

ELAD FDM-DUO

Dual Mode SDR Transceiver



USER MANUAL

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2 FDM-DUO Overview

2.1 Notice

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

2.2 Firmware versions

The features described in this manual refers the following firmware versions

RX Demodulator	TX Modulator	User Interface	USB Interface	FPGA
Ver: 1.04 Date: 09/18/2014	Ver: 1.03 Date: 09/18/2014	Ver: 3.03 Date: 09/18/2014	Ver: 4.08 Date: 09/18/2014	Ver: 2.00 Date: 07/30/2014

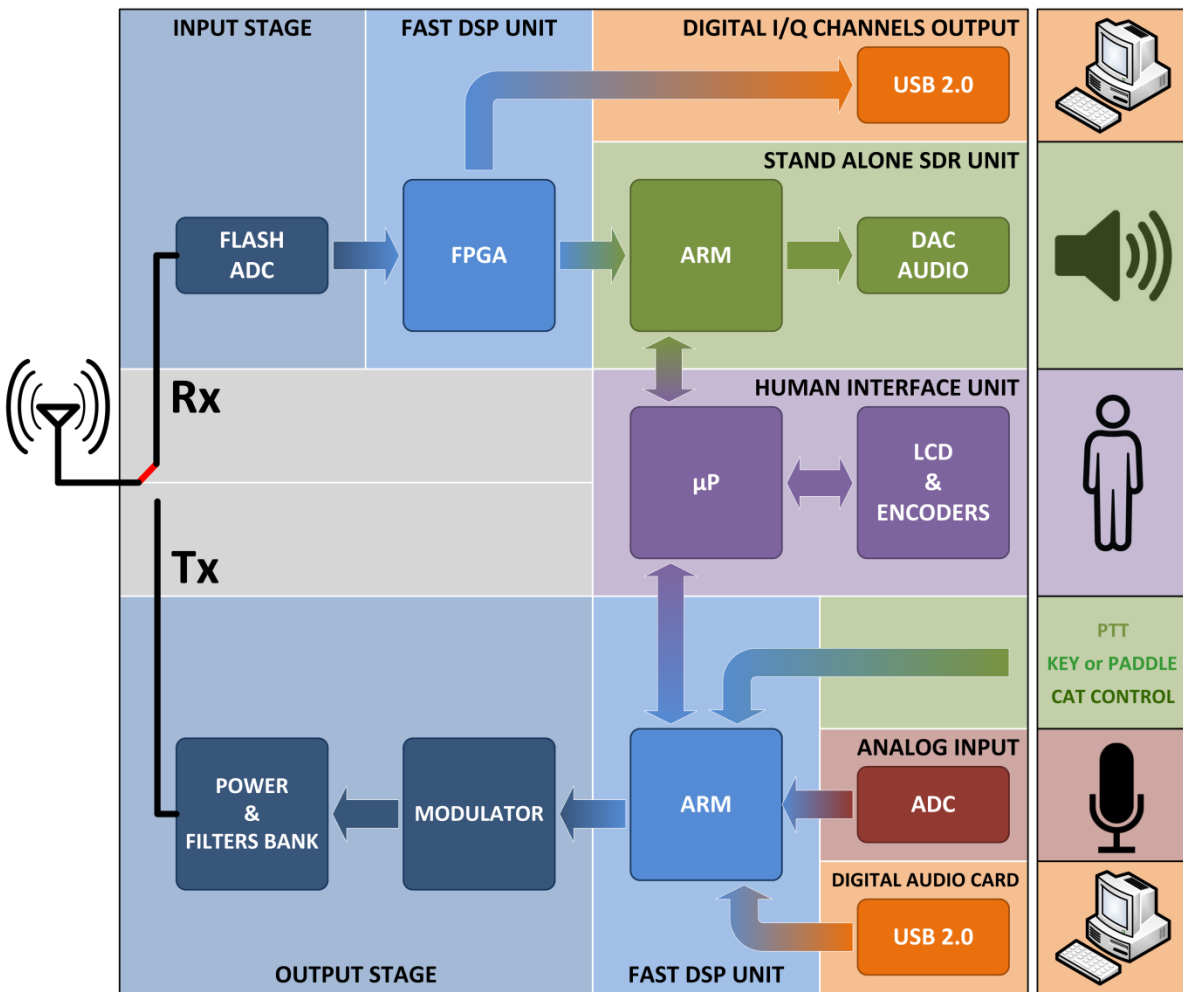
2.3 Introduction

Thank you for choosing the FDM-DUO. It is an innovative dual mode SDR transceiver covering the frequency range from 9kHz to 52MHz. The FDM-DUO can be used like a standard transceiver in stand-alone mode or connect to a PC to exploit the full potential of the ELAD FDM-SW2 software.

2.3.1 Main Features

- Frequency range: RX 9kHz to 52MHz direct sampling receiver
- TX 160m to 6m
- Selectable power output 5W on Ham Bands or 0dBm RF Out connector
- Double antenna connectors (RTX or separate RX/TX)
- Operating Modes: CW LSB USB AM
- ADC Linear LTC2165, 16bit @122.88MHz
- DDC FPGA Spartan 6 XC6SLX25 + Serial Flash for stand-alone mode
- Stand-alone RX demodulator with STM32F4 ARM floating point μ Controller
- LPC1766 Cortex M3 for LCD & Keyboard control
- TX modulator with STM32F4 floating point μ P + AD9957 DDS @368.64 MHz
- Clocking source Si5338 driven by 10MHz TCXO or External reference input
- TX modulator from I2S source: MIC using Cirrus CS5346 or USB integrated Codec (CM6510B codec with customized firmware)
- CAT USB interface with FTDI controller

2.3.2 FDM-DUO Block Diagram



2.4 Precautions

- Connect the transceiver 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 transceiver 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.

3 Front Panel Description



1 - LCD Display

See [LCD](#).

2 - E1 Knob

Audio volume , AGC, noise reduction, noise blanker control. [Knobs functions](#)

3 - Main Knob

Main VFO and MEM control. See [Knobs functions](#)

4 - Speaker/Headphones Audio Output

The main FDM-DUO audio output.

5 - Auxiliary Output

Audio /IQ data output.

6 - E2 Knob

Filter and pitch control. See [Knobs functions](#)

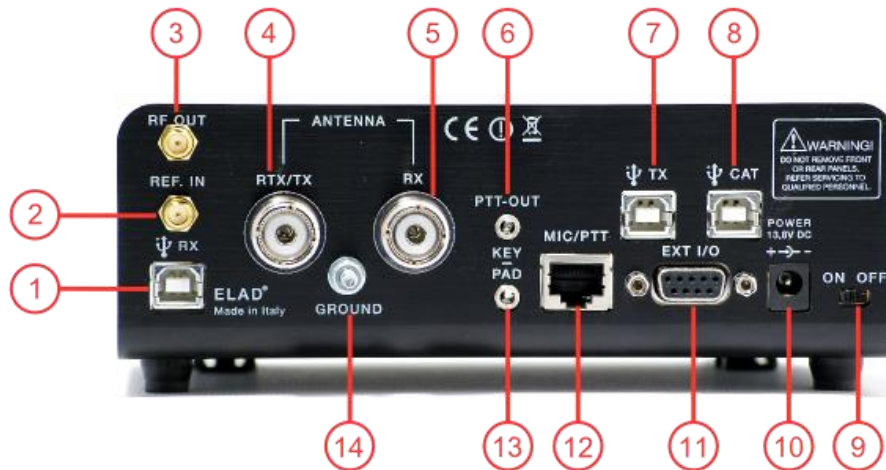
7 - MODE and MENU buttons

Change operating mode and enter the FDM-DUO setup menu. See [Keys functions](#)

8 - VFO and MEM buttons

Basic VFO Memory operations. See [Keys functions](#)

3.1 Rear Panel Description



1 - USB Receiver Data Connector

USB 2.0 port to connect with the PC. Please use the supplied cable.

2 - Frequency Reference Input

SMA 50 Ohm 10MHz, 0 dBm frequency reference input.

3 - RF Output Connector

SMA 50 Ohm 0 dBm TX output.

4 - RTX/TX Antenna Connector

M-type RTX/TX 50 Ohm antenna connector.

5 - RX Antenna Connector

M-type RX 50 Ohm antenna connector.

6 - PTT Output Connector

PTT Output to connect a switch-box or an amplifier

7 - USB Audio Connector

USB soundcard useful for digital modes

8 - CAT USB Serial Port

USB serial port for CAT communication

9 - Power Switch

Turn On/Off the FDM-DUO

10 - Power supply

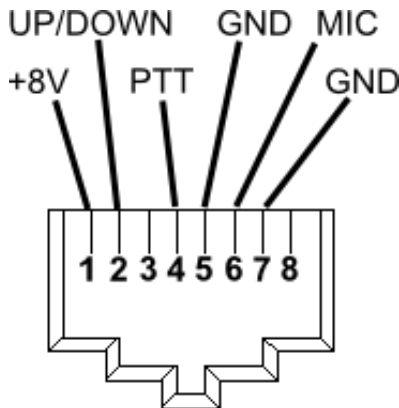
13.8V, 2.5A DC power supply connector

11 - Expansion Port

DB9 connector for external hardware (eg pre-selector filters board). **This is NOT a serial port.**

12 - MIC/PTT input

Compatible with the supplied microphone

**13 – Key/Paddle input**

3.5mm stereo jack connector. Can be used with any key or paddle

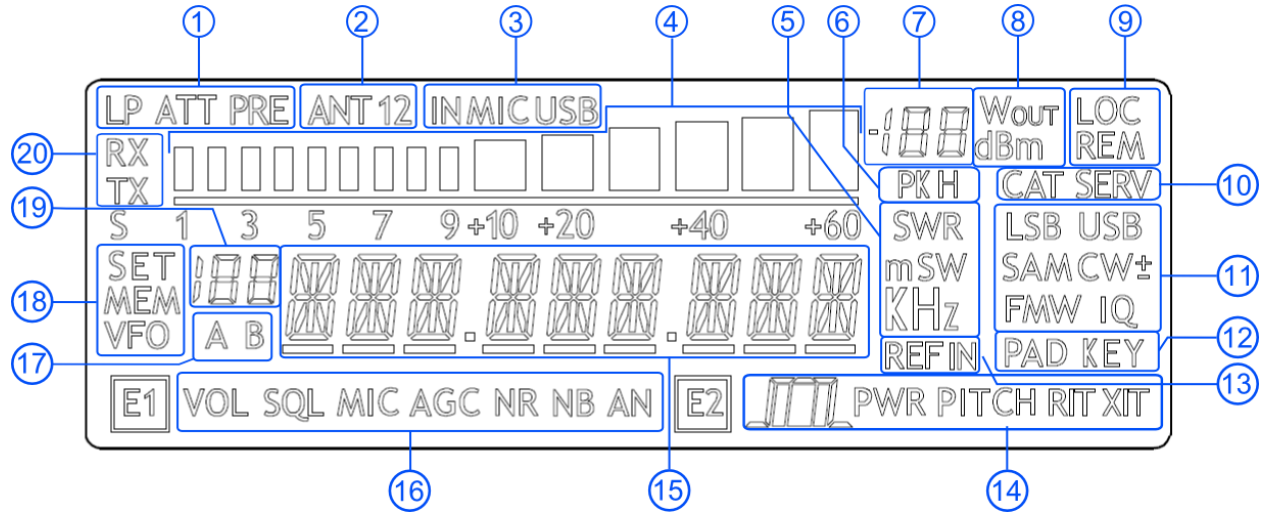


If a paddle is connected, the CW LEFT and TIP can be configured as dot or dash in the CW LEFT and CW TIP settings menu.

14 – Ground Connector

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

4 LCD

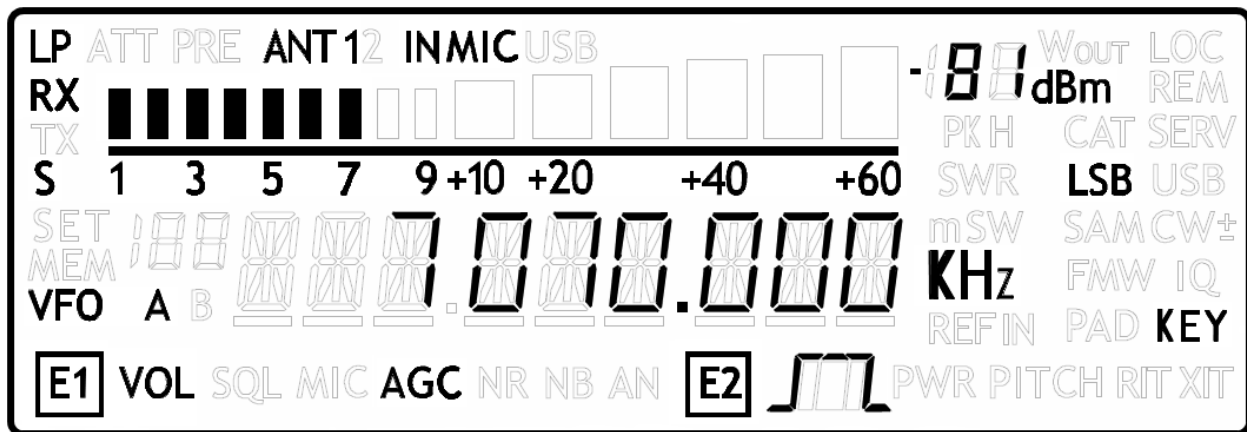


1. LP: Low pass input filter active. ATT: input attenuation active.
2. ANT 1 2: display the number of antennas.
3. IN MIC USB: display the input selected for transmission in SSB and AM modes.
4. Bar meter: in receiver mode displays the signal strength in S-units, in transmission mode displays the forward power transmitted.
5. Measurements unit for the main display. The "S" of SWR is also used to indicate the "QuickStep" function.
6. PK: blinks if the case of internal ADC overload.
7. Secondary display: in receiver mode displays the signal strength, in transmission mode displays the forward power transmitted.
8. Measurement unit for the secondary display.
9. LOC: on when the Main Knob is locked.
10. CAT: on when a CAT command is received, SERV: Service mode enabled.
11. Operating mode.
12. Input selection for CW mode.
13. External frequency reference present.
14. E2 Selected function. PITCH: CW pitch frequency, : Demodulation filter bandwidth.
15. Main display.
16. E1 Selected function. VOL: main volume, SQL: squelch, MIC: microphone gain, AGC: automatic gain control settings, NR: noise reduction, NB: noise blanker.
17. Display the selected VFO.
18. SET: settings menu mode, MEM: memory mode, VFO: VFO mode
19. In memory mode, displays the selected memory index, in settings mode display the menu number
20. RX: receive. TX: Transmit.

5 Quick Start

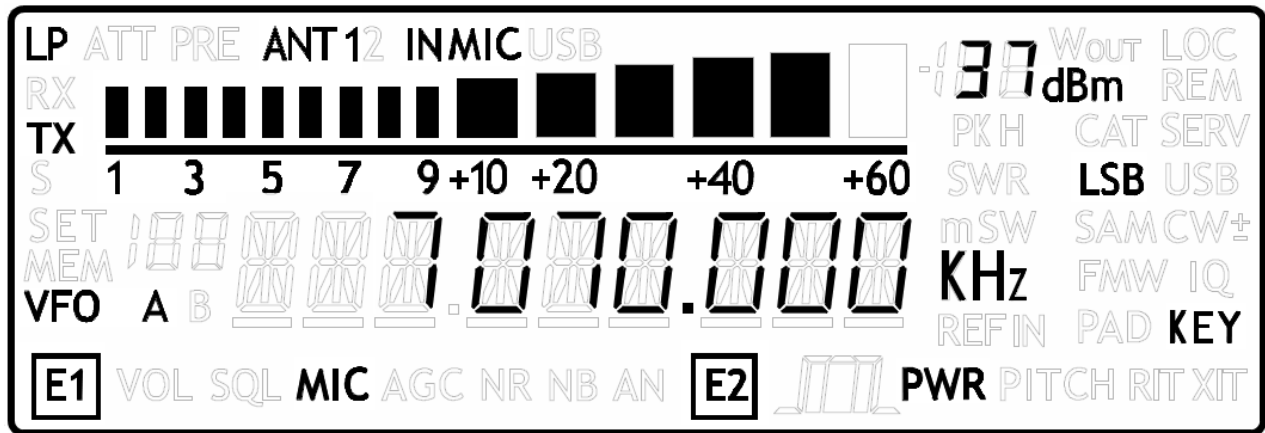
These instructions are intended only for a quick guide, detailed instructions are given later in this manual

5.1 Receive



- Turn on the FDM-DUO using the rear panel switch. The transceiver start in VFO mode with the VFO-A selected.
- Turn the E1 knob until you hear a suitable level of noise
- Use the Main knob to tune a frequency
- Press **MODE F3** to select the desired communication mode
- Use the E2 to set the demodulation filter

5.2 Transmit



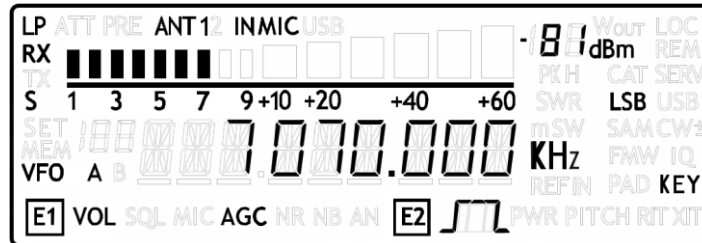
- Use the Main Knob to tune in a desired station or select an unused frequency
- Press and hold the **MODE F3** key until enter in the Antenna Tuning Mode, the display change its back color
- Tune the antenna...
- Press and hold the **MODE F3** key until return in the VFO mode
- Press microphone PTT and speak into the microphone, the display change its back color
- During the transmission use E1 to adjust the reception volume and E2 to adjust the power output

6 User Interface

6.1 VFO Mode

6.1.1 Receive

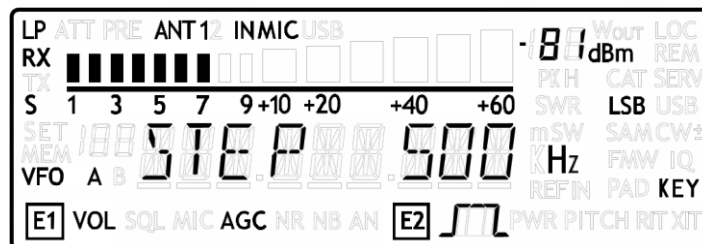
The VFO mode is the default mode of FDM-DUO. Each VFO memorize the tuning frequency, mode and tuning step



6.1.1.1 *Tuning*

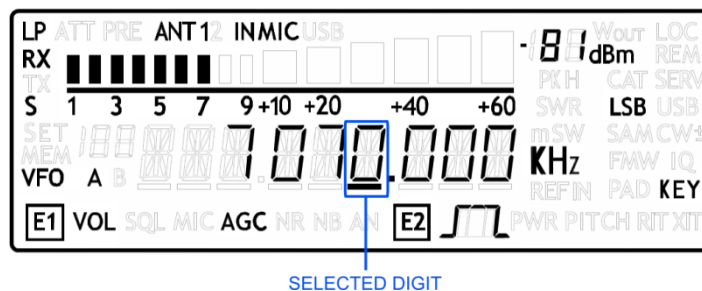
In this mode, use the Main Knob to tune a frequency.

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

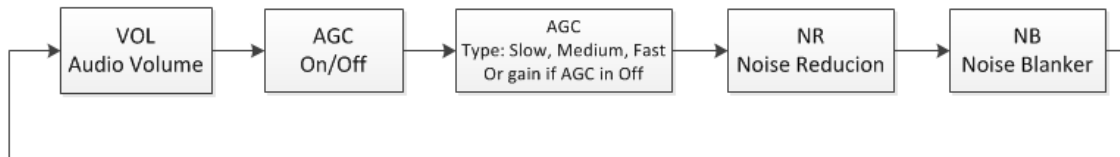
With a long pressure over the main knob, the Digit by Digit Frequency tuning mode is activated



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

6.1.1.2 *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.

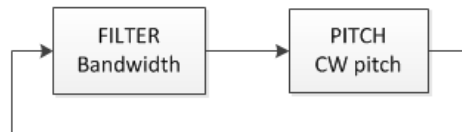


AGC: if the AGC is turned OFF (manual gain mode), the AGC icon blinks


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

6.1.1.3 *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.

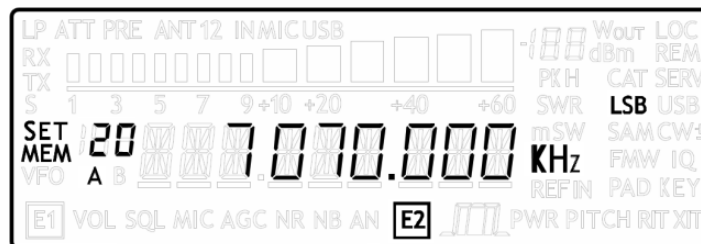


6.1.1.4 *Switch VFO*

Use the  button to switch VFO-A/B.


6.1.1.5 *Store VFO to memory*


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



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

6.1.1.6 *“QuickMem” mode*

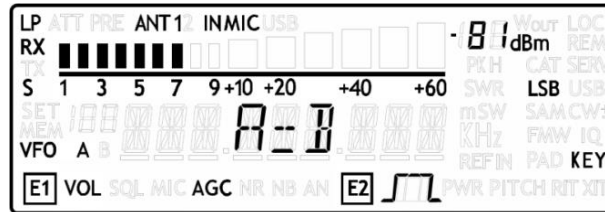
Keep pressed the  key to enter the “QuickMem” mode.

The memory channels 180 to 199 are reserved for the “QuickMem” selection. Keep pressed the  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-DUO Manager” feature in the ELAD FDM-SW2 software to customize the memory channels.

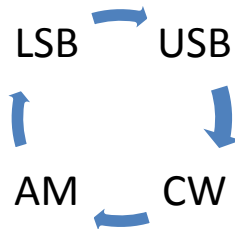
6.1.1.7 *VFO-A = VFO-B*

With long pressure on **M-V** key you get VFO-A = VFO-B



6.1.1.8 *Change Operating Mode*

With a short pressure on the **MODE** button, you can change the receiver mode between the available modes:



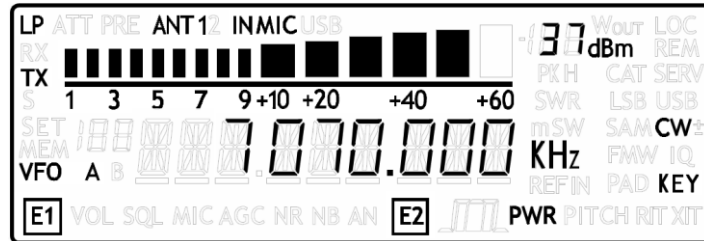
6.1.1.9 *“QuickStep”*

With a short pressure on the **S** key, the “QuickStep” function is activated. This function quickly sets the frequency step preset selected in the “QuickStep” setting menu, press again the **S** key to set the previous frequency step.



6.1.2 Antenna Tuning Mode

In VFO or MEM mode, apply a long pressure on **MODE F3** key to switch to the Antenna Tuning Mode



In this mode a tone at the transmission frequency is generated. Use E2 to modify the transmission power.

The antenna tuning mode have a default timeout of 10s, this value can be modified in the settings menu 50 "TUNE TIME". However you can apply a long pressure on **MODE F3** key to exit from the antenna tuning mode.

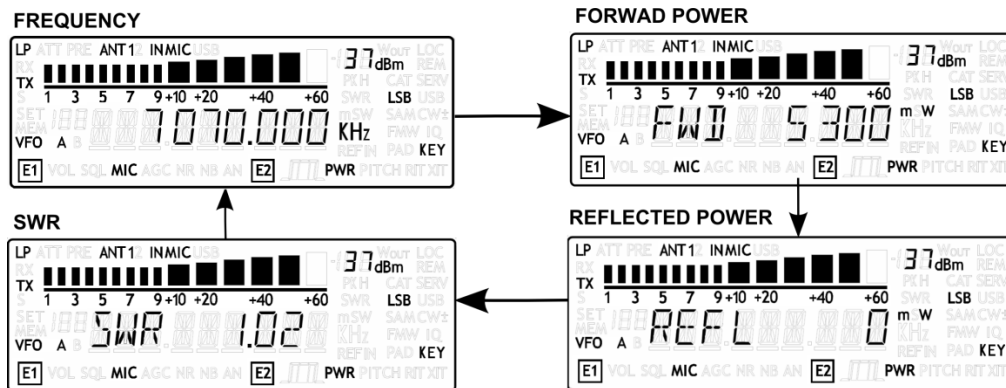
Note:

The timeout is not active if:

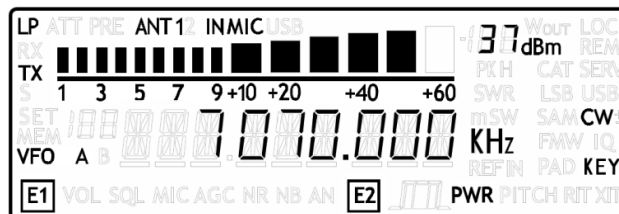
- The transmission selected transmission output is set to 0dBm
- The "SERVICE MODE" is active

6.1.3 Transmit

During the transmission some operations like tuning, VFO selection, mode selection are locked. With a short pressure on the E2 knob it is possible to change witch parameter is shown in the main display.



6.1.3.1 Transmission in CW mode

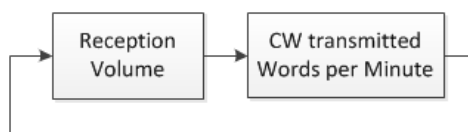


6.1.3.1.1 CW Message

To begin to transmit the CW message selected in the “CW message menu”, keep pressed the microphone PTT and press the CW key. With a long pressure on **S** if the function has been activated in the “F4 Function” menu, the selected CW message is transmitted. Push the PTT to terminate the CW message transmission

6.1.3.1.2 E1 transmitter settings

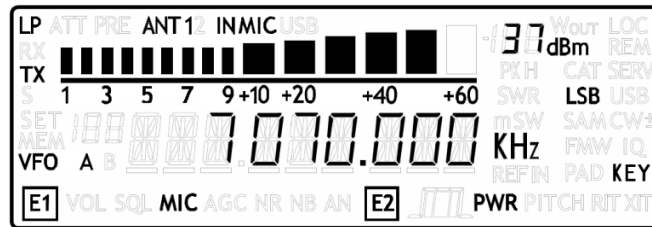
Apply a short pressure on the E1 knob to the Reception Volume or the CW Words Per Minute parameter. Turn until one click the E1 knob to display the parameter value, then turn again E1 to modify the parameter value.



6.1.3.1.3 E2 transmitter settings

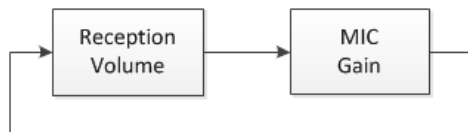
Use E2 to change the transmission power

6.1.3.2 *Transmission in AM and SSB mode*



6.1.3.2.1 E1 transmitter settings

Apply a short pressure on the E1 knob to the Reception Volume or microphone gain parameter. Turn until one click the E2 knob to display the parameter value, then turn again E2 to modify the parameter value.




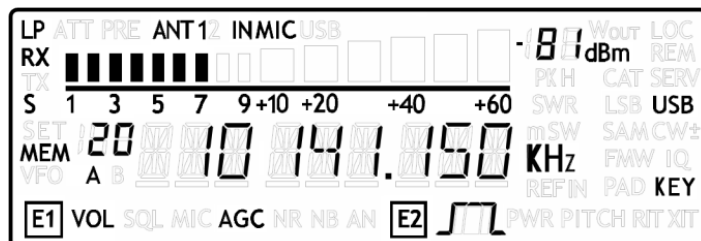
6.1.3.2.2 E2 transmitter settings

Use E2 to change the transmission power

6.2 MEM Mode

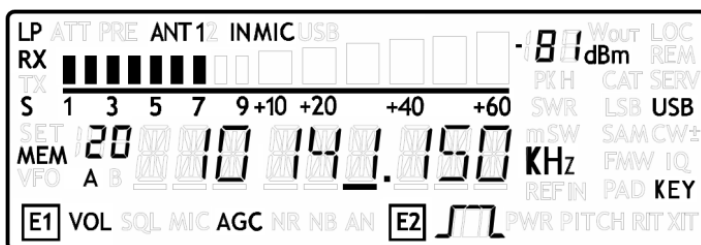
6.2.1 Receive


To activate the memory mode, apply a long pressure on the  button



6.2.1.1 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.



Use the  button to select the VFO-A/B. This is useful if you want to set the memory settings to a specific VFO.


6.2.1.2 Delete a memory

Apply a long pressure to the  key to enter the delete menu.



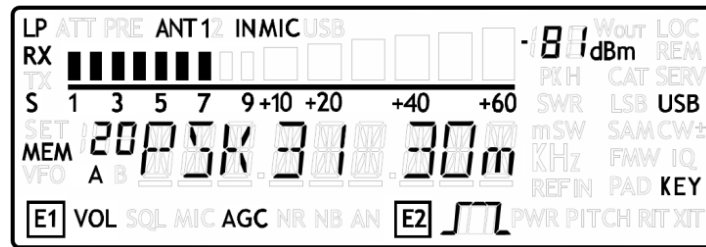
Use the E2 knob to set yes or no and make a short pressure on E2 to confirm.

6.2.1.3 Set memory to VFO

Use the  key to set the selected VFO to the selected memory frequency and mode. When this function is used, the FDM-DUO automatically switches to the VFO mode

6.2.1.4 *Change the memory display mode*

Apply a short pressure on the **S** **F4** key to show the memory label in the LCD main display. Press shortly again **S** **F4** to return to display the memory frequency.



You can use the “FDM-DUO Manager” feature in the ELAD FDM-SW2 software to customize the memory channels.

6.3 Knobs functions

The following table describes the knob functions for each user interface menu

Mode/Menu	Action	Main Knob	E1 Knob	E2 Knob
VFO	Value modified	Change selected VFO frequency	Enter E1 selection parameter	Enter E2 selection parameter
	Short Pressure	Enter STEP menu	Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Switch to DIGIT by DIGIT tuning mode		
STEP	Value modified	Change tuning step value		
	Short Pressure	Exit from STEP Menu		
	Long Pressure	Switch to DIGIT by DIGIT tuning mode		
MEM	Value modified	Select next/previous memory	Modify E1 selected parameter value	Modify E2 selected parameter value
	Short Pressure		Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Enter the menu to change the selected memory frequency		
E1 Selection: VOL - AGC- NR - NB	Value modified	Back to VFO or MEM menu	Modify E1 selected parameter value	Modify E2 selected parameter value
	Short Pressure	Back to VFO or MEM menu	Change E1 selected parameter	Change E2 selected parameter
	Long Press	Switch to digit by digit tuning mode		
E2 Selection: FILTER - PITCH	Value modified	Back to VFO or MEM menu	Modify E1 selected parameter value	Modify E2 selected parameter value
	Short Pressure	Back to VFO or MEM menu	Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Switch to digit by digit tuning mode		
VFO > MEM	Value modified	Change the destination memory		Change the destination memory
	Short Press			Save VFO in the selected memory
	Long Pressure			
Delete MEM	Value modified			Change Yes/No
	Short Pressure			Confirm Yes/No
	Long Pressure			
SETUP	Value modified	Parameter large step variation (1)		
	Short Press			
	Long Pressure			
DIGIT by DIGIT Tuning	Value modified	Modify the current digit value	Change digit selection	Change digit selection
	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

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 operating mode	Enable/disable Quickstep function	Enter settings menu
VFO	Long	Switch to MEM mode	Enter "QuickMem" menu	VFO A = B	Enter/Exit antenna tuning mode	F4 Selected Function	Lock/Unlock the main knob
MEM	Short	Switch VFO	-	Selected memory to VFO	Change selected memory operating mode	Change memory display frequency/label	Enter settings menu
MEM	Long	Switch to VFO mode	Enter delete memory menu	-	Enter/Exit antenna tuning mode	F4 Selected Function	Lock/Unlock the main knob

6.5 Microphone Keys functions

The following table describes the microphone keys functions.

Mode	Pressure	UP UP Keep pressed	DOWN DOWN Keep pressed
VFO	Short	Tune up frequency of one step	Tune down frequency of one step
VFO	Keep pressed	After HOLDTIME tune up the frequency according with the acceleration	After HOLDTIME tune down the frequency according with the acceleration
MEM	Short	Selected memory to VFO	Selected memory to VFO
MEM	Keep pressed	Selected memory to VFO and after HOLDTIME tune up the frequency according with the acceleration	Selected memory to VFO and after HOLDTIME tune down the frequency according with the acceleration

6.6 Settings Menu List

The following table describes the FDM-DUO settings menu list. To enter the settings menu mode, press the **MENU** 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

Menu	Title	Description	Available Settings	Default
1	RX ATT	Receiver input attenuation	OFF or ON	OFF
2	RX LP	Receiver low pass filter status	OFF or ON	ON
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
8	CW MUTE	Set mute status during CW transmission	OFF or ON	OFF
9	xSB MUTE	Set mute status during AM or SSB transmission	OFF or ON	ON
10	FILBPASS	Set pre-selection filters bypass, active only in reception in remote/mixed mode and in split mode	OFF or ON	OFF
11	TONE VOL	Sidetone volume	From 0 to 100	5
30	TX ENABLE	Enable the transmission	OFF or ON	ON
31	ANTENNAS	Number of antenna used	1 or 2	1
32	TX IN	Transmission input in AM and SSB	Microphone or USB soundcard	Microphone
33	TXOUT	Transmission output selection	PWR (ant. RTX) or 0dBm (RFOUT)	PWR
34	TX POWER	Transmission power selection	0.3W, 0.5W, 1W, 1.2W, 1.5W, 2W, 3W, 4W, 5W or max available	5W
35	TX BW	Transmission filter selection	50Hz - 4000Hz 100Hz - 2700Hz 100Hz - 3000Hz 100Hz - 3500Hz 100Hz - 4000Hz 200Hz - 2700Hz 200Hz - 3000Hz 200Hz - 3500Hz 200Hz - 4000Hz 300Hz - 2700Hz 300Hz - 3000Hz 300Hz - 3500Hz 300Hz - 4000Hz	100Hz - 2700Hz

36	MIC GAIN	Microphone Gain	±12dB in step of 0.5dB	0dB
37	CW IN	CW transmission input selection	Key or Paddle	Key
38	CW DELAY	PTT release delay in CW	0 to 1000ms	240ms
39	CW KEY	Select where the key is connected on the key/paddle jack	TIP or RING	TIP
40	CW TIP	Select the dot or dash on the tip of the key/paddle jack	DOT or DASH	DASH
41	CW IAMBIC	Set the iambic mode	A or B	A
42	CW RX WPM	CW characters decoding speed	5 to 90 words per minute	12
43	TX RX TH	CW threshold for a tone recognition	AUTO or from 1 to 10	AUTO
44	CW DECODE	Enable/Disable the automatic CW decoding	OFF or ON	OFF
45	CW TX WPM	CW transmission speed	5 to 90 words per minute	10
46	CW MSG	CW Message selection	Msg 1 to Msg 10	Msg 1
47	TX VIEW	Select the default parameter to be displayed during a transmission	Frequency, forward power, reflected power, SWR	Forward power
48	UP/DOWN ACC	MIC UP / DOWN acceleration of the microphone buttons	1, 2, 3	2
49	TUNE TIME	Antenna tuning mode timeout. Active only if the selected transmission output is the antenna. Not active in service mode	10 to 120 seconds	10s
50	ATT ON TX	Attenuation in transmission mode	OFF or ON	OFF
60	FR OFFSET	Enable / Disable the frequency offset for the visualization	OFF or ON	OFF
61	OFS VALUE	Frequency offset value for the visualization	+/- 99.999999999 GHz. See *	0Hz
62	F4 Button	Select the F4 key function when a long pressure is applied	None / Send CW Message / Split mode	None
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
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 firmware update mode	YES or NO	NO
83	VIEW SN	Display the FDM-DUO serial number		
84	VIEW FW	Display the FDM-DUO firmware versions	Firmware	UI

6.6.1 Frequency offset menu

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
 - kHz: the 8 most significant digit of the frequency offset are displayed
 - Hz: the 8 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

- kHz Display mode



- Hz Display mode



7 CAT Remote Control

7.1 Introduction

The FDM-DUO transceiver 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 [40] CAT BAUD menu. Available values are 9600, 38400, 57600, 115200 bps.

The FDM-DUO implement a subset of the Kenwood TS-480 command set. Some command have a dummy implementation for compatibility issues with Ham Radio Deluxe.

7.2 Computer control commands

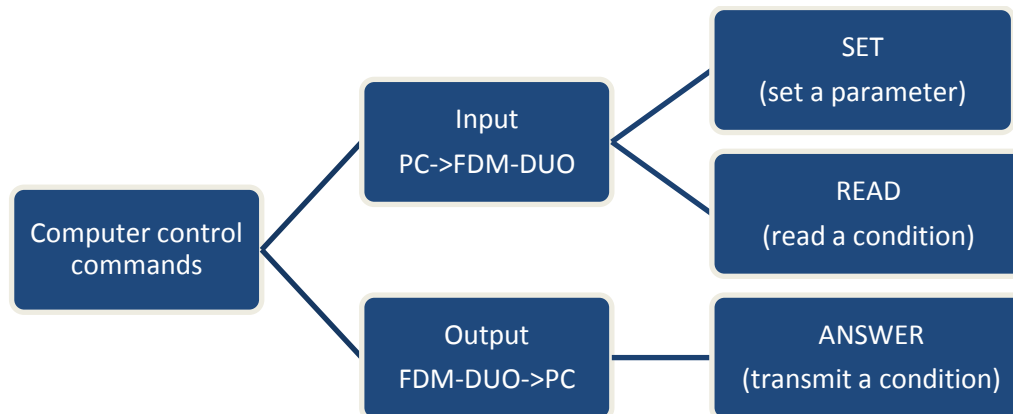
A computer control command is composed of an alphabetical command, various parameters, and the terminator that signals the of the command.

For example to set the VFO-A to 14MHz the command is:

FA000140000000;

- "FA": alphabetical command
- "00014000000000": parameter
- ";": terminator

Computer control commands can be classified as shown below:



EXAMPLE

- To set the VFO-A to 14MHz the PC sends: "FA00014000000000;" **SET command**
- To read the VFO-A frequency the PC sends: "FA;" **READ command**
- When this command has been sent, the following message is returned to the PC: "FA00014000000000;" **ANSWER**

7.3 FDM-DUO CAT commands list

7.3.1 Active commands table

FA	Reads and sets the VFO A frequency										Parameters: P1: Frequency in Hz (11 digit)
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>	<i>19</i>	<i>20</i>	
	P1	P1	P1	;							
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	A	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	P1	P1	P1	;							

FB	Reads and sets the VFO B frequency										Parameters: P1: Frequency in Hz (11 digit)
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	B	P1	P1	P1	P1	P1	P1	P1	P1	
	<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>	<i>19</i>	<i>20</i>	
	P1	P1	P1	;							
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	B	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	B	P1	P1	P1	P1	P1	P1	P1	P1	
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	P1	P1	P1	;							

FR	Selects or reads the receiver VFO or M.CH mode										Parameters: P1 0: VFO-A 1: VFO-B 2: M.CH
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	R	P1	;							
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	R	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	R	P1	;							

FT	Selects or reads the transmitter VFO or M.CH mode										Parameters: P1 0: VFO-A 1: VFO-B 2: M.CH
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	R	P1	;							
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	R	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	F	R	P1	;							

IF	Retrieves the transceiver status										Parameters: P1: Frequency 11 digit P2: 5 spaces P3: Always 0 P4: Always 0 P5: Always 0 P6: Always 0 P7: Memory ch. Number 0-99 P8: 0:Rx 1:Tx P9: Operating Mode (See MD) P10: See FR, FT P11: Always 0 P12 0:Normal 1:Split P13: Always 0 P14: Always 0 P15: Space
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	I	F	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	I	F	P1	P1	P1	P1	P1	P1	P1	P1	
	<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>	<i>19</i>	<i>20</i>	
	P1	P1	P1	P2	P2	P2	P2	P2	P3	P3	
	<i>21</i>	<i>22</i>	<i>23</i>	<i>24</i>	<i>25</i>	<i>26</i>	<i>27</i>	<i>28</i>	<i>29</i>	<i>30</i>	
	P3	P3	P3	P4	P5	P6	P7	P7	P8	P9	
	<i>31</i>	<i>32</i>	<i>33</i>	<i>34</i>	<i>35</i>	<i>36</i>	<i>37</i>	<i>38</i>	<i>39</i>	<i>40</i>	
	P10	P11	P12	P13	P14	P14	P15	;			

MC	Recalls or reads the Memory channel										Parameters: P1: 0 or 1 P2: 00 to 99
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	M	C	P1	P2	P2	;					
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	M	C	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	M	C	P1	P2	P1	;					

MD	Recalls or reads the operating mode status										Parameters: P1: 1: LSB 2: USB 3: CW 5: AM
Set	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	M	D	P1	;							
Read	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	M	D	;								
Answer	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	
	M	D	P1	;							

MR	Reads the Memory channel data										P1:0 P2: 0 P3: 00 to 99 Memory No. P4: Frequency (11 digit) P5: Mode P6: Always 0 P7: Always 0 P8: Always 0 P9: Always 0 P10: Memory label, last 14 chars P11: Always 0 P12: Always 0 P13: Always 000000000 P14: Step size P15: Memory status B: used F: free P16: Memory label, first 8 chars
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	M	R	P1	P2	P3	P3					
Answer	1	2	3	4	5	6	7	8	9	10	
	M	R	P1	P2	P3	P3	P4	P4	P4	P4	
	11	12	13	14	15	16	17	18	19	20	
	P4	P4	P4	P4	P4	P4	P4	P5	P6	P7	
	21	22	23	24	25	26	27	28	29	30	
	P8	P8	P9	P9	P10	P10	P10	P10	P10	P10	
	31	32	33	34	35	36	37	38	39	40	
	P10	P10	P10	P10	P10	P10	P10	P10	P11	P12	
	41	42	43	44	45	46	47	48	49	50	
	P15	P16	P16	P16	P16	P16	P16	P16	P16	;	

MW	Store the data to the Memory channel										P1:0 P2: 0 P3: 00 to 99 Memory No. P4: Frequency (11 digit) P5: Mode P6: Always 0 P7: Always 0 P8: Always 0 P9: Always 0 P10: Memory label, last 14 chars P11: Always 0 P12: Always 0 P13: Always 000000000 P14: Step size P15: Memory status B: used F: free P16: Memory label, first 8 chars
Set	1	2	3	4	5	6	7	8	9	10	
	M	W	P1	P2	P3	P3	P4	P4	P4	P4	
	11	12	13	14	15	16	17	18	19	20	
	P4	P4	P4	P4	P4	P4	P4	P5	P6	P7	
	21	22	23	24	25	26	27	28	29	30	
	P8	P8	P9	P6	P10	P10	P10	P10	P10	P10	
	31	32	33	34	35	36	37	38	39	40	
	P10	P10	P10	P10	P10	P10	P10	P10	P11	P12	
	41	42	43	44	45	46	47	48	49	50	
	P15	P16	P16	P16	P16	P16	P16	P16	P16	;	
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

RX	Sets the receiver function status										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
	R	X	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	
	R	X	P1	;							

TX	Sets or reads the TF-SET function status										Parameters: P1 0 P2 0
Set	1	2	3	4	5	6	7	8	9	10	
	T	X	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	
	T	X	P2	;							

7.3.2 Dummy commands table

The following commands have a dummy implementation.

AC	Sets or reads the internal antenna tuner status DUMMY IMPLEMENTATION										Parameters: P1: Always 00 P2: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	A	C	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	A	C	P1	P1	P2	;					

AG	Sets or reads the AF gain DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 000
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the Auto Information (AI) function ON/ OFF DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
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	Selects the antenna connector ANT1/ ANT2 DUMMY IMPLEMENTATION										Parameters: P1: Always 1
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the Beat Canceller function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	B	C	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	B	C	P1	;							

BY	Reads the busy signal status DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	B	Y	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	B	Y	P1	P2	;						

CA	Sets and reads the CW Auto Zero-beat function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	C	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	A	P1	;							

CN	Sets and reads the CTCSS tone number DUMMY IMPLEMENTATION										Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	C	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	A	P1	P1	;						

CT	Sets and reads the CTCSS function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	C	T	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	C	T	P1	;							

DL	Sets and reads the Digital Noise Limiter (DNL) function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the Extension Menu DUMMY IMPLEMENTATION										Parameters: P1: 000 - 060: Menu No. P2: Always 00 P3: Always 0 P4: Always 0 P5: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	E	X	P1	P1	P1	P2	P2	P3	P4	;	
Answer	1	2	3	4	5	6	7	8	9	10	
	E	X	P1	P1	P1	P2	P2	P3	P4	P5	
	11	12	13	14	15	16	17	18	19	20	
	P5	;									

FS	Selects or reads the Fine Tuning function status DUMMY IMPLEMENTATION										Parameters: P1 Always 0
Set	1	2	3	4	5	6	7	8	9	10	
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	Selects or reads the DSP filtering bandwidth DUMMY IMPLEMENTATION										Parameters: P1 Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
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	Selects or reads the DSP filtering bandwidth DUMMY IMPLEMENTATION										Parameters: P1 Always 000
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	G	T	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	G	T	P1	P1	P1	;					

IS	Sets and reads the IF SHIFT function status DUMMY IMPLEMENTATION										Parameters: P1: "+" P2: Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets and reads the CW electric keyer's keying speed DUMMY IMPLEMENTATION										Parameters: P1: 010
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads Menu A or B DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	M	F	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	M	F	P1	;							

MG	Sets or reads the Microphone gain status DUMMY IMPLEMENTATION										Parameters: P1: Always 000
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	M	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	M	G	P1	P1	P1	;					

NB	Set or reads the Noise Blanker (NB) function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	N	B	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	N	B	P1	;							

NL	Set or reads the NB (Noise Blanker) level DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
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	;					

NR	Sets or reads the Noise Reduction (NR) function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
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	;							

PA	Sets or reads the pre-amplifier function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	P	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	A	P1	P2	;						

PC	Sets or reads the output power DUMMY IMPLEMENTATION										Parameters: P1: Always 005
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	P	C	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	C	P1	P1	P1	;					

PR	Sets or reads the Speech Processor function ON/ OFF DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	P	R	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	R	P1	;							

PS	Sets or reads the Power ON/ OFF status DUMMY IMPLEMENTATION										Parameters: P1: Always 1
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	P	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	S	P1	;							

QR	Sets or reads the Quick Memory channel data DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the Attenuator function status DUMMY IMPLEMENTATION										Parameters: P1: Always 00 P2: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or read the RF gain status DUMMY IMPLEMENTATION										Parameters: P1: Always 000
Set	1	2	3	4	5	6	7	8	9	10	
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	;					

RL	Sets or reads the Noise Reduction level DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
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	;							

SD	Sets or reads the CW Break-in time delay DUMMY IMPLEMENTATION										Parameters: P1: Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the DSP filter settings DUMMY IMPLEMENTATION										Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the DSP filter settings DUMMY IMPLEMENTATION										Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
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	;						

SM	Reads the S-meter status DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	S	M	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	S	M	P1	P2	P2	P2	P2	;			

SQ	Sets and reads the squelch level DUMMY IMPLEMENTATION										Parameters: P1: Always 0 P2: Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the Tone frequency number DUMMY IMPLEMENTATION										Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	T	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	N	P1	P1	;						

TO	Sets or reads the Tone function ON/ OFF DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	T	O	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	O	P1	;							

TS	Sets or reads the TF-SET function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	T	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	S	P1	;							

VD	Sets or reads the VOX delay time DUMMY IMPLEMENTATION										Parameters: P1: Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
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	Sets or reads the VOX GAIN DUMMY IMPLEMENTATION										Parameters: P1: Always 000
Set	1	2	3	4	5	6	7	8	9	10	
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	;					

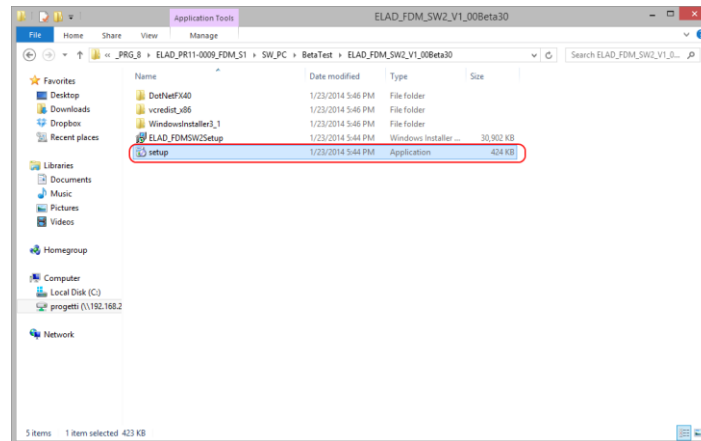
VX	Sets or reads the VOX function status DUMMY IMPLEMENTATION										Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	V	X	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	X	P1	;							

8 Software & Driver Installation

8.1 Software installation in Windows 8 Windows 7 and Windows XP

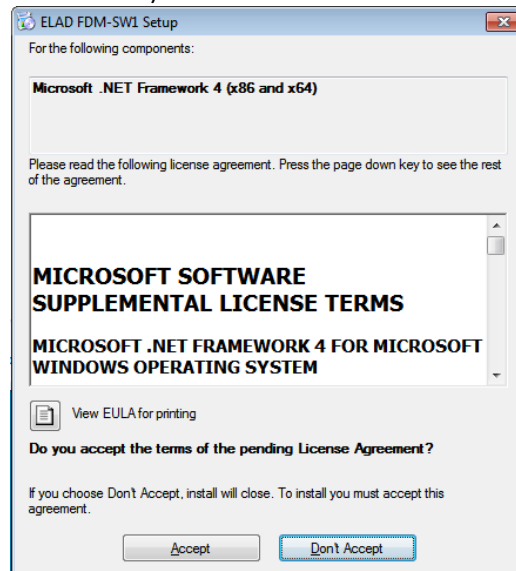
8.1.1 First-time install in Windows 8 and Windows 7

Double-click the file “setup.exe” in the CD .

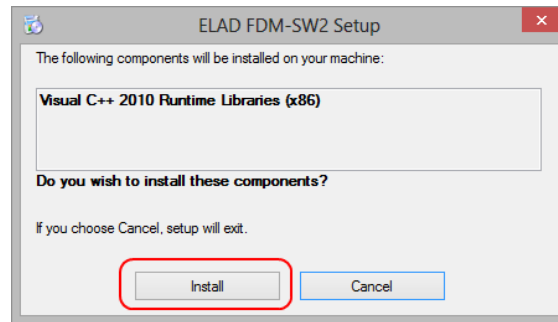


The windows installer first installs the prerequisites:

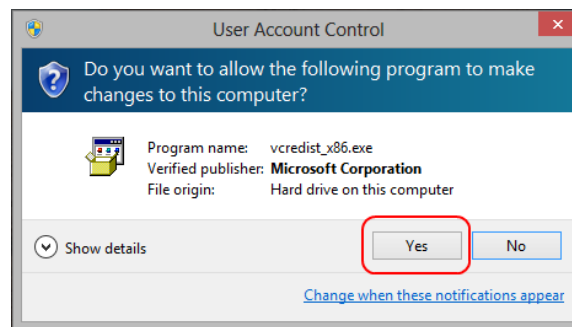
- Microsoft VC++ 2010 Runtime libraries
 - Microsoft .NET Framework 4.0 (Only for Windows 7)
- and then the FDM-SW2 software.
- Click on “Accept” (Only for Windows 7)



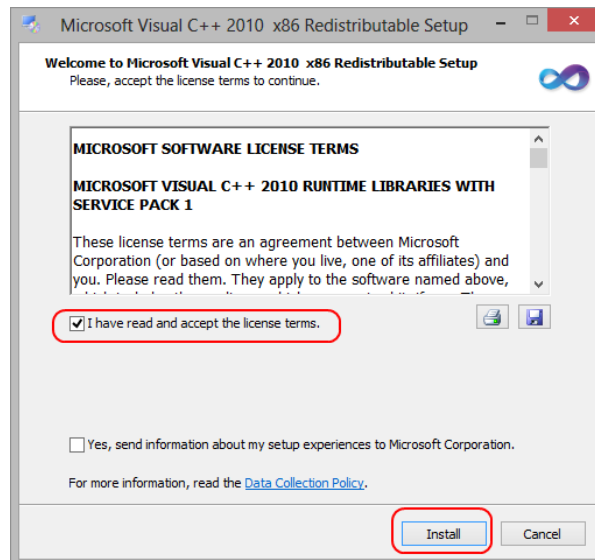
Click on “Install”



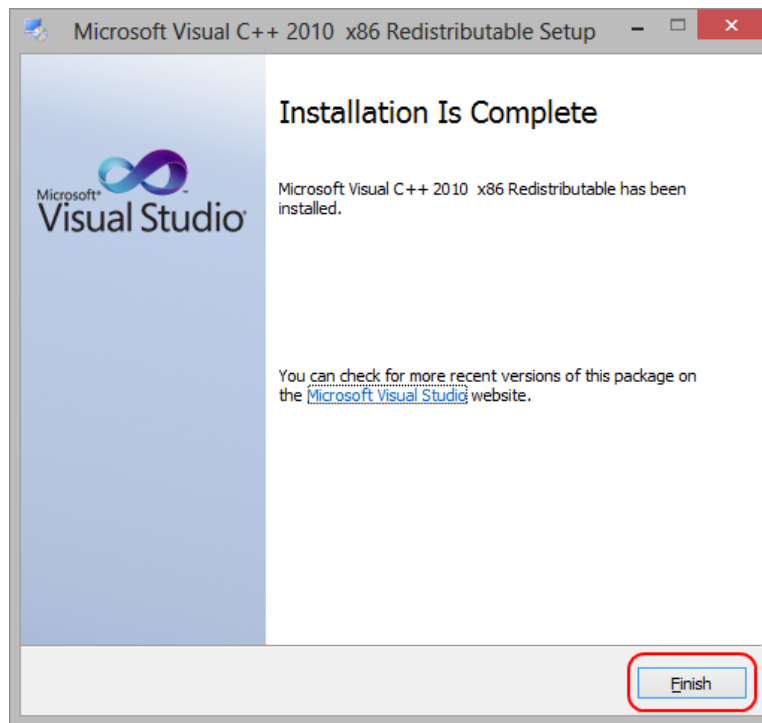
Click on “Yes”



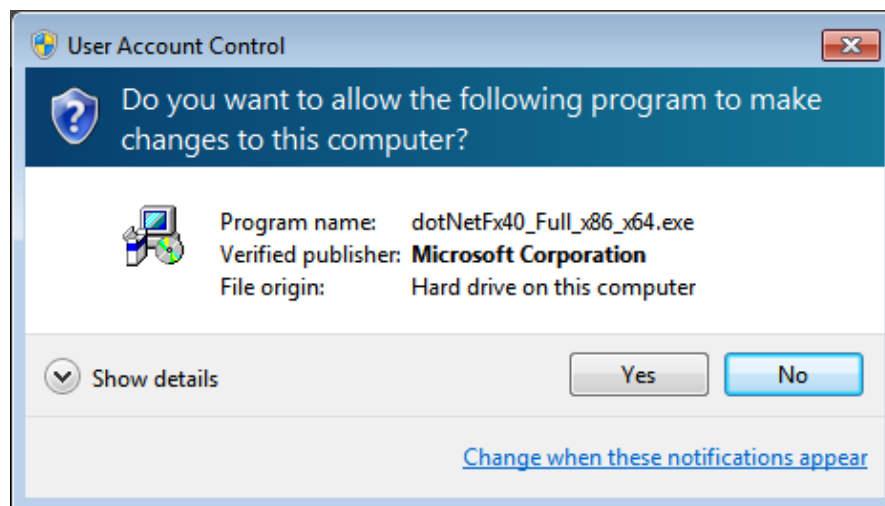
Click on Install



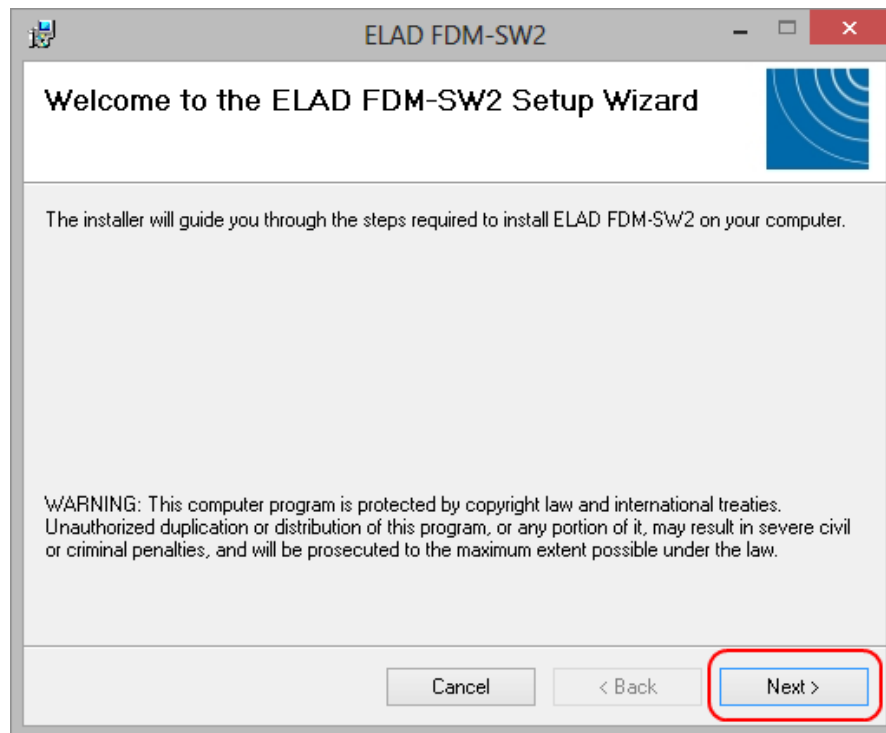
Microsoft Visual C++ 2010 x86 Redistributable installation is complete, click on “Finish”



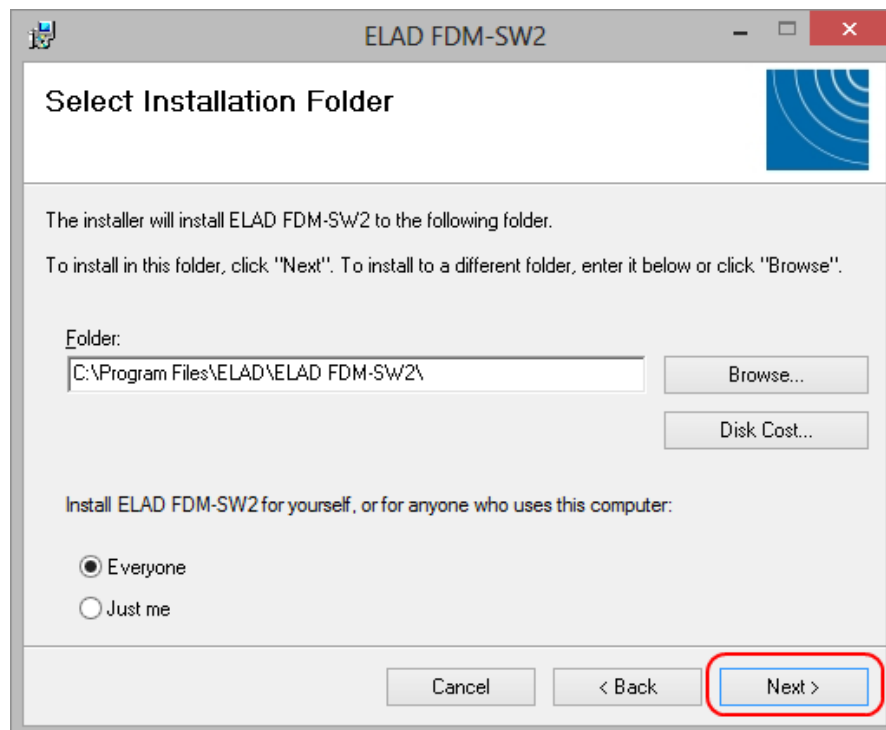
Click on “Yes” to start the installation of the .Net Framework 4.0 (Only for Windows 7)



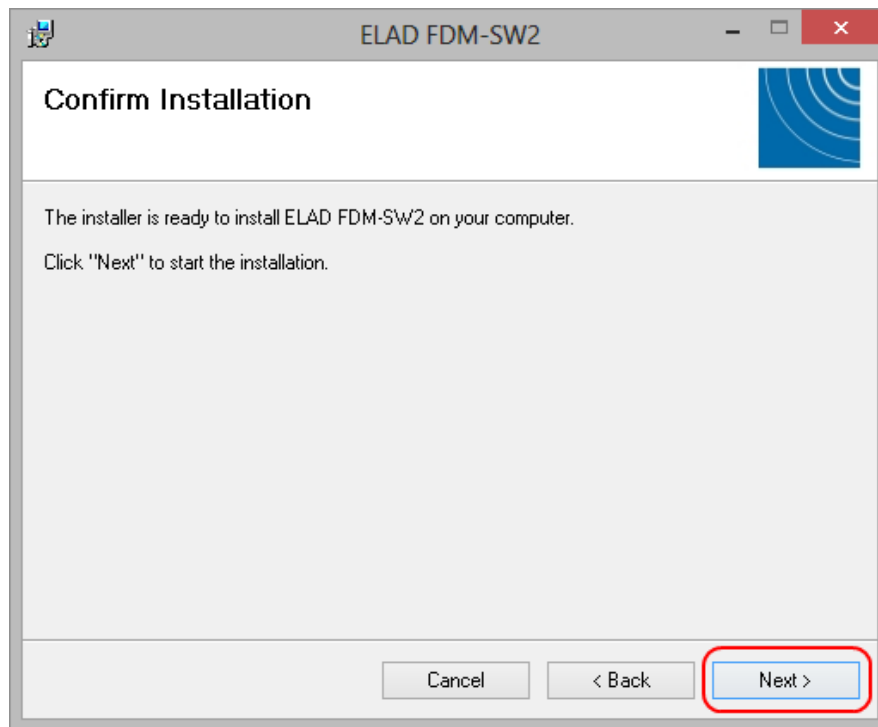
Click to “Next” to start the FDM-SW2 software installation



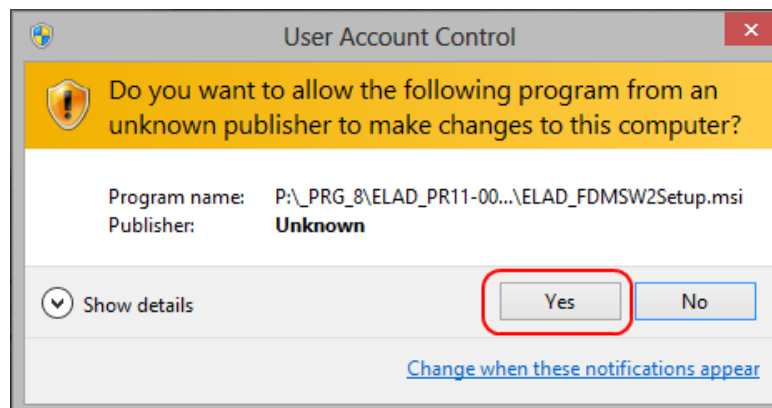
Chose the installation folder, then click on “Next”



Click on “Next”

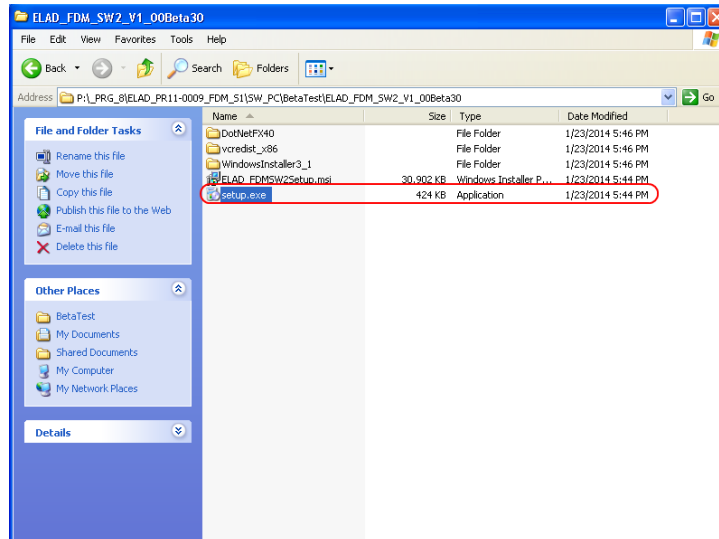


Click on “Yes”

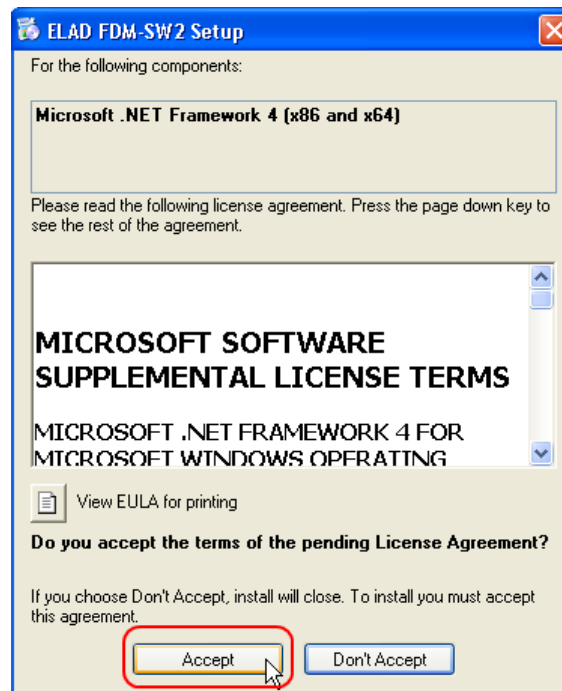


8.1.2 First-time install in Windows XP

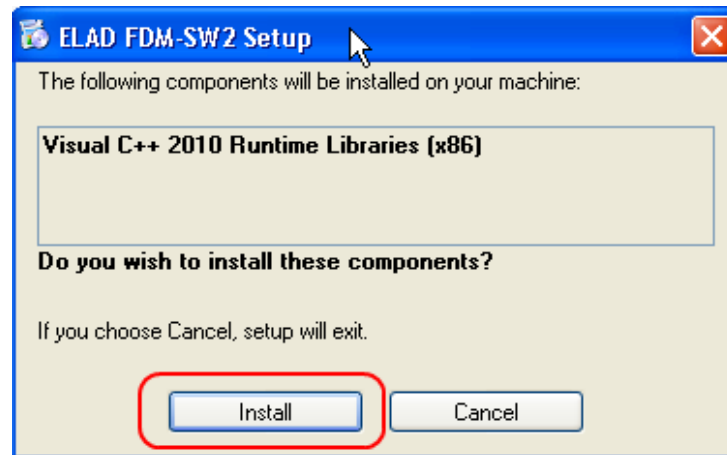
Double-click the file “setup.exe” in the installation folder.



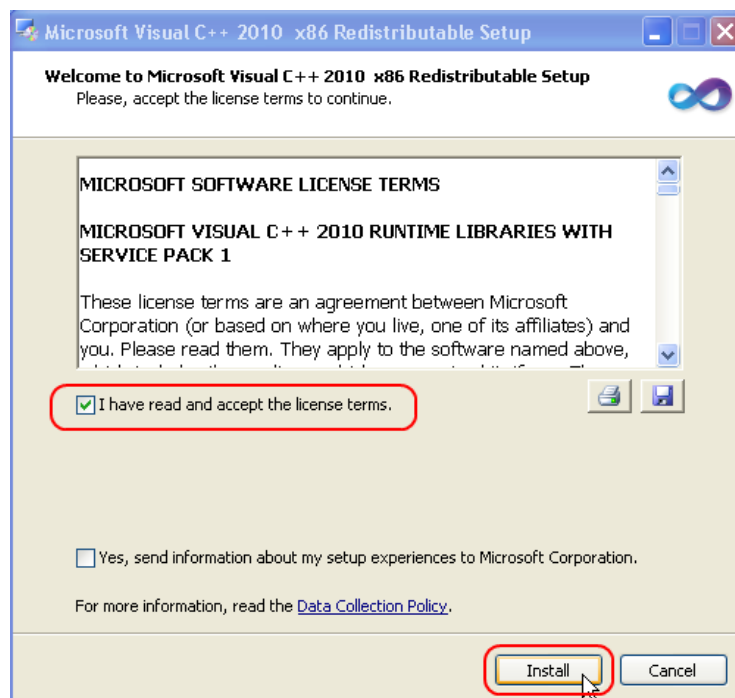
Click on “Accept”



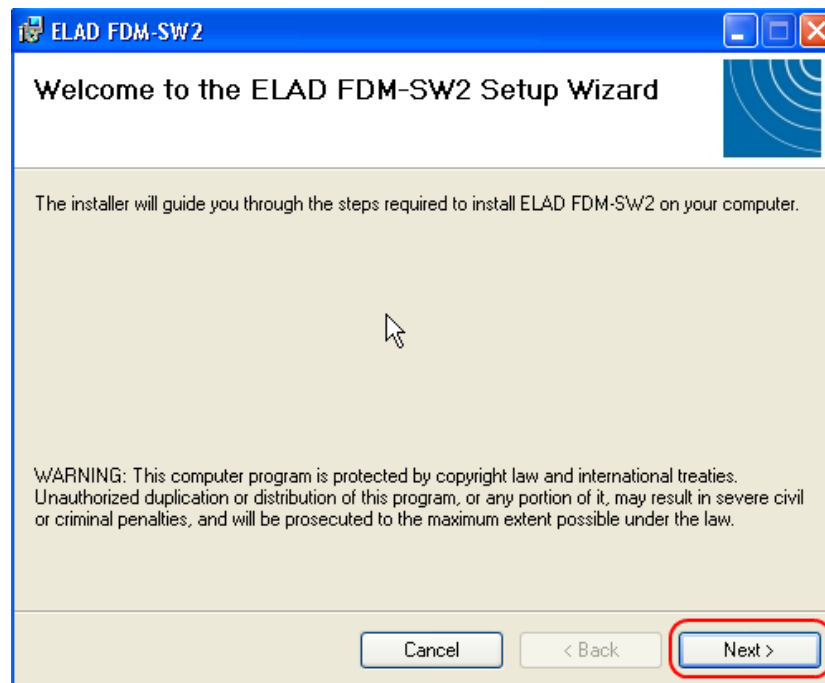
Click on “Install”



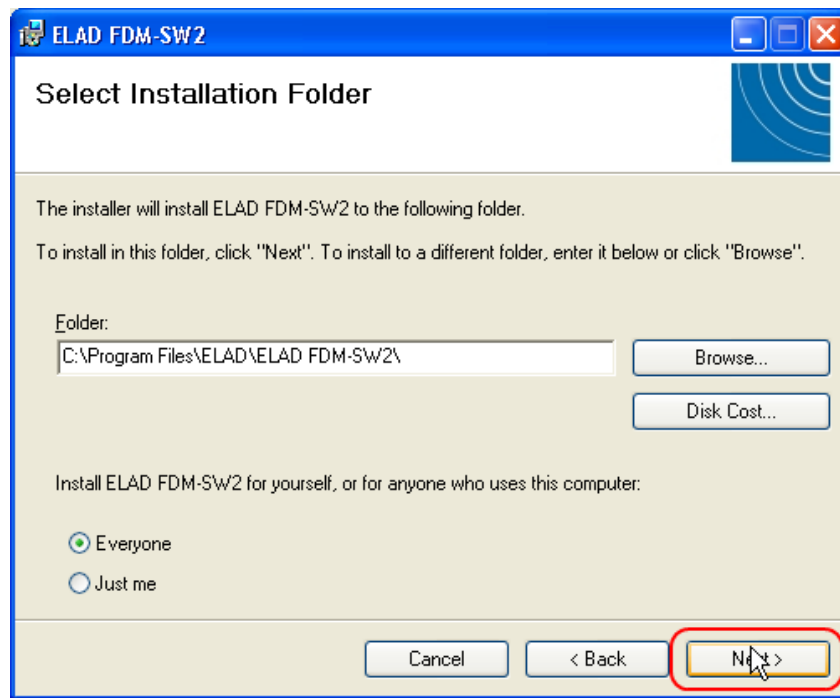
Click on “Install”



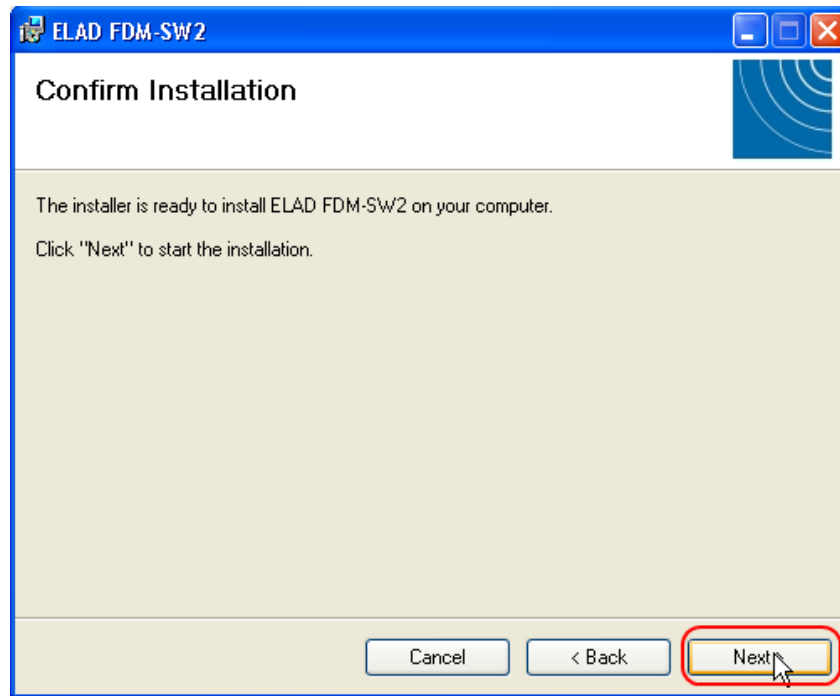
Click on Next to install the FDM-SW2 software



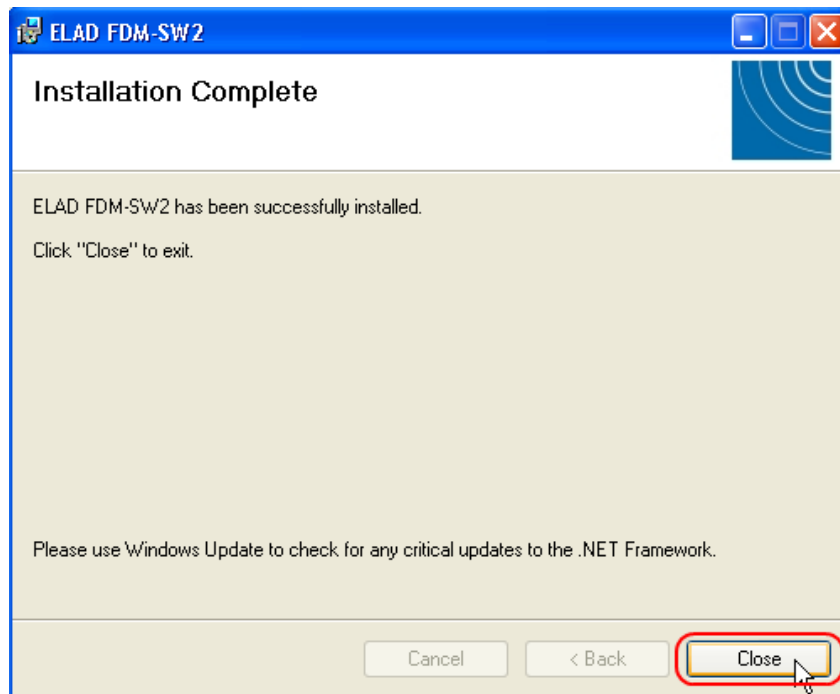
Select the installation folder, then click on "Next"



Click on “Next”



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.

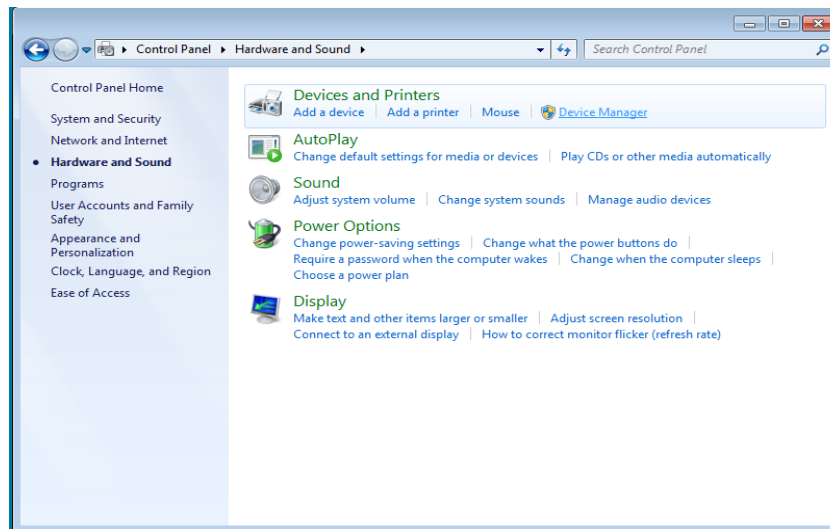
8.2 FDM-DUO USB driver

8.2.1 FDM-DUO USB driver installation in Windows 8 and Windows 7

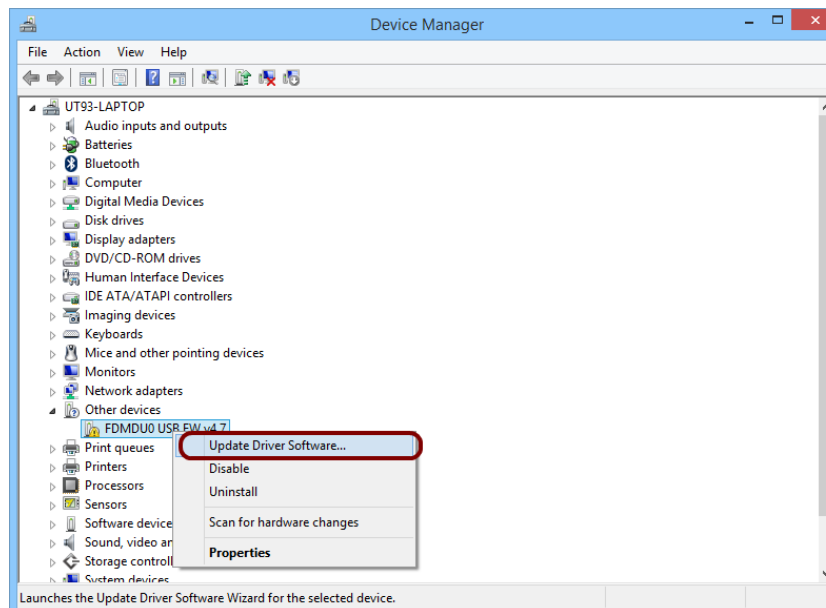
8.2.1.1 *First driver installation*

To install ELAD FDM-DUO driver, connect FDM-DUO 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:

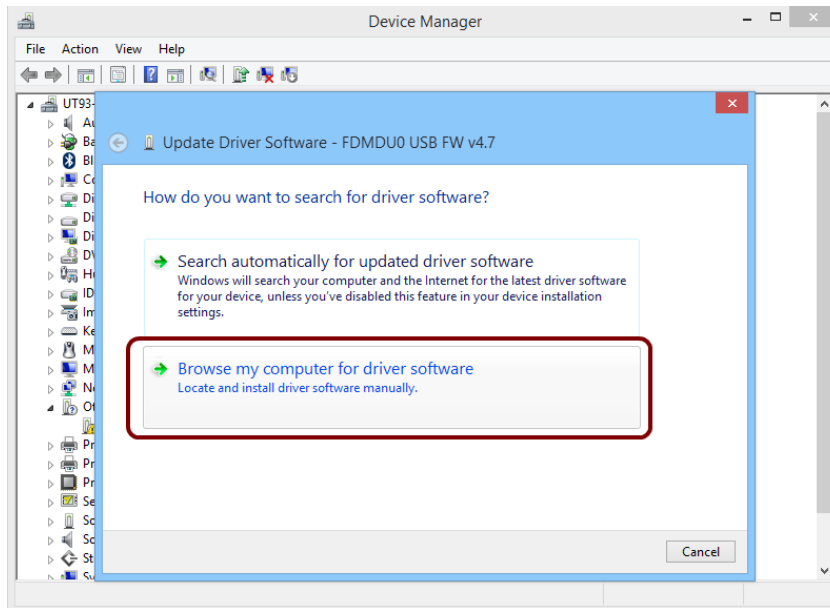
Open **Control Panel** from **Start** menu, select “System” and “Device Manager”. Expand “Other Devices” node: FDM-DUO.



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



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



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

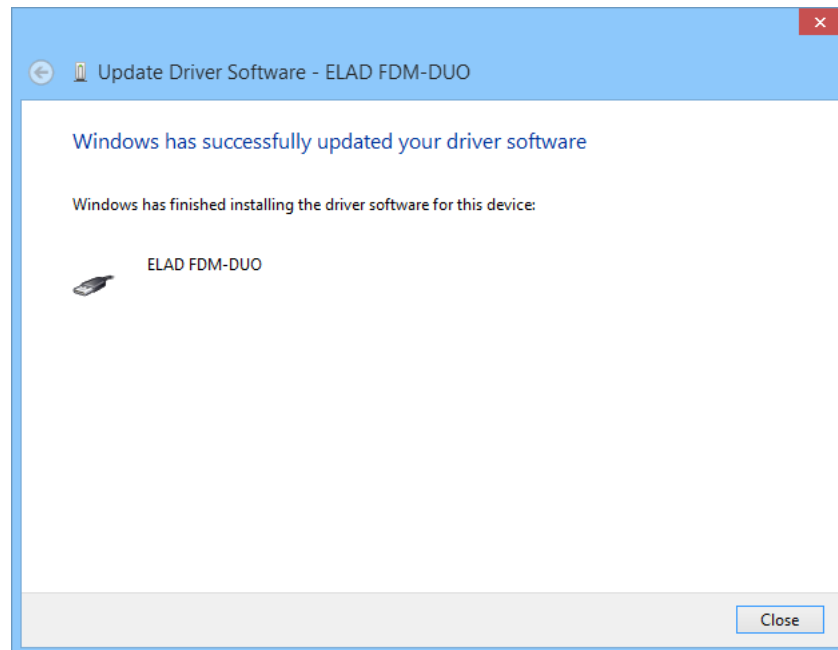
For 32 bit system select the folder: **C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver**

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-DUO device on the same USB socket.



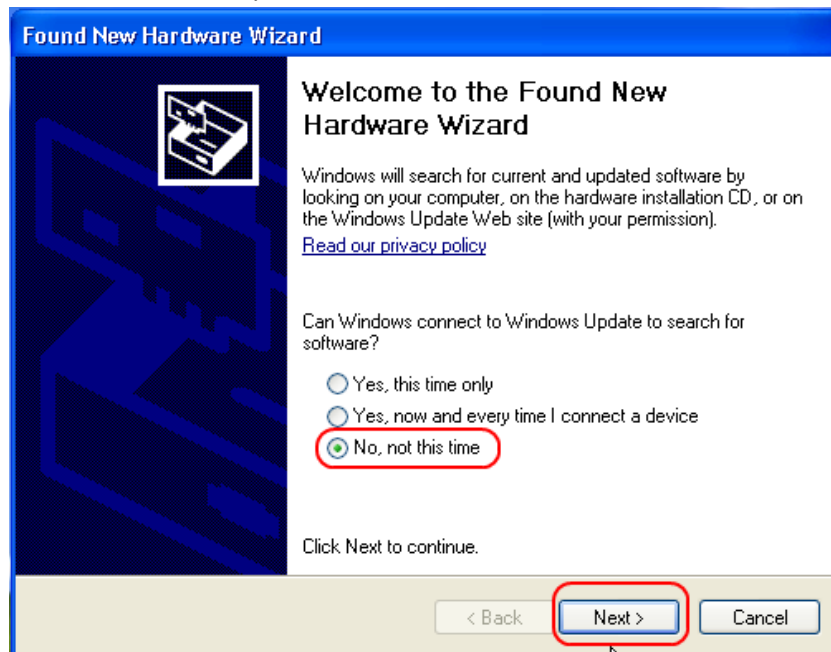
Now ELAD FDM-DUO USB driver is installed on your PC.

8.2.2 FDM-S2 USB driver installation in Windows XP

8.2.2.1 First driver installation

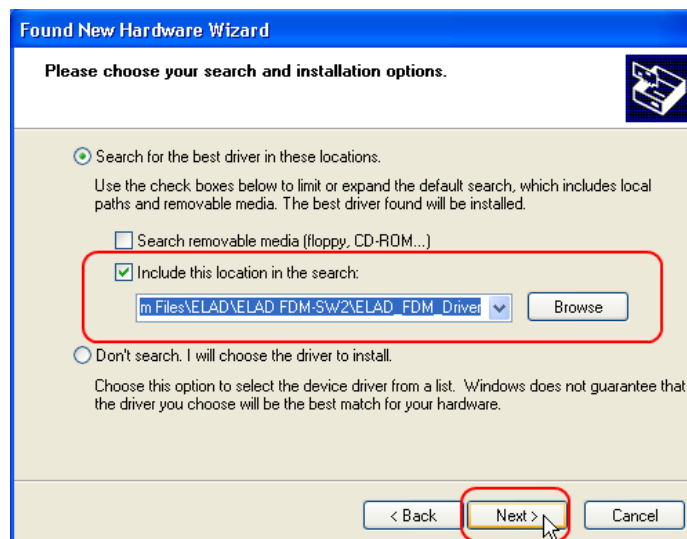
To install ELAD FDM-DUO driver, connect FDM-DUO USB RX port to a USB 2.0 socket on PC and power on the device. Windows XP detects the new hardware and starts the hardware installation wizard. Then, next steps to install FDM-DUO driver are listed below:

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

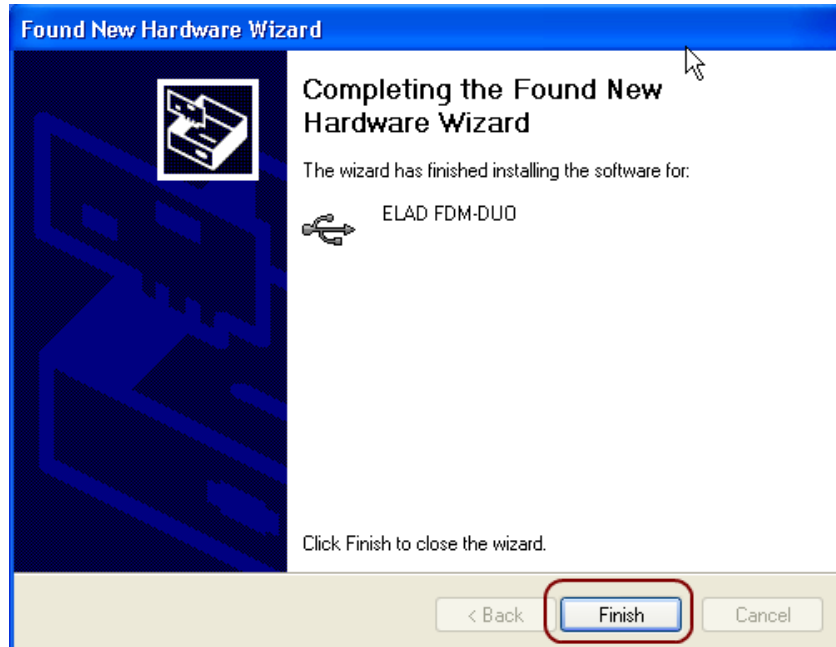


Select “Install from a list or specific location (Advanced)” and “Next”.

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”.



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

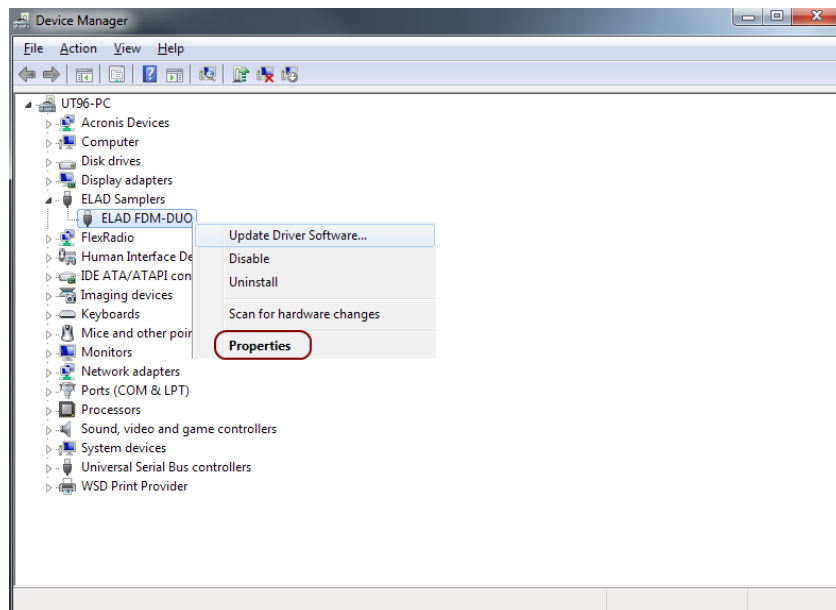


Now ELAD FDM- DUO driver is installed on your PC.

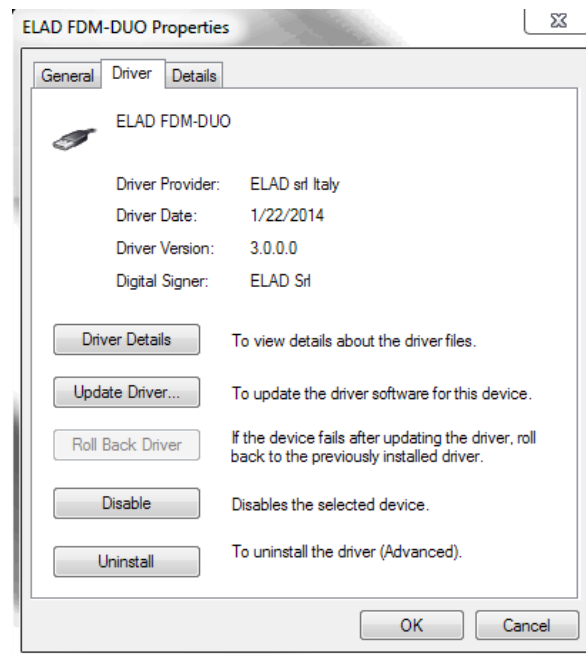
8.2.2.1 *Driver installation verify in Windows 8 and Windows 7*

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”.



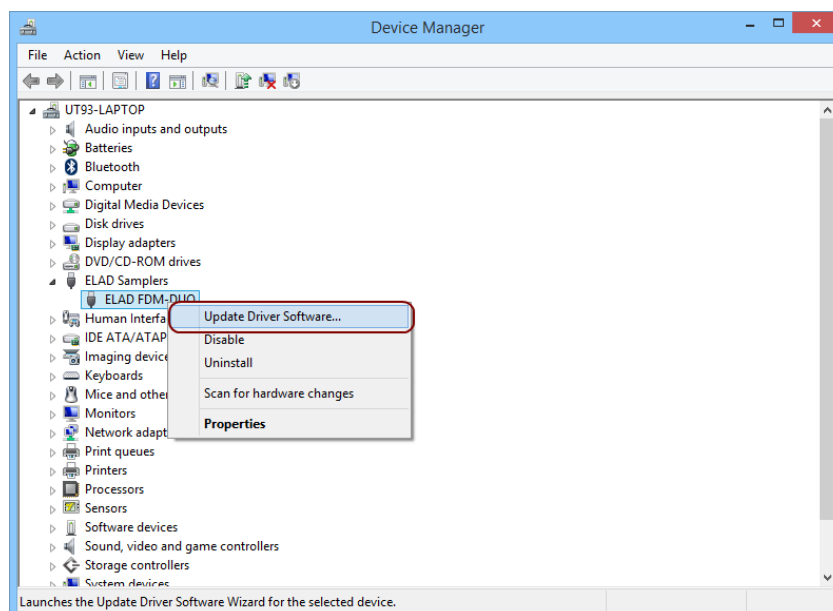
When dialog box opens, select “Driver” label: you must read provider name, current driver release date and current driver version. The figure shows an old FDM- DUO driver version.



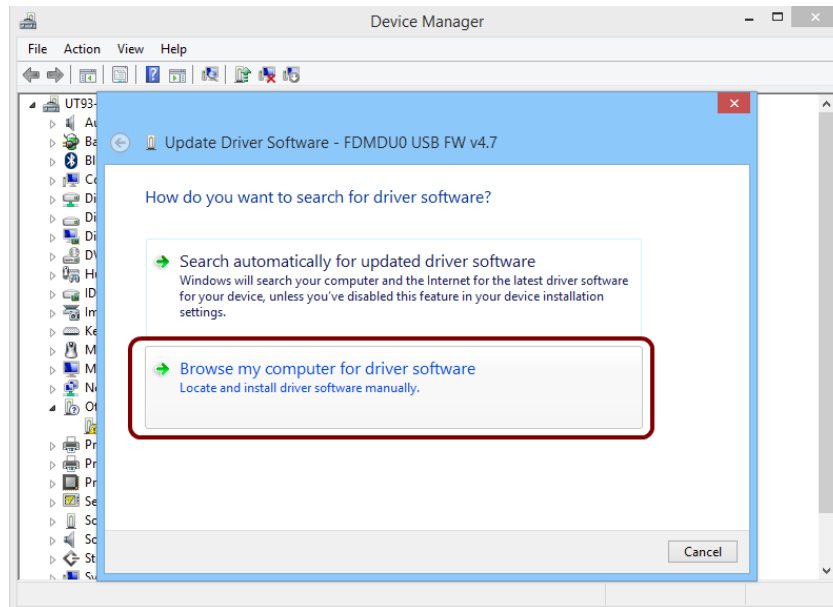
8.2.2.2 *Manual driver update*

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”.

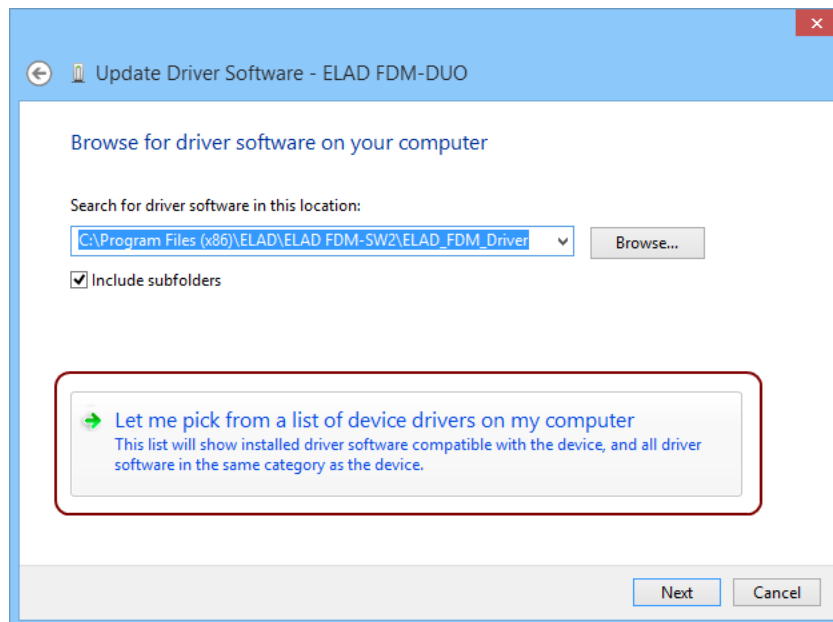
Under “ELAD samplers” list select “ELAD FDM-DUO”, right click on it and execute “Update driver”.



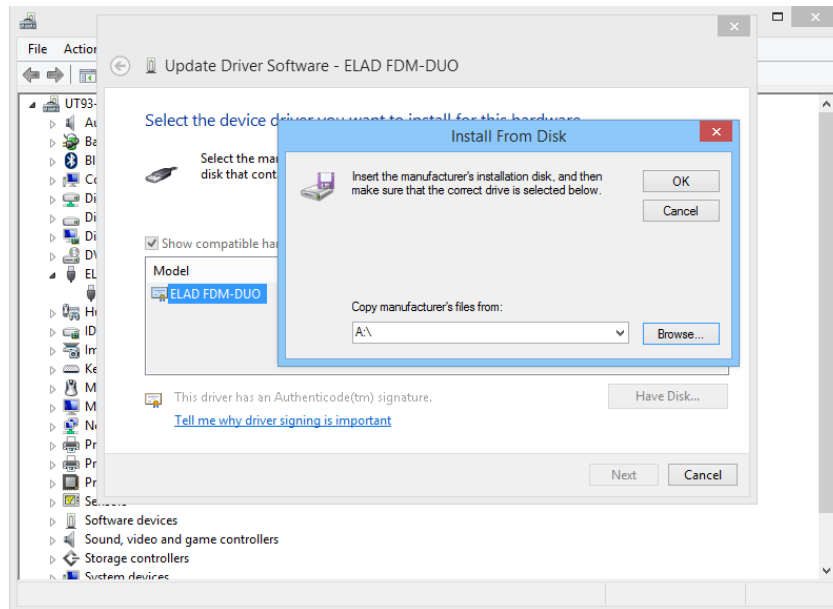
When Windows starts the installation procedure, select the last option “Browse my computer for driver software”.



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”.

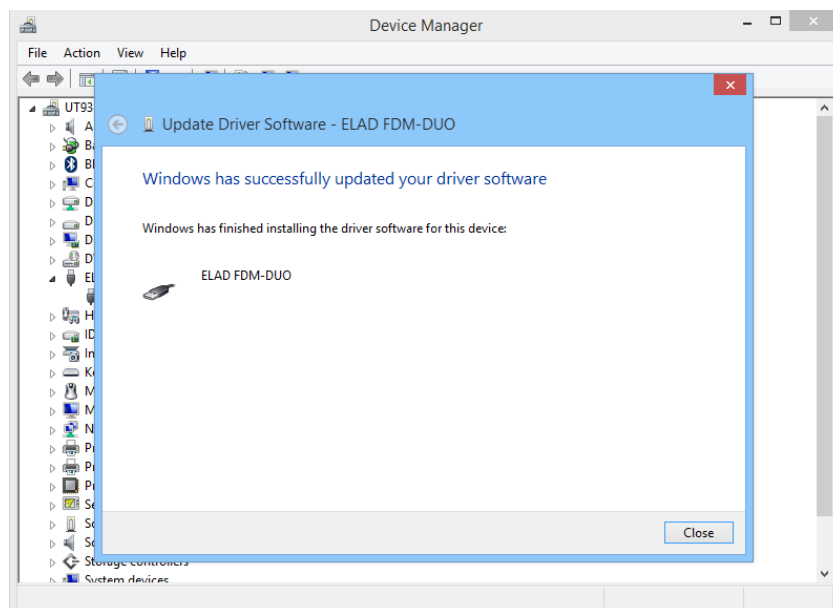


Verify that “Show compatible hardware” option is checked and ELAD FDM-DUO is selected: then click on “Have a Disk”. In this way the manual driver update is enabled. Don’t click “Next”.

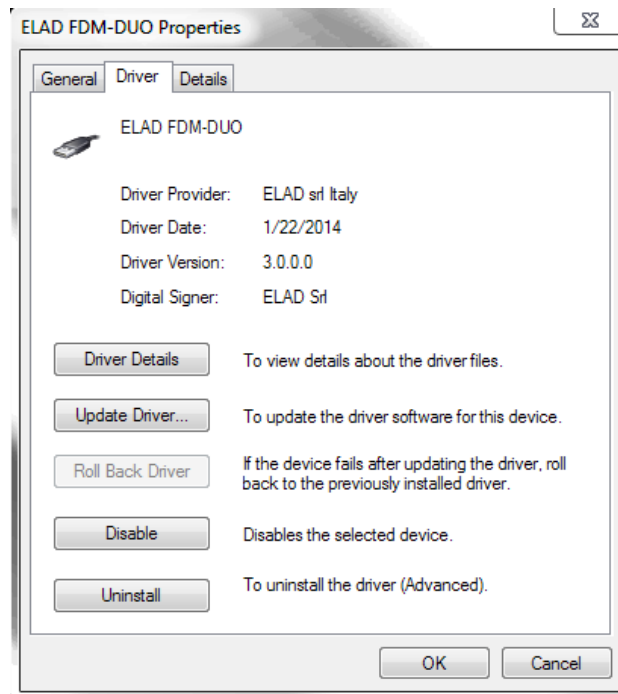


Click on “Browse” and search for FDM-DUO driver update folder location; then open winusb_fdmsampler.inf file. Click “OK” and then “Next”.

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



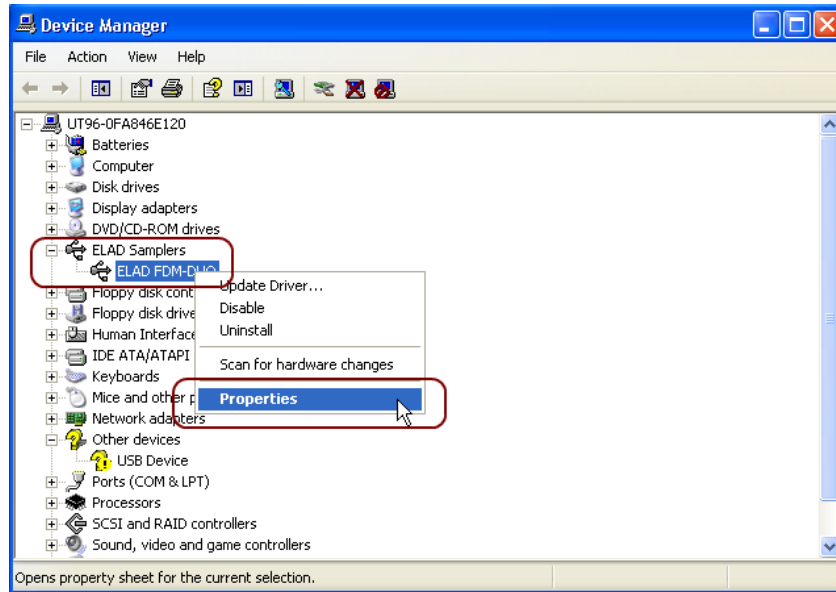
To verify that a correct update is done, enter “Device Manager” in Control Panel; under “ELAD samplers” label select ELAD FDM-DUO driver (see sub-chapter [Driver installation verify in Windows 8 and Windows 7](#)): right click on it and choose “Properties”: select “Driver” label to visualize the last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



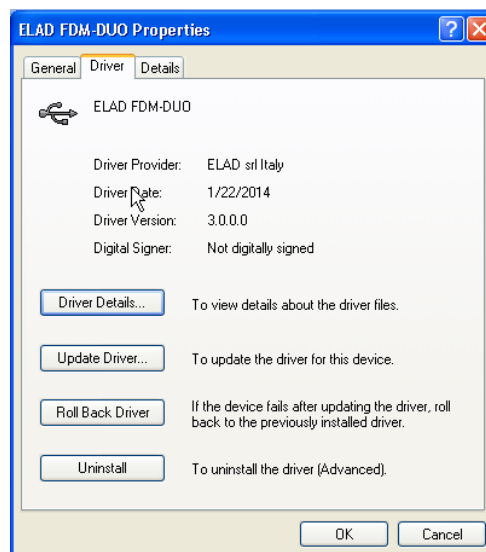
8.2.2.3 *Driver installation verify in Windows Xp*

To verify FDM-DUO 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”.



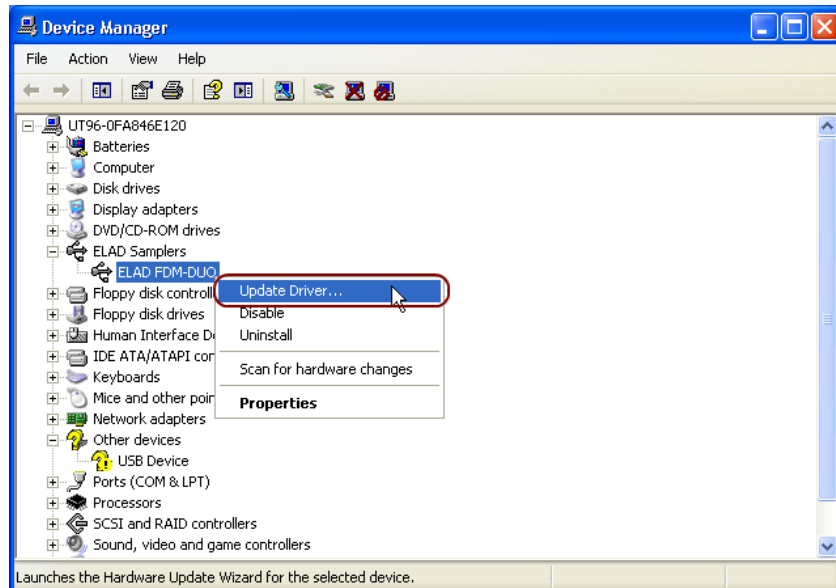
When dialog box opens, select “Driver” label: you must read provider name, current driver release date and current driver version. The old ELAD FDM-DUO driver version is shown in figure below as example.



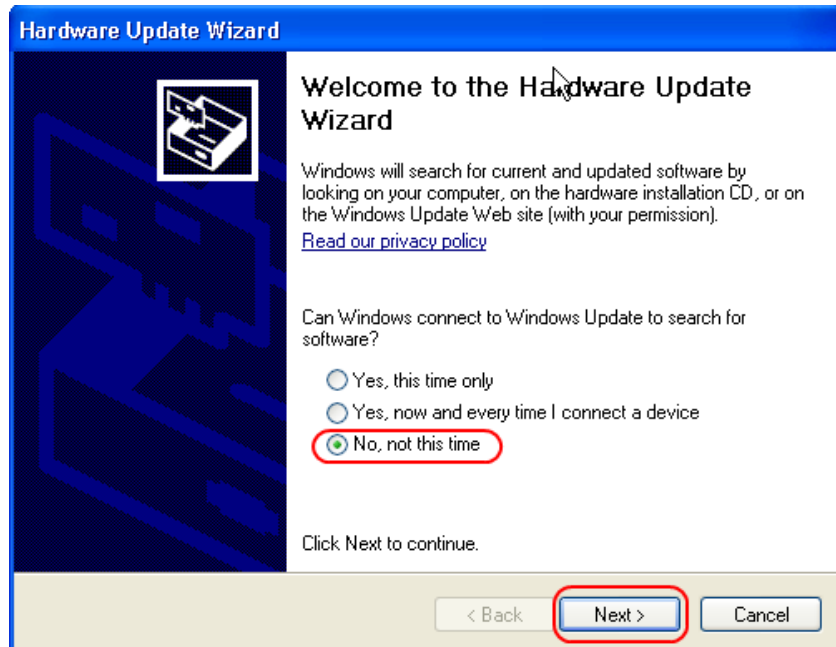
8.2.2.4 *Manual driver update in Windows Xp*

To update FDM-DUO 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 ”

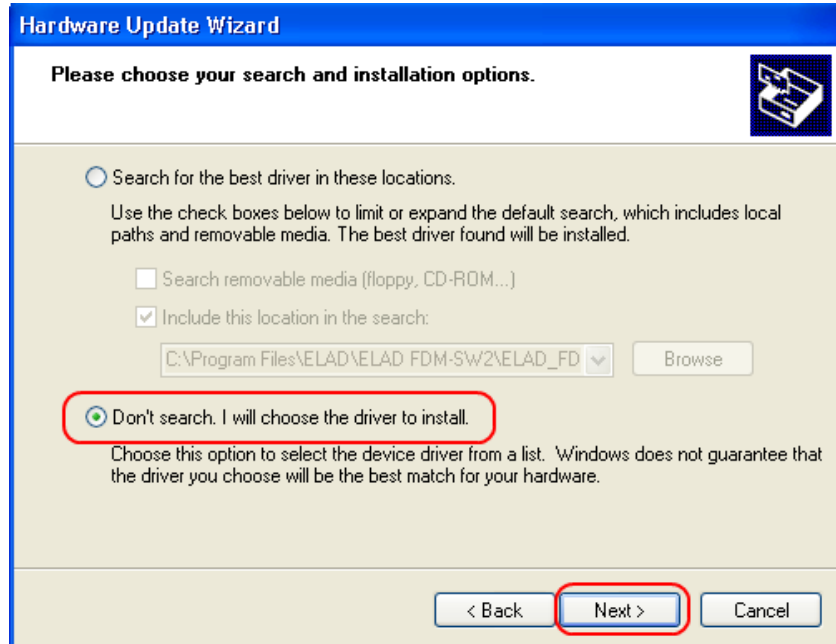


Now Windows XP launches the hardware update wizard: select the last option “No, not this time” and “Next”.

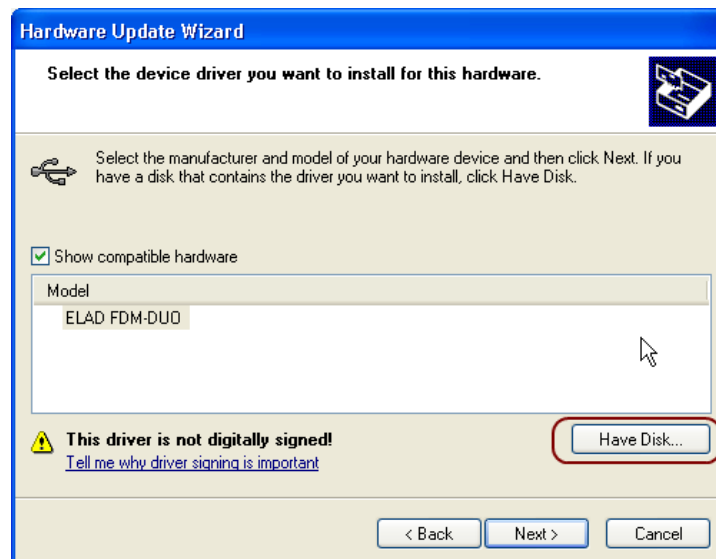


At next step select “Install from a list or specific location (Advanced)” and “Next”.

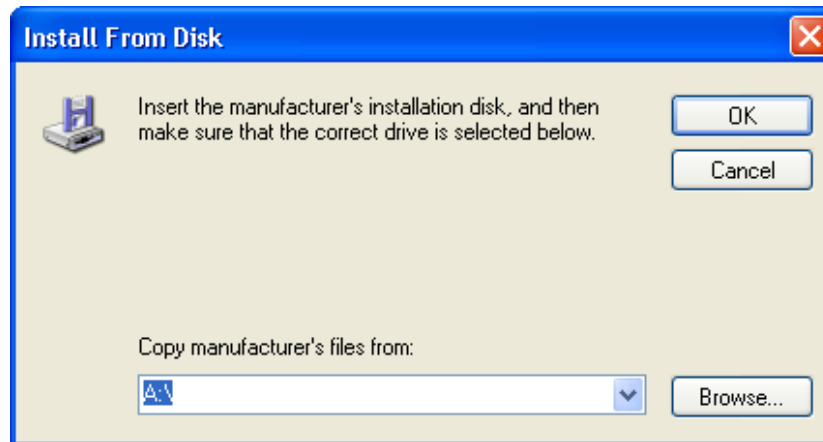
Then, disable all check-boxes that the system automatically sets and choose the last option for manual driver update, as depicted in figure. Select “Next”.



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

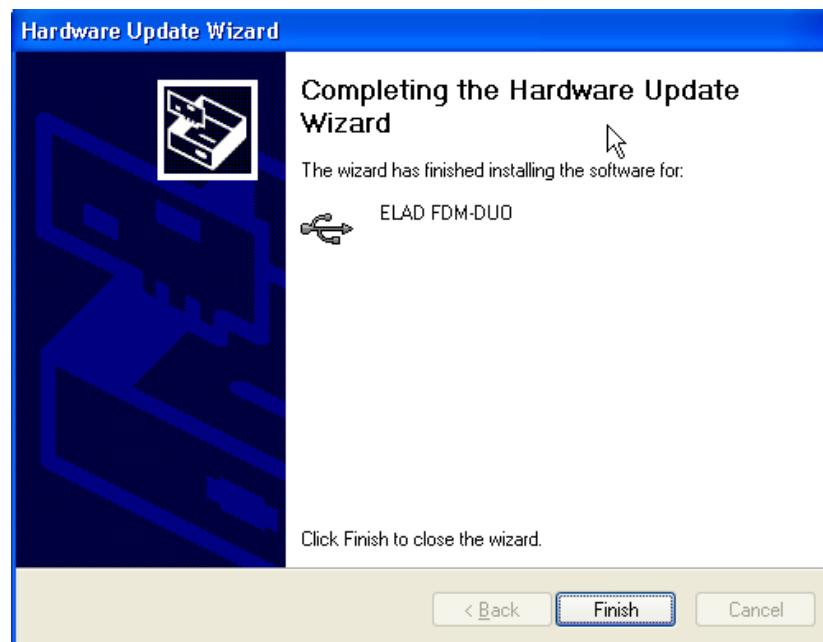


Click on “Browse” and search for the FDM-DUO driver update folder location; then open `winusb_fdmsampler.inf` file, as depicted in figure. Click “OK” and then “Next”.

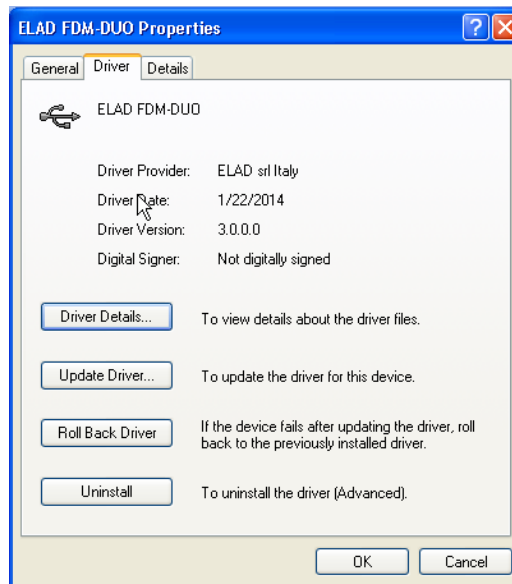


Now driver update starts: at next dialog box select “Continue Anyway” and ignore the warning.

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

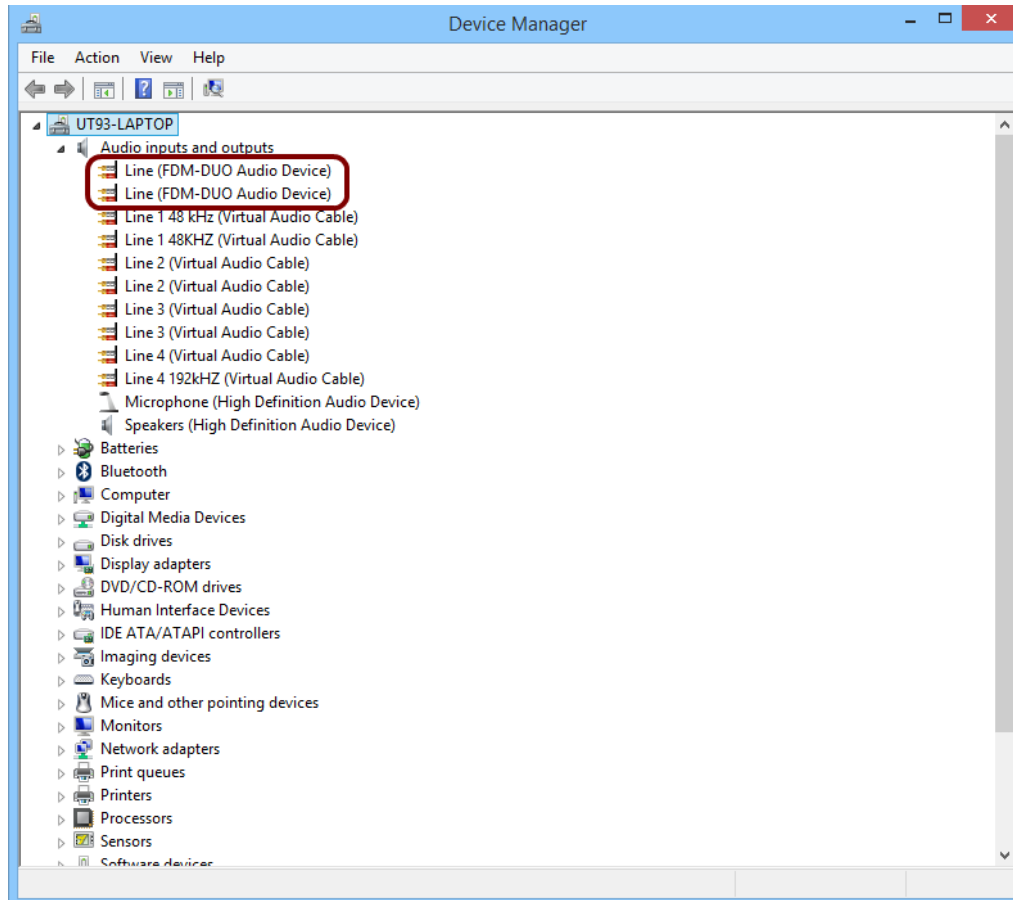


To verify that a correct update is done, enter “Device Manager” from **Control Panel**; under “ELAD Samplers” list, select ELAD FDM-DUO driver (see chapter [Driver installation verify in Windows Xp](#)) right click on it and choose “Properties”. Select “Driver” label to visualize the last driver version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



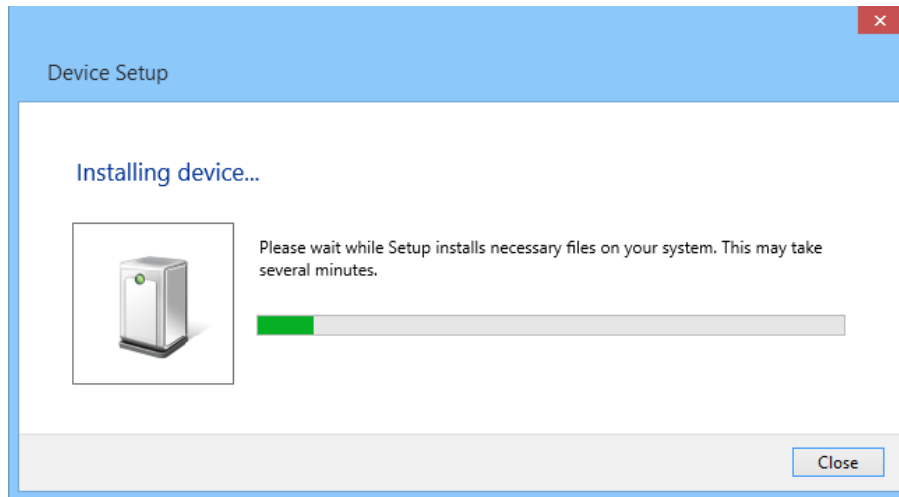
8.2.3 FDM-DUO USB sound card

Connect the TX USB port of FDM-DUO to a USB 2.0 port of the PC and power on the device. Then open the PC device manager. No driver installation is required for this device, just expand the node Audio inputs and outputs and check the FDM-DUO audio device.

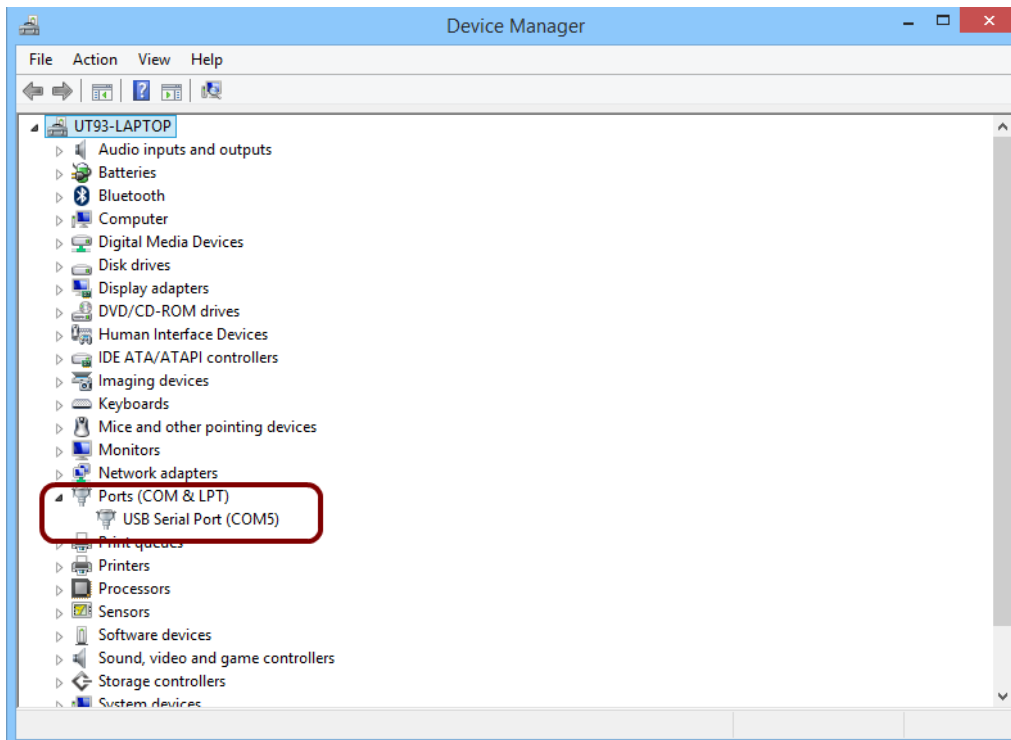


8.2.4 FDM-DUO USB CAT Serial port

Connect the CAT USB port of FDM-DUO 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-DUO USB serial port in the node Ports (COM & LPT).



9 Firmware update

The following section describes how to update the firmware of the various components of the FDM-DUO. The latest versions for the User interface, Rx demodulator, Tx modulator, USB interface and FPGA are available here: <http://sdr.eladit.com/FDM-DUO/Firmware Releases/>.

To ensure that the transceiver still working properly, please download the full update compressed archive named ELAD_FDM_DUO_Update_YYYY_MM_DD.zip (where YYYY_MM_DD are year, month and day of the release date). In this archive you can find the latest version of each firmware and also the latest version of the ELAD FDM-SW2 software.

TO AVOID UPDATE ERRORS, PLEASE UPDATE THE “USER INTERFACE” FIRMWARE AFTER THE OTHERS FIRMWARE UPDATES

9.1 User interface firmware update

Download the latest version of the UI firmware

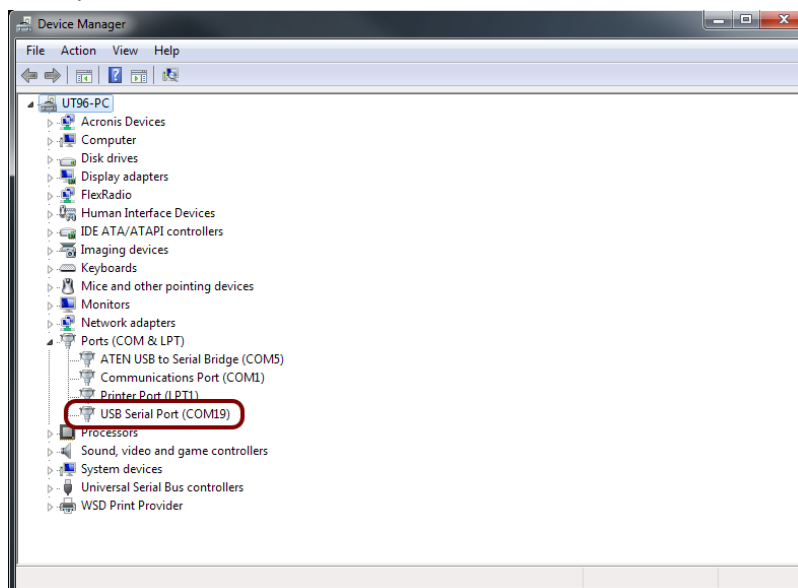
DISABLE ANY ANTIVIRUS PROGRAM BEFORE START THE FIRMWARE UPDATE

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

Turn on the ELAD FDM-DUO and connect the CAT USB serial port to a USB 2.0 port of your PC. Enable the FDM-DUO to perform a UI firmware update:

- Press the **MENU F5** key and select the menu “60 SERVICE”.
- Press E2 to enter the setting, turn E2 to select ON then press E2 to store the setting.
- Go to menu “62 UI Update”.
- Press E2 to enter the setting, turn E2 to select YES then press E2 to store the setting.

You need to identify the CAT USB COM port. Open the windows “Device Manager” and expand the COM port node. The CAT USB port is listed as “USB Serial Port”.



In this case the CAT USB port is the COM19

Run Flash Magic software.

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:

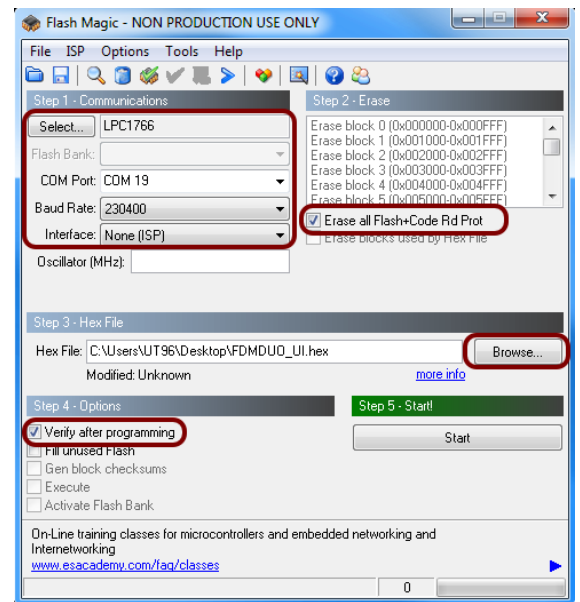
- Check “Erase all Flash+Code Rd Prot”

In the “Step 3 – Hex File” section:

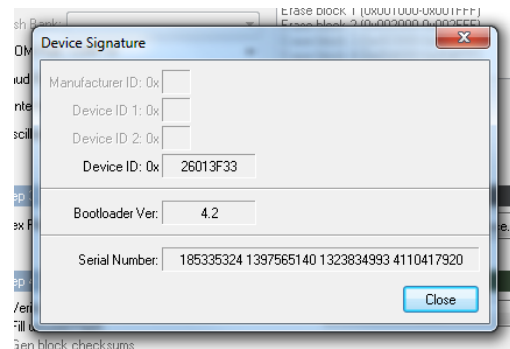
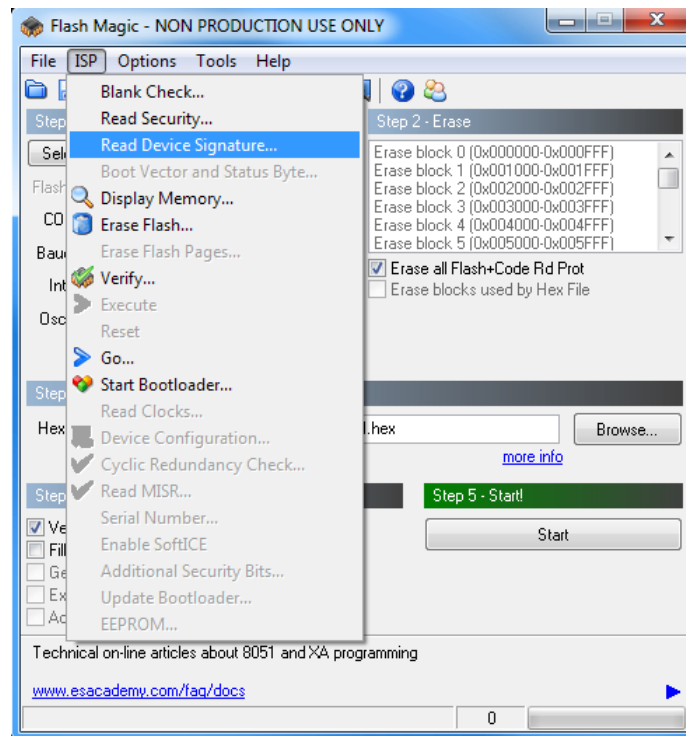
- Click on Browse and select the update “.hex” file

In the “Step 4 – Options” section:

- Check “Verify after programming



Check the communication with the FDM-DUO. Click on ISP and click on “Read Device Signatures”. If the communication with the FDM-DUO is ok, a new windows with some device information is opened.



If the communication is Ok, click on close and in the Flash Magic main window, click on Start to begin the programming. Wait until the end of the process, then turn off and restart the FDM-DUO.

9.2 RX demodulator and TX modulator firmware update

To update the RX demodulator and TX modulator firmware, you must remove the FDM-DUO top cover. Remove the four screws in the FDM-DUO chassis bottom as shown in the figure below.



Then remove the top cover of the FDM-DUO

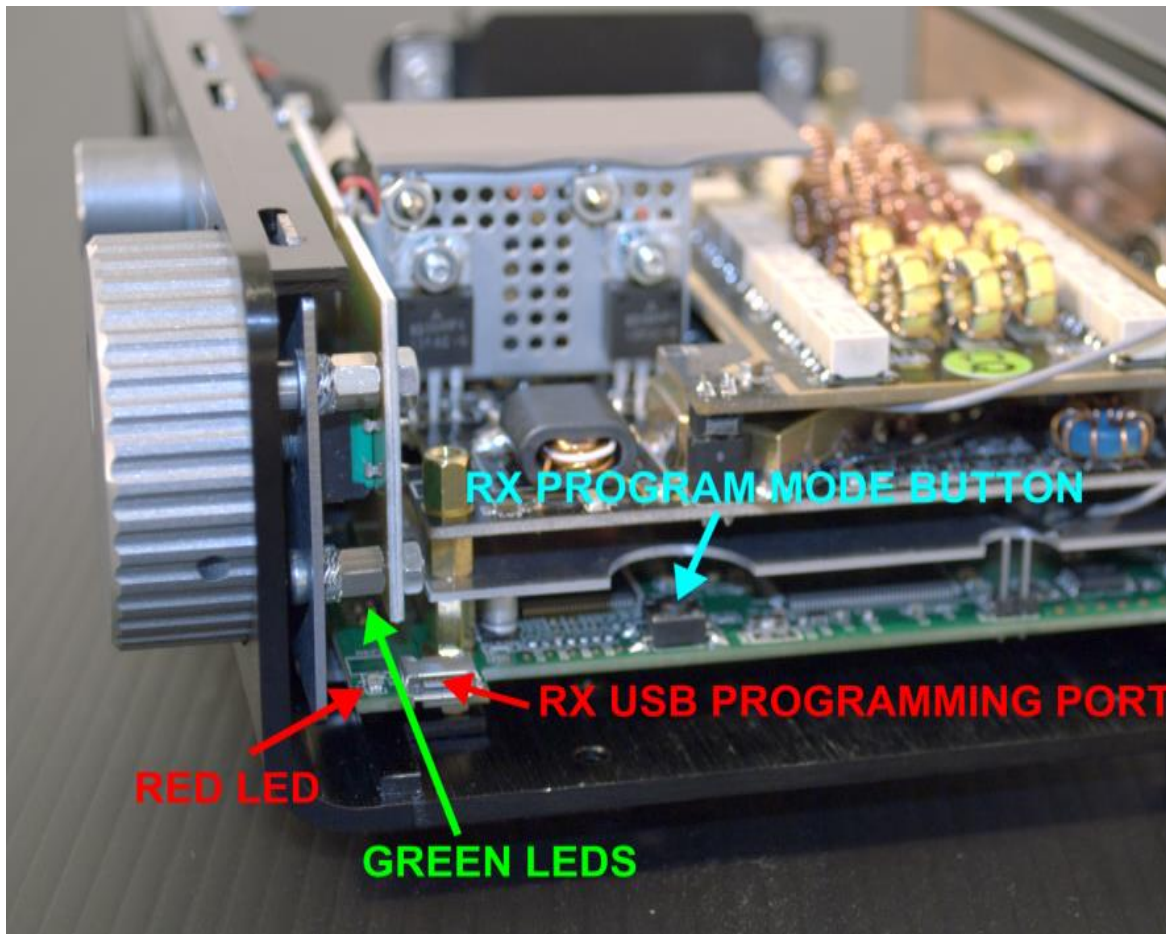
9.2.1 RX demodulator firmware update

Download the latest version of the RX demodulator firmware.

Replace the file *fdmduorx.bin* in the USB pen provided with the FDM-DUO

Connect the provided USB pen to the FDM-DUO RX Micro-USB programming port using the provided micro-USB adapter.

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 pen and restart the FDM-DUO.

If during the firmware update the green leds are blinking quickly, it means that the programming process is failed. In this case contact the technical assistance.

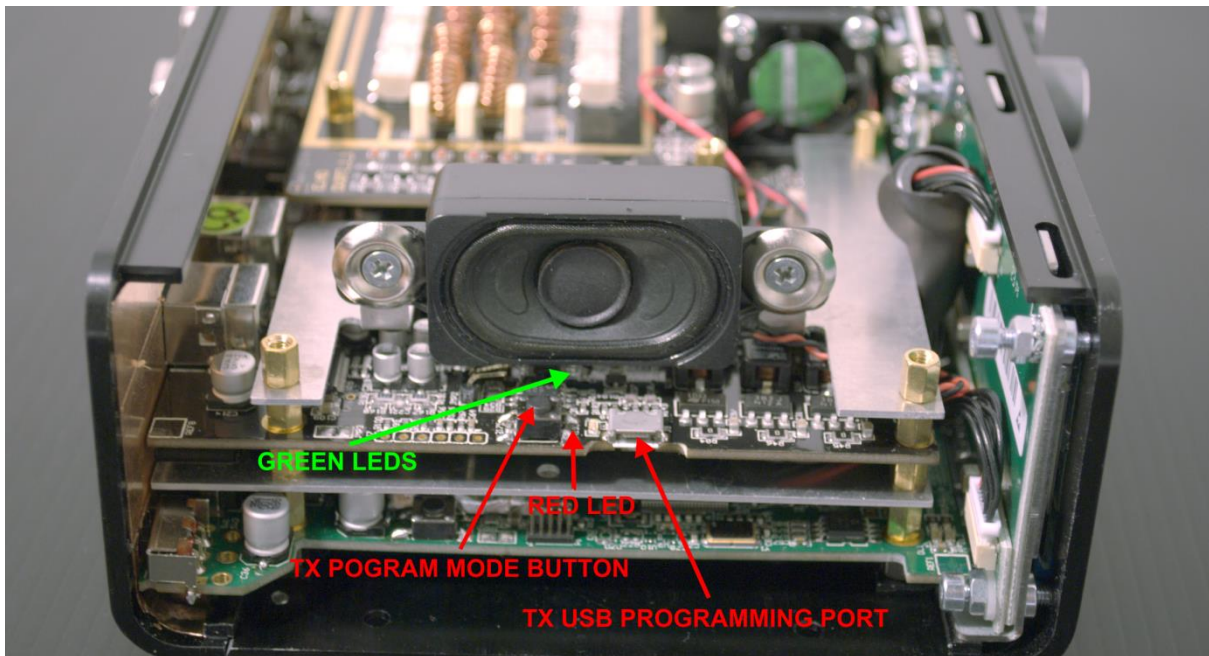
9.2.2 TX modulator firmware update

Download the latest version of the TX modulator firmware.

Replace the file *fdmduotx.bin* in the USB pen provided with the FDM-DUO.

Connect the provided USB pen to the FDM-DUO TX Micro-USB programming port using the provided micro-USB.

Connect the power supply, keep pressed the TX program mode button and power up the FDM-DUO.



- Keep pressed the TX program mode button until the red led turns on.
- Release the TX program mode button.
- Wait until the red led turns off.
- Turn off the FDM-DUO, disconnect the USB pen and restart the FDM-DUO.

If during the firmware update the green leds are blinking quickly, it means that the programming process is failed. In this case contact the technical assistance.

9.3 USB interface firmware update

Download the latest version of the USB interface

Turn on the FDM-DUO and connect the USB Receiver data connector port to a USB 2.0 port of your PC.

Disable any antivirus program before start the firmware update

Run the downloaded file and wait until the end of the update process **without disconnecting the USB cable or power off the FDM-DUO**, then turn off and restart the FDM-DUO.

9.4 FPGA DDC update

Download the latest version of the FPGA DDC.

Turn on the FDM-DUO and connect the USB Receiver data connector port to a USB 2.0 port of your PC.

Disable any antivirus program before start the firmware update

Run the downloaded file and wait until the end of the update process **without disconnecting the USB cable or power off the FDM-DUO**, then turn off and restart the FDM-DUO.

Declaration of Conformity (EC)

The product marked as

FDM-DUO

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

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:

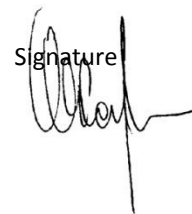
ELAD S.r.l.
Via Col De Rust, 11 - Sarone
33070 CANEVA (PN)

Issued by:

Name: Franco Milan
Function: President of ELAD

Caneva
Place

July, 30th 2014
Date

Signature


Declaration of Conformity (FCC)

The product marked as

FDM-DUO

manufactured by

Manufacturer: ELAD S.r.l.

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

complies with the following requirements:

- FCC (Federal Communications Commission) Part 15

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC ID: 2AAE5FDM-DUO

This product is distributed in USA by:

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