

High Brightness Line Light

User Manual



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1 Introduction

The TENSOR is a linear light designed for the machine vision industry. It can be mounted as a lighting unit or as a backlighting unit. Various combinations of power and focal length enable a large number of uses and configurations.

The TENSOR comes pre-set for uniformity at 100% luminous power. Two system of control are available to the user:

- Dimming control by analogue input
- Full uniformity and dimming control via digital input

The manual defines the following:

- Product overview and installation
- Operating instructions – “how to”
- TENSOR technical information and maintenance
- Warranty
- Contact

2 Product Overview & Installation

2.1 Description

- CVR Lighting Ltd offers today’s Machine Vision market a line light for line scan and web inspection applications. The light can be either passively cooled, or actively cooled through by two cooling methods: active airflow cooling or liquid cooling, offering the potential of very high luminous flux.
- The TENSOR comes with industry standard mechanical interface. The line light is a compact, robust industrial light which incorporates T-slot mounting for easy integration in your vision system.
- Product features include integrated optical elements which meet the requirements for both front and backlighting applications of diffuse and highly specular materials. The

modular design (100mm increments) addresses line lengths up to 5m for every customer installation.

- The TENSOR also comes with industry standard power and control interfaces. The optical power output can be controlled via an integrated current control driver either by 0-10V or by 10-0V (HB High brightness models) additionally, as well as the 0-10V or 10-0V analogue control the (HBC High brightness Controllable models) can be controlled in steps of 50mm via RS 485. See data sheet for further details.

2.2 Product feedback

At CRV Lighting Ltd we are continually trying to improve our product performance and end user feedback is at the heart of our product development cycles.

If you would like to make recommendations for product improvement or would like to see additional features added, please let us know by contacting our sales and marketing department

Please email sales@CVRLighting.com with your feedback.

The management team at CVR Lighting Ltd would like to thank you for your business and we hope this product helps to give you an added advantage in today's Machine Vision markets

2.3 Precautions

Safety Warning

Only qualified personnel are allowed to make electrical connections.

This product is for dry locations only.

DO NOT modify or dismantle part or all of the product, doing so will cause the warranty to be void.

DO NOT connect or clean the product when the power is on.

DO NOT look directly into the light!

All local and national regulations take precedence over this user guide.

Driver, cables and connections must be secured into an enclosure.



2.4 Unpacking

Products are packed in our factory using suitable material to ensure that they arrive with you safely, and in perfect condition. However, if the packaging is damaged upon arrival, this must be reported directly to the carrier, and must be noted in writing on the delivery note. Please send a letter, or email to CVR.Lighting Ltd. (info@CVRLighting.com) as soon as possible (up to 24 hours after delivery). If the transportation damage has not been stipulated on the delivery order or reported to CVR Lighting Ltd. on time, the package will not be taken back or exchanged. Take care when opening the package, using knives could cause damage to the product. Please refer to the datasheet or CVR-Lighting Ltd. for information on accessories that can be used with this product.

3 Operating Instructions

3.1 Packing List

Please ensure that the following items have been provided prior to installation, if not please contact CVR Lighting or your nearest representative.

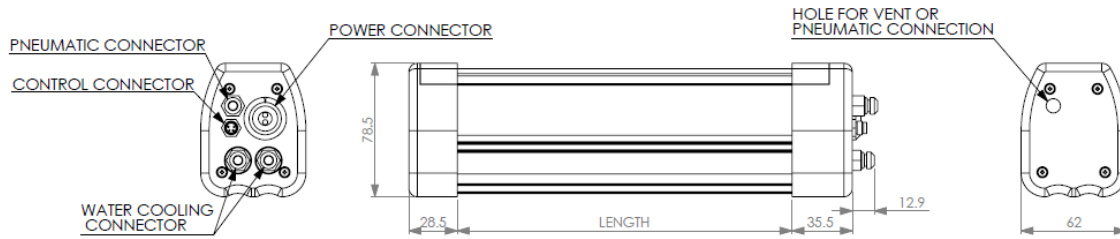
- 1) TENSOR line light
- 2) 2m power cable (connector version only)*
- 3) 2m control cable (connector version only)*

*if.ordered.separately.

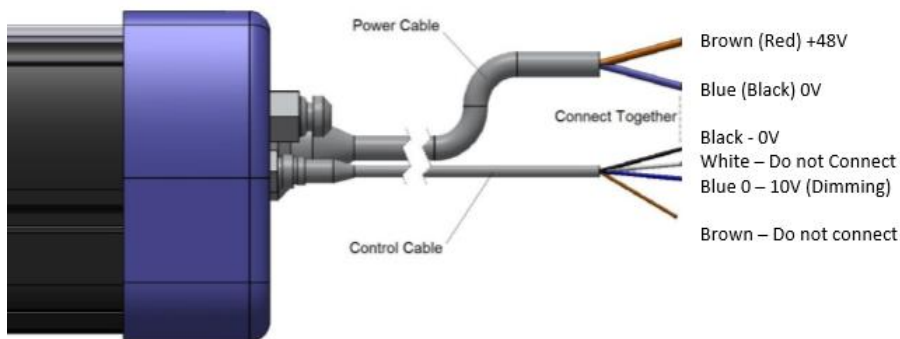


3.2 Connections

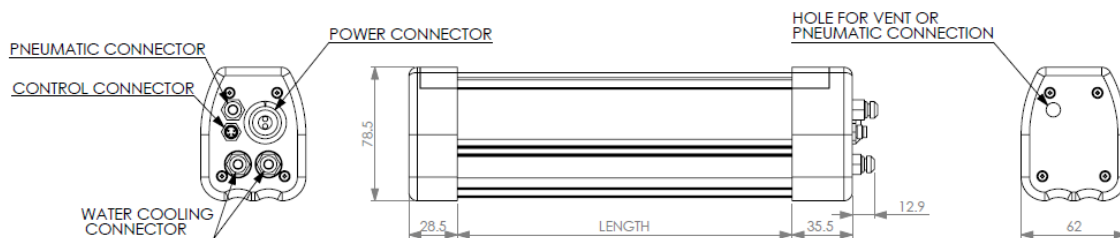
High Brightness (HB) Connector version.



- 1) Connect the power cable to the power supply (Brown +48V, Blue 0V)
- 2) Connect the control cable to the 0-10V dimming. (Black 0V, Blue +VE)
- 3) Do not connect whilst live!



High Brightness Controllable (HBC) connector version



- 1) Connect the power cable to the power supply (Brown +48V, Blue 0V)
- 2) Connect the control cable to the 0-10V dimming. (Black 0V, Blue +VE) and RS 485 (White 485 + and Brown 485 -).
- 3) Do not connect whilst live!



3.3 Electrical power requirements

The TENSOR can be powered with 48 V DC currents. The power consumption is outlined in section 4.3 (or see data sheet)

3.4 Water cooled specifications

The water cooled version of the TENSOR has two 6mm quick fit adaptors (inlet and outlet) these must be connected to a water cooling system before turning the TENSOR on.

The water cooling system needs to be selected according to the length of the TENSOR, see table on data sheet (Approx. 250 W/m) of cooling is needed.

The TENSOR is fitted with a safety cut out should the water cooling system fail, the TENSOR will turn off until a safe temperature has been reached.

3.5 RS485 control

Full control of the intensity of the TENSOR is a powerful option to achieve best in class lighting performance. The intensity of each section (50mm long) of the TENSOR can be controlled with steps of 0.4% of the full intensity. Full calibration using either a portable light meter, or a feedback from a camera, can allow the user to achieve very good uniformity at any level of light intensity (dimming level).

CVR Lighting offers a set of commands that can be used to extract the best performances out of the linear light.

Choosing from a number of interfaces, including proprietary interface from CVR Lighting or customer designed interface (CVR Lighting offers a software interface design service), customers can tailor the TENSOR to their most specific applications and systems.

On powering up the TENSOR, the following information is given

EA-00XXXYYWWXXXXXX VXX STDAD/INVAD XX BOARDS

Command to send:#

The first 3 X's are the CVR part number, YY = year, WW is the week, XXXXX is the serial number. VXX is the version number of the end cap software. STDAD = standard analogue dimming (0V 100% light, 10 V 0% light) INVAD = inverted analogue dimming (0V = 0 light and 10 V = 100% light) XX = number of boards.

The TENSOR is made of 100mm long LED boards, each of these boards has two chains of 5 high brightness LEDs. These are numbered from the power and control input side starting with 001, the last being furthest away i.e. in a 5 board system this would have the number 010.

Parameters

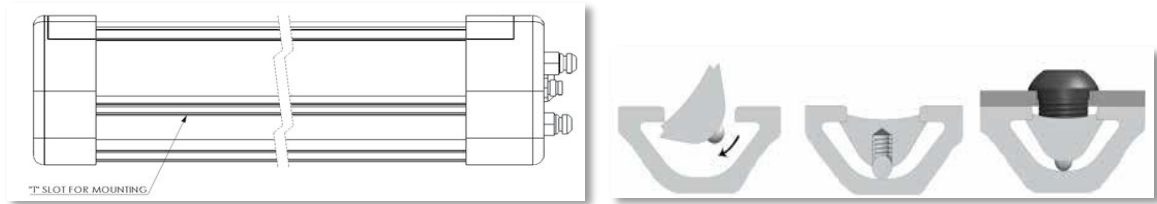
Chain Intensity from 0-255 steps 0 = no light and 255 is 100% light intensity.

Dimming Levels 0-100%

Command	Command description	Output	Input val 1	Input example	Output	Input val 2	Output	Meaning
disadc	Disable Analogue Dimming	Command to send:#						Disable analogue dimming
enaadc	Enable Analogue Dimming	Command to send:#						Enable analogue dimming
setchn	Set Chain	Chain number (001...010):#	XXX	001	Level (0000...0255):#	255	Command to send:#	Set chain 1 to level 255
				011	Out of range (001...010) Chain number(001...010):#	010		If the input is out of range the output will be repeated until a valid value is given. It then continues as above
					Level (0000...0255):#	0257		Level is out of range (0...255) Level (0...255):# If the input is out of range the output will be repeated until a valid value is given. It then continues as above
savchn	Save Chain	Chain number (001...010):#	XXX	001	Command to send:#			Save level of chain 1
decchn	Decrement chain	Chain number (001...010):#	XXX	002	Command to send:#			Decrease the intensity of chain 2 by 1 step
incchn	Increment Chain	Chain number (001...010):#	XXX	003	Command to send:#			Increase the intensity of chain 3 by 1 step
asklev	ask level	Chain number (001...010):#	XXX	010	chain level is : 250 Command to send:#			Asks intensity level of a specific chain
setall	Set all	Level (0...255):#	XXX	250	Command to send:#			Sets all chains to the stated level
savall	save all	Command to send:#						Saves the set level of all chains. The levels that are saved are the levels that are currently being used, if the unit is dimmed the dim levels will become the saved level.
dimall	Dimming All	Set level of light to (0...100)%:#	XXX	050	Command to send:#			Dims the light level to 50% of the saved value. If the chain value is 250, level is set to 125, if 200 then 100.etc.
lstlev	List levels	Level of chain 1:125 Level of chain 2:125 Level of chain 3:125 Level of chain 4:125 Level of chain 5:125 Level of chain 6:125 Level of chain 7:125 Level of chain 8:125 Level of chain 9:125 Level of chain 10:125 Command to send:#						List the intensity level of all the chains
lstsys	List System	EA-00XXXXYYWXXXXX VXX STDAD/INVAD XX BOARDS Command to send:#						requests the serial number revision dim version and Nr boards (same as on power up)
dimlev	Dimming Level	Dimming level:250 Command to send:#	XXX					Requests the analogue dimming input level. (0000 to 0255)
temled	Temperature	Board number [001...005]:#	XXX	001	Temperature:23 Command to send:#			Ask temperature level on specific board, result in Celsius
temavg	Temperature	Average temperature:23 Command to send:#						show unit average temperature in Celsius, no decimals; measured each boards temperature and calculated average level by number of boards
temlst	List Temperature	Temperature on board Nr 1:27 Temperature on board Nr 2:25 . . Temperature on board Nr 9:27 Temperature on board Nr 10:28						List the temperature level of each boards

3.6 Mounting

Mounting is over two T-Slots on the adjacent side to the light aperture face. The nuts (M5) are freely moveable over the whole length. Additional nuts can be added to the mounting sides if required.



3.7 Cleaning and maintenance

Dust and stains on the optical window will result in a reduction in the emitted optical intensity due to scattering. The following section outlines some basic principles to keep your optical window maintained.

Step 1:

Oil and debris from your hands can cause staining or damage to the optical window. It is important to always handle optics in a clean, low dust environment while wearing powder free / acetone impenetrable gloves or finger cots. Only clean the window when necessary as handling the window increases the risk of getting it dirty or damaged.

Step 2:

Rubbing dust on the optical window can cause damage and scratchings to the surface. Therefore, it is important to begin cleaning by removing dust using compressed air or nitrogen. If there are no visible stain on the window after dusting, then no further cleaning should be conducted as this will increase the risk of damaging the window.

The TENSOR has been designed with a replaceable cover which can be purchased with new seals if needed from CVR Lighting ltd

Step 3:

To remove stains from the window, use a low lint lens tissue and an optics cleaning solvent. It is important solvent with the lens tissue as a dry lens tissue could scratch the optical window.

Always clean the window slowly to allow the solvent to evaporate to avoid streaking.

Active cooled TENSOR should have the fans checked and cleaned on regular intervals. The fans should be freed from and debris per hand and then blown clean with compressed air to remove and dust.

The duration between cleaning depends on the environment the TENSOR is operating in. When first installed the TENSOR should be checked daily until the correct safe cleaning interval has been established.

4 TENSOR line light technical information

The TENSOR passively cooled line light has been designed for industrial line and web inspection applications. The following information on product lifetime, warranty, mechanical & electrical specifications is based on standard TENSOR options only. For custom or private label options please contact CVR Lighting or your local sales representative directly.

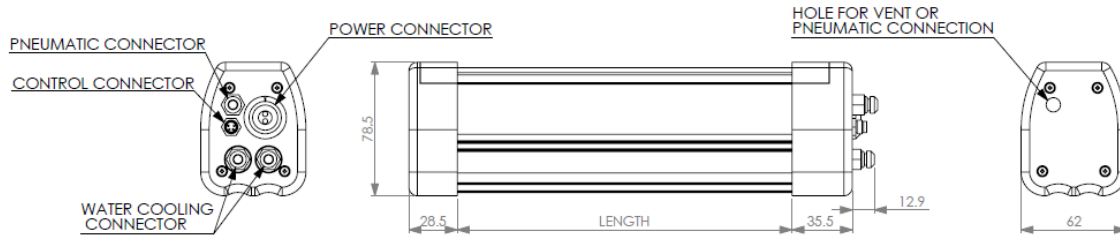
4.1 Product Lifetime

The TENSOR is based on LED technology. The LEDs contained within the TENSOR dictate its life expectancy. All other electronics components have a life expectancy superior to that of the LEDs. CVR Lighting follows the L70 (B50, L70) industry standard, defining the LED lifetime as the number of hours that it takes for the optical intensity to drop to 70% of its original value. CVR Lighting projects that the TENSOR line light will deliver, on average, 70% lumen maintenance at an excess of 50,000 hours (or about 5 years) of operation provided that the line light is operated in an environment with ambient temperatures not exceeding 40°C. Operating the TENSOR line light in ambient temperatures in excess of 40°C will result in a reduction in expected product lifetime. Please contact CVR Lighting for further details.

4.2 Mechanical Specifications

Mechanical housing material: compact (79 mm x 62 mm), Powder coated body and anodised aluminium endcaps

Connector Version



4.3 Electrical specifications

The electrical power and current consumption are 220 Watts (maximum) and 4.5 Amps (maximum) per meter length of Active cooled TENSOR visible wavelengths. (See data sheet for exact details).

5 Warranty

CVR Lighting shall make every reasonable effort to have repaired or replaced free of charge any TENSOR line light which is, or becomes, defective through any fault in design, material or workmanship in the manufacture thereof provided that such defect occurs within the 12 months of the date of manufacture and provided that the purchaser notifies CVR Lighting of any such defect immediately it occurs in line with CVR Lighting's Return Merchandise Authorisation, (RMA) process. Save as aforesaid under no circumstances will CVR Lighting be liable in contract or otherwise, for any loss, damage, expense or injury whatsoever, consequential or otherwise, arising out of or in connection with the supply, installation use or failure of, or defect in, the goods sold hereunder.

Any unauthorised attempt to disassemble the TENSOR line light will void the warranty.

6 Contact details

CVRL

Hoffmann Park

Inchera, Little Island

Cork

Ireland

T45YX04

Email : Sales @CVRLighting.com

Web: www.CVRLighting.com

Tel: +49 172 3652253 or +49 6132 8975616

For information on your local distribution agent please contact CVRL Limited directly and we will send you the details of the nearest CVRL Ltd representative.