Assembly instructions
Tiltrotator/rotator SS10/μ-prop

The noble art of digging
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Safety instructions

General information

This document is a supplement to the instruction manuals for tiltrotators EC02, EC05, EC10, EC15, EC20 and EC30.

This instruction manual provides information relevant to tiltrotators equipped with the 10/μ-prop control system.

The 10/μ-prop control system is designed for proportional control of the tiltrotator. Proportional control means that several of the tiltrotator’s functions can be operated simultaneously with stepless speed control.

With this control system, it is possible to customise certain of the tiltrotator functions without making physical changes to the system. The adjustments are made from the menu in the cab module, which is navigated using the buttons and thumb wheels on the joysticks. The μ-Config PC software (included with “μ-prop Calibration Kit”, 10075282) offers additional options for customising the system. For information on μ-Conf, see the software’s help function.

A built-in monitoring function checks the electronic circuits in the control system and warns the user of system errors. If an error is detected, an error description automatically appears on the cab module display.

This instruction manual describes the system with the factory settings that it is delivered with. If the system is reconfigured after installation, the functions on the joysticks may differ to the ones described in this manual.

The safety information in these instructions relates directly to the tiltrotator and does not regard the base machine. In addition to this information, you should carefully read the safety information regarding the base machine and any other equipment you will be using.

Cab module in 10/μ-prop control system.
Cautions

**CAUTION**

Never use your hands to check for leaks in the hydraulic system. Hydraulic oil under pressure can penetrate the skin causing serious injury.

**CAUTION**

Implements connected to the tiltrotator/rotator may not be used unless correctly locked into place. ALWAYS make sure that the lock bolts protrude according to the specifications for the relevant quick hitch.

**CAUTION**

Never attempt to increase the equipment’s maximum capacity by making modifications without the supplier’s approval.

**CAUTION**

Risk of burn injuries from hot hydraulic oil.

**CAUTION**

The machine must never be operated with the implement lock switch activated, except when attaching or detaching a bucket or implement.

**CAUTION**

If in any doubt regarding the machinery or the safety features, contact an engcon dealer or engcon Nordic AB.

**CAUTION**

Risk of catching in moving parts. Risk of personal injury.
Control

1. Checking the type plate on unit

A = Tiltrotator model
B = Quick hitch, lower, (GR = Integrated grab)
C = Quick hitch, upper
D = Control system
System overview

2. System overview SS10/μ-prop

1. Unit module
2. μ-prop joystick
3. Cab module
4. Quick hitch
5. Oil feeder valve
6. Tiltrotator

3. Manipulation of controls

Quick hitch switch not activated.

Quick hitch switch activated.

Continued on next page
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System overview

The diagrams and tables below show the factory configurations for the buttons and thumb wheels on the joysticks and how they control the tiltrotator’s functions.

### Tiltrotator without integrated grab (User 1 and 3*).

#### Left μ-prop joystick
- JL:3 (1) Rotation clockwise
- JL:3 (2) Rotation anti-clockwise
- JL:6 AUX Extra 1A+2A
- JL:7 AUX Extra 1A+2A
- JL:8 SHIFT JR:3 – Extra 1+2 AUX

#### Right μ-prop joystick
- JR:3 (1) Tilt
- JR:3 (2) Tilt
- JR:6 AUX Extra 1B+2B
- JR:7 AUX Extra 1B+2B
- JR:8 SHIFT JL:3 – Extra 1+2 AUX

### Tiltrotator with integrated grab; EC02 and EC05 (USER 2 and 4*).

#### Left μ-prop joystick
- JL:3 (1) Rotation clockwise
- JL:3 (2) Rotation anti-clockwise
- JL:6 AUX Extra 2A**
- JL:7 Optional grabber open or Extra 1A
- JL:8 SHIFT JR:3 – Extra 2 AUX

#### Right μ-prop joystick
- JR:3 (1) Tilt
- JR:3 (2) Tilt
- JR:6 Optional grabber close or Extra 1B
- JR:7 AUX Extra 2B**
- JR:8 SHIFT JL:3 (1) – Grab close JL:3 (2) – Grab open

* User options in cab module menu.
** Function not available on tiltrotators EC02 and EC05.
**Menues**

**4. Cab module menu**

**General information**
The left and right μ-prop joysticks are used to navigate in the cab module menu.

JL= Left μ-prop joystick  
JR= Right μ-prop joystick  
CM= Cab module

<table>
<thead>
<tr>
<th>Button</th>
<th>Function CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>JL:7, JR:6</td>
<td>Confirm selection/ continue</td>
</tr>
<tr>
<td>JL:3</td>
<td>SELECT or EXIT</td>
</tr>
<tr>
<td>JR:3</td>
<td>Up / down in menu</td>
</tr>
<tr>
<td>JL:7+ JR:6 5 seconds</td>
<td>Activate menu*</td>
</tr>
</tbody>
</table>

*To activate the menu, press simultaneously for 5 seconds on two buttons with opposite functions.*
5. Menu functions

Activate and navigate with the cab module according to the instructions in “Cab module menu”, page 7.

When the menu is activated, various menu options will appear as shown in the table below.

<table>
<thead>
<tr>
<th>Menu</th>
<th>Function</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>USER</td>
<td>System configuration.</td>
<td>6</td>
</tr>
<tr>
<td>SPEED</td>
<td>Setting of speed for tiltrotator functions</td>
<td>7</td>
</tr>
<tr>
<td>JOYSTICK</td>
<td>Calibration of thumb wheels.</td>
<td>8-9</td>
</tr>
<tr>
<td>AUTO</td>
<td>Automatic calibration of oil feeder valve.</td>
<td>10</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>System information and resetting of the system.</td>
<td>11</td>
</tr>
</tbody>
</table>
6. USER

This menu function allows you to choose between different users (USER 1–4). Each USER has factory configurations based on different tiltrotator models:

- USER1 and 3: Tiltrotator without integrated grab. These USERs are programmed identically.
- USER2 and 4: Tiltrotator with integrated grab. These USERs are programmed identically.
- SHEAR (only systems with double oil feeder): should be selected when the machine is not used with a tiltrotator. When the machine is used with a tiltrotator, select USER1–4.

Select your preferred user (USER1–4) in the cab module menu. The selected/active USER will be shown when the system is started up (switched on).

After this, the speed of the tiltrotator functions for the selected/active USER can be chosen according to the instructions in section 7.

The μ-Config software allows you to create more customised settings and store them according to your preference for USER 1–4.
7. SPEED

Used to set the speed (HIGH or LOW) of the different tiltrotator functions. The factory setting is “HIGH” for all functions.

First, choose USER 1–4 according to section 6. The speed settings for each function will be saved for this USER.

Functions to be set to HIGH or LOW:
- ROT (rotation)
- TILT (tilt)
- EXTRA1 (integrated grab)
- EXTRA2 (extra function)

The selected speed for each function will now be shown when the system is started up (switched on).
8. JOYSTICK

This function can be used to calibrate the thumb wheels. This is normally done at the same time as the system is installed, but can also be done if the thumb wheel function is unsatisfactory.

See section 9 for instructions on calibrating the thumb wheels.
Calibration

9. Calibration of thumb wheels

1. Power the system by switching on the ignition. 
   *CM shows “μ-PROP”, then “JOYSTICK CALIBRATION”.*

2. Release JL:3 and JR:3, then press any key. 
   *CM shows zeroed/calibrated values for the thumb wheels.*

3. Push JL:3 and JR:3 to their end positions to the right and left. 
   *CM shows zeroed/calibrated values for JL:3 and JR:3 and “Press any key to exit”.*

4. Press any key to continue. 
   *CM shows list of available tiltrotator models.*

5. Choose the relevant tiltrotator with JR:3. Make sure that “SELECT” is selected (if necessary, use JL:3 to move the cursor), then press any key. 
   *CM shows “μ-PROP” for a few seconds, then “SAVED SETTINGS”.*
10. AUTO

This function allows basic calibration of the system, which is normally done on installation.

To use this function, a special pulse transmitter must be connected to the system. This function is intended for workshop staff and is not described any further in this document.

11. SYSTEM

This function provides help with error tracing, and is used for resetting the system. The function is intended for workshop staff and is not described any further in this document.

**NB:** All settings and calibrations will be erased if the “reset” function is activated.
Alert

12. Alert

Both the system’s modules (unit and cab module) have built-in monitoring of the electronic circuits in the tiltrotator’s control system. If an error is detected, an error description automatically appears on the cab module display (alert). After the error has been corrected, the alert will immediately disappear. If a short circuit alert is shown, the alert will not disappear until the system has been restarted.

1. Alert heading.
2. The module where the error has been detected (A), the connection (B) and the pin (C) where the error is located.
   In certain cases, the function affected by the error will be indicated (D).
4. Alerts shown, of total number of alerts.
5. Number of times the error has been detected.
12. Alert headings

**CM:** Cab module
**AM:** Unit module
**VALVE XX:** Valve 1–10 on tiltrotator
**LEFT/RIGHT JOY:** Left or right μ-prop joystick.
**TOOL LOCK:** Quick hitch
**FEEDER:** Oil feeder valve

*Overview of alert headings*
## 12. Alert list

<table>
<thead>
<tr>
<th>Alerting device (1)</th>
<th>Connector (2)</th>
<th>Short description (3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFEEDER CM-X2.2</td>
<td>SHORT CIRCUIT</td>
<td>The cable or the connector is damaged and short-circuited.</td>
<td></td>
</tr>
<tr>
<td>FEEDER CM-X2.2</td>
<td>OPEN CIRCUIT</td>
<td>The cable is damaged or disconnected.</td>
<td></td>
</tr>
<tr>
<td>AM FAULT CM-X1.2</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged and short-circuited.</td>
<td></td>
</tr>
<tr>
<td>AM FAULT CM-X1.3.8</td>
<td>NO HEARTBEAT</td>
<td>The cable is damaged or disconnected. If it is connected and undamaged, the AM may be damaged.</td>
<td></td>
</tr>
<tr>
<td>DO3 CM-X2:4</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
<td></td>
</tr>
<tr>
<td>DO4 CM-X2:5</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
<td></td>
</tr>
<tr>
<td>VALVE CABLES NOT</td>
<td>DISCONNECTED</td>
<td>The aggregate cables are not disconnected when the tool lock switch is opened. The machine quick hitch will not open. NOTE! This is not a fault, it is information.</td>
<td></td>
</tr>
<tr>
<td>INT. FAULT CM INTERNAL</td>
<td>RELAY TOOL LOCK</td>
<td>The CM is damaged internally. Contact your retailer.</td>
<td></td>
</tr>
<tr>
<td>JOYSTICK DIGITAL SUPPLY</td>
<td>SHORT CIRCUIT</td>
<td>The cable or the joystick is damaged.</td>
<td></td>
</tr>
<tr>
<td>JOYSTICK ANALOG SUPPLY</td>
<td>SHORT CIRCUIT</td>
<td>The cable or the joystick is damaged.</td>
<td></td>
</tr>
<tr>
<td>LEFT JOY CM-JL.3</td>
<td>SHORT CIRCUIT</td>
<td>The cable or the joystick is damaged.</td>
<td></td>
</tr>
<tr>
<td>LEFT JOY CM-JL.6.7.8</td>
<td>START: OUTSIDE DB</td>
<td>The left joystick thumbwheel was affected at startup. Release thumbwheel and reboot system.</td>
<td></td>
</tr>
<tr>
<td>LEFT JOY CM-JL.3</td>
<td>START: DI ACTIVE</td>
<td>Digital input is affected at startup. Release switch and reboot system</td>
<td></td>
</tr>
<tr>
<td>LEFT JOY CM-JL.3</td>
<td>OVER 95 PERCENT</td>
<td>Wrong type of joystick is used. Contact your retailer.</td>
<td></td>
</tr>
<tr>
<td>LEFT JOY CM-JL.3</td>
<td>BELOW 5 PERCENT</td>
<td>Wrong type of joystick is used. Contact your retailer.</td>
<td></td>
</tr>
<tr>
<td>RIGHT JOY CM-JR.3</td>
<td>SHORT CIRCUIT</td>
<td>The cable or the joystick is damaged.</td>
<td></td>
</tr>
<tr>
<td>RIGHT JOY CM-JR.3</td>
<td>OPEN CIRCUIT</td>
<td>The right joystick thumbwheel was affected at startup. Release thumbwheel and reboot system.</td>
<td></td>
</tr>
<tr>
<td>RIGHT JOY CM-JR.6.7.8</td>
<td>START: DI ACTIVE</td>
<td>Digital input is affected at startup. Release switch and reboot system</td>
<td></td>
</tr>
<tr>
<td>RIGHT JOY CM-JR.3</td>
<td>OVER 95 PERCENT</td>
<td>Wrong type of joystick is used. Contact your retailer.</td>
<td></td>
</tr>
<tr>
<td>RIGHT JOY CM-JR.3</td>
<td>BELOW 5 PERCENT</td>
<td>Wrong type of joystick is used. Contact your retailer.</td>
<td></td>
</tr>
<tr>
<td>TOOL LOCK CM-TL.1</td>
<td>SHORT CIRCUIT</td>
<td>The cable or the joystick is damaged.</td>
<td></td>
</tr>
<tr>
<td>TOOL LOCK CM-TL.3.4</td>
<td>MISSING INPUT</td>
<td>The inputs of the tool lock are incorrect. Check that the tool lock switch is working and that there are no short- or open circuit.</td>
<td></td>
</tr>
<tr>
<td>TOOL LOCK AM-X2.17</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
<td></td>
</tr>
<tr>
<td>TOOL LOCK AM-X2.17</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
<td></td>
</tr>
<tr>
<td>VALVE 2 AM-X2.2 ROT B</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
<td></td>
</tr>
<tr>
<td>VALVE 2 AM-X2.2 ROT B</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
<td></td>
</tr>
<tr>
<td>VALVE 3 AM-X2.1 ROT A</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
<td></td>
</tr>
<tr>
<td>VALVE 3 AM-X2.1 ROT A</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
<td></td>
</tr>
<tr>
<td>VALVE 4 AM-X2.6 EXTRA1 B</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
<td></td>
</tr>
</tbody>
</table>
### 12. Alert list

<table>
<thead>
<tr>
<th>Alarming device (1)</th>
<th>Connector (2)</th>
<th>Short description (3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALVE 4</td>
<td>AM-X2.6 EXTRA1 B</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
</tr>
<tr>
<td>VALVE 5</td>
<td>AM-X2.5 EXTRA1 A</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
</tr>
<tr>
<td>VALVE 5</td>
<td>AM-X2.5 EXTRA1 A</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
</tr>
<tr>
<td>VALVE 6</td>
<td>AM-X2.4 TILT B</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
</tr>
<tr>
<td>VALVE 6</td>
<td>AM-X2.4 TILT B</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
</tr>
<tr>
<td>VALVE 7</td>
<td>AM-X2.3 TILT A</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
</tr>
<tr>
<td>VALVE 7</td>
<td>AM-X2.3 TILT A</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
</tr>
<tr>
<td>VALVE 9</td>
<td>AM-X2.8 EXTRA2 B</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
</tr>
<tr>
<td>VALVE 9</td>
<td>AM-X2.8 EXTRA2 B</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
</tr>
<tr>
<td>VALVE 10</td>
<td>AM-X2.7 EXTRA2 A</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
</tr>
<tr>
<td>VALVE 10</td>
<td>AM-X2.7 EXTRA2 A</td>
<td>OPEN CIRCUIT</td>
<td>The cable is disconnected or damaged.</td>
</tr>
<tr>
<td>PULSE SENSOR</td>
<td>AM-X2.21</td>
<td>SHORT CIRCUIT</td>
<td>The cable is damaged.</td>
</tr>
</tbody>
</table>
engcon Nordic  engcon Finland
engcon UK  engcon Denmark
engcon Germany  engcon Poland

engcon Sweden/Nordic/Holding, PO Box 111, SE-833 22 Strömsund, Sweden
Phone: +46 670 178 00  •  Fax: +46 670 178 28
info@engcon.com  •  www.engcon.com