PZEM-051 DC Digital Multi-Function Meter - Instruction Manual

The instructions for this device are not only hard to find online, but even if you do find them, they're not very clear. This blog post is meant as an attempt to remedy both issues.

Note: To find and download the original instructions, it may be useful to search for PZME_051.pdf (instead of PZEM-051).

Features
The PZEM-051 has the following functions.

- Default "Always On" Display includes these 4 values
  - **Source Voltage** - used to determine the charge level of a battery
  - **Amperage Draw** - used to determine the rate at which power is being drawn
  - "**Power**" - wattage being drawn
    - Note: This could be calculated from Amps * Volts, but this saves doing the math in your head
  - "**Energy**" - watt-hours drawn since reset - used to determine how much a battery has been discharged (compare with the amp-hours of the battery
    - displayed in Wh until 10000 Wh is reached
    - displayed in kWh above 10000 Wh
    - counter value is kept in memory and persists across power cycles until explicitly reset/cleared (i.e. When the PZEM-051 is disconnected and then reconnected to voltage, the accumulated value of "energy" will continue where it left off.)
- Backlight
  - can be toggled on or off
  - The backlight state is kept in memory and persists across power-cycles (i.e. When the PZEM-051 is disconnected and then reconnected to voltage, the backlight will return to the same state it was in previously.)

- High and Low Voltage Alarms -
  - flashes the display/backlight
    - Note: This is **not** an audible alarm
    - can be customized to match the source battery.

- will flash the backlight when the actual voltage is not within range

Button Functions

- Backlight Toggle
  - Each short click turns the backlight on or off
- Voltage Alarm Settings
  - Click and hold until **SEt** appears in the display
    - Each digit of the high and low voltage values will blink in turn
    - If the value of a digit is not changed for 3 seconds, the blinking digit will automatically switch to the next digit in sequence
  - Each short click in this mode will increase the value of the blinking digit, wrapping from 9 back to 0 (zero)
  - Each alarm threshhold may be set to a value from 6.5V up to 99.90V
  - Values less than 10.0 must have the first digit set to zero (e.g. 09.5)
  - **Important: The high voltage alarm threshold is on the left side, and the low voltage alarm threshold is on the right side** (reversed from low-to-high, left-to-right)
  - To store the new settings, click and hold again until PASS appears briefly on the display
    - Note: If the high and low alarm thresholds are set backwards, the display will show "Err uAL" briefly, and the new values will be rejected (i.e. the previous values will be retained).
- Clear/Reset the counter/accumulated-value for Energy (watt-hours)
  - Click and hold until **CLr** appears in the display, and the "Energy" counter value begins blinking.
    - **Note: SEt will appear first - continue holding until CLr appears**
  - A short click while in this mode will reset the "Energy" value to 0Wh (zero watt-hours)
- Adjust the type of Current Shunt
  - Click and hold until Curr appears in the display
    - **Note: SEt will appear first, then CLr - continue holding until Curr appears**
  - Note: This should be preset to the type of shunt that was bundled with the PZEM-051, but can be switched to one of two types.
  - Each short click in this mode will toggle between
    - **100A** - for the 100A/75mV shunt
    - **50A** - for the 50A/75mV shunt