



# Hand pump PUMP1000-4L-CONTROL

User manual

# Safety guidelines and symbols

## High product safety

Our products correspond to the current level of research and technology. If the bearing arrangement is designed correctly, the products are handled and fitted correctly and as agreed and if they are maintained as instructed, they do not give rise to any direct hazards.

## Follow instructions

This publication describes standard products. Since these are used in numerous applications, we cannot make a judgement as to whether any malfunctions will cause harm to persons or property.

It is always and fundamentally the responsibility of the designer and user to ensure that all specifications are observed and that all necessary safety information is communicated to the end user. This applies in particular to applications in which product failure and malfunction may constitute a hazard to human beings.

## Definition of guidelines and symbols

The warning and hazard symbols are defined along the lines of ANSI Z535.6–2006.

The meaning of the guidelines and symbols is as follows:

**Warning**



If these safety guidelines are not observed, death or serious injury may occur.

**Caution**



If these safety guidelines are not observed, minor or slight injury will occur.



If these safety guidelines are not observed, damage or malfunctions in the product or the adjacent construction will occur.

**Hinweis**

There follows additional or more detailed information that must be observed.



Numbers within a circle are item numbers.

## Original user manual

This user manual is the original user manual in accordance with the Machinery Directive 2006/42/EC.

# Hand pump

		Page
<b>Features</b>	Scope of delivery .....	5
<b>Design and safety guidelines</b>	Intended purpose .....	6
	Qualified personnel .....	6
	Protective equipment .....	6
	Hydraulic oil .....	7
	Maximum pressure .....	7
	Ambient conditions .....	7
<b>Initial operation</b>	Checking the hand pump.....	8
	Setting the stroke volume.....	9
	Spacer ring .....	9
	Mounting the spacer ring .....	9
	Dismounting the spacer ring .....	9
<b>Operation</b>	Mounting the rolling bearing.....	10
	Mounting the hydraulic nut.....	10
	Connecting the hand pump .....	11
	Venting the hand pump .....	11
	Connection .....	11
	Venting the hydraulic nut.....	12
	Setting the start position .....	12
	Determining the start pressure.....	12
	Building up the start pressure.....	12
	Setting the end position .....	13
	Determining the number of strokes .....	13
	Moving the rolling bearing to the end position .....	14
	Dismounting the hand pump .....	14
	Releasing the pressure .....	14
	Removing the hand pump .....	14
	Maintenance .....	15
	Changing the oil.....	15
	Cleaning the oil container .....	15

## Hand pump

	Page
<b>Technical data</b>	
Ordering designation.....	16
EG Declaration of Conformity .....	17
<b>Digital manometer</b>	
Features .....	18
Operation.....	18
Control keys .....	18
Control diagram.....	19
Maintenance .....	20
Changing the battery .....	20
Dismantling.....	20
Mounting.....	20
Technical data.....	21
Ordering designations .....	21
<b>Troubleshooting</b>	22
<b>Value table</b>	
Displacement distance, number of strokes.....	24

# Hand pump

## Features

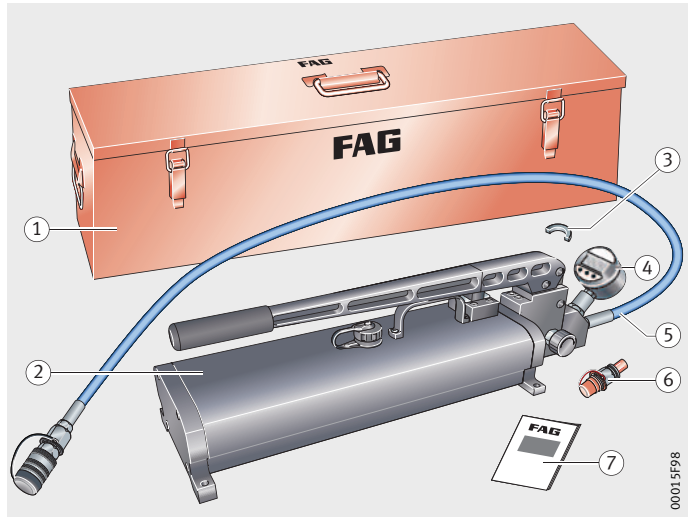
The hand pump and accessories are supplied in a sturdy metal case made from sheet steel. The metal case and parts should be checked immediately for any damage during transit. The carrier should be informed of any damage without delay.

## Scope of delivery

The items included in delivery are shown in *Figure 1*.

- ① Metal case
- ② Hand pump
- ③ Spacer ring (half ring),  
HYDNUT50 to 150
- ④ Digital manometer
- ⑤ High pressure hose  
with coupling sleeve
- ⑥ Coupling nipple
- ⑦ User manual

*Bild 1*  
Scope of delivery



## Warning

If the hand pump or accessories are damaged, they must not be used. Do not attempt to carry out repairs. Any repair work required should be carried out by Schaeffler Technologies GmbH & Co. KG, Schweinfurt.

# Hand pump

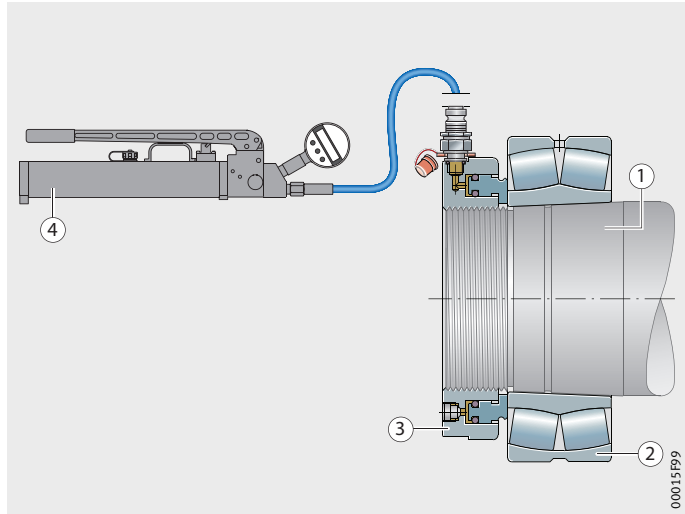
## Design and safety guidelines

### Intended purpose

The hand pump PUMP1000-4L-CONTROL is used to operate FAG hydraulic nuts. These are used to mount rolling bearings on a tapered seat, *Figure 2*.

- ① Tapered seat
- ② Rolling bearing
- ③ Hydraulic nut
- ④ Hand pump

*Bild 2*  
Mounting



### Hinweis

The hand pump can also be used for dismounting, see BA 7, FAG Hand Pump Sets.

### Qualified personnel

The hand pump must only be used by qualified personnel.

A person defined as qualified personnel:

- is authorised to use the hand pump
- has all the necessary knowledge
- is familiar with the safety guidelines
- has read and understood this manual.

### Protective equipment

Protective equipment is intended to protect personnel against health hazards.

**Warning** 

When working with the hand pump, wear protective goggles at all times.

**Caution** 

Avoid skin contact with hydraulic oil.  
Use appropriate gloves or oil-based cream.

### Hydraulic oil

The only hydraulic oils that can be used are:

- any hydraulic oils with a viscosity of 32 mm<sup>2</sup>/s at +40 °C.



Only clean hydraulic oil should be used.

If the oil is not clean, this may lead to blockage of the filter fitted.

### Warning



Hydraulic oil can cause irritation to skin and respiratory passages. Skin contact should therefore be avoided, vapours and fumes should not be inhaled. Eyes must be protected against hydraulic oil.

### Maximum pressure

The hand pump delivers a pressure of up to 1000 bar. The maximum pressure that can be used with a hydraulic nut is 800 bar.

### Warning



800 bar must never be exceeded.

The manometer must be monitored continuously during operation.

### Ambient conditions

The hand pump should be used under the following ambient conditions:

- The surface underneath must be even and capable of supporting loads
- Temperature: 0 °C to +60 °C
- Humidity: max. 90%, no condensation.



Ensure that the ambient conditions are maintained throughout the operating period.

# Hand pump

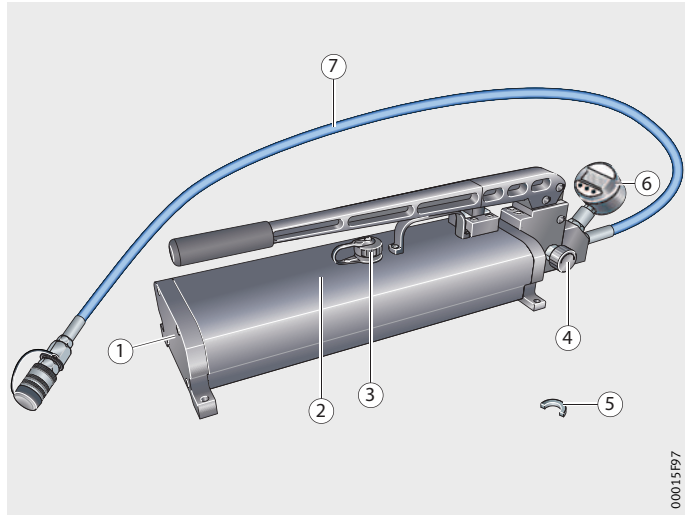
## Initial operation

This manual describes the initial operation of the hand pump, for information on the initial operation of hydraulic nuts see BA 4, FAG Hydraulic Nuts.

## Checking the hand pump

Before any use, check the hand pump and the accessories to be used, *Figure 3*.

- ① Hand pump
- ② Oil container
- ③ Oil container lid
- ④ Escape valve
- ⑤ Spacer ring (half ring),  
HYDNUT50 to 150
- ⑥ Digital manometer
- ⑦ High pressure hose



*Bild 3*

Checking for initial operation

The hand pump can only be put into operation if all the following questions can be answered with “yes”:

- Is the hand pump ① free from corrosion, cracks and damage?
- Is the oil container ② completely filled with a suitable hydraulic oil, see page 7?
- Is the escape valve ④ easy to move and free from damage?
- Is the battery in digital manometer ⑥ in acceptable condition (if not, see the section Changing the battery, page 20)?
- Is the high pressure hose ⑦ free from damage and kinks?
- Is the high pressure hose suitable for at least 1000 bar?
- Is the required stroke volume set (see the section Setting the stroke volume, page 9)?

**Warning**

If the hand pump or accessories are damaged, they must not be used. Do not attempt to carry out repairs. Any repair work required should be carried out by Schaeffler Technologies GmbH & Co. KG, Schweinfurt.



## Setting the stroke volume

The stroke volume of the hand pump can be adjusted as a function of the hydraulic nut used.

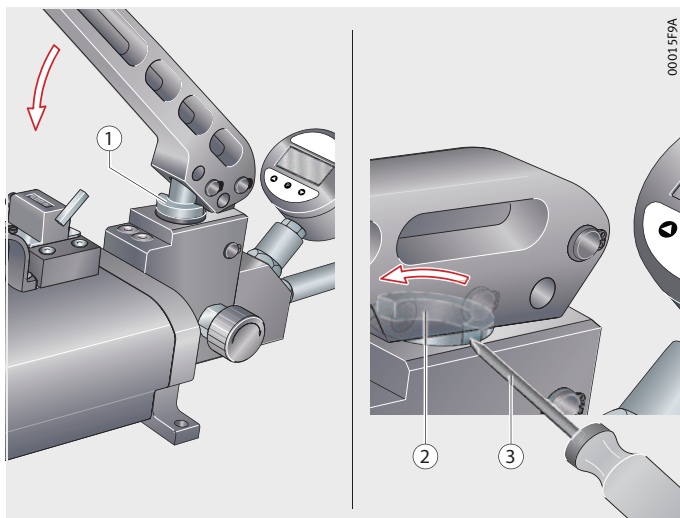
### Spacer ring

The spacer ring (half ring) restricts the stroke and thus reduces the stroke volume. The volume without a spacer ring (half ring) is 0,9 cm<sup>3</sup> per stroke, when the spacer ring (half ring) is mounted, 0,2 cm<sup>3</sup> of hydraulic oil is pressed into the hydraulic nut on a complete stroke.

- ① Spacer ring (half ring), position A
- ② Spacer ring (half ring), position B
- ③ Screwdriver

*Bild 4*

Spacer ring (half ring)



The spacer ring (half ring) should be mounted when using:

- HYDNUT50 to HYDNUT150.

### Mounting the spacer ring

A small flat blade screwdriver is recommended as a mounting tool, *Figure 4*:

- Insert the spacer ring (half ring) ① (position A, ②).
- Press the arm of the hand pump down almost to the stop.
- Rotate the spacer ring (half ring) by 180° into position B, ③.

### Dismounting the spacer ring

- Press the arm down almost to the stop.
- Rotate the spacer ring (half ring) by 180° into position A, ②.
- Move the arm upwards.
- Remove the spacer ring (half ring).



Do not replace the spacer ring (half ring) during operation of the pump. Any inaccuracies in the displacement distance can damage the bearing.

# Hand pump

## Operation

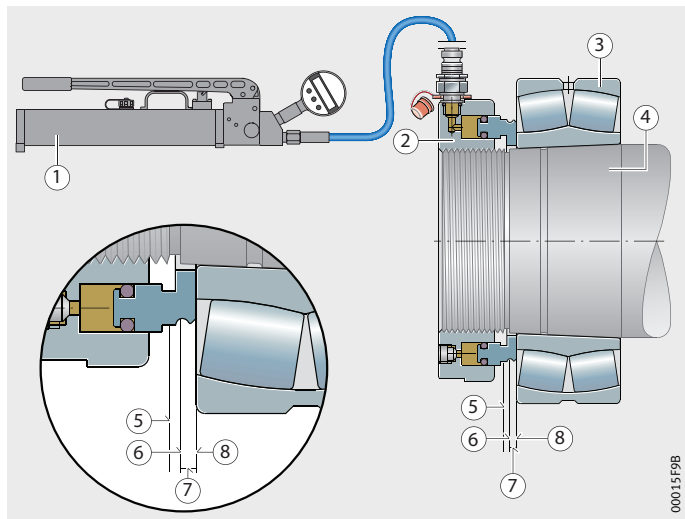
The mounting operation begins with mounting of the rolling bearing on the tapered seat, *Figure 5*. Slide the rolling bearing firmly onto the shaft or slide the mounting sleeve into the original position. A suitable hydraulic nut is then screwed onto the shaft and the hand pump is connected. The hand pump is then operated until the pressure to reach the start position is achieved. The hand pump is now operated (number of strokes in accordance with the table) until the rolling bearing has been driven up the required displacement distance and the end position is achieved. The pressure is then released and the hydraulic oil flows back into the pump, after which the pump can be removed.

## Hinweis

In order to avoid delays during mounting, we recommend that the initial pressure and the number of strokes is determined before the start of mounting.

- ① Hand pump
- ② Hydraulic nut
- ③ Rolling bearing
- ④ Tapered seat
- ⑤ Original position
- ⑥ Start position
- ⑦ Displacement distance
- ⑧ End position

*Bild 5*  
Mounting



## Mounting the rolling bearing

Slide the rolling bearing firmly onto the shaft. In this way, it will reach the original position ⑤, *Figure 5*.



If the rolling bearing is slid on further than the start position, the radial clearance is too small.

## Mounting the hydraulic nut

Insert the annular piston of the hydraulic nut completely into the annular ring. Screw the hydraulic nut onto the shaft journal or sleeve until the annular piston is in contact with the part to be mounted, see BA 4, FAG Hydraulic Nuts. Screw a coupling nipple into the hydraulic nut.

## Connecting the hand pump

Check whether the spacer ring (half ring) should be mounted, see the section Spacer ring, page 9. First mount or remove the spacer ring (half ring) as necessary and the hand pump should only be connected after this has been done.

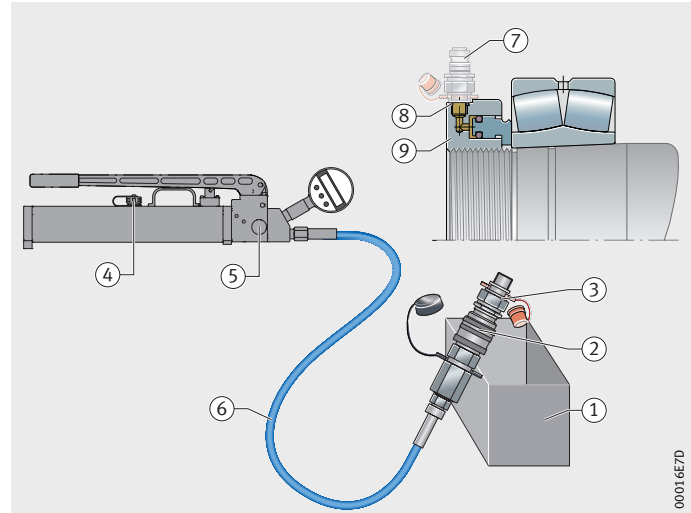
**Warning** 

Only use the hand pump if the oil container is completely filled with hydraulic oil. Otherwise, air may be sucked in and compressed.

- ① Collection container (hydraulic oil)
- ② Sleeve
- ③ Coupling nipple
- ④ Aeration screw
- ⑤ Escape valve
- ⑥ High pressure hose
- ⑦ Coupling nipple, mounted
- ⑧ Sealing ring
- ⑨ Hydraulic nut

*Bild 6*

### Venting the hand pump



### Venting the hand pump

Before connecting the hand pump to the hydraulic nut, vent the hand pump, *Figure 6*:

- Provide a collection container ① (not included in the delivery).
- Fit the sleeve ② on the coupling nipple ③.
- Place the hand pump on a rigid, horizontal surface, since it is only possible to prevent air being sucked in when the hand pump is horizontal.
- Close the aeration screw ④ completely, then open it (one revolution).
- Close the escape valve ⑤.
- Hold the high pressure hose ⑥ vertically upwards.
- Operate the hand pump until oil emerges without air bubbles.
- Remove the sleeve ② from the coupling nipple ③.

### Connection

- Screw the coupling nipple ⑦ and sealing ring ⑧ into the hydraulic nut ⑨.
- Fit the sleeve ② on the coupling nipple ⑦.

**Warning** 

The high pressure hose must be suitable for a pressure of at least 1000 bar. Do not extend the arm of the hand pump. Check whether the sleeve and coupling nipple are completely coupled. Observe a minimum bending radius for the high pressure hose of 70 mm.

# Hand pump

## Venting the hydraulic nut

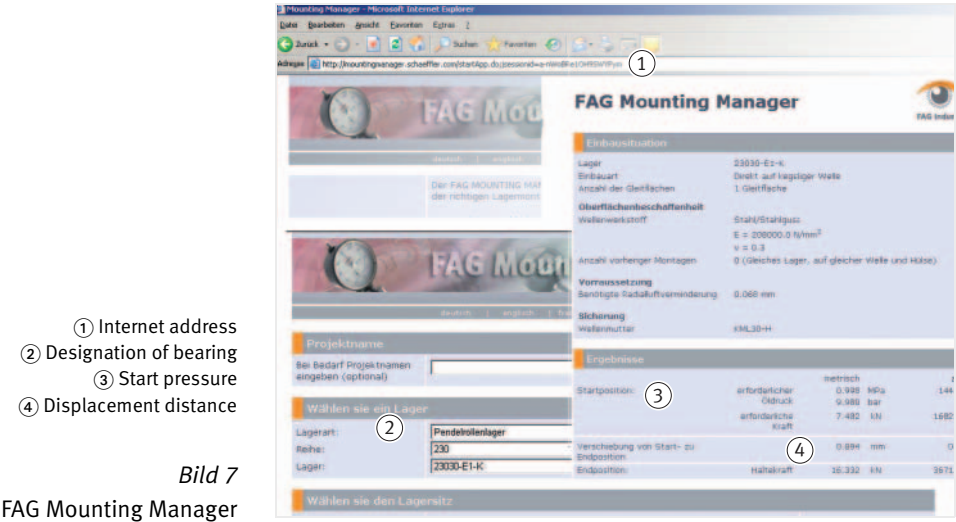
Operate the hand pump until the hydraulic nut is completely vented, see BA 4, FAG Hydraulic Nuts.

## Setting the start position

The rolling bearing is displaced from the original position to the start position. The hand pump is of a twin stage design. At low pressure, a large quantity of oil is pressed into the hydraulic nut, while above 10 bar this quantity is significantly smaller, see the section Technical data, page 21.

## Determining the start pressure

The start pressure can be determined, for example, using the Schaeffler software FAG Mounting Manager. A user manual for the software is available on the Internet.



After calling up FAG Mounting Manager, the necessary data are entered, *Figure 7*. The start pressure for reaching the start position is then displayed.

**Warning**

Do not loosen the connectors on the hand pump if the unit is still pressurised. Do not add any more oil.

## Building up the start pressure

Once the start pressure has been built up, the rolling bearing is in the start position, *Figure 5*, page 10.

Keep the aeration screw open (one revolution):

- Close the escape valve, *Figure 3* ④, page 8.
- Set the digital manometer to zero, then monitor continuously.
- Operate the hand pump until the start pressure is reached.



Do not exceed the start pressure. If the start pressure is exceeded, the bearing must be dismounted and then remounted.

Setting the end position

The end position is reached when the rolling bearing has been moved the displacement distance. The displacement distance can be read off, for example, in FAG Mounting Manager.

Determining the number of strokes

The number of strokes can be read off on the basis of the displacement distance and the hydraulic nut used, *Figure 8*, and the value table, starting from page 24.

Example

The following hydraulic nut is used for mounting of bearings:  
■ HYDNUT160.  
When using HYDNUT160, any spacer ring present must be dismounted, see the section Spacer ring, page 9.  
The software FAG Mounting Manager determines the displacement distance as follows:  
■ 0,94 mm.  
The next highest displacement distance is 1,01 mm and the number of strokes is as follows, see the value table:  
■ 10 strokes for mounting with hydraulic support  
■ 12 strokes for mounting without hydraulic support.

- ① Next highest displacement distance
- ② Number of strokes

Bild 8  
Value table, excerpt

HYDNUT										
160	s mm	0,52	0,57	0,63	0,69	0,76	0,84	0,92	1,01	1
	x <sub>1</sub> –	5	6	6	7	7	8	10	11	11
	x <sub>2</sub> –	6	7	7	8	9	10	12	13	13
170	s mm	0,55	0,61	0,67	0,73	0,81	0,89	0,97	1,07	1
	x <sub>1</sub> –	6	6	7	8	9	9	10	11	13
	x <sub>2</sub> –	7	7	8	9	10	11	12	13	15
180	s mm	0,57	0,63	0,69	0,76	0,83	0,92	1,01	1,11	1
	x <sub>1</sub> –	7	7	8	9	10	11	12	13	14
	x <sub>2</sub> –	8	8	9	10	11	12	13	15	16
190	s mm	0,61	0,67	0,74	0,81	0,89	0,98	1,08	1,19	1
	x <sub>1</sub> –	8	9	10	10	12	13	14	15	17
	x <sub>2</sub> –	9	10	11	12	13	15	16	18	19
200	s mm	0,64	0,7	0,77	0,85	0,94	1,03	1,13	1,25	1
	x <sub>1</sub> –	9	10	11	12	13	14	16	17	19
	x <sub>2</sub> –	10	11	12	14	15	16	18	20	22
210	s mm	0,7	0,77	0,85	0,93	1,02	1,13	1,24	1,36	1
	x <sub>1</sub> –	11	12	13	14	15	17	19	20	
	x <sub>2</sub> –	12	13	15	16	18	19	21	23	
220	s mm	0,7	0,77	0,85	0,93	1,02	1,13	1,24	1,36	

# Hand pump

## Moving the rolling bearing to the end position

**Warning** 

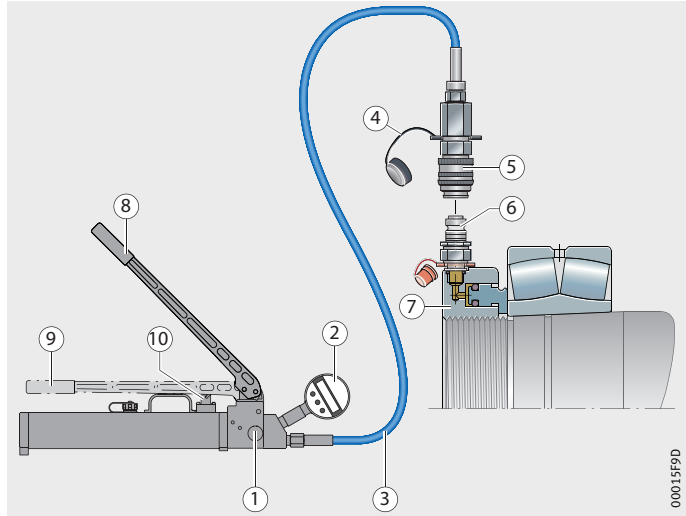
The hand pump is operated to bring the rolling bearing into the end position, *Figure 9*.

800 bar must not be exceeded. Do not loosen the connectors on the hand pump if the unit is still pressurised.  
Do not add any more oil.

- ① Escape valve
- ② Digital manometer
- ③ High pressure hose
- ④ End cap
- ⑤ Sleeve
- ⑥ Coupling nipple
- ⑦ Hydraulic nut
- ⑧ Upper stop
- ⑨ Lower stop
- ⑩ Stroke counter

*Bild 9*

End position, dismantling



Keep the aeration screw open (one revolution):

- Close the escape valve ①, set the stroke counter ⑩ to 0.
- Monitor the digital manometer ②.
- Move the hand pump from the upper stop ⑧ to the lower stop ⑨ until the stroke counter ⑩ shows the number of strokes.



Operate the escape valve by hand only. On each occasion, the arm must be moved up to the upper stop and then down. Do not exceed the number of strokes. If the number of strokes is exceeded, the bearing must be dismantled and then moved back to the start position.

## Dismounting the hand pump

### Releasing the pressure

Before the hand pump is removed, it must be unpressurised.

- Slowly open the escape valve ①.
- Monitor the digital manometer ②.

### Removing the hand pump

- Once the unit is unpressurised, remove the sleeve ⑤ from the coupling nipple ⑥.
- Close the sleeve ⑤ using the end cap ④.

**Maintenance** The use of unsuitable oils can damage the hand pump and may lead to hazards occurring for the user.



Only use oils recommended by us, see the section Hydraulic oil, page 7.

**Changing the oil** Check the hydraulic oil six months after the last oil change. Replace contaminated oil.  
One year after the last oil change, replace the oil even if it is not contaminated:

- Empty the oil container completely.
- Check the oil container and clean it if necessary.
- Fill the oil container completely with fresh oil, pump 50 times, then fill up with fresh oil.

**Hinweis** Dispose of oil, contaminated cloths and similar materials in the correct manner.

**Cleaning the oil container** Clean the oil container if there are stubborn deposits on the walls of the oil container:

- Empty the oil container completely.
- Fill the oil container with petroleum ether.
- Rock the filled oil container.
- Empty the oil container completely.
- Vent the oil container.

**Hinweis** Dispose of petroleum ether, contaminated cloths and similar materials in the correct manner.

# Hand pump

## Technical data

### Hand pump

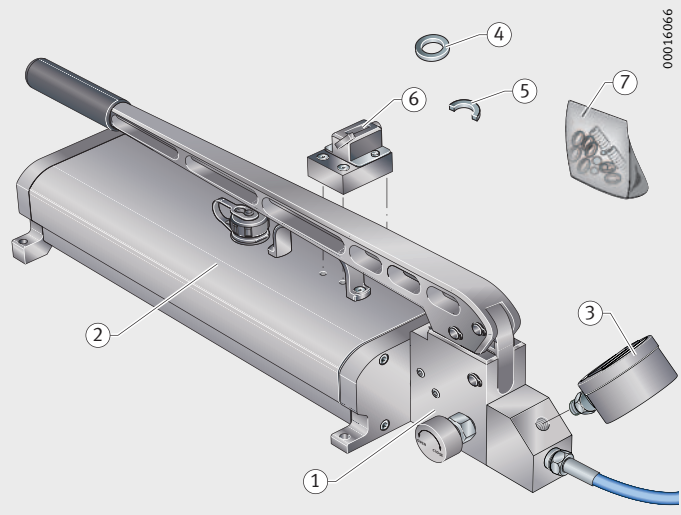
Component	Technical data
Threaded connector	G 1/4
Oil container capacity	4 l
Delivery volume <10 bar	4 cm <sup>3</sup> per stroke with spacer ring (half ring); 18 cm <sup>3</sup> per stroke without spacer ring (half ring)
Delivery volume >10 bar	0,2 cm <sup>3</sup> per stroke with spacer ring (half ring); 0,9 cm <sup>3</sup> per stroke without spacer ring (half ring)
Maximum oil pressure	1000 bar
Mass	≈ 24 kg (including metal case)

## Ordering designations

Replacement parts, *Figure 10* and  
table Ordering designation PUMP1000-4L-CONTROL.

- ① Pump body
- ② Oil container
- ③ Digital manometer
- ④ Spacer ring (full ring)
- ⑤ Spacer ring (half ring)
- ⑥ Stroke counter
- ⑦ Wear parts (set)

*Bild 10*  
Replacement parts



## Ordering designation

### PUMP1000-4L-CONTROL

Component	Ordering designation
Complete hand pump	PUMP1000-4L-CONTROL (incl. digital manometer in metal case)
Pump body	PUMP1000-4L.BODY
Oil container	PUMP1000-4L-CONTROL.TANK
Digital manometer	PUMP1000.MANO-DIGI
Spacer ring (full ring)	PUMP1000-4L-CONTROL.RING-0,2ML
Spacer ring (half ring)	PUMP1000-4L-CONTROL.RING-0,9ML
Stroke counter	PUMP1000-4L-CONTROL.COUNTER
Wear parts	PUMP1000-4L.SPARE-KIT






## Hand pump

## EG Declaration of Conformity

Declaration of Conformity for hand pump PUMP1000-4L-CONTROL.

GB

---



## EG Declaration of Conformity

In accordance with EG Machinery Directive 2006/42/EG

***We hereby declare that the product described below is in conformity with the applicable health and requirements of the EG Directive in terms of its design and type and in the execution we have brought into circulation.  
This declaration shall cease to be valid if any modification is made to the product without our agreement.***

Product description:	Hand pump set
Product name:	PUMP
Type:	1000-0,7L; 1000-0,7L-DIGI; 1000-4L; 1000-4L-DIGI; 1000-4L-CONTROL; 1000-4L-D; 1000-8L-D; 1600-4L; 1600-4L-D; 1600-8L; 1600-8L-D; 2500-4L; 2500-4L-D; 2500-8L; 2500-8L-D



***Applicable harmonised standards:***

EN 292-1:92

EN 292-2:92

EN 82:96

**Signatures:**

 Dipl. Ing. Armin Kempkes Vice President Services Industrial Aftermarket Schaeffler Group Industrial	 Paul König Product Manager FIS Maintenance Tools
--	--

**Date:**  
Schweinfurt, 28.04.2010

This declaration certifies conformity with the stated directives but does not represent a guarantee of characteristics.  
The safety guidelines in the user manual must be observed.

---

Schaeffler Technologies GmbH & Co. KG, Georg-Schäfer Straße 30, D-97421 Schweinfurt, Tel.: +49/2407/9149-99

0016EE7

Bild 11

## EG Declaration of Conformity

# Hand pump

**Digital manometer** The digital manometer PUMP1000.MANO-DIGI is part of the hand pump and is already mounted when the hand pump is supplied.

**Features** A ceramic sensor records the pressure and shows the value on a four digit LC display. The accuracy is 0,5%. The manometer is powered by a 9 V battery and has a peak value memory.

**Operation** The device is operated using three membrane keys on the front, *Figure 12.*

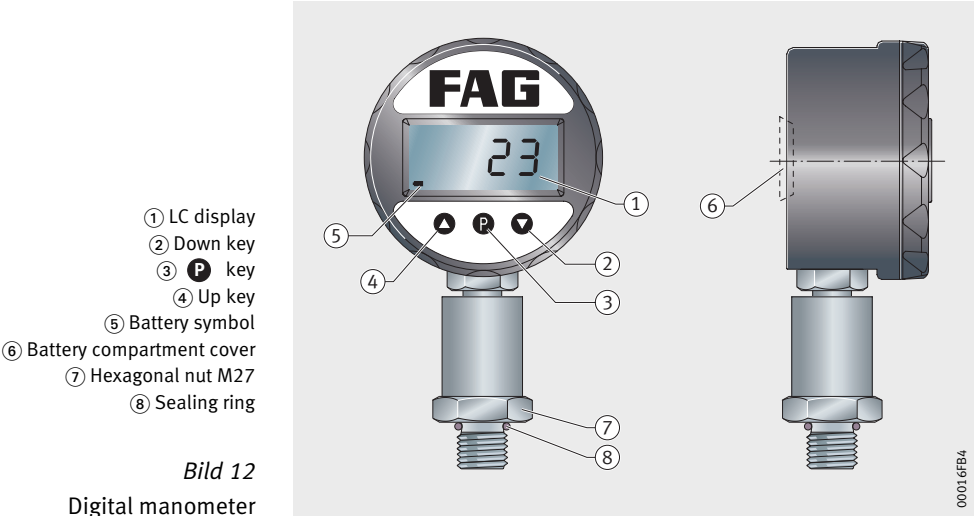


Bild 12  
Digital manometer

**Switching on, switching off**

Key	Function
<b>P</b>	Device is switched on
2× <b>P</b>	Device is switched off

**Control keys** The specific function of the key depends on whether the user changes between different menu items or is within a single menu item, see table.

**Function of control keys**

Key	Select menu item	Set value
<b>▼</b>	Next menu item	Reduce value
<b>▲</b>	Previous menu item	Increase value
<b>P</b>	–	Confirm value <sup>1)</sup>
<b>▲ &amp; ▼</b>	–	Cancel value
<b>P &amp; ▼</b>	Jump to function	–

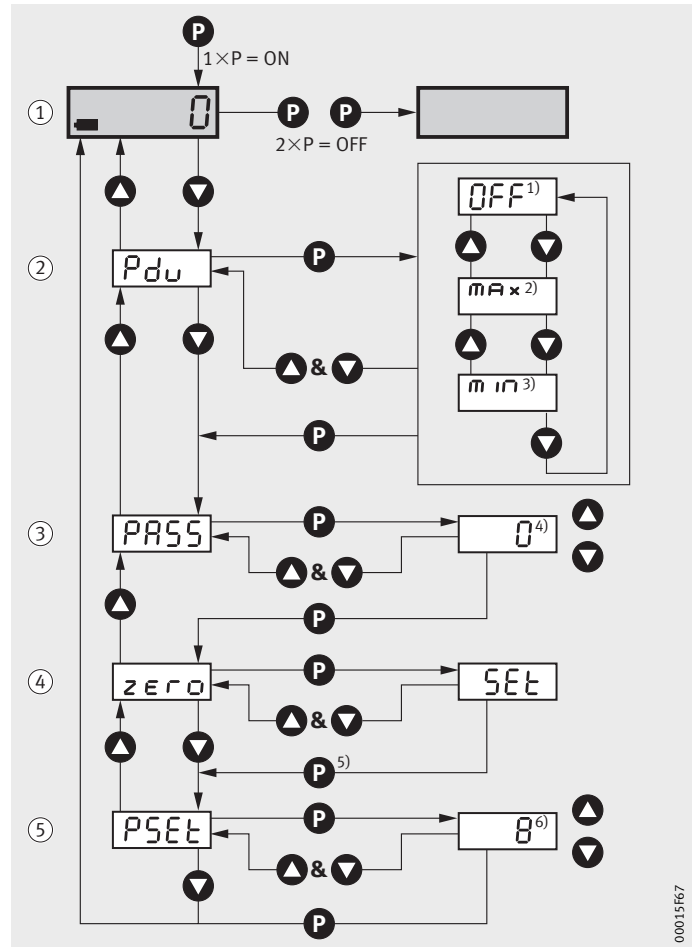
<sup>1)</sup> When the value is confirmed, the system moves to the next menu item.

## Control diagram

The navigation and setting options are shown in the control diagram, *Figure 13*.

- ① LC display
- ② Peak value memory
- ③ Enter password
- ④ Automatic zeroing
- ⑤ Change password

*Bild 13*  
Control diagram



## Footnotes for *Figure 13*

- 1) Peak value memory off.
- 2) Recording of maximum values.
- 3) Recording of minimum values.
- 4) Factory setting = 5.
- 5) Automatic zeroing.
- 6) New password, example.

# Hand pump

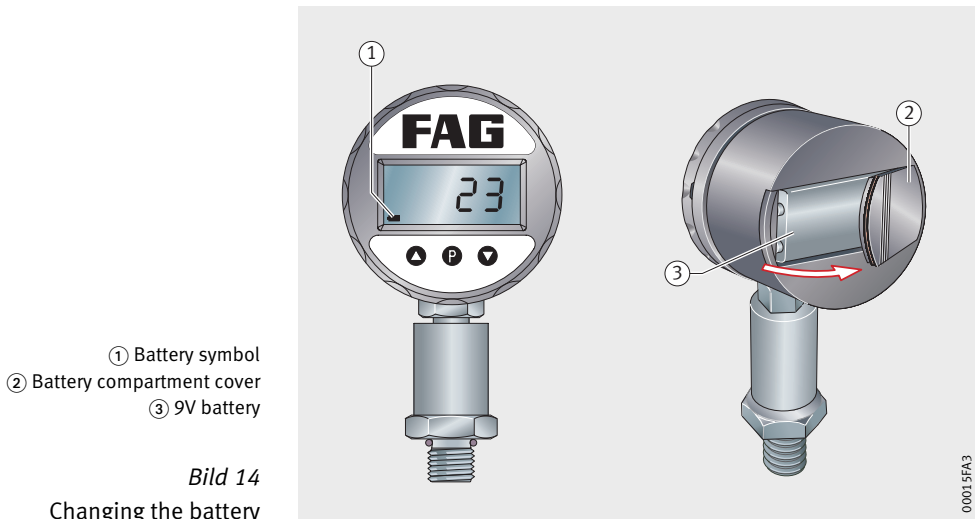
## Maintenance

Contaminated hydraulic oil can make maintenance necessary at Schaeffler Technologies GmbH & Co. KG. If clean hydraulic oil is always used, maintenance is restricted to changing the battery.

## Changing the battery

If the voltage of the battery falls below 7 Volt, the battery symbol is shown, *Figure 14*:

- Lift the battery cover outwards.
- Change the battery.
- Replace the battery cover.



Replace a used battery promptly by a fresh battery if the battery symbol is shown. Replace a damaged battery department cover and seal promptly, since the ingress of hydraulic oil will destroy the device. Always mount and dismount the digital manometer using the hexagonal nut, never the housing, *Figure 12*, page 18!

## Dismounting

To replace a digital manometer that is damaged or in need of maintenance:

- Ensure that the hand pump is unpressurised.
- Unscrew the digital manometer (right hand thread) using a wrench (A/F27).

## Mounting

To mount a new or repaired digital manometer:

- Use a new sealing ring, *Figure 12*, page 18.
- Mount the digital manometer (right hand thread) using a wrench (A/F27).

**Technical data**  
**Digital manometer**

Component	Technical data
Threaded connector	G <sup>3</sup> / <sub>4</sub>
Accuracy class	0,5%
Zero point correction	≦25%
Measurement range	0 bar to 1 000 bar
Overload range	1 500 bar
Power supply	9 V
Battery life	≈ 5 000 h (600 mAh)
Operating temperature	0 °C to +60 °C
Storage temperature	−30 °C to +80 °C
Max. relative humidity	90%, no condensation
Protection type	IP 65
Mass	≈ 0,35 kg

**Ordering designations**  
**Digital manometer**

Component	Ordering designation
Digital manometer	PUMP1000.MANO-DIGI
Sealing ring	Flat seal to DIN 16 258
Battery	9 V

# Hand pump

## Troubleshooting

The use of unsuitable replacement parts can damage the hand pump and may lead to hazards occurring for the user.

A list of common malfunctions is shown in the table.

**Warning**



Always use original replacement parts sets from Schaeffler Technologies GmbH & Co. KG.

When assembling the pump, observe the tightening torque of the screws, see the drawing included with the replacement parts set.

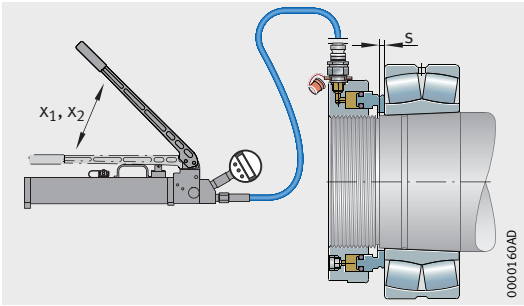
## Malfunction, cause, remedy

Malfunction	Cause, remedy
Piston does not move out	<p>The hand pump was positioned with the head facing up:</p> <ul style="list-style-type: none"> <li>Position the hand pump with the feet facing down.</li> </ul> <p>The escape valve of the hand pump is not closed or not completely closed:</p> <ul style="list-style-type: none"> <li>Close the escape valve.</li> </ul> <p>Leak in the oil circuit:</p> <ul style="list-style-type: none"> <li>Replace leaking parts or send the hand pump to Schaeffler Technologies GmbH &amp; Co. KG, Schweinfurt, for repair.</li> </ul>
Cylinder moves out in a jolting motion or not completely	<p>Air in the oil circuit:</p> <ul style="list-style-type: none"> <li>Vent the pump, high pressure hose and hydraulic nut.</li> </ul> <p>The piston of the hydraulic cylinder is bent or damaged and is being subjected to mechanical braking as a result:</p> <ul style="list-style-type: none"> <li>Send the hand pump to Schaeffler Technologies GmbH &amp; Co. KG, Schweinfurt, for repair.</li> </ul>
The piston sinks back under load	<p>Escape valve leaking:</p> <ul style="list-style-type: none"> <li>Replace leaking parts or send the hand pump to Schaeffler Technologies GmbH &amp; Co. KG, Schweinfurt, for repair.</li> </ul> <p>Cylinder seals leaking:</p> <ul style="list-style-type: none"> <li>Replace the seals.</li> </ul> <p>Leakage at couplings or hose fittings:</p> <ul style="list-style-type: none"> <li>Replace parts with original replacement parts.</li> </ul>
Cylinder does not move back completely or only very slowly	<p>Oil is not flowing freely back into the oil container:</p> <ul style="list-style-type: none"> <li>Check whether the escape valve is completely open and the nipples and sleeves are correctly coupled.</li> </ul>
Continuous oil loss	<p>Leakage at the pump piston:</p> <ul style="list-style-type: none"> <li>Replace the seals.</li> </ul>
Stroke counter is not counting	Replace stroke counter.
Manometer not functioning	Replace the battery.



# Displacement

## Number of strokes



Value table														
Designation	s = Displacement													
	x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method													
HYDNU T	x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method													
50 <sup>1)</sup>	s mm	0,2	0,22	0,24	0,27	0,29	0,32	0,35	0,39	0,43	0,47	0,52	0,57	
	x <sub>1</sub> –	3	3	4	4	5	5	5	6	7	7	8	9	
	x <sub>2</sub> –	5	5	5	6	7	7	8	9	10	11	12	13	
55 <sup>1)</sup>	s mm	0,21	0,23	0,25	0,28	0,31	0,34	0,37	0,41	0,45	0,5	0,54	0,6	
	x <sub>1</sub> –	3	4	4	4	5	5	6	7	7	8	9	10	
	x <sub>2</sub> –	5	5	6	7	7	8	9	10	11	12	13	14	
60 <sup>1)</sup>	s mm	0,23	0,25	0,28	0,31	0,34	0,37	0,41	0,45	0,49	0,54	0,6	0,66	
	x <sub>1</sub> –	4	4	4	5	5	6	6	7	8	9	10	10	
	x <sub>2</sub> –	5	6	6	7	8	9	9	10	11	12	14	15	
65 <sup>1)</sup>	s mm	0,24	0,26	0,29	0,32	0,35	0,39	0,43	0,47	0,51	0,57	0,62	0,68	
	x <sub>1</sub> –	4	5	5	6	6	7	8	9	9	10	11	13	
	x <sub>2</sub> –	6	7	8	8	9	10	11	12	14	15	16	18	
70 <sup>1)</sup>	s mm	0,25	0,28	0,3	0,33	0,37	0,4	0,44	0,49	0,54	0,59	0,65	0,71	
	x <sub>1</sub> –	5	6	6	7	8	9	9	10	11	12	14	15	
	x <sub>2</sub> –	7	8	9	10	11	12	13	15	16	18	19	21	
75 <sup>1)</sup>	s mm	0,27	0,3	0,33	0,36	0,4	0,43	0,48	0,53	0,58	0,64	0,7	0,77	
	x <sub>1</sub> –	6	7	7	8	9	10	11	12	13	14	16	17	
	x <sub>2</sub> –	8	9	10	11	12	14	15	17	18	20	22	24	
80 <sup>1)</sup>	s mm	0,28	0,31	0,34	0,37	0,41	0,45	0,5	0,55	0,6	0,66	0,73	0,8	
	x <sub>1</sub> –	7	8	9	9	10	11	12	14	15	17	18	20	
	x <sub>2</sub> –	10	11	12	13	14	16	17	19	21	23	25	28	
85 <sup>1)</sup>	s mm	0,3	0,33	0,36	0,4	0,44	0,48	0,53	0,58	0,64	0,71	0,78	0,86	
	x <sub>1</sub> –	7	8	9	10	11	12	13	14	16	17	19	21	
	x <sub>2</sub> –	10	11	12	13	15	16	18	20	22	24	26	29	
90 <sup>1)</sup>	s mm	0,31	0,34	0,38	0,41	0,45	0,5	0,55	0,6	0,66	0,73	0,8	0,88	
	x <sub>1</sub> –	8	9	9	10	11	13	14	15	17	19	20	22	
	x <sub>2</sub> –	11	12	13	14	16	17	19	21	23	25	27	30	
95 <sup>1)</sup>	s mm	0,32	0,35	0,39	0,43	0,47	0,52	0,57	0,62	0,69	0,75	0,83	0,91	
	x <sub>1</sub> –	9	9	10	11	12	14	15	17	18	20	22	24	
	x <sub>2</sub> –	11	13	14	15	17	18	20	22	24	27	30	32	
100 <sup>1)</sup>	s mm	0,34	0,37	0,41	0,45	0,5	0,55	0,6	0,66	0,73	0,8	0,88	0,97	
	x <sub>1</sub> –	9	10	11	12	14	15	17	18	20	22	24	27	
	x <sub>2</sub> –	12	14	15	16	18	20	22	24	27	29	32	35	

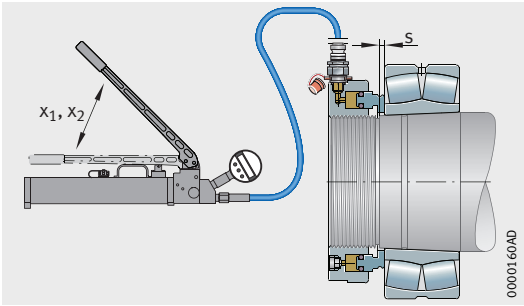
1) Spacer ring (half ring) must be mounted.



0,63	0,69	0,76	0,84	0,92	1,01	1,11	1,22	1,35	1,48	1,63	1,79	1,97	2,17
10	11	12	13	14	16	17	19	21	23	25	28	30	33
14	16	17	19	21	23	25	28	31	34	37	41	45	49
0,66	0,72	0,8	0,88	0,96	1,06	1,17	1,28	1,41	1,55	1,71	1,88	2,07	2,28
11	12	13	14	15	17	19	21	23	25	27	30	33	37
15	17	19	20	23	25	27	30	33	36	40	44	48	53
0,72	0,79	0,87	0,96	1,06	1,16	1,28	1,41	1,55	1,7	1,87	2,06	2,27	2,49
12	13	14	15	17	19	20	22	25	27	30	33	36	40
17	18	20	22	24	27	29	32	36	39	43	47	52	57
0,75	0,83	0,91	1	1,1	1,21	1,33	1,47	1,61	1,78	1,95	2,15	2,36	2,6
14	15	17	18	20	22	25	27	30	33	36	40	44	48
20	22	24	26	29	32	35	39	42	47	51	56	62	68
0,78	0,86	0,95	1,04	1,15	1,26	1,39	1,53	1,68	1,85	2,04	2,24	2,46	2,71
17	18	20	22	24	27	29	32	36	39	43	47	52	57
23	26	28	31	34	38	41	46	50	55	61	67	73	81
0,85	0,93	1,03	1,13	1,24	1,36	1,5	1,65	1,82	2	2,2	2,42	2,66	2,93
19	21	23	25	28	31	34	37	41	45	49	54	60	66
27	29	32	35	39	43	47	52	57	63	69	76	83	92
0,88	0,97	1,06	1,17	1,29	1,42	1,56	1,71	1,88	2,07	2,28	2,51	2,76	3,03
22	24	27	29	32	36	39	43	47	52	57	63	69	76
30	33	37	41	45	49	54	59	65	72	79	87	96	105
0,94	1,04	1,14	1,25	1,38	1,52	1,67	1,83	2,02	2,22	2,44	2,69	2,95	3,25
23	26	28	31	34	38	41	45	50	55	60	66	73	80
32	35	38	42	47	51	56	62	68	75	82	91	100	110
0,97	1,07	1,18	1,29	1,42	1,57	1,72	1,9	2,09	2,29	2,52	2,78	3,05	3,36
25	27	30	33	36	40	44	48	53	58	64	70	77	85
33	37	40	44	49	54	59	65	71	78	86	95	104	115
1	1,1	1,22	1,34	1,47	1,62	1,78	1,96	2,15	2,37	2,6	2,87	3,15	3,47
27	29	32	36	39	43	47	52	57	63	69	76	84	92
36	39	43	48	52	58	63	70	77	84	93	102	112	123
1,07	1,17	1,29	1,42	1,56	1,72	1,89	2,08	2,29	2,52	2,77	3,04	3,35	3,68
29	32	36	39	43	47	52	57	63	69	76	84	92	102
39	43	47	52	57	63	69	76	83	92	101	111	122	134

# Displacement

## Number of strokes



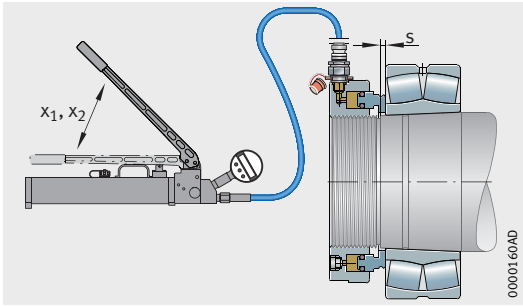
Value table (continued)													
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method												
HYDNU T													
105 <sup>1)</sup>	s mm	0,38	0,42	0,46	0,51	0,56	0,61	0,67	0,74	0,81	0,9	0,99	1,08
	x <sub>1</sub> –	11	12	13	15	16	18	19	21	24	26	28	31
	x <sub>2</sub> –	14	16	17	19	21	23	25	28	31	34	37	41
110 <sup>1)</sup>	s mm	0,37	0,41	0,45	0,49	0,54	0,6	0,66	0,72	0,79	0,87	0,96	1,06
	x <sub>1</sub> –	11	12	13	15	16	18	19	21	24	26	29	31
	x <sub>2</sub> –	14	15	17	19	20	23	25	27	30	33	36	40
115 <sup>1)</sup>	s mm	0,46	0,51	0,56	0,61	0,67	0,74	0,81	0,9	0,99	1,08	1,19	1,31
	x <sub>1</sub> –	14	16	17	19	21	23	25	27	30	33	37	40
	x <sub>2</sub> –	18	19	21	23	26	28	31	34	38	42	46	50
120 <sup>1)</sup>	s mm	0,4	0,44	0,48	0,53	0,59	0,64	0,71	0,78	0,86	0,94	1,04	1,14
	x <sub>1</sub> –	13	14	15	17	19	20	23	25	27	30	33	36
	x <sub>2</sub> –	16	17	19	21	23	25	28	30	33	37	40	44
125 <sup>1)</sup>	s mm	0,48	0,53	0,58	0,64	0,7	0,77	0,85	0,94	1,03	1,13	1,24	1,37
	x <sub>1</sub> –	16	17	19	21	23	26	28	31	34	37	41	45
	x <sub>2</sub> –	19	21	23	25	28	31	34	37	41	45	49	54
130 <sup>1)</sup>	s mm	0,42	0,46	0,51	0,56	0,61	0,68	0,74	0,82	0,9	0,99	1,09	1,2
	x <sub>1</sub> –	14	15	17	19	20	22	25	27	30	33	36	40
	x <sub>2</sub> –	17	18	20	22	24	27	30	32	36	39	43	48
135 <sup>1)</sup>	s mm	0,51	0,56	0,62	0,68	0,75	0,82	0,9	0,99	1,09	1,2	1,32	1,46
	x <sub>1</sub> –	17	19	21	23	25	28	31	34	37	41	45	49
	x <sub>2</sub> –	21	23	25	27	30	33	36	40	44	48	53	59
140 <sup>1)</sup>	s mm	0,45	0,5	0,54	0,6	0,66	0,72	0,8	0,88	0,96	1,06	1,17	1,28
	x <sub>1</sub> –	14	15	16	18	20	22	24	26	29	32	35	39
	x <sub>2</sub> –	16	18	19	21	23	26	28	31	34	38	42	46
145 <sup>1)</sup>	s mm	0,55	0,61	0,67	0,73	0,81	0,89	0,97	1,07	1,18	1,3	1,43	1,57
	x <sub>1</sub> –	20	22	24	26	29	32	35	38	42	46	51	56
	x <sub>2</sub> –	23	25	28	31	34	37	41	45	49	54	60	66
150 <sup>1)</sup>	s mm	0,49	0,54	0,59	0,65	0,72	0,79	0,87	0,95	1,05	1,16	1,27	1,4
	x <sub>1</sub> –	19	21	23	25	27	30	33	36	40	44	48	53
	x <sub>2</sub> –	22	24	26	29	32	35	39	42	47	51	57	62
155	s mm	0,51	0,56	0,62	0,68	0,75	0,82	0,91	1	1,1	1,21	1,33	1,46
	x <sub>1</sub> –	5	5	6	6	7	8	8	9	10	11	12	13
	x <sub>2</sub> –	5	6	7	7	8	9	10	11	12	13	14	16

1) Spacer ring (half ring) must be mounted.

1,19	1,31	1,44	1,59	1,75	1,92	2,11	2,32	2,56	2,81	3,09	3,4	3,74	4,12
34	38	42	46	50	56	61	67	74	81	89	98	108	119
45	49	54	59	65	72	79	87	96	105	116	127	140	154
1,16	1,28	1,41	1,55	1,7	1,87	2,06	2,26	2,49	2,74	3,01	3,31	3,64	4,01
35	38	42	46	51	56	61	67	74	81	90	99	108	119
44	48	53	58	64	71	78	86	94	104	114	125	138	152
1,44	1,59	1,75	1,92	2,11	2,33	2,56	2,81	3,09	3,4	3,74	4,12	4,53	4,98
44	49	54	59	65	71	78	86	95	104	115	126	139	153
55	61	67	74	81	89	98	108	118	130	143	158	173	191
1,26	1,38	1,52	1,67	1,84	2,02	2,22	2,45	2,69	2,96	3,26	3,58	3,94	4,33
40	44	48	53	58	64	71	78	86	94	104	114	125	138
49	54	59	65	72	79	87	95	105	115	127	139	153	169
1,51	1,66	1,82	2,01	2,21	2,43	2,67	2,94	3,23	3,55	3,91	4,3	4,73	5,2
50	55	60	66	73	80	88	97	107	118	129	142	157	172
60	66	72	80	88	96	106	117	128	141	155	171	188	207
1,32	1,45	1,59	1,75	1,93	2,12	2,34	2,57	2,83	3,11	3,42	3,76	4,14	4,55
44	48	53	58	64	70	78	85	94	103	113	125	137	151
52	58	63	70	77	84	93	102	112	123	136	149	164	181
4,6	1,76	1,94	2,13	2,34	2,58	2,84	3,12	3,43	3,77	4,15	4,57	5,02	5,53
54	60	66	72	79	87	96	106	116	128	141	155	170	187
65	71	78	86	95	104	114	126	138	152	167	184	203	223
1,41	1,55	1,71	1,88	2,07	2,27	2,5	2,75	3,03	3,33	3,66	4,03	4,43	4,88
42	47	51	57	62	68	75	83	91	100	110	121	133	147
50	55	61	67	74	81	89	98	108	119	131	144	158	174
1,73	1,9	2,09	2,3	2,53	2,78	3,06	3,36	3,7	4,07	4,48	4,92	5,42	5,96
61	68	74	82	90	99	109	120	132	145	159	175	193	212
72	80	88	96	106	117	128	141	155	171	188	207	227	250
1,54	1,69	1,86	2,05	2,25	2,48	2,72	3	3,3	3,63	3,99	4,39	4,83	5,31
58	64	71	78	86	94	104	114	125	138	152	167	184	202
68	75	83	91	100	110	121	133	147	161	177	195	215	236
1,61	1,77	1,94	2,14	2,35	2,59	2,84	3,13	3,44	3,78	4,16	4,58	5,04	5,54
15	16	18	19	21	24	26	29	31	35	38	42	46	51
17	19	21	23	25	28	30	33	37	40	44	49	54	59

# Displacement

## Number of strokes

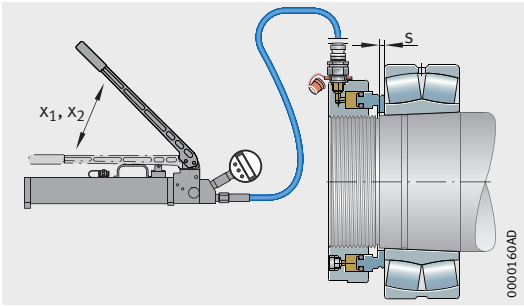


Value table (continued)													
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method												
HYDNU T													
160	s mm	0,52	0,57	0,63	0,69	0,76	0,84	0,92	1,01	1,11	1,23	1,35	1,48
	x <sub>1</sub> –	5	6	6	7	7	8	9	10	11	12	13	15
	x <sub>2</sub> –	6	7	7	8	9	10	10	12	13	14	15	17
170	s mm	0,55	0,61	0,67	0,73	0,81	0,89	0,97	1,07	1,18	1,3	1,43	1,57
	x <sub>1</sub> –	6	6	7	8	9	9	10	11	13	14	15	17
	x <sub>2</sub> –	7	7	8	9	10	11	12	13	15	16	18	19
180	s mm	0,57	0,63	0,69	0,76	0,83	0,92	1,01	1,11	1,22	1,34	1,48	1,63
	x <sub>1</sub> –	7	7	8	9	10	11	12	13	14	16	17	19
	x <sub>2</sub> –	8	8	9	10	11	12	13	15	16	18	20	22
190	s mm	0,61	0,67	0,74	0,81	0,89	0,98	1,08	1,19	1,31	1,44	1,58	1,74
	x <sub>1</sub> –	8	9	10	10	12	13	14	15	17	19	20	22
	x <sub>2</sub> –	9	10	11	12	13	15	16	18	19	21	23	26
200	s mm	0,64	0,7	0,77	0,85	0,94	1,03	1,13	1,25	1,37	1,51	1,66	1,83
	x <sub>1</sub> –	9	10	11	12	13	14	16	17	19	21	23	25
	x <sub>2</sub> –	10	11	12	14	15	16	18	20	22	24	26	29
210	s mm	0,7	0,77	0,85	0,93	1,02	1,13	1,24	1,36	1,5	1,65	1,82	2
	x <sub>1</sub> –	11	12	13	14	15	17	19	20	23	25	27	30
	x <sub>2</sub> –	12	13	15	16	18	19	21	23	26	28	31	34
220	s mm	0,7	0,77	0,85	0,93	1,02	1,13	1,24	1,36	1,5	1,65	1,82	2
	x <sub>1</sub> –	11	12	14	15	16	18	20	22	24	27	29	32
	x <sub>2</sub> –	13	14	16	17	19	21	23	25	27	30	33	37
230	s mm	0,76	0,84	0,92	1,01	1,11	1,22	1,35	1,48	1,63	1,79	1,97	2,17
	x <sub>1</sub> –	14	15	16	18	20	22	24	26	29	32	35	39
	x <sub>2</sub> –	15	17	19	20	23	25	27	30	33	36	40	44
240	s mm	0,76	0,84	0,92	1,01	1,11	1,22	1,35	1,48	1,63	1,79	1,97	2,17
	x <sub>1</sub> –	14	15	17	19	21	23	25	27	30	33	36	40
	x <sub>2</sub> –	16	17	19	21	23	26	28	31	34	37	41	45
250	s mm	1,37	1,51	1,66	1,82	2,01	2,21	2,43	2,67	2,94	3,23	3,55	3,91
	x <sub>1</sub> –	28	31	34	37	41	45	49	54	60	65	72	79
	x <sub>2</sub> –	31	35	38	42	46	51	56	61	67	74	81	90
260	s mm	0,82	0,9	0,99	1,09	1,2	1,32	1,45	1,6	1,76	1,93	2,13	2,34
	x <sub>1</sub> –	17	19	21	23	25	28	30	34	37	41	45	49
	x <sub>2</sub> –	19	21	23	26	28	31	34	38	42	46	50	55

1,63	1,8	1,97	2,17	2,39	2,63	2,89	3,18	3,5	3,85	4,23	4,66	5,12	5,63
16	18	19	21	23	26	28	31	34	38	41	46	50	55
19	20	23	25	27	30	33	36	40	44	48	53	58	64
1,73	1,9	2,09	2,3	2,53	2,78	3,06	3,36	3,7	4,07	4,48	4,92	5,42	5,96
18	20	22	24	27	30	33	36	39	43	48	52	58	63
21	23	26	28	31	34	38	42	46	50	55	61	67	74
1,79	1,97	2,16	2,38	2,62	2,88	3,17	3,49	3,83	4,22	4,64	5,1	5,61	6,18
21	23	25	28	30	33	37	40	45	49	54	59	65	72
24	26	29	32	35	38	42	47	51	56	62	68	75	82
1,91	2,11	2,32	2,55	2,8	3,08	3,39	3,73	4,1	4,51	4,97	5,46	6,01	6,61
25	27	30	33	36	40	44	48	53	58	64	70	77	85
28	31	34	38	41	46	50	55	61	67	73	81	89	98
2,01	2,21	2,43	2,67	2,94	3,23	3,56	3,91	4,31	4,74	5,21	5,73	6,3	6,93
28	31	34	37	41	45	49	54	60	66	72	80	88	96
32	35	39	43	47	51	57	62	68	75	83	91	100	110
2,2	2,42	2,66	2,92	3,22	3,54	3,89	4,28	4,71	5,18	5,7	6,27	6,89	7,58
33	36	40	44	48	53	58	64	71	78	85	94	103	114
38	41	46	50	55	61	67	73	81	89	98	107	118	130
2,2	2,42	2,66	2,92	3,22	3,54	3,89	4,28	4,71	5,18	5,7	6,27	6,89	7,58
35	39	43	47	52	57	63	69	76	83	92	101	111	122
40	44	49	54	59	65	71	78	86	95	104	115	126	139
2,39	2,62	2,89	3,17	3,49	3,84	4,23	4,65	5,11	5,62	6,19	6,81	7,49	8,23
43	47	51	57	62	68	75	83	91	100	110	121	133	147
48	53	58	64	71	78	86	94	104	114	125	138	152	167
2,39	2,62	2,89	3,17	3,49	3,84	4,23	4,65	5,11	5,62	6,19	6,81	7,49	8,23
44	48	53	59	64	71	78	86	94	104	114	126	138	152
50	55	60	66	73	80	88	97	107	118	129	142	157	172
4,3	4,73	5,2	5,72	6,3	6,92	7,62	8,38	9,22	10,14	11,15	12,27	13,49	14,84
87	96	105	116	128	140	154	170	187	206	226	249	274	301
99	108	119	131	144	159	175	192	211	232	255	281	309	340
2,57	2,83	3,11	3,43	3,77	4,14	4,56	5,02	5,52	6,07	6,68	7,34	8,08	8,88
54	59	65	72	79	87	96	105	116	127	140	154	170	186
61	67	74	81	89	98	108	119	130	144	158	174	191	210

# Displacement

## Number of strokes

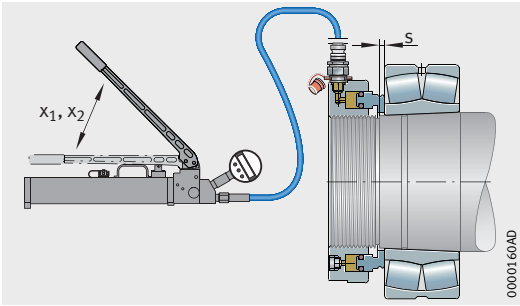


Value table (continued)													
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method												
HYDNUT													
275	s mm	1,47	1,62	1,78	1,96	2,15	2,37	2,6	2,86	3,15	3,47	3,81	4,19
	x <sub>1</sub> –	33	37	40	44	49	54	59	65	72	79	87	95
	x <sub>2</sub> –	38	41	45	50	55	60	66	73	80	88	97	107
280	s mm	0,87	0,96	1,05	1,16	1,27	1,4	1,54	1,7	1,86	2,05	2,26	2,48
	x <sub>1</sub> –	20	23	25	27	30	33	36	40	44	48	53	58
	x <sub>2</sub> –	23	25	28	31	34	37	41	45	49	54	60	65
290	s mm	1,37	1,51	1,66	1,83	2,01	2,21	2,44	2,68	2,95	3,24	3,57	3,92
	x <sub>1</sub> –	33	37	40	44	49	54	59	65	72	79	87	95
	x <sub>2</sub> –	37	41	45	50	55	60	66	73	80	88	97	107
295	s mm	1,55	1,71	1,88	2,06	2,27	2,5	2,75	3,02	3,32	3,65	4,02	4,42
	x <sub>1</sub> –	40	44	48	53	58	64	70	77	85	94	103	113
	x <sub>2</sub> –	44	49	54	59	65	71	79	87	95	105	115	127
300	s mm	0,93	1,02	1,13	1,24	1,36	1,5	1,65	1,81	1,99	2,19	2,41	2,65
	x <sub>1</sub> –	25	27	30	33	36	39	43	48	53	58	64	70
	x <sub>2</sub> –	27	30	33	36	40	44	48	53	59	64	71	78
310	s mm	1,43	1,57	1,73	1,9	2,09	2,3	2,53	2,78	3,06	3,37	3,7	4,07
	x <sub>1</sub> –	40	43	48	53	58	64	70	77	85	93	102	113
	x <sub>2</sub> –	44	48	53	59	64	71	78	86	94	104	114	126
315	s mm	1,67	1,84	2,02	2,22	2,45	2,69	2,96	3,25	3,58	3,94	4,33	4,76
	x <sub>1</sub> –	47	52	57	62	69	76	83	91	101	111	122	134
	x <sub>2</sub> –	52	57	63	69	76	84	92	102	112	123	135	149
320	s mm	1,32	1,45	1,6	1,76	1,93	2,13	2,34	2,57	2,83	3,11	3,42	3,77
	x <sub>1</sub> –	39	43	47	52	57	62	69	75	83	91	100	110
	x <sub>2</sub> –	43	47	52	57	63	69	76	84	92	101	112	123
335	s mm	1,76	1,94	2,13	2,34	2,58	2,83	3,12	3,43	3,77	4,15	4,56	5,02
	x <sub>1</sub> –	54	59	65	72	79	87	95	105	115	127	139	153
	x <sub>2</sub> –	60	66	72	79	87	96	106	116	128	141	155	170
340	s mm	1,4	1,54	1,69	1,86	2,05	2,25	2,48	2,73	3	3,3	3,63	3,99
	x <sub>1</sub> –	44	49	54	59	65	71	79	86	95	105	115	126
	x <sub>2</sub> –	49	54	59	65	72	79	87	96	105	116	127	140
355	s mm	1,85	2,04	2,24	2,46	2,71	2,98	3,28	3,61	3,97	4,36	4,8	5,28
	x <sub>1</sub> –	63	69	76	83	92	101	111	122	134	148	162	178
	x <sub>2</sub> –	69	76	84	92	101	111	122	135	148	163	179	197
360	s mm	1,48	1,63	1,79	1,97	2,17	2,38	2,62	2,88	3,17	3,49	3,84	4,22
	x <sub>1</sub> –	52	57	62	69	76	83	91	101	111	122	134	147
	x <sub>2</sub> –	57	63	69	76	83	92	101	111	122	134	148	162

4,61	5,07	5,58	6,14	6,75	7,43	8,17	8,99	9,89	10,88	11,97	13,16	14,48	15,93
105	115	127	139	153	169	186	204	225	247	272	299	329	362
118	129	142	157	172	190	209	229	252	278	305	336	369	406
2,73	3	3,3	3,63	4	4,4	4,84	5,32	5,85	6,44	7,08	7,79	8,57	9,43
64	71	78	86	94	104	114	125	138	152	167	183	202	222
72	79	87	96	105	116	128	140	154	170	187	205	226	249
4,32	4,75	5,22	5,74	6,32	6,95	7,64	8,41	9,25	10,17	11,19	12,31	13,54	14,9
105	115	127	140	154	169	186	204	225	247	272	299	329	362
117	129	142	156	172	189	208	229	252	277	304	335	368	405
4,86	5,35	5,89	6,47	7,12	7,83	8,62	9,48	10,43	11,47	12,62	13,88	15,27	16,79
125	137	151	166	183	201	221	243	267	294	323	356	391	431
139	153	169	185	204	224	247	271	299	329	361	398	437	481
2,92	3,21	3,53	3,88	4,27	4,7	5,17	5,69	6,26	6,88	7,57	8,33	9,16	10,08
77	85	93	102	113	124	136	150	165	181	200	220	241	266
86	94	104	114	126	138	152	167	184	202	223	245	269	296
4,48	4,93	5,42	5,96	6,56	7,22	7,94	8,73	9,6	10,56	11,62	12,78	14,06	15,47
124	136	150	165	182	200	220	242	266	292	322	354	389	428
138	152	167	184	202	223	245	269	296	326	358	394	434	477
5,24	5,77	6,34	6,98	7,67	8,44	9,29	10,21	11,23	12,36	13,59	14,95	16,45	18,09
147	162	178	196	216	237	261	287	316	347	382	420	462	508
164	180	198	218	240	264	290	319	351	386	425	467	514	566
4,14	4,56	5,01	5,51	6,07	6,67	7,34	8,07	8,88	9,77	10,75	11,82	13	14,3
122	134	147	162	178	196	215	237	260	287	315	347	381	420
135	149	163	180	198	218	239	263	290	318	350	385	424	466
5,52	6,08	6,68	7,35	8,09	8,9	9,79	10,76	11,84	13,02	14,33	15,76	17,34	19,07
169	186	204	225	247	272	299	329	362	398	438	482	530	583
187	206	227	249	274	302	332	365	402	442	486	535	588	647
4,39	4,83	5,32	5,85	6,43	7,08	7,78	8,56	9,42	10,36	11,4	12,54	13,79	15,17
139	153	168	185	204	224	247	271	298	328	361	397	437	480
154	170	186	205	226	248	273	300	330	363	400	440	484	532
5,81	6,39	7,03	7,73	8,5	9,35	10,29	11,31	12,45	13,69	15,06	16,57	18,22	20,04
196	216	238	261	287	316	348	383	421	463	509	560	616	678
217	239	263	289	318	349	384	423	465	512	563	619	681	749
4,64	5,11	5,62	6,18	6,8	7,48	8,23	9,05	9,96	10,95	12,05	13,25	14,58	16,04
162	178	196	216	237	261	287	316	347	382	420	462	508	559
179	196	216	238	261	288	316	348	383	421	463	510	560	616

# Displacement

## Number of strokes



Value table (continued)

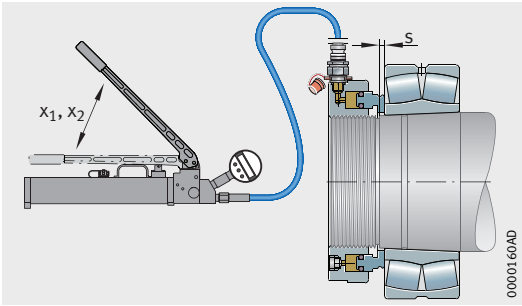
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method												
HYDNU T													
375	s mm	1,94	2,13	2,35	2,58	2,84	3,12	3,44	3,78	4,16	4,57	5,03	5,54
	x <sub>1</sub> –	72	79	87	96	106	116	128	141	155	170	187	206
	x <sub>2</sub> –	79	87	96	106	116	128	141	155	170	187	206	227
380	s mm	1,54	1,69	1,86	2,05	2,25	2,48	2,73	3	3,3	3,63	3,99	4,39
	x <sub>1</sub> –	58	63	70	77	84	93	102	112	124	136	150	165
	x <sub>2</sub> –	63	70	77	84	93	102	112	124	136	150	164	181
395	s mm	2,07	2,28	2,5	2,76	3,03	3,33	3,67	4,03	4,44	4,88	5,37	5,91
	x <sub>1</sub> –	82	90	99	109	120	132	145	160	176	194	213	234
	x <sub>2</sub> –	90	99	109	120	132	145	160	176	193	213	234	257
400	s mm	1,64	1,8	1,98	2,18	2,4	2,64	2,91	3,2	3,52	3,87	4,25	4,68
	x <sub>1</sub> –	67	74	81	89	98	108	119	131	144	158	174	191
	x <sub>2</sub> –	74	81	89	98	108	118	130	143	158	173	191	210
415	s mm	2,17	2,39	2,63	2,89	3,18	3,49	3,84	4,23	4,65	5,12	5,63	6,19
	x <sub>1</sub> –	93	102	113	124	136	150	165	181	200	219	241	266
	x <sub>2</sub> –	102	112	123	136	149	164	181	199	219	240	264	291
420	s mm	1,69	1,86	2,04	2,25	2,47	2,72	2,99	3,29	3,62	3,98	4,38	4,82
	x <sub>1</sub> –	73	81	89	98	107	118	130	143	157	173	190	209
	x <sub>2</sub> –	80	88	97	107	118	129	142	157	172	189	208	229
435	s mm	2,26	2,49	2,73	3,01	3,31	3,64	4	4,4	4,84	5,33	5,86	6,45
	x <sub>1</sub> –	101	111	122	135	148	163	179	197	217	239	262	289
	x <sub>2</sub> –	111	122	134	147	162	178	196	216	237	261	287	316
440	s mm	1,79	1,97	2,17	2,38	2,62	2,88	3,17	3,49	3,84	4,22	4,64	5,11
	x <sub>1</sub> –	85	93	102	113	124	136	150	165	181	200	220	242
	x <sub>2</sub> –	92	102	112	123	135	149	164	180	198	218	240	264
460	s mm	1,85	2,04	2,24	2,46	2,71	2,98	3,28	3,61	3,97	4,36	4,8	5,28
	x <sub>1</sub> –	93	102	112	124	136	150	164	181	199	219	241	265
	x <sub>2</sub> –	101	111	123	135	148	163	179	197	217	239	263	289
480	s mm	1,92	2,11	2,32	2,56	2,81	3,09	3,4	3,74	4,12	4,53	4,98	5,48
	x <sub>1</sub> –	99	108	119	131	144	159	175	192	211	232	256	281
	x <sub>2</sub> –	107	118	130	143	157	173	190	209	230	253	279	307
500	s mm	2,01	2,21	2,43	2,68	2,94	3,24	3,56	3,92	4,31	4,74	5,21	5,73
	x <sub>1</sub> –	117	129	142	156	171	189	207	228	251	276	304	334
	x <sub>2</sub> –	127	140	154	170	187	205	226	248	273	301	331	364
520	s mm	2,67	2,94	3,23	3,55	3,91	4,3	4,73	5,2	5,72	6,3	6,93	7,62
	x <sub>1</sub> –	161	177	195	215	236	260	286	314	346	380	418	460
	x <sub>2</sub> –	175	193	212	233	257	282	311	342	376	414	455	500



6,09	6,7	7,37	8,1	8,91	9,81	10,79	11,86	13,05	14,36	15,79	17,37	19,11	21,02
227	249	274	302	332	365	402	442	486	535	588	647	712	783
249	274	302	332	365	402	442	486	535	588	647	712	783	861
4,83	5,32	5,85	6,43	7,08	7,78	8,56	9,42	10,36	11,4	12,54	13,79	15,17	16,69
181	199	219	241	265	292	321	353	388	427	470	517	568	625
199	219	241	265	291	320	353	388	427	469	516	568	625	687
6,5	7,15	7,86	8,65	9,51	10,46	11,51	12,66	13,93	15,32	16,85	18,54	20,39	22,43
258	283	312	343	377	415	457	502	552	608	668	735	809	890
283	311	342	377	414	456	501	551	606	667	734	807	888	977
5,15	5,66	6,23	6,85	7,54	8,29	9,12	10,03	11,03	12,14	13,35	14,69	16,15	17,77
210	232	255	280	308	339	373	410	451	496	546	600	661	727
231	254	279	307	338	372	409	450	495	544	599	659	724	797
6,81	7,49	8,24	9,06	9,97	10,97	12,07	13,27	14,6	16,06	17,66	19,43	21,37	23,51
292	321	353	389	428	470	517	569	626	689	758	833	917	1 008
320	352	387	426	469	515	567	624	686	755	830	913	1 004	1 105
5,3	5,83	6,42	7,06	7,77	8,54	9,4	10,34	11,37	12,51	13,76	15,13	16,65	18,31
230	253	279	307	337	371	408	449	494	543	598	657	723	795
252	277	305	336	369	406	447	491	540	595	654	719	791	870
7,09	7,8	8,58	9,44	10,38	11,42	12,57	13,82	15,2	16,72	18,4	20,24	22,26	24,49
318	349	384	423	465	512	563	619	681	749	824	906	997	1 096
347	382	420	462	508	559	615	677	744	819	901	991	1 090	1 199
5,62	6,18	6,8	7,48	8,23	9,05	9,95	10,95	12,04	13,25	14,57	16,03	17,63	19,39
266	292	322	354	389	428	471	518	570	627	689	758	834	917
290	319	351	386	425	467	514	566	622	684	753	828	911	1 002
5,81	6,39	7,03	7,73	8,5	9,35	10,29	11,31	12,45	13,69	15,06	16,57	18,22	20,04
291	321	353	388	427	469	516	568	625	687	756	831	915	1 006
318	350	385	423	466	512	563	620	682	750	825	907	998	1 098
6,03	6,63	7,29	8,02	8,82	9,7	10,68	11,74	12,92	14,21	15,63	17,19	18,91	20,8
309	340	374	412	453	498	548	603	663	730	803	883	971	1 068
337	371	408	449	494	543	598	657	723	795	875	962	1 059	1 164
6,31	6,94	7,63	8,4	9,24	10,16	11,18	12,29	13,52	14,87	16,36	18	19,8	21,78
367	404	445	489	538	592	651	716	788	867	953	1 048	1 153	1 269
400	440	484	533	586	644	709	780	858	943	1 038	1 141	1 256	1 381
8,38	9,22	10,14	11,15	12,27	13,5	14,84	16,33	17,96	19,76	21,73	23,91	26,3	28,93
506	557	612	674	741	815	897	986	1 085	1 193	1 313	1 444	1 589	1 747
550	605	666	733	806	886	975	1 073	1 180	1 298	1 428	1 570	1 728	1 900

# Displacement

## Number of strokes



**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYD NUT										
<b>530</b>	s mm	2,67	2,94	3,23	3,55	3,91	4,3	4,73	5,2	5,72
	x <sub>1</sub> –	161	177	195	215	236	260	286	314	346
	x <sub>2</sub> –	175	193	212	233	257	282	311	342	376
<b>550</b>	s mm	2,15	2,37	2,6	2,86	3,15	3,46	3,81	4,19	4,61
	x <sub>1</sub> –	135	148	163	179	197	217	239	262	289
	x <sub>2</sub> –	146	161	177	195	214	236	259	285	313
<b>560</b>	s mm	2,81	3,09	3,4	3,74	4,11	4,53	4,98	5,48	6,02
	x <sub>1</sub> –	185	204	224	247	271	299	328	361	397
	x <sub>2</sub> –	201	221	243	268	295	324	356	392	431
<b>570</b>	s mm	3,16	3,48	3,82	4,21	4,63	5,09	5,6	6,16	6,77
	x <sub>1</sub> –	222	244	269	296	325	358	393	433	476
	x <sub>2</sub> –	240	264	291	320	352	387	426	468	515
<b>580</b>	s mm	2,96	3,26	3,58	3,94	4,33	4,77	5,24	5,77	6,35
	x <sub>1</sub> –	211	232	255	281	309	340	374	411	452
	x <sub>2</sub> –	228	251	276	304	334	367	404	445	489

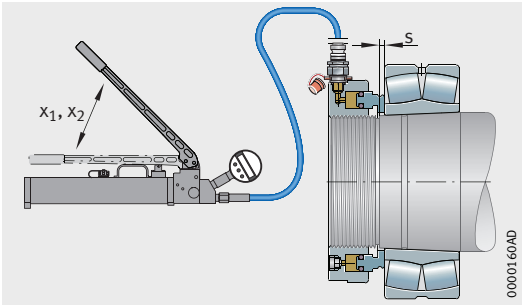
**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYD NUT										
<b>530</b>	s mm	10,87	11,95	13,15	14,46	15,91	17,5	19,25	21,18	23,29
	x <sub>1</sub> –	680	749	823	906	996	1 096	1 206	1 326	1 459
	x <sub>2</sub> –	739	813	894	984	1 082	1 191	1 310	1 441	1 585
<b>550</b>	s mm	14,2	15,62	17,19	18,9	20,79	22,87	25,16	27,68	30,45
	x <sub>1</sub> –	937	1 031	1 134	1 247	1 372	1 509	1 660	1 826	2 009
	x <sub>2</sub> –	1 017	1 119	1 230	1 353	1 489	1 638	1 802	1 982	2 180
<b>560</b>	s mm	11,27	12,4	13,64	15	16,5	18,15	19,97	21,96	24,16
	x <sub>1</sub> –	767	844	929	1 022	1 124	1 236	1 360	1 496	1 645
	x <sub>2</sub> –	832	915	1 006	1 107	1 218	1 340	1 474	1 621	1 783
<b>570</b>	s mm	15,97	17,57	19,33	21,26	23,38	25,72	28,3	31,13	34,24
	x <sub>1</sub> –	1 122	1 235	1 358	1 494	1 643	1 807	1 988	2 187	2 406
	x <sub>2</sub> –	1 215	1 336	1 470	1 617	1 779	1 957	2 152	2 367	2 604
<b>580</b>	s mm	14,96	16,46	18,1	19,91	21,9	24,1	26,5	29,16	32,07
	x <sub>1</sub> –	1 066	1 173	1 290	1 419	1 561	1 717	1 889	2 078	2 286
	x <sub>2</sub> –	1 153	1 268	1 395	1 535	1 688	1 857	2 042	2 247	2 471

5,07	5,58	6,13	6,75	7,42	8,16	8,98	9,88
317	349	384	423	465	511	562	619
345	379	417	459	505	555	611	672
6,63	7,29	8,02	8,82	9,7	10,67	11,74	12,91
437	481	529	582	640	704	775	852
474	522	574	631	695	764	840	924
5,26	5,78	6,36	7	7,7	8,47	9,32	10,25
358	394	433	477	524	577	634	698
388	427	470	516	568	625	687	756
7,45	8,2	9,02	9,92	10,91	12	13,2	14,52
524	576	634	697	767	843	928	1 020
567	623	686	754	830	913	1 004	1 104
6,98	7,68	8,45	9,29	10,22	11,24	12,36	13,6
497	547	602	662	728	801	881	969
538	592	651	716	787	866	953	1 048

# Displacement

## Number of strokes



**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYD NUT										
<b>600</b>	s mm	2,41	2,65	2,92	3,21	3,53	3,88	4,27	4,7	5,17
	x <sub>1</sub> –	182	200	220	242	266	293	322	354	390
	x <sub>2</sub> –	196	216	237	261	287	316	348	382	421
<b>625</b>	s mm	3,16	3,48	3,82	4,21	4,63	5,09	5,6	6,16	6,77
	x <sub>1</sub> –	247	272	299	329	362	398	438	481	530
	x <sub>2</sub> –	267	293	323	355	390	429	472	520	572
<b>630</b>	s mm	2,54	2,79	3,07	3,38	3,72	4,09	4,5	4,95	5,44
	x <sub>1</sub> –	205	226	249	273	301	331	364	400	440
	x <sub>2</sub> –	222	244	268	295	324	357	393	432	475
<b>655</b>	s mm	3,34	3,67	4,04	4,45	4,89	5,38	5,92	6,51	7,16
	x <sub>1</sub> –	286	314	345	380	418	460	506	556	612
	x <sub>2</sub> –	308	339	372	410	451	496	545	600	660
<b>670</b>	s mm	2,71	2,98	3,28	3,61	3,97	4,36	4,8	5,28	5,81
	x <sub>1</sub> –	240	264	290	319	351	387	425	468	514
	x <sub>2</sub> –	259	284	313	344	379	416	458	504	554

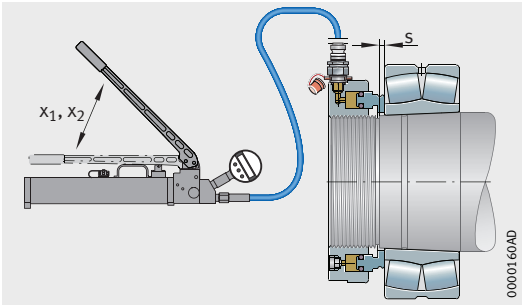
**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYD NUT										
<b>600</b>	s mm	12,18	13,4	14,74	16,21	17,83	19,62	21,58	23,74	26,11
	x <sub>1</sub> –	919	1 010	1 111	1 223	1 345	1 479	1 627	1 790	1 969
	x <sub>2</sub> –	992	1 091	1 200	1 320	1 452	1 598	1 758	1 933	2 127
<b>625</b>	s mm	15,97	17,57	19,33	21,26	23,38	25,72	28,3	31,13	34,24
	x <sub>1</sub> –	1 249	1 373	1 511	1 662	1 828	2 011	2 212	2 433	2 676
	x <sub>2</sub> –	1 348	1 482	1 631	1 794	1 973	2 170	2 387	2 626	2 889
<b>630</b>	s mm	12,84	14,12	15,53	17,09	18,8	20,68	22,74	25,02	27,52
	x <sub>1</sub> –	1 038	1 142	1 257	1 382	1 520	1 672	1 840	2 024	2 226
	x <sub>2</sub> –	1 120	1 232	1 355	1 491	1 640	1 804	1 984	2 183	2 401
<b>655</b>	s mm	16,88	18,57	20,43	22,47	24,72	27,19	29,91	32,9	36,19
	x <sub>1</sub> –	1 443	1 587	1 746	1 921	2 113	2 324	2 557	2 812	3 094
	x <sub>2</sub> –	1 556	1 711	1 882	2 071	2 278	2 506	2 756	3 032	3 335
<b>670</b>	s mm	13,7	15,07	16,57	18,23	20,05	22,06	24,27	26,69	29,36
	x <sub>1</sub> –	1 213	1 334	1 468	1 615	1 776	1 954	2 149	2 364	2 600
	x <sub>2</sub> –	1 307	1 438	1 581	1 739	1 913	2 105	2 315	2 547	2 801

5,68	6,25	6,88	7,56	8,32	9,15	10,07	11,07
429	471	519	570	627	690	759	835
463	509	560	616	678	745	820	902
7,45	8,2	9,02	9,92	10,91	12	13,2	14,52
582	641	705	775	853	938	1 032	1 135
629	692	761	837	920	1 012	1 114	1 225
5,99	6,59	7,25	7,97	8,77	9,65	10,61	11,67
484	533	586	645	709	780	858	944
523	575	632	696	765	842	926	1 018
7,88	8,66	9,53	10,48	11,53	12,68	13,95	15,35
673	741	815	896	986	1 084	1 193	1 312
726	798	878	966	1 063	1 169	1 286	1 414
6,39	7,03	7,73	8,51	9,36	10,29	11,32	12,45
566	623	685	753	829	911	1 003	1 103
610	671	738	811	893	982	1 080	1 188

# Displacement

## Number of strokes



**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNU T										
<b>680</b>	s mm	3,71	4,11	4,53	4,98	5,48	6,02	6,63	7,29	8,02
	x <sub>1</sub> –	340	274	412	453	498	548	603	663	730
	x <sub>2</sub> –	367	403	444	488	537	590	649	714	786
<b>695</b>	s mm	3,53	3,88	4,27	4,7	5,17	5,69	6,25	6,88	7,57
	x <sub>1</sub> –	339	373	410	451	496	546	600	661	727
	x <sub>2</sub> –	365	401	441	485	534	587	646	711	782
<b>710</b>	s mm	2,86	3,15	3,46	3,81	4,19	4,61	5,07	5,57	6,13
	x <sub>1</sub> –	279	307	337	371	408	449	494	543	597
	x <sub>2</sub> –	300	330	363	399	439	483	531	584	642
<b>720</b>	s mm	3,94	4,33	4,77	5,24	5,77	6,35	6,98	7,68	8,45
	x <sub>1</sub> –	407	448	493	542	596	656	721	793	873
	x <sub>2</sub> –	438	481	529	582	641	705	775	853	938
<b>740</b>	s mm	3,74	4,11	4,53	4,98	5,48	6,02	6,63	7,29	8,02
	x <sub>1</sub> –	412	453	498	548	603	663	730	803	883
	x <sub>2</sub> –	442	487	535	589	648	713	784	862	948

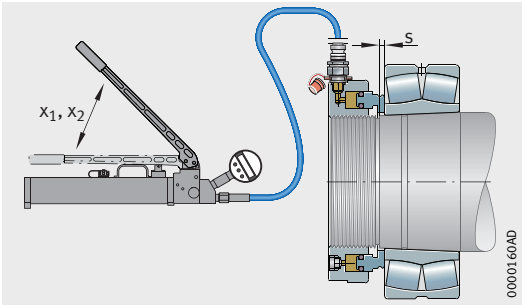
**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNU T										
<b>680</b>	s mm	18,9	20,79	22,87	25,16	27,68	30,44	33,49	36,84	40,52
	x <sub>1</sub> –	1 721	1 893	2 082	2 290	2 519	2 771	3 048	3 353	3 688
	x <sub>2</sub> –	1 853	2 038	2 242	2 466	2 713	2 984	3 282	3 610	3 971
<b>695</b>	s mm	17,84	19,63	21,59	23,75	26,12	28,74	31,61	34,77	38,25
	x <sub>1</sub> –	1 713	1 885	2 073	2 280	2 508	2 759	3 035	3 339	3 673
	x <sub>2</sub> –	1 843	2 028	2 231	2 454	2 699	2 969	3 266	3 592	3 952
<b>710</b>	s mm	14,46	15,9	17,49	19,24	21,16	23,28	25,61	28,17	30,99
	x <sub>1</sub> –	1 409	1 549	1 704	1 875	2 062	2 269	2 495	2 745	3 020
	x <sub>2</sub> –	1 515	1 666	1 833	2 016	2 218	2 439	2 683	2 952	3 247
<b>720</b>	s mm	19,91	21,91	24,1	26,51	29,16	32,07	35,28	38,81	42,69
	x <sub>1</sub> –	2 058	2 264	2 490	2 739	3 013	3 315	3 646	4 011	4 412
	x <sub>2</sub> –	2 212	2 433	2 676	2 944	3 238	3 562	3 918	4 310	4 741
<b>740</b>	s mm	18,9	20,79	22,87	25,16	27,68	30,44	33,49	36,84	40,52
	x <sub>1</sub> –	2 082	2 290	2 519	2 771	3 048	3 353	3 689	4 057	4 463
	x <sub>2</sub> –	2 236	2 460	2 706	2 976	3 274	3 601	3 961	4 358	4 793

8,82	9,7	10,67	11,74	12,91	14,2	15,62	17,19
803	883	971	1 068	1 175	1 293	1 422	1 564
864	951	1 046	1 150	1 265	1 392	1 531	1 684
8,32	9,16	10,07	11,08	12,19	13,41	14,75	16,22
799	879	967	1 064	1 170	1 287	1 416	1 558
860	946	1 041	1 145	1 259	1 385	1 524	1 676
6,74	7,42	8,16	8,98	9,87	10,86	11,95	13,14
657	723	795	875	962	1 058	1 164	1 281
707	777	855	941	1 035	1 138	1 252	1 377
9,29	10,22	11,24	12,37	13,6	14,96	16,46	18,1
960	1 056	1 162	1 278	1 406	1 546	1 701	1 871
1 032	1 135	1 248	1 373	1 511	1 662	1 828	2 011
8,82	9,7	10,67	11,74	12,91	14,2	15,62	17,19
971	1 068	1 175	1 293	1 422	1 564	1 721	1 893
1 043	1 147	1 262	1 388	1 527	1 680	1 848	2 033

# Displacement

## Number of strokes



**Value table** (continued)

Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNU T										
<b>750</b>	s mm	3,82	4,2	4,62	5,08	5,59	6,15	6,77	7,44	8,19
	x <sub>1</sub> –	439	483	532	585	643	708	778	856	942
	x <sub>2</sub> –	472	519	571	628	690	759	835	919	1 011
<b>760</b>	s mm	4,19	4,61	5,07	5,58	6,13	6,75	7,42	8,17	8,98
	x <sub>1</sub> –	487	536	590	649	713	785	863	950	1 045
	x <sub>2</sub> –	523	575	633	696	765	842	926	1.019	1 121
<b>780</b>	s mm	3,94	4,33	4,77	5,24	5,77	6,35	6,98	7,68	8,45
	x <sub>1</sub> –	469	515	567	624	686	755	830	913	1 005
	x <sub>2</sub> –	502	553	608	669	735	809	890	979	1 077
<b>800</b>	s mm	4,01	4,41	4,85	5,34	5,87	6,46	7,1	7,81	8,6
	x <sub>1</sub> –	482	530	583	641	705	776	854	939	1 033
	x <sub>2</sub> –	516	568	625	687	756	831	914	1 006	1 107
<b>830</b>	s mm	4,19	4,61	5,07	5,58	6,13	6,75	7,42	8,17	8,98
	x <sub>1</sub> –	513	565	621	683	752	827	910	1 001	1 101
	x <sub>2</sub> –	550	605	665	732	805	885	974	1 071	1 178

**Value table** (continued)

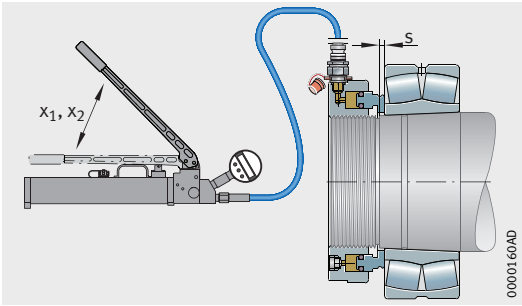
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNU T										
<b>750</b>	s mm	19,31	21,24	23,36	25,7	28,27	31,1	34,21	37,63	41,39
	x <sub>1</sub> –	2 221	2 443	2 687	2 956	3 251	3 577	3 934	4 328	4 760
	x <sub>2</sub> –	2.384	2.622	2.884	3.173	3.490	3.839	4.223	4.645	5.109
<b>760</b>	s mm	21,18	23,3	25,63	28,19	31,01	34,11	37,52	41,27	45,4
	x <sub>1</sub> –	2 463	2 709	2 980	3 278	3 606	3 967	4 364	4 800	5 280
	x <sub>2</sub> –	2 642	2 906	3 197	3 517	3 868	4 255	4 681	5 149	5 664
<b>780</b>	s mm	19,91	21,91	21,1	26,51	29,16	32,07	35,28	39,81	42,69
	x <sub>1</sub> –	2 369	2 605	2 866	3 153	3 468	3 815	4 196	4 616	5 077
	x <sub>2</sub> –	2 539	2 793	3 072	3 380	3 718	4 089	4 498	4 948	5 443
<b>800</b>	s mm	20,27	22,3	24,52	26,98	29,68	32,64	35,91	39,5	43,45
	x <sub>1</sub> –	2 435	2 679	2 947	3 242	3 566	3 922	4 314	4 746	5 221
	x <sub>2</sub> –	2 609	2 870	3 157	3 473	3 820	4 202	4 622	5 084	5 593
<b>830</b>	s mm	21,18	23,3	25,63	28,19	31,01	34,11	37,52	41,27	45,4
	x <sub>1</sub> –	2 595	2 855	3 140	3 454	3 800	4 179	4 597	5 057	5 563
	x <sub>2</sub> –	2 778	3 056	3 362	3 698	4 068	4 475	4 922	5 414	5 956





# Displacement

## Number of strokes



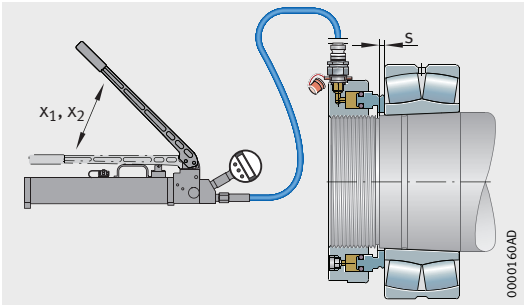
Value table (continued)										
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNU T										
850	s mm	4,29	4,72	5,19	5,71	6,28	6,91	7,6	8,36	9,2
	x <sub>1</sub> –	551	606	667	733	807	887	976	1 074	1 181
	x <sub>2</sub> –	590	648	714	785	863	950	1 045	1 149	1 264
880	s mm	4,42	4,86	5,35	5,88	6,47	7,12	7,83	8,61	9,47
	x <sub>1</sub> –	565	621	683	752	827	909	1 000	1 100	1 210
	x <sub>2</sub> –	604	664	730	803	884	972	1 069	1 176	1 294
900	s mm	4,62	5,08	5,59	6,15	6,76	7,44	8,18	9	9,9
	x <sub>1</sub> –	643	707	778	856	941	1 036	1 139	1 253	1 378
	x <sub>2</sub> –	687	755	831	914	1 005	1 106	1 216	1 338	1 472
930	s mm	4,69	5,16	5,67	6,24	6,87	7,55	8,31	9,14	10,05
	x <sub>1</sub> –	673	741	815	896	986	1 084	1 193	1 312	1 443
	x <sub>2</sub> –	718	790	869	956	1 051	1 157	1 272	1 399	1 539
950	s mm	4,89	5,38	5,92	6,51	7,16	7,88	8,66	9,53	10,48
	x <sub>1</sub> –	743	817	898	988	1 087	1 196	1 315	1 447	1 592
	x <sub>2</sub> –	792	870	957	1.053	1.159	1.274	1.402	1.542	1.696

Value table (continued)										
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNU T										
850	s mm	21,68	23,85	26,24	28,86	31,75	34,92	38,41	42,26	46,48
	x <sub>1</sub> –	2 785	3 064	3 370	3 707	4 078	4 486	4 934	5 427	5 970
	x <sub>2</sub> –	2 980	3 278	3 606	3 967	4 363	4 799	5 279	5 807	6 388
880	s mm	22,34	24,57	27,03	29,74	32,71	35,98	39,58	43,54	47,89
	x <sub>1</sub> –	2 854	3 140	3 454	3 799	4 179	4 597	5 056	5 562	6 118
	x <sub>2</sub> –	3 051	3 356	3 692	4 061	4 467	4 913	5 405	5 945	6 540
900	s mm	23,35	25,69	28,26	31,08	34,19	37,61	41,37	45,51	50,06
	x <sub>1</sub> –	3 250	3 575	3 933	4 326	4 758	5 234	5 758	6 334	6 967
	x <sub>2</sub> –	3 470	3 817	4 199	4 619	5 081	5 589	6 148	6 763	7 439
930	s mm	23,71	26,08	28,68	31,55	34,71	38,18	42	46,2	50,81
	x <sub>1</sub> –	3 403	3 743	4 117	4 529	4 982	5 480	6 028	6 631	7 294
	x <sub>2</sub> –	3 630	3 993	4 392	4 831	5 314	5 846	6 430	7 074	7 781
950	s mm	24,72	27,19	29,91	32,9	36,19	39,81	43,79	48,17	52,98
	x <sub>1</sub> –	3 753	4 129	4 541	4 996	5 495	6 045	6 649	7 314	8 045
	x <sub>2</sub> –	3 999	4 399	4 839	5 323	5 856	6 441	7 085	7 794	8 573

10,12	11,13	12,24	13,46	14,81	16,29	17,92	19,71
1 299	1 429	1 572	1 729	1 902	2 093	2 302	2 532
1 390	1 529	1 682	1 850	2 035	2 239	2 463	2 709
10,42	11,46	12,61	13,87	15,26	16,78	18,46	20,31
1 332	1 465	1 611	1 772	1 949	2 144	2 359	2 595
1 423	1 566	1 722	1 894	2 084	2 292	2 521	2 774
10,89	11,98	13,18	14,5	15,95	17,54	19,3	21,23
1 516	1 668	1 835	2 018	2 220	2 442	2 686	2 955
1 619	1 781	1 959	2 155	2 370	2 607	2 868	3 155
11,06	12,16	13,38	14,72	16,19	17,81	19,59	21,55
1 587	1 746	1 921	2 113	2 324	2 557	2 812	3 094
1 693	1 863	2 049	2 254	2 479	2 727	3 000	3 300
11,53	12,68	13,95	15,35	16,88	18,57	20,43	22,47
1 751	1 926	2 119	2 330	2 564	2 820	3 102	3 412
1.866	2.052	2 258	2 483	2 732	3 005	3 305	3 636

# Displacement

## Number of strokes



Value table (continued)										
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNUT										
1000	s mm	5,07	5,58	6,13	6,75	7,42	8,17	8,98	9,88	10,87
	x <sub>1</sub> –	841	925	1 017	1 119	1 231	1 354	1 489	1 638	1 802
	x <sub>2</sub> –	895	984	1 083	1 191	1 310	1 441	1 585	1 744	1 918
1060	s mm	5,33	5,86	6,45	7,09	7,8	8,58	9,44	10,39	11,43
	x <sub>1</sub> –	954	1 049	1 154	1 270	1 397	1 536	1 690	1 859	2 045
	x <sub>2</sub> –	1 014	1 116	1 227	1 350	1 485	1 633	1 797	1 976	2 174
1080	s mm	5,81	6,39	7,03	7,73	8,51	9,36	10,29	11,32	12,45
	x <sub>1</sub> –	1 085	1 193	1 313	1 444	1 588	1 747	1 922	2 114	2 326
	x <sub>2</sub> –	1 152	1 268	1 394	1 534	1 687	1 856	2 042	2 246	2 470
1120	s mm	5,62	6,18	6,8	7,48	8,23	9,05	9,96	10,95	12,05
	x <sub>1</sub> –	1 187	1 306	1 436	1 580	1 738	1 911	2 103	2 313	2 544
	x <sub>2</sub> –	1 259	1 385	1 524	1 676	1 844	2 028	2 231	2 454	2 700
1180	s mm	5,91	6,5	7,15	7,87	8,65	9,52	10,47	11,52	12,67
	x <sub>1</sub> –	1 379	1 517	1 669	1 835	2 019	2 221	2 443	2 687	2 956
	x <sub>2</sub> –	1 462	1 608	1 769	1 946	2 140	2 354	2 590	2 849	3 133

Value table (continued)										
Designation	s = Displacement x <sub>1</sub> = Number of strokes <b>with</b> hydraulic method x <sub>2</sub> = Number of strokes <b>without</b> hydraulic method									
HYDNUT										
1000	s mm	25,63	28,19	31,01	34,11	37,52	41,27	45,4	49,94	54,93
	x <sub>1</sub> –	4 249	4 674	5 142	5 656	6 221	6 843	7 528	8 281	9 109
	x <sub>2</sub> –	4 523	4 975	5 473	6 020	6 622	7 284	8 013	8 814	9 695
1060	s mm	26,94	29,63	32,6	35,86	39,44	43,39	47,73	52,5	57,75
	x <sub>1</sub> –	4 821	5 303	5 834	6 417	7 059	7 764	8 541	9 395	10 335
	x <sub>2</sub> –	5 126	5 639	6 203	6 823	7 505	8 256	9 082	9 990	10 989
1080	s mm	29,37	32,3	35,53	39,09	43	47,29	52,02	57,23	62,95
	x <sub>1</sub> –	5 484	6 032	6 635	7 299	8 029	8 831	9 715	10 686	11 755
	x <sub>2</sub> –	5 825	6 407	7 048	7 753	8 528	9 381	10 319	11 351	12 486
1120	s mm	28,41	31,25	34,37	37,81	41,59	45,75	50,32	55,36	60,89
	x <sub>1</sub> –	5 999	6 599	7 259	7 985	8 783	9 661	10 628	11 690	12 859
	x <sub>2</sub> –	6 366	7 002	7 702	8 473	9 320	10 252	11 277	12 405	13 645
1180	s mm	29,87	32,86	36,15	39,76	43,74	48,11	52,92	58,21	64,03
	x <sub>1</sub> –	6 970	7 667	8 434	9 277	10 205	11 225	12 348	13 583	14 941
	x <sub>2</sub> –	7 388	8 127	8 940	9 834	10 817	11 899	13 089	14 398	15 838



**Schaeffler Technologies  
GmbH & Co. KG**

Georg-Schäfer-Straße 30  
97421 Schweinfurt (Germany)  
Internet [www.fag.com](http://www.fag.com)  
E-Mail [FAGinfo@schaeffler.com](mailto:FAGinfo@schaeffler.com)

In Germany:

Phone 0180 5003872  
Fax 0180 5003873

From other countries:

Phone +49 9721 91-0  
Fax +49 9721 91-3435

Every care has been taken to ensure the correctness of the information contained in this publication but no liability can be accepted for any errors or omissions. We reserve the right to make technical changes.

© Schaeffler Technologies GmbH & Co. KG  
Issued: 2010, August

This publication or parts thereof may not be reproduced without our permission.

BA 20 GB-D