

# User Manual and Installation Guide

## Tornado MK1 Upgrade Kits

*Upgrades all fiberglass Tornado 2000, 2200 and 2300 to current specification*



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You can download a copy of this manual at <http://www.tempestlighting.com/products.html#tornado>

*This manual applies to product manufactured after January 1st, 2011 with DEC3 firmware revision 2.1 or higher*

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2000.RK	Tornado 2000
2200.RK	Tornado 2200
2300.RK	Tornado 2300

January, 2011

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# PRELIMINARY

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## 1 Introduction

### The Tornado™ Lighting Enclosure

Thank you for purchasing the original Tornado Lighting Enclosure. We hope that this investment has paid off many times over, in preserving your expensive moving lights in a hostile outdoor environment. Now you have wisely decided to extend the life of your investment even further, by upgrading all the active elements in your enclosure(s) to the latest specification, and with a new 12-month manufacturer's warranty. This will at least double the life of your enclosure, at a far lower cost than replacing it

### What's in a Kit?

Your Tornado retrofit Kit provides brand-new parts to replace EVERYTHING on your original Tornado enclosure, excepting the fiberglass base and the plexiglass globe (replacement globes are always available – accidents can happen!). All metal parts and hardware supplied are 304 stainless steel, and marine-grade latches are included as standard.

### Using This Manual

Please read this manual in its entirety before starting work. All the information contained is important, and should be read carefully before proceeding. Heed all warnings and advisories.

### Terminology:

Enclosure - Tornado Lighting Enclosure

Luminaire - intelligent lighting fixture that will be placed into the enclosure

DMX - ANSI E1.11-2008, Entertainment Technology - USITT DMX512-A, Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories.

RDM - ANSI E1.20-2006, Entertainment Technology - RDM, Remote Device Management over DMX512 Networks

### Icon Key:

① Valuable information

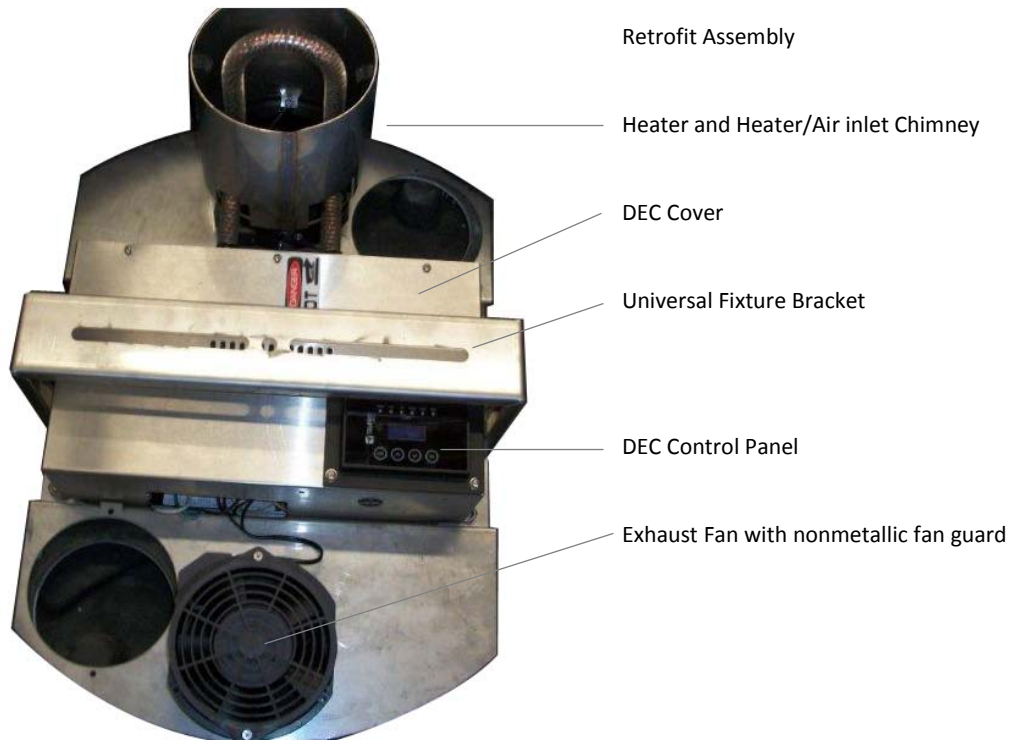
⚡ Electrical Warning

🚧 Safety Information

***IMPORTANT SAFETY NOTICE: All safety instructions provided by the luminaire manufacturer must be followed carefully. Failure to do this may void both the luminaire and the enclosure warranties.***

***When working at heights or in awkward locations, it is imperative to develop a safety plan, based on the information in this manual, and on local conditions and safety regulations. The safety plan must be approved by the site engineer/safety officer, as appropriate to local conditions. NEVER attempt to install Tornado enclosures in high winds or when precipitation is present or imminent.***

## Check What you Got



### Unistrut Kit:

1 length stainless steel low-profile Unistrut

4 x ½" socket cap screw, rubber washer, flat washer, spring washer, nut

### Neon Sealing Kit:

2 x 5/16" x 1" hex bolts, cone washers, flat washers, spring washers, nuts

### Marine Latch Top Assembly Kit

4 x Marine top latch (joggle and three mounting holes)

12 x #8 machine screws, cone washers, locknuts

### Marine Latch Bottom Assembly Kit

4 x Marine bottom latch (with 5/16" stud)

4 x flat washers and locknuts

8 x #8 machine screws, cone washers, locknuts

2 x Air Filters, with Velcro tabs









1 lengths of rubber edge seal

This Manual - please read it!

## 2 *Installing the Retrofit Kit*




### Safety and Warnings

These warnings are for your protection. Failure to comply may result in serious injury or death. Manufacturer assumes no responsibility for damages or injury incurred by misuse or mishandling of product.

-  **Do not** attempt to install or operate the enclosure before fully reading and understanding this manual
-  **Never** allow anyone who has not read this manual to open the enclosure or perform maintenance on the luminaire within.
-  **Never** leave the enclosure unattended when open.
-  **Always** make sure all bolts are tight and safety cables are in place after performing any form of maintenance on the unit.
-  Even after power has been disconnected from the unit, it is likely that the heater will remain warm. **Do not** touch it unless you can be sure that the heater has been off for at least one hour.
-  **Observe** all posted warnings in the enclosure itself.
-  **Do not** open any electrical boxes until power has been shut off to all supply lines to the enclosure (including the one powering the luminaire).
-  **Do not** open the enclosure in wet weather.

### Handling the Enclosure

In order to preserve the integrity of the Tempest Enclosure, care must be taken to prevent damage. Following these simple guidelines will ensure that damage is not incurred in normal conditions.

-  **Never** move the enclosure with the luminaire inside.
-  **Never** handle the enclosure by the globe.
-  **Always** lift from under the base.

## 1. Remove the Enclosure from the Installation Site

This upgrade must be performed by an authorized Tempest Lighting service representative in order to qualify for the 12-months warranty from the date of re-installation on site. The work may be performed by trained technicians, using normally-available hand tools. Tempest Lighting strongly recommends performing the upgrade in a workshop, and not on site.

- ✍ **Do not** open any electrical boxes until power has been shut off to all supply lines to the enclosure (including the one powering the luminaire).
  1. Open the original enclosure and remove the luminaire for separate service/cleaning
  2. Open the Existing DEC cover in the base of the enclosure and disconnect power feeder wires. Note whether the enclosure is fed with a single or dual supply (one feed for the enclosure, one for the fixture). If so, identify and tag wires correctly for re-installation.
  3. Disconnect DMX wiring entering the enclosure
  4. Remove electrical fittings under enclosure (they will not be re-used) and disconnect feeder conduits
  5. Remove the mounting hardware attaching the Tornado Unistruts to the installation, and carefully remove the Tornado base. **DO NOT ATTEMPT TO DO THIS WITH FEWER THAN TWO PEOPLE, OR IN BAD WEATHER.**
  
- 2. Strip down and Update the Top Assembly
  - a. Back in the shop, strip down as follows
  - b. Top Assembly – do not remove the globe from the top fiberglass ring unless the globe is damaged. In this case refer to instructions below for replacing globe. Check the silicone seal around the globe and clean out and touch up as needed.
  - c. Remove the four latches and hardware and discard.
  - d. Remove the existing rubber seal around the top ring and discard.
  - e. This is a good time to **CLEAN** the top assembly – use mild detergent and no abrasives. Use a proprietary acrylic polish to take any minor scuffs out of the globe.
  - f. Carefully install the new rubber seal, tapping home with a rubber mallet, and cut to length with metal shears. Glue join with outdoor-rated silicone.
  - g. Mount the four top marine latches (they have three mounting holes) to the top ring. Note that the stainless/rubber cone washer sits under the latch plate, and with its rubber side to the fiberglass, to prevent water ingress.
  
- 3. **IMPORTANT** – check the height of the fixture brackets
  - a. Measure from the inside of the base (fiberglass) to the top of the two Z-brackets that support the fixture (they're bolted down onto the DEC box). Make a note of this dimension – the retrofit kits are universal, and you'll need to adjust the height later.

4. Strip down the bottom Assembly
  - a. The only parts you will be using from the base of the Tornado are the two fiberglass shells - so tear everything else out!
  - b. Open the top of the DEC cover to access the Unistrut bolts, and remove them
  - c. Remove all fans, using a Philips #2 screwdriver (note that the new fans are 208/230VAC, and the old ones are 24VDC - they are NOT compatible)

5. Replace the Neon Indicators
  - a. Locate the two short cables connected to the DEC box, and cut off the Molex connectors with wire cutters
  - b. Remove the neons from the outside, pull the wires through and discard.
  - c. This is a good time to CLEAN the two bottom fiberglass moldings.
  - d. Replace the Neons with the 1" x 5/16" hex bolt kits (shown here). MAKE SURE THE Rubber side of the cone washer is under the bolt head and conforming into the fiberglass exterior, to assure a good seal. They should look like this...



6. Install the Bottom marine latches, with the studs facing UP, and using two #8 screws, Note that the stainless/rubber cone washers sit under the latch plate, and with their rubber side to the fiberglass, to prevent water ingress.
7. Prep the Retrofit Assembly
  - a. Remove the stainless steel DEC cover, taking care to disconnect the control panel, and set it aside
  - b. Check that all internal connections are positive and that nothing has obviously come adrift in transit
  - c. Ccheck alignment - Make sure that the two conduit entry holes in the base of the retrofit kit will line up with those in the fiberglass BEFORE attempting to install the kit. We've all done it twice, and once is way better!

8. Assemble the Base
  - a. Insert the ½” socket cap screws up through the two unistruts, and press a rubber washer onto each one
  - b. Now set the bottom and middle shell fiberglass moldings on the threads. The rubber washers should keep the screws in place, but this is much easier with two people. The holes should all line up. If they don’t, use a 9/16” drill to ease open the fiberglass.
  - c. Set the retrofit kit in place on the four bolts – making sure before you tighten anything down that the two conduit entry holes line up.
  - d. With everything aligned, drop a flat washer, a spring washer and a nut onto each of the four socket cap screws, and tighten down.
  
9. Referring to the note you took earlier, adjust the height of the fixture bracket and bolt firmly in place using the four sets of hardware provided. If you’re using a different fixture than before, adjust so that the fixture wasitline is approximately at the level of the ‘equator’ of the globe.
  
10. You’re essentially done. Time to test the system.
  - a. Connect a 200-240VAC supply to the power terminals (details in Section 3 – Wiring).
  - b. Replace the DEC cover, making sure to reconnect the DEC display.
  - c. Switch on power. You should see:
    - i. The DEC display comes to life, showing temperature and humidity
    - ii. Both lamp LEDs should be off
    - iii. The fans will spin for a couple of seconds roughly every 30s
    - iv. The heater will get warm, but not hot
  - d. Now plug a lamp load (almost anything will do – say 500 to 1000W, 208/230V) into the L6-20 fixture receptacle, at which point the heater will go off, the fans will run continuously, and the lamp relay and lamp on indicators will light. Unplug the load to revert to background ‘pulse’ mode.
  
11. IF you determined that the original installation used two supplies (one for the fixture and one for the enclosure) then go to the wiring section (3) and follow the procedure for splitting the feeds to the DEC3 terminal block.
  
12. The original Tornados did not support DMX or RDM. The retrofit kits are supplied set up for Standalone Operation, which emulates the way Tornados originally worked. Like the original product, this one should just plug in and run. If you want to use the more advanced features available, please study the DEC3 control section in this manual.

## Re-installing the Tornado Enclosure on Site

### 12 Preparation

*The following must be observed when re-installing the enclosure following retrofit:*

Before starting the installation of the Tempest Enclosure, you must prepare the location, the luminaire and the enclosure itself.

#### Planning

Before beginning, it is necessary to decide how the enclosure will be mounted. These considerations must be taken into account.

- ① No part of the enclosure should fall below two feet above the average snowfall for the area. If snow is not a consideration, then enclosure may sit on ground as long as proper drainage is available.
- ① Enclosure will need to be powered at all times, although fixture may not be.

#### Tools and Equipment

To install the enclosure, you will need the following items:

- 👤 Two people to carry out the installation. **Warning:** This installation cannot be safely completed by 1 person.
- ① Crescent wrench
- ① Phillips screwdriver
- ① Proper wiring installation equipment (for line power and DMX)
- ① Any equipment listed in the fixture manufacturer's fixture-specific installation directions

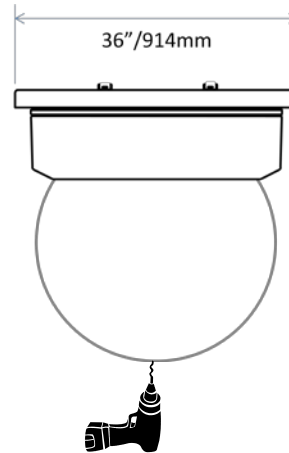
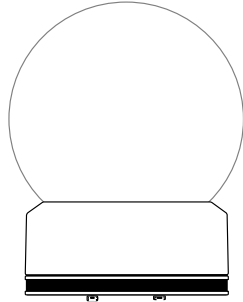
### 13 Reinstalling the Tornado Enclosure

Normally enclosures that have been upgraded as instructed here will be returned to the same location and mounts where they were originally installed. If that is the case, it is only necessary to verify the structural integrity and condition (eg rust) of any structural components and hardware, and to replace or remediate any problems found.

### Base Down and Base Up Mounting

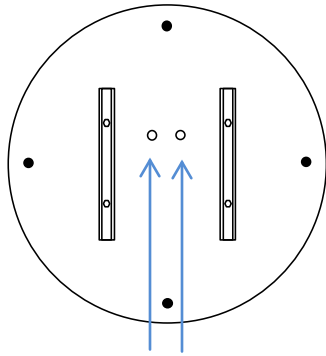
Tornado 2000, 2200 and 2300 enclosures of the original fiberglass design may be installed either base up or base down. Enclosures used in the base-up orientation must have an open 3/16" weep hole at their lowest point, to prevent any water penetrating through the filters from ponding in the bottom of the globe. This does not affect thermal performance.

*Base-down - no  
part number  
suffix, no weep  
hole in globe.*



*Base up - weep hole at  
globe's lowest point.*

### 3 Wiring



Power and DMX conduit entries

There are two wiring entry holes on the underside of the Tornado enclosure, one for power and one for DMX signal cable(s). Power and signal cables must be routed separately to the enclosure.

The conduit entry holes are 0.875" (22.2mm), and will accept US 1/2" conduit fittings, and international 20mm (OD) conduit fittings.

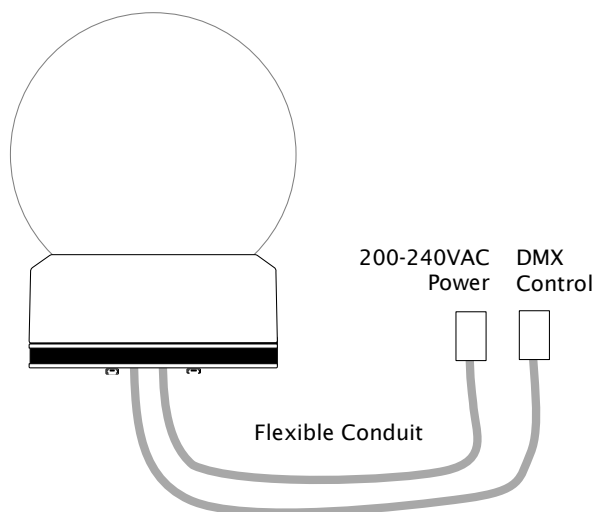
It will generally be most convenient to connect flexible conduit from the enclosure to adjacent electrical boxes. *Note: In any conflict between this manual and local electrical standards, local standards must prevail.*

#### Electrical Preparation

This covers the permanent location where the enclosure will be mounted.

⚡ **All electrical work must be carried out by a properly licensed electrician. Failure to observe this point will void the factory warranty for the Tempest Enclosure and possibly the luminaire.**

- 1 Before starting work, switch off power to the branch circuit, carefully following lockout and tag-out procedures. Failure to do so could cause serious injury or death.
- 2 You will need two electrical junction boxes, located within a few feet of the enclosures. Both junction boxes must be installed in accordance with local electrical codes (one for power, one for DMX control). Each junction box should have a length of 1/2" (International - 20mm OD) flexible weather-resistant conduit long enough to reach from junction box to the enclosure conduit bodies. Make sure to leave slack for positioning of enclosure.



- 3 The DMX junction box should contain the DMX cable(s) that will connect to the enclosure (if required) and luminaire. See the DEC3 section below for DMX wiring instructions.
- 4 The power junction box should contain the 200-240VAC (50/60Hz) power supply line(s) for

both the enclosure and luminaire. Depending on your luminaire and requirements, you may choose a single line or two separate lines. Since the enclosure needs to be powered at all times, the only way to use a single line is if you will be using the DEC3 controller in DMX mode, to switch the enclosure's lamp relay on and off with DMX (see the DEC3 Control section of this manual). If the luminaire must be switched on and off by switching the luminaire supply on and off, two separate supply lines will be required. The supply line(s) will run through the flexible conduit into the enclosure's power conduit body.

### Enclosure Supply Voltage

Tornado enclosures normally operate on a supply voltage between 208-24VAC. In certain circumstances they may be supplied for 120VAC operation. The following instructions assume 208-240VAC – if connecting the enclosure to a 120VAC supply, be sure to double the current stipulated for 240V.

Tempest enclosures may be wired on single or double line supplies. On a single feed, both enclosure and luminaire are permanently on. With a double-line supply, you can switch off the luminaire when not in use, while the enclosure continues to protect it 24/7.

Either way, the enclosure must be powered 24/7, in order to protect the luminaire inside against condensation and extremes of temperature.

- 5 **Single-line requirements.** This line must be capable of carrying 240VAC @ 5A plus the current required by the luminaire (over the requisite distance). Note that this also requires that the luminaire operate on 240VAC power.
- 6 **Double-line requirements.** In this case, there will be two lines, an enclosure supply line and a luminaire supply line. This requires that the enclosure line be capable of carrying 240VAC @ 5A and the luminaire line be capable of carrying the current required by the luminaire (over the requisite distance).

### AC Connections

① Remember that the enclosure will need to be powered at all times, even though the fixture may not be. For more information on this and power supply lines, read Step 4 of Location Preparation.

⚡ **Line connections must only be carried out by a licensed electrician.**

- 1 Before beginning to connect the power supply line(s), turn on the circuits to be used and measure the voltages present. Make sure that the enclosure circuit provides 200-240VAC and that the luminaire circuit, if different from the enclosure circuit, provides the proper voltage for the luminaire.

⚡ After doing this, turn off all circuits that are being used and use proper lockout and tag-out procedures. The power supply lines run through the conduit fitting into the power supply conduit body (containing power wires) and connections can then be made.



### **3.1 DMX Connections**

DMX refers to USITT DMX512, a commonly used control protocol in the entertainment industry, running over RS485. Consult USITT DMX installation guidelines when laying out a system, or consult a qualified DMX system integrator.

Note that DMX is optional - in many applications it is not required, and need not be connected. For more information, see DEC3 Operating Modes in the next section.

**DMX IN** - Connect incoming DMX to the 2-part 3-pin terminal on the DEC3 control circuit board so labeled.

Pinout: (1) Ground, (2) Data -, (3) Data +.

**DMX THRU** - there are two DMX pass-through terminals - one for a fixture inside the enclosure, the other to run to the next DMX device in the network.

Pinout: (1) Ground, (2) Data -, (3) Data +.

## DEC3 Control – Introduction

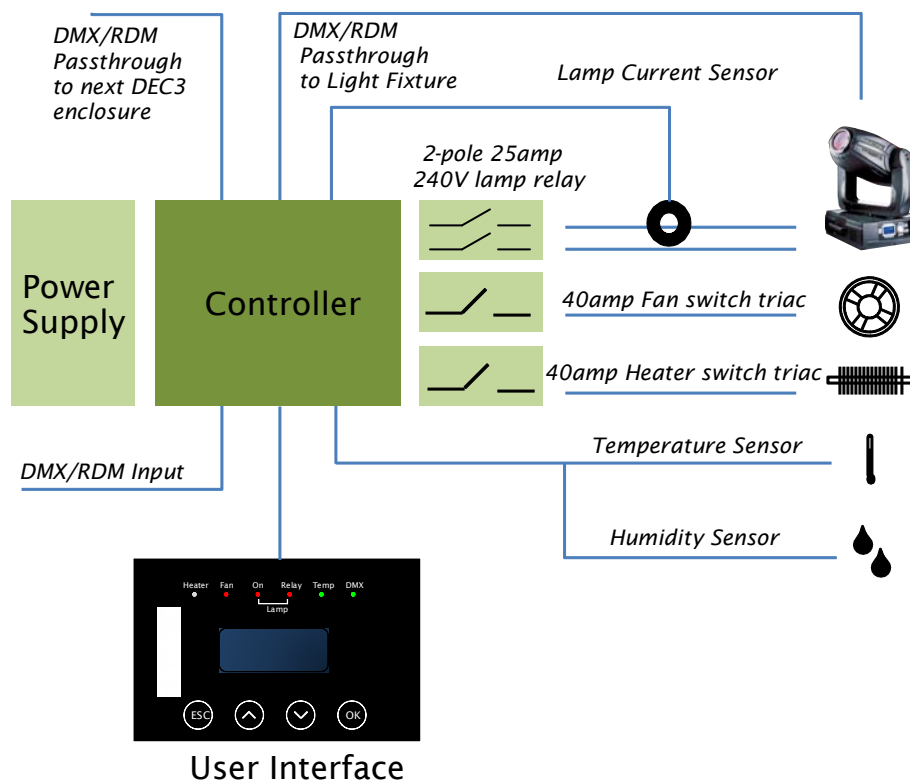
Tempest Lighting and Projector Enclosures have been in daily use around the world for almost a decade. Tempest enclosures protect expensive and delicate equipment in all climates, maintaining a comfortable operating temperature, and preventing condensation – the real outdoor enemy.

DEC3™ – that’s *Digital Enclosure Control, third Generation* – is the brain of your Tempest enclosure. It will maintain the internal environment in a comfortable temperature and humidity range, and prevent condensation – the real equipment killer. DEC3 monitors internal temperature, humidity and lamp current at all times, and uses this information to control its lamp relay, fan(s) and heater(s). It can report back over the DMX cable, using the RDM protocol (Remote Device Management) if desired.

Unless otherwise specified, this version of the user guide refers to DEC3 units fitted with software version 2.1 or later.

### So, what does DEC3 actually DO?

DEC3 is the brains of the operation – here’s a layout:



*This schematic shows the relationship between DEC3’s functional elements. The power supply is universal 90-260V, but fans and heaters are either 120V or 230VAC, and must be so specified. A high-quality 25amp 2-pole electro-mechanical relay isolates fixture/projector power in the event of an over-temperature condition. Fans and heaters are switched using generously overrated 40amp Triac devices for maximum reliability. Two DMX outputs connect to the internal fixture (if desired) and on to other enclosures or DMX devices.*

DEC3’s mission is to maintain temperature and humidity inside the enclosure, within determined bounds, and to prevent condensation – particularly overnight dew formation – inside the equipment housed. Condensation is fatal to electronic equipment, particularly in polluted areas or saline environments, where it brings not only rust and short-circuits, but also a steady buildup of mineral and/or salt deposits. Incidentally, condensation is very hard to control with air-conditioning type systems, which is why we don’t use them.

Broadly speaking, DEC3's function depends on whether the fixture/projector lamp is on or off:

#### **Lamp ON**

When the projector/fixture is running, the heat from the lamp takes care of humidity, and DEC3 runs the enclosure's fan(s) to change its air every few seconds – ensuring minimal temperature rise above outside ambient.

#### **Lamp OFF**

When the lamp is off, DEC3 senses temperature and humidity and controls its fan(s) and heater(s) accordingly. When conditions are within normal bounds (between top and bottom temperature settings and below the humidity threshold (see below), DEC3 pulses the heater at a low level to dry the air and eliminate condensation, and runs the fans to change the enclosure air every 30 seconds or so. We call this 'pulse mode', and it is the key to preventing damaging condensation inside your equipment.

If the temperature rises above the top set limit (see below), DEC3 runs the fans to cool it down. In cold conditions, DEC3 will run the heater as required to maintain the bottom set temperature.

Thus, DEC3 maintains a comfortable operating temperature inside the enclosure, and prevents damage from condensation. Users all over the world have found that Tempest enclosures provide an optimal environment for expensive and delicate equipment, in every climate type.

And while doing all of this, DEC3 can tell you what's happening over your RDM network – a real boon in larger installations.

## *Operating Modes*

DEC3 may be run in one of three basic operating configurations. A fourth configuration is provided for test and service use.

**Standalone:** The enclosure operates independently, and automatically, requiring no user intervention. User may set parameters such as temperature and humidity thresholds, and monitor sensor information and DEC status at the DEC3 user interface. Standalone is the default DEC3 shipping mode unless specified otherwise at time of order. DMX is not required or utilized.

### **DMX/RDM Mode 1 (RDM Monitor)**

All of the Standalone features plus the ability to discover and monitor the DEC3 over a DMX512 connection, using RDM.

In this mode, the DEC3 does not need to “see” any DMX to operate. The mode allows the use of RDM to set the various temperature thresholds, and monitor the conditions inside the enclosure remotely. The fixture inside the Tempest enclosure may also be an RDM enabled device.

### **DMX/RDM Mode 2 (DMX Enable)**

All of the Standalone and RDM Monitor features plus the use of a single DMX address (slot) to control the Lamp Relay.

This means that the user is responsible for maintaining a DMX input with the slot (as selected as the DMX START ADDRESS on the DEC3) high. This slot level must be set greater than 50% at all times when the internal fixture is to be powered. This has the useful attribute of enabling the user to remotely force a hard reset of the fixture by opening and then closing the Lamp Relay. It also means that it is unnecessary to feed the enclosure with two power sources (for the enclosure and the luminaire/projector), since the DMX slot may be used to isolate the projector when not in use, without removing power from the enclosure. This mode is recommended for show-control applications, where it is desirable to have power control of the internal fixture, and accidental loss of the DMX data is very unlikely to occur.

In the absence of DMX, the Lamp Relay defaults to “ON”.

All RDM functions are available for configuration and monitoring of the DEC3.

### **DMX/RDM Mode 3 (Service/Test)**

This mode is intended for test and service use.

It gives the user direct control of the lamp, fan and heater relays over DMX. User may NOT override any of the relays in an unsafe direction – for example, if the DEC3 has determined the enclosure is over-temperature and has switched off the lamp relay, the relay may not be overridden ON by DMX. In this sense, DMX ‘piles

on' to DEC3 operation, within defined safety limits. However, until such time as the temperature reaches the TOP limit, the heater may be enabled and the fan disabled, which is why the mode should only be used for Test and Service use.

If the DEC3 has been purchased with DMX/RDM enabled, it is possible to select the required mode 1-3 using RDM. In the RDM context, this is known as selecting the device's DMX PERSONALITY. Setup of the DEC3 from the Front Panel is available in all configurations.



RDM is an effective and powerful tool for commissioning and monitoring an installation, particularly in large systems. For further guidance, we recommend you consult a qualified RDM system integrator. If you don't have one in your neighborhood, go to [www.tempestlighting.com](http://www.tempestlighting.com), and click on the RDM and RDM Integration bug on the home page for some useful contacts. Tempest Lighting warrants DEC3 to be compliant with the RDM standard, but is not an RDM systems integrator, and can offer only basic guidance on RDM utilization.

## DEC3 Control Parameters

DEC3 will run out of the box with its default parameter settings, which equate to the (fixed) settings of its predecessor DEC1 and 2.

Temperature:

Top Set	<i>Range 35-45°C, Default = 40°C</i> Most manufacturers recommend a max temperature for their equipment of 40°C, though this does vary. When DEC3 senses a temperature higher than Top Set, it indicates an overtemp condition as a warning. NOTE: in moving light enclosures the thermal sensor is necessarily placed in the exhaust air path, which will be higher (sometimes a lot higher) than the actual fixture ambient. This needs to be kept in mind when adjusting temperature settings.
Cutoff Temp	<i>Range 0-15°C, Default = 15°C</i> This is a setting <i>above</i> the Top Set temperature that determines the temperature at which the lamp relay is opened, cutting off power from the fixture/projector. The user may reduce it as desired, but should establish before doing so the actual operating temperatures experienced in hot weather before doing so, to avoid nuisance tripping.
Bottom Set	<i>Range 0-10°C, Default = 10°C</i> The temperature maintained by the heater in cold conditions. Most equipment manufacturers recommend a minimum

operating temperature of 0°C, and users may set it lower than the default if desired.

- Humidity      Range 50-90%, *Default 80%*  
The threshold at which incoming air is more aggressively heated to remove moisture. This parameter will not normally require adjustment.
- DMX Set      *Range 001-510, Default 001*  
Sets the DMX address for the lamp relay control. In the DMX/RDM service mode, the subsequent two DMX slots control fan and heater respectively.
- Lamp Hours      *Default 0000*  
DEC3 counts the hours your projector/fixture lamp is on, and can report it both on the user interface display and over RDM. ***Remember to reset to 0 when changing lamps.*** This is provided to allow lamp hours monitoring on devices such as Video Projectors and certain moving lights that have no native RDM or DMX support.

# Setup and Connections

## Operating Mode Setup

Your DEC3 will normally be factory set to the operating mode you specified in your order:

### Operating Mode DIP Switch Settings

Mode	DIPswitch Settings	Mode Summary
Standalone	1-6 OFF	Standalone - no DMX/RDM
DMX/RDM	2 ON, 1, 3-6 OFF	DMX/RDM Modes 1-3 - support for remote monitoring

## DMX Connections

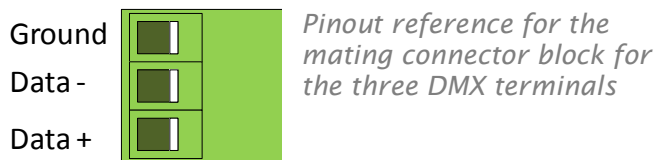
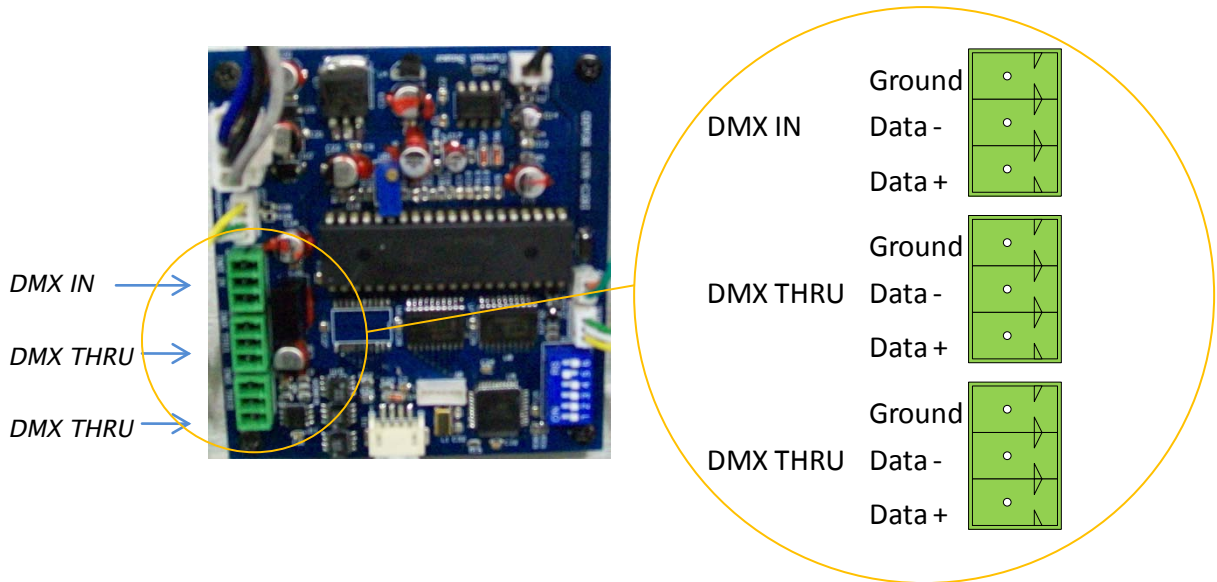
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Note that DMX is optional - in many applications it is not required, and need not be connected.

**DMX IN** - Connect incoming DMX to the 2-part 3-pin terminal on the DEC3 control circuit board so labeled.

Pinout: (1) Ground, (2) Data -, (3) Data +.

**DMX THRU** - there are two DMX pass-through terminals - one for a fixture inside the enclosure, the other to run to the next DMX device in the network. Pinout: same as DMX IN.



## *DMX Line Termination*

DMX cable runs must be terminated at the far end of the cable run with a termination resistor as detailed in the DMX standard. This is particularly important for satisfactory operation of DMX/RDM installations. The individual fixtures installed inside the Tempest enclosures must NOT be terminated. It is recommended that any line termination is done using the 3-pin terminal connector fitted to the DEC3 control circuit board.

1. Make sure that any DMX termination provided by the fixture inside your enclosure(s) is disabled.
2. The LAST enclosure in the installed DMX daisy chain should have a DMX Termination fitted to one of the pass through DMX connectors. Per the ANSI E1.11 standard, the Terminator shall be 120 ohm +5%/-10% impedance placed between Data+ and Data-. We recommend minimum power rating of 0.6W for the resistor.

We recommend that the installer fit a label externally to say "DMX Termination fitted internally".

Test:

3. Switch mains power OFF to all enclosures.
4. Before connecting the DMX line to your controller, measure the impedance between Pin 2 (Data-) and Pin 3(Data+) at the controller end. Reading should be around 100-130 ohms.

This test shows that you have a terminator in place, and also that you have continuity of Data- and Data+ between installed devices. If the measured resistance is significantly less than 100 ohms, (say 40-80 ohms) it suggests you may have multiple terminations in place. Check that any terminator switches on light fixtures are OFF. If impedance is very low, check for wiring shorts.

## *RDM Connections*

RDM refers to ANSI E1.20, a control protocol in the entertainment industry gaining popularity and essentially an "extension" of DMX512. The use of RDM is optional - but it does require a DMX512 cable connection.

## ***Important – RDM and RDM Integration***

RDM (Remote Device Management) is an ANSI standard that adds bidirectional discovery and status monitoring to a standard DMX network connection. No additional wiring is required for RDM operation.

DEC3's RDM implementation allows system integrators to set up remote control and status monitoring of all attributes and sensors, including:

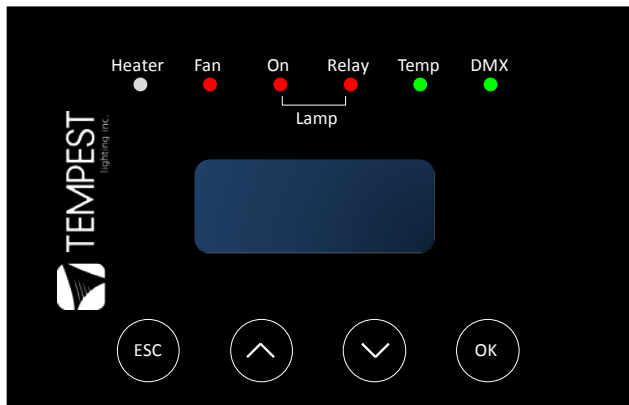
- Temperature
- Humidity
- Lamp Current
- Elapsed Lamp Hours
- Lamp Relay Status
- Fan Relay Status
- Heater Relay Status
- DMX Status
- DMX Start Address
- DMX Personality (RDM Mode)
- Device Type
- Device Label
- Software Version

Tempest Lighting warrants that its RDM products are compliant to the RDM standard, but does not directly support RDM system integration. Tempest Lighting will however provide introductions to qualified RDM system integrators for customers requiring assistance in this area. Links are provided on the Tempest Lighting web site ([www.tempestlighting.com](http://www.tempestlighting.com)).

### **DEC-3 RDM Supported parameters**

DEVICE -INFO  
IDENTIFY -DEVICE  
DMX -START -ADDRESS  
SOFTWARE -VERSION-LABEL  
PARAMETER -DESCRIPTION  
QUEUED -MESSAGE  
STATUS -MESSAGES  
STATUS -ID -DESCRIPTION  
CLEAR -STATUS -ID  
MANUFACTURER -LABEL  
DEVICE -LABEL  
SENSOR -DEFINITION  
SENSOR -VALUE  
LAMP - HOURS  
DEVICE -MODEL -DESCRIPTION  
SLOT -INFO  
SLOT -DESCRIPTION  
DMX -PERSONALITY  
DMX -PERSONALITY -DESCRIPTION  
TOP TEMP  
BOTTOM TEMP  
CUTOFF TEMP

## Control Interface



The control interface features a 2-line display, LED indicators, and 4 cap-sense control buttons.

### LED Indicators

#### Heater

SHORT PULSE (RED) - Indicates lamp is off, and the heater is pulsing to prevent condensation inside the enclosure and projector/light fixture. This is normal operation when the lamp is off and the temperature range is above the bottom set limit.

ON (RED) - Indicates heater is on, due to temperature being below bottom temperature setting when lamp is off.

OFF - indicates lamp is on and maintaining temperature above bottom limit.

#### Fan

SHORT PULSE (RED) - The fan is moving a little air through the enclosure, as part of the condensation prevention strategy. The fan comes on for a few seconds approximately every 30 seconds.

ON (RED) - Indicates fan is running, due to lamp being on or internal temperature exceeding top limit.

#### Lamp Relay

ON (RED) Indicates lamp relay closed and power is available to the internal fixture/projector.

OFF Indicates lamp relay open and power is removed from the internal fixture.

#### Lamp On

ON (RED) Indicates current sensed on the lamp circuit greater than 1 amp (this allows some current to be drawn for such things as fans and control electronics without the Lamp On indicator lighting. When the Lamp On indicator is on, the lamp counter is counting lamp life.

#### Temp

ON (GREEN) - The temperature is between Bottom and Top temperature settings.

FLASHING (RED) - The temperature is above Top setting but has not yet reached the Cutoff level.

ON (RED) - Temperature is above Cutoff level or below Bottom level.

DMX (only used when DMX/RDM setting is in effect)

ON (RED) - DMX error.

ON (GREEN) – Good DMX or RDM data packet received.

## Control Interface Operation

The Control Interface is normally LOCKED.

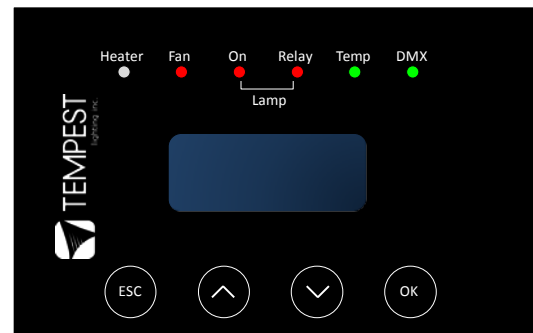
To UNLOCK, touch ESC and OK together for 5 seconds.

You are now in the CONTROL MENU

Use the arrow keys to scroll up and down the menu.

Use OK, to enter a menu item, then the arrow keys to set the item parameter, or to scroll to the next menu level.

Use ESC to back up a level, and OK to confirm settings.



*Depending on the Operating Mode selected, and present status, DEC3's display shows you temperature, humidity, DMX address and a selection of error and status messages.*

### CONTROL MENU

#### DMX SET (if DMX/RDM mode 2 or 3 is selected)

Select a DMX starting address in the range 001 to 510

1 – Lamp Relay

In RDM Mode 3 an addition two slots are required

2 – Fan Relay

3 – Heater Relay

*Note that the DMX control is designed using a SAFETY pile-on Logic. In other words, the DMX input can only override automatic settings in a safe manner. For example, if the enclosure has switched off the lamp relay due to an over-temperature condition, the DMX input cannot switch it on, if the fans are running because of Overtemp, the DMX input cannot turn them off, and so on.*

*The DMX SET menu can be ignored if the DEC3 is in Standalone or DMX/RDM Mode 1 (RDM Monitor) mode.*

#### SET LAMP HOURS TO 0

The lamp hour counter needs to be reset each time you change the lamp in the fixture/projector. Make this a part of your maintenance instructions.

#### STATUS DISPLAY

View Temperature (in Celsius) and Relative Humidity (in %) inside the enclosure. Note that in Tornado moving light enclosures the temp/humidity sensor is located in the exhaust airflow, which may be significantly warmer than ambient.

#### HUMIDITY SET

The humidity level above which the heater kicks in to remove humidity from incoming air (default 80%, permissible range 50-90%). This setting should not normally be changed.

#### TEMP SET

Set three temperature trigger points for Top, Cutoff and Bottom temperatures.

##### TOP TEMP

The desired upper temperature limit for normal operation (default 40°C, permissible range 35-45°C).

When the DEC3 sees air above this temperature, but below the additional Cutoff temperature (see below), it indicates a temperature error. This is not dangerous, but may reduce lamp life.

#### **CUTOFF TEMP**

The desired upper temperature ABOVE the TOP TEMP setting, at which the lamp relay is forced to open, isolating the fixture/projector power.

(default 15°C, permissible range 0-15°C).

To avoid nuisance tripping, set this variable to the maximum, and monitor actual temperatures in your normal operating conditions. If your actual temperatures are running lower, then you may reduce the cutoff temperature margin. In hot climates, it may be advisable to set both TOP TEMP and CUTOFF TEMP as high as possible.

#### **BOTTOM TEMP**

The desired lower temperature limit for normal operation

(default 10°C, permissible range 0-10°C).

Note that a higher BOTTOM TEMP may provide additional protection against condensation in some conditions, but will consume more energy. Therefore a lower setting is desirable, provided the user is certain that no condensation is occurring.


#### **RDM MODE SET**

The RDM Mode is normally set using RDM commands from a remote RDM control device to set the DMX PERSONALITY of the DEC3.

From the DEC3 user interface, this menu item allows the user to check (and if necessary alter) the RDM mode. Please ensure that the DEC3 is NOT unintentionally left in Mode3 (Service/Test).

## 5 *Mounting the Luminaire - Tornado 2000, 2200, 2300*


Having mounted and wired the enclosure, the next step is to mount the luminaire into it. More specific instructions are given in the luminaire-specific instructions

-  Do not attempt to mount the luminaire with only a single person. Handling the luminaire safely requires two people.
- 1 If the globe is on the enclosure, remove it and place it in a safe location.
- 2 Make sure that the power switch of the luminaire is in the off position.
- 3 Carefully load the luminaire into the enclosure and hold in place so that the holes line up.
- 4 Place appropriate bolts through holes as indicated in the luminaire-specific instructions. Tighten bolts down to hold luminaire in place.
- 5 Safety cable the luminaire to the box yoke of the enclosure.
- 6 Plug the luminaire into the power receptacle in the enclosure, and then connect the DMX cables to the luminaire
- 7 Tie down cables (to luminaire or mounting brackets) so that they will not come into contact with the heater or fans at any point.

The fixture bracket is slotted to accept all standard fixture omega clamps. Use two per fixture.

**Congratulations! Your system is now ready to check out.**

## 6 *Activation and Checkout*

-  When the enclosure is powered, the heater will get hot and the fans will turn periodically (see section 4). Keep hands and any other objects away from these areas before applying power.
- 1 Clear the enclosure and luminaire of all debris. If your enclosure is being powered by only one supply line, skip to Step 5.
  - 2 Make sure that the power switch on the luminaire is in the on position.
  - 3 **If the enclosure has been connected with two power supply lines**, turn on the supply for the luminaire. If connected properly, nothing should appear to turn on at this point. Because of the automatic luminaire shutdown feature when the climate control is not functioning, the luminaire should not come on. If the luminaire or temperature control unit comes on, shut off the power and check your supply line wiring. If the supply line wiring is correct, contact technical support for assistance. If everything is working properly, shut off the power and continue to the next step.
  4. **If the enclosure has been connected with two power supply lines**, turn on the supply for the enclosure. The control panel will cycle through its initialization sequence and then display the internal temperature (in °C) Humidity (in %) and DMX address, if DMX mode is active. The heater indicator should be flashing, and the fans will turn for a few seconds approximately every 30 seconds. If all is operating correctly, turn on the supply for the luminaire and proceed to Step 6.
  - 5 **If the enclosure has been connected with only one power supply line**, turn on the supply. The control panel will cycle through its initialization sequence and then display the internal temperature (in °C) Humidity (in %) and DMX address, if DMX mode is active. The heater indicator should be flashing, and the fans will turn for a few seconds approximately every 30 seconds. If all is operating correctly, turn on the luminaire power switch. If temperature is in the normal range (see section 4), your fixture should start. Proceed to Step 6.
  - 6 The exact status of the luminaire depends on the DMX signal present, but there should be an indication that power is connected to it. If no indication is present, shut down **all** power supplies and check your wiring. If it is present, continue to the next step.
  - 7 Test the luminaire by sending DMX signals to it, in accordance with the luminaire manual. If it does not respond, check your DMX control wiring. If it responds properly, continue to the next step.
  - 8 Place the globe back on the enclosure and lock it down. The installation is complete.

### **Note**

**Enclosure can be locked with a padlock at this time. Only qualified personnel should be accessing the enclosure.**

## 7 *Operation*

- ① Enclosure must receive power at all times. It is an active, climate-controlled enclosure, and will not provide proper protection for the luminaire inside if it is not connected to AC power.
- ① Unless the enclosure or luminaire is undergoing routine maintenance, the globe should be in place and locked down at all times.
- ① Only authorized personnel should open the enclosure (see maintenance warnings in the next chapter).
- ① If the ambient temperature is high enough, the over-temperature shutdown feature may engage and temporarily cut off power to the luminaire. Once the temperature reaches acceptable levels, power will be automatically restored.
- ① **Do not** routinely operate luminaire in full sun in warm weather. Black luminaires absorb a significant amount of energy from the sun and may overheat in these conditions. The enclosure has not been designed to protect the luminaire when running in this kind of extreme condition (keep in mind outside lighting is generally used at night).






## 8 Routine Maintenance

It is very important to perform routine maintenance on both the enclosure and the luminaire within. Failure to do so may reduce lifetime for both the enclosure and the luminaire.

### Note

*Maintenance schedules depend on location and environment. The times given here are simply general minimum guidelines for you to use. It is up to you to judge whether maintenance should be done more often. We do advise doing these tasks no less often than mentioned here.*

### Safety

-  As the enclosure is a powered unit with moving parts, it is necessary to keep safety in mind while performing routine maintenance. Although maintenance can be performed while the enclosure is powered, it is safer to carry it out with the power disconnected with proper lockout and tag out procedures followed.
-  Be aware that once the enclosure has had power applied to it, the heater will get hot and the fans will start to turn. Make sure that your hands are clear of these areas before applying power to the enclosure.
-  Only authorized personnel should perform maintenance on the enclosure or luminaire
-  Do not service the unit in the rain or other adverse weather conditions (snow, sleet, high winds, etc.).
-  Be aware that the globe is a large object that can be awkward to handle, especially when standing on a ladder or scaffolding.

### Inspection Checklist: - Every Three (3) Months

- All weep (drain) holes should be clear
- All vents should be free of debris
- Enclosure should be free of debris both inside and out
- Bolts should be tight
- All safety cable should be in good condition
- Lid seal should be in good condition, Check seal inside and out for gaps.
- Globe should not be cracked
- Fans should be moving (it will be necessary to have the power on to check this), with corresponding indicator status

Except for the last two items (concerning globe and fan), problems with any of these things can be easily remedied. Contact technical support for problems with the last two items.

### **Air Filters - Every Three (3) Months**

The air filters all around the base should be removed and cleaned on a regular basis. To remove filters, pull them directly out of their grooves. The filters can be cleaned by running water from a hose and do not require any special solution.

To reinstall, push filter back into place between the top and bottom base covers.

### **Case and Globe - As Needed**

The outside of the case and globe should be cleaned as needed. Outside inspection should give you a good idea of when this is necessary. The case should be cleaned with a wet cloth and mild detergent (if necessary). Do not use a direct spray from a hose to clean the case. The globe can be cleaned with any mild cleaner. It is also acceptable to treat globe with a product that keeps rain from adhering to its surface.

**DO NOT USE hydrocarbon-based cleaners on the globe under any circumstances.** They can severely damage the globe material.

### **Luminaire**

Review the manufacturer's instructions for proper maintenance of your luminaire. Remember, the enclosure simply protects the luminaire and is not a substitute for regular maintenance.

## 9 *Troubleshooting*

This is a guide to the general symptoms, problems, and solutions that may occur during the lifetime of your enclosure. However, it is important to remember that problems may occur within the luminaire itself and these must also be considered.

### **Luminaire does not have power.**

Check power switch of luminaire. (Note: the following actions should be performed by a licensed electrician) If power is on, check wiring (including metering supply voltages, enclosure must receive 200-240VAC to operate properly). If LEDs on the DEC3 control panel controller are lit, check the Lamp Relay LED. If it is on, meter power in receptacle. If no power is present at the receptacle, contact technical support.

In case of over-temperature, the power disconnection is an intended function of the enclosure and is for the protection of the luminaire, which is not meant to operate in extreme conditions. In this case, the problem will only continue until temperature drops to acceptable levels. It is possible that the air intake or exhaust has become clogged, leading to higher temperatures inside the enclosure. Make sure that these areas are clear, the filters are clean, and the fans are working properly.

### **Luminaire turns on and off repeatedly**

Check that vent areas and airways are clear. If so, ambient temperature may be too high (see over-temperature note above) or luminaire may have internal problem.

### **Luminaire does not respond to DMX signal.**

Make sure that luminaire has power. If so, check DMX wiring. If not, see above.

### **Fans are not spinning.**

Fan cords may have become disconnected. Check connections between fan and cord.

Fans may be obstructed. Shut off power to enclosure and check for obstructions. Turn power back on to see if fans will start spinning. If fans do not turn and display on temperature controller is lit, contact technical support. If fans do not turn display is not lit, then enclosure is not receiving power. Turn off all power and check wiring. If the wiring is correct, contact technical support.

### **Excessive debris in unit.**

Filter may not be fully pushed into groove. Make sure that it is in place around the whole unit.

### **Excessive water in enclosure.**

Weep (drain) holes may be clogged. Clear them.

### **Latches do not latch properly.**

Closure of globe may be obstructed. Check to make sure perimeter is clear before replacing globe.

## 10 Limited Warranty

### What is covered. Exclusions.

Unless otherwise stated, your product is covered by a one (1) year parts and labor limited warranty. Factory-painted product is not guaranteed against scratches. It is the Owner's responsibility to furnish receipts or invoices for verification of purchase date, and dealer or distributor. If purchase date cannot be provided, date of manufacture will be used to determine start of warranty period. Unless otherwise specifically stated in writing, all warranty work is carried out at the Tempest Lighting factory. In the event that the Owner purchases any optionally available on-site check-out or turn-on services, Owner agrees to provide facilities to perform such services at ground level. Tempest Lighting does not in any way offer any warranty for the luminaire.

### Owner Responsibility for Installation.

Tempest Lighting makes no recommendations for mounting any Tempest Lighting product. It is the sole responsibility of the Owner to perform any necessary structural, electrical, environmental or other appropriate analysis prior to installing any Tempest Lighting product.

### Returning an Item Under Warranty for Repair.

It is necessary to obtain a Return Material Authorization number (RMA#) from your dealer or point of purchase BEFORE any units are returned for repair. The manufacturer will make the final determination as to whether or not the unit is covered by warranty.

Any Product unit or parts returned to Tempest Lighting, Inc., must be packaged in a suitable manner to ensure the protection of such Product unit or parts, and such package shall be clearly and prominently marked to indicate that the package contains returned Product units or parts and with a Return Material Authorization (RMA#) number. Accompany all returned Product units or parts with a written explanation of the problem or malfunction.

***NOTE: Freight Damage Claims are invalid for fixtures shipped in non-factory boxes and packing materials. These materials can be supplied if requested, at additional cost. It is recommended that all packaging material be retained for possible re-use.***

### Freight.

All shipping charges must be prepaid by the Owner. Items under warranty shall have return shipping paid by the manufacturer only in the Continental United States. Under no circumstances will freight collect shipments be accepted. Prepaid return shipping does not include expediting such as airfreight. Airfreight will ship customer collect.

REPAIR OR REPLACEMENT AS PROVIDED FOR UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. TEMPEST LIGHTING, INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO ANY PRODUCT, AND TEMPEST LIGHTING SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEMPEST LIGHTING

SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGE, INCLUDING LOST PROFITS, SUSTAINED OR INCURRED IN CONNECTION WITH ANY PRODUCT OR CAUSED BY PRODUCT DEFECTS OR THE PARTIAL OR TOTAL FAILURE OF ANY PRODUCT REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE, AND WHETHER OR NOT SUCH DAMAGES WERE FORESEEN OF UNFORESEEN.

Warranty is void if the product is misused, damaged, modified in any way, or where unauthorized repairs or parts have been employed. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

#### Tempest Product Support.

Step 1: First contact your local Dealer for support. Your dealer is best placed to respond quickly to your needs.

Step 2: If your dealer is unable to answer your questions please contact

Tempest Lighting  
13110 Saticoy Street  
North Hollywood, CA 91605, USA  
Tel +1 818 787 8984  
Fax +1 818 982 5582  
[info@tempestlighting.com](mailto:info@tempestlighting.com)

Visit our web site for current information and specifications:

[www.tempestlighting.com](http://www.tempestlighting.com)

## ***12 Registration***

Filling out the registration form on the next page and sending it to the Tempest Lighting factory within 30 days of installation entitles you to the warranty cover specified in this manual. It also enables us to notify you in case of important news or post-sale information regarding the Tornado Lighting Enclosure.

## ***Tornado Enclosure Registration Form***

Detach and mail/fax to:

Tempest Lighting, Inc., 13110 Saticoy St., N Hollywood, CA 91605

Fax # +1 818 982 5582

If a Tempest Representative has not inspected the installation, please send photos showing installation.

Model Number: .....RETROFIT.....

Serial Number: .....

Latch Key Number: .....

Dealer/Sold By

Name: .....

Location: .....

Date Purchased: .....

Contractor/Installed By

Name: .....

Date Installed: .....

Location Installed: .....

Company/Organization

Name: .....

Street Address: .....

City, State, ZIP, Country:

.....

Phone: .....

Fax: .....

Contact Information

Name: .....

Phone: .....

Extension: .....

Fax: .....

E-mail: .....