

# Model 197

## Precision Light Chopper



### FEATURES

- ◆ Self contained chopper head
- ◆ Quartz crystal frequency accuracy and stability
- ◆ Internal or external frequency reference
- ◆ Sync outputs
- ◆ Fully enclosed housings for safety and low noise

### APPLICATIONS

- ◆ Optical absorption, reflection and transmission measurements
- ◆ Dual-beam ratiometric measurements
- ◆ Automatic background subtraction in boxcar averager experiments

### DESCRIPTION

The model 197 is a compact, high performance chopper, offering features and benefits that are ideal for use in modern photometric systems.

The unit is self contained, comprising a dual aperture chopper blade, motor and the necessary driving electronics. Each aperture provides an independent reference output allowing simultaneous dual frequency operation (10:1 ratio) for dual-path experiments. Frequency control is by a precision internal oscillator set by a 4-digit push-button selector on the unit or by the application of an external AC reference signal. The unit is powered via an external line power supply module.

Mounting holes are provided in the base and right-hand side of the housing (viewed from the front) to allow for mounting the model 197 onto an optical bench or support post.

#### Quartz Crystal Frequency Accuracy and Stability

The model 197, in common with all **SIGNAL RECOVERY** light choppers, uses a quartz crystal oscillator as its primary frequency standard. The oscillator signal is divided down to yield the required chopper frequency, and then the motor speed is continuously adjusted to phase lock the actual chopper frequency to this required value. The result is a chopper with an output frequency as stable as any other modern frequency source.

#### External Frequency Control

Like many other choppers, the frequency can be controlled externally. However, unlike other units the control is via an applied TTL reference rather than an analog voltage. This means that the modulation frequency generated is exactly that required which allows these choppers to be used in conjunction with the dual reference modes offered by our model 7265 and 7280 lock-in amplifiers to implement two-channel source compensation experiments - see applications notes AN1003 on page 117 and AN1005 on page 129.

### Specifications

#### General

Dual-aperture self-contained chopper with internal or external reference frequency. Two sync outputs.

Frequency	15 Hz to 3000 Hz
outer sector	150 Hz to 3000 Hz
inner sector	15 Hz to 300 Hz

#### Control

manual  
external

Digital push-button  
Application of 0.5 V to 10 V pk-pk sine or squarewave, 150 Hz to 3000 Hz to EXT SYNC BNC connector

#### Internal Frequency accuracy stability

±20 ppm at 25 °C  
±30 ppm/ °C (range 10 °C to 60 °C)

# Light Choppers

## Specifications

### Model 197 (continued)

Jitter (measured pk-pk and presented as a % of a full cycle)

outer sector	blade only: 0.5%; blade + electronics: < 1.5%
150 to 500 Hz	
500 to 3000 Hz	blade only: 0.5%; blade + electronics: < 1%
inner sector	blade only: 0.5%; blade + electronics: < 1.5%
15 to 50 Hz	
50 to 500 Hz	blade only: 0.5%; blade + electronics: < 1%
Lock indication	Bicolor LED - red when unlocked and green when locked

### Settling Time

7 s nominal at 1 kHz from switch-on;  
9 s nominal for frequency change from 150 to 3000 Hz;  
30 s nominal for frequency change from 3000 to 150 Hz

### Outputs

Sync Out 1	10 V pk-pk squarewave at outer sector chopping frequency, 150 - 3000 Hz
Sync Out 2	10 V pk-pk squarewave at inner sector chopping frequency, 15 - 300 Hz
Connectors	BNC
Impedance	10 kΩ. Note that although the output voltage is 10 V pk-pk, the high output impedance means that the outputs can be directly connected

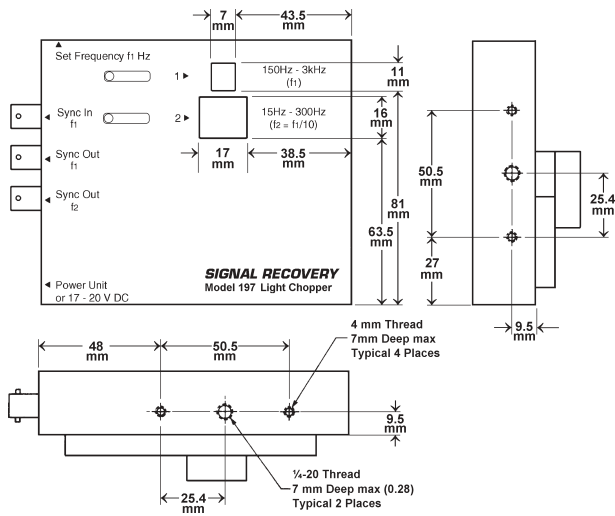
to the external reference input of any **SIGNAL RECOVERY** lock-in amplifier without causing problems.

### General

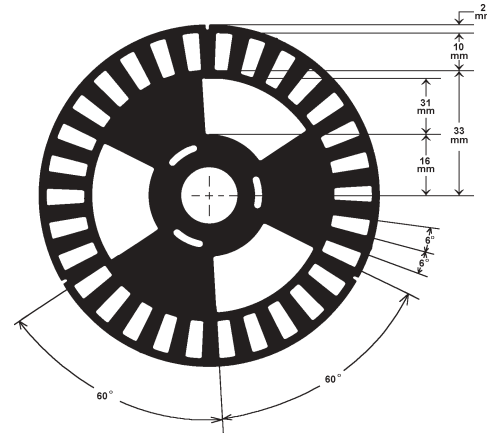
**Power Requirements** Via separate power adapter for 110 V AC, 50/60 Hz or 220/240 V AC, 50/60 Hz supply. State which voltage is required when ordering

### Dimensions

Width	4¾" (122 mm)
Height	4" (104 mm)
Depth	1¾" (44 mm)
Weight	1lb (0.45 kg) excluding power supply



Model 197 Mechanical Dimensions



Model 197 Chopper Blade Dimensions