

## FCU (FES control unit) User Manual



Type: **FES-FCU 57**

Serial Number: \_\_\_\_\_



**ATTENTION:** This manual contains important safety and maintenance information concerning your motor. It must remain with the motor at time of resale.

**Warning:**

We urge you to read this FCU Manual thoroughly. It contains important information about your motor. The FCU is one of the most critical parts having vital importance to the flight safety.

**Record of revisions**

Any revision of the present manual must be recorded in the following table.

Rev. No	Affected section	Affected pages	Date of Issue	Approval	Date of approval	Date of Insertion	Signature

### List of Effective Pages

Page	Date of Issue
1	Cover page
2	3rd January 2012
3	3rd January 2012
4	3rd January 2012
5	3rd January 2012
6	3rd January 2012

## 1. General

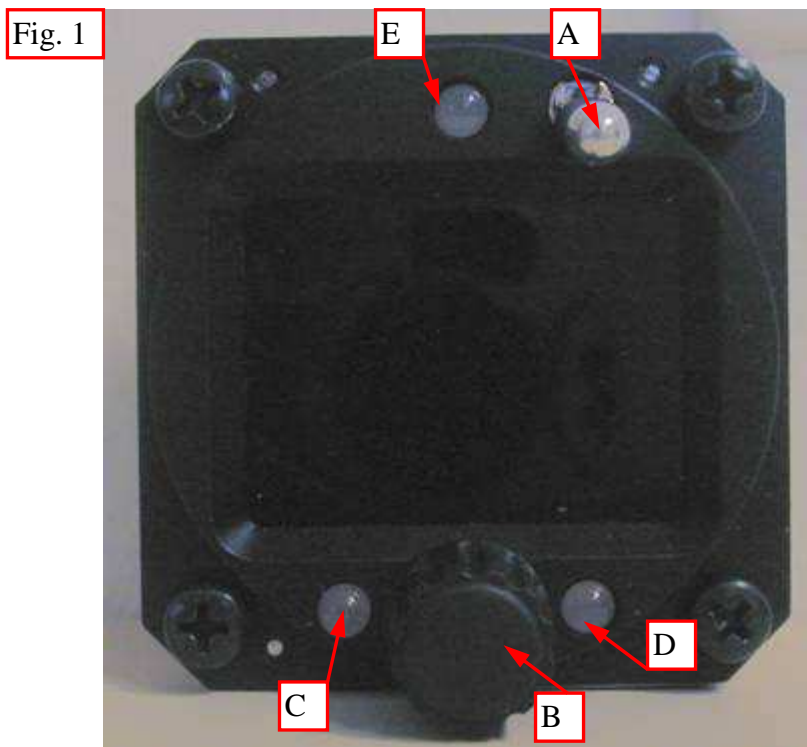
FCU (FES control unit) instrument manual

This manual is intended for the users of FES system.

Last change of this manual is from 3.1.2012 (FCU user manual v.1.4 for LAK17A FES)

## 2. General layout of the instrument:

A. ON/OFF switch - for FCU power supply



B. Throttle/brake knob (Rotary encoder button)

- by rotation clockwise is used for throttle

- by rotation counter clockwise is used for propeller braking

- by pressing is used for changing menus and resetting alarms

C. Green led - shows normal operation of controller

D. Red led - shows different alarm codes from controller

E. Red led - turns on if there are some alarm messages from FCU

## 3. Switching on the instrument

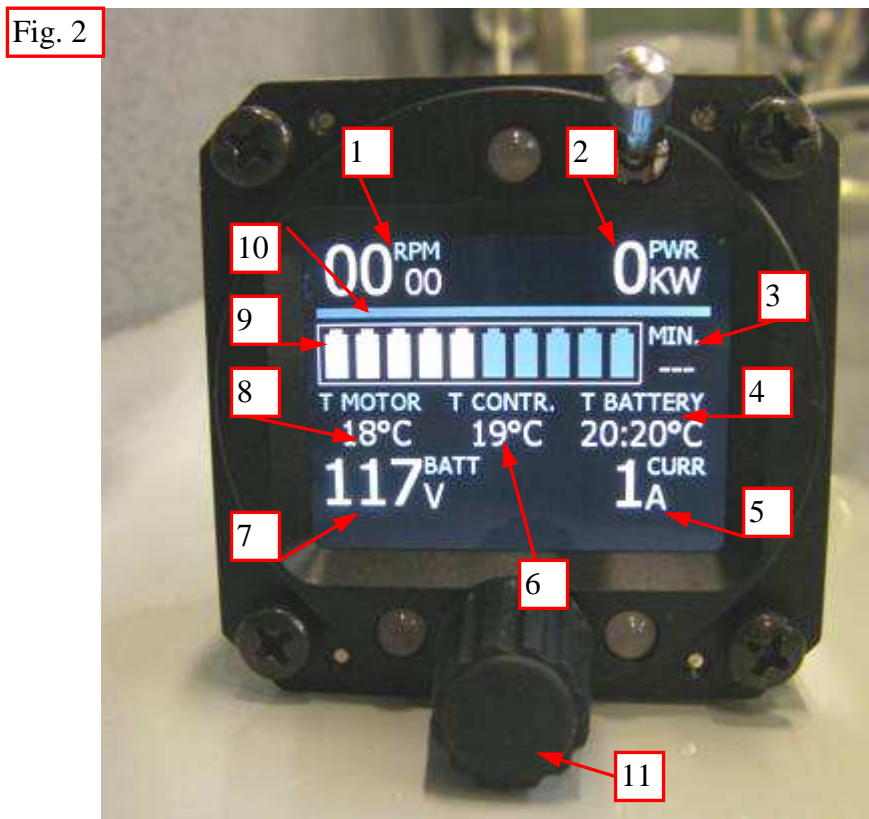
To switch ON the instrument simply set the pull-switch to upward position (ref. 1 fig. 1). To do this slightly pull handle out, as it has protection for unintended switching off-on. The instrument screen illuminates starting with an internal check procedure. LXNAV and FES logo is shown, together with software version for about 1 second.

**IMPORTANT:** Make sure that FCU instrument is always ON, before Power switch (under red safety cover) is turned ON!

## 4. Description of the instrument

## 4.1 Main screen

The instrument, by default, switches on at the main screen. See fig. 2 for a description of the indications.



1. RPM (revolution per minute) counter
2. Electrical power from batteries
3. Time endurance at current power setting
4. Battery packs temperature, first and second
5. Current delivered
6. Controller inside temperature
7. Batteries total voltage
8. Motor inside temperature
9. Remaining energy level in batteries
10. Throttle settings indicator 0-100% (clockwise rotation)

If you rotate Throttle knob counter-clockwise that line starts blinking red. This means that regenerative braking of propeller is active.

11. Throttle knob (rotary encoder), with additional press button function

## 4.2 Setup and info pages

FCU instrument has additional Setup and Info pages available. You can reach them by long (more than 3 seconds) pressing Throttle knob (11) located at the middle lower side of the instrument. Access is protected by PASSWORD set by manufacturer. During motor run this function is disabled.



Fig. 2

On Info page you can find information like this:

Firmware: Software version  
Serial number: # of the instrument  
Cons. Energy: energy consumed from last charging  
Capacity: total capacity of the batteries  
Voltage: minimum loaded voltage during latest flight  
Flash wr cnt: number of different setup savings  
Totalizer: total motor operation time  
Chg. Cycle cnt: number of batteries charge cycles

## 5. In flight – Main screen informations (fig. 2 for reference)

**5.1. Power is set by rotating the Throttle knob (Ref. 11) in clockwise direction. (the power value is at position of Ref. 2).**

Once the Power is set at the requested value Ref 1 gives the motor RPM (propeller RPM are identical to the motor RPM as propeller is direct driven)

Ref. 3 gives the endurance time at chosen power setting before discharging the batteries (minutes)

Ref. 5 gives the current flowing from batteries to controller (A-amps)

Ref. 4 gives the temperature of each pack of each battery,

Ref. 6 – 8 gives the temperature of controller and motor.

Ref. 7 gives the total voltage of the batteries

Ref. 9 gives the total amount of energy available in batteries at that moment. Each symbol represents a 10% from 100%

4.2. To reduce RPM rotate the Throttle knob in counter-clockwise direction.

Minimum possible setting is about 100RPM (2 steps clockwise)

Two steps counter-clockwise the power indication (Ref 2) show 0. At this setting motor gives no power. On the ground propeller will stop slowly but in the air propeller will start rotating faster due to wind milling effect (about 1500 RPM at 90km/h).

4.3. To stop propeller completely, rotate Throttle knob in counter-clockwise direction for additional 1 step, so that bar is flushing red (Ref 10). For successful stop there must be some RPM (about 700 minimum), otherwise braking is not working, due to too small induced voltage (regeneration function of controller is used for propeller braking)

If blades stops in a way that pilot can see one of them trough the canopy, just start motor again to about 700 RPM and then stop it again. Repeat this procedure until blades are randomly positioned in suitable position.

4.4. During flight pilot must take care about all four temperature levels and also voltage level of the batteries.

In any case the instrument will provide to pilot different WARNING messages, which must be confirmed by pressing throttle button, to be hidden away!

Minimum batteries voltage is:

-77V (for 12 cells per pack configuration, this is at 3,2V)

-90V (for 14 cells per pack configuration, this is at 3,2V)

You should never go below this level as batteries could be damaged.

## 6. Warnings

There are two types of alarm messages:

- YELLOW Warning, 1st stage of alarm means that the pilot has to take care to the parameter indicated in Warning message and to manage the suggested solution to solve the problem. But in any case the YELLOW warning means that there isn't an immediate danger.

- RED Warning, 2nd stage of alarm

RED warning means that the pilot has to manage the solution of the indicated problem IMMEDIATELY

You can recognize type of warning by colour of triangle!

Next picture shows a YELLOW WARNING message as an example.



Every warning message is accompanied by an acoustical advertisement.

When a Warning message appears on the instrument, the pilot has to push on the rotary encoder button as confirmation that he read message.

### 6.1. Warning list

Temperature warnings:

Motor:

-70°C YELLOW Warning

-90°C RED Warning

Controller

-70°C YELLOW Warning

-90°C RED Warning

Batteries

-45°C YELLOW Warning

-55°C RED Warning

Temperature difference of batteries

-3°C YELLOW Warning

-6°C RED Warning

Other messages:

#### **-Canopy open!**

There is safety switch prevent motor run, if canopy is open

You get two warnings to confirm, if you are still trying to run motor. After second confirmation you will be able to run it anyway, even if safety is active - in case of switch failure

**-Low voltage! reduce power!**

Message appears at 95V (14 cells per pack)

**-Critical voltage! stop motor!**

Message appears at 90V (14 cells per pack)

**6. Power switch**

Power switch is located on right side of cockpit, and is protected by red safety cover. To turn it on open first safety cover than flip switch forward.