SCHAEFFLER



Hydraulic Pumps

PUMP700-2L
PUMP1000-2,2L
PUMP1000-5L-AIR
PUMP4000-1,6L

Hydraulic pumps

		Page
Features	Operation	2
	Pressure	3
	Hydraulic oil	3
	Marking	3
	Hand pump set PUMP700-2L	4
	Hand pump set PUMP1000-2,2L	6
	Compressed air-driven foot pump PUMP1000-5L-AIR	8
	Hand pump set PUMP4000-1,6L	10
	Accessories for pump sets	12
Design and safety guidelines	Areas of application of hydraulic pumps	14
	Requirements for consumer device connector	17
	Safety	17
Dimension table	Hydraulic pumps	18

Hydraulic pumps

Features

The range of hydraulic pumps from Schaeffler comprises the designs:

- PUMP700-2L Hand pump, twin stage
- PUMP1000-2,2L Hand pump, twin stage
- PUMP1000-5L-AIR Foot pump, compressed air-driven, stageless design
- PUMP4000-1,6L Hand pump, single stage.

The hydraulic pumps are supplied as complete hydraulic pump sets and comprise a pump body (hand pump or foot pump), analogue manometer, hydraulic hose (with coupling sleeve) and push fit coupling nipple with thread $G^{1}/_{4}$ for the consumer device, *Figure 1*.

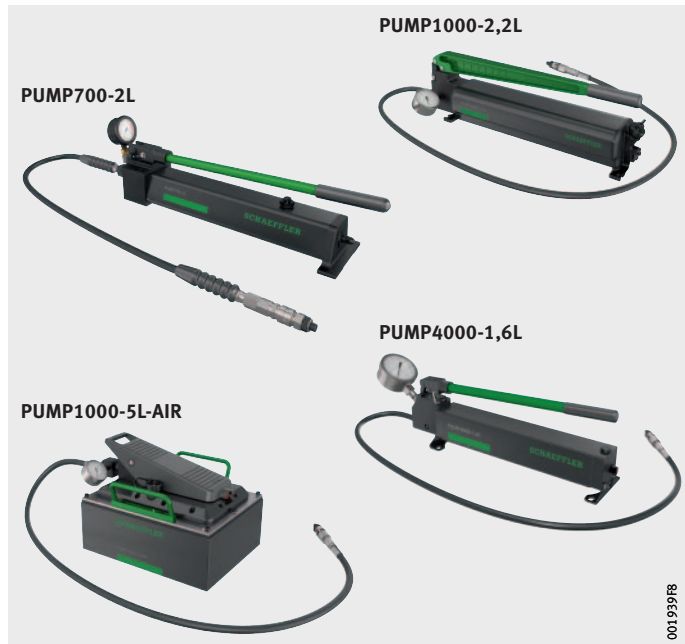


Figure 1
Hydraulic pump sets

Operation

The hydraulic hand pumps PUMP700-2L, PUMP1000-2,2L and PUMP4000-1,6L are only operated manually. The hydraulic foot pump PUMP1000-5L-AIR is operated by compressed air.

The pumps PUMP700-2L and PUMP1000-2,2L are of a twin stage design, PUMP4000-1,6L is of a single stage design and the foot pump PUMP1000-5L-AIR is of a stageless design. The values for oil flow per stroke in the first stage and in the second stage or the values for oil flow per minute in the foot pump are given in the dimension table.

Between the hydraulic hose and connection nipple, push fit couplings are used that allow very quick and easy disconnection and connection during use.

Pressure

The maximum permissible operating pressure p_{max} of the hydraulic pumps is between 700 bar and 4 000 bar. The value is stated in the designation of the hydraulic pump. It is also given on the nameplate. Values: see dimension table.

Hydraulic oil

The hydraulic pumps are supplied already filled with the required quantity of hydraulic oil. The hydraulic oil has a viscosity grade that is in the range from ISO VG 32 to ISO VG 46.

Volume of oil container

The volume V_{max} of the oil container varies between 1,8 l and 5 l, see dimension table. For the pumps PUMP700-2L, PUMP1000-2,2L and PUMP1000-5L-AIR, the volume V_{max} of the oil container is stated in the designation.

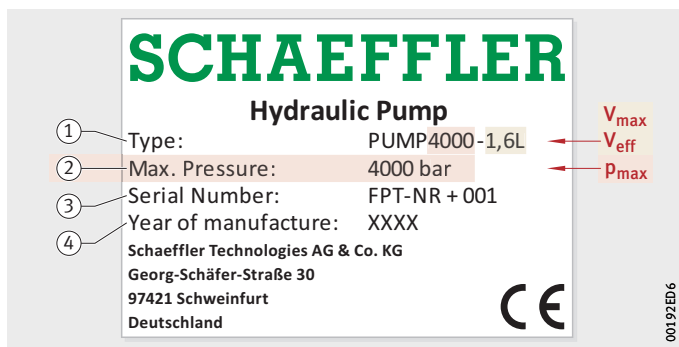
Usable oil quantity

The usable oil quantity V_{eff} during the application of hydraulic pumps is somewhat smaller than the volume V_{max} of the oil container. The values are between 1,6 l und 4 l, see dimension table. For the pump PUMP4000-1,6L, the usable oil quantity V_{eff} is stated in the designation.

Marking

The hydraulic pumps are equipped with a nameplate that contains the following information:

- ordering designation or code;
  this contains information on the volume V_{max} of the oil container or on the usable oil quantity V_{eff}
- maximum operating pressure p_{max}
- serial number
- year of manufacture
- CE mark.



① Ordering designation
② Maximum operating pressure
③ Serial number
④ Year of manufacture

Figure 2
Marking of hydraulic pumps taking the example of PUMP4000-1,6L

The hydraulic hoses are printed with the rupture pressure, the maximum operating pressure p_{max} and the date of manufacture.

Based on the markings, the user can check whether the selected hydraulic pump set is essentially suitable for the necessary operating pressure and the oil volume required for the application.

Hydraulic pumps

Hand pump set PUMP700-2L

The hydraulic hand pump PUMP700-2L is suitable for applications up to 700 bar and for the mounting of press fits up to a contact pressure of 35 N/mm^2. The usable oil quantity is 1,6 l.
It can therefore be used as a pressure generation device for the following applications:

- mounting and dismounting of rolling bearings with hydraulic nuts
- mounting and dismounting by the hydraulic method, for example of shaft couplings, pinions, gears, ships' propellers.

The twin stage pump is operated manually by means of a hand lever. It offers a good price/performance ratio for occasional use, is characterised by its ease of use and, with a mass of only 6 kg, is very easy to handle. The technical data are listed in the dimension table, see page 18.

Scope of delivery

① Hand pump 700 bar with 2 litre oil container, twin stage, completely filled with hydraulic oil ISO VG 32

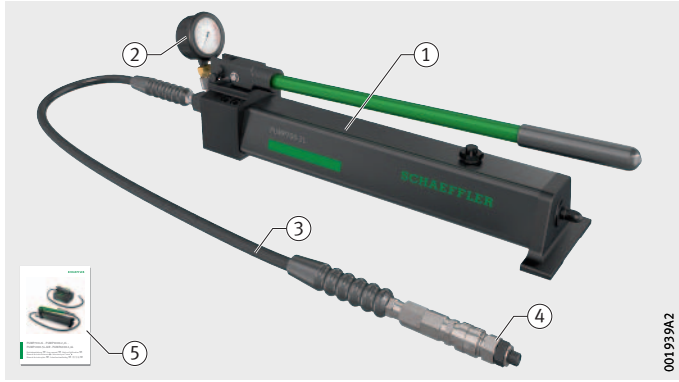
② Analogue manometer 0 bar to 700 bar, display with diameter ∅63 mm, threaded connector G$^1/_4$

③ Hydraulic hose 1 000 bar, hose length 1,5 m, with push fit coupling sleeve

④ Push fit coupling nipple 1 000 bar with threaded connector G$^1/_4$ for the consumer device. Other sizes: see section Accessories for pump sets, page 12

⑤ User manual BA 54, Hydraulic Pumps.

The hydraulic pump set is supplied completely assembled and ready for operation, *Figure 3* and table.



① Hand pump
② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple
⑤ User manual

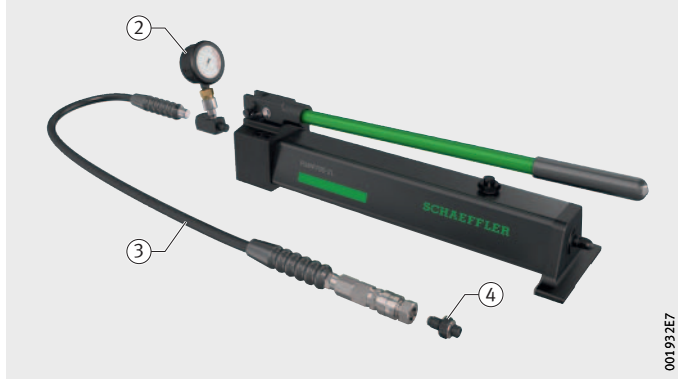
Figure 3
PUMP700-2L

Ordering designation

Pump type	Ordering designation	Ordering number
Hand pump set, 700 bar	PUMP700-2L	094150940-0000-10

Replacement parts

The analogue manometer ②, the hydraulic hose with coupling sleeve ③ and the coupling nipple ④ can be ordered as replacement parts, *Figure 4* and table.



② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple

Figure 4
Replacement parts PUMP700-2L

Ordering designations Replacement parts

Component		Ordering designation	Ordering number
②	Manometer, analogue	PUMP700.MANO	094151067-0000-10
③	Hydraulic hose with coupling sleeve	PUMP700.HOSE	094151091-0000-10
④	Coupling nipple	PUMP1000.NIPPLE	094151105-0000-10

Accessories

For the hydraulic pump set PUMP700-2L, a digital manometer and an adapter set for three different sizes of consumer device connectors $G^{3}/_{8}$, $G^{1}/_{2}$ and $G^{3}/_{4}$ can be ordered as accessories, see table, page 12.

Hydraulic pumps

Hand pump set PUMP1000-2,2L

The hydraulic hand pump PUMP1000-2,2L is suitable for applications up to 1 000 bar and for the mounting of press fits up to a contact pressure of 50 N/mm^2. The usable oil quantity is 2 l.
It can therefore be used as a pressure generation device for the following applications:

- mounting and dismounting of rolling bearings with hydraulic nuts
- mounting and dismounting by the hydraulic method, for example of shaft couplings, pinions, gears, ships' propellers.

The twin stage pump is operated manually by means of a hand lever. It is ideally suitable for continuous use and is very easy to handle. The technical data are listed in the dimension table, see page 18.

Scope of delivery

① Hand pump 1 000 bar with 2,2 litre oil container, twin stage, completely filled with hydraulic oil ISO VG 32

② Analogue manometer 0 bar to 1 000 bar, display with diameter ∅63 mm, threaded connector G$^1/_4$

③ Hydraulic hose 1 000 bar, hose length 2 m, with push fit coupling sleeve

④ Push fit coupling nipple 1 000 bar with threaded connector G$^1/_4$ for the consumer device. Other sizes: see section Accessories for pump sets, page 12

⑤ User manual BA 54, Hydraulic Pumps.

The hydraulic pump set is supplied completely assembled and ready for operation, *Figure 5* and table.



① Hand pump
② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple
⑤ User manual

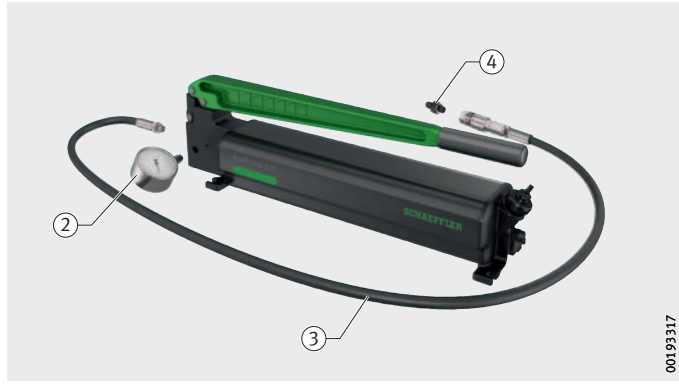
Figure 5
PUMP1000-2,2L

Ordering designation

Pump type	Ordering designation	Ordering number
Hand pump set, 1 000 bar	PUMP1000-2,2L	094154945-0000-10

Replacement parts

The analogue manometer ②, the hydraulic hose with coupling sleeve ③ and the coupling nipple ④ can be ordered as replacement parts, *Figure 6* and table.



② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple

Figure 6
Replacement parts PUMP1000-2,2L

Ordering designations Replacement parts

Component		Ordering designation	Ordering number
②	Manometer, analogue	PUMP1000.MANO	039619834-0000-10
③	Hydraulic hose with coupling sleeve	PUMP1000.HOSE	094342741-0000-10
④	Coupling nipple	PUMP1000.NIPPLE	094151105-0000-10

Accessories

For the hydraulic pump set PUMP1000-2,2L, a digital manometer and an adapter set for three different sizes of consumer device connectors $G^{3}/_{8}$, $G^{1}/_{2}$ and $G^{3}/_{4}$ can be ordered as accessories, see table, page 12.

Compressed air-driven foot pump PUMP1000-5L-AIR

The hydraulic foot pump PUMP1000-5L-AIR driven by compressed air is suitable for applications up to 1 000 bar and for the mounting of press fits up to a contact pressure of 50 N/mm^2. The usable oil quantity is 4 l. It can therefore be used as a pressure generation device for the following applications:

- mounting and dismounting of rolling bearings with hydraulic nuts
- mounting and dismounting by the hydraulic method, for example of shaft couplings, pinions, gears, ships' propellers.

The foot pump is operated by compressed air. For its function, the pneumatic connector requires a compressed air supply and is equipped with a pressure control valve. Since application is hands-free, this compressed air-driven variant is very comfortable to use. It is optimally suitable for day-to-day use (batch mounting) and is also recommended for use with large hydraulic nuts. The technical data on the pump and the required compressed air supply are listed in the dimension table, see page 18.

Scope of delivery

① Compressed air-driven foot pump 1 000 bar with 5 litre oil container, stageless design, completely filled with hydraulic oil ISO VG 32, compressed air connector ADAPTER-AIR with G$^1/_4$ (BSP) for connection of the compressed air supply p_{AIR}

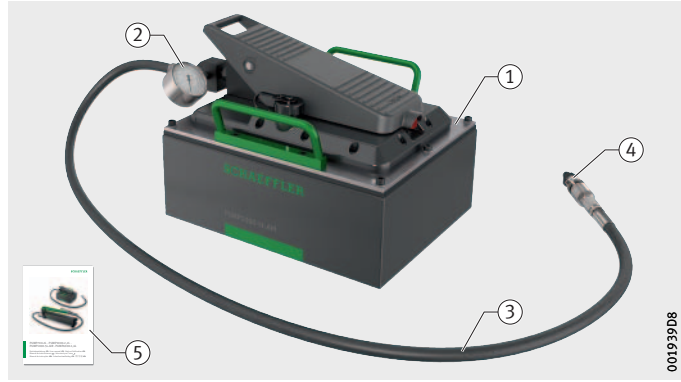
② Analogue manometer 0 bar to 1 000 bar, display with diameter ∅63 mm, threaded connector G$^1/_4$

③ Hydraulic hose 1 000 bar, hose length 2 m, with push fit coupling sleeve

④ Push fit coupling nipple 1 000 bar with threaded connector G$^1/_4$ for the consumer device. Other sizes: see section Accessories for pump sets, page 12

⑤ User manual BA 54, Hydraulic Pumps.

The hydraulic pump set is supplied completely assembled and ready for operation, *Figure 7* and table.



① Compressed air-driven foot pump
② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple
⑤ User manual

Figure 7
PUMP1000-5L-AIR

Ordering designation

Pump type	Ordering designation	Ordering number
Compressed air-driven foot pump, 1 000 bar	PUMP1000-5L-AIR	094154953-0000-10

Replacement parts

The analogue manometer ②, the hydraulic hose with coupling sleeve ③ and the coupling nipple ④ can be ordered as replacement parts, *Figure 8* and table.



② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple

Figure 8
Replacement parts PUMP1000-5L-AIR

Ordering designations Replacement parts

Component		Ordering designation	Ordering number
②	Manometer, analogue	PUMP1000.MANO	039619834-0000-10
③	Hydraulic hose with coupling sleeve	PUMP1000.HOSE	094342741-0000-10
④	Coupling nipple	PUMP1000.NIPPLE	094151105-0000-10

Accessories

For the hydraulic pump set PUMP1000-5L-AIR, a digital manometer and an adapter set for three different sizes of consumer device connectors $G^{3}/_{8}$, $G^{1}/_{2}$ and $G^{3}/_{4}$ can be ordered as accessories, see table, page 12.

Hydraulic pumps

Hand pump set PUMP4000-1,6L

The hydraulic hand pump PUMP4000-1,6L is suitable for applications up to 4 000 bar and for the mounting of press fits with high contact pressures of up to 200 N/mm^2. The usable oil quantity is 1,6 l. It is therefore recommended as a pressure generation device for the following high pressure applications:

- mounting and dismounting by the oil pressure method, or example of shaft couplings, pinions, gears, ships' propellers.

The pump is operated manually by means of a hand lever. It is very light and characterised by its ease of use. As a special pump for the high pressure range, it is the ideal pressure generation device for the oil pressure method, which reduces the drive-up forces during mounting using hydraulic nuts. The technical data are listed in the dimension table, see page 18.

Scope of delivery

① Hand pump 4 000 bar with 1,8 litre oil container, single stage, completely filled with hydraulic oil ISO VG 46

② Analogue manometer 0 bar to 4 000 bar, extra large display with diameter ∅100 mm, threaded connector G$^1/_4$

③ Hydraulic hose 4 000 bar, hose length 2 m, with push fit coupling sleeve

④ Push fit coupling nipple 4 000 bar with threaded connector G$^1/_4$ for the consumer device. Other sizes: see section Accessories for pump sets, page 12

⑤ User manual BA 54, Hydraulic Pumps.

The hydraulic pump set is supplied completely assembled and ready for operation, *Figure 9* and table.



① Hand pump
② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple
⑤ User manual

Figure 9
PUMP4000-1,6L

Ordering designation

Pump type	Ordering designation	Ordering number
Hand pump set, 4 000 bar	PUMP4000-1,6L	094156743-0000-10

Replacement parts

The analogue manometer ②, the hydraulic hose with coupling sleeve ③ and the coupling nipple ④ can be ordered as replacement parts, *Figure 10* and table.



② Manometer, analogue
③ Hydraulic hose with coupling sleeve
④ Coupling nipple

Figure 10
Replacement parts PUMP4000-1,6L

Ordering designations Replacement parts

Component		Ordering designation	Ordering number
②	Manometer, analogue	PUMP4000.MANO	094256756-0000-10
③	Hydraulic hose with coupling sleeve	PUMP4000.HOSE	094256748-0000-10
④	Coupling nipple	PUMP4000.NIPPLE	094256730-0000-10

Accessories

For the hydraulic pump set PUMP4000-1,6L, an adapter set for three different consumer device connectors $G^{3}/_{8}$, $G^{1}/_{2}$ and $G^{3}/_{4}$ can be ordered as accessories, see table, page 12.

Accessories for pump sets

For the hydraulic pump sets, a digital manometer (not in the case of PUMP4000-1,6L) and an adapter set for three further sizes of consumer device connectors are available as a separate accessory.

Ordering designations Accessories

Component	Ordering designation	Ordering number
PUMP700-2L, PUMP1000-2,2L and PUMP1000-5L-AIR		
Adapter set comprising 3 adapters $G^{1}/_{2}$, $G^{3}/_{8}$, $G^{3}/_{4}$ (with sealing ring)	PUMP1000.ADAPTER-SET	094151113-0000-10
Digital manometer	PUMP1000.MANO-DIGI	038809028-0000-10
PUMP4000-1,6L		
Adapter set comprising 3 adapters $G^{1}/_{2}$, $G^{3}/_{8}$, $G^{3}/_{4}$	PUMP4000.ADAPTER-SET	094256969-0000-10

Digital manometer

The digital manometer PUMP1000.MANO-DIGI is, like the analogue standard manometer, equipped with a threaded connector $G^{1}/_{4}$. It can be used in place of the analogue manometer included in the hydraulic pump set, *Figure 11*. The digital manometer can be used for the hydraulic pumps with a maximum operating pressure of 700 bar or 1 000 bar.

The digital manometer is supplied together with an adapter and a blind plug, which are additionally used for mounting in PUMP1000-2,2L and PUMP1000-5L-AIR, see also user manual BA 54, Hydraulic Pumps.

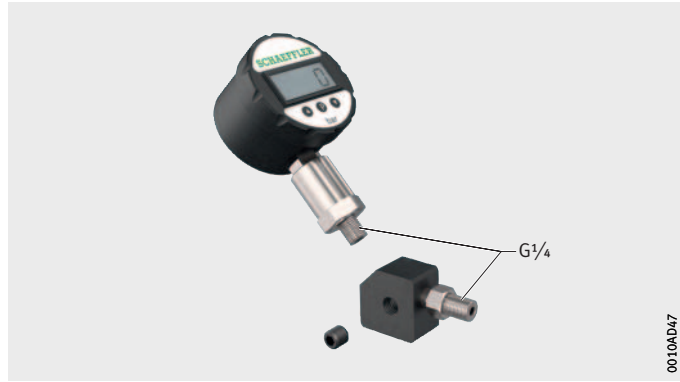


Figure 11
Digital manometer PUMP1000.MANO-DIGI

Adapter set

Each adapter set comprises three adapters with threaded connector $G^{1}/_{2}$, $G^{3}/_{8}$ and $G^{3}/_{4}$, *Figure 12*, page 13. The adapter set PUMP1000.ADAPTER-SET is compatible with the 700 bar pump and the 1 000 bar pumps, while the PUMP4000.ADAPTER-SET is compatible with the 4 000 bar pump.

The accessory adapters can be screwed into the push fit coupling nipple instead of the standard adapter (threaded connector $G^1/_4$), if a consumer device with the threaded connector bore $G^1/_2$, $G^3/_8$ or $G^3/_4$ is used. The adapters for use up to 1 000 bar already have an integrated sealing ring, as in the standard adapter, *Figure 12*. The adapters in the PUMP4000.ADAPTER-SET are supplied, as in the standard adapter, without a sealing ring (different seal design).

① Coupling nipple
② Accessory adapters
③ Sealing ring
(only with PUMP1000.ADAPTER-SET)
$G^1/_4$, $G^3/_8$, $G^1/_2$, $G^3/_4$ = threaded connector for consumer device

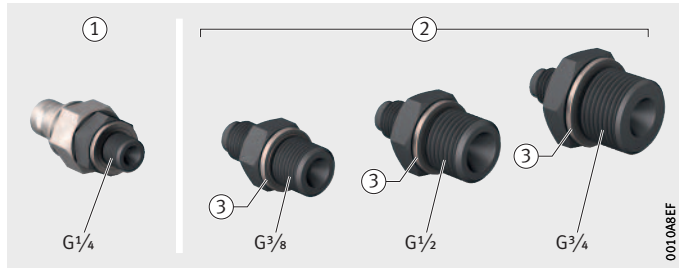
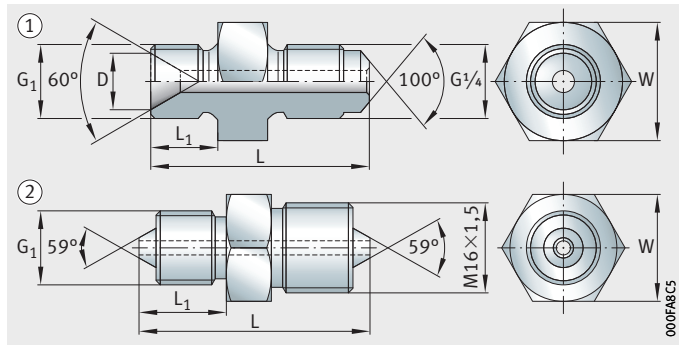


Figure 12
Adapter set comprising 3 adapters

Dimensions of adapters, *Figure 13* and table. Required dimensions of consumer device connectors see page 17.



① For 700 bar and 1 000 bar pumps
② For 4 000 bar pump

Figure 13
Adapters

Dimensions of adapters

Threaded connector	For 700 bar and 1 000 bar, PUMP1000.ADAPTER-SET				For 4 000 bar, PUMP4000.ADAPTER-SET		
G_1 mm	D mm	L_1 mm	L mm	W mm	L_1 mm	L mm	W mm
Standard							
$G^1/_4$	10	12	39	21	12,5	41	19
Accessories							
$G^3/_8$	10	17	44	21	12,5	41	19
$G^1/_2$	14	20	47	26	14,5	43,5	22
$G^3/_4$	14	22	49	32	15,5	46	30

Design and safety guidelines

Areas of application of hydraulic pumps

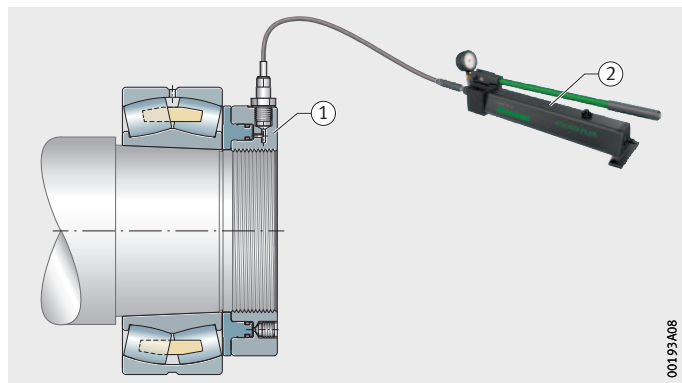
The hydraulic pump sets are highly suitable for the mounting and dismounting of rolling bearings with hydraulic nuts. In particular, the 700 bar pump and the 1 000 bar pumps are recommended for this purpose.

If the hydraulic method is used, the hydraulic pumps are also suitable for the mounting and dismounting of press fits.

For example, they can be used for the mounting or dismounting of shaft couplings, pinions, gears or ships' propellers. Such mounting operations often require considerable drive-up forces, which can provided by the hydraulic pumps together with hydraulic nuts. The 1 000 bar pumps and in particular the 4 000 bar pump PUMP4000-1,6L can be used to generate very high drive-up forces.

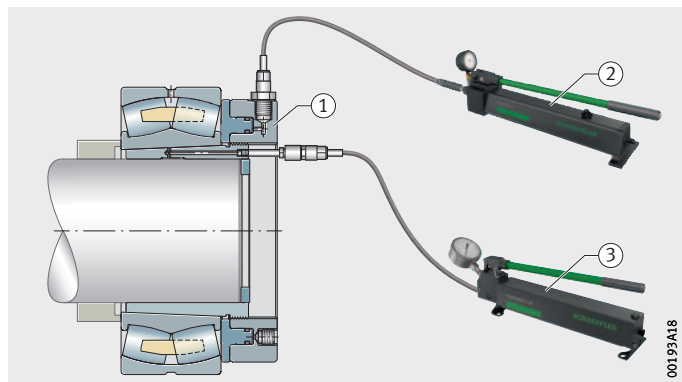
Mounting and dismounting using hydraulic nuts

Hydraulic nuts can be used in the mounting and dismounting of bearings of all sizes. A hydraulic pump is used as a pressure generation device for the hydraulic nut. In the case of smaller or medium bearing sizes, the bearings are slid "dry" onto the bearing seat, *Figure 14*. If higher drive-up forces are required, however, it is recommended that mounting or dismounting is carried out in combination with the hydraulic method, *Figure 15*.



① Hydraulic nut
② Pressure generation device for mounting with hydraulic nut

Figure 14
Mounting of bearing on shaft using hydraulic nut



① Hydraulic nut
② Pressure generation device for mounting with hydraulic nut
③ Pressure generation device for hydraulic method

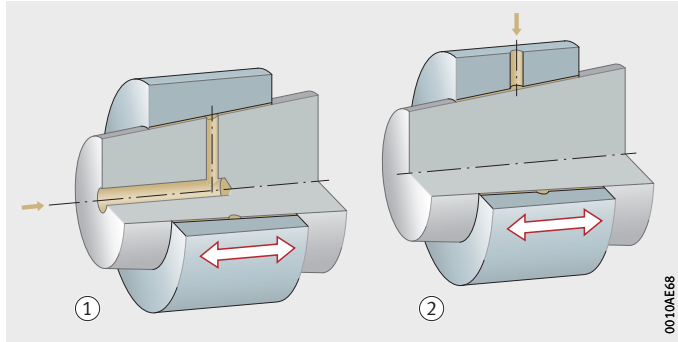
Figure 15
Dismounting of withdrawal sleeve with hydraulic nut, on combination with hydraulic method

Hydraulic method, oil pressure method

In the hydraulic method, also known as the oil pressure method, oil is pressed between the fit surfaces, causing slight expansion of the bearing ring or hub, *Figure 16*. The fluid film eliminates the contact between the fit parts to the point where these can be displaced with little application of force and without the risk of surface damage.

The hydraulic method is only suitable for dismounting in the case of cylindrical fit parts. Conical fit parts can, however, be either mounted and removed using the hydraulic method.

During dismounting, the inner ring becomes loose abruptly. It must therefore be axially secured.



① Hydraulic connection through shaft

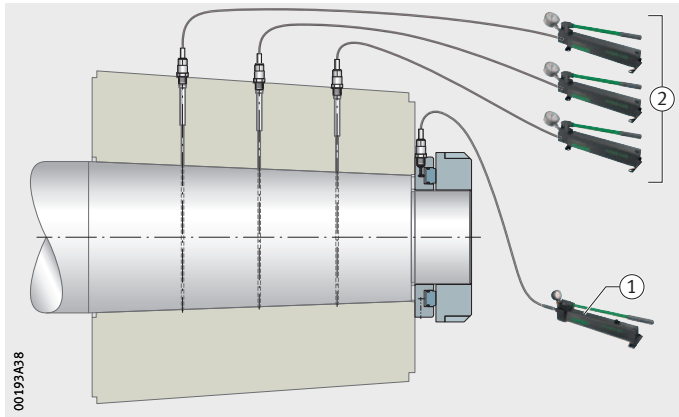
② Hydraulic connection through hub

Figure 16
Principle of hydraulic method: creation of a fluid film between the fit surfaces

Hydraulic nuts are used as a mounting tool. The hydraulic method to be used in this combination requires one or more separate pressure generation devices. The high pressure pump PUMP4000-1,6L is optimally suitable as an additional pressure generation device for the hydraulic method. For pressing in the oil, oil grooves and feed ducts as well as threaded connectors for the pressure generation device or devices must be provided. These are located either in the outside cylindrical surface of the hub or in the end face of the shaft. For the mounting and dismounting of rolling bearings, adapter and withdrawal sleeves can also be used that already contain these ducts.

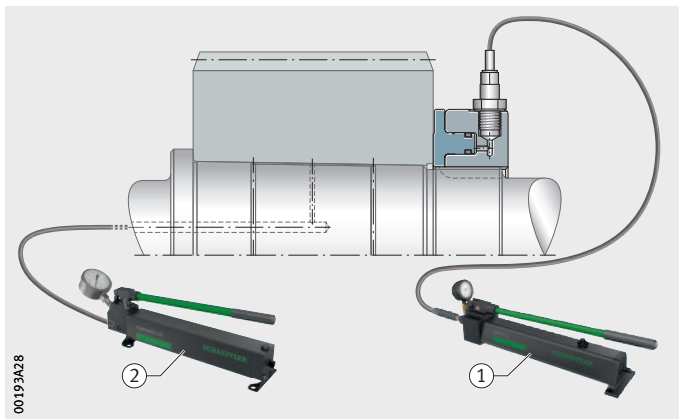
Hydraulic pumps

As pressure generation devices for the hydraulic method, the 4 000 bar pumps can be used either on the outside cylindrical surface or on the end face of the shaft, *Figure 17* and *Figure 18*.



① Pressure generation device for mounting with hydraulic nut
② Pressure generation device for hydraulic method

Figure 17
Mounting of ship's propeller using the hydraulic method and a hydraulic nut



① Pressure generation device for mounting with hydraulic nut
② Pressure generation device for hydraulic method

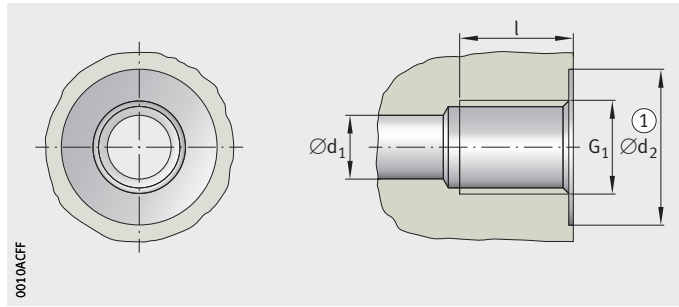
Figure 18
Mounting of gear using the hydraulic method and a hydraulic nut

Further information

- Operation of hydraulic pumps, see user manual BA 54, Hydraulic Pumps. Download at: https://www.schaeffler.de/std/1F31
- Schaeffler hydraulic nuts: see Technical Product Information TPI 196, Hydraulic Nuts HYDNUT
- Mounting and dismounting using Schaeffler hydraulic nuts: see user manual BA 04, Hydraulic Nuts HYDNUT
- Mounting and dismounting of rolling bearings using hydraulic nuts or oil pressure method: see MH 1, Mounting Handbook.

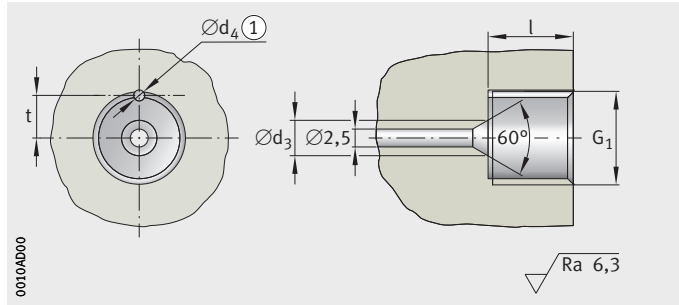
Requirements for consumer device connector

The consumer device requires, for correct connection of the hydraulic hose, a threaded connector hole that fulfils specified geometrical requirements. The required design of the consumer device connector is dependent on the threaded connector of the push fit coupling nipple and the permissible operating pressure of the hydraulic pump set, *Figure 19* and *Figure 20*.



Dimensions: see table
① Flattened

Figure 19
Consumer device connector for 700 bar and 1 000 bar



Dimensions: see table
① Bleed hole

Figure 20
Consumer device connector for 4 000 bar

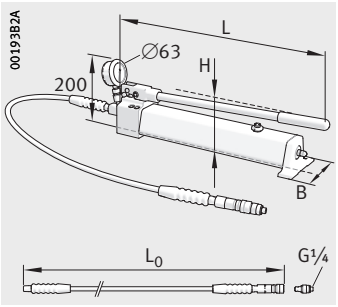
Consumer device connector

Threaded connector	For 700 bar, 1 000 bar, PUMP1000.ADAPTER-SET			For 4 000 bar, PUMP4000.ADAPTER-SET			
G_1	d_1 max.	d_2 min.	l min.	d_3 max.	l max.	d_4	t
mm	mm	mm	mm	mm	mm	mm	mm
Standard							
$G^1/_4$	10	22	16	5	12	1,5	6
Accessories							
$G^3/_8$	10	22	21	5	12	1,6	7,7
$G^1/_2$	14	27	24	7	14	1,8	9,7
$G^3/_4$	14	33	26	7	15	2	12,3

Safety

All hydraulic pump sets PUMP700-2L, PUMP1000-2,2L, PUMP1000-5L-AIR and PUMP4000-1,6L conform to the EC Directive. EU Declaration of Conformity and safety guidelines: see user manual BA 54, Hydraulic Pumps.

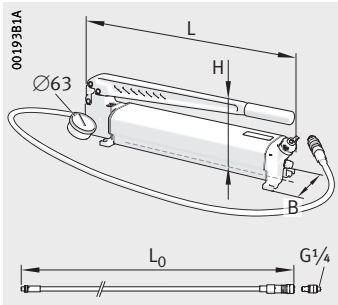
Hydraulic pumps



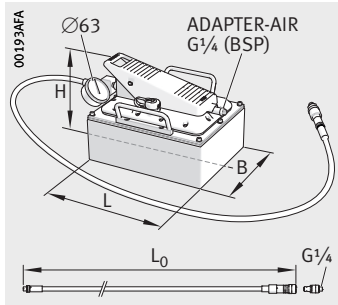
PUMP700-2L

Dimension table · Dimensions in mm

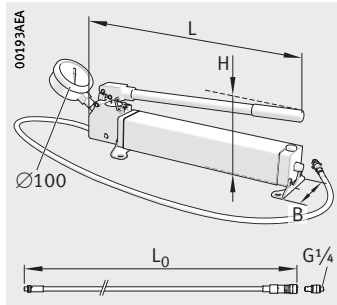
Designation	Maximum operating pressure p_{max}		Oil flow per stroke $\dot{V}_H$		Oil flow per minute $\dot{V}$		Volume of oil container V_{max}	Usable oil quantity V_{eff}
	1st stage	2nd stage	1st stage	2nd stage	from	to		
	bar		cm^3		cm^3/min		l	l
PUMP700-2L	700	20	2,3	12,9	–		2	1,6
PUMP1000-2,2L	1 000	30	1,4	29	–		2,2	2
PUMP1000-5L-AIR	1 000	–	–	–	100	500	5	4
PUMP4000-1,6L	4 000	–	0,5	–	–		1,8	1,6



PUMP1000-2,2L



PUMP1000-5L-AIR



PUMP4000-1,6L

Oil viscosity in accordance with ISO VG at +40 °C		Dimensions				Mass	Requisite pressure in the air supply	
η_{40}		L	B	H	Hose length	m	p_{AIR}	
from	to				L_0		from	to
mm^2/s						≈ kg	bar	
32	46	620	150	170	1 500	6	–	
32	46	580	125	170	2 000	8	–	
32	46	320	270	235	2 000	14	2,8	8,5
32	46	590	130	210	2 000	7,8	–	

Schaeffler Technologies AG & Co. KG
Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany
www.schaeffler.de/en/services

Sales:
Phone +49 9721 91-0
Technical support:
www.schaeffler.de/en/technical-support

All information has been carefully compiled and checked by us, but we cannot guarantee complete accuracy. We reserve the right to make corrections. Therefore, please always check whether more up-to-date or amended information is available. This publication supersedes all deviating information from older publications. Printing, including excerpts, is only permitted with our approval.
© Schaeffler Technologies AG & Co. KG
TPI 195 / 01 / en-GB / DE / 2021-06