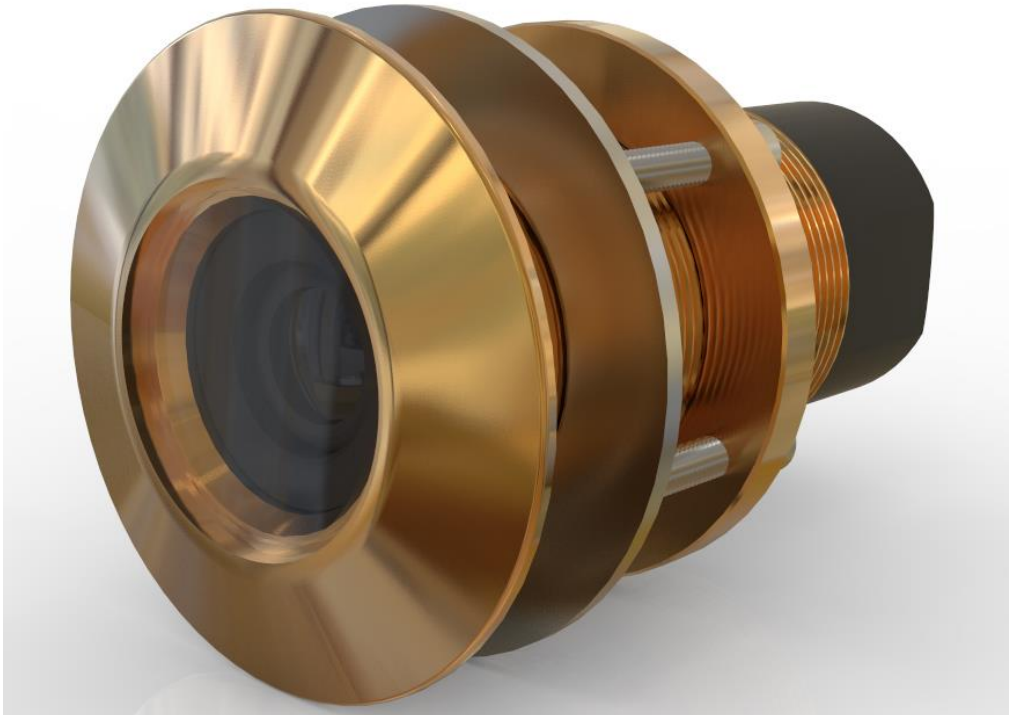




HD Camera

TIX402 Interchangeable Flush Fit Thru-Hull HD Camera

Installation and Operation Guide



Congratulations! You have purchased a LUMISHORE advanced technology HD Camera. Every care has been taken to ensure your Thru-Hull HD Camera arrives in perfect condition, so please enjoy the ultimate experience in underwater viewing.

LUMISHORE Thru-Hull Interchangeable products are designed for those owners who prefer the integrity of a thru-hull installation where the product may be removed from the inside of the hull. The LUMISHORE Interchangeable Thru-Hull range is suitable for many sizes and types of watercraft, including Sports Boats, Cruisers, Yachts, and Super Yachts. LUMISHORE TIX402 Interchangeable Thru-Hull HD Cameras have an integrated internal module to make installation simple and ensure trouble free operation for years to come.

Please read the following pages before attempting installation to ensure complete understanding of the LUMISHORE HD Camera.

FEATURES

- Interchangeable (removable HD Camera module) Flush Fit Thru-Hull camera for transom, bottom, and hull-side mounting
- Requires 2-1/4" (57mm) entry hole (When using isolation sleeves refer to manual for correct hole size)
- Latest HD Camera technology
- HD-SDI Video Output and Composite Video Output
- Toughened BK7 Borosilicate lens
- Marine-grade bronze housing
- **12 Volt DC only**

PACKING LIST

If any of the following items are missing, email or call LUMISHORE using the information provided in Product Support Section. TIX402 Thru-Hull housing, HD Camera Module, Locknut, Washer and Installation and Operation Guide.

TABLE OF CONTENTS

Number	Section	Page
1.0	BEFORE YOU START	3
2.0	TIX402 INTERCHANGEABLE FLUSH FIT THRU-HULL HD CAMERAS	4
2.1	Materials and Dimensions	4
3.0	THRU-HULL HD CAMERA ASSEMBLY INSTALLATION	5
4.0	REMOVING THE HD CAMERA INSERT MODULE	6
5.0	ELECTRICAL CONNECTIONS	6
5.1	Fuse Installation	6
5.2	Cable Size (gauge)	6
5.3	HD-SDi Output Connection	7
5.4	SD (Composite) Output Connection	8
5.5	Camera Set up	9
6.0	MAINTENANCE	10
7.0	PRODUCT SUPPORT INQUIRIES	10
8.0	WARRANTY	11

1.0 BEFORE YOU START

- **HD Camera - DO NOT touch camera glass. Take care to keep the camera glass clean during handling and installation.**
- Always ensure that the vessel's power source and battery are disconnected or isolated prior to installation.
- A qualified professional should carry out both electrical and mechanical installation. If in doubt please contact LUMISHORE. Refer to Product Support Section.
- Always use a suitable fuse or circuit breaker to protect the complete system. Each camera should be individually fused using the fuse holder supplied with the camera. Make sure to choose the correct fuse size for the 12 Volt supply.
- The Thru-Hull may be installed into GRP (Glass Reinforced Plastic or Fibreglas) and wooden hulls.
- The camera should be installed 6"-10" (150-250mm) below the surface of the water although this is not critical.
- Never try to install or remove the thru-hull fitting or the Camera Insert Module with the vessel in the water.
- Confirm there is clearance (more than 7") inside the hull to be able to remove the Camera Insert Module.
- The camera should not be exposed to any temperatures in excess of 150°F (65°C). For example, next to hot engine components or where exhaust emissions could be expelled onto the camera while underway.
- Do not over tighten the retaining nut.
- All LUMISHORE Thru Hull products should have bonding to the DC system via bonding strap for galvanic protection.
- Caution: NEVER leave the vessel unattended in water if the Camera Insert Module is not in place

Note: Before mounting the camera, record the serial number for future reference. The number is located on the back of the camera.

2.0 TIX402 INTERCHANGEABLE FLUSH FIT THRU-HULL CAMERAS

Bonding Attention:

Failure to bond the cameras properly and maintain the appropriate protection will invalidate the LUMISHORE warranty.

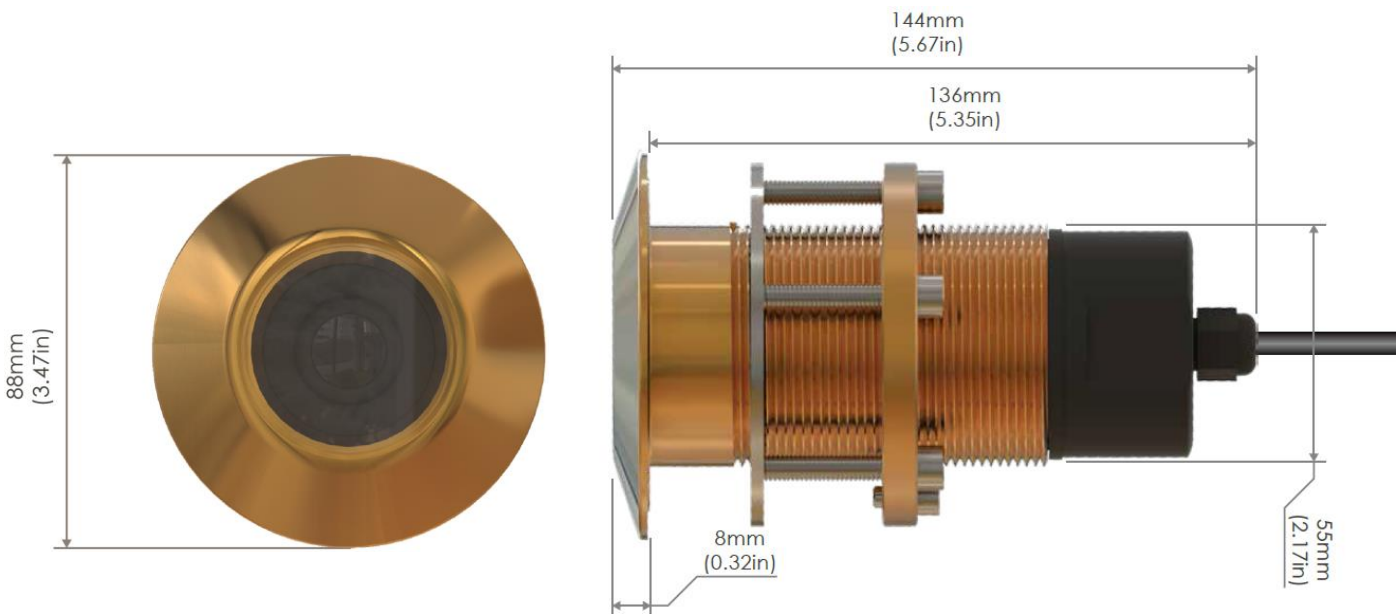
LUMISHORE cameras should be connected to the vessel's DC Bonding system to ensure protection from electrolytic / galvanic corrosion. All bonding connections should be fully checked prior to returning the vessel to the water. LUMISHORE cameras have integrated circuitry to protect cameras from external issues, but these are dependent upon correct bonding. Bond to the bolt on the locking ring (yellow connection tab is supplied).

Installation Considerations

- Location – positioning will be dependent on both external and internal obstacles; consideration should also be given to installation wiring and internal access within the vessel. Ideally the camera modules should be installed 6" to 10" (150-250mm) below the surface water line.
- Select a flat surface; make sure that both the internal and external surfaces of the hull are even and parallel. It may be necessary to sand or grind the surface.
- A hole will be drilled to allow the Thru-Hull Camera Assembly to be inserted; care must be taken to ensure there is unrestricted access inside the hull.
- Confirm there is clearance (more than 7") inside the hull to be able to remove the Camera Insert Module.
- The camera is temperature sensitive and must not be located close to the exhaust.

2.1 Materials and Dimensions:

Cable: 3'3" (1 meter)

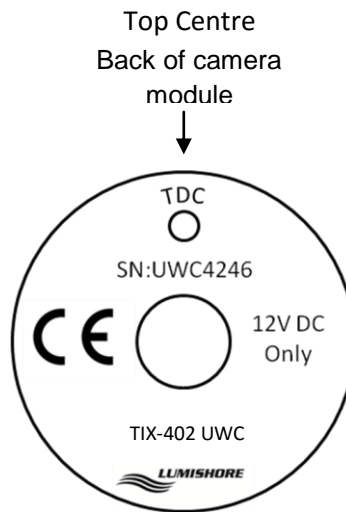


3.0 THRU-HULL CAMERA ASSEMBLY INSTALLATION

1. Measure the position of the cameras, mark carefully, and double-check for internal obstacles.
2. Confirm there is clearance (more than 7") inside the hull to be able to remove the Camera Insert Module.
3. Drill a 2-1/4 inch (57 mm), perpendicular hole through the hull.
Note: The required hole size will change when using an isolation sleeve, refer to the isolation sleeve instructions, supplied with the sleeves, for further information.
4. The exposed inner hull surface must be properly sealed to prevent water intrusion into the hull before the Thru-Hull is secured in place.
5. Before inserting the Thru-Hull Camera Assembly ensure that the hull surface is free from dirt and grease and remove any existing anti-foul from the hull surface.

Note: Do not use an alcohol-based solvent as this may have an adverse effect on the sealant.

TO ALIGN THE PICTURE - MAKE SURE THE "TDC" ON THE BACK OF THE CAMERA MODULE IS AT THE TOP CENTRE OF THE THRU-HULL CAMERA ASSEMBLY WHEN IT IS INSERTED.



5. Using an approved adhesive (3M 4200 Marine or similar), apply liberally a continuous bead of sealant around the entire circumference of the sealant groove, on the base of the stem, and on the shaft of the thru-hull.
6. Gently insert the stem of the Thru-Hull Camera Assembly through the hole in the hull.
7. Apply gentle even pressure with a slight circular motion until the Thru-Hull housing is flush with the hull surface.
8. From inside the vessel, feed the supplied rubber washer down the shaft of the Thru-Hull fitting. Screw the locking nut in place and tighten hand tight. **Do not tighten fully at this stage, excess pressure will push all of the sealant out.**
9. Remove excess sealant that is squeezed from behind the camera with a rag.
10. Allow the sealant to cure according to the sealant manufacturer's instructions. Once fully cured, tighten the locking nut. **Hand tight only - excessive force can cause damage to the camera module or to the hull of the vessel.**
11. Attach the vessel's bonding protection to the bonding bolt on **the rear of the locking nut.**

!! IMPORTANT:

- Ensure that each camera module has correct vertical and horizontal alignment with the hull. Ensure the "TDC" on the rear of the camera is at the top centre.
- Before launching the vessel the sealant should be checked to ensure it is fully cured in accordance with the manufacturer's instructions.

4.0 REMOVING THE HD CAMERA INSERT MODULE

!! IMPORTANT:

Care must be taken to ensure the lens is not damaged before removing the camera module. If the lens on the Thru-Hull has been damaged and the Camera Insert Module is removed, water will enter the vessel.

The interchangeable module should only be removed after consultation with Lumishore and only in the event of camera failure or module upgrade.

- Replacement is easily performed. However, full instructions are available from Lumishore to ensure that this is done in a way that optimises the life of the unit.
- Unauthorised removal of the insert will result in the warranty being void.

5.0 ELECTRICAL CONNECTIONS

5.1 Fuse Installation

Each camera should be individually fused, the TIX402 HD camera module is supplied with an external fuse holder and two fuses. The correct fuse for 12 Volts is a 1 A fuse

5.2 Cable size (Gauge)

LUMISHORE cameras have advanced electronic systems that protect them from under current or voltage.

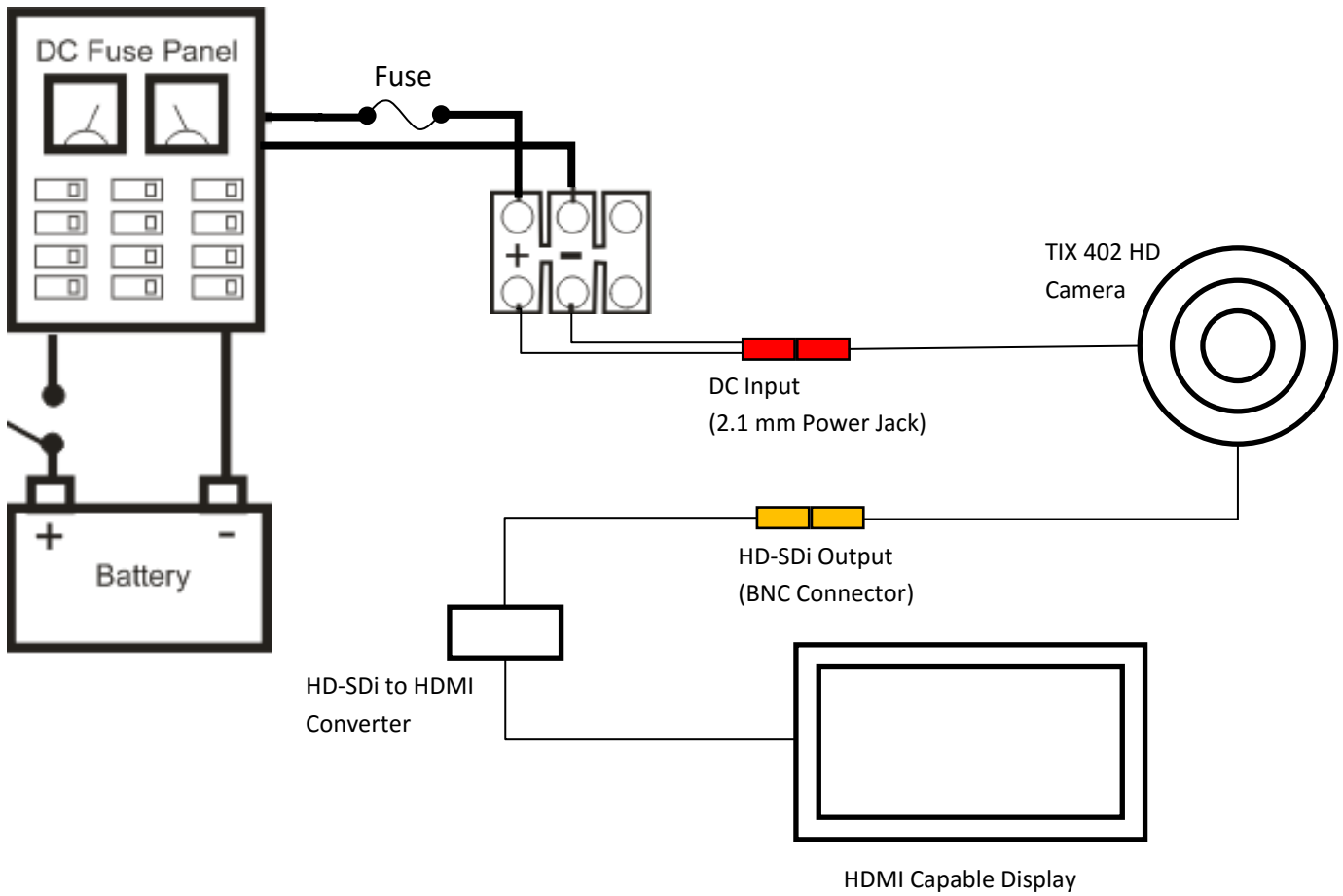
Note: Current draw per module with a camera connected: 12VDC – 0.25 A

- Proper wire cable size must be considered when installing the cameras.
- Compute the gauge of the cable needed camera at 12VDC
- Cable lengths referenced in the Conductor Size tables are from the source to the cameras and back to the source.

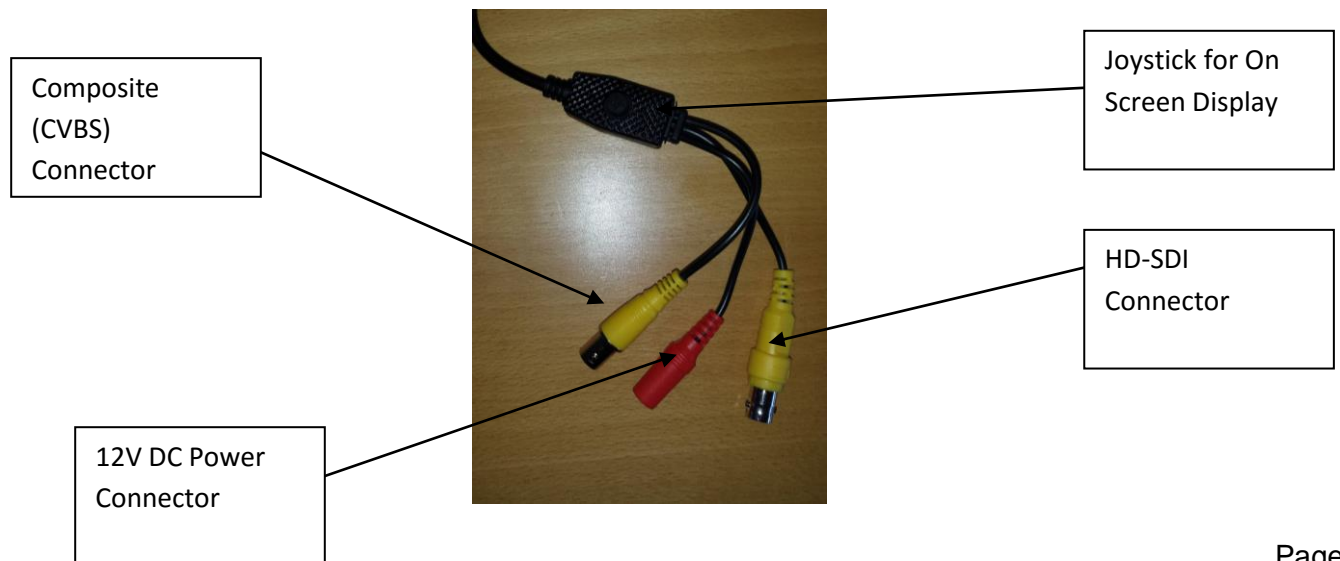
Calculate the total current draw of all products that are connected to the terminal strip and use the chart below to find cable size from power source to terminal strip. Use the same size wire from the terminal strip to each camera.

Total Current on Circuit	Conductor Sizes (Gauge) for 3% Voltage Drop - 12 VOLTS																		
	Length of conductor from source of current to the product and back to the source - in feet.																		
	10	15	20	25	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170
5 Amps	18	16	14	12	12	10	10	10	8	8	8	6	6	6	6	6	6	6	6
10 Amps	14	12	10	10	8	6	6	6	6	4	4	4	4	2	2	2	2	2	2
15 Amps	12	10	10	8	8	6	6	6	4	4	2	2	2	2	2	1	1	1	1
20 Amps	10	10	8	6	6	4	4	4	2	2	2	2	1	1	1	0	0	0	2/0
25 Amps	10	8	6	6	6	4	4	2	2	2	1	1	0	0	0	2/0	2/0	2/0	3/0
30 Amps	10	8	6	6	4	4	2	2	1	1	0	0	0	2/0	2/0	3/0	3/0	3/0	3/0
40 Amps	8	6	6	4	4	2	2	1	0	0	2/0	2/0	3/0	3/0	3/0	4/0	4/0	4/0	4/0
50 Amps	6	6	4	4	2	2	1	0	2/0	2/0	3/0	3/0	4/0	4/0	4/0				
60 Amps	6	4	4	2	2	1	0	2/0	3/0	3/0	4/0	4/0	4/0						
70 Amps	6	4	2	2	1	0	2/0	3/0	3/0	4/0	4/0								
80 Amps	6	4	2	2	1	0	3/0	3/0	4/0	4/0									
90 Amps	4	2	2	1	0	2/0	3/0	4/0	4/0										
100 Amps	4	2	2	1	0	2/0	3/0	4/0											

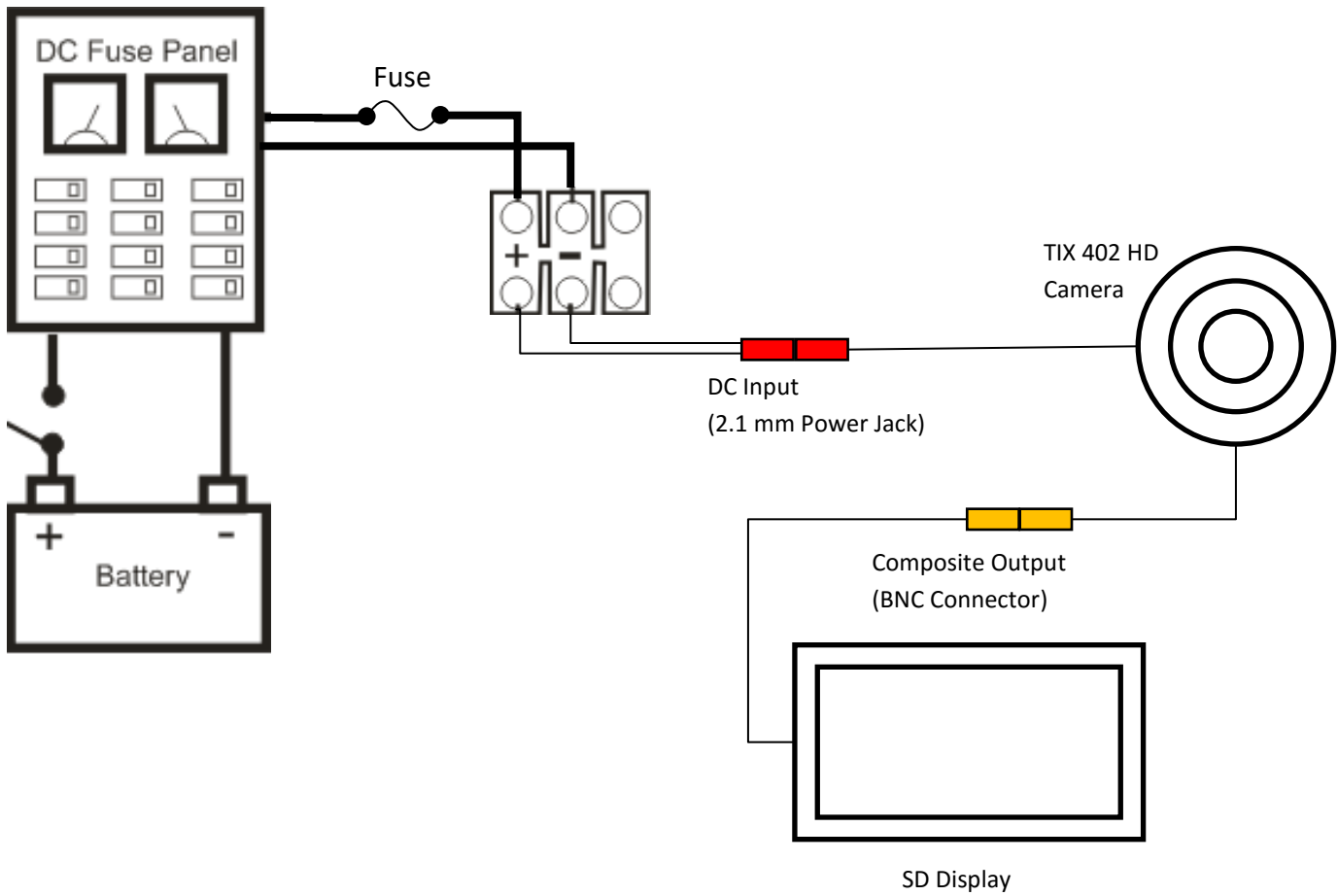
5.3 HD-SDi Output Connection



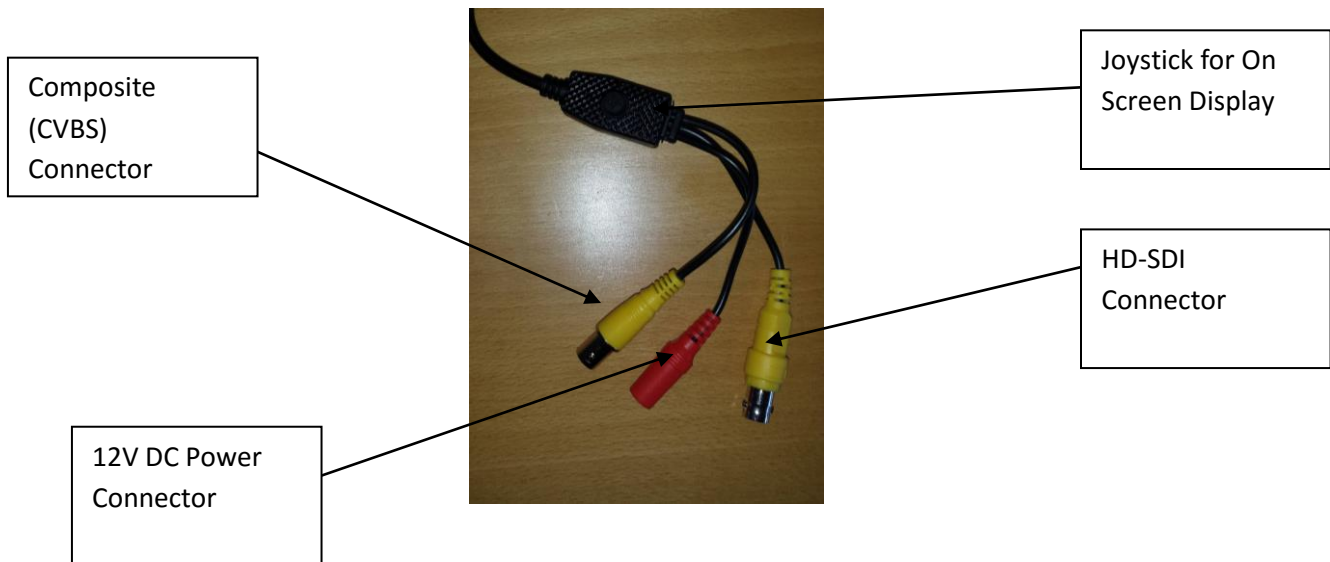
- If required an AC / DC PSU can be supplied
- The Joystick can be used to set up the camera using the On Screen Display – see section 5.5
- If the display has a direct HD-SDi input then there is no need for a HD-SDi to HDMI Converter
- The connections should be fitted inside a waterproof junction box to protect them from contact from water



5.4 SD (Composite) Output Connections



- The Joystick can be used to set up the camera using the On Screen Display – see section 5.5
- NTSC / PAL mode should be selected using the on screen display
- The connections should be fitted inside a waterproof junction box to protect them from contact from water



5.5 Camera Operation and Connections

The camera has several modes of operation. These can be selected using the joystick button located in the cable just before it enters into the back of the light / camera module, the menu is shown on the display screen. The table below shows the layout of the On Screen Display:

EXPOSURE	BRIGHTNESS	0 - 20			
	MODE	INDOOR			
		OUDOOR			
	LENS	MANUAL			
		DC			
	SHUTTER	AUTO			
		MANUAL		1/25 - 1/60000	
					RETURN
	DSS	OFF			
X2					
X3					
X4					
AGC	0 - 10				
FREQ	50Hz/60Hz				
RETURN					
COLOR	AWB	AUTO			
		AUTO ext			
		PRESET			
		MANUAL	KELVIN	LOW/MIDDLE/HIGH	
			R-GAIN	0 - 20	
		B-GAIN	0 - 20		
		RETURN			
CHROMA	0 - 20				
RETURN					
IMAGE	SHARPNESS	0 - 10			
	MIRROR	OFF/ON			
	FLIP	OFF/ON			
	DZOOM	0 - 96			
	PRIVACY	OFF			
		ON		ZONE NO	0 - 32
				ZONE OP	OFF/ON
				X-POS	0-60
				Y-POS	0-40
				X-SIZ	0-40
				Y-SIZ	0-40
				COLOR	
				TRANS	0-4
		RETURN			
	SHADING	OFF/ON			
	DAY&NIGHT	COLOR			
		B&W			
		AUTO	AGC THRS	0 - 20	
			MARGIN	0 - 20	
			DELAY	LOW/MIDDLE/HIGH	
		RETURN			
HLMASK	OFF				
	ON		LEVEL	0-20	
				COLOR	
			RETURN		
ACE	OFF/ON				
RETURN					

WDR/BLC	MODE	OFF/BLC/WDR		
	WDR_WGT	0-4		
	BLC OSD	OFF/ON		
	BLC POS-X	0-20		
	BLC POS-Y	0-20		
	BLC SIZ-X	0-20		
	BLC SIZ-Y	0-20		
	RETURN			
MOTION	RESOLUTION	0-20		
	SENSITIVITY	0-20		
	WINDOW USE	OFF/ON		
	X-POS	0-60		
	Y-POS	0-40		
	X-SIZ	0-60		
	Y-SIZ	0-40		
RETURN				
SYSTEM	SHADING DET	OFF/ON		
	DEFECT DET	OFF/ON		
	DOUT SCALE	FULL/COMP		
	DOUT FORMAT	720P/1080P		
	DOUT FPS	25/30		
	CVBS	NTSC/PAL		
	RESET	ON/PUSHING		
RETURN				
EXIT				

6.0 MAINTENANCE

- The locking nut should be inspected on a regular basis to ensure they are kept tight. LUMISHORE recommends general inspection of the camera module and cable attachments every month.
- The glass lens should be kept clean with a plastic scraper or soft brush. Do not use an abrasive cloth or cleaning agent as permanent damage to the lens may occur.
- To prolong device lifetime and prevent marine growth build up, a good quality antifouling system must be used to coat the external body of the device. This should be renewed regularly.

7.0 PRODUCT SUPPORT ENQUIRIES

If you have questions or comments, please email info@lumishore.com or call:
 USA (941) 405-3302, United Kingdom +44(0)208 144 1694, France +33(0)493 582 537.

8.0 WARRANTY

LUMISHORE Ltd warrants the Thru-Hull Camera System to be free from defects in workmanship and materials for a period of three years, starting from the date of original purchase. Should your camera system have a problem during this period, please contact your dealer as soon as you become aware of the defect.

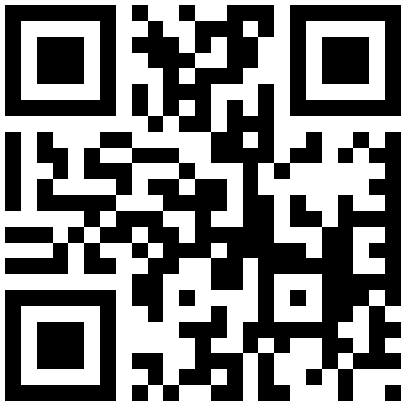
Misuse, abuse, improper installation, neglect, improper shipping, damage caused by disasters such as fire, flood, and camera, installation by unqualified personnel, unauthorized repair or modification will void this warranty. For the avoidance of confusion and doubt, non-compliance with all installation, maintenance, and operating instructions in this document constitute non-conformance with warranty terms.

NOTES



THANK YOU

FOR PURCHASING LUMISHORE CAMERAS!



Scan with your smart phone to link to

TIX-402 HD CAMERA
Lumishore
Home page

Lumishore USA
(Americas Enquiries)
7137 24th Court East
Sarasota, FL 34243
www.lumishore.com
info@lumishore.com

Lumishore Ltd
Head Office
Unit 11, Technium 1
King's Road
Swansea SA1 8PH
United Kingdom