

## **ELAD FDM-DUOr** Dual Mode SDR Receiver



# **USER MANUAL**

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## **Revision History**

Revision	Date	Description	
Rev 1.1	04/2016	<ul> <li>Added the OW cat command description.</li> </ul>	
		• Updated the MA, MB and RF cat command descriptions with CWR	
		information.	
		Updated firmware versions table.	
Rev 1.2	06/2016	• Updated the picture in the section "5.1.2 - E1 Receiver Settings"	
		with the AGC Threshold parameter.	
		<ul> <li>Updated the section "8.4 - UI firmware update".</li> </ul>	
		<ul> <li>Updated the firmware versions table.</li> </ul>	
Rev 1.3	01/2017	<ul> <li>Moved the preselectors description in section "3 - Preselectors</li> </ul>	
		Description".	
		<ul> <li>Updated the preselectors description.</li> </ul>	
		Updated firmware versions table.	

### **1** Overview

### 1.1 Notice

Amateur radio regulations vary from country to country. Confirm your local amateur radio regulations and requirements before operating the ELAD FDM-DUOr.

### **1.2 Firmware versions**

The features described in this manual refers the following firmware versions :

RX Demodulator	User Interface	USB Interface	FPGA
Ver. 1.30	Ver. 4.67	Ver. 4.09	Ver. 2.00
Date: 06/20/2016	Date: 12/16/2016	Date: 05/28/2015	Date: 07/30/2014

### 1.3 Introduction

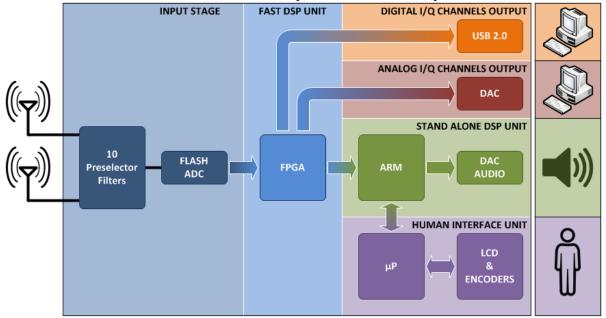
Thank you for choosing the FDM-DUOr. It is an innovative dual mode SDR (Software Defined Radio) receiver covering the frequency range from 9kHz to 54MHz. The FDM-DUOr can be used like a standard receiver in stand-alone mode or in remote mode to exploit the full potential of the ELAD FDM-SW2 software. The FDM-DUOr can still be connected to the FDM-SW2 software when it works in "stand-alone" mode.

**NOTE**: For detailed information about ELAD FDM-SW2 software refer to user manual available at <a href="http://sdr.eladit.com/FDM-sw220Software/Doc/">http://sdr.eladit.com/FDM-sw220Software/Doc/</a>

### **1.3.1 Main Features**

- Frequency range: 9kHz to 54MHz in direct sampling mode.
- Two antenna connectors (one with a 54MHz low-pass filter, the other one without).
- 10 slots for preselectors (filters). Settable by the user with the FDM-SW2 software.
- Operating modes: CW, CWR, LSB, USB, AM and FM.
- ADC Linear LTC2165,16bit @122.88MHz.
- FPGA Spartan 6 XC6SLX25 + Serial Flash for stand-alone mode.
- Stand-alone RX demodulator with STM32F4 ARM floating point μController.
- LPC1766 Cortex M3 for LCD & Keyboard control.
- Clocking source Si5338 driven by 10MHz TCXO or external reference input.
- CAT USB interface with FTDI controller.

### 1.3.2 Block Diagram



## ELAD FDM-DUOr (Receiver ONLY) BLOCK DIAGRAM

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### **1.4 Precautions**

- Connect the receiver only to a power source described in this manual.
- Take care when plugging-in cables, avoid applying sideways pressure that might damage the connectors.
- Avoid operating in wet conditions.
- For better performance and safety, connect the receiver to good earth ground using a short, heavy, braided cable.
- Ground all outdoor antennas for this receiver using approved methods. Grounding helps protect against voltage surges caused by lightning. It also reduces the chance of build-up of static charge.

### 2 Panels Description

### 2.1 Front Panel Description



### 1 - LCD Display

See <u>LCD Display</u>.

### 2 - E1 Knob

Available functions : settings of audio volume, squelch for FM, gain control (AGC), noise reduction (NR), noise blanker (NB) and auto notch (AN). See <u>Knobs functions</u> for more information about knobs use.

### 3 - Main Knob

Available functions : VFO tuning, memory selection in MEM mode, step selection in VFO mode. See <u>Knobs functions</u> for more information about knobs use.

### 4 - Main audio output for speakers and headphones (front panel)

#### 5 - Auxiliary audio output

### 6 - E2 Knob

Available functions : settings of reception filters, CW pitch value, and RIT value. See <u>Knobs functions</u> for more information about knobs use.

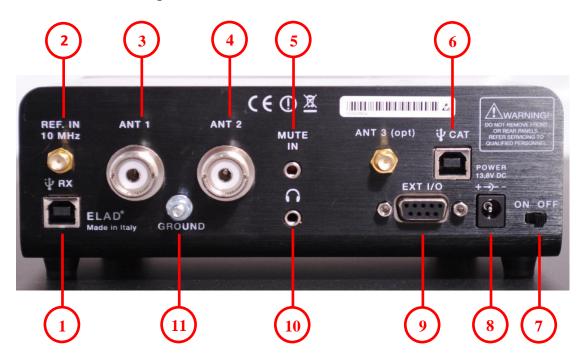
### 7 - MODE and MENU buttons

Operating mode selection (AM, CW, ...). Tune mode activation. "QuickStep" function activation. Access to the setup menu. See <u>Keys functions</u> for more information about keys use.

### 8 - VFO and MEM buttons

Basic VFO and memory operations. See <u>Keys functions</u> for more information about keys use.

### 2.2 Rear Panel Description



#### 1 - USB Receiver Data Connector

USB 2.0 port. Connect it to computer to use the SW2 software. Please use the supplied cable.

### 2 - Frequency Reference Input

SMA 50 Ohm connector. Apply an 10MHz 0dBm signal.

### 3 - Input Antenna 1 Connector

M-type 50 Ohm connector. Connected to the integrated low pass filter.

#### 4 - Input Antenna 2 Connector

M-type 50 Ohm connector. Not connected to the integrated low pass filter.

### 5 - Mute Input Connector

3.5mm stereo jack connector.



RING: do not connect (reserved for future use). TIP : mute input, connect to GROUND to activate the mute functionality.

#### 6 - CAT USB Serial Port

USB 2.0 port. Connect it to the computer to manage the FDM-DUOr through the CAT (Computer Aided Transceiver) protocol.

#### 7 - Power Switch

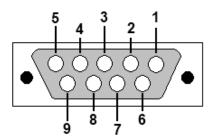
Turns on or off the FDM-DUOr.

#### 8 - Power Connector

Voltage to apply : 13.8V. Maximum current consumption : 0.6A DC.

#### 9 - Expansion Port

DB9 connector for external hardware. THIS IS NOT A STANDARD SERIAL PORT.



- Pin 1: SPI Latch
- Pin 2: I2C SCL
- Pin 3: SPI Clock
- Pin 4: I2C SDA
- Pin 5: Ground
- Pin 6: DUOr TX
- Pin 7: DUOr RX
- Pin 8: SPI Data
- Pin 9: +5V

#### 10 – Main audio output for speakers and headphones (rear panel)

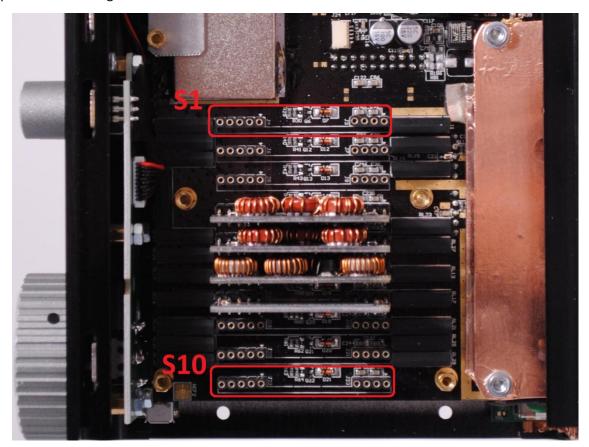
#### **11 – Ground Connector**

For better performance and safety, connect it to an earth ground using a short and wide cable.

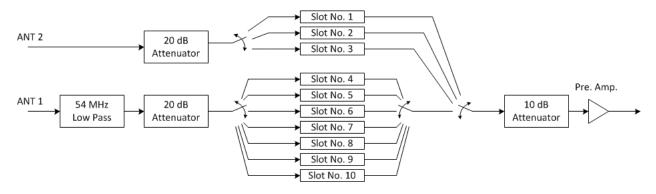
### **3** Preselectors Description

### 3.1 Preselectors Slots

The FDM-DUOr has ten slots for preselector filters, also simply called preselectors or filters. To change the preselectors configuration remove the top cover, identify the appropriate slot and insert or remove the preselector board. The picture below shows their position and numbering. Use the FDM-DUOr manager in the FDM-SW2 software (as described in **3.3** - **Modify the preselectors configuration**) to send the preselectors configuration to the FDM-DUOr.



As shown in the FDM-DUOr front end block diagram below, use slots 4 to 10 for HF (under Antenna 1) and slots 1 to 3 if using Antenna 2 (no low pass filter).



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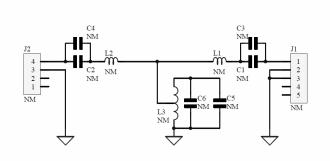
### 3.2 Preselectors List

	Actual available preselectors (*)							
Code Description		Code	Description					
FHP05M-1	High Pass 500 kHz	FBP17-1	Band Pass 17 m					
FHP1M7-1	High Pass 1700 kHz	FBP15-1	Band Pass 15 m					
FBP160-1	Band Pass 160 m	FBP12-1	Band Pass 12 m					
FBP80-1	Band Pass 80 m	FBPY	Bypass module (**)					
FBP40-1	Band Pass 40 m	FPCB-B3	Empty module for self-made filters					
FBP30-1	Band Pass 30 m	FPCB-H5	Empty module for self-made filters					
FBP20-1	Band Pass 20 m							

<sup>(\*)</sup> Please refer to ELAD website for updated list of preselector modules.

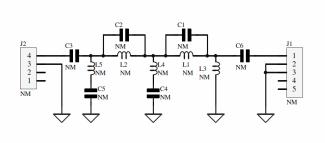
### **FPCB-B3** Preselector Schematic





**FPCB-H5** Preselector Schematic





### 3.3 Modify the preselectors configuration

The filters configuration is stored in the FDM-DUOr internal memory. To modify and save this configuration use the "FDM-DUO Manager" feature in the ELAD FDM-SW2 SDR Software.

FDM-DUO Stand A	) 🔲 RX = TX	X	1 3 5 7 9 +20 + 3) <u>14.070.000</u> Hz ) ← c		AF QQ +	FDM-SW2 2 I V Attenuator Noise Blanker Noth BW Frequency 077 100 0 0 0 100 0 1
Use only RTX/TX Ante Use both RTX/TX and Volume Volume AUX TX Power 1.0W AGC AGC Gain FAST	2004-0.25		TX	<b>3</b>		Filter BW 2.500 € AGC MEDIUM ▼ Thr Noise Reduction Auto Notch Vol 2 67% 0 Sql 14005% 67% 0 Sql 14005% 67% 0 Sql 67% 0
MACRO	HF MEM 2 MEM 4	FFT Res. 11, 7Hz/point 20kHz 14040kHz 2, 5MHz 13, 0MHz 3	CAT Port COM13  Baudrate 115200	20m 11100kHz 1412 1,0MHz 15,5MHz	AV6 = 2	Kall         Sql         -140dBm           RX3         Vol 1         100%         1           Vol 2         67%         67%         1           Sql         -140dBm         100%         1           RX3         Vol 1         100%         1         100%         1
MEM 5	7070 USB FM	60m 4 9m 40m 0 IG FILE FDM-DUO 4 No file select	Start	AN LSB BW:	12m 10 2,5kHz LO 14.070.000Hz 0:00:00/0:00:00	Vol 2 67% 67% 4400Bm Sql 4400Bm UTC Time 11/04/2016 14:24:23 FDM-SW2 CPU Usage 4.5% Total CPU Usage 25,4%
AM 3KH2 VF0 A TUNE	AM 6KHz VFO B FDUO AGER 2 ¢					

- 1. Click on the "FDM-DUO" button.
- 2. In the "FDM-DUO control panel", click on the "FDM-DUO MANAGER" button.
- 3. Choose the right COM port, the right baud rate (menu 70 of the FDM-DUOr) and click on "Start". You need to connect the CAT USB port of the FDM-DUOr to the computer to perform this operation.

The loading process may take some time, depending on the baud rate selected.

FDM-DUO Manager							
Memories Backlight Preselectors 1							
Internal Preselectors	;			Load	2		
	Filter ID	Enabled		High Pass Freq	Low Pass Freq		3
	1	NO	•	0	1		3
	2	NO	•	0	0		
	3	NO		0	0		
	4	YES		13.600.000	21.500.000		
	5	YES		21.500.000	35.000.000		
	6	YES		1.700.000	54.000.000		
	7	YES		0	1.700.000		
	8	NO		0	0		
	9	NO		0	0		
	10	NO	•	0	0	Message	5
				Save	4	i	Configuration Saved

### Then.

- 1. Select the "Preselectors" tab.
- 2. The "Load" button allows you to retrieve from the FDM-DUOr the current configuration.
- 3. Set a filter. The settings table is formed by 10 rows, one for each filter slot of the FDM-DUOr. Each row contains 4 fields :
  - the filter ID / slot number : from 1 to 10,
  - the state of the filter/slot : enabled or not,
  - the beginning frequency of the filter use, otherwise called "high pass frequency",
  - the end frequency of the filter use, otherwise called "low pass frequency".
  - For each row choose the "Enabled" state and if enabled, enter the desired High Pass and Low Pass frequencies which specify the activation band of the filter.
- 4. Press the "Save" button to store the configuration in the FDM-DUOr internal memory.
- 5. A message box appears to confirm the operation or indicate a negative outcome.

Some rules to keep in mind :

- the frequency to enter is in Hertz,
- the High Pass frequency must be strictly slower than the Low Pass frequency,
- in the same way the Low Pass frequency must be strictly higher than the High Pass frequency,
- in case of use of the FBPY bypass module, insert it to the last used slot.

Slot number	Antenna	Preselector code	Frequency range
1	ANT 2	-	-
2	ANT 2	-	-
3	ANT 2	-	-
4	ANT 1	FBP-13/21	13.6MHz – 21.5MHz
5	ANT 1	FBP2135	21.5MHz – 35.0MHz
6	ANT 1	FHP1M7-1	1.7MHz – 54MHz
7	ANT 1	FBPY	0Hz – 1.7MHz
8	ANT 1	-	-
9	ANT 1	-	-
10	ANT 1	-	-

For example, considering the default configuration of the FDM-DUOr which is :

To select the right filter the FDM-DUOr analyses the configuration following the ascending order of the slots. If the current tuning frequency is inside the frequency range the filter is selected, if not it passes to the next slot. This mean that filters that have more bandwidth should be left last. It is recommended to place the bypass module in the last used slot and to enable it in the frequency range which is not covered by the others filter modules.

Some cases with the above configuration :

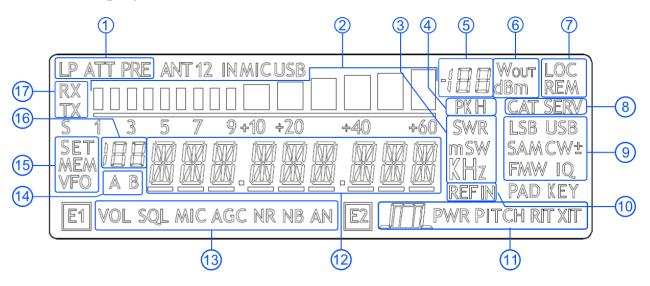
- tuning frequency set to 14MHz : the filter on the fourth slot is selected,
- tuning frequency set to 28MHz : the filter on the fifth slot is selected,
- tuning frequency set to 52MHz : the filter on the sixth slot is selected,
- tuning frequency set to 1MHz : the filter on the seventh slot is selected.

If you want to mount a new filter, for example FBP-40-1 with the frequency range 7MHz – 7.45MHz, it is better to insert it in slot 4 and move all the other filters by one slot.

Slot number	Antenna	Preselector code	Frequency range	
1	ANT 2	-	-	
2	ANT 2	-	-	
3	ANT 2	-	-	
4	ANT 1	FBP-40-1	7MHz – 7.45MHz	
5	ANT 1	FBP-13/21	13.6MHz – 21.5MHz	
6	ANT 1	FBP2135	21.5MHz – 35.0MHz	
7	ANT 1	FHP1M7-1	1.7MHz – 54MHz	
8	ANT 1	FBPY	0Hz – 1.7MHz	
9	ANT 1	-	-	
10	ANT 1	-	-	

So the configuration should become :

### 4 LCD Display



- 1. LP: turns on when the low pass filter is active. ATT: turns on when attenuation is active.
- 2. METER: displays the signal strength in S-units.
- 3. Units of measurements of the values displayed. The "S" letter of SWR is also used to indicate that the "QuickStep" function is active.
- 4. PK: blinks if the ADC of reception is "overloaded".
- 5. Secondary indication: displays the signal strength in dBm.
- 6. Measurement unit for the secondary indication.
- LOC: turns on when the Main Knob is locked.
   REM: turns on when the remote mode is active, turns off when the stand-alone mode is active.
- 8. CAT: turns on when a CAT command is received. SERV: turns on when the service mode is enabled.
- 9. Displays the selected operating mode.
- 10. Turns on when the external frequency reference is present.
- 11. E2 selected function :
   III : filter bandwidth setting,
   PITCH : CW pitch frequency setting,
   RIT : Receiver Incremental Tuning setting.
- 12. Alphanumeric characters to displaying messages and numeric values.

13. E1 selected function :

VOL: main volume setting, SQL : squelch setting (for FM mode), AGC: automatic gain control settings, NR: noise reduction setting, NB: noise blanker setting, AN : auto notch setting.

- 14. Displays the selected VFO, A or B.
- 15. MEM: turns on in memory mode.
  VFO: turns on in VFO mode.
  SET: turns on when the setting menu is shown.
  SET: turns on jointly to MEM when the VFO→MEM menu is active.
- 16. In memory mode, displays the selected memory index. When in the setting menu, displays the menu number.
- 17. RX: reception state indication.

### 5 Quick Start

These instructions are intended only for a quick guide, detailed instructions are given later in this manual.

### 5.1 First of all

To avoid having a forest of buttons and knobs as front panel, each control has different operating modes.

The buttons can be "short pressed" or "long pressed" to activate different functions. The different functions associated to each pressure are written in different colors just above the corresponding button. Each top white label is associated to the "short pressure" on the button, while the lower blue label is associated to the "long pressure".

	Example	
AVB swaps A and B VFOs if "short pressed", and swaps VFO and Memory mo The A/B label refers to the A/B VFO swap obtained with a "short pressure". The M label refers to the VFO/Memory mode swap obtained with a "long pres		

	LUNG I I COSUIC	_
		٦
A button is "long pressed" when it is kept pressed for more than 1 sec.		
This value can be changed using menu 71 (Hold Time ) as explained in section	on <b>6.5 - Settings Menu</b>	
List.		

Valid values can vary from 500 ms to 2500 ms.

The knobs can be pressed as well to control a different parameter.

The E1 knob usually controls the audio volume, but if pressed once it controls the squelch value.

### Tuning

Example

ong Pressure

The tuning knob can be pressed to change the tuning step or to enter the "Digit by digit tuning mode".

The tuning knob operations are detailed in section 6.1.1 - Tuning.

Reset

### 5.2 Reset

When first approaching a largely programmable device like FDM-DUOr it is nearly unavoidable to mess some parameters with useless values. This is not a problem and should not prevent users from trying the different settings, since a "reset" command is available to bring back the device to the factory settings.

The reset procedure is quite simple:

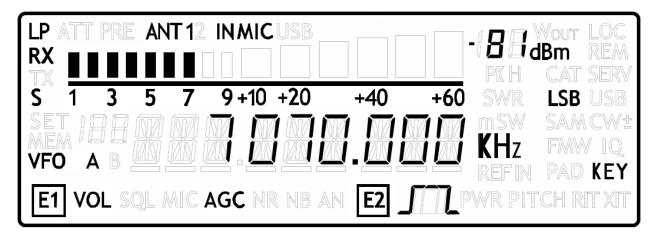
- short press the MENU button
- turn the F2 knob until reading 81 DEFAULT on the display
- short press the E2 knob to show "N" on the right of DEFAULT
- turn the E2 knob to change "N" to "Y"
- short press the E2 knob
- wait for the radio reset and restart

### 5.3 A first trip

A radio like FDM-DUOr has many possible application scenarios, both used as a stand-alone device, and paired with its mate software.

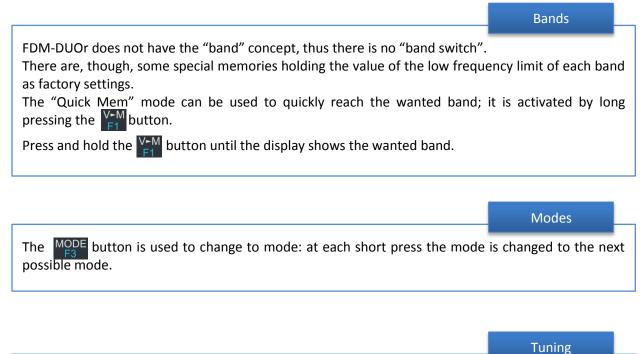
In this section the simplest and most common uses will be shown, to allow a first familiarization with FDM-DUOr.

The first use for FDM-DUOr is, clearly, reception. To do that, just connect the device to a 12V power supply (or to a battery) and turn it on by using the back switch.



After some seconds the device is in reception mode with VFO A enabled.

The main controls are as follows:



The tuning is done using the main tuning knob.

It is possible to change the tuning step to an alternate value with a short pressure on the button.

Another short pressure on the  $\begin{bmatrix} S \\ c \end{bmatrix}$  button resets the usual tuning step.

It is possible to change the tuning step to various values with a short pressure on the tuning knob. This leads the tuning knob to select different tuning steps.

Once the desired step has been selected, another short pressure on the tuning knob will bring it back to control the tuning, using the new selected step.

Volume and bandwidth

The volume is set by the E1 knob.

The E2 knob controls the bandwidth.

#### Enhancing Reception

By clicking on the E1 knob, it is possible to activate some useful options:

- 1. Audio Volume: this, as seen previously, is the default behavior;
- 2. Squelch Value: if activated, the related icon on the display blinks;
- 3. Automatic Gain Control On/Off: if activated, the AGC icon on the display blinks;
- 4. Automatic Gain Control Speed: it is possible to select Slow, Medium, or Fast;
- 5. Noise Reduction: it is possible to activate and set the level, if activated the NR icon on the display blinks;
- 6. Noise Blanker: it is possible to activate and set the level, if activated the NB icon on the display blinks;
- 7. Auto Notch: it is possible to activate and select two different levels of intervention; when activated, Auto Notch detects and kills an audio persistent tone.

By clicking on the E2 knob, it is possible to activate some useful options:

- 1. Filter Bandwidth: this, as seen previously, is the default behavior;
- 2. CW Pitch: this allows to choose the preferred CW reception tone;
- 3. Receive Incremental Tuning On/Off;
- 4. Receive Incremental Tuning Value: this allows to move the reception frequency away from the transmission frequency; this function appears only if the previous Receive Incremental Tuning is set to On.

### 6 User Interface

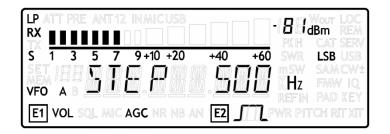
### 6.1 VFO Mode

The VFO mode is the default mode of FDM-DUOr. Each VFO memorize the tuning frequency, mode and tuning step

LP ATT PRE ANT 12 IN MICUSB	
	PKH CAT SERV
S 1 3 5 7 9+10 +20 +40 +60	SWR LSB USB
	mSW SAMCW±
	KHz FAW IQ
	REFIN PAD KEY
	WR PITCH RIT XIT

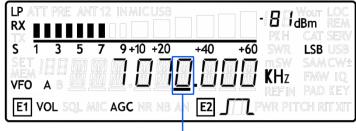
### 6.1.1 Tuning

In this mode, use the Main Knob to tune a frequency. A short pressure on the main knob enter the frequency step menu



Use the main knob to modify the tuning step, then with a short pressure return in the VFO menu.

With a long pressure over the main knob, the Digit by Digit Frequency tuning mode is activated

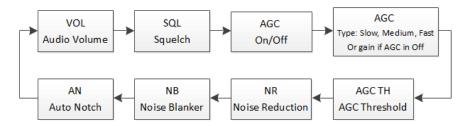


SELECTED DIGIT

In this mode use the main knob to modify the selected digit and E1 or E2 to change witch digit you want to modify. Apply a short pressure on main knob to return in the standard tuning mode.

#### 6.1.2 E1 Receiver Settings

Apply a short pressure on the E1 knob to change the E1 selected parameter, the selected parameter icon is turned on in the LCD. Turn until one click the E1 knob to display the parameter value, then turn again E1 to modify the parameter value.



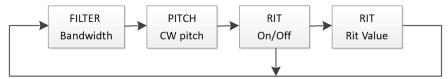
SQL: if the Squelch is turned on the relative SQL icon blinks.

AGC: if the AGC is turned OFF (manual gain mode), the AGC icon blinks.

NR and NB: if the Noise Reducer or the Noise Blanker is turned on the relative NR or NB icon blinks.

### 6.1.3 E2 Receiver Settings

Apply a short pressure on the E2 knob to change the E2 selected parameter, turn until one click the E1 knob to display the parameter value, then turn again E1 to modify the parameter value.



RIT: if the RIT is turned on the relative RIT icon blinks, note that if the RIT is turned off the "Rit Value" menu is not displayed. To modify the RIT value you have to use the E2 knob to change the selected digit key to change the digit selection. Keep press the key to reset the RIT value. and press the

#### 6.1.4 Switch VFO

Use the A/B button to switch VFO-A/B.

#### 6.1.5 Store VFO to memory

Use the Ver key to store the current VFO settings into a memory

			Wout LOC Bm REM CAT SERV
	<u>].0</u> [	KHz	LSB USB SAMCW± FMW IQ
E1 VOL SQL MIC AGC NR NB A	N E2		PAD KEY ICH RIT XIT

Use E2 knob or main knob to select the destination memory and confirm with a short pressure on E2.

### 6.1.6 "QuickMem" Mode

Keep pressed the V-M key to enter the "QuickMem" mode.

The memory channels 180 to 199 are reserved for the "QuickMem" selection. Keep pressed the  $\underbrace{V}_{F1}^{F1}$  key until the desired frequency appears on the LCD display, then release the key and the current VFO is set to the frequency and mode saved in the memory channel.

You can use the "FDM-DUOr Manager" feature in the ELAD FDM-SW2 software to customize the memory channels.

### 6.1.7 VFO-A = VFO-B

With long pressure on  $\frac{M-V}{F2}$  key you get VFO-A = VFO-B

			Nout LOC IBM REM CAT SERV
S 1 3 5 7 9+10 +20	+40	+60 SWR	LSB USB
	<u>B.R.</u>		SAM CW± FMW IQ PAD KEY
E1 VOL SQL MIC AGC NR NB	AN E2 🥤	PWR PIT	CH RT XI

### 6.1.8 Change Operating Mode

With a short pressure on the  $\frac{MODE}{F3}$  button, you can change the receiver mode between the available modes:



### 6.1.9 "QuickStep"

With a short pressure on the  $\begin{bmatrix} S \\ F4 \end{bmatrix}$  key, the "QuickStep" function is activated. This function quickly sets the frequency step preset selected in the "QuickStep" setting menu, press again the  $\begin{bmatrix} S \\ F4 \end{bmatrix}$  key to set the previous frequency step.

### 6.2 MEM Mode

To activate the memory mode, apply a long pressure on  $\frac{A/B}{M}$ . In MEM mode it is possible to receive, transmit and change the E1/E2 settings in the same way of the VFO mode.

S 1 3 5 7 9+10 +20 +40 +60 MEM A	SWR LSB USB mSW SAMCW± KHz FMW IQ REFIN PAD KEY
E1 VOL SQL MIC AGC NR NB AN E2	WR PITCH RT XIT

### 6.2.1 Select and edit a memory

Use the main knob to select a memory. Apply a long pressure on the main encoder to enter the edit memory menu. In this menu it is possible to modify the selected memory frequency in digit by digit mode.

	-{ <b>8</b> 8, pkh	Nout LOC IBM REM CAT SERV
S 1 3 5 7 9+10 +20 +40 +60 MEM A	m SW KHz	LSB USB SAM CW± FMW IQ PAD KEY
E1 VOL SQL MIC AGC NR NB AN E2	0 00000 200 4	

### 6.2.2 Delete a memory



	-IBB WOUT LOC BB dBm REM PKH CAT SERV
\$ <u>13579+10+20+40+60</u>	SWR LSB USB
MEM 20 0 0 0 EE 0 <u>4E 5</u>	msw samcw± KHz fmw iq refin Pad key
E1 VOL SQL MIC AGC NR NB AN E2	WR PITCH RIT XIT

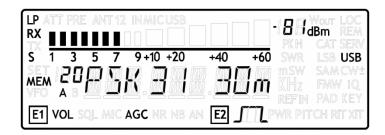
Use the E2 knob to set yes or no and make a short pressure on E2 to confirm.

### 6.2.3 Set memory to VFO

Use the  $\frac{A/B}{M}$  button to select the VFO-A/B. Use the  $\frac{M-V}{F2}$  key to set in the selected VFO the selected memory frequency and mode. When this function is used, the FDM-DUOr automatically switches to the VFO mode.

### 6.2.4 Change the memory display mode

Apply a short pressure on the  $\begin{bmatrix} S \\ F4 \end{bmatrix}$  key to show the memory label in the LCD main display. Press shortly again  $\begin{bmatrix} S \\ F4 \end{bmatrix}$  to return to display the memory frequency.



You can use the "FDM-DUOr Manager" feature in the ELAD FDM-SW2 software to customize the memory channels.

### 6.3 Knobs functions

Menu	Action	Main Knob	E1 Knob	E2 Knob
	Value modified	Change selected VFO frequency	Enter E1 selection parameter	Enter E2 selection parameter
VFO	Short Pressure	Enter STEP menu	Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Change tuning step value		
STEP	Short Pressure	Exit from STEP Menu		
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Select next/previous memory	Enter E1 selection parameter	Enter E2 selection parameter
MEM	Short Pressure		Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
E1 Selection: VOL - SQL - AGC - NR - NB	Value modified	Back to VFO or MEM menu	Modify E1 selected parameter value	Modify E2 selected
	Short Pressure	Back to VFO or MEM menu	Change E1 selected	Change E2 selected
	Long Press	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Back to VFO or MEM menu	Modify E1 selected parameter value	Modify E2 selected
E2 Selection: FILTER - PITCH	Short Pressure	Back to VFO or MEM menu	Change E1 selected parameter	Change E2 selected parameter
- RIT	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Change the destination memory		Change the destination memory
VFO > MEM	Short Press	,		Save VFO in the selected memory
	Long Pressure		(2)	(2)
	Value modified			Change Yes/No
Delete MEM	Short Pressure			Confirm Yes/No
	Long Pressure			
	Value modified			Change parameter selection
SETUP - PARAMETER CHOICE (MENU button)	Short Press			Enter parameter setup menu
	Long Pressure			

The following table describes the knob functions for some user interface menu :

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Menu	Action	Main Knob	E1 Knob	E2 Knob
SETUP - PARAMETER MODIFICATION	Value modified	Parameter coarse variation (1)	Parameter coarse variation (1)	Parameter fine variation
	Short Press			Save and exit
	Long Pressure			
	Value modified	Modify the current digit value	Change digit selection	Change digit selection
DIGIT by DIGIT Tuning	Short Pressure	Switch to standard tuning mode	Switch to standard tuning mode	Switch to standard tuning mode
	Long Pressure		(2)	(2)

- (1) Available only for certain menu.
- (2) Press simultaneously E1 and E2 to lock/unlock all the keys and knobs. When the keys/knobs lock function is activated the E1/E2 icons blink.

### 6.4 Keys functions

The following table describes the keys functions :

Mode	Pressure	A/B M	V►M F1	M►V F2	MODE F3	S F4	MENU F5
VFO	Short	Switch VFO	Enter VFO to MEM menu	-	Change selected VFO operating mode	Enable/disable Quickstep function	Enter settings menu
VIO	Long	Switch to MEM mode	Enter "QuickMem" menu	VFO A = B	-	-	Lock/Unlock Main Knob
MEM	Short	Switch VFO	-	Selected memory to VFO	Change selected memory operating mode	Change memory display frequency/label	Enter settings menu
	Long	Switch to VFO mode	Enter delete memory menu	-	-	-	Lock/Unlock Main Knob

### 6.5 Settings Menu List

The following table describes the FDM-DUOr settings menu list. To enter the settings menu mode, press the  $\frac{MENU}{F5}$  key. Use E2 to select the menu, then apply a short pressure on E2 to display the current menu setting, if you want to change the setting use the E2 knob and confirm the setting with a short pressure on E2. In some menu you can also use the main knob to change the setting more quickly. To turn back or exit the menu just press  $\frac{MENU}{F5}$ .

Menu	Title	Description	Available Settings	Default
		RECEPTION MENU	-	
1	RX ATT	Receiver input attenuation	0dB, 10dB, 20dB and 30dB	OdB
3	SNAP	Round to step	OFF or ON	ON
4	AGC TH	AGC Threshold	From 0 to 10	4
6	AUX VOL	Auxiliary output volume	From 0 to 100	50
7	QUICKSTEP	Step selected for the "QuickStep" mode	1Hz, 5Hz, 10Hz, 25Hz, 50Hz, 100Hz, 250Hz, 500Hz, 1kHz, 2kHz, 3kHz, 4.5kHz, 5kHz, 7.5kHz, 9kHz, 10kHz, 12.5kHz, 25kHz, 50kHz, 100kHz, 125kHz, 250kHz, 500kHz, 1MHz	1kHz
12	SET CW MODE	Enable / disable CW reverse mode	YES or NO	NO
		GENERAL SETTINGS MENU		
60	FR OFFSET	Enable / Disable the frequency offset for the visualization	OFF or ON	OFF
61	OFS VALUE	Frequency offset value for the	+/- 99.99999999 GHz.	OHz
		visualization	See <u>Frequency</u>	
			visualization offset menu	
70	CAT BAUD	CAT serial port baud rate	9600, 38400, 57600, 115200	38400
71	HOLD TIME	Hold time to detect a long pressure	From 500 to 2500ms	1000ms
72	REPT TIME	Repetition time when a key is pressed	From 100 to 1500ms	600ms
73	BACKLIGHT	Enables the backlight to change when the DUO changes modality between Stand-Alone and Remote	YES or NO	YES
00		SERVICE MENU	01 055	0.55
80	SERVICE	Enable Service mode	ON or OFF	OFF
81	DEFAULT	Restore default parameters	YES or NO	NO
82	UI UPDATE	If Service mode is active, enable the	YES or NO	NO
02		firmware update mode		
83	VIEW SN	Display the FDM-DUOr serial number		
84	VIEW FW	Display the FDM-DUOr firmware	Firmware	UI
85	CLK ADJ	versions Sets the internal clock correction value.	±50000 dots (not Hz)	-
60		It is used to have a fine frequency		-
		setting. In case of "Ref In" utilization,		
		this parameter is not relevant.		

### 6.5.1 Frequency visualization offset menu

The frequency visualization offset is helpful when using a transverter. The Frequency offset set in digit by digit mode with some improvements to set a signed 10 digit offset in a 9 digit display.

- E2: Select the digit to modify
- Main encoder: modify the selected digit value
- E1: change the visualization
  - o kHz: the 8 most significant digit of the frequency offset are displayed
  - $\circ$   $\;$  Hz: the 9 least significant digit of the frequency offset are displayed
- E1 or Main encoder short pressure: change the sign of the offset (+/-)
- E2 short pressure: save the setting

#### EXAMPLES:

Frequency offset value: +10,000,034,120 Hz

o kHz Display mode

LP ATT PRE ANT 12 IN MICUSB		-{88	Wolt LOC IBm REM CAT SERV
<u>S 1 3 5 7 9+10+20</u>	+40 +60		
	<u>84</u> 4	KHz	
E1 VOL SQL MIC AGC NR NB AN			CH RIT XIT

• Hz Display mode

LP ATT PRE ANT 12 INA RX DODDDDDDD	AICUSB			Wour LOC IBm REM CAT SERV
		+40   <b>     </b>	+60 SWR D SWR Hz	LSB USB SAM CW± FMW IQ
	NR NB AN	E2 _/		PAD KEY Ch rit xit

### 7 CAT Remote Control

### 7.1 General Specifications

The FDM-DUOr receiver uses a full-duplex, asynchronous, USB serial interface for communicating through the USB CAT port. Each data is constructed with 1 start bit, 8 data bits, 1 stop bit, no parity is used (8N1). The baud rate is selectable in the [70] CAT BAUD menu. Available values are 9600, 38400, 57600, 115200 bps.

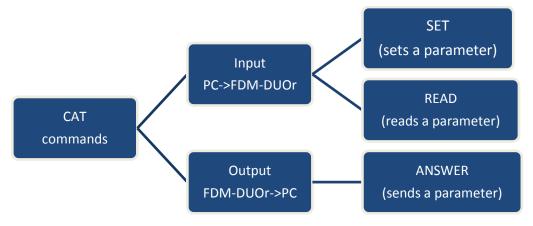
The FDM-DUOr implements proprietary commands and also a subset of the Kenwood TS-480 command set. Some of those TS-480 commands have no effect on the receiver, they only ensure the compatibility of the FDM-DUOr with Ham Radio Deluxe.

### 7.2 Commands Types

A CAT command is composed of an alphabetical part, various parameters and a terminator that signals the end of the command. For example to set the VFO-A to 14MHz the command is: "FA00014000000;" with :

- "FA": alphabetical command,
- "00014000000": parameter,
- ";": terminator.

CAT commands can be classified as shown below:



### EXAMPLE

- To set the VFO-A to 14MHz the PC sends the SET command type "FA00014000000;"
- To read the VFO-A frequency the PC sends the **READ command type** "FA;", the **ANSWER** response type is returned to the PC: "FA00014000000;".

### NOTE

Some particular rules about the CAT commands on the FDM-DUOr :

- not all the commands have the three types of command/response (SET, READ and ANSWER),
- normally, send the SET command type will not cause the FDM-DUOr to send the ANSWER response type but if a command does not have a READ command type and has the SET and ANSWER type, then send the SET command will cause the FDM-DUOr to send the ANSWER response type.

### 7.3 Cat Commands

### 7.3.1 Active commands list

COMMAND	FUNCTION	SET	READ	ANS.
AT/RA	RF ATTENUATOR	YES	YES	YES
DT	DUO TYPE	-	YES	YES
FA	VFO-A FREQUENCY	YES	YES	YES
FB	VFO-B FREQUENCY	YES	YES	YES
FI	INTERNAL FILTER MODULES	YES	YES	YES
FR/FT	VFO/MEM MODE	YES	YES	YES
GC	GAIN CONTROL	YES	YES	YES
GI	GENERAL INFORMATION	-	YES	YES
GS	GAIN SETTINGS	YES	YES	YES
IF	INFORMATION	-	YES	YES
LB	LCD BACKLIGHT	YES	YES	YES
LP	LOW PASS	YES	YES	YES
MA	VFO-A MODE	-	YES	YES
MB	VFO-B MODE	-	YES	YES
MC	MEMORY CHANNEL	YES	YES	YES
MD	MODE	YES	YES	YES
MR	MEMORY READ	-	YES	YES
MU	MUTE RX	YES	YES	YES
MW	MEMORY WRITE	YES	-	-
NB	NOISE BLANKER STATUS	-	YES	YES
NC	NOISE REDUCTION	YES	YES	YES
NK	NOISE BLANKER	YES	YES	YES
NO	AUTO NOTCH	YES	YES	YES
NR	NOISE REDUCTION STATUS	-	YES	YES
OS	FVO STATE	YES	YES	YES
OV	FVO VALUE	YES	YES	YES
OW	FVO VALUE	YES	YES	YES
PI	РІТСН	YES	YES	YES
RC	RIT CLEAR	YES	-	-
RD	RIT DOWN	YES	YES	YES
RF	RECEPTION FILTERS	YES	YES	YES
RI	READS RSSI	-	YES	YES
RT	RIT STATUS	YES	YES	YES
RU	RIT UP	YES	YES	YES
RV	RIT VALUE	YES	YES	YES
SE	SERVICE	YES	YES	YES
SM	S METER	-	YES	YES
SN	SERIAL NUMBER	-	YES	YES
SQ	SQUELCH	YES	YES	YES
VA	AUX VOLUME	YES	YES	YES
VM	MAIN VOLUME	YES	YES	YES
VS	FIRMWARE VERSION	-	YES	YES

FVO : Frequency Visualization Offset (for transverter use)

**RIT : Receiver Incremental Tuning** 

**RSSI : Received Signal Strength Indicator** 

### 7.3.2 Active commands tables

AT	Rea	ds or	sets th	ne inp	out at	tenu	ator s	status	5		Parameters: P1 '0': 0dB
Set	1	2	3	4	5	6	7	8	9	10	'1': 10dB
	A	т	P1	;							'2': 20dB
Read	1	2	3	4	5	6	7	8	9	10	'3': 30dB
	A	т	;								3.300B
Answer	1	2	3	4	5	6	7	8	9	10	1
	Α	Т	P1	;							]

DT	Rea	ds th	e FDM	-DUO	type	•					Parameters: P1 Always 002
Set											
Read	1	2	3	4	5	6	7	8	9	10	
	D	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	D	Т	P1	P1	P1	;					

FA	Rea	ds or	sets tl	ne VF	O A fi	requ	ency				Parameters: P1 Frequency in Hz (11 digit)
Set	1	2	3	4							
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	7							
Read	1	2	3	4	5	6	7	8	9	10	
	F	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							

FB	Rea	ds or	sets tl	າe VF	O B fi	reque	ency				Parameters: P1 Frequency in Hz (11 digit)
Set	1	2	3	4	5	6	7	8	9	10	Trequency in the (II digit)
	F	в	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	7							
Read	1	2	3	4	5	6	7	8	9	10	
	F	В	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	В	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							

FI	Rea	ds or	sets th	ne int	ernal	filte	r moo	lules	settii	ngs	Parameters: P1 module index, from '0' to '9'
Set	1	2	3	4	5	6	7	8	9	10	P2 module state;
	F	I	P1	P1	P2	Р3	P3	Р3	Р3	P3	'0' not used
	11	12	13	14	15	16	17	18	19	20	'1' used
	Р3	P3	Р3	P3	Р3	Р3	P4	P4	P4	P4	1 useu
	21	22	23	24	25	26	27	28			P3 module low frequency
	P4	P4	P4	P4	P4	P4	P4	;			PS module low frequency
Read	1	2	3	4	5	6	7	8	9	10	D4 modulo high frequency
	F	I	P1	P1	;						P4 module high frequency
Answer	1	2	3	4	5	6	7	8	9	10	
	F	I	P1	P1	P2	Р3	<b>P3</b>	<b>P3</b>	<b>P3</b>	P3	
	11	12	13	14	15	16	17	18	19	20	
	P3	Р3	P3	<b>P3</b>	P3	P3	P4	P4	P4	P4	
	21	22	23	24	25	26	27	28			
	P4	P4	P4	P4	P4	P4	P4	;			

FR	Rea	ds or	sets tł	າe VF	O or I	M.CH	l mod	е			Parameters: P1 0: VFO-A
Set	1	2	3	4	1: VFO-B						
	F	R	P1	;	2: M.CH						
Read	1	2	3	4	2. W.Ch						
	F	R	;								
Answer	1	2	3	4	5	10					
	F	R	P1	;				]			

FT	Rea	ds or	sets tl	າe VF	O or I	M.CH	l mod	e			Parameters: P1 0: VFO-A
Set	1	2	3	4	5	6	7	8	9	10	1: VFO-B
	F	R	P1	- 7							2: M.CH
Read	1	2	3	4	5	6	7	8	9	10	2. W.CT
	F	R	;								]
Answer	1	2	3	4	5	6	7	8	9	10	]
	F	R	P1	;							

GC	Rea	ds or	sets th	ne act	tive g	ain c	ontro				Parameters: P1
Set	1	2	3	4	5	6	7	8	9	10	0: auto (AGC)
	G	С	P1	;							1: manual
Read	1	2	3	4	5	6	7	8	9	10	
	G	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	G	С	P1	;							

GI	Rea	ds th	e recei	ver st	tate						Parameters: P1 : RIT state
Set											0:off 1:on
Read	1	2	3	4	5	6	7	8	9	10	P2 : always 0 P3 : selected memory index (000-
	G	I	;								199)
Answer	1	2	3	4	5	6	7	8	9	10	P4 : always 0
	G	I	P1	P2	P3	P3	<b>P3</b>	P4	P5	P6	'
	11	12	13	14	15	16	17	18	19	20	P5 : operating mode (see MD)
	P7	P8	P8	P8	P8	;					P6 : receiver mode (see FR/FT) P7 : always 0
											P8 : always 0000

GS	Rea	ds or	sets tl	ne co	ntrol	gain	settir	ngs			Parameters: P1
Set	1	2	3	4	5	6	7	8	9	10	0: auto (AGC)
	G	S	P1	P2	P2	P2	;				1: manual
Read	1	2	3	4	5	6	7	8	9	10	
	G	S	P1	;							P2 for P1='0'
Answer	1	2	3	4	5	6	7	8	9	10	0 : slow
	G	S	P1	P2	P2	P2	;				1 : medium 2 : fast
											P2 for P1='1' 0 : OFF 1 a 10 : active

IF	Retr	ieves	the r	eceive	er stat	us					Parameters: P1: Frequency 11 digit
Set											P2: 5 spaces P3: RIT value in tens of hertz
Read	1	2	3	4	5	6	7	8	9	10	P4: RIT state 0: OFF
Answer	<b>I</b>	<b>F</b> 2	; 3	4	5	6	7	8	9	10	1: ON P5: Always 0
Answei	<b>I</b>	<b>F</b> 12	<b>P1</b> 13	<b>P1</b> 14	<b>P1</b> 15	<b>P1</b> 16	<b>P1</b> 17	<b>P1</b> 18	<b>P1</b> 19	<b>P1</b> 20	P6/P7: Memory ch. Number 0-199
	<b>P1</b> 21	<b>P1</b> 22	<b>P1</b> 23	<b>P2</b> 24	<b>P2</b> 25	<b>P2</b> 26	<b>P2</b> 27	<b>P2</b> 28	<b>P3</b> 29	<b>P3</b> <i>30</i>	P8: Always 0 P9: Operating Mode (See MD)
	Р3	P3	P3	P4	P5	P6	P7	P7	P8	P9	P10: See FR/FT P11: Always 0
	31 <b>P10</b>	32 <b>P11</b>	33 <b>P12</b>	34 <b>P13</b>	35 <b>P14</b>	36 <b>P14</b>	37 <b>P15</b>	38 ;	39	40	P12: Always 0 P13: Always 0 P14: Always 0 P14: Always 0
											P15: Space

LB	Sets	s/Rea	ds the	LCD	backli	ight p	baran	neter	5		Parameters: P1 mode
Set	1	2	3	4	5	6	7	8	9	10	0 : temporary set
	L	В	P1	P3	P3	Р3	P4	P4	P4	P5	1 : Rx Stand Alone
	11	12	13	14	15	16	17	18	19	20	2 : Rx Remote (PC Controlled)
	P5	P5	;								
Read	1	2	3	4	5	6	7	8	9	10	P2 mode selection
	L	в	P2	;							1 : Rx Stand Alone
Answer	1	2	3	4	5	6	7	8	9	10	2 : Rx Remote (PC Controlled)
	L	В	P2	P3	P3	Р3	P4	P4	P4	P5	
	11	12	13	14	15	16	17	18	19	20	P3 : RED component (0 to 100)
	P5	P5	;								P4 : GREEN component (0 to 100)
											P5 : BLUE component (0 to 100)

LP	Rea	ds th	e Low-	Pass	Parameters: P1 0: not active						
											1: active
Read	1	2	3	Δ	5	6	7	8	9	10	
Redu	L	P	;	7	5	0	,	0		10	
Answer	1	2	3	4	5	6	7	8	9	10	
	L	P	P1	;							

MA	Rea	ds the	e VFO	А оре	Parameters: P1: 1: LSB						
Set											2: USB
											3: CW
Read	1	2	3	4	5	6	7	8	9	10	4: FM
	М	D	;								5: AM
Answer	1	2	3	4	5	6	7	8	9	10	7: CWR
	Μ	D	P1	;							7. CVVN

MB	Rea	ds the	e VFO	В оре	Parameters: P1: 1: LSB						
Set											2: USB 3: CW
Read	1 <b>M</b>	2 D	3	4	5	6	7	8	9	10	4: FM
Answer	1 M	2 D	; 3 <b>P1</b>	4	5	6	7	8	9	10	- 5: AM - 7: CWR

MC	Reca	alls or	reads	s the I	Parameters: P1: 0 or 1 P2: 00 to 99						
Set	1	2	3	4	5	6	7	8	9	10	12.001033
	М	С	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
	М	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Μ	С	P1	P2	P2	;					

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MD	Rec	alls or	reads	s the o	opera	ting	mode	9			Parameters: P1: 1: LSB
Set	1	2	3	4	5	6	7	8	9	10	2: USB
	М	D	P1	;							3: CW
Read	1	2	3	4	5	6	7	8	9	10	4: FM
	М	D	;								5: AM
Answer	1	2	3	4	5	6	7	8	9	10	7: CWR
	М	D	P1	;			7. CVVR				

MR	Read	ds the	Mem	nory c	hann	el dat	а				Parameters: P1: 0 P2/3: 000 to 199 Memory No.		
Set											P4: Frequency (11 digit)		
Read	1	2	3	4	5	6	7	8	9	10	P5: Mode (see MD command) P6: Always 0		
	М	R	P1	P2	Р3	Р3					,		
Answer	1	2	3	4	5	6	7	8	9	10	P7: Always 0 P8: Always 0		
	М	R	P1	P2	Р3	Р3	P4	P4	P4	P4			
	11	12	13	14	15	16	17	18	19	20	P9: Always 0 P10 to P13: Memory label, last 14		
	P4	P4	P4	P4	P4	P4	P4	P5	P6	P7			
	21	22	23	24	25	26	27	28	29	30	chars		
	P8	P8	Р9	Р9	P10	P10	P10	P10	P10	P10	P14: 00		
	31	32	33	34	35	36	37	38	39	40	P15: Memory status		
	P10	P10	P10	P10	P10	P10	P10	P10	P11	P12	B: used		
	41	42	43	44	45	46	47	48	49	50	F: free		
	P15	P16	P16	P16	P16	P16	P16	P16	P16	;	P16: Memory label, first 8 chars		

MU	Sets	or re	ads th	ie mu	te fu	nctio	n stat	us			Parameters: P1: 000 : OFF
Set	1	2	3	4	5	6	7	8	9	10	001 : ON
	М		P1	P1	P1	;					001.01
Read	1	2	3	4	5	6	7	8	9	10	P2:
	М	U	;								000 : OFF
Answer	1	2	3	4	5	6	7	8	9	10	
	M	U	P2	P2	P2	;					001 : ON (turned on from cat) 002 : ON (turned on from jack)

MW	Stor	e the	data	to the	Merr	ory c	hanne	el			Parameters: P1:0						
Set	1	2	3	4	5	6	7	8	9	10	P2/3: 000 to 199 Memory No. P4: Frequency (11 digit)						
	М	W	P1	P2	P3	P3	P4	P4	P4	P4	P5: Mode (see MD command)						
	11	12	13	14	15	16	17	18	19	20	P6: Always 0						
	P4	P4	P4	P4	P4	P4	P4	P5	P6	P7	P7: Always 0						
	21	22	23	24	25	26	27	28	29	30	P8: Always 0						
	<b>P8</b> <i>31</i>	P8	Р9	P6	P10	P10	P10	P10	P10	P10	P9: Always 0						
		32	33	34	35	36	37	38	39	40	,						
	P10	P10	P10	P10	P10	P10	P10	P10	P11	P12	P10 to P13: Memory label, last						
	41	42	43	44	45	46	47	48	49	50	14 chars						
	P15	P16	P16	P16	P16	P16	P16	P16	P16	;	P14:00						
Read											P15: Memory status						
											B: used						
Answer											F: free						
		1									P16: Memory label, first 8 chars						

NB	Read	ds the	noise	e blan	ker fu	inctio	n stat	us			Parameters: P1 0: Noise Blanker OFF
Set											1: Noise Blanker ON
Read	1	2	3	4	5	6	7	8	9	10	
	N	В	;								1
Answer	1	2	3	4	5	6	7	8	9	10	]
	N	В	P1	;			]				

NC	Rea	ds or	sets th	ne no	ise re	ducti	ion va	alue			Parameters: P1 always 0
Set	1	2	3	4	5	6	7	8	9	10	
	N C P1 P2 P2 ;										P2 noise reduction value
Read	1	2	3	4	5	6	7	8	9	10	0: OFF
	N	С	P1	;							01 ~ 10 (active)
Answer	1	2	3	4	5	6	7	8	9	10	]
	N	С	P1	P2	P2	P2	;				

NK	Rea	ds or	sets th	ne no	ise bl	anke	r valu	Ie			Parameters: P1 always 0			
Set	1	2	3	4	5	6	7	8	9	10				
	N	K	P1	P2	P2	P2	;				P2 noise blanker value			
Read	1	2	3	4	5	6	7	8	9	10	0: OFF			
	N	K	P1	;							01 ~ 10 (active)			
Answer	1	2	3	4	5	6	7	8	9	10				
	N K P1 P2 P2 ;													

NO	Rea	ds or	sets th	ne aut	to no	tch v	alue				Parameters:				
Set	1	2	3	4	5	10	P1 always 0								
	N	0	P1	P2	P2	P2	;								
Read	1	2	3	4	5	6	7	8	9	10	P2 auto notch value				
	N	0	P1	;							0: OFF				
Answer	1	2	3	4	5	6	7	8	9	10	01 ~ 02 (active)				
	N	0	P1	P2	P2	P2	7								

NR	Read	ds the	noise	e redu	iction	funct	ion st	atus			Parameters: P1 0: Noise Reduction OFF
Set											1: Noise Reduction ON
Read	1	2	3	4	5	6	7	8	9	10	
	N	R	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	N	R	P1	;							

OS	Sets	s/Rea	ds the	Frequ	iency	view	offset	t statı	IS		Parameters: P1
Set	1	2	3	4	5	6	7	8	9	10	0: not active
	0	S	P1	;							1: active
Read	1	2	3	4	5	6	7	8	9	10	
	0	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
1	0	S	P1	;							

ov	Sets	s/Rea	ds the	Frequ	iency	view	offset	t valu	е		Parameters:
											P1
Set	1	2	3	4	5	6	7	8	9	10	Always 'O'
	0	v	P1	P2	P3	P3	P3	P3	P3	P3	P2
	11	12	13	14	15	16	17	18	19	20	Offset sign'+' /'-'
	Р3	Р3	P3	P3	P3	P3	P3	P3	P3	;	P3
Read	1	2	3	4	5	6	7	8	9	10	Absolute value in Hz
	0	v	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	0	v	P1	P2	P3	P3	P3	P3	P3	Р3	
	11	12	13	14	15	16	17	18	19	20	
	P3	P3	P3	P3	P3	Р3	P3	Р3	P3	;	

ow	Sets	s/Rea	ds the	Frequ	ency	view	offset	t valu	e		Parameters: P1
Set	1	2	3	4	5	6	7	8	9	10	Offset sign'+' /'-'
	0	W	P1	P2	P2	P2	P2	P2	P2	P2	P2
	11	12	13	14	15	16	17	18	19	20	Absolute value in Hz
	P2	P2	P2	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
	0	W	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	0	W	P1	P2	P2	P2	P2	P2	P2	P2	
	11	12	13	14	15	16	17	18	19	20	1
	P2	P2	P2	P2	P2	;					

PI	Rea	ds or	sets th	ne pit	ch va	lue					Parameters: P1 pitch value in Hz
Set	1	2	3	4	5	6	7	8	9	10	0000 ~ 1000 in 10Hz step
	P	I	P1	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10	
	P	I	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	I	P1	P1	P1	P1	;				

RA	Rea	ds or	sets th	ne att	enua	tor fu	unctio	on sta	atus		Parameters: P1 00: ATT OFF
Set	1	2	3	4	5	6	7	8	9	10	01: ATT ON (20dB)
	R	Α	P1	P1	;						P2: always 00
Read	1	2	3	4	5	6	7	8	9	10	- F 2. always 00
	R	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	A	P1	P1	P2	P2	;				1

RC	Clea	ars th	e RIT v	alue							Parameters: None
Set	1	2	3	4	5	6	7	8	9	10	
	R	С	;								
Read											
Answer											

RD	Sets	RIT 1	to a ne	gativ	e valı	Je					Parameters: P1 negative value of RIT to set (from 0
Set	1	2	3	4	5	6	7	8	9	10	to 50000Hz, max value subject to
	R	D	P1	P1	P1	P1	P1	;			change)
Read	1	2	3	4	5	6	7	8	9	10	change
	R	D	;								P2: always 1
Answer	1	2	3	4	5	6	7	8	9	10	F2. diways 1
	R	D	P2	;							

RF	Rea	ds oi	r sets t	he re	cepti	on fil	ters v	alues	5		Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1 (like MD command)
	R	F	P1	P2	P2	;					1: LSB
Read	1	2	3	4	5	6	7	8	9	10	2: USB
	R	F	P1	;							3/7: CW/CWR
Answer	1	2	3	4	5	6	7	8	9	10	4: FM
	R	F	P1	P2	P2	;					5: AM
											P2: see parameter details below

P2		MOI	DE	
	LSB/USB	CW/CWR	AM	FM
00	1600Hz	-	2500Hz	Voice Narrow
01	1700Hz	-	3000Hz	Voice Wide
02	1800Hz	-	3500Hz	Data
03	1900Hz	-	4000Hz	-
04	2000Hz	-	4500Hz	-
05	2100Hz	-	5000Hz	-
06	2200Hz	-	5500Hz	-
07	2300Hz	100Hz & 4	6000Hz	-
08	2400Hz	100Hz & 3	-	-
09	2500Hz	100Hz & 2	-	-
10	2600Hz	100Hz & 1	-	-
11	2700Hz	100Hz	-	-
12	2800Hz	300Hz	-	-
13	2900Hz	500Hz	-	-
14	3000Hz	1000Hz	-	-
15	3100Hz	1500Hz	-	-
16	4000Hz	2600Hz	-	-
17	5000Hz	-	-	-
18	6000Hz	-	-	-
19	DATA 300Hz	-	-	-
20	DATA 600Hz	-	-	-
21	DATA 1000Hz	-	-	-

RI	Rea	ds RS	SI								Parameters:
											P1:
				1		1	1	1		1	'-' : negative value
Set											'+' : positive value
											'!' : unreliable value
Read	1	2	3	4	5	6	7	8	9	10	
	R	1	;								P2 :RSSI absolute value
Answer	1	2	3	4	5	6	7	8	9	10	
	R	1	P1	P2	P2	P2	P2	;			

RT	Rea	ds or	sets th	ne RIT	ր func	tion	statu	s			Parameters: P1 0: RIT function OFF
Set	1	2	3	4	5	6	7	8	9	10	1: RIT function ON
	R	т	P1	;							1. KH Hancdon ON
Read	1	2	3	4	5	6	7	8	9	10	
	R	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	Т	P1	;							

RU	Sets	s RIT t	to a po	sitive	e valu	е					Parameters: P1 positive value of RIT to set (from 0
Set	1	2	3	4	5	6	7	8	9	10	to 50000Hz, max value subject to
	R	U	P1	P1	P1	P1	P1	;			change)
Read	1	2	3	4	5	6	7	8	9	10	change)
	R	U	;								P2: always 1
Answer	1	2	3	4	5	6	7	8	9	10	ΓΖ. αίνναγό τ
	R	U	P2	;							

RV	Rea	ds or	sets tł	ne RIT	r valu	e					Parameters: P1 '+': positive o null value
Set	1	2	3	4	5	6	7	8	9	10	'-': negative value
	R	v	P1	P2	P2	P2	P2	P2	P2	;	
Read	1	2	3	4	5	6	7	8	9	10	P2:
	R	v	;								absolute value of RIT to set (from 0
Answer	1	2	3	4	5	6	7	8	9	10	to 50000Hz, max value subject to
	R	v	P1	P2	P2	P2	P2	P2	P2	;	change)

SE	Rea	ds or	sets tł	ne ser	rvice n	node	status	5			Parameters: P1 always 1. Force the service
Set	1	2	3	4	5	6	7	8	9	10	mode
	S	E	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	P2 always 0. If in service mode
	S	E	;								this CAT protocol is not available
Answer	1	2	3	4	5	6	7	8	9	10	
	S	E	P2	;							1

SM	Read	ds the	e S-me	eter st	atus						Parameters: P1: Always 0 P2: Meter Read
Set	1	2	3	4	5	6	7	8	9	10	0000: S0
											0002: S1
Read	1	2	3	4	5	6	7	8	9	10	0003: \$2
	S	М	P1	;							0004: S3
Answer	1	2	3	4	5	6	7	8	9	10	0005: S4
	S	M	<b>P1</b>	P2	P2	P2	P2	;			0006: S5
											0008: S6
											0009: S7
											0010: S8
											0011: S9
											0012: \$9+10
											0014: \$9+20
											0016: \$9+30
											0018: \$9+40
											0020: \$9+50
											0022: \$9+60

SN	Read	ds the	recei	ver se		Parameters: P1 Serial number					
Set	1	2	3	4	5	6	7	8	9	10	Scharnamser
Read	1	2	3	4	5	6	7	8	9	10	
	S	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	N	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	]
	P1	P1	P1	P2	P2	P2	;				

SQ	Rea	ds or	sets th	ne squ	uelch	valu	e				Parameters: P1 always 0
Set	1	2	3	4	P2 squelch value						
	S	Q	P1	P2	0: OFF						
Read	1	2	3	4	5	6	7	8	9	10	1-10: ON
	S	Q	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	P2	P2						

VA	Rea	ds or	sets th	ne au	xiliary	y volu	ume				Parameters: P1
Set	1	2	3	4	5	6	7	8	9	10	000 ~ 100
	v	A	P1	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10	
	v	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	A	P1	P1	P1	;					

VM	Rea	ds or	sets th	ne ma	ain vo	lume	•				Parameters: P1
Set	1	2	3	4	5	6	7	8	9	10	000 ~ 005
	v	М	P1	P1	P1	;					010 ~ 100 in 5 dots step
Read	1	2	3	4	5	6	7	8	9	10	
	v	М	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	М	P1	P1	P1	;					

VS	Rea	ds tl	he FD	M-DU	Or fir	mwa	are v	ersio	ns		Parameters: P1 firmware version to read I: User Interface		
Set											F: FPGA U: USB audio		
Read	1 <b>V</b>	2 <b>S</b>	3 <b>P1</b>	4	5	6	7	8	9	10	R: Rx Demodulator		
Answer	1 <b>V</b>	2 <b>S</b>	3 <b>P1</b>	4 P2	5 <b>P2</b>	6 <b>P2</b>	7 <b>P2</b>	8 <b>P2</b>	9	10	P2: firmware version in the format "xx.yy" with : - "xx" major number - "yy" minor number		

## 7.3.3 Compatibility commands

The following commands have no effect on the receiver, they only ensure the compatibility of the FDM-DUOr with Ham Radio Deluxe.

AC											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 00
											P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	A	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	A	С	P1	P1	P2	;					

AG											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
											P2: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	A	G	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	A	G	P1	P2	P2	P2;					

AI											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	A	I	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	A	I	P1	;							

AN											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 1
Read	1	2	3	4	5	6	7	8	9	10	
	A	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	A	N	P1	;							

BC											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	В	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	В	C	P1	;							

BY											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0 P2: Always 0
											P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	В	Y	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	В	Y	P1	P2	;						

CA											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	С	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	A	P1	;							

CN											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	С	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	A	P1	P1	;						

СТ											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	Parameters: P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	С	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	Т	P1	;							

DL											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0 P2: Always 00
											P2: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	D	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	D	L	P1	P2	P2	;					

EX											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: 000 - 060: Menu No.
											P2: Always 00
Read	1	2	3	4	5	6	7	8	9	10	P3: Always 0
	E	Х	P1	P1	P1	P2	P2	Р3	P4	;	P4: Always 0
Answer	1	2	3	4	5	6	7	8	9	10	P5: Always 0
	E	X	P1	P1	P1	P2	P2	Р3	P4	P5	
	11	12	13	14	15	16	17	18	19	20	
	P5	;									

FS											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	Parameters: P1 Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	F	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	S	P1	;							

FW											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1 Always 0000
Read	1	2	3	4	5	6	7	8	9	10	
	F	W	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	W	P1	P1	P1	P1	;				

GT											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1 Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	G	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	G	Т	P1	P1	P1	;					

ID											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: 020
Read	1	2	3	4	5	6	7	8	9	10	
	I	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	I	D	P1	P1	P1	;					

IS											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: "+"
											P2: Always 0000
Read	1	2	3	4	5	6	7	8	9	10	
	I	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	I	S	P1	P2	P2	P2	P2	;			

KS											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: 010
Read	1	2	3	4	5	6	7	8	9	10	
	K	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	K	S	P1	P1	P1	;					

MF											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	М	F	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Μ	F	P1	;							

MG											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	М	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	М	G	P1	P1	P1	;					

NL											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	N	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	N	L	P1	P1	P1	;					

PA											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0 P2: Always 0
											P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	Р	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	A	P1	P2	;						

РС											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 005
Read	1	2	3	4	5	6	7	8	9	10	
	P	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	С	P1	P1	P1	;					

PR											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	Р	R	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	R	P1	;							

PS											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 1
Read	1	2	3	4	5	6	7	8	9	10	
	Р	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Р	S	P1	;							

QR											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0 P2: Always 0
											P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	Q	R	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Q	R	P1	P2	;						

RA											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 00
											P2: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	R	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	A	P1	P1	P2	P2	;				

RG											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	R	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	G	P1	P1	P1	7					

RL											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	R	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	P1	;						

RM											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 1
											P2: Always 0001
Read	1	2	3	4	5	6	7	8	9	10	
	R	М	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	М	P1	P2	P2	P2	P2	;			

SD											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0000
Read	1	2	3	4	5	6	7	8	9	10	
	S	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	D	P1	P1	P1	P1	;				

SH											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	Parameters: P1: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	S	H	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	H	P1	P1	;						

SL											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	S	H	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	H	P1	P1	;						

SQ											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
											P2: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	P2	P2	P2	;				

TN											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 00
Read	1	2	3	4	5	6	7	8	9	10	
	т	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	N	P1	P1	;						

то											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	т	0	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	0	P1	;							

TS											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	т	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	S	P1	;							

VD											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0000
Read	1	2	3	4	5	6	7	8	9	10	
	v	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	v	D	P1	P1	P1	P1	;				

VG											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	v	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	v	G	P1	P1	P1	;					

VX											Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	v	х	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	v	х	P1	;							

## 8 Software & Driver Installation

## 8.1 Software installation

#### 8.1.1 First-time install in Windows 8 and Windows 7

Double-click the file "setup.exe" in the provided USB stick.

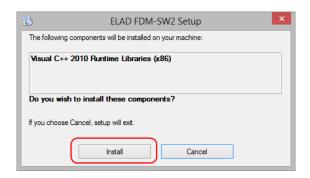
1 🕞 🕕 = 1	Application Tools	E	LAD_FDM_SW2_V1	_00Beta30			-
File Home Shar	re View Manage						$\vee$
🖻 🏵 🔻 🕇 📕 « .	PRG_8 > ELAD_PR11-0009_FDM_S1 > SW	_PC → BetaTest → ELAD_FD	M_SW2_V1_00Beta30		v C	Search ELAD_FDM_SW2_V1_0.	- <i>P</i>
☆ Favorites	Name	Date modified	Туре	Size			
E Desktop	DotNetFX40	1/23/2014 5:46 PM	File folder				
🗼 Downloads	vcredist_x86	1/23/2014 5:46 PM	File folder				
💝 Dropbax	WindowsInstaller3_1	1/23/2014 5:46 PM	File folder				
Recent places	BLAD_FDMSW2Setup	1/23/2014 5:44 PM	Windows Installer	30,902 KB			
	🔂 setup	1/23/2014 5:44 PM	Application	424 KB	)		
Cibraries							
Documents							
👌 Music							
Fictures							
😸 Videos							
🜏 Homegroup							
🖳 Computer							
Local Disk (C:)							
g progetti (\\192.168	2						
🗣 Network							
	423 KB						800

The windows installer first installs the prerequisites:

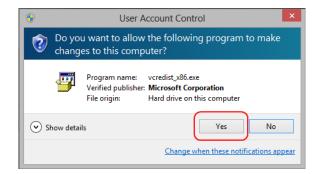
- Microsoft VC++ 2010 Runtime libraries
- Microsoft .NET Framework 4.0 (Only for Windows 7) and then the FDM-SW2 software.
- Click on "Accept" (Only for Windows 7)

ELAD FDM-SW1 Setup	<b>X</b>
For the following components:	
Microsoft .NET Framework 4 (x86 and x64)	
Please read the following license agreement. Press the page down key to see of the agreement.	the rest
	-
MICDOSOFT SOFTWARE	
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	
	)FT
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSO	)FT
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSO WINDOWS OPERATING SYSTEM	)FT
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSO WINDOWS OPERATING SYSTEM	)FT

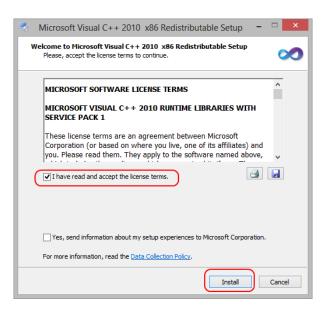
#### Click on "Install"



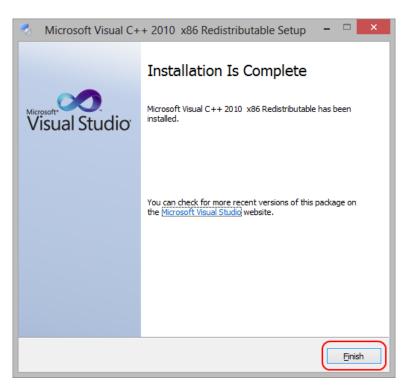
#### Click on "Yes"



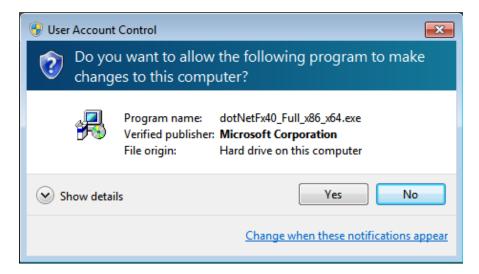
#### **Click on Install**



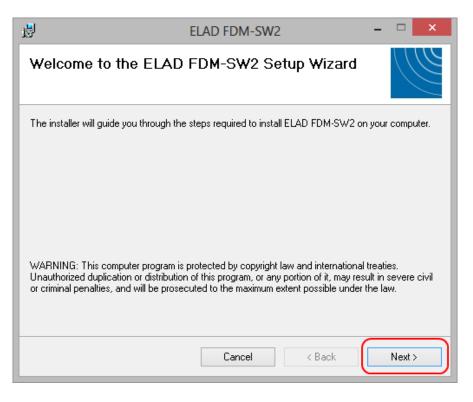
Microsoft Visual C++ 2010 x86 Redistributable installation is complete, click on "Finish"



Click on "Yes" to start the installation of the .Net Framework 4.0 (Only for Windows 7)



#### Click to "Next" to start the FDM-SW2 software installation



Chose the installation folder, then click on "Next"

17	ELAD FDM-SW2 -	×
Select I	nstallation Folder	
The installer	will install ELAD FDM-SW2 to the following folder.	
To install in t	his folder, click "Next". To install to a different folder, enter it below or click "B	rowse".
<u>F</u> older: C:\Progra	m Files\ELAD\ELAD FDM-SW2\ Brows	:e
	Disk Co	ost
Install ELA		
	Cancel < Back N	lext >

## Click on "Next"

1 <sup>1</sup> 1	ELAD FDM-SW2 - 🗆 🗙
Confirm Install	ation
The installer is ready to in	stall ELAD FDM-SW2 on your computer.
Click "Next" to start the ir	nstallation.
	Cancel < Back Next >

## Click on "Yes"

😗 User Account Control						
Û		u want to allow the following program from an when when the work of the work o				
	Program name: Publisher:	P:\_PRG_8\ELAD_PR11-00\ELAD_FDMSW2Setup.msi <b>Unknown</b>				
و 🕥	Show details	Yes No				
		Change when these notifications appear				

## 8.1.2 First-time install in Windows XP

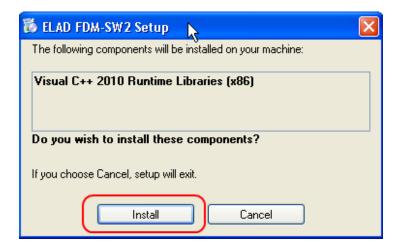
Double-click the file "setup.exe" in the provided USB stick.

Edit View Favorites Back • 🕥 - 🍂		lp Folders 🞹 -				
	-	M_S1\SW_PC\BetaTest\ELAD_FD	M CW2 V1 OOPata	20		✓ →
		ame 🔺		Туре	Date Modified	
File and Folder Tasks		DotNetFX40	5420	File Folder	1/23/2014 5:46 PM	
	_	vcredist x86		File Folder	1/23/2014 5:46 PM	
Rename this file		WindowsInstaller3_1		File Folder	1/23/2014 5:46 PM	
🙀 Move this file		ELAD FDMSW2Setup.msi	30.902 KB	Windows Installer P		
Copy this file		setup.exe	424 KB	Application	1/23/2014 5:44 PM	
🚳 Publish this file to the W	Veb					
E-mail this file						
X Delete this file						
••						
Other Places	۲					
	~					
🛅 BetaTest						
My Documents						
🛅 Shared Documents						
🙀 My Computer						
My Network Places						
9						
Details	۲					

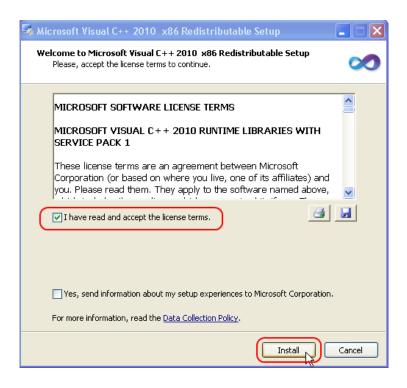
Click on "Accept"

🐞 ELAD FDM-SW2 Setup	×
For the following components:	
Microsoft .NET Framework 4 (x86 and x64)	
Please read the following license agreement. Press the page down key to see the rest of the agreement.	to
	~
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	_
MICROSOFT .NET FRAMEWORK 4 FOR MICROSOFT WINDOWS OPFRATING	<b>~</b>
View EULA for printing	
Do you accept the terms of the pending License Agreement	?
If you choose Don't Accept, install will close. To install you must accept this agreement. Accept Don't Accept	

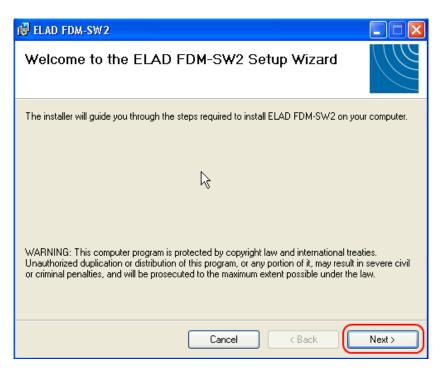
#### Click on "Install"



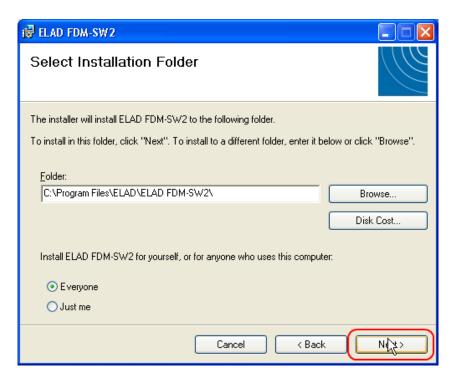
#### Click on "Install"



Click on Next to install the FDM-SW2 software



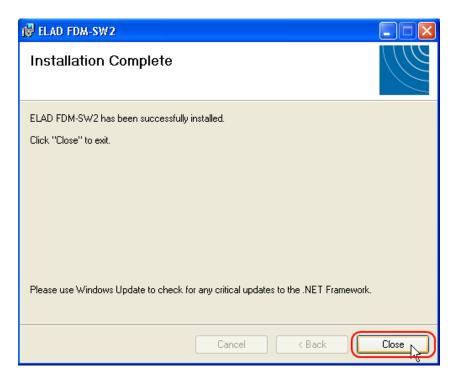
Select the installation folder, then click on "Next"



#### Click on "Next"

🛃 ELAD FDM-SW2	
Confirm Installation	
The installer is ready to install ELAD FDM-SW2 on your computer.	
Click "Next" to start the installation.	
Cancel < Back	Next

The FDM-SW2 Software installation is completed



## 8.1.3 Update an existing software version

Double click on file ELAD\_FDM\_SW2\_V\_x.xx.msi included in the update and follow the instructions.

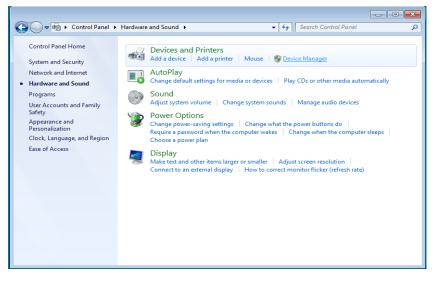
## 8.2 USB driver

#### 8.2.1 USB driver installation in Windows 8 and Windows 7

#### 8.2.1.1 First driver installation

To install ELAD FDM-DUOr driver, connect the FDM-DUOr USB RX port to a USB 2.0 socket on PC end power on the device. When Windows detects the new hardware, follow the steps listed below to install driver correctly:

Open **Control Panel** from **Start** menu, select "System" and "Device Manager". Expand "Other Devices" node: FDM-DUO.



Select FDM-DUO, right click on it and execute "Update driver software".

🚔 Device Manager – 🗖	×
File Action View Help	
a 🚔 UT93-LAPTOP	^
b 4 Audio inputs and outputs	
b Batteries	
b Bluetooth	
b 1 Computer	
> 🖵 Digital Media Devices	
Disk drives	
> 🎭 Display adapters	
DVD/CD-ROM drives	
Iman Interface Devices	
IDE ATA/ATAPI controllers                \screwing IDE ata/ATAPI controllers                 \screwing IDE ata/ATAPI controllers	
S and a sector of the secto	
Reyboards Mice and other pointing devices	
Monitors	
Network adapters	
Other devices	
DIA FDMDU0 USR FW v4 7	
▶ 🚔 Print queues Update Driver Software	
A printers     Disable	
Decessors Uninstall	
b The Sensors	
D Software device Scan for hardware changes	
Sound, video ar	
Storage control	
N 1■ System devices	Ť
Launches the Update Driver Software Wizard for the selected device.	

When Windows starts the installation procedure, select the option "Browse my computer for driver software" (the second option).

4		Device Manager	-	
File	Action V	fiew Help		
Image: 1	🔶   📻   📴	)   🖸 📷   🔍   😭 🔫 🚜		
		) 📓 Update Driver Software - FDMDU0 USB FW v4.7	×	^
	▷ 1 및 Cc ▷ 1 및 Di ▷ 1 → Di ▷ 1 → Di	How do you want to search for driver software?		
	> 🔐 D\ > 🤐 Hi > 🦛 Hi > 🐨 ID > 🐨 Im	Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.		
	<ul> <li>▷</li> <li>▷</li> <li>○</li> <li>○</li></ul>	Browse my computer for driver software Locate and install driver software manually.		
	<ul> <li>→ Pr</li> <li>→ Pr</li> <li>→ Pr</li> <li>&gt; ■ Pr</li> <li>&gt; ■ Se</li> <li>→ ■ Sc</li> <li>&gt; ■ Sc</li> </ul>		-	
	⊳ ∎ Sc ⊳ C St		Cancel	~

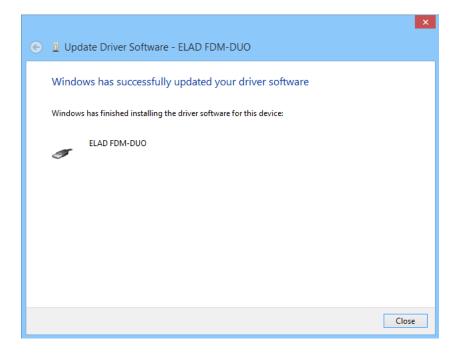
In the next dialog-box, insert the driver folder location using "Browse" button and check the option "Include subfolders". In this way manual driver search is enabled

For 32 bit system select the folder: C:\Program Files\ELAD\ELAD FDM-SW2\ELAD\_FDM\_Driver For 64 bit system select the folder: C:\Program Files (x86)\ ELAD\ELAD FDM-SW2\ELAD\_FDM\_Driver Then click "Next".



Click Install.

Let the hardware installation automatically completes and, at the procedure ending, click on "Close"; then disconnect and connect FDM-DUOr device on the same USB socket.



Now ELAD FDM-DUOr USB driver is installed on your PC.

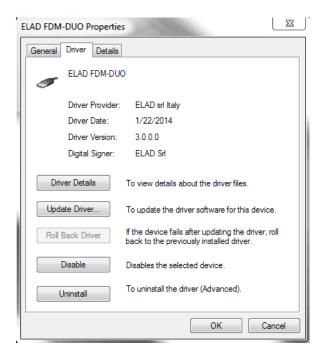
#### 8.2.1.2 Driver installation verify

To verify FDM-DUO driver current version, connect the device to USB socket (where the device driver is already installed) and power on the device. Then open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager".

Expanding "ELAD Samplers" node, right click on "ELAD FDM-DUO" and select "Properties".

A Device Manager				
<u>File Action View Help</u>				
Image: Second				

When dialog box opens, select "Driver" label: you must read provider name, current driver release date and current driver version. The figure shows an old FDM- DUO driver version.



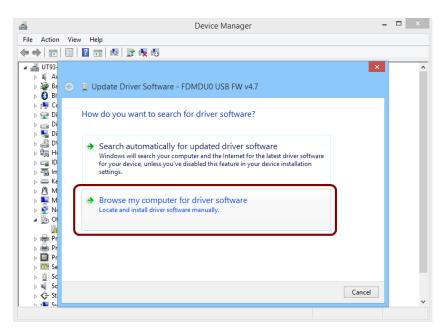
#### 8.2.1.3 Manual driver update

To update FDM-DUO driver, connect the device to USB RX socket (where the device driver is already installed) and power on the device. Then open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager".

- 🗆 🗙 Device Manager 4 File Action View Help (= +) 📰 🔲 🛛 📰 💐 📴 😽 a 📇 UT93-LAPTOP Audio inputs and outputs Batteries Bluetooth 👰 Computer Digital Media Devices Disk drives
 Display adapters A DVD/CD-ROM drive a 🍯 ELAD Samplers ELAD FDM-DL Update Driver Software.. IDE ATA/ATAP
 Imaging device Disabl Uninstall Keyboards Mice and other
 Monitors Scan for hardware changes Properties Network adapt Print queues Printers Processors Sensors Software devices Sound, video and game controllers Storage controllers System devices Launches the Update Driver Software Wizard for the selected device.

Under "ELAD samplers" list select "ELAD FDM-DUO", right click on it and execute "Update driver".

When Windows starts the installation procedure, select the last option "Browse my computer for driver software".



In the next dialog-box, disable the option "Include subfolders" and choose "Let me pick from a list of device drivers on my computer". Don't click "Next".

€	
Browse for driver software on your computer	
Search for driver software in this location:	
C:\Program Files (x86)\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver V Browse	
✓ Include subfolders	
Let me pick from a list of device drivers on my computer	
This list will show installed driver software compatible with the device, and all driver software in the same category as the device.	
Next Cancel	

Verify that "Show compatible hardware" option is checked and ELAD FDM-DUO is selected: then click on "Have a Disk". In this way the manual driver update is enabled. Don't click "Next".

File Action	× • ×
Select the device driver way wast to install for this hardware Select the device driver way wast to install from Disk Select the mar Select	
▶       Pr       Next       Cancel         ▶       Image: Set and the set of the s	]
N 🛍 Sustem devices	~

Click on "Browse" and search for FDM-DUOr driver update folder location; then open winusb fdmsampler.inf file. Click "OK" and then "Next".

Let the hardware installation automatically completes and, at the procedure ending, click on "Close"; then disconnect and connect FDM-DUOr device on the same USB socket.

4	Device Manager	• • ×
File Ac	tion View Help	
		<u> </u>
	A 📀 📱 Update Driver Software - ELAD FDM-DUO	Â
	BI C Windows has successfully updated your driver software	
	D Windows has finished installing the driver software for this device:	
	D EL ELAD FDM-DUO	
	IC	
	in Ki M	
	Pi Sc Sc	
	Sr Sr Storage commoners	
	Svotem devices	~

To verify that a correct update is done, enter "Device Manager" in Control Panel; under "ELAD samplers" label select ELAD FDM-DUO driver (see sub-chapter <u>Driver installation verify in Windows 8 and Windows 7</u>): right click on it and choose "Properties": select "Driver" label to visualize the last driver version (an example is depicted in figure below).

1	ELAD FDM-DUO Properties
	General Driver Details
	ELAD FDM-DUO
	Driver Provider: ELAD srl Italy
1	Driver Date: 1/22/2014
	Driver Version: 3.0.0.0
	Digital Signer: ELAD Srl
	Driver Details To view details about the driver files.
1	Update Driver To update the driver software for this device.
	Roll Back Driver If the device fails after updating the driver, roll back to the previously installed driver.
	Disable Disables the selected device.
	Uninstall To uninstall the driver (Advanced).
	OK Cancel

#### 8.2.2 USB driver installation in Windows XP

#### 8.2.2.1 First driver installation

To install ELAD FDM-DUOr driver, connect the FDM-DUOr USB RX port to a USB 2.0 socket on PC and power on the device. Windows XP detects the new hardware and starts the hardware installation wizard. Then, next steps to install FDM-DUOr driver are listed below:

At the first dialog box, select the last option "No, not this time" and "Next".

Found New Hardware Wizard		
	Welcome to the Found New Hardware Wizard	
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>	
	Can Windows connect to Windows Update to search for software?	
	◯ Yes, this time only	
	<ul> <li>Yes, now and every time I connect a device</li> <li>No, not this time</li> </ul>	
	Click Next to continue.	
	< Back Next > Cancel	

Select "Install from a list or specific location (Advanced)" and "Next".

In the next dialog-box, check the options "Search for the best driver in these location" and "Include this location in the search" to enable manual driver search. Clicking on "Browse", select the path where the driver folder is located: Local Drive (C:) \Programs\ELAD\ELAD FDM-SW2\ELAD\_FDM\_Driver. Then click "Next".

ound New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:  The search: The searc
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Let the hardware installation automatically completes and click on "Finish"; then disconnect and connect FDM- DUOr device on the same USB socket.

Found New Hardware Wiza	ard
Found New Hardware Wize	Completing the Found New Hardware Wizard The wizard has finished installing the software for: ELAD FDM-DUO
	Click Finish to close the wizard.
	< Back Finish Cancel

Now ELAD FDM- DUOr driver is installed on your PC.

#### 8.2.2.2 Driver installation verify

To verify FDM-DUOr driver current version, connect the device to USB socket (where the device driver is already installed) and open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager" under "Hardware" label.

Expanding "ELAD Samplers" node, right click on "ELAD FDM-DUO" and select "Properties".

🖴 Device Manager	
File Action View Help	
⊡	~
🕀 🍓 Batteries	
🕀 🧕 Computer	
🕀 🥪 Disk drives	
🗈 😼 Display adapters	
E S DVD/CD-ROM drives	
ELAD Samplers	
ELAD FDM-DUO	
Hoppy ask conc	
E S Floppy disk drive	
E G IDE ATA/ATAPI Scan for hardware changes	
E Scanda Haldhard Changes	
Mice and other p Properties	
E Bolton Adapters	
USB Device	
	-
	<u> </u>
Opens property sheet for the current selection.	

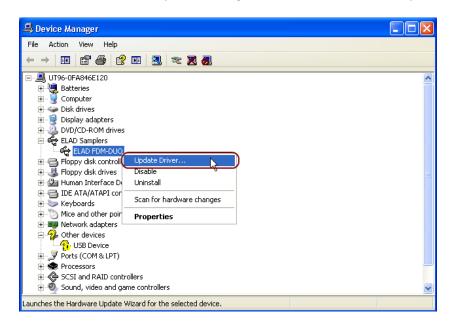
When dialog box opens, select "Driver" label: you must read provider name, current driver release date and current driver version. The old ELAD FDM-DUOr driver version is shown in figure below as example.

ELAD FDM-DU	O Properties	? 🛛
General Drive	er Details	
eca ela	D FDM-DUO	
Driv	er Provider: ELAD srl Italy	
Driv	er Nate: 1/22/2014	
Driv	er Version: 3.0.0.0	
Digi	tal Signer: Not digitally signed	
Driver Det	ails To view details about the	driver files.
Update Dr	iver To update the driver for th	is device.
Roll Back	Driver If the device fails after upo back to the previously inst	
Uninsta	all To uninstall the driver (Adv	vanced).
		JK Cancel

#### 8.2.2.3 Manual driver update

To update FDM-DUOr driver, connect the device to USB socket (where the device driver is already installed) and power on the device. Then open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager" under "Hardware" label.

Select "ELAD FDM-DUO" from "ELAD Samplers" list, right click on it and execute "Update driver "



Now Windows XP launches the hardware update wizard: select the last option "No, not this time" and "Next".

Hardware Update Wizard	
	Welcome to the Handware Update Wizard
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>
	Can Windows connect to Windows Update to search for software?
	🔘 Yes, this time only
	Yes, now and every time I connect a device
	💿 No, not this time
	Click Next to continue.
	< Back Next > Cancel

At next step select "Install from a list or specific location (Advanced)" and "Next".

Then, disable all check-boxes that the system automatically sets and choose the last option for manual driver update, as depicted in figure. Select "Next".

Hardware Update Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FD 🐱 Browse
Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Verify that "Show compatible hardware" option is checked and ELAD FDM-DUO is selected: then click on "Have a Disk". Don't click "Next".

Hardware Update Wizard	
Select the device driver you want to ins	stall for this hardware.
have a disk that contains the driver you	our hardware device and then click Next. If you want to install, click Have Disk.
Show compatible hardware	
ELAD FDM-DUO	
	ß
This driver is not digitally signed! <u>Tell me why driver signing is important</u>	Have Disk
	< Back Next > Cancel

Click on "Browse" and search for the FDM-DUOr driver update folder location; then open winusb fdmsampler.inf file, as depicted in figure. Click "OK" and then "Next".

Install F	rom Disk	X
	Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.	OK Cancel
	Copy manufacturer's files from:	Browse

Now driver update starts: at next dialog box select "Continue Anyway" and ignore the warning.

Let the hardware update automatically completes and, at the procedure ending, click on "Finish"; then disconnect e connect FDM-DUOr device on the same USB socket.

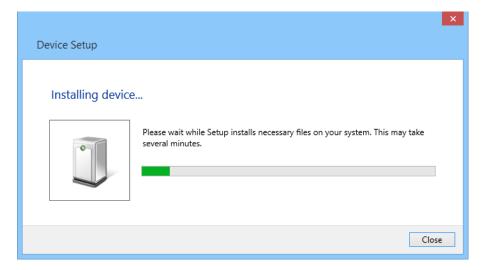
Hardware Update Wizard	
	Completing the Hardware Update Wizard The wizard has finished installing the software for: ELAD FDM-DUO
	< <u>B</u> ack <b>Finish</b> Cancel

To verify that a correct update is done, enter "Device Manager" from **Control Panel**; under "ELAD Samplers" list, select ELAD FDM-DUO driver (see chapter <u>Driver installation verify in Windows Xp</u>) right click on it and choose "Properties". Select "Driver" label to visualize the last driver version (an example is depicted in figure below).

ELAD FDM-DUO Properties
General Driver Details
ELAD FDM-DUO
Driver Provider: ELAD srl Italy
Driver Nate: 1/22/2014
Driver Version: 3.0.0.0
Digital Signer: Not digitally signed
Driver Details To view details about the driver files.
Update Driver To update the driver for this device.
Roll Back Driver If the device fails after updating the driver, roll back to the previously installed driver.
Uninstall To uninstall the driver (Advanced).
OK Cancel

## 8.2.3 USB CAT Serial port

Connect the CAT USB port of FDM-DUOr to a USB 2.0 port of the PC . Windows download and install automatically the FTDI FT232R serial port driver.



When the installation process ends, open the windows device manager and check the FDM-DUOr USB serial port in the node Ports (COM & LPT).

Bevice Manager	- 🗆 🗙
File Action View Help	
🔺 🚔 UT93-LAPTOP	^
Audio inputs and outputs	
> 🗃 Batteries	
Bluetooth	
> 👰 Computer	
Digital Media Devices	
Disk drives	
b Signal Display adapters	
DVD/CD-ROM drives	
⊳ 🕼 Human Interface Devices	
IDE ATA/ATAPI controllers	
▷ 3 Imaging devices	
> — Keyboards	
Mice and other pointing devices	
Monitors	
Network adapters	
A 🐺 Ports (COM & LPT)	
USB Serial Port (COM5)	
V tear Print queues	
> 🖶 Printers	
Processors	
> 🚾 Sensors	
Software devices	
Sound, video and game controllers	
Storage controllers	
N 📲 Suctem devices	*

## 9 Firmware Update

This section describes how to update the various firmware of the FDM-DUO. The latest firmware versions are available here: <u>http://sdr.eladit.com/FDM-DUO/Firmware Releases/</u>.

# TO FACILITATE THE PROCEDURE, PLEASE UPDATE THE USER INTERFACE (UI) FIRMWARE AFTER DOING THE OTHERS FIRMWARE UPDATES.

## 9.1 RX firmware update

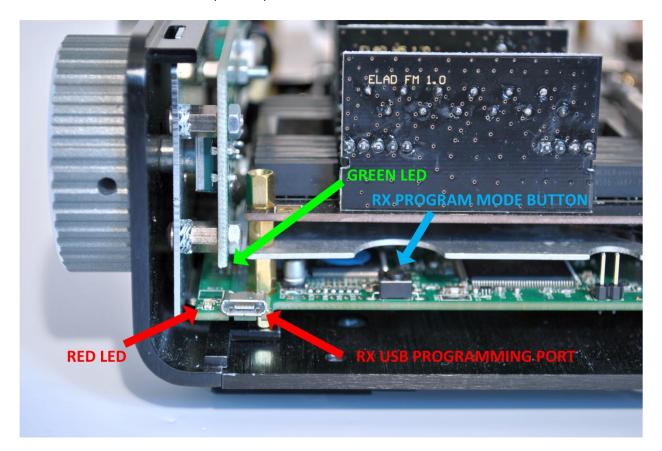
To update the RX demodulator firmware, you must remove the FDM-DUOr top cover. Remove the four screws in the FDM-DUOr chassis bottom as shown in the figure below. Then remove the top cover of the FDM-DUOr.



Download the latest version of the RX firmware. Unzip the archive and copy the file "fdmduorx.bin" in the USB flash drive provided with the FDM-DUOr. If the file already exists, replace it.

#### The file *"fdmduorx.bin"* must be in the root of the USB flash drive. For example : *"E:\fdmduorx.bin"*.

Connect the provided USB flash drive to the FDM-DUOr "RX USB PROGRAMMING PORT" using the provided micro-USB adapter. See the picture below. Connect the power supply, keep pressed the "RX PROGRAM MODE BUTTON" and power up the FDM-DUO.



- Keep pressed the "RX PROGRAM MODE BUTTON" until the "RED LED" turns on.
- Release the "RX PROGRAM MODE BUTTON".
- Wait until the "RED LED" turns off.
- Turn off the FDM-DUO, disconnect the USB flash drive and power up the FDM-DUO.

If during the firmware update the "GREEN LEDS" are blinking together quickly, it means that the update process ended not successfully. In this case contact the ELAD technical assistance.

## 9.2 USB interface firmware update

Download the latest version of the USB interface firmware here : <a href="http://sdr.eladit.com/FDM-DUO/Firmware Releases/USB Interface Firmware/index.php?lang=EN">http://sdr.eladit.com/FDM-DUO/Firmware Releases/USB Interface Firmware/index.php?lang=EN</a>.

#### Before starting the firmware update, disable all anti-virus programs to avoid any inconvenience.

Turn on the FDM-DUOr and connect the USB RX connector to a USB 2.0 port of your computer. Unzip the archive, launch the executable file inside and follow the instructions to update the firmware.

#### Do not disconnect the USB cable and do not turn off the FDM-DUOr.

Once the update is completed, turn off and on the FDM-DUOr.

## 9.3 FPGA firmware update

Download the latest version of the FPGA firmware.

#### Before starting the firmware update, disable all anti-virus programs to avoid any inconvenience.

Turn on the FDM-DUOr and connect the USB RX connector to a USB 2.0 port of your computer. Unzip the archive, launch the executable file inside and follow the instructions to update the firmware.

#### Do not disconnect the USB cable and do not turn off the FDM-DUOr.

Once the update is completed, turn off and on the FDM-DUOr.

## 9.4 User interface (UI) firmware update

Download the latest version of the user interface firmware.

# Before starting the firmware update, it is recommended to disable all antivirus programs in order to avoid any inconvenience.

In order to update the user interface (UI) firmware, you need to install the Flash Magic software. This program is available here: <u>http://www.flashmagictool.com/</u>

Turn on the FDM-DUOr and connect the CAT USB port to a USB 2.0 port of your computer. Follow the steps below to enable the user interface reprogramming mode :

- Press the MENU F5 key, turn the E2 knob to go to the menu 80 (SERVICE), press E2 to enter in the menu,
- turn E2 to display "ON" and press E2 to confirm,
- turn E2 to go to the menu 82 (UI Update), press E2 to enter in the menu,
- turn E2 to display "YES" and press E2 to confirm.

Then you need to identify the CAT USB port number. Open the windows "Device Manager" and expand the "Ports (COM &LPT)" node. The CAT USB port is listed as "USB Serial Port".

File Action View Help	
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4 🛃 UT96-PC	
Acronis Devices	
⊳-₁¶ Computer	
Disk drives	
Display adapters	
FlexRadio	
🖟 🕼 Human Interface Devices	
IDE ATA/ATAPI controllers	
Imaging devices	
⊳ - Keyboards	
Mice and other pointing devices	
Monitors	
Network adapters	
Ports (COM & LPT)	
Communications Port (COM1)	
Printer Port (I PT1)	
> - Processors	
Sound, video and game controllers	
System devices	
🖕 🏺 Universal Serial Bus controllers	
🔈 🖶 WSD Print Provider	

In the picture above the CAT USB port number is COM19.

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Run Flash Magic and set the following parameters.

In the "Step 1 – Communication" section:

- Select LPC1766,
- COM Port: the CAT USB COM port,
- Baud Rate: 230400,
- Interface: None (ISP).

In the "Step 2 – Erase" section:

• Check "Erase all Flash+Code Rd Prot".

In the "Step 3 – Hex File" section:

• Click on Browse and select the update ".hex" file.

In the "Step 4 – Options" section:

• Check "Verify after programming"0

🌧 Flash Magic - NON PRODUCTION USE ON				
File ISP Options Tools Help				
🛅 🗔 🔍 🏈 🖌 📕 🔈 💝 🔣 🥝 🖏				
Step 1 - Communications	Step 2 - Erase			
Select LPC1766	Erase block 0 (0x000000-0x000FFF)			
Flash Bank:	Erase block 1 (0x001000-0x001FFF) Erase block 2 (0x002000-0x002FFF)			
COM Port: COM 19 🗸	Erase block 3 (0x003000-0x003FFF) Erase block 4 (0x004000-0x004FFF)			
Baud Rate: 230400 👻	Erase block 5 (0x005000-0x005EEE)			
Interface: None (ISP)	Erase all Flash+Code Rd Prot			
Oscillator (MHz):				
Step 3 - Hex File				
Hex File: C:\Users\UT96\Desktop\FDMDU0_U	I.hex Browse			
Modified: Unknown	more info			
Step 4 - Options	Step 5 - Start!			
Verify after programming	Start			
Gen block checksums				
Execute				
Activate Flash Bank				
On-Line training classes for microcontrollers and embedded networking and Internetworking				
www.esacademy.com/faq/classes	<b>_</b>			
	0			

Check the communication with the FDM-DUOr clicking on "ISP" and then on "Read Device Signature". If the communication with the FDM-DUOr is working, a new window with some device information is opened.

-	lach	Magic - NON PRODUCTION USE ON		sh B	Jank .	Erase block 1 (0x001000-0x001FFF	
File	_	_		ОМ	Device Signature	×	-
		Blank Check	1 😨 😂	iud	Manufacturer ID: 0x		
Ste		Read Security	Step 2 - Erase	nte	Device ID 1: 0x		
		Read Device Signature		scill	Device ID 2: 0x		
Se	9	Boot Vector and Status Byte	Erase block 0 (0x000000-0x000FFF) Erase block 1 (0x001000-0x001FFF)		Device ID: 0x	26013F33	
Flas		Display Memory	Erase block 2 (0x002000-0x002FFF)	ep (	F		
0		Erase Flash	Erase block 4 (0x004000-0x004FFF)	ex F	Bootloader Ver:	4.2	e
Bai		Erase Flash Pages	Erase block 5 (0x005000-0x005FFF)		Serial Number:	185335324 1397565140 1323834993 4110417920	
l Ir	ıt 🦪	🖇 Verify	Erase all Flash+Code Rd Prot Erase blocks used by Hex File	ep «	· ·		
0s		• Execute		/eri		Close	
		Reset		Fill d Gen	block checksums		2
					Dioon on oon oan o		
Ste	2	Start Bootloader					
Не	]	Read Clocks	I.hex Browse				
110		Device Configuration	more info				
		Cyclic Redundancy Check					
Ste	ľ	Read MISR Serial Number	Step 5 - Start!				
V		Enable SoftICE	Start				
F	1	Additional Security Bits					
E		Update Bootloader					
		EEPROM					
Teo	hnica	al on-line articles about 8051 and XA prog	Iramming				
			-				
www	v.esa	academy.com/fag/docs					
L			0				

If the communication is working it is possible to proceed with the firmware update. Click on "close" on the "Device Signature" window. In the Flash Magic main window, click on "Start" to begin the programming.

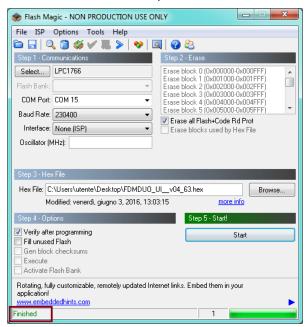
Flash Magic will now proceed to program the firmware.

🌧 Flash Magic - NON PRODUCTION USE ONLY - Using 230400 ba 🗔 💷 💻 🍋				
File ISP Options Tools Help				
┗ 🖬 🔍 🛢 🐗 🗸 🏷 🔍 🛡 🛯	🗷   🕜 😂			
Step 1 - Communications	Step 2 - Erase			
Select       LPC1766         Flash Bank:       •         COM Port:       COM 15         Baud Rate:       230400         Interface:       None (ISP)         Oscillator (MHz):	Erase block 0 (0x000000-0x000FFF) Erase block 1 (0x0001000-0x001FFF) Erase block 2 (0x002000-0x002FFF) Erase block 3 (0x003000-0x003FFF) Erase block 4 (0x004000-0x003FFF) Erase block 5 (0x005000-0x005FFF) Zerase block 5 (0x005000-0x005FFF) Erase block 5 (0x005000-0x005FFF) Erase block 5 (0x005000-0x005FFF) Erase block 5 (0x005000-0x005FFF) Erase block 5 (0x005000-0x005FFF)			
Step 3 - Hex File				
Hex File: C:\Users\utente\Desktop\FDMDUO_ Modified: venerdi, giugno 3, 2016, 13:0				
Step 4 - Options	Step 5 - Start!			
Venity after programming     Fill unused Flash     Gen block checksums     Execute     Activate Flash Bank	Cancel			
On-Line training classes for microcontrollers and e Internetworking <u>www.esacademy.com/faq/classes</u> Programming device (0x00031800)	mbedded networking and			

Then, Flash Magic performs the programming verification.

🌧 Flash Magic - NON PRODUCTION USE ONLY - Using 230400 ba 💶 💷 🚾 🏎					
File ISP Options Tools Help					
	國 💡 😂				
Step 1 - Communications	Step 2 - Erase				
Select         LPC1766           Flash Bank:            COM Port         COM 15           Baud Rate:         230400	Erase block 0 (0x00000-0x000FFF) Erase block 1 (0x001000-0x001FFF) Erase block 2 (0x002000-0x002FFF) Erase block 3 (0x003000-0x003FFF) Erase block 4 (0x004000-0x004FFF) Erase block 5 (0x005000-0x004FFF)				
Interface: None (ISP)	✓ Erase all Flash+Code Rd Prot Erase blocks used by Hex File				
Step 3 - Hex File Hex File: C:\Users\utente\Desktop\FDMDU0 Modified: venerdl, giugno 3, 2016, 13					
Step 4 - Options	Step 5 - Start!				
Verify after programming Fill unused Flash Gen block checksums Execute Activate Flash Bank	Cancel				
Visit the "Flash Magic" home page for info on the latest revision					
www.esacademy.com/software/flashmagic					
Verifying (0x00002C00)	0				

Wait until the end of the process, it should result like the picture bellow.



Then turn off and on the FDM-DUOr.

If some problems occur during the firmware update procedure, please contact the ELAD technical assistance.

# **10 Technical Specifications**

	ELAD FDM-D	DUOR TECHNICAL SPECIFICATIONS
	USB 2.0 Ports (Peripheral Control)	2 (RX, CAT)
	Master Clock Frequency	122.88 MHz
	Master Clock Phase Noise	-136 dBc @ 100 kHz, -130 dBc @ 10 kHz
	10 MHz Reference Clock Stability	2.5 ppm TCXO within temperature range 0°C ÷ 40°C (32°F ÷ 104°F) Typical Stability within temperature range 15°C ÷ 35°C (59°F ÷ 95°F) 0.1 ppm i.e. 1Hz @ 10 MHz
AL	Frequency Resolution	1 Hz min.
GENERAL	Antenna Connectors / Impedance	2x SO-239 / 50 Ohm
B	Power Supply Requirements	13.8 Vdc ± 10%
	Current Drain	<500 mA @ 13.8 V
	Dimensions (W x D x H)	180 mm (7.00") x 155 mm (6.10") x 70 mm (2.75") including knob and connectors 180 mm (7.00") x 130 mm (5.10") x 70 mm (2.75") enclosure only
	Weight (approximate)	1.2 Kg (2.4 lb)
	Operating Temperature Range	0°C ÷ 40°C (32°F ÷ 104°F)
	Modes	CW, USB, LSB, AM, FM
	ADC Sampling Rate / Resolution	122.88 MHz @ 16 bits
	Wideband Frequency Coverage	10 kHz ÷ 54 MHz
	IQ Channel Bandwidth	192 kHz (24 bits)
	MDS @14.200MHz (BW 500Hz)	-132dBm
Stand Alone Mode	Typ. 3 <sup>rd</sup> order IMD DR (injection of a third signal strong and off frequency)	92dB
one	Attenuator	10dB / 20dB / 30dB
d AI	Spurious Response	>105 dBfs @ 0 dB attenuation
otan	DDC Image Rejection Ratio	>100 dB
•,	Receive Low Pass Filters Bandwidth	SSB: 300 Hz, 600 Hz, 1 kHz, 1.6 kHz + 3.1 kHz (Step 100 Hz), 4 kHz, 5 kHz, 6 kHz AM: 2.5 kHz + 6 kHz (Step 500 Hz) CW: 100 Hz & DR <sup>(1)</sup> Level 1 + 4, 100 Hz, 300 Hz, 500 Hz, 1kHz, 1.5 kHz, 2.6 kHz FM: Voice Narrow, Voice Wide, Data
	Headphones Connectors (front & rear) / Impedance	3.5 mm Stereo Jack / 8 Ohm
	AUX OUT Connector / Impedance	3.5 mm Stereo Jack / 8 Ohm
	Modes	CW, CW SH+, CW SH-, CW Narrow Band, USB, LSB, AM, FM, WB FM (Stereo + RDS), SYNC AM, DSB, RTTY, ECSS, DRM
PC Based Mode (ELAD FDM-SW2 Software)	IQ DDC Sampling Rate / Resolution	1 Channel (Slice) @ 32 bits: 192 kHz, 384 kHz, 768 kHz, 1536 kHz, 3072 kHz 1 Channel (Slice) @ 16 bits: 6144 kHz 2 Channels (Slices) @ 32 bits: 192 kHz, 384 kHz
Based Mode M-SW2 Softv	Simultaneous Receivers	4 with 1 Channel (Slice) DDC, 8 with 2 Channels (Slices) DDC
aseo 1-SV	Software Defined Filters	Double IF Notch Filters, Continuous Variable Band Filter
FDN	Advanced DSP Features	Noise Blanker, Adaptive Noise Reducer, Adaptive Auto Notch, AGC
F (ELAD	Main Software Features	Recording and playback of IF and audio data stream, EIBI database support, Dx-Cluster spot visualizatic (Internet connection required), built in CAT protocol and Omni-Rig Server, double output channel (for VAC support for external down-converter, WoodBox Tmate and Tmate2 compatibility
	Software Visualization	Input Data (Spectrum + Waterfall), IF Data (Spectrum + Waterfall), Audio Data (Spectrum + Waterfall)

All stated specifications and other product information provided in this document are subject to change without notice or obligation.

## **Declaration of Conformity (EC)**

The product marked as

#### FDM-DUOr

manufactured by

Manufacturer:

ELAD S.r.l.

Address:

Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

is produced in conformity to the requirements contained in the following EC directives:

- ▶ R&TTE Directive 1999/5/CE
- EMC Directive 2004/108/CE
- Low Voltage Directive 2006/95/CE
- ▶ RoHS Directive 2011/65/CE

The product conforms to the following Product Specifications:

#### **Emissions & Immunity:**

ETSI EN 301 489-1 V1.9.2 ETSI EN 301 489-15 V1.2.1 ETSI EN 301 783-2 V1.2.1

#### Safety:

EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013

And further amendments.

This declaration is under responsibility of the manufacturer:

ELAD S.r.l. Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

Issued by:

Name: Franco Milan Function: President of ELAD

> Caneva Place

July, 30<sup>th</sup> 2014 Date

Signature