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# Application Note – Xicato Mini Driver (XMD) Handling and Installation Guide

## Introduction

The Xicato Miniature Driver (XMD) is a compact, DC-powered, LED driver that can stand alone as simple power on/off driver or connect to a Bluetooth mesh dongle for wireless control. The XMD provides constant current control to a wide variety of LED luminaires.

## General Handling

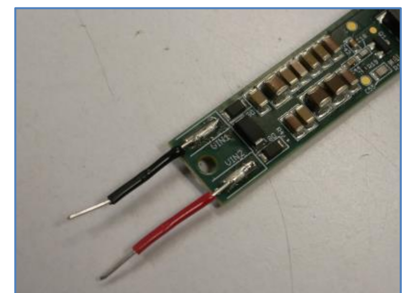
- XMD is an open frame power supply and should be handled with care to avoid damaging the components physically or through electrostatic discharge (ESD).
- XMD should be handled by the edges. Avoid touching the circuits or components.
- The areas where the XMD will see handling should maintain a high level of cleanliness. Maintain clean workstations and eliminate all possible sources of contamination.

### Handling XMDs with Heatsinks (XMD01-30/45/60 Models)

The thermal interface material holding the heatsink onto the XMD board is a liquid dispensed filler that provides better coverage and mechanical integrity than a traditional tacky gap pad. It is not a structural acrylic epoxy or silicone adhesive. Therefore, care must be taken in the handling of the assembly to prevent separating the heatsink from the XMD board. The bond between the heatsink and XMD board can tolerate light routine handling, but will not withstand any significant loading stresses (shear, torsion, cleavage, etc).

## General Soldering Procedure for XMD

When soldering wire leads to XMD $V_{IN}$ or external potentiometer contact pads, Xicato recommends using Alpha HF-850 no-clean solder wire and a temperature-controlled soldering iron such as a Metcal MX Series soldering system with an STTC-117 chisel tip. Since there is variability in available solder alloys and solder guns/irons, Xicato cannot make a specific soldering recommendation; therefore, the following general processes should be practiced.



1. Uniformly cover contact pad with solder.
2. Solder tin wires prior to soldering them to XMD contacts.
3. Soldering duration should be no longer than 5 seconds per connection.
4. Allow XMD to return to room temperature prior to handling.

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The quality of the solder joint should comply with the following standards governing wire soldering:

| | |
|---|---|
| IPC J-STD-001 | Requirements for Soldered Electrical and Electronic Assemblies |
| IPC/EIA J-STD-002 | Solderability Tests for Component Leads, Terminals and Wires |
| J-STD-004 | Requirements for Soldering Fluxes |

### Soldering to $V_{IN}$ Pads

Use stranded and tinned wires with cross sectional area between 0.5 $mm^2$ and 1 $mm^2$ rated appropriately for the luminaire's power to be connected to the adapter. If intending to use the XMD in a Stucchi® 9519-166 track adapter, trim wire lengths between 25-30 mm. Strip wire insulation 4-6 mm on each end.

### External Potentiometer Solder Pad Locations

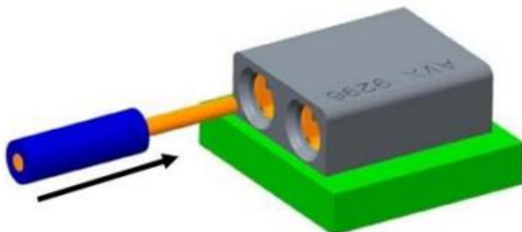
The XMD provides two solder pads on the main board that can be connected to an external 100kOhm potentiometer for wired control of maximum and/or power-on intensity.

## LED Push-in Connector

The LED push-in wire connector is for wires (solid and stranded) 20AWG to 26AWG. These wires must be sized appropriately to accommodate the maximum power capability of the power supply. Xicato recommends stripping the wire insulation 3.5mm to 4.5mm. Stranded wire should be tightly bunched and twisted before insertion to achieve better retention forces within the contact. It is possible to tin the ends, but the conductor diameter must not exceed 0.81mm.

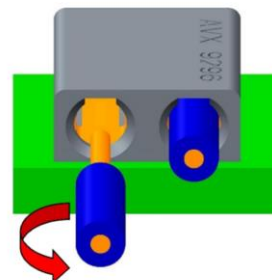
### Wire Insertion

Wires should be pushed until the stop face is reached. Small diameter wires can buckle if over inserted therefore stop pushing as soon as the stop is reached.



### Wire Extraction

Gently rotate wire while pulling until extraction is complete.



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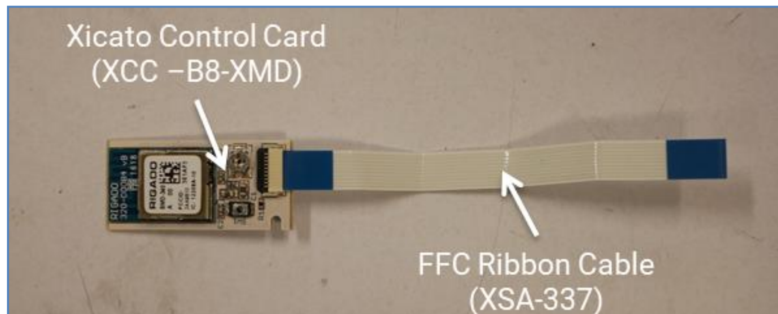
## Xicato Control Card (XCC) Attachment

When paired with the optional Xicato Control Card (XCC), the XMD can communicate wirelessly over a Bluetooth mesh network. The XCC connects to the XMD via a flexible flat cable (FFC). FFC ribbon cables are widely available at most electrical distributors. Compatible FFC cables for the XCC connector should meet the specifications below.

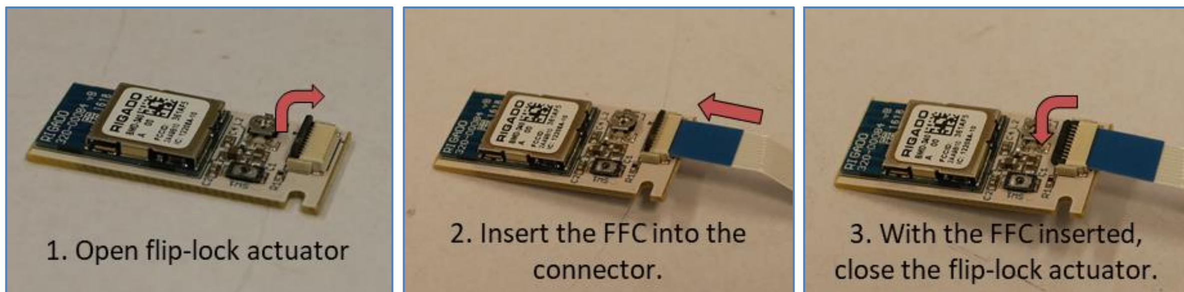
| | |
|---|---|
| UL Style No | 20706 |
| Plating Material | Tin |
| Cable Thickness (mm) | .27 |
| Pitch (mm) | 0.50 |
| Width (mm) | 5.5 |
| Contact Layout Type | Same Side (Type A) |
| Number of Conductors | 10 |
| Temperature Rating | 105°C |

As a convenience to our customers, Xicato carries **XSA-377**, a compatible FFC ribbon cable, in a 65 mm (2.56”) length (*equivalent Molex PN* 0152660603).




### Back Flip-lock Actuator Instructions

The XCC Card and XMD Driver both incorporate back flip-lock actuators for FFC cable retention. The operation of the flip-lock actuator is outlined below.




Do not forcibly remove the FFC cable from the connector when the flip lock actuator is in the closed position; this will lead to wear on the cable and contacts.

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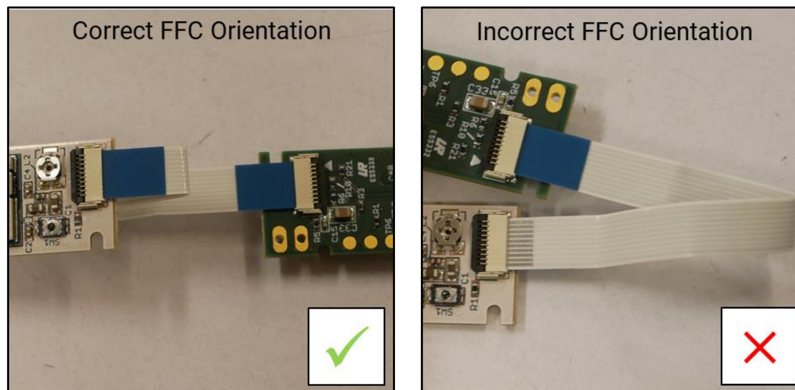
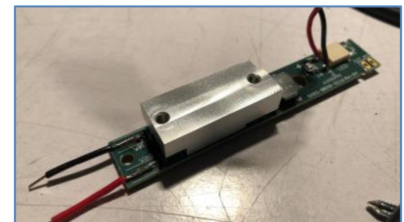
## FFC Orientation

The FFC connectors utilize a dual contact design that can accommodate a flexible printed circuit facing either up or down. However, it is important that the orientation of the FFC contacts in the XMD connector and XCC connector match. For example, if the FFC contacts are facing up in the XMD connector, the contacts must be facing up when mated with the Xicato Control Card.




## Mounting to Preinstalled Heatsink (XMD01-30/45/60 Models)



Two M3x0.5 tapped thru-holes are located on the surface of the heatsink located 21.93mm apart (axis to axis). These mounting holes may be used to fasten the heatsink (and attached XMD) to another heatsink or structure. Only M3 fasteners should be used with the heatsink and screw lengths should be chosen such that the depth of the threads does not travel further than 4mm into the heatsink. Screws fastened deeper may contact components on the XMD causing electrical shortages or physical damage.

When secured to another structure, even greater care must be taken in the handling of the assembly to prevent separating the heatsink from the XMD board. The bond between the heatsink and XMD board will not withstand any significant loading stresses (shear, torsion, cleavage, etc).

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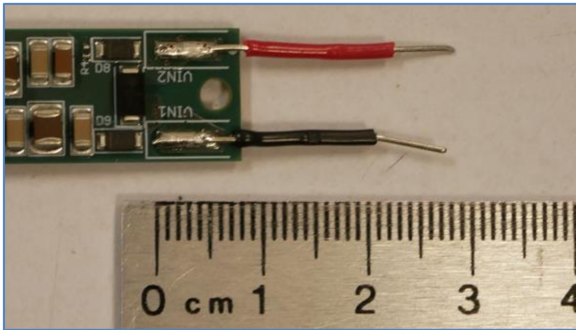
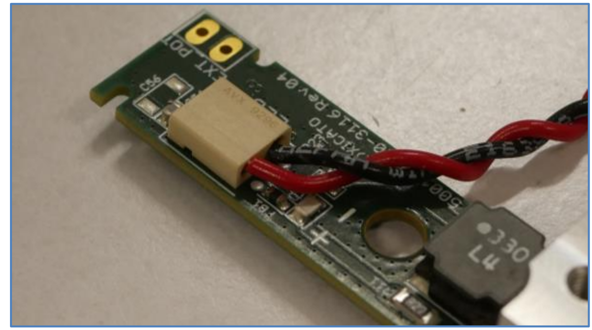
## Installation into Stucchi® Track Adapter

Below is Xicato's recommended procedure for installing an XMD with heatsink into a Stucchi® 9519-166 track adapter.

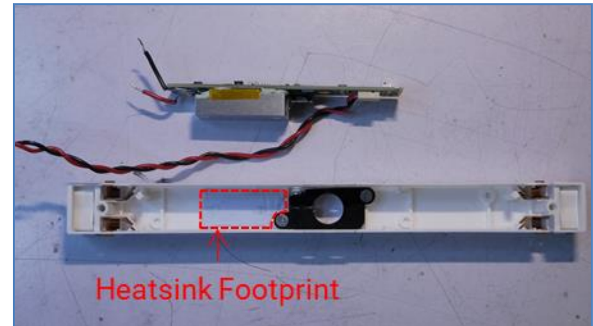



1. Solder wires to the XMD $V_{IN}$ contact pads using the recommended soldering procedure outlined in this document.



2. Insert LED output wires into the LED push-in connector.

3. Remove the Stucchi® 9519-166 adapter cover by loosening the two screws. Install Stucchi rotation kit into the adapter if needed.




4. Place a soft thermally conductive pad in the location where the heatsink will contact the bottom of the track adapter. The thermally conductive pad, also known as a gap-pad, will conform to each surface and help transfer heat away from the XMD and into the plastic adapter housing.

   Note: In internal testing, Xicato uses E-Fill8300, 1.5mm thickness, 1.5W/mK, by eMEIGroup as the preferred gap-pad. Gap-pads with similar thermal performance and characteristics are recommended.

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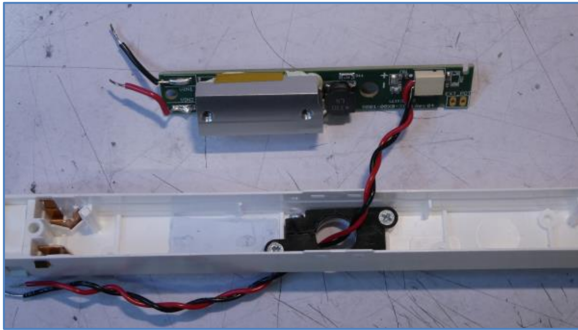
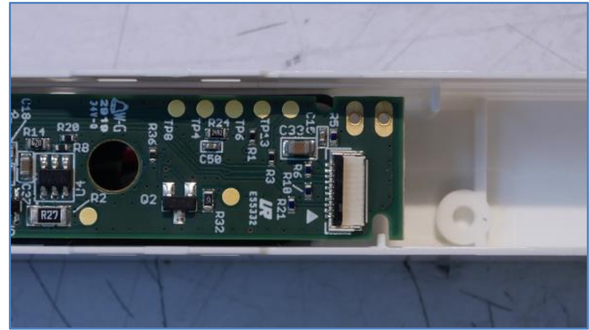
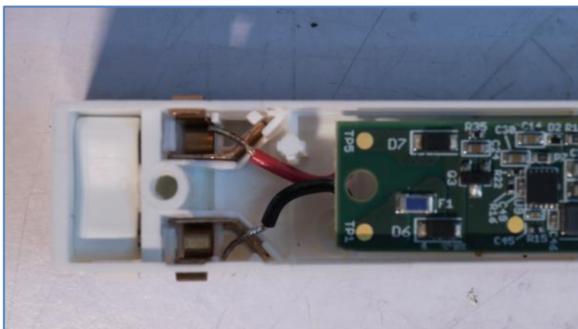


5. Feed the LED output wires through the central hole of the adapter.

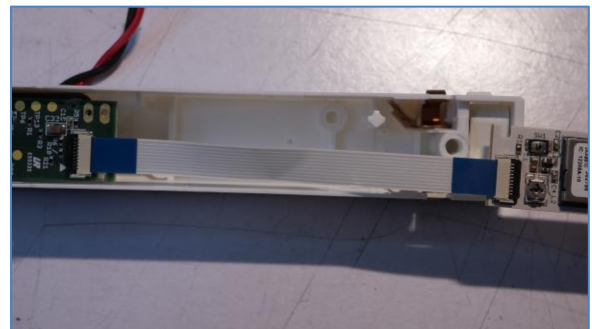


6. Position the XMD inside the Stucchi® adapter housing. Verify proper alignment of the XMD board to the housing by confirming the rib of the housing aligns with the cutout of XMD board near the FFC connector. The PCB will sit above the rib in the housing on the XMD models that have a pre-attached heatsink.

   Note that the central holes of the XMD and the Stucchi adapter **will not** be concentric when positioned correctly.



7. Attach the $V_{IN}$ wires to the adapter and comply with the pole markings inside the adapter. Push each wire in until it is completely inserted in the IDC contact.



8. Attach Xicato Control Card (XCC) to XMD using an XSA-337 FFC cable. Verify connections are secure and contact orientation matches both connectors.

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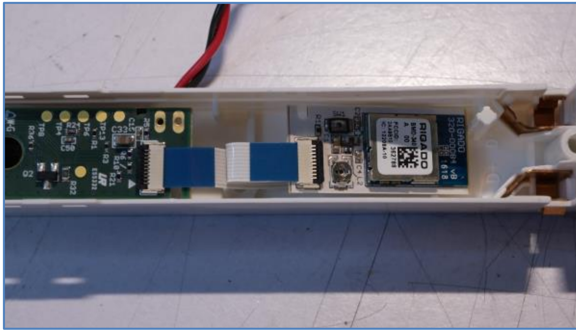
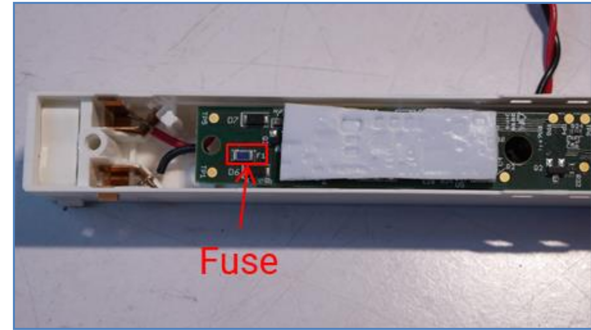
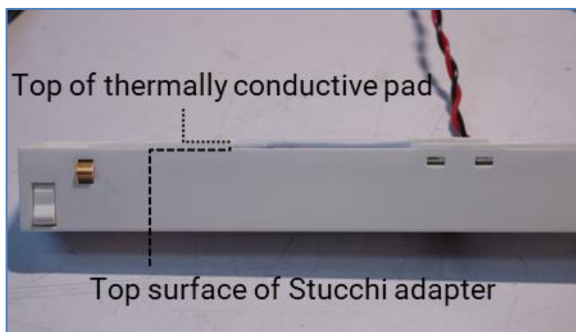


9. Carefully fold FFC so that the XCC card fits inside the adapter. Removal and reinsertion of the FFC cable may be necessary to position the XCC card in the location shown above. It may be beneficial to pre-fold the FFC prior to assembly once an acceptable fold pattern has been determined.



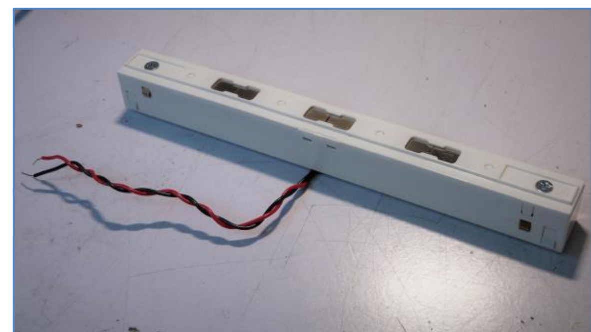

10. Place a soft, conforming, thermally conductive pad over the top components of the XMD board directly opposite the heatsink positioned below.

    Xicato recommends keeping the XMD fuse uncovered to facilitate inspections to the driver in the future should a potential driver failure occur.




11. Top of the thermal pad should be co-planar with the top of the adapter base. If the gap-pad is located too high, the adapter cover will bulge and interfere with the correct operation of the adaptor once it is installed on the track.

    Alternatively, if the gap-pad is positioned too low, there will be no contact between the cover of the adapter and the pad. Positive pressure on the XMD by the cover is needed to ensure XMD heat dissipates through the heatsink and into the adapter.



12. Put the cover on the adapter and tighten the two screws. Verify the adaptor cover is perfectly level with the plane, without bulging. If a bulge is present, reduce the thickness of the thermal gap pad used.

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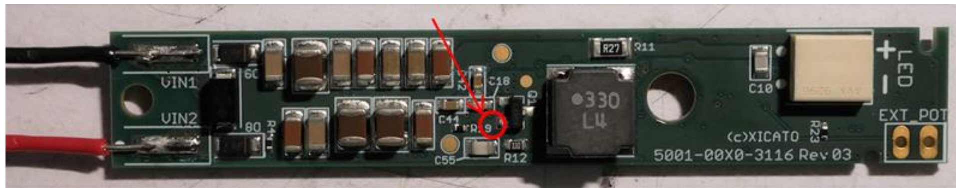
## Installing XMD into Conductive Enclosures

When mounting the XMD into an electrically conductive enclosure, it’s necessary to observe the required creepage and clearance distances to the equipment enclosure to all faces of the XMD. This may necessitate the use of insulators around the XMD assembly.

## TC Measurement

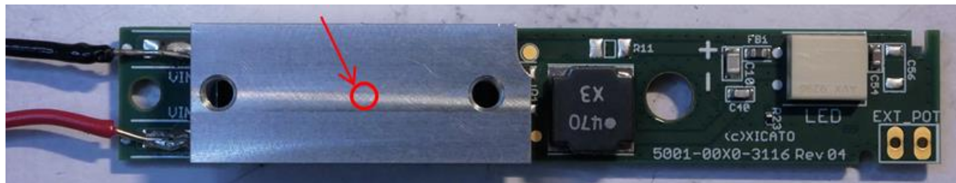
Depending on the XMD model number, the driver’s $T_C$ measurement location is located on the top surface of either the XMD board or heatsink. This site must be utilized for attaching a thermocouple to the XMD in order to verify that the driver is running below its maximum design $T_C$ temperature limit of 70°C.

### XMD without Heatsink (XMD01-15 Model Only)




$T_C$ point - On board next to Q1

### XMD with Heatsink (XMD01-30/45/60 Models)




$T_C$ point - Center of heatsink surface

### Attachment Method

Xicato recommends attaching the thermocouple using the following method accepted by UL1598-2008, Section 19.7.4, Rev January 11, 2010.

1. Verify that the $T_C$ location is clean, dry, and free from debris. Any debris between the $T_C$ surface and the thermocouple bead may add thermal resistance to the test and could deliver erroneous results.

2. Apply cyanoacrylate adhesive sparingly to the surface of the thermocouple bead. Press surface of bead to surface of $T_C$ point immediately. Hold in place until bond sets per manufacturer’s instructions. Do not reposition.

3. In a separate mixing container, add recommended ratio of two-part thermally conductive adhesive and blend per adhesive manufacturer’s instructions. Avoid high mixing speeds

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which could entrap excessive amounts of air or cause overheating of the mixture resulting in reduced working life.

4. Apply the adhesive around the surfaces of the bonded thermocouple bead such that the bead is fully contained within the adhesive. Let the adhesive fully cure per the manufacturer's instructions. Stress relieve the thermocouple wire to further protect the joint.