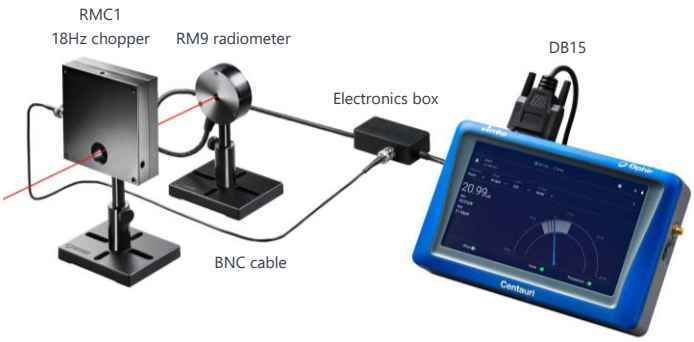
User Notes for Ophir RM9 Series Sensors + RMC1 Chopper

1. General description and setup:

The RM9 series sensors and RMC1 chopper, together with a host meter such as Vega, StarLite or Juno, form a system capable of measuring CW power in the region of ~100nW up to ~100mW. In order for the system to work correctly, connect up as follows:

- Connect RM9 DB15 connector from electronics box to host meter or PC interface device
- Connect the BNC cable (included with RM9) between RM9 electronics box and RMC1 chopper
- Connect 12V power supply (included with RMC1) to 12VDC input socket on RMC1



The RMC1 chopper should be mounted with the side marked "THIS SIDE TOWARD SENSOR" facing the RM9. The side of the chopper blade facing this direction has a low emissivity surface to minimize measurement artifacts that could be caused by thermal signal from the chopper blade. The other side of the blade faces the light source and has an absorptive black coating to minimize stray reflections.

For convenience, the RMC1 chopper is provided with screw threads on all four sides, to allow it to be mounted in the most convenient orientation possible relative to the light source and sensor. The screw threads allow it to connect to the standard Ophir base and post for easy mounting in the customer's system.
For customers who choose not to purchase the Ophir RMC1 Chopper, the RM9 sensor is compatible with most available commercial choppers. Chopper blades should have a low emissivity surface facing the RM9 sensor. Just connect the sync output from your chopper to the BNC connector on the RM9 electronics box. The chopping frequency must be set to 18Hz.

2. Tips and best practice when using the sensor:

The sensor circuit is sensitive to any signal chopped at 18Hz and insensitive to any other light that does not have a frequency of 18Hz (or a multiple of 18Hz). In general, it is recommended that the chopper be placed as close as possible to the light source, and as far away as possible from the sensor. This will minimize the amount of stray light that will be able to pass through the chopper (and be chopped at 18Hz) and reach the sensor. This is very important when performing measurements at the lower end of the sensor's measurement range, in the region of a few μW or lower.

The RM9 and RM9-THz sensors are based on a pyroelectric sensor. This makes them sensitive to mechanical vibrations that can be transmitted through the optical work bench or other surface on which the sensor is standing. Minimizing the effects of such vibrations is recommended when working with very lower powers. This can be accomplished by placing the sensor on soft rubber, cloth or other damping material.

The RM9 and RM9-THz sensors are sensitive to IR radiation in the 1μm to 12μm wavelength band. Care should be taken to avoid having heat sources in the field of view that the RM9 sensor sees through the chopper window.

Note that the RM9 pyroelectric sensors have a response time 0-95% of approximately 3.5 seconds. They will not be able to respond to signals changing faster than this. Pulsed sources can be measured using the RM9, and the output will represent the average power of the pulsed source. For reliable readings, the pulse rate of the source should exceed 200Hz.

The noise of the RM9 series sensors is specified using a 10s moving average. The host meter or interface measures at a rate of 15Hz but for best performance, it is recommended that averaging be performed. This can be done either by engaging averaging on the meter itself, or as a post-processing stage after logging the data into a PC.

3. Zeroing the sensor against the host meter or interface device:

In order to get the best possible performance from the sensor, it is recommended to zero the sensor against the host meter or interface device before using the sensor. This can be done as follows:

- Disconnect the BNC cable between the RM9 and RMC1 (or power off the RMC1) – the sensor output will drop to zero
- Perform regular zeroing function (refer to your Ophir power meter or PC interface device "User Manual" for instructions)

It is recommended to eliminate any measurement offset before making sensitive measurements. This can be accomplished by turning off the measured source or blocking it close to the source and then activating the offset feature on the meter or PC. Measurement offsets can be either positive or negative.

4. Compatibility of the RM9 series with Ophir power meters and PC interface devices:

The following Ophir power meters and PC interface devices provide full support for the RM9 sensors, when using the latest firmware upgrade available:

- StarLite – firmware version 1.26 or above
- StarBright – firmware version 1.18 or above
- Centauri
- Nova II – firmware version 2.44 or above
- Vega – firmware version 2.44 or above
- Juno – firmware version 1.31 or above
- Juno+
- EA-1

The latest firmware upgrades should be available on the Ophir website.

All future power meters and interfaces will also support the RM9 series in a similar way.

The following Ophir power meters and PC interface devices provide limited support for RM9 sensors:

- Nova
- LaserStar
- USBI
- Pulsar
- Quasar

The limitation when using these meters is that the maximum power signal that can be displayed is limited to between ~1mW and ~2mW (depending on the chosen wavelength). If the incident power exceeds this value, the measured value on the power meter will continue to display ~1mW and no warning will be provided by the meter.

The "StarLab" PC application supports the RM9 sensors to the same degree it supports the host meter or PC interface to which the RM9 is attached.