

# FLYBOX®



## APR1

Automatic Propeller Regulator

*User Manual*

## **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 A2021APR1  
Revision#1.0, 09/2021  
For firmware version 1.0

This booklet is suitable for printing in A5 format.

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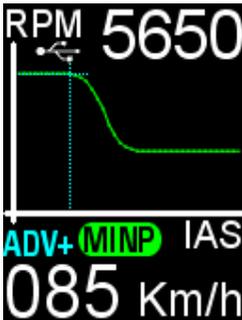
**WARRANTY**

**DISCLAIMER**

### Examples of available screens



Homepage: NORMAL



Homepage: IASTAB



Homepage: MAPTAB

Thank you for purchasing a Flybox® **APR1** instrument.

The **APR1** instrument is available in 4 different models. This manual describes the use of each of the 4 models.

**APR1-LC** (standard low current)

**APR1-HC** (standard high current)

**APR1-M-LC** (MAP - low current)

**APR1-M-HC** (MAP - high current)

All models are installable in a standard 2-1/8" (57mm) hole.

Our intention in developing the **APR1** family of instruments was to create a product that is light and compact, powerful and easy to use.

The **APR1** family of instruments features a highly visible display, a powerful 32-bit microcontroller and state-of-the-art solid-state sensors to ensure reliability and accuracy over time.

The owner has the option of keeping the instrument software up-to-date by downloading the latest revision available on [www.flyboxavionics.it](http://www.flyboxavionics.it) and installing it via a USB pen drive.

We are confident that our products will be satisfactory and make your flying experience enjoyable.

**Symbols used in the User Manual**

**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.

**FAILURE TO DO SO MAY RESULT IN SERIOUS  
INJURY OR DEATH.**



**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:** This device is operated through a software which from time to time can be updated and/or subject to change. Please, always refer to the Installation and User Manual, Safety Instructions and Warning Booklet for the last updated version of the software available on [www.flyboxavionics.it](http://www.flyboxavionics.it)

 **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.

 **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:** Installation and configuration of this instrument should only be carried out by trained and authorised professionals. See the Flyboxavionics website for a list of authorised installers.



**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.



**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](http://www.flyboxavionics.com) in the "support" section.



**NOTE:** Check the website [www.flyboxavionics.it](http://www.flyboxavionics.it) periodically for software and manual updates.



**NOTE:** For some products, registration may be required to receive important news or information on available firmware updates or to receive security information.

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## **1.0 APR1 SYSTEM OVERVIEW**

### **CONSTRUCTION FEATURES**

The **APR1** front panel is built from solid aluminum alloy, CNC milled and powder coated to last a long time over the years always showing a new appearance. The other parts of the housing are made of corrosion-protected aluminium. No plastic parts are used.

### **ELECTRONICS**

The **APR1** use a powerful 32 bit microcontroller and the latest generation of solid state sensors to ensure reliability and accuracy over time. Thanks to its features, it can interface with all types of latest-generation engines and propellers.

### **ERGONOMICS**

- Large TFT display, 320x240 Pixels, 1000 nits, antiglare surface, sunlight readable, wide temperature range.
- High quality knob encoder with push button for easy access to all features.
- Automatic backlight dimming function thanks to integrated light sensor.

### **EASY SOFTWARE UPDATE**

The user can download any new firmware, when available from Flybox website, connect a USB pen drive to the instrument and freely update it with the last features.

## **EASY DATALOG SAVING**

Easy logging of the data for debug purpose. If needed, The **APR1** unit can save a last flight log on the USB pen drive. The user can then send the log via e-mail to the installer for a help/support request.

## **SINGLE LEVER ENGINE CONCEPT**

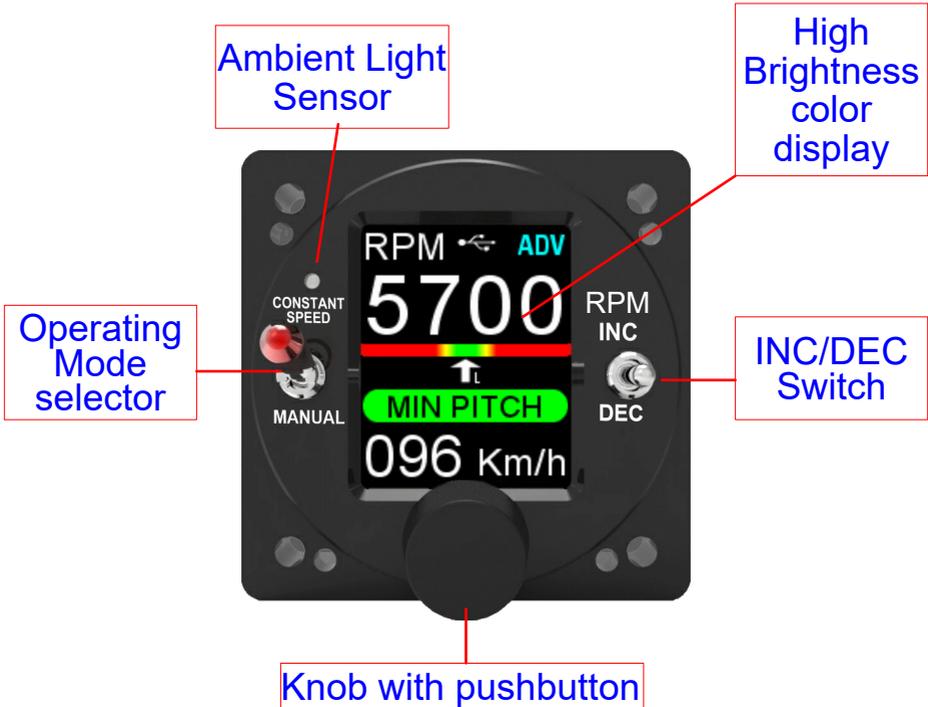
With APR1, the engine revs are automatically set by the aircraft's speed which is measured by a built-in sensor connected to the aircraft's static and pitot ports. A graphic editor allows the installer to draw the best curve for your engine-propeller-aircraft combination. The **APR1** will be able to hold the most appropriate RPM for each flight phase. In this way, your powertrain becomes a **Single Lever Engine**. Just move the throttle, and your new system will take care of all the rest.

## **ABOUT SAFETY**

**APR1** has been designed with safety in mind. Its high-current output in HC models, the rapid short-circuit protection and the possibility of continuing to operate the propeller pitch in the event of a failure of the internal electronics by simply setting the red selector to manual, make it a state-of-the-art instrument.

The -M- versions are equipped with a Manifold pressure sensor and through an editable curve MAP/RPM, the RPM are automatically increased if a pressure value too high for the current RPM is requested. This avoid engine overtorque.

### 2.0 PANEL INDICATORS & COMMANDS



The knob can be rotated to select the functions and increment or decrement the values while pressing it to confirm.



**CAUTION:** The **Operating Mode selector** has a safety lock to avoid accidental operation: it must first be pulled on the outside and then moved to the desired position.

**If it is raised or lowered without first pulling it, it may be broken.**

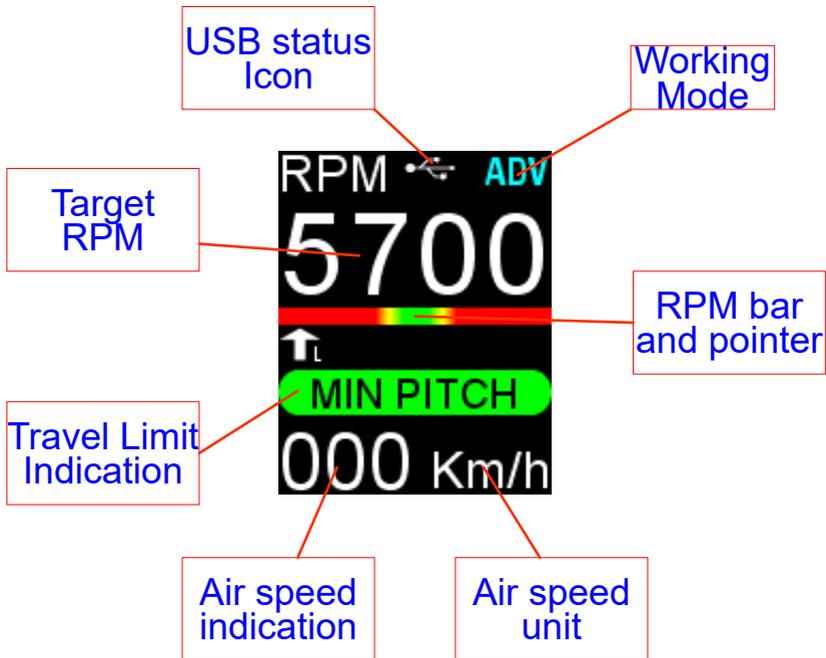
## **2.1 SETUP MENU NAVIGATION**

Navigation through the menus is very simple and fast using the knob.

- Press the knob for 1 second to enter in the Main Menu. The menu automatically disappears if you don't press or rotate the knob for 5 seconds.
- Rotate the knob to navigate through menus and submenus items.
- The setup system is organized in menus and submenus; a submenu is a term used to describe a menu that is contained within another menu.
- Press the knob to enter in the selected item.
- The knob can be rotated to select the functions and increment or decrement the values while pressing it to confirm. To exit without changing while editing a number or multiple choice, keep pressed the knob for 3 seconds.
- The first items on every menu are Exit or Back. "Exit" is used to quit the Setup and go directly to the main screen, "Back" is used to go back to the previous level. In the first menu level there is no the "Back" item.

### 3.0 Indications on the “Normal” screen

There are 3 different screen you can chose as the main one, the one defined as "NORMAL" is shown below. Read chapter 4.3.3 for more.



**USB status icon:** This icon appears only when a USB flash drive is connected to the instrument.

Its coloring can vary in:

- White > pen drive connected, datalog Off
- Green > pen drive connect, datalog ON
- Red > Pen drive connected, error writing data

**Working Mode:** the Modes can be

- **CSPD > Constant Speed** mode, available in all 4 **APR1** models. Go to chapters 4.3.1 and 5.1 for a full description.

- **ADV > Advance** mode, available in all 4 **APR1** models. Go to chapters 4.3.1 and 5.2 for a full description.

- **ADV+ > Advance Plus** mode, this function is available in models **APR1-M-LC** (MAP - low current) and **APR1-M-HC** (MAP - high current) only. Go to chapters 4.3.1 and 5.3 for a full description.

**RPM bar and pointer:** It graphically represents how the controller is working to keep the set RPMs.

**AIR speed unit:** Shows the currently selected unit of measurement for speed indication.

**AIR speed indication:** Shows the current Air Speed Indication.

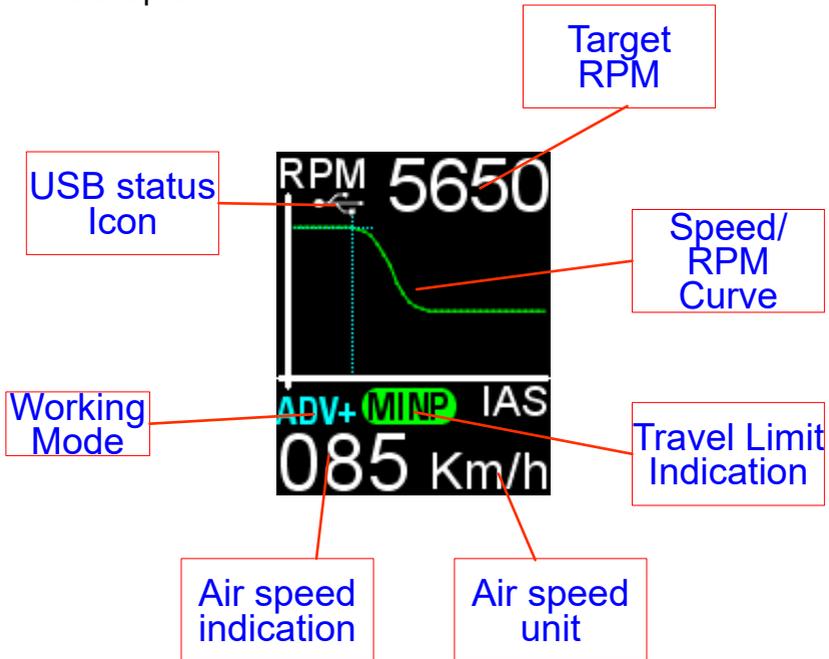
**Travel Limit Indication:** This indicator can show when the pitch of the blades is in one of the 2 extreme positions. For all intermediate positions, this indicator is off.



**Target RPM:** The RPM shown here are **NOT** the actual RPM of the engine. They represent only the desired RPM at this stage of flight, whether set by the pilot (CSPD mode) or derived from the automatic modes (ADV and ADV+).

### 3.1 Indications on the “IASTAB” screen

There are 3 different screen you can chose as the main one, the one defined as "IASTAB" is described below. Read chapter 4.3.3 for more.

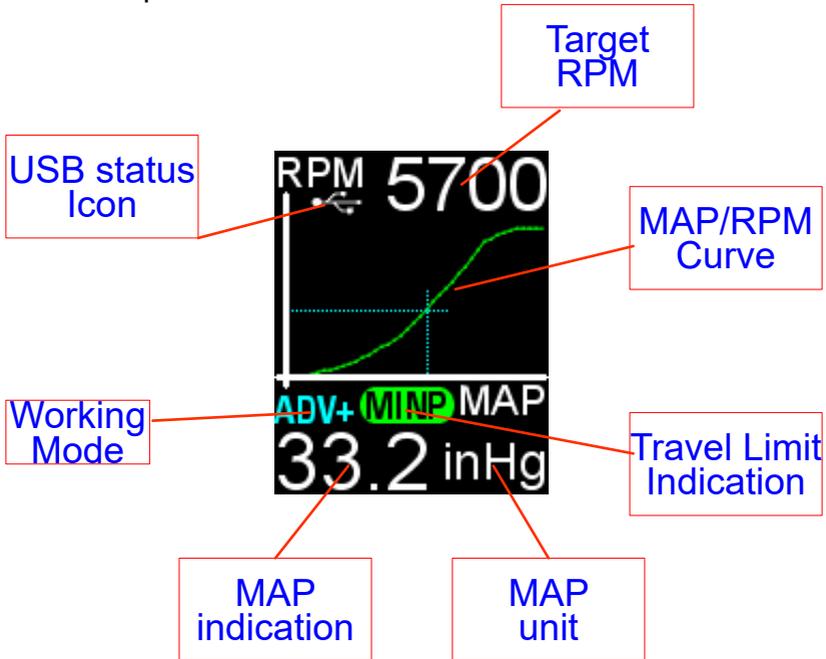


The display shows how the Speed/RPM curve is followed.

The blue reference lines run across the curve graphically indicating the intersection of Speed/RPM. The input speed value and the resulting RPMs are also shown in numerical value.

### 3.2 Indications on the “MAPTAB” screen

There are 3 different screen you can chose as the main one, the one defined as "MAPTAB" is described below. Read chapter 4.3.3 for more.



The display shows how the MAP/RPM curve is followed.

The blue reference lines run across the curve graphically indicating at the current MAP value how much minimum RPM is required. The input MAP values and the resulting RPMs are also shown in numerical value.

### 4.0 MAIN MENU



#### Exit

Confirm to go back to the main screen.

### 4.1 Propeller test

Select it to execute a propeller self-test before take-off. The device will increase the propeller pitch to check the correct working of the regulator/propeller system, then it will bring it back to minimum pitch.

To execute this test you must rev up the engine to an appropriate value (for example 4500 RPM for a ROTAX 912) and press the knob confirming to start the propeller test.

The **APR1** will increase the pitch until the propeller reach the RPM value your installer has defined. Once reached this minimum value (4000 RPM for example) it returns to the initial RPM (in this example 4500 RPM).

While the **APR1** is performing the Propeller-test, you can press the knob or the INC/DEC switch to stop the test and to bring the propeller to the minimum pitch position.



**NOTE:** To prevent unintentional activation of the Propeller test when in flight, this feature is disabled after takeoff. The **APR1** considers a takeoff when the engine reaches or exceeds the minimum value that can be set with the knob for at least 30 seconds.

Therefore, if you perform a check of the engine ignition above 4000 RPM and for more than 30 seconds, the Propeller test item will disappear from the main menu and you will not be able to perform it automatically. In this case it will be possible to do the test by manually reducing the RPM by turning the knob.



**CAUTION:** performing this operation manually is not advisable as you will need to remember to select all RPMs before taking off.

## ***4.2 Dimmer***

Adjust display brightness from 1 (min brightness) to 19 (max brightness). Default value=19. The adjustment works in Manual mode only. See also chapter 4.3.4 for more on Backlight settings.

### 4.3 Setup



**Back:** confirm to go back to previous menu.

**Exit:** confirm to go directly to the main screen.

#### 4.3.1 Control Submenu

Choose the desired working mode between **CSPD**, **ADV**, **ADV+**.

- **CSPD** > Constant Speed Mode

This function is available in all 4 **APR1** models.

The instrument operates semi-automatically and requires pilot action to change the target rpm. In this mode the aircraft speed and MAP value are ignored even if your model is an -M- and the Speed/RPM and MAP/RPM curves have been set by your installer. When the **CSPD** mode is set, the maximum take-off revs are automatically set at the instrument power-up.



**CAUTION:** In **CSPD** Mode, the pilot must remember to set the appropriate RPMs for each phase of flight as in a traditional semi-automatic constant RPM controller, such as the Flybox PR1-P model.



**CAUTION:** The pilot must realize that turning the knob or moving the INC/DEC switch or even in the other modes provided, if enabled, the target revs on the display before take-off may differ from those expected and set by the installer.



**CAUTION:** Before take-off, always check to have set the maximum allowable RPMs and that the green minimum pitch indicator is lit and if not, **do not take off!**

The shape of the indicator can be shown in 2 different ways depending on the screen displayed.



- **ADV > Advance** mode

This function is available in all 4 **APR1** models.

**ADV** mode enable the controller to follow the Speed/RPM curve set by your installer.

The instrument automatically adjusts the engine speed, according to the Speed/RPM curve set by the installer. In this mode, the instrument recognises the various flight phases according to the speed of the aircraft, and when the speed changes, it quickly makes the RPM changes by changing the propeller pitch.

When operating in this mode, it will still be possible to vary the RPM as desired by acting on the knob or in any other possible mode, among those available, if activated. Go to chapter 4.3.2 for a full description.

When the **ADV** mode is used, the instantaneous value of the MAP does not affect the RPM even if your model is an -M- and the MAP/RPM curve has been set by your installer. Read chapter x.x for more information on using in **ADV** mode.

- **ADV+** > **Advance Plus** mode

This function is available in models **APR1-M-LC** (MAP - low current) and **APR1-M-HC** (MAP - high current) only.

The **APR1** adjusts the engine speed according to the Speed/RPM and also to the MAP/RPM curves set by the installer.

In this mode, the instrument recognises the various flight phases according to the speed of the aircraft, and when the speed changes, it quickly makes the RPM changes by changing the propeller pitch.

When operating in this mode, it will still be possible to vary the RPM as desired, by acting on the knob or in any other possible mode among those available and if activated. Go to chapter 4.3.2 for a full description.

Because the **ADV+** mode continuously monitors the MAP value, in certain situations the RPM can be increased automatically to prevent overtorque conditions.

If you own the -M- model and your installer has set a MAP/RPM curve in your device, you can select this mode of operation. The ADV+ item will not be available in the menu for models without a MAP sensor.

The -M- versions are equipped with a Manifold pressure absolute sensor and through an editable curve MAP/RPM, the RPM are automatically increased if by pushing the throttle the MAP value became too high for the current RPM. This to avoid engine overtorque.

### **4.3.2 Manually Modify RPMs while in ADV and ADV+ mode**

An important feature of ADV and ADV+ modes is the ability given to the pilot to manually select a different number of RPM from those predicted by the Speed/RPM curve by turning the knob or operating the INC/DEC switch, (click down to decrease or click up to increase the target RPM). Other ways are also possible, if enabled by the installer, for example by an external switch installed on the stick grip, or by connecting an external control potentiometer. Contact your installer if you have any queries.

When making a manual setting of the target RPMs, in any of the modes described above, the flashing message **CSPD** appears in the top right of the display.

The flashing message will remain as long as the CSPD status requested by the pilot persists.

To exit this mode and return to ADV or ADV+ mode, simply press the knob.

A safety control system, automatically returns the RPM to the Speed/RPM curve as soon as the aircraft speed deviates significantly, either positively or negatively, from the speed at the time of the RPM request. Go to chapter 4.3.5, "Speed win" section for more.

### 4.3.3 Home Submenu

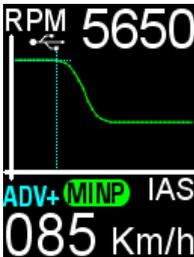
Choose here which main page you want from those available for your version. The available pages are:

#### NORMAL



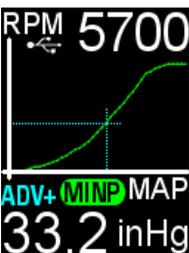
This page is always available and can be activated in all 4 models. It is recommended as the standard operating screen.

#### IASTAB



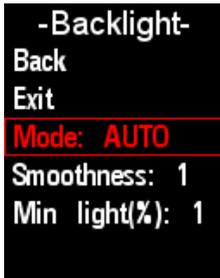
This page is always available in all the 4 models but can only be activated if ADV or ADV+ mode has been selected. It cannot be activated if CSPD mode has been selected. The display shows how the Speed/RPM curve is followed.

#### MAPTAB



This page is available in the -M- models only and can be activated if ADV+ mode has been selected. It cannot be activated if CSPD or ADV mode has been selected. The display shows how the MAP/RPM curve is followed.

### 4.3.4 Backlight submenu



**Back:** confirm to go back to previous menu.

**Exit:** confirm to go directly to the main screen.

**Mode:** select to choose between “Manual” and “Auto”. When in “Manual” mode, the brightness can be changed with the dimmer function from the main menu, from 1 (min brightness) to 19 (max brightness). Default value=19.

Selecting “Auto”, the following new parameters will appear in the list:

**Smoothness:** choose how fast the backlight changes when there is a variation of light on the sensor.

Default= 1

Min= 1 (faster)

Max= 3 (slower)

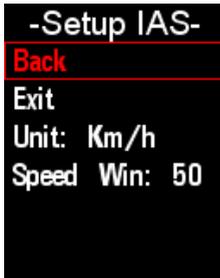
**Min light(%):** choose minimal backlighting when the environment is dark.

Default= 1

Min= 1 (dark)

Max= 20 (bright)

### 4.3.5 IAS Setup



**Back:** confirm to go back to previous menu.

**Exit:** confirm to go directly to the main screen.

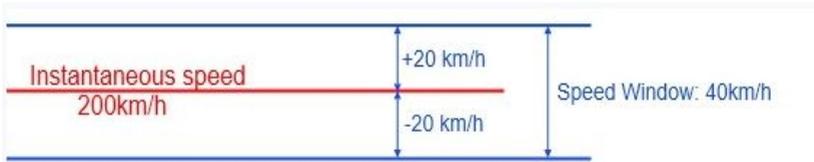
**Unit:** select to choose the unit of the speed among Km/h, Kts, Mph.

**Speed win:** this value establishes the width of a speed window, centered on the instantaneous speed the aircraft has when the manual target RPM change request occurs. When you rotate the knob to change RPM from the current target RPM in ADV or in ADV+ mode, the controller automatically switches to CSPD mode and stores the instantaneous aircraft speed in memory.

If during the flight, the aircraft speed exit this window, the controller automatically returns to the selected ADV or ADV+ mode.

In the example in the next page, the speed at the time of the target RPM change was 200 Km/h.

The APR1 then stores the detected instantaneous speed of 200 Km/h and establishes a window of 40 Km/h, placing the upper and lower limits at +20 and -20 Km/h. The default Speed win is 50 Kp/h.



As long as the aircraft speed remains within the limits, (in this example between 180 Km/h min and 220 Km/h max), the controller continues to work in constant speed CSPD mode, indicating this on the display (flashing CSPD). Any speed variation that takes the speed values outside these limits will return the controller to the selected ADV or ADV+ mode.



In the image above, the speed increased to the upper Speed Window limit of 220 Km/h and the APR1 controller returned to ADV or ADV+ mode, indicating this on the display.

### 4.3.6 Debug

**Debug:** selecting 1, some useful information will be shown on the display when the Operating Mode selector is in “Manual” position.



The data shown are:

- Current consumption
- RPM
- Resistive value (only for certain propellers)
- MAP
- IAS

When this information is displayed, you can leave it on the screen indefinitely or make it disappear by selecting 0.

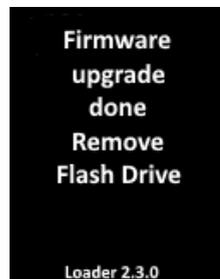
### 4.4 Firmware Upgrade

The **APR1** software can be easily updated with new versions, when available. It is advisable to check often whether a new software version is available, going to [www.flyboxavionics.it](http://www.flyboxavionics.it) under “support > software” page. Download the new version and if the file is compressed (zipped), after unpacking it, copy it to a USB stick, possibly free from other files. To update the instrument it is necessary to connect the USB stick to the instrument, then from the main menu select “Firmware Upgrade”. If the USB stick is not yet plugged-in, the message “**Insert Flash Drive**” will appear.

If already plugged-in, a message indicating the SW versions will appear:



Select “YES” to upgrade



This will appear after upgraded

Wait until the “done” message will appear then remove the USB stick. The instrument will reboot with the new software.

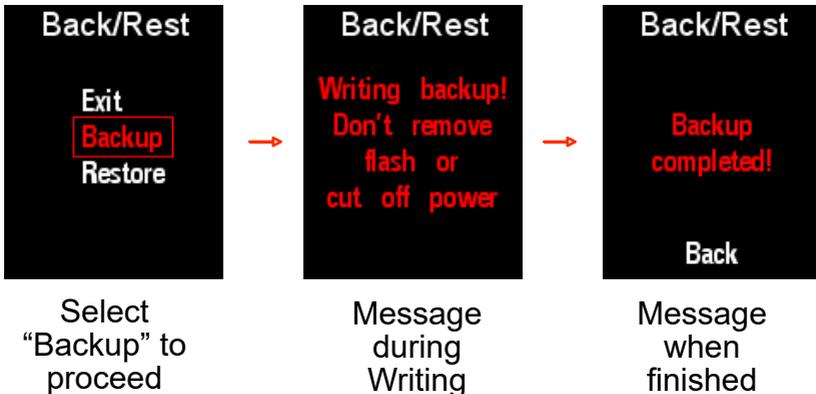


**NOTE:** The USB stick must contain the new firmware file only.

### 4.5 Backup/Restore

All set parameters and calibrations made in the instrument can be saved in a backup file. This can be useful if you need to restore all the parameters in a new instrument, for example in case of replacement, or if you need help from your installer. In this case, simply send the backup file saved on the USB stick to your installer for a support service. To backup or restore the parameters it is necessary to connect a USB pen drive to the instrument. From the main menu of the instrument, choose “Backup/Restore”. If the USB stick is not plugged-in yet, the message “Insert Flash Drive” will appear.

If already plugged-in, a message indicating to choose the operation will appear:



**NOTE:** A backup file is now written on the pen drive, copy it to a safe place for future use.

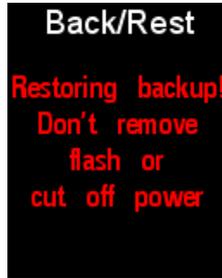


**NOTE:** The USB stick must be free from any file before saving a Backup file.

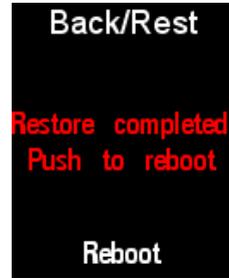
To restore the parameters, put the file on the pen drive, choose and confirm "Restore".



Select  
"Restore" to  
proceed



Message  
during  
Restoring



Message  
when  
finished

Push now the knob to reboot the software with the updated parameters.



**NOTE:** The USB stick must be free from any file except for the Restore file.

## 4.6 Logger

The Logger can be useful for storing flight data on the USB pen drive, for example to ask for assistance in case of problems. The data will be stored at 10 Hz samples and written on a file with some information of the instrument that generated them.

When the USB flash drive is plugged-in to the device a **white** icon will appear on the display indicating that the flash drive is connected.

To activate the Logger choose “Yes” from the Main Menu>Logger. The icon will turn **green** when the file is being written and **red** when the Logger is enabled but the USB pen drive is not connected.

To stop logging, the preferred way is to choose "NO" from the Main Menu>Logger.

However, logging is saved even if you switch off the instrument directly, but you may lose the last recorded events.

The Logger function automatically returns to NO when the instrument is switched off, so it must be enabled as often as necessary.

To send the Logger data to your installer, the best thing to do is to zip and send it by email.

## **4.7 About**

Enter to see instrument information.



About page example

## **5.0 General Suggestions about using the APR1**

Once you have had your **APR1** installed by your professional installer, who has also checked and tested its correct operation and you have carefully read through the manual, you will certainly be eager to fly your new instrument!

However, we do not claim to replace a good flight instructor or your mechanic, who knows your aircraft and its powerplant system better than we do.

If you have any doubts or queries, do not hesitate to contact your installer.

He will interface with the Flybox technical service team if necessary.

In the following paragraphs you will find tips on how to use the instrument in the 3 different ways, **CSPD**, **ADV** and **ADV+**.

These suggestions are intended to be illustrative and not exhaustive.

## **5.1 Use in CSPD (Constant Speed mode)**

After setting the **CSPD** control mode, you can follow the advice below if you want to use **APR1** in this semi-automatic mode.

At start-up, the instrument will automatically set the target RPM to the maximum value set by your installer, e.g. 5700 or 5800 in case of Rotax or another RPM in case of a different engine.

Before takeoff, always do the Propeller test in automatic mode as expected and explained in chapter 4.1.

This is to check that the APR1-propeller system is working correctly and if something goes wrong, **do not take off** but check what the problem might be and if necessary call your technician.

When the the Propeller Test is finished, check that the green idle pitch light is lit and that the target rpm on the display is the maximum RPM for takeoff, if not, turn the knob to set it.

During the takeoff run, in addition to checking the increasing aircraft speed, it is mandatory to check if the motor is giving the target RPM for takeoff. Remember that the target RPM shown on APR1 are not the engine RPM. The engine RPM must be checked on the aircraft tachometer and not on the **APR1** screen.

If these two parameters are not optimal, consider aborting the takeoff, provided that there is enough runway to do so and it is not too late. The assessment is entirely up to you as the responsible pilot at the controls.

The **CSPD** mode requires the pilot to manually select the target RPM for each phase of the flight, e.g. after takeoff you will need to reduce the MAP and then reduce the RPM. If you continue the climb you will need to set the RPM to perform at best considering the MAP you want to keep, also depending on the limits given by the engine manufacturer.

For this reason, it is important that if you are not yet an expert in manual RPM and MAP power settings, you train with an instructor. By following his advice you will learn in a short time.

The basic rule is:

- If you need to increase power, increase RPM first and then MAP.
- If you need to reduce power, decrease MAP first and then reduce revs.

All this, of course, must be done within the limits declared by the engine manufacturer.

This is just a general recommendation that may not work for you, so please be aware that we do not take any responsibility.



**CAUTION:** What to do if you find that the controller is not adjusting thr RPMs.

If you find that the set RPM is not being maintained, first check that you have enough MAP to achieve the desired target RPM. You may have a small open throttle and a high RPM setting. If not, you need to check that both the controller and the propeller are working properly. You can do this by setting the operating mode selector to Manual and increasing the RPM by flipping the right switch (up to increase, down to decrease RPM). If the RPM does not change, without handling the throttle, then for some reason the pitch of the blades is not changing and you will need to verify why after landing.

If not, i.e., if the RPM changes with the INC/DEC switch, then the governor electronics may be faulty and you will need to call your service technician.



**NOTE:** The internal safety circuit offers a by-pass of the electronics so that in the event of a fault and if there are no problems in the cables or hub, you will always be able to position the pitch so that you can reach the landing. **Don't take off again if you haven't fixed the fault first.**

Remember that when in “constant speed”, in addition to turning the knob, you can also change the target RPMs with the INC/DEC switch and by other means (if your installer has provided them). See Chapter 4.3.2 for more information.

In manual position, remember to set the maximum RPM especially on landing as well as takeoff. You may need to go around or do a touch & go and you will end up with all the RPM and power you need.

## 5.2 Use in ADV (Advanced mode)

In Advanced mode, the regulator will automatically set the engine revs following the Speed/RPM curve set by your installer.

After setting the **ADV** control mode (see chapter 4.3.1) you can follow the advice below if you want to use **APR1** in this automatic mode.

At start-up, the instrument will automatically set the target RPM to the maximum value set by your installer, e.g. 5700 or 5800 in case of Rotax or another RPM in case of a different engine.

Before takeoff, always do the Propeller test in automatic mode as expected and explained in chapter 4.1.

This is to check that the APR1-propeller system is working correctly and if something goes wrong, **do not take off** but check what the problem might be and if necessary call your technician.

When the the Propeller Test is finished, check that the green idle pitch light is lit and that the target RPM on the display is the maximum RPM for takeoff.

During the takeoff run, in addition to checking the increasing aircraft speed, it is mandatory to check if the motor is giving the target RPM for takeoff. Remember that the target RPM shown on APR1 are not the engine RPM. The engine RPM must be checked on the aircraft REV Counter not on the **APR1** screen.

If these two parameters are not optimal, consider aborting the takeoff, provided that there is enough runway to do so and it is not too late. The assessment is entirely up to you as the responsible pilot at the controls.

This is just a general recommendation that may not work for you, so please be aware that we do not take any responsibility. If you do not feel confident about the suggestions described here, consult your installer or get a training with an instructor. By following his advice you will learn in a short time.



**CAUTION: What to do if you find that the controller is not adjusting the RPMs.**

If you find that the Target RPM is not being maintained, first check that you have enough MAP to achieve the desired target RPM. You may have a small open throttle and a high RPM setting. If not, then you need to check that controller and propeller are working properly. You can do this by setting the operating mode selector to Manual and increasing the RPM by flipping the right switch (up to increase, down to decrease RPM). If the RPM does not change, without handling the throttle, then for some reason the pitch of the blades is not changing and you will need to verify why after landing.

If not, i.e., if the RPM changes with the INC/DEC switch, then the governor electronics may be faulty and you will need to call your service technician.



**NOTE:** The internal safety circuit offers a by-pass of the electronics. In the event of a fault, and if there are no problems in the cables or hub, you will always be able to position the pitch so that you can reach the landing. **Don't take off again if you haven't fixed the fault first.**

Remember that when in “constant speed”, in addition to turning the knob, you can also change the target RPMs with the INC/DEC switch and by other means (if your installer has provided them). See Chapter 4.3.2 for more information.

In manual position, remember to set the maximum RPM especially on landing as well as takeoff. You may need to go around or do a touch & go and you will end up with all the RPM and power you need.

### **5.3 Use in ADV+ (Advanced Plus mode)**

In Advanced Plus mode, the **APR1** regulator will automatically set the engine revs following the Speed/RPM curve and also to the MAP/RPM curve set by your installer.

After setting the **ADV+** control mode, see chapter 4.3.1, you can follow the advice below if you want to use **APR1** in this automatic mode.

At start-up, the instrument will automatically set the target rpm to the maximum value set by your installer, e.g. 5700 or 5800 in case of Rotax or another RPM in case of a different engine.

Before takeoff, always do the Propeller test in automatic mode as expected and explained in chapter 4.1.

This is to check that the APR1-propeller system is working correctly and if something goes wrong, **do not take off** but check what the problem might be and if necessary call your technician.

When the the Propeller Test is finished, check that the green idle pitch light is lit and that the target RPM on the display is the maximum RPM for takeoff.

During the takeoff run, in addition to checking the increasing aircraft speed, it is mandatory to check if the motor is giving the target RPM for takeoff. Remember that the target RPM shown on APR1 are not the engine RPM. The engine RPM must be checked on the aircraft tachometer and not on the **APR1** screen.

If these two parameters are not optimal, consider aborting the takeoff, provided that there is enough runway to do so and it is not too late. The assessment is entirely up to you as the responsible pilot at the controls.

This is just a general recommendation that may not work for you, so please be aware that we do not take any responsibility. If you do not feel confident about the suggestions described here, consult your installer or get a training with an instructor. By following his advice you will learn in a short time.

**CAUTION: What to do if you find that the controller is not adjusting thr RPMs.**



If you find that the Target RPM is not being maintained, first check that you have enough MAP to achieve the desired target RPM. You may have a small open throttle and a high RPM setting. If not, then you need to check that controller and propeller are working properly. You can do this by setting the operating mode selector to Manual and increasing the RPM by flipping the right switch (up to increase, down to decrease RPM). If the RPM does not change, without handling the throttle, then for some reason the pitch of the blades is not changing and you will need to verify why after landing.

If not, i.e., if the RPM changes with the INC/DEC switch, then the governor electronics may be faulty and you will need to call your service technician.



**NOTE:** The internal safety circuit offers a by-pass of the electronics. In the event of a fault, and if there are no problems in the cables or hub, you will always be able to position the pitch so that you can reach the landing. **Don't take off again if you haven't fixed the fault first.**

Remember that when in “constant speed”, in addition to turning the knob, you can also change the target RPMs with the INC/DEC switch and by other means if your installer has provided them. See Chapter 4.3.2 for more information.

In manual position, remember to set the maximum RPM especially on landing as well as takeoff, you may need to go around or do a touch & go and you will end up with all the RPM and power you need.

## Technical specifications

- Graphic TFT LCD with backlight and coated glass, 2.4".
- Standard mounting 2 1/4" (57mm).
- Powder painted aluminium case.
- Dimensions: 60 x 60 x 60 mm. (body)
- Weight: 235 gr.
- ASI sensor range: 30-400 Kp/h
- MAP sensor range: 6-50 inHg
- Supply voltage: 10 ~ 30 V=.
- Supply current no load: 60mA.
- MAX load current: 20A.
- RPM voltage signal range (high input): 5-100Vpp.
- RPM voltage signal range (low input): 2-20Vpp.
- RPM minimum pulse width: 300uS.
- MAX input frequency: 1.7Khz.
- Operating temperature range: -20 ~ +70°C.
- Humidity: 90% max (without condensation).
- Communication through 3 CAN bus.
- USB port: for USB 2.0

## CLEANING

The screen is very sensitive to some cleaning materials and should be cleaned with a clean, damp cloth only.

## One Year Warranty:

Product support and warranty information can be found at [www.flyboxavionics.it](http://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 maintenance, 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 manufacturer 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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## Out of warranty repairs

Products that can not be repaired under warranty as out of the maximum term or that do not work for reasons that would have been covered by warranty, can be repaired at a flat rate as described on the site. For out-of-warranty eligible damages, the repair must be assessed for each individual case.

## ***Term of Use and Disclaimer***

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Date	Revision	Description
September 2021	1.0	First release

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## **Important**

*Do not send your instrument for repair until you have filled out the request form on the support page at [www.flyboxavionics.it](http://www.flyboxavionics.it). After filling out the form you will receive an authorization email with the RMA number.*

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**APR1**- User Manual,  
Safety Instructions and Warning Booklet  
REV 1.0