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IFD-NET EFIS/PLUS
IFD-NET SLAVE

BEYOND THE HORIZON

USER AND INSTALLATION MANUAL

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FEATURES

- Standard 80mm diameter installation shape
- Very bright screen, sunlight visible, up to 1000 cd/m².
- Low power consumption down to 2.3W (200mA @ 12Vdc).
- Ergonomic interface with rotary knob
- High integration level with all sensors embedded (NOTE: PLUS only)
- Multi-environment software with simple switch through single button press
- Several functions in color/ graphic display:

  - Artificial horizon
  - Anemometer (IAS)
  - Altimeter with settable REF Pressure
  - Variometer (VSI)
  - 3D Magnetic compass
  - Moving map display with airspace, radio aids and VFR reporting points
  - Database coverage: Europe or USA
  - Wind Vector

  - Slip indicator
  - Turn coordinator
  - G-Meter with peak recording
  - GPS navigation in ADF and HSI modes
  - Direct navigation to more than 10000 POIs (navigation points) in the internal database
  - Synthetic Vision with 3D terrain model and basic features (lakes, rivers, cities)

ELECTRICAL AND MECHANICAL SPECIFICATION

- Main power 10 - 30Vdc 200mA with internal filter and peak transient protection.
- Functional temperature range -20°C to 80°C 90% Rh no condensation status.
- 83 mm x 87 mm x 67 mm (width, height, depth), weight 500g
- 2 x 1/8 NPT Pitot and Static pneumatic connectors.
- SMA female connector for GPS passive antenna.
- Standard 9 SUB-D female connector for power and BUS connection.

BASIC FUNCTIONS

Switch between the main pages (environments) by pressing **the rotary knob** (short-press):

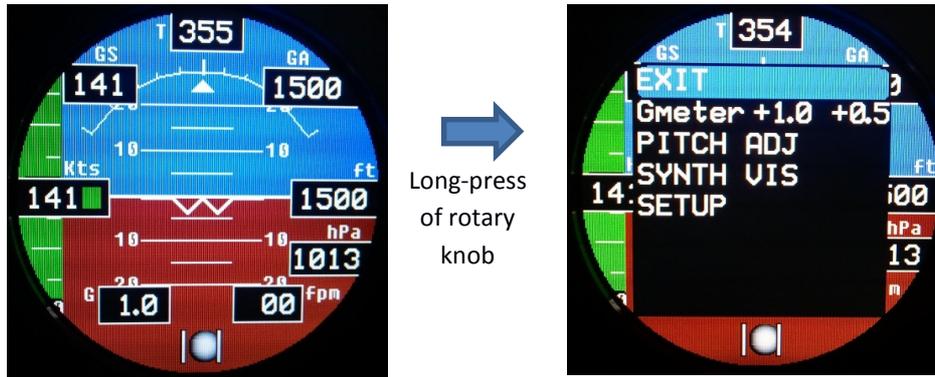**PFD**: Attitude and basic flight data   **MAP**: Moving map   **NAV**: Direct-to navigation to a point

NOTE: The actual screen sequence depends on which pages you have enabled in the configuration

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Each of the environments (pages) has an "Environment menu", which can be accessed **pressing and holding the rotary knob** (long-press, about 1 sec):

Long-press of rotary knob

WORKING WITH MENUS

Once a menu is displayed on the screen:

- o   Rotate the knob to highlight the desired menu item
- o   Press the knob to confirm the selection

If the highlighted item is an adjustable parameter:

- o   The parameter turns green
- o   Rotate the knob to adjust the value
- o   Press the knob to confirm the change
- o   The parameter turns white again

Menus usually have an EXIT item at the top or at the bottom.

EFIS PLUS AND EFIS SLAVE

The EFIS SLAVE has no internal sensors and is meant to be connected to another IFD-NET (EFIS, MAP, PLUS) or an Avionic module through the MAV avionic bus.

All software functions are the same in the SLAVE and PLUS variants; the only practical difference is that the SLAVE instrument gets all the data feeds externally and as such does not need any calibration.

HOW TO PROCEED?

1. Follow the INSTALLATION GUIDE (starting from page 24).
   The EFIS SLAVE will only need electrical power and data bus connection.

2. Perform the ARTIFICIAL HORIZON CALIBRATION (page 28)
   (PLUS version only)

3. If desired perform the MAGNETIC COMPASS CALIBRATION (page 29)
   (PLUS version only)

4. Go through the SETUP menu (page 21) to configure the instrument as desired

5. Discover the available functions described in the following pages

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AVAILABLE PAGES

You can choose to display **up to 6 pages** on your IFD-NET instrument; the table below provides an overview, and the following sections of the manual describe each page (environment) in detail.

To enable or disable each page enter the **SETUP** menu (described further down) and then open the **PAGES** menu.

PFD – Primary flight display	**MAP** – Moving map	**NAV** – Navigation/HSI
ALTI – Analog altimeter (3-pointers)	**ALTI** – Analog altimeter (Drum)	**IAS** – Airspeed indicator
VSI – Vertical speed indicator	**MFD** – Barometric overview	**APPROACH** overview
TURN C. – Turn Coordinator	**GYROCOMP -** Gyro heading indicator	**NEAREST** aerodromes and points
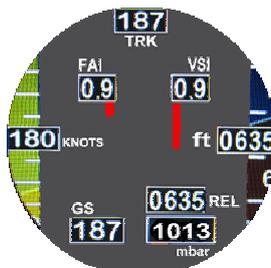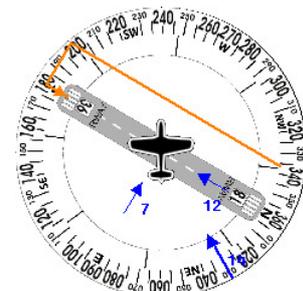
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PFD PAGE (PRIMARY FLIGHT DISPLAY)
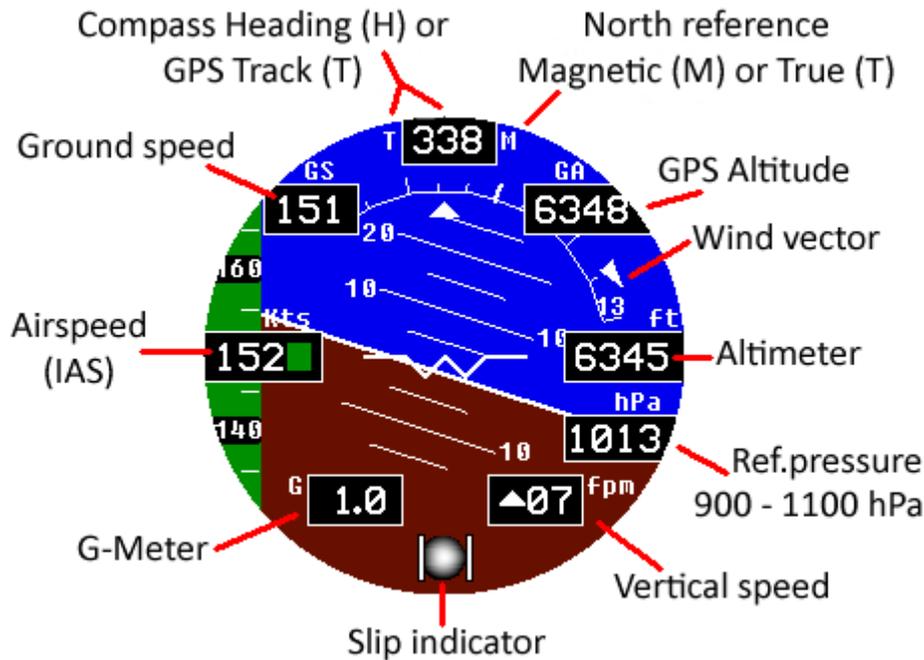
NOTES:

North Reference is always Magnetic (M) in this version

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.

The Primary Flight Display (PFD) contains avionic data mainly concerning aircraft attitude and speed. In order to maximize screen clarity it is possible to configure which parameters to display through the setup menu.

Rotate the knob to set the reference pressure (for example, QNH or QFE).

The PFD can be switched between Horizon and **Synthetic Vision** modes using the context menu (**SYNTH VIS** menu item)

In case the temperature is too low for reliable operation, the PFD displays a yellow message "**WARMING UP**". The takeoff should be delayed until this warning disappears. Similarly, the instrument shows a yellow message "**HIGH TEMP**" when the temperature measured internally is above 75°C.

When navigation is active the PFD displays the basic indications to maintain the aircraft on course. See below the paragraph "NAV PAGE (NAVIGATION)".
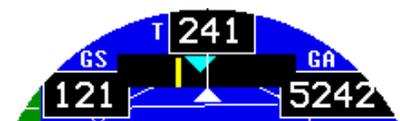
PFD MENU

EXIT - Returns to the PFD screen.

Gmeter - Displays the minimum and maximum recorded G values.
Press the rotary knob on this item to reset the min/max G values to +1.0G

PITCH ADJ - Resets the attitude indicator to indicate ZERO PITCH and ZERO BANK in the current conditions. The slip indicator is also centered.
The indicated bank must be within +/- 7 degrees, indicated pitch must be within +/- 30 degrees (otherwise the setting is ignored)

SYNTH VIS - Switches between the HORIZON and SYNTHETIC VISION displays. The avionic data - airspeed, altitude, vertical speed - is displayed identically in both cases.

SETUP - Opens the setup menu, described below in detail.

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MAP PAGE (MOVING MAP)

This environment displays the GPS position of the aircraft over a geographical and aeronautical map.

By rotating the knob, it is possible to change the zoom level (range) of the map.

The map is always aligned with the aircraft track ("Track up")

If there is an active navigation, the route to fly will be shown as a Cyan line (see picture on the right)

MAP MENU

EXIT - Returns to the MAP screen.

ROUTE CAPTURE - Switches to the browsable map environment.
The scrollable map will start centered on the aircraft position at the moment when the option is selected. See "ROUTE CAPTURE PAGE" below.

INFO AIRSPACE - Shows information about the airspace around the aircraft

INFO POI - Shows information about the closest navigation points near the aircraft (sorted by distance)

FIND POI >> - Allows searchinf for navigation points by name or identification (see paragraph "FIND POI" FUNCTION below)

FREQUENCY [AUTO, OFF] - When set to **AUTO**, on the bottom of the map there will be a window displaying the frequencies of the closest navigation points and airspace. The displayed information automatically cycles between all the available frequencies.

TERRAIN [ON, OFF]
<u>ON</u> (default) - Terrain is drawn using a color scale depending on elevation above sea level.
There are several color scales available, which are selected by the **MAP SKIN** setup parameter (PFD MENU - SETUP - MAP CONFIG)
<u>OFF</u> - Terrain is shown in black, other features remain visible as usual.

TAWS [ON, OFF] - **Terrain Awareness Warning System**
<u>OFF</u> (default) - Terrain is drawn normally (color scale provided by the selected MAP SKIN)
<u>ON</u> - When the aircraft is close to the ground the terrain is drawn differently:
- RED for terrain areas that are above the aircraft
- YELLOW when the terrain is lower, but within 100 meters
- Normal color scale in all other cases

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CUST MAPS [ON, OFF] - **Custom raster maps**

<u>OFF</u> (default) - The MAP page is drawn from the geographical and navigation database (vector data)

<u>ON</u> - The MAP page shows georeferenced raster data (images). The image files are read from an SD card.

Note that the map is always orientated "North-Up" when custom raster maps are displayed, and the aircraft icon rotates accordingly to show the heading/ground track.

See "**Custom raster maps**" below for details.

QUICK WAYPOINT
This function places a user waypoint at the current aircraft coordinates.
The waypoint is named automatically (WPT001, WPT002, ... in sequence) and can be modified later in the ROUTE CAPTURE environment.
When this command is activated, the corresponding menu item changes briefly to "QUICK WPT DONE" to give a feedback to the user.

NAV PAGE (NAVIGATION)
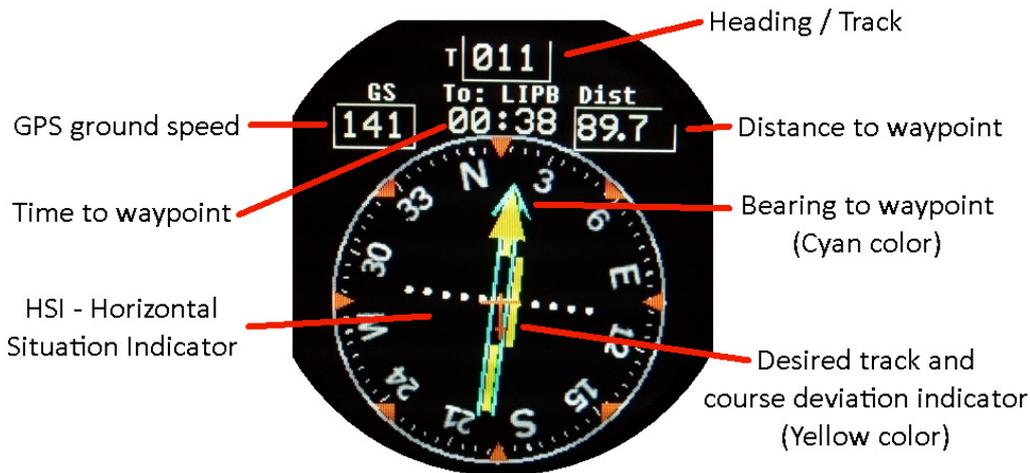
This environment assists the navigation toward a navigation point, or any geographical position selected on the map.

When there is no active navigation (no destination selected) this page behaves as a gyro-compass.

As soon as a GO-TO destination is selected, several additional elements are displayed:

- The bearing pointer (Cyan color), which points directly at the destination

- The HSI arrow (Yelllow color), which indicates the initial track from origin to destination (**Desired Track**)

- The Course Deviation Indicator (**CDI**), which shows the lateral offset from the original track
  When the CDI moves to the right, the aircraft is LEFT of the original track, and the pilot has to turn RIGHT to re-intercept the original route.

- Time to destination (hours : minutes)

- Distance to destination

The rotating knob has no effect on this screen.

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Hints:

If you want to fly DIRECTLY to the waypoint right now, you have turn the aircraft in the direction of the BEARING POINTER (Cyan color)

If you want to fly EXACTLY the ORIGINAL TRACK (from origin to destination) then you have to keep the CDI centered. Once the CDI indicates no deviation, fly the direction indicated by the HSI arrow (Yellow color)

NAVIGATION INFORMATION ON THE PFD PAGE

When navigating to a waypoint it is possible to maintain the aircraft on track while the PFD page is active.

The indication and color coding is similar to the NAV page:

		The aircraft has to turn left to fly directly to the destination (cyan pointer is to the left). The original track is slightly to our left (yellow CDI indicator)
		The aircraft is flying toward the destination (cyan pointer is almost centered). At the same time, we are still the right of the original track (yellow CDI is to our left)

NAV MENU

EXIT
Returns to the NAV screen.

FIND POI >> - Allows searching for navigation points by name or identification (exactly the same as in the MAP menu; see paragraph "FIND POI" FUNCTION below)

STOP NAV - Cancels the direct navigation to a point.
The bearing pointer disappears and navigation data is not shown anymore (time and distance to destination).
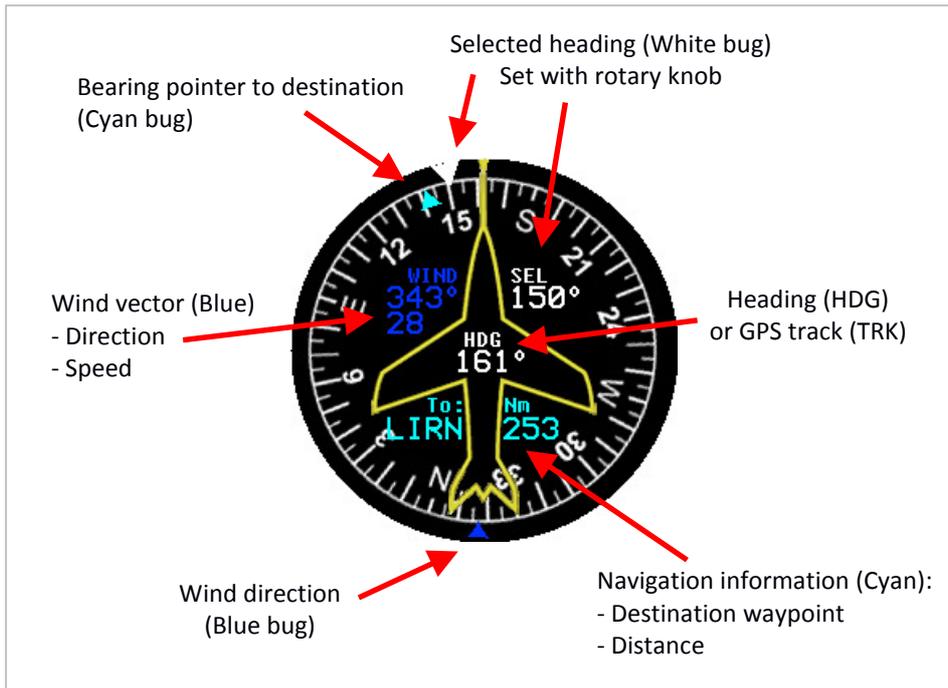
UPDATE DTK – Recalculates the desired track (DTK) to the waypoint, from current position

This is used to re-establish a direct track to the waypoint from the actual aircraft position, in case it is not desired to re-intercept the original track from origin to destination.

This function has exactly the same effect as setting a new GO-TO to the same destination.

SETUP - Opens the setup menu, described below in detail.

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GYROCOMPASS PAGE

Bearing pointer to destination
(Cyan bug)

Selected heading (White bug)
Set with rotary knob

Wind vector (Blue)
- Direction
- Speed

Heading (HDG)
or GPS track (TRK)

Wind direction
(Blue bug)

Navigation information (Cyan):
- Destination waypoint
- Distance

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 MENU

Press and hold the knob for about one second to access the menu.

EXIT - Returns to the Gyrocompass screen.

FIND POI >> - Allows searching for navigation points by name or identification (see paragraph "FIND POI" FUNCTION below)

STOP NAV - Cancels the navigation to a point.
The bearing pointer disappears and navigation data is not shown anymore.

SETUP - Opens the setup menu, described below in detail.

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"NEAREST" PAGE

This page shows the closest aerodromes and navigation points according to the current GPS position.

Ground speed

Heading (HD)
or GPS track (TK)

GPS position

Nearest navigation points
(Scroll with the rotary knob)
- Identifier
- Name

GPS altitude (AMSL)

Type of navigation point

APT	Airport
ULM	Ultralight airfield
HEL	Heliport
VOR	VOR
VD	VOR/DME
DME	DME
TAC	TACAN
VT	VORTAC
NDB	NDB
ND	NDB-DME
L	Locator NDB
MKR	Marker
VRP	VFR reporting point
UAD	User-defined Aerodrome
UWP	User-defined Waypoint

Radio frequency

Distance

Bearing relative to the
aircraft heading (up = in
front of the aircraft)

*NOTE: All distances, altitudes and speeds are shown in the
measurement units chosen in the SETUP menu (see below)*

Rotate the knob to scroll through the list of nearest points.

When a point is highlighted, pressing the knob opens a menu which allows to view more details (**View info**) or activate the navigation to that same point (**Set GO-TO**)

If you have activated the MAP page in the SETUP menu, you will also see the option "**Center on map**".

"NEAREST" MENU

EXIT - Returns to the Gyrocompass screen.

NRST TYPE - Selects which point types are shown in the NEAREST page

ALL - All aerodromes and navigation points
AD - Aerodromes, including ultralight airfields
NAV - Only navigation points and radio aids
HELI - Only heliports

FIND POI >> - Allows searching for navigation points by name or identification (see paragraph "FIND POI" FUNCTION below)

SETUP - Opens the setup menu, described below in detail.

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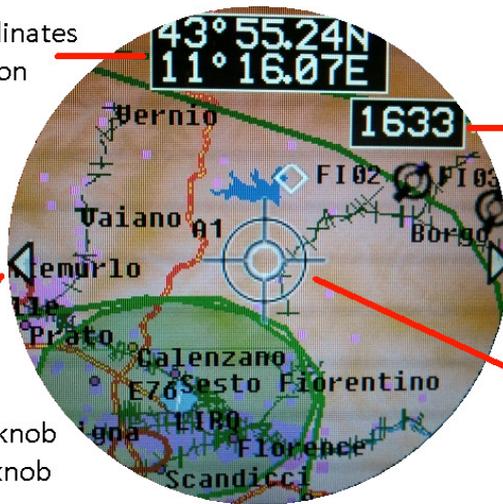## ROUTE CAPTURE PAGE

Geographical coordinates at cursor position

Terrain elevation at cursor position

Cursor position (center of screen)

Scroll direction
- Toggle by pushing knob
- Scroll by rotating knob

NOTE: This page is active only if you have activated the MAP page, too.

ROUTE CAPTURE is a browsable map that can be accessed through the environment menu of the MAP page.

You can scroll the map horizontally and vertically using the rotary knob. The scroll direction (vertical / horizontal) is changed by a short-press of the knob.

Every time the ROUTE CAPTURE page is entered, the map cursor is positioned at the current aircraft position given by the GPS.

ROUTE CAPTURE MENU

EXIT (MOV.MAP) - Returns to the MAP page

ZOOM [250m .. 256Km] - Changes the map zoom (Viewing range).
As soon as the new zoom is selected, the menu disappears and the map is redrawn with the new scale.

FIND POI >> - Allows searching for navigation points by name or identification (exactly the same as in the MAP menu; see paragraph "FIND POI" FUNCTION below)

INFO POI - Displays details about aeronautical points around the cursor
The data can be scrolled up/down using the rotary knob.
Pushing the knob will close the information window.

INFO AIRSPACE - Displays details about airspaces around the cursor
The data can be scrolled up/down using the rotary knob.
Pushing the knob will close the information window.

GO-TO - Starts navigation toward the geographical coordinates of the MAP cursor. Using this function it is possible to navigate to any point on the map, even if there is no aeronautical feature there.

ADD USR WPT >> - Creates a new user waypoint at the current MAP cursor position (see below "USER WAYPOINTS").

CLEAR TRACE - Removes any previous recorded flight trace from the map.

Hint: if you want to close the ROUTE CAPTURE MENU without changing anything and want to remain in the ROUTE CAPTURE PAGE, select ZOOM and press the rotary knob twice. The menu will disappear and the map reappears quickly because the ZOOM has not been changed.

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USER WAYPOINTS

The option "**ADD USR WPT >>**" in the ROUTE CAPTURE MENU opens a sub-menu where the user waypoint details can be entered

SYMBOL - Choose the symbol that will be shown on the map.

NAME - Once this option is selected, a blank text field will be shown on the bottom of the screen with a green cursor.
- Rotate the knob to select the letter/number to add to the name
- Confirm each letter/number with a short-press of the knob
- When finished entering the complete name, push and hold down the knob (long-press)
- The entered text will be displayed near "NAME"

ORIENTAT - Choose the orientation of the runway (the symbol will actually be rotated on the map)

**FREQ** - If wanted, enter here the radio communication frequency

GEO COORD - Use this option to specify a precise geographic coordinate. Otherwise the user waypoint will be positioned at the map cursor coordinates.

ADD WPT - Save the waypoint. The menu will close and you will see the new user waypoint on the map.

DISCARD WPT - Close the menu without saving the changes.

To MODIFY or DELETE an existing user waypoint, scroll the map to position the map cursor exactly over the waypoint. Then open the ROUTE CAPTURE MENU (Long-press of the rotary knob, as usual).

In this case the "ADD USR WPT" option will change to "**MOD USR WPT >>**". Select it to modify the user waypoint details.
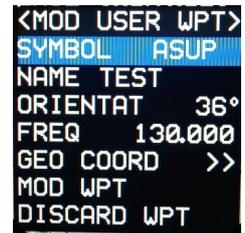
This sub-menu is similar to "ADD USR WPT ", with the following differences:

MOD WPT - Save the changes to they waypoint. The menu will close and you will see the modified user waypoint on the map.

DELETE WPT - Removes the user waypoint from the map.

WAYPOINT SYMBOLS

APT	HPT	ASUP	ULM	FUEL
MED	TOOL	DAN	CAR	SLEEP
PARK	FLAGB	FLAGG	FLAGR	FLAG
TOWER	TOWRL	CAMP	FOOD	

Note: the ASUP and ULM symbols change depending whether the orientation is provided or not.

EXPORTING WAYPOINTS TO SD CARD

Insert an SD card into the SD/MMC slot behind the instrument.

Open the **SETUP** menu, select **UPDATE** and then **EXPORT USR**.

The user waypoints will be exported to a file named "**user_wpt.txt**".

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IMPORTING WAYPOINTS FROM SD CARD

The user waypoints have to be written in a file name "user_wpt.txt" on an SD card (see below for the format description).

Insert the SD card into the SD/MMC slot behind the instrument.

Open the **SETUP** menu, select **UPDATE** and then **IMPORT USR**.

The IFD-NET will try to read "**user_wpt.txt**" from the SD card.

If the import procedure is successful you will see the message "**IMPORT USR OK**"; in case of error (e.g. file not found or SD card not inserted) you will see "**IMPORT USR ERR**".

FORMAT OF "USER_WPT.TXT"

Each text line describes a single user waypoint record; the line must start with "**<**" and end with "**>**". The data fields are separated by "," (comma). All other text lines (not starting with "<") are ignored.

The format of the waypoint record is:

`<type,name,latitude,longitude,frequency,orientation>`

Example:

`<APT,TEST,45.12.26N,10.12.9E,118.55,150>`

The example describes an airport named "TEST", latitude N45°12'26", longitude E010°12'09", frequency 118.55, runway orientation 150°.

The frequency and orientation fields can be left empty; however, you must still provide the field separators (comma). For example:

`<APT,TEST,45.12.26N,10.12.9E,,>`

Explanation of data fields

type	Can be APT, HPT, ASUP, ULM, FUEL, MED, TOOL, DAN, CAR, SLEEP, PARK, FLAGB, FLAGG, FLAGR, FLAG, TOWER, TOWRL, CAMP, FOOD Refer to the waypoints symbols above.
name	Identification of the user waypoint, maximum 9 characters.
latitude	Degrees, Minutes and Seconds, plus N (North) or S (South) Example: 42.21.10N = 42 degrees, 21 minutes, 10 seconds North
longitude	Degrees, Minutes and Seconds, plus E (East) or W (West) Example: 12.10.25E = 12 degrees, 10 minutes, 25 seconds East
frequency	Example: 118.55
orientation	Example: 72 = runway orientation is 72 degrees

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CUSTOM RASTER MAPS

The EFIS/PLUS can display charts loaded from an SD or MMC memory card. These charts are composed of several JPEG files, named with a specific format which describes the geographical coverage of each image file.

Note that custom raster maps are always shown without rotation (North-Up), while the aircraft icon is orientated accordingly.

Every JPG file should cover one geographical degree square (1° latitude by 1° longitude).

Example of file naming format:

<h1 style="text-align:center">cmap42N_12E_41N_13E.jpg</h1>

42N_12E = North-West corner of the chart file ; **41N_13E** = South-East corner of the chart file.

To view the custom raster maps:

- There must be an SD or MMC card inserted in the SD/MMC slot on the back of the instrument

- In the MAP MENU the "CUST MAPS" option must be set to "ON"

As soon as these conditions are met, the instrument starts looking for chart files on the SD/MMC card.

If there are useable chart files on the SD/MMC card, the instrument will display "**Loading map…**".

As soon as the EFIS-MAP has loaded enough data, the chart appears on the screen.

The screen will remain black if there are no chart files on the memory card (in this case "Loading Map" will disappear).

It is advisable, then, to disable the "CUST MAPS" option from the MAP MENU, or remove the SD/MMC card from the slot.

IMPORTANT - Several functions are not displayed on the custom raster charts:

Function	Displayed on raster charts?
Route	Yes, the route line is shown and can be used for navigation
TAWS	No
Points from navigation database	No, but "FIND POI" and "INFO POI" can still search for them
User waypoints	No, but "FIND POI" and "INFO POI" can still search for them
Airspaces	No, but "INFO AIRSPACE" can still display airspace information

Practical example: if the custom charts cover the area around Catania airport (LICC) and the pilot uses the "FIND POI" function to search that same point, then the system will correctly center the view on Catania airport as represented on the custom chart.

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"FIND POI" FUNCTION

The navigation database contains more than 10000 points of interest, which are shown on the map and available for search and navigation.

Once the FIND POI command is activated, a black window appears on the screen with a "Search: " prompt on top.

Enter the search text, one character at a time:
- Rotate the knob to scroll through the alphabet and numbers
- Push the knob to confirm each single character

As soon as 2 characters or more have been entered, the search results appear instantly under the "Search" prompt.

When enough characters have been entered, just press the knob without selecting any character.

NOTE: If the system detects that there is only a single search result, the selection is automatic.

The cursor will move to the list of search results and the knob rotation is then used to select the desired navigation point.

Push the knob again to confirm the selection of a result from the list.

A menu with the following items will appear:

- o **Center on map** - switches to the ROUTE CAPTURE environment and shows the selected point at the center of the screen
- o **View info** - shows additional information about the selected point and also the closest points around
- o **Set GO-TO** - starts navigation toward the selected point and switches to MAP screen.

NOTE: The search results are ordered first by relevance and second by identifier. There are three levels of relevance:

1. Exact match either on the identifier or the name of the point.
   Example: a search for "LIPO" matches exactly the ICAO code of the Brescia / Montichiari airport in Italy. Other matches, for example "EGBC / Cheltenham Heliport", will have lower relevance even if the identifier comes before in alphabetical ordering (EGBC is alphabetically before LIPO)
2. Search term is at the beginning of the identifier or the name of the navigation point.
3. All other matches

FIND POI - EXAMPLE 1

We want to navigate to Rome Urbe airport (ICAO code: LIRU).

- o From the MAP or NAV environment, press and hold down the rotary knob for about one second.
- o Rotate the knob to select "FIND POI >>" and push it (short press)
- o Rotate the knob right to scroll through the alphabet, up to "L" (the first character of the ICAO code), push the knob
- o Repeat until the text "Search: LIRU" is shown.
- o As soon as the system detects that there is only a single point in the database matching "LIRU", it will propose the choice to Center it on the map, View information or Set GO-TO.
- o Rotate the knob to "Set GO-TO" and push it
- o The MAP screen will appear, and a cyan line will show the direct navigation to the destination.
- o Pushing the knob will switch to the NAV screen, where navigation data is shown:
  - ➤ Identification of destination point: "To: LIRU"

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> ➢ Distance to destination
> ➢ Time to destination
> ➢ The bearing pointer and HSI navigation are shown on the gyro compass

FIND POI - EXAMPLE 2

We want to find the "Guglielmo Zamboni" airfield (Italy) on the map. The search will be done on a partial match of the name, by entering the search term "ZAMB"

- o From the MAP or NAV environment, press and hold down the rotary knob for about one second.
- o Rotate the knob to select "FIND POI >>" and push it (short press)
- o Rotate the knob right to scroll through the alphabet, up to "Z". Push the knob.
- o Repeat until "ZAMB" has been entered near the "Search: " prompt
- o Rotate the knob left until the asterisk "*" is shown (will look like: "Search: ZAMB*"), then push the knob.
- o Rotate the knob to the right to scroll down to the desired result "BO05 - Guglielmo Zamboni", push the knob.
- o A menu will appear, "Center on map" is already highlighted, so just push the knob
- o The system will switch to the ROUTE CAPTURE menu and show the location of the airfield and its surroundings.

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"EMERGENCY" FUNCTION

The IFD-NET can be connected to an external "emergency" switch, through the pins "EMER" and "GND" of the power connector (see below "REAR CONNECTORS VIEW AND DESCRIPTION")

The switch is normally open. To enter the emergency status the switch has to be held closed.

Once the emergency status is engaged:

- The MAP screen shows the estimated gliding range of the aircraft, keeping in account the flight altitude and the terrain in the vicinity

- The instrument activates a direct navigation to the closest suitable airfield for landing

- The speed ribbon on the PFD screen shows a red marker indicating the optimum gliding speed

- If configured, the IFD-NET switches to the preferred page to be used in EMERGENCY status.

Configuration

Enter the SETUP menu, then select "EMERGENCY >>". Follow these steps:

a. Adjust the "GLIDE" parameter according to the gliding ratio of your aircraft. For example, 1/10 means that the aircraft flies forward 10 meters while losing 1 meter of altitude.

b. Adjust the "OPT SPD" parameter according to the best gliding speed of your aircraft.

c. Select the page to be activated when emergency status is engaged. "NO CHG" means that the instrument keeps the current page

d. Select whether the instrument should show the frequencies of the closest airfields (AUTOFRQ ON/OFF)

e. Select whether airports shall be considered suitable landing points (APT YES/NO)

f. Select whether ultralight airfields shall be considered suitable landing points (ULM YES/NO)

g. Select whether user waypoints shall be considered suitable landing points (NO/ALL/ORIENT). When "ORIENT" is selected, the EMERGENCY function only searches for user waypoints that have a runway orientation.

To exit the EMERGENCY status, just reopen the electrical connection between the EMER and GND pins.

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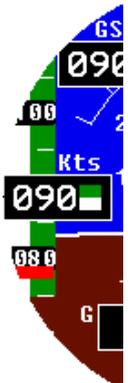
ALTI – ANALOG ALTIMETER

In the SETUP menu, BARO CONFIG sub-menu, you can choose between two altimeter styles.

The 3-pointers altimeter (on the right) mimics the appearance of the typical mechanical altimeter that you may find on small single engine aircraft (e.g. Cessna 172).

The "Drum" altimeter (on the left) is similar to the single-pointer electromechanical altimeter you may find on high performance aircraft.

IAS – ANALOG AIRSPEED

The airspeed gauge is drawn with its colored arcs according to the V-speeds configured in the SETUP menu, IAS ARC sub-menu.

There is a digital flight hour meter at the top of the instrument, which can be reset in the SETUP menu, BARO CONFIG sub-menu. Only the time in the air is actually counted (airspeed > 40 km/h).

VSI – VERTICAL SPEED INDICATOR

This is a typical vertical speed indicator you may find on a small General Aviation aircraft.

TURN COORDINATOR

This page mimics the behavior of a typical electromechanical turn coordinator or turn/slip indicator.

Depending on the parameter SETUP - PFD CONFIG - ROLL SENS you get two possible configurations:

ROLL SENS = 0 (Zero)   **ROLL SENS = 1 .. 4**

The instrument behaves as a turn/slip indicator, thus it is sensible only to the TURN rate.

The instrument behaves as a turn coordinator (sensitive to both ROLL and TURN rates).

The sensitivity to the ROLL rate depends on the ROLL SENS: 1 = min, 4 = max
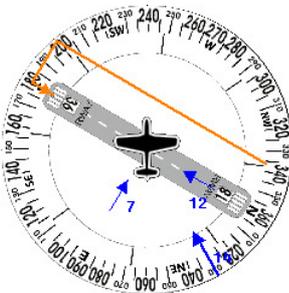
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MFD – OVERVIEW OF BAROMETRIC PARAMETERS

This page is similar to the PFD but only shows the main flight parameters without any attitude indication.

FAI is the Frontal Acceleration calculated using Indicated Airspeed.
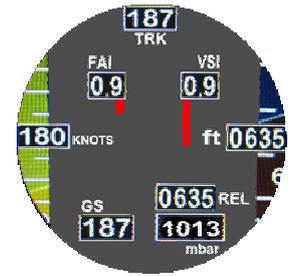
APPROACH PAGE

This is simply a visualization tool which may help situational awareness before entering a traffic pattern for landing.

By holding the knob pressed you can enter the environment menu and set:

- Orientation of landing runway
- Pattern direction (left/right)
- Wind speed and direction as communicated by the tower

You will see the orientation of the runway and traffic pattern compared to the aircraft heading/GPS track (depends on what is selected in SETUP, PFD CONFIG, HDG TYPE).

The wind components along the runway are also shown with blue arrows.

WIND VECTOR

The EFIS can estimate the actual wind speed and direction during flight.

The display of the Wind Vector can be activated or deactivated via: **SETUP** - **PFD CONFIG** - **WIND VECT** (ON or OFF).

The wind speed is shown in the same measurement unit as the airspeed and ground speed indications.

Shown below is an example of wind speed 30 Kts coming from 23° (magnetic reference):

PFD	NAV page	Gyrocompass

LIMITATIONS

- The Wind Vector appears only if the magnetic compass is calibrated.

- The instrument does not have an air temperature sensor to derive the TAS (True Air Speed). Thus the wind calculation can become inaccurate if the air temperature at altitude deviates significantly from ISA conditions (Standard Atmosphere)

- The accuracy of the wind vector is also heavily influenced by the accuracy of the compass calibration. Especially if the compass has been calibrated only on the ground, the wind calculation will degrade when the aircraft is not flying level.

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SETUP MENU

START ENV - Determines which page appears when the instrument is powered up. For example:

- PFD (default) - Primary Flight Display in horizon mode

- MAP - Moving map

- SYNT - Primary Flight Display in Synthetic Vision mode

- NAV - Navigation page

Other options will appear depending on the pages you activate.

LIGHT [20% .. 100%]

Adjusts the brightness of the screen; the selected backlight intensity is maintained on next power up.

ALT UM [m, ft]
Selects the measurement unit for altitude, as shown on the PFD and ALTImeter pages.

PRESS UM [hPa, inHg]
Selects the measurement unit for the reference pressure (e.g. QNH) on the PFD

IAS-GS UM [Kph, Kts]
Selects the measurement unit shown on the PFD for the airspeed and GPS ground speed.

IAS ARC >> (sub-menu)

Vs0	Stall speed, full flaps
Vs1	Stall speed, clean
Vfe	Maximum speed with flaps extended
Vno	Airspeed at start of the yellow arc
Vne	Red line, "never exceed" speed
EXIT	Goes back to the SETUP menu
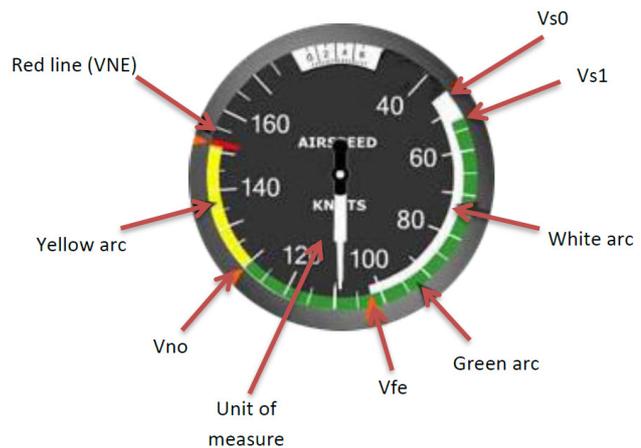
These values and color ranges are displayed on the speed ribbon on the PFD. Refer to your aircraft manual in order to set all V-speeds accurately.

VSI UM [m/s, ft/m]
Sets the measurement unit for vertical speed shown on PFD

PFD CONFIG >> (sub-menu)

HDG TYPE [AUTO, GPS, MAG]	Heading source:	AUTO - Use MAG when not moving, GPS otherwise
		GPS - Use GPS track only
		MAG - Use magnetometer only
LAYOUT [FUL, CLR, AH]	FUL (default) - PFD shows all available air and GPS data	
	CLR - PFD shows Airspeed, Baro Altitude, Heading and slip indicator	
	AH - PFD shows just heading and slip indicator	
WIND VECT [ON, OFF]	Activates or deactivates the calculation of the WIND VECTOR	
ROLL SENS [0..4]	Turn coordinator: sets the sensitivity to the roll rate.	
PITCH AD G / ROLL AD G **PITCH AD K / ROLL AD K**	See "ARTIFICIAL HORIZON CALIBRATION" below	

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MAP CONFIG >> (sub-menu)	Only appears if you have activated the **MAP** page.
IAS [HIDE, ENAB]	ENAB (default) - show airspeed in moving map
	HIDE - Airspeed is hidden
GS [HIDE, ENAB]	ENAB (default) - show GPS ground speed in moving map
	HIDE - GPS speed is hidden
TRACE REC [OFF, ON]	Enables or disables trace recording
TRACE BUF [0 .. 10000]	Sets the number of GPS position samples stored in the trace buffer
MAP SKIN [0 .. 7]	Selects between several color scales for display of terrain elevation in the moving map
MAP DET >>	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
MAP ZOOM >>	For each type of map symbol, define the minimum zoom level to show the symbol itself and its label
EXIT	Returns to the main SETUP menu
BARO CONFIG >> (sub-menu)	Only appears if at least one of these page is enabled: **ALTI, IAS, VSI, MFD**
ALT TYP [3PTR, DRUM]	Defines the appearance of the altimeter (3-pointers or "Drum")
MFD FAI [ON, OFF]	Display of frontal acceleration in MFD page (from pitot pressure)
TIMER RES	Resets the hour-meter shown on the airspeed gauge (IAS page)
TRIM PRESS	Adjusts the reference pressure offset (in hPA - ideally should remain 0.0) May be used to match the IFD-NET with another onboard altimeter.
COMPASS >>	see "MAGNETIC COMPASS CALIBRATION"
UPDATE >> (sub-menu)	
SW VER xxxxxx	Indicates the software release (same as "SW xxxxxx" in main setup menu)
UP NAV AIR [yymm]	yymm =Year/month of installed navigation database
	This item is used to start a database update from the SD card. The manufacturer will provide instructions with the database update.
UP FW	To be used for firmware update. Follow instructions provided by the manufacturer with the update.
IMPORT USR	Import user waypoints from SD card (user_wpt.txt)
EXPORT USR	Export user waypoints to SD card (user_wpt.txt)
REBOOT	Restarts the instrument
EXIT	Returns to main SETUP menu

NMEA >> (sub-menu): Defines the parameters for the NMEA RS-232 data output from the instrument

BAUD [4800 .. 115200]	Sets serial port speed for NMEA output

There is an entry for each supported NMEA sentence; these can be enabled (ON) or disabled (OFF) individually.
By default all sentences are disabled. The NMEA output can drive an autopilot or a MODE S transponder.

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The IFD-NET can generate the following NMEA sentences:

GPRMC

GPRMB

GPAPA

GPAPB

EMERGENCY >>   (sub-menu): Configures the emergency function. See above: "EMERGENCY FUNCTION".

PAGES >>   (sub-menu): Configures which pages are active. See "AVAILABLE PAGES" on page 5.

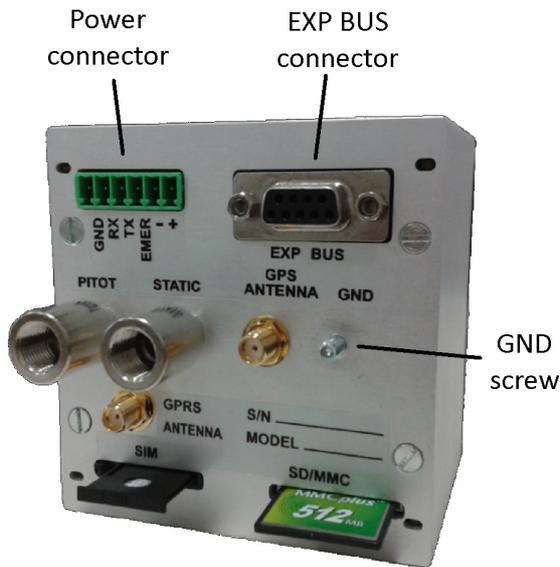**INSTALL >>**   (Only for factory usage)

SW xxxxxx
Indicates the software release, e.g. "SW 280716"

EXIT
Exits the SETUP menu

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REAR CONNECTORS VIEW AND DESCRIPTION

Power connector

EXP BUS connector

GND screw

POWER CONNECTOR:

- +12V (10 to 30Vdc) 250mA: use 5A Fuse
- – 0V -> connect to GND
- EMER -> close to GND to engage emergency status.
- TX -> RS232 transmission line for internal GPS
- RX -> RS232 transmission line for internal GPS
- GND -> GND for internal GPS

EXP BUS CONNECTOR:

- 12/24 Vdc out (max 500mA)
- RS232 TX out to external Autopilot (NMEA)
- RS232 RX in from external Autopilot
- RS485 A+ signal for FLY BUS®
- GND
- +5 Vdc out (max 250mA)
- +5 Vdc out (max 250mA)
- GND
- RS485 B- signal for FLY BUS®

INSTALLATION GUIDE
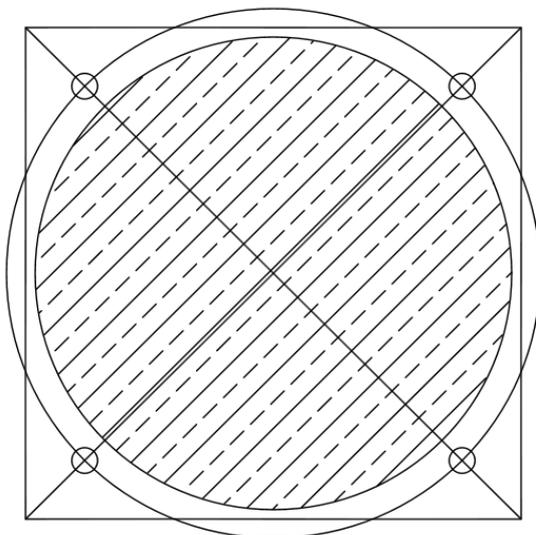
3 1/8 (80mm) Instrument Hole

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.

The IFD-NET EFIS/MAP has a standard 80mm aeronautical shape.

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 57/80mm holes already prepared.

The IFD-NET is installable in a standard hole, keeping in account that the lower-right screw hole shall be enlarged to a diameter of 7.41mm 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 need 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 the plastic profile template to obtain a thickness of about 1.5mm between the cockpit surface and the bottom part of the aluminum knob.

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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.

GPS ANTENNA

In the figures below there are two different types of GPS antenna. These are terminated by a SMA MALE standard connector.

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

- Choose between magnetic or adhesive type 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 sensitivity of the antenna.
- 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.

SELECTING AN APPROPRIATE INSTALLATION POSITION

IFD-NET EFIS/MAP 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 results, 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 EFIS/MAP. 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.

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- 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.

POWERING AND EXPANSION BUS

The electrical connection of the EFIS/MAP is very simple. As all of the sensors are inside the metal housing, the only electrical connection needed is the main power line (10 to 28Vdc 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.

Use wires with a cross section not less than 1.5 square millimeters. Keep connections as short as possible.

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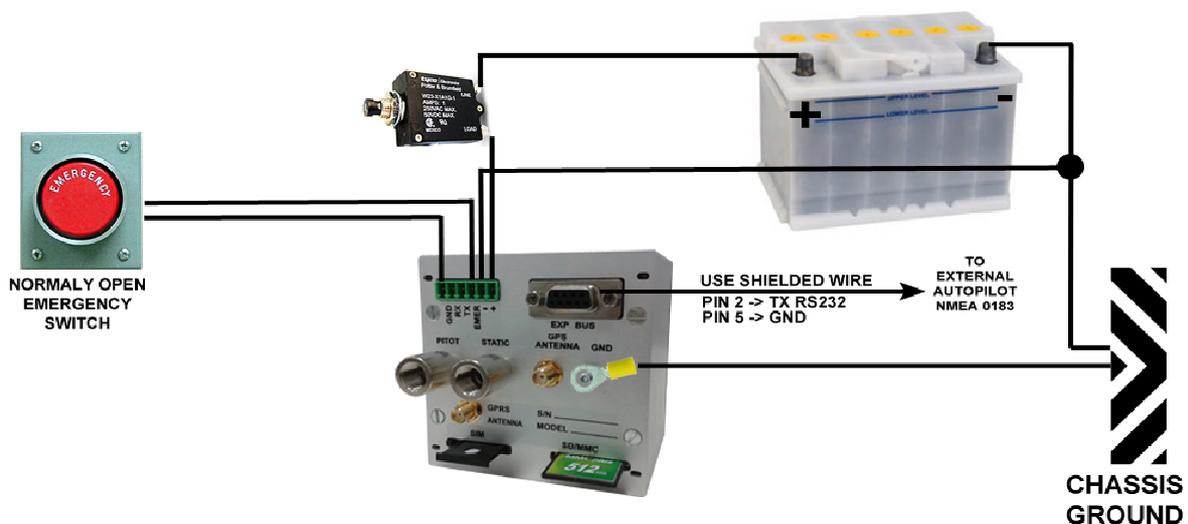
PNEUMATIC AND GPS ANTENNA CONNECTION

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.
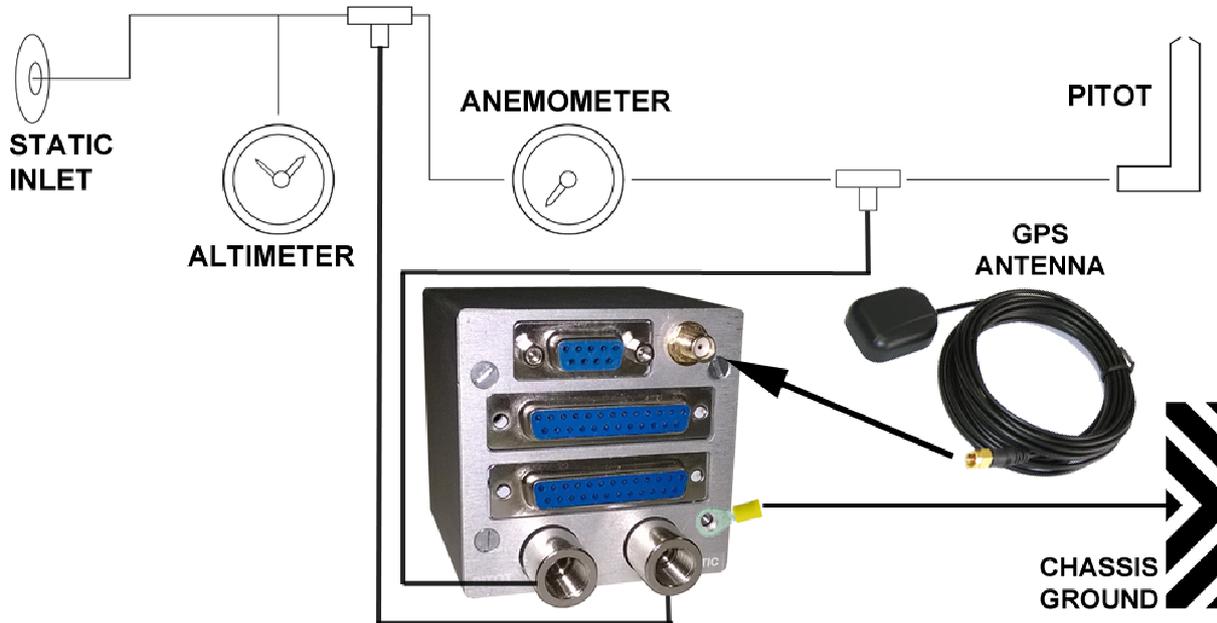
IMPORTANT NOTES ON PITOT/STATIC CONNECTION

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

When fixing the PITOT/STATIC pipes to the instrument, please be especially 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.

We suggest to use pipe hose adapters with rubber o-ring in order to avoid pressure leaks, and in any case don't lock it too strongly.

The hose adapters should be locked by hands and not by wrench. Otherwise, during screw operation, hold the 1/8NPT units adapter with a second wrench to avoid that they rotate and twist the internal pipes.

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ARTIFICIAL HORIZON CALIBRATION

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

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

- From the PFD PAGE enter the SETUP menu, then PDF CONFIG sub-menu

- Adjust the parameters: PITCH AD K, ROLL AD K
  When one of these parameters is highlighted, an horizontal bar will appear on the bottom of the screen

- Change each of the parameter values in a way that the corresponding horizontal bar becomes fully green.

- Select EXIT to leave the SETUP menu and save the 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 flight but will be less accurate.

Additionally, it is possible to adjust the displayed attitude by introducing an offset in pitch and roll.

Let's say that the instrument is mounted in the panel, the aircraft is parked on a level surface, but the horizon is showing a residual pitch and/or bank angle.

This can be corrected as follows:

- Enter the PFD MENU, then press the knob on the option **PITCH ADJ**. Finally select **EXIT**.

- The horizon will now show a level attitude, even if the instrument is detecting a pitched or banked position.

It is also possible to fine-tune the PITCH ADJ offsets manually:

- From the PFD PAGE enter the SETUP menu, then PDF CONFIG sub-menu

- Adjust the parameters: PITCH AD G and ROLL AD G

You will notice that the horizon behind the menu moves accordingly.

Please refer to your aircraft instruction manual in order to obtain information regarding the attitude angle during cruise, and/or about the best condition to obtain the reference attitude to be used to adjust the horizon to zero pitch and roll.

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MAGNETIC COMPASS CALIBRATION

The compass is usually calibrated and tested at the factory; however we strongly advise to recalibrate the instrument after installation in the panel, due to the specific electromagnetic environment of each aircraft.

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

The EFIS compass is designed to be calibrated automatically in flight.

STEP 1: Activate the calibration mode

We suggest to start the engine and turn on avionics and radios, so that the electromagnetic field of the aircraft will be in a condition similar to normal cruise flight.

Enter the **SETUP** menu, then select "**COMPASS >>**" to enter the compass page.

If calibration mode is off ("Calibrate OFF"), select "Calibrate", and press the knob; the text will change to "**Calibrate ON**".

The calibration mode works in background, so if desired you can leave the COMPASS screen by selecting "EXIT".

STEP 2: Taxi around and/or fly to calibrate the compass
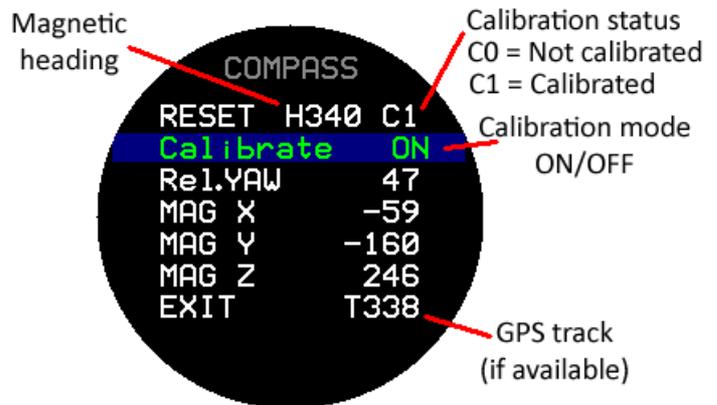
Tip: The GPS track can be compared to the magnetic heading to check the accuracy of the compass while taxiing on the ground

The compass calibrates **automatically**, both on the ground and in flight, as long as the aircraft performs at least a turn through 360 degrees or more.

To obtain a good calibration we suggest to take off and **fly at least two 360° turns**, first to the left and then to the right, keeping a good bank angle (between 30° - 45°).

The more maneuvers you fly (especially turns), the better the compass calibration should become. You can also fly some pitch up/down maneuvers in several directions, so the instrument has more data to refine the calibration.

If you choose to calibrate the compass only on the ground, it will still work but the heading indication will probably be inaccurate when the aircraft attitude is not level.

STEP 3: Optionally, switch off automatic calibration when done

The automatic compass calibration can remain always on, but if you prefer to keep the current calibration because you are happy with it, you can switch it off.

Enter again the COMPASS screen and set "**Calibrate: OFF**"

Note that the instrument will remember whether the automatic calibration is active or not, even after the electrical power is cycled OFF/ON.

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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 itself may become magnetized if exposed to a magnet, for example the one contained in some GPS antennas.

If metallic components near the IFD-NET become magnetized, it may be necessary to re-calibrate the compass.

In case the magnetic field near the instrument is is too strong, the compass will not calibrate and/or will not indicate correctly.

You can detect this situation in the COMPASS page. If any of the indications "MAG X", "MAG Y" or "MAG Z" shows three asterisks (***) instead a number, then the magnetometer is saturated by a too strong magnetic field and the compass will not work properly.

CLEARING THE COMPASS CALIBRATION

If for any reason you want to completely clear the compass calibration, press the knob over the "**RESET**" option in the COMPASS calibration page.

When you press "**RESET**" and then don't complete the calibration, the magnetic heading will remain unavailable outside the COMPASS page.

In this case the heading indicator in the PFD/MAP/NAV pages will always show "**- - -**" unless you set "HDG TYPE" to either "AUTO" or "GPS" in the SETUP menu.

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.

You can press on the "MAG X" (fourth) item to show more parameters that may be useful for troubleshooting by a technician (X, Y, Z offsets and scale factors):

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

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MECHANICAL DIMENSIONS

83 mm

87 mm

67 mm

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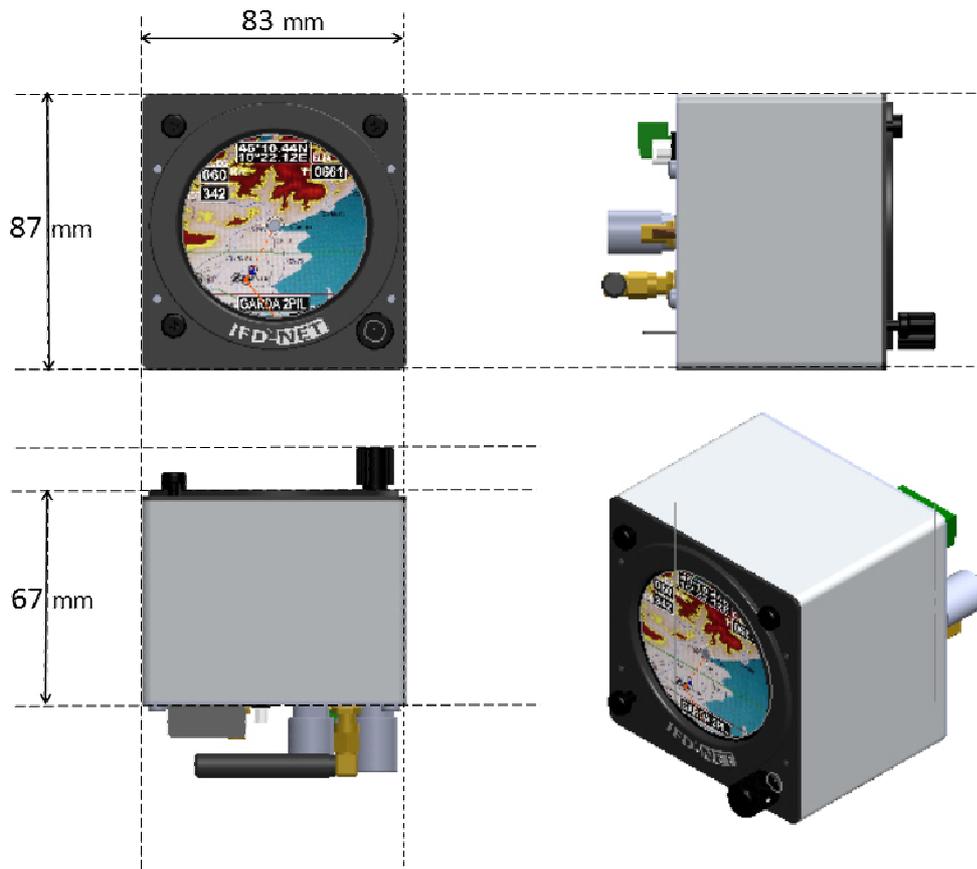
ORDERING INFORMATION

The IFD-NET series is available in several models (BARO, EFIS, EFIS/MAP, EFIS/PLUS). Because of their differing internal electronic configuration, it is not possible to switch between the different models after final assembly and 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 applicable to the product described in this manual, and its optional tools/spare:

- IFD-NET EFIS/PLUS
- GPS ANTENNA
- 1/8 NPT MALE to RUBBER PIPE HOSE ADAPTERS

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 observe VFR policy during your flight.