Cylinder with clamping unit / Clamping unit

DNCKE/KEC

FESTO

en Operating instructions

8074345
2017-10b
[8074347]
The clamping unit KEC or the cylinder with clamping unit DNCKE 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.
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1 Configuration

DNCKE

1. Compressed air supply port for cylinders next to the adjusting screws for the pneumatic cushioning (only for DNCKE)
2. Supply port for releasing the clamp
3. Locking screw with internal hexagon socket (for adjusting sleeve)
4. Piston rod (only DNCKE)

KEC

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

Fig. 1
2 Safety

2.1 Intended use

The clamping unit KEC is intended to serve both as an individual product and integrated into a DNC cylinder (for cylinders with clamping unit DNCKE) for holding, clamping and inhibiting the movement of round material.

2.2 Foreseeable misuse

The clamping unit is not intended as a brake. Use as a braking device (dynamic applications) does not conform with the intended use.

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 General safety information

**WARNING**
Risk of injury! Uncontrolled movement. Piston rods can advance suddenly and unexpec-
tedly, 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 modify the product in any way. Improper modifications impair its function and present a safety risk.

- Observe legal regulations applicable to the destination.
- Only use the product if it is in its original status and in perfect working order.
- Use the product only within the defined values (13 Technical data).
- Observe product labelling.
- Observe 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

2.4 Mounting and connecting

- Observe tightening torques. Unless otherwise specified, the tolerance is ±20 %.

2.5 Qualification of specialized personnel

Only qualified specialized personnel may install, commission, service or disassemble the clamping unit. The specialized personnel must be familiar with the installation and operation of electrical and pneu-
matic control systems.
3 Function

Pressurising with compressed air on the supply port 2 (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. That way, the round material is clamped.

4 Transport

- Take product weight into account (13 Technical data).

5 Installation

5.1 Mechanical installation

Prerequisites

Note
Lateral loads and bending moments exerted on the round material damage its function and destroy the internal clamping component.
- Make sure that the loads are only exerted on the round material in the direction of movement. The use of a self-aligning rod coupler (11 Accessories) prevents lateral forces.

Note
Movement of the round material against the clamping forces leads to heavy wear on the internal clamping element and the round material.
- Make sure that the holding force is never exceeded. Otherwise, unexpected movement may occur.

- Make sure that the clamping unit is installed as follows:
  - Operating elements always accessible
  - Product fixed in such a way that it is free from mechanical stress or bending
- Check if additional external safety measures (e.g. pawls or moveable bolts) are required.
- Select the installation type for the desired application.
  Refer to the Festo catalogue for more mounting alternatives (Fig. 5) and required accessories.
5.1.1 Mounting the clamping unit

Interfaces for mounting components on the cover (examples)

with foot mounting HNC\(^1\)    with flange mounting FNC\(^1\)    with swivel mounting SNC\(^1\)

\(^1\) [www.festo.com/catalogue](http://www.festo.com/catalogue)

Fig. 5
### Dimensions (➔ Catalogue specifications)\(^1\)

Clamping unit KEC

![Clamping unit KEC](image1)

Clamping unit (with cylinder) DNCKE

![Clamping unit DNCKE](image2)

1) ➔ [www.festo.com/catalogue](http://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 varies depending on setting of the adjusting screw.

Tab. 1

- Place the clamping unit in the intended position.
- Tighten screws evenly (tightening torques ➔ Tab. 1).

#### 5.1.2 Mounting attachments

**Mounting on the DNCKE**

- Mount the attachment component on the piston rod.

  The spanner flat 10 on the piston rod serves as a counter holder for the lock nut. If necessary, secure the lock nut with a screw locking agent.

![Mounting on the DNCKE](image3)
5.1.3 **Mounting accessories**

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

- Use Festo accessory proximity sensors
  ([www.festo.com/catalogue](http://www.festo.com/catalogue)).
- Place the proximity switches in the slots of the cylinder.
- Fix the proximity sensors to the desired switching positions.

![Fig. 8](image)

5.2 **Pneumatic installation**

5.2.1 **Prerequisites**

- Check if the following accessories are required:

<table>
<thead>
<tr>
<th>Designation</th>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-return valve</td>
<td>HGL</td>
<td>slow pressure reduction with loss of compressed air</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 line</td>
</tr>
</tbody>
</table>

Tab. 2

- Use a one-way flow control valve type (e.g. GRLZ or GRLA) directly in the relevant supply port.

For activating the cylinder with clamping unit:

- Select a suitable activation type for your specific application.

**Example for clamping unit activation**

Before the clamping unit is released, measures must be taken to prevent the piston rod from advancing suddenly.

![Fig. 9](image)
5.2.2 Functional tests

Functional test when used as a holding device (clamping function)
The frequency (or testing interval) of functional tests is to be determined dependent on the application / risk evaluation. At least once or month or every 100,000 switching cycles unless C-type standards or other regulations require more.
Instructions for performing the structural test (⇒ 6.4 Clamping force test).

5.2.3 Creating a tubing connection to the clamping unit

In case of use in normal ambient atmosphere (without particles):
- Remove covers (if present) from the compressed air supply ports.
- Remove dirt particles and foreign matter from the ports and tubing lines.
- Use the shortest suitable tubing lines. This will reduce switching times.
- Create tubing connections between the supply ports of the clamping unit [2] and those of the cylinder [1].

![Fig. 10]

<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>Supply port for cylinder (DNCKE only)</td>
<td>1</td>
<td>G 1/4</td>
<td>G 3/8</td>
<td>G 1/2</td>
</tr>
</tbody>
</table>

Tab. 3

To prevent dirt particles from entering the pneumatic system when used in ambient air with fine particulate matter or fine mist:
- Use a barbed fitting (e.g. QS-CM-M5) instead of the filter nipple in the exhaust channel [7] of the spring interior.
- Run hose into an area with clean ambient atmosphere.

![Fig. 11]
6 Commissioning

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

Note
• Ensure that:
  – Adjustment is only performed by qualified specialized personnel.
  – The holding force corresponds to the specified values
    (6.4 Clamping force test).
  – The limit values are not exceeded (13 Technical data).

Note
Clamping without round material will destroy the internal clamping component.
• Make sure that the clamping unit KEC is always pressurised when the round material is not inserted.
If the clamping unit KEC is exhausted without round material inserted, the high spring force will deform the internal clamping component until it cannot function.
6.1 Dismounting the round material (only required for KEC)

1. Pressurise the supply port \( \#2 \) with at least 3.8 bar.
2. Loosen the locking screw \( \#3 \) using an Allen key.

![Fig. 13](image)

<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>Spanner size for internal hexagon socket ( #3 ) ( \text{[mm]} )</td>
<td></td>
<td></td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 4

3. Unscrew the adjusting sleeve \( \#5 \) half a turn in an anti-clockwise direction
4. Pull supplied round material \( \#9 \) out completely.

![Fig. 14](image)

**Note**

If the round material is inserted in a tilted way, the scraper and seals might be damaged.
- A 15° chamfer at least 3 mm wide at the end of the round material ensures it can be slid on easily (workpiece quality \( \rightarrow 13 \) Technical data).

![Fig. 15](image)

5. Slide the clamping unit onto the rod of the attachment product carefully.
6. Adjust the KEC to the new round material (\( \rightarrow \) Following chapter).
6.2 Adjustment of the clamping unit

**Note**
Adjusting is not required for initial start-up of DNCKE.

1. Exhaust the cylinder in a stable position (e.g. if installed vertically, at the lowest point).
2. Pressurise the supply port \( \textcolor{red}{2} \) with at least 3.8 bar.
3. Loosen the locking screw \( \textcolor{red}{3} \) using an Allen key.

![Fig. 16](image1)

### Size

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

Spanner size for internal hexagon socket \( \textcolor{blue}{1} \) [mm] 6 8

Tab. 5

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

![Fig. 17](image2)

5. Turn the adjusting sleeve \( \textcolor{red}{5} \) clockwise until the round material can no longer move.
6. Turn the adjusting sleeve \( \textcolor{red}{5} \) clockwise until the round material is just free to move (approx. 10–30°).
7. Tighten locking screw \( \textcolor{red}{3} \).
The tightening torque is 7 Nm.
8. Exhaust the clamping unit.
That way, the round material is clamped.

![Fig. 18](image3)

![Fig. 19](image4)
6.3 Test run

- Comply with limits for all loads.

For setting the speed and pneumatic cushioning:

1. First, screw in the screws of the upstream one-way flow control valves and the pneumatic cushioning on the DNCKE, then loosen by about 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 (Fig. 1, only for DNCKE).
   This prevents movement in the direction of the unpressurised cylinder chamber.
4. Pressurise the clamping unit at the supply port (Fig. 1) with a minimum of 3.8 bar.
   This might be enough for the piston rod to move slowly into the advanced end position.
5. Start a test run at a low cycle rate and low impact speed.
6. Repeat the test run increasing speed incrementally until reaching operating speed.
   If set correctly, the payload (e.g. the moved machine part) should reach the end position without stopping hard.
7. In the test run, check if the following equipment settings need to be modified:
   - speed of the payload
   - pneumatic cushioning
   - clamping force

After completing the required adjustments:
8. End the test run.

6.4 Clamping force test

**WARNING**

Unexpected movement of components.
Injury due to impacts or pinching.
If the clamping unit’s holding force is no longer sufficient, moving parts of the pneumatic components might move in an uncontrolled way.
Uncontrolled movements of the connected actuators can cause personal injury or material damage.

- The clamping force is checked in the resting position.

The specified test examples correspond to cases of application with the maximum amount of stress. Deviating applications (slanted mounting position) cannot be represented. It may be necessary to make calculations for a specific application and carry out a specific test for that.
**WARNING**
Unexpected movement of components.
Injury due to impact or pinching.

- Make sure that there is a balance of forces acting on the operating cylinder's piston. There is a danger of the piston rod advancing suddenly when it is loosened due to axial force (weight force) applied, especially with vertical installation.

**Note**
Observe the following points:
- The test force (test pressure) must equal at least the force (pressure) acting in the application or be specified in the application's risk evaluation.
- The test force must not be greater than the maximum static holding force (13 Technical data).
- The piston rod must not slip through during a testing 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:

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

Tab. 6

**Static functional test**
Place the piston rod in the returned end position.

Exhaust port (2 Fig. 1). The clamp is active.

Pressurise cylinder chamber of the DNCKE in the advancing direction at $P = 10$ bar while simultaneously exhausting the cylinder chamber in the returning direction. Test force for testing with KEC Tab. 6.

The test force (test pressure) should be acting for 60 s. During this time, the piston should not move any further.

Tab. 7
Vertical mounting position

Case 2: Test with additional suspended weight force:

![Diagram]

Fig. 22

- Calculate the required test pressure \( P_A \) using the following equation:

\[
P_A = \left( \frac{F_p - m \times g}{A} \right) \times 10
\]

- \( P_A \) = test pressure [bar]
- \( F_p \) = test force [N]
- \( m \) = payload [kg]
- \( g \) = acceleration due to gravity [9.81 m/s\(^2\)]
- \( A \) = piston area [mm\(^2\)]

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test force ( F_p ) [N]</td>
<td></td>
<td>1300</td>
<td>3200</td>
<td>8000</td>
</tr>
<tr>
<td>Piston area ( A ) [mm(^2)]</td>
<td>Advancing direction</td>
<td>1257</td>
<td>3117</td>
<td>7854</td>
</tr>
</tbody>
</table>

Tab. 8

Static functional test

Place the piston rod in the returned end position.

Exhaust port (\( 2 \) \( \Rightarrow \) Fig. 1). The clamp is active.

Pressurise cylinder chamber of the DNCKE in the advancing direction with test pressure \( P_A \) (\( \Rightarrow \) Tab. 8) while simultaneously exhausting the cylinder chamber in the returning direction.

The test force (test pressure) should be acting for 60 s. During this time, the piston should not move any further.

Tab. 9
Case 3: Test with additional weight force, standing orientation:

\[
P_A = \left(\frac{F_P - m \times g}{A}\right) \times 10
\]

- Calculate the required test pressure \(P_A\)\(^1\) using the following equation:

\(P_A\) = test pressure [bar]
\(F_P\) = test force [N]
\(m\) = payload [kg]
\(g\) = acceleration due to gravity [9.81 m/s\(^2\)]
\(A\) = piston area [mm\(^2\)]

<table>
<thead>
<tr>
<th>Size</th>
<th>DNCKE</th>
<th>40</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test force (F_P) [N]</td>
<td></td>
<td>1300</td>
<td>3200</td>
<td>8000</td>
</tr>
<tr>
<td>Piston area (A) [mm(^2)]</td>
<td>returning direction</td>
<td>1055</td>
<td>2803</td>
<td>7363</td>
</tr>
</tbody>
</table>

\(^1\) The test pressure \(P_A\) must not exceed 10 bar (\(\Rightarrow\) 13 Technical data).

Even with a calculation result of \(P_a > 10\) bar, only the maximum test pressure of 10 bar may be applied.

**Static functional test**

Place the piston rod in the advanced end position.

Exhaust port ([2] \(\Rightarrow\) Fig. 1). The clamp is active.

Pressurise cylinder chamber of the DNCKE in the returning direction with test pressure \(P_A\) (\(\Rightarrow\) Tab. 10) while simultaneously exhausting the cylinder chamber in the advancing direction.

The test force (test pressure) should be acting for 60 s. During this time, the piston should not move any further.
7 Operation

Before releasing the clamping:

**WARNING**
Unexpected movement of components.
Injury due to impact or pinching.
- Make sure that there is a balance of forces acting on the operating cylinder's piston. There is a danger of the piston rod advancing suddenly when it is loosened due to axial force (weight force) applied, especially with vertical installation.

Observe the following after each adjustment:

**Note**
Check clamping unit for safe function after each adjustment (6.4 Clamping force test):
If the clamping unit does not clamp the payload securely:
- Readjust the clamping unit (6.2 Adjustment of the clamping unit).

If there are changes in the payload or operating pressure:

**Note**
Payloads that have been increased at a later time and a changed operating pressure change the clamping conditions and might impair operational reliability.
- Observe permissible maximum load 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).

In case of dynamic braking due to unavoidable irregular movement:

**Note**
Use of the product as a braking device does not conform with the intended use. Dependent on the braking load, dynamic braking can jeopardize the future operational reliability of the clamping unit. Check clamping unit for safe function (6.4 Clamping force test).

**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 if there are signs of wear:

<table>
<thead>
<tr>
<th>Test procedure</th>
<th>Clamping unit as holding device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of wear</td>
<td>- Loud noises</td>
</tr>
<tr>
<td></td>
<td>- Clamping unit cannot hold the payload securely.</td>
</tr>
<tr>
<td></td>
<td>- Holding force is not achieved (slippage). If properly set, the payload should always maintain</td>
</tr>
<tr>
<td></td>
<td>the clamping position and reach the end positions without stopping hard.</td>
</tr>
<tr>
<td>Test cycle</td>
<td>Every 100,000 clamping cycles and at least once per month</td>
</tr>
<tr>
<td>Adjusting cycle</td>
<td>Every 500,000 clamping cycles or if there are signs of wear</td>
</tr>
<tr>
<td>Adjusting procedure</td>
<td>➔ 6.2 Adjustment of the clamping unit</td>
</tr>
</tbody>
</table>

Tab. 12

- In the following cases, check to determine if more frequent tests are required:
  - high thermal stress
  - severe accumulation of dirt
  - if there are grease-solvent fluids or vapours nearby

- Avoid contamination of the round material or exhaust port (7 ➔ Fig. 1).
  This is the only way to ensure normal function will not be impaired.
8 Maintenance and care

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

- Clean the clamping unit as required using 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 impact or pinching.
- Secure payload and verify load-free status before dismounting.
- Exhaust the clamping unit before working on it.
- Observe instructions on transport (4 Transport).

**WARNING**
Flying parts!
Injury due to impact or pinching.
Loaded springs may be released suddenly during dismantling. The sudden release of internal spring forces (e.g. when dismantling the housing cover) poses a risk of injury.
- Do not disassemble clamping unit.

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

10 Disposal

- Dispose of the clamping unit and its packaging at the end of its lifecycle by using environmentally friendly ways of recycling in accordance with applicable specifications.

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 cannot be released.</td>
<td>Clamping unit leaky</td>
<td>Send clamping unit to Festo with a description of the 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 stop at the cylinder's end position</td>
<td>Speed too high</td>
<td>Reduce impact speed.</td>
</tr>
<tr>
<td></td>
<td>Insufficient cushioning</td>
<td>Increase cushioning or use additional external cushioning components.</td>
</tr>
<tr>
<td></td>
<td>Payload too great</td>
<td>Increase cushioning or use additional external cushioning components.</td>
</tr>
<tr>
<td>Round material slips through.</td>
<td>Payload too great</td>
<td>Reduce payload.</td>
</tr>
<tr>
<td></td>
<td>Operating pressure on cylinder too high</td>
<td>Reduce operating pressure. Change activation.</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 a description of the fault.</td>
</tr>
<tr>
<td>Position sensing malfunctions at the DNCKE</td>
<td>Incorrect position of proximity sensors</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>Ferritic components in the vicinity of the proximity sensor.</td>
<td>Use components made of non-magnetic materials.</td>
</tr>
</tbody>
</table>

Tab. 13
## 13 Technical data

<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>Clamping type</td>
<td></td>
<td>clamping through spring force, releasing through compressed air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting position</td>
<td></td>
<td>any</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating medium</td>
<td></td>
<td>Compressed air in accordance with ISO 8573-1-2010 [7;4;4]; lubricated operation possible (in which case lubricated operation will always be required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamping unit</td>
<td>[bar]</td>
<td>3.8 ... 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinders</td>
<td>DNCKE [bar]</td>
<td>0.6 ... 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. test pressure</td>
<td>DNCKE [bar]</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td>[mm]</td>
<td>16 [h7 ... f7]</td>
<td>20 [h7 ... f7]</td>
<td>25 [h7 ... f7]</td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td>hardened (min. HRC 60) or hard-chromium-plated (min. thickness 20 μm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface roughness Rt less than 4 μm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 mm wide 15° chamfer on the end of the round material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static holding force</td>
<td>[N]</td>
<td>1300</td>
<td>3200</td>
<td>8000</td>
</tr>
<tr>
<td>Theoretical force</td>
<td>DNCKE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advance at 6 bar</td>
<td>[N]</td>
<td>754</td>
<td>1870</td>
<td>4712</td>
</tr>
<tr>
<td>Return at 6 bar</td>
<td>[N]</td>
<td>633</td>
<td>1682</td>
<td>4418</td>
</tr>
<tr>
<td>Advance at max. test pressure</td>
<td>[N]</td>
<td>1257</td>
<td>3117</td>
<td>7854</td>
</tr>
<tr>
<td>Return at max. test pressure</td>
<td>[N]</td>
<td>1055</td>
<td>2803</td>
<td>7363</td>
</tr>
<tr>
<td>Max. permissible travel speed</td>
<td>[m/s]</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>[°C]</td>
<td>–20 ... +80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>[°C]</td>
<td>–20 ... +80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration and shock (without payload)</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></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 m/s² acceleration at 8–27 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 0.35 mm deflection at 27–60 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 m/s² acceleration at 60–160 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 m/s² acceleration at 160–200 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock in accordance with IEC 60068 part 2–27</td>
<td></td>
<td>± 300 m/s² acceleration with a duration of 11 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></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 with a duration of 6 ms</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000 shocks per direction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Materials

<table>
<thead>
<tr>
<th>Item</th>
<th>DNCKE</th>
<th>KEC</th>
<th>63</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing, cover</td>
<td>Aluminium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piston rod</td>
<td>DNCKE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tie rods, collar nuts</td>
<td>Steel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seals</td>
<td>TPE-U, NBR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Weight Type</th>
<th>DNCKE [kg]</th>
<th>KEC [kg]</th>
<th>63 [kg]</th>
<th>100 [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic weight</td>
<td>1.9</td>
<td>4.5</td>
<td>16.8</td>
<td></td>
</tr>
<tr>
<td>Basic weight</td>
<td>2.3</td>
<td>5.5</td>
<td>18.2</td>
<td></td>
</tr>
<tr>
<td>per 10 mm of path</td>
<td>0.045</td>
<td>0.073</td>
<td>0.11</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 14