

#### For real-time statistics:

1. Press "Menu" and enter "Display". Go to "Graph Type" and select Statistics. Return to main display screen.
2. Displays Maximum, Minimum, Average, Standard Deviation, Total Readings and Number Overage.
3. To subtract background and set current reading to zero, press the "Offset" button. Press "Offset" again to cancel.
4. Press "Reset" to clear the Statistics.

#### For pass/fail tracking:

1. Press "Menu" and enter "Display". Go to "Graph Type" and select Pass/Fail. Return to main display screen.
2. Set Upper and Lower tolerance limits. If reading is out of range, an appropriate warning will be displayed on the screen.

## 6 Math Functions

#### To apply a fixed offset to measurements:

1. Press "Menu" and enter "Functions". Go to "Fixed Offset".
2. Set to value to subtract from all subsequent measurements.

#### To apply a scale factor to measurements:

1. Press "Menu" and enter "Functions". Go to "Scale Factor".
2. Set to value by which to multiply all subsequent measurements.
3. Useful when working with beam splitters.

#### To compare against a reference measurement:

1. Press "Menu" and enter "Functions". Go to "Normalize".
2. Set to reference value by which to normalize all subsequent measurements.

#### To display as power/energy density:

1. Press "Menu" and enter "Functions". Go to "Density".
2. Select beam shape and size.
3. Measurements will be shown as  $\text{cm}^2$ .

# 1919-R Power Meter

## Quick Reference

### 1 Getting Started

The 1919-R is equipped with "soft keys." That is, the functions of the keys change as indicated by the legend above each key. It is also equipped with 4 navigation keys and a round enter key in the center.

#### To connect sensor to the 1919-R meter:

Insert the 15 pin D type connector of the measuring sensor cable into the socket marked "Sensor Input" on the rear panel of the 1919-R meter.

#### To switch the 1919-R on:

To switch on, briefly press the on/off/backlight switch (leftmost key). The unit will switch on, and the display will appear. The backlight for the 1919-R's LCD can be configured to toggle between full, half, and low illumination. This toggling will be performed by briefly pressing the on/off switch after the 1919-R has been switched on. To switch the 1919-R off, press the on/off switch and hold it for ~ 2 seconds until the display blanks.

#### To set general instrument settings:

1. Disconnect the sensor. Use the Navigation keys to select the parameter to change and press Enter. Change the setting with the Navigation keys. Press Enter to save.
2. "RS232 Baud": Set baud rate for PC communication through its COM port.
3. "Max An. Output": Set desired max analog output.
4. "Language": Set to desired language.
5. "Line Frequency": Set to 50Hz or 60Hz, depending on the electrical power grid of the area that you are in.
6. "Date and Time": Set to correct date and time.
7. The 1919-R automatically saves the current settings for next power up.

#### To zero instrument:

1. Disconnect the sensor.
2. Make sure instrument is not in an electrically noisy environment and is undisturbed.
3. Press "Zero" and "Start". Wait until "Zeroing completed successfully" appears.

## 2 Thermal Sensors

### 2.1. Use of the 1919-R with Thermal Type Sensors

1. Plug in the thermal sensor. The 1919-R will reconfigure itself to work with the attached sensor.
2. All of the sensor's measurement parameters are shown on the main screen. Use the Navigation keys to select and change the parameters.
3. Use the Navigation keys to select the parameter to change and press Enter. Change the setting with the Navigation keys. Press Enter to save.
4. The 1919-R saves the changes automatically for next startup of the instrument.

#### Warning:

Do not exceed maximum sensor limits for power, energy, power density and energy density as listed in the main manual. Otherwise, there is a risk of damaging the absorber.

### 2.2. To use the 1919-R to Measure Laser Power

1. Set "Measuring" to Power.
2. Set "Range" to AUTO or one of the manual ranges. The correct manual range is the lowest one that is larger than the expected maximum power of the laser.
3. Set "Wavelength" to the appropriate laser wavelength.
4. Set "Average" to the period you wish to average power over or set to "NONE" to disable.

### 2.3. To use the 1919-R to Measure Single Shot Energy

1. Set "Measuring" to Energy.
2. Set "Range". In Energy mode there is no autoranging. The correct range is the lowest one that is larger than the expected maximum pulse energy of the laser.
3. Set "Wavelength" to the appropriate laser wavelength.
4. Set "Threshold" if you wish to change the energy threshold.
5. When the 1919-R screen flashes "READY" on and off, fire the laser.

## 3 Photodiode Sensors

### 3.1. Use of the 1919-R with Photodiode Type Sensors

1. Plug in the photodiode sensor. The 1919-R will reconfigure itself to work with the attached sensor.
2. All of the sensor's measurement parameters are shown on the main screen. Use the Navigation keys to select and change the parameters.
3. Use the Navigation keys to select the parameter to change and press Enter. Change the setting with the Navigation keys. Press Enter to save.
4. The 1919-R saves the changes automatically for next startup of the instrument.

#### Warning:

Do not exceed maximum sensor limits for power, energy, power density and energy density as listed in the main manual. Otherwise, there is a risk of damaging the absorber.

### 3.2. Setting the Measurement Parameters

1. Set "Range" to the appropriate manual range, autorange or dBm (logarithmic scale). Note that when selecting a manual range, the correct range is the lowest one that is larger than the expected maximum power of the laser.

2. Set "Wavelength" to the correct laser wavelength. If the wavelength you want is not among the wavelengths listed, select one and press Modify. Using the up/down keys to change each number and the right/left keys to move to the next number, key in the wavelength you want. When finished, press Enter.
3. Set "Filter" to IN or OUT as physically configured on the sensor. Not necessary for sensors with built-in filter state detection.
4. Set "Average" to the period you wish to average power over or set to "NONE" to disable.

## 4 Pyroelectric or Photodiode Energy Sensors

### 4.1. Use of the 1919-R with Energy Sensors

1. Plug in the pyroelectric/photodiode energy sensor. The 1919-R will reconfigure itself to work with the attached sensor.
2. All of the sensor's measurement parameters are shown on the main screen. Use the Navigation keys to select and change the parameters.
3. Use the Navigation keys to select the parameter to change and press Enter. Change the setting with the Navigation keys. Press Enter to save.
4. The 1919-R saves the changes automatically for next startup of the instrument.

#### Warning:

Do not exceed maximum sensor limits for power, energy, power density and energy density as listed in the main manual. Otherwise, there is a risk of damaging the absorber.

### 4.2. Zeroing Instrument Against Sensor

For most accurate calibration, you should zero the energy sensor against the 1919-R it is being used with. Proceed as follows:

Make sure the sensor is in a quiet environment and not subject to pulsed radiation. Press "Menu" and select "Instrument". Press "Zero" and "Start". Wait until "Zeroing completed successfully" appears.

### 4.3. Setting the Measurement Parameters

1. Set "Range" to the lowest one that is larger than the expected maximum pulse energy of the laser.
2. Set "Wavelength" to the correct laser wavelength. If this sensor is a metallic type and if the wavelength you want is not among the wavelengths listed, select one and press Modify. Using the up/down keys to change each number and the right/left keys to move to the next number, key in the wavelength you want. When finished, press Enter.
3. Set "Pulse Length" to the shortest time that is longer than the expected pulse length. **Warning:** Incorrect readings will result if pulse length is not set up correctly.
4. For sensors with the diffuser option, set "Diffuser" to IN or OUT as physically set on the sensor.
5. Set "Threshold" as necessary to screen out false triggers due to noise.
6. Set "Average" to the period you wish to average power over or set to "NONE" to disable.

### 4.4. Energy, Average Power or Exposure Measurement

With the pyroelectric sensor, you have been supplied a test slide with the same coating as on your pyroelectric detector. You can also obtain

this slide from your dealer. You should use this slide to test the damage threshold with your laser pulses. If the slide is damaged, then either enlarge your beam or lower the laser energy until damage is no longer seen.

#### To measure energy:

1. Set "Measuring" to Energy.
2. Set measurement parameters as described above.
3. Energy will be displayed on the screen as well as the laser's frequency.

#### To measure average power:

1. Set "Measuring" to Power.
2. Set measurement parameters as described above.
3. Average power will be displayed as a function of Energy x Frequency will be displayed on the screen as well as the laser's frequency.

#### To measure exposure:

1. Set "Measuring" to Exposure.
2. Set measurement parameters as described above.
3. Set Stop Mode to manual, time period, or pulse count.
4. Accumulated energy exposure will be displayed on the screen as well as elapsed time and number of pulses measured.

## 5 Graphical Displays

### To present measurements on a graduated scale:

1. Press "Menu" and enter "Display". Go to "Graph Type" and select Bargraph. Return to main display screen.
2. To expand the bargraph scale  $\pm 5x$  about the present reading, press the "Zoom" button. Press the "Zoom" button again to return the bargraph to full scale.
3. To subtract background and set current reading to zero, press the "Offset" button. Press "Offset" again to cancel.

### To simulate an analog needle:

1. Press "Menu" and enter "Display". Go to "Graph Type" and select Needle. Return to main display screen.
2. To expand the needle graph  $\pm 5x$  about the present reading, press the "Zoom" button. Press the "Zoom" button again to return the needle range to full scale.
3. To subtract background and set current reading to zero, press the "Offset" button. Press "Offset" again to cancel.
4. Press "Persist" to keep older measurements on screen and to show Min and Max measured. Press "Persist" again to cancel.

### To graph laser output over time:

1. Press "Menu" and enter "Display". Go to "Graph Type" and select Line. Return to main display screen.
2. Set the percentage range of the scale to be displayed to desired setting.
3. Set the horizontal sweep time as necessary.
4. Press "Reset" to clear the Min/Max tracking and to restart the graph.
5. Especially useful to fine-tune laser power.