5. SII-Hydraulic systems (yearly)

Document no.: 0093-1903 V11
Class: CONFIDENTIAL
Type: T09
Date: 2025-09-30

Vestas proprietary notice

Trademarks and permissions

Document update

The contents of this document are subject to change without notice. All statements, instructions, and recommendations are believed to be correct at time of release, but changes are the result of continued progress in the product, methods, procedures, and manufacturing. Users must take full responsibility for their deployment and maintenance of any products.

For answers to questions about Vestas products or publications, contact your local Vestas representative.

Head office

Vestas Wind Systems A/S
Hedeager 42
8200 Aarhus N
Denmark

Wind turbine type

Read the full document before you start to do work.

Send questions or concerns about the document to Vestas Wind Systems A/S.

Wind turbine type	Mk version
EnVentus™	Mk 0A

Change description

Description of changes
Updated the version of the document.

Table of Contents

1 Abbreviations and technical terms

0021730649

Table 1.1: Abbreviations

Abbreviation	Explanation
CIR	Component inspection report
HMI	Human-machine interface
HPU	Hydraulic power unit
LOTO	Lockout-tagout
PPE	Personal protective equipment
SDS	Safety data sheet
SPRA	Standardised procedure risk assessment

Table 1.2: Explanation of terms

Term	Explanation
None	

2 Referenced documentation

2.1 Safety documents

0027479112

Table 2.1: Safety documents

Document no.	Title
0001-0410	Personal protective equipment sheets
0004-4159	Standardised procedure risk assessment (SPRA)
0092-3874	Rotor locking system
0092-3919	Safety regulations for operators and technicians
0093-1983	Safe work in hub
0094-2383	Mode selector system
	Relevant SDS for the chemicals used in this document
	Appropriate LOTO document

2.2 Reference documents

0042320996

Table 2.2: Reference documents

Document no.	Title
920098	Torque wrench settings
960501	Bolt connections
0001-1996	Service guide, menu 11–19 operating manual
0093-2489	Charging of nitrogen accumulators
0093-3811	Lubrication and coolant chart
0097-4826	Extraction of oil samples in use
0101-8427	Replacement of the filters
0163-9163	Rescue instruction for EnVentus™ with bulk head - Blade A pointing down
0163-9164	Rescue instruction for EnVentus™ with bulk head - Blade B pointing down

Unless it is specified differently, see 920098 ‘Torque wrench settings’ for information about bolt types and bolt lubrication, and see 960501 ‘Bolt connections’ for information about torque values.

3 Purpose

0016771142

The purpose of this document is to give the instructions for how to do the yearly inspection of the hydraulic systems.

4 Note

0016770707

This document gives the description of the service inspections that must be done during the yearly inspection. Unscheduled replacement procedures are not included in the yearly inspection. If it is necessary to make an unscheduled replacement, then make a note of it in the service report.

5 Hydraulic systems

5.1 Nacelle hydraulics

0016771141

5.1.1 To do a visual inspection of the hoses, seals, and connections in the nacelle and the hub for hydraulic oil leakage

0027448631

Risk of high-pressure fluid! SPRA ID No. 4.06

- Switch off the pump.
- Release the stored pressure in hoses/pipes/components.
- Make sure that there is no pressure in the hydraulic system before you disconnect hoses/pipes/components from the system.
- Clean up spilled oil immediately.
- Use the necessary PPE. This includes protective goggles and cut-resistant gloves. (Cut-resistance to protect against cutting force of high-pressure oil emerging from ruptures in hoses, for example). To protect against exposure to oil, wear a nitrile glove under the work glove.

Risk of exposure to hazardous substances and mixtures, Texaco Rando WM 32! SPRA ID No. 2.02

- Move the affected person away from exposure. Avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow the affected person to assume the most comfortable position and keep warm. Keep at rest until fully recovered. Seek medical advice if effects persist.
- If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. If swelling, redness, blistering, or irritation occurs, seek medical assistance.
- If in eyes, wash out immediately with water. In all cases of eye contamination, it is a sensible precaution to seek medical advice.
- Rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water to drink. Never give anything by the mouth to an unconscious person. If vomiting occurs, give further water. Seek medical advice.
- Use the necessary PPE given in sheet G. Read and obey the related SDS.

Risk of exposure to hazardous substances and mixtures, Mobil DTE 10 Excel 32! SPRA ID No 2.02

- If inhaled, remove the affected personnel from further exposure. For those who provide assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.
- In case of skin contact, wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high-pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.
- In case of eye contact, flush thoroughly with water. If irritation occurs, get medical assistance.
- If ingested, first aid is normally not required. Seek medical attention if discomfort occurs.
- Use the necessary PPE that is given in sheet G. Read and obey the related SDS.

Some of the EnVentus™ Mk 0A, 0B, and 0C main shafts have a bulk head solution applied as part of CIM 5773. Service technicians must obey the applicable instructions for these main shafts. See ‘Rescue instruction for EnVentus™ with bulk head – Blade A pointing down’ and ‘Rescue instruction for EnVentus™ with bulk head – Blade B pointing down’ in section ‘Reference documents’.

Figure 5.1: Main shaft assembled with bulk head solution

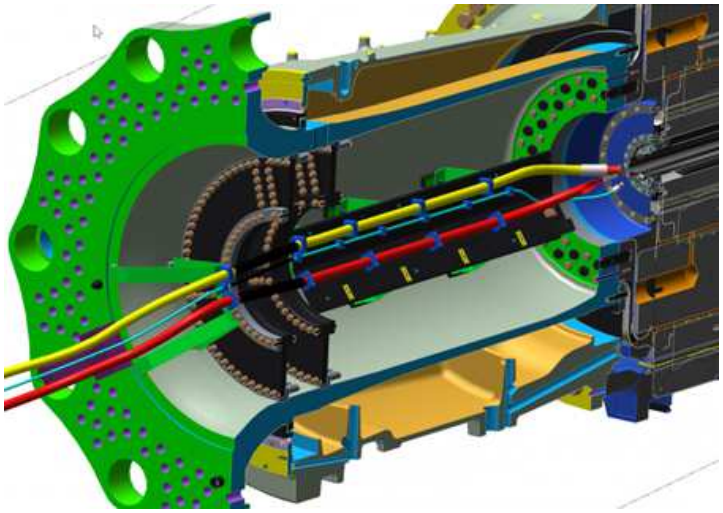


Figure 5.2: Main shaft assembled with bulk head solution

---

1 Do the visual inspection of the hoses, the seals, and the connections in the nacelle and the hub for hydraulic oil leakage.

a If necessary, repair the hydraulic systems. Make sure that the hydraulic oil is not spilled when you repair the hydraulic systems.

b If you find leakages in the hoses, the seals, and the connections in the nacelle, record the information in the CIR.

c If you find leakages in the hoses, the seals, and the connections in the hub, record the information in the CIR.

---

2 Do a check of the hose surface for wear due to rubbing.

a If you are in doubt about signs of rubbing and wear, pitch the system fully to run for each pitch system and back while you observe the hoses.

Risk related to rotating parts! SPRA ID No. 5.09

- Do not enter the hub and do not do any procedures on the hub or nose cone unless you have done the applicable LOTO and made sure that the pitch system is in a safe condition.
- Do not enter and exit the hub without headlights or portable lights with enough batteries.
- Obey the rules for work at height.

3 Do a check for the oil level in the HPU.

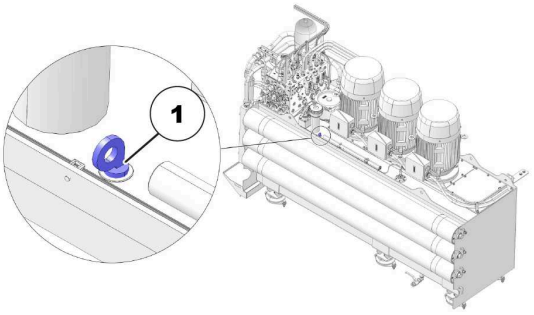
a Make sure that the hub is in the Hub service mode. See ‘Safe work in hub’ in section ‘Safety documents’.

When the hub is in the Hub service mode, the hydraulic oil drains from the hub accumulators into the HPU.

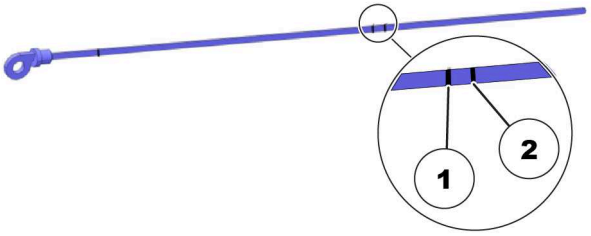
b Loosen and remove the oil dipstick to do a check of the hydraulic oil level.

Oil dipstick location is different for each of the suppliers.

- Oil dipstick (1) installed on the Hydratech Industries HPU.



c Examine the hydraulic oil level in the HPU. The hydraulic oil level must be between the minimum mark (2) and the maximum mark (1) on the oil dipstick.



d If necessary, fill hydraulic oil in the HPU again.

The oil used to fill up the HPU must be of the same type as the oil that is already in the HPU.

5.1.2 To get a sample of hydraulic oil

0021731375

1 Get a sample of the hydraulic oil within 25 minutes of stopping the wind turbine. See ‘Extraction of oil samples’ in section ‘Reference documents’.

5.1.3 To replace the filter element of the -695-HQ2 return filter

0027479110

1 Replace the filter element of the -695-HQ2 return filter according to ‘Replacement of the filters’ in section ‘Reference documents’.

5.1.4 To replace the -695-HQ3 high-pressure filter

0027479109

1 Replace the -695-HQ3 high-pressure filter ‘Replacement of the filters’ in section ‘Reference documents’.

5.1.5 To replace the -695-HQ1 air breather filter element

0027479108

For the type of -695-HQ1 air breather filter element, see ‘Lubrication and coolant chart’.

Risk of dust! SPRA ID No. 23.04

- Use the necessary PPE that is given in PPE sheet S.

1 Replace the -695-HQ1 air breather filter element (item no. 109113) during yearly inspections. Also, you must replace the -695-HQ1 air breather filter element when you change the hydraulic oil.

a Make sure that the hub is in safe mode as given in ‘Safe work in hub’ in section ‘Safety documents’ before you go into the hub.

b Loosen and remove the filter housing lid with your hand.

c Remove old -695-HQ1 air filter element from the air breather filter.

d Put the new -695-HQ1 air filter element in the correct position on the air breather filter.

e Install the filter housing lid and secure-tighten it with your hand.

5.1.6 To do a check of the pressure in the system accumulators in the nacelle

0027479107

The check of pressure in the system accumulators in the nacelle must be done during the 2-yearly inspections.

- The hub must be in the Hub service mode as given in ‘Safe work in hub’ in section ‘Safety documents’ before you go into the hub.

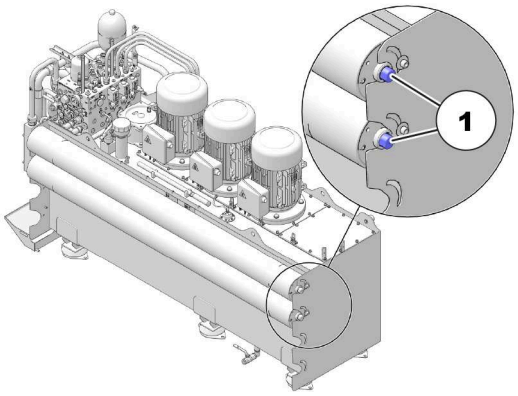
1 Wait for minimum of 10 minutes from the hub service mode activation for the accumulator to be thermally stable.

2 Measure and, if necessary, refill system accumulator -695-CM4 (attached to the HPU) according to ‘Charging of nitrogen accumulators’ in section ‘Reference documents’.

According to the wind turbine variant, 2–4 system accumulators are available in the HPU.

3 Make a note of the pre-charge pressure (measured in bar, given at 20°C) of system accumulators -695-CM4-1, -695-CM4-2, -695-CM4-3, and -695-CM4-4 in the SIF.

- Position of nitrogen filling valve (1) on the Hydratech-industries HPU.



5.2 Brake system

0016771140

5.2.1 To do a test of the brake

0027479106

Risk of exposure to hot surfaces! SPRA ID No. 15.02

- Let the parts cool before you start work, if possible.
- If necessary, open the nacelle skylights to facilitate cooling.
- When you do work with hot components, make sure that you are protected against contact with hot fluids.
- Use the necessary PPE that is given in PPE sheet 3.

1 Select the service menu **11.83: BRAKE TESTS** on the control panel.

2 Select **1** to open the service menu **11.83: BRAKE ACCUMULATOR TEST**.

3 Select **RUN** in the service menu **11.83: BRAKE ACCUMULATOR TEST** to start the brake test.

4 Examine the result of the brake test.

- The service menu **11.83: BRAKE ACCUMULATOR TEST** must show the test result **Result: No Failure**. If the result is different, follow the instructions in section 5.2.2 *To do a check of the pre-charge pressure in the 3.5 l brake accumulator -200-16-CM3 and the 0.32 l brake accumulator -200-16-CM2*, page 13.

5.2.2 To do a check of the pre-charge pressure in the 3.5 l brake accumulator -200-16-CM3 and the 0.32 l brake accumulator -200-16-CM2

0027479105

The check of the pre-charge pressure in the 3.5 l brake accumulator -200-16-CM3 and the 0.32 l brake accumulator -200-16-CM2 must be done during the yearly inspections.

1 Select the service menu **11.85: BRAKE VALVE CONTROL**.

2 Set the supply valve to OFF and the drain valve to ON in the service menu **11.85: BRAKE VALVE CONTROL**.

3 Set the supply valves 1 and 2 to ON in the service menu **11.85: BRAKE VALVE CONTROL**.

4 Wait until the pressure becomes stable at 0 ±1.6 bar. Find the pressure information as follows:

a Select the service menu **11.85: BRAKE VALVE CONTROL** and find the pressure information of the brake accumulator under **Acc. press**.

b Select the service menu **11.85: BRAKE VALVE CONTROL** and find the pressure information of the brake under **Brake pressure**.

---

5 Wait for 5 minutes.

Risk of exposure to hazardous substances and mixtures, Nitrogen! SPRA ID No. 2.02

- If inhaled, remove the affected person to an uncontaminated area, wearing self-contained breathing apparatus. Keep the affected person warm and rested. Call a doctor. Apply artificial respiration if breathing has stopped.
- In case of skin or eye contact, no adverse effects are known.
- Ingestion is not considered a potential route of exposure.
- Use the necessary PPE that is given in sheet R. Read and obey the related SDS.

6 Connect the nitrogen charging equipment to the 3.5 l brake accumulator -200-16-CM3 and the 0.32 l brake accumulator -200-16-CM2.

The nitrogen charging equipment must be connected to one brake accumulator at a time.

---

7 Do a check of the pre-charge pressure according to the table that follows at least 5 minutes after the oil pressure is released.

Table 5.1: Pre-charge pressure values

Brake accumulator	Item no.	Pre-charge pressure [bar]
3.5 l brake accumulator -200-16-CM3	29186037	60
0.32 l brake accumulator -200-16-CM2	29186036	50

Tolerances for the pre-charge pressure are given in ‘Charging of nitrogen accumulators’ in section ‘Reference documents’.

---

8 Record the observed value of the pre-charge pressure before you fill the nitrogen in the 3.5 l brake accumulator -200-16-CM3 and the 0.32 l brake accumulator -200-16-CM2 again.

---

9 Recharge the nitrogen in the 3.5 l brake accumulator -200-16-CM3 and the 0.32 l brake accumulator -200-16-CM2 again according to ‘Charging of nitrogen accumulators’ in section ‘Reference documents’ for the correct temperature.

5.3 ++102 Hydraulic control panel

0027479104

5.3.1 To do a test of the heaters

0027456186

1 Open the door of the ++102 hydraulic control panel.

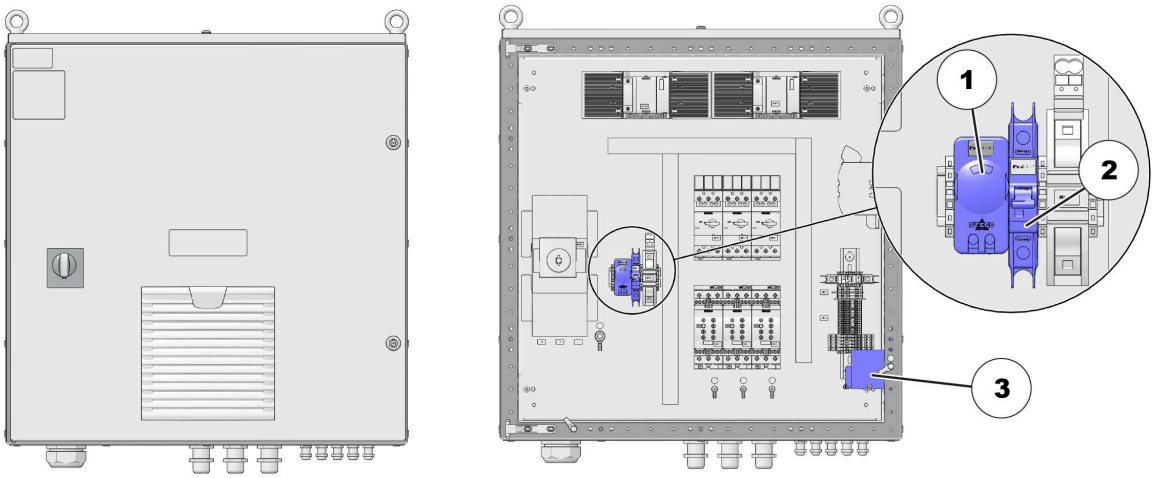


Figure 5.3: ++102 hydraulic control panel

1 -625-50-01-F1 circuit breaker
2 -625-50-01-BT1 thermostat
3 -625-50-01-E1 heater

Item no.	Quantity	Description	Type no.	RDS no.
29199089	As necessary	ERP: MCB SU201M-C10 10A 1P UL489	2CDS271337-R0104	-625-50-01-F1
29124388	As necessary	ERP: THERMOSTAT NC 10A 01115.0-00	STO01115.0-00	-625-50-01-BT1
29199092	As necessary	ERP: FAN HEATER CS028 140W 240V AC	02800.0-01	-625-50-01-E1

2 Close the -625-20-F2 circuit breaker.

3 Adjust the temperature of the -625-50-01-BT1 thermostat to 5ºC.

a Turn the thermostat switch clockwise and make sure that the thermostat starts heating.

b Make sure that there is no abnormal noise while the thermostat gets heated.

c Turn the thermostat switch counterclockwise and make sure that the thermostat stops heating.

---

4 Make sure that the -625-50-01-E1 heater warms up after a short period of time.

► If the fan does not operate or if heat is not generated, replace the heater.

Carefully test with the hands to make sure that the fan of the heater operates.

---

5 Adjust the temperature of the thermostat back to the original position after the test.

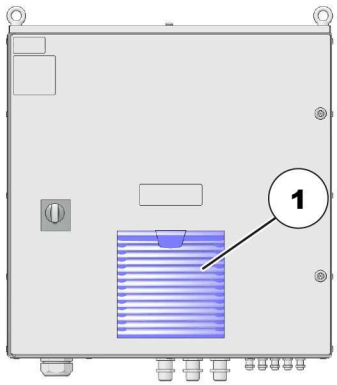
a Set the temperature of the -625-50-01-BT1 thermostat to 11ºC.

5.3.2 To do a visual inspection of the air filters

0027456471

The filter mats can be accessed and examined without opening the ++102 hydraulic control panel doors.

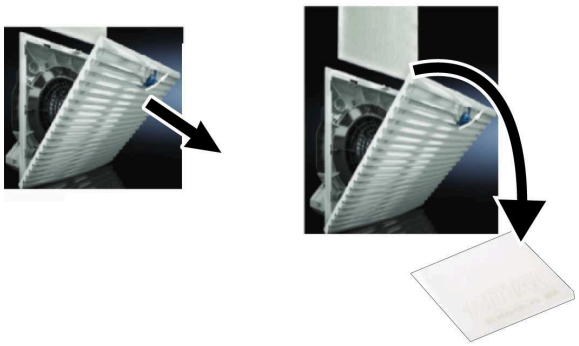
1 Visually examine the filter mats (1) (item no. S091839) of the ++102 hydraulic control panel for damage.



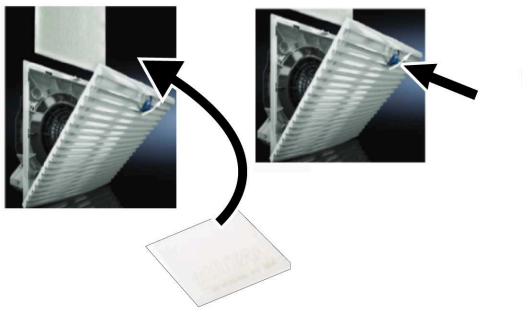
Risk of dust! SPRA ID No. 23.04

- Use the necessary PPE that is given in PPE sheet S.

a Do a visual check of the filter mats for deposition of dust, salt, or other particles.



► If the filter mats are clogged, replace the filter mats.



2 Do a check to make sure that the filter mats are installed in the correct position in the ++102 hydraulic control panel.

3 Visually examine the air filters in the ++102 hydraulic control panel for damage.
