Vacuum pump set
For hydromechanical operating mechanisms
Product manual - 1HDS680632 REV. A

The vacuum pump set 1HDS112160R0001 is designed to evacuate hydromechanical operating mechanisms of type AHMA and HMB in mounted, discharged condition before commissioning.
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1 General information
Trapped air may occur in the high-pressure hydraulic system of the operating mechanism for example due to changes of the operating position during shipping. Trapped air in the high-pressure hydraulic system may lead to malfunction of the operating mechanism. The operating mechanism has to be evacuated to remove this trapped air. Therefore, the vacuum pump set for hydromechanical operating mechanisms (1HDS112160R0001) has to be used.

Furthermore, this vacuum pump set may be also used for oil handling procedures on hydromechanical operating mechanisms. The oil handling procedure is not described in this manual.

2 Abbreviations
AHMA  Hydromechanical operating mechanism type A
CO   Close - Open
COV  Change over valve
HMB  Hydromechanical operating mechanism type B
SF₆  Sulphur-hexafluoride

3 Associated documents
• Technical description of oil handling kit  1HDS680617P0001
• Instruction for operation and maintenance  1HDH118041 or comparable

4 Scope of delivery
The vacuum pump set will be delivered in a transportation case. The scope of supply is shown in Figure 2. The detailed scope of supply is printed on a packing list provided with the transportation case.

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**02 Scope of supply**

1 Vacuum pump 110/230V, 50/60 Hz
2 Expansion tank 1.5 l
3 Spiral hose 7.5 m
4 Pressure gauge
5 Pipe connection 150 mm
6 Pipe connection 50 mm
7 Tank connection adapter G3/4"
8 Tank connection adapter G3/8"
9 Refill oil for vacuum pump
10 Power cable (Euro)
11 Combination lock
12 Pipe connection adapter 10S
13 Hydraulic hose 1 m
5 Safety instructions

- When using the vacuum pump set regard all local regulations concerning safety on work and those regulations of the operator of the installation.
- Do not install the vacuum pump on high exposed GIS parts. This may cause hazards. The spiral hose has sufficient length to operate the vacuum pump on the floor or an occasional working table.
- There is a risk of stumbling and slipping. Block the working place to prevent stumbling over the associated parts.
- Only personnel which has been trained on hydromechanical operating mechanisms and switching apparatus shall operate the vacuum pump set.
- Wear safety glasses, oil-resistant gloves and safety shoes during work.
- Do not release hydraulic oil of the operating mechanism or lubricating oil of the vacuum pump to the environment. Dispose oil-soaked clothes environmentally compatible. Hydraulic and lubricating oil is harmful to the environment.
- Avoid direct contact to hydraulic or lubricant oil. Direct contact may cause irritations. Clean affected sites with abundant amount of water.
- Do not breathing or swallowing hydraulic or lubricant vapor, mist and oil. Breathing high concentration levels or swallowing may cause damages to health or death.
- Do not put defective or damaged parts into operation. Replace damaged parts and parts which recommended period of use is exceeded by new parts. The device shall only be repaired by the manufacturer.
- For following switching operations of the operating mechanism on the coupled breaker, it has to be secured that the switching device is filled with SF₆ gas at appropriate operating pressure. The minimal oil level at fully charged operating mechanism should not be lower than the oil level given in the oil level charts of the technical description of the oil handling kit 1HDS680617P0001.

6 Standards and directives

The vacuum pump set is in conformance with the machine directive 2006/42/EG. Additional directives do not apply.

7 Shipping and storage

Transport and store the vacuum pump set only in the supplied transportation case to prevent damage and protect especially the spiral hose and the expansion tank from sunlight.
Store only in dry and dust-free areas. Storage temperature: +5°C ... +40°C

8 Commissioning

Check all parts of the vacuum pump set for damages before commissioning:
1. Check the vacuum pump for damages. If the vacuum pump is damaged do not put it into operation!
2. Check the expansion tank for damages. If the expansion tank is damaged it has to be replaced by a new one before commissioning!
3. Check the spiral and the hydraulic hose as well as the pipe connections for damages. If the spiral and the hydraulic hose or the pipe connections are damaged they have to be replaced by a new one before commissioning!
4. Check the period of use of the spiral and hydraulic hose. We recommend to replace the spiral and the hydraulic hose by a new one at least five years after purchase to prevent leakages and malfunctions.
9 Technical information

- Set the supply voltage selector switch of the vacuum pump to the appropriate supply voltage (110 V or 230 V) before starting work.
- For the evacuation process, the expansion tank has to be mounted in vertical position with the ball valve upwards to the tank connection of the operating mechanism. Therefore, either the straight or the angled pipe connection, the hydraulic hose or a combination of the different connection opportunities as well as the attached tank connection adapters have to be used. Which of the connection opportunities is applied depends on the type and the operation position of the operating mechanism and where appropriate.
- Hang up the expansion tank with the eyebolt to any applicable surroundings when the hydraulic hose is used as tank connection.
- A slight over pressure (~0.6 bar) may leak through the opened tank connection of the low pressure tank into the connected expansion tank when opening the pressure release lever/pressure release screw regularly.
- Hydraulic oil is exhausted from the low pressure tank of the operating mechanism to the expansion tank during the evacuation process. Thereby, foam may be generated. Attention must be paid that neither the hydraulic oil nor the foam is exhausted from the expansion tank into the vacuum pump. This may lead to damage of the vacuum pump. To avoid this, the ball valve has to be opened temporary to create a bypass to reduce the vacuum and let the hydraulic oil float back into the low pressure tank.
- The operating mechanism has to be ventilated according to the instruction for operation and maintenance (e. g. 1HDH118041) after the evacuation process has been completed (cf. operating instruction step 13).
- The first 5 CO-switching operations after the completed evacuation process must not be used for evaluation of the final switching characteristics (e. g. simultaneity).
- The mentioned pressure ranges are absolute pressure values (e. g. 50 mbar absolute). The provided pressure gauge has a relative pressure sensor display. Consequently, a conversion of absolute to relative pressure values with regard to the ambient atmospheric pressure is necessary.

10 Operating instructions

1. Open the tank connection of the low pressure tank.
2. Connect the expansion tank with any applicable connection opportunity shown in figure 3 to the tank with the pipe connection to the tank. If necessary use one of the tank connection adapters.
3. Connect the pressure gauge to the screw connection at the expansion tank.
4. Connect the vacuum pump with the spiral hose to the fast coupling connection at the expansion tank. Connect the power plug of the vacuum pump to the power supply.
5. Open the ball valve at the expansion tank.
6. Open the pressure release screw/lever slowly to discharge the disc spring stack.
7. Switch on the vacuum pump and lower the pressure of the hydraulic systems to ≤ 50 mbar absolute (5 kPa absolute) by closing the ball valve slowly. Meanwhile, press the pilot valves (ON/Close and OFF/Open) simultaneously/set the COV to intermediate position.
8. Keep the vacuum pressure at ≤ 50 mbar absolute (5 kPa absolute) for approx. 5 minutes. Meanwhile, press the pilot valves (ON/Close and OFF/Open) simultaneously/set the COV to intermediate position.
9. Finish the evacuation process: switch off the vacuum pump and open the ball valve slowly.
10. Disconnect the vacuum pump and the spiral hose from the expansion tank.
11. Let flow back the oil from the expansion tank to low pressure tank as far as possible.
12. Disconnect the expansion tank from the tank connection.
13. Ventilate the operating mechanism. Therefore, close the pressure release screw/lever and charge the operating mechanism fully (to PUMP OFF).
14. Check and correct the oil level according to the charts in the oil handling kit when necessary.
15. Close the tank connection again and tight it with 25 Nm.
11 Maintenance

<table>
<thead>
<tr>
<th>Part</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum pump 110/230 V, 50/60 Hz</td>
<td>1HDS112161R0001</td>
</tr>
<tr>
<td>Expansion tank 1.5 l</td>
<td>1HDS112166R0001</td>
</tr>
<tr>
<td>Spiral hose 7.5 m</td>
<td>1HDS112167P0001</td>
</tr>
<tr>
<td>Pressure gauge</td>
<td>1HDS112171R0001</td>
</tr>
<tr>
<td>Pipe connection 150 mm</td>
<td>1HDS112165R0001</td>
</tr>
<tr>
<td>Pipe connection 50 mm</td>
<td>1HDS112165R0002</td>
</tr>
<tr>
<td>Tank connection adapter G3/4*</td>
<td>1HDS112023P0125</td>
</tr>
<tr>
<td>Tank connection adapter G3/8*</td>
<td>9ABA460090P2080</td>
</tr>
<tr>
<td>Pipe connection adapter 10S</td>
<td>1HDS112177P0001</td>
</tr>
<tr>
<td>Hydraulic hose 1 m</td>
<td>1HDS112176P0001</td>
</tr>
</tbody>
</table>

12 Troubleshooting

Vacuum can not be generated.

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Aktion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum pump doesn’t work correctly.</td>
<td>Check vacuum pump for operation.</td>
</tr>
<tr>
<td>Hose or pipe isn’t connected correctly.</td>
<td>Check hose and pipe for correct connection.</td>
</tr>
<tr>
<td>Spiral or hydraulic hose is leaking.</td>
<td>Replace the spiral or the hydraulic hose by a new one.</td>
</tr>
<tr>
<td>Ball valve at expansion tank is opened.</td>
<td>Make sure that ball valve at expansion tank is closed.</td>
</tr>
<tr>
<td>Expansion tank is leaking.</td>
<td>Check that expansion tank bottom and top plates are screwed tight together.</td>
</tr>
</tbody>
</table>

13 Disposal

The vacuum pump set consists of materials which may be recycled. The main components are aluminum and plastics.

However, most of the components are directly in contact with hydraulic oil. Observe the local regulations for this case. In doubt contact the local ABB representative.

14 Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>110-120 / 220-240 V</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>50 / 60 Hz</td>
<td></td>
</tr>
<tr>
<td>Minimum pressure</td>
<td>0.01 bar</td>
<td></td>
</tr>
<tr>
<td>Temperature range (operation)</td>
<td>0...+50 °C</td>
<td></td>
</tr>
<tr>
<td>Temperature range (storage)</td>
<td>+5...+40 °C</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>280 x 460 x 580 mm</td>
<td></td>
</tr>
<tr>
<td>Total weight</td>
<td>21 kg</td>
<td></td>
</tr>
</tbody>
</table>

15 Manufacturer information

ABB AG
High Voltage Products
Brown-Boveri-Strasse 30
63457 Hanau, Germany

For any assistance, support or service we recommend to contact directly our local representatives first. They have extensive knowledge of the specific customer needs, the individual circumstances and the possibilities of the whole ABB group and are consequently able to organize an optimal service.

Information

In case of an ABB Power Care contract the customer is able to use our 24-h hotline for free. In case of emergency our troubleshooting experts offers a fast and reliable support.

24-h hotline: +49 (0) 180 6222 007

Please have the following information ready when calling our 24-h hotline:

- Your contact details
- Bay no
- Designation of station
- Module no
- Order / Serial No
EG declaration of conformity

Original declaration of conformity in accordance with the EG machine 2006/42/EG of 17th May 2006, appendix IIA

We hereby declare that the following described machine in the version put by us into circulation is in accordance with all relevant requirements of the EC machine directive 2006/42/EG:

Manufacturer/Representative  ABB AG
Kallstadter Straße 1
68309 Mannheim
Germany

Authorized person for technical documentation  Markus Ramel, PGHV-SE
ABB AG, Brown-Boveri-Straße 30, 63457 Hanau

Description of the machine  Vacuum pump set for hydromechanical operating mechanisms
1HDS112160R0001

Applied harmonized standards  EN ISO 12100:2010

Mannheim, 31th July 2018

[Signature]
Peter Wehrmeister
LBU Manager Service
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