POWER HYDRAULICS

Hydraulische installatie
Hydraulic installation
Hydraulische Installation
Installation hydraulique
Instalación hidráulica
Impianto idraulico
1 Introduction

The hydraulic tank is the central part of any hydraulic system. The valves required for driving hydraulic motors (for example a hydraulic bow thruster motor or a hydraulic anchor windlass motor) are fitted on the hydraulic tank.

The hydraulic tank is supplied as standard with all necessary valves pre-mounted.

2 Description and working

The hydraulic tank consists of the following components:

1. **Tank**: This serves both for the storage and the cooling of the hydraulic oil in the system.
2. **Base plate**: The necessary valves are mounted on this.
3. **Valves**: Necessary for driving the hydraulic motors.
4. **Filler cap/return filter/air vent**: In order to fill the tank with hydraulic oil/for filtering the oil which flows back into the tank.
5. **Combined thermometer/depth gauge**: To check the temperature and the quantity of oil.
6. **Drain connections**: To connect the various drain pipes.
7. **Suction connection to the hydraulic pump**
8. **Pressure connection from the (2nd) hydraulic pump**
9. **Suction connection to the 2nd hydraulic pump (optional)**
10. **Connection for manometer**
11. **Connection for low oil level sensor, HT5571 (optional)**

3 Installation

3.1 General pointers

- Always work with clean tools and in clean surroundings. Dirt and moisture are the biggest enemies of hydraulic systems.

- There are 2 sorts of connections within hydraulic systems:
  a) **thread connection with O-ring**
     Never use a locking or sealing agent!
  b) **thread connection without O-ring** (for example BSP and NPT thread)
     Always use a locking or sealing agent; this is ideally suited for hydraulic connections! Always clean the connections thoroughly making sure they are grease free.

- Check that all connections are tight after installation.

3.2 Positioning the hydraulic tank

Always fit the hydraulic tank horizontally.

4 rubber vibration dampers can be delivered as extras (HT3010). It is recommended that the tank be placed on these dampers.

There needs to be about 15 cm free room on all sides of the tank in order to allow the valves to be fitted.

3.3 Valves

3.3.1 General

Two or more valves have been fitted, depending on the configuration:

1. **valve for bow thruster**
2. **valve for stern thruster**
3. **valve for anchor windlass**
4. **valve for installation for lowering the mast**
5. **‘1-step load-sensing’ valve or ‘2-step load-sensing’ valve**

See pages 34 - 37 for diagrams of the hydraulic system.

Because of the pattern of the holes the valves can only be fitted in one way.
Use the [vetus](#) logo on the valve which is already fitted to see how the other valves should be fitted.

**If the bolts cannot be fitted easily then the valve is not positioned correctly.**

Before fitting always check that the 4 O-rings in the valve are positioned correctly in the O-ring chambers. If necessary use acid-free Vaseline to hold the O-rings in their correct places.
Use a good quality hexagonal screw-driver to tighten the M5 bolts supplied with the valves evenly and tightly. Use of this tool prevents the bolts being over tightened.

### 3.3.2 Connecting a bow thruster

The 4/3 valve (HT5017) and the fittings are pre-mounted.
Fit the hoses.

### 3.3.3 Connecting a stern thruster

The 4/3 valve (HT5017) and the fittings are pre-mounted.
Fit the hoses.

### 3.3.4 Connecting an anchor windlass when using a ‘1-step load-sensing’ system

The cross-over valve (HT5119), the flow control valve (HT5161) the 4/3 valve (HT5017) and the connections are pre-mounted.
Fit the hoses.

When putting into operation, the flow should be set using the flow control valve (HT5161).
The pressure should be set in the junction box. Always start with the lower pressure (connection 5-7).

The flow is related to the speed of the anchor windlass motor.

### 3.3.5 Connecting an anchor windlass when using a ‘2-step load-sensing’ system

The flow control valve (HT5161), the 4/3 valve (HT5017) and the connections are pre-mounted.
Fit the hoses.

When putting into operation, the flow should be set using the flow control valve (HT5161).
The pressure should be set in the junction box. Always start with the lower pressure (connection 5-7).

The flow is related to the speed of the anchor windlass motor.

### 3.3.6 Connecting a cylinder for the mast-lowering system

The flow control valves (HT5082), the counter balance valve (HT5046), the dual non-return valve (HT5198) and the 4/3 valve (HT5017) are pre-mounted.
Fit the hoses.

When putting into operation, the flow should be set using the flow control valve (HT5082). The flow is related to the speed of the mast-lowering system.
The pressure should be set in the junction box. Always start with the lower pressure (connection 5-7).
3.3.7 Connecting a small cylinder for the mast-lowering system
The dual non-return valve (HT5198), the flow control valve (HT5161), the 4/3 valve (HT5017) and the connections are pre-mounted. Fit the hoses.

When putting into operation, the flow should be set using the flow control valve (HT5161). The flow is related to the speed of the mast-lowering system. The pressure should be set in the junction box. Always start with the lower pressure (connection 5-7).

3.3.8 Load-sensing valve
At least 1 load-sensing valve should always be fitted. This can be a ‘1-step load-sensing’ valve or a ‘2-step load-sensing’ valve.

‘1-step load-sensing’ valve
The valve (HT5032) and the connection are pre-mounted. Fit the hose.

‘2-step load-sensing’ valve
The shuttle valve (HT5038), the reduction valve (HT5037) and the 4/3 valve (HT5017) are pre-mounted. The connections are pre-mounted. Fit the hose.

When putting into operation, the reduction valve (HT5037) should be used to set the 1st step pressure.

3.4 Suction connection to the pump
Fit the suction connection. Only use a liquid sealer which must be suitable for hydraulic connections. For example Loctite® 542 or Permabond® A130.

3.5 Drain connections
There are 5 drain connections on the hydraulic tank.

The pump, the bow thruster and the stern thruster have a drain connection. Remove the plugs and fit the connections. Fit the hoses.

For drain connections that are not to be used: Tighten the plugs firmly.

3.6 Hydraulic pump
Consult the separate manual for instructions for installing the hydraulic pump.
3.7 Hoses

3.7.1 General

- Only use hoses which satisfy the standards of:
  - DIN EN 853
  - SAE 100 R2 AT
- Only use hoses with pressed on couplings.

Vetus hydraulic hoses satisfy the above requirements.

Vetus hydraulic hose is available in any length required.

All Vetus hydraulic hoses are fitted with direct couplings. Angled connections can be made by using an adjustable elbow joint (EVW). This ensures that the hose connections are always free of tension.

3.7.2 Installation

Always fit the hoses using exclusively those hose fittings and clamps which are supplied with the various hydraulic components. This ensures the correct connection and avoids fitting hoses with the wrong diameter.

Check that all hoses have been connected correctly as shown in the diagrams before taking the system into service.

Fit the hoses in such a way that there is very little risk of external damage occurring.

Protect hoses which have to pass through a bulkhead with a lead-through or use special couplings.

Bends must be free of kinks; a kink in the hose restricts the free flow of the hydraulic oil.

3.7.3 Hose choice table (see diagram pages 38 - 39)

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Remarks</th>
<th>Hose Art. code</th>
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<tbody>
<tr>
<td>Pressure connection pump (P)</td>
<td>Hydraulic tank</td>
<td>System with 2 pumps and/or powersteering: Also required: connection kit for two pumps: HT3060</td>
<td>HH1020---</td>
</tr>
<tr>
<td>Suction connection pump (Z)</td>
<td>Hydraulic tank</td>
<td>System with pump HT1015, HT1016 or HT1017</td>
<td>FFHOSE38</td>
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<tr>
<td>Load-sensing connection pump (LS)</td>
<td>Single step or two step load-sensing control unit HT1011 or HT1012</td>
<td>-</td>
<td>HH0610---</td>
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<td>Drain connection from the pump (L)</td>
<td>Drain connection on the hydraulic tank</td>
<td>System with pump HT1015, HT1016 or HT1017</td>
<td>HH0815---</td>
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<tr>
<td>Bow thruster/stern thruster motor</td>
<td>Valve HT1013</td>
<td>System with pump HT1022</td>
<td>HH1018---</td>
</tr>
<tr>
<td>Anchor windlass motor</td>
<td>Valve HT102311 or HT102312</td>
<td>-</td>
<td>HH0612---</td>
</tr>
<tr>
<td>Bow thruster/stern thruster motor</td>
<td>Drain connection on the hydraulic tank</td>
<td>BOW55HM, BOW95HM, BOW160HM</td>
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<td></td>
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<td>BOW300HM</td>
<td>HH1018---</td>
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<tr>
<td>Anchor windlass motor</td>
<td>Valve HT1014 or HT1014NB</td>
<td>BOW55HM, BOW95HM</td>
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<tr>
<td></td>
<td></td>
<td>BOW160HM, BOW300HM</td>
<td>HH0612---</td>
</tr>
</tbody>
</table>
| Cylinder for mast lowering system | Valve HT1014 or HT1014NB | BOW160HM, BOW300HM | HH0612---
4 Taking into service

Consult the separate manual for hydraulic pumps for instructions concerning taking the whole system into service.

Remove the filler cap and filter from the hydraulic tank.
Fill the hydraulic tank with hydraulic oil. Only use an oil specified in the technical details.
The tank capacity is 60 litres.
Replace the filter and tighten the filler cap by hand.

A combined thermometer/depth gauge is fitted to the tank.
The depth gauge must show 2/3 full of oil when the installation is in service.
Depending on the total length of the hoses, the oil level may be above the gauge before putting into operation.

The five-fold base plate comes complete with connection. The manometer can be connected to this.

5 Maintenance

- Regularly check that all connections are tight.
- Return filter
  The filter element must be replaced once a year.
  Art. code: HT5146

6 Technical data

Hydraulic fluid

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
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<tr>
<td>Hydraulic oil</td>
<td>in accordance with ISO VG 46</td>
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<tr>
<td>Viscosity</td>
<td>46 cSt at 40˚C</td>
</tr>
<tr>
<td>Viscosity index</td>
<td>more than 100</td>
</tr>
<tr>
<td>Solidifying point</td>
<td>below -27˚C</td>
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</table>

The following hydraulic oils satisfy the above specifications:

- Vetus : Hydraulic fluid ISO VG 46
- Shell : Tellus 46
- Esso : Nuto H46
- Texaco : Rando oil HD46
- BP : HLP46
* met Stuur- en regelunit voor het Vetus slingerdempingsysteem HT1024
** met Hydraulisch bekrachtigde besturing HT1019

* with Control unit for Vetus roll damping system HT1024
** with Hydraulic powersteering HT1019

* mit Steuer- und Regeleinheit für das Vetus-Schlingerdämpfungssystem HT1024
** mit Hydraulische Servolenkung HT1019

* avec Unité de commande et de réglage destinée au système anti-roulis de Vetus HT1024
** avec Servo-direction hydraulique HT1019

* con Unidad de dirección y control para el sistema de amortiguamiento de oscilación HT1024
** con Dirección hidráulica asistida HT1019

* con Unità di governo e regolazione per sistema antirollio Vetus HT1024
** con Timonerie idrauliche servo-assistitie HT1019

‘Power Hydraulics’, Hydraulic installation
1-step load-sensing

1 hydraulische boegschroefmotor 1 hydraulic bow thruster motor 1 hydraulischer Bugschraubenmotor
2 hydraulische hekschroefmotor 2 hydraulic stern thruster motor 2 hydraulischer Heckschraubenmotor
3 hydraulische maststrijk installatie 3 hydraulic mast lowering installation 3 hydraulische Mastabsenkinstallation
4 hydraulische ankerliermotor 4 hydraulic anchor windlass motor 4 hydraulischer Ankerspillmotor
5 ventiel boegschroef 5 valve bow thruster 5 Ventil Bugschraube
6 ventiel hekschroef 6 valve stern thruster 6 Ventil Heckschraube
7 ventiel maststrijk installatie 7 valve mast lowering installation 7 Ventil Mastabsenkinstallation
8 ventiel ankerierv 8 valve anchor windlass 8 Ventil Ankerspill
9 ventiel ’1-step load-sensing’ 9 ‘1-step load-sensing’ valve 9 Ventil ’1-step load-sensing’
10 ventiel ’2-step load-sensing’ 10 ’2-step load-sensing’ valve 10 Ventil ’2-step load-sensing’
11 hydraulische pomp 11 hydraulic pump 11 Hydraulikpumpe
12 retourfilter 12 return filter 12 Rückfilter
13 hydrauliektank 13 hydraulic tank 13 Hydrauliktank
2-step load-sensing
1-step load-sensing

1. hydraulic bow thruster motor
2. hydraulic stern thruster motor
3. hydraulic mast lowering installation
4. hydraulic anchor windlass motor
5. valve bow thruster
6. valve stern thruster
7. valve mast lowering installation
8. valve anchor windlass
9. '1-step load-sensing' valve
10. '2-step load-sensing' valve
11. hydraulic pump
12. return filter
13. hydraulic tank

1. hydraulischer Bugschraubenmotor
2. hydraulischer Heckschraubenmotor
3. hydraulische Mastabsenkininstallation
4. hydraulischer Ankerspillmotor
5. Ventil Bugschraube
6. Ventil Heckschraube
7. Ventil Mastabsenkininstallation
8. Ventil Ankerspill
9. Ventil '1-step load-sensing'
10. Ventil '2-step load-sensing'
11. Hydraulikpumpe
12. Rückfilter
13. Hydrauliktank
2-step load-sensing

1 moteur hydraulique d’hélice d’étrave
2 moteur hydraulique d’hélice de poupe
3 installation hydraulique de rabattement du mât
4 moteur hydraulique du treuil d’ancrage
5 valve de l’hélice d’étrave
6 valve de l’hélice de poupe
7 valve de l’installation de rabattement du mât
8 valve du treuil d’ancrage
9 valve ‘1-step load-sensing’
10 valve ‘2-step load-sensing’
11 pompe hydraulique
12 filtre de retour
13 réservoir hydraulique

1 motor hidráulico de la hélice de proa
2 motor hidráulico de la hélice de popa
3 instalación hidráulica para bajar el mástil
4 motor hidráulico del molinete
5 válvula para la hélice de proa
6 válvula para la hélice de popa
7 válvula para la instalación para bajar el mástil
8 válvula para el molinete
9 válvula ‘de detección de carga de 1 paso’
10 válvula ‘de detección de carga de 2 pasos’
11 bomba hidráulica
12 filtro de retorno
13 depósito hidráulico

1 Motore idraulico elica di prua
2 Motore idraulico elica di poppa
3 Impianto idraulico reclino albero
4 Motore idraulico verricello d’ancora
5 Valvola elica di prua
6 Valvola elica di poppa
7 Valvola impianto reclino albero
8 Valvola verricello d’ancora
9 Valvola ‘1-step load-sensing’
10 Valvola ‘2-step load-sensing’
11 Pompa idraulica
12 Filtro di ritorno
13 Serbatoio idraulico
Let op!
Indien wordt afgeweken van de in deze handleiding vermelde adviezen (waaronder slangdiameters), draagt Vetus geen enkele verantwoording voor eventueel optredende fouten in het hydraulisch systeem.

Caution!
If the recommendations made in this manual are not followed (including hose diameters), Vetus cannot accept responsibility for any faults that may occur in the hydraulic system.

Achtung!

Attention !
Si les recommandations (y compris les diamètres des tuyaux) fournies dans ce manuel ne sont pas respectées, Vetus décline toute responsabilité quant aux dysfonctionnements qui pourraient se produire dans le système hydraulique.

¡Precaución!
De no seguirse las recomendaciones indicadas en este manual (incluidos los diámetros de los tubos flexibles), Vetus no aceptará ninguna responsabilidad por fallos que puedan darse en el sistema hidráulico.

Attenzione!
La Vetus declina ogni responsabilità per eventuali errori di funzionamento dell’impianto idraulico dovuti al mancato rispetto delle indicazioni contenute nel presente libretto di istruzioni (relative anche al diametro dei tubi).
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