DYNACTO 12 to 100

INSTALLATION
MAINTENANCE

- General overview
- Tooling
- Installation
- Hydraulic remote control
- Adjustment of opening or closing adjustable end stops
- Actuator disassembly
- Actuator re-assembly
- Trouble-shooting

KSB is ISO 9001 approved
The purpose of this manual is to describe the installation/maintenance procedures and actions to be carried out in case of breakdowns or faulty operation of the ACTO 25 to 200 hydraulic actuators.

**DYNACTO 12 to 100 – Construction**

The spring cartridge 598 is welded so dismountable.

![Diagram showing chamber for closing and chamber for opening](image)

**DYNACTO represented with version closing upon missing oil pressure**

**Version with ball check valve**

**Version with quick coupling**

*Parts included in the spare parts kit*
## DYNACTO 12 to 100 – Construction

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<td>554.1</td>
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<td>Rod</td>
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<tr>
<td>598</td>
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<td></td>
<td></td>
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</table>
RECOMMENDED TOOLS (not supplied)
- Pneumatic screwing machine
- Mallet
- Open ended spanner 10 and 13
- Allen key 4
- Spur spanner Ø 7
- Clamp spring retaining ring
- Threaded rod M 8 for DYNACTO 12 and 25 and Threaded rod M12 for DYNACTO 50 and 100

SPECIAL TOOLING (not supplied)
- Definition drawings

TEST EQUIPMENT (not supplied)
- Hydraulic power pack 0-350 bar

CONSUMABLES
- Superflux HV46 oil
- Grease EPEXELF MO2 (Elf) or Multi MS2 (Total) or RETINAX HDM (Shell) or equivalent

INSTALLATION

BEFORE ANY ACTION
- Index the mounting position of the actuator onto the valve (Position N or M)
- Index the mounting position of the position plate 970.2 onto the housing 103
- Index the index position of the pinion 877 in comparison with the indications of the position plate 970.2

ADAPTATION
The adaptation onto the valves is achieved either directly or through adaptor parts:
- interchangeable inserts manufactured to the size and the shape of the different valve shafts
- adaptor flanges for coupling.

ACTUATOR POSITION ONTO THE VALVE
The actuator can be positioned in 4 positions, at 90° intervals.
Standard arrangement is N position 1
When a manual override is fitted on the actuator, the actuator should be mounted in accordance with M position 2.
If the actuator is disconnected, fit it onto the valve following the steps as defined before the uncoupling, then drain the actuator.

DYNACTO represented with version closing upon missing oil pressure
The arrangement position can be modified at site. The procedure below should be followed as well as the specific assembly operations as described in the maintenance procedure.
TRANSFORMATION Position N
- Remove the 4 screws 901,
- rotate the position plate 970.2 of 90°,
- Put in place the 2 screws 901,
- Remove the balls 486.2 with a screwdriver,
- Put in place the balls 486.2 in the 90° slot.
DRAINING PROCEDURE

PIPING CONNECTION
All components and pipework must remain sealed until connected.
All openings must be fitted with recommended plugs.
Pickling of internal surfaces of pipework is always necessary when pipes and fittings contain scale, corrosive products, magnetic particles or when pipeworks have to be welded or heated.
Pickling must be confined only to the pipework. All sensitive components (actuators, solenoid valves, deck boxes, ...) are to be isolated and bypassed. All traces of pickling, neutralising and cleansing solutions must be removed from the system before connection and oil filling.

DRAINING
All newly installed hydraulic systems require cleaning to remove foreign matters and any contamination.
In order to reduce the circulation time; it is advised to perform a first injection with nitrogen under a 30–40 bar pressure for a 30 second to 1 minute period.
All elements, part of the system (hydraulic power pack, distribution panel or stand, actuators) are delivered perfectly clean, with obturated ends.
Therefore, it is most important to flush all the pipe connections to the various equipment:
- hydraulic power pack towards solenoid valves rack or deck boxes
- solenoid valves rack or deck boxes towards the actuators.
Flushing through KSB AMRI components is not allowed.
All components must be disconnected or by-passed.

Under no circumstances, process pumps should be used for flushing.
The pump used for flushing must be a dedicated unit and be external to the system. The pump capacity should be such that the flow speed be maintained at a minimum of 5m/s to 8m/s (turbulent flow) throughout the system.
Oil must be introduced through the filling orifice; it should be properly filtered in accordance with cleanliness standards in force.
The filter must have the ability to accommodate the high flow rates required for turbulent flow flushing.
The required cleanliness class must be minimum ISO 18/15 according to ISO 4406 standards (equivalent to NAS 1638 class 9).

SYSTEM FILLING
During the filling operations, the flowmeter must be protected, therefore:

- after flushing connect the hydraulic pipes to the components
- open the flow restrictors F,
- connect the flexible connector R471-10200 to the hydraulic block fitted on the actuator, valve V closed.
- open the valve V,
- operate the solenoid valve
- Let the oil flowing 10 minutes minimum,
- Close the valve V,
- disconnect the flexible connector from the hydraulic block or from the actuator.
ADJUSTMENT OF STANDARD CLOSING ADJUSTABLE END STOPS

Adjustment amplitude: +/- 2°

Adjustable end stops are adjusted in the factory and do not need further adjustment at site.

This is of utmost importance for the perfect tightness of the valve.

After any intervention on the actuator, the correct adjustment of the adjustable end stops must be verified.

If need be, this adjustment will be modified as per the following procedure.

These operations are carried out on the two sides of the actuator.

The process of adjustment is identical for the cartridge spring, and in the case of an actuator with Quick coupling.

- Disconnect the oil supply,
- Remove the plug 916.2 and the sealing washer 411, unscrew by one turn the screw 904
- Screw or unscrew the cylinder cover 916.1 to increase or decrease the stroke of the rack.

The correspondence between +/- 2° and the length between the face of the mounting plate and the housing cylinder is the following:

- DYNACTO 12: X = +/- 0.70mm (approx. 1/3 turn of plug)
- DYNACTO 25: X = +/- 0.90mm (approx. 1/2 turn of plug)
- DYNACTO 50: X = +/- 1.10mm (approx. 1/2 turn of plug)
- DYNACTO 100: X = +/- 1.40mm (approx. 2/3 turn of plug)

For a good operation of the equipment, never exceed these values.

- Regularly check by putting under pressure the actuator until the adequate adjustment position is found.

- Tighten the socket screw 904 then replace the sealing washer 411 and the plug 916.2
ACTUATOR DISASSEMBLY

- Disconnect the oil supply and let the actuator be emptied of its oil.
- Check that the actuator is closed for an actuator with closing upon missing oil or opening for an actuator with opening upon missing oil
- Remove the actuator and accessories from the valve and place on a work bench
- Remove the accessories of the actuator
- Remove the position plate 970.2 and the lip seal ring 415.2
- Remove the circlips 932

- Extract the sub-unit pinion 877, O-rings 412.2 and 412.3, self-lubricating bearings 310.2 and 310.3 (DYNACTO 25–50 and 100)
- Extract plugs 916.2, sealing washers 411 and unscrew by 5 turns the screws 904

- Unscrew cylinder covers 916.1 and extract O-rings 412.1 and 412.5
- Remove the rack 87–15:
  - **DYNACTO 12 and 25:**
    - Actuators delivered since 2001 by drawing with a threaded rod M8 screwed in the rack.
    - Actuators delivered before the end of 2000 by pushing on one of its extremities.
  - **DYNACTO 50 and 100:**
    - by pulling using a threaded rod M12 screwed in the rack

- Extract the 2 lip seal rings 415.1 of the housing.
**PREPARATION OF PARTS**

All constitutive parts of the spare kits must be used.

- Check the internal cleanliness of the housing 103 and eliminate all the dirt and lightly lubricate.
- Mount the self-lubricating bearing 310.3 in the housing 103.

For this operation, it is advised to use tools as defined below.

This operation is not carried out on ACTO 200, the self-lubricating bearing 310.4 is not in the kit.

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**ACTUATOR RE-ASSEMBLY**

Material: Aluminium

0.5 to 45°

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Ø A</th>
<th>Ø B</th>
<th>Ø C</th>
<th>D</th>
<th>E</th>
<th>Ø F</th>
<th>Ø G</th>
<th>Ø H</th>
<th>I</th>
<th>J</th>
<th>K</th>
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<tbody>
<tr>
<td>12</td>
<td>46.5</td>
<td>33</td>
<td>+0.062</td>
<td>48</td>
<td>-0.025</td>
<td>-0.05</td>
<td>48</td>
<td>112</td>
<td>31</td>
<td>-0.025</td>
<td>-0.064</td>
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<tr>
<td>25</td>
<td>59</td>
<td>43</td>
<td>+0.062</td>
<td>61</td>
<td>-0.025</td>
<td>-0.05</td>
<td>61.5</td>
<td>140</td>
<td>41</td>
<td>-0.025</td>
<td>-0.064</td>
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<tr>
<td>50</td>
<td>73</td>
<td>50</td>
<td>+0.062</td>
<td>74.5</td>
<td>-0.025</td>
<td>-0.05</td>
<td>91</td>
<td>186</td>
<td>48</td>
<td>-0.025</td>
<td>-0.064</td>
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<tr>
<td>100</td>
<td>88.5</td>
<td>67</td>
<td>+0.074</td>
<td>90</td>
<td>-0.025</td>
<td>-0.05</td>
<td>105.5</td>
<td>207</td>
<td>65</td>
<td>-0.03</td>
<td>-0.076</td>
</tr>
</tbody>
</table>

- Brush clean the pinion 877, the rack 87-15 and cylinder covers 916.1. Ensure constantly these are free from shocks or scores on the sealing surfaces and bearings. Lightly sand-paper if necessary.
- Any shocks or scores not eliminated on the lip sealing surfaces of the rack make it unusable.
- Grease and mount O-rings

- O-rings 412.2 and 412.3 on pinion 877

sub-unit pinion

- O-rings 412.1 and 412.5 on cylinder cover 916.1

sub-unit cylinder cover

The same O-rings exist for the cartridge spring
RE-ASSEMBLY

Procedure for a DYNACTO with closing upon missing oil.

Strictly follow the order of operations

1 - Tighten of a few turns the first cylinder cover sub-unit until the overlap dimension $Y$ of cylinder cover face compared to the end of the housing cylinder is obtained.
   - DYNACTO 12: $Y = 12$ mm
   - DYNACTO 25: $Y = 13$ mm
   - DYNACTO 50: $Y = 16.5$ mm
   - DYNACTO 100: $Y = 21$ mm

2 - Check that:
   - Pistons are not corroded or scratched,
   - Joint grooves are clean.

Grease the rack 87-15 and the pistons without grease the extremities.

Slide cautiously opposite end (using a flat rod M12 for DYNACTO 50 and 100) up to bump in the Cylinder cover 916.1.

Extract the threaded rod.

3 - Mount 1st lip seal ring 415.1 in its groove
   Special care:
   - Lips outwards direction.
   - Lightly lubricate the lips.
   - Check the perfect insertion into its groove

4 - Housing and rack in a horizontal position:
   - Tighten the cylinder cover sub-unit until contact with the housing: This operation permit to push slightly the rack.

5 - Without moving the housing, nor the rack:
   - Remove the cylinder cover sub-unit and tighten side room for opening until the overlap dimension $Y$.

6 - Push slightly the rack with caution until to stumble in the cylinder cover sub-unit.
   - The grease is scraped through the joint and remains where it is necessary.

7 - Mount the second lip seal 415.1 and proceed in the same way as operation 3

8 - Tighten the first cylinder cover sub-unit until $Y = 0$
   (use preferably the spur spanner $Ø 7$)

9 - Tighten completely the cartridge spring in the housing, side room for closing

See page 11 for the continued operations.
RE-ASSEMBLY

Procedure for a DYNACTO with opening upon missing oil.

Strictly follow the order of operations

1. Tighten of a few turns the first cylinder cover sub-unit until the overlap dimension Y of cylinder cover face compared to the end of the housing cylinder is obtained.
   - DYNACTO 12 : Y = 12 mm
   - DYNACTO 25 : Y = 13 mm
   - DYNACTO 50 : Y = 16.5 mm
   - DYNACTO 100 : Y = 21 mm

2. Check that:
   - Pistons are not corroded or scratched,
   - Joint grooves are clean.
   - Grease the rack 87-15 and the pistons without greasing the extremities.
   - Slide cautiously opposite end (using a flat rod M12 for DYNACTO 50 and 100) up to bump in the Cylinder cover 916.1.
   - Extract the threaded rod.

3. Mount 1st lip seal ring 415.1 in its groove
   - Special care: lips outwards direction.
   - Lightly lubricate the lips.
   - Check the perfect insertion into its groove.

4. Housing and rack in a horizontal position:
   - Tighten the cylinder cover sub-unit until contact with the housing: This operation permit to push slightly the rack.

5. Without moving the housing, nor the rack:
   - Remove the cylinder cover sub-unit and tighten side room for opening until the overlap dimension Y.

6. Push slightly the rack with caution until to stumble in the cylinder cover sub-unit.
   - The grease is scraped through the joint and remains where it is necessary.

7. Mount the second lip seal 415.1 - and proceed in the same way as operation 3.

8. Tighten the first cylinder cover sub-unit until Y = 0
   (use preferably the spur spanner Ø 7)

9. Tighten completely the cartridge spring in the housing, side room for opening.

See page 11 for the continued operations.
Continued operations for a DYNACTO with closing and/or opening upon missing oil

10 - Test the functional tightness by putting under pressure each chamber:

- Oil pressure between 120 and 160 bar
- Duration: 5 minutes minimum

Check the perfect tightness at the level of:
- lip seal ring 415.1: leakage inside the housing
- O-rings of cylinder cover 12.1: leakage at the orifice of screws

Should leakage occur, disassemble all parts and:
- Check the surface of the rack and lip seal rings (415.1 in particular) and replace if found faulty.
- Start again very carefully the assembly from operation N° 1 until perfect tightness is obtained as per operation Nr 10
- Go to next step

11 - Tighten screw 904 until blocked and fit plugs 916.2 with their corresponding washers 411.

12 - Grease abundantly the pinion teeth 877 and self-lubricating bearing face.

13 - Fit the self-lubricating bearing 310.2 on pinion sub-unit.

14 - Progressively insert the sub-unit pinion into the actuator following the initial indexes.

15 - Put in place the circlips 932.

16 - Mount the sub-unit position plate following the initial indexes.

17 - Pressurize the actuator and check the good operation.

18 - Adjust end stops as described in the § Adjustment of opening or closing adjusting screws.

19 - Fully reassemble the actuator in its initial construction.
### TROUBLE SHOOTING

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<td>Damaged O-rings 412.1 and 412.5</td>
<td>Change O-rings 412.1 and 412.5</td>
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<tr>
<td>Damaged check valve 486.2</td>
<td>Change the sub-unit cylinder cover 916.1 + O-rings 412.1 and 415.2</td>
</tr>
<tr>
<td>Damaged lip seal ring 415.1</td>
<td>Change O-rings 415.1 and/or 412.3 and/or 412.2 and 415.2 + check the cleanliness of the oil in the actuator</td>
</tr>
<tr>
<td>Damaged lip seal ring 412.2</td>
<td>Change O-ring 412.1</td>
</tr>
<tr>
<td>Damaged O-rings of the interface</td>
<td>Change O-rings of the interface</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>Wrong applicabilities</td>
<td>Consult leaflet 8506</td>
</tr>
<tr>
<td>Wrong interface</td>
<td>Consult technical leaflet 8506 or contact the manufacturer</td>
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<tr>
<td>Wrong adjustment of travel stops</td>
<td>Refer to § &quot;Adjustment of travel stops&quot; of the maintenance manual</td>
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<tr>
<td>System improperly drained</td>
<td>Drain the actuator according to the procedure of the maintenance manual</td>
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<tr>
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<tr>
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</table>