



PULSESTAR VCT6 Installation Guide



1140-D-00008-Rev 3

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Contents

1.0 Getting Started.....	4
2.0 Safety	4
2.1 Heat.....	4
2.2 Electrical.....	5
2.3 General.....	5
2.4 Installation Guidance (disclaimer)	5
2.5 Eye/Skin Guidance	6
2.5.1 IEC/BS EN62471 Risk Groups	6
2.5.2 Product Labelling	6
3.0 Mounting.....	7
3.1 Heatsinking.....	7
4.0 Connecting the VCT6.....	8
4.1 Cable Terminations	8
4.2 Connecting the Power Supply	8
5.0 Communications	9
5.1 Trigger Input.....	9
5.2 Trigger Output.....	10
6.0 General Configuration.....	11
6.1 Pulse and Duty Cycle Limits	11
6.2 Pulsed Output	11
6.3 Switched Output	12
6.4 Internal Trigger Timer	12
6.5 Trigger Input Options	12
6.6 Factory Settings.....	12
7.0 Ethernet Address	13
7.1 IP Address.....	13
7.2 Programmed IP Address and DHCP	13
7.2.1 DHCP	13
7.2.2 Fixed IP Address	14
8.0 Webpage Configuration	15
8.1 Main Page	15
8.2 General Setup Page.....	15
8.3 Light Output Configuration Page	16
8.4 Trigger Output Configuration Page	16

9.0 Configuration Commands	17
9.1 Command Structure	17
9.2 General Commands.....	18
9.2.1 Save the Settings Memory	18
9.2.2 Report the Firmware Version.....	18
9.2.3 Report the Configuration	18
9.2.4 Clear Configuration	19
9.2.5 Enable Ethernet Messages.....	19
11.2.6 Clear Any Errors	19
9.2.7 Set/Clear the Web-Page Password	20
9.3 Lighting Commands.....	20
9.3.1 Set Switched Mode	20
9.4.1 Set Pulse Mode	20
9.4.2 Set Option Flags	20
9.4.3 Set the Internal Trigger	21
9.4.4 Simulate an Input Trigger.....	21
9.5 Command Summary.....	21
10.0 Reference Information.....	22
10.1 Ratings and Restrictions.....	22
10.2 Event Codes.....	23
10.3 Error Codes.....	23

1.0 Getting Started

This user manual describes the setting up and operation of the PULSESTAR VCT6 pulsed illuminator.

The VCT6 is a pulsed illuminator suitable for use in transport or machine vision applications. It is available in White-Light or Infra-Red and can be controlled through an Ethernet connection.

Read section 2, 'Safety' and section 10, 'Reference Information' to check that the VCT6 illuminator fulfils your requirements.

Mount the VCT6 as described in section 3, 'Mounting' and connect the VCT6 as described in section 4, 'Connecting the VCT6'.

The VCT6 may be configured using its web pages. To configure the VCT6 using its web pages, refer to section 8, 'Webpage Configuration'.

The convention for standard VCT6 part numbers is:

VCT6-www-aa-ccc

www is the wavelength of light in nanometres; 850, 940, or W for White-Light

aa is the optical beam profile; 14°, 28°, 50°

ccc is the communications protocol, i.e. ETH for 'ethernet'

The convention for special variants VCT6 part numbers is as above with the addition of a specific suffix:

VCT6-www-aa-ccc-vvv

vvv is the variant; -T20 for example. This field is not required when specifying standard products.

2.0 Safety

The following symbols are used in this guide:



WARNING: Read instructions to understand possible hazard.



WARNING: Surface may get hot.



WARNING: Possible hazardous voltage.

Always observe these safety precautions. If in doubt, contact Raytec.

2.1 Heat

Ensure the VCT6 is mounted correctly (see section 3, 'Mounting'), and that you do not exceed any of the ratings for the unit (see section 10, 'Reference Information').



At its maximum ratings, the VCT6's enclosure can exceed 75°C which is sufficient to cause a burn if touched. Place the VCT6 in a position where personnel cannot accidentally touch it and ensure there is a free flow of air around the unit.

2.2 Electrical

The VCT6 does not have complete electrical isolation of inputs (including triggering and communications ports), therefore, please observe the following guidance:



- Computer equipment that is connected to the communication or trigger ports must be either; internally powered, separated from mains electricity by double insulation/reinforced isolation or be approved to IEC 60950-1 standard. All other equipment connected to the triggers, or other ports, must also have double insulation/reinforced isolation protection from the mains supply.
- The Power Supply Unit (PSU) used to energise the VCT6 must provide double insulation/reinforced isolation from mains electricity and protected against short circuits and overloads. The PSU should be approved to either IEC 62368-1, IEC 60335-1, IEC 61010-1, IEC61558-1,-2,-16. The PSU may also be approved to equivalent or superior safety standards.
- Any energised conductors derived from mains electricity must also have Safety Extra Low Voltage (SELV) output. Refer to section 10, 'Reference Information' for allowable voltage limits.
- Power supply cabling to the VCT6 must be rated to at least 4A.
- The DC power supply to the VCT6 must be externally fused to 4A using a slow blow fuse (T4AH, 50V).
- The installer must provide a clearly marked, nearby and easily accessible switch as part of the installation to allow the controller to be disconnected from its energy source on both power conductors.
- Transients caused by inductive loads must be suppressed externally to the VCT6.

WARNING: *This is a Class A product. Its use in residential areas may cause radio interference, and such use should be avoided unless special measures are taken by the user to restrict emissions to a level that allows the reception of broadcast transmissions.*

2.3 General

The VCT6 must not be used in an application where its failure could cause a danger to personal health or damage to other equipment.



If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

2.4 Installation Guidance (disclaimer)

This information is for guidance only. Installers must perform their own risk assessment specific to each installation. While Raytec has taken every care in the preparation of this advice, Raytec accepts no liability for damages of any kind except those required by law. Deliberate acts of endangerment and vandalism are not covered by this document and must be considered by the installer.

2.5 Eye/Skin Guidance

High levels of artificial optical radiation can cause damage to both eyes and skin. Exposure limit values have been drawn up for such hazards. All light systems are placed within Risk Groups, which define the level of risk when the light is used normally.



The user must take precautions appropriate to this risk group and ensure that no harm can come to anyone within the vicinity of the light.

2.5.1 IEC/BS EN62471 Risk Groups

The following applies to all variants of the VCT6 running full power and at maximum duty cycle:

Risk Group 2;

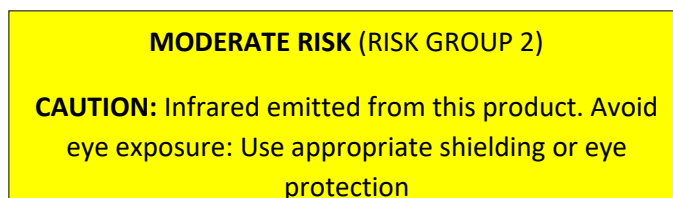
- VCT6-850-14-xxx
- VCT6-850-28-xxx
- VCT6-940-14-xxx
- VCT6-940-28-xxx

Exempt;

- VCT6-W-12-xxx
- VCT6-W-28-xxx

2.5.2 Product Labelling

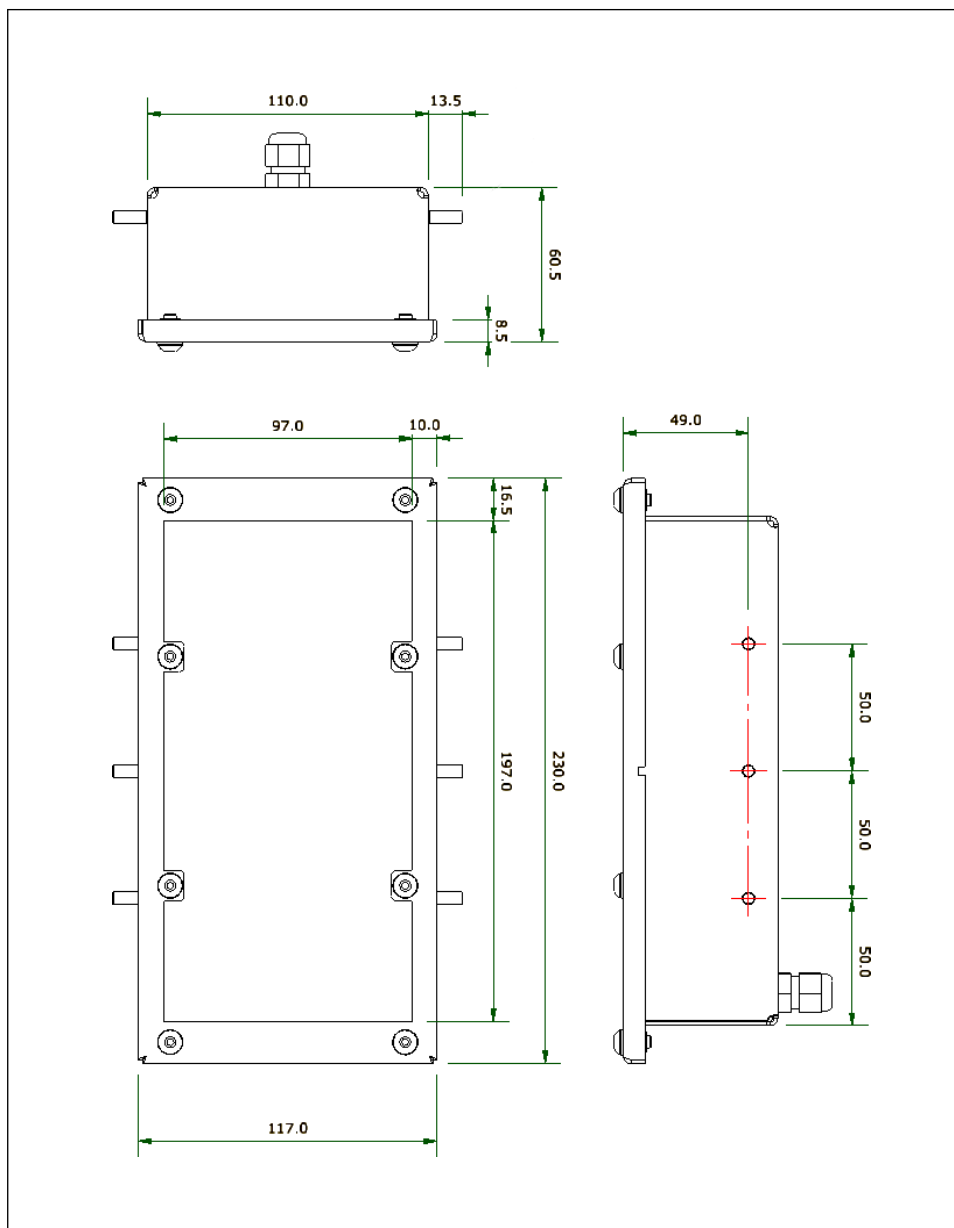
The Infra-Red versions of this product are labelled:



The White-Light versions of this product do not require a warning label.

3.0 Mounting

Half nuts are fitted permanently to the six M5 mounting studs on the standard VCT6. If these studs are fitted to your unit, **do not** attempt to remove them.



3.1 Heatsinking

The heat dissipation of the VCT6 can be calculated as follows:

$$HD = (6 \times Br \times PW \times TF) + 2$$

Where:

- HD = Heat dissipation in Watts
- PW = Strobe pulse width in seconds
- TF= Maximum trigger frequency in Hertz

Br = Brightness of light output in percent.

Without any heatsinking, the internal temperature of the VCT6 rises 1.8°C per Watt of heat dissipation. Given the range of ambient temperatures and radiated sunlight, additional external heatsinking may be necessary on the rear surface.

4.0 Connecting the VCT6

All connections to a standard VCT6 are made through an unterminated 12 core cable. The length of this cable is typically 2000mm ± 100mm. The terminations for this cable are explained in the section below.

Alternatively, the unit may be fitted with a 3000mm ± 100mm cable terminated with two Molex Mini-fit Jr connectors.

4.1 Cable Terminations

The wires of the 12-core cable are connected as follows:

Wire colour	Function (Ethernet)
Black Blue	Power supply –
Red Red & Blue	Power supply +
White	Trigger in –
Brown	Trigger in +
Grey	Ethernet Tx +
Pink	Ethernet Tx –
Yellow	Ethernet Rx +
Green	Ethernet Rx –
Grey & Pink	Trigger out –
Violet	Trigger out +

4.2 Connecting the Power Supply

Choose a PSU that limits its output current by design, by setting the current limit on the supply (if this feature exists) or use fuses.

Remember to de-rate the fuse when mounted in an enclosure, as the temperature will be higher than ambient.

The external power supply should be able to supply 2.5A nominal. A few seconds after switch-on, the VCT6 will draw current surges of 5A for a maximum of 100ms. Thereafter,

current surges of 3A will be drawn immediately after each flash. Each of these 3A surges will be drawn for no more than 50ms.

The use of a regulated power supply with 100% short-circuit protection is recommended and an external disconnecter is required. However, if a non-regulated power supply is used, then the maximum ripple voltage of this power supply must not exceed 10% of the actual DC value.

We recommend that the length of the power supply cable does not exceed 3 metres. Additional surge protection is required if the power supply cable is longer than 3 metres, or if transient interference of greater than $\pm 60V$ on the power supply lines is expected.

5.0 Communications

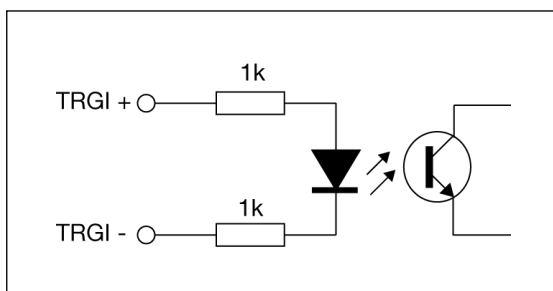
The VCT6 is designed to be integrated with a camera, or an external trigger, which can be used to control the pulse functionality of the illuminator. For a detailed guide on integrating the VCT6 with a camera or external trigger, refer to the 'PULSESTAR Connectivity Guide' which is available from www.rayteccctv.com

5.1 Trigger Input

The trigger input is opto-isolated. The opto-isolator isolates voltages up to 50V.

Signal	Function
TRIGI-	Trigger input -
TRIGI+	Trigger input +

The trigger input circuit is shown below:



The trigger input circuit operates as follows:

Logic 1 (on)

When a voltage of 5V to 24V is applied across TRIGI negative (-) and TRIGI positive (+), the trigger input is logic 1 (on).

Logic 0 (off)

When a voltage of 0V to 2V is applied across TRIGI negative (-) and TRIGI positive (+), the trigger input is logic 0 (off).

By default, the trigger is activated on a rising edge. However, this is configurable.

The trigger input typically sinks 2mA when a 5V trigger is applied, and 12mA when a 24V trigger is applied. The trigger input current will scale linearly between these two extremes if a voltage of between 5V and 24V is applied.

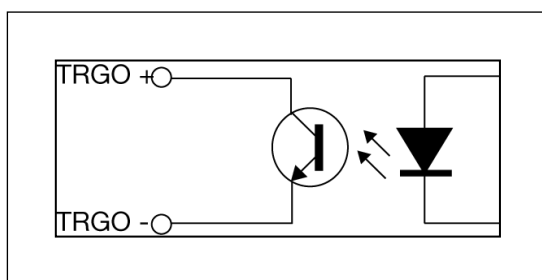
5.2 Trigger Output

The trigger output is opto-isolated and can be used to trigger other external equipment, such as additional lights or an external camera. The opto-isolator isolated voltages up to 50V.

The outgoing pulse length and transmission delay can be adjusted, enabling the complete control of the trigger timing between a VCT6 and a camera. The pulse width can be used to control a camera's exposure.

Signal	Function
TRIGO –	Trigger output–
TRIGO +	Trigger output+

The trigger output circuit is shown below:



The trigger output can be used to switch a signal of up to 24V, switching up to 20mA when on. The trigger output circuit operates as follows:

Logic 1 (on)

When the output is logic 1 (on), a current of up to 20mA can flow. The absolute maximum current must be limited to 50mA by the external circuit. The forward voltage is less than 2V.

Logic 0 (off)

When the output is logic 0 (off), a voltage of up to 24V can be blocked.

6.0 General Configuration

Two modes of operation are provided for the VCT6's light output:

Pulse (strobe) — the output is pulsed once per trigger. One trigger input is used as a trigger. The delay from trigger to pulse, the pulse duration, and the brightness can all be set.

Switched — a trigger input can be used to switch the output current on and off. The sense of the trigger signal can be 'active high' or 'active low'.

The set-up is non-volatile, so the VCT6 will resume the same operation after a power cycle.

6.1 Pulse and Duty Cycle Limits

In both pulsed and switched mode, the pulse width and duty cycle are internally limited to prevent damage to the light.

The brightness, pulse width and duty cycle can all be set in accordance with the table below:

Output brightness	850nm Variant		White variant	
	Allowed pulse width	Allowed duty cycle	Allowed pulse width	Allowed duty cycle
0% to 20%	3ms	6%	3ms	3%
21% to 30%	3ms	6%	2ms	3%
31% to 50%	3ms	3%	2ms	2%
51% to 100%	2ms	3%	1ms	1%

For example, if the brightness is set to 40%, then an 850nm variant VCT6 will not allow pulses greater than 3ms long.

With 1ms pulses, if a trigger occurs less than 33ms after a previous trigger (so that the duty cycle would be greater than 3%), the trigger is ignored.

If necessary, the VCT6 will limit the duty cycle by increasing the re-trigger delay.

When the VCT6 internal temperature gets too high, the allowed duty cycle is reduced, and an Event149 code is generated.

6.2 Pulsed Output

The output is off by default. When the VCT6 is triggered, it waits for a delay and then pulses the output. Re-trigger delay is the minimum allowed time from one trigger to the next. Any triggers that occur too soon after the previous trigger are ignored. The re-trigger delay is set in multiples of 100µs. The delay, pulse width, re-trigger delay and pulse intensity are all configurable.

6.3 Switched Output

Switched mode uses the trigger input to switch the output on or off using the timing of the trigger signal. The output brightness can be varied from 0% to 100%.

The VCT6 applies the same duty cycle and pulse width limits as for pulse mode, to prevent the light being damaged.

6.4 Internal Trigger Timer

An internal timer is available for continuous triggering in pulse mode. The period of this timer is configurable.

***Note:** The internal timer is mostly used when synchronising a camera using the trigger output. Generally, it is not possible to run the light strobe from this timer while free running the camera. They will not stay synchronised and the images will have a highly variable intensity.*

When the timer is turned on, the light strobe pulse and the trigger output are both triggered. External triggers still work. When troubleshooting during development, it is sometimes useful to set this timer to give regular light pulses.

6.5 Trigger Input Options

The trigger sense and the way the VCT6 is triggered can be changed according to how you set the 'P' flag. This is summarised in the table below:

Mode	Trigger input	Output
Switched	Input = off	Is off if P Flag= 1 Is on if P-Flag = 0
	Input = on	Is on if P Flag = 1 Is off if P-Flag = 0
Pulsed	Trigger rising edge	Pulse is triggered if P-Flag = 1
	Trigger falling edge	Pulse is triggered if P-Flag = 0

The 'P' flag can be set from the VCT6's web pages (see section 8, 'Webpage Configuration'), or through its command interface (see section 9, 'Configuration Commands').

6.6 Factory Settings

The default configurations for the VCT6 light output and trigger output are as listed below:

- Pulse operation 1ms pulse width
- 20.0µs pulse delay
- 100% intensity

- Trigger delay (Infra-Red variants - 32.26ms re-trigger delay, White-Light variants - 100.0ms re-trigger delay)

The **CL** command can be used to restore the VCT6 to its default configuration.

7.0 Ethernet Address

When setting up Ethernet versions of the VCT6, you may need to ask your network administrator for advice about making the Ethernet connection.

Ethernet set-up is not affected by power cycling the VCT6.

The Ethernet link uses a 10-base T connection and runs at 10Mbits per second. An RJ45 connector may be wired to the free end of the cable to facilitate this. The VCT6 is usually connected to a network switch (or hub, or router). It is also possible to connect it directly into the network port on a PC by using a cross-over cable.

7.1 IP Address

The VCT6 needs an IP address to communicate over Ethernet. There are two ways to get an IP address; either programmed into the unit or using DHCP.

For DHCP mode, the VCT6 acquires its IP address, subnet mask, and gateway address from the DHCP server. Otherwise the VCT6 has a fixed IP address, subnet mask, and gateway address.

DHCP mode or the IP address can be set/read using the GardasoftMaint program available to download from www.rayteccctv.com. This program has been developed in-conjunction with Gardasoft Vision and is compatible with all Raytec PULSESTAR products.

GardasoftMaint allows you to view the controllers on your network, change their IP addresses and upgrade their firmware if it becomes necessary. In the messaging section of GardasoftMaint, you can communicate with your VCT6 using the commands explained in section, 9 'Configuration Commands'. You can also open the VCT6's web pages by clicking the 'Link to controller webpage' button. For more information about the VCT6's web pages, see section 8, 'Webpage Configuration'.

7.2 Programmed IP Address and DHCP

This section explains the use of DHCP and fixed IP addressing.

7.2.1 DHCP

Most networks use a DHCP server. If there is a PC on the network, you may be able to find out whether a PC on the same network uses DHCP as follows:

Right-click on the Windows 10™ icon at the left of your PC's task bar.

*Select **Network Connections**.*

*In the Status pane, click **View your network properties**.*

'DHCP enabled' will be set to 'yes' if DHCP is in use.

You can find out what IP address is being used by a PC at any time by following the steps below:

Right-click on the Windows 10™ icon at the left of your PC's task bar.

*Select **Network Connections***

*In the left-hand pane, click on **Ethernet**.*

Click on your network icon under Ethernet.

Your IP address will be given as the 'IPv4 address'.

Note: *The steps set out above are for a PC using Windows® 10; if your operating system is different, the steps may not be the same.*

7.2.2 Fixed IP Address

When using a fixed IP address, you must ensure that you use an IP address that is not being used by any other device on the network. It is usual to keep the first three numbers of the IP address (which are comprised of the first seven digits) the same as those of other devices on your network, and to change only the last number (the digits after the final point).

For example, if you have a network consisting of a PC (IP address 192.168.1.35) and two VCT6 illuminators, you might address the VCT6's as 192.168.1.201 and 192.168.1.202.

8.0 Webpage Configuration

You can set up the VCT through its own internal web page. Click the Open webpage button in GardasoftMaint to take you directly to the VCT6's web pages. You can also type the light's IP address (displayed in GardasoftMaint) into your web browser, which will display the main page.

GardasoftMaint software is available from www.rayteccctv.com.

8.1 Main Page

The Main page (shown below) is the first to open when you access the VCT6's web pages. This gives the light's hardware and firmware revision levels, its serial number and identifies other devices on the network.



8.2 General Setup Page

On the 'General' setup page, you can set up a password for the VCT6 and send it commands. Refer to section 9, 'Configuration Commands' for the commands you can use to operate the VCT6. You can also set up the trigger mode and turn the internal trigger on or off.

8.3 Light Output Configuration Page

The 'Light Output Configuration' page (shown below) allows you to set up the parameters of the VCT6's light output. You can set the mode (continuous, pulsed, or switched), the light's brightness and pulse settings. You must click the **Submit** button to effect any changes you make.

8.4 Trigger Output Configuration Page

The 'Trigger Output Configuration' page (shown below) allows you to set up the pulse parameters for the trigger output pulse.



9.0 Configuration Commands

The VCT6 can be configured through the Ethernet connection using UDP or TCP/IP.

For TCP, commands from a host should be sent to destination port 30313. Replies are sent to destination port 30312. For UDP, commands from a host should be sent from source port 30312 to destination port 30313.

Replies are sent from source port 30313 to destination port 30312.

9.1 Command Structure

Communication consists of commands sent by the host (controlling PC). All output generated by the command is returned in reply UDP or TCP/IP packets.

The last character sent is (>) (the 'greater than' symbol). When this is received, the host recognises that the command has been completed.

It is recommended that the host waits for the (>) symbol before sending the next command. UDP communications are not guaranteed to arrive, so the host software must be able to cope with lost messages.

Using the **GT** command, a host can request that a message is sent to it whenever an error occurs.

Several commands can be put into one command line, by separating them by a semi-colon (;).

A 'carriage-return' character should be sent to terminate the command line. The VCT sends any replies to the commands and then sends a (>) character to indicate that the command line has been completed.

Commands are comprised of a code of two letters followed by the parameters (if any) needed for the command. Spaces in the commands are ignored.

Numeric parameters are separated by a comma (,). For a parameter which is a time period, the default units are milliseconds. 's', 'ms' or 'us' can be added to the end of the number to indicate seconds, milliseconds or microseconds.

For example:

Parameter	Meaning
0.1	0.1 milliseconds

200us	200 microseconds
0.1s	0.1 seconds

Note: The characters are in USA/UK format, so that 'a half' is written as '0.5' (rather than '0,5').

The command codes and their meanings are summarised below (that is, in the table on the next page). The upper-case commands are shown, followed by lower case letters denoting the numeric argument.

Note: Any changes made using Ethernet commands are not saved permanently until the AW command has been issued.

9.2 General Commands

The general command codes and their meanings are described below. The upper-case commands are shown, followed by lower case letters denoting the numeric argument.

Note that any changes using these commands are not saved permanently until the AW command has been issued.

9.2.1 Save the Settings Memory

AW

Once the settings are saved to memory, they are retained when the unit is switched off. If this is not done, changes to the settings are volatile, and if the unit is switched off, they revert to those in force when the last AW command was issued.

9.2.2 Report the Firmware Version

VR

This command returns the firmware version currently running in your VCT6

For example:

VCT6 (HW002) V007

9.2.3 Report the Configuration

ST

This command reports all the channel settings. A typical output is:

CH 1, MD 1, S 100.0 DL 10us, PU 1.000ms, RT 1.020ms, IP1,FL0, CS0.000A, RA24V
CH 2, MD 1, S 100.0 DL 10us, PU 1.000ms, RT 1.020ms, IP1,FL0, CS0.000A, RA36V

Where:

CH	Channel number
MD	Mode: 1 = pulsed; 2 = switched
S	Brightness in percent
DL	Pulse delay
PU	Pulse width
RT	Retrigger delay
IP,FL, CS, RA	Unused.

ST0

This reports the general settings. A typical output is:

TM 1, TP 20.00ms

Where:

TM Internal trigger: 0 off; 1 = on

TP Internal trigger period.

STc

This reports the settings for a single channel.

Where:

c = 1, for light strobe input

c = 2, for trigger output signal

9.2.4 Clear Configuration

CL

This command clears the configuration.

9.2.5 Enable Ethernet Messages

GTm

Where:

m = 0, to disable Ethernet messages

m = 1, to enable Ethernet messages

When Ethernet messages are enabled, any error reports are sent to the most recent UDP or TCP addresses from which a command has been received. Messages are typically in the following form:

Evt1,e

Where (for example):

e – event value – 32 to 47; Lighting error code.

9.2.6 Clear Any Errors

GR

If Ethernet messages are not enabled, the last event or error number can be read by this command.

If there was a lighting error, the VCT6 resumes normal operation.

The reply is in the same form as the GT command above. If there are no outstanding events or errors, then only the prompt > is returned.

9.2.7 Set/Clear the Web-Page Password

EY

EY asc1, asc2, asc3, asc4, asc5, asc6

This command sets the password required to access the webpages. If EY is entered on its own, then the password is cleared.

There are six optional parameters, which are decimal ASCII values for a password from one to six letters. A value of 65 is 'A', 66 is 'B', and so on to 90 for 'Z'.

9.3 Lighting Commands

The lighting command codes, and their meanings are described below. The upper-case commands are shown, followed by lower case letters denoting the numeric argument.

Note that any changes using these commands are not saved permanently until the AW command has been issued.

9.3.1 Set Switched Mode

RW1,s

The output is set to switched mode at a specified percentage of full brightness.

Where:

s = brightness setting in percent (0 to 100)

9.4.1 Set Pulse Mode

RTc,p,d,s

RTc,p,d,s,r

The output can be set to pulse on a trigger. The delay from trigger to start of pulse, the length of pulse, and the brightness are all configurable.

An error is generated if the brightness setting requires a current greater than 20A, or if the combination of pulse width and setting is not allowed.

Where:

- c output: 1 for light strobe output, 2 for trigger output signal.
- p pulse width in milliseconds (0.01 to 100)
- d delay from trigger to pulse in milliseconds (0.01 to 999)
- s brightness setting in percent (0 to 100)
- r re-trigger delay in milliseconds (optional).

9.4.2 Set Option Flags

Rec,p

Where:

- c output: 1 for light strobe output, 2 for trigger output signal.
- p P Flag: 0 is set (positive triggers), 4 is cleared (negative triggers).

9.4.3 Set the Internal Trigger

These commands enable or disable the internal trigger. When enabled, all outputs are triggered simultaneously using an internal trigger signal. This setting can be saved to non-volatile memory using the AW command.

TT0 Disable the internal trigger.

TT1 Enable the internal trigger (using the previously set period).

TT1,p Enable the internal trigger and set the period.

Where:

p = the period of the triggers in milliseconds.

For example:

TT1,200 Set the internal trigger to 200ms(5Hz).

TT1,1s Set the internal trigger to 1 second (1Hz).

9.4.4 Simulate an Input Trigger

TR1

This command simulates a trigger pulse. If the channel is in pulse mode, it emits a single pulse.

9.5 Command Summary

Command	Example	Effect
AW	AW	Save changes
CL	CL	Clear configuration
ST	ST	Show configuration
GT	GT1	Enable Ethernet messages
GR	GR	Clear any error condition
EY	EY65,66	Set webpage password to 'AB'(where 'A' is ASCII Character 65, and 'B' is 66, and so on). See note below
VR	VR	Read the firmware version
RW	RW1,50	Set channel 1 to switched mode, 50% brightness
RT	RT1,3,100us,50	Set light to strobe with 3ms pulses, delayed by 100ms, at 50% brightness
RE	RE1,4	Trigger on falling edge of trigger input
TT	TT1,100ms	Set internal triggers every 100ms

TR	TR1	Trigger an output pulse
----	-----	-------------------------

Note: The password can be any string of ASCII characters separated by commas. Alternatively, you can set the password without having to use ASCII numerical characters by using a web browser to access the VCT6's web pages as described in section 8, 'Webpage Configuration'.

10.0 Reference Information

This section gives the electrical ratings and details of any restrictions on the use of your VCT6. Event and error codes are also listed.

10.1 Ratings and Restrictions

The electrical ratings for the connections are as follows:

Signal	Rating
Power input	The VCT6 operates from either a 12V or a 24V supply. 11.0V DC minimum to 26.4V DC maximum. Maximum ripple 10%.
Trigger input	Opto-coupler input: 0V to 2V is logic 0, 5V to 24V is logic 1.
Trigger output	Opto-coupler transistor output: maximum switched voltage $V_{CE0} = 24V$.

The VCT6 has the following restrictions on its operation:

- The minimum delay for the light pulse output is approximately 2µs

- When using the re-trigger delay, the minimum delay is approximately 5µs
- For pulse widths of less than approximately 100µs, fault detection does not operate

10.2 Event Codes

Event No	Reason
1 to 127	An error has occurred. The error code is given by the event number
130	The temperature of the light is too high and operation has been stopped
148	The allowed duty cycle is now normal (that is, after event 149)
149	The allowed duty cycle has been reduced due to high internal temperature

10.3 Error Codes

Error No	Reason
Err 1	A parameter value is invalid
Err 2	Command not recognised
Err 3	A numeric value is in the wrong format
Err 4	There is an incorrect number of parameters
Err 5	This is a warning and not an error. One of the parameters is out of range. The value of the parameter has been adjusted. For example, sending an RT command with a delay of 0 prompts an 'Err 5' response. The command will be accepted, and the delay set to the minimum allowed
Err 6, 12	EEPROM corrupt. The configuration has been cleared
Err 9, 20	Could not save settings to EEPROM
Err 27	Cannot read Ethernet settings from EEPROM, so these may be incorrect
Err 33	The VCT6 is too hot. The unit has a thermal cut-out that operates at approximately 85°C, depending on conditions
Err 49	Ethernet communications are not present

Note: All other errors are internal error