

dellmecco

Operating Instructions as translated from the original German

Operating and Repair Instructions

Pneumatic double diaphragm pump
and pulsation damper for DM range models
Polished stainless steel housing



Dellmecco GmbH
Industriestraße-West 1
D-63808 Haibach

Telephone 06021 / 446 39 80
Telefax 06021 / 446 39 85

E-mail: info@dellmecco.net
Homepage: www.dellmecco.net
DM_Hygiene_DE_Ausgabe_05_2021_EN.
docx

Table of Contents

General description of the machine.....	4
Safety.....	4
Explanation of symbols and warnings	4
Explanation of symbols	4
Warnings	5
Signal words.....	5
Warning signs.....	5
Mandatory signs	6
Target groups.....	6
Intended use of electrostatically conductive pumps compliant with Directive 2014/34/EU (ATEX)	7
Intended use of electrostatically non-conductive pumps	10
Technical data	11
Pump codes	11
Presentation and dimensions	12
Planning.....	15
Installation.....	16
Regulation of delivery	19
Transport	21
Unpacking.....	21
Assembly	21
Connection instructions	21
Equipotential bonding	21
Installation into the piping system.....	21
Compressed air connection	22
Commissioning	22
Operation.....	22
Starting to pump.....	23
Stopping to pump.....	24
Stopping.....	24
Troubleshooting.....	25
Service and maintenance.....	26
Checks	26
Daily.....	26
Every two months	26
Maintenance	27
Flushing the pump	27
Decommissioning, disassembly and disposal.....	27
Cleaning the pump.....	27
Repairing the diaphragm pump	28
Exploded drawings and pump spare parts lists.....	30
Model DM 15/30.....	30
Models DM 25/75 and 40/125.....	31

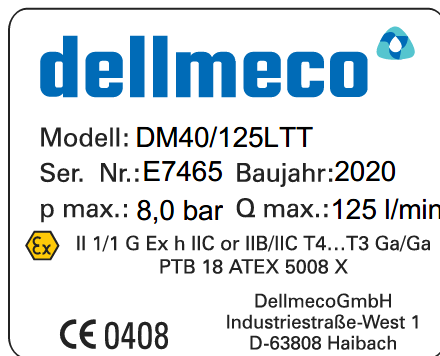
Model DM 50/315 and 65/565	32
Model DM 80/850.....	33
Spares list.....	34
Pulsation damper.....	35
Intended use compliant with Directive 2014/34/EU (ATEX) for electrostatically conducting pulsation dampers	35
Technical data.....	36
Pulsation damper code	36
Pulsation damper fitment	38
Connection instructions.....	38
Commissioning	39
Operation	39
Maintenance	39
Cleaning.....	39
Repairing the pulsation damper	39
Exploded drawing for pulsation damper	40
Options	41
Diaphragm rupture monitoring	41
Planning	41
Assembly.....	42
Decommissioning.....	43
Warranty	43
Warranty period	43
Exclusion of warranty.....	43
Sample of CE Declaration of Conformity for explosion-protected double diaphragm pumps and pulsation dampers.....	44

General description of the machine

The Dellmecco pneumatic double diaphragm pump is a positive displacement pump designed to convey fluids. The conveying diaphragm is driven by compressed air.

The housing parts in contact with the medium are made of stainless steel.

The exemplary nameplate shows the product code which fully describes the model of the pump. Position and exemplary representation of the nameplate:



The item numbers of the individual components refer to the exploded drawings and spare parts lists.

Safety






These Instructions will enable suitably qualified staff to manage the pump throughout its service life. Residual risks to persons and material are unavoidable during certain operations. These operations will be identified by means of warnings.

Explanation of symbols and warnings

The following sections explain all symbols and abbreviations used here.


Explanation of symbols

This section describes the symbols used in these Instructions.

Symbol	Meaning
	Warning signs are triangular with a black border and a symbol on a yellow background
	Highlighting sections of these Operating and Repair Instructions for explosion-protected pump versions, with the Atex symbol and text on a grey background
	Mandatory signs are round with a white symbol on a blue background
	Information is pointed out with an i . This information describes optimal use.
	Environmental requirements are pointed out by a crossed-out dustbin. Environmental requirements refer to statutory requirements for disposal of substances.




Warnings

Structure of the warnings

 Severity of the hazard indicated by signal words
Type and source of the hazard Consequences Escaping the hazard










Signal words

Signal words in the header of the warning indicate the severity of the hazard unless the escape action is followed.

Signal word and colour	Severity
 DANGER	Indicates a hazard with high risk of death or serious injury.
 WARNING	Indicates a hazard with medium risk potentially resulting in death or serious injury.
 CAUTION	Indicates a hazard with potential risk of minor or moderate injury.
ATTENTION	Warns of possible material or environmental damage and potential operational interference.





Warning signs

These are the signs used in the warnings.

Symbol	Meaning
	General warning
	Warning against explosive atmosphere
	Warning against suspended loads
	Warning against hot surface
	Warning against low temperatures/frost
	Warning against flammable substances
	Warning against caustic substances
	Warning against toxic substances
	Warning against electric shock

Mandatory signs

These mandatory signs indicate a requirement for personal protective equipment. Also observe local regulations.

Symbol	Meaning
	Use ear protection
	Use eye protection
	Use hand protection
	Use foot protection

WARNING

Defective personal protective equipment provides inadequate protection against these hazards and could result in death or serious injury. Replace defective protective equipment.

Target groups

The Instructions distinguish between three groups of skilled staff:

- Planner/Project planner
- Specialist/Operator
- Service/Repairs

The groups will be experienced in:

- Certificates, regulations; accident prevention regulations and standards
- Techniques for selecting and erecting mechanical equipment
- Work permit system



For explosion-protected versions, also:

- Project planning, selection and installation of electrical systems in explosive atmospheres as per DIN EN 60079-14
- Explosion protection principles
- Types of ignition protection, equipment markings
- Tests for DIN ISO EN 60079-17 compliance


Depth of experience:

- **Planner/Project planner:**
In-depth knowledge of the items listed under Experience above, in terms of planning, scheduling and supervisory activities.
- **Specialist/Operator:**
Understanding of the items listed under Experience above, required to perform the activities.
- **Service/Repairs:**
Understanding of the items listed under Experience above, required to perform the activities.
Practical experience in carrying out repairs.

Safety-conscious working





Any person carrying out work relating to installation, commissioning, operation, maintenance and service/repair must assiduously and entirely read these Operating Instructions and observe all the safety rules and warnings.

- Planner/Project planner:
 - Planning installation of the equipment and type
 - Marking surfaces as HOT SURFACE depending on the temperature of the pumped medium

	<p>For explosion-protected versions, also:</p> <ul style="list-style-type: none"> • Determining the temperature class depending on the temperatures of pumped media • Determining the explosion subgroup depending on the conductivity of pumped media or for suspensions • Checking the suitability of the category
---	---

- Specialist/Operator:
 - Implementation of scheduled activities
 - Operating the pump
- Service/Repairs:
 - Implementation of scheduled activities
 - Operating the pump
 - Proven practical experience in the repairs required

Safekeep these Instructions in a suitable place. Hand over these Instructions together with the pump should the operator change.

	<p>Intended use of electrostatically conductive pumps compliant with Directive 2014/34/EU (ATEX)</p> <p>Only pumps built using this type of material are suitable for use in and near explosive atmospheres:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Explosion subgroup</th> <th colspan="2">Category/EPL</th> <th>Product code Housing</th> </tr> <tr> <th>Inside</th> <th>Outside</th> <th>Inside</th> <th>Outside</th> <th></th> </tr> </thead> <tbody> <tr> <td>IIC or IIB</td> <td>IIC</td> <td>1/Ga</td> <td>2/Gb</td> <td style="text-align: center;">L</td> </tr> </tbody> </table> <p>The Dellmeeco compressed gas-operated double diaphragm pumps are designed to transfer fluid media of explosion subgroups up to IIC or IIB to Zone 0, Zone 1 or Zone 2. The pump is a category 1G device on the inside.</p> <p>These compressed gas-operated double diaphragm pumps are category 2G on the outside. This means they can be used in explosive gas atmospheres in Zone 1 or Zone 2. The pump can be used outside in explosion subgroups IIA, IIB or IIC.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; vertical-align: middle;">  </td> <td> <p>Pressure and temperature suitability of this pump means that IIC substances will not be in liquid form and therefore cannot be pumped with this pump. Hydrogen-forming substances allowed to be pumped inside as per IIC classification may, however, exist.</p> </td> </tr> </table> <p>The operating parameters specified in these Operating Instructions and the prescribed conditions for installation, assembly, commissioning, operation, maintenance and disassembly must be maintained.</p>	Explosion subgroup		Category/EPL		Product code Housing	Inside	Outside	Inside	Outside		IIC or IIB	IIC	1/Ga	2/Gb	L		<p>Pressure and temperature suitability of this pump means that IIC substances will not be in liquid form and therefore cannot be pumped with this pump. Hydrogen-forming substances allowed to be pumped inside as per IIC classification may, however, exist.</p>
Explosion subgroup		Category/EPL		Product code Housing														
Inside	Outside	Inside	Outside															
IIC or IIB	IIC	1/Ga	2/Gb	L														
	<p>Pressure and temperature suitability of this pump means that IIC substances will not be in liquid form and therefore cannot be pumped with this pump. Hydrogen-forming substances allowed to be pumped inside as per IIC classification may, however, exist.</p>																	

Types of ignition protection

Designation: Ex h as per DIN EN ISO 80079-36:2016-12
 Constructional safety: c as per DIN EN ISO 80079-37:2016-12

The pump operates strictly pneumatically. The compressed air motor and pulsation damper have plain bearings.



X Special requirements

- The resistance of hoses connected to the diaphragm pump must not exceed $10^6 \Omega$ between hose ends.
- The diaphragm pump must be included in equipotential bonding before commissioning.
- Vessels must be separately earthed should the type of installation not ensure this already.
- The maximum media temperature as per Operating Instructions must not be exceeded.
- Operation must be stopped immediately should fluids leak from the diaphragm pump housing or sound suppressors.
- Operation of the pump may electrostatically charge flowing fluids.
- The pumps may be used to pump fluids, including flammable fluids, of medium and high conductivity ($k > 50 \text{ pS/m}$) when running dry for indefinite periods during venting of the pump/lines or when pumping empty with droplet/particle/air mixtures forming inside diaphragm spaces or lines.
- Only when suspensions or fluids of low conductivity ($k \leq 50 \text{ pS/m}$), including flammable fluids of groups IIA and IIB, are pumped, long dry runs (i.e. longer than 30 s) as the pump is vented or pumped empty with droplet/particle/air mixtures potentially forming in the diaphragm chambers or lines, must be avoided.

The planner/project planner will assign explosion subgroups IIC or IIB inside, depending on conductivity, conveyance of suspensions or entrained solids:

Explosion subgroup inside	Conductivity	or suspensions / solids
IIC	$\kappa > 50 \text{ pS/m}$	not permissible
IIB	$\kappa \leq 50 \text{ pS/m}$	permissible

Frame size DM 80/850 is limited to pumping fluids with $\kappa > 50 \text{ pS/m}$ with no suspensions/solids, thus always IIC inside.

The planner/project planner will stipulate the temperature class.

The actual maximum surface temperature of the pump and thus the temperature class will depend on the inlet temperature of the pumped medium.

Inlet temperature and temperature class correlate as follows:

Max. media infeed temperature	Temperature class
120 °C	T 3
90 °C	T 4

 **DANGER**

- Incorrect assignment of media temperature to temperature class may cause explosive atmospheres to ignite on hot surfaces. The assignment table must be observed, the limits must be made known to and strictly observed by the operator.
- Impermissible media temperatures will lead to failure of the pump material and uncontrolled media leakage. The temperature restrictions imposed by the pump material are given in the technical data and must be observed.
- Heat build-up on the pump and ambient temperatures of > 40 °C will lead to the permissible surface temperature being exceeded and possible explosions caused by hot surfaces. The maximum ambient temperature must not be exceeded and ambient air must be free to circulate at the installation site.
- The pump must not be operated in dusty atmospheres or in the presence of dusty surfaces.

Operators must ensure that pumps are appropriately labelled if media temperatures exceed 65 °C.

 **WARNING**

Pumping of hot media will heat up the surface of the pump, potentially causing severe burns if touched. For media temperatures of 65 °C and higher, the planner/project planner must affix a warning to the pump or cordon off the area to ensure that the HOT SURFACE hazard is evident and the potential for contact limited.

  **DANGER**

Warning signs such as HOT SURFACE that operators may need to attach may acquire electrostatic charge and turn into effective sources of ignition, triggering explosions. Operators shall observe safe electrostatic measures. The distance between the signboard and existing lettering should be at least 10 mm. Do not stick the sign to painted surfaces.

The pump is suitable for installation indoors and outdoors.


  **DANGER**

Painted surfaces may pick up electrostatic charge and become effective sources of ignition, triggering explosions. Operators shall observe safe electrostatic measures. The pumps shall not be painted without permission.

Foreseeable misuse:

The pump is **NOT** suited for the following applications:

- Spraying of flammable fluids
- Use as submersible pump
- Conveyance of dust
- Installation in dust explosive atmospheres
- Underground
- Continuous dry running

	 <p>DANGER</p> <p>Incorrect operation or misuse may pose a risk of personal injury and/or damage to property, including explosion. The pumps shall not be used unless for their intended purpose and in safe condition.</p>
--	---

Intended use of electrostatically non-conductive pumps


The intended use of Dellmeeco compressed gas operated double diaphragm pumps is to pump fluid media. The operating parameters specified in these Operating Instructions and the prescribed conditions for installation, assembly, commissioning, operation, maintenance and disassembly must be maintained. The pump is suitable for installation indoors and outdoors.

The planner/project planner will stipulate the temperature.

The actual maximum surface temperature of the pump will also depend on the inlet temperature of the pumped medium.

Refer to the "Technical data" section for further limits to the maximum temperature of the pumped medium.


The operator must ensure that pumps are suitably labelled for media temperatures > 65 °C.

	 <p>WARNING</p> <ul style="list-style-type: none"> • Pumping of hot media will heat up the surface of the pump, potentially causing severe burns if touched. For media temperatures of 65 °C and higher, the planner/project planner must affix a warning to the pump or cordon off the area to ensure that the HOT SURFACE hazard is evident and the potential for contact limited. • Heat build-up on the pump and ambient temperatures > 40 °C will cause permissible pump temperature to be exceeded, with the potential for leakages. Health may be affected, depending on pumped media. Do not exceed the maximum ambient temperature and allow free circulation of ambient air at the installation site.
--	--

Foreseeable misuse:

The pump is **NOT** suited for the following applications:

- Spraying of flammable fluids
- Pumping of flammable fluids
- Conveyance of dust
- Continuous dry running
- Installation in explosive atmospheres

	 <p>DANGER</p> <p>The pump materials will become electrostatically charged during pumping, causing vapours of flammable fluids to ignite. The outer surface of this pump design can also become electrostatically charged and thereby ignite explosions.</p> <p>Only pump designs using electrostatically conductive material - observe product codes - may be operated in explosive atmospheres.</p>
--	---

Technical data

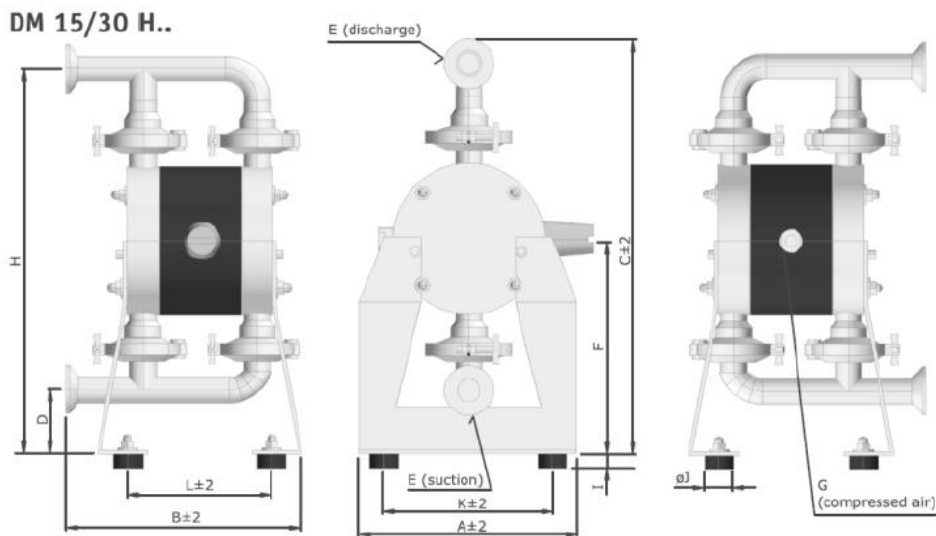
Pump codes

DM	25	75	H	T	T	-	TC
							no marking – dairy tube TC - Tri Clamp connection SMS - SMS connection F10 - Flange connection DIN EN 1092-1
						Valve body	E - EPDM N - NBR S - AISI 316 T - PTFE U - PU C - Ceramics
						Diaphragm	E - EPDM N - NBR T - TFM / PTFE V - Viton (FKM) L - PTFE electrostatically conducting comprises bronze sound suppressor
						Housing material	H – stainless steel, polished, AISI 316L L – stainless steel, polished, AISI 316L, electrostatically conducting
						Capacity	75 l/min at 8.0 bar
						Nominal size	DN 25 (1")

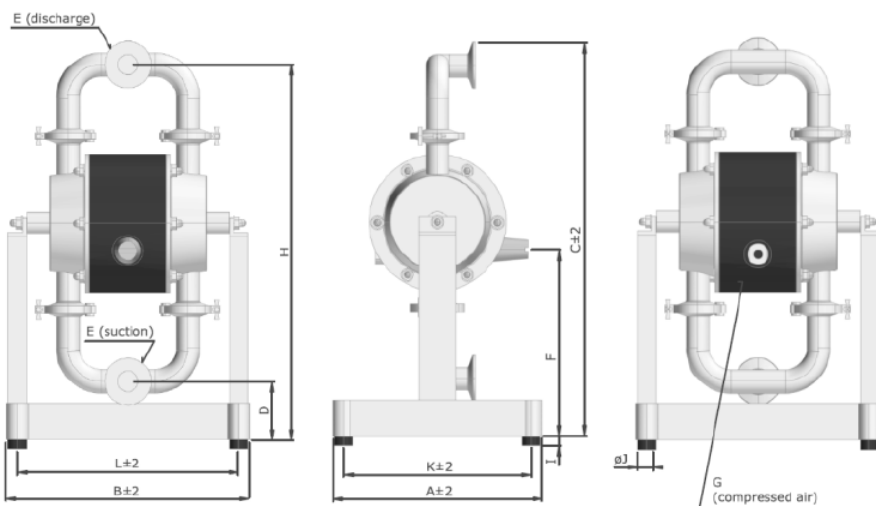
Dellmeeco pneumatic double diaphragm pump - DM series

Presentation and dimensions

Dimensions



DM 25/75 H., ..., DM 80/850 H..



	A	B	C	D	E	F	G	H	I	ØJ	K	L	Y*	M*
DM 15/30	150	165	299	46	1/2" Dairy tube, DIN 11850*	162	R 1/8"	282	18	30	116	103	M8	5
DM 25/75	206	240	230	75	1" Dairy tube, DIN 11850*	204	R 1/4"	394	18	30	206	238	M8	5
DM 40/125	256	287	465	67	1 1/2" Dairy tube, DIN 11850*	221	R 1/4"	440	18	30	226	257	M8	5
DM 50/315	350	387	679	102	2" Dairy tube, DIN 11850*	247	R 1/2"	640	18	30	325	357	M8	10
DM 65/565	350	459	888	126	2 1/2" Dairy tube, DIN 11850*	357	R 1/2"	842	18	30	326	435	M8	12
DM 80/850	590	600	1310	129	3" Dairy tube, DIN 11850*	688	R 3/4"	1257	18	30	565	575	M8	12

* Tri-Clamp or SMS connection on request

Dimensions may vary, all dimensions in mm

Technical data

	DM 15/30	DM 25/75	DM 40/125	DM 50/315	DM 65/565	DM80/850
Max. capacity [l/min]	30	75	125	315	565	850
Max. pressure [bar]	8.0	8.0	8.0	8.0	8.0	8.0
Materials connection	Dairy tube, DIN 11850*					
Air connection	R 1/8"	R 1/4"	R 1/4"	R 1/2"	R 1/2"	3/4"
Max. compressed air consumption Nm ³ /min	0,3	0,4	0,6	1,6	2	3,5
Suction height, dry [mH ₂ O]	2.0	3.0	4.0	4.0	5.0	5.0
Suction height wet [mH ₂ O]	9.0					
Max. solid matter size [mm]	4	5	8	11	14	15
Max. pumped media temperature - NBR/EPDM diaphragms [°C]	80	80	80	80	80	80
Max. pumped media temperature - PTFE diaphragms [°C]	120	120	120	120	120	120
Weight – stainless steel [kg]	5	8	10	26	33	85
Diaphragm options	EPDM, NBR, TFM/PTFE, PTFE-electrostatically conducting, FKM (Viton)					
Valve ball	EPDM, NBR, TFM/PTFE, AISI 316, PU, ceramics					
Cylinder valve	n.a.					
O-rings	EPDM, NBR, FEP/FKM, silicone					
Sound pressure level dB(A)						
Drive air pressure 3.0 bar	67.5	74.9	71.9	73.9	71.7	69.5
Drive air pressure 5.0 bar	70.8	80.1	75.5	82.8	78.3	77.1
Drive air pressure 7.0 bar	72.1	82.0	78.8	81.7	82.8	81.9
Max. pumped media supply pressure [bar]	0.3	0.3	0.3	0.3	0.3	0.3
Test pressure [bar]	12	12	12	12	12	12
Max. stroke rate	430	240	160	140	100	95
Recommended stroke rate / min.	280	180	120	100	60	60
Max. air inlet pressure**	8.0	8.0	8.0	8.0	8.0	8.0
Torque, housing screws	9	10	14	17	22	45
Torque, air connection	2.0	4.0	6.0	6.0	10.0	10.0
Torque, suction/pressure connection	4.0	5.0	12.0	15.0	19.0	19.0
Ambient temperature	-20 to +40°C					
Installation altitude	4 000 NHN (German std. elevation zero)					

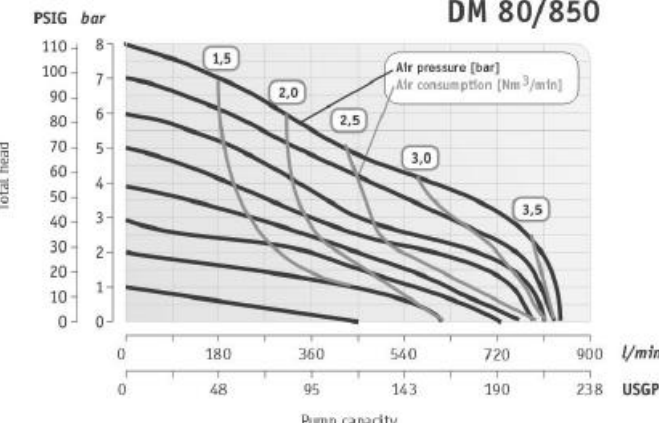
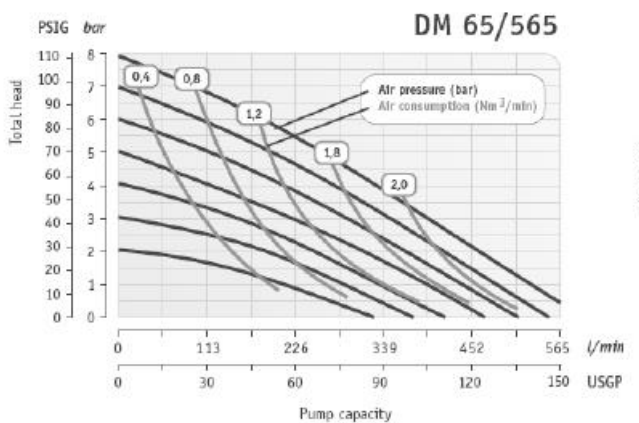
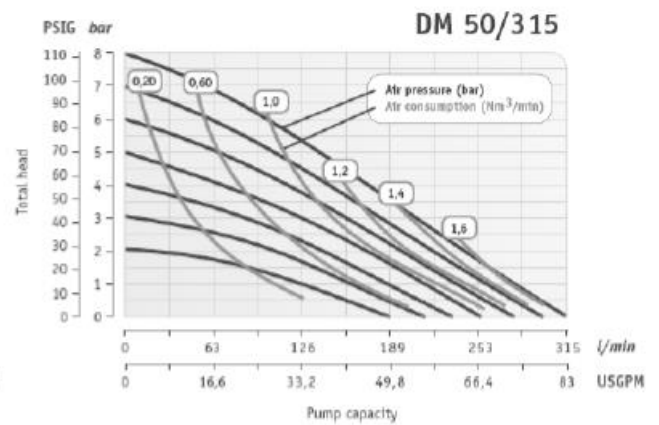
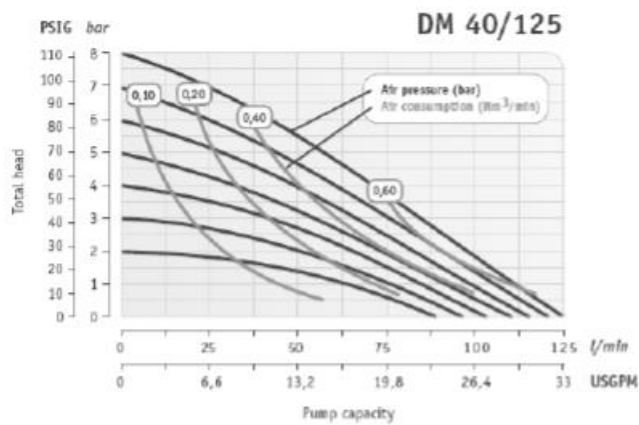
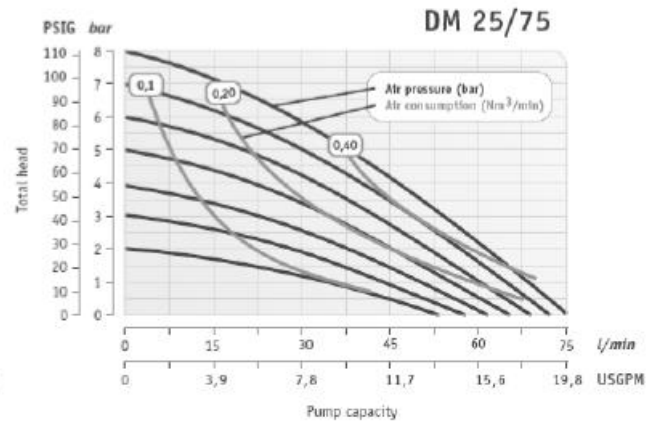
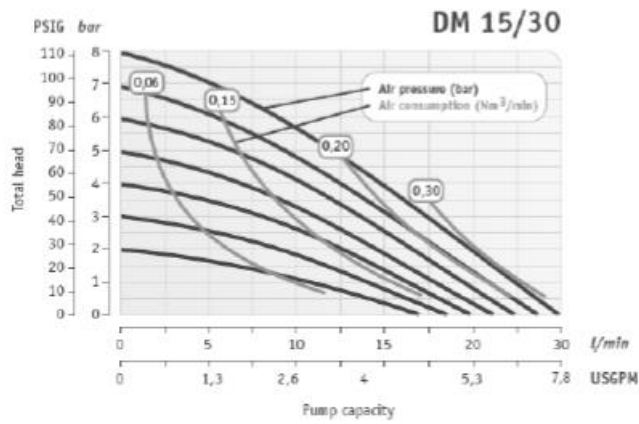
Technical data may vary

* Tri-Clamp or SMS connection on request

** up to 16.0 bar on request

Characteristics





(Characteristics determined with water (20 °C) at pump inlet and free pump outlet, properties such as viscosity, solids or entrained solids transport are not taken into account).






Planning

The planner/project planner must check that the Dellmeeco pneumatic double diaphragm pump and the connected hoses and piping are suitable for the application as per specifications, specifically materials.

For details of the materials used refer to the Technical Data section for the pump code as per the pump nameplate.

   	WARNING
<ul style="list-style-type: none"> • The chemical properties of pump materials that are not resistant to the pumped fluid may cause leakages and serious injury, even death. Check the chemical resistance of the materials to the pumped medium. • Should the diaphragm rupture or tear, drive gas will enter the pumped medium and potentially create ignitable atmospheres there and in the connected parts of the system. To minimise the risk of diaphragm rupture, service the pump as instructed in the maintenance and servicing section and switch off should the diaphragm be ruptured or torn. Nitrogen may be used as the drive gas to prevent the formation of explosive atmospheres even in cases of rupture. 	

	 	DANGER
<ul style="list-style-type: none"> • The pump may lose heat to the environment, depending on the temperature of the pumped medium. Build-up of heat will lead to overheating and temperatures exceeding the permissible temperatures, including danger of explosion. Ensure natural convection (ventilation) to ensure heat dissipation. • Electrostatic charge may build up when pumping flammable fluids in explosion subgroup IIA or IIB or IIC hydrogen formers, even in IIC environments. Electrostatic charge may cause explosions and considerable damage to property and the environment, even personal injury or death. Applicable national guidelines must be observed (in Germany: TRGS 727) to avoid electrostatic charging. Only conductive or electrostatically conductive devices, e.g. hoses, containers and valves, shall be used for pumping. The resistance of hoses connected to the diaphragm pump must not exceed $10^6 \Omega$ between hose ends. All objects and thus also the pumped fluid must be earthed or connected to earth. The specific connection on air motor housing of the pump (Pos. 2) must be used for earthing. Vessels must be separately earthed should the type of installation not ensure this already. Operators and maintenance personnel must also be connected to earth via appropriate footwear. • Electrostatic charging caused by splashing of the fluid may ignite an explosion. Such electrostatic charging must be avoided by decanting below the fluid level and using fill-pipes reaching down to the bottom for filling from the top. • Lightning will be an effective source of ignition of explosive atmospheres. Lightning protection, especially for outdoor installation, must be installed. 		


If necessary, install a pulsation damper at the pump outlet to smoothen media pulsations. Observe the sections in these Instructions that deal with pulsation dampers.



Installation

Installation position

Install the pump on a horizontal surface with the vibration dampers (Pos. 11) facing downward. A maximum inclination of 30° in any direction is allowed.

Vibrations caused by pumping must be absorbed. This must be considered during installation by securing the vibration damper fastening screws against loosening.

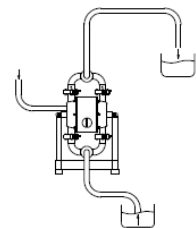
	<p>For explosion-proof versions, see the warning in the section "Intended use", also observing Directive 2014/34/EU (ATEX) of electrostatically conductive pumps:</p> <ul style="list-style-type: none"> • Pumping fluids with low electrostatic conductivity $\kappa \leq 50$ pS/m and suspensions.
---	--

	 DANGER
	<p>The pump stroke rate will increase when running dry. Impermissibly high stroke rates may result in excess temperatures and sources of ignition. Do not operate the pump above the permissible stroke rate - see section "Technical data".</p>

Three types of installation must be distinguished:

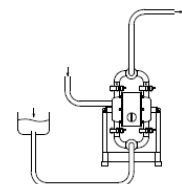
1. Self-priming

The pumps are dry self-priming. Greater suction heights are possible with filled pumps. Suction heights will vary depending on pumped medium and application parameters. The values given in the "Technical data" section are based on water at 20 °C.





2. Primary pressure fed

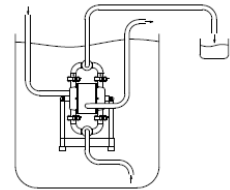
This situation arises when suction is required from the bottom of a storage, mixing or septic tank. The primary pressure must be limited to 0.3 bar(gauge).




3. Submersible pump

	 DANGER
	<p>Flowing flammable fluid may in immersion applications charge up electrostatically also charging the pump. The electrostatic charge may ignite flammable atmospheres around the pump and cause explosions. Do not immerse the pump in flammable fluids.</p>

All pump frame sizes may be operated submerged. The pump materials must be chemically compatible with the respective fluid. The exhaust air must be vented to the atmosphere via an exhaust pipe.





The maximum submersion depth is 3 m with 0.3 bar (gauge) inlet pressure.

 WARNING
<ul style="list-style-type: none"> • Pump materials that are not resistant to the pumped medium in which the pump is submerged may lead to media leakage, causing serious injury, even death, due to the chemical properties of the media. Check the chemical resistance of the materials to the pumped medium. • Discharging exhaust air into surrounding pumped fluid will cause foaming and overflow of the container. Such escaped volumes may cause serious injury, even death, due to their chemical properties. The exhaust air must be vented to the outside.

Connection of suction and pressure lines

The pump cannot be screwed into the piping system and cannot absorb forces caused by piping.

 DANGER
<p>Oscillations may damage the pump and system, including leakage. Depending on the pumped medium and the seriousness of the leakage, the medium may escape and cause serious injury, even death. Pumps must always be installed in pipelines free of stress by using electrostatically conducting, flexible hoses or compensators on the compressed air supply, suction and pressure sides.</p>

 WARNING
<p>Diaphragm rupture may in the absence of compressed air supply cause pumped media to escape through the exhaust air silencer. Such leakage may lead to serious injury, even death, due to the chemical properties of pumped media. Discharge the exhaust air safely, away from people, animals or food.</p>

Pump connection **E** determines the nominal size of the connecting line.


The pressure levels of the lines must be selected to suit the relevant pump pressure.

Pump performance may suffer if this is disregarded.

Suction lines rising to the pump gradually will prevent air bubbles from forming in the line, yet also reduce the pump's suction performance.

It should be possible to isolate stationary pumps by means of shut-off valves on the pressure and suction sides when two or more pumps pump into the same pipeline and not all the pumps are operating.


Appropriate shut-off valves must be provided on installation.

	Use appropriate hoses or compensators that will not contract under suction and thereby impede pumping. Restoring forces on the pump must be ZERO.
---	---

Compressed air connection

One of the following gases, referred to as "compressed air" in this document, will be required to operate the pumps:



- Dry compressed air, containing no dust or oil
- Nitrogen


	DANGER
<ul style="list-style-type: none"> • Using other or inferior quality gases may cause air pollution, destruction of the pump or even explosion. Only compressed air or nitrogen may be used to drive the pump. • The compressed air will in the event of a diaphragm rupture block the pumped medium from entering the air motor. The compressed air will enter the pumped medium, creating an ignitable atmosphere. Nitrogen used as the drive gas will exclude the potential creation of explosive atmospheres. 	

DIN ISO 8573-1 quality compressed air of the following classes should be maintained to prevent malfunctioning of the air motor:

- Solids content Class 2 at least
- Water content Class 3 at least
- Oil content Class 3 at least



The pressure of the pump's compressed air supply must remain constant.

		CAUTION
Freezing may despite dried compressed air occur on the silencer if the humidity of ambient air is high. Such freezing may cause minor injury when touched. Such freezing may be prevented by means of an exhaust hose (at least 0.5 m long). Ventilation must be provided when installing in very confined spaces, to ensure that no "cold build-up" occurs at the silencer. Wear protective gloves during work.		

	DANGER
Nitrogen used as driving gas will in normal operation escape from the air motor's silencer. This may pose a suffocation hazard in closed areas. Ensure adequate ventilation; for maximum nitrogen volume see section "Technical data" and discharge exhaust air safely away from people, animals and food.	
Using other or inferior quality gases may cause air pollution, destruction of the pump or even explosion. Only compressed air or nitrogen may be used to drive the pump.	

Conveying solids





The pump is in principle capable of conveying solids up to sizes specified in section "Technical data".

	<div style="border: 1px solid black; padding: 5px;"> <p> DANGER</p> <ul style="list-style-type: none"> Particles will heat up the pump and such hot surfaces will ignite explosive atmospheres. Ensure that no unacceptably large solids will be pumped. This may be achieved using a sieve with mesh size 80 % of the permitted solids size. When pumping suspensions or entrained solids in continuous operation during bleeding or empty pumping, the associated formation of mixtures of droplets, particles or air in the diaphragm chambers and connected lines may charge up the fluids electrostatically and ignite explosive atmospheres. To avoid this situation, such pumping with suspensions or entrained solids must be limited to 30 seconds max. </div>
---	---

Regulation of delivery




Delivery pressure

The delivery pressure may be adjusted via the pressure of the compressed air supply and air filter regulator. The minimum starting pressure for the DELLMECO pump is 1.5 bar (gauge) or less. For the maximum permissible supply pressure refer to section "Technical data".

    DANGER
<p>Exceeding the maximum pressure will damage pump and system, causing leakages. Pumped media will escape and lead to explosion and serious injury, even death, depending on the medium and the severity of the leakage. Pressure in the air motor and pressure line must not exceed the permissible pressure ranges as per the "Technical data".</p>

Delivery volume

The delivery volume of the pump may be adjusted via the needle valve in the compressed air line to regulate the compressed air delivery.

   WARNING
<p>Closing the shut-off valve will briefly increase pressures in the air motor and pressure line. Exceeding the permissible pressure may cause leakages and possibly serious injury, even death, due to chemical properties of the pumped medium. Close and open the valve slowly.</p>

The permissible flow rate of the pumped medium may vary due to viscosity, density, material friction coefficients, suction cycle, etc. Strong increase in the flow velocity may cause cavitation. This will affect performance and impair pump functionality.

ATTENTION
<p>Cavitation will damage the pump. To avoid this, match media supply on the suction side with flow rate on the pressure side. Immediately switch off the pump and check the installation should no media flow take place after starting the pump or should abnormal noises or other complications occur.</p>

The connection thread **G** for the compressed air supply of the pump (18) is located in the air motor housing (Pos. 2) opposite the silencer (Pos. 17).

The cross-section of the compressed air supply line should correspond at least to the cross-section of the pump's air connection.

Refer to illustration "Example of an installation" for components needed for operation:

1. Compressed air supply:
 - Air shut-off valve
 - Air filter regulator
 - Needle valve

Install all the components as close as possible to the pump.

2. Pumped media connection
 - Pressure line shut-off valve
 - Suction line shut-off valve
 - Pressure gauge with shut-off valve in the suction line
 - Pressure gauge with shut-off valve in the pressure line

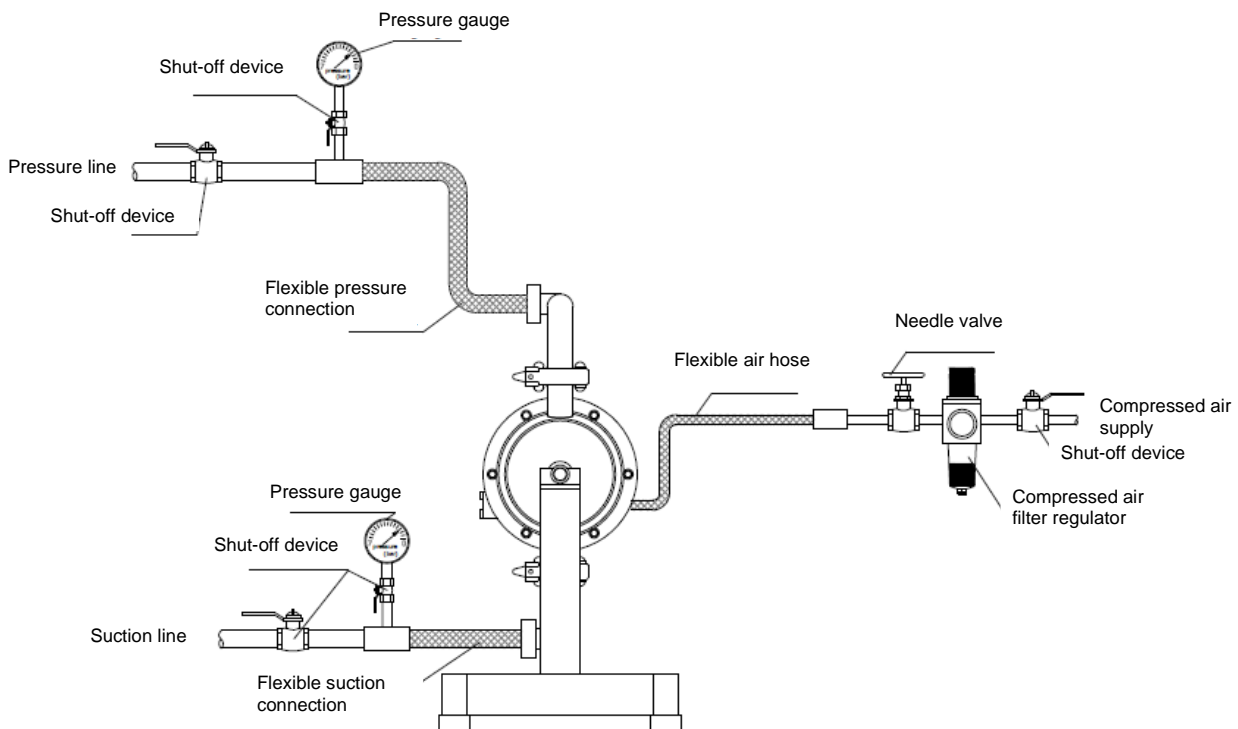
Pressure test on the entire system

The design of the pump requires that system pressure tests may only be carried out with the shut-off valves on the suction and pressure lines closed or by briefly increasing pump pressure.

WARNING

Pressurising the pump without compressed air supply may rupture the diaphragm and cause leakages and risk of serious injury, even death, due to chemical properties of the pumped medium. Do not pressurise unless in the presence of compressed air.

Exemplified connection



To be provided on site:

- Suction side strainer for the pumped medium
- Pumped medium draining valve
- Flushing the conveyance space across the assembly

Running pumps will generate high noise levels. Noise levels will vary depending on application. For the maximum value, refer to “Technical data”.

Transport

CAUTION
Crushing may occur in the presence of suspended loads. Wear protective gloves and safety shoes as prescribed under local regulations.

To transport the pump, use lifting or slinging equipment suitable for the respective environment and weight. Pumps from frame size 40/315 must be lifted with a lifting sling according to DIN EN 1492-1 as shown in the illustration.



Unpacking

	DANGER
Unpacking from the foil packaging will cause electrostatic charging of the foil and pump. Uncontrolled discharge will cause sparking and possibly explosions. Remove the foil packaging of the pumps away from potentially explosive areas and also discharge electrical charge to earth outside such areas.	

ATTENTION
Dispose of packaging in accordance with local regulations.

Assembly

Install the pulsation damper, if supplied, at the pump outlet. Observe the sections in these Instructions that deal with pulsation dampers.

Connection instructions

Mount the pump into the vibration dampers at the installation site from underneath. Thread size and tightening torques as specified in section “Technical data”.

Equipotential bonding


The pump must be included in the equipotential bonding of the entire system. The connection on the air motor housing is marked according to the symbol shown opposite.




Installation into the piping system

Always install the DELLMECO pumps into piping systems stress-free, using electrostatically conducting, flexible hoses or compensators on the compressed air supply and on the suction and pressure sides to prevent damage from oscillations, since the pump cannot absorb any weight or forces introduced by piping.

Installation as per illustration “Exemplified connection” in the Planning section.

 WARNING
Escaping media may cause serious injury, even death, by direct jets or due to their chemical properties. Work only on depressurised pumps and clean media lines and wear personal protective equipment.

Compressed air connection

 CAUTION
Escaping compressed air may cause injury due to direct jet or ejected parts. Work only on depressurised pumps and wear personal protective equipment.


- Connect the air shut-off valve, air filter regulator and needle valve to the compressed air line.
- Connect this subassembly to air inlet **G** of the pump.
- The pump will be ready for operation when all lines are properly connected.


Commissioning

Check and, if necessary, adjust the torques of the screwed casing connections (through bolts Pos. 9) before commissioning. The required torques are given in section “Technical data” in these Operating Instructions.

Check proper fastening of all pipework.

Operation

 WARNING
Leaks caused by cracks in the pump or loose pump housing or piping screws may cause hazardous media to escape, with potential injury, even death. Before each start-up, check the pump for cracks and check the screw connection torques as specified in section "Technical data". Report any discrepancies to the responsible officer.

	The pump should only be operated with the minimum air pressure necessary since higher air pressure will result in higher air consumption and increase wear of the pump.
---	---

Regulation of delivery

Delivery pressure

The delivery pressure is adjusted via the compressed air supply pressure on the air filter regulator. The minimum start-up pressure of the DELLMECO pump is 1.5 bar (gauge) or less. For the maximum pressure refer to section “Technical data”.

Delivery volume

The delivery volume of the pump may be adjusted via the needle valve in the compressed air line to regulate the compressed air delivery.

 WARNING
--

- | |
|--|
| <ul style="list-style-type: none"> • Closing the shut-off valve will briefly increase pressures in the air motor and pressure line. Exceeding the permissible pressure may cause leakages and possibly serious injury, even death, due to chemical properties of the pumped medium. Close and open the valve slowly. • Pressurising the pump without compressed air supply may rupture the diaphragm and cause leakages and risk of serious injury, even death, due to chemical properties of the pumped medium. Do not pressurise unless in the presence of compressed air. |
|--|

Strong increase of flow velocity may cause cavitation.

 CAUTION
--

<p>Running pumps will generate high noise levels. Noise levels will vary depending on application. For the maximum value, refer to "Technical data". Wear ear protection.</p>

The pump is dry self-priming. It is not necessary to fill the suction line before operation. The pump's suction capacity may, however, be increased if the suction line is filled before operation. The pump will have a high stroke rate when running dry. Do not exceed the maximum value specified under "Technical data".



 DANGER

- | |
|--|
| <ul style="list-style-type: none"> • Dry running, indicated by a high stroke rate, will lead to electrostatic charging of the medium in cases of pumped media with low electrostatic discharge capacity $\kappa \leq 50$ pS/m or of suspensions, potentially igniting an explosive atmosphere. To avoid this, limit such operation to less than 30 seconds when pumping relevant media. • Impermissibly high stroke rates (limits given in section "Technical data"), will cause heating in excess of the temperature class, potentially igniting explosive atmospheres. Do not exceed the maximum stroke rate. |
|--|

 CAUTION
--

<p>Negative pressure at the suction connection of the pump may cause injury. Do not close the suction connection by hand.</p>

In the event that two or more pumps pump into a pipeline, any stationary pumps on the pipeline must be shut off on the pressure and suction side by means of shut-off valves.

Starting to pump

The pump will start up when the compressed air switches on.

1. Start compressed air supply.
2. Slowly open the air shut-off valve only partially.
3. Adjust the air filter regulator to the desired medium delivery pressure.
4. Open the shut-off valve in the media suction line.
5. Open the shut-off valve in the media pressure line.
6. Check whether the medium is being pumped into the pressure line.
7. Fully open the air shut-off valve.
8. Set the delivery volume on the needle valve.

Stopping to pump

Stop the pump by closing the air shut-off valve.

The pump can also be stopped by closing the external shut-off valve in the pressure line for the delivery medium whilst compressed air remains.



There is a risk of leakage from pump and connections in this situation, with resultant continuing media flow. Environmental risks exist, depending on pumped medium. Do not in this situation leave the pump unattended for hours.

Stopping

Close the external air shut-off valve upstream from the pump and if required shut off the compressed air supply.

Always flush the pump via the connection pipes after pumping is complete in order to

- prevent pumped media from clogging the diaphragm chambers when media with strong tendency to sedimentation are pumped,
- minimise wear and tear and
- prevent damage caused by thermal expansion as a result of frost or heat.



DANGER

Chemical reactions of the residual fluid in the pump and connected joints may cause explosions. Flush the pump after operation.



A risk exists of pumped media leaking from the pump and connections when the air motor is depressurised. Environmental risks exist, depending on pumped medium. Use the drain valve installed on site to relieve the pressure in pump chambers and media lines. Collect and dispose of residual quantities as per local regulations.

See section “Flushing the pump” in this respect.

Troubleshooting

Fault	Cause	Remedy	Qualification
Pump not running	Drive pressure too low Air supply blocked Silencer (Pos. 17) dirty or iced up External suction line shut-off valve of faulty Pump chamber clogged Diaphragm (Pos. 4) faulty	Increase air pressure Open valve Clean or replace Replace Clean Replace	Operator Operator Operator Specialist/Operator Specialist/Operator Repair
Poor suction capacity	Suction connection leaking Suction line clogged Silencer (Pos. 17) dirty or iced up Valve balls (Pos. 5) blocked Valve balls (Pos. 5) damaged	Reseal Clean suction line Clean or replace Clean pump chamber Replace	Specialist/Operator Specialist/Operator Specialist/Operator Specialist/Operator Repair
Pump runs irregular	Valve balls (Pos. 5) blocked Seals (Pos. 16) in air motor housing (Pos. 2) or air valve (Pos. 13) faulty Diaphragm (Pos.4) faulty	Clean pump chamber Replace Replace	Specialist/Operator Repair Repair
Inadequate power/pressure	Pressure drop in air supply line Suction or air line blocked Silencer (Pos. 17) clogged or iced up Air valve (Pos. 13) faulty Valve balls (Pos. 5) worn/damaged Air in fluid Diaphragm (Pos. 4) faulty	Increase air pressure flush Replace Replace Replace Check seals Replace	Operator Operator Operator Specialist/Operator Repair Specialist/Operator Repair
Leakage on pump	Through bolts (Pos. 9) are loose	Check torque	Specialist/Operator
Leakage on silencer	Diaphragm (Pos.4) faulty	Replace	Repair



Problem not solved, contact seller or Dellmeeco.







Dellmeeco GmbH
Industriestraße-West 1
D-63808 Haibach

Telephone 06021 / 446 39 80
Telefax 06021 / 446 39 85

E-mail: info@dellmeeco.net
Homepage: www.dellmeeco.net

Service and maintenance

	<div style="border: 1px solid black; padding: 5px;">  DANGER Working in explosive areas may lead to explosions. Observe the work permit system. </div>
---	---

      WARNING	<ul style="list-style-type: none"> • Hazardous pumped media may escape when dismantling or opening the pump and connections, resulting in injury, even death. Depressurise the pump before starting work, using customer-side valves. Collect and dispose of residual quantities compliant with local regulations. • Spare parts by third-party suppliers may cause the pump to leak or malfunction. Leakage of hazardous media may cause injury, even death, or explosions. Use only genuine Dellmeeco spare parts for servicing.
--	--

Checks






Daily

1. Ensure that there are no fluid leakages at the pump connections.
2. Ensure that there are no cracks in the pump or the piping.
3. Check the connections to accessories and piping for leakage.
4. Check that drive gas supply is clean; check that the upstream service unit is clean.

Every two months

Check the housing screw connection torques (through bolts, Pos. 9). The required torques are given in section "Technical data" in these Operating Instructions.



Do not start the pump should there be discrepancies; first eliminate the cause and take appropriate countermeasures.

     WARNING	<ul style="list-style-type: none"> • Leaks caused by cracks in the pump or loose pump housing or piping screws may cause hazardous media to escape, with potential injury, even death. Check the pump every day for cracks and check the screw connection torques as specified in the "Technical data" section. Report any discrepancies to the responsible officer. • Dust deposits on the pump may turn into sources of ignition. Wipe dust deposits and general dirt, even on conductive materials, using a damp cloth.
--	--

Maintenance

Clean or replace blocked or iced up silencers (Pos. 17). Screw in the silencer hand-tight.

Flushing the pump

  ATTENTION
Observe local situations and regulations when disposing of flushing/cleaning agents.








Pumps remain connected during flushing; they are neither opened nor unmounted. Suitable flushing facilities must be provided on site.

1. A suitable receptacle, depending on pumped and flushing medium, must be provided on the pressure side.
2. Flushing medium must be fed in from the suction side after flushing.
3. Duration, flushing medium and quantity will be selected by the operator, according to the medium to pump.
4. Flush conveyance takes place by compressed air drive, as in conveyance in operation.

Decommissioning, disassembly and disposal

Clean the pump before decommissioning.

Cleaning the pump

       WARNING
Residual quantities may splash when opening connections or disassembling; avoid risks of eye or skin damage.
Before starting work, depressurise the pump using customer-side valves; collect and dispose of residual quantities compliant with local regulations. Wear personal protective equipment. This may also, depending on the pumped medium, include self-contained breathing apparatus or wearing full protection.

Pumps should, prior to cleaning, be flushed whilst remaining in circuit – as also recommended after every operation (as described in section "Flushing the pump").

Cleaning:

1. Close the compressed air shut-off valve.
2. Close the shut-off valve in the suction line.
3. Close the shut-off valve in the pressure line.
4. Remove the suction line hose from the pump inlet side.
5. Remove the pressure line hose from the pump outlet side.
6. Position a container suitable for collecting residual quantities under the pump outlet.
7. Open the compressed air shut-off valve. Briefly open the compressed air (max. 1.5 bar (gauge)) to convey any residual quantities of material out of the pump.
8. Attach cleaning hoses for flushing and cleaning to the pump.
9. Have a container with suitable cleaning agent at hand, the type and volume will depend on the pumped medium and should be specified by the operator.
10. Start pumping by slowly opening the compressed air shut-off valve (max. 1.5 bar (gauge)) and allow the cleaning agent to circulate between its container and the pump for a few minutes to ensure thorough cleaning.
11. Rinse with clean water, provided the operator's specifications allow this for the pumped medium.
12. Remove the cleaning and flushing hoses. To drain any remaining cleaning agent, turn the pump 180° on its head for approx. 2 minutes. Collect residual quantities. Use a lifting strap as described under "Transport" to turn the pumps.



ATTENTION

Observe local situations and regulations when disposing of flushing/cleaning agents.

Repairing the diaphragm pump

Disassembly:

The DELLMECO diaphragm pump frame sizes DM15 to DM80 differ in the number of through bolts and the valve ball seat design.

The piston rod (Pos. 14) for frame size DM15 also functions as a pilot piston. This model pump has no piston rod seals.

The valve ball seats are integrated into the pump housing or material inlet for frame sizes DM25 - DM65.

The valve seat (Pos. 22) and ball stop (Pos. 26) are separate components for frame size DM80.

These minor design differences must be taken into account in the disassembly instructions below.



WARNING

Residual quantities may splash when opening connections or disassembling; avoid risks of eye or skin damage.

Before starting work, depressurise the pump using customer-side valves; collect and dispose of residual quantities compliant with local regulations. Wear personal protective equipment. This may also, depending on the pumped medium, include self-contained breathing apparatus or wearing full protection.

Loosen the two clamps (Pos. 6) on the material outlet (Pos. 3). Carefully remove the material inlet. Remove the upper valve balls (Pos. 5) and seals (Pos. 7). Loosen the clamp collars (Pos. 6) for the material inlet (Pos. 3). Carefully remove the material inlet. Remove the lower valve balls (Pos. 5) and seals (Pos. 7).

The following section applies only to DM80:

Loosen the four clamp collars (Pos. 6) on the material outlet (Pos. 3). Carefully remove the material outlet. Remove ball stop (Pos. 26), upper valve balls (Pos. 5), ball seat (Pos. 22) and the four seals (Pos. 7). Loosen the four clamp collars (Pos. 6) on the material inlet (Pos. 3). Carefully remove the material inlet. Remove ball stop (Pos. 26), lower valve balls (Pos. 5), ball seat (Pos. 22) and four seals (Pos. 7).

Loosen the frame nuts (Pos. 82) and lift the pump out of the frame (Pos. 25).

Unscrew the nuts with washers (Pos. 12) on one side of the housing. Slide the pump housing (Pos. 1) from the through bolts (Pos. 9). Position the pump and remaining pump housing flat on its diaphragm side. Pull the nuts with washers (Pos. 12) and through bolts (Pos. 9) out of the pump housing (Pos. 1) / air motor housing (Pos. 2). Separate pump housing and air motor housing.

The diaphragms (Pos. 4) are hand-tightened only on the diaphragm piston (Pos. 14); unscrew and pull the diaphragm piston out of the air motor housing. Unscrew the diaphragm piston grub screws (pos. 80) from both diaphragms. Carefully remove the diaphragm piston seal (Pos. 16) and the diaphragm piston O-ring (Pos. 30) from the air motor housing. Unscrew the air connection adapter (Pos. 18) and the silencer (Pos. 17). Unscrew both end pieces of the air valve (Pos. 13) using an adjustable two-hole nut wrench (item SK4) and check the seals for damage. Push the air valve (Pos. 13) out of the air motor housing (Pos. 2) and check all seals for damage.

After dismantling all components such as seals, balls, diaphragms, etc., check these for damage and replace if necessary.

Assembly:

The individual subassemblies are assembled as described for disassembly, but in reverse order.

To fit the air valve with end piece (Pos. 13), first screw on an air valve end piece flush with the air motor housing (Pos. 2). Insert one O-ring (Pos. 15) of the air valve from the inside, through the air motor housing and into the air valve end piece. Moisten the four remaining air valve O-rings (Pos. 15) and press them into the air motor housing (Pos. 2). Should the air valve jam or not move easily, remove and reposition again. Screw the sixth O-ring (Pos. 15) onto the remaining second end piece.

To fit new diaphragm piston seals (Pos. 16) and diaphragm piston O-rings (Pos. 30), carefully bend these inwards, kidney shaped, using circlip pliers, and insert into the air motor housing (Pos. 2) groove. Then use a round object (e.g. diaphragm piston) to press the inner bulge of the piston ring fully into the groove. Screw the diaphragm piston grub screws (Pos. 80) into both diaphragms. Screw the piston (Pos. 14) into a diaphragm (Pos. 4). Push the diaphragm and piston into the air motor housing. Screw the second diaphragm onto the piston. Make sure that the outer diaphragm bores are aligned with the holes in the air motor housing. Adjust the diaphragms as needed. Absolutely ensure that the sealing surfaces are undamaged. Damaged sealing surfaces will result in leaks.

Screw nuts with washer (Pos. 12) onto one side of the through bolts (Pos. 9). Insert the through bolts into one pump housing (Pos. 1) and carefully slide the preassembled air motor housing and diaphragms over the through bolts (observe the direction of flow through the pump housing (Pos. 1)). Position the second pump housing aligned with the pre-assembled pump housing. Screw on the nuts with washer (Pos. 12). Evenly and crosswise tighten the through bolt nuts with the specified torque until both pump housings rest on the air motor housing.

Lift the pre-assembled pump into the frame (Pos. 25) and screw on the frame nuts (Pos. 82) (torque approx. 15 Nm).

Insert the valve balls (Pos. 5) and seal (Pos. 7) into the material inlet (Pos. 3). Carefully position the material inlet with ball and seal on the suction side of the pump (bottom). Slip on the clamps (Pos. 6) and hand-tighten. Insert the valve balls (Pos. 5) and seal (Pos. 7) into the pump housing (top). Position the material outlet (Pos. 3) and fit the clamps (Pos. 6) and hand-tighten.

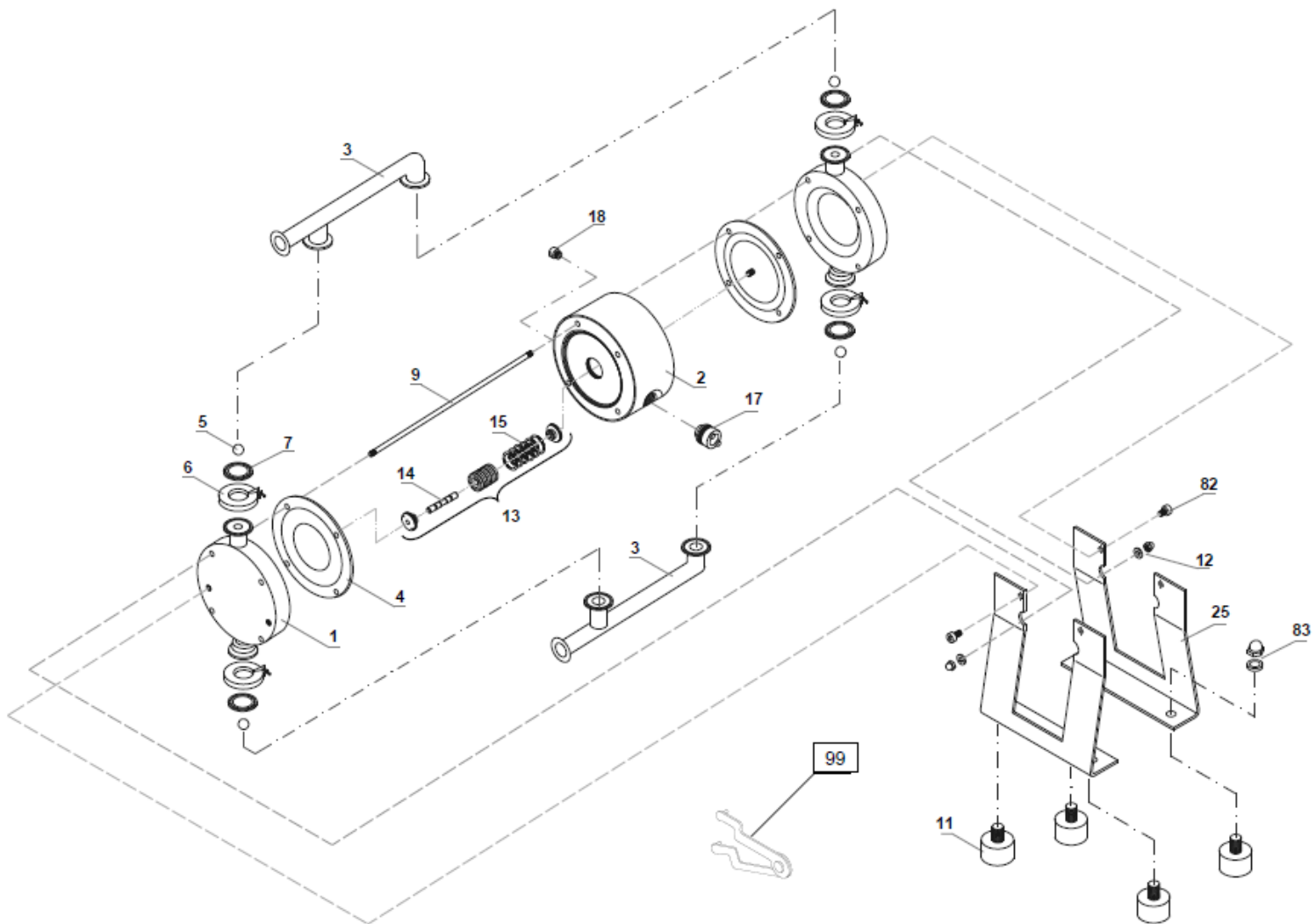
The following section applies only to DM80:

Insert the valve ball (Pos. 5) into the ball seat (Pos. 22). Place the ball stop (Pos. 26) and seal (Pos. 7) onto the ball seat (see exploded view DM 80/850 for the ball seat (Pos. 22) installation position on the pump). Position the subassembly on the suction side and hand-tighten the clamps (Pos. 6). Assemble and fit the same subassembly for the suction side opposite. Carefully position the material inlet (Pos. 3) with seal (Pos. 7) on the suction side of the pump. Slip on the clamps (Pos. 6) and hand-tighten. Position seal (Pos. 7) and ball seat (Pos. 22) on the pump chamber. Position the clamps (Pos. 6) and hand-tighten. Insert the valve ball (Pos. 5) and ball stop (Pos. 26) into the ball seat (Pos. 22). Assemble and fit the same subassembly for the pressure side opposite. Place seals (Pos. 7) on both ball seat subassemblies and position material outlet (Pos. 3). Fit clamps (Pos. 6) and tighten by hand.

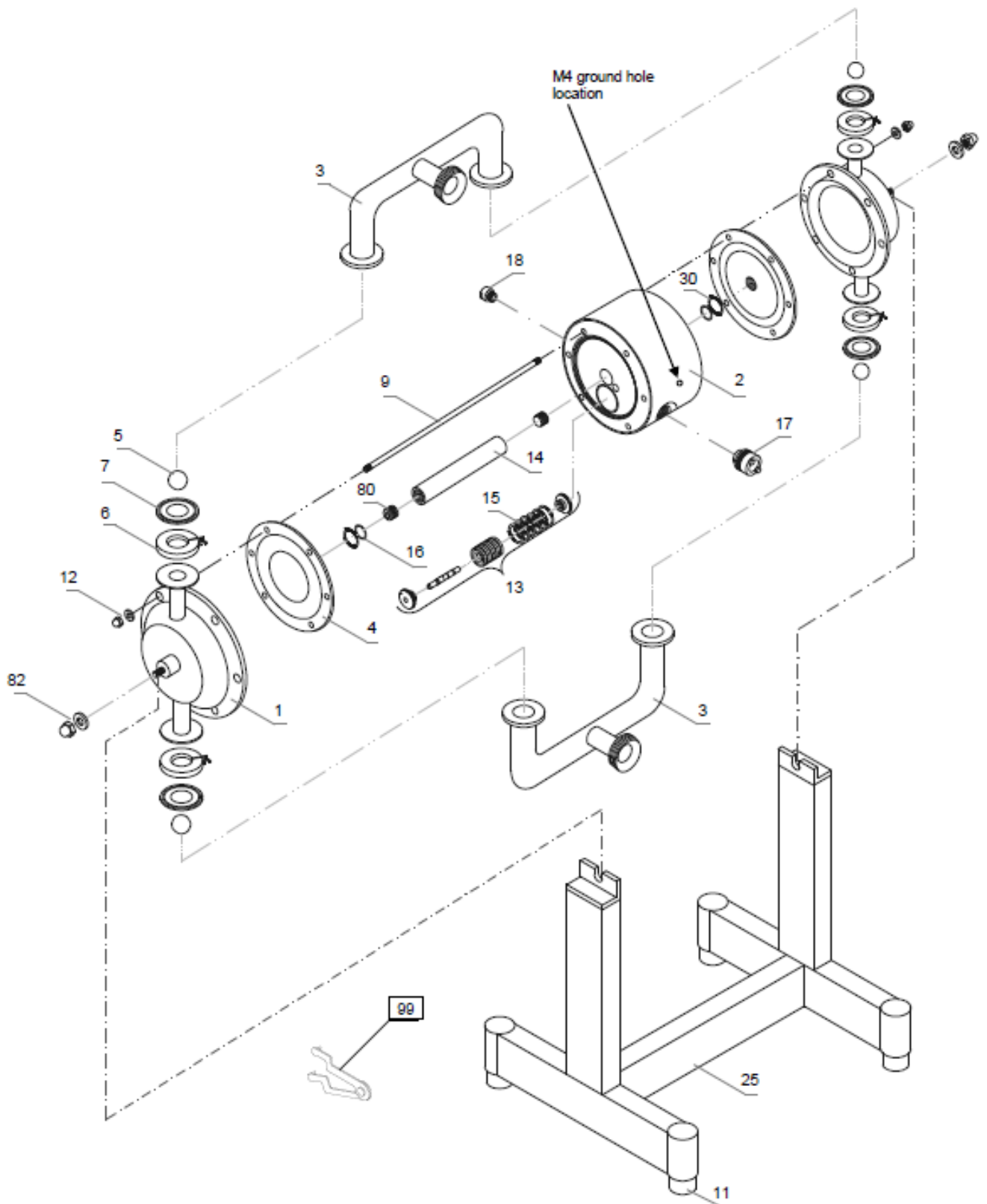
Check for leaks before again starting the pump.

Exploded drawings and pump spare parts lists

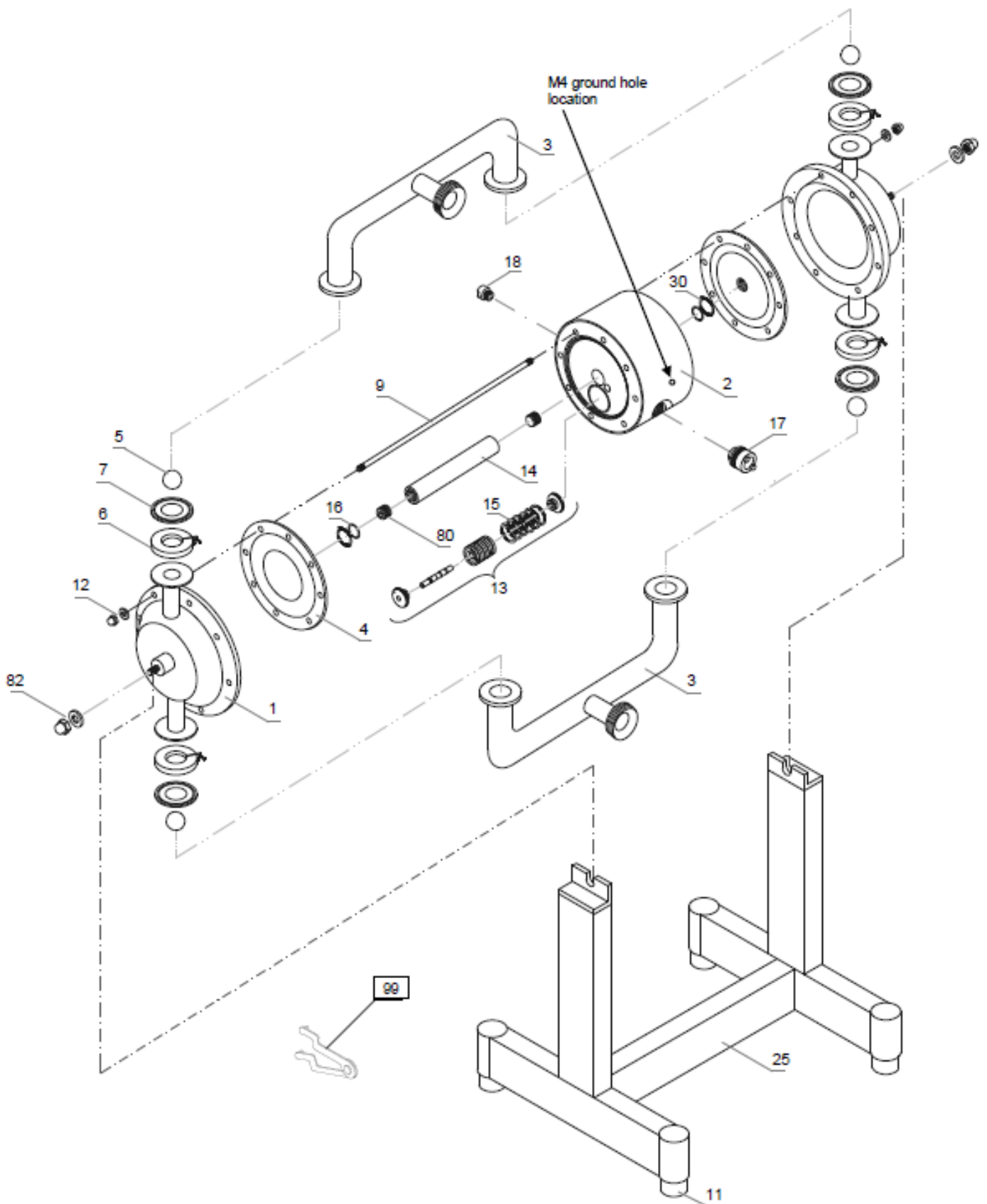
Model DM 15/30



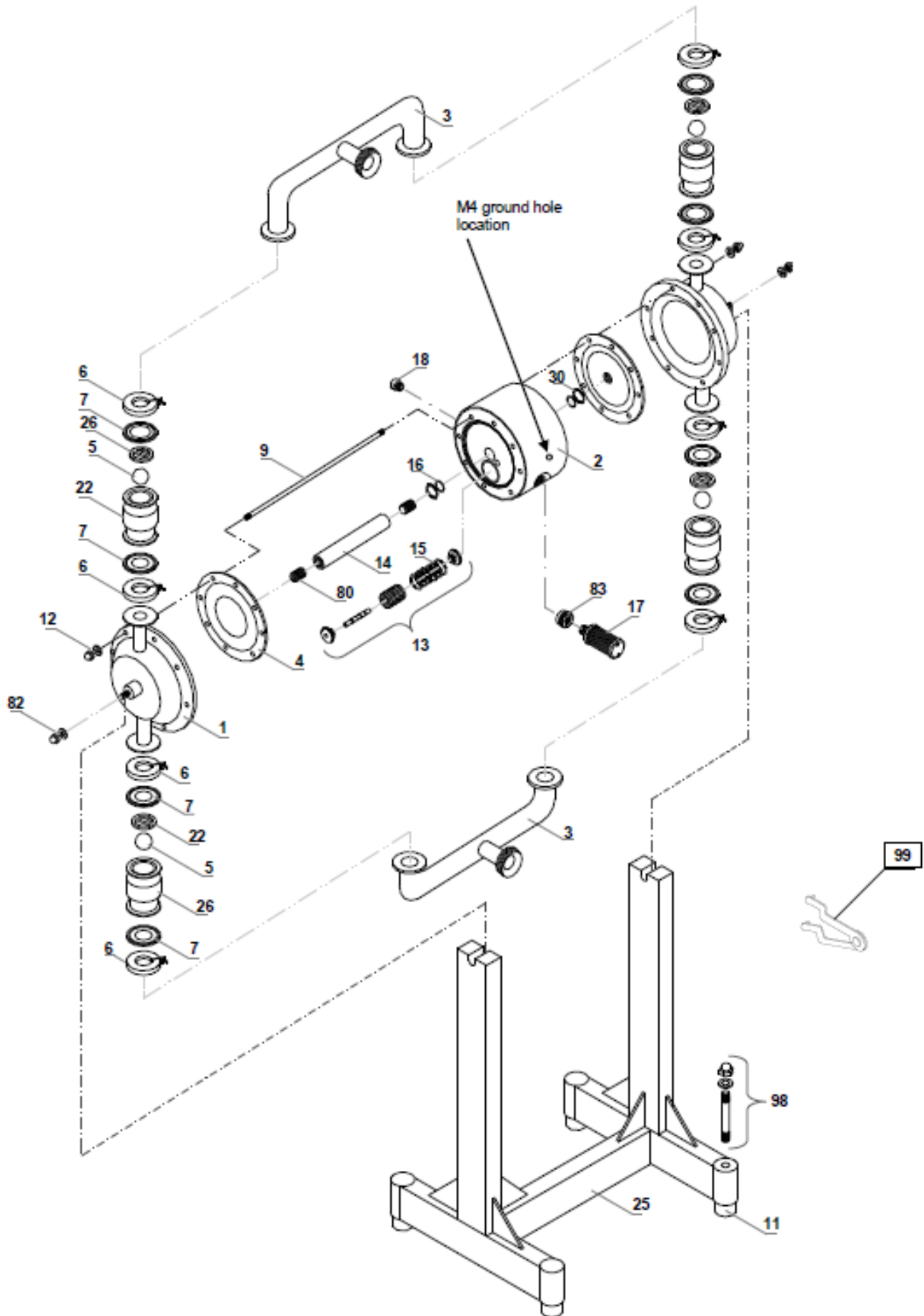
Models DM 25/75 and 40/125



Models DM 50/315 and 65/565



Model DM 80/850



Spares list

Pos.	Description	Material	Number	DM 15/30	DM 25/75	DM 40/125	DM 50/315	DM 65/565	DM 80/850
1	Pump housing, Code H../L..	AISI 316 L	2	4 15 01 53	4 25 01 53	4 40 01 53	4 50 01 53	4 65 01 53	4 80 01 53
2	Air motor housing, Code H..	PE	1	1 10 10 20	1 15 10 20	1 25 10 20	1 40 10 20	1 50 10 20	1 80 10 20
	Air motor housing, Code L..	PE conducting	1	1 10 10 21	1 15 10 21	1 25 10 21	1 40 10 21	1 50 10 21	1 80 10 21
3	Material inlet DIN	AISI 316 L	2	4 15 30 53	4 25 30 53	4 40 30 53	4 50 30 53	4 65 30 53	4 80 30 53
	Material inlet SMS	AISI 316 L	2	4 15 31 53	4 25 31 53	4 40 31 53	4 50 31 53	4 65 31 53	4 80 31 53
	Material inlet TC	AISI 316 L	2	4 15 32 53	4 25 32 53	4 40 32 53	4 50 32 53	4 65 32 53	4 80 32 53
	Material outlet DIN	AISI 316 L	2	4 15 33 53	4 25 33 53	4 40 33 53	4 50 33 53	4 65 33 53	4 80 33 53
	Material outlet SMS	AISI 316 L	2	4 15 34 53	4 25 34 53	4 40 34 53	4 50 34 53	4 65 34 53	4 80 34 53
	Material outlet TC	AISI 316 L	2	4 15 35 53	4 25 35 53	4 40 35 53	4 50 35 53	4 65 35 53	4 80 35 53
4	Diaphragm, Code ..T.	TFM (PTFE)	2	D1 10 50 05	D1 15 50 05	D1 25 50 05	D1 40 50 05	D1 50 50 05	1 80 50 05
	Diaphragm, Code ..E.	EPDM	2	D1 10 50 08	D1 15 50 08	D1 25 50 08	D1 40 50 08	D1 50 50 08	1 80 50 08
	Diaphragm, Code ..N.	NBR	2	D1 10 50 10	D1 15 50 10	D1 25 50 10	D1 40 50 10	D1 50 50 10	1 80 50 10
	Diaphragm, Code ..Z.	EPDM/TFM/PFA	2	1 10 50 00	1 15 50 00	1 25 50 00	-	-	-
	Diaphragm, Code ..L.	PTFE, conducting	2	D1 10 00 24	D1 15 00 24	D1 25 00 24	D1 40 00 24	D1 50 00 24	-
	Diaphragm, Code ..V.	FKM	2	-	D1 15 50 09	D1 25 50 09	-	-	-
5	Valve balls, Code ..T	PTFE	4	1 15 60 23	1 15 60 23	1 25 60 23	1 40 60 23	1 50 60 23	1 80 160 23
	Valve balls, Code ..E	EPDM	4	1 15 60 08	1 15 60 08	1 25 60 08	1 40 60 08	1 50 60 08	1 80 160 08
	Valve balls, Code ..N	NBR	4	1 15 60 10	1 15 60 10	1 25 60 10	1 40 60 10	1 50 60 10	1 80 160 10
	Valve balls, Code ..S	AISI 316	4	1 15 60 52	1 15 60 52	1 25 60 52	1 40 60 52	1 50 60 52	-
	Valve balls, Code ..U	Polyurethane	4	1 15 60 07	1 15 60 07	1 25 60 07	1 40 60 07	1 50 60 07	-
	Valve balls, Code ..C	Ceramic	4	1 15 60 90	1 15 60 90	1 25 60 90	-	-	-
	Valve balls, Code ..V	FKM	4	1 15 60 09	1 15 60 09	1 25 60 09	1 40 60 09	1 50 60 09	-
6	Clamp	AISI 304	4	4 15 36 50	4 25 36 50	4 40 36 50	4 50 36 50	4 65 36 50	4 80 36 50
7	Seal, Code ..T../Z../L../V.	PTFE	4	4 15 70 23	4 25 70 23	4 40 70 23	4 50 70 23	4 65 70 23	4 80 70 23
	Seal, Code ..E.	EPDM	4	4 15 70 08	4 25 70 08	4 40 70 08	4 50 70 08	4 65 70 08	4 80 70 08
	Seal, Code ..U.	Silikon	4	4 15 70 11	4 25 70 11	4 40 70 11	4 50 70 11	4 65 70 11	4 80 70 11
	Seal, Code ..N.	NBR	4	4 15 70 10	4 25 70 10	4 40 70 10	4 50 70 10	4 65 70 10	4 80 70 10
9	Through bolt	AISI 304	4	4 15 42 50	-	-	-	-	-
		AISI 305	6	-	4 25 42 50	4 40 42 50	-	-	-
		AISI 306	8	-	-	-	4 50 42 50	4 65 42 50	-
		AISI 304	8	-	-	-	-	-	4 80 42 50
11	Vibration damper	NRc/stainless steel	4	1 15 69 52	1 15 69 52	1 15 69 52	1 15 69 52	1 15 69 52	1 80 69 53
12	Nut with washer	AISI 304	8	1 10 45 50	-	-	-	-	1 80 45 50
		AISI 305	12	-	1 15 45 50	1 25 45 59	-	-	-
		AISI 306	16	-	-	-	1 40 45 50	1 50 45 59	-
13	Air valve with end piece	PET/NBR	1	1 08 020 31	1 15 020 31	1 15 020 31	1 40 020 31	1 40 020 31	1 80 020 31
14	Diaphragm piston	AISI 304	1	1 08 24 50	1 15 40 50	1 25 40 50	1 40 40 50	1 50 40 50	1 80 40 50
15	O-ring	NBR	6	1 08 080 10	1 15 080 10	1 15 080 10	1 40 87 10	1 40 87 10	1 80 87 10
16	Seal for air motor housing	PTFE-PPS-conducting	2		1 15 85 18	1 25 85 18	1 40 85 18	1 50 85 18	1 80 85 18
17	Silencer, Code L..	Bronze	1	1 08 99 86	1 15 99 20	1 15 99 20	1 40 99 86	1 50 99 86	1 80 99 00
	Silencer, Code H..	PE porous	1	1 08 99 35	1 15 99 35	1 15 99 35	1 40 99 35	1 50 99 35	-
18	Air connection	PP, c	1	1 08 46 21	1 15 46 21	1 15 46 21	1 40 46 21	1 40 46 21	1 80 46 21
22	Ball seat	AISI 316 L	4	-	-	-	-	-	4 80 54 53
25	Frame	AISI 304	1	4 15 96 50	4 25 96 50	4 40 96 50	4 50 96 50	4 65 96 50	4 80 96 50
26	Ball stop	AISI 316 L	4	-	-	-	-	-	4 80 39 53
30	O-ring diaphragm piston	NBR	2	-	1 15 85 10	1 25 85 10	1 40 85 10	1 50 85 10	1 80 85 10
35	Centre housing complete, Code H..	PE	1	1 10 11 20	1 15 11 20	1 25 11 20	1 40 11 20	1 50 11 20	1 80 11 20
	Centre housing complete, Code L..	PE, conducting	1	1 10 11 21	1 15 11 21	1 25 11 21	1 40 11 21	1 50 11 21	1 80 11 21
80	Grub screw for diaphragm piston	AISI 304	2	-	1 15 540 50	1 25 540 50	1 40 540 50	1 50 540 50	1 80 540 50
82	Nut for frame	AISI 304	4	4 15 138 50	4 25 138 50	4 40 138 50	4 50 138 50	4 65 138 50	1 80 45 50
83	Vibration damper with nut / washer	AISI 304	4	4 15 345 50	4 25 345 50	4 40 345 50	4 50 345 50	4 50 345 50	1 80 945 50

A separately specified diaphragm rupture sensor (Item no. 9 15 19 00) may be installed instead of the exhaust air silencer (Pos. 17).

Sensors not used in explosive atmospheres must be permanently marked as not Ex.

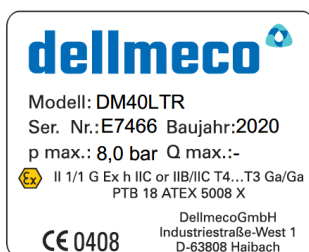
Pulsation damper

The Dellmeeco pulsation damper represents the latest generation of active pulsation dampers. They were designed specifically for the Dellmeeco double diaphragm pumps.

The intended use of pulsation dampers is to deliver all flow rates with virtually no pulsation.

	WARNING
<p>Unless the chemical properties of pulsation damper materials are resistant to the pumped fluid, leakages may occur, causing serious injury, even death.</p>	
<p>Check the chemical resistance of the materials to the pumped medium.</p>	

All material designations are listed on the pulsation damper nameplate, by product code.



The instructions here are analogous to those in the sections applying to the pump.

	<p>Intended use compliant with Directive 2014/34/EU (ATEX) for electrostatically conducting pulsation dampers</p> <p>All metallic pulsation dampers using this type of material will be suitable for use in and near potentially explosive atmospheres:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Damper housing</td> <td style="text-align: center;">Damper head</td> </tr> <tr> <td style="text-align: center;">L</td> <td style="text-align: center;">R</td> </tr> </table> <p>Dellmeeco compressed air operated double diaphragm pumps with pulsation dampers are designed to pump fluid media of explosion subgroups up to IIC or IIB to Zones 0, 1 or 2. Pump and pulsation damper are designed category 1G equipment inside.</p> <p>These compressed air operated double diaphragm pumps with pulsation dampener are designed category 2G on the outside. This means they can be used in explosive gas atmospheres in Zone 1 or Zone 2.</p> <p>The pump with damper may be used in explosion subgroups IIA, IIB or IIC outside.</p> <p>Planners/project planners will specify temperature classes for pump and damper together, as described above.</p>	Damper housing	Damper head	L	R
Damper housing	Damper head				
L	R				

Technical data

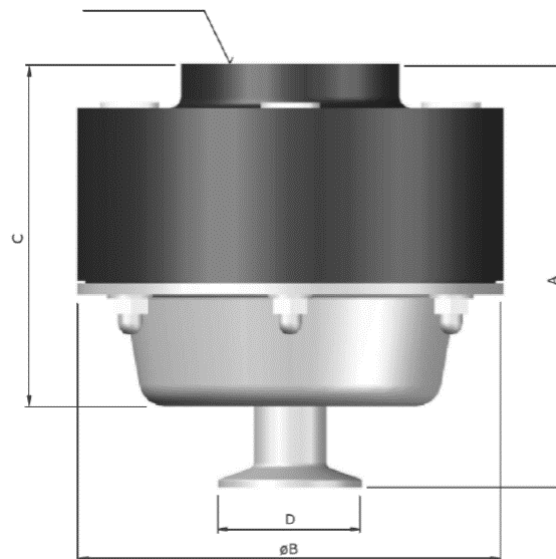
Pulsation damper code

DM	25	L	T	R	
					Damper head
					R - PE - electrostatically conductive P - PE
					Diaphragm
					E - EPDM N - NBR T - TFM / PTFE V - VITON (FKM) L - PTFE electrostatically conductive
					Damper housing
					H – stainless steel, polished, AISI 316L L - stainless steel, polished, AISI 316L, electrostatically conductive and damper head R
					Nominal size
					DN 25 (1")

Dellmeeco compressed air operated pulsation damper, DM - range

Pulsation damper dimensions – [mm]

E Compressed air connection



	A	ØB	C	D			E
				TC	DIN	SMS	
DM15	108	110	77	1/2"	15	-	R 1/8"
DM25	149	156	124	1"	25	25.00	R 1/8"
DM40	149	156	124	1 1/2"	40	38.00	R 1/8"
DM50	178	204	150	2"	50	51.00	R 1/4"
DM65	220	273	198	2 1/2"	65	63.00	R 1/4"
DM80	265	365	240	3"	80	106.00	R 1/2"

Dimensions may vary, all dimensions in mm

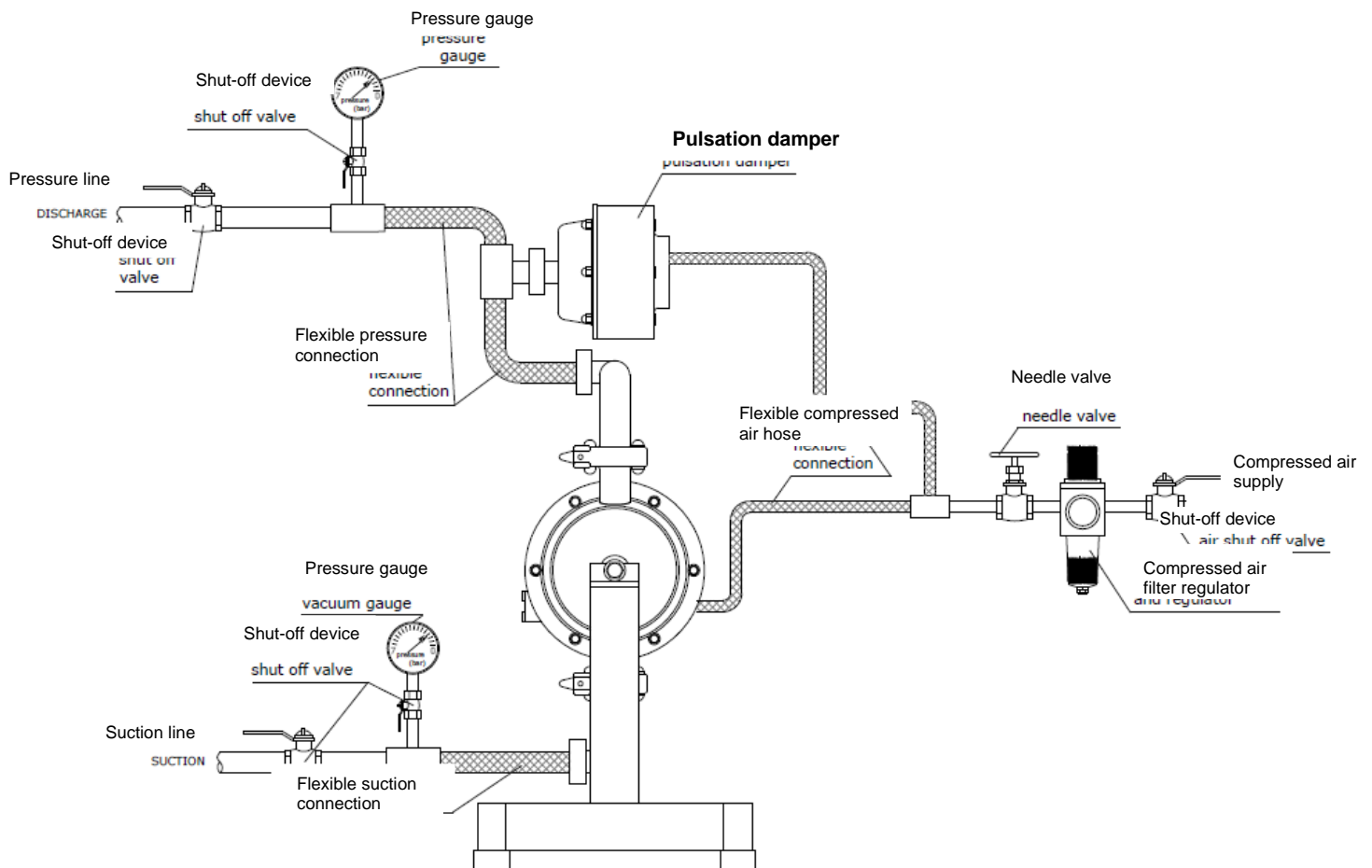
Torques for pulsation damper through bolts.[Nm]

	DM 15	DM 25	DM 40	DM 50	DM 65	DM 80
Damper	8	8	13	17	22	24
Pulsation damper air connection	4	4	4	6	6	6

Pulsation damper fitment

It is possible to upgrade a pump by fitting a pulsation damper. The illustrated below explains how pulsation dampers are fitted.

Pulsation dampers must be included in equipotential bonding of the pump and piping.



Connection instructions

The pulsation damper may be mounted directly on the pump by means of an optionally available stainless steel T-piece, or separately fitted in the media pressure line. Remove the blind plug at the air inlet above the damper head (Pos. 41) to fit the pulsation damper compressed air connection. The pulsation damper uses its own compressed air connection to ensure proper operation. Pump and pulsation damper must be connected to a common compressed air line. Pump and damper will be supplied with compressed air via a T-piece in the supply line.

The air used must be oil-free, dry and clean, as for the pump itself.
The connection must be via hoses or compensators, stress free.

Pressure test on the entire system

The pump and damper must be bypassed on the pumped medium side during pressure tests on the entire system.



Pressurising damper and pump in the absence of a compressed air supply may rupture the diaphragm and cause leakages with a risk of serious injury, even death, posed by the chemical properties of the pumped medium. Do not pressurise unless in the presence of compressed air.

Commissioning

Check pulsation dampers for cracks or other damage before commissioning and before every start.

Operation

Start up empty dampers slowly, together with the pump.

The damper will self-regulate to match all changes in operation.

Maintenance

Check pulsation dampers for leaks after the first max. 100 hours of operation, thereafter check at inspection intervals, together with the pump.

Cleaning


Ensure that pump and damper are empty and flushed before unmounting pump and damper from the system. Ensure that pump and damper are depressurised (medium and air).

Observe the Safety instructions for the pump.

Repairing the pulsation damper

Disassembly:

DELLMECO pulsation damper frame sizes DM15 - DM80 differ in their number of through bolts (Pos. 42). These minor design differences must be taken into account in the disassembly instructions below.

	WARNING
<p>Residual quantities may splash when opening connections or disassembling; avoid risks of eye or skin damage.</p> <p>Before starting work, depressurise the pump using customer-side valves; collect and dispose of residual quantities compliant with local regulations. Wear personal protective equipment. This may also, depending on the pumped medium, include self-contained breathing apparatus or wearing full protection.</p>	

Use a screwdriver to remove the sealing plugs (Pos. 45) on the damper head (Pos. 41). Loosen the nuts with washer (Pos. 44). Pull the tie rods (Pos. 42) together with cap nuts and washers (Pos. 43) from the damper housing. The damper head may now be separated from the damper housing. Pull the diaphragm (Pos. 40) and piston (Pos. 39) out of the damper head. Unscrew the diaphragm piston from the diaphragm. Remove the piston seals (Pos. 37) and O-rings (Pos. 38) from the damper head. Do not reuse the seals. Remove the silencer (Pos. 46).

After dismantling, check all components such as seals, diaphragms etc. for damage and replace as necessary.

Assembly:

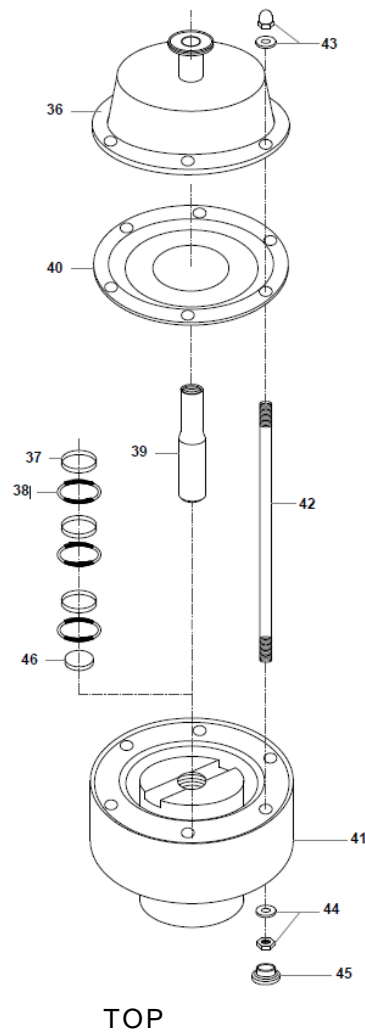
The individual subassemblies are assembled as described for disassembly, but in reverse order.

Insert the silencer (Pos. 46) into the damper head. Use circlip pliers to carefully bend the piston seals (Pos. 37) and O-rings (Pos. 38) inwards, kidney shaped, and insert them into the damper head groove (Pos. 41). Then use a round object (e.g. diaphragm piston) to press the inner bulge of the piston seals fully into the groove.

Screw the piston (Pos. 39) into the diaphragm (Pos. 40), hand-tight. Insert piston and diaphragm into the damper head. Be sure to align the outer holes of the diaphragm with the holes of the damper head. Connect damper housing (Pos. 36) and damper head. Screw cap nut with washer (Pos. 43) onto one side of the through bolts and insert through the damper head (Pos. 41), from the damper housing side. Screw nuts with washers (Pos. 44) onto the through bolts. Evenly tighten the through bolt nuts crosswise, to the specified torque. Insert the sealing plug (Pos. 45) into the damper head.

Check the pulsation damper for leaks before starting up again.

Exploded drawing for pulsation damper



Pulsation damper spare parts list

Position	Description	Material	Qty	DM 15	DM 25	DM 40	DM 50	DM 65	DM80
36	Damper housing, Code	AISI 316L	1	8 15 01 53	8 25 01 53	8 40 01 53	8 50 01 53	8 65 01 53	8 80 01 53
37	Piston ring	PTFE-PPS-conducting	3	1 08 90 18	1 08 90 18	1 15 85 18	1 25 85 18	1 40 85 18	1 50 85 18
38	O-ring	NBR	3	1 08 82 10	1 08 82 10	1 15 85 10	1 25 85 10	1 40 85 10	1 50 85 10
39	Piston	PET	1	8 10 40 30	8 15 40 30	8 25 40 30	-	-	-
		AISI 304	1	-	-	-	8 40 40 50	8 50 40 50	8 80 44 50
40	Membrane, Code .E.	EPDM	1	-	D1 10 50 08	D1 15 50 08	D1 25 50 08	D1 40 50 08	D1 50 50 08
	Membrane, Code .T.	TFM / PTFE	1	D1 08 50 05	D1 10 50 05	D1 15 50 05	D1 25 50 05	D1 40 50 05	D1 50 50 05
	Membrane, Code .N.	NBR	1	-	D1 10 50 10	D1 15 50 10	D1 25 50 10	D1 40 50 10	D1 50 50 10
	Membrane, Code .L.	PTFE, conducting.	1	D1 08 00 24	D1 10 00 24	D1 15 00 24	D1 25 00 24	D1 40 00 24	-
	Membrane, Code .V.	FKM	1	-	-	D1 15 50 09	D1 25 50 09	-	-
41	Damper head, Code ..P	PE	1	8 10 203 20	8 25 203 20	8 25 203 20	8 40 203 20	8 50 203 20	8 80 203 20
	Damper head, Code ..R	PE I conducting	1	8 10 203 21	8 25 203 21	8 25 203 21	8 40 203 21	8 50 203 21	8 80 203 21
42	Through bolt	AISI 304	4	8 10 742 50	8 25 742 50	-	-	-	-
		AISI 304	6	-	-	8 25 742 50	8 40 742 50	-	-
		AISI 304	8	-	-	-	-	8 50 742 50	8 80 742 50
43	Nut with washer	AISI 304	4	1 15 145 50	1 25 145 50	-	-	-	-
		AISI 304	6	-	-	1 25 145 50	1 40 145 50	-	-
		AISI 304	8	-	-	-	-	1 50 145 50	1 80 145 50
44	Nut with washer	AISI 304	4	1 15 245 50	1 25 245 50	-	-	-	-
		AISI 304	6	-	-	1 25 245 50	1 40 245 50	-	-
		AISI 304	8	-	-	-	-	1 50 245 50	1 80 245 50
45	Blind plug	PE	4	8 10 058 20	8 25 058 20	-	-	-	-
		PE	6	-	-	8 25 058 20	8 50 058 20	-	-
		PE	8	-	-	-	-	8 65 058 20	8 80 058 20
46	Silencer	PE	1	8 10 99 20	8 25 99 20	8 25 99 20	8 40 99 20	8 50 99 20	8 80 99 20

Options

In addition to the pulsation damper, the option:

- Diaphragm rupture monitoring

is also available as standard. The product code for these options is appended to the end of the pump code. The codes will be shorter if this option is missing.

Other options are available on request from the dealer or from Dellmeeco.

Diaphragm rupture monitoring






In the event of a diaphragm rupture and loss of compressed air, the process medium pressure might force the pumped fluid into the pump's air motor housing and possibly escape through the silencer. This intrusion of fluid may be detected if the diaphragm is monitored for ruptures.

Planning

Double diaphragm pumps may be equipped with a diaphragm rupture monitoring system for added protection against leakage of pumped media. Pumped media will in cases of diaphragm rupture enter the pump's air motor housing against the pressure of supply air and escape through the outlet silencer (Pos. 17); a diaphragm rupture monitor will detect such leakage. The capacitive diaphragm rupture sensor will for this purpose be installed in the silencer, where it will register any fluid, regardless of conductivity.



ATTENTION
<ul style="list-style-type: none"> • False alarms are possible. Use only dry compressed air as specified in section "Technical data". • Diaphragm rupture monitoring is not possible for submersible pump applications.

	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; align-items: center;">   DANGER </div> <p>Faulty connection and supply of diaphragm rupture sensors will lead to explosion. Planning exclusively by persons familiar with electrical explosion protection, especially intrinsic electrical safety.</p> </div>
---	--

Diaphragm rupture monitoring is available in two variants; the relevant code will be appended to the pump code; the code will be shorter unless the option is selected:

- DM1 diaphragm sensor (Namur)
- DM2 diaphragm monitoring complete with sensor and isolator

Both versions are suitable for explosive atmospheres.

	<div style="border: 1px solid black; padding: 5px;"> <p>The DM1 and DM2 versions are suitable for use in explosive atmospheres as separately certified category 1 G devices for ignition type protection Ex ia IIC T6 in Zones 0, 1 and 2 G. Planners must take into account restrictions on the deployment of the pump with diaphragm rupture monitoring subassembly in terms of the temperature class and explosion subgroup and information given on the pump nameplate and temperature specifications.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <div style="display: flex; align-items: center;">  DANGER </div> </div>
---	---

- Unsuitable switching devices used to record the DM1 sensor data will lead to explosions. Use only separately certified switchgear for equipment associated with intrinsically safe operation in protection type Ex i.
- Incorrect design of intrinsically safe circuits including electrical connections will lead to explosions. Design safe circuits and provide proof of intrinsic safety.
- Observe information on the sensor, the separately enclosed sensor data sheet and the isolator and connections in this respect.
- Diaphragm rupture sensors not operated in intrinsically safe manner, even if once only, will become a source of ignition and explosion. At all times keep sensors used in explosive atmospheres connected to their associated devices.
- Isolators installed at unsuitable locations will lead to explosions. Install isolators on site in a suitable environment as specified in their separate datasheets.



DANGER

Danger of electric shock. Planning only by planners familiar with electrical engineering.

Planners shall specifically define the response to the alarm and communicate this to the operator.

Spares for diaphragm rupture monitoring					DM15	DM25	DM40	DM50	DM65	DM80
Code	Pos.	Qty	Description	Material	Art. No.	Art. No.	Art. No.	Art. No.	Art. No.	Art. No.
DM1	63	1	Membrane rupture sensor NAMUR	diverse	9 15 19 00	9 15 19 00	9 15 19 00	9 15 19 00	9 15 19 00	9 15 19 00
DM2	63	1	Membrane rupture sensor NAMUR		9 15 19 00	9 15 19 00	9 15 19 00	9 15 19 00	9 15 19 00	9 15 19 00
	-	1	Isolator		9 15 14 00	9 15 14 00	9 15 14 00	9 15 14 00	9 15 14 00	9 15 14 00

Please refer to the data sheets supplied for technical data, wiring diagrams and other detail.

Assembly

Diaphragm rupture sensors screw into the silencer (Pos. 17). Install the electrical connections.



DANGER

Danger of electric shock. Fitment only by specialists familiar with electrical systems.

Implementation:



DM1 connection to an on-site isolator as associated equipment. Observe planning specifications.



DANGER

Faulty connection and supply of diaphragm rupture sensors will lead to explosion. Fitment exclusively by persons familiar with electrical explosion protection, especially intrinsic electrical safety.

Connect DM2 to the supplied isolator.

The connection diagram and technical data are located directly on the isolator.

Install the switchgear accordingly in a suitable switchgear cabinet/enclosure as specified by the planner.

Decommissioning



ATTENTION

Observe local conditions and regulations when disposing of the diaphragm rupture sensor and isolator as electrical devices.

Warranty

This product was shipped to the customer only after inspection. Should a fault occur in normal operation, as defined in these Operating Instructions, within the warranty period, then defective parts will be either repaired free of charge or the item will be replaced.

Warranty period

The warranty period shall be 24 months from the date of purchase.

Exclusion of warranty

The following instances will be excluded, also during the warranty period:

- Problems caused by third-party repairs other than performed by us, our service partners or sellers or by service staff authorised by us.
- Defects caused by product modifications not undertaken by authorised qualified staff.
- Wearing parts: Worn and cracked parts needing to be replaced in the course of normal operation, such as diaphragms, valve seats, balls, seals and O-rings.
- Defects and/or damage caused by transport, relocation or dropping of the product after purchase.
- Defects and/or damages caused by fire, earthquakes, floods or force majeure.
- Defects caused by compressed air with included foreign substances, by oil-bearing air or by excessive humidity or the use of gases or liquids other than the specified compressed air.
- Defects caused by excessively abrasive fluids.
- Defect due to corrosion.

Sample of CE Declaration of Conformity for explosion-protected double diaphragm pumps and pulsation dampers

**EU-Konformitätserklärung
EU Declaration of Conformity
Déclaration UE de conformité**

EU-Konformitätserklärung im Sinne der Richtlinie 2014/34/EU
EU Declaration of Conformity in the sense of the directive 2014/34/EU
Déclaration UE de conformité au titre de la directive 2014/34/UE



Dellmecco GmbH
Industrie-Str.-West 1
63808 Haibach
Germany

Modell: **DM40/125LTT**
model / modèle:
Serien-Nr.: **E7465**
serial / série:

Wir	We	Nous
Dellmecco Deutschland GmbH		
erklären in alleiniger Verantwortung, dass das Produkt	declare in sole responsibility that the product	attestons sous notre seule responsabilité que le produit
druckluftbetriebene Doppelmembranpumpe	gas operated double diaphragm pump	pompe à membrane à double effet pneumatique
auf das sich diese Erklärung bezieht, den Anforderungen den folgenden Richtlinien (RL) entspricht	to which this declaration relates is in accordance with the provisions of the following directives (D)	se référant à cette attestation correspond aux dispositions des directives (D) suivantes
ATEX Richtlinie 2014/34/EU und Maschinenrichtlinie 2006/42/EG	ATEX directive 2014/34/EU and Machinery directive 2006/42/EC	ATEX directive 2014/34/UE et Directive s. l. machines 2006/42/CE
und mit folgenden harmonisierten Normen	and with the following harmonized standards	et est conforme aux normes harmonisées
DIN EN 1127-1:2019-10 DIN EN ISO 80079-36:2016-12 DIN EN ISO 80079-37:2016-12		
und weiteren verwendeten Normen und technischen Spezifikationen	and other standards and technical specifications	et d'autres normes et spécifications techniques
DIN EN ISO 12100:2013-08		
übereinstimmt.	confirms.	correspondre.

Kennzeichnung

Marking

Marquage



**II 1/1 G Ex h IIC oder IIB/IIC T4...T3 Ga/Ga
PTB 18 ATEX 5008 X**



Christian Bathon
Geschäftsführer

Haibach, **01/11/2020**



Alexander Freund
Geschäftsführer

Certificate of Conformity in accordance with IECEx Scheme

In addition to certification of the pumps for use in explosive atmospheres and for pumping of explosive media in accordance with ATEX Directive 2014/34/EU, Dellmecco GmbH is also certified under the international IECEx Scheme for explosion-proof equipment.

Verified by the Certificate of Conformity, tested by the Physikalisch Technische Bundesanstalt of the Federal Republic of Germany.

Sample of Certificate of Conformity

		<h1>IECEX Certificate of Conformity</h1>	
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres <small>for rules and details of the IECEx Scheme visit www.iecex.com</small>			
Certificate No.:	IECEX PTB 21.0015X	Page 1 of 4	Certificate history:
Status:	Current	Issue No: 0	
Date of Issue:	2021-04-30		
Applicant:	Dellmecco GmbH Industriestraße West 1 Halbach 63808 Germany		
Equipment:	Diaphragm pumps		
Optional accessory:			
Type of Protection:	Ex h		
Marking:	Ex h IIC or IIB/IIC T4...T3 Ga/Gb, or Ex h IIC or IIB/IIC T4...T3 Ga/Ga		
Approved for issue on behalf of the IECEx Certification Body:		Dr. Ing. M. Thedens	
Position:		Head of department "Physical-Ignition-Processes"	
Signature: (for printed version)		<hr/>	
Date:		<hr/>	
<ol style="list-style-type: none"> This certificate and schedule may only be reproduced in full. This certificate is not transferable and remains the property of the issuing body. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code. 			
Certificate issued by:			
Physikalisch-Technische Bundesanstalt (PTB) Bundesallee 100 38116 Braunschweig Germany		<small>Physikalisch-Technische Bundesanstalt Braunschweig und Berlin</small>	

**Dellmeco GmbH
Industriestraße-West 1
D-63808 Haibach**

**Telephone 06021 / 446 39 80 E-mail: info@dellmeco.net
Telefax 06021 / 446 39 85 Homepage: www.dellmeco.net**