measured at maximum pump counter pressure.

The pump can be operated in the range of 1% to 100% of the maximum dosing capacity.

### DDI 222

Pump	Model	Vstroke [cm <sup>3</sup> ]	Max. pressure <sup>1)</sup> [bar]	Capacity <sup>2)</sup> [l/h]			Max. stroke rate [strokes/min]
				Normal	Slow mode-1	Slow mode-2	
DDI 60-10	222	6.63	10	60	40	25	180
DDI 150-4	222	13.9	4	150	100	62	180

1) Observe the maximum permissible temperatures. When dosing viscous media, observe the maximum permissible viscosity.

2) The maximum dosing flow of HV type pumps is reduced by up to 10%.

The maximum capacity is measured at maximum pump counter pressure.

The pump can be operated in the range of 0.125% to 100% of the maximum dosing capacity.



## Suction lift

### DDI 209

Pump	Model	Max. suction lift during operation <sup>1)</sup> Liquids with a viscosity similar to water [m]				Max. suction lift Start-up <sup>2)</sup> Non-degassing liquids with a viscosity similar to water [m]	
		Normal operation	Slow mode operation	Normal operation with Plus <sup>3</sup> system	Slow mode operation With Plus <sup>3</sup> system	Standard	With Plus <sup>3</sup> system
DDI 0.4-10	209	*	*	1.5	1.5	*	**
DDI 2.2-16	209	4.0	6.0	1.5	1.5	1.5	**
DDI 2.5-10	209	4.0	6.0	1.5	1.5	1.5	**
DDI 5.5-10	209	4.0	6.0	1.5	1.5	2.0	**
DDI 13.8-4	209	3.0	3.0	-	-	2.8	-
DDI 20-3	209	3.0	3.0	-	-	2.8	-

1) Dosing head and valves moistened.

2) Deaeration valve open.

\* Flooded suction.

\*\* Pumps incorporating the Plus<sup>3</sup> system include a special start-up device.

### DDI 222

Pump	Model	Max. suction lift during operation <sup>1)</sup> Liquids with a viscosity similar to water [m]		Max. suction lift Start-up <sup>2)</sup> Non-degassing liquids with a viscosity similar to water [m]	
		Normal operation	Standard	Standard	Standard
DDI 60-10	222	3.0		1.0	
DDI 150-4	222	2.0		1.0	

1) Dosing head and valves moistened.

2) Deaeration valve open.

## Permissible viscosity

### DDI 209

Pump	Model	Max. permissible viscosity at operating temperature <sup>1)</sup> [mPa s]				Max. permissible viscosity at operating temperature <sup>1)</sup> Spring-loaded valves <sup>2)</sup> [mPa s]			
		Normal operation	Slow-mode operation	Normal operation With Plus <sup>3</sup> system	Slow-mode operation With Plus <sup>3</sup> system	Normal operation	Slow-mode operation	Normal operation With Plus <sup>3</sup> system	Slow-mode operation With Plus <sup>3</sup> system
		DDI 0.4-10	209	200	200	200	200	500	1000
DDI 2.2-16	209	200	200	200	200	200	1000	-	-
DDI 2.5-10	209	200	200	200	200	200	1000	-	-
DDI 5.5-10	209	100	200	100	200	200	500	-	-
DDI 13.8-4	209	100	200	-	-	200	500	-	-
DDI 20-3	209	100	200	-	-	200	500	-	-

1) The specified values are approximate values and refer to Newtonian fluids.  
2) Version for high-viscosity media.

**Note:** The viscosity increases at lower temperatures.

### DDI 222

Pump	Model	Max. permissible viscosity at operating temperature <sup>1)</sup> [mPa s]			Max. permissible viscosity at operating temperature <sup>1)</sup> Spring-loaded valves <sup>2)</sup> [mPa s]		
		Normal operation	Slow mode-1 operation	Slow mode-2 operation	Normal operation	Slow mode-1 operation	Slow mode-2 operation
		DDI 60-10	222	100	200	500	200
DDI 150-4	222	100	200	500	500	800	2000

1) The specified values are approximate values and refer to Newtonian fluids.  
2) Version for high-viscosity media.

**Note:** The viscosity increases at lower temperatures.

## Inlet and discharge pressures

### DDI 209

Pump	Model	Max. pre-charge pressure at the pump suction side [bar]		Min. counter pressure at the pump pressure valve [bar]	
		Standard	With Plus <sup>3</sup> system	Standard	With Plus <sup>3</sup> system
DDI 0.4-10	209	2.0	0*	1.0	1.0
DDI 2.2-16	209	2.0	0*	1.0	1.0
DDI 2.5-10	209	2.0	0*	1.0	1.0
DDI 5.5-10	209	2.0	0*	1.0	1.0
DDI 13.8-4	209	2.0	-	1.0	1.0
DDI 20-3	209	1.5	-	1.0	1.0

\* The pump must not be installed with inlet pressure, as this would cause overflow.

### DDI 222

Pump	Model	Max. pre-charge pressure at the pump suction side [bar]			Min. counter pressure at the pump pressure valve [bar]		
		Normal operation	Slow mode-1 operation	Slow mode-2 operation	Normal operation	Slow mode-1 operation	Slow mode-2 operation
DDI 60-10	222	2.0	2.0	2.0	1.0	1.0	1.0
DDI 150-4	222	2.0	2.0	2.0	1.0	1.0	1.0

## Permissible temperature range of the pumped medium

**Note:** The pumped media must be liquid. Exceeding the permissible temperatures may cause malfunction or damage to the pump.

Dosing head material	Permissible media temperature [°C]	
	p < 10 bar	p < 16 bar
PVC, PP	0 to 40	0 to 20
Stainless steel, DIN 1.4571*	-10 to 70	-10 to 70
PVDF**	-10 to 60	-10 to 20

\* Short-term (15 min.) resistance to 120 °C at up to 2 bar counter pressure.

\*\* Increased resistance to 70 °C if the counter pressure is less than 3 bar.

## Weights

Pump	Weights [kg]	
	PVC, PVDF and polypropylene	Stainless steel
DDI 0.4-10	2.3 - 3.0	3.5
DDI 2.2-16	2.3 - 3.0	3.5
DDI 2.5-10	2.3 - 3.0	3.5
DDI 5.5-10	2.3 - 3.0	3.6
DDI 13.8-4	2.6	3.6
DDI 20-3	2.6	3.6
DDI 60-10	5.0	7.0
DDI 150-4	6.5	12.0

## Electrical data

	DDI 209	DDI 222
Power supply	100-240 V, 50/60 Hz; 24 V DC optional	100-240 V, 50/60 Hz
Power consumption	20 VA	50 VA
<b>Input signal</b>		
Pulse signal • min. pulse length: 10 ms • min. pause time: 25 ms	Load < 12 V, 5 mA	Load < 12 V, 5 mA
Remote on/off	Load < 12 V, 5 mA	Load < 12 V, 5 mA
Tank-empty signal	Load < 12 V, 5 mA	Load < 12 V, 5 mA
Current signal	Load < 22 Ohm	Load < 22 Ohm
<b>Output signal</b>		
Current signal 0(4) - 20 mA	Load < 350 Ohm	Load < 350 Ohm
Error signal	Ohmic load < 50 V DC/75 V AC, 0.5 A	Ohmic load < 50 V DC/75 V AC, 0.5 A
Tank-empty pre-alert	Ohmic load < 50 V DC/75 V AC, 0.5 A	Ohmic load < 50 V DC/75 V AC, 0.5 A
Stroke signal • contact time: 200 ms /stroke	Ohmic load < 50 V DC/75 V AC, 0.5 A	Ohmic load < 50 V DC/75 V AC, 0.5 A
Enclosure class	IP 65	IP 65

## Additional technical data

	DDI 209	DDI 222
Control range	1% to 100% of the maximum dosing capacity	0.125% to 100% of the maximum dosing capacity
Accuracy	+/- 1.5% repeatability throughout adjustable range	+/- 1.5% repeatability throughout adjustable range
Permissible ambient temperature	0 to 40 °C	0 to 40 °C
Permissible storage temperature	-10 to 50 °C	-10 to 50 °C
Max. relative humidity	92% (non-condensing)	92% (non-condensing)
Sound pressure level	55 dB (A)	65 ± 5 dB (A)
Material of enclosure (pump and electronics)	s PS FR GF 22 (glass-fibre-reinforced polystyrene)	PPE-SB (fibre-reinforced Luranyl®) Option: Flameproof enclosure
Approvals	CE	CE

## Electronic functions

Function	DDI 209	DDI 222
Continuous operation (for functional test, self-priming and dosing head deaeration)	●	●
Memory function saves up to 65,000 pulses	●	●
Two-stage, tank-empty signal (requires tank-empty sensors)	●	●
Flow monitor (option) <sup>1)</sup>	●	●
Diaphragm leak detection (option) <sup>2)</sup>	●	●
Stroke signal (standard) or tank-empty pre-alert or pulse input (adjustable) <sup>3)</sup>	●	●
Password protection of settings	●	●
Calibration function	●	●
Dosing quantity counter with reset to 0	●	●
Tamper-proof operating hours counter	●	●
Remote on/off	●	●
PROFIBUS DP interface (option)	●	●
Hall sensor (for motor monitoring) <sup>4)</sup>	●	●
Pressure limitation <sup>5)</sup>		●

- 1) The flow monitor for dosing control consists of a pressure sensor integrated in the dosing head. Based on the pressure measured by the sensor and on the motor position, an indicator diagram is created. Possible dosing faults or the exceeding of the permissible counter pressure are detected reliably and indicated by the display or the error message output.
- 2) The dosing head of pumps with diaphragm leak detection are equipped with opto-electronic sensor.
- 3) Depending on the relay setting, the contact output receives a signal on each complete stroke of the pump or on a tank-empty pre-alert signal input or on each pulse input at the pump.
- 4) If the pump has existing strokes to process, the Hall sensor checks whether the drive motor is turning. If the motor is blocked, for example due to excess counter pressure in the dosing system, the failure is detected and indicated by the integrated motor monitoring function.
- 5) The DDI 222 features an integrated pressure control function. The pressure is calculated from the motor current consumption or measured direct in the dosing head if a pressure sensor is present (flow monitor pump option). At a user-defined pressure, the pump is switched off automatically.

## Operating modes, additional data

Operating mode	Data	Pump	V <sub>max</sub> [ml]	V <sub>min</sub> [ml]
Manual control	Input/display of the dosing flow in l/h or gal/h.	DDI 0.4-10	.0.001	0.07
		DDI 2.2-16	0.004	0.88
		DDI 2.5-10	0.004	0.88
Pulse control (most constant dosing)	Input/display in ml/contact	DDI 5.5-10	0.011	2.20
		DDI 13.8-4	0.024	4.96
		DDI 20-3	0.038	7.86
		DDI 60-10	0.111	2.22
		DDI 150-4	0.278	55.5
Analog control	Adjust the volumetric flow in proportion to the current signal (displayed in l/h). Weighting of current input/output.			
Batch mode	Input dosing capacity and dosing flow per batch. Triggered manually or by contact.			
Time batch	Input dosing capacity and dosing flow per batch. Input start time for first batch. Input repeat time for subsequent batches.			
Slow mode	Long suction stroke (for viscous media) (The DDI 222, has a two-stage reduction of the maximum dosing flow to 66% (slow mode 1) or 41% (slow mode 2))			



## DDI selection (0.4 to 150 l/h)

The example in bold is a **DDI 20-3 AR PVC/V/G-F-313B1 B**

Max. capacity and pressure	Control variant	Materials of dosing head, gaskets and valve balls	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
	AR = Standard	<b>Dosing head variant</b>	<b>Control panel position</b>			<b>Connection, suction/discharge</b>	
	AF = AR with flow monitor	PP = Polypropylene	F = Front-mounted			B6 = Pipe, 4/6 mm	
	AP = AR with PROFIBUS	PV = PVDF	S = Side-mounted			3 = Tube, 4/6 mm	
	APF = AR with flow monitor and PROFIBUS	PVC = Polyvinyl chloride	T = Top-mounted			A5 = Tube, 5/8 mm	
		SS = Stainless steel, DIN 1.4401		<b>Supply voltage</b>		4 = Tube, 6/9 mm	
		PP-P3 = PP + Plus <sup>3</sup> system		3 = 1 x 100-240 V, 50/60 Hz		6 = Tube, 9/12 mm	
		PVC-P3 = PVC + Plus <sup>3</sup> system		I = 24 VDC		Q = Tube, 19/27 mm	
		PP-L = PP + integrated diaphragm leak detection	<b>Valve type</b>			C4 = Tube, 1/8" / 1/4"	
		PV-L = PV + integrated diaphragm leak detection	1 = Standard			R = Tube, 1/4" / 3/8"	
		PVC-L = PVC + integrated diaphragm leak detection	2 = Spring-loaded, 0.05 bar opening pressure, suction/discharge			S = Tube, 3/8" / 1/2"	
		SS-L = SS + integrated diaphragm leak detection	3 = Spring-loaded, 0.05 bar opening pressure, suction			A = Threaded, Rp 1/4	
			4 = Spring-loaded, 0.8 bar opening pressure, discharge			A1 = Threaded, Rp 3/4	
		<b>Gasket material</b>	5 = For abrasive media (SS only)			V = Threaded, 1/4" NPT	
		E = EPDM	6 = Spring-loaded, (DN 20, SS balls) 0.8 bar, discharge side			A9 = Threaded, 1/2" NPT, male	
		V = FKM				A3 = Threaded, 3/4" NPT	
		T = PTFE				A7 = Threaded, 3/4" NPT, male	
		<b>Valve ball material</b>				B1 = Tube, 6/12 mm/ cementing diameter, 12 mm	
		C = Ceramic				B2 = Tube, 13/20 mm/ cementing diameter, 25 mm	
		G = Glass				B3 = Welding diameter, 16 mm	
		T = PTFE				B4 = Welding diameter, 25 mm	
		SS = Stainless steel, DIN 1.4401					
						<b>Mains plug</b>	
						F = Schuko	
						B = USA and Canada, 120 V	
						I = Australia	
						E = Switzerland	
						X = Without plug	
[l/h] - [bar]	Control variant	Materials of dosing head, gaskets and valve balls**	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
<b>DDI 209, P&lt;10 bar, DN 4</b>							
0.4-10	AR	PP/E/C				3	F
2.5-10	AF	PP/V/C	F	3	1	A5	B
5.5-10	AP*	PP/V/G	T	I	2	B1	I
	APF*	PV/T/C			3	B6	E
		PVC/E/C			4	C4	X
		PVC/V/C					
		<b>PVC/V/G</b>					
		SS/T/SS	F	3	1	A9	F
		SS/V/SS	T	I	2	B6	B
					3		I
					4		E
							X
<b>DDI 209, P&lt;10 bar, DN 8</b>							
13.8-4	AR	PP/E/C				4	F
20-3	AF	PP/V/C				6	B
	AP*	PP/V/G	F	3	1	A5	I
	APF*	PV/T/C	T	I	2	A9	E
		PVC/E/C			3	B1	X
		PVC/E/SS			4	B3	
		PVC/V/C				R	
		PVC/V/G				S	
		SS/T/SS	F	3	1	A	F
		SS/V/SS	T	I	2	A9	B
					3	V	I
					4		E
							X



# Pump selection

DDI

Max. capacity and pressure	Control variant	Materials of dosing head, gaskets and valve balls	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
	AR = Standard	<b>Dosing head variant</b>	<b>Control panel position</b>			<b>Connection, suction/discharge</b>	
	AF = AR with flow monitor	PP = Polypropylene	F = Front-mounted			B6 = Pipe, 4/6 mm	
	AP = AR with PROFIBUS	PV = PVDF	S = Side-mounted			3 = Tube, 4/6 mm	
	APF = AR with flow monitor and PROFIBUS	PVC = Polyvinyl chloride	T = Top-mounted			A5 = Tube, 5/8 mm	
		SS = Stainless steel, DIN 1.4401		<b>Supply voltage</b>		4 = Tube, 6/9 mm	
		PP-P3 = PP + Plus <sup>3</sup> system		3 = 1 x 100-240 V, 50/60 Hz		6 = Tube, 9/12 mm	
		PVC-P3 = PVC + Plus <sup>3</sup> system		I = 24 VDC		Q = Tube, 19/27 mm	
		PP-L = PP + integrated diaphragm leak detection			<b>Valve type</b>	C4 = Tube, 1/8" / 1/4"	
		PV-L = PV + integrated diaphragm leak detection			1 = Standard	R = Tube, 1/4" / 3/8"	
		PVC-L = PVC + integrated diaphragm leak detection			2 = Spring-loaded, 0.05 bar opening pressure, suction/discharge	S = Tube, 3/8" / 1/2"	
		SS-L = SS + integrated diaphragm leak detection			3 = Spring-loaded, 0.05 bar opening pressure, suction	A = Threaded, Rp 1/4	
					4 = Spring-loaded, 0.8 bar opening pressure, discharge	A1 = Threaded, Rp 3/4	
		<b>Gasket material</b>			5 = For abrasive media (SS only)	V = Threaded, 1/4" NPT	
		E = EPDM			6 = Spring-loaded, (DN 20, SS balls) 0.8 bar, discharge side	A9 = Threaded, 1/2" NPT, male	
		V = FKM				A3 = Threaded, 3/4" NPT	
		T = PTFE				A7 = Threaded, 3/4" NPT, male	
		<b>Valve ball material</b>				B1 = Tube, 6/12 mm/ cementing diameter, 12 mm	
		C = Ceramic				B2 = Tube, 13/20 mm/ cementing diameter, 25 mm	
		G = Glass				B3 = Welding diameter, 16 mm	
		T = PTFE				B4 = Welding diameter, 25 mm	
		SS = Stainless steel, DIN 1.4401				<b>Mains plug</b>	
						F = Schuko	
						B = USA and Canada, 120 V	
						I = Australia	
						E = Switzerland	
						X = Without plug	
[l/h] - [bar]	Control variant	Materials of dosing head, gaskets and valve balls**	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
<b>DDI 209, P&lt;16 bar</b>							
2.2-16	AR AF AP* APF*	PP/E/C			1		F
		PP/V/C			2		B
		PP/V/G	F	3	2	A9	I
		PVC/E/C	T	I	3	B1	E
		PVC/V/C			4	C4	X
		PVC/N/C					
		PVC/V/G					
		SS/T/SS	F	3	1	A9	F
		SS/V/SS	T	I	2	B6	B
					3		I
					4		E
							X
<b>DDI 209, P&lt;10 bar, Plus<sup>3</sup></b>							
0.4-10	AR	PP-P3/E/C			1	3	F
2.5-10	AF	PP-P3/V/C	F	3	2	A5	B
5.5-10	AP	PVC-P3/E/C	T	I	3	B1	I
	APF	PVC-P3/V/C			4	C4	E
							X
<b>DDI 209, P&lt;16 bar, Plus<sup>3</sup></b>							
2.2-16	AR AF AP APF	PP/E/C			1		F
		PP/V/C			2		B
		PVC/E/C	F	3	2	B1	I
		PVC/V/C	T	I	3	C4	E
					4		X

# Pump selection

DDI

Max. capacity and pressure	Control variant	Materials of dosing head, gaskets and valve balls	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
	AR = Standard	<b>Dosing head variant</b>	<b>Control panel position</b>			<b>Connection, suction/discharge</b>	
	AF = AR with flow monitor	PP = Polypropylene	F = Front-mounted			B6 = Pipe, 4/6 mm	
	AP = AR with PROFIBUS	PV = PVDF	S = Side-mounted			3 = Tube, 4/6 mm	
	APF = AR with flow monitor and PROFIBUS	PVC = Polyvinyl chloride	T = Top-mounted			A5 = Tube, 5/8 mm	
		SS = Stainless steel, DIN 1.4401		<b>Supply voltage</b>		4 = Tube, 6/9 mm	
		PP-P3 = PP + Plus <sup>3</sup> system		3 = 1 x 100-240 V, 50/60 Hz		6 = Tube, 9/12 mm	
		PVC-P3 = PVC + Plus <sup>3</sup> system		I = 24 VDC		Q = Tube, 19/27 mm	
		PP-L = PP + integrated diaphragm leak detection			<b>Valve type</b>	C4 = Tube, 1/8" / 1/4"	
		PV-L = PV + integrated diaphragm leak detection			1 = Standard	R = Tube, 1/4" / 3/8"	
		PVC-L = PVC + integrated diaphragm leak detection			2 = Spring-loaded, 0.05 bar opening pressure, suction/discharge	S = Tube, 3/8" / 1/2"	
		SS-L = SS + integrated diaphragm leak detection			3 = Spring-loaded, 0.05 bar opening pressure, suction	A = Threaded, Rp 1/4	
					4 = Spring-loaded, 0.8 bar opening pressure, discharge	A1 = Threaded, Rp 3/4	
		<b>Gasket material</b>			5 = For abrasive media (SS only)	V = Threaded, 1/4" NPT	
		E = EPDM			6 = Spring-loaded, (DN 20, SS balls) 0.8 bar, discharge side	A9 = Threaded, 1/2" NPT, male	
		V = FKM				A3 = Threaded, 3/4" NPT	
		T = PTFE				A7 = Threaded, 3/4" NPT, male	
		<b>Valve ball material</b>				B1 = Tube, 6/12 mm/ cementing diameter, 12 mm	
		C = Ceramic				B2 = Tube, 13/20 mm/ cementing diameter, 25 mm	
		G = Glass				B3 = Welding diameter, 16 mm	
		T = PTFE				B4 = Welding diameter, 25 mm	
		SS = Stainless steel, DIN 1.4401					<b>Mains plug</b>
							F = Schuko
							B = USA and Canada, 120 V
							I = Australia
							E = Switzerland
							X = Without plug
[l/h] - [bar]	Control variant	Materials of dosing head, gaskets and valve balls**	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
<b>DDI 222, P&lt;10 bar, DN 8</b>							
60-10	AR AF AP APF	PP/E/C				4	
		PP/V/C				6	
		PP/V/G				A5	
		PV/T/C	F		1	A9	
		PVC/E/C	S	3	2	B1	F
		PVC/E/SS			5	B3	B
		PVC/V/C			6	R	I
		PVC/V/G				S	E
						A7***	X
						B2***	
						B4***	
						Q***	
		SS/T/SS	F		1	A9	F
		SS/V/SS	S	3	2	B6	B
					5	A1***	I
					6	A3***	E
							X
<b>DDI 222, P&lt;10 bar, DN 20</b>							
150-4	AR AF AP APF	PP/E/SS					
		PP/E/T					
		PP/V/G					F
		PV/T/C	F		1	A7	B
		PV/T/T	S	3	2	B2	I
		PVC/E/SS			5	B4	E
		PVC/E/T			6	Q	X
		PVC/V/C					
		PVC/V/G					
		SS/T/SS	F		1		F
		SS/V/SS	S	3	2	A1	B
					5	A3	I
					6		E
							X

\* Ceramic balls are required on control variant AF/APF, other materials are not allowed.

\*\* Leak detection is an option on all DDI pumps except variants with Plus<sup>3</sup> and DDI 209 AF/APF variants.

\*\*\*Only for HV variant.

## List of pumped media

The table below is intended only as a general guide on the resistance of materials (at room temperature) to the media listed. The table cannot replace actual testing of the pumped media and pump materials under specific working conditions.

The list should, however, be applied with some caution as factors such as purity, temperature, abrasive particles, etc. may affect the chemical resistance of a specific material.

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

Pumped medium (68°F)		Concentration %	Materials									
Designation	Chemical formula		Pump housing				Gasket			Ball		
			PP	PVDF	Stainless steel, DIN 1.4401	PVC	FKM	EPDM	PTFE	Centellen C	Ceramic	Glass
Acetic acid	CH <sub>3</sub> COOH	25	●	●	●	●	-	●	●	●	●	●
		60	●	●	●	●	-	○	●	○	●	●
		85	●	●	●	-	-	-	●	○	●	●
Aluminium chloride	AlCl <sub>3</sub>	40	●	●	-	●	●	●	●	●	●	
Aluminium sulphate	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	60	●	●	●	●	●	●	●	●	-	
Ammonia, aqueous	NH <sub>4</sub> OH	28	●	●	●	●	-	●	●	○	●	-
Calcium hydroxide★ <sup>7</sup>	Ca(OH) <sub>2</sub>		●	●	●	●	●	●	●	●	●	●
Calcium hypochlorite	Ca(OCl) <sub>2</sub>	20	○	●	-	●	●	●	●	●	●	●
		10	●	●	●	●	●	●	●	●	●	●
		30	-	●	-	●	●	○	●	○	●	●
		40	-	●	-	●	●	-	●	○	●	●
		50	-	●	-	●	●	-	●	○	●	●
Copper sulphate	CuSO <sub>4</sub>	30	●	●	●	●	●	●	●	●	●	
Ferric chloride★ <sup>3</sup>	FeCl <sub>3</sub>	100	●	●	-	●	●	●	●	●	●	
Ferric sulphate★ <sup>3</sup>	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	100	●	●	●	●	●	●	●	●	●	
Ferrous chloride	FeCl <sub>2</sub>	100	●	●	-	●	●	●	●	●	●	
Ferrous sulphate	FeSO <sub>4</sub>	50	●	●	●	●	●	●	●	●	●	
Hydrochloric acid	HCl	<25	●	●	-	●	○	●	●	●	●	●
		25 to 37	●	●	-	●	-	●	●	○	●	●
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	30	●	●	●	●	●	●	●	●	●	●
		10	●	●	●	●	●	●	●	●	●	●
Nitric acid	HNO <sub>3</sub>	30	●	●	●	●	●	●	●	-	●	●
		40	○	●	●	●	●	●	●	-	●	●
		70	-	●	●	-	●	-	●	-	●	●
Peracetic acid	CH <sub>3</sub> COOOH	5	●	●	-	●	-	●	●	●	●	
Potassium hydroxide	KOH	50	●	-	●	●	-	●	●	○	●	-
Potassium permanganate	KMnO <sub>4</sub>	10	●	●	●	●	-	●	●	●	●	
Sodium chlorate	NaClO <sub>3</sub>	30	●	●	●	●	○	●	●	●	●	
Sodium chloride	NaCl	30	●	●	-	●	●	●	●	●	●	
Sodium chlorite	NaClO <sub>2</sub>	20	●	○	-	-	●	●	●	●	●	●
		20	●	○	●	●	-	●	●	○	●	-
		30	●	-	●	●	-	●	●	○	●	-
Sodium hydroxide	NaOH	50	●	-	●	●	-	●	●	○	●	-
		20	○	●	-	●	●	●	●	●	●	●
		30	●	●	●	●	●	●	●	●	●	●
Sodium hypochlorite	NaOCl	20	○	●	-	●	●	●	●	●	●	
Sodium sulphide	Na <sub>2</sub> S	30	●	●	●	●	●	●	●	●	-	
Sodium sulphite★ <sup>6</sup>	Na <sub>2</sub> SO <sub>3</sub>	20	●	●	●	●	●	●	●	●	-	
Sulphurous acid	H <sub>2</sub> SO <sub>3</sub>	6	●	●	●	●	●	●	●	●	○	
Sulphuric acid★ <sup>4</sup>	H <sub>2</sub> SO <sub>4</sub>	<80	●	●	-	○	●	○	●	○	●	○
		80 to 98	○	●	-	-	●	-	●	●	●	-

● Resistant.

○ Limited resistance.

- Not resistant.

★<sup>3</sup> Risk of crystallisation.

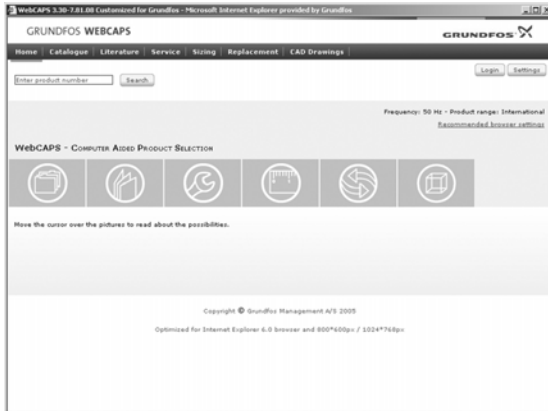
★<sup>4</sup> Reacts violently with water and generates much heat.  
(Pump should be absolutely dry before dosing sulphuric acid.)

★<sup>5</sup> Must be fluoride-free when glass balls are used.

★<sup>6</sup> In neutral solutions.

★<sup>7</sup> Saturated solution 0.1%.

## WebCAPS

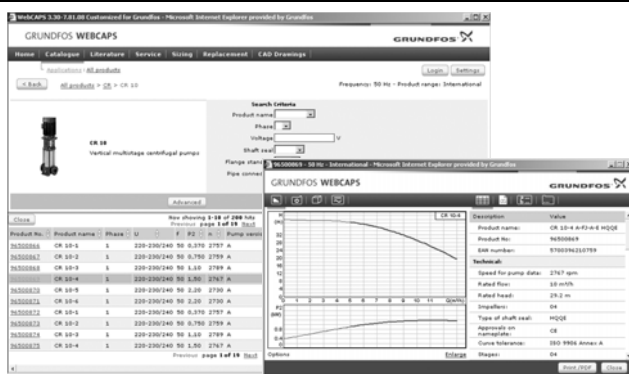


WebCAPS is a **Web-based Computer Aided Product Selection** program available on [www.grundfos.com](http://www.grundfos.com).

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

In WebCAPS, all information is divided into 6 sections:

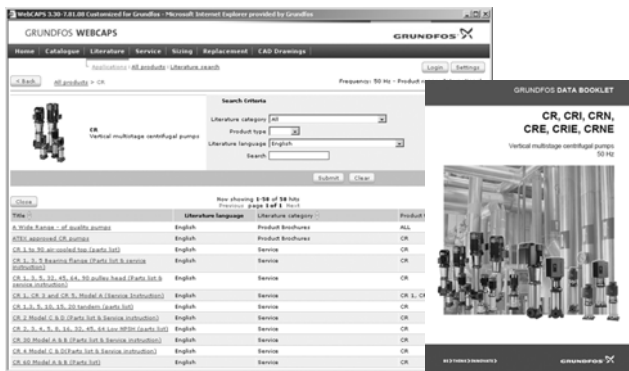
- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



### Catalogue

This section is based on fields of application and pump types, and contains

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



### Literature

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

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



### Service

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



## Sizing

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

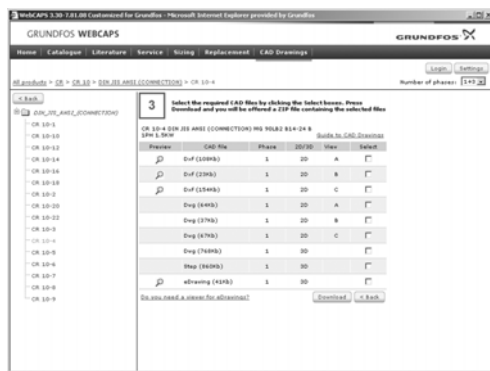
- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- analyse your selected pump via the built-in life cycle cost tool
- determine the flow velocity in wastewater applications,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



## Replacement

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

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



## CAD drawings

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

These formats are available in WebCAPS:

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

## WinCAPS



Fig. 24 WinCAPS CD-ROM

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 185,000 Grundfos products in more than 20 languages.

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

WinCAPS is available on CD-ROM and updated once a year.





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Subject to alterations.