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)

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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

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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

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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)