

# CaMate Series User's Manual

Rev0.1

2016/8/26

## Introduction

The CaMate illuminators' variable beam angles can be adjusted via an RS485 connection. Using a USB-to-RS485 converter, the LED ON/OFF, trigger level, Dimming, Fade in/out can be remotely controlled.

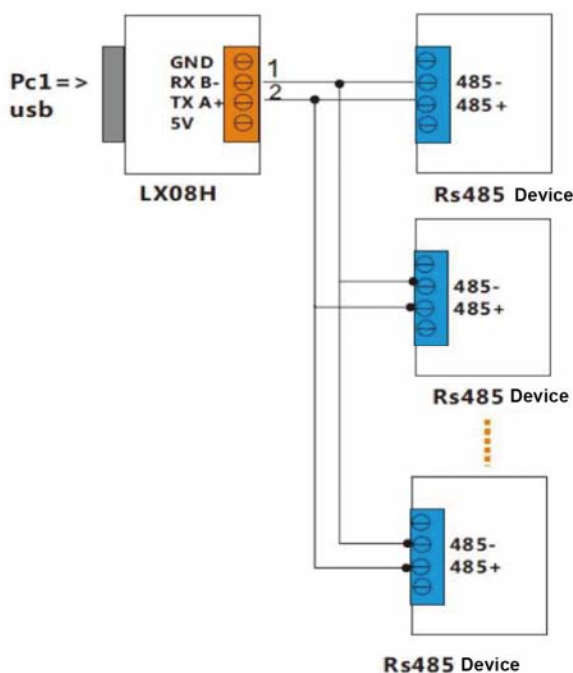
## Configuration & Control

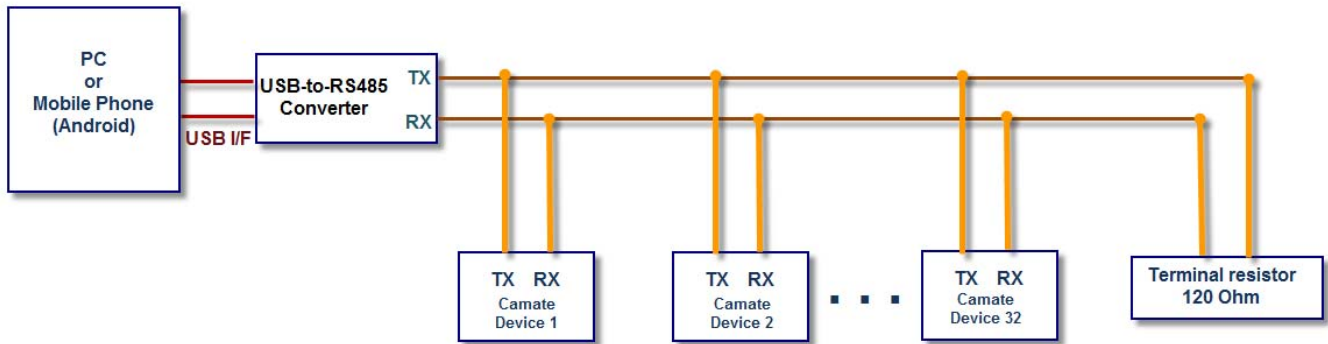
CaMate can be configured and controlled through the RS485 interface and/or a remote controller. A PC or Android mobile phone can be used to configure CaMate through the RS485 interface. You can download a Windows application software and Android APP from "[www.vivotek.com/CaMate/app](http://www.vivotek.com/CaMate/app)." Devices that come with the RS485 interface, e.g. camera, can configure and control CaMate through the RS485 interface with a correct command set (refer to Appendix A).

To connect a PC or Android device to a CaMate illuminator via the RS485 interface, an USB-to-RS485 converter should be used. The converter is separately purchased. An example is shown below:



An exemplary connection should look like this:

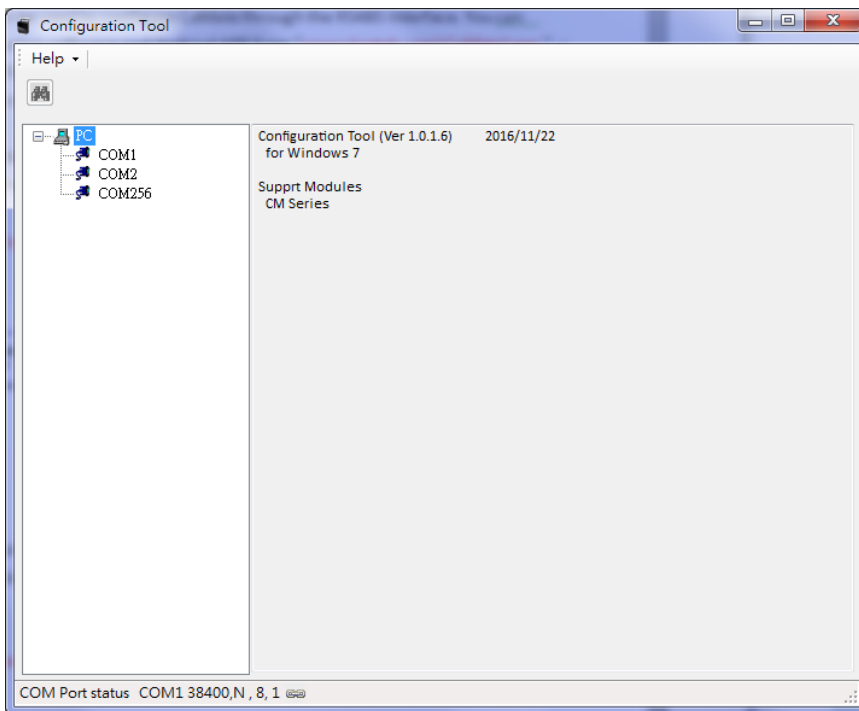




NOTES: If termination is required, a resistor value of 120Ω or greater should be used, and no more than 2 termination resistors should be used, one at each end of the RS485 transmission line.

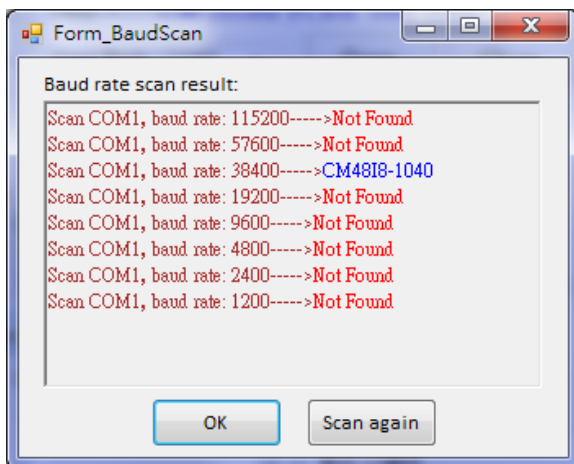
## Windows Application Software

After the device driver for the USB-to-RS485 converter is installed (refer to the installation guide that comes with the USB-to-RS485 converter), execute the **EXIR\_ConfigurationTool.exe** application software.

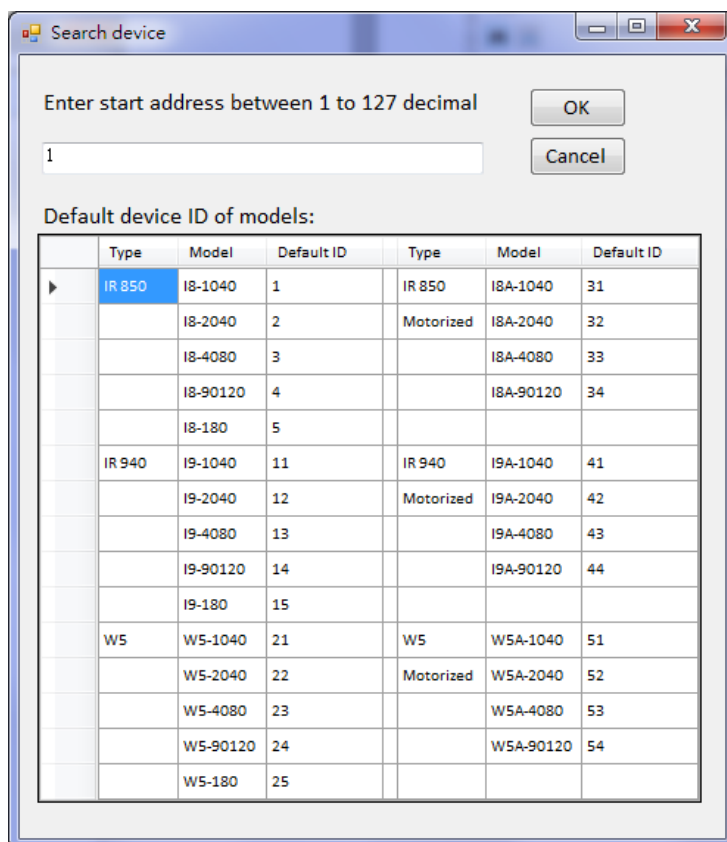
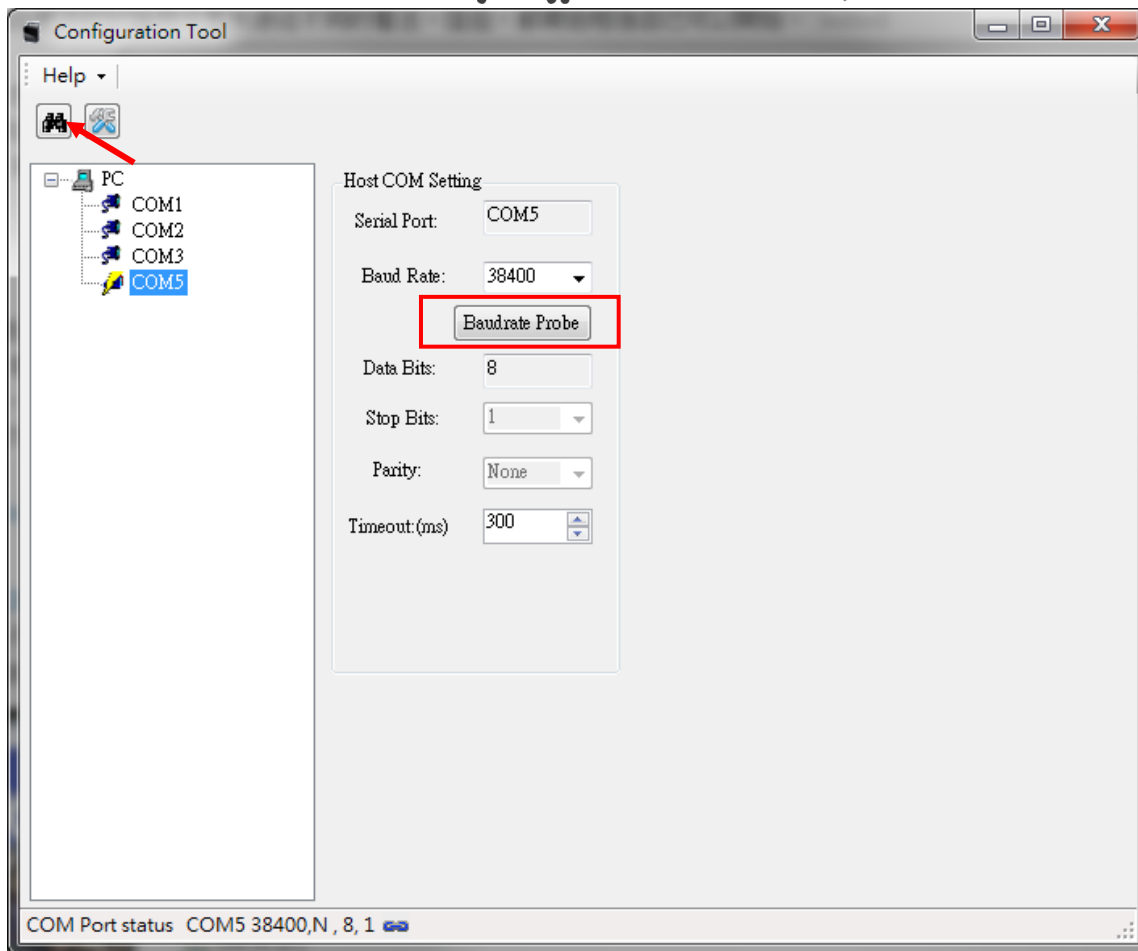


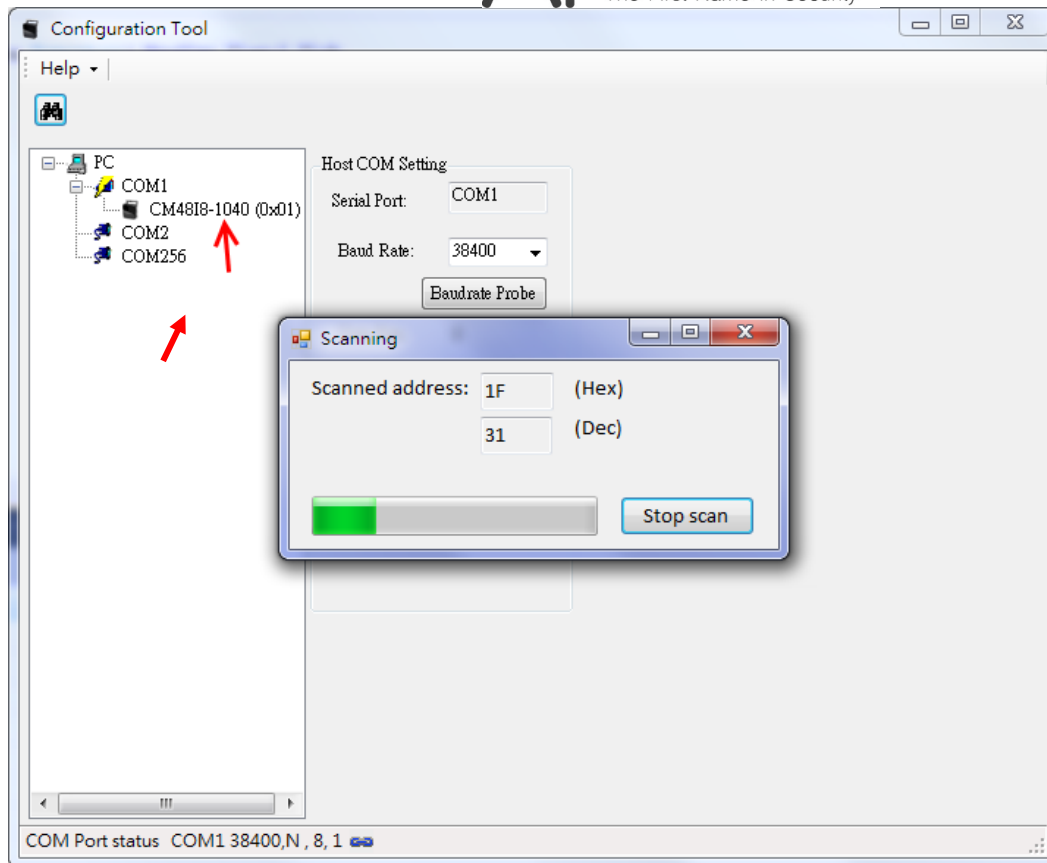
1. First select the correct COM port that is connected to CaMate.

If you are not sure of the baudrate of CaMate, (default is 38,400), you can use the Baudrate probe icon to search for the correct baudrate.



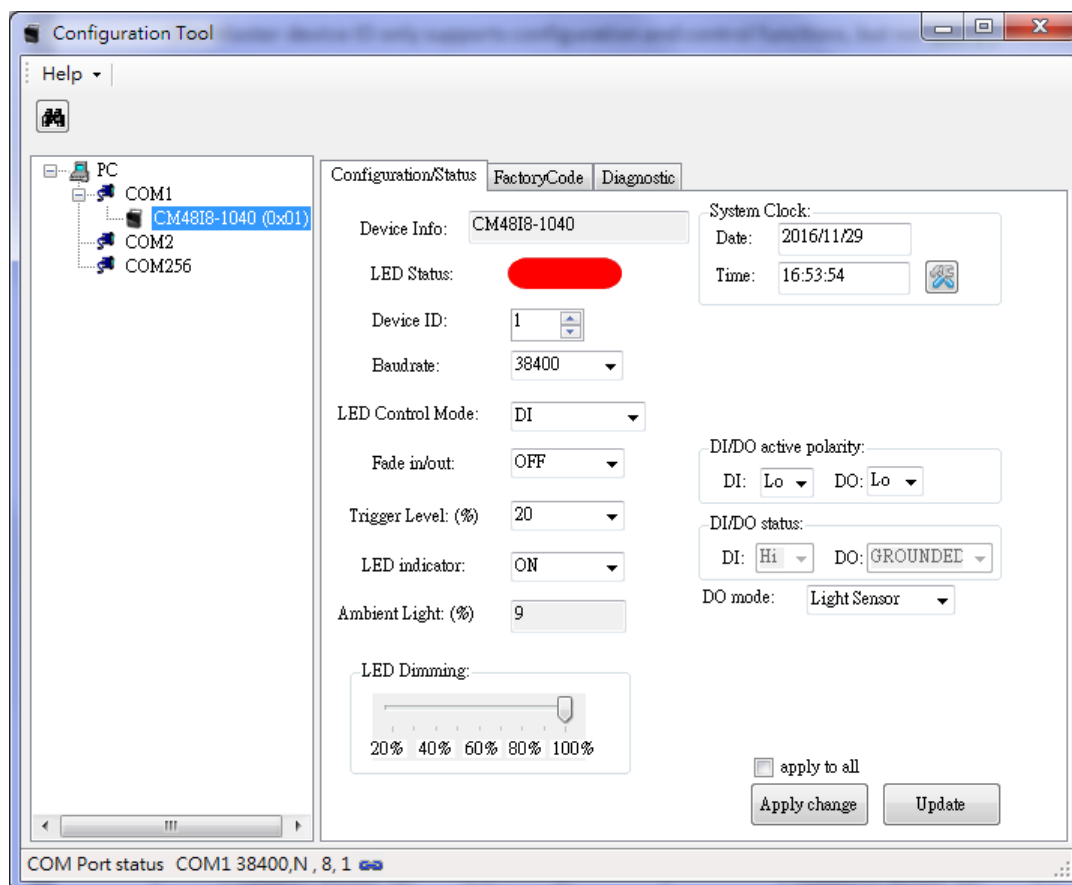
2. Then, configure the correct baudrate and click the Find icon. A search device window will prompt to ask for a start Device ID number. Default is 1. Unless a change to the device ID of your CaMate was made, otherwise, press OK to start finding from device ID 1. You can press the Stop scan button any time once your CaMate is found.





The CaMate illuminator thus found will be listed under the selected COM port. Select the CaMate you want to configure and/or control, and the Configuration/Status page will display.

## Configuration/Status Page



### Apply change

The Apply change button lets the configuration values take effect. CaMate configuration values will not be saved until you click the Apply change button.

### Update

The Update button is used to query the CaMate configuration to display on the software. To ensure the software is displaying the latest information from CaMate, you should use Update button before you start to configure.

### Device Info

Device Info indicates the CaMate model name, e.g., CM4818-1040.

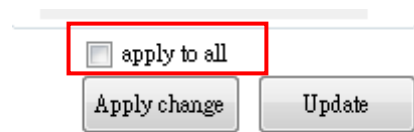
### LED Status

LED Status depicts the current ON/OFF state of LED. Red means OFF, and Green means ON.

### Device ID

Each device comes with a unique Device ID when multiple CaMate devices are present on the RS485 bus. The Device ID ranges from 0 to 127. Make sure you configure different IDs for CaMate devices bearing the same model name. There are a total of 128 device IDs, i.e. 0 ~ 127. A special Master

Device ID 80h (128) can be used to configure any device no matter what the device ID of devices is (the Master device ID only supports configuration and control functions, but not query ). The Master Device ID can be used to configure multiple devices connected together with the same configuration profile. If the apply to all checkbox is selected, the software will use the Master device ID to proceed with configuration.



The screenshot shows a configuration window. At the top, there is a text input field. Below it, a checkbox labeled 'apply to all' is highlighted with a red rectangle. Below the checkbox are two buttons: 'Apply change' and 'Update'.

### Default Device ID of models

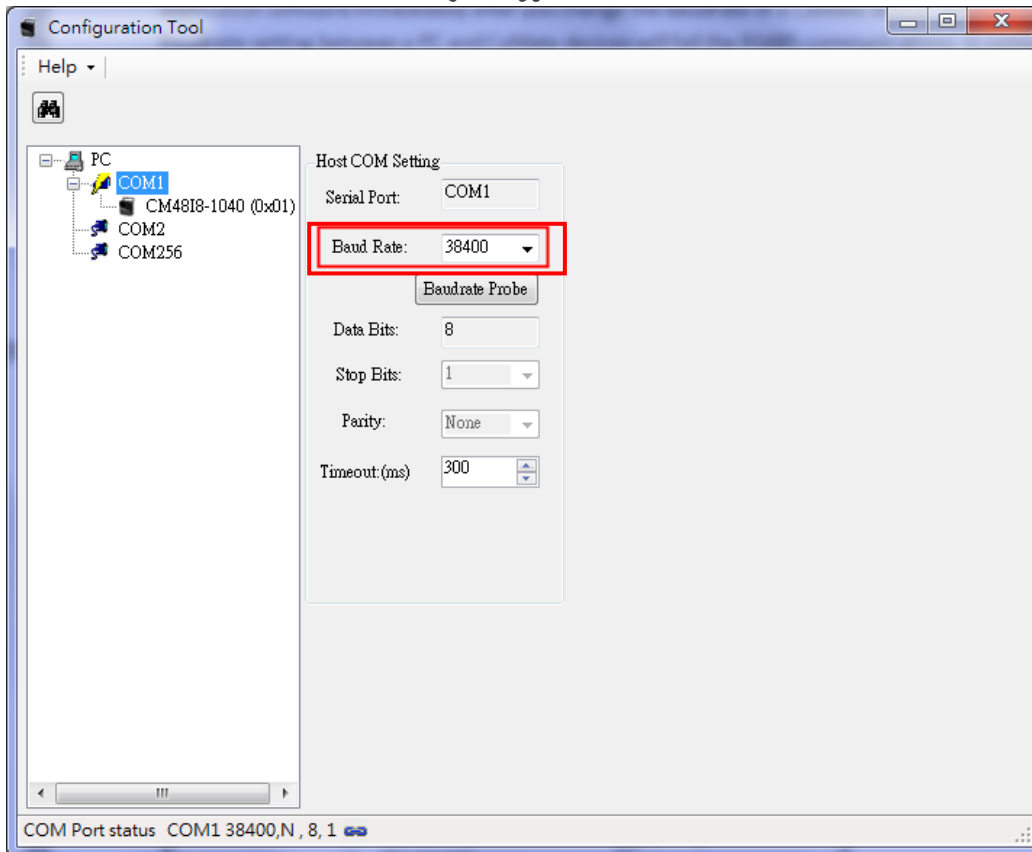
Model		Device ID	Remarks
IR 850	CM48I8-1040	1	
	CM48I8-2040	2	
	CM48I8-4080	3	
	CM48I8-90120	4	
	CM48I8-180	5	
IR 940	CM48I9-1040	11	
	CM48I9-2040	12	
	CM48I9-4080	13	
	CM48I9-90120	14	
	CM48I9-180	15	
W5	CM48W5-1040	21	
	CM48W5-2040	22	
	CM48W5-4080	23	
	CM48W5-90120	24	
	CM48W5-180	25	

Model		Device ID	Remarks
IR 850 motorized	CM48I8A-1040	31	
	CM48I8A-2040	32	
	CM48I8A-4080	33	
	CM48I8A-90120	34	
IR 940 motorized	CM48I9A-1040	41	
	CM48I9A-2040	42	
	CM48I9A-4080	43	
	CM48I9A-90120	44	
W5 motorized	CM48W5A-1040	51	
	CM48W5A-2040	52	
	CM48W5A-4080	53	
	CM48W5A-90120	54	

### Baudrate

Baudrate sets the communication speed of CaMate devices on the RS485 interface. The Max. rate is 115,200, and the min. is 1,200. The default baudrate is 38,400. Remember to change the baudrate of application software immediately after you change the baudrate of a CaMate device. Mismatched Baudrate setting between a PC and CaMate devices will fail the RS485 communications. In some computers, the max. baudrate may only reach 38,400.

It is recommended not to change the baudrate of CaMate devices because once the baudrate is changed and forgotten, the only way is to run the PC software is to probe the baudrate.

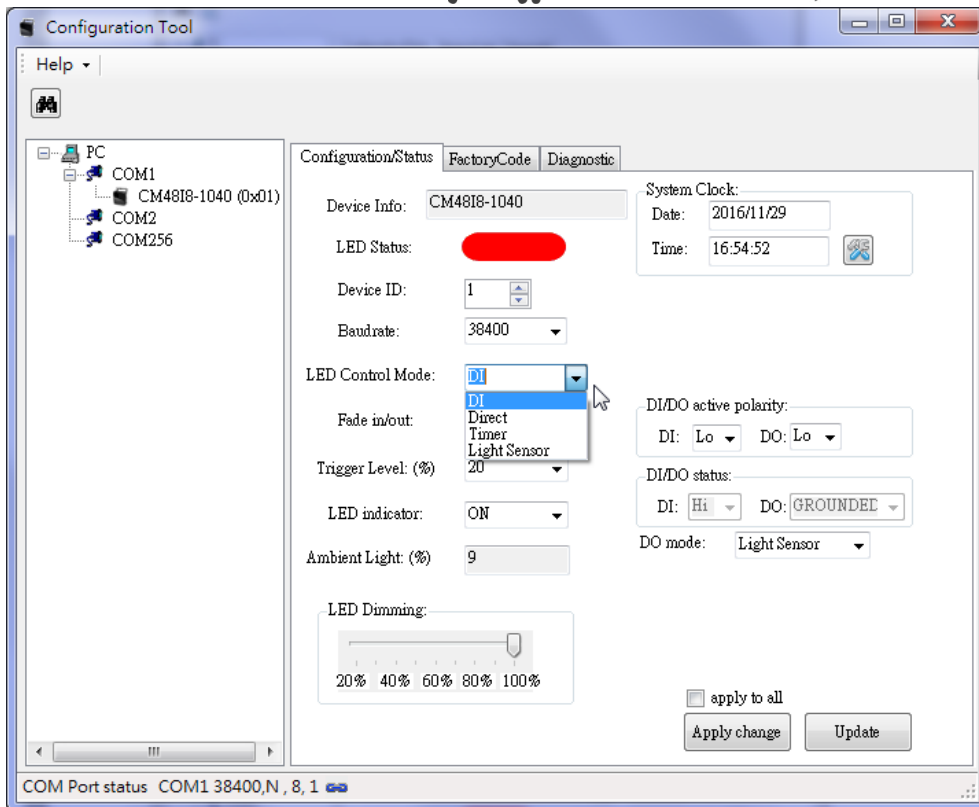


## LED Control Mode

There are 4 control modes for the illuminator LEDs: DI mode, Direct mode, Timer mode, and Light sensor mode.

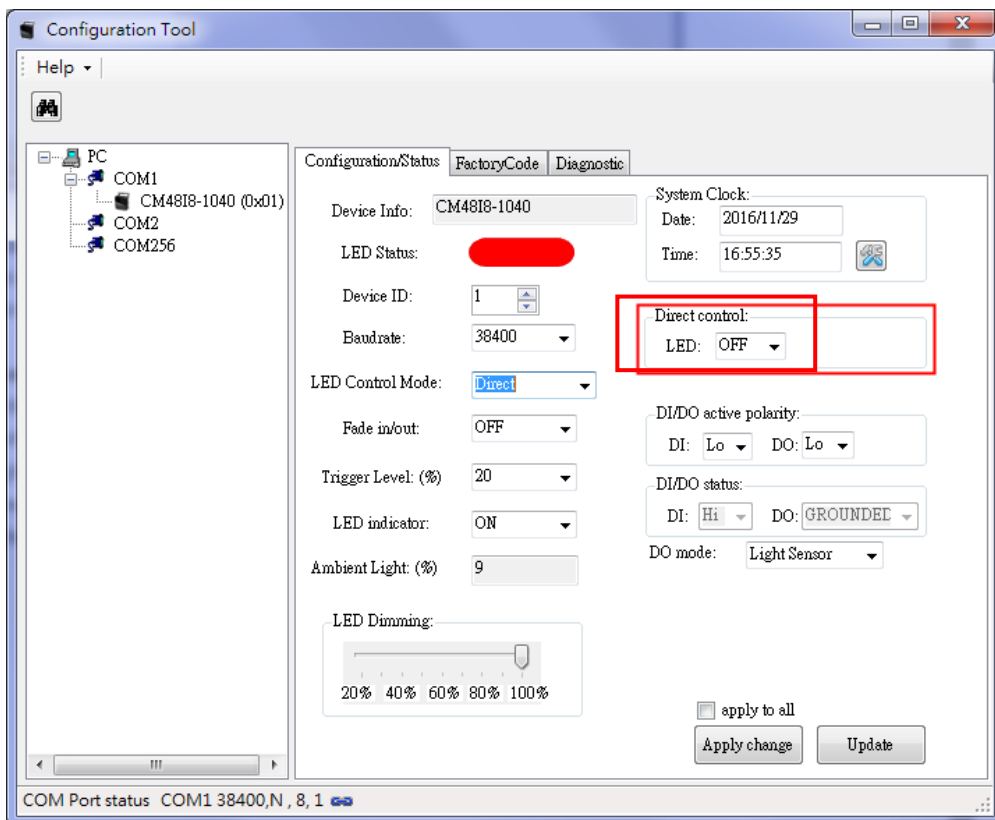
### DI mode

In the DI mode, the system default, the LED ON/OFF is controlled via a DI signal. The associated configuration is DI/DO active polarity, which defines the activation polarity of DI, e.g. low voltage or high voltage. The DI/DO status shows the current state of DI and DO signal. The DI mode applies when the application prefers a control signal from an external device, e.g., a network camera or a PIR detector.



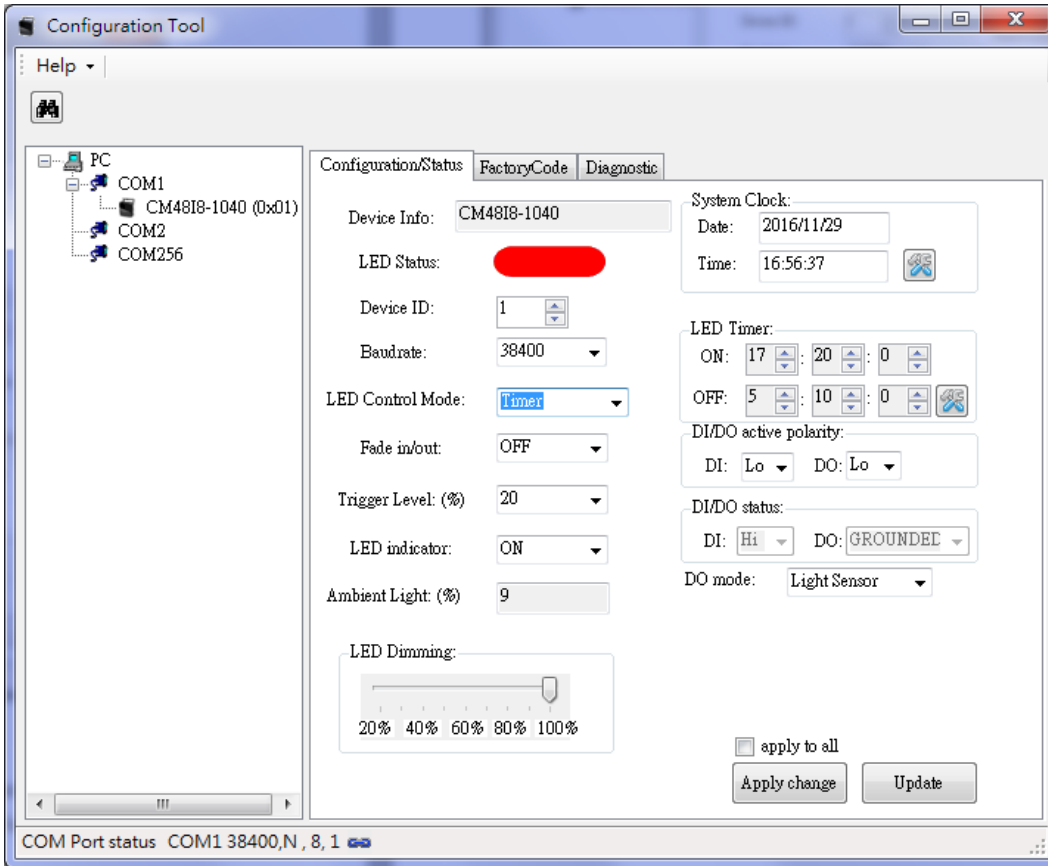
## Direct mode

In the Direct control mode, the IR LED is controlled by the commands issued through the RS485 interface.



## Timer mode

There is an embedded system clock on CaMate devices. The Timer mode allows the configuration of periodical ON/OFF time to control LED automatically. However, since there is no battery in CaMate, the system Clock will reset to default setting when powered down. (If you need to implement a battery to sustain the system clock during power-off, please contact your sales representative for customization service)

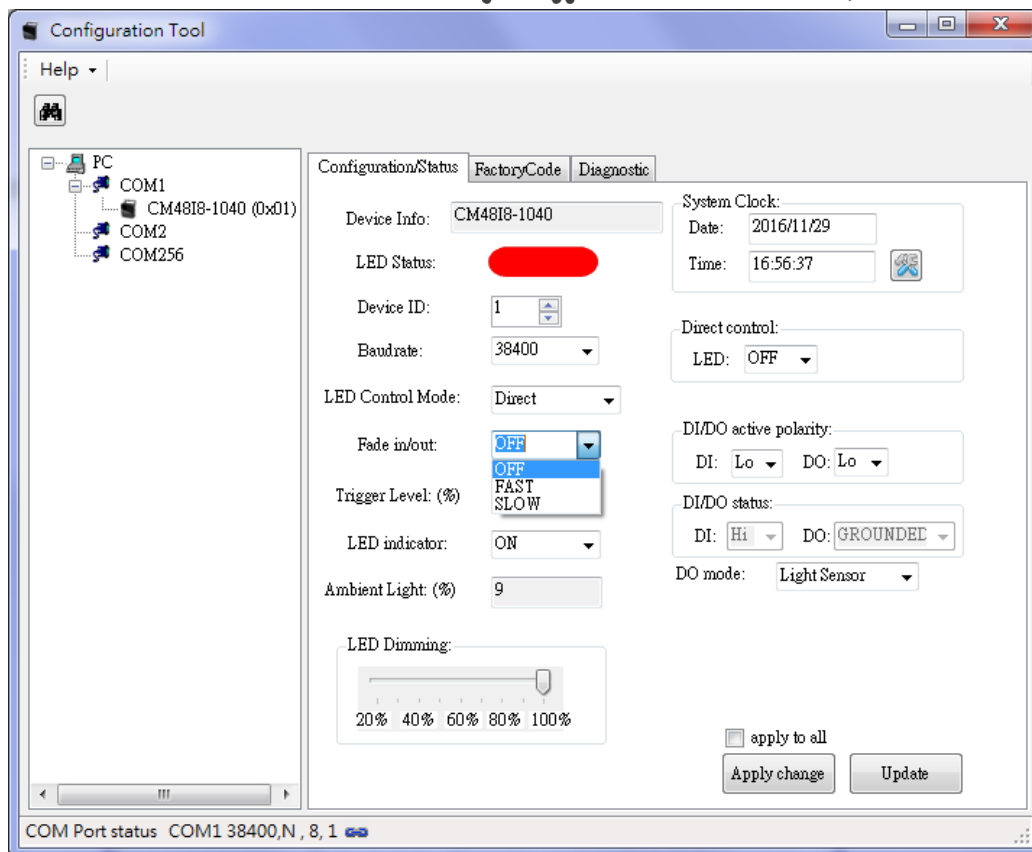


## Light sensor mode

In the Light sensor mode, the LED is directly controlled by the light sensor status. If the Ambient Light is lower than the Trigger Level, LED turns ON. If higher than the Trigger level, the LED turns OFF.

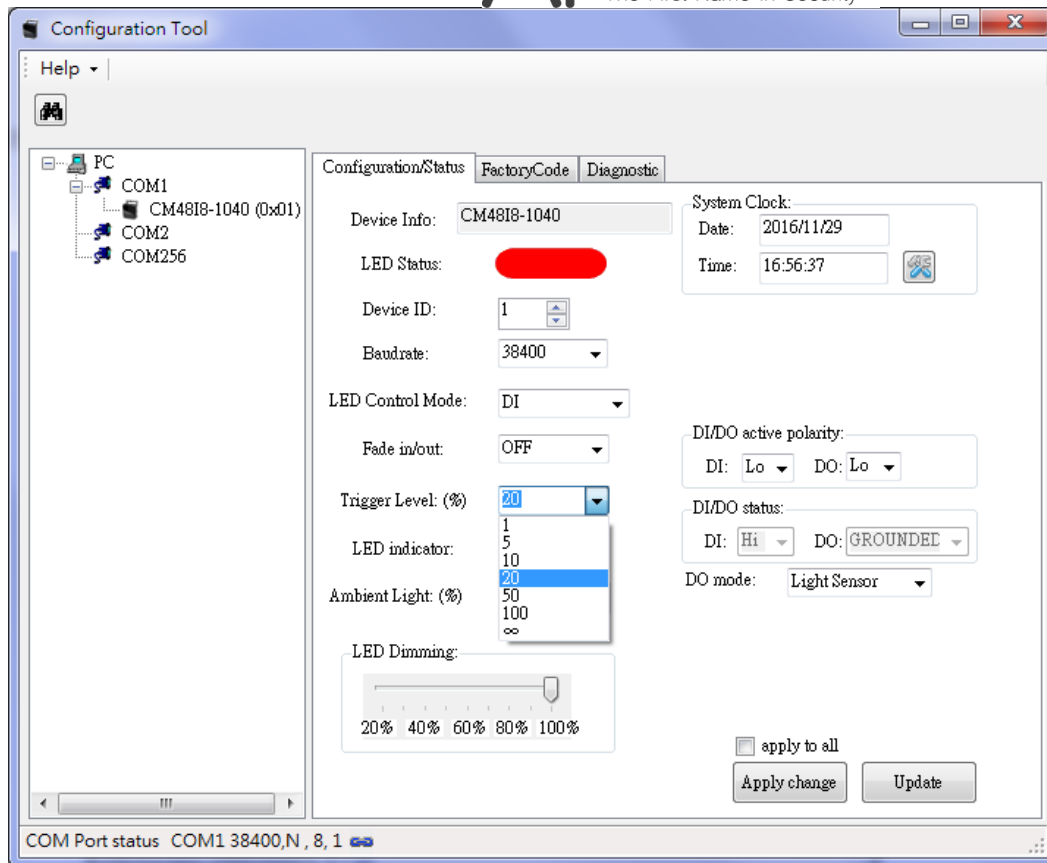
## Fade in/out

The Fade in/out control defines the LED ON/OFF behavior. If the Fade in/out function is disabled, the LED is turned ON or OFF immediately. When the Fade in/out is set to FAST, the LED fades in or out in 1 second, and 3 seconds if set to SLOW. Fade in/out can avoid sudden LED ON/OFF, which may cause the occurrence of over-exposure or under-exposure on camera image. The sudden ON/OFF will also cause discomfort for human eyes when using the visible light CaMate, such as the w5 series.



## Trigger Level

Trigger Level defines the ambient Lux threshold for the embedded light sensor. There are 7 threshold levels. 20 % is the default value. "∞" represents the infinite value, which means the light sensor detection is always active. When the ambient light falls under the triggering threshold, the LEDs enter the active state, and will become inactive state when the light level is 10 % above the threshold, e.g., when the detected level is 30%.



## LED indicator

LED indicator activates or deactivates the information status LED, i.e. red and green LEDs (not the IR illumination LEDs). Because of opaque front cover in the IR models, I8 and I9, the LED indicators only can be seen in the non-IR CaMate products, i.e. w5. Below are the definitions of LED indicators:

- Red LED constant ON means normal operation, OFF means system is not working.
- Red LED flashes every 1 second means IR LEDs are overheated, flashes every 3 seconds means LED voltage is out of range.
- Green LED flashes means the device received and executing commands.
- If both red and green LEDs flash simultaneously, the device upgrading its firmware.

## Ambient Light

Ambient Light reports the current ambient lighting level. The ambient light level is polled every 10 seconds. The light sensor detection control may have a max. of 10 seconds delay when the ambient light level changes.

## LED Light Level

LED Light Level controls the strength of LED lighting from 100% (default setting, max. power consumption) to 20% when the LED is ON.

## DO Mode

The DO mode defines the function of DO pin. The DO signal can be used to report three conditions:

Detected Light Level, LED state, or Diagnostic mode. The DO pin signal follows the DO active polarity setting.

### DO light sensor mode

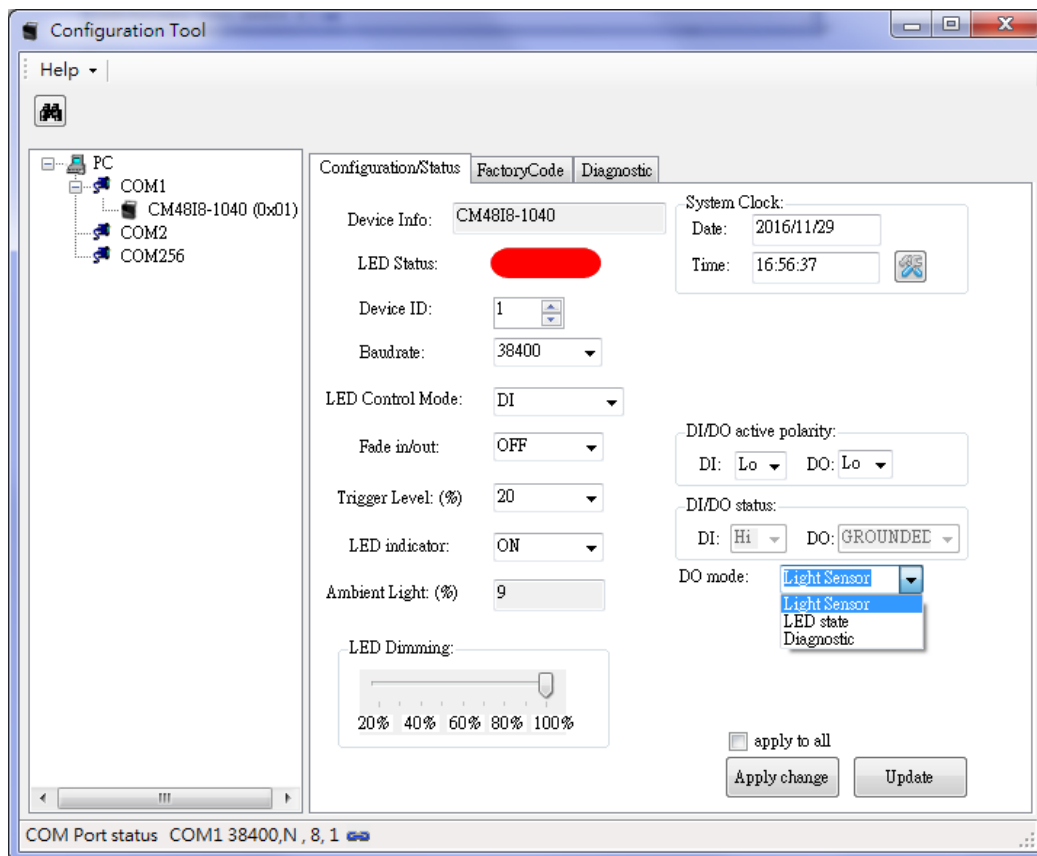
In the default Light sensor mode, the DO pin outputs the light sensor detection result as the "bright" state (ambient lighting higher than the Triggering level) or the "dark" state (ambient light lower than the Triggering level). If the application requires CaMate to report Day/Night mode to other devices, e.g., the network camera, the DO mode should be configured to the Light sensor mode.

### DO LED state mode

In the LED state mode, the DO pin outputs the LED ON/OFF state. If a CaMate is operating in the Direct or Light sensor LED control mode, other devices can acknowledge the CaMate's LED ON/OFF status via the DO connection.

### DO Diagnostic mode

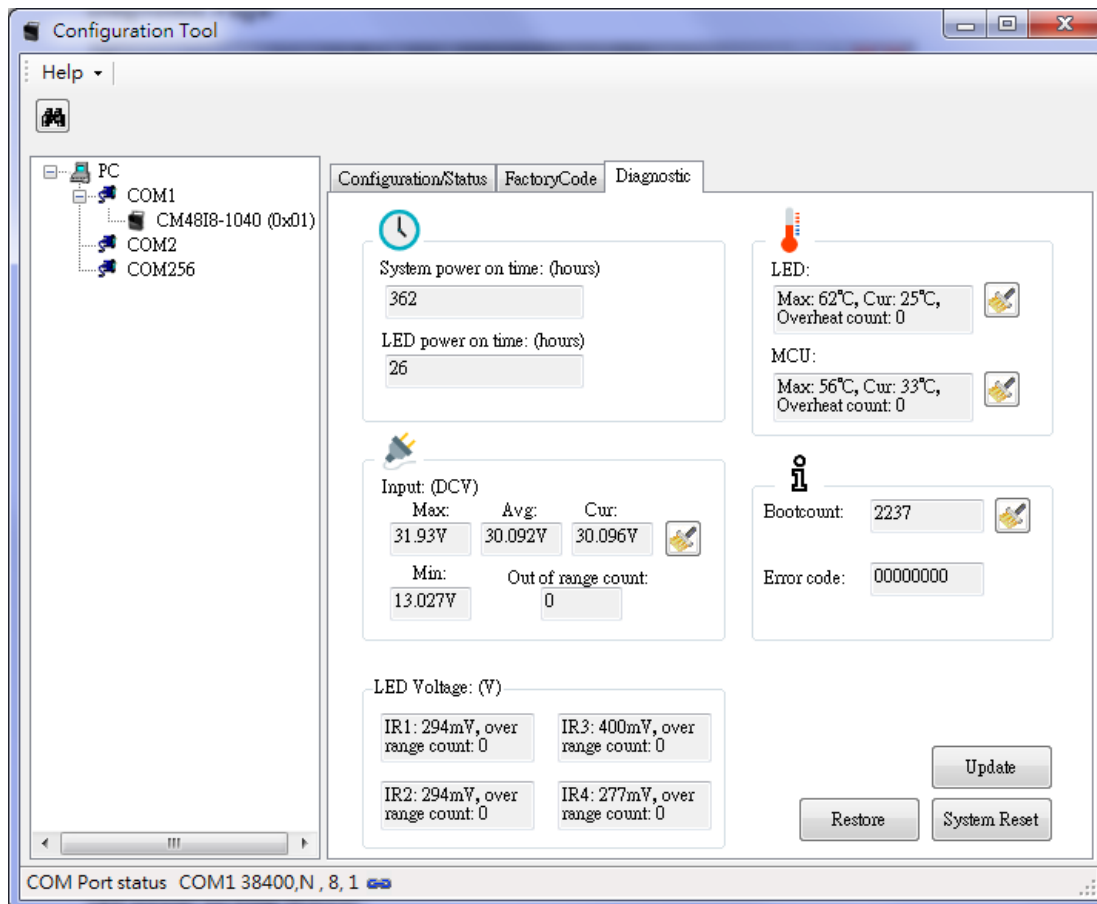
In the Diagnostic mode, the DO pin outputs the LED health status. Abnormal conditions may include: LEDs overheated or LED voltage out of range. The Diagnostic mode can be used for maintenance purpose.



### Angle Level (Only available for the motorized version of CaMate, e.g. CM4818a-1040)

Angle level is used to adjust the beam angle of CaMate, and thus adjust the effective IR illumination range.

## Diagnostic Page



In the diagnostics page, you can find important system operating information.

### System power on time (hours)

System power on time records total the accumulated number of operating hours.

### LED power on time (hours)

LED power on time as the total LED ON hours.

### Inputs

The Input state reports the input voltage of power supply to CaMate. It records the Max. and Min. voltage ever recorded, the average voltage during operation, and the current voltage reading. The Out of range count records the event when the input voltage is under DC12V -10% (DC10.8V) or over the AC24V+10% (AC26.4V).

### LED Voltage

The LED voltage reports the health condition for LED strings, as there are 4 LED strings in CaMate. The normal LED ON voltage should fall between 400mV and 1200mV. The Over range count records the event when the detected LED voltage is over 1200mV. Once the LED voltage is over range, the LED is probably damaged. The 4 LED strings work independently.

**LED Temperature**

The LED temperature records the Max. temperature of LEDs ever happened, the current temperature, and the count of overheating events.

CaMate supports the automatic overheat protection when IR LED is overheated, i.e., over 95°C (203°F), by automatically reducing the current to maintain the LED working in a safe temperature range and to ensure the device reliability and longevity.

**MCU Temperature**

MCU temperature records the Max. temperature ever happened to MCU, current temperature reading, and the count of overheating events.

**Boot count**

How many times the device is power on and off. It can be used to check if power losses have occurred in the operation history.

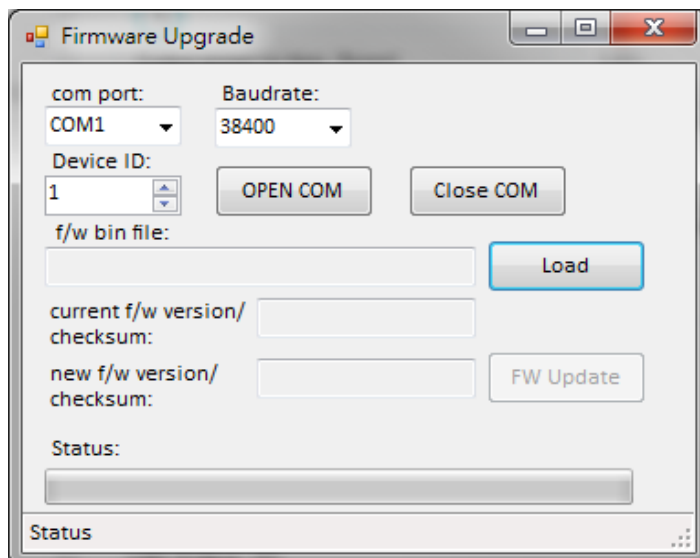
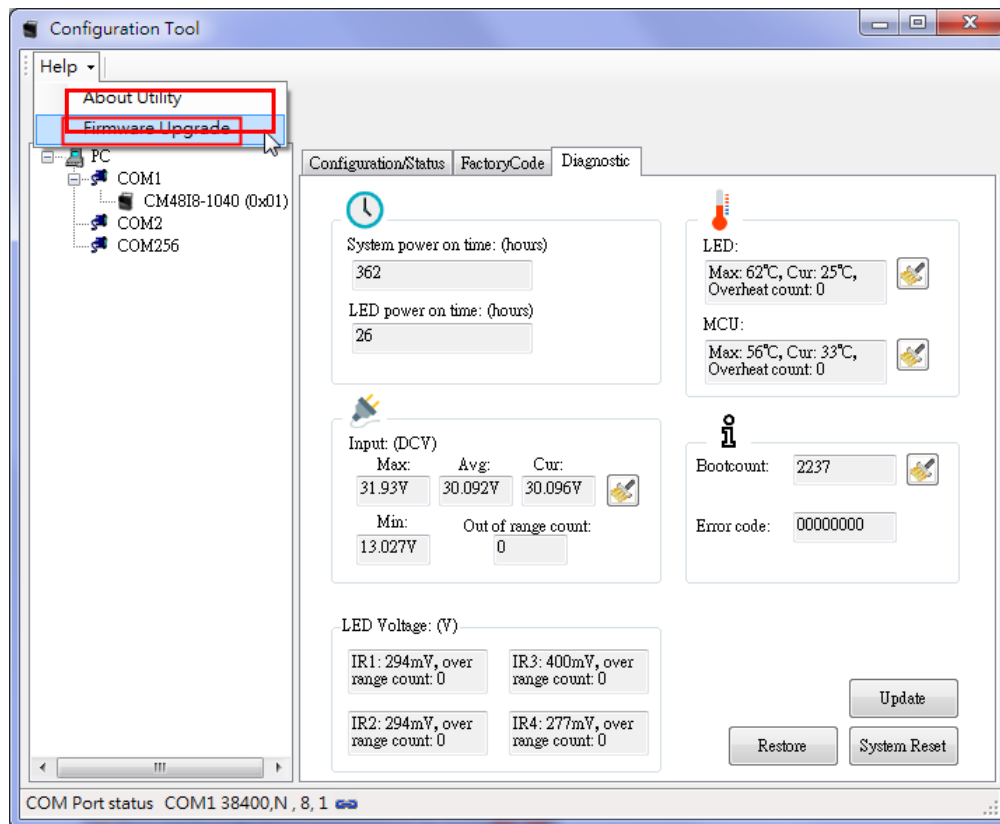
**Error code**

The Error code is used for diagnostics purposes. You can report the error code to your technical support for help if the device is out of order.

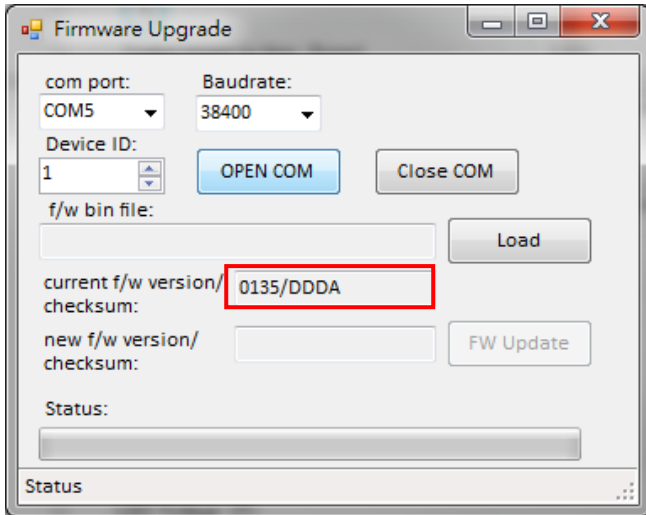
## Firmware Upgrade

CaMate's firmware can be upgraded through the RS485 interface. Access the firmware upgrade function in the Help menu.

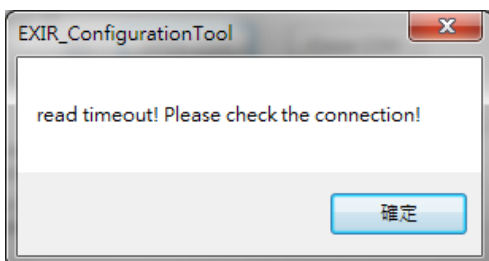
Select Firmware Upgrade , the Firmware Upgrade window will prompt.



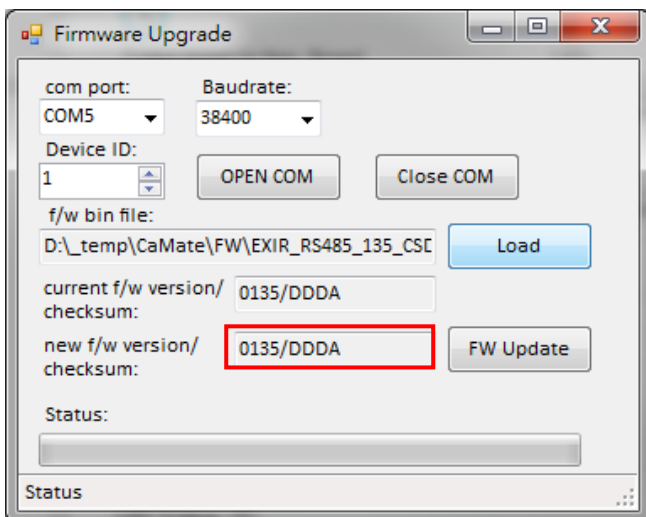
1. Select the correct COM port, Baudrate, and Device ID, then click the OPEN COM button. When a CaMate is connected, current firmware version and checksum will be read and shown.



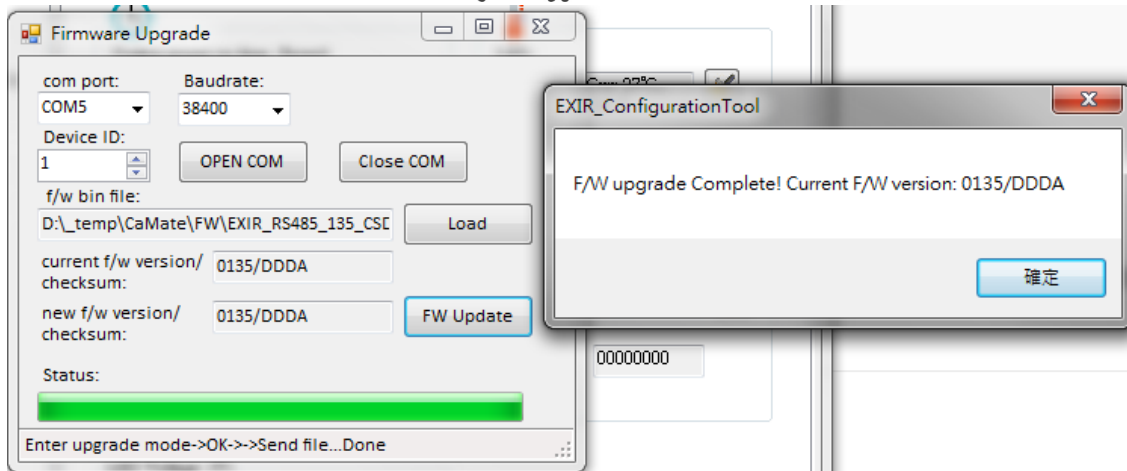
If the software cannot connect to a CaMate, a timeout warning displays. Please check if the COM port and/or baudrate settings are correct, or the wire connection is correctly made.



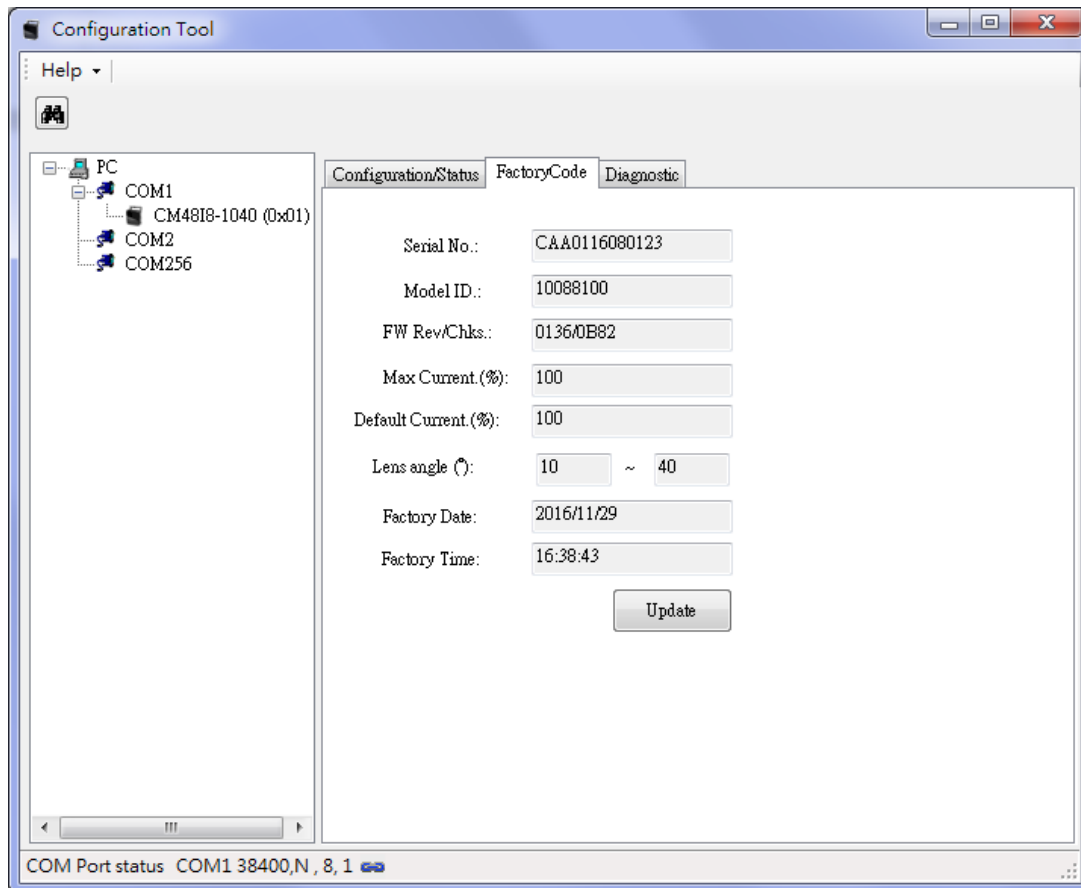
2. Load CaMate firmware binary code by clicking the Load button, and select the correct binary file. The new firmware version and checksum will display after loading.  
You can find the firmware binary file at [www.vivotek.com](http://www.vivotek.com) or contact your sales representative.



3. Click FW Update and confirm the upload, firmware upgrade will then start. Please do not turn off the power to CaMate until the upgrade is completed.



## FactoryCode Page



The FactoryCode page records manufacturing information of the device. Generally, the code is used for manufacturing.

### Model ID

Model ID represents the model of CaMate.

### FW Rev/Chks

Firmware revision and checksum of the code.

### Max Current

Allowed max. LED current. It depends on hardware circuitry design.

### Default Current

Default LED current configuration.

### Lens angle

Optical Lens used in CaMate, e.g., 10° ~ 40°.

### Factory Date

Manufacturing date.

### Factory Time

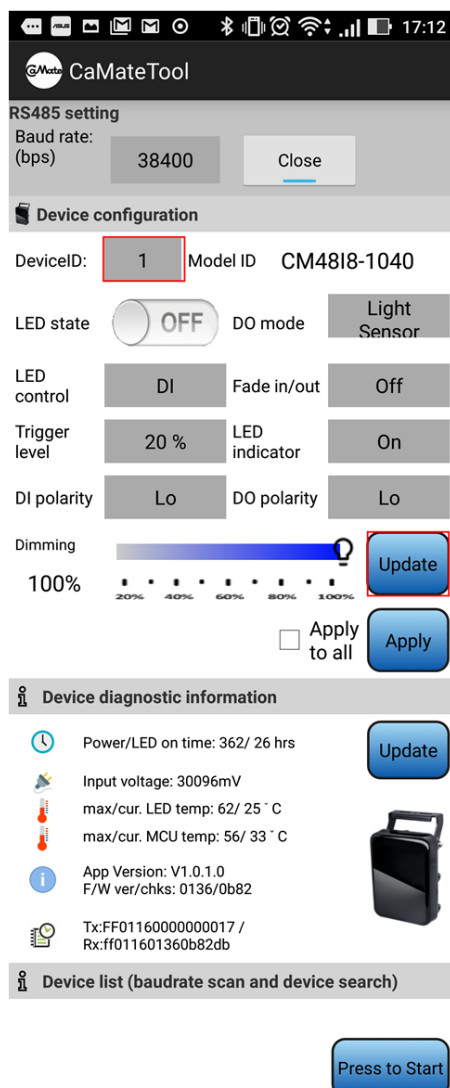
Manufacturing time.

## Android APP

After you install CaMateTool.apk in your Android device, the app will automatically launch upon USB-to- RS485 converter connection. If not, tap the CaMate icon on the screen to launch.



When CaMateTool screen appears, the app enables RS-485 communication using the default baud rate - 38,400 bps. The default device ID is 1. You can select a new one by touching the device ID value using a drop-down menu with all other available values. Then, click on the Update button, the app will query configuration status and display them on screen.



## Device configuration

**Device configuration**

DeviceID: **1**    Model ID    **CM4818-1040**

LED state: **OFF**    DO mode: **Light Sensor**

LED control: **DI**    Fade in/out: **Off**

Trigger level: **20 %**    LED indicator: **On**

DI polarity: **Lo**    DO polarity: **Lo**

Dimming: **Update**

☐ Apply to all    **Apply**

After the configuration value is changed, click the Apply changes button for the configuration changes to take effect. For the configuration details, please refer to the description in **Windows Application Software - Configuration/Status Page**.

## Device diagnostic information

**Device diagnostic information**

Power/LED on time: 362/ 26 hrs

Input voltage: 30096mV

max/cur. LED temp: 62/ 25 ° C

max/cur. MCU temp: 56/ 33 ° C

App Version: V1.0.1.0  
F/W ver/chks: 0136/0b82

Tx:FF01160000000017 /  
Rx:ff011601360b82db

**Update**

For the diagnostic information, please refer to the description in **Windows Application Software - Diagnostic Page**.

## Device list (baudrate scan and device search)

### Device list (baudrate scan and device search)

Start to scan Baudrate...

scan Baudrate:1200...

scan Baudrate:2400...

scan Baudrate:4800...

scan Baudrate:9600...

scan Baudrate:19200...

scan Baudrate:38400...CM48I8-1040 ← correct baudrate

scan Baudrate:57600...

scan Baudrate:115200...

Start to search device...

Inquiry ID:0...

Inquiry ID:1...CM48I8-1040 ← device is found

Inquiry ID:2...

Inquiry ID:3...

Inquiry ID:4...

Press to Start

If you are not sure of the baudrate or device ID of CaMate, you can scroll down on the screen, click the Press to Start button to search for correct baudrate and device ID. You can click Press to Stop button to stop scanning anytime once your CaMate is found.

## Remote Controller



### Unlock



By default, the CaMate IR remote control is disabled. To enable the control function, the unlock button must be pressed continuously for at least 2 seconds. After being idle for 5 minutes, it automatically enters the lock mode to disable IR remote control function.

### LED on/off



The button is a toggle switch to turn LEDs on/off.

### LED status



The button is a toggle switch to turn status LED indicators on/off. Because of the opaque front cover in the IR version, I8 and I9, the LED indicators only can be seen in the non-IR CaMate products, i.e. w5.

### Light sensor sensitivity

There are three pre-defined levels to configure the light sensor threshold values.



Turn LED on when the ambient light is under 50 % and turn off when the ambient light is above 60%.



Turn LED on when ambient light is under 20 % and turn off when the ambient light is above 30 %.



Turn LED on when ambient light is under 10 % and turn off when the ambient light is above 20 %.

### LED dimming

There are four pre-defined levels to configure the strength of LED lighting.



100%



75%



50 %



25%

The fine-tune button set the strength of LED lighting from 100% to 20%.



## Angle of illuminator

(Only available for the motorized version of CaMate, e.g. CM48I8A-1040). The Angle level is used to adjust the beam angle of CaMate for variable effective illumination distances.



Adjusts angle to tele



Adjusts angle to 66%



Adjusts angle to 33%



Adjusts angle to wide



Adjusts angle to tele (fine-tune)



Adjusts angle to wide (fine-tune)

## Appendix A: Command set of CaMate

Protocol:

To avoid communication conflicts when several devices trying to send data at the same time, all transmission and reception are controlled by the host computer. The basic form is a command/response protocol with the host initiating the sequence. When the CaMate devices are not transmitting, they are in the listening mode. The host sends a command to CaMate with a specified address and waits a certain amount of time for the CaMate devices to respond.

The format for a command is:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Sync Byte	Address	Command	Data1	Data2	Data3	Data4	Checksum

All values below are shown in hexadecimal.

The synchronization byte is always 0xFF.

The address is the logical address of the CaMate being controlled.

The checksum is the 8-bit sum of the payload bytes (bytes2 through 7) in the command.

Command set Table: default address is 0x01

Command Name	Command Syntax	Description
Software Reset	FF 01 10 00 00 00 01 12	
Read Serial No	FF 01 14 00 00 00 00 15	Reply: FF 01 14 (data) chks, data: 16-bytes
Read Model ID	FF 01 15 00 00 00 00 16	Reply: FF 01 15 dd dd dd dd chks, dddd dddd = model ID
Read F/W version	FF 01 16 00 00 00 00 17	Reply: FF 01 16 dd dd cc cc chks, dddd: version, cccc: checksum
Read Max/Default current	FF 01 17 00 00 00 00 18	Reply: FF 01 17 00 mm 00 cc chks, mm: percentage of max current , cc: percentage of default current
Read Lens angle	FF 01 18 00 00 00 00 19	Reply: FF 01 18 pp qq rr ss chks, unit: degree pp: Lens1 tele angle, qq: Lens1 wide angle rr: Lens2 tele angle, ss: Lens2 wide angle
Read Factory date	FF 01 19 00 00 00 00 1A	Reply: FF 01 19 yy yy mm dd chks, yyyy/mm/dd = year/month/day
Read Factory time	FF 01 1A 00 00 00 00 1B	Reply: FF 01 1A 00 hh mm ss chks, hh/mm/ss = hours/minutes/seconds
Read Configuration Data	FF 01 20 00 00 00 00 21	Reply: FF 01 20 dd dd dd dd chks, dddd dddd: 32-bit configuration data
Write Configuration	FF 01 21 dd dd dd dd chks	configuration data dddd dddd: (bold font is default value)

Data		bit 31~24: Device ID <b>(01)</b> ~(127) bit 23~21: Baudrate (bps) (0)1200/(1)2400/(2)4800/(3)9600/(4)19200/ <b>(5)38400</b> /(6)57600/(7)115200 bit 20~16: Brightness (0)20~ <b>(31)100%</b> , unit=2.5% bit 15~13: LED control mode <b>(0)DI</b> /(1)Direct/(2)Timer/(3) Light Sensor bit 12: LED status (1)on/ (0)off READ ONLY bit 11~10: Fade inout <b>(0)Off</b> /(1)Fast/(2)Slow bit 9: DI active polarity (1)Hi/ <b>(0)Lo</b> , bit 8: DO active polarity (1)Hi/ <b>(0)Lo</b> bit 7~6: Reserved bit 5~4: DO mode <b>(0)Light sensor state</b> / (1)LED state/ (2)Diagnostic bit 3~1: Light sensor threshold (6)infinite/ (5)100/ (4)50/ <b>(3)20</b> /(2)10/ (1)5/ (0)1 % bit 0: LED indicator control <b>(1)on</b> / (0)off
Read Clock Date	FF 01 22 00 00 00 00 23	Reply: FF 01 22 yy yy mm dd chks, yyyy/mm/dd = year/month/day
Write Clock Date	FF 01 23 yy yy mm dd chks	yyyy/mm/dd = year/month/day
Read Clock Time	FF 01 24 00 00 00 00 25	Reply: FF 01 24 00 hh mm ss chks, hh/mm/ss = hours/minutes/seconds
Write Clock Time	FF 01 25 00 hh mm ss chks	hh/mm/ss = hours/minutes/seconds
Write LED Status	FF 01 27 00 00 00 0d chks	d: (1) on, (0)off
Read Lens position and motor speed	FF 01 28 00 00 00 00 chks	Reply: FF 01 28 00 mm 00 nn chks, mm: Lens position, mapping to Lens angle range Wide (0x00) ~ Tele (0xFF) nn: motor speed SLOW(0) ~ FAST(3)
Write Lens position and motor speed	FF 01 29 00 mm 00 nn chks	mm: Lens position, mapping to Lens angle range Wide (0x00) ~ Tele (0xFF) nn: motor speed SLOW(0) ~ FAST(3)
Read LED on timer	FF 01 2A 00 00 00 00 2B	Reply: FF 01 2A 00 hh mm ss chks, hh/mm/ss = hours/minutes/seconds
Write LED on timer	FF 01 2B 00 hh mm ss chks	hh/mm/ss = hours/minutes/seconds
Read LED off timer	FF 01 2C 00 00 00 00 2D	Reply: FF 01 2C 00 hh mm ss chks, hh/mm/ss = hours/minutes/seconds
Write LED off timer	FF 01 2D 00 hh mm ss chks	hh/mm/ss = hours/minutes/seconds
Read Temperature	FF 01 30 00 00 00 00 31	Reply: FF 01 30 pp qq rr ss chks, temperature value in 2's complement pp: max. LED temperature, qq: current LED temperature, rr: max. MCU temperature, ss: current MCU temperature

Read AC/DC max/avg. voltage	FF 01 31 00 00 00 00 32	Reply: FF 01 31 mm mm nn nn chks, mmmm: max. voltage (in mV) nnnn: average voltage (in mV)
Read AC/DC current voltage	FF 01 32 00 00 00 00 33	Reply: FF 01 32 rr rr pp pp chks pppp: current voltage (in mV) rrrr: min. voltage (in mV)
Read Total System power on time	FF 01 35 00 00 00 00 36	Reply: FF 01 36 hh hh hh hh chks, hhhh hhhh: 0~232 hours
Read Total LED on time	FF 01 36 00 00 00 00 37	Reply: FF 01 36 hh hh hh hh chks, hhhh hhhh: 0~232 hours
Read Ambient light	FF 01 37 00 00 00 00 38	Reply: FF 01 37 00 00 00 aa chks, aa: ambient light in %
Read Boot count	FF 01 38 00 00 00 00 39	Reply: FF 01 38 00 00 bb bb chks, bbbb: boot count
Read LED string1 voltage	FF 01 3A 00 00 00 00 3B	Reply: FF 01 3A 00 00 pp pp chks, pppp: current voltage (in mV)
Read LED string2 voltage	FF 01 3B 00 00 00 00 3C	Reply: FF 01 3B 00 00 pp pp chks, pppp: current voltage (in mV)
Read LED string3 voltage	FF 01 3C 00 00 00 00 3D	Reply: FF 01 3C 00 00 pp pp chks, pppp: current voltage (in mV)
Read LED string4 voltage	FF 01 3D 00 00 00 00 3E	Reply: FF 01 3D 00 00 pp pp chks, pppp: current voltage (in mV)
Read Error code	FF 01 3F 00 00 00 00 40	Reply: FF 01 3F ee ee ee ee chks, eeee eeee: 32-bits All zero: System is OK Bit 0: Watchdog Reset Bit 1: MCU RX buffer overflow Bit2: EEPROM write fail Bit8: LED driver1's voltage is out of range Bit9: LED driver2 's voltage is out of range Bit10: LED driver3's voltage is out of range Bit11: LED driver4's voltage is out of range Bit17: Temperature sensor read fail