CTR-50 1-Channel LED Controller

Bedienungsanleitung des 1-Kanal CTR-50 LED Controllers

1. Warn- und Anwendungshinweise

Bitte vor Verwendung des Gerätes die Warn- und Anwendungshinweise sorgfältig durchlesen.

Allgemein - Das Gerät ist für nur die Verwendung in Innenräumen ausgelegt.

Gesundheit - Bei Installations- und Wartungsarbeiten ist das Gerät vorher von der Stromversorgung zu trennen. Das Gerät darf nicht verwendet werden, wenn ein Ausfall zu einem Personenschaden führen kann.

Hitze - Bei Betreiben des Blitzmodus (>2A) als Dauerlicht können intern Temperaturen größer 60°C auftreten. Es ist auf ausreichendem Abstand zu leicht entflammbaren Materialien zu achten.

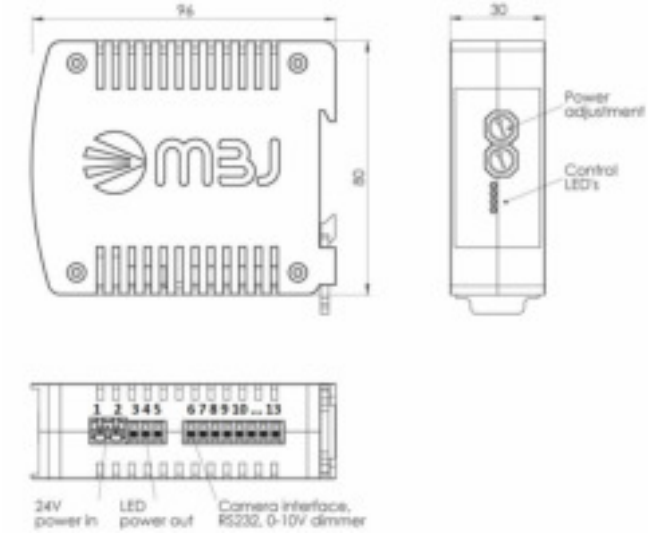
Elektrischer Anschluss - Das Gehäuse ist von der Masse der Spannungsversorgung elektrisch isoliert. Ein Überschreiten der zulässigen Betriebsspannung Uin oder des zulässigen Schaltstromes pro Kanal kann zur Zerstörung des Gerätes oder zu einer erheblichen Verkürzung der Lebensdauer der angeschlossenen LED-Beleuchtung führen.

Mechanischer Einbau – Der Controller ist für die Hutschienenmontage vorgesehen. Ein Clip dient zur Verriegelung an der Hutschiene. Für eine optimale Wärmeabgabe ist links und rechts zum nächsten Gerät ein Mindestabstand von 10mm einzuhalten.

2. Leistungsmerkmale

- 1-Kanalbetrieb im Blitz – und Dauerlicht.
- Intelligente Ansteuerung der MBJ Beleuchtung via Rsense-Technologie zur Erkennung von LED-Leistung
- Ansteuerung von Fremd-LED-Beleuchtungen
- Einfache Konfiguration über Drehschalter.
- Direkte Blitzsteuerung über das Kamera-Exposure-Signal oder Verzögerung und Länge frei konfigurierbar
- Kamera mit I/O-Funktionen direkt anschließbar
- Integrierte 12VDC Kameraspannungsversorgung
- Fernsteuerung und Konfiguration über RS232 Software

3. Elektrische Anschlüsse



Operating manual of the 1-channel CTR-50 LED controller

1. Cautions and instructions for use

Please read the warning and application instructions carefully before using the backlight.

General - The device is designed for indoor use only.

Health – The device must be disconnected from the power source before the installation and/or maintenance can start. The device must not be used when a failure may cause a personal injury.

Heat - In case of running the device with a 'flash' current >2A is a continuous operating mode the inside temperature may exceed 60 °C. Keep off flammable materials at any time.

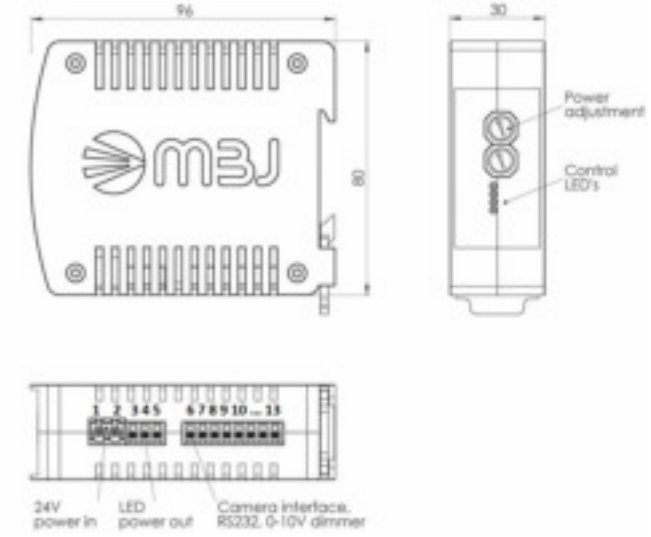
Electricity - The housing is electrically isolated from the ground of the power supply. Exceeding the permissible operating voltage Uin or exceeding the maximum allowed switched current per channel can lead to the destruction of the device or to a significant shortening of the lifetime of the connected LED lighting module.

Mechanical integration – The controller is made for top hat rail mounting. A clip can be used to lock the unit to the top hat rail. For optimal heat flow a left/right distance of 10 mm to next unit is mandatory.

2. Key specification

- 1-channel operation for steady and flash light usage..
- Intelligent MBJ lighting control via Rsense technology with detection for LED lighting power
- Support for 3d party LED lightings
- Easy set-up via rotary switches
- Straight flash control via the camera 'exposure signal' manual flash set-up for delay and duration
- I/F for straight camera connection.
- Integrated 12VDC power supply for MV camera
- Set-up and control via RS232 remote software

3. Electrical connection



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CTR-50
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CTR-50 1-Channel LED Controller

Der Controller wird mit Steckkontakten und den zugehörigen Schraubsteckern für das LED-Modul, für die 24V DC und für die Steuersignale und die RS232-Schnittstelle geliefert.

Pin	Stromversorgung
1	24V DC (Eingang)
2	Masse

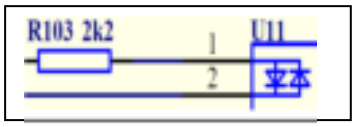
Pin	Litze[1)]	Anschluss LED-Modul
3	Schwarz	LED- [2)]
4	Weiß	LED+, Ub
5	Blau	Rsense Signal

1) bei Verwendung der MBJ-Anschlusskabel.

2) Bitte **nicht** mit der externen Masse der Stromversorgung verbinden!!!

Pin	Steuersignale
6	Dimmer 0V … 10V
7[1)]	Trigger + (mit 2k2 Widerstand)
8[1)]	Trigger -
9	Masse
10	12VDC out (Kam. Stromversorgung)
11	Triggersignal (3V ... 24V) = AN, <0,7V =Aus)
12	RxD
13	TxD

1) Maximal zulässiger Eingangsstrom: 50mA, Optokopplerbeschaltung:



3. Bedienelemente, Anzeigen und Funktionen

Betriebsarten

Betriebsart	Beschreibung
Smart AutoDetect[2)]	Der CTR versucht, eine MBJ-oder Fremdbeleuchtung zu erkennen
STEADY[1)]	Dauerlicht mit Dimmer
AUTO	LED-OUT synchron zum Trigger, 2-facher Strom (Überblitzen)
AUTOLIMIT	LED-Out synchron zum Trigger, 3-facher Strom (Überblitzen) Puls auf 500ms begrenzt,
MANUAL	Manuelle Einstellung von Blitz-verzögerung und Dauer (RS232), 3-facher Strom (Überblitzen)
OFF	LED-Ausgänge ausgeschaltet

[1)] Wenn eine Spannung >0,7V an Pin 6 während des SmartAutoDetect Mode erkannt wurde, dann wird der analoge Dimmeingang aktiviert.

[2)] Fabrikeinstellung. Das Gerät verbleibt solange im AutoDetect Mode, bis eine Beleuchtung erkannt wurde. Danach wechselt der CTR in folgende Modi:

- MBJ-Licht: Betriebsmode je nach Schalterstellung
- Fremdlicht: Betriebsmode **AUTO**

The controller is supplied with plug-contacts and the belonging plugs for the LED light, control signals, RS232 interface and power.

Pin	Power Supply
1	24V DC (input)
2	Ground

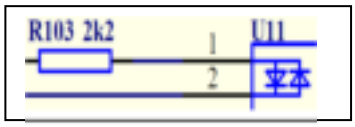
Pin	Wire[1)]	Output for LED light
3	Black	LED- [2)]
4	White	LED+, Ub
5	Blue	Rsense signal

1) for use with MBJ connecting cable

2) Please do **not** connect to the external ground of the power supply!!!

Pin	Control signals
6	Dimmer 0V … 10V
7[1)]	Trigger + (with 2k2 resistor inside)
8[1)]	Trigger -
9	Ground
10	12VDCout (camera power supply)
11	Trigger signal (3V ... 24V = ON, <0.7V =OFF)
12	RxD
13	TxD

1) Max. allowed trigger input current: 50mA, optocoupler input circuit:



3. Controls, Displays and Functions

Operation modes

Mode	Description
Smart AutoDetect[2)]	CTR tries to detect a MBJ (via Rsense) or 3d party light
STEADY[1)]	Continuous light with dimmer
AUTO	LED-output follows the trigger 2-times current (overdrive)
AUTOLIMIT	LED-output follows the trigger, 3-times current (overdrive), 500ms flash time out
MANUAL	Manual set-up for flash, delay and duration (via RS232 only) 3-times current (overdrive)
OFF	LED outputs switched off

[1)] If a voltage >0.7V is detected at Pin 6 the analogue dimm input wil be enabled during the 'SmartAutoDetect' mode.

[2)] Factory default. As long as no light has been detected the unit remains in the AuoDetect mode. In case a light has be detected:

- MBJ light: New mode depending on rotary switch
- 3d party light: New mode **AUTO**

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Bedienelemente und Einstellungen

Wenn das Rsense-Signal der MBJ-Beleuchtung nicht angeschlossen ist, wird der Strom für die angeschlossene LEDs über die Drehschalter eingestellt. Der entsprechende Wert ist dem Manual des Herstellers der Beleuchtung zu entnehmen. Es ist sicherzustellen, dass der max. zulässige Strom nicht überschritten wird.

RS232

- Die serielle Schnittstelle ist immer aktiv.
- Die Steuerbefehle sind im separaten RS232-Protokoll beschrieben.
- Es ist möglich, Grundeinstellungen zu ändern. (z.B. den SmartAutoDetect Mode zu deaktivieren)

Oberer Drehschalter / Modus

Pos	MBJ LED[1)]	Fremd-LED
0	STEADY	AUTO 0A (bis 0,9A)
1	AUTO[2)]	AUTO 1A (bis 1,9A)
2	AUTOLIMIT[3)]	AUTO 2A (bis 2,9A)
3	OFF	AUTO 3A (max.)
4-6	Nicht verwendet	Nicht verwendet

1) If theMBJ light been detected via the Rsense input

2) Doppelte Stromstärke für MBJ Module mit Rs

3) Bis zu 3-fache Stromstärke mit 500ms Blitzbegrenzung für MBJ Module mit Rsense

Unterer Drehschalter / Helligkeit

Pos	MBJ LED[1)]	Fremd-LED
0	10%	ca. 50 mA
1	20%	plus 100mA
2	30%	plus 200mA
3	40%	plus 300mA
4	50%	plus 400mA
5	60%	plus 500mA
6	70%	plus 600mA
7	80%	plus 700mA
8	90%	plus 800mA
9	100%	plus 900mA

1) MBJ light has been detected via the Rsense input

LED Anzeige[1)]		Bedeutung
Power	AUS	Stromversorgung aus
	AN	Stromversorgung an
Light on	AUS	LED ausgeschaltet
	AN	LED angeschaltet
	BLINK	AutoDetect Modus nach dem Anschalten
MBJ	AUS	kein MBJ-Modul erkannt
	AN	MBJ-Modul erkannt
	BLINK	Falscher Rsense[2)]
Trigger	AUS	Trigger aus
	AN	Trigger an
	BLINK	4x: System started

1) oberste LED

2) Rsense abklemmen und auf einen EXT Modus umschalten

Controls and Configuration

If the Rsense signal of the MBJ light is not in use the rotary switches are used to set-up the allowed current for the connected LED. Please check the LED light makers manuals to make sure not exceeding the maximum LED current.

RS232

- The RS232 is always active.
- The protocol itself and the control commands are described in the separate RS232 protocol document.
- It is possible to change default settings (e.g. disable SmartAutoDetect mode after system boot)

Upper rotary switch / Mode

Pos	MBJ LED[1)]	3d part LED
0	STEADY	AUTO 0A (to 0.9A)
1	AUTO[2)]	AUTO 1A (to 1.9A)
2	AUTOLIMIT[3)]	AUTO 2A (to 2.9A)
3	OFF	AUTO 3A (max.)
4-6	Not in use	Not in use

1) Wenn eine MBJ Beleuchtung über den Rsene-Eingang erkannt wurde

2) Double current intensity for MBJ lights with Rs

3) 3-times current intensity with 500ms maximum flash length for MBJ lights w/ Rs

Lower rotary switch / Intensity

Pos	MBJ LED[1)]	3d part LED
0	10%	approx. 50mA
1	20%	add. 100mA
2	30%	add. 200mA
3	40%	add. 300mA
4	50%	add. 400mA
5	60%	add. 500mA
6	70%	add. 600mA
7	80%	add. 700mA
8	90%	add. 800mA
9	100%	add. 900mA

1) MBJ Beleuchtung wurde über den Rsene-Eingang erkannt

LED display[1)]		Meaning
Power	OFF	power off
	ON	power on
Light on	OFF	LED light switched off
	ON	LED light switched on
	FLASH	AutoDetect mode after power on
MBJ	OFF	No MBJ light detected
	ON	MBJ light detected
	FLASH	Rsense out of range[2)]
Trigger	OFF	Trigger low state
	ON	Trigger high state
	FLASH	4x: boot sequence

1) starting from top

2) Please disconnect Rsense and switch to EXT mode

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4. Spezifikation

Betriebsspannung	24V DC -10%/+25% (30V maximal)
Bereich für den LED Dauerstrom	70mA … 2000mA [1]
Max. zulässiger LED Blitzstrom	3 A (Einschaltdauer < 25% und Blitzdauer < 500ms)
Min. Blitzverzögerung	20 µs [2]
Min. Blitzzeit	Ca. 100 µs (bis zu 500µs, abhängig vom LED Arbeitspunkt und der Taktrate)
Spannungsbereich für die LED-Module	Ca. 2,5V bis 22,0V (max. 28,0 V)
Min. Blitzschrittweite	10 µs (Verzögerung und Zeit)
Max. Pulslänge	1000ms
Abmessungen	30mm x 80mm x 96mm
Kameraausgang	12V DC, max. 400mA
Gewicht	320g
Anschlüsse	2Pin Steckkontakt, RM5,00 3Pin inv.Steckkontakt, RM3,81 8Pin Steckkontakt, RM3,81
Umgebungs-temperatur	10°C bis 30°C
Schutzart	IP20 (für Schaltschrankeinbau)
Luftfeuchtigkeit	30% bis 70%
Zulassungen	CE, RoHS
Zubehör	Montageclip (Lieferumfang), Siehe www.mbj-imaging.com Webseite für diverse Kabel, Halter und LED-Beleuchtungen

1) Strömen kleiner 70mA können zu einem Flackern des LED-Lichtes führen.

2) Je höher der Strom und je kleiner die Zykluszeit desto größer ist die Verzögerung.

4. Specification

Operating voltage	24V DC -10%/+25% (30V maximum)
Range for LED steady current	70mA … 2000mA [1]
Allowed flash current per channel	max. 3 A (on time < 25% and flash duration < 500ms)
Min. flash delay	20 µs [2]
Min. flash duration	Approx. 100 µs (up to 500µs, depending on LED working point and duty cycle)
Voltage range for the LED modules	Approx. 2.5V to 22.0V (max. 28.0 V)
Min. flash increments	10µs (for delay and duration)
Max. flash length	1000ms
Dimensions	30mm x 80mm x 96mm
Camera Power	12V DC, max. 400mA
Weight	320g
Connectors	2Pin plug contact, RM5.00 3Pin inv. plug contact, RM3.81 8Pin plug contact, RM3.81
Operating temperature	10°C to 30°C
Degree of protection	IP20 (made for control cabinet)
Humidity	30% to 70%
Certifications	CE, RoHS
Accessories	Mounting clip (scope of supply), for cable, mounts and LED lighting modules please check www.mbj-imaging.com

1) LED current less than 70mA may cause LED light jitter

2) The higher the current and the less the duty cycle the higher the delay can be.

RS232 protocol for MBJ controller

1. General description

This description refers to the MBJ LED controller. Depending on the controller type and hardware not all of the functions might be supported.

2. Supported Controller

Controller	Remark
CTR-50, CTR-50/500	I/F: RxD, TxD, GND

3. Firmware Revision

Controller	FW Rev.	Notes, implemented commands
CTR-50	1.1	Full command set support
CTR-50	1.2	New operating mode: smart auto detect
CTR-50	1.3/1.4	Max. flash length in manual mode for EXT and MBJ mode set to 1000ms, 2x overdrive for MBJ/EXT AUTO and 4x overdrive MBJ/EXT AUTOLIMIT
CTR-50/500	1.5	Rev. 1.5 for CTR-50/500 version only
CTR-50	1.6	New "EFD\n" command for reset to default settings, By default 3x overdrive for MBJ AUTOLIMIT mode By default no flash overdrive for all EXT mode
CTR-50 & CTR50/500	1.8	Analogue dimming and fan behavior improved
CTR-50 & CTR50/500	1.9	LED detection improved (higher detection current)
CTR-50	1.10	New command for Fan ON/OFF depending on ambient temperature

4. RS232 Settings

RS232 Baud Rate	9600
RS232 Data Bits	8
RS232 Parity	N
RS232 Stop Bits	1

5. Protocol and method of operation

The controller always operates in slave mode. Each action (read, write or program data) has to be initiated by the master device (e.g. PLC or PC). Communication between the master and the MBJ controller is based on ASCII codes. Upper and lower case characters have the same meaning. Expect 0x0a for LF("\n") ASCII control characters are NOT used. After a command has been sent please wait for the reply command before sending the next one.

Default settings, valid after system boot, are stored in the EEPROM memory, but can be redefined and overwritten by dedicated EEPROM write commands. Data of RAM write commands are temporary and valid until system shut down only.

5.1 Messages examples (with echo)

Read command : "RC\n"
Reply command: ↳"RC\0700\n" (read out actual set current of 700mA)

RAM write command: "WB50\n" (RAM only: set target brightness to 50%)
Reply command: ↳ "WB50\nOK\n" (successful)

RAM write command: "WB50\n" (1st: set RAM target brightness to 50%)
Reply command: ↳ "WB50\nOK\n" (successful)
EEPROM write command: "EB\n" (2nd: write RAM data to EEPROM)
EEPROM reply command: ↳ "EB\nOK\n" (successful)

RS232 protocol for MBJ controller

6. Read Messages

Com	Remark	Data type	Data range	Sample	Controller reply (Note)
RT	unit temperature	℃	010… 150	“RT\n”	“RT\n44\n” : 44℃ inside temperature
RB	brightness	%	0… 100	“RB\n”	“RB\n50\n” : 50% brightness MBJ: 100% defined by MBJ Rsense and lower rotary switch set-up EXT: 100% defined by upper and and lower rotary switch set-up
RM	operating mode	No.	0… 99	“RM\n”	“RM\n0\n” : controller in OFF mode 0: OFF (LED always off) 1: MBJ Steady (LED always on) 2: MBJ AUTO (LED double power) 3: MBJ AUTOLIMIT (LED 3x power, timeout) 4: MBJ MANUAL (LED flash wait,length,gap) 5: EXT Steady (LED always on) 6: EXT AUTO (LED flash follows trigger) 7: EXT AUTOLIMIT (LED flash follows trigger, with 500ms time out) 8: EXT MANUAL (LED flashdelay,length,gap)
RW	flash wait (or delay)	ms.µs	000.01.. 1000.00	“RW\n”	“RW\n100.0\n”: delay of 100ms, 10µs steps (manual mode only, from 10µs to 1000ms)
RL	flash length	ms.µs	000.20.. 1000.00	“RL\n”	“RL\n0.5\n” : flash length of 500 µc, 10µs steps (manual mode only, from 200µs to 1000ms)
RG	Gap after flash	ms.µs	000.01.. 1000.00	“RG\n”	“RG\n010.00\n” : for 10ms any input trigger not accepter after flash pulse (manual mode only)
RC	LED current	mA	40 ... 3000	“RC\n”	“RC\n1500\n” : LED current set to 1.5A (set by MBJ Rsense or rotary switch for EXT)
RA	actual LED current	mA	40 ... 3000	“RA\n”	“RA\n973\n” : measured LED current is 973mA, (only possible in steady mode)
RO	Pulse overdrive	DEC	1.0 .. 10	“RO\n”	“RO\n1.5\n” : LED overdrive set to 150% (default, valid for MANUAL, AUTOLIMIT only) (SmartAutoDetect might overwrite this value)
RS	Smart auto detect	On / Off	0, 1	“RS\n”	“RS\n1\n” : ‘Smart auto detect‘ for LED, Rsense and analogue dimming enabled
RD	Analogue dim level	Dec	0… 1024	“RD\n”	“RD\n670\n” : 10V analogue dimming level (670 refers to 100%=10V dimming level)
RF	Firmware	No.	1.1	“RF\n”	“RF\n1.1\n” : major release 1, minor release 1
RE	Reply echo ON/OFF	Dec	0, 1	“RE\n”	“RE\n1\n” : reply echo On/Off (0 [default]: without echo, 1: with echo)
RN	Serial number	No.	000000	“RN\n”	“RN\n166001\n” : S/N 166001
T	software trigger	---	---	“T\n”	“T\n” : simulates a input trigger
D	debug output	---	---	„D\n“	output of several status parameters

RS232 protocol for MBJ controller

7. Write Messages

Com	Remark	Data type	Data range	Sample	Controller reply, note
WT	set Fan on/off temp.	℃	010… 150	“RT\n”	“WT60\n” : inside Fan will be activated at 60℃ (default 50℃)
WB	set brightness	%	0… 100	“WB50\n”	“WB50\nOK \n” : brightness set to 50% (In a range between 0% and 100%) MBJ: 100% defined by MBJ Rsense and lower rotary switch set-up EXT: 100% defined by upper and and lower rotary switch set-up (this brightness overwrites the analogue dimmer)
WM	set unit mode	No.	0… 9	“WM4\n”	“WM4\nOK\n” : unit set to EXTsteady light “WM\nERR\n”: invalid mode 0: OFF (LED always off) 1: MBJ Steady (LED always on) 2: MBJ AUTO (LED double power) 3: MBJ AUTOLIMIT (LED 3x power, timeout) 4: MBJ MANUAL (LED flash wait,length,gap) 5: EXT Steady (LED always on) 6: EXT AUTO (LED flash follows trigger) 7: EXT AUTOLIMIT (LED flash follows trigger, 500ms time out) 8: EXT MANUAL (LED flashdelay,length,gap)
WW	flash wait (delay)	ms.µs	000.01.. 1000.00	“WW15.10 \n”	“WW0015.10\nOK\n”: 15ms+100µs delay Note “WW0\n”: disable flash delay.
WL	Flash length	ms.µs	000.20.. 1000.00	“WL100.50 \n”	“WL100.50\nOK\n”: 100.05 ms flash length “WL\nERR\n” invalid value (range between 200µs to 1000ms)
WG	Gap after flash	ms.µs	000.01.. 1000.00	“WG100\n”	“OK\n”: no trigger after pulse accepted for 100ms, manual mode only, from 10µs..1000ms Note “WG0\n”: disable flash gap.
WO	Pulse overdrive	DEC	1.0 .. 10	“WO1.5\n”	“OK\n” : set LED overdrive to 150%, (default, valid for MANUAL, AUTOLIMIT only) (SmartAutoDetect might overwrite this value)
WS	Smart auto detect	On / Off	0, 1	“WS1\n”	“OK\n” : ‘Smart auto detect‘ for LED, Rsense and analogue dimming @startup active
WD	Analogue dim level	Dec	0… 1024	“WD680\n”	“OK\n” : 10V analogue max. dimming level (670 refers to 100%=10V dimming level) (335 refers to 100%=5V dimming level) (dimming level limited to 100%)
WE	Echo	On / Off	0, 1	“WE1\n”	“OK\n” : enable RS232 communication with echo chars

RS232 protocol for MBJ controller

8. EEPROM Messages (for permanent storage, followed right after the related Write command)

Com	Remark	Sample	Controller reply, note
EB	brightness	“EB\n”	Writes current value to EEP memory
EM	operation mode	“EM\n”	Writes current value to EEP memory
EW	flash wait (delay)	“EW\n”	Writes current value to EEP memory
EL	pulse length	“EL\n”	Writes current value to EEP memory
EG	gap after flash	“EG\n”	Writes current value to EEP memory
EO	pulse overdrive	“EO\n”	Writes current value to EEP memory
ES	boot Smart auto detect	“ES\n”	Writes current value to EEP memory
ED	analogue dim level	“ED\n”	Writes current value to EEP memory
EE	echo	“EE\n”	Writes current value to EEP memory
EFD	factory default reset	“EFD\n”	Reset the controller to factory default settings, followed by a reboot (it takes approx. 15s)