



**Tritech
International
Limited**

MD4000 CAMERA

Operator & Installation Manual



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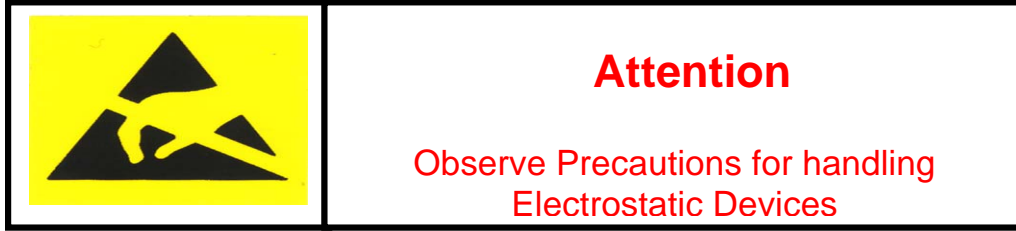
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Handling of Electrostatic-Sensitive Devices



Caution

Handling of Electrostatic-Sensitive Devices

Certain semiconductor devices used in the equipment are liable to damage due to static voltages.

Observe the following precautions when handling these devices in their unterminated state, or sub-units containing these devices:

- Persons removing sub-units from any equipment using electrostatic sensitive devices must be earthed by a wrist strap via a 1M Ω resistor to a suitable discharge reference point within the equipment.
- Soldering irons used during any repairs must be low voltage types with earthed tips and isolated from the Mains voltage by a double insulated transformer. Care should be taken soldering any point that may have a charge stored.
- Outer clothing worn must be unable to generate static charges.
- Printed Circuit Boards (PCBs) fitted with electrostatic sensitive devices must be stored and transported in appropriate anti-static bags/containers.

F110.0

Warranty Statement

Tritech International Limited herein after referred to as **TIL**

TIL warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature.

The unit/system warranty commences immediately from the date of customer acceptance and runs for a period of 365 days. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.

Note: Any customer acceptance testing (if applicable) must be performed at either TIL premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

Conditions:

These include, but are not limited to, the following:

- 1 The warranty is only deemed to be valid if the equipment was sold through TIL or one of its approved distributors.
- 2 The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.
- 3 The warranty is not transferable, except or as applies to Purchaser first then to client.
- 4 TIL must be notified immediately (in writing) of any suspected defect and if advised by TIL, the equipment subject to the defect shall be returned by the customer to TIL, via a suitable mode of transportation and shall be freight paid.
- 5 The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures. Or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is outwith the control of TIL.
(**Note:** The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)
- 6 The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.
- 7 The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.
- 8 Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by TIL
- 9 The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from TIL.
- 10 TIL retains the sole right to accept or reject any warranty claim.
- 11 Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and TIL notified of the damage.

Note: TIL reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.

Note: If the instrument is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.

F167.1

Safety Statements



Caution!

Throughout the manual certain safety or operational related comments and requirements will be highlighted to the operator by indications identified by the adjacent symbol and text.




Danger!

Throughout the manual certain safety or operational related comments and requirements that could lead to injury or loss of life will be highlighted by the adjacent symbol and text.

Technical Support

Contact your local agent or **Tritech International Ltd**

	Mail	<i>Tritech International Ltd.</i> Peregrine Road, Westhill Business Park, Westhill, Aberdeen, AB32 6JL, UK
	Telephone	++44 (0)1224 744111
	Fax	++44 (0)1224 741771
	Email	support@tritech.co.uk
	Web	www.tritech.co.uk

An out-of-hours emergency number is available by calling the above telephone number

If you have cause to use our Technical Support service, please ensure that you have the following details at hand **prior** to calling:

- System Serial Number (If applicable)
- Fault Description
- Any remedial action implemented

Due to the expansion of equipment capabilities and the fact that new sub-modules are continually being introduced, this manual cannot detail every aspect of the operation.

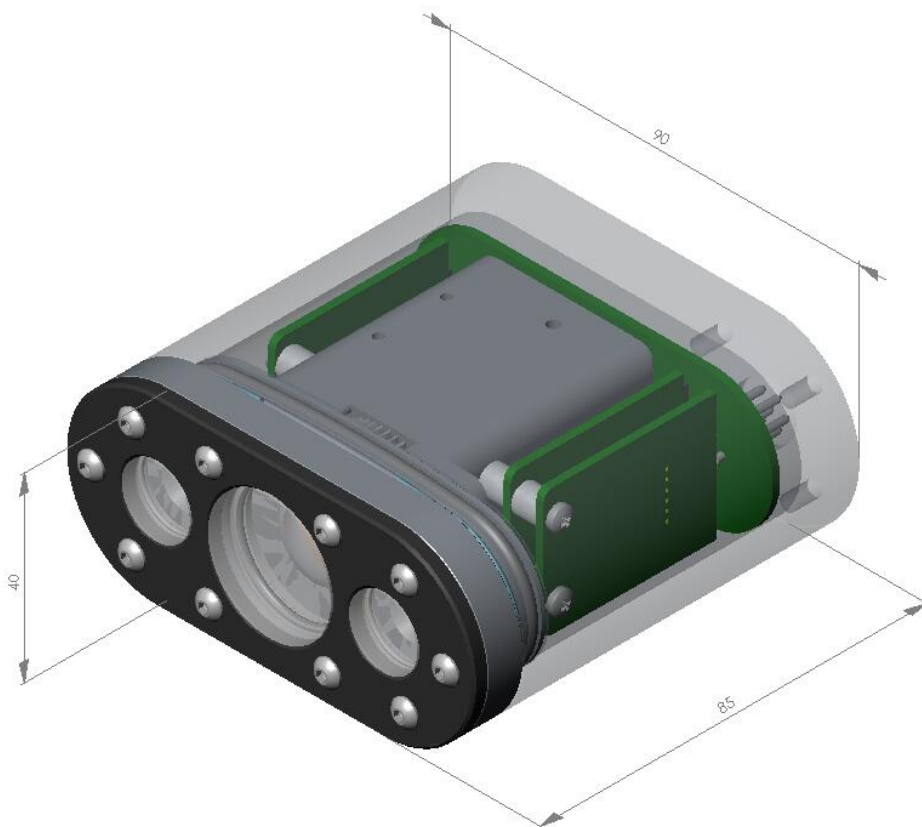
Introduction

The MD4000 underwater camera represents the ultimate synthesis of high resolution colour CCD module with the latest in LED technology to produce the definitive integrated small inspection camera.

As standard the MD4000 incorporates an automatic light sensing circuit which compensates LED brightness in proportion to the ambient lighting. In addition external voltage controls are also provided for focus and manual control of LED brightness.

Again as standard, a 3 stage selectable line driver provides compensation for cable attenuation of the video signal, and the camera module is protected from damage in the event of an accidental misconnection.

The overall package provides an extremely useful and robust camera for use in the harshest of environments.



Operating conditions



Caution!

The camera has been designed primarily for underwater operations and in air usage is not optimised due to the heat produced by the LED's. Water has a cooling effect on the camera which means that it will become hot when operated in air. Operation in air for extended periods will activate a safety device within the electronics which will reduce the light emission as a direct function of the internal temperature reached by the LED's. The light should not be used out with the limit of conditions specified in this manual. For any special requirement please contact TRITECH INTERNATIONAL LTD.

SAFETY OF USE



Danger!

THE LIGHT RADIATION EMITTED FROM THE CAMERAS LED LIGHTS IS EXTREMELY CONCENTRATED AND MAY DAMAGE THE EYE IF SHINED DIRECTLY ONTO IT.

DO NOT STARE DIRECTLY AT THE LIGHTS WHEN OPERATIONAL

When first powered on the camera lighting circuit will be in DLC mode (Dynamic Light Control) this means that in a darkened area or normal ambient light conditions (i.e. not pointing at a direct light source) the LED's will emit light– i.e. any dimmer commands initiated on previous operation will not be retained after switch off. For this reason it is not advisable to be looking directly at the camera face where the LED's are located at switch on.

Disassembly Procedure

STEP 1



Turn the camera underside up and remove the 4 x 2.5mm hex bolts from the base-plate.

STEP 2



The base-plate can now be removed revealing the ends of the nylon securing cord.

STEP 3



Pry out one end of the cord using a sharp implement such as tweezers (shown).

STEP 4



The nylon retaining cord can now be pulled out from around the housing.

STEP 5



With the camera on a flat surface, hold the body housing in one hand and the head housing in the other then simply pull apart.

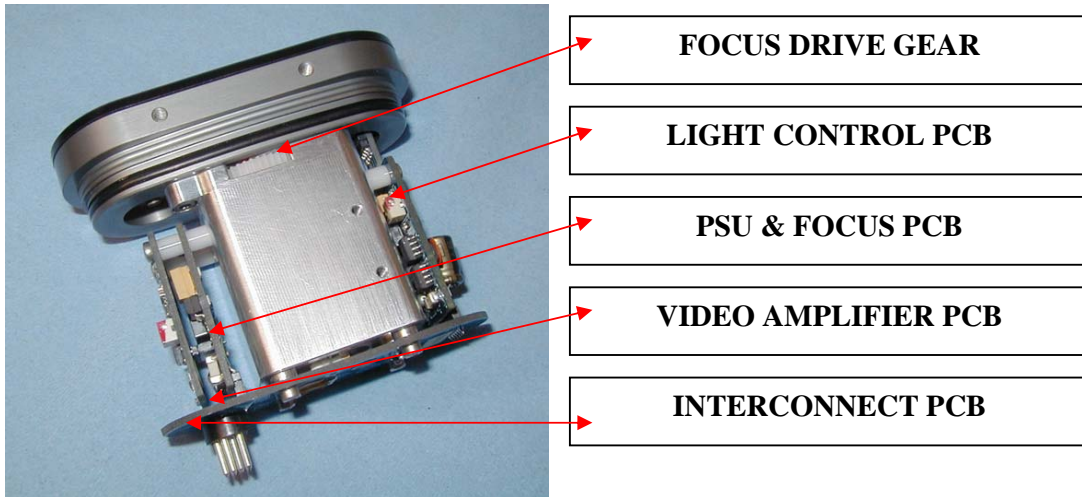
Reassembly is simply the reverse of the five step procedure detailed above.



Caution!

*Maintenance of water integrity is the responsibility of the user.
Internal damage caused by water ingress is not covered by product warranty unless the cause can clearly be identified as a manufacturing defect.*

Camera Internal Layout

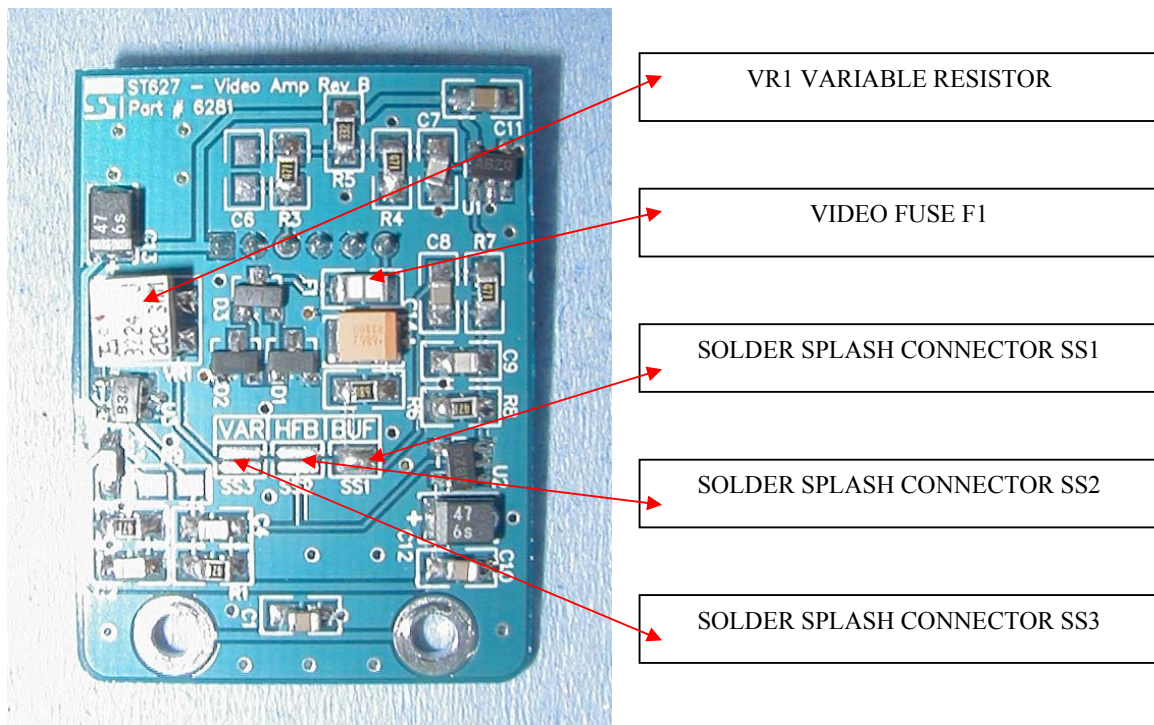


Setting up Procedures

Long line amplifier (Rev B)

If there is a need to drive a long coaxial cable then the video amplifier board is required (Seen pictured below). A solder link can be made in one of the three possible positions to set the compensation circuit for the long line amplifier. Unless otherwise agreed the camera will always be supplied with the solder link in position SS1. Video line protection is provided via a quick blow 250mA fuse at F1.

Position 1- SS1 _____ unity gain (standard buffered video output)
 Position 2- SS2 _____ high frequency boost (standard buffered video output with colour boost)
 Position 3- SS3 _____ high frequency and DC boost gain variable using VR1 (As with setting SS2 but allows manual adjustment of signal amplitude via variable resistor at VR1 up to a maximum of (2Vp-p)).



VR1 VARIABLE RESISTOR

VIDEO FUSE F1

SOLDER SPLASH CONNECTOR SS1

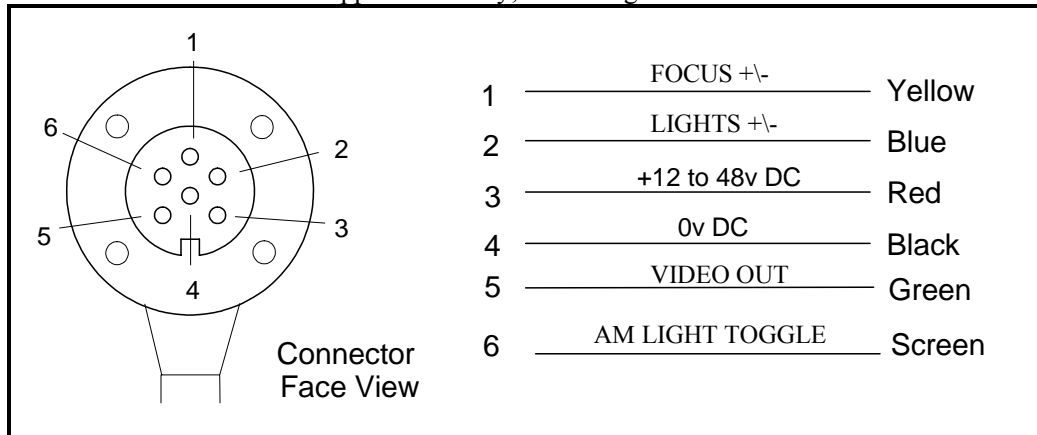
SOLDER SPLASH CONNECTOR SS2

SOLDER SPLASH CONNECTOR SS3

IMPORTANT – When selecting and changing the video line compensation settings via the solder bridges at SS1, SS2 & SS3 ensure that only **one** solder connection is made at any one time on the board. For example – if SS3 setting is required then SS1 & SS2 do not require soldered as well.

UNDERWATER CONNECTOR – FEMALE

The Underwater Connector supplied is 6-way; the wiring code is shown below.



Control Functions

LED Control

On initial power on the camera will be in Dynamic Light Control mode. This means that the LED's will react automatically to any changes in the light reflectivity of the scenery: - In darker areas the LED's will brighten and the reverse in lighter areas.

Manual control of the LED's can be obtained by applying an analogue voltage to **PIN2** of any value in between -12 to -24V which is referenced to the 0Vdc on pin4; this will dim the LED's.

To increase the light output a positive voltage anywhere between +12 and 24V is required on PIN2. As soon as an analogue voltage is applied to PIN2 then the LED control remains locked in manual mode to revert back to automatic can be done either by switching the camera off and then back on again or by applying +12V to +24V to the 'AM LIGHT TOGGLE' line on pin6 (this need only be applied momentarily).

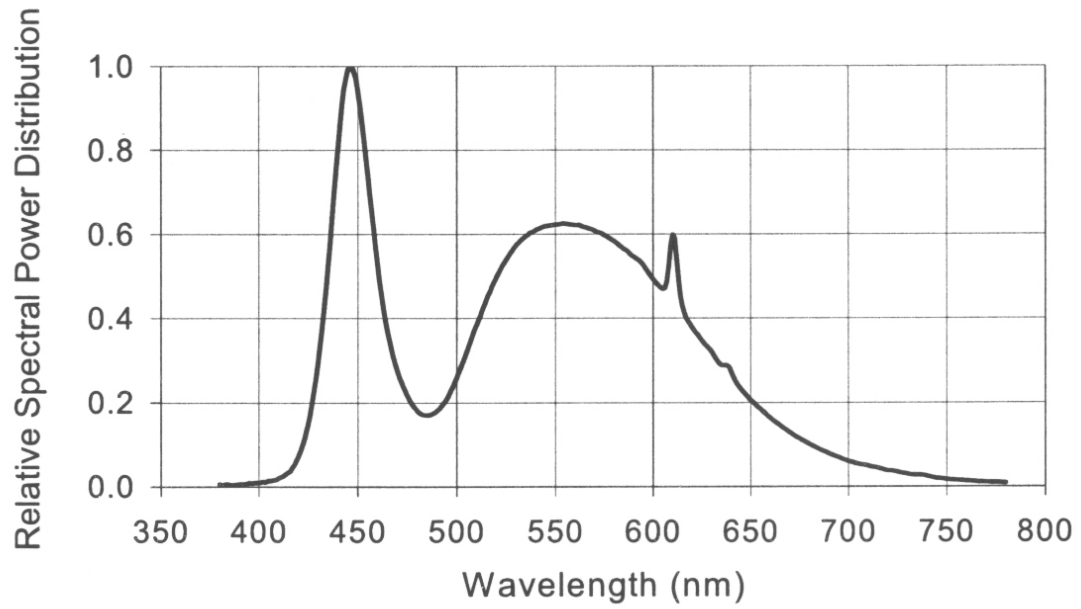
FOCUS Control

Focusing is controlled by applying an analogue voltage to **PIN1** of any value in between -12 to -24V or +12 to +24V which is referenced to the 0Vdc on pin4. The negative \ positive control voltages will drive the focus control motor either clockwise or anticlockwise allowing very fine adjustments in focusing. There is no danger in holding the focus control on continually as there is no drive limiter and the focus will never hit a stop, the lens will just move in and out continually switching between near and far focus.

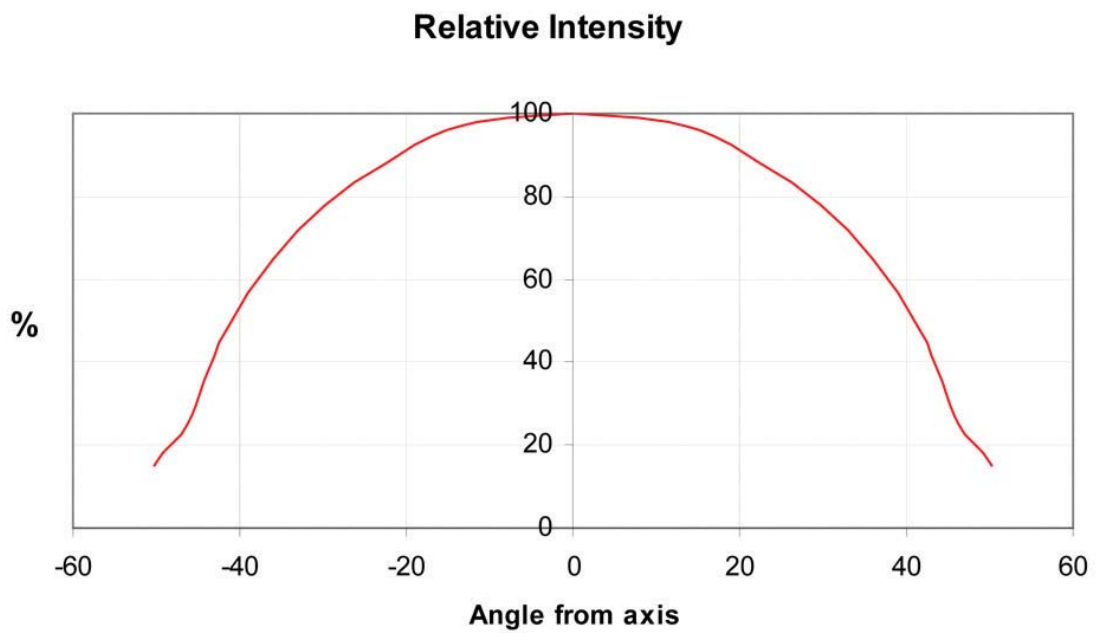
OPTIONAL Control

The camera may also be controlled with wiring configured for 'Tri-state' operation centered around 5V Dc. *If required please contact Tritech for details.*

LED Typical Spectral Content



LED Typical Beam Plot



APPENDIX 1

Product Specification