

LED Turret Manual

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Sending Commands

The LED turret is commanded using a simple I2C interface. Several parameters can be set individually for every one of the 24 LEDs, or in a group, depending on the running mode. The parameters are set simply by writing to the appropriate register, as described below. Parameters are not reset until the Command Register (145 or 0x91) is written.

LED Parameters

Max-Duty:

This is the maximum duty cycle (or brightness) that the LED will reach. Values 0-128 correspond to 0-100% duty cycles, respectively.

Period:

Defines the blinking period of the LED. The period is defined in 100ms time steps. For example, a Period value of 27 will result in a blinking period of 2.7s. Values 0-255 correspond to 0-25.5s periods, respectively.

- If the value of the period is set to 0, the LED will run at the Max-Duty cycle with no blinking.

On-Time:

Defines the time at which the LED will turn on within its cycle. Acceptable values are between 0 and the Period value, inclusively. The LED turns on by gradually increasing its duty cycle until it reaches the Max-Duty value. The rate of this increase is set by the On-Slope value.

Off-Time:

Similar to the On-Time value, defines the time at which the LED will turn off within its cycle, at the rate of the Off-Slope value. This value can be lower than the On-Time value.

- If the On-Time value is equal to the Off-Time value, the LED will stay at the Max-Duty value without blinking
- If the duty cycle is still increasing when the Off-Time is reached (the Max-Duty value has not yet been reached), the duty cycle will start decreasing *from its current value*
- If the duty cycle is still decreasing when the On-Time is reached (0 duty cycle has not yet been reached), the duty cycle will start increasing *from 0*

Up-Slope:

Defines the slope at which the LED brightness increases from 0 to Max-Duty.

Down-Slope:

Defines the slope at which the LED brightness decreases from Max-Duty to 0.

I2C Registers:

Running Mode (Register 144 or 0x90 hex):

There are several running modes available on the LED turret, including fully asynchronous mode and several synchronous modes. Setting this register defines the running mode of the LED Turret:

Register Value	Mode	Description
0	Asynchronous	All LEDs are asynchronous, and use all of their parameters individually. Blinking timing is independent for all LEDs
1	Period Synchronous	All LEDs use their own settings except for the Period value, which is synchronized using the Period value of Red0
2	Colour Synchronous	All LEDs of the same colour use the same properties (set by LED0 of each colour)
3	3-Colour LED Synchronous	Each 3-colour LED is synchronized on the same period (set by the Red LED of that number)
4	Single LED	Only Red0 is turned on – used for testing
5	Off	All LEDs are turned off

Command Register (Register 145 or 0x91)

This register is used to issue a command to the LED Turret. When the Command Register is set to any value, the LED Turret will reset all parameters that have been changed since the last reset. The purpose of this register is to keep the LEDs from changing their function until all the new parameters have been set. This register should be written at the end of any new command to be implemented. The value to be written is arbitrary.

LED Parameter Registers

Each LED has six registers defining its parameters, as described in the previous section. The following table describes the number of each register:

LED number	max duty		up slope		down slope		on time		off time		period	
	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex	Dec	Hex
red0	0	00h	24	18h	48	30h	72	48h	96	60h	120	78h
red1	1	01h	25	19h	49	31h	73	49h	97	61h	121	79h
red2	2	02h	26	1Ah	50	32h	74	4Ah	98	62h	122	7Ah
red3	3	03h	27	1Bh	51	33h	75	4Bh	99	63h	123	7Bh
red4	4	04h	28	1Ch	52	34h	76	4Ch	100	64h	124	7Ch
red5	5	05h	29	1Dh	53	35h	77	4Dh	101	65h	125	7Dh
red6	6	06h	30	1Eh	54	36h	78	4Eh	102	66h	126	7Eh
red7	7	07h	31	1Fh	55	37h	79	4Fh	103	67h	127	7Fh
blue0	8	08h	32	20h	56	38h	80	50h	104	68h	128	80h
blue1	9	09h	33	21h	57	39h	81	51h	105	69h	129	81h
blue2	10	0Ah	34	22h	58	3Ah	82	52h	106	6Ah	130	82h
blue3	11	0Bh	35	23h	59	3Bh	83	53h	107	6Bh	131	83h
blue4	12	0Ch	36	24h	60	3Ch	84	54h	108	6Ch	132	84h
blue5	13	0Dh	37	25h	61	3Dh	85	55h	109	6Dh	133	85h

blue6	14	0Eh	38	26h	62	3Eh	86	56h	110	6Eh	134	86h
blue7	15	0Fh	39	27h	63	3Fh	87	57h	111	6Fh	135	87h
green0	16	10h	40	28h	64	40h	88	58h	112	70h	136	88h
green1	17	11h	41	29h	65	41h	89	59h	113	71h	137	89h
green2	18	12h	42	2Ah	66	42h	90	5Ah	114	72h	138	8Ah
green3	19	13h	43	2Bh	67	43h	91	5Bh	115	73h	139	8Bh
green4	20	14h	44	2Ch	68	44h	92	5Ch	116	74h	140	8Ch
green5	21	15h	45	2Dh	69	45h	93	5Dh	117	75h	141	8Dh
green6	22	16h	46	2Eh	70	46h	94	5Eh	118	76h	142	8Eh
green7	23	17h	47	2Fh	71	47h	95	5Fh	119	77h	143	8Fh