engcon®

User manual

2-SERIES TILTROTATOR

EC202 | EC204 | EC206 | EC209 | EC214 | EC219 | EC226 | EC233

Article 9000113 | Version 1.36 | 2026-03-03

Original Instructions

Preface

Dear Customer,
Thank you for choosing a product from engcon.

engcon is the market leader in tiltrotators and tools for excavators. We represent innovation, knowledge and experience, and we develop our products with a focus on the customer's needs. Please visit our website for contact information and details about the rest of our product range.

www.engcon.com

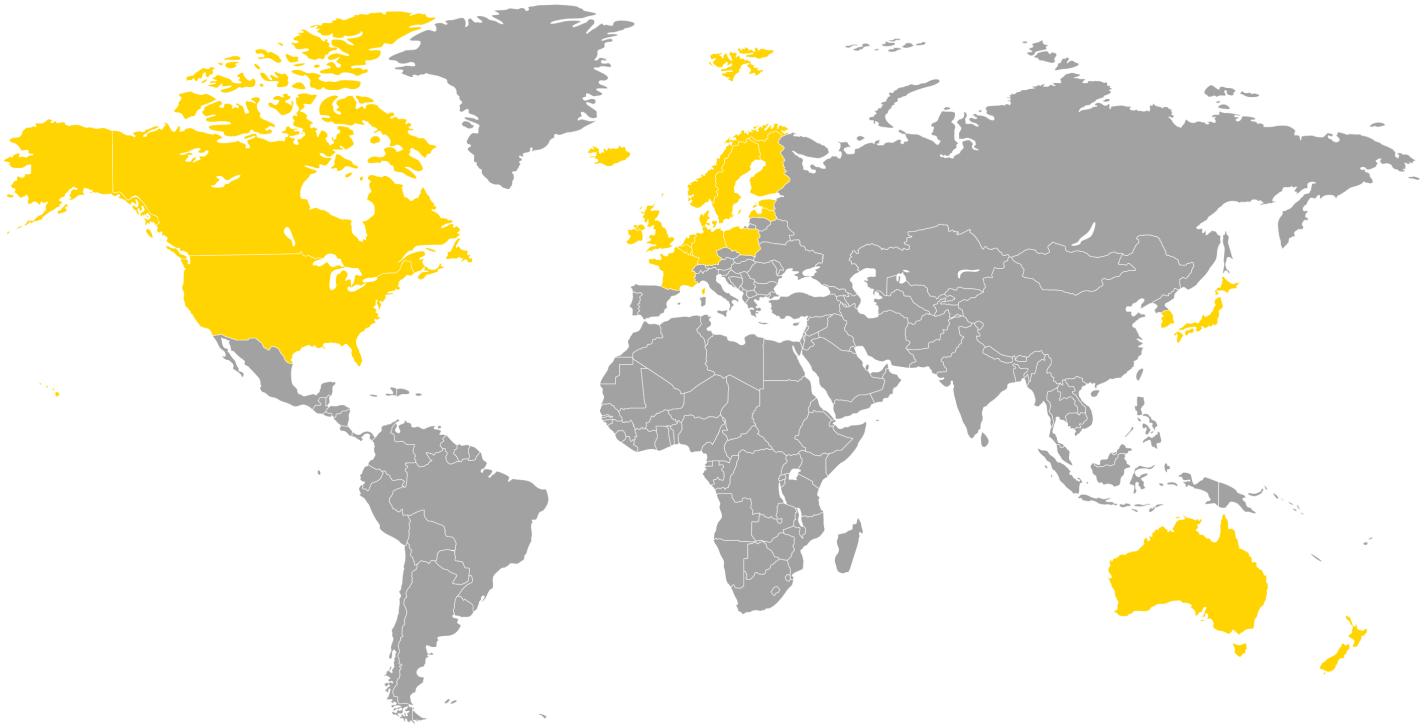


Table of Contents

1. Introduction

1.1. General

This user manual contain important information about your product's functions and characteristics, and how to use it in the best way. Before you begin using the product, it is important that you read and understand the content of these instructions, especially the sections that address safety.

In addition to these instructions, you must study and understand the applicable safety information for the relevant base machine as well as any other equipment involved.

The user manual is supplied with supplementary documentation providing more detailed descriptions of the installation, fitting, operation and maintenance of control systems and custom modifications for your specific product.

Information, images, illustrations and specifications used in the instructions are based on product information that was available at the time of going to press. Images and illustrations used in the instructions are typical examples and not intended to be exact depictions of various part of the product. We reserve the right to make changes without prior notice.

Always store the user manual together with any other supplementary information in a safe manner and such that it is always available.

1.2. Scrapping and recycling

engcon makes constant efforts to reduce its environmental impact. engcon's products comprise at least 99 per cent recyclable material. All assembly and service work must take place in compliance with legislation and ordinances governing the environment, health and occupational safety. This refers to all work with residual materials including handling, storage and processing. To prevent contamination of soil and water, spillages must be avoided. Should a spillage occur, it must be dealt with.

Hazardous waste may only be disposed of by those authorised to do so. All waste produced must be disposed of in compliance with applicable legislation and ordinances:

- Metal and plastics to be recycled.
- Hydraulic hoses are normally used for energy recovery (sort as hazardous waste).
- Oils and greases are normally used for energy recovery (sort as hazardous waste).
- Electronic components to be recycled for materials (sort as hazardous waste).
- Packaging to be sorted at source and recycled for materials.
- Paper to be sorted at source and recycled for materials.

If in doubt, contact the environmental manager at engcon.

1.3. Transport and storage

There are no lifting or attachment points on the tiltrotator. The tiltrotator may only be handled, moved or transported while strapped to a pallet.

When storing the piston rod of a cylinder for a long period, treat it with corrosion protection or push it inside the cylinder.

1.3.1. Temperature during operation and storage

Description	Temperature
Operating temperature	-30° to +50°C

Description	Temperature
Temperature range during storage	-30° to +50°C

1.4. Warranty

All customers receive a 2-year warranty on their tiltrotator.

We encourage you to register your tiltrotator to enjoy faster service. Visit www.engcon.com and search for "register your product".

1.5. Technical support and spare parts

Contact information for support and spare parts can be found at www.engcon.com.

1.6. Product approval

1.6.1. EU Declaration of Conformity

Manufacturer: engcon Nordic AB
Address: Box 111, SE 833 22 Strömsund, SWEDEN
Telephone: + 46 670 178 00
Email: info@engcon.se

engcon hereby declares that the below is manufactured in conformance with Machinery Directive 2006/42/EU.

Type designation:	
Part no:	Serial No:
Max jacking point:	Max hydraulic pressure:
Date:	Other:

Because the following standards and regulatory directives are also applied, the product complies with the requirements for CE marking.

- EMC Directive 2014/30/EU
- SS-EN ISO 12100:2010, SS-EN 474-1:2022 och SS-EN 474-5:2022, SS-ISO 13031:2016
- ISO 10567:2007, SAE J2506:2012, SAE J1362:2018

This declaration and engcon's warranties will cease to be valid immediately if spare parts other than engcon original spare parts are used, or if any changes or other interventions are made without engcon's permission.

Krister Blomgren - Signatory for engcon Nordic AB

Qualified person authorised to compile the technical documentation:

Fredrik Jonsson, Head of R&D, engcon AB

2. Safety

2.1. General

It is important that you read and understand all warnings prior to installation work on this product or before you use it and any accessories supplied. The warning texts highlight potential risks and describe how to avoid them. The following warning levels are used in this user manual:

DANGER
Indicates that an accident will occur if the regulation is not followed.
Risk of personal injury or death.

WARNING
Indicates that an accident may occur if the regulation is not followed.
Risk of personal injury or death.

CAUTION
Indicates that an accident may occur if the regulation is not followed.
Risk of personal injury.

IMPORTANT
Indicates that an accident may occur if the regulation is not followed. Risk of damage to property, process or the surroundings.

REMARKS
Specifies additional information that may make performance or understanding of specific operations easier.

3. Design and function

3.1. General

The engcon tiltrotator adds flexibility and efficiency to an excavator and allows it to be used for more operations. The product provides the ability to both tilt and rotate a tool.

3.2. Tool(s)

engcon's tiltrotators are designed to be used with engcon's hydraulic tools and tools that are type-approved in the base machine's operator's manual.

DANGER
Do not exceed tipping load limits. The weight of the product and the increased reach may impair stability. Risk of personal injury and damage to property.

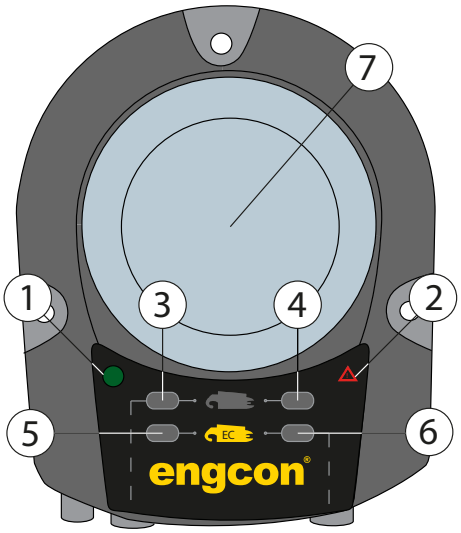
3.3. Q-Safe

Q-Safe is a warning system that monitors the connection of tools to the machine quick hitch and/or the quick hitch beneath the tiltrotator. It has a double mechanical lock to prevent the tool coming loose from the hitch, even if some part of the locking system should fail. The alarm outputs are connected to a QLM module mounted on the stick. It uses sound and light warning signals when a tool is incorrectly connected, as the primary safety purpose of the quick hitch is to protect personnel nearby. The operator must inform personnel concerned what the alarms mean.

WARNING
Stop work immediately and begin troubleshooting if the system warns of a faulty tool connection during operation. Risk of personal injury and damage to property.

CAUTION
Use hearing protection when close to or handling the Q-Safe quick hitch when it is connected. Risk of hearing damage.

3.3.1. Overview



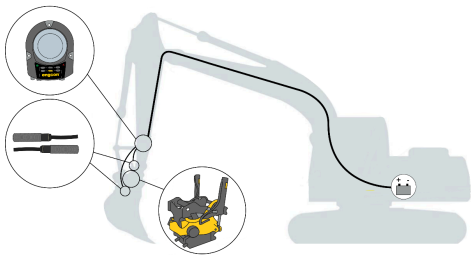


Figure 1.

Position	Description
1	Power supply
2	Alarm indication
3	Sensor, machine hitch hook
4	Sensor, machine hitch ejector
5	Sensor, quick hitch hook
6	Sensor, quick hitch ejector
7	Warning lamp

Table 1.
For indications, see section 7.1.1. Indications

3.4. HS and SW quick hitch with sensor

The HS and SW quick hitch with sensor monitors whether or not the quick hitch is in the open position. The alarm output is connected to a QLM module mounted on the stick. It uses sound and light warning signals when the tool's locking cylinder is open, as the primary safety purpose of the quick hitch is to protect personnel nearby. The operator must inform personnel concerned what the alarms mean.

WARNING
Stop work immediately and begin troubleshooting if the system warns of a faulty tool connection during operation. Risk of personal injury and damage to property.

CAUTION
Use hearing protection when close to or handling the Q-Safe quick hitch when it is connected. Risk of hearing damage.

3.4.1. Overview

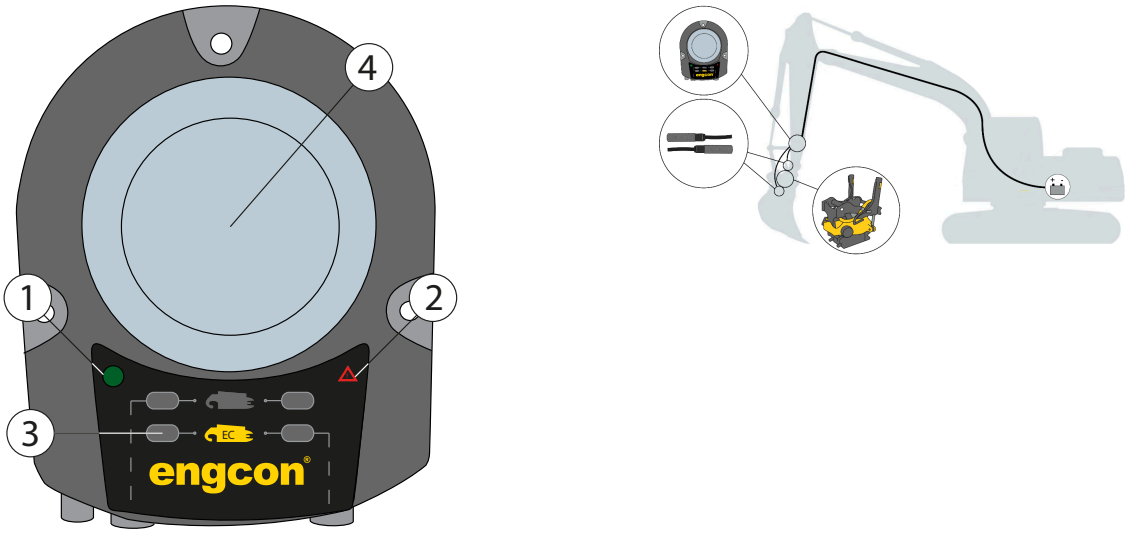


Figure 2.

Position	Description
1	Power supply
2	Alarm indication
3	Indication for open quick hitch
4	Warning lamp

Table 2.
For indications, see section 7.2.1. Indications

3.5. EC-Oil

engcon's system for more efficient tool changes. It provides the ability to switch hydraulic tools without leaving the cab. The system is designed for maximum reliability in harsh environments. It is a fully hydraulic system that handles the connection of tools under full system pressure.

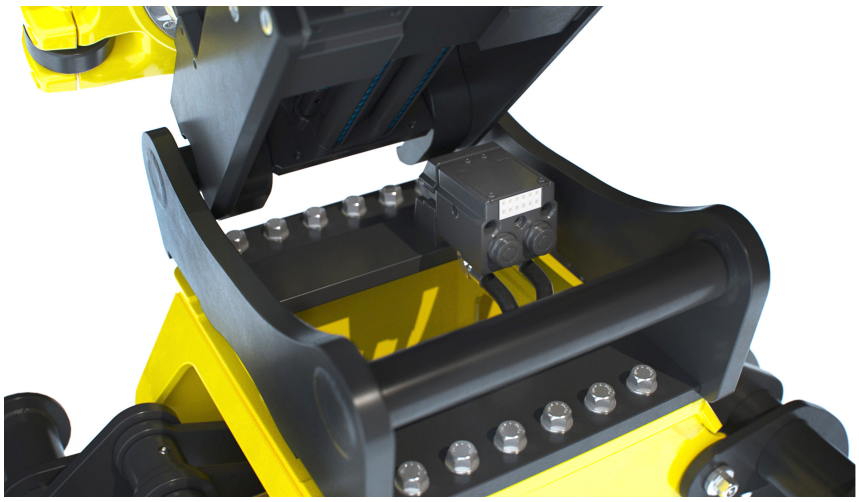


Figure 3.

3.6. ePS/C2C

Together with the tiltrotator, engcon's ePS rotation sensor creates an ePS-compatible excavator guidance system – a concept that provides the selected system with more functions. It provides full control of the bucket and the ability to see its exact rotational position. C2C acts as a connection point between two different systems.

3.6.1. Overview

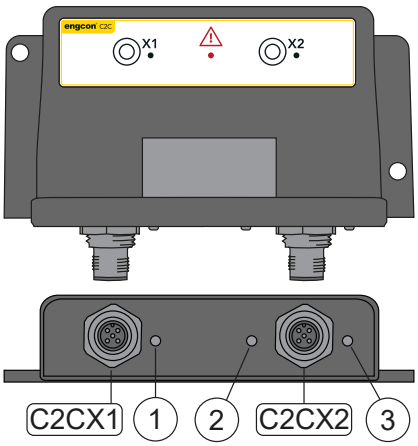


Figure 4.

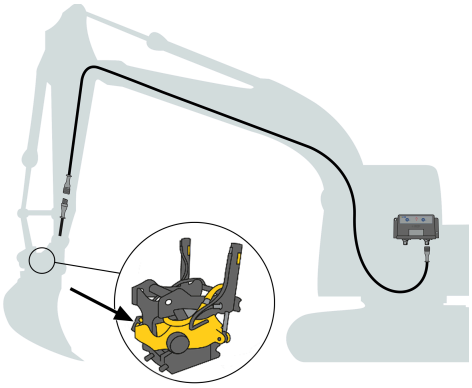


Figure 5.

Position	Description	Remarks
CMX1	CAN Excavator guidance system	
CMX2	CAN Rotation sensor	
1	Traffic indication, Excavator guidance system	Green LED
2	Status C2C (Alarm indication)	Red LED
3	Traffic indication, Rotation sensor	Green LED

Table 3.
For indications, see sections 7.3.1. Indications.

4. Installation

It is important to check the necessary additional documentation before installation. At time of delivery, your product and supplementary documentation are as far as possible adapted to your base machine.

WARNING
Never attempt to increase the maximum capacity of the equipment by modifications not approved by the supplier. Risk of personal injury and damage to property.

WARNING
Welding is not permitted. It can have a negative impact on safety. Risk of personal injury and damage to property. For welding, contact your dealer or engcon Nordic AB.

WARNING
Beware of moving parts. A lack of awareness may lead to crush injuries. Risk of personal injury.

4.1. Oil

On delivery, your product is filled with Fuchs Hydraway White 46, a white oil-based hydraulic oil.

An oil drain pan must be available during installation.
T and P are labelled with:

IMPORTANT
Ensure miscibility with the base machine's hydraulic oil prior to installation. If you are in any doubt, contact your lubricant supplier. An incorrect mixture could damage hydraulic components.

4.2. Identification

Check that your product's rating plate matches the information on the EC Declaration of Conformity. If there is any deviation, contact the supplier before you begin initial installation.

The rating plate is located on the tiltrotator's yellow frame or its black protective cover.

Rating plate content:
Part number
Type designation
Serial number
Year of manufacture
Weight
Max jacking point
Max hydraulic pressure

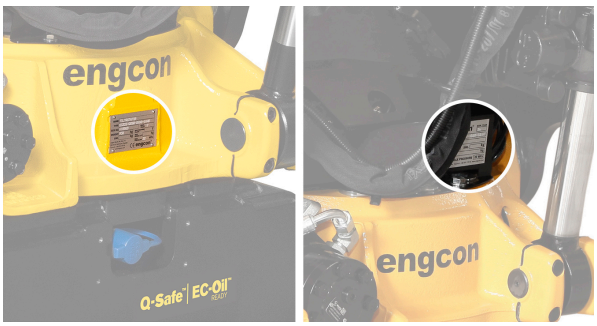


Figure 6.

4.3. Mechanical

The following assembly and installation instructions refer to direct attachment of the tiltrotator.

If the tiltrotator will be installed on a machine hitch, use the user manual for connecting tools.

DANGER
Do not exceed tipping load limits. The weight of the product and the increased reach may impair stability. Risk of personal injury and damage to property.

WARNING
If you have any doubts concerning the safety aspects of your knowledge, the equipment or work, contact a dealer or engcon Nordic AB. Incorrect installation affect safety.

IMPORTANT
Assembly and installation may only be carried out at a workshop authorised by the manufacturer. Changes to the assembly may not be carried out without the manufacturer's consent.

4.3.1. Attaching the tiltrotator

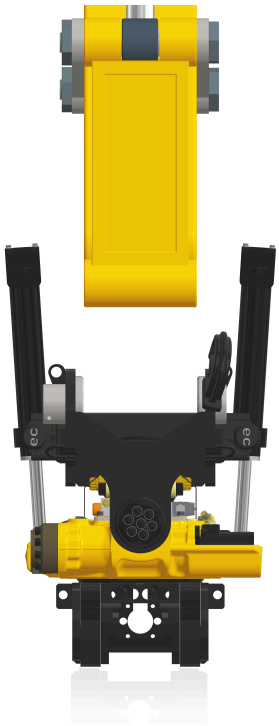


Figure 7.

Before installation

1. Check the tipping load limits. Take tiltrotator weight and the extended risk area into account. Installation may entail a necessary reduction in the volume of the tool.
2. Position the base machine and the tiltrotator on a flat, non-slip surface. Make sure the tiltrotator is upright and in line with the stick and break link.
3. If necessary, use a firmly planted ladder.

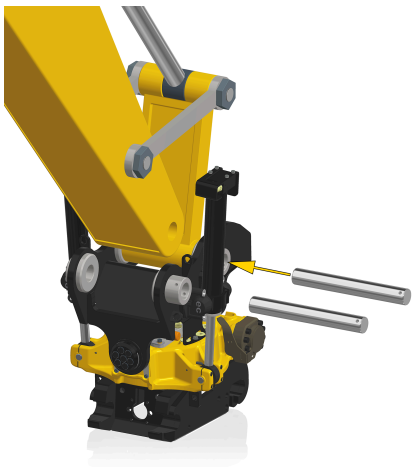


Figure 8.

Installation

1. Fit any O-rings if such must be used.
2. Position the dog bone linkage to align with the appropriate holes in the upper section of the tiltrotator.
3. Shim the width if necessary.
4. Insert the intended shaft journal.
5. Fit the shaft journal lock and make sure it locks correctly.

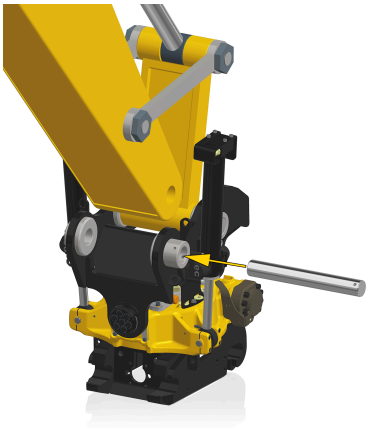


Figure 9.

Figure 10.

6. Align the break link such that it corresponds to the holes in the upper section of the tiltrotator/rotator.
7. Lower the stick carefully; make sure that no shear forces occur.
8. Shim the width if necessary.
9. Apply plenty of grease in the cavity and bushings.

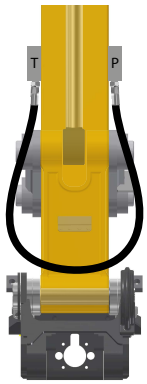
IMPORTANT
Fill the bushings and the cavity in the stick with grease. Central lubrication only provides top-ups.

10. Insert the intended shaft journal.
11. Fit the shaft journal lock and make sure it locks correctly.

4.4. Electrical and hydraulics

For electrical and hydraulic hose installation, refer to the separate installation instructions supplied with the selected control system. Also available on the website or by contacting engcon.

4.4.1. Filter the hydraulic oil



1. Connect a hydraulic hose between (P) and (T) on the excavator's hydraulic circuit.
2. Open shut-off valves for (P) and (T).
3. Run the hydraulic oil through the excavators oil filter for approximately 3 minutes to make sure that the hoses and pipes are clean.
4. Close shut-off valves for (P) and (T).
5. Remove the hydraulic hose from the excavator's hydraulic circuit.

IMPORTANT
Maintenance and repair of the electrical system may only be carried out by professionally qualified persons.

WARNING
Switch off power when working on the electrical system and remove any live objects before starting work Risk of personal injury.

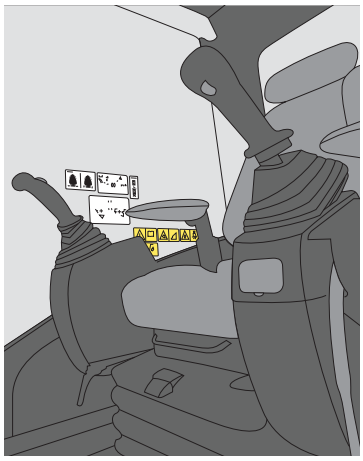
WARNING
Be meticulous with the insulation of electrical conductors and components when installing/fitting electrical equipment. Short circuits in electrical wiring can result in fires.

4.4.2. Q-Safe

See separate installation instructions. Also available on the website or by contacting engcon.

4.5. On completion

4.5.1. Apply decals



Affix the warning decal supplied in a conspicuous place in the cab where it does not distract the operator.

WARNING
Replace damaged or illegible signs and decals before using the machine. Risk of personal injury and damage to property.

4.5.2. Function check

Carry out a function test according to the following items.

- Run all the tiltrotator functions a few times to remove any air from the system. Important for preventing uncontrolled movement.
- Check that the tiltrotator functions according to section 5.5. Manoeuvring.
- Make sure the tool operates when the hydraulics are activated.
- Check that hoses and cables are not exposed to wear or pinching.

5. Operation

5.1. Before and during use

Check your base machine manufacturer's recommendations for calculating tipping loads, and be sure to include the increased weight and reach the product entails.

DANGER
Do not exceed tipping load limits. The weight of the product and the increased reach may impair stability. Risk of personal injury and damage to property.

The tiltrotator may be used only for the brackets and tools it is intended for.

See additional information in the separate user manual for each tool.

WARNING
Take care when handling long objects. Take dynamic load and the extended risk area into account. Risk of personal injury and damage to property.

WARNING
Always make sure of a good grip when handling objects. Risk of personal injury and damage to property.

WARNING
Using the tiltrotator to lift people or work platforms is prohibited. Risk of personal injury and damage to property.

IMPORTANT
Check the base machine's specified max capacity. Any use of the product in excess of base machine max capacity may damage the machine.

5.2. Lifting points

Approved

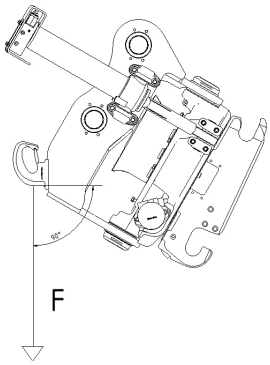


Figure 11.

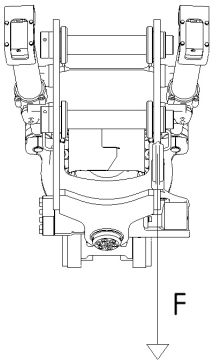


Figure 12.

Not approved

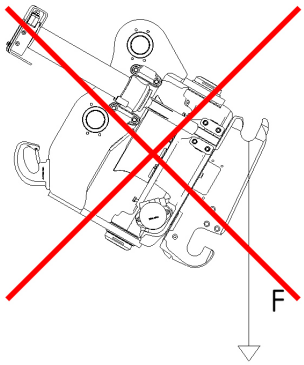


Figure 13.

Check the maximum permitted load for the lifting point as stamped on the lifting hook / lug and rating plate. Designed with safety factor 5:1.

WARNING
The base machine must be equipped with a load-holding valve on the boom/stick and an overload warning when using a jacking point on the tiltrotator. Risk of injury and damage to property.

5.3. Integrated grab

The grab is not designed for lifting with chains, straps or similar.

WARNING
Use dedicated lifting equipment when lifting objects. Risk of personal injury and damage to property.

WARNING
Do not use the grab for work using directional forces, e.g. piling. Risk of personal injury and damage to property.

WARNING
Make sure the load burdens both grab arms when lifting. Make sure the load cannot shift and only burden one grab arm. When all force is exerted by only one arm, the grab is at risk of opening. Risk of injury and damage to property.

Figure 14.

5.4. Tool(s)

WARNING
Do not use a grab when handling standing trees. Risk of injury and damage to property.

5.4.1. Grab saw

Do not use the tiltrotator with a grab saw when felling trees.

5.4.2. Hydraulic hammers

The use of hydraulic hammers together with the tiltrotator is not recommended as this leads to increased wear.

5.4.3. Augers

The use of augers together with the tiltrotator is not recommended as this leads to increased wear.

IMPORTANT
Avoid rotation for extended periods; it can cause the worm gear to overheat. Risk of property damage.

5.4.4. Pallet forks

When using pallet forks, the tiltrotator's cylinders must be fitted with hose break valves. If uncertain, contact your supplier.

To avoid overloading the quick hitch locking pins, the pins must be turned away from the forklift tines.

WARNING
The excavator arm system cylinders must be fitted with valves to prevent the load from dropping in the event of a hose failure. Risk of personal injury and damage to property.

WARNING
When using pallet forks together with the tiltrotator, exercise caution and manoeuvre carefully. The load can easily fall off during rapid rotation or tilting.

5.4.5. Crane boom

The tiltrotator may not be used together with a crane boom. During crane boom operation, the tiltrotator must be disconnected from the carrier.

5.5. Manoeuvring

The functions described for each control system apply to the recommended installation/configuration. Deviations may occur depending on the user's preferences for alternative button functionality and configuration.

5.5.1. DC3 control system (for machines with double-acting hydraulic circuit)

The engcon control system allows simultaneous operation of all functions.

Refer to separate user manual supplied on delivery. Also available on the website or by contacting engcon.

5.5.2. DC2 control system (for machines with double-acting hydraulic circuit)

The engcon control system allows simultaneous operation of all functions.

Refer to separate user manual supplied on delivery. Also available on the website or by contacting engcon.

5.5.3. Control system 10 (for machines with proportional control hydraulic circuits)

The external control system allows simultaneous operation of all functions.

Refer to the instructions for mounted/installed, external control systems; contact/support apply accordingly.

5.5.4. Control system 9-2 (for machines with two or more proportionally controlled hydraulic circuits)

Allows simultaneous operation of two functions.

Refer to separate user manual supplied on delivery. Also available on the website or by contacting engcon.

5.5.5. Control system 1 (for machines with double-acting hydraulic circuit)

Has two functions, tilt and rotation.

Refer to separate user manual supplied on delivery. Also available on the website or by contacting engcon.

5.5.6. Control system 15 (for machines with double-acting hydraulic circuit)

Allows simultaneous operation of two functions, tilt and rotation.

Refer to separate user manual supplied on delivery. Also available on the website or by contacting engcon.

5.5.7. Externally controlled quick hitch lock – SQ/QSC

See separate user manual for quick hitch lock operation.

- SQ – separate locking hydraulics. User manual available from system supplier.
- QSC – Separate engcon locking system. User manual is available for download on the website or through direct contact with engcon.

5.5.8. Control system 5

5.5.8.1. Control system 5 SQ

For tiltrotators with 5 SQ control systems, refer to the machine's instruction manual.

5.5.8.2. Control system 5 IQ

IMPORTANT
Always pressurise the tiltrotator to activate the locking cylinder after changing tools

Quick hitch lock(s)

Deactivated

Activated

Operating lock latches

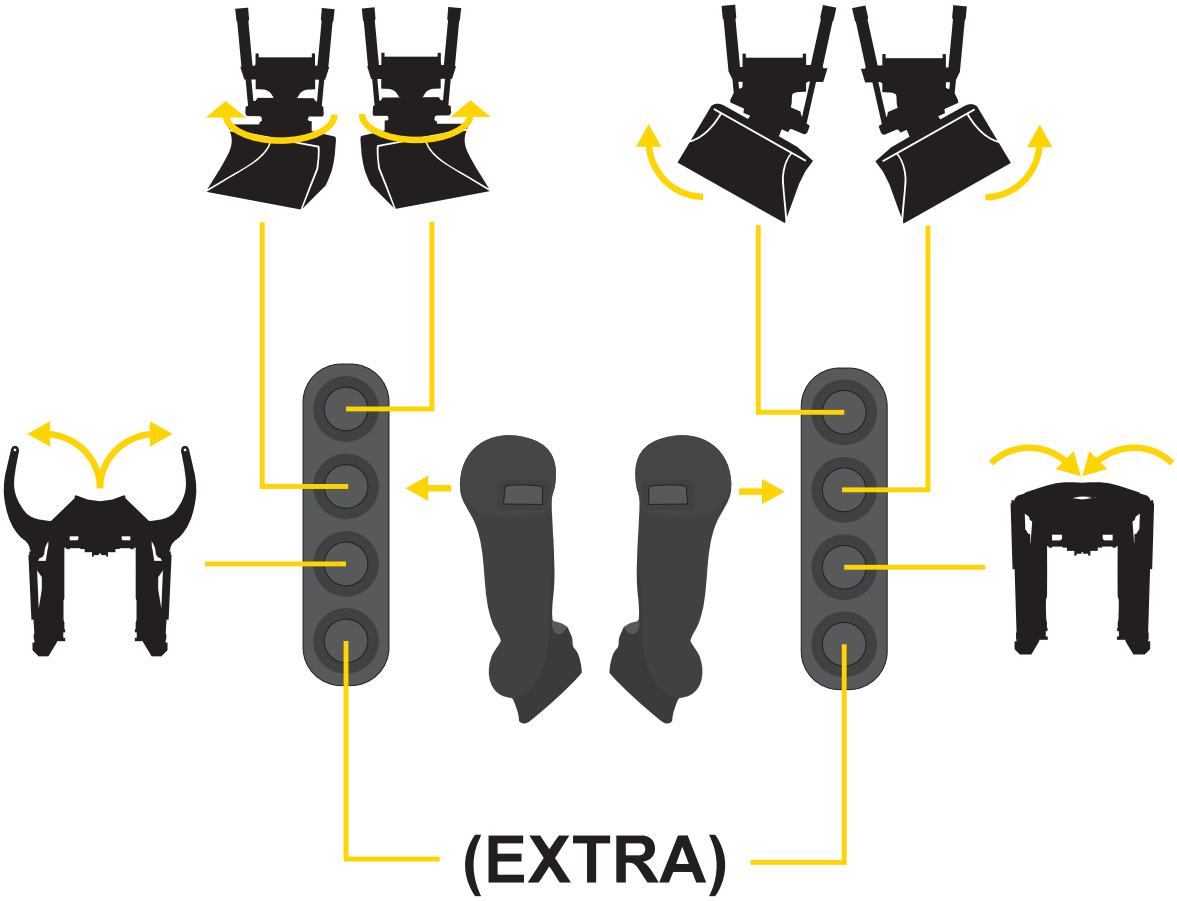
Closing the quick hitch lock latches

Opening the quick hitch lock latches

Tiltrotator/Rotator

WARNING
The grab cassette is not suitable for lifting with chains, slings or equivalent. Risk of injury and property damage. Use the dedicated lifting device.

The instructions below describe the general operation of a system where buttons have been installed on existing joysticks. Press the button corresponding to the desired function. Pressing the foot pedal then activates the oil flow to the hydraulics.

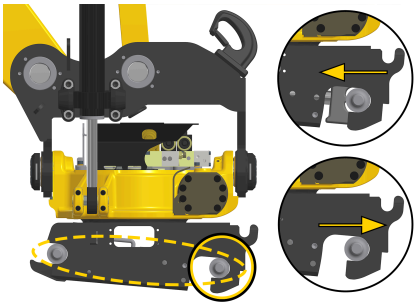


5.6. Changing tools

The following instructions concern general operation of the engcon quick hitch. For further information and instructions, refer to the separate user manual for the quick hitch concerned.

5.6.1. Connecting the tool, hydraulic lock

1. Activate the quick hitch lock function.
2. Activate the hydraulics to operate the locking bolts.



HS/SW with sensor: The sound and light warning signals are activated when the locking cylinder is in the open position.

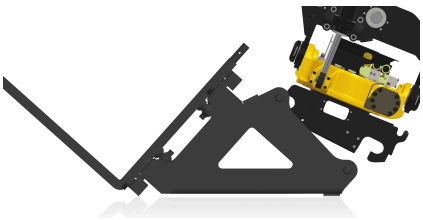
3. Check that the indicator rod is out. Indicator rod location may vary depending on the tiltrotator model.

ECPUP: Check that the red hook is in the open position.
QSM40: Quick hitch QSM40 lacks an indicator rod.

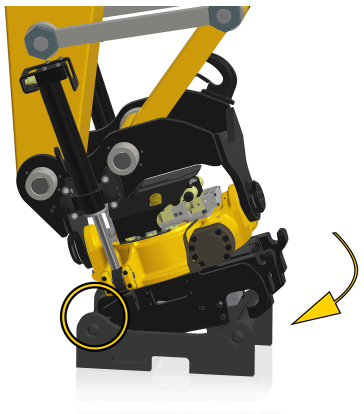
4. Move the quick hitch towards the tool.

EC-Oil: Make sure the tool is positioned such that the shaft with the EC-Oil block is located closest to the base machine. If the tool is positioned correctly, the block will be visible on the left side of the shaft as seen from the cab.

Pallet fork: To avoid overload when connecting, the quick hitch locking pins must face away from the forklift tines.

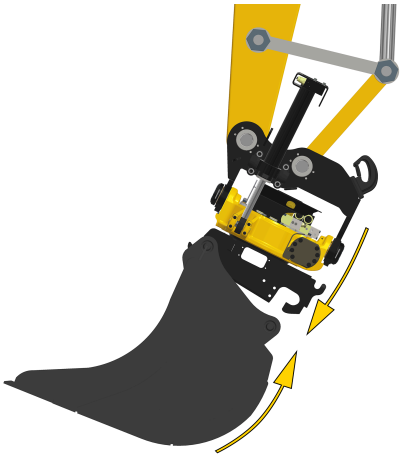


5. Connect the tool by moving the machine coupler toward one axle on the tool.



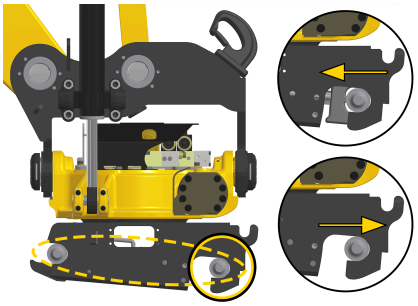
Q-Safe: The sound and light warning signals are activated.

6. Raise the tiltrotator very slightly above the ground so that the tool moves towards the quick hitch.



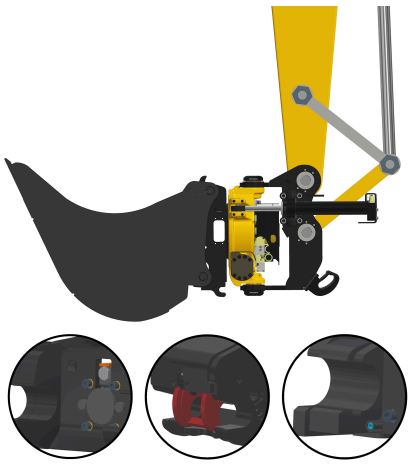
IMPORTANT
The machine may only be operated with the quick hitch lock switch in the activated position when connecting and disconnecting tools.

7. Activate the quick hitch lock function. The quick hitch lock is not fully connected to the attachment point until the hydraulic system is activated and the "open" indicator is no longer visible.
8. Activate the hydraulics to operate the locking bolts.



IMPORTANT
Always pressurise the tiltrotator to activate the locking cylinder after changing tools.

9. Check that the quick hitch lock function engages and that the indicator rod no longer protrudes from the quick hitch.

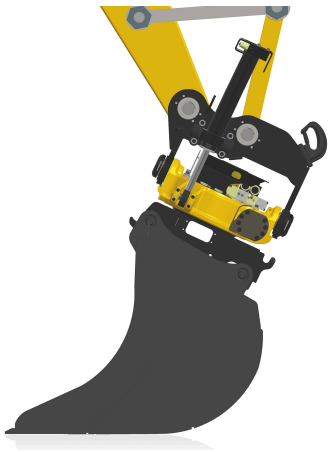


Q-Safe: The sound and light warning signals are deactivated when the hitch is correctly connected.
HS/SW with sensor: The sound and light warning signals are deactivated when the locking cylinder is in the closed position.
ECPUP: Check that the red hook is in the closed position.
QSM40: Quick hitch QSM40 lacks an indicator rod.

For other quick hitches, check that the lock function has engaged as specified for the quick hitch concerned.

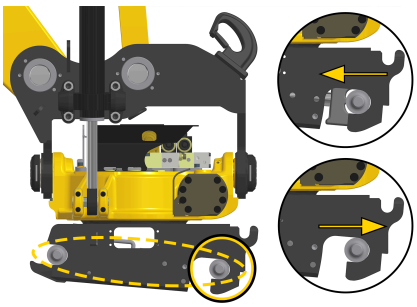
5.6.2. Disconnecting the tool, hydraulic lock

1. Place the tool on the ground, with the locking bolts pointing away from the cab.

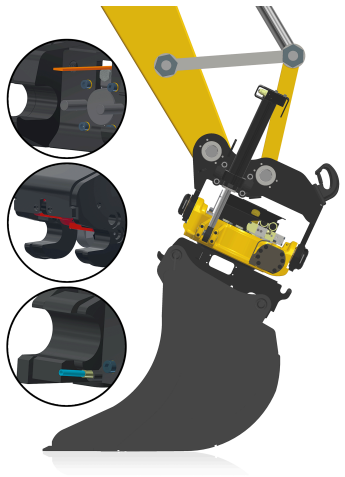


2. Activate the quick hitch lock function.

3. Activate the hydraulics and the locking bolts.

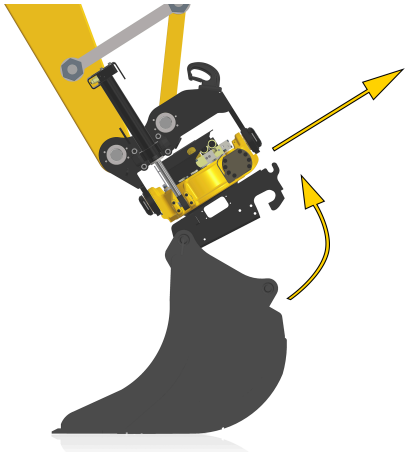


4. The locking cylinders are activated and open position is reached when the indicator rod is visible.



Q-Safe: The sound and light warning signals are activated.
HS/SW with sensor: The sound and light warning signals are activated when the locking cylinder is in the open position.
ECPUP: Check that the red hook is in the open position.
QSM40: Quick hitch QSM40 lacks an indicator rod.

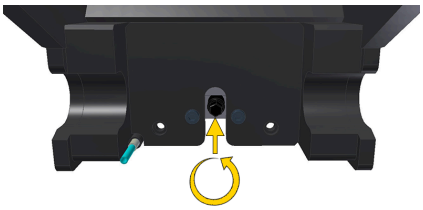
5. The locking bolts are now in the open position and the tool is released. Carefully lift the machine hitch away from the tool.



IMPORTANT
The machine may only be operated with the quick hitch lock switch in the activated position when connecting and disconnecting tools.

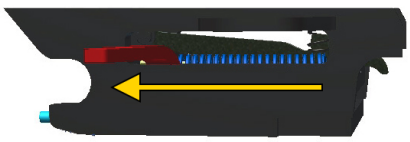
5.6.3. Connecting the tool, mechanical lock

1. Open the quick hitch lock with a suitable tool.



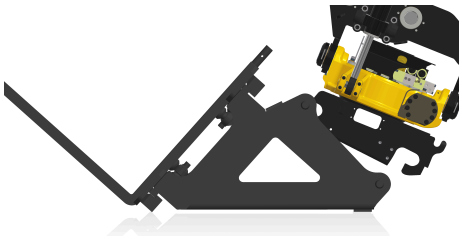
On models fitted with a screw, turn the screw anticlockwise until the locking bolts engage and the indicator rod* is in its outermost position.

On models with a lever, use an extension pipe and move the lever to its end position. The indicator rod* will then be in its outermost position and the lock clamp will keep the locking bolts open.

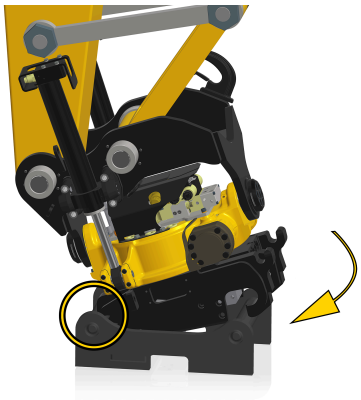


2. Move the quick hitch towards the tool.

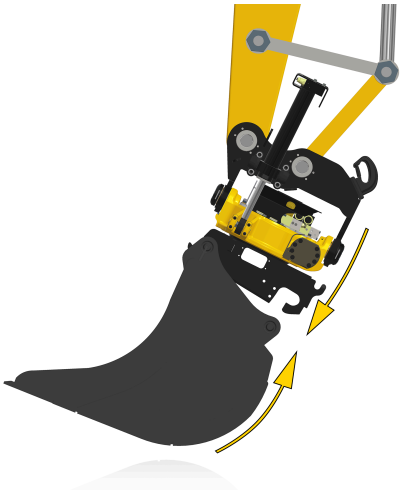
To avoid overloading the quick hitch during use, turn the quick hitch locking pins to face away from the forklift tines when connecting.



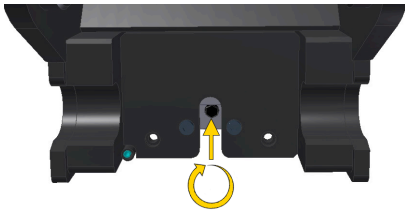
3. Connect the quick hitch to the tool.



4. Raise the tiltrotator very slightly above the ground so that the tool moves towards the quick hitch.

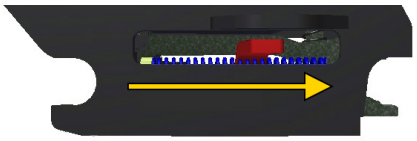


5. Close the machine hitch with an appropriate tool.

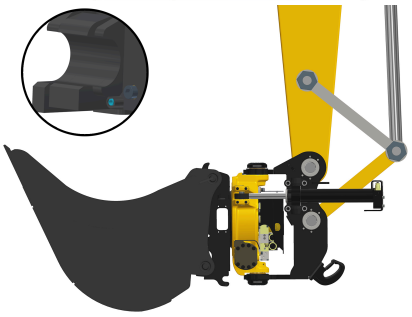


On models with a screw, turn the screw clockwise until the locking bolts are retracted and the indicator rod* is in its innermost position.

On models with a lever, the lock closes automatically when the adaptor axle forces the lock clamp up.



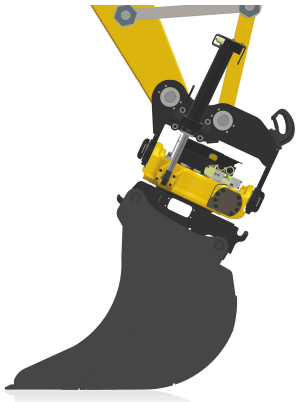
6. Check that the quick hitch lock function has engaged.
   On engcon's other quick hitches, the blue indicator rod will no longer protrude from the hitch. Indicator rod* location may vary depending on the tiltrotator model.



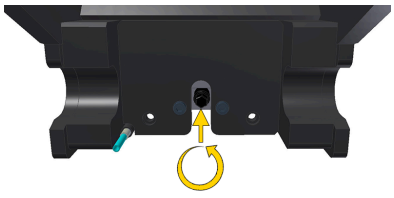
**Quick hitch QSM40 lacks an indicator rod.*

5.6.4. Disconnecting the tool, mechanical lock

1. Place the tool on the ground, with the locking bolts pointing away from the cab.



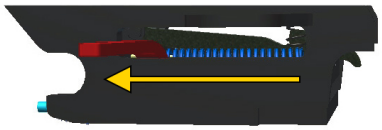
2. Open the quick hitch lock with a suitable tool.



On models fitted with a screw, turn the screw anticlockwise until the locking bolts engage and the indicator rod* is in its outermost position.

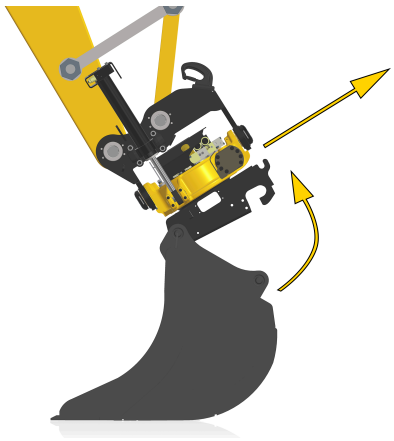
On models with a lever, use an extension pipe and move the lever to its end position. The indicator rod* will then be in its outermost position and the lock clamp will keep the locking bolts open.

In this position the tool is free !



3. The locking bolts are now in the open position and the tool is free. Carefully raise the tiltrotator from the tool.

**Quick hitch QSM40 lacks an indicator rod.*



5.7. Fitting and setting up quick hitch locks

DANGER
Check the attachment points regularly and be alert for the formation of cracks. Risk of personal injury and damage to property.

WARNING
Beware of moving parts. A lack of awareness may lead to crush injuries. Risk of personal injury.

Shim the quick hitch and the tool for minimum play. Check that minimum locking wedge engagement is not below the minimum value:

Quick hitch S30-S80

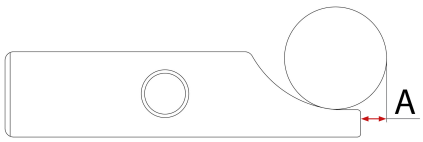


Figure 15.

Quick hitch	A (max)
S30	5mm
S40	10mm
S45	10mm
S50	10mm
S60	20mm
S70	22mm
S80	25mm

Table 4.

Quick hitch S1-S3

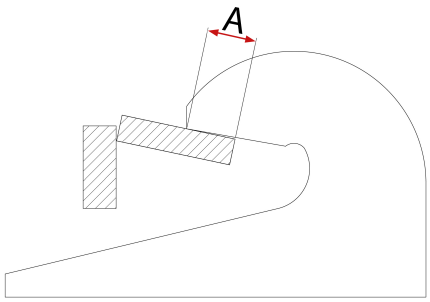


Figure 16.

Quick hitch	A (min)
S1	30mm
S2	30mm
S3	30mm

Table 5.

Quick hitch RF40-90 (PUP)

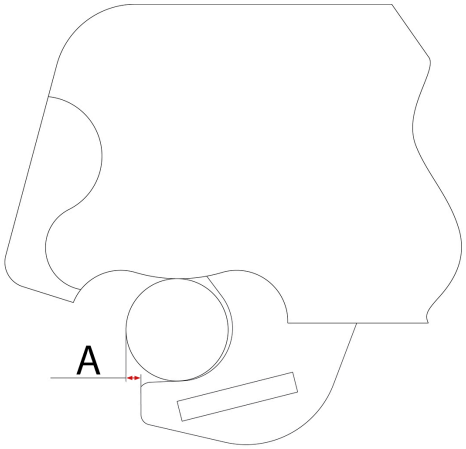


Figure 17.

Quick hitch	A (max)
PUP40-90	14mm

Table 6.

Quick hitch ECPUP

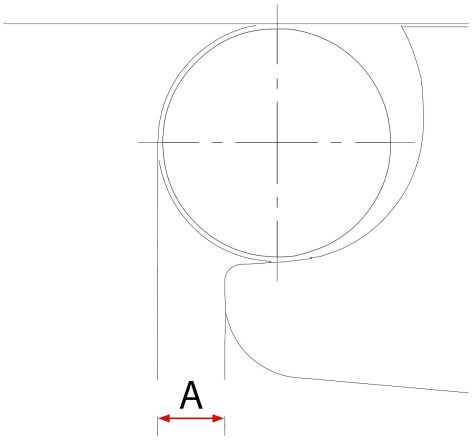


Figure 18.

Quick hitch	A (max)
ECPUP45	2mm
ECPUP50	5mm
ECPUP60	22mm
ECPUP65	25mm
ECPUP70	25mm
ECPUP80	30mm

Table 7.

Quick hitch CW10-45

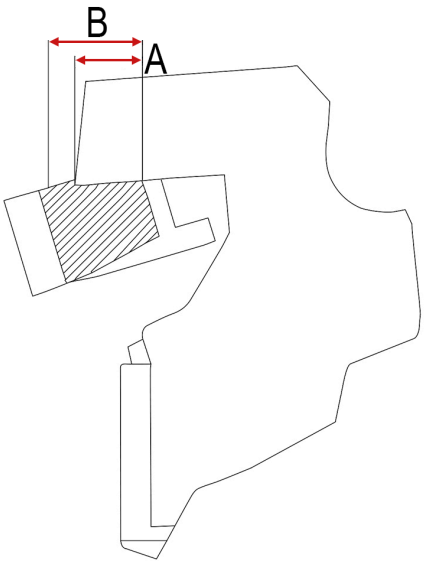


Figure 19.

Quick hitch	A (max)
CW10-45	A ≥ B * 0.75

Table 8.

Quick hitch HS

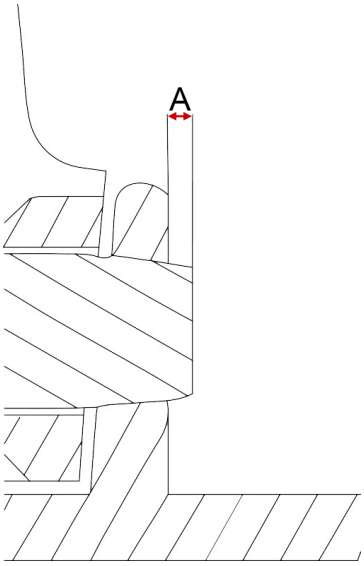


Figure 20.

Quick hitch	A (max)
HS08	0 till 14mm
HS10	0 to 5mm
HS20/21/25	-10 till 5mm

Table 9.

5.8. Work under water

We do not recommend work under water as this leads to increased wear and risks reducing tiltrotator service life. Work in brackish or salt water will reduce the service life of EC-Oil electrical connectors by more than half.

5.8.1. Before performing work under water

- Fill the tiltrotator with grease as described in section 6.3.4. Worm gear lubrication. Ideally, use grease that is more water repellent. Always check with your dealer to ensure miscibility.
- Fill all connectors with contact grease. Ideally, use contact grease that is water repellent.
- Check the condition of the O-ring between the rotator frame and the quick hitch. See section 10.2. Tiltrotator overview.

5.8.2. After performing work under water

- Always finish the working day by rotating, tilting and filling grease via the central lubrication to expel water from bearings.
- Apply oil to shiny surfaces.

6. Maintenance

Daily maintenance is essential for ensuring optimal function of your product. Neglected maintenance may result in loss of warranty.

DANGER
Check the attachment points regularly and be alert for the formation of cracks. Risk of personal injury and damage to property.

WARNING
Make sure that service and maintenance is carried out according to the manufacturer's recommendations. Inadequate maintenance may cause defects on the base machine and its equipment.

WARNING
When changing hoses, only hoses with press couplings may be used. Screw connections may not be used. Risk of personal injury and damage to property.

6.1. General

Scheduled greasing and inspections to be performed by the operator:

- **Daily:** To be performed according to section 6.2. Daily inspections and 6.5. Special maintenance before the working day is begun.
- **Every 8 operating hours:** Lubrication according to section 6.3.2. Lubrication every 8 operating hours.
- **Every 250 operating hours:** Perform according to section 6.4. Service every 250 operating hours.

In addition to the above, service must be performed by a service technician during the first machine service or no later than 500 operating hours. Then at 500-hour intervals according to section 11.1. Service schedule.

Fill in section 11.4. Service record after completed service.

IMPORTANT
Review the personal and environmental risks of hydraulic oil and grease by reading the safety data sheets for the hydraulic oil and grease in use. Risk of personal injury and damage to surroundings.

IMPORTANT
Be sure to keep your product clean. Inadequate cleaning can cause damage to your equipment.

6.2. Daily inspections

Check that:

- Visible fasteners are tightened (see section 6.9. Tightening torque).
- The shaft journal lock attachment points are not loose.
- No damage or cracks are present.
- The tiltrotator is correctly attached to the machine and tool.
- Warning decals are present and legible.
- The quick hitch is clean, without visible damage and is functioning normally.
- No breakout play or rotational play is present (see section 6.6. Checking axial and radial play).
- There are no hydraulic leaks.
- No grease leakage is present on hoses or in connectors.
- The QLM electronics modules signals correctly when attaching and detaching tools.

WARNING
Avoid contact with hydraulic oil. Risk of burns.

WARNING
Never use your hands to search for leaks in the hydraulic system. Use the necessary protective equipment. Pressurised hydraulic oil can penetrate the skin. Risk of personal injury.

WARNING
Beware of moving parts. A lack of awareness may lead to crush injuries. Risk of personal injury.

WARNING
The hydraulic system must be de-pressurised before work on the system is begun. Risk of personal injury and damage to property.

6.3. Tiltrotator lubrication

The tiltrotator has sliding bearings that require daily greasing; it is fitted with a progressive central lubrication system.

The integrated grab and quick hitch beneath the tiltrotator have their own grease points and are not connected to the lubrication system. See the relevant images for lubrication points for the quick hitch and integrated grab beneath the tiltrotator. During refilling, a certain amount of spillage may occur between the body and the hitch's ring.

Blockage in one grease channel will entail blockage of the entire lubrication system. Use pre-filled hoses when replacing lubrication hoses; this is especially important when the tiltrotator is connected to the base machine’s lubrication system.

For troubleshooting, contact your service partner or engcon AB.

IMPORTANT
Grease nipple not connected to central lubrication system; only used for service.

6.3.1. Grease recommendation

The tiltrotator's worm gear is factory filled with the recommended lithium-based universal grease (NLGI 2). This grease is often miscible with other greases of similar type.

Always check with your dealer to ensure miscibility. The use of inferior grease categories will lead to increased consumption.

IMPORTANT
Do not use greases containing solid particles such as molybdenum, graphite or copper. Such particles can lead to failure of the lubrication block.

IMPORTANT
Ensure the highest possible cleanliness when greasing or connecting the lubrication system. The lubrication system is sensitive to dirt.

IMPORTANT
Grease with a higher base oil viscosity will be required in greater quantities during heavy excavation and when using hydraulic tools.

6.3.2. Lubrication every 8 operating hours

IMPORTANT
Never add greater quantities of grease via central lubrication as over lubrication will damage the seals in certain places.

IMPORTANT
The quantities of grease specified refer to the minimum quantity that must be added.

6.3.2.1. Manual lubrication

EC204: 10g | EC206: 10g | EC209: 15g | EC214: 20g | EC219: 20g | EC226: 25g | EC233: 35g

Grease the tiltrotator by removing the protective cap from the grease nipple and connecting a grease gun. Grease the tiltrotator until grease forces its way out at all axles and bearings. Wipe the grease nipple and nozzle thoroughly clean before attaching the grease gun.

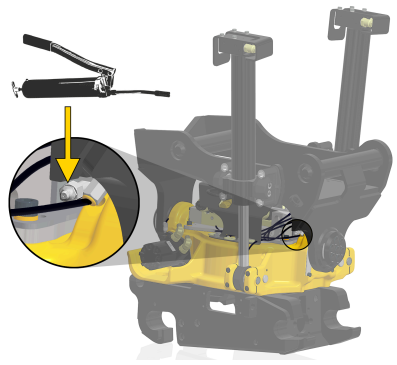


Figure 21.

6.3.2.2. Automatic lubrication

The distribution block on the tiltrotator is of progressive type and distributes the grease to all connected grease points automatically. The distributor delivers the grease to the grease points one by one. This makes sure no grease point goes without. The system can be connected to the base machine's automatic lubrication system.

Replace the grease nipple on the distribution block with a suitable hose connection (the thread in the distributor is M10x1) and connect the hose from the base machine's lubrication system. To deliver grease to the tiltrotator, always check that the valve supplied and the pump's operating settings provide the correct volume and that system pressure is sufficiently high (max 300 Bar).

IMPORTANT
In winter, a higher system pressure is required for tiltrotator lubrication.

IMPORTANT
Check regularly that new grease is supplied to the tiltrotator.

6.3.3. Greasing the quick hitch

Grease quantity: 3-4 pump strokes per nipple.

Grease nipples on both sides, applies to all examples.

The arrows show the location of the grease nipples.

Example, S80

Figure 22.

Example, S70

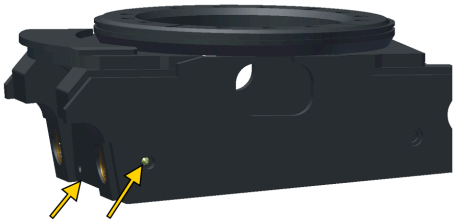


Figure 23.

Example, HS

Figure 24.

Example, ECPUP

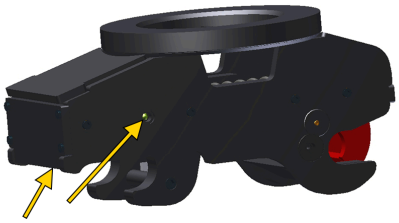


Figure 25.

6.3.4. Worm gear lubrication

1. Remove the protective cover on the left side of the tiltrotator and the plug on the bolted joint.
2. Clean and remove all grease from the hole where the plug was installed.

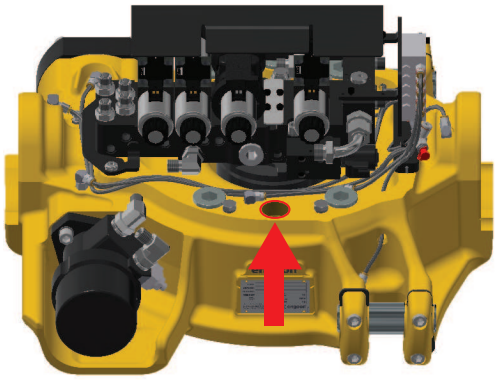


Figure 26. Plug

3. Rotate the worm wheel anticlockwise and note if grease accumulates in the hole.

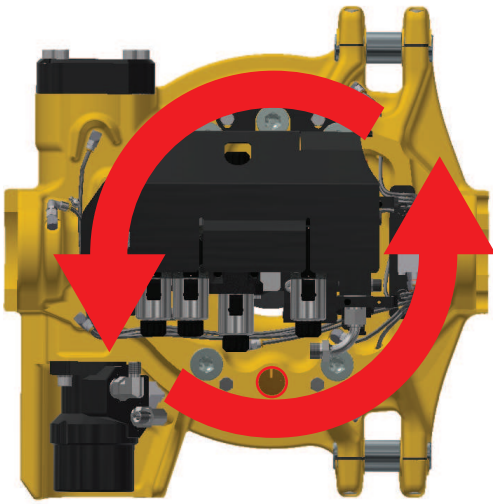


Figure 27. Rotation

4. If grease accumulates in the hole, no grease need be added. Otherwise add grease (while rotating if possible) and repeat step 3.

WARNING
Beware of moving parts. A lack of awareness may lead to crush injuries. Risk of personal injury.

6.3.5. Lubrication, integrated grab GR10, GR20

Grease quantity: 3-4 pump strokes per nipple.

The arrows show the location of the grease nipples.

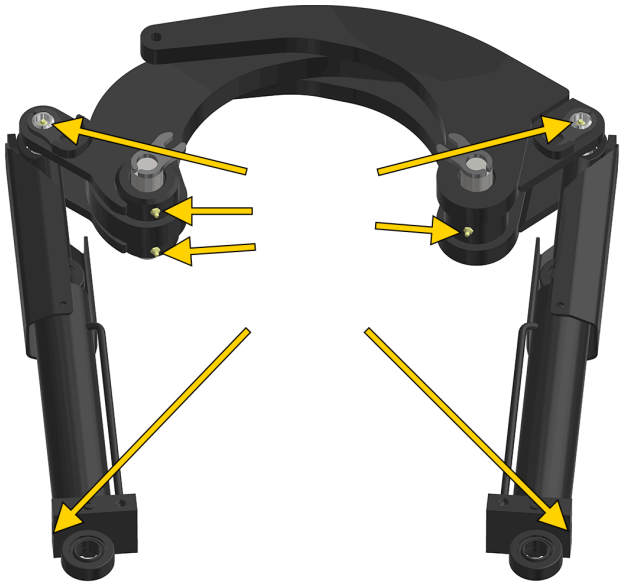


Figure 28.

6.3.6. Lubrication, integrated grab GR20RR

Grease quantity: 3-4 pump strokes per nipple.

The arrows show the location of the grease nipples.

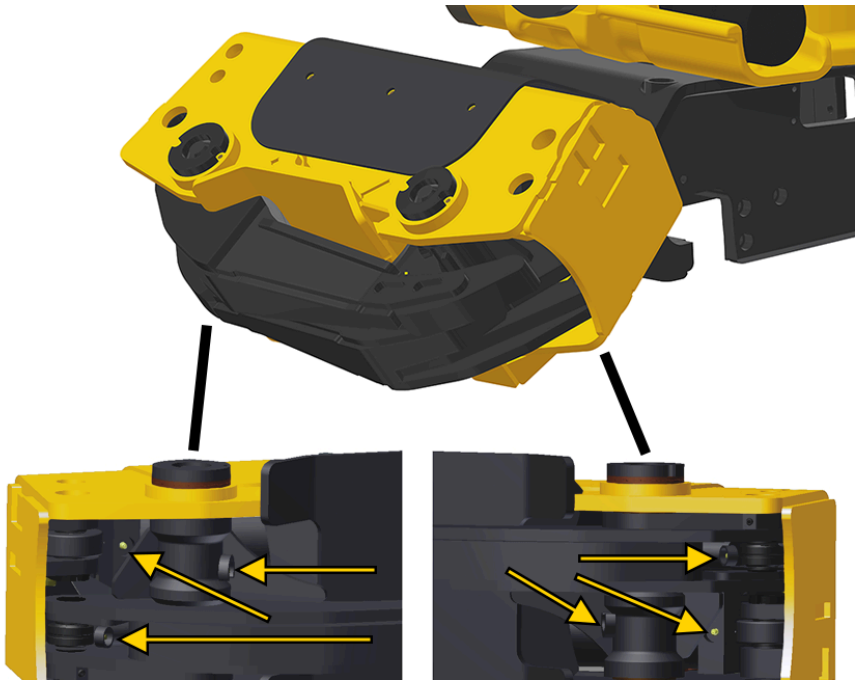


Figure 29.

6.4. Service every 250 operating hours

- Review according to section 6.2. Daily inspections.
- Check the grease level according to section 6.3.4. Worm gear lubrication.
- Check the central lubrication system for any leaks at connections.
- Check the tilt axles according to section 6.4.1. Tilt axle checks.

6.4.1. Tilt axle checks

6.4.1.1. Shimming, tilt upper section

1. Make sure the tilt upper section abuts the base machine by using a suitable tool as a wedge. Insert the tool between the rotator body and the tilt upper section where the tilt axle points away from the cab.
2. Undo the tilt axial washer's two bolts.
3. Install shims on the inside of the tilt axial washer where the tilt axle points towards the cab.
4. Refit the tilt axial washer.

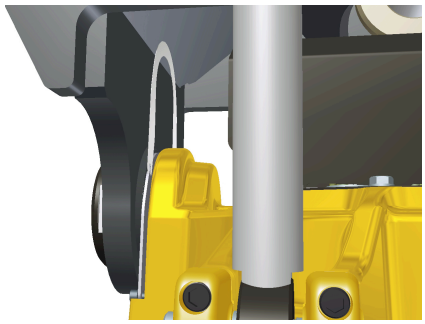


Figure 30.

6.4.1.2. Tightening the tilt axle

1. Undo the tilt axle cover bolts
2. Tighten the bolts concealed behind according to 6.9. Tightening torque
3. Reinstall the tilt axle cover

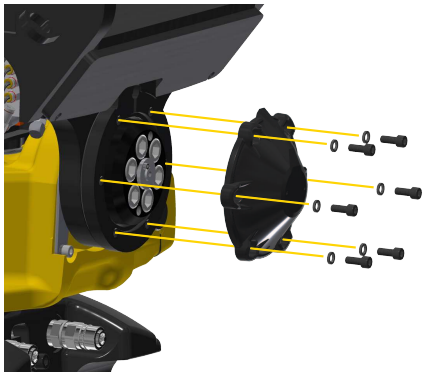


Figure 31.

6.5. Special maintenance

6.5.1. EC-Oil

Cleaning

- Clean oil connections, electrical connectors, grease connections and dirt guards before and after use in order to avoid oil or grease leakage and safeguard EC-Oil function.
- If oil or grease leakage occurs despite cleaning, we recommend face seal replacement.
- Clean electrical connectors daily and spray with water repellent.

Figure 32.

Replacing face seals

Applies to hydraulic connectors on quick hitches.

1. Remove the existing face seal with the aid of a sharp tool.
2. Carefully install the new face seal by hand.

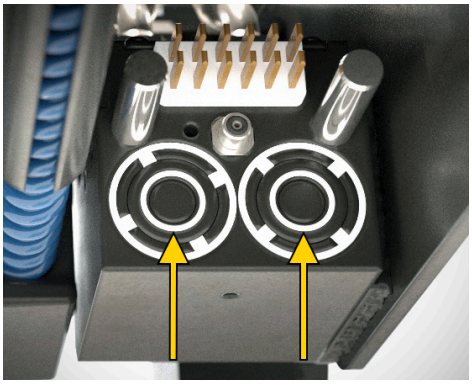


Figure 33.

EC-Oil	Face seal	Part number
ECO40-50	3/8"	1052976
ECO60	1/2"	1050018
ECO70	3/4"	1050580
ECO80	1"	1056072

REMARKS
Install the tapered face seal with a narrow edge outward.

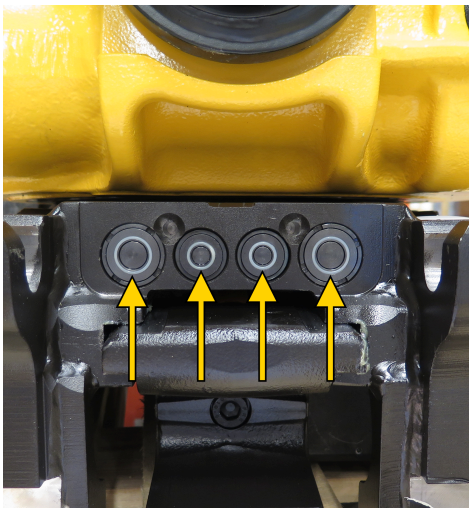


Figure 34.

6.6. Checking axial and radial play

IMPORTANT
No tool may be connected during checks.

The following tools are required for checking lateral and rotational play:

- Extended 10 mm Allen key.
- Dial indicator with magnetic base.
- Long hexagonal socket
- Crowbar.

6.7. Checking lateral play

1. Raise the tiltrotator to a comfortable working height and switch off the machine.
2. Remove the protective cover on the left side of the tiltrotator and the plug on the bolted joint.
3. Clean and remove all grease from the hole where the plug was installed.
4. Rotate the worm wheel until a free surface without a bolt head is visible.
5. Lower the tiltrotator and press it against firm, level ground.

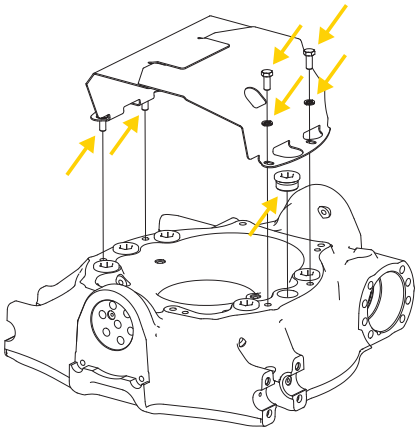


Figure 35. Remove the protective cover.

6. Insert the hex socket into the hole, making sure it connects with the worm wheel.
7. Mount the dial indicator with the magnetic base and zero the dial gauge to the top of the hex socket.
8. Carefully raise the tiltrotator off the ground and read the clock.

Figure 36. Free surface without bolt head.

EC204-206	EC209-233	Remarks
< 0,10mm	< 0,10mm	Requires action immediately.
0,10-0,15mm	0,10-0,25mm	Correct lateral play
0,16-0,20mm	0,26-0,35mm	Requires action soon.
>0,20mm	> 0,35mm	Requires action immediately.

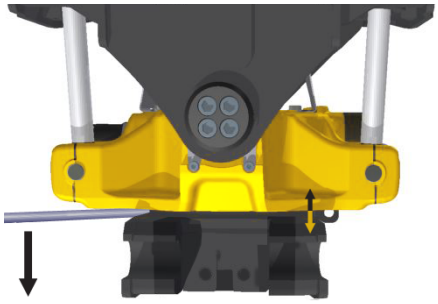


Figure 37. Prise apart with a crowbar.

9. Using the crowbar as a lever, read off any changes on the dial gauge.

6.7.1. Checking rotational play

1. Use the crowbar to move the quick hitch to the left.
2. Remove the motor bolts and the motor.
3. Clean the worm screw thoroughly and remove all grease.
4. Mount the dial indicator on the rotatorbody and reset the clock against the end of the worm screw.
5. Use the crowbar to move the quick hitch to the right and read off the clock.

Figure 38. Rotate the quick hitch to the left.

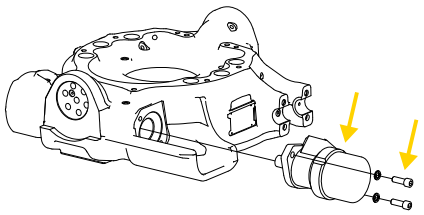


Figure 39. Remove the motor.

EC204-206	EC209-233	Remarks
<0,05mm	< 0,12mm	Adjustment required
0,06-0,15mm	0,12-0,20mm	Correct rotational play
>0,15mm	> 0,25mm	Adjustment required

Figure 40. Rotate the quick hitch to the right.

REMARKS
We recommend adjustment be carried out by a specialist in a workshop.

6.7.1.1. Significance of rotation play

Play of less than 0.12 mm will cause early overheating. Play greater than 0.25 mm will have a leverage effect causing impact and shocks to destroy the lubrication film between the thrust washers.

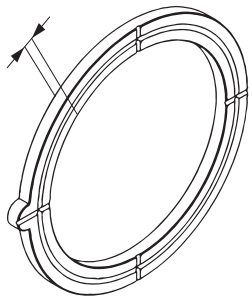
REMARKS
Lack of lubrication can deform the thrust washers.

6.7.2. Thrust washers

Check that the thrust washers are flat.

Max wear: Min 4.5 mm

We always recommend the installation of new thrust washers before adjusting.



6.7.3. ePS

Your tiltrotator is fitted with an engcon rotation sensor; it must be calibrated after service.

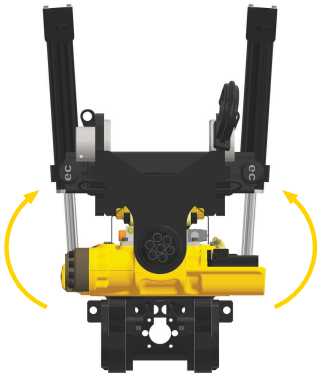
6.8. Testing load-holding valves

A lever is required when testing load-holding valves.

Load the tilt function in both directions; it must not move.

If it moves, replace the load-holding valve on the cylinder that can be extended (on the side where the tilt upper section moves away from the rotator body).

See also section 10.2. Tiltrotator overview.



6.9. Tightening torque

The rotator section is dimensioned to cope with major shear loads and torsional loads. For reasons of strength, it is essential that certain fasteners be torque tightened.

Bolts and threaded holes must be thoroughly clean.

EC204

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M10	12.9	4	79 Nm
Quick hitch/ Worm wheel*	M12	12.9	12	136 Nm
Yoke bracket	M12	12.9	4	136 Nm
Tilt axle	M12	12.9	8	136 Nm
Hydraulic motor	M8	12.9	3	40 Nm
Worm wheel	M12	12.9	12	

*Only needs to be tightened during the first service after installation.

Table 10.

EC204B

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M10	12.9	4	79 Nm
Quick hitch/ Worm wheel*	M12	12.9	16	136 Nm
Yoke bracket	M12	12.9	4	136 Nm
Tilt axle	M12	12.9	8	136 Nm
Hydraulic motor	M8	12.9	2	40 Nm

*Only needs to be tightened during the first service after installation.

Table 11.

EC206

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M10	12.9	6	79 Nm
Quick hitch/ Worm wheel*	M14	12.9	12	217 Nm
Yoke bracket	M12	12.9	4	136 Nm
Tilt axle	M16	12.9	8	333 Nm
Clamping half	M10	12.9	4	79 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 12.

EC206B

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M10	12.9	6	79 Nm
Quick hitch/ Worm wheel*	M14	12.9	16	217 Nm
Yoke bracket	M12	12.9	4	136 Nm
Tilt axle	M16	12.9	8	333 Nm
Clamping half	M10	12.9	4	79 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 13.

EC209

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M12	12.9	8	136 Nm
Quick hitch/ Worm wheel*	M14	12.9	12	217 Nm
Yoke bracket	M16	12.9	8	333 Nm
Tilt axle	M16	12.9	8	333 Nm
Clamping half	M10	12.9	8	79 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 14.

EC209B

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M12	12.9	8	136 Nm
Quick hitch/ Worm wheel*	M14	12.9	18	217 Nm
Yoke bracket	M16	12.9	8	333 Nm
Tilt axle	M16	12.9	8	333 Nm
Clamping half	M10	12.9	8	79 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 15.

EC214

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M12	12.9	8	136 Nm
Quick hitch/ Worm wheel*	M16	12.9	12	333 Nm
Yoke bracket	M16	12.9	8	333 Nm
Tilt axle	M16	12.9	14	333 Nm
Clamping half	M10	12.9	8	79 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 16.

EC219

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M12	12.9	8	136 Nm
Quick hitch/ Worm wheel*	M20	12.9	12	649 Nm
Yoke bracket	M16	12.9	8	333 Nm
Tilt axle	M16	12.9	14	333 Nm
Clamping half	M12	12.9	8	136 Nm
Railway grab, grab axle	M20	12.9	2	649 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 17.

EC226

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M14	12.9	8	217 Nm
Quick hitch/ Worm wheel*	M20	12.9	12	649 Nm
Yoke bracket	M16	12.9	8	333 Nm
Tilt axle	M16	12.9	18	333 Nm
Clamping half	M20	12.9	8	136 Nm
Railway grab, grab axle	M20	12.9	2	649 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 18.

EC233

Fastener	Dimension	Quality	Quantity	Torque
Screw cap	M12	12.9	12	136 Nm
Quick hitch/ Worm wheel*	M20	12.9	20	649 Nm
Yoke bracket	M16	12.9	8	333 Nm
Tilt axle	M20	12.9	16	649 Nm
Clamping half	M14	12.9	8	217 Nm
Railway grab, grab axle	M20	12.9	2	649 Nm
Hydraulic motor	M12	12.9	2	136 Nm

*Only needs to be tightened during the first service after installation.

Table 19.

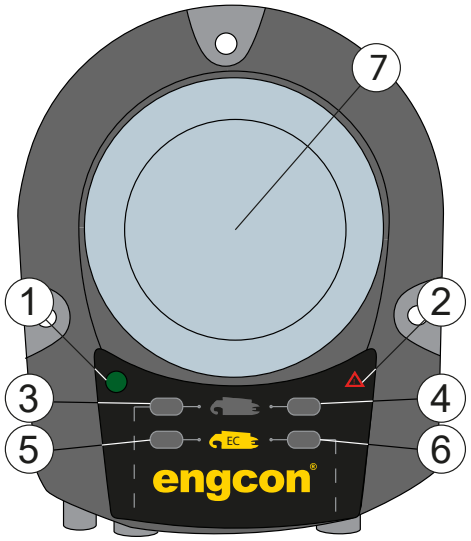
EC-Oil hydraulic connectors

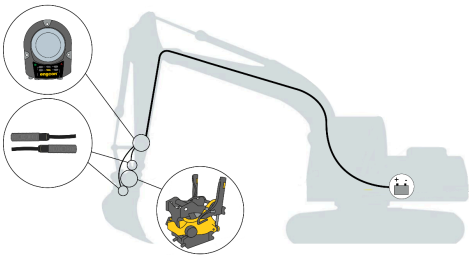
Fastener	Dimension	Quantity	Torque
Hydraulic connector ECO	ECO40-80	2	60 Nm

Table 20.

7. Troubleshooting

7.1. Q-Safe





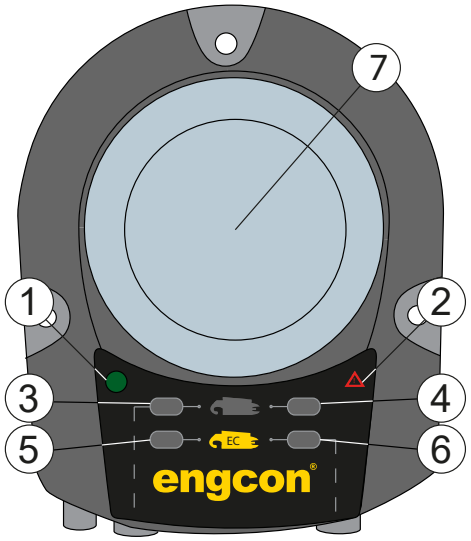
7.1.1. Indications

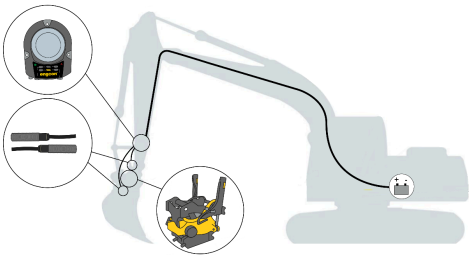
Position	Behaviour	Indicates	Remarks
1	1 flash * _ * _ * _	Power supply OK	Applies to DC2 without QSC
	2 flashes ** _ ** _ ** _	Power supply OK	Applies to QSC
	Constant light	Power supply OK	Applies to SS0-SS9 without QSC
2	1 flash * _ * _ * _	CAN time out	Applies to QSC
	2 flashes ** _ ** _ ** _	Short circuit, power to sensor in EC	Applies to SS0-SS9 without QSC and QSC during start
	3 flashes *** _ *** _ *** _	Short circuit, power to sensor in RF	Applies to SS0-SS9 without QSC and QSC during start
	3 flashes *** _ *** _ *** _	Short circuit, power to sensor in EC	Applies to DC2
	Inactive	No fault	
3	Constant light	Connected tool	Sensor, hook for quick hitch on machine
4	Constant light	Connected tool	Sensor, ejector for quick hitch on machine
5	1 flash * _ * _ * _	Tiltrotator removed	Applies to DC2

Position	Behaviour	Indicates	Remarks
	Constant light	Connected tool	Sensor, hook for quick hitch underneath tiltrotator
6	1 flash * _ * _	Tiltrotator removed	Applies to DC2
	Constant light	Connected tool	Sensor, ejector for quick hitch underneath tiltrotator
7	Flashing white and intermittent siren (normal behaviour during the connection sequence)	Unsafe tool connection	Check attachment

Table 21.
For overview, see section 3.3.1. Overview

7.2. HS and SW with sensor





7.2.1. Indications

Position	Behaviour	Indicates	Remarks
1	Flashing light	Power supply OK	DC2 Other control systems with QSC
	Constant light	Power supply OK	Other control systems without QSC
2	1 flash *_*_*_	Short circuit, power to sensor in RF	Applies when starting up the system
	2 flashes **_**_**_	Short circuit, power to sensor in EC	Applies when starting up the system
	Inactive	No fault	
3	Constant light		Not applicable
4	Constant light		Not applicable
5	Constant light	Quick hitch in closed position	Quick hitch beneath the tiltrotators
6	Constant light		Not applicable
7	Flashing white light and pulsating siren	Open locking cylinder	

Table 22.
For overview, see section 3.4.1. Overview

7.3. ePS/C2C

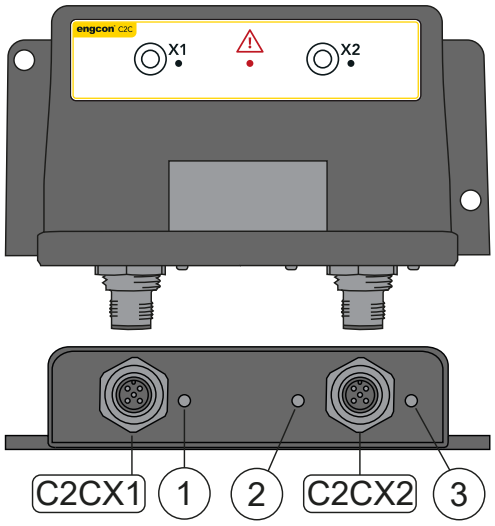


Figure 41.

7.3.1. Indications

Position	Sign	Indicates	Remarks
1	Off	No power supply	
1	Constant light	No communication in X1	
1	Flashing	CAN communication with the unit connected to X1	
3	Off	No power supply	
3	Constant light	No communication in X2	
3	Flashing	CAN communication with the unit connected to X2	
2	Off	No fault or no power supply	
2	1 flash	No communication with rotation sensor	*__*__*__
2	2 flashes	Short circuit, rotation sensor X2	**__**__**__

Table 23.
For overview, see section 3.6.1. Overview

8. Decals

Machine instructions, decals and warning signs must be kept clearly legible. Contact your supplier to order replacements.

WARNING
Replace damaged or illegible signs and decals before using the machine. Risk of personal injury and damage to property.

8.1. Decal disposition

8.1.1. Control systems 9 and 10

For decals, refer to separate user manual supplied on delivery.

8.1.2. Control system 5

The decals below show the functions for the general keypads fitted on existing levers.

IMPORTANT
Not supplied on all machines.

Deactivated

Activated

8.1.2.1. Levers

Left lever

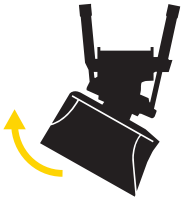
Rotation clockwise

Rotation anti-clockwise

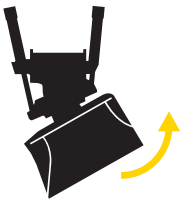
Open integrated grab

(EXTRA) Extra function

Right lever



Tilt left



Tilt right

Close integrated grab

(EXTRA) Extra function

8.2. Warning decals

8.2.1. Warning decals in cab

The decals are usually placed to the right of the operator in clearly visible locations.

8.2.1.1. 9000157

Figure 42. Warning decal to the right of operator.

8.2.2. Warning decals on product

8.2.2.1. 980101

Figure 43. Tilt cylinder warning decal (EC206-EC233).

8.2.2.2. 980102

Figure 44. Tilt cylinder warning decal (EC204).

8.2.2.3. 9000338

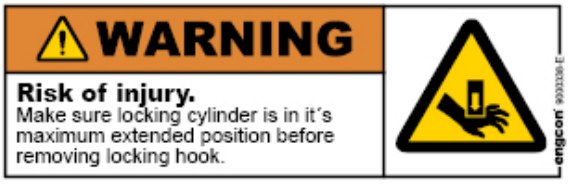


Figure 45. Warning decal on locking cylinder.

8.2.3. Symbol legend

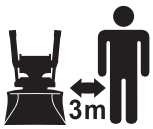
Important to subtract tiltrotator weight when calculating lifts.

Rotating equipment hazard. Stay clear of rotating equipment.

Tilting equipment hazard. Stay clear of tilting equipment.

Take care when handling long objects. Bear in mind inertia and the extended risk area when handling long objects.

Falling material hazard. Never stand under or pass beneath a raised tool.



Keep clear. Moving and rotating equipment. Hazard zone 10 feet.

Crushing hazard. Stay clear of moving parts.

Tipping hazard. Never exceed the base machine´s approved tipping load.

Suspended load hazard. Stay clear of suspended loads.

Read and understand the user manual before operating this machinery.

9. Technical data

The illustration shows a typical configuration. Technical data may vary.
We reserve the right to make changes without prior notice.

9.1. Tiltrotator

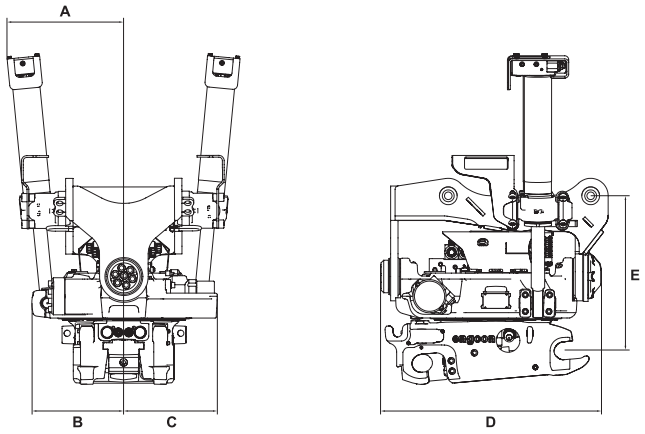


Figure 46.

Description		EC202	EC204	EC206	EC209	EC214	EC219	EC226	EC233
Max machine size	t	3	4	6	9	14	19	26	33
Standard bracket		S30	S40	S40	S45	S60	S60	S70	S80
Width (A)	mm*	180	280	289	342	355	382	447	501, 581
Width (B)	mm*	155	161	220	250	285	315	340	385
Width (C)	mm*	160	169	219	273	303	310	340	385
Overall length (D)	mm*	435	463	500	561	665	737	760	878
Construction height (E)	mm*	282	360	410	485	508	517	638	720
Weight	kg*	90	130	185	330	440	535	790	995
Rec hydraulic flow DC2/ss10	l/min	25	30	40	60	80	120	120	120
Rec hydraulic flow ss9 tilt/rotation	l/min	7/20	10/25	15/30	35/40	35/50	65/70	70/70	70/70
Max hydraulic pressure	MPa	22	22	22	22	22	22	22	25
Tilt angle	°	2x40	2×45	2×45	2×45	2×45	2×45	2×45	2×45
Rotation		∞	∞	∞	∞	∞	∞	∞	∞
Electrical system	V	12	12	12/24	12/24	12/24	12/24	12/24	12/24

S40

*Table 24. *Standard attachment*

Description		EC202	EC204	EC206	EC209	EC214	EC219	EC226	EC233
Max breakout torque	kNm	20	28	45	74	126	186	270	340
Max bucket width	mm	900	1,000	1,200	1,300	1,600	1,700	2,000	2,200
Tilt duration from end position to end position	s / l/min	3/7	3/7	3/15	3/34	3/40	3/65	5/43	5/63
Rotation duration for one rotation under hydraulic flow	s / l/min	7/20	7/21	6.5/30	7/40	7/50	6.5/70	7/70	10/70
Rec hydraulic flow ss15	l/min	N/A	25	30	N/A	N/A	N/A	N/A	N/A
Rec unlock/lock pressure SQ S30-S3, HS03/08	MPa	21 / 3-6	21 / 3-6	21 / 3-6	21 / 3-6	21 / 3-6	21 / 3-6	21 / 3-6	21 / 3-6
Rec open/close pressure SQ ECPUP	MPa	N/A	N/A	21 / 10-21	21 / 10-21	21 / 10-21	21 / 10-21	21 / 10-21	21 / 10-21
Rec open/close pressure SQ Q-Safe	MPa	N/A	21	21	21	21	21	21	21
Rec max return line pressure	MPa	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Standard dimension, extra port**		N/A	1/4"	3/8"	3/8" + 1/4"	1/2" + 1/4"	1/2"+ 1/4" (3/8")*	3/4"	3/4"
Swivel channel extra function, number of ports		2	2	4	4	4	4	4	4
Swivel channel locking function, number of ports		2	2	2	2	2	2	2	2
Max hydraulic flow EXTRA	l/min	18	13/N/A	35/N/A	40/50*	70/100*	70/100*	70/100*	70/100*
Max hydraulic flow standard (extra)***	l/min	N/A	20	35	50	100	100	100	100

Table 25.
** [l/min] with High Flow*

***Standard configuration*

****If equipped with integrated grab*

9.2. Integrated grab cassette

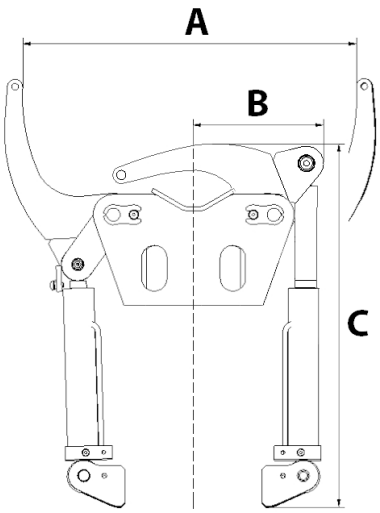


Figure 47.

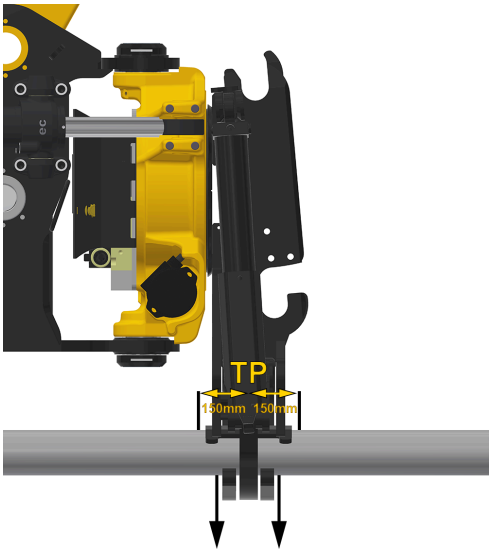


Figure 48.
Max centre of gravity displacement 150mm.

Description		GR05	GR10	GR20B	GR30	GR20RR/R2
Widest grab width (A)	mm	350	610	820 - 950	1,080	820
Width (B)	mm	200	270	350	440	380
Length (C)	mm	585	760	910	980	*
Clamping force (tip - tip) at 21 MPa	kg	1,654	1,497	2,234	1,956	1,750
Max load	kg	1,000	1,500	2,000	2,200	3,000
Weight	kg*	50	70	85	148	140
Max hydraulic pressure	MPa	22	22	22	22	22

Table 26.
**Depending on attachment*

See separate user manual for detachable GRD. Also available on the website or by contacting engcon.

9.3. Load-holding valve

Listed below are the torques required to defeat the load-holding valves on the tilt cylinders.

Description		EC204	EC206
Torque	Nm*	5,000 (tilt right)	7,000 (tilt right)
Torque	Nm*	4,000 (tilt left)	6,000 (tilt left)

Description		EC209	EC214	EC219	EC226	EC233
Torque	Nm*	18,000	22,000	41,000	45,000	68,000

Table 27.
**Values calculated with a universal tilt upper section; values may vary depending on the tilt upper section.*

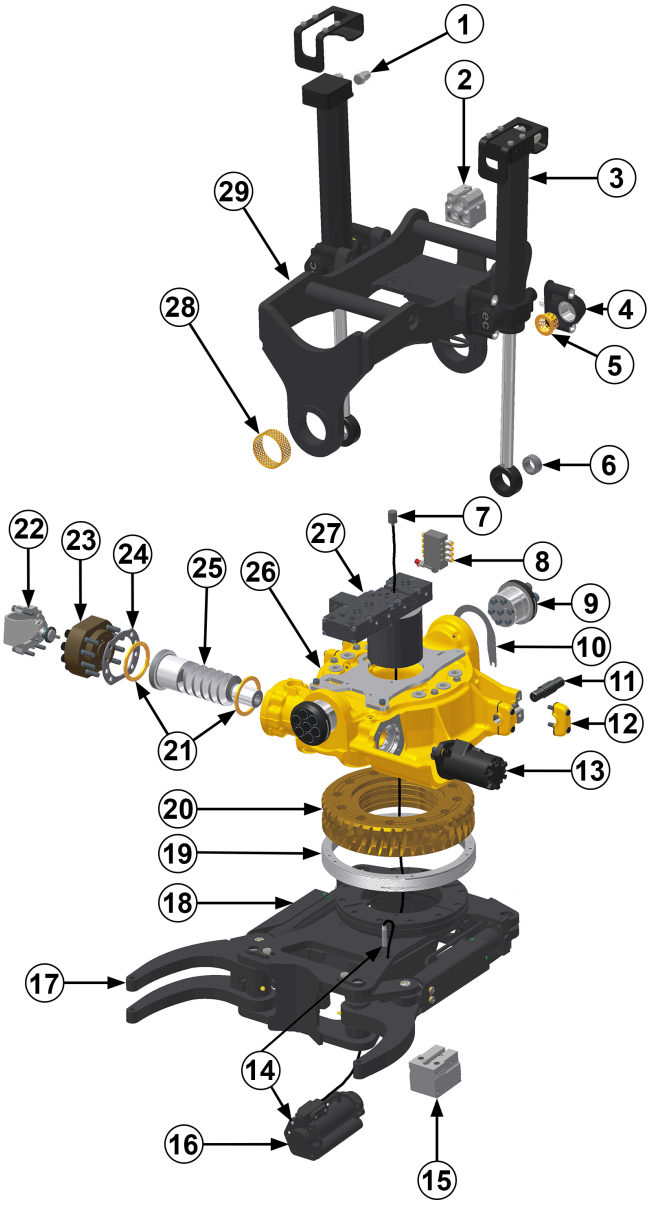
10. Glossary

10.1. Designations

Term	Description
Base machine	The machine carrying the equipment concerned. Excavator or backhoe loader.
EC-Oil	Automatic oil connection system for changing hydraulic tools from the cab. See section 3.5. EC-Oil.
EC-Oil block H (Hitch)	Located in the machine or in the quick hitch.
EC-Oil block T (Top)	Located on the upper section of the hydraulic tool and/or the tiltrotator.
ECxxPS (e.g. EC219PS)	Tiltrotator when it is equipped with ePS.
ECxxR (e.g. EC219R)	Rotator, no tilt function.
ECxxU (e.g. EC219U)	Tiltrotator without the valve block and swivel.
ECxxW (e.g. EC219W)	Tiltrotator equipped with an extra-wide tilt upper section.
Dog bone linkage	The link between the breakout cylinder and the machine hitch or directly attached tiltrotator.
Dynamic load	Swinging/hanging load
Machine hitch	Quick hitch mounted directly on the excavator's stick
Quick hitch	The part of the tiltrotator that connects to the bucket or other tool.
Stick	The 'arm' at the very front of the excavator.
Tipping load	Specifies the maximum weight the excavator is able to lift without tipping forward.

10.2. Tiltrotator overview

Pos.	Designation
1	Load-holding valve
2	EC-Oil block T (Option)
3	Tilt cylinder
4	Yoke bracket
5	Bushing, yoke bracket
6	Spherical bearings
7	QS/Q-safe Slip ring (Option)
8	Single-point lubrication
9	Tilt axle
10	Shim set, tilt axle
11	Cylinder axle
12	Clamping half
13	Hydraulic motor
14	QS/Q-safe Sensor (Option)
15	EC-Oil block H (Option)
16	Locking cylinder
17	Integrated grab cassette
18	Quick hitch
19	Bearing ring
20	Worm wheel
21	Axial washer
22	Rotation sensor ePS (Option)
23	Screw cap
24	Shim set, screw cap
25	Worm screw
26	Body
27	Valve block and swivel
28	Bushing, tilt axle
29	Tilt upper section



11. Service

WARNING
Make sure that service and maintenance is carried out according to the manufacturer's recommendations. Inadequate maintenance may cause defects on the base machine and its equipment.

WARNING
Make sure the locking cylinder is in its maximum extended position before removing the locking hook. Risk of injury and damage to property.

WARNING
Welding is not permitted. It can have a negative impact on safety. Risk of personal injury and damage to property. For welding, contact your dealer or engcon Nordic AB.

11.1. Service schedule

11.2. Service every 500 operating hours

To be performed by a service technician during the first machine service or no later than 500 operating hours. Then every 500 operating hours.

- Check the product compliance with the rating plate and user manual.
- Complete check items according to section 6.2. Daily inspections.
- Tighten bolted joints according to section 6.9. Tightening torque.
- Check connectors and cabling for wear and pinching.
- Check hoses for wear and pinching.
- Perform tests according to section 6.8. Testing load-holding valves.
- Check the tilt axles according to section 6.4.1.1. Shimming, tilt upper section.
- Check lubrication according to section 6.3. Tiltrotator lubrication .
- Perform function checks according to section 4.5.2. Function check.
- Perform checks according to section 6.6. Checking axial and radial play.
- Visual inspection of bushings and spherical bearings; see section 10.2. Tiltrotator overview.

11.3. Service every 250 hours

To be performed by the operator according to section 6.4. Service every 250 operating hours.

11.4. Service record

On the service record, there is space to note actions performed on the product that these instructions for use refer to. Specify the date of the action, what was done and who did it. Service partners may also use a stamp in the space provided. This will make sure your product is a safe buy for any future owner.

Date	250 h	500 h	Remark/Action	Stamp/Signature
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	

Date	250 h	500 h	Remark/Action	Stamp/Signature
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	

Date	250 h	500 h	Remark/Action	Stamp/Signature
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	
.....	☐	☐	.....	

12. Contact us

engcon Australia Pty Ltd
+61 2 7252 5279
australia@engcon.com

engcon Austria GmbH
+43 676 3786239
info-at@engcon.com

engcon Belgium BVBA
+32 15 79 73 10
belgium@engcon.com

engcon Canada Inc.
+1 438-226-1716
canada@engcon.com

engcon Denmark A/S
+45 70 20 13 50
info@engcon.dk

OY engcon Finland AB
+358 6322 815
finland@engcon.com

engcon France SAS
+33 1 60 79 49 70
france@engcon.com

engcon Germany GmbH
+49 9342 934 85 0
germany@engcon.com

engcon International
+46 670 178 00
international@engcon.com

engcon Ireland Ltd
+353 15 686 742
ireland@engcon.com

engcon Japan K.K.
+81 45 489 5011
japan@engcon.com

engcon Korea Ltd
+82 70 4472 9978
engcon_kor@engcon.com

engcon Netherlands
+31 85 82 23 550
netherlands@engcon.com

engcon North America Inc.
+1 203 691 5920
northamerica@engcon.com

engcon Norway AS
+47 22 75 44 44
norge@engcon.com

engcon Poland Sp. z o.o.
+48 61 894 00 47
info@engcon.pl

engcon Sweden AB
+46 670 65 04 00
sweden@engcon.com

engcon UK Ltd
+44 1684 297168
uk@engcon.com

engcon®