

DDI

Dosing



1. Features and benefits	3
DI 222	3
2. Performance range	4
DDI AR	4
3. Identification	5
Type key	5
4. Functions	6
Versions	6
Options	6
Capacity control	7
Control panel	7
Menu	8
Operating modes	10
Other options	10
5. Construction	14
General description	14
DDI 222 AR	14
A Spring-loaded valves	14
6. Technical data	15
Dimensions	15
Performance data	16
Suction lift	16
Permissible viscosity	16
Inlet and discharge pressures	16
Permissible temperature range of the pumped media	17
Weights	17
Electrical data	17
Additional technical data	17
Electronic functions	18
Operating modes, additional data	18
7. Pump selection	19
8. Pumped liquids	20
List of pumped liquids	20
9. Further product information	21
WebCAPS	21
WinCAPS	22
GO CAPS	23

1. Features and benefits

DI 222

DIGITAL DOSING
up to 39.6 GPH



TM 03 4770 2706

Fig. 1 DI 222 AR

The DDI series is well 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 liters 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 back pressure allowed (in bar) and leave everything to the DDI. If the pressure is exceeded, the pump shuts down.

Double diaphragm for optimal process reliability - optional

Some processes must never be interrupted - not even in the event of a diaphragm rupture. The DDI is available with an integrated double diaphragm system with a differential pressure sensor. If the diaphragm fails, the DDI will continue dosing thanks to the protective diaphragm, send an error signal as notification to replace the diaphragm.

Turndown ratio 1:800

The DDI 222 AR has a turndown ratio ten times better than that of traditional equipment, allowing 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 dosing pumps. Each stroke is carefully timed to bring you even concentrations in the system and optimal 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 liquids with a viscosity of up to 1,000 cps; at 40 %, it will handle extremely viscous media up to 2600 cps. 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

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

2. Performance range

DDI AR

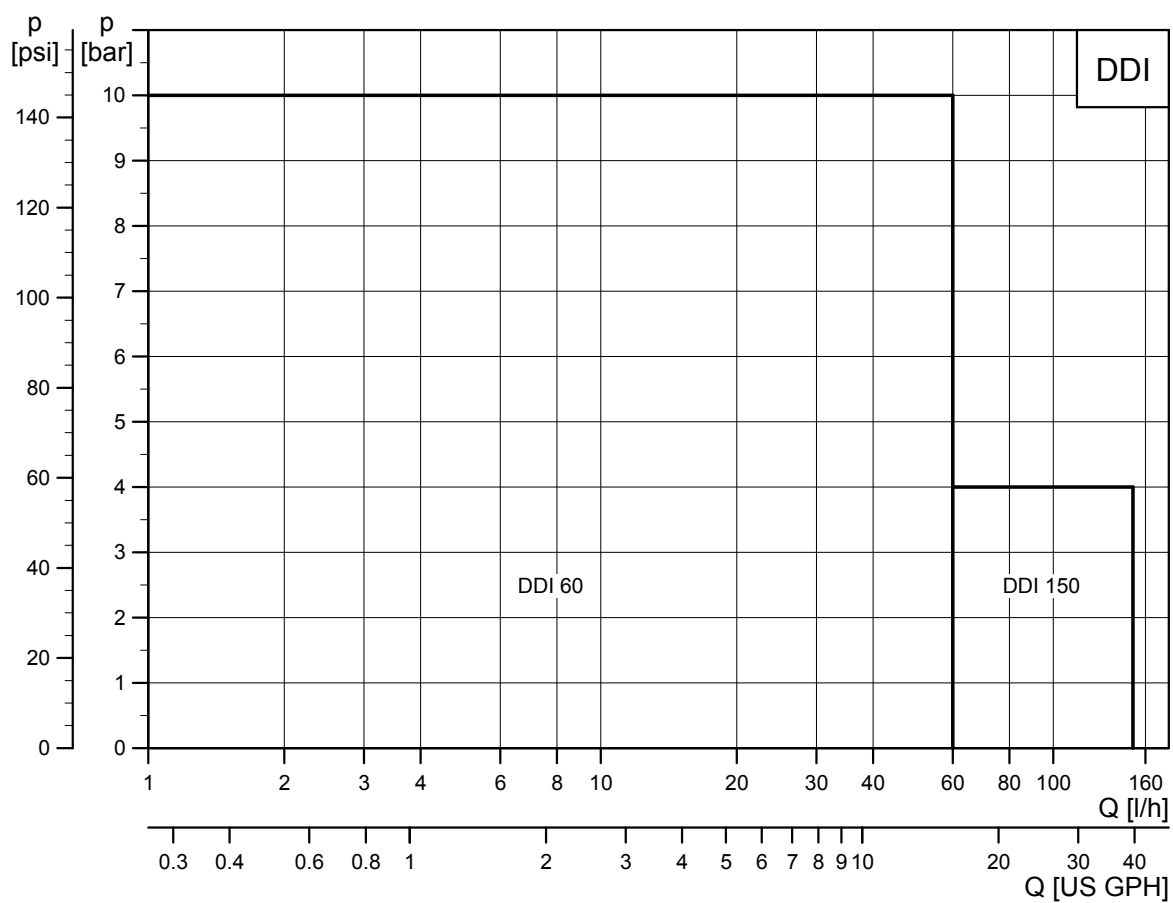


Fig. 2 Performance range, DDI AR

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3. Identification

Type key

Example:		DDI	2- 16	AR	PVC	/V	/G	-F	-3	1	3	B1	B
Type range													
DDI													
Size													
Control version													
AR	Standard												
AF	AR with flow monitor												
AP	AR with Profibus												
APF	AR with flow monitor and Profibus												
Dosing head variant													
PP	Polypropylene												
PV	PVDF (polyvinylidene fluoride)												
PVC	Polyvinyl chloride												
SS	Stainless steel 316												
PP-L	PP + Integrated diaphragm leakage detection												
PV-L	PV + Integrated diaphragm leakage detection												
PVC-L	PVC + Integrated diaphragm leakage detection												
SS-L	SS + Integrated diaphragm leakage detection												
Gasket material													
E	EPDM (ethylene propylene diene monomer)												
V	FKM (fluorocarbon, e.g. Viton®)												
T	PTFE (polytetrafluoroethylene, e.g. Teflon®)												
Valve ball material													
C	Ceramic												
G	Glass												
T	PTFE (polytetrafluoroethylene, e.g. Teflon®)												
SS	Stainless steel 316												
Control panel position													
F	Front-mounted												
S	Side-mounted												

Mains plug	
X	No plug
F	EU (Schuko)
B	USA, Canada
I	Australia, New Zealand, Taiwan
E	Switzerland
Connection, suction/discharge	
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 NPT 1/4"
A9	Threaded NPT 1/2", male
A3	Threaded NPT 3/4", female
A7	Threaded NPT 3/4", male
B1	Tube 6/12 mm/cementing d. 12 mm
B2	Tube 13/20 mm/cementing d. 25 mm
B3	Welding d. 16 mm
B4	Welding d. 25 mm
Valve type	
1	Standard Spring-loaded
2	0.7 psi inlet opening pressure 0.7 psi discharge opening pressure Spring-loaded
3	0.7 psi inlet opening pressure 11.6 psi discharge opening pressure
4	Spring-loaded discharge 11.6 psi discharge opening pressure
5	For abrasive media (SS only)
6	Spring-loaded discharge (DN 20, SS balls) 11.6 psi discharge opening pressure
Supply voltage	
3	1 x 100-240 V, 50/60 Hz
I	24 VDC

4. Functions

Versions

Features	Control versions			
	AR	AF	AP	APF
Flow monitor		●		●
Profibus communication			●	●



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Fig. 3 DDI 222 AR

Options

Pump	Control versions			
	Standard	AR with flow monitor	AR with Profibus	AR with flow monitor and Profibus
	AR	AF	AP	APF
DDI 60-10	●	●	●	●
DDI 150-4	●	●	●	●

Pump	Pump heads	Additional options
	Leak detection	Spring-loaded valves (HV)
DDI 60-10	●	●
DDI 150-4	●	●

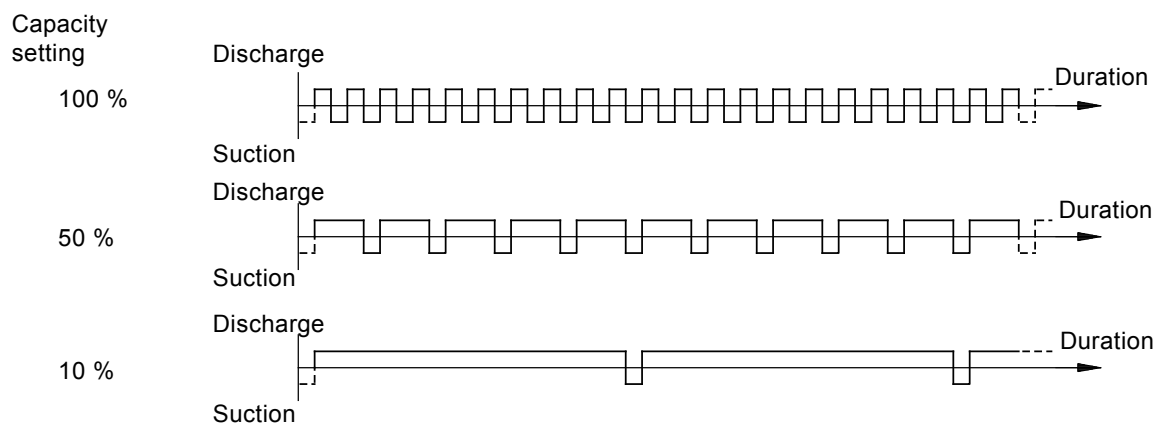
Capacity control

The DDI 222, has an EC motor (brushless DC motor) and electronic power control. Please see page 16 for performance data.

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 liquids is easier.



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Fig. 4 Relation between discharge stroke speed and capacity

Control panel

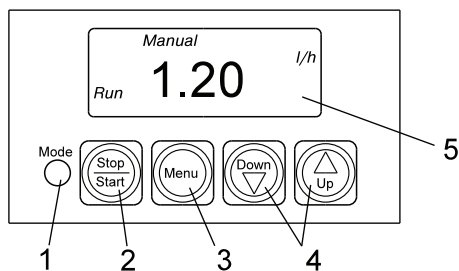


Fig. 5 DDI control panel

TM03 4455 2106

Legend

Pos.	Component
1	Mode (light-emitting diode): • Red light indicates that the pump has stopped. • Green light indicates that the pump has started; the light is briefly off during a suction stroke. • Yellow light indicates that the pump is switched off remotely • Red light is flashing in case of an error signal • Light is off when the pump is in menu mode
2	Start/stop (button): • For starting and stopping the pump.
3	Menu (button): • For switching between operating modes.
4	Down/Up (button): • For changing the values in the display.
5	LCD display

Menu

Menu, first level

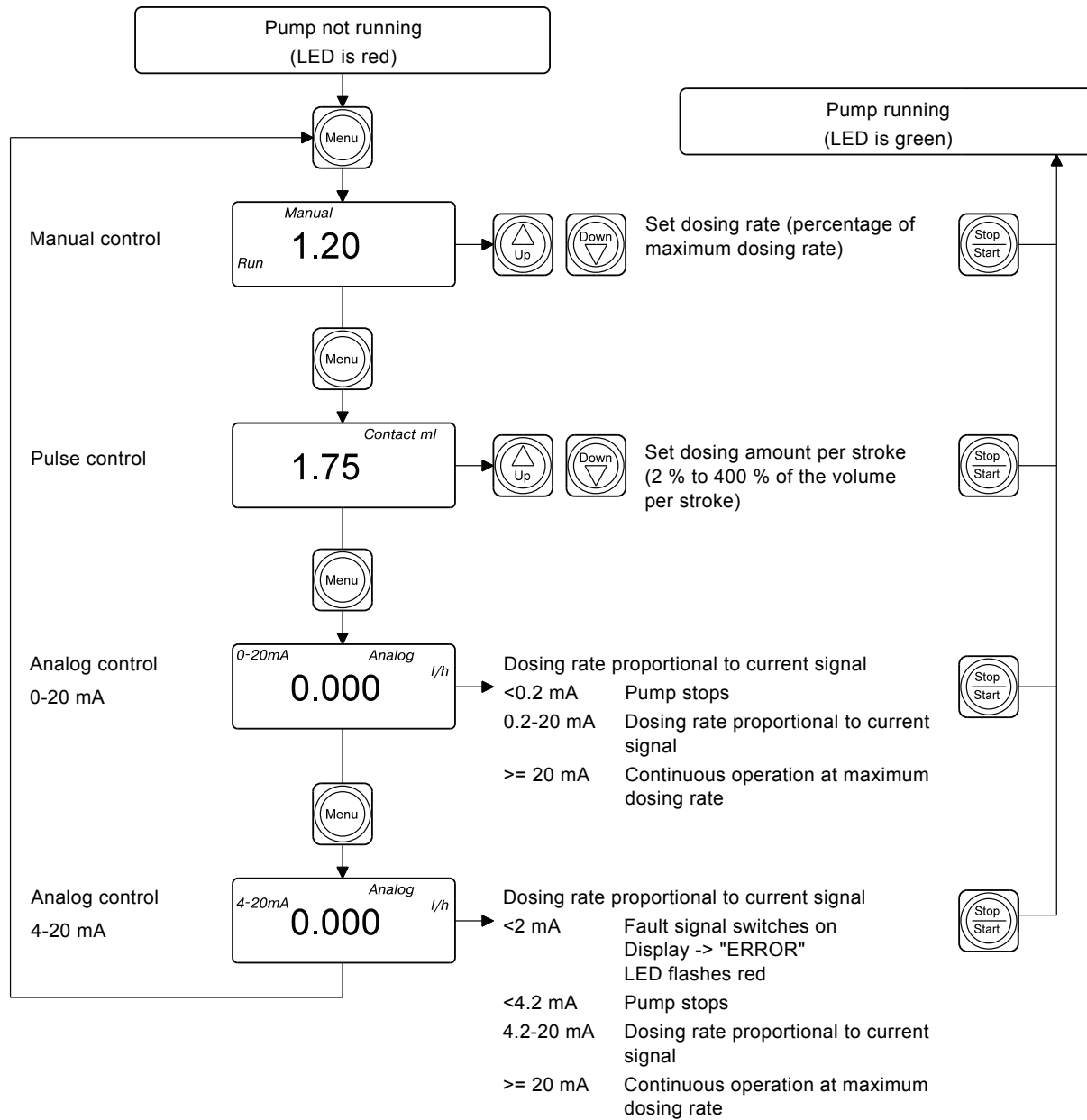
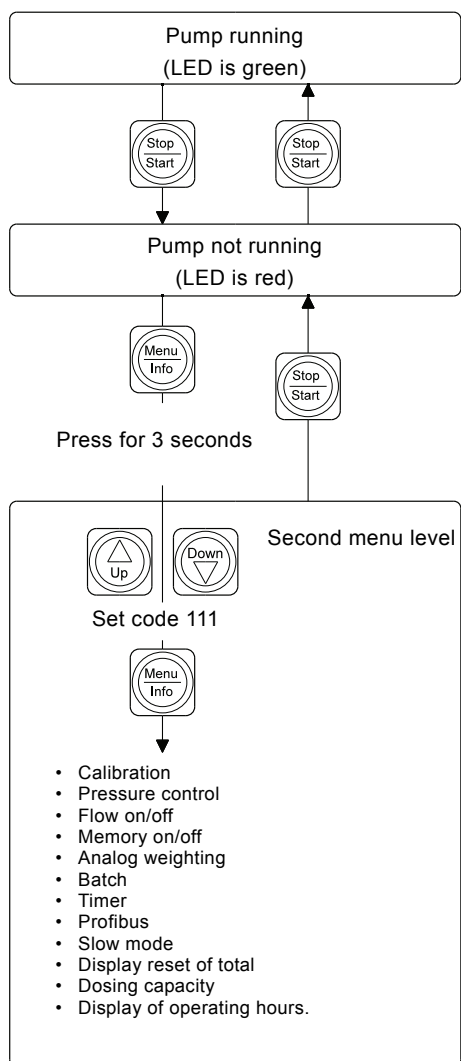


Fig. 6 Menu (first level)

TM03 4453 2106

Menu, second level

Please see the pump manual for a detailed overview and instructions for navigating the menu.



TM03 4454 2106

Fig. 7 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 for setting the inputs and outputs.

Operating modes

Manual control

In manual control mode, the flow rate is set 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 65000 pulses for processing later.

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

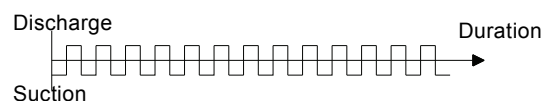
The set batch quantity is dosed with a preset interval.

Slow mode

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

Slow mode can be activated in any operating mode.

Normal mode



Slow mode

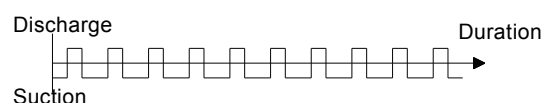


Fig. 8 Slow mode vs. normal operation

Other options

Leak detection

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

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

The opto-electronic sensor contains:

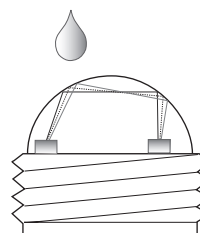
- infrared transmitter
- infrared receiver.

Leak-detection opto-sensor

In the event of a leak in the diaphragm:

- liquid penetrates the dosing head flange
- light refraction changes
- the sensor emits a signal.

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



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Fig. 9 Leak-detection opto-sensor

Tank level control

Two-stage empty-tank signal. This requires a separate empty-tank sensor, not included with the pump.

Flow monitor (option)

This unit monitors the dosing process and emits a pulse for each suction stroke. Only for aqueous liquids with a maximum viscosity of 5 mPa s.

Electronic lock

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

It is still possible to acknowledge error messages by means of the "Start/Stop" button.

To stop the pump when the electronic lock is activated:

- If the 'remote switching' is connected: switch off the pump remotely
- Disconnect the pump from the power supply.

Calibration

The dosing flow display is factory-set to an operating back pressure of 43.5 psi (3 bar). Calibration can be used to set the pump flow to the actual operating conditions.

Remote on/off

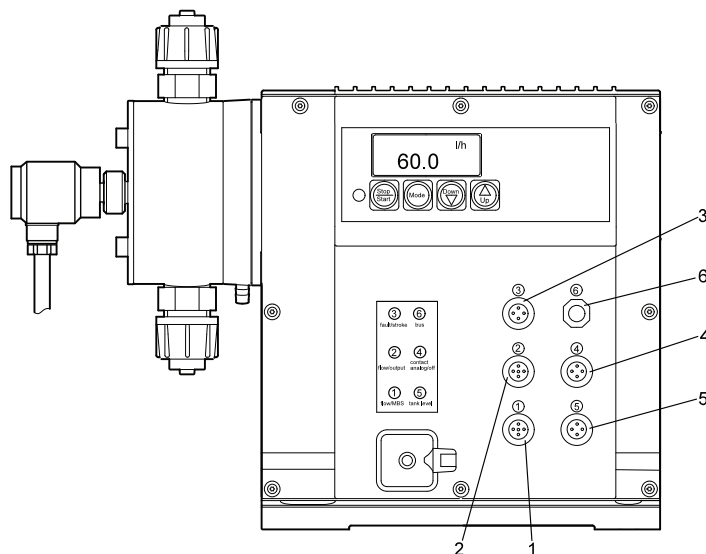
The pump can be switched off remotely (for example from a control room).

- If the pump is switched off remotely, it does not respond to any input signals or to operator inputs. Exception: The pump can still be stopped manually (press the "Start/Stop" button) and run in continuous operation (press and hold down the "Start/Stop" button).

- "Stop" is indicated in the display.
- The yellow LED is on.
- When it is switched on remotely, the pump returns to the state it was in before it was switched off. If, for example, the pump was previously in "Stop" mode, it returns to this mode once it is switched on.

Profibus

The DDI is also available with a Profibus DP interface.

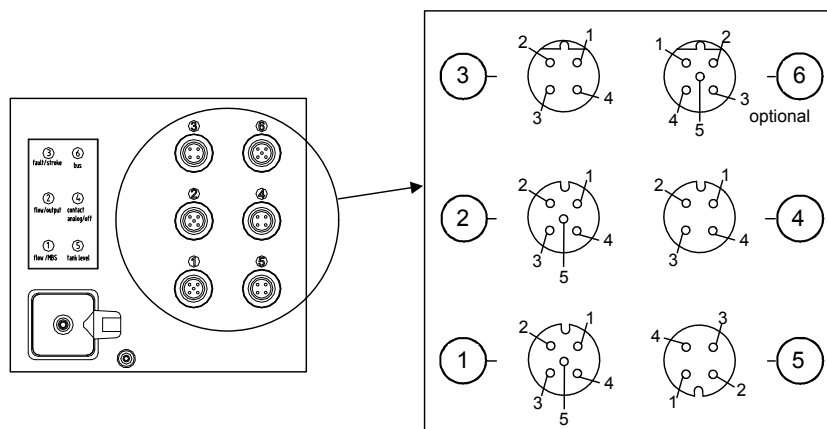
Control cable connections

TM03 4780 2806

Fig. 10 Connectors on the DDI 222 AR

Legend

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



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Fig. 11 DDI 222 connection diagram

Socket 1: Diaphragm leakage signal / Flow Monitor (pressure sensor)

For diaphragm leakage signal (MLS) and/or pressure sensor (Flow Monitor pump option).

The diaphragm leakage signal and pressure sensor are pre-assembled with an M12 plug for socket 1.

- Connect the cables according to the table below.

Socket 1		Used for / wire colors	
Pin	Assignment	Diaphragm leakage signal (MLS)*	Pressure sensor
1	+5 V		x
3	Pressure sensor input		x
4	MLS input	Black	
5	GND	Green/yellow	x

* MLS is an abbreviation of the function in German language "Membranleckagesignalisierung" = diaphragm leakage signalling

Socket 2: Current output/Flow Monitor (pressure sensor)

For pressure sensor for Flow Monitor option.

The pressure sensor is supplied ready-made with M12 plug for socket 2 or socket 1.

The current output indicates the current dosing flow and can be weighted independently of the selected operating mode.

Note

Pressure sensor (Flow Monitor):
If socket 2 is also used for current output, the pressure sensor can be either connected to socket 1 or preferably together with the current output to socket 2 using the plug set (product number 96645265)

		2m (6 ft.) cable 96632921	5m (16 ft.) 96632922		
Socket 2		Cable	Used for		
Pin	Assignment	Wire color	+/- current output	Pressure sensor	
1	+5 V	Brown		x	
3	Pressure sensor input	Blue		x	
4	Current input	Black	+		
5	GND	Green/yellow	-	x	

Socket 3: Stroke/pulse/pre-empty/error signal

Electrically isolated output for stroke/pulse signal or pre-empty signal and error signal.

		2m (6 ft.) cable 96609017	5m (16 ft.) 96609019
Socket 3		Cable	Used for
Pin	Assignment	Wire color	Stroke/pulse signal/ pre-empty signal Error signal
1	Error signal contact	Brown	x
2	Stroke/pulse signal or pre-empty signal contact	White	x
3	Stroke/pulse signal or pre-empty signal contact	Blue	x
4	Error signal contact	Black	x

Socket 4: Remote on/off/contact input/current input

For the remote on/off input and contact input or current input. If the remote on/off and contact inputs are to be used at the same time, wire 1 is assigned twice.

Caution

For the connection of one cable, use a plug adapter with simple cable entry, for the connection of two cables, use a plug adapter with double cable entry, otherwise the protection will be lost!

		2m (6 ft.) cable 96609014	5m (16 ft.) 96609016
Socket 4		Cable	Used for
Pin	Assignment	Wire color	Remote on/off input Contact input +/- current input
1	GND	Brown	x x -
2	Current input	White	+
3	Remote on/off input	Blue	x
4	Contact input	Black	x

Socket 5: Empty signal only/pre-empty and empty signal

For the empty signal only or pre-empty and empty signal input. The suction lines with empty signal or pre-empty and empty signal are pre-assembled with a plug for socket 5.

Socket 5		Used for	
Pin	Assignment	Empty signal	Pre-empty signal
1	Pre-empty signal		x
2	Empty signal	x	
3	GND	x	x

Socket 6: PROFIBUS (optional)

Socket 6 for PROFIBUS is only used when the PROFIBUS option is selected.

For pumps with PROFIBUS option, please refer to the separate "PROFIBUS-DP" manual provided.

5. Construction

General description

The DDI range of pumps are digitally controlled dosing pumps.

DDI 222 AR

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

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

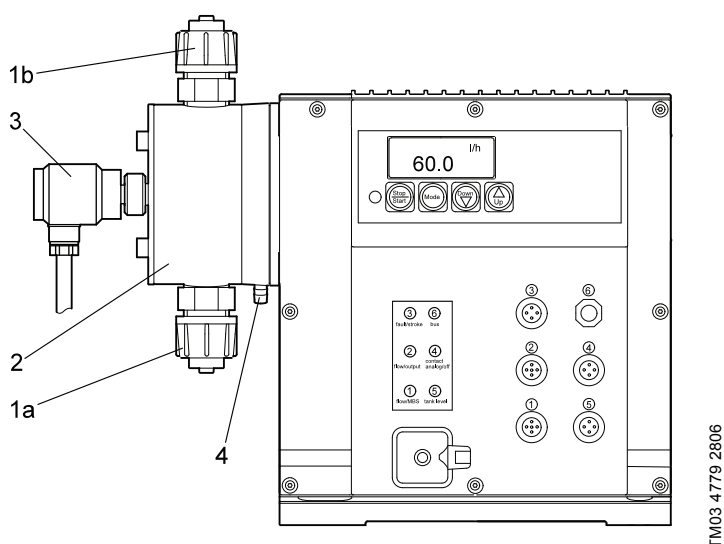


Fig. 12 Main components, DDI 222 AR

Legend

Pos.	Component
1a	Suction valve
1b	Discharge valve
2	Dosing head
3	Leakage detection pressure switch
4	Outlet joint in case of diaphragm breakage

A Spring-loaded valves

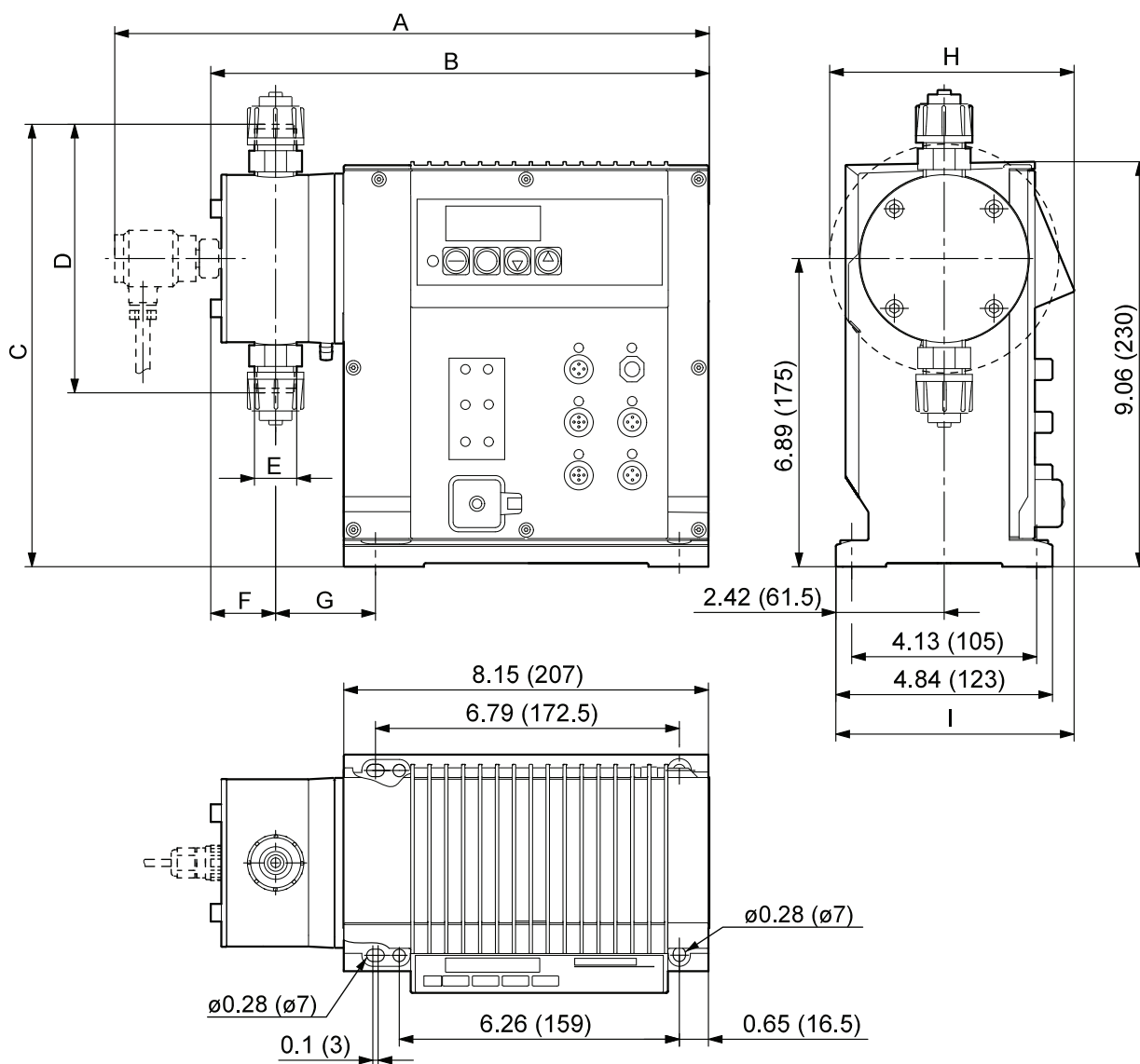
The pump head can be supplied with spring-loaded valves for improved performance when handling viscous liquids. Some of these valves have a larger nominal width and incorporate adapters.

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

6. Technical data

Dimensions

DDI 222 AR



TM03 4877 3206

Dimensions [inches (mm)]

Pump	Model	A	B	C	D	E	F	G	H	I	C HV"	D HV"	E HV"	F HV"	G HV"
DDI 60-10	222 AR	12.83 (326)	10.71 (272)	9.92 (252)	6.02 (153)	R 5/8	1.02 (26)	2.28 (58)	- (-)	5.39 (137)	9.69 (246)	5.63 (143)	R 1 1/4	1.54 (39)	3.54 (90)
DDI 150-4	222 AR	14.65 (372)	12.4 (315)	10.43 (265)	7.05 (179)	R 1 1/4	1.54 (39)	3.54 (90)	5.47 (139)	5.39 (137)	10.43 (265)	7.05 (179)	R 1 1/4	1.54 (39)	3.54 (90)

* Adjusted dimensions for high-viscosity option

Performance data

DDI 222 AR

Pump	Model	Vstroke [cm ³]	Max. pressure ¹⁾ [psi (bar)]	Capacity ²⁾ [GPH (l/h)]			Max. stroke rate [strokes/min]
				Normal	Slow mode-1	Slow mode-2	
DDI 60-10	222 AR	6.63	145 (10)	15.9 (60)	10.6 (40)	6.5 (24.7)	180
DDI 150-4	222 AR	13.9	58 (4)	39.7 (150)	26.4 (100)	16.4 (62)	180

- 1) Observe the maximum permissible temperatures. When dosing the more viscous liquids, 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 back pressure.

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

Suction lift

DDI 222 AR

Pump	Motor	Max. suction lift during operation ¹⁾ Viscosity similar to water [ft. (m)]	Max. suction lift Start-up ²⁾ Non-degassing liquids Viscosity similar to water [ft. (m)]
		Normal operation	Standard
DDI 60-10	222 AR	9.8 (3)	3.3 (1)
DDI 150-4	222 AR	6.6 (2)	3.3 (1)

- 1) Dosing head and valves moistened.

- 2) Venting valve open.

Permissible viscosity

DDI 222 AR

Pump	Motor	Max. permissible viscosity at operating temperature ¹⁾ [cps]			Max. permissible viscosity at operating temperature ¹⁾ Spring-loaded valves ²⁾ [cps]		
		Normal operation	Slow mode-1 operation	Slow mode-2 operation	Normal operation	Slow mode-1 operation	Slow mode-2 operation
DDI 60-10	222 AR	100	200	500	200	1000	2600
DDI 150-4	222 AR	100	200	500	500	800	2000

- 1) The specified values are approximate values and refer to Newtonian liquids.

- 2) Version for high-viscosity liquids.

Please note the increasing viscosity at lower temperatures.

Inlet and discharge pressures

DDI 222 AR

Pump	Motor	Max. inlet pressure [psi (bar)]			Min. back pressure [psi (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 AR	29 (2)	29 (2)	29 (2)	14.5 (1)	14.5 (1)	14.5 (1)
DDI 150-4	222 AR	29 (2)	29 (2)	29 (2)	14.5 (1)	14.5 (1)	14.5 (1)

Permissible temperature range of the pumped media

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

Dosing head material	Permissible liquid temperature [°F (°C)]	
	p < 145 psi (10 bar)	p < 232 psi (16 bar)
PVC, PP	32 to 104 (0 to 40)	32 to 68 (0 to 20))
316TiSS *	14 to 158 (-10 to 70)	14 to 158 (-10 to 70)
PVDF**	14 to 140 (-10 to 60)	14 to 68 (-10 to 20)

* Short-term (15 min.) resistance to 248°F at up to 29 psi back pressure.

** Increased resistance to 158°F if back pressure is less than 43 psi.

Weights

Pump	Weights [lbs]	
	PVC, PVDF and Polypropylene	Stainless steel
DDI 60-10	11.0	15.4
DDI 150-4	14.3	26.5

Electrical data

	DDI 222
Power supply	100-240 V, 50/60 Hz
Power consumption	50 VA
Input signal	
pulse signal	load < 12 V, 5 mA
• min. pulse length: 10 ms	
• min. pause time: 25 ms)	
remote on/off	load < 12 V, 5 mA
empty-tank signal	load < 12 V, 5 mA
current signal	load < 22 Ohm
Output signal	
current signal 0(4) - 20 mA	load < 350 Ohm
error signal	ohmic load < 50 V DC/75 V AC, 0.5 A
empty-tank pre-alert	ohmic load < 50 V DC/75 V AC, 0.5 A
stroke signal	ohmic load < 50 V DC/75 V AC, 0.5 A
• contact time 200 ms /stroke	
Enclosure class	IP 65

Additional technical data

	DDI 222
Control range	0.125 % to 100 % of the maximum dosing capacity
Accuracy	+/- 1.5 % repeatability throughout adjustable range
Permissible ambient temperature	32 to 104 F
Permissible storage temperature	14 to 122 F
Max. relative humidity	92 % (non-condensing)
Sound pressure level	65 ± 5 dB (A)
Material of enclosure (pump and electronics)	PPE-SB (fibre-reinforced Luranyl®) Option: Flameproof enclosure
Approvals	CE

Electronic functions

Function	DDI 222 AR
Continuous operation (for functional test, self-priming and dosing head deaeration)	●
Memory function saves up to 65,000 pulses	●
Two-stage, empty-tank signal (requires empty-tank sensors)	●
Integrated, two-step tank level indicator for the dosing system	
Flow monitor (option) ¹⁾	●
Diaphragm leakage detection (option) ²⁾	●
Stroke signal (standard) or empty-tank pre-alert or pulse input (adjustable) ³⁾	●
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)	●
Integrated flow measurement and monitoring	
Hall sensor (for motor monitoring) ⁴⁾	
Pressure limitation ⁵⁾	●

- 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 admissible back pressure are detected reliably and indicated by the display or the error message output.
- 2) The dosing head of pumps with diaphragm leakage 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
 - an empty-tank pre-alert signal input or
 - each pulse input at the pump.
- 4) If the pump has existing strokes to process, the Hall sensor checks whether the drive is turning. If the drive 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, is equipped with integrated pressure control function. The pressure is calculated from the motor current consumption or is measured directly 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				
Manual control	Input/display of the dosing flow in l/h or gal/h.			
Pulse control (most constant dosing)	Input/display in ml/contact	Pump	V _{max} [ml]	V _{min} [ml]
		DDI 60-10	0.111	22.2
		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))			

7. Pump selection

DDI 209 AR with Plus³

Size	Control variant	Materials of dosing head, gaskets and valve balls	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
60-10 150-4		Dosing head version: PP = Polypropylene PV = PVDF PVC= Polyvinyl chloride SS = Stainless steel, AISI 316 PP-P3 = PP + Plus ³ system PVC-P3 = PVC + Plus ³ system PP-L= PP + integrated diaphragm leakage detection PV-L= PV + integrated diaphragm leakage detection PVC-L = PVC + integrated diaphragm leakage detection SS-L= SS + integrated diaphragm leakage detection	Control panel position F = Front-mounted (variants A, AR) T = Top-mounted (variants A, AR)	Supply voltage 3 = 1 x 100-240 V, 50/60 Hz I = 24 VDC		Connection, suction/discharge 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" V = Threaded NPT 1/4" A9 = Threaded NPT 1/2", male A3 = Threaded NPT 3/4" A7 = Threaded NPT 3/4", male B1 = Tube 6/12 mm/cementing d. 12 mm B2 = Tube 13/20 mm/cementing d. 25 mm B2 = Welding d. 16 mm B4 = Welding d. 25 mm	
	AR = Standard						
	AF = AR with flow monitor						
	AP = AR with Profibus						
	APF= AR with flow monitor and Profibus						
		Gasket material: E = EPDM V = FKM T = PTFE Valve ball material: C = Ceramic G = Glass T = PFFE SS = Stainless steel, AISI 316	Valve type 1 = Standard 2 = Spring-loaded, 0.7 psi opening pressure, suction/discharge 3 = Spring-loaded, 0.7 psi opening pressure, suction 11.6 psi opening pressure, discharge 4 = Spring-loaded, 11.6 psi opening pressure, discharge 5 = For abrasive media (SS only) 6 = Spring-loaded, (DN 20, SS balls) 11.6 psi, discharge side			Mains plug B = USA and Canada, 120 V	

Size	Control variant	Materials of dosing head, gaskets and valve balls	Control panel position	Supply voltage	Valve type	Connection, suction/discharge	Mains plug
DDI 222 AR							
6-10 150-4	AR AF AP APF	PV/T/T PVC/E/SS PVC/T/T (only with 60-10) PVC/V/G (only with 150-4)	F S	3 I	1 2 5 6	4 6 A S V Q A1 A3 A9 B1 B2 B3 B4	B
		SS/V/SS	F S	3 I	1 2 5 6	A9 V	B

8. Pumped liquids

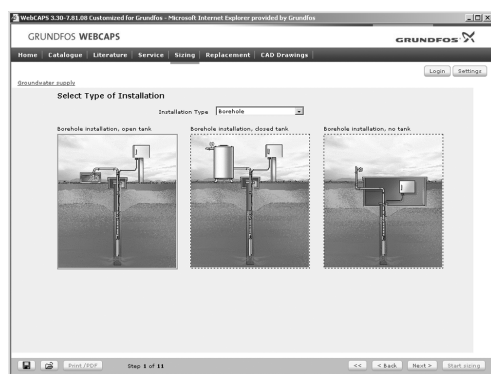
List of pumped liquids

The table below is intended only as a general guide on the resistance of materials (at room temperature) to the liquids listed. The table cannot replace actual testing of the pumped liquids 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 liquids in this table may be toxic, corrosive or hazardous. Be careful when handling the liquids.

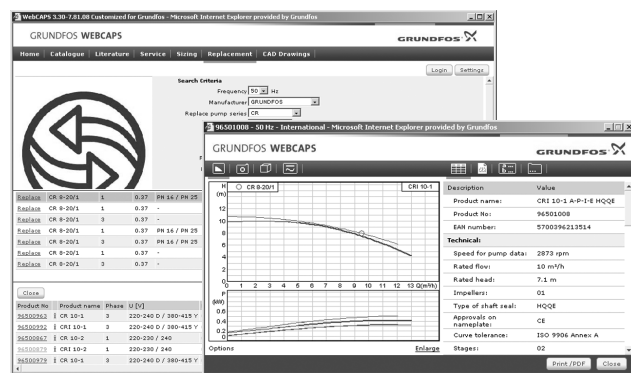
Pumped liquid (68°F)		Concentration %	Materials									
			Pump housing				Gasket				Ball	
Designation	Chemical formula		PP	PVDF	Stainless steel, 316	PVC	FKM (e.g. Viton®)	EPDM	PTFE (e.g. Teflon®)	Centellen C	Ceramic	Glass
Acetic acid	CH ₃ COOH	25	●	●	●	●	-	●	●	●	●	●
		60	●	●	●	●	-	○	●	○	●	●
		85	●	●	●	-	-	-	●	○	●	●
Aluminium chloride	AlCl ₃	40	●	●	-	●	●	●	●	●	●	●
Aluminium sulphate	Al ₂ (SO ₄) ₃	60	●	●	●	●	●	●	●	●	●	-
Ammonia, aqueous	NH ₄ OH	28	●	●	●	●	-	●	●	○	●	-
Calcium hydroxide★ ⁷	Ca(OH) ₂		●	●	●	●	●	●	●	●	●	●
Calcium hypochlorite	Ca(OCl) ₂	20	○	●	-	●	●	●	●	●	●	●
Chromic acid★ ⁵	H ₂ CrO ₄	10	●	●	●	●	●	●	●	●	●	●
		30	-	●	-	●	●	○	●	○	●	●
		40	-	●	-	●	●	-	●	○	●	●
		50	-	●	-	●	●	-	●	○	●	●
Copper sulphate	CuSO ₄	30	●	●	●	●	●	●	●	●	●	●
Ferric chloride★ ³	FeCl ₃	100	●	●	-	●	●	●	●	●	●	●
Ferric sulphate★ ³	Fe ₂ (SO ₄) ₃	100	●	●	●	●	●	●	●	●	●	●
Ferrous chloride	FeCl ₂	100	●	●	-	●	●	●	●	●	●	●
Ferrous sulphate	FeSO ₄	50	●	●	●	●	●	●	●	●	●	●
Hydrochloric acid	HCl	<25	●	●	-	●	○	●	●	●	●	●
		25 to 37	●	●	-	●	-	●	●	○	●	●
Hydrogen peroxide	H ₂ O ₂	30	●	●	●	●	●	●	●	●	●	●
		10	●	●	●	●	●	●	●	●	●	●
Nitric acid	HNO ₃	30	●	●	●	●	●	●	●	-	●	●
		40	○	●	●	●	●	●	●	-	●	●
		70	-	●	●	-	●	-	●	-	●	●
		50	●	-	●	●	-	●	●	○	●	-
Peracetic acid	CH ₃ COOOH	5	●	●	-	●	-	●	●	●	●	●
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	20	●	○	●	●	●	●	●	○	●	-
		30	●	-	●	●	●	●	●	○	●	-
		50	●	-	●	●	●	●	●	○	●	-
Sodium hypochlorite	NaOCl	20	○	●	-	●	●	●	●	●	●	●
Sodium sulphide	Na ₂ S	30	●	●	●	●	●	●	●	●	●	-
Sodium sulphite★ ⁶	Na ₂ SO ₃	20	●	●	●	●	●	●	●	●	●	-
Sulphurous acid	H ₂ SO ₃	6	●	●	●	●	●	●	●	●	●	○
Sulphuric acid★ ⁴	H ₂ SO ₄	<80	●	●	-	○	●	○	●	○	●	○
		80 to 98	○	●	-	-	●	-	●	●	●	-
● Resistant.	★ ³ Risk of crystallization.											
○ Limited resistance.	★ ⁴ Reacts violently with water and generates much heat. (Pump should be absolutely dry before dosing sulphuric acid.)											
- Not resistant.	★ ⁵ Must be fluoride-free when glass balls are used. ★ ⁶ In neutral solutions. ★ ⁷ Saturated solution 0.1 %.											



Sizing

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

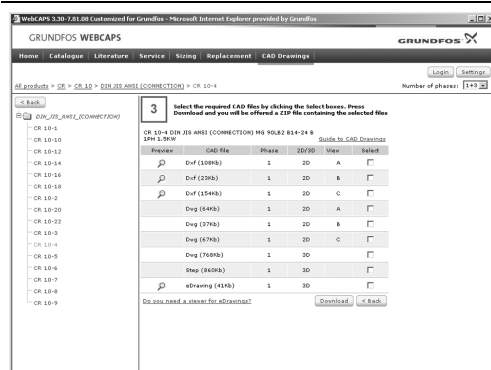
- Select the most suitable and efficient pump for your installation.
- Carry out advanced calculations based on energy, consumption, payback periods, load profiles, life cycle costs, etc.
- Analyze your selected pump via the built-in life cycle cost tool.
- Determine the flow velocity in wastewater applications,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



Replacement

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

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



CAD drawings

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

These formats are available in WebCAPS:

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

WinCAPS



Fig. 13 WinCAPS DVD

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

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

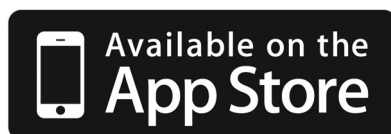
WinCAPS is available on DVD and updated once a year.

GO CAPS

Mobile solution for professionals on the GO!



CAPS functionality on the mobile workplace.



Subject to alterations.

L-DDI-PG-01

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GRUNDFOS Pumps Corporation

17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

GRUNDFOS Canada Inc.

2941 Brighton Road
Oakville, Ontario L6H 6C9
Canada
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

Bombas GRUNDFOS de Mexico S.A. de C.V.

Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. Mexico 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010