

gMOT - Compact Grating Magneto-Optical Trap

CPI Electron Devices Business - CPI TMD Technologies gMOT



The gMOT device is a compact, portable grating magneto-optical trap capable of trapping 6 million alkali-metal atoms with temperatures below 10 microkelvin demonstrated.

It provides a precision sensing capability in applications ranging from academic research to civilian and defence applications.

The device makes use of the latest advances in microfabricated silicon etching technology to manufacture the patented gMOT grating design. It also employs novel vacuum engineering and optical design to provide a portable and rugged ultra-high vacuum device.

The module can be supplied with a laser system as standard but comes without, so the customer can choose to integrate the device into an existing set-up with their own laser system.

The device will be supplied with a 15 W USB-C power supply as a standard prime power source.

The MOT lifetime is indefinite when the ion-pump is operational. When the ion-pump is turned off, the lifetime of the MOT remains operational for greater than 10 days.

These devices are delivered to agreed acceptance test procedures to meet customer requirements.

This product is ITAR-free.

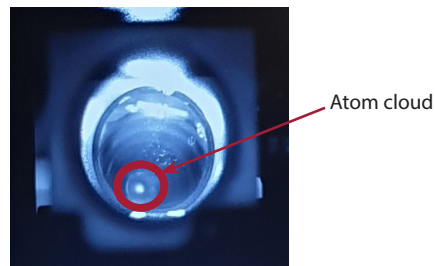
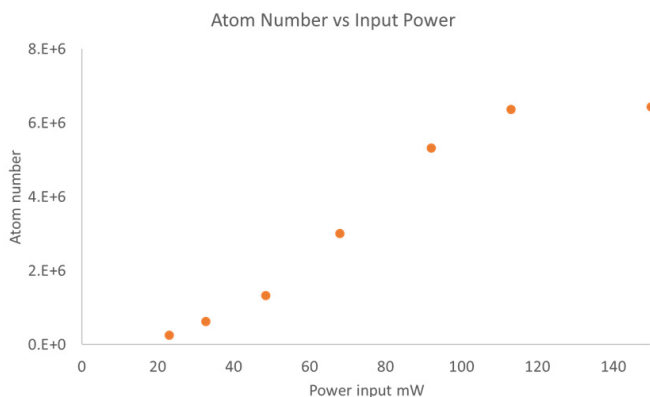


Figure 1. gMOT trapped atom cloud

Performance

Vacuum level	1×10^{-7} mbar typical (with Rb dispenser on)
MOT loading rate	$> 10^7$ atoms/s
Atom number	Peak atom number $> 10^6$ 1-6 million typical depending on input power



Atom Loading Time	100 ms typical
Vacuum Lifetime	Indefinite with pump Unpumped minimum of 7 days Pumped cell life indefinite

Mechanical

Mechanical Outline	330 x 88 x 104 mm
Optical Access	25 mm diameter window MOT cloud height - 6 mm from grating surface Cloud access angle 30° / horizontal plane (see diagram)
Weight	< 4.9 lbs (2.0 kgs)
Orientation	Any
Finish	Anodized
Markings/Labels	Type number Model number Serial number Laser hazard warning Rubidium hazard warning

Prime Power Requirements

Power consumption	15 W typical
Laser Power	20 mW minimum (laser not provided)

Connectors

Power	USB-C
Trapping laser input connection	Bulkhead: FC/APC polarization maintaining fiber connector Fiber Input: Thorlabs P3-630-FC-X – 630 nm PANDA polarization maintaining APC patch cable

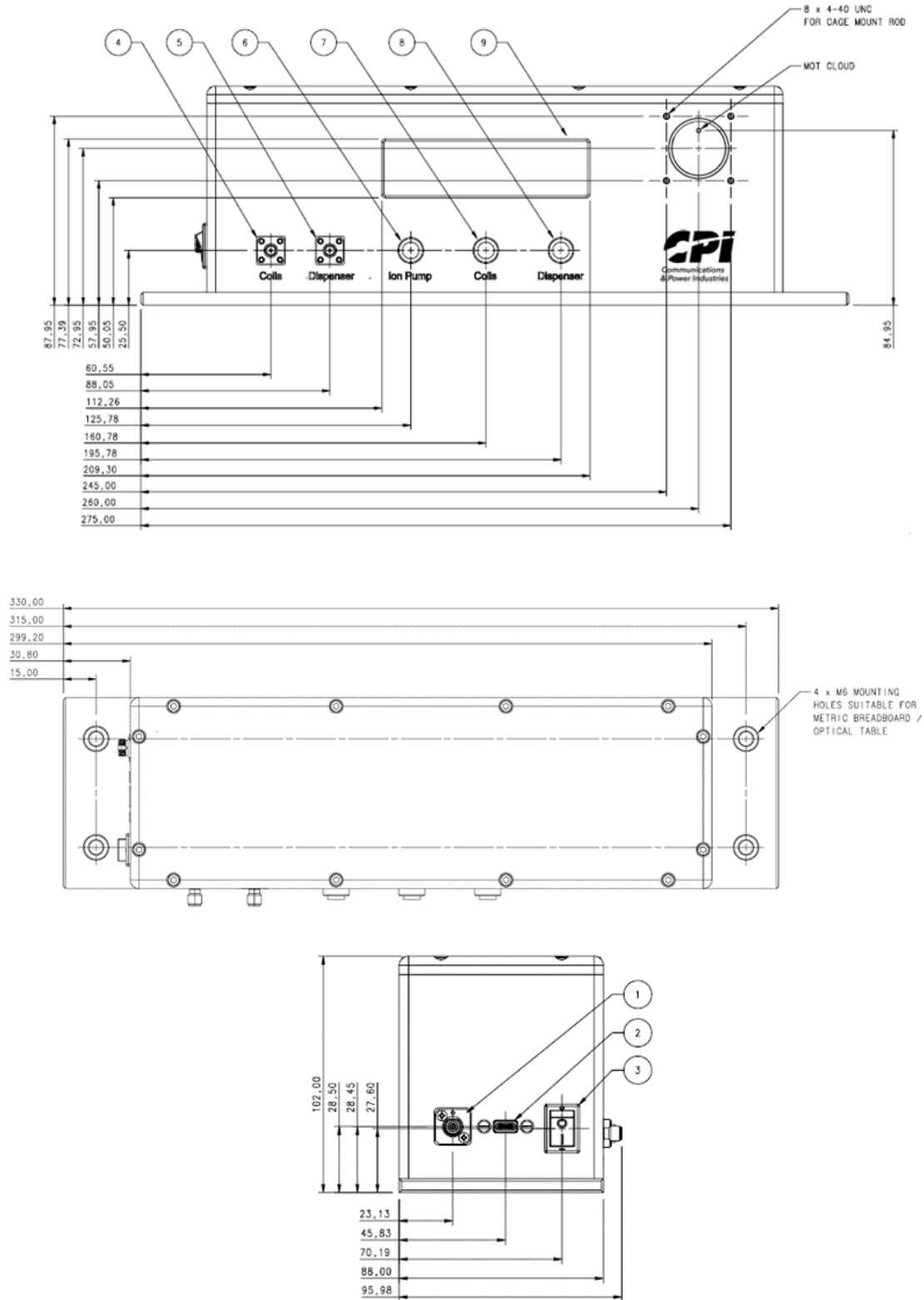
Control Inputs

Push switches for anti-helmholtz coils, rubidium dispenser and ion pump. External control for coils and rubidium dispenser via SMA connectors at TTL levels

Monitors

Anti-helmholtz coil operation status, rubidium dispenser current and ion pump current are displayed on an LCD display

Technical Drawings



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For more detailed information, please refer to the corresponding technical description if one has been published, or contact CPI TMD Technologies. Specifications may change without notice as a result of additional data or product refinement. Please contact CPI TMD Technologies before using this information for system design.