



Solar Lamp Products

18, 21 & 24  
WATT

OPERATION and  
INSTALLATION MANUAL



### 1. Description:

S1 arc lamp is a high intensity metal halide light source. The light is emitted from an arc discharge between two closely spaced electrodes hermetically sealed inside a small quartz glass tubular envelope. Refer to lamp data sheets and section 11 of this manual for arc lamp specifications. The light emitted from this arc tube is intense and appropriate safety precautions relating to exposure protection are required. Refer to Figure 3 of this manual for arc lamp spectral distribution. Metal halide lamps operate at very high temperatures and pressures. The quartz glass must be kept clean. The glass lamps should be handled with care giving special attention of the quartz arc tube. Proper mounting, cooling, and ventilation is required to assure reliable operation of metal halide lamps. Metal halide lamps use high voltage, short duration pulses to initiate operation. The S1 arc is a DC lamp and proper electrical wiring polarity must be observed to prevent damage to the lamp.

### 2. Photobiological Safety Compliance Standard RP-27.3:

CAUTION: Ultraviolet, visible, and infrared radiation is emitted from metal halide lamps. Possible skin or eye irritation can result from exposures exceeding 15 minutes. Use appropriate shielding. Do not stare at exposed lamp in operation. During operation, the lamp should be enclosed in a housing to prevent injury. Do not remove lamp from equipment until it has cooled. Never handle the lamp when it is operating!

### 3. Handling:

Protect the quartz arc tube when handling the lamp. The arc tube may be protruding from the end of some reflectorized lamp assemblies. Keep the arc lamp clean. Do not touch the quartz tube, the inside surface of the reflector, and the connecting wires. Contamination can degrade lamp performance or cause premature failures. If necessary, clean the lamp by wiping with a lint free towel or swab immersed in denatured alcohol.

Ballast products are electrostatic sensitive electronic assemblies and should be handled as such. Proper Electro-Static Discharge (ESD) handling procedures should be employed.

#### 4. Cooling

To ensure proper arc lamp operation and acceptable life, appropriate forced air cooling should be provided when housed in an enclosure. Cooling must be sufficient to maintain the temperature at the tip of the arc tube between  $200^{\circ}\text{C}$  and  $285^{\circ}\text{C}$ . Care must also be taken not to overcool the lamp. This will result an arc that is bluer in color and may cause some flicker.

The ballast should reside in a well ventilated housing. Forced air cooling is highly recommended, but not a strict requirement. Q401 FET heat sink (largest heat sink on PC board) located adjacent to the input power connections must be maintained below  $90^{\circ}\text{C}$ . See Figures 1 or 2 for Q401 FET location. For an optimum temperature measurement location, position and adhere a thermocouple on the reverse side of the Q401 heat sink at the same height as the FET.

#### 5. Mounting:

Sl arc arc lamps are specified for operation in a specific orientation, such as horizontal or vertical base down. Verify specified orientation with the appropriate lamp data sheet. Lamps specified for horizontal operation have a preferred rotational orientation. Refer to the specific lamp data sheet or follow the designation THIS SIDE UP marked on the lamp base. To prevent damage during lamp installation, mounting, and replacements, care must be taken to avoid mechanical interference with the quartz arc tube.

Mount the ballast as desired using the 4 corner through holes provided on the circuit board assembly or some other acceptable means. See Figure 1 for mounting hole locations and dimensions. Handling and mounting care should be exercised to prevent mechanical stressing of the prone components on the through hole side of this assembly.

#### 6. Ballast Wiring:

Inherently, the ballast provides a series of high voltage pulses during lamp starting. To avoid electric shock and arcing, implement appropriate isolation techniques from equipment directly adjacent to the lamp and ballast. As an example, under normal relative humidity conditions, an air gap of 9.53mm (0.375) is recommended if no additional isolation techniques are employed.

### 6.1 Input Wiring Instructions:

Construct an input power connector assembly compatible with the input connector (Molex 41761 connector 2-pin series or equivalent) located on the ballast circuit board assembly. The physical location of the input connector can be found at the bottom edge of the ballast assembly shown in Figure 1, J101 location. Pin 1 is the positive input voltage and Pin 2 is the negative input return voltage. Slide the connector housing portion of the assembly onto the input power connector, J101 location, until the mating halves lock in place. Observe the wiring voltage polarity as specified in the pinouts section in the performance specifications table

Failure to observe input power wiring polarity could result in catastrophic failure of the product.

Read Section 8 of this manual prior to operation.

### 6.2 Output Wiring Instructions:

Welch Allyn arc lamps are direct current (DC) mode of operation. It is vital that the proper voltage polarity of power to the lamp be correctly installed and maintained. The supplied polarized connectors which electrically couple the arc lamp and ballast, are designed to provide the proper voltage polarity. The two insulated electrical wires supplied with the connection assemblies are colored-coded; the black wire is connected to the Cathode and the white wire is connected to the Anode of the arc lamp. The wires are terminated at the ballast and are designated by P1 for the white wire (Anode) and P2 for the black wire (Cathode). Solder the Anode lead (white wire) of the lamp connector assembly to P1. Solder the Cathode lead (black wire) of the lamp connector assembly to P2. The physical location of the P1 and P2 output termination can be found at the top middle edge of the ballast assemblies shown in Figures 1 and 2.

Avoid connecting the P1 and P2 terminals to anything other than the arc lamp. Instrumentation and/or other circuitry connected to either of these electrical nodes can drastically affect normal ballast operating performance.

High voltage pulses are present on P1 termination during ignition.

Failure to observe input power wiring polarity could result in catastrophic failure of the product.

## 7. Input Power Supply Selection:

The power ratings of the ballast s identified in the data sheets and section 10 of this manual refers to the output power to the lamp. The ballast input power will always be greater than its output power because of its efficiency limitations. The ballast has a capacitive input which will demand a short duration inrush current from the power supply. This is usually not a cause for concern.

## 8. Troubleshooting:

### 8.1 If the lamp fails to ignite;

Check input and output wiring polarity and integrity.

Attempt ignition a second time after properly resetting the ballast by disconnecting and reconnecting the input voltage.

Pre-set the input power supply current limit adjustment is at least 50% above the specified Steady-State Current in Section 10 table.

Pre-set the input power supply voltage adjustment as specified in Section 10 table and use the on / off switch to operate the arc lamp.

### 8.2 If the steps in 8.1 fail to correct the problem;

Ensure the anode wire is not routed near any metal or other conductor.

Ensure that no arcing occurs on the ballast assembly in the area near the P1 connector. (A dark room enables visual detection of arcing).

Ensure that no arcing occurs between the ballast assembly and any adjacent subassembly within the system (components, subassemblies, wire harnesses, etc.). A 9.53mm (0.375") air spacing (or higher dielectric strength) is recommended in the above mentioned areas.

## 9. System Integration Hints:

Physically locate the ballast away from circuitry that is noise sensitive or circuitry that is routed outside of the system housing. This will help control EMI/RFI emissions and help enable the ballast to be compatible within the system.

Do not bundle sensitive signal leads with the ballast input and output power leads. Intentional spacing or shielding may be required in enabling the ballast to be compatible with adjacent circuitry. A common symptom is corruption of adjacent circuits during ignition.

Figure 1. Ballast Mounting Configuration  
Dimensions in mm [inches]

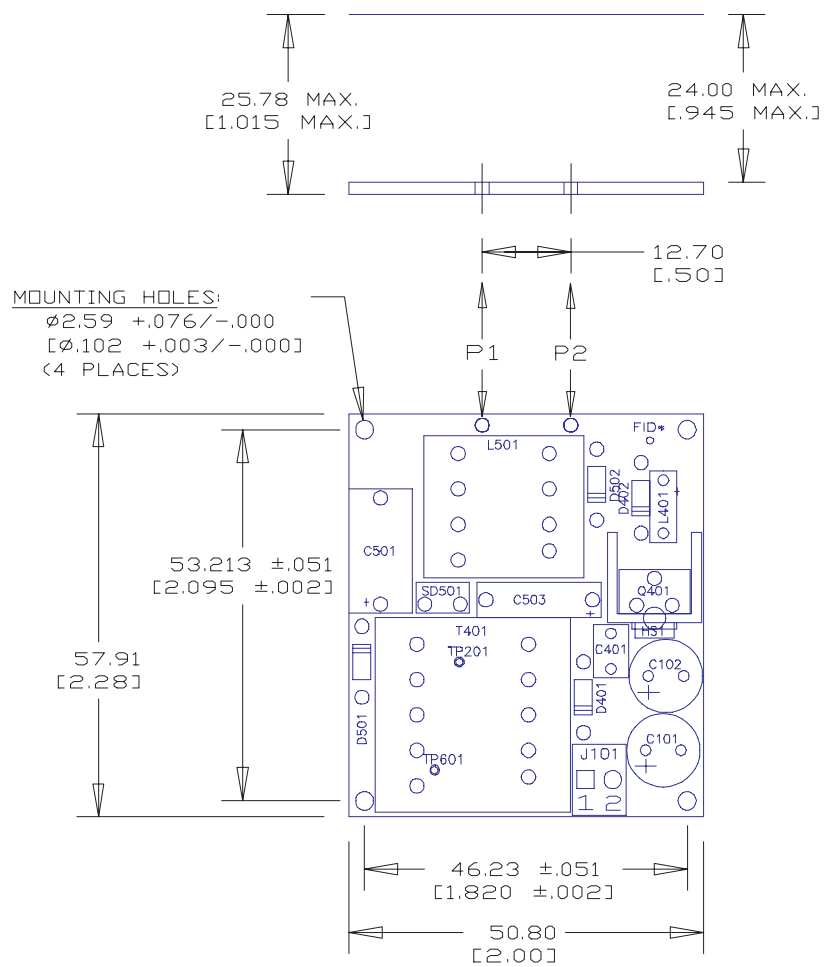


Figure 2. Ballast / Arc Lamp Configuration

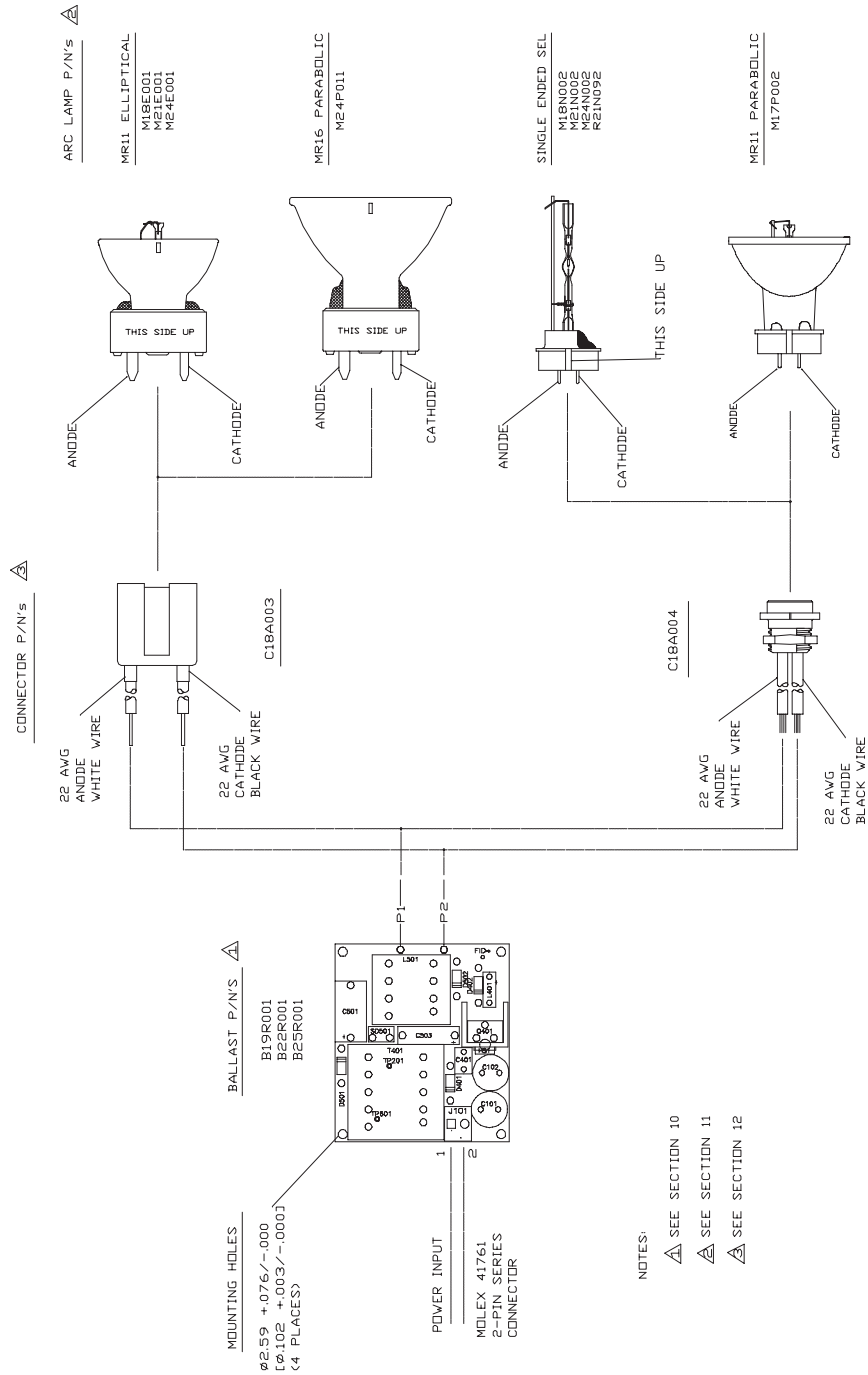


Figure 3. Spectral Output - Typical

