FCU320

This manual is intended for Flight Simulator use only and may not be used in any real world aviation application. The authors are not responsible for any errors or omissions.

FOREWORD

Thank you for purchasing the CPflight FCU320 hardware. To optimize the performance of this unit, please read through this manual carefully. This manual contains the latest information at the time of drafting, eventual later informations can be found at CPflight website www.cpflight.com
This manual gives you the information to connect and use the FCU320 panel with Microsoft Flight simulator through Project Magenta FCU software or AST software. For more informations about these software see www.projectmagenta.com and/or www.airsimtech.com website.

The CPflight modules are produced to meet requirements from the hobby market; the use of our products in professional or commercial environments is not permitted without approval of the CPflight management; please contact us at info@cpflight.com if you need to exploit our products in professional or commercial environments.
FCU320 is a full scale replica of the Airbus 320/340 Flight Control Unit, look and functionality are reproduced with high details. FCU320 is equipped with high quality level components; custom made LCD display and Push/pull knobs give a high fidelity performances and a never seen realism.
FCU320 interface with Project Magenta FCU software and AST advanced version software; it is important to know that the hardware have not its own intelligence on board, it establish an interface with the software; logics, operating modes and aircraft behavior are managed by Project Magenta or AST software. The use of this hardware presuppose to be familiar with Project Magenta (or AST) software.
The FCU320 does not interface directly with Microsoft Flight simulator or with other software add-on.

HARDWARE INSTALLATION

WARNING! The panels back cover are made with stainless still metal sheet, pay particular attention to the cutting edges when you handle the panels.

The FCU320 is designed for panel assembly. The FCU320 is intended as a part to be inserted an a cockpit reproduction, CPflight does not produce chassis or other mechanical parts for the cockpit structure, so the panel is intended to be inserted in your own cockpit glare shield. To fix the FCU in your cockpit, cut out your glare shield panel according with the dimensions quoted at the last pages of this manual. The FCU is provided for “Captain only” configuration (FCU + left EFIS), or in a full configuration (FCU + Captain EFIS + F/O EFIS), in the panel fixing cut-out consider the front-plates overhang to keep enough space to place the EFIS’s.
The FCU units has to be fixed before to place the EFIS’s, differently you will not able to screw the fixing nuts. Fix the FCU through the 4 fixing nuts (see figure 1); connect the EFIS’s flat cables and place EFIS’s in theirs location. EFIS’s are fixed through 3 nuts.

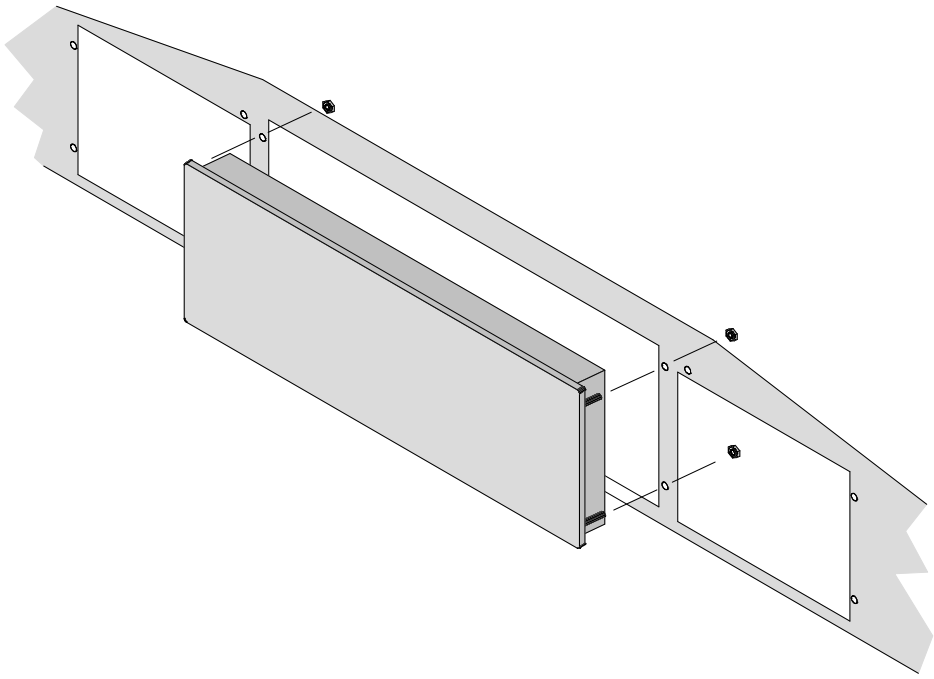


Figure 1: FCU fixing

CONNECTIONS

The FCU is provided with a universal supply adapter that accepts a voltage of 100 to 240Vac (50/60Hz). Supply adapter and USB cable are provided with the FCU, you don't need further hardware to operate.
Sockets for connections are on the back of panel (Figure 2). The two 20 pole sockets on sides (Figure 2 E and F) are provided for EFIS's connection; connect the flat cable of each EFIS to these sockets.

WARNING! Do not invert the connection of right and left EFIS, the two EFIS's have different internal circuit and this could damage both the FCU and EFIS.

In a network system, the FCU320 hardware has to be connected to the computer where the Project Magenta FCU software runs. Even if Project Magenta (and CPflight) FCU may run on a client, in most of case the data update result more fast if Project Magenta (and CPflight) FCU run on the server. Beyond to the EFIS connection, supply and USB connectors the FCU320 have some further sockets: they are provided to allow system expandability. A 16-pin connector "D" allows input/output connection, while DIN 5 pole socket "C" is used to link auxiliary CPflight modules, both connectors are predisposed for future development. Close to the left EFIS connection socket, there are the two jumpers for firmware upgrade and a small 2-pole socket ready for external backlight control.

Figure 2: Connectors (back view)

A - Power supply socket
B - USB
C - 5 poles DIN socket for external module connection
D - Input/Output (I/O) expansion socket (future development)
E - Left EFIS connection
F - Right EFIS connection
G - External Backlight control
H - Jumpers for firmware upgrade

WARNING! For D and G auxiliary connector refer to "AUXILIARY INPUTS" section later on this manual. Do not attempt to connect anything different from as described in this section; warranty does not cover damages due to incorrect wiring of any external device.

Note: If you do not use FCU320 for a long time it is preferable to disconnect the power supply.

USB DRIVER INSTALLATION

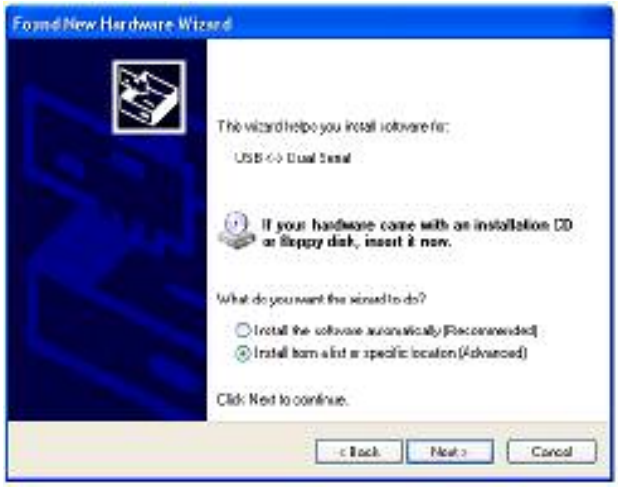
When you connect the FCU for the first time you will asked for the driver installation, the drivers are available for download at CPflight website. To install the drivers follows these steps:

- Download the file "usb.zip" at http://www.cpflight.com/sito/downloads/downloads.asp
- Files are in a compressed archive .zip; unzip the files in a temporarily folder…
- Connect the USB cable to the FCU320 USB connector (Figure 2 "B") and the other side to a free USB port of your computer…
- Connect the DC power adapter to the FCU320 (Figure 2 "A") and plug the adapter to a main supply socket. The computer has to be switched on when you connect the FCU for the first time…

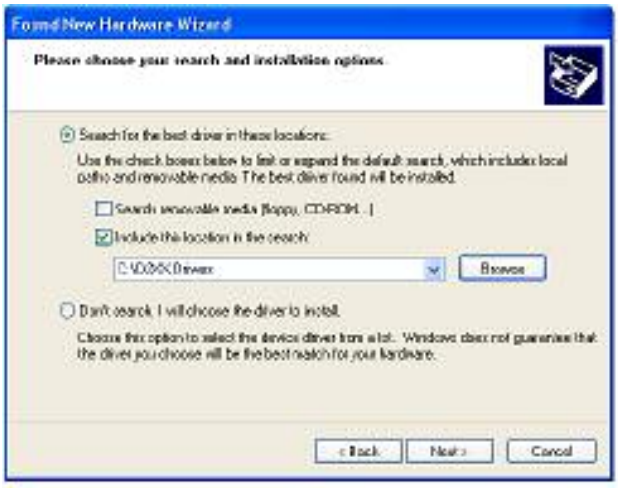
WARNING! FCU320 accepts a supply voltage of 6Vdc. Only provided stabilized plug-in power supply adapter must be used; do not attempt to plug in a different adapter to FCU as you may irreparably damage it.

- The driver installation procedure will start automatically; follows the instruction on the screen (note that the figure of the following example may be different depending by your operating system)…

When you will ask to connect to Menus Update to search for software select “No, not this time” and click next to continue…



Select “Install from a list or specific location” and click next to continue…



Browse the temporarily folder where you have unzipped the files and click next to continue…

You will be informed that the driver has not been subordinate to Menus Logo testing click “Continue Anyway”…

The drivers will be installed in the system; click “Finish” when prompted.

Important note: Depending by the system you may be required to repeat the driver installation two times.

During the USB drivers installation the system assign a number to the communication port. Check your configuration in the Windows Control panel -> System Property -> Device Manager Tab. On the (COM & LPT) port you will see “CPflight serial adapter (COM n)” where “n” is the assigned communication port number, you will use this number in the First set up (se following).

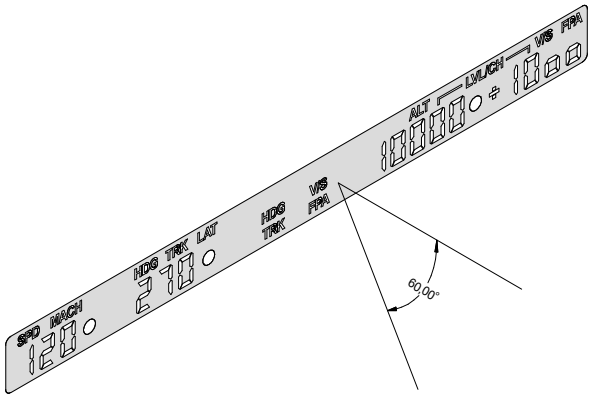
FIRST SET UP AND START-UP

Project Magenta: To enable communication with Project Magenta you have to set the communication port. In the Project Magenta FCU folder open “FCU.ini” file with a text editor, browse the [Serial Connection] section and set CpflightComm= n where “n” is the communication port assigned by the system during the USB drivers installation (see the above “Driver Installation” section). Save the “FCU.ini” file.

AST: to enable the communication install the AST Interface software for CPFlight FCU/EFIS Unit; download the file at Airsimtech website download page. To enable the communication set the communication port number in the enclosed ini file. Open the ini file with a text editor, in the Serial channel section set channel = n where “n” is the communication port assigned by the system during the USB drivers installation (see the above “Driver Installation” section).

Run Project Magenta FCU (or CPflightFCUinterface.com if used with AST) software to start-up the FCU. The FCU320 will show on the displays the installed Firmware revision and the device serial number, and then synchronize data.
The FCU turns off command come from the computer when you close the Project Magenta FCU (or AST) software. If you shut-down the computer without exit the program, or a computer block occur, the FCU may stay on or may fail the subsequent turn on. If you find any problem with the FCU start or turn off, it is advisable to reset the unit. To do this, disconnect the power supply from the FCU, wait few seconds and reconnect power.

Important notes! The FCU can extinguish the displays to simulate a "cold and dark" situation depending by the battery, avionics or other aircraft systems status. Be sure to have the right conditions in the cockpit to have the display turned on - The 3 positions toggle switches of EFIS selectors (ADF/OFF/VOR) have lock lever, pull the lever to move in the new position.



Display bias angle

The bias angle is the angle from the perpendicular from which an LCD display is best viewed. The bias angle is often stated with reference to a clock face. The FCU320 display is designed for 6:00 viewing angle, this mean that the display is better visible from the perpendicular to the bottom. The better display viewing angle is from the perpendicular to 60° bottom (see Figure 3). The horizontal viewing angle is 140°. These are the better viewing condition for the expected placement in the cockpit.

Figure 3: display viewing angle

ON-FLY DISPLAY BRIGHTNESS AND BACKLIGHT REGULATION

When the FCU is normal running (starts with Project Magenta or in test mode using the CPflight software test) you can on-fly set the display brightness and contrast, besides the backlight intensity. This function is not available if the related preferences are settled “On” in the configuration menu (see above “CONFIGURATION MODE” section). To regulate the display and the backlight: hold pushed the SPD/MACH button and rotates knobs as follow:

- **Speed knob**: change the display contrast.
- **Heading knob**: change the display brightness.
- **V/S knob**: change the backlight intensity.

The FCU keep the regulation in its working memory, data are saved in a non-volatile memory when the FCU switch-off (data are not saved if the FCU power supply is disconnected during the normal running).

CONFIGURATION MODE

FCU320 firmware provides an internal program mode to configure some preferences in the hardware functionality. With the FCU in stand-by (powered and switched–off, Project Magenta/AST software not running) push and hold the A/THR key for more than 1 second; this start the hardware in configuration mode. This is the only way to access to the configuration mode; no PC software program is required to configure the FCU320 hardware. In program mode only some keys are operating; the HDG, ALT and V/S display area show the program title and option as following:

HDG display	ALT display	V/S display
Function to be settled	Parameter	Setting

A/THR key (push and hold for more than 1 second): enter the configuration mode
AP1 key: scroll to the next program menu.
AP2 key: toggle the preference setting (ON/OFF).
A/THR key: save changes and exit the configuration mode

Settings are saved in a non-volatile memory when you exit the configuration menu and the FCU go in stand-by. Following a description of the menu available in Configuration Mode:

CONFIGURATION MENU	HDG display	ALT display	V/S display
BACKLIGHT CONTROL: allow to select how to manage the backlight control. Setting this function to "OFF" (default) the backlight is related to the status of FS NAV lights, so the backlight will light-up when the NAV lights in FS are ON. Setting this function to "ON" the NAV lights status will be ignored and the backlight can be controlled through the related auxiliary input (Figure 2 G). *Note: this setting does not modify the backlight brightness, it select the way to control this variable.*	EbL	Ctrl	OFF/On
DISPLAY BRIGHTNESS CONTROL (advanced information): allow selecting how to manage the display brightness. Setting this function to "OFF" (default) the display brightness can be regulated during the normal functioning as described above (see "ON-FLY DISPLAY BRIGHTNESS AND BACKLIGHT REGULATION"). Setting this function to "ON" the display brightness can be regulated through a potentiometer connected to the 16 pole connector (future development). *Note: this setting does not modify the display brightness, it select the way to control this variable.*	dSP	briG	OFF/On
FAST INCREMENT: this menu allows setting the fast increment functions to the knobs. Setting this function to "ON" (default) allows the value increase/decrease to be amplified when knobs are rotated fast to rapidly approach the desired value.	FFI	---	OFF/On
SERIAL NUMBER: This menu displays the device serial number. It is a read only location and is not modifiable.	Sn	xxxx	xxx
FIRMWARE RELEASE: This menu displays the installed firmware release. The number is not modifiable in this menu, but it is updated when you load a new firmware in the FCU internal memory (see "FIRMWARE UPDATE" section).	Rel	xxxx	xxx
COUNTER: This menu show the Hours of FCU running. It is a read only location and is not modifiable. *Note: the "xxxxx" in the above menu act for the total Hours of FCU running from 0 to 99999.*	Cont	H xx	xxx

EXPANSIONS

FCU320 comes provided with expansion capability through the DIN 5 pole auxiliary socket (Figure 2 “C”). This allows you to connect and interface CPflight plug&play expansion modules (Future development).

WARNING! The use of auxiliary connectors (Figure 2 D and G) is intended for expertise users. To use the external backlight regulation it is necessary to weld wires to the provided 2 pole pin strip and connect these to your own switch or potentiometer. Do not attempt to connect anything different by the following indications; do not connect anything coming from any external power, warranty does not cover damages due to incorrect wiring of any external device.

EXTERNAL BACKLIGHT CONTROL (Figure 2 G)

External backlight control accepts input from steady position switch (ON/OFF) or potentiometer. Connecting a potentiometer you can regulate the backlight brightness directly from this input. Note that the FCU backlight also affects the backlight of the connected modules (if any). The suitable value for the potentiometer is affected by the number of connected expansion modules; a 1000 ohm (0,5W minimum) potentiometer is suitable for a typical setup. To allow the external backlight inputs to work the related preference have to be settled “ON” in the preferences setting (see “CONFIGURATION MODE” section).

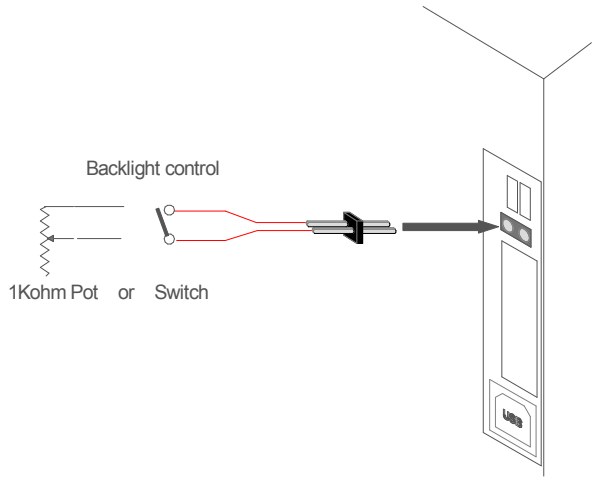


Figure 4: connection diagram for external backlight control wiring.

WARNING! To connect wires to the 2 pole socket use the provided 2 pole pin strip; do not weld the wires directly to the FCU connector. Weld wires to the provided pin strip and place thermo-retractile isolation tube on each connection to avoid short-circuit between poles. Do not weld wires to the pin strip when it is inserted in the FCU socket, insert in only after welding the wires.

16 POLE CONNECTOR (Figure 2 D)

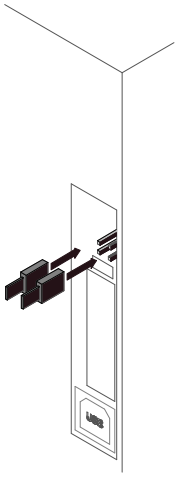
The 16 pole connector is provided for future development.

Important note: The 16 pole connector is <u>not</u> compatible with the MCPEX1 expansion board.

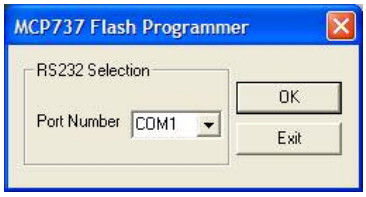
FIRMWARE UPDATE

The FCU hardware is based on a microprocessor, on this device run a special program called “firmware”. The firmware manages all the hardware functions besides the communication with the computer.
The firmware is stored in a “flash” memory, this allows the program to be updated at any time in case of improvements or functions addition. The firmware is available at CPflight website on download page (except the first released version); the revision number is progressive, so a higher number correspond to a latest version. Before to proceed with the upgrade check the installed firmware revision number. You can see the installed version in configuration mode (see related section) or at the FCU startup.
In some circumstances a firmware upgrade may require an updating of the software too (Project Magenta or AST), if you encounter any malfunction after a firmware update, check software version and update the software if required. To update the firmware follows these steps:

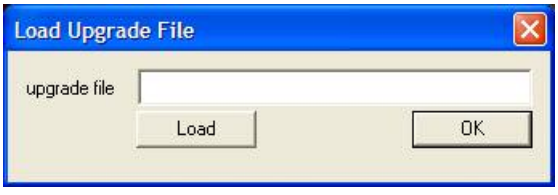
- Download the firmware at: http://www.cpflight.com/sito/downloads/downloads.asp ; pay attention to the relation between the firmware and the device as on the download page you may find firmware for different devices. The firmware for the FCU is named “fcufwxxx.zip” (where xxx act for the revision number)…
- Files are in a compressed archive .zip; unzip the files in a temporarily folder…
- Disconnect supply from the FCU; disconnect external modules and expansion board if any…
- Insert the two jumpers (provided) on the pins located on the back of the FCU as indicated in the below figure…



- Connect power supply to the FCU, a small flash on the backlight indicate that the FCU has started in firmware program mode…
- Close any application on the computer, browse the temporary folder that contain the downloaded firmware and run UPGRADE.EXE program. The following dialog will prompt…

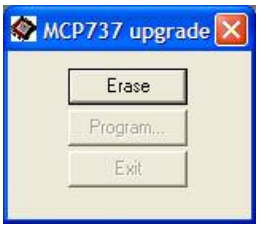


Select the port number assigned during the driver installation (see “driver installation” section) and click on OK…



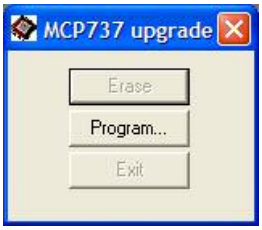
…click on "Load" button and browse the FCU320xxx.mot file (where xxx represent the release number) in the folder where you have extracted the firmware files; select it and proceed…

…the file name will be shown into “upgrade file” field click OK to proceed…



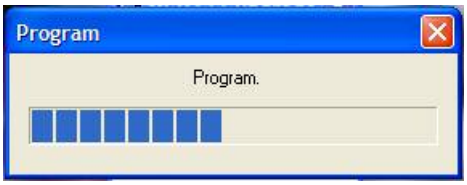
…click on the Erase button to clear the memory for programming…

…at the end of erase phase the above dialog will prompt; clock OK to proceed…



…now click on Program... button…

…the program show the info about the memory area to be programmed, click OK…



…the memory programming will take some time, during the programming the FCU backlight will flash…

…at the end of program procedure the above dialog will prompt, click OK to continue…

…now click to Exit button and wait until the dialog will close before proceed…

- Firmware has upgraded; disconnect supply from the FCU…
- Remove the two jumpers from the pin…
- Reconnect external modules and expansion board if any…
- Reconnect power supply to the FCU, the displays will show the new installed Firmware revision.

MAIN CHARACTERISTICS

Common characteristics for FCU320 and EFI320 (Left & Right)

- Engravity backlighting frontplate.
- Backlight color: Warm White
- Engravity back lighted pushbuttons.
- Pushbuttons legend backlight color: White
- Pushbuttons active status LED color: Green
- Encoders characteristics: mechanical with PUSH/PULL function, 20 increment for rotation (with detent).
- Knobs: aluminum dust-coated (with symbols)
- External or internal display brightness regulation.
- External or internal backlight brightness regulation.

Characteristics for FCU320

- Display: Custom made back lighted LCD
- Display color: Warm white
- 4 digital encoders: SPD/MACH, HDG/TRK/LAT, ALT, V/S
- Dual concentric ALT Knob (external knob for x100 / x1000 exchange)
- 16 bit Flash microcontroller.
- DIN 5 pole socket for plug&play CPflight modules interface.
- USB Interface (USB cable provided).
- Supply: 6Vdc 1A (supply adapter provided).

Characteristics for EFI320 (Left & Right)

- Display: 4 digit + BARO/QNH legends
- Display characteristics: LED 7 segments. Digit height: 0,3” (7,6mm)
- Display color: white
- Dual concentric Altimeter setting Knob (external knob for inHg / hPa exchange)

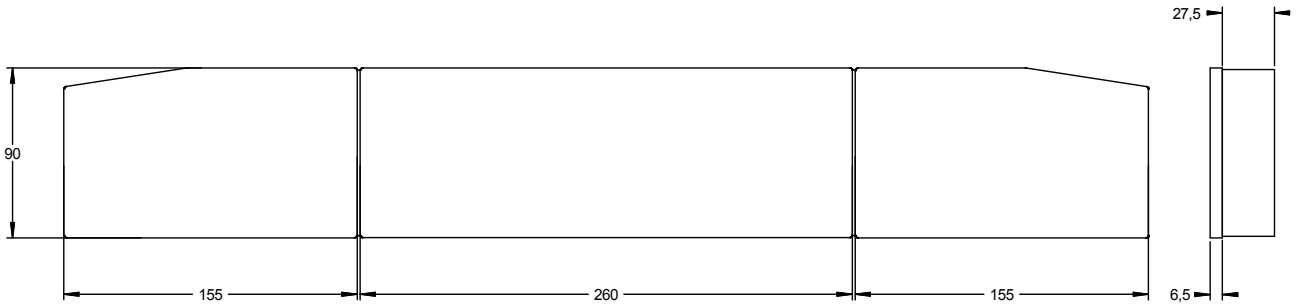


Figure 4: Mechanical Dimensions (mm). See panel cut-out at the next pages

LINKS/REFERENCES

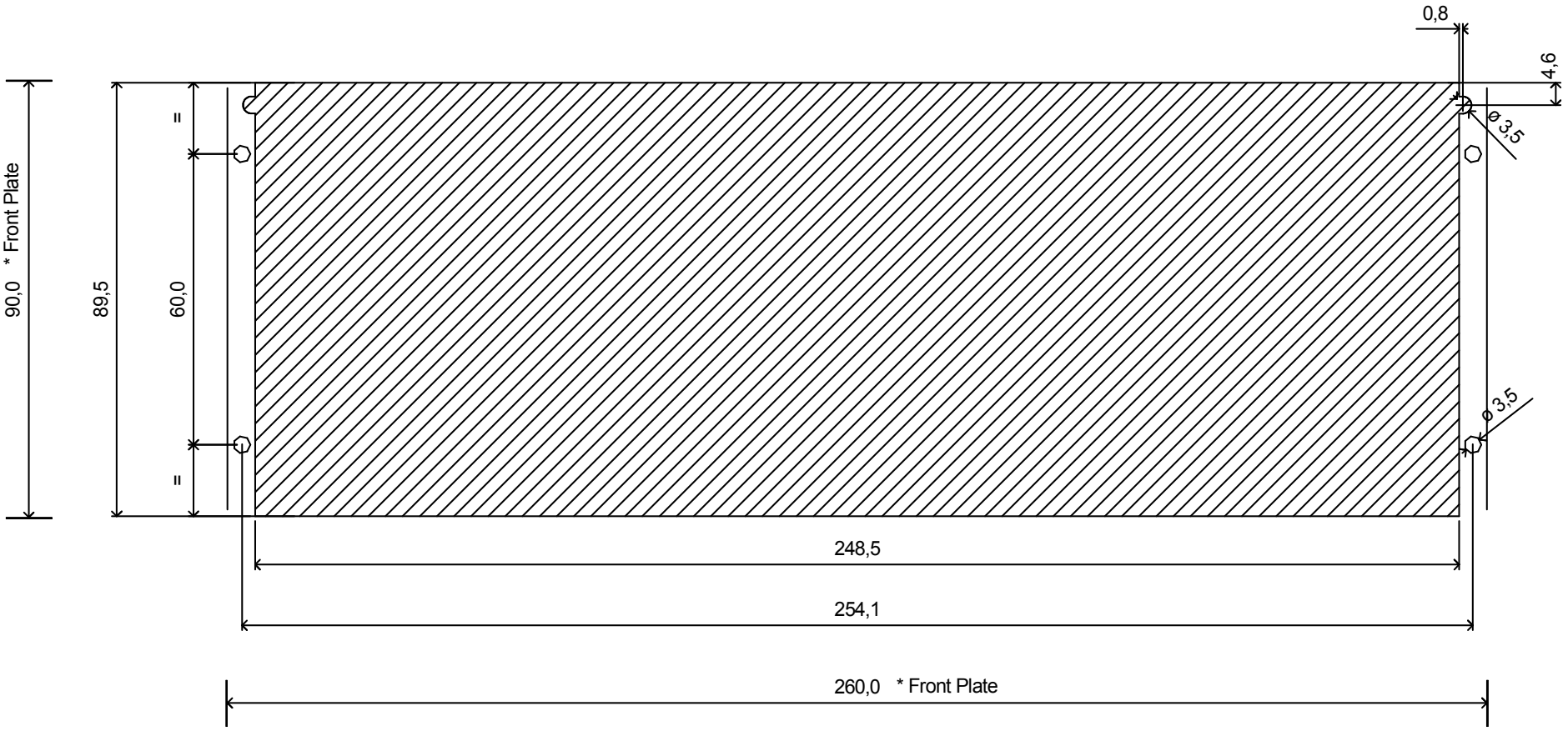
Web site:	http://www.cpflight.com
Support:	http://www.cpflight.com/sito/support.asm
Email:	info@cpflight.com

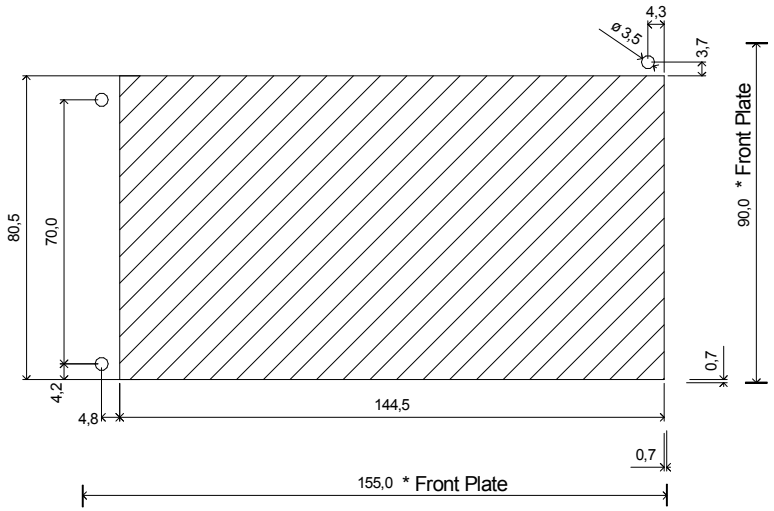
APPENDIX:

Panel Cut-Out

Dimensions are in millimeters. In the panel fixing cut-out consider the front-plates overhang to keep enough space between the FCU and EFIS's cut out windows.

FCU cut-out (EFIS at the nex page)





Left EFIS cut-out

Right EFIS cut-out