FRACARRO

The product can only be installed by qualified personnel in compliance with local safety laws and regulations. Fracarro Radioindustrie is free from all civil and criminal responsibility due to breaches of current legislation derived from the improper use of the product by the installer, user or third parties The product must be used in full compliance with the instructions given in this manual, in order to protect the operator against all possible injury and the product from being damaged.
Never remove the product cover as there are live parts underneath it

Installation precautions

- The product must not be exposed to water drips and must be installed indoors inside in dry places.
- Damp and condensation drops could damage the product. Consequently always wait for the product to be perfectly dry before use. Handle with care. Knocks could damage the product. Leave plenty of space around the product to ensure sufficient ventilation. High temperatures or overheating could compromise the product functions and life.
- Do not install the product above or close to sources of heat, in dusty atmospheres or when it could be exposed to corrosive substances.
- If the product is installed on the wall, use proper expansion bolts suitable to the fixing support. The wall and the fixing support must be able to bear at least 4 times the equipment weight.
- Attention: to avoid being hurt, the unit must be mounted to the wall/floor according to the installation instructions.
- The "PERMANENTLY INSTALLED EQUIPMENT" needs a sectioning device, easy to access, that must be integrated outside the unit; in the "EQUIPMENT WITH POWER PLUG", the plug must be installed close to the equipment and easily accessible.
- The unit must be connected to the ground electrode of the antenna system, in compliance with the EN 60728-11 standard. The earth screw is indicated with the symbol: ⏚.
- It is important to observe the provisions of the EN60728-11 standard and not to connect this screw to the power supply earth line.

⏚ Class II symbol   ⏚ Ground symbol of the antenna system

GENERAL PRECAUTIONS

In case of a malfunction, do not attempt to repair the product because this would invalidate the guarantee.
Only use the feeder supplied with the product. The information given in this manual has been carefully prepared, however Fracarro Radioindustrie S.r.l. reserves the right at any time, and without prior notice, to make any Improvements or changes to the product described in the manual. Consult the website of www.fracarro.com for the terms regarding assistance and the guarantee.

2. DESCRIPTION OF THE PRODUCT

D-Matrix 4S EVO is an apparatus that enables generating two modulated multiplexes according to the standard for digital terrestrial (DVBT) or cable television (DVB-C), using streams received from four satellite transponders (DVB-S or DVB-S2), or read from transport stream .TS, contained in an external USB drive. The .TS files can be obtained by converting any audio/video file into the right format, using a PC conversion program. The modulator is full-band and therefore can independently modulate the MUX on arbitrary frequencies in the VHF-S-UHF (114 – 858 MHz) bands.
NB: the four MUX are not completely independent and are linked in couples (MUX 1-MUX 2 and MUX 3-MUX 4) from channel parameters (or frequency parameters), bandwidth and output level: if the output channel of the MUX 1 (or MUX 3) is set, the output channel of the MUX 2 (or MUX 4) will be automatically set to the following adjacent channel of the channel set in MUX 1 (or MUX 3). If the output channel of the MUX 2 (or MUX 4) is set, automatically the output channel of MUX 1 (or MUX 3) will be set to the previous adjacent channel. Similarly setting a different value of the bandwidth or the output level of MUX 1 (or MUX 3), the same value will be set for MUX 2 (or MUX 4) and vice versa.
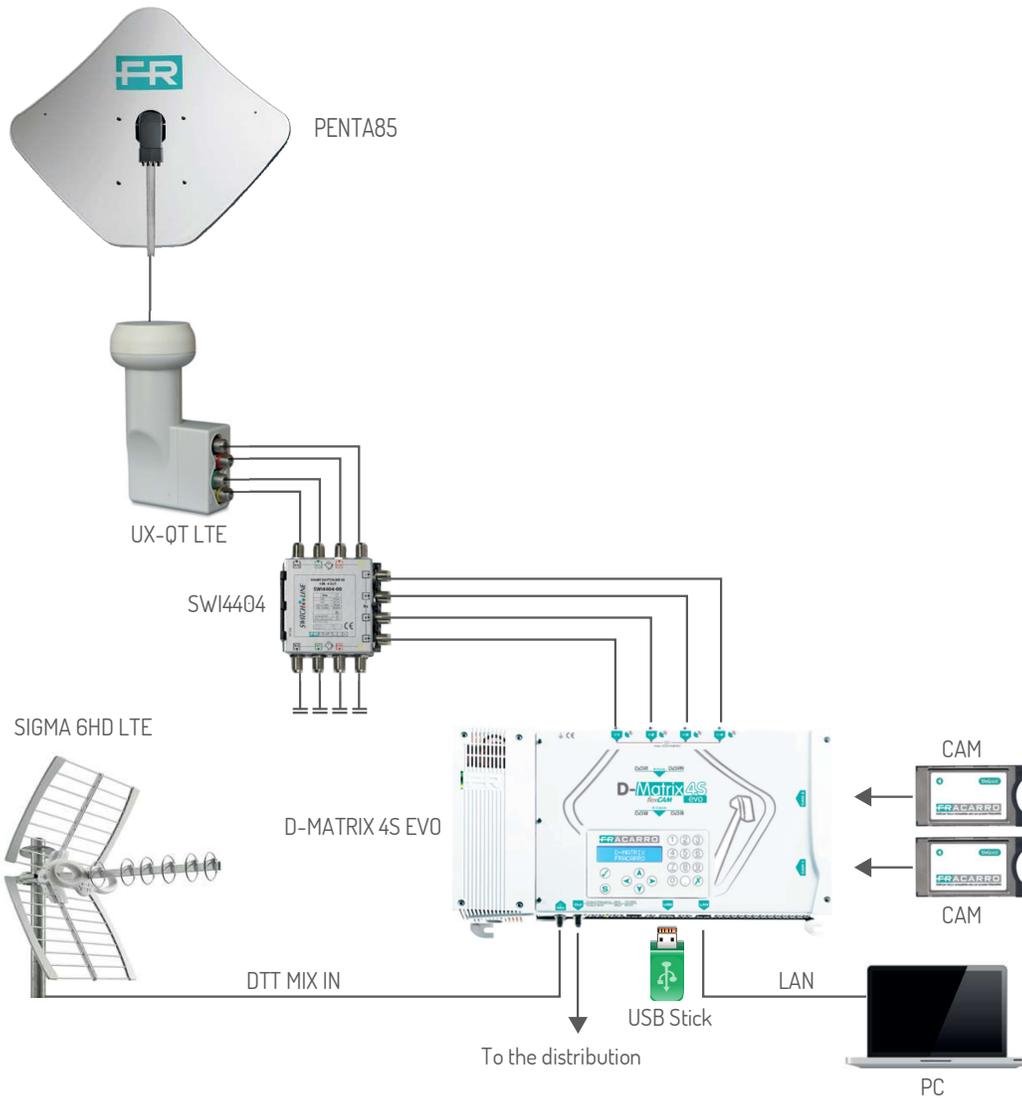
The product is equipped with:
- Bipolar electric power socket;
- Four DVB-S / DVB-S2 satellite inputs with DiSEqC management and overload control;
- Four multicolour Leds, one for each input, indicating the input status;
- Two common interface slots, each one can be associated to any of the inputs or in Flex-cam mode to enable decrypting programs from different inputs;
- MIX input that enables mixing the signal generated from the device with one coming from a TV reception system or other product that generates RF signals;
- RF output of the generated MUX and whatever comes from the MUX input;
- Ethernet 10base-T / 100base-TX Ethernet port;
- USB host port for .TS file storage, the firmware update and configuration save/reset;
- Multicolour led indicating the system status;
- Reset button (internal).

It can be programmed in one of the following ways:
- Base programming, using the keypad and LCD display on the front panel;

- Advanced programming, using the web interface connecting with a local or remote PC network using the network port.

Example of installation

PENTA85

UX-QT LTE

SWI4404

SIGMA 6HD LTE

D-MATRIX 4S EVO

CAM

CAM

DTT MIX IN

USB Stick

LAN

To the distribution

PC

The inputs support DVB-S/DVB-S2 satellite signal reception, they are able to provide remote power feed to an LNB and support the DiSEqC, release 1.0, control management. The signal can be provided to each input independently, using the four upper connectors, or the loop-through function can be used, which enables providing a signal received from one of the subsequent inputs in cascade. In this case, the cascade inputs cannot have the reception polarity/band specified, because the signal that can be used will be the same as the input used as source for the loop.

IN1   IN2   IN3   IN4

LOOP   CONN   LOOP   CONN   LOOP   CONN

TUNER1   TUNER2   TUNER3   TUNER4
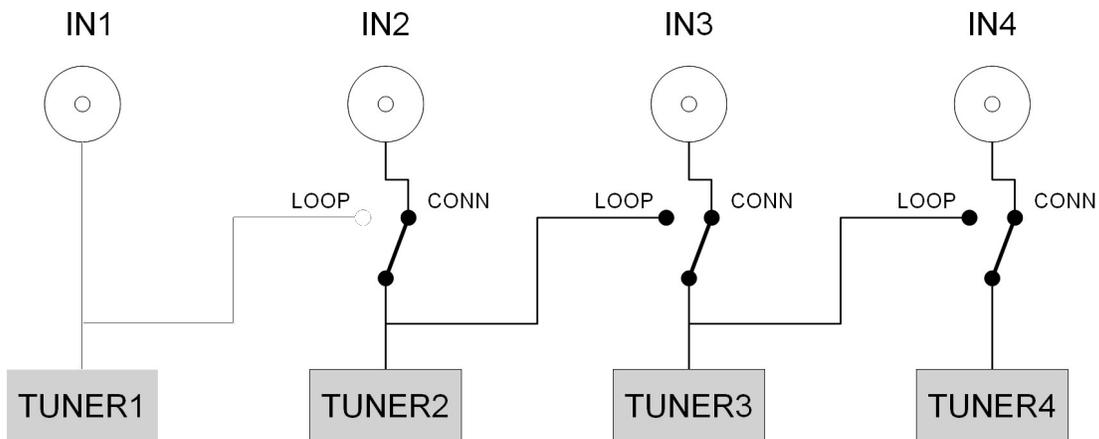
The LNB remote power supply is able to supply a maximum current of 400 mA, total for all the inputs. If this limit is exceeded, a current limiter triggers, which temporarily deactivates the remote power feed on all the inputs, reactivating them one at a time, until the input (or inputs) causing the problem is identified. The remote power feed and reception from these inputs is finally deactivated, while the loop function remains active. The red led then lights up corresponding to the overloaded input. Reception from the error inputs can be reset after solving the system malfunction, deactivating and reactivating the input, or by restarting the D-Matrix 4S EVO. The signal received from the sat inputs can be decrypted using a maximum of two CAM modules, inserted in the slots on the right. Each slot can be programmed in two ways:

1.   It can be associated to one (and only one) of the inputs: the CAM will decrypt the wanted programs from the selected input and the signal received by the same input but with different codes could also be decrypted, associating two CAMs to the same input.
2.   It can be associated to a personalized transport stream (FLEX): the CAM wll decrypt the programs coming from different inputs.

The product enables reproducing a program saved on files with standard transport stream format (.TS files). This file can be generated beginning with any audio/video file, by using a specific conversion tool. The file must be in a USB storage unit connected to the device, formatted with FAT32 file system.

Programs from satellites or file can be intelligently multiplexed, which means the user is able to generate ad hoc output MUX, depending on the available bitrate and the end user's preference. The system automatically regenerates the transport stream, also using certain position/priority parameters, so that certain programs are preferred over others that are considered less important in bitrate terms.

For example, consider a MUX generated from the P2, P2 and P3 programs received from a satellite, configured with the respective positions 1, 2 and 3 (the lower position means the higher priority). If the overall bitrate of the three programs is lower than the available amount from the output modulation, all three programs are produced in output without any bitrate loss. However, supposing the total bitrate exceeds the available amount in certain moments, the system guarantees viewing of the higher priority programs, cutting the bitrates of the lower priority ones. Therefore in this case, program P3 will be degraded (squaring), while the P1 and P2 programs are not changed at all.

In certain situations, the installation requires that a transport stream received from a satellite is not multiplexed but directly transmitted without any processing. For this the ALL-PID mode can be activated, and in this mode all processing on the transport stream is deactivated.

The output transport-streams are modulated according to the DVB-C or DVB-T standards. The modulation parameters are available through the configuration interface, and are also independent for the four MUX, except for the standard used (DVB-T or DVB-C) which must be the same for all MUX and the output channel which can be set as described before.

The unit can be managed by the web interface. Equipped with an Ethernet network interface 10/100 which allows the direct connection to a PC (by a crossed cable) or a LAN network.

3. INSTALLATION OF THE PRODUCT

3.1 CONTENTS OF THE PACKAGING

The packaging contains the following items:
•   D-Matrix 4S EVO
•   Power cord
•   Safety warnings and product installation instructions

3.2 ASSEMBLY PRODUCT

•   By using the specific fixing points, screw the product to the wall so that it is vertical to allow correct heat dissipation.
•   Connect the earth terminal to the antenna earth line.
•   Connect the antenna cables to their inputs.
•   If required, insert the CAM and smartcards in their slots.
•   If required, insert an external USB drive.
•   Connect the product to the electricity supply
•   Wait for the device to start and it can then be configured.
•   Check the output signal is generated correctly and the reception status of the inputs and system on the specific multicolour LEDs

3.2.1 WALL MOUNTING

Install the unit as shown in the figure (Fig. 3.2.1), using the brackets incorporated in the product mechanics. Allow sufficient space to connect the power lead and for correct ventilation (15 cm airspace on all sides). Any other type of installation could affect the correct functions of the device.
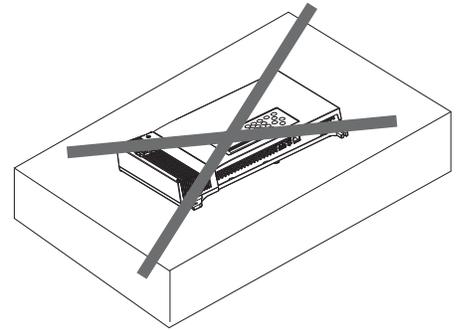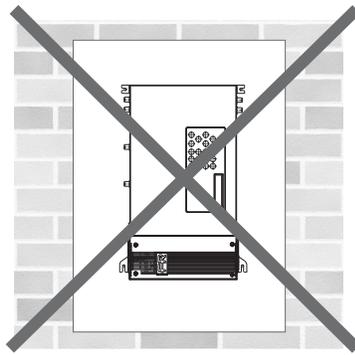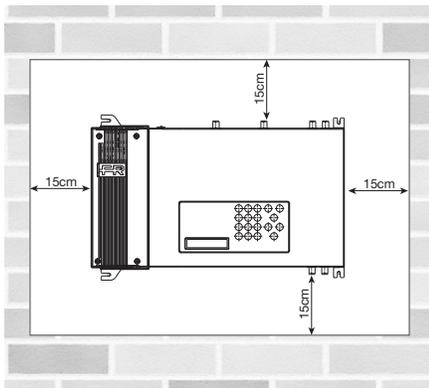
3.3 INSERTING CAM MODULES

To insert the CAM modules in the slots, position the module as shown in the figure and press it lightly.
The module should slide along the guides freely. If it does not, check they are correctly aligned and the insertion direction. To extract the CAM modules pull slightly to one side and the module should come out without difficulty.
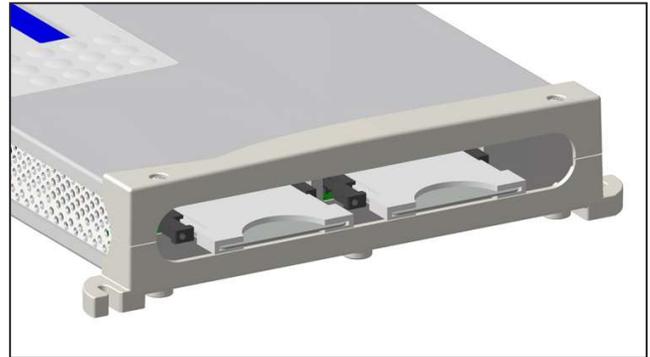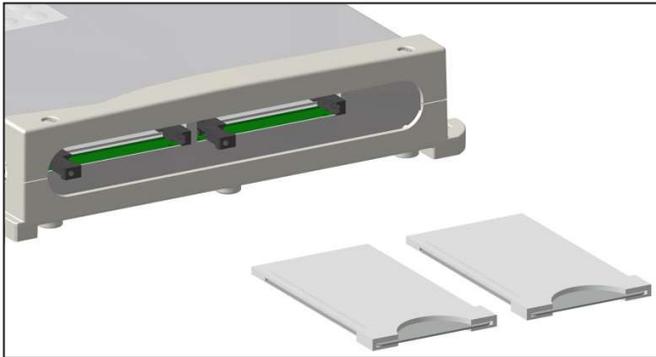
3.4 MULTICOLOUR STATUS LEDS

D-MATRIX 4S EVO has four multicolour LEDs on the top (one for each input), to indicate the sat signal reception status, and one multicolour led on the bottom showing the system status.
The following table gives a useful summary to interpret the lighted LEDs.

INPUT STATUS LED
Off: Input off
Orange: Input active waiting to lock
Green: Input active and locked
Red: Input overloaded

SYSTEM STATUS LED (during initialisation)
Orange: Boot system
Red: start applications
Green: System started without error

SYSTEM STATUS LED (system started)
Green: Normal
Orange: Anomaly
Flashing red: Update and/or recovery phase

4. OPERATING INSTRUCTIONS

- Wait until the D-MATRIX 4S EVO is initialized (the display shows D-MATRIX FRACARRO)
- To access the panel menu, press V, type in the user code (default code is 1234) and confirm by pressing V.
- Program as instructed below (see the paragraph 5.1. BASE PROGRAMMING FROM THE PANEL).
- Check the output signal is available by using a field meter
- Connect the distribution cable to the output connector

A PC can be used alternatively to configuration from the panel, by accessing the programming using a web interface (see the paragraph 5.2 PROGRAMMING BY WEB INTERFACE).
If required, the product can be reset to the factory.
ATTENTION: in this condition English is the default language.
After resetting the factory settings, the D-Matrix 4S EVO will have to be reprogrammed, as the preset parameters may not coincide with the required ones.

5. PROGRAMMING INSTRUCTIONS

5.1 BASE PROGRAMMING FROM THE PANEL

D-MATRIX 4S EVO can be programmed using the keypad and display directly from the front panel. Press √ to access the programming menu and input the user code (default code is 1234), then confirm the code by pressing √ again. Use the arrow up and down keys to move around the menu and select the required parameter, press √ to confirm and enter the selected parameter. To exit the selection press X.
When viewing a parameter, use the arrow right and left keys to select the required value, then press X to exit (no confirmation is required). If required, use the 0-9 keypad to input a numeric value, then press √ to confirm.

NB: The configuration interface timeout is 5 minutes: after that time, if no other changes are made to the program, the last saved configuration by the product or the factory configuration is reinstated.

The menu is available in various languages. To change the menu language, access the main "LANGUAGE" menu, select the required language and press √ to confirm.

KEYPAD FUNCTIONS

- Arrow up / arrow down: To surf among the various menu items;
- Arrow left / arrow right: To select the parameter value;
- √: To confirm an input value or enter a submenu;
- X: To cancel an input value or to exit a menu or a submenu;
- S: To save the changes;

–INPUT MENU: allows you to select the input to be programmed between 5 available (see flow chart INPUT)

FLOW CHART INPUT
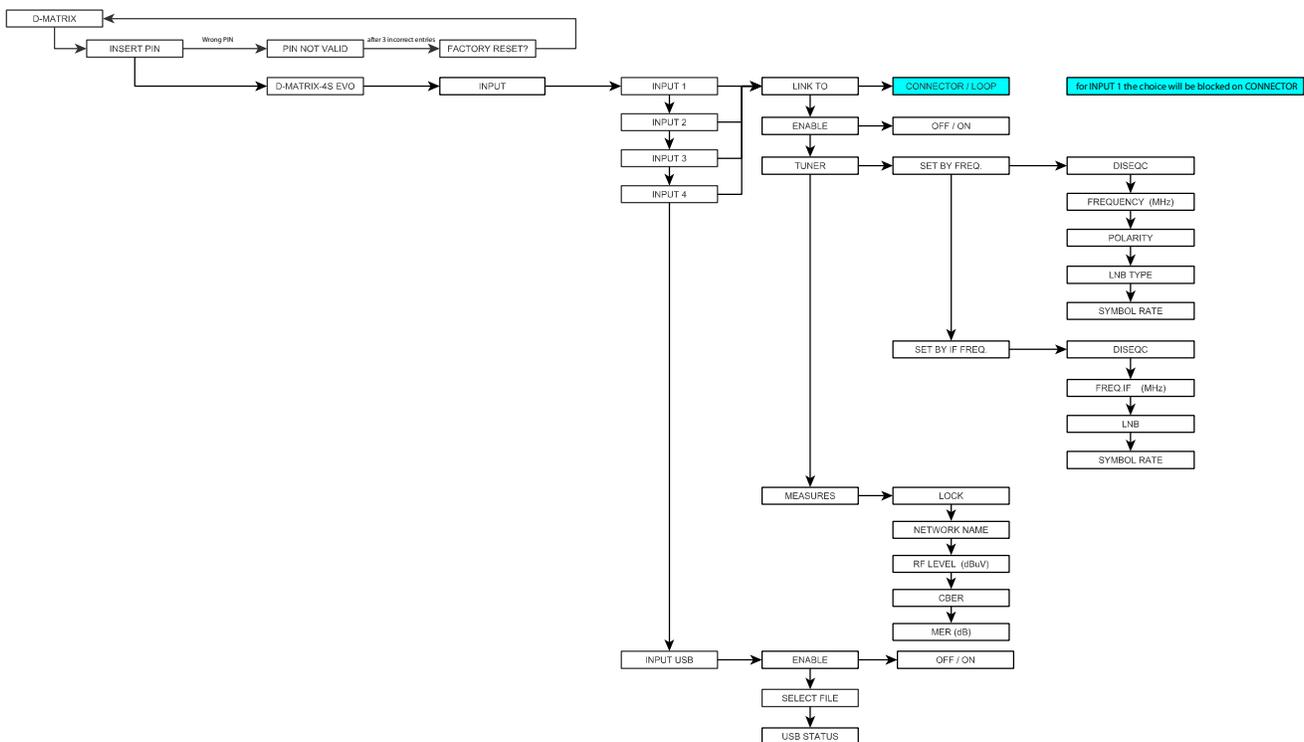
–INPUT 1, INPUT 2, INPUT 3, INPUT 4
- **ASSOCIATE TO**: enables deciding whether the SAT signal to use for the input being selected should come from the SAT source directly connected to the CONNECTOR or from a previous input through a LOOP (for the INPUT 1 the double option is not possible as the signal must come from a CONNECTOR).

NB: using the LOOP as the SAT signal source just one input can be selected for the subsequent one or for all the subsequent SAT inputs. For example, if we want to just use INPUT 1 and the LOOP is selected on INPUT 2, INPUT 3 and INPUT 4, all these inputs will receive the SAT signal from INPUT 1 (with the same polarity set on INPUT 1), and on the remaining inputs only the reception frequency and symbol rate can be selected.

Remember that if there are any reception anomalies on the main module (SQAT transponder with an instable signal and/or which unlocks) there could also be reception problems on the modules with the LOOP input; in In this case, the LOOP option must be deactivated and the SAT signal taken to all the required inputs by activating the CONNECTOR option.
- **ENABLE**: allows deciding whether to use the receiver connected to the selected input, if **OFF** is selected the receiver is turned off;
- **TUNER**: allows setting the decoder reception parameters after programming the following submenu.
    - **SET BY FREQ**;
        - **DISEQC**: allows setting the DiSEqC according to the satellite (A, B, C or D);
        - **FREQUENCY (MHz)**: allows setting the extended frequency for the transponder to be received.
        - **POLARITY**: to set horizontal or vertical polarity;
        - **LNB TYPE**: to set the type of LNB;
        - **SYMBOL RATE**: allows setting the symbol rate for the selected frequency;
- **SET FREQ. IF**
        - **DISEQC**: allows setting the DiSEqC according to the satellite (A, B, C or D);
        - **FREQ. IF (MHz)**: allows setting the IF frequency for the transponder to be received;
        - **LNB**: allows setting the parameters for the reception of the selected Transponder (OFF, 14V/0KHz, 18V/0KHz, 14V/22KHz, 18V/22KHz);
        - **SYMBOL RATE**: allows setting the symbol rate for the selected frequency;
    - **MEASURES**: contains information relevant to the signal received by the selected input;
        - **LOCK**: to check whether the receiver has locked the signal;
        - **NETWORK NAME:** shows the transponder name, the parameter can't be changed;
        - **RF LIVEL (dBµV)**: shows the input signal level;
        - **CBER**: to view the BER (quality) of the input signal;
   - **MER (dB)**: allows viewing the input signal MER.
–INPUT USB: to manage the USB input as source for an audio/video signal in transport stream after setting its submenu.
- **ENABLE**: allows enabling or otherwise reading the audio/video files in an external USB drive;
- **SELECT FILE**: to select which file to be used in an external USB drive;
- **USB STATUS**: shows the state of the selected file.
NB: D–Matrix 4S EVO only recognises and reproduces audio/video files in TS format and Standard Definition, any other audio/video format must be converted beforehand using any of the conversion software that can be found in the web.

–COMMON INTERFACE MENU: consente di impostare i parametri relative alle CAM presenti

FLOW CHART COMMON INTERFACE
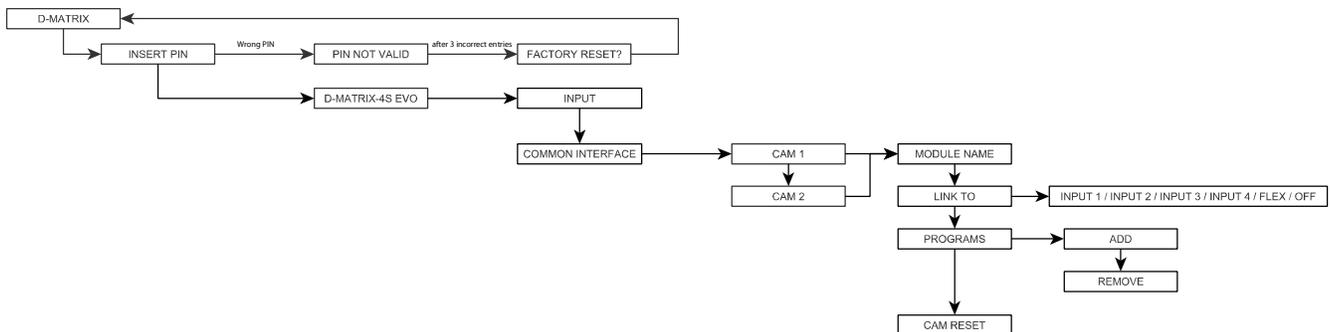
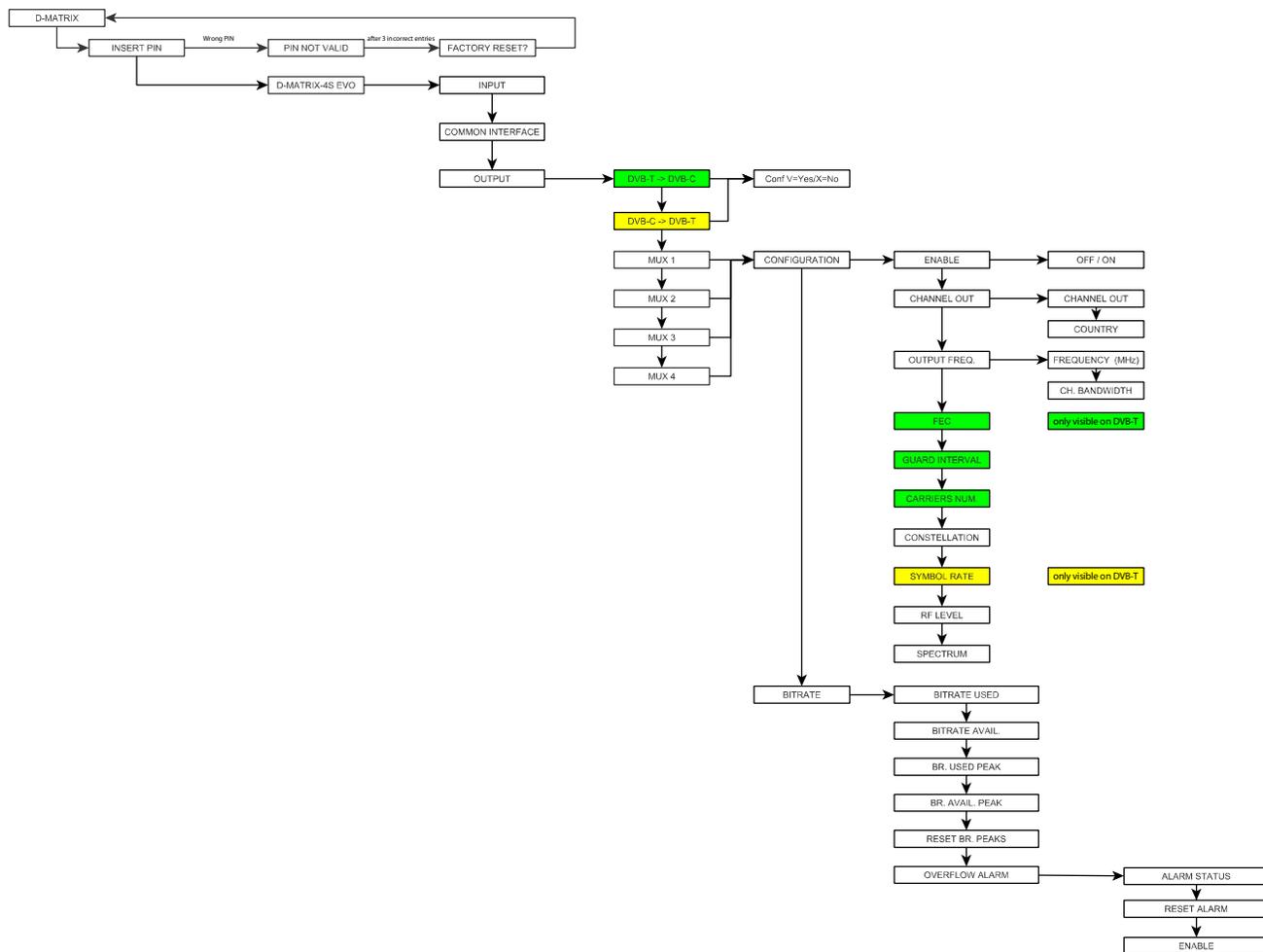- **CAM 1 / CAM 2**: to configure the operation of the selected CAM;
    - **MODULE NAME**: to verify the common interface module name in the proper slot;
    - **ASSOCIATE TO**: to associate the selected CAM to one of the 4 available INPUTS or to set its operation in FLEX mode (see the specific paragraph);
    - **PROGRAMS**: to add or remove the programs to be decrypted;
    - **RESET CAM**: to reset the CAM.

–FLEX CAM MODE: The FLEX mode allows not to associate the selected CAM to a specific input and creates a customized list of programs to decrypt by suing the programs coming from any inputs. Set the item "ASSOCIATE TO" as "FLEX" to have the list of all programs coming from the 4 INPUTS in "PROGRAMS". The wanted programs can be decrypted independently from the input the program comes from.

–OUTPUT MENU: to configure an output signal from D-MATRIX 4S EVO for its distribution.

FLOW CHART OUTPUT

```
D-MATRIX
   └─ INSERT PIN ──Wrong PIN──> PIN NOT VALID ──after 3 incorrect entries──> FACTORY RESET?
          └─ D-MATRIX-4S EVO ──> INPUT
                                   └─ COMMON INTERFACE
                                          └─ OUTPUT ──> DVB-T -> DVB-C ──> Conf V=Yes/X=No
                                                        DVB-C -> DVB-T
                                                             └─ MUX 1 ──> CONFIGURATION ──> ENABLE ──> OFF / ON
                                                                MUX 2                        CHANNEL OUT ──> CHANNEL OUT
                                                                MUX 3                                        COUNTRY
                                                                MUX 4                        OUTPUT FREQ. ──> FREQUENCY (MHz)
                                                                                                             CH. BANDWIDTH
                                                                                             FEC ──> only visible on DVB-T
                                                                                             GUARD INTERVAL
                                                                                             CARRIERS NUM
                                                                                             CONSTELLATION
                                                                                             SYMBOL RATE ──> only visible on DVB-T
                                                                                             RF LEVEL
                                                                                             SPECTRUM
                                                             └─ BITRATE ──> BITRATE USED
                                                                            BITRATE AVAIL.
                                                                            BR. USED PEAK
                                                                            BR. AVAIL. PEAK
                                                                            RESET BR. PEAKS
                                                                            OVERFLOW ALARM ──> ALARM STATUS
                                                                                               RESET ALARM
                                                                                               ENABLE
```

–DVB-T–>DVB-C, DVB-C–>DVB-T: the input signal standard can be selected between DVB-T and DVB-C; according to the standard set, other specific parameters in the output MUX can be viewed and changed or otherwise. For example, if you press the V key on DVB-C -> DVB-T and, after the request message, you confirm by pressing the V key again, the output standard will switch from the current set DVB-C to DVB-T and all its parameters will be possibly checked or changed;

–MUX 1, MUX 2, MUX 3, MUX 4: for selecting which output MUX to configure, after setting the various submenus;

•**CONFIGURATION**: sets all the output MUX parameters;

  •**ENABLE**: to enable the selected MUX, if the parameter is set on OFF, the MUX is switched OFF;

  •**CHANNEL OUT**:

   •**CHANNEL OUT**: to set the output channel where the MUX will be modulated; this parameter modifies automatically the channel value of the adjacent MUX in the same couple;

   •**COUNTRY**: to set the channels for the installation country;

  •**OUTPUT FREQ.**:

   •**FREQUENCY (MHz)**: to set the output frequency where the MUX will be modulated; this parameter modifies automatically the frequency value of the adjacent MUX in the same couple;

   •**BANDWIDTH**: to set the output channel bandwidth from the available ones (7 MHz, 8 MHz, 6MHz); this parameter modifies automatically the bandwidth value of the adjacent MUX in the same couple.

  •**FEC**: to set the FEC (Forward Error Correction) parameter from the available ones (1/2 ,2/3, 3/4, 5/6, 7/8) [only DVB-T];

  •**GUARD INTERVAL**: to set the width of the guard interval from the available ones (1/4,1/8,1/16,1/32) [only DVB-T];

 •**CARRIERS NUM.**: to set the number of carriers between 2K and 8k [only DVB-T];

  •**CONSTELLATION**: to set the constellation used to modulate the carriers as QPSK,16QAM and 64QAM (in DVB-T) or 16QAM, 32QAM, 64QAM, 128QAM, 256QAM [in DVB-C];

   •**RF LIVEL**: to set the output level in dBuV, at steps of 1 dBuV; this parameter modifies automatically the level value of the adjacent MUX

in the same couple;
    •**SPECTRUM**: to regulate the spectrum as NORMAL or INVERTED, according to the reception instrument, that could only function with one of the two modes. Normally "NORMAL";
  •**BITRATE**: to know the measures made on the multiplex bitrate in the output programs;
    •**BITRATE USED**: shows the bitrates used. This parameter refers to the total measure of all the programs added to the list of output programs;
    •**BITRATE AVAIL.**: fshows the bitrates available. This parameter refers to the total available output bitrates after including one or more programs;
    •**BR. USED PEAK**: a measure in bit/s of the maximum bitrate peak used by the programs in the output mux;
    •**BR. AVAIL. PEAK**: a measure in bit/s of the total available bitrate peaks available in the output mux;
    •**RESET BR. PEAK**: to reset the peaks to the initial levels, calculated according to the COFDM modulation settings. After a bitrate overflow, when the peaks have reached their limit, this function has to be used;
    •**OVERFLOW ALARM**: bitrate overflow alarm management;
      •**ALARM STATUS**: shows if a bitrate overflow has occurred;
      •**CANCEL ALARM**: to cancel the overflow alarm. The product is reset on the standard working conditions (the red LED is turned off);
      •**ENABLE**: to enable (ON) or deactivate (OFF) the overflow alarm signal function. If the function is set on OFF, the option is disabled;
–**PROGRAM MENUS**: To select the programs that will be broadcast in the previously created MUX and monitor the transmission band.

FLOW CHART PROGRAM
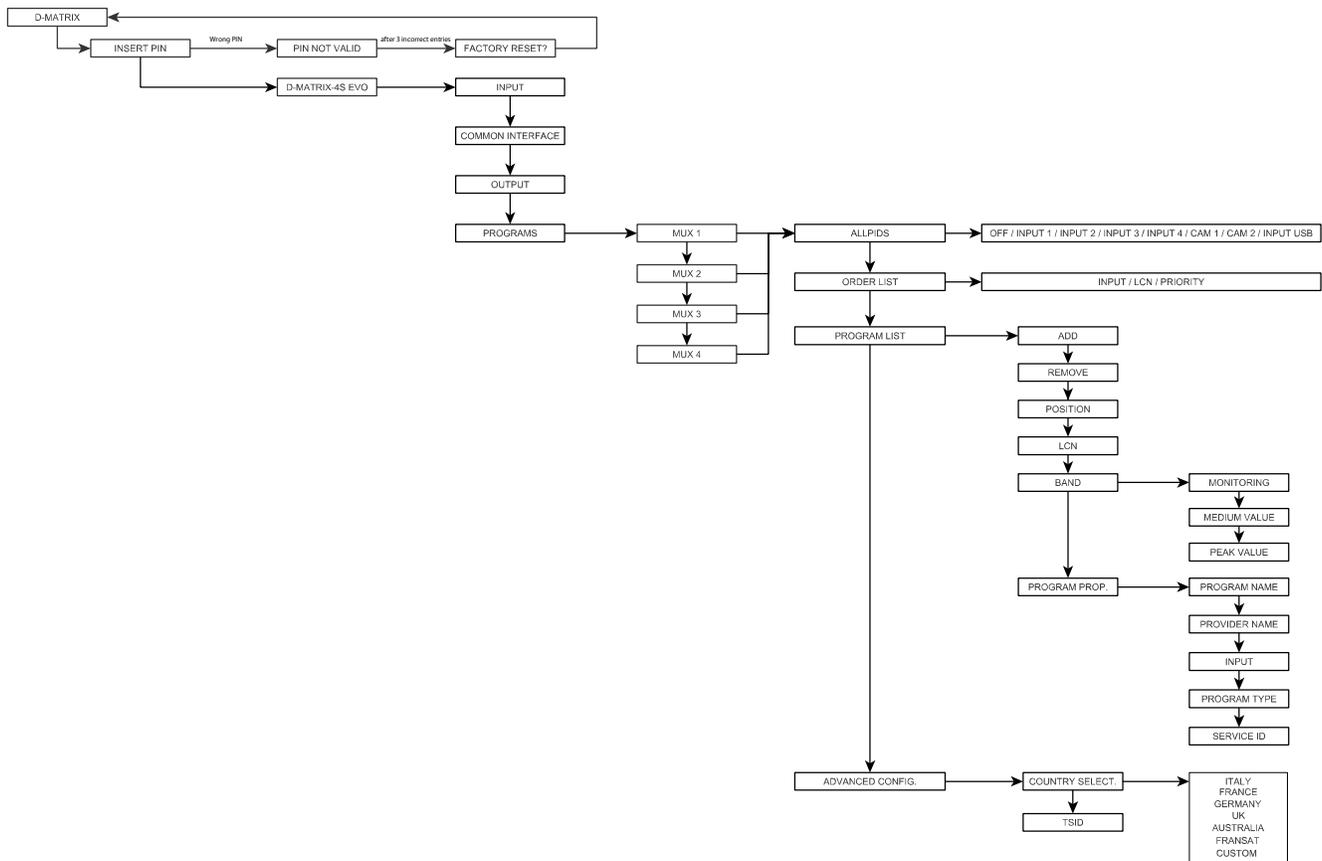
–**MUX 1, MUX 2 , MUX 3, MUX 4**: to select the MUX to be used;
  •**ALL PIDS**: allows you to disable or enable the voice to one of the inputs or CAM;
  •**ORDER LIST**: to set the order criteria for the program list;
    •**INPUT**: ordered by classification to the input number;
    •**LCN**: sorting is carried out for LCN ie depending on the number associated with the program without distinction of origin from the entrance;
    •**PRIORITY**: ordered by priority, i.e. according to the priority assigned to the program;
  •**PROGRAM LIST**: to set the list of output programs;
    •**ADD**: to add the selected program to the list of output programs. When it has been added the program is marked with an (A) in front of its name in the channel list;
    •**REMOVE**: to remove the selected list from the list of output programs;
•**POSITION**: to set the priority and, therefore, the program position in the list of output programs;
    •**LCN**: to set the program LCN. The available values are between 0 and 999.

1000 means a deactivated LCN.
- •**BAND**: to manage the program bitrate monitoring by means of the following parameters;
    - •**MONITORING**: to enable/deactivate the program bitrate monitoring if it has not been added to the channel list.
    This enables verifying whether the program has been included in the output mux or not, according to the program bitrate;
    - •**MEDIUM VALUE**: to view the program average bitrate value;
    - •**PEAK VALUE**: to view the program peak bitrate value;
    - •**PROGRAM PROP.**: to view useful data about the programs;
    - •**PROGRAM NAME**: to view the program name;
    - •**PROVIDER NAME**: to view the provider name;
    - •**INPUT**: to view the corresponding input provenance;
    - •**PROGRAM TYPE**: to view the program type (TV, RADIO…);
    - •**SERVICE ID**: to view the program service ID;
  - •**ADVANCED CONFIGURATION**
    - •**COUNTRY SELECT**: to select the installation country;
    - •**TSID**: to view and change the ID associated to the transport stream by the broadcaster.

–**SYSTEM SETUP MENU**: to set the parameters relevant to the system operation.

SYSTEM FLOW CHART
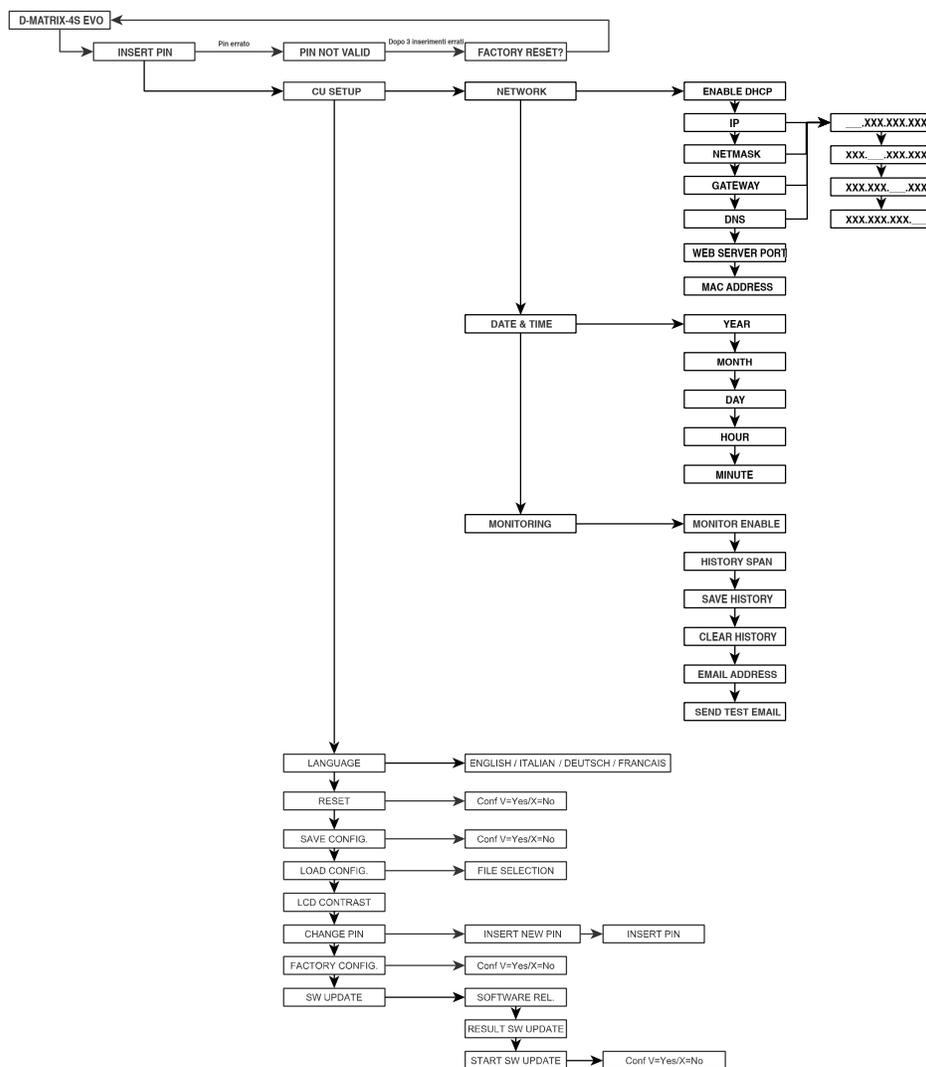
- •**NETWORK**: to configure the network by using the following parameters:
    - •**ENABLE DHCP**: To enable automatic management of network parameter allocation, if the subnet has a DHCP service.
    It is deactivated as default (for expert users).
    NOTE: Do not enable the DHCP function if the network parameters have been set as indicated below)
    - •**IP**: to enter a UP address, which is compatible with the address detected by the LAN network settings, to which you want to connect the D-MATRIX 4S EVO (default 192.168.0.2)

•**NETMASK**: use a netmask that is compatible with the subnet (default 255.255.255.0)
•**GATEWAY**: gateway address of the subnet (default 192.168.0.1)
•**DNS**: DNS server address, if it is available (default 0.0.0.0)
•**WEB SERVER PORT**: enables changing the web communications port, by default it is set on 80
•**MAC ADDRESS**: to view the address that uniquely identifies the device
ATTENTION: AFTER DEFAULT RESETTING, THESE PARAMETERS ARE REINSTATED TO THOSE SET IN THE FACTORY.

–**LANGUAGE**: to set the display language for the unit menus (ITALIAN, GERMAN, FRENCH and ENGLISH are available).
–**RESET**: to restart the unit
–**SAVE CONFIG.**: to copy the product configuration on a USB drive in .XML format.
  Insert the USB drive in the product USB port before saving the configuration.
–**LOAD CONFIG.**: allows you to load the product configuration from a file in XML format saved on a pen drive.
–**LCD CONTRAST**: to regulate the contrast for better display.
–**CHANGE PIN**: to change the PIN (default 1234) to access programming on the unit.
–**FACTORY CONFIG.**: to reinstate the D-Matrix 4S EVO to the values set in the factory, deleting all the changes made by the user.
–**SW UPDATE**: permette di aggiornare il software del sistema utilizzando un pacchetto di upgrade salvato precedentemente in una periferica di memorizzazione USB.
•**SOFTWARE REL**: to view the SW release installed in the D-MATRIX 4S EVO
•**RESULT SW UPDATE**: to view the outcome of the SW update;
•**START SW UPDATE**: to run the SW update from a USB drive.

5.2 PROGRAMMING BY WEB INTERFACE

After configuring the network parameters using the front panel and connecting to the local network, or to a PC using a cross lead, the web browser can be used.

EXAMPLE (DIRECT CONFIGURATION FROM A PC):
Change the IP address using one that belongs to the same subnet as the one set in the local net card on the PC.

Parameters set in the PC net card
- IP: 192.168.0.3
- SUBNET MASK: 255.255.255.0
- GATEWAY: 192.168.0.1

Parameters to change in the D-MATRIX 4S EVO network settings:
- IP: 192.168.0.2
- SUBNET MASK: 255.255.255.0
- GATEWAY: 192.168.0.1

Connect the device to the PC using a UTP cross lead CAT-5E or higher.
Start the web browser (recommended: Google Chrome, Mozilla).
In the address bar type in the IP address associated to the D-MATRIX 4S EVO, here 192.168.0.2; the opening screen is displayed shown in figure 1, requesting the access data. Type the username and password (here the factory settings):
Username: admin.
Password: 1234

FIG. 1

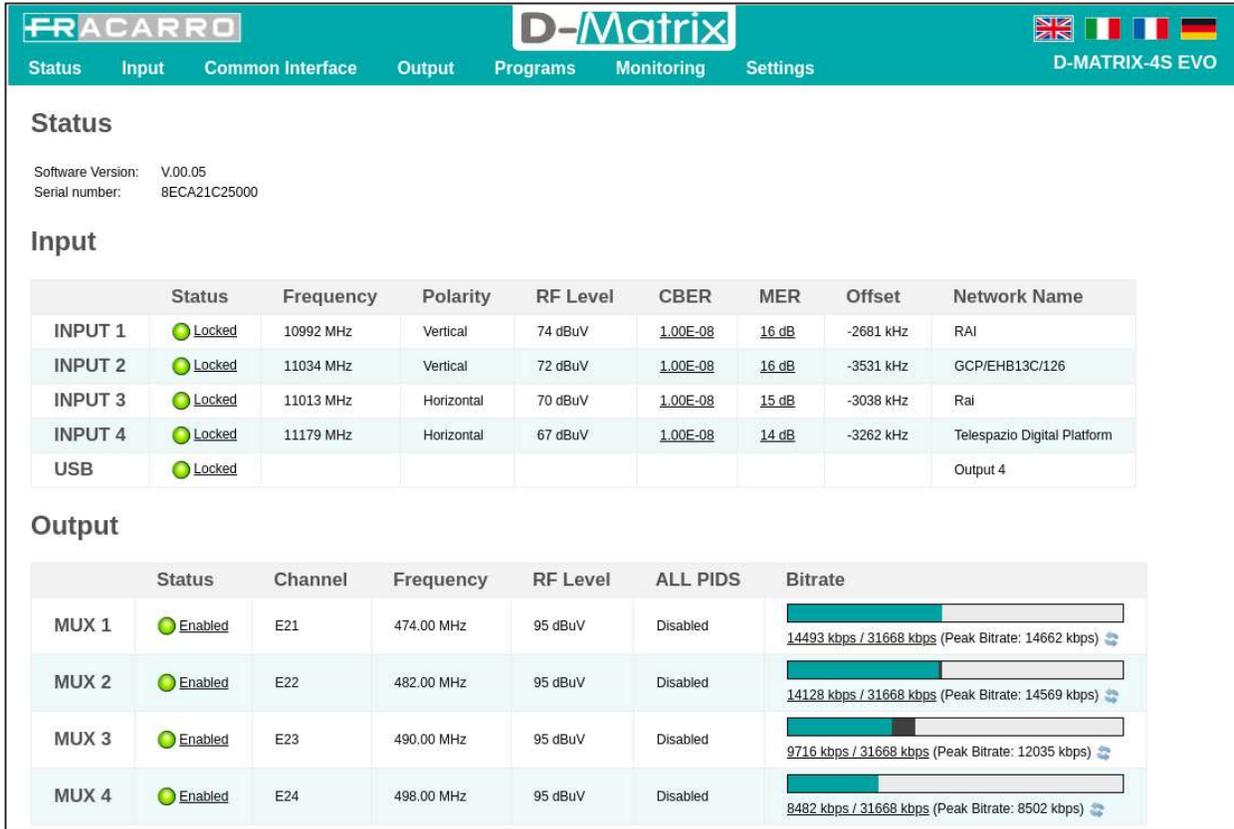Press OK to confirm, the screen is displayed shown in figure 2

English

FIG.2

Select the language by clicking on the flags at the top right (available in English, Italian, French and German).

NOTE: the configuration must be made using just one browser window to avoid risk of making mistakes: therefore two or more configuration cards cannot be opened on the same browser as the only one that would work would be the last that was opened.

IMPORTANT: to access programming by the web interface, the panel menu must not be used. The web interface could change according to the software release installed in the product.

The homepage in figure 2 shows the general status of the D-MATRIX 4S EVO system.

The STATUS item can always give information about the installed software version of the product and its serial number.

The top section shows the INPUT status, displaying the main data about the level and reception quality parameters (CBER/MER) and the name of the transponder received.

Each input also has a led showing the input status, with the following colours:
• GREEN if the input is enabled and the receiver is locked (for USB: function enabled and selected file read correctly).
• YELLOW if the input is enabled but the receiver is not locked (for USB: function enabled but file missing, not selected or incompatible)
• RED if the input is remote power feed overload
• GREY if the input is not enabled

The OUTPUT sections gives the status of the four output MUX and displays the channel and the output frequency, the RF level, the total used bitrate by the entered program and the available bitrate of the MUX. This piece of information is provided in both numerical and graphic format with a horizontal bar; the LIGHT BLUE bar shows the instantaneous used bitrate, the GREY part shows the maximum peak and the WHITE part shows the bitrate which is still available.

If the "RESET PEAK" button is pressed, the peak and overflow details are reset.

Each output MUX shows a light to indicate the status with the following colours:
• GREEN for normal functions
• DARK GREEN if the MUX is activated but overflow monitoring is disabled;
• GREY if the MUX is off;
• RED if there has been a bitrate overflow

5.2.1 CONFIGURING SATELLITE INPUTS

Using the mouse, click on the name of one of the 4 inputs or use the menu at the top INPUT ▶ INPUT 1 / INPUT 2 / INPUT 3 / INPUT 4 to open the following screen:

FIG. 3

This page shows all the parameters of the selected input:
- Checkbox to enable the receiver. Any inputs that are not used should be deactivated to save energy.
- The receiver association to the signal source, i.e. the external CONNECTOR or the LOOP (taking it by cascade from the previous input).
- Selected reception frequency input mode (effective frequency or converted or IF frequency).
- DiSEqC setting according to the system and selected satellite (A, B, C or D).
- Required frequency level (effective or converted depending on the previous selection).
- Polarity for the transponder to be received.
- Symbol-rate for the transponder to be received.
- SAVE key to save the settings.

The right section shows information relevant to the transponder locking status and the quality of the signal and transport stream.

Remember that by selecting the LOOP option for an input, the available polarity for that input will be the same as that selected on the previous module, and if there are any reception anomalies on the main module (SAT transponder with an instable signal or which unlocks) there could also be reception problems on the modules with LOOP inputs. In this case, the LOOP option must be deactivated and the SAT signal taken to all the required inputs.

NB. CLICK ON "SAVE" FOR THE CHANGES TO BECOME EFFECTIVE.

5.2.2 CONFIGURING USB INPUT

The user's transport stream can also be distributed uploaded from a .TS file, in the same way as any transport stream received from one of the satellite inputs. The programs in the specified file will be included in the program list and can be distributed in the output MUX, together with any programs received from the satellite. The .TS file can be created from a generic .AVI audio/video file, using specific conversion tools which can be downloaded from the Internet, and must be stored in an external USB drive (flash key or hard disk).

To use the USB functions, connect the USB drive to the D-Matrix 4S EVO, and enter the configuration page from the homepage by clicking on "USB", or from the menu INPUT ▶ USB; the USB configuration page opens as shown in the figure:
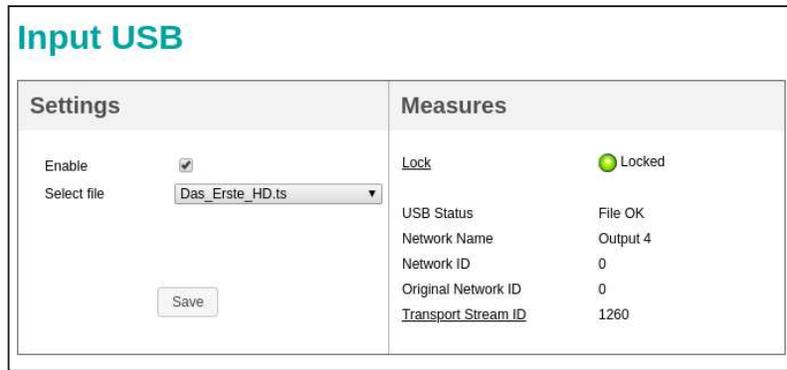
Fig.4

Flag the ENABLE box and select the required file in SELECTED FILE. Click on SAVE to save the configuration.

If the file has never been used, the system analyses the format and bitrate to conduct an automatic configuration, creating a file with the same name but an .FR extension, where the analysis result is stored for future use. The right section lock led should turn on green, showing that the file is being successfully read. The transport run data are shown in the fields on the bottom right. During the pre-analysis, which can take a few minutes if the file is very large, the "uploading" status is shown.

When a file is started and the "File OK" status is shown by the green led, the programs in the selected file are added to the list of input programs and can also be added to the list of output programs.

5.2.3 COMMON INTERFACE CONFIGURATION

The menu COMMON INTERFACE ▶ CAM1 / CAM2 is used to access the CAM module configuration pages, inserted in their respective slots. The new page will appear as shown in the figure below:
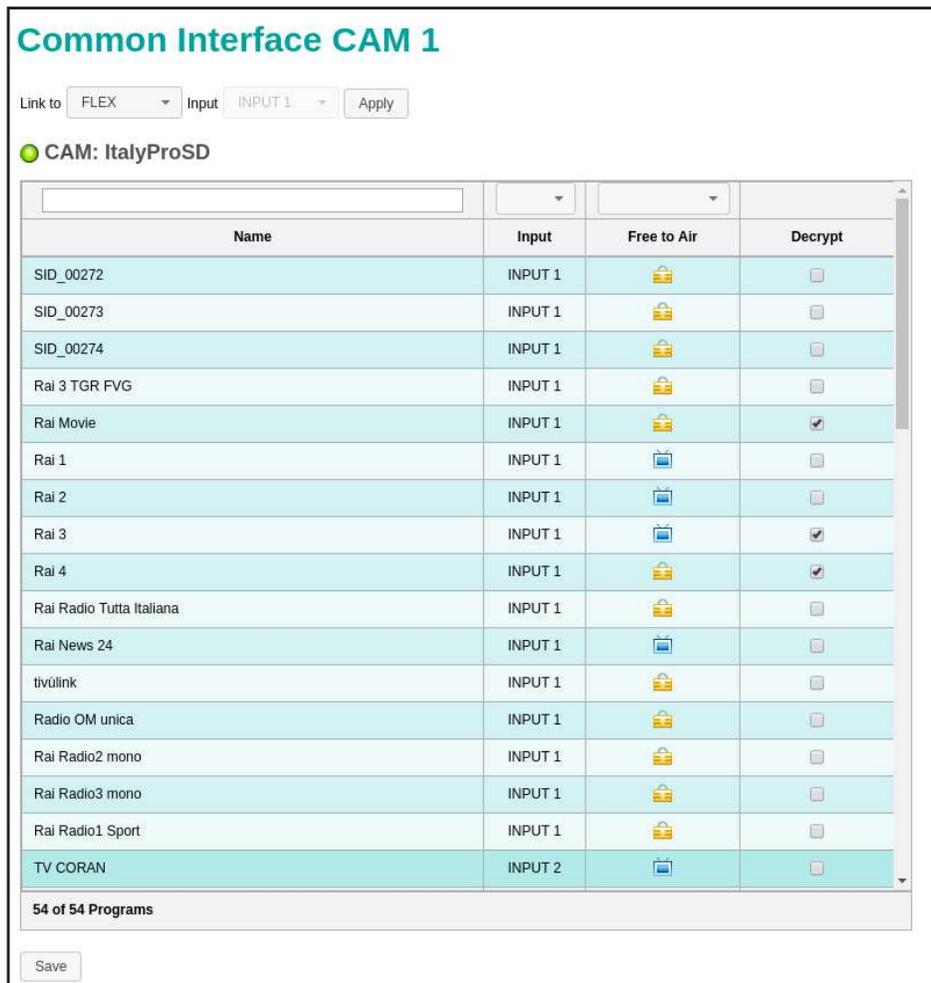
Fig. 5

The name of the CAM in the slot is shown at the top. If there is no name or it is not correctly initialized the message "No Module" appears.

The ASSOCIATE TO field enables associating the selected CAM slot to the required input: if the INPUT 1 / INPUT 2 / INPUT 3 / INPUT 4 is selected, the list of received programs will be displayed: if the CAM slot is associated to the FLEX mode, the list of all programs coming from the 4 input will be displayed. For each of the received programs, the icon in the "free to air" column shows whether the program is free to air or encrypted; by flagging the "decrypt" column box the program can be enabled for decryption.

The CAM advanced functions can be selected by clicking the relevant keys, as follows:
- RESET CAM: to reset the CAM module in the slot;
- COMMON MENU INTERFACE: to access the common interface menu (only enabled if the CAM supports the menu) (see fig. 6);
- SHOW CAM MESSAGES: shows the CAM messages (only enabled if there are pending messages);
- ADVANCED SETTINGS: change the advanced settings in the CAM module (see fig. 7)
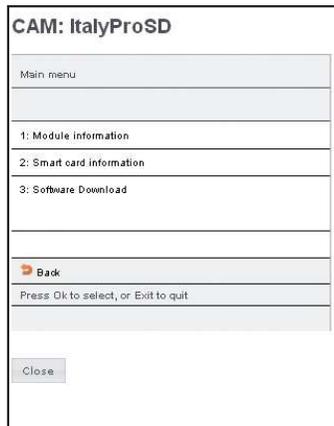
Fig. 6

Fig. 7

The figure 6 shows the window which opens clicking the "COMMON INTERFACE MENU" key. Information is given about the CAM module, the Smart Card and the last release of the CAM software can be downloaded if it is available.

The figure 7 shows the window which opens clicking the "ADVANCED SETTINGS" key: this page enables changing the advanced CAM module functions. The items, CAPMT Management and CAPMT Sending, enable changing the decrypt management for the CAM, choosing from the options in the dropdown menu. If the third item CAPMT Resize is flagged, the CAM is set to decrypt just the audio and video of a program (in this case, the number of decrypted programs could be higher). If it is not flagged everything is decrypted: audio, video, ttx, subtitles, MHP, etc.

The item "CAPMT Resend Attempts" sets the number of decrypting attempt of a program that the CAM will perform before starting again; by default the value is 3. The items "TS Framing" and "TS Clock" specify if sending transport streams with a CAM with packages of 188 or 204 bytes as well as which bitrate should be used. Modify only after checking the CAM technical specifications; incorrect setting can compromise the unit operation. The default parameters are normally suitable for the most of the CAMS on the market.

The "Time reference" section synchronizes the CAM with the information contained in the input programs. If the CAM is set in AUTO, it will automatically search the various INPUTS. Click APPLY and then OK to save changes.

5.2.4 OUTPUT MUX CONFIGURATION

Clicking the name of the MUX to program or the menu OUTPUT ▶ MUX 1 / MUX 2 / MUX 3 / MUX 4 you can access the output MUX configuration page modulated according to the DVB-T or DVB-C standards, and the relative parameters are shown as given in the following table.

Fig. 8

First of all specify the modulation standard to use (DVB-T o DVB-C). The mux output frequency can be specified directly as in MHZ, or the channel to use can be specified according to the standard channelling foreseen in the various countries.
The output power can be set in dBuV, in the range foreseen by the technical specification or switch the MUX off by setting the level to OFF.
Below are certain parameters that depend on the modulation standard used. For DVB-T the following are specified:
FEC (1/2, 2/3, 3/4, 5/6, 7/8), guard interval (1/4,1/8,1/16,1/32), constellation (QPSK,16QAM and 64QAM), number of carriers (8K, 2K), spectrum (normal or inverted). For DVB-C the following are specified:
Constellation (256QAM, 128QAM, 64QAM, 32QAM, 16QAM), symbol rate, spectrum (normal or inverted). The "Alarm overflow" box shows if a band overflow has to be notified to the user by the led on the bottom or not.
NB: Click on save for the changes to become effective.

5.2.5 PROGRAM CONFIGURATION

From the menu PROGRAMS ▶ MUX 1 / MUX 2 / MUX 3 / MUX 4 you can access the output program configuration page.

Fig. 9

The section on the left shows the program list received from the inputs, those one decrypted by the CAMS, plus those input to the system from the .TS files in a USB drive.

The text box and the dropdown menus filter the program lists for facilitating search. The easy mode hides automatically the double program in the event of a decryption on CAM: if a program coming from an input is added in decrypt, only the decrypted version will be shown. The programs which are not added in decrypt will always be shown. The advanced mode shows all programs regardless they are decrypted on CAM.

The input program columns show respectively:

the program name, the input the program comes from, the program type (TV, Radio, Data), if the received program is free to air or encrypted, if decryption has been flagged for one of the two CAMS and the band used by the program (if the relative box is flagged).

If the program is used to create one of the four output mux, the box is automatically flagged and the relative band is shown.

To add programs to an output, drag and drop the program name from the input list to the output list. To do this, click the left button on the mouse over the program in the input program list and keep it pressed and drag the program and then release it in the table for the required output mux.

The column of lists in figure 9 show:

the program name, the input it comes from, the program position (the lower the number the higher the priority), the assigned LCN HD value (0 if not specified) and the band used.

The position (or priority) determines the importance of the programs and, therefore, which will be cut first if there is a bitrate overflow, for example: 1 = top priority, therefore the most important one and the one to save (see the paragraph Programming Indications).

The LCN and LCN HD parameters must be set so that each generated output program, including among a number of devices, has a distinct value. If this is not to be specified, input 0.

To remove a program from the output list click on X in the right hand column (ACTIONS).

The bottom section of the table gives data about the band occupied by just the output programs (sum of the programs, not considering the tables for the common TS and PID) and the indication of the interval of programs viewed out of the total.

By clicking on the icon <properties> in the right hand column, access is given to more advanced program management.

By clicking on the program <program properties>, the following screen opens:
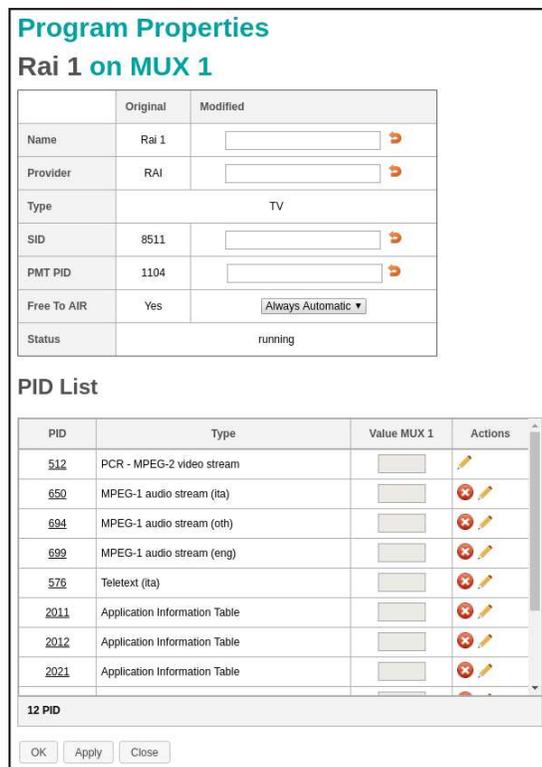
Program Properties

Rai 1 on MUX 1

	Original	Modified	
Name	Rai 1		↩
Provider	RAI		↩
Type		TV	
SID	8511		↩
PMT PID	1104		↩
Free To AIR	Yes	Always Automatic ▼	
Status		running	

PID List

PID	Type	Value MUX 1	Actions
512	PCR - MPEG-2 video stream		✏
650	MPEG-1 audio stream (ita)		✖ ✏
694	MPEG-1 audio stream (oth)		✖ ✏
699	MPEG-1 audio stream (eng)		✖ ✏
576	Teletext (ita)		✖ ✏
2011	Application Information Table		✖ ✏
2012	Application Information Table		✖ ✏
2021	Application Information Table		✖ ✏

12 PID

| OK | Apply | Close |

Fig. 10

In the first table certain program parameters can be changed, by writing directly in the space, such as: name, provider, SID, the PMT PDI. When a parameter has been changed it can be reset (returned to the original shown in the second column) by clicking on the arrow U on the right of the change space. The last parameter in the list opens a dropdown menu to select how to set the program so that it is declared as free to air or encrypted by the decoder:

- always automatic: the program is declared as free to air automatically if it is decrypted by the cam.
- always yes: the program is always declared as free to air even if it is not decrypted by the cam.
- always no: the program is always declared as encrypted, even if it is decrypted by the cam.
- unchanged: the program is declared free to air if it is not changed or if it is not sent to the cam for decryption.

The second table is to manage the PID list. It can be changed by writing in the following PID in the space: PCR video stream, audio stream, teletext, MHP, application information table. In the last column in this table, by clicking on the symbol certain actions can be taken with each program PID:

❌ to delete the PID (the entire line for the deleted PID is highlighted in grey),

↩ to reinstate the PID.

✏ to change the PID.

NB: click on "Apply" to make the changes effective.

The keys for the advanced configuration of the PIDs of the selected MUX are positioned under the OUTPUT table. By clicking with the mouse on the "MUX PID configuration" key, the following screen opens:

Fig. 11

In the figure 11, with the table "Added PID list" you can: write the PID to add which is shown under the column "remapped value", select the signal input (INPUT 1, INPUT 2, INPUT 3, INPUT 4, CAM 1, CAM 2, USB). Other actions are also possible: add the PID ➕, delete the added PID ❌ and change the remapped value of the added PID ✏ and reset the changed PID ↩.

In the second table "Deleted PID list", certain PID can be deleted from the output mux by directly writing the PID to delete in the space, add it to the list ➕ and select the input (INPUT 1, INPUT 2, INPUT 3, INPUT 4, USB). Later the deleted PID can be reinstated ↩ and therefore removed from the deleted PID list.

NB: click on "Apply" to make the changes effective.

By clicking on the "MUX Advanced Configurations" key, the following screen opens:

Fig.12

This screen in the figure 12 is used to set the following parameters:
- Time reference: to give a synchronisation time reference by selecting INPUT 1, INPUT 2, INPUT 3, INPUT 4, USB). (e.g. time, EPG, etc.)
- Enabled LCN: enable by flagging the box or deactivate the LCN and then order the programs according to their assigned priority.

- Auto SID Remapping: if enabled this innovative function allows automatically resetting a new progressive SID to the programs and to change the list.
- Auto program name: if enabled this innovative function allows automatically resetting a new progressive name to the programs by writing it in the space (base name), e.g. program 1, program 2, etc.
- Auto LCN: if enabled this function allows setting a base LCN number that is assigned to the first program in the list, the following ones will then be set automatically in a sequence from the base number.
- LCN country: select the country for setting the LCN.

After, certain advanced signal parameters can be viewed: Original Network ID, Network ID, and the Private Data Specifying Descriptor.
Other parameters like Transport Stream ID, Network Name, Cell ID can be set and changed by writing the new number in the space.
NB: click on "Apply" to make the changes effective.

5.2.6 SETTING CONFIGURATION

From the menu CONFIGURATION▶SETTINGS the general system configuration page can be opened.

Settings

System settings

System name	D-Matrix system
PIN	••••
Display contrast	8
Software Version	V.00.05

Network settings

DHCP	○ Enabled ● Disabled
IP	10.1.247.132
Netmask	255.255.0.0
Gateway	10.1.255.1
DNS	10.1.244.2
MAC Address	00:50:c2:21:ca:8e

Web access settings

Port	80
Password	••••

Save

In this menu you can:
- Rename the system
- Change the access password
- Adjust the display contrast
- Display the installed software version
- Change the network connection settings.

Fig. 13

5.3 MONITORING

From the MONITORING ▶ CONFIGURATION menu, you can set all parameters relevant to the headend monitoring. The menu is divided into three sections: Monitoring settings, Date and Time Settings, Email Settings.

Enabling monitoring: for disabling or enabling the monitoring function,
Saving on a log file: for enabling or disabling the saving on a monitoring file
Duration of the log file: for enabling its duration.
The Empty key allows you to delete all monitored events from the log file.
Send an alarm email: for enabling or disabling the dispatch of an alarm email in the event one or more parameters exceeds the operation range you have set.
Date: for setting the date of the headend, by entering it in the proper box.
Time: for setting the time of the headend by entering it in the proper box.
Tuning date and time (NTP): for enabling or disabling the tune of date and time of the headend with those of the server.
NTP tuning server: for setting the address of the server that is used for tuning the date and the time of the headend (default: 0.it.pool.ntp.org).
Country time: for setting the time of the installation country.
Smpt server: for setting the support server's address for performing the function of sending the monitoring email by entering the address in the proper box.
Receiver email address: for setting the email address where the monitoring message will be sent.
Sender email address: for setting the email address from which the monitoring message will be sent (default: 3dg_glex@fracarro.com).
Furthermore, by clicking the key "send test email," you can send a test email to make sure that the email works properly.

Monitoring settings

Monitoring settings

Enable monitoring	○ Enabled ● Disabled
Enable history	○ Enabled ● Disabled
History span	30 days
	Empty
Send alarm email	○ Enabled ● Disabled

Date/Time settings

Date	01/01/2012
Time	00:55
Date/Time web synchronization (NTP)	● Enabled ○ Disabled
Date/Time server address (NTP)	0.pool.ntp.org
Timezone	UTC

Email settings

SMTP server address	smtp.gmail.com
Port	465
Receiver email address	
Sender email address	
Use Secure Connection	● No ○ TLS ○ SSL
User Name	
Password	
	Send test email

Save

Fig. 14

Click the "Save" key to apply the modifications.

From the MONITORING ▶HISTORY menu it is possible to access the following page:

Fig. 15

From this window, you can display and search the history of events detected by monitoring.
The page reports the event ID, the relevant module, the date, the time, the value, if an alarm was generated or not, and the description of the event.
The Historical can also be exported in Excel or PDF formats or it can be printed directly.

5.4 OPERATIONS MENU

From the menu SETTINGS ▶ OPERATIONS it is possible to access the pages to save the configuration directly to files, PC or a USB drive.

Fig. 16

Clicking on the related bottons will automatically save an XML file containing the complete D-MATRIX 4S EVO configuration directly on the PC or a USB drive.
Once one or more configuration files have been saved on the PC or a USB drive, the configuration can be loaded into the D-MATRIX 4S EVO: clicking on the load configuration buttons (from file, form USB) will load a previously saved configuration file.

Select the saved configuration file and confirm the download by clicking on "Upload configuration".

When clicking on the Factory Default button it is possible to reset the product with the factory default settings.
Clicking on the Reboot button will restart the module.

5.5 FIRMWARE UPGRADE

From the menu SETTINGS ▶ FIRMWARE UPDATE you can check which firmware release is installed and then update the system if required.
To update the system, check there is correct update package available in a PC folder, or in a USB drive, then select it and press on BROWSE and then UPDATE MODULES. Wait for the operation to finish.

Firmware Upgrade

	Module	Version HW.SW	Number of partitions	Partition 1 version	Partition 2 version	Partition 3 version	Partition 4 version	Partition 5 version	Partition 6 version	Partition 7 version
☐	D-MATRIX-4S EVO	0.5	7	3	5	2	7	3	3	6

Scegli file   Nessun file selezionato

Upgrade Module

Fig. 17

English

6. PROGRAMMING INSTRUCTIONS

INTRODUCTION: before programming the D-MATRIX 4S EVO the following general indications should be followed.
Decide whether you want to use the ALL PID OUT function or to program the programs singularly (PID) that must be available in output.
With the ALL PID function, the transport stream received from the specified input is rebroadcast at the output with no further processing.
Therefore the output channels need no management, and all the contents, including non-standard or erroneous, in the original transport will be rebroadcast without change, ensuring compatibility with other more "rigid" decoders in managing the input data. However, at the same time the programs or priorities cannot be managed in the case of band limit problems.
If the output band is insufficient, due to the lack of priority management, EACH program in the transport could lose packages, meaning only artefacts are view on the TV. The ALL PID mode therefore should only be used when the output band is definitely the same or higher than the input band. If the programs are programmed singularly (PID) for them to be available on output the indications given below must be scrupulously followed.
Given the overall bitrate of an output mux, determined according to the standard and modulation parameters set, the overall band for the associated programs must be much lower, otherwise the low priority programs will be lost or malfunction. After configuring the output mux parameters, the available band can be viewed in the web configuration homepage or from the panel menu in the section OUTPUT ▶ MUX 1 / MUX 2 / MUX 3 / MUX 4 ▶ BITRATE.
Programs can then be added to the output mux until the overall peak band for the added channels exceeds the mux band, as the excess band data that cannot be broadcast are rejected by the system.
Therefore, the installer must check that the peak band for the input programs does not exceed the available band.
If the band limit is exceeded, and for as long as this occurs, the system automatically chooses which programs to broadcast according to the priority order, guaranteeing correct broadcasting for the low number (high priority) programs.
The first programs that are penalised are the high number (low priority) ones, which lose packages and are viewed with errors.
If the output band falls lower than the available band, all the programs can be broadcast without any data being lost.
To aid this, the system offers a band graphic indicator, in the web management, which is updated automatically every second.
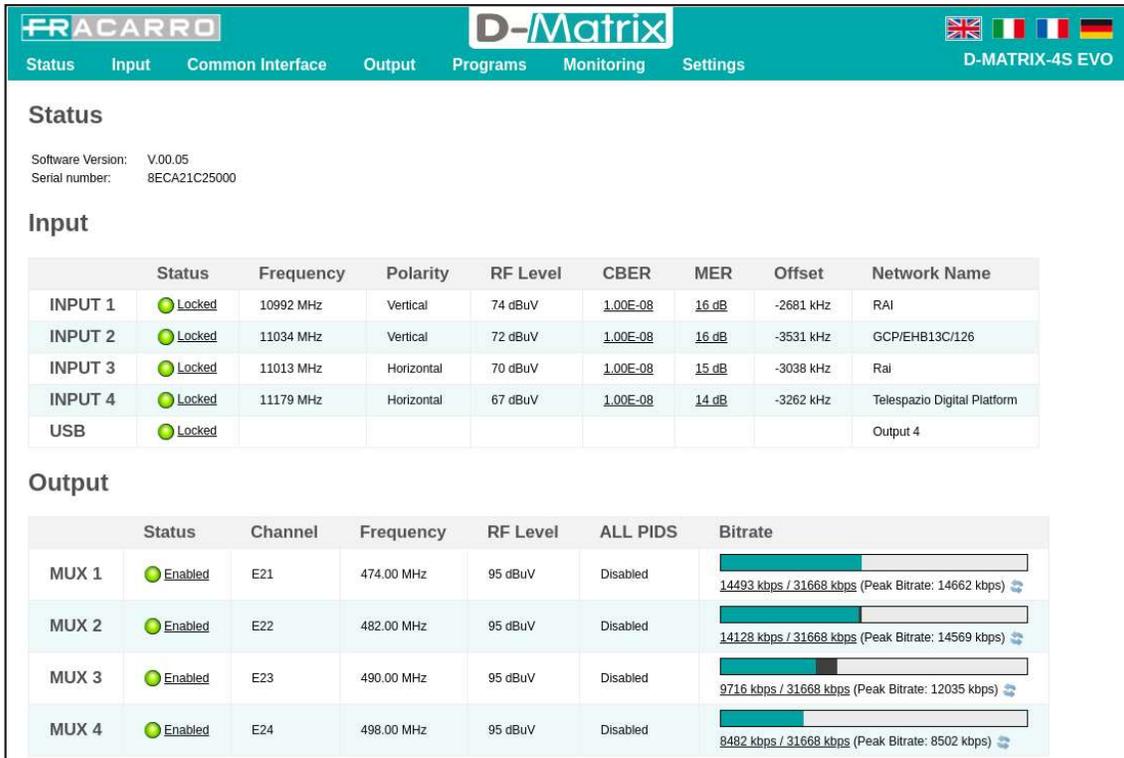
Fig. 18

The length of the complete graphic bar (including the colours blue, grey and white) shows the overall available band for the output mux, while the band immediately used by the programs is blue.

As the overall program band could change with time, the maximum acquired value since the last reset (done by pressing RESET PEAK) is shown in grey.

If there is a white section, it shows the amount of remaining band and therefore the margin that can still be used. If at any time a band peak reaches and exceeds the maximum, there is no white section and the red overflow led comes on.

The same values numerically are available in the panel menu in the section OUTPUT ▶ MUX 1 / MUX 2 / MUX 3 / MUX 4 ▶ BITRATE.

Therefore the installer should configure the output program list, after carefully informing himself about the maximum band required by each program (using web sources or specific magazines), and monitor the band over a sufficient period of time to ensure that the overall peak never reaches the maximum available, but that there is always a minimum margin available to offset any problems that may occur.

Always carefully evaluate how to assign the priority positions to each program, to ensure that the most important programs are always guaranteed.

IMPORTANT: to maximise the available band, in standard installations it is advisable to maintain the default modulation settings (for DVB-T constellation 64QAM, FEC 7/8, guard interval 1/32, number of carriers 8K, for DVB-C constellation 256QAM, symbol rate 6900kbps).

IMPORTANT: to keep the system immune from bitrate overflow, the bitrates must be kept sufficiently lower than the maximum limit defined when setting the modulations. Remember that high definition programs, broadcast with dynamic bitrates, can have broadcast peaks up to 20 Mbit/s. Therefore the installer must carefully monitor the bitrate peaks during the programming, and find information beforehand about the broadcast modes for the channels being distributed.

7. UPDATE FIRMWARE

The D-MATRIX 4S EVO can be updated in the field by uploading the firmware saved on a USB drive, directly on the module through its USB port (see the programming flowchart).

IMPORTANT: do not remove the USB drive while the update is in progress, because it would block the card.

To obtain the latest firmware and update instructions, refer to the section "software update" in our website www.fracarro.com

8. TECHNICAL SPECIFICATIONS

General features		
Operating temperature	°C	-5 – 55 (-5 – 45°C with CAM)
Power supply	V~	230
Power frequency	Hz	50 – 60
IEC protection class		Class II
Max consumption	W	42
Complies with standards		EN50083-2, EN60065
Common Interface		2 x PCMCIA (Standard EN50221, TS10169), with FLEX configuration
Connectors	Tipo	F-female (RF), RJ45, port USB (type A, FAT32 filesystem, playback file .TS)
Dimensions	mm	360x230x54 (without CAM), 385x230x54 (with CAM)
Input signal		
Number of inputs	n°	4
Input frequency	MHz	950 – 2150
Connector type	tipo	F, female
Input frequency step	MHz	1
RF input level	dBµV	50 – 80
Input impedance	Ohm	75
Remote feed	VDC, KHz	0/14/18, 0/22
Demodulation		DVB-S2 (8-PSK, QPSK), DVB-S (QPSK)
Symbol rate	MS/sec	2 – 45 (DVB-S/DVB-S2)
AFC range	MHz	-5 – +5
Loop-through insertion loss (one passage)	dB	3
DiSEqC version		1.0
LNB power feed (max)	@14V mA @18V mA	400
Output signal		
Generated Mux	n.	4 (two couples of adjacent channels)
Transmission standard		DVB-T, DVB-C
Connector type	tipo	F, female
Output frequency	MHz	110 – 862 (S2 – E69)
Output frequency steps	kHz	250
Output signal level	dBuV	95
Output level regulation (per couple of channel)	dB	-20 – 0
Output impedance	Ohm	75
Spurious	dBc	50
MER	dB	37
CAM mode		
Number of CAMS		2, can be configured in INPUT ASSOCIATION mode or FLEX mode
DVB-T output		
Number of carriers		2k, 8k
Modulation		QPSK, 16-QAM, 64-QAM
Guard interval		1/4, 1/8, 1/16, 1/32
FEC		1/2, 2/3, 3/4, 5/6, 7/8
Spectrum type		Normal, inverted
Bandwidth	MHz	6, 7, 8
DVB-C output		
Symbol rate	Msymb	1000 – 6999
Modulation type		DVB-C J.83 annex A/C
Modulation		16QAM, 32QAM, 64QAM, 128QAM, 256QAM
Bandwidth	MHz	SR depends on the set output
Mix Input		
Connector	tipo	F, female
Mix input band	MHz	47 – 862
insertion loss	dB	2.5