Strand Lighting Specification

I. CD80 DIGITAL DIMMER PACK(S)

A. GENERAL

1. The dimmer packs shall be fully digital, rugged, and designed specifically for entertainment.
2. A wide variety of dimmer pack configurations shall be available, including 1.2kW, 2.4kW, 6kW or 12kW dimmers, with 24, 12, or 6 dimmers per pack, and a selection of dimmer output connections.
3. Dimmer packs shall be UL and CSA listed. Plastic materials are self-extinguishing to UL94VO.
4. Pack setup shall be, as standard, fully user programmable.

B. MECHANICAL

1. The dimmer pack shall be a free standing, dead-front switchboard, constructed of 0.1254” (3mm) thick aluminum. The dimmer pack shall have a main structural chassis, a removable cover for access to all components, an interchangeable rear connector panel and recessed carrying handles. The front panel is recessed to protect the breakers and PCB face panel components.
2. The pack shall be properly treated, primed and finished in fine texture, scratch resistant, gray powder coat epoxy paint.
3. Dimmer outputs shall be provided on the rear of the pack, and shall be available in the following configurations:
   a. 1.2kW: grounded-pin (20A), grounded twistlock (20A) U-ground (20A), multi-pin Socapex or terminal strip
   b. 2.4KW: grounded pin (20A), grounded twistlock(20A), multi-pin Socapex or terminal strip
   c. 6kW: grounded pin (60A), grounded twistlock (60A) or terminal strip
   d. 12kW: grounded pin (100A), or terminal strip
   e. Canadian versions of 1.2kW and 2.4kW packs shall be fitted with 15A connectors to comply with CSA.
4. Dimmer packs shall not exceed 8.5”"H x 23.0"W x 20.5"D.
5. The dimmer pack shall weigh 65-85lbs, depending on pack configuration.
6. Packs shall be designed to be fully portable, wall-mountable, or stackable.
7. The pack shall be designed to allow for easy insertion and removal of the digital command module without the use of tools.

C. COOLING AND ENVIRONMENTAL

1. A single 100CFM low noise fan shall be provided to cool the dimmer pack.
2. The fan shall maintain the temperature of all components at proper operating levels with dimmers at any load, providing the ambient temperature of the dimmer room is within 0 to 35°C degrees C. Air shall flow over the surfaces of the heat generating components using a combination of convection and fan assisted air flow. Maximum heat dissipated is approximately 3-5% of connected load (Convert watts to BTU's).
3. In the event of SSR heatsink overheat, the O.T. indicator will turn on and the pack will shut down.
4. Dimmer Packs which do not incorporate an overtemperature warning system are not equal and are not acceptable.
5. The Dimmer Pack shall operate in an environment with a relative humidity of 10-95%, non-condensing.

D. ELECTRICAL

1. Load terminations shall be clearly marked with the pack circuit number. Neutral and ground shall be clearly marked close to each respective termination. Signal terminations shall be by pre-wired connectors to facilitate contracting and servicing and shall be clearly labeled.
2. The supply voltage and frequency of the pack shall be:
   a. 1.2kW, 2.4kW or 6kW: three phase, 120/208V, 50/60Hz or single phase, 120/240V, 50/60Hz.
   b. 12kW: three phase, 120/208V, 50/60Hz.
3. Maximum current of the pack shall be:
   a. 1.2kW x 24: 80A for 3 phase 4 wire and 120A for 1 phase 3 wire.
   b. 2.4kW x 12: 80A for 3 phase 4 wire and 120A for 1 phase 3 wire.
   c. 2.4kW x 24: 160A for 3 phase 4 wire and 240A for 1 phase 3 wire.
   d. 6kW x 6: 100A for 3 phase 4 wire and 150A for 1 phase 3 wire.
   e. 12kW x 6: 200A for 3 phase 4 wire.
4. Line and neutral terminals shall accept #6 - 250mcm gauge wire.
5. Ground terminals shall accept #12 - 1/O gauge wire.
6. 1.2kW, 2.4kW, 6kW and 12kW packs shall be available with Camlock power input connectors in some configurations.

7. Load terminals shall accept #18 - #8 gauge wire.
8. Each dimmer module is protected by a fully magnetic circuit breaker of 10kA fault current rating.

E. ELECTRONICS, PHYSICAL

1. The main dimmer control electronics shall be housed in one Pack Processor Module (RPM) plug in module. The dimmer control electronics shall be completely digital without employing any digital to analog demultiplexing schemes or analog ramping circuits.
2. All pack setup is achieved through switch and jumper settings. Setup configuration may only change if reconfigured manually by the user and there is no possibility of losing setup configuration due to memory loss .
3. The Pack Controller shall have six LEDs that indicate mux Protocol Type, Overtemp, and Power per Phase.
4. The Pack Controller shall have the following connectors for dimmer data: 1 each male and female 4 pin XLR connectors for AMX input (f)/output (m), 1 each male and female 5 pin XLR connectors for DMX or SMX input (f)/output (m), 2 female 15 pin D-Type connectors for 0-10V Analog input. The Controller shall automatically detect the type of protocol received (AMX, DMX or SMX). DMX connectors are opto-isolated from dimmer electronics.
5. The Pack Controller shall have 12 or 24 backlit push buttons to turn on any dimmer to its full level without a console or discreet analog input.
6. The Pack Controller shall have a Panic switch to turn all dimmers on to full.
7. The Pack Controller shall have a Reset switch to reset the processor and an RS232 connector for connection with a computer. The Controller shall also have dip switches to select the rack Mode.
8. The Pack Controller shall have 3 Thumbwheels for selecting the dimmer start number for the pack.

F. ELECTRONICS: CONTROL AND COMMUNICATIONS

1. The control electronics shall provide the following control and communication inputs standard:
   a. One optically isolated DMX512/SMX input.
   b. One AMX input.
   c. 24 analog 0 to +10 VDC signal inputs. Analog inputs may pile-on to mux levels.
   d. Eight optically isolated contact inputs, for external switching of functions.
   e. One RS-232 signal input for local connection to a personal computer.
2. The control electronics shall provide the following outputs as standard:

a. 24 phase controlled signals to control the dimmer SSRs.

b. One DMX512/SMX output.

c. One AMX output.

3. The control electronics shall provide the following setup features that shall be user programmable:
   a. Dimmer start address.

   b. Pack phase configuration.

   c. Analog input pile-on mode (additive or HTP).

   d. Control input numbering (for 6kW and 12kW only).

   e. Dimmer curve type (Analog or square law type).

   f. Status Quo on/off (holds last dimmer levels for 30 minutes)

G. DIMMERS, PHYSICAL

1. The dimmers shall be factory wired.
2. One SSR for each dimmer, rated appropriately for the dimmer power rating, are mounted on a common 18" long heat sink anchored to the bottom of the housing. Each SSR is field replaceable. One torroidal choke for each dimmer is mounted in a common assembly adjacent to the heat sink.

H. DIMMERS, ELECTRICAL

1. One primary, fully magnetic circuit breaker foe each dimmer is mounted to the front panel and provides for protection of individual dimmers.
2. Dimmer electronics shall be completely solid state. They shall utilize two silicon controlled rectifiers in a back-to-back electrical configuration. The full load of the circuit is to be carried and controlled by the silicon controlled rectifiers.
3. Each dimmer shall be protected by a fully magnetic circuit breaker of the appropriate current rating and 10,000 AIC surge rating mounted on the face plate of the dimmer module so that the trip current is not affected by ambient or pack temperature.
4. The circuit breaker shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current and shall disconnect the power to the dimmer module before damage can be done to the dimmer power components. The circuit breakers shall be rated for 100 percent switching duty applications and shall be a UL and CSA recognized device.

I. DIMMERS, SOLID STATE RELAY (SSR)

1. SSR devices shall be encapsulated, epoxy filled high impact plastic cases with optically isolated firing circuits, control circuitry, and two silicon controlled rectifiers (SCRs). There shall be a minimum of 2,500 volts RMS of isolation between the AC line and the control lines of the SSR.
2. The SCR shall be in an industry standard format that is easily field replaceable without removing any other electrical or electronic devices.

J. DIMMERS, FILTERING

1. Each dimmer module shall have an integral inductive filter to reduce the rate of current rise time resulting from the SCR switching on. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit the radio frequency interference on line and load conductors.
2. Stage dimmers shall have a rise time of not less than 350 microseconds

K. DIMMERS, PERFORMANCE

1. The dimmer module shall be capable of "hot patching" cold, incandescent loads up to its full rated capacity without malfunction with the control signal at full ON.
2. Each 120VAC dimmer module, with circuitry in the Digital Controller, regulates output voltage with changes in the AC line from 108 to 130 volts RMS.
3. The dimmer output levels shall be regulated for incoming line voltage variations. Dimmers will maintain output RMS voltage within +/-2% with changes in load from 10 watts to full rated load at any point on the dimming curve.
4. Output RMS voltage versus setting follows a modified square law dimming curve.
5. Output waveform is a variable conduction angle 120VAC sine wave.
6. Output response time (from control signal change) is less than 0.1 seconds.
7. The power efficiency of the dimmer is a minimum of 95% at full load.

L. SUPPLY THE FOLLOWING:

Qty.	Cat. No.	Description
#	73200	CD80 1.2kW pack, 24 dimmers, one 20A GTL connector per dimmer
#	73201	CD80 1.2kW pack, 24 dimmers, one 20A GP connector per dimmer
#	73202	CD80 1.2kW pack, 24 dimmers, one 20A GR connector per dimmer
#	73203	CD80 1.2kW pack, 24 dimmers, one 15A GR Canadian connector per dimmer

73204 CD80 1.2kW pack, 24 dimmers, terminal strip output.

73210 CD80 2.4kW pack, 12 dimmers, two 20A GTL connectors per dimmer

73211 CD80 2.4kW pack, 12 dimmers, two 20A GP connectors per dimmer

73112 CD80 2.4kW pack, 12 dimmers, two 20A GR connectors per dimmer

73113 CD80 2.4kW pack, 12 dimmers, two 15A GR Canadian connectors per dimmer

73214 CD80 2.4kW pack, 12 dimmers, terminal strip output

73205 CD80 2.4kW pack, 12 dimmers, GP and Socapex sockets

73206 CD80 2.4kW pack, 12 dimmers, GTL and Socapex sockets

73240 CD80 2.4kW pack, 24 dimmers, one 20A GTL connector per dimmer

73241 CD80 2.4kW pack, 24 dimmers, one 20A GP connector per dimmer

73244 CD80 2.4kW pack, 24 dimmers, terminal strip output.

73220 CD80 6kW pack, 6 dimmers, one 60A GTL connector per dimmer

73221 CD80 6kW pack, 6 dimmers, one 60A GP connector per dimmer

73224 CD80 6kW pack, 6 dimmers, terminal strip output

73230 CD80 12kW pack, 6 dimmers, one 100A GP connector per dimmer

73234 CD80 12kW pack, 6 dimmers, terminal strip output

76470 Digital Pack Controller for 24 x 1.2kW or 2.4kW CD80 dimmer packs

76471 Digital Pack Controller, to retrofit AMX192 2.4kW, 6kW, and 12kW CD80 dimmer packs or as a spare