POWER-Z FL001 SUPER Manual

Front View

Back View with Parameters and interfaces indicate

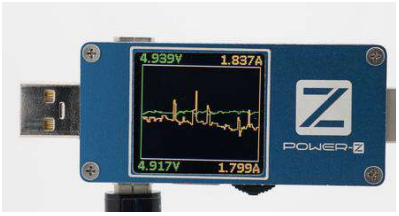
Brief introduction of interfaces, detail information please refers to following chapters.

Power on logo, whether display it or not could enter the setting menu to config it.

Voltage\Current\Power\Protocol\Temperature value interface(Not 100% accuracy)

Simple display interface. Only display Voltage Current and Power data.

Low power display with black&white interface. Please connect outside HID power supply, PD meter doesn't consume any input current except HID port. FL001super meter provides seamless handover feature, can be plug and pull out anytime.



Curve interface

Should plug in a microSD card（tf card）,otherwise didn't display this interface.

Should plug in a microSD card（tf card）,otherwise didn't display this interface.

Setting menu. Enter for more options, refer to follow chapters for detail information.

PDOs，the PD broadcast.

Emark chip information display. Should plug in a wire with Emark chip, otherwise didn't display information

The logo displayed when meter powered on.

About 3 seconds enter the interface when powered off last time.

Skip logo interface and begin to measure, please refer to menu "SETTINGS"->"DISPLAY"->"QUIET BOOT".

The introduce of Switch:

Toggle the switch in the basic interface can switch to previous/next interface. Loop back to the first interface if reach the last interface. Press and hold the switch enter the sub-interface and implement the corresponding function.

0. Backlight strategy.
   The default backlight is always on (0s). If set the backlight power on timer, the time of no operation exceed the timer will turn the backlight off. When the backlight is power off, press the OK button will turn the backlight on(Just turn on backlight didn't trigger other action).
1. Voltage/current/protocol interface, as follow:

The first and second row display the voltage and current data with large font. Keeps 5 decimal digits, the unit is V\A. The maximum voltage and current value range please refer to Appendix 1.
In the table, from left the first column of second row show the current MCU core temperature with blue digits (The temperature of meter's processor).The value can be the reference of temperature of meter's circuit board, keep 1 decimal digits, the unit is ℃. The second column of second row scroll displays charge protocol.
The charge protocols which this meter support and corresponding characters please refer to Appendix 2.
The second column of third row display voltage value of two USB wires, keeps 2 decimal digits, the unit is V.
Press OK button to change the display direction for the convenient of take a photo at the angle you want. Each time rotate 90 degrees clockwise.
Press and hold OK button for a while can reverse the color of screen.

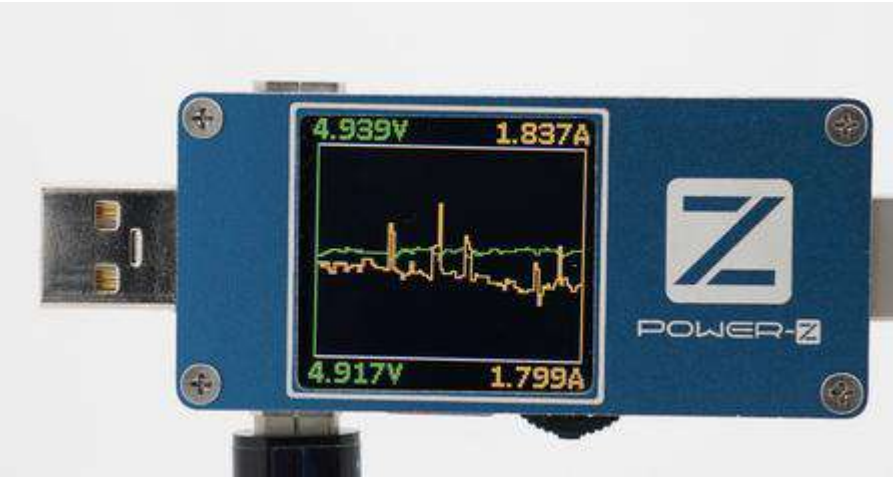
0. Voltage and current data with large font.

Press OK button to change the display direction. Press and hold OK button for a while can reverse the color of screen.

1. Black & white display mode

The display content as same as "Voltage/current/protocol interface". Display the values in black background, the backlight at low level. Reduce the power consume of itself. Press OK button to change the display direction. Press and hold OK button for a while can reverse the color of screen.

2. Voltage and current curve interface



Under this interface toggle the switch wait for a while could change the horizontal ordinate (the time unit).
Upper left/lower left corners display the maximum and minimum value of voltage (voltage Y ordinate), Upper right/lower right corners display the maximum and minimum value of current (current Y ordinate). The maximum and minimum values are automatic determined by value measured. Green curve is voltage value, yellow one is current value. Toggle +- could adjust fresh period of voltage and current value.

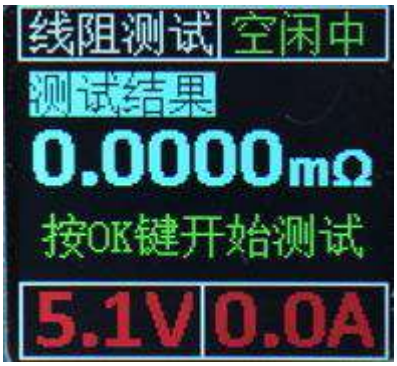
3. Capacity record interface

The first and second rows display the capacity and energy value with large font. Default unit is mAh and mWh, accurate to 1mAh and 1mWh. If value exceed 9999 will automatic stop record.
First row of table displays the voltage/current/power rate.
The left column of first row under the table title displays voltage value, the second row display current value. Keep 4 decimal digits, the unit is V and A. The third row display the power rate, keeps 2 decimal digits, the unit is W.
The right column under table title are parameters and record time.
The right column of first row under the table title displays automatic stop current setting value, set this value to 0.0A the automatic stop function is disabled. (The detail information of automatic stop current value please the chapter of settings about automatic stop current value).
The right column of second row under the table title displays time of record. The third row is current MCU's core's temperature.
The number in lower left square is record number. The record number counts from 1 to 10, total 11 numbers.
The record number is green indicate that there is no activity of record. Press the OK button, the color of record number changes to blinking yellow, indicate in record choose mode. Toggle the switch to left or right can increase or decrease record number. When finish to choose the record number, the record number changes to red color, means the recording data is saved in file according to the record number.
Press OK button in recording mode will stop record.

Press and hold OK button for a while will clear the capacity and energy data of current record number.
No action for 10s in record file choose mode will quit and not enter record mode, the record number stay in current record file number.

4. Wire resistance measure interface

Wire resistance measure mode 0 (Please refer to SETTINGS->TEST SET)
Enter interface



Display the resistance measure data of last time. Prompt you press OK button to start measure.
Insert the meter's USB male plug into power supplier, press OK button to start measure.
The measurement is 4 steps. First step is displayed in figure (Insert the meter's USB male plug into power supplier), indicated in graphic pattern.

The upper right corner indicates the first step with number 1, measure and count the voltage without load.
After measure and count automatic jump to step 2, the screen display as figure followed.

In this step, please plug a load to meter, the meter will automatic loaded.
When finish to measure on-line voltage and load current will automatic jump to step 3. The base reference data is measured and recorded.

Please disconnect FL001S from power supplier and connect the wire's USB-A plug to power supplier, another side USB-C plug connect to meter's TYPEC IN.
When meter power on will enter idle mode, display as figure followed, the base reference data is measured.

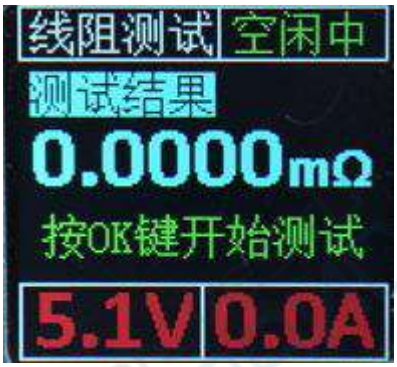
Press OK button, wire resistance measure will start step 3 and will automatic jump to step 4.

Wait for a while the meter will finish measurement and display the resistance value.

When finish a cycle of measurement a wire if use the same power supplier could skip the step1 and step2 to measure. The meter saves the power supplier base reference data. If use a different power supplier, please press and hold the OK button for a while to clear base reference data for a new measurement.

Wire resistance measure mode 1:

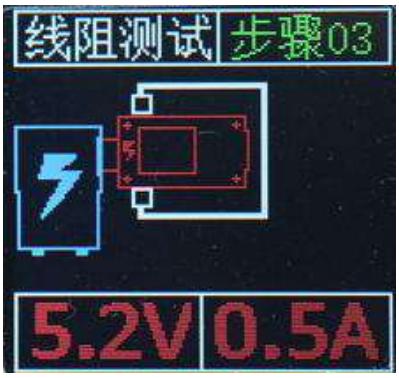
Enter interface:



Press OK:

Wait for a while enter step 02:

Connect one end of wire to meter's TYPEC OUT(TYPEC->TYPEC wire) or USB A port output （USBA->TYPEC wire）, then connect another end to meter's TYPEC IN connector, the meter will enter step 03 automatically.



Automatic get measurement result.

The resistance data will save even the meter disconnected until overlap by the data next measurement.

5. EMARK information interface

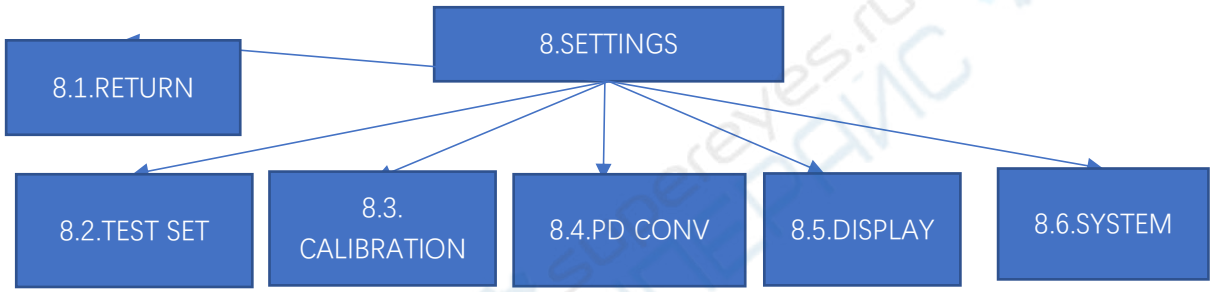
This interface will appear if the meter's Type-C OUT connected with a USB Type-C wire with EMARK chip. Display the information of "manufacturer of wire USB VID\hardware version\firmware version\USB version supported\the voltage and current supported". This interface didn't appear if no wire connected.

6. System settings interface

The FL001SUPER meter has plenty of settings. The option with * is advanced option only appear when advanced mode is opened, otherwise the option will stay in default value.

Press +- choose, press OK button enter lower level setting, press and hold OK return upper level. The menu is two level, choose the option and click OK button to set, press +- to adjust setting value, press +- button longer time the value increase or decrease 10, finish set and press OK to save and return.

First level menu structure:



8.1 RETURN

Press to return upper level

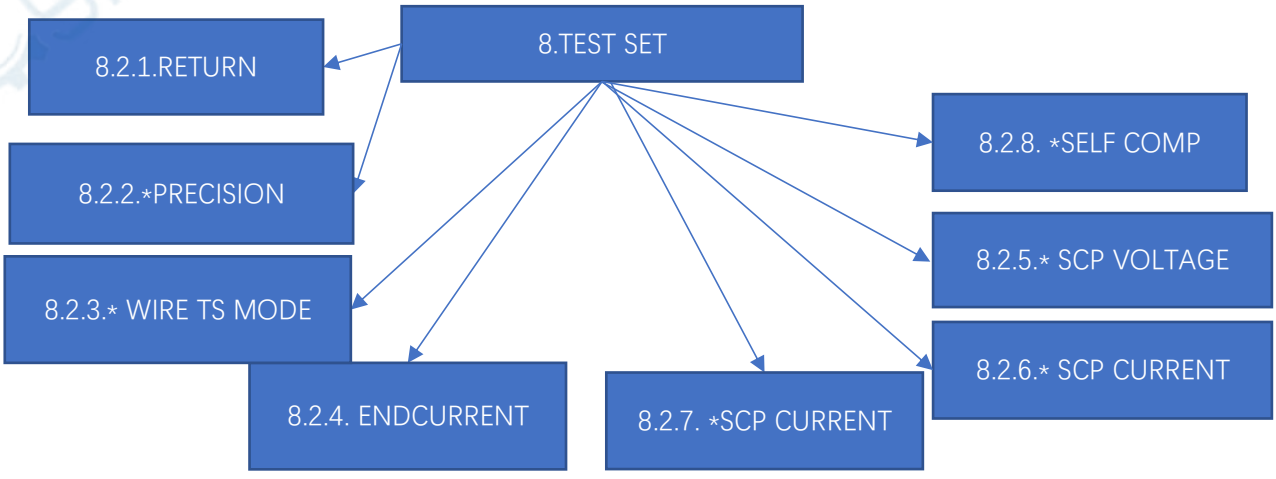
8.2 TEST SET

Include setting about test.

Menu structure

8.2.1. RETURN

Return to upper level



8.2.2. * PRECISION

This option set AD sampling accuracy and speed. Lower accuracy refreshes fast, higher accuracy refreshes slower. Default setting is highest accuracy.

8.2.3. * WIRE TS MODE

Measurement type 0 is measurement with voltammetry, measure procedure is complicated. Only applied to USB-A->TYPEC wire resistance measurement. When wire's ground resistance is much differed with VBUS resistance could try measurement type 0.

Measurement type 1 is parallel method for measuring resistance, measure procedure is simple. This method applies to USB-A->TYPEC 和 TYPEC->TYPEC wires resistance measurement.

The result will deviate when wire's ground resistance is much differed with VBUS resistance.

8.2.4. ENDCURRENT

This option applies to set lower threshold of automatic stop. When this value set to 0 the automatic stop function is disabled. The default value is 0.

8.2.5. * SCP VOLTAGE

This option is applied to set Huawei supercharge protocol's trigger voltage. The default value is 4.50V.

8.2.6. * SCP CURRENT

This option is applied to set Huawei supercharge protocol's trigger constant current value. The default value is 100. This option is experimental function. It is not recommended to set values at will, maybe cause trigger abnormal.

8.2.7. * SCP CURRENT

This option is applied to set Huawei supercharge over-current protect threshold. The default value is 20, current restrict 5A. The meaning of this option is not clearly understanding. It is not recommended to set values at will, maybe cause trigger abnormal.

8.2.8. * SELF COMP

Compensate the self-power consumption with current value. Increase the accuracy of power bank capacity measurement. Please don't open this function in other condition.

8.3. CALIBRATION

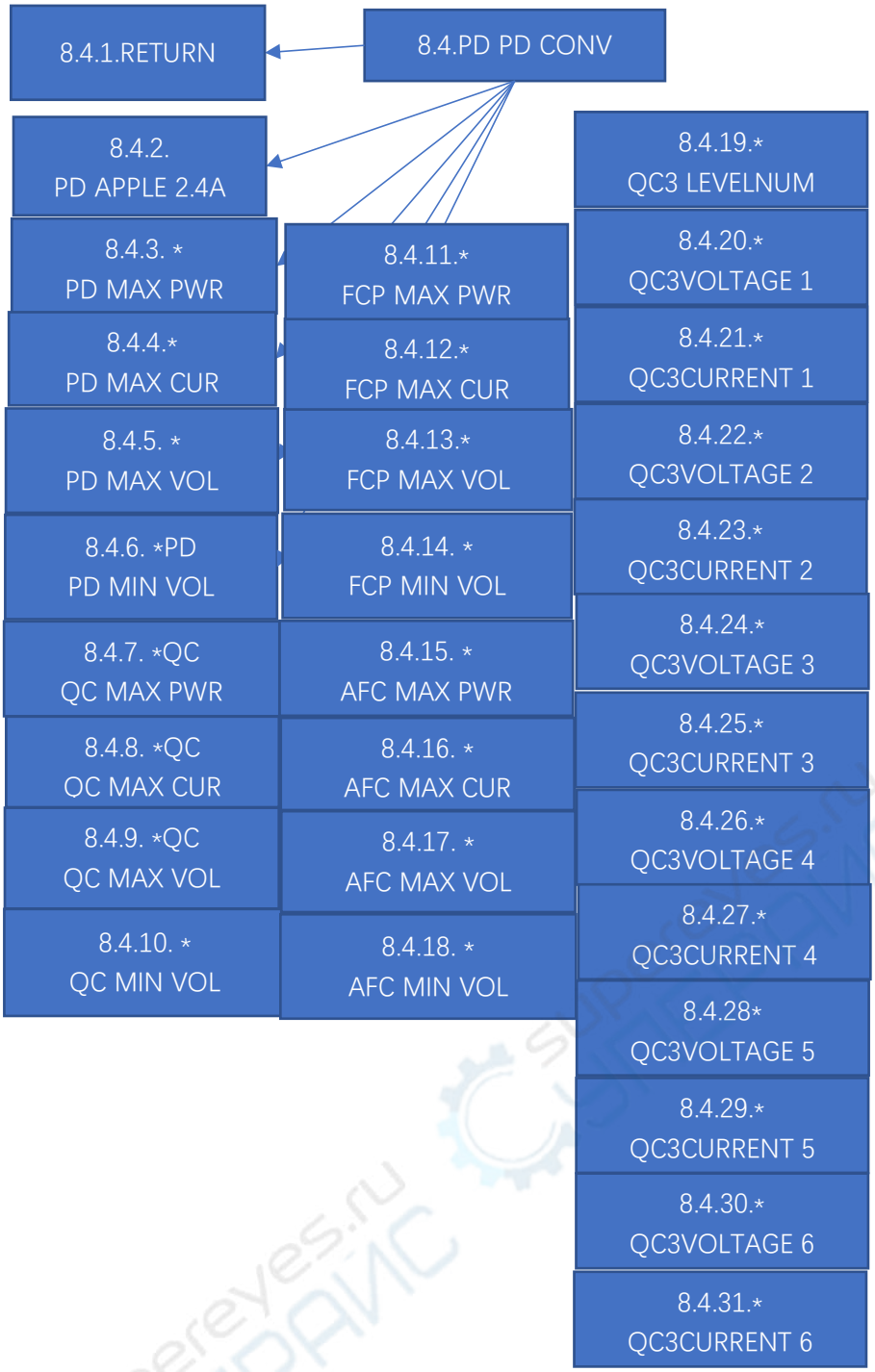
This option mainly includes the setting about calibration.

Calibration please refer to "calibration procedure"

8.4. PD CONV

This option mainly includes the setting about PD convert.

The sub layer menu structure of this option



8.4.1. RETURN

Return to upper level

8.4.2. PD to Apple 2.4A mode

Add support of Apple 2.4A to improve compatibilities of some Apple devices.

8.4.3-8.4.18*[Protocol name] PDOs (that is levels) parameters settings after converted to PD protocol.

These settings are used for [Protocol name] quick charge protocol (also include originate PD protocol) convert to PD protocol PDOs(Levels information about voltage and current). **Attention! The parameters just for the PD power supplier provide to PD load. If the PD load didn't run under the PD protocol the actually current maybe not less than restrict parameter (means the PD load didn't meet the requirements of PD standards).**

[Protocol name] Power upper threshold.

Applied to restrict the max power value of PD levels which [Protocol name]'s quick charge protocol converts to PD protocol. Power=voltageXcurrent. For example, set the PD power upper threshold to 24W, when connect a Netease 65W PD power supplier. The Netease 65W PD power supplier's PD levels are 5V 3A\9V 3A\12V 3A\15V 3A\20V

3.25A, because the power upper threshold the levels will restrict to 5V 3A\9V 2.67A\12V 2A\15V 1.6A\20V 1.2A (**The specific level's current also restrict by "current upper threshold value", in this situation we assume the "current upper threshold value" is more than 3A**). This function can be applied to these purpose: 1 Use large power PD power supplier to simulate a low power PD charge, to test the load whether run under the PD protocol standard's voltage and current or exceed the power standard. 2 Restrict the PD load's max power through PD protocol upper threshold. 3 Restrict the QC、FCP、AFC and other quick charge power supplier's power upper threshold convert to PD protocol in case these power suppliers exceed the power threshold. The common QC\FCP\AFC power supplier is 15-24W, the particular parameter please refer to the power supplier.

[Protocol name] Current upper threshold.

Applied to restrict the max current value of PD levels which [Protocol name]'s quick charge protocol converts to PD protocol. For example, set the PD power upper threshold to 24W, when connect a Netease 65W PD power supplier. The Netease 65W PD power supplier's PD levels are 5V 3A\9V 3A\12V 3A\15V 3A\20V 3.25A, through the PD upper power threshold and current 2A upper threshold restrict, the PD levels will be 5V 2A\9V 2A\12V 2A\15V 1.6A\20V 1.2A. This function can be applied to these purpose: 1 Use large power PD power supplier to simulate a low power PD charge, to test the load whether run under the PD protocol standard's voltage and current or exceed the current value. 2 Restrict the PD load's max current through PD protocol upper current threshold. 3 Restrict the QC、FCP、AFC and other quick charge power supplier's current upper threshold convert to PD protocol in case these power suppliers exceed the current threshold. The common QC\FCP\AFC power supplier is 15-24W, max current 2-3A, the particular parameter please refer to the power supplier.

[Protocol name] Voltage upper threshold, Voltage lower threshold

Set the PD protocol's level's voltage range. Also use the Netease 65W PD power supplier, assume the power upper threshold is 100W, the current upper threshold is 5A, which means not restrict the voltage and current value. The Netease 65W PD power supplier's PD levels are 5V 3A\9V 3A\12V 3A\15V 3A\20V 3.25A, set the PD voltage upper threshold and lower threshold are 15V and 12V. The PD levels under 12V such as 9V and the levels above 15V such as 20V are filtered. At last the output PD protocol levels are 5V 3A\12V 3A\15V3A. Attention, the 5V level is default couldn't be filtered. This function can be applied to these purpose: 1 Use a multi levels PD protocol power supplier to simulate a less levels power supplier by filter some PD levels. For example, if you want to know a mobile phone compatible with PD protocol 5V\15V levels. With a Netease 65W or other multi levels PD charger (with 15V level), set the voltage upper and lower threshold to 15V can simulate a charger with 5V\15V output levels. 2 Restrict the voltage range of PD levels which convert from QC2.0/3.0/FCP/AFC. Most QC2.0/3.0 charger not support voltage above 12V, most FCP/AFC charger not support voltage above 9V, consequently convert these charger to PD protocol maybe not compatible (The default setting of QC2.0 convert to PD has 5V/9V/12V/20V levels if a device request 20V the meter will request the QC charger for 20V. The QC charger not support 20V, the output voltage is 5V. It will be two situations: 1/ the load didn't charge; the meter will detect output voltage which not reach the target voltage and automatically abandon the 20V level and sent the new levels information until load work properly. 2/ Some PD load will directly send PD hard restart command lead to the PD convert reset, cause not compatible. To solve this problem please set the QC voltage upper threshold manually, be the same with the FCP/AFC. Because the 12V is unusual of AFC, the default AFC voltage upper threshold is restrict to 9V. Please set the AFC voltage upper threshold manually). The PD convert function is associate with automatic quick charge detect. After automatic quick charge detect the levels of QC/FCP/AFC convert to PD protocol will automatically set to compatible with charger, the levels and quick charge not compatible will be automatically removed. Detail information please refer the chapter related to.

8.4.19* QC3 settings numbers

This function could set the number of levels which QC3.0 convert to PD protocol. The minimum number is 1 (just 5V), the maximum number is 7. Please set other 6 levels in chapter 8.4.20-8.4.31.

8.4.20-8.4.31 *QC3.0 Levels parameters setting

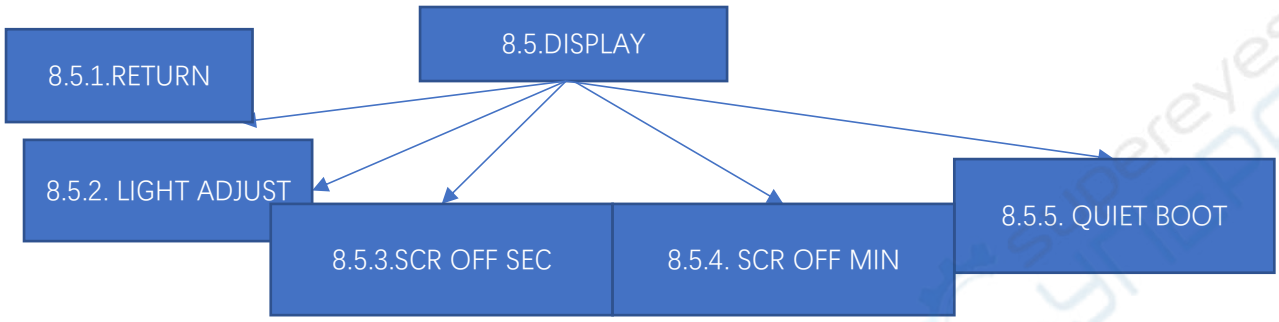
Set the maximum value of voltage and current of level 2 to level 7 which PD protocol converted by QC3.0. The voltage and current 1 is corresponding to level 2. The maximum value of current is restricted by power upper threshold and current upper threshold QC protocol. The actual value of odd number after a decimal point is 0.1 less

than setting value. If set voltage to 5.5V the actual value is 5.4V. Because the minimum level shift deviation is 0.2V. This function can be used for: 1\ Use a QC3.0 power supplier to simulate a charger with really voltage levels (compatible PD protocol), such a 5.6V 2.5A or 7.8V 2.1A not provider by the common PD protocol power supplier, to test for PD protocol compatibility of load. 2\ Restrict power of quick charge for iPhone. The iPhone8/X's PD quick charge power upper threshold is 18W and current upper threshold is 2A. Restrict voltage under 9V could restrict(adjust) charge maximum power. Set this value to 8V, the charge power upper threshold set to 16W. 3\Use as you wish.

8.5. DISPLAY

This option mainly includes the setting about display.

The structure of sub layer menu display as follow



8.5.1. RETURN

Return to upper layer menu.

8.5.2. LIGHT ADJUST

This option used for adjusts backlight. The backlight 10 levels from 0-9. Set the backlight level to 0 is still with light.

8.5.3. SCR OFF SEC

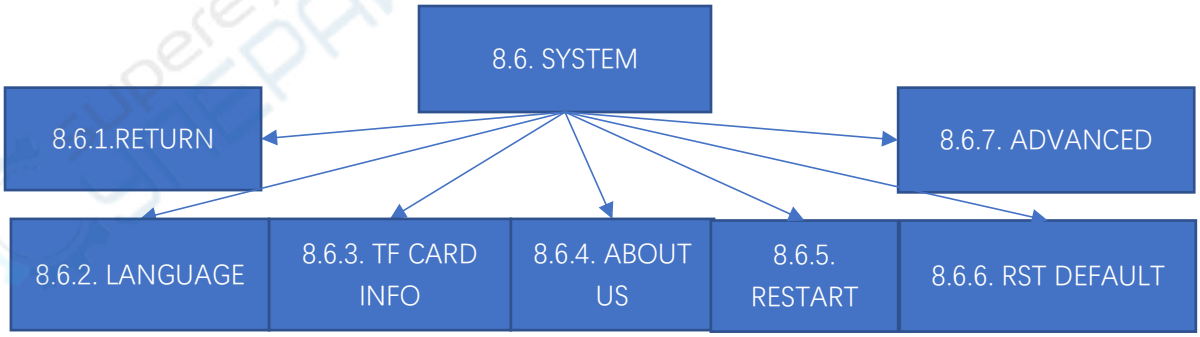
8.5.4. SCR OFF MIN

These two options are used for sets the timer of automatic shut. The default value is 0 minute 0 second(always on). 8.5.3 set second. 8.5.4 set minute. The maxium value of minute and second are 59. The setting value of minute and second add together is backlight automatic shut timer. To avoid this value set too short to use, when the timer set to less than 5S the timer will work as 5S. When this timer sets to 0s the backlight will always on.

8.5.5 QUIET BOOT

This option is used for quite boot. Whether display full screen logo or not, the default is N (display logo), set “Y” will skip the logo and directly enter measure mode.

8.6 . SYSTEM



8.6.1. RETURN

Return to upper layer menu.

8.6.2. LANGUAGE

Set the language of interface, Chinese or English is optioned.

8.6.3. TF CARD INFO

Display the type of TF card (version and capacity)

8.6.4. ABOUT US

Display about information.

8.6.5. RESTART

Restart the meter.

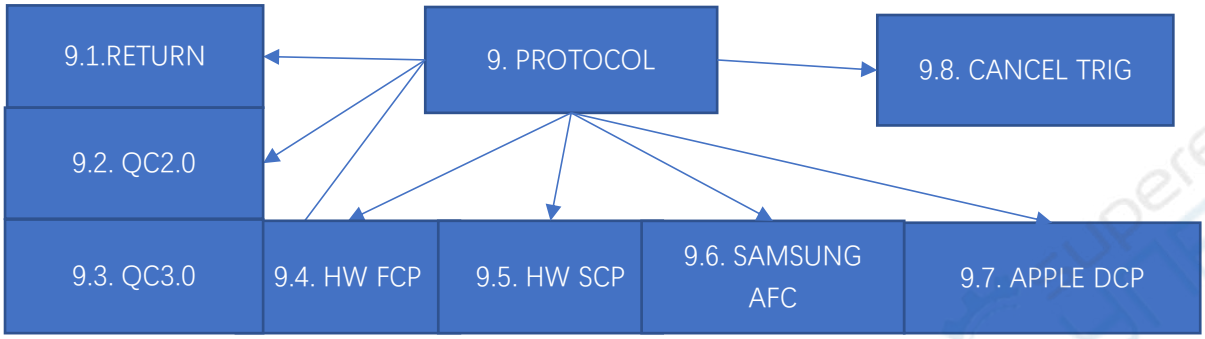
8.6.6. RST DEFAULT

Restore the setting and calibrate value to factory settings.

8.6.7 ADVANCED

Set whether enable the advanced function (the function with * mark). The default settings are not enable, the value of option are default value.

7. Quick charge trigger



Enter the interface, the middle of interface display the trigger menu. The structure of sub layer menu display as follow The current value displayed in lower of interface.

9.1 RETURN

Return to upper layer menu.

9.2 Qualcomm QC2.0

9.3 Qualcomm QC3.0

9.4 Huawei HW FCP

9.5 Huawei HW SCP

9.6 SAMSUNG AFC

Choose menu and press OK button enter voltage trigger mode, press the value of voltage and press OK button to trigger. The value of QC3.0 is relative value. +.2V increase 0.2V ,-.2V decrease 0.2V. The voltage value of Huawei SCP please set in test setting menu.

9.7 Apple Samsung DCP

This menu could simulate Apple 2.4A identify mode, enable Apple devices enter full speed charge mode. The Samsung 2.0A mode did tested.

9.8 CANCEL TRIG

Choose this menu and press OK button to cancel all of trigger return to not trigger mode.

10 PROTOCOL DETECT

This interface user for detect the quick charge protocols(non-PD) the meter supported.

Press OK button to detect. The protocol displayed in green font is support by power supplier, not supported in red font, unknown in blue font.
Press OK button when detecting can quit the detect procedure. This interface only valid when the PD convert interface choose BYP(not convert).

11 PD TRIGGER

This interface only valid when the PD protocol is detected. Press OK button to choose voltage and current level then press OK button to trigger, will display adjust value of PPS levels, short press +- will adjust with 20mV step, long press +- will adjust will 200mV step, set up the value voltage then press OK button to trigger the voltage.

12 PD CONVERTER

This interface can convert input of the quick charge from USB-TYPEA or TYPEC to PD protocol output through TYPEC output port. The PD protocol forward (some kind of quick charge convert, only the source protocol is PD protocol, the input by TYPEC port and process by FL001SUPER meter, provide PD protocol quick charge through TYPEC output port) also set in this interface.
Press OK button to choose the source protocol, press OK button to confirm. PD forward please choose “PD”, non-PD protocol not convert please choose ”BYP”. The protocol displayed in blue color couldn’t convert (the charger not support). PD protocol choose “BYP” may reset for several time to be steady, please wait for meter enter steady status to use.

For example:
If you have a PD protocol charger to test a power bank which support PD protocol, please choose “PD”.
If you have a QC3.0 charger with USB-A output port to charge a load which support PD protocol but not support QC protocol, could connect FL001SUPER’s USB-TYPEA plug to charger then choose QC2.0 or QC3.0, connect dual USB-C wire to meter’s USB-C output port and connect to load.

Appendix 1 Max measure value (Exceed these values may cause error even to damage the meter)

Maximum measurable Voltage（V）	24V
Maximum measurable Current（A）	5A

Appendix 2 Protocol and Corresponding display

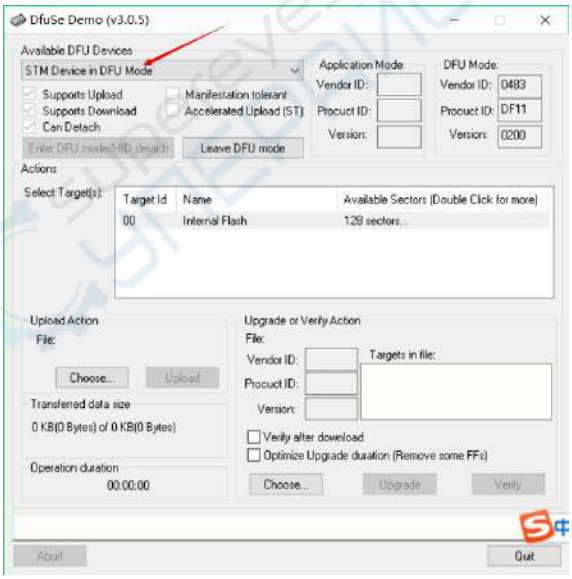
Unknown	UNKNOWN
USB DCP	USB DCP
MTK PE/USB DCP	PE OR USBDCP
USB PD	USBPD
Qualcomm QC2.0	QC2.0
Qualcomm QC3.0	QC3.0
Apple 0.5A	APPLE 0.5A
Apple 1.0A	APPLE 1.0A
Apple 2.1A	APPLE 2.1A
Apple 2.4A	APPLE 2.4A
Huawei SCP	HUAWEI SCP
Huawei FCP	HUAWEI FCP
Huawei FCP or Samsung AFC	FCP OR AFC

Firmware flash tutorial

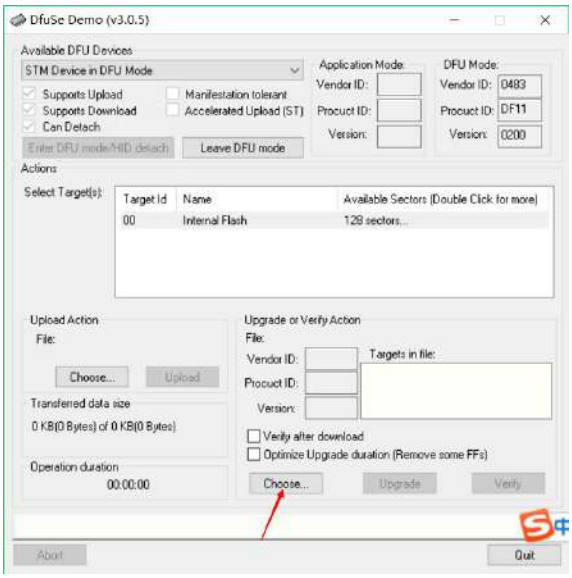
Install the flash tool ‘DfuSeDemo’.
Install driver.
Press OK button then connect USB HID interface to computer. The meter’s screen flash slowly means the meter is in the flash mode.

Run the flash tool.

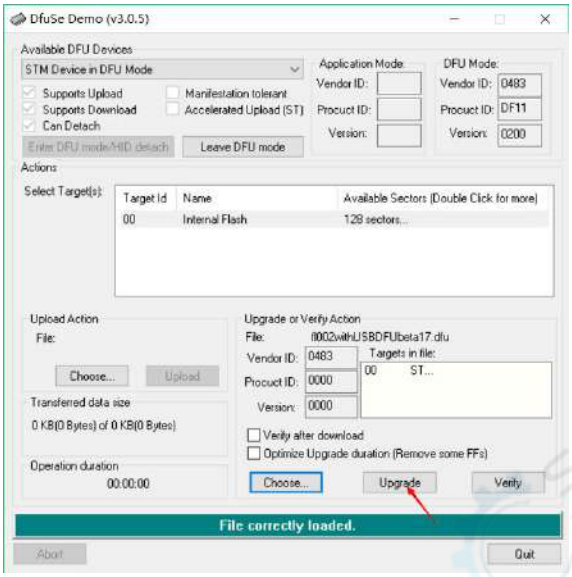
The interface shows as follow, the arrow pointed to means the device is connected correctly, otherwise should reinstall the driver.



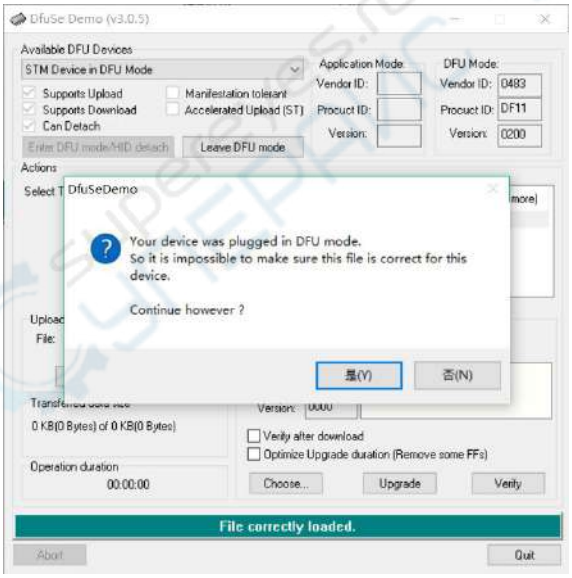
Click “CHOOSE” to choose the firmware file



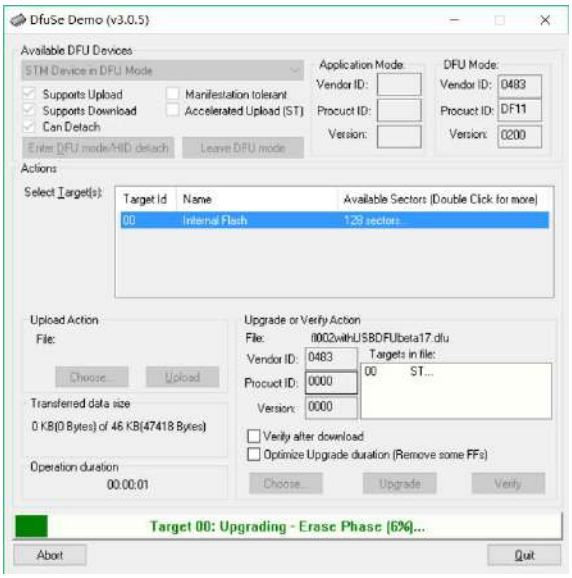
After choosing the firmware, the “Upgrade” button is usable.



Click “Upgrade” in dialog box, click (Y) when dialog box ask whether continue upgrade or not.:

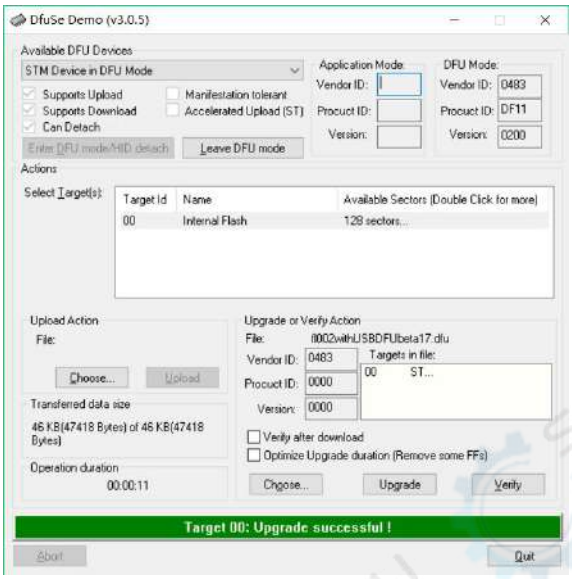


Click (Y) to continue flash.



The status bar prompt the flash progress.

When flash is complete the status bar prompt “Upgrade successful”.



Quit the flash tool, disconnect the meter to finish flash procedure.

Some operate instance for users:

PD charge mode, the USB-C input, autodetect PD power supplier's PDO broadcast information, connect the device, automatic choose charge level.

The last character "A B" with arrow mean the wire have CC1 or CC2. There are "A B" in figure displayed.

The last character "A B" with arrow mean the wire have CC1 or CC2. There are "B A" in figure displayed.

The last character "A B" with arrow mean the wire have CC1 or CC2. There are "B B" in figure displayed.
There are no need to distinguish between positive and negative side of wires when use FL001SUPER meter in PD charge mode, plug in any of "AB BA AA BB" at will, much better user experience.

PD protocol convert chapter, detail discussed in chapter above, only used for demonstration.

Idle mode, the lower part in the screen displays the current value.

Plug USB-A port in will automatic enter BYP mode, the USB-C interface is default in PD mode.
Switch to other mode should manually set the meter. Config the Type-C port to QC only mode could choose “BYP” then PD protocol is disabled. Provide the right of choose to user. The USB-A port doesn’t have PD switch mode.

The USB-A port with multi-protocol output, the QC2.0 convert to PD mode.The output voltage and current are determined by power source, the default is 18W. Increase the output should enter the setting menu choose by yourself.

QC3.0 convert to PD is benefit from QC3.0 0.2V fine-tuning function. The voltage is abundant. If do not need much voltage level,the FL001SUPER provide optional voltage function which you can enter setting menu choose the voltage by yourself.

Huawei FCP convert to PD.

Samsung AFC convert to PD.

There are huge amount QC2.0 and QC3.0 or AFC FCP quick charger which are easily convert to PD output for adapt to iPhone8 ,iPhone8p ,iPhone X ,MacBook , Nintendo switch, or other mobile phones and power bank. This PD convert function is tested for most devices in market. There is no comment for any device.

*外观及规格若有更改，恕不另行通知

*私自拆卸改造不在保修范围