www.metropwr.com

VECTOR NETWORK ANALYZER
FX700/FX1300

USER MANUAL

SAFETY INFORMATION

Handle your FX700 with care. It may be damaged if dropped, burnt, punctured or broken, or if it comes into contact with liquids. Do not use FX700 if it has been damaged.

Repairs. Do not open FX700 and try to repair by yourself. Disassembly may damage the device or cause you injury.

Battery. Do not try to replace the FX700 battery yourself because you may damage it, or could cause overheating and damage. The lithium-ion batteries must be re- cycled or disposed of separately from household waste. Do not incinerate the battery or exceed the recharge time of 6 hours.

Do not charge the battery in areas in the presence of flammable gases. Disconnect the FX700 from the electrical outlet after charging and do not leave unattended while charging.

Avoid prolonged exposure to heat for long periods of time, in case of malfunction – turn it off immediately.

Disposal of waste batteries. If this product contains batteries,do not dispose of them with otherhousehold waste.

Disposal of Electrical & Electronic Equipment. This symbol indicates that this RAEE product should not be treated as household waste. Instedhand it over to the appropriate collection point for recycling of electrical and electronic equipment which will conservenatural resources. If it is not possible to deliver to a collection point, it can be disposed of through your local retailer.

IMPORTANT INFORMATION Read all the operating instructions, safety tips and warnings in the instruction manual. Identifying potential hazardous situations and observing the appropriate safety rules will avoid accidents.

Dangerous situations to avoid in order to prevent all risks that are shown above. Never use the FX700 inappropriately, but only as described in the user manual. The Manufacturer reserves the date the technical information contained in this manual without notice.

INTRODUCTION

The Vector Network Analyzer FX700/FX1300 is a useful instrument for the amateur radio environment for the development of antennas, filters and measurement of transmission lines.It is based on the initial EU1KY * project, has been redesigned, modified the firmware and hardware. It is very advanced and aims to surpass the best features of a commercial VNA without neglecting the simplicity and flexibility of use. It works on the high bands using the harmonic frequencies with good precision. Due to its small size, low weight and use of a rechargeable battery pack, it is perfectly compatible with all the requirements of a modern Radio Amateur, both in the workshop, shack and outside. It can be used:

- Fast check of all antenna parameters
- Coaxial cable length measurement
- Export graphics to your computer
- Detailed screenshots of the measures
- Quickly measure resonance of multiband antennas
- Comparison of many types of antennas
- Generate RF signals
- Measurement of the series and parallel parameters of the quartz
- Complete OSL calibration (open,load,short)
- TDR chart (time domain reflectometer)

It can easily and quickly measure all the parameters of an antenna or a transmission line including:

- **SWR /Returnloss**
- **Automatic / best SWR**
- **Impedance Z**
- **Resistance R**
- **Reactance X (sign)**
- **Rs/Ls - Rp/Lp**

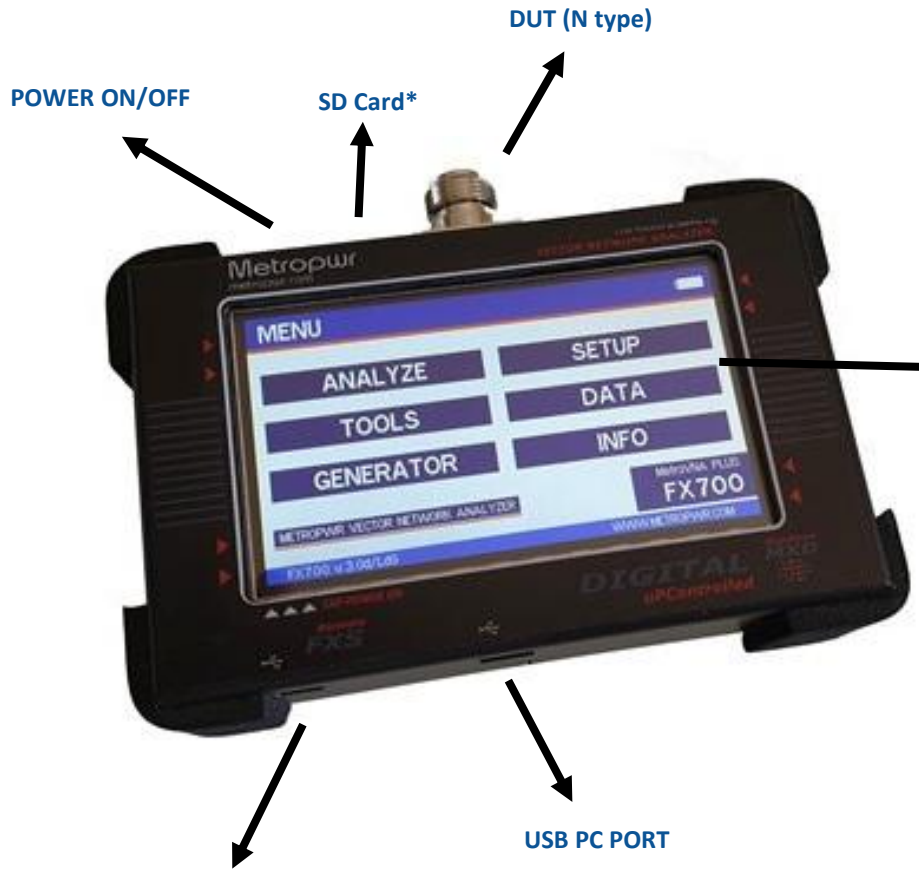
All measurament are displayed simultaneously and can be shown graphically on the display.

Using convenient menus you can choose measurements of multiband antennas, crystals, filters or traps - all with extreme simplicity.

* initial project released under license WTFPL Version 2 license, EU1KY authorship.

FX700/FX1300

DESCRIPTION

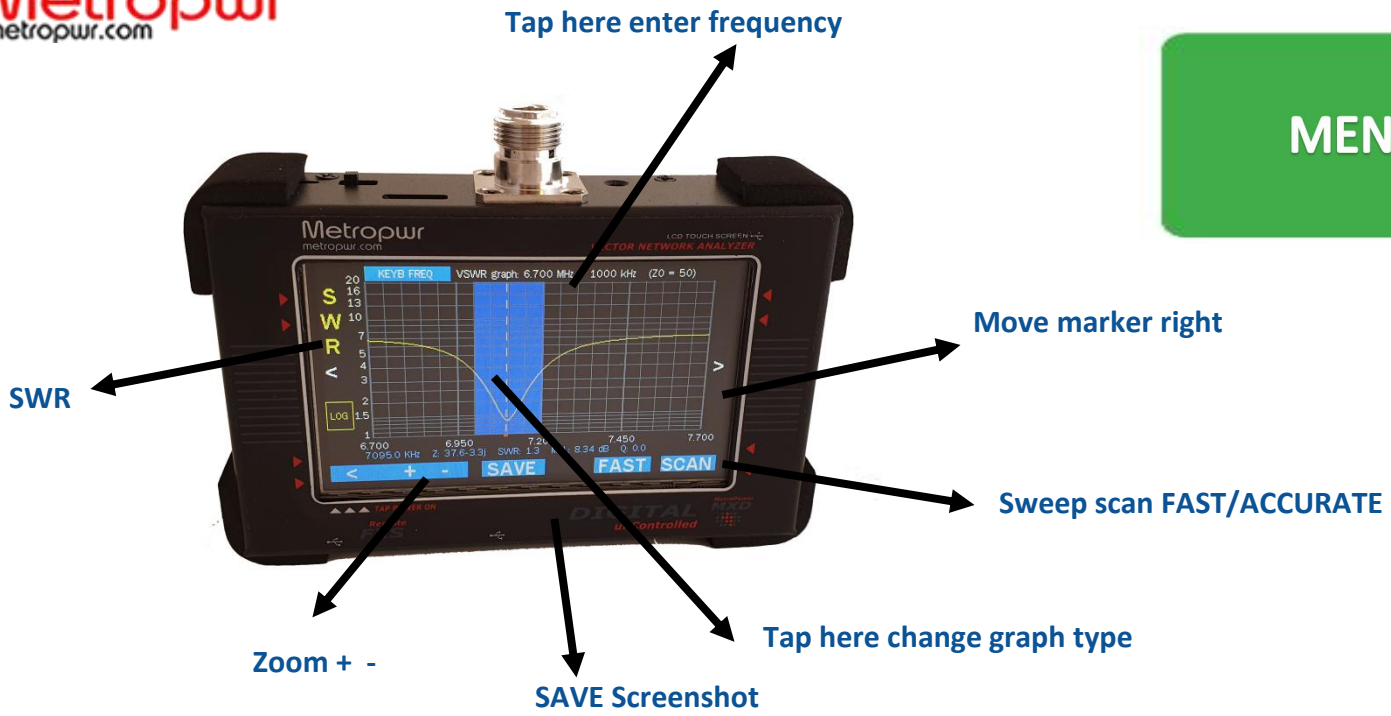


* don’t remove it

Keyboard

Attention before connecting the antenna to the DUT, short the antenna connector to ground.

MENU



Smith Chart

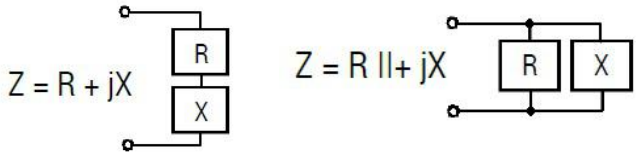
S11/SWR/R/X

METER

calibration status

Smith chart on/off

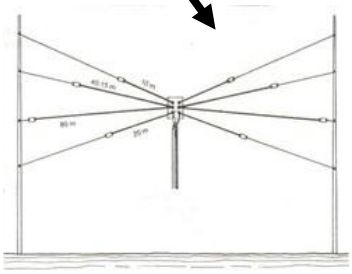
Tap here to change the type of series / parallel measurement. Antenna equivalent circuit:



MULTI

Tap here to enter frequency

FX700/FX1300 can simultaneously measure SWR/R/X on 5 bands. This function is very useful for measuring multiband antennas.



EASY

frequency

SWR measure

Easy Menu enter the antenna frequency and a modulated tone warns when SWR is lower

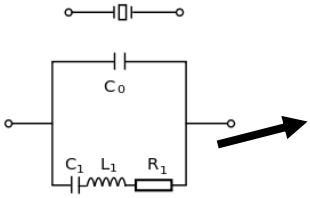
Tone disable

CABLE LENGHT

Menu for measuring the length of coaxial cables. It is possible to select the velocity factor for many types of cable. Selecting SCAN shows the graph and cable length. Cable failure is also possible here.

QUARTZ DATA

KEYB: set frequency quartz
CAL OPEN: disconnect cable on N connector
START: start measurement



Equivalent circuit of a quartz.

Menu for measuring the basic parameters of quartz:
Fs/Fp: resonance serial/parallel
Cs/Cp: capacity serial/parallel
Ls: inductance
Rs: resistance
Q: quality factor

GENERATOR

Menu Generator: possibility to select the frequency and set steps. A square wave and all harmonic frequencies will be generated on the DUT connector, no filtering expected.

HW CALIBRATION

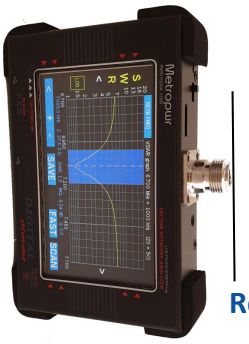
FX700/FX1300 offers two types of calibration:
1) Hardware calibration*
2) OSL user calibration.

The HW calibration is made in the factory. User can redo it by positioning the rear switch to the right position and proceeding with the calibration. This calibration is done only once and it is not necessary to repeat it. (The switch could be inside the enclosure, in this case you need to remove the rear cove).After calibration, reposition the rear switch to the left position.

* this menu could be disabled

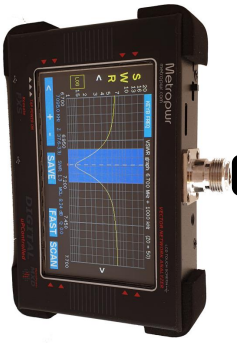
OSL CALIBRATION

OSL kit* not included



SHORT
LOAD
OPEN

Reference plane



SHORT
LOAD
OPEN

Reference plane

The calibration is necessary to compensate the cables connected on the DUT, this moves the reference plane to the end of the cable. Proceed with calibration by connecting in sequence SHORT/LOAD(50ohm)/OPEN tool and then SAVE calibration.

*use a better quality calibration kit.

UTILITY

EXTERNAL/INTERNAL: display color changes
FAT/THIN LINE: trace size of graph menu
BEEP ON/OFF: active deactivate beep

SPECTRUM

This is a service menu that displays the spectrum of V / I (voltage/current) signals taken from the measurement coupler.

With a tap in the center of the display can show the oscilloscope.

SNAPSHOTS

In this area it is possible to manage the screenshot files.

Through this menu it is possible to select and view the screenshots stored on the sd card.

INTERNAL SETUP

SETUP

MENU 1/2

Setup Menu FW ver. FX700 v3.0.d

S11_SHOW	0	Reflection S11 (module in dB) graph in the panoramic window: 1 enabled, 0 disabled
S1P_TYPE	0	Type of Touchstone S1P file saved with panoramic screen shot: 0 - S MA R 50, 1 - S RI R 50.
SHOW_HIDDEN	0	1: Show hidden options in configuration menu. 0: hide.
SCREENSHOT_FORMAT	0	Screen shot image file format. 1: PNG, 0: BMP.
BAND_FMAX	710MHz	Maximum operating frequency of the device from 150, to 710MHz.
SI5351_MAX_FREQ	200MHz	Maximum frequency in Hz that Si5351a can reliably output. Can be 160MHz or 200 MHz.
SI5351_CAPS	10pF	Si5351 built-in quartz capacitors setting. 1 for 6pF, 2 for 8pF, 3 for 10 pF
TDR_VF	66	Velocity factor for TDR distance calculation, percent (valid range 1..100)

Metropwr
metropwr.com

MENU 2/2

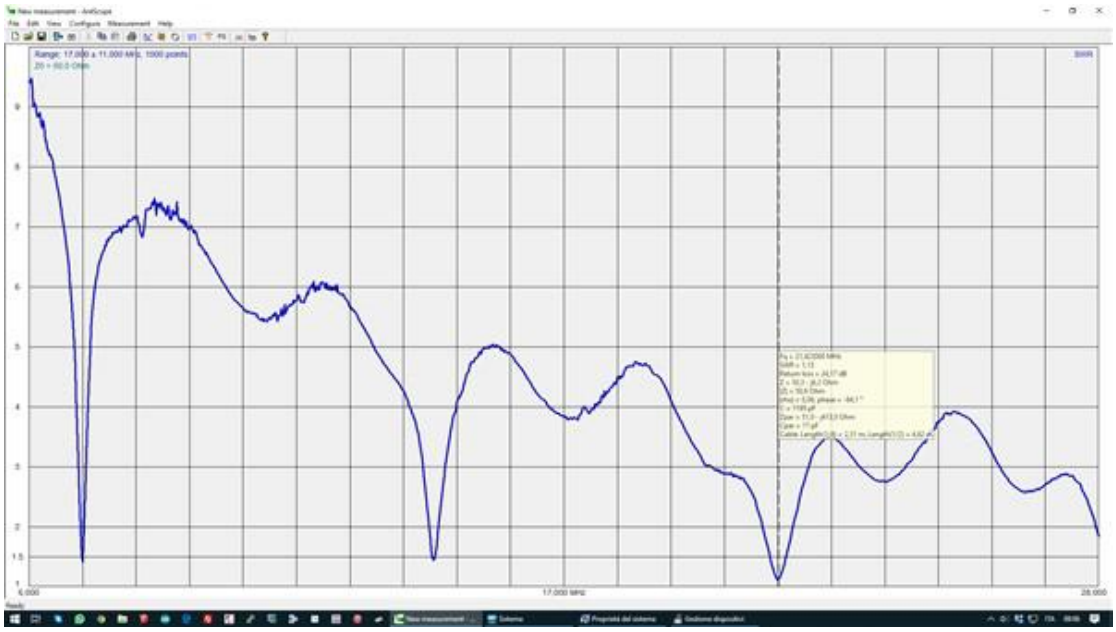
Name	Default Value	Description
VERSION		
PAN_F1	14000	Panoramic window initial frequency, kHz
PAN_SPAN	2	Span for panoramic window (0..9)
MEAS_F	14000000	Measurement window frequency, Hz
SYNTH_TYPE	SI5351A	Frequency synthesizer type. 0 for Si5351, do not change: other values are reserved for future use.
SI5351_XTAL_FREQ	27000000	Si5351a's nominal crystal frequency, Hz
SI5351_BUS_BASE_ ADDR	C0h	Si5351a address on I2C bus. Can be changed to any even number in the range 02h..FEH
SI5351_CORR	0	Si5351a's crystal frequency offset from nominal frequency, Hz
OSL_SELECTED	A	Selected OSL file index (0..15 for files A .. P, other values - no OSL file selected)
Z0	50	Base Z0 for VSWR measurements and Gamma calculation
OSL_RLOAD	50	OSL calibration standard for the Load measurement, Ohm
OSL_RSHORT	0	OSL calibration standard for the Short measurement, Ohm
ROPEN	open	OSL calibration standard for the Open measurement, Ohm. Use value >100000 for purely open load.
OSL_NSCANS	1	Number of scans to average during OSL calibration
MEAS_NSCANS	1	Number of scans to average in measurement window
PAN_NSCANS	1	Number of scans to average in panoramic window
LIN_ATTENUATION	6 (06h)	Linear audio input attenuation. Applied during audio input device initialization after reset. Sets the linear audio input volume to (100 - ATTENUATION). One unit is approximately 1 dB.
F_LO_DIV_BY_TWO	0	Deprecated, references in the code have been removed. Leave at default setting (0). Set to non zero if LO frequency is divided by two in quadrature mixer. Intended to be used with obsolete version 2 RF front end.
GEN_F	14000000	Frequency for generator window, Hz
PAN_CENTER_F	0	Way of setting panoramic window. 0: F0+band_span, 1: F_center +/- Band_span/2
BRIDGE_RM	5.1	Value of measurement resistor (R4, R11) in bridge, Ohm float
BRIDGE_RADD	200	Value of series resistor (R5, R9) in bridge, Ohm
BRIDGE_RLOAD	51	Value of load resistor in bridge (R7, R10), Ohm
COM_PORT	USB	Serial (COM) port to be used: 0 for COM1, 1 for COM2
COM_SPEED	38400	Serial (COM) port speed, bps
LOWPWR_TIME	off	Time in milliseconds after which to lower power consumption by switching off LCD. (0 - disabled)

*** the information in this table may vary with an updated firmware version**

Metropwr
metropwr.com

SOFTWARE

PC SOFTWARE

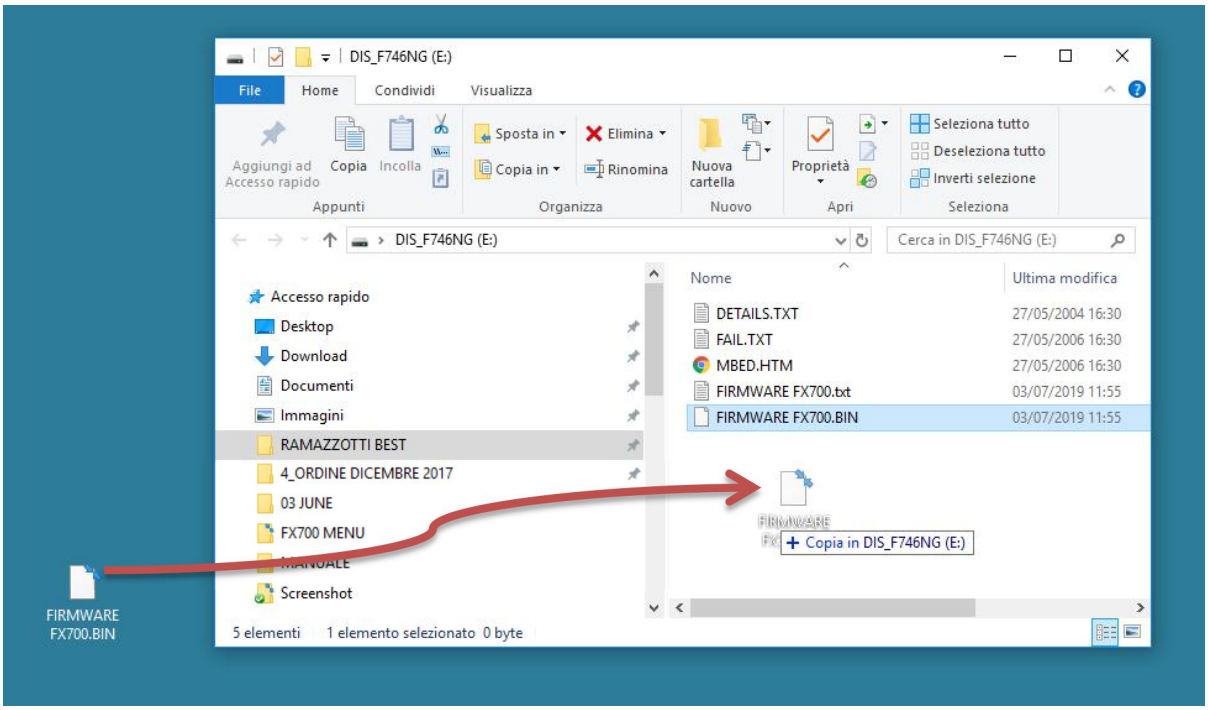


FX700/FX1300 can be interfaced with the PC via the left USB port. At the moment it is compatible with third-party software. Through the second right USB port it is possible to download screenshots on the computer in bmp/png format.

FW UPGRADE

1 **Connect USB cable**

2 **Drag drop files in the windows**



3 **Reboot FX700/FX1300**

TECHNICAL FEATURES

Metropwr FX700/FX1300 Technical Features

- Coverage 0.1/700 MHz - 0.1/1300 MHz
- Display 4,3” color
- Capacitive Touch screen
- DUT Connector N
- Measurament R, Z, X (sign), SWR, Phase, ReturnLoss, Tdr, L, C
- Impedance 50,75,100,150,300 ohm
- Calibration OPEN,SHORT,LOAD (osl)
- Smith chart , measure antenna multiband
- TDR (time domain reflectometer)
- Cable length measurement
- Storage of graphics on the sd / bmp, png card
- Export images via sd
- Measure quartz parameters
- Menu generator
- Fast / accurate scan
- Battery LI-ion included (2600mA)
- USB charging circuit
- Firmware upgradable via USB
- 3.7V operating voltage
- Compact dimensions 135 x 32 x 85 mm
- Weight 250gr

Metropwr
metropwr.com

www.metropwr.com

Technical features and internal menus may change without notice.