



WATT PILOT

Enhanced Attenuator

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1. Introduction

This manual is designed to help to install and operate Watt Pilot. Before installing and operating Watt Pilot please read installation and operation instructions carefully. Safety instruction must be read especially careful. If there are any questions about manual content please contact info@altechna.com. Altechna reserves the right to update the manual content without notification.

1.1. Watt Pilot description

Enhanced Watt Pilot is a manually controlled laser beam attenuation device. It attenuates free space laser beam/pulse continuously without introducing additional energy fluctuations.

1.2. General safety requirements

Motorized Watt Pilot is designed to operate in conjunction with laser system. All applicable rules and regulations for safe operation of lasers must be known and applied while installing and operating Watt Pilot. The user is solely responsible for laser safety while using Watt Pilot as standalone or integrated into system. The user must use suitable protective measures.

While assembling or operating Watt Pilot, user cannot stare into direct or scattered laser beam. All parts of the Watt Pilot body must be kept away from the laser radiation. While adjusting laser beam path through Watt Pilot laser power must be low as possible. The risk of hazardous laser radiation can increase while optical components or instruments are used in combination with Watt Pilot. Appropriate eye protection must be worn at all times.

1.3. Operating and storage conditions

Environmental conditions that must be hold while storing, servicing and operating are:

Storage temperature should be between -35 °C and +60 °C. Operating temperature is 25 °C ± 10 °C. Watt Pilot must be protected from humidity, dust and corrosive vapours to avoid damaging optical components.

2. Principle of operation

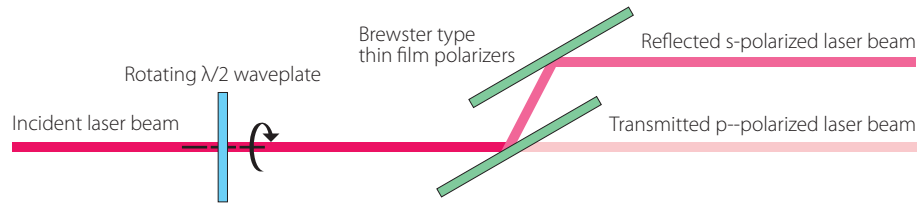


Figure 1. Watt Pilot operation principle. Colour differences shows intensity of laser beam. Brighter red means more intensive laser beam.

Enhanced Watt Pilot incorporates 2 high-performance Brewster type thin film polarizers, which reflect s-polarized light while transmitting p-polarized light. Rotating phase retardation of $\lambda/2$ waveplate is placed in the incident polarized laser beam. The intensity ratio of those two beams may be continuously varied without alteration of other beam parameters by rotating the waveplate. The intensity of either exit beam, or their intensity ratio, can be controlled over a wide dynamic range. P-polarization could be selected for maximum transmission, or high-purity s-polarization could be reflected when maximum attenuation of the transmitted beam takes place. Proper functioning of Watt Pilot requires optimal configuration of optical elements regarding to incident laser beam. Watt Pilot output polarization contrast depends on incident laser beam polarization contrast.

2.1. Main components of Watt Pilot

Optical components are placed into mechanical holders. Main mechanical components of Watt Pilot are shown in figure 2. Waveplate mount is designed to 1 inch diameter waveplate $\lambda/2$.



Figure 2. Watt Pilot main components.

Waveplate inside the waveplate holder is rotating around the optical axis of incident laser beam. Brewster type thin film polarizers are placed into adapter for polarizers. Adapter for polarizers and waveplate mount are fixed while using M4 screw with vinyl cap. Watt Pilot might be fixed to an optical table using posts and clamps or to the custom system while using M6 screw on the bottom.

3. Assembling

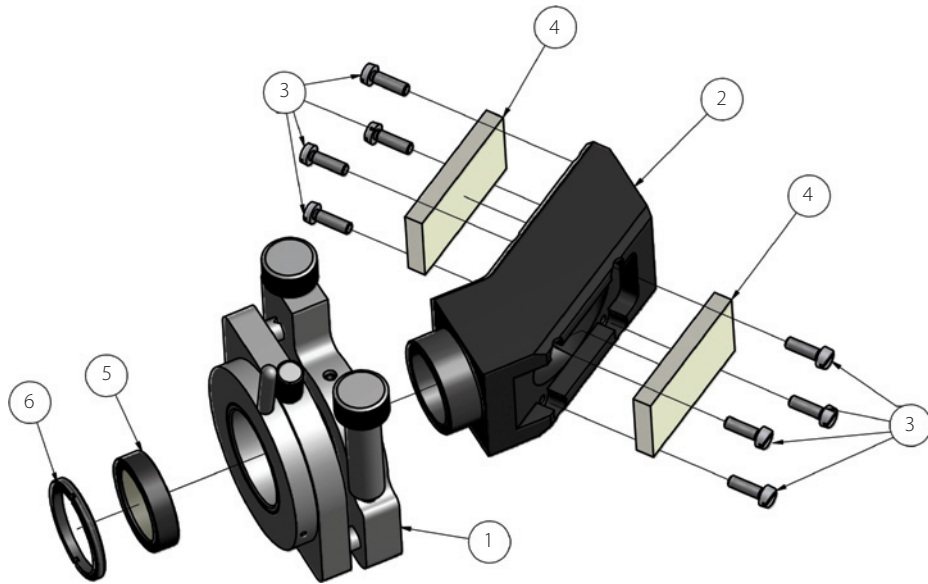


Figure 3. Assembling Watt Pilot.

Watt Pilot assembling steps:

Step 1 Place polarizers (figure 3, component no. 4) into mechanical adapter (figure 3, component no. 2). Polarizers must face each other with surfaces coated with polarizing coating. Polarizing coating is marked with an arrow in order to put the polarizers with the arrows on the sides facing each other. Then fix polarizers with the plastic bolts (figure 3, component no. 3). Use all 4 plastic bolts to fix one polarizer.

NOTICE: do not tighten up the bolts too much since it can bend the polarizer and thus distort the laser beam.

Step 2 Put wave plate (figure 3, component no. 5) into attenuator (figure 3, component no. 1) between two mounting rings (figure 3, component no. 6) as shown. Be sure the waveplate is immobilized tightly.

Step 3 Attenuator consists of two mechanical parts. You should assemble both mechanical parts together (figure 3, component no. 1 and no. 2).

Step 4 Use fixing screw for tightening both parts together.

PEASE NOTICE: Powder free gloves must be worn while mounting optical components. Avoid touching and scratching optical surfaces.

4. Mechanical dimensions of enhanced Watt Pilot

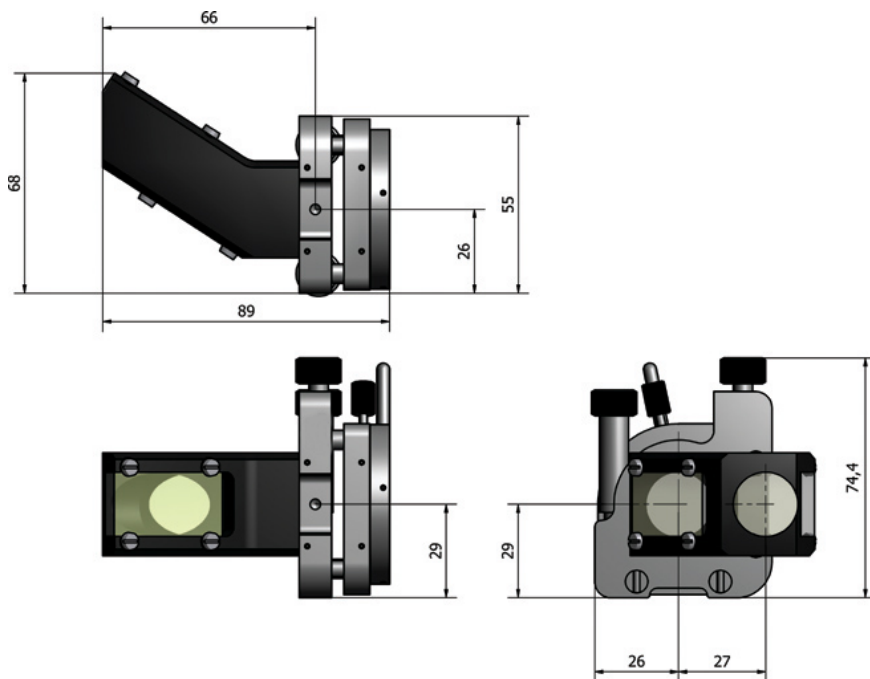


Figure 4. Watt Pilot dimensions.