



INSTRUCTION MANUAL

Air operated double diaphragm pumps

Ver. 6.13

Models: DMF 10

DMF 20

Serial no.

DECLARATION OF CONFORMITY

Directive 2006/42/EC, Annex 2A

Company: **DELLMECO LTD**

Address: **Unit 1, Willow Row
Longton, Stoke on Trent
Staffordshire, ST3 2PU, United Kingdom**

declares under our sole responsibility, that the product:

Product name: **Air Operated Double Diaphragm Pumps**

Models: **DMF - series**

Referred to in this declaration conforms with the:

- Directive 2006/42/EC

Date: **January 2nd 2014**

A handwritten signature in black ink, appearing to read 'K. Ziemann', with a stylized, cursive script.

**K. Ziemann
Managing Director**

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1. Introduction

This pump is a positive-displacement pump that transfers fluids by means of diaphragms movement operated by compressed air. The casing in contact with the fluid is made of PE conductive material.

F-series are pneumatic diaphragm pumps with integrated pulsation dampener and two separated product chambers. Transport of liquid is realized by the delivery chamber. The fluid passes an active pulsation dampener to smoothen the flow. Trouble-free operation of the pulsation dampener is only possible with a minimum back pressure of 1 bar and becomes increasingly efficient as the back pressure increases.

The second product chamber can be used as an extractor pump, then not needed e.g. ink or glue can be sucked from the machine back to the supply container. Another possibility is to use the chamber as circulation pump, then we have the ink circulated within the supply container. Circulating ink helps to ensure complete blending and to avoid sedimentation.

2. For safe operation

This document contains information indispensable for maintaining safe and efficient operation of this product. Read this document carefully before using the pump particularly the "warnings and cautions". Get familiar with all operating procedures. This document must be kept handy for future reference.

3. Warnings and cautions

The meanings of warning and caution symbols are given below. Be sure to remember their meanings.



WARNING:

ignoring the warning and operating the product in an improper manner can result in danger of serious bodily injury or death.



CAUTION:

ignoring the warning and operating the product in an improper manner can result in danger of personal injury or property damage.



This symbol means a "DON'T", and will be followed by an explanation on what you must not do.



This symbol means a "DO", and will be followed by an explanation on what you must do in a specified situation.

4. Operating caution

Before using this product



WARNING

- ! To drive the pump you must use one of the following compressed gases (called in this document "compressed air"):
 - Compressed air supplied from an air compressor
 - Nitrogen (N₂) gas

Use of compressed air other than the above may cause air pollution, damage to the pump, or even an explosion.

- ! The maximum permissible pressure for the compressed air, and the fluid pumped by one of its pumps is 8 bars. Should the above applicable maximum permissible pressure be exceeded, the following results may follow: damage to the casing, or even a severe, possibly fatal accident.

- ! In case a diaphragm gets damaged, fluid will gush out together with air through the exhaust port. Provide protective measures in consideration of possible leakage of fluid.
When you using the hose and pit etc, make sure to use a model with appropriate corrosion resistance for the fluid to be pumped.



WARNING

- ! When installing this product, be sure to connect a ground wire from the specified position of this product. Otherwise friction between parts and abrasion caused by the flow of some fluids inside the casing may generate static electricity. Depending on the type of fluid being pumped and the installation environment (such as gases in the air and type of surrounding mixtures), static electricity could cause fire or electric shock.

- ! Some fluid may remain inside the pump and inside the connected piping after shutting down the pump, or if the pump is left unused for a prolonged period.
Therefore, be sure to purge the system of fluid and clean the pump before prolonged disuse.
The fluid remaining in the connected piping as well as the pump itself may expand because of freezing or heat which may cause damage to the pump or/and piping and lead to leakage of the fluid.

Ø Use only genuine Dellmeco parts when replacing component parts of this product.

- ! Torque of all tightening parts must be checked before running the pump. Designated torques is mentioned in maintenance manual.

- ! In case of pumping a hazardous fluid (hot, flammable, strong acid, etc.) with this pump, protective measures (install a pit, a protection box, sensors, etc.) must be provided in consideration of possible leakage of fluid. Warning signs must be displayed at necessary places. Leakage of fluid may cause fire or accident.

- ! Before using this pump, get fully familiar with the precautions regarding the fluid to be pumped, and verify the corrosion resistance of the parts that will come into contact with the fluid. NEVER use the pump with any fluid against which it does not have sufficient corrosion resistance or with a fluid that poses a risk of explosion. If you are unable to verify the corrosion resistance, contact your dealer. Using this product with any fluid against which the parts in contact with the fluid do not have sufficient corrosion resistance may result in damaging the product or leakage of fluid.



CAUTION

- ! The running pump may generate loud operating noise. Its level will vary depending upon the conditions of use (fluid pumped, supply air pressure and discharge pressure)
- ! To drive this product, supply air with minimum moisture content and without any oil must be used.
- ! If a diaphragm of this pump is damaged, supply air may mix with the fluid or the fluid may flow into the central housing. DO NOT OPERATE THE PUMP if air supply is inadequate or contaminated.
- Ø While operating this product, do NOT put your hand on the inlet port.

DMF 10



Spare parts list for DMF10 and DMF20 pumps

				DMF 10	DMF 20
1.	1	Pump housing, left hand	PE conductive	6 10 101 21	6 20 101 21
2.	1	Pump housing, right hand	PE conductive	6 10 201 21	6 20 201 21
3.	1	Center housing	PE conductive	6 10 110 21	6 20 110 21
4.	3	Diaphragm	TFM (PTFE)	1 10 50 05	1 15 50 05
			EPDM	1 10 50 08	1 15 50 08
5.	4	Valve balls	AISI 316	1 15 60 52	1 15 160 52
6.	4/6	Housing bolt	AISI 304	6 10 42 50	6 20 42 50
7.	4	Shock absorber	NR	1 10 69 06	1 10 69 06
8.	8	Nut with washer	AISI 304	1 10 45 50	1 15 45 50
9.	1	Air valve	PET/FPM	1 08 020 32	1 15 020 32
10.	6	O-ring	FPM	1 08 080 09	1 15 080 09
11.	1	Shaft	AISI 304	1 08 24 50	1 15 24 50
12.	2	O-ring for center housing	NBR	-	1 15 85 10
13.	2	Center housing seal	PE	-	1 15 85 22
14.	1	Muffler	PE porous	1 08 99 35	1 15 99 35
15.	1	Air adapter	PET	1 08 46 25	1 15 46 25
16.	2	Valve housing	PE conductive	6 10 053 21	6 20 053 21
17.	1	Plug lower	PE/PA 6.6	6 10 059 41	6 20 059 41
18.	2	Plug upper	PE conductive	6 10 055 21	6 20 055 21
19.	4	Plug upper/valve sealing	EPDM	6 10 78 08	6 20 78 08
20.	1	Plug lower sealing	NBR	1 08 84 10	1 15 84 10
21.	1	Plug	PE conductive	6 10 166 21	6 10 166 21
22.	4	Washer	PE conductive	6 10 064 21	6 20 064 21
23.	1	Dampener head	PE conductive	6 10 03 21	6 20 03 21
24.	3	Piston ring	PE	1 08 90 22	1 08 90 22
25.	3	O-ring	NBR	1 08 82 10	1 08 82 10
26.	1	Actuator shaft	PET	8 10 40 30	8 15 40 30
27.	1	Dampener muffler	PE	8 10 99 20	8 15 99 20
28.	1	Connection - set	diverse	6 10 061 00	6 20 061 00
99.	1	Upper/lower plugs and Air valve key (SK3, SK4)	diverse	1 08 58 00	

6. Assembly and Disassembly

- 1) Fix the diaphragm completely into the shaft.
- 2) Adjust the bores in the center block to the diaphragm on both sides (turn slightly backwards if necessary).
- 3) The sealing surfaces of the diaphragms and the side housings have to be absolutely clean and undamaged. Even small scratches can cause leaking (if necessary, smoothen the housing surfaces carefully with fine sandpaper).
- 4) Moisture all O-rings for assembly, push them in carefully, do not bend any ring.

For taking out the air valve:

- 1) Unscrew both end caps using the special key SK3 or SK4.
- 2) Take out main and pilot piston, shove out the valve housing carefully.

To install the air valve:

- 1) Screw in one end cap flushly into the center block.
- 2) Insert one of the six O-rings, air valve housing into the end cap from the inside.
- 3) Moisture the four O-rings of the air valve housing with a bit of water and push the housing into the center block.

Take care that it slips in softly. Do not ever insert the housing violently with a hammer. In case the housing locks or hardly gets in, take it out and start again. Insert the main piston and the pilot piston. Lay the sixth O-ring on the edge of the air valve housing and crew the second end cap.

A re-assembly of the same piston rings is impossible; they have to be replaced. To assemble new piston rings, carefully shape them like kidneys with locking ring pliers and insert the rings into the grooves; completely press the rings into the grooves smoothly using some round tool.

In case the flow rate of the pump decreases after some time of operation without any reason, this is frequently due to a muffler blocked by heavily soiled driving air:

- take out the muffler and replace it, if necessary
- clean air valve carefully without any solvents and install air filter to clean driving air before entering the pump.



CAUTION



When installing accessories prevent any foreign matter from getting into the product.

Otherwise malfunction of the air-valve may follow.



When assembling the pump, it is absolutely essential to ensure that the product and air channels are clear and O-rings are correctly settled.



Check the tightness of the pump before putting the pump back into operation.

Size	DMF 10	DMF 20
Torque values for housing bolts (Nm):	5	10

7. Installation

7.1. Installing the pump

1) Decide where the pump is to be installed and secure a site.

Note:

- The suction lift should be kept as short as possible.
- Sufficient space around the pump for maintenance must be provided.

When fixing the pump in place, use the cushions on the pump base. The tied-down bolts should be tightened a little at a time to secure the pump.



CAUTION



In general, the pump has to be connected load free. Neglecting this causes leakage and maybe even damages.



To avoid vibrations compensators are recommended.



CAUTION



Vibration generated by pump operation should be absorbed. Take it into consideration when mounting it.



When using the pump in submerged position, follow the steps below:

- Verify the corrosion resistance of each component of the pump. DO NOT expose the pump to any fluid for which it does not have proper corrosion resistance.
- Exhaust should direct outside, not into the fluid in which the pump is submerged.



The running pump may generate noise. Its level will depend upon conditions of use (kind of fluid being pumped, supply air pressure and discharge pressure).



WARNING



The end of the hose must be equipped with a pit, a protection box, etc. at the end of the hose in case the diaphragm gets damaged and a leakage of the fluid follows.



Pump exhaust should be directed to a safe place, away from people, animals and food.



CAUTION



Before putting the pump into operation as well as after some hours of pumping, the housing bolts have to be fixed according to the torque data of the following schedule, as the elements of construction “settle”. All plugs [17, 18, 21] have to be fixed, too. Fixing all these parts is necessary as well after longer periods of stoppage, at extreme temperature variations, after transport and dismantling the pump.

7.2. Connecting the ground wire

- a) When installing the conductive pump, be sure to connect the ground wire at the specified position.
- b) Ground wires should be connected to peripheral equipment and piping as well.
- c) Use 2.0 mm² minimum ground wire.



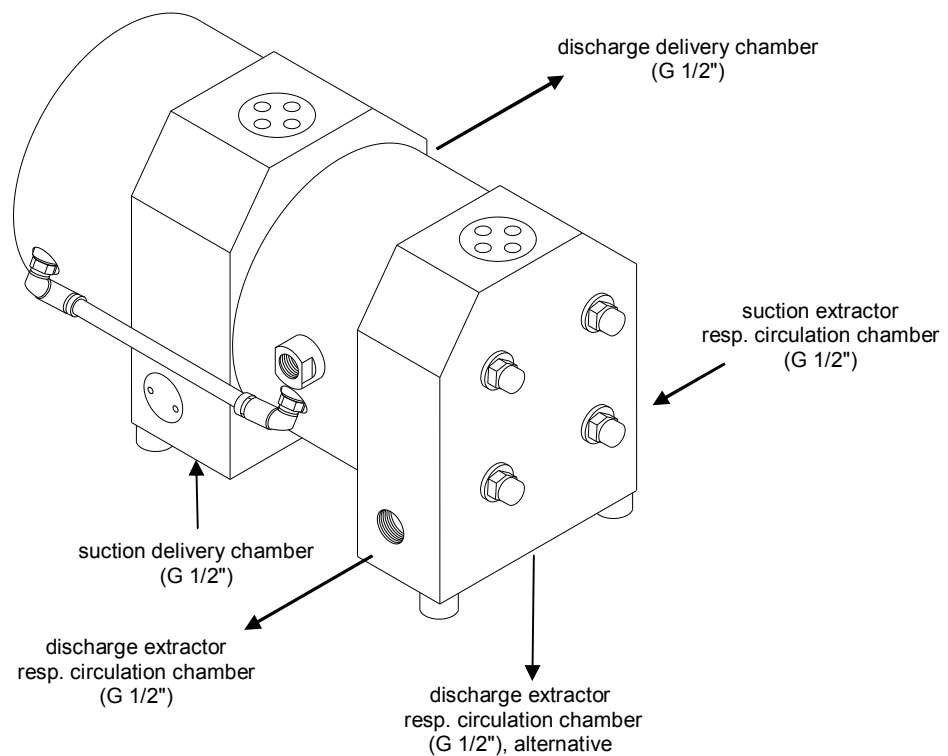
WARNING



Ground wires must be connected to the piping and any other peripheral equipment. When operating the pump make sure it is properly grounded. Otherwise friction between the parts and abrasion caused by some fluids flowing inside the casing may generate static electricity. In addition it may cause fire or electric shock, depending on the type of fluid being pumped and the installation environment (such as gases in the air or the surrounding fixtures).

8. Connection

8.1. Connecting fluid piping



- 1) Connect a flow valve and a drain valve to the fluid discharge port of the pump.
- 2) Connect a valve for maintenance to the fluid suction intake port of the pump.
- 3) Connect a hose to the valve on the suction-port side and the valve of the discharge-port side of the pump.
- 4) Connect a hose on the suction-side intake and the discharge-port side to the respective vessels.



CAUTION

- ! A hose must be flexible to absorb pump vibration. The hose must be grounded.
- ! There must be NO external force on any connection part of the pump. Be especially careful not to have the pump support part of the weight of the hose and the piping.
- ! Use a sturdy hose that will not collapse under the strong suction of the pump. The hose must be of more than sufficient pressure rating.
- ! Use a hose of a diameter the same or larger than the pump's ports. If the diameter of a hose is smaller, it will affect the pump's performance or cause its malfunction. Too big pipe can cause that dry suction capacity if the pump decrease.
- ! Keep a vessel below the relief valve to catch any drain off.
- ! The product has been inspected using clean water at 8 bar discharge pressure.

8.2. Connecting air piping



WARNING



Before starting work, make sure that the air compressor is shut off.



CAUTION



Make sure that air supply hose is free of solids.



Use oil-free, dry and clean compressed air for optimal function of precision-control air valve.



If humidity is expected, a water separator or air dryer has to be fitted to protect the pump from blocking by ice. The ideal condition is the dew point of air at -20°C .



If icing from the outside occurs despite the driving air is dried (humid surroundings) a prolonged waste-air exhaust (ca 500 mm by pipe or hose) can be helpful.



Make sure that cold air does not get caught behind the muffler when installing the pump into boards or cabinets.

- 1) Connect an air valve, air filter, regulator to a hose connected to the compressor. Install items near the pump.
- 2) Connect the hose from the peripheral equipment to the air valve of the pump's supply port.

Note:

The diameter of the piping should be the same as the diameter of the pump supply port in order to supply sufficient air.

Peripheral equipment with sufficient airflow should be chosen to meet the requirement of the pump air consumption. It must be installed nearest the pump unit, even using dry air. Usage and stability of air pressure must be considered. Excessive pressure increases both the air consumption and the wear of the pump.

9. Operation

9.1. Method of operation

Dellmeco pneumatic diaphragm pumps are self-priming when dry, thus it is not necessary to fill the suction line of the pump. However the suction lift capacity of a liquid-filled pump is much higher. The pump is appropriate for running dry during slow operation. Dry running at high stroke frequency causes premature wear. The maximum permissible stroke frequency can be found in the table below. Throttling on the suction side may damage the pump.

Size	DMF 10	DMF 20
Max. number of strokes/min during nominal performance	430	240



CAUTION

- ! Before starting the pump, check that all piping is properly connected.
- ! Before starting the pump, check that **all the bolts are securely tightened**.
- ! Check that the regulator and the drain valve on the discharge side are closed and that the valve on the suction side is opened.

- 1) Start the air compressor.
- 2) Open the air valve. Using a regulator adjust the supply air pressure to within the permissible range.
- 3) Open the flow valve on the discharge side.
- 4) First, check that fluid is flowing inside the piping and is being pumped to the discharge side, and then fully open the air valve.



CAUTION



Do NOT open the air valve suddenly.

9.2. Flow adjustment

Adjust the flow valve on the discharge side, or adjust the supply air pressure.



CAUTION

- ! The supply air pressure may initially rise during closing the flow valve. Make sure that the pressure is kept within the normal operating range.
- ! The permissible suction flow speed can vary depending upon the viscosity and specific gravity of the fluid, the suction stroke and other factors. However in case of a rapid growth of the pump speed (flow speed of fluid), cavitations will occur. This will reduce pump performance and may cause a malfunction. In order to prevent cavitations, adjust the supply air pressure and the flow.
- ! If fluid is not discharged after you start the pump, or if you hear an abnormal noise or notice any irregularity, shut down the pump immediately.

9.3. Shutdown

Close the air valve of the pump and shut off the supply air.



CAUTION

- ! When the pump is shut down while pumping slurry, particulate matter contained in the slurry will be deposited and get stuck inside the out chamber. Therefore after finishing work the pump must be purged of the remaining fluid. Otherwise when starting the pump again, the diaphragm may yet damaged and the centre rod may bend.



CAUTION

- ! Keep a vessel below the relief valve for any drain off.
- ! Be careful! - Fluid under pressure will gush out the moment you open the valve.
- ! If the pump is unused for a prolonged period, purge and clean it.

10. Method of cleaning



WARNING

- ! Make sure that compressed air is not supplied to the pump BEFORE you start cleaning the pump.
- ! Make sure that the pump is not pressurized BEFORE you start cleaning the pump.

- 1) Remove the hose from the suction side of the pump.
- 2) Close the flow valve on the discharge side and open the drain valve. Then start air pressure for a while to discharge possibly much fluid remaining inside the pump.
- 3) Remove the hose from the discharge side, and attach different hoses to the suction side and the discharge side for cleaning.
- 4) Be ready with a vessel with cleaning solution, the kind appropriate for the type of fluid pumped. Next connect the suction-side and the discharge-side hoses of the pump.
- 5) Start the pump air pressure slowly, and let the cleaning solution circulate for sufficient cleaning.
- 6) Flush with clean water.
- 7) Remove the hose from the suction side of the pump, run the pump for a while to purge the pump of remaining fluid as much as possible.



CAUTION

- ! Be extremely careful when removing piping - the fluid will gush out.
- ! After cleaning with clean water, turn the pump upside-down to let the water flow out.

11. Daily check

Before starting pump operation, conduct the following check procedures every day. In case there appears any irregularity, do NOT start running the pump until the cause of the irregularity has been determined and corrective measures have been taken.

- a) Make sure that there is no leakage of fluid from any connection part or the pump.
- b) Make sure that there are no cracks in the pump casing or piping.
- c) Check the tightness of every bolt of the pump.
- d) Make sure that the connection parts of the piping and peripheral equipment are not loose.
- e) Make sure that any parts of the pump that are to be replaced at regular intervals have been changed.

12. Possible problems

12.1. Pump does not run

Cause	Action to take
The exhaust port (muffler) of pump is clogged with sludge.	Check and clean the exhaust port and muffler.
Air is not supplied.	Start the compressor, and open the air valve and air regulator.
The supply air pressure is low.	Check the compressor and the configuration of air piping.
Air leaks from connection parts.	Check the connection parts and tightness of bolts.
The flow valve on the discharge side is not open.	Open the flow valve on the discharge side.
The fluid piping is clogged with sludge.	Check and clean the fluid piping.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

12.2. Pump runs, but fluid does not come out

Cause	Action to take
The suction lift or discharge head is long.	Confirm the piping configuration and shorten the length.
The discharge-side fluid piping (including the strainer) is clogged with sludge.	Check and clean the fluid piping.
The valve on the suction side is not open.	Open the valve on the suction side.
The pump is clogged with sludge.	Disassemble the casing, check and clean.
The balls and valve seats are worn out or damaged.	Disassemble the pump, check and replace parts.

12.3. Flow (discharge volume) decreased

Cause	Action to take
The supply air pressure is low.	Check the compressor and configuration of air piping.
Air piping or peripheral equipment is clogged with sludge.	Check and clean the air piping.
The discharge-side flow valve opens differently.	Adjust the discharge-side flow valve.
Air is taken in together with fluid.	Replenish fluid and check the configuration of the suction-side piping.
Cavitations occur.	Adjust the supply air pressure and discharge pressure, and shorten the suction lift.
Chattering occur.	Adjust the supply air pressure and discharge pressure. Reduce inlet flow valve to adjusting liquid pressure and volume.
The fluid piping (including the strainer) is clogged with sludge.	Check and clean the fluid piping and strainer.
The exhaust port (muffler) of the pump is clogged with sludge.	Check and clean the exhaust port and muffler.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

12.4. Liquid leakage from exhaust port (silencer)

Cause	Action to take
Damaged diaphragms.	Replace the diaphragms.

12.5. High air consumption during operation

Cause	Action to take
The o-rings and sleeves are worn out.	Disassemble the air-valve, check and clean. Replace parts as necessary.

12.6. Irregular noise

Cause	Action to take
The supply air pressure too high.	Adjust the supply air pressure.
The pump is clogged with sludge with particles of larger than the permissible diameter.	Disassemble the casing, check and clean.

12.7. Irregular vibration

Cause	Action to take
The supply air pressure too high.	Adjust the supply air pressure.
The sleeves are worn out.	Disassemble the air-valve, check and clean. Replace parts as necessary.
Connection parts and pump mounting are loose.	Check each connection part and tighten the bolts.

If any of the above mentioned causes do not apply to your problem, contact your dealer or our office.

13. Returning the product for servicing

If you want to return the product for servicing, copy the **Trouble-Reporting FAX Sheet**, fill it out giving the details of the problem and conditions of operation, and fax it to your dealer or our regional office.

- 1) Get an acceptance from your dealer or regional office.
- 2) Clean the pump.
- 3) Return the product in the same package as when it was first shipped from the factory.



WARNING



It is the end-user responsibility to thoroughly wash and clean the pump to prevent any damages caused by accidental liquid leaks.



CAUTION



Be sure to maintain the transport safety by preventing any liquid leaks from the pump.

Trouble-Reporting FAX Sheet

Your information will be most helpful in our efforts to improve our service as well as checking into causes of troubles and irregularities. We kindly request you therefore to fill out the following FAX sheet carefully and fax it to your dealer or our regional office. Thank you.

Company		Name of person in charge	
Address		Department	
		Telephone	
		Fax	e- mail
MODEL		Year of manufacturing	
Period of use		Serial No.	
Operating conditions *Indoor * Outdoor		Date of Purchase	
Frequency of operation * Continuous * Intermittent _____ Hours/day/week/month		Name of Dealer _____ Type of fluid pumped _____	
Operating air pressure _____ bar Discharge pressure _____ bar Discharge volume _____ l/min. Suction side _____ m Suction side diameter _____ m Discharge side _____ m		Specific gravity _____ Viscosity _____ cPs Fluid temperature _____ *C/*F Slurry: *YES Density _____ wt% Particulate diameter _____ mm *NO	
Problem			
Draw a summary drawing of application (size, length of piping, and component parts) 			

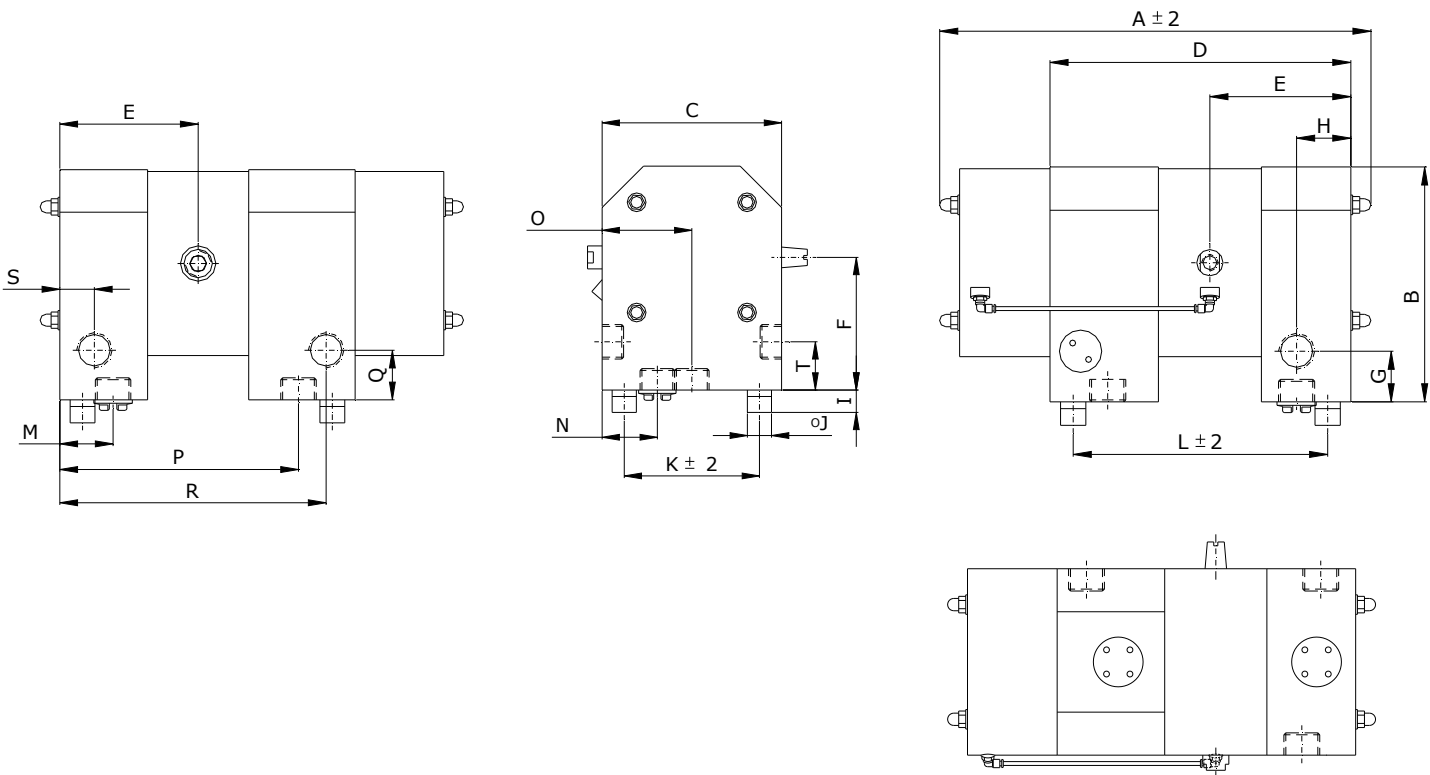
14. Main body specification

14.1. Main specification



! Due to constant improvements and/or modifications to our products, the dimensions and detailed technical specifications may be changed without prior information. Any claims concerning these changes shall not be considered. Please contact your dealer or our regional office for details.

14.2. Appearance and dimensions



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
DMF 10	238	130	103,5	167	78	77	28	40,5	13	Ø15	81	138	31	32,5	51,8	134	28	148	23	28
DMF 20	300	236	150	212	110	90	30	43	13	15	125	187	32	54	75	176	30	202	23	30

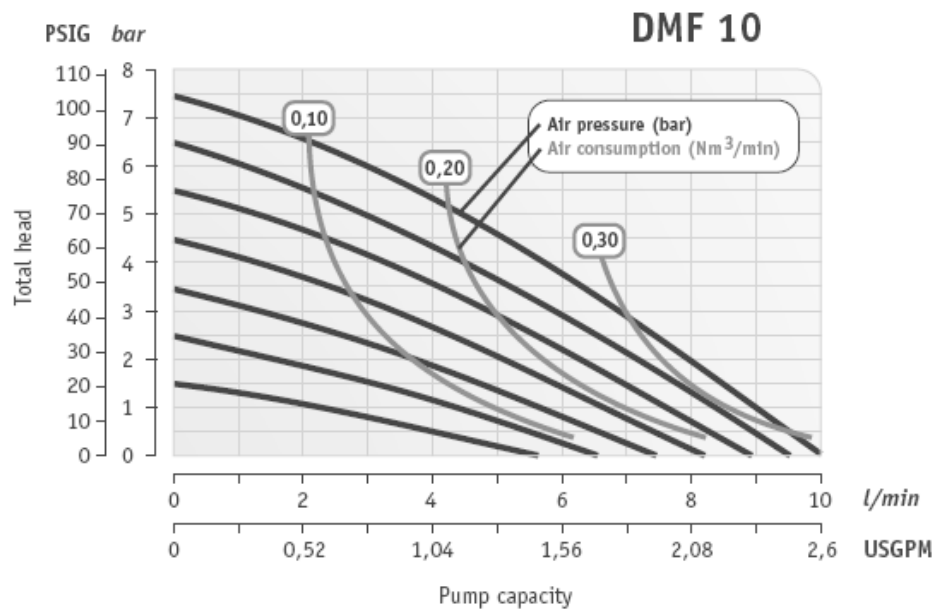
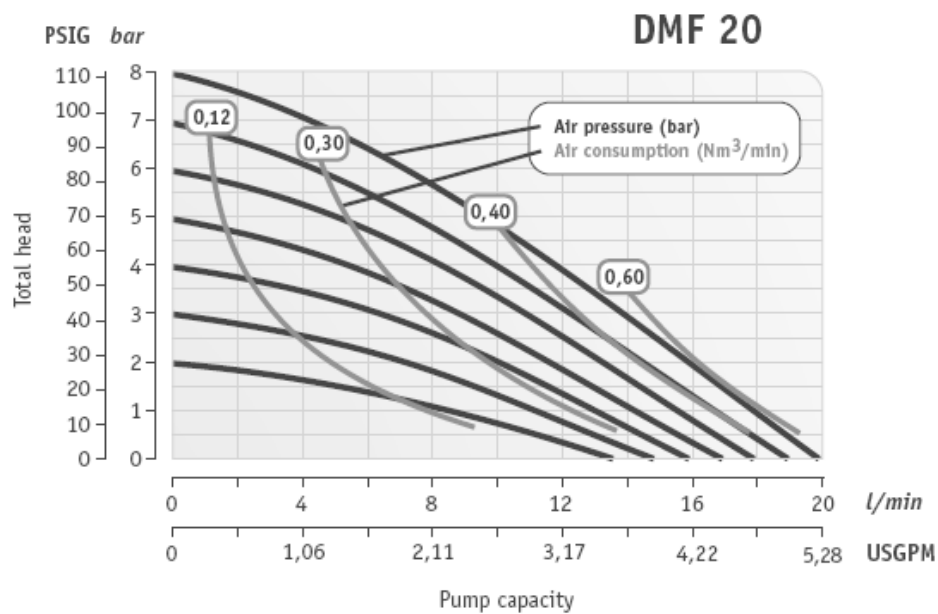
14.3. Technical Data

	DMF 10	DMF 20
Max capacity (l/min)	10	20
Max pressure (bar)	8	
Nominal port size BSP	1/2"	1/2"
Air connection	R 1/8"	R 1/4"
Suction lift dry (mWC):	1.5	2.5
Suction lift wet (mWC)	9	
Temperature limits (°C)	70	
Max viscosity (cP)	6000	10000
Weight (kg)	2.3	6.3
Material of pump housing	PE Conductive	
Diaphragm options	TFM/PTFE or EPDM	
Valve balls	AISI 316	
O-rings	EPDM	

14.4. Pump code

DMF 10 RTS
DMF - Dellmeco Pump F- series
R - Housing material: R - PE conductive
T - Diaphragm material: E - EPDM T - TFM/PTFE
S - Material of valve ball: S - AISI 316

14.5. Performance curves



15. Limited warranty

This product is shipped to customers only after meeting strict inspection standards. If an abnormality occurs during normal operation in accordance with the operating instructions and other operating cautions within the warranty period (24 months after date of purchase) that can be attributed to a manufacturing defect, the defective parts of this product will be serviced or the product will be replaced free of charge. However, this warranty will NOT cover compensation for incidental damage or any malfunction listed below.

This product is shipped to customers only after meeting strict inspection standards. If an abnormality occurs during normal operation in accordance with the operating instructions and other operating cautions within the warranty period (24 months after date of purchase) that can be attributed to a manufacturing defect, the defective parts of this product will be serviced or the product will be replaced free of charge. However, this warranty will NOT cover compensation for incidental damage or any malfunction listed below.

1. Warranty period

This warranty is valid for 24 months after the date of purchase.

2. Warranty

If, during the warranty period, any of the material of the genuine parts of this product or the workmanship of this product is found defective, and is so verified by our company, the servicing cost will be fully covered by our company.

3. Exclusion

Even during the warranty period, this warranty DOES NOT cover the following:

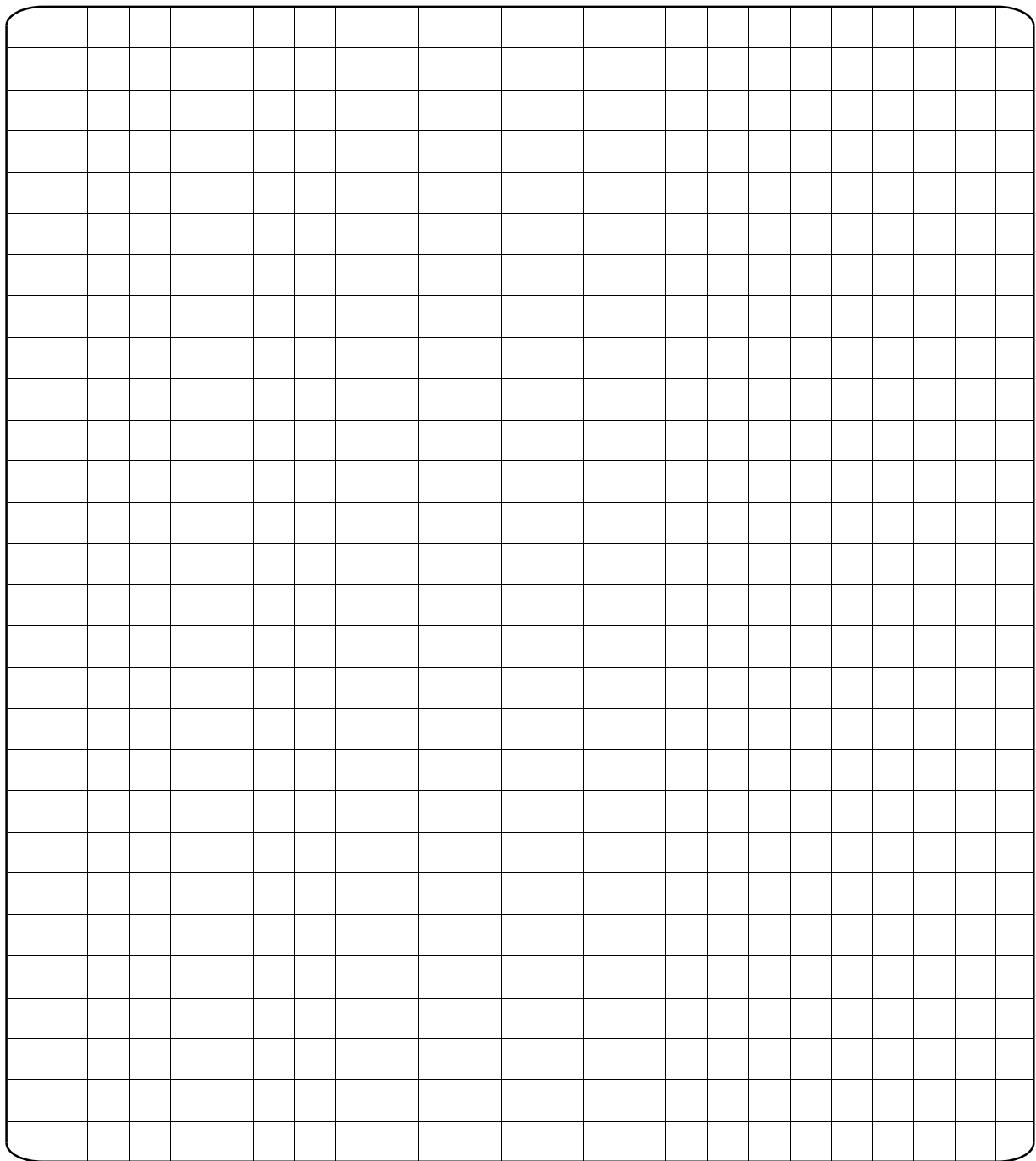
- 1) Malfunction caused by the use of parts other than manufacturer-specified genuine parts.
- 2) Malfunction caused by misuse or operating errors, or lack of storage or maintenance care.
- 3) Malfunction caused by the use of a fluid that may cause corrosion, inflation or dissolution of the component parts of the product.
- 4) Irregularity caused by a repair made by other than our firm, our regional office, dealer or authorized service personnel.
- 5) Malfunction caused by a modification of the product by other than authorized service personnel.
- 6) Wear and tear of parts that must be regularly replaced in the course of normal operation, such as diaphragms, valve seats, balls, air motor sleeve valves and o-rings.
- 7) Malfunction and/or damage due to transportation, moving or droppage of the product after purchase.
- 8) Malfunction and/or damage due to fire, earthquake, flood or other force majeure.
- 9) Malfunction caused by the use of compressed air that contains impurities, air with oil or excessive moisture, or use of gases or fluids other than the specified compressed air.
- 10) Malfunction caused by the use of a fluid that causes excessive abrasion.

Furthermore, this warranty does not cover the rubber parts, or other parts that are subject to wear in normal operation, used in this product and its accessories.

4. Parts

Parts for this product will be kept available for 5 years after discontinuation of production. Once 5 years have elapsed after close of production, availability of parts for this product cannot be guaranteed.

This image shows a full page of blank graph paper. The grid consists of small squares formed by thin black lines. There are 20 columns and 20 rows of squares. The top-left corner of the page has rounded corners, while the rest of the edges are straight. The entire page is white except for the black grid lines.



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