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Laborgeräte zu fairen Preisen.

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DG10 pump heads – technical data and operating notes

DG10-1, DG10-2, DG10-4 and DG10-8 for low flow rates with low pulsation. Shared technical data and operation, with model-specific channel counts and dimensions.

Features

- Ten 304 stainless steel rollers
- Individually removable cassettes
- Ratchet or spring cassettes depending on version
- Flow values per channel; maximum 100rpm



Models and our product codes

Model	Product code	Channels	H × W × L mm
DG10-1	1704_B1	1	87.2 × 86 × 39.5
DG10-2	1704_B2	2	87.2 × 86 × 47.5
DG10-4	1701_B6	4	87.2 × 86 × 63.5
DG10-8	1701_B5	8	87.2 × 86 × 95.5

The illustration shows an example of a multi-channel version. Cassette type and material depend on the version actually supplied.

Technical overview

Property	Specification
Rollers / maximum speed	10 / 100rpm; also observe the drive limit
Flow range per channel	0.00011–32mL/min; depending on tubing and application
Tubing ID / wall thickness	0.13–3.17mm / 0.8–1mm
Housing / cassettes	ABS / POM; PVDF optional
Tubing materials	Silicone, Pharmed, PVC, fluoroelastomer
Environment	0–40°C; relative humidity <80%

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1 Safety instructions

⚠ **Important information: Read the operating instructions carefully before operation.**

Symbol	Meaning
	Warning: Keep fingers away from moving parts.
	Warning: Caution.
	Warning: Caution, hot surface.
	Warning: Caution, electric shock hazard.
	Note: Recycle this product.
	Warning: Wear personal protective equipment.

Table 1 Safety symbols

1.1 Danger

⚠ Operate the pump drive only with the power supply stated on its nameplate. Otherwise, the device may be damaged.

⚠ Do not open the drive housing or modify the inside of the device yourself. This may cause malfunctions or electric shock.

Switch off the power before inserting or removing the pump tubing. Keep away from the rotating rollers so that fingers and clothing cannot become caught in the mechanism.

For hazardous liquids, establish a procedure appropriate to the liquid concerned and protect people from injury during use.

1.2 Warning

Before use, check that the liquid does not react chemically with the tubing or pump head. Otherwise, the tubing or head may be damaged. If in doubt, contact Labmaterial GmbH.

Tubing is a wear part and must be checked regularly. To the extent permitted by law, Leadfluid and Labmaterial GmbH accept no responsibility for losses resulting from tubing damage, particularly leaks of toxic, harmful or valuable liquids.

⚠ Only use tubing compatible with the pump head. Observe the assignments and flow values in 6 Tubing and flow values.

⚠ During long idle periods, raise the pressure block to prevent the inner tubing walls from sticking together under prolonged compression.

⚠ If actual environmental conditions, such as temperature, humidity or supply voltage, exceed the technical specifications and the device is damaged as a result, this is not covered by the standard manufacturer's warranty. Repair costs will be charged; further consequential damage is not covered by this manufacturer's warranty.

⚠ Protection against injury from moving pump parts is primarily provided by the pump head's safety device. Its design may differ between head models. Follow the instructions for the head actually installed.

⚠ If the pump was running before a power failure, it may restart automatically when power returns. Check the restart setting of the drive being used and prevent unintended restarting.

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2 Description and structure

The DG series is designed for low liquid flow rates and simultaneous operation of multiple tubing channels. The cassettes can be inserted and removed individually. Depending on the version, a ratchet mechanism or a spring adjusts the tubing occlusion gap. The rollers are stainless steel; cassettes are available in POM or optionally PVDF.

These instructions cover the DG6 and DG10 families with six and ten rollers respectively, spring and ratchet cassettes and the intended channel configurations. DG6 has a wider flow range; DG10 reduces pulsation but places greater stress on the tubing. Our regular DG10 products are listed in 9.1 Our product codes. The technical family overview is not a product range or scope-of-supply list.

The family includes 1, 2, 4, 6, 8, 10 and 12 channels. Depending on the equipment, stacking can provide systems with up to 48 channels or more. This does not approve an arbitrary number of heads on every drive; observe the specific mounting and drive design.

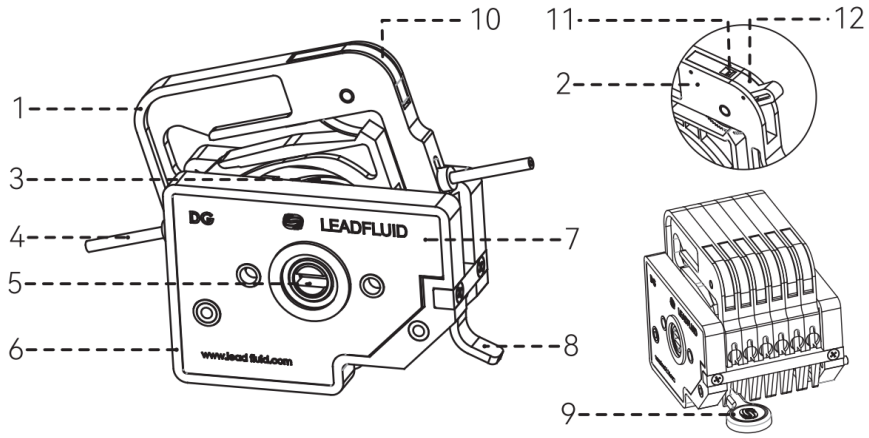


Figure 1 Components of DG pump heads

2.1 Components and functions

1. **Spring cassette**: Holds the tubing; the occlusion gap adjusts automatically.
2. **Ratchet cassette**: Accommodates the tubing and allows manual adjustment of the occlusion gap.
3. **Roller assembly**: Rotates and compresses the tubing to pump the liquid.
4. **Pump tubing**: Carries the liquid; positioning sleeves are located at both ends of the pumping section.
5. **Pump head shaft**: Connects the head to the drive or additional heads.
6. **Pump head housing**: Supporting structure of the pump head.
7. **Identification label**: Indicates the head model, among other information.
8. **Release lever**: Press down to release the cassettes; intended for versions with one to three channels.
9. **Small removal tool**: Releases the cassettes, particularly on versions with more than three channels. It can be stored in the front holder hole when not in use.
10. **Adjustment spring**: Automatically adjusts the tubing occlusion gap on spring cassettes.
11. **Ratchet setting window**: Shows the selected setting and the adjustment limit to prevent excessive compression.
12. **Ratchet lever**: Manually changes the occlusion gap on ratchet cassettes.

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3 Mounting and tubing replacement

3.1 Cassette type and occlusion gap

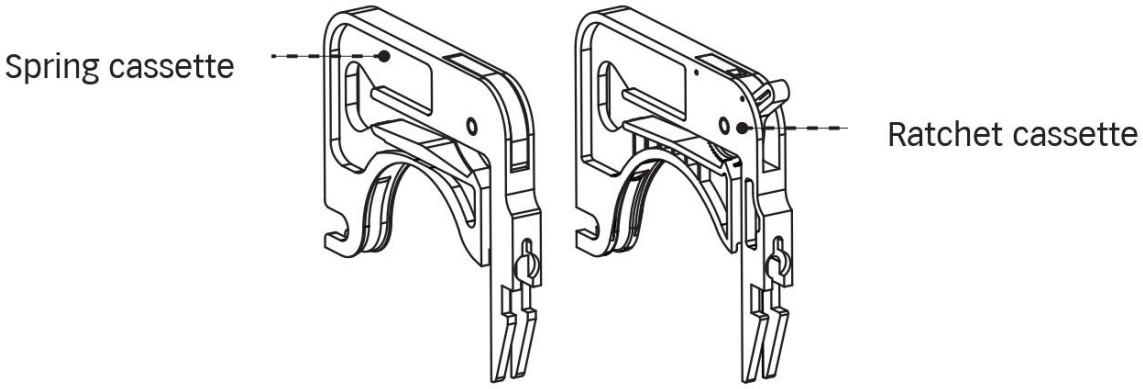


Figure 2 Spring cassette and ratchet cassette

Spring cassette: No manual gap adjustment is required after inserting suitable tubing. The spring adjusts the occlusion gap to the tubing wall thickness.

Ratchet cassette: After inserting the tubing, move the ratchet lever up or down. Colour marks identify the settings. Material- and size-dependent reference settings are listed in 8 Ratchet settings for tubing and material.

Higher occlusion pressure can increase the achievable pumping pressure but reduces tubing life. If higher pressure is required, further ratchet settings can be selected starting from the reference setting; the specific application must be assessed beforehand.

⚠ **Note:** The ratchet lever adjusts the gap, not the flow rate. Use speed and calibration to set the flow rate. High-pressure pumping is not intended without a specific assessment.

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3.2 Mounting the pump head on the drive

1. Remove the cassettes from the pump head.

2. Align the positioning hole of the pump head with the positioning pin on the bracket. At the same time, align the flattened shaft end with the coupling groove of the drive and insert it until the head sits fully against the bracket.

3. Insert the supplied screws into the mounting holes of the rear mounting plate. Pass the hex key through the connecting hole of the front plate and tighten the screws.

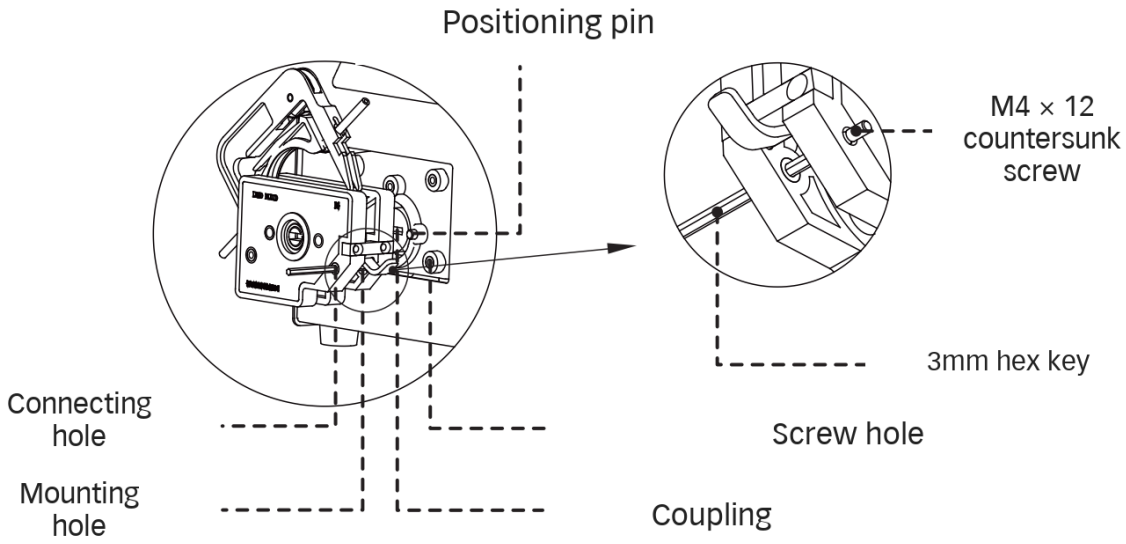


Figure 3 Positioning and mounting the DG pump head

4. When stacking heads, mount the second head in front of the first using the same procedure. Observe the specific drive design and permitted number of heads.

⚠ **Note:** Tighten the mounting screws as evenly as possible and do not overtighten. The drawing shows M4 × 12 countersunk screws and a 3mm hex key; use the parts supplied with the head.

3.3 Selecting the tubing

The family is designed for tubing with a wall thickness of 0.8–1mm and an internal diameter of 0.13–3.17mm. Suitable materials include silicone, Pharmed, PVC and fluoroelastomer, depending on the cassette and application. The complete documented diameters and flow values are listed in 6 Tubing and flow values.

The dimensional accuracy of the wall thickness and internal diameter, as well as the spacing of the tubing retainers, affect pumping accuracy. For precise pumping, use dimensionally accurate standard tubing with suitable positioning sleeves. Check material compatibility with the pumped liquid.

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3.4 Inserting the tubing and cassette

1. Insert the tubing into the tubing retainers. Set a spacing of 74mm between the two retainers; see Figure 4.

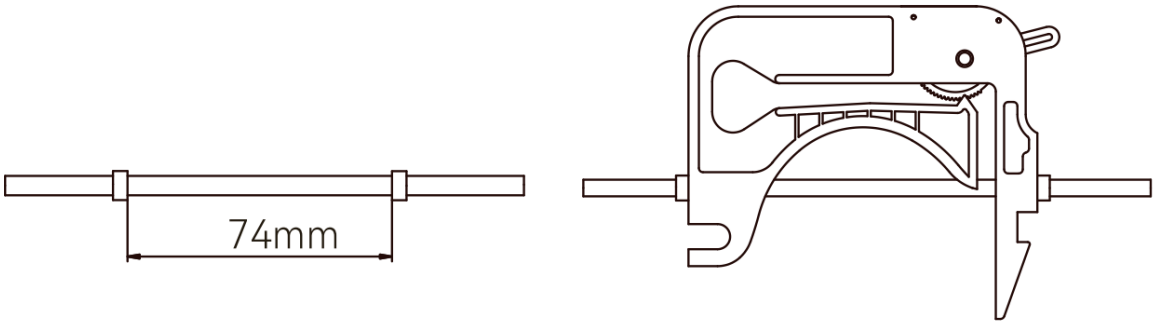


Figure 4 Inserting tubing with 74mm spacing between retainers

2. Insert the tubing into the cassette and place the cassette in the pump head as shown in Figure 5.

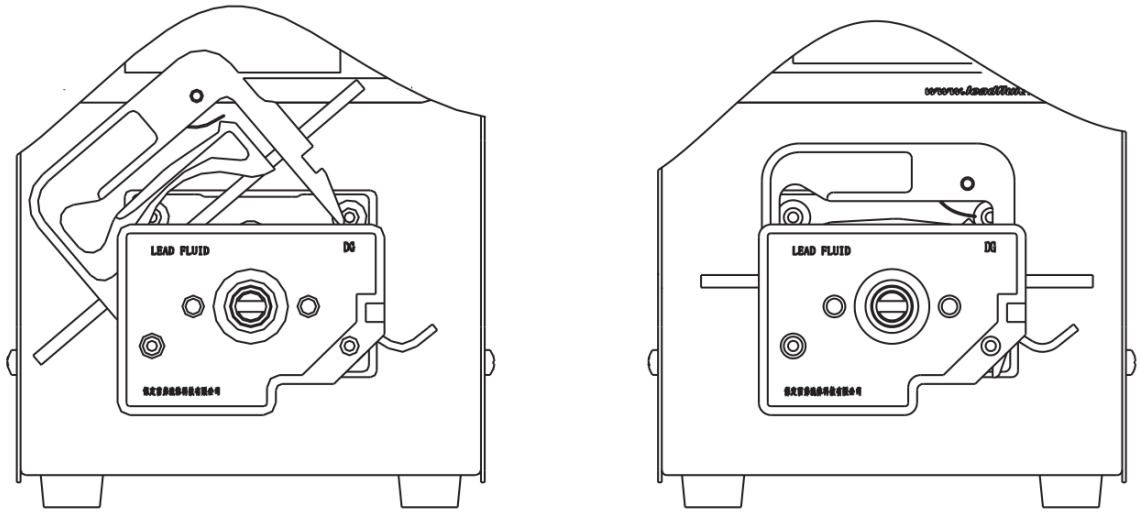


Figure 5 Inserting and locking the cassette in the pump head

⚠ **Note:** The tubing inside the pump head must not be twisted or laterally misaligned.

⚠ **Note:** When using multiple channels, retainer spacing and tubing lengths must be the same on each channel to obtain comparable pumping conditions.

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3.5 Removing the cassette and tubing

One to three channels: Press the lever on the right-hand side. The cassette releases from its latch; see Figure 6.

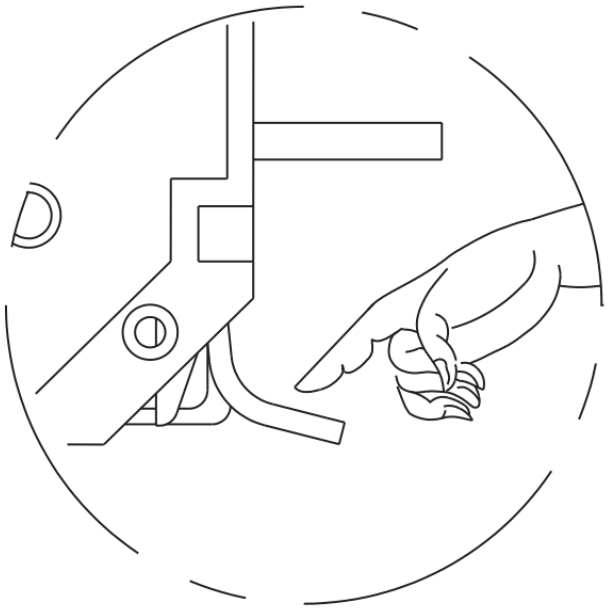


Figure 6 Releasing the cassette with the side lever

More than three channels: Release the cassette using the small removal tool; see Figure 7.

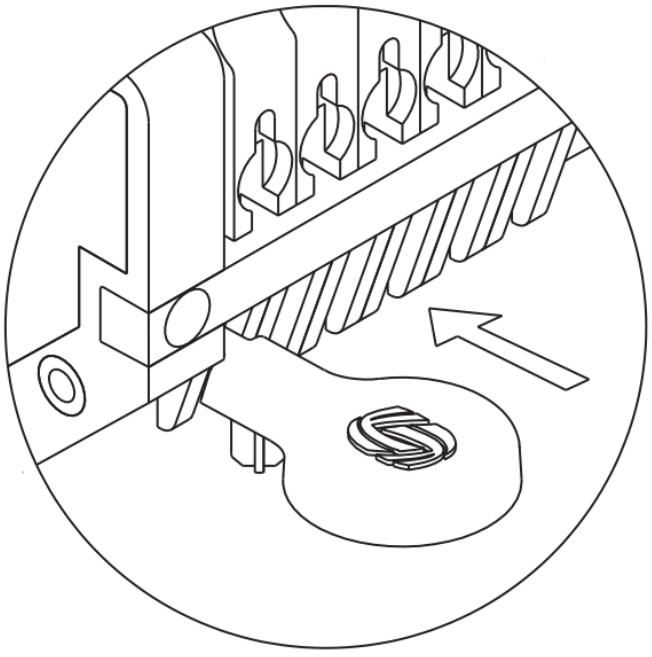


Figure 7 Releasing the cassette with the removal tool

1. Lift the released cassette upwards and to the left.
2. Remove the tubing along the cassette groove.

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4 Operating notes

• Flow changes as the tubing is used. Adjust the speed in good time; recalibrate flow-controlled pumps.

• DG10 heads with ten rollers deliver less than DG6 heads with six rollers, but produce less pulsation.

• Individual channels may deliver different flow rates during simultaneous operation. Contact Labmaterial GmbH if close agreement between channels is required.

• Slight running noise may occur after prolonged use. For maintenance, the head can be disassembled and a small, suitable amount of grease applied to both ends of the plain bearings.

⚠ **Note:** Switch off and disconnect the drive from the power supply before maintenance, disassembly or tubing replacement. Contact Labmaterial GmbH if the maintenance procedure is unclear.

5 Maintenance and troubleshooting

5.1 Manufacturer warranty and customer service

One-year manufacturer warranty for DG pump heads

1. The warranty covers DG pump heads only. Tubing and other consumables are excluded.

2. The warranty period starts on the purchase date shown on the valid proof of purchase.

3. For quality defects within the warranty period, the manufacturer provides for free repair or replacement.

4. For problems caused by human action, such as leakage, dropping or improper use, the manufacturer describes repair without labour charges; material costs are charged.

Contact Labmaterial GmbH for clarification and processing.

Special notes on consumables

Before using tubing and other consumables, check the model specifications. Once opened and used, returns and exchanges are no longer accepted except for quality defects.

5.2 Daily maintenance

• Inspect the tubing for damage and loss of elasticity after no more than 50 operating hours.

• A suitable silicone oil film on the tubing can extend its life. Check compatibility with the tubing and application.

• Do not rinse the pump head with water. If tubing breaks, immediately wipe up or dry any escaped liquid.

• Do not use chemical reagents for general cleaning of the pump head.

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5.3 Troubleshooting

No liquid is being pumped

Fault / check	Action
Tubing damaged or broken	Replace the tubing.
Incorrect tubing dimensions	Select tubing with a suitable wall thickness.
Excessive suction or blocked inlet	Check the liquid supply and inlet line.
Liquid viscosity too high	Shorten the inlet line or increase its internal diameter.
Tubing incorrectly inserted	Reinsert the tubing according to these instructions.
Slippage between motor shaft and roller	Clean the roller and tubing surfaces. For this fault, the manufacturer manual specifies alcohol; check material compatibility and do not apply it to the housing without verification.
Tubing severely deformed after prolonged downtime	Remove the tubing and knead the deformed section by hand. Replace if damaged.

Table 2 Checks when no liquid is pumped

Tubing life has become significantly shorter

Fault / check	Action
Roller does not rotate freely	Clean the roller surface; contact Labmaterial GmbH if damaged.
Tubing incorrectly inserted	Reinsert according to these instructions.
Excessive dirt inside the head	Clean the inside of the pump head.
Tubing not secured and moving	Secure the tubing correctly again.
Hard solid particles in the liquid	Filter impurities out of the pumped liquid.

Table 3 Checks when tubing life is reduced

⚠ **Note:** If the fault persists after these checks, contact Labmaterial GmbH.

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6 Tubing and flow values

The values apply per channel to silicone tubing and water at normal temperature and pressure. The reference measurement uses inlet and outlet lines each 500mm long, with inlet and outlet at the same height. Liquid, viscosity, line length, pressure difference, tubing and cassette affect the actual delivery. Calibrate the actual flow rate.

The tables also include technically compatible tubing sizes outside our range. The absence of our own product code does not indicate technical incompatibility. The maximum permitted speed is 100rpm, even on a drive with a higher speed range. Tubing with an internal diameter of 3mm or more is subject to increased wear; monitor its life accordingly.

6.1 Current reference values for DG6 and DG10

ID mm	DG6 mL/rev	DG6 100rpm	DG10 mL/rev	DG10 100rpm
0.13	0.0016	0.16	0.0011	0.11
0.25	0.006	0.6	0.0039	0.39
1	0.064	6.4	0.049	4.9
1.52	0.15	15	0.11	11
2	0.24	24	0.18	18
2.4	0.31	31	0.21	21
3.17	0.49	49	0.32	32

Table 4 Current reference values per channel; flow rates in mL/min

These model-specific reference values apply to the seven internal diameters listed here. Distinguish the maximum values of 49mL/min for DG6 and 32mL/min for DG10. They are not a common maximum rating for all versions.

6.2 Additional DG6 tubing diameters

The following supplementary tables describe further tubing diameters in the DG family. They are published reference measurements, not intermediate values calculated from the first table. Tubing design and test conditions must match the application.

ID mm	0.1rpm	1rpm	50rpm	100rpm
0.5	0.0022	0.022	1.1	2.2
0.76	0.0048	0.048	2.4	4.8
1.22	0.0108	0.108	5.4	10.8
1.65	0.018	0.18	9	18
2.1	0.021	0.21	10.5	21
2.79	0.035	0.35	17.5	35

Table 5 Additional DG6 reference values in mL/min per channel

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6.3 Additional DG10 tubing diameters

ID mm	0.1rpm	1rpm	50rpm	100rpm
0.5	0.00177	0.0177	0.885	1.77
0.76	0.0039	0.039	1.956	3.91
1.22	0.008	0.080	3.981	7.96
1.65	0.014	0.140	7.031	14.06
2.1	0.016	0.161	8.05	16.1
2.79	0.028	0.28	14	28

Table 6 Additional DG10 reference values in mL/min per channel

6.4 Common tubing dimensions and pressure reference

ID mm	Wall thickness mm	Pressure reference MPa
0.5	0.8	0.1
2.4	0.8	0.1
1	1	0.1
2	1	0.1
3	1	0.1

Table 7 Common DG tubing dimensions

The pressure value is a reference for the specified tubing dimensions, not a general pressure approval for the entire pump. 0.1MPa equals 1bar. Also consider material, tubing ageing, cassette gap and the specific drive combination.

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7 Dimensions and channel configurations

All dimensions in mm. H × W × L means height × width × model-dependent depth.

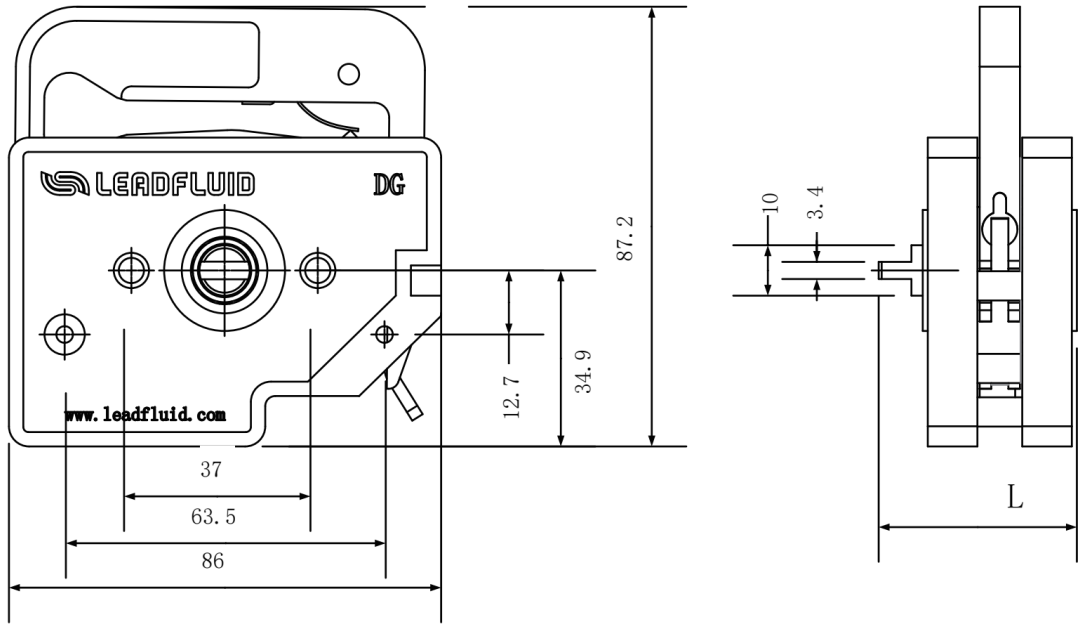


Figure 8 Connection and installation dimensions of the DG series

Channels	L mm	Assignment
1	39.5	Current model sheet
2	47.5	Current model sheet
4	63.5	Current model sheet
6	79.5	Current model sheet
8	95.5	Current model sheet
10	112.5	Supplementary family reference
12	127.5	Current model sheet

Table 8 Model-dependent head depth L

The channel count determines the length; DG6 and DG10 instead indicate the number of rollers. The dimensions shown apply to an individual head, not a complete multi-head pump.

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8 Ratchet settings for tubing and material

The following settings are reference positions for ratchet cassettes. Spring cassettes adjust the gap automatically. The reference table includes rounded diameters up to 3.2mm; this does not extend the specified tubing limit of 3.17mm.

ID mm	Tubing material	DG6	DG10
0.5	Silicone	Red	White
1	Silicone	Red	White
2	Silicone	Black	Yellow
2.4	Silicone	Black	White
3	Silicone	Black	Yellow
0.13–3.2	PVC / Pharmed	Green	Blue
0.13–3.2	Fluoroelastomer	Blue	Blue

Table 9 Reference settings by tubing and roller count

Setting	Colour mark
1	Yellow
2	White
3	Black
4	Red
5	Blue
6	Green
7	Violet

Table 10 Colour coding of ratchet settings

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9 Technical data and ordering information

Property	Specification
Listed drive families	BT10XX and BT100X-1; observe mounting and specific drive version
Tubing wall thickness	0.8–1mm
Tubing inner diameter	0.13–3.17mm
Tubing materials	Silicone, Pharmed, PVC, fluoroelastomer; check actual compatibility
Speed limit	Maximum 100rpm
Number of rollers	DG6: 6; DG10: 10
Roller material	304 stainless steel; 316 stainless steel as a special version
Housing	ABS
Cassette material	POM; PVDF optional
Occlusion gap	Manually through ratchet settings or automatically through spring cassette
Environment	0–40°C; relative humidity <80%
Height × width	87.2 × 86mm; depth L depends on channel count

Table 11 Technical features of the DG family

9.1 Our product codes

Labmaterial product code	Product name	Channels
1704_B1	Pump head – DG10-1	1
1704_B2	Pump head – DG10-2	2
1701_B6	Pump head – DG10-4	4
1701_B5	Pump head – DG10-8	8

Table 12 Our regular DG10 head products

The ordering overview lists our regular individual head products. Other technical versions described in these instructions are not automatically available as our own products. Observe the cassette and material version actually supplied.

Disclaimer

The suitability of the pump, pump head and tubing for the intended application must be checked before use. To the extent permitted by law, Labmaterial GmbH accepts no liability for damage caused by improper use, failure to follow these instructions, unauthorised modifications or the use of unsuitable media and tubing. Liability for intent and gross negligence and mandatory statutory product liability remain unaffected.

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10 Tubing life

The laboratory comparison shows how tubing material, roller count and speed affect service life. Values are in hours; they are not guaranteed replacement intervals. Daily inspection according to section 5.2 remains necessary.

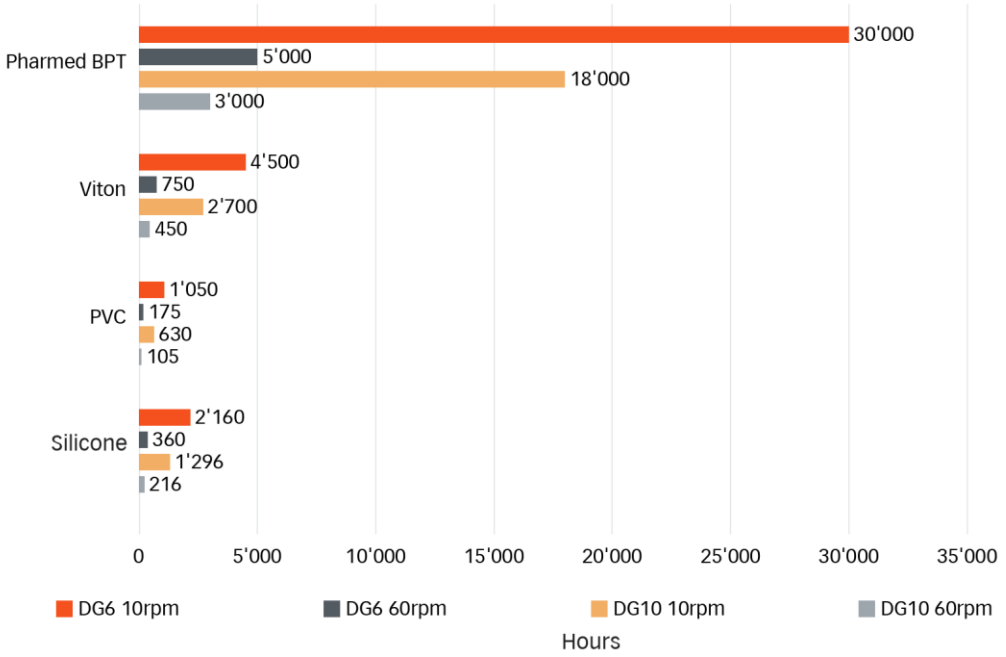


Figure 9 Comparison of tubing life by roller count and speed

Tubing material	DG6 10rpm	DG6 60rpm	DG10 10rpm	DG10 60rpm
Pharmed BPT	30'000	5'000	18'000	3'000
Viton	4'500	750	2'700	450
PVC	1'050	175	630	105
Silicone	2'160	360	1'296	216

Table 13 Laboratory comparison of tubing life in hours

Purified water at normal temperature and pressure; laboratory references, not guaranteed replacement intervals. Pressure, temperature, fluid, tubing batch and wall thickness affect actual service life.

Do not equate DG6 and DG10: the higher roller count reduces pulsation but can place greater stress on the tubing. The values do not refer to the channel count.