ERGO-DigiStick

MADE IN FINLAND

Käyttöohje

Bruksanvisning

User Guide

ROTEC engineering

Käyttöohje sivu 3

ERGO-DigiStick on digitaalinen ohjauskahva sisäänrakennetulla elektroniikalla hydrauliventtiilien ohjaukseen. Käyttökohteena: metsäkuormaimet, etu-kuomraimet ja muu liikkuva kalusto.

Bruksanvisning sidan 14

ERGO-DigiStick är en digital styrspak med inbyggd elektronik för styrning av hydraulventiler till skogskranar, frontlastare samt andra mobila redskap

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ERGO-DigiStick is a digital joystick with built-in electronics for steering hydraulic valves for forest cranes, front loaders and other types of mobile equipment

Contents

Warranty Terms

The warranty time for the mechanical parts in the ERGO-DigiStick joystick is one year. The electronic components have a limited warranty of one year since the producer of the joystick is not able to control where the joystick is installed. The warranty is not valid if the problem originates from the users broken or poorly working electrical system in the working machine. Inside the joystick there are built-in protection-components intended to protect the PCB against a limited amount high voltage spikes and like. The user must be sure that there are no problems in the electrical system which will give often recurring high voltage spikes because these high voltage spikes will sooner or later destroy the protection components and when this happens the PCB will be destroyed. If the red LED light is flashing continuously, even after the power supply has been switched off and on again, it indicates that the PCB (circuit board) has been destroyed because of often recurring high voltage spikes. In this case the warranty is not valid. Before installing a new PCB, it is important that the problem in the electrical system is fixed; otherwise there is a great risk that the new PCB also will be destroyed.

It is very important to carefully follow the instructions which are given in this manual to avoid the problems described above. Especially important are the instructions about power supply, the power switch and the usage of the power switch when the working machine is started.

The ERGO-DigiStick joystick is designed for use in dry places (eg. in a tractor cab). The joystick can be used outside if it's installed in an upright position. The cable connections at the bottom of the joystick are not air– or waterproof (the purpose of the breathing space is to level the air pressure), therefor it is essential to make sure that no water gets in through the breathing spaces at the bottom. The warranty is not valid if the electronics is damaged because of water inside the joystick. The PCB has a protective grease layer, which protects the electronics from condensation.

Connecting the joystick to the power source

The ERGO-DigiStick joystick is connected to the power source with the power cable. The red wire is positive (+) and the black wire is negative (-). The power should be taken directly from the battery and the power cable should be equipped with a 10A fuse and power switch. To protect the electronics in the joystick from high voltage spikes caused by the starter, it is important that the power is switched off from the joystick when the working machine is started! The power switch is also needed for adjustment of the minimum and maximum current.

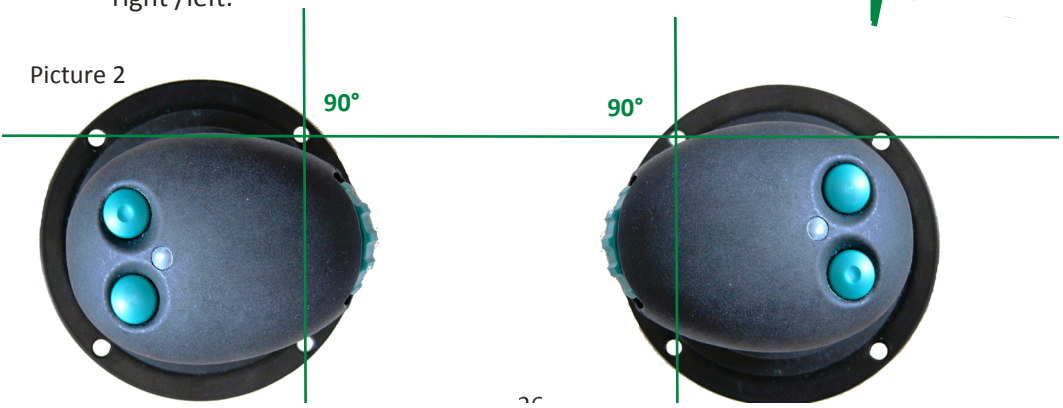
How to place the joystick

Picture 1

The ERGO-DigiStick is an excellent sample of Finnish Industrial Design. The highest priority in the design has been to achieve great ergonomics and comfortability for the driver.

- The joystics are intalled so that the rolls are facing each other. You use your thumbs to steer the rolls.
- The best working position is obtained if the joysticks are installed at both sides of the driver's thighs. The joysticks should lean forward 10 to 15 degrees (see picture 1). When the joysticks are installed like this, the movement for the wrist is natural also when the joystick is pulled back.
- The joystick should be installed at a height so that the forearm is horizontal when the hand rests at the joystick. The fastening holes should be in line with the operators seat (see picture 2). Correctly installed the movements of the joystick are forward/backward and right /left.

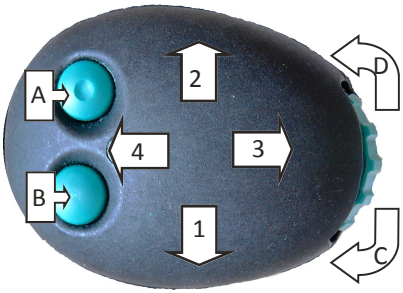
Picture 2

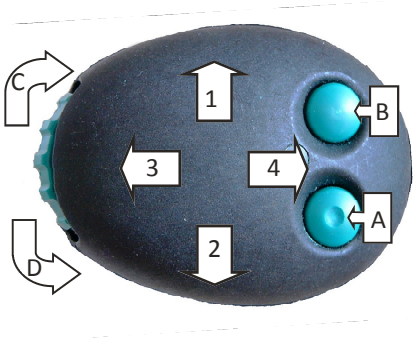


ERGO-DigiSticks operating a Forest Crane Valve

How to Connect the Joystick to the Valve and How the Joystick Movements Corresponds with the Steering Cable Markings

In the picture below the directions of the joysticks are marked with [1, 2, 3, 4]. The direction of the rolls are marked with [C, D] and the buttons with [A, B]. Under the picture you find the forest crane functions which the different movements corresponds to. The 8 connectors of the steering cable are marked [1, 2, 3, 4, A, B, C, D] and should be connected to the solenoids so that they corresponds to the functions below.





The Steering Cables are Connected to the Solenoids as Follows:

LEFT HAND JOYSTICK

1 Second boom down

2 Second boom up

3 Crane turnig to the right

4 Crane turning to the left

A Left stabilator down

B Left stabilator up

C Extension tube in

D Extension tube out

RIGHT HAND JOYSTICK

1 Main boom down

2 Main boom up

3 Rotator turns counterclockwise

4 Rotator turns clockwise

A Right stabilator up

B Right stabilator down

C Grapple closing

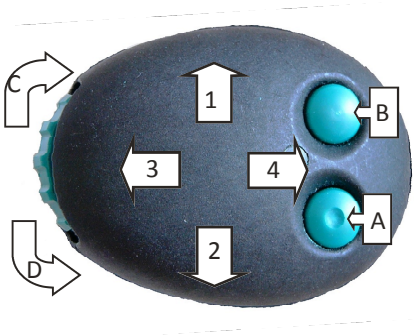
D Grapple opening

ERGO-DigiStick operating a Front Loader Valve

How to Connect the Joystick to the Valve and How the Joystick Movements Corresponds with the Steering Cable Markings

In the picture below the directions of the joystick are marked with [1, 2, 3, 4]. The direction of the roll is marked with [C, D] and the buttons with [A, B]. Under the picture you find the functions which the different movements corresponds to. The 8 connectors of the steering cable are marked [1, 2, 3, 4, A, B, C, D] and should be connected to the solenoids so that they corresponds to the functions below.

The steering cable is connected to the solenoids as follows:



1 Loader down --- joystick forward

2 Loader up --- joystick backward

3 Tilt the bucket forward (bucket dump) --- joystick to the left

4 Roll back the bucket --- joystick to the right

A Floating contact (Hirschman contact) --- press the A-switch

B On-Off signal (if needed) --- press the B-switch

C Proportional output signal (if needed) --- roll forward

D Proportional output signal (if needed) --- roll backward

How to use the floating:

Activate the floating mode: Push the lever all the way forward and press the A-switch. The LED light on top of the joystick indicates that the floating function is active. It is possible to use all movements when the floating is active.

De-activate the floating mode: A rapid press on the A-switch will de-activate the floating mode (LED light goes out)

NOTE: If one or more movements are slow, please control the servo pressure. Different circumstances (e.g. dirty return filter or severe cold) may raise the tank pressure, and because of that the servo pressure should be raised. 20-25 bar servo pressure is usually enough.

How to adjust the speed of movement

Follow the instructions bellow for adjusting start and maximum currents for one ore more joystickdirections:

1. Put the joystick in programming mode

- Start the tractor and put the hydraulic pressure on
- Switch off electric power from the joysticks
- Press and hold the A-switch (the swith with a cavity)
- Turn the power on, wait for 5 seconds until the red LED light appears (this indicates that the joystick is now in programming mode)
- Release the A-switch
- Now, choose which function (direction of the lever/roll) you want to adjust and do steps 2 and 3. If you after this want to adjust another function do steps 2 and 3 again for the new direction. When you have adjusted all the desired functions (one or several) you can go to step 4 to exit the programming mode and start to use the joystick

2. Define the desired start current of the selected function

- Move the lever/roll to the desired direction until the selected movement starts. After this, move the lever/roll just enough for the movement to stop again, in this position: press the A-switch (**max 1 second**)
- Let the lever/roll go back to the centre position (LED light flashes now and indicates that the information is stored in the memory)

3. Define the desired maximum current for the function

- Move the lever/roll to the same direction as in step 2 until the desired maximum speed is reached and select this current by pressing the A-switch (**max 1 second**)
- Let the lever/roll go back to the centre position (LED light flashes now and indicates that the information is stored in the memory)

4. Exit the programming mode

- Hold the A-switch pressed until LED light indicates that the programming mode is ended. The joystick is now ready for use

How to Recall the Factory Settings

A fast recall of the factory settings is done with the roll. The recall does not effect the dead bands (see page 32 for further information) or the potentiometre limits.

Fast Recall of the Factory Settings with the Roll

1. Switch off electric power from the joystick
2. Either push or pull the roll the roll to its maximum position
3. With the roll in one of it maximum positions: switch on the electrical power to the joystick (the LED light will now be alight for 1 secound)
4. Let the roll go back to its original position
5. The joystick is now ready to use

After recalling the factory settings, the start current is relatively low (ensuring that all functions will have a smoth start) and the max current is very high (ensuring that all functions certainly get enough current to reach full strength/movement speed). Because of this wide current range (low minimum current and high maximum), there is probably a need to tune up individual movements for the best driving comfort (see page 29).

How to Choose the Ramps

The idea with a ramp is to achieve a softer start and stop of a selected movement. This makes the driving much smoother and more comfortable. Smoother stops are also more gentle for the crane and may increase the life time of it. When following the instructions you will be asked to see which ramp-mode is active by counting the number of LED flashes. Below is a list of what ramp a specific number of LED flashes indicate:

1 flash = no ramps	4 flashes = ramp on 0.6 seconds
2 flashes = ramp on 0.2 seconds	5 flashes = ramp on 0.8 seconds
3 flashes = ramp on 0.4 seconds	

Installing ramps to one or several functions

1. Switch off electric power of the joystick (the hydraulic pressure can be on or off, there are no signals to the solenoids)
2. Move the lever/roll to the selected direction (corresponding the function you will change ramp-mode to) and press and hold the B-swith (the swith without cavity)
3. Now, switch on the electric and wait for 5 seconds until the LED light lightens (indicating that the joystick is in ramp-programming mode)
4. Release the B-switch but keep the lever/roll to the selected direction
5. Press the B-switch quickly (max 1 second) and count the number of LED flashes to find out the current ramp-mode for this direction
6. If you want to change the ramp-mode: press the B-switch to increase the number of flashes and A-switch to decrease it. Do this until you have reached the desired number of flashes (the desired ramp-mode).
7. If you now want to:
   a. **Exit the programming mode and start to use your joystick:** let the lever/roll go back to the centre position and press and hold the B-switch until the LED light start to shine. After this you can release the switch and start to use the joystick.
   b. **Change the ramp-mode for another function:** follow instructions 2 to 7 for the new function

How to Adjust the Dead Bands

A deadband is an area of regulation range where no action occurs. The purpose is to prevent involuntary power feeding to the coils. If no deadband is defined, the electronics is feeding random signals to various coils, and if the deadband is set too narrow, even a small unintentional movement of the lever can cause a harmful additional reaction.

As an example: A small side movement of the joystick can cause the rotator to turn when the attempt was to rise or lover the main boom of a forest crane.

Setting the deadbands will always recall, by the program selected current values. Because the current values starts from low, at all lever directions of the joystick (even the thumb roll) shall all hydraulic movements start smooth from a low level, without any preset speed. The current starting from low level will lead to a relatively long lever movement for gaining a required current for start in some functions. To adjust these function to start smooth, immediately after the deadband, please read the manual at page 29.

The procedure to set the deadbands / returning the factory settings:

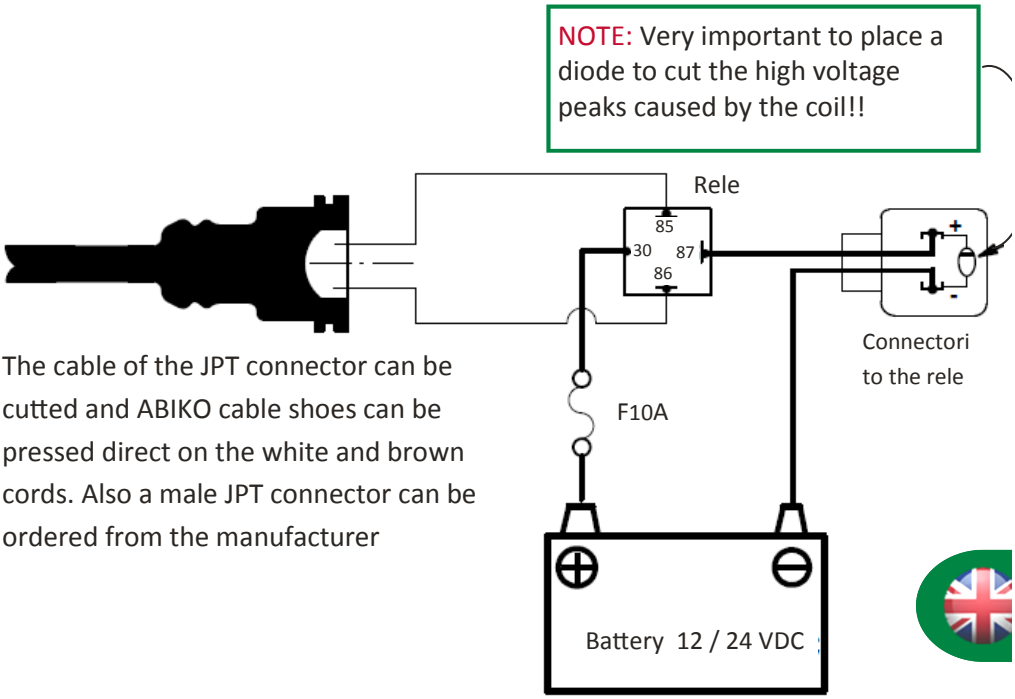
(the hydraulic pressure can be on because the joystick will not give any out signal) **Note:** At the referred switches A and B, A is marked with a cavity.

1. Switch off the power from the joystick
2. Press and hold A and B switches.
3. Turn on the power to the joystick, still holding A and B pressed until the red light come on after 5 seconds. Then let off the switches.
4. To set the deadbands at the joystick move the lever apr. 10 mm in every direction, also the roller apr. 2 mm forward and back.
5. Press A switch to register the deadband values (just press, don't hold)
6. The red light will flash to indicate the registered values.
7. Move the lever to the maximum position in all directions, also the roller.
8. Press A switch to register the maximum lever values.
9. The red light will now be on for 1 second to indicate the finished procedure.
10. The joystick is now ready for use.

Note: The length of the deadbands can be set longer than 10 mm if wanted but not shorter to avoid earlier mentioned unintentional movements.

Operating Additional Solenoid Valves by Using a Rele

Junior Power Timer (JPT) connectors B, C and D of the ERGO-DigiStick joystick's steering cable can be used for operating external electrical components like selector valves in a front loader. These coils normally need higher current than one channel of ERGO-DigiStick can supply (2A). Therefor a rele is needed. Notice that the signal to the terminals 85 and 86 is taken from the JPT connector. Using external souces , plus or minus, will destroy the PCB card of the joystick!



The cable of the JPT connector can be cutted and ABIKO cable shoes can be pressed direct on the white and brown cords. Also a male JPT connector can be ordered from the manufacturer

B connector gives direct current C and D gives puls wide regulated current (PWM) which makes the rele to "vibrate" on low currents. The vibration will disappear with full PWM. The vibration can also be avoided by connecting a 100 µF condensator between terminals 85 and 86 on the rele. Notice that the polarity has to be right when the condensator is used.

Meaning of the LED indications

The LED indication light on top of the joystick has two main functions. First, it is used when adjusting the minimum and maximum currents and ramps (see pages 29 and 31). Secondly, it is informing the user about malfunctions of the joystick. Beneath you find the meaning of the LED indications:

Overload (6 flashes)

In case of an overload situation, the joystick is automatically switched off. The LED light will flash six times in a row, pause and flash six times again and so on. The joystick will start to work normally again when the power is switched off and on. Make sure that the problem is fixed before turning on the power (the reason can be a cable injury or short circuit).

Error signals from the potentiometers (1 or 2 flashes)

If the LED light flashes once, pauses and flashes once again (reapetedly), there is a problem with the forward-backward potentiometer. Please contact service/producer. The life length of the potentiometer is approx. 5-10 years.

If the LED light flashes two times, pauses and flashes two times again (repeatedly) there is a problem with the left-right potentiometer. Please contact service/producer. The life length of the potentiometer is approx. 5-10 years.

PCB broken (constant flashing without pauses)

If the LED light flashes constantly without pauses, it indicates that the PCB (printed circuit board) is broken because of a high voltage spike. The PCB must be replaced. In this case the warranty is not valid. Please contact the service/producer.

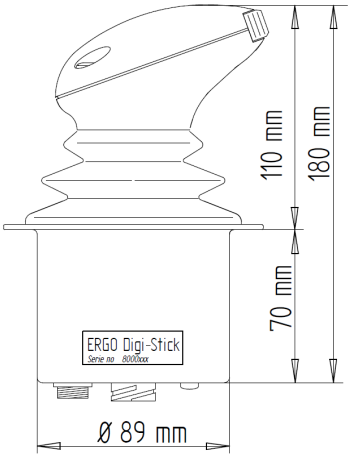
Information about the ERGO-DigiStick

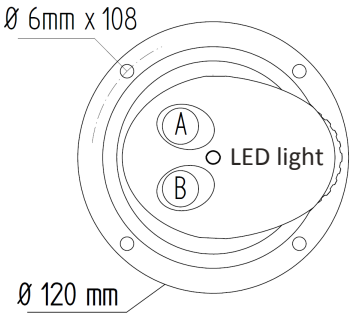
Size, weight and materials:

- Fastening holes: 4 pc à 6 mm
- Center diam. of fast. holes: 108 mm
- Total height: 185 mm
- Diameter: 120 mm
- Weight: 720 g
- Materials:
  - Grip: injection molded plastic with fiberglass strengthening
  - Rubber bellow: rubber
  - Building: Stainless steel
  - Cables: polyuretan (a flexible and durable material, flexible even in -40C°)

About the electronics:

- Steering:
  - PMW 100 Hz
  - 12/24 VDC (max 28 VDC)
  - Propo: 1,5 A /14,5 VDC
  - ON-OFF: 2,4 A /14,5 VDC
- 8 channels:
  - 6 analog (proportional functions)
  - 2 digital (on-off functions)





Lisävarusteet / Tilläggsutrustning / Accessories

Art. nr. 2065

Kahvanpidinrengas

Kahvan kiinnitys penkkiin

Spakfäste (ring)

Spakfäste för att fästa spaken i bänken

Fastening ring

Fastening ring to attach the joystick to the driver's seat

Art. nr. 2060

Kaksiosainen kahvanpidin

Kahvan kiinnitys penkkiin. Säädettävissä joka suuntaan, myös korkeus.

Justerbart tvådelat spakfäste

Höjden och vinkeln är justerbar för bästa ergonomi. Snabbkoppling för att lätt kunna koppla bort spaken .

Adjustable fastening system

Fastening system in two parts for attaching the joystick to the driver's seat. Hight and angle is adjustable.

Art. nr. 2050

Ohjauskaapelin jatkokaapeli / 2 tai 4 m

Jatkokaapelin tarkoitus on siirtää kytkentäpisteen traktorin hytin ulkopuolelle, helpottamaan kuormaimen irroittamista/ kiinnittämistä

Skarvkabel till styrkabeln / 2 eller 4 m

Syftet med skarvkabeln är att flytta kopplingspunkten utanför traktorn och möjliggöra snabbkoppling av vagnen

Extension cable to the steering cable / 2 or 4 m

Allows disconnection outside the cabin.

Valmistajan yhteistiedot / Tillverkarens kontaktuppgifter / Contact Information

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