



User manual

SS10/μ-prop

**The noble art
of digging**



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Safety instructions

General information

This system is designed for controlling tiltrotators. System components:

- Cab module (810454) – controls the system functions.
- Unit module (810456) – controls the tiltrotator valves as commanded by the cab module.
- Oil feeder valve (810462) – proportionally controls the hydraulic oil flow as commanded by the cab module.
- μ -prop joystick (810140) for manipulating the tiltrotator functions.
- Implement lock switch (810459).
- Cables, hoses and other components for assembly.

The system has automatic calibration functions, and the system's functions can be customised. A μ -prop calibration kit is required in order to customise the functions (1007528).

These assembly instructions provide installation instructions and information relevant to the 10/ μ -prop control system.

The safety information in these instructions relates directly to the 10/ μ -prop and does not regard the base machine. In addition to these assembly instructions, you should carefully read the safety information regarding the base machine and any other equipment you will be using.



CAUTION

Do not attempt to install, use or perform maintenance on the tiltrotator/rotator and its enclosed equipment before carefully reading all the information regarding the tiltrotator/rotator, its related equipment and the base machine. Observe all safety instructions carefully.

NB:

There are further safety instructions in the instruction manual for the rotator.

Identification and marking of the tiltrotator/rotator

Check that the information in "Certification of conformity" corresponds to the information on the machine (**see point 2, "Checking the type plate"**), the equipment and the documentation. In the event of non-conformities, contact your supplier before first assembly.

Carefully read all warning texts before assembling or using the tiltrotator/rotator and its accompanying equipment. The warning texts explain potential risks and how to avoid them. If in any doubt, contact your employer or supplier.

Remember that sound judgment and thorough knowledge of your machinery reduces many unnecessary risks. Consequently, operators should take the time to learn safe use of the tiltrotator/rotator and its related equipment before starting operation.

Safety requirements

The system meets the safety requirements according to:

- SS-EN ISO 13849-1: 2006 – Machine Safety – Safety-related Parts of Control Systems – Part 1: General Design Principles.

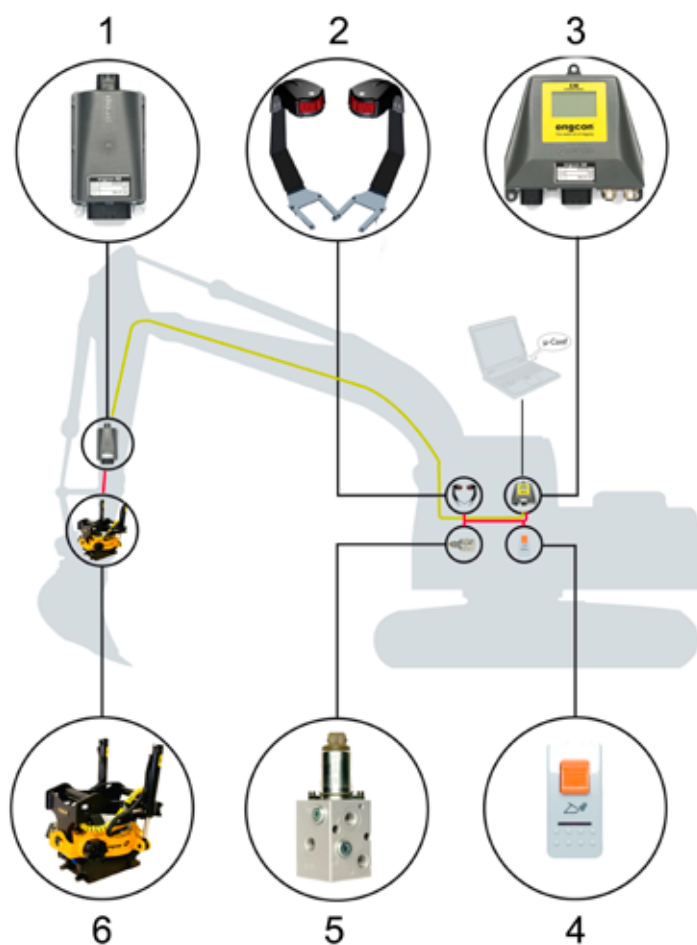
EMC – Electromagnetic Compatibility

The system meets the following CE standards:

- ISO 13766:2006 Earth Moving Machinery.
- European Vehicle Requirements 2004/104/EC.

System overview SS10/ μ -prop

Pos.	Article no.
1	810456
2	810140
3	810454
4	810459
5	810462
6	Tiltrotator



Cautions



CAUTION

Faulty installation can be dangerous. If in any doubt, contact your dealer or engcon Nordic AB.



CAUTION

Ensure that the hydraulic system is decompressed before starting work on the system. Risk of personal injury.

NB: Observe the maximum input pressure and maximum input flow. This applies to all control systems. See technical data.



CAUTION

Switch off the power when working with the electrical system and remove rings, watches etc. before starting work. Risk of personal injury.



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

Take care if using a ladder to install parts. Risk of personal injury.



CAUTION

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



CAUTION

Short circuits in electrical cables can cause injury and burning. Insulate electrical conductors and parts carefully when installing electrical equipment.



CAUTION

Risk of burn injuries from hot hydraulic oil.



CAUTION

The machine must never be operated with the implement lock switch turned on, 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.

Symbols



Implement lock switch.



CAUTION

Risk of damage and / or personal injury.



Read the enclosed documentation for more information.



No / Wrong action.



Yes / Correct action.

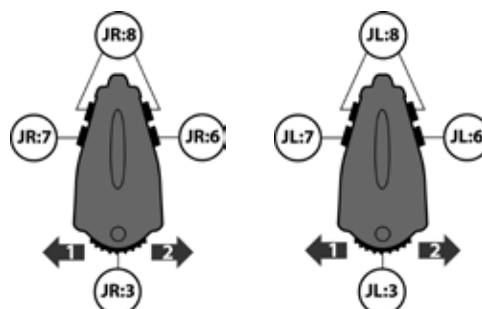


Implement lock switch not activated.



Implement lock switch activated.

The diagrams and tables below show the factory configurations for the buttons and thumb wheels on the joysticks.



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

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

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

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

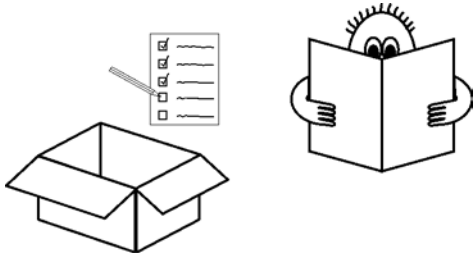
* User options in cab module menu

** Function not available on tiltrotators EC02 and EC05.

The buttons and thumb wheels can be configured according to the customer's preferences using the μ -Conf software.

Control

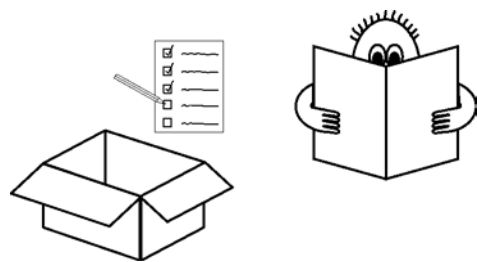
1. Checklist, electronics



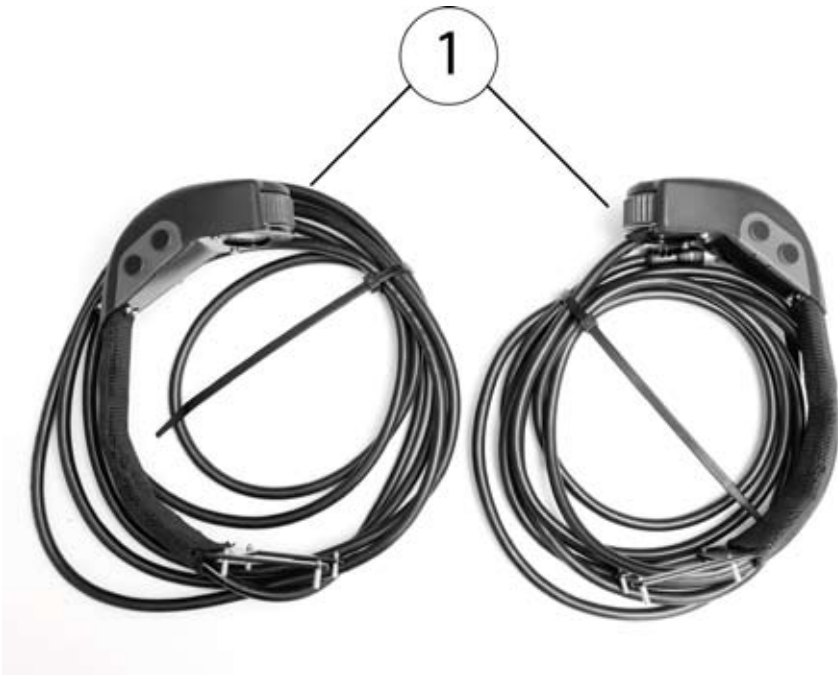
No.	Article	Designation	Quantity
1.	810454	Cab module	1
2.	810456	Unit module	1
3.	1008739	Safety plate, unit module	1
4.	810462	Oil feeder valve	1
5.	810465	Assembly kit	1
6.	810460	Cable assembly X2	1
7.	810457	Machine cable	1
8.	810459	Implement lock	1
9.	810478	Blocking kit	1



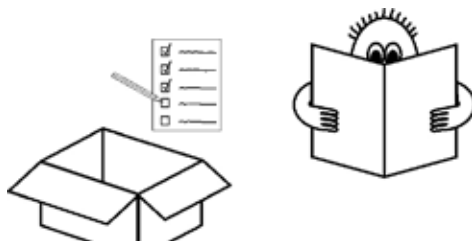
1b. Checklist, μ-prop joystick



No.	Article	Designation	Quantity
1.	810140	μ-prop joystick	2



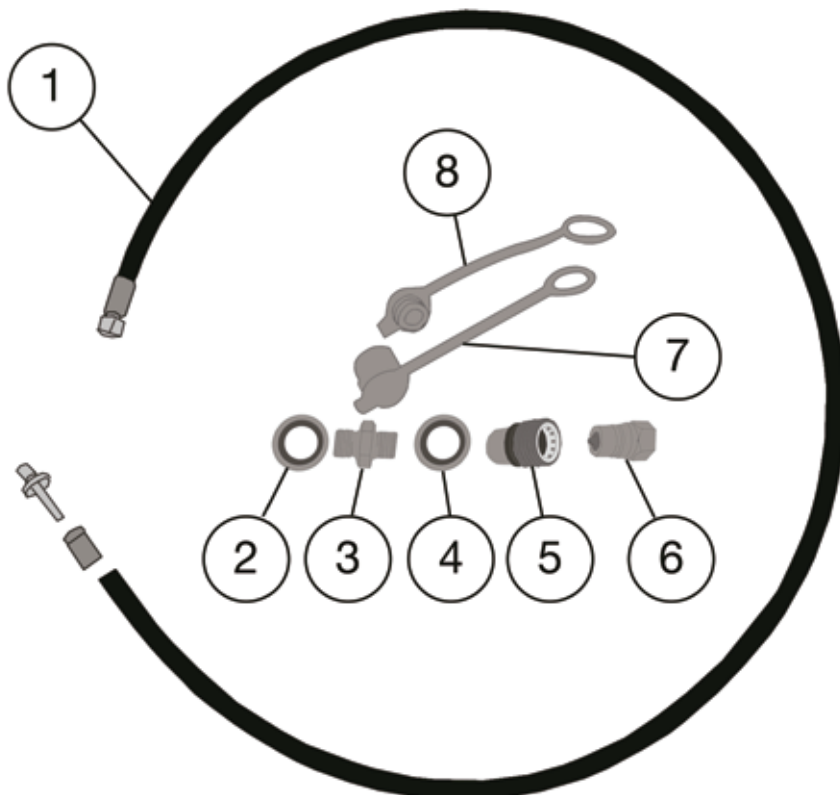
1c. Checklist, hydraulics



No.	Article	Designation	Quantity
1.	740408	Hydraulic hose with couplings 3/8" free end	2
	740409	Hydraulic hose with couplings 1/2" free end	2
2.	Machine-specific	Tredo washer	4
3.	Machine-specific	Adapter	
4.	710704	Tredo washer	2
5.	790114	Hydraulic coupling	2
6.	790115	Hydraulic coupling	2
7.	790118	Dust guard	2
8.	790121	Dust guard	2

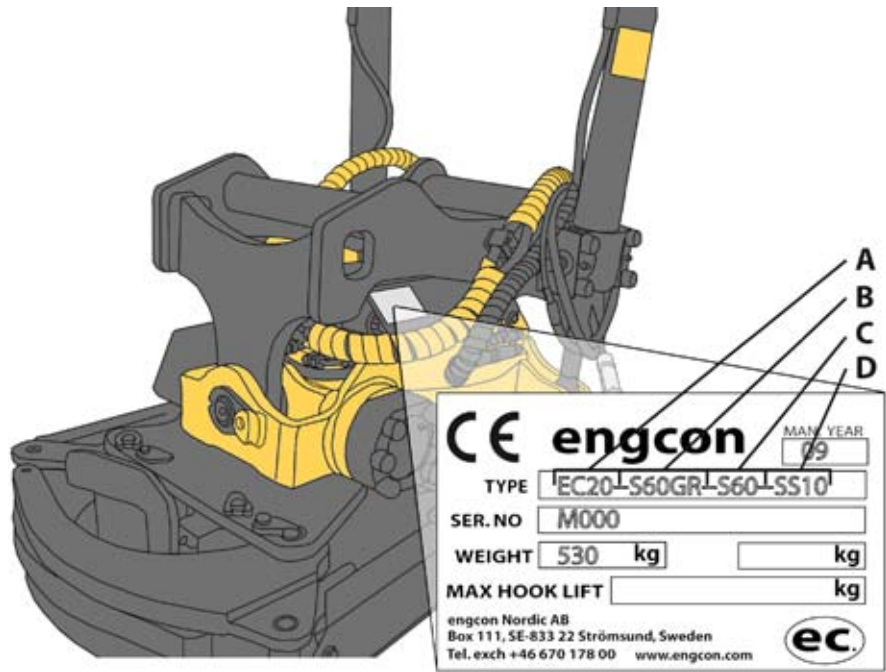
EC02–EC15 = Hydraulic hose 3/8"

EC20–EC30 = Hydraulic hose 1/2"



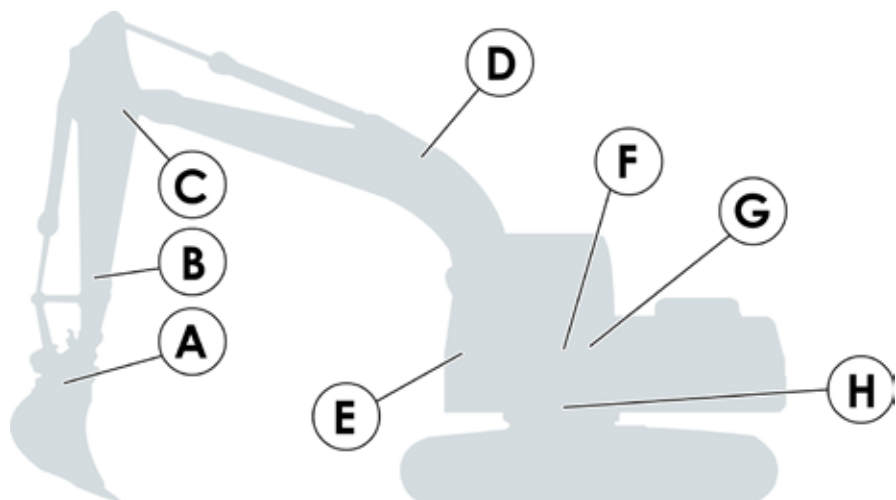
2. Checking the type plate on unit

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



Montage av styrsystem/ledningsdragning

3. Picture diagram, machine

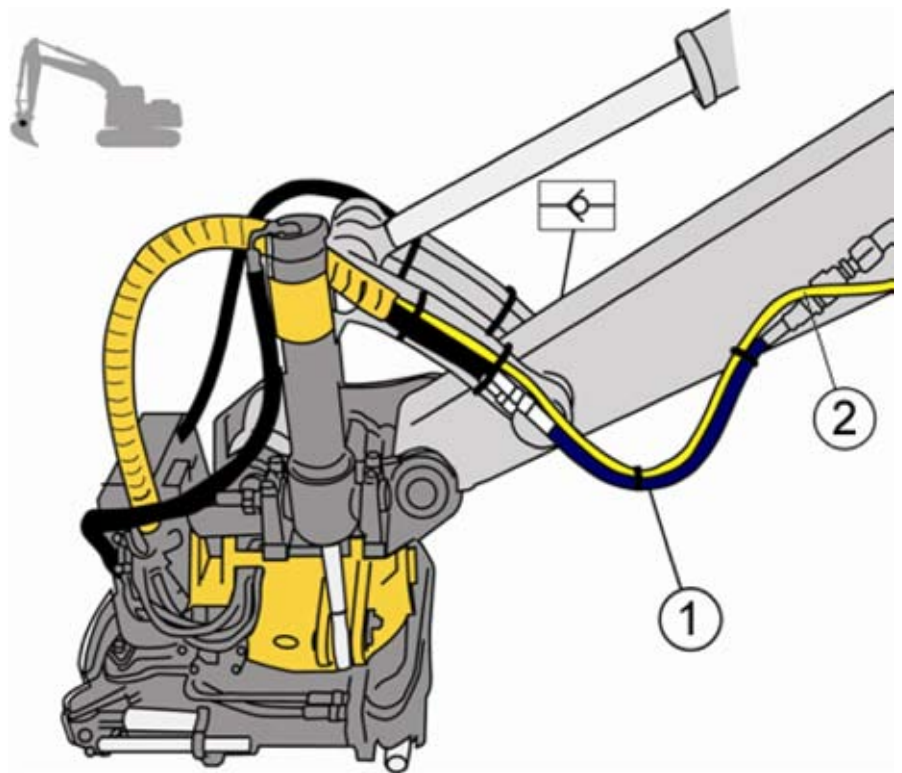


4. Line installation and mounting, stick and unit

1. Cut the free end of the hydraulic hose to the correct length.

Press measurements: 740408 = 20.0 mm, 740409 = 23.4 mm

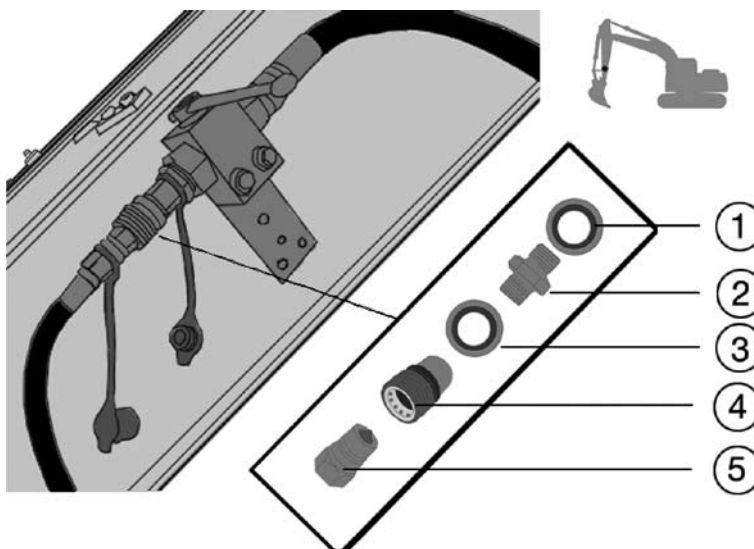
2. Connect the power line to 252297.



5. Hydraulic coupling, components

Pos.	Art. no.
1.	Tredo washer*
2.	Adapter*
3.	710704
4.	790114
5.	790115

* Machinespecific

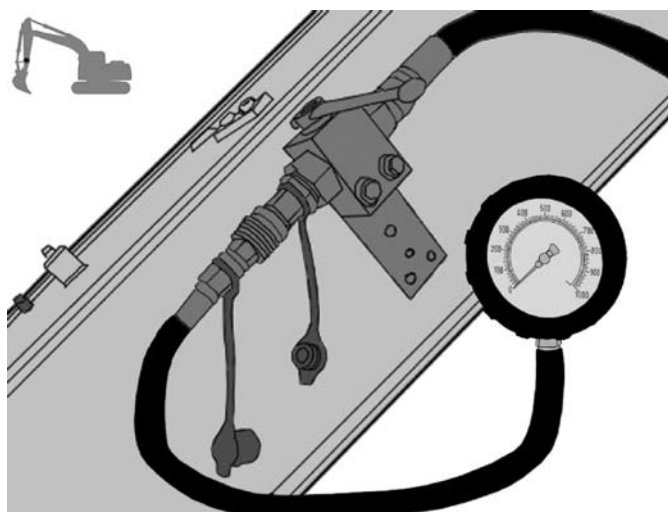


6. Checking the hydraulic pressure

The pressure may only be adjusted by an authorised workshop according to the relevant specifications.

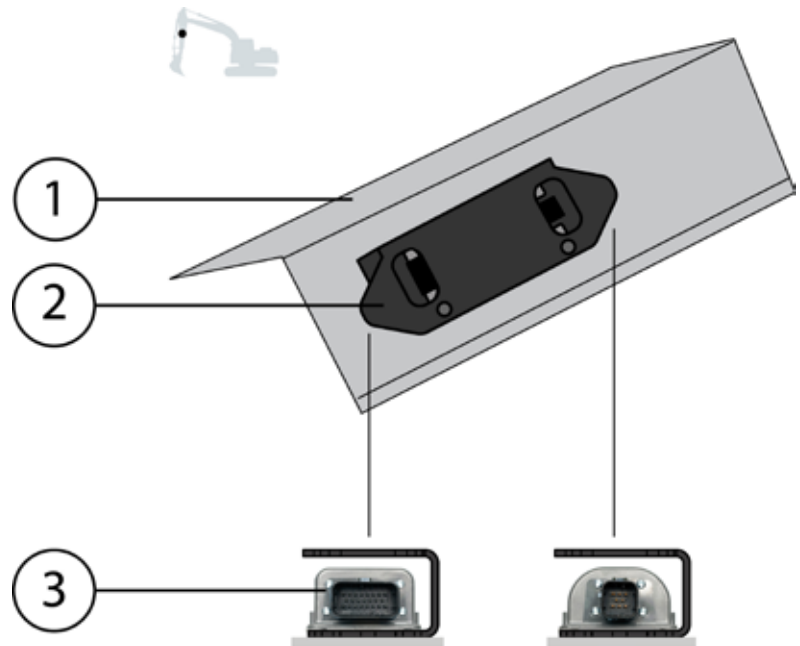
Max. supply pressure: 22.5 MPa, 225 Bar, 3263 PSI

Max. return pressure: 2.5 MPa, 25 Bar, 363 PSI



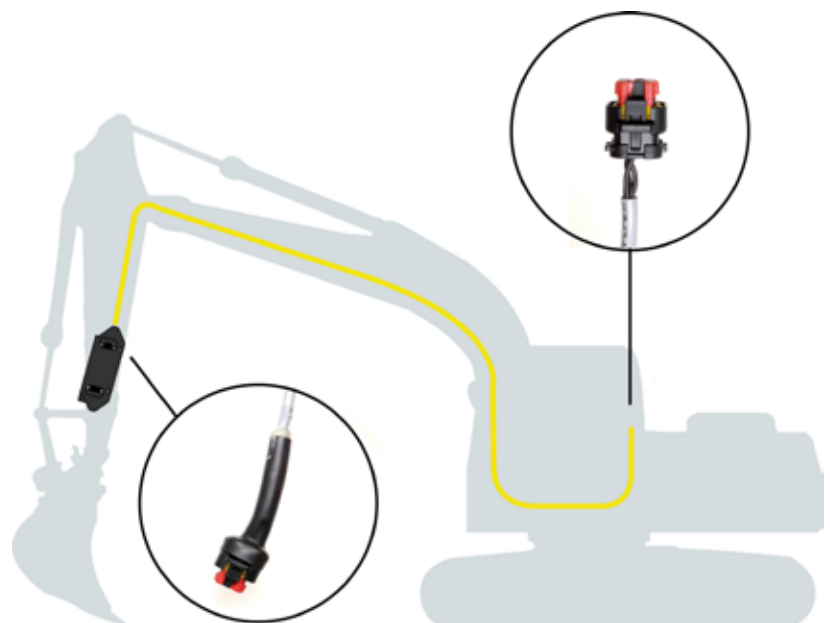
7. Mounting of unit module

Pos.	Art. no.
1.	Machine stick
2.	1008739
3.	810456

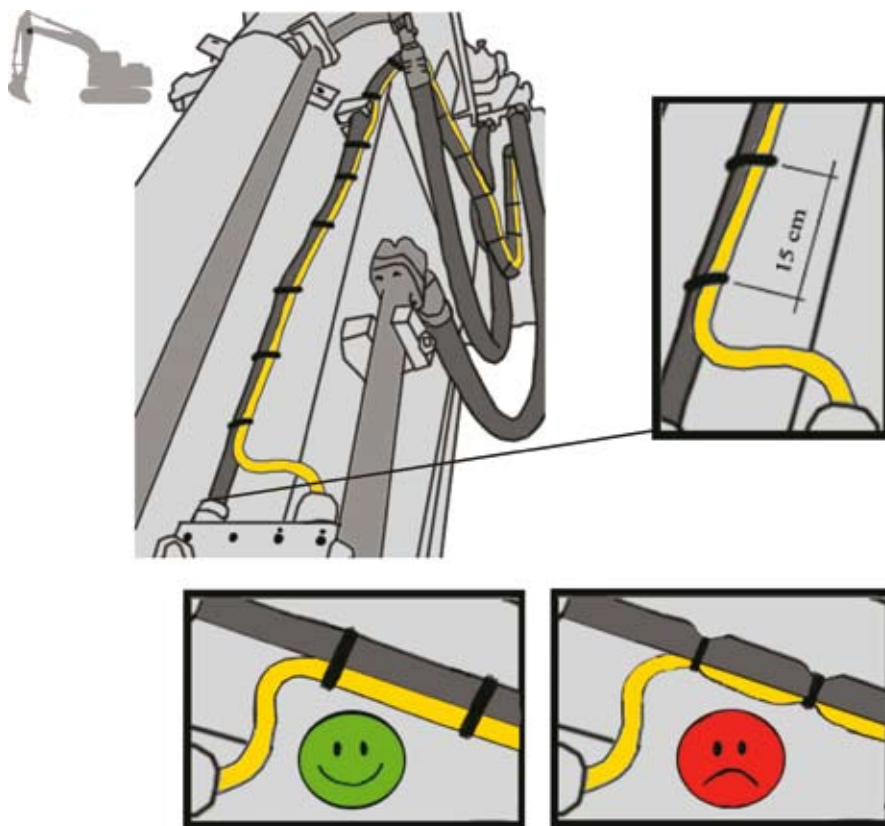


8. Line installation, machine cable

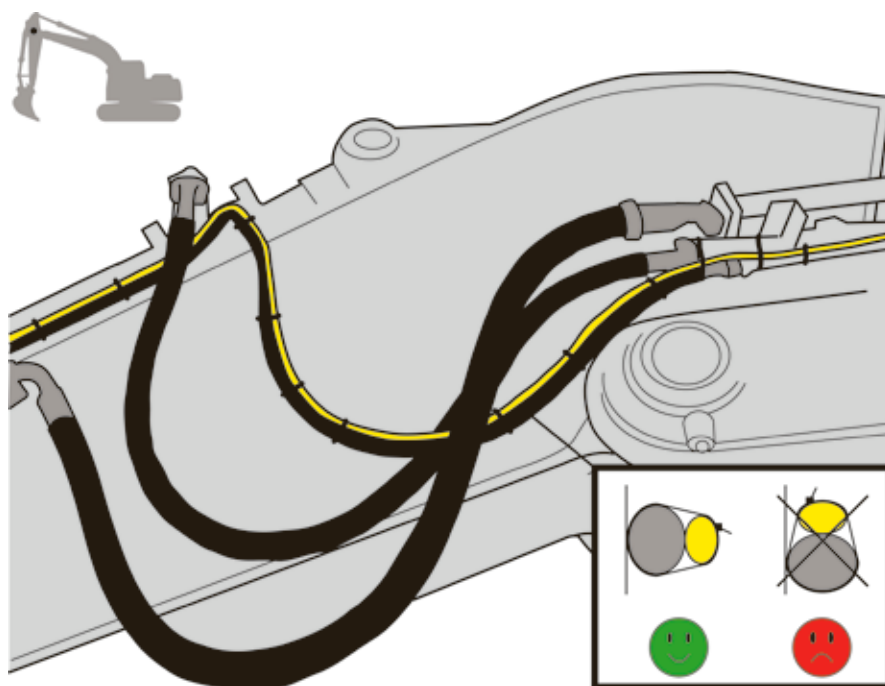
NB: The connector piece reinforced with shrink sleeving should be mounted on the unit module.



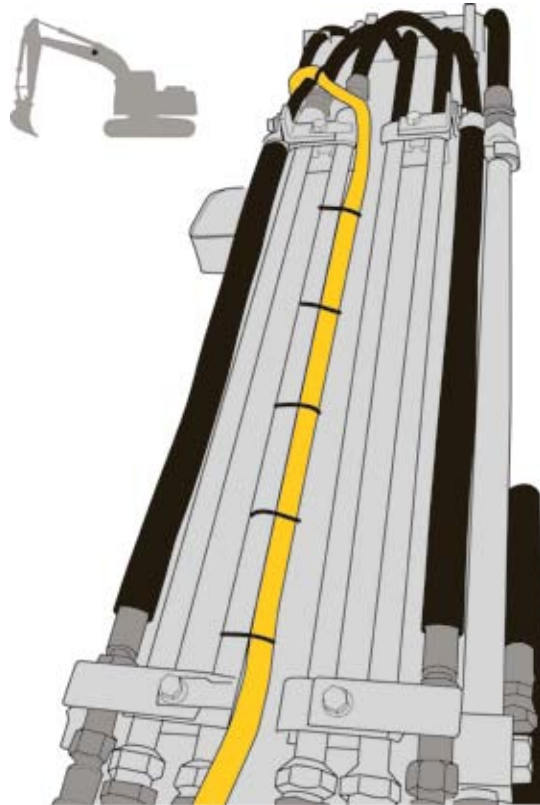
9. Line installation and mounting, stick



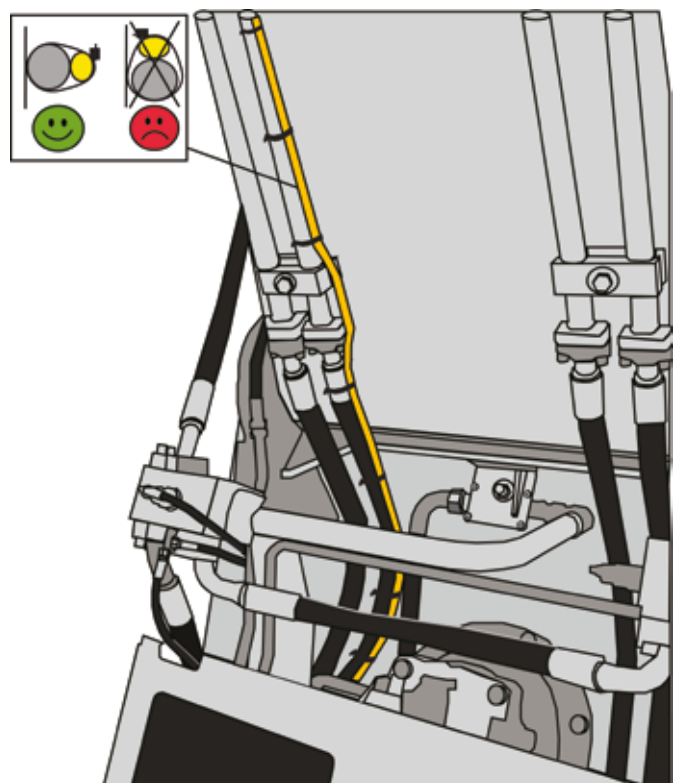
10. Line installation and mounting, boom



11. Line installation and mounting, boom

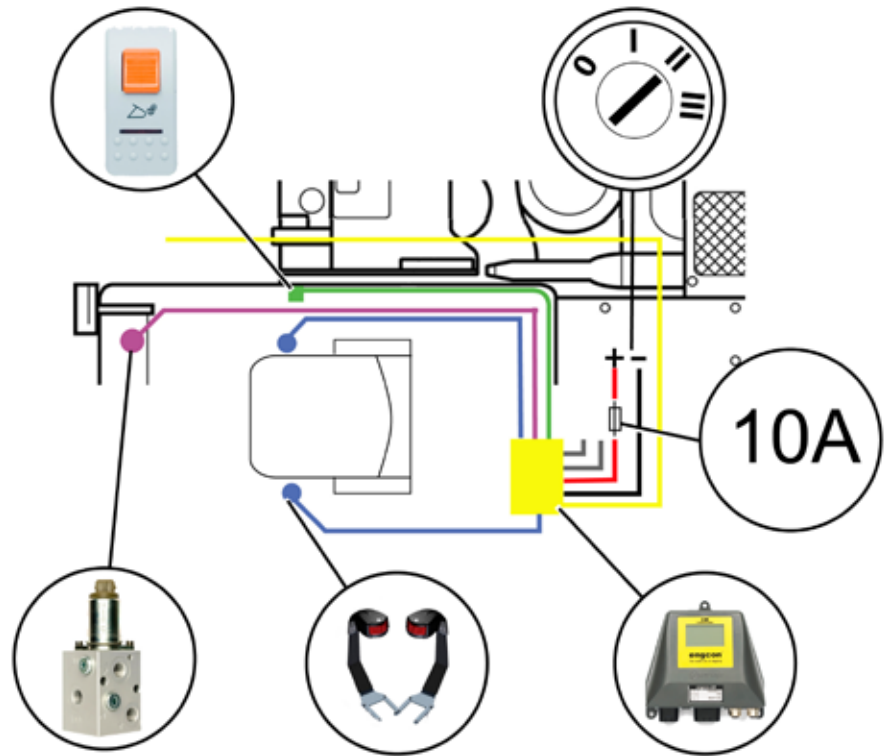


12. Boom root



13. Line installation, cab

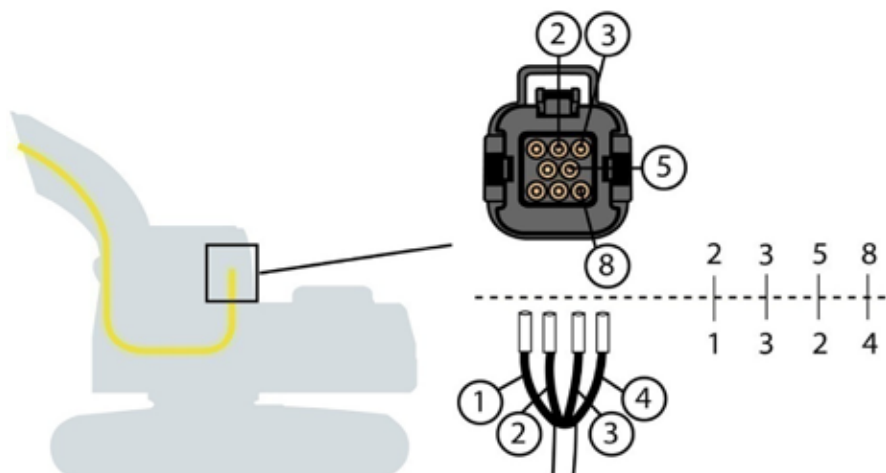
NB: The implement lock should be positioned so that it cannot be activated unintentionally.



14 . Connector, machine cable

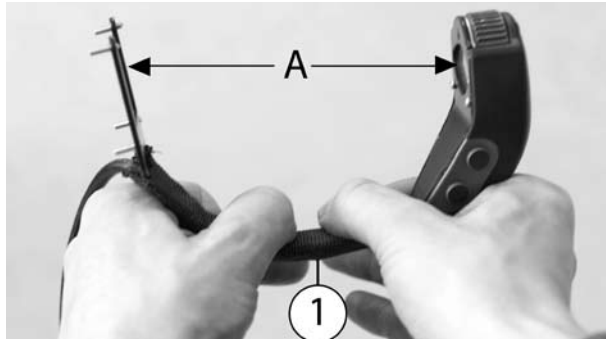
Detach the connector from the machine cable if necessary. Reassemble the cabling as shown in the picture.

NB: The picture shows the back of the connector.



15. Assembly of μ -prop joystick

The two joysticks are identical. It makes no difference which joystick is installed to the right and to the left.



1. Adjust the distance (A) by carefully bending the joysticks as shown (1) so that they fit the machine's control levers.



2. Mount the joysticks on the machine's levers. Position the fork of the joystick underneath the machine's control lever. Screw into place with the four screws.

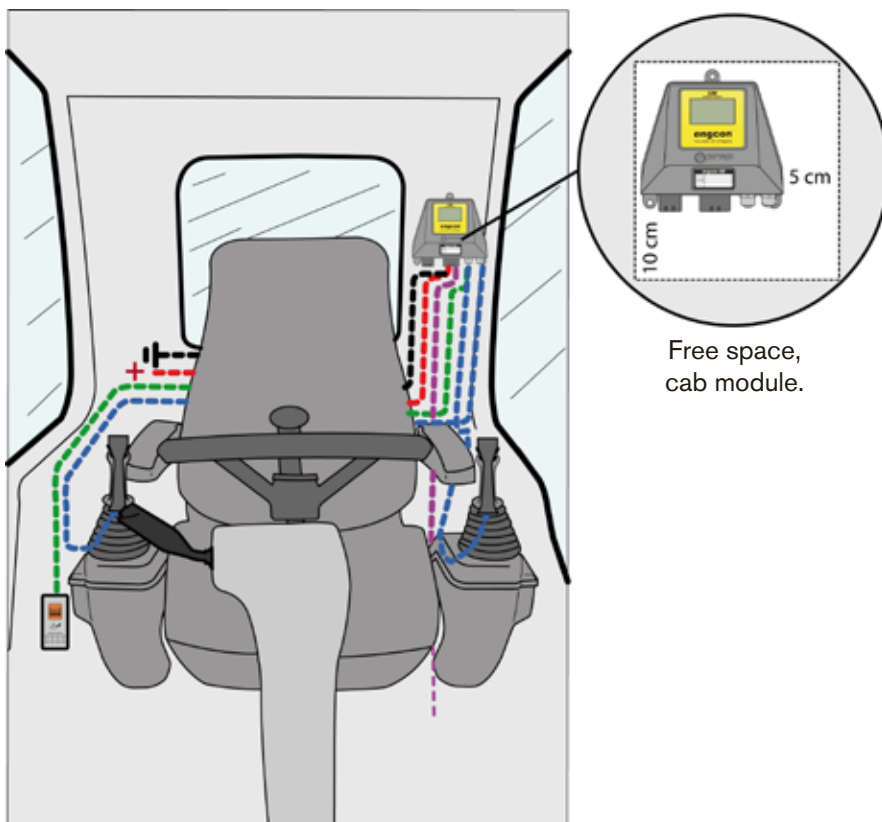
16. Protecting the line from mechanical stress



3. Position the lines so that they are not in the way of the machine operator. Make sure the lines are free of stress when the levers are pushed to their end positions.

17. Installation of cab module

NB: The cab module display must be visible when the system is later configured and calibrated.

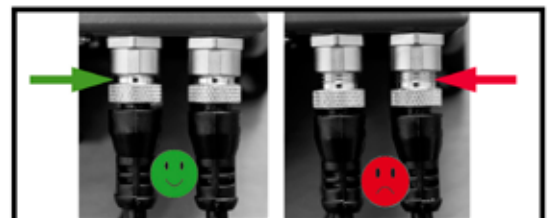
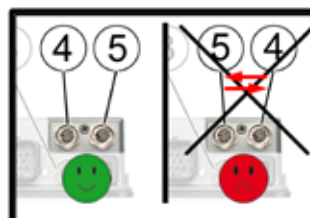
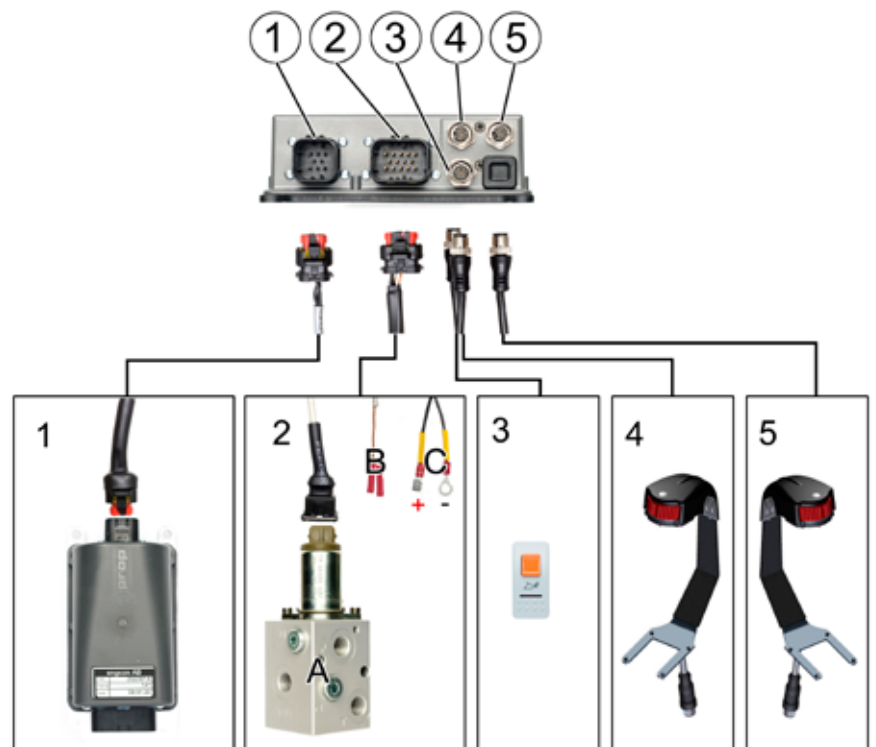


18. Connections, cab module

Pos.	Art. no.
1.	810456
2.	A: 810462 B: Power supply, ignition on.
3.	810459
4.	810140, left
5.	810140, right

NB: Check that the left and right μ -prop joysticks are connected to the correct connection points in the cab module.

NB: Securely screw the connector for the μ -prop joystick and the implement lock into the connection points on the cab module.



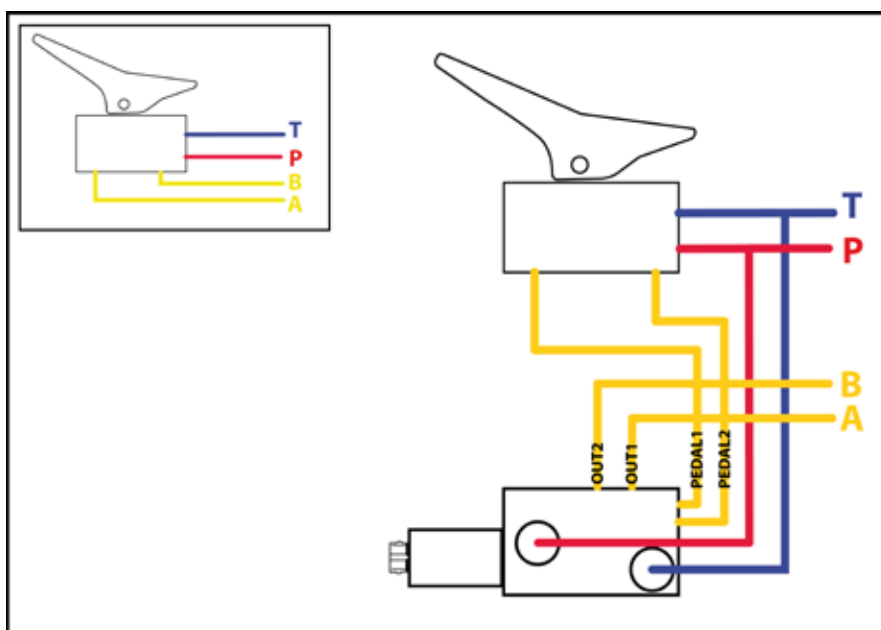
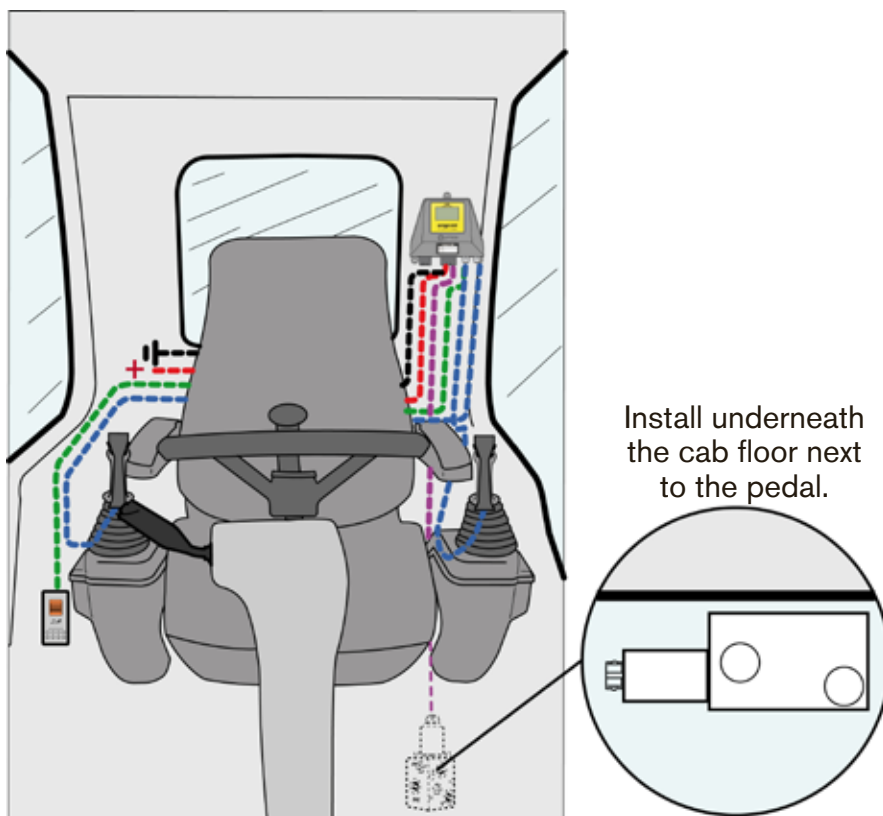
19. Connection of oil feeder valve

RED = P (pressure)

BLUE = T (tank)

YELLOW = A/B (servo)

Also see the documentation/hydraulic diagram for the machine.



Calibration of thumb wheels and configuration

20. Cab module menu

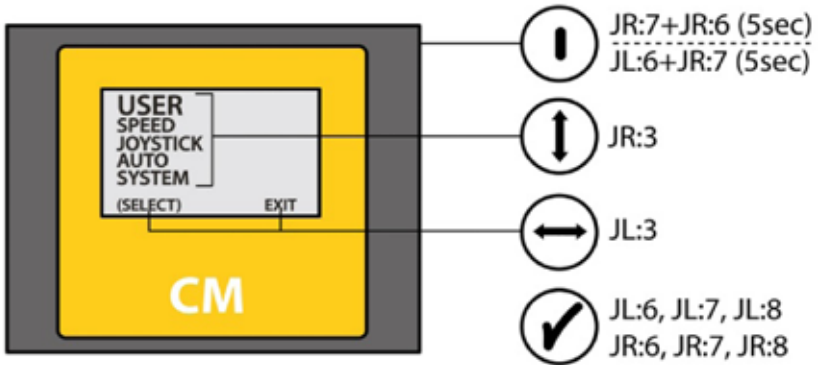
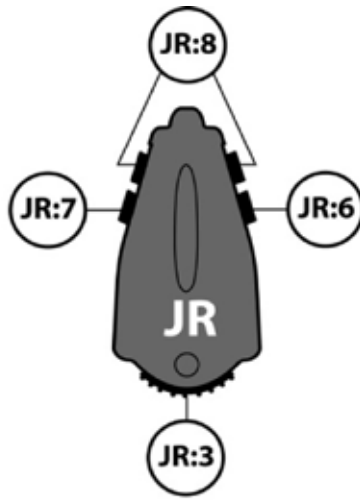
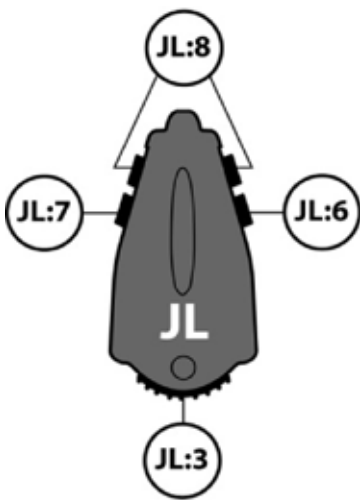
General information

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

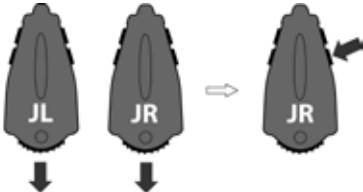
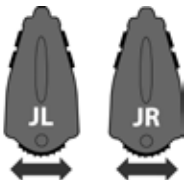
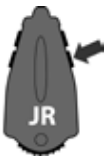
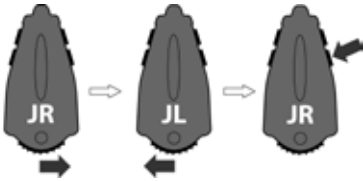
NB: It is not possible to navigate in the cab module menu with μ -Conf connected.

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

Button	Function CM
JL:7+ JR:6 5 seconds	Activate menu
JL:6+ JR:7 5 seconds	Activate menu
JR:3	Up/down in the menu
JL:3	SELECT or EXIT
JL:6, JL:7, JL:8, JR:6, JR:7, JR:8	Confirm selection/continue



21. Calibration of thumb wheels and configuration

- 1  Power the system by switching it on.
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".

Problem solving

If no text appears when the cab module display is switched on, check the fuses and power supply connections to the cab module.

If the cab module display signals an error during calibration, check and correct the connections where the error may have occurred. For information on different error messages, see the user manual.

If no errors are detected, contact an authorised engcon workshop.

Now continue with "Calibration of oil feeder valve".

Calibration of oil feeder valve

General information

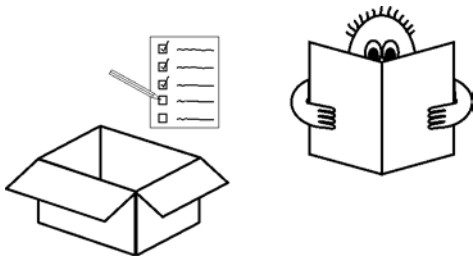
To calibrate the system and adjust the settings, you can either use the μ -Conf PC software along with a pulse transmitter, or you can use the system's automatic calibration with only a pulse transmitter. The μ -Conf PC software and pulse transmitter are available in a separate calibration kit.

The software's help function provides information on how to use μ -Conf.

This document only describes the automatic basic calibration.

NB: If a double oil feeder is installed, the system must be configured for this prior to calibration. See installation instructions for double oil feeder.

1. Checklist, calibration components



No.	Article	Designation	Quantity
1.	810467	USB cable	1
2.	810464	Cable, pulse transmitter	1
3.	810461	Pulse transmitter with lock nuts	1
4.	810466	USB with μ -Conf software	1



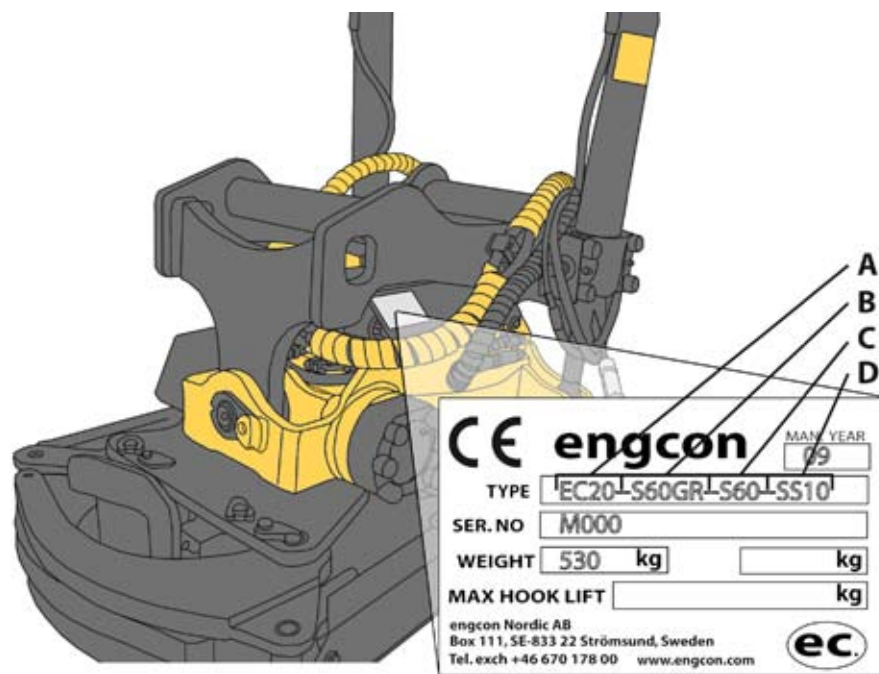
2. Checking the type plate on unit

A=Tiltrotator model

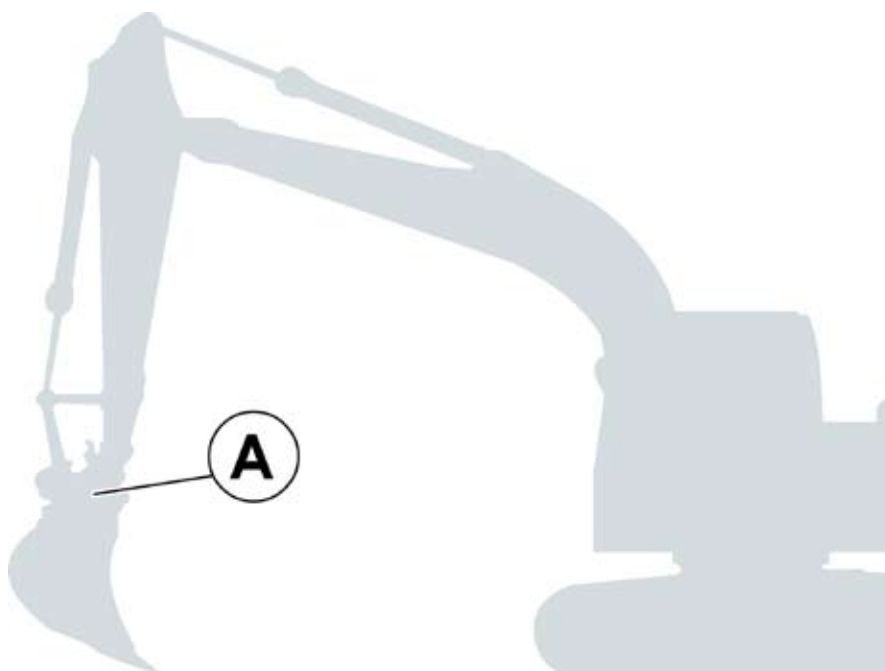
B=Quick hitch, lower (GR=Integrated grab)

C=Quick hitch, upper

D=Control system



3. Picture diagram, machine



4. Assembly, pulse transmitter

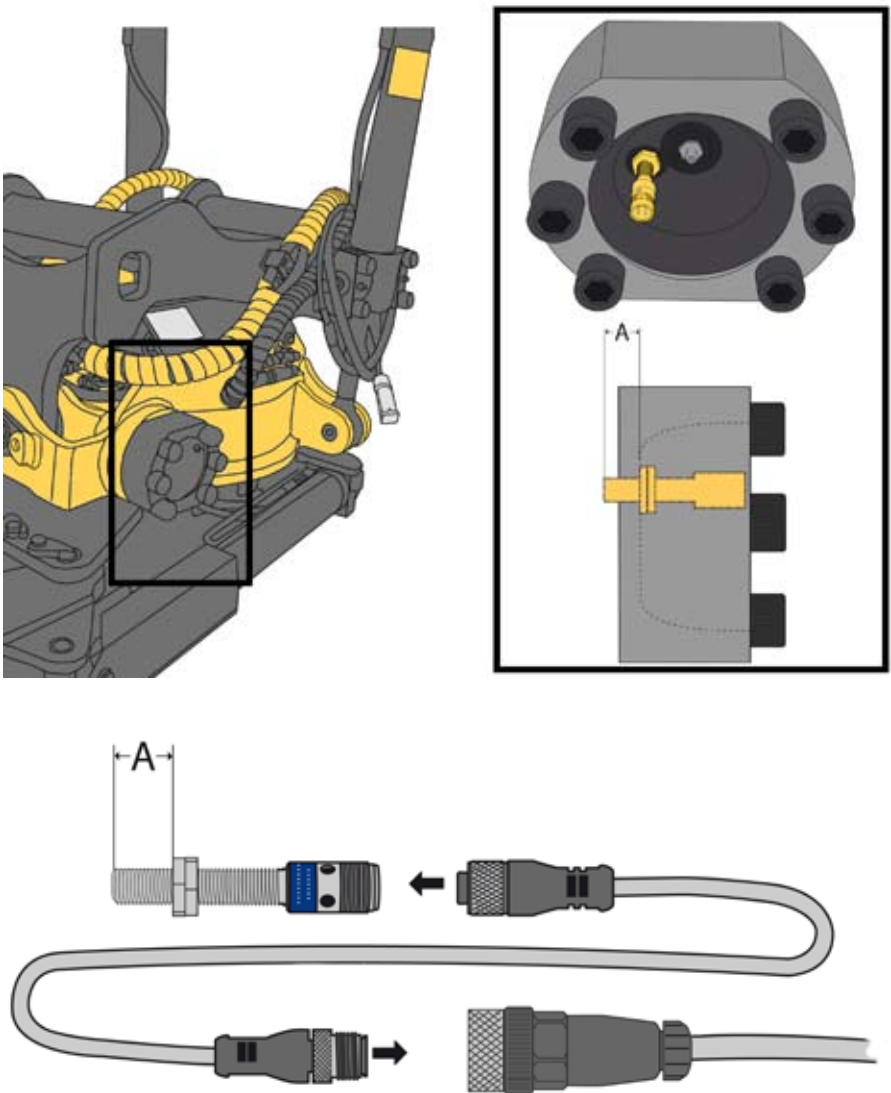
Install the pulse transmitter on the end of the tiltrotator's worm screw.

NB: The pulse transmitter must be fitted at a specific depth or screwed in a certain number of turns, depending on the tiltrotator model. Damage may occur if the pulse transmitter is fitted incorrectly.

Model	Dimensions (A)	Number of turns
EC05	16 mm	16
EC05B	18,5 mm	18,5
EC10/20	15,5 mm	15,5
EC15	17,5 mm	17,5
EC30	21 mm	21

Connect the pulse transmitter cable to the pulse transmitter, and to the connection for the tiltrotator cable assembly.

NB: The tiltrotator will rotate during calibration. Fix the pulse transmitter cabling into place to protect it from damage.



5. Cab module menu

General information

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

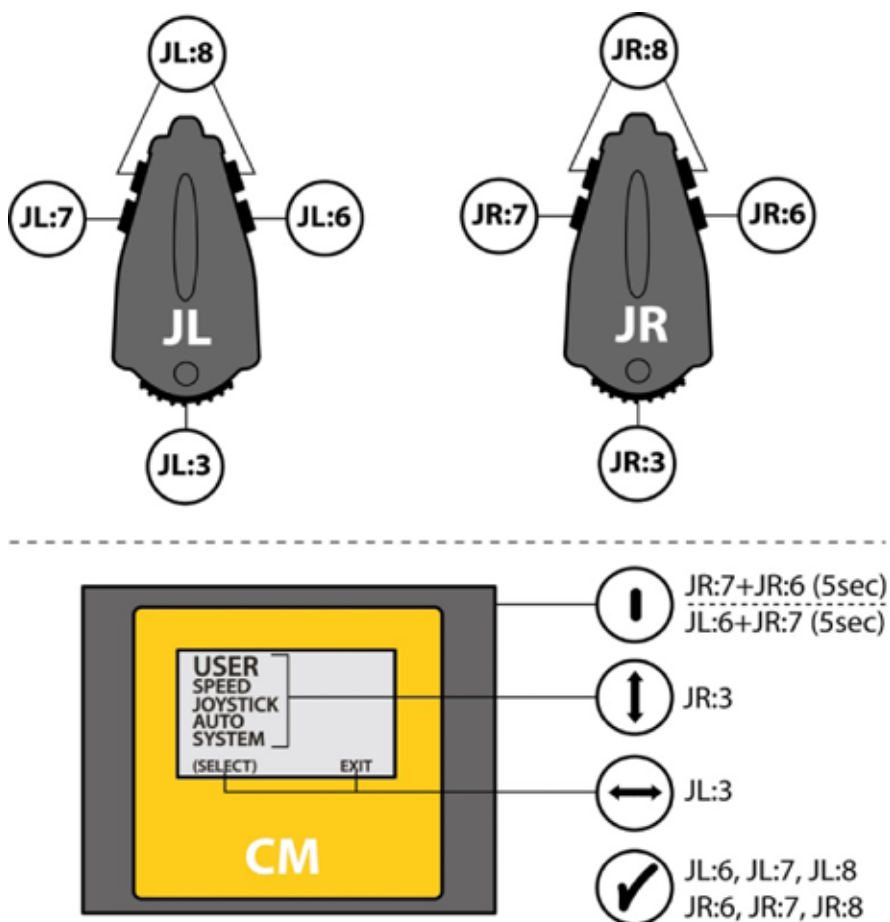
NB: It is not possible to navigate in the cab module menu with μ-Conf connected.

JL = Left μ-prop joystick

JR = Right μ-prop joystick

CM = Cab module

Button	Function CM
JL:7+ JR:6 5 sekunder	Activate menu
JL:6+ JR:7 5 seconds	Activate menu
JR:3	Up/down in menu
JL:3	SELECT or EXIT
JL:6, JL:7, JL:8, JR:6, JR:7, JR:8	Confirm selection/ continue

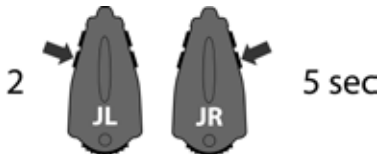


6. Calibration, oil feeder valve



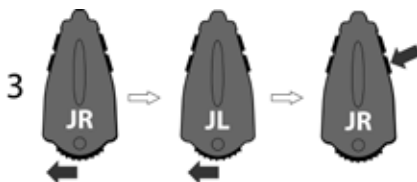
Start the machine and run the motor at operating speed.

CM shows "μ-prop", then the screen is turned off.



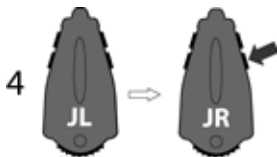
Click on JL:7 and JR:6 (or JL:6+ JR:7) simultaneously for 5 seconds to show the system menu.

CM will show a list of menu functions.



Select "AUTO" using JR:3. Make sure that "SELECT" is selected (if necessary, use JL:3 to move the cursor), then press any key.

CM shows "START AUTO".



Make sure that "SELECT" is selected (if necessary, use JL:3 to move the cursor), then press any key.

CM shows "Auto calibration".



NB: The tiltrotator will move during calibration.

Push JL:3 as far as possible to the left and **hold it there until calibration is completed**, (see section 7).

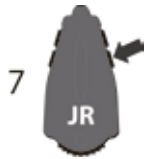
CM will now show the different calibration steps performed by the system. The LED on the pulse transmitter indicates when the rotator's worm screw is rotating.



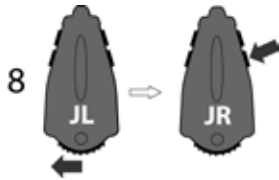
CM shows "Saved settings" and the calibrated values after calibration is completed.

Release JL:3.

Continued on next page.



Click on any key to complete the calibration.
CM shows "START AUTO".



Exit the menu by selecting "EXIT" with JL:3, and then press any key. Repeat until the display is turned off.

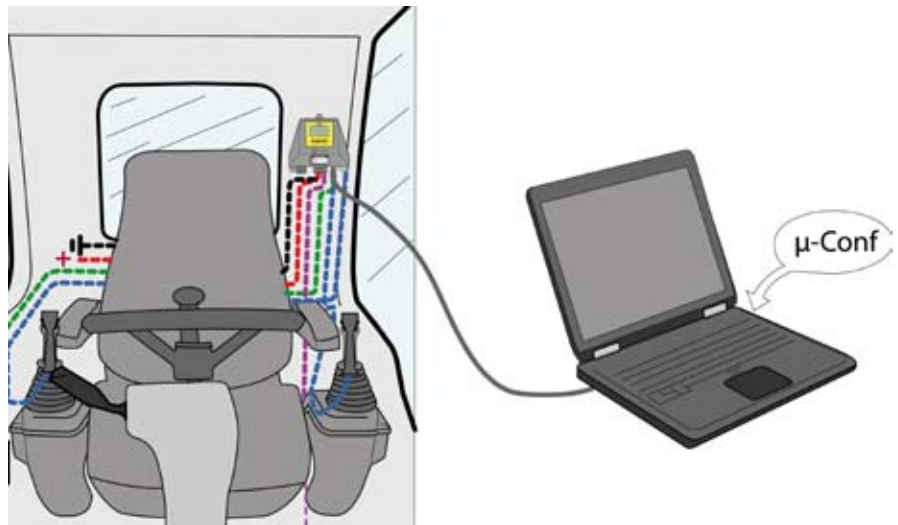
Problem solving

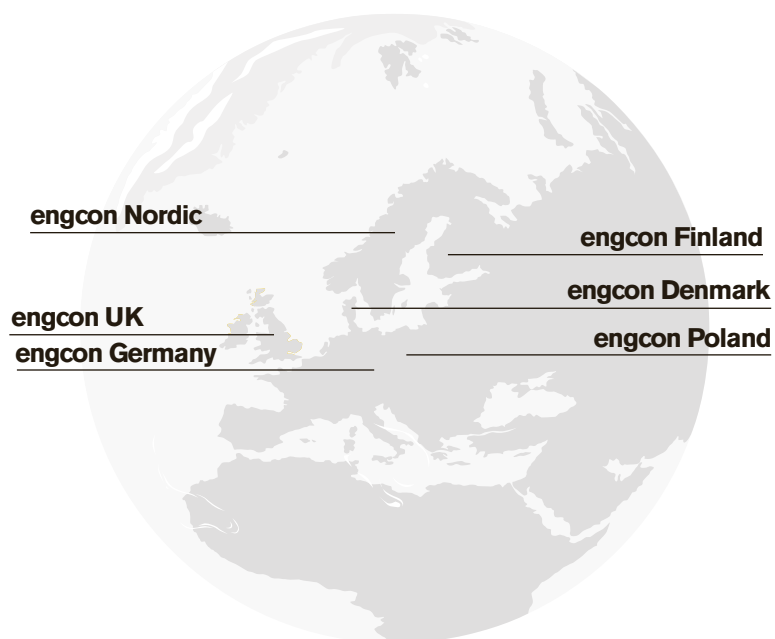
If the cab module display signals an error during calibration, check and correct the connections where the error may have occurred, and check the mounting depth of the pulse transmitter. For information on different error messages, see the user manual.

For best results, perform the calibration when the machine is running at the correct operating speed and has reached operating temperature.

If no errors are detected, contact an authorised engcon workshop.

Check the tiltrotator functions: Connect a PC to the cab module and use the μ-Conf software if further calibration/ setting adjustment is required.





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