

HDP User Manual



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1 Introduction

This User Manual gives detailed instructions on how to size, mount and use the Heavy Duty Protection, hereafter referred to as the HDP.

1.1 Illustrations disclaimer

The illustrations in this manual are intended for illustration purposes only and may not necessarily depict the shown items and products such as they appear in real life.

1.2 Original language

The original language of this manual is English. In case of discrepancies between a translated version of this manual and the original, it is the original version that is valid.

2 Safety

It is important to read, understand and follow the instructions carefully. The safety precautions are there to prevent:

- Personal injury
- Damage to the product or other property
- Product malfunction

Throughout this manual the following symbols will be used.



Warning: Indicates that an accident may or will occur if the instructions are not followed. The accident may result in **personal injury**.



Caution: Indicates that an accident may occur if the instructions are not followed. The accident may result in **material and/or product damage** or **product malfunction**.



Note: Indicates important information and may indicate a risk of **product malfunction**.

3 General information

3.1 Intended use

The HDP is designed for use together with KALLER gas springs having a threaded hole (often denoted as a service thread) in the center of the piston rod top, and the purpose of the HDP is to protect the piston rod and the piston rod seals from particle contamination.

The HDP provides a barrier that significantly reduces the number of particles that can reach the piston rod and the piston rod seals.

The HDP does not protect the gas spring or the piston rod from liquid contamination, corrosive gases or very hot debris or particles, like for example droplets of molten metal.

3.2 Operating temperature and SPM

The ambient operating temperatures of the HDP are for practical purposes limited to the max and min operating temperatures of the gas spring. The HDP itself can withstand ambient temperatures up to 150°C, but the limiting factor to consider is the operating temperature of the gas spring.

However, provided that the ambient temperature is within the specified limits for the gas spring, the HDP can be used to protect the piston rod from dirt, debris and particles with a temperature of up to 150°C. Occasional short term contact with particles that are even hotter (up to approximately 200°C) is most often no problem as long as the particles do not have a tendency to stick to the HDP cover fabric.



Caution: The min and max operating temperatures for the gas spring must always be observed.

The HDP can be used at whatever stroke rate (Strokes Per Minute, SPM) the gas spring is being operated at.

3.3 Gas spring parts naming

Throughout this manual some parts of the gas spring will be referenced frequently. These parts are shown in the figure below together with the naming used in this manual.

Note that illustrations are general and that any given gas spring might not look exactly like the one in figure 1 below.

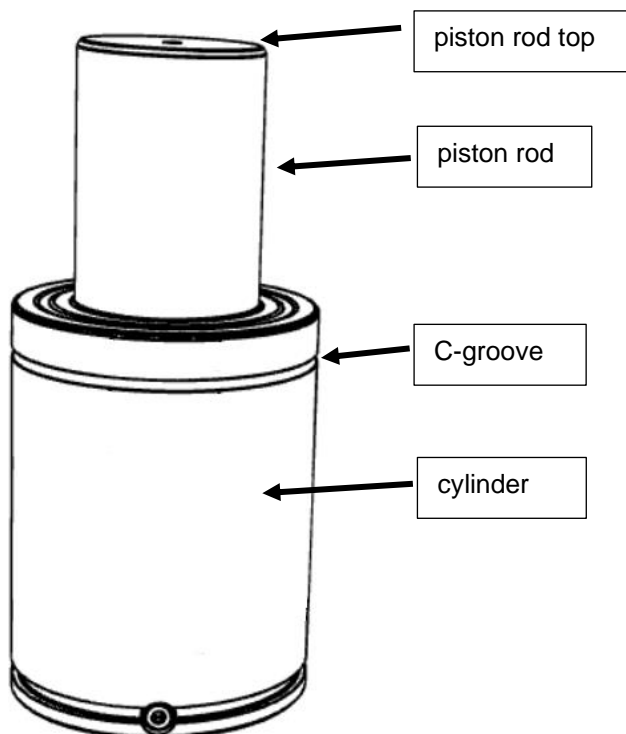


Figure 1 - Naming of parts of the gas spring

4 HDP parts and required tools

This section explains what is included in the HDP delivery and what tools and consumables that are necessary for sizing and mounting the HDP onto a gas spring.

4.1 What is included in the HDP delivery

The HDP delivery contains the items listed below and shown in figure 2.

- The HDP cover fabric (1)
- A striker plate (2)
- A shoulder screw with an O-ring (3)
- One metal cable tie (not shown in figure 2)

The HDP cover fabric and the shoulder screw with its O-ring are pre-mounted onto the striker plate.

In addition to the items listed above, the mounting of the HDP may also require a flange adapter which is ordered separately. The flange adapter is needed when the HDP is to be used onto a gas spring that is mounted using an FCS flange to the upper C-groove.

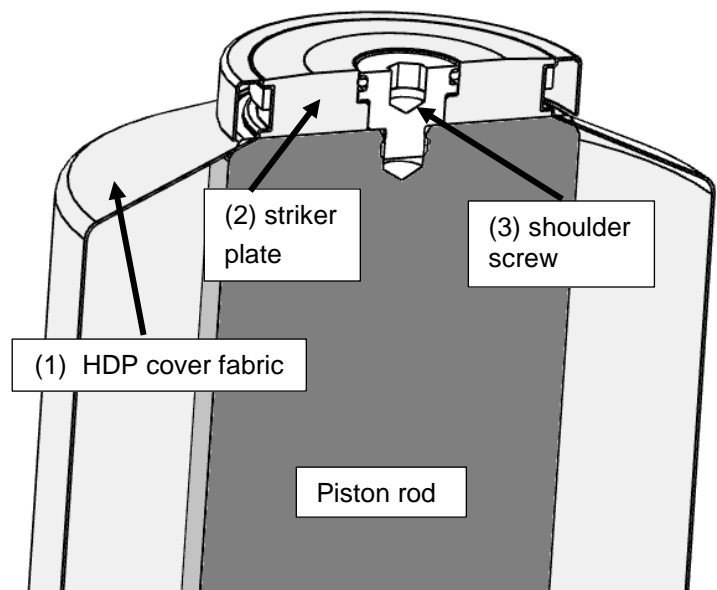


Figure 2 - HDP parts shown in cross section view on a piston rod

4.1.1 Striker plate thickness

The striker plate is 10 mm thick, meaning that the total height of the gas spring onto which the HDP is mounted will increase with 10 mm.



Caution: the added height (+ 10 mm) of the gas spring assembly must be taken into account to avoid collisions in the tool or machine.

4.1.2 Striker plate diameter

For some combinations of gas spring and HDP the diameter of the striker plate does intentionally not match the diameter of the piston rod. The striker plate diameter may, for these combinations of gas spring and HDP, be either slightly larger than or slightly smaller than the piston rod diameter. In those cases where the striker plate diameter is smaller than the piston rod diameter it is still recommended that the contact piece in the tool or machine has at least the same contact area as the piston rod top (i.e. as prescribed in the mounting instructions for the gas spring).

4.2 Required tools and consumables

4.2.1 Tools

- A pair of scissors. The HDP cover fabric is delivered in one length and needs to be cut to the appropriate length, depending on the stroke length of the gas spring to which it is to be fitted.
- Allen keys (hex keys) for tightening the HDP shoulder screw.
- If the HDP uses the flange adapter, tools are also required for tightening the screws used for the flange.
- Torque wrench for tightening screws to the appropriate torque.
- Gas charging equipment may also be required if the gas spring is not gas charged when the HDP is to be mounted.
- Optional but recommended: a cable tie tightening tool for metal cable ties, available as an accessory (see section 7.2).

4.2.2 Consumables

- Soft lint-free cloth for cleaning the piston rod.
- Cotton buds (cotton sticks) or similar to clean the thread in the piston rod top.
- Mild solvent (for example rubbing alcohol or similar) to clean grease or oil from the thread in case the thread is very oily or greasy.
- Thread locking compound (Loctite 2700 or similar).



Caution: Thread locking compound (Loctite 2700 or similar) is necessary to prevent the shoulder screw from getting loose.

5 Sizing the HDP cover fabric

The HDP cover fabric is always delivered in its full length and should be cut to a length that suits the stroke length of the gas spring. The HDP cover fabric should be cut slightly below the markings as indicated by the table below. Cutting below the marking is especially important for stroke lengths that coincide with or are very close to the marking. For stroke lengths that coincide with or are very close to the marking the cut should be made approximately halfway between the coinciding marking and the next higher marking.

Gas spring stroke length [mm]	Cut below HDP cover fabric marking
10-25	25
26-50	50
51-75	75
76-100	100
101-125	125
126-150	150
151-175	175
176-200	200
201-225	225
>226	no cutting needed

Table 1 - Sizing guide

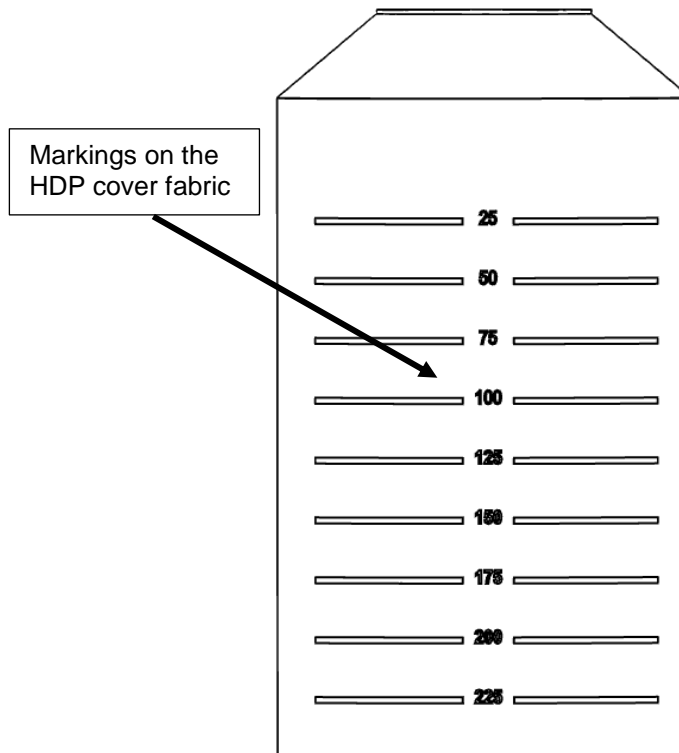


Figure 3 - Markings

5.1 Example 1

The stroke length of the gas spring is 38 mm. This stroke length lies in between 26-50 mm and according to table 1 above the appropriate cut should be made just below the "50" marking on the HDP cover fabric.

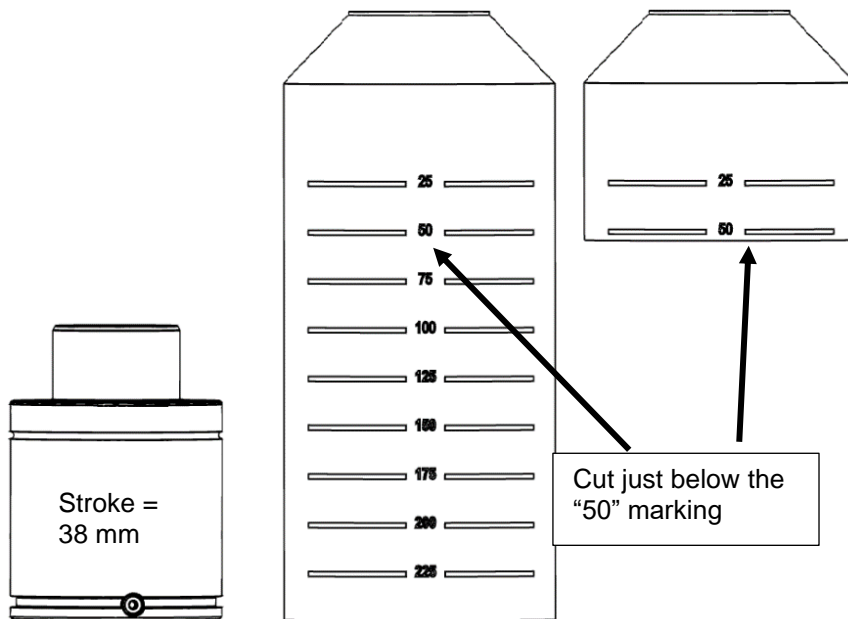


Figure 4 – Example 1, stroke = 38 mm

5.2 Example 2

The stroke length of the gas spring is 175 mm. This stroke length coincides with the marking "175", and then the cut in the HDP cover fabric should be made approximately halfway between the "175" and the "200"-markings.

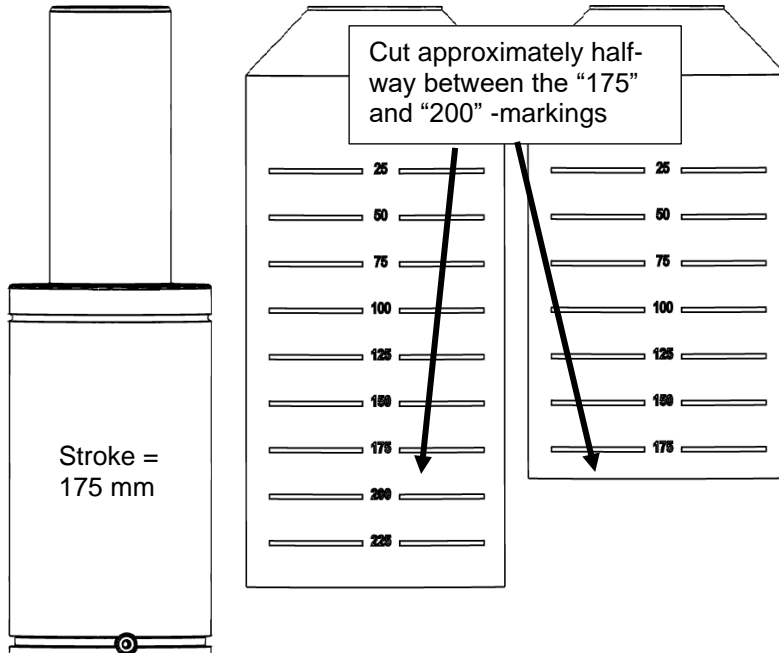


Figure 5 - Example 2 stroke = 175 mm



Note: The HDP cover fabric should have a tight fit to ensure proper function and to avoid risk of operational disturbances. A loose fit means an increased risk of the excess fabric forming pockets that might collect dirt and possibly even get stuck in moving parts.

6 Mounting procedures

6.1 Mounting without flange adapter

If the application does not require a HDP flange adapter, i.e. if the upper C-groove on the cylinder is not used for fastening the gas spring, follow the procedure described below.

1. Carefully wipe clean the piston rod and especially the piston rod top using the lint-free cloth. There should be no residues of solid particles, oil or grease on the piston rod top.
2. Clean thoroughly the threaded center hole in the piston rod top, there should be no traces of grease or oil or solid particles left in the threads. If necessary, use a small amount of rubbing alcohol on a cotton bud to clean oil or grease from the thread.
3. If necessary, clean the thread on the shoulder screw.
4. Apply a small amount of thread locking compound (Loctite 2700 or similar) to the thread in the piston rod top, not to the threads on the shoulder screw. Applying thread locking compound to the shoulder screw introduces a risk of accidentally getting thread locking compound on the top surface of the piston rod, gluing the striker plate to the piston rod. If the striker plate is glued to the piston rod, the striker plate is unable to rotate relative to the piston rod which introduces a risk of operational disturbances due to the HDP cover fabric becoming twisted.

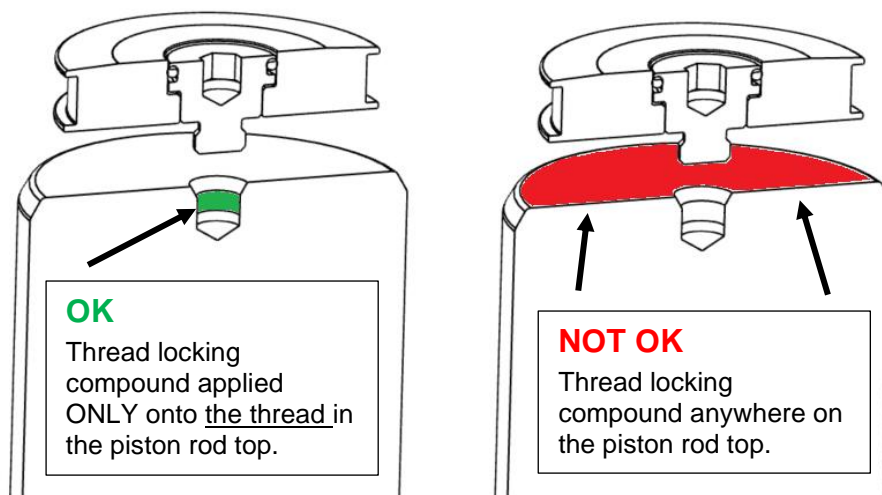


Figure 6 – Only apply thread locking compound directly to the threads in the piston rod top.



Caution: be careful not to get any thread locking compound between the striker plate and the piston rod top, since this could prevent the striker plate from rotating.



Caution: should there get any thread locking compound onto the outside of the piston rod it must immediately be wiped off completely, since otherwise there is a significant risk of damage to the gas spring.

5. Place the striker plate on top of the piston rod top and tighten the shoulder screw. The shoulder screw should be tightened to the torque corresponding to its thread size according to the table below.

Shoulder screw thread size	Recommended torque [Nm]
M6	4
M8	8
M16	40

In case the piston rod starts to rotate before the recommended tightening torque is reached do not try to grip the piston rod with anything else than your bare hands. If it is not possible to reach the recommended torque with only hand strength to grip the piston rod, then just tighten the shoulder screw as much as possible. Using tools to grip the piston rod to prevent it from rotate means a very high risk of damaging the piston rod.



Caution: never grip the piston rod with a tool when tightening the shoulder screw since this may severely damage the piston rod.

6. After having tightened the shoulder screw let the thread locking compound cure for a few minutes. Then check that the striker plate has not been glued to the piston rod by rotating the striker plate by hand. It should be possible to rotate the striker plate without much resistance. If it is not possible to rotate the striker plate by hand then the striker plate might have been glued to the piston rod. If the striker plate has been glued to the piston rod, the striker plate has to be removed and the glue removed before restarting the mounting procedure from step 1 above.
7. Gently pull down on the HDP cover fabric over the cylinder. The HDP cover fabric should be draped over the cylinder as straight, evenly and wrinkle-free as possible.



Note: The HDP cover fabric should have a tight fit. A loose fit means an increased risk of the excess fabric forming pockets that might collect dirt and possibly even get stuck in moving parts.

8. Attach the cable tie over the HDP cover fabric so that the cable tie sits in the C-groove on the cylinder and tighten the cable tie firmly, preferably using a cable tie tightening tool. Cut off the excess cable tie.
9. The HDP mounting procedure is now finished.

6.2 Mounting with flange adapter

In applications where the C-groove on the cylinder is already used for fastening the gas spring with an FCS flange, a flange adapter is required for fastening the HDP cover fabric. The flange adapter is ordered separately.

The flange adapter is available in several different sizes. All sizes of the flange adapter have the same basic design consisting of a plastic flange and four metal washers.

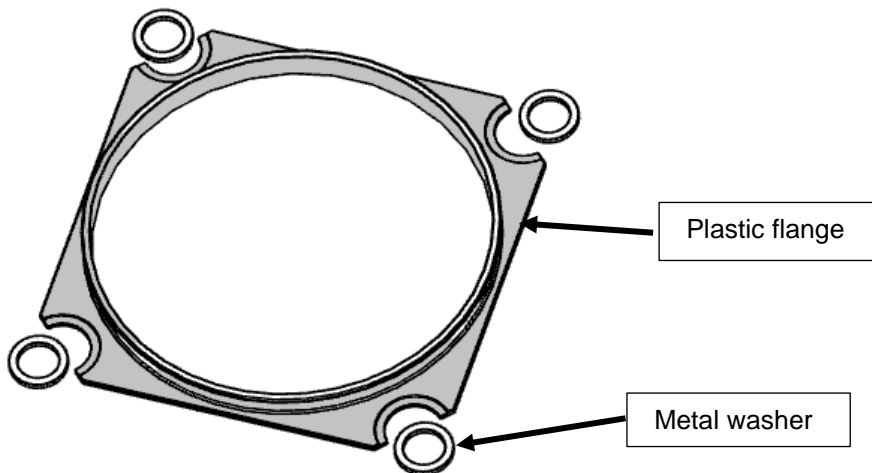


Figure 7 - The flange adapter

When mounting the flange adapter it is important to use the metal washers included in the delivery of the flange adapter and also to use a screw head size that is slightly larger than the washer. The thickness of the washer is 2 mm meaning that the screw will be displaced 2 mm compared to when not using the flange adapter.



Caution: the diameter of the head of the screws used to fasten the FCS flange must be larger than the outer diameter of the metal washers in the flange adapter, but the screw head must also not be so large that it touches the flange.

The plastic flange has a slightly recessed portion next to the cut-out for the washer. The recess provides a gap between the screw head and the plastic flange, this gap is needed to prevent the screw head to crush the flange.

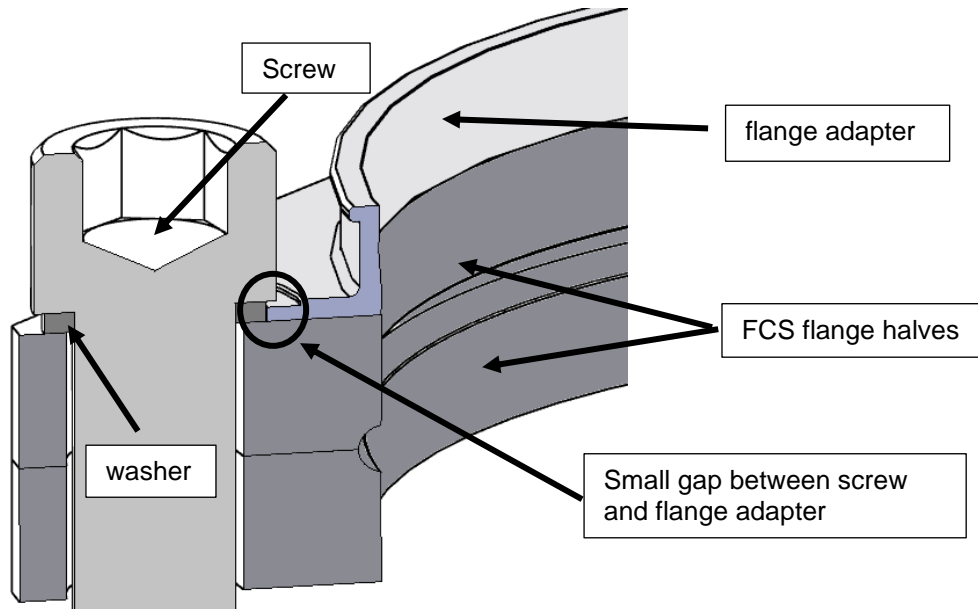


Figure 8 – Cross-section view of flange adapter, washer, screw and FCS flange

As a consequence of the small gap the flange adapter may sometimes appear a bit loose since it can move a fraction of a millimeter between the FCS flange and the screw head, but this is normal and as designed.

Follow the procedure below when mounting the HDP using the flange adapter.

1. If the gas spring is already mounted using the FCS flange the screws holding the FCS flange have to be unscrewed.
2. Place the flange and the washers on top of the FCS flange so that the screw holes match.

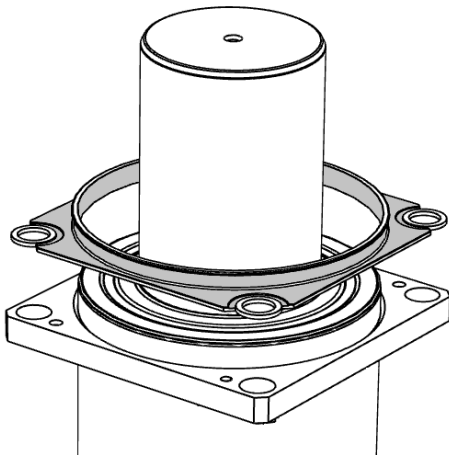


Figure 9 – Place the adapter and washers on top of the FCS flange

3. Insert the screws through the washers and through the holes in the FCS flange.

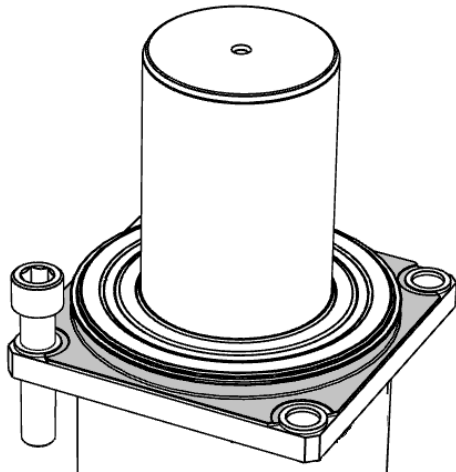


Figure 10 - Insert screws

4. Ensure that all parts align and that the screw heads do not touch the plastic flange.
5. Cross-tighten the screws according to the FCS flange mounting guidelines. Tighten the screws according to the recommended tightening torque for the particular screw types used.
6. Mount the striker plate following steps 1 to 7 in section 6.1.
7. Attach the cable tie over the HDP cover fabric so that the cable tie sits in the groove in the flange adapter and tighten the cable tie firmly, preferably using a cable tie tightening tool. Cut off the excess cable tie.
8. The HDP mounting procedure with the flange adapter is now finished.

6.3 Notes regarding the cable tie

Make sure that the cable tie is clean before mounting it. Dirt in the locking mechanism may potentially impair the locking mechanism during tightening of the cable tie.

When cutting the cable tie, make the cut perpendicular to the length direction of the cable tie to avoid creating very sharp edges of the remaining piece of the cable tie, and cut as close to the lock as possible to reduce the risk of the remaining piece to get stuck in the HDP cover fabric.

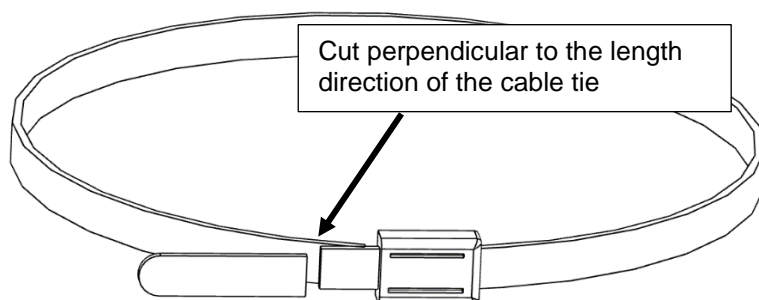


Figure 11 – Cut the excess cable tie perpendicular and close to the lock



Caution: An incorrectly cut cable tie increases the risk of damaging the HDP cover fabric.

7 Spare parts and accessories

7.1 Spare parts

The shoulder screws and metal cable ties are available as spare parts for the HDP.

There are 4 different shoulder screw models. The table below shows the 4 different shoulder screws and below each shoulder screw are the corresponding gas spring models and sizes listed.

The shoulder screw spare part includes the O-ring.




Shoulder screw model description			
M6 Order number 1034847	M8 short Order number 1034848	M8 long Order number 1034849	M16 Order number 1034850
			
Fits gas springs	Fits gas springs	Fits gas springs	Fits gas springs
X 750	TX 2400	TU 750	TU 7500
TX 750	X 4200	LCF 750	LCF 7500
XG 750	TX 4200	TU 1500	TU 10000
XF 750	XG 4200	LCF 1500	KF2 / KF2-A 7500
X 1000	X 6600	TU 3000	
TX 1000	TX 6600	LCF 3000	
XG 1000	XG 6600	KF2 /KF2-A 1500	
XF 1000	X 9500	TU 5000	
X 1500	TX 9500	LCF 5000	
TX 1500	X 20000	KF2 /KF2-A 3000	
XG 1500	TX 20000	KF2 /KF2-A 5000	
XF 1500			
X 2400			
XG 2400			
XF 2400			

Table 2 - Spare part shoulder screw determined from gas spring model and size

Alternatively, if the order number for the particular HDP model is known, the corresponding spare part shoulder screw can also be determined using the table below:

HDP order number			
HDP-1-45 HDP-2-50 HDP-1-63 HDP-3-75	HDP-2-75 HDP-2-95 HDP-2-120 HDP-2-150 HDP-2-195	HDP-1-50 HDP-1-75 HDP-1-195 HDP-1-120 HDP-3-150	HDP-1-150 HDP-1-195
Shoulder screw spare part order number	Shoulder screw spare part order number	Shoulder screw spare part order number	Shoulder screw spare part order number
1034847	1034848	1034849	1034850

Table 3 - Spare part shoulder screw determined from HDP order number

Additional metal cable ties can be ordered in sets of 10 pcs.

The order number for this set of 10 pcs of metal cable ties is **1032103**.

7.2 Accessories

A cable tie tightening tool for metal cable ties is available as an accessory. The order number for the metal cable tie tightening tool is **1031124**.

8 Version record

Issue No.	Change description	Release date	Issued by	Approved by
8200-2085	First issue	2024-01-17	Engsén	AK