CRANE WITH WINCH
CONTENTS

1 FOREWORD page 3
  1.1 Description of the crane with winch page 3
2 USE OF THE CRANE WITH WINCH page 3
  2.1 General norms page 3
  2.2 Safety norms page 3
  2.3 Use of the winch page 4
  2.4 Safety devices page 4
3 LIFTING ROPE AND OPTIONS page 5
  3.1 General norms page 5
  3.2 Use precautions page 5
  3.3 Checks page 6
4 MAINTENANCE page 6
  4.1 Winch maintenance page 6
  4.2 Rope maintenance page 6
  4.2.1 Lubrication procedures page 7
  4.2.2 Rope replacement page 7
5 WIRING AND HYDRAULIC DIAGRAMS page 8
  5.1 Hydraulic diagram page 8
  5.2 Wiring for crane with load limiting device page 8
Use and maintenance manual for crane with winch

1 Foreword

1.1 Description of the crane with winch

The winch is a rope lifting accessory, which is installed under the crane boom, through proper fastening, and which together with the transmission, coupling and safety devices, becomes an integral part of it. The crane can be used only with hook. In this case, it is necessary to release the rope block from the lifting hook, and to wind the rope anchoring it to a fixed coupling, so that it does not loosen.

2 Use of the crane with winch

2.1 General norms

The lifting capacity of the winch is shown on the registration name plate placed on the winch side. The max. lifting capacity of the winch in some conditions can exceed the max. one allowed for the crane to a certain outreach. Therefore, should the crane not be equipped with load limiting device, the operator must make sure not to exceed with the winch the max. loads allowed for the crane, which are mentioned for the different outreaches in the load chart placed beside the boom. Heavier loads than the max. one which can be lifted by the winch, but which are part of the values mentioned in the crane load chart, can be lifted by using the winch in double pull line by using a second rope block. In this configuration the lifting speed halves. The cranes with winch in single pull line can be equipped with rope block for double pull line, by requesting it to Next Hydraulics. Otherwise performances stay those mentioned in the crane load chart, and anyway they cannot exceed the max. pull line value mentioned on winch name plate.

ATTENTION

The winch is not to be used either for lifting or moving people.

2.2 Safety norms

- Avoid that hook and counterbalance get too close to the return pulley.
- Nobody must cling to the rope block, the lifting hook or the load.
- Always keep at least four (4) turns of rope wound on the drum.
- Check winch brake functioning before moving the load.
- The winch and the crane have different lifting capacities; it is necessary to know both of them, so that the lifted weight respects the minor capacity allowed by the two systems.
- Never drag a load by the winch or the crane boom.
- Always keep the rope in tension in order to make winding easy.
- Avoid rope twisting and check that it is correctly wound on winch drum.
2.3 Use of the winch

- Always operate winch function during extension or booms re-entry, so that the lifting hook is kept at safety distance from the rope block.
- Only lift loads with proper hooking point, such anyway as to guarantee a safe and stable hold; in any case it is good manners to check always the hold reliability before lifting the load.
- To lift a load:
  - move above it by the lifting hook using crane extensions, then hook it, making sure that it is not anchored to the ground in anyway
  - then lift the load of a few centimetres using the winch, and release immediately the valve bank function to check winch the operation re-entering with the extension and simultaneously rewinding the rope by the winch
  - be careful that the rope does not twist during rewinding, and that it renews correctly.
During the above operations you must always have at least four (4) turns of rope wound on the winch.
- Avoid rough manoeuvres with crane boom or slewing with suspended load, in order to prevent dangerous rotations of the load itself, and that these are transferred to the rope.

2.4 Safety devices

- In order to prevent the rope to come excessively out from the drum or, on the contrary, that the lifting hook is erroneously dragged against the rope block, two stop ends (1 - 2) on the winch and on the rope block itself (see pict. 1) are foreseen. These lock rope movement, draining through a solenoid valve (3) the oil under pressure going to the hydraulic motor operating the winch. Two further micro-switches (4 - 5) are placed inside the control valve bank casing, near the winch function lever; their purpose is to allow circuit reset and to allow the opposite operation to the previous locking one. The functioning of this system is shown in picture 1.
- A double acting valve (6) is flanged directly on winch hydraulic motor. Its function is to lock the load in case of break of connection piping or breakdown of the hydraulic motor.
- The negative brake inside the drum is used to safely hold and lock the load when you are not operating (control lever in central neutral position); it unlocks hydraulically by carrying out raising or lowering.
3 Lifting rope and options

3.1 General norms

The lifting rope is one of the most delicate components as far as crane safety is concerned. It is subjected to extreme loads, abrasions, twisting, extreme atmospheric conditions, corrosions and other inconveniences which can reduce its reliability. Periodical rope inspection and maintenance are essential to keep safe working conditions.

3.2 Use precautions

- In order to prevent rope weakening, it is necessary to prevent twisting. It will not be possible to recover a rope when greatly twisted.
- Avoid rope dragging with locked rope block pulley, in order to prevent damaging and abrasions on the external wires.
- Do not use very worn pulleys or with flattened races. They do not guarantee a suitable support to the rope and can cause its flattening and distortions.
- Do not use pulleys with cracks, notches or carvings in the race: these can cause breaks or cuts in the external rope wires.
- Wind uniformly the rope on winch drum, in order to prevent crushing or bending on the rope.
- Do not expose the rope to corrosive chemical agents.
3.3 Checks

**DANGER**

Do not camper with the rope when inspecting it, rather check it visually each day or each time it is used.

All days or before each working session with the winch, check the rope to find out any:

- bending
- crushing
- strands loosening even with rope under load
- internal wires coming out
- reduction in rope diameter (even if only in one point)
- visual differences in rope strands
- wires or strands breaks
- wires or strands cuts.

Carry out monthly the following checks:

- check the rope for the above damages, verifying its full length
- check the terminal devices of thimbles, eyelets, etc.
- check loading hook state, making sure that it does not have permanent deformations, such as widening of upper entrance opening at 10%, and that there are no reductions in section, cuts, wear and corrosions.

4 Maintenance

4.1 Winch maintenance

Replace the lubrication oil inside the drum every 6 months, or after six hundred (600) hours working. To replace the oil it is necessary to unroll the rope until the plug on the drum is uncovered. Prepare a container under the drum to collect the oil to replace. Remove the plug and turn the drum by 180°. Empty completely the drum from the oil, turn back the drum and fill up with about 0.6 lt. of new oil, then put the plug back. Use hydraulic oil type ISO 46. Replace periodically the filter hydraulic system. This will extend the life of the winch and of other components of the system, helping also to keep low the counter-pressure inside the circuit.

4.2 Rope maintenance

4.2.1 Lubrication procedures

The rope is lubricated during its production, so that strands and single wires can move and bend freely. The first lubrication, which is carried out during manufacturing, has a limited duration, and it is necessary to restore the lubricant to extend rope life. The regular lubricant application increase the fatigue life by over 50%.

- Lubricate frequently the rope, in order to reduce friction and to prevent its corrosion.
- The rope surface can cover with dirt and dust along the time; such impurities hinder the application of new lubricant, and for this reason they must be eliminated in advance, by means of metal brushes and clothes.
- The lubricant must be carefully applied, so that it can reach the internal rope wires.
• Lubricant application can be carried out by immersion, by a brush, spray or through proper devices which, operating under pressure, can make the lubricant enter the internal rope part. The application of lubricant on the rope in those parts where it bends, for instance where it slides on the pulley, makes easy the penetration of the product inside: indeed, in such points, the rope can easily widen.
• The type of lubricant must be compatible with the one applied to the rope during its manufacturing.
• The rope life duration is proportional to the care used when lubricating it, and to the quantity of lubricant which can reach its internal part.

4.2.2 Rope replacement

It is very difficult to decide the exact moment for rope replacement, since there are many factors and causes to consider before taking this decision.
All the rope visible parts will have to be submitted to a daily visual examination, in order to locate the general deterioration and the deformations.
Each perceptible and suspect variation shall have to be reported and followed by a verification of the rope itself by qualified personnel, which will check the remaining loading capacity.
The following reasons are to be considered as a sufficient reason for rope replacement:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>When there are three (3) broken wires in a single strand, or a total of six broken wires on the total strands the rope is made of.</td>
<td><img src="#" alt="Image 1" /></td>
</tr>
<tr>
<td>When you remark diameter reductions and flattening in the external wires, and their thickness is lower than 2/3 of the complete wires' one.</td>
<td><img src="#" alt="Image 2" /></td>
</tr>
<tr>
<td>When there are clear reductions in rope diameter (10% lower than the original rope), even only in one point; this can indicate a weakening or an damage of the internal part of the rope.</td>
<td><img src="#" alt="Image 3" /></td>
</tr>
<tr>
<td>When there are swellings, coming out of internal wires, permanent deformations.</td>
<td><img src="#" alt="Image 4" /></td>
</tr>
<tr>
<td>When there are clear overheating damages, highlighted by changes in colour of the external part of the rope.</td>
<td><img src="#" alt="Image 5" /></td>
</tr>
<tr>
<td>When one or more broken wires come out from the internal part of the rope.</td>
<td><img src="#" alt="Image 6" /></td>
</tr>
</tbody>
</table>

Replace the lifting rope only by one with the same features of the one delivered along with the crane.
Before mounting a new rope, it is necessary to check that the races of the pulleys are not warn; if this problem is existing too, it will be necessary to replace also these ones.
5 Diagrams

5.1 Hydraulic diagram

5.2 Wiring for crane with load limiting device

Pict. 2

Pict. 3