Operating instructions

Electric hydraulic power pack
XE1| DXE1

PowerPaX

PLARAD®
Torque & Tension Systems

PLARAD® PowerPaX
XE1*power* | XE1*docu* | XE1*control* | XE1*direct control*
DXE1*docu* | DXE1*control*
VAX | IQ-VAX | IQ-VAX-DM-DW
IQ-VAX-Z-D1500 (2400)

Read the manual carefully before use!

Maschinenfabrik Wagner GmbH & Co. KG
Birrenbachshöhe 12
53804 Much
GERMANY
Telephone: +49 2245 62-0
Fax: +49 2245 62-22
Email: info@plarad.de
Internet: www.plarad.de
Translation of the original operating instructions
pA# 82032, 1, en_GB

Information about this manual

This manual enables safe and efficient handling of the electric hydraulic power packs PLARAD PowerPaX (referred to in the following as “hydraulic power pack”).

The manual is a component of the hydraulic power pack and must be kept in its immediate vicinity where the user can access it at any time.

The user must have read and understood this manual prior to commencing any tasks. A basic prerequisite for ensuring that work is performed safely is compliance with all safety instructions and guidelines in this manual. In addition, the local accident prevention regulations and general safety provisions for the hydraulic power pack’s area of application apply.

Illustrations in this manual serve to provide a basic understanding and may differ from the actual design.

PLARAD® PowerPaX

The PLARAD® PowerPaX electric hydraulic power packs are available in different versions and configurations.

Overview of the options ↳ *Chapter 2 ‘Getting to know the hydraulic power pack’ on page 12*.

Other applicable documents

The following documents must be observed in addition to this manual:

- Rating plate
- EU declaration of conformity
- Test report for testing electrical equipment as per DIN VDE 0701-0702
  Testing of equipment as per DGUV Regulation 3
- Certificates/test reports (option)
- Technical data sheet (dimension sheet)
  ↳ www.plarad.de

Download operating instructions

You can download and save the operating instructions in various languages from here:

- *www.plarad-manuals.com*

Copyright

Further development of the manual

This manual was compiled with great care. If you notice any errors, have any questions or identify any inconsistencies, please notify us in writing. Your suggestions for improvement will help us design a user-friendly manual.

Follow-up order

Further copies of this manual can be ordered subject to an additional fee.

Contact .

Manufacturer

Maschinenfabrik Wagner GmbH & Co. KG

Birrenbachshöhe 12

53804 Much

GERMANY

Telephone: +49 2245 62-0

Telefax: +49 2245 62-22

Email: info@plarad.de

Internet: www.plarad.de

PLARAD® service

Information about PLARAD® service and authorised PLARAD® partners:

- *www.plarad.de*

Table of contents

1 Unpacking and transporting

Delivery

Fig. 1: Example, shipping crate

The hydraulic power pack is delivered together with the rest of the scope of delivery in packaging adapted to the transport route and delivery location.

For example, this could be a wooden crate delivered on a pallet. The hydraulic power pack is wrapped in film to ensure that no hydraulic oil can escape.

Checking the delivery

Check the delivery for transport damage and ensure it is complete immediately upon receipt. If it is incomplete or if there are defects, note the extent of the damage on the transport documents and lodge a complaint immediately.

Scope of delivery

The scope of delivery includes:

- Hydraulic power pack filled with hydraulic oil
- Operating instructions
  Download document from:
  www.plarad-manuals.com
- Document folder
  – EU declaration of conformity

Options:

- Any accessory ordered
- Test reports

Hydraulic power pack with auxiliary tank

Fig. 2: Plugs for auxiliary tank

- Transport plug
- Service plug

To prevent oil spillage, hydraulic power packs with an auxiliary tank are sealed with black transport plugs for transport.

→ Prior to commissioning, replace the black transport plug ● with the orange service plug ●.

Handling packaging material

The individual packages are packed according to the expected transport conditions. Only environmentally friendly materials are used for the packaging.

The packaging should provide protection against transport damage, corrosion and other damage. For this reason, do not destroy the packaging and do not remove it until shortly before use.

Dispose of packaging material in accordance with the applicable statutory provisions and local regulations.

ENVIRONMENT!

Danger to the environment due to incorrect disposal!

Packaging materials are valuable raw materials and, in many cases, can be further utilised or appropriately reconditioned and recycled. Incorrect disposal of packaging materials can be hazardous to the environment.

- Reuse pallets.
- Dispose of packaging materials in an environmentally sound manner.
- Observe the locally applicable disposal regulations. If necessary, engage the services of a specialist company with regard to disposal.

Transport by a forwarding agent

Observe the following points when the hydraulic power pack is transported in a vehicle by a forwarding agent or parcel service:

1. **WARNING!**

   Danger of crushing from unsecured load!

   Ensure that the load is properly secured in the vehicle. Secure the hydraulic power pack in such a way that it cannot slide out of position during transport.

2. **ENVIRONMENT!**

   Danger to the environment due to hydraulic oil leakage!

   Ensure that the hydraulic power pack is horizontal and protected from shocks and impacts for the entire duration of transport.

   Never put the hydraulic power pack on its side or position it upside down.

3. Put the hydraulic power pack in a foil bag to prevent oil spillage in the event of an accident.

Transport with an industrial truck

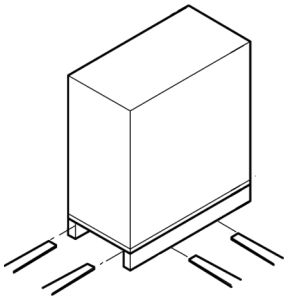


Fig. 3: Transport with an industrial truck

1. Ensure that the industrial truck is designed for the weight of the transport item. For details of the weight, see *Chapter 2.3 'Rating plate' on page 17*.
2. Drive the forks of the industrial truck between or under the bars of the pallet.
3. Drive in the forks until they protrude on the opposing side.
4. **WARNING!**
   Danger of crushing due to the package tipping over!

   If the centre of gravity is eccentric, ensure that the pallet cannot tip over.
5. Lift the pallet with the transport item and commence transport.

Transport by crane

Protective equipment: ■ Industrial safety helmet

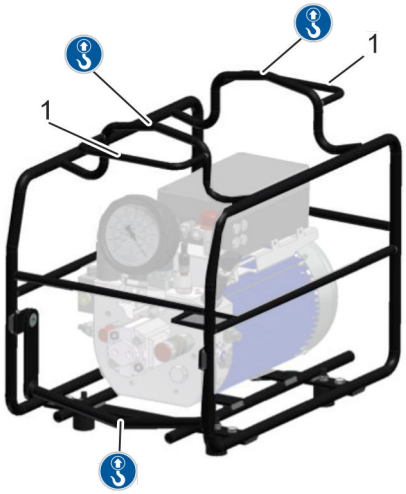


Fig. 4: Transport

If unpacked, the hydraulic power pack can be transported by crane.

The attachment points are marked with .

The cables can be rolled up on the holders (Fig. 4/1).

1. Ensure that the crane and hoists are designed for the weight of the hydraulic power pack. For details of the weight, see *Chapter 2.3 'Rating plate' on page 17*.
2. Attach the ropes, slings or multi-point suspension gear in the proper manner.
3. **WARNING!**
   Danger of crushing due to the hydraulic power pack falling!

   Ensure that the hydraulic power pack hangs straight. Observe the eccentric centre of gravity as necessary.
4. Commence transport.

   Do not loiter under suspended loads.

Transport by hand

1. Remove any hoses that are connected.
2. **WARNING!**
   Danger of tripping!

   Neatly roll up the power cord and the remote control cable and secure them on the frame of the hydraulic power pack. For information about holders for rolling up the cables, see Fig. 4/1.
3. Seal the couplings and nipples with the caps prior to transport.
4. Ensure that all openings (e.g. cover of the surge tank) are sealed.
5. **WARNING!**
   Danger of injury due to high weight!

   Carry with the aid of a second person. In doing so, keep the transport item horizontal at all times. Never turn it upside down.

Transport after operation

WARNING!
Danger of burns due to hot surfaces or hydraulic oil!

In the event of a high ambient temperature and prolonged operation, the hydraulic power pack can reach surface temperatures of up to 80 °C. The hydraulic oil gets hot when pressurised. Contact with hot surfaces and hot hydraulic oil could result in severe burns.

- Let the hydraulic power pack cool down prior to transport.
- Seal all openings.
- Wear personal protective equipment.

Storage

- Ensure disconnection from the power supply grid during storage.
- Put it in a horizontal position.
- Comply with ambient conditions *Chapter 16 'Technical data' on page 123*.
- Seal all openings (couplings, nipples, surge tank).
- Roll up the power cord and the remote control cable. Do not twist, kink or subject to any other mechanical loads.

2 Getting to know the hydraulic power pack

2.1 Overview of the hydraulic power pack

Dual hydraulic power pack

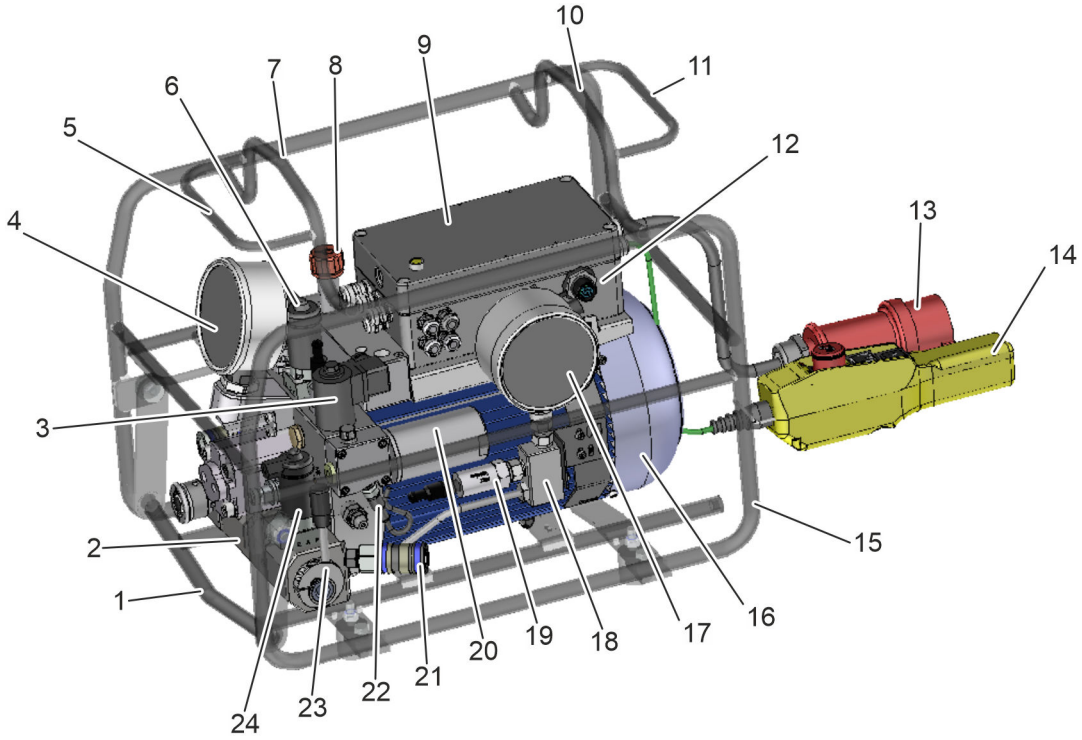


Fig. 5: DXE1docu 30+

1	Attachment point for transport by crane
2	Pressure amplifier
3	Pressure relief valve
4	Pressure display, process connections, front
5	Holder for cable collection
6	Main valve
7	Attachment point for transport by crane
8	Oil filling neck
9	Control system
10	Attachment point for transport by crane
11	Holder for cable collection
12	Documentation and service interface
13	Power cord
14	Remote control
15	Supporting frame
16	Oil-immersed motor
17	Pressure display (2,500 bar), process connection, side
18	Pressure unit/pressure measuring unit
19	High-pressure sensor
20	Oil filter
21	Pressure connection for hydraulic tensioner
22	Pressure sensor
23	Safety valve for pressure release
24	Pressure relief valve

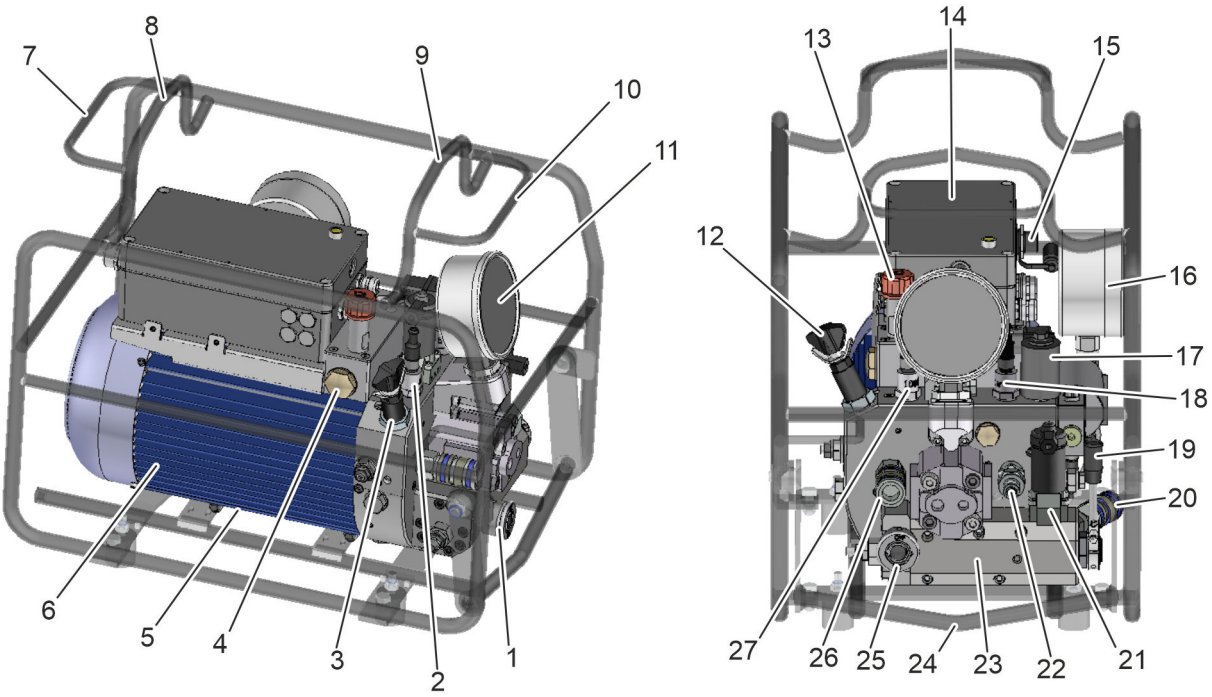


Fig. 6: DXE1docu 30+

1 Hydraulic connection, pressure-side
2 Low-pressure adjustment valve for the return stroke Set at the factory (approx. 130 bar). Do not change the setting!
3 Pressure adjustment valve with adjustment lock
4 Sight glass for oil level
5 Oil drain plug (under the motor)
6 Oil-immersed motor
7 Holder for cable collection
8 Attachment point for transport by crane
9 Attachment point for transport by crane
10 Holder for cable collection
11 Pressure display, process connections, front
12 Pressure adjustment valve with adjustment lock
13 Oil filling neck
14 Control system
15 Documentation and service interface
16 Pressure display (2,500 bar), process connection, side
17 Pressure relief valve
18 Adjustment valve, gear pump switching point. Set at the factory (approx. 130 bar). Do not change the setting!
19 Safety valve for pressure release
20 Pressure connection for hydraulic tensioner
21 Pressure relief valve
22 Hydraulic connection, return-side
23 Pressure amplifier
24 Attachment point for transport by crane
25 Switching valve, pressure connections: Hydraulic wrench/hydraulic tensioner
26 Hydraulic connection, pressure-side
27 Low-pressure adjustment valve for the return stroke Set at the factory (approx. 130 bar). Do not change the setting!

XE1*docu* 30+

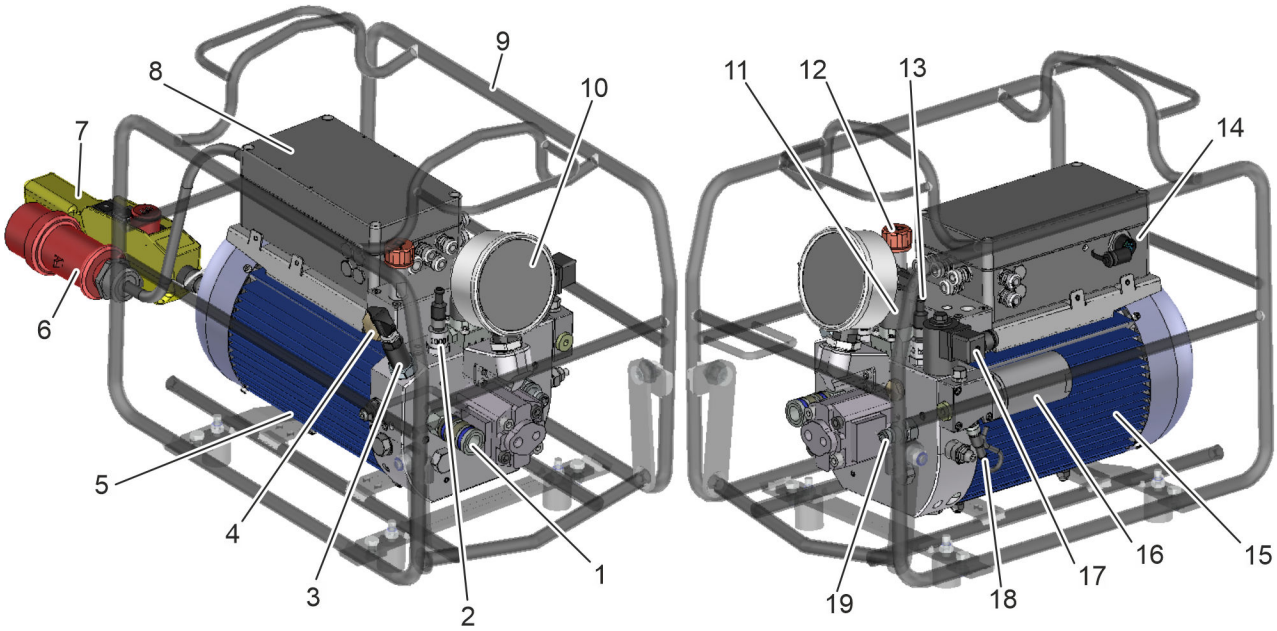


Fig. 7: XE1docu 30+

1 Hydraulic connection, pressure-side
2 Low-pressure adjustment valve for the return stroke Set at the factory (approx. 130 bar). Do not change the setting!
3 Pressure adjustment valve with adjustment lock
4 Sight glass for oil level
5 Oil drain plug (under the motor)
6 Power cord
7 Remote control
8 Control system
9 Supporting frame
10 Pressure display
11 Main valve
12 Oil filling neck
13 Adjustment valve, gear pump switching point. Set at the factory (approx. 130 bar). Do not change the setting!
14 Documentation and service interface
15 Oil-immersed motor
16 Oil filter
17 Pressure relief valve
18 Pressure sensor
19 Hydraulic connection, return-side

XE1*power*

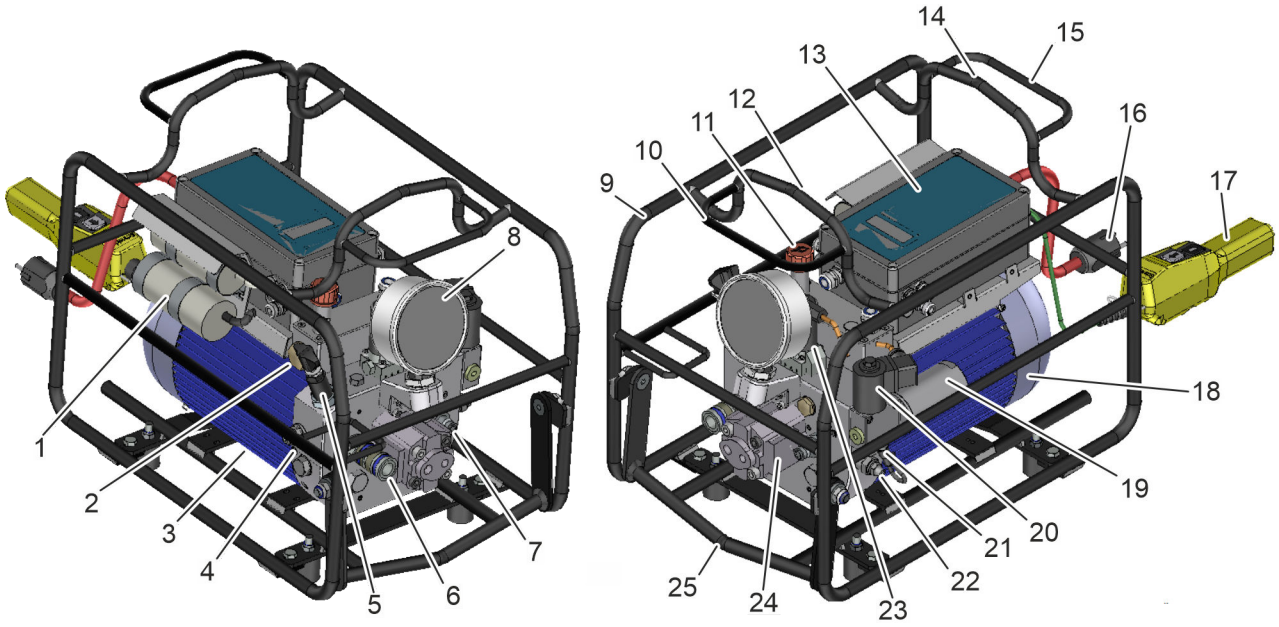


Fig. 8: XE1power

1	Starting capacitors
2	Sight glass for oil level
3	Oil drain plug (under the motor)
4	Adjustment valve, gear pump switching point. Set at the factory. Do not change the setting!
5	Pressure adjustment valve with adjustment lock
6	Hydraulic connection, pressure-side
7	Hydraulic connection, return-side
8	Pressure display
9	Supporting frame
10	Holder for cable collection
11	Oil filling neck
12	Attachment point for transport by crane
13	Control system
14	Attachment point for transport by crane
15	Holder for cable collection
16	Power cord
17	Remote control
18	Drive (oil-immersed motor)
19	Oil filter
20	Pressure relief valve
21	Temperature sensor in the oil filter
22	Low-pressure adjustment valve for the return stroke Set at the factory (approx. 130 bar). Do not change the setting!
23	Main valve
24	Gear pump (2-stage version only)
25	Attachment point for transport by crane

2.2 Brief description

The hydraulic power pack is a transportable, hydraulic pressure generator, which can be used to operate PLARAD® tools in order to produce bolted joints.

The hydraulic power pack can offer the following functions:

- Manual bolted connections with PLARAD® hydraulic wrenches
- Fully automatic bolted connections with PLARAD® hydraulic wrenches

- Only with XE1*direct control*:
  Direct measurement of the set values by the integrated sensors
- DXE1:
  PLARAD® hydraulic wrenches and PLARAD® hydraulic tensioners can be used.

The hydraulic power pack may only be used for commercial purposes.

The hydraulic power pack is electrically powered.

The hydraulic power pack may be operated on a fixed operating network or mobile power generators, subject to compliance with the connected loads stated under *Chapter 16 'Technical data' on page 123*.

Designation

Designations for the PLARAD® PowerPaX product family are composed as follows:

Example: **DXE1*power* 30+ ZT**

Designation	Meaning
XE1	PLARAD® PowerPaX Electrically powered hydraulic power packs
DXE1	For hydraulic tensioners and hydraulic wrenches
power *docu* *control* *direct control*	Product line *'Product lines' on page 16*
10 | 20 | 30	Motor size
+	– single-stage + – dual-stage
ZT	– without auxiliary tank ZT – with auxiliary tank

Product lines

The PLARAD® PowerPaX product families differ in terms of the following special features:

Functions	XE1*power*	XE1*docu*	XE1*control*	XE1*direct control*
Manual and automatic operation	✔	✔	✔	✔
Torque bolting process	✔	✔	✔	✔
Torque-angle method	–	–	✔	✔

Functions	XE1*power*	XE1*docu*	XE1*control*	XE1*direct control*
Preload method	–	✔	✔	✔
Direct measurement of the set values	–	✘	✘	✔
Documentation	–	✔	✔	✔
Definition of the fastening operation	–	✔	✔	✔
Control unit (BE)	–	✔	✔	✔

✔ - Function available

– - Function not available

DXE1

Dual hydraulic power packs enable tasks to be performed with PLARAD® hydraulic tensioners or PLARAD® hydraulic wrenches by switching between the process connections.

2.3 Rating plate

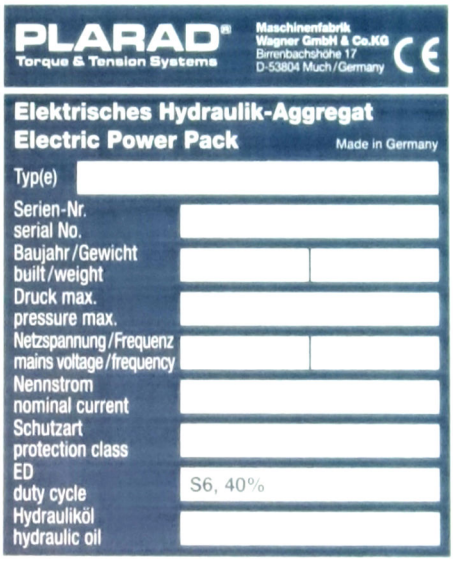


Fig. 9: Rating plate

The following data is inscribed on the rating plate:

- Name of the manufacturer including their full address
- CE mark
- Machine designation
- Type designation
- Serial number
- Year of construction
- Weight
- Maximum pressure
- Mains voltage/frequency
- Nominal current
- Protection class
- Duty cycle
- Hydraulic oil

2.4 PowerPaX versions

PLARAD® hydraulic power packs are available in different versions.

Motor sizes

Available motor versions:

- 1 | 10
- 2 | 20
- 3.5 | 30

Mains voltage/frequency

Available mains voltages and mains frequencies:

Alternating current: AC 100 V, AC 110 V, AC 220 V, AC 230 V – 50/60 Hz

Three-phase alternating current: 3 AC 200 V, 3 AC 400 V, 3 AC 440 V, 3 AC 480 V – 50/60 Hz

Others on request.

- 230 V/50 Hz
- 230 V/60 Hz
- 110 V/50 Hz
- 110 V/60 Hz
- 3-400 V/50 Hz
- 3-400 V/60 Hz
- 3-480 V/50 Hz
- 3-480 V/60 Hz
- Others on request

Process connections

'Process connections' on page 27

Power plug

'Power plug' on page 27

Cable length – power cord

- 5 m

Cable length – remote control

- 5 m

Auxiliary tank

Fig. 10: Service plug, Transport plug

- Surge tank (standard)
- 4-litre auxiliary tank (option)

Prior to commissioning, replace the black transport plug with the orange service plug.

Pressure display

'Pressure displays' on page 19

Gear pump

2-stage hydraulic power packs are equipped with a gear pump on the valve block. The gear pump increases the volume flow in the low pressure range.

2.5 Display elements and controls

The hydraulic power pack can be equipped with the following display elements and controls:

Remote control with display

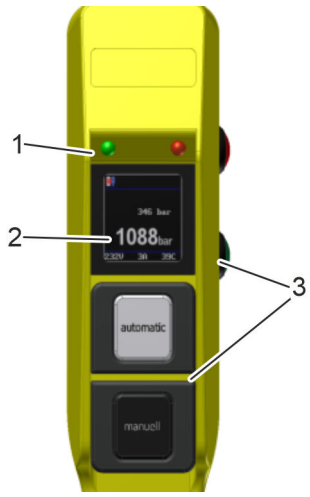


Fig. 11: Remote control

1 LEDs
2 Display
3 Buttons

The remote control can be used to select and perform the basic functions of the hydraulic power pack. The display and LEDs show the settings and status.

↳ *Chapter 2.8 'Remote control' on page 22*

Control unit (option)

Fig. 12: Control unit (BE)

1 Display
2 Membrane keyboard

Fastening operations (all implemented tightening torques and further rotation angles) can be stored using the optional control unit. After being transferred to a computer, the data can serve as verifiable proof of fastening work.

Further details ↳ *Chapter 12 'Control unit (BE)' on page 79*.

Pressure displays

Fig. 13: Example, pressure gauge

There could be different pressure displays depending on the area of application:

- Digital pressure gauge
- Pressure gauge 800 bar
- Pressure gauge 2,000 bar
- Pressure gauge 2,400 bar

The working pressure is also displayed on the remote control ↳ *Chapter 2.8 'Remote control' on page 22*.

Pressure adjustment valve with adjustment lock

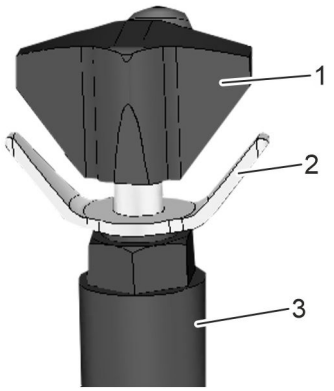


Fig. 14: Pressure adjustment valve

1 Knob
2 Adjustment lock
3 Pressure adjustment valve

The hydraulic pressure used to supply the connected tool is adjusted with the aid of the pressure adjustment valve.

An adjustment lock prevents the pressure being changed unintentionally. Prior to any pressure adjustment, the adjustment lock needs to be loosened and secured again after the adjustment has been made.

↺ Reduce pressure – turn the knob anti-clockwise

↻ Increase pressure – turn the knob clockwise

Pressure valve

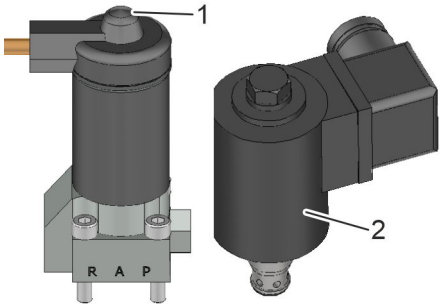


Fig. 15: Pressure valves

The main valve (Fig. 15/1) is equipped with a button that can be used to release the pressure in the respective system.

Main valve

The main valve (Fig. 15/1) switches between forward and return stroke.

Pressure relief valve

If the return stroke of the tool has been completed, the pressure relief valve switches to relief mode (release).

Pressure release valve

The pressure release valve (Fig. 15/2) is installed parallel to the lever of the safety valve for releasing the pressure.

Safety valve for pressure release

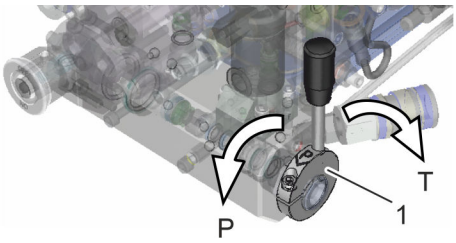


Fig. 16: Lever

DXE1 only:

Lever (Fig. 16/1) between pressure connection and pressure release.

P - Rotate the lever downwards.

Build up pressure at the hydraulic tensioner pressure connection.

T - Rotate the lever upwards.

Relieve pressure.

Pressure amplifier switching valve

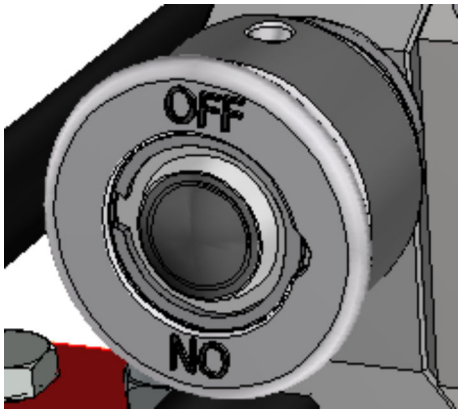


Fig. 17: Switching valve

DXE1 only:

The switching valve can be used to switch between the front pressure connections for hydraulic wrenches and the side pressure connection for hydraulic tensioners.

Markings:

ON - Maximum 1,500 bar (2,400 bar) at the side pressure connection

OFF - Maximum 800 bar at the front pressure connections

2.6 Menu structure

Structure

The menu of the remote control is structured as shown in Fig. 18.

The actual parameter setting options and menu entries available depend on the hydraulic power pack.

Unavailable options are not displayed in the menu for the specific hydraulic power pack.

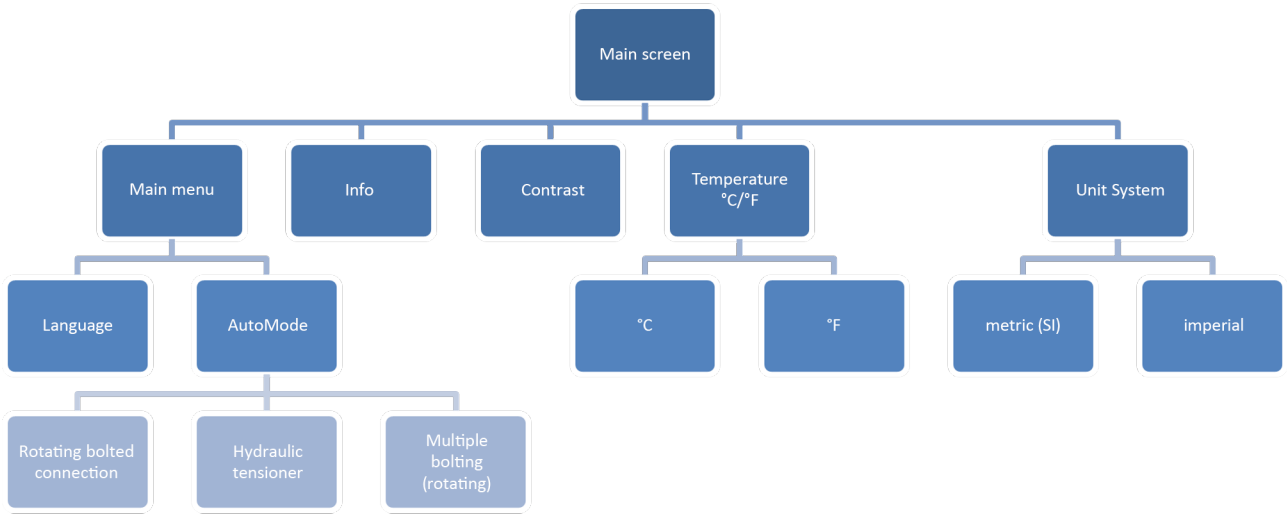


Fig. 18: Menu structure of the remote control display

Operation

Operation of the menu with , , and , see *Chapter 2.8.3 'Buttons of the remote control' on page 26*.

2.7 Operating modes

Stages

- 1-stage
- 2-stage

2-stage hydraulic power packs are equipped with a gear pump on the valve block. The gear pump increases the power of the hydraulic power pack by means of higher volume flows in low pressure ranges.

Dual-stage hydraulic power packs are marked with a '+'.

Manual

During manual bolting processes, the tool operates for as long as the relevant button on the hydraulic power pack is pressed. The maximum pressure set on the hydraulic power pack is not exceeded.

The return stroke is performed automatically when the relevant button is released.

Automatic

After starting the fastening operation, the bolted connection operation is performed automatically until the set torque is reached.

2.8 Remote control

Remote control with display

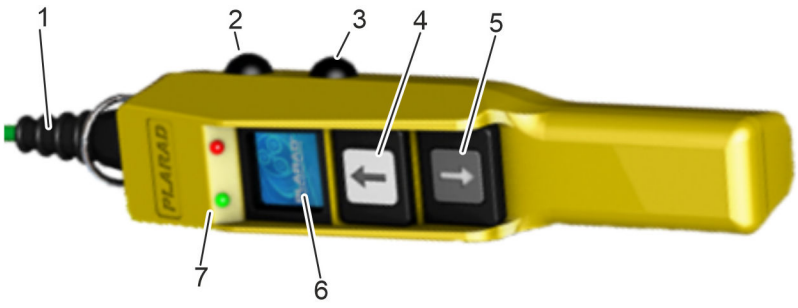


Fig. 19: Remote control with display

1 Cable
2 Red button
3 Green button
4 White button
5 Black button
6 Display
7 LED display

2.8.1 LEDs of the remote control

Messages are displayed by the red and green LED on the remote control.

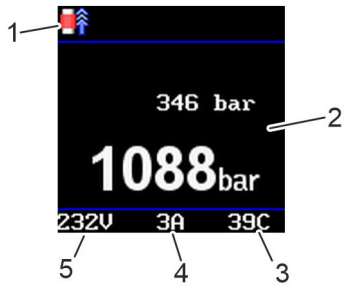
In some cases, the messages differ if the optional control unit is used.

LED display	Function with control unit	Function without control unit
Operation with hydraulic tensioners		
Green LED flashing slowly	Hydraulic power pack is in pressure adjustment mode.	
Green LED illuminated continuously	Hydraulic power pack is in tensioning mode. Function 1: Hydraulic power pack is ready for tensioning (it may still be necessary to set the pressure according to the fastening operation). Function 2: Tensioning process was completed correctly, i.e. the documented pressure was within the tolerance field specified by the control unit.	Hydraulic power pack is in tensioning mode. Function 1: Hydraulic power pack is ready for tensioning (it may still be necessary to set the pressure according to the fastening operation). Function 2 (only if automatic repump mode is deactivated): Tensioning process was completed correctly, i.e. the set pressure was delivered by the hydraulic power pack.
Green LED flashing rapidly	Hydraulic power pack is in tensioning mode. Rapid flashing always indicates that a process is running, e.g. startup of the hydraulic power pack or pressure buildup during the tensioning process.	
Red LED flashing	Pressure is being released from the hydraulic tensioner.	
Red and green LED flashing in alternation	There is an error.	
Red and green LED both illuminated continuously at the same time	Tensioning is active. Target pressure was reached. Nut can be added. Repumping might take place automatically in the meantime.	Only in automatic repump mode: Tensioning is active. Target pressure was reached. Nut can be added. Repumping might take place automatically in the meantime.
Red LED illuminated continuously, green LED flashing	Hydraulic power pack is repumping automatically.	Only in automatic repump mode: Hydraulic power pack is repumping automatically.

LED display	Function with control unit	Function without control unit
Operation with hydraulic wrenches		
Green LED flashing slowly	Bolting system is in tightening mode. When starting the bolting system. Learning has not yet taken place.	

LED display	Function with control unit	Function without control unit
Green LED illuminated continuously	Bolting system is in tightening mode. Function 1: After the learning process, if this process is OK. Function 2: After the bolting process, if this process is OK and the documented pressure was within the tolerance field specified by the control unit.	Bolting system is in tightening mode. Function 1: After the learning process, if this process is OK. Function 2: After the bolting process, if this process is OK.
Green LED flashing rapidly	Bolting system is in tightening mode. Rapid flashing always indicates a bolting system process is running, e.g. startup of the unit, or the bolting process is running.	
Red LED flashing slowly	Bolting system is in loosening mode. Learning has not yet taken place.	
Red LED flashing quickly	Bolting system is in loosening mode. Rapid flashing always indicates the a bolting system process is running, e.g. startup of the unit, or the loosening process is running.	
Red LED illuminated continuously	Bolting system is in loosening mode after the learning process if learning is OK.	
Red and green LED flashing in alternation	There is an error.	
Red LED illuminated continuously, green LED flashing	Hydraulic power pack is repumping automatically.	Only in automatic repump mode: Hydraulic power pack is repumping automatically.

2.8.2 Remote control display



Status messages are shown on the remote control display. Settings can be made.

The information displayed depends on the version of the hydraulic power pack. Only the menus available for the specific hydraulic power pack are displayed.

Fig. 20: Remote control display

Number	Symbol	Description
1	Status line	
		Menu

Number	Symbol	Description
		Hydraulic tensioner mode without automatic repumping
		Hydraulic tensioner mode with automatic repumping
		Tensioning process
		Pressure adjustment mode active 1,500 bar – hydraulic tensioner function 800 bar – bolts function – learning required
		Torque function
		Loosening function
		Torque rotation angle function
		Connected to PC or control unit
		Multi-bolting function
		Multi-loosening function
		Bolting result is OK!
		Error Bolting result is NOK!
		Aborted by the user

Number	Symbol	Description
2		Depending on the status of the hydraulic power pack: ■ Primary pressure in the example Fig. 20 *'346 bar'* ■ Secondary pressure (high pressure, working pressure, hydraulic tensioner pressure, etc.) in the example Fig. 20 *'1088 bar'* ■ Menu display ■ Error message
3		Current temperature [°C]
4		Current power consumption [A]
5		Current operating voltage [V]

2.8.3 Buttons of the remote control

The function of the individual buttons of the remote control depends on the operating status of the hydraulic power pack:

Red button

- Switch off. The hydraulic power pack stops.
- Press and hold: The information menu is displayed. It indicates which button results in which action.
- Settings menu: Exit current menu level.

Green button

- Information menu: Jump to the settings menu.
- Settings menu: Confirm.
- TAX: Discharge pressure from hydraulic tensioner.

White button

- If the motor is running: Learn.
- Settings menu: Scroll up.
- Perform functions in automatic operation.

Black button

- Switch on.
  The hydraulic power pack starts. The motor starts up.
- If the motor is running: Manual forward stroke is performed for as long as the button is pressed.
- Information menu: Toggle bolts – loosen.
- Settings menu: Scroll down.

2.9 Functions

method

Various procedures can be used to produce bolted joints or tensions.

- Torque
- Torque rotation angle
- Pretensioning force

Hydraulic tensioner

The requisite pretensioning force can be set for the hydraulic tensioner in use.

Torque measurement

Only with XE1*direct control*: The integrated sensors enable measurement of the rotation angle and the end position of the lever.

Documentation

In conjunction with the control unit, all hydraulic power pack events can be documented and evaluated on a PC.

Definition of the fastening operation

In conjunction with the control unit, the parameters of individual fastening operations or tensioning operations can be stored and utilised.

2.10 Connections

Power plug

Possible power plugs:

- CEE-compliant power plugs
  - 110 V
  - 230 V
  - 3-400 V
- Others on request

Fig. 21: Example, CEE-7/7 power plug

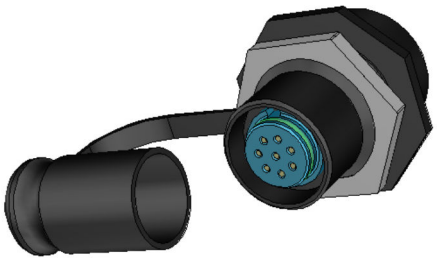
Process connections

Fig. 22: Example, CEJN SE 115

Various coupling/nipple versions are available for connecting the hose lines to the hydraulic power pack.

The hydraulic power pack is equipped with pressure-dependent hydraulic quick-release couplings (process connections) from Cejn, Lukas, Pioneer or Parker for 350, 700, 800, 1,500 or 2,400 bar applications as standard.

Service and documentation interface



The service and documentation interface of the control system can be used as the communication interface for service and as the connection for the control unit.

Fig. 23: Service and documentation interface

2.11 Accessories

The following accessories are available for ordering together with the hydraulic power pack and may be included in the delivery:

- Transport trolley
  Transport and assembly trolley for power pack, tools, and accessories
- PLARAD® hydraulic oil – refill canister
  1, 3 or 5 litre
- Hydraulic hose
  Different lengths
  For different pressure rangers
- Ball valve
  For shutting off the process pressure
  800 bar, 1,500 bar, 2,400 bar
- Torque Control Tower
  Torque Control Tower for documentable power pack with bar-code scanner, industrial PC, transport trolley, and label printer
- Distributor
  2-/3-/4-way distributor
  800 bar, 1,500 bar
- 2-stage pressure valve
  Enables rapid switching between two preset pressures
- Control unit (BE)
- Certificate (e.g. for pressure gauge)

Special accessories

Contact PLARAD® service.

3 Before you begin – safety

This section provides an overview of all important safety aspects for protecting personnel and for ensuring safe and fault-free operation. Further task-specific safety instructions can be found in the sections of the individual chapters.

3.1 Symbols in this manual

Safety warnings

Safety warnings in this manual are indicated by symbols. Safety warnings are introduced by signal words that identify the severity of the hazard.

DANGER!
This combination of symbol and signal word indicates an immediate danger that will cause serious injury or death if not avoided.

WARNING!
This combination of symbol and signal word indicates a potential danger that may cause serious injury or death if not avoided.

CAUTION!
This combination of symbol and signal word indicates a potential danger that may cause minor or slight injury if not avoided.

NOTICE!
This combination of symbol and signal word indicates a potential danger that may cause damage if not avoided.

ENVIRONMENT!
This combination of symbol and signal word indicates potential pollution of the environment.

Safety warnings in step-by-step instructions

Safety warnings may apply to specific, individual instructions. Such safety warnings will be embedded in the list of instructions to maintain readability when executing the respective action. The signal words listed above are used.

Example:

1. Loosen the bolt.
2. **CAUTION!**
   Risk of getting trapped by lid!

   Close lid carefully.
3. Tighten the bolt.

Tips and recommendations

This symbol highlights useful tips and recommendations as well as information to help you use your equipment efficiently and without disruption.

Other markings

The following markings are used in this manual in order to highlight instructions, outcomes, lists, references and other elements:

Marking	Explanation
→	Step by step instructions
⇨	Outcomes of steps
↳	References to sections of this manual and to other applicable documents
■	Lists without a fixed order
[Button]	Controls (e.g. buttons, switches), indicators (e.g. signal lamps)
'Display'	Display elements (e.g. on-screen buttons, assignment of function keys)
'Menu' → *'Submenu'* → *'Setting'*	Shortened description of navigation: Call up menu, call up submenu, change settings

3.2 Symbols on the hydraulic power pack

Illustration

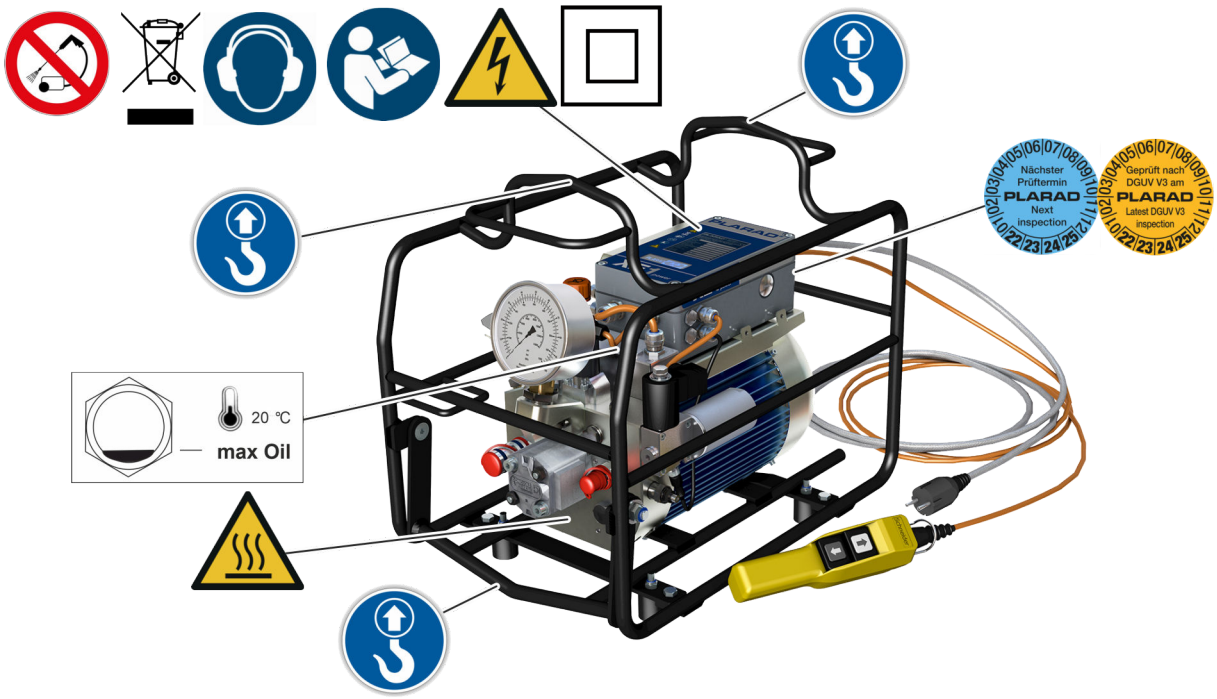


Fig. 24: Symbols on the hydraulic power pack

- ↳ *'Voltage' on page 32*
- ↳ *'Hot surface' on page 32*
- ↳ *'Follow the manual' on page 32*
- ↳ *'Hearing protection' on page 32*
- ↳ *'Protection class II' on page 32*
- ↳ *'Separate collection' on page 32*
- ↳ *'Test badges' on page 32*
- ↳ *'High-pressure cleaners prohibited' on page 33*
- ↳ *'Attachment point' on page 33*
- ↳ *'Maximum oil level' on page 33*

Illegible signage

WARNING!

Danger in the event of illegible signage!

Over time, signs and stickers can become dirty or be rendered unrecognisable by other means, such that hazards cannot be recognised and necessary operating instructions cannot be followed. This creates a danger of injury.

- Keep all safety notices, warnings and operating instructions in a clearly legible state at all times.
- Replace damaged signs and stickers immediately.

You will find the following symbols and information notices on the hydraulic power pack:

Voltage

The equipment marked in this way is supplied with electrical energy.

Do not open the hydraulic power pack.

Hot surface

Hot surfaces, such as the housing of the drive motor, cannot always be identified as such. Do not touch surfaces marked in this way without protective gloves.

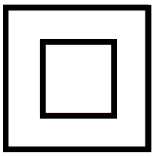
Follow the manual

Read the operating instructions prior to using the hydraulic power pack.

Hearing protection

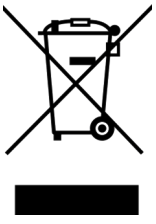
Hearing protection is used to protect against hearing damage cause by noise.

Protection class II



This symbol indicates protection class II. Equipment of protection class II has reinforced insulation between active and touchable parts.

Separate collection

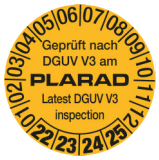


Do not dispose of waste electronic and electrical equipment marked with this symbol in household waste.

Test badges

The test badges state the dates of the respective tests.

Date of the next PLARAD® service



Date of the last DGUV-V3 test

High-pressure cleaners prohibited

Do not use any high-pressure cleaners when cleaning. The pressure of the cleaning jet can result in property damage.

Attachment point

Attach the hoist only at the marked points for lifting.

Maximum oil level

The marking indicates the maximum permissible oil level at 20 °C. Never fill oil above this marking.

3.3 Intended use

The electric hydraulic power pack is a transportable, hydraulic pressure generator and may only be used to operate PLARAD® tools in order to produce bolted joints in line with the given specifications (*Chapter 16 'Technical data' on page 123*).

The hydraulic power pack may only be used for commercial purposes and only in conjunction with PLARAD® hydraulic tensioners.

The hydraulic power pack is electrically powered.

The hydraulic power pack may be operated on a fixed operating network or mobile power generators, subject to compliance with the connected loads stated under *Chapter 16 'Technical data' on page 123*.

The hydraulic power pack may only be used in atmospheres that are not potentially explosive.

The hydraulic power pack may only be used in a dry environment.

Intended use includes compliance with all of the stipulations in this manual.

3.4 Misuse

Any use beyond the intended use as well as any other use is considered misuse.

WARNING!

Danger in the event of misuse!

Misuse of the hydraulic power pack can lead to dangerous situations.

- Do not operate the hydraulic power pack outside the defined specifications.
- Do not operate the hydraulic power pack in continuous operation.
- Never disregard protection ratings.
- Never operate outside the permissible environmental conditions.
- Never operate with a mains voltage and mains frequency other than those specified on the rating plate.
- Do not switch on in a damp environment.
- Never operate in a potentially explosive atmosphere.

3.5 Residual risks

The following section outlines the residual risks potentially posed by the hydraulic power pack even when it is used as intended.

To reduce the risks of injury and damage and to avoid dangerous situations, observe the safety warnings listed here and the safety warnings in the other sections of this manual.

3.5.1 Electrical dangers

Electrical current

DANGER!

Danger of death due to electric shock!

Touching live parts poses an immediate danger of death due to electric shock. Damage to the insulation or individual components can be life-threatening.

- Do not open the housing of electrical components.
- In the event of damage, disconnect the hydraulic power pack from the power supply immediately and arrange for repair.
- Keep moisture away from live parts. Moisture can cause short circuits.
- Never operate with a mains voltage and mains frequency other than those specified on the rating plate.
- Ensure that the power supply complies with local regulations.
- Never make modifications to the hydraulic power pack.
- Never modify the power plug or power cable.
- Only operate at suitable power sockets.
- Never operate after the inspection period has elapsed. See the test seal for the date of the next test.
- Never operate in a potentially explosive atmosphere.
- Keep away from moisture, liquids, steam, dust and coarse contamination.

  Do not switch on in a damp environment or in the rain.
- If possible, operate with a residual current-operated circuit breaker installed.
- Avoid making physical contact with earthed components.

Faulty power cable

DANGER!

Danger of death due to faulty power cable!

Faulty power cables can lead to a direct danger of death from electric shock.

Rolled-up power cables can result in thermal overload and could catch fire.

- Never modify the power plug or power cable.
- Only operate at suitable power sockets.
- Prior to every use, check the power cable for visible damage to the insulation.
  Never replace the power cable yourself.
- Do not crush, shear or overload the power cable (pressure, strain).
- Do not pull on the power cable in order to disconnect the power plug from the power socket.
- Prior to switching it on, always unwind the power cable fully.
- Do not route the power cable over sharp edges, pinch points, through water, oil or other chemicals.
- Do not kink the power cable and do not twist it.
- Do not route the power cable close to moving parts or hot surfaces, such as motors or exhaust lines of mobile power generators.
- Wherever possible, do not expose the power cable to constant sunlight or other forms of UV radiation.
- Do not wrap the power cable around the hydraulic power pack.
- Ensure that extension cables routed outdoors or through humid environments are approved for the ambient conditions.
- Ensure that supply lines have the minimum permissible cross-section.

3.5.2 Danger due to hydraulics

Pressurised hydraulic fluid

WARNING!

Pressurised hydraulic components could result in life-threatening injuries!

Inadvertent opening or defects could result in the discharge of hydraulic fluid under high pressure.

Hydraulically powered drives could move unexpectedly.

Contact with hot hydraulic oil could result in severe burns.

- Prior to commencing all work, check the hydraulic power pack, connections, hoses and tools for visible damage and leaks.
  Have all identified defects remedied immediately.
- Prior to commencing work on the hydraulic system, first switch it off, then depressurise it and let it cool down. Fully relieve all accumulators of pressure. Check to ensure a depressurised state.
- Do not change pressure settings such that they exceed the maximum values.
- Comply with the maintenance intervals.
- Always ensure that hydraulic hoses are properly connected and locked. Quick-release couplings must be engaged. Bolted connections must be fully secured.

Exceeding the maximum pressure

WARNING!

Danger of bursting due to excessive hydraulic pressure!

If the hydraulic pressure exceeds the maximum permissible pressure for connections, hoses, tools or components of the hydraulic power pack, these could burst. Airborne parts and hydraulic fluid discharged under high pressure could cause serious injuries.

- Ensure that all components are designed for the maximum applied hydraulic pressure and that none of the components are damaged.
- Check for defects, damage and leaks.
  Have all identified defects remedied immediately.
- Comply with the maintenance intervals.

Hydraulic oil

WARNING!

Damage to health and secondary illnesses due to contact with hydraulic oil!

Contact with hydraulic oil could cause allergic reactions, skin and eye irritation, nausea and other secondary illnesses.

- Wear personal protective equipment for all work with hydraulic oil.
- Do not eat, drink or smoke in areas in which work involving hydraulic oil is performed.
- Upon completion of the work, clean or dispose of clothing and personal protective equipment contaminated with hydraulic oil in the proper manner.
- Note the safety data sheet for the hydraulic oil in use.

Oil specifications

NOTICE!

Property damage due to non-compliance with the oil specifications!

Incorrect hydraulic oils, an incorrect oil level and the use of contaminated hydraulic oils could result in property damage. If hydraulic oil overflows due to the oil level being too high, this could result in environmental damage.

- Check and correct the oil level as follows as a minimum requirement:
  - In the course of commissioning
  - After connecting/disconnecting the hydraulic hoses
  - After flushing
  - After transport, maintenance, repair, troubleshooting
- Top up using only new and clean hydraulic oil *'Oil specifications' on page 124*.
- Fill hydraulic oil via a funnel with an oil filter.
- Always pay attention to the maximum oil level marking (see sticker).
- Comply with the maintenance intervals.

3.5.3 Mechanical dangers

Moving components and rotational movements

WARNING!

Danger of injury due to moving components!

Moving components and tools could cause serious injuries. There is a danger of being pulled in during rotational movements.

- During operation, do not reach into moving components or handle moving components.
- Prior to commissioning, secure the reaction arm, impact wrench socket and other such tool components in the proper manner.
- Do not switch on the nutrunner while carrying it.
- Wear tight fitting work clothing with a low tearing resistance.
- Wear safety goggles.
- Wear a protective cap (hair net) to prevent long hair from being pulled in by rotating parts.

Crushing

WARNING!

Danger of crushing due to high weight!

The high weight can cause crushing if it falls down.

- Handle the hydraulic power pack with care and as intended.
- Give due consideration to the weight during transport and during all work.
- Carry with the aid of a second person or use suitable hoists.
- Secure the hydraulic power pack against falling when working at height.
- Wear safety shoes.
- Always set up the hydraulic power pack securely.
- Put the hydraulic power pack with all its four feet on firm and level ground.

Dirt and scattered objects

CAUTION!

Danger of injury from falling over dirt and scattered objects!

People may slip on or stumble over dirt and scattered objects. Falling may cause injuries.

– Always keep the work area clean.
– If objects are no longer needed, remove them from the work area and especially if such objects are at ground level.
– Mark unavoidable stumbling points with hazard tape.

3.5.4 Noise and ergonomics

Noise

WARNING!

Danger of injury due to noise!

The noise level of 89 dB(A) (3 dB(A) measurement uncertainty) occurring in the work area can cause hearing damage.

– Always wear hearing protection when working.
– Remain in the danger zone only for as long as your presence is required.
– Set up the hydraulic power pack as far away from the operating site of the tool as possible.

Hot surfaces

WARNING!

Danger of injury due to hot surfaces!

The surfaces of components, such as the drive motor or gearbox, could heat up significantly during operation. Surface temperatures of up to 80 °C could develop. Contact between the skin and hot surfaces will result in severe burns to the skin.

– Always wear heat-resistant protective work clothing and safety gloves when working in the vicinity of hot surfaces.

Inattention

WARNING!

Danger of injury due to distraction, inattention or irresponsible use!

Distraction, inattention or irresponsible use can result in losing control of the hydraulic power pack and thus cause serious injuries.

- Always keep the work area well-lit when working on the hydraulic power pack.
- Keep children and unauthorised persons away.
- Work purposefully and in a responsible manner. Do not allow yourself to be distracted.
- Do not work if you are tired or under the influence of drugs, alcohol or medicine.
- Do not be lulled into a false sense of security. Do not disregard the safety information and instructions in this manual, even if the hydraulic power pack seems familiar to you after frequent use.
- When the hydraulic power pack is not in use, always store it safely out of reach of unauthorised persons.
- Wear the prescribed personal protective equipment.

Faulty safety devices

WARNING!

Danger of death due to inoperative safety devices!

If safety devices or safety functions are inoperative or disabled, there is a danger of serious injuries.

- Prior to commencing work, check that all safety devices are operative and correctly installed.
- Never disable or bypass safety devices or safety functions.

The hydraulic power pack is equipped with the following safety devices and safety functions:

- Insulation of the power cord
- Protection rating 2

A residual current-operated circuit breaker must be installed by the operator.

Monitoring of the mains voltage and frequency

Overvoltage and undervoltage

The hydraulic power pack cannot be switched on or is switched off automatically.

Nevertheless, overvoltage can lead to the destruction of input components.

The error is displayed. The hydraulic power pack cannot be switched on again until the correct mains voltage has been restored.

Monitoring of the motor current

The motor current is monitored. The motor is switched off if values are incorrect. The power pack needs to be disconnected from the mains. Recommissioning is not possible until this has been done.

Monitoring of the motor oil temperature

The temperature of the motor oil is monitored. The motor is switched off if the motor oil temperature is too high. The power pack cannot be switched on again until the motor oil temperature has dropped below a set threshold.

Pressure monitoring

The hydraulic pressure is monitored with regard to exceeding a parametrised maximum value. The motor is switched off if the value is exceeded. The power pack needs to be disconnected from the mains. Recommissioning is not possible until this has been done.

3.6 Operator's obligations

The hydraulic power pack is used in the commercial sector. The operator of the hydraulic power pack is therefore subject to the statutory obligations pertaining to occupational safety.

In addition to the safety instructions in this manual, the applicable safety, occupational safety and environmental protection regulations for the hydraulic power pack's area of application must be adhered to.

The following specifically applies in this regard:

- Operators must familiarise themselves with the applicable occupational safety regulations and, as part of a risk assessment, determine additional dangers that arise as a result of the specific operating conditions at the operating site of the hydraulic power pack. This risk assessment must be implemented in the form of safety instructions for operation of the hydraulic power pack.
- During the entire time the hydraulic power pack is in use, the operator must check whether the safety instructions they have compiled reflect current regulations and, if necessary, the operator must change the instructions accordingly.
- The operator must clearly define and regulate responsibilities for all work on and with the hydraulic power pack. The authority and responsibilities of personnel regarding operation, set-up, maintenance and repair must be clearly defined.
- The operator must reliably check the use of the hydraulic power pack and ensure that only commissioned and instructed personnel work with the hydraulic power pack. Personnel being trained or instructed and personnel undertaking vocational training must always be supervised by an experienced person when working on the hydraulic power pack.
- The operator must ensure that no unauthorised persons open the hydraulic power pack or perform work on the electrical or hydraulic equipment.

  Work on electrical equipment may only be performed by an electrician or by trained persons under the guidance and supervision of an electrician. Adhere to electrotechnical regulations for safety reasons.

The operator is also responsible for ensuring that the hydraulic power pack is in technically flawless condition at all times. The following applies for this reason:

- The operator must ensure adherence to the maintenance intervals described in this manual.
- The operator must have the functionality and integrity of all safety devices checked on a regular basis.
- Some parameters are set by the manufacturer prior to initial commissioning, e.g. some valve settings. The operator must ensure that these parameters are not changed.

3.7 Who may use the hydraulic power pack?

WARNING!

Danger of injury if personnel are insufficiently qualified!

If unqualified personnel perform work on or with the hydraulic power pack or if such persons are present in the danger zone while work is being performed, dangers arise that could cause serious injuries and considerable property damage.

– Have all tasks performed by suitable qualified personnel without exception.
– Keep unqualified personnel away from the danger zones and work areas.

User

Users of the hydraulic power pack have the requisite knowledge and the requisite training for handling electric power generators. Furthermore, as part of training provided by the operator, users have been trained in relation to the tasks assigned to them and the potential dangers associated with improper conduct.

Users are trained in how to use the personal protective equipment, are familiar with the most important specifications, situations and information relating to working with electric and hydraulic systems and are capable of using the hydraulic power pack safely. This includes connecting and flushing hydraulic hoses.

Users must satisfy the legal minimum age requirements.

Users may only perform tasks that exceed operation under normal operating conditions if this is specified in this manual and the operator has expressly entrusted the users with the performance of such tasks.

Users know who their supervisor is, can contact their supervisor if they have questions or in an emergency, and are able to communicate with their supervisor.

The user is familiar with all residual risks and is trained in the practical handling of the hydraulic power pack.

Qualified hydraulic power pack personnel

Qualified hydraulic power pack personnel are trained for the specific task area in which they work and are familiar with the relevant standards and regulations.

Due to their professional training and experience, qualified hydraulic power pack personnel are able to perform work with the hydraulic power pack, recognise and avoid potential dangers independently and convey this to users.

Specific capabilities of qualified hydraulic power pack personnel include:

- Use all functions of the hydraulic power pack.
- Create passwords for users.
- Uphold safety, occupational safety and health protection when using the hydraulic power pack and convey this to users.

- Identify damage on the hydraulic power pack and arrange for repairs or get in touch with the manufacturer.
- Instruct users in the proper manner.

Operator

Operators are persons who operate the hydraulic power pack for commercial or economic purposes themselves, or make it available for a third party to use, and who bear legal responsibility for the product vis-à-vis protection of personnel and third parties during operation.

Chapter 3.6 'Operator's obligations' on page 43

PLARAD® service

Certain work may only be performed by PLARAD® service or by personnel authorised by Maschinenfabrik Wagner GmbH & Co. KG. Other personnel are not authorised to perform this work. Contact PLARAD® service or authorised PLARAD® partners regarding performance of the work that is due.

Contact: *www.plarad.de*

Chapter 13.4 'Having service tasks performed by the manufacturer' on page 114

Unauthorised persons

WARNING!

Danger of death for unauthorised persons due to dangers in the danger zone and work area!

Unauthorised persons, who do not meet the requirements described in this manual, are not aware of the dangers in the danger zone. There is therefore a danger of serious injuries or even death for unauthorised persons.

– Keep unauthorised persons away from the danger zone and work area.
– If in doubt, address the respective persons and instruct them to leave the danger zone and work area.
– Suspend work while there are unauthorised persons loitering in the work and danger zone.

3.8 Personal protective equipment

Safety gloves

Safety gloves are used to protect the hands from friction, abrasions, punctures or deeper injuries and from contact with hot surfaces.

Safety shoes

Safety shoes protect the feet from crushing, falling parts and from slipping on slippery ground.

Hearing protection

Hearing protection is used to protect against hearing damage cause by noise.

Safety goggles

Safety goggles are used to protect the eyes from airborne parts and liquid jets.

Protective work clothing

Protective work clothing is tight fitting work clothing with a low tearing resistance, with tight sleeves and without any protruding parts.

Industrial safety helmet

Industrial safety helmets are used to protect the head from falling objects, suspended and swinging objects and from bumping into stationary objects.

3.9 Environmental protection

ENVIRONMENT!

Danger for the environment due to incorrect handling of environmentally hazardous substances!

If environmentally hazardous substances are handled incorrectly, especially if such substances are disposed of incorrectly, this could cause significant damage to the environment.

- Always adhere to the instructions given below in relation to the handling of environmentally hazardous substances and the disposal thereof.
- If environmentally hazardous substances accidentally enter the environment, adopt suitable measures immediately. If in doubt, notify the competent local authority of the damage and inquire about suitable measures to be taken.

The following environmentally hazardous substances are used:

Lubricants

Lubricants, such as greases and oils, contain toxic substances. Such substances must not enter the environment.

Electrical and electronic components

Electrical and electronic components contain toxic materials. These components must be collected separately and deposited at municipal collection points or be disposed of by a specialist company.

Hydraulic oil

Hydraulic oil can contain harmful and environmentally hazardous substances. It must not enter the environment (soil, water), sewage system or household waste. Dispose of hydraulic oil and waste containing hydraulic oil separately via an approved disposal company.

Observe the manufacturer’s safety data sheet.

4 Choosing the installation site

Incorrect installation site

WARNING!

Danger of injury due to careless choice of installation site!

Risks could arise from the choice of installation site. If the hydraulic power pack falls, this could result in serious crushing. The noise emissions could cause hearing damage.

– Adhere to the following principles when choosing the installation site.

Installation site

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety gloves
- Safety shoes

1. Ensure that the ambient conditions are adhered to:
   - *Chapter 16 'Technical data' on page 123*
   - Not a potentially explosive atmosphere
   - Dry
2. **ENVIRONMENT!**

   Environmental damage due to oil leakage!

   Ensure that the hydraulic power pack is horizontal.
3. **WARNING!**

   Danger of crushing due to falling or moving hydraulic power pack!

   Ensure that the hydraulic power pack cannot fall from elevated installation sites or slide out of position. If there is any doubt, secure the hydraulic power pack against falling.
4. Note the maximum power cable length.
5. Note the maximum remote control cable length.
6. **WARNING!**

   Hearing damage due to noise!

   As far as possible, install the hydraulic power pack in such a way that the noise emissions do not affect the workplace. Note the maximum remote control cable length.

7. Check the stability.

5 Supplying with energy

Electrical current

DANGER!

Danger of death due to electric shock!

Touching live parts poses an immediate danger of death due to electric shock. Damage to the insulation or individual components can be life-threatening.

- If the housing is damaged, disconnect it from the power supply immediately and arrange for repair.
- Keep moisture away from live parts. Moisture can cause short circuits.
- Never operate with a mains voltage and mains frequency other than those specified on the rating plate.
- Ensure that the power supply complies with local regulations.
- Never modify the power plug or power cable.
- Only operate at suitable power sockets.
- Never operate after the inspection period has elapsed. See the test seal for the date of the next test.
- Keep away from moisture, liquids, steam, dust and coarse contamination.

  Do not switch on in a damp environment or in the rain.
- Avoid making physical contact with earthed components.
- During operation with mobile power generators, ensure continuous and constant compliance with the specified values for voltage, frequency, sufficient power and earthing.

Faulty power cable

DANGER!

Danger of death due to faulty power cable!

Faulty power cables can lead to a direct danger of death from electric shock.

Rolled-up power cables can result in thermal overload and could catch fire.

- Never modify the power plug or power cable.
- Only operate at suitable power sockets.
- Prior to every use, check the power cable for visible damage to the insulation.
  Never replace the power cable yourself.
- Do not crush, shear or overload the power cable (pressure, strain).
- Do not pull on the power cable in order to disconnect the power plug from the power socket.
- Prior to switching it on, always unwind the power cable fully.
- Do not route the power cable over sharp edges, pinch points, through water, oil or other chemicals.
- Do not kink the power cable and do not twist it.
- Do not route the power cable close to moving parts or hot surfaces, such as motors or exhaust lines of mobile power generators.
- Wherever possible, do not expose the power cable to constant sunlight or other forms of UV radiation.
- Do not wrap the power cable around the hydraulic power pack.
- Ensure that extension cables routed outdoors or through humid environments are approved for the ambient conditions.
- Ensure that supply lines have the minimum permissible cross-section.

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety gloves
- Safety shoes

The hydraulic power pack needs to be supplied with electrical power prior to use.

Power supply

1. Ensure that the available electrical power supply complies with the device's electrical connected loads *Chapter 16 'Technical data' on page 123*.

> *Consult an electrician if you have any questions. Never make changes or perform repair work on the electrical system yourself.*

Connecting cable

2. Have a suitable connecting cable ready for the operating site.
3. Ensure that there is no damage on the hydraulic power pack, on the power cable, on the connecting cable, on the power plug or on the power socket.
4. Lay connecting cables in such a way that no tripping hazards arise, no mechanical load occurs, no sharp corners or edges can damage the insulation and that the ambient conditions correspond to the operating conditions for the connecting cables. Completely unwind the connecting cables if they are on a reel.
5. Have the hydraulic power pack ready at the operating site. When doing so, ensure that ambient conditions correspond to the specifications *Chapter 16 'Technical data' on page 123*.

Connection

6. Plug the connecting cable's plug into the power socket and connect the power cable of the hydraulic power pack to the connecting cable.

   ⇨ The hydraulic power pack is electrically connected.

6 Preparing for operation

6.1 Prior to switching on

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Installation

1. Install the hydraulic power pack securely *Chapter 4 'Choosing the installation site' on page 48*.
2. Check for leaks. If the hydraulic power pack is damaged, do not put it into service.

Hydraulic power pack with auxiliary tank

3. If present, replace the black transport plug ● on the auxiliary tank with the orange service plug ●.

Oil level

Fig. 25: "max Oil" sticker

4. **WARNING!**
   Danger of burns and environmental damage due to hydraulic oil!
   Hydraulic oil expands when it heats up during operation. If filled above the marking, hydraulic oil could escape from the sealing plug. Contact with hot oil could result in burns. If hydraulic oil escapes, this could result in environmental damage.

   Check the oil level in the sight glass to ensure it matches the "max Oil" sticker. In doing so, ensure that the hydraulic power pack is horizontal so that the correct value can be read.

   The "max Oil" sticker indicates the intended maximum oil level in the surge tank when the hydraulic power pack has cooled down (20 °C).
5. Top up the oil if the display and oil level in the sight glass do not match.

   To do so, open the cover of the oil filling neck.
6. Fill hydraulic oil (*'Oil specifications' on page 124*) through an oil filter and into the surge tank until the oil level in the sight glass matches the marking on the "max Oil" sticker.
7. Mop up any spilled hydraulic oil in the proper manner and clean the work environment.

   ⇨ The hydraulic power pack can be started.

6.2 Starting the hydraulic power pack

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Power supply

DANGER!
Danger of death due to improperly secured mains connection!

Safeguard the power supply *Chapter 5 'Supplying with energy' on page 50*.

⇨ The hydraulic power pack starts with a self-test.

Remote control display

Fig. 26: Example, internal error message

The LEDs on the remote control light up for approximately 5 seconds during the self-test.

Error messages may be displayed briefly during the self-test. These messages disappear again upon successful completion of the test.

If the error messages continue to be displayed after the self-test, send the hydraulic power pack to PLARAD® service.

6.3 Using the hydraulic power pack at low temperatures

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Proceed as follows in relation to operation below -5 °C:

Starting multiple times

1. If need be, start the hydraulic power pack multiple times until the drive motor is running.
2. Set the pressure relief valve to 400 bar *Chapter 6.6 'Setting the operating pressure' on page 59*.

Bring the hydraulic power pack to operating temperature

3. *Do not connect any hydraulic hoses or tools.*

Press and hold the black button for 5 minutes to let the hydraulic power pack run.

⇨ The hydraulic oil is brought to operating temperature.

6.4 Setting the functions

Basic settings

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

The basic settings for the hydraulic power pack can be made in the *'Settings'* menu on the remote control with a display.

1. To switch to the *'Settings'* menu, press and hold the red button and, at the same time, press the green button.

2. Navigation within the menu:

1 – Red button - Return to the previous menu level.

2 – Green button - Select the submenu.

3 – White button - Scroll up.

4 – Black button - Scroll down.

3. Select a setting:
- Language
- Contrast
- Information
- Temperature unit
- Pressure unit

Language

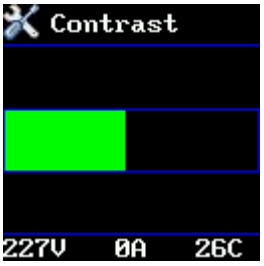
4. Switch to the *'Language'* menu in order to set the display language.

Navigate to the desired language using the white button and the black button.

Press the green button to save the language setting.

Press the red button to exit the menu.

Contrast



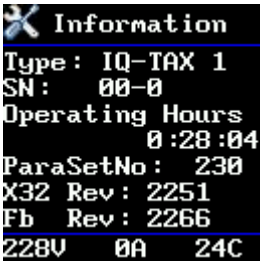
5. Switch to the *'Contrast'* menu in order to set the contrast of the display.

Set the desired value using the white button (increase contrast) or the black button (reduce contrast).

Press the green button to save the contrast setting.

Press the red button to exit the menu.

Information



6. Switch to the *'Information'* menu to display information about the hydraulic power pack.

Press the red button to exit the menu.

Temperature

7. Switch to the *'Temperature'* menu to change the displayed temperature unit.

Press the green button to switch between °C and °F.

Press the red button to exit the menu.

Pressure

8. Switch to the *'Pressure'* menu to change the displayed pressure unit.

Press the green button to switch between bar and psi.

Press the red button to exit the menu.

Selecting special functions with the remote control

Various special functions are available depending on the hydraulic power pack. To select these special functions, proceed as follows:

1. Press and hold the red button.

⇨ This can switch off the hydraulic power pack.

A context-dependent hint is displayed. The hint describes the function that will be triggered if another button is pressed.

If a menu item is highlighted green, the corresponding button press was detected.

Mode

2. *Only the functions available for the hydraulic power pack are displayed.*

Call up *'Local menu'* → *'Mode'* and select the desired function.

- – Hydraulic wrench
- – Torque rotation angle
- – Multiple bolting
- – Hydraulic tensioner

3. Exit the menu. To do so, press the red button multiple times until the operating display is shown.

6.5 Connecting the hose

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Period of use

1. Ensure that the hydraulic hoses have not exceeded the maximum period of use.

Hose check:

- *The maximum period of use must not be exceeded.*
  Comply with the replacement interval.
  Use for a maximum of 5 years.
- *The maximum pressure must not be reached.*
- *Use filled hydraulic hoses only.*
- *Oil specifications must match.*
- *Couplings and nipples must be compatible and be undamaged.*
- *There is no visible damage.*

Coupling

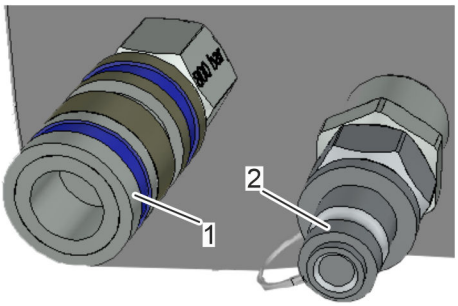


Fig. 27: Example, coupling (1) – nipple (2)

2.

The hydraulic power pack can be equipped with various coupling systems.

The pressure connection is the connection on the hydraulic power pack that is fitted with a coupling.

Ensure that the coupling/nipple combination is suitable and free of damage.

Ensure that the maximum permissible pressures of all components are sufficient.

Ensure that the hydraulic hose is fully filled with suitable hydraulic oil *'Oil specifications' on page 124*.

Connect the hydraulic hoses to the hydraulic power pack.

Check the lock.

Older couplings have counter-threads. Tighten to lock.

New couplings have a bayonet closure. Let it fully engage.

3. Do not connect the tool yet.

Flushing

4. Flush *Chapter 6.7 'Flushing' on page 59*.

Sequence

Connect hydraulic hoses only in a depressurised state!

The motor may run.

Adhere to the following sequence when connecting the tools:

1. - Hydraulic power pack pressure connection
2. - Tool pressure connection
3. - Hydraulic power pack return line
4. - Tool return

6.6 Setting the operating pressure

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

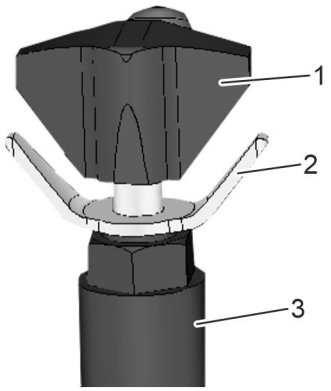


Fig. 28: Pressure adjustment valve

1 Knob
2 Adjustment lock
3 Pressure adjustment valve

1. Read the pressure to be set from the torque chart/tensile force chart for the tool.
2. Release the adjustment lock (Fig. 28/2). To do so, turn it anti-clockwise.
3. Turn the knob (Fig. 28/1) anti-clockwise. Open completely.
4. Start the hydraulic power pack with the remote control.

   Press the white button to start the motor.
5. **WARNING!**
   Danger of injury from exceeding the maximum permissible tool pressure!

   Set the pressure during the forward stroke. To do so, slowly turn the knob clockwise. Note the pressure display.

   ⇨ The pressure is increased.
6. Activate the forward stroke again if the maximum forward stroke time is exceeded. To do so, release the button and press it again.
7. Save the setting when the desired pressure is reached. To do so, turn the adjustment lock clockwise until the knob is secured.

6.7 Flushing

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

To prevent air pockets, the hoses need to be flushed prior to use.

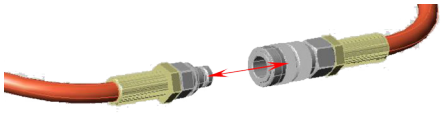


Fig. 29: Flushing

1. Ensure that the hydraulic hoses are properly connected ↳ *Chapter 6.5 'Connecting the hose' on page 57*.
2. Connect the hydraulic hoses together at the ends. For tandem use, connect both pairs of hoses together.

3. Press the black button to switch on the hydraulic power pack.

   ⇨ The hydraulic power pack starts.

   As the hydraulic power pack performs a return stroke after every start and no pressure can build up via the connected hydraulic hoses, this return stroke is never completed.

   The ongoing return stroke ensures that the hydraulic hoses are flushed. Any air pockets present are cleared from the hoses.

> *Depending on the set function, either the red LED or the green LED flashes rapidly when the hydraulic power pack is switched on.*
>
> *The LED continues to flash until the hydraulic power pack is switched off by pressing the red button.*

4. Press the white button to switch on the hydraulic power pack.

   ⇨ The hydraulic power pack starts.

   As the hydraulic power pack performs a return stroke after every start but no pressure can build up via the connected hydraulic hoses, this return stroke is never completed.

   The ongoing return stroke ensures that the hydraulic hoses are flushed. Any air pockets present are cleared from the hoses.

5. Let it run for at least 30 seconds (for a standard hose length of 4 m).

6. Check for leaks. Replace the hydraulic hoses if there are any leaks.

7. Switch off the hydraulic power pack.

   Press the red button to switch off the motor.

8. Disconnect the ends of the hydraulic hoses.

   ⇨ The hydraulic power pack is operational.

6.8 Learning

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Do not attach the tool to a bolt during learning.

The hydraulic power pack has to be taught the tool for automatic operation. The following values are measured:

- Number of strokes that the hydraulic power pack needs to pump in order to perform a forward stroke.
- Number of strokes that the hydraulic power pack needs to pump in order to perform a return stroke.

The data is stored and the hydraulic power pack knows how the tool is to be operated from this point onwards.

Two to three full strokes are performed to this end.

1. Connect the flushed hoses and the tool to the operational hydraulic power pack.

Do not attach the tool to a bolt.

2. Switch on the hydraulic power pack. To do so, press the black button.

⇨ The green LED flashes. The learning symbol is displayed.

3. Press and hold the white button.

⇨ The hydraulic power pack performs strokes.

4. Release the white button if the green LED lights up continuously.

⇨ The tool is taught and can be used in automatic operation.

The learning symbol is no longer displayed.

5. If the red LED and green LED flash in alternation upon conclusion of the learning process, an error has occurred. Repeat learning.

Deleting measurement values

The learned measurement values in the memory of the hydraulic power pack control system can be deleted.

1. Press and hold the red button.

2. Press the white button at the same time.
   - ⇨ The learned measurement values are deleted.

     The LED (for tightening or loosening) flashes slowly.

The learned measurement values are also deleted if the hydraulic power pack is disconnected from the electrical power supply.

7 Working with hydraulic wrenches

Exceeding the maximum pressure

WARNING!

Danger of bursting due to excessive hydraulic pressure!

If the hydraulic pressure exceeds the maximum permissible pressure for connections, hoses, tools or components of the hydraulic power pack, these could burst. Airborne parts and hydraulic fluid discharged under high pressure could cause serious injuries.

– Ensure that all components are designed for the maximum applied hydraulic pressure and that none of the components are damaged.
– Check for defects, damage and leaks.
  Have all identified defects remedied immediately.
– Comply with the maintenance intervals.

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Installation

1. Install the hydraulic power pack securely *Chapter 4 'Choosing the installation site' on page 48*.

Power supply

2. Supply the hydraulic power pack with power *Chapter 5 'Supplying with energy' on page 50*.

Oil level

3. Check the oil level .

Starting

4. Press the white button on the remote control.

   ⇨ The hydraulic power pack starts.

Leaks

5. Check again for leaks and ensure that the oil level is correct. Correct the oil level if necessary.

Stopping

6. Switch off the hydraulic power pack.

   Press the red button to switch off the motor.

Connecting the hoses

7. Check the hydraulic hose and couplings for leaks. Note the maximum period of use. Do not use the hydraulic hose if there are leaks or if the maximum period of use is exceeded *Chapter 6.5 'Connecting the hose' on page 57*.

8. Ensure that the hydraulic hose is fully filled with the specified hydraulic oil *'Oil specifications' on page 124*.

9. First connect the pressure side. Connect the couplings in the proper manner. Let the circlip lock in place or secure the bolted connection.

> *The hydraulic connections of the hydraulic power pack and the hydraulic hose must be compatible.*

10. Connect the hydraulic hose for the return.
11. Check the connections for leaks and reconnect them if there are leaks.

Flushing

12. Flush ↳ *Chapter 6.7 'Flushing' on page 59*.
13. Ensure that the fastening operation is known.

Setting the pressure

14. Read the required pressure from the torque chart for the tool (↳ Operating instructions for the tool) and set it ↳ *Chapter 6.6 'Setting the operating pressure' on page 59*.

Hydraulic wrench

15. Connect the tool ↳ Operating instructions for the tool.

7.1 Selecting the 'Tighten' or 'Loosen' function

The hydraulic power pack always starts with the most recently selected function.

Remote control with display

The function currently selected is shown on the remote control's display.

Tightening

Loosening

1. Press and hold the red button.

2. Use the black button to switch between  and  .

The LED of the remote control indicates the set function:

- – green LED illuminated continuously: Tightening function
- – red LED illuminated continuously: Loosening function

7.2 Manual operation – tightening

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

1. Ensure that the desired function is set *Chapter 7.1 'Selecting the 'Tighten' or 'Loosen' function' on page 64*.
2. Ensure that the correct pressure is set *Chapter 6.6 'Setting the operating pressure' on page 59*.
3. Attach the tool to the bolt in the proper manner.

4. Press the black button.
   ⇨ The tool rotates the bolt.
5. Release the black button.
   ⇨ The tool retracts.
6. Press and hold the button and release it again until there is no further visibly discernible rotation of the tool.

7. Press the red button to switch off the hydraulic power pack after establishing the bolted connection.

7.3 Manual operation – loosening

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

1. Ensure that the desired function is set *Chapter 7.1 'Selecting the 'Tighten' or 'Loosen' function' on page 64*.
2. Ensure that the correct pressure is set *Chapter 6.6 'Setting the operating pressure' on page 59*.
3. Attach the tool to the bolt in the proper manner.

4. Press the black button.
   ⇨ The tool rotates the bolt.
5. Release the button.
   ⇨ The tool retracts.
6. Press and hold the button and release it again until the bolt is loosened.

7. Press the red button to switch off the hydraulic power pack after loosening.

7.4 Automatic operation – learning

For automatic operation, the hydraulic power pack needs to be taught in conjunction with the tool *Chapter 6.8 'Learning' on page 61*.

7.5 Automatic operation – tightening

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

Torque rotation angle bolted connections can only be performed in conjunction with the control unit (optional accessory).

1. Ensure that the desired function is set *Chapter 7.1 'Selecting the 'Tighten' or 'Loosen' function' on page 64*.

2. Switch on the hydraulic power pack. To do so, press the black button.

   Wait until the flashing green LED lights up continuously.

3. Attach the hydraulic wrench to the bolt.

4. Start the bolting process. To do so, press and hold the white button.

   ⇨ The green LED flashes rapidly.

   The bolting process is performed automatically.

Bolting OK

The green LED lights up continuously if the bolting process has been completed correctly.

Bolted connection faulty

If the LED flashes upon conclusion of the bolting process, an error has occurred.

The control option is blocked on the power pack if there is an error message.

1. Remedy the error ↬ *Chapter 14 'Troubleshooting' on page 115*.
2. Restart the bolting process.

Bolting process aborted

'Abort' is displayed if the bolting process is aborted by the user.

→ Press the white button.

⇨ The error message/aborted message is reset and control option is enabled again on the hydraulic power pack.

7.6 Automatic operation – loosening

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

1. Ensure that the desired function is set ↬ *Chapter 7.1 'Selecting the 'Tighten' or 'Loosen' function' on page 64*.

2. Switch on. To do so, press the black button.

   Wait until the flashing red LED lights up continuously.
3. Attach the hydraulic wrench to the bolt.

4. Start the loosening process. To do so, press and hold the white button.

   ⇨ The red LED flashes rapidly.

   The loosening process is not finished automatically.
5. Release the white button to finish the loosening process.

8 Working with hydraulic tensioners

Selecting the function

→ Select the hydraulic tensioner function on the remote control.

To do so, call up *'Call up menu'* → *'Mode'* and select the desired function ↳ *Chapter 6.4 'Setting the functions' on page 55*.

8.1 Up to 800 bar

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

*The hydraulic tensioner must **not** be connected to the hydraulic power pack when setting the pressure.*

Observing the tensile force chart

1. → Read the required tensile force from the tensile force chart of the hydraulic tensioner.
2. → Loosen the lock on the pressure limiting valve.

Starting the hydraulic power pack

3. → Start. To do so, press and hold the black button.

Setting the pressure adjustment valve

4. → Set the requisite pressure by turning the pressure adjustment valve.
   - Turning anti-clockwise – pressure is reduced
   - Turning clockwise – pressure is increased

   ⇨ The set pressure can be read on the pressure display.
5. → Secure the lock on the pressure adjustment valve.
6. → Ensure that the maximum pressure of the hydraulic tensioner is suitable for the hydraulic power pack.

Connecting the hydraulic tensioner

7. → Connect the hydraulic tensioner to the hydraulic hose.

   ⇨ The hydraulic power pack is prepared for hydraulic tensioner operation.
8. → Attach the hydraulic tensioner to the bolted connection.

Tensioning

9. → In order to generate the requisite tensile force, press and hold the black button until the system reaches the pressure set on the pressure adjustment valve and the bolted connection has been completed correctly.

Relieving pressure

10. → Release the black button.

    ⇨ The system is relieved of pressure.
11. → Remove the hydraulic tensioner from the bolted connection.

8.2 Up to 1,500 bar

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

A pressure amplifier is installed on the front of the hydraulic power pack. This enables operation of hydraulic tensioners at a maximum pressure of 1,500 bar (optional 2,400 bar).

*The hydraulic tensioner must **not** be connected to the hydraulic power pack when setting the pressure.*

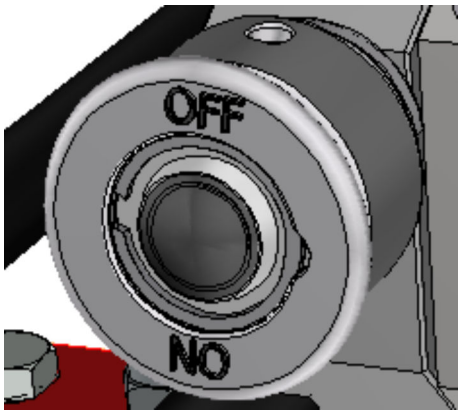


Fig. 30: Switching valve

1. Set the pressure amplifier switching valve to hydraulic tensioner mode *[ON]*.

In the *'ON'* position, the power pack is set for 1,500 bar (pressure is applied at the side pressure connection for hydraulic tensioner); in the *'OFF'* position, the power pack is set for 800 bar (pressure is applied at the front pressure connections for hydraulic wrench).

Markings:

ON - Maximum 1,500 bar (2,400 bar) at the side pressure connection

OFF - Maximum 800 bar at the front pressure connections

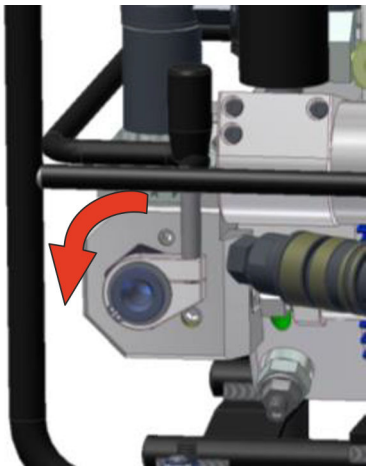


Fig. 31: Closing the pressure relief valve

2. Close the manual pressure relief valve in order to build up pressure.

Markings:

P - Build up pressure at the hydraulic tensioner pressure connection.

T - Relieve pressure.

Observing the tensile force chart

3. Read the required tensile force from the tensile force chart of the hydraulic tensioner.

4. Loosen the lock on the pressure limiting valve.

Starting the hydraulic power pack

5. Start the hydraulic power pack. To do so, press and hold the black button.
6. Set the pressure.

   Manual setting ↳ *Setting the pressure adjustment valve*.

   Automatic setting ↳ *Setting the pressure automatically – learning*.

Setting the pressure adjustment valve

7. Set the requisite pressure by turning the pressure adjustment valve.
   - Turning anti-clockwise – pressure is reduced
   - Turning clockwise – pressure is increased

   ⇨ The set pressure can be read on the pressure display.
8. Secure the lock on the pressure adjustment valve.
9. Proceed with ↳ *Checking the maximum pressure*.

Setting the pressure automatically – learning

10. Open the pressure adjustment valve fully.

11. Start the hydraulic power pack. To do so, press the black button.

12. Press and hold the white button. When doing so, turn the pressure adjustment valve clockwise until the working pressure is shown on the pressure display.

    ⇨ Pump strokes generate a rising secondary pressure in the pressure amplifier.

13. Press and hold the white button until the red LED lights up continuously.

14. Press the black button briefly.

    ⇨ The automatic pressure setting is finished.

    The pressure is set and the power pack is relieved of pressure.
15. If the pressure was exceeded when setting it, relieve the hydraulic power pack of pressure and repeat the pressure setting. To do so, release the white button and begin with ↳ *Setting the pressure automatically – learning*.
16. Secure the lock on the pressure adjustment valve.

Checking the maximum pressure

17. Ensure that the maximum pressure of the hydraulic tensioner is suitable for the hydraulic power pack.
18. Switch off the hydraulic power pack.

Connecting the hydraulic tensioner

19. Connect the hydraulic tensioner to the hydraulic hose.

    ⇨ The hydraulic power pack is prepared for hydraulic tensioner operation.
20. Attach the hydraulic tensioner to the bolted connection.

Manual operation

1. In order to generate the requisite tensile force, press the black button as often as is necessary for the set pressure to be reached.
2. Tighten the fastening element. Observe the pressure display in doing so.

   Compensate for the pressure dropping below the minimum value by repumping. To do so, press the black button as often as is necessary for the set pressure to be reached.

3. Relieve pressure from the hydraulic tensioner after tightening the fastening element. To do so, press the green button.
4. Remove the hydraulic tensioner from the bolted connection.

Automatic operation

1. Press and hold the white button to perform the tensioning process. Note the buildup of pressure on the pressure display.

   ⇨ Once the preset pressure is reached, the hydraulic power pack automatically stops any further buildup of pressure.

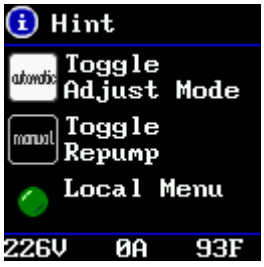
> *Due to settling losses, for example, the hydraulic pressure originally achieved in the system could drop again. To compensate for these pressure losses automatically, the “automatic repump” function is activated on the hydraulic power pack in automatic hydraulic tensioner operation.*

   The hydraulic power pack automatically begins pumping again if pressure drops by 10 bar.

   The fastening element is tightened.

2. Relieve pressure from the hydraulic tensioner after tightening the fastening element. To do so, press the green button.
3. Remove the hydraulic tensioner from the bolted connection.

Deactivating “automatic repump”



The “automatic repump” function prevents pressure losses during automatic tensioning. To switch the function on or off, proceed as follows:

1. To deactivate the automatic repump, press and hold the red button.

2. Press the black button to switch between  and  .

⇨ “Automatic repump” is activated.

“Automatic repump” is deactivated.

Relieving pressure from the hydraulic tensioner

Prerequisite: The hydraulic power pack is switched on.

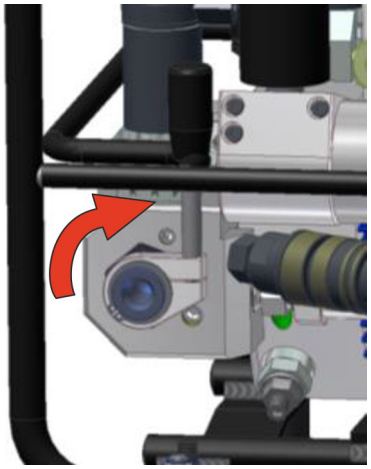
The system needs to be relieved of pressure so that the hydraulic tensioner can be removed.

1. Press the green button briefly.

2. Press the red button to switch off the hydraulic power pack.

⇨ The hydraulic power pack is relieved of pressure.

Manual pressure relief



3. *Relieve pressure from the hydraulic tensioner manually in the event of faults (e.g. power failure).*

Open the pressure relief valve of the pressure amplifier.

9 Multiple bolting

Fig. 32: Example, multiple bolting

Hydraulic power packs with X32 control system and remote control with graphic display can offer an automatic multiple bolting function (“Multi” AutoMode).

The following are suitable for use with multiple bolting:

- Hydraulic power packs, 800 bar, X32 control system
- Dual hydraulic power packs, 800 bar + 1,500 bar, X32 control system

This allows multiple tools to be used simultaneously.

This function can be enabled for some PLARAD® hydraulic power packs.

Only identical tools can be used.

The maximum number of tools is limited by the oil quantity.

Automatic bolted connections are generally only possible with 2-hose nutrunners.

Only 800-bar tools can be used with the “Multi” function.

System requirements

The following system requirements apply when using the “Multi” AutoMode function:

- X32 control system
  - X32 firmware: 4232
  - X32 remote control firmware: 4224
- Control unit
  - BE32 firmware: 4231
  - PC software: 4231

9.1 Hardware requirements

Hose connections

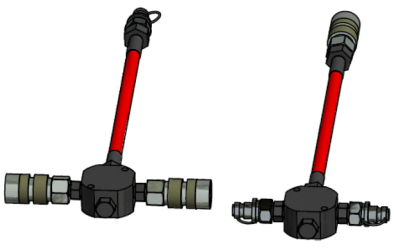


Fig. 33: Example, multiple distributor

The number of connections for couplings and nipples on the valve block must correspond to the number of fastening tools.

Example: For tandem use with a 2-hose nutrunner, there need to be two couplings and two nipples available in each case.

Alternatively, a multiple distributor can be used. Multiple distributors are available from PLARAD® in different designs.

Example: Two-way distributor for 2-hose nutrunner with hoses, 800 bar, with connecting hoses

High pressure hoses

Two hydraulic hoses designed for the maximum pressure are required for each tool to be connected.

Example: Four high pressure hoses are required for tandem use with a 2-hose nutrunner.

Oil volume

The usable oil volume in the surge tank + auxiliary tank (option) must be sufficient for use with multiple tools.

9.2 Selecting the multiple bolting function

Remote control

This submenu is only displayed if the hydraulic power pack commands more than one mode and is not connected to a control unit.

If a control unit is connected, it determines the mode. If the control unit is disconnected, the hydraulic power pack returns to the most recently activated mode.

The hydraulic power pack can perform the following automatic functions (AutoMode) depending on activation:

- *'Wrench'* - Automatic bolting with a ratcheting tool
- *'Tensioner'* - Automatic tensioning with any number of hydraulic tensioners
- *'Multi'* - Semi-automatic bolting with more than one ratcheting tool (multiple bolting

→ Select the *'Multi'* AutoMode.

⇨ Mode not active

Mode active

The current function is displayed as an icon in the top left of the remote control. The following icons are used in relation to the *'Multi'* function:

Tightening in “Multi” mode

Loosening in “Multi” mode

Control unit

For further information, see the operating instructions for the control unit.

In the “BE32.exe” PC program, the “Multi” mode can be selected in addition to the already existing modes (torque, torque/rotation angle, etc.).

1. Select “Multi” mode.

⇨ A further input field (in addition to the fields in “Wrench” mode) appears after selecting this mode.

2. Enter the number of tools used.
   ⇨ Once the fastening operation has been transferred to the control unit, this operation is handled in the same way as all other fastening operations.

A “Multi” fastening operation can only be selected on the control unit if the hydraulic power pack connected is unlocked for this mode.

9.3 Multiple bolting

With the exception of the deviations described below, the workflow is identical to that of a bolting process in *‘Wrench’* mode.

Learning mode

In this mode, too, the hydraulic power pack needs to teach the connected hydraulic torque wrenches before the actual bolting process.

1. Connect all hydraulic tools subsequently used for bolting.
2. Learn *Chapter 6.8 ‘Learning’ on page 61*.

Tightening mode

*Multiple bolting is a semi-automatic function; the bolting process is **not** ended automatically!*

As soon as the hydraulic power pack detects that all bolts have likely been tightened, the red LED is displayed.

1. Ensure that there is in fact no bolt still moving. Press the black button (continue pressing the white button) to confirm.
   ⇨ The hydraulic power pack completes the stroke in progress and then finishes the bolting process with the OK message.

   If a control unit is connected, the most recent maximum pressure is transferred to the control unit for documentation purposes.
2. Do not release the white button until the bolting process has finished.
   ⇨ ✔ Bolted connection OK.

   ✘ Premature release is deemed to be “aborted by the user”.

“Multi” function with control unit

In the “BE32.exe” PC program, the “Multi” function can be selected in addition to the already existing functions (torque, torque/rotation angle).

1. Select the “Multi” function.
   - ⇨ A further input field (in addition to the fields in “Wrench” mode) appears after selecting this function.
2. Enter the number of heads used in the additional field displayed in the “Wrench” function.
3. Transfer the fastening operation to the control unit ↯ Control unit operating instructions.
   - ⇨ Once such a fastening operation has been transferred to the control unit, this operation is handled in the same way as all other fastening operations.

A “Multi” fastening operation can only be selected on the control unit if the connected hydraulic power pack is unlocked for this function (analogous to torque/ rotation angle fastening operations).

10 Documenting operation

Option

Operation of the hydraulic power pack can be documented in conjunction with the optional control unit.

The control unit is connected to the hydraulic power pack via the service and documentation interface using the hydraulic power pack adapter cable.

For further information, see ↳ Control unit operating instructions.

The following is described therein:

- Connecting the control unit
- Putting the control unit into service
- Controlling tensioning with the control unit (D1500 dual power packs only)
- Controlling the bolting process with the control unit
- Loosening
- Further functions of the control unit
- User data entry
- Viewing documentation and data
- Viewing information about the control unit
- Changing settings
- Switching off the control unit
- Data exchange between PC and control unit

11 Creating and managing fastening operations

Option

Fastening operations can be created and managed using the “BE32.exe” PC program and the control unit.

For further information, see ↳ “BE32.exe” PC program operating instructions.

The following is described therein:

- Creating user fields
- Creating and editing fastening operations
- Creating definition lists for bolting
- Managing documentation data

12 Control unit (BE)

Reference number pA# 82895

Brief description Bolting operations (all implemented tightening torques and further rotation angles) or tensioning operations can be stored using the optional control unit (BE). After being transferred to a computer, the data can serve as verifiable proof of work.

Scope of delivery The scope of delivery for the control unit (BE) comprises the following:

- Control unit (BE)
- Docking station
- Adapter cable
- CD
- Holder (option)

12.1 Illustration

Illustration of the control unit (BE)

1 Housing with port for the docking station
2 Display
3 Docking station
4 Menus and navigation buttons
5 Input buttons
6 Port for the adapter cable

Fig. 34: Illustration

Display

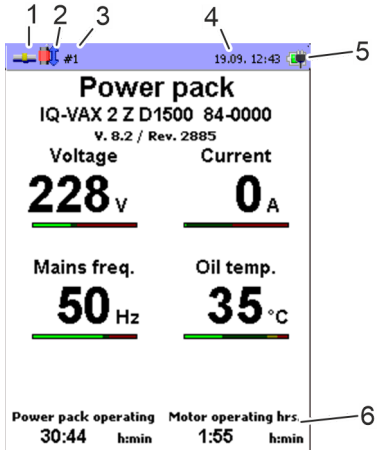


Fig. 35: Display elements

1	Connection status	
		Control unit (BE) not connected to the hydraulic power pack
		Control unit (BE) connected to the hydraulic power pack
		Control unit (BE) has a data connection to the PC
2	Hydraulic power pack status	
		Hydraulic tensioner mode
		No bolting application transmitted
		Torque function
		Loosening function
		Torque rotation angle function
		Pressure adjustment mode active 1,500 bar – hydraulic tensioner function 800 bar – bolts function – learning required
3	Number of the current bolting operation	
4	Date, time	
5	Battery charge status or mains supply	
6	Footer	

Menus and navigation buttons

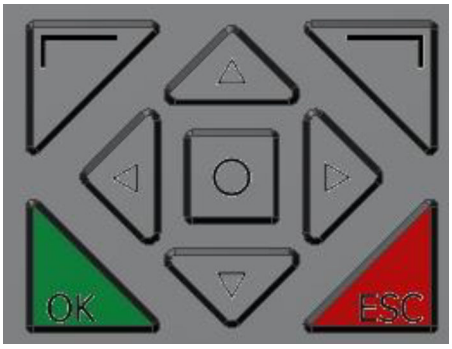


Fig. 36: Menus and navigation buttons

	Triangular button
	Navigation buttons
	Menu button
	Confirmation button *[OK]*
	Cancel button *[ESC]*

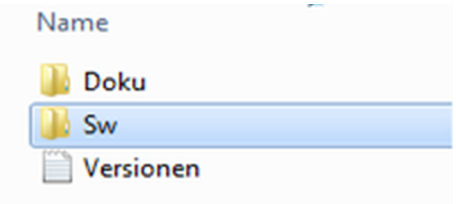
Input buttons

Fig. 37: Input buttons

Inputs of letters and numbers

#↑ Switch between upper case, lower case, and numerical input

Software



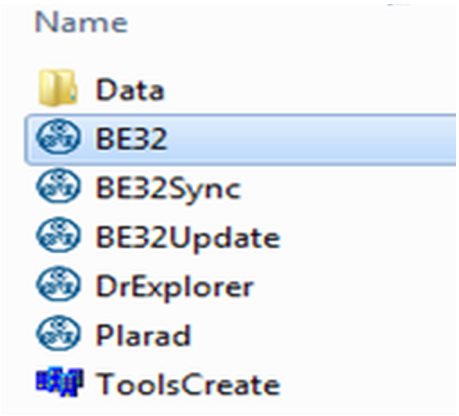
The “BE32.exe” PC software is part of the scope of delivery for the control unit (BE). This allows you to create bolting applications on the PC, which can then be transferred to the connected hydraulic power pack via the control unit.

A CD containing the following is enclosed with the control unit:

Doku - Operating instructions in several languages

Sw - Folder containing saved functions

Versionen - Information about the current software version



The *'Sw'* folder contains the following:

Data	-	Data folder
BE32	-	Program for entering documentation specifications
BE32Sync	-	Program for synchronising the specifications from the computer with the control unit (BE) and transferring the bolting application data
BE32Update	-	Online update for new functions and parameters
DrExplorer	-	Online update for new functions and parameters
ToolsCreate	-	Tool database

Adapter cable

Fig. 38: Adapter cable

An adapter cable is part of the scope of delivery for the control unit (BE). This cable connects the control unit (BE) to the data interface of the hydraulic power pack.

Red bushing	-	Connect the red bushing to the control unit (BE).
Blue plug	-	Insert the blue plug in the documentation and service interface of the hydraulic power pack.

Docking station

Fig. 39: Docking station

A docking station is part of the scope of delivery for the control unit (BE). The docking stations allows you to charge the battery of the control unit (BE).

12.2 Safety

If using the control unit (BE), also observe the following safety instructions regarding residual risks posed by the hydraulic power pack and the hydraulic tool:

Battery

The control unit (BE) is equipped with a battery.

WARNING!

Danger of injury from incorrect handling of batteries!

Incorrect handling of rechargeable batteries can result in fire, explosions and electric shock. Escaping gases or smoke can lead to poisoning and suffocation.

- Only use the docking station included in the delivery to charge the battery.
- Never open the control unit (BE) and remove the battery. Always dispose of the battery together with the control unit.
- If the battery is faulty, contact PLARAD® service.

Data protection

Data is recorded while the control unit (BE) is in use.

The operator must ensure that saving and processing of personal data complies with the locally applicable data protection laws.

12.3 Charging the control unit (BE)

If the control unit (BE) is connected to the hydraulic power pack, the hydraulic power pack supplies the control unit (BE) with electrical energy.

The control unit (BE) is also equipped with a battery. If the control unit (BE) is connected to the hydraulic power pack, the battery is not charged.

Connecting the PSU

1.

DANGER!

Danger of death due to electrical energy!

Only use the original PSU.

To charge the battery, connect the docking station to the PSU and plug the power plug into the power socket.

Docking station

2. Connect the control unit (BE) to the docking station.

⇨ The battery of the control unit is charged.

The control unit can be operated for roughly 2 hours without an external power supply if the battery is fully charged.

12.4 Connecting the control unit (BE)

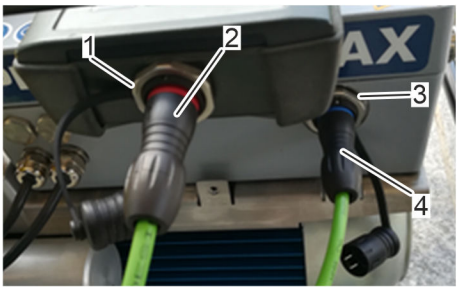


Fig. 40: Connecting the adapter cable

1. Connect the red bushing of the adapter cable (Fig. 40/2) to the control unit (BE) (Fig. 40/1).
2. Plug the blue plug of the adapter cable (Fig. 40/3) into the documentation and service interface of the hydraulic power pack (Fig. 40/4).
3. Supply the hydraulic power pack with power.

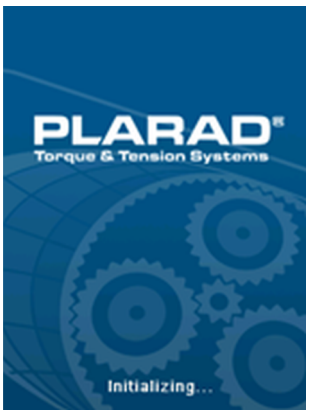
   ⇨ The control unit (BE) is supplied with electrical energy.

12.5 Putting the control unit (BE) into operation

To put the control unit (BE) into operation, proceed as follows:

Starting

1. Press to switch on the control unit (BE).



⇨ The control unit (BE) is initialised.

The start screen is displayed.

Fig. 41: Message

2. If the control unit (BE) has never been synchronised with a PC, the message Fig. 41 is displayed. Synchronise the control unit with a PC (↳ *Chapter 12.11 'Data exchange between PC and control unit' on page 99*) and restart the control unit (BE) (↳ *'Starting' on page 84*).
3. If the message Fig. 41 is displayed in relation to an already synchronised control unit, the internal clock battery is faulty. Have the battery exchanged by PLARAD® service.

Initialisation

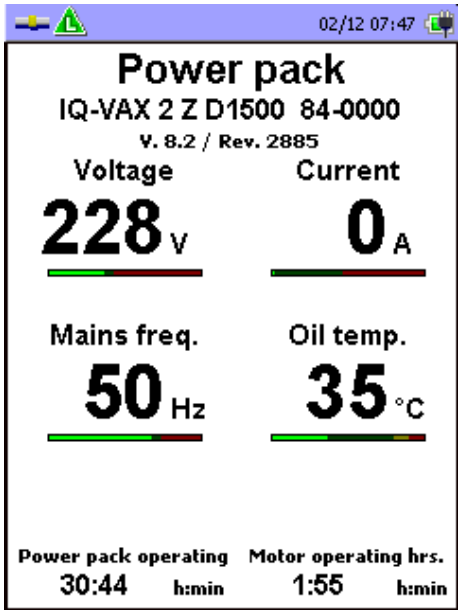


Fig. 42: Power pack data

4. Wait until initialisation is complete.
   - ⇨ A proper connection between the hydraulic power pack and control unit (BE) is indicated in the connection status (Fig. 35/1) by  .
   - ⇨ If the data connection has been established between the control unit (BE) and the hydraulic power pack, the *'Power Pack Data View'* menu is displayed.

5. If there is a faulty connection between the control unit (BE) and the hydraulic power pack (connection status ), ensure that the adapter cable has been connected correctly.

12.6 Preloading with the control unit (BE)

Preloading is only possible with dual hydraulic power packs.

Preparing the control unit (BE) and hydraulic power pack

Prerequisites:

- The hydraulic power pack and the control unit (BE) are connected ↯ *Chapter 12.4 'Connecting the control unit (BE)' on page 84*.
- The hydraulic power pack and the control unit (BE) are ready for use ↯ *Chapter 12.5 'Putting the control unit (BE) into operation' on page 84*.
- Bolting applications (hydraulic tensioner mode) have been created and were transferred to the control unit (BE) ↯ *Chapter 12.12 'Managing bolting applications' on page 101*.

1. Press ○ to call up the main menu of the control unit (BE).

2. Use ▽ or △ to select the *'Bolting App. Defs.'* submenu and confirm with OK.

⇨ The list of available bolting applications is displayed.

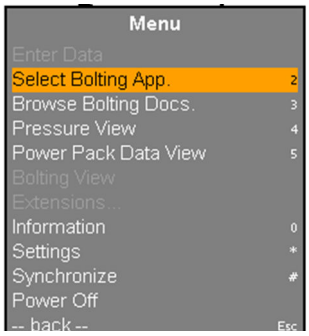


Fig. 43: Bolting application definitions

Fig. 44: Bolting application definitions

3. Use ▽ or △ to select the list of bolting applications and confirm with OK.

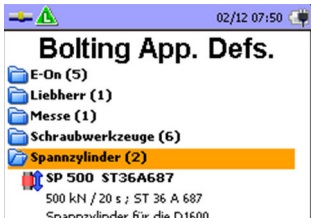


Fig. 45: List of bolting applications

4. Use ▽ or △ to select the bolting application and confirm with ◣.

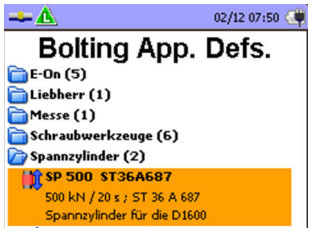


Fig. 46: Bolting application

5. Ensure that a bolting application created in hydraulic tensioner mode (marked with ▮) is selected.

⇨ The bolting application parameters are transferred to the hydraulic power pack.

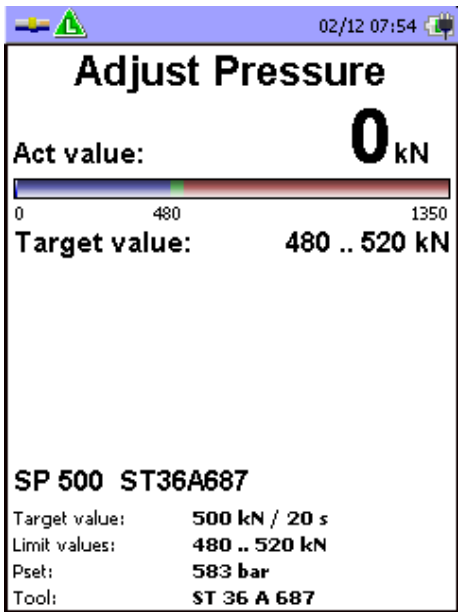


Fig. 47: Pressure adjustment

6.

The pressure adjustment only works in pressure adjustment mode if using the control unit (BE).

To switch to pressure adjustment mode, press the white button to activate adjustment mode or learning mode while keeping the red button pressed down.

Use the pressure reducing valve to set the value of the pretensioning force in kN displayed on the control unit (BE).
↳ *Chapter 6.6 'Setting the operating pressure' on page 59*

Press the white button and red button on the remote control simultaneously to deactivate pressure adjustment mode.

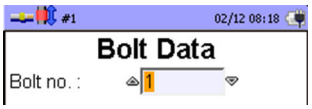


Fig. 48: Bolt data

⇨ The window for data entry appears.

In the 'Bolt Data' submenu, data for the bolted connection (e.g. operator's name, operator's number, workpiece designation) can be entered in six assignable user-defined text fields.

» Continued on the next page

The number and name of the fields is defined in the PC software “BE32.exe” included in the delivery. The control unit (BE) cannot be used to make any changes in this regard. It is only possible to enter data in the fields if a bolting application was selected beforehand.

Entering bolt data

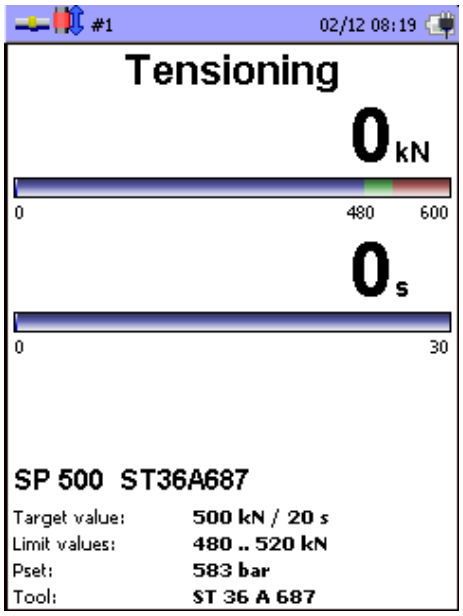


Fig. 49: Bolt data

7. Select the data field.

8. Use the input buttons to enter free text.

Press #⇧ to switch between upper case, lower case, and numerical input.

9. Confirm the entry with ◣ or cancel with ◢.

⇨ If the entry is confirmed, the data is transferred and the selected bolting application is shown on the control panel. The header displays the number of the next bolted connection.

10. Connect the hydraulic tensioner to the hydraulic hose.

⇨ Documented operation of the hydraulic tensioner has been prepared.

Tensioning

1. Press and hold the white button on the remote control.

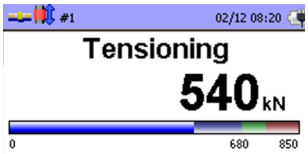


Fig. 50: Pressure build-up

⇨ The pressure build-up is shown on the control unit (BE).

2. Press and hold the white button on the remote control until the green and red LEDs light up continuously and simultaneously on the remote control.

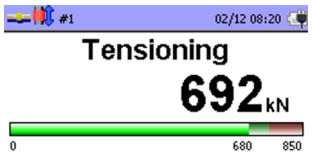


Fig. 51: Control unit display

⇨ The tensile force achieved is within the tolerance window and the control unit (BE) indicates Fig. 51.

Fig. 52: Remote control display

⇨ The remote control display indicates Fig. 52.

3. Tighten the fastening element.

⇨ If using the control unit (BE), the hydraulic power pack always re-pumps if, for example, the pressure reached drops due to settling losses.

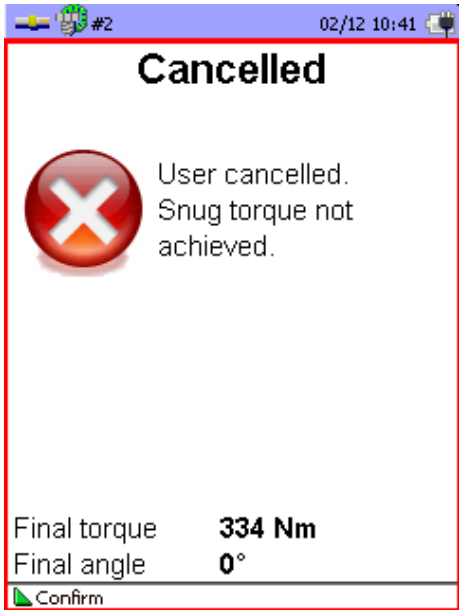
4. Relieve pressure from the hydraulic tensioner after tightening the fastening element. Press the green button on the remote control to do so.

⇨ The control system documents the pressure measured immediately before pressure relief as the bolting result.

Documentation for the tensioning process

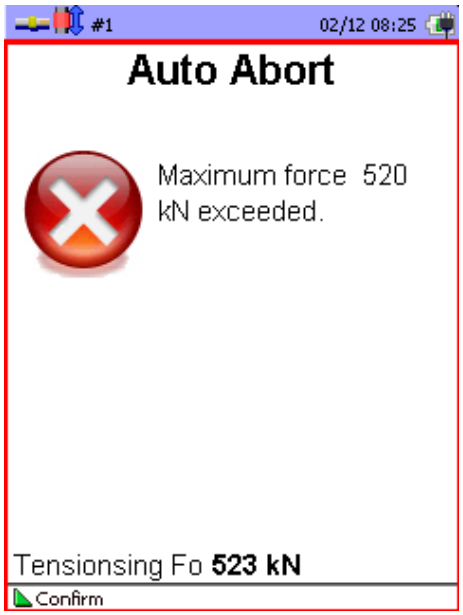
If the tensioning process has been completed successfully, the *'Tensioning OK'* message appears on the control unit (BE).

Cancellation by the user



If the tensioning process was cancelled by pressing the red button on the remote control, the *'User Cancelled'* error message appears on the control unit (BE).

Faulty tensioning process



Other error messages, such as exceeding the maximum permissible tensile force by inadvertently shifting the pressure adjustment valve, are shown as a plain text message.

If there is a pending error message, the number of the bolted connection does not increase automatically.

12.7 Bolting with the control unit (BE)

Preparing the control unit (BE) and hydraulic power pack

Prerequisites:

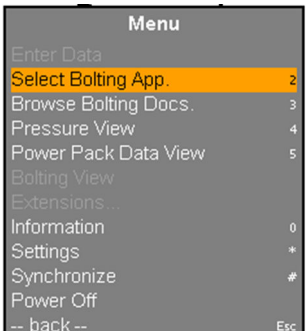
- The hydraulic power pack is suitable for torque-angle bolting applications.
- The hydraulic power pack and the control unit (BE) are connected ↳ *Chapter 12.4 'Connecting the control unit (BE)' on page 84*.

- The hydraulic power pack and the control unit (BE) are ready for use ↳ *Chapter 12.5 'Putting the control unit (BE) into operation' on page 84*.
- Bolting applications (torque mode or torque-angle mode) have been created and were transferred to the control unit ↳ *Chapter 12.12 'Managing bolting applications' on page 101*.

1. Press ○ to call up the main menu of the control unit (BE).

2. Use ▽ or △ to select the *'Bolting App. Defs.'* submenu and confirm with OK.

⇨ The list of available bolting applications is displayed.



3. Use ▽ or △ to select the list of bolting applications and confirm with OK.

Fig. 53: Bolting application definitions

Fig. 54: Bolting application

4. Use ▽ or △ to select the bolting application and confirm with ◣.

> *Torque-angle bolting applications can only be performed with suitable hydraulic power packs.*
>
> *The control unit detects whether the connected hydraulic power pack can perform torque-angle bolting applications. If the hydraulic power pack is not suitable, stored torque-angle bolting applications will be greyed out on the control unit.*

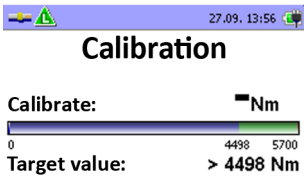


Fig. 55: 'Calibration' display

⇨ The bolting application parameters are transferred to the hydraulic power pack.

⇨ The *'Calibration'* display appears.

If the power pack requires calibration, this is indicated by ⚠ in the status bar.

⇨ If the calibration pressure corresponds to a previously learned bolting pressure and the same hydraulic wrench is used, the *'Calibration'* display appears. Calibration is not performed again. Bolting can commence.

5. Connect the hydraulic wrench to the hydraulic hose.

Setting the pressure

6. Set the pressure.

- **Torque bolting applications:**
  On the pressure reducing valve of the hydraulic power pack, set the pressure ("target value") as precisely as possible so that is corresponds to the indicated torque.
- **Torque-angle bolting applications:**
  The torque indicated on the control unit is a minimum value. Set the hydraulic power pack to any given pressure corresponding to a torque in excess of this minimum value.

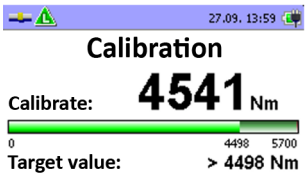


Fig. 56: Torque

7.

WARNING!

Danger of injury from high pressure!

Excessive pressure can cause components to burst, and result in injuries and property damage.

– Never exceed the maximum permissible operating pressure for the connected hydraulic wrench.

While adjusting the pressure, observe the increase in the resulting torque on the control unit.

Example: torque-angle bolting process

The value for the set pressure corresponds to a torque of 4,541 Nm and is thus greater than the target value of 4,498 Nm. The result is OK.

⇨ If the necessary pressure has been set properly, the bar display indicating the torque is green.

Calibration

8. Perform the *'Calibration'* function of the hydraulic power pack.

⇨ An error during calibration is indicated as follows:

- The LEDs on the remote control flash in alternation.
- A clear text message is displayed on the control unit (BE).

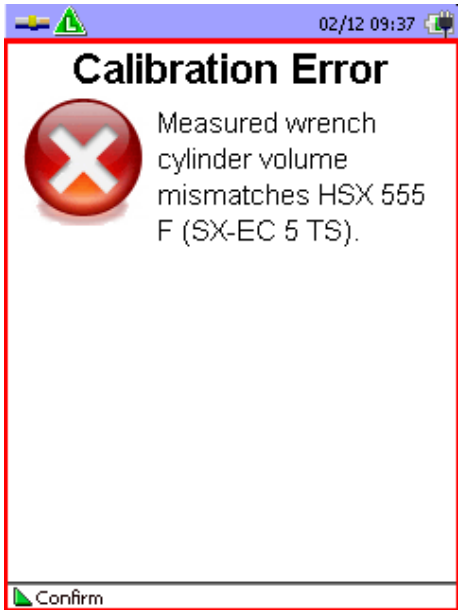


Fig. 57: Calibration error

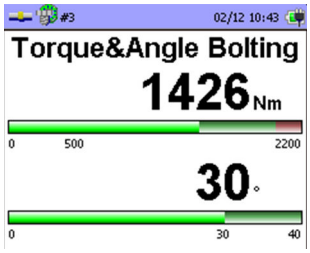


Fig. 58: Example: torque-angle bolting process

9. Rectify the calibration error by pressing the green button and repeat calibration.

⇨ If calibration was performed correctly, this is indicated as follows:

- The green LED on the remote control switches from blinking to permanent light.

⇨ After successfully undergoing calibration, the power pack is prepared for automatic bolting processes and their documentation on the control unit (BE).

The control unit displays the bolting screen associated with the bolting application:

- Torque bolting process
- Torque-angle bolting process

Bolting

10. Bolt.

⇨ During bolting, the control unit (BE) indicates the progress of the bolting process.

- Torque
  The increase in torque is shown.
- Torque-angle bolting process
  First the increase of the torque until the snug torque is reached and then the increase of the angle of further rotation is shown.

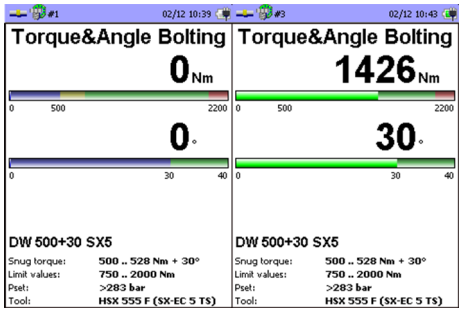


Fig. 59: Example: torque-angle bolting process

Left During bolting
Right After completion of the bolting operation

Bolting documentation

If the bolting process has been completed successfully, the *'Bolting OK'* message appears on the control unit (BE).

- Torque
  The torque reached is within the allotted time frame.
- Torque rotation angle
  The angle of further rotation was reached. The torque corresponding to the angle of further rotation is within the tolerance window stored during bolting application definition.

Repositioning the hydraulic wrench

Before repositioning the hydraulic wrench, switch off the power pack by pressing the red button on the side.

The hydraulic wrench can be attached to the next bolted connection and can make this connection without there being any need to acknowledge the data on the control unit that was reported to the control unit (BE) by the power pack. The active bolting counter increases by one. The control unit continues to count automatically.

The system automatically decides whether the bolting operation was performed correctly. The bolting data (operator's name etc.) is automatically transferred for the next bolting operation, unless this data is changed (e.g. during a shift change).

Fastening incorrect

Fig. 60: Example: fastening incorrect

Left Tightened bolt
Right User cancelled

An error message appears if an error is detected during the bolting process.

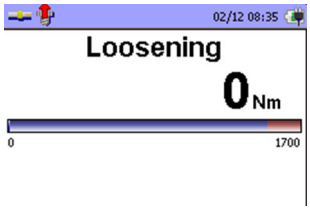
Examples:

- An already tightened bolt was tightened again.
- The white button is inadvertently released during the automatic bolting process.

An error message must be acknowledged on the control unit (BE) by pressing .

The bolting number does not automatically increase by one. The bolting process can be repeated.

12.8 Loosening with the control unit (BE)



The procedure for loosening bolts is the same with and without the control unit (BE).

The *'Loosening'* message appears on the control unit (BE) during the loosening process.

Fig. 61: Loosening

12.9 Exploring additional functions

12.9.1 Calling up the menu

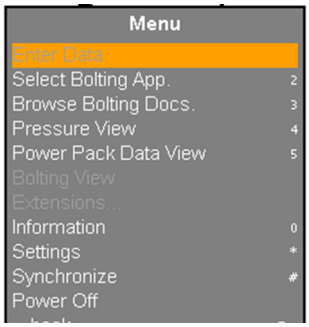


Fig. 62: Menu

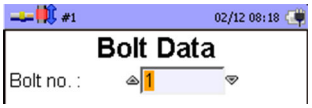
1. Press ▣ to call up the main menu of the control unit (BE).
2. Use ▽ or △ to select the desired submenu and confirm with ◣.

12.9.2 User data input

To modify the data that was entered after the pressure adjustment (e.g. operator's name during a shift change), proceed as follows:

1. Select ▣ *'Menu'* → submenu *'Enter Data'* and confirm with ◣.

   ⇨ The available data fields are displayed.



2. Enter data in the user-defined text fields (maximum six).

The number and name of the fields is defined in the PC software "BE32.exe" included in the delivery. The control unit (BE) cannot be used to make any changes in this regard. It is only possible to enter data in the fields if a bolting application was selected beforehand.

12.9.3 Viewing documentation and data

The completed bolted connections are shown as a list in the *'Documentations'* submenu.

Fig. 63: Documentation

1. Select *'Menu'* → submenu *'Documentations'* and confirm with .

   ⇨ The available records are displayed.

2. To view a set of documentation, use or to select the desired record and confirm with .

Fig. 64: Detailed view

⇨ The complete data for this bolted connection is displayed:

- Date
- Pretensioning force entered
- Torque entered
- Snug torque
- Angle of further rotation
- Tool used
- Bolting designation

3. Use or to navigate to the next or previous record in the detailed view.

⇨ If no data is available, the *'No data'* message appears.

4. Press to confirm this message.

12.9.4 Viewing hydraulic power pack data

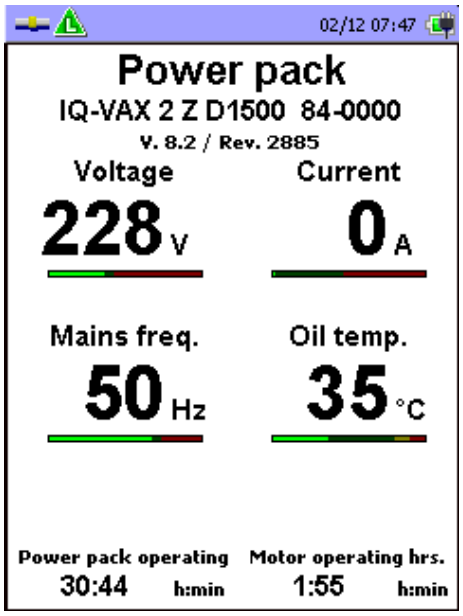


Fig. 65: Hydraulic power pack data

The *'Power Pack Data View'* submenu allows you to view the data of the hydraulic power pack connected to the control unit (BE).

→ Select *'Menu'* → submenu *'Power Pack Data View'* and confirm with .

⇨ The current data of the hydraulic power pack is displayed.

12.9.5 Viewing data about the control unit (BE)

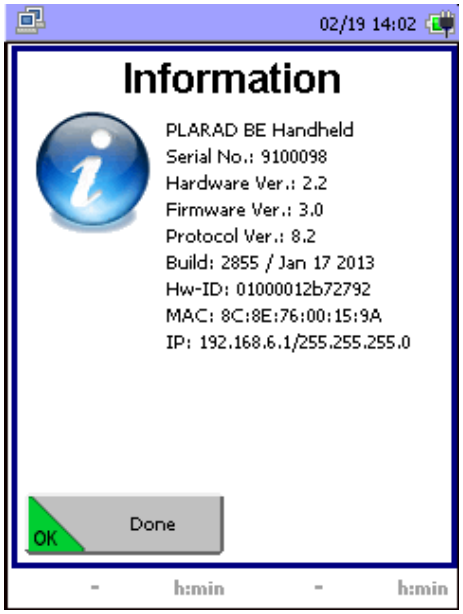


Fig. 66: Data about the control unit (BE)

The *'Information'* submenu lets you view all data about the control unit (BE).

1. Select *'Menu'* → submenu *'Information'* and confirm with .

   ⇨ The current data of the control unit (BE) is displayed.

2. Press to exit the information view.

12.9.6 Modifying settings

You can alter the settings for the control unit (BE) in the "Settings" submenu:

- Language
- Unit for temperature indication (degrees Celsius or Fahrenheit)

- Time zone
- If using the control unit (BE) in a network
  - IP address
  - Netmask

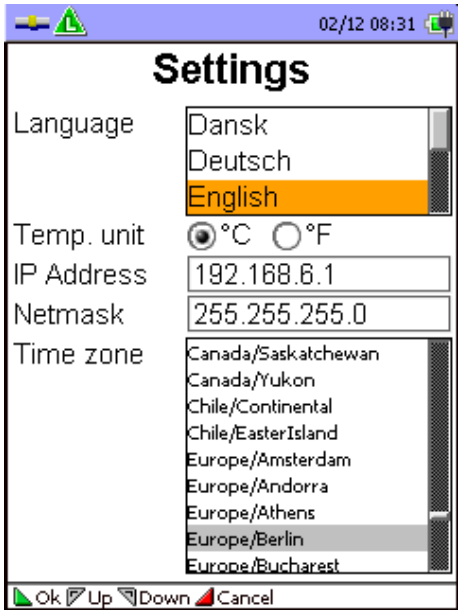


Fig. 67: Settings

1. Select *'Menu'* → submenu *'Settings'* and confirm with .
   ⇨ The available settings are displayed.
2. Use or to select a setting.
   ⇨ *'123'* is displayed in the status bar if IP address or netmask are selected. The input buttons of the control unit can be used to enter digits.
3. Use , , or to change the language or temperature unit.
4. The input buttons of the control unit can be used to enter digits. This allows you to enter an IP address or netmask.
5. Press to confirm the entry.
6. Press to cancel the entry.

12.10 Switching off the control unit (BE)

To switch off the control unit (BE), select *'Menu'* → submenu *'Power Off'* and confirm with .

Alternatively, press and hold the red button on the control unit (BE).

12.11 Data exchange between PC and control unit

PC

The control unit (BE) can only be used with a hydraulic power pack if bolting application data was previously transferred from the PC to the control unit (BE).

Software

Only the PC software included in the delivery can be used to create or modify bolting applications. This ensures that the parameters of the bolting application cannot be tampered with at a subsequent point in time.

Connecting to the network

1. Use one of the following options to connect the control unit (BE) to the network:
   - Connect the docking station directly to the PC via a network cable.
   - Connect the docking station using the network adapter included in the delivery.

   Have the network connection set up by the network administrator. Observe the corresponding documentation on the CD in the *'Doku'* folder.
2. If the network adapter (see enclosed installation CD) included in the delivery is used, connect the control unit (BE) to a USB port of the PC.
3. If the control unit is addressed via a network, connect the control unit (BE) to the network directly via a network cable.
4. Assign a valid IP address to the control unit (BE) or to the network interface.

Performing data exchange

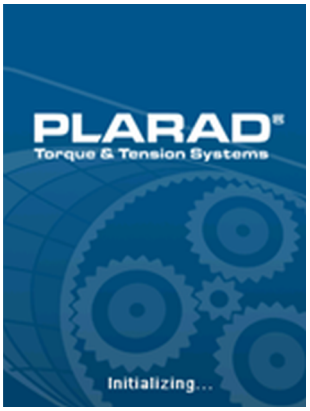
1. Insert the control unit in the docking station.

   ⇨ If the control unit (BE) is properly connected to the PC via the docking station, is displayed in the status bar.
2. Synchronise the control unit with the PC.

   To do so, select *'Menu'* → submenu *'Synchronize'* and confirm with .

   ⇨ The bolting documentation (data of the completed bolting operations) is transferred to the PC database.

   The bolting application definitions selected for the data transfer are transferred from the PC to the control unit (BE).



The *'Initializing...'* message is displayed during synchronisation.

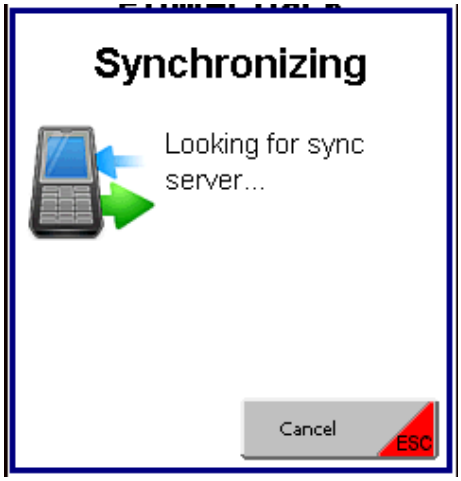


Fig. 68: Synchronisation

If the control unit (BE) is not properly connected to the PC or if the synchronisation program is not running on the PC, the *'Synchronize'* message appears.

1. Press to cancel the synchronisation process.
2. Establish the connection or start the synchronisation program "BE32Sync.exe" on the PC.

12.12 Managing bolting applications

12.12.1 Using the PC software "BE32.exe"

Bolting applications are created and managed using the PC software "BE32.exe".

Prerequisite:

- PC software and driver have been installed.
  The operating instructions and the software can be found on the enclosed software CD.

Launching the software

1. Launch the PC software "BE32.exe".

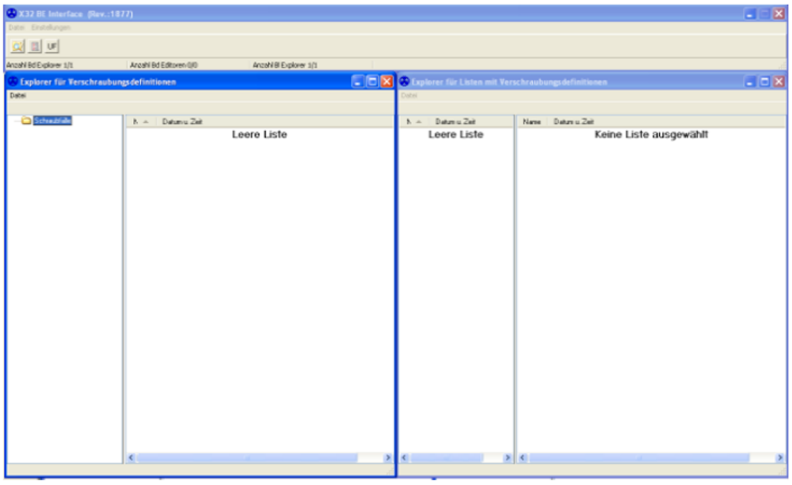


Fig. 69: Main window

⇨ The main window *'X32 BE Interface'* with the *'Bolting definition browser'* and the *'Browser for bolting definition lists'* is displayed.

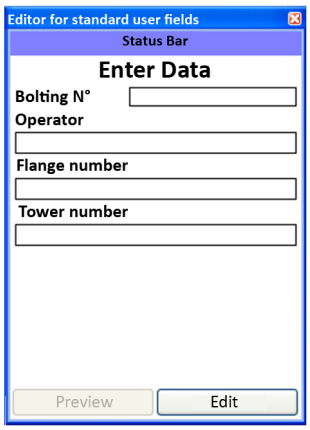
2. Press to open additional browsers:
   - - Bolting definition browser
   - - Browser for bolting definition lists
   - - Editor for standard user fields

   ⇨ The status bar indicates the current number of open browsers/editors.
3. To control the browsers and editors, move the cursor into the work area of the browser or editor.
4. Right-click to open the context menu.

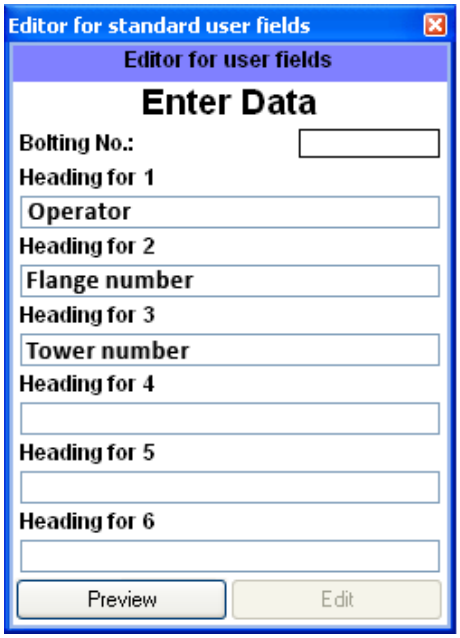
12.12.2 Creating user fields

The editor for standard user fields can be used to define up to six free text user fields of your choice for the control unit (BE). During the bolting process, additional information can be entered in the fields created with this editor.

1. Press to open the editor for standard user fields.



2. Press *'Edit'* to switch to the editor view.



3. Enter headings for the fields.
4. Press *'Preview'* to view a preview.
   ⇨ The preview shows how the text entries will later appear on the control unit (BE).

   The template created can be adopted for a bolting application ↬ *Chapter 12.12.3 'Creating and editing bolting application' on page 103*.

In the example shown here, the user fields created are *'Bolting'*, *'Operator'*, *'Flange number'* and *'Tower number'*. These specifications are stored during bolting along with the bolt data.

12.12.3 Creating and editing bolting application

The bolting definition browser can be used to create and manage bolting applications. A directory structure can also be created in which to store individual bolting applications (e.g. sorted by machine type).

1. Open the bolting definition browser. Press to do so.

Fig. 70: Editor

2. Right-click to open the context menu.
3. Select *'Create bolting application'* and enter a name.
   ⇨ The bolted application created is shown in the list.

   ⇨ A bolting application remains invalid until all data fields have been completed correctly and in full.
   ⇨ If the bolting application has been created correctly and in full, the icon for the respective bolting mode appears in front of the name.

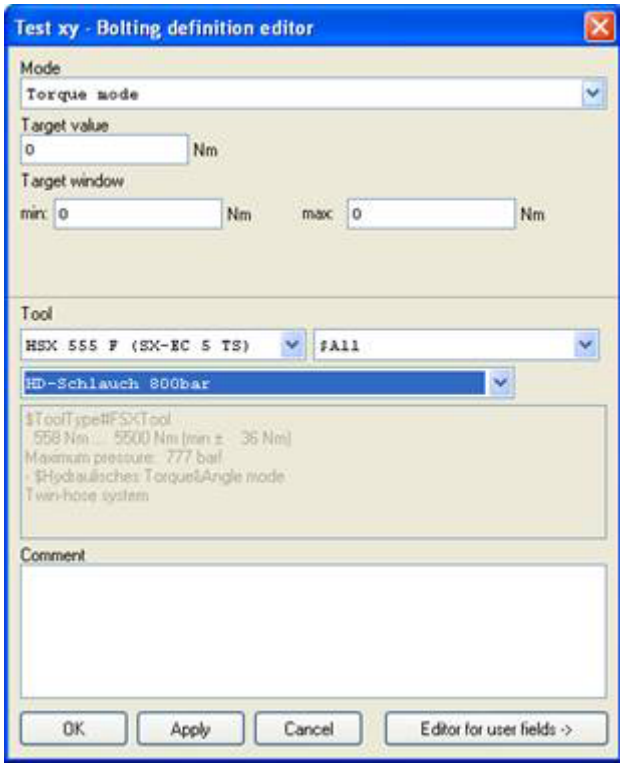


Fig. 71: Bolting definition editor

4. Open the *'Bolting definition editor'* by double-clicking on the bolting application.

5. Enter the bolting application parameters in the editor window.

Information about the target window

Note regarding definition of the target window and subsequent adjustment of the working pressure on the hydraulic power pack:

Torque bolting operations

The exact pressure is set on the hydraulic power pack for torque bolting operations.

The torque resulting from the torque chart for the hydraulic wrench ensures that the bolt cannot be overtightened.

The hydraulic power pack checks during the calibration process whether the correct pressure expected by the BE32 is set within the appropriate tolerance window.

If the pressure is not set correctly, the hydraulic power pack rejects the calibration process.

Torque-angle bolting operations

With torque-angle bolting operations, a pressure is set on the power pack which is sufficient to apply the snug torque and, subsequently, the further angle of rotation.

The pressure set on the power pack must be greater than the pressure required to reach the maximum torque defined by the operator (which is obtained after applying the further angle of rotation) of the target window.

Two mechanisms prevent the overtightening of a bolt:

a - At the start of the bolting operation, the hydraulic power pack detects whether the bolt has already been tightened. Due to external influences (e.g. skipping of a tooth on the ratchet system of the hydraulic wrench in the case of worn wrenches or sudden yielding of the incorrectly applied reaction arm during pressure build-up), it is possible that the hydraulic power pack will not recognise the tightened bolt. This is because, as with a non-tightened bolt, the pressure curve briefly collapses in such cases. This is due to external circumstances and is not a hydraulic power pack malfunction.

b - The second safety mechanism to prevent overtightening the bolt is ensured by the fact that a torque window (upper and lower target value of the torque after applying snug torque and further angle of rotation) can also be meaningfully defined for torque-angle bolting operations:

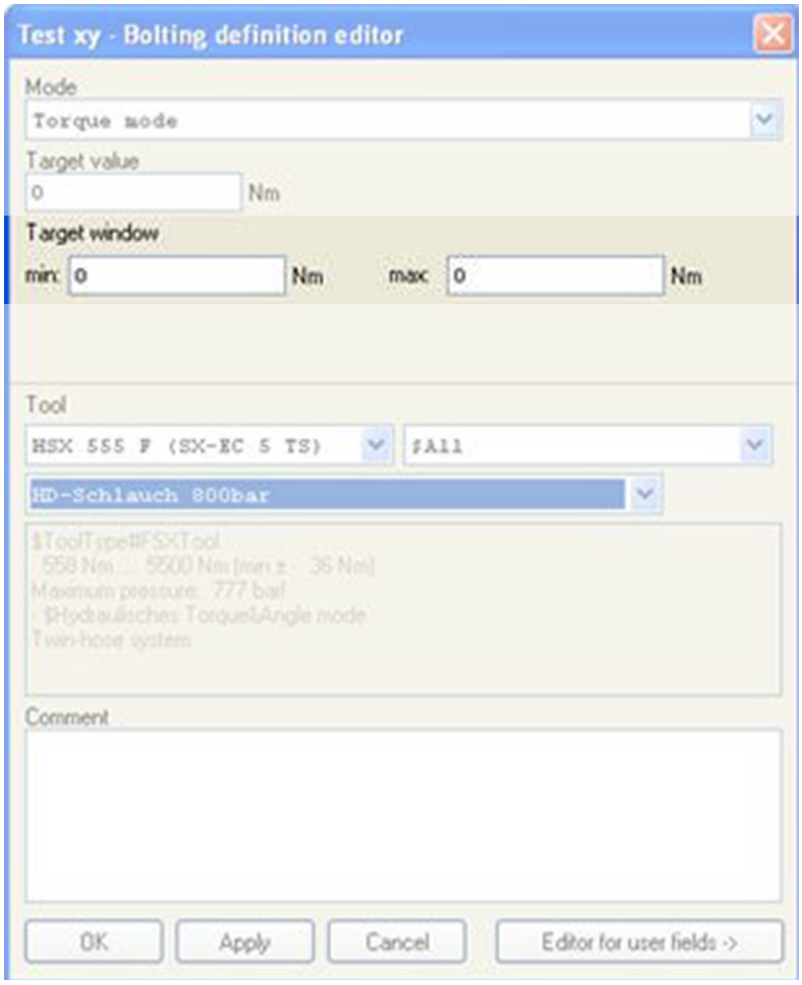


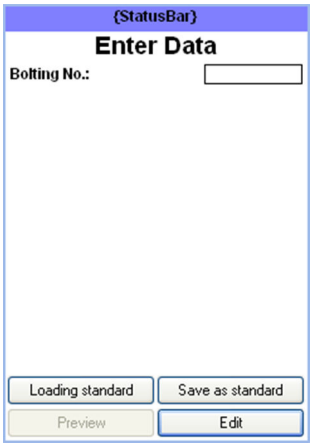
Fig. 72: Torque window

If mechanism a does not intervene, the hydraulic power pack constantly checks the current system pressure and compares it with the pressure corresponding to the upper limit of the expected total torque.

If this pressure is not reached, the bolting operation is cancelled with an error message.

If the upper target value of the torque and its corresponding pressure have been meaningfully defined, the bolt cannot be overtightened.

1. Open the editor for standard user fields if user fields are to be created. Press UF to do so *Chapter 12.12.2 'Creating user fields' on page 102*.



2. If the user field definition is to be stored as default (as a template for other bolting applications), press *'Save as standard'*.
3. If standard user field definitions have already been created and these are to be loaded, press *'Loading standard'*.

12.12.4 Creating bolting definition lists

The browser for bolting definition lists can be used to compile application-specific lists based on the bolting applications you have created.

1. Press to open the browser for bolting definition lists.
2. Right-click to open the context menu.
3. Select *'Create bolting definition list'* and enter a name.

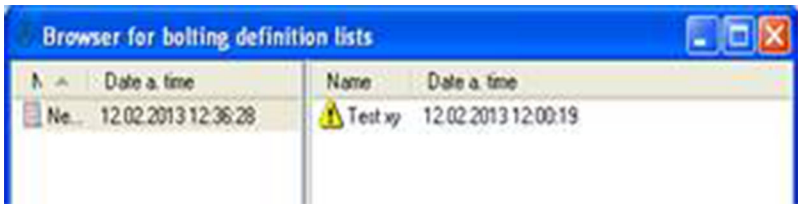


Fig. 73: Bolting definition browser

4. Drag-and-drop the desired bolting applications from the bolting definition browser to the selected list.

In the default setting, all available bolting definition lists will be transferred to the connected control unit (BE) during every synchronisation.

Invalid bolting applications contained in these bolting definition lists will not be included in the transfer.

12.12.5 Managing documentation data

The sets of bolting documentation stored in the control unit (BE) are transferred to the PC database during every synchronisation.

The sets of bolting documentation stored in the control unit are deleted after each successful transfer.

Program *'DrExplorer.exe'* is used to display and manage the sets of bolting documentation stored on the PC. This program shows the sets of bolting documentation in a table and makes it possible to filter, sort, and export them.

Launching the software

1. Launch the *'DrExplorer.exe'* software.

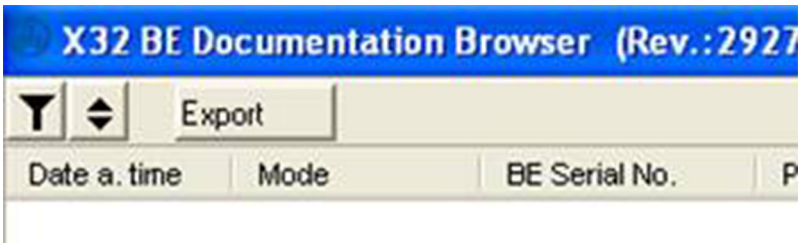


Fig. 74: "DrExplorer.exe" software

⇨ The program window is displayed.

2. To select the *'Filter'* function, press .

3. To select the *'Sort'* function, press .

4. Right-click to open the context menu.
   ⇨ The dialog for defining a filter or a sort sequence opens.

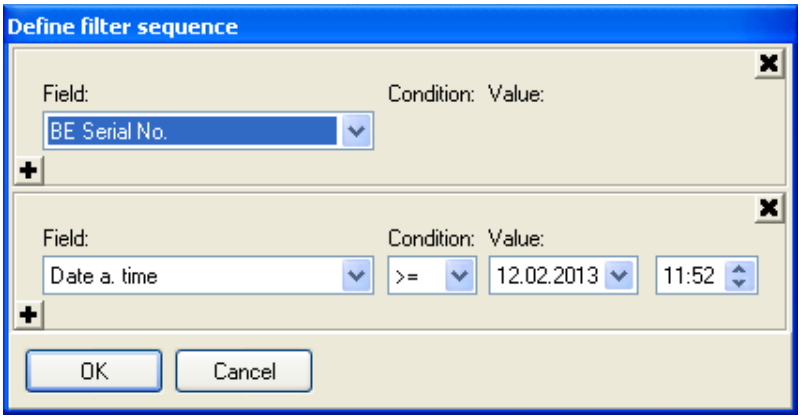


Fig. 75: Example: Filter according to serial number of the control unit and date/time

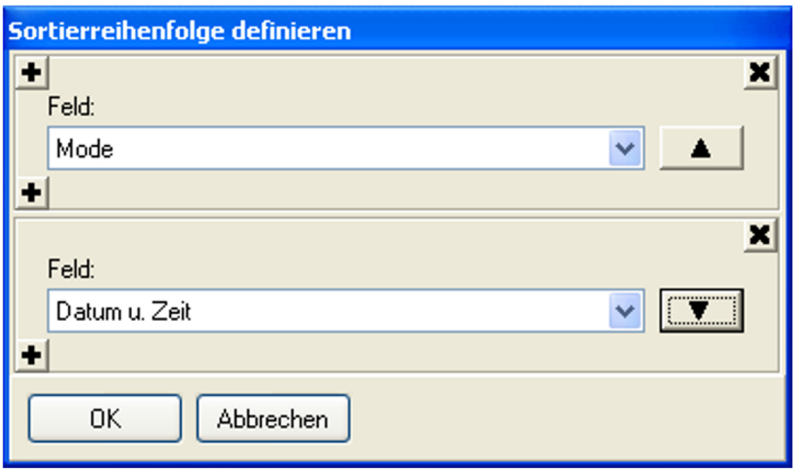
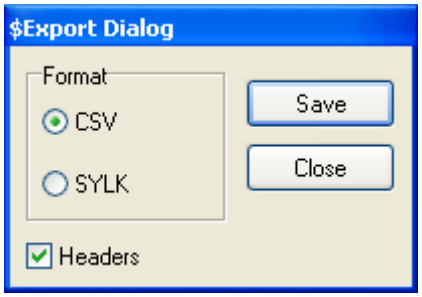


Fig. 76: Example: The results are sorted first by bolting mode (descending) and then by date/time (ascending)

5. Press *'Export'* to export data.



6. Define the file format.
7. Press *'Close'* to cancel the process.
8. Press *'Save'* to export the data.

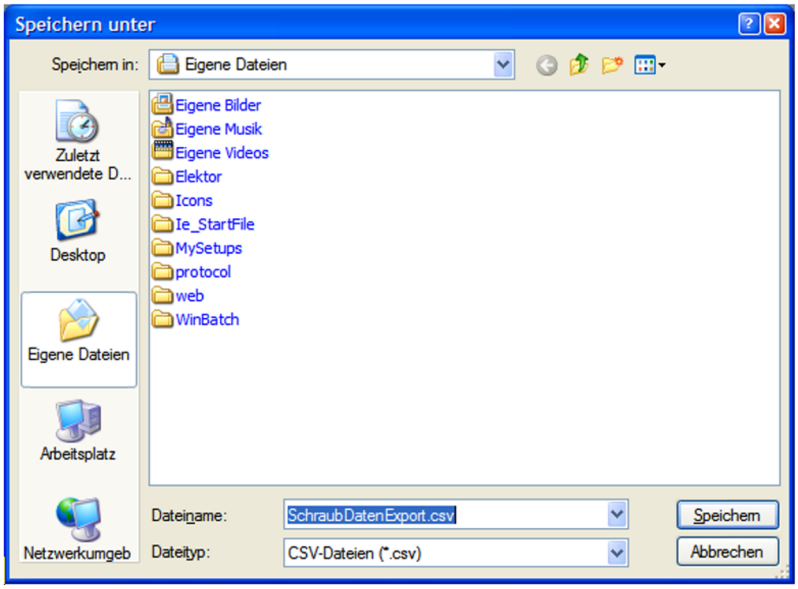


Fig. 77: Save dialog

9. Enter the file name and storage location, and press *'Save'*.

⇨ Only data that was previously selected via the filter is exported.

The data is transferred in the sequence that was defined via the sort criteria.

13 Performing maintenance

13.1 Maintenance schedule

Improperly performed maintenance tasks

WARNING!

Danger of injury from improperly performed maintenance tasks!

Improper maintenance can cause serious injuries and significant property damage.

- Ensure sufficient assembly space prior to commencing the tasks.
- Ensure that the assembly site is clean and tidy. Loosely stacked or randomly scattered components and tools may cause accidents.
- Only permit users to perform the following maintenance activities: “ensure correct oil level”, “clean”, “ensure compliance with maximum period of use for hydraulic hoses”, “change oil” and “have checked for damage”.
- Have all repairs performed by the manufacturer.
- Never open components of the hydraulic power pack.
- Use only PLARAD® original parts.

Faultless operation

The following sections describe the maintenance tasks that are required in order to ensure optimum and faultless operation.

If routine checks reveal increased wear, shorten the requisite maintenance intervals according to the actual signs of wear. If you have questions about maintenance tasks and intervals, contact PLARAD® service.

Interval	Maintenance task	Personnel
Before and after every use	■ Check the oil level. ■ Clean. ■ Check surfaces, warning symbols and pictograms for damage. ■ Check the power cable, power plug and fasteners for damage. ■ Check for leaks and visible damage. ■ Ensure that the maximum period of use for the hydraulic hoses has not been reached. Note the exchange intervals for the hydraulic hoses. See the hose manufacturer's specifications. *Chapter 13.2 'Having the hydraulic power pack maintained by the user' on page 112*	User
After 150 operating hours or yearly	■ Change the oil *Chapter 13.3 'Changing the oil' on page 113*.	User
Every 3 months ■ In the event of extreme operating conditions (e.g. dust, dirt) ■ In the event of high frequency of use, multi-shift operation Every 6 months ■ In the event of standard operating conditions ■ In the event of average frequency of use Every 12 months ■ In the event of low frequency of use	■ Oil-immersed motor Perform service as stipulated by the motor manufacturer. ■ Perform the software update. ■ Gearbox Perform service as stipulated by the manufacturer. ■ Change the oil filter. ■ Change the hydraulic oil. ■ Replace wear parts such as seals. ■ Exchange damaged markings. ■ Test as per DGUV Regulation 3. ■ Accessories Check for damage; exchange. *Chapter 13.4 'Having service tasks performed by the manufacturer' on page 114*	PLARAD® service

Accessories, spare parts and wear parts

Spare parts must meet the technical requirements specified by PLARAD®. This is always ensured by original spare parts. A warranty can only be provided for original spare parts supplied by PLARAD®.

The installation or use of other spare parts can, under certain circumstances, adversely alter the specified design properties and, consequently, impair active or passive safety.

Any liability and warranty for damage resulting from the use of parts other than the original spare parts and accessory parts is excluded.

Have at least the following information about the hydraulic power pack to hand to enable quick and easy processing:

- Client
- Serial number
- Desired spare part
- Desired quantity
- Desired mode of shipping

↳ *'PLARAD® service' on page 4*

13.2 Having the hydraulic power pack maintained by the user

Personnel: ■ User

Perform the following maintenance steps before and after every use:

Oil level

1. Check the oil level. Top up the oil if the depiction of the "max Oil" sticker and the oil level in the sight glass do not match ↳ *Chapter 6 'Preparing for operation' on page 53*.

Cleaning

2.

NOTICE!
Property damage due to improper cleaning!

Clean the hydraulic power pack with a soft cloth. Never use strong cleaning agents, water, brushes, sharp-edged tools or high-pressure cleaners.

WARNING!
Fire hazard!

When using isopropyl alcohol, do not clean the hydraulic power pack near ignition sources. Do not smoke. Let it evaporate.

Surfaces and markings

3. Check surfaces and markings for damage. Arrange for repairs if there is damage or illegible markings.

Power cable

4.

DANGER!
Electric shock!

Check the power cable and power plug for damage and insufficient fastening. Have them exchanged by PLARAD® service if they are damaged.

Never replace them yourself.

Remote control

5. Check the remote control and the remote control cable for damage and insufficient fastening. Have them exchanged by PLARAD® service if they are damaged.

Hydraulic hoses

6. Check the hydraulic hoses and connections for damage and leaks. Check the period of use. Have the hoses replaced if they are damaged or if the maximum permissible service life has been exceeded.

7. **WARNING!**
Danger of injury due to faulty hydraulic power pack!

Do not use the hydraulic power pack if it is faulty. Have it repaired immediately or have the faulty parts exchanged. Contact PLARAD® service.

13.3 Changing the oil

Personnel:
- User

Protective equipment:
- Protective work clothing
- Safety goggles
- Safety gloves
- Safety shoes

The hydraulic oil must be changed yearly or after 150 operating hours.

Operating hours

1. Read the operating hours on the control system's or the remote control's display.

Draining the oil

2. Put a container with sufficient volume (*Chapter 16 'Technical data' on page 123*) under the hydraulic power pack. Open the oil drain plug.
3. Close the oil drain plug if the oil has been fully discharged.

Topping up the oil

4. Open the cover of the oil filling neck.
5. Carefully fill clean new hydraulic oil (*'Oil specifications' on page 124*) into the surge tank via a funnel and oil strainer until the correct oil level is reached.

Oil level

Fig. 78: Sticker for oil level

6. Do not add any more oil if the oil level in the sight glass matches the depiction on the "max Oil" sticker.
7. Close the cover of the oil filling neck.

Cleaning

8. Clean the work environment in the proper manner. Dispose of the oil in an environmentally sound manner or reuse it.

13.4 Having service tasks performed by the manufacturer

Service intervals

The service intervals are dependent on the conditions of use and the operating site.

Service interval	Conditions
Every 3 months	■ In the event of extreme operating conditions (e.g. dust, dirt) ■ In the event of high frequency of use, multi-shift operation
Every 6 months	■ In the event of standard operating conditions ■ In the event of average frequency of use
Every 12 months	■ In the event of low frequency of use

Contacting service

→ 

WARNING!
Danger of injury due to improperly performed service tasks!

Contact PLARAD® service in good time regarding the following service tasks.

Do not perform service tasks yourself.

Service tasks

Personnel: ■ PLARAD® service

→ Perform service tasks as per the manufacturer's specifications.

Component	Service task
Hydraulic power pack	Check for damage. Rectify any damage.
	Change the oil and oil filter.
	Replace wear parts.
	Exchange damaged markings (e.g. seals).
	Test as per DGUV Regulation 3.
	Perform the software update.
	Check the oil-immersed motor and gearbox for damage. Rectify any damage.
Pressure gauge	Perform service as stipulated by the manufacturer.
	Replace the pressure gauge certificate.
Accessories	Check for damage; exchange.
	Exchange damaged markings.

14 Troubleshooting

Error display on the remote control in plain text

Errors that the user cannot remedy independently are shown on the remote control's display in plain text.

Fig. 79: Example, plain text

Faults are also displayed in text form on the control unit (BE) screen.

Fig. 80: Example fault display

14.1 Error messages on the display

Contact ↳ 'PLARAD® service' on page 4 if you have any questions about error messages.

The screen may display the following messages:

Message	Fault description	Possible cause	Troubleshooting
Bolting OK	Bolting OK	Fastening operation successful	
Tensioning OK	Tensioning OK	The fastening operation was successful.	
OK (bolt tight)	OK (bolt tight)	Bolt has already been tightened	

Message	Fault description	Possible cause	Troubleshooting
User cancelled	Abort (no bolt)	The user has aborted the fastening operation. No bolt detected.	■ Reposition the tool. ■ Start fastening again.
User cancelled	Abort (no pressure build-up)	The user has aborted the fastening operation. No pressure has been built up yet.	■ Reposition the tool. ■ Start fastening again.
User cancelled	Abort (under target torque)	The user has aborted the fastening operation. Minimum torque not reached.	**DM mode:** ■ Reposition the tool. ■ Start fastening again. **DM/DW mode:** ■ Loosen. ■ Reposition the tool. ■ Start fastening again.
User cancelled	Abort (under snug torque)	The user has aborted the fastening operation. Snug torque not reached.	Continue bolting.
User cancelled	Abort (pressure applied)	The user has aborted the fastening operation. Some pressure has already been applied.	**DM mode:** ■ Reposition the tool. ■ Start fastening again. **DM/DW mode:** ■ Loosen. ■ Reposition the tool. ■ Start fastening again.
User cancelled	Abort (before safety stroke)	The user has aborted the fastening operation. Safety stroke was not successful.	Continue bolting.
User cancelled	Abort (before target angle)	The user has aborted the fastening operation. Snug torque $TSETMAX exceeded. Target angle $ASET not reached.	■ Loosen. ■ Reposition the tool. ■ Start fastening again.
User cancelled	Abort (pressure applied)	The user has aborted the fastening operation. Some pressure has already been applied.	**DM mode:** ■ Reposition the tool. ■ Start fastening again. **DM/DW mode:** ■ Loosen. ■ Reposition the tool. ■ Start fastening again.

Message	Fault description	Possible cause	Troubleshooting
Auto Abort	Bolt tight	Bolt has already been tightened	**a)** Check whether the correct bolt was used. **b)** Loosen and repeat fastening.
Auto Abort	Starting torque already greater than snug torque	Starting torque $TACT greater than snug torque $TSETMAX.	**a)** Check whether the correct bolt was used. **b)** Loosen and repeat fastening.
Auto Abort	Pressure too high	Set pressure $PACT is higher than taught pressure $PLEARN	■ Loosen the bolt. ■ Perform new learning stroke. ■ Start fastening again.
Auto Abort	Pressure too high	Set pressure $PACT is higher than maximum specification $PMAX	■ Loosen the bolt. ■ Perform new learning stroke. ■ Start fastening again.
Auto Abort	Maximum torque exceeded	Maximum torque $TMAX exceeded	■ Loosen. ■ Reposition the tool. ■ Start fastening again.
Auto Abort	Maximum force exceeded	Maximum force $FMAX exceeded	■ Loosen. ■ Reposition the tool. ■ Start fastening again.
Auto Abort	Target torque not reached	Target torque $TSET not being reached	**a)** Check pressure adjustment valve. **b)** ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.
Auto Abort	Target force not reached	Target force $FSET not being reached	**a)** Check pressure adjustment valve. **b)** ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.

Message	Fault description	Possible cause	Troubleshooting
Auto Abort	Pressure fluctuations	Too much time is elapsing before the pressure becomes stable. Measuring the pressure correctly is not possible.	Contact *'PLARAD® service' on page 4*.
Invalid mode	Invalid fastening mode	The unit is reporting invalid fastening mode. Documentation is not possible.	Check communication with the control unit (BE).
Auto Abort	Relief lever fault	Pressure amplifier's relief lever not in end position	■ Engage relief lever. ■ Restart the fastening operation.
Auto Abort	Pressure amplifier engaged	Pressure amplifier engaged	■ Switch off pressure amplifier. ■ Restart the fastening operation.
Auto Abort	No pressure amplifier	Pressure amplifier not engaged	■ Engage pressure amplifier. ■ Restart the fastening operation.
Fastening incorrect	Angle not reached	Target angle $ASET not reached at $TACT.	**a)** Check the particulars of the fastening operation. **b)** ■ Check lubrication. ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.
Fastening incorrect	Minimum torque not reached.	Minimum torque $TMIN not reached	**a)** Check the particulars of the fastening operation. **b)** ■ Check lubrication. ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.

Message	Fault description	Possible cause	Troubleshooting
Fastening incorrect	Minimum torque not reached.	Minimum torque $TMIN not reached after $AACT	**a)** ■ Check the particulars of the fastening operation. **b)** ■ Check lubrication. ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.
Bolting incorrect	Minimum force not reached	Tightening force has dropped below $FMIN	**a)** ■ Check hydraulic system for leaks. ■ Loosen. ■ Start fastening again. **b)** ■ Check the particulars of the fastening operation. ■ Loosen. ■ Start fastening again.
Fastening incorrect	Maximum torque exceeded	Maximum torque $TMAX exceeded	■ Check the particulars of the fastening operation. ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.
Bolting incorrect	Maximum force exceeded	Maximum tightening force $FMAX exceeded	■ Check the particulars of the fastening operation. ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.
Bolting complete	OK (ext. signal)	The fastening operation was successful (external signal supplying OK message)	
Bolting complete	OK (ext. signal)	The fastening operation was successful (external signal supplying OK message)	

Message	Fault description	Possible cause	Troubleshooting
Auto Abort	Power pack fault	$ERR Bolting process aborted	Contact *'PLARAD® service' on page 4*.
Auto Abort	Bolting characteristic erratic	Bolting characteristic is erratic. Safe torque fastening cannot be guaranteed.	■ Loosen. ■ Clean bolt or use a new fastener set. ■ Start fastening again.
Auto Abort	High pressure not relieved.	The pressure amplifier is still under high pressure.	Relieve high pressure. To do so, use relief lever or press relief switch on remote control.
Auto Abort	Maximum angle exceeded	Maximum turning angle $AMAX exceeded	**a)** Check the particulars of the fastening operation. **b)** ■ Check lubrication. ■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation.
Connection lost	Connection lost	The connection to the unit was lost during bolting. The fastening operation has failed.	■ Check the cabling. ■ Reconnect. ■ Perform learning stroke. ■ Loosen. ■ Start fastening again.
Fastening incorrect	Fault #$RESULT	Fault code #$RESULT No further details available.	■ Loosen. ■ Use a new set of fasteners (bolt, washer, nut) and restart fastening operation. If fault persists, contact *'PLARAD® service' on page 4*.

14.2 Error messages via the LED of the remote control

Error messages are displayed via the red and green LED of the remote control.

LED display	Function with control unit	Function without control unit
Red and green LED flashing in alternation	There is an error.	There is an error.

14.3 Performing troubleshooting

Improperly performed troubleshooting

WARNING!

Danger of injury from improperly performed troubleshooting!

Improper troubleshooting can cause serious injuries and significant property damage.

- Have all repairs performed by the manufacturer.
- Never open components of the hydraulic power pack.
- Use only PLARAD® original parts.

Device damage

→ Contact *'PLARAD® service' on page 4* if there is any damage to the hydraulic power pack.

Power supply

1. → Check the power cord and connections and arrange for exchange if there is damage.
2. → Check the electrical parameters and correct the power supply.

Returning to service after remedying the error

WARNING!

Danger of injury due to faulty hydraulic power pack!

If a hydraulic power pack is not properly repaired, this can cause serious injuries.

- Never return a defective hydraulic power pack to service.

→ Prior to first use, have a test performed as per DGUV Regulation 3.

15 Disposal

The hydraulic power pack must be disposed of in an environmentally sound manner at the end of its service life.

Disassembly

WARNING!

Danger of injury due to short circuit and stored residual energy!

If components are damaged, there is a danger of injury due to short circuit or the continued presence of stored residual energy.

1. Disconnect the hydraulic power pack from the power supply. To do so, unplug the power plug.
2. Remove the hydraulic hoses.
   ⇨ Reuse these components if necessary.

Draining the oil

3. Put a container with sufficient volume (*Chapter 16 'Technical data' on page 123*) under the hydraulic power pack. Open the oil drain plug.
4. Close the oil drain plug if the oil has been fully discharged. Clean the work environment in the proper manner. Dispose of the oil in an environmentally sound manner or reuse it.
5. Do not dismantle the hydraulic power pack any further.

Disposal

If no take-back or disposal agreement has been put in place, dispose of the hydraulic power pack as electronic waste in accordance with local regulations. Use authorised collection points for the reprocessing of old electrical and electronic devices.

Dispose of waste oil in an environmentally sound manner as per local regulations.

ENVIRONMENT!

Danger to the environment due to incorrect disposal!

Incorrect disposal can be hazardous to the environment.

Do not allow electronic components to enter bodies of water, the sewage system, the soil or household waste collection.

Have electronic waste, electronic components, lubricants and other auxiliary materials disposed of by approved specialist companies.

If in doubt, obtain information about environmentally sound disposal from the local municipal authority or from specialist disposal companies.

16 Technical data

Technical data sheet

Technical data sheet is available online at: https://www.plarad.de/download-center.html

Dimensions and weight

Dimensions and weight are dependent on the hydraulic power pack version. See the technical data sheet regarding specific values for the hydraulic power pack.

Data	Value	Unit
Weight*	20 – 42	kg
Length	455 – 500	mm
Width	246 – 343	mm
Height	366 – 655	mm

* See the rating plate for specific details.

Performance values

Data	Value	Unit
Pressure, maximum*	800 – 2,400	bar
Flow rate	0.8 – 13.2	l/min
Drive power	0.8 – 2.2	kW

* See the rating plate for specific details.

Electrical connected loads

Specific details on the rating plate:

- Mains voltage
- Mains frequency
- Nominal current
- Protection class

Possible electrical connected loads:

- Alternating current:
  AC 100 V, AC 110 V, 220 V, 230 V – 50/60 Hz
- Three-phase alternating current:
  3 AC 200 V, 3 AC 400 V, 3 AC 440 V, 3 AC 480 V – 50/60 Hz

Minimum connected load for mobile power generators: 4 kVA

Ambient conditions

Data	Value	Unit
Temperature range	-10 – 50	°C
Relative humidity, maximum	Non-condensing	

Emissions

Emission levels as per EN 60745

Data	Value	Unit
Emission sound pressure level	89	dB(A)
Measurement uncertainty of emitted sound pressure level	3	dB(A)

Oil specifications

Data	Value	Unit
Usable oil volume with surge tank (standard) for:		
Motor size 1	0.1	l
Motor size 2 and 3.5	0.3	l
Additionally usable oil volume with auxiliary tank (option)	4	l
Filter insert	10	µm
Hydraulic oil	Shell Tellus S2 VX 15	

17 Index

Q

R

S

T

U

V

W

Appendix

In addition to this manual, the following documents are supplied in a document folder enclosed with the hydraulic power pack.

- EU declaration of conformity
- Test report for testing electrical equipment as per DIN VDE 0701-0702
  Testing of equipment as per DGUV Regulation 3
- Certificates (option)

EC Declaration of Conformity

Translation of original

Manufacturer	Maschinenfabrik Wagner GmbH & Co. KG	
	Birrenbachshöhe 17 53804 Much Germany	
Person authorised to compile the technical file	Dr Marcus Stuhlert	
Product name	XE1 eco XE1 power XE1 docu XE1 control	XE1 eco 2-Stage XE1 power 2-Stage XE1 docu 2-Stage
Type	See rating plate	
Serial number Year of construction	See rating plate	

The manufacturer declares that the machinery conforms to all relevant regulations:

2006/42/EC	EC Machinery Directive
2014/30/EU	EMC Directive
2011/65/EU	ROHS Directive

The following harmonised standards have been applied:

EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN ISO 4413:2012	Hydraulic fluid power - General rules and safety requirements for systems and their components
EN 60204-1:2006 + A1:2009	Safety of machinery. Electrical equipment of machines - General requirements
DIN EN 61000-6-4:2020-09	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
DIN EN IEC 61000-6:2019-11	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards - Immunity standard for industrial environments

Much, 01/01/2024	Dr Marcus Stuhlert (Managing Director)