

PRODUCT

SynJet[®] MR16 LED Cooler with Heat Sink

Assembly Guide

Version 1.1
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 NUVENTIX

Version History

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Version 1.0, January 2009	Initial release.
Version 1.1, June 2009	Updated Packaging and Requirements information, and added paragraphs to Handling section in Chapter 1. Changed length of screw used for attachment of heat sink to SynJet housing from 6mm to 5mm in Table 2 on page 11.

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Chapter 1

Introduction

This document provides information necessary to develop a production process for integrating the SynJet MR16 LED Cooler with Heat Sink as elements of an overall lighting assembly.

Audience

The audience for this assembly guide is the luminaire assembly and manufacturing process development team. Marketing and Engineering team members may find background information in this document useful.

Related Documents

For additional information, refer to the following:

- *SynJet MR16 w/HS Product Specification*
- *SynJet MR16 LED Cooler with Heat Sink Design Guide*
- Visit www.nuventix.com for the above documents and latest additions

Components

The SynJet MR16 assembly consists of the SynJet MR16 and heat sink.

The SynJet MR16 LED Cooler with Heat Sink is shown assembled in the following figure.



Figure 1: SynJet MR16 LED Cooler Assembled

Packaging

The SynJet MR16s and heat sinks are shipped as follows:

- The SynJet MR16s and heat sinks are shipped in separate boxes. Quantities are based on ease of handling, shipping costs, and customer requirements. Contact Nuventix Sales for details.

Requirements

For assembly, the following customer-supplied items are required:

- Three screws, M3 x 5mm, are required per cooler. Select a screw head type that is compatible with the production assembly process. The three screws are ship with the cooler for small evaluation projects.
- Loctite purple (222MS). This is applied to all screws to ensure a tight fit for the entire lighting product life.

Handling

IMPORTANT! Electrostatic Discharge (ESD) is a significant cause of electronic circuit failure. A failure may:

- be immediate
- occur later due to a weakened component
- appear as an early service life failure.

An industry-standard assembly and test area must have proper ESD protected work stations. In addition, the staff must have ESD prevention education.

The SynJet MR16 electronics require industry-standard care and use of proper ESD protection during assembly and test.

When handling the SynJet MR16, use care with the wiring and the circuit card. The SynJet MR16 is designed for normal assembly operations. With excessive force, the wires and components can be over-stressed and broken.

If secondary machining operations are performed on the heat sink, remove the SynJet MR16 to avoid damage to the housing or circuit card.

The SynJet MR16 LED Cooler plastic housing has been designed to withstand normal assembly forces. Clamping or force fits can create very strong local forces that could damage or weaken the cooler housing, thus creating an early life failure risk.

The SynJet MR16 LED Cooler contains magnets. Small particles of iron, screws, and other magnetic materials from secondary machining or that are loose in the assembly area may be attracted to the housing or the PCBA. They could interfere with performance or cause a failure. Be sure any particles are removed after machining and the assembly work area is clean.

Safety

This section discusses safety precautions that should be taken when assembling the SynJet MR16 with heat sink.

Failure to follow these instructions carefully may result in personal injury as well as incorrect assembly leading to overheating of components.

Electrical

The SynJet MR16 voltages and currents are low and are typically not a hazard. The customer-supplied LED driver circuit card and connections may have higher voltages present. This could be a risk during rework operations. Be sure all electrical power is disconnected.

Hot Surfaces

The LED and the heat sink surface nearby could be hot to touch, even though the LED and SynJet MR16 Cooler are operating as specified. This could become a risk during a rework and test operation. Allow the assembly to cool before working on it.

Thermal Interface Material

Thermal interface material (TIM) is important between surfaces that transfer heat. Refer to the *SynJet MR16 LED Cooler with Heat Sink Design Guide* for additional information on selection and use of TIM.

For the best heat transfer, properly clean and prepare the transfer mating surfaces. Refer to the TIM supplier's recommendations for surface preparation.

Nuventix does not specify or supply a specific TIM. This is the responsibility of the of the luminaire design team's thermal engineer. Nuventix Sales can provide support and consultation.

Chapter 2

Assembly Instructions

This chapter shows you how to assemble the SynJet MR16 with heat sink. It includes suggestions for the assembly with customer specified LEDs and drive electronics. This chapter includes:

- Preparation Steps - describes steps required prior to assembly
- Mounting Features and Assembly - includes figures that show various SynJet MR16 and heat sink mounting features, partial assemblies, and an assembled SynJet MR16 with heat sink
- Assembly Overview with more detailed process sequence steps.

Preparation

The face of the heat sink is machined for improved flatness. Usually, secondary machining operations by the customer are necessary for attachment of the LEDs to the face of the heat sink. Since the face of the heat sink is not coated, it can be machined more easily. For specific customer needs, custom mounting features may also be special ordered.

Heat transfer is significantly improved by cleaning the heat sink surface after machining operations and prior to attachment of the LEDs.

IMPORTANT! The surface must:

- be clean
 - have high spots and roughness removed
 - conform to surface drawing specification
-

The SynJet MR16 is shipped with the ends of the power leads stripped and tinned. If a connector is used to connect the power supply, the leads are ready for the customer to crimp or solder them to the connector. This connector is most easily added early in the assembly process. If no connector is used, the leads can be soldered or otherwise attached to the power supply.

Table 1: Power Lead Specifications

Configuration	Lead Color		Overall Length	AWG (stranded)	Wire Diameter (mm)
	Power	Ground			
5V	Red	Black	150 mm	26	1.02
12V	Yellow	Black	150 mm	26	1.02

Mounting Features and Assemblies

LED Driver PCBA Mounting Features

This section provides assembly graphics and is followed by an assembly outline. This outline gives the recommended process steps for integration. Detailed descriptions of each of the assembly elements and their mounting and wiring features are provided.

This section discusses mounting features for the LED driver printed circuit board assembly (PCBA).

The bosses with brass inserts extend above the SynJet MR16 driver PCBA. These bosses may be used for attachment of a PCBA to provide LED driver power. They are also designed to be used as attachment points for the entire SynJet MR16 and heat sink assembly.

The three bosses are located on the SynJet MR16 top side around the perimeter of the PCBA. [Figure 2](#) shows the locations for the bosses.

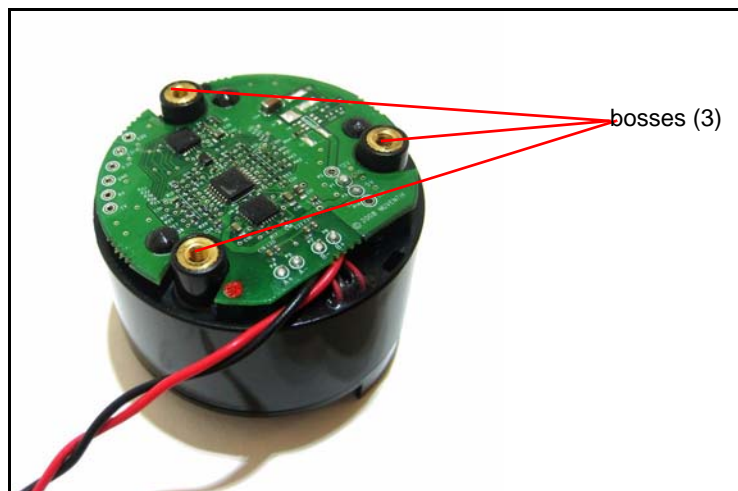


Figure 2: Mounting Features

The LEDs are attached in the center area using the luminaire designer's selected attachment process.

SynJet MR16 Attachment to Luminaire

[Figure 2](#) shows the PCBA end of the SynJet MR16 and three bosses with brass inserts. These three bosses are also used to attach the entire SynJet MR16 LED Cooler with Heat Sink/LED assembly to the luminaire.

Refer to the *SynJet MR16 Mechanical Drawing Data Sheet* for details and screw sizes.

LED Attachment and Wiring

[Figure 3](#) shows the center of the heat sink face used to attach the LED.

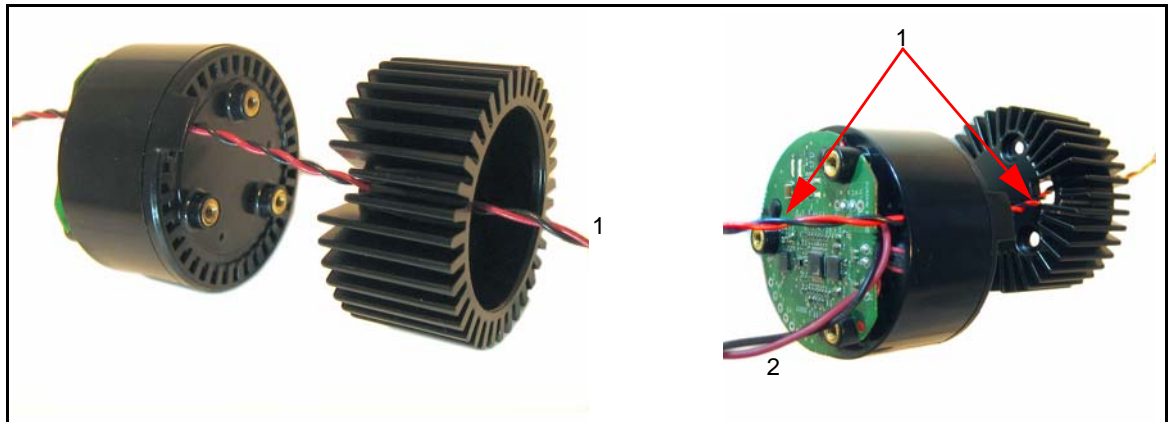


Figure 3: Heat Sink Face - Center Area for LED Attachment

Figure 4 and Figure 5 show the wire routing from the LED, thru the SynJet MR16 housing tunnel, to the LED driver card.



Figure 4: Mating SynJet MR16 with Heat Sink



1 LED power wires

2 SynJet MR16 power wires

Figure 5: Wire Routing Path – LED on Heat Sink to LED Driver

Figure 6 shows the completed assembly of the heat sink and SynJet MR16.



Figure 6: Assembled SynJet MR16 with Heat Sink

Assembly Overview

This section outlines the assembly process. The components for the process include the SynJet MR16, heat sink, LEDs, optics or diffuser, power connections, and LED driver electronics. The final step is integration with the luminaire. Refer to [Appendix A](#) for details and a schematic of the SynJet MR16 Cooler with heat sink components.

SynJet Cooler

To assemble the SynJet Cooler and LED electronics, complete the following steps:

1. Attach connector to SynJet MR16 stripped/tinned power leads for DC power to SynJet MR16 electronics
2. Verify operation, with quick power on check
3. Mount LED driver electronics card above the SynJet MR16 electronics card using the three bosses and screws

Heat Sink

To assemble the heat sink, LED, and optics; complete the following steps:

1. Complete secondary machining operations on the heat sink.
2. Attach the LEDs to the heat sink.

NOTE: TIM is recommended.

3. Route LED power wires through the heat sink holes and through the tunnel in the side of the cooler housing.
4. Add a connector to the LED driver wires or solder them directly to the LED driver PCBA.
5. Attach the optics or diffuser.

Integration

To integrate the luminaire with the SynJet MR16, complete the following steps:

1. Align and mount the SynJet MR16 to the luminaire using the three bosses and customer supplied screws.
2. Connect power to the SynJet MR16 and the LEDs.
3. Turn the power on and then off to test the assembly.
4. Attach the completed assembly to the luminaire.

Operation

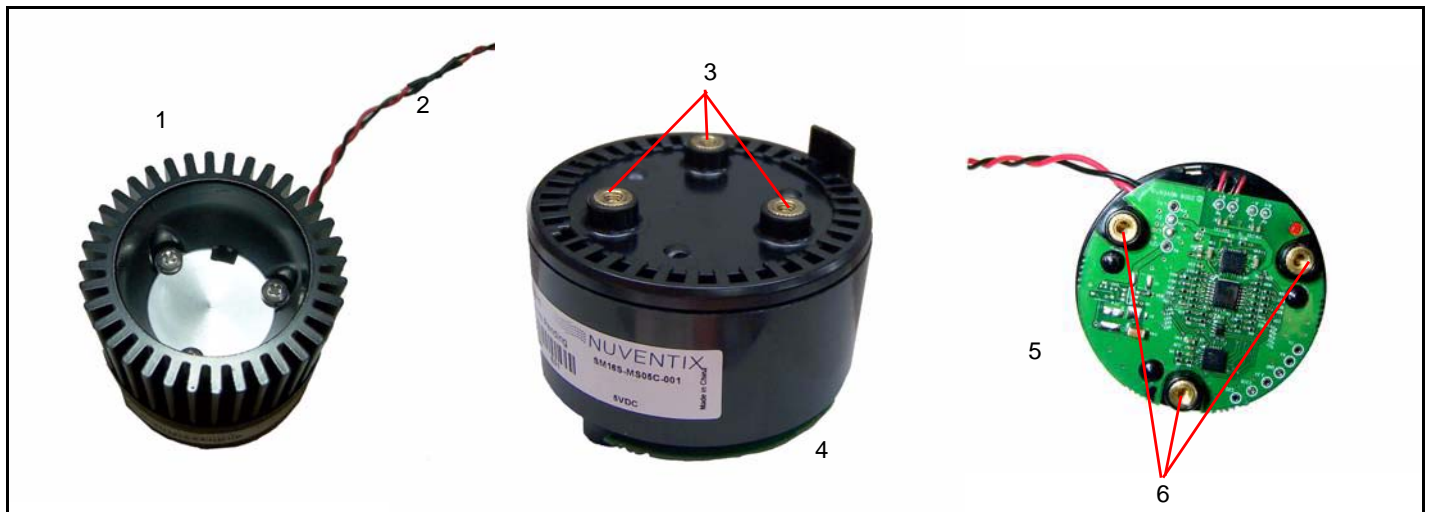
When power is turned on, the SynJet MR16 begins operating immediately.

NOTE: Due to its extremely quiet air flow, you must be in close proximity to feel the air flow and hear the cooler operating.

Appendix A

SynJet MR16 Components

The following figure illustrates the components of the SynJet MR16.



- | | | | | | |
|---|-------------|---|--------------------------|---|--|
| 1 | heat sink | 2 | power lead | 3 | mounting screw bosses heat sink to SynJet MR16 |
| 4 | SynJet MR16 | 5 | SynJet MR16 driver board | 6 | mounting screw bosses SynJet MR16 to external attachment |

Figure 7: Components of the SynJet MR16

The following table describes each component.

Table 2: Component Description

Component	Description
SynJet MR16	The SynJet MR16 is the air mover of the cooling system. The SynJet MR16 creates turbulent pulses of air, i.e., synthetic jets, which are directed between heat sink fins.
Heat Sink	The heat sink spreads the heat dissipated from the LEDs over a large surface area. The heat sink is die cast aluminum and is coated with an electro-coating for protection.
SynJet MR16 Driver Board	The driver board contains the components needed to operate the SynJet MR16.

Table 2: Component Description (Continued)

Component	Description
Power Leads	The power leads are the electrical interface to an external DC power supply. The leads have stripped and tinned ends for easy soldering or connection to a connector.
Mounting Screws	Three M3x 5mm screws secure the SynJet MR16 to the heat sink.
Product Label	The product label contains pertinent information such as part number, revision, operating voltage, manufacturing information, and patent notification.

Disclaimer/Warranty

Customers are responsible for testing products for their unique applications. Any information furnished by Nuventix and its agents is believed to be accurate and reliable. However, since every potential application cannot be anticipated, Nuventix makes no warranties as to the fitness, merchantability, or suitability of any Nuventix products for any specific or general uses. Nuventix shall not be liable for incidental or consequential damages of any kind.

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