OneStep rock anchor

It is essential that the operating instructions are read before initiation of the system.

Always keep these operating instructions with the OneStep system.

1. General Information

1.1 Safety notices and their meaning

-CAUTION-
This word draws attention to a potentially dangerous situation that could lead to minor personal injury or damage to the equipment or other property.

-NOTE-
This word draws attention to instructions and other useful information.

1.2 Pictograms

Warning signs

- General warning
- Warning: avoid hand injuries
- Warning: Falling objects

Obligation signs

- Wear a hard hat
- Wear ear protection
- Wear protective gloves
- Wear safety boots

Approvals of the HOS rock anchor

MSHA  
DMT  
Bezirksregierung Arnsberg

1.3 Other information

In these operating instructions, the designation “the system” always refers to the OneStep rock anchor system.

These numbers refer to the corresponding illustrations. The illustrations can be found on the fold-out cover-pages. Keep these pages open while studying the operating instructions.

These numbers refer to the corresponding valves shown in the flow diagram on illustration on the cover-page.
2. Description

2.1 Components
The Hilti OneStep rock anchor system consists of 3 main components which are necessary for drilling the anchor and injecting the mortar contained within the anchor:

1. **OneStep rock anchor (HOS)**
   1. 12-pointed nut (Single piece nut with standard anchor, two piece nut with pretension anchor)
   2. Anchor-tube (HOS-W: steel; HOS-C: fiber)
   3. Drill-head
   4. Flushing-water channel
   5. Mortar
   6. Centre ring

2. **Dispenser**
   1. 12-pointed chuck
   2. Connection end (hydraulic-motor); according to appendix 8 different designs are available
   3. Water connection (dispensing water)
   4. Inner component

3. **Multi Rig Intensifier Unit**
   1. Pump
   2. Manifold
   3. Ball valve - ON/OFF switch pump
   4. Filter
   5. Non return valve 5 bar
   6. Pressure gauge (system-pressure water)
   7. Water-distribution T-fitting
   8. Blind / Orifice
   9. Non return valve 0.2 bar
   10. Control valve / Dispensing lever
   11. Pressure gauge (Dispensing-pressure control)

2.2 Use of the product as directed

- **CAUTION**-
In addition to the safety rules listed in the individual sections of these operating instructions, the following points must be strictly observed at all times.

The system is designed for drilling with the Hilti OneStep rock anchor and for injecting the contained mortar.

When assembling and using the dispensing unit the national standards are to be followed, the minimum requirements are as defined in DIN EN ISO 4413.

It is permissible to use in environments where there is a risk of explosion. The appliance complies with the provisions and requirements of 94/9/EC (ATEX) for: Group I category M2 → Mining and explosive atmospheres (firedamp)

Changes or modifications to the system are not permissible. To avoid the risk of injury, use only genuine Hilti accessories and ancillary equipment. Observe the information printed in the operating instructions concerning operation, care and maintenance.

The system and its ancillary equipment may present hazards when used incorrectly by untrained personnel or not as directed.

3. Technical Data and required media

### Technical specification of the rock anchor HOS-W

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubular shaft diameter</td>
<td>38.5 mm (1½ inch)</td>
</tr>
<tr>
<td>Lengths</td>
<td>120–250 cm (47½ – 98½ inch)</td>
</tr>
<tr>
<td>Ultimate load</td>
<td>≥ 320 kN</td>
</tr>
<tr>
<td>Yield strength</td>
<td>≥ 270 kN</td>
</tr>
<tr>
<td>Elongation at break</td>
<td>≥ 10 %</td>
</tr>
<tr>
<td>Chemical mortar</td>
<td>2-component polyester mortar</td>
</tr>
<tr>
<td>Drilling method</td>
<td>Clockwise rotating, wet</td>
</tr>
<tr>
<td>Pretensioning method (only for HOS-W type T)</td>
<td>Anticlockwise rotating</td>
</tr>
<tr>
<td>Drill head</td>
<td>Roof-shaped cutting edge</td>
</tr>
<tr>
<td>Diameter at cutting edge</td>
<td>40.5 mm</td>
</tr>
</tbody>
</table>

### Technical specification of the rock anchor HOS-C

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubular shaft diameter</td>
<td>38.0 mm (1½ inch)</td>
</tr>
<tr>
<td>Lengths</td>
<td>120–250 cm (47½ – 98½ inch)</td>
</tr>
<tr>
<td>Ultimate load</td>
<td>≥ 200 kN</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Shear load</td>
<td>≥ 50 kN</td>
</tr>
<tr>
<td>Nut pull-off</td>
<td>≥ 100 kN</td>
</tr>
<tr>
<td>Chemical mortar</td>
<td>2-component polyester mortar</td>
</tr>
<tr>
<td>Drilling head</td>
<td>Roof-shaped cutting edge</td>
</tr>
<tr>
<td>Diameter at cutting edge</td>
<td>40.5 mm</td>
</tr>
</tbody>
</table>

### Dispenser

<table>
<thead>
<tr>
<th>Connection ends</th>
<th>Different types of connection ends available → appendix 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>depending on type and length → appendix 8</td>
</tr>
<tr>
<td>Length</td>
<td>depending on type and length → appendix 8</td>
</tr>
<tr>
<td>Speed of rotation</td>
<td>max. 1000 r.p.m.</td>
</tr>
<tr>
<td>Torque transfer</td>
<td>max. 800 Nm</td>
</tr>
<tr>
<td>Contact pressure during drilling</td>
<td>max. 20 kN (HOS-W) ; max. 10 kN (HOS-C)</td>
</tr>
</tbody>
</table>

### Pump data

<table>
<thead>
<tr>
<th>Weight</th>
<th>16.5 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>250 mm × 150 mm × 165 mm</td>
</tr>
</tbody>
</table>

### Pump connections

- Power supply (P, T) 1/2" BSPP female
- Water supply (S) 3/4" BSPP female
- Water outlet (HP) 3/8" BSPP female

### Media specifications

**Power fluid medium**
- Viscosity 10 to 200 cSt
- Temperature < 70 °C
- Filtration ratio < 25 µm
- Pressure (in P-line) 140 to 200 bar* (2030 to 2860 PSI)*
- Flow rate max. 45 L/min (max. 12 US-gal/min)

**Cooling capacity** 2 kW

**Dispensing water**
- Temperature < 40 °C
- Filtration ratio < 80 µm
- Pressure inlet 5 to 25 bar (75 to 360 PSI)
- Pressure outlet 120 bar (1740 PSI)
- Flow rate max. 30 L/min (max. 8 US-gal/min)

**Flushing water (Measured at the drill motor)**
- Pressure 15 to 25 bar (215 to 360 PSI)
- Flow rate > 30 L/min (> 8 US-gal/min)
- Filtration ratio < 200 µm
- Temperature < 40 °C
4. Safety rules – general

4.1 Proper arrangement and organization of the workplace

- Wear non-slip boots and always work from a secure stance.
- Wear Personal Protective Equipment (PPE) while working.
- Do not wear loose clothing, loose long hair and jewellery, which could become caught up in moving parts.
- Avoid unfavourable body positions.
- Ensure that the workplace is well lit.
- Ensure that the workplace is well ventilated.
- Objects which could cause injury should be removed from the working area.
- Keep other persons outside the area affected while you are working.
- Take care of your tools. You will work more efficiently and more safely if tools are clean and sharp.

4.2 Handling and using the appliance with due care and attention

-CAUTION-
- The hoses are pressurized. Check the hoses at the beginning of every shift and ensure that all hoses are well positioned to avoid damage as a result of surrounding influences.
- Don’t touch or hold rotating parts.
- The system is heavy. There is a risk of pinching parts of the body. Wear a hard hat, protective gloves and safety boots.
- The system emits noise. Excessive noise may damage the hearing. Wear ear protection.
- Drilling may cause hazardous splintering of the material. Splintering material may injure parts of the body and the eyes. Wear eye protection and a hard hat.
- Operate the system only as directed and only when it is in faultless condition.

- NOTE-
- When assembling and using the system the national standards are to be followed, the minimum requirements are as defined in DIN EN ISO 4413.

- CAUTION-
- When connecting the pump and the dispenser, national standards are to be followed, the minimum requirements are as defined in DIN EN ISO 4413. The pressure-outlet of the dispensing water is limited to 120 bar at the pump. Do not change this setting.

4.3 Requirements to be met by users

- Never leave the system unsupervised.
- Use only the genuine Hilti accessories or spare parts listed in the operating instructions. The use of other equipment may present a risk of injury.
- Do not overload the system. The system operates more efficiently and more safely within its given performance range.
- Ensure that the parameters of the machine where you want to install the system on can match the technical requirements of the OneStep system (see chapter 3).

-NOTE-
- Specified maximum operating-pressure:
  - max. power fluid pressure in feed-line to the Hilti system: 200 bar / 2900 PSI
  - If the pressure in the tank line exceeds 5 bar / 70 PSI the minimum pressure in the P-line has to be increased until 120 bar / 1740 PSI dispensing water pressure can be ensured for the entire dispensing process. This must only be done by authorized personnel.

Fittings (min. requirements) Nominal pressure > 250 bar / 3600 PSI

-CAUTION-
- The given minimum values are valid if the pressure in the tank-line is less than 5 bar / 70 PSI. If the pressure in the tank line exceeds 5 bar / 70 PSI the minimum pressure in the P-line has to be increased until 120 bar / 1740 PSI dispensing water pressure can be ensured for the entire dispensing process. This must only be done by authorized personnel.
5. Installation

It is essential that safety rules printed in these operating instructions are read and observed.

⚠️ Ensure that the parameters of the machine where you want to install the system on can match the technical requirements of the OneStep system (see chapter 3).

- **NOTE-**
  When assembling and using the system the national standards are to be followed, the minimum requirements are as defined in DIN EN ISO 4413.

The length of the hoses has to be fitted to the required working radius. All possible movements have to be covered to avoid tearing off the hoses.

All equipment must be clean, undamaged and fully functional when installed.

- **CAUTION-**
  When connecting the pump and the dispenser, national standards are to be followed, the minimum requirements are as defined in DIN EN ISO 4413.

The pressure-outlet of the dispensing water is limited to 120 bar at the pump. Do not change this setting.

Ensure that the required power fluid medium with adequate pressure and flow rate (see chapter 3) is available at the pump at any time you want to dispense OneStep anchors.

5.1 Preparation for use

5.1.1 Fitting the Multi Rig Intensifier Unit (MRIU)

- **NOTE-**
The flow diagrams shown in appendix 7 are to be known as schematic diagrams. The implementation of the Intensifier Unit into the complete hydraulic system has to be defined on the basis of the already existing flow diagram of the machine.

1. Mount the pump assembly (#1 - #6) in a well protected, easily accessible and visible location. Use four M8 screws for the assembly and add bolt adhesive (Loctite or similar). The pump should be mounted on a sufficiently horizontal surface to enable proper working of leakage detecting bores (see chapter 6.1.5).
2. Connect the power-fluid feed-line to the ball valve (#3). The ball valve is already pre-assembled to the P-port.
3. Connect the power-fluid tank-line to the T-port at the manifold (#2).
4. Connect the water supply line to the filter (#4). The filter is already pre-assembled to the S-port.
5. Connect the dispensing water line to the WP-port at the pump (#1)
6. Connect the WP-port at the pump (#1) and the T-fitting (#7) with a 3/4” hose.
7. Connect the T-fitting (#7) and as many control valves as required with a 9/16” hose.
8. Ensure that all fittings are tight.

- **NOTE-**
The maximum number of six anchors dispensed in parallel must not be exceeded.

9.  The pump can be switched ON and OFF at the ball valve (#3). The pump can be immediately used after the power fluid has been switched ON.
10. Bleed the power-fluid circuit in accordance with the manufacturers guidelines.
11. Vent the dispensing water circuit. Turn all dispensing levers at the control valves (#10) into dispensing position (ON) until the dispensing water escapes continuously and smoothly.

- **CAUTION-**
Water can exit the dispenser at pressure. Keep out of the way.

12. Ensure that the required media are available at the pump with adequate pressure and flow rates (see chapter 3) at any time you want to dispense OneStep anchors.

5.1.2 Fitting the dispenser

1. Check the seals at the connection end of the dispenser (if worn, change seals according to existing connection end as shown in appendix 8).
2. Grease the connection end.
3. Fit the dispenser, connection end first, into the drilling motor.
4. Secure the dispenser in the drill-motor with the mount-
ing-accessories intended for the existent drill-motor.

5. Connect the dispensing-water hose to the dispenser.
6. Secure the housing to prevent rotation as shown in appendix 4 and appendix 5 (Caution: No rigid connection to the motor or motor carriage).

7. Use stainless cylinder-head bolts M8 with adequate length to fix the anti-twist device. Ensure that all screws of the dispenser are set and mounted with the specified torque (see appendix 8) after mounting the anti-twist device.

5.1.3 HOS Feed Control (optional)

Description
The HOS Feed Control is an option to support the HOS drilling process. It controls the feed rate of the drill rig as a function of flushing water pressure. Therefore, the feed rate is automatically kept at an optimum without the need for the operator to adjust it. The HOS Feed Control System is particularly suitable for drilling strata with cohesive layers. Hydraulic circuit and part list is located in appendix 9. The standard system can be used with flushing water pressures up to $p = 22$ bars / 320 PSI.

Installation
During assembly and operation of the HOS Feed Control System all local regulations on hydraulic systems are to be considered. The DIN EN ISO 4413 is always to be taken into account as a minimum requirement.

1. Switch off the machine and block the flushing water line.
2. Release the pressure on all hydraulic and water lines.
3. Find a suitable position for the feed control valve close to the HOS anchor. Ask for support from your Hilti Technical Support.
4. Assemble the HOS Feed Control System in accordance to hydraulic circuit and part list in appendix 9.

Adjustment
The HOS Feed Control system has to be adjusted to the local flushing water conditions. This guarantees a drilling performance at its best.

- Block the ball valve in the flushing water line (the valve actuation now has maximum static pressure).
- Remove protective cap from valve [1.1].
- Release locking screw of valve [1.2 + 2].
- Switch on flushing water supply.
- Vent system air at valve actuation (water cylinder).
- Adjust the drill rig feed rate as follows:

  **Step 1: Switch on feed**
  **Step 2:** In case the drill rig moves, reduced feed by turning valve adjustment screw clockwise until carriage just stops [3].
  **Step 3:** In case the drill rig does not move, increase feed by turning valve adjustment screw anti clockwise until drill rig just moves [3]. With a maximum flushing water pressure between 20 and 22 bars / 290 and 320 PSI you may skip step 4. The adjustment is already done here.
6. Before Use

6.1 Before each usage

6.1.1 General overview

• Inner component: Check the contact surface of the sealing plate for signs of wear (good seal with the rock anchor). Change sealing plate, if it is worn or broken (see chapter 8.2). Ensure the inner component is properly fixed in the dispenser.

• Check 12-pointed chuck for signs of excessive wear.

• Ensure that the required media are available with adequate pressure and flow-rate (see chapter 3).

• Ensure that all used adapters and extensions are in good and operative condition.

6.1.2 Setting the system

-CAUTION-

Water can exit the dispenser at pressure. Keep out of the way.

1. Ensure that all hoses and valves are mounted properly and connected correctly and all fittings are tight.

2. Bleed the system (waterside)

   - Turn all dispensing levers at the Control Valves (#10) into dispensing position (ON). Wait until the water escapes smoothly and continuously out of the dispenser.

   - Measure at every dispenser the time until 1.5 liters have been drained
     - 15-18 sec. → o.k.
     - if dispensing time differs from 15-18 sec. → troubleshooting chapter 9.

3. Set the system under pressure by turning the dispensing levers at all Control Valves (#10) into dispensing position (ON) and leave the lever in that position.

   - Ensure that all fittings and hoses do not leak.

   - Observe the gauge that shows the water-pressure in the dispensing-water line (#11) for proper function after leakage test. When operating the dispensing lever (#10) the pressure must increase immediately to ~110 bar / 1600 PSI.

4. Ensure at the pressure gauge (#6) that the system pressure is 120 bar.

5. Return the dispensing-lever to the drilling position (OFF).

6. Observe the gauge (#11) that shows the pressure in the dispensing water line and ensure the pressure is completely released before starting to remove the screw.

6.1.4 Checking HOS Feed Control (if used)

The HOS Feed Control Valve should be adjusted to the flushing water pressure as needed, but at least once per day. If there are problems see the troubleshooting chapter 9.3.

6.1.5 Observation of pump leakage detector

The leakage detecting bore is located on the bottom surface of the pump-housing at the zone which separate oil- and water-chambers from each other.

-CAUTION-

If the draining from leakage detectors exceeds rate of 10 drops per minute, the pump must be replaced and sent to Hilti. Refer to chapter 8.4.

6.2 Periodical checks

If the system is in constant use, these checks should be carried as frequently as mine conditions require, but at least once per week. If the system has been idle for a long period of time they should be made before the next usage.

6.2.1 Dirt trap (filter) (#4)

• Check the mesh
  – Clean the mesh, if silted/blocked.
  – Change the dirt trap (filter), if worn.

6.2.2 Assembly

• Ensure the anti-twist device is secure.

• Ensure the dispenser is securely connected with the drill motor.
7. Operation

It is essential that the safety rules printed in these operating instructions are read and observed. Ensure that the expiry date of the anchor you want to set is not exceeded.

- NOTE -
Use only anchors that are in a proper condition (anchor tube, drill bit and 12-pointed nut) as delivered by Hilti. Ensure that the anchors didn’t become damaged during storage or transportation in the mine.

7.1 Operation HOS-W ISL and HOS-C (pictures a–e)

- NOTE -
Ensure that the pump is switched on at the Ball Valve (#3) and ensure that the required media (see chapter 3) are available with adequate pressure and flow-rate at any time you want to install OneStep anchors.

7.1.1 Drilling HOS-W ISL and HOS-C

- NOTE -
Before drilling: Ensure that the Dispensing Lever at the Control Valve (#10) was turned into the drilling position (OFF). There must be no water escaping at the dispensing water nozzle at the inner component of the dispenser during drilling.

1. Remove the protective cap from the 12-pointed nut of the rock anchor.
2. Ensure flushing-water holes at dispenser and anchor (at 12-pointed-nut and drill bit) are open. Clean holes and dispenser chuck from debris, if necessary.
3. Insert the 12-pointed-nut of the rock anchor into the 12-pointed chuck of the dispenser, until the seal at the nut-bottom gets in contact with the sealing plate of the inner component.
4. Use the anchor guide (or similar equipment) on the drilling carriage to stabilize the rock anchor whilst drilling.
5. Ensure that the anchor rotates freely in the anchor guide.
6. Drilling direction: clockwise
7. Use an extension (see appendix 2) in case of uneven strata to ensure that the anchor can be drilled to its complete depth.
8. Brace the drill rig to the strata. Bring the drill bit of the rock anchor in contact with the rock and press it to the strata (from now on do not remove the thrust until the complete setting procedure has been finished).

- NOTE -
9. Do not use excessive drill thrust that bends/breaks the anchor.
10. Start flushing water.
11. Start drilling.
12. Where required remove the anchor guide in accordance with manufacturer’s guidelines and local work and safety procedures.
13. Drill anchor to its complete depth.
14. In order to prevent strong friction stop drilling and applying thrust immediately once anchor reaches its complete depth.
15. Continue flushing for approx. 2 seconds after drilling has been finished.

7.1.2 Dispensing (Standard HOS) (pictures f–h)

1. Ensure that the rock anchor is still properly engaged in the dispenser chuck.
2. Ensure that the anchor is firmly pushed against the strata.
3. Turn the Dispensing Lever at the Control Valve (#10) into dispensing position (ON).
4. Keep the lever in the dispensing position (ON) until the resin escapes from the drilled hole. If no mortar escapes, end the injection operation when maximum injection pressure ~110 bar / 1600 PSI is shown at the gauge in the dispensing-water line (#11).
5. Maintain thrust until the resin has set. The length of the waiting time depends on the surrounding temperature and the flushing-water temperature, but lasts at least 15 sec.
6. Push the Dispensing Lever (#10) of the control valve back into drilling position (OFF) and wait until the pressure in the dispensing water line is released.
7. Retract the drilling motor to its original position.
8. Assure that the dispenser is free of debris every time before inserting a new anchor.

- NOTE -
Observe also the safety precautions listed in the MSDS material safety data sheet (see also training documents).

7.2 Operation Pretension HOS

- NOTE -
Ensure that the pump is switched on at the Ball Valve (#3) and ensure that the required media (see chapter 3) are available with adequate pressure and flow-rate at any time you want to install OneStep anchors.

7.2.1 Drilling (Pretension HOS) (pictures a–e)

- NOTE -
Before drilling: Ensure that the Dispensing Lever at the Control Valve (#10) was turned into the drilling position (OFF). There must be no water escaping at the dispensing water nozzle at the inner component of the dispenser during drilling.

1. Remove the protective cap from the 12-pointed nut of the rock anchor.
2. Ensure flushing-water holes at dispenser and anchor (at 12-pointed-nut and drill bit) are open. Clean holes and dispenser chuck from debris, if necessary.
3. Insert the 12-pointed-nut of the rock anchor into the 12-pointed chuck of the dispenser, until the seal at the nut-bottom gets in contact with the sealing plate of the inner component.

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4. Use the anchor guide (or similar equipment) on the drilling carriage to stabilize the rock anchor whilst drilling.
5. Ensure the anchor rotates freely in the anchor guide.
6. Drilling direction: clockwise
7. Use an extension (see appendix 2) in case of uneven strata to ensure the anchor can be drilled to its complete depth.
8. Brace the drilling carriage to the strata. Bring the drill bit of the rock anchor in contact with the rock and press it to the strata (from now on do not remove the thrust until the complete setting procedure has been finished).

-NOTE-
9. Do not use excessive drill thrust that bends the anchor.
10. Start flushing water.
11. Start drilling.
12. Where required remove the anchor guide in accordance with manufacturer's guidelines and local work and safety procedures.
13. Drill anchor to its complete depth.
14. In order to prevent strong friction stop drilling and applying thrust immediately once anchor reaches its complete depth.
15. Continue flushing for approx. 2 seconds after drilling has been finished.

7.2.2 Dispensing and tensioning
(Pretension HOS) (pictures f-i)

1. Ensure that the rock anchor is still properly engaged in the dispenser chuck.
2. Ensure that the anchor is firmly pushed against the strata.
3. Turn the Dispensing Lever at the Control Valve (#10) into dispensing position (ON).
4. Continue dispensing until the maximum pressure of ~110 bar / 1600 PSI is shown on the gauge in the water line (#11).
5. Push the Dispensing Lever (#10) of the control valve back into drilling position (OFF) and wait until the pressure in the dispensing water line is released.
6. Maintain thrust until the fast resin has set. The length of the waiting time depends on the surrounding temperature and the flushing-water temperature. Wait 5 to 10 seconds before tensioning the rock anchor.
7. Rotate the drill motor anti-clockwise to tension the anchor.

-NOTE-
For consistent pretension in the rock anchor, check the torque level of the drill motor regularly.

-NOTE-
Observe also the safety precautions listed in the MSDS material safety data sheet (see also training documents).

7.3 Consequences of improper setting

-NOTE-
If one of the following cases occurs during injection or setting of the resin the full load capacity of the anchor cannot be ensured:

- Power failure (dispensing incomplete)
- Drill-rig thrust removed (potential move of the anchor in the underground and hence potential damage of chemical bond)
- Rotation of the anchor (potential damage of chemical bond)
- Interruption of dispensing (dispensing incomplete)

-CAUTION-
If the anchor is not properly installed or damaged in any way:
- Ensure that the anchor can not cause any damage or harm. If required, remove and dispose the anchor.
- If required set a new anchor.

Do not under any circumstances put any part of your body between the dispenser and a bolt that has not been or is suspected of not being dispensed.
8. Maintenance

-NOTE-
The following described activities are to be done in case of need.

The required spare parts and repair tools are listed in appendix 6 and concerning to the type of dispenser in appendix 8.

8.1 Replacement of the inner component

8.1.2 Dispenser Type B (short inner component)

• Release the cylinder cap screws and retaining-washers with an Allen key (6 mm)
• Screw the extractor into the inner component.
• Pull out the inner component.
• Insert and position a new, lightly greased inner component.
• Secure the inner component with new cap screws and Nord-Lock® washers.

8.1.3 Dispenser Type B (long inner component)

• Screw the extractor into the inner component.
• Release the circlip (fig 1)
• Pull out the inner component (fig 2)
• Insert and position a new, lightly greased inner component.
• Secure the inner component with a circlip.

8.2 Maintenance of the inner component

• Use a hammer and pin punch to drive out both slotted pins (fig 1).
• Remove worn sealing plate / fit new sealing plate (fig 2).
8.3 Replacement of the seals at the connection end

The seals at the drilling-motor interface differ between the various types of connection ends. The different work steps, seal-types and tools are shown in appendix 8 according to the existing type of dispenser.

8.4 Maintenance of the pump

In general, the pump is maintenance free. Only the leakage detector has to be observed (refer chapter 6.1.5). If the draining from leakage detectors exceeds the rate of 10 drops per minute, the pump must be replaced and sent to Hilti.

In this case
1. Shut off the machine power supply.
2. Shut off the ball valve (#3) in the power-fluid line of the pump.
3. Open one of the dispensing valves on the machine to de-pressurize the water lines.
4. Replace the pump by changing hydraulic hoses and fittings according to national standards, the minimum requirements are defined in EN ISO 443.
9. Troubleshooting

9.1 Troubleshooting HOS rock anchor (all types) and dispensing system

Problem: No dispensing / bolt encapsulation incomplete (no resin show at the mouth of bore)

→ Turn the Dispensing Lever at the Control Valve (#10) into dispensing position (ON) and observe the Pressure Gauges (#6) (P$_6$; system-pressure) and (#11) (P$_{11}$; dispensing pressure)

P$_6$ ~ 0 bar / pump not working
→ no water-supply
   → No/insufficient dispensing-water supply?
   → Water-hoses blocked/squeezed?
   → Filter (#4) blocked?
   → Pump-sealings worn? → Check leakage detector (see 6.1.5)

→ no power fluid supply
   → Power fluid hoses installed at the correct port?
   → No/insufficient power fluid supply?
   → Ball valve (#3) blocked/shut?
   → Pump-sealings worn? → Check leakage detector (see 6.1.5)

→ Leakage in power fluid supply / water supply?
→ Pump broken or blocked?

0 < P$_6$ < 120 bar
→ Insufficient power fluid supply (flow rate/pressure) → see chapter 3
→ Bolter overloaded?
→ Diameter of power-supply hoses (P-line) too small?
→ Pressure setting at pump misaligned?

P$_6$ ~ 120 bar and P$_{11}$ ~ 110 bar at the end of dispensing process
→ Resin completely dispensed
→ Broken ground?
→ Cavities in the strata?

P$_6$ ~ 120 bar and P$_{11}$ ~ 110 bar immediately after operating the Control Valve / Dispensing Lever (#10)
→ Blockage behind P$_{11}$
   → Flushing holes at drill-bit blocked?
   → Water-hose blocked/squeezed?
   → Dispensing-water nozzle at inner-component of dispenser blocked?
   → Check-valve in inner-component of dispenser blocked?

P$_6$ ~ 120 bar and P$_{11}$ ~ 110 bar suddenly during dispensing (dispensing time shorter than usual)
→ dispensing process interrupted
   → Resin cured too quickly? Storage-, flushing water- or underground-temperature too high?
   → Annular gap blocked?
   → Hoses blocked/squeezed?
   → Orifice (#8) broken/worn?

P$_6$ ~ 120 bar and P$_{11}$ ~ 0 bar after operating the Control Valve / Dispensing Lever (#10)
→ Pressure Gauge (#11) faulty or
→ Blockage between Pressure Gauge (#6) and Pressure Gauge (#11)
→ Water-hose blocked/squeezed?
→ Control Valve (#10) blocked or faulty?
→ Orifice (#8) blocked?
P\(_6\) = 120 bar and P\(_{11}\) < 110 bar after standard dispensing time (depends on anchor-length)

→ Anchor not pressed to the strata?
→ Draining water between Dispenser and HOS anchor?
→ Leakage in the system/dispenser?
→ Air in system?
→ Control Valve (#10) blocked or faulty?
→ Center-ring at anchor broken?
→ Orifice (#8) blocked?
→ Fittings not tight?

P\(_6\) > 120 bar
→ Call Hilti personnel or trained personnel to readjust pressure limit to 120bar.

9.2 Trouble shooting pretension HOS

Problem: During drilling the nut runs out of the dispenser

Is the direction of rotation correct?
→ Correct rotation direction controls

Problem: During tensioning the nut doesn’t run out of the dispenser

Is the direction of rotation correct?
→ Correct rotation direction controls

Problem: Anchor doesn’t rotate during drilling

Pretenison nut run forwards on the anchor?
→ Screw the nut back in position

9.3 Trouble shooting Option HOS Feed Control System

With installation and operation of the HOS Feed Control System the local regulations are to be taken into account. The guideline DIN EN ISO 4413 is always to be considered as a minimum requirement.

Problem: Clogging of bolt = no function of HOS Feed Control Systems

Air in valve actuation (water line)
→ Vent air at actuation and repeat valve adjustment according chapter 5.1.4

No or not sufficient flushing water to bolt
→ Ref. chapter 9.1 Trouble shooting HOS bolt

Valve adjustment screw out of adjustment
→ Repeat valve adjustment according chapter 5.1.4

Water leakage out of protective cap
→ Replacement of FC valve

Problem: Carriage feed too slow

Pressure of flushing water above selected control pressure range
→ Repeat valve adjustment according chapter 5.1.4

Problem with hydraulic power supply
→ Check hydraulic power supply by qualified staff

Valve damaged
→ Replacement of FC valve
10. Storage and transportation

See the actual Material Safety Data Sheet concerning storage and transportation.

11. Accessories, spare parts & repair tools

- Coupling nut → appendix 2
- Extensions → appendix 2
- Drill- and setting-adapters → appendix 3
- Spare parts hydraulic circuit → appendix 7
- Spare parts & repair tools dispenser → appendix 6 and appendix 8
- Feed control → appendix 9

12. Disposal

See the actual Material Safety Data Sheet concerning disposal.

-CAUTION-
Improper disposal of the equipment may have serious consequences: The burning of plastic components generates toxic fumes which may present a health hazard.

Most of the materials from which Hilti tools or appliances are manufactured can be recycled. The materials must be correctly separated before they can be recycled. In many countries, Hilti has already made arrangements for taking back old tools and appliances for recycling. Ask Hilti customer service or your Hilti representative for further information.
13. Manufacturer’s warranty – tools

Hilti warrants that the tool supplied is free of defects in material and workmanship. This warranty is valid so long as the tool is operated and handled correctly, cleaned and serviced properly and in accordance with the Hilti Operating Instructions, and the technical system is maintained. This means that only original Hilti consumables, components and spare parts may be used.

This warranty provides the free-of-charge repair or replacement of defective parts only over the entire lifespan of the tool. Parts requiring repair or replacement as a result of normal wear and tear are not covered by this warranty.

Additional claims are excluded, unless stringent national rules prohibit such exclusion. In particular, Hilti is not obligated for direct, indirect, incidental or consequential damages, losses or expenses in connection with, or by reason of, the use of, or inability to use the tool for any purpose. Implied warranties of merchantability or fitness for a particular purpose are specifically excluded.

For repair or replacement, send tool or related parts immediately upon discovery of the defect to the address of the local Hilti marketing organization provided. This constitutes Hilti’s entire obligation with regard to warranty and supersedes all prior or contemporaneous comments and oral or written agreements concerning warranties.

14. Declaration of conformity (original)

Designation: Dispenser
Type: HOS I-T xx / HOS I-N xx
Year of design: 2003–2009

We declare, on our sole responsibility, that the in appendix 8 named dispenser comply with the following directives and standards: 94/9/EC, 2006/42/EC, EN 12100, EN 13463-1.

Designation: Multi Rig Intensifier Unit
Year of design: 2011

We declare on our sole responsibility, that the in appendix 7 named preassembled Pump assemblies and Dispensing assemblies comply with the following directives and standards: DIN EN ISO 4413, 2006/42/EC.
# Appendix 1 Rock anchor (HOS-W 320) for dispenser N

<table>
<thead>
<tr>
<th>Name (steel-drill bit)</th>
<th>Total length [mm]</th>
<th>Total length [inch]</th>
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<th>Item number</th>
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## Appendix 1  Rock anchor (HOS-W 320) for dispenser T

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# Appendix 1  Rock anchor (HOS-C 200) for dispenser T

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* Exception: for dispenser N

## Name (steel-drill bit)

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* Exception: for dispenser N

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### Appendix 2 Extension for dispenser T

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### Appendix 2 Coupling nut HOS-W 320 for all nut types

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### Appendix 3  Drill- and setting-adapters for dispenser N

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## Drill- and setting-adapters for dispenser T

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Appendix 4 Proposal for an anti-twist device (Type B)
Adapt dimensions a, b to motor-geometry
Appendix 5  
**Spare part- and tool-box**

**Information**
The spare part- and tool-box is intended to store the most important spare parts and tools together. Spare parts for the hydraulic system, plus special tools, seals and wear parts needed for the maintenance of the dispensers are shown in the corresponding appendices. The tools named on this page are generally needed for maintaining the hydraulic system and the dispensers.

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<td>Allen wrench PB 2 mm</td>
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<td>Extractor RSH</td>
<td>17744</td>
</tr>
<tr>
<td>Operating Instruction HOS</td>
<td>2043530</td>
</tr>
</tbody>
</table>
# Appendix 6 System overview

<table>
<thead>
<tr>
<th>Item-#</th>
<th>Part-name</th>
<th>Part-number in illustrations</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018105</td>
<td>Pump assy</td>
<td>HOS MRI</td>
<td>Pump unit (1,2) incl. Pressure gauge (6) preassembled with valves (3,4) and all necessary fittings to connect the parts.</td>
</tr>
<tr>
<td>2029874</td>
<td>Pump</td>
<td>HOS MRI</td>
<td>Pump unit (1,2) incl. Pressure gauge (6) as spare to replace worn pump in Pump assy (# 2018105).</td>
</tr>
<tr>
<td>2018200</td>
<td>Filter element</td>
<td>HOS MRI JIC</td>
<td>Filter mesh to replace worn mesh in Filter (4).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item-#</th>
<th>Part-name</th>
<th>Part-number in illustrations</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018106</td>
<td>Dispenser assy</td>
<td>HOS MRI</td>
<td>Ball cock assy (# 2018107) and pressure gauge (11) preassembled in a steel housing (see also picture next side).</td>
</tr>
<tr>
<td>2018107</td>
<td>Ball cock assy</td>
<td>HOS 1/4&quot;</td>
<td>Control valve (10), Orifice (8) and Non return valve (9) preassembled with all necessary fittings as spare part to replace worn Ball cock assy in Dispenser assy (item # 2018106).</td>
</tr>
<tr>
<td>2018108</td>
<td>Manometer</td>
<td>0-160</td>
<td>Spare part to replace Pressure gauge in Dispenser assy (# 2018106)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Item-#</th>
<th>Part-name</th>
<th>Part-number in illustrations</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018109</td>
<td>Hydraulic fitting</td>
<td>JIC</td>
<td>Includes T-fittings and elbow fittings to distribute the dispensing water from the pump to the Dispenser assies. For required hose sizes see chapter 3</td>
</tr>
</tbody>
</table>
Appendix 7  Non-Load Sensing

System overview – exploded view (Non-Load Sensing)

System overview – schematic view (Non-Load Sensing)
Appendix 7  Load Sensing

System overview – exploded view (Load Sensing)

System overview – schematic view (Load Sensing)
Appendix 8/1  Dispenser type B - ARO/Hydro

Maintenance of the shaft
- Remove the dispenser from the drill motor
- Remove the worn O-rings / fit new O-rings (#105)
- Grease the connection end slightly before reassembly

<table>
<thead>
<tr>
<th>#</th>
<th>Tools</th>
<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Extractor assy</td>
<td>17719</td>
</tr>
</tbody>
</table>

Printed: 07.07.2013 | Doc-Nr: PUB / 5140059 / 000 / 00
### Dispenser HOS I-N A5
- Length without shaft: 286 mm (11 ⅞ in)
- Weight: 14.7 kg (32.5 lb)
- Item number: 362227

### Dispenser HOS I-N A2
- Length without shaft: 336 mm (13 ⅝ in)
- Weight: 16.4 kg (36.2 lb)
- Item number: 287569

### Dispenser HOS I-N A3
- Length without shaft: 386 mm (15 ⅞ in)
- Weight: 18.0 kg (39.7 lb)
- Item number: 287570

### Spare parts
- **100** Inner component HOS I-N sht assy
- **101** Stop Kit
- **102** O-Ring HOS-I-N
- **103** Hex skt hd cap screw
- **104** Retaining washer NL 8
- **105** O-ring Hydro Kit

### Dispenser HOS I-T A 391
- Length without shaft: 286 mm (11 ⅞ in)
- Weight: 14.7 kg (32.5 lb)
- Item number: 428536

### Dispenser HOS I-T A 441
- Length without shaft: 336 mm (13 ⅝ in)
- Weight: 16.4 kg (36.2 lb)
- Item number: 428537

### Dispenser HOS I-T A 491
- Length without shaft: 386 mm (15 ⅞ in)
- Weight: 18.0 kg (39.7 lb)
- Item number: 428538

### Spare parts
- **100** Inner component HOS I-TR sht assy
- **101** Stop Kit HOS I-T
- **102** O-Ring HOS-I-N
- **103** Hex skt hd cap screw
- **104** Retaining washer NL 8
- **105** O-ring Hydro Kit

---

Printed: 07.07.2013 | Doc-Nr: PUB / 5140059 / 000 / 00
Appendix 8/2 Dispenser type B - ARO/Hydro (short)

Maintenance of the shaft
• Remove the dispenser from the drill motor
• Remove the worn O-rings / fit new O-rings (#105)
• Grease the connection end slightly before reassembly

<table>
<thead>
<tr>
<th>#</th>
<th>Tools</th>
<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
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</table>

Printed: 07/07/2015 | Doc-Nr: PUB / 5140059 / 000 / 00
<table>
<thead>
<tr>
<th>Name</th>
<th>Length without shaft</th>
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<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[mm]</td>
<td>[inch]</td>
<td></td>
</tr>
<tr>
<td>Dispenser HOS I-N A1</td>
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<td>$6\frac{15}{16}$</td>
<td>11.1</td>
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<table>
<thead>
<tr>
<th>#</th>
<th>Spare parts</th>
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<tbody>
<tr>
<td>100</td>
<td>Inner component Hydro 160 assy</td>
<td>238521</td>
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<tr>
<td>101</td>
<td>Stop Hydro 160 kit</td>
<td>238582</td>
</tr>
<tr>
<td>102</td>
<td>O-ring HOS-I-N</td>
<td>274442</td>
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<tr>
<td>105</td>
<td>O-ring Hydro Kit</td>
<td>238577</td>
</tr>
<tr>
<td>107</td>
<td>circlip A20 stnls</td>
<td>238576</td>
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</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Length without shaft</th>
<th>Weight</th>
<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[mm]</td>
<td>[inch]</td>
<td></td>
</tr>
<tr>
<td>Dispenser HOS I-T A 281</td>
<td>176</td>
<td>$6\frac{15}{16}$</td>
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</table>

<table>
<thead>
<tr>
<th>#</th>
<th>Spare parts</th>
<th>Item number</th>
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<tbody>
<tr>
<td>100</td>
<td>Inner component Hydro 160-TR assy</td>
<td>435836</td>
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<tr>
<td>101</td>
<td>Stop Kit Hydro 160-T kit</td>
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<tr>
<td>102</td>
<td>O-ring HOS-I-N</td>
<td>274442</td>
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<tr>
<td>105</td>
<td>O-ring Hydro Kit</td>
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<tr>
<td>107</td>
<td>circlip A20 stnls</td>
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### Appendix 9  Feed Control

<table>
<thead>
<tr>
<th>Pos</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.1</td>
<td>HOS FC Unit JC</td>
<td>423049</td>
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<tr>
<td>1.2</td>
<td>HOS FC Unit BSPP</td>
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<tr>
<td>1.3</td>
<td>HOS FC Unit DN</td>
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<tr>
<td>2</td>
<td>HOS FC Valve Assembly</td>
<td>423050</td>
</tr>
<tr>
<td>6.1</td>
<td>HOS FC Hose Assembly JIC</td>
<td>423054</td>
</tr>
<tr>
<td>6.2</td>
<td>HOS FC Hose Assembly BSPP</td>
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</tr>
<tr>
<td>6.3</td>
<td>HOS FC Hose Assembly DIN</td>
<td>423058</td>
</tr>
</tbody>
</table>
Flushing water to bolt

Flushing water supply

Power Fluid to cylinder

Power Fluid from pump

FeedControl System (Option) – Flow Diagram

Flushing water supply to bolt

Feed Circuit of machine