

## EQ-400 Water Cooling

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### Introduction

The EQ-400 Laser-Driven Light Source (LDLS™) requires active water cooling. Energetiq provides a basic component set for typical installations, but customer specific requirements may lead to the need for customized solutions. This document will cover the basic requirements and suggested chiller and cooling lines, as well as, additional information that should be sufficient for the end-user to customize their own individual solutions if preferred.

### Recommended Chiller & Accessories

Energetiq recommends the following model chiller and accessories. Please visit <https://www.smcusa.com/contact/global-locator/> to locate the distributor for pricing and delivery information.

Item	Part Number	Specification
Chiller	SMC Series #HRS018-A-XX-T	100/115 VAC: HRS018-A-10T or 200/230 VAC: HRS018-A-20T
By-Pass Piping Kit	SMC #HRS-BP001	
Filter Housing Kit	SMC #HRS-PF003	

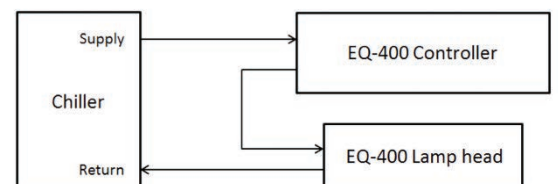
### System Minimum Requirements

- Cooling Power: 1,500 watts (5,118 BTU/hr)
- Flow:
  - Controller - 3.0 liters/min (0.79 GPM) minimum
  - Lamp - 1.0 liters/min (0.26 GPM) minimum
- Temp: 18°C -24°C (64°F – 75°F)

### Recommended Cooling Configuration

The recommended cooling configuration is to connect the controller and lamp head in series using the optional Energetiq 10m chiller kit which includes a 5.0m supply & 5.0m return line.

When configured as shown at right, the system pressure drop measured at the cooling water source will be 0.18MPa (27.0 PSI) differential at the recommended flow of 3.0 liters/min (0.79 GPM). For other operating conditions, see table on next page.



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## System w/ 10m Chiller Kit\* – Estimated

Flow Rate (l/min)	Pressure Drop (psi)
1.0	3.8
2.0	13.2
3.0	27.2
4.0	46.7

\*8.0mm OD X 6.0mm ID tubing

For other configurations, including longer cooling hose lengths, the flow vs pressure data of the individual components is provided below as design guidelines for user-provided cooling systems. If cooling hose lengths are increased, use of larger diameter hose is recommended.

## Measured Pressure Drop vs. Flow Rate

### EQ-400 Lamp Housing

#### Lamp - measured

Flow Rate (l/min)	Pressure Drop (psi)
1.0	1.0
2.0	3.5
3.0	7.2
4.0	11.5

### EQ-400 Controller – Nominal

#### Controller - measured

Flow Rate (l/min)	Pressure Drop (psi)
1.0	3.8
2.0	2.5
3.0	5.0
4.0	8.0