SCHAEFFLER

Mobile Hydraulic Unit
TOOL-RAILWAY-AGGREGATE-2
TOOL-RAILWAY-AGGREGATE-2-DIGI

User manual

Foreword

TAROL units (**Ta**pered **Rol**ler Bearing) of the FAG brand are double row tapered roller bearings that are supplied set for clearance, greased and sealed. The TAROL units are thus supplied ready for mounting and are pressed onto the shaft journal by means of a hydraulic device.

TAROL units are used for the bearing arrangements of wheelsets on rail vehicles such as locomotives, freight wagons and passenger carriages. They can be quickly and easily fitted: the bearing is pressed onto the shaft journal in a single operation and secured by means of additional parts and screws. Since the unit has a press fit on a shaft journal of a diameter within the specified tolerances, the bearing arrangement achieves the required axial clearance.

TAROL units are filled as standard with greases proven in practical use. The standard grease in the metric size bearing units is certified in accordance with EN 12081. For inch size units, a grease approved by the AAR (**A**ssociation of **A**merican **R**ailroads) is used as standard. Upon request, we can also supply TAROL units with relubrication holes. The relubrication intervals are then set in accordance with the application. Schaeffler supplies TAROL units in inch and metric sizes for all standardised shaft journals on rail vehicles.
Special sizes, individual parts, replacement parts and housing adapters are available by agreement.

Further information on TAROL units is given in TPI 156, Tapered Roller Bearing Units TAROL.

In order to prevent the occurrence of personal injury or damage to property, it is necessary that the operating personnel have read and understood this user manual before using the hydraulic device.

Observe the information in the Mounting Handbook MH 1, Mounting of Rotary Bearings, for example on preparations for mounting and general guidelines.

If you have any questions about the user manual or other questions about operation of the hydraulic unit, we will be pleased to advise you.

Contents

About the user manual

This user manual is part of the device and contains important information.

Usage for the intended purpose

The intended purpose of the hydraulic unit is the mounting and dismounting of wheelset bearing arrangements on rail vehicles.

Usage not for the intended purpose

The hydraulic unit must not be used for the mounting and dismounting of bearings other than wheelset bearing arrangements on rail vehicles.

Usage not for the intended purpose can lead to the injury or death of persons or damage to the device.

Symbols

The warning and hazard symbols are defined in accordance with ANSI Z535.6-2011.

WARNING In case of non-compliance, death or serious injury may occur. ◁

CAUTION In case of non-compliance, minor or slight injury will occur. ◁

NOTICE In case of non-compliance, damage or malfunctions in the product or the adjacent construction will occur. ◁

Signs

The warning, prohibition and instruction signs are defined in accordance with DIN EN ISO 7010.

Warning, prohibition and instruction signs

Signs and descriptions	
	Wear safety gloves
	Wear safety shoes
	Wear eye protection

Availability

This user manual is supplied with each device.

WARNING

If the user manual is missing, incomplete or illegible, the user may make errors.

Serious injury or death may occur because important information for safe working is missing.

As the safety coordinator, you must ensure that this user manual is always complete and legible and that any persons using the device have the user manual available. ◁

Legal guidelines

The illustrations and descriptions cannot be used as grounds for any claims relating to devices that have already been delivered. Schaeffler Technologies AG & Co. KG accepts no liability for any damage or malfunctions if the device or accessories have been modified or used in an incorrect manner.

Warranty

The warranty for the hydraulic unit and the accessories additionally supplied is in accordance with the terms and conditions of Schaeffler Technologies AG & Co. KG.

The warranty excludes any defects arising from commissioning not as prescribed, unauthorised changes, incorrect handling, non-compliance with the user manual, normal wear and defects in the system environment.

Only original parts supplied or approved by Schaeffler Technologies AG & Co. KG may be used as replacement parts and accessories. The mounting or use of other products may under certain circumstances alter the characteristics of the hydraulic unit or accessories and pose a safety hazard.

Applicable directives

For the mobile hydraulic unit, the following directives apply:

- Directive 2006/42/EC
  on machinery
- Directive 2014/30/EU
  on electromagnetic compatibility
- Directive 2011/65/EU
  on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- Directive 2014/35/EU
  on the making available on the market of electrical equipment
- Directive 2014/68/EU
  on the making available on the market of pressure equipment.

Original user manual

The original user manual is prepared in German. User manuals in other languages are translations.

General safety guidelines

In the operation and dismounting, mounting, maintenance and repair of wheelset bearings, the occupational safety regulations of the relevant state and the relevant train company must be applied.

A description is given of how the device may be used, who may use the device and what must be observed when using the device.

Qualified personnel

For safety reasons, the hydraulic unit may only be operated by qualified personnel.

A person defined as qualified personnel:

- has all the necessary knowledge
- is aware of all the hazards and safety guidelines
- is authorised to use the hydraulic unit by the safety co-ordinator
- has fully read and understood this user manual.

Work on electrical devices

Work on the electrical subassemblies of the hydraulic unit may only be carried out by a trained electrician. This work includes but is not restricted to the electrical connection of the hydraulic device, repairs to the hydraulic device and maintenance operations where these are not explicitly approved for other groups of persons.

An electrician is in a position, on the basis of his technical training, knowledge and experience as well as his knowledge of the appropriate regulations, to assess the work assigned to him and recognise possible hazards.

Hazards

In operation of the hydraulic unit, the principle used means that hazards can occur as a result of electric potential, the hydraulic device, the height adjustment device, the hollow piston cylinder and hydraulic oil.

If movable, rotating, hot or cold machine parts constitute a hazard, measures must be taken to prevent contact with these parts. The protection against contact must not be removed in the case of movable or rotating parts.

WARNING

Risk of injury and damage to property if the scissors lift table is tilted when being moved.

Always lower the scissors lift table before moving. ◁

Hazards due to electrical accidents

In the electric motor and the other electrical components, electric potentials occur that are greater than mains voltages.

WARNING

These electric potentials give rise to considerable hazards. The possible consequences of incorrect work with potential can be death or severe injury and damage to property.

The hydraulic unit must only be used if the electrical connections of the hydraulic unit are dry.

If malfunctions occur, please inform Schaeffler Technologies AG & Co. KG. ◁

WARNING

During maintenance and repair, hazards can occur if the hydraulic device has not previously been disconnected from the mains voltage by means of the mains plug or an external main switch and then secured against switching on again.

The electric motor must not be opened until 5 minutes after disconnection from the mains voltage. The hydraulic device is not voltage-free immediately after disconnection from the mains voltage. ◁

WARNING

Danger of death, injuries and damage to property as a result of damage to the power cable.

When making the connection to the voltage supply, ensure that the power cable is not damaged or crushed.

A damaged cable or damaged supply line must not be used further. ◁

WARNING

Danger of injuries and damage to property due to tripping over the power cable.

When laying cables, ensure that areas are left free for work and movement. ◁

CAUTION

Hazards can occur if the characteristics of the electricity grid do not coincide with the requirements on the nameplate of the hydraulic device.

The use of an incorrect current supply will cause damage to the motor in the hydraulic device.

It must always be ensured that the mains voltage used conforms to the voltage of the motor in the hydraulic device. ◁

Hazards due to hydraulic oil, hydraulic hose and high pressure

In an hydraulic unit, the hydraulic oil generates high pressures. The hydraulic oil and the high pressure create considerable hazards. The possible consequences of incorrect work with this hydraulic oil and this pressure can be death or severe injury and damage to property.

WARNING

If the hydraulic hose is damaged, run over or bent, injuries may be caused by the spraying of hydraulic oil.

The hydraulic hose and the connections of the hydraulic hose must be inspected before operation. Where necessary, the hydraulic hose must be replaced immediately, paying attention to the marking stating the maximum permissible pressure.

A minimum bending radius of 60 mm must be observed. ◁

WARNING

If a connection on the hydraulic hose is loosened while the hydraulic unit is under pressure, injuries may be caused by the spraying of hydraulic oil. Connections on the hydraulic hose may only be loosened if the hydraulic unit is unpressurised. ◁

WARNING

If an operating pressure higher than the maximum permissible pressure is set, injuries may occur due to the spraying of hydraulic oil and flying parts as a result of damage to the hydraulic hose and hydraulic device. Do not under any circumstances set the pressure relief valve to a higher operating pressure than the permissible maximum pressure.

Replace the hydraulic hose after no more than a maximum period of usage of 4 years (DIN 20066 and DGUV 113-020) or observe any country-specific regulations. ◁

WARNING

Slip hazard due to escape of hydraulic oil.

Remove even the smallest quantities of escaped hydraulic oil.

Leakages of hazardous substances must be directed away such that there are no hazards to persons and the environment.

Wear slip-proof safety shoes. ◁

WARNING

Contact with hydraulic oil can cause irritation to skin and respiratory organs.

Avoid skin contact, for example by means of gloves or fat cream.

Do not inhale vapours or fumes. ◁

WARNING

Hydraulic oil fumes and vapours are flammable.

Naked flames are prohibited. ◁

NOTICE

Risk of malfunctions due to contamination of the hydraulic oil.

Protect the hydraulic oil from contaminants.

Only top up the device using hydraulic oil of the prescribed specification, see *table*, page 69. ◁

NOTICE

Hydraulic oil is harmful to the environment.

Collect the hydraulic oil and dispose of it correctly or send for recycling.

Any used oil or indirect process materials must be disposed of in accordance with the appropriate safety datasheets from the lubricant manufacturer.

Dispose of indirect process materials correctly if they contain oil, by example by means of cleaning cloths in the special waste.

The legal requirements must be observed. ◁

Hazards due to shearing or crushing

When working with the mobile hydraulic unit, hazards occur due to shearing or crushing. The possible consequences of incorrect work with the hydraulic unit can be death or severe injury and damage to property.

WARNING

When setting the working height and aligning the hollow piston cylinder, shearing or crushing may occur.

Never insert hands or feet between the height adjustment device of the scissors lift table.

Only rotate the handle of the escape valve counterclockwise if there is nothing under the height adjustment device. Always rotate the handle very carefully and slowly.

Do not use the hydraulic unit for lifting loads. ◁

WARNING

When operating the height adjustment cylinder, crushing may occur.

Ensure the 4/3 way valve is in the “Stop” position, see page 22, before starting the hydraulic device in order to prevent unintentional activation.

Keep hands away from movable parts and pressurised hydraulic hoses. ◁

WARNING

Hazard due to lowering of the scissors lift table during maintenance work.

In order to secure the scissors lift table, the steel pin supplied must be inserted in the ring provided when the table is in the raised position, see *Figure 53*, page 60. ◁

WARNING

During assembly and working with the withdrawal device, crushing may occur.

Masses of more than 25 kg may only be lifted by two persons or with the aid of a suitable lifting device, for example a crane or swivel arm with balancer. ◁

CAUTION

When using tools, their breakage may lead to injuries or damage to components.

Only use Schaeffler Technologies AG & Co. KG tools in accordance with the tool set, see page 36. ◁

NOTICE

While the scissors lift table is in the raised position, the hydraulic cylinder is pressurised.

If the hydraulic unit is not being used, lower the scissors lift table completely. ◁

Protective equipment

Personal protective equipment is intended to protect operating personnel against health hazards, *Figure 1*.

The personal protective equipment comprises:

- safety gloves
- safety shoes
- safety goggles.

Safety gloves give protection against irritation due to hydraulic oil.

Safety shoes give protection against foot injuries due to falling heavy components.

Safety goggles give spray protection for the eyes from fumes and vapours of hydraulic oil when operating the hydraulic unit.

Figure 1
Personal protective equipment: instruction signs in accordance with DIN EN ISO 7010

Depending on the workstation, personal protective equipment may be extended, for example by means of a protective helmet, if components can fall onto the operating personnel.

Mobile FAG hydraulic unit

Scope of delivery

The scope of delivery of the mobile hydraulic unit comprises:

- hydraulic unit on scissors lift table
  - Standard, *Figure 2*
  - With data logger box, *Figure 3*
- user manual.

Figure 2
Mobile hydraulic unit
TOOL-RAILWAY-AGGREGATE-2

Figure 3
Mobile hydraulic unit
TOOL-RAILWAY-AGGREGATE-2-DIGI

Ordering designation

Ordering designation	Ordering number
TOOL-RAILWAY-AGGREGATE-2	093687800-0000-10
TOOL-RAILWAY-AGGREGATE-2-DIGI	093687770-0000-10

Installation site and operating conditions

An installation site suitable for operation of the hydraulic unit has the following characteristics:

- The subsurface is firm and even.
- The mounting area is spacious and separated from machining plant, welding equipment or compressed air devices.
- No serious contamination of the air by dust, oil, chemicals, vapours or high humidity, caused for example by other machines or climatic influences.
- The environment of the bearing has been carefully cleaned.
- The mains voltage conforms to the voltage of the motor in the hydraulic device.

For operation, the following operating conditions must be observed:

- Ambient temperature: –20 °C up to +60 °C
- Relative humidity: 5% up to 85% (not permanent, non-condensing).

Accessories

The hydraulic unit is supplied without a tool.

The application-specific tool required is available as an accessory, *Figure 4* and page 72.

① 1×yoke
② 4×pull rod
③ 1×withdrawal shoe
④ 1×centring ring
⑤ 1×locknut
⑥ 2×guide bush
(3 hole or 4 hole design)
⑦ 1×mounting sleeve
⑧ 1×spindle
⑨ 1×crank arm
⑩ 6×socket head screw
for location of the guide bush
(3 hole design)
or
8×socket head screw
for location of the guide bush
(4 hole design)

Figure 4
Tool set
TOOL-RAILWAY-AXLE

Ordering designation

Ordering example for tool sets TOOL-RAILWAY-AXLE:

Design	Ordering designation	Ordering number
Metric size	TOOL-RAILWAY-AXLE-F-803329-130/230	089761316-0000-10
Inch size	TOOL-RAILWAY-AXLE-E6X11	057502730-0000-10

Damage during transit

Check all parts without delay for any transport damage. Any damage during transit must be reported as a complaint to the carrier.

Defects

If defects are found, these should be reported without delay as a complaint to Schaeffler Technologies AG & Co. KG.

Modification

For safety reasons, autonomous modifications to the hydraulic unit are not permitted.

Modification and changes to the unit are only permissible in agreement with Schaeffler Technologies AG & Co. KG.

In order to comply with directives on electromagnetic compatibility (EMC), no modifications may be made to the electrical installation (cables, shielding).

Transport

The hydraulic unit can be moved using the castors of the scissors lift table.

For greater changes of location, the mobile hydraulic unit can be transported using a suitable means of transport. The hydraulic unit must be secured against unintentional movement.

In transport, the relevant safety and accident prevention guidelines must be observed. Where necessary, suitable protective equipment must be worn.

Do not throw the hydraulic unit or subject it to heavy shocks.

Preparation for transport

Prepare the mobile hydraulic unit for transport:

- Lower the scissors lift table completely.
- Secure the mobile hydraulic unit against unintentional movement.
- Secure all movable parts by means of cable ties.

WARNING

Risk of injury due to toppling or falling of the hydraulic unit during transport.

Use only suitable lifting gear and suitable means of transport.

Secure the hydraulic unit against slipping, toppling or falling.

Wear safety shoes. ◁

Storage

The hydraulic unit must be stored under cool, dry conditions, in order to avoid promoting corrosion of individual parts of the device.

For storage of the hydraulic unit, the following ambient conditions apply:

- ambient temperature: 0 °C to +60 °C
- relative humidity: 5% to 80%.

Commissioning

Before the hydraulic unit is used for the first time, it must be commissioned.

Carrying out initial commissioning

Commissioning of the hydraulic unit is carried out as follows:

- ▶ Remove the packaging.
- ▶ Check the scope of delivery.
- ▶ Place the hydraulic unit at a suitable installation site, see page 13.
- ▶ Check the hydraulic unit, especially the high pressure hose, its connections and the accessories for any visible damage.
- ▶ Check the hydraulic oil level in the hydraulic device, see page 62.
- ▶ Bleed the oil circuit, see page 64.
- ▶ Premount and prepare the tool set corresponding to the TAROL unit, see page 36.
- ▶ Only connect the hydraulic unit to a suitable voltage supply if the plug and power cable show no damage or wear. The specifications for the voltage supply can be found on the nameplate and in the Technical data, see *table*, page 69.
- ▶ When making the connection to the voltage supply, ensure that the power cable is not damaged or crushed.
- ▶ Switch on the main switch on the hydraulic unit.
- ▶ Only TOOL-RAILWAY-AGGREGATE-2-DIGI: Select the start button on the data logger box.
- ▷ The hydraulic unit is now ready for operation.

Components and control elements

The main components of the mobile hydraulic unit for the dismounting and mounting of TAROL units are the hydraulic device, the hollow piston cylinder, the foot pedal, the handle of the escape valve and the 4/3 way valve.

In the standard variants, the mobile hydraulic unit is available as TOOL-RAILWAY-AGGREGATE-2, *Figure 5*, as well as with data logger box and measuring device for the hollow piston cylinder as TOOL-RAILWAY-AGGREGATE-2-DIGI, *Figure 6* and *Figure 7*, page 20.

TOOL-RAILWAY-AGGREGATE-2

① Hollow piston cylinder
② 4/3 way valve
③ Pressure control valve
④ Manometer
⑤ Main switch (red and green)
⑥ Handle of escape valve
⑦ Hydraulic device
⑧ Foot pedal for height adjustment
⑨ Scissors lift table
⑩ Cylinder for height adjustment

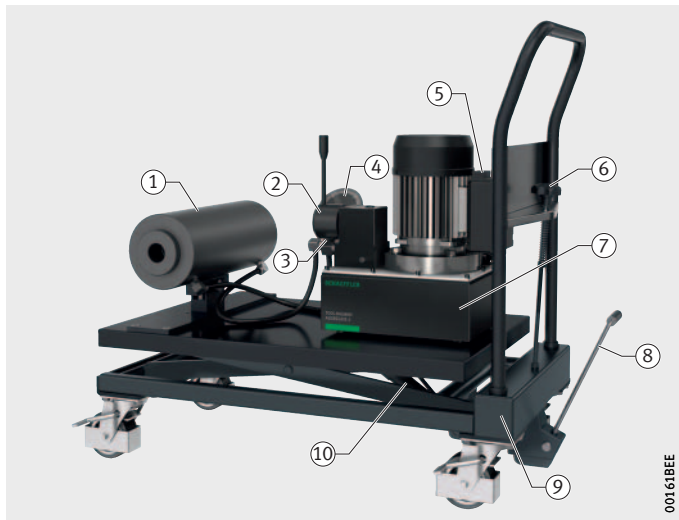


Figure 5
Mobile hydraulic unit TOOL-RAILWAY-AGGREGATE-2

The mobile hydraulic unit TOOL-RAILWAY-AGGREGATE-2 can be retrofitted at Schaeffler with a data logger box and a measuring device for the hollow piston cylinder which effectively makes it a TOOL-RAILWAY-AGGREGATE-2-DIGI. Please contact Schaeffler for this option.

① **Hollow piston cylinder**	This is used for the dismounting and mounting of TAROL bearings.
② **4/3 way valve**	The 4/3 way valve is used to control the height of the hollow piston cylinder to 3 positions.
③ **Pressure relief valve**	The pressure relief valve is required for setting the contact force.
④ **Manometer**	The manometer displays the system working pressure.
⑤ **Main switch**	The hydraulic unit is switched on using the green main switch and switched off using the red main switch.
⑥ **Handle of escape valve**	The scissors lift table is lowered using the handle of the escape valve. During operation, the escape valve must be closed. For lowering, the escape valve is opened. The further the escape valve is opened, the more quickly the scissors lift table is lowered.
⑦ **Hydraulic device**	The hollow piston cylinder is driven by the hydraulic device. The hydraulic device switches itself off if it becomes overheated.
⑧ **Foot pedal for height adjustment**	The foot pedal is used to pump the scissors lift table steplessly upwards.
⑨ **Scissors lift table**	The hydraulic unit is mounted on the scissors lift table. It can be steplessly adjusted in height and moved. All four castors on the scissors lift table have a brake.
⑩ **Cylinder for height adjustment**	The cylinder moves the platform of the scissors lift table to working height.

TOOL-RAILWAY-AGGREGATE-2-DIGI

① Hollow piston cylinder
② 4/3 way valve
③ Pressure control valve
④ Manometer
⑤ Main switch (red and green)
⑥ Handle of escape valve
⑦ Hydraulic device
⑧ Foot pedal for height adjustment
⑨ Scissors lift table
⑩ Cylinder for height adjustment
⑪ Measuring device for piston stroke
⑫ Data logger box

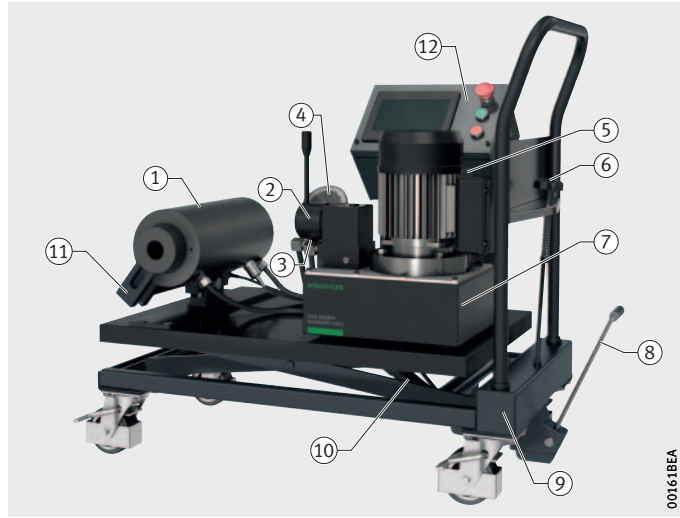


Figure 6
Mobile hydraulic unit
TOOL-RAILWAY-AGGREGATE-2-DIGI

⑬ TFT touch display
⑭ Emergency stop
⑮ Start
⑯ Stop
⑰ USB port

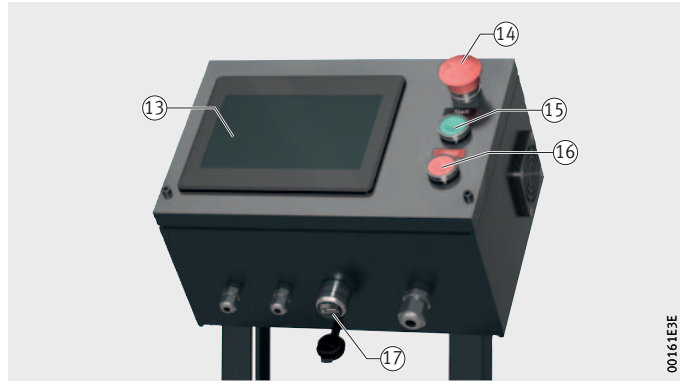


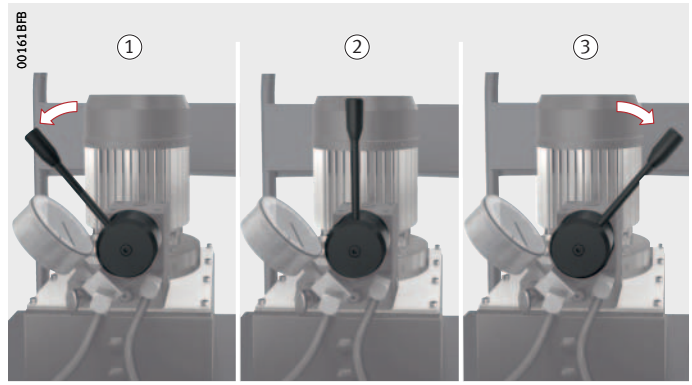
Figure 7
TOOL-RAILWAY-AGGREGATE-2-DIGI
Data logger box

① **Hollow piston cylinder**	This is used for the dismounting and mounting of TAROL bearings.
② **4/3 way valve**	The 4/3 way valve is used to control the height of the hollow piston cylinder to 3 positions.
③ **Pressure relief valve**	The pressure relief valve is required for setting the contact force.
④ **Manometer**	The manometer displays the system working pressure.
⑤ **Main switch**	The data logger box is started with the green main switch and stopped with the red main switch.
⑥ **Handle of escape valve**	The scissors lift table is lowered using the handle of the escape valve. During operation, the escape valve must be closed. For lowering, the escape valve is opened. The further the escape valve is opened, the more quickly the scissors lift table is lowered.
⑦ **Hydraulic device**	The hollow piston cylinder is driven by the hydraulic device. The hydraulic device switches itself off if it becomes overheated.
⑧ **Foot pedal for height adjustment**	The foot pedal is used to pump the scissors lift table steplessly upwards.
⑨ **Scissors lift table**	The hydraulic unit is mounted on the scissors lift table. It can be steplessly adjusted in height and moved. All four castors on the scissors lift table have a brake.
⑩ **Cylinder for height adjustment**	The cylinder moves the platform of the scissors lift table to working height.
⑪ **Measuring device for piston stroke**	The measuring device measures the piston stroke and transfers the data to the data logger box.
⑫ **Data logger box**	The data logger box saves the project data and has a USB port as well as a TFT touch display.
⑬ **TFT touch display**	Data entry is via the 7 inch TFT touch display which also displays various data.
⑭ **Emergency stop**	The emergency stop switch cuts off the power supply to the entire hydraulic unit.
⑮ **Start**	The start button switches the hydraulic unit on.
⑯ **Stop**	The stop button switches the hydraulic unit off.
⑰ **USB port**	A USB data carrier can be connected via the USB port.

Controlling the 4/3 way valve

The 4/3 way valve is used to control the functions of the hydraulic unit, *Figure 8*:

- Extend
- Stop, the pump is idle and thus unpressurised
- Retract.



4/3 way valve in position:
① Extend
② Stop
③ Retract

Figure 8
Functions of the hydraulic unit

CAUTION

When controlling the piston of the hollow piston cylinder, the hydraulic lines must not be damaged by clamping. ◁

Raising and lowering the scissors lift table

The scissors lift table can be used to move the hydraulic unit and raise the hollow piston cylinder to working height.

The castors of the scissors lift table facilitate alignment of the hollow piston cylinder to the shaft journal.

CAUTION

Risk of deforming or breaking the scissors lift table.

Never subject the scissors lift table to a load of more than 110 kg. ◁

CAUTION

Risk of crushing or shearing when lowering the scissors lift table.

Do not reach under the height adjustment device of the scissors lift table. ◁

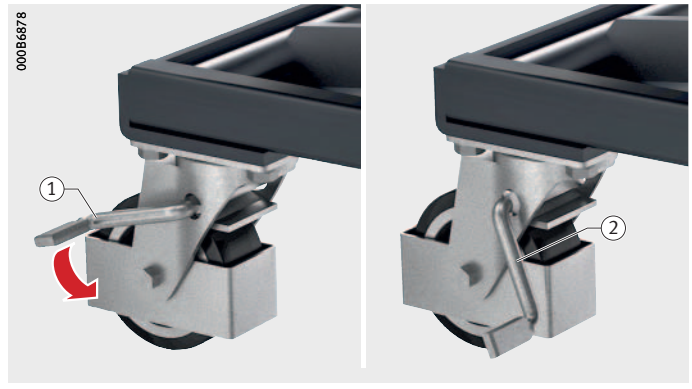
NOTICE

Risk of damage to the scissors lift table due to excessively quick lowering.

When lowering the lifting device, operate the handle of the scape valve very carefully and slowly. ◁

Before raising or lowering the scissors lift table, make sure the brakes on the castors are engaged and if necessary engage them, *Figure 9*, ②.

Always lower the scissors lift table when not in use so that there is no pressure in the hydraulic system and it is therefore not under load.



① Brake released
② Brake applied

Figure 9
Brake on the castors of the scissors lift table

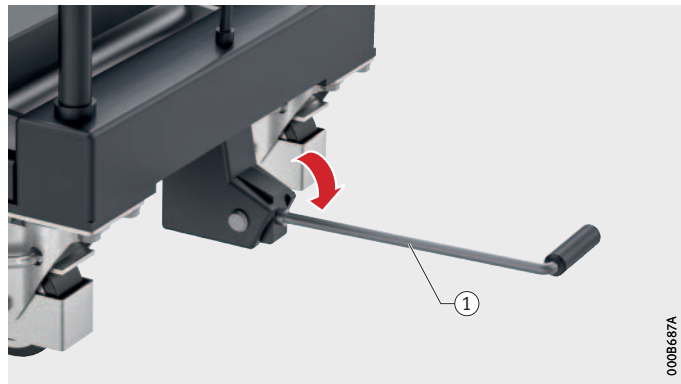
Raising and lowering the table

The stepless height adjustment device facilitates alignment of the hollow piston cylinder to the bearing.

The scissors lift table is raised using the foot pedal, *Figure 10*, ①, lowered using the handle of the escape valve, *Figure 11*.

Raising the table

- ▶ Ensure that the escape valve is closed, *Figure 11*, ②.
- ▶ Activate the foot pedal, *Figure 10*.
- ▷ The scissors lift table with the hollow piston cylinder is raised.

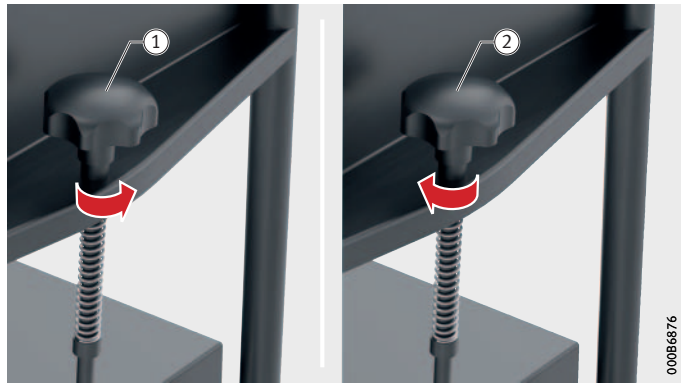


① Foot pedal

Figure 10
Raising the scissors lift table

Lowering the table

- ▶ Rotate the handle of the escape valve very carefully and slowly, *Figure 11*, ①.
- ▷ The scissors lift table with the hydraulic device is lowered.
- ▶ Rotate the handle of the escape valve until the escape valve is closed, *Figure 11*, ②.
- ▷ The scissors lift table can be raised again.

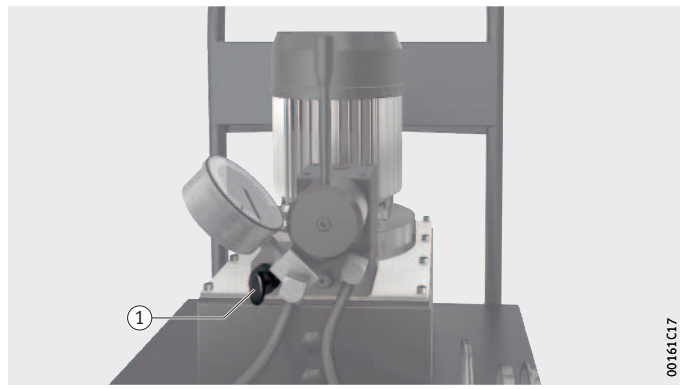


① Open escape valve
② Close escape valve

Figure 11
Lowering the scissors lift table

Pressure relief valve

In order to prevent damage to the bearings during mounting, a mechanical, adjustable pressure relief valve is fitted as a safety device. Observe the contact force specified for mounting, see *table*, page 53.



① Pressure relief valve

Figure 12
Pressure relief valve

Setting the pressure relief valve

Set the pressure relief valve as follows:

- ▶ Start the hydraulic device.
- ▶ Loosen the securing nut on the adjustment screw.
- ▶ Set the 4/3 way valve to the position “Extend”, move the hollow piston cylinder to its stop point and build up pressure in the system, *Figure 8*, page 22, ①. Alternatively, the pressure relief valve can be set during mounting of the TAROL unit.
- ▶ Rotate the adjustment screw counterclockwise in order to reduce the pressure and clockwise in order to increase the pressure.
- ▶ In order to achieve accurate setting, reduce the pressure to a point below the valid setting.
- ▶ Then increase the pressure slowly until it reaches the valid setting.
- ▶ Tighten the securing nut when the required pressure is set.
- ▶ Adjust the 4/3 way valve to the position “Stop”, *Figure 8*, page 22, ②; the system pressure can thus be returned to 0 bar.
- ▶ Check the final pressure setting by adjusting the 4/3 way valve and apply pressure to the system.
- ▷ The pressure relief valve is set.

TFT touch display TOOL-RAILWAY-AGGREGATE-2-DIGI

The data logger box is operated via the TFT touch display by touching buttons and input fields on the display. Touching an input field displays a keyboard which allows text to be entered. Text entries are confirmed with [**Enter**].

The start screen is displayed when the data logger box is started, *Figure 13*.

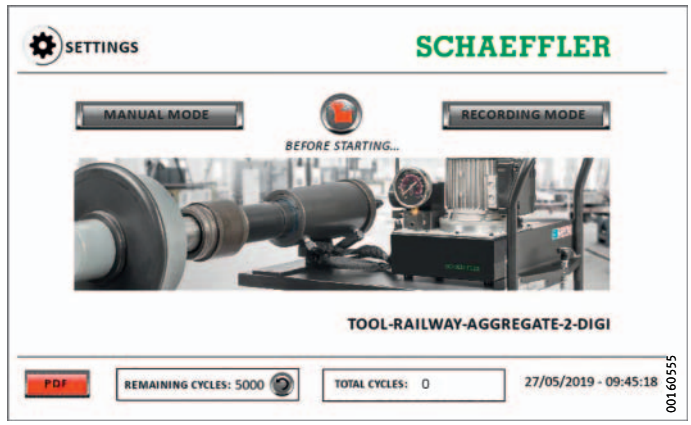


Figure 13
Start screen

General buttons

Button	Description
[**Return**]	Button to go to previous page
[**Return home**]	Button to go to start screen

BEFORE STARTING

A service message is displayed when the [**BEFORE STARTING**] button is selected on the start screen, *Figure 14*.

Figure 14
BEFORE STARTING screen

For more information on maintenance work, see page 59.

For information on hydraulic oil, see page 69.

PDF

Selecting the [**PDF**] button on the start screen displays a window which allows various PDF files to be retrieved, *Figure 15*.

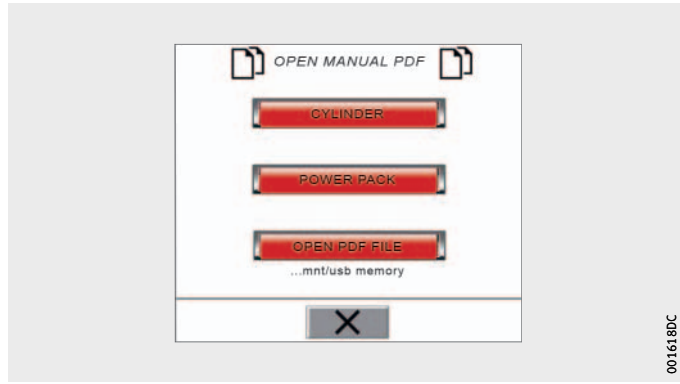


Figure 15
PDF screen

Button explanations

Designation	Description
[**CYLINDER**]	Opens a PDF with the technical data for the hydraulic cylinder.
[**POWER PACK**]	Opens a PDF with the technical data for the unit.
[**OPEN PDF FILE**]	Saved PDFs can be opened from a USB data carrier connected to the unit.
[**X**]	Closes the window.

SETTINGS

The language, units of measurement, and sensor parameters can be selected in Settings, *Figure 16*.

The sensor parameters must be set later if the data logger box and measuring device for the hollow piston cylinder have been retrofitted to the standard carriage.

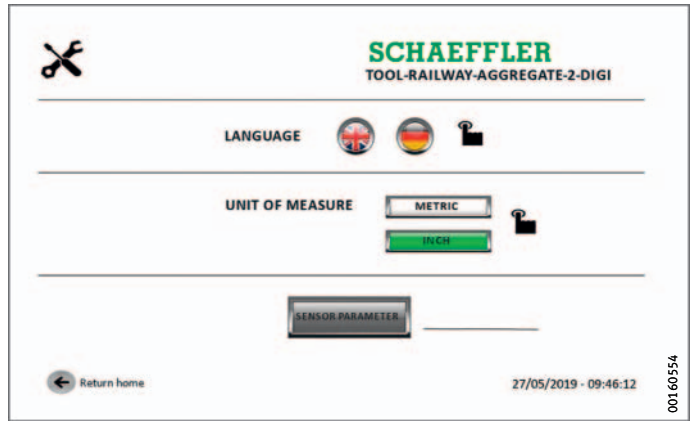


Figure 16
SETTINGS screen

RECORDING MODE

Selecting the [**RECORDING MODE**] button on the start screen takes you to recording mode.

In recording mode, application data are queried and all the relevant values for assembly are recorded.

All the input fields for the application data must be completed otherwise recording mode cannot be used, *Figure 17* and *Figure 18*, page 29.

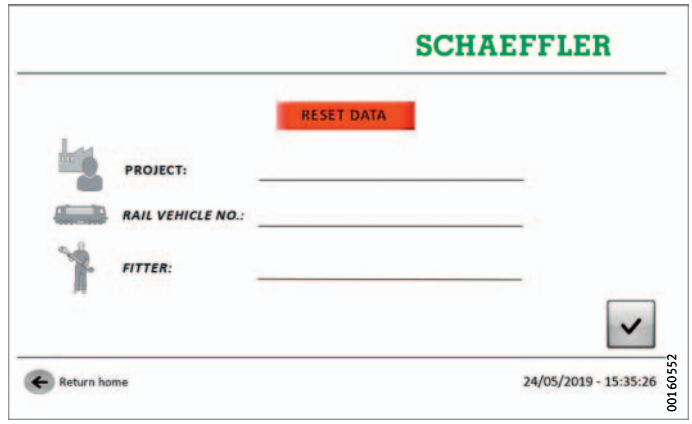


Figure 17
RECORDING MODE Screen 1

RECORDING MODE Screen 1 Explanation

Designation	Description
PROJECT	Project data. The previous data are retained until they are changed or [**RESET DATA**] is selected.
RAIL VEHICLE NO.	
FITTER	
[✔]	Confirms the entries from RECORDING MODE Screen 1 and moves to RECORDING MODE Screen 2.
[**RESET DATA**]	All entries from RECORDING MODE Screen 1 and RECORDING MODE Screen 2 are reset.

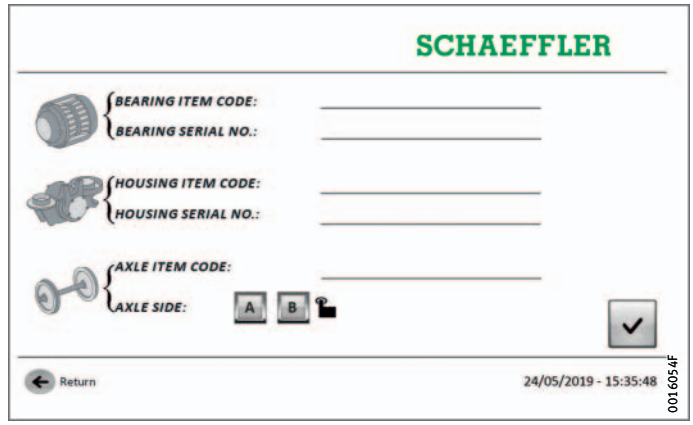


Figure 18
RECORDING MODE Screen 2

RECORDING MODE Screen 2 Explanation

Designation	Description
BEARING ITEM CODE	Bearing unit designation. The previous entry is retained until it is changed or [**RESET DATA**] on RECORDING MODE Screen 1 is selected.
BEARING SERIAL NO.	Bearing serial number. The entry is queried for each new assembly.
HOUSING ITEM CODE	Housing designation. The previous entry is retained until it is changed or [**RESET DATA**] on RECORDING MODE Screen 1 is selected.
HOUSING SERIAL NO.	Housing serial number. The entry is queried for each new assembly.
AXLE ITEM CODE	Axle item number. The entry is queried for each new assembly.
AXLE SIDE [A][B]	Establish the axle side.
[✔]	Confirms the entries from RECORDING MODE Screen 2 and moves to RECORDING MODE Screen 3.

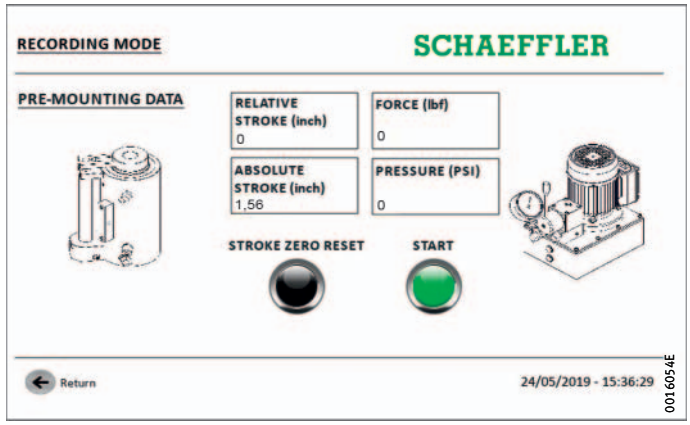


Figure 19
RECORDING MODE Screen 3

RECORDING MODE Screen 3 Explanation

Designation	Description
RELATIVE STROKE	Displays the current relative stroke of the hollow piston cylinder.
ABSOLUTE STROKE	Displays the current absolute stroke of the hollow piston cylinder.
[STROKE ZERO RESET]	Sets the relative stroke to zero. If the relative stroke is set to zero immediately before sliding into place, then a guide value for the sliding distance for the bearing can be measured.
FORCE	Displays the current force being exerted on the bearing by the hollow piston cylinder.
PRESSURE	Displays the current pressure being exerted on the bearing by the hollow piston cylinder.
[START]	Starts the display for data, time, pressure, force, and stroke. Goes to RECORDING MODE Screen 4 and starts the time measurement on RECORDING MODE Screen 4.

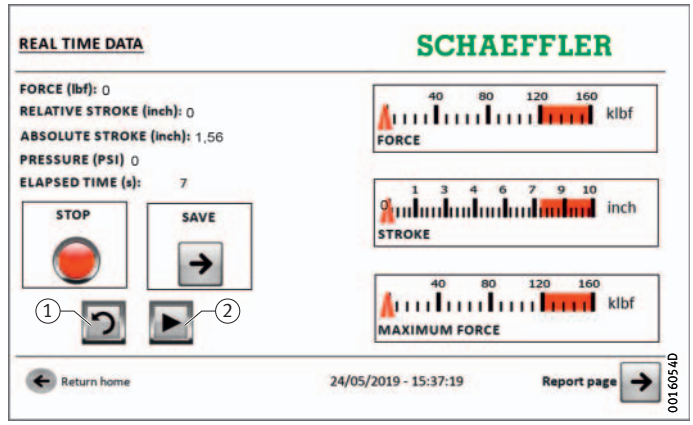


Figure 20
RECORDING MODE Screen 4

RECORDING MODE Screen 4 Explanation Display

Designation	Image	Description
FORCE	Digits	Displays the current force being exerted on the bearing by the hollow piston cylinder.
	Scale	
MAXIMUM FORCE	Scale	Shows the maximum force achieved during the assembly process.
RELATIVE STROKE	Digits	Displays the current relative stroke of the hollow piston cylinder.
	Scale	
ABSOLUTE STROKE	Digits	Displays the current absolute stroke of the hollow piston cylinder.
PRESSURE	Digits	Displays the current pressure being exerted on the bearing by the hollow piston cylinder.
ELAPSED TIME	Digits	Displays the time elapsed since selecting [START] on RECORDING MODE Screen 3.

RECORDING MODE Screen 4 Explanation Buttons

Designation	Description
[STOP]	Stops the display of the values and elapsed time. If a USB data carrier is connected, a CSV file is saved on the data carrier. If a permanent copy is required, the [SAVE] button must also be selected, otherwise, the file is overwritten with the subsequent measurement.
①	Resets the displayed values if the assembly process is to be restarted. The entered project data are retained.
②	Restarts the display after resetting the values.
[SAVE]	If a USB data carrier is connected, a CSV file is saved on the data carrier in the folder “mnt/usb memory”. The folder is generated automatically.
[Report page]	Goes to RECORDING MODE Screen 5 (Report page).

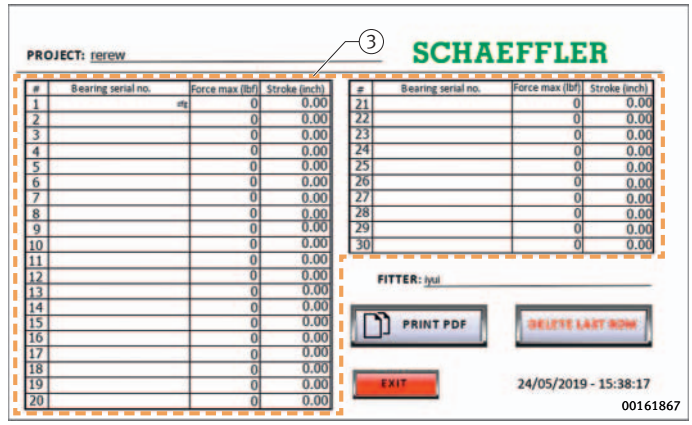


Figure 21
RECORDING MODE Screen 5

RECORDING MODE Screen 5 Explanation

Designation	Description
③	Extract from the recorded data.
[PRINT PDF]	Saves a PDF file in the folder “mnt/usb memory”, *Figure 22*. The folder is generated automatically. The file name is made up of the date and time it is saved. The entered project data (RECORDING MODE Screen 1 and RECORDING MODE Screen 2) are saved as well as the maximum force, the relative stroke, and the date. Up to 30 previous assembly processes are saved.
[DELETE LAST ROW]	Deletes the last assembly process.
[EXIT]	Goes to start screen.

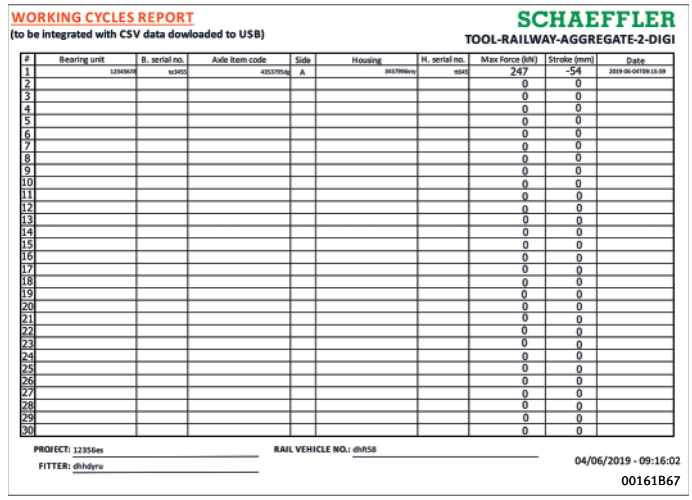


Figure 22
Report PDF file

MANUAL MODE

Selecting the [**MANUAL MODE**] button on the start screen takes you to manual mode.

No project data is queried in manual mode and CSV files cannot be saved.

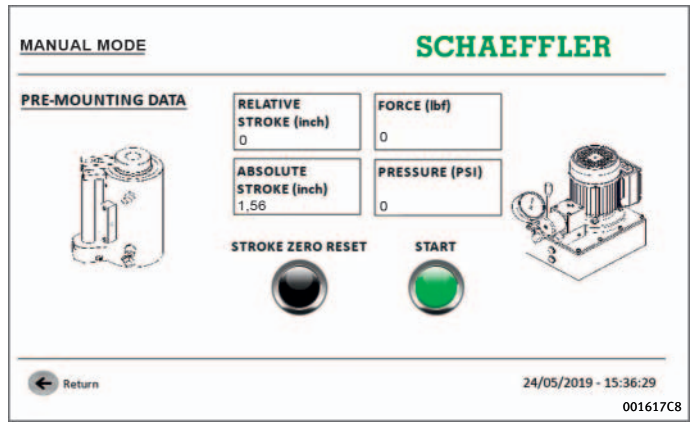


Figure 23
MANUAL MODE Screen 1

MANUAL MODE Screen 1 Explanation

Designation	Description
RELATIVE STROKE	Displays the current relative stroke of the hollow piston cylinder.
ABSOLUTE STROKE	Displays the current absolute stroke of the hollow piston cylinder.
[STROKE ZERO RESET]	Sets the relative stroke to zero. If the relative stroke is set to zero immediately before sliding into place, then a guide value for the sliding distance for the bearing can be measured.
FORCE	Displays the current force being exerted on the bearing by the hollow piston cylinder.
PRESSURE	Displays the current pressure being exerted on the bearing by the hollow piston cylinder.
[START]	Starts the display for data, time, pressure, force, and stroke. Goes to MANUAL MODE Screen 2 and starts the time measurement on MANUAL MODE Screen 2.

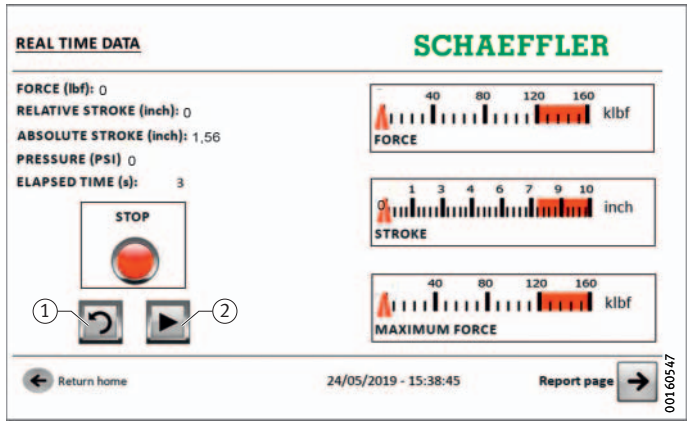


Figure 24
MANUAL MODE Screen 2

MANUAL MODE Screen 2 Explanation Display

Designation	Image	Description
FORCE	Digits	Displays the current force being exerted on the bearing by the hollow piston cylinder.
	Scale	
MAXIMUM FORCE	Scale	Shows the maximum force achieved during the assembly process.
RELATIVE STROKE	Digits	Displays the current relative stroke of the hollow piston cylinder.
	Scale	
ABSOLUTE STROKE	Digits	Displays the current absolute stroke of the hollow piston cylinder.
PRESSURE	Digits	Displays the current pressure being exerted on the bearing by the hollow piston cylinder.
ELAPSED TIME	Digits	Displays the time elapsed since selecting [**START**] on MANUAL MODE Screen 2.

MANUAL MODE Screen 2 Explanation Buttons

Designation	Description
[**STOP**]	Stops the display of the values and elapsed time.
①	Resets the displayed values if the assembly process is to be restarted.
②	Restarts the display after resetting the values.
[**Report page**]	Goes to MANUAL MODE Screen 3 (Report page).

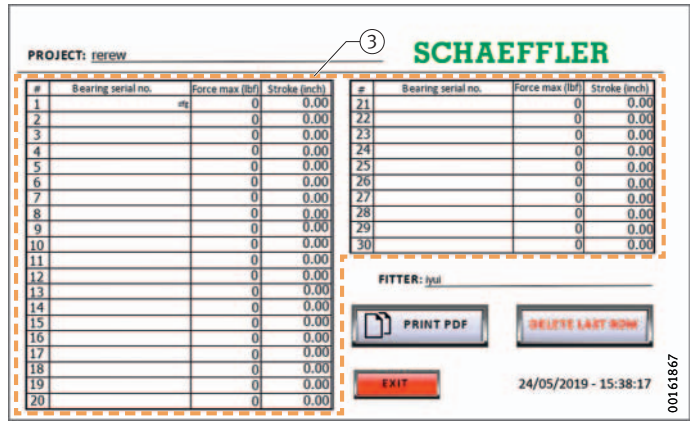


Figure 25
MANUAL MODE Screen 3

MANUAL MODE Screen 3 Explanation

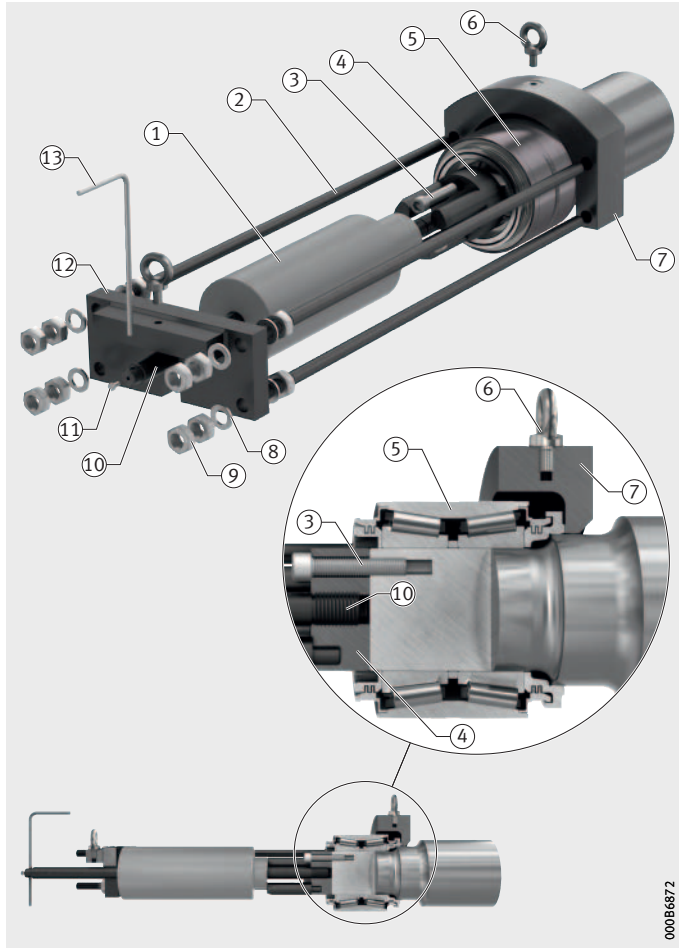
Designation	Description
③	Extract from the recorded data.
[PRINT PDF]	Saves a PDF file in the folder “mnt/usb memory”, *Figure 22*, page 32. The folder is generated automatically. The file name is made up of the date and time it is saved. The maximum force, the relative stroke, and the date are saved. Up to 30 previous assembly processes are saved.
[DELETE LAST ROW]	Deletes the last assembly process.
[EXIT]	Goes to start screen.

Tool set

Assemble the individual parts in accordance with the dimensions of the TAROL unit.

Tool set for dismounting

The following tool set is necessary for dismounting, *Figure 26*.
The tool set is based on the dimensions of the TAROL unit.

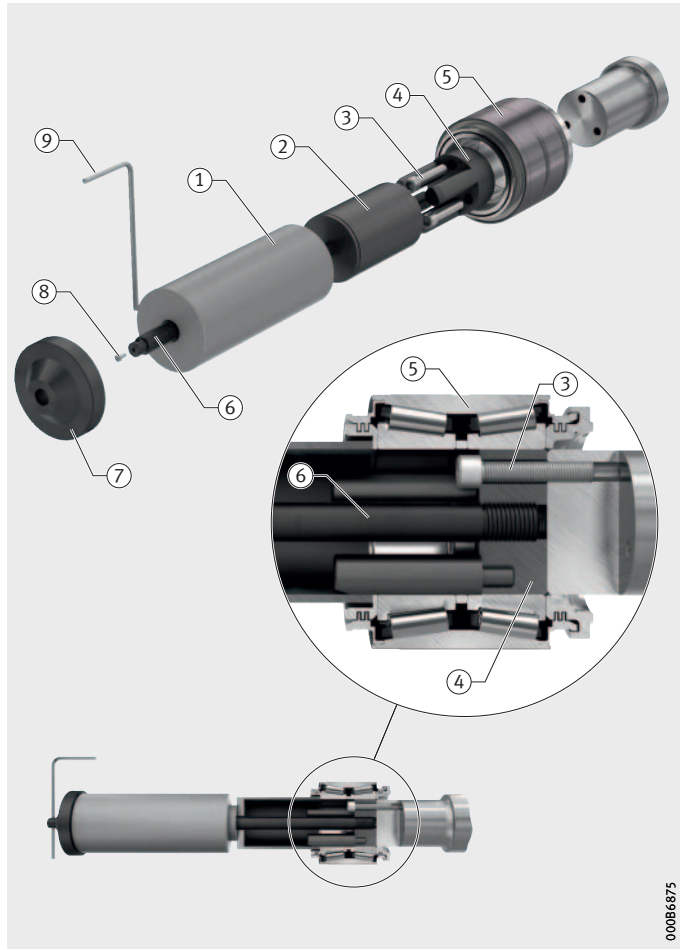


① 1×hollow piston cylinder (component of TOOL-RAILWAY-AGGREGATE-2)
② 4×pull rod
③ 3×socket head screw for location of the guide bush (3 hole design)
or
4×socket head screw for location of the guide bush (4 hole design)
④ 1×guide bush
⑤ 1×TAROL bearing
⑥ 2×eye bolt
⑦ 1×withdrawal shoe
⑧ 8×support washer
⑨ 12×nut
⑩ 1×spindle
⑪ 1×screw
⑫ 1×yoke
⑬ 1×crank arm

Figure 26
Tool set for dismounting

Tool set for mounting

The following tool set is necessary for mounting, *Figure 27*.
The tool set is determined by the dimensions of the TAROL unit.



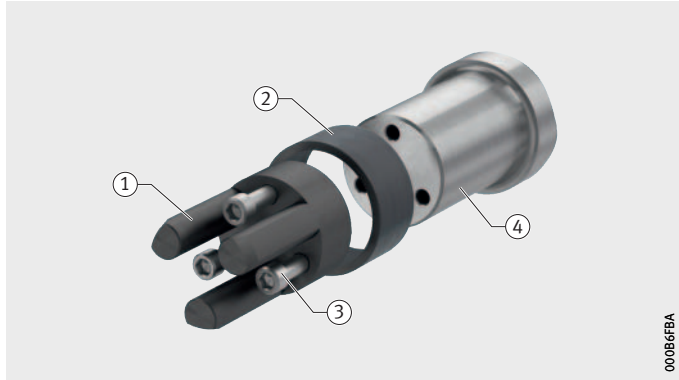
① 1×hollow piston cylinder (component of TOOL-RAILWAY-AGGREGATE-2)
② 1×mounting sleeve
③ 3×socket head screw for location of the guide bush (3 hole design)
or
4×socket head screw for location of the guide bush (4 hole design)
④ 1×guide bush
⑤ 1×TAROL bearing
⑥ 1×spindle
⑦ 1×locknut
⑧ 1×screw
⑨ 1×crank arm

Figure 27
Tool set for mounting

Preparation of tool set for mounting and dismounting

Prepare the tool set for dismounting and mounting for the centring operation in accordance with the dimensions of the TAROL unit.

The guide bush is located on the axle journal with the aid of the centring ring and screwed into place, *Figure 28*.



① Guide bush
② Centring ring
③ Socket head screws for guide bush
④ Axle journal

Figure 28
Tool set
for dismounting and mounting

Locate the assembled withdrawal device with the eye bolts on a suitable lifting device, such a a crane or swivel arm with balancer, *Figure 29*.

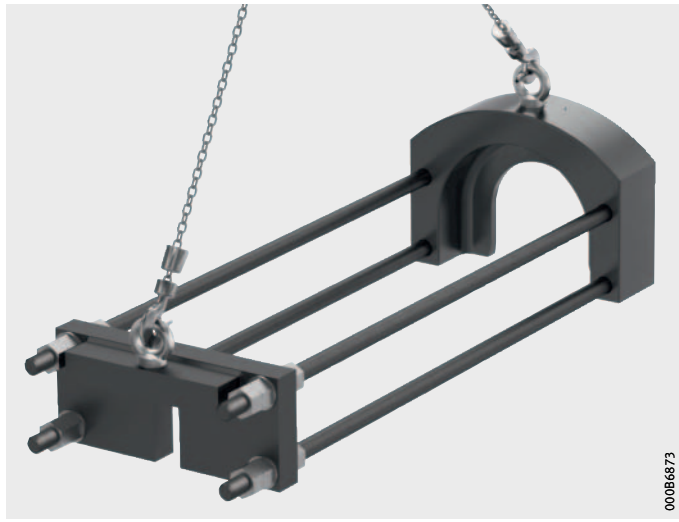


Figure 29
Tool on lifting device

Operation

After commissioning is complete, the hydraulic unit can be used for the dismounting and mounting of TAROL units.

Preparations for dismounting and mounting

Before dismounting and mounting, prepare the following:

- Installation site, see page 13.
- Commissioning, see page 17.
- Tool, see page 36.

Additional preparations for mounting:

- Set the pressure relief valve to the required contact force, see page 25.
- Check the shaft journal, see page 40.
- Ensure that the bearing to be fitted is new or has been overhauled and greased.

Checking the shaft journal

Before mounting of the bearing to be fitted, the shaft journals must be checked and processed if necessary.

- ▶ Remove any contamination, swarf and anti-rust coating.
- ▶ Smooth out any impact marks and traces of corrosion using fine abrasives. The bearing seating surface should be smooth and free from scoring and notches.
- ▶ Demagnetise any magnetised shafts before mounting.
- ▶ Check the shaft journal in accordance with the bearing table, *Figure 31*, page 41. The shaft and measuring tool, such as the snap gauge and master ring, see page 73, should be at the same temperature.

Figure 30
Setting the snap gauge using the master ring

Figure 31
Measuring the shaft journal using the snap gauge

Tolerances of shaft journals in the AAR range

The regulation AAR M-101 of the Association of American Railroads applies to dimensional and geometrical accuracy:

- out-of-roundness of the shaft journal max. 0,02 mm (0,0008 inch), measured at 3 cross-sections of the bearing seat
- conicity of the shaft journal over the whole bearing seat max. 0,025 mm (0,001 inch).

Tolerances of shaft journals in metric sizes

Shaft journals in metric sizes:

- The deviation from the cylindrical form is a maximum of 0,01 mm.

Checking the threaded holes

Check the threaded holes of the shaft journals:

- It must be checked whether the threaded holes are intact.

Dismounting of TAROL units

The following guidelines and recommendations apply to the standard dismounting of TAROL bearings. Where bearing-specific mounting recommendations and parameters exist, these application-specific requirements must be followed.

CAUTION

Risk of injury or crushing due to parts falling off or flying around.

Depending on the design, secure the guide bush to the axle journal using only the 3 or respectively 4 original screws 12.9 in order to secure non-hazardous handling.

Only use the original spindle in order to prevent mechanical overload.

Always screw in the spindle completely as far as the colour marking (if present) in order to secure all the parts against falling with a sufficient number of load-bearing thread turns.

Always position the cylinder with the piston side facing the guide bush. Otherwise there is a danger that the bearing, after withdrawal from the shaft journal, will press against the housing of the cylinder and parts of the tool will thus be damaged or destroyed.

Position the hydraulic unit at the correct working height and ensure that the spindle moves freely, in order to prevent crushing.

During dismounting, always align the withdrawal device correctly in order to prevent mechanical overload of the parts.

Locate the assembled withdrawal device with the eye bolts on a suitable lifting device, in order to secure it against falling.

Check the hydraulic lines regularly in order to prevent rupture.

Set only the hydraulic pressure corresponding to the bearing size, in order to prevent mechanical overload.

Never reach between parts moving towards each other, in order to prevent crushing.

Before loosening the screws, secure the workpiece parts against falling.

After dismounting or respectively mounting, rotate the 4/3 way valve to the position “Stop”, in order to prevent crushing. ◁

Note

The dismounting process for the TAROL units is identical for the TOOL-RAILWAY-AGGREGATE-2 and the TOOL-RAILWAY-AGGREGATE-2-DIGI.

Removing the end cap

The end cap is removed as follows:

- ▶ Clean the bearing and accessory parts.
- ▶ If present, dismount the cover.
- ▶ If present, bend the tab washer away from the lateral faces of the screw heads.
- ▶ Untighten and remove the screws, *Figure 32*.

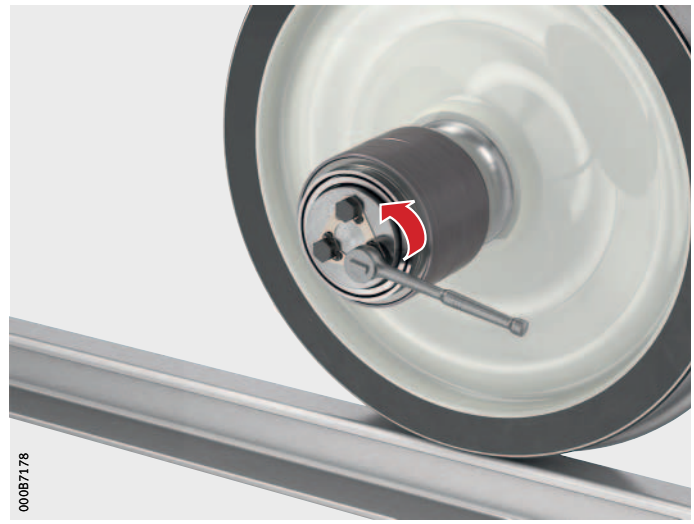


Figure 32
Dismounting the end cap

- ▶ Remove the end cap without removing the sealing ring, *Figure 33*.

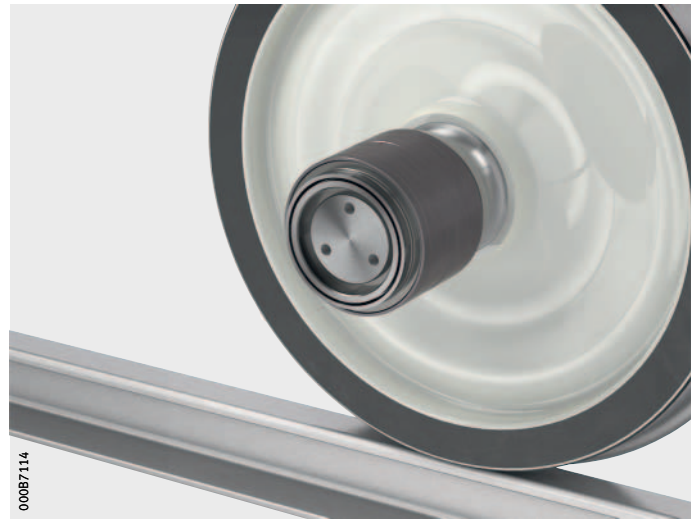


Figure 33
End cap removed

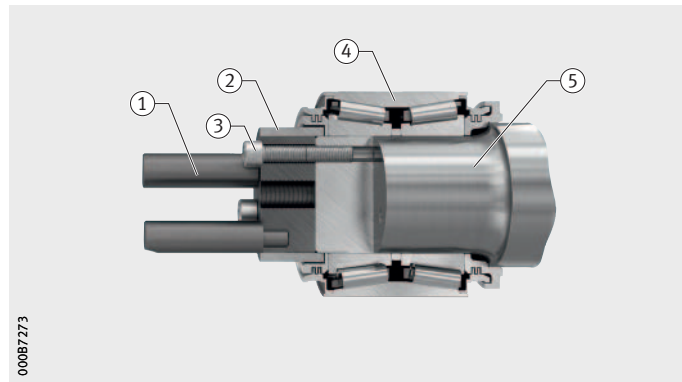
▷ The end cap is removed.

Removing the unit

The unit is removed as follows:

▶ Screw on the guide bush with the aid of the centring ring, *Figure 34* and *Figure 35*.

Figure 34
Screwing on the guide bush



① Guide bush
② Centring ring
③ Socket head screws for guide bush
④ TAROL unit
⑤ Axle journal

Figure 35
Centring the guide bush

▶ Insert the spindle without the locknut through the hollow piston of the hydraulic unit and align the spindle to the shaft, *Figure 36*, page 45.

▶ Check the brakes on the castors are off. If necessary, release the brakes on the castors. During dismounting, the scissors lift table moves on the castors by the displacement distance of the hollow piston cylinder.

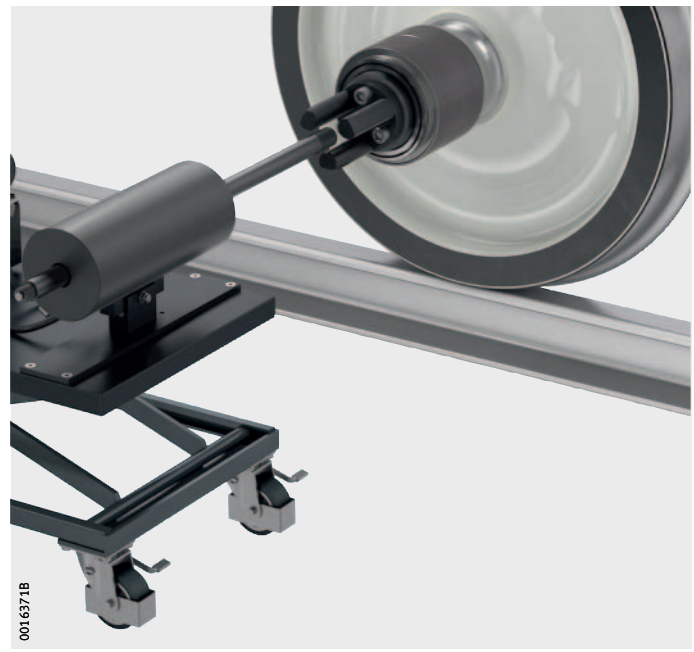


Figure 36
Inserting the spindle through the hollow piston

▶ Screw the spindle into the guide bush, *Figure 37*.

Figure 37
Screwing the spindle into the guide bush

- ▶ Fit the drawing frame.
- ▶ Check whether the extractor shoe is in contact with the shaft behind the shaft shoulder, *Figure 38*.

Figure 38
Extractor shoe in contact with shaft

- ▶ Secure the extractor shoe in place using a suitable lifting device, such as an indoor crane, in order to prevent damage by the extractor shoe after dismounting.
- ▶ Activate the hydraulic unit.
- ▶ During removal, rotate the outer ring back and forth by hand in order to prevent tensioning.
- ▶ Switch off the hydraulic unit once the removal operation is completed.
- ▶ Lift off the drawing frame and place it to one side.
- ▶ Unscrew the spindle from the guide bush.
- ▶ Move the hydraulic unit to one side.
- ▶ Remove the bearing from the guide bush.
- ▶ Unscrew the guide bush, *Figure 39*.

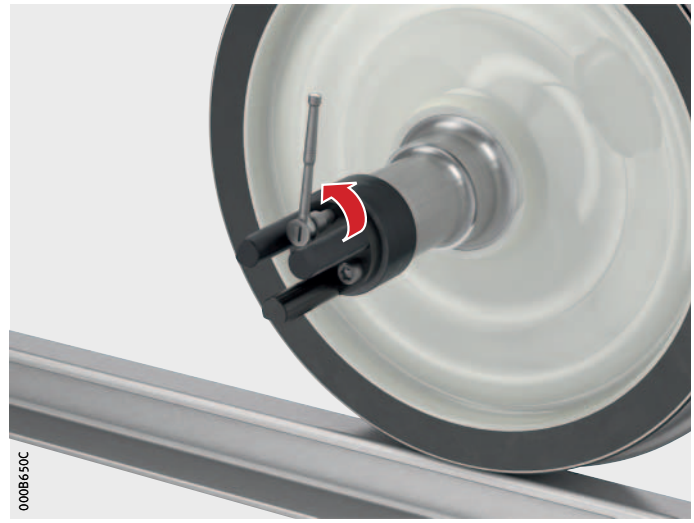


Figure 39
Unscrewing the guide bush

▷ Dismounting of the TAROL unit is completed.

Mounting of TAROL units

The following guidelines and recommendations apply to the standard mounting of TAROL bearings. Where bearing-specific mounting recommendations and parameters exist, these application-specific requirements must be followed.

Note

We recommend entering the project data before starting the dismounting process if you are using the mobile hydraulic unit TOOL-RAILWAY-AGGREGATE-2-DIGI in record mode, see page 28.

Sliding the unit into place

▶ Screw the guide bush onto the shaft journal with the aid of the centring bush, *Figure 40* and *Figure 41*.

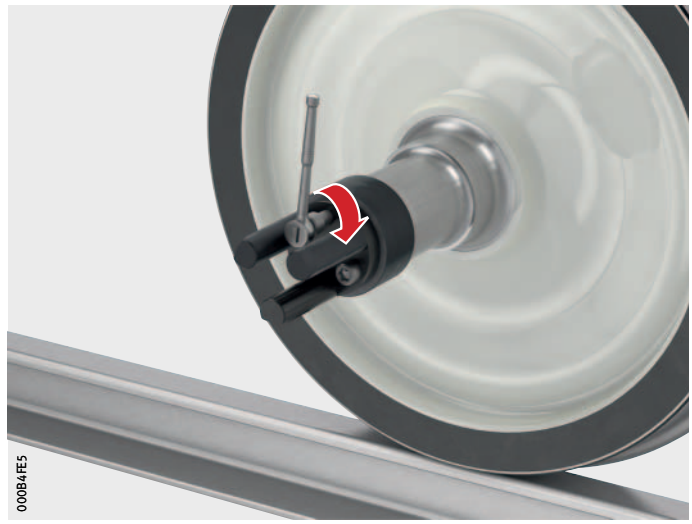
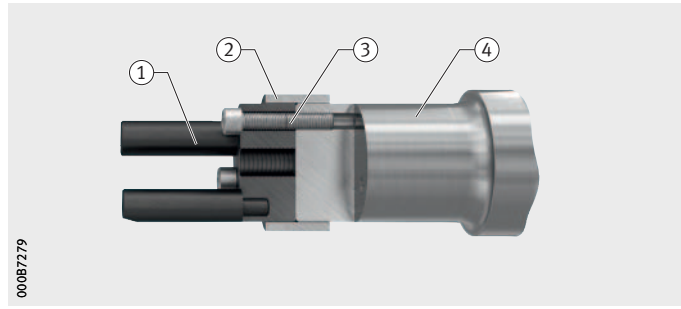


Figure 40
Screwing the guide bush onto the shaft journal



① Guide bush
② Centring ring
③ Socket head screws for guide bush
④ Axle journal

Figure 41
Centring the guide bush

- Apply a very thin coating of Arcanol mounting paste (ARCANOL-MOUNTINGPASTE) to the shaft journal to prevent any scoring when sliding the unit into place, see *table*.
- Remove the TAROL unit from the packaging and slide it onto the guide bush. In the case of bearing units with rubber seals, the seal wear ring must not be allowed to slip out of the sealing cap, *Figure 42*.

Figure 42
Sliding the TAROL unit onto the guide bush

Ordering designation

Ordering designation	Ordering number
ARCANOL-MOUNTINGPASTE-250G	019145365-0000-10
ARCANOL-MOUNTINGPASTE-400G	019145373-0000-10
ARCANOL-MOUNTINGPASTE-1KG	019145357-0000-10

- ▶ Move the mobile hydraulic device into place and prepare the spindle with locknut and mounting sleeve, *Figure 43*.
- ▶ Check whether the brakes on the castors are released. If necessary, release the brakes on the castors. The scissors lift table will move by means of the castors through the displacement distance of the hollow piston cylinder during mounting.

Figure 43
Moving the hydraulic unit into place

- ▶ Insert the spindle with the locknut screwed into place from the rear side of the hydraulic unit through the hollow piston.
- ▶ Slide the mounting sleeve onto the spindle of the piston press, *Figure 44*.

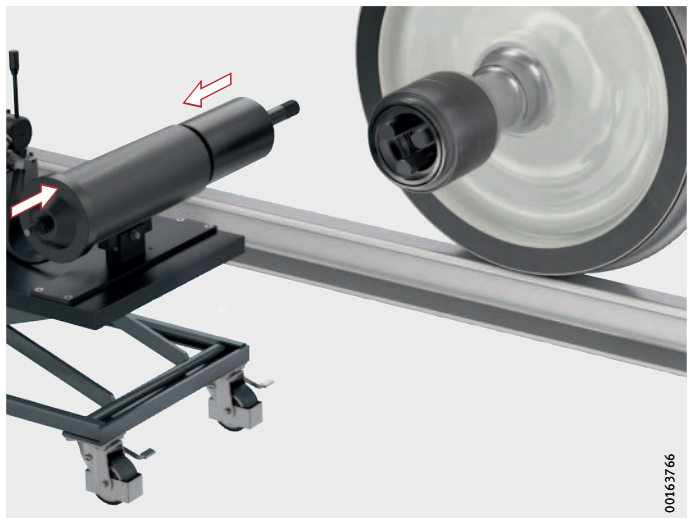


Figure 44
Mounting the spindle and sliding the mounting sleeve onto the spindle

▶ Align the hydraulic unit to the TAROL unit and the shaft journal.
▶ Slide the mounting sleeve onto the guide bush, *Figure 45*.

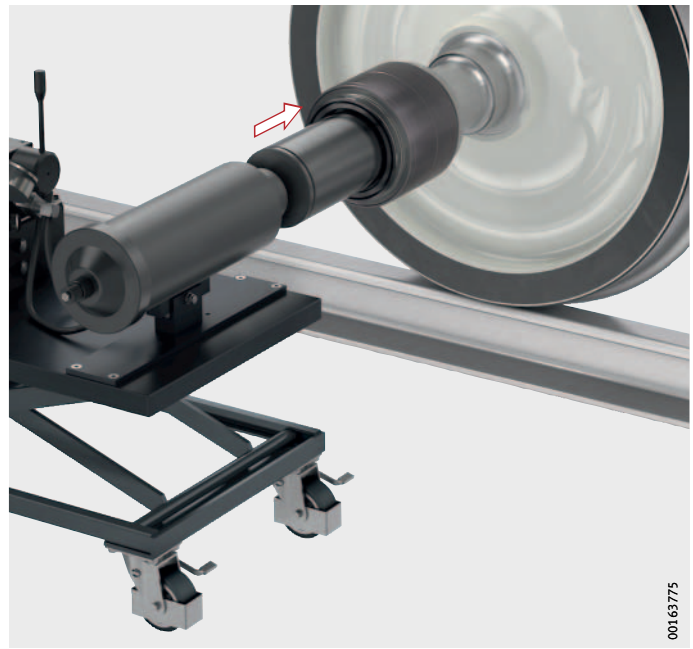


Figure 45
Aligning the hydraulic unit to the TAROL unit

▶ Screw the spindle of the hydraulic unit using the crank arm into the guide bush, *Figure 46*.

Figure 46
Screwing the spindle into the guide bush

▶ If necessary, reset the piston stroke and select [**START**] if you are using the mobile hydraulic unit TOOL-RAILWAY-AGGREGATE-2-DIGI, *Figure 19*, page 30, and *Figure 23*, page 33.

▶ Move the 4/3 way valve to the position “Extend”. The bearing is slid onto the shaft journal from the guide bush with the aid of the mounting sleeve.

Rotate the outer ring back and forth by hand so that no tensioning occurs, *Figure 47*.

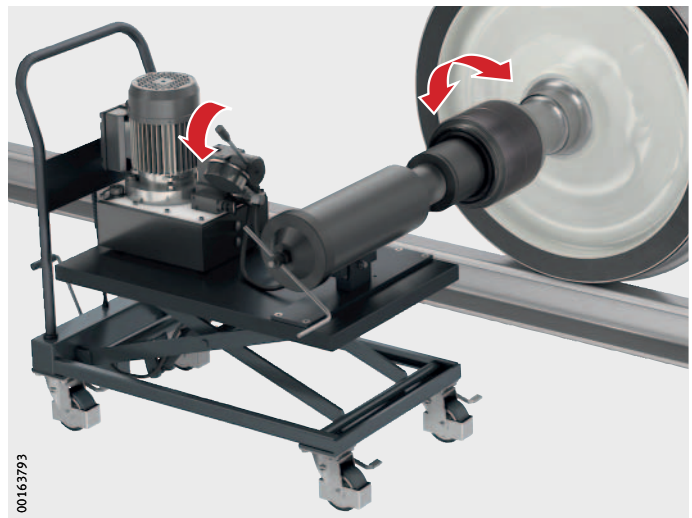


Figure 47
Sliding the bearing unit into place

▷ When the backing ring of the TAROL unit is in axial contact with the shaft shoulder, the pressure will increase rapidly.

- ▶ Rotate the 4/3 way valve to the position “Stop”, *Figure 8*, page 22, ②. The highest contact force should correspond to the maximum contact force in the *tables*.
- ▶ Rotate the 4/3 way valve for a short time to the position “Retract”, in order to set the hydraulic unit free from pressure, *Figure 8*, page 22, ③.
- ▶ Extend the hollow piston cylinder once again with the specified contact force.

Maximum contact force of TAROL units in metric sizes

TAROL unit d	Maximum contact force		Pressure
	Tolerance ±20 kN	Tolerance ±2 t	Tolerance ±20 bar
mm	kN	t	bar
90	200	20	200
100	250	25	250
110	250	25	250
120	250	25	250
130	350	35	350
140	350	35	350
150	350	35	350
160	400	40	400

Maximum contact force of TAROL units in inch sizes

TAROL unit	Maximum contact force		Pressure
	Tolerance ±50 kN	Tolerance ±5 t	Tolerance ±55 bar
	kN	t	bar
B4-1/4×8	350	35	350
C5×9	350	35	350
D5-1/2×10	500	50	500
E6×11	500	50	500
F6-1/2×12	500	50	500
K6-1/2×9	500	50	500
G7×12	650	65	650
GG6-1/2	650	65	650
GG6-7/8	650	65	650

▶ Check the seating of the bearing. The gap between the support ring and shaft shoulder must not be greater than 0,05 mm (0,002 inch). Check the gap using the feeler gauge, *Figure 48*. If necessary, repeat mounting with a contact force of + 50 bar.

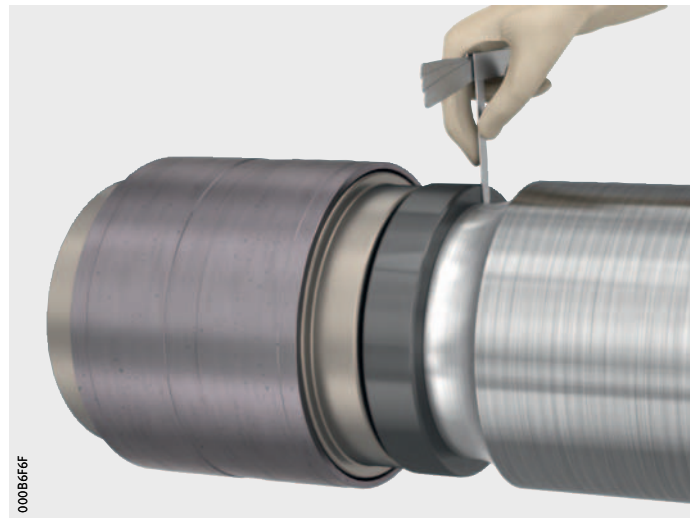


Figure 48
Checking the seat

Fitting the end cap

▶ Screw the spindle with the locknut out of the guide bush and remove the spindle from the hydraulic nut.

▶ Move the hydraulic unit to one side.

▶ Remove the mounting sleeve.

▶ Unscrew the guide bush from the shaft journal, *Figure 49*.

Figure 49
Unscrewing the guide bush from the shaft journal

▶ Screw the end cap together with the retainer (plate or washer) onto the shaft end face.

▶ Tighten the end cap screws to the tightening torque stated in the tables, *Figure 50* and *tables*, page 56.

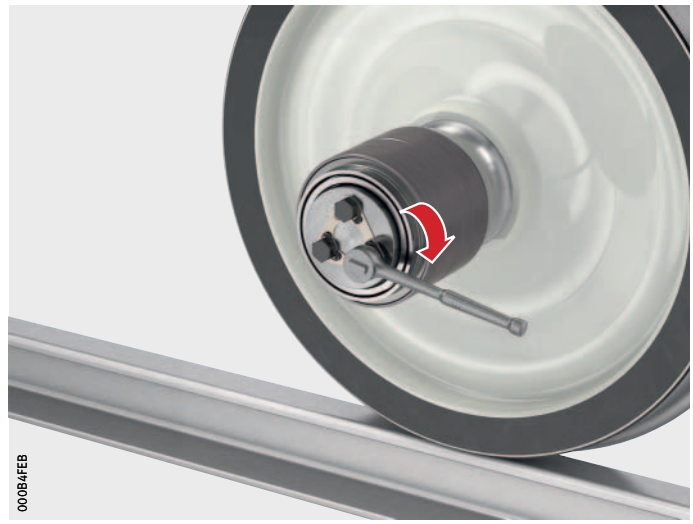


Figure 50
Tightening the end cap screws

▶ Where present, bend back the tabs on the tab washer on all the end cap screws, *Figure 51*.

Figure 51
Bending back the tabs on the tab washer

▶ In the case of designs with a cover:
Tighten the end cap screws to the specified tightening torque and secure them.

▶ Fit the cover over the end cap.

Tightening torque of end cap screws for TAROL units in metric sizes

Screw size d	Tightening torque	
	Normal screws with retention Tolerance ±5 Nm Nm	Self-retaining screws Tolerance ±5 Nm Nm
M12	75	80
M16	180	205
M20	370	415

Tightening torque of end cap screws for TAROL units in inch sizes

TAROL unit d	Thread dimension of end cap screw inch	Tightening torque	
		Tolerance ±4% Nm	Tolerance ±4% ftlbs
B4-$^1/_4$×8	$^3/_4$	56	115
C5×9	$^7/_8$	197	145
D5-$^1/_2$×10	$^7/_8$	217	160
E6×11	1	393	290
F6-$^1/_2$×12	1$^1/_8$	569	420
K6-$^1/_2$×9	1$^1/_8$	569	420
G7×12	1$^1/_4$	664	490
GG6-$^1/_2$	$^7/_8$	502	370
GG6-$^7/_8$	$^7/_8$	502	370

The tightening torques stated are standard values for axle closure parts supplied by us. Components from other suppliers may vary from these values.

Troubleshooting and rectification

Malfunctions may only be determined and eliminated by qualified personnel. Observe the accident prevention guidelines.
Personal protective equipment must be used for all work.

This manual contains advice on possible causes of malfunctions and remedial actions.

You can eliminate a malfunction as follows:

- Disconnect the hydraulic unit from the mains voltage and secure it against being switched on again.
- Determine the cause of the malfunction.
- Eliminate the cause.

General errors

If a malfunction occurs, the hydraulic unit must not be used again until the cause of the malfunction has been detected and resolved.

Error, cause, remedy

Error	Possible cause	Remedy
Scissors lift table does not raise	Escape valve is open	Close the escape valve completely
	Too little oil in the height adjustment cylinder	Check oil level and refill if necessary
	Release valve or ball in the mechanism not working properly	Clean, replace if necessary
Scissors lift table raises after significant delay	Air in the scissors lift table cylinder	☐ Lower the scissors lift table to its lowest position ☐ Open bleed screw, *Figure 52*, page 58, ① ☐ Raise scissors lift table and check it has reached its topmost position ☐ When the scissors lift table has reached topmost position, lower it to half the height ☐ Close the bleed screw on the cylinder
Scissors lift table does not remain in its raised position	Escape valve is open	Close the escape valve completely
	Release valve or ball in the mechanism not working properly	Clean, replace if necessary
Scissors lift table will not lower	Escape valve is closed	Open the escape valve completely
	Worn parts	☐ Replace the seal ☐ Check the valve stopper and repair or replace if necessary
Oil leak at the escape valve	Worn seal	Replace the seal
Oil leak on height adjustment cylinder	Worn seal or O-ring	Replace seal and/or O-ring
Hydraulic unit motor will not start	No power supply	Attach power supply
	Overheated motor	Allow motor to cool down

Error, cause, remedy
(continued)

Error	Possible cause	Remedy
Incorrect pressure in the hydraulic unit	Pressure relief valve set incorrectly	Set the pressure relief valve to the required contact force
	Oil level in the tank too low	Check hydraulic oil level and refill if necessary until the tank is full
	Leakage	Check system for leaks: - Replace defective parts - Retighten screws
	Hydraulic unit error	Check hydraulic unit, if necessary, contact Schaeffler
Uneven pressure in the hydraulic unit	Air in the oil circuit	Check hydraulic oil level and connections and then bleed the oil circuit
	Contaminated hydraulic oil	Clean oil tank and change hydraulic oil
	Worn out or damaged pump	Contact Schaeffler
Hydraulic unit pressure does not increase after bleeding the oil circuit	Air in the oil circuit	- Release the hydraulic unit from the scissors lift table - Carefully tilt the hydraulic unit slightly towards the motor - Switch the hydraulic unit on and off several times to assist the suction in the motor - Refit the hydraulic unit to the scissors lift table
Data logger box is not reacting	Operating system crashed	- Press red main switch - Press green main switch

① Bleed screw on the cylinder of the scissors lift table

Figure 52
Bleed screw on the cylinder of the scissors lift table

Maintenance

Regular maintenance of the hydraulic device is a prerequisite for reliable operation of the hydraulic unit.

Basic rules for maintenance and repair

In all maintenance and repair work on the hydraulic unit, the 4/3 way valve must be in the position “Stop”, the hydraulic unit must be detached from the mains voltage and must be secured against being switched on again.

All maintenance and repair work as well as the activities described in the maintenance plan may only be carried out by qualified personnel, see page 6, observing the accident prevention guidelines. All further activities, and especially repair work to the voltage supply, may only be carried out by a trained electrician.

Personal protective equipment must be used for all work.

If any safety devices must be removed during maintenance or repair, these must be refitted once the work is complete and their function must be checked.

When carrying out maintenance and repair work, only suitable tools may be used and these must be used correctly.

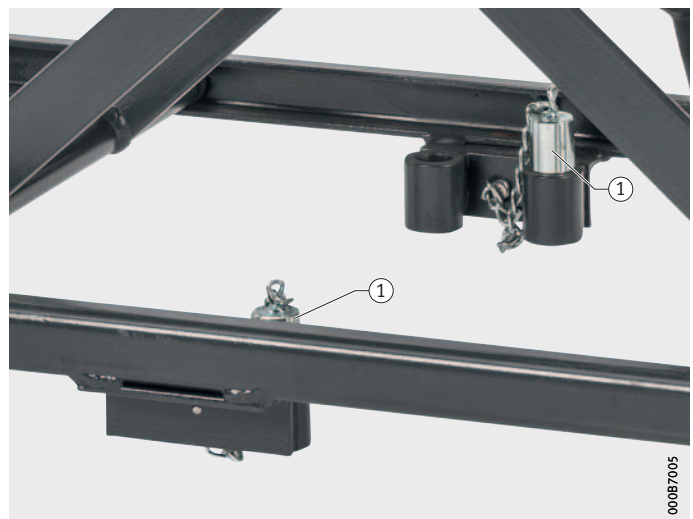
Any indirect process materials must be disposed of in accordance with the appropriate safety datasheets from the lubricant manufacturer.

If you have any questions on maintenance or repair, please contact Schaeffler.

Safety equipment

In order to protect the user as well as the hydraulic unit and the scissors lift table, the following safety equipment is present:

- During maintenance work, the scissors lift table is secured against unintentional lowering by means of two pins, *Figure 53*, ①.
- Burstproof hoses given protection against rupture of a hydraulic hose.
- In order to prevent unintentional retraction and extension of the hollow piston cylinder, the 4/3 way valve is equipped with 3 settings.
- The mechanical pressure relief valve prevents damage to the bearings during mounting.



① Pins for securing against unintentional lowering

Figure 53
Pins for securing the scissors lift table

Maintenance plan

Maintenance activities are stated in the maintenance plan.
They must be carried out in some cases before each use, monthly, once per year, every two years, in accordance with the prescribed annually usage period and in some cases as necessary.

The hydraulic hose must be replaced in accordance with DIN 113-020 after no more than a period of usage of 4 years.
As necessary, observe any country-specific regulations.

WARNING

Contact with cleaning agents can cause irritation to skin and respiratory organs.

Avoid skin contact, for example by means of gloves.

Observe the safety and environmental guidelines of cleaning agent manufacturers. ◁

Before every use

Subassembly	Activity
Mains connection cable	Visual inspection for damage, see page 67
Hydraulic connections and supply lines	Visual inspection for damage and leaks
Hydraulic device	Visual inspection for damage
Castors on the scissors lift table	Visual inspection for wear and checking for mobility
Brake on the scissors lift table	Checking for function
Cylinder for height adjustment	Visual inspection for leakage

Monthly

Subassembly	Activity
All friction points on the scissors lift table	Lubrication with grease

Annually, after 1 000 hours of operation or after 5 000 cycles

Subassembly	Activity
Hydraulic oil	Change the hydraulic oil annually, after 1 000 hours of operation or after 5 000 cycles, see page 64

Every two years or after 2 000 hours of operation

Subassembly	Activity
Hydraulic oil filter	Cleaning and inspection of hydraulic oil filter, replacement as necessary of the hydraulic oil filter, every two years or after 2 000 hours of operation, see page 65

As necessary

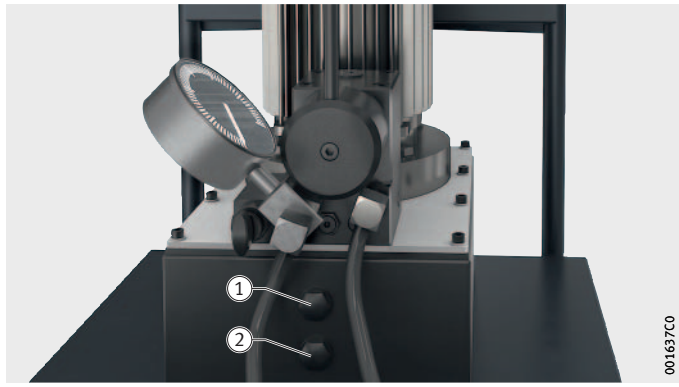
For the following maintenance work, the maintenance intervals are dependent on the degree of contamination of the environment and the number of operating hours.

Subassembly	Activity
All hydraulic components	Clean away contamination
Hydraulic oil	Change the hydraulic oil immediately if contaminated

Checking the hydraulic oil level

Check the hydraulic oil level in the hydraulic device by means of the viewing window. The tank is full if the oil level is visible in the upper viewing window, *Figure 54*, ①.

If the oil level is at the height of the lower viewing window, the hydraulic oil must be topped up until the oil level is visible in the upper viewing window, *Figure 54*, ②.



① Upper viewing window
② Lower viewing window

Figure 54
Checking the hydraulic oil level

Topping up the hydraulic oil

The hydraulic oil must be topped up if the hydraulic oil level is at the height of the lower viewing window, *Figure 54*, page 62, ②.

NOTICE

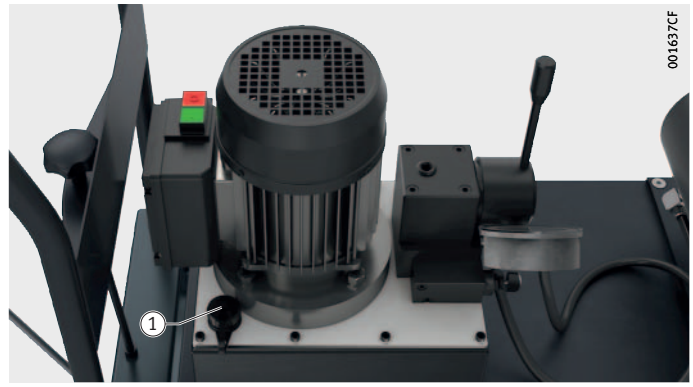
Only top up the device using hydraulic oil of the prescribed specification, see *table*, page 69.◁

NOTICE

Add hydraulic oil only if the hollow piston cylinder is fully returned to its original position and the 4/3 way valve is in the position “Stop”.◁

Top up the hydraulic oil:

- ▶ Return the hollow piston cylinder completely to its original position and ensure that the 4/3 way valve is in the position “Stop”, *Figure 8*, page 22, ②.
- ▶ Remove the closure from the oil fill hole, *Figure 55*, ①.
- ▶ Top up the hydraulic oil until it is visible in the upper viewing window.
- ▶ Close off the oil fill hole.
- ▶ Bleed the oil circuit if necessary, see page 64.



① Oil fill hole

Figure 55
Oil fill hole

Bleeding the oil circuit

Before first use and after each change of hydraulic oil, the oil circuit must be bled in order to remove any air bubbles from the system:

- ▶ Top up the hydraulic oil to the upper viewing window, see page 63.
- ▶ Start the hydraulic device.
- ▶ Start the hydraulic device and move the 4/3 way valve to the position “Extend” or “Retract”, *Figure 8*, page 22, ① or ③.
- ▶ Check using the manometer whether pressure has built up.
- ▷ When the pump has drawn up hydraulic oil, there will be a change to the running noise. The oil circuit has been bled.

Changing the hydraulic oil

In order to achieve an environmentally responsible change of the hydraulic oil, a suitable collection container must be used.

Change the hydraulic oil:

- ▶ Prepare the collection container.
- ▶ Carefully remove the cover from the oil tank, *Figure 56*, page 66, ①, in order to avoid damage to the seal, *Figure 56*, page 66, ⑥.
- ▶ Draw the hydraulic oil into the suitable collection container.
- ▶ Check the seal for defects and replace if necessary, *Figure 56*, page 66, ⑥.
- ▶ One the oil tank is emptied, refit the cover to the oil tank. Ensure that the seal is correctly seated.
- ▶ Top up the oil tank with sufficient hydraulic oil according to the standard ISO VG32 via the oil fill hole, *Figure 55*, page 63, ①, until the oil level is visible at the upper viewing window, *Figure 54*, page 62, ①.
- ▶ Close off the oil fill hole.
- ▶ Bleed the oil circuit, see page 64.
- ▷ The hydraulic device is ready for operation.

⚠ CAUTION

Slip hazard due to hydraulic oil.

Hydraulic oil must always be stored and disposed of by environmentally acceptable methods.

Remove oil stains immediately. ◁

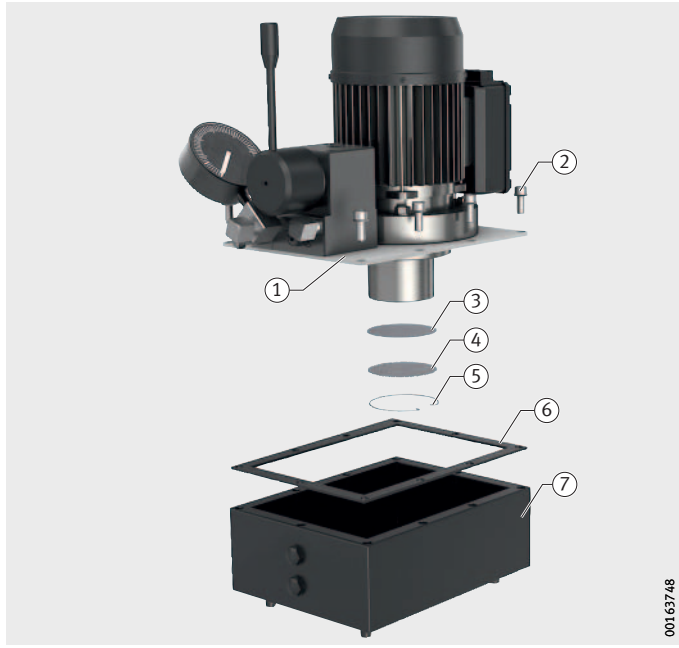
Changing the hydraulic oil filter

In order to achieve an environmentally responsible change of the hydraulic oil filter, a suitable collection container must be used.

The hydraulic oil filters are installed underneath on the hydraulic oil pump.

Change the hydraulic oil filter:

- ▶ Prepare the collection container.
- ▶ Carefully remove the cover from the oil tank, *Figure 56*, page 66, ①, in order to avoid damage to the seal, *Figure 56*, page 66, ⑥.
- ▶ Remove the retaining ring, *Figure 56*, page 66, ⑤.
- ▶ Remove both hydraulic oil filters and place these in the suitable connection container.
- ▶ Place the cleaned or new hydraulic filters respectively in their original position. Fit the fine hydraulic filter first, then the coarse filter, *Figure 56*, page 66, ③ and ④.
- ▶ Locate the retaining ring.
- ▶ Check the seal for defects and replace if necessary, *Figure 56*, page 66, ⑥.
- ▶ Refit the cover to the oil tank. Ensure that the seal is correctly seated.
- ▶ As necessary, top up the oil tank with sufficient hydraulic oil according to the standard ISO VG32 via the oil fill hole, *Figure 55*, page 63, ①, until the oil level is at the upper viewing window, *Figure 54*, page 62, ①.
- ▶ As necessary, close off the oil fill hole, *Figure 55*, page 63 ①.
- ▶ Bleed the oil circuit, see page 64.
- ▷ The hydraulic device is ready for operation.



① 1×cover for oil tank
② 10×screw with support washer
③ 1×hydraulic oil filter, fine
④ 1×hydraulic oil filter, coarse
⑤ 1×retaining ring
⑥ 1×seal
⑦ 1×oil tank

Figure 56
Hydraulic oil filter

Checking the mains connection cable

It is recommended that checking should be carried out before every use and at least before every shift change.

The mains connection cable is checked for damage as follows:

- ▶ Switch off the hydraulic unit.
- ▶ Disconnect the hydraulic unit from the mains voltage by removing the plug of the mains connection cable.
- ▶ Carry out visual inspection of the mains connection cable including the push-fit connections. Pay attention to cuts or other damage.
- ▶ Replace any damaged mains connection cables with new cables or repair the cables.

Replacement parts

Only replacement parts from Schaeffler Technologies AG & Co. KG may be used.

As replacement parts, hydraulic hoses and a seal kit are available for the hollow piston cylinder.

Ordering designation

Designation	Ordering designation	Ordering number
Hydraulic hose	TOOL-RAILWAY-AGGREGATE-2.TUBE	093864957-0000-10
Seal kit for hollow piston cylinder	TOOL-RAILWAY-AGGREGATE-2.SEAL-CYL	093865309-0000-10

Decommissioning

If the hydraulic unit will no longer be used regularly, it should be decommissioned.

WARNING

Hazard of electric shock from components still carrying voltage.

Switch off the hydraulic unit and disconnect it from the mains voltage. Ensure that it cannot be switched on again without authorisation or unintentionally. ◁

WARNING

Hazard due to spraying of hydraulic oil.

Ensure that the hydraulic oil circuit is free from pressure. ◁

WARNING

Risk of cutting injuries to the hands when working on sharp-edged components located in the interior of the hydraulic unit.

In dismantling, use cut-resistant safety gloves. ◁

CAUTION

Hazard to the environment from the incorrect disposal of used oil.

Any used oil or indirect process materials must be disposed of in accordance with the appropriate safety datasheets from the lubricant manufacturer. ◁

Decommissioning the hydraulic unit

- Fully retract the hydraulic piston cylinder.
- Switch off the hydraulic unit by means of the main switch.
- Disconnect the hydraulic unit from the voltage supply.
- Lower the scissors lift table completely.
- Fit a protective cover.

Disposal

The device can be returned to Schaeffler for disposal.

The hydraulic unit can be dismantled in order to dispose of the subassemblies separately.

Disposal must be carried out in accordance with locally applicable regulations.

Technical data
TOOL-RAILWAY-AGGREGATE-2
TOOL-RAILWAY-AGGREGATE-2-DIGI

Component	Designation		Value	Unit
Hydraulic device	Dimension	Length	1 050	mm
		Width	500	mm
		Height	900	mm
	Max. load carrying capacity		110	kg
	Total mass TOOL-RAILWAY-AGGREGATE-2 (incl. hydraulic oil)		155	kg
	Total mass TOOL-RAILWAY-AGGREGATE-2-DIGI (incl. hydraulic oil)		161	kg
	Permissible total mass		250	kg
Hydraulic unit	Electrically driven hydraulic unit			
	4/3 way valve			
	Pressure relief valve			
	Voltage		400	V
	Frequency	3 phase	50 – 60	Hz
	Power consumption		1,1	kW
	Max. pressure		700	bar
	Delivery rate	0 – 85 bar	2,4	l/min
		85 – 700 bar	0,9	l/min
	Oil tank volume	Total	5	l
		Effective	3,8	l
	Type of oil		ISO VG32	–
	Mass		31	kg
	Protection class		IP54	–
Hollow piston cylinder	Double action hollow piston cylinder			
	Max. contact force		692	kN
	Max. working stroke		230	mm
	Max. working pressure		700	bar
	Piston bore		39	mm
	Working height (measured at the horizontal axis of the hollow piston cylinder)	min.	440	mm
		max.	990	mm
	Hydraulic hose screw connection		$^{3}/_{8}$	inch
	Mass		47	kg

Technical data
TOOL-RAILWAY-AGGREGATE-2
TOOL-RAILWAY-AGGREGATE-2-DIGI
(continued)

Component	Designation		Value	Unit
Scissors lift table	4 solid rubber, braked castors			
	Height adjustment upwards: hydraulic with foot pedal			
	Height adjustment downwards: manually operated adjustable lowering valve			
	Dimension	Length	800	mm
		Width	500	mm
	Stroke range (scissors lift table height)		250 – 850	mm
	Stroke per pumping movement		23	mm
	Wheel diameter		100	mm
	Mass		56	kg

Technical data
TOOL-RAILWAY-AGGREGATE-2-DIGI

Component	Designation		Value	Unit
TFT touch display	Exor eX707			
	Technology	Capacitive	–	–
	Rechargeable VL2330 back-up battery, cannot be replaced		3	V
			50	mAh
	Fuse	Automatic	–	–
	Flash		4	GB
	RAM		1	GB
	Clock, calendar	With back-up battery	–	–
	Operating system	Linux RT	–	–
	Display	TFT colour, LED	–	–
	Colours		16	M
	Resolution		800×480	Pixel
	Diagonally		7	inch
	DC voltage		24	V
	Current carrying capacity		0,7	A
	Operating temperature[1)]	min.	–20	°C
		max.	+60	°C
	Storage temperature	min.	–20	°C
		max.	+70	°C
	Humidity, non-condensing (storage and operation)	min.	5	%
		max.	85	%
	Front panel protection class		IP66	–

[1)] Plug-in modules and USB devices may limit maximum operating temperature to +50 °C.

Technical data TOOL-RAILWAY-AGGREGATE-2-DIGI (continued)

Component	Designation		Value	Unit
Piston stroke measuring device	Balluf BTL7			
	Protection class		IP67	–
	DC voltage		24	V
	Operating temperature	min.	–40	°C
		max.	+85	°C
	Storage temperature	min.	–40	°C
		max.	+100	°C
	Humidity, non-condensing (storage and operation)		< 90	%
Pressure transmitter	AEP TP38			
	Protection class		IP67	–
	DC voltage		24	V
	Operating temperature	min.	–25	°C
		max.	+70	°C
	Storage temperature	min.	–25	°C
		max.	+80	°C

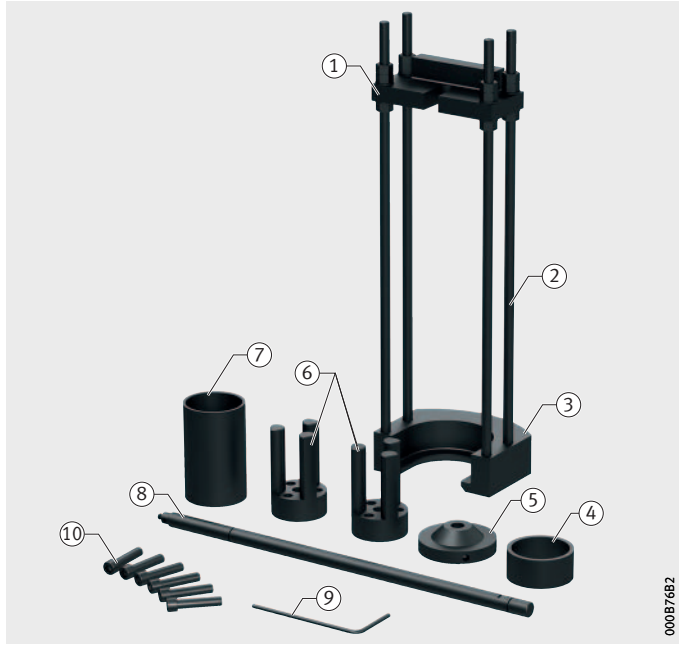
Ordering designation

Ordering designation	Ordering number
TOOL-RAILWAY-AGGREGATE-2	093687800-0000-10
TOOL-RAILWAY-AGGREGATE-2-DIGI	093687770-0000-10

Accessories

Only accessories authorised by Schaeffler Technologies AG & Co. KG may be used.

Tools for dismounting and mounting of specific bearings and applications are produced in accordance with the TAROL unit. When making enquiries or placing orders, information on the bearing type and installation drawings (shaft, housing, additional parts) are therefore required, *Figure 57*.



① 1×yoke
② 4×pull rod
③ 1×withdrawal shoe
④ 1×centring ring
⑤ 1×locknut
⑥ 2×guide bush (3 hole or 4 hole design)
⑦ 1×mounting sleeve
⑧ 1×spindle
⑨ 1×crank arm
⑩ 6×socket head screw for location of the guide bush (3 hole design) or 8×socket head screw for location of the guide bush (4 hole design)

Figure 57
Tool set

Ordering designation Examples

Tool set	Ordering designation	Ordering number
Metric size	TOOL-RAILWAY-AXLE-F-803329-130/230	089761316-0000-10
Inch size	TOOL-RAILWAY-AXLE-E6X11	057502730-0000-10

Tool set for dismounting and mounting

Since TAROL units in metric sizes have different adjacent constructions, the tools are also individually matched.

Tools for other designs are available by agreement.

Components of mounting device

Component	Application
Eye bolt	Location on lifting device
Guide bush	Dismounting and mounting
Spindle	Dismounting and mounting
Crank arm	Dismounting and mounting
Centring ring	Dismounting and mounting
Socket head screw	Dismounting and mounting
Pull rod	Dismounting
Extractor shoe	Dismounting
Yoke	Dismounting
Mounting sleeve	Mounting
Locknut	Mounting

Snap gauges

Snap gauges SNAP GAUGE can be used to check the diameter of cylindrical workpieces directly on the machine tool.

The snap gauge functions as a comparator gauge. It is set using master rings. The deviation from the set value can then be determined.

Available snap gauges

Ordering designation	Ordering number	Diameter range	
		min. mm	max. mm
SNAP-GAUGE-30/60	089745817-0000-10	30	60
SNAP-GAUGE-60/100	086252232-0000-10	60	100
SNAP-GAUGE-100/150	061556238-0000-10	100	150
SNAP-GAUGE-150/200	089745892-0000-10	150	200
SNAP-GAUGE-200/250	075053993-0000-10	200	250
SNAP-GAUGE-250/300	093280718-0000-10	250	300

Master rings for numerous diameters are available as accessories.

Ordering examples for master ring

Ordering designation	Ordering number	Shaft diameter mm
SNAP-GAUGE.MASTER-DISC100	089448502-0000-10	100
SNAP-GAUGE.MASTER-DISC120	068900422-0000-10	120
SNAP-GAUGE.MASTER-DISC130	061556165-0000-10	130
SNAP-GAUGE.MASTER-DISC150	088876942-0000-10	150

Appendix
EC Declaration of Conformity

Declaration of Conformity for hydraulic unit, *Figure 58*.

SCHAEFFLER

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EC Declaration of Conformity

in accordance with Machinery Directive 2006/42/EG
Directive 2014/30/EU relating to electromagnetic compatibility
Directive 2011/65/EU (RoHS)
Low Voltage Directive 2014/35/EU

We hereby declare that the product described below is in conformity with the applicable health and safety requirements of the EC 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:	Mobile hydraulic unit
Product name:	TOOL-RAILWAY-AGGREGATE-2
	TOOL-RAILWAY-AGGREGATE-2-DIGI

Applicable harmonized standards:

EN-ISO 12100	Safety of machinery – General principles for design – Risk Assessment and risk reduction
EN-ISO 4413	Hydraulic fluid power – General rules and safety requirements for systems and their components

Name and address of the authorized person for the technical documentation:

Schaeffler Technologies AG & Co. KG
Georg-Schäfer-Straße 30
D-97421 Schweinfurt

i.V.

Peter Schuster
Department Manager Mechatronics

Place, Date:
Schweinfurt, 24.06.2019

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.

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Figure 58
EC Declaration of Conformity

Notes

Notes

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