

## 1.1.2.1 Low Noise Lock In Power Sensors

### 300fW to 100mW

#### Features

- Chopper and lock in amplifier for lowest noise and drift
- Wavelength range from UV to deep IR including Terahertz
- RM9 pyro is not sensitive to background radiation



The RM9 series Radiometers use a pyroelectric or photodiode sensor in conjunction with chopped CW or quasi CW radiation, using a digitally synthesized lock-in amplifier to reduce external noise to a minimum. The signal is passed through the 18Hz chopper and the chopped signal is detected by the sensor. All signals not at this 18Hz frequency are suppressed. The output of the sensor is displayed on a standard Ophir meter or PC interface. The chopper may be placed at any convenient location but preferably close to the signal source so as to eliminate interference from all unchopped radiation. The chopper is to be oriented with the indicated side toward the sensor.

#### Specifications

Model	RM9	RM9-THz	RM9-PD
<b>Use</b>	<b>Low level signals</b>	<b>Low level Terahertz</b>	<b>Very low level signals</b>
Detector Type	Pyroelectric	Pyro with THz absorber	Si Photodiode
Spectral Range	0.15 - 12 $\mu$ m <sup>(a)</sup>	0.1 – 30THz <sup>(g)</sup>	0.2 - 1.1 $\mu$ m <sup>(b)</sup>
Aperture mm	Ø8mm	Ø8mm	Ø10mm
Surface Reflectivity % approx.	50	40 - 70	50
Power Range <sup>(c)</sup>	100nW – 100mW	100nW – 100mW	300fW – 300nW
Power Scales	100mW to 3 $\mu$ W	100mW to 3 $\mu$ W	300nW to 3pW
Power Noise Level <sup>(d)</sup>	~30nW	~20nW	30fW
Minimum Frequency for Pulsed Sources	200Hz	200Hz	200Hz
Thermal Drift (20min) <sup>(e)</sup>	~30nW	~15nW	N.A.
Power Accuracy	±5% <sup>(a)</sup>	±10% <sup>(g)</sup>	±5% <sup>(b)</sup>
Damage Threshold W/cm <sup>2</sup>	5	5	5
Response Time with Meter (0-95%) s	3.5s	3.5s	3.6s
Linearity with Power	±2%	±2%	±2.5%
Connections:			
1. 1.5 meter cable hard wired to interface module.			
2. BNC connector on module for connection to chopper (2 meter BNC to BNC cable included). Perform zeroing with BNC cable removed.			
3. 0.5 meter cable from module terminated in DB15 connector.			
Cooling	convection	convection	convection
Weight kg	0.37	0.37	0.37
Compliance	CE, UKCA, China RoHS	CE, UKCA, China RoHS	CE, UKCA, China RoHS
Version			
<b>Part Number for RM9 Series with RMC1 Chopper <sup>(f)</sup></b>	<b>7Y70669</b>	<b>7Y70678</b>	<b>7Y70672</b>
<b>Part Number for RM9 Series Sensors</b>	<b>7Z02952</b>	<b>7Z02956</b>	<b>7Z02953</b>

Notes: (a) At calibrated wavelengths 500 – 1100nm. At other wavelengths, there is an additional error as follows: <500nm add ±8%, 1100 – 3000nm add ±5%, 10.6 $\mu$ m add ±15%

Notes: (b) At calibrated wavelengths 200 – 1100nm. For <700nm add ±2% additional error

Notes: (c) For LaserStar, Pulsar, USBI, Quasar and Nova/Orion, upper limit is 1mW for RM9/RM9-THz and 90nW for RM9-PD. For these models, accuracy may also be less than values given above

Notes: (d) Averaged over 10s

Notes: (e) In a typical laboratory environment

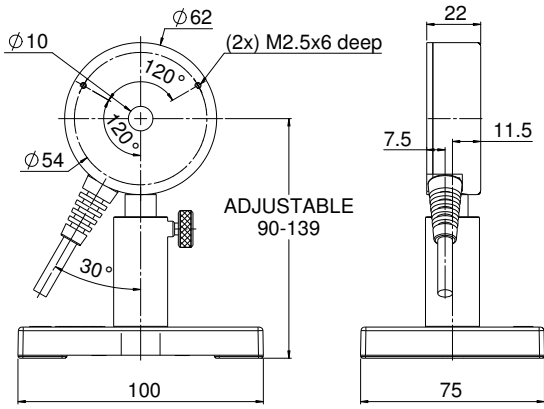
Notes: (f) The RMC1 or another chopper unit that can be set to 18Hz is required for operation of the RM9 series sensors

Notes: (g) The sensor is calibrated for 0.7, 1.5, 2.5, 4 and 10THz. Response at other frequencies can be interpolated from the graph on page 45. Stated accuracy is for frequencies or interpolated frequencies in the range 0.7 – 5THz. For 5 – 10THz, the calibration uncertainty is 15% and for frequencies outside that range, approximate readings can be calculated from the graph but no specified accuracy is given.

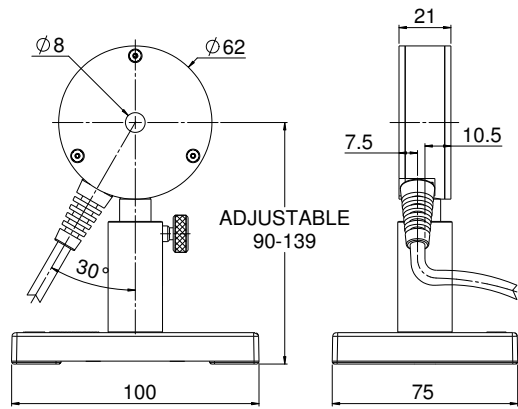
\* For drawings and graphs please see page 45

Model	RMC1 Chopper
<b>Use</b>	<b>Chopper for RM9 Series</b>
Aperture	Ø22mm
Chopping Frequency <sup>(a)</sup>	18Hz
Power Consumption	85mA
Connections:	
1. BNC to interface module	
2. 12V wall cube power supply (included)	
3. Mini USB connector (factory use only)	
Notes: (a) not adjustable by user.	

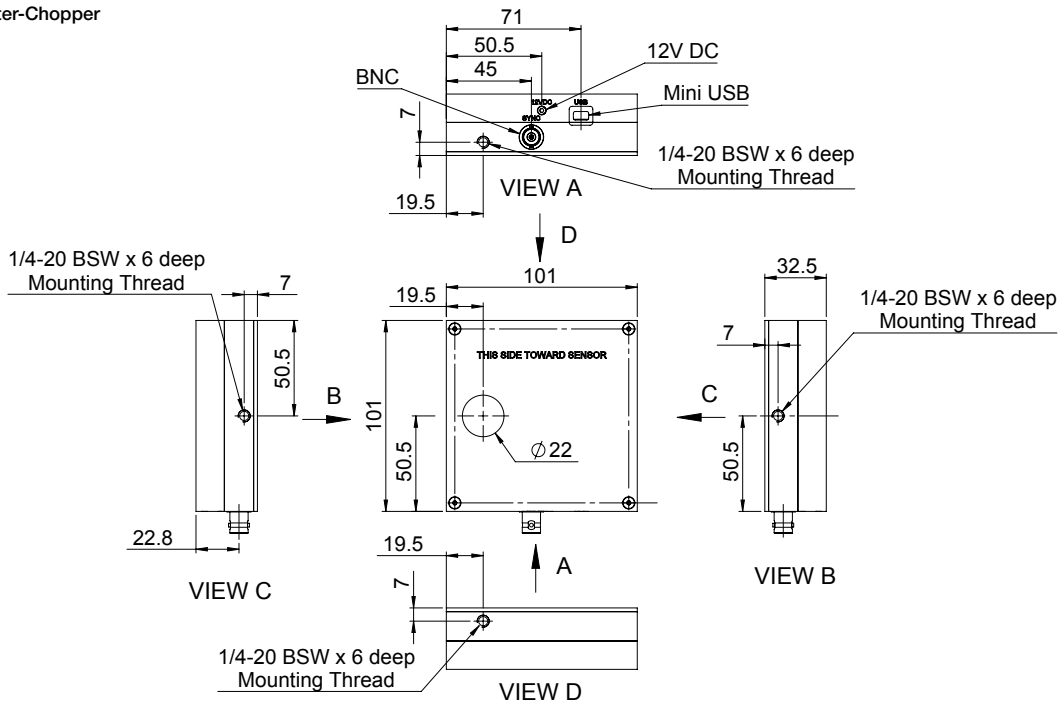
RM9-PD Sensor



RM9 / RM9-THz Sensors



Radiometer-Chopper



Interface Module

