



# PULSESTAR VCT6 Installation Guide

Issue 009



For your notes:

# Contents

<b>1</b>	<b>Getting started</b>	<b>5</b>
<b>2</b>	<b>Safety</b>	<b>6</b>
2.1	Heat	6
2.2	Electrical	6
2.3	General	7
2.5	Eye/skin safety guidance	7
2.5.1	<i>IEC/BS EN62471 Risk Groups</i>	8
2.5.2	<i>Product labelling</i>	8
<b>3</b>	<b>Sicherheit</b>	<b>9</b>
3.1	Wärme	9
3.2	Elektrik	9
3.3	Allgemein	10
3.5	Sicherheitsleitfaden für Augen/Haut	10
3.5.1	<i>IEC/BS EN62471 Risikogruppen</i>	10
3.5.2	<i>Produktbeschriftung</i>	10
<b>4</b>	<b>Sécurité</b>	<b>11</b>
4.1	Chaleur	11
4.2	Électricité	11
4.3	Généralités	12
4.5	Conseils de sécurité pour les yeux et la peau	13
4.5.1	<i>Groupes de risque IEC/BSEN62471</i>	13
4.5.2	<i>Étiquetage du produit</i>	13
<b>5</b>	<b>Mounting the VCT6</b>	<b>14</b>
5.1	Heat-sinking	15
<b>6</b>	<b>Connecting the VCT6</b>	<b>16</b>
6.1	Ethernet variants	16
6.2	RS232 variants	16
6.3	Connecting the power supply	18
6.4	Trigger input	19
6.5	Trigger output	20
6.6	Communications	21
6.6.1	<i>Ethernet option</i>	21
6.6.2	<i>Serial option</i>	21

<b>7</b>	<b>General description .....</b>	<b>22</b>
7.1	Pulse and duty cycle limits.....	22
7.2	Pulsed output.....	23
7.3	Switched output.....	23
7.4	Internal trigger timer.....	23
7.5	Trigger input options.....	24
7.6	Factory settings.....	24
<b>8</b>	<b>Ethernet address.....</b>	<b>25</b>
8.1	IP address.....	25
8.2	Programmed IP address andDHCP.....	26
8.2.1	<i>DHCP</i> .....	26
8.2.2	<i>Fixed IP address</i> .....	27
<b>9</b>	<b>Webpage configuration .....</b>	<b>28</b>
9.1	Main page.....	28
9.2	General setup page.....	29
9.3	Light configuration page.....	30
9.4	Trigger output configuration page.....	31
<b>10</b>	<b>Configuration commands .....</b>	<b>32</b>
10.2	General commands.....	33
10.3	Lighting commands.....	36
10.4	Command summary.....	38
<b>11</b>	<b>Reference information .....</b>	<b>39</b>
11.1	Ratings and restrictions.....	39
11.2	Event codes.....	39
11.3	Error codes.....	40

# 1 Getting started

This user manual describes the setting up and operation of the VCT6 strobe light.

The VCT6 is a strobe light suitable for use in traffic applications. It is available in white or infrared and can be controlled through an Ethernet connection or RS232 depending on the version specified.

Read Section 2, Safety (or Section 3, Sicherheit, or Section 4, Sécurité) and Section 11, Reference information, and check the VCT6 fulfils your requirements.

Mount the VCT6 as described in Section 5, Mounting the VCT6 and connect the VCT6 as described in Section 6, Connecting the VCT6.

The VCT6 may be configured using its web pages if an Ethernet variant is used, or by commands issued using the RS232 connection. To configure the VCT6 using its web pages, refer to Section 9, Webpage configuration. The commands that can be used are described in Section 10, Configuration commands.

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 coolwhite
- aa** is the optical beam profile; 14°, 28°, 50°
- ccc** is the communications protocol; ETH or RS232

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 Safety

Read this before using the VCT6. Always observe the following safety precautions. If in doubt, contact your distributor or Raytec. The following symbols mean:



**Warning:** Read instructions to understand possible hazard.



**Warning:** Surface may get hot.



**Warning:** Possible hazardous voltage.

Where these symbols appear in the manual, refer to the text for precautions to be taken.

### 2.1 Heat



Ensure the VCT6 is mounted correctly (see Section 5, Mounting the VCT6), and that you do not exceed any of the ratings for the unit (see Section 11, Reference information).

At its maximum ratings, the VCT6's enclosure can exceed 75°C which is sufficient to cause a burn if touched. Place 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 internally powered or 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 60950-1, 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 11, 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 safety 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

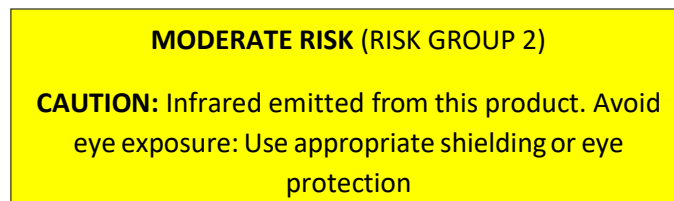
- VCT6-850-14-xxx
- VCT6-850-28-xxx
- VCT6-850-50-xxx
  
- VCT6-940-14-xxx
- VCT6-940-28-xxx
- VCT6-940-50-xxx

### Exempt

- VCT6-W-12-xxx
- VCT6-W-28-xxx
- VCT6-W-50-xxx

## 2.5.2 Product labelling

The infra-red versions of this product are labelled:



The white versions of this product do not require a warning label.



## 3 Sicherheit

Bitte lesen Sie vor Verwendung des VCT6 diese Informationen. Beachten Sie immer die folgenden Sicherheitshinweise. Wenden Sie sich im Zweifelsfall an Ihren Händler oder Raytec. Die folgenden Symbole haben die folgende Bedeutung:



**Warnung:** Lesen Sie die Hinweise, um eine mögliche Gefahr zu verstehen.



**Warnung:** Oberfläche kann heiß werden.



**Warnung:** Mögliche gefährliche Spannung.

Wenn diese Symbole in der Anleitung auftauchen, enthält der Text Hinweise zu den zu ergreifenden Vorsichtsmaßnahmen.

### 3.1 Wärme



Stellen Sie sicher, dass der VCT6 korrekt montiert ist (siehe [Section 5, Mounting the VCT6](#)) und dass Sie die Grenzwerte für das Gerät nicht überschreiten (siehe [Section 11, Reference information](#)).

Bei den maximalen Grenzwerten kann das Gehäuse des VCT6 75°C überschreiten, was ausreichend ist um bei einer Berührung zu Verbrennungen zu führen. Positionieren Sie das Gerät so, dass eine versehentliche Berührung durch das Personal ausgeschlossen ist und stellen Sie sicher, dass Luft frei um das Gerät zirkulieren kann.

### 3.2 Elektrik



Das VCT6 verfügt über keine vollständige elektrische Trennung der Eingänge (einschließlich Trigger- und Kommunikationsports). Beachten Sie daher unbedingt die folgenden Hinweise:

- Computergeräte, die an die Kommunikations- oder Trigger-Ports angeschlossen sind, müssen über eine interne Stromversorgung verfügen oder vom Stromnetz durch eine doppelte Isolierung/verstärkte Isolierung getrennt sein oder nach dem Standard IEC 60950-1 zugelassen sein. Alle anderen Geräte, die an die Trigger- oder andere Ports angeschlossen sind, müssen ebenfalls durch eine doppelte Isolierung/verstärkte Isolierung vom Stromnetz getrennt sein.
- Das Netzgerät, das zur Stromversorgung des VCT6 dient, muss durch eine doppelte Isolierung/verstärkte Isolierung von der Stromversorgung getrennt sein und gegen Kurzschlüsse und Überlastungen geschützt sein. Das Netzgerät muss nach IEC 60950-1, IEC 60335-1, IEC 61010-1 oder IEC61558-1,-2,-16 zugelassen sein. Das Netzgerät kann auch nach gleichwertigen oder höheren

Standards zugelassen sein.

- Alle stromführenden Leiter, die vom Stromnetz abgeleitet sind, müssen ebenfalls Sicherheitskleinspannung (SELV) am Ausgang erzeugen. Hinweise zu den zulässigen Spannungsgrenzwerten finden Sie im Section 11, Referenceinformation.
- Die Verkabelung der Stromversorgung zum VCT6 muss für mindestens 4 A bemessen sein.
- Die Gleichstromversorgung zum VCT6 muss extern durch eine träge Sicherung (T4AH, 50V) bis 4 A gesichert sein.
- Der Installationstechniker muss einen deutlich gekennzeichneten, leicht zugänglichen Schalter als Teil der Installation in der Nähe vorsehen, mit dem die Steuerung an beiden Stromleitern von ihrer Stromquelle getrennt werden kann.
- Durch induktive Lasten verursachte Einschaltstöße zum VCT6 müssen extern unterdrückt werden.

**Warnung:** Dies ist ein Klasse-A-Produkt. Es handelt sich hierbei um ein Produkt der Klasse A. Die Verwendung in Wohngebieten kann zu Funkstörungen führen und eine solche Verwendung sollte vermieden werden, es sei denn besondere Maßnahmen werden vom Anwender ergriffen, um die Emissionen auf ein Niveau zu begrenzen, das den Empfang von Rundfunkübertragungen ermöglicht.

### 3.3 Allgemein



Das VCT6 darf nicht in Anwendungen eingesetzt werden, bei denen es durch einen Ausfall des Geräts zu einer Gefahr für die Gesundheit von Personen oder zur Beschädigung anderer Geräte kommen könnte.

Wenn das Gerät in einer anderen als der vom Hersteller vorgesehenen Weise verwendet wird, kann die Schutzvorrichtung des Geräts beeinträchtigt werden.

### 3.4 Installationsanleitung (Haftungsausschluss)

Diese Informationen dienen nur zur Orientierung. Installationstechniker müssen ihre eigene spezifische Risikobewertung für die jeweilige Installation durchführen. Auch wenn Raytec diese Empfehlung mit größter Sorgfalt erstellt hat, übernimmt Raytec keine Haftung für Schäden jeglicher Art, außer in dem gesetzlich erforderlichen Maße. Vorsätzliche Gefährdungs- oder Zerstörungshandlungen werden in diesem Dokument nicht behandelt und müssen vom Installationstechniker berücksichtigt werden.

## 3.5 Sicherheitsleitfaden für Augen/Haut



Hohe künstliche optische Strahlung kann sowohl Augen als auch Haut schädigen. Für eine derartige Gefährdung wurden Expositionsgrenzwerte festgelegt. Alle Lichtsysteme werden in Risikogruppen eingeteilt, die das Risikoausmaß bei normaler Verwendung der Leuchte definieren.

Bei der Verwendung müssen die dieser Risikogruppe entsprechenden Vorsichtsmaßnahmen getroffen werden und dafür gesorgt werden, dass im Nahbereich der Leuchte niemand Schaden nehmen kann.

### 3.5.1 IEC/BS EN62471 Risikogruppen

Folgendes gilt für alle Varianten des VCT6 beim Betrieb mit voller Leistung und maximaler Betriebsdauer:

#### Risikogruppe 2

- VCT6-850-14-xxx
- VCT6-850-28-xxx
- VCT6-850-50-xxx
- VCT6-940-14-xxx
- VCT6-940-28-xxx
- VCT6-940-50-xxx

#### Ausnahme

- VCT6-W-12-xxx
- VCT6-W-28-xxx
- VCT6-W-50-xxx

### 3.5.2 Produktbeschriftung

Die Infrarotversionen dieses Produkts sind folgendermaßen beschriftet:

**MODERATE RISK (RISK GROUP 2)**  
**CAUTION: Infrared emitted from this product. Avoid eye exposure: Use appropriate shielding or eye protection**

Die weiße Version dieses Produkts benötigen keinen Warnhinweis.

## 4 Sécurité

Lisez ce document avant d'utiliser le VCT6. Respectez les mesures de sécurité suivantes en toutes circonstances. En cas de doute, contactez votre distributeur ou Raytec. Les symboles ci-dessous auront la signification suivante:



**Attention:** Lisez les instructions pour comprendre quels sont les risques éventuels.



**Attention:** La surface peut devenir chaude.



**Attention:** Risque d'électrocution.

Lorsque ces symboles apparaissent dans le manuel, reportez-vous aux consignes pour connaître les précautions à prendre.

### 4.1 Chaleur



Veillez à ce que le VCT6 soit monté correctement (voir Section 5, Mounting the VCT6) et à ne dépasser aucune valeur nominale pour l'unité (voir Section 11, Reference information).

Lorsqu'il atteint ses valeurs nominales maximales, le boîtier VCT6 peut dépasser les 75°C, ce qui est suffisant pour provoquer des brûlures en cas de contact. Placez l'appareil à un endroit où le personnel ne risque pas de le toucher par accident et veillez à ce que l'air circule librement autour de l'unité.

### 4.2 Électricité



La VCT6 ne possède pas d'isolation électrique complète des entrées (notamment des ports de déclenchement et de communication). Par conséquent, respectez les consignes suivantes:

- L'équipement informatique connecté aux ports de communication et de déclenchement doit être alimenté en interne ou séparé de l'alimentation secteur par une isolation double/renforcée, ou être approuvé selon la norme CEI 60950-1. Tous les autres équipements branchés aux déclencheurs ou à d'autres ports doivent aussi posséder une isolation double/renforcée pour être protégés de l'alimentation secteur.
- Le boîtier d'alimentation utilisé pour mettre sous tension la VCT6 doit fournir une isolation double/renforcée pour isoler le VCT6 de l'alimentation secteur, et le protéger des courts-circuits et des surcharges. Le boîtier d'alimentation doit être approuvé selon la norme CEI 60950-1, CEI 60335-1, CEI 61010-1 ou CEI 61558-1,-2,-16. Le boîtier d'alimentation peut aussi être approuvé selon des normes de sécurité équivalentes ou supérieures.

- Tous les conducteurs sous tension dérivés depuis l'alimentation secteur doivent aussi posséder une sortie à tension de sécurité extra-basse. Référez-vous à la Section 11, Référence information pour les limites de tension autorisées.
- Le câblage d'alimentation vers la VCT6 doit avoir une capacité minimale de 4A.
- L'alimentation en courant continu vers la VCT6 doit être protégée par un fusible 4A en externe, plus précisément un fusible à action retardée (T4AH, 50V).
- Dans le cadre de l'installation, l'installateur doit fournir un interrupteur clairement marqué, qui soit à proximité et facilement accessible, pour permettre au contrôleur d'être déconnecté de sa source d'énergie sur les conducteurs d'alimentation.
- Les coupures causées par des charges inductives doivent être supprimées de manière externe vers la VCT6.

**Attention:** Il s'agit d'un produit de classe A. Son utilisation en zone résidentielle peut causer des interférences radio. Ce type d'utilisation doit être évité, sauf si des mesures particulières sont prises par l'utilisateur pour restreindre les émissions à un niveau qui permet la réception des transmissions diffusées.

### 4.3 Généralités



Le VCT6 ne doit pas être utilisé dans une application où la santé des personnes et l'intégrité des équipements seraient mises en danger s'il venait à tomber en panne.

Si l'équipement est utilisé autrement qu'aux fins prévues par le fabricant, la protection offerte par l'équipement pourrait en être altérée.

### 4.4 Guide d'installation (clause de non-responsabilité)

Ces informations sont seulement à titre indicatif. Les installateurs doivent effectuer leur propre évaluation des risques, pour chaque installation.

Même si Raytec a préparé minutieusement ces conseils, Raytec décline toute responsabilité pour tout dommage, quel qu'il soit, à l'exception de ceux requis par la loi. La mise en péril volontaire ainsi que les actes de vandalisme ne sont pas couverts par le présent document et doivent être pris en compte par l'installateur

## 4.5 Conseils de sécurité pour les yeux et la peau



Des niveaux élevés de rayonnements optiques artificiels peuvent causer des dommages aux yeux et à la peau. Les valeurs limites d'exposition ont été établies pour de tels dangers. Tous les systèmes d'éclairage sont placés dans des groupes de risque, qui définissent le niveau de risque lorsque l'éclairage est utilisé normalement.

L'utilisateur doit prendre les précautions appropriées pour ce groupe de risque et s'assurer qu'aucun dommage corporel ne peut survenir à proximité de la lampe.

### 4.5.1 Groupes de risque IEC/BSEN62471

Les dispositions suivantes s'appliquent à toutes les variantes du VCT6 fonctionnant à pleine puissance et en cycle d'utilisation maximal:

#### Groupe de risque 2

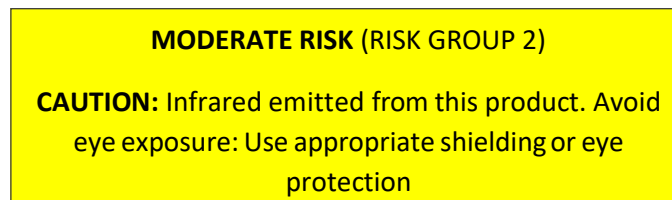
- VCT6-850-14-xxx
- VCT6-850-28-xxx
- VCT6-850-50-xxx
- VCT6-940-14-xxx
- VCT6-940-28-xxx
- VCT6-940-50-xxx

#### Exclus

- VCT6-W-12-xxx
- VCT6-W-28-xxx
- VCT6-W-50-xxx

### 4.5.2 Étiquetage du produit

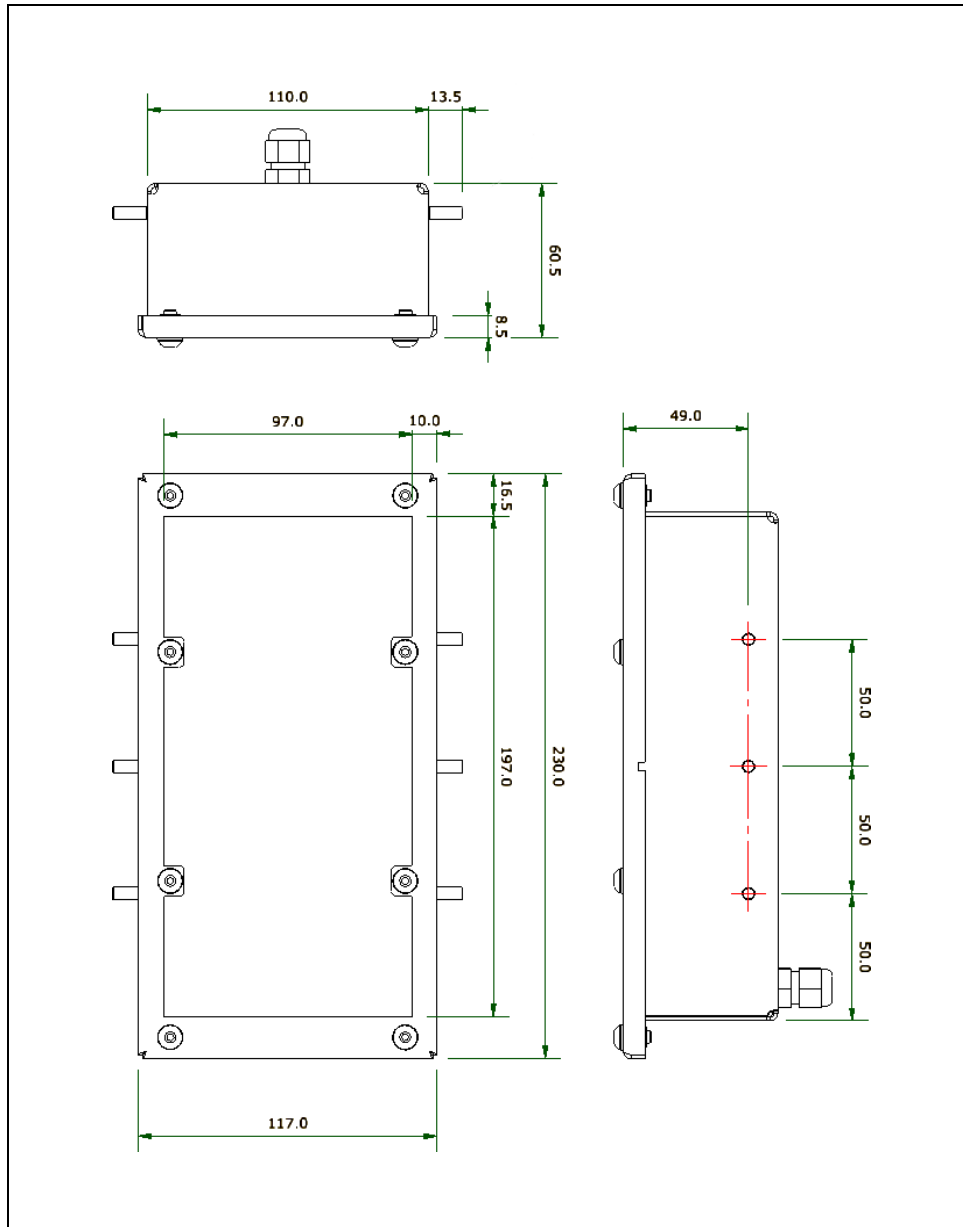
Les versions infrarouges de ce produit sont étiquetées:



Les versions blanche de ce produit ne nécessitent pas d'étiquette d'avertissement.

## 5 Mounting the VCT6

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.



## 5.1 Heat-sinking

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 heat-sinking, 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 heat-sinking may be necessary on the rear surface.



## 6 Connecting the VCT6

All connections to a standard VCT6 are made through an unterminated, screened 12 core cable. The length of this cable is typically 2000mm  $\pm$  100mm. The terminations for this cable are explained in Section 6.1, Ethernet variants and Section 6.2, RS232 variants.

Alternatively, the unit may be fitted with a 3000mm  $\pm$  100mm unscreened cable terminated with two Molex Mini-fit Jr connectors. The terminations for this cable are explained in Section 6.2, RS232 variants.

### 6.1 Ethernet variants

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 +
Screen	Case ground

### 6.2 RS232 variants

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

Wire colour	Function (RS232)
Black Blue	Power supply –
Red Turquoise	Power supply +
White	Trigger in –

Wire colour	Function (RS232)
Brown	Trigger in +
Grey	Not connected
Pink	TxD
Yellow	RxD
Green	GND
Orange	Trigger out –
Violet	Trigger out +
Screen	Case ground

**Note:** Using a 9-way D-type connector, the following connections are made:

Wire colour	Pin
Pink	2
Yellow	3
Green	5

For RS232 units fitted with a cable assembly terminated with Mini-Fit connectors, refer to the table overleaf:

Wire colour	Function	Connector	Connector Terminal
Black	Power supply -	8 Way Molex part no. 39-01-3083 Fitted with crimp contacts: 39-00-0040	1
Blue	Power supply -		5
Red	Power supply+		2
Turquoise	Power supply+		6
White	Trigger in -		3
Brown	Trigger in +		7
Orange	Trigger out -		4
Violet	Trigger out +		8
Yellow	RS232 Rx	8 Way Molex part no. 39-01-3043 Fitted with crimp contacts: 39-00-0040	1
Pink	RS232 Tx		3
Grey	Not connected		2
Green	RS232 GND		4

### 6.3 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 disconnect 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.

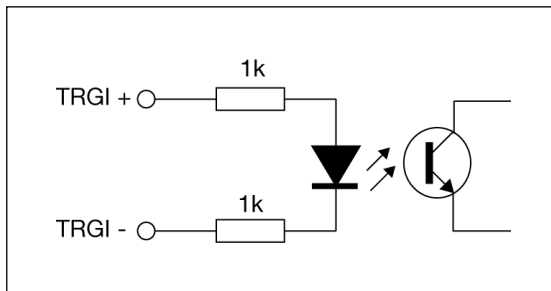
We recommend that the length of the power supply cable does not exceed 3 metres. Additional surge protection is required if the power supply cable is longer than 3 metres, or if transient interference of greater than  $\pm 60V$  on the power supply lines is expected.

## 6.4 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.

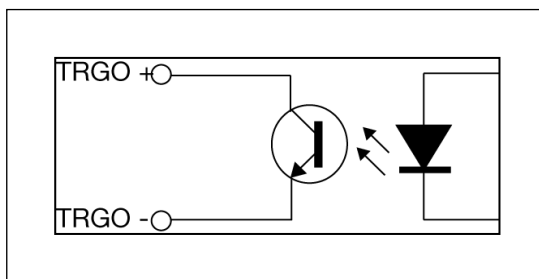
## 6.5 Trigger output

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.

## 6.6 Communications

The VCT6 may be specified as having Ethernet or RS232 communications.

### 6.6.1 Ethernet option

The Ethernet connection is 10-Base T and runs at 10Mbits per second.

### 6.6.2 Serial option

The RS232 connections are as follows: The communications port should be set to 115200 baud, no parity, 8 data bits and 1 stop bit.

Connecting to the specified pin on a standard 9-way, female D-type enables straight-through connection to a PC COM port.

Signal	Function	Connection pin
GND	Connected to power supply –	5
RxD	Receive input to VCT6	3
TxD	Transmit output from VCT6	2

## 7 General description

Two modes of operation are provided for the 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-T20 will resume the same operation after a power cycle.

### 7.1 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 **Event 149** code is generated.

## 7.2 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.

## 7.3 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.

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



## 7.5 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 <b>off</b> if P Flag = <b>1</b> Is <b>on</b> if P-Flag = <b>0</b>
	Input = on	Is <b>on</b> if P Flag = <b>1</b> Is <b>off</b> if P-Flag = <b>0</b>
Pulsed	Trigger rising edge	Pulse is triggered if P-Flag = <b>1</b>
	Trigger falling edge	Pulse is triggered if P-Flag = <b>0</b>

The 'P' flag can be set from the VCT6's web pages (see Section 9, Webpage configuration), or through its command interface (see Section 10, Configuration commands).

## 7.6 Factory settings

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

- Pulse operation
- 1ms pulse width
- 20.0µs pulsedelay
- 100% intensity
- 32.26ms re-trigger delay, for 850nm variants, and 100.0ms retrigger delay for white variants.

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

# 8 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.

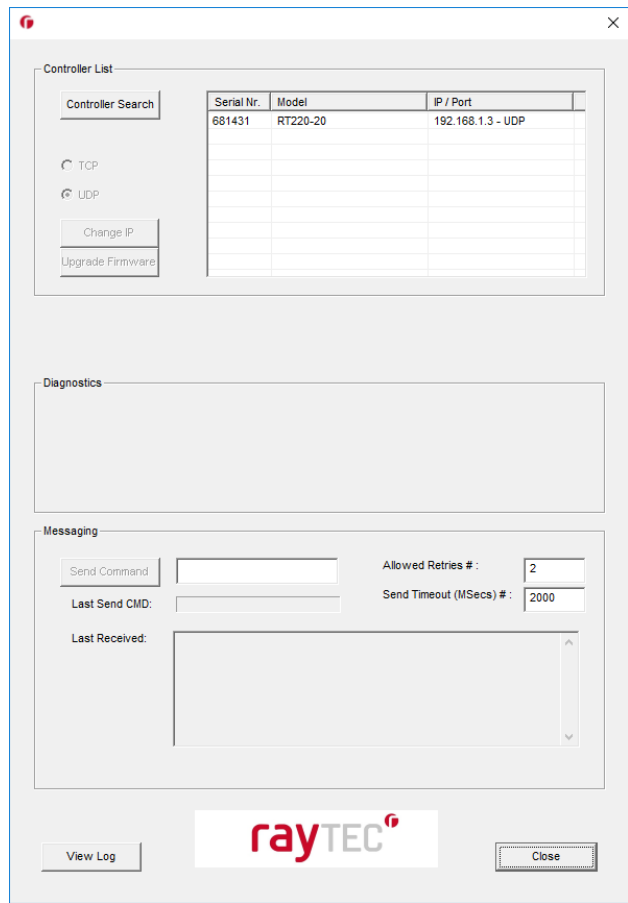
The Ethernet link uses a 10-base T connection. An RJ45 connector may be wired to the free end of the cable to facilitate this. The VCT6 is usually connected to a network switch (or hub, or router). It is also possible to connect it directly into the network port on a PC by using a cross-over cable.

## 8.1 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 or read using the RaytecMaint program available from [www.rayteccctv.com](http://www.rayteccctv.com). The RaytecMaint window is shown below:



RaytecMaint 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 RaytecMaint, you can communicate with your light using the commands explained in Section 10, Configuration commands. You can also open the light's web pages by clicking the **Link to controller webpage** button. For more information about the VCT6's web pages, see Section 9, Webpage configuration.

## 8.2 Programmed IP address and DHCP

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

### 8.2.1 DHCP

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

- i. Go to the **Control Panel**.
- ii. Select **Network and Sharing Centre**.
- iii. Click on **Local Area Connection** in the list of connections. The *Local Area Connection Status* box is displayed.
- iv. Click on **Details**, and the *Network Connection Details* box is displayed.

If *DHCP Enabled* is set to **Yes**, then DHCP is used. However, there may be an alternative fixed IP address on the Alternative Configuration tab.

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

- i. Go to the **Control Panel**.
- ii. Select **Network Connections**.
- iii. Right-click on **Local Area Connection**. Select **Status**.
- iv. Select the **Support** tab. The IP address is displayed.

**Note:** The steps set out above are for a PC using Windows® 7; if your operating system is different, the steps may not be the same.

## 8.2.2 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, in the example below) the same as those of other devices on your network and to change only the last number (the digits after the last point).

For example, if you have a network consisting of a PC (IP address 192.168.1.35) and two VCT6 lights, you might address the VCT6s as follows: 192.168.1.201 and 192.168.1.202.

## 9 Webpage configuration

You can set up the VCT through its own internal web page. Click the Open webpage button in RaytecMaint to take you directly to the VCT6's web pages. You can also type the light's IP address (displayed in RaytecMaint) into your web browser, which will display the main page. RaytecMaint software is available from [www.rayteccctv.com](http://www.rayteccctv.com).

### 9.1 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.



## 9.2 General setup page

On the General setup page, you can set up a password for the VCT6 and send it commands. Refer to Section 10, 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.

The screenshot displays the 'VCT6 Strobe Light - General' configuration page. At the top, there are three navigation tabs: 'Go To Main Page' (with sub-link 'Set up Light Output'), 'General Setup' (with sub-link 'Set up Trigger Output'), and 'Visit Gardasoft.com'. The main content area is titled '(HW002) V007, serial number 601307' and is divided into three sections:

- Set Password:** Contains two input fields for 'Enter Password:' and 'Repeat Password:', followed by a 'Save' button.
- Internal Trigger:** Contains a dropdown menu for 'Internal Trigger:' set to 'Off', an input field for 'Internal Trigger Period:' set to '200.0ms', and a 'Save' button.
- Send Command:** Contains an input field for 'Enter command:', a label 'Previous output:' with a '>' symbol, and a 'Send' button.

## 9.3 Light configuration page

The Light configuration page (shown below) allows you to set up the light's parameters. 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.

Go To Main Page    General Setup    Visit Gardasoft.com  
Set up Light Output    Set up Trigger Output

### VCT6 Strobe Light - Light Output Configuration

(HW002) V007, serial number 601307

Mode:

Brightness (%):

Pulse Delay:

Pulse Width:

Multi Pulse Width:

Retrigger Delay:

Flags: Pos Trigger

Click to update

---

Status: OK

Supply Voltage: 24.7V

SafePower(TM) Voltage: 27.9V

Duty Cycle: 0.6%

Trigger Count: 15514, TRIG1 = 1

Click to Refresh

Trigger

## 9.4 Trigger output configuration page

The internal trigger configuration page (shown below) allows you to set up the pulse parameters for the trigger output pulse.



Go To Main Page    General Setup    Visit Gardasoft.com  
Set up Light Output    Set up Trigger Output

VCT6 Strobe Light - Trigger Output Configuration  
(HW002) V007, serial number 601307

Pulse Delay:   
Pulse Width:   
Click to update



## 10 Configuration commands

The VCT6 can be configured through the Ethernet connection using UDP or TCP/IP. A configuration program with source code can be downloaded from [www.gardasoft.com](http://www.gardasoft.com).

- **Ethernet communication**

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.

- **RS232 communication**

When using RS232, the COM port should be set to 115200 baud, 8 data bits, no parity, 1 stop bit, no hand-shaking.

### 10.1 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.

## 10.2 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.

### Save the settings to 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.

### Report the firmware version

#### **VR**

This command returns the firmware version currently running in your VCT6. For example:

```
VCT6 (HW002) V007
```

## 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	Unused.
CS, RA	

## STO

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 output
	= 2 for trigger output signal

## Clear configuration

### CL

This command clears the configuration.

## Enable Ethernet messages

### GTm

Where:

**m** = 0 to disable Ethernet messages  
= 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.

## 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.

## 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'.

## 10.3 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.

### Set switched mode

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

**RW1,s**

Where:

**s** = brightness setting in percent (0 to 100)

### Set pulse mode

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.

**RTc,p,d,s**

**RTc,p,d,s,r**

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).

### 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).

### Set the internal trigger

This command enables or disables 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).

### Simulate an input trigger

**TR1**

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

## 10.4 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 9, Webpage configuration.

## 11 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.

### 11.1 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 2 $\mu$ s.
- When using the re-trigger delay, the minimum delay is approximately 5 $\mu$ s.
- For pulse widths of less than approximately 100 $\mu$ s, fault detection does not operate.

### 11.2 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.



## 11.3 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 <b>RT</b> 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 (normal for RS232 versions).

**Note:** All other errors are internal error