# MFK - Multi Function Key

## Contents



## DEFINITIONS

- **BIOS** is the synonym for **Firmware** in **FREE Studio**
- **target** is the synonym of **Smart** in **FREE Studio**

## DESCRIPTION

The **MFK** (**Multi Function Key**) is an accessory which connects to the TTL serial port of **FREE Smart (target)** for:

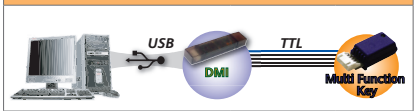
- quick programming the **target** parameters (upload/download a parameters map into one or several **targets** of a given type)
- programming the **target BIOS**
- programming the **IEC** applications of **FREE Studio.**

To download the IEC **FREE Studio** applications from your **PC** into the **MFK, you will need the DMI (Device Manager Interface) module as well as the Smart target**.

⚠ The **Smart** must be of the type you want to program the **MFK** for.

The tables below show the various options:

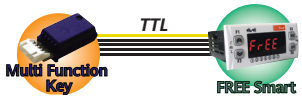
**EXAMPLE 1 Multi Function Key / DMI**
**PC → ← MFK**




**Use blue TTL cable for DMI - MFK connection**

| direction Data downloading | → | ← |
|---|---|---|
| Parameter map | - | - |
| IEC application | ✓ | - |
| BIOS | ✓ | - |

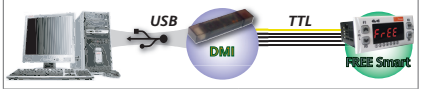
**EXAMPLE 2 Multi Function Key**
**MFK → ← Smart**




**Use yellow TTL cable for MFK - target connection**

| direction Data downloading | → | ← |
|---|---|---|
| Parameter map | ✓ | ✓ |
| IEC application | ✓ | - |
| BIOS | ✓ | - |

**EXAMPLE 3 Direct**
**PC → ← Smart**




**Use yellow TTL cable for DMI-target connection**

| direction Data downloading | → | ← |
|---|---|---|
| Parameter map | ✓ | ✓ |
| IEC application | ✓ | - |
| BIOS | ✓ | - |

Note: in the "Direct" case, the **Smart** must not be grounded.
In the following pages we show in deep how to download data in cases 1&2
For case 3 refer to 9MAx0043 FREE Studio QuickStart

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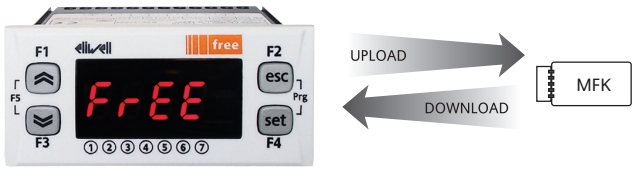
## CONNECTING UP THE MFK

Quick programming using the **Smart** menu (keypad)

For quick programming, the upload (label **UL**), download (label **dL**) and MFK formatting (label **Fr**) operations are as follows:




**NOTE: The MFK and FREE connect with the YELLOW cable**

### UPLOAD (copy SMART → MFK)

This operation copies the parameters from the **FREE Smart** to the **MFK**.

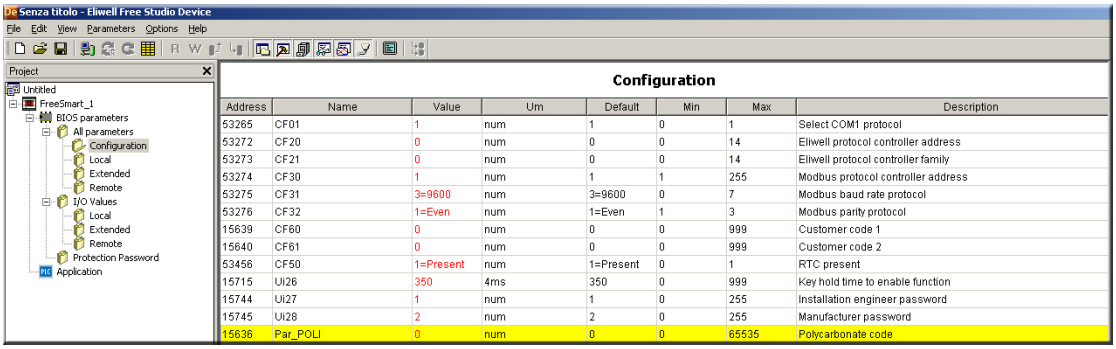
### DOWNLOAD (copy MFK → SMART)

This operation copies the parameters from the **MFK** to the **FREE Smart**.

Note: The **MFK** must be loaded with map from another **Smart**. The map contains the **Par_POLI** parameter: the parameters can only be copied to the destination **Smart** if it contains the same **Par_POLI** as the **MFK FORMAT** (to be done before an Upload in case of first use).

Formatting the **MFK** deletes all its contents.

**Par_POLI** is the "polycarbonate code", a **BIOS** parameter which is read by **FREE Studio Device**, Configuration folder, and which controls compatibility with the **Smart** hardware model.



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Note that the keypad allows you to up/download only the parameters

The **DOWNLOAD** procedure is illustrated in the example:

If the target is 'empty', e.g. there is no IEC application on the device, **Smart** will display the message **FrEE**.

Otherwise (the **Smart** is loaded with an **IEC** application) the developer's default message displays, or **PLC** if no default has been set.

Press the UP and DOWN keys (**F1+F3**) together to display the message **FrEE**.


Press [esc + set] in the main screen.

The label 'PAr' will display. Scroll with 'UP' and 'DOWN' to display the 'FnC' label.

Press 'set'. The label 'CC' will display.


The commands you need to use the **MFK** are in the 'CC' folder.

Press 'set' to access the functions.


Use the 'UP' and 'DOWN' keys to display the desired function:

- UL for upload
- dL for download
- Fr for format

Press the 'set' key and the upload (or download) will start (in this example, dL- download). wait twnety seconds or so for UL/dL… (formatting is instantaneous)

- dL: green led flashing
- UL/Fr: green led off


If the operation is successful, 'YES' will display for a couple of seconds. The display will then return to the main screen

On completion, remove the **MFK**


If the operation is not successful, 'Err' displays

## DOWNLOAD PARAMETERS FROM RESET

⚠ The parameters map will only download if the destination **Smart** has the same **Par_POLI** (i.e., same hardware model) as the **MFK**.

Connect the **MFK** when the target is switched off.

On start up, if there is a compatible parameter map in the **MFK**, the programming parameters are loaded into the instrument:

This happens as follows:

- firmware verification/update (**MFK** led flashes)
- termination with successful programming (**MFK** led on fixed).

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## DOWNLOAD IEC

### Requisites

- **FREE Studio** version **2.2 or later**
- target software ('file version' per catalogue) version **412.6** or later
- firmware template ('firmware version' i.e. 'Msk412_06.fwf') version **412.6** or later
- a sample **Smart** with firmware template **412.6** or later.

The aim is to load an **IEC** application onto an **MFK** for duplication to n **FREE Smart targets**.

The download has two steps (first **FREE Studio** connects to the **target** to check its compatibility and then it downloads the IEC application to the **MFK**).

**NOTE: the two steps must be run in the indicated order; both as necessary for downloading the IEC application into the MFK.**

The **Direct** mode uses the **DMI** directly from the PC

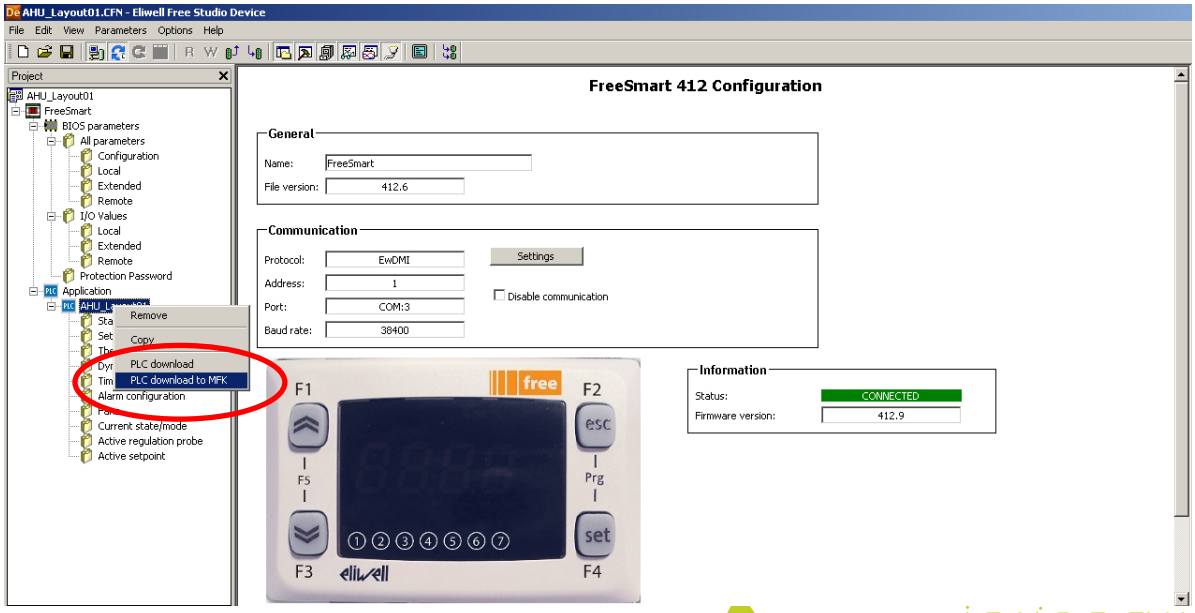
### 1. CONNECT IEC→TARGET

**NOTE: The DMI and target connect with the YELLOW cable**

**NOTE: set baud rate to 38400 baud , EVEN parity (CF31=5, CF32=1)**

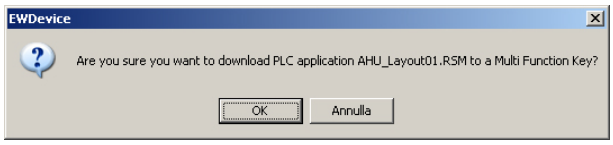
Proceed as follows:

- open/create a **.cfn** file
- Select the name of the **PLC** and right click on it.
- Select PLC download to MFK



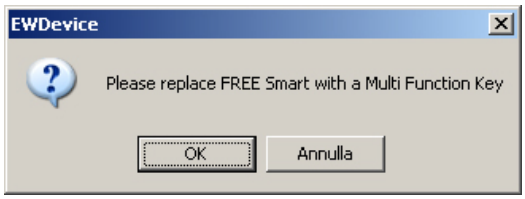
- you are prompted to confirm that you want to download the application into the **MFK**. Click on OK. Note: In reality this step precedes the actual download to the **MFK** since you are connected to the **target**.

## 2. DOWNLOAD IEC→MFK

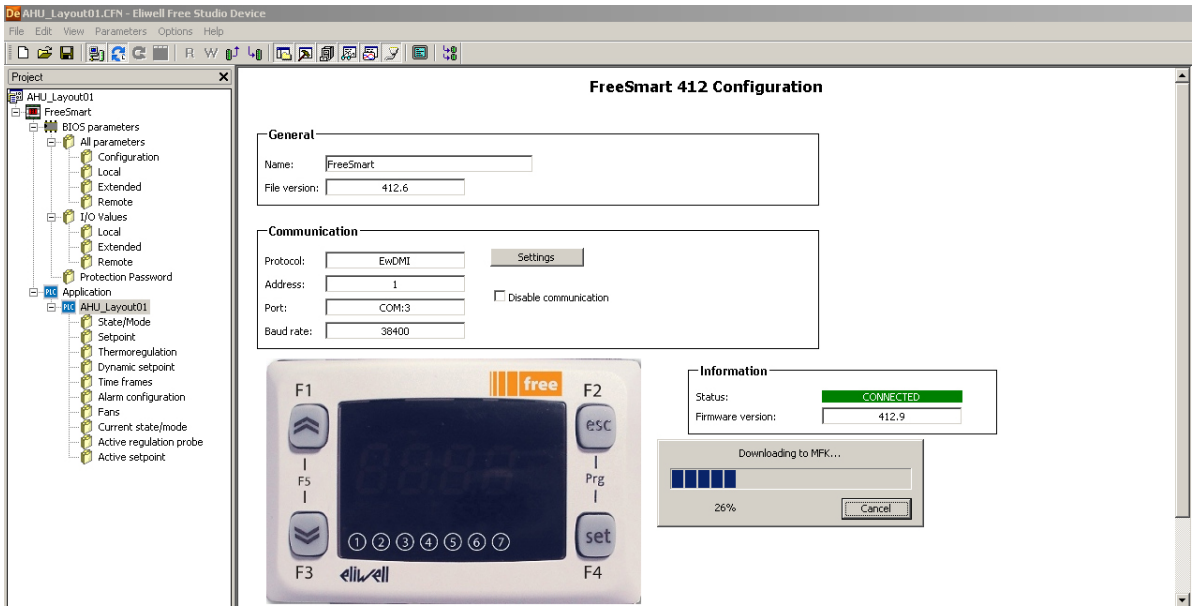



**NOTE: The target and MFK connect with the BLUE cable**
**DISCONNECT THE YELLOW CABLE AND CONNECT THE BLUE CABLE.**

- after the first step you are prompted to replace the application on the **MFK**. Click on OK.




The **IEC** downloads into the **MFK**:



The **MFK** is now ready for connecting to a **Smart** to download its content - **ONLY WITH THE SMART SWITCHED OFF (DOWNLOAD FROM RESET)**.

The BIOS can only be downloaded after a reset

At start up, if a **IEC** is loaded into the **MFK** the new **BIOS** is downloaded into the device.

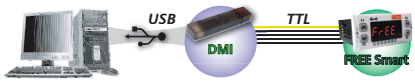
This happens as follows:

- **IEC** verification/update (**MFK** led flashes)
- termination with successful programming (**MFK** led on fixed)
- switch off the device.

If, on termination, the **MFK** led does not stay on fixed, the operation must be repeated as this means it failed.

**Direct** mode

**DOWNLOAD IEC→TARGET**




⚠ Power the **Smart** only and exclusively with the **DMI (DO NOT CONNECT IT TO AN EXTERNAL POWER SUPPLY)**

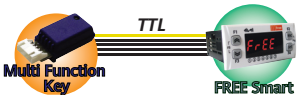
## DOWNLOAD BIOS

You can also update the **Smart BIOS** from the **Device**. There are two ways to download the **BIOS**
The **MultiFunctionKey** has two steps: upload to the **MFK** (a) followed by download to the **Smart** (b)
The **Direct** mode uses the **DMI** directly from the PC

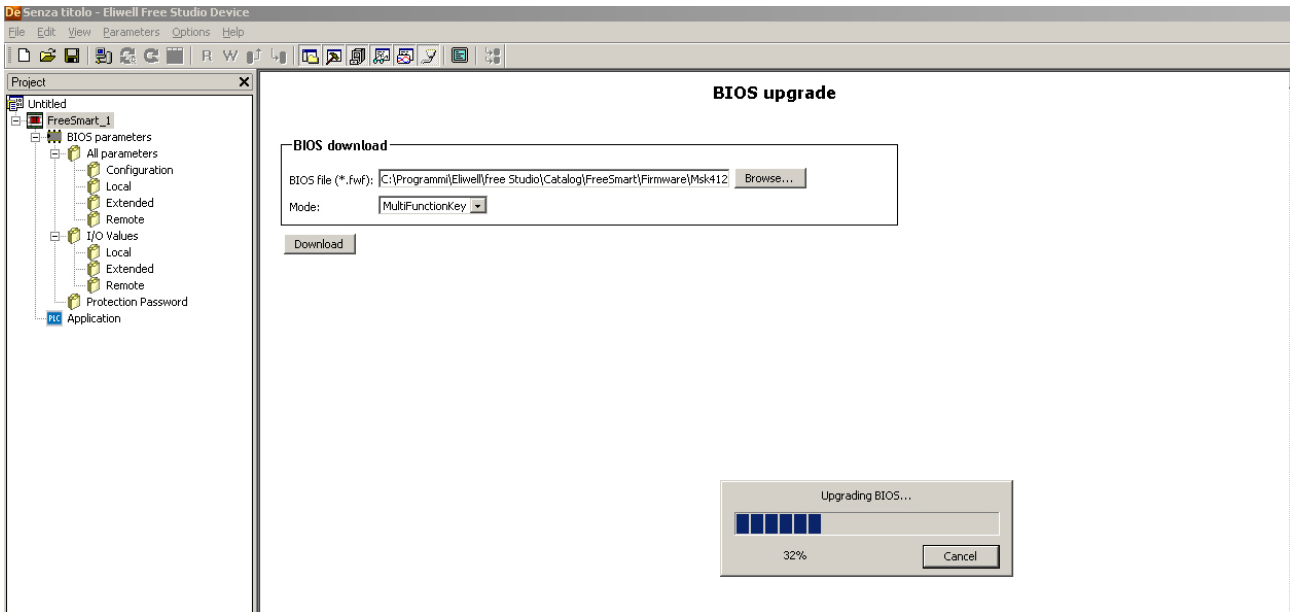
### MultiFunctionKey mode

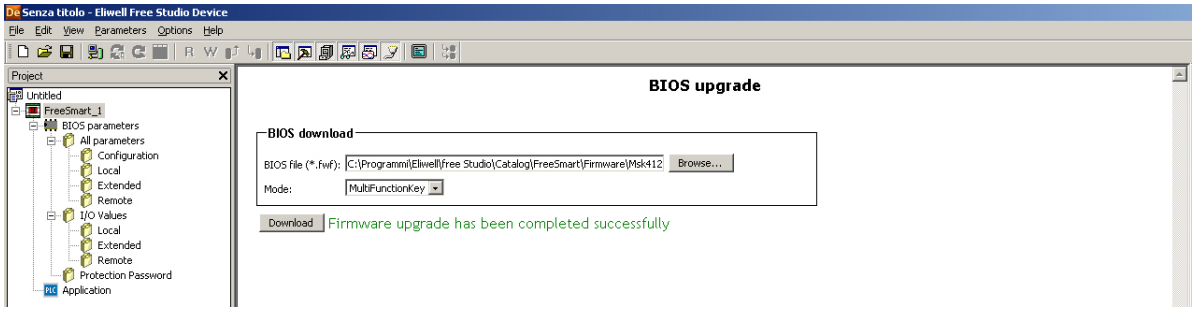
(a)**DOWNLOAD BIOS→TARGET**

### NOTE: The MFK and DMI connect with the BLUE cable




- Connect the **MFK** to the DMI and the DMI to the PC
- Open **FREE Studio Device**
- Add a **Smart target** to the project
- Select the name of the **target** and right click on it.
- Select mode **MultiFunctionKey**
- Select BIOS download and open the **.fwf** file you want to download.
- Click on Download



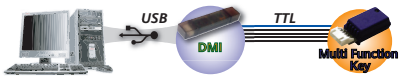



The operation may take a few minutes to conclude. If the download terminates successfully, a confirmation displays.

Disconnect the MFK and connect it to the target.

**NOTE: The MFK and target connect with the YELLOW cable**

## (b)DOWNLOAD BIOS→TARGET FROM RESET




The BIOS can only be downloaded after a reset

At start up, if a **BIOS** is loaded into the **MFK** (the MFK can be prepared for this with the **FREE Studio** software), the new **BIOS** is downloaded into the device.

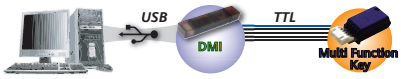
This happens as follows:

- **BIOS** verification/update (**MFK** led flashes)
- termination with successful programming (**MFK** led on fixed)
- switch off the device.

If, on termination, the **MFK** led does not stay on fixed, the operation must be repeated as this means it failed.

**Direct** mode

## DOWNLOAD BIOS→TARGET




⚠ Power the **Smart** only and exclusively with the **DMI (DO NOT CONNECT IT TO AN EXTERNAL POWER SUPPLY)**



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## NOTES

1. always download the parameters first and then the **BIOS** / **IEC** application
2. if the **MFK** is loaded with a compatible **BIOS** and parameters map, the parameters download first, followed by the **BIOS**
3. **Format**. ⚠ This operation cannot be reversed.
   Formatting is necessary:
   - only for up/downloading parameters: when using an **MFK** for the first time (virgin **MFK**)
   - when using the **MFK** with mutually incompatible devices
   - to delete a **BIOS** or IEC application stored on the **MFK**
   - a **MFK** programmed by Eliwell must not be formatted. After the download, the device will work with the settings of the new **BIOS** / newly loaded map.
4. disconnect the **MFK** on completion of the procedure
5. switch the **target** off and back on again.

If Err displays:

- Make sure the **MFK** is connected to the target
- Check the **MFK** - **FREE Smart** connection (check the TTL cable)
- Check that the **MFK** is compatible with the instrument
- Check the hardware compatibility **(Par_POLI)**
- Contact Eliwell Technical Support.



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