



Operating and Installation Instructions Pulsation Damper P Series for Pumps of the BIOCOR Series

*Read carefully before installing the
pulsation damper*

Original Instruction



INTRODUCTION

ALMATEC pulsation damper are constructed according to the state of the art and they are reliable. Imminent danger by operating error or misuse can lead to damages of properties and/or persons. The pumps are to be applied for the intended use and in a safety-related proper condition only.

Each person working on the ALMATEC pulsation damper concerning installation, start-up, handling or maintenance has to read this manual completely and in an attentive way and has to follow all mentioned procedures and safety notes.

GENERAL DESCRIPTION OF THE MACHINE, APPROPRIATE USE AND RESIDUAL DANGERS

Pulsation dampers of the P series are used for damping of a pulsating flow. They are self-regulating and have their own air connection.

The appropriate use of an ALMATEC pulsation damper is the installation on the discharge side of a pump transporting liquids taking into account the operation parameter mentioned in this manual and in compliance of the given terms for commissioning, operation, assembly, disassembly and maintenance.

Even if all necessary safety measures described in this manual have been met, a residual danger exists by leakages or mechanical damages. At sealing areas or connections liquid can be released uncontrollably then.

STORAGE

In general the ALMATEC pulsation damper is delivered operational and packaged. If the unit is not installed right away, proper storage conditions are important for a trouble free operation later. The pump has to be protected from wetness, coldness, dirtying, UV-radiation and mechanical influences. The following storage conditions are recommended:

- Steady ventilated, dust and vibration free storage room
- Ambient temperature between 15°C and 25°C with a relative humidity below 65%
- Prevention of direct thermal influences (sun, heating)

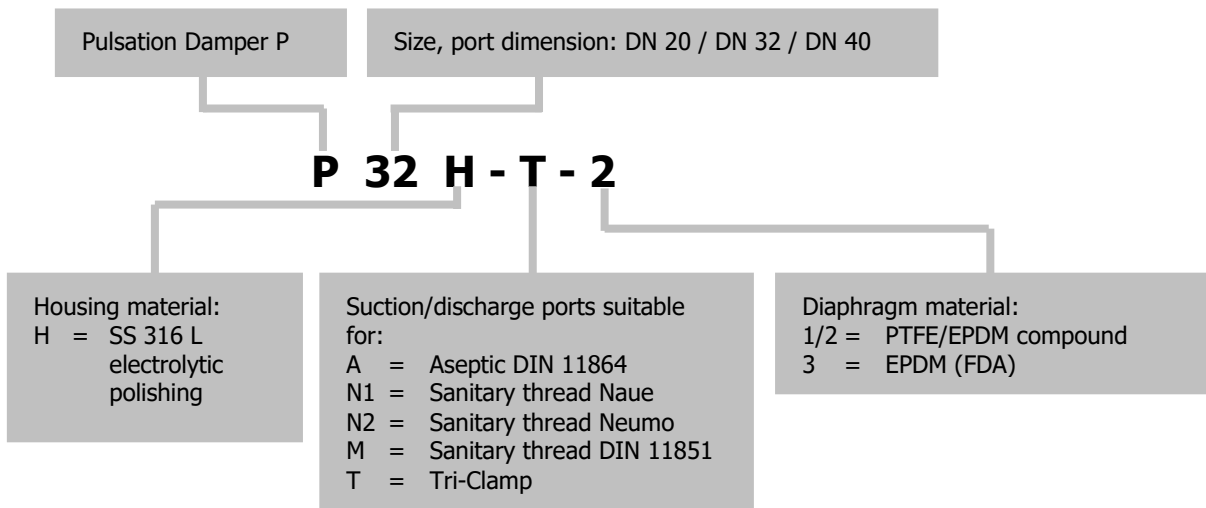
CODE SYSTEM AND TECHNICAL DATA

PSG Germany GmbH is certified as a modern, quality-orientated enterprise acc. to DIN EN ISO 9001 and 14001. Before release for dispatch, any P series pulsation damper has to undergo an extended final control. When applying a damper behind a pump, the capacity of the whole system decreases depending on the point of operation.

As a general rule in the countries of the EU only such machines are allowed to take into operation, which are determined to meet the regulations of the EU machinery directive, the harmonized standards, European standards and the respective national standards. Hence the operator has to verify whether the ALMATEC pulsation damper manufactured and delivered properly according to the customers order meets the mentioned requirements.

Therefore make sure, before putting the damper into operation, that the materials of construction are resistant to the chemical contacted. To check this, the exact damper code is required. This code, as well as the serial number and the year of construction, can be found on the identification plates on the pulsation damper itself.

Here is an example to clarify the system of the damper code:



Technical data		P 20	P 32	P 40
Dimensions (mm):	length	205	260	350
	width	150	200	270
	height	139	170	222
Air connection (BSP)		1/8"	1/4"	1/4"
Nominal port size		DN 20	DN 32	DN 40
Max. operating temperature		80°C (176°F)	80°C (176°F)	80°C (176°F)
Max. driving and operating pressure (bar)		7	7	7

INSTALLATION AND OPERATION

In general, any pulsation damper has to be connected load free. Neglecting this causes leakage and maybe even damages. Before connecting the pump, take the yellow blind plugs out of the liquid and air connections. The operator is responsible for an adequately stability and an appropriate fixation of the piping according to the state of the art.

The ALMATEC pulsation dampers are regulating and adjusting themselves automatically. They can only be attached to the discharge side of a pump at a distance as small as possible; a direct connection to the discharge of the pump is ideal. The installation position can be chosen variably, however, it has to be ensured, that no air locks can occur in the liquid chamber of the damper. For a draining until the last drop the damper has to be installed in a vertical position.

For optimal function, the pulsation damper absolutely requires an air supply of its own, connected to the air supply line of the pump the damper is working on. No closing or regulating fitting whatsoever may be positioned between the pump and damper supply as pump and damper always have to be driven with the same air pressure.

It is not possible to operate one pulsation damper with several pumps; every single pump needs a separate damper, which it forms a closed regulating circuit with. ALMATEC pulsation dampers have to be supplied with oil-free, clean and dry compressed air. A minimum counter pressure of approximately 1 bar is required for faultless function. An empty damper has to be driven slowly along with the pump. It adapts itself to changing operating conditions automatically. A general aspect to be considered is, that a pulsation damper decreases the total capacity of the system depending on the point of operation.

Torque Values



Immediately before putting the pulsation damper into operation with the pump as well as after some hours of operation, the housing bolts [AT:10 P:2] have to be fixed according to the torque data of the following schedules, as the elements of construction "settle". Fixing these parts is necessary as well after periods of stoppage, at temperature variations, after transport and dismantling the pump. In case of temperature varying between extremes or high temperature difference between the liquid and the surrounding, the housing bolts should be controlled more frequently (interval proposals are available on request). The following schedules show the torque values of the damper housing bolts.

Damper Size	P 20	P 32	P 40
Torque values for damper housing bolts (Nm):	6	10	11

SAFETY HINTS



- Installation, operation, and maintenance by qualified staff only.
- Before putting the pulsation damper into operation as well as after some hours of pumping, the housing bolts [2] have to be fixed, as the elements of construction "settle". In case a gap is visible between the damper housing [1] and the damper head [16], the housing bolts [2] have to be fixed carefully until the housing [1] contacts the damper head [16]. Fixing the bolts is necessary as well after longer periods of stoppage, at extreme temperature variations, after transport and dismantling the pump.
- Before any maintenance and service procedures arising on the pulsation damper, the complete installation has to be turned off and protected against accidental turn on. This is possible by a lockable emergency stop for the air supply of the pump/damper. Additional a danger sign against restart should be attached.



- Pressure tests of the plant may only be carried out with the pump and damper disconnected from the pressure on both ports or by using the pressure the pump develops while operating. The load of a pressure in the plant may damage the pump/damper.
- Pump/damper must not be operated with a positive suction pressure.
- In case of a diaphragm rupture, it might be possible for the fluid pumped to intrude into the air side of the pump. In very adverse conditions - e.g. pressure within the fluid system during stopped air supply - the fluid might as well find its way into the air supply lines. To protect other devices like pulsation dampers or even pneumatic valves, it is recommended to protect the air supply line accordingly, e.g. via a non-return valve. This would as well avoid polluting the air supply line.
- If the product tends to settle, the pump/damper has to be flushed regularly. For larger solids a filter has to be installed in the suction line of the pump.
- The relevant effective security advises have to be respected.
- Pools of liquid which appear in the near outer area of the pulsation damper have to be inspected on danger potential, if necessary safety measures are to be taken.
- Chemical and biological reactions in the product chamber of the pulsation damper (mixture of different substances) and the freezing of the liquid have to be avoided.
- Before starting to disassemble the pulsation damper, take care that the pump/damper has been emptied and rinsed. Both ports piping are to be closed and drained if applicable. Further the pump/damper has to be cut off from any energy on the air and product side. If the pulsation damper is being deported from the plant, a reference about the delivered liquid has to be attached.
- Please respect the relevant additional security advices, if the pulsation damper has been used for aggressive, dangerous or toxic liquids (e.g. suitable protective equipment according to the safety data sheet of the liquid). In case of a diaphragm rupture, it is possible that residues of the liquid remain. Hence, appropriate safety equipment according to the safety data sheet of the liquid is indispensable.
- Before putting the pump/damper back into operation, the tightness of the has to be checked.
- All wetted materials of the pulsation damper are appropriate for food-contact. A malfunction can however result in material contact to components of a damper that are not wetted during normal operation (e.g. air side parts). Therefore, we recommended to discard a batch of sensitive media after any malfunction as usual for pumps and dampers.
- Pulsation damper can lead to bruises when lifting, sinking or assembling them. Appropriate accessories and safety equipments are to be used. Big and heavy modules have to fixed and secured to lifting gears when transporting/replacing them.
- Especially when deliver critical liquids, wear parts, like diaphragms, should be replaced within a preventive maintenance.
- The use of non-original ALMATEC spare parts and structural changes lead to the lapse of the warranty immediately. When operating such a pump/damper, damages of properties and/or persons cannot be excluded.
- Possible electrical connections (e.g. when using optional equipment with controllers) may be executed by a qualified person only. The regulations of the respective manufacturers are to be followed.
- At any work arising it has to be made sure that no explosive atmosphere can appear. Appropriate safety equipment is recommended.
- Procedure for damper return: According to the requirements of our 14001-certification, every unit which is send to ALMATEC for diagnosis or maintenance reasons has to be accompanied by a filled out decontamination-sheet. Otherwise a processing is not possible. The decontamination-sheet is enclosed to this manual. Please pay attention to the further safety regulations.
- For further warning instructions, please refer to the pump manual.

OPERATION IN EX-AREAS OR PUMPING FLAMMABLE LIQUIDS

X = CAUTION! = Special operating conditions apply!

For inflammable liquids as well as for applications in explosion-proof areas, AT pulsation dampers have to be equipped with a damper head in conductive PE. Pump and AT-damper have to be grounded separately. The damper has to be grounded to the appropriate connection at the lower part of the damper housing.

ALMATEC pulsation dampers made of electrically conductive PE/PTFE are suitable for use in potentially explosive atmospheres of category 2 and 3 ("Zone 1" and "Zone 2" respectively), atmosphere G/D, which are subject to the scope of EU Directive 2014/34/EU. Conductive diaphragms (material code 68, 70, 72) can be used without restriction for damping liquids in all explosion groups. If non-conductive diaphragm materials are used (material code 67, 98), explosion group IIB applies within the damper for dampener size P 20 up to including P 32 (regardless of the installation site). Following protective measures must be taken for dampener size P 40 as examples:

- exclusive use of water-miscible or conductive pump media or
- avoidance of dry running by operational measures or
- inerting during dry running with nitrogen, water, carbon dioxide, etc. after the pumping operation.

Pipelines and product connections must be grounded separately. To avoid ignition hazards, the formation of dust deposits on the units must be prevented. Repairs in Ex areas may only be carried out after careful examination of the feasibility and only with appropriate tools. For marking Ex according to 2014/34/EU see the enclosed declaration of conformity and the corresponding sticker on the pump.

The interfaces for electrical accessories have been considered and do not represent a new potential ignition source.

The ignition protection type "c=constructive safety" was applied according to guideline EN ISO 80079-37.

SPECIAL OPERATING CONDITIONS	P 20/32/40
Permissible ambient temperature (°C)	-10 - 50
Permissible temperature compressed air pressure (°C)	0 - 50
Maximum drive and operating pressure (bar)	7
Maximum operating temperature (X):	130
with damper head in PE-conductive (°C):	80
with NBR internals (°C):	80

The ATEX marking for gases and dusts is defined as follows according to 2014/34/EU:

In order to enable the optimum and flexible design of an ATEX pump to the customer-specific application, a differentiation is made in the marking between the installation location of the pump (hazardous area outside the pump) and the inside of the pump (hazardous area inside the pump).

Equipment category G (gases, mists, vapors)


Installation site: Category G

Inside the pump: Category G


Conductive ALMATEC air-operated diaphragm pumps may generally be used in explosion group IIC at the installation site (potentially explosive area outside the pump), since the solid housings are made of dissipative materials and the entire pump is grounded.

CAUTION! Inside the pump, the permitted explosion group varies depending on the diaphragm material used:

When using *non-conductive diaphragms*, explosion group IIB applies inside the pump:

 II 2/2 G Ex h IIB/IIC T6...T4 Gb/Gb X (inside the pump/installation site)

When using *conductive diaphragms*, explosion group IIC applies inside the pump:

 II 2/2 G Ex h IIC/IIC T6...T4 Gb/Gb X (inside the pump/installation site)

Equipment category D (Stäube)

Installation site: Category D

Inside the pump: Category G

Conductive ALMATEC air-operated diaphragm pumps may generally be used in dust group IIIC at the installation site (potentially explosive area outside the pump; equipment category D).

CAUTION! Inside the pump (equipment category G), the approved explosion group varies depending on the diaphragm material used:

When using *non-conductive diaphragms*, explosion group IIB applies inside the pump:

 II 2/2 D Ex h IIB/IIIC T 70°C...130°C Gb/Db X (inside the pump/installation site)

When using *conductive diaphragms*, explosion group IIC applies inside the pump:

 II 2/2 D Ex h IIC/IIIC T 70°C...130°C Gb/Db X (inside the pump/installation site)

CIP- und SIP Cleaning

Basic condition for the delivery of hygienic perfect and high-quality liquids is a clean pump. The construction of the P series damper permits the CIP as well as the SIP cleaning. Despite the general restriction of temperature of 80°C (176°F) a brief operating (max. 30 minutes) to 130°C (266°F) for purification processes is permitted, in these cases the pump/damper must run slowly (e.g. sterilization with steam). If a cleaning liquid is used, this should be sucked by the pump itself without external pressure in the system. For explosion proof areas please see the explanations on page 2.

EHEDG information

An EHEDG-certificate for the pulsation dampers of the P series is not possible. To achieve an EHEDG-certification, a machine has to undergo a defined test cycle to prove that this machine can clean itself while operating. As a pulsation damper cannot operate on its own, such a test cannot be executed for a pulsation damper. This means that despite a design analogue to the pump, an EHEDG-certification is not possible for the pulsation damper.

DISASSEMBLY

When dismantling a pulsation damper the previous mentioned procedures and safety notes have to be considered generally. The general design of the ALMATEC P series pulsation dampers is simple. No special tools are required for disassembly and re-assembly. Part numbers can be found in the spare part list.

Loosen the housing bolts [2] using a socket spanner and remove the housing [1] (do not damage the sealing surfaces for the diaphragms!). Screw the diaphragm [4] off the actuator shaft [3] counter-clockwise and take out the actuator shaft [3]. Remove both parts of the shaft piston rings [6] from their grooves carefully (do not damage the edges in the damper head; a re-assembly of the same piston rings is impossible; they have to be replaced). To tear the old O-rings out of the grooves, a needle may be helpful.

ASSEMBLY

The re-assembly of the components is principally carried out vice-versa to the dismantling. Here are some additional references.

To assemble new piston rings [6], carefully shape them like kidneys with locking ring pliers and insert the rings into the grooves (Attention: rings have to be fit into the first, third and fifth groove) in the damper head [5]; completely press the rings into the grooves smoothly using some round tool.

Insert the actuator shaft [3] and attach the diaphragm completely. The spanning area of the diaphragm and the diaphragm sealing surface of both damper housing [1] and head [5] have to be absolutely clean and undamaged; mere small scratches can cause leaking (if necessary, smoothen the housing surfaces carefully with fine sandpaper). Align the bore holes of the diaphragm to those in the damper head [5]. Lay on the damper housing [1] and shove the housing bolts [2] carefully through the head (slightly turning the bolts helps them to find their way). Fix the housing bolts [2] crosswise evenly until the damper housing [1] contacts the damper head [5]. Further tightening of the bolts does not improve sealing but can deform the housing!

Before putting the pump back into operation, the tightness of the damper has to be checked.

Maintenance

Only use original ALMATEC spare parts for repairs and / or preventive maintenance work. If this is not observed, the CE and ATEX markings, the declaration of conformity (s) and the guarantee claim for the pump will expire.

All work on the pump may only be carried out with the appropriate tools and by trained specialist personnel.

SPARE PART LIST P-Series

Damper size				P 20	P 32	P 40
Item	Pc.	Description	Material	Part number	Part number	Part number
1	1	Damper housing, Code A (DIN 11864)	SS 316 L	5 20 470 23	5 32 470 23	5 40 470 23
	1	Damper housing, Code N1 (Naue)*	SS 316 L	5 20 070 23	5 32 070 23	5 40 070 23
	1	Damper housing, Code N2 (Neumo)*	SS 316 L	5 20 170 23	5 32 170 23	5 40 170 23
	1	Damper housing, Code M (DIN 11851)	SS 316 L	5 20 270 23	5 32 270 23	5 40 270 23
	1	Damper housing, Code T (Tri-Clamp)	SS 316 L	5 20 370 23	5 32 370 23	5 40 370 23
2	6	Housing bolt, cpl.	1.4301	5 20 073 22	5 32 073 22	5 40 073 22
3	1	Actuator shaft	1.4301	1 15 482 22	1 25 482 22	1 40 482 22
4	1	Diaphragm	EPDM (FDA)	1 15 031 73	1 25 031 73	1 40 031 73
		Diaphragm	PTFE	1 15 031 67	1 25 031 67	1 40 031 67
5	1	Damper head	PE conductive	2 25 081 55	2 40 081 55	2 50 081 55
6	3	Shaft piston ring, cpl.	PTFE	1 15 041 64	1 25 041 64	1 40 041 64
7	1	Muffler	PE	1 15 644 51	1 25 644 51	1 40 644 51

When ordering please state the serial number of the damper!

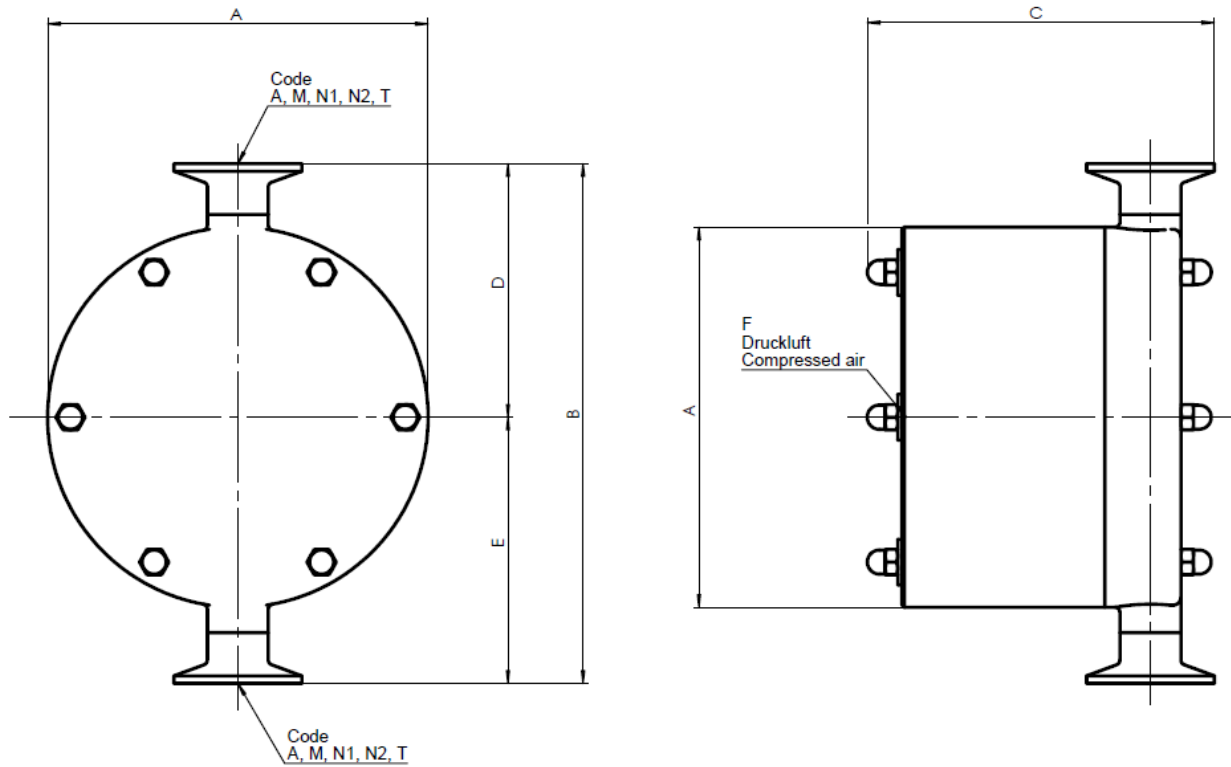
SPARE PART LIST P-Series-USP

Damper size				P 20-USP	P 32-USP	P 40-USP
Item	Pc.	Description	Material	Part number	Part number	Part number
1	1	Damper housing, Code A (DIN 11864)	SS 316 L	5 20 470 23	5 32 470 23	5 40 470 23
	1	Damper housing, Code N1 (Naue)*	SS 316 L	5 20 070 23	5 32 070 23	5 40 070 23
	1	Damper housing, Code N2 (Neumo)*	SS 316 L	5 20 170 23	5 32 170 23	5 40 170 23
	1	Damper housing, Code M (DIN 11851)	SS 316 L	5 20 270 23	5 32 270 23	5 40 270 23
	1	Damper housing, Code T (Tri-Clamp)	SS 316 L	5 20 370 23	5 32 370 23	5 40 370 23
2	6	Housing bolt, cpl.	1.4301	5 20 073 22	5 32 073 22	5 40 073 22
3	1	Actuator shaft	1.4301	1 15 482 22	1 25 482 22	1 40 482 22
4	1	Diaphragm	PTFE	1 15 031 67	1 25 031 67	1 40 031 67
5	1	Damper head	PE conductive	2 25 081 55	2 40 081 55	2 50 081 55
6	3	Shaft piston ring, cpl.	PTFE	1 15 041 64	1 25 041 64	1 40 041 64
7	1	Muffler	PE	1 15 644 51	1 25 644 51	1 40 644 51

When ordering please state the serial number of the damper!

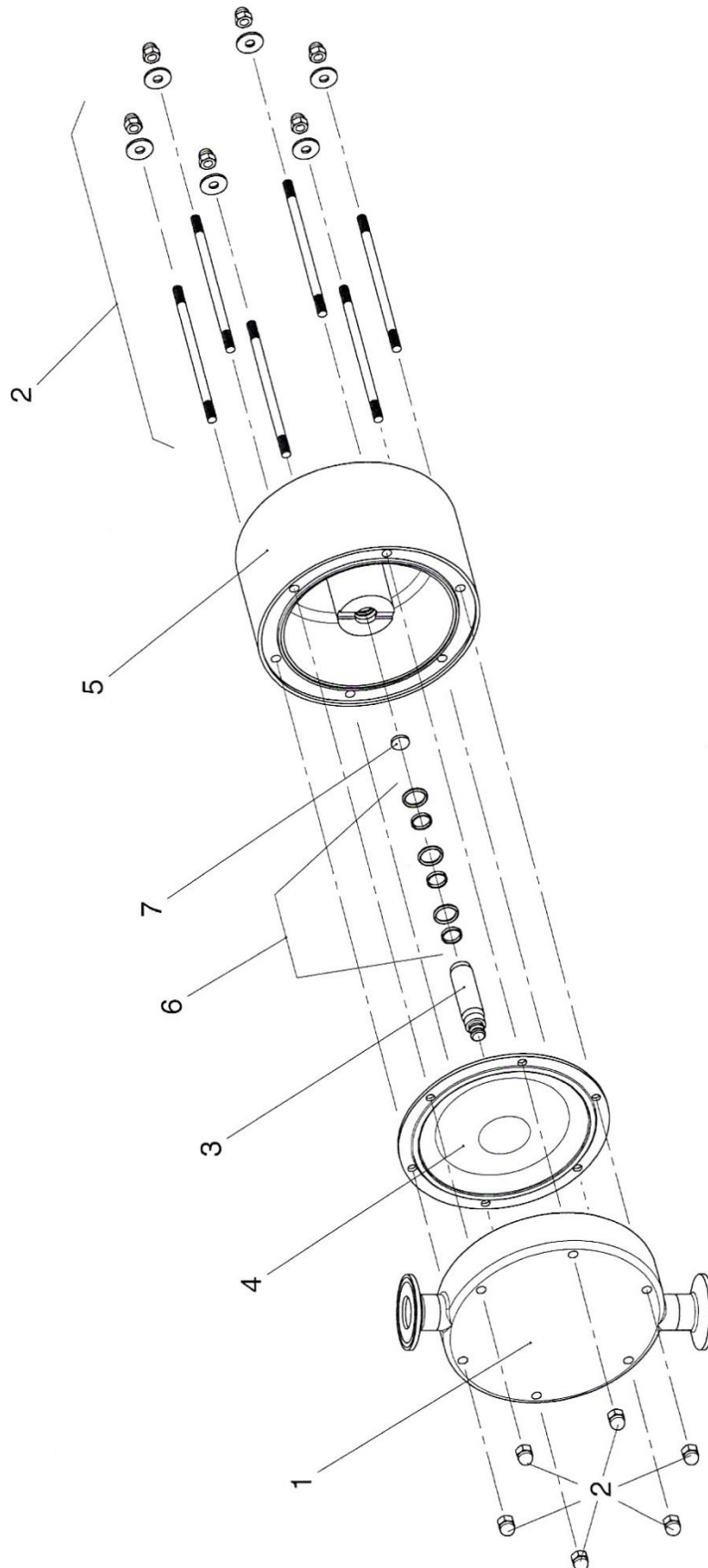
* Obsolete version

Dimensions (in mm)



	A	B	C	D	E	F	Code A (DIN 11864)	Code M	Code N1	Code N2	Code T
P 20	150	205	139	100	105	R 1/8"	Rd 44 x 1/6" (DN 20)	Rd 44 x 1/6" (DN 20)	M 36 x 2 (DN 20)	M 36 x 2 (DN 20)	1" Tri-Clamp
P 32	200	260	170	125	135	R 1/4"	Rd 58 x 1/6" (DN 32)	Rd 58 x 1/6" (DN 32)	M 52 x 2 (DN 32)	M 52 x 2 (DN 32)	1 1/2" Tri-Clamp
P 40	270	350	222	170	180	R 1/4"	Rd 65 x 1/6" (DN 40)	Rd 65 x 1/6" (DN 40)	M 56 x 2 (DN 40)	M 56 x 2 (DN 40)	2" Tri-Clamp

Exploded View





Subject to change without notice, 2021/07

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