

### Welcome!

Everyone at Altinex greatly appreciates your purchase of the MU400-123 MUSE Power Transmitter, HDMI/IR/RS232 Receiver. We are confident that you will find it both reliable and simple to use. If you need support, please do not hesitate to call us at 714-990-2300.

We are committed to developing unique and state of the art Signal Management Solutions® for demanding audiovisual installations. Welcome to the Altinex family of satisfied customers around the world.

### 1. Precautions and Safety Warnings

Please read the manual entirely before using your MU400-123. You can download a full version of this manual at [www.altinex.com](http://www.altinex.com). These safety instructions are to ensure the reliable operation of your MU400-123 and to prevent fire and shock hazards. Please read carefully and heed all warnings.

#### 1.1 General

- The MU400-123 does not contain any user serviceable parts. Only qualified Altinex service personnel may perform product service.
- The MU400-123 is safety tested.
- The MU400-123 incorporates a proprietary technology for the transmission of source power and receipt of display video over low voltage CAT-6 cable.

#### 1.2 Installation Precautions

- To prevent fire and shock, do not expose this unit to water or moisture. Do not place the MU400-123 in direct sunlight, near heaters or heat-radiating appliances, or near any liquid. Exposure to direct sunlight, smoke, or steam can harm internal components.

- Handle the MU400-123 carefully. Dropping or jarring can cause internal and external damage.
- Do not pull any cables that are attached to the MU400-123.
- For optimal safety, apply AC power only after the system is installed with all wires connected.

#### 1.3 Cleaning

- Clean the MU400-123 only with a dry cloth. Never use detergents or solvents such as alcohol or thinner. Do not use a wet cloth or water to clean.

#### 1.4 FCC Notice

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions found herein, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- Any changes or modifications to the unit not expressly approved by Altinex, Inc. could void the user's authority to operate the equipment.

### 2. Installation Procedures

Note: The CAT-6 type cable is a critical component to the functionality of the unit. Use only the recommended cable for optimum performance.

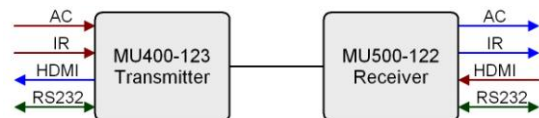
#### Warnings

Air vents MUST be installed facing up or perpendicular to the ground (never facing down) as this prevents a safety hazard in the event of fire.

The minimum cable length required between the MU400-123 and MU500-122 is 25 ft. (8 m).

Use the MU500-122 only with the Altinex MU400-123.

- Step 1. For detailed information, download the entire manual at [www.altinex.com](http://www.altinex.com).
- Step 2. Connect the display device (monitor) to the MU400-123's HDMI output using standard HDMI® cable. Connect the monitor AC power to a standard wall socket.
- Step 3. Connect the source device (camera) power to the MU500-122 using a standard AC cable. Connect the source HDMI output to the MU500-122's HDMI input using standard HDMI cable.
- Step 4. Connect the MU400-123 to the MU500-122 using terminated, unshielded, CAT-6 cable; AWG23 is required to achieve full power.
- Step 5. Connect AC power to the MU400-123. The MU400-123 verifies the MU500-122 is connected and full power is provided to the MU500-122. It may take several minutes for the source to power up and for an image to be displayed on the monitor.
- Step 6. For IR (Infrared Control) operation, use Altinex accessories: AC301-114 Emitter and AC301-115 IR Receiver.
- The IR receiver connects to the MU400-123 Transmitter
  - The IR emitter connects to the MU500-122 Receiver.
- Step 7. The MUSE Transmitter is now ready for operation.



### 3. Warranty and Return Policies

Please visit the Altinex website at [www.altinex.com](http://www.altinex.com) for details on warranty and return policies. In the case of a unit needing repair, please fill out the RMA (return material authorization) form located on the bottom left hand corner of the Altinex homepage. Once filled out, please email the form to [support@altinex.com](mailto:support@altinex.com).

### 4. About MUSE Receiver

- Deliver Power, HDMI, and control 300 ft. (91m) over a single cable
- Power devices with up to 150 W of clean power
- Bidirectional pass through RS232 communication (9600 baud rate)
- Gives integrators greater control over their AV projects
- HDMI\*\* and HDCP Compliant (see details)
- Transmit IR signals from transmitter (HDMI display side) to the receiver (HDMI source side)
- Easy low voltage installation is safe and reliable



The MUSE line of products allow users to transmit HDMI video, AC power, and control over a single unshielded CAT-6 cable. The MUSE is powerful enough to power a 150 watt HDMI source device and can extend power up to 300 ft. away from a signal and power source. The MUSE is fully compliant with HDMI and HDCP standards. Advanced features of the MU400-123 Power Transmitter, HDMI /IR/RS232 Receiver provide a safe and reliable way of sending both signal and power over a single unshielded CAT-6 cable as well as RS232 and infrared control of third party devices. Simplicity of installation makes it a “no brainer” for your next AV system design.

The output of the MU400-123 unit is monitored for power consumption and when power is exceeded, the output is turned off to protect all components. The MUSE can power devices with a maximum continuous power consumption of 150 watts. The MU500-122 provides constant power and voltage to the HDMI source device. When the cable length increases, the system automatically adjusts itself to provide the maximum possible power to the display. Since CAT type cables have resistance associated with them, care must be taken to use the smallest possible cable length to maximize power transfer.

The MU400-123 has many advanced features to safely transmit power to source and receive HDMI video. These features include: current monitoring, auto shutdown, and auto receiver detection. Each unit has a durable metal enclosure with built-in ball bearing cooling fans to provide years of trouble free operation. Every MUSE product comes with a 3 year Altinex Warranty.

The MU400-123 and MU500-122 combination has a built in IR channel that allows IR signals to be sent from the MUSE transmitter (display side) to the MUSE receiver (HDMI source side), to control AV equipment. This feature simplifies setup and provides convenience when AV equipment is hidden out of sight.

\*\*The HDMI video source MUST support clock stretching on the Clock line.

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400-0572-008

**ALTINEX®**



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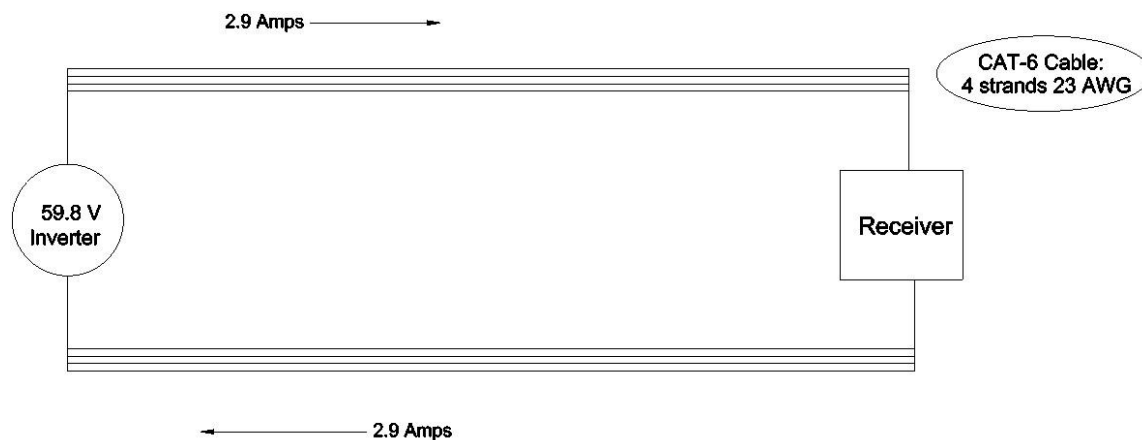
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### Available Power

Distance (ft.)	Available Power	Available Surge Power (10 Seconds)
	AWG23	
25	150	254
50	150	249
75	150	244
100	150	238
125	150	233
150	150	228
175	148	223
200	146	218
225	144	213
250	142	208
275	140	202
300	138	197

### Available Power Calculations (Example Calculations for 300ft Cable)



#### 1. Resistance

Resistance of a single strand of CAT-6 Cable: 20Ω per 1000ft

Resistance of the 4 strands in a CAT-6 Cable: 5Ω per 1000ft

Example:

$(5\Omega \times 300\text{ft} \times 2) / 1000\text{ft} = 3\Omega$  [NOTE: x2 because cable travels 2 ways (from inverter to receiver and vice versa)]

### 2. Voltage

Current across CAT-6 Cable: 2.9A (max)

Inverter Voltage: 60V

Current x Resistance = Voltage Drop

Example:

$$2.9A \times 3\Omega = 9V$$

Inverter Voltage – Voltage Drop = Voltage on Inverter

Example:

$$60V - 9V = 51V$$

### 3. Power

Voltage on Inverter x Current = Power to Receiver

Example:

$$51V \times 2.9A = 148W$$

Power to Receiver - Power Used by Receiver = Available Power

Example:

$$148W - 10W = 138W$$

### Available Surge Power Calculations (Example Calculations for 300ft Cable)

#### 1. Voltage

Surge Current: 4.5 A

Surge Current x Resistance = Surge Voltage Drop

Example:

$$4.5A \times 3\Omega = 14V$$

Inverter Voltage – Surge Voltage Drop = Surge Voltage on Inverter

Example:

$$60V - 14V = 46V$$

#### 2. Power

Surge Voltage x Surge Current = Surge Power

Example:

$$46V \times 4.5A = 207W$$

Surge Power to Receiver – Power Used by Receiver = Available Surge Power

Example:

$$207W - 10W = 197W$$

### 5. Technical Specifications

Specifications are subject to change due to continuous product developments. See [www.altinex.com](http://www.altinex.com) for up-to-date information.

Features/Description	Specification
MU400-123	
<b>Input Connectors</b>	
AC Power	IEC C14 (1)
IR Receiver	3.5 mm F (1)
<b>Output Connectors</b>	
HDMI Video	Type - A F (1)
HDMI + Power + Control	RJ-45 F (1)
RS-232 Connector	3 pos TB (1)
<b>Accessories Included</b>	
Power Cord	PC5301US
<b>Compatibility</b>	
Signal Types	HDMI
HD TV Resolution	480p to 1080p
Computer Resolution	1920 x 1080 at 60Hz
Use with	MU500-122
<b>Optional Accessories</b>	
IR Receiver	AC301-115

Table 1. MUSE Transmitter General

Mechanical	Specification
Material	0.031" Steel
Color	Clear Zinc
MTBF (calc.)	38,000 hrs.
Transmitter: Height	2.5 in (64 mm)
Width (no mounting ears)	3.3 in (84 mm)
Depth	6.9 in (175 mm)
Weight	2.2 lb. (1.0 kg)
T° Operating	10°C-50°C
T° Maximum	75°C
Humidity	90% non-condensing

Table 2. MUSE Transmitter Mechanical

Electrical	Specification
<b>Video</b>	
Video Output Signal Format	HDMI
<b>Control</b>	
RS-232	Imbedded into HDBT
IR Control	Imbedded into HDBT
<b>Power</b>	
Transmitter Power Consumption	250 W (max)
Output Power to CAT6	172W (max)

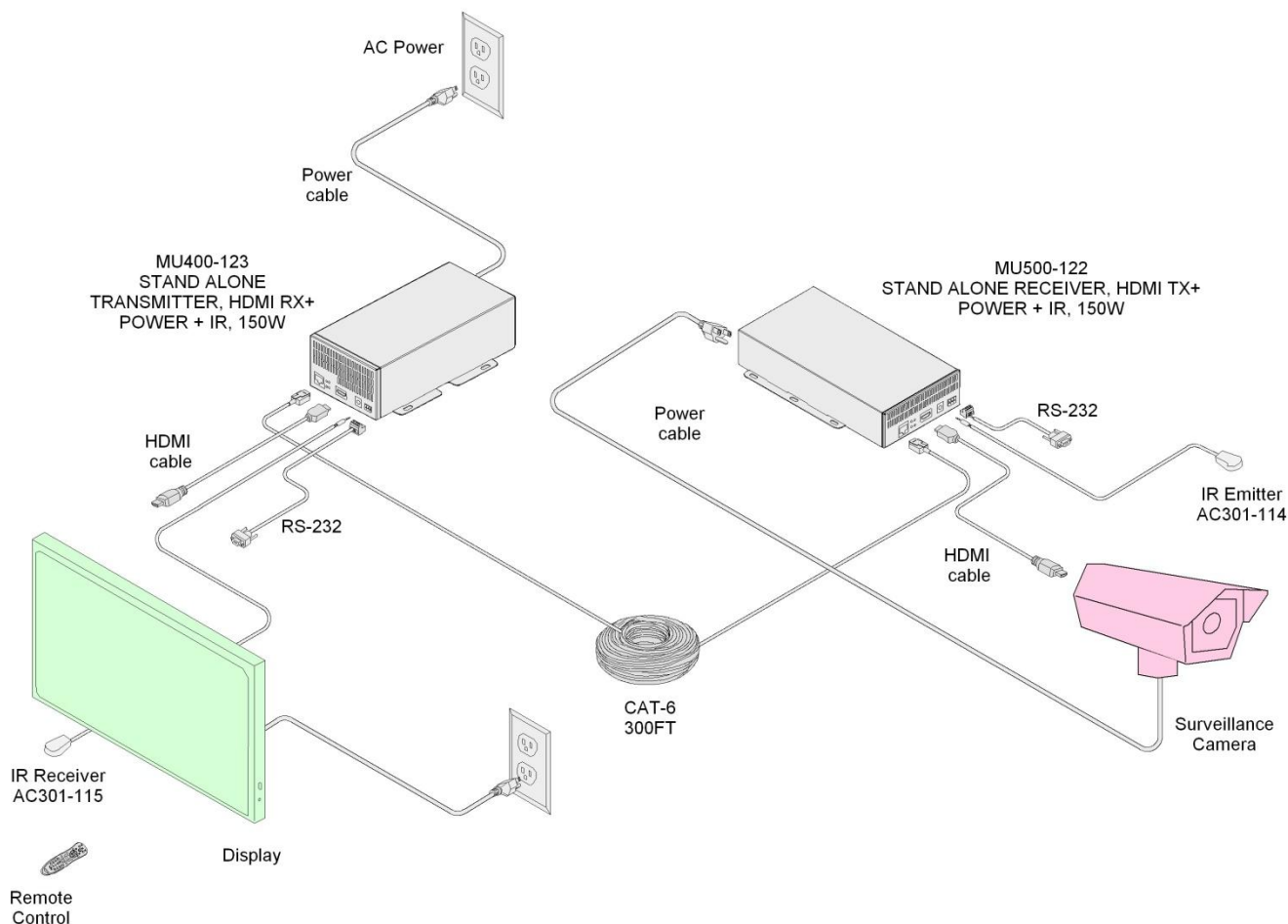
Table 3. MUSE Transmitter Electrical

CAT-6 Cable	Minimum Cable Specifications
Conductor Material/Size/Quantity:	Bare Copper/ 23 AWG / 8
Conductor Construction:	Solid + Unshielded
Color Code:	Per TIA/EIA 568-B
Flammability Rating:	IEC 60332-1, UL 1581 VW-1
Frequency Range:	1~550 MHz
Voltage:	300 V
Operating Temperature:	-20 °C to +60 °C
HDBT Certified	UTP, CAT-6 or CAT6a
Recommended Cable Type	See Diagram 6

Table 4. CAT-6 Cable Minimum Specification

### 6. Application Diagrams

Diagram 1: Typical Setup



TX STATUS	POWER	PAIR
NORMAL	ON	ON
IDLE	ON	SLOW BLINKING
FAULT	FAST BLINKING	FAST BLINKING
VIDEO STATUS	LINK	VIDEO
LINK ACTIVE	ON	
LINK FAILED	OFF	
HDCP ACTIVE		ON
HDCP INACTIVE		BLINKING
No video		OFF

Table 5: Status of MU400-123



Diagram 2: MU400-123 Internal View

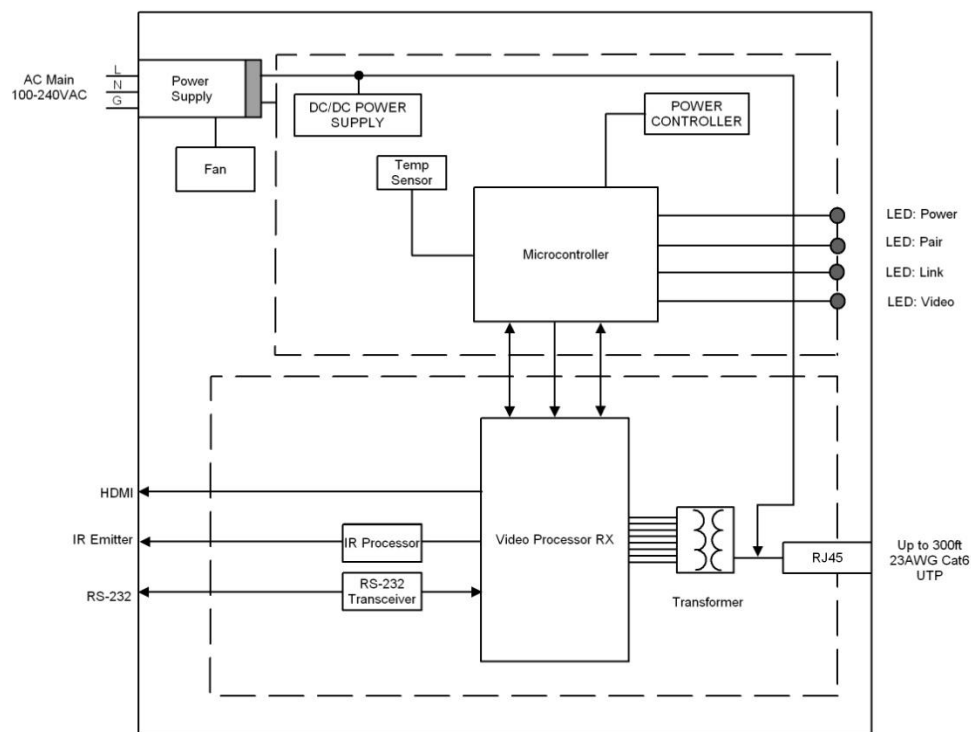
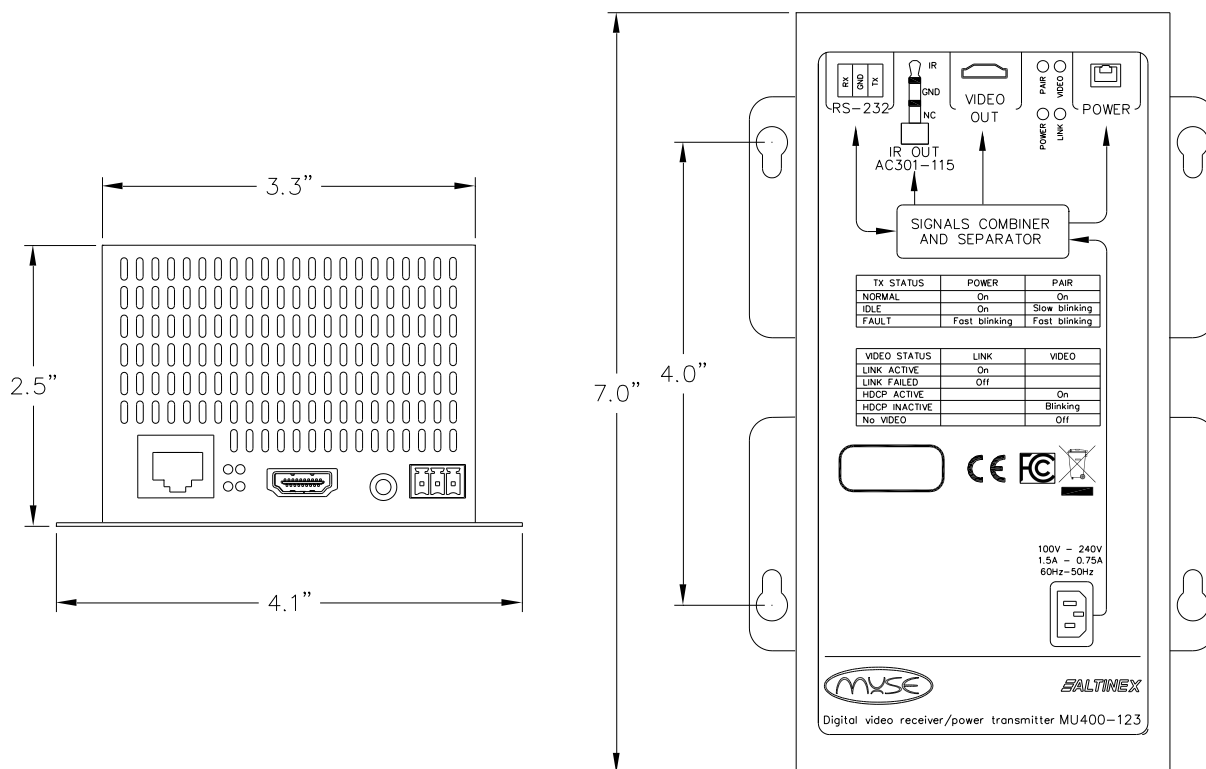


Diagram 3: MU400-123 Dimensions





### Recommended Components

Supplier	Designator	Part Number	Description	Supplier Website
Firefold	Crimp tool	100004C	Modular Crimping Tool	<a href="http://www.firefold.com">www.firefold.com</a>
	RJ45 Connector	CAT6-RJ45-23AWG-SOL	RJ45 Connector	<a href="http://www.firefold.com">www.firefold.com</a>
	CAT6 cable	1 KCMR-BLU	CAT 6 cable	<a href="http://www.firefold.com">www.firefold.com</a>
	CAT6 cable	CAT6-1KSOL-BLU	CAT 6 cable	<a href="http://www.firefold.com">www.firefold.com</a>
Teldor	CAT6 cable	750AZ04129	CAT 6 cable	<a href="http://www.teldor.com">www.teldor.com</a>

### 7. Operation

The MU400-123 requires no adjustments for performance. Once set-up, the MU400-123 will work trouble-free without user intervention. For technical support please call 1-800-ALTINEX (258-4639).

There are a few things that need to be done right to assure trouble-free operation:

1. Assure that the correct cable and connector are used. Use the recommended cable and connectors as they were tested with the MUSE products. Patch cables should not be used with the MUSE because they do not have the current capacity to provide sufficient power to a display. Also, patch cables attenuate HDMI signal and therefore will result in unreliable video.
2. Terminate RJ45 connectors using proper tools. Many plastic termination tools do not have the strength to make good termination. Use the recommended tools to avoid damaging MUSE RJ-45 connectors. In our experience, the most damage occurs when connectors are not properly terminated.
3. Use only as much cable as needed to get from a source to display. Do not coil and leave extra cable "just in case." Every foot of cable takes little bit of power away from the receiver (Typically 5W per 25 ft. of cable). Making the cable as short as possible maximizes the power available to the display.
4. Understand your monitor power consumption. Most monitors 42"-50" screen size can be powered by MUSE. There are however some exceptions for monitors that have very large initial current requirements. These are typically Plasma displays or low cost, non-Energy Star compliant displays. If you have difficulty powering up a display, adjust the settings to Eco mode (which will maximize power consumption).
5. The MUSE can power multiple displays and other equipment. The only limitation is the initial startup current value. This can be minimized by turning each display ON separately about 5-10 seconds apart.
6. Many monitors have a built in audio amplifier. This amplifier can consume a lot of power when set to maximum volume. Make sure to adjust the volume to the level that will actually be used. It is not unusual for an audio amplifier to consume 20-50W of peak power and be listed at 15W RMS power.
7. In addition to displays, the MUSE products can power any other equipment compatible with 120V outputs. This includes lights, small motors, computers, laptops and many more accessories. Since these accessories have a smaller initial current (compared to monitors), it will be possible to load the output of the MUSE to its limit.
8. To fully understand your monitor profile, it is advisable to purchase a low cost Watt meter that will display the power consumption of a display. This will eliminate the hassle of trial and error when selecting the right monitor.

### 8. Troubleshooting Guide

<b>MUSE</b>	
<b>Symptom</b>	<b>Resolution</b>
LEDs Are OFF	<ol style="list-style-type: none"> <li>1. Make sure the transmitter unit is plugged into a working AC outlet.</li> <li>2. Verify that the cable is properly terminated. For proper pin-out, check the cable with a cable checker.</li> </ol>
Always Idle Mode	<ol style="list-style-type: none"> <li>1. Verify that the display is connected to the MU400-123.</li> <li>2. Check the CAT-6 cable specifications. The CAT-6 cable is critical to proper operation and power transfer.</li> </ol>
Fault LED is ON	<ol style="list-style-type: none"> <li>1. Disconnect the display from the MU400-123 and see if the problem is fixed.</li> <li>2. Disconnect the MU400-123 from the MU500-122. If the problem is fixed, wait 10 seconds and then reconnect the MU400-123.</li> <li>3. Reconnect the display; if the problem returns, check the display power requirements.</li> </ol> <p>Note: There is sufficient power for displays rated at 150 W or less. If the display is rated above 150 W the MUSE will not be able to power the unit. Try another display.</p>
No Video on Display	<ol style="list-style-type: none"> <li>1. Check the source and make sure there is a signal present.</li> <li>2. Make sure the display is turned on.</li> <li>3. Make sure the display is set to the correct HDMI input.</li> <li>4. If the display set to the correct input, make sure the cables are connected properly.</li> <li>5. Switch the source to a lower resolution and check to see if the image is then displayed.</li> </ol>
No Sound	<ol style="list-style-type: none"> <li>1. Make sure the display/TV is not muted.</li> <li>2. Set the volume on the display/TV to midrange.</li> <li>3. If the source is a PC/laptop, make sure the sound is set to the HDMI output. On some computers, this step must be done manually the first time the computer is connected to an HDMI device.</li> </ol>