

# General Technical Details

## Testing Houses

These approval marks indicate Vossloh-Schwabe's contacts with testing houses worldwide to obtain approvals. Our cooperation with national and international committees ensures that we are notified early of any new or amended specifications and therefore that our products are in line with the latest technologies.

If a product is UL-recognized instead of UL-listed the luminaire manufacturer has to ensure that the applicable conditions of acceptability are being maintained.

## Materials and Dimensions

Our technical advice is given to the best of our knowledge and without any obligation; this also applies with respect to any third-party industrial property rights. We reserve the right to make changes to materials, designs and product lines. The details on the product's casing or type plate are always binding.

Manufacturers of luminaires and lighting systems remain responsible for the choice of suitable luminaire components such as ballasts and lampholders, their materials, and the skilled and safe installation of the components with the observance of luminaire and installation regulations.

The product drawings shown in this catalog contain only the essential dimensional details. For reasons of space and clarity, we cannot give all dimensions nor the associated tolerances. For the luminaire design, please ask us for our detailed dimension assembly drawings.

Meter Conversions (Metric-US)			Meter Conversions (US-Metric)		
to convert from	to	use formula	to convert from	to	use formula
millimeters (mm)	inches	$mm \times 0.0394$	inch	mm	$inch \times 25.4$
centimeters (cm)	inches	$cm \times 0.394$	inch	cm	$inch \times 2.54$
meters (m)	inches	$m \times 39.4$	inch	m	$inch \times 0.0254$

Weight Conversions			Temperature Conversions		
to convert from	to	use formula	to convert from	to	use formula
lb	kg	$lb \times 0.453$	Celsius (C)	Fahrenheit (F)	$F = 1.8C + 32$
kg	lb	$kg \times 2.20$	Fahrenheit (F)	Celsius (C)	$C = (F - 32) / 1.8$

## Temperature Limits for Plastics

Brief designation	Designation	Max. permitted limit temperature to IEC 60598-1 (°F)
PE	Polyethylene	176*
PP	Polypropylene	212
PA	Polyamide	248
PA GF	Polyamide, glass-fibre reinforced	374*
PC	Polycarbonate	266
PBT GF	Polybutylene terephthalate, glass-fibre reinforced	410*
PET GF	Polyethylene terephthalate, glass-fibre reinforced	464*
PPS	Polyphenol sulphide	500*
LCP GF	Liquid crystal polymer, glass-fibre reinforced	536*/572*

\* According to manufacturer's specification



## Electronic Ballast Limited Warranty

### What this Warranty Covers and for How Long

Vossloh-Schwabe (VS) warrants that all electronic ballasts (the "ballast") will be free from defects in material and workmanship for the time period below as measured from the date of manufacture stamped on the ballast:

- (3) years, or (5) years if the maximum case temperature is less than the values specified on the individual ballast specification sheets.

If the operating time exceeds 4000 hours per year, the warranty time will be based on 12,000 hours and 20,000 hours respectively.

The temperatures stated above shall be determined by installing the ballast in the field condition and testing maximum case hot spot temperatures. If the temperature measured and installed time period does not exceed the conditions above, VS will, at its option, and at no charge, either replace any defective ballast (F.O.B. VS's plant or other point of shipment, with freight allowed within the continental United States, Alaska and Hawaii) or refund the purchase price of any defective ballast, provided it is covered under the terms and conditions of this limited warranty. Any simulated field condition test concerning any, ballast that is claimed to be defective must be mutually agreed upon in writing. VS must be notified of and may be represented at all such tests.

### Warranty Conditions

VS extends this limited warranty only to the original purchaser or the first purchaser who is an end user. That is the complete warranty for the ballast by VS. Unless it is provided for in a separate agreement between you and VS. VS does not warranty the installation, maintenance, or service of the ballast.

VS cannot be responsible for any ancillary equipment not furnished by VS, which is attached to or used in connection with the ballast, or for the operation of the ballast with any ancillary equipment, and all such equipment is expressly excluded from this limited warranty. Furthermore, VS cannot be responsible for any damage to the ballast resulting from the use of ancillary equipment not furnished by VS for use with the ballast.

### What this Warranty Does Not Cover

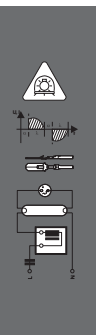
This limited warranty is, and the remedies set forth herein are, conditional to the proper storage, installation, use and maintenance of the ballast and conformance with any recommendations of VS. In particular, this warranty is not applicable to any ballast that is not installed and operated in accordance with:

- The National Electrical Code (NEC)
- Federal, state and local codes
- The Standards for Safety of Underwriters Laboratories, Inc. (UL)
- The standards of the American National Standards Institutes (ANSI)
- VS Application Guidelines

### How to Obtain Warranty Service

If it appears within the time periods above from the date of manufacture that an installed ballast does not meet the limited warranty set forth above, the purchaser must notify VS at 1-888-427-6628, of its warranty claim, and, after receiving proper authorization, return the ballast to the nearest VS Ballast Warranty Service location.

VS will pay actual and reasonable labor expenses for the replacement of the defective ballast up to a maximum of \$25.00 per ballast provided that VS has satisfied itself that the ballast was in fact, defective, and was operated, used, and maintained in accordance with VS's published instructions. Only one labor replacement allowance shall be payable per ballast.



# General Technical Details

## Electronic Ballast Limited Warranty

### General Provisions

This limited warranty sets forth all of VS's responsibilities regarding the ballast. Your exclusive remedy is replacement of the ballast or refund of the purchase price, at VS' option.

This warranty is given in lieu of all other express warranties. Implied warranties, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, are limited to the duration of this warranty. In no event shall VS be liable for damages in excess of the purchase price of the ballast, for any loss of use, of time, inconvenience, commercial loss, lost profits or savings or other incidental, special or consequential damages arising out of the use or inability to use such ballast to the full extent that may be disclaimed by law.

### State Law Rights

Some states do not allow the exclusion or limitation of consequential or incidental damages, or how long an implied warranty lasts. Therefore the limitations or exclusions of consequential or incidental damages and implied warranties set forth herein may not apply to you. This warranty gives you specific legal rights, and you also have other rights which vary from state to state.

## VS Warranty for Magnetic Ballasts, Magnetic Transformers and Lampholders

Vossloh-Schwabe provides a warranty of 3 years on VS magnetic ballasts, VS magnetic transformers and VS lampholders.

Vossloh-Schwabe provides an extended five-year manufacturer's warranty as long as the lighting system was designed and installed according to all applicable local norms and standards, and only if technical parameters defined by VS were observed in the respective luminaires, e.g. temperature limits, lead lengths, circuits, etc.

This extended warranty only applies if the respective lighting system is registered with Vossloh-Schwabe within 90 days following the delivery (invoice) date.

You can find the registration form at <http://vossloh-schwabe.com/eng/unternehmen/131.php>

# Glossary

## **AG DALI**

Action group for Digital Addressable Lighting Interface (Aktionsgemeinschaft Digital Addressable Lighting Interface).

## **Analogue Interface 1–10 V**

Bipolar interface of dimmable operating devices with a built-in constant current source.

## **ANSI**

American National Standards Institute

## **A Type, B Type Capacitors**

The requirements of the safety standard for capacitors differentiates between capacitor types; A type capacitors stand for plastic can capacitors; B type capacitors stand for aluminum can capacitors.

## **Average Service Life**

Specified service life of electronic operating devices with a failure rate per unit of time.

## **Capacitive Circuit (series compensation)**

Circuit of an inductive ballast with a capacitor connected in series.

## **CELMA**

Association of European component and luminaire manufacturers (Committee of E.E.C. Luminaire Components Manufacturers Association).

## **CE Mark**

European regulation governing all products that are introduced to the market. Products must comply with the respective EC directives.

## **CENELEC**

European committee for electronic standardisation (Comité Européen de Normalisation Electrotechnique).

## **CISPR**

International special commission for radio interference (Comité International Spécial des Perturbations Radioélectriques).

## **Compensation Capacitors**

The power factor can be increased to a value of 0.9–0.98 by using compensation capacitors.

## **Compensated Circuit (parallel compensation)**

Circuit of an inductive ballast with a capacitor between phase and neutral conductor.

## **Conformity Declaration**

Documentation for an operating device or a luminaire regarding compliance with European directives; this documentation is for submission to national supervisory authorities (e.g. regulation authority for telecommunications and post (Reg. TP) or trade supervisory authorities).

## **Converters**

Electronic converter (electronic conversion of line in extra-low voltage) to generate operating voltage for low-voltage halogen lamps.

## **Creepage and Air Clearance Distances**

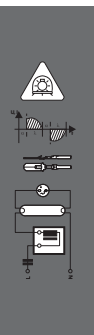
Regulation minimum distances between voltage-carrying components of different polarity or between voltage-carrying components and the accessible casing surfaces (air clearance: shortest distance through air; creepage distance: shortest distance across a surface).

## **Cross Discharge**

Discharge in the lamp electrode region during preheating.

## **CSA**

Canadian Standards Association



# Glossary

## **DALI**

Digital interface for controlling dimmable electronic operating devices (Digital Addressable Lighting Interface).

## **$\Delta t$**

Increase in the winding temperature during the operation of a ballast (the ballast is mounted on 75 mm high wooden blocks and its temperature is measured at an ambient temperature of 25°C).

## **$\Delta t_{an}$**

Temperature increase during short-circuit operation (e.g. defective starter, defective lamp).

## **DIAL**

German institute for applied lighting technology (Deutsches Institut für Angewandte Lichttechnik), Lüdenscheid, Germany.

## **DKE**

German electrotechnical commission of the DIN and VDE.

## **EC Directives**

Regulations (laws) of the European Community that have to be transposed into national laws within a prescribed period of time.

## **Efficiency**

Ratio of power output in relation to power input.

## **ELC**

European Lamp Companies Federation

## **EMC**

Electromagnetic compatibility

## **ENEC Agreement**

Agreement between the European testing institutes for issuing the European test mark.

## **ENEC Mark**

Marking for a device that complies with the European standards and that was tested by a testing institute that is a part of the ENEC agreement (European Norms of Electrical Certification).

## **Energy Classification EEI**

Assignment of ballasts to energy classes (Energy Efficiency Index).

## **Error Current**

Current that is caused by a fault in the insulation or via creepage or air clearance distances.

## **Error Current Protection Switch**

Evaluates the magnitude of the error current and switches the circuit off if a predefined maximum value is reached.

## **Feed-through of Line Voltage**

Operating device with the option of connecting two conductors to one connection terminal so that an electrical connection can be effected to another device.

## **FEP Capacitors**

Flame- and explosion-proof capacitors with a contact breaker.

### **FGL**

Promotion Society for Good Lighting (Fördergemeinschaft Gutes Licht – ZVEI)

### **Function Protection Conductor**

It may be necessary to connect a "function protection conductor" to ensure compliance with the EMC requirements or as a starting aid for lamps; VS operating devices are suitably marked.

### **IDC Terminal (ALF terminal)**

IDC-type connection terminal (Insulation Displacement Connection) for automatic luminaire fabrication (ALF terminal).

### **IEC**

International Electrotechnical Commission

### **ILCOS Lamp Designation System**

International IEC marking system for lamps.

### **Illuminance $E_v$**

Illuminance  $E_v$  is the luminous flux density on an area illuminated by luminous flux  $\Phi_v$ . The unit is lux [ $lx=lm/m^2$ ], with luminous flux in [lm] and area in [ $m^2$ ]. Illuminance  $E_v$  forms the basis for all lighting calculations and designs.

### **Impedance**

Impedance is a conductor's apparent resistance to an alternating current.

### **IMQ**

Italian institute for quality marking; at the same time, the mark of conformity with standards (Istituto Italiano del Marchio di Qualità).

### **Independent Lamp Operation**

Possibility of operating a single lamp with a multi-lamp operating device after the other lamps have failed.

### **Independent Operating Device**

Operating device that does not have to be installed in a casing; the safety regulations are fulfilled by the operating device itself.

### **Inductance**

Inductance establishes the relationship between the current and the magnetic flux caused by it in a conductor configuration taking into account all design and material influences.

### **Inductive Circuit**

Operation of a fluorescent lamp with a magnetic ballast without a capacitor.

### **Interference**

Interference signals emitted by operating devices via the line voltage or the air.

### **Interference Immunity**

Property of an operating device to remain fully functional despite interference emitted by other operating devices.

### **IP Numbers**

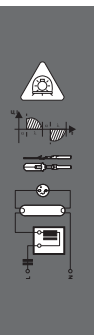
Code system for marking the protection level of an operating device or a luminaire against moisture or foreign bodies entering (the first figure stands for foreign bodies and the second for moisture).

### **IPP Technology**

Generating the ignition voltage required for high-pressure lamps using the special intelligent pulse pause technology.

### **LBS Lamp Designation System**

Marking system for lamps, established for Europe.



# Glossary

## Leak Current

Current of an operating device or a luminaire that is discharged via the potential compensation conductor (earth conductor).

## LiTG

German Association for Lighting Technology (Deutsche Lichttechnische Gesellschaft)

## Luminance L

Luminance L is the luminous intensity density of an area that emits or reflects light with a certain emission angle. The unit of luminance L is  $[\text{cd}/\text{m}^2]$  and is the photo-technical measure that corresponds to the subjective perception of the level of brightness of a light source or an object, while luminous flux  $\Phi$ , luminous intensity I and illuminance E are not visible, i.e. not sensed by the human eye. Light only becomes visible when it hits an object that it is either reflected by or penetrates in a diffused manner. Objects of different levels of brightness therefore only seem to be darker or brighter at same illuminance because they reflect the light differently.

## Luminous Efficiency / Efficiency / Efficacy

Ratio of luminous flux to power input ( $\text{lm}/\text{W}$ ).

## Luminous Flux $\Phi$ (photon radiation)

Luminous flux  $\Phi$  is the radiated/emitted light power in lumen  $[\text{lm}]$ , a unit of measurement for the number of light photons emitted in all directions. Luminous flux is the photometrical light output perceived by the human eye.

## Luminous Intensity I

Luminous intensity I in  $[\text{cd}]$  is decisive for characterising an LED and is defined as a quotient of the emitted luminous flux  $\Phi$  and the radiated area of the solid angle  $\Omega$ . Luminous intensity I is thus the focused luminous flux  $\Phi$  within the radiated solid angle  $\Omega$ . Today's LEDs can reach a luminous intensity of more than  $I=10\text{cd}$ . The luminous intensity value depends on the viewing angle, i.e. the luminous intensity of an LED chip in a  $30^\circ$  reflector will be higher than that of an identical LED chip in a  $60^\circ$  reflector. This is because a  $60^\circ$  reflector results in the same luminous flux  $\Phi$  having to illuminate a larger area.

## Master/Slave Circuit

Operating several lamps in different luminaires with one ballast.

## $\mu\text{F}$

Unit of capacitance (microfarad)

## MPP Capacitors

Metallised polypropylene film dielectric capacitors.

## Parallel-compensated Circuits

Circuit of an inductive ballast with a capacitor between phase and neutral conductor (connected in parallel to the lamp circuit).

## Part Load Range

Variable load range up to the maximum rated load.

## Phase-cutting Leading-edge Control

In accordance with the defined angle, voltage regions are suppressed of the positive and negative sinusoidal oscillations of the line voltage in an upwards direction starting with the voltage zero crossing.

## Phase-cutting Trailing-edge Control

In accordance with the defined angle, voltage regions are suppressed of the positive and negative sinusoidal oscillations of the line voltage in a reverse direction starting with the voltage zero crossing.

## Pinch Temperature

This is measured at a defined point of the lamp base; the permissible maximum values are internationally determined.

### Polyester Resin Impregnation

High-grade vacuum impregnation with polyester resin.

### Power Factor

Ratio of true power to apparent power (total power).

Lambda expresses the power factor for non-sinusoidal currents and voltages. In contrast,  $\cos \varphi$  (phi) expresses the power factor for sinusoidal currents or voltages.

### PUSH

Key-operated bipolar interface of VS electronic ballasts for controlling the brightness of connected lamps.

### Pulse Ignition

Generation of the ignition voltage for high-pressure lamps with the help of ballasts (ballast insulation must match the ignition voltage).

### Safety Transformer

Isolation transformer for supplying circuits with safety extra-low voltages.

### SELV

Safety extra-low voltage.

### Short-circuit-proof

Short-circuit-proof operating devices do not pose a safety risk if a short-circuit occurs at the output of the operating device; a difference is made between operating devices offering limited and unlimited protection against short-circuit; in the case of operating devices with limited short-circuit protection, an additional mechanism has to be installed.

### Solid Angle $\Omega$

Solid angle  $\Omega$  is the area within a sphere that is pervaded by the light emitted by a light source. The steradian (sr) is the unit of measure for solid angle, whereby  $1 \text{ sr} = 65.5^\circ$ . This describes a cone with its peak in the light source and a beam spread angle of  $65.5^\circ$ . A whole solid angle is expressed as  $4\pi \text{ sr} = 12.56 \text{ sr}$ .

### Standards

VS products comply with the regulations of the following European standards:

Electronic ballasts for fluorescent lamps:

EN 60928, EN 61347-1, EN 61347-2-3, EN 60929, EN 55015, EN 61547, EN 61000-3-2

Electronic ballasts for high intensity discharge lamps:

EN 61347-1, Draft EN 61347-2-12, EN 55015, EN 61547, EN 61000-3-2

Electronic converters:

EN 61347-1, EN 61347-2-2, EN 61047, EN 55015, EN 61547, EN 61000-3-2

Electromagnetic ballasts:

EN 61347-1, EN 61347-2-8, EN 61347-2-9, EN 60921, EN 60923, EN 50294, EN 55015, EN 61547, EN 61000-3-2

Electromagnetic transformers:

EN 61558-1, EN 61558-2-6, EN 55015, EN 61547, EN 61000-3-2

Ignitors:

EN 61347-1, EN 61347-2, EN 60927, EN 55015, EN 61547, EN 61000-3-2

Capacitors:

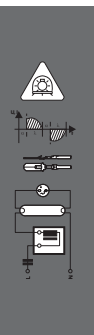
EN 61048, EN 61049

Lampholders:

EN 60238, EN 60400, EN 60838-1, EN 61184, EN 60399

### Stroboscopic Effect

Optical illusion whereby objects appear either to be moving or stationary in contrast to their actual state when illuminated by periodically alternating light.



# Glossary

## **Superimposed Ignition**

Generation of the ignition voltage required for high-pressure lamps by the ignitor independent of the ballast (superimposed over the line voltage).

## **System power consumption**

Total power input of lamp and operating device (in Watt).

## **Tandem circuit**

Series connection of two fluorescent lamps using a single ballast.

## **$t_a$**

Permissible ambient temperature range.

## **$t_c$**

Maximum operating temperature of the casing at the marked measuring point.

## **Temperature Details**

The temperature details on our ballasts are always maximum values; these are based on the maximum voltage values given on the type plate.

## **Thermal Classes**

Classification of transformers according to the degree of heat resistance offered by the insulation materials.

## **Thermal Cut-out**

Protection from overheating due to abnormal lamp conditions (rectifier effect, short-circuit and overload), with automatic restart after cooling.

## **Total Harmonic Distortion**

Input current distortion caused by higher frequency current components.

## **Transient Overvoltages**

Voltage peaks that briefly occur and are superimposed over the line voltage.

## **T Rating**

Rated value of the lampholder's maximum operating temperature (e.g. T130).

## **Tungsten-halogen Cycle**

In the outer, cooler part of the lamp, the halogen combines with the tungsten vapour released by the filament to form a tungsten-halogen molecule which then decomposes and deposits the tungsten on the filament.

## **$t_w$**

Maximum permissible winding temperature.

## **UL, UL Approval**

Underwriters' Laboratories Inc., USA; US conformity mark for safety.

## **VDE Mark**

Safety mark on the basis of the German safety standard for electrical equipment; tested by the VDE-PZI (Verband Deutscher Elektrotechniker – Prüf- und Zertifizierungsinstitut).

## **Winding Temperature**

Temperature of the copper winding in a magnetic ballast; the change in winding temperature is measured using the change of the resistance of the copper winding.

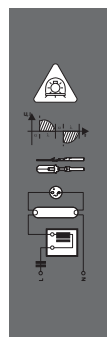
## **ZVEI**

Central association of the electrotechnical and electronics industry in Germany (Zentralverband Elektrotechnik- und Elektronikindustrie e.V.).

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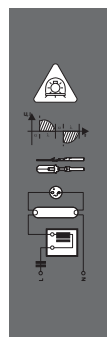
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