3. OPERATION MANUAL

3.1 OUTLINE

(1) The davit is consist of pedestal, slewing ring gear, jib, hoisting winch driven by electric motor and slewing device driven by hydraulic motor.

(2) All functions are operation to electrically and hydraulic driven.

(3) The davit is hydraulically driven slewing jib type, and it lowers the boat on the water by the help of its own weight. The davit is slewed to boarding position by stored power of hydro-accumulator and recovered by main power to disembarkation deck.

(4) When the hand brake on the winch is released by pulling of remote control wire in the boat or raft, the boat or raft is immediately lowered to the sea due to keep continuously during to the total lowering procedure.

(5) A semi-permanently mounted electric motor on the winch is used to hoist the rescue boat with 6 persons or empty raft to embarkation deck level.

(6) Manual crank handles are used for hoisting the rescue boat with 6 persons or empty hook to embarkation deck level.

(7) Each safety device of limit switch on the top of jib is automatically cut off the electrical power before reach highest hook position.

(8) The wire drum on winch is driven by the rotating of motor through the reduction gear and equipped with the centrifugal brake, manual clutch brake, one way clutch bearing in the gear box.

(9) Hydro-power pack is automatically controlled when the pressure on the accumulator is dropped below than limited pressure by the control pressure switch.
3.2 INSPECTION & PREPARATION PRIOR TO OPERATION

Trained staff must inspect all parts of the davit and required/necessary cleaning is to be carried out before the davit is put into operation.

The inspection should at least contain the following item:

(1) Check the davit for visible damages.

(2) Apply grease to necessary points.

(3) Special attention should be paid to the hydraulic system. Check for damage.

(4) Check that there are no signs of hydraulic oil leakage from hydraulic hoses, tubes and fittings.

(5) Ensure that all hydraulic valves are in normal position.

(6) Check return filter.

(7) Check that wire rope runs correctly in the sheaves and that the wire ropes ends are securely locking.

(8) Ensure that the wire rope of the hoist is in perfect condition.

(9) Check the oil-quantity of the hoisting gear(Winch) and the hydraulic power pack tank on the Jib.

(10) Check that the davit can move freely in its operation area.

(11) Switch “ON” on R.P.B Switch.

(12) Check hoisting upper limit switch is in normal operation.

(13) Hoisting motor & winch gear is in normal operation at no load operation.

(14) Slewing motor & reducer is in normal operation.
3.3 PREPARATION FOR STORED POWER OF ACCUMULATOR BEFORE OPERATING.

- For the launching operation, the davit is slewed by stored hydraulic power in accumulator and both of main power & accumulator for recovery operation.
- Therefore, the accumulator must be stored with maximum hydraulic power by the pressure 200bar all the time.
- It is automatically charged by pressure switch control if the hydraulic pressure is drop less than the lower pressure 140bar.
- The pump motor power “OFF” automatically when the pressure in accumulator reached to 200bar.
- Initial set of accumulator pressure to be followed by below procedure before operation.

(1) Check the system oil in tank.

(2) Set pressure switch high 200bar, low 140bar.

(3) Charge nitrogen pressure approx.70bar in accumulator.

(4) Open the “stop valve 1” and close the “stop valve 2”.

(5) Charge oil in accumulator by pump “ON” up to pressure 100bar, and pump “OFF”.

(6) Confirm nitrogen pressure 70bar in accumulator by open the “stop valve 2”.
   - It is evidence that the nitrogen is suitably charged in accumulator, if the value of pressure gauge is dropped to 0bar rapidly at around 70bar.

(7) Check whether the system oil is enough or not, before electric power "on"

※ CAUTION!
The “stop valve 2” shall be always closed when the accumulator is charged.
This valve is opened for only drainage oil in accumulator.
STOP VALVE No.1 (Part No.11)

STOP VALVE No.2 (Part No.10)
3.4 NITROGEN CHARGING INSTRUCTION

(1) CHECKING ACCUMULATOR PRESSURE.

- Isolate the accumulator from the system and reduce the fluid pressure in the accumulator to zero.
- Prior to connecting charging head to accumulator ensure valve 1 is fully opened (counter clockwise) and that valve 2 is fully close (clockwise).
- Attach charging set to accumulator gas valve assembly and tighten nut 4 (clockwise)
- Close valve 1 until pressure is registered on pressure gauge 3.

If pressure gauge 3 shows required pressure, remove charging set as follows.

(2) REMOVAL OF CHARGING KIT ACCUMULATOR

- Open valve 1 fully (counter clockwise) then slowly open valve 2 to bleed gas pressure from pressure gauge 3(counter clockwise).
- Unscrew nut 4 (counter clockwise) and remove charging kit from accumulator.
(3) INCREASING PRECHARGE PRESSURE.

- Isolate the accumulator from the system and reduce the fluid pressure in the accumulator to zero.
- Remove the protective cap and gas valve-sealing cap from accumulator.
- Prior to connecting charging head to accumulator ensure valve 1 is fully opened (counter clockwise) and that valve 2 is fully closed (clockwise).
- Attach charging set to accumulator gas valve assembly and tighten nut 4 (clockwise).
- Attach Nitrogen Pressure Regulating Valve (NPRV) to nitrogen bottle and back off handle anti-clockwise until loose. If NPRV unavailable fit nitrogen bottle adaptor to nitrogen bottle.
- Connect charging hose between NPRV (or nitrogen bottle adaptor) and charging head on accumulator.
- Slowly close valve on NPRV (clockwise) until pressure gauge 3 registers a pressure slightly higher than required pressure.
- Allow 5 minutes to cool and recheck pressure in accumulator and adjust if required.
- Remove charging kit as explained in section 2.

(4) DECREASING PRECHARGE PRESSURE.

- Isolate the accumulator from the system and reduce the fluid pressure in the accumulator to zero.
- Remove the protective cap and gas valve-sealing cap from accumulator.
- Prior to connecting charging head to accumulator ensure valve 1 is fully opened (counter clockwise) and that valve 2 is fully closed (clockwise).
- Attach charging set to accumulator gas valve assembly and tighten nut 4 (clockwise)
- Close valve 1 until pressure is registered on pressure gauge 3.
- Slowly open valve 2 and bleed down until desired pressure is reached.
- Remove charging kit as explained in section 2

(5) CHECKING PRECHARGE

When a new accumulator has been in service for a short period, the pre-charging should be checked to ensure there is no leakage. Subsequent checks need only be at 6 months intervals
3.5  OPERATION INSTRUCTION FOR HOISTING WINCH

※ ATTENTION!
The space heater for hoisting electric motor should be operated before 10 hours prior to operation.

(1) CONSTRUCTION
Winch consists of reduction gears, shafts, centrifugal brake, hand brake, one way bearing and hoisting motor.

(2) CHARACTERISTIC WINCH GEAR

1) HOISTING(UP) : It is performed by electric motor through reduction gears, and the sequence of power transmission is as attached at braking position by hand brake. During hoisting, If hand brake is released, hoisting is immediately stopped due to power transmission cut off between friction lining and disc.

2) BRAKING DURING HOISTING(UP) : If electric source of electric motor cut off by push button “OFF”, The rotation of motor shaft is stopped, and it is generated the rotating force by the pulling load on the drum downward, and rotating force is transmitted through 3rd shaft up to friction disc of 2nd shaft. However, rotating force is lost between friction disc and lining due to 2nd shaft could not rotate to opposite direction by one way bearing. Consequently, the wire drum is stopped by friction force between lining and disc when hand brake acts.

3) LOWERING : It is performed by gravity of dead load on the wire drum not electric motor power through reduction gears as attached at releasing position only by hand brake.

4) BRAKING DURING LOWERING : Lowering is immediately stopped by the friction force between linings and disk due to one 2nd shaft could not rotate to opposite direction by one way bearing. Friction force between lining and disc is controlled by the moment of hand brake shaft and pusher to axial direction during up and down operation of boat, The boat is stopped by this friction force. Accordingly,
please kindly secure the operation of hand brake to make safe operation.

5) Centrifugal brake consist with 4pcs of brake shoe with lining is fitted on the out-ring, and these shoe & lining rotates during hoisting and lowering, and this brake will act when lowering only by the increasing of centrifugal force if the speed is greater than limited speed.
### 3.6 LAUNCHING PROCEDURE FOR RESCUE BOAT

<table>
<thead>
<tr>
<th>NO</th>
<th>PROCEDURE</th>
<th>ILLUSTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Release the boat lashing lines. Insert hook into boat link.</td>
<td><img src="image1.png" alt="Illustration 1" /></td>
</tr>
<tr>
<td>2</td>
<td>Embarkation.</td>
<td><img src="image2.png" alt="Illustration 2" /></td>
</tr>
<tr>
<td>3</td>
<td>Slightly life the boat by control R.P.B switch box.</td>
<td><img src="image3.png" alt="Illustration 3" /></td>
</tr>
<tr>
<td>4</td>
<td>Slew the boat to lowering position by using the manual control valve in boat or on deck.</td>
<td><img src="image4.png" alt="Illustration 4" /></td>
</tr>
<tr>
<td></td>
<td>※ ATTENTION! Fasten on deck a painter line to prevent the boat rotating</td>
<td><img src="image5.png" alt="Illustration 5" /></td>
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</tbody>
</table>
| 5 | (1) Lower the boat by pulling the remote control line in boat slowly.  
   | (2) Lift the hand brake lever directly on the deck.  
   | **<CAUTION>** Ensure the lowering situation before pull the R/C line as the boat is lowered continuously by pulling R/C line. |
| 6 | When the boat is water borne, release hook in accordance with boat maker instruction, and release the painter line. |
### 3.7 RECOVERY PROCEDURE FOR RESCUE BOAT

<table>
<thead>
<tr>
<th>NO</th>
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<th>ILLUSTRATION</th>
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</table>
| 1  | Set the brake lever of the winch.  
Pump “ON” on the power pack for the hydraulic power storing. | ![Brake Lever Illustration](image_url) |
| 2  | Insert the hook into the boat link.  
Fasten the painter line. | ![Boat Link Illustration](image_url) |
| 3  | Lift the boat to deck level by control of R.P.B switch box. | ![Lifting Boat Illustration](image_url) |
| 4  | Slew the boat to storage position by manual control valve. | ![Slew Illustration](image_url) |
| 5  | Lower the boat slowly on the boat rest  
Fasten the lashing line. | ![Lowering Boat Illustration](image_url) |
| 6  | Switch “OFF” on the R.P.B switch box. | ![Switching Off Illustration](image_url) |
### 3.8 LAUNCHING PROCEDURE FOR LIFE RAFT.

<table>
<thead>
<tr>
<th>NO</th>
<th>PROCEDURE</th>
<th>ILLUSTRATION</th>
</tr>
</thead>
</table>
| 1  | Full flap off container.  
     Bring the container out of the container cradle, and place it close to the davit.  
     Insert auto release hook into link on the raft, and close. | ![Illustration](image1.png) |
| 2  | Haul out painter line Abt.10m (The line should be always permanently fastened to the deck side) | ![Illustration](image2.png) |
| 3  | Slew the davit outboard to lowering position by manual control valve on deck. | ![Illustration](image3.png) |
| 4  | Inflate raft by pulling painter line strongly.  
     Tighten up the steering lines and fasten boarding flap. | ![Illustration](image4.png) |
<p>| | |</p>
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<tbody>
<tr>
<td><strong>5</strong></td>
<td>Embarkation.</td>
</tr>
</tbody>
</table>
| **6** | Remove all lines.  
   Pull the remote control line which is suspended from the brake lever in the life raft.  
   The raft will be lowered to the sea without stop.  
   **<WARNING>**  
   Ensure the lowering situation before pull the R/C line as the boat is lowered continuously by pulling R/C line. |
| **7** | When the raft is water borne, release hook by pulling red line. |