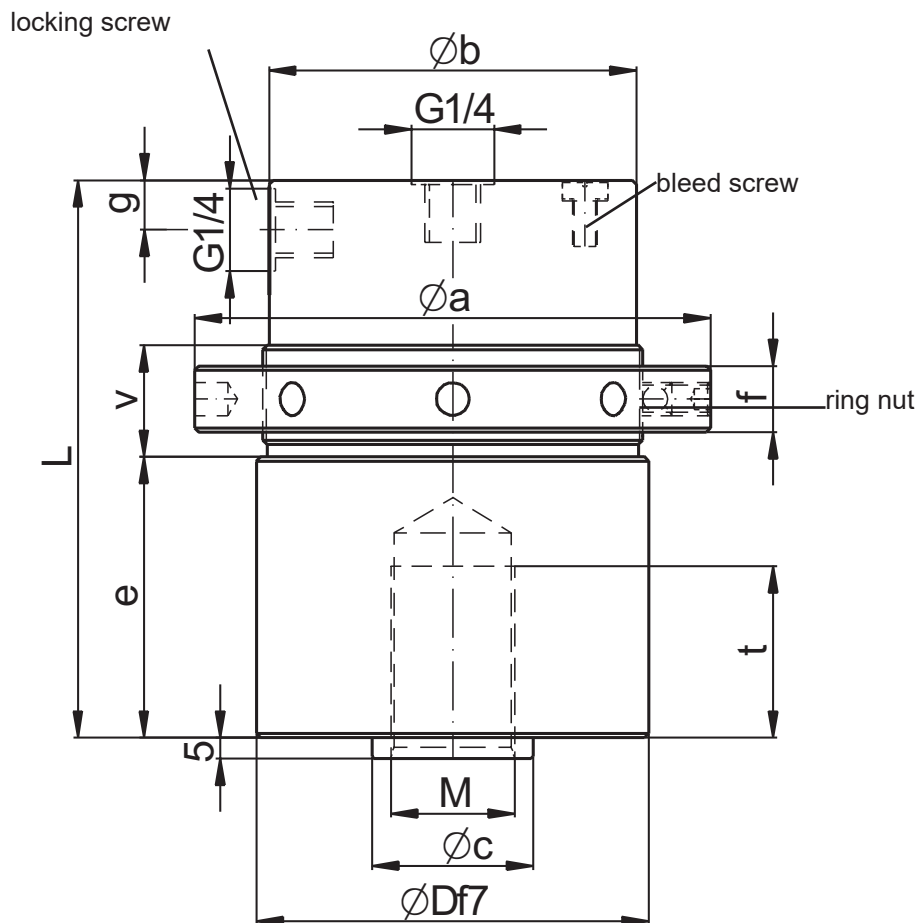




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## 1. Assembly drawing



## 2. Construction and function

### 2.1 Construction

The spring clamping cylinder ESZS consists of a housing with ring nut and an internal thread, as well as a connection for a mechanical hand piston pump or an hydraulic unit. Spring assemblies are arranged inside the cylinder. The hydromechanical clamping system works mechanically-hydraulically interacting. The clamping force is mechanically applied. Hydraulic pressure is only needed for the release stroke of the elements, which releases the tie rod.

The hydromechanical spring clamping cylinders can be used in all cases where sliding or moving parts must be clamped or locked temporarily.

The housing is made of burnished tempered steel, whereby the elements can be used between  $-30^{\circ}\text{C}$  and  $+100^{\circ}\text{C}$ , special versions are available

### 2.2 Function

The clamping force is applied mechanically by a prestressed disc spring assembly. Hydraulic pressure is only needed for the release stroke of the elements, which lifts the tie rod. The traction piston is reciprocally charged by the disc spring assembly or the hydraulic pressure. This means that the spring assembly is compressed with increasing oil pressure, the spring force increases. At set pressure the corresponding nominal clamping force is achieved as a reaction force of the disc spring assembly.

In actual operation cycle, the cylinders are driven either without pressure or with release pressure. The corresponding pressure values are given in tables. A mandrel or tie rod gets screwed into the threaded hole of the pulling piston and secured (one piece part on request, also available with special thread). The pulling piston is secured against rotation by a pin connection to the housing.

### 3. Dimensioning

Main criteria for the selection of a spring clamping cylinder are the required clamping force or gripping power, as well as the required release stroke. **The nominal tension of the spring clamping cylinder is the force that is transmitted at the specified set pressure on the tie rods.**

After the actual clamping process additional loads in form of operating forces (e. g. tool weights, cutting forces, etc.) may occur, which draw on the spring clamping cylinder via the tie rod. **The maximum static load, which must be withstand by the spring clamping cylinder and the tension rod without failure, is therefore higher and can amount up to a multiple of the nominal clamping force.**

On **dynamic processes** (e. g. when clamping press tools, etc.) the **sum of all operating forces should always be smaller than the preload (= nominal clamping force of the cylinder)**, otherwise the clamped parts can ,lift‘ of each other. Indeed, this operation forces are in most cases unknown, which means you should plan sufficiently high safety factors when choosing the clamping cylinder size. The reduction of the nominal clamping forces basically allows an increase of the clamping strokes (s. force-way diagram).

### 4. Checking the screw-in depth

To transfer the clamping force properly, a minimum screw-in depth , $T_{min}$ ‘ of the tie rod into the threaded hole , $G$ ‘ has to be ensured. We recommend a screw-in depth of min. 50% of the thread length , $t$ ‘ of the clamping piston (s. data-sheet).

## 5 Usage

### 5.1 Tightening

Fill cylinder and pipes with low pressure and bleed, because the cylinders are delivered unfilled.

Slowly increase the system pressure to set pressure and hold, now align the cylinder using the ring nuts until the clamping parts rests without play. Then secure the ring nut of the clamping cylinder.

Now drain the system pressure; set release pressure for the required release stroke, control release stroke and readjust if necessary.

### 5.2 Releasing

**To release the traction piston, a higher hydraulic pressure is required, which is proportional to the maximum value of the release stroke. (see data sheet). This means that the set pressure is required only during the initial assembly for exact force adjustment.**

### 5.3 Required tools

Needed is an hydraulic unit which needs to be equipped with a manometer, a pressure relief valve, a switching magnet valve and a pressure switching device.

If an automatic clamping operation isn't necessary, the temporary, manual hydraulic connection to a manual piston pump with pressure gauge is an inexpensive alternative.

**->!!The operation of the clamping cylinder should be carried out exclusively at room temperature!!<-**

## 6. Maintenance

The clamping cylinders type ESZS are basically maintenance-free. Latest after a 5 years period or 100.000 clamping-cycles we recommend to exchange the disc springs and the lip seal.

## **7. Supplements**

### **7.1 Warranty**

The warranty period is 12 months starting with date of delivery when used in the intended one-shift operation, or max. 10,000 tensions. The warranty does not cover damage caused by improper operation. Any warranty claims are determined by repair or intervention, carried out by unauthorized persons and the use of utilities and spare parts, which aren't matching our power clamping nut.

### **7.2 Safety regulations**

Regardless of the instructions listed in this manual, the german statutory safety and accident prevention regulations are valid. Any person who is responsible for the operation, maintenance and repair of the clamping cylinder must have read and understood the operating instructions before commissioning. Repairer of the clamping cylinders are basically responsible for workplace safety. Following all valid safety and regulatory instructions is an requirement to prevent damages to persons and the product during maintenance and repair work. Proper repair of ENEMAC GmbH products assumes accordingly trained staff. The duty of training is up to the operator or repairer. It is to ensure that the operator and future repairer are properly trained for the product

### **7.3 Copy right**

This operating instructions manual is copyrighted property of ENEMAC GmbH. It is only delivered to our customers and users of our products and is supplied with the clamping cylinder. Without our explicit approval these documents mustn't be reproduced nor made available to third persons in particular competitive companies.

### **7.4 Spare Parts**

Only spare parts, which correspond to the requirements specified by ENEMAC GmbH or supplier are allowed. This is always guaranteed with original spare parts. Improper repairs, as well as incorrect spare parts lead to the exclusion of product liability or warranty. When ordering spare parts it is essential to specify type, size and the identification number of the clamping cylinder to avoid incorrect deliveries

### **7.5 Proviso**

We reserve the right for technical changes. Changes, errors and misprints shall not justify any titles of indemnity.