FLYBOX®

Electronic Flap Controller EFC57-P / EFC-P

Revision# 3.4 03/12/2019
For firmware version 1.5

Installation and User Manual, Safety Instructions and Warning Booklet

This product is not TSO'd and cannot be installed into traditional FAA Part 23 and similarly Type-Certificate Aircraft

Document A2019EFC
Revision#3.4, 12/2019
For firmware version 1.5

This booklet is suitable for printing in A5 format.

SECTIONS

Thank you for purchasing a Flybox® product. We hope it fully satisfy you and makes your flights pleasant and secure.
Developing EFC57-P and EFC-P, **hereinafter referred to as the EFCX**, our intent was to create a compact and lightweight flap controller, easy to install and use and reliable. We are confident our products will be satisfactory and will make your flying experience a pleasant one.

Symbols used in the Installation and User Manual, Safety Instructions and Warning Booklet

NOTE: Used to highlight important information.

CAUTION: Used to warn the user, it indicates a potentially hazardous situation or improper use of the product.

WARNING: Used to indicate a dangerous situation that can cause personal injury or death if the instruction is disregarded.

WARNING: These instructions must be provided to users before use, and retained for ready reference by the user.
The user must read, understand (or have explained) and heed all instructions and warnings supplied with this product and with those products intended for use in association with it. Always keep a copy of the Installation and User Manual, Safety Instructions and Warning Booklet on the aircraft. In case of change of ownership, the Installation and User Manual, Safety Instructions and Warning Booklet must be delivered together with all of the other papers.

WARNING: Read the Installation and User Manual, Safety Instructions and Warning Booklet before installing the device on your aircraft and follow the procedure described therein.

WARNING: This device is intended to be installed on NON-TYPE CERTIFIED AIRCRAFT ONLY, as it does NOT require any air operator's certificate. Refer to your national aviation authorities to check if this device can be installed on your aircraft.

WARNING: It is the owner's responsibility to test this device before operating the aircraft and to make sure nobody is using it unless properly instructed and authorized to do so.

WARNING: Once the installation process is completed, it is extremely important to test the device before taking off to make sure it works properly. Therefore, we strongly suggest to double check all of the electronic instruments available on the aircraft and to turn them on to verify they function correctly.

WARNING: It is the responsibility of the installer to properly install the device on the aircraft. In case of calibration, or any technical or functional customization of the device, the responsibility lies with the individual who carried out such operation.
FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

WARNING: If this product is not used correctly, or it is subjected to additions or alterations, the effectiveness of this device may be considerably reduced.

WARNING: Alterations, additions, or repairs not performed by the instrument manufacturer or by a person or organization authorized by the manufacturer shall negate any warranty.

WARNING: The unit isn't waterproof. Serious damage could occur if the unit is exposed to water or spray jets.

WARNING: The EFCX is attached directly to the flaps actuator: the non-respect of the instructions or a damage to the EFCX may result in unexpected movements of the flaps. In this situation you must immediately disable the EFCX by turning the switch in the "MANUAL" position (see chap.4.4 "Use in MANUAL mode").

CAUTION: the EFCX must be turned off in case of start with booster. open the corresponding breaker before starting. warranty shall not apply for damage to the EFCX for this reason.

NOTE: Although the EFCX has been heavily tested to ensure the maximum safety in every condition, the correct operation depends also by installation and wiring, that must be accurately made and verified reading completely this manual.

CAUTION: The pilot must understand the operation of this instrument prior to flight, and must not allow anyone to use it without knowing the operation. Don't use this instrument in flight until you are sure of the correct operating of the same.

CAUTION: When the installation is finished you must do a test, prior to flight, switching on all the possible source of electric noise and checking the properly operation of this instrument.

CAUTION: Using this instrument over the maximum allowable ranges can cause malfunction or wrong indications.

NOTE: Flybox Avionics reserves the right to change or improve its products as well as terms, conditions, and notices under which their products are offered without prior notice.

NOTE: The Installation and User Manual, Safety Instructions and Warning Booklet will be updated annually if needed.

All changes or updates will be published on our website www.flyboxavionics.com in the "support" section.

NOTE: Upon receipt of the instrument it is advisable to register on our website www.flyboxavionics.it in the "product registration" section.

The Registration data will be used only to send important news or information about available firmware updates or to communicate safety information about the instrument.

NOTE: The consumer decides of his own free will if the purchased product is suitable and safe for his need. If the consumer does not agree with the notices contained in this Installation and user Manual, Safety Instructions and Warning Booklet, do not install this instrument in his aircraft.

SECTION 1

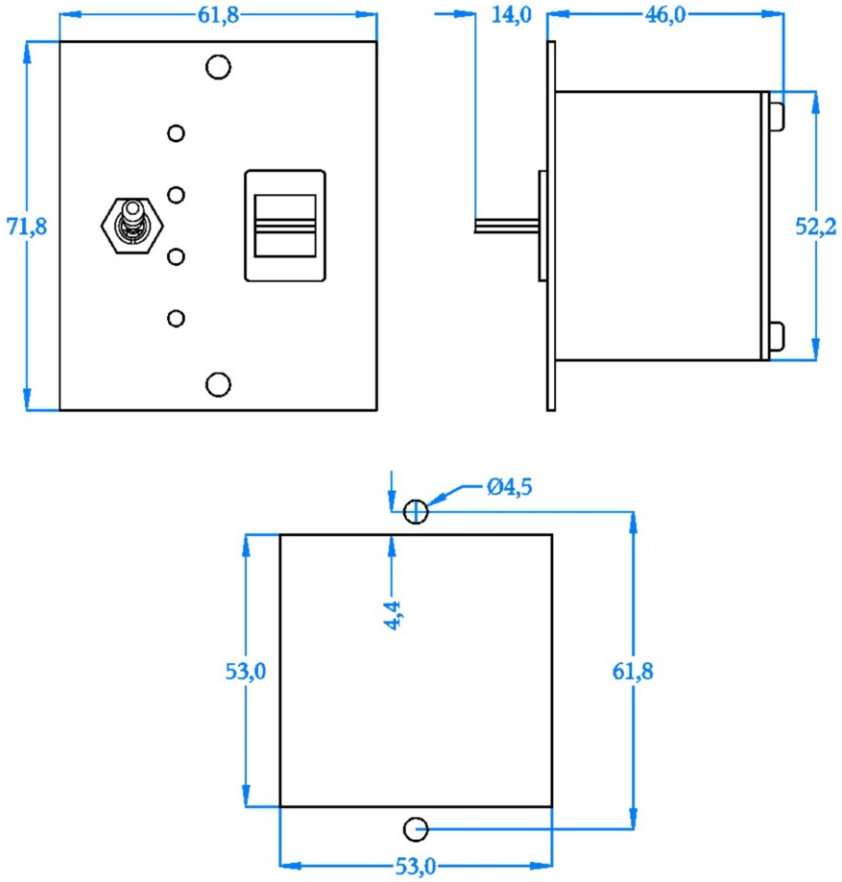
SECTION 2

SECTION 3

SECTION 1

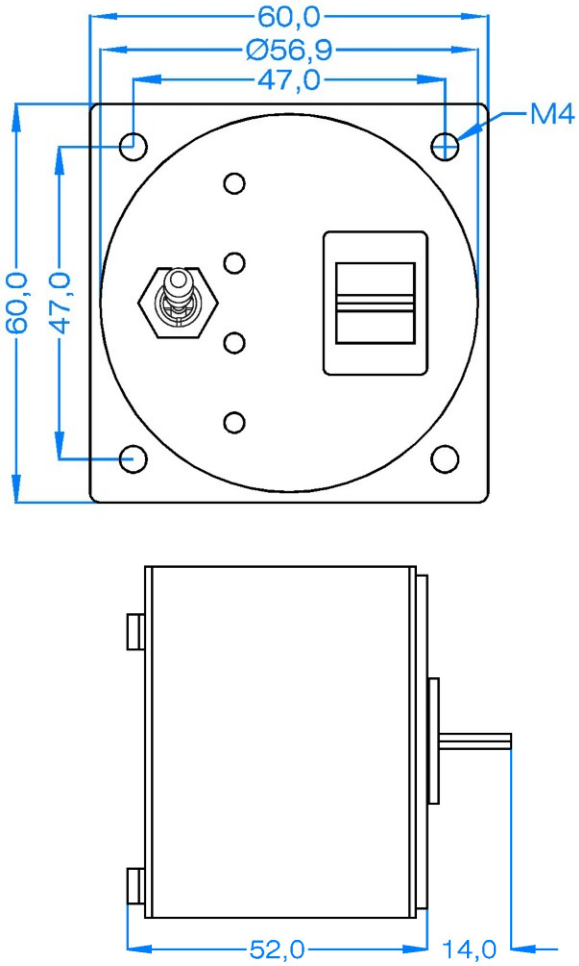
1.1 MECHANICAL INSTALLATION

Rectangular version (EFC-P) panel cut-out



Dimensions in millimeters

2”1/4 round version (EFC57-P)

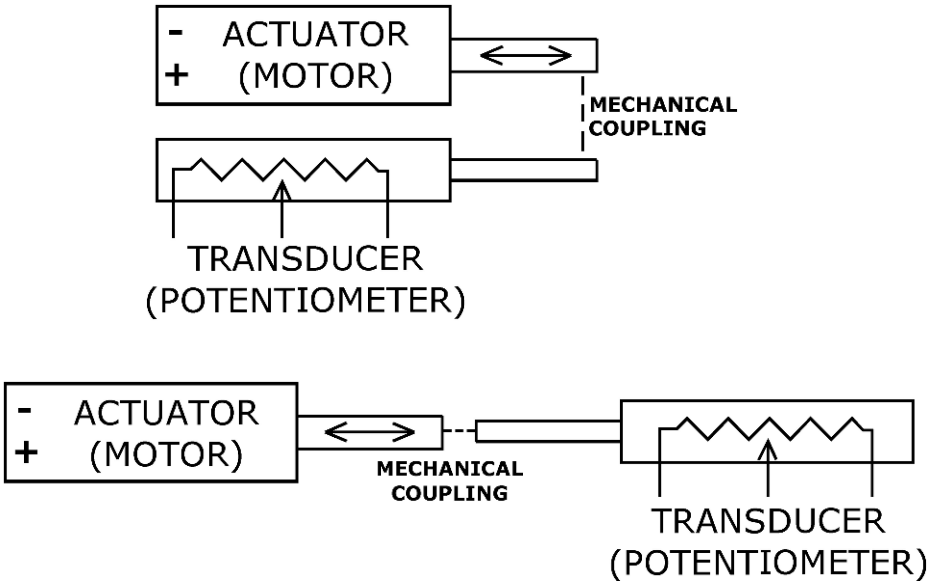


Dimensions in millimeters

SECTION 2

2.1 TRANSDUCER INSTALLATION (only if using an actuator without integrated transducer)

The installation consists in the mechanical coupling between the flaps actuator (motor) and the transducer (potentiometer) which allows the EFCX to know the actual flaps position.



Example of mechanical installations actuator-transducer

NOTE:

- The transducer's travel must be at least 10mm more then the actuator's travel.

- The electrical resistance of the transducer must be from 1 to 10 Kohm.

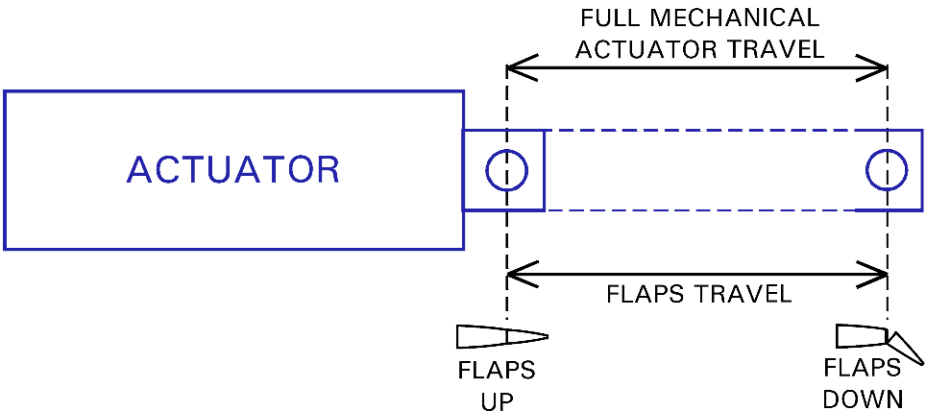
- The transducer must be centered over the actuator's travel so that it isn't possible to exit from the limits, with consequently damage to the position's transducer.

2.2 ACTUATOR INSTALLATION

If the actuator doesn't have any internal limit switches it's necessary to install them externally.

To avoid the possibility of mechanical and electrical damage, the actuator travel must match exactly with the flaps travel: with the actuator completely retracted (limit switch reached) the flaps must be completely retracted (or completely extracted for inverse mechanical coupling); with the actuator completely extracted the flaps must be completely extracted (or completely retracted for inverse mechanical coupling). Adjust your actuator travel if it does not coincide with the flaps travel, for example using an arm/lever with an appropriate length.

If the condition above indicated is not satisfied the actuator is not protected against possible overtravel during flap extension and retraction, therefore a pilot that drive the flaps manually (for example using "Manual" mode of the EFCX) can cause mechanical damage if he don't stop exactly when the flaps have reached the up and down positions.



Correct installation: actuator travel exactly match flaps travel.

IMPORTANT NOTES WHEN USING ACTUATORS WITH INTEGRATED TRANSDUCER:

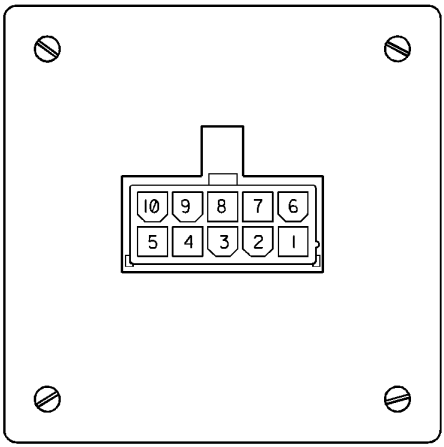
- The electrical resistance of the transducer must be from 1 to 10 Kohm.

- Choose a model that use the maximum electrical resistance range. For example if you choose an actuator with 10 Kohm transducer, verify that the stroke that you are going to use provide at least a variation of half the transducer's resistance, i.e. 5 Kohm.

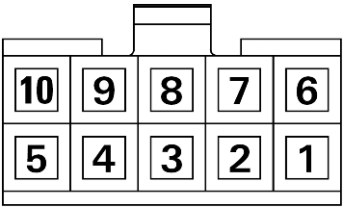
SECTION 3

3.1 ELECTRICAL INSTALLATION

In the backpanel there is a 10-poles plug connector (model: MOLEX Mini-Fit JR.); the corresponding socket connector is delivered with your EFCX.



Backpanel plug



Socket view (from wire'insertion side)

Connector pinout:

1 – Motor out (-)
2 – Power input (+12V)
3 - Positive voltage (+5V) for the position's transducer
4 – Position's transducer signal
5 – Ground for the position's transducer
6 – Motor out (+)
7 – Power input (GND)
8 – "DOWN" limit switch
9 – Limit switches common connection
10 – "UP" limit switch

NOTE: Insert a breaker to the power lead (+12V); choose a correct amperage depending on the actuator installed.

NOTE: Use aeronautical standard wire and cable.

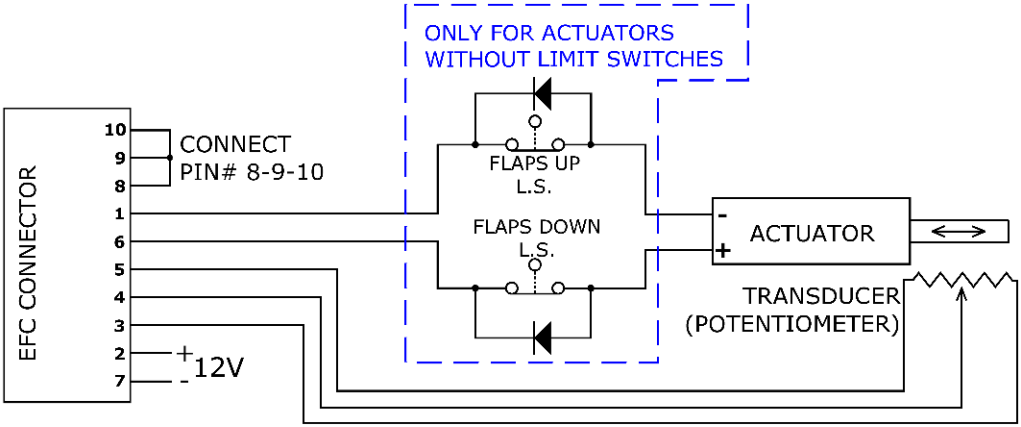
NOTE: It's recommendend to use shielded cable (2 poles+shield) for the motor output (pin#1 & 6), connecting the shield of the cable to ground on the EFCX side and leaves disconnected the shield on the actuator side.

CAUTION: Voltage peaks higher than 15 Volt on the supply line can damage the device.

CAUTION: The EFCX must be turned off in case of start with booster. Open the corresponding breaker before starting.

3.2 WIRING DIAGRAM FOR ACTUATOR WITH NO INTERNAL LIMIT SWITCHES

If the actuator used has no internal limit switches you must install them externally and follow the wiring diagram below.
The UP and DOWN switches must be normally closed; diodes max current must be at least 3 Ampere (for example 1N5402, which can be purchased from us or from RS components with cod.774-3338).
Pay attention to the UP and DOWN limit switches mechanical and electrical installation, because a wrong connection can prevent the EFCX from turn off the actuator before the mechanical stop, with possible damage to the actuator itself.



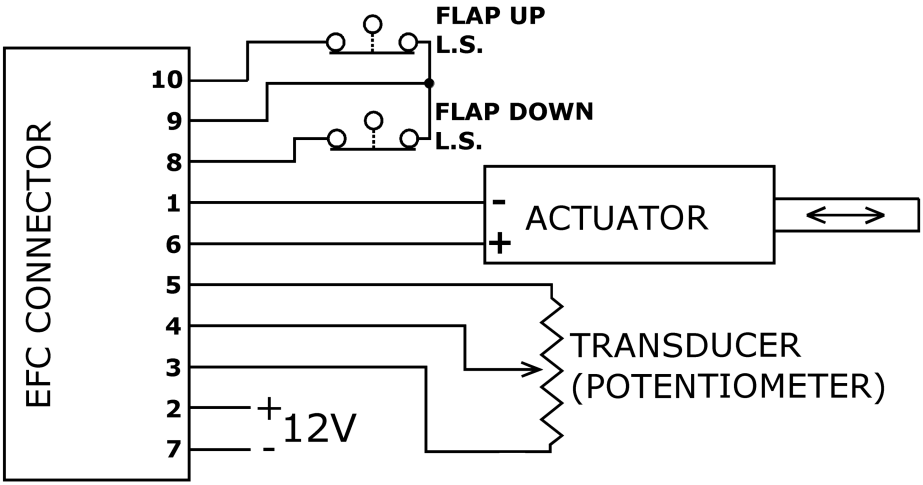
Wiring diagram for actuator with no internal limit switches

3.3 WIRING DIAGRAM FOR ACTUATOR WITH INTERNAL LIMIT SWITCHES

If the actuator used has integrated limit switches and wiring (no external wires) use the wiring diagram above, connecting pin #1 and #6 of the EFCX connector directly to the actuator.

3.4 WIRING DIAGRAM FOR ACTUATOR WITH INTERNAL LIMIT SWITCHES AND EXTERNAL WIRES

If the actuator used has 3 wires for the limit switches connection, probably one wire is the common contact for the limit switches, so the wiring diagram to the EFCX is the following:



Wiring diagram for actuator with internal limit switches and external wires.
Note that the common contact of the limit switches is connected to pin #9.

3.5 WIRINGS CHECK

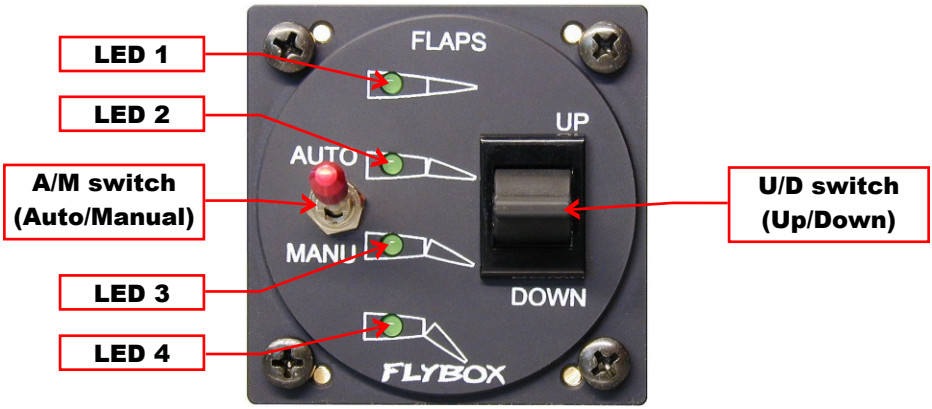
FIRST CHECK:
After all wiring has been completed, set the Auto/Manual switch to the Manual position and check the movement of the flaps with the UP/DOWN switch: press to the "DOWN" position and check that the flaps go down, press to the "UP" position and check that the flaps go up. If the directions are reversed, swap the wire of the two actuators (pins 1 and 6 on the EFCX connector).
If you have connected external ends of the actuator, check the exact correspondence of the end position pressed down, while the flap goes down the one connected to pin 8 must be activated and while it goes up the one connected to pin 10 must be activated.

CAUTION: Failure to respect this connection may damage the output of the instrument.

SECOND CHECK:
The wiring between the transducer and the EFCX connector (pins 3-5) depends on the actuator-transducer mechanical coupling (i.e. flaps down-->transducer's shaft extracted or flaps down-->transducer's shaft retracted).
To check if the wirings are ok measure the voltage between ground (pin#7) and pin #4 of the EFCX connector:
with the flaps completely down the voltage must be to its maximum value, with the flaps completely up the voltage must be to its minimum. If this doesn't occur, or if the EFCX does not work correctly, swap the two wires on pins #3 and #5 of the EFCX connector.

SECTION 4

4.1 PANEL INDICATORS AND COMMANDS



NOTE: The Auto/Manual switch has a safety lock to avoid accidental operation: it must first pulled on the outside and then moved to the desired position.
Operating this switch without pulling the red knob will cause it to break.

4.2 OPERATION INSTRUCTIONS

The instrument can work in two modes: Automatic or Manual. For normal operations use the “Automatic” mode; the “Manual” mode must be used only in case of emergency or failure of the EFCX.

NOTE: Before using the device for the first time you must program the four position that the EFCX store in memory and use in Automatic mode. Follow this steps to perform the programming:

- Set the EFCX in “Manual” mode and move the flaps until the limit switch are not activated.
-
- With the device powered off turn the A/M switch in the “Automatic” position, then press and hold the U/D switch in the “UP” position..
- Power on the EFCX and wait 10 seconds until the LED1 and the LED4 come on steady.
- Release the U/D switch (LED1 and LED4 start flashing), indicating that the device is in programming mode.

- Make this sequence using the U/D switch: 2 click in the UP position, 2 click in the DOWN position and 1 click in UP; if the sequence is correct the EFC-P enters in positions programming mode and the LED2/LED3 briefly flash.

- Now the first led is flashing indicating that you can adjust the flaps in the desired position (using the U/D switch). To store the position, briefly move the A/M switch in "Manual" and then return in "Automatic".

- Now the second led is flashing and you can adjust and then store the second position in the same way explained in the previous step (U/D switch to adjust then A/M switch to store the position). Repeat again the step for the third and fourth position.The EFCX will automatically exit from the programming mode and become operative once the last position is correctly stored in memory.

NOTE: If the EFCX is powered on the first time without enter in the programming mode the four LED will simultaneously flash.

The positions remains stored in memory also without power supply.

4.3 USE IN AUTOMATIC MODE

In AUTOMATIC mode you can move the flaps choosing one of the four stored position; the maximum travel of the motor is defined by the two limit switches UP and DOWN.

The LEDs show the status of the flaps:
LED on: indicate the current position of the flaps
LED flashing: indicate the position that the flaps are reaching

-EXAMPLE OF USE-
The flaps are in the first position (LED1 on, all other LEDs off):
to move the flaps in the third position press two times the U/D switch in the DOWN position; the flaps start moving and the third LED is flashing, indicating the position that the flaps are reaching.
When the flaps reaches the second position the first LED turn off while the second turn on; when they reaches the third position the second LED turn off and the third turn on. The flaps have reached the selected position and the EFCX return to steady state, waiting for another command.

Pressing the U/D switch in the UP position for more than 1 second move automatically the flaps to the first position (regardless of the current position).

4.4 USE IN MANUAL MODE

In this mode the flaps position are not fixed between the four programmed positions but the movement are continuous; however it's recommended to use the MANUAL mode only in case of device's electronic failure, because this mode bypass the internal electronic circuits and connect directly the motor to the U/D switch.

To control the flaps simply use the U/D switch: press and hold in a position (UP or DOWN) and release when the motor have reached the desired position.

4.5 TROUBLESHOOTING AND ERROR CODE

- **All the four LEDs flashing:** no positions' programming have been made (see chap. 4.2)

- **LED1 and LED2 flashing:** it means that the EFCX try to move the motor but there is no feedback from the transducer: can be a wrong connections on the motor's wiring or on the transducer's wiring.
  To exit from this condition you must turn off the device and remove the cause of failure.

- **LED1 and LED3 flashing:** it means that the connection motor/transducer are not correct; maybe the motor's wire reversal or a wrong tranducer wiring.
  To exit from this condition you must turn off the device and remove the cause of failure.

- **LED2 and LED4 flashing:** it means that the EFCX has detected an over-current condition. Check that wirings of the actuator motor have no short circuits or check that the actuator is working correctly.

SECTION 5

5.1 TECHNICAL SPECIFICATIONS

- **Frontpanel dimensions:**
  61.8 x 71.8 mm (rectangular panel version).
  60.0 x 60.0 mm (2”1/4 round panel version).

- **Depth:**
  46 mm (rectangular panel version).
  52 mm (2”1/4 round panel version).

- **Weight:** 125 g.

- **Power requirements:** 12 ~ 20 V=, 80 mA.

- **Maximum current supplied to the motor:** 7 Ampere.

- **Operating temperature range:** -20 ~ +70 °C.

- **Relative humidity:** 10% ~ 90% without condensation.

WARRANTY:

One Year Warranty:

Product support and warranty information can be found at www.flyboxavionics.it.
Flybox® warrants this Product to be free from defects in materials and workmanship for 12 months from date of delivery. The inactivity of the Products determined by periods of repair does not involve the extension of the warranty period.
This warranty covers only defects in material and workmanship found in the products under normal use and service when the product has been properly installed and maintained. This warranty does not cover failures due to abuse, misuse, accident, improper maintenence, failures to follow improper instructions or due to unauthorized alterations or repairs or use with equipments with which the Products is not intended to be used. Flybox®, after verification of the complaint and confirmation that the defect is covered by warranty, at its sole discretion, will either replace or repair the Products at no costs for the customer. Alterations, additions, or repairs not performed by the manufactuter shall negate any warranty. This warranty doesn't cover cosmetic or incidental damages. Shipping costs, taxes, custom fee, any other duties and any costs incurred while removing, reinstalling or troubleshooting the Products, shall be at customer's charge.

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Date	Revision	Description
06/2011	2.8	First release
11/2014	3.0	Layout update
7/2015	3.1	Updated chap.4.2
1/2016	3.2	Updated chap.3.2
06/2011	3.4	General revision

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