

## DDI 209

The digital diaphragm dosing pump



## The Highlights

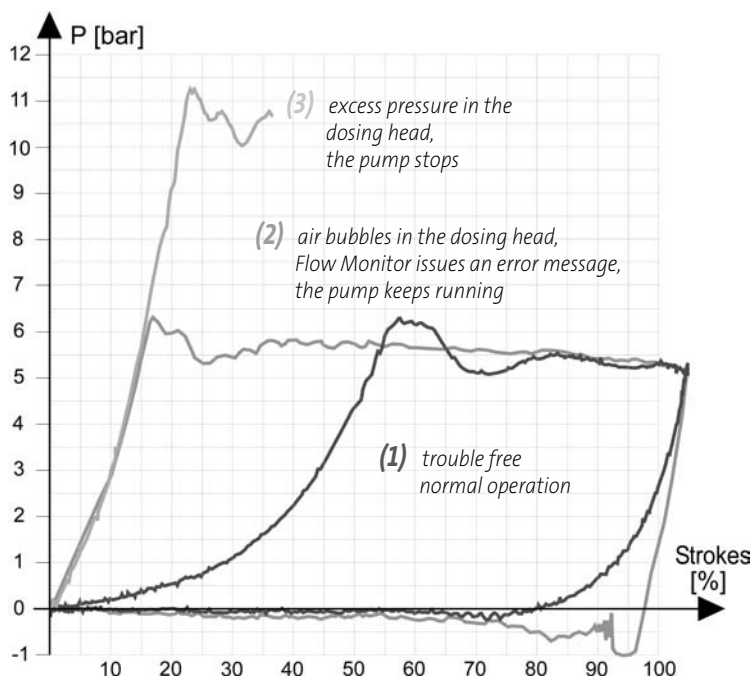
- Straightforward input and monitoring of the dosing rate in l/h or gal/h with perfect calibration, delivering a unique level of precision
- Smooth, virtually continuous dosing guarantees top process quality and optimum media miscibility
- The Slow Mode decelerates the suction stroke in a way, that even very viscous liquids are dosed with high precision
- Optimum suction ensures that even very small quantities can be dosed reliably
- Thanks to the powerful stepping motor, DDI model 209 doses with unrivalled precision, stability and effectiveness
- Versatile digital control for customised processes
- Special valve combinations for particularly viscous media
- Various possibilities for individual applications, e.g. contact or analogue signal control, batch dosing with or without timer



DDI 209 - back side

## Flow Monitor – unique digital dose monitoring

### Indication diagram



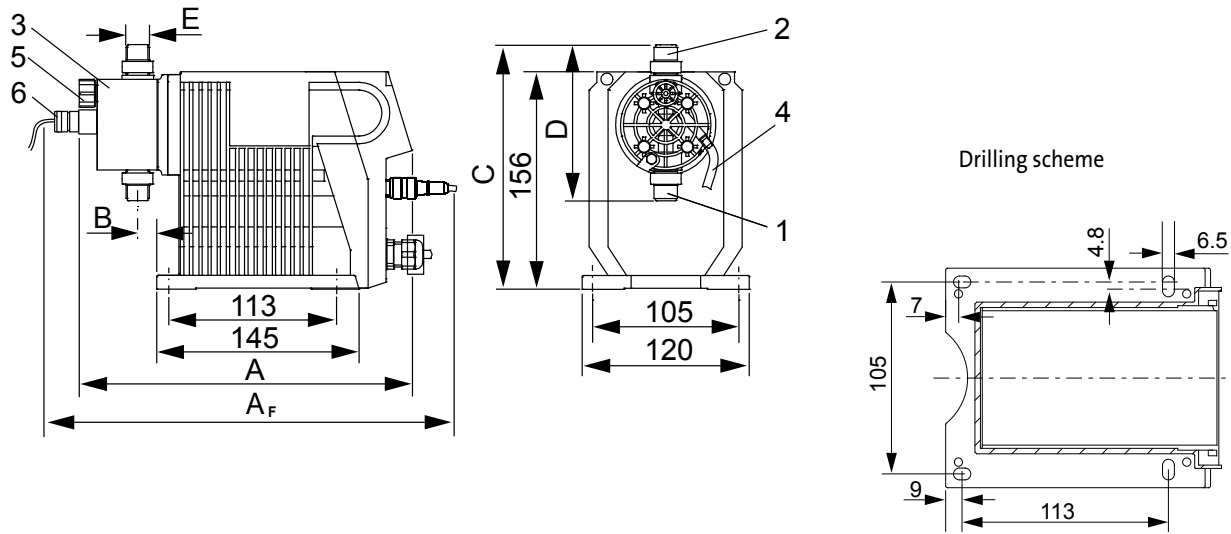
- Dosing malfunctions – on both the suction and pressure side – are detected and reported immediately and reliably, even with very low volumetric flows and a low number of strokes.
- The system is monitored for excess pressure on the pressure side: simply set the maximum permissible pressure in the dosing head and the pump will stop if it is exceeded.
- The prevailing pressure is measured continually and can be queried at any time at the touch of a button.



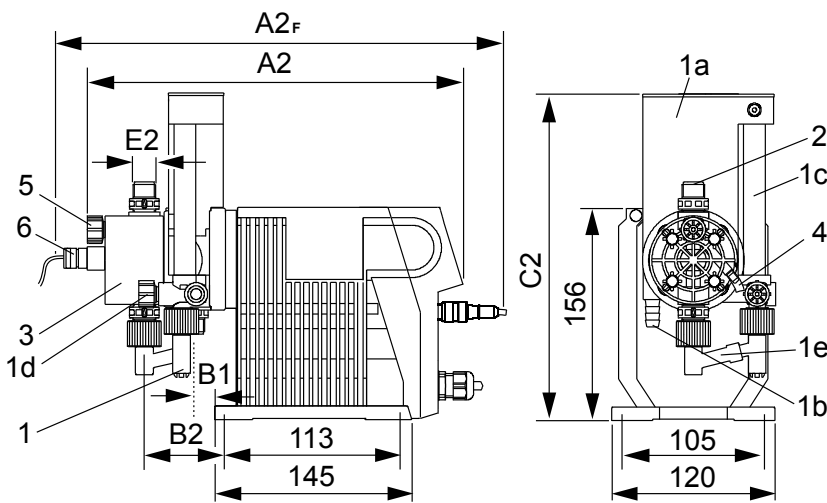
DDI 209 FM P3



● DDI 209 with manual deaeration



\* DDI 209 with P3<sup>3</sup> system



1 Suction line from the tank

**Plus<sup>3</sup> system P3:**

1a Priming unit with deaeration chamber

1b Overflow line to the tank

1c Calibrating tube

1d Shut-off valve at the calibration tube

1e Line from calibrating tube to dosing head

2 Dosing line

3 Dosing head

4 Deaeration line

5 Deaeration screw

6 Flow Monitor (option)

Measurements in mm

DDI model	● A	* A2	● * A <sub>F</sub>	* A2 <sub>F</sub>	● B	* B1	* B2	● C	* C2	● D	● E	* E2
209-0.4	239	276	345	385	23	25	61	176	240	108	G 3/8"	G 3/8"
209-2.2	239	276	345	385	23	25	61	176	240	108	G 3/8"	G 3/8"
209-2.5	239	276	345	385	23	25	61	176	240	108	G 3/8"	G 3/8"
209-5.5	239	276	345	385	23	25	61	176	240	108	G 3/8"	G 3/8"
209-13.8	240	-	346	-	29	-	-	185	-	133	G 5/8"	-
209-20	240	-	346	-	29	-	-	185	-	133	G 5/8"	-

## Pump types

- incl. connections, deaeration line, cable and European plug
- strokes per minute: max. 180 in normal operation, max. 120 in slow mode

Normal operation				Slow mode				V <sub>stroke</sub> [ml] (p = 3 bar)	DDI model
Q [l/h]	p <sub>max</sub> [bar]	Q [USg/h]	p <sub>max</sub> [psi]	Q [l/h]	p <sub>max</sub> [bar]	Q [USg/h]	p <sub>max</sub> [psi]		
0.004 - 0.4 *)	10	0.001 - 0.11	145	0.004 - 0.26	10	0.001 - 0.071	145	0.069	209-0.4D
0.025 - 2.2	16	0.007 - 0.58	232	0.025 - 1.5	16	0.007 - 0.39	232	0.276	209-2.2D
0.025 - 2.5	10	0.007 - 0.66	145	0.025 - 1.7	10	0.007 - 0.45	145	0.276	209-2.5D
0.055 - 5.5	10	0.015 - 1.45	145	0.055 - 3.7	10	0.015 - 0.97	145	0.587	209-5.5D
0.138 - 13.8	4	0.036 - 3.64	58	0.138 - 9.2	4	0.036 - 2.38	58	1.36	209-13.8D
0.200 - 20	3	0.053 - 5.28	43.5	0.200 - 13.3	3	0.053 - 3.43	43.5	1.95	209-20D

## Pumps with Plus<sup>3</sup> system

0.004 - 0.4 *	10	0.001 - 0.105	145	0.004 - 0.27	10	0.001 - 0.071	145	0.069	209-0.4D Plus <sup>3</sup>
0.025 - 1.9	16	0.007 - 0.50	232	0.025 - 1.3	16	0.007 - 0.32	232	0.276	209-2.2D Plus <sup>3</sup>
0.025 - 2.2	10	0.007 - 0.58	145	0.025 - 1.4	10	0.007 - 0.37	145	0.276	209-2.5D Plus <sup>3</sup>
0.055 - 4.9	10	0.015 - 1.29	145	0.055 - 3.2	10	0.015 - 0.84	145	0.587	209-5.5D Plus <sup>3</sup>

\*) If the backpressure is less than 10 bars, the maximum dosing capacity of DDI model 209-0.4D increases to 1.0 l/h.

## Technical data

Connections	DDI model 209-2.2D (16 bars)	<ul style="list-style-type: none"> <li>suction side PVC (PE) hose 4/6, PVDF hose 4/6, steel pipe 4/6</li> <li>pressure side PVC hose 6/12, PP or PVDF pipe 12/16, steel pipe 4/6</li> </ul>	
	DDI model 209-0.4D/-2.5D/-5.5D	<ul style="list-style-type: none"> <li>suction side PVC (PE) hose 4/6, PVDF hose 4/6, steel pipe 4/6</li> <li>pressure side PVC hose 6/12, PP or PVDF pipe 12/16, steel pipe 4/6</li> </ul>	
	DDI model 209-13.8D/-20D	<ul style="list-style-type: none"> <li>PVC hose 6/12, PP or PVDF pipe 12/16, steel pipe 1/4"</li> </ul>	
Accuracy	dosing flow variation < ± 1.5%, linearity deviation < ± 1.5 %		
Noise level	55 ± 5 dB (A), tested according to DIN 45635-01-KL3		
Max. suction height <i>liquids with viscosity similar to water</i>	DDI models: 209-0.4D 209-2.2D/-2.5D/-5.5D 209-13.8D/-20D	<b>Normal operation</b> flooded suction, Plus <sup>3</sup> : 1.5 m WC 4 m WC; with Plus <sup>3</sup> : 1.5 m WC 3 m WC	<b>Slow mode</b> flooded suction, Plus <sup>3</sup> : 1.5 m WC 6 m WC; with Plus <sup>3</sup> : 1.5 m WC 3 m WC
Max. viscosity <i>at operating temperature</i>	DDI models: 209-0.4D/-0.4 Plus <sup>3</sup> / 209-2.2D/-2.5D 209-2.2D Plus <sup>3</sup> / 209-5.5D/-13.8D/-20D 209-5.5D Plus <sup>3</sup>	<b>Normal operation</b> 200 mPa s, HV valves 500 mPa s 100 mPa s 100 mPa s, HV valves 200 mPa s 50 mPa s	<b>Slow mode</b> 200 mPa s, HV valves 1000 mPa s 200 mPa s 200 mPa s, HV valves 500 mPa s 100 mPa s
Max. admission pressure	2 bar on the suction side ( <b>with Plus<sup>3</sup> system: only suction</b> )		
Min. backpressure	1 bar on the pressure side (at the pressure joint of the pump)		
Max. temperature	<ul style="list-style-type: none"> <li>max. ambient and operating temperature + 40° C</li> <li>storage temperature - 10° C to + 50° C</li> </ul>		
Max. relative air humidity	92%, no condensation		
Motor / voltage	dynamic stepping motor with gear, long range 110 V - 240 V, 50/60 Hz, option 24 V DC <b>power consumption 20 VA</b>		
Enclosure, protection	pump and electronics, material of enclosure: s PS FR GF 22; Pump protection: IP 65		
Weight	up to max. 3.6 kg		
Plus <sup>3</sup> system	<ul style="list-style-type: none"> <li>suitable for moderately degassing, crystallizing and/or concentrated liquids as well as very small quantities; Examples: <b>sodium hypochlorite, flocculents, hydrochloric acid</b></li> <li>for H<sub>2</sub>O<sub>2</sub> or peracetic acid please contact us!</li> </ul>		

## Options

- **Voltage:** 110 - 240 V or 24 V DC
- **Profibus:** with or without Profibus® DP - VO incl. GSD file and address decoder document
- **Display:** horizontal or at an angle

## Electronics and electronic data

- Continuous operation: start/stop, function check, dosing head deaeration
- Memory function saves up to 65 000 pulses
- Empty tank signal: Reed contact for empty signal/ pre-alert
- Flow Monitor (option)
- Diaphragm leakage indication, dosing head with optical sensor, option
- Stroke signal (standard) or empty pre-alert (adjustable)
- Code protection against unauthorized access
- Calibrating function
- Dosing quantity counter, with reset to 0
- Tamper-proof service hours counter
- Remote On/Off
- Profibus DP interface (option)

Operating modes	Input / Display																								
Manual operation	input / display of dosing capacity in l/h or gal/h																								
Contact signal control	<table border="1"> <thead> <tr> <th>input / display of dosing capacity in ml/contact</th> <th>DDI model</th> <th>V<sub>min</sub> (ml)</th> <th>V<sub>max</sub> (ml)</th> </tr> </thead> <tbody> <tr> <td></td> <td>209-0.4D</td> <td>0.001</td> <td>0.07</td> </tr> <tr> <td></td> <td>209-2.2D / -2.5D</td> <td>0.004</td> <td>0.88</td> </tr> <tr> <td></td> <td>209-5.5D</td> <td>0.011</td> <td>2.20</td> </tr> <tr> <td></td> <td>209-13.8D</td> <td>0.024</td> <td>4.96</td> </tr> <tr> <td></td> <td>209-20D</td> <td>0.038</td> <td>7.86</td> </tr> </tbody> </table>	input / display of dosing capacity in ml/contact	DDI model	V <sub>min</sub> (ml)	V <sub>max</sub> (ml)		209-0.4D	0.001	0.07		209-2.2D / -2.5D	0.004	0.88		209-5.5D	0.011	2.20		209-13.8D	0.024	4.96		209-20D	0.038	7.86
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Current signal 0(4)-20 mA with manual weighting function	display of dosing capacity in l/h or gal/h, weighting function for manual assignment of the volume flow in proportion to the current signal values (current input / current output)																								
Batch dosing (contact signal/manual)	input / display of dosing capacity in l/h or gal/h (per batch)																								
Batch dosing with timer function	<ul style="list-style-type: none"> <li>&gt; input / display of dosing flow (1 ml up to 999.9 l)</li> <li>&gt; input / display of dosing capacity (l/h or gal/h)</li> <li>&gt; input starting time of the first batch: t<sub>1</sub> = 1 min. up to max. 999 h</li> <li>&gt; input starting time of subsequent batches: t<sub>2</sub> = 1 min. up to max. 999 h</li> </ul>																								
Slow mode (longer suction stroke)	reduction of the suction speed and the maximal dosing capacity to avoid cavitation or for dosing viscous liquids																								

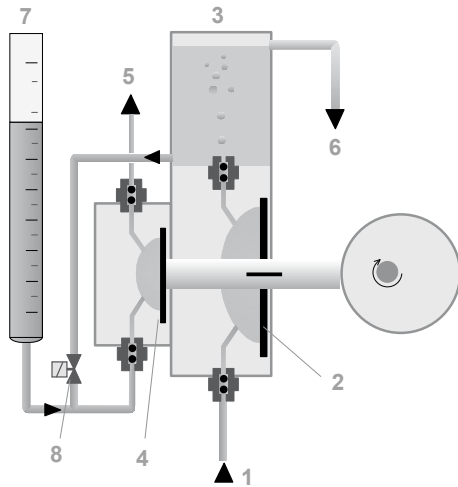
## Inputs and outputs

Inputs and outputs		Technical data	Contact / function adjustable with software	
			standard adjustment	adjustable to
Input	contact signal	load < 12 V, 5 mA		
	current signal 0(4) - 20 mA	load < 22 Ohm		
	remote On/Off	load < 12 V, 5 mA	N.O.	N.C.
	tank empty signal	load < 12 V, 5 mA	N.O.	N.C.
	Flow Monitor			
	diaphragm leakage indication			
Out-put	current signal 0(4) - 20 mA	load < 350 Ohm		
	error signal	ohm load < 50V DC/75 V AC, 0.5 A	N.O.	N.C.
	stroke signal	contact time 200 ms / stroke	N.O.	N.C. / empty pre-alert
	empty pre-alert	ohm load < 50V DC/75 V AC, 0.5 A	N.O.	N.C. / stroke signal

## Accessories for electronics and Profibus

Signal transmission cable incl. circular connector <i>Please indicate the cable length: 2 or 5 m!</i>	Order number
For inputs: control contact or remote On/Off or 0/4-20 mA current input, 4-wire cable	321-205
For outputs: empty pre-alert or individual stroke signal or error signal, 4-wire cable	321-206
For output: current signal, 5-wire cable	321-215
For output <b>Flow Monitor</b> : 5-wire cable with coupling for pressure sensor	321-327
Accessories for Profibus DP	Order number
T-splitter with M 12 connection technology <i>Necessary for every pump!</i>	321-225
Terminating resistor M 12 <i>Necessary for every pump connected at the first and/or the last position of the bus system!</i>	321-224

## Functional diagram P3 system



- The conveying diaphragm (2) takes a large volume of liquid out of the dosing station (tank) (1) and transfers it into the priming (deaeration) chamber (3). No problem when drawing in very small amounts.
- Any gas bubbles in the liquid are vented to the atmosphere in the priming chamber.
- The separate working diaphragm (laid out for the required litre capacity) (4) doses the liquid into the process line (5).
- Any excess liquid is returned to the tanks via the deaeration bypass (6).
- The integrated calibration system comprising a graded calibration tube (7) and a calibration valve (8) allows precise calibration of the dosing flow while the pump is running.
- **Additional advantage:** Chemical storage tanks can be exchanged without stopping the system.

## Dosing head and valve versions

Dosing head	Valve body	Material				Options: dosing heads with						
		Gaskets	Seat	Ball (*)		special valves	dia-phragm leakage indication	P3 system	Flow Monitor	P3 system and Flow Monitor		
				4/6	6/12 + 12/16	spring-load. pressure valve	for viscous liquids (**) >100 mPa s					
PVC	PVC	Viton	Viton	glass	glass	●	●	●	–	–	–	–
PVC	PVC	Viton	Viton	ceramics	ceramics	●	●	–	●	●	●	●
PVC	PVC	EPDM	EPDM	ceramics	PTFE	●	●	●	●	●	●	●
PVC	PVC	PTFE	PTFE	ceramics	ceramics	●	–	–	–	●	–	–
PP	PP	Viton	Viton	glass	glass	●	●	●	–	–	–	–
PP	PP	Viton	Viton	ceramics	ceramics	●	●	–	●	●	●	●
PP	PP	EPDM	EPDM	ceramics	PTFE	●	●	●	●	●	●	●
PVDF	PVDF	PTFE	PTFE	ceramics	PTFE	●	●	●	–	●	–	–
st. steel	st. steel	st. steel	PTFE	st. steel	st. steel	●	●	●	–	–	–	–
st. steel	st. steel	Viton	Viton	st. steel	st. steel	●	●	●	–	●	–	–

(\*) material depending on the connection size; connections 6/12 and 12/16 not suitable for Plus<sup>3</sup> system

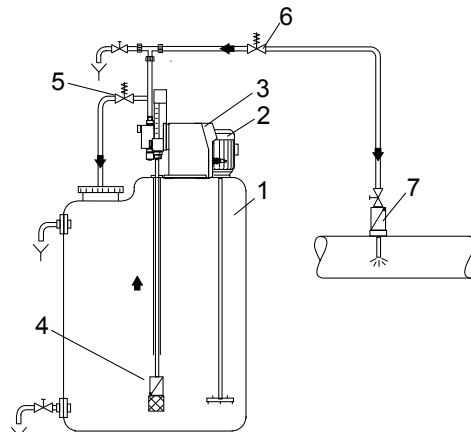
(\*\*) **suction and pressure side:** spring-loaded valve with steel ball, connection 4/6 (DDI model 209-0.4D) or 6/12 (DDI model 209-2.2D); DDI model 209-13.8/-20: suction side 9/12, pressure side 6/12

## Accessories and armatures

(see separate Data Booklet Accessories)

### Flow scheme of a complete dosing installation

- 1 Dosing tank 502
- 2 Electric agitator 509
- 3 Dosing pump DDI
- 4 Suction line 531 with empty signal
- 5 Pressure relief valve 525
- 6 Pressure loading valve 525
- 7 Injection unit 522



## Wall console

- with fastening material

Description	Order number
PE black	539-006

## Spare parts sets

### for dosing heads with manual deaeration valve

- suction/pressure valves, gaskets for dosing head and valves, 1 deaeration cartridge, 1 dosing diaphragm, 1 sealing diaphragm, screws for the dosing head

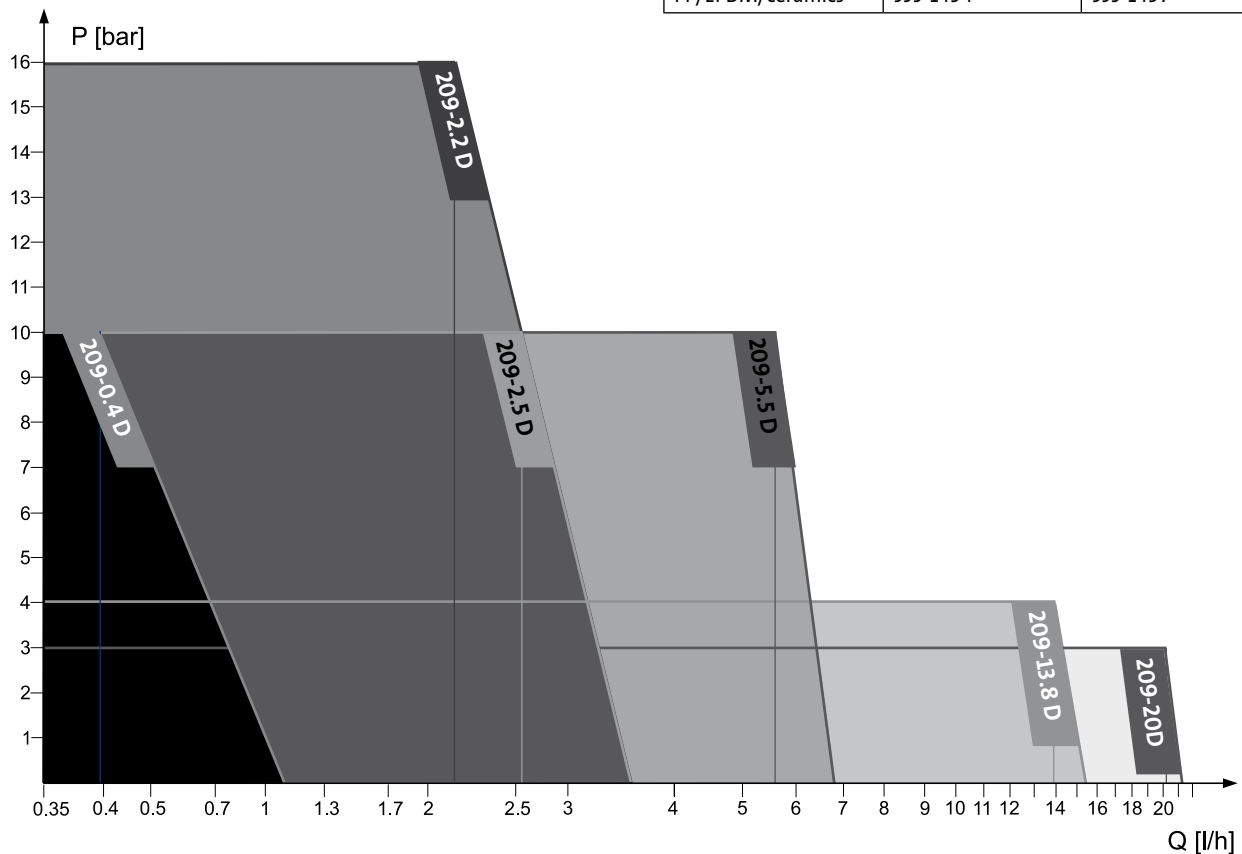
Material	Order number for DDI model 209...		
	-0.4D	-2.2D to -5.5D	-13.8D/-20D
PVC/Viton/glass	553-1395	553-1403	553-1419
PVC/EPDM/ceramics	553-1399	553-1407	553-1423
PVC/Viton/ceramics	553-1256	553-1597	553-1708
PP/Viton/glass	553-1396	553-1404	553-1420
PP/EPDM/ceramics	553-1400	553-1408	553-1424
PP/Viton/ceramics	553-1693	553-1694	553-1709
PVDF/PTFE/ceramics	553-1401	553-1409	553-1425
St.steel/PTFE/st.steel	553-1402	553-1410	553-1426

### for dosing heads with Plus<sup>3</sup> system

- suction/pressure valves, gaskets for dosing head and valves, 1 deaeration cartridge, 1 dosing diaphragm, dosing head screws

Material	Order number for DDI model 209...	
	-0.4D	-2.2D to -5.5D
PVC/Viton/ceramics	553-1487	553-1486
PVC/EPDM/ceramics	553-1492	553-1495
PP/Viton/ceramics	553-1493	553-1496
PP/EPDM/ceramics	553-1494	553-1497

## Capacity diagram



91834792 0307	EN
15.820014 V6.0	

Subject to change!