The clamping unit KEC-S or the cylinder with clamping unit DNCKE-S is designated a product or cylinder in these operating instructions.

Installation and commissioning may only be performed in accordance with these instructions by technicians with appropriate qualifications.
English – Cylinder with clamping unit / Clamping unit
DNCKE–...–S / KEC–...–S

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<tr>
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<td>27</td>
</tr>
</tbody>
</table>
Documentation on the product

For all available product documentation ➔ www.festo.com/pk

1 Configuration

**DNCKE-....-S**

1. Compressed air supply port for cylinders next to the adjusting screws for the pneumatic cushioning (only for DNCKE)
2. Compressed air supply port for loosening the clamp
3. Locking screw with hex key (for adjusting sleeve)
4. Piston rod (only DNCKE)

**KEC-....-S**

1. Adjusting sleeve with spanner flat
2. Hollow bolt with thread for mounting
3. Hole with filter element for exhausting the clamping chamber
4. Slots for proximity switch (only DNCKE)
5. Round material for transport protection (only KEC)

Fig. 1
2 Safety

2.1 Use for intended purpose

The clamping unit KEC is intended to serve both as an individual product and integrated into a cylinder DNC (for cylinder with clamping unit DNCKE) for the following usage:

- holding, clamping and to avoid movement of round material
- braking (stopping a movement) for processing or handling procedures in a normal industry environment without substances and ambient conditions that influence the function or materials used

The intended use has been checked by the Institute for Occupational Safety and Health and is documented by a DGUV test certificate.

If used as a braking device, e.g. for interrupting potentially dangerous movements in a danger zone, a regular check is required of the overtravel as a factor of the travel speed and the frequency of the braking procedures (increased wear) as well as of the local operating conditions (min./max. temperature).

2.2 Foreseeable misuse

The clamping unit is not suitable for positioning tasks or for transmitting torques and lateral forces. A self-aligning rod coupler (11 Accessories) can prevent the transmission of lateral forces and bending moments.
2.3 Specified standards

<table>
<thead>
<tr>
<th>Version status</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN ISO 12100:2011-03</td>
</tr>
<tr>
<td>DIN EN ISO 4414:2011-04</td>
</tr>
<tr>
<td>DIN EN ISO 13849-1:2008-12</td>
</tr>
</tbody>
</table>

Tab. 1 Standards specified in the document

2.4 General safety information

WARNING
Risk of injury! Uncontrolled movement. Piston rods can move out suddenly and unexpectedly, thereby causing injury to anybody who is in the positioning range.

- Make sure that nobody can place his/her hand in the positioning range of the payload.
- Make sure that no foreign objects are present in the positioning range of the payload.
- Do not make any modifications to the product. Improper modifications impair the functioning and represent a safety risk.

The operating modes must guarantee that the residual risk is less than/equal to the accepted risk (DIN EN ISO 12100). The measures for risk reduction are to be taken in accordance with DIN EN ISO 4414, DIN EN ISO 12100 and DIN EN ISO 13849-1. Monitor/check the function of the entire system during use in accordance with the measures defined in the validation report (DIN EN ISO 13849-2).

- Take into consideration the applicable legal regulations for the respective destination.
- Only use the product if it is in its original status and in an excellent technical status.
- Use the product only within the defined values (13 Technical data).
- Take into account labelling on the product.
- Observe other applicable documents.
- Take into consideration the ambient conditions at the location of use.
- Protect the product during storage and operation from the following:
  - wetness or moisture
  - corrosive coolant or other materials (e.g. ozone)
  - UV radiation
  - oils, greases and grease-solvent vapours
  - grinding dust
  - glowing chips or sparks
2.5 Mounting and connecting
- Observe tightening torques. Unless otherwise specified, the tolerance is ±20 %.

2.6 Qualification of specialized personnel
Only qualified specialized personnel may perform installation, commissioning, maintenance and disassembly of the clamping unit. The qualified personnel must be familiar with installation and operation of electrical and pneumatic control systems.

3 Function
Pressurizing with compressed air on the supply port \( \text{(Fig. 1)} \) opens the internal clamping component through a pneumatically driven release mechanism. The round material can then move freely.

If the compressed air supply port is exhausted, a spring-loaded mechanism generates the clamping force of the clamping component. The round material is clamped this way.

4 Transport
- Take product weight into account \( \text{(Fig. 13 Technical data)} \).

5 Installation
5.1 Mechanical installation

Prerequisites

Note
Lateral loadings and bending moments on the round material damage the function and destroy the internal clamping component.
- Make sure that the load on the round material is only in the direction of movement. If necessary to avoid lateral forces, use a self-aligning rod coupler \( \text{(Fig. 11 Accessories)} \).

Note
Movement of the round material against the clamping forces creates high wear on the internal clamping element and the round material.
- Make sure that the holding force is never exceeded. Otherwise, unexpected movements may occur.
Make sure that the clamping unit is installed as follows:
- operating elements always accessible
- product fastened free of mechanical stress and bending
- Always fasten the clamping unit on the side opposite the braking direction $r$ (Fig. 5)

Check whether safety measures (e.g. toothed latches or moving bolts) are also required externally (DIN EN ISO 12100 and DIN EN ISO 13849-1).

Select the installation type for the desired application.
Refer to the Festo catalogue for information on other ways of mounting the clamping unit (Fig. 5) and on the required accessories.

### 5.1.1 Mount clamping unit

**Interfaces for mounting components on the cover**

e.g. with foot mounting HNC$^1$
(e.g. with flange mounting FNC$^1$
(only permitted for use as a holding device)
(permitted for use as a holding and braking device – observe braking direction $r$)

---

$^1$ [www.festo.com/catalogue](http://www.festo.com/catalogue)
Dimensions (➔ Catalogue specifications)\(^1\)

Clamping unit KEC

![Clamping unit KEC diagram](image)

Clamping unit (with cylinder) DNCKE

![Clamping unit (with cylinder) DNCKE diagram](image)

1) ➔ www.festo.com/catalogue

Fig. 6

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KEC</td>
<td>16</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>L1(^2)</td>
<td>[mm]</td>
<td>178</td>
<td>208.5</td>
<td>287</td>
</tr>
<tr>
<td>ZJ+ (plus stroke length)</td>
<td>[mm]</td>
<td>277</td>
<td>315</td>
<td>408</td>
</tr>
<tr>
<td>TG</td>
<td>[mm]</td>
<td>38</td>
<td>56.5</td>
<td>89</td>
</tr>
<tr>
<td>E</td>
<td>[mm]</td>
<td>54</td>
<td>80</td>
<td>126</td>
</tr>
<tr>
<td>Screw-in depth</td>
<td>[mm]</td>
<td>9.5 ... 15</td>
<td>12.5 ... 14</td>
<td>14 ... 17</td>
</tr>
<tr>
<td>Screw</td>
<td></td>
<td>M6 (4x)</td>
<td>M8 (4x)</td>
<td>M10 (4x)</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>[Nm]</td>
<td>5</td>
<td>13</td>
<td>30</td>
</tr>
</tbody>
</table>

\(^2\) Dimension depends on how the adjusting screw is set.

Tab. 2

- Place the clamping unit in the intended position.
- Evenly tighten screws (tightening torques ➔ Tab. 2).
5.1.2 Mount attachment components

Mounting on the DNCKE

- Mount the attachment component to the piston rod. The spanner flat on the piston rod serves as a counter holder for the lock nut. If necessary, secure the lock nut with a screw locking agent.

5.1.3 Mounting accessories

If proximity switches are used in the cylinder with clamping unit DNCKE:

- Use proximity sensors from the Festo accessories (www.festo.com/catalogue).
- Place the proximity switches in the slots of the cylinder.
- Tighten the proximity switches in the desired switching positions.

5.2 Pneumatic installation

5.2.1 Prerequisites

- Check whether the following accessories are required:

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check valve</td>
<td>HGL</td>
<td>Slows pressure reduction when compressed air is lost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Redundancy with “stop function”</td>
</tr>
<tr>
<td>Compensation reservoir</td>
<td>VZS</td>
<td>Reduction of pressure fluctuations in the following compressed air string</td>
</tr>
</tbody>
</table>

Tab. 3

- Use a one-way flow control valve type (e.g. GRLZ or GRLA) directly at the respective compressed air supply port.
Activating the cylinder with clamping unit:
- Select the activation for your application.

**Example for clamping unit activation**

2 safety functions are possible:
- SF1: Protection against unexpected start-up of the piston rod (holding function)
- SF2: Stopping a dangerous movement of the piston rod (emergency brake function)

Before the clamping unit is loosened, measures must be taken to prevent the piston rod from taking off suddenly.

![Fig. 9](image)

### 5.2.2 Functional tests

**Functional test when used as a holding device (clamping function)**

The frequency (or test interval) must be determined for a statistical functional test, depending on the application/risk evaluation and the selected category in accordance with DIN EN ISO 13849. In addition, the static functional test, if not required by C-standards or other regulations, must be performed at least once per month and every 100,000 switching cycles.

**Functional test when used as an emergency braking device (emergency brake/emergency stop function)**

In principle, a static functional test and a dynamic braking test are required after every emergency brake (emergency stop).

The frequency (or test interval) must be determined for a “dynamic braking test”, depending on the application/risk evaluation and the selected category in accordance with DIN EN ISO 13849.

In addition, the dynamic braking test, if not required by C-standards or other regulations, must be performed at least once per year. After the dynamic braking test, a static functional test must be performed.

For notes on conducting the static functional test and the dynamic braking test (⇒ 6.4 test of clamping force/overtravel).
5.2.3 Make tubing connection to the clamping unit

In case of use in normal ambient atmosphere (without particles):

- Remove the covers (if any) from the compressed air supply ports.
- Remove dirt particles or foreign matter in the ports and tubing lines.
- Use tubing lines that are as short as possible. This permits short switching times.
- Connect the tubing to the supply ports of the clamping unit and, if applicable, to the supply ports of the cylinder in accordance with DIN EN ISO 4414.

![Fig. 10](image1)

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply port for clamping unit</td>
<td>2</td>
<td>G 1/8</td>
<td>G 1/4</td>
<td>G 3/8</td>
</tr>
<tr>
<td>Compressed air supply port for cylinder (only DNCKE)</td>
<td>1</td>
<td>G 1/4</td>
<td>G 3/8</td>
<td>G 1/2</td>
</tr>
</tbody>
</table>

Tab. 4

If used in fine dusty or misty ambient air to prevent dirt particles from entering the pneumatic system:

- Use a barbed fitting (e.g. QS-CM-M5) instead of the filter nipple in the exhaust channel of the spring interior.
- Guide hose into an area with clean ambient air.

![Fig. 11](image2)
6 Commissioning

**WARNING**
Unexpected movement of components.
Injury due to impacts or pinching.
- Protect positioning range from access (e.g. with protective guards).
- Make sure that no foreign objects are present in the positioning range.

**Note**
- Ensure that:
  - Only qualified specialized personnel makes the settings.
  - The holding force corresponds to the specified values (6.4. Checking clamping force/overtravel).
  - The limit values are not exceeded (13 Technical data).

**Note**
Clamping without round material will destroy the inside clamping component.
- Make sure that the clamping unit KEC is always pressurised if round material is not introduced.
  If the clamping unit KEC is exhausted without round material inserted, the high spring force will deform the inside clamping component until it cannot function.
6.1 Dismantling of the round material (only required for KEC)

1. Pressurize the supply port [2] with at least 3.8 bar.
2. Loosen the locking screw [3] with a hex key wrench.

![Fig. 13]

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEC Width</td>
<td></td>
<td>16</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>across flats</td>
<td>[mm]</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 5


![Fig. 14]

**Note**
If the round material is inserted tilted, it may damage the wiper and the seals.
- A 15°-chamfer at least 3 mm wide at the end of the round material ensures it can be pushed on without a problem (rod quality ➔ 13 Technical data).

![Fig. 15]

5. Push the clamping unit carefully onto the rod of the plug-in product.
6. Adjust the KEC to the new round material ( ➔ Following chapter).
6.2 Adjustment of the clamping unit

Note
Adjustment is not required when the DNCKE is commissioned for the first time.

1. Exhaust the cylinder in a stable position (e.g. if installed vertically, at the lowest point).
2. Pressurize the supply port \( \text{2} \) with at least 3.8 bar.
3. Loosen the locking screw \( \text{3} \) with a hex key wrench.

![Fig. 16]

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>KEC 16</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width across flats for hex key ( \text{1} )</td>
<td>[mm]</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 6

4. Loosen the adjusting sleeve \( \text{5} \) half a turn in an anti-clockwise direction.

![Fig. 17]

5. Turn the adjusting sleeve \( \text{5} \) clockwise until the round material can no longer move.
6. Turn the adjusting sleeve \( \text{5} \) clockwise until the round material just moves freely (approx. 10°...30°).
7. Tighten locking screw \( \text{3} \) again.
The tightening torque is 7 Nm.
8. Exhaust the clamping unit.
The round material is clamped this way.

![Fig. 18]

![Fig. 19]
6.3 Test run

- Comply with limits for all loads.

For setting the speed and pneumatic cushioning:

1. First, completely screw in screws of the upstream one-way flow control valves \( \text{aA} \) and the pneumatic cushioning \( \text{aB} \) at the DNCKE, then unscrew again around one turn.

2. Pressurise the complete system slowly, e.g. with the soft-start valve type HEL.

3. Pressurise the cylinders simultaneously at both supply ports \( \text{1} \) \( \rightarrow \) Fig. 1, only for DNCKE.
   This prevents movement in the direction of the unpressurised cylinder chambers.

4. Pressurise the clamping unit at the supply port \( \text{2} \) \( \rightarrow \) Fig. 1) with at least 3.8 bar.
   The piston rod might already then move slowly into the extended end position.

5. Start a test run at low cycle rate and at low impact speed.

6. Repeat the test run, increasing the speed in steps until the operating speed is reached.
   If the speed is set correctly, the payload (e.g. the moved machine part) will reach the end position without striking hard against it.

7. In the test run, check whether the following equipment settings need to be modified.
   - speed of the payload
   - pneumatic cushioning
   - clamping force

After completing the necessary adjustments:

8. End the test run.
6.4 Checking clamping force/overtravel

**WARNING**
Unexpected movement of components.
Injury due to impacts or pinching.
If the clamping force of the clamping unit is no longer sufficient, the movable parts of the pneumatic components can cause uncontrolled movements.
Uncontrolled movements of the connected actuators can cause personal injury or material damage. Frequent checking of the overtravel will increase wear, depending on how often this is done.

- Perform a check of the overtravel only if the product is used as a brake.
  The overtravel is dependent on the load and the environmental conditions: temperature, oil on the piston rod, number of switching cycles, speed, mass, operating pressure and control (diagrams 14 Characteristic curves).
- The overtravel check in a dynamic brake test must be performed beginning with the maximum possible speed in the application (the maximum permissible travel speed must not be exceeded).
- The clamping force is checked from the rest position.
The specified test examples correspond to the maximum applications. Deviating applications (sloping mounting position) cannot be represented. The specific application might have to be calculated and tested separately.

**WARNING**
Unexpected movement of components.
Injury due to impacts or pinching.

- Make sure that there is an equilibrium of forces on the piston of the drive cylinder. Especially when the device is mounted vertically, there is a danger of the piston rod extending suddenly when it is loosened due to the axial force (weight force).

**Note**

- Observe the following points:
  - The test force (test pressure) must at least equal the force (pressure) in the application or must be specified in the risk assessment of the application.
  - The test force must not be greater than the maximum static holding force (13 Technical data).
  - The overtravel in the dynamic brake test must be less than the tolerable overtravel from the application/risk assessment.
  - The piston rod must not slip through during the test over a period of 60 s. Remedy in case of slipping: Readjust the clamping unit (6.2 Adjustment of the clamping unit).
Horizontal mounting position

Case 1: without additional weight force:

![Diagram](image)

Fig. 21

<table>
<thead>
<tr>
<th>Size</th>
<th>KEC</th>
<th>16</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test force $F_p$</td>
<td>[N]</td>
<td>1300</td>
<td>3200</td>
<td>8000</td>
</tr>
</tbody>
</table>

Tab. 7

**Static functional test**

Place the piston rod in the retracted end position.

Exhaust port ([2](#) Fig. 1).

The clamp is active.

Pressurise cylinder chamber of the DNCKE in the advancing direction with $P = 10$ bar while simultaneously exhausting the cylinder chamber in the returning direction.

That corresponds to the following test force (for testing with KEC [Tab. 7]).

- The movement begins (danger of crushing).
- The max. permissible travel speed must not be exceeded.

Pressurise cylinder chamber of the DNCKE in the advancing direction with $P = 10$ bar while simultaneously exhausting the cylinder chamber in the returning direction.

Test force for testing with KEC [Tab. 7].

Exhaust port ([2](#) Fig. 1).

- Braking begins.
- The cylinder stops.

Determine path from the exhaust start signal until the cylinder is at rest.

- This path equals the overtravel.

Apply the test force (test pressure) for 60 seconds. During this time, the piston must not move further.

Tab. 8
Vertical mounting position

Case 2: Test with additional weight force suspended:

- Calculate the required test pressure $P_A$ using the following equation:

$$P_A = \frac{(F_P - m \times g)}{A} \times 10$$

- $P_A$ = test pressure [bar]
- $F_P$ = test force [N]
- $m$ = effective load [kg]
- $g$ = acceleration due to gravity [9.81 m/s$^2$]
- $A$ = piston surface area [sq. mm]

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE 40</th>
<th>DNCKE 63</th>
<th>DNCKE 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test force $F_P$</td>
<td>[N]</td>
<td>1300</td>
<td>3200</td>
</tr>
<tr>
<td>Piston area $A$ Extending direction</td>
<td>[sq. mm]</td>
<td>1257</td>
<td>3117</td>
</tr>
</tbody>
</table>

Tab. 9

<table>
<thead>
<tr>
<th>Static functional test</th>
<th>Dynamic brake test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place the piston rod in the retracted end position.</td>
<td>Pressurise cylinder chamber of the DNCKE in the advancing direction with test pressure $P_A$ (Tab. 9) while simultaneously exhausting the cylinder chamber in the returning direction.</td>
</tr>
<tr>
<td>Exhaust port (Fig. 1). The clamp is active.</td>
<td>- The movement begins (danger of crushing).</td>
</tr>
<tr>
<td>Pressurise cylinder chamber of the DNCKE in the advancing direction with test pressure $P_A$ (Tab. 9) while simultaneously exhausting the cylinder chamber in the returning direction.</td>
<td>- The max. permissible travel speed must not be exceeded.</td>
</tr>
<tr>
<td>Exhaust port (Fig. 1).</td>
<td>- Braking begins.</td>
</tr>
<tr>
<td></td>
<td>- The cylinder stops.</td>
</tr>
<tr>
<td>Determine path from the exhaust start signal until the cylinder is at rest.</td>
<td>- This path equals the overtravel.</td>
</tr>
<tr>
<td>Apply the test force (test pressure) for 60 seconds. During this time, the piston must not move further.</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 10
Case 3: Test with additional weight force upright:

![Fig. 23](image)

- Calculate the required test pressure $P_A$ using the following equation:

$$P_A = \frac{(F_P - m \times g)}{A} \times 10$$

- Test pressure [bar]
- Test force [N]
- Effective load [kg]
- Acceleration due to gravity [9.81 m/s$^2$]
- Piston surface area [sq. mm]

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE 40</th>
<th>DNCKE 63</th>
<th>DNCKE 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test force $F_P$ [N]</td>
<td>1300</td>
<td>3200</td>
<td>8000</td>
</tr>
<tr>
<td>Piston area $A$ [sq. mm]</td>
<td>1055</td>
<td>2803</td>
<td>7363</td>
</tr>
</tbody>
</table>

1) The test pressure $P_A$ must not exceed 10 bar (Technical data).

Even with a calculation result of $P_A > 10$ bar, only the maximum test pressure of 10 bar may be applied.

Tab. 11

### Static functional test

<table>
<thead>
<tr>
<th>Place the piston rod in the advanced end position.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exhaust port (2) Fig. 1.</strong> The clamp is active.</td>
</tr>
</tbody>
</table>

### Dynamic brake test

<table>
<thead>
<tr>
<th>Pressurise cylinder chamber of the DNCKE in the returning direction with test pressure $P_A$ (Tab. 11) while simultaneously exhausting the cylinder chamber in the advancing direction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The movement begins (danger of crushing).</td>
</tr>
<tr>
<td>The max. permissible travel speed must not be exceeded.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressurise cylinder chamber of the DNCKE in the returning direction with test pressure $P_A$ (Tab. 11) while simultaneously exhausting the cylinder chamber in the advancing direction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust port (2) Fig. 1.</td>
</tr>
<tr>
<td>Braking begins</td>
</tr>
<tr>
<td>The cylinder stops.</td>
</tr>
</tbody>
</table>

Determine path from the exhaust start signal until the cylinder is at rest.

- This path equals the overtravel.

**The test force (test pressure) should last 60 s. During this time, the piston must not move further.**

Tab. 12
7 Operation

Before loosening the clamping

**WARNING**
Unexpected movement of components.
Injury due to impacts or pinching.
- Make sure that there is an equilibrium of forces on the piston of the drive cylinder.
  Especially when the device is mounted vertically, there is a danger of the piston rod extending suddenly when it is loosened due to the axial force (weight force).

After an emergency stop and after each adjustment, consider:

**Note**
The further operational reliability of the clamping unit may be impaired, depending on the brake loading.
- Check clamping unit for safe function (6.4 Check of the overtravel):
  - after every emergency stop
  - after every adjustment
  - at least once per month

If the clamping unit does not clamp the payload securely:
- Readjust the clamping unit (6.2 Adjustment of the clamping unit).

If there are modifications to the payload or operating pressure:

**Note**
Payloads that have been increased subsequently and modified operating pressure change the clamping conditions and might impair operational reliability.
- Observe that the maximum loadings do not exceed the permitted limits (13 Technical data).

If the clamping unit does not clamp the payload securely:
- Readjust the clamping unit (6.2 Adjustment of the clamping unit).

If the product is used as a braking device:

**Note**
Frequent use of the product as a brake will increase wear depending on how often this is done.
- Therefore, check the overtravel regularly (in accordance with the specifications in the chapter “Validating by checking” in the validation report as per EN 13849-2).
The overtravel is dependent on the load and the environmental conditions: temperature, oil on the piston rod, number of switching cycles, speed, mass, operating pressure and control (diagrams 14 Characteristic curves).
Note
A permanently pressurised clamping unit can jeopardize the operational reliability.
- Exhaust the clamping unit at least once per day.

7.1 Adjustment of the clamping unit

- Adjust the clamping unit regularly or when there are signs of wear:

<table>
<thead>
<tr>
<th>Test procedure</th>
<th>Clamping unit as holding device</th>
<th>Clamping unit as braking device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of wear</td>
<td>- Loud noises</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Clamping unit cannot hold the payload securely.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Holding force is not achieved (slippage).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If properly set, the payload should always maintain the clamping position and reach the end positions without knocking hard against them.</td>
<td></td>
</tr>
<tr>
<td>Test cycle</td>
<td>Every 100,000 clampings and at least once per month</td>
<td>The testing and adjusting cycle depends on the specifications of the application and must be determined by the machine manufacturer within the framework of the validation report.</td>
</tr>
<tr>
<td>Adjusting cycle</td>
<td>Every 500,000 clampings or when there are signs of wear</td>
<td></td>
</tr>
<tr>
<td>Adjusting procedure</td>
<td>➤ 6.2 Adjustment of the clamping unit</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 13

- In the following cases, check to see if more frequent tests are required:
  - high thermal load
  - large accumulation of dirt
  - when there are fat solvent fluids or fumes in the vicinity

- Avoid contamination of the round material or exhaust port (7 ➤ Fig. 1).
  Only in this way can you be sure that functioning is not impaired.
8 Maintenance and care

WARNING
Unexpected movement of components.
Injury due to impacts or pinching.
• When working on the clamping unit, switch off the controller and secure it against
being switched back on unintentionally.

• Clean the clamping unit as required with a soft cloth. Do not use aggressive cleaning agents.
• The clamping unit is lubricated for life. Additional lubrication is not necessary.

9 Disassembly and repair

WARNING
Unexpected movement of components.
Injury due to impacts or pinching.
• Secure payload and verify load-free status before dismantling.
• When working on the clamping unit, exhaust it beforehand.
• Observe notes on transport (☞ 4 Transport).

WARNING
Parts flying through the air!
Injury due to impacts or pinching.
Pre-stressed springs may be ejected suddenly during dismantling. Sudden release of
internal spring forces (e.g. when dismantling the housing cover) may cause injury.
• Do not dismantle clamping unit.

If repairs are required:
• Send clamping unit to Festo or contact Festo service (☞ www.festo.com).
Information about spare parts and auxiliary means (☞ www.festo.com/spareparts).

10 Disposal

• Dispose of packaging and clamping unit at the end of its useful life through environmentally friendly
recycling in accordance with applicable regulations.

11 Accessories

☞ www.festo.com/catalogue
## 12 Fault clearance

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping unit does not open.</td>
<td>Clamping unit leaky</td>
<td>Send clamping unit to Festo with description of fault.</td>
</tr>
<tr>
<td></td>
<td>Insufficient operating pressure</td>
<td>Increase operating pressure to maximum permitted value.</td>
</tr>
<tr>
<td></td>
<td>Clamping unit not correctly adjusted</td>
<td>Readjust round material (6.2 Adjustment of the clamping unit).</td>
</tr>
<tr>
<td>Hard knocking in cylinder end position</td>
<td>Speed too high</td>
<td>Reduce the impact speed.</td>
</tr>
<tr>
<td></td>
<td>Cushioning not sufficient</td>
<td>Increase cushioning or use additional external cushioning components.</td>
</tr>
<tr>
<td></td>
<td>Payload too great</td>
<td>Reduce payload.</td>
</tr>
<tr>
<td>Round material slips through.</td>
<td>Payload too great</td>
<td>Select lower speed.</td>
</tr>
<tr>
<td></td>
<td>Speed too high</td>
<td>Brake additionally with power valves.</td>
</tr>
<tr>
<td></td>
<td>Operating pressure on cylinder too high</td>
<td>Reduce operating pressure.</td>
</tr>
<tr>
<td></td>
<td>Round material contaminated</td>
<td>Clean the round material with a soft cloth and protect from dirt.</td>
</tr>
<tr>
<td></td>
<td>Round material does not meet the quality requirements</td>
<td>Comply with specifications for the quality of the round material (13 Technical data).</td>
</tr>
<tr>
<td></td>
<td>Clamping unit not correctly adjusted or worn</td>
<td>Readjust round material (6.2 Adjustment of the clamping unit).</td>
</tr>
<tr>
<td></td>
<td>Clamping component worn or clamping mechanism defective</td>
<td>Replace clamping unit or send it to Festo with description of fault.</td>
</tr>
<tr>
<td>Malfunctions in position scanning at the DNCKE</td>
<td>Position of proximity sensors incorrect</td>
<td>Correct position of proximity sensors.</td>
</tr>
<tr>
<td></td>
<td>Incorrect type of proximity sensor used</td>
<td>Only use suitable proximity sensors (<a href="http://www.festo.com/catalogue">www.festo.com/catalogue</a>).</td>
</tr>
<tr>
<td></td>
<td>Proximity sensor defective</td>
<td>Replace proximity sensor.</td>
</tr>
<tr>
<td></td>
<td>Ferrite components in the vicinity of the proximity sensor.</td>
<td>Use components made of non-magnetic materials.</td>
</tr>
</tbody>
</table>

Tab. 14
## 13 Technical data

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>KEC</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting position</td>
<td></td>
<td>any</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamping unit</td>
<td>[bar]</td>
<td>3.8 ... 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder</td>
<td>DNCKE</td>
<td>[bar]</td>
<td>0.6 ... 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. test pressure</td>
<td>DNCKE</td>
<td>[bar]</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round material</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diameter [mm]</td>
<td></td>
<td>16 [h7 .. f7]</td>
<td>20 [h7 .. f7]</td>
<td>25 [h7 .. f7]</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td>Hardened (min. HRC 60) or hard chrome-plated (thickness of layer min. 20 μm)</td>
<td>Surface roughness Rt less than 4 μm</td>
<td>3 mm wide 15° chamfer on the end of the round material</td>
<td></td>
</tr>
<tr>
<td>Static and dynamic holding force [N]</td>
<td></td>
<td>1300</td>
<td>3200</td>
<td>8000</td>
<td></td>
</tr>
<tr>
<td>Theoretical force DNCKE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advance at 6 bar [N]</td>
<td></td>
<td>754</td>
<td>1870</td>
<td>4712</td>
<td></td>
</tr>
<tr>
<td>Return at 6 bar [N]</td>
<td></td>
<td>633</td>
<td>1682</td>
<td>4418</td>
<td></td>
</tr>
<tr>
<td>Advance at max. test pressure [N]</td>
<td></td>
<td>1257</td>
<td>3117</td>
<td>7854</td>
<td></td>
</tr>
<tr>
<td>Return at max. test pressure [N]</td>
<td></td>
<td>1055</td>
<td>2803</td>
<td>7363</td>
<td></td>
</tr>
<tr>
<td>Max. permissible travel speed [m/s]</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature [°C]</td>
<td></td>
<td>−10 ... +60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature [°C]</td>
<td></td>
<td>−20 ... +80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration and shock (without payload)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration in accordance with IEC 60068 part 2-6</td>
<td></td>
<td>± 3.5 mm deflection at 2-8 Hz</td>
<td>10 m/s² acceleration at 8-27 Hz</td>
<td>± 0.35 mm deflection at 27-60 Hz</td>
<td>50 m/s² acceleration at 60-160 Hz</td>
</tr>
<tr>
<td>Shock in accordance with IEC 60068 part 2-27</td>
<td></td>
<td>± 300 m/s² acceleration with 11 ms duration</td>
<td>5 shocks per direction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous shock in accordance with IEC 60068 part 2-29</td>
<td></td>
<td>± 150 m/s² acceleration at 6 ms duration</td>
<td>1000 shocks per direction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tab. 15

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>KEC</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KEC</td>
<td></td>
<td>16</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Materials

<table>
<thead>
<tr>
<th></th>
<th>DNCKE</th>
<th>KEC</th>
<th>Aluminium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing, cover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston rod</td>
<td>DNCKE</td>
<td></td>
<td>Steel (hard chrome-plated)</td>
</tr>
<tr>
<td>Tie rods, collar nuts</td>
<td></td>
<td></td>
<td>Steel</td>
</tr>
<tr>
<td>Seals</td>
<td></td>
<td></td>
<td>TPE-U, NBR</td>
</tr>
</tbody>
</table>

Weight

<table>
<thead>
<tr>
<th></th>
<th>DNCKE</th>
<th>KEC</th>
<th>[kg]</th>
<th>[kg]</th>
<th>[kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic weight</td>
<td></td>
<td></td>
<td>2.3</td>
<td>5.5</td>
<td>18.2</td>
</tr>
<tr>
<td>Basic weight</td>
<td></td>
<td></td>
<td>1.9</td>
<td>4.5</td>
<td>16.8</td>
</tr>
<tr>
<td>per 10 mm stroke</td>
<td>0.045</td>
<td>0.073</td>
<td>0.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14 Characteristic curves

Note

For illustration, the following diagrams show overtravel in terms of various parameters. The overtravel determined in a customer application can deviate from the examples depicted here. Additional information (7 Operation).

Overtravel s [mm] with exhausted clamping unit until standstill with vertical mounting position as a factor of the speed v [m/s] at 6 bar

Fig. 24

Festo – DNCKE-...–S / KEC-...–S – 2017-10c English 27
Overtravel $s$ [mm] with exhausted clamping unit until standstill with vertical mounting position as a factor of the speed $v$ [m/s] at 6 bar.

**Fig. 25**
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