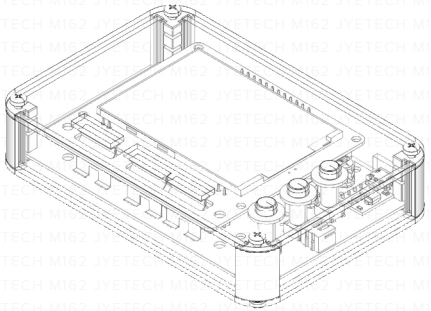
USER MANUAL (REV. 00)

M162 LCR METER



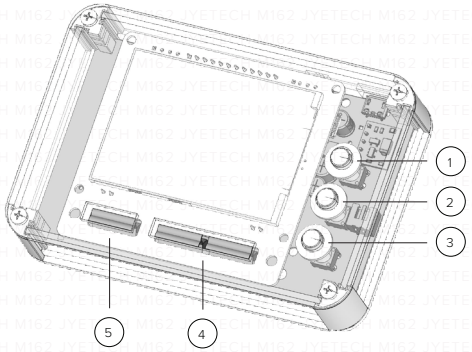
MODEL	M162
PCB VERSION	MAIN: 109-16202-00B
	ANALOG: 109-16201-00F
FIRMWARE	113-16202-060 OR LATER

WHAT'S INCLUDED

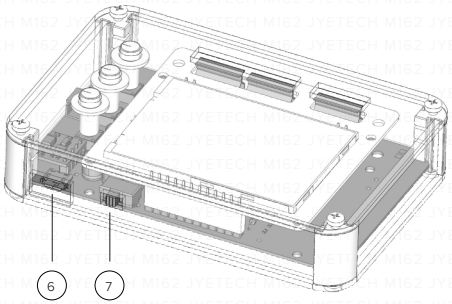
1. M162 LCR Meter
2. Zero impedance board
3. USB cable
4. User manual
5. Assembly guide (included with 16201K DIY kit only)

1 Getting Started

CONTROL



1. HOLD button – Hold the current display. Pressing it again will release the hold.
2. P/S button – Select Parallel or Serial equivalent circuit modes.
3. RCL button – Select the primary measurement parameter.
4. Test Port – Terminals holding the component being measured.
5. GND – Ground for future adapter connection.



6. USB Connector – For power supply, data transfer, and firmware upgrade.
7. Power switch

BATTERY CHARGER

If the battery charger and battery are installed, the power applied through the USB connector will charge the battery. A red LED light will light up indicating charging is in progress. The charging will automatically stop when the battery is full.

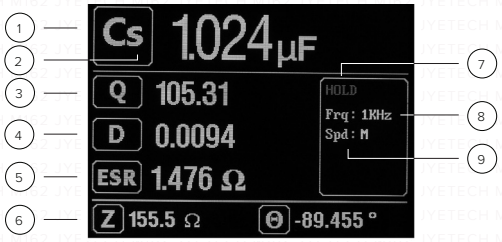
2 Basic Operations

POWER ON / OFF

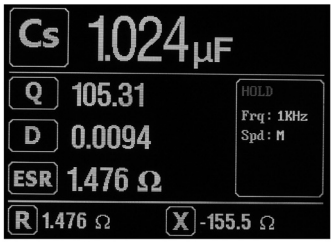
To Power ON — Connect the device to a USB power source with a USB cable. Slide the power switch to ON position.

To Power OFF — Slide the power switch to OFF position.

DISPLAY OVERVIEW



1. Primary parameter.
2. Equivalent circuit mode.
3. Secondary parameter – Q value
4. Secondary parameter – Dissipation Coefficient
5. Secondary parameter – Equivalent Serial Resistance
6. Primitive measurement data – Primitive measurement data is displayed in modules and phase angle. It can be switched to the display of resistance and reactance from within Setting. The figure below display the same primitive data in resistance and reactance.



7. HOLD state indicator
8. Measurement frequency
9. Measurement speed

MEASUREMENTS

1. Press RCL button to select the primary parameter to be displayed.
2. Press P/S button to select serial or parallel equivalent circuit mode.

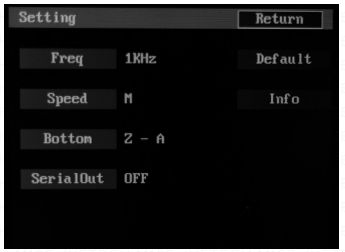
> Tip: As a rule of thumb, for low impedance component (< 100 ohm), select serial equivalent circut mode. For high impedance component (> 100 Kohm), select parallel equivalent circut mode.

3. Insert the component to be measured into the testing terminals. The screen will display measurement results.
4. Press HOLD button can hold the current display until the same button is pressed again.

3 Change Settings

ENTER SETTINGS

1. Hold down the RCL button for about 2 seconds to enter Settings. The Settings screen will display as below.
2. Use the RCL button to navigate through the entries.
3. Use the P/S button to change/execute the highlighted entry.
4. Press the HOLD button to exit Settings.



SELECT TEST FREQUENCY

1. Highlight the Freq entry.
2. Press P/S button to change the test frequency. The frequency can be set to 1KHz or 100Hz.

SELECT TEST SPEED

1. Highlight the Speed entry.
2. Press P/S button to change the test speed. The speed can be set to L2 (slowest), L1, M (medium), H1, H2 (fastest).

TOGGLE BOTTOM DISPLAY MODE

1. Highlight the Bottom entry.
2. Press P/S button to toggle the bottom display mode. The display mode can be set to Z – A (modules and phase angle) and R – X (resistance – reactance).

SERIAL OUTPUT

1. Highlight the SerialOut entry.
2. Press P/S button to turn serial output ON or OFF.

DEFAULT RESTORE

1. Highlight the Default entry.
2. Press P/S button to reset all the settings to their default values. This operation also clears all the values for the Calibration 1, Calibration 2, Open Zeroing, and Close Zeroing.

DISPLAY PRODUCT INFO

1. Highlight the Info entry.
2. Press P/S button to display the information about the meter hardware and firmware.

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4 Zeroing

OPEN ZEROING

1. Make sure the test terminals are open (no component connected).
2. Put the meter in a normal measurement mode (R, C, or L).
3. Press and hold the HOLD button for about 2 seconds.

Note: The open zeroing removes the stray parameters in parallel with the test terminals and helps to improve the measurement accuracy for high impedance components.

SHORT ZEROING

1. Insert the 0 impedance board (provided with the product) into the test terminals.
2. Put the meter in a normal measurement mode (R, C, or L).
3. Press and hold the P/S button for about 2 seconds.

Note: The short zeroing removes the stray parameters in series with the test terminals and helps to improve the measurement accuracy for low impedance components.

5 Serial Output

The measurements can be outputted via the serial port at J5 on the main board (in LVTTL level) or through J10 on the analog board (as USB virtual COM port). The output can be turned ON or OFF in the Settings menu. Serial data is only sent under R, C, and L measurement modes.

Note: If the USB virtual COM port is used for receiving the serial data, a driver for the CH340 USB-Uart converter is required (can be downloaded at https://jyetech.com/drivers).

SERIAL PARAMETERS

The serial output data are transferred with 8 data bits, 1 stop bit, and no parity. The baud rate is 115200 bps.

DATA FORMAT

1. Each measurement is transferred in one line consisting of multiple data fields.
2. All the fields are ASCII strings and separated with commas.
3. All the numerical fields are expressed in ASCII coded decimal numbers.
4. The unit for resistance and reactance is in ohm (Ω).
5. The unit for capacitancet is in micro-farad (μF).
6. The unit for inductance is in micro-henry (μH).
7. Each line is terminated with one CR character (0x0D) and one LF character (0x0A).

The line format is described in the table below.

Field Index	Field Definition	Remarks
1	“Rs”, “Rp”, “Cs”, “Cp”, “Ls”, or “Lp”	Measurement mode
2	Measurement	Primary
3	Q Value	Secondary
4	D Value	
5	ESR	
6	| Z |	Primitive measurement data
7	Θ	
8	Rs	
9	Xs	
10	CR (0x0D) and LF (0x0A)	End of line

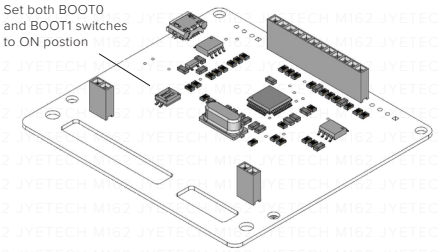
6 Firmware Upgrade

TOOL REQUIRED

1. Flash Loader Demonstrator. This application can be downloaded from ST website at https://www.st.com/en/development-tools/flasher-stm32.html
2. A USB cable with micro-USB plug.

STEPS

1. Download and install the Flash Loader Demonstrator to your PC if you haven't done so.
2. Download and install the driver for CH340 USB-Uart converter to your PC if you haven't done so. This converter has been installed on the main board. The driver for Windows can be downloaded at https://jyetech.com/drivers.
3. Download the new firmware to be upgraded from JYETech website (jyetech.com) and save it to your PC.
4. Power off the M162 LCR meter. Unplug the main board from the analog board.
5. Set the DIP switches on the main board to ON position as shown in the picture below.



6. Connect the main board to a USB port on your PC with a USB cable. The main board LCD will light up with a blank screen. This is normal.
7. Launch the Flash Loader Demonstrator tool. For how to use this tool please refer to the section 4 (Upgrading Steps) in the document “WAVE2: How to upgrade firmware” at https://jyetech.com/wave2/howto. **Note: in the device dropdown menu, select “STM32F303_128K”.**
8. After the firmware has been upgraded disconnect the USB cable. Set the DIP switches back to the position away from ON. And plug the main board back to the analog board.
9. Apply power. Verify the firmware has been upgraded correctly.

7 Specifications

Display	
Primary	R, C, L
Secondary	Q, D, ESR
Equivalent Circuit	Parallel or Serial
Primitive Data	| Z | andΘ,or Rs and Xs
Measurement Range and Accuracy	
R, | Z |	0.1Ω – 20MΩ
C	1pF – 20000μF
L	1μH – 20000H
Q, D	0 – 10000
Θ	-90° – 90°
Accuracy	About 1% (for resistance 1Ω – 1MΩ)
Measurement Conditions	
Test Frequency	100Hz, 1KHz
Open Voltage	0.5Vpp
Miscellaneous	
Measurement Connections	4 Kelvin wires on the test terminals
Ranging	Fully automatic
Compensations	Open, Short
Serial Data Output	Yes
Power Supply	USB or battery
Power Consumption	< 100mA @ 5V
Dimensions	111 x 76 x 25mm (4.37 " x 3.0 " x 1.0 ")
Weight	100g

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