



# What's Connected?

## Unique Global Dimmer Load Survey Delivers Surprising Results

By Steve Terry

In early 2005, as part of our product development efforts, the marketing and R&D groups at ETC began thinking about the current global state of dimmer loading and sizing in performance lighting systems. Because of our role as the manufacturer of Source Four® lighting fixtures, we knew that the global uptake of 575-watt lamps in performance lighting systems has been significant over the last 13 years. Somewhat surprisingly, we saw no apparent change in direction of dimmer capacities that might reflect the large worldwide usage of 575-watt lamps. This caused us to scratch our heads. We had plenty of anecdotal evidence that the market trend was towards higher dimmer quantities and light dimmer loading. We needed a relatively easy method of proving or disproving our anecdotal evidence. And in order to be believable to ourselves and to the industry, we needed to gather enough data to be statistically meaningful. In initial discussions, we felt that 100,000 dimmers of connected load data would give us a representative sample.

Previous efforts to characterize dimmer system loading have focused on system feeder currents during performance, with a view to right-sizing feeders and air conditioning systems. The typical method of gathering data was to send a measurement team out with a recording three-phase ammeter to various performance venues. Feeder current data was gathered during a performance and then compared with the nameplate rating (maximum possible current) of the dimmer system. These efforts were of limited success due to high cost, cumbersome equipment connection methods, lack of volunteer time to do the work, and no good method of coordinating the effort.

We reasoned that in order to gather effective dimmer loading data in great volume, a simpler approach was needed. It had to be painless, and we needed help from hundreds, not tens of people. First, we worked the problem from the dimmers themselves, not the system feeders. For every show, in every venue, we concluded that someone must know how much load was plugged into every dimmer. Second, we devised a pain-free Web-based survey method of reporting dimmer loads (see below). Finally, we added the carrot of a small gift and an opportunity to win a drawing for ETC product to those that responded to the survey.

As a reference,  
Please name your first production.

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Choose only one that best describes.  
What best describes the type of venue for the first production you will be reporting about?

- Broadway
- Educational
- Not for profit
- Touring (Road House)
- Regional
- Opera House
- Concert Hall
- TV studio
- Film
- Theme park
- Other

Fig. 1

Choose only one that best describes.  
What title would best describe your role in this production.

- Lighting Designer/Consultant
- Assistant Lighting Designer/Consultant
- Technical Director
- Electrician
- Console Programmer/Operator
- Other

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You must select one answer.  
What voltage was the lighting system for this production? \*

- 100V Japan
- 120V North America
- 230/240V EU and other areas

**ONLY CLICK "Continue" FOR SURVEY NAVIGATION**  
Do NOT use the browser "Back" button!

Fig. 2

### What's your connection?

Tell us about the number of dimmers in your system and their power capacity.

Enter the number of dimmers available in the lighting system for your first production.

2500W Dimmers

3000W Dimmers

Other Dimmers

[0]

Fig. 3

How many dimmers were loaded to the watt ranges listed?

Enter the number of 2500W and 3000W dimmers you loaded at each range. Do the same for other dimmers you may have.

Total of dimmers entered should EQUAL the TOTAL DIMMERS AVAILABLE from the previous question.

Leave blank if 0.

	No Load	575W 1 watt or less	576- 750W Load	751- 1000W Load	1001- 1150W Load	1151- 1500W Load	1501W 1 watt or more
2500W Dimmers	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3000W Dimmers	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other Dimmers	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Fig. 4

## An Avalanche Response

We publicized the survey in the trade press and through various industry Web sites. In addition, our staff worked on an outreach to various lighting designers and production electricians, who provided connected load data for productions by sending us Lightwright™ files containing the data.

At the end of the day, the response was overwhelming. We received data from a total of 480 individuals, consisting of 736 unique shows and 642 discrete dimming systems. We received connected load data for a total of 119,862 show/dimmers. We defined a show/dimmer as the connected load for a given dimmer for a particular production. Thus, if a respondent was reporting about a system of 500 dimmers, and provided data on four separate shows, that translated to 2000 show/dimmers.

Everyone we talked to, from theater consultants to lighting designers to electricians, immediately grasped the goal of the survey and came up with significant data. We want to thank each and every person who took the time and energy to participate in this important effort.

## Who Responded and Where are They Located?

The survey respondents cover a wide range of performance venues. The breakdown by show/dimmers for each market and voltage (120V is assumed to be North America, while 230/240V is assumed to be “the rest of the world, excluding Japan”) looks like this:

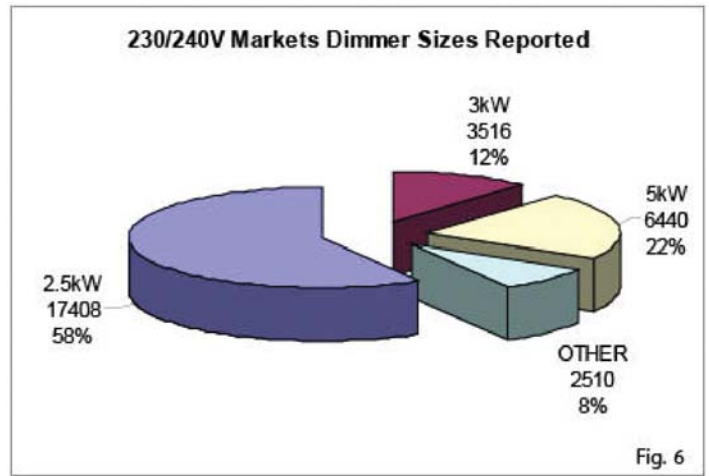
<b>120V MARKET</b>	<b>Show/dimmers Reported</b>	<b>Percent 120V Show/dimmers</b>	<b>Shows Reported</b>	<b>Systems Reported</b>
Broadway	18836	20.93%	53	53
Educational	21459	23.85%	160	130
Non Profit	6804	7.56%	71	56
Touring	5726	6.36%	34	31
Regional	12422	13.80%	60	45
Opera House	3821	4.25%	9	5
Concert	3500	3.89%	24	22
TV Studio	2473	2.75%	8	8
Film	4182	4.65%	8	8
Theme Park	1591	1.77%	7	7
Place of Worship	2733	3.04%	27	27
Industrial	5191	5.77%	30	30
Other	1250	1.39%	13	13
<b>120V TOTAL</b>	<b>89988</b>	<b>100.00%</b>	<b>504</b>	<b>435</b>

<b>230/240V MARKET</b>	<b>Show/dimmers Reported</b>	<b>Percent 230/240V Show/dimmers</b>	<b>Shows Reported</b>	<b>Systems Reported</b>
Broadway	1180	3.95%	5	5
Educational	2012	6.73%	38	36
Non Profit	1033	3.46%	23	22
Touring	2058	6.89%	26	26
Regional	8457	28.31%	53	45
Opera House	6413	21.47%	14	10
Concert	3173	10.62%	33	24
TV Studio	2121	7.10%	13	12
Film	1131	3.79%	2	2
Theme Park	414	1.39%	2	2
Place of Worship	389	1.30%	6	6
Industrial	1043	3.49%	11	11
Other	450	1.51%	6	6
<b>230/240V TOTAL</b>	<b>29874</b>	<b>100.00%</b>	<b>232</b>	<b>207</b>

<b>GLOBAL SUMMARY</b>			
<b>Show/dimmers Reported</b>	<b>Shows Reported</b>	<b>Systems Reported</b>	<b>Individual Respondents</b>
<b>119862</b>	<b>736</b>	<b>642</b>	<b>480</b>

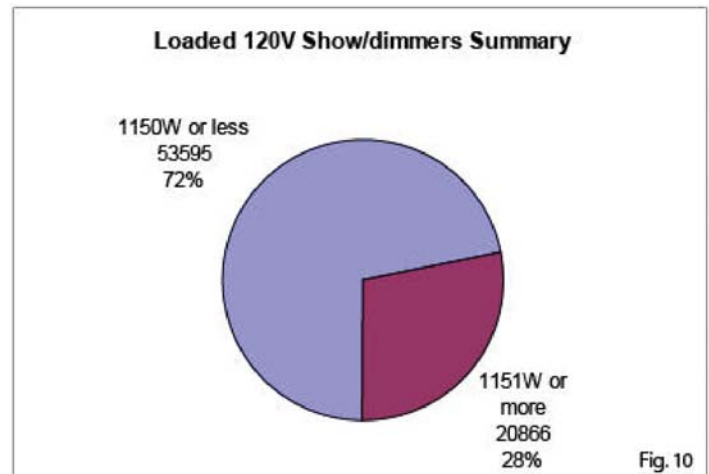
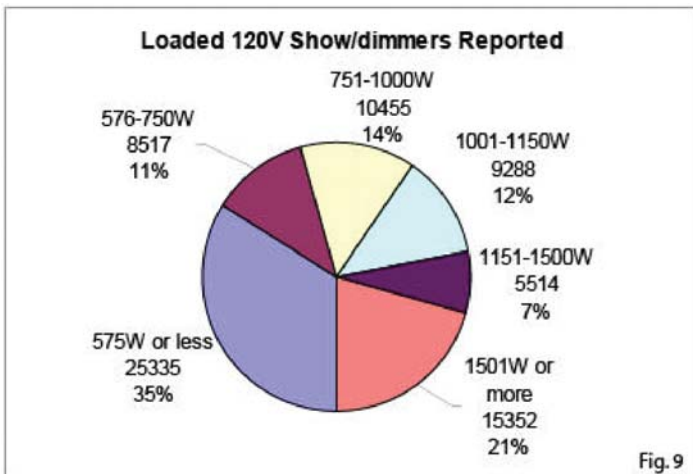
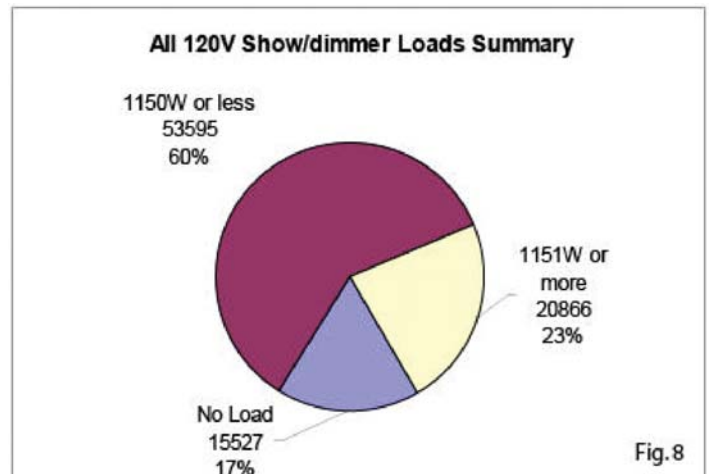
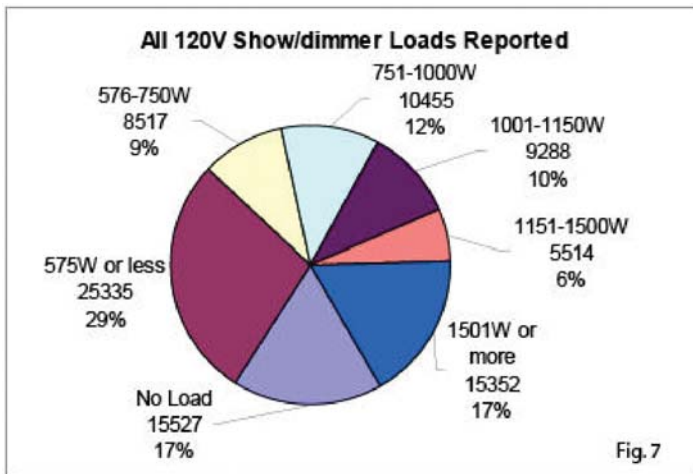
## What Size Dimmers are People Using?

The charts below show the breakdown of dimmer sizes reported. Perhaps not surprisingly, 2.4kW is the leader in the 120-volt markets with 91% of the reported dimmers. Likewise, 2.5kW is king in the 230/240-volt markets, with 58% of the reported dimmers.



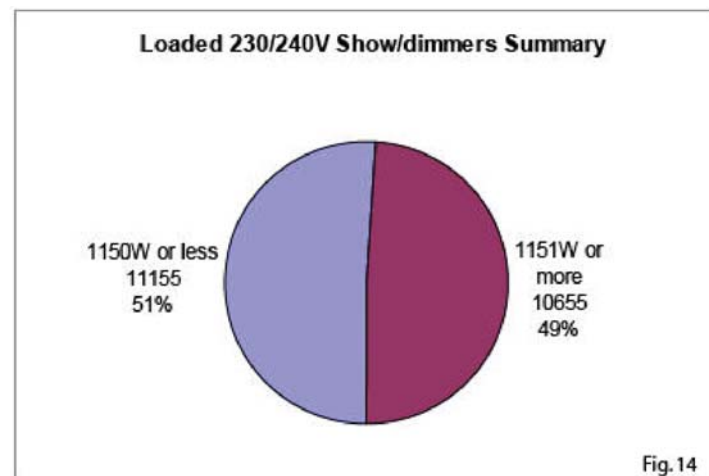
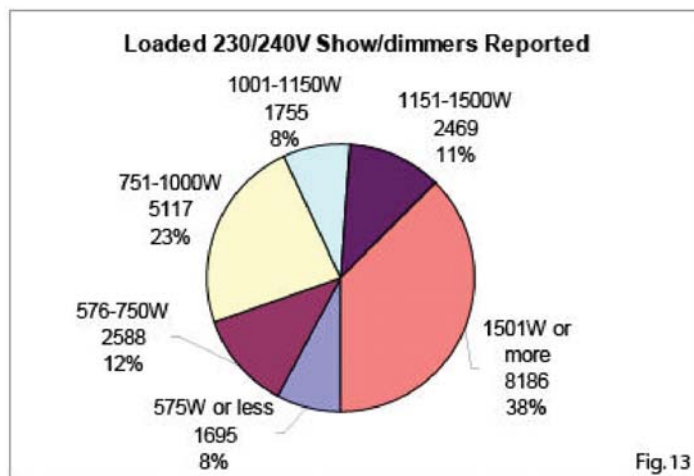
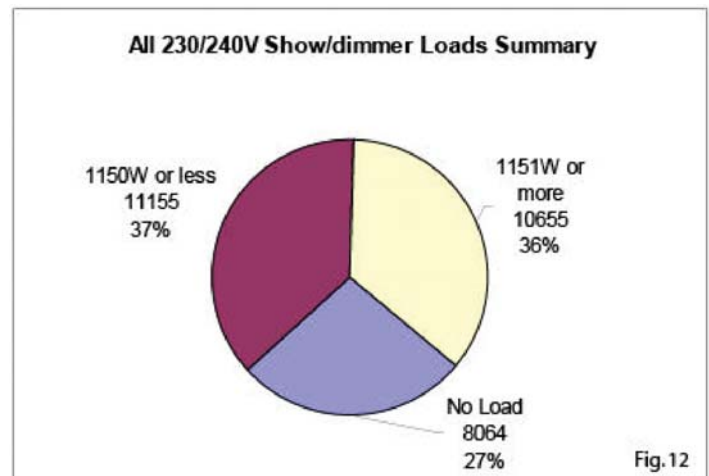
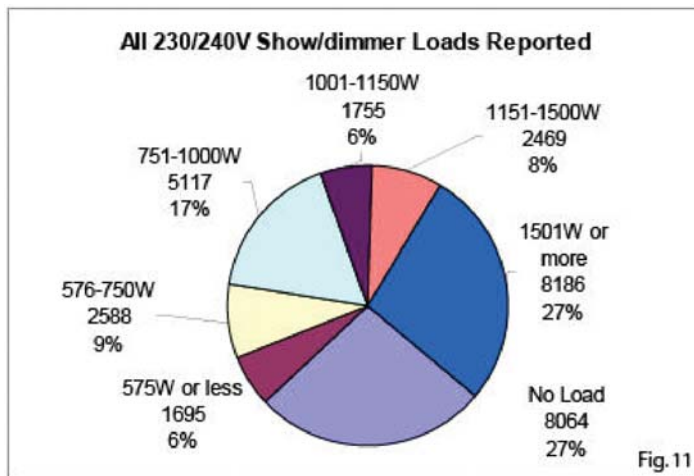
## What is the Dimmer Loading?

The answer to this question contains the meat of the whole survey effort. The figures below show the results for the 120-volt market and 230/240-volt markets in detail and in summary. When we identify percentages here, we refer to the 120-volt and 230/240-volt markets as separate entities. The data speaks for itself, but some results are notable:



## Loading of 120-Volt Systems

- In the 120-volt market, 72% of loaded show/dimmers reported are loaded at 1150 watts or below. 28% of loaded show/dimmers reported are loaded at 1151 watts or above.
- 17% of total reported show/dimmers in the 120-volt market have no load at all. This is useful in evaluating whether dimming systems are too large or small by dimmer count, but a dimmer with no load cannot be characterized as “1150 watts or below,” since “no load” is a unique category.



## Loading of 230/240-Volt Systems

- In the 230/240-volt market, 51% of loaded show/dimmers reported are loaded at 1150 watts or below. 49% of loaded show/dimmers reported are loaded at 1151 watts or above.
- 27% of total reported show/dimmers in the 230/240-volt market have no load at all. This is useful in evaluating whether dimming systems are too large or small by dimmer count, but a dimmer with no load cannot be characterized as “1150 watts or below,” since “no load” is a unique category.

## Why is the 1150-Watt Number Interesting?

We believe that the load survey data can be viewed in the context of “1150 watts or less” and “1151 watts or more,” for the following reasons:

- The majority of the dimmer loads reported in the 120-volt market were 1150 watts or less, by a significant margin. In the 230/240V markets, 1150 watts or less was also the majority, but by a smaller margin.
- 1150 watts represents a load approximately half the capacity of the most popular 120-volt and 230/240-volt dimmers. Therefore, if a future reduction in dimmer capacity were made to right-size for 1150 watt loads, it would be a material reduction of at least 50%.

## Food For Thought

We are pleased to present the results of this load survey to the lighting industry as a way of starting a dialogue about dimmer sizing. We believe the data speaks for itself, but what is it saying? Here are some further questions to kick off a dialogue:

- Is there now a real requirement for 1.2kW dimmers in the performance space? As new technologies like sine wave dimming emerge, perhaps the over-sizing of dimmers that we are used to becomes a luxury in terms of cost and space. With SCR dimming, such over-sizing carries very little penalty, but a 2.4kW sine wave dimmer is four times the size of a 1.2kW dimmer and is significantly more expensive. One way to make sine wave dimming technology more accessible would be to right-size it to the loads being used. The load survey results suggest that 1.2kW might be right-sized for a significant percentage of loads.
- If 1.2kW dimmers look desirable for a big percentage of loads, what's the best method of deploying 2.4 kW dimmers where needed in the performance space? It seems to us that 2.4kW dimmers are not going away, and will always be needed for some of the higher power loads like cyc lights, strip lights, and 2kW fresnels. But where to put them and in what quantity? Some possibilities might include distributed dimming at or near the load, flexible cable distribution rather than hard raceways, or a percentage of 2.4kW dimmers at each physical location where there are outlets.
- Will 1.2kW dimmers have a cost-ripple effect in wiring and cooling a performance space? Even though the Code allows feeding a dimming system based on the connected load, and the air conditioning requirements are supposedly based on that connected load, it seems likely that current feeders and cooling plants are being somewhat oversized. There could be material savings in right-sizing feeders, branch circuit wiring, and air conditioning to match the move from 2.4kW to 1.2kW dimmers for a significant number of circuits.

We believe the next step is to listen to end users, specifiers, and theatre consultants. We welcome your reaction to this article.



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