# ROV Tools

# Torque Tool Cl.1-4

Client: FMC Kongsberg Subsea as

Client DR-Code:

Client P/N: 100035992

Oceaneering P/N: 0287700

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| A | 06.03.09 | Issued for Project Acceptance | DHD | EW |
| Rev. | Date | Reason for Issue | Made by | Approved by |

**Client Doc. No.:**

**100035992-OMM**

**Client Logo :**

FMC Technologies

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|---|---|---|
| **Oceaneering AS**<br>P.O.Box 8024<br>4068 Stavanger, Norway<br>Phone: 51 82 51 00 - Telefax: 51 82 52 90 | Oceaneering Doc. No.<br><br>101753-DTS-OPR-008 | Rev.<br><br>02 |

Document Title:

## Operation & Maintenance Manual



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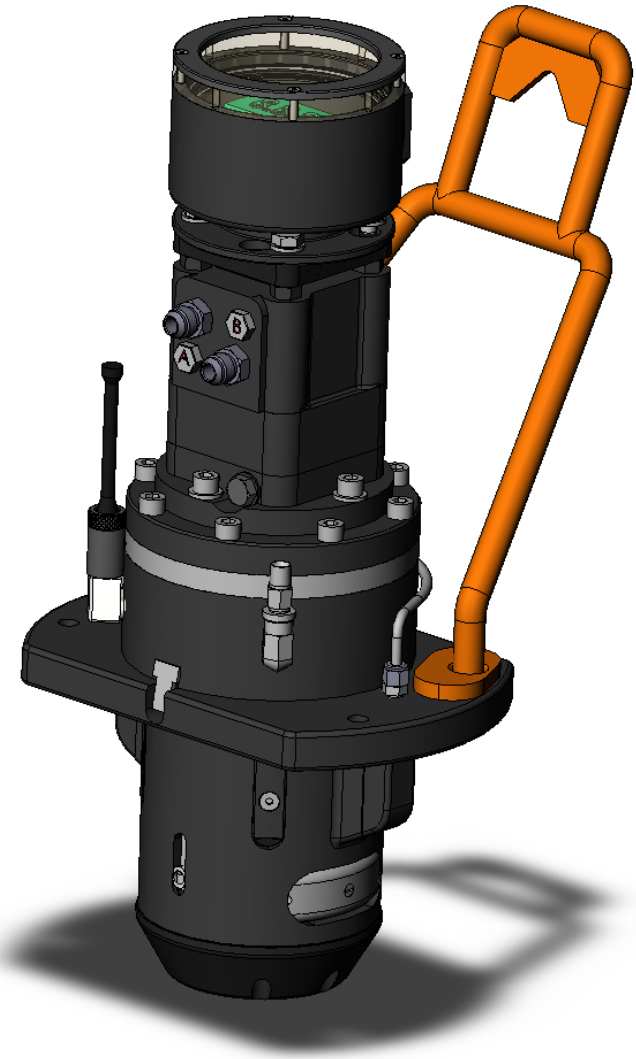
## Operation and Maintenance Manual

# 2700Nm Torque Tool ISO 13628-8 Cl.1-4



**101753-DTS-OPR-008**
**Rev.02**

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|---|---|
| Document No.: | 101753-DTS-OPR-008 |
| Title: | 2700 NM TORQUE TOOL ISO 13628-8 CL.1-4 |
| Project: | |
| Oceaneering P/N: | 0287700 |
| Oceaneering S/N: | |

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| 02 | Issued for Use | 20.11.08 | EW | TAB | EW |
| 01 | Issued for Use | 21.02.08 | EW | KKA | EW |
| Rev. | Reason for Issue | Date | By | Check | Approval |

# Table of content

# 1 Introduction

This User Manual contains operation and maintenance instructions for the 2700 Nm Torque Tool ISO 13628-8 Cl.1-4. The Torque Tool is intended for operation directly from an ROV or via an Oceaneering provided Remote Control Unit (RCU).

For operation of the RCU, please refer to the RCU User Manual.

It is suggested that the ROV operators read this manual thoroughly prior to mobilization for offshore work in order to familiarize them selves with the tooling package and to allow time for fabrication of any mounting hardware required to adapt the tooling to the specific ROV being utilized.

## 1.1 Purpose and Scope

The purpose of this manual is to give instructions to install, operate and maintain the following equipment as supplied by Oceaneering AS:

| OAS P/N | Title |
|---|---|
| 0287700 | 2700 Nm TORQUE TOOL ISO 13628-8 Cl.1-4 |

The manual is to be used by trained and competent personnel only.

## 1.2 Abbreviations

The following abbreviations are used in this manual:

| Abbrevation | Title |
|---|---|
| TT | Torque Tool |
| CW | Clockwise |
| CCW | Counter Clockwise |
| OMM | Operation and Maintenance Manual |
| P/N | Part Number |
| S/N | Serial Number |
| SJA | Safe Job Analysis |
| ROV | Remote Operated Vehicle |
| RCU | Remote Control Unit |
| HPU | High Pressure Unit |
| TJ | Test Jig |
| BOM | Bill Of Material |

## 1.3 Safety Notes

### 1.3.1 Handling and Transportation

- Visually inspect condition and certification on lifting/ handling equipment.
- Always wear steel toed-shoes when handling the Torque Tool or Transportation Box.
- Always secure Transportation Box with straps to transportation basket/deck when transporting

### 1.3.2 Testing

- Always wear safety glasses when testing and operating pressurized equipment.
- Secure area around tools when operating Torque Tool in Test Jig.

### 1.3.3 Installation/Retrieval

- Visually inspect the Torque Tool for mechanical damage.

### 1.3.4 Operation

- Verify that the Torque Tool is secured to ROV before each dive.
- During handling of MQC plates with the Torque Tool, pressure applied to the latch mechanism should not be lower than 100 bar.

### 1.3.5 Maintenance

- Always wear safety gloves when performing maintenance on oilfilled equipment.
- WARNING: Special attention has to be taken during handling off the OMSS hydraulic motors. The splined shaft can drop out if motor is turned with the splined shaft down. A small washer will then fall off the taco shaft. This will prevent the splined shaft to engage with the valve drive and the taco shaft. See also "Danfoss Service Manual" in the appendix.

## 1.4 Contact Addresses

Oceaneering Norway:
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NORWAY

Switch Board: +47 51 82 51 00
Duty Phone: +47 90 64 44 77

# 2 Technical information and data

## 2.1 Technical Description

The 2700 Nm Torque Tool ISO 13628-8 Class 1-4 is able to operate rotational Valves from 35 Nm up to 2700 Nm, Latch and handle MQC plates, SCM Override Tool etc. according to the modified Intervention Fixture, ISO 13628-8 App. C, Docking/rotary, Latch Class 1, 2, 3 and 4.

The tool is equipped with the following instruments:

- A turn counter giving the actual number of turns in 0,1 resolution (readable by the ROV camera).
- Mechanical Turn Counter Indicator (readable by the ROV camera).
- Hydraulic Latch System.
- Torque Feedback (based on strain gauge).

The 2700 Nm Torque Tool ISO 13628-8 Class 1-4 transmits torque from a hydraulic motor, through a gearbox and a socket to the valve stem. Reaction forces are transferred to the docking receptacle.

The tool can be mounted onto flying lead orientation tool, tool elevator or be deployed by ROV manipulator.

The 2700 Nm Torque Tool ISO 13628-8 Class 1-4 will maintain its position in the receptacle by gravity (vertical valve stems) or by use of horizontal ROV thruster capacity or latch mechanism (horizontal valve stems).

The latch system is designed to interface with the ISO 13628-8 Class 1-4 docking receptacle internal profile. It consists of two hydraulic mini-cylinders with a spring return. When hydraulic pressure is applied, the cylinders will push two latch dogs into the docking receptacle profile. The springs ensure return of the dogs.

The latch dogs are mounted in such a way that the axial forces between the tool and the receptacle are transferred through the dogs, but not through the hydraulic mini cylinders. The only force taken up by the cylinders is the push/pull force to extend/retract the dogs. The latch dogs have a rounded profile which, combined with the spring return force, will force the dogs back into the tool body if a pull force is applied on the tool, in event of loss of hydraulic power.

The turn counter consists of an electronics canister and a magnet wheel. The canister contains the counter electronics, display and sensors as well as batteries and is equipped with a MCBHRA8MSS bulkhead connector, providing power/ battery charging input. The turn counter is powered from a battery when not connected to the RCU. It is equipped with a power saving feature providing temporary shut down if no rotation is detected within 3 minutes. When powered from the battery, the turn counter is turned ON by connecting a supplied linked connector or the RCU to the MCBHRA8FSS bulkhead connector on the counter. Removing the linked connector or the RCU turns the counter OFF. The linked connector has a yellow marking. There is also a low battery warning “Lob” displayed on the display when the battery is near to be discharged. The turn counter is powered from the RCU when the RCU is connected.

The turn counter batteries are charged using the provided battery charger and cable. Charging is done by removing the plug connector on the turn counter, connecting the battery charger cable to the turn counter, and connecting the charger to a 220/110VAC 50/60Hz outlet

### 2.1.1 Interface Description

MECHANICAL INTERFACE

| Interface to | Interface Type |
|---|---|
| ROV | ROV Handle |
| Valves, MQC plates, SCM override Tool, etc | ISO 13628-8 Class 1-4 |

HYDRAULIC INTERFACE

| Interface to | Interface Type |
|---|---|
| RCU or ROV | Hydraulic Hoses |

ELECTRICAL INTERFACE

| Interface to | Interface Type |
|---|---|
| RCU | Electrical Cable |

## 2.2 Technical Data

| | |
|---|---|
| Size: | Ø =300 mm x L= 600 mm (11 ¾" x 23 ½") |
| Weight in air: | 40.0 kg (88 lbs) |
| Submerged in water: | 30.0 kg (66 lbs) |
| Depth rating: | 2500 m (8200 ft) |
| Operating Temperature: | -10 to +60°C |
| Hydraulic Motor type: | Danfoss OMSS 200 and OMM 32 |
| Pressure max: | 210 bar (3045 psi) |
| Test pressure (hoses): | 310 bar (4495 psi) |
| Hydraulic connections: | |
| -Motor: | Parker fluid connector JIC No 8 |
| -Tool Drain: | Parker fluid connector JIC No 4 |
| -Latches: | ¼" Swagelok |
| Hydraulic hoses: | 2-off 4-meter (13 ft) 3/8" with JIC 8 swivel and JIC 8 90˚ swivel<br>1-off 4-meter (13 ft) 1/4" with JIC 4 swivel in both ends<br>1-off 4-meter (13 ft) 1/4" with ¼" Swagelok and JIC No 4 swivel |
| Torque output: | |
| OMSS 200 | 250 – 2700 Nm (185 - 2000 lb.ft) |
| OMM 32 | 26 – 300 Nm (19 - 222 lb.ft) |
| Torque multiplier: | HT-5 1/5 ratio |
| Turns Counter: | |
| Mechanical: | 2-off, indication of 0.5 revolution |
| Electronic: | Indication of 1/10 revolution and up to 99.9 revolution |
| Battery Type: | 5 x YUASA HRY2300A Nickel-Metal Hybrid Rechargeable<br>6 VDC nominal (1.2 VDC x 5) @ + 20° Celsius (68°F)<br>2300 mAh @ + 20° Celsius (68°F) |
| Battery Charger: | Battery Charger - NiCd. for turn counter<br>Spec.: charge current 2.0 A<br>Connector type MCIL8F (PIN 1-Pos., PIN 3-Neg.) |
| Charging current: | 2.0 A |
| Charging time: | ca. 1.5 hrs full charge |
| Battery time: | ca. 100 hrs at 20mA average load. |
| Electrical connection: | Subconn MCBHRA8FSS |
| Battery charger: | Friwo FW 7304/10 |
| Valve interface: | ISO 13628-8 Class 1-4 |
| ROV manipulator interface: | Vertical- and Horizontal interface |
| Transport box size LBH: | 800 mm x 600 mm x 400 mm (32 x 24 x 16 in) |

# 3 AUXILIARY EQUIPMENT

## 3.1 Equipment Matrix

| Item | Handling / Transport | Testing | Installation / retrieval | Operation | Mainte-nance |
|---|---|---|---|---|---|
| RCU/ HPU | | X | X | X | |
| Testjig Cl.4 | | X | X | | |
| Typical Tools. Allen Keys, Wrench and sockets | | X | | | |
| ROV | | | X | X | |

# 4 Handling and Transportation

Item Weights

| Item | Weight in Air (kg) | Weight in water (kg) |
|---|---|---|
| Torque Tool ISO 13628-8 Class 1-4 | 40 | 30 |
| Transport Box with inventory | 95 | N/A |

Item Measurements

| Item | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|
| Torque Tool ISO 13628-8 Class 1-4 | 740 | Ø300 | N/A |
| Transport box Size | 800 | 600 | 400 |

## 4.1 Handling and Lifting

### 4.1.1 Onshore

Storage box includes interface to pallet jack for handling. Lifting of Torque Tool itself performed with crane to lift eye, or ROV handle if mounted.

### 4.1.2 Offshore

For topside handling, see section 4.1.1 Onshore. For subsea handling use ROV.

## 4.2 Transportation

### 4.2.1 Onshore

The Torque Tool shall be transported in Aluminium transportation box. Secure box with straps.

### 4.2.2 Offshore

See section 4.2.1 Onshore

# 5 Preservation

Place the tool and spare parts into the storage/shipping container. Verify that the tool and spare parts are secured properly to prevent damage during transportation.

## 5.1 Preservation Matrix

| Action | Prior to Shipment | Mobilization | Demob / Prior to Storage | Before / After Use |
|---|---|---|---|---|
| Fresh water rinsing of the tool | | | X | X |
| Repair damages (paint; hydraulic fittings and pipes etc.) | | | X | X |
| Perform flushing of tool as per 7.2.1 Flushing | | | X | X |
| Perform calibration of TT | | | | X |
| Spray the complete TT with protective oil WD-40 or equivalent | | | X | X |
| Disassembly of the tool to subassembly level, rinsing and relubricating each component (Repetition for stored tool every 6. month) | | | X | |
| Complete disassembly of tool and replace all seals, every 2. year | X | X | X | X |
| Charge the turn counter battery pack | | X | X | X |
| Preservation performed as described above | Date: | | Signature: | |

# 6 Storage

- High storage temperature can cause damage to seals
- The equipment should be stored and transported in a non-corrosive environment.
- Location: Indoor, in its transportation box
- Sunlight: Minimal.

## 6.1 Storage Matrix

| Action | Onshore Storage | Offshore Storage |
|---|---|---|
| Store the tool in its dedicated transportation box indoor. | X | X |
| Make sure that the Transport Box is complete according to the inventory list | X | X |
| Preservation performed as described above | Date: | Signature: |

# 7 INSTALLATION AND RETRIEVAL

## 7.1 Pre-operational/Pre Installation Test

### 7.1.1 Function Test

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Connect the hoses directly to the ROV or to the RCU. In order to prevent Motor damage caused by overpressure, ensure that Motor drain is properly connected and unrestricted.<br><br>Verify Tool Socket rotation and latch mechanism. | | |
| 2 | Turn the turns counter ON by connecting the Linked Dummy connector to the 8-pin connector. Check counter function and that the socket rotates freely.<br><br>**NOTE:**<br>**The turn counter will enter sleep mode, i.e the display will become dark, after 3 min. This function is implemented for power saving when powering from the battery. The Turn Counter will light up immediately with the same value that it had before entering sleep mode when the TT is rotated. To reset the Counter, disconnect the “special switch” and reconnect it.** | | |
| 3 | Insert the TT in a TJ and apply specified operation Torque/ Pressure to the tool by adjusting the Pressure Relief valve setting. Read the torque applied to the Test Jig on the Readout Unit | | |
| 4 | Install the TT onto ROV manipulator with hoses "up". Ensure that the hydraulic hoses leave enough slack for manipulator operation. | | |
| 5 | When TT is deployed from ROV manipulator, secure the TT to the manipulator and use an extra wire attached between TT and the ROV. | | |

### 7.1.2 Pressure Test

This test applies to the hydraulic Latches circuit only. The Motor shall not be pressure tested.

- ANY HYDRAULIC FITTING/PORT, WHEN LEFT DISCONNECTED, MUST BE CAPPED OFF WITH A CLEAN, PURPOSE MADE BLANKING CAP OR OTHER TEMPORARY CAPPING DEVICE. THE CAPPING DEVICE MUST BE INSPECTED VISUALLY FOR SIGNS OF CONTAMINATION PRIOR TO FITTING.
- PRIOR TO CONNECTION OF ANY TEST EQUIPMENT, VERIFY THAT SUCH EQUIPMENT IS COMPATIBLE WITH THE HYDRAULIC FLUID TO BE USED FOR TESTING.

WARNING:

- ENSURE THAT THE TEST AREA IS PROPERLY MARKED, RESTRICTED AND SECURED PRIOR TO START – UP OF TEST.
- NEVER ATTEMPT TO CONNECT, DISCONNECT OR TIGHTEN A LEAKING HYDRAULIC FITTING WHILE PRESSURISED.
- ALWAYS WEAR SUITABLE PROTECTIVE CLOTHING AND SAFETY GLASSES WHEN THERE IS A POSSIBILITY FOR CONTACT WITH HYDRAULIC FLUIDS.
- DO NOT CHECK PRESSURE LEAKS WITH BARE HANDS. HIGH PRESSURE FLUID CAN PIERCE YOUR SKIN.

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Connect an external hydraulic power source (Enerpac) to the hydraulic line for the latches. | | |
| 2 | Connect an isolation valve and a test manometer in the circuit. | | |
| 3 | Pressure up to 210 bar and isolate with the valve. | | |
| 4 | Let the pressure stabilize | | |
| 5 | Check for pressure drop according to holding time | | |

**Pressure test acceptance criteria:**

- 2% Pressure variation and no visible leaks
- 5min. Hold Period.

### 7.1.3 Flushing

WARNING:

- ENSURE THAT THE TEST AREA IS PROPERLY MARKED, RESTRICTED AND SECURED PRIOR TO START – UP OF FLUSHING.
- NEVER ATTEMPT TO CONNECT, DISCONNECT OR TIGHTEN A LEAKING HYDRAULIC FITTING WHILE PRESSURISED.
- ALWAYS WEAR SUITABLE PROTECTIVE CLOTHING AND SAFETY GLASSES WHEN THERE IS A POSSIBILITY FOR CONTACT WITH HYDRAULIC FLUIDS.
- DO NOT CHECK PRESSURE LEAKS WITH BARE HANDS. HIGH PRESSURE FLUID CAN PIERCE YOUR SKIN.
- DURING ALL FUNCTIONAL TESTING AND ON-DECK OPERATION OF THE TT, SUFFICIENT COOLING OF THE HYDRAULIC OIL MUST BE ENSURED TO AVOID TOO HIGH TEMPERATURE IN THE MOTOR. OIL TEMPERATURE TO BE HELD BELOW 50 DEG. C.

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Connect the TT to a test HPU or similar with clean oil | | |
| 2 | Run the TT for 10 min. | | |

**Flushing acceptance criteria, on site:**

- NAS1630/SAE AS4860 class 8
- Water content less than 500 ppm

**Flushing acceptance criteria, after maintenance:**

- NAS 6
- Water content less than 250 ppm

**Cleanliness chart**

Cleanliness chart with date/sign and KOP Part/Serial number must be attached

| Cleanliness | Comments | Date | Sign |
|---|---|---|---|
| | | | |

| Tool assembled after flushing | Date | Sign |
|---|---|---|
| | | |

## 7.2 Installation

**Installation to seabed**

The following is a description of the installation of the Torque Tool, from vessel deck to landing on the sea bed. Status prior to start of installation is:

- The subsea operation programme has been prepared
- The subsea operation area is inspected and prepared.
- The Torque Tool is on deck and fitted to the ROV, ready for installation

**Normal installation**

Initial Requirements: Pre survey completed, any marine growth covers or debris removed.

- Perform post survey of the area, and find a stable position for the ROV to operate the Torque Tool (Grabber Bar or Landing platform).
- Check valve position indicator. Write down the valve position.
- Insert the Torque Tool in the receptacle. Rotate the tool opposite of operation direction until the valve stops against end stop. Confirm proper docking. This will be observed when the turn counter stops. Note the turn counter number.
- Latch on to the receptacle

## 7.3 Retrieval

- Retract latches
- Disengage the Torque Tool from receptacle
- Visually observe valve indicator and confirm that the valve is in correct position.

# 8 Operation

After successful installation:

- Activate tool in operation direction and observe the Turn Counter in the rear end of the Torque Tool.
- Release torque when the required number of rotations has been performed, or valve stem has reached end position.

NOTE: DURING HANDLING OF MQC PLATES WITH THE 2700 Nm Torque Tool ISO 13628-8 Class 1-4, PRESSURE APPLIED TO THE LATCH MECHANISM SHOULD NOT BE LOWER THAN 100 BAR

## 8.1 Disturbance of Operation

### 8.1.1 Emergency Stop

The latch mechanism is fail-safe, i.e. the spring return in combination with the shape of the Latches ensures TT release in the case of ROV power loss.

The following is a procedure for emergency retrieval of the TT from its installed position in the subsea Bucket, if hydraulic control to unlock the Latches is lost. It is dependent on the hydraulic valves controlling the TT are connected to “Open centre” valves.

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Centralize the hydraulic control valve, thereby opening hydraulic flow to drain from both ports of the TT | | |
| 2 | Now depressurised, the hydraulic Latches will move to “Open” position when the TT is pulled out of the Bucket by the ROV. | | |
| 3 | Bring to surface to locate source of malfunction, and repair. A power/ hydraulic failure of the ROV/RCU would result in a "dead" vehicle recovery and would be accomplished as per the ROV operations instructions. | | |

### 8.1.2 Start after Emergency Stop

Verify that hydraulic control valves on RCU are in mid position to prevent unexpected activation of TT.

## 8.2 Corrective Measures

### 8.2.1 Troubleshooting/Faultfinding

- **Hydraulic leakage:**

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Check Torque Tool Body, motor, fittings and hydraulic connections. | | |
| 2 | Check for water ingress in Torque Tool body and ROV reservoir. Locate and repair the leakage, drain water and flush with clean oil. | | |

- **Torque not available / tool socket will not turn:**

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Check hydraulic supply / return from ROV | | |
| 2 | Check weak link (Gear Spline) See section 9.3.1 Assembly/Disassembly for disassembly of tool | | |
| 3 | Check motor for internal wear / leakage: Insert the Torque Tool into the Test Jig. Disconnect the drain line from the ROV, apply 120 Bar on the supply line and measure the leakage over the motor through the drain line with a flowmeter. Specification to be found in the Danfoss service manual | | |
| 4 | Check oil temperature. Not to exceed 30°C | | |

- **Turn counter not responding**

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Check that turn counter is ON. | | |
| 2 | The batteries may be discharged. Recharge the batteries. | | |
| 3 | Check for water ingress in turn counter housing. If electronic components are damaged, return for repair. | | |

- **No torque feedback:**

| Item/Step | Task Description | Date | Sign |
|---|---|---|---|
| 1 | Check conductivity on torque feedback cable and connectors | | |
| 2 | Check condition of torque bucket, see section 9.3.1 Assembly/Disassembly for disassembly of tool | | |

Other critical problems caused by external systems are:

- **Loss of ROV power**

  The tool latches on to the subsea equipment. However, the latch mechanism is fail-safe, i.e. the spring return in combination with the shape of the latches ensures tool release in the case of ROV power loss. Any emergency or failure condition of the tool should result in returning the ROV to the surface. A power / hydraulic failure on the ROV would result in a "dead" vehicle recovery and would be accomplished as per the ROV operations instructions.

- **Incorrect calibration of instruments**

## 8.3 Hazards and Protection

Ref. section 1.3 Safety Notes

## 8.4 Qualifications and Training

Equipment must be operated by qualified personnel only.

# 9 Inspection, Maintenance & repair

## 9.1 Inspection Matrix

| 1. Daily/After every dive | 2. Weekly | 3. Monthly |
|---|---|---|
| Inspect Latch Cylinder for hydraulic leakage. | Inspect movable parts for mechanical damage and lubrication | Inspect welded joints for mechanical damage. (Handle) |
| Inspect bolts on TT for loosening. Tighten if necessary. | | |
| Inspect hydraulic hoses / fittings for leakage and mechanical damage. | | |
| Inspect electrical connector on turn count and torque feedback for mechanical damage. | | Inspect surface coating on hydraulic motor. |
| Preservation performed as described above | Date: | Signature: |

## 9.2 Preventive Maintenance

### 9.2.1 Pre/post Operational Preventive Maintenance Matrix

| Action | Prior to / after use | Prior to / after shipm. | Mob. | Demob | During Storage (every 12 months) |
|---|---|---|---|---|---|
| Clean the TT with fresh water to remove all traces of salt. Remove excess water using compressed air. | X | | | X | |
| Inspect markings and refresh the paint as required according to manufacturer instructions | X | | X | X | X |

| Action (Cont.) | Prior to / after use | Prior to / after shipm. | Mob. | Demob | During Storage (every 12 months) |
|---|---|---|---|---|---|
| Check the hydraulic fluid for water intrusion. If present, thoroughly flush the unit with clean hydraulic oil. | X | | | X | |
| Check for loose hydraulic fasteners and fittings. Tighten fittings as required. | X | | X | X | X |
| Perform flushing of TT as per 8.1.2. Pre-Installation Testing | | | | X | X |
| Perform leak/ function test of TT as per 8.1.2. Pre-Installation Testing | X | | X | X | |
| Perform pressure test of TT as per 8.1.2. Pre-Installation Testing | X | | X | X | |
| Perform calibration of TT | X | | X | | |
| Charge battery of turns counter | X | | X | | |
| Spray all parts of TT with protective oil such as WD-40 or similar | | | | | X |
| Inspect Hubs and fit Protection Caps | X | | X | X | X |
| Report observations and correct (repair or replace with new) all divergences. | X | X | X | X | X |
| Preventive Maintenance performed as described above | Date: | | Signature: | | |

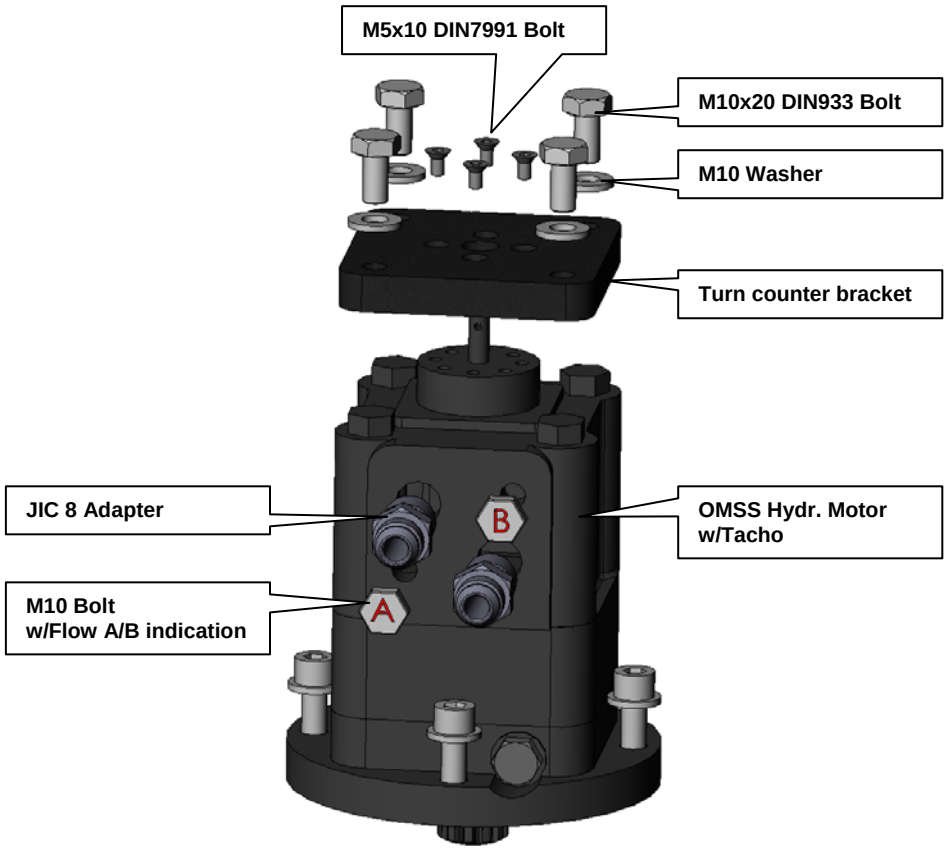
## 9.3 Corrective Maintenance

### 9.3.1 Assembly/Disassembly

This section provides assembly instructions for the 2700 Nm Torque Tool ISO 13628-8 Class 1-4. The tool uses metric components except for the Norbar Hand torque gearbox and hydraulic fittings. No special tools are required to assemble the tool. The item name in the assembly instruction refers to the item names in the BOM of the tool drawings.

#### 9.3.1.1 Hydraulic Motors

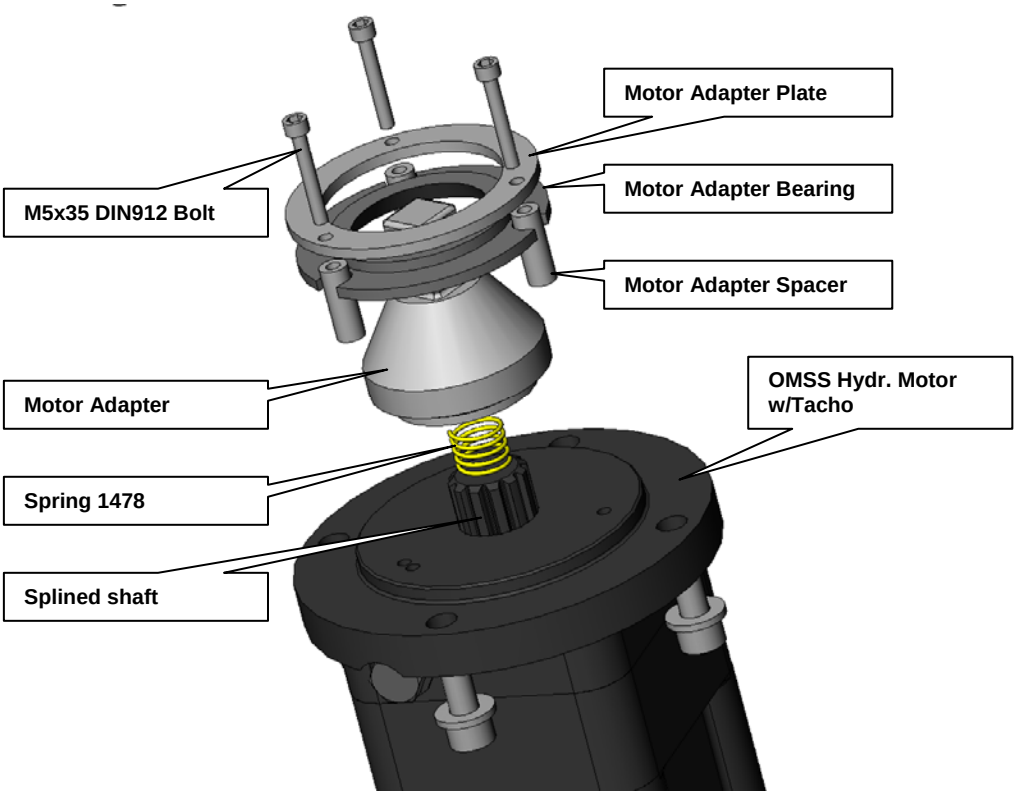
Oceaneering modifies the OMM 32 and OMSS 200 Motor before install in the 2700 Nm Torque Tool ISO 13628-8 Class 1-4.




**OMSS hydraulic motor**

The illustration above shows the motor, Turn Counter Bracket and it's bolts. The bracket is fastened to the motor with the 4-off M5x10 DIN7991 Bolts. The 4-off M10x20 DIN933 Bolts holds the Turns Counter assembly. The Turn Counter assembly is described later in this manual.

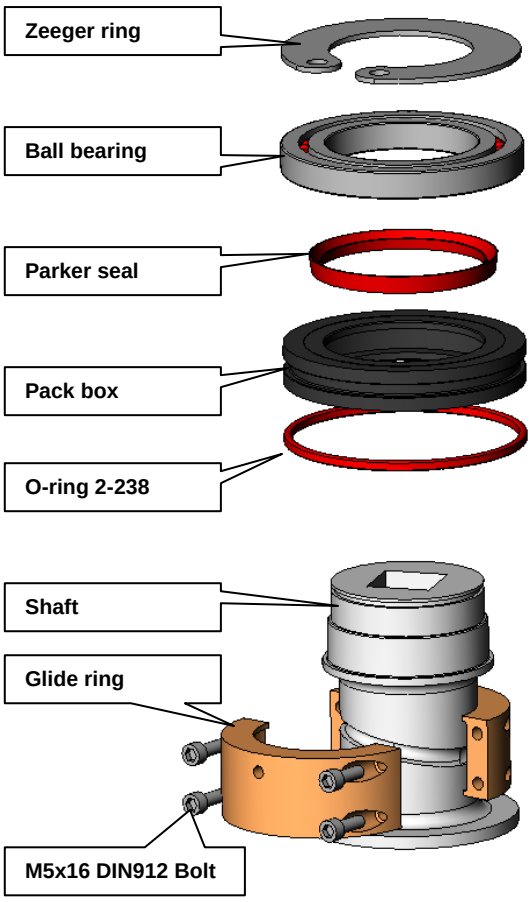
**NOTE:**
**SPECIAL ATTENTION HAS TO BE TAKEN DURING HANDLING OFF THE OMSS 200 HYDRAULIC MOTOR. THE SPLINED SHAFT CAN DROP OUT IF MOTOR IS TURNED WITH THE SPLINED SHAFT DOWN. A SMALL WASHER WILL THEN FALL OFF THE TACO SHAFT. THIS WILL PREVENT THE SPLINED SHAFT TO ENGAGE WITH THE VALVE DRIVE AND THE TACO SHAFT. SEE ALSO "DANFOSS SERVICE MANUAL IN THE APPENDIX.**

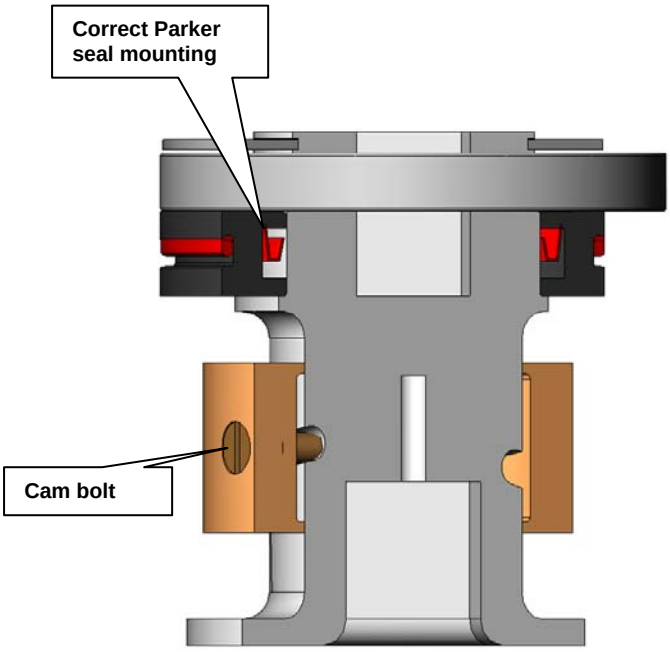



**Motor Adapter assy**

- Place the Motor Adapter with the spring into the Motor Adapter Bearing.
- Mount 3-off M5x35 DIN912 through Motor Adapter Plate, Motor Adapter Bearings and Motor Adapter Spacers into the OMSS Motor as shown above.

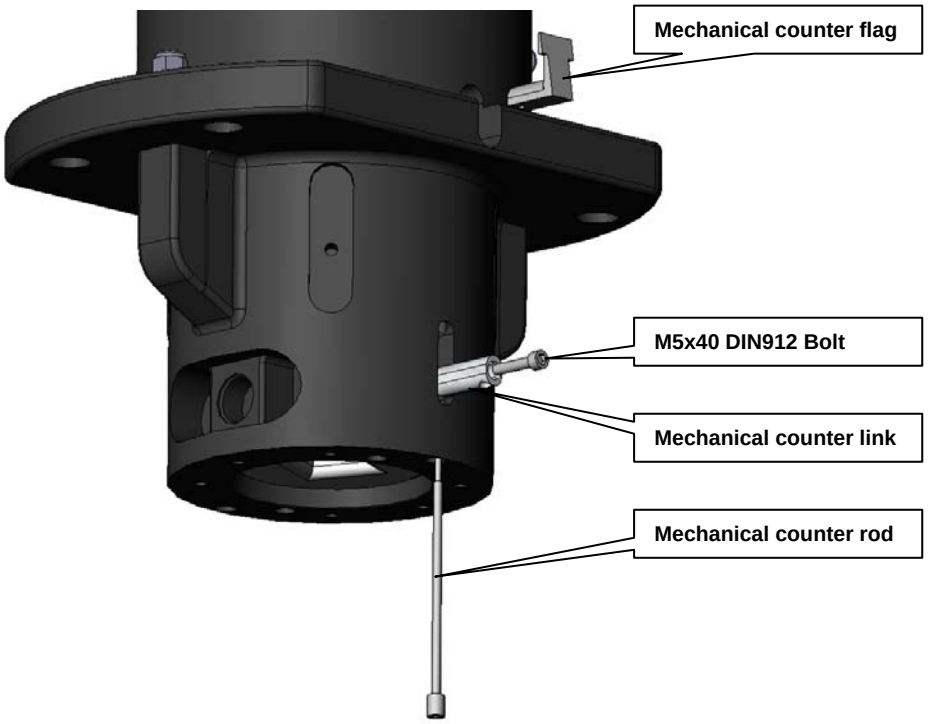
### 9.3.1.2 Shaft assy

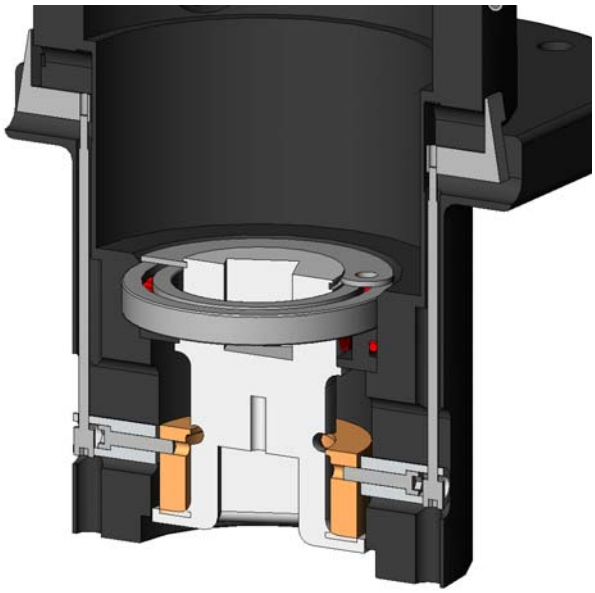



- Clamp the bronze alloy Glide Ring onto the Shaft. The Glide Ring shall be mounted so that its two M5 holes are farthest away from the largest diameter shaft flange.
- Insert the Cam Bolt in the Glide Ring and into the cam track on the Shaft. Make sure the Glide Ring is free to whirl around about the Shaft
- Mount Parker Seal into the Seal Housing after lubricating it with silicone grease
- Mount the Seal Housing (Pack Box) with Parker seal and Bearing onto the Shaft and secure with the Seeger Ring. **NOTE: The Parker Seal is to be mounted with the U-lip in position like shown in figure above, so that the inside oil pressure forces the lip to seal.**
- Prior to installing Seal Housing (Pack Box), lubricate the O-ring 2-238 with silicon grease and place it into the O-ring groove on the Seal Housing as shown above.
- Install the Shaft, large flange end first into the Tool Body. Direction of installation is from top of the Tool Body and through

#### 9.3.1.3 Mechanical rotation indicator

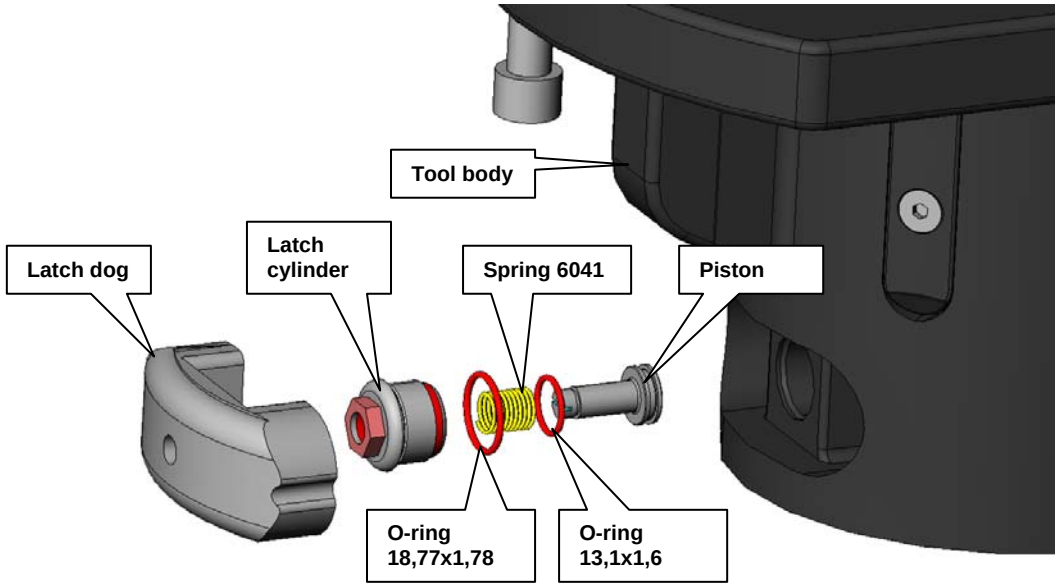


- Insert a M5 bolt through the Link as shown on above.
- Screw the M5 bolt into the Glide Ring, which now should be located inside the Tool Body. After no more turns are possible rewind two revolutions.
- Insert the Indicator Flag into slot on Tool body.
- Insert Rod into Tool body and through the Link.

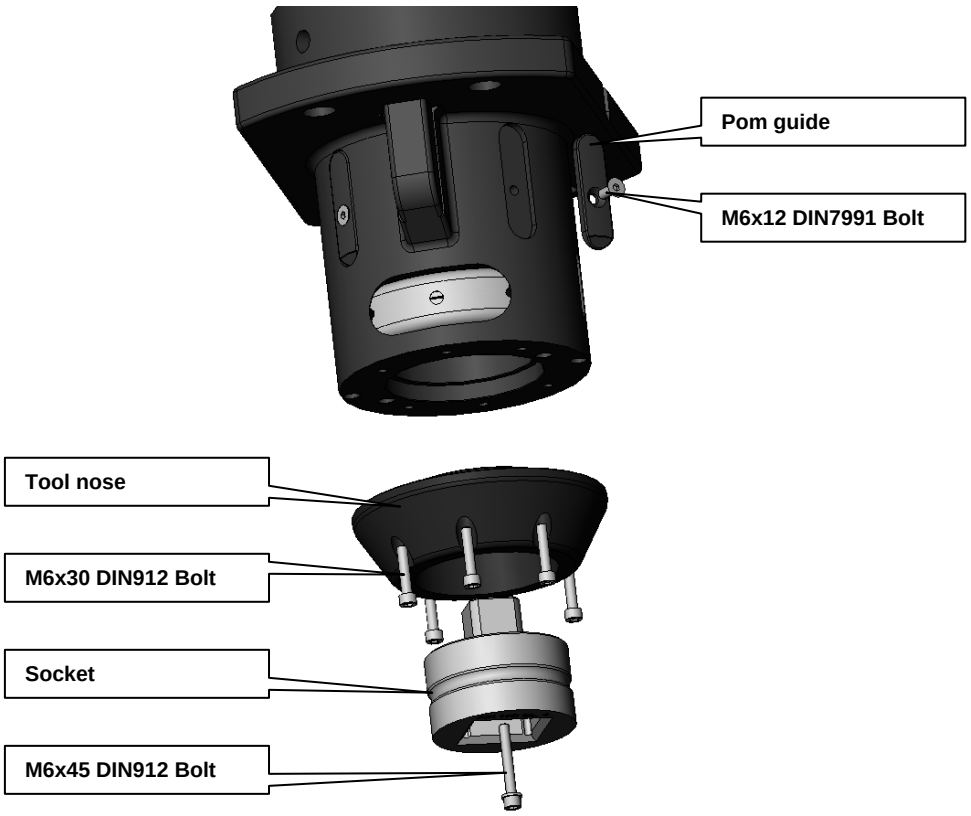
- Screw the Rod into Indicator Flag before Rod head is screwed into the Link. Repeat on other side.
- Make sure that mechanical indicators run freely up and down when Shaft is rotated.

#### 9.3.1.4 Latch assy



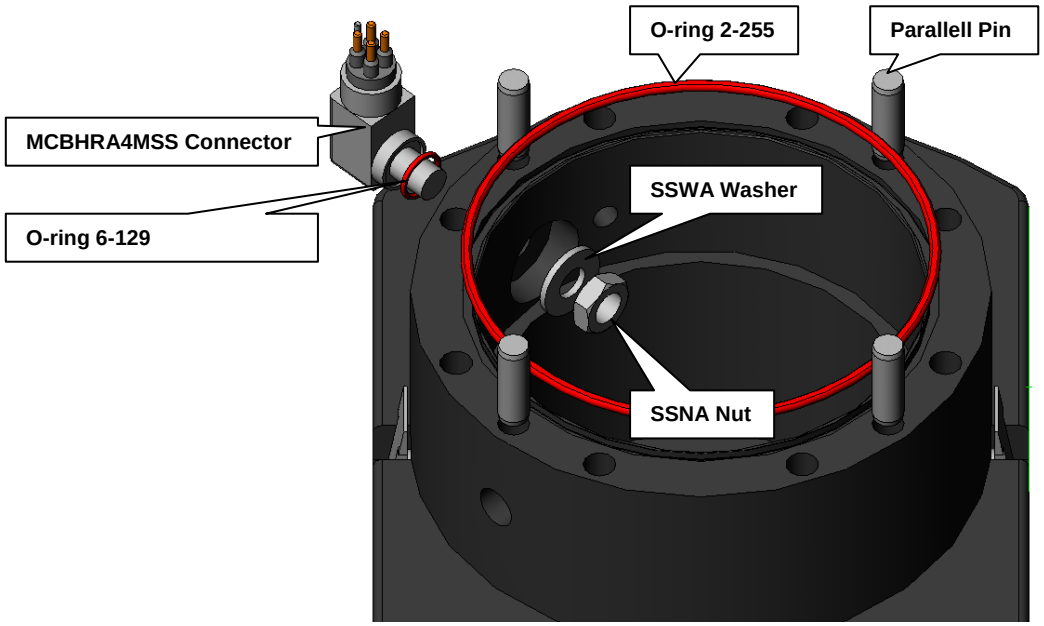

- Place the spring onto the Piston
- Place a O-ring 13,1x1,6 into the O-ring groove on the Piston
- Place a O-ring 18,77x1,78 onto the Latch Cylinder
- Mount the Piston into the Latch Cylinder
- Mount the Latch Cylinder into the Tool Body
- Mount the Latch Dog into the Tool Body and lock it to the Cylinder by turning the Piston counter clockwise.
- Repeat on other side.

### 9.3.1.5 Tool nose

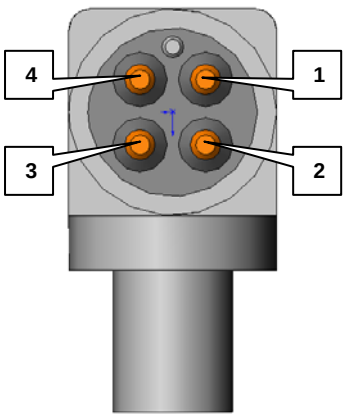



- Mount the 4-off Pom guides to the Tool Body with M6 Bolts.
- Mount the Tool Nose to the Tool Body with 6-off M6 Bolts.
- Mount the Socket and fasten with the M6 Bolt.

#### 9.3.1.6 Torque bucket and gear

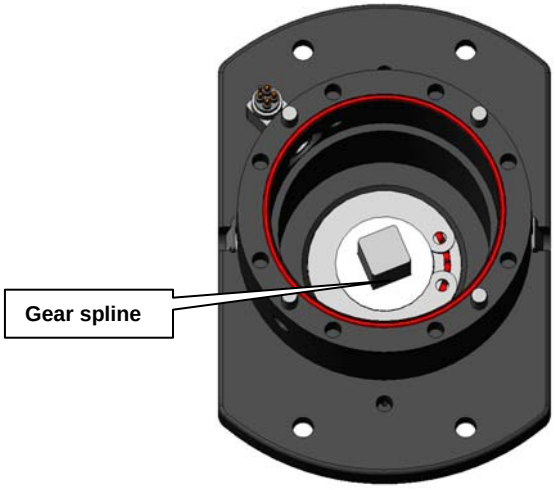


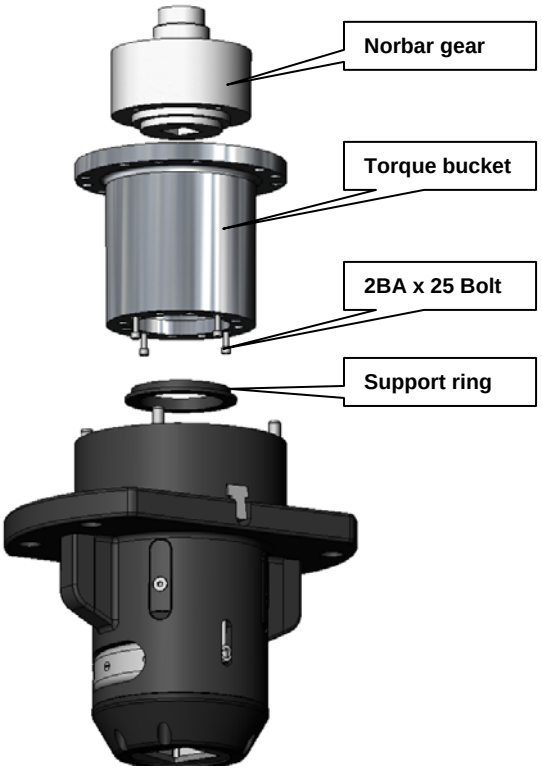

- Insert the connector into tool body, fasten with the washer and nut
- Lubricate the o-ring with silicon grease and insert to o-ring groove.
- Insert the 4-off parallel pins into the tool body




- Solder the blue wire on the Torque Bucket to pin 1 on the pre-mounted MCBHRA4MSS connector on the Tool Body. (Wires on connector are marked with pin no.) Leave sufficient wire length for Torque bucket to be mounted correct.
- Solder the red wire on the Torque Bucket to pin 2
- Isolate the solded area on each wire with a shrink tube.

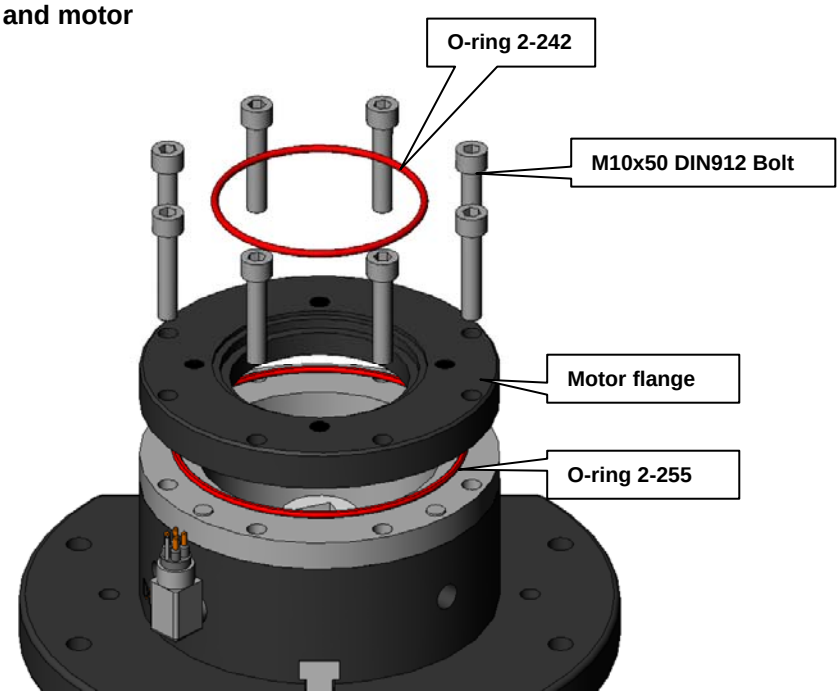
- If available, the shield from the Torque Bucket is to be solder to pin 3 (Ground)
- Cut wire on pin 4 as close to the connector as possible.
- Handle the wires carefully when mounting the Torque Bucket.



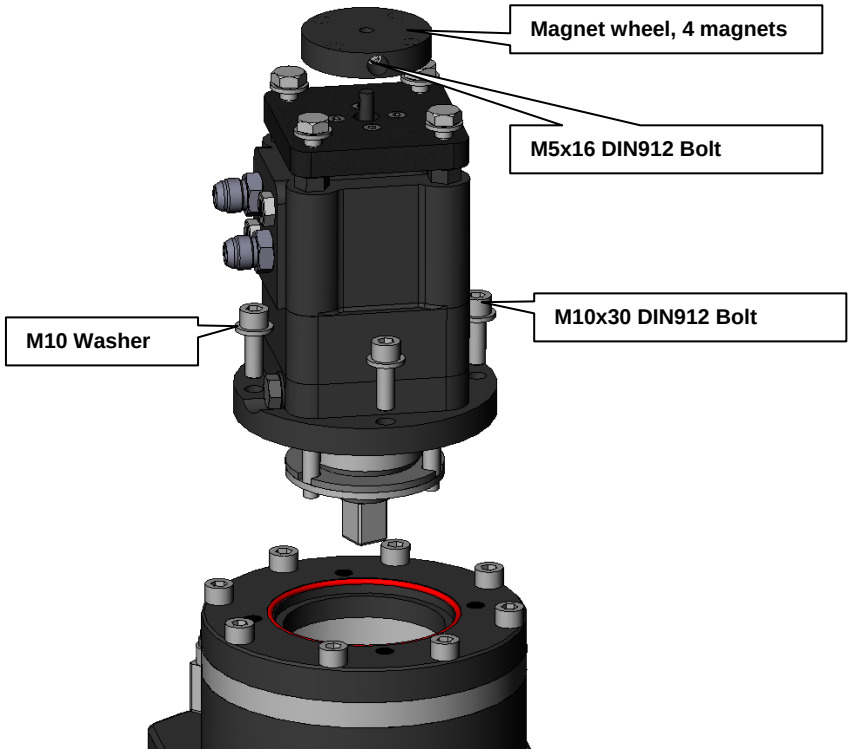




- Insert the Gear spline into the square on top of the shaft in the tool body
- Insert the Support ring over the shaft bearing
- Insert the HT5 Gear into the Torque Bucket, fasten with the 4-off 2BA x 25 bolts.
- Insert the bucket carefully into the tool body, without pinching the wires.

#### 9.3.1.7 Motor flange and motor

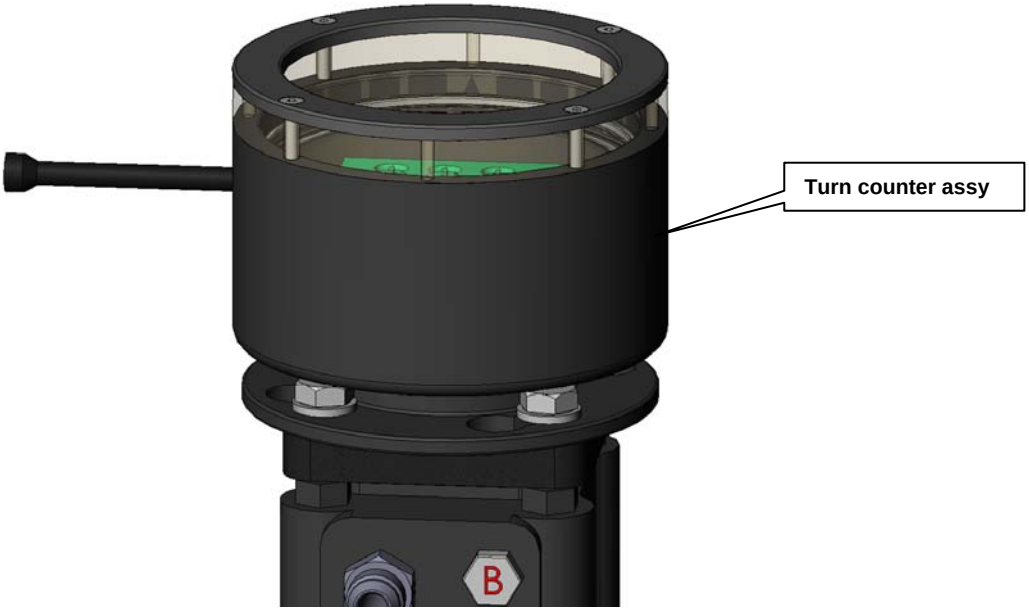



- Lubricate the O-rings with silicone grease.
- Place the O-ring 2-255 into the groove in the Motor Mounting Flange
- Use 8-off M10 bolts to mount the Mounting Flange.
- Place the O-ring 2-242 on top of the Mounting Flange in the O-ring groove.



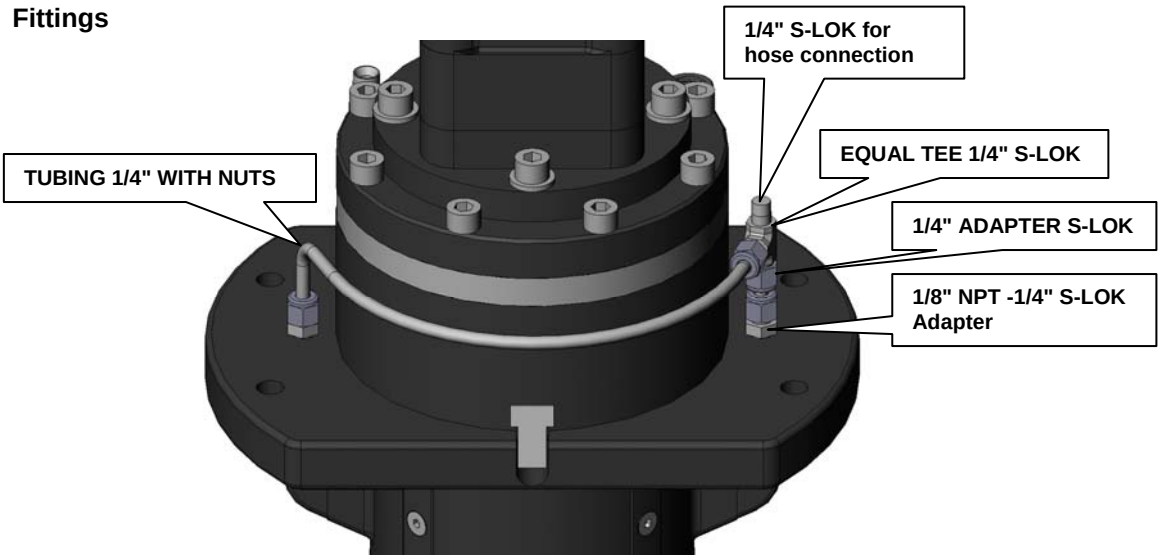

- Place the OMSS Motor with Motor Adaptor onto the Motor Mounting Flange.
- Turn the Motor adaptor and motor until the Adaptor fits into the Gear Box.
- Mount the Motor to the Motor Flange with 4-off M10x30 with Washers.
- Mount the Magnet Wheel to the motor with the opening for the magnets facing down.
- Lock the Magnet Wheel to the Motor Shaft with 2-off M5x16 DIN912 bolts.

#### 9.3.1.8 Turn counter

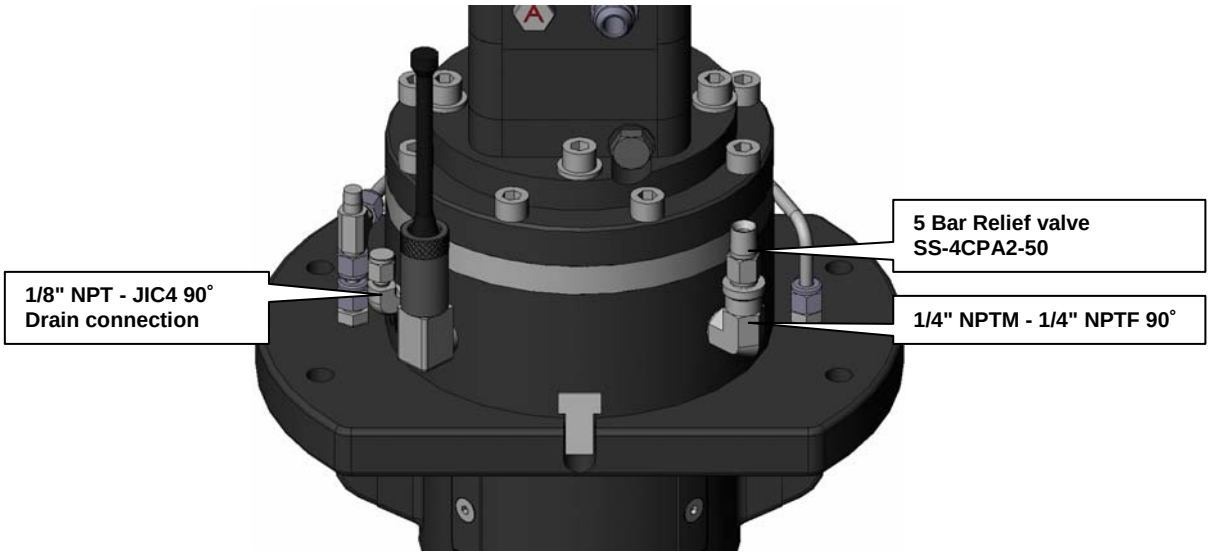



- Place the Turn Counter onto the M10x20 DIN933 on the Turn Counter Bracket. .
- Rotate the Turn Counter Body Clockwise and tighten the M10x20 DIN933 Bolts to lock the Turn Counter in Position

### 9.3.1.9 Fittings

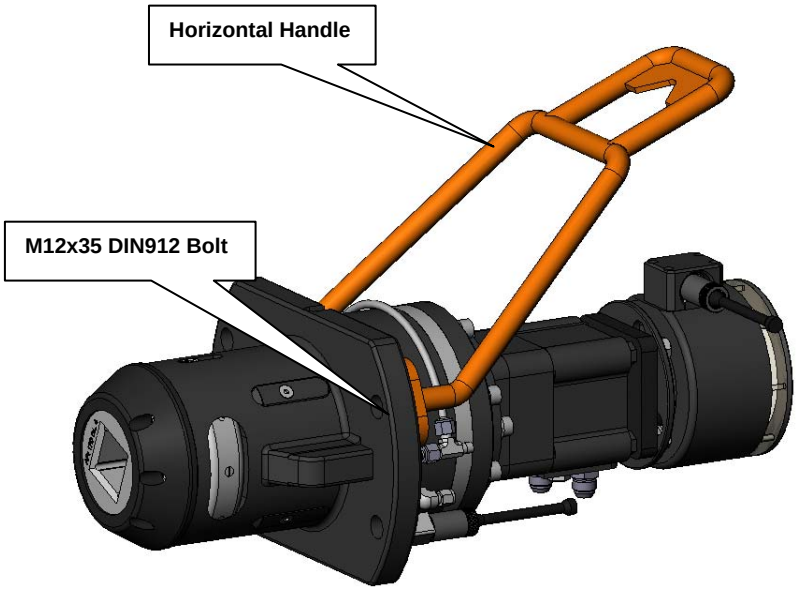


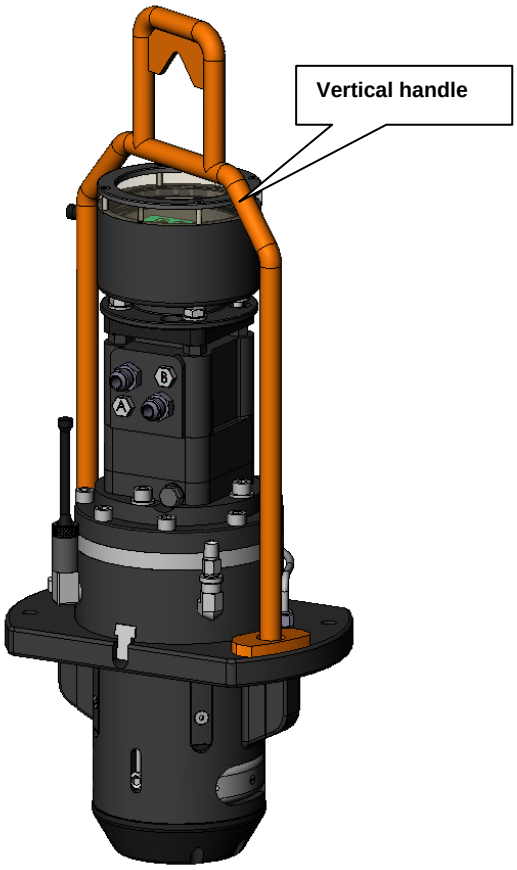

**Latch hydraulics**




- Fittings to be fastened to tool body like shown above

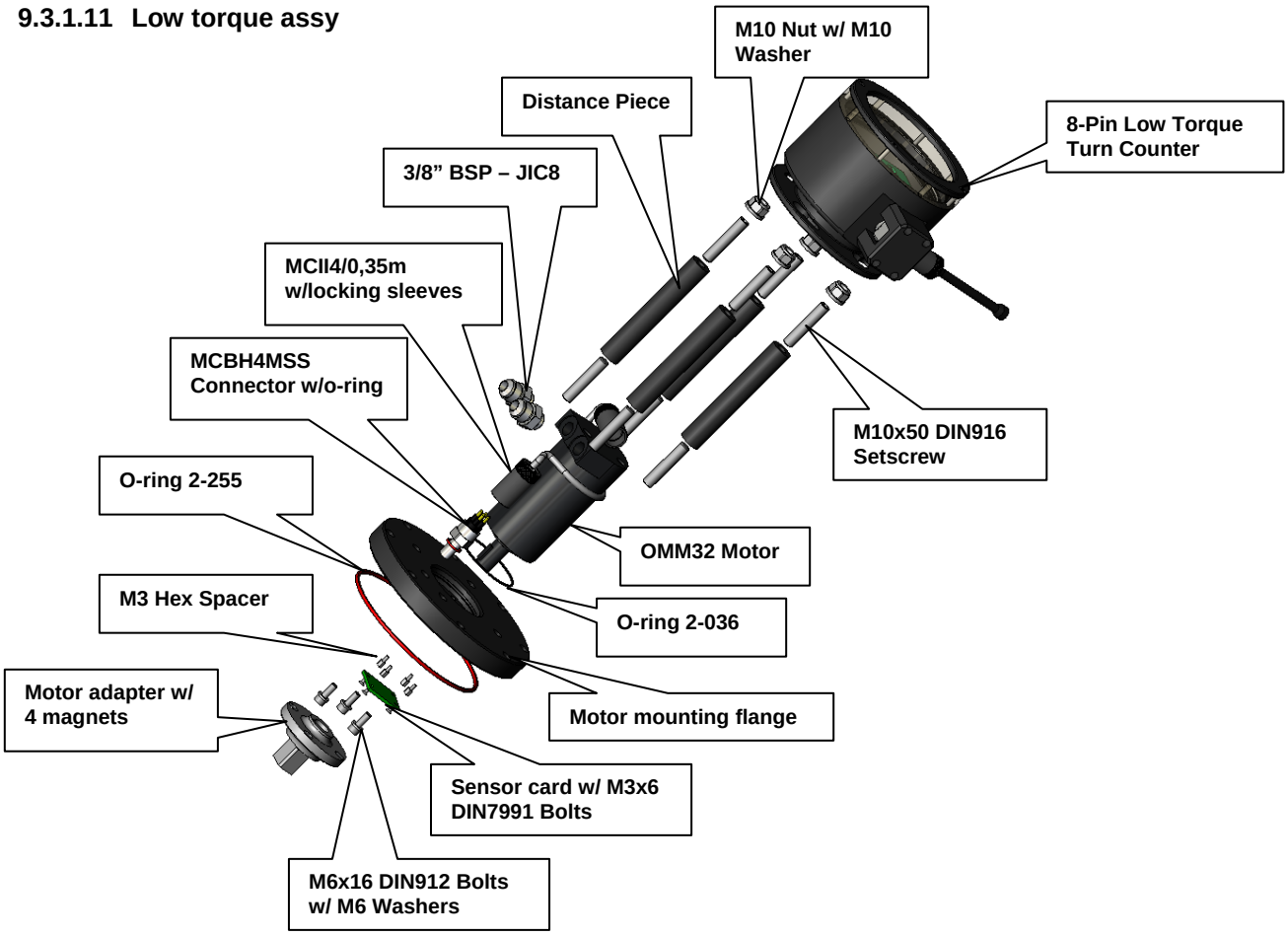
### 9.3.1.10 Rov handle



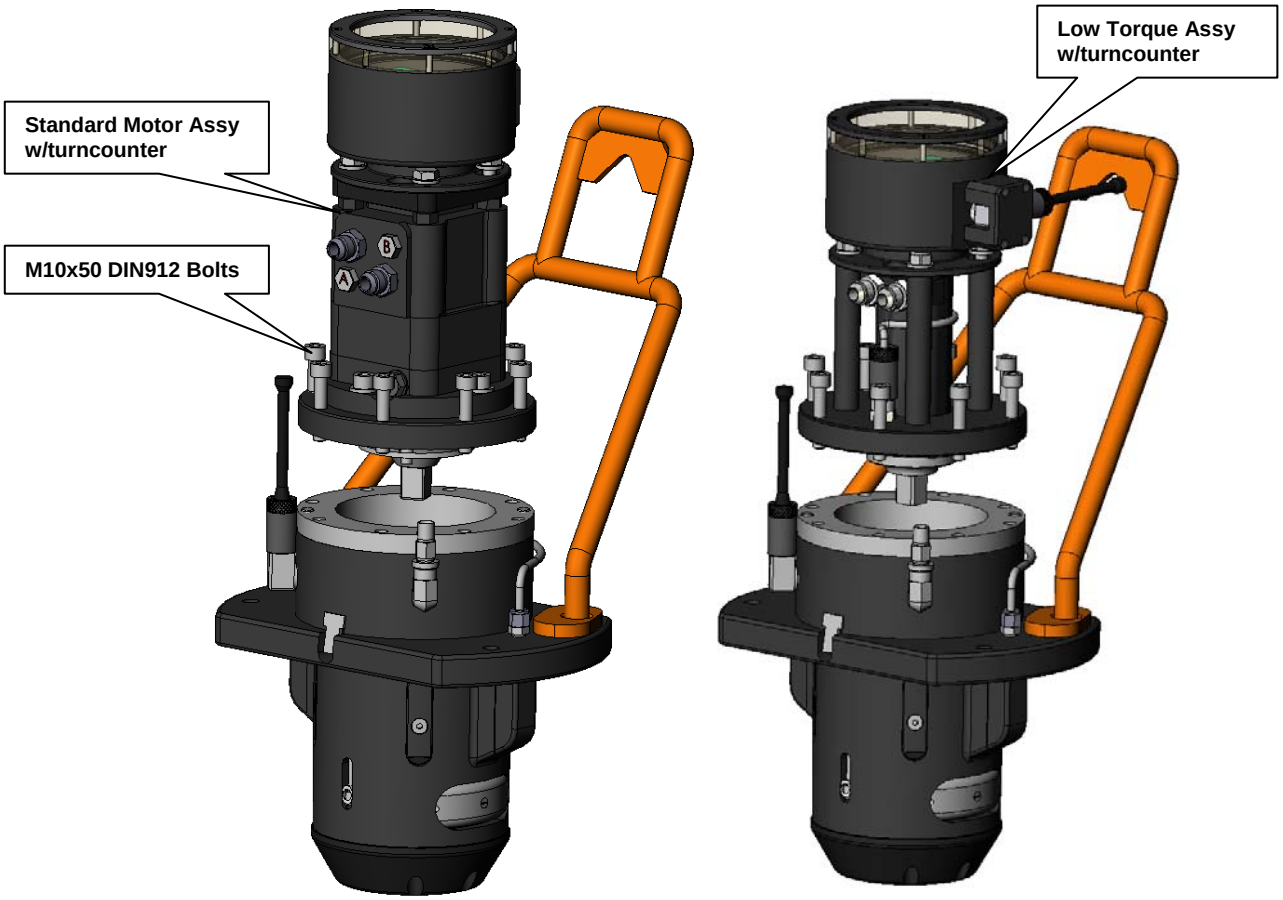

- Fasten the handle of choice with the 2-off M12 bolts from underneath

### 9.3.1.11 Low torque assy




- Lubricate the O-ring 2-036 with Silicone grease and install it on top of the Motor Mounting Flange
- Place OMM32 Motor onto the Motor Mounting Flange and fasten with M6 Washers and Bolts
- Screw the Distance Piece and the Threaded Rods into the Motor Mounting Flange.
- Install the Subconn Connector MCBH4MSS to the Motor Mounting Flange.
- Mount the turn counter on top of the Distance Pieces and fasten with Washers and Nuts.
- Connect up the Cable between the turn counter and the Motor Mounting Flange and secure with locking Sleeves
- Install the Sensor Card on the Motor Mounting Flange and secure with M3 Washers and Screws.
- Insert the Motor Adapter with Magnets.
- Lubricate O-ring 2-255 with Silicone grease and install it on the bottom of the Motor Mounting Flange.

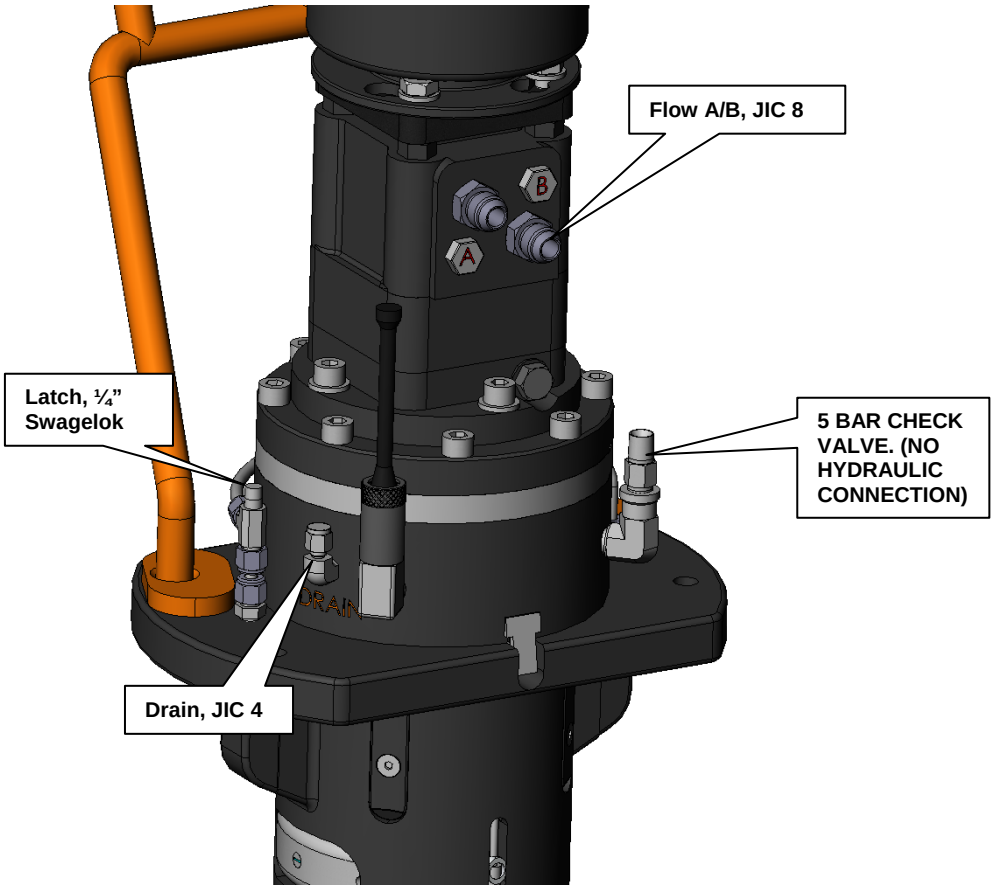
### 9.3.1.12 Changing from OMSS motor w/ turn counter to the OMM Motor w/ turn counter




- Remove the M10 bolts and carefully pull the OMSS 200 Motor Assy w/ turn counter off the tool body as shown above.
- Place the O-ring 2-255 into the O-ring groove in the Motor Mounting Flange of the OMM Motor Assembly as shown below to the left
- Mount and secure the OMM 32 Motor Assy to the Tool Body with the M10 bolts.
- Reverse the process to change back to the OMSS 200 Motor Assy.

The torque ranges for the motors are described in the specifications in section 2.2 Technical Data

### 9.3.1.13 Hydraulics




Hoses with fittings are listed in the 2.2 Technical Data

- Connect the 2-off 4 m (13 ft) long 3/8" hoses from the Torque Tool Motor directly to the ROV tool outlet or to the RCU. Verify tool socket rotation direction.
- Connect the 4 m (13 ft) long 1/4" hose from Motor drain located on the Tool body directly to the ROV reservoir or to the RCU drain / tank line.
- Connect the 4 m (13 ft) long 1/4" hose from the latch system on the Tool Body directly to a spare directional valve on the ROV or to the RCU.

**NOTE:**

- **The latch system must be connected to an open centre directional valve (A and B Connected to the tank)**
- **The drain hose must be connected to the tool before operation. If the tool is operated without the drain function the tool will most probable be damaged due to high internal pressure.**

### 9.3.2 Repair

For repair of Torque Tool it is recommended to locate the faulty/damaged part and change it with a new spare part.

# 10 Spare Parts

## 10.1 Spare Parts Lists Index

| OAS Doc. No | Client Doc. No. | Title |
|---|---|---|
| 101753-DTS-LST-006 | N/A | Sparekit Torque Tool Body Latch |

# 11 Referenced drawings, documents and Data Sheets

## 11.1 Drawing Index

| OAS Doc. No | Client Doc. No. | Title |
|---|---|---|
| 0287700 | 100035992 | GA-drawing Torque Tool ISO 13628-8 Cl.1-4 |
| 0312890 | N/A | GA-drawing Low Torque Assy |
| 0299487 | N/A | GA-drawing Torque Feedback Cable |

## 11.2 Document Index

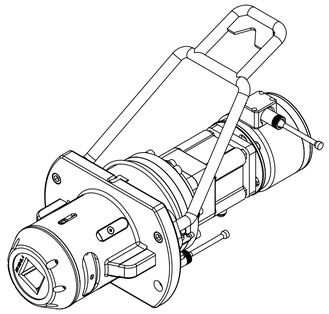
| OAS Doc. No | Client Doc. No. | Title |
|---|---|---|
| N/A | N/A | Danfoss service manual OMSS/OMM |

## 11.3 Technical Data Sheets Index

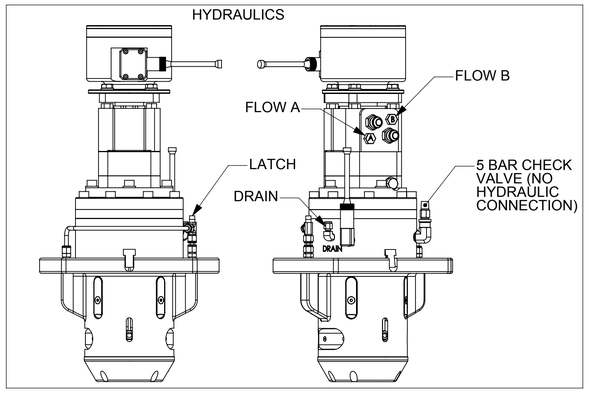
| OAS Doc. No | Client Doc. No. | Title |
|---|---|---|
| General Torque Diagram OMSS 200 Motor | N/A | 101753-DTS-CAL-001 |
| General Torque Diagram OMM 32 Motor | N/A | 101753-DTS-CAL-002 |

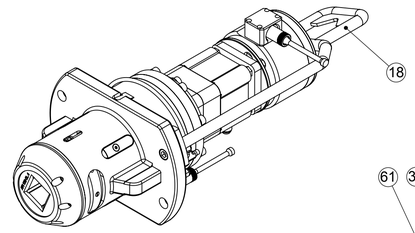
- VERIFY CORRECT HYDRAULIC CONNECTION ACCORCDING TO USER MANUAL BEFORE OPERATING THE TOOL.
- NOTICE THE LOCATION OF FLOW, DRAIN AND LATCH HOSES.

| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | INCORP BY | DATE |
| C | INITIAL RELEASE | WT | 12 MAR 08 |



TORQUE TOOL W/ HORIZONTAL HANDLE




TORQUE TOOL W/ VERTICAL HANDLE













| CLASS 1&2 END EFFECTOR | CLASS 3 END EFFECTOR |
|---|---|
| API 17D CL. 1&2 | API 17D CL. 3 |
| 0287708 | 0287707 |

FMC Energy Systems
FMC Kongsberg Subsea

Material : TORQUE TOOL, API 17D CLASS 1-4
Material No:100035992
Serial No : -
Equip. No : -
Tag No : -
Weight (Kg):In air: 40 kg/In water: 30 kg
Max Voltage:210 Bar
Max W.P. : -

WEIGHT IN AIR: 40KG
WEIGHT IN WATER: 30KG

| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
|---|---|---|---|---|
| 1 | 1 | 0287659 | TOOL BODY | ALU 6082 T6 |
| 2 | 1 | 0281948 | 1/4" ADAPTER S-LOK | VARIOUS |
| 3 | 1 | 0287660 | TUBING 1/4" WITH NUTS | N/A |
| 4 | 1 | 0286840 | 8 PIN STANDARD | VARIOUS |
| 5 | 1 | 0282225 | RELIEF VALVE SS-4CPA2-50 | 316 L |
| 6 | 1 | 0273495 | 1/8" NPT - JIC4 90˚ | 316 L |
| 7 | 1 | 0287704 | GEAR SPLINE | N/A |
| 8 | 1 | 0292606 | MCBHRA4MSS 1/2" LENGTH | N/A |
| 9 | 2 | 0278271 | 1/2" BSP - JIC8 | 316 L |
| 10 | 1 | 0287705 | POM RING | BLACK POM |
| 11 | 1 | 0287706 | SOCKET API 17D CL. 4 SIS 40,1x40,1 | 165 M |
| 12 | 1 | 0287707 | SOCKET API 17D CL. 3 SIS 30,6x30,6 | 165 M |
| 13 | 1 | 0287708 | SOCKET API 17D CL. 1 & 2 SIS 19,5x19,5 | 165 M |
| 14 | 1 | 0314254 | DUMMY CONNECTOR MCDC4F | N/A |
| 15 | 4 | 0287710 | PARALLELL PIN | S165M |
| 16 | 1 | 0287663 | TOOL NOSE | BLACK POM |
| 17 | 1 | 0292620 | HORIZONTAL HANDLE | VARIOUS |
| 18 | 1 | 0292615 | VERTICAL HANDLE | VARIOUS |
| 19 | 4 | 0287662 | POM SHIM | POM BLACK |
| 20 | 2 | 0287661 | PARKER O-RING 2-255 | NITRIL 70 |
| 21 | 1 | 0287666 | SHAFT | 165 M |
| 22 | 1 | 0287670 | BALL BEARING FAG16012 | N/A |
| 23 | 1 | 0287668 | PARKER SEAL RING C1-6035-N3571 | NITRIL |
| 24 | 1 | 0287671 | ZEEGER RING A-60 | 316 L |
| 25 | 1 | 0287667 | PACK BOX | ALU 6082 T6 |
| 26 | 1 | 0287669 | O-RING 2-238 | NITRIL 70 |
| 27 | 1 | 0287676 | PARKER O-RING 2-242 | NITRIL |
| 28 | 1 | 0281827 | TORQUE BUCKET TM200 | ALU 6082 T6 |
| 29 | 1 | 0287673 | NORBAR GEAR 5:1 | N/A |
| 30 | 1 | 0287674 | MOTOR MOUNTING FLANGE STD | ALU 6082 T6 |
| 31 | 1 | 0287683 | GLIDE RING | BRONZE ALLOY |
| 32 | 2 | 0287679 | MECH. COUNTER LINK | 316 L |
| 33 | 2 | 0287678 | MECH. COUNTER FLAG | 316 L |
| 34 | 2 | 0287677 | MECH. COUNTER ROD | 316 L |
| 35 | 1 | 0287682 | GLIDE RING | BRONZE ALLOY |
| 36 | 1 | 0287681 | CAM BOLT | BRONZE ALLOY |
| 37 | 1 | 0033192 | SPRING LESJOFORS 1478 | SS 1774-04 |
| 38 | 1 | 0287672 | OMSS 200 W/TACO | N/A |
| 39 | 1 | 0028105 | MOTOR ADAPTER | 165 M |
| 40 | 2 | 0287697 | CYLINDER | 165 M |
| 41 | 2 | 0287698 | LATCH DOG | 316L |
| 42 | 2 | 0287699 | LATCH CYLINDER | 165 M |
| 43 | 2 | 0287701 | O-RING D13,1x1,6 SHORE 70 | NITRIL |
| 44 | 2 | 0287702 | O-RING D18,77X1,78 SHORE 70 | NITRIL |
| 45 | 2 | 0287703 | SPRING 6041 LESJØFORS | SS 2331-06 |
| 46 | 1 | 0287688 | MOTOR ADAPTER BEARING | POM |
| 47 | 3 | 0287689 | MOTOR ADAPTER SPACER | ALU 6082 T6 |
| 48 | 1 | 0287687 | MOTOR ADAPTER PLATE | ALU 6082 T6 |
| 49 | 2 | 0287694 | 1/8" NPT -1/4" S-LOK | 316 L |
| 50 | 1 | 0281947 | EQUAL TEE 1/4" S-LOK WITHOUT NUTS | 316 L |
| 51 | 1 | 0281455 | 1/4" NPTM - 1/4" NPTF 90 DEGREE | 316L |
| 52 | 1 | 0027692 | FEMALE LOCKRING RETROFIT | |
| 53 | 1 | 0287692 | TURN COUNTER BRACKET | ALU 6080-T6 |
| 54 | 1 | 0287685 | M10X10 DIN933 A | A4 |
| 55 | 1 | 0287691 | M10X10 DIN933 B | A4 |
| 56 | 4 | 0292608 | 2BA X 25 | N/A |
| 57 | 1 | 0286838 | WASHER 013153N SSNA | N/A |
| 58 | 1 | 0286851 | 013151N SSNA NUT | A4 |
| 59 | 1 | 0292607 | O-RING 6-129 | NITRIL 70 |
| 60 | 4 | M5X10 DIN7991 | M5X10 DIN7991 | A4 |
| 61 | 4 | M5X16 DIN912 | M5X16 DIN912 | A4 |
| 62 | 2 | M5X25 DIN912 | M5X25 DIN912 | A4 |
| 63 | 3 | M5x35 DIN912 | M5X35 DIN912 | A4 |
| 64 | 1 | M6 DIN125 | M6 DIN125 WASHER | A4 |
| 65 | 4 | M6x12 DIN7991 | M6X12 DIN7991 BOLT | A4 |
| 66 | 1 | M6x45 DIN912 | M6X45 DIN912 BOLT | A4 |
| 67 | 6 | M6x30 DIN912 | M6X30 DIN912 BOLT | A4 |
| 68 | 4 | M10X20 DIN933 | M10X20 DIN933 | A4 |
| 69 | 4 | M10X30 DIN912 | M10X30 DIN912 | A4 |
| 70 | 8 | M10X50 DIN912 | M10X50 DIN912 | A4 |
| 71 | 8 | M10 DIN125 | M10 DIN125 WASHER | A4 |
| 72 | 2 | M12x35 DIN912 | M12X35 DIN912 BOLT | A4 |

NOTES:

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS.

DECIMALS: NO DEC. ±0.4
.X ±0.2
.XX ±0.05

ANGLES: ±0.5°

BREAK ALL SHARP EDGES

SURFACE TEXTURE: 3.2 USO

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**OCEANEERING INTERNATIONAL, INC.**

WWW.OCEANEERING.COM



TITLE

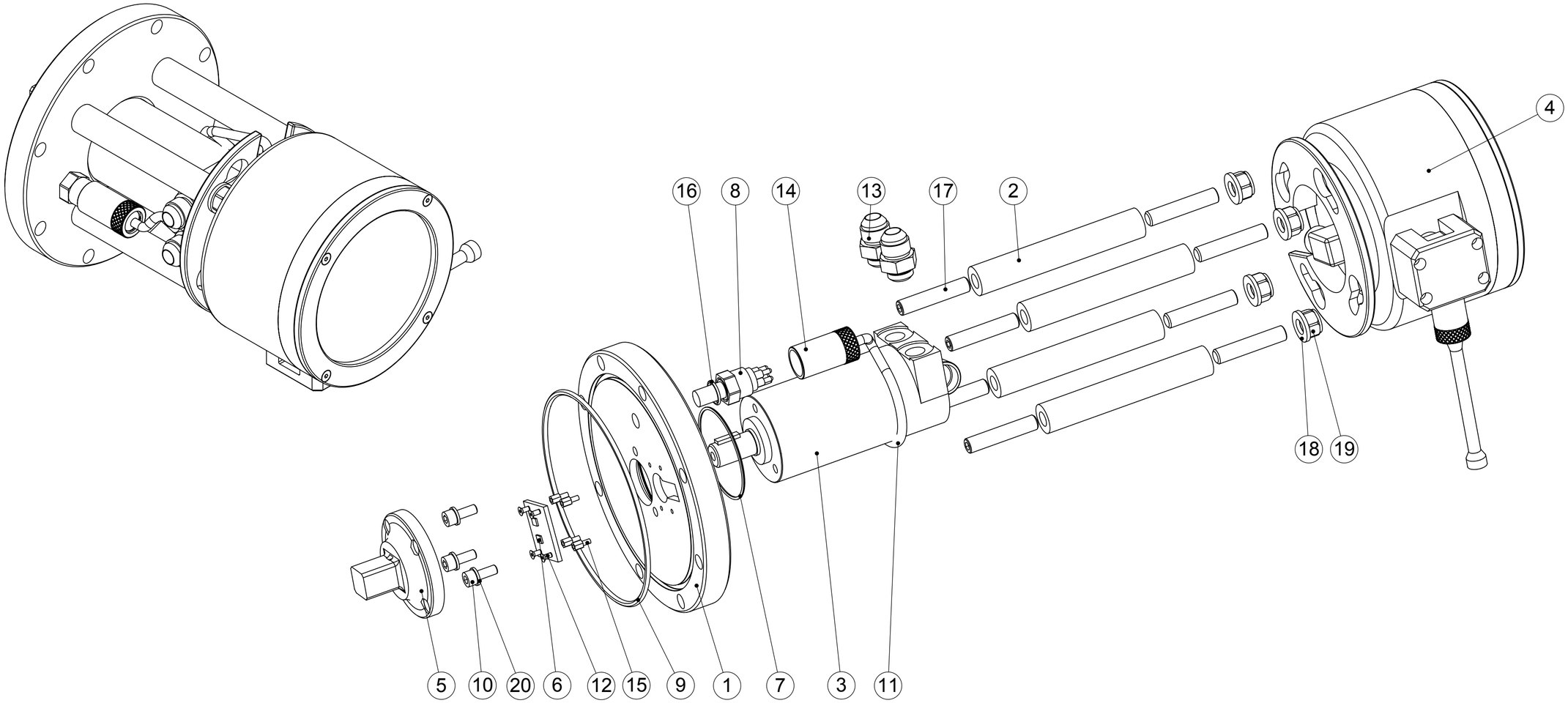
# TORQUE TOOL ISO 13628-8
# 2,7 KNM TORQUE TOOL CLASS 1-4
# GENERAL ARRANGEEMENT

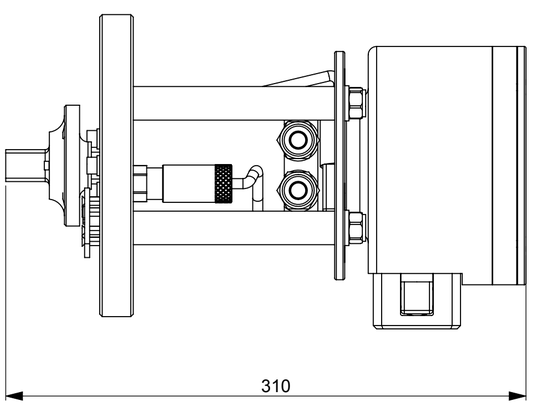
| | | | |
|---|---|---|---|
| DRAWN: WTJOELSEN | DATE: 12 MAR 08 | 1ST ANGLE PROJECTION | DO NOT SCALE |
| ENGR: GMULLAND | DATE: 12 MAR 08 | SIZE A1 | DWG. NO. 0287700 REV C |
| PR MGR: EWAHLBERG | DATE: 12 MAR 08 | | |
| eSIGNATURES ON FILE | | SCALE: NTS | WEIGHT: KG SHEET 1 OF 1 |

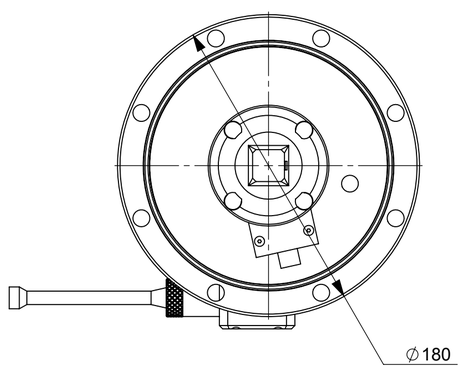
SOLIDWORKS

FORM F1365, REV. A

| REVISIONS | | | |
|---|---|---|---|
| REV | DESCRIPTION | INCORP BY | DATE |
| B | INITIAL RELEASE | WT | 02 APR 08 |




| ITEM NO. | QTY. | PART NO. | DESCRIPTION | MATERIAL |
|---|---|---|---|---|
| 1 | 1 | 0312891 | MOTOR MOUNTING FLANGE | ALU 6082 T6 |
| 2 | 4 | 0289483 | DISTANSE PIECE | ALU 6082 T6 |
| 3 | 1 | 0314090 | DANFOSS OMM32 WITHOUT SEAL | N/A |
| 4 | 1 | 0281829 | 8 PIN LOW TORQUE | VARIOUS |
| 5 | 1 | 0320257 | MOTOR ADAPTER ASSY | VARIOUS |
| 6 | 1 | 0289485 | SENSOR CARD | N/A |
| 7 | 1 | 0289487 | PARKER O-RING 2-036 | NITRIL SHORE 70 |
| 8 | 1 | 0289488 | MCBH4MSS SUB. CONN | N/A |
| 9 | 1 | 0287661 | PARKER O-RING 2-255 | NITRIL 70 |
| 10 | 3 | M6X16 DIN912 | M6X16 DIN912 | A4 |
| 11 | 1 | 0289479 | MCIL4M//0.35M//MCIL4F CABLE | N/A |
| 12 | 4 | M3X6 DIN7991 | M3X6 DIN7991 | A4 |
| 13 | 2 | 0289481 | 3/8" BSP - JIC8 | 316 L |
| 14 | 2 | 0027692 | FEMALE LOCKRING RETROFIT | |
| 15 | 4 | 0289489 | M3 HEX SPACER | 316L |
| 16 | 1 | 0292607 | O-RING 6-129 | NITRIL 70 |
| 17 | 8 | M10x50 DIN916 | M10X50 DIN916 | A4 |
| 18 | 4 | M10 DIN125 | M10 DIN125 WASHER | A4 |
| 19 | 4 | M10 DIN985 | M10 DIN985 NUT | A4 |
| 20 | 3 | M6 DIN125 | M6 DIN125 WASHER | A4 |

NOTES:

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN MILLIMETERS

DECIMALS: NO DEC. ±0.4
.X ±0.2
.XX ±0.05

ANGLES: ±0.5°

BREAK ALL SHARP EDGES

SURFACE TEXTURE: 3.2 USO

OCEANEERING®

**OCEANEERING INTERNATIONAL, INC.**
WWW.OCEANEERING.COM



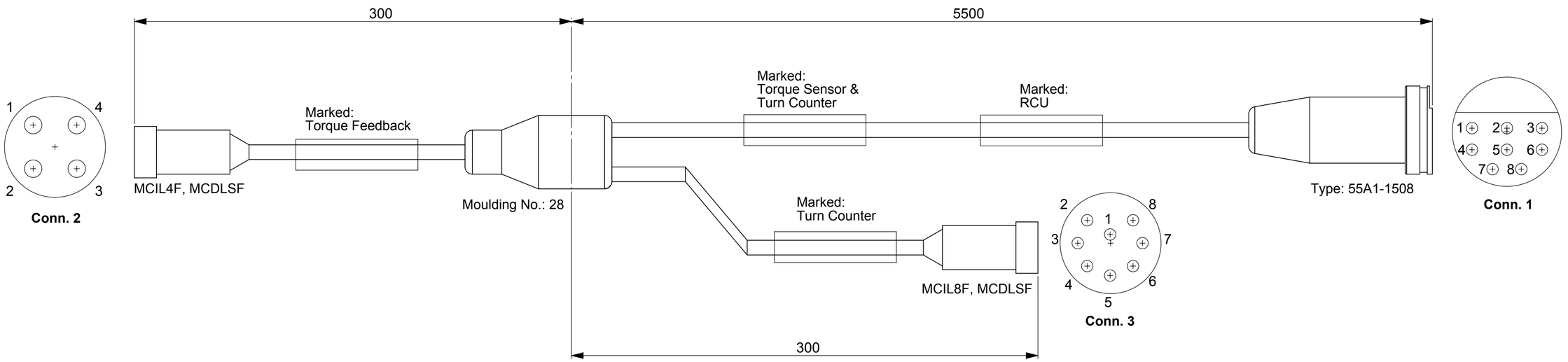
TITLE
# LOW TORQUE ASSY W/BODY LATCH 2,7 KNM TORQUE TOOL CLASS 1-4 GENERAL ARRANGEMENT

| | | | |
|---|---|---|---|
| DRAWN: WTJOELSEN | DATE: 02 APR 08 | 1ST ANGLE PROJECTION | DO NOT SCALE |
| ENGR: KALBREKTSEN | DATE: 02 APR 08 | SIZE A2 / DWG. NO. 0312890 | REV B |
| PR MGR: EWAHLBERG | DATE: 02 APR 08 | | |
| eSIGNATURES ON FILE | | SCALE: NTS / WEIGHT: KG | SHEET 1 OF 1 |

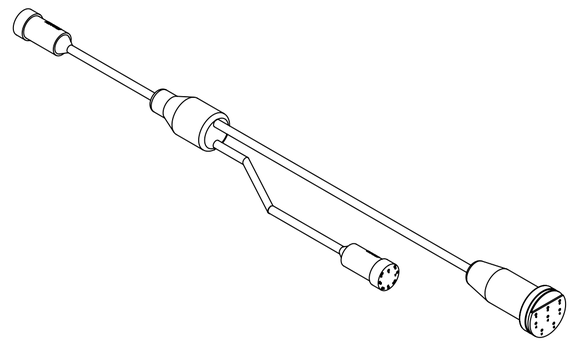
SOLIDWORKS

FORM F1362, REV. A

| REVISIONS | | | |
|---|---|---|---|
| REV | DESCRIPTION | INCORP BY | DATE |
| C | INITIAL RELEASE | KKA | 15 JAN 08 |




| Conn. 1 | | Conn. 2 | Conn. 3 |
|---|---|---|---|
| 1 | Blue 1,34sqmm; TORQUE RETURN | 1 | |
| 2 | Black 1,34sqmm; +24VDC | 2 | |
| 3 | Screen from Blue/Yellow | 3 | 6 |
| 4 | Red 1,34sqmm; +12VDC | | 2 |
| 5 | Coax Screen ; Common | | 3 |
| 6 | Blue 0,50sqmm; D-out | | 4 |
| 7 | Yellow 0,50sqmm; TX | | 5 |
| 8 | Green/Blue 2x0,22sqmm; RX | | 7 |



NOTES:

| | |
|---|---|
| MATERIAL: | N/A |
| COATING: | |

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN MILLIMETERS
DECIMALS: NO DEC. ±0.4 .X ±0.2 .XX ±0.05
ANGLES: ±0.5°
BREAK ALL SHARP EDGES
SURFACE TEXTURE: 3.2 USO

OCEANEERING

**OCEANEERING INTERNATIONAL, INC.**
WWW.OCEANEERING.COM



TITLE
**55A1-1508/Y-MOULD/ MCIL4F+MCIL8F**
**TORQUE TOOL CABLE**
**DETAIL**

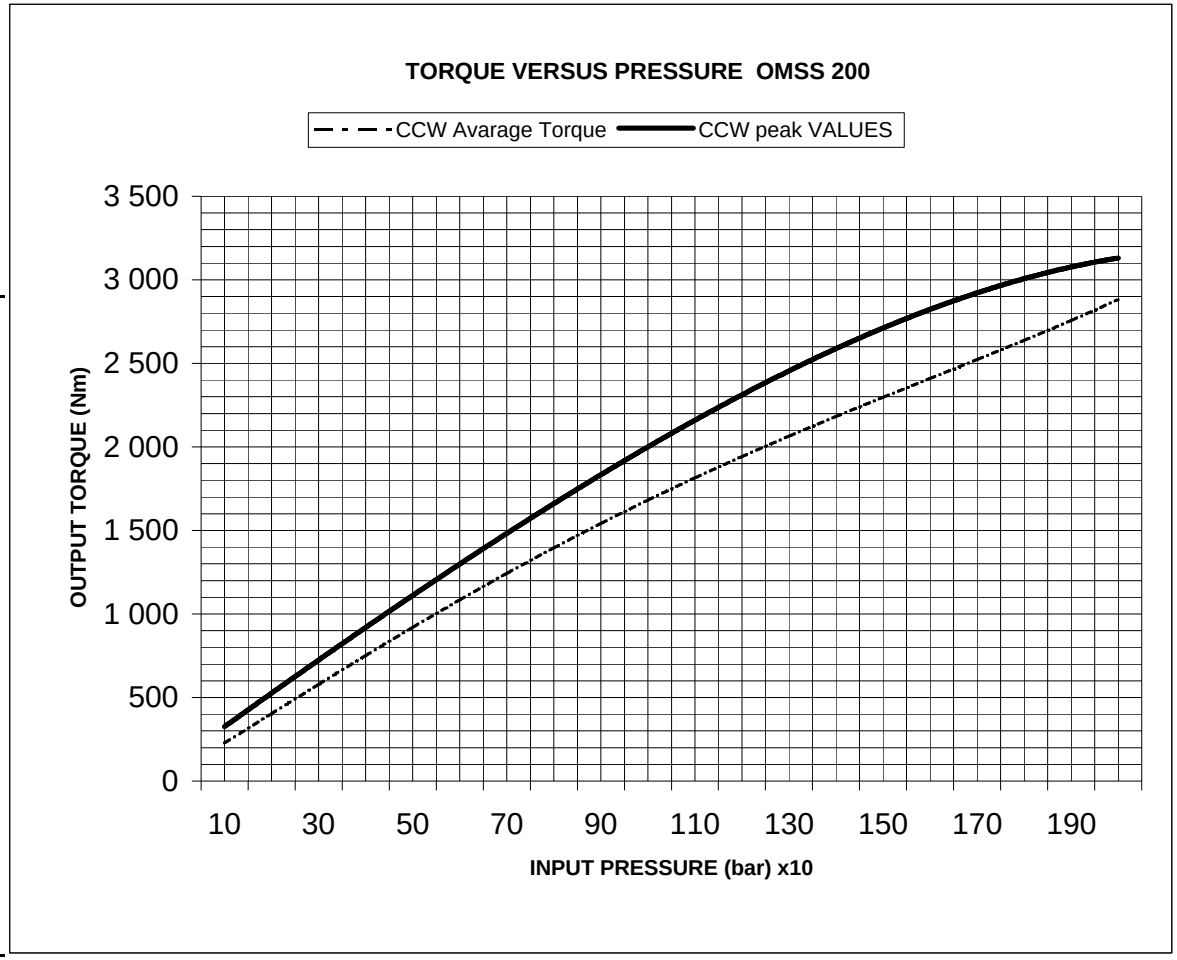
| | | | |
|---|---|---|---|
| DRAWN: JHARESTAD | DATE: 17 AUG 07 | 1ST ANGLE PROJECTION | DO NOT SCALE |
| ENGR: KALBREKTSEN | DATE: 15 JAN 08 | SIZE A2 | DWG. NO. 0299487 REV C |
| PR MGR: EWAHLBERG | DATE: 15 JAN 08 | | |
| eSIGNATURES ON FILE | | SCALE: NTS WEIGHT: KG | SHEET 1 OF 1 |

SOLIDWORKS
FORM F1361, REV. A

## TORQUE VS. PRESSURE CURVE

TOOL : 2.7 KNm Torque Tool Class 4
TAG NO :
RCU TAG I :
FMC TT SI :
FMC RCU :
BY :

| Pressure (PSI) | (bar) | (ft.lb) | CCW Torque Average (Nm) | Peak (Nm) |
|---|---|---|---|---|
| 145 | 10 | 156 | **210** | **330** |
| 290 | 20 | 307 | **415** | **531** |
| 435 | 30 | 444 | **600** | **744** |
| 580 | 40 | 564 | **761** | **908** |
| 725 | 50 | 690 | **931** | **1104** |
| 870 | 60 | 777 | **1049** | **1236** |
| 1015 | 70 | 890 | **1202** | **1420** |
| 1160 | 80 | 1021 | **1378** | **1670** |
| 1305 | 90 | 1171 | **1581** | **1944** |
| 1450 | 100 | 1273 | **1718** | **2110** |
| 1595 | 110 | 1358 | **1832** | **2230** |
| 1740 | 120 | 1431 | **1931** | **2245** |
| 1885 | 130 | 1500 | **2025** | **2337** |
| 2030 | 140 | 1615 | **2179** | **2500** |
| 2175 | 150 | 1713 | **2312** | **2696** |
| 2320 | 160 | 1790 | **2415** | **2840** |
| 2465 | 170 | 1873 | **2528** | **3000** |
| 2610 | 180 | 1930 | **2605** | **3060** |
| 2755 | 190 | 2063 | **2784** | **3080** |
| 2900 | 200 | 2131 | **2876** | **3085** |




**NOTE:** The Transducer calibrated counter clock wise.
The plot shows the average value of three measurings.

**This Sheet is for information only. It is based on tests with different Torque tools to different RCUs. The Torque vs. pressure for the actual Torque Tool have to be verifyed before used in operation.**

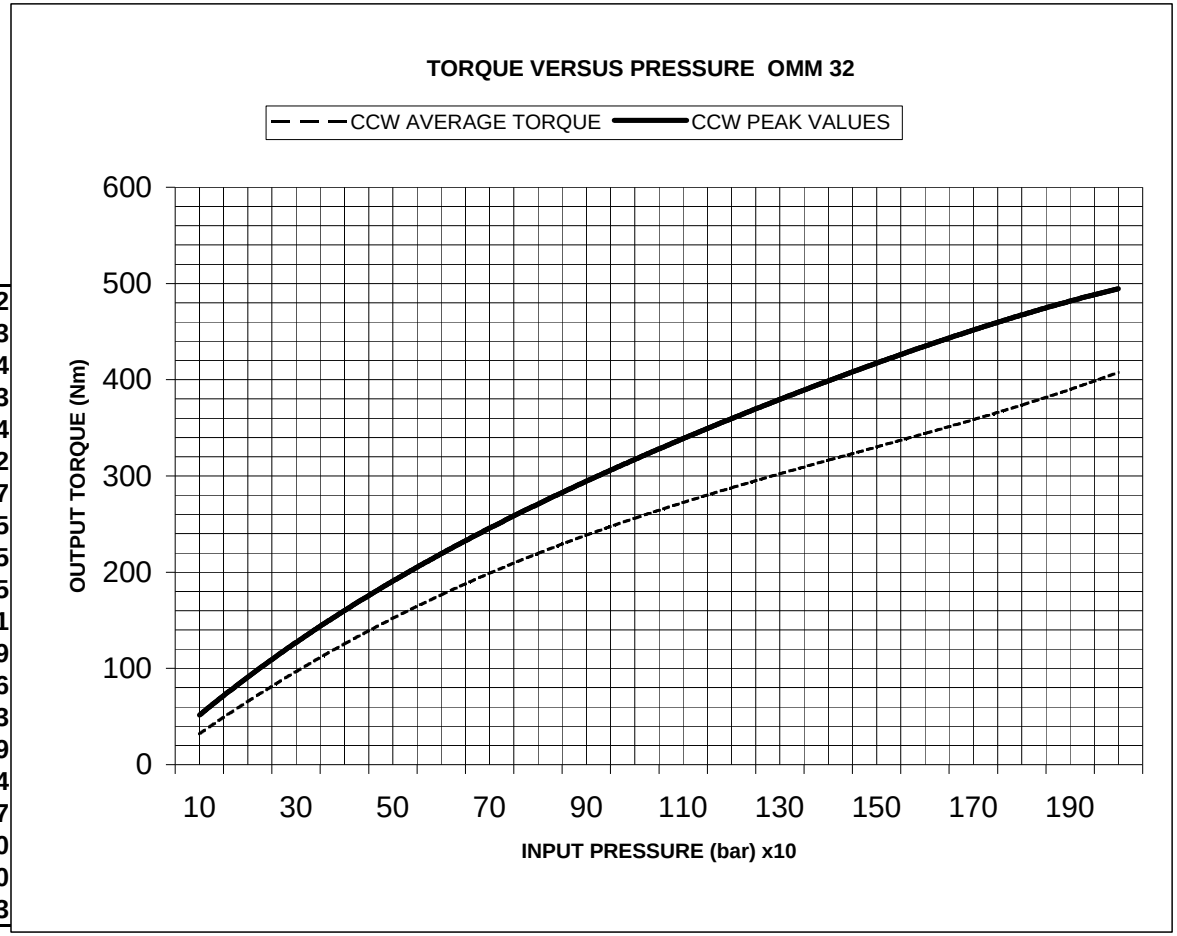
| | | | |
|---|---|---|---|
| MAX OUTPUT TORQUE: | 3085 | Nm | OCEANEERING® |
| MAX OUTPUT PRESSURE: | 200 | Bar | |

## TORQUE VS. PRESSURE CURVE

TOOL : 2.7 KNm Torque Tool Class 4
TAG NO :
RCU TAG NO :
FMC TT SN: :
FMC RCU SN: :
BY :

| Pressure (PSI) | (bar) | (ft.lb) | CCW Torque Average (Nm) | Peak (Nm) |
|---|---|---|---|---|
| 145 | 10 | 24 | **32** | **52** |
| 290 | 20 | 49 | **66** | **93** |
| 435 | 30 | 72 | **97** | **124** |
| 580 | 40 | 93 | **125** | **163** |
| 725 | 50 | 111 | **149** | **184** |
| 870 | 60 | 133 | **179** | **222** |
| 1015 | 70 | 143 | **194** | **237** |
| 1160 | 80 | 164 | **221** | **275** |
| 1305 | 90 | 181 | **245** | **305** |
| 1450 | 100 | 191 | **258** | **325** |
| 1595 | 110 | 201 | **271** | **341** |
| 1740 | 120 | 213 | **287** | **349** |
| 1885 | 130 | 217 | **293** | **366** |
| 2030 | 140 | 237 | **320** | **403** |
| 2175 | 150 | 247 | **334** | **419** |
| 2320 | 160 | 252 | **340** | **434** |
| 2465 | 170 | 268 | **361** | **457** |
| 2610 | 180 | 279 | **377** | **470** |
| 2755 | 190 | 287 | **387** | **480** |
| 2900 | 200 | 302 | **408** | **493** |

**NOTE:** The Transducer calibrated counter clock wise.
The plot shows the average value of three measurings.



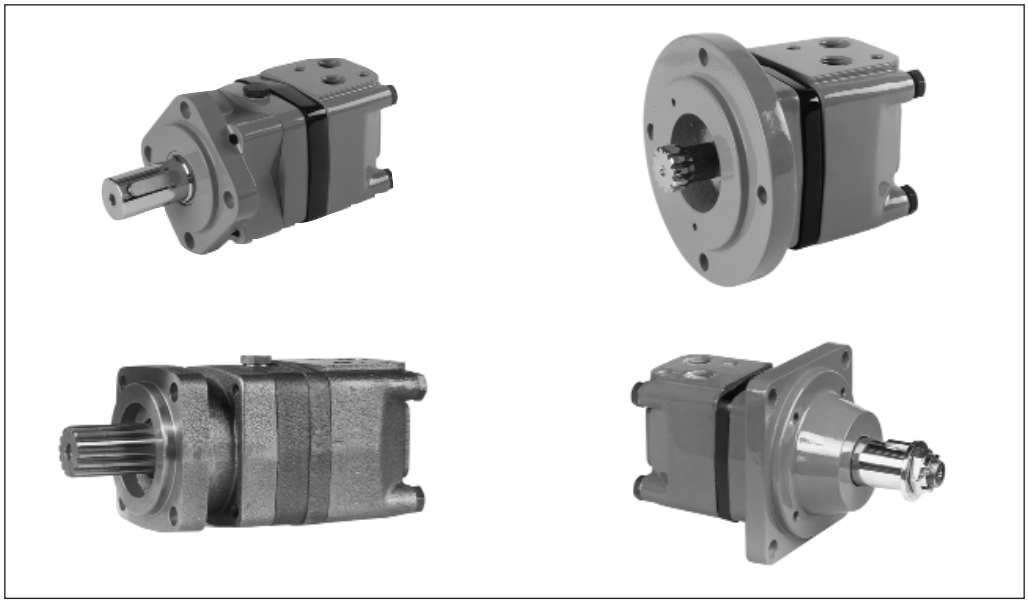

**This Sheet is for information only. It is based on tests with different Torque tools to different RCUs. The Torque vs. pressure for the actual Torque Tool have to be verifyed before used in operation.**

| | | | |
|---|---|---|---|
| MAX OUTPUT TORQUE: | 493 | Nm | OCEANEERING® |
| MAX OUTPUT PRESSURE: | 200 | Bar | |

# Hydraulic motors
# OMS series 2 and series 3

## Metric version

DKMH.PS.130.AG.52 replaces HN.13.AF.52



**Contents**

**Specialudførelse**

Reservedelslisten kan ikke anvendes til bestilling af reservedele til OMS i specialudførelser. Kontakt venligst salgsorganisationen for Danfoss Hydraulik vedrørende dette spørgsmål.

**Special versions**

The list of spare parts cannot be used when ordering parts for special OMS versions. In this respect, please contact the sales organisation for Danfoss Hydraulics.

**Sonderausführung**

Die Ersatzteilliste kann nicht für Bestellung von Ersatzteilen für OMS in Sonderausführungen benutzt werden. Wenden Sie sich diesbezüglich bitte an die Verkaufsorganisation für Danfoss Hydraulik.

**Version spéciale**

La liste de pièces de rechange ne peut pas être utilisée pour commander pièces de rechange pour OMS en versions spéciales. A ce sujet, vous êtes priés de vous adresser à l'organisation de vente de composants hydrauliques Danfoss.

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**Vederlagsfri reparation**

Vi gør opmærksom på at den vederlagsfrie reparation som er omtalt i Danfoss Almindelige Leveringsbetingelser kun udføres hos Danfoss Nordborg eller hos Danfoss autoriserede service shops.

**Cost-free repairs**

We would point out that cost-free repairs as mentioned in Danfoss General Conditions of Sale, are carried out only at Danfoss Nordborg or at service shops authorised by Danfoss.

**Kostenlose Reparatur**

Wir machen darauf aufmerksam, daß die in den "Allgemeinen Lieferbedingungen" von Danfoss erwähnte kostenlose Reparatur nur bei Danfoss Nordborg oder bei den autorisierten Danfoss Kundendienstwerkstätten ausgeführt wird.

**Réparation gratuite**

Nous faisons observer que la réparation gratuite mentionnée dans les Conditions générales de Vente de Danfoss ne devra être effectuée que dans les ateliers Danfoss à Nordborg ou dans les ateliers de dépannage agréés par Danfoss.

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**Authorized Service Shops**

| | |
|---|---|
| Australia | : Danfoss (Australia) Pty. Ltd., Melbourne |
| Austria | : Hainzl Industriesysteme, GmbH., Linz |
| Belgium | : N.V. Danfoss S.A., Bruxelles |
| Brazil | : Danfoss do Brasil Ind.e Com. Ltda., São Paulo |
| Canada | : Danfoss Mfg. Ltd., Mississauga |
| Denmark | : Danfoss Hydraulik A/S, Ganløse |
| Finland | : OY Danfoss AB, Espoo |
| France | : Danfoss S.a.r.l., Trappes (Paris) |
| Germany | : Danfoss GmbH., Offenbach/Main |
| Great Britain | : Danfoss Limited, Greenford (London) |
| Iceland | : Hedinn Verslun HF, Reykjavik |
| India | : Dantal Hydraulics PVT Ltd., New Delhi |
| Italy | : Danfoss s.r.l. Division Sordella, Torino |
| Japan | : Danfoss K.K., Gotemba |
| Korea | : Unitek Corporation, Seoul |
| Netherlands | : Itho B.V., Schiedam |
| New Zealand | : Danfoss (New Zealand) Limited, Auckland |
| Norway | : Danfoss A/S, Skui |
| Republic of South Africa | : Danfoss (Pty) Ltd., Johannesburg |
| Singapore | : Danfoss Industries Pte. Ltd., Singapore |
| Spain | : Danfoss S.A., San Sebastian de los Reyes, (Madrid) |
| Sweden | : Danfoss AB, Mjölby |
| Switzerland | : Danfoss Werner Kuster AG, Frenkendorf |
| Turkey | : Mert Teknik A.S., Istanbul |
| U.S.A. | : Danfoss Fluid Power Div. Racine, Wisconsin |

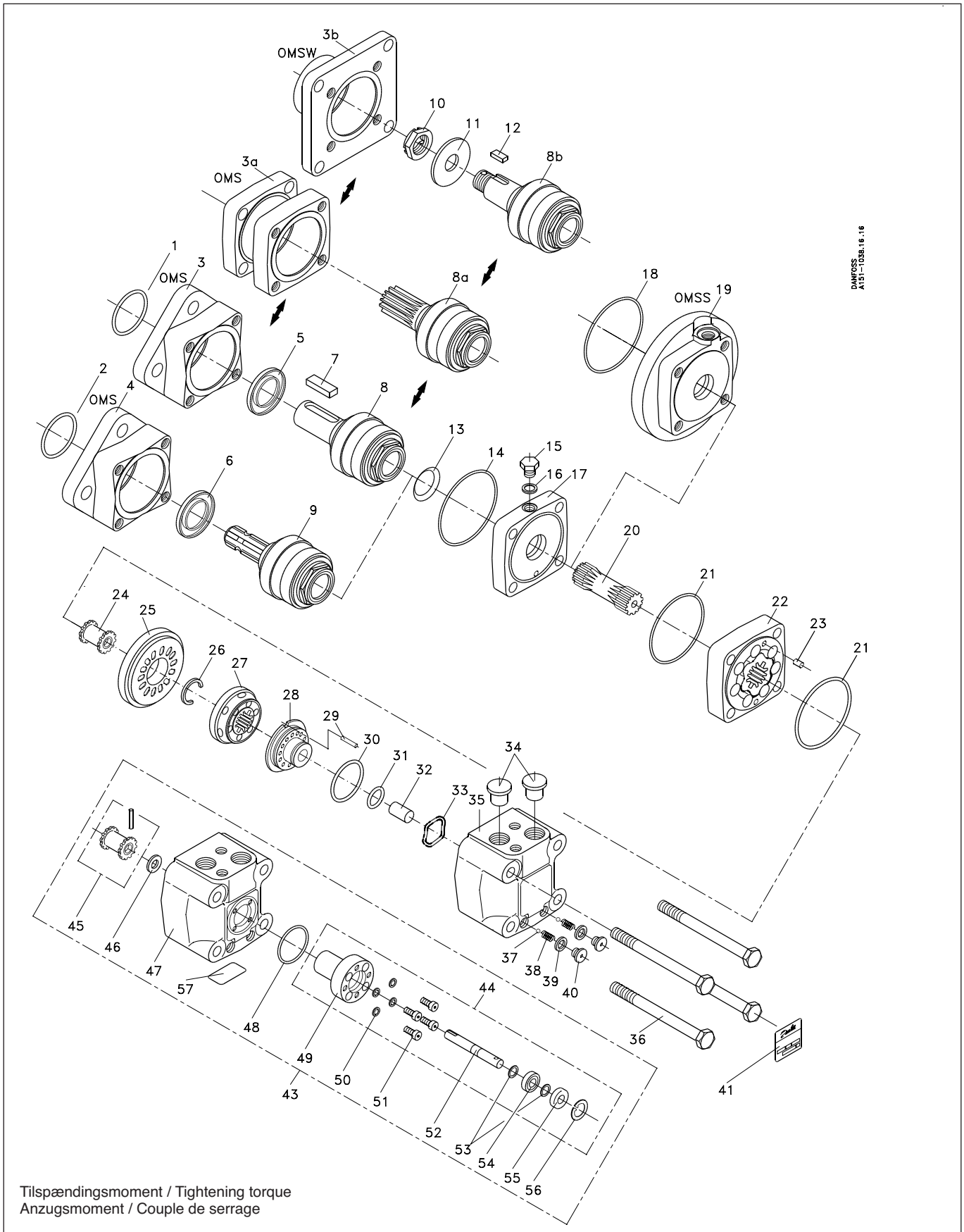
**Service Shops**

| | |
|---|---|
| Australia | : Danfoss (Australia) Pty. Ltd., Adelaide |
| Australia | : Danfoss (Australia) Pty. Ltd., Brisbane |
| Australia | : Danfoss (Australia) Pty. Ltd., Perth |
| Australia | : Danfoss (Australia) Pty. Ltd., Sydney |
| Czech Rep. | : Techno Trade, Olomouc |
| Greece | : A. Skoura & Co. E.E., Athens |
| New Zealand | : Danfoss (New Zealand) Limited, Christchurch |
| Taiwan | : Symbridge Machinery Co. Ltd., Taipei |

| | |
|---|---|
| **Seriemærkning** | Serienummer ændres, når der foretages ændringer af dele i motorerne.<br>OMS er mærket med seriebetegnelse efter datomærkningen xxx-3 |
| **Series marking** | The series number is altered when parts in the motor are changed.<br>The OMS series marking follows its date marking: xxx-3 |
| **Serienkennzeichnung** | Bei Teileänderungen im Motor wird die Seriennummer geändert.<br>Die Kennzeichnung von OMS erfogt mit einer Serienbezeichnung nach der Datumszeichnung: xxx-3 |
| **Marquage de série** | A toute modification d'une ou de plusieurs pièces des moteurs correspond un changement de numéro de série.<br>Les moteurs OMS portent leur numéro de série à la suite de la date, par example: xxx-3 |

| | | |
|---|---|---|
| **Kommentarer** | **a)** | Kun OMS serie 2:<br>Efter uge 41.97 er spændestift flyttet. Ved reparation af motor fremstillet før 41.97 skal endedæksel, balanceplade, spændestift og fjederskive skiftes. |
| **Comments** | **a)** | Only OMS series 2:<br>After week 41.97 the guide pin has a new location. When repairing motors manufactured before week 41.97 it will therefore be necessary to replace end cover, balace plate, tightening pin and spring washer. |
| **Kommentare** | **a)** | Nur OMS Serie 2:<br>Der Spannstift hat nach Woche 41.97 eine neue Plazierung. Bei Reparaturen von Motoren die vor Woche 41.97 gefertigt wurden, müssen deswegen Enddeckel, Ausgleichplatte, Spannstift und Federscheibe ausgewechselt werden. |
| **Commentaires** | **a)** | Seulement OMS série 2:<br>À partir de la semaine 41.97, la pièce de serrage occupe une nouvelle position. Lors d'une réparation sur un moteur fabriqué avant la semaine 41.97, le couvercle d'extrémité, la plaque de compensation, la pièce de serrage et la rondelle à ressort devront être changées. |

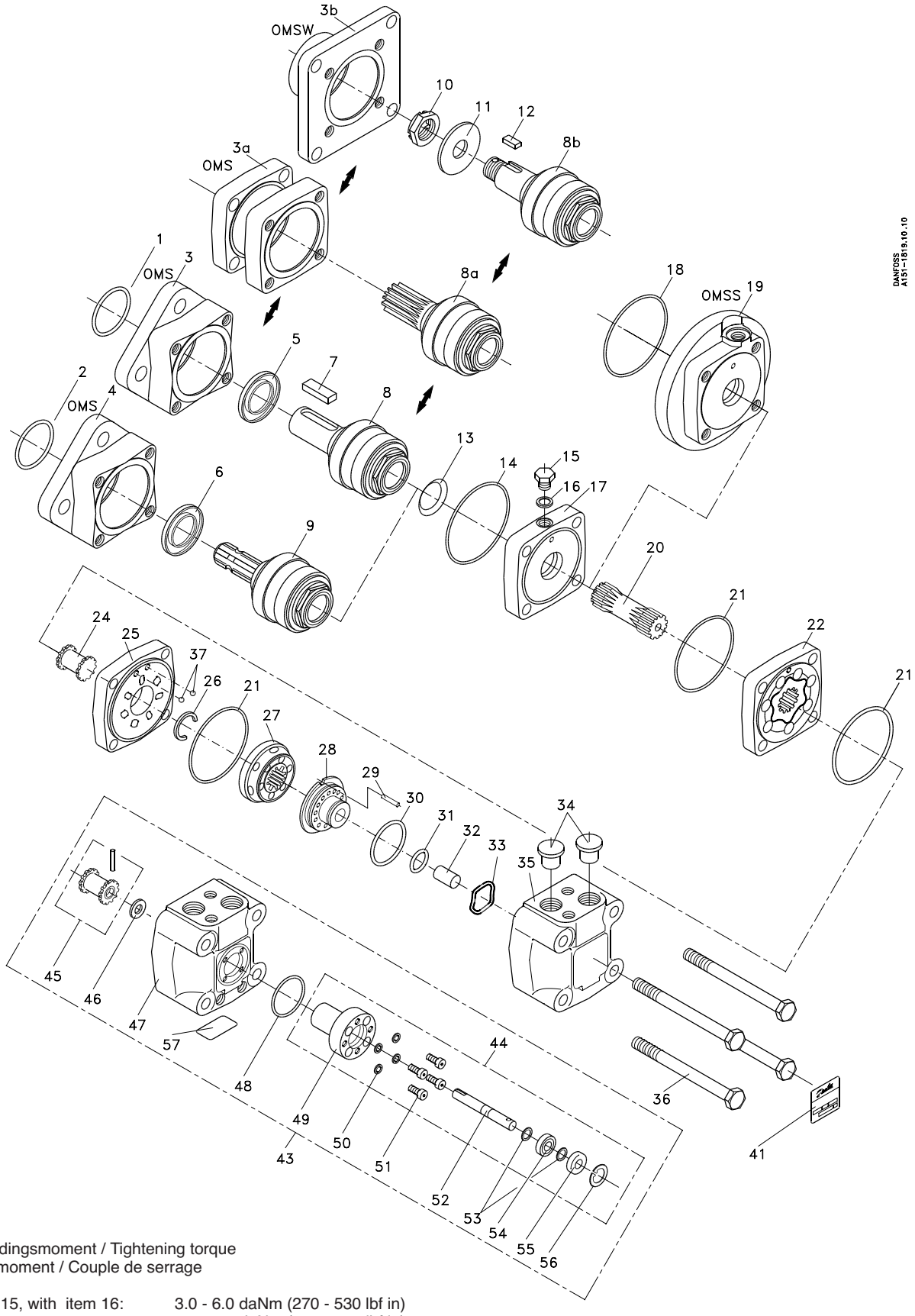
**Exploded view OMS series 2**




Tilspændingsmoment / Tightening torque
Anzugsmoment / Couple de serrage

| | | |
|---|---|---|
| Item | 15, with item 16: | 3.0 - 6.0 daNm (270 - 530 lbf in) |
| Item | 36: | 7.5 - 8.0 daNm (660 - 705 lbf in) |
| Item | 40: | 1.0 - 1.5 daNm (90 - 130 lbf in) |
| Item | 51: | 0.4 - 0.6 daNm (35 - 55 lbf in) |

**Exploded view OMS series 3**




Tilspændingsmoment / Tightening torque
Anzugsmoment / Couple de serrage

| | | |
|---|---|---|
| Item | 15, with item 16: | 3.0 - 6.0 daNm (270 - 530 lbf in) |
| Item | 36: | 7.5 - 8.0 daNm (660 - 705 lbf in) |
| Item | 40: | 1.0 - 1.5 daNm (90 - 130 lbf in) |
| Item | 51: | 0.4 - 0.6 daNm (35 - 55 lbf in) |

**Spare parts list**

| Item | Spare parts | | Code No. | Stock per 100 motors** Number per motor OMS Series 2 | 3 | |
|---|---|---|---|---|---|---|
| 1 | Dust seal ring | 35 x 42 x 3.5 mm | 633B3198 | 1 | 1 | * |
| 2 | Dust seal ring (p.t.o.) | 40 x 47 x 4.0 mm | 633B3356 | 1 | 1 | * |
| | Bearing housing | | | | | |
| 3 | OMS | | 151F1534 | 1 | 1 | 2 |
| 3a | OMS with special flange | | 151F1536 | 1 | 1 | 2 |
| 3b | OMSW | | 151F1535 | 1 | 1 | 2 |
| 4 | OMS (p.t.o.) | | 151F1549 | 1 | 1 | 2 |
| 5 | Shaft seal ISO R 1629 | 35 x 52 x 5.9 mm NBR | 633B3197 | 1 | 1 | * |
| | | 35 x 52 x 5.9 mm FPM | 633B3196 | 1 | 1 | * |
| 6 | Shaft seal (p.t.o.) ISO R 1629 | 40 x 60 x 6.0 mm NBR | 633B3355 | 1 | 1 | * |
| 7 | Parallel key | A 10 x 8 x 45 mm | 682L8019 | 1 | 1 | 5 |
| 8 | Cylindrical shaft ø32 mm with bearings incl. item 7; | | 151F0112 | 1 | 1 | 2 |
| 8a | Splined shaft 1 1/4 in with bearings; | | 151F0113 | 1 | 1 | 2 |
| 8b | Tapered shaft 35 mm with bearings; incl. item 10, 11 and 12 | | 151F0114 | 1 | 1 | 2 |
| 9 | P.t.o. shaft incl. bearing, DIN9611 | | 151F0116 | 1 | 1 | 2 |
| 10 | Castellated nut | M20 x 1.5 mm | 681X8235 | 1 | 1 | 5 |
| 11 | Washer | 20.5 x 44 x 4 mm | 684X2530 | 1 | 1 | 5 |
| 12 | Parallel key | B6 x 6 x 20 mm | 682L8021 | 1 | 1 | 5 |
| 13 | Seal ring | | 633B9023 | 1 | 1 | * |
| 14 | O-ring | 70 x 2 mm NBR ISO 1629 | 633B1379 | 1 | 1 | * |
| 15 | Drain plug | G1/4 (ISO228/1) | 151-1524 | 1 | 1 | 10 |
| 16 | Washer | 13.5 x 17.5 x 1.5 mm | 684X2120 | 1 | 1 | 5 |
| 17 | Intermidiate plate | | 151F1811 | | 1 | 5 |
| | | | 151F1538 | 1 | | 5 |
| 18 | O-ring for OMSS | 100 x 3 mm NBR ISO 1629 | 151F1033 | 1 | 1 | 10 |
| 19 | Mounting flange for OMSS | | 151F1817 | | 1 | 5 |
| | | | 151F1486 | 1 | | 5 |
| 20 | Cardan shaft | | | | | |
| | OMS/OMSW/OMSS 80 | l = 70 mm | 151F1461 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 100 | l = 73 mm | 151F1462 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 125 | l = 78 mm | 151F1463 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 160 | l = 84 mm | 151F1464 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 200 | l = 91 mm | 151F1769 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 250 | l = 99.5 mm | 151F1770 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 315 | l = 111 mm | 151F1829 | 1 | 1 | 3 |
| | OMS/OMSW/OMSS 400 | l = 124.5 mm | 151F1830 | 1 | 1 | 3 |
| 21 | O-ring | 82.5 x 2 mmNBR ISO R 1629 | 633B1431 | 2 | 3 | * |

NBR: (Buna N, Perbunan); FPM (Viton)

**Spare parts list**

| Item | Spare parts | Code No. | Number per motor OMS Series 2 | Number per motor OMS Series 3 | Stock per 100 motors** |
|---|---|---|---|---|---|
| 22 | Gearwheel set **Series 3** | | | | |
| | OMS/OMSW/OMSS 80 w = 14 mm | 151F1081 | | 1 | 5 |
| | OMS/OMSW/OMSS 100 w = 17 mm | 151F1082 | | 1 | 5 |
| | OMS/OMSW/OMSS 125 w = 22 mm | 151F1083 | | 1 | 5 |
| | OMS/OMSW/OMSS 160 w = 28 mm | 151F1084 | | 1 | 5 |
| | OMS/OMSW/OMSS 200 w = 35 mm | 151F1085 | | 1 | 5 |
| | OMS/OMSW/OMSS 250 w = 44 mm | 151F1086 | | 1 | 5 |
| | OMS/OMSW/OMSS 315 w = 55 mm | 151F1087 | | 1 | 5 |
| | OMS/OMSW/OMSS 400 w = 68.4 mm | 151F1088 | | 1 | 5 |
| | Gearwheel set **Series 2** | | | | |
| | OMS/OMSW/OMSS 80 w = 14 mm | 151F1036 | 1 | | 5 |
| | OMS/OMSW/OMSS 100 w = 17 mm | 151F1037 | 1 | | 5 |
| | OMS/OMSW/OMSS 125 w = 22 mm | 151F1038 | 1 | | 5 |
| | OMS/OMSW/OMSS 160 w = 28 mm | 151F1039 | 1 | | 5 |
| | OMS/OMSW/OMSS 200 w = 35 mm | 151F1040 | 1 | | 5 |
| | OMS/OMSW/OMSS 250 w = 44 mm | 151F1041 | 1 | | 5 |
| | OMS/OMSW/OMSS 315 w = 55 mm | 151F1042 | 1 | | 5 |
| | OMS/OMSW/OMSS 400 w = 68.4 mm | 151F1059 | 1 | | 5 |
| 23 | Guide pin ø 4 mm, l = 6 mm DIN 6325 | 682L2006 | 1 | | 5 |
| 24 | Valve drive | 151F1448 | 1 | 1 | 5 |
| 25 | Channel plate | 151F1821 | | 1 | 5 |
| | | 151F1023 | 1 | | 3 |
| 26 | Stop ring (only OMSS 200, 250, 315 and 400 | 151F1542 | 1 | 1 | 3 |
| 27 | Disc valve | 151F1022 | 1 | 1 | 3 |
| 28 | Balance plate a) | 151F1738 | 1 | 1 | 3 |
| 29 | Guide pin ø 4 mm, l = 20 mm DIN 1481 a) | 682L9105 | 1 | 1 | 5 |
| 30 | O-ring 45 x 2 mm | | | | |
| | NBR, ISO R 1629 | 633B1429 | 1 | 1 | * |
| | FPM, ISO R 1629 | 633B1455 | 1 | 1 | * |
| 31 | O-ring 24 x 2 mm | | | | |
| | NBR, ISO R 1629 | 633B1428 | 1 | 1 | * |
| | FPM, ISO R 1629 | 633B1453 | 1 | 1 | * |
| 32 | Spacer | 151F1449 | 1 | 1 | 2 |
| 33 | Spring washer a) | 684X0097 | 1 | 1 | 5 |
| 34 | Seal plug G 1/2 | 633X0074 | 2 | 2 | 20 |
| 35 | Valve housing | 151F1801 | | 1 | 2 |
| | a) | 151F1445 | 1 | | 2 |

NBR: (Buna N, Perbunan); FPM (Viton)

**Spare parts list**

| Item | Spare parts | | | Code No. | Stock per 100 motors** Number per motor OMS Series 2 | 3 | |
|---|---|---|---|---|---|---|---|
| 36 | Screw M10 | | | | | | |
| | OMS/OMSW | 80 | l = 120 mm | 681X1349 | 4 | 4 | 12 |
| | OMS/OMSW | 100, 125 | l = 130 mm | 681X1350 | 4 | 4 | 12 |
| | OMS/OMSW | 160, 200 | l = 140 mm | 681X1352 | 4 | 4 | 12 |
| | OMS/OMSW | 250 | l = 150 mm | 681X1353 | 4 | 4 | 12 |
| | OMS/OMSW | 315 | l = 160 mm | 681X1356 | 4 | 4 | 12 |
| | OMS/OMSW | 400 | l = 180 mm | 681X0038 | 4 | 4 | 12 |
| | OMSS | 80, 100 | l = 100 mm | 681X1347 | 4 | 4 | 12 |
| | OMSS | 125, 160 | l = 110 mm | 681X1348 | 4 | 4 | 12 |
| | OMSS | 200 | l = 120 mm | 681X1349 | 4 | 4 | 12 |
| | OMSS | 250 | l = 130 mm | 681X1350 | 4 | 4 | 12 |
| | OMSS | 315 | l = 140 mm | 681X1352 | 4 | 4 | 12 |
| | OMSS | 400 | l = 150 mm | 681X1353 | 4 | 4 | 12 |
| 37 | Check valve ball | | ø3/16 in | 689X1005 | | 2 | 10 |
| | | | ø1/4 in | 689X1015 | 2 | | 10 |
| 38 | Check valve spring | | | 013-0662 | 2 | | 10 |
| 39 | Washer | 10.2 x 13.5 x 1 mm | | 684X2564 | 2 | | 10 |
| 40 | Check valve plug | G 1/8 (ISO228/1) | | 631X2053 | 2 | | 10 |
| 41 | Name plate (adhesiv) | | | | | | |
| | Aluminium OMS/OMSW/OMSS | | | 151A0407 | 1 | 1 | 15 |
| | Brass OMS/OMSW/OMSS | | | 151A0408 | 1 | 1 | 15 |
| 43 | Tacho valve housing, complete | | | 151F0137 | | 1 | 2 |
| | | | a) | 151F0100 | 1 | | 2 |
| 44 | Tacho connection, complete | | | 151F1031 | 1 | 1 | 3 |
| 45 | Tacho valve drive + guide pin | | | 151F1032 | 1 | 1 | 2 |
| 46 | Spacer ring | | | 151F1502 | 1 | 1 | 2 |
| 47 | Tacho valve housing | | | 151F1802 | | 1 | 1 |
| | | | a) | 151F1498 | 1 | | 1 |
| 48 | O-ring | 40 x 2 mm | | 633B1378 | 1 | 1 | 4 |
| 49 | Bearing housing | | | 151F1499 | 1 | 1 | 1 |
| 50 | Washer | 5.6 x 8.5 x 1 mm | | 684X2012 | 4 | 4 | 20 |
| 51 | Screw M5; | l = 15 mm | | 681X1880 | 4 | 4 | 16 |
| 52 | Tacho drive shaft | | | 151F1500 | 1 | 1 | 1 |
| 53 | Locking ring | UR 6 x 0.7 mm DIN6799 | | 682L4922 | 2 | 2 | 4 |
| 54 | Bearing | 8 x 22 x 7 mm | | 981X1020 | 1 | 1 | 2 |
| 55 | Shaft seal | | | 633B3175 | 1 | 1 | 2 |
| 56 | Locking ring | N 22 x 1 mm DIN427 | | 682L4008 | 1 | 1 | 2 |
| 57 | Name plate (Tacho) | | | 151A0410 | 1 | 1 | 4 |

NBR: (Buna N, Perbunan); FPM (Viton)
a, Se kommentarer side 3
a, See comments page 3
a, Siehe Kommentare Seite 3
a, Voir commentaire à la page 3

**Spare parts list**

| Item | Spare parts | Code No. | Number per motor OMS Series 2 | Number per motor OMS Series 3 | Stock per 100 motors** |
|---|---|---|---|---|---|
| A | Set of seals NBR, ISO R 1629,<br>OMS/OMSW<br>Item 1, 5, 13, 14, 21, 30 and 31<br>OMS (p.t.o)<br>Item 2, 6, 13, 14, 21, 30 and 31 | 151F0111<br><br>151F0117 | 1<br><br>1 | 1<br><br>1 | 10<br><br>10 |
| B | Set of seals NBR, ISO R 1629,<br>OMSS Item 13 ,18, 21, 30 and 31 | 151F0103 | 1 | 1 | 10 |
| C | Set of seals NBR, ISO R 1629<br>OMSS<br>Item 13 and 18 | 151F1033 | 1 | 1 | 10 |
| D | Set of seals FPM, ISO R 1629<br>OMS/OMSW/OMSS<br>Item 1, 5, 30 and 31 | 151F0109 | 1 | 1 | 10 |

NBR: (Buna N, Perbunan); FPM (Viton)
a, Se kommentarer side 3
a, See comments page 3
a, Siehe Kommentare Seite 3
a, Voir commentaire à la page 3

* Indeholdt i reservedelsposen A eller D

* Conained in spare parts bag A or D

* Im Ersatzteilbeutel A oder D enthalten

* Contenu dans le sachet de pièces de rechamge A ou D

** Antallet af reservedele som Debør have på lager for hver 100 motorer der er i brug i Deres område.

** The number of spare parts to be held in stock for each 100 motors being in service in your district.

** Die Anzahl von Ersatzteilen, die Sie für je 100 Motoren, die in Ihrem Gebiet verwendet werden, auf Lager haben sollten.

** Les Quantités de pièce de rechange que vous devez prévoir en stock pour 100 moteurs actuallement en service dans votre secteur.

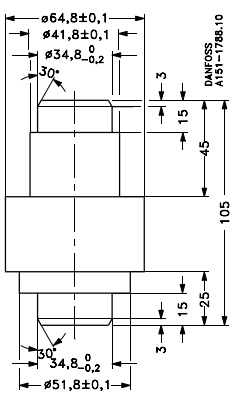
## Special tools

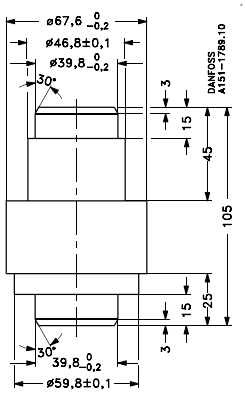
**A**

**B**

**C**

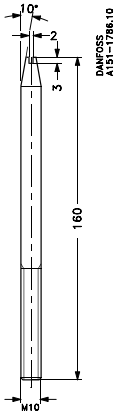
**D**



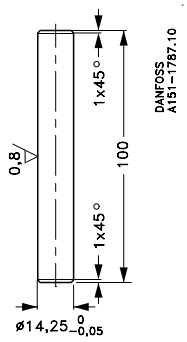




p.t.o.

**E**




**F**




A Main holding tool. Code no.: SJ 151-9000-1
B Holding tool for OMSS. Code no.: SJ 151F9000-1
C Holding tool for OMSW. Code no.: SJ 151B9000-1
D Mandrel for fitting shaft seal.
E Two guide bolts.
F Mandrel to remove balance plate.

Note: D, E, and F cannot be bought from Danfoss.

**Dismantling**

| Item | Part to remove | Comments |
|---|---|---|
| 7 or 12 | Parallel key | Cylindriske eller koniske aksler.<br>Cylindrical or tapered shafts.<br>Zylindrischen oder konischen Wellen.<br>Les arbres cylindriques ou coniques. |
| *) 13 | Conical seal ring | |
| 15, 16 | Drain plug and washer | |
| 34 | Seal plugs (2 off) | Anbring motor i holdeværktøj.<br>Place the motor in holding tool.<br>Den Motor im Haltewerkzeug anbringen.<br>Placer le moteur dans un appareil de fixation. |
| 40 | Plugs (2 off) Series 2 only | Benyt 5 mm unbrakoskruenøgle.<br>Use 5 mm Allen head spanner.<br>5 mm Innensechskantschlüssel benutzen.<br>Utiliser une clé Allen de 5 mm. |
| 39 | Washer (2 off) Series 2 only | |
| 38 | Springs (2 off) Series 2 only | Tip motor, hvorefter fjedre og kugler falder ud.<br>Tilt motor, springs and balls come out.<br>Motor neigen; Federn und Kugeln fallen heraus<br>Les ressorts et les billes sortent d'eux-mêmes en inclinant le moteur. |
| 37 | Ball (2 off) Series 2 only | |
| 36 | Srew (4 off) | Benyt 17 mm topnøgle.<br>Use 17 mm socket spanner.<br>Einen 17 mm Steckschlüssel verwenden.<br>Utiliser clé à douille 17 mm. |
| 35 | Valve housing | Placer fingrene under kanalpladen (pos. 25) og løft forsigtigt hele enheden ud.<br>Lift off carefully as a unit, holding your fingers under the channel plate (Item no.25).<br>Vorsichtig als Einheit abheben, indem Sie die Finger unter die Kanalplatte (Pos. 25) halten.<br>Soulever l'ensemble avec précaution en plaçant vos doigts sous la plaque profilée (pièce n° 25). |
| 25 | Channel plate | |
| 21 | O-ring | Series 2 (1 off), Series 3 (2 off) |
| 37 | Ball (2 off) Series 3 only | |
| 26 | Stop ring | Kun på OMSS 200, 250, 315 og 400<br>Only on OMSS 200, 250, 315 and 400<br>Nur an OMSS 200, 250, 315 und 400<br>Uniquement sur les OMSS 200, 250, 315 et 400. |
| 27 | Disc valve | |
| 32 | Spacer | |
| 28 | Balance plate | Fyld olie i hul for afstandsstykke, og skub balance plade op ved at bruge en ø14.25 mm dorn som stempel.<br>Fill in oil into the spacer hole and use the ø14.25 mm mandrel as a piston to press up the balance plate.<br>Öl in das Loch für das Distanzstück füllen und den Ø14.25 mm-Dorn als Kolben benutzen um die Ausgleichsplatte hochzudrücken.<br>Verser de l'huile par le trou de l'entretoise et utiliser le mandrin ø14.25 mm comme piston pour enfoncer la plaque de compensation. |

* OMSS only

**Dismantling**

| Item | Part to remove | Comments |
|---|---|---|
| 29 | Guide pin | |
| 30 | O-ring | |
| 31 | O-rin | |
| 33 | Spring washer | |
| 24 | Valve drive | |
| 23 | Guide pin Series 2 only | |
| 22 | Gearweel set | Hold fingrene under tandhjulsæt for at forhindre delene i at falde ud.<br>Hold fingers under the gearweel set to prevent the parts from dropping out.<br>Halten Sie die Finger unter das Zahnradsatz, um ein Herausfallen der Teile zu vermeiden.<br>Tenir le jeu d'engrenage par le dessous pour éviter de perdre des pièces. |
| 21 | O-ring | |
| 20 | Cardan shaft | |
| 17 | Intermediate plate | |
| 13 | Conical seal ring | Ikke på OMSS; er allerede fjernet.<br>Not on OMSS, is already removed.<br>Nicht bei OMSS; ist bereits entfernt.<br>Pas sur l'OMSS ; est déjà enlevé. |
| 14 | O-ring | |
| *)8<br>8a<br>8b<br>9 | Shaft incl. bearings | Vend lejehuset.<br>Pres aksel/lejeenhed ud ved hjælp af en hydraulisk presse (trykkraft max. 250 daN).<br>Bemærk:<br>aksel/lejeenhed må ikke demonteres!<br>Turn the bearing housing.<br>Press out the shaft/bearing assembly using a hydraulic press (pressing force max. 250 daN)<br>Note: Shaft/bearing assembly should not be dismantled!<br>Das Lagergehäuse wenden.<br>Die Wellen/Lager-Kombination mit Hilfe einer hydraulischen Presse (Preßdruck max. 250 daN) herauspressen.<br>Anmerkung: Die Wellen/Lager-Kombination darf nicht demontiert werden!<br>Tourner le logement de palier.<br>Extraire l'assemblage arbre-palier en utilisant une presse hydraulique (force maximale à exercer : 250 daN)<br>Attention : l'assemblage arbre-palier ne doit pas être démonté ! |

* Except OMSS

**Dismantling**

| Item | Part to remove | Comments |
|---|---|---|
| *) 1, 2 | Dust seal ring | Slå pos. nr. 1 og 5 ud ved hjælp af specialdorn. (“D” på side 7)<br>Item nos. 1 and 5 to be knocked out by means of the special mandrel. (“D” on page 7)<br>Pos. 1und 5 sind mit Hilfe des Spezialdorns herauszuschlagen. (“D” auf Seite 7)<br>Les pièces n°1 et 5 doivent être extraites à l’aide d’un mandrin spécial. (“D” en page 7) |
| *) 5, 6 | Shaft seal | |

**Tacho connection**

| Item | Part to remove | Comments |
|---|---|---|
| 51 | Screw (4 off) | |
| 44 | Tacho connection | Fjern den fra tachoventilhuset.<br>Remove from tacho valve housing.<br>Vom Tachoventilgehäuse entfernen.<br>Extraire du logement de valve du tachymètre. |
| 48 | O-ring | |
| 46 | Spacer ring | |
| 56 | Retaining ring | Løsn tachoakselenhed (ved at banke let på akselenden) og tag den ud af tachohuset.<br>Loosen tacho shaft package (by tapping lightly at the end of the shaft) and extract the package from tacho housing.<br>Die Tachowelleneinheit lösen (durch leichtes Schlagen am Wellenende) und die Einheit aus dem Tachogehäuse herausziehen.<br>Débloquer l’ensemble arbre du tachymètre (en tapant légèrement sur l’extrémité de l’arbre) et l’extraire du logement du tachymètre. |
| 55 | Shaft seal | |
| 53 | Retaining ring (2 off) | |
| 54 | Bearing | |

* Except OMSS

After dismantling, clean all parts in low aromatic kerosene.

Examine the parts and exchange them if necessary.

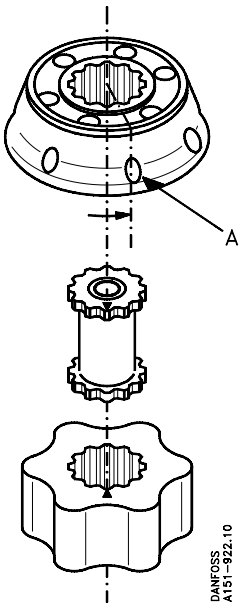
Immidiately before assembly, lubricate each part with hydraulic oil and grease rubber parts with vaseline.

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| *) 5, 6 | Shaft seal | Slå den på plads i lejehuset ved hjælp af monteringsdorn. Smør læbe med vaseline.<br>Knock into position in the bearing housing,using the assembly mandrel. Grease lip with vaseline.<br>Mit Montagedorn in das Lagergehäuse hineinschlagen. Lippe mit Vaseline einschmieren.<br>À enfoncer dans le logement de palier à l'aide du mandrin d'assemblage. Graisser la lèvre du joint à la vaseline. |
| *) 1, 2 | Dust seal ring | Benyt monteringsdorn og plasthammer. Smør læbe med vaseline.<br>Use assembly mandrel and plastic hammer. Grease lip with vaseline.<br>Montagedorn und Kunststoffhammer benutzen. Lippe mit Vaseline einschmieren.<br>Utiliser le mandrin d'assemblage, et le maillet en plastique. Graisser la lèvre du joint à la vaseline. |
| *) 8, 8a 8b, 9 | Shaft incl. bearings | Benyt den hydrauliske presse. (max. 250 daN). Bemærk: pres altid på lejets yderring.<br>Use the hydraulic press. (max. 250 daN). Note: Always press on the bearing outer ring.<br>Hydraulische Presse benutzen. (max. 250 daN). Anmerkung: Immer auf den Lageraußenring pressen.<br>Utiliser la presse hydraulique. (max. 250 daN). Attention : la pression doit toujours être exercée sur la bague extérieure du palier. |
| 17, 14<br>13 | Intermediate plate,<br>O-ring, conical seal ring | Skru de to styrebolte i lejehuset. Monter O-ring i lejehus. Monter den koniske tætningsring i mellempladens reces. Ringens største diameter skal vende mod mellempladen. Monter mellemplade på lejehuset med konisk tætningsring pejende nedad.<br>Screw the guide bolts into the bearing housing. Fit the O-ring into the bearing housing. Fit the conical seal ring (biggest diameter facing the intermediate plate) into the recess in the intermediate plate. Place the intermediate plate in position on the bearing housing with the conical seal ring downwards.<br>Die beiden Führungsbolzen in das Lagergehäuse einschrauben. Den O-Ring in Lagergehäuse montieren. Den kegeligen Dichtungsring in die Aussparrung in der Zwischenplatte montieren. Der größte Durchmesser des Rings muß gegen die Zwischenplatte gekehrt sein. Die Zwischenplatte mit dem kegeligen Dichtungsring zuerst auf das Lagergehäuse montieren.<br>Visser dans le carter de roulement les deux boulons de guidage. Monter le joint torique dans le carter de roulement . Monter la bague d'étanchéité conique dans l'évidiment de a plaque intermédiaire. Le diamètre le plus grand doit être orienté vers la plaque intermédiaire.<br>Monter la plaque intermédiaire dans le carter de roulement avec la baque d'etanchéité conique orientée vers le bas. |

* Except OMSS

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| 20 | Cardan shaft | Før kardanakslen ned i udgangsakslen så splines kommer i indgreb.<br>Guide the cardan shaft down into the output shaft so that the splines engage.<br>Kardanwelle in die Abtriebswelle hinabführen, so daß die Vielkeile in Eingriff kommen.<br>Descendre l'arbre à cardan dans l'arbre de sortie engageant les cannelures. |
| 21 | O-ring | Smør med vaseline.<br>Grease with vaseline.<br>Mit Vaseline einschmieren.<br>Graisser à la vaseline. |
| 22, 23 | Gearwheel set<br>  | Hold fingrene under tandhjulsættet for at forhindre delene i at falde ud. Læg forsigtig tandhjulsættet på mellempladen således at o-ringsrillen (OMS serie 3) eller hul til styrestift (OMS serie 2) peger opad. Gennemgående hul (6 mm) skal flugte med hul i mellempladen. Monter styrestiften (kun OMS serie 2) i tandkransen. Mærk tandhjulsættets hjul på det sted, hvor bunden af en indvendig tand befinder sig over for bunden af en udvendig placeret tand (se tegning).<br>Hold fingers under the gearwheel set to prevent parts falling out. Carefully lay the gearwheel set on the intermediate plate so that the O-ring groove (OMS series 3) or guide pin hole (OMS series 2) is upwards. The through-hole (6 mm) must line up with the hole in the intermediate plate. Fit the guide pin (OMS series 2 only) in the gear rim.<br>Mark the wheel of the gearwheel set at the point where the bottom of an internal tooth is opposite the bottom of an external tooth (see drawing).<br>Die Finger unter den Zahnradsatz halten, um ein Herausfallen der Teile zu verhindern. Den Zahnradsatz vorsichtig auf die Zwischenplatte legen, so daß die O-Ringrille (OMS Serie 3) oder das Loch im Führungsstift (OMS Serie 2) nach oben zeigen. Das durchgehende Loch (6 mm) muß mit dem Loch in der Zwischenplatte fluchten. Den Führungsstift im Zahnkranz montieren (nur OMS Serie 2).<br>Den Zahnradsatz an der Stelle kennzeichnen, an der sich der Boden eines Innenzahns gegenüber dem Boden eines Außenzahns befindet (siehe Zeichnung).<br>Glisser les doigts sous le jeu d'engrenages afin d'éviter la chute de pièces. Placer avec précaution le jeu d'engrenages sur la plaque intermédiaire de façon que la cannelure du joint torique (OMS série 3) ou l'orifice de la goupille-guide (OMS série 2) soit dirigé vers le haut. L'orifice traversant (6 mm) doit être aligné avec l'orifice de la plaque intermédiaire. Monter la goupille-guide (OMS série 2 uniquement) dans la couronne de l'engrenage.<br>Marquer la roue du jeu d'engrenage à l'endroit ou le creux de la dent intérieure se trouve en face du creux d'une dent placée à l'extérieur (voir croquis). |
| 24 | Valve drive | Mærk toppen af en tand på enden af ventildrevet med den bredeste fortanding. Sørg for at mærke på tandhjul og ventildrev flugter. Enden med bredeste fortanding skal pege opad.<br>(Bemærk: På motorer med tachoforbindelse skal stift på ventildrev pege opad).<br>Mark the tip of a spline tooth on the end of the valve rive with the widest splines. Line up mark on rotor and valve drive. The end with the widest splines must point upwards. |

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| 24 | Valve drive | (Note: Applies to motors with tacho connection: Pin on valve drive must point upwards).<br>Markieren Sie die Spitze eines Zahns am Ende des Ventilantriebs mit der breitesten Verzahnung. Die Markierungen am Zahnrad und Ventilantrieb miteinander fluchten. Das Ende mit der breitesten Verzahnung muß nach oben zeigen.<br>(Anmerkung: Gilt für Motoren mit Tachoanschluß: Der Stift am Ventilantrieb muß nach oben zeigen).<br>Marquer le pointe d'une dent de cannelure sur le bout de la commande de soupape avec la cannelure la plus large. Aligner la marque du rotor avec celle de la commande de soupape. L'extrêmité avec la cannelure la plus large doit tourner vers le haut.<br>(Attention : S'applique aux moteurs avec jonction de tachymètre ; la fiche placée sur la commande de soupape doit pointer vers le haut). |
| 21 | O-ring (OMS series 3: 2 off)<br>(OMS series 2: 1 off) | Smøres i vaseline og lægges i tandhjulsættets (kun OMS serie 3) og kanalpladens rille .<br>Grease with vaseline. Mount in the gearwheel (only OMS serie 3) and channel plate groove.<br>Mit Vaseline einschmieren. In die Rille des Zahnradsatzes (Nur OMS serie 3) und Kanalplatte einlegen.<br>Placer un joint torique (enduit de vaseline) dans le jeu d'engrenages (Uniquement OMS Serie 3) et la rainure de la plaque à canaux. |
| 25 | Channel plate (OMS series 3) | Monter kanalpladen sådan at o-ringsrillen vender opad og huller til kontraventil flugter med gennemgående hul i tandhjulsættet.<br>Fit the channel plate so that the O-ring groove is upwards and the check valve holes line up with the through-hole in the gearwheel set.<br>Die Kanalplatte so montieren, dass die O-Ringrille nach oben zeigt und die Löcher für das Rückschlagventil mit dem durchgehenden Loch im Zahnradsatz fluchten.<br>Monter la plaque à conduits de façon que la cannelure du joint torique soit orientée vers le haut et que les orifices du clapet anti-retour soient alignés avec l'orifice traversant du jeu d'engrenages. |
| | Channel plate (OMS series 2) | Monter kanalpladen sådan at styrestiften kommer i indgreb med hullet i kanalpladen.<br>Fit the channel plate so that the guide pin engages with the hole in the channel plate.<br>Kanalplatte so montieren, daß der Führungsstift mit dem Loch in der Kanalplatte in Eingriff kommt.<br>Monter la plaque à canaux de telle sorte que la goupille de guidage s'engrène avec le trou de la plaque à canaux. |
| 37 | Ball (2 off) OMS series 3 only | |
| 27 | Disc valve | Sørg for, at mærke på ventildrev flugter med et hul i yderkrans. (A på tegning). Drej skiveventil mod uret, indtil splines i de to dele går i indgreb.<br>Align mark on valve drive with a hole in the outer rim. (A on drawing). Turn disc valve counter clockwise until splines in the two parts engage.<br>Die Markierung am Ventilantrieb mit einer Bohrung im Außenkranz fluchten. (A auf der Skitse). Das Scheibenventil gegen den Uhrzeigersinn drehen bis die zwei Teile ineinandergreifen. |

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| 27 | Disc valve | Aligner la marque de la commande de soupape avec un des trous du bord extérieur (A sur le plan). Tourner la soupape à disque dans le sens des aiguilles d'une montre jusqu'à ce que les cannelures des deux pièces s'enclenchent. |
| 33 | Spring washer | Placer dem i ventilhus.<br>Place into valve housing.<br>Im Ventilgehäuse plazieren.<br>Positionner dans le logement de soupape. |
| 30, 31 | O-ring | Monter de to O-ringe (indfedtet i vaseline) i balancepladens riller.<br>Fit the two O-rings (greased with vaseline) in the balance plate grooves.<br>Die beiden O-Ringe (mit Vaseline eingefettet) in die Rillen der Ausgleichsplatte montieren.<br>Monter les deux joints toriques (enduits de vaseline) dans les rainures de la plaque d'équilibrage. |
| 29 | Guide pin | Monter i ventilhuset<br>Mount in valve housing<br>Im Ventilgehäuse montieren<br>Monter dans le carter de la glace à disque. |
| 28 | Balance plate | Monter i ventilhuset<br>Mount in valve housing<br>Im Ventilgehäuse montieren<br>Monter dans le carter de la glace à disque. |
| 32 | Spacer | Smør med vaseline for at forhindre afstands-stykke i at falde ud.<br>Grease with vaseline to prevent the spacer from dropping out.<br>Mit Vaseline einschmieren, um ein Herausfallen des Distanzstückes zu vermeiden.<br>Graisser à la vaseline pour empêcher l'entretoise de tomber. |
| 35 | Valve housing | Monter enheden på den resterende del af motoren. Portene skal pege i den samme retning som drænporten.<br>Mount unit on the rest of the motor. Ports should face in the same direction as the drain port.<br>Die Einheit am übrigen Teil des Motors montie-ren. Die Anschlüße sollten in die gleiche Richtung zeigen wie der Leckölanschluß.<br>Monter l'unité sur le reste du moteur. Les orifices doivent être dirigés dans la même direction que l'orifice de drainage. |
| 36 | Screw (4 off) | Smør gevindene og spænd skruerne krydsvis med 7.5 - 8.0 daNm.<br>Lubricate threads and cross tighten screws to 7.5 - 8.0 daNm.<br>Die Gewinde schmieren und die Schrauben kreuzweise mit 7.5 - 8.0 daNm anziehen.<br>Lubrifier les filetages et serrer les vis en croix au couple de 7.5 - 8.0 daNm. |

**Assembly**

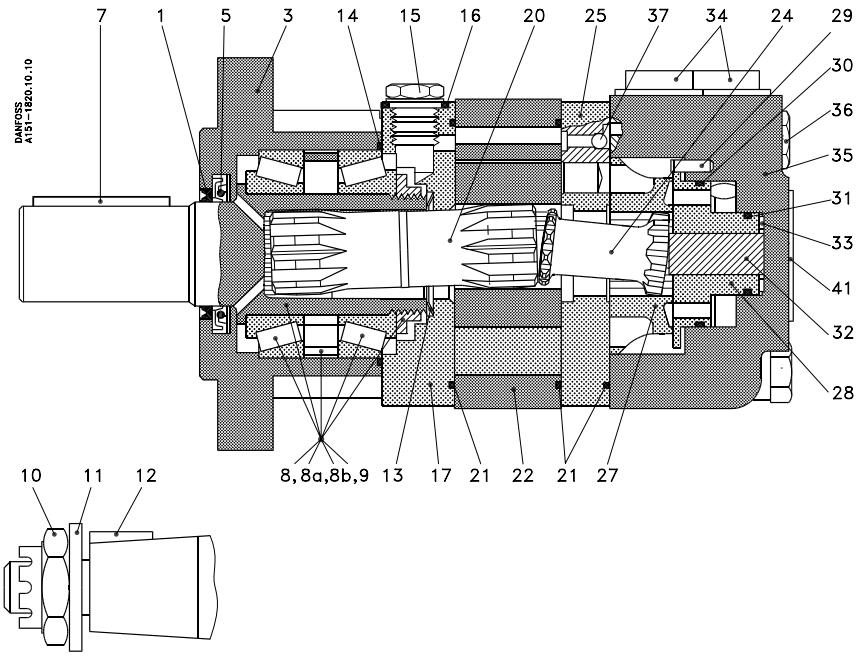
| Item | Part to mount | Comments |
|---|---|---|
| 37 | Ball (2 off) Series 2 only | |
| 38 | Spring (2 off) Series 2 only | |
| 39 | Washer (2 off) Series 2 only | |
| 40 | Plug (2 off) Series 2 only | Spænd dem med 1.0 - 1.5 daNm.<br>Tighten to 1.0 - 1.5 daNm.<br>Mit 1.0 - 1.5 daNm anziehen<br>Serrer au couple de 1.0 - 1.5 daNm. |
| 7 or 12 | Parallel key | Sikres med plastring eller tape.<br>Secure with plastic ring or tape.<br>Mit Kunsstoffring oder Klebeband sichern.<br>Fixer au moyen d'une bague en plastique ou du scotch. |
| 15, 16 | Drain plug<br>and washer | Fyld olie på motoren før tilpropning.<br>Spændes med 3.0 - 6.0 daNm.<br>Fill motor with oil before plugging.<br>Tighten to 3.0 - 6.0 daNm.<br>Vor dem Zustopfen den Motor mit Öl füllen.<br>Mit 3.0 - 6.0 daNm anziehen.<br>Remplir le moteur d'huile avant de vidanger.<br>Serrer au couple de 3,0 – 6,0 daNm. |
| *) 13 | Conical seal ring | Smør med vaseline for at holde den på plads.<br>Grease with vaseline to keep in place.<br>Mit Vaseline einfetten um ihn am Platz zu halten.<br>Coller à la vaseline pour les maintenir en place. |
| 34 | Seal plug (2 off) | |

* OMSS only

**Assembling of tacho connection**

The tacho connection must be reassemled in reverse order in relation to the procedure described under "disassemling the tacho connection".
4 screws (pos. 51) to be tightened to 0.4 - 0.6 daNm.

**OMS series 3**



# Danfoss Hydraulics Organization

Danfoss is an international concern with factories in 10 countries and subsidiaries in 32 countries. In addition to the hydraulic components, the Danfoss range of products includes refrigeration controls, industrial automatics, precision step systems, industrial instrumentations, electrical drives and controls, controls for heating plant, system controls, components for burners and boilers, compressors and thermostats for refrigerators and freezers.

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**6430 Nordborg**
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# Hydraulic motor OMM

## All standard versions and OMM with integrated pressure relief valve

DKHM.PS.170.A1.93 replaces HN.17.X2.93

**Contents**

**Specialudførelse**

Reservedelslisten kan ikke anvendes til bestilling af reservedele til OMM i specialudførelser. Kontakt venligst salgsorganisationen for Danfoss Hydraulik vedrørende dette spørgsmål.

**Special versions**

The list of spare parts cannot be used for ordering parts for special OMM versions. In this respect, please contact the sales organisation for Danfoss Hydraulics.

**Sonderausführung**

Die Ersatzteilliste kann nicht für Bestellung von Ersatzteilen für OMM in Sonderausführungen benutzt werden. Wenden Sie sich diesbezüglich bitte an die Verkaufsorganisation für Danfoss Hydraulik.

**Version spéciale**

La liste de pièces de rechange ne peut pas être utilisée pour commander pièces de rechange pour OMM en versions spéciales. A ce sujet, vous êtes priés de vous adresser à l'organisation de vente de composants hydrauliques Danfoss.

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**Vederlagsfri reparation**

Vi gør opmærksom på, at den vederlagsfrie reparation som er omtalt i Danfoss' Almindelige Leveringsbetingelser kun udføres hos Danfoss Nordborg eller hos Danfoss autoriserede service shops.

**Cost-free repairs**

Please note that cost-free repairs as mentioned in Danfoss' General Conditions of Sale, are carried out only at Danfoss Nordborg or at service shops authorised by Danfoss.

**Kostenlose Reparatur**

Beachten Sie bitte, daß die in den "Allgemeinen Lieferbedingungen" von Danfoss erwähnte kostenlose Reparatur nur bei Danfoss Nordborg oder bei den autorisierten Danfoss Kundendienstwerkstätten ausgeführt wird.

**Réparation gratuite**

Nous faisons observer que la réparation gratuite mentionnée dans les Conditions générales de Vente de Danfoss ne devra être effectuée que dans les ateliers Danfoss à Nordborg ou dans les ateliers de dépannage agréés par Danfoss.

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**Seriemærkning**

Serienummer ændres, når der foretages ændringer af dele i motorerne.
OMM er mærket med seriebetegnelse efter datomærkningen xxx-3

**Series marking**

The series number is altered when parts in the motor are changed.
The OMM series marking follows its date marking: xxx-3

**Serienkennzeichnung**

Bei Teileänderungen im Motor wird die Seriennummer geändert.
Die Kennzeichnung von OMM erfoLgt mit einer Serienbezeichnung nach dem Datumstempel: xxx-3

**Marquage de série**

A toute modification d'une ou de plusieurs pièces des moteurs correspond un changement de numéro de série.
Les moteurs OMM portent leur numéro de série à la suite de la date, par example: xxx-3

**Authorized Service Shops**

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| Australia | : | Danfoss (Australia) Pty. Ltd., Melbourne |
| Austria | : | Hainzl Industriesysteme, GmbH., Linz |
| Belgium | : | N.V. Danfoss S.A., Bruxelles |
| Brazil | : | Danfoss do Brasil Ind.e Com. Ltda., São Paulo |
| Canada | : | Danfoss Mfg. Ltd., Mississauga |
| Denmark | : | Danfoss Hydraulik A/S, Ganløse |
| Finland | : | OY Danfoss AB, Espoo |
| France | : | Danfoss S.a.r.l., Trappes (Paris) |
| Germany | : | Danfoss GmbH., Offenbach/Main |
| Great Britain | : | Danfoss Limited, Greenford (London) |
| Iceland | : | Hedinn Verslun HF, Reykjavik |
| India | : | Dantal Hydraulics PVT Ltd., New Delhi |
| Italy | : | Danfoss s.r.l. Division Sordella, Torino |
| Japan | : | Danfoss K.K., Gotemba |
| Korea | : | Unitek Corporation, Seoul |
| Netherlands | : | Itho B.V., Schiedam |
| New Zealand | : | Danfoss (New Zealand) Limited, Auckland |
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| Republic of South Africa | : | Danfoss (Pty) Ltd., Johannesburg |
| Singapore | : | Danfoss Industries Pte. Ltd., Singapore |
| Spain | : | Danfoss S.A., San Sebastian de los Reyes, (Madrid) |
| Sweden | : | Danfoss AB, Mjölby |
| Switzerland | : | Danfoss Werner Kuster AG, Frenkendorf |
| Turkey | : | Mert Teknik A.S., Istanbul |
| U.S.A. | : | Danfoss Fluid Power Div. Racine, Wisconsin |

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| Australia | : | Danfoss (Australia) Pty. Ltd., Perth |
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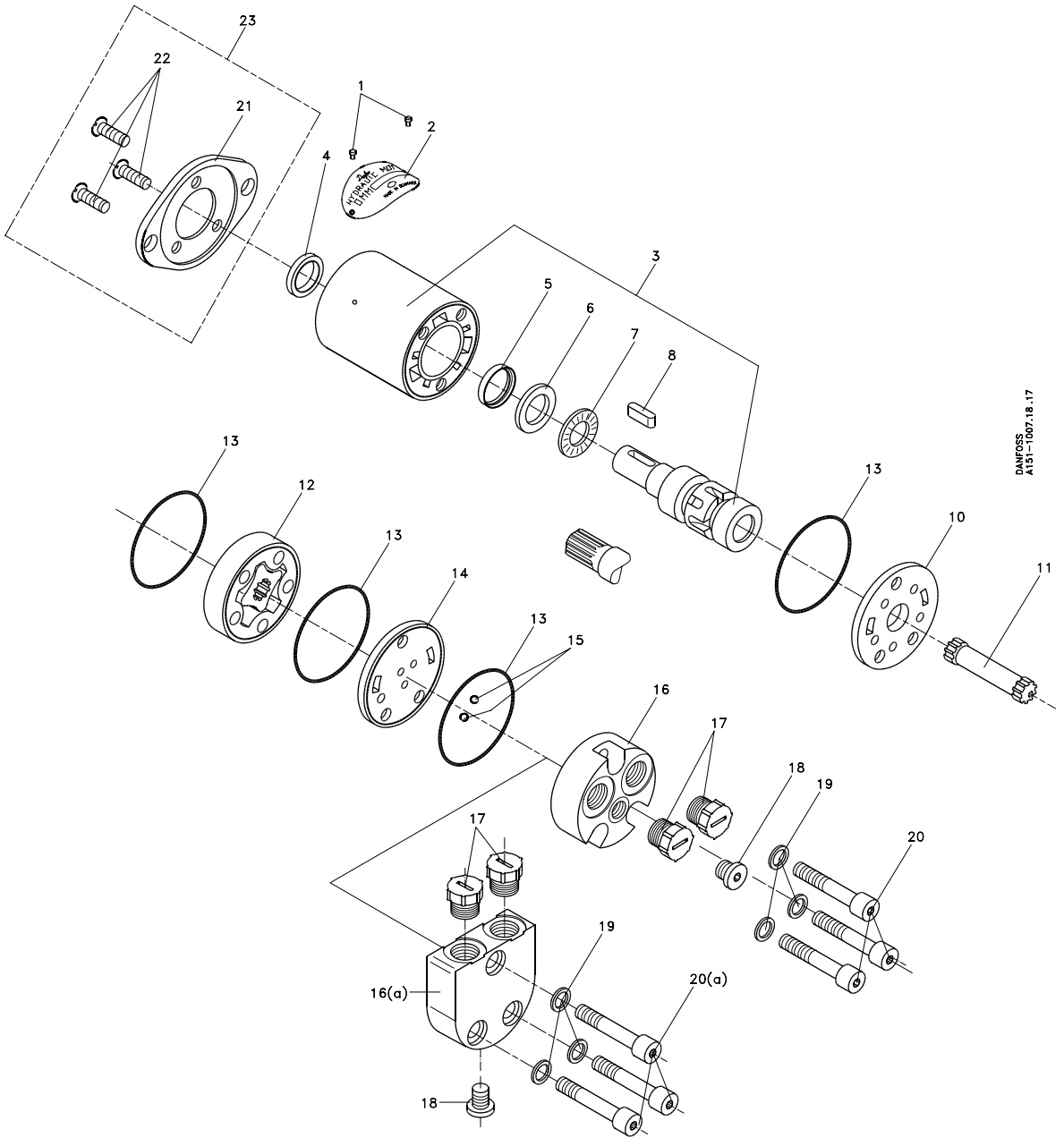
| Greece | : | A. Skoura & Co. E.E., Athens |
| New Zealand | : | Danfoss (New Zealand) Limited, Christchurch |
| Taiwan | : | Symbridge Machinery Co. Ltd., Taipei |

**Exploded view OMM series 3**




| Tilspændingsmoment / Tightening torque<br>Anzugsmoment / Couple de serrage | | | |
|---|---|---|---|
| Item | 18: | Drain plug | 0.5 - 1.0 daNm (45 - 90 lbf in) |
| Item | 20: | Screw M8 x 1.25 | 2.2 - 2.8 daNm (200 - 250 lbf in) |

**Spare parts list**

| Item | Spare parts | | Code No. | Number per motor | Stock per 100 motors** |
|---|---|---|---|---|---|
| 1 | Drive screw | | 681Z1011 | 2 | 100 |
| 2 | Name plate | | | | |
| | Aluminium | | 151A0237 | 1 | 10 |
| | Brass | | 151A0239 | 1 | 10 |
| 3 | Housing + output shaft | | Not sold separately | | |
| 4 | Dust seal ring | 17 x 23 x 5 mm NBR | 633B3373 | 1 | * |
| 5 | Shaft seal | | | | |
| | BAKHD ring | 17 x 28,2 x 5.5 mm NBR | 633B3208 | 1 | * |
| | BAHD ring | 17 x 28,2 x 5.5 mm FPM | 633B3390 | 1 | * |
| 6 | Bearing race | | 151G0307 | 1 | 15 |
| 7 | Axial needle bearing | | 981X3172 | 1 | 50 |
| 8 | Parallel key | | | | |
| | | 5 x 5 x 16 DIN 6885 | 682L8026 | 1 | 50 |
| | | 3/16 x 3/16 x 3/4 B.S. 46 | 682L8031 | 1 | 50 |
| 10 | Distributor plate | | 151G0314 | 1 | 10 |
| 11 | Cardan shaft | | | | |
| | OMM 8 | l = 54 mm | 151G0369 | 1 | 10 |
| | OMM 12.5 | l = 56 mm | 151G0101 | 1 | 10 |
| | OMM 20 | l = 59 mm | 151G0310 | 1 | 10 |
| | OMM 32/50 | l = 64 mm | 151G0311 | 1 | 10 |
| 12 | Gearwheel set | | | | |
| | OMM 8 | w = 3.5 mm | 151G0119 | 1 | 10 |
| | OMM 12.5 | w = 5.5 mm | 151G0101 | 1 | 10 |
| | OMM 20 | w = 8.5 mm | 151G0102 | 1 | 10 |
| | OMM 32 | w = 13.5 mm | 151G0103 | 1 | 10 |
| | OMM 50 | w = 21.5 mm | 151G0117 | 1 | 10 |
| 13 | O-ring | 54 x 1.5 mm NBR | 633B1487 | 4 | * |
| 14 | Intermediate plate | | 151G0332 | 1 | 10 |
| 15 | Check valve ball | | 689X1005 | 2 | 10 |
| 16 | End cover | | | | |
| | | G 3/8 in end ports | 151G0113 | 1 | 5 |
| | | 9/16 - 18 UNF end ports | 151G0110 | 1 | 5 |
| 16a | End cover | | | | |
| | | G 3/8 in side ports | 151G0109 | 1 | 5 |
| | | 9/16 - 18 UNF side ports | 151G0110 | 1 | 5 |
| 17 | Seal plugs | | | | |
| | | G 3/8 in ports | 633X7009 | 2 | 20 |
| | | 9/16 - 18 UNF ports | 633X7023 | 2 | 20 |
| 18 | Drain plug | | | | |
| | | G 1/8 thread | 631X2053 | 1 | 5 |
| | | 3/8 - 24 UNF ports | 151G0111 | 1 | 5 |
| 19 | Washer | 8.2 x 11.9 x 1 mm | 684X2481 | 3 | * |
| 20 | Screw M8 x 1.25; for end port motor | | | | |
| | OMM 8 | l = 40 mm | 681X0358 | 3 | 18 |
| | OMM 12.5 | l = 40 mm | 681X0358 | 3 | 18 |
| | OMM 20 | l = 45 mm | 681X0359 | 3 | 18 |
| | OMM 32 | l = 50 mm | 681X0360 | 3 | 18 |
| | OMM 50 | l = 55 mm | 681X0324 | 3 | 18 |
| 20a | Screw M8 x 1.25; for side port motor | | | | |
| | OMM 8 | l = 45 mm | 681X0359 | 3 | 18 |
| | OMM 12.5 | l = 45 mm | 681X0359 | 3 | 18 |
| | OMM 20 | l = 50 mm | 681X0360 | 3 | 18 |
| | OMM 32 | l = 55 mm | 681X0324 | 3 | 18 |
| | OMM 50 | l = 60 mm | 681X0098 | 3 | 18 |
| 21 | Mounting flange; for metric version only | | 151G0336 | 1 | 5 |

## Spare parts list

| Item | Spare parts | | | Code No. | Stock per 100 motors** Number per motor | |
|---|---|---|---|---|---|---|
| 22 | Screw M6 x 1.25 for mounting flange | | l = 12 mm | 681X2260 | 3 | 15 |
| 23 | Mounting flange and screws (Item 21 + 22) for metric version only. | | | 151G0211 | | |
| | Spare parts bag | | | 151G0202 | 1 | 5 |
| 4 | Dust seal ring | 1 pcs. | 633B3373 | | | |
| 5 | Shaft seal NBR | 1 pcs. | 633B3208 | | | |
| 13 | O-ring | 4 pcs. | 633B1487 | | | |
| 19 | Washer | 3 pcs | 684X2481 | | | |

NBR: (Buna N, Perbunan)

* Indeholdt i reservedelsposen.

* Contained in spare parts bag.

* Im Ersatzteilbeutel enthalten.

* Contenu dans le sachet de pièces de rechange.

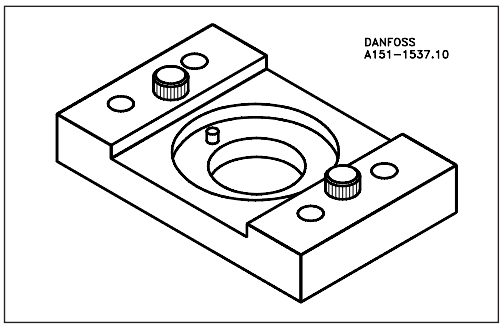
** Antall reservedele som De bør have på lager for hver 1000 motorer der er i brug i Deres område.

** The number of spare parts to be held in stock for each 1000 motors in operation in your district.

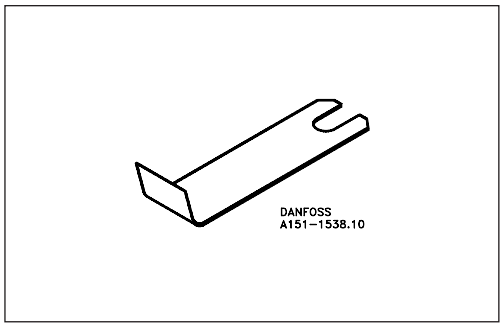
** Die Anzahl von Ersatzteilen, die Sie für je 1000 Motoren, die in Ihrem Gebiet verwendet werden, auf Lager haben sollten.

** Les quantités de pièce de rechange que vous devez prévoir en stock pour 1000 moteurs actuellement en service dans votre secteur.

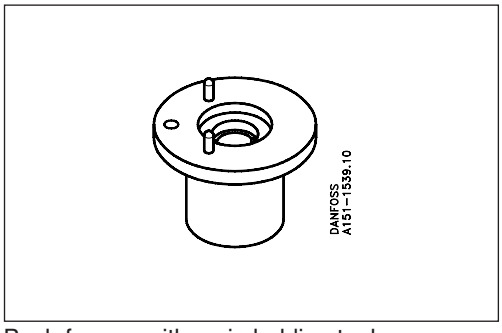
## Special tools



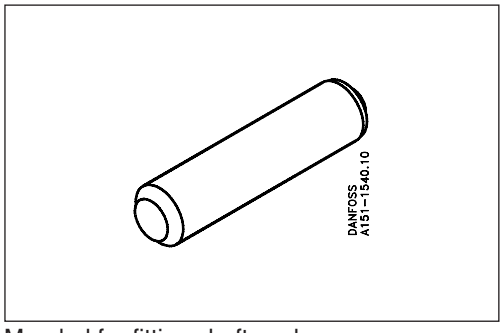

Main holding tool:
Code no.: SJ 150-9000-2




Fork. For use when fitting OMM cardan shaft.
Code no.: SJ 151G9000-1




Bush for use with main holding tool.
Code no.: SJ 151G9000-2




Mandrel for fitting shaft seal:
Code no.: SJ 151G9000-5

**Dismantling**

| Item | Part to remove | Comments |
|---|---|---|
| 8 | Key | Fjern feder fra udgangsaksel (kun cylindrisk aksel).<br>Remove key from output shaft. (Cylindrical shafts only).<br>Feder von der Abtriebswelle entfernen (nur zylindrische Welle).<br>Enlever la clavette de l'arbre de sortie (arbres cylindriques seulement). |
| 17 | Seal plugs | Placer motor i holdeværktøj med udgangsaksel nederst.<br>Place the motor in holding tool with the output shaft down wards.<br>Den Motor mit der Abtriebswelle nach unten im Haltewerkzeug anbringen.<br>Placer le moteur dans l'outil avec l'arbre de sortie en bas. |
| 18 | Drain plug | Benyt 5 mm unbrakonøgle.<br>Use 5 mm Allen key.<br>5 mm Inbusschlüssel benutzen.<br>Utiliser une clé Allen de 5 mm. |
| 19, 20 | Screws washers<br>(3 off) | Benyt 6 mm unbrakonøgle.<br>Use 6 mm Allen key.<br>6 mm Inbusschlüssel benutzen.<br>Utiliser une clé Allen de 6 mm. |
| 15, 16 | End cover<br>Check valves balls | Fjern endedæksel sideværts. Pas på kontraventilkugler.<br>Remove end cover sideways. Mind the check valve balls.<br>Den Enddeckel seitwärts entfernen. Auf Rückschlagventilkugeln achten.<br>Enlever le couvercle latéralement. Attention aux billes du clapet antiretour. |
| 13, 14 | O-ring<br>Intermediate plate | Fjern O-ring og mellemplade.<br>Remove O-ring and intermediate plate.<br>O-Ring und Zwischenplatte entfernen.<br>Enlever le joint torique et la plaque intermédiaire. |
| 12, 13 | Gearweel set<br>O-rings (2 off) | Hold fingrene under tandhjulsættet for at forhindre delene i at falde ud.<br>Hold fingers under the gearweel set to prevent the parts from dropping out.<br>Halten Sie die Finger unter dem Zahnradsatz, damit die Teile nicht herausfallen..<br>Tenir le jeu d'engrenage par le dessous pour éviter de perdre des pièces. |
| 11 | Cardan shaft | Fjern kardanakslen.<br>Remove cardan shaft.<br>Kardanwelle entfernen.<br>Enlever l'arbre à cardan |
| 13, 12 | Distributor plate | Fjern fordelerplade og O-ring.<br>Remove distributor plate and O-ring.<br>Verteilerplatte und O-Ring entfernen.<br>Enlever la plaque de distribution et le joint torique. |
| 3 | Output shaft | Tag udgangakslen ud af huset.<br>Take output shaft out of housing.<br>Abtriebswelle aus dem Gehäuse heraus nehmen.<br>Sortir l'arbre de sortie du carter. |
| 6, 7 | Bearing race<br>Axial needle bearing | Ryst nåleleje og løbeskinne ud af huset.<br>Shake needle bearing and bearing race out of housing.<br>Nadellager und Laufscheibe aus dem Gehäuse herausschütteln.<br>Secouer le carter pour le roulement à aiguilles et la baque de roulement. |

**Dismantling**

| Item | Part to remove | Comments |
|---|---|---|
| 4 | Dust seal ring | Fjern støvtætningsring med skruetrækker.<br>Remove dust seal ring with screwdriver.<br>Staubdichtungsring mit Schraubenzieher entfernen.<br>Enlever la baque anti-poussière avec un tournevis. |
| 5 | Shaft seal | Fjern akselpakning med skruetrækker.<br>Remove shaft seal with screwdriver.<br>Wellendichtung mit Schraubenzieher entfernen.<br>Enlever le joint d'arbre avec un tournevis. |

**Rensning, kontrol, udskiftning og smøring**

Rensning
Alle dele rengøres omhyggeligt.

Kontrol og udskiftning
Kontroller omhyggeligt alle dele og skift dem ud om nødvendigt.
Alle pakningsdele udskiftes i forbindelse med reparation.

Smøring
Smør alle enkeltdele ind i hydraulikolie og indfedt gummidele med vaseline før samling.

**Cleaning, inspection, replacement and lubrication**

Cleaning
Clean all parts carefully.

Inspection and replacement
Check all parts carefully and replace, if necessary.
All sealing parts must always be replaced during a repair.

Lubrication
Before assembly, lubricate all parts with hydraulic oil, and grease rubber parts with vaseline.

**Reinigung, Kontrolle, Austausch und Schmierung**

Reinigung
Alle Teile sorgfältig reinigen.

Kontrolle und Auswechselung
Alle Teile sorgfältig kontrollieren und - wenn nötig - auswechseln.
Alle Dichtungsteile müssen in Verbindung mit einer Reparatur ausgewechselt werden.

Schmierung
Vor dem Zusammenbau alle Einzelteile mit Hydrauliköl und Gummiteile mit Vaseline einfetten.

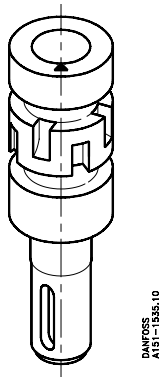
**Nettoyage, contrôle, remplacement et graissage**

Nettoyage
Nettoyer soigneusement toutes les pièces.

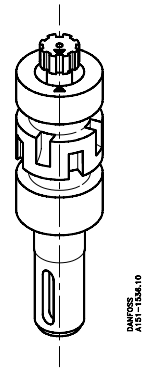
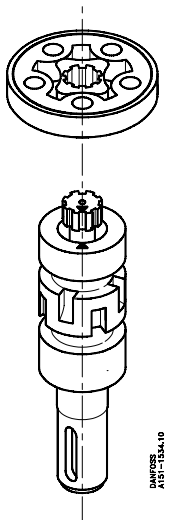
Contrôle et remplacement
Contrôler minutieusement toutes les pièces et les remplacer au besoin.
Lors d'une réparation, remplacer tous les joints.

Graissage
Avant de procéder à leur rassemblage, enduire toutes les pièces détachées d'huile hydraulique et tous les joints de vaseline.

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| 5 | Shaft seal | Monter akselpakning i motorhus ved hjælp af dorn og plastic hammer.<br>Fit shaft seal into motor housing by means of mandrel and plastic hammer.<br>Wellendichtung anhand Dorn und Kunststoffhammer ins Motorgehäuse montieren.<br>Monter le joint d'arbre dans le carter au moyen de mandrin et de marteau plastique. |
| 4 | Dust seal ring | Benyt monteringsdorn og plasthammer.<br>Use assembly mandrel and plastic hammer.<br>Montagedorn und Kunststoffhammer benutzen.<br>Utiliser le mandrin d'assemblage, et le maillet en plastique. |
| 6, 7 | Bearing race<br>Axial needle bearing | Monter nåleleje og løbeskive på aksel.<br>Fit needle bearing and bearing race on to shaft.<br>Nadellager und Laufscheibe auf die Welle montieren.<br>Remonter le roulement à aiguilles et la baque de roulement sur l'arbre. |
| 3 | Output shaft<br>  | Akselsølerne smøres med hydraulikolie.<br>Mærk udgangsakslen mellem to kommuteringsriller.<br>Før akslen på plads i motorhuset.<br>Grease the axle journals with hydraulic oil.<br>Mark output shaft in the middle between two commutation grooves. Install shaft in motor housing.<br>Die Gleitlager der Welle mit Hydrauliköl einschmieren.<br>Abtriebswelle zwischen zwei Kommutierungsrillen kennzeichnen. Welle ins Motorgehäuse montieren.<br>Enduire les paliers glissants d'huille hydraulique.<br>Avec un crayon à feutre, marquer la partie vanne de l'arbre de sortie en face du milieu de deux rainures de commutation.<br>Monter l'arbre dans le carter. |
| 8 | Parallel key | Monter feder i udgangsaksel.(Kun cylindrisk aksel).<br>Placer motorhus med aksel i holdeværktøj.<br>Fit key in to output shaft. (Cylindical shafts only).<br>Place motor housing with shaft in holding tool.<br>Feder in Abtriebswelle montieren. (Nur zylindrische Welle).<br>Motorgehäuse mit Welle ins Haltewerkzeug anbringen.<br>Monter la clavette dans l'arbre de sortie. (arbres cylindriques seulement). Placer le carter avec l'arbre dans l'outil de montage. |
| 13 | O-ring | Indfedt O-ringen og læg den i husets O-ringsrille.<br>Grease the O-ring and put into the O-ring groove in the housing.<br>Den O-Ring einfetten und in die O-Ring-Rille des Gehäuses legen.<br>Graisser le joint et le placer dans sa rainure dans le carter. |

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| 11 | Cardan shaft  | Før kardanakslen ned i udgangsaksel. Overfør markering fra udgangsaksel til kardanaksel.<br>Hold kardanakslen oppe ved brug af gaffel.<br>Guide the cardan shaft down into the output shaft. Transfer the mark from output shaft to cardan shaft. Support cardan shaft with the fork.<br>Kardanwelle in die Abtriebswelle einführen. Markierung von der Abtriebswelle auf die Kardanwelle übertragen. Kardanwelle mit der Gabel angehoben halten.<br>Glisser l'arbre à cardan dans l'arbre de sortie. Transposer le marquage de l'arbre de sortie à l'arbre à cardan. Maintenir l'arbre à cardan soulevé dans la fourche. |
| 10 | Distributor plate | Placer fordelerplade på huset. Drej fordelerplade så huller flugter.<br>Place the distributor plate on the housing. Turn the distributor plate so that the holes line up.<br>Verteilerplatte an das Gehäuse anbringen. Die Verteilerplatte so drehen, daß die Löcher fluchten.<br>Placer la plaque distribution sur le carter. Ajuster la plaque de distribution pour aligner les trous. |
| 13 | O-rings | Indfedt O-ringe og monter dem i riller i tandsæt.<br>Lubricate the O-rings and fit them into the recesses in the gearwheel set.<br>O-Ringe einfetten und in die Rillen im Zahnradsatz montieren.<br>Graisser les joints toriques et les remonter dans les encoches de jeu d'engrenages. |
| 12 | Gearwheel set  | Monter tandsæt på fordelerplade (og gaffel). For at sikre korrekt omløbsretning skal markeringen på kardanakslen være midt imellem 2 tandtoppe på tandhjulets udvendige fortanding.<br>Fit the gearwheel set onto the distributor plate (and fork). To ensure correct direction of rotation the mark of the cardan shaft must be in the middle of two tooth peaks on the external toothing of the gearwheel.<br>Zahnradsatz auf Verteilerplatte (und Gabel) montieren. Um die richtige Drehrichtung sicherzustellen, muß sich die Markierung der Kardanwelle zwischen zwei Zahnköpfen der äußeren Verzahnung befinden.<br>Remonter le jeu d'engrenages sur la plaque de distribution (et la fourche). Pour obtenir le sens de rotation correct, s'assurer que la marque sur l'arbre se trouve au milieu des deux pointes d'une dent extérieure du jeu d'engrenage. |
| 13 | O-ring | Indfedt O-ringen og monter den i rillen i mellempladen.<br>Lubricate the O-ring and fit it into the recess in the intermediate plate.<br>O-Ring einfetten und in die Rille der Zwischenplatte montieren.<br>Graisser le joint torique et le remonter dans l'encoche de la plaque intermédiaire. |

**Assembly**

| Item | Part to mount | Comments |
|---|---|---|
| 14 | Intermediate plate | Placer mellemplade på tandsæt så huller for sammenspændingsskruer flugter.<br>Place the intermediate plate on the gearwheel set so that the holes for tightening screws line up.<br>Zwischenplatte auf den Zahnradsatz so anbringen,daß die Löcher für die Befestigungsschrauben fluchten.<br>Placer la plaque intermédiaire sur le jeu d'engrenages pour aligner les trous des vis de fixation. |
| 15 | Check valves balls | Indfedt kuglerne og placer dem i hullerne i mellempladen.<br>Lubricate the check valve balls and place them in the holes in the intermediate plate.<br>Kugeln einfetten und in die Löcher in der Zwischenplatte anbringen.<br>Graisser les billes et les placer dans les trous de la plaque intermédiaire. |
| 16 | End cover | Monter endedæksel på mellemplade.<br>Fit the end cover onto the intermediate plate.<br>Enddeckel auf die Zwischenplatte montieren.<br>Remonter le couvercle sur la plaque intermédiaire. |
| 20 | Screws (3 off) | Skru de tre sammenspændingsskruer løst i huset og fjern gaffelen. Spænd herefter skruerne med momentnøgle. Tilspændingsmoment: 2.2 - 2.8 daNm.<br>Loosely screw the three retaining screws into the housing and remove the fork. Then tighten the screws with a torque wrench. Tightening torque: 2.2 - 2.8 daNm.<br>Die drei Verbindungsschrauben locker in das Gehäuse einschrauben und Gabel entfernen. Dann die Schrauben mit Drehmomentschlüssel anziehen.<br>Anzugsmoment: 2.2 - 2.8 daNm.<br>Visser sans resserrer les trois vis d'assemblage dans le carter et enlever la fourche. En utilisant une clé dynamométrique, resserrer ensuite les trois vis;<br>couple 2.2 - 2.8 daNm. |
| 17, 18 | Seal plugs<br>Drain plug | Skru plastpropper i tilslutningsporte. Skru drænprop i dræntilslutning med momentnøgle.<br>Tilspændingsmoment: 0.5 - 1.0 daNm.<br>Screw plastic plugs into connection ports.<br>Screw drain plug into the drain port with a torque wrench.<br>Tightening torque: 0.5 - 1.0 daNm.<br>Kunststoffstopfen in die Anschlußöffnungen einschrauben.<br>Leckölstopfen mit Drehmomentschlüssel in den Leckölanschluß montieren.<br>Anzugsmoment: 0.5 - 1.0 daNm.<br>Visser les bouchons synthétiques dans les orifices de raccordement.<br>Visser le bouchon de drainage dans le raccord de drainage avec une clé dynamométrique;<br>couple: 0.5 - 1.0 daNm. |

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Danfoss is an international concern with factories in 10 countries and subsidiaries in 32 countries. In addition to the hydraulic components, the Danfoss range of products includes refrigeration controls, industrial automatics, precision step systems, industrial instrumentations, electrical drives and controls, controls for heating plant, system controls, components for burners and boilers, compressors and thermostats for refrigerators and freezers.

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**Comments**

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