WWW.IFD-NET.COM

EFIS WITH AUTO-PILOT SYSTEM

USER GUIDE AND INSTALLATION MANUAL

EVOLUTION, THE BEST EVER!

USE VFR POLICY MANDATORILY

REVISIONS HISTORY

Revision	Description
06/08/2019	Initial release
27/04/2020	Added functionality descriptions of NAV/MAP/PLUS/SLAVE models
19/04/2021	Minor fixes on powering and expansion bus section
22/06/2022	Added functionality description and minor fixes (FW220711 onwards)
25/11/2022	Added functionality description, minor fixes
13/03/2025	Added SETUP parameters and AP Servo information
	Added some new parameters in the EVO SETUP
13/07/2025	Better explained concerning the AP engage/disengage SWITCH

Summary

WARRANTY CERTIFICATE

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (M.A.V. srl via Lombardia, 2 25025 Manerbio BRESCIA Italy); provided, however, that this warranty applies only to equipment found to be so defective within a period of **lifetime** from the date of manufacture by the Seller. Other kind of damages not belongings to the production process won't be covered by the warranty program.

Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives.

EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF SELLER'S LIABILITY

SELLER'S LIABILITY TO BUYER FOR ANY LOSS OR CLAIM, INCLUDING LIABILITY INCURRED IN CONNECTION WITH

(I) BREACH OF ANY WARRANTY WHATSOEVER, EXPRESSED OR IMPLIED,
(II) A BREACH OF CONTRACT,
(III) A NEGLIGENT ACT OR ACTS (OR NEGLIGENT FAILURE TO ACT) COMMITTED BY SELLER, OR
(IV) AN ACT FOR WHICH STRICT LIABILITY WILL BE INPUTTED TO SELLER,

IS LIMITED TO THE "LIMITED WARRANTY" OF REPAIR AND/OR REPLACEMENT AS SO STATED IN OUR WARRANTY OF PRODUCT. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY SPECIAL, INDIRECT, CONSEQUENTIAL OR OTHER DAMAGES OF A LIKE GENERAL NATURE, INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS OR PRODUCTION, OR LOSS OR EXPENSES OF ANY NATURE INCURRED BY THE BUYER OR ANY THIRD PARTY.

MPORTANT NOTICE REGARDING AUTO PILOT SYSTEM INSTALLATION AND LIABILITY

The autopilot system **must be installed exclusively by qualified and authorized personnel**. The installer is required to strictly follow all relevant safety procedures and best practices.

The installation must take into account any potential **electrical, electronic, or mechanical faults** that could compromise the integrity or operation of the servos or the aircraft's primary flight control systems. It is the responsibility of the installer to ensure that **any malfunction, interference, or incorrect setup does not affect the pilot's ability to control the aircraft safely**.

If the installer has **any doubts or uncertainties**, they must contact our technical support team **before proceeding** with the installation to receive proper guidance.

⚠ **The manufacturer cannot be held liable for any damage, injury, or malfunction resulting from incorrect installation, improper use, or failure to follow the instructions and safety guidelines.**

DICHIARAZIONE DI LIMITAZIONE DI RESPONSABILITÀ E AVVERTENZE

Le informazioni visualizzate dagli strumenti della famiglia IFD-NET EVO non sono certificate per l'utilizzo VFR e IFR.
Gli strumenti della famiglia IFD-NET EVO sono intesi come un aiuto alla navigazione VFR e non sono sostitutivi di strumenti certificati o analogici.
Tutte le informazioni di volo critiche sono presentate per riferimento e devono essere verificate dal comandante/pilota.
Gli strumenti della famiglia IFD-NET EVO non sono un sostituto per gli strumenti di bordo.
Il comandante/pilota si assume la totale responsabilità e si assume i rischi associati con l'uso di questo dispositivo e rimane l'unico responsabile per il volo in condizioni di sicurezza.
M.A.V. SRL e MAV Technologies Inc. declinano ogni responsabilità derivante da un uso improprio del dispositivo, in modo che possa violare il volo e le regole di navigazione, i regolamenti e la sicurezza.

DISCLAIMER & WARNINGS

The information displayed by the family IFD-NET EVO is not certified for use for VFR or IFR flights.
The family IFD-NET EVO is meant as an aid to VFR navigation and is not a substitute for certified EFIS or traditional gauges.
All critical flight information is presented for reference only and must be verified by the commander/pilot in command.
The family IFD-NET EVO is not a substitute for on-board instruments.
The commander/pilot in command assumes total responsibility and risk associated with the use of this device and remains solely responsible for flying in safe conditions.
M.A.V. SRL and MAV Technologies Inc. disclaims any liability deriving from an improper use of the device, in a way that may violate the flight and navigation rules, regulations and safety.

1. INTRODUCTION

The **IFD-NET EVO EFIS**, developed by **MAV Srl**, is an advanced and reliable avionics system featuring an **integrated autopilot** connected to dedicated servomechanisms capable of delivering 5 Nm of torque. It is based on a modern, continuously evolving software platform, designed to meet the operational needs of modern **ultralight aircraft**, **light sport aircraft** (**LSA**), and **experimental aviation**.

This all-in-one system provides comprehensive flight and navigation data, while also incorporating a **fully integrated autopilot**. Unlike other solutions, it does not rely on external modules—all the necessary sensors, computing units, and control interfaces are fully embedded within the system architecture. This ensures improved reliability, reduced installation complexity, and full control over system updates and functionalities.

Below are some of the key features of the IFD-NET EVO device:

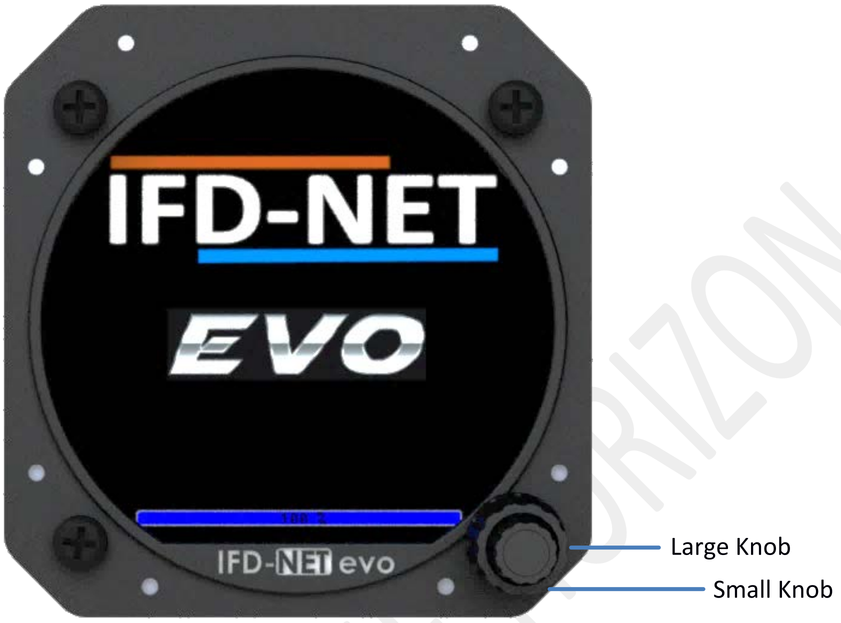
- 80mm (3’’ 1/8) standard diameter installation shape
- Adjustable brightest screen ever, sunlight visible, up to 1200 cd/m².
- Special Release under request to reach up to 2000 cd/m².
- Low power consumption down to 3.5W (300mA @ 12Vdc).
- Ergonomic interface with double aeronautical rotary knob and switch
- High integration level (totally embedded sensors) *
- Multi-environment software with simple switch menu
- Several functions in color/ graphic display:
    - Artificial horizon.
    - AUTO PILOT with 3D NAV.
    - IAS and TAS indication.
    - Airspeed trend vector.
    - Rotation, stall and max efficiency speeds indication.
    - Altimeter with settable Reference Pressure.
    - Vertical speed indicator.
    - 3D Magnetic compass.
    - Slip indicator.
    - Turn coordinator.
    - G-Meter with peak recording.
    - GPS Altitude.
    - Wind vector with wind speed estimation.

1.1. ELECTRICAL AND MECHANICAL SPECIFICATION

- Main power **10 - 28Vdc** 0.8A max with internal filter and peak transient protection.
- Functional temperature range -10°C to 70°C 90% Rh no condensation status.
- 85.4mm x 89mm x 67.5mm (width, height, depth).
- 3 x 1/8 NPT AOA, Pitot and Static pneumatic inlets.
- SMA female connector for GPS passive or active antenna.
- Standard 9 SUB-D female connector for power and BUS connection.

2. SYSTEM DECRIPTION

2.1. IFD-NET EVO OVERVIEW



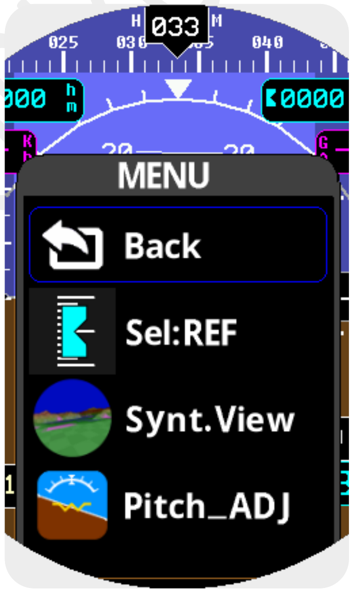
EVO Bezel overview

The IFD-NET EVO EFIS PFD is part of a large range of instruments. In the follow sections will be described how to use the new aeronautical interface based on a high force double rotary knob with push switch.

Action	Effect
Tap the rotary switch button	Engage the actual focused feature. Use it to edit parameters or save those after their modification.
Rotate large rotary knob crown	Has different effects depending on the environment the user is. Please refer to below descriptions to deeply understand about this feature.
Rotate small rotary knob crown	Has different effects depending on the environment the user is. Please refer to below descriptions to deeply understand about this feature.
Long tap on switch button	Recall of the environment menu. Keep pressed for 2 seconds to obtain the options menu displayed on screen.

3. UNIT DESCRIPTION

The IFD-NET EVO interface is based on a double concentric rotary knob with a push switch that gives access to all the settings the pilot needs during the flight, and allow to adjust the setup's parameters.
On the right side of this page is shown an instrument in "Primary Flight Display" configuration (AVIONIC). Spinning the big crown rotary knob will increase or decrease the reference pressure respectively. The reference pressure affects the value of the barometric altitude; setting the exact local pressure (QFE) in the reference pressure causes the altimeter to display zero altitude. Setting the pressure to the sea level (QNH), the barometric altitude will display the exact altitude AMSL.
The small crown rotary knob rotation add decimal value to the pressure reference.
The pilot can access the main menu by keeping pressed the knob for about 2 seconds until the screen, shown on the right, appears.
Within menus, by rotating the bigger rotary knob's crown, moves the selection up and down, and tapping button confirms the highlighted selection.



PFD Menu page 1

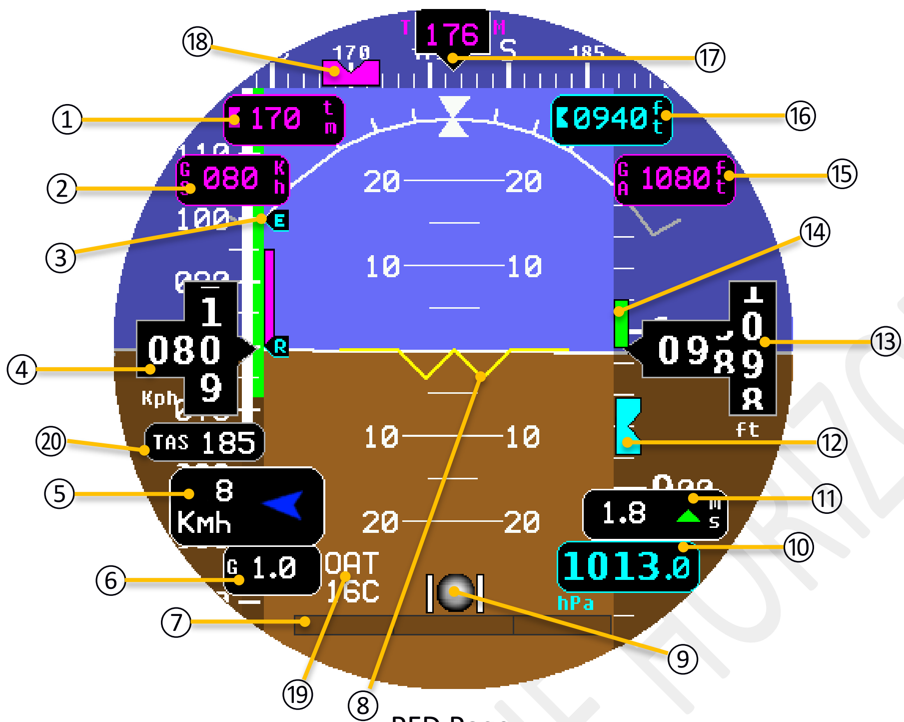
Explanation of main menu:

- **Back**: Close context menu.
- **Sel**: By turning the small knob it is possible to select one of the three settable references (see image "Page PFD ATTITUDE" ⑩,⑯,①).
- ***Synt. View:** Switch from 2D attitude to 3D view or vice versa.
- **Pitch_ADJ**: Use this option to zero the pitch/roll attitude of the artificial horizon. The aircraft must be in a level attitude. This function is active both in flight and on the ground.
  Once "PITCH ADJ" is selected and confirmed, the EFIS returns to the PFD screen. However, the system refuses to reset the level attitude if the currently calculated PITCH is greater than +/-30.0 degrees and/or ROLL is greater than +/-7.5 degrees; in this case pushing the button over this option has no effect (the menu remains on the screen).
- **G_Reset**: highlight this option in order to read the G-meter minimum and maximum recorded peak values. These peak values are zeroed at the startup of the system (power up).
  You can manually reset the G-meter by pressing the rotary knob button over this menu option.
- **Setup**: the setup page lists all the configuration parameters that influence the instrument behavior. The Display will appear like the image on the right. As the BASE model of the instrument doesn't offer all the features of the MAP and PLUS models, some parameters listed in the "4.10 SETUP PARAMETERS" may not appear. To change a SETUP parameter, highlight it rotating the big knob, press the button to enter edit mode (the parameter turns green) and use the big crown rotary knob to change its value. Finally confirm the change tapping the button (the parameter becomes white again).

PFD Menu page 2

*Available only on MAPS/PLUS/SLAVE models

4. OPERATING MODES AND PAGES



PFD Page

4.1. Page PFD Attitude

The Primary Flight Display (PFD) contains avionic data mainly concerning flight speed and aircraft attitude. In order to maximize screen clarity, it is possible to configure which parameters to display through the setup menu within three layouts. Refer to the setup description for details.

The following flight instruments are displayed on the “PFD Page”:

① Selected heading (cyan) or ground track (purple)

② Ground speed (GPS)

③ V-speed reference

④ Indicated air speed

⑤ Wind vector, speed and direction

⑥ G-meter

⑦ Turn rate indicator

⑧ Aircraft symbol

⑨ Slip indicator

⑩ Reference pressure trim

⑪ Vertical speed indicator

⑫ Selected altitude bug

⑬ Current altitude

⑭ Altitude trend vector

⑮ GPS Altitude

⑯ Selected Altitude

⑰ Magnetic heading (cyan) or Ground track (purple)

⑱ Selected heading (cyan) or Ground track (purple) Bug

⑲ Outside air temperature indication

⑳ True air speed indication

4.1.1. Heading

Heading track

On top of the screen is displayed a Heading/Ground track tape with mayor ticks every 5 degrees while minor ticks are displayed every 1 degree.
On the sides of the numerical indication (PFD Page ⑰) there are two letters which indicate the source of heading track. The table below shows the meaning of the two letters:

MH	Magnetic Heading	Use Magnetic compass for heading show
TH	True Heading	Use compensated (from declination) magnetic compass for heading show
GT	Ground Track	Use GPS track for heading show

Adjust the selected heading or ground track (PFD Page ⑱/①):

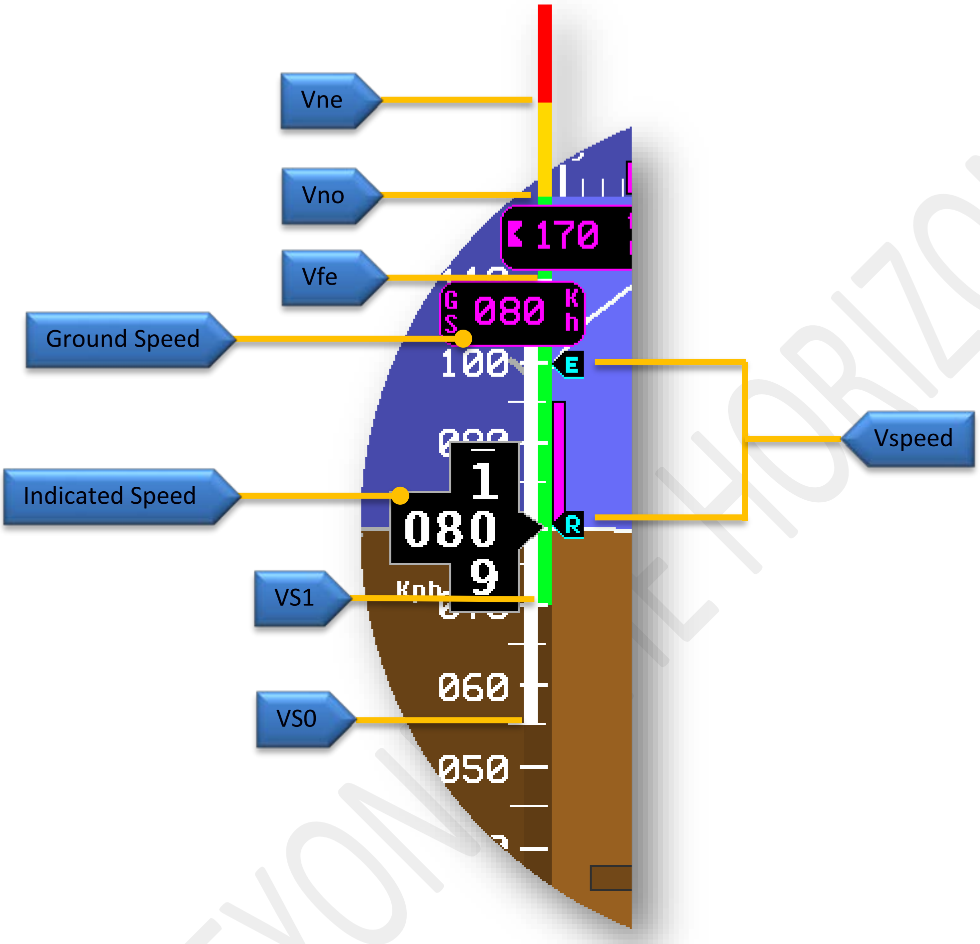
Long press on knob for at least 2 seconds, turn big knob to select “Sel:” after that turn little knob until “MAG” is not displayed (see image above). Now by clicking on knob it will be possible to change it, by using big knob for increase or decrease of 10 degrees and little knob for each 1 degree.

Marker syncing (PFD page ⑱) **with the current heading or ground track:**

Long press on knob for at least 2 seconds, turn big knob to select “Sel:” after that turn little knob until “MAG” is not displayed (see image above). Now by long click (> 2 sec) the current selected heading or ground track will be sync.

4.1.2. Airspeed and Vspeed Indicators

Below is shown the IAS representation displayed as a classic anemometer screen to easily explanation. In the setup menu it is possible to configure the entire colored arc. Full scale speed is automatically determined by Vne parameter plus 40 Km/h.



Airspeed Indicators

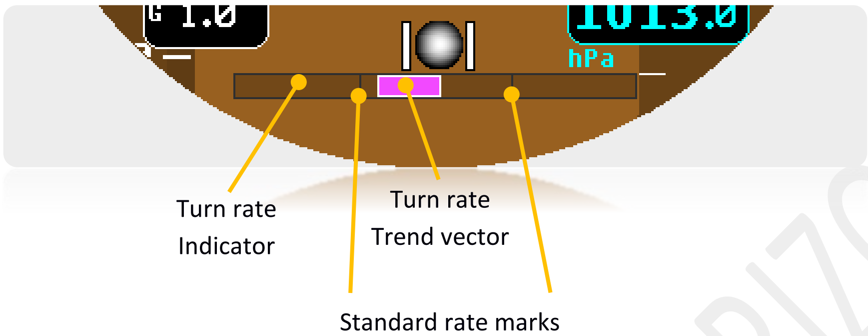
The color ranges in the speed arc are determined by setting the parameters listed in the SETUP.
* White arc starts from Vs0 value and ends on Vfe, defining the safe area of operation for flaps and gears.
* Green arc starts from Vs1 and ends on Vno
* Yellow arc starts from Vno and ends on Vne.
Additionally, if enabled in setup, Vspeed indicators are displayed on right of the IAS tape.
(Vspeed Vx, Vy, Vr, Ve, Va, Vg: see ias-speed setup for descriptions).

Please refer to your aircraft manual in order to set all V-speeds accurately.

4.1.3. Turn Rate indicator

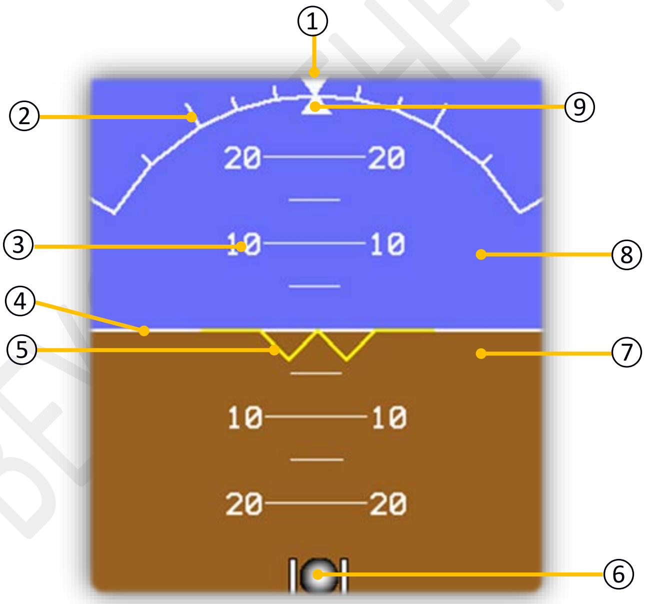
Turn rate indicator is shown on bottom of PFD page.
A pink turn rate trend vector shows the current turn rate while a green turn rate trend vector shows the standard turn rate (3 deg/sec).

Turn Rate Indicator



4.1.4. Attitude Indicator

Attitude indicator symbology is displayed on PFD and includes roll and pitch indicators and a slip indicator.
On roll indicator, major tick marks are 30 and 60 degrees and minor tick marks are 10, 20 and 45 degrees.
On pitch indicator, marks occur every 5 degree.



Attitude Indicator

① Roll Zero reference	⑥ Slip indicator
② Roll scale	⑦ Land
③ Pitch scale	⑧ Sky
④ Horizon line	⑨ Roll pointer
⑤ Aircraft symbol	

4.1.5. Altimeter

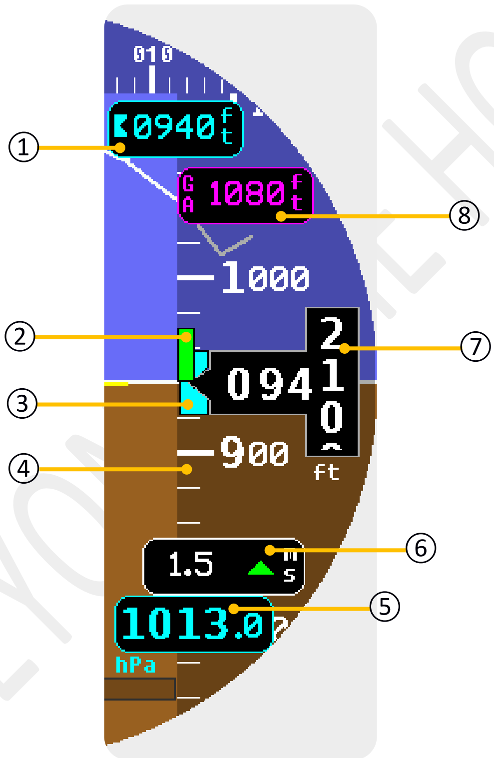
Altimeter indicator displays numeric labels and ticks.
Major tick marks are at intervals of 50 meters or 100 feet while minor tick marks are at intervals of 10 meters or 20 feet. The current altitude is displayed in the black pointer ⑦ where a drum style is used.
After 10'000 feet, is show only the flight level (FLxxx).

Adjust the selected Altitude ①:

Long press on knob for at least 2 seconds, turn big knob to select “Sel:” after that turn little knob until “ALT” is displayed. Now by clicking on knob it will be possible to change it, by using big knob for increase or decrease of 50 units and little knob for each unit.

Syncing to the current altitude:

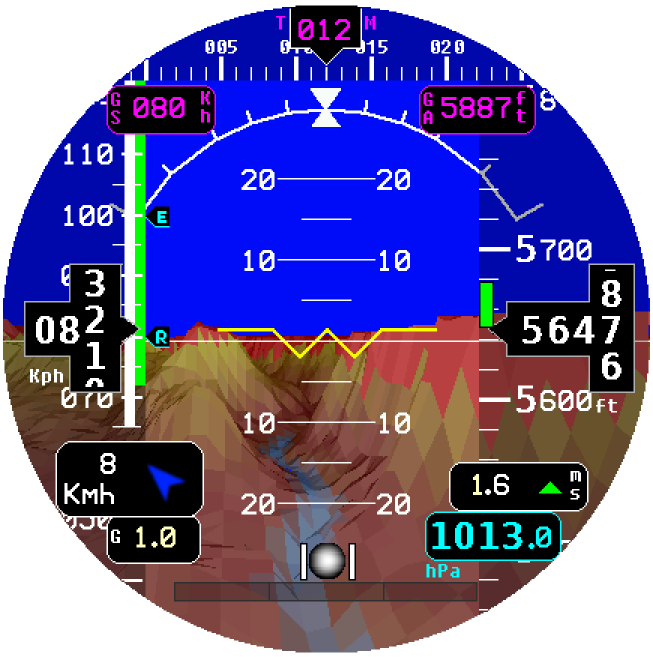
Long press on knob for at least 2 seconds, turn big knob to select “Sel:” after that turn little knob until “ALT” is displayed. Now by long click (> 2 sec) the selected altitude ① will be sync.



Altimeter

① Selected Altitude
② Altitude trend vector
③ Selected Altitude marker
④ Altitude Tape
⑤ Barometric Pressure reference
⑥ Vertical speed indicator
⑦ Current Altitude, drum style
⑧ GPS Altitude

4.1.6. Attitude 3D (MAPS/PLUS/SLAVE models only)



Synth 3D

NOTE: out-of-range or otherwise unavailable values are displayed as dashes ("- - -")

A fault is indicated with "X", e.g. XXXX
In case a fault indication appears permanently, try to power-cycle the unit. If the problem persists the instrument may need maintenance.

In the picture "Synth 3D" is represented a special feature, available in the IFD-NET EVO MAP and PLUS versions. The 3D vision, also called synthetic vision, perform a tridimensional rendering of the terrain instead of the standard 2D artificial horizon. Please contact vendor for more information on how to move your unit into the MAP or PLUS version in case of PFD or NAV one. Refer to chapter "

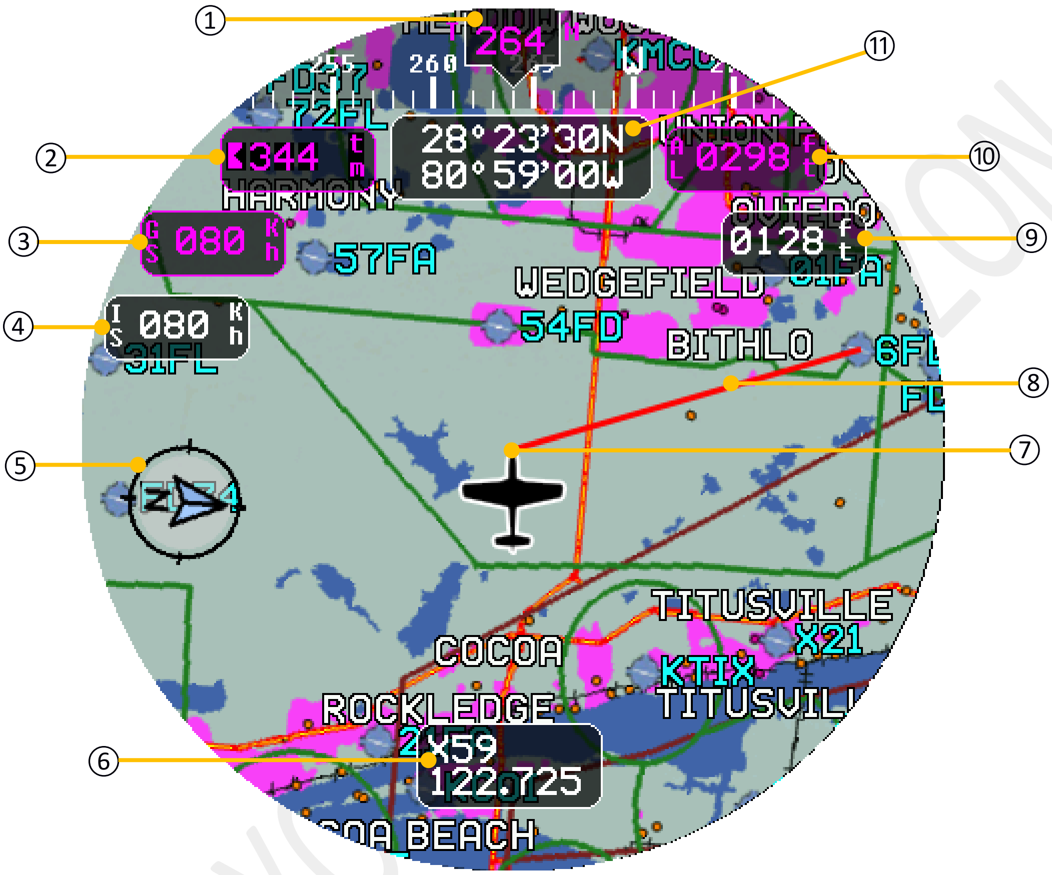
ORDERING INFORMATION" for more on available models.

4.1.7. Wind vector:

The wind vector auto calculation permits to detect a wind component by analyzing data as IAS, TAS, GS, HDG and GPS Tracking. This task estimates even speed and direction of the wind component. In case pilot engaged this feature in the instrument SETUP, it will be displayed automatically in case the calculation result would be greater than a fixed trig. Please refer to the "PFD Page" figure in order to understand how it will be displayed in the PFD layout. **Keep in account that this feature produces an estimation of the wind component vector and haven't to be used in a different way as a pure estimation**. The calculation is strongly affected by the correct detection of the hearth magnetic fiend and even weak distortion of this can cause errors especially in the wind speed estimation. Please refer to the compass calibration paragraphger in order to amend the magnetic field distortion.

4.2. PAGE MAPS (MAPS/PLUS/SLAVE MODELS ONLY)

The MAPS page, display the current GPS position on an aeronautical chart preloaded inside the memory storage.
The map is always aligned with the direction of the airplane ("Track up / Heading up").
By rotating big knob will increase or decrease the zoom factor from 250 m minimum to 128 km maximum, while rotating the little knob it will change the selected heading or selected ground track ②.



MAPS Page

① Heading or ground track

② Selected heading (cyan) or ground track (purple)

③ Ground speed (GPS)

④ Indicated air speed

⑤ North direction

⑥ Local Radio frequency

⑦ Current position on the map

⑧ Track of navigation

⑨ Barometric altitude

⑩ Altitude above ground

⑪ Current GPS coordinates

Point's ②, ③, ④ and ⑥ can be disabled via setup.

4.2.1. MAPS Menu

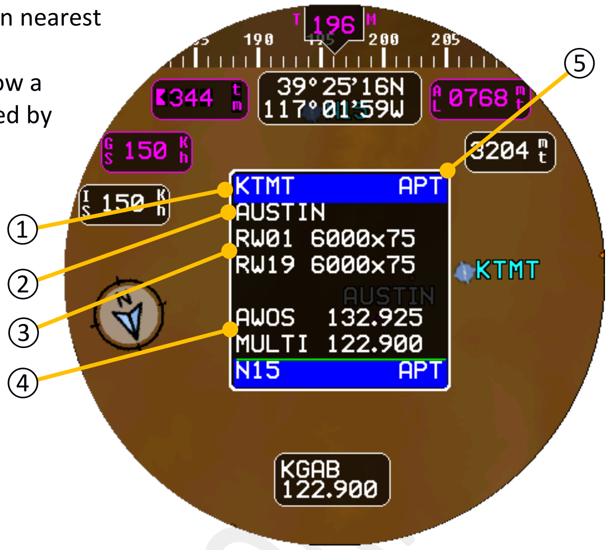
A long click for at least 2 seconds it will allow to access to the current page menu.
Rotating the big knob it be possible to change the selection.
On the image, a full menu representation (instrument menu is divided in 3 or 4 pages):

Maps menu

- **BACK**: Close maps menu window
- **Stop NAV**: Ends active navigation
- **Move Map**: Go to route capture page (see 4.3 route capture section)
- **Airspace**: Show air space information, if present.
- **Info POI**: Show the nearest points information.
- **Find POI**: Find a desired point using the text box.
- **Frequency**: Display/Hide the local frequency (⑥ MAPS Page)
- **Terrain**: Display/Hide terrain on maps, colors depended by "MAP SKIN" parameter in map setup.
- **Taws**: Display/Hide **Terrain Awareness Warning System,** the color map is based on ground altitude if enabled (no circle crossed out on the icon) else color map is based on "MAP SKIN" parameter.
- **Profile**: Display/Hide elevation profile (see section "4.2.4 Elevation Profile").
- **Cust Maps**: User cartography (see section "4.2.5 User Cartography" for details).
- **Quick WPT**: Stores a user waypoint at the current position of the plane. The waypoint name is set automatically (WPT001, WPT002... in sequence) and can be automatically included in the ROUTE CAPTURE page.
- **Setup**: Enter in the setup.

4.2.2. Info POI

In the EVO maps page is possible to show the information on nearest points.
From the environment menu, clicking on "Info POI", it is show a drop list with some information on the nearest points (sorted by distance).
Rotating the big knob it is scroll up or down the list and the next nearest points while, clicking again, to exit.



Info POI

① ICAO code

② Point name

③ Runway orientation and size (L x W)

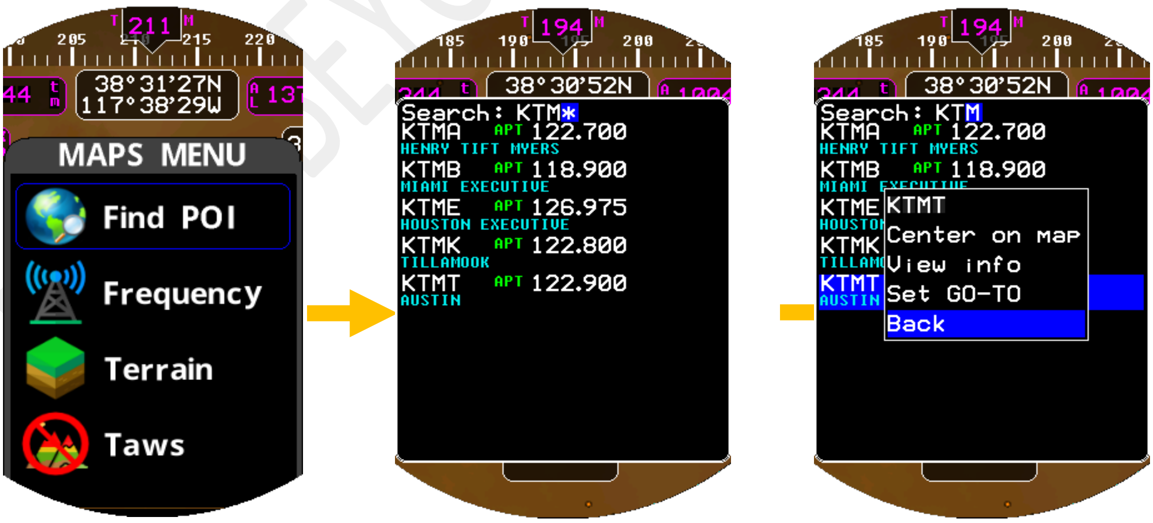
④ Radio type and frequency

⑤ Point type

APT: Airport	NDB
AF: Airfield	DME
HP: Heliport	NDBDME: NDB+DME
UWP: User Waypoint	VOR
AWP: User Airfield	VORDME: VOR+DME
MKR: Marker beacon	VORTAC
L: NDB Locator	TACAN

4.2.3. Find POI

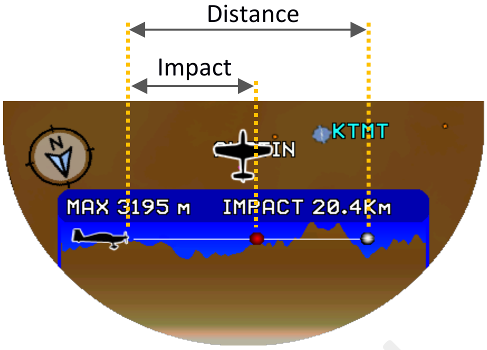
In the EVO maps page is also possible to find a point of interest using manual search.
To do that, in the environment menu, clicking on "Find POI", it is show an empty text box where on top of that is possible to insert desired point name using the ICAO code or name of the point (use big knob for scroll the alphabet).
During text insert (after two letters) a drop list of points is showed which are the related to the text just inserted.
The special character "<" delete the character just inserted and "*" terminate the insertion, moving down the selection to the list, if results are present, otherwise it move the cursor to the start.
By long click is possible to go back or exit from search.



Find Point Of Interest

4.2.4. Elevation Profile

Elevation profile can help pilot to evaluate a possible impact with the ground in a predetermined altitude and distance range.
In the map setup, under F.C.W sub-setup, is possible to adjust altitude and distance.



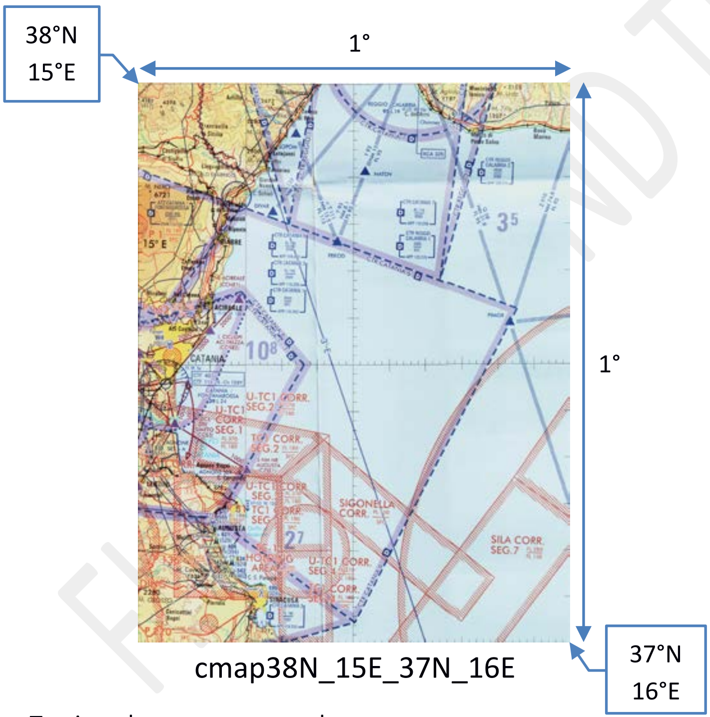
Elevation Profile

4.2.5. User Cartography

The *EVO EFIS can display maps created by the user and loaded into an SD or MMC card. This cartography is composed of one or more JPEG files (JPG extension), named according to a specific format that describes their geographical coverage.
User cartography is always shown without rotation (North always up), while the airplane icon rotates according to the orientation with respect to the North.
Each JPG file should cover one geographic degree (1 degree latitude by 1 degree longitude).
Example of file name:

Cmap38N_15E_37N_16E.jpg

38N_15E = Coordinates of the northwest corner.
37N_16E = Coordinates of the southeast corner.



cmap38N_15E_37N_16E

To view the user cartography:

- The SD or MMC card containing the JPG files described above must be inserted in the SD / MMC slot on the back of the instrument.
- In maps menu the item "CUST MAPS" must be set to "ON" (no circle crossed out on the icon).

In this condition, the instrument immediately starts searching for the cartography files on the SD / MMC card.
If there are usable data on the SD / MMC card, the message "Loading map ..." appears.
As soon as the EFIS has loaded enough data, the cartography appears on the screen.

The map screen remains black if no JPG files that can be used on the SD / MMC card are found (in this case the message "Loading Map" disappears).
It is advisable, then, to disable the “CUST MAPS” option from the maps menu, or remove the SD/MMC card from the slot.
IMPORTANT - Some functions are not working on the user cartography:

Function	Availability on custom maps
Route	Full supported
TAWS	Not supported
Points of the navigation database	Not displayed, but "FIND POI" and "INFO POI" find them equally
User waypoints	Full supported
Airspace	Not displayed, but "INFO AIRSPACE" still shows the information
Altitude Profile	Not supported

Verify example: If the user cartography covers the area around the Catania airport (LICC) and the pilot uses the "FIND POI" function to search for the same point, the system will correctly center the view on the Catania airport (provided that the user cartography is correctly georeferenced).

Notes: Larger images take longer to load. It is recommended, if possible, to keep the size of each image below 1 Mbyte.

Map File Format Requirements: the JPG files used for map segments must have a consistent resolution and be sized such that each file remains reasonably close to 1 megabyte. Oversized files may cause delays during loading and could result in screen flickering, particularly when crossing tile boundaries during flight.
Additionally, the JPG importer does not support extended JPEG formats containing numerous georeferencing tags or embedded color profiles. Such files may fail to load or display incorrectly. Generate the map tiles with the same x and y resolution in pixel in order to allow the system to merge those snootly.

Recommended Optimization Procedure: once the map images have been processed and sized appropriately, follow this procedure to ensure compatibility and optimal performance:

1. Export to PNG
   Export the map images to PNG format using the desired resolution and DPI.
   ⚠ *All files must have identical pixel dimensions (width × height).*
2. Convert to JPG using Windows Paint
   - Open each PNG file on a Windows PC using the built-in Paint application.
   - Save the file as a JPG using Paint’s native JPG encoder.
3. Verify File Size
   Ensure that the resulting JPG file is less than 1 MB in size.

The Windows Paint JPG encoder is recommended because it:

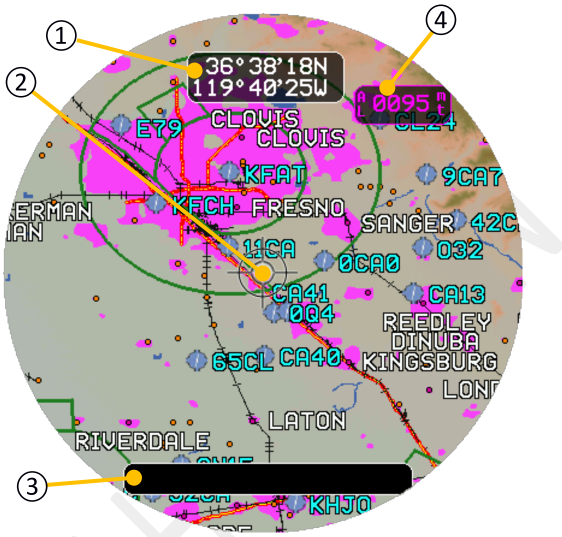
- Produces clean JPG files without unsupported metadata (such as color profiles or geotags),
- Achieves high compression with excellent visual quality.

*Available only on MAPS/PLUS/SLAVE models

4.3. PAGE ROUTE CAPTURE (MAPS/PLUS/SLAVE MODELS ONLY)

Through this environment it is possible to view the whole map at each geographical position. The map can be moved horizontally or vertically by turning the two knobs (the small one for left/right movements and the big one for up/down movements).

① Coordinates at cursor position
② Cursor position (center of screen)
③ Route name (if loaded)
④ Terrain elevation at cursor position



Route Capture

4.3.1. Action List

The click allow to display the action list:

ADD RTE WPT:	Add route waypoint on current position
ALTITUDE:	Set waypoint altitude
RENAME ROUTE:	Rename the current route
ZOOM:	Change zoom level
SET LAST FIX:	Set current position as last known position
EXIT:	Exit from action list

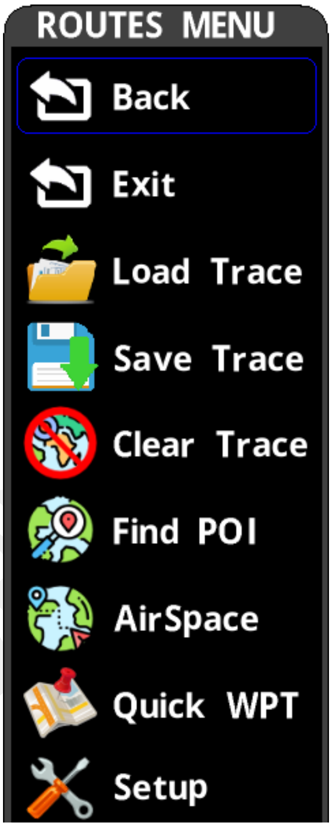
Note: Renaming route using big knob for moving cursor position and little knob for change character.

When the list of actions is opened on an "RTE WPT" it is possible to modify or delete it.

4.3.2. Route Capture Menu

A long click for at least 2 seconds it will allow to access to the current page menu.
Rotating the big knob it be possible to change the selection.
On the image, a full menu representation (instrument menu is divided in 3 pages):

- **Back:** Close menu window.
- **Exit:** Exit from route capture page.
- **Load Trace:** Load a route stored in the internal memory or GPX and RTE files from SD card.
- **Save Trace:** Save a just planned route in the internal memory.
- **Clear Trace:** Clear the planned route.
- **Find POI:** Find a point of interest using a manual research.
- **Airspace:** Show information on nearby airspace.
- **Quick WPT:** Insert a user waypoint on current position.
- **Setup:** Open setup.

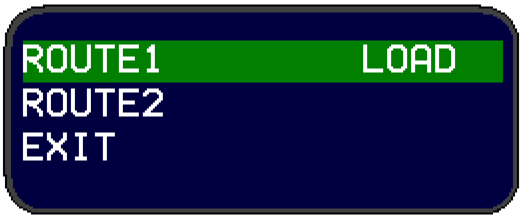


Route Capture Menu

4.3.3. Load Trace

Loading a trace stored in the internal memory:

- Engage environment menu
- Click on "Load Trace"
- Click on desired route in the list
- Select "load"

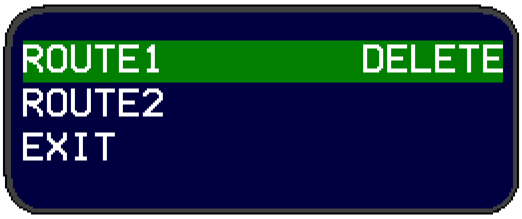


Load Trace

4.3.4. Delete Trace

Deleting a trace stored in the internal memory:

- Engage environment menu
- Click on “Load Trace”
- Click on desired route in the list
- Turn big knob to select “delete” and click, this will delete the selected route



Delete Trace

4.4. PAGE HSI NAV (NAV/MAP/PLUS/SLAVE MODELS ONLY)

This environment shows the navigation data to a reporting point or a geographical location chosen on the map.
If there is no active navigation (no destination selected), the page becomes a gyrocompass.
As soon as a destination is selected, some additional elements appear on the monitor:

- Bearing pointer (cyan), which points directly to the destination
- HSI indicator (purple), which indicates the starting direction from the point of origin to the point of destination (Desired Route)
- Course Deviation Indicator (CDI), which shows (purple) the current lateral deviation from the desired course. When CDI moves to the right, the plane is to the left of the original leg, and the pilot must veer to the RIGHT to intercept the original route.
- Time to arrival (hours: minutes)
- Distance to the destination
- Selected heading

Rotating the knobs adjusts the selected heading:
- The **large knob** changes the heading in **10-degree increments**.
- The **small knob** changes the heading in **1-degree increments**.

If the ****AUTOPILOT mode is engaged***, the knobs behave as follows:
- The **large knob** adjusts the **heading bug** in **2-degree steps**.
- The **small knob** adjusts the **altitude marker** in increments of **100 feet** (or **50 meters**, depending on the selected unit system).

*Available only on PLUS model

4.4.1. HSI NAV Menu

A long click for at least 2 seconds it will allow to access to the current page menu. Rotating the big knob it be possible to change the selection.

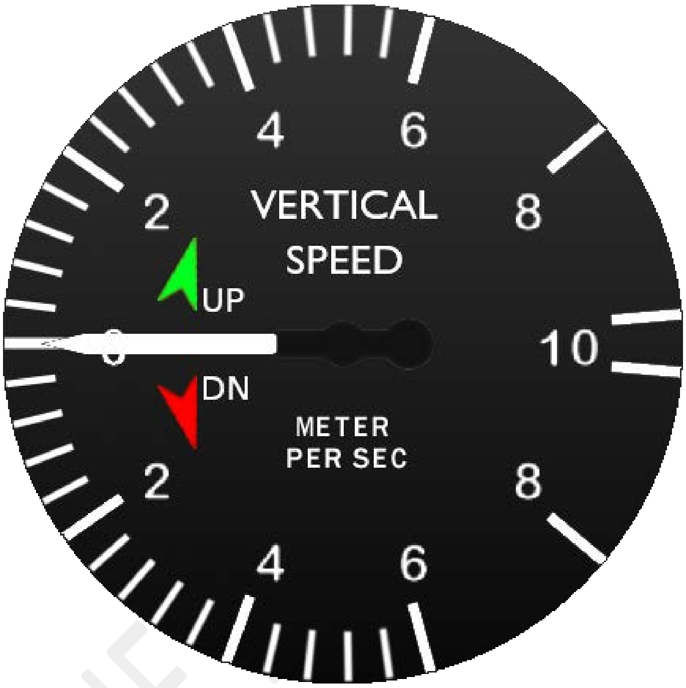
- **Back:** Close menu window.
- **Find POI:** Find a point of interest using manual research
- **Stop NAV:** Stop active navigation
- **Update DTK:** Update the navigation trace
- **Setup:** Open setup.

Route Capture Menu

4.5. PAGE VSI (BARO/PLUS/SLAVE MODELS ONLY)

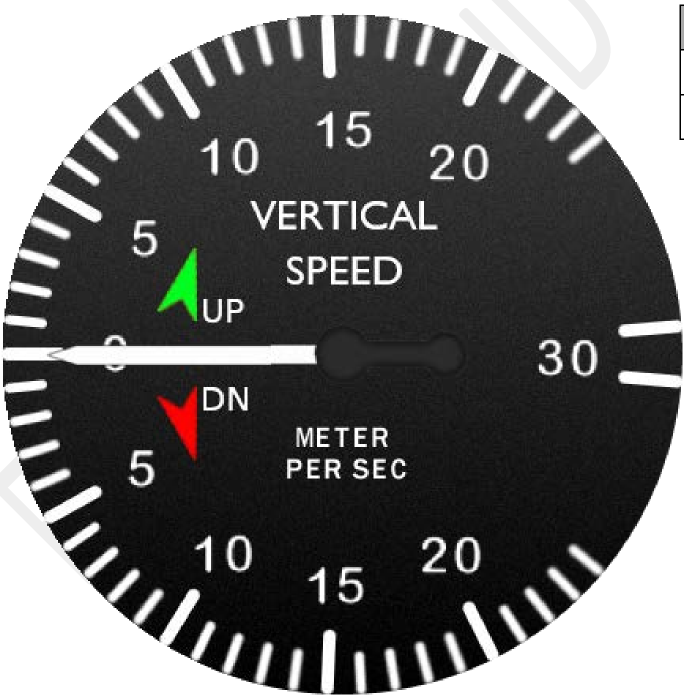
EVO VSI page represents a typical vertical speed indicator that you may find on a small General Aviation aircraft.

Units	Major tick	Minor tick	Full Scale
m/sec	2	0,4	10
Feet/min	500	100	2500



It's also possible to extend the maximum scale by setting "VSI SCALE" parameter in the "BARO CONFIG" setup.

VSI EXTENDED SCALE



Units	Major tick	Minor tick	Full Scale
m/sec	5	1	30
Feet/min	1000	200	6000

4.6. PAGE ALT (BARO/PLUS/SLAVE MODELS ONLY)

EVO ALT page represents a typical altimeter indicator that you may find on a small General Aviation aircraft.
It's possible to choose two different styles of altimeter:

Units	Major tick	Minor tick
Meter	100	20
Feet	100	20

3PTR CLASSIC STYLE

DRUM MODERN STYLE

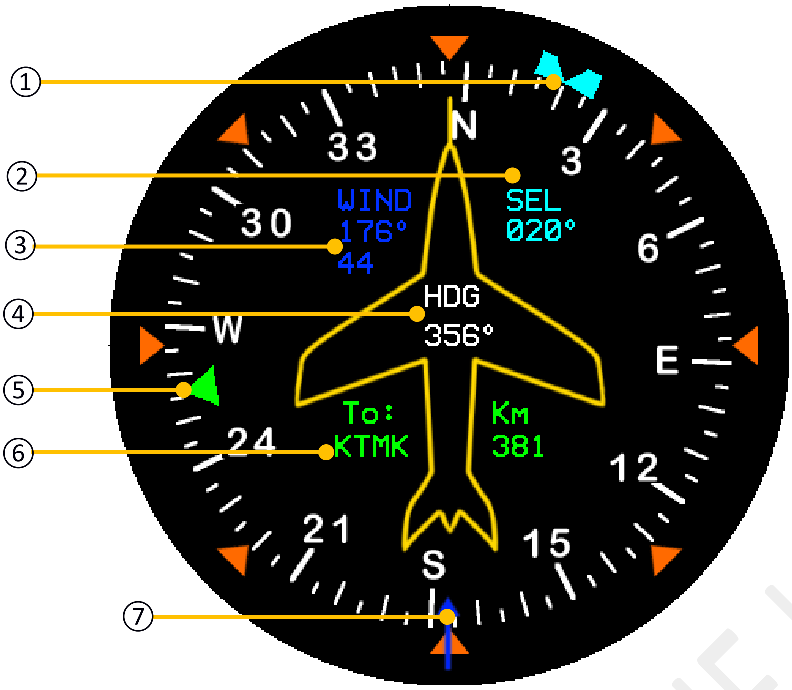
4.7. PAGE IAS (BARO/PLUS/SLAVE MODELS ONLY)

EVO IAS page represent a typical anemometer indicator that you may find on a small General Aviation aircraft.

① Numerical IAS
② Speed never to be exceeded
③ Range of speeds allowed in calm air
④ Flight in clean configuration
⑤ Flight with landing gear and flaps extended
⑥ Stall speed in clean configuration
⑦ Stall speed with landing gear and flaps extended

To configure the arcs, see section "4.10 setup parameters" under "IAS SPEEDS"

4.8. PAGE GYROCOMPASS (PLUS/SLAVE MODELS ONLY)



NOTE: when the compass is not calibrated the instrument displays three dashes (“- - -“) instead of the numeric heading. You can either enable the GPS track (set HDG TYPE “AUTO” in SETUP) or **calibrate the magnetic compass** as described below.

A fault is indicated with “XXX”. In case a fault indication appears permanently, try to power-cycle the unit. If the problem persists the instrument may need maintenance.

Gyrocompass

① Heading Bug

② Selected Heading Bug

③ Wind vector information (orientation and speed)

④ Heading indication

⑤ Bearing pointer to destination

⑥ Navigation information (destination waypoint and distance to destination)

⑦ Wind vector

Rotating the knobs adjusts the selected heading:

- The **large knob** changes the heading in **10-degree increments**.
- The **small knob** changes the heading in **1-degree increments**.

If the ****AUTOPILOT mode is engaged***, the knobs behave as follows:

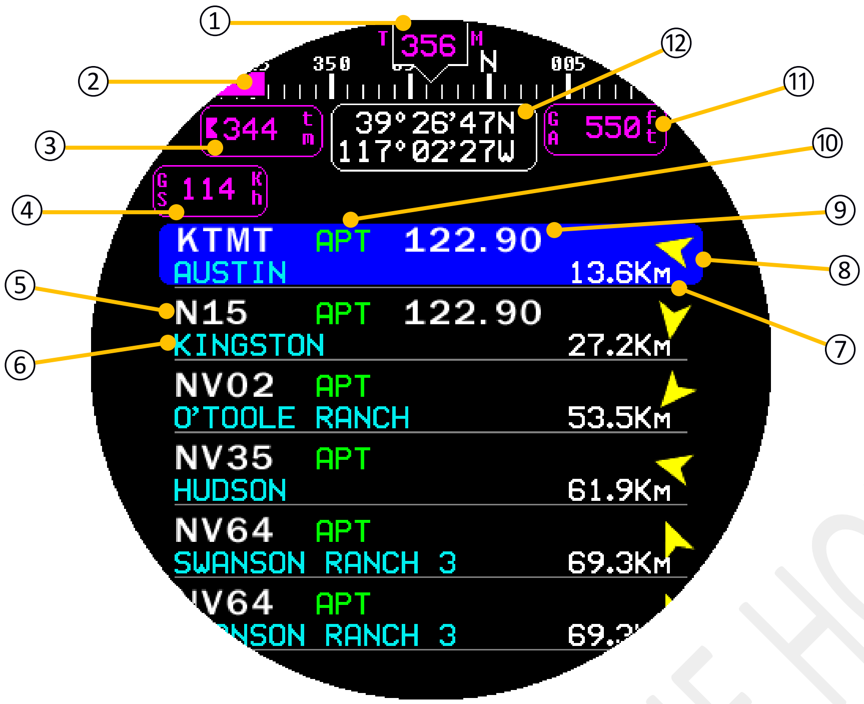
- The **large knob** adjusts the **heading bug** in **2-degree steps**.
- The **small knob** adjusts the **altitude marker** in increments of **100 feet** (or **50 meters**, depending on the selected unit system).

4.8.1. Gyrocompass Menu

The related menu page has the same options of HSI NAV menu page, so please reference to section HSI NAV Menu.

*Available only on PLUS model

4.9. PAGE NEAREST (NAV/MAPS/PLUS/SLAVE MODELS ONLY)



Nearest

NOTE: when GPS signal is not present the list is not displayed.

NOTE: Use big knob to scroll the list. A click when point is highlighted (blue color) open the related menu point.

Point menu

① Heading or ground track
② Heading/Track bug
③ Selected heading/Track
④ Ground speed
⑤ Nearest point Identifier (ICAO)
⑥ Nearest point name
⑦ Distance from actual position
⑧ Bearing relative to the aircraft heading (Up = front)
⑨ Radio Frequency
⑩ Type of navigation point
⑪ GPS Altitude (AMSL)
⑫ GPS position

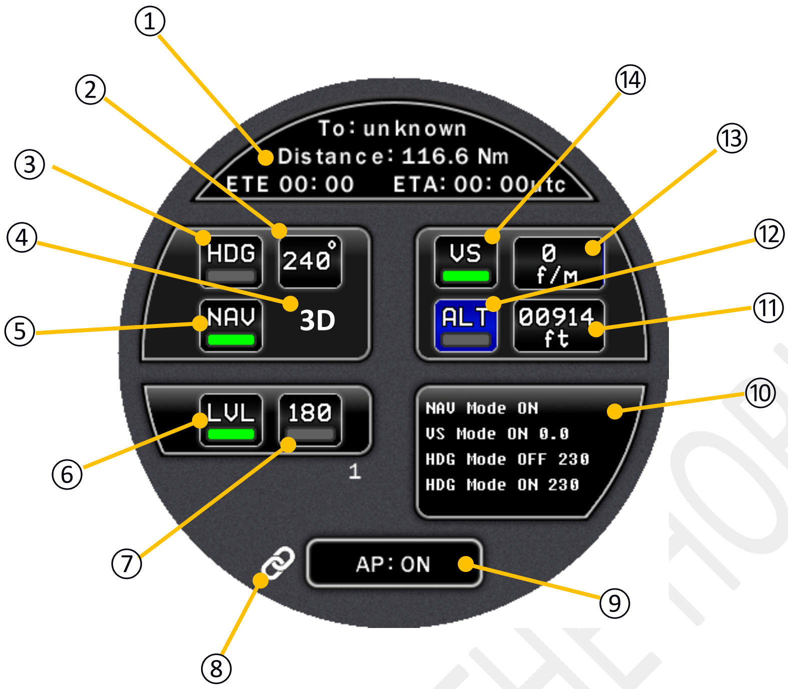
4.9.1. Nearest menu

A long click for at least 2 seconds it will allow to access to the current page menu. Rotating the big knob it be possible to change the selection.

- **EXIT:** Close menu window
- **ALL:** Filter nearest by type (Change by clicking and turn the small knob).
- **Find POI:** Find a point of interest using manual research.
- **Stop NAV:** Stop active navigation.
- **Update DTK:** Update the navigation trace.
- **Setup:** Open setup.

4.10. Page AUTO PILOT (PLUS model only)

The AUTO PILOT page allows the access to the AUTO PILOT functions and is available for the IFD-NET EVO model only. Follow a layout description:



AP Page layout

1. Flight plan information
2. Programmed Heading
3. Heading AP function switch
4. NAV mode [2D, 3D, NMEA]
5. NAV AP function switch
6. Leveling [ROLL] AP function switch
7. Turn back [180°] AP function switch
8. Master / Slave link
9. AP Function status (ON OFF)
10. AP Function message list
11. Programmed altitude for AP ALT Function
12. ALT AP function switch
13. Programmed V-Speed for VS AF function
14. VS [Climb] AP function switch

Rotating the large knob scrolls through the activation boxes for autopilot modes or preset parameter settings. To enable or disable a specific AP mode, press the knob when the corresponding box is highlighted in blue. A green rectangle within the box indicates the mode is active; a grey rectangle means it is inactive.

To adjust parameters such as heading (in degrees) or altitude (in feet or meters), rotate the knob to highlight the desired box in blue, then press the knob. When the value appears in green, it is editable: rotating the large knob changes the value in larger steps, while rotating the small knob adjusts it in single units.

4.10.1. HDG Mode (Heading Hold)

When the HDG mode is engaged, the NAV mode is automatically deactivated. In addition, although not explicitly activated, the LVL mode is internally executed by the autopilot to maintain wings-level attitude when the selected heading does not require active turns.

The HDG function commands the autopilot to maintain a specific flight heading. When box ② is selected, the desired heading can be adjusted using the encoder:

- Outer knob: changes in 10-degree increments
- Inner knob: changes in 1-degree increments
- Long press on the knob: immediate set of the current aircraft heading

Once the heading is selected, the autopilot will actuate the servos to initiate a turn toward the target heading and level the aircraft once established on course.

The HDG mode affects only the ROLL axis (lateral control). To maintain altitude or apply vertical corrections (PITCH axis), one of the vertical modes — [VS] (Vertical Speed) or [ALT] (Altitude Hold) — must be activated, as described in the following sections.

4.10.2. AP NAV mode:

The NAV mode is activated by pressing the knob when the NAV box is highlighted in blue. The following modes can be selected by turning the knob: **2D, 3D, EXT [NMEA], and OFF**.

- **NAV 2D and NAV 3D** modes refer to a route generated locally using the **ROUTE CAPTURE** function, available from the menu **MAP -> MOVING MAP**. After entering a new flight plan or loading one from internal memory or SD card (GPX format), you can start navigation using the **NAVIGATE** function. The autopilot will manage the flight plan by continuously updating the **HDG (heading)** value to follow the correct ground track.
- In **NAV 2D** mode, only the **ROLL** function is active. Any elevation (ALT) values from the route are ignored. In this case, the pilot must manage altitude manually by activating the **ALT** mode and setting the desired altitude.
- In **NAV 3D** mode, even if the ALT function is deactivated, the autopilot will set the altitude by linearly interpolating between the altitude values of the current route segment. Activating the ALT function has no effect, and the altitude value cannot be edited. The autopilot remains active and locked in NAV 3D mode.
- In **NAV EXT [NMEA]** mode, if the autopilot is active, it will interpret incoming **$GPAPA** and **$GPAPB** NMEA sentences to continuously update the HDG value for route tracking. Altitude is not managed in this mode, and behavior is similar to NAV 2D. Pitch control depends on whether **ALT** or **VS** modes are enabled and configured.

To receive $GPAPA and $GPAPB commands via the NMEA interface, set the baud rate under **SETUP -> NMEA -> BAUD**. It is recommended to configure the transmitter to **115200 8N1**, and set the BAUD parameter to **115200**.

The connection must be made between the **RS232 TX pin** of the transmitter and **Pin 3 [NMEA RS232 RX]** of the **SUBD9 connector** located on the rear panel of the EVO EFIS. Refer to the POWER CONNECTION section for further details.

Refer to the WIRING SPECIFICATION section for further details on connecting an external navigator via RS232 NMEA bus or, in the case of APP such as **SkyDemon®**, via the Bluetooth interface.

4.10.3. AP Autopilot VS and ALT Functions:

The **VS (Vertical Speed)** and **ALT (Altitude Hold)** autopilot functions are related to **PITCH axis control**. Through these modes, the autopilot manages climb, descent, and altitude hold.

Since the current altitude is measured via the **barometric sensor**, any change in atmospheric pressure or in the barometric reference (QNH [MSLP] or QFE) will cause the autopilot to immediately react on the PITCH axis in order to return to the programmed altitude.

VS and ALT modes can be enabled or disabled by pressing the knob when the corresponding box is highlighted in blue. Each function also has an associated parameter box for configuration.

VS Function (Vertical Speed)

The **VS function** maintains a controlled climb or descent rate. The selected value, expressed in **ft/min** or **m/s**, is adjustable within **±1000 ft/min** or **±5 m/s**.

However, the indicated airspeed (**IAS**) must remain within the limits defined in **SETUP → AP CONFIG → MIN IAS / MAX IAS**. If these limits are exceeded, the vertical speed will be automatically reduced for safety reasons.

⚠ **It is the pilot's responsibility to ensure all maneuvers are performed within safe flight conditions and comply with VFR policies.**

ALT Function (Altitude Hold)

The **ALT function** levels the aircraft at a specific target altitude. It operates through pitch control and uses the altitude set in the relevant parameter box.

If the target altitude is changed manually, or if it is modified automatically due to active 3D navigation, the autopilot will initiate a climb or descent using the **standard vertical speed** defined in the pareter located in **SETUP → AP CONFIG → STD VS**, which is adjustable within **±1500 ft/min**.

Long Press Actions

A **long press** on the knob when a value box (VS or ALT) is selected triggers the following actions:

- **On the VS value box**: the selected vertical speed is immediately reset to zero.
- **On the altitude box**: the current altitude is automatically copied into the setpoint field.

4.10.4. AP LVL and 180° mode:

LVL Function (Wing Level)

When enabled, the **LVL function** commands the **ROLL axis** to keep the aircraft wings level. It does **not** control heading or altitude. This is a basic mode intended to maintain a **stable, level attitude** aligned with the horizon.

To enable full autopilot control over **heading and altitude**, the pilot must activate **HDG** and/or **ALT** functions in addition to LVL.

Behavior in Combination with HDG or NAV

Note that when HDG or NAV mode is engaged, the aircraft will also be leveled once the selected heading is reached. However, it is strongly recommended to activate all desired autopilot functions before engaging the autopilot to ensure smooth and expected operation.

4.10.5. 180° Function (Quick Turn)

When the **180° function** is activated, the system adds **180 degrees** to the current heading setpoint. This allows for a quick and direct **course reversal**.

⚠ In **NAV mode**, the heading cannot be reversed using the 180° function. The route change must be performed through the **navigation system or flight plan** interface.

4.10.6. AP Activation:

AUTOPILOT ENGAGEMENT PROCEDURE

When all required autopilot modes have been selected and operating conditions are met, pressing the **AP engagement button** will activate the autopilot system. This button is wired between **pins 7 and 8** of the **9-pin SUBD connector**, in parallel with the **OAT sensor** (if present, for TAS calculation).

INITIAL BEHAVIOR AND PILOT CAUTION

Due to several factors—such as imperfect alignment between **servo offset and control stick neutral position**, **incorrect axis trim**, or **flap deployment**—the aircraft may experience slight attitude changes at the moment of engagement if the control stick is released.

☑ It is important that, once all autopilot **functions and setpoints** have been correctly configured, the **AP engagement button is pressed while maintaining manual control of the stick** for a few seconds, until the servos engage and the aircraft levels out.

At that point, the control can safely be handed over to the autopilot, but the pilot must **continue monitoring system behavior and environmental conditions** to ensure maximum safety.

CALIBRATION NOTE

After engagement, it may be necessary to perform calibration of the autopilot control parameters. Refer to the section: AP PARAMETER CALIBRATION for further instructions.

4.10.7. AP Control via Markers:

When the autopilot system is active and **LVL**, **HDG**, and **ALT** modes are engaged, it is possible to control heading and altitude parameters using **on-screen markers** available across different pages, including **PFD**, **HSI**, **MAP**, **GYRO COMPASS**, and **AP**.

Below is a description of marker behavior for each page:

- **PFD ATTITUDE Page:**
  On the artificial horizon screen, the autopilot **heading and altitude** can be adjusted by modifying the corresponding markers via the environment menu.
  Refer to the **PFD ATTITUDE** page section for more details.

- **MAP Page:**
  On the map screen, when the autopilot is active, rotating the **small knob** adjusts the **cyan-colored marker**. This marker directly sets the **HDG value** of the autopilot, which results in a heading change.
  ⚠ This function has **no effect if NAV mode is active**.

- **HSI ADF and GYRO Pages:**
  On the **HSI/ADF** and **GYRO COMPASS (DG)** navigation pages, rotating the **large and small knobs** while the autopilot is active allows for modification of both **heading and altitude markers**.

  - Heading changes have **no effect** if NAV mode is enabled.
  - Altitude changes **do affect** the autopilot even in **NAV mode**, provided the system is operating in **NAV 2D**.

- **AP Page:**
  Modifying the **HDG**, **ALT**, or **VS** values from the AP page immediately updates the corresponding **PITCH** and **ROLL** commands issued by the autopilot.

4.10.8. AUTO_TRIMS:

The **AUTO TRIM** function allows the aircraft trim adjustment to be automated using the autopilot algorithm. Alternatively, the dedicated management page allows manual adjustment of the trim position, which can be saved either as a fixed value or linked to airspeed, in case the angle of attack changes significantly at different cruise speeds.

This function is available upon request only. Please contact the product supplier for more information.

4.10.9. AUTO-FLAPS:

The AUTO-FLAPS function, like the AUTO-TRIM function, uses the autopilot system to automate flap management based on airspeed. In the dedicated screen, it is possible to configure flap deployment settings according to different cruise speeds. Manual flap control is also available. This allows the pilot to adjust the flap position directly, overriding the automatic settings when necessary.

This function is available upon request only. Please contact the product supplier for more information.

5. SETUP PARAMETERS

NOTE: The setup parameters may vary depending on the model

- **EXIT:** Exit from setup.
- **START PAGE:** set which page to show at startup, based on which pages have been enabled in PAGES.
- **BRIGHTNESS:** Sets the display brightness. Set it between 20% and 100% of the IFD-NET EVO PFD brightness level. Select this value according to environment lighting conditions and also keeping in account that a lower value means a lower power consumption and heating generation. In case of battery backup powering, a lower brightness means more autonomy.
- **HDG TYPE:** select “AUTO”, “GPS” or “MAG” to set the behavior of the “heading indicator” in the Primary-Flight-Display (Avionic) screen.
  - “GPS” results in an indication of true ground track.
  - “MAG” shows magnetic heading.
  - “AUTO” shows aircraft GPS ground track when available and falls back to MAG (e.g. if the aircraft is not moving or the GPS fix is lost).
- **MAG DEC** (Magnetic Declination): The MAG DEC (magnetic declination) setting is used to align GPS track and magnetic heading indications. It compensates for the difference between true north (geographic) and magnetic north, and is calculated based on the current position obtained from the GPS receiver.
  - **“OFF”:** Magnetic declination is not applied. The **GPS track** will reference **true north**, while the **magnetic heading** will point to **magnetic north**.
  - **“MAG”** [default]**:** Magnetic declination is applied to the **heading** calculated by the magnetometers. The **magnetic heading** will reference **true north**.
  - **“GPS”:** Magnetic declination is applied to the **GPS track**. The **GPS track** will point to **magnetic north** (used by some EFIS systems as a convention).
- **WIND VECT:** select “ON” to engage the automatic wind direction calculation and wind speed estimation.
- **UOM ALT:** define the unit of measure for barometric altitude and GPS altitude in: meter or feet.
- **UOM IAS:** define the unit of measure for speed indicators in: KPH (Km/h), MPH (Mils/h) or KNOTS.
- **UOM VSI:** define the unit of measure of vertical speed indicator in: meters per second or feet per minute.
- **UOM PRESS:** define the unit of measure of reference pressure in the relative indicator between mBar or inHg. The normalized value after the power up sequence of the unit is 1013mB or 29.92 IN/HG. Pilots can vary this value by aging on the rotary knob big crown in order to increase or decrease reference pressure.
- **UOM DIST:** define the unit of measure of distance in Kilometers (KM) or Nautical Miles (NM)
- **G LIMIT MAX**: Defines the maximum limit of **positive** g-force.

- **G LIMIT MIN**: Defines the maximum limit of **negative** g-force.
- **IAS SPEEDS ->**: enter to IAS colored arcs configuration.
  - **IAS Vs0:** Indicate the value of Vs0 speed corresponding to the white arc start. The speeds are indicated according to the "UOM IAS" parameter setting. Please refer to section "Vspeed" to learn more about the colored arc on IAS gauge screen.
  - **IAS vs1:** Indicate the value of Vs1 speed corresponding to the start of the green arc.
  - **IAS Vfe:** Indicate the value of Vfe speed corresponding to the end of the white arc.
  - **IAS Vno:** Indicate the value of Vno speed corresponding to the end of the green arc and the start of the yellow arc.
  - **IAS Vne:** Indicate the value of Vne speed corresponding to the end of the yellow arc and the start of the red arc.
  - **IAS Vx:** Best-angle-of climb speed (shown as label beside the IAS tape).
  - **IAS Vy**: Best-rate-of climb speed (shown as label beside the IAS tape).
  - **IAS Vr:** Rotation speed (shown as label beside the IAS tape).
  - **IAS Ve:** Maximum efficiency speed (shown as label beside the IAS tape).
  - **IAS Va:** Design maneuvering speed (shown as label beside the IAS tape).
  - **IAS Vg:** Minimum speed with which a maneuver with a negative load factor can be faced (shown as label beside the IAS tape).
- **COLORS->**: enter to COLORS configuration. It's possible to choose up to 32 different colors
  - **GPS BKGND:** change the background color of the GPS info shown on the [PFD②]
  - **GPS TEXT:** change the text color of the GPS info shown on the [PFD②]
  - **WIND BKGND:** change the background color of the Wind info shown on the [PFD⑤]
  - **REF PRESS BKGND:** change the background color of the pressure reference shown on the screen [PFD⑩]
  - **REF PRESS TEXT:** change the text color of the pressure reference shown on the screen [PFD⑩]
  - **BUGs BKGND:** change the background color of the BUGs info shown on the screen [PFD①/⑯]
  - **BUGs TEXT:** change the text color of the BUGs info shown on the screen [PFD①/⑯]
  - **MENU SELECTION:** change the selection color of the menu page [PFD Menu page]
- **PFD CONFIG->**: access to PFD page sub menu settings.
  - **PFD LAYOUT:** chose between "FUL", "CLR" or "AH". In CLR configuration, the Primary Flight Display screen will be re-cluttered by hiding the G-meter, the TURN COORDINATOR bar, the GROUND SPEED, the GROUND ALTITUDE and the VERTICAL SPEED indicator. In AH

configuration (Artificial Horizon) only the bank indicator, heading and slip indicator are visible.

- **BALL SENS:** increases or decreases the sensitivity of the slip indicator. A value of 1.0 means more sensitive while, 16.0 means less sensitive
- **PITCH ALARM:** ON / OFF in order to activate the max and min pitch and display red chevrons that suggest the pilot to pitch up or pitch down and reestablish the safe attitude.
- **PITCH LIMIT:** limit in ± degrees for PITCH ALARM feature.
- **ALT Marker:** Select "ON" to show the selected altitude indicator.
- **MAG Marker:** Select "ON" to show the selected heading indicator
- **PFD COLOR:** change the sky and terrain colors in the AH representation. There are 3 possible graduations:
  - **STD:** the standard EVO style colors.
  - **BRT:** stronger colors in order to maximizes the visibility in sunshine environments.
  - **DRK:** grey terrain and black sky.
- **AH FILTER:** a graphical filtering applied on the AH in order to minimizes the image vibration especially in very turbulent flights:
  - **FST:** this is the standard very fast response AH.
  - **MED:** hyperbolic follower filter with 0.25 sec of delay.
  - **SLO:** hyperbolic follower filter with 0.75 sec of delay.
- **DBG:** reserved. **Keep OFF**!
- **Kp [%]** (default 100%)**:** decreasing this value will affect the extended Kalman filter for gyroscopes compensation. Consider it only after consulting the technical department. 100% is the standard value.
- **EXIT:** back to the main SETUP menu.

- **ROLL TILT (***software releases before 250306***):** by activating this function the installer can adjust for the exact roll installation error. Please refer to the section "ARTIFICIAL HORIZON CALIBRATION" for more details.
- **PITCH TILT (***software releases before 250306***):** by activating this function the installer can adjust for the exact pitch installation error. Please refer to the section "ARTIFICIAL HORIZON CALIBRATION" for more details.
- **BARO CONFIG** ->: enter to BARO configuration
  - **ALT TRIM [-100.0-100.0]**: Can be used to compensate the altimeter indication to precisely match another reference or installed altimeter. The value is expressed in hPa

- **IAS TRIM [-20.0-20.0]**: Can be used to compensate the anemometer indication to precisely match another reference or installed anemometer. This is also the way to compensate the zero-speed offset; in case the IAS tape move and display a residual speed when the aircraft is stationary and no windy, use this parameter to amend this offset by applying -0.1 or -0.2 to this parameter.
- **IAS FACT (%):** percentage factor that allow to adjust the IAS calculation gain. Certain PITOT has a different pressure characteristic and need to be adjusted by the gain factor. Standard PITOT need 100% (default).
- **IAS FILTER:** can be used to apply a digital filtering to the IAS speed indication. Possible value is **FST** (fast and standard setting), **MED** (medium filtering) or **SLO** (maximum filtering level).
- **AOA ENABLE: YES / NO** to enable or disable the AOA representation on the PFD AH page.
- **AOA TRIM [-20.0-20.0]**: use this parameter to adjust the offset position for the optimal angle of attach.
- **AOA GAIN:** use this parameter to adjust the gain for the AOA indicator. The calibration procedure is explained in the <u>CALIBRATION</u> section.
- **TAS/UTC ENABLE**: enable or disable the TAS visualization on PFD. The TAS box also display the UTC time and the power voltage level.
- **SAVE MSLP:** allows saving and restoring the reference pressure across power cycles.
- **ALT TYPE:** set the altimeter style, choosing between the classic style with hands (3PTR) or the modern one with numerical indicator (DRUM).
- **VSI SCALE:** Set the full scale of the hand Variometer choosing between "NORM" (+ -2500 ft/min) or "EXT" (+- 6000 ft/min)
- **VSI SENS [2.0-8.0]:** Set the sensitivity of the hand Variometer by setting it between 2.0 (more sensitive) and 8.0 (less sensitive)

- **MAP CONFIG ->:** enter to MAP configuration.
  - **GS on MAP:** choose to display or not the ground speed on the maps page.
  - **IAS on MAP:** choose to display or not the indicated speed on the maps page.
  - **TRACE REC:** Enable / Disable the track recorder, this will memorize the track traveled by the aircraft.
  - **TRACE BUFFER [0-10’000]:** Sets the number of GPS position samples stored in the trace buffer.
  - **MAP SKIN [0-7]:** Selects between several colors scales for display of terrain elevation in the moving map.
  - **POS. ICON:** Select which position icon to appear on the moving map.

- **F.C.W:** Forward collision warning, setting altitude and distance.
- **DETAILS:** For each type of map symbol, define whether it is shown
  - DIS - Disabled, not shown on map.
  - SYMB - Show the symbol without label.
  - SY/LA - Show both symbol and label.
- **ZOOM:** For each type of map symbol, define the minimum zoom level to show the symbol itself and its label.

- **A.P. CONFIG**

  - **MIN IAS:** Minimum indicated airspeed for automatic reduction of climb or descent rate. When this limit is reached, a **MIN IAS** indication appears on the **PFD** page.

  - **MAX IAS:** Maximum indicated airspeed for automatic reduction of descent or climb rate. When this limit is reached, a **MAX IAS** indication appears on the **PFD** page.

  - **MIN ALT:** When this limit is reached, a **MIN ALTITUDE** indication appears on the **PFD** page.

  - **MAX ALT:** When this limit is reached, a **MAX ALTITUDE** indication appears on the **PFD** page.

  - **STD VS[±] f/min:** Indicates the standard vertical speed used by the autopilot system to reach the selected altitude when adjusting the altitude parameter in **AP ALT** mode. The value is always expressed in **feet per minute**.

  - **VS GAIN ADJ:** Additional parameter to optimize the climb or descent ratio in VS mode.

  - **SERVO ROLL ->** Please refer to AP PARAMETERS CALIBRATION for more details concerning the AP parameters configuration.

    - **MAX BANK:** Indicates the maximum bank angle used by the autopilot to perform turns when adjusting to the correct heading. If this angle is exceeded by more than **5 degrees for over 5 seconds**, a **MAX BANK** warning will appear on the **PFD page**.

    - **MAX TORQUE:** indicates the maximum torque the servo can apply without causing the safety clutch to slip, which would return manual control to the pilot. If this protection is triggered, the autopilot will attempt to resynchronize the control positions and regain control until the pilot manually disengages the autopilot using the **ENGAGE/DISENGAGE** button.

    - **SERVO SPEED:** Indicates the maximum servo rotation speed, expressed in degrees per second.

    - **SERVO OFFSET:** Indicates the servo neutral position and is used to compensate for installation inaccuracies. If this value is too high, it is recommended to check the mechanical installation parameters.

    - **SERVO COURSE ±:** indicates the maximum travel range of the servo, which may be affected by the value set in **SERVO OFFSET**. In any case, the servo's physical travel cannot exceed **±60 degrees** from the absolute neutral position.

- **GAIN KP:** Indicates the **proportional gain** of the PID controller for the autopilot's **ROLL axis**.
- **GAIN KI:** Indicates the **integrative gain** of the PID controller for the autopilot's **ROLL axis**.
- **GAIN KD:** Indicates the **derivative gain** of the PID controller for the autopilot's **ROLL axis.**
- **TURN RATE:** When settled, it controls the turn rate by maintaining a constant angular velocity, while always respecting the **MAX BANK** limit.
- **REVERSE:** enables command reversal for the servo. This setting is required in cases where the installation is **asymmetrical**, and an increase in the servo position angle results in a **decrease** in the control surface incidence (i.e., **reversed control response**).

o **SERVO PITCH ->** Please refer to AP PARAMETERS CALIBRATION for more details concerning the AP parameters configuration.

- **MAX PITCH:** Indicates the maximum pitch angle used by the autopilot to perform climbs or descents in order to reach the desired vertical speed or target altitude. If this angle is exceeded by more than **3 degrees for over 5 seconds**, a **MAX PITCH** warning will appear on the **PFD page**.
- **MAX TORQUE:** indicates the maximum torque the servo can apply without causing the safety clutch to slip, which would return manual control to the pilot. If this protection is triggered, the autopilot will attempt to resynchronize the control positions and regain control until the pilot manually disengages the autopilot using the **ENGAGE/DISENGAGE** button.
- **SERVO SPEED:** Indicates the maximum servo rotation speed, expressed in degrees per second.
- **SERVO OFFSET:** Indicates the servo neutral position and is used to compensate for installation inaccuracies. If this value is too high, it is recommended to check the mechanical installation parameters.
- **SERVO COURSE ±:** indicates the maximum travel range of the servo, which may be affected by the value set in **SERVO OFFSET**. In any case, the servo's physical travel cannot exceed **±60 degrees** from the absolute neutral position.
- **GAIN KP:** Indicates the **proportional gain** of the PID controller for the autopilot's **PITCH axis.**
- **GAIN KI:** Indicates the **integrative gain** of the PID controller for the autopilot's **PITCH axis.**
- **GAIN KD:** Indicates the **derivative gain** of the PID controller for the autopilot's **PITCH axis.**
- **VS-FWD:** Guadagno della compensazione PID feedforward usata nell'algoritmo di controllo del rateo di salita o discesa.
- **REVERSE:** enables command reversal for the servo. This setting is required in cases where the installation is **asymmetrical**, and an increase in the servo position angle results in a **decrease** in the control surface incidence (i.e., **reversed control response**).

- **SERVO AUX ->** The AUX servo can be configure to work as **YAW** axes **PITCH TRIM** or **FLAP** actuator. Please refer to AP PARAMETERS CALIBRATION for more details concerning the AP parameters configuration.

  - **MAX YAW:** Indicates the maximum angle used by the autopilot to perform the function selected in the **MODE** parameter. Depending on the mode assigned to the **AUX** servo, the related configuration parameters may vary significantly

  - **MAX TORQUE:** indicates the maximum torque the servo can apply without causing the safety clutch to slip, which would return manual control to the pilot. If this protection is triggered, the autopilot will attempt to resynchronize the control positions and regain control until the pilot manually disengages the autopilot using the **ENGAGE/DISENGAGE** button.

  - **SERVO SPEED:** Indicates the maximum servo rotation speed, expressed in degrees per second.

  - **SERVO OFFSET:** Indicates the servo neutral position and is used to compensate for installation inaccuracies. If this value is too high, it is recommended to check the mechanical installation parameters.

  - **SERVO COURSE ±:** indicates the maximum travel range of the servo, which may be affected by the value set in **SERVO OFFSET**. In any case, the servo's physical travel cannot exceed **±60 degrees** from the absolute neutral position.

  - **GAIN KP:** Represents the **PROPORTIONAL** gain of the **PID** controller for the **AUX** servo, if required by the mode selected in the **MODE** parameter.

  - **GAIN KI:** Represents the **INTEGRATIVE** gain of the **PID** controller for the **AUX** servo, if required by the mode selected in the **MODE** parameter.

  - **GAIN KD:** Represents the **DERIVATIVE** gain of the **PID** controller for the **AUX** servo, if required by the mode selected in the **MODE** parameter.

  - **MODE:** Used to define the function assigned to the auxiliary servo. The available configuration options are described below:

    - **YAW:** in this mode, the servo is controlled by the autopilot to manage the rudder and compensate for yaw during turns, helping to maintain coordinated flight.

    - **TRIM:** in this mode, the servo is configured to adjust the **PITCH trim**. Refer to the **AUTO-TRIM** section for more details.

    - **FLAP:** in this mode, the servo is linked to the **FLAP** function. Refer to the **AUTO-FLAP** section for further information.

  - **REVERSE:** enables command reversal for the servo. This setting is required in cases where the installation is **asymmetrical**, and an increase in the servo position angle results in a **decrease** in the control surface incidence (i.e., **reversed control response**).

- **UPDATE FW SERVO ->** Follow the instructions shown on the screen. For the correct servo firmware update procedure, refer to the **SERVO CALIBRATION AND FIRMWARE UPDATE** section.

- **NMEA**->: Configure GPS input and output information
  - **BAUD:** Set the output information speed.
  - **GPRMC:** enable or disable the recommended minimum specific GPS/Transit data.
  - **GPRMB:** enable or disable the recommended minimum navigation info.
  - **GPAPA:** enable or disable the Autopilot sentence A.
  - **GPAPB:** enable or disable the Autopilot sentence B.

- **PAGES**->: Configures which pages are active.

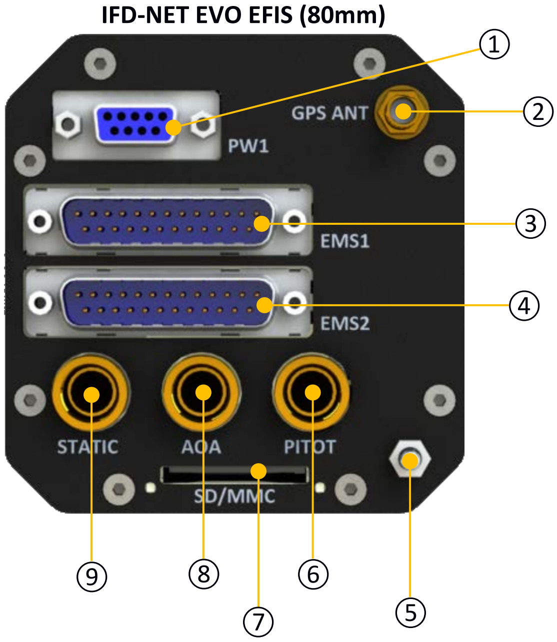
- **COMPASS ->:** this is the way to access to magnetic compass calibration sub menu'. Please refer to section "MAGNETIC COMPASS CALIBRATION" to find the exact calibration sequence steps.
- **LOGIN->:** Internal use
- **UPDATE:**
  - **SW VER:** Indicates the software release.
  - **UP NAV:** YYMM Year/month of installed navigation database. This item is used to start a database update from the SD card.
  - **UPDATE SOFTWARE:** This item is used to start a software update from the SD card.
  - **IMPORT USR:** Import user waypoints from SD card (user_wpt.txt).
  - **EXPORT USR:** Export user waypoints to SD card (user_wpt.txt).
  - **REBOOT:** System reboot.

NOTE: The setup parameters may vary depending on the model

6. CONNECTIONS

6.1. REAR CONNECTORS VIEW AND DESCRIPTION

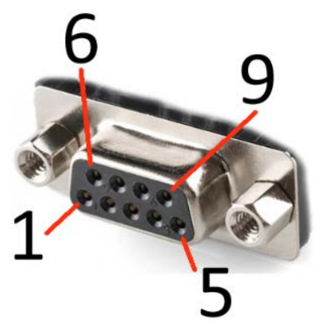
IFD-NET EVO EFIS (80mm)



The power connector is the only electrical connection needed. The details about this connector are explained in the section "8.1 POWERING AND EXPANSION BUS". The expansion connectors are not used in IFD-NET EVO EFIS model. Pneumatic inlets, STATIC, AOA and PITOT pressures, are provided by three brass 1/8 NPT female plugs. **USE ADEQUATE ADAPTERS WITH RUBBER O-RINGS AND DO NOT TURN HOSES WITH TOO MUCH FORCE IN ORDER TO AVOID DAMAGE TO UNIT'S INTERNAL PARTS**. GPS connector antenna accepts any SMA male standard connector and several active or passive types GPS band antennas. Please observe the right policy during your aircraft antenna's position selection. Contact the vendor to obtain more information on this point.

① Power Connector
② GPS Antenna
③ Expansion connector 1
④ Expansion connector 2
⑤ Ground chassis
⑥ Pitot connector
⑦ Slot for SD-Card
⑧ AOA connector (secondary pitot for angle of attack)
⑨ Static connector

6.2. POWER CONNECTOR



- **Pin 1**: Input 12/24 Vdc
- **Pin 2**: NMEA RS232 TX
- **Pin 3**: NMEA RS232 RX
- **Pin 4**: RS485 A+ signal for FLY BUS®
- **Pin 5**: GND
- **Pin 6**: Input 12/24 Vdc (internally connected to pin 1)
- **Pin 7**: NTC temperature sensor for TAS calculation (10K @ 25°)
- **Pin 8**: GND temperature sensor for TAS calculation
- **Pin 9**: RS485 B- signal for FLY BUS®

6.3. GPS ANTENNA

In the figure below, the GPS antenna provided in the box with terminated by a SMA MALE standard connector.

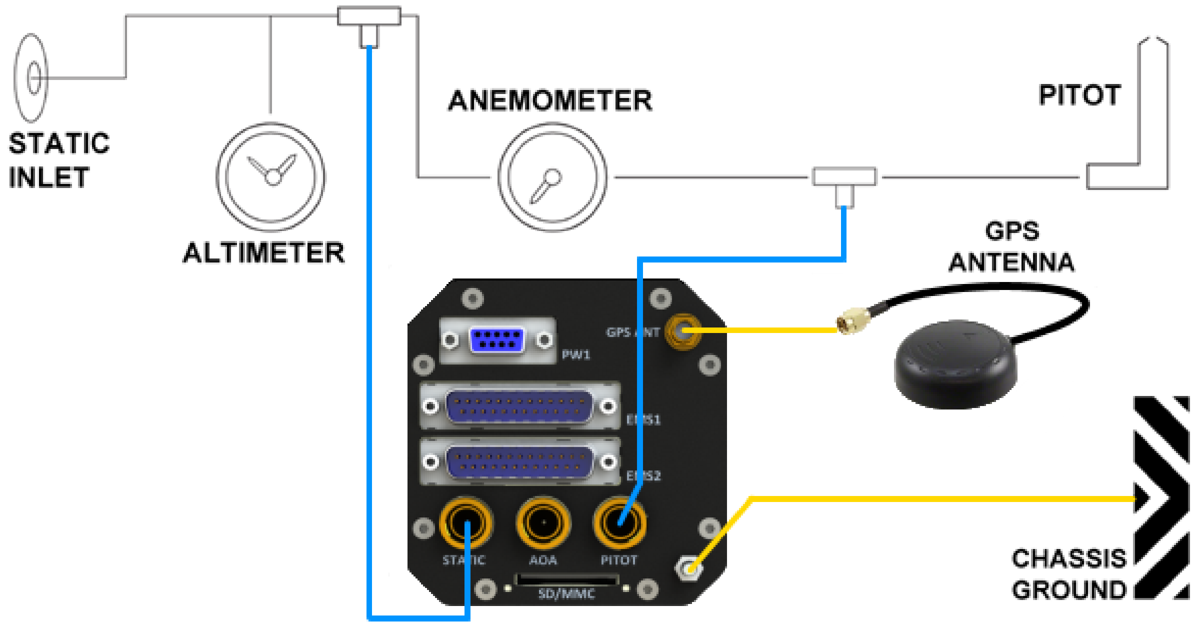
There are some precise rules to observe on how to install GPS antenna:

- Choose an adhesive type antenna in order to obtain a perfect coupling between the parts, antenna and aircraft.
- Choose a location where no electromagnetic noise is present.
- GPS antenna must not be covered by metallic or conductive shields. Keep in account that carbon fiber is a conductive material and may reduce the receiver’s sensitivity.
- GPS antenna cable must not pass near electromagnetic noise generators like radio, transponder or ELT.

Please refer to safety aeronautical rules in order to make a reliable antennas installation. Consider all the radio frequency based installed equipment needs in order to avoid electromagnetic conflicts.

6.4. PNEUMATIC AND GPS ANTENNA CONNECTION DIAGRAM

The pneumatic circuit functionality is very important in order to obtain correct avionic data. Please observe normal safety rules by connecting rubber pipes to the STATIC and PITOT inlet. Contact vendor for any questions regarding the right way to setup the aircraft plant. See below a diagram of pneumatic and GPS antenna connections.



Pneumatic, GPS and Ground chassis connections

IMPORTANT NOTES ON PITOT/STATIC CONNECTION

<u>Ensure that during installation the PITOT and STATIC tubes don't develop any twist and/or kinks, otherwise the IAS and barometric Altitude indications will not work correctly. A bad airspeed reading may also affect the reliability of the attitude indication</u>.

When fixing the PITOT/STATIC pipes to the instrument, please be particularly careful to not twist the 1/8 NPT female adapters on the back of the unit.

IF A TOO STRONG TORQUE IS APPLIED, THESE ADAPTERS MAY ROTATE AND TWIST THE INTERNAL SILICON PIPES, CAUSING A MALFUNCTION OR PRESSURE LICKS.

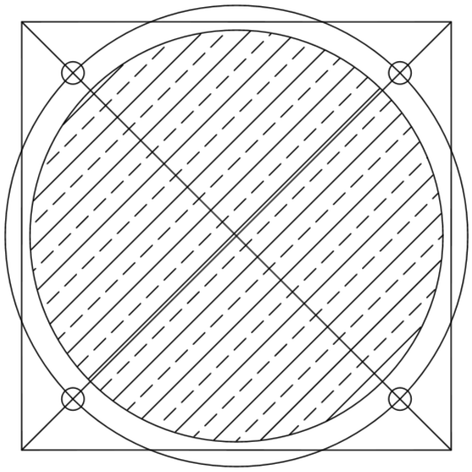
We suggest to use pipe hose adapters with rubber O-Ring in order to avoid pressure leaks, and in any case don't lock the assembly too strongly.

<u>!!!THE HOSE ADAPTERS SHOULD BE LOCKED BY HAND AND NOT BY WRENCH!!!</u>

7. INSTALLATION GUIDE

The IFD-NET EVO EFIS model has a standard 80mm aeronautical shape and is intended to be installed into a standard 80mm hole (3.125'').

This means the installer should observe the standard way in order to obtain a correct installation on the unit. Refer to the hole templates below in case your aircraft doesn't have 80mm holes already prepared.



3 1/8 (80mm) Instrument Hole

1. Draw a 3.25" X 3.25" Square
2. Scribe 2 diagonal lines corner to corner
3. Using the center of the lines, scribe a 3.5" diameter circle.
4. At the intersection of the diagonals and the 3.5" dia circle drill 4 holes to clear #8 screw (.170" dia.)
5. Using the center of the diagonal lines cut a hole with a hole saw 3.125" dia.

To lock the IFD-NET EVO EFIS (80mm) unit on your cockpit use the three black screws provided in the purchase box, otherwise select different screws with same dimension of 4MA x 10mm MAX.

The IFD-NET (80mm) is installable in a standard hole, keeping in account that the lower-right screw hole shall be enlarged to a diameter of 7.5 mm to accommodate the rotary knob.

The screws on the remaining three holes shall be tightened with appropriate torque, in a way to keep the instrument fixed and not introduce any vibration which would decrease the accuracy of the gyro sensors.

Remove the aluminum knob by turning on the little screw. This is because the encoder shaft needs to pass throw the 7.5mm diameter hole in the bottom right corner of the 80mm hole.

After putting the instruments in the reworked slot, install the aluminum knob and turn its screw to lock it; use a plastic profile to obtain a thickness of about 1mm between the cockpit surface and the bottom part of the aluminum knob.

Use the provided 4mm MA black screws (length 10mm) to fix the instrument to the panel. Do not over-tighten the screws in order to avoid damage to the IFD-NET chassis. Use a medium thread locker to ensure screws will not come off due to vibrations.

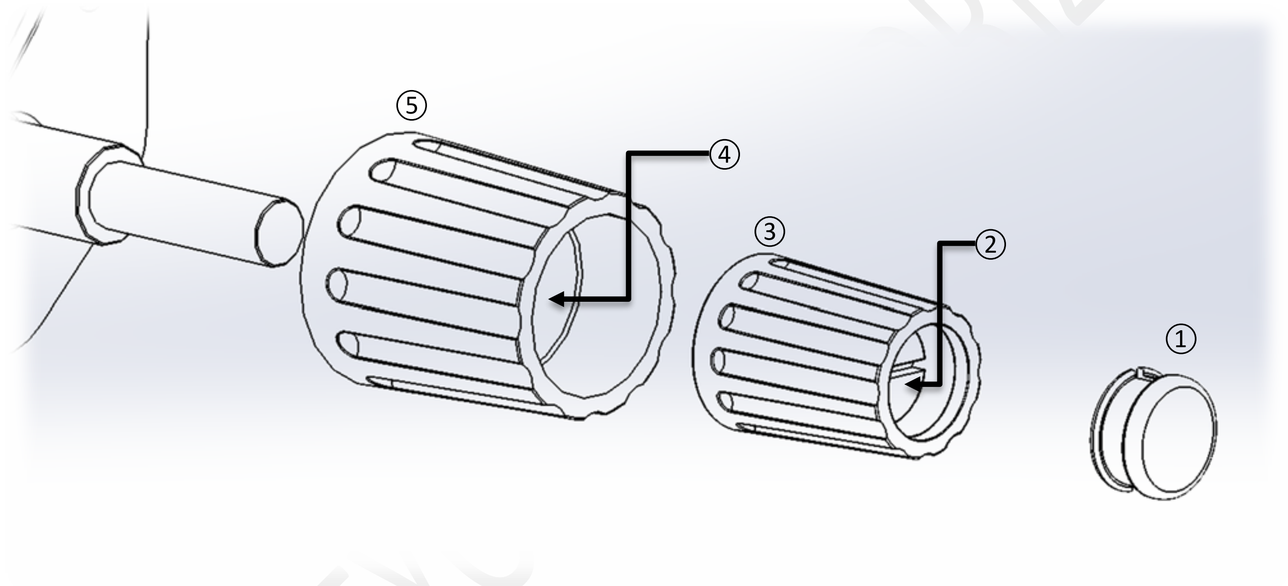
7.1. DISASSEMBLY/ASSEMBLY THE KNOBS

To disassembly/assembly the knobs it needs:

- flat screwdriver (blade 4 x 0.8mm)
- socket hex screwdriver (6mm)

7.2. DISASSEMBLY STEPS

1. Using a thin blade or fingernail, remove frontal cap ①
2. With a flat blade screwdriver unscrew (not completely, half turn) the screw ② under the cap ① and remove the little knob ③
3. With a socket hex screwdriver unscrew the hex nut ④ (not completely, about half turn) and remove the big knob ⑤



<u>It is not recommended to completely unscrew the nuts and screws of the knob as reassembly may be difficult.</u>

7.3. SELECTING AN APPROPRIATE INSTALLATION POSITION

IFD-NET EVO EFIS is a multi-sensor system based on a variety of sophisticated transducers. Every sensor has a sensitive element which measure a different physical quantity. For this reason, the embedded three axis magnetometer must be as far as possible from strong magnetic fields, as much as the three-axis accelerometer could be located in a zone not directly subjected to resonant unwanted vibrations of the body of the plane. Some rules must be observed in order to select an appropriate installation position:

- Mobile headset, phone or other electronic equipment may generate unwanted magnetic fields that interact with magnetometer sensor at the base of the embedded digital compass; this result, firstly, in an incorrect value of the magnetic heading, and then, in an erroneous calculation/estimation of the wind direction and speed. Metallic objects (especially ferromagnetic) can disturb the normal functionality of the magnetic compass. **We suggest to use a hand-held compass to verify the magnetic disturbance in the area selected for installation**. If the needle shows relevant changes or unstable indication, the location is not suitable for installation. Make sure to perform this test with all on-board electronic devices switched ON.
- GPS unit is embedded in the body of the instrument IFD-NET EVO EFIS. For this reason, a high level of electromagnetic radiations may cause a degradation of its sensitivity and performance. Choose an install position not so close to radio-frequency emitter units like radios, ELTs or transponders. Pay attention in antennas position also in order not to compromise the proper operation of all the aircraft instruments.
- As the unit contains GYROSCOPE and ACCELEROMETER sensors, we recommend to install the instrument as much aligned as possible with the aircraft axes. A maximum tilt of 5 degrees in roll and pitch should be respected. It is possible to compensate for this directly and easily when the aircraft is in a level attitude using the PITCH ADJ function.
- Choose a position not affected by residual and unwanted vibration. The instrument uses a sophisticated algorithm to determine the real gravity vector from the total sensed acceleration. Too much resonant vibration can further complicate the computation resulting in reduced performance of this compensation.
- The pitot-static system contributes to the attitude calculation (it determines the frontal acceleration) and also for this reason must be in good condition and without leaks. No high pressures are involved in this circuit but, when selecting the install position, leave enough space on the rear of the instrument to allow the rubber pipes to flow without too tight bends.
- Avoid installing the equipment near hot surfaces. A good idea could be to ventilate the rear of the cockpit in order to protect instruments from overheating during exposure of the aircraft to direct sunlight.

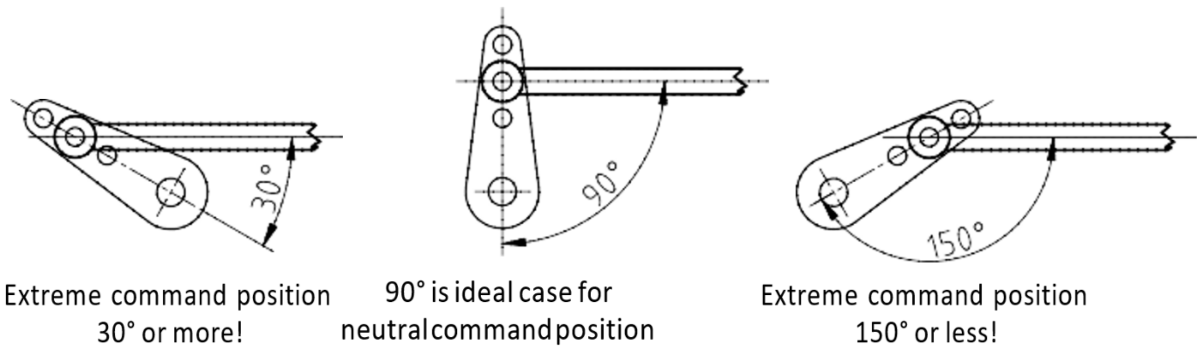
There is plenty of documentation available that explains how to correctly install avionic instruments. Please refer to technical literature for more information.

7.4. SERVO INSTALLATION

The installation of servos for control stick actuation must follow specific geometric and mechanical requirements. These considerations are essential to ensure proper operation and system reliability.

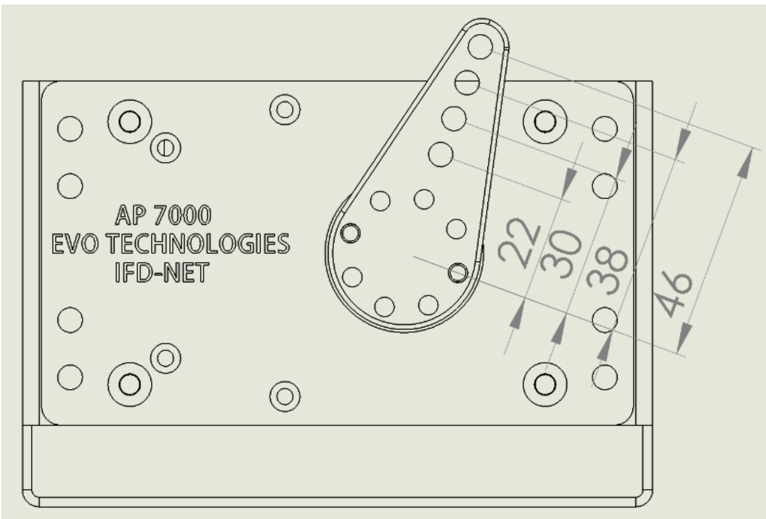
First, it is important to note that the servos generate a variable and configurable torque ranging from **1.5 Nm to 5 Nm**. This torque is applied to a slotted lever with four anchoring points located at different radial distances from the rotation center. As a result, the system can produce a wide range of output forces and offers four different linear stroke lengths.

The maximum allowable rotation is **120°**, mechanically limited by built-in structural end stops. However, it is the installer's responsibility to ensure that the maximum travel of the linkage system never reaches these mechanical limits. A descriptive illustration is provided below:



It is **MANDATORY** during installation to ensure that the lever cannot reach a **stall position** due to a "negative" linkage geometry (rod rotation) that could **block the control arm**. If the installer is not fully familiar with this aspect, technical support must be contacted.

It is also mandatory to ensure that all joint fasteners and the control stick mechanism are designed to **break or release** under a defined force, allowing the complete release of flight controls in case of emergency. For this reason as well, it **is essential** that the installer **has solid technical knowledge**, and contacts technical support if further clarification is needed.



The slotted lever is designed with pre-drilled holes, allowing it to be installed at different angles with 45° offsets. It is therefore important to consider several parameters when deciding how and where to attach the push linkage to the control stick lever.

The different mounting positions of the push arm on the four available holes of the slotted lever produce a range of output forces for each torque setting. These values are summarized in the following table:

TORQUE	POS. 1 [46 mm]	POS. 2 [38 mm]	POS. 3 [30 mm]	POS. 3 [22 mm]
1.5Nm	3.33 kgf	4.03 kgf	5.10 kgf	6.95 kgf
2.0Nm	4.43 kgf	5.37 kgf	6.80 kgf	9.27 kgf
2.5Nm	5.54 kgf	6.71 kgf	8.50 kgf	11.59 kgf
3.0Nm	6.65 kgf	8.05 kgf	10.20 kgf	13.91 kgf
3.5Nm	7.76 kgf	9.39 kgf	11.90 kgf	16.22 kgf
4.0Nm	8.86 kgf	10.73 kgf	13.60 kgf	18.54 kgf
4.5Nm	9.97 kgf	12.07 kgf	15.30 kgf	20.86 kgf
5.0Nm	11.08 kgf	13.42 kgf	17.00 kgf	23.18 kgf

The table below shows the actual maximum linear travels corresponding to a 120° rotation (from -60° to +60°), for a push arm mounted in each of the four possible positions on the slotted lever.

Mounting Position (radius)	Linear travel
46 mm	96.34 mm
38 mm	79.59 mm
30 mm	62.83 mm
22 mm	46.08 mm

Useful Information for Installation

The installer must take into account the control stick leverage ratio, considering the distance between the pilot's hand position and the anchoring point relative to the control stick's rotation axis. Many ultralight aircraft provide predefined mounting points for push arms driven by servos, as shown in the image below (P92 Tecnam®).

However, even in these cases, the leverage ratio for both axes must be calculated or measured using a suitable force gauge. The selection of the anchoring position is aimed at achieving three main objectives:

1. The first objective is to ensure that the full movement of the control stick along the selected axis corresponds to an almost complete rotation of the slotted lever, within its maximum allowable range of ±60°. This ensures that the stick can move through its full natural travel and that the servo does not in any way limit its dynamics. It is recommended to leave a safety margin of approximately ±10° before the servo reaches its mechanical end stops. This means that the full stick travel should produce a **rotation of about ±50°** on the lever, with the **neutral (trimmed flight) position** located near the **center of this rotation** range.
2. The second objective is to select the servo position, set the slotted lever at the correct rotation angle (**45° steps**), and choose the appropriate length of the push arm in order to ensure that the lever rotates as close as possible to its **central position (OFFSET = 0°)** when the control stick is in the **neutral position**—that is, the position that keeps the aircraft level during cruise flight.
3. The third objective is to ensure that the force generated by the servo, with a torque setting of **3 to 3.5 Nm**, is sufficient to control the stick even in turbulent conditions, while still being low enough for the pilot to override the autopilot and manually control the aircraft when desired or needed.

Although in some cases—on one or more axes—it may be necessary to set a higher torque, even close to the maximum allowed value of **5.0 Nm**, it is recommended to calculate an anchoring position that allows **3.5 Nm** to be sufficient. This provides a useful adjustment margin, for example in case of **cruise flight under heavy turbulence** (from **3.5 Nm to 5.0 Nm**). In addition, operating the servos at a torque level well below the maximum available significantly reduces power consumption and increases the overall reliability of the servos.

In case of turbulence, strong wind, or if the pilot intends to override the autopilot control, the electronic clutch will allow the slotted lever to rotate, opposing only the programmed torque—for example, 3.5 Nm. The maximum slip angle of the clutch is **±20°**. Beyond this limit, the servo will **temporarily release the clutch**, then automatically resume control with the preset force. If the pilot wishes to permanently disable the control function, the **AP ON/OFF button** must be used.

Proper ventilation must be ensured in the compartment where the servos are installed.

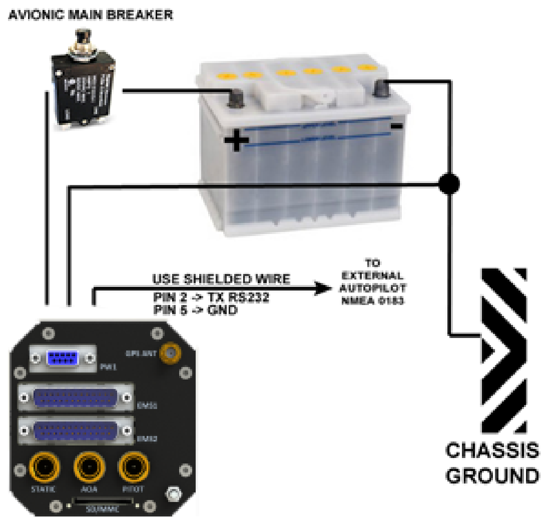
Adequate routing for the electrical connection cables must be provided to prevent damage during movement of the slotted levers.

Each servo contains a strong magnet used to determine the absolute rotation position of the slotted lever. As a result, servos are **not suitable for installation near remote modules such as digital compasses or other equipment sensitive to magnetic fields**. Additionally, the servo itself may be affected by strong external magnetic fields, so installations in magnetically noisy environments must be avoided.

8. ELECTRICAL CONNECTIONS

8.1. POWERING AND EXPANSION BUS

IFD-NET EVO wiring



The electrical connection of the **EFIS BASE** and **PLUS** models is very simple. As all of the sensors are inside the metal aluminum housing, the only electrical connection it needs is the main power line (**10 to 28 Vdc** using an aeronautical safety breaker) and an optional connection to the expansion BUS. Please contact vendor in order to find out more details on the expansion accessories designed for this unit.

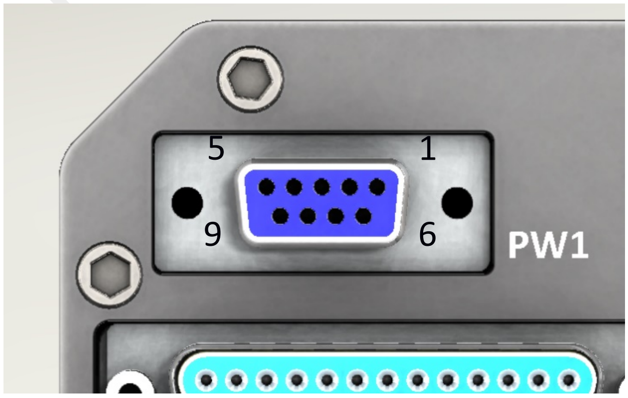
Each unit current consumption depends on the applied voltage and the brightness level chosen in the SETUP. The suggested Breaker value is 2A each unit.

On the right is a simple wiring diagram for electrical connection of the IFD-NET EVO.

Use wires with a cross section not less than 1.0 square millimeters. Keep connections as short as possible.

8.2. IFD-NET EVO EFIS POWER CONNECTOR PINS

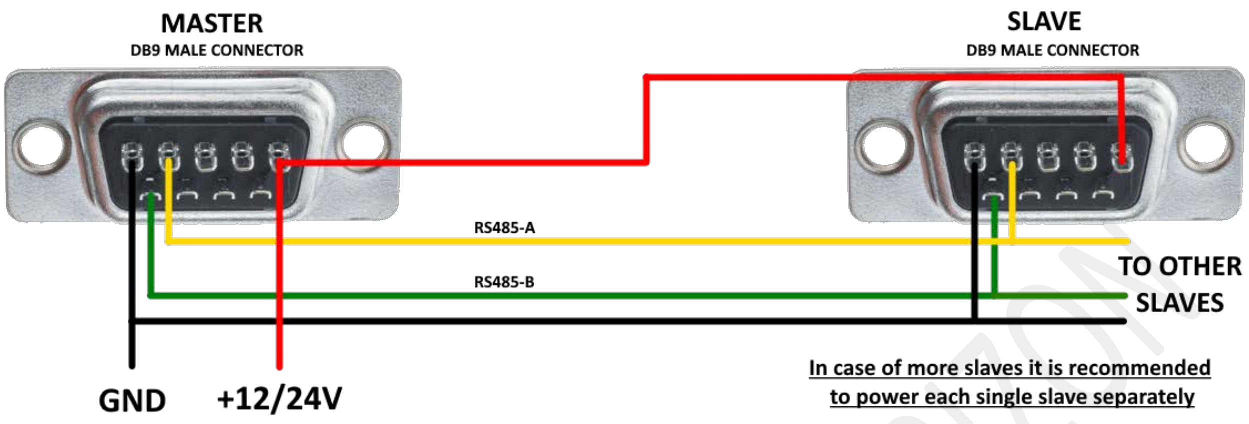
1. Main power supply (acceptable voltages 10 - 28 Vdc).
2. (TX output) pole of RS232 BUS.
3. (RX input) pole of RS232 BUS.
4. (A) Pole of RS485 BUS.
5. Ground. Connect to Ground chassis of aircraft or to negative pole of electric circuit.
6. Main power supply (acceptable voltages 10 - 28 Vdc).
7. NTC sensor for TAS calculation / AP switch.
8. GND sensor for TAS calculation / AP switch.
9. (B) Pole of RS485 BUS.



Pins 1 and 6 must be connected both to the positive pole of aircraft electric circuit. Pins 5 must be connected to negative pole of aircraft electric circuit.

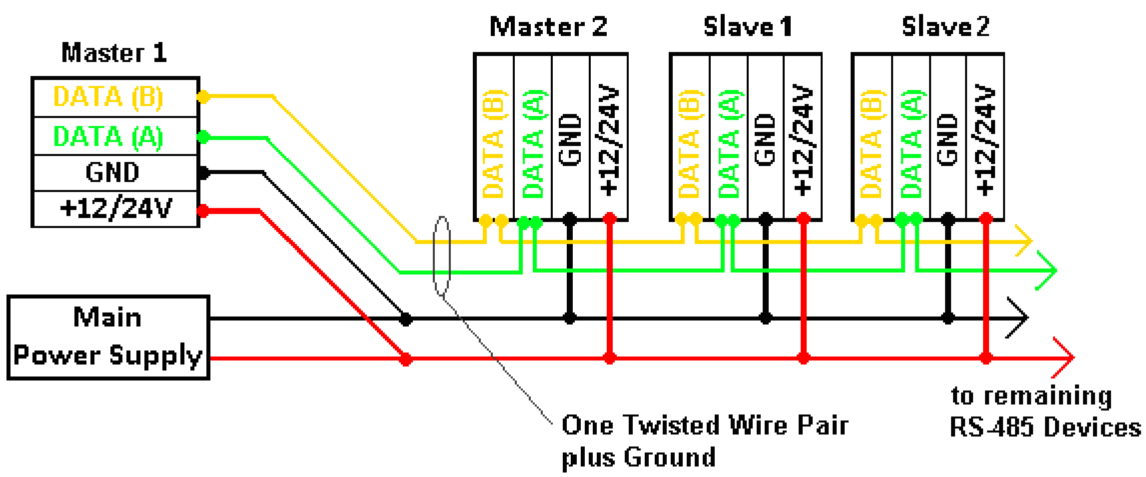
Is strictly recommended to connect the dedicated GROUND shaft on the rear of the instrument directly to the metal ground chassis of the aircraft by an adapt "ring faston terminal" and by a black cable with 1.0 square millimeters section. This practice may decrease radio frequency noises generated by the device and improve the filtering efficiency of internal electronic components (see "Pneumatic, GPS and Ground chassis connections" figure below).

8.3. MASTER SLAVES CONNECTION



8.3.1. WIRING SPECIFICATION

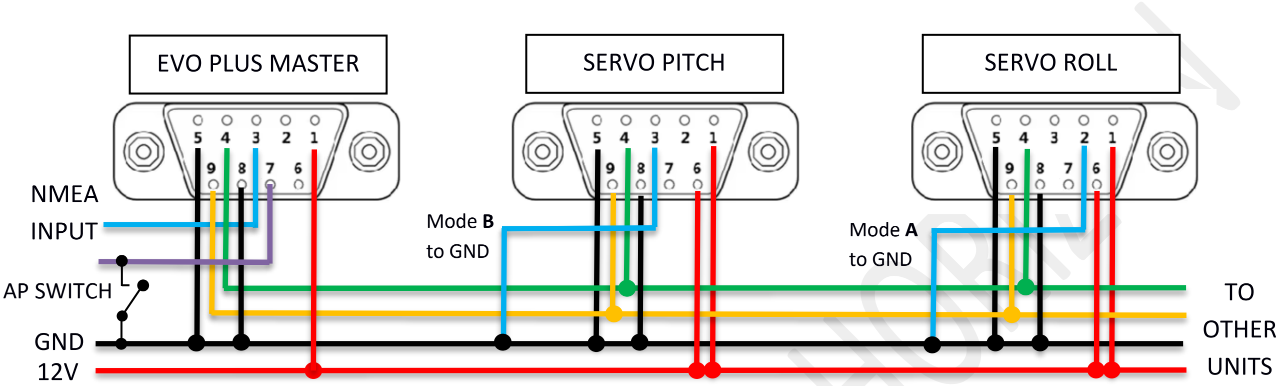
The MASTER-SLAVE connection has to be made by shielded cable with at least 4 conductors with a section equal to or greater than 0.5mm^2 (20AWG) and less than 1 meter in length.
In case of lengths greater than 1 meter it is recommended to increase the cable section to 1 mm^2 (17AWG).
If several SLAVE units are to be connected, it is recommended to separate the bus cable from the power supply (see image below).



8.4. AP SERVO CONNECTIONS:

The diagram below shows a connection layout for the **EVO PLUS** master unit with two servos configured for the **PITCH** and **ROLL** axes. Note that the servo power supply must be strictly **12 V**. Supply voltages above **14.7 V are not allowed** (**24 V NOT PERMITTED**).

Pay close attention to polarity reversal, as it can cause permanent damage to the electronic board inside the servo. Before powering the circuit for the first time, carefully check all connections. If in doubt, contact **qualified technical personnel**.

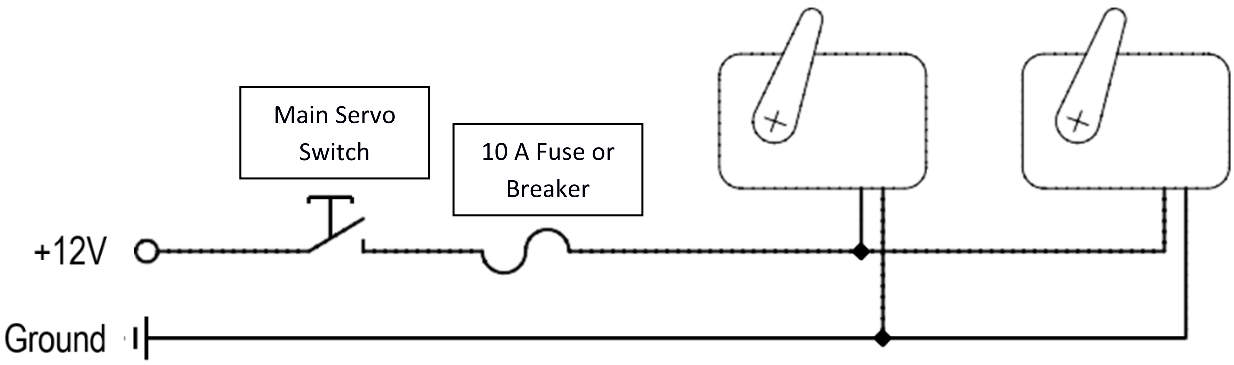


Rear view of the harness's flying 9-pin SUB-D connectors

The connectors shown in the diagram are male inline types and are represented from the rear view, where the electrical wires are soldered.

For wiring, it is essential to use cables with appropriate cross-section and quality, suitable for the current drawn by each device.

Each servo can draw peak currents up to 5 Amps, especially during sudden movements at maximum torque, even if only for short periods. A dedicated power circuit for the servos is strongly recommended. In such cases, a dedicated switch and a **10 A fuse or Breaker** should be included.



8.4.1. SERVO WIRING:

The servo connector is a standard SUB-D Female and the relative Male connector is provided. Electrical connections must be done by a qualified personnels only. Is mandatory to connect both the positive pins (pin #1 and pin #6) and negative pins (pin #5 and pin #8)

1. Main power supply (Acceptable voltages 11.5 – 14.7 Vdc).
2. Mode A.
3. Mode B.
4. (A) Pole of RS485 BUS.
5. GND.
6. Main power supply (Acceptable voltages 11.5 – 14.7 Vdc).
7. Reserved.
8. GND.
9. (B) Pole of RS485 BUS.

Male connector of the servo unit.

8.4.2. SERVO CONFIG:

Servo configuration for axis assignment is performed by connecting the Mode A and B pins to ground (**GND**), according to the table below. Note that the same Mode A and B pin configuration is also used to trigger the **automatic servo calibration** process. For this procedure, refer to the SERVO CALIBRATION AND FIRMWARE UPDATE section**.**

MODE A	MODE B	FUNCTION
GND	OPEN	ROLL
OPEN	GND	PITCH
OPEN	OPEN	AUX
GND	GND	CALIBRATION PROCEDURE

9. CALIBRATIONS

9.1. ARTIFICIAL HORIZON CALIBRATION (FOR SOFTWARE RELEASES BEFORE 250306)

The gyroscopes and accelerometers are already factory calibrated and don't need further adjustments during installation.

In case your **software release** would be **precedent to 250306_B**, it is however possible to compensate for a mounting orientation that is not perfectly aligned with the aircraft axes using the following procedure:

- Park the aircraft on a flat and level surface and move it according to the correct angle of the levelled flight at normal cruise speed.
- Enter the SETUP menu and adjust the parameters: ROLL TILT, PITC TILT
- When one of these parameters is highlighted, a vertical bar will appear on the left of the screen
- Change each of the parameter values in a way that the corresponding vertical bar becomes fully red
- Select EXIT to leave the SETUP menu and save the calibration

Mount calibration

The system then computes the actual pitch and roll, and creates a compensation value in order to zero the mounting errors. This procedure is even possible during a flight but will be less accurate.

There is another setting for pitch adjustment in the main menu (**PITCH ADJ**, previously described) which is intended as a pilot preference adjust. This is only a graphical setting which is remembered and restored on the next power-up.

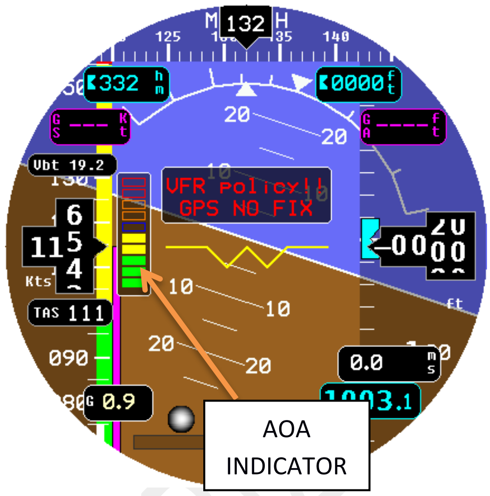
Please refer to your aircraft instruction manual in order to obtain information regarding the attitude angle during cruise at different speed or about best attitude condition to obtain a zero-pitch indication.

9.2. IAS OFFSET COMPENSATION

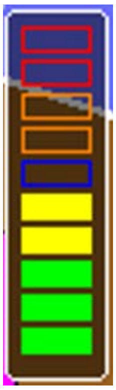
After installation, a small residual offset may occur in the **PITOT** sensor, requiring minor compensation. To correct this, go to **SETUP → BARO CONFIG** and adjust the **IAS TRIM** parameter. Values like **-0.1 or -0.2** are often sufficient to bring the **IAS** indicator on the **PFD** page and the analog needle indicator on the **IAS** page back to zero, in the absence of airspeed and wind.

⚠ This compensation must be performed under true zero **IAS** conditions. Even a light breeze on the **PITOT** tube may result in a residual **IAS** reading. It is therefore recommended to perform this calibration indoors (e.g. inside a hangar) and only after removing the "**REMOVE BEFORE FLIGHT**" protective cover from the PITOT tube.

9.3. AOA CALIBRATION



The **AOA** measurement function requires connecting the **AOA** differential-pressure port, via a 1/8" NPT adapter, to the **AOA** dynamic port on the specific **PITOT** sensor. This special **PITOT** tube has three ports: **STATIC**, **PITOT** and **AOA**.



After enabling the AOA function via **SETUP → BARO CONFIG → AOA ENABLE**, you must adjust the AOA indicator's gain and offset. The indicator will then appear on the Primary Flight Display (PFD) or on the Synthetic Vision page.

The indicator comprises a series of colored rectangles as shown. The meaning of each color is detailed in the table below:

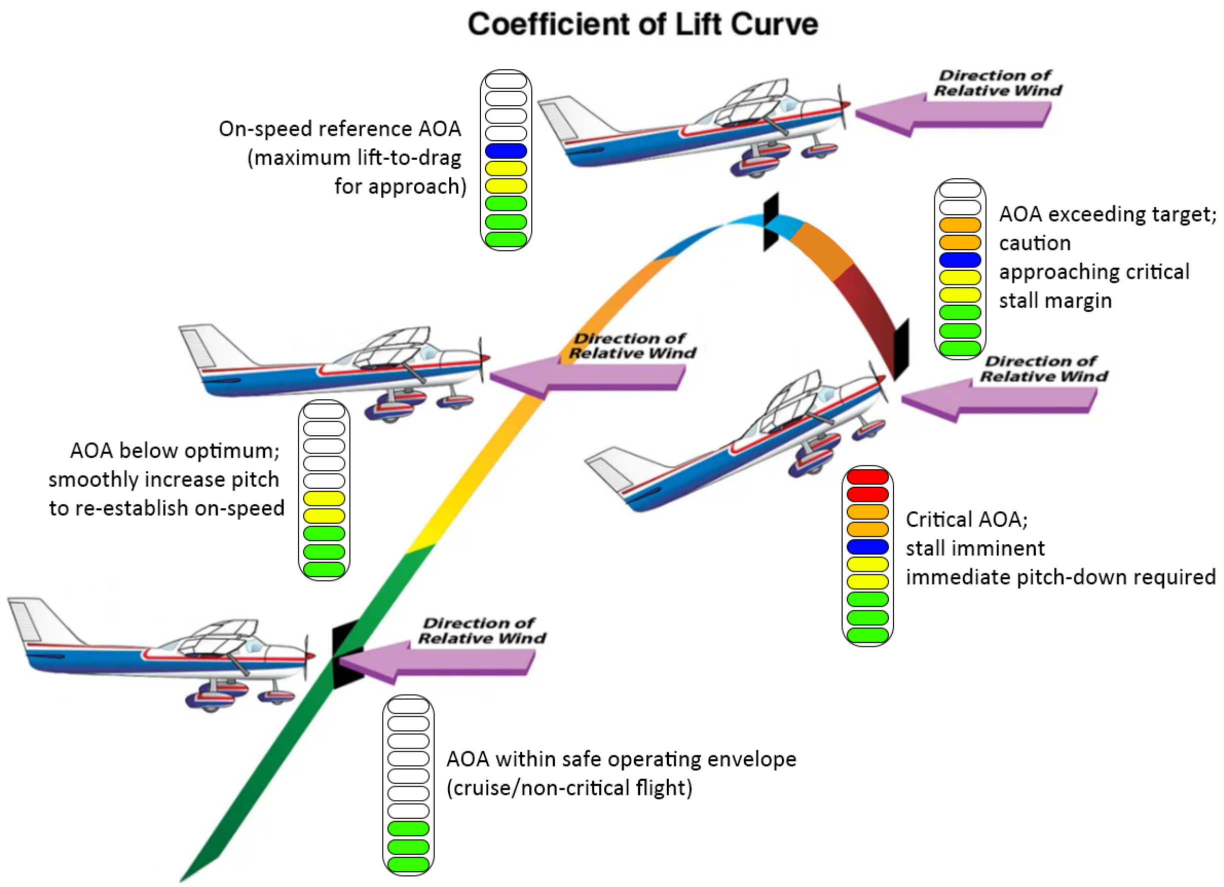
COLOR	AOA Condition	Indication	Pilot Action
Red	Critical AOA (stall imminent)	Critical AOA; stall imminent—immediate pitch-down required	Immediately reduce AOA (pitch down) to recover lift
Amber	Caution—approaching critical	AOA exceeding target; caution—approaching critical stall margin	Increase monitoring and apply corrective pitch input
Blue	Optimum AOA ("On-speed")	On-speed reference AOA (maximum lift-to-drag for approach)	Maintain current pitch/attitude
Yellow	Sub-optimum AOA	AOA below optimum; smoothly increase pitch to re-establish on-speed	Pitch up smoothly to re-establish optimum AOA
Green	Low AOA	AOA within safe operating envelope (cruise/non-critical flight)	No action required

Set the **AOA TRIM** and **AOA GAIN** values in the **SETUP → BARO CONFIG** menu to achieve correct illumination of the colored sectors under their respective maneuver conditions. Pay particular attention to the controlled-stall zone **Vs_0** (two red bars illuminated) and the maximum lift-to-drag efficiency zone **1.3 × Vs_0** (blue bar illuminated).

Conduct this procedure only at a safe altitude and with the requisite technical authorization.

Vs_0 is determined in landing configuration (flaps extended, gear down) by reducing airspeed until the first aerodynamic buffet, after which **AOA TRIM** (offset) and **AOA GAIN** are adjusted so that the red bar illuminates at the ΔP corresponding to **Vs_0** and the blue bar at the ΔP corresponding to **1.3 × Vs_0.**

Refer to the follow picture in order to better understand the AOA colored bars indicator.



9.4. SERVO CALIBRATION AND FIRMWARE UPDATE

The servo calibration procedure may be required after updating the servo control firmware.

9.4.1. FIRMWARE UPDATE

The servo firmware update is performed via **SETUP → AP CONFIG → UPDATE FW Ser**. This procedure must only be carried out under manufacturer guidance and strict supervision of qualified technical personnel. Refer to the servo manufacturer for the complete update procedure.

9.4.2. CALIBRATION

Servos are factory-calibrated during production testing. However, if required and as directed by the manufacturer’s technical staff, internal-sensor recalibration may be performed to optimize performance. To begin this procedure, mechanically disconnect the servo so that the splined output lever is free to move.

Autocalibration mode is entered when the servo is powered and both **Mode A** and **Mode B** contacts are tied to ground (**GND**), i.e. **FACTORY** mode. The calibration cycle lasts approximately five minutes, during which the servo will execute a series of movements. At the end of the cycle, rapid lever oscillations indicate whether the procedure has succeeded or failed:

- Repeated lever movements from the neutral position to **+45°** (**YES**) indicate that the procedure has completed successfully. You may now power down the servo and disconnect **Mode A** or **Mode B** to reconfigure it as the **ROLL** or **PITCH** axis.
- Repeated lever movements from **–45°** to **+45°** (**NO**) indicate the procedure has failed. To retry, power-cycle the servo while keeping both **Mode A** and **Mode B** tied to ground (**FACTORY** mode).

9.5. AP PARAMETERS SETTING

The **IFD-NET EVO** autopilot system uses **PID** controllers for flight stabilization and to execute the turns required to follow a route or maintain a preset heading. Below is a list with a brief description of the parameters that a professional installer or test pilot must configure at least for each axis to ensure correct operation. Please refer to the section SETUP PARAMETERS for the other AP parameters.

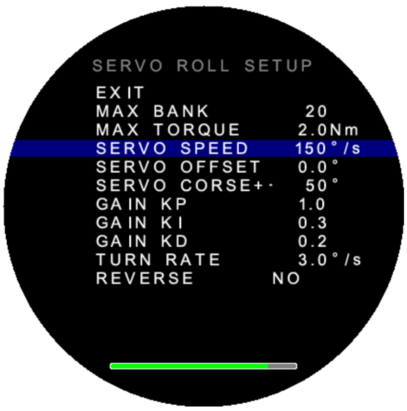
9.5.1. GENERAL PARAMETERS

- **STD VS fm**: Specifies the standard climb or descent vertical speed that the autopilot will maintain when the selected altitude is manually adjusted or when, in **NAV 3D** mode, a new track leg with a different altitude is executed.

- **VS GAIN ADJ.**: This parameter sets an additional gain on the **PITCH** axis for vertical-speed (climb/descent) control. It is normally left at 1.0 (no compensation), but in some cases you may reduce PITCH sensitivity to minimize vertical-speed oscillations caused by airspeed variations. For more advanced compensation, the **VS-FWD** (Vertical Speed Feedforward) pre-processing parameter is also available in the **PITCH** axis settings.

9.5.2. AXES PARAMETERS

- **MAX BANK/PITCH**: They indicate the maximum angle the aircraft may attain to execute a turn or maintain a commanded climb or descent rate when requested by the navigation system or pilot input.
- **MAX TORQUE**: Maximum torque the servo applies to the control linkage before the automatic clutch begins to slip.
- **SERVO SPEED**: Maximum angular speed for the servo lever. The speed is proportional to the angular displacement between the lever's current position and the position commanded by the autopilot. Even if the position error is greater, this parameter still caps the maximum speed.
- **SERVO OFFSET**: Indicates the servo's neutral position (zero), which must coincide with the control yoke's neutral position. If they do not align, adjust this parameter to realign them. With a proper installation, this value should remain at zero or within a few degrees. If the offset is large, consider repositioning the lever on a different spline (splines are located every 45° of rotation) or reevaluating the installation geometry.
- **SERVO COURSE**: This parameter allows limiting the maximum travel beyond the neutral position for each individual axis.
- **GAIN KP**: It represents the **proportional** gain used by the **PID** controller on the respective axis to calculate the feedback signal applied to the servo.
- **GAIN KI**: It represents the **integral** gain used by the **PID** controller on the respective axis to calculate the feedback signal applied to the servo.
- **GAIN KD**: It represents the **derivative** gain used by the **PID** controller on the respective axis to calculate the feedback signal applied to the servo.
- **REVERSE**: Used to invert the control commands on the respective axis. In some installations, symmetric geometry may necessitate command inversion to compensate.
- **TURN RATE**: For the **ROLL** axis, when set to a non-zero value, this parameter defines the roll rate during heading changes; it is typically configured to **3°/sec**.



- **VS-FWD**: For the **PITCH** axis, this parameter is the feedforward pre-processing coefficient used to further stabilize the climb or descent rate by modulating and overriding the **PID** controller setpoint based on environmental or inertial factors—such as sudden **IAS** changes caused by increased drag (angle of attack) or headwinds.
- **MODE**: For an **AUX** servo, this parameter defines the mode in which the **AUX** servo is used: **YAW**, **TRIM**, or **FLAPS**.

The autopilot parameter calibration procedure is described below.

These adjustments must be carried out by two pilots in flight under conditions of optimal visibility and maximum safety. Only one axis may be calibrated at a time; the pilot must manually trim the axis not under autopilot control without affecting the axis being calibrated.

9.5.3. SELECTING ONE BY ONE AXES.

To adjust the **ROLL** and **PITCH** axes individually, engage only one axis at a time to avoid cross-axis interaction:

- Configure **ROLL** axis first
    - Establish a stable cruise speed and trim all axes—especially **PITCH**—for level flight.
    - Enable only the **HDG** function and set the heading to your current track. With the heading field selected, press and hold the control knob to auto-load the present heading.
- Configure **PITCH** axis next
    - Enable only the **ALT** function and set the altitude to your current flight level. With the altitude field selected, press and hold the control knob to auto-load the present barometric altitude.
- Initial setup
    - Before activating each axis, complete the minimum configuration defined in section 8.5.5 "**ESSENTIAL AND DEFAULT SETTINGS**."

It is strongly recommended to take a moment to review the fundamental concepts of the PID controller before configuring parameters and proceeding to the in-flight verification and tuning phase. If you are already familiar with these concepts, you may proceed to the next section: ESSENTIAL AND DEFAULT SETTINGS.

9.6. UNDERSTANDING THE PID CONTROLLER

Below is a brief overview of how the system manages control inputs. It is **essential** to **fully understand** these concepts before adjusting the parameters in the **AP CONFIG** menu.

WHAT IS THE PID CONTROLLER AND WHAT IS ITS ROLE IN THE AUTOPILOT SYSTEM

The PID controller is a core component of the autopilot system. It maintains stable and precise aircraft performance during automatic flight by continuously correcting deviations from the selected course, attitude, or vertical speed. PID stands for:

- **P: Proportional**
- **I: Integral**
- **D: Derivative**

These three control actions are combined to compute, in real time, the corrective commands sent to the servos, ensuring the aircraft holds the intended attitude.

HOW IT WORKS IN SIMPLE TERMS

When the autopilot is engaged to hold a specific altitude or heading, the PID controller continuously reads data from onboard sensors (gyroscopes, accelerometers, altimeters) and compares them to the user's setpoints (e.g. target altitude). Based on the difference, it computes the corrective commands needed to keep the aircraft at the desired attitude.

If there is any deviation, the PID calculates:

1. Proportional (P): the magnitude of the deviation at that moment
2. Integral (I): how long the deviation has persisted
3. Derivative (D): how quickly the deviation is changing

By combining these three actions, the PID determines how much and how fast to move the controls (elevator, ailerons, etc.) to return the aircraft smoothly, efficiently, and stably to the correct flight condition.

WHY IT IS IMPORTANT

A well-tuned PID allows the system to:

- Avoid oscillations or instability (e.g. overly abrupt turns or excessive corrections)
- Respond smoothly and predictably to disturbances (wind, turbulence, etc.)
- Achieve and maintain the selected course, altitude, or speed with precision

⚠ EXAMPLES OF MALFUNCTIONS CAUSED BY INCORRECT PID PARAMETERS

Even though the PID system is designed for precise control, incorrect parameter settings can cause unwanted behavior. Below are some common examples:

1. ***CONTINUOUS OSCILLATIONS (OVERCOMPENSATION)***
   Description: The aircraft oscillates around the target value (e.g. heading or altitude) and never stabilizes. **Possible Cause:** Proportional gain (P) is too high → the system reacts too aggressively to small deviations. **Example:** While on course, the autopilot makes repeated small turns left and right without holding a stable track.
2. ***SLOW RESPONSE (UNDERCOMPENSATION)***
   Description: The system responds slowly to commands or disturbances, taking too long to return the aircraft to trim.
   Possible Cause: P and/or I gains are too low → the response is too “soft” or insensitive.
   Example: After turbulence, the aircraft takes many seconds to return to the selected altitude or to stabilize its pitch.
3. ***ERROR ACCUMULATION (SLOW SYSTEM DRIFT)***
   Description: The aircraft gradually drifts over time, even though corrections are applied.
   Possible Cause: Integral gain (I) is too low or absent → the system does not account for accumulated error.
   Example: During a long flight with crosswind, the autopilot fails to fully correct drift and the course slowly shifts off track.
4. ***ABRUPT OR UNSTABLE MOVEMENTS (DERIVATIVE-INDUCED INSTABILITY)***
   Description: The system reacts harshly or unstably to sudden changes (e.g. turbulence).
   Possible Cause: Derivative gain (D) is too high → the system over-reacts to rapid deviations and issues excessive corrections.
   Example: Exiting a turbulence zone, the aircraft makes a rapid, jerky movement that causes discomfort or requires manual intervention.

WHAT TO DO IN CASE OF MALFUNCTION

- Do not attempt to modify PID parameters without the proper tools and expertise and before to read the section UNDERSTANDING THE PID CONTROLLER.
- Record any observed anomalies and, if possible, capture flight video showing the real horizon, artificial horizon, and control yoke; enabling the DBG function (SETUP → PFD CONFIG → DBG ON) during recording may be useful.
- Contact the manufacturer’s technical support for video evaluation and tuning recommendations; include the SETUP.BIN file to allow a complete analysis of the configured parameters.

9.6.1. ESSENTIAL AND DEFAULT SETTINGS

Before engaging the autopilot system one axis at a time, the following parameters must be set to consistent default values. Below are some recommended values for the subsequent flight-test phase:

MAX BANK = 15° : A very low maximum **BANK** limit prevents large oscillations, even in the event of reversed controls or grossly incorrect **PID** settings.

MAX PITCH = 10° : A very low maximum **PITCH** limit prevents large oscillations, even in the event of reversed controls or grossly incorrect **PID** settings.

MAX TORQUE = 2.0 Nm. Very low, but allows easy override by the pilot.

SERVO SPEED = 60 °/sec. Slow axes movements at first.

SERVO OFFSET = 0. One of the parameters to determine initially.

SERVO COURSE = ±30°. Limited travel range, which can be increased later if required.

GAIN KP = 1.0. Initially, set only the proportional gain.

GAIN KI = 0.0.

GAIN KD = 0.0.

REVERSE = NO. This is the first parameter that must be verified.

REVERSE PARAMETER CHECK

Engage the autopilot in LVL or HDG mode with the selected heading set to your current track, then verify wing leveling (roll):

- If the autopilot exaggerates roll inputs and drifts, the **REVERSE** parameter must be inverted.
- If it corrects or even just damps roll deviations, **REVERSE** is set correctly.

Repeat this procedure on the PITCH axis by enabling only ALT mode and setting the altitude to the current level:

- If the autopilot holds altitude (even with minor oscillations or damping of climbs/dives), the **REVERSE** setting is correct.
- If the aircraft drifts up or down, invert the **REVERSE** logic.

During each axis check, the pilot must apply only light manual inputs on the other axis to avoid overriding the autopilot's corrective action.

9.6.2. OPTIMAL OFFSET SEARCH

The second crucial parameter to determine is the **servo's operating offset**. On each axis, installation errors can cause the servo's neutral position to diverge from the control's neutral position during properly trimmed cruise flight; if this offset is excessive, the servo installation geometry must be reconsidered.

SERVO OFFSET: This parameter compensates for installation-geometry errors (when the servo lever is not at neutral while the control yoke is neutral) and the aircraft's trim position during cruise flight.

It is essential to set **SERVO OFFSET** correctly so the control system recognizes the true neutral position of the axis control and the actual servo travel matches the value defined in **SERVO TRAVEL**. Although the system can find neutral via error integration through the **KI** parameter, this may take several seconds to stabilize the axis.

Determine the **SERVO OFFSET** value either on the ground or in flight under high-safety conditions.

Set **KP** = 1.0, **KI** = 0 e **KD** = 0.

Also set **SERVO SPEED** to **90 °/s**; higher speeds are not recommended except on highly responsive aircraft, where up to **150 °/s** may be used. This parameter influences the **KP**, **KI**, and **KD** gains, so if **SERVO SPEED** is altered, the **PID** calibration procedure must be repeated or verified.

Set **MAX BANK** to **20°** for **ROLL** and **MAX PITCH** to **12°** for **PITCH**. This defines the maximum bank angle or maximum pitch angle during a control adjustment.

With these settings, the **ROLL** axis will initially stabilize at a slight bank angle caused by the mechanical installation offset. Adjust the **SERVO OFFSET** until the wings are level. At this point, the autopilot outputs zero correction (horizon level) and commands the servo to its neutral position—which may differ from absolute zero by the offset value in degrees. Extreme precision is not required here, as the **PID** controller will finely correct any residual error once **KI** is set above zero.

Repeat the same procedure for the PITCH axis.

If the mechanical installation is correct and accounts for trim position during cruise flight, the **SERVO OFFSET** values should be near zero. If these values exceed **±30°**, it is recommended to rotate the control lever by **45°**, as otherwise the mechanical end stops may not prevent the lever from reaching the stall position.

9.6.3. INITIAL PARAMETERS FOR PID CONTROLLER

Once the **REVERSE** and **SERVO OFFSET** values are set, proceed to determine the ultimate gain (**Ku**) and ultimate period (**Pu**), which are needed to calculate the initial **KP**, **KI**, and **KD** parameters.

SCIENTIFIC METHOD:
Follow these steps:

- **Increase KP gradually** (with **KI** = **KD** = **0**) until the axis exhibits a stable, uniform oscillation during calibration.
- **Record KP at oscillation** as the ultimate gain, **Ku**.
- **Measure the oscillation period**, **P**, in seconds (in practice, typically 3–5 s).

Below is a practical example with plausible values:

- **KP** in a stable and uniform oscillation = 1.9 (**KU = 1.9**)
- **P** = 3.5 s
- **KP** = 0.6 × **KU** = 1.14 (1.1)
- **Ti** = **P** / 2 = 1.75 s
- **Td** = **P** /8 = 0.43 s
- **KI** = **KP** / **Ti** = 0.65 (0.7)
- **KD** = **KP** x **Td** = 0.5

[KP = 1.1 , KI = 0.7 , KD = 0.5] These are baseline values in our example that must be fine-tuned through detailed observations in accordance with the criteria described below:

EMPIRICAL METHOD:
A simple yet effective non-scientific solution is to apply default parameter values that serve as acceptable baseline settings for most ultralight aircraft, provided that the actuator installation has addressed the considerations outlined in the preceding section SERVO INSTALLATION.

Possible baseline values could be as follow:

- **KP** = 1.0
- **KI** = 0.4
- **KD** = 0.2

Then proceed to fine-tune the parameters using the same approach, following the general **PID** controller guidelines.

9.6.4. FINE TUNING OF OPTIMAL PARAMETERS

Fine-tuning the flight controller parameters is a delicate procedure that, when done correctly, delivers optimal system performance. Only perform this procedure after you have a complete understanding of how the **PID** controller operates and how it uses these parameters to correct attitude and achieve the desired result. Refer to the section "UNDERSTANDING THE PID CONTROLLER" for an introductory overview.

Below is a list of points to evaluate in order to determine which parameter should be adjusted to correct the observed control error.

OBSERVABLE IN-FLIGHT EFFECTS OF INCORRECT PID GAINS

1. KP (Proportional gain) too high

- TECHNICAL DESCRIPTION: The system exhibits an overly aggressive response to instantaneous errors. Excessive proportional gain (KP) causes corrective actions that are larger than necessary, leading to overshoot and oscillations in the opposite direction
- IN-FLIGHT BEHAVIOR:
  - **PITCH:** High-frequency oscillations about the selected altitude; marked dynamic instability after attitude changes.
  - **ROLL:** Residual lateral oscillations following corrective maneuvers; difficulty achieving a stable attitude after a turn.

2. KP too low

- TECHNICAL DESCRIPTION: The system response is weak, with limited immediate error correction. An excessively low **KP** value produces corrective actions that only damp the error rather than fully correct it. Note that the **proportional** term's role is to **reduce the error significantly** without overshoot; the **integral** term then **eliminates** any remaining **residual error**.
- IN-FLIGHT BEHAVIOR:
  - **PITCH**: Delay in reaching target altitude; imprecise attitude control during automatic climb or descent.
  - **ROLL**: Gradual directional drift; instability in maintaining heading during level flight.

3. KI (Integral gain) too high

- TECHNICAL DESCRIPTION: The system overcompensates the accumulated error, resulting in low-frequency instability.
- IN-FLIGHT BEHAVIOR:
  - **PITCH**: Wide, slow oscillations around the selected altitude; delayed damping of accumulated error.

- **ROLL**: Continued corrective inputs even after the commanded bank angle is reached; difficulty maintaining lateral attitude.

4. KI too low

- TECHNICAL DESCRIPTION: The system is unable to eliminate steady-state errors, resulting in persistent deviations.
- IN-FLIGHT BEHAVIOR:
  - **PITCH**: Inability to hold the selected altitude under constant aerodynamic loading.
  - **ROLL**: Slow bank-angle drift; difficulty maintaining precise heading in straight flight.

5. KD (Derivative gain) too high

- TECHNICAL DESCRIPTION: The system is hypersensitive to rapid changes, producing unstable responses and exhibiting susceptibility to measurement noise.
- IN-FLIGHT BEHAVIOR:
  - PITCH: Impulsive or irregular responses to external disturbances; reduced control quality in the presence of turbulence.
  - ROLL: Discontinuities at the start and end of automatic turns; unwanted micro-variations in the roll angle.

6. KD too low

- TECHNICAL DESCRIPTION: The system exhibits poorly damped dynamics, with a tendency to overshoot and prolonged transient responses.
- IN-FLIGHT BEHAVIOR:
  - PITCH: Significant overshoot of the target altitude during attitude transitions.
  - ROLL: Turns with overshooting response; temporary instability in roll angle stabilization.

ADDITIONAL NOTES

- **PITCH effects** are generally more noticeable to the pilot (vertical oscillations, speed variations).
- **ROLL effects** mostly impact directional accuracy and stability during turns or while maintaining a heading.
- **Changes to the PID parameters during flight take effect immediately.** It is mandatory to proceed with extreme caution, adjusting the parameters gradually and with a clear understanding of the expected effect. These adjustments **must** be made only in **perfect visibility conditions** and with **no turbulence**. A **minimum crew of two qualified pilots** with both flight and technical experience is **required** to maintain full control of the aircraft during the setup phase.
- **Each aircraft has its own dynamic behavior**, so the optimal **PID** tuning must always be **adapted to the specific model** and determined through **experimental testing**.
- **SERVO OFFSET**: This is effectively the center or neutral position of the control arm's rotation range. It must be set as described in **Section 8.2.2** to achieve level flight during cruise without requiring integral corrections from the controller. For this reason, the value should be determined with **KI and KD set to zero**.

9.7. COMPASS CALIBRATION

The purpose of this procedure is to compensate magnetic disturbances affecting the EFIS, due to aircraft metallic structures and electromagnetic components. These disturbances, if not compensated, will alter the heading value provided by the system.

Even if the factory performs a preliminary calibration, after installing the instrument a re-calibration will be probably required due to the unique electromagnetic environment of each aircraft cockpit.

Please note that outside the compass calibration page (described below) the magnetic compass is used only if the heading source is set to “MAG” or “AUTO”. Otherwise the instrument will only show GPS track when available (see paragraph SETUP above, PFD CONFIG --> HDG TYPE)

9.7.1. Magnetic compass calibration:

The IFD-NET EFIS EVO compass is designed to be calibrated in flight with simple maneuvers. We suggest to perform two 360° turns, one to the left and one to the right, with a bank angle of at least 30°.

Proceed as follows:

- Ensure that the avionics and radios are powered, so that the magnetic field generated by the aircraft is representative of a normal cruise flight condition.
- Take off and fly to an area where you can maneuver freely.
- Enter the **SETUP** menu, then select “**COMPASS ->**”

Setup compass

- Select "**RESET**" and press the knob, to delete any previous calibration.
- Select “**CALIBRATE**” and press the knob to start the calibration. This menu item usually reads “OFF”. The “**OFF**” will change to “**ON**” (green color) to indicate that the calibration process has been started.
- Fly the aircraft along a right turn, we suggest to maintain a bank angle about of 30°. Once you have completed the 360° turn to the right, invert the turn direction for another 360° turn to the left. Again, we suggest to maintain a bank angle about of 30°.
- Once you have flown the turns, you can stop the calibration in two ways:
  a. Continue turning until the "**Rel.YAW**" value reaches +/- 420°, or
  b. Select “**CALIBRATE**” and press the knob again.

  You will notice that the “ON” near "**CALIBRATE**" changes back to “OFF”. Also, the top-right item on the screen should read “**C1**” instead of “**C0**”.

Compass page calibration

  - In case the “**C0**” never turns to “**C1**”, it could mean that the magnetometer is not working properly. It may be saturated by a very strong magnetic field.
  - When the magnetometer is saturated, one or more of the “MAG X”, “MAG Y” and MAG Z” items show asterisks symbols instead of a number (“***”). In this case try to reduce magnetic interference before attempting another calibration.

- When the top-right of the screen shows “**C1**”, the basic calibration procedure is complete. Look at the heading indication on the top of the screen (“Hxxx”) and verify whether it reads correctly. You may compare it with a reference compass for accuracy.
- If the GPS is connected and the aircraft is moving, the COMPASS screen shows also an indication “Gxxx”. This is the ground track. If you are taxiing on the ground, or flying with a negligible wind, you may use this indication to check whether the compass heading is correct.
- Select "**EXIT**", then again “**EXIT**” to go back to the main screen. The heading indication may be initially wrong because the gyroscope needs some time to align with the compass. In any case when the IFD-NET is powered OFF and then ON, the gyroscope is aligned instantly to the magnetometer.

9.7.2. Calibration on the ground

We recommend to perform the calibration in flight; however, you may have acceptable results on the ground, too.

In this case, we suggest to perform a single 420° taxi turn instead of the two turns in the air. However, **the resultant heading indication will only be correct when flying level or taxiing on the ground**; moreover, the wind vector may be reliable only when cruising straight and level.

9.7.3. Verification of compass heading against GPS track

On the ground, it is possible to verify the accuracy of the magnetic compass calibration using the GPS track indication.

Open the compass calibration page, as described above.

Taxi the aircraft on a straight line, ideally along a taxiway or the runway. Keep the speed around 10 kts (not below 5 kts); an indication “Gxxx” will appear on the bottom right of the screen, near the “**EXIT**” menu item. (for example, “**T027**” as in the picture on the right).

That number (027 in the example) is your GPS track, corrected for magnetic variation. It should be very close to the magnetic heading (“Hxxx” at the top of the screen, 026 in the example).

Adjust the eventually residual offset by modifying the parameter OFS [xxx]. The correct value for this parameter depends on the average error the magnetic sensor display overall the entire 360° turn.

The Compass Calibration procedure must be executed either in an open field out of the hangar (to avoid interference from any metallic structure) or in flight, and requires to steer the aircraft toward 4 directions and execute some pitch up/down movements. The total duration for this procedure is about 5 minutes.

9.7.4. Additional technical notes

The three values shown in the compass calibration page (MAG X, MAG Y, MAG Z) are proportional the sensed magnetic field components. On a correctly calibrated system their values should remain between -500 and +500.

You can press on the “MAG X” (fourth) item to show more parameters. This additional information may be used by a technician for problem resolution.

When the compass is not under calibration, the alternate display shows, for each axis, the calibrated offset and gain values.

During calibration the alternate display shows the minimum, current and maximum readings for each of the three axes.

In case one or more axes are saturated by a strong magnetic field, the corresponding line on the display will show only asterisks (“***********”)

Press again on the fourth menu item to go back to the normal display (MAG X, MAG Y, MAG Z)

Compass not calibrated

Compass calibrated

9.7.5. Magnetic interference

Once your instrument has been installed on the panel and the magnetic compass is calibrated, pay special attention to avoid strong magnetic fields and/or magnets near the instrument. Some parts of the panel or the IFD-NET EVO EFIS itself may become magnetized if exposed to a magnet, for example the one that may be contained in the GPS antenna. We do not provide any more GPS antennas containing a magnet, precisely for this reason.

If metallic components near the EFIS become magnetized, it may be necessary to re-calibrate the compass but, in case of the magnetic field would be too strong, shell be considered the de-Gaussian procedure to remove the magnetic residual field from the aircraft iron parts. Refer to your technician to learn more on this procedure.

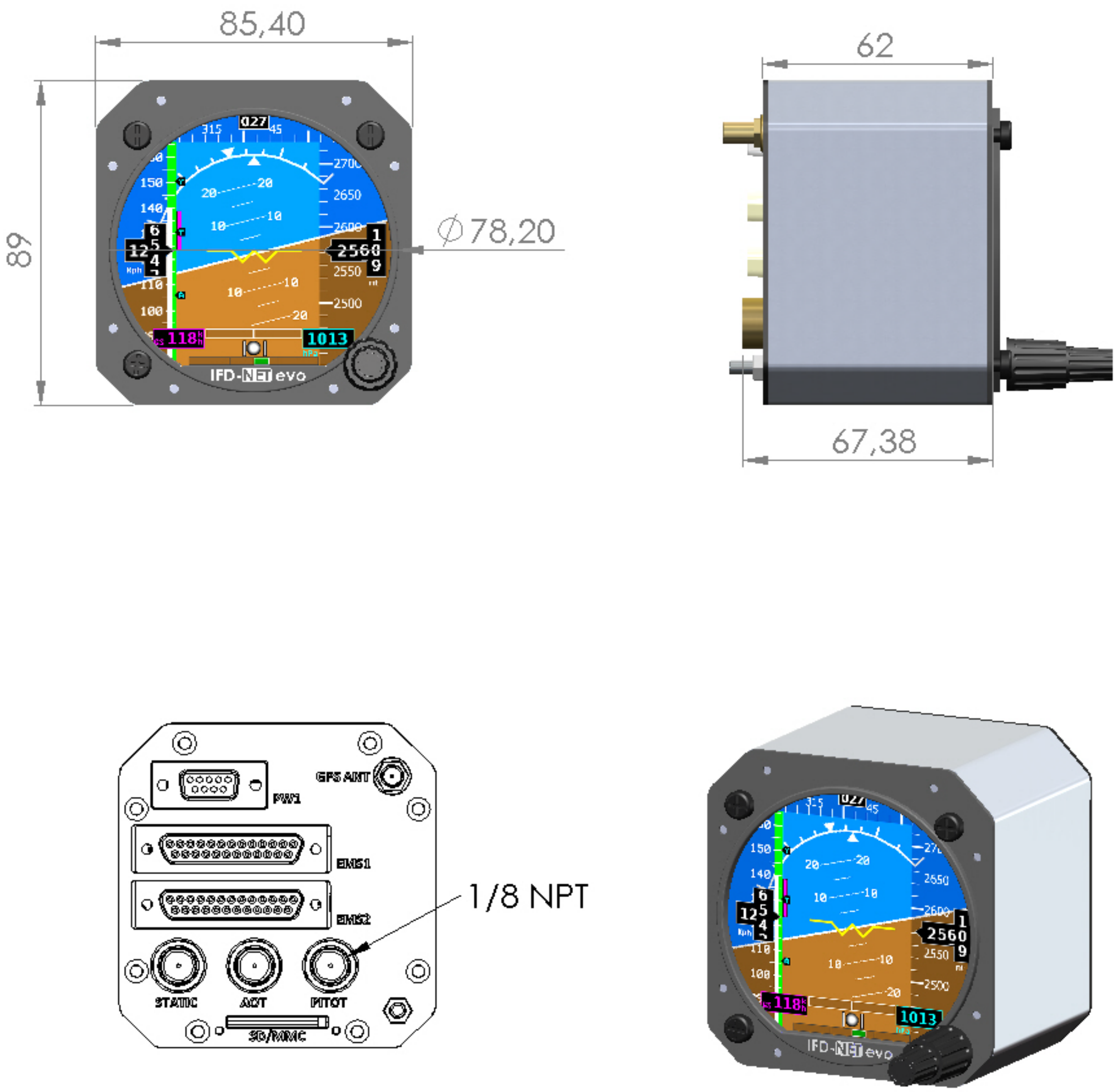
9.7.6. Non-calibrated compass

When you press “RESET” in the compass calibration page, and then don’t complete the calibration, the magnetic heading will remain unavailable outside this page.

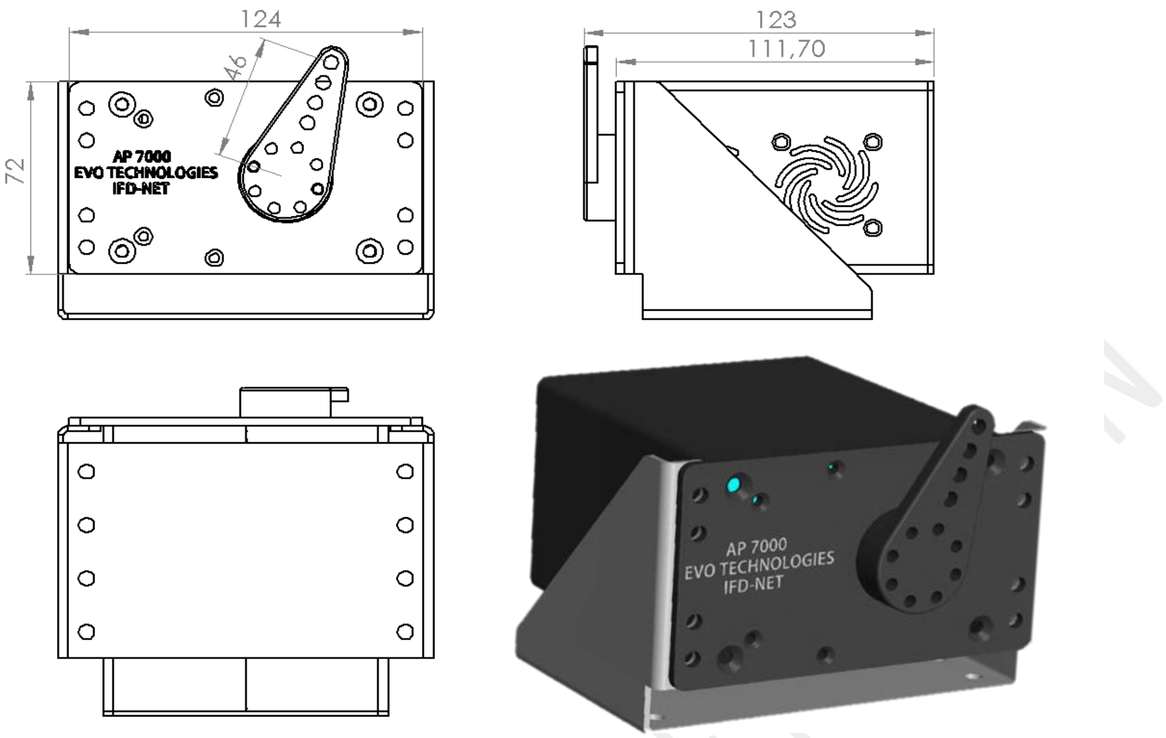
The item on the top-right of the page reads either “C0” (compass is not calibrated) or “C1” (compass is calibrated).

When the compass is not calibrated, the heading indicator will always show “---” unless in the SETUP menu you set “HDG TYPE” to either “AUTO” or “GPS”.

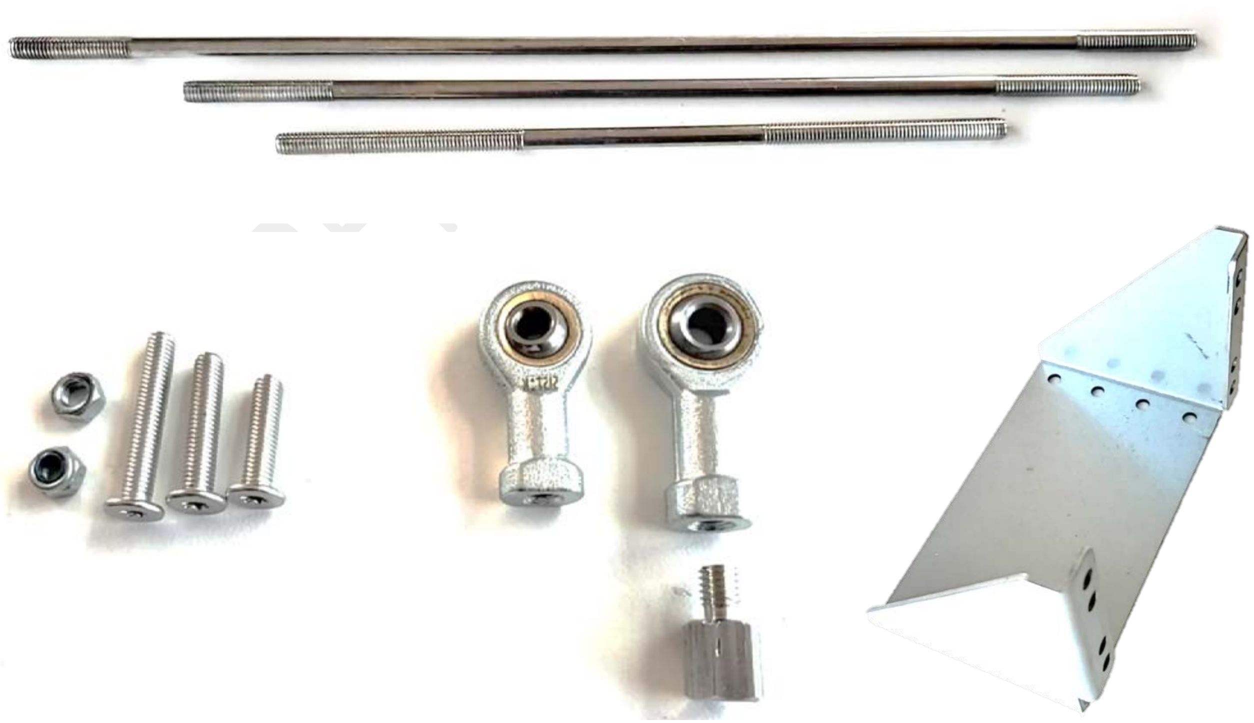
10. MECHANICAL DIMENSIONS DIAGRAM



IFD-NEV EVO Dimensional diagram.



AP 7000 SERVO Dimensional diagram.



Optional SERVO Installation KIT.

11. ORDERING INFORMATION

IFD-NET EVO EFIS PFD is part of a large range of products. Because of their differing internal electronic configuration, is not possible to switch between the different models after final testing. Please select the model keeping in account your exact needs or talk to our technical department for guidance to meet your aircraft configuration.

Below you'll find the ordering codes for different versions of the EFIS and its optional tools/spare:

- IFD-NET EVO EFIS PFD
- IFD-NET EVO BARO
- IFD-NET EVO EFIS NAV
- IFD-NET EVO EFIS MAP
- IFD-NET EVO EFIS PLUS
- IFD-NET EVO EFIS SLAVE
- IFD-NET EVO EMS MASTER
- IFD-NET EVO EMS SLAVE
- IFD-NET EVO X 10''
- IFD-NET EVO X 7''
- IFD-NET BKB (battery backup module)
- IFD-NET SERVO AP7000 5Nm
- IFD-NET SERVO INSTALLATION KIT
    - Optional and customizable among some sizes.
- GPS ANTENNA
- 1/8 NPT MALE to RUBBER PIPE HOSE ADAPTERS
- (T) RUBBER PIPE HOSE ADAPTER
- SD CARD Extension.

Note (*):

- Please contact vendor for more information about this product and other commercial offers.
- This equipment is not certified and was developed for ultralight and experimental aircraft. Must be observed VFR policy during your flight.
- The manufacture doesn't respond for any problem or damage generated by a not properly use of the product.
- Images on this manual are just for explication porpoises and may be different in some details to the final product the end user bought. Contact vendor for more information.
- The internal magnetometer works fine only if in case of the unit results correctly installed. Any improper installation detail could generate a malfunction of the magnetometer and the other embedded sensors or receivers. Keep in a great account all the hints reported in the present manual. Consult our representatives to learn more on how to obtain the perfect unimodality of the instruments described in the present manual.