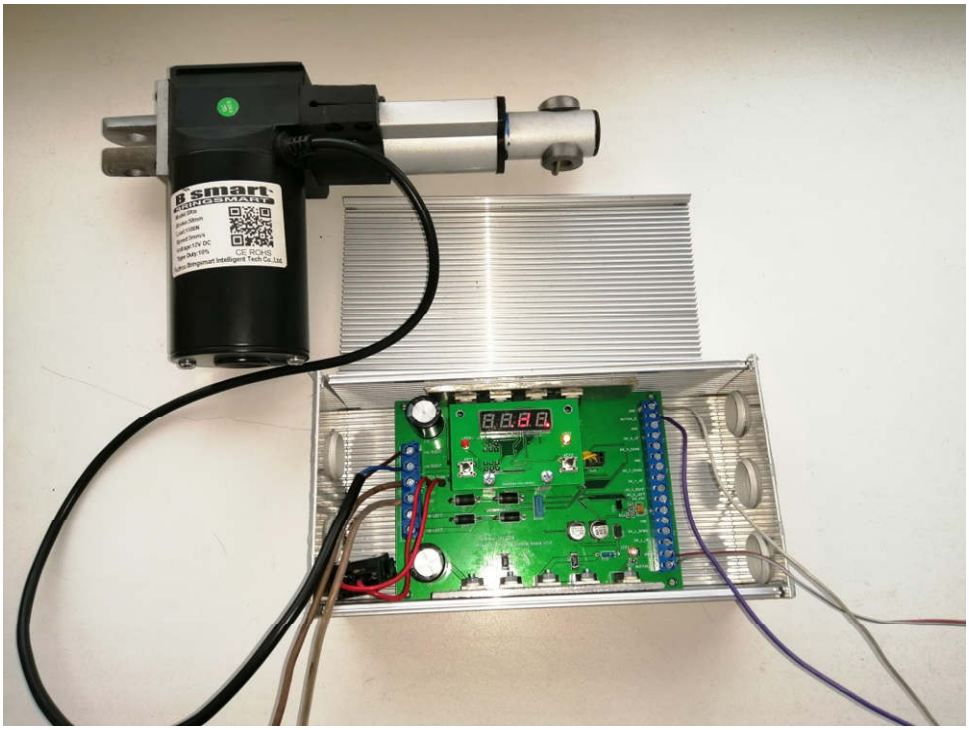
GAZ-71 GP Friction Clutch Controller



Installation and operation Manual

(Eng rev. 1.1)

The controller is designed to control the release of friction clutches on the main gearboxes (GP) of the GAZ-71 type (and their modifications) on side-turning all-terrain vehicles. The control is carried out by the clutch release buttons on the levers, or by limit switches mounted on them. Smooth adjustment of the actuators is carried out using additional 1-axis joystick. This system simplifies the operation of the ATV.

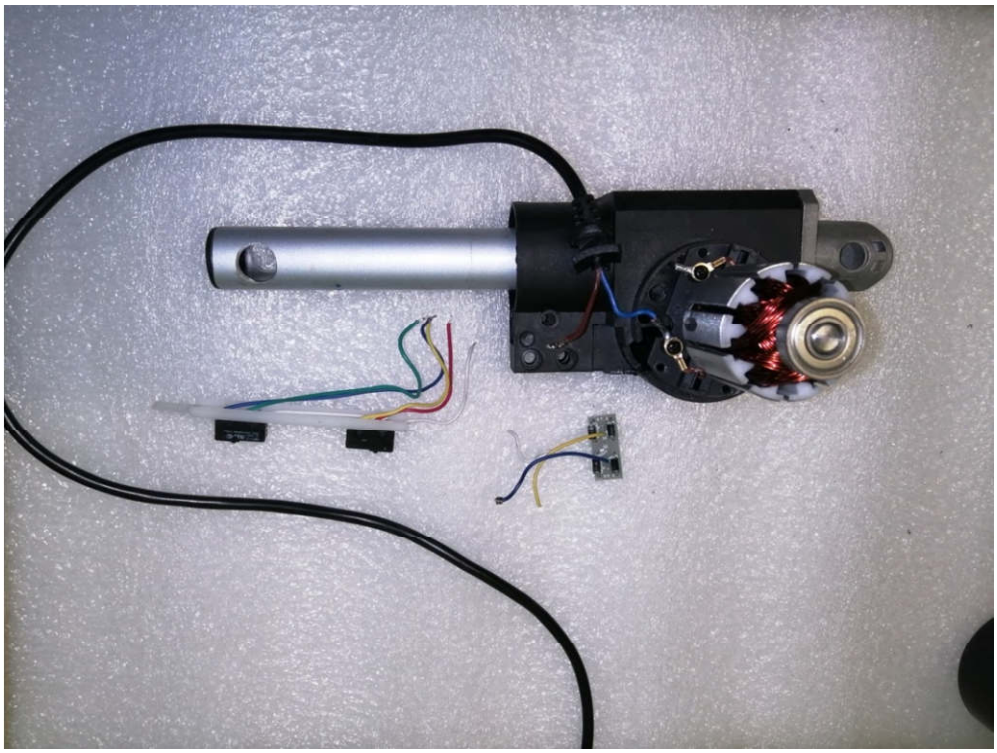
Main technical characteristics:

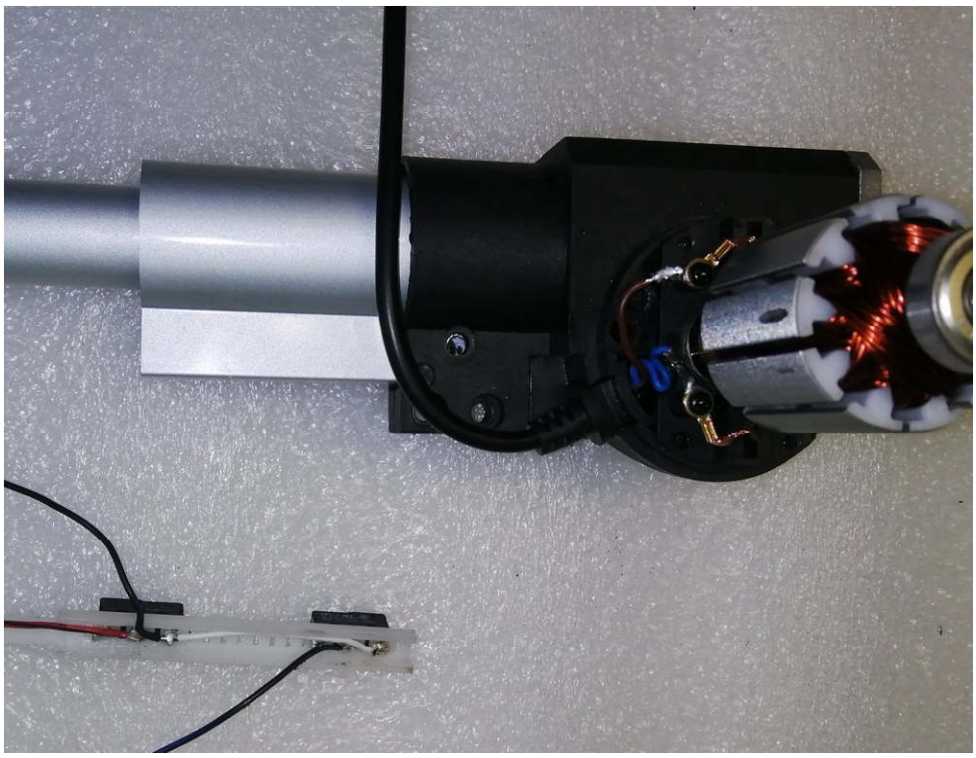
Model	vksensor Frictions control board v2.0
Channels	2 (left and right friction clutch)
Nominal voltage	12V (available 24V version)
Nominal current	< 20 A
Anti-jamming protection	Customizable in settings
Rated force for squeezing the clutch liner (for GP GAZ-71)	70-80 kg
Used with linear acuators	1. BringSmart Model SRB. 50 mm stroke. 12V,16 mm/s, 1500N (150 kg) or the same 1000N (100kg) 2. Sumotor 50 mm stroke. 12V,30 mm/s, 1000N (100 kg)

Typical release time	1.0-1.2 s (for 16mm/s actuators) 0.8-0.9 s (for 30 mm/s actuators)
Used joystick	Linde 7919040041, 1-axle used, resistive (4.7kOhm)
Dimensions and weight	150x106x55 mm, 0,630 kg

1. Refinement of actuators

To increase the reliability of operation, the actuators installed together with the controller need to be improved. Inside Bringsmart actuators (or analogs) are diodes with limit switches that are wired in series with the motor. It is necessary to disassemble the actuators, remove the board with diodes, separately bring the limit switches to the controller, connect the electric motor separately.





3 wires must be connected to the strip with limit switches:

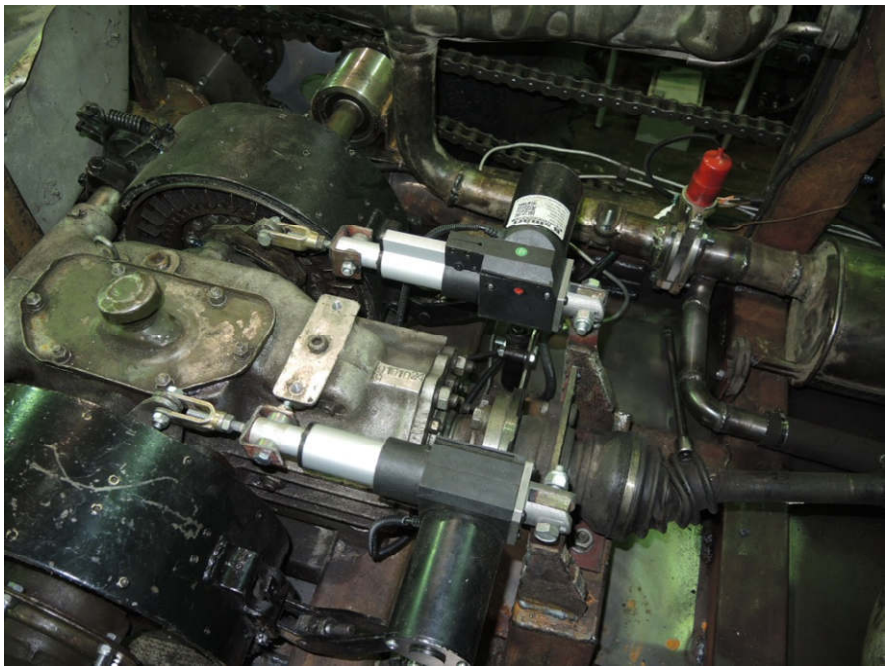
1 – common (GND), 2 - lower position limit switch (normally open), 3 - upper position limit switch (normally open).

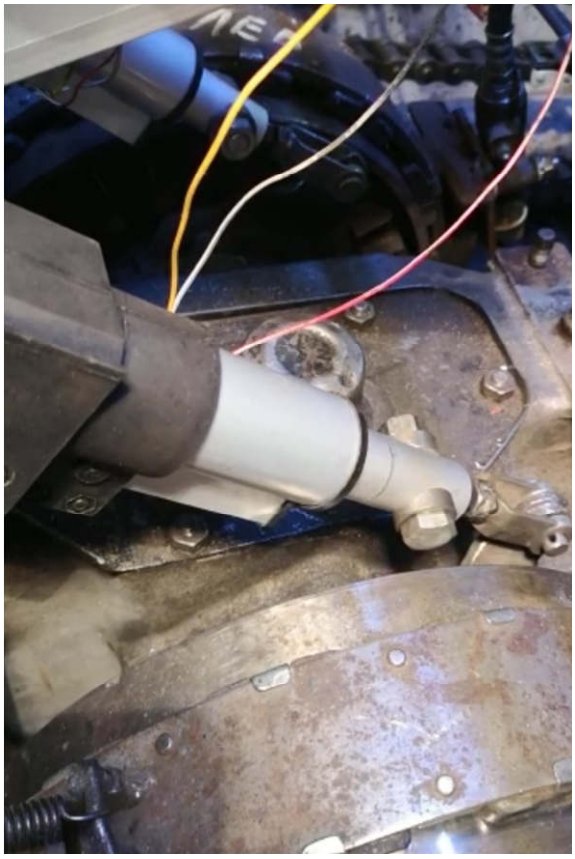
The electric motor must be connected directly.

When assembling, it is important to install the case with magnets in its original position, otherwise the direction of rotation of the motor will change to the opposite.

2. **Installation**

For GP GAZ-71, installation is possible both "towards" to the cardan flange, and along it. Below are possible installation variants.

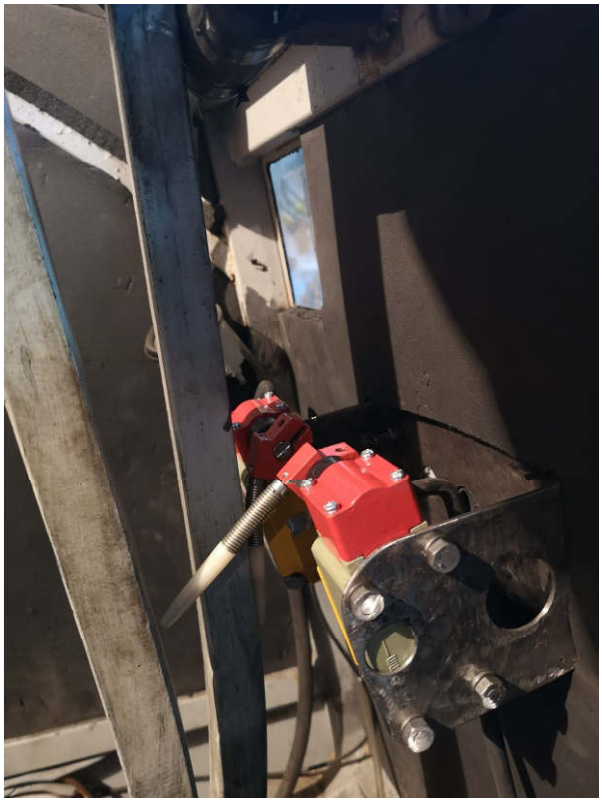




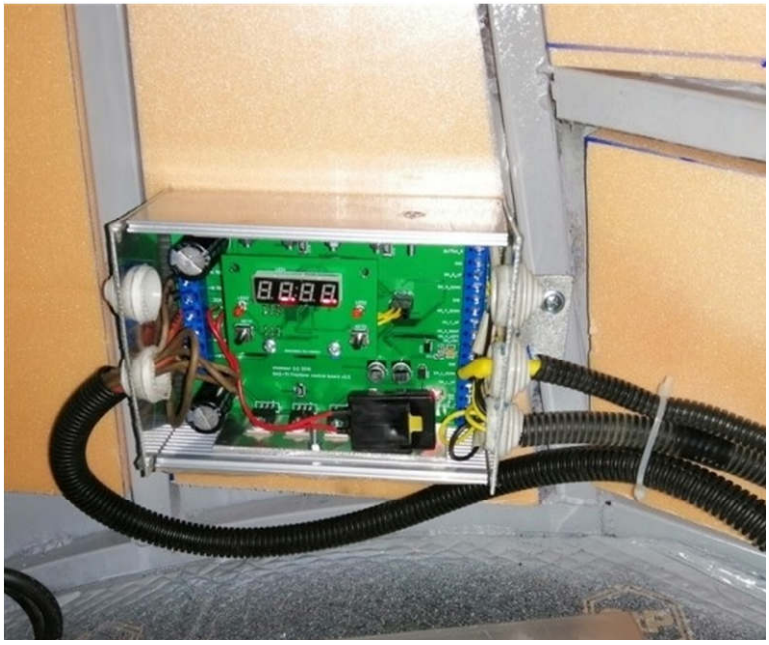
Important. For friction clutches, it is necessary to adjust the free play (for the GAZ-71 GP, 8-12 mm according to the repair manual), the actuator plug must be set to 2/3 of the free play of the friction clutch lever.

2.1 Installations of controls

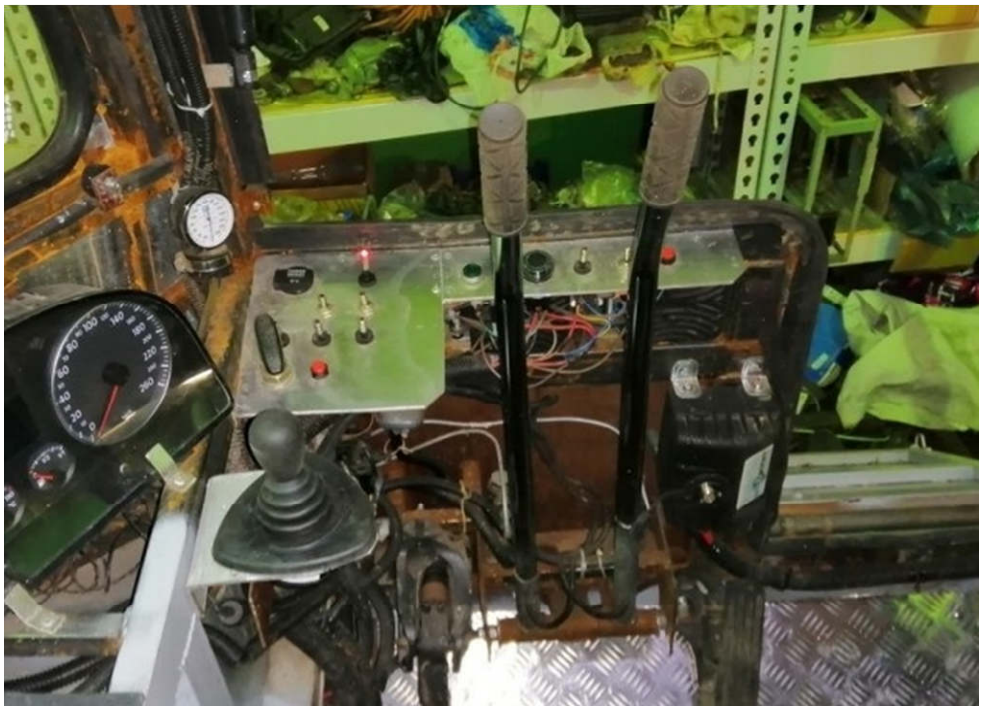
Variant with buttons on the levers (wiring is done internally with a rubber flexible cable)



Variant with limit switches for operator levers

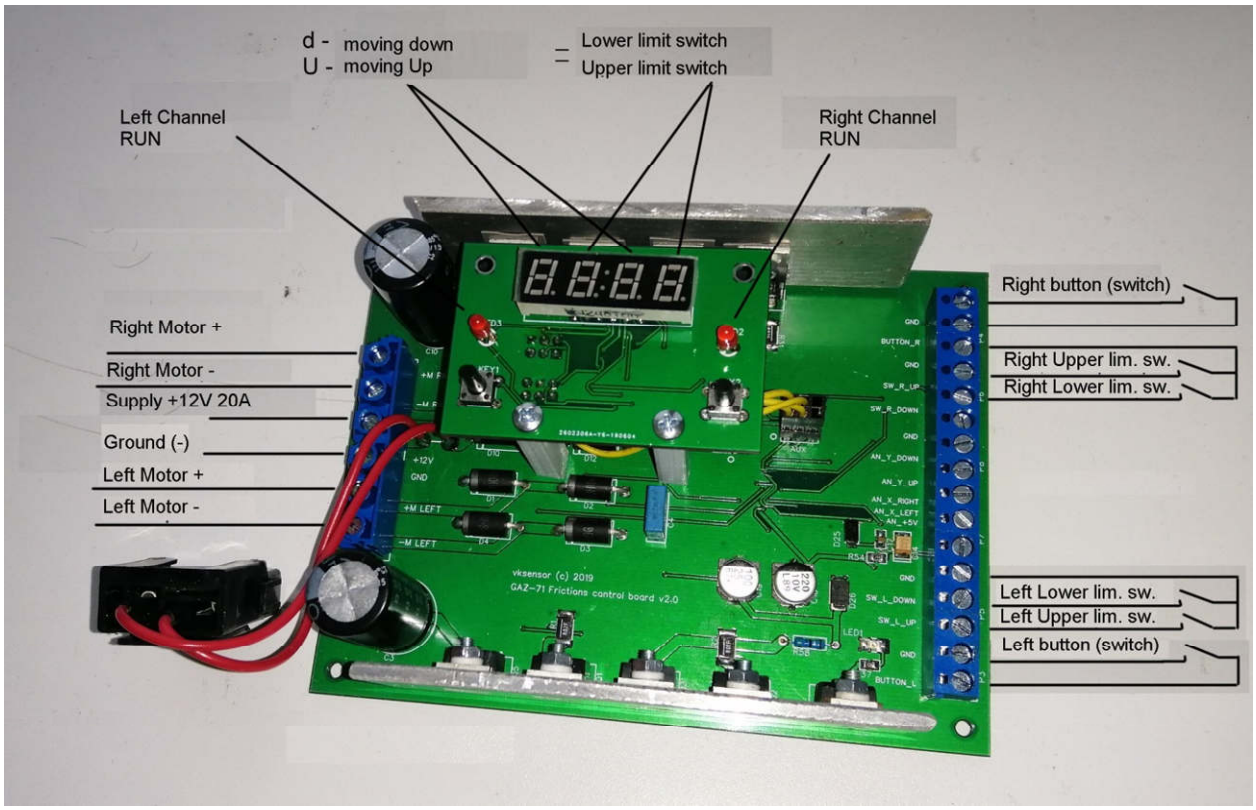


Install the controller in a place protected from splashing water

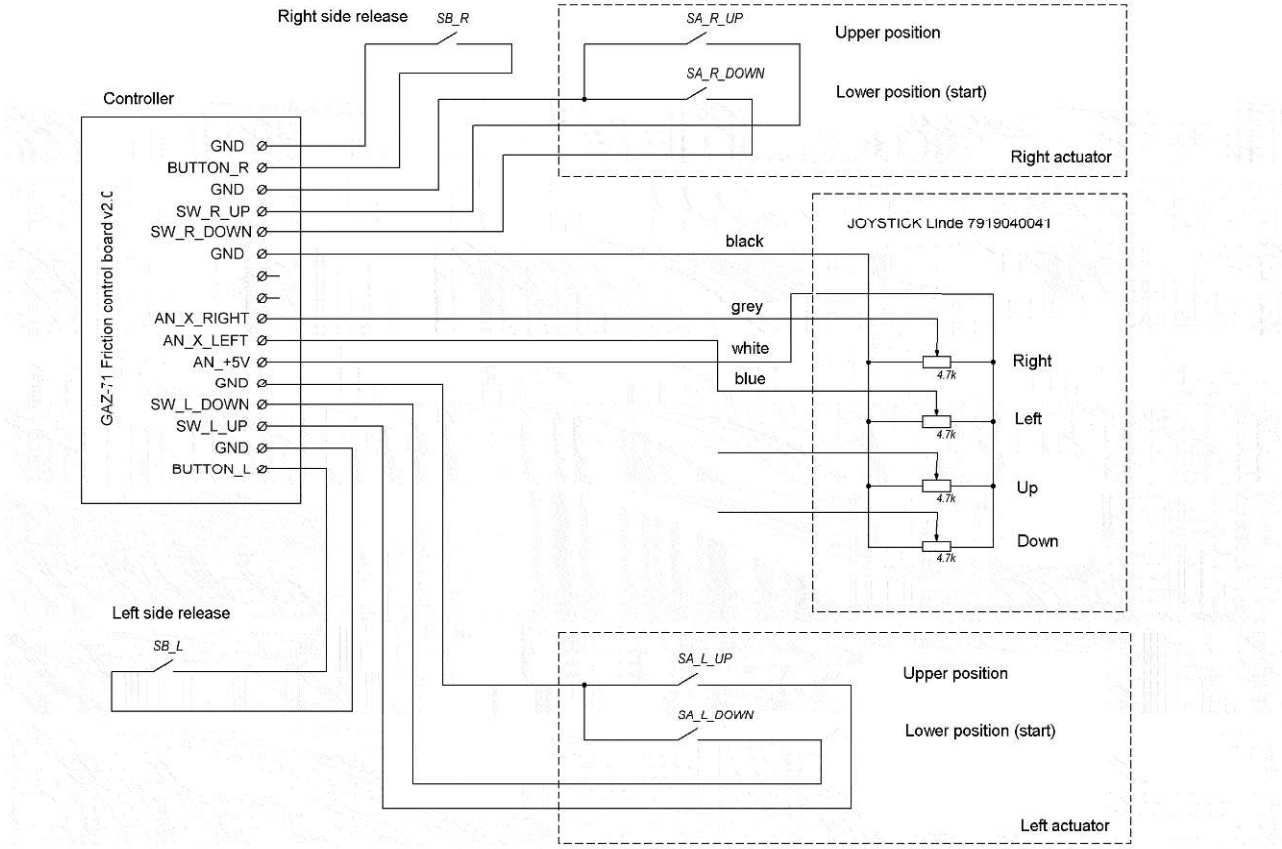


Location of the joystick control (here under the left hand)

3. Electrical connections



* 12V controller version



Connection diagram

4. Working logic

After pressing the friction clutch release button (limit switch), the drive extends for the time specified in the settings (by default, 1.1 seconds - Parameter 01) and squeeze the clutch. After releasing the lever, the actuator moves in the opposite direction until the lower limit switch is actuated, or until the time delay (default 3.0 seconds - Parameter 02).

When simultaneously pressing and holding the buttons (levers) for more than 15.0 s (by default, Parameter 03), the actuators are fixed in the extended position until any of the buttons is pressed again. This is sometimes necessary for the convenience of installing the cardan shaft/ checking the transmission or towing the ATV.

Displaying during operation

Symbol	**Description**
U	Moving Up
d	Moving down
.	Communication between Display Board and Power Board (I2C)
_ (underscore)	Lower limit switch of actuator
¯ (top line)	Upper limit switch of actuator
OC	Over Current protection occurred. Drive stopped. See parameters 30..33. To reset the message, press the button on the lever (limit switch)
Left Led	Left channel. RUN
Right Led	Right channel. RUN

The joystick operates in 4-step mode. That is, the angle of rotation to the left and right sides of the joystick is divided into 4 steps (which are adjusted in Parameters 10-19 for the left side and 20-29 for the right side), on each of which the actuator extends a certain distance.

In the event of a malfunction of one of the joystick resistors, it automatically switches to the adjacent connected resistor.

Buttons (limit switches) have priority over the joystick. That is, the signals from the levers are received first.

IMPORTANT. In the event of a jam or a malfunction of the actuator motor, the display shows OC (over current). This may be due to a jammed friction clutch or actuator. In this case, the drive stops, the drive is reset by pressing the button (limit switch) again.

If necessary, the current setting and the trip time of the overcurrent protection can be adjusted in parameters (30-33). By default, it match 10A current and time 0.1s.

5. Settings

The settings are entered by pressing the buttons on the display board of the KEY1 / KEY2

Parameter editing / saving carried out by pressing KEY2 for 3 s. Changed parameters are saved after power off.

1. IMPORTANT. Before starting work, it is necessary to check the operation of the actuator limit switches, the display shows "_" - the lower position, and "¯" - the upper position.

2. Drive setup consists in setting the minimum time for full friction clutch release (parameter 01).

- For 1500N and 16mm/s actuators, the extend time is 1.1 s, for faster actuators, the release time must be reduced.
- For 1000N and 30 mm/s actuators time may be 0.9 s.

During this time, the actuator travels 22-25 mm.

Measurements should be carried out on charged batteries or with started engine, as the drive speed depends on the battery voltage.

3. Joystick adjustment is reduced to checking the initial (neutral) position. Parameter 04 (07) is checked. This value should be the median (middle) between parameter values 14 - 15 (24 - 25).

4. The limit positions of the joystick must be greater than parameter 19 (29) and less than 10 (20) for the left and right clutch, respectively.

* Controller may work without joystick, with levers operation only.

6. Full parameter list (controller board firmware 2.2)

The settings are entered by short pressing the button on the display board of the controller KEY1 or KEY2.

Parameter No	**Read/Write**	**By default**	**Function**
01	R/W	1.1 (s)	Full actuators extend time
02	R/W	3.0 (s)	Return time (if lower limit switch not trip)
03	R/W	15.0 (s)	Time of simultaneous pressing of the buttons to fix the drives in the extend state
04	R	50 (%)*	Current position. Joystick. Left resistor. AN_X_LEFT input
05	R	0.0 …. 4.4	Joystick Control Command (Left Channel) X.Y format X - task from the joystick Y - current position of the actuator 0.0 - initial position 1.1 - 1 step ... 4.4 - step 4 (full squeeze)
06	R	0/1	Connection state of input AN_X_LEFT 0 – channel not connected/joystick defective

			1 – channel connected
07	R	50 (%)*	Current position. Joystick. Right resistor. AN_X_RIGHT input
08	R	0.0 …. 4.4	Joystick Control Command (Right Channel) X.Y format X - task from the joystick Y - current position of the actuator 0.0 - initial position 1.1 - 1 step ... 4.4 - step 4 (full squeeze)
09	R	0/1	Connection state of input AN_X_RIGHT 0 – channel not connected/joystick defective 1 – channel connected
Left Channel. Joystick. AN_X_LEFT. Characteristic (% of resistance)			
10	R/W	10 (%)	Lower limit (joystick resistor health)
11	R/W	30 (%)	4 step
12	R/W	35 (%)	3 step
13	R/W	40 (%)	2 step
14	R/W	45 (%)	1 step
		50 (%)	* Starting position.
15	R/W	56 (%)	1 step (reserve value for right channel)
16	R/W	61 (%)	2 step (reserve value for right channel)
17	R/W	66 (%)	3 step (reserve value for right channel)
18	R/W	71 (%)	4 step (reserve value for right channel)
19	R/W	90 (%)	Higher limit (joystick resistor health)
Right Channel. Joystick. AN_X_RIGHT. Characteristic (% of resistance)			
20	R/W	10 (%)	Lower limit (joystick resistor health)
21	R/W	30 (%)	4 step
22	R/W	35 (%)	3 step
23	R/W	40 (%)	2 step
24	R/W	45 (%)	1 step
		50 (%)	* Starting position.
25	R/W	56 (%)	1 step (reserve value for left channel)
26	R/W	61 (%)	2 step (reserve value for left channel)
27	R/W	66 (%)	3 step (reserve value for left channel)
28	R/W	71 (%)	4 step (reserve value for left channel)
29	R/W	90 (%)	Higher limit (joystick resistor health)
30	R/W	10	Left Channel. Overcurrent protection trip current (A)
31	R/W	10	Left Channel Overcurrent protection trip time (x0.01 s)
32	R/W	10	Right Channel. Overcurrent protection trip current (A)
33	R/W	10	Right Channel. Overcurrent protection trip time (x0.01 s)