



PULSESTAR VTS Installation Guide

Issue 004



For your notes:

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1 Getting started

This user manual describes the setting up and operation of the VTS10 and VTS20 strobe lights. The product is referred to as the 'VTS' throughout this User Manual, unless the differences between the two models require them to be specifically identified.

The VTS 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 check the VTS fulfils your requirements.

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

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

We recommend you visit www.raytecctv.com for a range of application notes relating to the Raytec range of strobe lights.

1.1 VTS identification

The convention for standard VTS part numbers is:

VTSnn-*www*-aa-ccc

Where:

nn	is the VTS model number; 10 or 20
www	is the wavelength of light in nanometres; 850 , 940 or cool white W
aa	is the optical beam profile in degrees: 14 , 28 or 50 for 850nm or 940nm and 12 , 28 or 50 for white.
ccc	is the communications protocol; ETH or RS232

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

VTSnn-*www*-aa-ccc-Txx

where

Txx	is the variant number; -T54 for example. This field is not required when specifying standard products
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2 Safety

Read this before using the VTS. 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 VTS is mounted correctly (see Section 5, Mounting the VTS), and that you do not exceed any of the ratings for the unit (see Section 11, Reference information).

At its maximum ratings, the VTS'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 VTS 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 VTS 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 VTS must be rated to at least 5A for a VTS10, or 8A for aVTS20.
- The DC power supply to the VTS must be externally fused to 5A for a VTS10 or 8A for a VTS20 using a slow blow fuse (T5AH, 50V or T8A, 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 emergency source on both power conductors.
- Transients caused by inductive loads must be suppressed externally to the VTS.

2.3 General



The VTS 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 VTS running full power and at maximum duty cycle:

Risk Group 1

VTS10/20 (White Light)

Exempt

VTS10/20 (850nm)

- Other Wavelengths – Contact Raytec

3 Sicherheit

Bitte lesen Sie vor Verwendung des VTS 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 VTS korrekt montiert ist (siehe Section 5, Mounting the VTS) und dass Sie die Grenzwerte für das Gerät nicht überschreiten (siehe Section 11, Reference information).

Bei den maximalen Grenzwerten kann das Gehäuse des VTS 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 VTS 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 Iso- lierung vom Stromnetz getrennt sein.
- Das Netzgerät, das zur Stromversorgung des VTS 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 gleich- wertigen 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, Reference information.
- Die Verkabelung der Stromversorgung zum VTS10 muss für mindestens 5A bemessen sein (für ein VTS20, 8A).
- Die Gleichstromversorgung zum VTS10 muss extern durch eine träge Sicherung (T5AH, 50V) bis 5A gesichert sein. Für ein VTS20, 8A.
- 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 VTS müssen extern unterdrückt werden.

3.3 Allgemein



Das VTS 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 VTS beim Betrieb mit voller Leistung und maximaler Betriebsdauer:

Risikogruppe 1

VTS10/20 (Weißes Licht)

Ausnahme

VTS10/20 (850nm)

- Andere Wellenlängen – Wenden Sie sich an Raytec

4 Sécurité

Lisez ce document avant d'utiliser le VTS. 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: Risqué 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 VTS soit monté correctement (voir Section 5, Mounting the VTS) et à ne dépasser aucune valeur nominale pour l'unité (voir Section 11, Reference information).

Lorsqu'il atteint ses valeurs nominales maximales, le boîtier VTS 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 VTS 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 VTS doit fournir une isolation double/renforcée pour isoler le VTR2 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, Reference information pour les limites de tension autorisées.
- Le câblage d'alimentation vers la VTS10 doit avoir une capacité minimale de 5A (pour une VTS20, 8A).
- L'alimentation en courant continu vers la VTR2 doit être protégée par un fusible 4A en externe, plus précisément un fusible à action retardée (T4AH, 50V). Pour une VTS20, 8A (T8A, 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 VTS.

4.3 Généralités



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

Sil'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 VTS fonctionnant à pleine puissance et en cycle d'utilisation maximal:

Groupe de risque 1

VTS10/VTS20 (Lumière blanche)

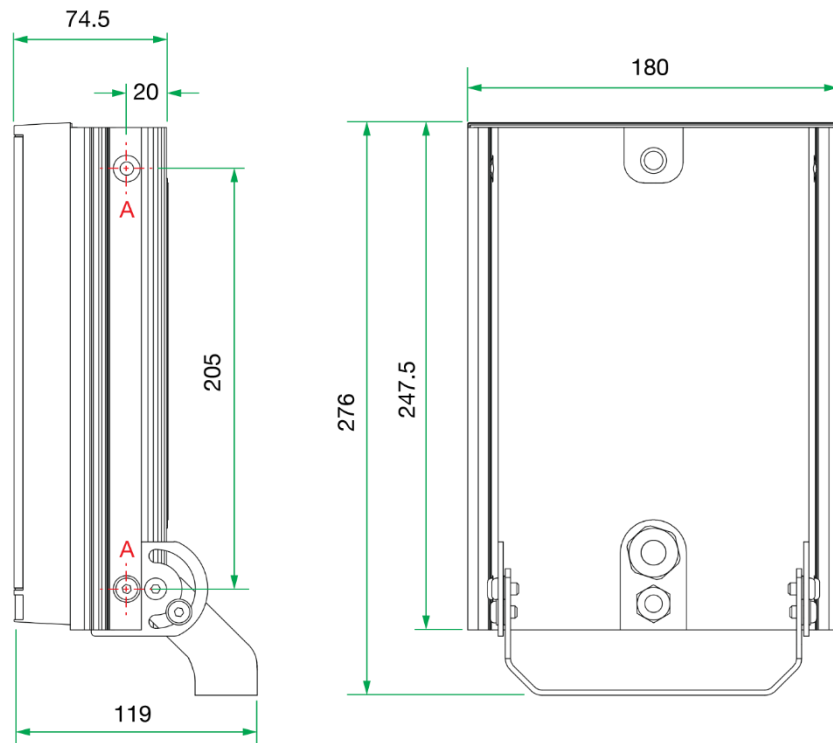
Exclus

VTS10/VTS20 (850nm)

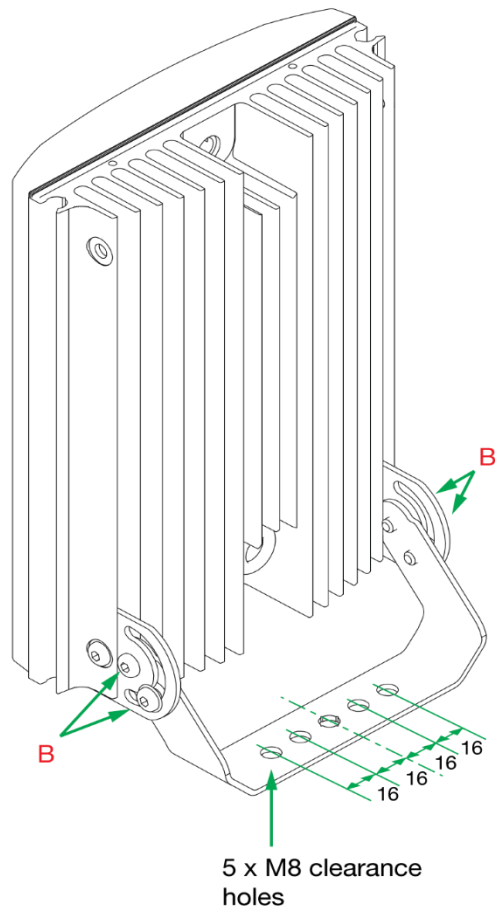
- Autres longueurs d'onde – Contactez Raytec
-

5 Mounting the VTS

The VTS may be mounted using the M6 clearance holes 'A' in the illustration below (there are two on each side), or by using the mounting bracket supplied.



The VTS mounting bracket is shown in the illustration overleaf. It is drilled with five M8 clearance holes for attaching the VTS to your structure, and its angle can be adjusted by slackening the mounting screws 'B'.



6 Connecting the VTS

All connections to the VTS are made through an unterminated, screened 16 core cable. The length of this cable is either 2000mm or 3000mm depending on what you specified. The terminations for the cable are explained in Section 6.1, Network connection.

6.1 Network connection

All connections are provided on a 16-core cable. The wire allocation depends on the variant chosen. The connections are as follows:

Wire Colour	Ethernet Function	RS232 Function
Black Blue	Power supply –	Power supply –
Red Red/Blue	Power supply +	Power supply +
White	Trigger in –	Trigger in –
Brown	Trigger in +	Trigger in +
Grey	Ethernet Tx +	Not connected
Pink	Ethernet Tx –	TxD
Yellow	Ethernet Rx +	RxD
Green	Ethernet Rx –	GND
Grey/Pink	Trigger out –	Trigger out –
Violet	Trigger out +	Trigger out +
Yellow/White	Not connected	Not connected
Yellow/Brown	Not connected	Not connected
Green/White	Not connected	Not connected
Green/Brown	Not connected	Not connected

When installing your VTS, ensure you do not exceed the allowed bend radius for the cable. For occasional flexing, this is 15 x outside diameter (or 155mm). For fixed installation, the bend radius is 6 x outside diameter (or 62mm).

6.2 Connecting the power supply

Refer to Section 2, Safety (or Section 3, Sicherheit, or Section 4, Sécurité) for important electrical safety information.

Choose a power supply unit that limits its output current by design, by setting the current limit on the supply (if this feature exists) or use fuses. The external power supply should be able to supply at least 6A.

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

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.

Additional surge protection is required if transient interference of greater than $\pm 60V$ on the power supply lines is expected.

6.2.1 VTS power supply handling

The VTS analyses its power supply in order to decide whether it is operating from a 12V supply or a 24V supply and applies internal self- protection mechanisms accordingly. At initial power-up, the VTS assumes that it is operating from a 12V power supply. However, if the incoming supply voltage rises above 18V, it will assume that it is operating from a 24V supply.

If the VTS has deduced that it is operating from a 12V supply and the supply voltage drops below 10V, an **Error 72** will be generated and the VTS will turn itself off until the supply recovers to above 10V again. If the VTS has deduced that it is operating from a 24V supply and the supply voltage drops below 18V, an **Error 73** will be generated and the VTS will turn itself off until the supply recovers to above 18V again.

Note: The performance may have already reduced by the time the supply voltage drops to the 10/18V threshold. See Section 11.1, Ratings and restrictions for the maximum and minimum allowable voltage supplies for full performance.

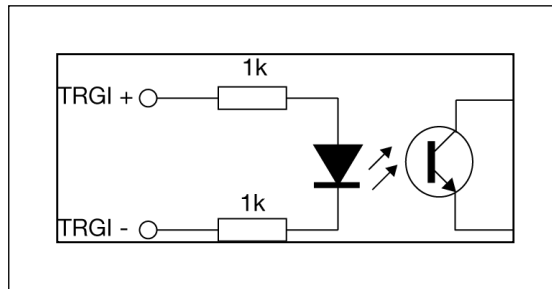
The power supply voltage decision made by the VTS is not stored permanently in memory, so every time the VTS is powered-up, it will decide what its power supply voltage is.

6.3 Trigger input

The trigger input is opto-isolated. The opto-isolator isolated 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 sinks from 3mA to 10mA for voltages between 5V and 24V.

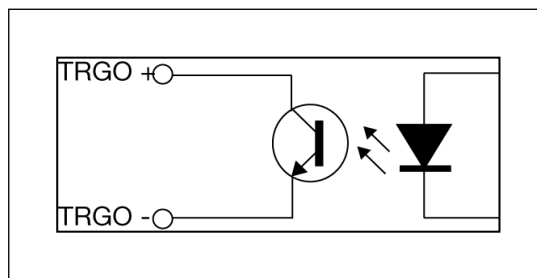
6.4 Trigger output

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 isolates voltages up to 50V.

The outgoing pulse length and transmission delay can be adjusted, enabling the complete control of the trigger timing between a VTS 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.

6.5 Communications

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

6.5.1 Ethernet option

The Ethernet connection is 100-Base T and runs at 100 Mbits per second.

6.5.2 RS232 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

6.6 EMC compliance

The VTS10/20 has been tested and complies with the requirements Of EN50293 Road traffic signal systems (Electromagnetic compatibility).

For units that employ Ethernet communications, it is necessary to use good quality shielded Ethernet cables and shielded connectors and the earth line on this cable must be connected to a suitable ground for earth continuity.

7 General description

The VTS current controller provides repeatable intensity and timing control for its strobe lighting. 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 VTS 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 can be set up to 100%, but only for short periods and at low duty cycles, so that the lighting does not damage itself by overheating. In pulse mode, the duty cycle is limited by ignoring triggers which occur too soon after the previous trigger.

The brightness, pulse width, and duty cycle can all be set, as shown in 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	2%
31% to 50%	3ms	3%	2ms	2%
51% to 100%	1ms	2%	1ms	1%

For example, if the brightness is set to 40%, then a VTS20-850 will not allow pulses longer than 3ms.

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 VTS limits the duty cycle by increasing the re-trigger delay.

When the VTS 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 VTS 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 VTS 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 trouble-shooting 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 VTS 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 VTS's web pages (see Section 9, Webpage configuration), or through it's command interface (see Section 10, Configuration commands).

7.6 Trigger output

A trigger output is available from the VTS which can be used to trigger a camera. Varying the width of the trigger output pulse can be used to control the camera's exposure. The trigger timing for the light and camera can be adjusted relative to each other.

The trigger output is triggered at the same time as the strobe light output. The delay and pulse width of this signal can be controlled independently of the light pulse.

7.7 Factory settings

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

- Pulse operation
- 1ms pulse width
- 20 μ s pulse delay
- 100% brightness
- 30ms re-trigger delay
- Internal trigger is set to a 100ms period but turned **OFF**.

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

8 Ethernet address

When setting up Ethernet versions of the VTS, 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 VTS.

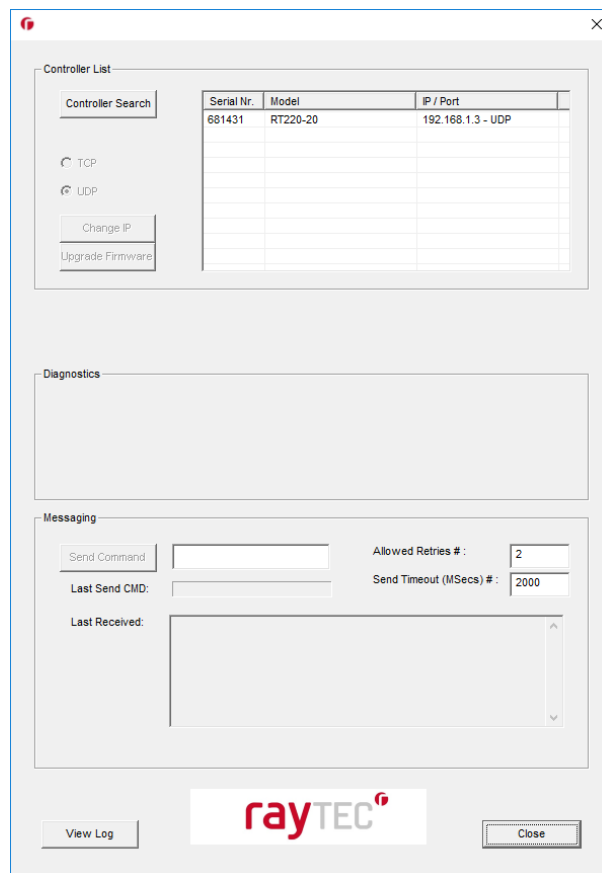
The Ethernet link uses a 100-base T connection. An RJ45 connector may be wired to the free end of the cable to facilitate this. The VTS is usually connected to a network switch (or hub, or router). It is also possible to connect it directly into the network port on a PC by using a cross-over cable.

8.1 IP address

The VTS 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 VTS acquires its IP address, subnet mask, and gateway address from the DHCP server. Otherwise the VTS 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. 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 on RaytecMaint. For more information about the VTS'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:

1. Go to the **Control Panel**.
2. Select **Network and Sharing Centre**.
3. Click on **Local Area Connection** in the list of connections. The *Local Area Connection Status* box is displayed.
4. 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:

1. Go to the **Control Panel**.
2. Select **Network Connections**.
3. Right-click on **Local Area Connection**. Select **Status**.
4. 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 VTS strobe lights, you might address the VTS as follows: 192.168.1.201 and 192.168.1.202.

9 Webpage configuration

You can set up the VTS through its own internal web pages. Select the VTS you want to configure in RaytecMaint and click the Open webpage... button to take you directly to the VTS'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.raytecctv.com.

Note: All configuration settings made using the VTS's web pages are automatically saved.

9.1 Main page

The Main page (shown below) is the first to open when you access the VTS'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 (shown below), you can set up a password for the VTS and send it commands. Refer to Section 10, Configuration commands for the commands you can use to operate the VTS. You can also set up the internal trigger.

Go To Main Page General Setup Visit Gardasoft.com

Set up Light Output Set up Trigger Output

VTS20 LED Lighting Controller Strobe Light - General

(HW05) V00&pre01, serial number 750009

Set Password

Enter Password:

Repeat Password:

Save

Internal Trigger: On ▾

Internal Trigger Period: 200.0ms

Save

Send Command

Enter command:

Previous output: >

Click to send Send

9.3 Light configuration page

The Light Configuration page (shown below) allows you to view some of the light's data such as its temperature, lifetime (how long the light has been powered up) and how long it has been emitting light.

You can also set the light's parameters, such as its mode (pulsed or switched), the light's brightness and pulse settings. You can also set the 'P' Flag to trigger from the falling edge of the trigger input. You must click the **Submit** button to effect any changes you make.



Section	Parameter	Value	
VTS20 LED Lighting Controller Strobe Light - Light Output Configuration (HW05) V008pre01, serial number 750009	Mode:	Pulse	
	Brightness (%):	20.0	
	Pulse Delay:	2.0us	
	Pulse Width:	200.0us	
	Multi Pulse Width:	0.0us, 0.0us, 0.0us, 0.0us	
	Retrigger Delay:	3.333ms	
	Flags:	Pos Trigger <input checked="" type="checkbox"/>	
	Click to update	Submit	
	Trinitii™ Light Data	Trinitii Status:	Trinitii Chip connected
		Light Manufacturer:	GVL
Light Model:		VTS20	
Light Serial Number:		750009	
Light Documentation:		www.gardasoft.com	
Light User Name:		Username	
Light Lifetime:		1 Hours	
Light On Time:		0 Hours	
Sensor Temperature:	14.7 °C		
Click to update	Submit		
Status	Status:	OK	
	Supply Voltage:	24.250V	
	SafePower(TM) Voltage:		
	Duty Cycle:	0.5%	
	Trigger Count:	1219, TRIG1 = 0	
	Click to Refresh	Refresh	
	Trigger	Trigger	

9.4 Trigger output configuration page



The screenshot shows a web interface for configuring a strobe light. At the top, there are three navigation links: "Go To Main Page", "General Setup", and "Visit Gardasoft.com". Below these are two sub-links: "Set up Light Output" and "Set up Trigger Output". The main heading is "VTS20 LED Lighting Controller Strobe Light - Trigger Output Configuration". Below the heading, the device information is displayed: "(HW05) V008pre01, serial number 750009". There are two input fields: "Pulse Delay:" with the value "20.0us" and "Pulse Width:" with the value "1.000ms". At the bottom left, there is a "Click to update" label, and at the bottom right, there is a "Submit" button.

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

10 Configuration commands

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

- **Ethernet communication**

For TCP and UDP, commands from a host should be sent to destination port 30313. Any port number can be used as the source port.

Replies are sent to the source port from 30313.

- **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 VTS sends any replies to the commands and then send 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.

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

Save the settings to memory

AW

The results of the **RW**, **RT**, **RE**, and **TT** commands are all saved. 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.

Note: The **AW** command is unnecessary when configuring the VTS through it's web pages. The configuration is automatically saved.

Report the firmware version

VR

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

```
VTS (HW001) V002
```

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
```

Where:

CH	Channel number
MD	Mode: 1 = pulsed; 2 = switched
S	Brightness in percent
DL	Pulse delay
PU	Pulse width
RT	Retrigger delay

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. The results of the **RW**, **RT**, **RE**, and **TT** commands are all cleared.

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; see Section 11.2, Event codes and Section 11.3, Error codes for the range of codes that may be reported.

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 VTS 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 is '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 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 3)
- 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 100µs, 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 VTS'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 VTS. Event and error codes are also listed.

11.1 Ratings and restrictions

	VTS10	VTS20
Wavelength	White, 730nm, 850nm, 940nm (others on request)	
Max pulse width	730nm, 850nm, 940nm: 3ms (1ms at max intensity) White: 3ms (1ms at max intensity)	
Max trigger frequency	10kHz	
Max duty cycle	730nm, 850nm, 940nm: 6% (2% at max intensity) White: 3% (1% at max intensity)	
Angle	850nm, 940nm: 14°, 28°, 50° White, 730nm: 12°, 28°, 50°	
Lighting drive power (pulsed)	940nm: 0.5kW 850nm: 0.5kW White: 0.4kW 730nm: 0.5kW	940nm: 1kW 850nm: 1kW White: 0.8kW 730nm: 1kW
Brightness repeatability	1%	
Power supply	11VDC (4.2A) to 11VDC (7.2A) to 26.4VDC (2.1A)	11VDC (7.2A) to 26.4VDC (3.6A)
Dimensions (excluding mounting bracket)	180mm (w) x 248mm (h) x 75mm (d)	
Trigger Input	5V to 24V opto-isolated	
Trigger Output	Synchronised to strobing, user adjustable pulse width and delay (24V, 20mA, opto-isolated)	
Communications	Ethernet or RS232	
Operating Temperature	-20°C to +50°C	
Storage Temperature	-20°C to +70°C	
Weight	2.7kg	
Environmental Protection	IP66, weatherproof cabling	

The VTS has the following restrictions on its operation:

- The minimum delay for the light pulse output is approximately 2 μ s.
- When using the re-trigger delay, the minimum delay is approximately 5 μ s.
- For pulse widths of less than approximately 70 μ s, fault detection does not operate.
- The minimum delay for the trigger output is approximately 2 μ s.

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.
140	The duty cycle is too high.
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.
170	Self-test has passed.
171	Self-test has failed.

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 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.

Error No	Reason
Err 27	Cannot read Ethernet settings from EEPROM, so these may be incorrect.
Err 33	The VTS 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 errors.