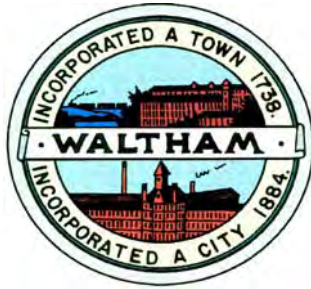


# The City of Waltham



**Invites  
Interested Parties  
To propose the best offer and or bid  
For the service or product herewith described:**

**Light Dimmer Installation, Auditorium Stage**

**The bid opening will be held: Thursday June 5, 2014 at 10:00 AM**

**Pre-Bid Meeting and Site Inspection: Wednesday May 28, 2014 at 11:00 AM**

*(Meet at the Waltham High School, 617 Lexington Street)*

*Phone: 781-314-3244, Fax: 781-314-3245*

# **Invitation to Bid**

# The City of Waltham

## Purchasing Department

### REQUEST FOR BID (RFB)

Under the rules of M.G.L. Chapter 30B, the Chief Procurement Officer of the City of Waltham Purchasing Department hereby requests sealed bids for:

#### **Light Dimmer Installation, Auditorium Stage**

Price Proposals will be received at the office of the Purchasing Agent, City Hall, 610 Main Street, Waltham MA 02452, until,

**Thursday June 5, 2014 at 10:00 AM**

Site inspection and Pre-Bid Meeting:

**Wednesday May 28, 2014 at 11 AM,**  
**(Meet at Waltham High School 617 Lexington Street)**

At which time and place the bids will be publicly opened and read.

Specifications and information available on line by visiting the Waltham Purchasing Department web site at [www.city.waltham.ma.us/open-bids](http://www.city.waltham.ma.us/open-bids)

**BIDS MUST BE SIGNED AND ENCLOSED IN A SEALED ENVELOPE AND MARKED:**

**BID FOR: Light Dimmer Installation, Auditorium Stage**

A 5% Bid Bond or Certified Check must accompany each bid submitted and made payable to, and become the property of the City of Waltham, if the successful bidder refuses or neglects to comply with the terms of the Contract.

If the Bidder is a corporation, state your correct corporate name and State of incorporation. If Bidder is a partnership, state names and addresses of partners. If Bidder is a trust or other legal entity, state correct names and addresses of trustees or names and address of those legally authorized to bid and enter into contracts.

**EXCEPTION OR ALTERNATES TO SPECIFICATIONS, TERMS OF SALE, AND DISCOUNTS AVAILABLE, MUST BE INCLUDED IN THE BID PRIOR TO OPENING DATE.**

# Intent of Project

The City of Waltham School Department wishes to purchase and install a light dimming system on the stage of the Regal Auditorium.

**AGREEMENT**

**CITY OF WALTHAM**

**ARTICLE 1.** This agreement, made this \_\_\_\_\_ day of \_\_\_\_\_, 2014 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and

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\_\_\_\_\_

hereinafter called the CONTRACTOR.

**ARTICLE 2.** Witnesseth, that the parties to this agreement, each in consideration of the agreement on the part of the others herein contained, do hereby agree, the CITY OF WALTHAM for itself, and said contractor for his heirs, executors, administrators and assigns as follows:

To furnish all equipment, machinery, tools and labor, to furnish and deliver all materials required to be furnished (except as otherwise specified) and deliver in and about the project and to do and perform all work in strict conformity with the provisions of this Contract and of the Notice to Bidders, bid, Project Manual, and Drawings hereto annexed. The said Notice to Bidders, bid, Project Manual, and Drawings are hereby made a part of this contract as fully and to the same effect as if the same had been set forth at length and incorporated in the contracts.

**ARTICLE 3.** In consideration of the foregoing premises the CITY agrees to pay and the CONTRACTOR agrees to receive as full compensation for everything furnished and done by the CONTRACTOR under this contract, including all work required by not included in the items herein mentioned, and also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, and for all expenses incurred by or in consequence of the suspension or discontinuance of the work specified, and for well and faithfully completing the work, and the whole thereof, as herein provided, such prices as are set forth in the accompanying bid.

Date for final **completion of the project is July 30, 2014.** Actual construction activity will commence on or about the date of the Notice-to-Proceed (NTP).

This Agreement entered into as of the day and year first written above.

**CITY OF WALTHAM, MASSACHUSETTS**

**FOR THE CITY**

\_\_\_\_\_  
Jeannette A. McCarthy, MAYOR,  
City of Waltham  
Date: \_\_\_\_\_

\_\_\_\_\_  
John B. Cervone, City Solicitor  
Date: \_\_\_\_\_  
APPROVED AS TO FORM ONLY

\_\_\_\_\_  
Susan Nicholson, Superintendent of Schools  
Date: \_\_\_\_\_

\_\_\_\_\_  
Joseph Pedulla, Purchasing Agent  
Date: \_\_\_\_\_

\_\_\_\_\_  
Paul Centofanti, Auditor  
Date: \_\_\_\_\_

I CERTIFY THAT SUFFICIENT FUNDS  
ARE AVAILABLE FOR THIS CONTRACT

**FOR THE COMPANY**

\_\_\_\_\_  
CONTRACTOR (Signature),  
Date: \_\_\_\_\_

\_\_\_\_\_  
Company

\_\_\_\_\_  
Address

# Instructions

## **INSTRUCTIONS FOR BIDDERS**

**1. READ ALL DOCUMENTS.**

Bidders should familiarize themselves with all the documents contained herein; it is mandatory that all Bids be in compliance with all the provisions contained in said documents.

**2. FORMS AND ATTACHMENTS.**

Bids are to be completed on the forms provided ONLY and enclosed in a sealed envelope marked on the outside "BID (title)" and the name and address of bidder. Attachments submitted in addition to the Waltham Purchasing Department produced forms may not be considered.

**3. PRINTED OR TYPED RESPONSE.**

All information must be typewritten or printed in ink, including the price the bidder offers in the space as provided on the bid form.

**4. CORRECTIONS.**

Bids that are submitted containing cross outs, white outs or erasures, will be rejected. All corrections or modifications to the original bid are to be submitted in a separate envelope, properly marked on the outside, "CORRECTION/ MODIFICATION TO BID (title)" and submitted prior to the bid opening.

**ALL DOCUMENTS SUBMITTED WITH YOUR RESPONSE WILL BE INCORPORATED INTO THE CONTRACT.**

**5. PRICE IS ALL INCLUSIVE.**

Bid prices shall encompass everything necessary for furnishing all items, materials, supplies or services as specified, and in accordance with the specifications, including proper packing, cost of delivery, and in the case of services, completion of same, as per specifications.

**6. PRICE DISCREPANCY.**

In the event of a discrepancy between the Unit Price and the Extension, the Unit Price shall prevail.



**7. EXPLANATIONS, EXCEPTIONS**

Explanations, exceptions or other information pertinent to the specifications may be made in writing and included in the same envelope with the bid.

**8. BID DEPOSITS.**

Bid deposits are to be made payable to the City of Waltham. In the event that the successful bidder fails to execute a Contract within (10) days of the receipt of said contract, such security shall be retained by the city as liquidated damages. Unsuccessful bidders' deposits will be returned immediately following the award to said successful bidder.

**9. WITHDRAW.**

A Bid may be withdrawn by written request prior to the schedule for the Bid Opening. No withdrawals are permitted after the bid opening date and time. Withdrawals after the bid opening date will cause the forfeit of the bid Deposit.

**10. AWARD.**

Bids will be awarded not later than (90) ninety days after the scheduled bid opening date, unless otherwise stated, in the specifications. Unless otherwise specified, bids will be evaluated on the basis of, completeness of your RFP response, responsiveness, responsibility, best price and experience.

**11. AWARD CRITERIA.**

Qualified and responsive proposals will be evaluated based on Price, Technical, and Compliance requirements.

**12. DISCOUNTS.**

Discounts for prompt payments will be considered when making awards.

**13. TAX EXEMPT.**

Purchases by the City of Waltham is exempt from any Federal, State or Massachusetts Municipal Sales and/or Excise Taxes.

**14. SAMPLES.**

The City of Waltham may require the submission of samples either before or after the awarding of a contract. Samples are to be submitted, at no charge to the City, so as to ascertain the product's suitability. If specifically stated in the Bid that samples are required, said samples must be submitted with the Bid prior to the Official Bid Opening. Failure to submit said samples would be cause for rejection of Bid. All samples must be

called for and picked up within (30) thirty days of award or said samples will be presumed abandoned and will be disposed of.

15. **ACTIVE VENDOR LIST.**

Vendors who wish to remain on the Active Bid List must either submit a Bid, No Bid, or a letter requesting same, no later than the Official Bid Opening. This is applicable to those vendors who have received the Invitation to Bid.

16. **FUNDS APPROPRIATION.**

**THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.**

17. **THE AWARDING AUTHORITY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR ANY PART OF ANY BID, WHICH IN THE OPINION OF THE AWARDING AUTHORITY, IS IN THE BEST INTERESTS OF THE CITY OF WALTHAM.**

18. **THE TAX ATTESTATION CLAUSE, CERTIFICATION OF NON-COLLUSION AND THE CERTIFICATE OF VOTE AUTHORIZATION,**

are required by statute and are an integral part of the Invitation for Bid and must be completed and signed by the person submitting the Bid, or by the person/persons who are officially authorized to do so. Failure to do so may disqualify the bid.

19. **STANDARD OF QUALITY.**

Where, in the specifications, one certain kind, type, catalog number, brand or manufacturer of material is named, it shall be regarded as the required standard of quality. Where two or more are named, these are presumed to be equal and the Bidder may select one or the other. If the Bidder proposes to offer a substitute as an equal, he shall so indicate on the Bid Form, the kind, type, catalog number, brand, or manufacturer of material that is offered as an equal, and describe where it differs from the specifications. Substituted items must be capable of performing all the functions and/or operational features described or indicated in the specifications. Failure to indicate the description of any substitute item on the Bid will be interpreted to mean that the Bidder will furnish the item or service as specified.

**20. MODIFICATION.**

No agreement, understanding, alteration or variation of the agreement, terms or provisions herein contained shall bind the parties, hereto unless made and executed in writing by the parties hereto.

**21. ASSIGNMENT.**

The final payment for work done under this Contract shall be made only after the Contractor has signed a statement under the penalty of perjury, certifying that he has completed the work described in the final estimate. Neither party hereto shall assign this Contract or sublet it in part or as a whole without the prior written consent of the other party hereto. The Contractor shall not assign any sum or sums due or becoming due to him hereunder without the prior written consent of the City.

**22. DELIVERIES:**

a) The Contractor shall pay all freight and delivery charges. The Waltham Purchasing Department does not pay for shipping and packaging expenses. Items must be delivered as stipulated in the specifications. All deliveries must be made to the inside of city buildings. Sidewalk deliveries will not be accepted. City personnel are not required to assist in the deliveries and contractors are cautioned to notify their shippers that adequate assistance must be provided at the point of delivery, when necessary.

b) All items of furniture must be delivered inside the building, set up, in place and ready for use. Deliveries are to be made between the hours of 8:30 a.m. and 3:00 p.m., Monday through Friday, except on holidays.

c) All damaged items, or items which do not comply with specifications will not be accepted and title therefore will not vest to the Waltham Purchasing Department until such items are accepted and signed for, in good order, by the receiving department.

d) The contractor must replace, without further cost to the Waltham Purchasing Department, such damaged or non-complying items before payment will be made.

**23. LABELING.**

All packages cartons or other containers must be clearly marked with (a) building and room destination; (b) description of contents of item number from specifications; (c) quantity; (d) City of Waltham Purchase Order Number and (e) Vendor's name and order number.

**24. GUARANTEES.**

Unless otherwise stipulated in the specifications, furniture, equipment and similar durable items shall be guaranteed by the contractor for a period of not less than one year from the date of delivery and acceptance by the receiving department. In addition, the manufacturer's guarantee shall be furnished. Any items provided under this contract which are or become defective during the guarantee period shall be replaced the contractor free of charge with the specific understanding that all replacements shall carry the same guarantee as the original equipment. The contractor shall make such replacement immediately upon receiving notice from the Purchasing Agent.

**25. SINGLE VENDOR.**

The Waltham Purchasing Department desires to award a single contract based on the Grand Total Price. However, where applicable, the City reserves the right to make multiple awards on a unit price basis if, in the opinion of the Waltham Purchasing Department, it is in the best interest of the Waltham Purchasing Department.

**26. CHANGE ORDERS.**

Change orders are not effective until, if, as and when signed by the Mayor and no work is to commence until the change orders are fully executed.

**28. BID OPENING INCLEMENT WEATHER**

If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

# **GENERAL CONDITIONS**

## GENERAL CONDITIONS

### 1. INFORMATION

All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words “or equal as approved” are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.

### 2. SUITS

The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.

### 3. LAWS AND REGULATIONS

The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.

### 4. PROTECTION OF PROPERTY

The Contractor shall take all proper precautions to protect the City’s property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.

### 5. PROTECTION OF PERSONS

The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.

### 6. CONTRACT DURATION.

This contract is for the period required to complete the project. All guarantees remain in effect.

7. INSURANCE

A. **WORKMAN'S COMPENSATION:** The Contractor shall provide insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor. Contractors shall provide insurance on a primary basis and the contractor's policy shall be exhausted before resorting to other policies. The contractor's policy is the primary one not the contributory.

B. **COMPREHENSIVE GENERAL LIABILITY**

Bodily Injury:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate
Property Damage:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate

C. **AUTOMOBILE (VEHICLE) LIABILITY**

Bodily Injury	\$2,000,000 Each Occurrence
Property Damage	\$1,000,000 Aggregate

D. **UMBRELLA POLICY**

General liability	\$1,000,000
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Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: *"The City of Waltham is a named additional insured for all insurances under the contract, excluding Automobile and Workers Compensation coverage"*. **Failure by the contractor to provide a current and updated insurance policy, during the entire duration of the contract, may result in additional legal liability.** The Certificate of Insurance must be mailed directly to:

Office of the Purchasing Agent  
Purchasing Department  
City of Waltham  
610 Main Street  
Waltham, MA 02452

8. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Labor and Materials or Payment Bond equal to 100% of the contract value. This contract shall not be in

force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

**A LETTER FROM A SURETY COMPANY CERTIFYING THAT THE CONTRACTOR IS QUALIFIED AND CAPABLE OF OBTAINING THE ABOVE BONDS MUST BE INCLUDED WITH HIS/HERS BID.**

**9. PERSONNEL:**

The Contractor shall employ a competent supervisor and all properly licensed personnel necessary to perform the services required in this contract. The City Purchasing Agent shall have the right to require the Contractor to remove and/or replace any of the personnel for nonperformance or for unprofessional behavior. The City Purchasing Agent may require the Contractor to submit a weekly performance record of the areas and of the work performed, on forms approved by the City Purchasing Agent. The Contractor or his supervisor shall be available to inspect such work as required by the City Purchasing Agent.

**10. PREVAILING WAGES**

The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority. The prevailing wage schedule for this project can be found at [www.city.waltham.ma.us/open-bids](http://www.city.waltham.ma.us/open-bids).

**11. MATERIALS**

The City or its Agent reserves the right to approve or reject any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any rejected supplies, materials or equipment, to the satisfaction of the City or its Agents.

**12. TERMINATION OF CONTRACT**

This contract may be terminated by the City upon deliverance to the Contractor of a five-day written notice of said termination.



**13. CONTRACT OBLIGATIONS**

Contract obligations on behalf of the City are subject to an annual appropriation to cover the contract obligation.

**14. BIDDER EXPERIENCE EVALUATION**

Each bidder shall submit with his bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

**15. NOT-TO-EXCEED AMOUNT**

The bid amount proposed in your company's response is a "not-to- Exceed" amount unless the City makes changes, in writing, to the scope of work to be performed. The Change Order must be signed and approved by the City's Purchasing Agent, City Auditor, Law Department and the Mayor prior to the commencement of the change order work. No work is to begin until the proper approvals have been obtained. A change order will be priced at the unit price. Failure to comply with this procedure will result in the cancellation of the contract and the non-payment of services provided

**16. FINANCIAL STATEMENTS.**

The City may require, within five (5) days after the bid opening, a complete and detailed Financial Statement prepared by a Certified Public Account, to determine a bidder's financial stability.

**17 BREACH OF CONTRACT/ NON PERFORMANCE**

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services

under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

**18 RIGHT TO AUDIT**

The City of Waltham has the right to review and audit documents related to this contract. This right extends to any subcontractor, supplier or other entity used by the prime contractor to fulfill the obligations under this contract.

**19. CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.**

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

**NOTE**

**Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal**

# Specifications

## SECTION 260943

### Part 1. GENERAL

#### 1.01 WORK INCLUDED

- A. The Electrical Contractor, as part of the work of this section, shall provide, install and test a complete lighting control system as specified herein for areas indicated on the drawings and circuit schedules.
- B. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware and other incidental items necessary for the complete and proper operation of the lighting control system.
- C. The Electrical Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to:
  - 1. General Conditions
  - 2. Electrical Section General Provisions
  - 3. Conduit
  - 4. Wire and Cable

#### 1.02 SYSTEM DESCRIPTION

- A. The system shall be designed for the control of architectural and theatrical lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relays, power supplies, breakers, terminals and/or control electronics.
- B. System shall work in conjunction with specified low-voltage control stations.

#### 1.03 SUBMITTALS

- A. Manufacturer shall provide 2 sets of full system submittals. Submittals shall include:
  - 1. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
  - 2. Full set of printed technical data sheets.
  - 3. Detailed set of dimmer schedules
  - 4. Detailed set of circuit and control schedules, including a complete list of all deviations from specifications.
- B. Manufacturer shall provide any additional information, including equipment demonstrations, as required by the engineer or specifier to verify compliance with specifications.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer shall be one who has been continuously engaged in the manufacturer of lighting control equipment for a minimum of ten years. All dimmer and cabinet fabrication must take place in a U.S. manufacturing plant.
- B. The manufacturer shall have a factory authorized stocking service center with at least one full time service technician on staff located within 150 miles of the job site. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year.
- C. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theater Technology. Permanently installed power distribution equipment such as dimmer racks and distribution shall be UL and C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels.

### **1.05 ACCEPTABLE MANUFACTURERS**

- A. The equipment herein specified shall be manufactured by
  - o Electronic Theatre Controls
  - o PO Box 620979
  - o Middleton, WI 53562
  - o Phone: 608/831-4116
  - o Fax: 608/836-1736
- B. Alternative manufacturers must submit a full pre-approval package ten days prior to bid date. Package shall consist of items listed in Part 1, Section 1.03A.
- C. Permission to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

## **Part 2. PRODUCT**

### **2.01 Unison ERn Series Control Enclosures**

- 1. Control Enclosures
  - A. The control enclosure shall be the Unison ERn Series Control Enclosure as manufactured by Electronic Theatre Controls, Inc., or equal.
  - B. Mechanical
    - 1. The External Processing enclosure shall be a surface mounted panel constructed of 18 gauge formed steel panels with a hinged, lockable full-height door containing an integral electrostatic air filter.
      - a. The enclosure door shall have an opening to allow limited access to the control module face panel.
      - b. Enclosures shall be convection cooled without the use of fans.

2. Control Enclosures shall be sized to accept one or two Control Processors and one or two Station Power Modules, including various options and accessories.
  - a. The Control Enclosure for a single control processor (ERn2) shall support a single Station Power Supply module; The Control Enclosure for 2 control processors (ERn4) shall support a quantity of 2 modules.
3. All enclosure components shall be properly treated and finished.
  - a. Exterior surfaces shall be finished in fine textured, scratch resistant, powder based epoxy paint.
4. Enclosure(s) shall also be available in a 19" rack mounted (RM) version.
  - a. Rack-mounted version shall have an independent enclosure suspension kit, with a full height, locking door/cover attached to the kit.
  - b. Rack-mounted version shall have an opening to access the control module face panel, and openings to view indicators on option modules.
5. Enclosure dimensions and weights (without modules) shall not exceed:
  - a. ERn2 - 15" W x 9" H, 10" D, 15 lb
  - b. ERn2-RM - 19" W 11"H 10" D, 20 lb.
  - c. ERn4 - 15" W x 14" H x 10" D, 20 lb.
  - d. ERn4-RM - 19" W x 16" H x 10" D, 25 lb.
6. Top, bottom, and side knockouts shall facilitate conduit entry.
7. Enclosures shall be designed to allow easy insertion and removal of all control and option modules without the use of tools.
  - a. Supports shall be provided for precise alignment of modules into power and signal connector blocks.
  - b. With modules removed, enclosures shall provide clear front access to all power and control wire terminations.
8. Option Modules
  - a. Ethernet Switch
    1. The Control Enclosure shall support an optional 5-port Ethernet Switch, with at least 4 ports supplying Power over Ethernet (PoE).
    2. The Ethernet Switch module shall be 100BaseTX, auto MDI/MDIX, 802.3af PSE compliant.
    3. The Ethernet Switch module shall contain power, status, and activity indicators. All indicators shall be visible when the enclosure door is open for both rack and wall mounted ERn.
  - b. Redundant Power Supply (RRPS)
    1. The Control Enclosure shall support an optional redundant power supply which shall automatically provide power to

the control electronics upon failure or removal of the primary power supply.

2. The redundant power supply shall assert itself seamlessly without a loss of power to the control electronics.
3. The redundant power supply shall seamlessly remove itself when the primary power supply is reengaged.
4. The redundant power supply shall provide visible indication that it is active.

c. Station Bus Repeaters (ERn4 only)

1. The Control Enclosure shall support an optional module to expand the station bus length an additional 400 meters, and the station count an additional 30 stations (60 maximum per processor/enclosure)
2. Wall-mount and 19" Rack-Mount versions shall also be available to support mid-span insertion away from the Control Enclosure.

d. Station Bus Dual Repeaters (ERn4 only)

1. The Control Enclosure shall support an optional module to expand the station bus length to two additional 400 meter segments (a total of 1200 meters from a single enclosure, and the station count to 60 stations (60 maximum per processor/enclosure).
2. Wall-mount and 19" Rack-Mount versions shall also be available to support mid-span insertion away from the Control Enclosure.

9. Accessories

a. RideThru Option (RTO)

1. The Control Enclosure shall support an optional, short-term back-up power source for the control electronics.
2. RideThru Option (RTO) provides power for controls electronics during brief power outages or drop outs.
3. The short-term back-up power source shall automatically engage upon the loss of normal power, seamlessly transitioning the supply power for the control electronics power to itself.
4. The short-term back-up power supply shall detect the return of normal power, and seamlessly return the control electronics to normal power.
5. The short-term back-up power source shall support the control electronics for at least 10 seconds.

b. BatteryPack Option (BPO)

1. The Control Enclosure shall support an optional, long-term back-up power source for the control electronics.

2. The long-term back-up power source shall automatically engage upon the loss of normal power, seamlessly transitioning the supply power for the control electronics power to itself.
3. The long-term back-up power source shall supply power to the control electronics for at least 90 minutes.
4. The long-term back-up power supply shall detect the return of normal power, and seamlessly return the control electronics to normal power.
5. A test switch/indicator shall be available without opening the rack door or removal of any modules/components.

#### C. Electrical

1. External Processing enclosures shall be available in 100, 120, 230 and 240 volt, single-phase configurations.
2. External Processing enclosures shall be completely pre-wired by the manufacturer. The contractor shall provide input and control wiring.
3. External Processing enclosures shall be designed to support the following wire terminations:
  - a. AC (single phase)
  - b. Echelon link power (Belden 8471 or equivalent)
  - c. 24Vdc (2- 16AWG Wire)
  - d. DMX512A Port A (In or Out) (Belden 9729 or equivalent)
  - e. DMX512A Port B (In or Out) (Belden 9729 or equivalent)
  - f. RS232 Serial In/Out (Belden 9729 or equivalent)
  - g. Unshielded Twisted Pair (UTP) Category 5 Ethernet
  - h. Contact Closure In (14AWG to 26AWG Wire)
  - i. Contact Closure Out (14AWG to 26AWG Wire)
    1. Contact Closure Out shall provide 1A @ 30vDC
4. Station Power Modules
  - a. Station power supply modules shall provide LinkPower for at 32 stations and 1.5A@24VDC of Auxiliary (AUX) power.
  - b. Station power repeater modules shall provide LinkPower for 30 stations and 1.5A@24VDC of Auxiliary (AUX) power.
  - c. Station power module shall support over-current/short protection for LinkPower and Aux. LinkPower shall support fault detection on each leg of the balanced data bus.
5. All control wire connections shall be terminated via factory provided connectors.

#### D. Thermal

1. Ambient room temperature: 0-40°C / 32-104°F
2. Ambient humidity: 10-90% non-condensing

### 2.02 Button and Fader Stations

#### 1. Stations

##### A. Button Stations



1. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.
2. Mechanical
  - a. Unison Heritage Button stations shall operate using up to ten programmable buttons.
  - b. All button stations shall be available with white, cream, ivory, gray or black faceplates, and buttons.
    1. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
  - c. Stations shall have indicator lights at each button or fader.
    1. Indicators shall be comprised of red, green and blue LED's
    2. Indicator color and state (steady On, Blink, Off) shall be configured in software, and shall operate relative to the button or fader it is associated with.
  - d. All faceplates shall be designed for flush or surface mounting.
  - e. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
  - f. Station faceplates shall be indelibly marked for each button or fader function.
  - g. The manufacturer shall supply back boxes for flush mounted half gang stations and for all surface mounted stations.
  - h. All Button stations shall be shall be designed to accept the infrared signal from a remote hand held IR transmitter.
    1. The stations shall have a 60° reception angle and shall operate reliably within a 45' distance.
  - i. IR Transmitters shall be available in five or ten button configurations.
    1. IR transmitters shall be mounted in a hand-held black plastic controller.
    2. Transmitter dimensions shall be 1.875" wide, 6.625" long and 0.60" deep.
3. Electrical
  - a. Unison control station wiring shall be an Echelon® Link power network.
    1. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).
    2. Network wiring may be bus, loop, home run, star or any combination of these.
    3. Wiring termination connectors shall be provided with all stations.
  - b. Button Stations shall offer the following Regular markings

1. UL and cUL LISTED
  2. CE Market
  3. RHoS and WEE Compliant
4. Functional
- a. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
    1. System presets shall be programmable via Button stations, Touchscreen stations, and LightDesigner software.
      - a. Presets shall have a discrete fade time, programmable from zero to 1,000 hours with a resolution of one millisecond.
      - b. Presets shall be selectable via button, fader, IR transmitter, time clock event, macro activation or switch interface stations.
    2. System macros and sequences shall be programmable via LightDesigner system software.
      - a. Macro and sequence steps shall provide user selectable steps, and allow the application of conditional logic.
      - b. Macro and sequences shall be activated by button, time clock event or LightDesigner software.
    3. System time clock events shall be programmable via LightDesigner system software, the processor user interface, or the internal web server.
      - a. Time clock events shall be assigned to system day types. Standard day types include: anyway, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. System shall support programming of additional custom or special day types.
      - b. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event. System shall automatically compensate for regions using a fully configurable daylight saving time.
  - b. Control components shall be designed to operate default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the software-based configuration program.
    1. Optional button functions include: preset selection, manual mode activation, record mode activation, station

lockout, raise, lower, macro activation, or room join/separate.

2. Optional fader functions include manual master control, individual zone control, fade rate control or preset master control.

c. Stations (Button and Button/Fader) shall allow programming of station and component electronic lockout levels via LightDesigner.

## B. Fader Stations

1. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.

### 2. Mechanical

a. Unison Heritage Fader Stations shall operate using up to sixteen programmable faders and twelve programmable buttons.

b. All fader stations shall be available with white, cream, ivory, gray or black faceplates, fader knobs, and buttons.

1. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.

c. Fader stations shall utilize standard 45-millimeter slide potentiometers.

d. Stations shall have indicators lights at each button or fader.

1. Indicators shall be comprised of red, green and blue LED's  
2. Indicator color and state (steady On, Blink, Off) shall be configured in software, and shall operate relative to the button or fader it is associated with.

e. All faceplates shall be designed for flush or surface mounting.

f. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.

g. Station faceplates shall be indelibly marked for each button or fader function.

h. The manufacturer shall supply back boxes for flush mounted half gang stations and for all surface mounted stations.

i. Fader stations shall be designed to accept the infrared signal from a remote hand held IR transmitter.

1. The stations shall have a 60° reception angle and shall operate reliably within a 45' distance.

j. IR Transmitters shall be available in five or ten button configurations.

1. IR transmitters shall be mounted in a hand-held black plastic controller.

2. Transmitter dimensions shall be 1.875" wide, 6.625" long and 0.60" deep.

### 3. Electrical

- a. Unison control station wiring shall be an Echelon® Link power network.
    - 1. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).
    - 2. Touchscreen and Interface stations shall also require (2) #16 AWG stranded wires for 24Vdc operating power. 24Vdc wiring shall be topology free.
    - 3. Network wiring may be bus, loop, home run, star or any combination of these.
    - 4. Wiring termination connectors shall be provided with all stations.
  - b. Fader Stations shall offer the following Regular markings
    - 1. UL and cUL LISTED
    - 2. CE Market
    - 3. RHoS and WEE Compliant
4. Functional
- a. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface, or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
    - 1. System presets shall be programmable via Button, Button/Fader, Touchscreen, or LightDesigner software.
      - a. Presets shall have a discrete fade time, programmable from zero to 1,000 hours with a resolution of one millisecond.
      - b. Presets shall be selectable via button, fader, IR transmitter, time clock event, macro activation or switch interface stations.
    - 2. System macros and sequences shall be programmable via LightDesigner system software.
      - a. Macro and sequence steps shall provide user selectable steps, and allow the application of conditional logic.
      - b. Macro and sequences shall be activated by button, time clock event or LightDesigner software.
    - 3. System time clock events shall be programmable via LightDesigner system software, the processor user interface, or the internal web server.
      - a. Time clock events shall be assigned to system day types. Standard day types include: anyway, weekday, weekend, Sunday, Monday, Tuesday,

Wednesday, Thursday, Friday and Saturday. System shall support programming of additional custom or special day types.

- b. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event. System shall automatically compensate for regions using a fully configurable daylight saving time.

- b. Control components shall be designed to operate default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the software-based configuration program.
  - 1. Optional button functions include: preset selection, manual mode activation, record mode activation, station lockout, raise, lower, macro activation, or room join/separate.
  - 2. Optional fader functions include manual master control, individual zone control, fade rate control or preset master control.
- c. Stations (Button and Button/Fader) shall allow programming of station and component electronic lockout levels via LightDesigner.

#### C. Portable Plug-in Stations

- 1. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.
- 2. Mechanical
  - a. Unison connector stations shall provide an interface to portable Unison stations.
  - b. All connector stations shall be available with white, cream, ivory, gray or black faceplates.
    - 1. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
  - c. All faceplates shall be designed for flush or surface mounting.
  - d. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
  - e. Station faceplates shall be indelibly marked with station function.
  - f. The manufacturer shall supply back boxes for all surface mounted stations.
- 3. Electrical
  - a. Unison control station wiring shall be an Echelon® Link power network.
    - 1. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).

2. Portable plug-in stations shall also require (2) #16 AWG stranded wires for 24Vdc operating power. 24Vdc wiring shall be topology free.
  3. Network wiring may be bus, loop, home run, star or any combination of these.
  4. Wiring termination connectors shall be provided with all stations.
- b. Portable Plug-in Stations shall offer the following Regular markings
1. UL and cUL LISTED
  2. CE Market
  3. RHoS and WEE Compliant
4. Functional
- a. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
    1. System presets shall be programmable via Button, Button/Fader, Touchscreen, or LightDesigner software.
      - a. Presets shall have a discrete fade time, programmable from zero to 1,000 hours with a resolution of one millisecond.
      - b. Presets shall be selectable via button, fader, IR transmitter, time clock event, macro activation or switch interface stations.
    2. System macros and sequences shall be programmable via LightDesigner system software.
      - a. Macro and sequence steps shall provide user selectable steps, and allow the application of conditional logic.
      - b. Macro and sequences shall be activated by button, time clock event or LightDesigner software.
    3. System time clock events shall be programmable via LightDesigner system software, the processor user interface, or the internal web server.
      - a. Time clock events shall be assigned to system day types. Standard day types include: anyway, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. System shall support programming of additional custom or special day types.
      - b. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event.

System shall automatically compensate for regions using a fully configurable daylight saving time.

- b. Control components shall be designed to operate default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the software-based configuration program.
  - 1. Optional button functions include: preset selection, manual mode activation, record mode activation, station lockout, raise, lower, macro activation, or room join/separate.
  - 2. Optional fader functions include manual master control, individual zone control, fade rate control or preset master control.

#### D. Locking Covers

- 1. The Lighting Control Station Locking Covers shall be the Unison Heritage UH Series as manufactured by Electronic Theatre Controls, Inc., or equal.
- 2. Mechanical
  - a. Locking covers shall be available in Sliding Locking for flush mount applications and Hinged Locking for flush and surface mount applications
  - b. Sliding Locking Covers shall
    - 1. Be available with white, cream, ivory, gray or black faceplates.
    - 2. Be constructed of Extruded Aluminum with ABS plastic end caps
    - 3. Provide a smoked Plexiglas window to allow for viewing control status and use of IR remote without opening cover
  - c. Hinged locking covers shall:
    - 1. Be available in standard black powder coat finish
    - 2. Be constructed of 18 gauge steel and finished in standard black powder coat paint, or custom color as specified.
    - 3. Provide a clear Plexiglas window to allow for viewing control status and use of IR remote without opening cover
    - 4. Use internal Hinge that is not accessible when the cover is closed
  - d. Standard colors shall conform to the RAL CLASSIC Standard.
  - e. Locking covers of the same type shall be keyed alike
  - f. The manufacturer shall supply back boxes for all hinged locking covers
- 3. Functional
  - a. All locking covers shall utilize 90-degree locking mechanisms
    - 1. Keys shall be held captive in locks when covers are unlocked.

- b. Locking covers shall allow for easy viewing of system status without opening the cover
- c. Locking covers shall support IR remote activation of configured system functions without opening door

## 2.03 Button and Fader Stations

### 1. Stations

#### A. Button Stations

1. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.
2. Mechanical
  - a. Unison Heritage Button stations shall operate using up to ten programmable buttons.
  - b. All button stations shall be available with white, cream, ivory, gray or black faceplates, and buttons.
    1. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
  - c. Stations shall have indicator lights at each button or fader.
    1. Indicators shall be comprised of red, green and blue LED's
    2. Indicator color and state (steady On, Blink, Off) shall be configured in software, and shall operate relative to the button or fader it is associated with.
  - d. All faceplates shall be designed for flush or surface mounting.
  - e. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
  - f. Station faceplates shall be indelibly marked for each button or fader function.
  - g. The manufacturer shall supply back boxes for flush mounted half gang stations and for all surface mounted stations.
  - h. All Button stations shall be designed to accept the infrared signal from a remote hand held IR transmitter.
    1. The stations shall have a 60° reception angle and shall operate reliably within a 45' distance.
  - i. IR Transmitters shall be available in five or ten button configurations.
    1. IR transmitters shall be mounted in a hand-held black plastic controller.
    2. Transmitter dimensions shall be 1.875" wide, 6.625" long and 0.60" deep.
3. Electrical
  - a. Unison control station wiring shall be an Echelon® Link power network.
    1. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14



- ESD drain wire (when not installed in grounded metal conduit).
- 2. Network wiring may be bus, loop, home run, star or any combination of these.
- 3. Wiring termination connectors shall be provided with all stations.
- b. Button Stations shall offer the following Regular markings
  - 1. UL and cUL LISTED
  - 2. CE Market
  - 3. RHoS and WEE Compliant
- 4. Functional
  - a. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
    - 1. System presets shall be programmable via Button stations, Touchscreen stations, and LightDesigner software.
      - a. Presets shall have a discrete fade time, programmable from zero to 1,000 hours with a resolution of one millisecond.
      - b. Presets shall be selectable via button, fader, IR transmitter, time clock event, macro activation or switch interface stations.
    - 2. System macros and sequences shall be programmable via LightDesigner system software.
      - a. Macro and sequence steps shall provide user selectable steps, and allow the application of conditional logic.
      - b. Macro and sequences shall be activated by button, time clock event or LightDesigner software.
    - 3. System time clock events shall be programmable via LightDesigner system software, the processor user interface, or the internal web server.
      - a. Time clock events shall be assigned to system day types. Standard day types include: anyway, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. System shall support programming of additional custom or special day types.
      - b. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event. System shall automatically compensate for regions using a fully configurable daylight saving time.

- b. Control components shall be designed to operate default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the software-based configuration program.
    - 1. Optional button functions include: preset selection, manual mode activation, record mode activation, station lockout, raise, lower, macro activation, or room join/separate.
    - 2. Optional fader functions include manual master control, individual zone control, fade rate control or preset master control.
  - c. Stations (Button and Button/Fader) shall allow programming of station and component electronic lockout levels via LightDesigner.
- B. Fader Stations
- 1. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.
  - 2. Mechanical
    - a. Unison Heritage Fader Stations shall operate using up to sixteen programmable faders and twelve programmable buttons.
    - b. All fader stations shall be available with white, cream, ivory, gray or black faceplates, fader knobs, and buttons.
      - 1. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
    - c. Fader stations shall utilize standard 45-millimeter slide potentiometers.
    - d. Stations shall have indicator lights at each button or fader.
      - 1. Indicators shall be comprised of red, green and blue LED's
      - 2. Indicator color and state (steady On, Blink, Off) shall be configured in software, and shall operate relative to the button or fader it is associated with.
    - e. All faceplates shall be designed for flush or surface mounting.
    - f. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
    - g. Station faceplates shall be indelibly marked for each button or fader function.
    - h. The manufacturer shall supply back boxes for flush mounted half gang stations and for all surface mounted stations.
    - i. Fader stations shall be designed to accept the infrared signal from a remote hand held IR transmitter.
      - 1. The stations shall have a 60° reception angle and shall operate reliably within a 45' distance.
    - j. IR Transmitters shall be available in five or ten button configurations.

1. IR transmitters shall be mounted in a hand-held black plastic controller.
  2. Transmitter dimensions shall be 1.875" wide, 6.625" long and 0.60" deep.
3. Electrical
- a. Unison control station wiring shall be an Echelon® Link power network.
    1. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).
    2. Touchscreen and Interface stations shall also require (2) #16 AWG stranded wires for 24Vdc operating power. 24Vdc wiring shall be topology free.
    3. Network wiring may be bus, loop, home run, star or any combination of these.
    4. Wiring termination connectors shall be provided with all stations.
  - b. Fader Stations shall offer the following Regular markings
    1. UL and cUL LISTED
    2. CE Market
    3. RHoS and WEE Compliant
4. Functional
- a. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface, or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
    1. System presets shall be programmable via Button, Button/Fader, Touchscreen, or LightDesigner software.
      - a. Presets shall have a discrete fade time, programmable from zero to 1,000 hours with a resolution of one millisecond.
      - b. Presets shall be selectable via button, fader, IR transmitter, time clock event, macro activation or switch interface stations.
    2. System macros and sequences shall be programmable via LightDesigner system software.
      - a. Macro and sequence steps shall provide user selectable steps, and allow the application of conditional logic.
      - b. Macro and sequences shall be activated by button, time clock event or LightDesigner software.

3. System time clock events shall be programmable via LightDesigner system software, the processor user interface, or the internal web server.
    - a. Time clock events shall be assigned to system day types. Standard day types include: anyway, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. System shall support programming of additional custom or special day types.
    - b. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event. System shall automatically compensate for regions using a fully configurable daylight saving time.
  - b. Control components shall be designed to operate default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the software-based configuration program.
    1. Optional button functions include: preset selection, manual mode activation, record mode activation, station lockout, raise, lower, macro activation, or room join/separate.
    2. Optional fader functions include manual master control, individual zone control, fade rate control or preset master control.
  - c. Stations (Button and Button/Fader) shall allow programming of station and component electronic lockout levels via LightDesigner.
- C. Portable Plug-in Stations
1. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.
  2. Mechanical
    - a. Unison connector stations shall provide an interface to portable Unison stations.
    - b. All connector stations shall be available with white, cream, ivory, gray or black faceplates.
      1. Manufacturer's standard colors shall conform to the RAL CLASSIC Standard.
    - c. All faceplates shall be designed for flush or surface mounting.
    - d. Station faceplates shall be constructed of ABS plastic and shall use no visible means of attachment.
    - e. Station faceplates shall be indelibly marked with station function.
    - f. The manufacturer shall supply back boxes for all surface mounted stations.
  3. Electrical

- a. Unison control station wiring shall be an Echelon® Link power network.
    - 1. Link power shall utilize low-voltage Class II unshielded twisted pair, type Belden 8471 or equivalent, and one #14 ESD drain wire (when not installed in grounded metal conduit).
    - 2. Portable plug-in stations shall also require (2) #16 AWG stranded wires for 24Vdc operating power. 24Vdc wiring shall be topology free.
    - 3. Network wiring may be bus, loop, home run, star or any combination of these.
    - 4. Wiring termination connectors shall be provided with all stations.
  - b. Portable Plug-in Stations shall offer the following Regular markings
    - 1. UL and cUL LISTED
    - 2. CE Market
    - 3. RHoS and WEE Compliant
4. Functional
- a. The Unison Paradigm Control System shall be designed to allow control of lighting and associated systems via Button, Button/Fader, and Interface or Astronomical time clock controls. System shall allow the programming of presets, sequences, macros and time clock events.
    - 1. System presets shall be programmable via Button, Button/Fader, Touchscreen, or LightDesigner software.
      - a. Presets shall have a discrete fade time, programmable from zero to 1,000 hours with a resolution of one millisecond.
      - b. Presets shall be selectable via button, fader, IR transmitter, time clock event, macro activation or switch interface stations.
    - 2. System macros and sequences shall be programmable via LightDesigner system software.
      - a. Macro and sequence steps shall provide user selectable steps, and allow the application of conditional logic.
      - b. Macro and sequences shall be activated by button, time clock event or LightDesigner software.
    - 3. System time clock events shall be programmable via LightDesigner system software, the processor user interface, or the internal web server.
      - a. Time clock events shall be assigned to system day types. Standard day types include: anyway,

weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. System shall support programming of additional custom or special day types.

- b. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event. System shall automatically compensate for regions using a fully configurable daylight saving time.
- b. Control components shall be designed to operate default or custom system functions. Components shall operate default functions unless re-assigned via LightDesigner, the software-based configuration program.
  - 1. Optional button functions include: preset selection, manual mode activation, record mode activation, station lockout, raise, lower, macro activation, or room join/separate.
  - 2. Optional fader functions include manual master control, individual zone control, fade rate control or preset master control.

#### D. Locking Covers

- 1. The Lighting Control Station Locking Covers shall be the Unison Heritage UH Series as manufactured by Electronic Theatre Controls, Inc., or equal.
- 2. Mechanical
  - a. Locking covers shall be available in Sliding Locking for flush mount applications and Hinged Locking for flush and surface mount applications
  - b. Sliding Locking Covers shall
    - 1. Be available with white, cream, ivory, gray or black faceplates.
    - 2. Be constructed of Extruded Aluminum with ABS plastic end caps
    - 3. Provide a smoked Plexiglas window to allow for viewing control status and use of IR remote without opening cover
  - c. Hinged locking covers shall:
    - 1. Be available in standard black powder coat finish
    - 2. Be constructed of 18 gauge steel and finished in standard black powder coat paint, or custom color as specified.
    - 3. Provide a clear Plexiglas window to allow for viewing control status and use of IR remote without opening cover
    - 4. Use internal Hinge that is not accessible when the cover is closed
  - d. Standard colors shall conform to the RAL CLASSIC Standard.
  - e. Locking covers of the same type shall be keyed alike

- f. The manufacturer shall supply back boxes for all hinged locking covers
- 3. Functional
  - a. All locking covers shall utilize 90-degree locking mechanisms
    - 1. Keys shall be held captive in locks when covers are unlocked.
  - b. Locking covers shall allow for easy viewing of system status without opening the cover
  - c. Locking covers shall support IR remote activation of configured system functions without opening door

### **Part 3. EXECUTION**

#### **3.01 INSTALLATION**

- A. It shall be the responsibility of the Electrical Contractor to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the dimming system, even though every item may not be specifically mentioned. The contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.
- B. The electrical contractor shall be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
- C. The electrical contractor shall install all lighting control and dimming equipment in accordance with manufacturers approved shop drawings.
- D. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals.

#### **3.02 MANUFACTURER'S SERVICES**

- A. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.
- B. Notification shall be provided in writing, two weeks prior to the time that factory-trained personnel are needed on the job site.

- C. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.
- D. The purchaser shall be liable for any return visits by the factory engineer as a result of incomplete or incorrect wiring.
- E. Upon completion of the formal check-out, the factory engineer shall demonstrate operation and maintenance of the system to the owners representatives. Training shall not exceed four working hours. Additional training shall be available upon request.

### **3.03 WARRANTY**

- A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.
- B. Warranty shall cover repair or replacement of such parts determined defective upon inspection.
- C. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.
- D. Warranty shall not cover any labor expended or materials used to repair any equipment without manufacturers prior written authorization.

**END OF SECTION**

### **SECTION 260961**

#### **Part 1. GENERAL**

##### **1.01 WORK INCLUDED**

- A. The Electrical Contractor, as part of the work of this section, shall provide, install and test a complete lighting control system as specified herein for areas indicated on the drawings and circuit schedules.
- B. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware and other incidental items necessary for the complete and proper operation of the lighting control system.
- C. The Electrical Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to:
  - 1. General Conditions



2. Electrical Section General Provisions
3. Conduit
4. Wire and Cable

## **1.02 SYSTEM DESCRIPTION**

- A. The system shall be designed for the control of architectural and theatrical lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relays, power supplies, breakers, terminals and/or control electronics.
- B. System shall work in conjunction with specified low-voltage control stations.

## **1.03 SUBMITTALS**

- A. Manufacturer shall provide \_\_\_\_\_ sets of full system submittals. Submittals shall include:
  1. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
  2. Full set of printed technical data sheets.
  3. Detailed set of dimmer schedules
  4. Detailed set of circuit and control schedules, including a complete list of all deviations from specifications.
- B. Manufacturer shall provide any additional information, including equipment demonstrations, as required by the engineer or specifier to verify compliance with specifications.

## **1.04 QUALITY ASSURANCE**

- A. Manufacturer shall be one who has been continuously engaged in the manufacturer of lighting control equipment for a minimum of ten years. All dimmer and cabinet fabrication must take place in a U.S.manufacturing plant.
- B. The manufacturer shall have a factory authorized stocking service center with at least one full time service technician on staff located within 150 miles of the job site. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year.
- C. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theater Technology. Permanently installed power distribution equipment such as dimmer racks and distribution shall be UL and C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels.

## **1.05 ACCEPTABLE MANUFACTURERS**

- A. The equipment herein specified shall be manufactured by
  - o Electronic Theatre Controls
  - o PO Box 620979
  - o Middleton, WI 53562
  - o Phone: 608/831-4116
  - o Fax: 608/836-1736
- B. Alternative manufacturers must submit a full pre-approval package ten days prior to bid date. Package shall consist of items listed in Part 1, Section 1.03A.
- C. Permission to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

## **Part 2. PRODUCT**

### **2.01 LIGHTING SYSTEM AND ACCESSORIES**

- A. General
  - 1. The lighting control desk shall be a microprocessor-based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems. The device shall be the Ion as manufactured by Electronic Theatre Controls, Inc., or equal.
  - 2. The system shall provide control of 1024 outputs, 1536 outputs, 2048 outputs, 2560 outputs or 3072 outputs on a maximum of 10,000 control channels, patched across any number up to 99,999. Output shall be distributed over a 10/100MB Ethernet network using Net3/ACN, ETCNet 2, Avab and/or ArtNet protocols. The user shall be able to control the application of protocols at an individual address level.
  - 3. The system shall support full bi-directional RDM communication with compatible devices via Net3 DMX/RDM Gateways. RDM communication shall adhere to ANSI standard E1.20-2006 Entertainment Technology – RDM – Remote Device Management Over DMX512 Networks. Supported RDM features shall include:
    - a. Discovery and identification of RDM capable devices
    - b. Setting of start addresses, operating modes and additional settings as exposed by connected devices and controllable via RDM
    - c. Viewing of Sensor data as provided by connected devices.
    - d. Error reported as provided by connected devices.
  - 4. A maximum of 10,000 cues, 999 cue lists, 1000 groups, 1000 presets, 4 x 1000 palettes (Intensity, Focus, Color and Beam), 1000 effects, 1000 macros and 100 curves may be contained in non-volatile electronic memory and stored to an onboard hard drive or to any USB storage device.
  - 5. Recorded cue lists may be played back simultaneously on a maximum of 200 faders. Channels shall respond to cue information by last instruction with discrete rate control provided for all cues. The desk may be placed in Tracking or Cue Only mode by the user as a system default and overridden on individual

record actions as required. HTP/LTP intensity flags, assert, proportional, intensity master or manual master fade control and independent status may be placed on each cue list. It shall also be possible for a cue list to contribute to playback background states or to withhold such contributions.

6. A Master Playback fader pair and dedicated Grand Master/Blackout shall be provided.
7. Up to six USB fader wings may be connected to the desk, for a maximum of 300 submasters and/or 200 playback faders. USB fader wings may be rigidly connected to the main desk to provide a "single connected unit" with no external cables required. The wings also may be connected via USB cables and used "on the side." Virtual fader control is also provided.
8. A high-resolution level wheel shall be provided to control intensity for selected channels and scrolling within selected displays. Four page-able high-resolution encoders shall be provided for control of non-intensity parameters. Non-intensity encoders may be operated in coarse or fine mode, with the amount of movement per revolution of the encoders in coarse mode definable by the user. Non-intensity parameters shall be controllable via the encoders or keypad controls, without need of an external pointing device. A high-resolution rate wheel shall also be provided.
9. Rotary encoders for non-intensity parameters shall be labeled by means of an integral LCD display mounted below the encoders on the main desk. The display shall show the currently loaded functions of the encoders based on the current selections. Systems using encoders with no LCD labeling shall not be acceptable.
10. Control and programming features for automated fixtures shall also include: a standard library of fixture profiles, the ability to copy and edit existing profiles and create new profiles, patch displays including channel and output addressing, 16-bit fade resolution, color characterization allowing color mixing and storing in Hue and Saturation or native device values.
11. System information, including playback status, live output and blind values for all record targets shall be displayed on a maximum of two external high resolution DVI monitors, or one SVGA monitor, which may also be touch-screen(s). Only one display shall be required for operation.
12. A context sensitive on-line Help feature shall explain and provide an example of the operation of each feature of the system.
13. A fully integrated Virtual Media Server feature shall allow the user to map images and animations to a rig array. 40 such maps may be created, each with 12 layers. Systems that rely on external hardware or software for this functionality shall not be acceptable.
14. User-definable, interactive displays may be created. These displays, which can be used in live and blind operating modes, allow graphical layout of channels, desk buttons and programming tools. Standard symbols are provided, and the user may import his own symbols or graphics. Each symbol may be individually defined with data feedback characteristics. Non-interactive status information, such as a mirror of other user's command lines, may also be included in the

display. A graphical browser is provided for fast selection of these views. Multiple zoom factors and placements may be stored and recalled for each display.

15. An optional, full-functioning, detachable alphanumeric keyboard shall be supported. The keyboard shall allow labeling of channels, cues, presets, groups, palettes, effects, macros, curves and the show. An integral electronic keyboard shall be provided.
16. A row of softkeys shall be provided, which change function based on the selection and context of the desk. These softkeys shall be labeled via an adjacent LCD display that shows their current functions at all times. Systems using softkeys with no LCD display shall not be acceptable.
17. Software upgrades shall be made by the user via a USB port; changing internal components shall not be required. It shall be possible to install software updates in all consoles, processor units and remotes from one device over the network.
18. The operating software shall be loaded into program execution memory from the internal hard drive when the console is powered. In the event of an uncontrolled shutdown, the device shall return to its last output state when power is restored.
19. Dimmer monitoring and configuration features shall be provided (in conjunction with ETC' s Sensor+, Sensor 3 or FDX dimming systems) to allow indication of dimming system status, dimmer load monitoring and show specific configurations.
20. Show data may be created and modified on a personal computer, using either Windows XP or Windows 7 operating systems, with a free offline editing application. The offline editor may also run natively on Intel-based Macintosh platforms using OS X. The program shall also allow output to visualization software supporting the same protocols as the lighting system.
21. A PC using Windows XP or Windows 7/8 or an Intel-based Macintosh computer using OS X running a client software application shall be able to connect to a control system via the network and view or modify current show data in an independent display environment, using an Eos Family Client Dongle. When connected without the dongle, the computer shall operate in Mirror Mode, with the device to be mirrored selectable by the user. Systems that do not provide client software that may run natively on the Apple platform in this environment shall not be acceptable
22. Synchronized backup shall be provided via another full desk on the network or by use of a remote processor unit. The backup unit (either full desk or rack mounted Remote Processor Unit (RPU) shall maintain synchronized playback with the master and shall take over control of the lighting system upon loss of communication with the master. Use of two RPUs to service and backup system output is also supported. Systems that do not offer this kind of instant backup from multiple sources shall not be acceptable.
23. A maximum of four users may access and interact with show data simultaneously. Each user shall have an individual workspace and channel

partitioning shall be supported. User identification may be assigned to more than one control device, allowing users to work in tandem, or allowing a designer/ALD to mirror the current display format, mode and command line of the associated programmer. Partitioned control allows discrete control of channel/parameter groupings by user. Partitioned control may be easily enabled and disabled with no need to merge show data from multiple users.

24. Mirror mode shall allow the desk displays and operating modes to be mimicked on another connected device. Alternatively, the desk may mirror another device.
25. The system shall allow remote control from external devices as follows: Client software running on a PC connected to the network, a remote video interface with keyboard, a purpose-built wireless remote focus unit (Radio Focus Remote). Universal fader wings may be attached to any of these devices for local fader control. Systems without these remote control devices shall not be acceptable.
26. The system shall support a Telephone remote control that allows basic functions to be controlled from a standard wireless phone producing touch-tone signals. This allows the use of a standard telephone for a low cost remote control. Systems that do not allow this function shall not be acceptable.
27. Show data may be created and modified on a personal computer, using either Windows XP or Windows 7/8 operating systems, with a free offline editing application. The offline editor may also run natively on Intel-based Macintosh platforms using OS X. The program shall also allow output to visualization software supporting the same protocols as the lighting system.
28. The system shall support up to 32 individual Time Code Event lists.

## B. Controls and Playback

### 1. Manual Control and Programming Section

- a. The programming keyboard shall be grouped by function. Major groupings shall be record target functions, numeric keys, level assignment functions, display navigation functions and controls.
- b. Non-intensity parameters may be set numerically or via the encoders. This control shall be fully interactive. In either case the current parameter value shall be displayed on the desk monitor and simultaneously on the integral LCD display. Systems using only a local LCD or only a video monitor shall not be acceptable.
- c. Only those parameters available for control in the active lighting system shall be displayed for control.
- d. Lamp controls provide direct access to luminaire functions such as striking and dousing arc lamps and calibrating entire fixtures or individual mechanisms of fixtures, as provided by the luminaire manufacturer. User access to these features is normalized across all manufacturers for ease of use. Use of a "control channel" for accessing these functions shall not be required and systems requiring use of a control channel shall not be acceptable. Lamp control commands maybe e staged, and channels which have been sent lamp on commands so indicated in live.

- e. Fan functions shall be provided both via command line operation and through encoder controls.
  - f. Highlight shall be supported, with user definable highlight values. Lowlight conditions may be defined for selected, but not specified channels. Rem Dim command, at specific levels by channel, may be optionally and automatically called with the highlight command.
  - g. Fixtures with CMY or RBG color mixing may be set with direct CMY or RBG controls, as well as the Hue and Saturation encoders and/or color picker. Color may also be set directly to a gel match, via a graphic selection tool or from the command line.
  - h. The Virtual Media Server function shall allow the user to create layouts of devices, identified as pixel maps. Media content (images, movies, text and procedurally generated effects) may then be applied, manipulated and stored. Stock content is provided and the user may import custom imagery and animations.
  - i. Macros may be set to run as default. Default macros called manually shall post to the command line, but executed via cue lists shall run in the background. The user may override this behavior by defining the macro to always execute in the foreground or the background, regardless of the recall method. Startup, Shutdown and Disconnect macros may also be defined.
2. Playback Section
- a. The master fader shall consist of a 60mm Master Fader pair with associated Load, Go and Stop/Back buttons. Additional playback faders may be configured via the virtual fader module or on the Universal Fader Wings.
  - b. It shall be possible to instantaneously halt an active cue, back to the previous cue, manually override the intensity fade or manually override the entire fade.
  - c. It shall be possible for a cue list to contribute to the background state or for the contents of each cue list to be withheld from such.
  - d. The playback faders shall have the following associate controls:
    - 1. Freeze, which halts the output of the fader
    - 2. Stop Effect, which stops the action of an effect.
    - 3. Filter, to assign filter states to a fader
    - 4. Go to Cue 0, to reset a cue list.
3. Fader Wings (Optional)
- a. Submaster and fader support shall be provided via optional fader wings. These wings are available in 1x20, 2x10 and 2x20 configurations. Up to six of these wings may be connected to the desk via internal or external USB. Via paging, access is provided to all 300 faders, regardless of the number of physical wings attached.
  - b. The 2x10 and 2x20 fader wings shall include a full length LCD for labeling and identification functions. Each fader shall have two associated hard

buttons for various operations. Systems without a local display or fewer than two buttons per fader shall not be acceptable.

- c. Up to 300 proportional, fully overlapping additive, effect or inhibitive submasters may be defined. Submasters shall have colored LEDs to indicate submaster status. Each submaster may have fade up, dwell and down fade times. Each has a bump and assert/channel select button. Submasters may be set to independent, exclusive, shielded and proportional/intensity or effect master control.
  - d. The submaster blind buffer shall be linked directly to live playback allowing live editing of live submaster content via the command line.
  - e. It shall be possible to set submaster values directly from the command line.
  - f. Up to 200 cue lists may be active concurrently.
4. Grand Master
- a. A dedicated grand master and blackout button are provided.
  - b. The grand master shall proportionally fade intensity values to zero. Blackout shall send all intensity outputs to zero. Non-intensity outputs shall not be affected. No additional configuration shall be required to withhold non-intensity values from Grand Master and Blackout control.

#### C. Display Controls

1. Format shall change the view of selected displays.
2. It shall be possible for the user to choose which parameter categories or parameters (s)he wishes to display.
3. Flexichannel shall change which channels are viewed in selected displays, as follows:
  - a. All channels
  - b. Patched channels
  - c. Show channels
  - d. Active/Moved channels
  - e. Selected channels
  - f. Manual Channels
  - g. View channels (user identified list)
  - h. Channels with discrete timing
4. Expand shall extend the selected view sequentially across connected displays, vertically or horizontally
5. [Time] depressed shall display discrete timing data. [Data] depressed shall display absolute values of referenced data.
6. User definable magic sheets shall provide alternative display of and access to channels and record targets. Multiple magic sheets may be created.
7. Playback status displays are provided with a variety of different formats. Indications are provided per cue for live moves (lights fading from zero and also moving non-intensity parameters) and dark moves (inactive lights which have stored non-intensity parameter moves).

#### D. Operating Modes

## 1. Live Mode

- a. Channel lists may be constructed using the +, - and Thru keys as well as the direct selects. Channel selection and deselection is fully interactive, regardless of the method used.
- b. Levels may be set with the keypad, level wheel and non-intensity encoders. "Selected" channels shall be those last addressed and under keypad control.
- c. Sneak shall be used to restore specified channels to background states, default values, or to send them to specified values, in user specified or default times.
- d. Selected channels may be set at a level or held to current values while all other channels are set to zero using Rem Dim. Toggling Rem Dim shall restore all unselected channels to original levels. The Rem Dim level shall be user definable via the command line or with a default setup value.
- e. Channels may be recorded into groups for fast recall of commonly used channels. 1000 groups shall be available. Groups shall store selection order. The Offset function supports rapid creation of ordered groups, including reverse and random order.
- f. Parameter settings may be stored to Intensity, Focus, Color and Beam Palettes and to Presets. All referenced data may be stored to whole numbers or to up to 99 decimal places between each whole number. It shall be possible to store 1000 presets and 1000 of each palette type.
- g. Any collection of channel data, as determined by the use of "Record", "Record Only, selective store commands and/or parameter filters may be stored to palettes (as appropriate to the type) and presets.
- h. The following conditions may be placed on a channel or channel parameter to be included with a cue record action.
  1. Discrete fade time and/or delay
  2. Block flag
  3. Assert flag
  4. IFCB Filters, which may be set at a parameter level.
- i. 999 cue lists may be stored. Cues may be recorded in any order. Up to 99 decimal cues may be inserted between any two whole number cues. Each cue may contain a maximum of twenty parts. Parameters may be automatically assigned to specific parts or assigned when the part is created.
- j. It shall be possible to record cues and cue parts with the following information:
  1. Any collection of channel data, as determined by the use of "Record", "Record Only" or selective store commands, combined with parameter filters.
  2. Cue Level timing and delays for Intensity Up, Intensity Down, Focus, Color and Beam.
  3. Follow or hang time



4. Link instruction
  5. Loop value
  6. Block, Assert, Allfade, Preheat and/or Mark Flag
  7. Curve
  8. Label and note
  9. Execute list to trigger other activity
- k. Non-intensity channel parameters may be marked (preset), in two ways. Automark presets any parameters transitions in the cue just prior to intensity becoming active. Automark may be disabled on a cue or cue part basis, enabling a "live" move. Alternatively, non-intensity parameters may be marked to a specific cue with a single command instruction. It shall not be necessary to store these parameters directly into the cue in which the movement is to occur.
  - l. Any channel parameter may be stored with an effect instruction. These effects may contain relative offsets from current value, or absolute instructions. Effects may be progressive action or on/off states. Entry and exit behaviors shall modify the channel parameters activity when beginning and ending the effect.
  - m. Update may be used to selectively add modified parameter data quickly to that parameter' s current source. It shall be possible to update inactive record targets. It shall also be possible to update back to the current source of the move instruction without specifying that cue via Trace. A context sensitive display provides detailed information regarding the results of the update command.
  - n. Recall From quickly pulls specified data from record targets or other channels into the current view. Recall from on an HTP basis shall be provided.
  - o. Copy To quickly copies selected data to specified channels or other record targets.
  - p. Address and channel check functions shall be provided.
  - q. Channel parameters may be "parked" at levels. Output addresses may also be parted directly. Parked levels shall not be added to any live record operations, nor may they be changed until the parked element is "unparked". Address Park shall also be provided.
  - r. About shall provide detailed status of selected channels or specified record targets. This shall include current source, current value, discrete timing, parked value, marked to and for indications. Background levels and current DMX output are also displayed. Channel usage indicates submaster and cue information and also provides a "dark moves" report on a per channel basis
  - s. 1000 snapshots may be stored which instantly recall specified front panel and display configurations.
  - t. Live data may be displayed in a summary view, detailed table orientation or a user-defined magic sheet

- u. Undo shall be used to sequentially step back through manual operations, record, update and delete actions. Redo functions shall be provided. Multiple undo commands may be executed at once.
  - v. Home shall set selected channels non-intensity parameters to their default values. User definable home, on a per- channel/per- parameter basis shall be provided.
  - w. Move shall allow all show data to be moved from one record target to another.
  - x. Query shall allow selection of channels by their current or possible state. Keywords and fixture types shall allow quick access to fixtures.
2. Blind
- a. The Blind display allows viewing and modification of all record targets without affecting stage levels.
  - b. Record target data may be displayed in a summary view, a detailed table orientation or a spreadsheet view, which allows quick data comparisons, move and replace with functions.
  - c. Changes made in blind displays shall be automatically stored.
  - d. Blind editing shall be possible for all record targets.
  - e. Selection of what parameter data to view for blind editing shall be user configurable.
3. Patch Display
- a. Patch shall be used to display and modify the system control channels with their associated library data.
  - b. Each channel may be provided with a proportional patch level, preheat, curve, label, swap and invert functions.
  - c. Offset functions in patch shall allow selection of channel ranges and shall allow the user to establish a "custom" footprint for any device output.
  - d. A full library of profiles is provided, with the ability for the user to define "favorites" for fast selection.
  - e. Custom color wheels, color scrolls and gobo wheels shall be defined in patch. These devices shall be created with a simple table and graphical user interface supported by images of major manufacturers.
  - f. Copy to and Move functions shall be supported in patch.
  - g. RDM discovery and device monitoring shall be supported.
4. Setup/Browser
- a. Setup shall access system, show and desk configurations.
  - b. The browser shall access show data storage, import, export, print to .pdf and clear functions, as well as show data utilities.
  - c. It shall be possible to partially merge show files. Users shall be able to select as much or as little of the show file as required, with renumber tools.
  - d. It shall be possible to import ASCII and Lightwright data files. It shall be possible to export as ASCII or .csv.
- E. Dimmer Monitoring and Configuration

1. The lighting control system shall provide communication with an ETC Sensor+, Sensor3 or FDX dimming system for remote monitoring and configuration of show specific functions from within the software application.
2. Circuit level configuration and monitoring functions shall include but not be limited to:
  - a. Control mode (dimnable, switched, latch-lock, always on, off or fluorescent).
  - b. Curves
  - c. Control threshold
  - d. Min and Max Scale Voltage
  - e. Preheat
  - f. Scale load
3. Rack Status messages shall include but not be limited to:
  - a. State of UL924 panic closure
  - b. DMX port error/failure
  - c. Network error/failure
  - d. A, B, C Phase below 90 or above 139 volts and headroom warning
  - e. Ambient temperatures out of range
4. Circuit status shall include but not be limited to:
  - a. Module type and location
  - b. Output level
  - c. Control Source
  - d. Overtemp
5. Advanced circuit feedback shall include but not be limited to:
  - a. Load higher or lower than recorded value
  - b. DC detected on output
  - c. SCR failed on/off
  - d. Breaker trip
  - e. Module has been removed
  - f. Load failure
  - g. Shutdown due to Overtemp

#### F. Training Options

1. Training packages shall be available customizable to the individual venue preferences and needs. The level of training (beginner, intermediate or advanced) may be selected and training may be defined as an element of system commissioning or deferred to a later time.

#### G. Interface Options

1. The unit shall support a variety of local interfaces.
  - a. AC input.
  - b. USB (five ports for connecting devices such as an alphanumeric keyboard, mouse, touch screens, USB Flash drive, fader wings, etc.) The desk shall provide four ports on the rear of the unit and one on the control service itself.
  - c. Ethernet (one port) 802.3af compliant

- d. Two DVI video output connectors, supporting a maximum of two DVI monitors at 1280x1024 resolution minimum.
  - e. One VGA output connector.
  - f. Up to six fader wings may be attached to the main console via internal or external USB connections. Systems that do not allow the addition of fader wings shall not be acceptable.
  - g. Two DMX512-A/RDM Ports
  - h. Contact Closure Trigger via D-Sub Connector
  - i. Phone Remote
  - j. MIDI In/Out (MIDI Timecode, MIDI Show Control)
- H. Accessories
- 1. Net3 Radio Focus Remote
  - 2. iRFR and iRFR Preview (application for iPhone, iPod Touch and iPad units)
  - 3. aRFR (application for Android devices)
  - 4. Net3 Remote Video Interface
  - 5. 1 x 20, 2x10 and 2x20 Universal Fader Wings
  - 6. Net 3Gateways
    - a. Net3/ETCNet 2 to DMX/RDM Gateways (one to four ports)
    - b. MIDI/SMPTE Gateways
    - c. I/O Gateway with 12 analog inputs, 12 SPDT contact outputs, RD232 interface
  - 7. Eos Family Client Software Kit
- I. Synchronized Backup
- 1. An optional Backup system shall consist of one of the following combinations of devices:
    - a. Two networked desk
    - b. One (or more) desk with one Remote Processor Unit (RPU)
    - c. One (or more) desk with two Remote Processor Units (RPUs)
- J. Physical and Acoustical
- 1. All operator controls and electronics for a standard system shall be housed in a single desktop console, not to exceed 19" wide, 19" deep, 5.5" high, weighing 20 pounds.
  - 2. Power shall be 95 – 240V AC at 50 or 60Hz, supplied via a detachable power cord.
  - 3. At typical CPU utilization, the unit shall operate at 26 dBA.

## **Part 3. EXECUTION**

### **3.01 INSTALLATION**

- A. It shall be the responsibility of the Electrical Contractor to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete

installation and operation of the dimming system, even though every item may not be specifically mentioned. The contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.

- B. The electrical contractor shall be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
- C. The electrical contractor shall install all lighting control and dimming equipment in accordance with manufacturers approved shop drawings.
- D. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals.

### **3.02 MANUFACTURER'S SERVICES**

- A. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.
- B. Notification shall be provided in writing, two weeks prior to the time that factory-trained personnel are needed on the job site.
- C. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.
- D. The purchaser shall be liable for any return visits by the factory engineer as a result of incomplete or incorrect wiring.
- E. Upon completion of the formal check-out, the factory engineer shall demonstrate operation and maintenance of the system to the owners representatives. Training shall not exceed four working hours. Additional training shall be available upon request.

### **3.03 WARRANTY**

- A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.
- B. Warranty shall cover repair or replacement of such parts determined defective upon inspection.

- C. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.
- D. Warranty shall not cover any labor expended or materials used to repair any equipment without manufacturers prior written authorization.

**END OF SECTION**

**SECTION 260933**

**Part 1. GENERAL**

**1.01 WORK INCLUDED**

- A. The Electrical Contractor, as part of the work of this section, shall provide, install and test a complete lighting control system as specified herein for areas indicated on the drawings and circuit schedules.
- B. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware and other incidental items necessary for the complete and proper operation of the lighting control system.
- C. The Electrical Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to:
  - 1. General Conditions
  - 2. Electrical Section General Provisions
  - 3. Conduit
  - 4. Wire and Cable

**1.02 SYSTEM DESCRIPTION**

- A. The system shall be designed for the control of architectural and theatrical lighting and shall consist of factory pre-wired dimming and processing rack enclosures containing dimmers, relays, power supplies, breakers, terminals and/or control electronics.
- B. System shall work in conjunction with specified low-voltage control stations.

**1.03 SUBMITTALS**

- A. Manufacturer shall provide \_\_\_\_\_ sets of full system submittals. Submittals shall include:
  - 1. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
  - 2. Full set of printed technical data sheets.
  - 3. Detailed set of dimmer schedules

4. Detailed set of circuit and control schedules, including a complete list of all deviations from specifications.
- B. Manufacturer shall provide any additional information, including equipment demonstrations, as required by the engineer or specifier to verify compliance with specifications.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer shall be one who has been continuously engaged in the manufacturer of lighting control equipment for a minimum of ten years. All dimmer and cabinet fabrication must take place in a U.S.manufacturing plant.
- B. The manufacturer shall have a factory authorized stocking service center with at least one full time service technician on staff located within 150 miles of the job site. In addition, the manufacturer shall have a toll free 24-hour hotline with a maximum response time of 20 minutes, 24 hours a day and 365 days a year.
- C. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code and the United States Institute for Theater Technology. Permanently installed power distribution equipment such as dimmer racks and distribution shall be UL and C-UL Listed, and/or CE marked (where applicable) and bear the appropriate labels. Portable equipment such as consoles and fixtures shall be UL and C-UL Listed, ETL Listed and/or CE marked (where applicable) and bear the appropriate labels.

#### **1.05 ACCEPTABLE MANUFACTURERS**

- A. The equipment herein specified shall be manufactured by
  - o Electronic Theatre Controls
  - o PO Box 620979
  - o Middleton, WI 53562
  - o Phone: 608/831-4116
  - o Fax: 608/836-1736
- B. Alternative manufacturers must submit a full pre-approval package ten days prior to bid date. Package shall consist of items listed in Part 1, Section 1.03A.
- C. Permission to bid does not imply acceptance of the manufacturer. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for controls systems that meet or exceed the specifications.

### **Part 2. PRODUCT**

#### **2.01 DIMMER MODULES**

- A. General
  1. The dimmer modules shall be the Sensor dimmer modules as manufactured by Electronic Theatre Controls, Inc., or equal. Sensor dimmer modules shall be

designed for dependable, economical service in theatrical and video applications.

B. Electrical

1. Each dimmer module shall contain two single-pole circuit breakers, a solid-state switching module, associated toroidal filters, and power and control connectors.
2. Modules shall not have any protruding pins subject to physical damage when the module is not installed.
3. Modules shall be keyed so that dimmer modules of different capacity shall not be interchangeable.
4. Circuit breakers shall be fully magnetic so the trip current is not affected by ambient temperature. Circuit breakers shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current. Circuit breakers shall be rated for 100 percent switching duty applications. Dimmers that do not operate continuously at 100% load shall not be acceptable.

C. SCR Assembly

1. Each dimmer module shall use a solid state module (SSM) consisting of two silicon-controlled rectifiers (SCRs) in an inverse parallel configuration, and all required gating circuitry on the high voltage side of an integral, opto-coupled control voltage isolator. Rectifiers, copper leads and a ceramic substrate shall be reflow soldered to an integral heat sink for maximum heat dissipation. The SSM shall also contain a control LED, a thermistor for temperature sensing, and silver-plated control and load contacts. The entire SSM shall be sealed in a plastic housing requiring only a screwdriver to replace. Dimmers employing triac power devices, pulse transformers, or other isolating devices not providing at least 2,500V RMS isolation, shall not be acceptable. Dimmer modules requiring disassembly, heat sink grease or additional tools for repair shall not be acceptable.
2. All electronic components (current/voltage sensors and indicators) shall be contained in a single, field-replaceable housing. Modules requiring discrete wiring of electronic components shall not be acceptable.
3. SCR power switching devices shall have the following minimum ratings:

Module Size:	15 A	20A
Single cycle: Peak surge current	625A	625A
Half cycle: 12T	1,620	1,620
Transient over voltage	600V	600V
Die size (in)	.257	.257

D. Filtering

1. Dimmer modules shall include toroidal filters to reduce the rate of current rise time resulting from switching the SCRs. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit radio frequency interference on line and load conductors. Modules shall offer 350 or 500 uS. filter rise times. Rise



time shall be measured at the worst case slew rate (about 50 percent) from 10 to 90 percent of the output wave form with the dimmer operating at full load.

2. All dimmers shall maintain their published rise time and/or fall time regardless of duty cycle or rack temperatures. Dimmers that derate due to increased dimmer temperature caused by full load operation or high phase angles shall not be acceptable.

E. Performance

1. Power efficiency for standard dimmers shall be at least 97 percent at full load with a no-load loss of 3V RMS. The dimmer shall accept hot patching of a cold incandescent load up to the full rated capacity of the dimmer.

F. Physical

1. Dimmer modules shall be fully plug-in and factory wired. Dimmer modules shall consist of a heavy duty, die-cast aluminum chassis with integral face panel. No tools shall be required for module removal and insertion. All parts shall be properly treated, primed and finished in fine-texture, scratch resistant, gray epoxy powder coat. With the exception of the circuit breaker, the module shall contain no moving parts. Each module shall be labeled with the manufacturer's name, catalog number and rating. Modules constructed of molded plastic for structural support are not equivalent and are not acceptable. Dimmer modules shall be UL Recognized.

## **2.02 POWER CONTROL ELECTRONICS**

A. General

1. The Power Control electronics shall be contained in one plug Power Controller. Each power controller shall plug into a dimming cabinet with no need for tools or discrete wire connections. A simple user interface shall be provided for group configuration, testing and diagnostics. The Power Control System shall be Sensor 3 as manufactured by Electronic Theatre Controls, Inc.
2. Power control shall be UL/cUL Listed and CE Marked. Power and dimming control that require tools for removal of control electronics shall not be acceptable.

B. Physical (Control Interface)

1. The control electronics shall be contained in one plugmodule, housed in a formed steel body with cast-aluminum face panel, and self-retaining ejection handles to ease removal from the rack.
2. A backlit eight-line by 20-character graphical LCD shall be provided for system configuration, live control and status display.
3. The following features shall be available in power control to reduce setup and tech times:
  - a. Full number pad shall be provided for quick access to dimmers. Power Control that does not provide 0-9 number pad and logic keys for AND, THRU, and AT for fast access, selection, and control of circuit/dimmer numbers shall not be acceptable.

- b. Power control shall provide NEXT and LAST buttons to progress through individual circuits/dimmers during pre-show lighting checks for lamp burnouts.
    - c. Shortcut buttons for Setup, About and live control shall be provided. These functions shall be separated in such a way that user intending to check status or settings does not accidentally render their system unusable. These buttons shall also serve to reduce maximum time to access any feature or setting on a single dimmer, range of dimmers or an entire rack.
  - 4. The front panel shall have five status LED indicators: power, network activity, DMX A, DMX B, and panic state.
- C. Control Signals and Physical Communications Media ports
  - 1. The power control shall be provided with an Ethernet control signal input. This input shall be fully configurable with a range of patching and priority programming capabilities. The Ethernet signal shall supply seamless integration between the dimmer racks and both the entertainment and architectural lighting control systems. The Ethernet signal shall also enable remote configuration, playback, file storage and monitoring features on a personal computer on the network. Dimming systems that require Ethernet to DMX translation devices for control of critical show lighting introduce a potential failure point and shall not be acceptable.
  - 2. All data and power input for control electronics shall be located on a separately removable/pluggable termination connector on the backplane such that backplane can be replaced without removal and discrete secondary conductor terminations. Systems that do not support tool-less replacement or that require removal of wires connected directly to the control electronics shall not be acceptable.
  - 3. Dimming systems that require discrete termination of DMX, Ethernet, power input, and dimmer control output directly on terminals on the power control or pluggable backplane shall not be acceptable.
  - 4. DMX connections shall be available with option for pluggable screw or punch-down type terminal. Systems that do not allow this option do not support both DMX over CAT5 and mutli-strand conductors shall not be acceptable.
  - 5. Ethernet connection shall be available via standard Cat5 RJ45 connection. System requiring punch down direct to rack or controller cannot be Cat5 system certified and shall not be acceptable.
  - 6. Power Control shall provide a convenience Ethernet uplink to the lighting network at the front face of the control module. Network capable 3rd party control and monitoring devices shall be provided full access to control, editing and real time feedback.
  - 7. The following options shall be available to backup all controller setup UL924 Panic configuration, and recorded presets:
    - a. Automatic backup in non-volatile backplane memory
    - b. Automatic backup in non-volatile Controller memory

- c. 3rd party FTP server
  - d. USB storage device pluggable on the controller face panel
  - e. Data shall also be transferable to and from library storage on a personal computer on a per-rack basis
8. The power controller shall directly support the following network protocols:
    - a. Net3 protocol suite including ANSI E1.31 Streaming ACN (sACN)
    - b. ANSI E1.17 Architecture for Control Networks (ACN)
    - c. Systems that do not support the above listed industry standard ACN protocols for Ethernet setup, control, and feedback integrated directly between the power system and control system shall not be deemed acceptable.
  9. The power control shall directly support 2 optically isolated ports of ANSI E1.11 USITT DMX512-A for control input. Minimum 2,500V of optical isolation shall be provided between the DMX512 inputs and the electronics. Systems that do not have optical isolation on a prewired factory plugdevice shall not be acceptable.
- D. Power Control Features
1. The power control shall automatically compensate for frequency variations during operation.
  2. Dimmer outputs shall exhibit no oscillating or hunting for levels. Dimmers with the same choke type set to the same level shall output within  $\pm 1V$  of each other, regardless of phase or input voltage.
  3. Power control shall maintain proper dimming performance for all line feed frequencies from 47-53Hz and 57-63Hz without flicker or misfire. Shifts in frequencies up to 3 hz shall not result in flicker or loss of dimming timing. Systems that cannot perform to these frequency tolerances and shifts shall not be acceptable.
  4. Dimmer output levels shall be regulated for incoming line voltages. The regulation shall adjust for both RMS voltage changes and deformations in the incoming AC waveform. The power control shall monitor and adjust each dimmer's output to maintain a constant power to the load. Regulation shall maintain the desired output voltage  $\pm 1V$  for the entire operating range (91-139V and 181-259 VAC) with the exception that the maximum output will be no greater than the line voltage minus dimmer insulation loss. The regulation shall compensate for dips and anomalies in the AC waveform on a dimmerbasis. There shall be no interaction between dimmers in the system or any other equipment. The output shall be nominally regulated to 115V/230V appropriate for the market, but shall be field adjustable on a dimmerbasis to allow for varying cable length. Systems that cannot maintain perform to the above stated voltage regulation shall not be acceptable.
  5. Power control shall support a rack filled with different types and sizes of dimmer modules. The properties of each dimmer shall be configurable, including dimmer name, output curve, dimmer firing mode, and scale voltage values.
    - a. The output curve selections shall include IES Modified Square, Square, Linear, Modified Linear and a Sensor v2.0 output curve. The power

- control shall also have the capability of storing up to three custom curves as well as an adjustable preheat level, assignable on a per-dimmer basis.
- b. Circuit control modes shall include: Always on, Dimmable, Dimmer Doubled, Switched (unregulated on/off with adjustable on-at level), Fluorescent with adjustable threshold and Off.
  - c. Power Control shall support forward or reverse phase firing of appropriate modules.
  - d. Dimmers set as Dimmer Doubled shall allow a single dimmer to set two different levels on one dimmer circuit by splitting the AC power into positive and negative half cycles with no resultant DC line current.
6. User programmable parameters shall support onsite setup via the local interface in the rack. These parameters shall include, but not be limited to, defining module type, scale voltage for each dimmer, firing mode, curve, dimmer numbering, and DMX512/sACN network port assignments. Systems requiring factory programming shall not be acceptable.
  7. Hardware settings for rack type, available module types, availability of AF features, and operating voltage shall be configurable at the factory or in the field, and shall not require secondary setup after system commissioning even in the event of power controller replacement.
  8. Controller shall support two methods of automatic configuration during controller replacement in a rack.
    - a. Use backplane configuration: The backplane shall retain full setup and preset data in. In this recovery mode, when a new power control is inserted, the controller shall automatically come on-line fully functional without any manual intervention.
    - b. Use controller configuration: Override backplane configuration such that replacement modules automatically use the configuration resident in nonvolatile memory of the power control
  9. Controller shall be capable of changing rack setup for multiple shows for an entire system with a single update command from a remote PC.
  10. In the event of data loss each rack shall maintain the last level for a usertime (zero to five minutes or indefinitely) or may be programmed to fade out or to play a specific preset. Systems that do not offer this feature shall not be acceptable.
  11. The power control shall contain diagnostic routines to allow the user to test and troubleshoot the system. The power control shall also contain a Test/Bypass switch to turn all dimmers on to full for testing. This switch shall bypass all electronics and shall force the fan on. Systems that do not include local control, "all on" control bypass, and diagnostic routines shall not be deemed acceptable.
  12. The power control shall be able to record up to 64 presets in a rack. Presets shall be user programmable by recording a snapshot of current dimmer levels (as set by the all control sources), by entering dimmer levels on the power control directly or by a combination of both methods. The system shall have the ability to program and activate grouppresets from the power control, remote station,

console, networked computer or handheld device. Presets shall be activated in the default fade time of 2 seconds, but shall be have a user-programmable fade time between 0 and 60 minutes.

13. A systempanic (emergency UL924) activation circuit shall be provided. Any dimmer in any rack may be assigned to the panic circuit. The panic closure shall be maintained. Upon activation the system shall:
  - a. Force all circuits selected to be included in panic to a master level between 80-100%
  - b. Optionally force all non-panic dimmers to zero
  - c. Provide configurable fade time to and from "emergency" state
  - d. Provide configurable delay to and from "emergency" state
14. DMX A and B as well as the Ethernet DMX (EDMX) data may be patched using a rack start address - assigned sequentially from a starting control channel or patched individually on a per-dimmer basis. Priority may be set per universe for the DMX inputs, and set per universe by the control source for Ethernet input. Each dimmer may have up to six network control inputs with either a highest takes precedence or priority patch. Each dimmer may also then be assigned to one of 16 spaces for additional specific preset control. Each preset shall have a separate priority for maximum flexibility of prioritization. Systems that do not support prioritization of multiple Ethernet sources beyond HTP shall not be acceptable. Systems that do not support the above listed flexibility in control source prioritization shall not be acceptable.
15. Power control shall provide the ability to set a single circuit, all circuits or a range of circuits to a level at the control interface in the rack. Systems that cannot locally control dimmers through local control override shall not be acceptable.
16. The power control shall be capable of monitoring and displaying incoming line voltage for all three phases on the LCD. With installed current sensors, the same display shall show amperage on each phase.
17. The power control shall support security protected access user shall to able to program passwords that restrict access, preventing unauthorized use of higher-level functions by unauthorized personnel Systems that do not provide security protected access to features that can render the system unusable shall not be acceptable.
18. Advanced Features (AF) option shall add an additional sensor in the individual dimmer modules. This option shall allow monitoring of current and output voltage on a dimmer basis and provide information on lamp burnouts, dimmer status and input voltages.
19. Power control shall allow the user to record the loads of all AF dimmers in the system. The power control shall, during operation, test each AF dimmer, determine its load and compare it to the recorded load. Any change from recorded loads of configured tolerance shall display an error on the power control and any monitoring device on the network. If a dimmer is driven on with no load, an optional message shall be available to notify the console operator and electrician that there is no load.

#### E. Connect to Console Communications

1. The Ethernet network shall provide an integral link to connect all racks in the system for remote rack-to-console and rack-to-network device communication of the below listed features of real-time control, configuration, and status/feedback using industry standard ANSI E1.17 ACN lighting protocol. Power control and dimming systems that do not use this protocol shall not be permitted. Reported system errors shall be given ACN access to be cleared remotely at the console with exception of system critical errors that require a person to go directly to the rack to manually clear the exiting fault.
2. Control
  - a. E1.31 sACN control
  - b. Activate/Deactivate rack presets
  - c. Set/Unset circuit levels as overrides to Preset, DMX, and sACN control
  - d. Lock relays into On/Off/Remote switching states without patching to a console.
  - e. Lock dimmers into non-dim mode with On/Off/Remote switching states without patching to a console.
3. Remote console configuration shall include, but not be limited to, real time reporting and editing the following:
  - a. Circuit' s control mode
    1. Dimmable
    2. Switched
    3. Latch-lock
    4. Always on
    5. Off
    6. Fluorescent
  - b. Curves
  - c. Control threshold
  - d. Min Scale Voltage
  - e. Max Scale Voltage
  - f. Preheat
  - g. Scale load
4. Standard rack feedback - Rack status messages shall include, but not be limited to, real time reporting of the following:
  - a. Identification
    1. Rack type
    2. Rack name
    3. Rack number
  - b. State of UL924 panic closure
  - c. DMX port A or B has an error or has failed
  - d. Network has an error or has failed
  - e. Phase A, B or C is below 90 volts
  - f. Phase A, B or C is above 139 volts

- g. Phase A, B or C did not start because it was outside of allowable voltage ranges at power up
  - h. Phase A, B or C voltage headroom warning
  - i. Frequency is not 50 or 60 Hz
  - j. Ambient temperature is below 0°C/32°F
  - k. Ambient temperature is above 40°C/104°F
  - l. System Critical-Ambient temperature exceeds 46°C/115°F
  - m. Configuration memory error
  - n. Run hours remaining before rack filter needs to be cleaned
  - o. IP address of the controller in the rack
  - p. Software version of the controller in the rack
5. Standard branch circuit feedback - Ethernet console access of the following circuit status shall be provided:
- a. Module type
  - b. Circuit location
  - c. Patched circuit addresses
  - d. Output level
  - e. Control Source
  - f. Overtemp
6. Advanced branch circuit feedback - Dimmer Specific status messages shall include, but not be limited to, the following:
- a. Load has dropped below recorded value
  - b. Load has raised above recorded value
  - c. DC detected on dimmer output
  - d. One SCR has failed on/off
  - e. Dimmer has failed off or circuit breaker has tripped
  - f. Dimmer has been removed
  - g. Dimmer load has failed
  - h. Dimmer has shut down due to over temperature

### **2.03 Sensor Sound Suppression Hood (SSSh**

#### **A. GENERAL**

1. The Sensor Sound Suppression Hood shall reduce the sound produced by the Sensor Installation Rack' s ventilation fan by surrounding it with an enclosure lined with sound absorbing foam.

#### **B. MECHANICAL**

1. The hood shall be constructed of steel and finished in a light gray (5C) fine-textured baked powder coat
2. The interior of the hood shall be fitted with a 1.25 (32mm) Soundmat PB-embossed foam insulation
3. The hood shall be designed to be installed without the use of tools
4. A Velcro or adhesive strip shall be used to adhere the hood to the top of the installation rack.

## **Part 3. EXECUTION**

### **3.01 INSTALLATION**

- A. It shall be the responsibility of the Electrical Contractor to receive and store the necessary materials and equipment for installation of the dimmer system. It is the intent of these specifications and plans to include everything required for proper and complete installation and operation of the dimming system, even though every item may not be specifically mentioned. The contractor shall deliver on a timely basis to other trades any equipment that must be installed during construction.
- B. The electrical contractor shall be responsible for field measurements and coordinating physical size of all equipment with the architectural requirements of the spaces into which they are to be installed.
- C. The electrical contractor shall install all lighting control and dimming equipment in accordance with manufacturers approved shop drawings.
- D. All branch load circuits shall be live tested before connecting the loads to the dimmer system load terminals.

### **3.02 MANUFACTURER'S SERVICES**

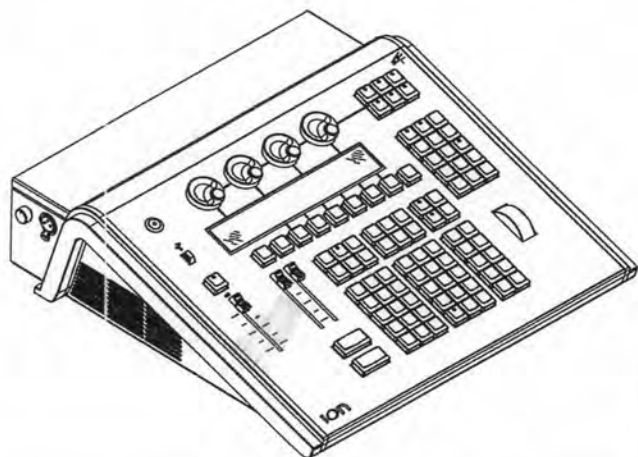
- A. Upon completion of the installation, including testing of load circuits, the contractor shall notify the dimming system manufacturer that the system is available for formal checkout.
- B. Notification shall be provided in writing, two weeks prior to the time that factory-trained personnel are needed on the job site.
- C. No power is to be applied to the dimming system unless specifically authorized by written instructions from the manufacturer.
- D. The purchaser shall be liable for any return visits by the factory engineer as a result of incomplete or incorrect wiring.
- E. Upon completion of the formal check-out, the factory engineer shall demonstrate operation and maintenance of the system to the owners representatives. Training shall not exceed four working hours. Additional training shall be available upon request.

### **3.03 WARRANTY**



- A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two years from date of delivery.
- B. Warranty shall cover repair or replacement of such parts determined defective upon inspection.
- C. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.
- D. Warranty shall not cover any labor expended or materials used to repair any equipment without manufacturers prior written authorization.

**END OF SECTION**



**GENERAL INFORMATION**

Fully integrated control of LEDs, conventional and moving lights in a compact, portable package. Up to four control devices, each with its own workspace, can be used for programming and playback. Synchronized backup is also optional. With Universal Fader Wings, multiple cue lists and up to 300 submasters are available.

**APPLICATIONS**

- Theatre
- Television Studios
- Houses of Worship
- Corporate Theatre
- Exhibits
- Special Events
- Touring

**FEATURES**

- 1024, 1536, 2048, 2560 or 3072 outputs
- 10,000 channels
- 4 Discrete Users
- Master playback pair with 60mm faders
- Four discrete palette types (IFCB)
- Presets function as "all palette"
- Effects provide dynamic relational or absolute progressive action
- Central information area (CIA) accesses electronic alpha keyboard, Hue + Saturation color picker, gel picker, browser and other controls
- Configurable high-density channel display, with format and flexi-channel modes
- User configurable topographical channel views
- List views of all record targets
- ETCNet2™, Net3™, ArtNet and Avab UDP output protocols
- Show import from Obsession®, Express™, Expression®, Emphasis®, Congo® and Strand 500/300 Series via ASCII
- In/Out: local DMX512 x 2, MIDI In/Out, Networking DMX, MIDI, SMPTE, SERIAL and contact closure via Net3 Gateways
- Virtual Media Server function for pix mapped effects, images and animations
- Support for multiple languages, including English, German, Spanish, French, Italian, Japanese, Korean, Russian and Chinese (Simplified and Traditional)

**ORDERING INFORMATION**

**Ion**

MODEL	DESCRIPTION
Ion 1000	Ion Console, 1024 outputs
Ion 1500	Ion Console, 1536 outputs
Ion 2000	Ion Console, 2048 outputs
Ion 2500	Ion Console, 2560 outputs
Ion 3000	Ion Console, 3072 outputs
Ion RPU - 2K	Ion Remote Processor Unit, 2048 outputs
Ion RPU - 3K	Ion Remote Processor Unit, 3072 outputs
Ion 500 Up	512 Output Upgrade
Eos - CSK	Eos Client Software Kit

Two universes of DMX output are available at the console via 5-pin XLR, or all universes may be distributed with ETCNet2 DMX Nodes or Net3 DMX/RDM Gateways.

**Ion Accessories**

MODEL	DESCRIPTION
Net3 RFR	Net3 Radio Focus Remote
Net3 RFR-RX	Net3 Radio Focus Remote, Receiver Only
Net3 RFR-TX	Net3 Radio Focus Remote, Transmitter Only
FADW 1x20	Universal Fader Wing - 1x20
FADW 2x10	Universal Fader Wing - 2x10
FADW 2x20	Universal Fader Wing - 2x20
Net3 RVI	Net3 Remote Video Interface
Net3 RVI 3	Net3 Remote Video Interface
19" LCD-T	19" Single-touch display
19" LCD	19" Flat-screen display

Eos Offline Editor software for Mac and PC platforms is available for download from [www.etconnect.com](http://www.etconnect.com)

**SHIPS WITH:**

- Dust Cover
- Mouse and Mousepad
- External Alpha-numeric keyboard



## SPECIFICATIONS

## SYSTEM CAPACITY

- 1024, 1536, 2048, 2560 or 3072 Outputs/Parameters
- 10,000 Channels
- 10,000 Cues
- 999 Cue Lists
- 4 x 1000 Palettes (Intensity, Focus, Color, Beam)
- 1000 Presets (all palette)
- 1000 Groups
- 1000 Effects (relative, absolute or step)
- 1000 Macros
- Supports two external DVI monitors or one VGA monitor at 1280x1024 minimum resolution, with optional touchscreen control
- Hard Disk
- USB ports for flash drives, pointing devices, keyboards

## DISPLAY FUNCTIONS

- All show data may be viewed on one or two external monitors. Views may be expanded across both from easily accessed front panel controls
- The Central Information Area accesses:
  - Browser
  - File Management
  - System Defaults
  - Show Defaults
  - Desk Defaults
  - Network Configuration
  - Show Data Utilities
  - Printing
  - Record Target Lists
  - Patch functions
  - Help
  - Hue and Saturation Color Picker
  - Electronic alpha keyboard
  - Command Line
  - Selected Cue
  - Error messages
  - Parameter Categories and individual parameters
  - Filters
- Channel Displays
  - Live channel or table view
  - Blind cue, palette, preset and submaster views, in list, channel, table and spreadsheet formats
  - User configurable to show required parameters and/or parameter categories (IFCB)
  - Flexi-channel to determine which channels to display
  - Zcom allows user to define how many channels are viewed
  - Color coded intensity levels indicate direction of move
  - Color coded non-intensity levels indicate change from previous state
  - Graphic differentiation of moving lights, single parameter devices, unpatched channels and deleted channels

## SPECIFICATIONS

- Magic Sheets
  - User-definable interactive views
  - Images and symbols may be imported
- Patch Views
  - Patch by channel
  - Patch by address
  - Patch by device (RDM)
  - Assign proportional patch value, curve, preheat value for intensity
  - Swap pan and tilt
  - Invert pan and tilt
  - Custom fixture editor
- Playback Status Display
  - Graphic representation of cue list status, past and future cues
  - Expanded cue list for selected cue
- Cue List Index
- Effect Editor
- Group Editor
- Park Display
- Fader Display
  - Isolates display to active output by fader contribution
- Dimmer Monitoring

## PLAYBACK CONTROLS

- Master Playback crossfade pair with two 60mm potentiometers, Go, Stop/Back and Load buttons
- Grand Master with Blackout
- Playback fader controls include:
  - Timing Disable
  - Off
  - Release
  - Manual Override
  - Rate
- A maximum of 200 playback faders and 300 submasters (additive or inhibitive) via optional fader wings
- A total of six universal fader wings can be attached

## MOVING LIGHT CONTROLS

- 4 rotary encoders with toggle state, which posts selected parameter to command line
- Labeling and current parameter value in integral LCD display
- Focus, Color, Form, Image, Shutter and Custom paging controls
- Flip
- Parameters selectable by category (IFCB), sub-category (Form, Image, Shutter) or individually for command line actions, such as setting discrete timing



## SPECIFICATIONS

## MANUAL CONTROL

- Channel selection from keypad and/or virtual direct selects
- Lists constructed with +, -, thru
- Intensity set with level wheel, keypad, "full" and "out"
- Select Last recalls last sequential channel selection set
- Ordered groups
- Offset, including even, odd, random, reverse
- Fan
- Sneak
- Remainder Dim and restore
- User definable home
- Home by parameter, parameter category or all non-intensity parameters
- Capture
- Park at level
- Scaled park for temporary percentage adjustment
- Recall from and Copy to commands
- About provides detailed view of selected channels or record targets
- Undo manual control, record, update and delete operations
- Highlight and Lowlight, with optional Rem Dim
- Lamp controls to strike, douse, calibrate fixtures

## PROGRAMMING FEATURES

- Channel Functions
  - Non Intensity parameters set via numeric entry or pageable encoders
  - Color matching to gel selector or Hue/Saturation color picker
  - Apply discrete time and delay per channel parameter
- Palette and Preset Functions
  - Record, Record Only and Update functions
  - Toggle display to absolute data
  - Up to 99 decimal values may be inserted between any two whole numbers
  - Filter states to refine contents of record targets
  - Selective store to refine contents of record targets
- Effects
  - Create live or blind
  - Pattern based relative dynamic effects
  - Absolute effects
  - Step effects
  - Cycle time, trail and grouping determine channel distribution and behavior when moving through effect
  - Duration of infinite, a specific amount of time or number of passes through pattern
  - Effect attributes to modify basic behavior
  - Cue Level Overrides to modify size, rate and form
  - Multi-part effects easily synchronize parameter activity
  - Er try mode determines how parameters enter effects
  - Exit mode determines how parameters depart effects
- Cue Recording
  - Cue List HTP/LTP Intensity
  - Cue List Independent
  - Cue List Assert
  - Record manual values or channels in use
  - Autoplay back recorded cues

## SPECIFICATIONS

- Referenced mark instructions or auto-mark
- Block at cue or parameter level
- Assert at cue or parameter level
- Allfade flag
- Follow or hang times
- Out of sequence link
- Loop functions
- Preheat enable
- Cue level parameter category timing
- 20 part multi-part cues with default part assignment
- Cue level rate override
- Up to 99 decimal cues between each two whole numbered cues
- Execute List
  - Triggers macros with delay
  - Triggers go of other cues
  - Syncs go to multiple cue lists
  - Show control triggers
  - Analog triggers
- Update and Update Trace functions
- Undo record and delete
- Submasters
  - Additive, effect or inhibitive
  - Bump button timing to fade up, dwell and fade out
  - Assert/Channel select button
  - Exclusive or Shielded mode
  - Faders as progress controller or intensity master
  - Bump button to mark NPs
  - Independent status
- Curves
  - Assignable in patch to modify dimmer output ramp
  - Assignable at cue or cue part level to modify intensity crossfade profile or non-intensity parameter ramping

## INTERFACES

- 2 DMX-512 Ports (RDM ready)
- Ethernet (ETCNet2™, Net3™, Artnet and Avab UDP output protocols)
- Contact Closure triggers via D-Sub connector
- DVI video connectors supports two external DVI displays (1280x1024) with optional touch screen control
- 1 - VGA connector
- USB Multi-purpose (5 ports)
- Phone Remote
- Net 3 Radio Focus Remote
- MIDI In/Out (Timecode, Show Control)
- Additional MIDI Timecode, Show Control through Gateway
- SMPTE Timecode through Gateway
- Additional contact closure (12 analog inputs, 12 SPDT contact outputs, RS-232) through Gateway

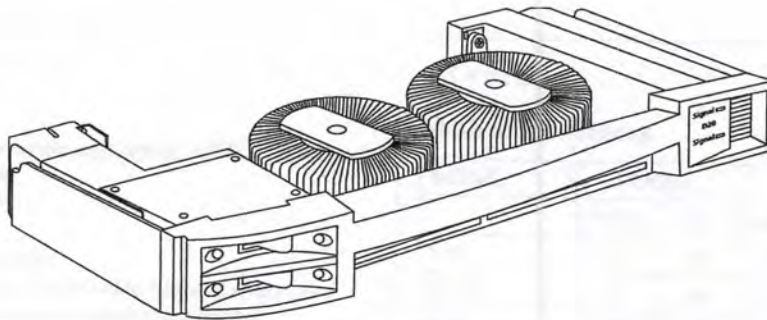
## ELECTRICAL

- AC input (100-240V at 50/60 Hz)
- 2 amps at 120V or 1 amp at 240V maximum power consumption



100V 120V

Standard Series



**GENERAL INFORMATION**

The Standard Dimmer Module is designed for use in both Sensor®+ and Unison® Dimming Series modular rack enclosures. Standard Dimmer Modules provide cost-effective digital forward phase angle dimming for standard loads such as incandescent, low voltage, quartz, neon, cold-cathode and 2 and 4-wire fluorescent ballasts. The patented, high-density, dual modules feature modular installation and removal, fully magnetic circuit breakers and standard or enhanced risetime toroidal filters.

**APPLICATIONS**

- Incandescent lighting
- Low voltage lighting
- Quartz lighting
- Neon lighting
- Cold Cathode lighting
- 2-wire Fluorescent ballast
- 4-wire Fluorescent ballast

**FEATURES**

- Two 1.8 or 2.4kW dimmers per module
- Standard or Enhanced risetime toroidal filters
- High-density modular assembly
- Die-cast aluminum chassis
- Fully magnetic circuit breakers

**GENERAL**

- 100,000A Short Circuit Current Rating (SCCR)
- UL and cUL LISTED

**ORDERING INFORMATION**

**100-120V Standard Dimmer Modules**

MODEL	DESCRIPTION
D15	Dual 15A Dimmer Module, 350µS
D15E	Dual 15A Dimmer Module, 500µS
D20	Dual 20A Dimmer Module, 350µS
D20E	Dual 20A Dimmer Module, 500µS
AFM	Air Flow Module

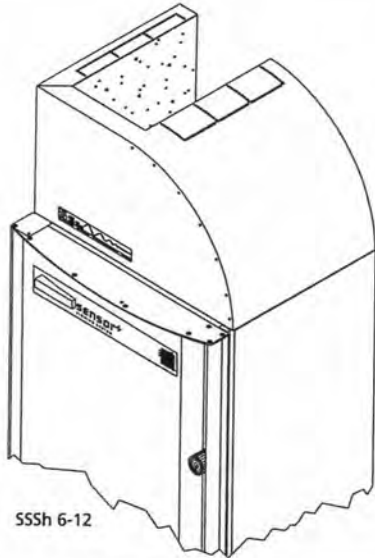
**Compatible Systems**

MODEL	DESCRIPTION
<b>INSTALLATION RACKS*</b>	
SR3	Sensor3 Installation racks
SR+	Sensor+ Installation racks
SR	Sensor Installation racks
<b>TOURING RACKS</b>	
SP3	Sensor+ 24 module Touring Rack (48-20A dimmers)
SP+	Sensor+ 48 module Touring Rack (96-20A dimmers)
<b>PORTABLE PACKS</b>	
SP3	Sensor3 Portable Packs
SP+	Sensor+ Portable Packs

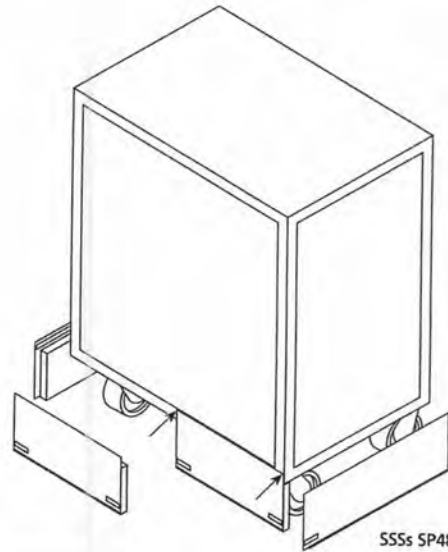
\*Rack enclosures also available for 230CE and 240 Volt applications







SSSh 6-12



SSSs SP48

**GENERAL INFORMATION**

Sensor Sound Suppression Hoods (SSSh) and Skirts (SSSs) reduce fan noise for acoustically sensitive installations.

**APPLICATIONS**

- Any Sensor rack installation
- Television/Video Studios
- Concert Halls
- Installations where the rack is located in close proximity to the stage

**GENERAL**

- Easy to install
- Does not interfere with rack cooling
- Hoods for Installation Racks
- Skirts for Touring Racks

Note: Be sure objects on a wall or ceiling do not impede the free flow of cooling air from the hood exhaust openings.

**ORDERING INFORMATION**

**Sound Suppression Hoods**

MODEL	DESCRIPTION
SSSh 6-12	Sound Suppression Hood for Sensor SR6 and SR12 Racks
SSSh 24-48	Sound Suppression Hood for Sensor SR24 and SR48 Racks

**Sound Suppression Skirts**

MODEL	DESCRIPTION
SSSs SP24	Sound Suppression Skirt for Sensor 24 Module Touring Rack
SSSs SP48	Sound Suppression Skirt for Sensor 48 Module Touring Rack

### SPECIFICATIONS

#### Sensor Sound Suppression Hood (SSSh)

##### GENERAL

- Reduces the sound produced by the Sensor ventilation fan by surrounding it with an enclosure lined with sound absorbing foam

##### MECHANICAL

- Constructed of steel
- Finished in a light gray (5C) fine-textured baked powder coat
- Interior of hood is fitted with a 1.25 (32mm) Soundmat PB-embossed foam insulation
- Designed to be installed without the use of tools
- Velcro/adhesive strip mounting method

### SPECIFICATIONS

#### Sensor Sound Suppression Skirt (SSSs)

##### GENERAL

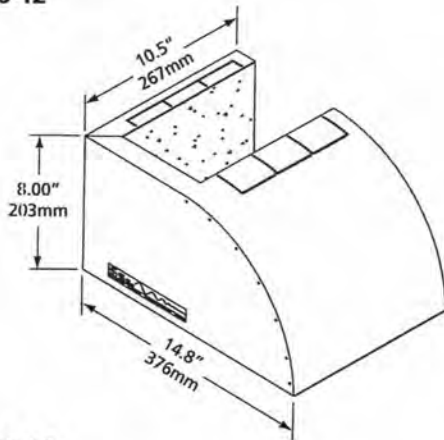
- Reduces fan noise by surrounding the fan with an enclosure lined with sound absorbing foam

##### MECHANICAL

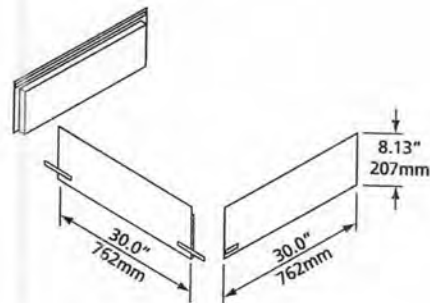
- Constructed of steel
- Finished in a black fine-textured baked powder coat
- Lined with a 1.25 (32mm) Soundmat PB-embossed foam insulation
- Designed to be installed without the use of tools
- Velcro/adhesive strip mounting method
- Skirt may be stored in the patch panel area of the rack.

### PHYSICAL

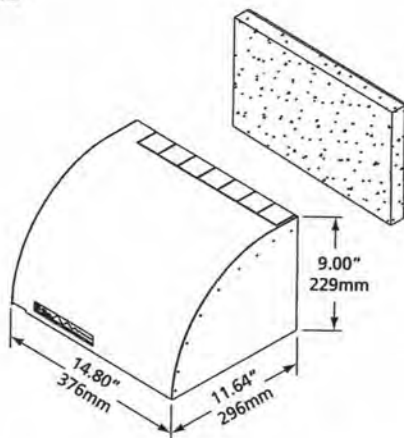
#### SSSh 6-12



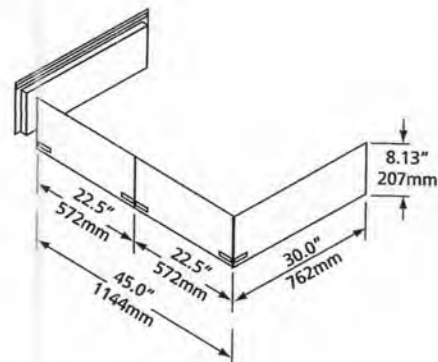
#### SSSs SP24



#### SSSh 24-48



#### SSSs SP48

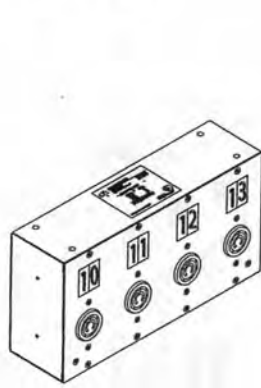


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 Sensor® products protected by one or more of the following U.S. Patent Numbers 5,323,088, 5,352,088, 7,233,112, 7,019,469, 6,849,943, and 6,002,563; European Number 060333372; German 69203609.

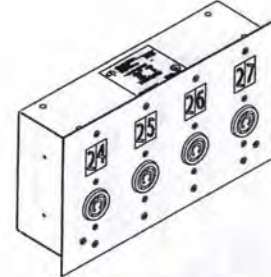
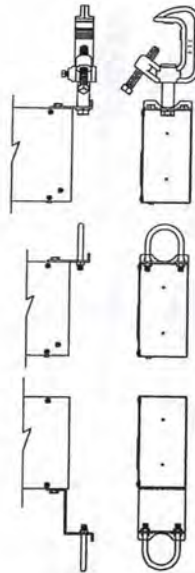




Distribution Series



9100 SERIES



9200 SERIES

GENERAL INFORMATION

Outlet boxes are designed for surface or recess mounting in theatres, television studios and other spaces for distribution of lighting circuits.

FEATURES

- Surface and recess mounting available
- 1, 2, 3, 4, 5, 6, and 8 connectors
- Panel mount connector Options:
  - Edison (20A)
  - Stage Pin (20, 60 and 100 amp)
  - Grounded Twist-Lock (20A)
- Over- and Under-hung U-bolt and C-clamp pipe mount options available
- Listed by a nationally recognized test lab (NRTL)

PHYSICAL

- Fabricated from 18-gauge steel with 16-gauge covers and 14-gauge end caps
- Finished with black fine-textured, scratch-resistant powder coat
- 1.25" or .75" labels with white numbers on black background (sized to match product)
- Pin outlets spaced on 1.25" or 3" centers
- Edison or Twist-Lock outlets spaced on 3" centers only

	# of Outlets	Back box Dimensions	9100 Panel Widths	9200 Panel Widths
PIN 1.25" Centers	1	3" W x 6.25" H x 3.25" D	3"	4"
	2, 3, 4	6" W x 6.25" H x 3.25" D	6"	7"
	5, 6	9" W x 6.25" H x 3.25" D	9"	10"
	8	12" W x 6.25" H x 3.25" D	12"	13"
Other 3.00" Centers	1, 2	6" W x 6.25" H x 3.25" D	6"	7"
	3, 4	12" W x 6.25" H x 3.25" D	12"	13"
	5, 6	18" W x 6.25" H x 3.25" D	18"	19"
	8	24" W x 6.25" H x 3.25" D	24"	25"

ORDERING INFORMATION

Standard Surface Mount Outlet Boxes

Outlet Qty.	Edison	Pin 3"	Pin 1.25"	Twistlock	MultiPin
1	9101A	9101B	9101BD	9101C	9101V
2	9102A	9102B	9102BD	9102C	9102V
3	9103A	9103B	9103BD	9103C	9103V
4	9104A	9104B	9104BD	9104C	
5	9105A	9105B	9105BD	9105C	
6	9106A	9106B	9106BD	9106C	
8	9108A	9108B	9108BD	9108C	

To any 9100 series box, add "-U" (U-Bolt), "-OU" (Offset U-Bolt), or "-C" (C-clamp) after the connector type to indicate pipe mount option. For example, 9104B-U indicates surface mount, 4-outlet box with stage pin connectors and U-bolt pipe mounting kit.

Standard Recessed Mount Outlet Boxes

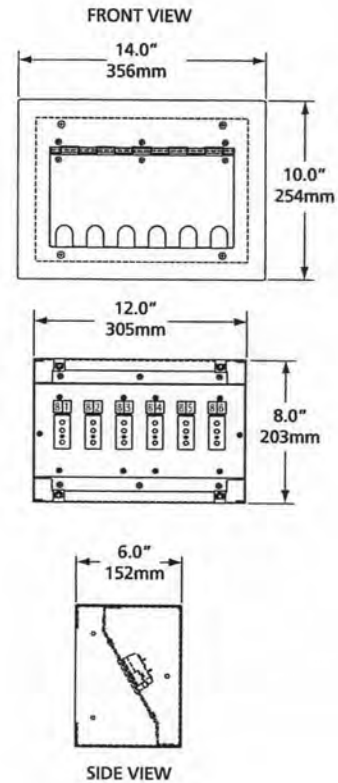
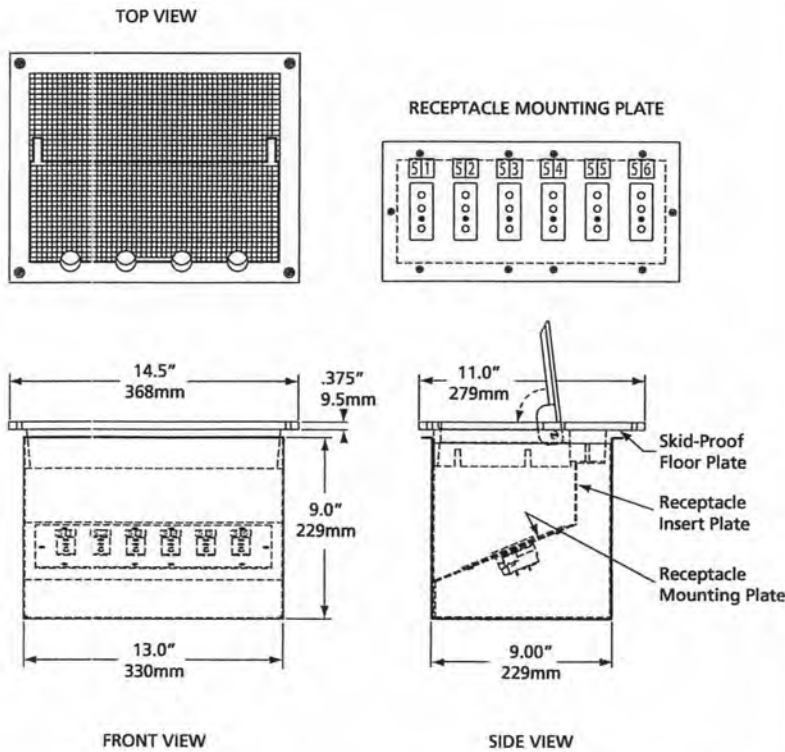
Outlet Qty.	Edison	Pin 3"	Pin 1.25"	Twistlock
1	9201A	9201B	9201BD	9201C
2	9202A	9202B	9202BD	9202C
3	9203A	9203B	9203BD	9203C
4	9204A	9204B	9204BD	9204C
5	9205A	9205B	9205BD	9205C
6	9206A	9206B	9206BD	9206C
8	9208A	9208B	9208BD	9208C

For outlets not listed, use manufacturer's part number (must be UL listed).





Distribution Series



GENERAL INFORMATION

Floor and Wall Pockets are designed for recess mounting in floors and walls of theatres, television studios and other spaces for distribution of lighting circuits.

FEATURES

- 1, 2, 3, 4, 5, and 6 connectors
- Connector Options:
  - Duplex Edison (20A)
  - Stage Pin (20, 60 and 100 amp)
  - Grounded Twist-Lock (20A)
- Listed by a nationally recognized test lab (NRTL)

FLOOR POCKET

- 3/8" cast iron hinged cover with a non-skid tread pattern and cable notches
- .75" labels with white numbers on black background

WALL POCKET

- Fabricated from 18-gauge steel with 16 gauge covers
- Finished with black fine-textured, scratch-resistant powder coat
- .75" labels with white numbers on black background

ORDERING INFORMATION

Standard Floor Pockets

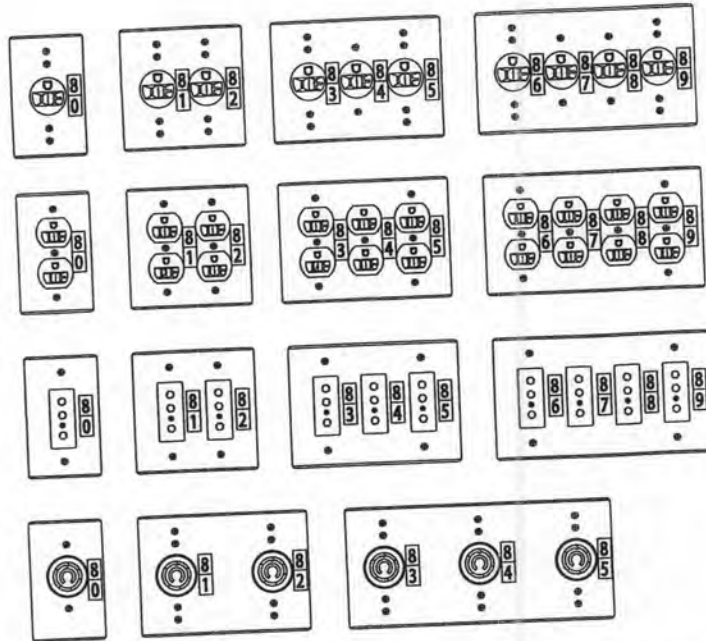
Outlet Qty.	Edison	Pin	Twistlock
1	8501AD	8501B	8501C
2	8502AD	8502B	8502C
3	8503AD	8503B	8503C
4	8504AD	8504B	8504C
5	8505AD	8505B	
6		8506B	

Standard Wall Pockets

Outlet Qty.	Edison	Pin	Twistlock
1	9601AD	9601B	9601C
2	9602AD	9602B	9602C
3	9603AD	9603B	9603C
4	9604AD	9604B	9604C
5		9605B	
6		9606B	

For outlets not listed, use manufacturer's part number (must be UL listed).

CUSTOM DISTRIBUTION BOXES ARE AVAILABLE. CONTACT ETC.  
PLEASE SPECIFY CIRCUIT NUMBERS FOR EACH BOX OR SERIES OF BOXES WHEN ORDERING.



### GENERAL INFORMATION

An alternative to surface and recessed outlet boxes, NEMA Panels are designed for recessed mounting in discreet small spaces or existing back boxes – balcony rails and orchestra pits.

NEMA panels are designed for use with customer-supplied industry standard electrical back boxes.

#### FEATURES

- 1, 2, 3, and 4 connectors
- 20A Connector Options:
  - Edison
  - Stage Pin
  - Grounded Twist-Lock
- Listed by a nationally recognized test lab (NRTL)

#### PHYSICAL

- Fabricated of .125 aluminum
- Finished with fine-textured, scratch-resistant, black powder coat
- Custom finishes available
- 3/4" labels with white numbers on black background
- Surface mount back box available (3.5" deep)

### ORDERING INFORMATION

#### Standard NEMA Connector Panels

Model #	Description	RACO Back Box Part #
9801A	1 single Edison connector	690
9802A	2 single Edison connectors	691
9803A	3 single Edison connectors	692
9804A	4 single Edison connectors	693
9801AD	1 Duplex Edison connector	690
9802AD	2 Duplex Edison connectors	691
9803AD	3 Duplex Edison connectors	692
9804AD	4 Duplex Edison connectors	693
9801B	1 Stage Pin connector	690
9802B	2 Stage Pin connectors	691
9803B	3 Stage Pin connectors	692
9804B	4 Stage Pin connectors	693
9801C	1 Twistlock connector	690
9802C	2 Twistlock connectors	692
9803C	3 Twistlock connectors	694

**CUSTOM DISTRIBUTION BOXES ARE AVAILABLE. CONTACT ETC.**  
**PLEASE SPECIFY CIRCUIT NUMBERS FOR EACH BOX OR SERIES OF BOXES WHEN ORDERING.**

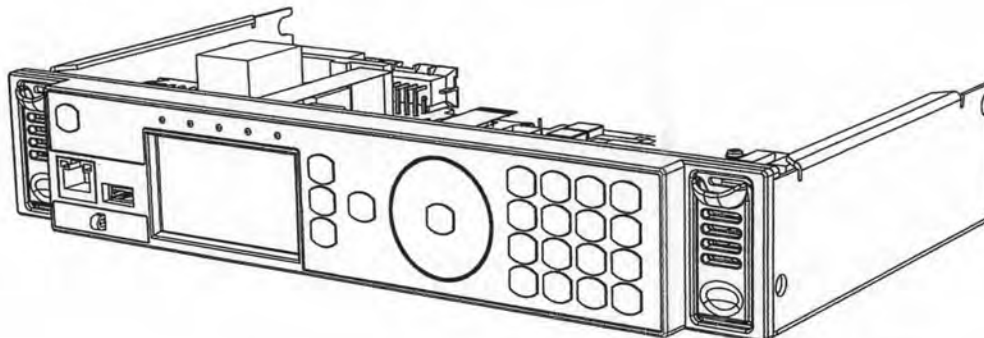


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CE 100V 115/120V 230/240V



GENERAL INFORMATION

The Sensor®3 Control Electronics Module (CEM3) is ETC's new platform for power control. CEM3 manages priority based Ethernet, DMX and Preset control for ultra smooth 16 bit dimming, fast activation of relays, and instant on support for emergency lighting systems. Energy usage, system status, and quick changes to circuit setup can be accessed at its intuitive face panel or remotely at the lighting console.

APPLICATIONS

- Professional and educational theatre
- Production studios
- Performance halls
- Retail and dining
- Houses of worship
- High density architectural dimming
- Touring and Portable dimming

FEATURES

- **Net3 Uplink** - Connect the Net3 Lighting network using the ethernet jack on the front of the control module
- **USB QuickLoad** - Backup system settings and upgrade software
- **Point of Control Interface** - Easy to read systems display shows the user pertinent system information
- **Live Control Override** - For presets, set level, and dimmer check
- **Local Menu** - Access to set up features and control directly at the control processor
- **Backup Looks** - 64 Presets with programmable fade times and priority allows for take control, pile on, or live control failover sources to insure that your show will never go black!
- **Connect to Console** - System and rack feedback to live control desks is standard (available Summer 2011)
- **Quick Setup Wizard** - Builds a simple system in a single step
- **Advanced Features (AF)** - Adds dimmer-specific reporting
- **ETC Dimmer Doubling™** - Increase your individually controllable fixtures without adding extra circuits (supported only at 60hz)
- **Ride Thru** - Optional accessory which holds up the processor electronics through a power outage for a few seconds
- **Battery Pack** - Optional accessory which holds up the processor electronics through a power outage for many minutes

ORDERING INFORMATION

Control Module

MODEL	DESCRIPTION
CEM3	CEM3 Power Controller

Compatible Systems

MODEL	DESCRIPTION
<b>SENSOR3 INSTALLATION RACKS</b>	
SR3-48/SR3AF-48	Sensor3 48 module installation racks
SR3-24/SR3AF-48	Sensor3 24 module installation racks
SR3-12/SR3AF-12	Sensor3 12 module installation racks
SR3-6/SR3AF-6	Sensor3 6 module installation racks
HSR3/HSR3AF-	Sensor3 230V installation racks
SR3AFN	Sensor3 GFCI installation racks
ESR3AFN	Sensor3 CE installation racks
<b>SENSOR3 TOURING RACKS</b>	
SP3	Sensor3 small frame touring rack
SP3	Sensor3 large frame touring rack
<b>SENSOR+ PORTABLE PACKS</b>	
SP3-2420	Sensor3 12 module portable pack
SP3-1220	Sensor3 6 module portable pack

CEM3 Accessories

MODEL	DESCRIPTION
RK	Retrofit kit for Sensor standard and AF racks



SPECIFICATIONS

GENERAL

- Universal Control Electronics Module
- Direct Ethernet connectivity for dimmer levels, feedback and system control
- UL, cUL LISTED and CE Marked

PHYSICAL

- Formed steel body
- Die cast face panel finished with textured epoxy paint
- Slide-in module installs and removes without tools
- Spring-loaded module release
- Airflow sensor to ensure adequate airflow

ELECTRICAL

- Accepts:
  - Single phase
  - Three phase WYE or Delta
- Universal Voltage range 91-139V and 181-259 VAC\*
- Line feed frequencies from 47-53Hz and 57-63Hz
- Automatic frequency variation compensation
- Two configurable DMX512 inputs (2500V opto-isolated)

\*Note: Suggested max main transformer tap 135V or 255V to allow for line fluctuation.

CONTROL FEATURES

- Eight-line by 20-character graphical LCD for system configuration, live control, and status display
- Full number pad for quick access to dimmers
- Shortcut buttons for Setup, About, and live control
- Five status LED indicators: Power, Network activity, DMX-A DMX-B, and Panic
- 64 user-programmable presets
- Single Panic circuit with flexible programming (Spring 2011)
- Replacement CEM3 automatically loads rack configuration
- Configuration backups saved on USB or network
- Dimmer outputs regulate to maintain constant power ±1V
- Individual output scale voltage settings for load wiring compensation
- Selectable Firing Modes: Normal (forward phase, Reverse Phase, Dimmer Doubled, Sinewave, and Fluorescent
- Control Modes: Dimmed, Switched, Latch/Lock, Always On, and Off
- Selectable Dimmer Output Curves: Linear, Modified Linear, Square, Modified Square, and Sensor 2.0, and five custom curves
- 16-Bit fade resolution (> 30,000-Step Resolution per 1/2 cycle)
- Selectable Data Loss Behavior

FEEDBACK

- All Sensor racks with CEM3 modules include basic system diagnostic reporting
- Standard rack feedback includes: DMX input status, Rack power status, and Rack temperature
- Advanced Features (AF) provides dimmer specific status and load feedback (requires AF dimmer rack and AF dimmer modules)

LOCAL PROGRAMMING

LOCAL LIVE CONTROL

- Set Levels, Preset Activation, and Dimmer Check

STATUS (ABOUT)

- All modules: module type, mode, control source, and module location, overtemp
- AF modules: module removed, breaker trip, recorded and actual load
- Rack: temperature, rack type, Run Hours
- Network: IP address, SubNet mask, Gateway and active link
- Rack Data Ports: status for DMXA and B, and sACN
- About Rack Power: frequency, voltage per phase, and voltage headroom
- About Software: version number

SETUP

- Setup dimmer: Firing Mode, Curve, Scale Voltage and Name
- Patch
- Set rack priority per DMX port
- Data Loss Behavior: Hold last Look, Wait and fade, Play Preset
- Name the rack (using ACN)
- Custom dimmer numbering
- Get Config and save Config to USB

PHYSICAL

CEM3 Dimensions

MODEL	HEIGHT		WIDTH		DEPTH	
	inches	mm	inches	mm	inches	mm
CEM3	2.06	52	11.80	300	7.00	178

CEM3 Weight

MODEL	WEIGHT		SHIPPING WEIGHT	
	lbs	kgs	lbs	kgs
All CEM3	3.5	1.6	6.2	2.8

Maximum BTU Production per Module

MODEL	BTUS	WATTS	EFFICIENCY
All CEM3	<10	<4	N/A



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SPECIFICATIONS

GENERAL

- Provides power for a single processor for at least 6 seconds
- UL and cUL LISTED
- CE Marked

FUNCTIONAL

- Designed for use in all Sensor3 installation Racks
- Compatible with CEM3
- Seamless transfer from charge to power output without user intervention
- Recharges during normal power operation
- Prevents the Processor from rebooting when power returns
  - Allows for immediate control of the full system as soon as normal power is present

MECHANICAL

- Mounts inside the Sensor3 rack
- Required connections made using included two-wire harness with no additional wiring required

ELECTRICAL

- Seamless transfer to battery power upon loss of incoming line power
- Provides 24vDC power for control processor during power loss
- Provides backup power for at least 6 seconds during power loss
- Automatically recharges from power feed
- Charging voltage 10.6V +/- 0.5 volts
- Factory provided connectors for wiring terminations
- UL and cUL LISTED, CE Marked

THERMAL

- Ambient room temperature: 0-40°C / 32-104°F
- Ambient humidity: 30-90% non-condensing.

PHYSICAL

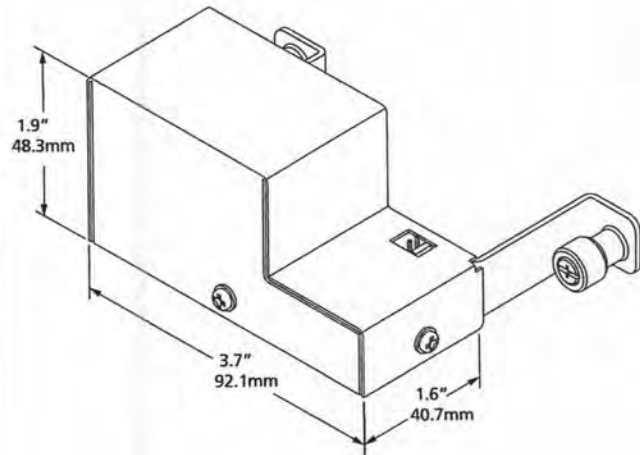
Sensor3 RideThru Option Dimensions\*

MODEL	HEIGHT		WIDTH		DEPTH	
	inches	mm	inches	mm	inches	mm
SR3-RTO	1.9	48.3	3.7	92.1	1.6	40.7

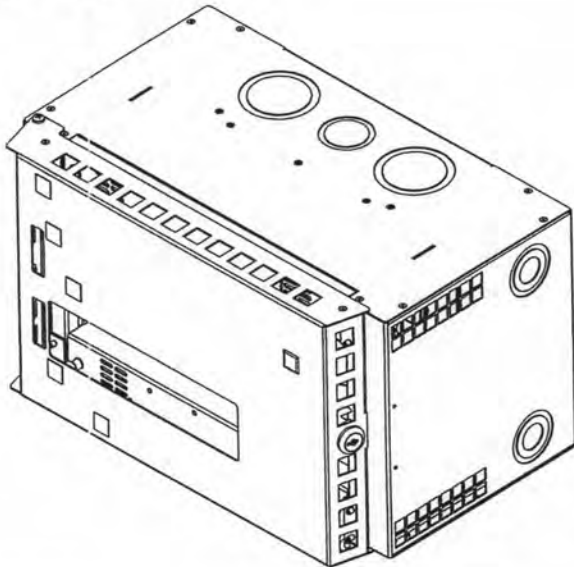
Sensor3 RideThru Option Weights\*

MODEL	WEIGHT		SHIPPING WEIGHT	
	lbs	kgs	lbs	kgs
SR3-RTO	0.8	0.4	1.1	0.5

\*Weights and dimensions typical



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GENERAL INFORMATION

With the ERn enclosure, you choose the features you need for your facility's unique lighting and building control requirements: processing, station support, power options, and networking. By isolating core components as a module, we optimize the system's longevity and performance. Compact external control enclosures available in two sizes; ERn2 and ERn4.

APPLICATIONS

- Churches
- Hotels
- Resorts
- Convention Centers
- Theatres
- Schools
- Restaurants
- Theme Parks
- Cruise Ships

FEATURES

- LinkConnect – using Echelon® LonTalk® protocol with LinkPower, the two wire topology-free system gives you the freedom to put station where you need them
- NetConnect – making use of low-cost, easy to install Cat5/5e with PoE to connect touchscreen stations and other devices to a networked Paradigm System
- RideThru® – Backup processor power for at least 10 seconds to accommodate short term power loss
- BatteryPack® – Backup processor power for at least 90 minutes for long term power loss
- Optional 5 port Power Over Ethernet (PoE) Ethernet Switch\*
- Optional Redundant Rack Power Supply\*
- Wall-mount or 19" equipment rack-mount

\*Option module required

ORDERING INFORMATION

100-120 Volt ERn Enclosure

MODEL	DESCRIPTION
ERn2-W-120*	2-slot wall mount 100-120V Control Enclosure
ERn2-RM-120*	2-slot rack mount 100-120V Control Enclosure
ERn4-W-120*	4-slot wall mount 100-120V Control Enclosure
ERn4-RM-120**	4-slot rack mount 100-120V Control Enclosure

\*Also available in 230V CE and 240V UL

\*\* Also available in 240V UL

Control Module Options

MODEL	DESCRIPTION
P-ACP	Paradigm Architectural Control Processor

Option Modules

MODEL	DESCRIPTION
P-SPM	Paradigm Station Power Module
P-REP*	Paradigm Station Repeater Module
P-DREP*	Paradigm Dual Station Repeater Module
ERn-BM	ERn Blank Module

\*For use with ERn4 only

Options and Accessories

MODEL	DESCRIPTION
ERn-Net*	ERn Ethernet Switch with Power over Ethernet
ERn-RPS	ERn Redundant Power Supply
URTO	Unison RideThru Option
UBPO*	Unison Battery Pack Option

\*For use with wall mount ERn enclosures only





## SPECIFICATIONS

## GENERAL

- External Processing Enclosure designed for one (ERn2) or two (ERn4) control processors plus options and accessories
- Full 2-year Warranty

## MECHANICAL

- 18-gauge formed steel construction
- Fine-texture, scratch resistant, epoxy paint
- Wall-mount and 19" rack-mount variants
- Convection Cooled
- Locking door with limited access to control processor
- Tool-free module removal and installation
- 19" equipment rack-mount offers connectorized rear panel for all wiring connections
- Wall-mount offers front access wiring terminations
- Top, bottom and side knockouts for conduit entry

## ELECTRICAL

- External control enclosure rated for 100-120 Volts, single phase configurations, 3.5 Amps maximum draw
- 230 Volt CE and 240 Volt UL, single phase configurations available
- Completely pre-wired by the manufacturer
- Designed to support the following wire terminations
  - AC (single phase)
  - 24VDC (2-16AWG)
  - Echelon® LinkPower®
  - (2) configurable DMX512A ports
  - RS232 Bi-directional serial
  - CAT5/5e UTP Ethernet
  - Contact I/O, 4in/4out (14-26AWG)
    - Contact output rated 1A@30vDC
- Contractor supplied input and control wiring
- Factory provided connectors for wiring terminations
- UL and CUL LISTED

## THERMAL

- Ambient room temperature: 0-40°C / 32-104°F
- Ambient humidity: 10-90% non-condensing

## RACK OPTIONS AND ACCESSORIES

## CONTROL PROCESSORS

- Paradigm® Architectural Control Processor (P-ACP)

## STATION POWER MODULES

- Station Power Module (P-SPM)
  - Provides Echelon LinkPower for up to 32 Stations
  - Provides 24V auxiliary power for interface and touchscreen stations
  - Provides 1640 feet (500 meters) of station bus from the ERn enclosure
- Station Bus Repeater. (P-REP)
  - Extends Station bus length by an additional 1640 feet (500 meter) segment
  - Accommodates up to 30 additional stations (maximum 62 stations per Processor)
  - Wall and rack mount versions available for mid-span insertion
- Station Bus Dual Repeater (P-DREP)
  - Extends the station Network bus by two additional 1640 feet (500 meter) segments
  - Accommodates up to 30 additional stations (maximum 62 stations per Processor)
  - Wall and rack mount versions available for mid-span insertion

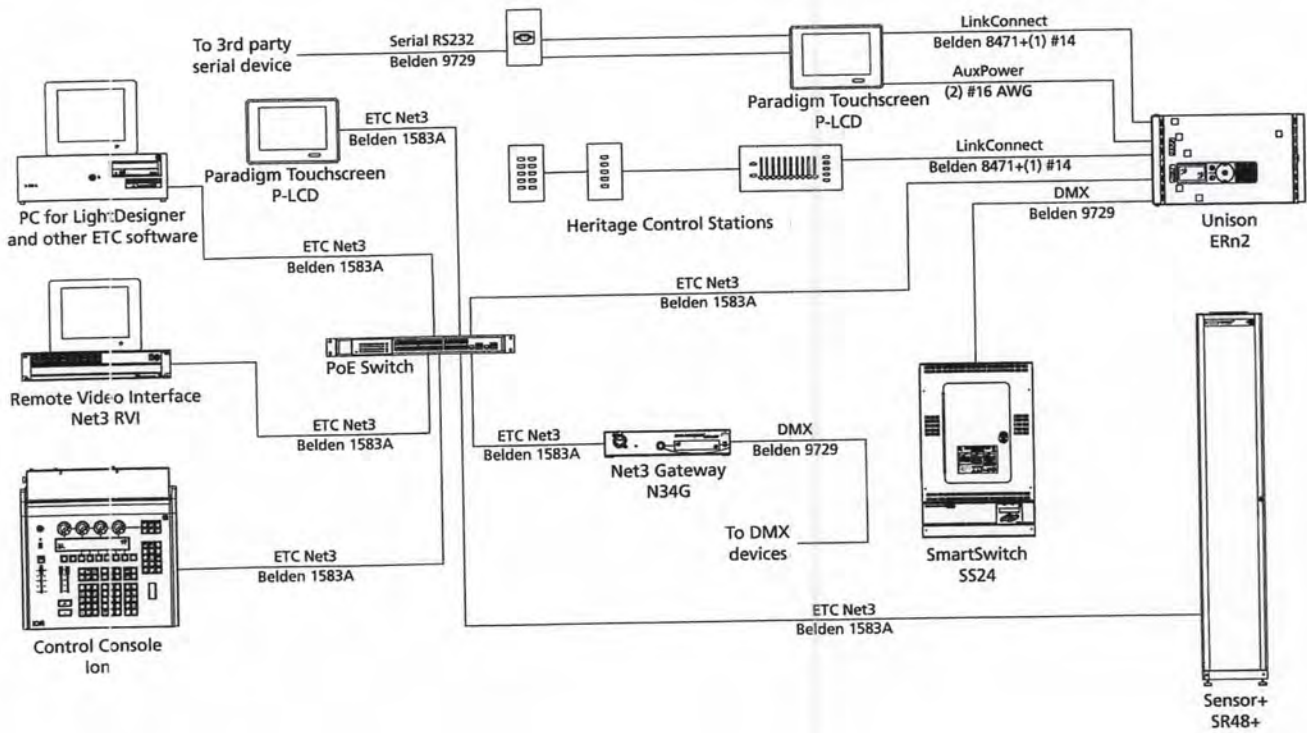
## OPTION MODULES

- Ethernet Switch (ERn-NET)
  - Five port Ethernet switch with four ports supplying Power over Ethernet (PoE)
  - 100BaseTX 802.3af PSE compliant
  - For use in wall mount ERn only
- Redundant Power Supply (ERn-RPS)
  - Seamless power for control processors upon failure or removal of the primary power supply
  - Front panel indicator for RPS status

## ACCESSORIES

- Unison RideThru Option (URTO)
  - Short term power back-up of control electronics for at least 10 seconds during short power outages
  - Automatically engages when power is lost
  - Recharges during normal power operation
- Unison Battery Pack Option (UBPO)
  - Long term power back-up of control electronics for at least 90 minutes
  - Automatically engages when power is lost
  - Recharges during normal power operation

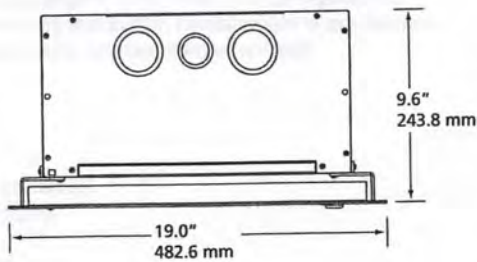
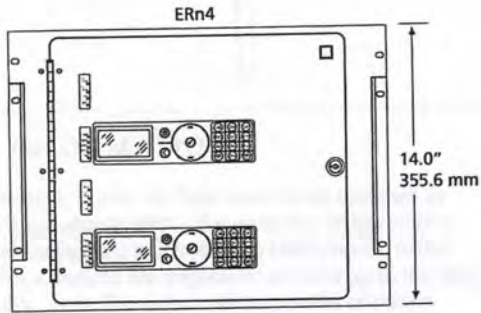
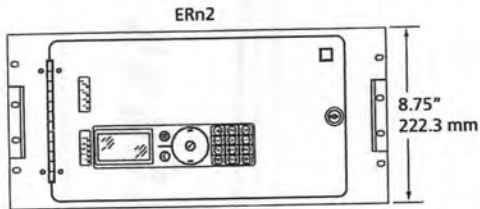
TYPICAL SYSTEM RISER – PARADIGM CONTROL



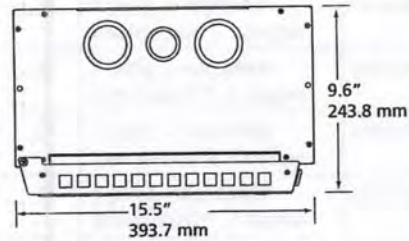
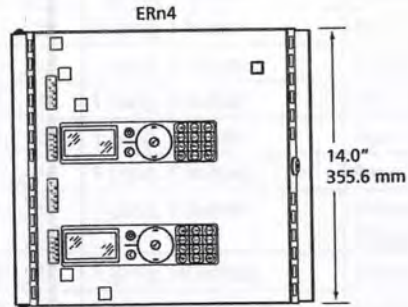
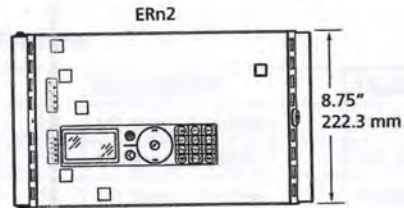


PHYSICAL

ERn Rack Mount



ERn Wall Mount



ERn Dimensions\*

MODEL	HEIGHT		WIDTH		DEPTH	
	inches	mm	inches	mm	inches	mm
ERn2-W-120	8.75	223	15.5	394	9.6	244
ERn2-RM-120	8.75	223	19.0	483	9.6	244
ERn4-W-120	14.0	356	15.5	394	9.6	244
ERn4-RM-120	14.0	356	19.0	483	9.6	244

ERn Weights\*

MODEL	WEIGHT		SHIPPING WEIGHT	
	lbs	kgs	lbs	kgs
ERn2-W-120	15	6.80	20	9.08
ERn2-RM-120	20	9.07	21	9.53
ERn4-W-120	20	9.07	25	11.34
ERn4-RM-120	25	11.34	29	13.15

\*Weights and dimensions typical



Corporate Headquarters • 3031 Pleasant View Rd, PO Box 620979, Middleton WI 53562 0979 USA • Tel +1 608 831 4116 • Fax +1 608 836 1736  
 London, UK • Unit 26-28, Victoria Industrial Estate, Victoria Road, London W3 6UU, UK • Tel +44 (0)20 8896 1000 • Fax +44 (0)20 8896 2000  
 Rome, IT • Via Ennio Quirino Visconti, 11, 00193 Rome, Italy • Tel +39 (06) 32 111 683 • Fax +44 (0) 20 8752 8486  
 Holzkirchen, DE • Ohmstrasse 3, 83607 Holzkirchen, Germany • Tel +49 (80 24) 47 00-0 • Fax +49 (80 24) 47 00-3 00  
 Hong Kong • Room 1801, 18/F, Tower 1 Phase 1, Enterprise Square, 9 Sheung Yuet Road, Kowloon Bay, Kowloon, Hong Kong • Tel +852 2799 1220 • Fax +852 2799 9325  
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Unison® products protected by one or more of the following U.S. Patent Numbers 5,323,088, 5,352,958 and 6,849,943; European Patent Number 0603333; German Patent Number 69203609; US and International patents pending

**SPECIFICATIONS**

**GENERAL**

- UL and cUL LISTED
- CE Marked

**FUNCTIONAL**

- Button and keyswitch functions include: preset selection, record mode activation, station lockout, raise, lower, macro activation, zone on/off control, timed event override and wall open/close or toggle
- Custom button functionality programmable via LightDesigner configuration software
- Programmable electronic lockout levels
- Allows for programming of individual lockout levels

**MECHANICAL**

- Standard configurations with 1, 2, 5, 7 and 10 buttons or 0,1,2,and 5 buttons with a maintained or momentary keyswitch
- Custom button stations available, contact ETC
- Gangable for custom applications
- Enclosed electronics assembly and faceplate included
- Cantilevered switch arrays with removable caps
- No visible means of attachment
- Flush mount in industry standard back box, RACO 690 or equivalent
- Surface mount back-boxes available from manufacturer
- Constructed of injection molded, ABS plastic in five standard colors, matched to RAL standard colors
- Custom colors available with sample
- Indelibly marked legends in a contrasting color
- Integral RGB LED response indicator for each button
- Integrated IR receiver

**ELECTRICAL**

- Connect via Echelon® LinkPower control network utilizing low voltage Class II wiring
- Topology free and polarity independent wiring over Belden 8471 or equivalent and (1) #14 ESD drain wire
- Wiring may be bus, loop, home-run or any combination of these
- All station terminations are connectorized
- UL and cUL LISTED, CE marked

**THERMAL**

- Ambient room temperature: 0-40°C / 32-104°F
- Ambient humidity: 30-90% non-condensing

**PHYSICAL**

**Flush Backbox Dimensions\***

GANG	HEIGHT		WIDTH		DEPTH	
	inches	mm	inches	mm	inches	mm
1/2	3.75	96	1.3	33	3.25	83
1	3.75	96	2.0	51	2.5	64

1 Gang flush mount back box RACO 690

1/2 Gang flush mount back box provided by ETC

**Surface Backbox Dimensions\***

GANG	HEIGHT		WIDTH		DEPTH	
	inches	mm	inches	mm	inches	mm
1	4.5	115	2.8	72	2.5	64

Surface mount back boxes provided by ETC

**Faceplate Dimensions\***

GANG	HEIGHT		WIDTH	
	inches	mm	inches	mm
1/2	4.5	115	1.75	45
1	4.5	115	2.8	71

\*Dimensions typical



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**Holzkirchen, DE** • Ohrstrasse 3, 83607 Holzkirchen, Germany • Tel +49 (80 24) 47 00-0 • Fax +49 (80 24) 47 00-3 00  
**Hong Kong** • Room 1801, 18/F, Tower 1 Phase 1, Enterprise Square, 9 Sheung Yuet Road, Kowloon Bay, Kowloon, Hong Kong • Tel +852 2799 1220 • Fax +852 2799 9325  
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
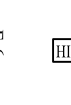

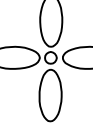
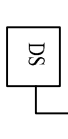

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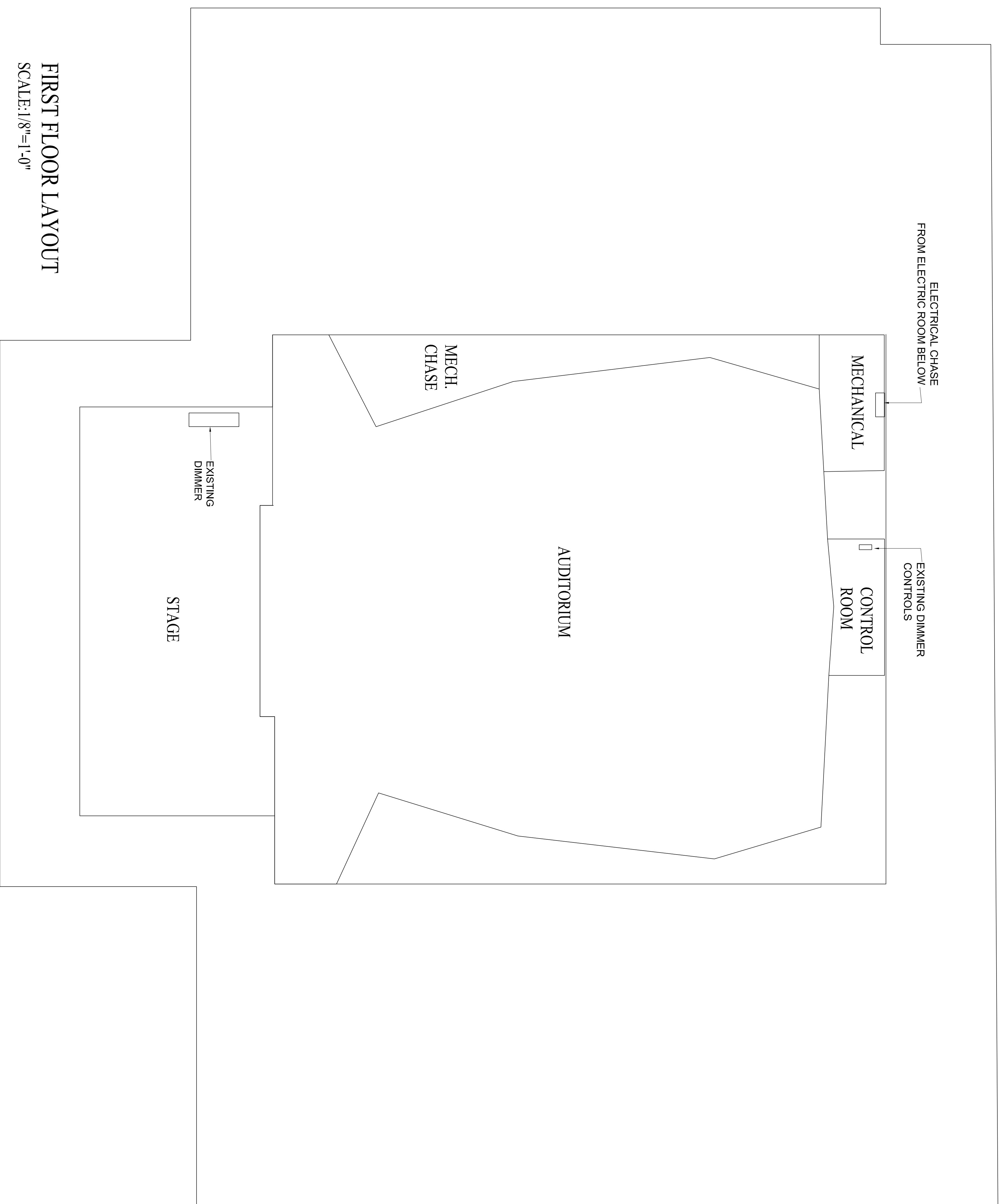
## WALTHAM HIGH SCHOOL AUDITORIUM DIMMING SYSTEM: BILL OF MATERIALS

Provide the following:

2	<b>SR3-48</b> ETC Sensor3 dimmer rack enclosure with locking door and filter
2	<b>CEM3</b> Control Electronics Module
72	<b>D20</b> Dual 20A Dimmer Module
24	<b>AFM</b> Air Flow Module
1	buss kit
2	<b>SSH</b> Sound suppression hood
2	<b>FVIP</b> floor vibration isolation pads
2	<b>Custom Outlet Box</b> with 4x 6 circuit Multi-pin connectors
1	<b>ERn2-WM-120</b> Architectural Control Processor, wall mount, to contain:
1	<b>P-ACP</b> Paradigm Architectural Control Processor
1	<b>P-SPM</b> Paradigm Station Power Module
1	<b>Ern-NET</b> network switch mounted inside ERn2
2	<b>UH10002</b> Unison Heritage single gang two button entry station, black
2	single gang surface mount back box
2	single gang sliding locking cover
2	<b>UH40707</b> Unison Heritage four gang seven fader, seven button control station, black
2	four gang surface mount back box
2	four gang sliding locking cover
1	<b>ECPB DMXIN/NET</b> DMX In/Net Plug-in Station single gang, to be located in the control booth
1	two gang surface mount back box
1	<b>ECPB DMXIN/OUT/NET</b> DMX In/Out/Net plug-in Station, three gang, to be located back stage left
1	three gang surface mount back box
1	<b>ETC Ion 1000 Lighting Control Console</b>
1	2x20 fader wing
1	19" DVI LCD color monitor
1	19" DVI LCD Touchscreen color monitor
1	power strip
1	25' five pin DMX extension cable
1	<b>Ion Training Session</b> one day with ETC factory authorized technician, at Waltham High School
1	<b>Low Voltage Terminations</b> by ETC factory authorized technician
1	<b>System Commissioning / User Training</b> by ETC factory authorized technician



- E1  4 TUBE 8' LONG FLUORESCENT FIXTURE
- E2  2x4 TUBE DROP IN RECESSED FLUORESCENT FIXTURE
- E3  2x2 DROP IN RECESSED FLUORESCENT FIXTURE
- E4  400 WATT SIDE WALL HPD
- E5  20 WATT SIDE WALL HPD
- E6  20 WATT LOADBROCK LIGHT
- E7  100 WATT WALL LANTERN
-  COMMERCIAL WAREHOUSE CEILING FAN
-  DISCONNECT SWITCH
-  METER SOCKET



**FIRST FLOOR LAYOUT**

SCALE: 1/8"=1'-0"

REV. #	DESCRIPTION	DATE

**CUMMINGS ENGINEERING**  
 323 ANDOVER STREET  
 WILMINGTON, MA 01887  
 (978) 658-2616

ENGINEER: RICHARD D. CUMMINGS, P.E.  
 CUMMINGS ENGINEERING  
 323 ANDOVER STREET  
 WILMINGTON, MA 01887

SCALE: 1/8" = 1'-0"  
 DRAWN: idc  
 CHECKED: idc  
 DATE: FEBRUARY 12, 2014

PROJECT: DIMMER REPLACEMENT  
 WALTHAM SCHOOL  
 WALTHAM, MA

DRAWING TITLE: FLOOR PLAN  
 DESIGN LAYOUT

CAD FILE NAME: DRAWING #

# Compliance

(Required Documents.)

# Compliance

The compliance documents in this section must be completed, signed and returned **with your bid package**.

## Purchasing Department

City of Waltham  
610 Main Street  
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

### Section Index

Check when Complete

- Non-collusion form and Tax Compliance form..... \_\_\_\_\_
- Corporation Identification Form..... \_\_\_\_\_
- Certificate of Vote Authorization..... \_\_\_\_\_
- CORI background Check ..... \_\_\_\_\_
- Certificate of Insurance (showing all limits of WC &GL)..... \_\_\_\_\_
- Three (3) References..... \_\_\_\_\_
- 5% Bid Bond or Certified Check..... \_\_\_\_\_
- Debarment Certificate ..... \_\_\_\_\_
- Prevailing Wage Certificate..... \_\_\_\_\_
- Right-to-know Law..... \_\_\_\_\_
- OSHA 10 Certificate for all Assigned Employees (MGL ch30, §39M and Ch 149) \_\_\_\_\_

**Before the commencement of the Job, the contractor must provide to the above office:**

- Performance Bond for 100% of the contract value and naming the City of Waltham  
***(letter must be included with your response)***

Your Company's Name: \_\_\_\_\_

Service or Product Bid \_\_\_\_\_

**NOTE:** Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

**NON-COLLUSION FORM AND TAX COMPLIANCE FORM**

**CERTIFICATE OF NON-COLLUSION**

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word “person” shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

\_\_\_\_\_, \_\_\_\_\_  
(Signature of person signing bid or proposal)      Date

\_\_\_\_\_  
(Name of business)

---

**TAX COMPLIANCE CERTIFICATION**

Pursuant to M.G.L. c. 62C, & 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

\_\_\_\_\_, \_\_\_\_\_  
Signature of person submitting bid or proposal      Date

\_\_\_\_\_  
Name of business

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

**CERTIFICATE OF VOTE OF AUTHORIZATION**

Date:

I \_\_\_\_\_, Clerk of \_\_\_\_\_ hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the \_\_\_\_\_ day of \_\_\_\_\_ at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That \_\_\_\_\_ (*name*) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seat, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that \_\_\_\_\_ is duly elected/appointed \_\_\_\_\_ of said corporation

SIGNED:

(Corporate Seal)

\_\_\_\_\_  
Clerk of the Corporation:

Print Name: \_\_\_\_\_

---

**COMMONWEALTH OF MASSACHUSETTS**

County of \_\_\_\_\_

Date:

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me, \_\_\_\_\_

Notary Public;

My Commission expires: \_\_\_\_\_



## CORPORATION IDENTIFICATION

The bidder for the information of the Awarding Authority furnishes the following information.

**If a Corporation:**

Incorporated in what state \_\_\_\_\_

President \_\_\_\_\_

Treasurer \_\_\_\_\_

Secretary \_\_\_\_\_

Federal ID Number \_\_\_\_\_

**If a foreign (out of State) Corporation** – Are you registered to do business in Massachusetts?

Yes \_\_\_\_\_, No \_\_\_\_\_

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

**If a Partnership: (Name all partners)**

Name of partner \_\_\_\_\_

Residence \_\_\_\_\_

Name of partner \_\_\_\_\_

Residence \_\_\_\_\_

**If an Individual:**

Name \_\_\_\_\_

Residence \_\_\_\_\_

**If an Individual** doing business under a firm's name:

Name of Firm \_\_\_\_\_

Name of Individual \_\_\_\_\_

Business Address \_\_\_\_\_

Residence \_\_\_\_\_

Date \_\_\_\_\_

Name of Bidder \_\_\_\_\_

By \_\_\_\_\_

Signature

\_\_\_\_\_

Title

Business Address

(POST OFFICE BOX NUMBER NOT ACCEPTABLE)

City

State

Telephone Number

Today's Date

**CORI CHECK VERIFICATION**

**NOTICE TO ALL CONTRACTORS**

ALL CONTRACTORS AWARDED A CONTRACT MUST PROVIDE THE WALTHAM PURCHASING DEPARTMENT WRITTEN CONFIRMATION OF ITS FULL COMPLIANCE WITH M.G.L. CHAPTER 71, SECTION 38R, WHICH REQUIRES CORI CHECKS FOR ALL SCHOOL EMPLOYEES AND VOLUNTEERS, AS WELL AS ANY AND ALL CONTRACTORS OF ANY KIND, OR LABORERS WHO PERFORM WORK ON SCHOOL GROUNDS, AND WHO MAY HAVE DIRECT AND UNMONITORED CONTACT WITH CHILDREN PLEASE SIGN BELOW TO INDICATE THAT THE ABOVE MASSACHUSETTS GENERAL LAW HAS BEEN ADDRESSED BY YOUR COMPANY.

PLEASE SIGN BELOW TO INDICATE THAT THE ABOVE MASSACHUSETTS GENERAL LAW HAS BEEN ADDRESSED BY YOUR COMPANY

---

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

Signature \_\_\_\_\_, Date \_\_\_\_\_

Print Name \_\_\_\_\_, Title \_\_\_\_\_

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

**PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES**

1. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

2. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

3. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

**NOTE**

**Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.**

**WEEKLY PAYROLL RECORDS REPORT &  
STATEMENT OF COMPLIANCE**

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided, A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit, on a weekly basis, a copy of his or her weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those reports for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

---

**STATEMENT OF COMPLIANCE**

\_\_\_\_\_, 200\_\_

I \_\_\_\_\_, \_\_\_\_\_  
(Name of signatory party) (Title)

I do hereby state that I pay or supervise the payment of the persons employed by

\_\_\_\_\_ on the \_\_\_\_\_  
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature \_\_\_\_\_, Title \_\_\_\_\_

Print \_\_\_\_\_



**RIGHT TO KNOW LAW**

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS and/or labels on each container may result in civil or criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

---

Authorized Signature Indicating Compliance with the Right-to-know laws:

---

Signature

Date

---

Print Name

**NOTE**

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

## DEBARMENT CERTIFICATION

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract of prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

---

Company Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_, State \_\_\_\_\_, Zip Code \_\_\_\_\_

Phone Number (\_\_\_\_) \_\_\_\_\_

E-Mail Address \_\_\_\_\_

Signed by Authorized Company Representative:

\_\_\_\_\_

Print name \_\_\_\_\_

Date \_\_\_\_\_

**10 HOURS OSHA TRAINING CONFIRMATION**

**Chapter 306 of the Acts of 2004**

**CONSTRUCTION PROJECTS**

**AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC**

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than \$10,000.00 have successfully completed a course in construction safety and health approved by the **United States Occupational Safety and Health Administration** that is at least **10 hours** in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Print Name \_\_\_\_\_

\_\_\_\_\_  
Date

***See Chapter 306 of the Acts of 2004***

**NOTE**

**Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.**



# **BID PRICE FORM**

**(Follows)**

**BID PRICE FORM**

My Company proposes the following all-inclusive price to provide the services described within this bid document.

1)	Allowance for Bill of Material (BOM) (See attached list of materials)	\$70,000.00
2)	Bid Price for Labor and Supplies	\$ _____
	<b>TOTAL BID</b>	<b>\$ _____</b>

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My company recognizes receipt of addenda # \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_

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Company Name: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_

Print Name: \_\_\_\_\_

E-Mail Address: \_\_\_\_\_

Date: \_\_\_\_\_