

Light is OSRAM

OSRAM

OPTOTRONIC® 4DIMLT2 Familie

Applikationshinweise zum DC-Betrieb

Die 4DIM Produktfamilie der OSRAM OPTOTRONIC® Outdoor LED Treiber kann in Kombination mit Zentralbatteriesystemen verwendet werden. Die folgenden Hinweise müssen beachtet werden:

- Gültiger DC-Eingangsspannungsbereich: **176V – 276V DC**
- Im DC-Betrieb ist eine **zusätzliche DC-Sicherung** fachgerecht vor dem Gerät zu installieren. Beispiel: 477 Serie, 5×20 mm, zeitverzögerte Sicherung (Slo-Blo®), Stromstärke: 3,15 A. Hierdurch verringert sich der differentielle Überspannungsschutz auf 2kV. Ein zusätzlicher Überspannungsschutz kann die ursprüngliche Stoßspannungsfestigkeit wieder herstellen. Der asymmetrische Überspannungsschutz bleibt unverändert.
- Im DC-Betrieb reduziert der LED Treiber die **Ausgangsleistung** automatisch auf **75%** der maximal möglichen AC-Ausgangsleistung. Das Verhalten des Treibers kann mittels der Tuner4TRONIC Software angepasst werden. Während des DC-Betriebes sind DALI-Funktionen, der Dimmbetrieb und die "End-of-life"-Funktion deaktiviert.

Folgende Systemkombinationen sind freigegeben:

EATON	DALI Baustein V-CG-SB 1	Stromwertüberwachung ZB-S
INOTEC	DALI Baustein DALI SV	Stromwertüberwachung CP/SKE
GESSLER	DALI Baustein LB1/009DD	
OT 40/120-277/1A0 4DIMLT2 E (ab IC: AA6427505DG) OT 60/170-240/1A0 4DIMLT2 E (ab IC: AA6748504DG) OT 90/170-240/1A0 4DIMLT2 E (ab IC: AA6640806DG) OT 165/170-240/1A0 4DIMLT2 E (ab IC: AA6748603DG) OT 20/170-240/1A0 4DIMLT2 G2 CE OT 40/170-240/1A0 4DIMLT2 G2 CE OT 75/170-240/1A0 4DIMLT2 G2 CE OT 110/170-240/1A0 4DIMLT2 G2 CE	<ul style="list-style-type: none"> • Kompatibel mit externer DC Sicherung • LED Treiber muss auf DALI Betrieb programmiert sein 	<ul style="list-style-type: none"> • Kompatibel mit externer DC Sicherung • Um die Genauigkeit der Stromwertüberwachung zu erhöhen, sollten max. 5 Leuchten pro Stromkreis angeschlossen werden

Die ON/OFF- Bausteine von EATON V-CG-S oder INOTEC J-SV sind nicht kompatibel mit der OT 4 DIM-Familie.

Hinweise:

Beachten Sie bei der Auslegung einer Leuchte für den DC-Betrieb die Einhaltung der Anforderungen entsprechend der Norm IEC 60598-2-22 (Norm für Leuchten für die Notbeleuchtung). Werden kompatible Geräte für den DC-Betrieb benötigt muss die Bestellung auf IC (Ident Code) Level erfolgen. Die aktuelle Version Ihres Gerätes können Sie dem Geräteaufdruck entnehmen:



Bitte beachten Sie:

Alle Informationen in diesem Leitfaden wurden mit größter Sorgfalt erstellt. OSRAM übernimmt jedoch keine Haftung für mögliche Fehler, Änderungen und/oder Auslassungen und keine Haftung für Schäden, die durch die Verwendung oder im Vertrauen auf den Inhalt dieses Leitfadens entstehen. Die Informationen in diesem Leitfaden spiegeln den Wissensstand am Tag seiner Veröffentlichung wider. Bitte überprüfen Sie auf www.osram.de, ob eine aktualisierte Version dieses Leitfadens erhältlich ist oder wenden Sie sich hierfür an Ihren Vertriebspartner. Dieser Leitfaden dient ausschließlich zu Informationszwecken, um Sie dabei zu unterstützen, die Herausforderungen der Technologie zu meistern und die Möglichkeiten der Technologie auszuschöpfen. Bitte beachten Sie, dass dieser Leitfaden auf eigenen Messungen, Tests, spezifischen Parametern und Annahmen beruht.

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Requirements for dimmable DALI control gears for fluorescent lamps and LED

Manufacturer: OSRAM GmbH Marcel-Breuer-Str. 6 D-80807 München	Type / description: LED control gear: OT 40/120-277/1A0 4DIMLT2 E (IC: AA6427505DG)		
Features:	CEAG data:	Comment:	Complies: (Yes/No)
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery) 186V - 275V DC (for NiCD-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	Yes
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	Yes
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	Necessary for an individual monitoring. $\Delta I < 12,5 \text{ mA}$ per luminaire, with max. 20 luminaires per circuit $\Delta I \text{ sum} < 250 \text{ mA}$	Yes
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	not relevant
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	not relevant
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	Yes
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	Yes
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	Yes
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current $\leq 16 \text{ A}$ per phase)	Yes
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	Yes
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207*	Control gear must have the DALI Logo	Yes

Note: VDE 0108 is not a standard for ECG, marking is not applicable

Features:	CEAG-Data:	Comment:	Manufacturer's instructions:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver	Yes
<u>Important for DC light output:</u> Behavior in DC operation: - Unlocked DC light output level - Locked DC light output level	DC light output settings on V-CG-SB.1 only active if control gear is unlocked!	In case of locked DC light output level, the DC level of V-CG-SB.1 is not active !	Unlocked DC [x] Locked DC []
<u>Important for lighting design:</u> If locked DC light output the lightout level in % is required	No control of light output level from V-CG-SB.1 in DC operation possible!	Locked light output level in %, e.g. 15%	100%
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A	Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	45A / 180 μs
<u>Important for lighting design:</u> Luminous flux ratio: DC-operation at 186 V in comparison to 230 V AC operation	-	Light output In battery operation of the ballast, for the light calculation	100%

Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)

*Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo

Note: Special LED-driver for outdoor application, which has only an integrated AC rated fuse. **For DC-operation an additional external fuse is required.** For the DC operation a fixed output level could be set via the Tuner4Tronic software.

Not suitable with SKU 4x1.5A CG-S, SOU CG-S/S+ and SU S+

In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.

Date: 20.Oct.2014

Requirements for dimmable DALI control gears for fluorescent lamps and LED

Manufacturer: OSRAM GmbH Marcel-Breuer-Str. 6 D-80807 München		Type / description: LED control gear: OT 60/170-240/1A0 4DIMLT2E (IC: AA6748504DG)	
Features:	CEAG data:	Comment:	Complies: (Yes/No)
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery) 186V - 275V DC (for NiCd-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	Yes
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	Yes
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	Necessary for an individual monitoring. $\Delta I < 12,5 \text{ mA}$ per luminaire, with max. 20 luminaires per circuit $\Delta I \text{ sum} < 250 \text{ mA}$	Yes
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	not relevant
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	not relevant
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	Yes
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	Yes
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	Yes
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current $\leq 16 \text{ A}$ per phase)	Yes
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	Yes
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207*	Control gear must have the DALI Logo	Yes

Note: VDE 0108 is not a standard for ECG, marking is not applicable

Features:	CEAG-Data:	Comment:	Manufacturer's instructions:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver	Yes
<u>Important for DC light output:</u> Behavior in DC operation: - Unlocked DC light output level - Locked DC light output level	DC light output settings on V-CG-SB.1 only active if control gear is unlocked!	In case of locked DC light output level, the DC level of V-CG-SB.1 is not active !	Unlocked DC [x] Locked DC []
<u>Important for lighting design:</u> If locked DC light output the lightout level in % is required	No control of light output level from V-CG-SB.1 in DC operation possible!	Locked light output level in %, e.g. 15%	100% ***)
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A	Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	53A / 200 μs
<u>Important for lighting design:</u> Luminous flux ratio: DC-operation at 186 V in comparison to 230 V AC operation	-	Light output In battery operation of the ballast, for the light calculation	100% ***)

Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)

*Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo

Note: Special LED-driver for outdoor application, which has only an integrated AC rated fuse. **For DC-operation an additional external fuse is required.** For the DC operation a fixed output level could be set via the Tuner4Tronic software. (***) If the connected load is 75% of the maximum rated output power.

Not suitable with SKU 4x1.5A CG.S, SOU CG-S/S+ and SU S+

In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.

Date: 20.Oct.2014

Requirements for dimmable DALI control gears for fluorescent lamps and LED

Manufacturer: OSRAM GmbH Marcel-Breuer-Str. 6 D-80807 München		Type / description: LED control gear: OT 90/170-240/1A0 4DIMLT2 E (IC: AA6640806DG)	
Features:	CEAG data:	Comment:	Complies: (Yes/No)
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery) 186V - 275V DC (for NiCD-Battery)	Possible voltage range of the battery in emergency mode. <i>(Not for AT-S* Systems required)</i>	Yes
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	Yes
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	Necessary for an individual monitoring. $\Delta I < 12,5 \text{ mA}$ per luminaire, with max. 20 luminaires per circuit $\Delta I \text{ sum} < 250 \text{ mA}$	Yes
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	not relevant
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	not relevant
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	Yes
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	Yes
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	Yes
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current $\leq 16 \text{ A}$ per phase)	Yes
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	Yes
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207*	Control gear must have the DALI Logo	Yes

Note: VDE 0108 is not a standard for ECG, marking is not applicable

Features:	CEAG-Data:	Comment:	Manufacturer's instructions:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver	Yes
<u>Important for DC light output:</u> Behavior in DC operation: - Unlocked DC light output level - Locked DC light output level	DC light output settings on V-CG-SB.1 only active if control gear is unlocked!	In case of locked DC light output level, the DC level of V-CG-SB.1 is not active !	Unlocked DC [x] Locked DC []
<u>Important for lighting design:</u> If locked DC light output the lightout level in % is required	No control of light output level from V-CG-SB.1 in DC operation possible!	Locked light output level in %, e.g. 15%	100% ***)
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A	Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	57A / 210µs
<u>Important for lighting design:</u> Luminous flux ratio: DC-operation at 186 V in comparison to 230 V AC operation	-	Light output In battery operation of the ballast, for the light calculation	100% ***)

Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)

*Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo

Note: Special LED-driver for outdoor application, which has only an integrated AC rated fuse. **For DC-operation an additional external fuse is required.** For DC operation a fixed output level could be set via the Tuner4Tronic software. (***) If the connected load is 75% of the maximum rated output power.

Not suitable with SKU 4x1.5A CG.S, SOU CG-S/S+ and SU S+

In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.

Date: 20.Oct.2014

Requirements for dimmable DALI control gears for fluorescent lamps and LED

Manufacturer: OSRAM GmbH Marcel-Breuer-Str. 6 D-80807 München	Type / description: LED control gear: OT 165/170-240/1A0 4DIMLT2 E (IC: AA6748603DG)		
Features:	CEAG data:	Comment:	Complies: (Yes/No)
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery) 186V - 275V DC (for NiCD-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	Yes
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	Yes
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	Necessary for an individual monitoring. $\Delta I < 12,5 \text{ mA}$ per luminaire, with max. 20 luminaires per circuit $\Delta I \text{ sum} < 250 \text{ mA}$	Yes
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	not relevant
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	not relevant
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	Yes
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	Yes
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	Yes
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current $\leq 16 \text{ A}$ per phase)	Yes
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	Yes
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207*	Control gear must have the DALI Logo	Yes

Note: VDE 0108 is not a standard for ECG, marking is not applicable

Features:	CEAG-Data:	Comment:	Manufacturer's instructions:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver	Yes
<u>Important for DC light output:</u> Behavior in DC operation: - Unlocked DC light output level - Locked DC light output level	DC light output settings on V-CG-SB.1 only active if control gear is unlocked!	In case of locked DC light output level, the DC level of V-CG-SB.1 is not active !	Unlocked DC [x] Locked DC []
<u>Important for lighting design:</u> If locked DC light output the lightout level in % is required	No control of light output level from V-CG-SB.1 in DC operation possible!	Locked light output level in %, e.g. 15%	100% ***)
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A	Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	62A / 330 μs
<u>Important for lighting design:</u> Luminous flux ratio: DC-operation at 186 V in comparison to 230 V AC operation	-	Light output In battery operation of the ballast, for the light calculation	100% ***)

Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)

*Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo

Note: Special LED-driver for outdoor application, which has only an integrated AC rated fuse. **For DC-operation an additional external fuse is required.** For DC operation a fixed output level could be set via the Tuner4Tronic software. (***) If the connected load is 75% of the maximum rated output power.

Not suitable with SKU 4x1.5A CG-S, SOU CG-S//S+ and SU S+

In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.

Date: 20.Oct.2014

Requirements for dimmable DALI control gears for fluorescent lamps and LED

Version 0

Manufacturer: Osram GmbH Marcel-Breuer-Straße 6 D-80807 München	Type / description: ECG-type: Ot 20/170-240/1A0 4DIMLT2 G2 CE (ident code: AM04626)		
Features:	CEAG data:	Comment:	Complies: (Yes/No)
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery) 186V - 275V DC (for NiCD-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	Yes
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	Yes
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	Necessary for an individual monitoring. $\Delta I < 12,5 \text{ mA}$ per luminaire, with max. 20 luminaires per circuit $\Delta I \text{ sum} < 250 \text{ mA}$	Yes
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	not relevant
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	not relevant
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	Yes
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	Yes
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	Yes
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current $\leq 16 \text{ A}$ per phase)	Yes
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	(*3) Yes
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207	Control gear must have the DALI Logo	(*1) Yes
<small>Note: VDE 0108 is not a standard for ECG, marking is not applicable</small>			
Features:	CEAG-Data:	Comment:	Manufacturer's instructions:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver	Yes
<u>Important for DC light output:</u> Behavior in DC operation: - Unlocked DC light output level - Locked DC light output level	DC light output settings on V-CG-SB.1 only active if control gear is unlocked!	In case of locked DC light output level, the DC level of V-CG-SB.1 is not active !	Unlocked DC [x] Locked DC []
<u>Important for lighting design:</u> If locked DC light output the lightout level in % is required	No control of light output level from V-CG-SB.1 in DC operation possible!	Locked light output level in %, e.g. 15%	(*2)100%
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 4 x 1,5A CG-S => 60 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A SOU CG-S // S* => 250 A SU S* => 250 A	Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	Ip=22,5A / Th=142µs
<u>Important for lighting design:</u> Luminous flux ratio: DC-operation at 186 V in comparison to 230 V AC operation	-	Light output In battery operation of the ballast, for the light calculation	(*2) 100%
Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)			
*1: Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo			
*2: The DC Output Level is not locked in DC Mode to 100% of current Light Level , it is possible to lock with DALI magic and Tuner 4 Tronic			
*3: Not to be used in high risk areas, special release required			
Max. 1 DALI- Driver to wire with 1 V-CG-SB.1			
In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.			
Date: 25. Januar.2018			

Requirements for electronic non-dimmable control gears for fluorescent lamps and LED



Manufacturer:
OSRAM GmbH
Marcel-Breuer Str. 6
D-80807 München

Product:
Ot 20/170-240/1A0 4DIMLT2 G2 CE



LED controller type	Values for load range	In in AC-operation (230V) / mA (trms)	In in AC-operation (240V) / mA (trms)	In in DC-operation (186V) / mA (trms)	In in DC-operation (216V) / mA (trms)	In in DC-operation (240V) / mA (trms)	In in DC-operation (260V) / mA (trms)
Ot 20/170-240/1A0 4DIMLT2 G2 CE	Umin, Imin	25,08	25,07	20,87	18,10	16,37	15,35
	Umin, Imax	50,11	47,08	57,46	49,84	44,55	41,14
	Umax, Imin	49,56	48,31	56,30	48,53	43,61	40,33
	Umax, Imax	127,70	120,69	119,73	102,90	92,08	85,17
	Open Load	12,95	15,50	2,25	2,22	2,25	2,26
	Short Load	14,25	17,58	6,03	4,80	4,83	7,78

Maximum inrush current for ECG in AC Operation

I_{peak}= 22,5 A
T_H= 142 μs

Requirements for dimmable DALI control gears for fluorescent lamps and LED

Version 0

Manufacturer: Osram GmbH Marcel-Breuer-Straße 6 D-80807 München	Type / description: ECG-type: Ot 40/170-240/1A0 4DIMLT2 G2 CE (ident code: AM04628)		
Features:	CEAG data:	Comment:	Complies: (Yes/No)
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery) 186V - 275V DC (for NiCD-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	Yes
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	Yes
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	Necessary for an individual monitoring. $\Delta I < 12,5 \text{ mA}$ per luminaire, with max. 20 luminaires per circuit $\Delta I \text{ sum} < 250 \text{ mA}$	Yes
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	not relevant
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	not relevant
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	Yes
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	Yes
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	Yes
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current $\leq 16 \text{ A}$ per phase)	Yes
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	(*3) Yes
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207	Control gear must have the DALI Logo	(*1) Yes
<small>Note: VDE 0108 is not a standard for ECG, marking is not applicable</small>			
Features:	CEAG-Data:	Comment:	Manufacturer's instructions:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver	Yes
<u>Important for DC light output:</u> Behavior in DC operation: - Unlocked DC light output level - Locked DC light output level	DC light output settings on V-CG-SB.1 only active if control gear is unlocked!	In case of locked DC light output level, the DC level of V-CG-SB.1 is not active !	Unlocked DC [x] Locked DC []
<u>Important for lighting design:</u> If locked DC light output the lightout level in % is required	No control of light output level from V-CG-SB.1 in DC operation possible!	Locked light output level in %, e.g. 15%	(*2)100%
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 4 x 1,5A CG-S => 60 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A SOU CG-S // S* => 250 A SU S* => 250 A	Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	Ip=25A / Th=161µs
<u>Important for lighting design:</u> Luminous flux ratio: DC-operation at 186 V in comparison to 230 V AC operation	-	Light output In battery operation of the ballast, for the light calculation	(*2) 100%
Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)			
*1: Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo			
*2: The DC Output Level is not locked in DC Mode to 100% of current Light Level , it is possible to lock with DALI magic and Tuner 4 Tronic			
*3: Not to be used in high risk areas, special release required			
Max. 1 DALI- Driver to wire with 1 V-CG-SB.1			
In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.			
Date: 23. Januar.2018			

Requirements for electronic non-dimmable control gears for fluorescent lamps and LED



Manufacturer:
OSRAM GmbH
Marcel-Breuer Str. 6
D-80807 München

Product:
Ot 40/170-240/1A0 4DIMLT2 G2 CE

OSRAM

LED controller type	Values for load range	I _N in AC-operation (230V) / mA (trms)	I _N in AC-operation (240V) / mA (trms)	I _N in DC-operation (186V) / mA (trms)	I _N in DC-operation (216V) / mA (trms)	I _N in DC-operation (240V) / mA (trms)	I _N in DC-operation (260V) / mA (trms)
Ot 40/170-240/1A0 4DIMLT2 G2 CE	U _{min} , I _{min}	33,00	32,96	27,14	24,06	22,22	20,70
	U _{min} , I _{max}	99,22	88,80	118,42	101,81	91,10	83,79
	U _{max} , I _{min}	67,32	65,52	79,02	68,51	60,61	56,17
	U _{max} , I _{max}	219,19	209,16	205,14	173,24	156,13	143,57
	Open Load	15,39	19,23	2,62	2,43	2,43	2,47
	Short Load	16,20	20,78	6,87	5,86	4,36	4,75

Maximum inrush current for ECG in AC Operation

I_{peak}= 25 A
T_H= 161 μs

Requirements for dimmable DALI control gears for fluorescent lamps and LED			Version 3
Manufacturer: Osram GmbH Marcel-Breuer-Straße 6 D-80807 München	Type / description: ECG-type: OT 75/170-240/1A0 4DIMLT2 G2 CE (ident code: AM03550)		Manufacturer information Complies: YES/NO
Features:	CEAG data:	Explanation:	
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	A stable operation of the control gear after 1.6 seconds of start up is required for the right functionality of the individual monitoring. With max. 20 luminaires for one current circuit: ΔI in sum < 250 mA are allowed	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	YES <input type="checkbox"/> NO <input type="checkbox"/>
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	YES <input type="checkbox"/> NO <input type="checkbox"/>
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207*	Control gear must have the DALI Logo*	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Note: VDE 0108 is not a standard for ECG, marking is not applicable			
Features:	CEAG-Data:	Explanation:	Manufacturer information:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver. These DALI commands are necessary to ensure the lamp failure detection, and must be support by the control gear.	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<u>Important for DC operation:</u> DALI light level	In case of locked DALI light level in DC operation (EOF=Emergency Output Level), the V-CG-SB.1 can not change the light level !	In DC-emergency case the DALI-Light Level is locked to prevent unwanted changes of the luminous flux.	Unlocked <input checked="" type="checkbox"/> Locked <input type="checkbox"/>
<u>Important for lighting design:</u> If DALI-Light level is locked, the value of the preset DC-Lightlevel (in %) is required		Pre-set DC-Light Level ** e.g. 15% (DALI-value 185 for logarithmic dimming curve)	100%
Note: Important for the planning - Max. no. Of luminaires per circuit			
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 4 x 1,5A CG-S => 60 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A SOU CG-S // S* => 250 A SU S* => 250 A	I-peak=42A Th=208µs / pcs Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	
Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)			
*Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo ** The DC-Light Level preset value ex factory (luminous flux in case of DC-voltage) can be adjusted project depending via DALI Magic and T4 Tronic in AC-operation To enable the adjustment of the luminous flux via the DALI - Module V-CG-SB.1, the DC detection has to be deactivated via T4T.			
Max. 1 DALI- Driver to wire with 1 V-CG-SB.1 In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.			
Date: 16.July.2018			

Requirements for electronic non-dimmable
control gears for fluorescent lamps and LED



Table 1:

Manufacturer: OSRAM GmbH Marcel-Breuer Str. 6 D-80807 München	Product: OT 75/170-240/1A0 4DIMLT2 G2 CE	
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LED controller type	Values for load range	I _N in AC-operation (230V) / mA (trms)	I _N in AC-operation (240V) / mA (trms)	I _N in DC-operation (186V) / mA (trms)	I _N in DC-operation (216V) / mA (trms)	I _N in DC-operation (240V) / mA (trms)	I _N in DC-operation (260V) / mA (trms)
OT 75/170-240/1A0 4DIMLT2 G2 CE	U _{min} , I _{min}	62,04	63,12	45,81	39,31	35,83	33,54
	U _{min} , I _{max}	191,36	172,42	228,66	196,39	175,87	161,84
	U _{max} , I _{min}	124,33	121,73	139,64	119,27	107,12	99,10
	U _{max} , I _{max}	346,08	328,61	361,87	308,05	276,41	254,21
	Open Load	34,77	42,64	12,34	11,75	11,47	11,24
	Short Load	12,11	11,45	12,14	11,78	11,45	11,25

Maximum inrush current for ECG in AC Operation

I_{peak}= 42 A
 T_H= 208 μs

Requirements for dimmable DALI control gears for fluorescent lamps and LED			Version 3
Manufacturer: Osram GmbH Marcel-Breuer-Straße 6 D-80807 München	Type / description: ECG-type: OT 110/170-240/1A0 4DIMLT2 G2 CE (ident code: AM03548)		Manufacturer information Complies: YES/NO
Features:	CEAG data:	Explanation:	
Control gear suitable for a DC voltage range:	186V - 260V DC (for Lead-Battery)	Possible voltage range of the battery in emergency mode. (Not for AT-S* Systems required)	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Control gear compatible with the switch-over time of the system?	Switch-over time: 180 ms - 450 ms	Typical switch-over time of CEAG systems between mains supply and emergency power supply	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Starting behavior of the control gear:	Stable current consumption after less than 1.6 sec. maximum.	A stable operation of the control gear after 1.6 seconds of start up is required for the right functionality of the individual monitoring. With max. 20 luminaires for one current circuit: ΔI in sum < 250 mA are allowed	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements	YES <input type="checkbox"/> NO <input type="checkbox"/>
<u>only for fluorescent lamps:</u> Control gear complies with the standard:	DIN EN 61347-2-3 (incl. Attachment J)	Particular requirements for AC and/or DC supplied electronic control gear for fluorescent lamps	YES <input type="checkbox"/> NO <input type="checkbox"/>
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 62384	DC. Or AC supplied electronic control gear for LED modules - Performance requirements	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<u>only for LED:</u> Control gear complies with the standard:	DIN EN 61347-2-13	Lamp controlgear — Part 2-13: Particular requirements for d. c. or a. c. supplied electronic controlgear for LED modules	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the standard:	DIN EN 55015 (Measurement on AC And DC)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the standard:	DIN EN 61000-3-2	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the standard:	DIN EN 61547	Equipment for general lighting purposes — EMC immunity requirements	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Fullfilled the DALI standards:	DIN EN 62386-101 /-102 / -207*	Control gear must have the DALI Logo*	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Note: VDE 0108 is not a standard for ECG, marking is not applicable			
Features:	CEAG-Data:	Explanation:	Manufacturer information:
<u>Important for function test!</u> According to IEC 62386 Part 102 Support of : DALI command 145 (Query Control Gear) DALI command 146 (Query Lamp Failure)	According to IEC 62386 Part 102	To detect a lamp failure, the V-CG-SB.1 module send DALI command queries (145/146) to the DALI LED driver. These DALI commands are necessary to ensure the lamp failure detection, and must be support by the control gear.	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
<u>Important for DC operation:</u> DALI light level	In case of locked DALI light level in DC operation (EOF=Emergency Output Level), the V-CG-SB.1 can not change the light level !	In DC-emergency case the DALI-Light Level is locked to prevent unwanted changes of the luminous flux.	Unlocked <input checked="" type="checkbox"/> Locked <input type="checkbox"/>
<u>Important for lighting design:</u> If DALI-Light level is locked, the value of the preset DC-Lightlevel (in %) is required		Pre-set DC-Light Level ** e.g. 15% (DALI-value 185 for logarithmic dimming curve)	100%
Note: Important for the planning - Max. no. Of luminaires per circuit			
<u>Important for the contact load SKU:</u> Max. inrush current each converter/luminaire in AC-operation:	Max. permitted inrush current per circuit: SKU 2 x 3A (CG) => 120 A SKU 1 x 6A (CG) => 180 A SKU 4 x 1,5A CG-S => 60 A SKU 2 x 3A CG-S => 250 A SKU 1 x 6A CG-S => 250 A SOU CG-S // S* => 250 A SU S* => 250 A	I-peak=60A Th=155µs / pcs Describes the max. inrush current of all ballasts in a circuit, to calculate the maximum contact rating of the circuit.	
Luminaires, which are used for emergency lighting, must be according to the standard DIN EN 60598-2-22 (particular requirements - Luminaires for emergency lighting)			
*Control of V-CG-SB.1 to the DALI LED driver is 100% done via DALI-commands according to IEC 62386-101 /-102 so the DALI LED driver must sign with the DALI logo			
** The DC-Light Level preset value ex factory (luminous flux in case of DC-voltage) can be adjusted project depending via DALI Magic and T4 Tronic in AC-operation To enable the adjustment of the luminous flux via the DALI - Module V-CG-SB.1, the DC detection has to be deactivated via T4T.			
Max. 1 DALI- Driver to wire with 1 V-CG-SB.1			
In use of manifold ballasts, the different lamp failure detection of the manufacturer must be consider! Some devices don't detect a failure if one lamp is defect.			
Date: 16.July.2018			

Requirements for electronic non-dimmable
control gears for fluorescent lamps and LED



Manufacturer:
OSRAM GmbH
Marcel-Breuer Str. 6
D-80807 München

Product:
OT 110/170-240/1A0 4DIMLT2 G2 CE

OSRAM

LED controller type	Values for load range	In in AC-operation (230V) / mA (trms)	In in AC-operation (240V) / mA (trms)	In in DC-operation (186V) / mA (trms)	In in DC-operation (216V) / mA (trms)	In in DC-operation (240V) / mA (trms)	In in DC-operation (260V) / mA (trms)
OT 110/170-240/1A0 4DIMLT2 G2 CE	Umin, Imin	107,93	107,47	109,48	93,52	84,57	78,12
	Umin, Imax	420,04	370,58	538,34	457,19	412,21	376,57
	Umax, Imin	212,60	196,77	259,10	215,54	199,34	181,40
	Umax, Imax	480,67	457,74	507,48	432,39	386,53	355,49
	Open Load	39,80	49,34	12,09	11,59	11,21	10,96
	Short Load	41,87	50,31	12,00	11,60	11,23	10,96

Maximum inrush current for ECG in AC Operation

I_{peak}= 60 A
T_H= 155 μs