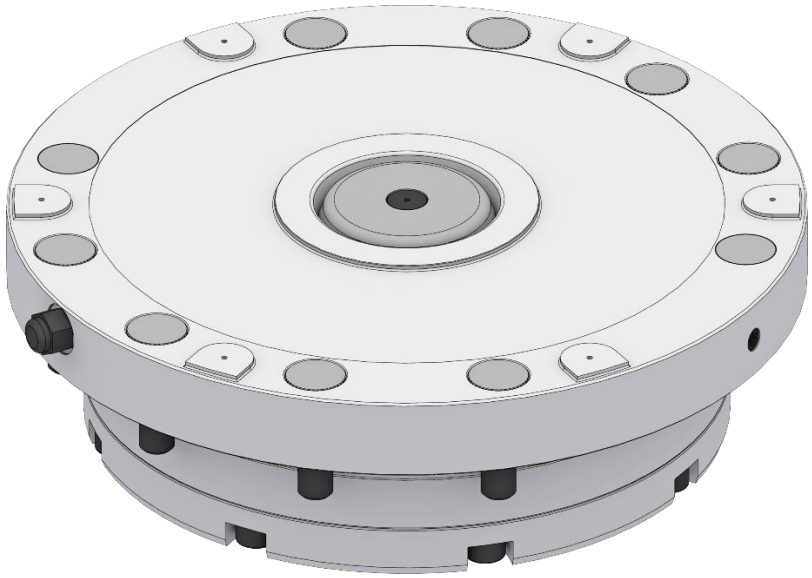
Assembly and operating instructions

DockLock

autoairline

Pneumatic zero-point clamping system

755136 LA



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Safety instructions

⚠ **CAUTION:**	Risk of crushing when placing a device!	
⚠ **CAUTION:**	Wear safety boots when installing cassettes / cylinders and when setting up pallets and locking devices!	
⚠ **CAUTION:**	Wear safety goggles and hearing protection while activating the air-blast of the cassettes / cylinders!	
⚠ **ATTENTION:**	The compressed air for air-blast must be filtered and have an oil content of 5 mg/m³ (ISO 8573-1:2010)!	
⚠ **ATTENTION:**	Applications may only be carried out according to these instructions or following consultation with HAINBUCH!	
⚠ **ATTENTION:**	HAINBUCH assumes no liability in the event of malfunctioning due to improper assembly, disassembly or operation!	
⚠ **ATTENTION:**	Only use original DockLock spare parts from HAINBUCH!	
⚠ **ATTENTION:**	Only use original DockLock plugs!	
⚠ **ATTENTION:**	The system must be maintained at the intervals specified on the data sheet!	
⚠ **ATTENTION:**	The minimum / maximum operating pressure (see Figure 1) must not be undercut or exceeded!	
⚠ **ATTENTION:**	Blowing out the clamping chamber with compressed air can cause the system to malfunction! Only remove swarf with a swarf extractor! Observe the WMAs and the data sheet (see chapter 5)!	
⚠ **ATTENTION:**	In the event of pneumatic supply using deep-hole bores, the material must be tight and free from blowholes and withstand continuous loading! The minimum wall thickness is 3 mm for steel and 5 mm for cast iron.	
⚠ **ATTENTION:**	The forces acting on a cassette / cylinder must not exceed the pull-in force specified on the data sheet! There is a risk of damage if the pull-in force is exceeded!	
⚠ **ATTENTION:**	The forces acting on a cassette / cylinder must not exceed the specified retention force! Risk of cassette / cylinder breakage!	

1 Introduction

Thank you for buying one of our products. We wish you every success using it. In purchasing your DockLock zero-point clamping system, you have acquired a product that is clearly set apart from other clamping systems on the market due to the fact that it offers high machining vibration damping, is free from wear and is minimally sensitive.

Please read these installation and operating instructions carefully **before** putting the product into operation.

2 Product description and areas of application

Zero-point clamping systems are vital components in the production of workpieces on machine tools to achieve results with high dimensional accuracy at the highest repetition rate and in the shortest set-up time. Our products can be used to combine maximum precision with the greatest possible cost-efficiency in industrial production when machining workpieces.

The built-in cassettes of the DockLock zero-point clamping systems are intended for installation in a machine table or pallet and can be used on an extremely wide variety of machine types and for almost all machining requirements imaginable.

The built-in cassettes are surrounded by a housing, which absorbs all pressures (forces) generated inside. The forces acting on a cassette must be absorbed by the machine table or pallet into which they are incorporated.

Cassettes used for clamping workpieces can be arranged on the machine table as required. This ensures a high degree of flexibility with regard to the machining of different workpieces on machine tools.

Other applications of DockLock zero-point clamping systems result from the unlimited clamping time. The cassettes' tension and thus pull-in force are maintained until the clamping system is opened again by a release signal. The pressure medium does not have to be connected to the clamping system to maintain an existing tension.

With appropriate planning, our zero-point clamping systems can therefore also be used to design robot cells, production islands and production lines for positioning devices and robots.

Additionally, the DockLock zero-point clamping systems can be used for workpiece pallet handling and logistics by an industrial robot within a robot cell.

3 Operating staff

The required personal protective equipment must be worn when working on and with the products. All applicable health and safety regulations must be observed when handling products from our company.

The work described in these assembly and operating instructions – particularly making locking devices (locking plates) and pallets, setting up the systems on machine tools and the maintenance work described – may only be carried out by trained specialists.

Additionally, extensive specialist knowledge of both the machine tool used and its functions is necessary to install, use and maintain our products.

4 Information on the cassette cover

Figure 1 shows all the information on the cassette cover that is used to uniquely identify and assign a cassette.

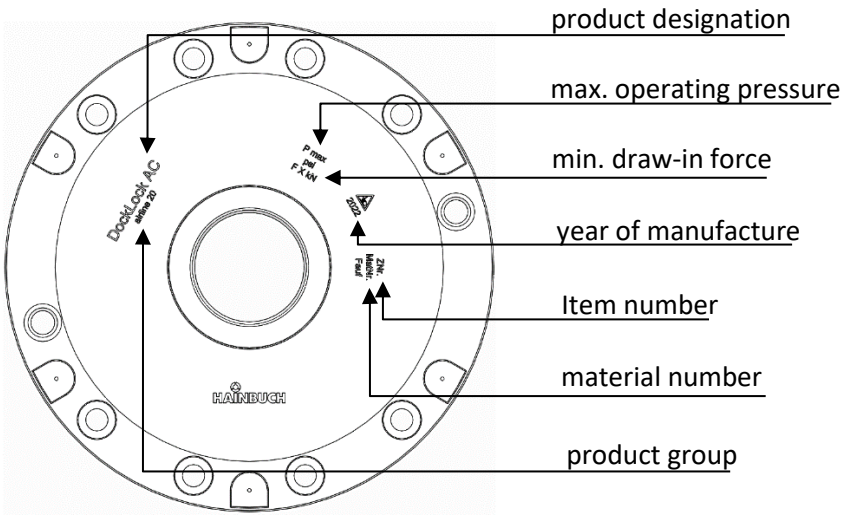


Figure 1 – Information on the cassette cover

5 Data sheets for the products

In addition to the technical data, the corresponding product's data sheet contains all of the applicable item numbers as well as all of the associated documentation such as installation drawings and assembly instructions. The data sheets for the corresponding product designation on the cassette cover are listed in Table 1.

Product designation	Description	Data sheet
autoariline	1-t airline automation system	DB airline A

Table 1 – Assignment of data sheets

6 Using the pressure medium (compressed air)

⚠ **ATTENTION:** The minimum / maximum operating pressure (see Figure 1) must not be undercut or exceeded!

The corresponding data sheet (see chapter 5) must be observed when using the pressure medium!

The products can either be integrated into the machine tool's or the production line's pneumatic system or operated with an independent source of compressed air. The compressed air system is connected directly to the corresponding cassette. Necessary connection and distribution work on the pneumatic system and the machine tool must be state-of-the-art and be planned and carried out by trained specialists.

Unless specified otherwise, DockLock cassettes are operated at an operating pressure of min. 6 bar. Pressure deviations must not exceed +/- 5% of the operating pressure.

The pressure build-up for release the lock lasts approx. 1 second.

The release line must be depressurised before machining. It must be ensured that the system has been re-clamped before machining. The system may be pressurised during machining at the re-clamping connection (turbo) or may be depressurised after re-clamping.

See the description of a clamping or release process under Point 8 entitled "Operating the zero-point clamping system".

7 Assembling the zero-point clamping system

The installation drawings (EBZ) and assembly instructions (WMA) must be observed for assembly (see chapter 5)!

To assemble the cassettes, first of all a **locking device** (separate or machine table) must be prepared to hold the cassettes and a workpiece carrier (pallet) must be prepared to hold the clamping plugs. Appropriately sized installation spaces must be provided in the locking device in preparation for cassette assembly.

Additionally, a **pallet** or **workpiece carrier** must be prepared regardless of the cassettes' type. Some mounting holes have to be drilled in the pallet or workpiece carrier to assemble the clamping plugs, which are used for subsequent fixation to the locking device.

The explanations provided in this chapter must be implemented one after the other to assemble the zero-point clamping system and prepare it for operation.

The applicable framework conditions for designing a workplace and the required ergonomic design guidelines (e.g. ISO TR 22100-3) must be taken into account while designing, assembling and operating the clamping systems.

7.1 Specifications for making locking devices

⚠ **ATTENTION:** The forces acting on a cassette must not exceed the pull-in force specified on the data sheet! There is a risk of damage if the pull-in force is exceeded!

⚠ **ATTENTION:** The forces acting on a cassette must not exceed the specified retention force! Risk of cassette breakage!

Locking devices are devices that are used to hold workpieces or workpiece carriers (e.g. pallets, see chapter 7.4). Each locking device must be designed for the specific application. The compressed air supply must also be taken into account during the design process (hoses, lines, directly in the device).

The forces to be expected on the clamping system as a whole and on the individual cartridges must be taken into account for designing the locking devices. No system cassette may be (axially and radially) loaded above the pull-in force specified on the data sheet during operation. As soon as a cassette is subjected to a load above the specified pull-in force, all parts must be dismantled, checked and – if necessary – replaced. The system may only be put back into operation once all of the affected parts have been inspected.

Steel or cast iron should preferably be used to make locking devices. See Table **2** for information on the strength classes.

Material	Quality / strength class
Steel	1.1191 (Ck45) / 1.2085 or similar
Cast iron	EN-GJL-300 (GG-30; 0.6030)

Table 2 – Materials for locking devices

7.2 Preparing the locking device

There are corresponding installation drawings for each individual product (item number) for the purpose of preparing the locking devices and assembly plans. The installation drawings show the dimensions of the installation volumes for holding the cassettes.

See the product's data sheet to select the appropriate installation drawing (see chapter 5 for assignment to the product).

7.3 Assembling the cassettes

⚠ **ATTENTION:** In the event of pneumatic supply using deep-hole bores, the material must be tight and free from blowholes and withstand continuous loading! The recommended minimum wall thickness is 3 mm for steel and 5 mm for cast iron.

Affix the cassettes to or inside the locking device once the locking device has been fully prepared.

See the product's data sheet to select the appropriate assembly instructions (see chapter 5 for assignment to the product).

7.4 Specifications for making pallets

Pallets or workpiece carriers must be designed and constructed according to the individual requirements of the machine, the workpieces and the load to be expected during machining.

There is no special material recommendation. Deformation due to workpiece clamping must be avoided.

7.5 Sizing the clamping plug holes in the pallets

⚠ **ATTENTION:** Only original DockLock clamping plugs!

The figure below shows the sizing of the clamping plug holes for fixing the clamping plugs in the pallet. The clamping plugs can also be installed directly in the workpiece. Then, there is no need to use a pallet.

The holes differ according to the clamping plugs' fixing type (fixing thread). The clamping plug can either be screwed in continuously (see Figure **2**, on the left) or screwed into a blind hole (see Figure **2**, on the right).

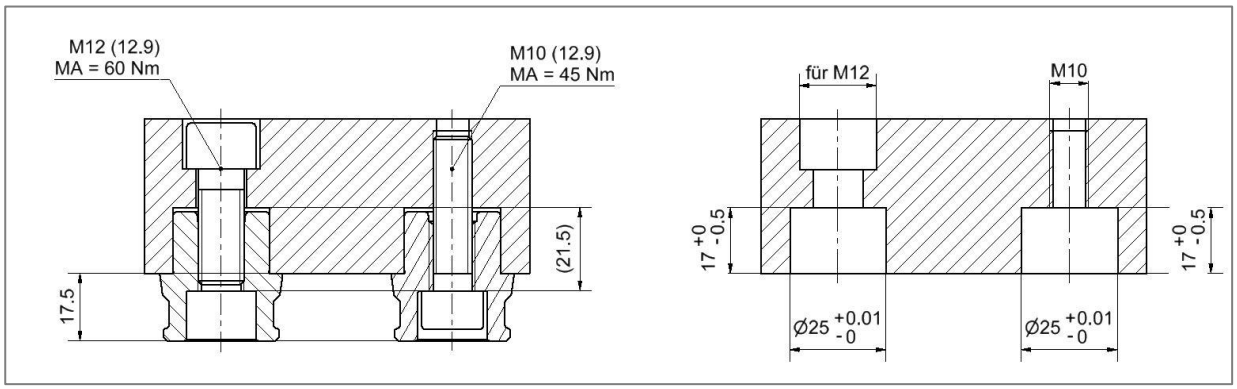


Figure 2 – Clamping plug holes

7.6 Arranging the clamping plug holes in the pallets

⚠ **ATTENTION:** Only use original DockLock clamping plugs!

At least one centring clamping plug is needed to reliably and accurately clamp a pallet or workpiece carrier. This also applies to arrangements with more than one clamping plug. At least two clamping plugs (one centring clamping plug and one compensating clamping plug, see Figure **3**) are needed to secure a workpiece against rotation in all directions.

A distinction is made between three different types of clamping plugs (see Figure **3**). Each type has a special function in the clamping plug arrangement. All three types of clamping plug must therefore be installed in a clamping plug arrangement (pallet, workpiece carrier or directly in the workpiece) with more than two clamping plugs. The clamping plugs without a centring function (see Figure **3**) are used to increase the retention force and are not used for alignment purposes.

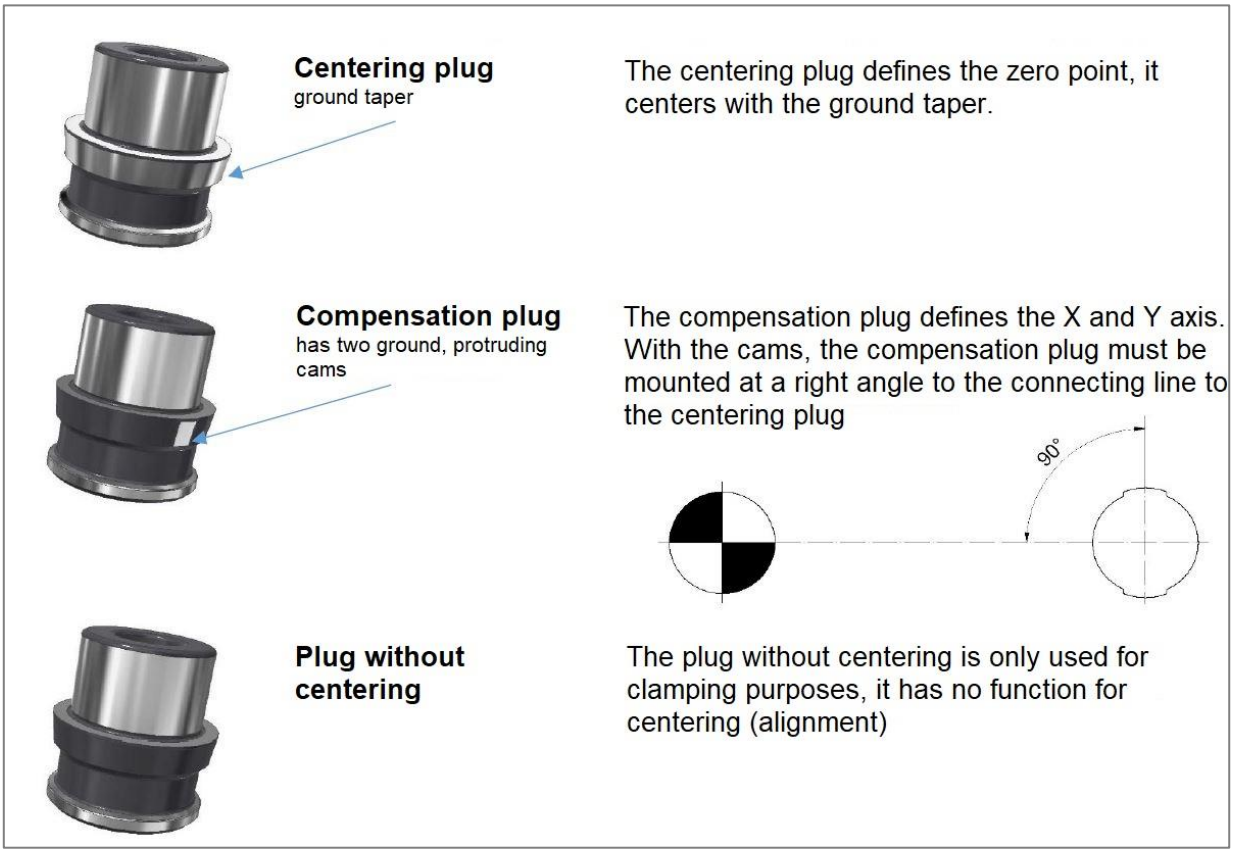


Figure 3 – Types of clamping plugs

The clamping plugs must be distributed as evenly as possible on the pallet or workpiece carrier to minimise the vibrations generated during workpiece machining and to distribute the forces generated during machining as evenly as possible.

The system shown in Figure 4 is recommended when positioning the individual types of clamping plugs.

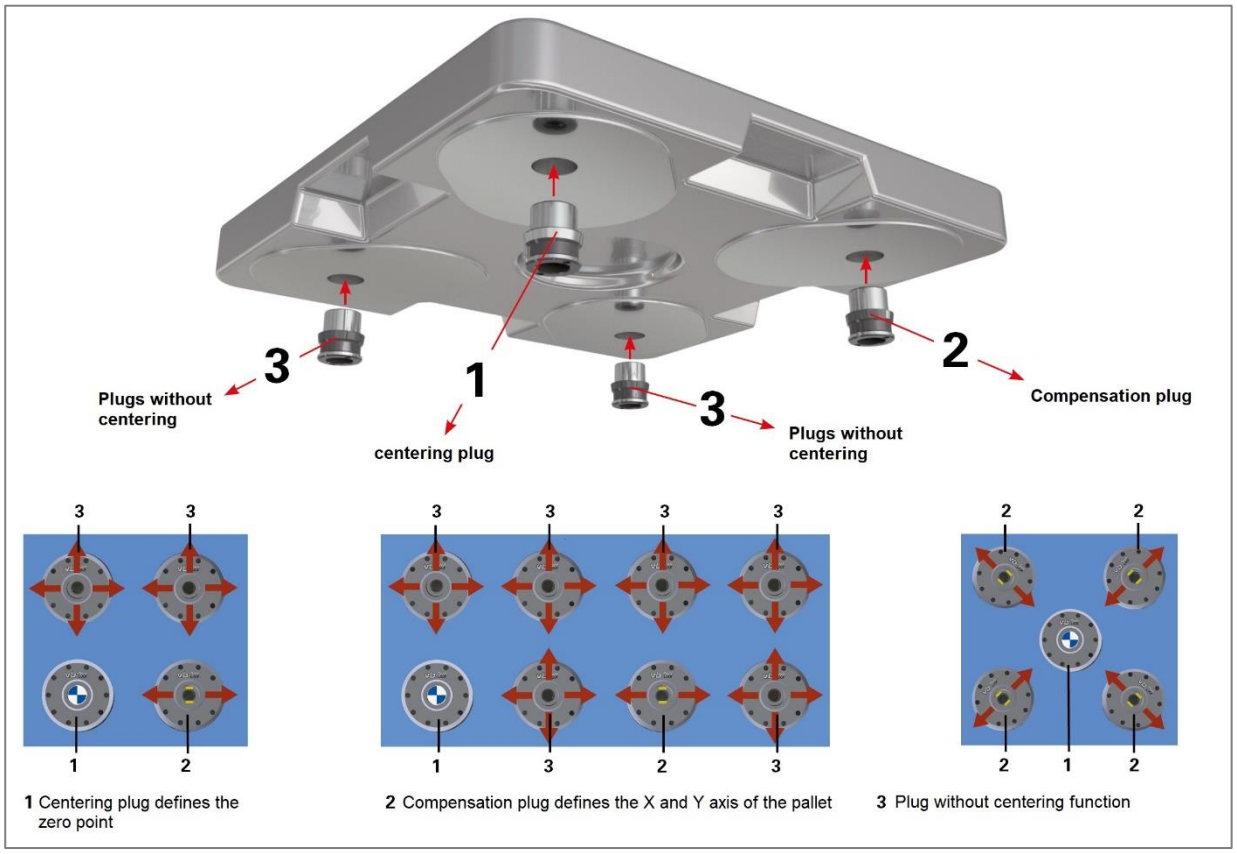
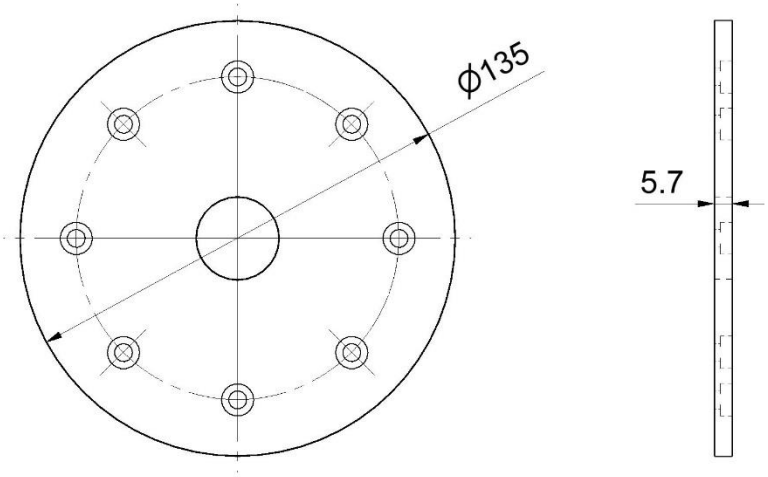


Figure 4 – Recommended clamping plug arrangements

7.7 Support discs

It is recommended to use hardened support discs that are assembled behind the clamping plugs for changing devices for automation cassettes. Support discs are supplied on request.

Support disc item number: **755540**



8 Operating the zero-point clamping system

⚠ **CAUTION:**	Risk of crushing when placing a device!	
⚠ **CAUTION:**	Wear safety boots when installing cassettes and when setting up pallets and locking devices!	
⚠ **ATTENTION:**	Applications may only be carried out according to these instructions or following consultation with HAINBUCH!	
⚠ **ATTENTION:**	HAINBUCH assumes no liability in the event of malfunctioning due to improper assembly, disassembly or operation!	
⚠ **ATTENTION:**	The maximum loading capacity per cassette must not be exceeded!	
⚠ **ATTENTION:**	The minimum / maximum operating pressure (see Figure 1) must not be undercut or exceeded!	

A single operating cycle consists of a clamping operation and a release operation. Refer to the corresponding product data sheet for operation (see chapter 5).

8.1 Clamping process

1. The piston (Fig. 5/2) must be at the lower stop to initiate a clamping process. The pressure medium is introduced through the opening (release system) in the housing above the piston (Fig. 5/2).Airblast of the clamping chamber and airblast of the support isles are activated.
2. The piston (Fig. 5/2), which surrounds the clamping segments (Fig. 5/1), lets them open through the expansion segments.
3. The clamping plug (Fig. 5/4) is mounted in a device, which can now be inserted and must lie flat. As soon as the device is lying flat, airblast of the clamping chamber and airblast of the support isles are deactivated.
4. If the pressure medium is now released, the piston (Fig. 5/2) moves upwards due to the force of the spring assembly (Fig. 5/3). The clamping segments (Fig. 5/1) are placed against the piston (Fig. 5/2) and surround the clamping plug (Fig. 5/4).
5. The pressure medium is introduced through the opening (clamp system - Turbo) in the housing below the piston (Fig. 5/2) to complete the clamping process. This pressure medium can be drained or remain in the system until a new release process. Then the piston position check is queried via the separate connection. The system is clamped correctly if there is no dynamic pressure. The system is not clamped (incorrect clamping) if dynamic pressure is present.
6. The systems support control is carried out via the airblast of the support isles connection. The device is positioned correctly on the clamping system if dynamic pressure is present. The device is missing or is not positioned correctly on the clamping system if dynamic pressure is not present.
7. The clamping process is complete. (System is clamped, support isles airblast equipment shows dynamic pressure, piston position check does not show dynamic pressure)

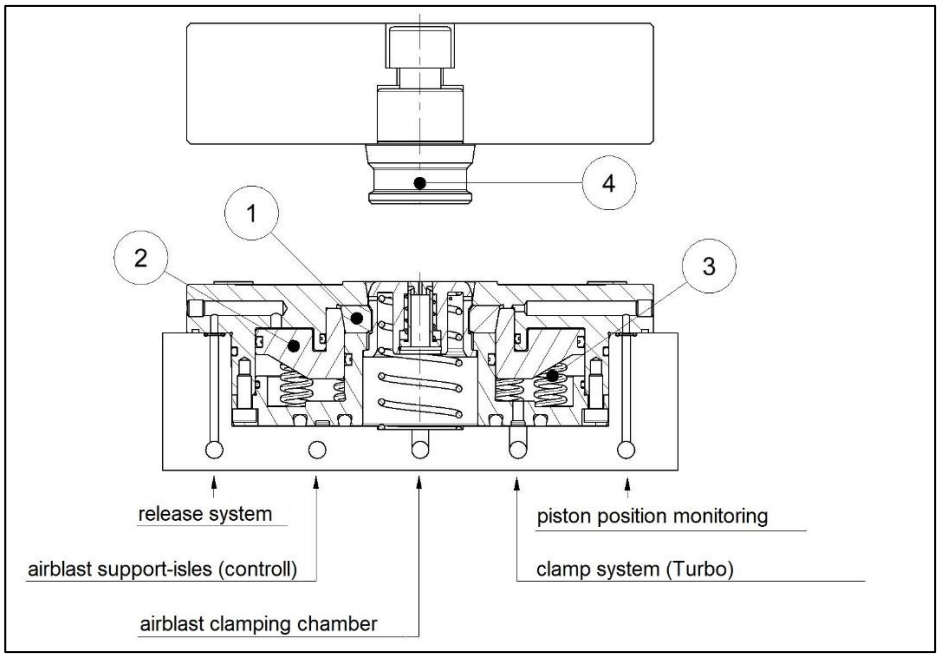


Figure 5 – Sectional view of the clamping / release process

8.2 Release process

1. The pressure medium is introduced through the opening (release system) in the cover above the piston (Fig. 5/2). Airblast of the clamping chamber and airblast of the support isles are activated.
2. The piston (Fig. 5/2), which surrounds the clamping segments (Fig. 5/1), lets them open through the expansion segments.
3. The clamping plug (Fig. 5/4) can now be lifted out of the clamping chamber. The interfaces are pneumatically cleaned by using the airblast connections.
4. The release process is complete.

8.3 Airblast of the cassettes

⚠ **CAUTION:** Wear safety goggles and hearing protection while activated airblast!

⚠ **ATTENTION:** Blowing out the clamping chamber with compressed air can cause the system to malfunction! Only remove swarf with a swarf extractor! Observe the MAIs and the data sheet (see chapter 5)!

⚠ **ATTENTION:** The compressed air for airblast must be filtered and have an oil content of 5 mg/m³ (ISO 8573-1:2010)!

⚠ **ATTENTION:** The residual moisture of the compressed air used must not exceed 5 g/m³!

It is recommended to activate the airblast of the cassettes during each changing cycle.

The cassettes are equipped with airblast equipment. The cassettes need to be blown out to achieve high dimensional accuracy and to maintain the clamping force.

It must be possible to regulate the air volume and airblast pressure separately. The pressure should not exceed 5 bar. Too much air prevents clamping of the pallets.

The following work steps are necessary to activate the airblast of the cassettes:

1. Clamp the cassette so that it can be blown out by the airblast.
2. Switch on the clamping chamber airblast equipment and the support isles airblast equipment
3. Release the cassette
4. Remove the device
5. Insert a new device
6. Switch off the clamping chambers and the support isles airblast equipment
7. Re-clamp the cassettes and query the piston position

8.4 Care and maintenance

⚠ **CAUTION:** Wear safety goggles and hearing protection while activated airblast!

⚠ **ATTENTION:** The compressed air for airblast must be filtered and have an oil content of 5 mg/m³ (ISO 8573-1:2010)!

⚠ **ATTENTION:** The residual moisture of the compressed air used must not exceed 5 g/m³!

Cartridge care and maintenance are carried out in three stages:

- It is recommended to activate the airblast of the cassettes **before each new work step** (see chapter 8.3)
- The cassettes' clamping chamber must be cleaned **regularly** as per the respective maintenance instructions (see data sheet, chapter 5).
- The cassettes' pull-in force must be checked after a **specified number of clamping cycles**. The number of clamping cycles until the pull-in force is checked depends on the product in question. Refer to the corresponding data sheet (see chapter 5). The pull-in force can also be checked by the Customer Service team.

Do not carry out repairs on the products yourself. The manufacturer is responsible for repairing and opening the cassettes. No liability will be accepted for consequential damage as a result of the products being opened without authorisation!

Defective products can be sent directly to HAINBUCH for repair. They must be well packed and wrapped in oiled paper. See the front page for the address. No liability will be accepted for transport damage caused by goods being insufficiently packed!

9 Interrupting production, storage and disposal

The corresponding data sheet (see chapter 5) must be observed when interrupting production and during storage and disposal!

Interrupting production: Cartridges that are not in use must be blown out and cleaned.

Storage: Cartridges can be stored in an oiled condition and wrapped in oiled paper. It is advisable to perform a cyclical, visual status check (monthly) if the cartridges are to be put into storage for an extended period of time.

Disposal: The given legal framework conditions must be observed when disposing of cartridges. The products are mainly made of metal or metal alloys. The rubber seals used must be disposed of separately.

10 Other applicable documents

The following documents are assigned to these assembly and operating instructions:

- The respective product's data sheet (see chapter 5). The corresponding installation drawings (IDs) and the maintenance and assembly instructions (MAIs) are listed in the data sheets.
- EU Declaration of Incorporation
- Current catalogue (workholding booklet)

11 Definitions

Explanations of the terms used in these assembly and operating instructions and on the corresponding data sheet are provided below.

Pull-in force:	Maximum permissible force a cassette may be loaded with axially or radially.
Boundary pull-in force:	Force that a cassette has to retract at as a minimum; the system's clamping springs must be replaced if the force is below this minimum value (maintenance / repair).
Retention force:	Force at which the weakest component begins to fail. Breakage occurs when this force is exceeded for a cassette.
Releasing operating pressure:	The pressure required to operate the system.
Repeat accuracy:	Describes the accuracy achieved when a device is removed from a system, placed back on the system and re-clamped.
Clamping cycles until maintenance:	Number of clamping cycles (cycle = clamping and releasing) at which system maintenance is recommended.
Clamping cycles until the pull-in force is checked:	Number of clamping cycles at which the existing pull-in force is to be checked.
Time until released:	Time needed to release a cassette (depending on line cross-sections, number of cartridges, pump type, etc.)
Pre-centring:	Accuracy with which the clamping devices have to be pre-positioned on the system to ensure insertion of the devices into the systems.
Clamping time:	Describes how long system clamping is maintained. If a system is clamped, it remains clamped until energy is supplied to release it again.