

Zhaga's New Housing Strategy Simplifies Interchangeability of Electronic Control Gear

Norbert Wittig, Panasonic Lighting Europe, describes the mechanical outlines of electronic control gear (ECG) and the Zhaga “New Housing Strategy” using the example of a spot LED light engine according to “Book 3 - Spot LED Light Engine with Separate Electronic Control Gear”.

The Zhaga consortium has created several interface specifications for LED light sources. One of these interface specifications is called “Book 3: Spot LED Light Engine with Separate Electronic Control Gear”. Book 3 defines the interface between a luminaire and an LED light source consisting of a round, 50 mm diameter, LED module and its associated electronic control gear (driver) in separate housings.

LED light sources that comply with “Book 3” are interchangeable. That means that a luminaire manufacturer can replace the light source with another Book 3-compliant light source without any change in the mechanical, thermal, and photometric components of the luminaire.

This article explains the background and the general understanding in Zhaga for the interchangeability of separate ECG used in combination with LED modules which are described in Book 1.

Interchangeability of Electronic Control Gear for Traditional Light Sources

For more than 30 years electronic control gear has been used with traditional light sources like fluorescent or high intensity discharge lamps. So far the safety and performance aspects are standardized but standardization or specification of the dimensions of ECGs under the aspect of inter-changeability are not realized. Over the years hundreds of different housings with different housing design principles (region-dependent) are created around the world. With this undefined interchangeability the freedom of actions for the luminaire manufacturer is restricted.

Interchangeability of Electronic Control Gear - Zhaga Target

Zhaga makes LED Light Engines (LLE = combination of ECG and LED module) inter-changeable. This statement includes also electronic control gear which is separated from the LED modules. In principle the combination of the ECG and the LED

module could be realized in two different ways - as one unit or within separate units for the ECG and the (one or more) LED modules.

Figure 1 shows the two different concepts of LLEs. Figure A is the example for a LLE in one unit. Here the interchangeability is realized with the description of the Zhaga Interface requirements in the related Zhaga Specification for the LLE, while figure B is an example for a LLE consisting of a separate electronic control gear and one LED module. Here the interchangeability is realized with the description of the Zhaga Interface requirements in the related Zhaga specification for the LED module linked with the requirements for the separate electronic control gear specified in Zhaga Book 1.

The interchangeability for a separate electronic control gear is given when the mechanical outlines of the used ECG meet the Zhaga specifications. That ensures that the luminaire manufacturer could also use electronic control gear in the future with the same specified dimensions.

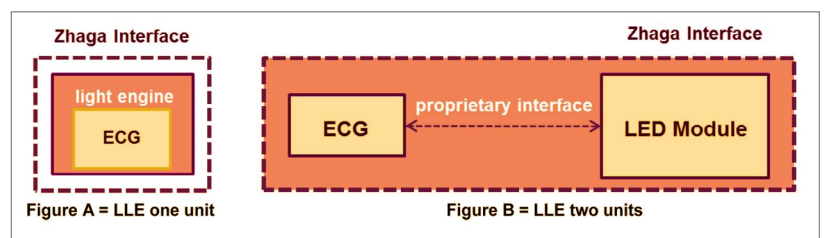


Figure 1: Figure A shows the Zhaga LLE concept with an integrated ECG, while Figure B shows an LLE with separate ECG

Special features are the electrical connections from the electronic control gear to the LED modules (so called “proprietary interface” see Figure B). This proprietary interface is not specified within Zhaga because a lot of functions and information (firmware) could be exchanged between the ECG and the LED module. Therefore, if it is necessary to change a LED module in a luminaire, the electronic control gear may also be changed to accommodate the different firmware requirements of the new LED module. With this background it makes sense not to specify the electrical properties of the electronic control gear.

The mechanical interchangeability of separate electronic control gear is realized in a two step strategy. The first step is called “Existing Common Practice” and the second step “New Zhaga Specification”. The two step strategy is necessary for producing Zhaga compliant luminaires in a short period of time and giving the industry time to develop electronic control gear related to the second step dimensions.

Existing Common Practice Dimensions of ECG

For the first step “Existing Common Practice” Zhaga selected the most widely used electronic control gear sizes from the different regions and listed this dimension in four different tables.

In Zhaga Book 1, the tables are divided into “compact” and “stretched” sizes, both for “built-in” and “independent” electronic control gear:

Table C-1: Designation and dimensions for compact built-in ECGs

Table C-2: Designation and dimensions for stretched built-in ECGs

Table C-3: Designation and dimensions for compact independent ECGs

Table C-4: Designation and dimensions for stretched independent ECGs

ECG Designation	A max. (mm)	B (mm)	C max. (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H max. (mm)	J	Min. screw hole size for:	Stud Size ¹	Type
AS1	103	94	67	58	-	-	-	31	-	M4	-	Type 1
AS3	93	83,5	58	48,5	-	-	-	29	-	M4	-	Type 1
AS5	70	60	95	85	-	-	-	32	-	M4	-	Type 1
AS6	97	87	77	67	-	-	-	30	-	M4	-	Type 1
AS7	98	88,3	44	34,3	-	-	-	32	-	M4	-	Type 2
AS8	102	98	33	15,5	-	-	-	30	-	M4	-	Type 5
AS9	102	-	34	-	-	50,8	-	35	-	-	8-32	Type 3
AM1	110	99	75	64	-	-	-	33	-	M4	-	Type 2
AM2	113	101	79	63	-	-	-	30	-	M3	-	Type 1
AM3	123	111	79	67	-	-	-	33	-	M4	-	Type 1
AM4	126	117	76	15	35	51	28	26	41	M4	8-32	Type 3
AM5	125	116	75	18,5	-	-	-	35	-	M6	-	Type 3
AM6	127	117	70	0	-	-	-	31	-	M4	-	Type 3
AM7	126	116	74	18,5	-	-	-	35	-	M6	-	Type 5
AM8	128	117	76	18,5	29	50,8	29	35	29	M4	8-32	Type 3
AM9	118	113	34	13,5	-	-	-	30	-	M4	-	Type 1
AL1	133	122	77	0	-	-	-	48	-	M4	-	Type 1
AL2	135	124	104	85	-	-	-	34	-	M3	-	Type 1
AL3	141	129	75	64	-	-	-	33	-	M4	-	Type 2
AL4	205	188	96	85	-	-	-	51	-	M3	-	Type 1
AL5	215	204	165	150	-	-	-	50	-	M5	-	Type 8
AL6	250	225	122	112	-	-	-	51	-	M3	-	Type 1
AL7	170	150	105	0	-	-	-	40	-	M4	-	Type 1
AL8	150	130	90	0	-	-	-	40	-	M4	-	Type 1
AL9	161	152	92	73	-	-	-	40	-	M4	-	Type 9
AL10	165	155	70	50	-	-	-	40	-	M4	-	Type 9
AL11	165	153	94	80	-	-	-	35	-	M4	-	Type 2

Table 1: Exemplary extract of the original Zhaga Book 1 Table C-1 - designation and dimensions for compact built-in ECGs. Here the type number starts with A – in Table C-2 the type number with B etc. (¹ designation of stud size is according to [ANSI B1.1])

Figure 2:
A reference drawing as it is used for the tables in the Zhaga Books

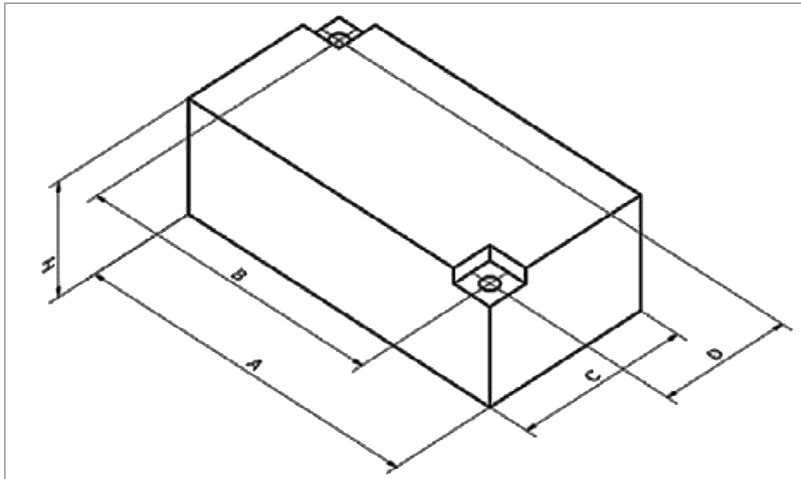
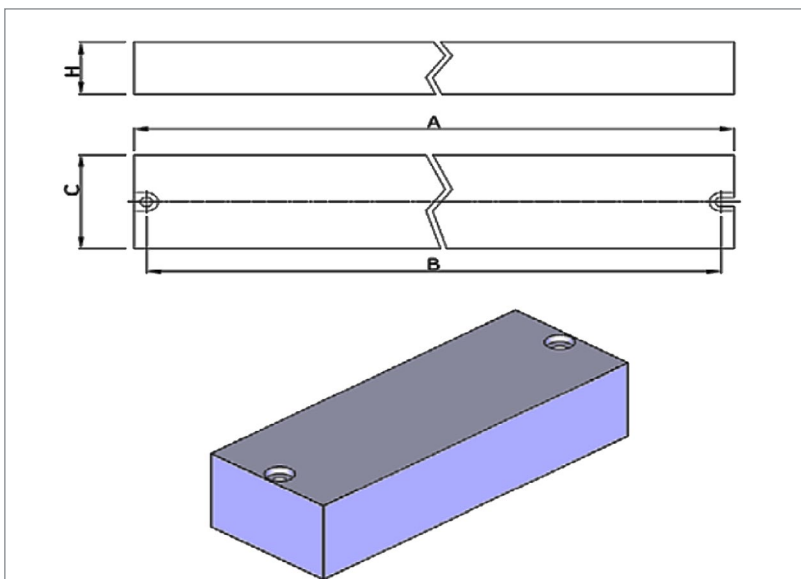


Figure 3:
Example of an ECG designation



The tables contain the maximum dimensions for the length, the height and the width as well as the place and the distances of the fixing holes with the definition of the screw size for the electronic control gear.

The definition of the mechanical interface is described in a reference drawing as indicated in the tables.

For each data set a type number (reference) with max. 4 digits is assigned – ECG designation (extract of Table C-1).

Electronic control gear defined in the tables could have either connectors or flying leads to fulfill the regional performance requirements.

Table 3:
The designation of the ECG housing example

	ZHAGA	Compact / Stretched	Size	Height	Height	Connections: Double / Single
Possible entries	Z	C	1	H	1	D
		S	2		2	S
			3		3	
			4		4	
			5		5	
			6		6	
			7		7	
			8		8	
			9		9	

The Electronic control gear of the table “Existing common practice” is not allowed to carry the Zhaga Logo. The Zhaga certification of electronic control gear is only possible for ECG of step two.

New Zhaga Specification of Electronic Control Gear

The second step of the Zhaga ECG Housing strategy is the “New Zhaga Specification”. There are only two tables “compact” (Table C-5) and “stretched” (Table C-6) defined. Zhaga selected the housing dimensions for the “New Zhaga Specification” in the view of two aspects. First the calculations of the space for the necessary components of ECG power classes and second a logical scheme to reduce the number of ECG housings.

The designation of the ECG housing is defined with max. 6 digits (Table 3).

Example - ZS9 H7 D:

- Z** Zhaga specified ECG housing
- S9** Stretched housing with data set 9
- H5** Indication of the housing height that is rasterized in 5 mm steps
- D** Terminals or flying leads on both ends of the housing

Alternative option:

- S** Terminals or flying leads on one end of the housing

For independent, potted or IP-Protected (higher than IP 20) electronic control gear the same dimensions scheme shall be used.

The following Table C-6 gives a view to the complete ECG designation of stretched electronic control gear under the “New Zhaga Specification”.

At this time only the height indications H3 = 20 mm, H4 = 25 mm, H5 = 30 mm, H6 = 35 mm and H7 = 40 mm are used (in Table C-6) – therefore, there is space for additional heights if needed in the future.

For Table C-5 additionally H8 = 50 mm is used.

ECG Designation	A max. (mm)	B (mm)	C max. (mm)	D (mm)	H max. (mm)	Min. screw hole size for:	Reference drawing
ZS1 H3 D	100	90	50	0	20	M4	Type 4
ZS1 H5 D	100	90	50	0	30	M4	Type 4
ZS2 H4 D	150	140	50	0	25	M4	Type 4
ZS2 H6 D	150	140	50	0	35	M4	Type 4
ZS3 H5 D	200	190	50	0	25	M4	Type 4
ZS3 H6 D	200	190	50	0	35	M4	Type 4
ZS4 H5 D	245	235	50	0	30	M4	Type 4
ZS4 H7 D	245	235	50	0	40	M4	Type 4
ZS5 H5 D	280	270	40	0	30	M4	Type 4
ZS5 H7 D	280	270	40	0	40	M4	Type 4
ZS7 H5 D	360	350	40	0	30	M4	Type 4
ZS7 H7 D	360	350	40	0	40	M4	Type 4
ZS9 H5 D	425	415	40	0	30	M4	Type 4
ZS9 H7 D	425	415	40	0	40	M4	Type 4

Table 3: Type 4 example of table C-6 - designation and dimensions for stretched ECGs of “New Zhaga Specification”

The table C-5 and C-6 containing the maximum dimensions for the lengths, the height and the width as well the place and the distances of the fixing holes with the definition of the screw size for the electronic control gear as well as defined in the tables of the first step.

The definition of the mechanical interface is described in a reference drawing as indicated in the tables (here Type 4 / Figure 3).

Electronic control gear defined in the tables C-5 and C-6 could have either connectors or flying leads to fulfill the regional performance requirements.

Electronic control gear with the ECG-Dimensions listed in the tables “New Zhaga Specification” (C-5 and C-6) and fulfilling the other Zhaga compliance criteria can obtain Zhaga certification and may carry the Zhaga logo. ■

Definitions and References:

LED Light Engine: A combination of on ECG (Electronic Control Gear) and one or more LED modules.

LED Module: A light source that is supplied as a single unit. In addition to one or more LEDs, their mechanical support and their electrical connection, it may contain components to improve its photometric, thermal, mechanical and electrical properties, but it does not include the electronic control gear.

Electronic Control Gear or ECG: A unit that is located between the external power and one or more LED modules to provide the LED module(s) with an appropriate voltage or current. It may consist of one or more separate components, and may include additional functionality, such as means for dimming, power factor correction, and radio interference suppression.

Book 1: This book contain specifications that are common in multiple Zhaga interface specifications, such as: common definitions, the mechanical interface of separated electronic control gear, the generic aspects of the thermal interface. See also: <http://www.zhagastandard.org/specifications/book-1.html>

Book 3: The interface specification for a spotlight LED light engine, consisting of an LED module and an electronic control gear in separate housings. See also: <http://www.zhagastandard.org/specifications/book-3.html>