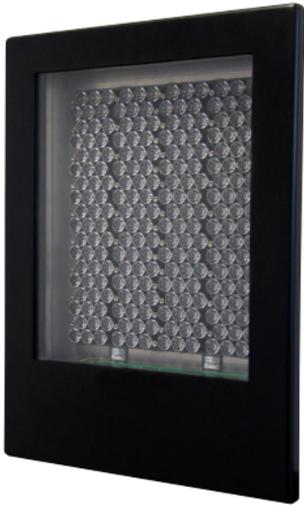


# PULSESTAR

## VTR Installation Guide



VTR4



VTR6

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# 1. Getting Started

This user manual describes the setting up and operation of the PULSESTAR VTR pulsed illuminator. Read Section 2 'Safety', and Section 11 'Reference Information', to check the VTR fulfils your requirements.

Mount the VTR as described in Section 5 'Mounting the VTR'. Connect the VTR up to a supply as described in Section 6 'Connections'. Set up the VTR for the desired operation as described in Section 10 'Configuration Commands'.

## 1.1 VTR Identification

Throughout this manual, references to the VTR refer to all variants in the VTR range unless otherwise stated. The convention for standard VTR product numbers is:

*VTRx-www-aa-ETH-NC*

- VTRx* is the model size; *VTR4* or *VTR6*
- www* is the wavelength of light in nanometres; *850* or *White-Light W*
- aa* is the optical beam profile in degrees: 12, 28 or 50 for white, 14, 28 or 50 for 850nm.
- ETH* Ethernet. The communications protocol,
- NC* No cable. If a cable is required, it should be ordered separately.

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

*VTRx-www-aa-ETH-NC-Tyy*

- Tyy* is the variant number; -T54 for example. This field is not required when specifying standard products.

## 2. Safety

Read this before using the VTR. 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 General



The VTR 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.

To reduce the risk of strangulation the flexible wiring connected to this luminaire shall be effectively fixed to the nearest structure if the wiring is within arm's reach

#### 2.1.1 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.

### 2.2 Heat



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

At its maximum ratings, the VTR'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.

## 2.3 Electrical



The VTR 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 62368-1 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 VTR 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 9 'Reference Information' for allowable voltage limits.
- Power supply cabling to the VTR4 must be rated to at least 5A. Power supply cabling to the VTR6 must be rated to at least 8A.
- The DC power supply to the VTR4 must be externally fused to 5A using a slow blow fuse (T5AH, 50V). The DC power supply to the VTR6 must be externally fused to 8A using a slow blow fuse (T8AH, 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 VTR.

**WARNING:** This is a EMC 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.

## 2.4 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.

## 2.4.1. IEC/BS EN62471 Risk Groups

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

### *Eye Safety: Infra-Red Variants*

Infra-Red Risk Group 1 Classification – Notice: Infra-Red emitted from this product. Use appropriate shielding or eye protection. Hazard distance is 2070mm

### *Eye Safety: White Light Variants*

White Light Risk Group 1 Classification

Other Wavelengths – Contact Raytec

## 3.0 Sicherheit

Bitte lesen Sie vor Verwendung des VTR 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 Allgemein



Das VTR 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.

Um die Strangulierungsgefahr zu verringern, müssen die an diese Leuchte angeschlossenen flexiblen Kabel wirksam an der nächstgelegenen Struktur befestigt werden, wenn sich die Kabel in Reichweite der Arme befinden.

#### 3.1.1 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 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.

## 3.2 Wärme



Stellen Sie sicher, dass das VTR korrekt montiert ist (siehe Section 5 'Mounting the VTR') und dass Sie die Grenzwerte für das Gerät nicht überschreiten (siehe Section 11 'Reference Information').

Bei den maximalen Grenzwerten kann das Gehäuse des VTR 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.

## 3.3 Elektrik



Das VTR 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 62368-1 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 VTR 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 62368-1, IEC 60335-1, IEC 61010-1 oder IEC61558-1,-2,-16 zugelassen sein. Das Netzgerät kann auch nach gleichwertigen oder höheren Standards zugelassen sein. 6

Das VTR 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 62368-1 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 VTR 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 62368-1, IEC 60335-1, IEC 61010-1 oder IEC61558-1,-2,-16 zugelassen sein. Das Netzgerät kann auch nach gleichwertigen oder höheren Standards zugelassen sein. 6
- Alle stromführenden Leiter, die vom Stromnetz abgeleitet sind, müssen ebenfalls Sicherheitskleinspannung (SELV) am Ausgang erzeugen. Hinweis zu den zulässigen Spannungsgrenzwerten finden Sie im Section 11 'Reference Information'.
- Die Verkabelung der Stromversorgung zum VTR4 muss für mindestens 5A bemessen sein. Die Verkabelung der Stromversorgung zum VTR6 muss für mindestens 8A bemessen sein.

- Die Gleichstromversorgung zum VTR4 muss extern durch eine träge Sicherung (T5AH, 50V) bis 5A gesichert sein. Die Gleichstromversorgung zum VTR6 muss extern durch eine träge Sicherung (T8AH, 50V) bis 8A 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 VTR 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.

### 3.4 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.

#### 3.4.1 IEC/BS EN 62471 Risikogruppen

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

*Augensicherheit- Infrarot-Varianten:*

Einstufung der Infrarot-Risikogruppe 1. Hinweis: Von diesem Produkt geht Infrarotstrahlung aus. Direkter, längerer Blick in das Leuchtmittel sollte vermieden werden. Vermeiden Sie den Blickkontakt mit der Lampe oder verwenden Sie eine geeignete Schutzbrille. Der Sicherheitsabstand beträgt 2070mm.

*Augensicherheit - Weißlicht-Varianten:*

Weißlicht Risikogruppe 1 Klassifizierung

Andere Wellenlängen - Kontaktieren Sie Raytec

## 4.0 Sécurité

Lisez ce document avant d'utiliser la VTR. 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 Généralités



La VTR 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.

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

Pour réduire le risque de strangulation, les câbles flexibles connectés à ce luminaire doivent être efficacement fixés à la structure la plus proche si les câbles sont à portée de main.

#### 4.1.1 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.

### 4.2 Chaleur



Veillez à ce que la VTR soit montée correctement (voir Section 5 'Mounting the VTR') et à ne dépasser aucune valeur nominale pour l'unité (voir Section 11 'Reference Information').

Lorsqu'il atteint ses valeurs nominales maximales, la VTR 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.

### 4.3 Électricité



La VTR 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 62368-1. 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 VTR doit fournir une isolation double/renforcée pour isoler la VTR de l'alimentation secteur, et le protéger des courts-circuits et des surcharges. Le boîtier d'alimentation doit être approuvé selon la norme CEI 62368-1, 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 VTR4 doit avoir une capacité minimale de 5A. Le câblage d'alimentation vers la VTR6 doit avoir une capacité minimale de 8A.
- L'alimentation en courant continu vers la VTR4 doit être protégée par un fusible 5A en externe, plus précisément un fusible à action retardée (T5AH, 50V). L'alimentation en courant continu vers la VTR6 doit être protégée par un fusible 8A en externe, plus précisément un fusible à action retardée (T8AH, 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 VTR.

**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.

## 4.4 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.

### 4.4.1. Groupes de risque IEC/BS EN62471

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

*Sécurité Phytobiologique - spécifications pour les projecteurs Infrarouges:*

Classification Infra Rouge Groupe de risque 1 - Avis : Les infrarouges sont émis par ce produit . Utiliser un écran ou une protection oculaire appropriés. La distance de danger est de 2070mm

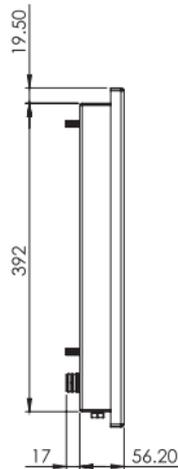
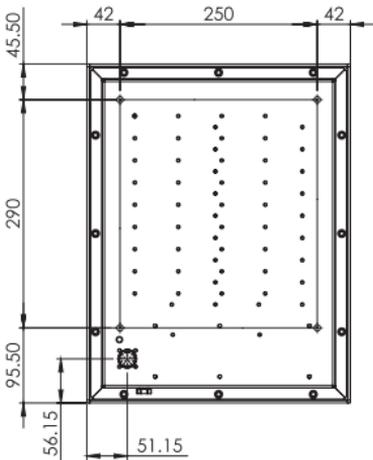
*Sécurité Phytobiologique - spécifications pour les projecteurs a lumière blanche:*

Lumière Blanche Risque Groupe Classification 1

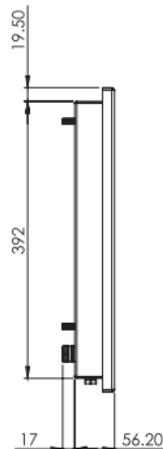
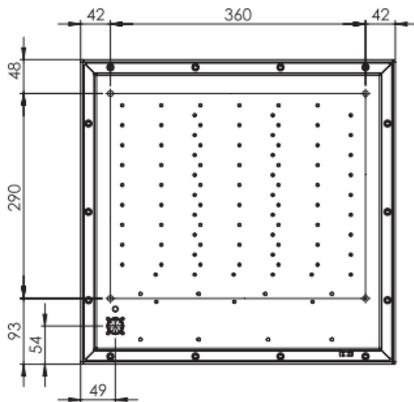
Autres longueurs d'onde – Contactez Raytec

## 5. Mounting the VTR

VTR4



VTR6



The VTR has 4 off M8 mounting studs. These should be fitted to the VTR optional mounting bracket, or through 9.0mm diameter holes in the user's infrastructure and fastened with nuts that are tightened to a maximum of 15Nm. If larger diameter holes, or a higher torque is used, then there is a risk of damaging the VTR.

## 5.1 Heatsinking

The approximate heat dissipation of the VTR can be calculated as follows:

$$HD = (36 \times BR \times PW \times TF) + 2$$

Where:

HD Heat dissipation(W)

BR Brightness of the light output (%)

PW Strobe pulse width(seconds)

TF Maximum trigger frequency(Hz)

Without any heatsinking, the internal temperature of the VTR4 rises 0.45°C per Watt of heat dissipation, and the internal temperature of the VTR6 rises 0.40°C per Watt of heat dissipation. Given the range of ambient temperatures and radiated sunlight, the installation must provide enough heatsinking on the rear surface to keep the internal temperature of the VTR below 70°C

## 6. Connections

See Section 11 'Reference Information' for information on connection ratings. All connections are provided on a 17-way bulkhead connector. The connector pin-out varies according to the options provided. The bulkhead connector details are as follows:

Connector shell: Hummel AG code 7.420.000.000

Connector insert: Hummel AG code 7.003.917.101N

Connector pins: Hummel AG code 7.010.901.001

Assembled cables are available from Raytec to the customer's specification. If a standard cable assembly is provided by Raytec, then the wire colours will be as shown below.

Bulkhead connector pin	ETH option	Wire colour (std cable assy)
6 7 8 9	Power -	Black Blue Grey/Pink Green/White
2 3 4 5	Power +	Green/Brown Red Red/Blue Violet
15	TRGI -	White
14	TRGI +	Brown
12	Tx +	Grey
13	Tx -	Pink
10	Rx +	Yellow
11	Rx -	Green
17	TRGO -	Yellow/White
16	TRGO +	Yellow/Brown
1	Case ground	Screen

## 6.1 Power Supply

Refer to the information in Section 2 'Safety' concerning power supply arrangements for the VTR. 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 derate the fuse, if mounted in an enclosure, as the temperature will be higher than ambient. The external power supply of the VTR4 needs to be able to supply at least 5.0A, and the external power supply of the VTR6 needs to be able to supply at least 8.0A.

The use of a regulated power supply with 100% short circuit protection is recommended. If, however 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.

The low voltage and AC mains wiring should be routed separately. If they must be loomed together ensure that low voltage insulation rating is sufficient or that supplementary insulation is used.

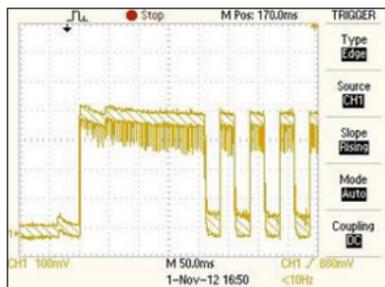
The maximum recommended power supply cable length 3m. If longer cables are fitted, or if surge or transient interference greater than +/-60V may occur on the power supply lines, additional surge protection should be provided.

## 6.1.1 Power-up Surges

The VTR will draw current surges from the user's power supply at various stages as it becomes operational. At the instant on which power is applied, the capacitors internal to the VTR will draw a surge that is dependent upon the impedance of the user's power supply and cabling. If not limited, this surge will be of the order of 100-150Amps with a duration of approximately 50 $\mu$ s.

After a few seconds, the internal micro-controller will begin to apply power to the LEDs. This will cause an initial demand for current, followed by regular bursts as shown in the image on the right.

*NOTE:* The peak of these current pulses is typically 8 Amps, and that mean current consumption is typically 5 Amps once the power-up sequence is complete, and the VTR is running at maximum brightness and duty cycle.

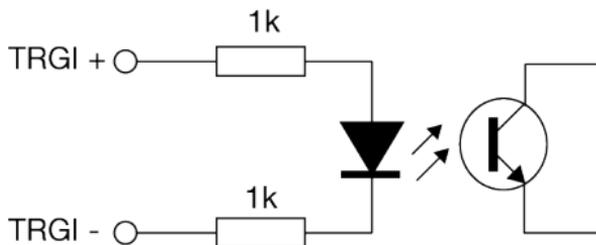


## 6.2 Trigger input

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

Signal	Function
TRIGI -	Trigger input negative
TRIGI +	Trigger input positive

The trigger input circuit is shown below:



The trigger input circuit operates as follows:

When a voltage of 5V to 24V is applied across TRGI – and TRGI +, the trigger input is logic 1 (on). When a voltage of 0V to 2V is applied across TRGI – and TRGI +, the trigger input is logic 0 (off).

To see how to set up the light to trigger on a 0-1 transition (rising edge) or a 1-0 transition (falling edge), refer to Section 7.5 'Trigger Input'.

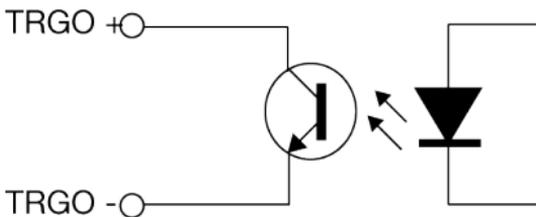
The trigger input typically sinks 2mA when a 5V trigger is applied, and 12mA when a 24V trigger is applied. The trigger input current will scale linearly between these two extremes.

## 6.3 Trigger output

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

Signal	Function
TRIGI -	Trigger input negative
TRIGI +	Trigger input positive

The trigger input circuit is shown below:



The trigger output can be used to switch a signal of up to 24V, switching up to 20mA when on. When the output is logic 1 (on) a current of up to 20mA can flow. The maximum current must be limited to an absolute maximum of 50mA by the external circuit. The forward voltage is less than 2V.

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

## 6.4 Ethernet Option

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

## 7. General Description

The VTR current controller provides repeatable intensity and timing control for strobe lighting. Two modes of operation are provided for the light output:

*Pulse (strobe)* - In pulse mode the output is pulsed once per trigger. The delay from trigger to pulse, the pulse duration and the brightness can be set.

*Switched* - In switched mode the trigger input can be used to switch the output current on and off. The setup is non-volatile, so the VTR resumes the same operation after a power cycle.

### 7.1 Pulse and duty cycle limits

In both pulsed and switched modes, 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 overheat and get damaged. In pulse mode, the duty cycle is limited by ignoring triggers which are too soon after the previous trigger.

Output Brightness	850nm Variant		White-Light	
	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%

So, for example, if the brightness is set to 40%, then a VTR (850nm) does not allow pulses greater than 3ms long. With 1ms pulses, if a trigger occurs within 33ms of a previous trigger (so that the duty cycle would be greater than 3%) the trigger is ignored.

If necessary, the VTR limits the duty cycle by increasing the retrigger delay.

When the VTR internal temperature gets too high, the allowed duty cycle is reduced and event 149 is generated. This typically happens at 50°C.

## 7.2 Pulsed Output

The output is off by default. When the VTR is triggered, it waits for a delay and then pulses the output. This delay can be set from 0.01ms to 999ms.

Retrigger delay is the minimum allowed time from one trigger to the next. Any triggers that happen too soon after the previous trigger are ignored. The retrigger delay is set in multiples of 100us.

The delay, pulse width, retrigger 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 VTR 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 as they will not remain synchronised and the images will have very 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

The trigger input is used as follows:

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

*NOTE:* The P-flag inverts the sense of the trigger input.

## 7.6 Trigger Out

This signal can be used to trigger a camera. It can be used for pulse width exposure control of the camera. The trigger timing for the light and camera can be adjusted relative to each other.

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

## 7.7 Factory Settings

The default VTR configuration for the light output and trigger output are:

- Pulse operation
- 1ms pulse width
- 0.02ms delay
- 100% intensity
- 30ms retrigger delay

The configuration can be cleared to the default settings, by sending the *CL* command.

## 8.0 Ethernet Address

You may need to ask your network administrator for advice about setting up the Ethernet connection.

Ethernet set up is not affected by cold booting the VTR.

### 8.1 Connection

The Ethernet link uses a 10 base-T connection on an RJ45 connector. The VTR is usually connected to a network switch (or hub or router). It is also possible to connect it direct into the network port on a PC by using a crossover cable.

### 8.2 IP Address

The VTR 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.

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:

- i. Go to *Control Panel > Network and Internet*
- ii. Select *Network and Sharing Center*
- iii. From the list on the left, select *Change adapter settings*
- iv. Right click on connection being used. Select *Properties*
- v. From the list, select *Internet Protocol (TCP/IP)* and select *Properties*

If *Obtain an IP address* automatically is set, then DHCP is probably 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 a PC at any time by following the steps below:

- i. Go to Settings > *Network and Internet*
- ii. Select *Ethernet*
- iii. Select *Properties*. The IP address is displayed.

**NOTE:** These instructions assume Windows™ 10 is installed on your PC. If you use a different operating system, the procedure may be different. Refer to individual operating systems for exact instructions.

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 the same as other devices and to change only the last number. For example, if you have a network consisting of a PC (IP address 192.168.1.35) and two VTRs, you might give them addresses 192.168.1.201 and 192.168.1.202.

## 8.2.1 Programmed IP Address and DHCP

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

DHCP mode or the IP address can be set using the RaytecMaint software available for download at [www.raytecltd.com](http://www.raytecltd.com).

## 8.2.2 Network Broadcast Packets

The VTR sends out a message on three events:

- On power up
- When an IP address is received or renewed by DHCP
- When an enquiry message is received

On the first two events, the message is broadcast. On the third it is a reply to a single IP address.

An enquiry message is a UDP packet from source port 30310, destination port 30311 with the message body "Gardasoft Search" (8-bit ASCII, 13 characters).

The message output by the VTR is a UDP packet from source port 30311, destination port 30310. It is formatted as:

*Gardasoft,VTR4,000000,111111111111,22222222*

(8-bit ASCII, 44 characters), where:

000000      the serial number of the unit.

111111111111 the MAC address in 6 HEX bytes.

22222222      the IP address in 4 HEX bytes.

For example, for VTR serial number 12345, IP address 192.168.1.103, MAC address 00.0B.75.01.80.99 the packet contains:

*Gardasoft,VTR4,012345,000B75018099,C0A80167*

## 9.0 Webpage Configuration

The VTR has a web server inside, so that it can be configured from a standard web browser, such as Internet Explorer.

The IP address of the VTR must be known (see Section 8, 'Ethernet Address') Open a web browser window and type the IP address (for example 192.168.1.71) of the VTR into the URL box at the top. The main page of the VTR web server should be shown.

### 9.1 Main Page

The main page shows general information about the VTR. Links are provided to the configuration pages. An example of the main page is shown below:



### 9.2 General Setup Page

The general setup page allows the webpage protection password to be set or cleared and the internal trigger to be set up. Also, any Ethernet command from Section 10 'Configuration Commands' can be entered.

'Test Mode' referred to on this page is the internal trigger timer. An example of the general setup page is shown below:



## 9.3 Light Output Configuration Page

This page allows the parameters for the light to be set up. Press the *Submit* button to update the VTR and save the changes to non-volatile memory.

Some measured values are displayed on this page, and an example of the page is shown below:

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

### VC16 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:

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

### VC16 Strobe Light - Trigger Output Configuration

(HW002) V007, serial number 601307

Pulse Delay:

Pulse Width:

Click to update:

## 10.0 Configuration Commands

The VTR can be configured via the Ethernet connection which allows data entry through the unit's web pages using UDP or TCP/IP.

### 10.1 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.

### 10.2 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 > ('greater than' symbol). Once this is received, the host knows 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 VTR sends any replies to the commands and then sends a > character to indicate that the command line has been completed.

Commands comprise 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:* Parameters are in 'USA/UK' format so that a half is written '0.5' not '0,5'.

## 10.3 General Commands

### 10.3.1 Report the version of firmware running in the VTR

This command returns the firmware version. For example:

*VR* returns:

*VTR4 (HW001) V001*

### 10.3.2 Set switched mode

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

*RW1,s*

Where:

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

### 10.3.3 Set pulse mode

The output can be set up to pulse on a trigger input. The delay from trigger to the start of the pulse, the length of the pulse and the brightness are 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* = 1 to select light strobe output

*c* = 2 to select a 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* = setting in percent (*s* = 0 to 100)

*r* = retrigger delay in milliseconds. This parameter is optional.

### 10.3.4 Set the Option Flags

*REc,p*

Where:

*c* = 1 to select light strobe output

*c* = 2 to select a trigger output signal

*p* = 0 to set the P flag (positive triggers)

*p* = 4 to clear the P flag (negative triggers)

### 10.3.5 Set Internal Trigger

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 internal trigger

*TT1*            Enable internal trigger (uses previously set period)

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

Where:

*P* = 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)

### 10.3.6 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 then 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.

### 10.3.7 Clear Configuration

*CL*

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

### 10.3.8 Report the configuration

*ST*

Reports all the channel settings. 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 the numeric values are:

CH	Channel number. Channel 2 refers to a trigger output
MD	Mode: 1 = pulse, 2 = switched
S	Brightness setting as a percentage
DL	Pulse delay
PU	Pulse width
RT	Retrigger delay
IP FL	These values are unused
CS RA	

*ST0*

Reports the general settings. Typical output is:

TM 1, TP 20.00ms

Where:

TM = Internal trigger: 0 = off, 1 = on

TP = Internal trigger period

*STc*

Reports settings for a single channel.

c = 1 to select light strobe output

c = 2 to select a trigger output signal

### 10.3.9 Simulate an Input Trigger

*TR1*

Simulates a trigger pulse. If the channel is in pulse mode it emits a single pulse.

### 10.3.10 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 address from which a command has been received.

Messages are of the form:

*Evt1,e*

Where:

*e* = event value: 32 to 47 are lighting error codes.

### 10.3.11 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 VTR 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.

### 10.3.12 Set/Clear the Webpage 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'.

### 10.3.13 Report internal temperatures

*AT*

Each of the two internal LED PCBs has a temperature sensor, and the *AT* command reports a string with the following format:

TM 18C 19C [=19C] [21C19C] 50C 70C [100%]

In this example:

18C 19C	Reports the measured temperature of the two LED PCBs.
[=19C]	Reports the average measured temperature of 19°C.
[>19C]	Reports the maximum of the two measured temperatures.
50C	States the pre-programmed average temperature at which the VTR begins to omit flashes in order to cool down.
70C	States the pre-programmed average temperature at which the VTR is omitting all flashes.
[100%]	Reports the proportion of triggers that the VTR is currently responding to, based upon the average measured temperature.

## 10.4 Command Summary

Command	Example	Effect
AT	AT	Reports the temperature of the LED PCBs.
AW	AW	Save changes.
CL	CL	Clear configuration.
ST	ST	Show configuration.
GT	GT1	Enable Ethernet messages.
GR	GR	Clear any error conditions.
EY	EY65,66	Set webpage password to 'AB'.
VR	VR	Read the firmware version.
RW	RW1,50	Set channel 1 to 50%, switch mode.
RT	RT1,3,100us,50	Set light to strobe with 3ms pulses, delayed by 100us, at 50% brightness.
RE	RE1,4	Trigger on falling edge of trigger input.
TT	TT1,100ms	Set internal triggers every 100ms.
TR	TR1	Triggers an output pulse.

## 11.0 Reference Information

This section contains information about the VTR's ratings, restrictions, error and event codes.

### 11.1 Ratings

The electrical ratings of the connections are:

Signal	Rating
Power input	24VDC $\pm$ 10%. Maximum ripple 10%.
Trigger input	Opto-coupler input: $\sim$ 2 kohms series resistance. 0V to 2V is a logic 0. 5V to 24V is a logic 1, drawing between 2 mA and 12mA
Trigger output	Opto-coupler transistor output. Maximum switched voltage $V_{ce0}$ =24V. Load current should be externally limited to 50mA maximum.

*NOTE:* These ratings are the absolute maximum permitted.

### 11.2 Restrictions

The minimum pulse delay for the light pulse output is approximately  $2\mu$ s. When using the retrigger delay, the minimum delay is approximately  $5\mu$ s.

For pulse widths less than approximately  $70\mu$ s fault detection does not operate. The minimum delay for the trigger output is approximately  $2\mu$ s.

(*NOTE:* The light source (LEDs) of this Illuminator is not replaceable. When the unit reaches its end of life the whole Illuminator shall be disposed of and re-cycled where possible.)

## 11.3 Error codes

Error number	Reason
Err 1	A parameter value is invalid.
Err 2	Command not recognised.
Err 3	Numeric value is in the wrong format.
Err 4	Wrong number of parameters.
Err 5	This is a warning, 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 results in 'Err 5'. The command is accepted but the delay is set to the minimum allowed.
Err 8, Err 12	EEPROM corrupt. The configuration has been cleared.
Err 9, Err 20	Unable to save settings to EEPROM.
Err 27	Unable to read Ethernet settings from EEPROM, so they may be incorrect.
Err 33	The VTR is too hot. The VTR has a thermal cut-out which operates around 65°C to 70°C, depending on conditions.

*NOTE:* All other errors are internal errors.

## 11.4 Event Codes

Event messages are sent when an error occurs. The format of these is as follows:

```
Evt<channel>,<event code>;
```

These event messages are only sent after the *G71* command has been sent.

Event number	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 (after event 149).
149	The allowed duty cycle has been reduced due to high internal temperature.

*DISCLAIMER:* The information provided in this document was accurate at the time of its creation. However, due to the evolving nature of our products and continuous improvements, there may be changes or updates that occur after its publication. For the most current and detailed information about our products, please contact our sales team at [sales@rayteclcd.com](mailto:sales@rayteclcd.com).



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