



ASLOC Biometric Imaging System 8" Display

User Manual & Technical Specifications

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1. PSI

Perception Sensors and Instrumentation Ltd. (PSI) are specialists in the design of sensors, instrumentation, and imaging hardware. PSI are a leading supplier of biometric imaging hardware, a designer of machine vision solutions for cutting-edge process control applications and the source of a range of highly regarded non-optical industrial instrumentation solutions. Founded in 2004 PSI has worked in expanding its facial recognition hardware, designing both illumination and camera technology to maximise the performance of its systems that focus on image acquisition for biometric applications. PSI applies this experience in a range of bespoke vision-based process control solutions. PSI has been installing and supplying proven and reliable facial recognition imaging hardware to industry for over 10 years, becoming a leading supplier to UK airports. It is estimated PSI's biometric solutions verify over 500,000 individuals every day, which equates to over 5 people per second every day.

2. ASLOC Imaging System

ASLOC is an imaging system that is optimised specifically for facial recognition. It is intended for indoor use without the presence of high dust levels. Comprising of a camera and integrated Near Infra-Red (NIR) pulsed illumination, the imaging unit is housed in a dry powder coated aluminium tubular housing supported by a circular dry powder coated aluminium mounting base. The camera unit itself has a hard coated NIR cast acrylic filter front face. The ASLOC 8" display incorporates a 16:9, high brightness, wide viewing angle, HDMI long-life screen, with touchscreen capability.

The system has four inbuilt cables to use for interfacing with the host computer and power. These cables consist of two USB2.0 cables, one to enumerate the camera with the host computer and one to activate the touch capability, a HDMI cable to project the host computer onto the screen and a 2-core power extension cable, which is terminated with a 2.1mm DC barrel connector for powering the camera unit.

2.1 Camera

The camera itself has a global shutter with a resolution of 756×482 pixels. It is a USB2 high-speed device which utilises the maximum 480Mb transfer speed with bulk transfer mode. This advanced state of the art USB powered device draws approximately 170mA when both acquiring and transmitting images and 170mA when in idling mode. External optical filtering is employed via the cast acrylic NIR window to provide 860nm optimal response to light. Orientation of the imaging chip in portrait mode allows better utilisation of subject heights. The camera is configured to capture still images on demand from the host computer whilst allowing each image to be optimised for the key region of interest. The maximum transfer speed for the images being highly dependent on the host but has a practical limit of around 25 frames per second (fps). The provision of host-controlled status LEDs gives user feedback. These LEDs are arranged as a 5-bar line with each LED comprising of a red, green and blue dice: the colour and mode of operation being programmed from the host. The command protocol between host and camera is propitiatory although employs Libusb/WinUSB at driver level. Control of the illumination module is via an internal 3-wire communication link comprising of clock, data, and trigger signals.

2.2 Illumination

The systems pulsed illumination is via a bank of 18 x NIR LEDs operating in short duration pulse mode. In normal mode the on-time for the LED is in the range of 125 – 350µs, depending on the exposure setting of the camera, with each LED having a through current of 2A. Illumination may be set to higher currents but with shorter maximum on-time as shown in Table 1. During actual image capture, the duty cycle for the LEDs is 15fps x 0.00035s = 0.00525

MODE	CURRENT	MAX DURATION
1	4A	150µs
2	3.8A	150µs
3	3.2A	303µs
4	3A	360µs
5	2.5A	600µs
6	1.7A	1.84ms

Table 1

A 12V 2.5A rated power supply unit provides the power for the illumination (please ensure only the specific type of power supply unit provided is used on the ASLOC, replacement units can be ordered though Perception Sensors and Instrumentation). The standby power for the illumination is 0.5 watts with all the LEDs off. For facial recognition applications the system is designed to acquire a small group of images of the subject stood in front of the camera. A typical image set, or group would be around six, acquired at a rate of 15fps. The average power required when acquiring an image set for a subject stood 500mm from the camera is typically 0.8W, therefore the average power of the system is dominated by the standby current at 0.5W.

The ASLOC imaging systems' illumination employs three banks of LEDs each bank comprising of six LEDs. The minimum voltage required to forward bias the LEDs at 1A is 3V hence the minimum bank voltage is 18V at 1A operation. The incoming supply is 12V therefore it requires a step-up power supply to provide the boost voltage. The on-board step up power supply charges a bank of four 330µF capacitors to 24V: the charge in these capacitors provides the power to the LEDs. The maximum single pulse energy for all three banks is given by initial energy – residual energy

$$0.5 \cdot (4 \times 330 \times 10^{-6}) \times 24^2 - 0.5 \cdot (4 \times 330 \times 10^{-6}) \times 18^2 = 0.166 \text{ Joule}$$

This energy is distributed across a total of 18 LEDs giving 0.00922 Joule/LED maximum single pulse energy. In fault conditions when the on-board power supply fails, the incoming supply voltage is insufficient to forward bias the LEDs therefore no illumination is emitted. When a single driver fault occurs such that the output of the power supply supplies full output to one bank of LEDs the maximum continuous current will flow in that one bank. This continuous current is around 750mA and is only present for up to a few seconds due to the 2A input current exceeding the on-board electronic resettable fuse rating and automatically removing the power.

If all LED banks fail to the on condition the 750mA is shared between all three banks thus reducing the fault current to 250mA/LED. In any instance the input power is unable to exceed 4.2W for more than a few seconds due to the on-board fuse.

The illumination is designed to operate in burst pulse mode therefore the on-board power supply is

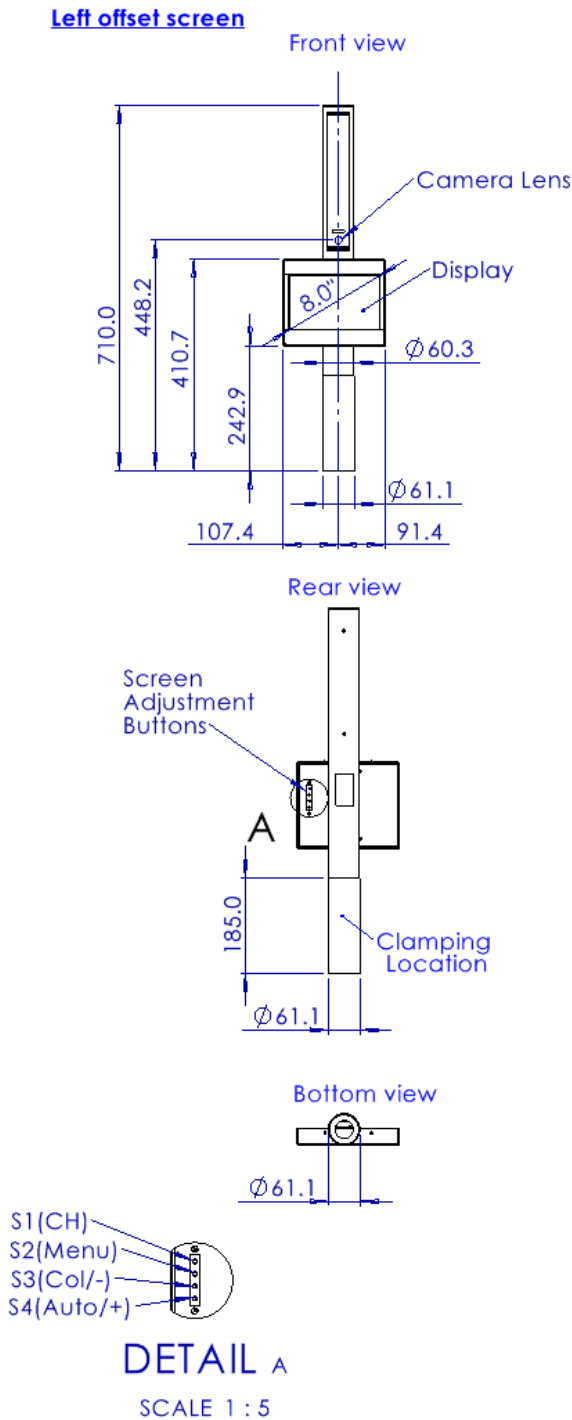
designed to rapidly replenish the charge used within the capacitors and as such requires significantly higher peak load power supplies than that demanded by the average power consumption. The power supply supplied with the ASLOC imaging system is a 12V supply with a maximum output current of 2.5A. The power supply provided is fully safety approved to I.T.E 62368 UL, CSA, EN, BS, AS/NZ and J standards and has been tested to ensure it can handle the large transient load changes demanded by the imaging system, please only use this type of power supply on the ASLOC unit.

The LEDs have three cylindrical lenses fitted to them in order to reduce the sideways spread of the illumination. This in turn minimises any interference from ASLOC systems which may be mounted near each other. The fitting of these lenses also increases the available light in the region of interest by approximately 25%, improving overall efficiency.

Average light output from the system is significantly lower than that of the average tungsten reading lamp. This low average power, together with the NIR operation ensures the ASLOC unit is non-intrusive and almost invisible in operation to the end user. This provides an imaging system which discards the need for power hungry, high brightness, steady state lighting employed in other imaging systems.

When not illuminated but with the screen active, the current is around 300mA providing a standby power of 3.6W. With the screen inactive the current is approximately 10mA providing a standby power of 0.12W. The DC supply range is 10-14V with a peak current draw of 2.3A. With a 12V supply and streaming video the average current drawn is approximately 550mA giving a running power of 6.6W. The power supply is fully approved for this application and has been EMC compliance tested when in combination with the ASLOC imaging unit. The PSU is 12V DC and can supply the peak current without exceeding the voltages that have been outlined in this document. Connection to power supplies that do not fulfil this criterion will void product warranty.

3. Installation of ASLOC



ASLOC is designed to be clamped into the application gate. The system has a 185mm long clamping area as highlighted below.

ASLOC can be positioned accurately at a set calculated distance to allow some overlap of acquired images which facilitates the capture of full-face images over a wide height range of targets. Some height adjustment of the unit is available by means of sliding to the desired clamping position before securing.

For children and wheelchair users an additional lower unit is recommended, where the camera lens can cover a lower height range. PSI can offer a dual upper and lower camera pole, or a handheld unit to facilitate this.

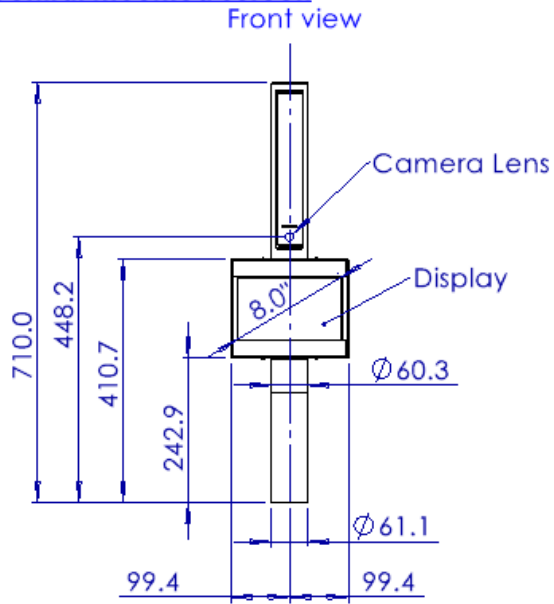
In all instances, a clear floor area allowing the subject to be positioned approximately 500mm from the imaging system must be provided.

By default the landscape screen is positioned slightly offset to the left when viewing front on. This is so the screen positions within a 180mm width at a 35° angle in a left side gate, as per specified. The screen can be positioned centrally if it is to be viewed straight on, or offset right for right sided gates also, the following figures highlight these positions.

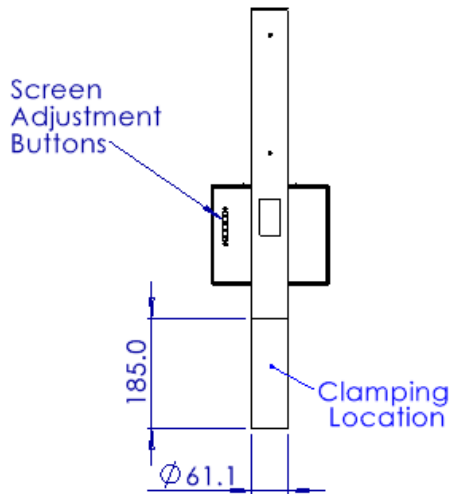
If a central or right offset requirement is needed, please specify this with PSI upon placement of order. The screen can be repositioned, but this does involve opening up the screen casing and carefully unscrewing from the pole, relocating and screwing into place onto the pole.

Figure 1: Dimensional drawing of Left Offset ASLOC with 8" Display

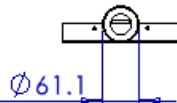
Central mounted screen



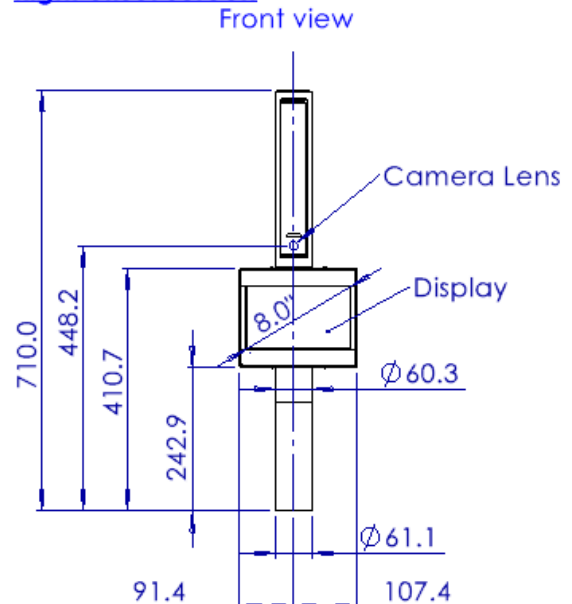
Rear view



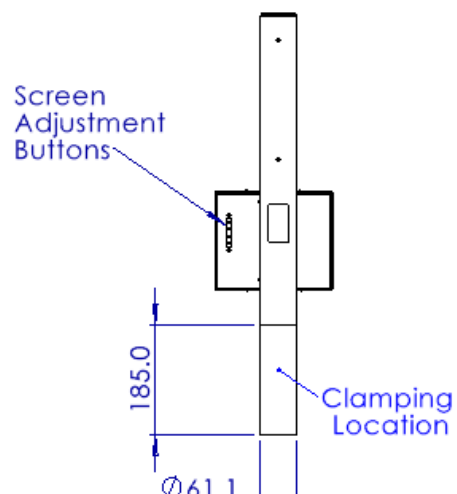
Bottom view



Right offset screen



Rear view



Bottom view

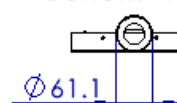


Figure 2: Dimensional drawings of central mounted and right offset ASLOCs with 8" Displays

Please note the touch screen size is 8" diagonal (174mm (H) x 104.4mm (V)), however the overall dimension of the framed screen is 198.8mm (H) x 167.8mm (V) X 34mm (D). The screen sits inside the 61.1mm diameter pole.

Left Offset Screen (Default)

Right Offset Screen

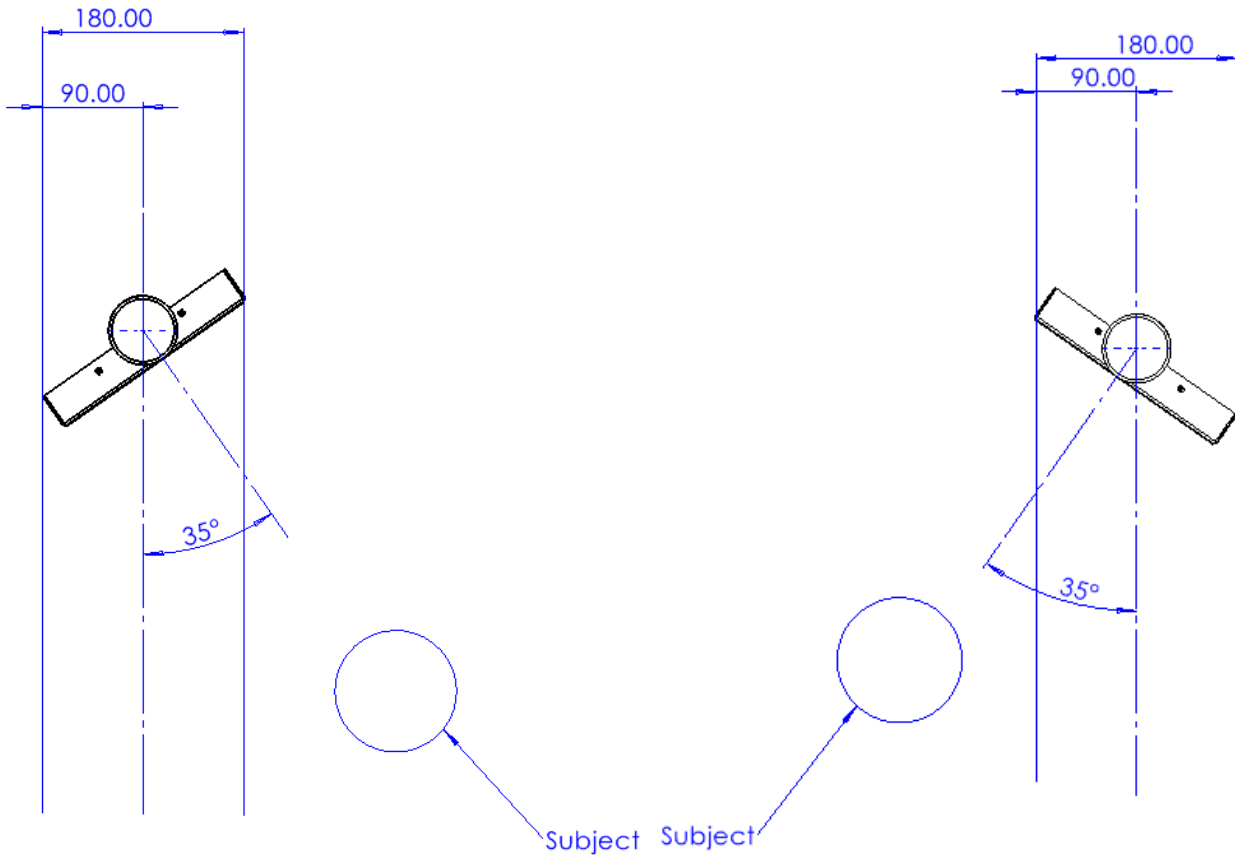


Figure 3: Dimensional top down view drawing highlighting benefits of screen offsets

The diagram above highlights the advantage of an offset screen. Offsetting the screen prevents the screen framework overhanging either side of the gate application, if the ASLOC pole is positioned at 35° to the subject. The screen must be offset to account for the position of the gate to the subject.

If the camera lens is mounted at 1710mm from ground level of the room, the camera is able to detect the following height range of faces.

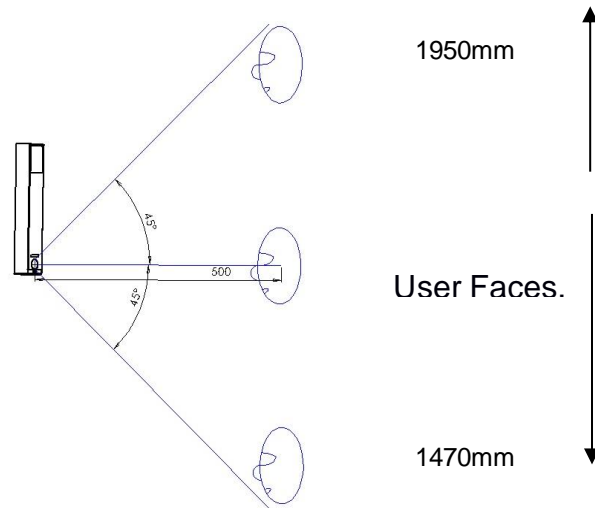


Figure 4: Recommended height of camera from ground level of the room. Showing head positions within camera range at 500mm from the terminal, if camera lens is mounted at 1710mm from room ground level. Please note to achieve height the unit would be mounted onto a platform surface.

The ASLOC system is provided with a USB2.0, HDMI and 2.1mm DC barrel power extension cable, along with the power supply unit. These cables can be run to a suitable location however please note that the USB2 and HDMI cables have a maximum length of 3 metres. The maximum cable length is always a function of the cable quality. The power supply provided should use cable rated at a minimum of 2.5A and should be mounted in accordance with local regulation.

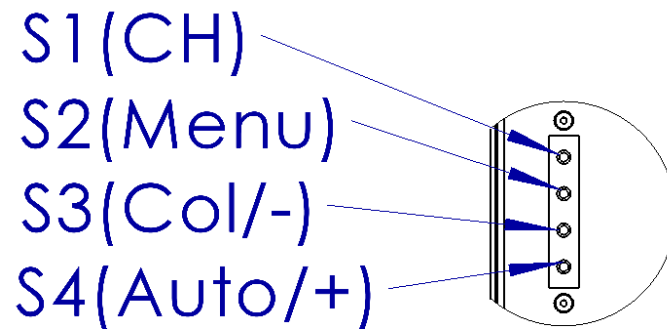
Connect the USB cables and HDMI cable to the host and apply power via the 12V power supply provided. The status LEDs will illuminate with a yellow central light. This indicates power is applied but the camera has not enumerated with the host. When enumeration is complete the yellow light will turn green and the system is ready for operation.

4. Operation of ASLOC

Once mounted and enumeration is complete the hardware is operational and can reliably undertake facial recognition as directed by the host computer. As mentioned in the mounting section of this user manual it is recommended the user is approximately 500mm away from the system to ensure the subject is in the optimal range for the camera lens (as per figure 4).

4.1 Operation of the screen and its adjustment buttons

Located at the rear of the screen are 4 function buttons that control the display. These functions are:



- **“Auto/+” key (S4): Auto Position calibrated key**, when pressed this key will force the display perform the position calibrated routine. This key is only valid at the HDMI input signal condition.
- **“COL/-” key (S3): Auto Colour calibrated key**, when pressed this key will force the display perform the Colour calibrated routine. This key is only valid at the HDMI input signal condition.
- **“MENU” key (S2):** This key will bring up a menu of settings for the display, there are only three valid buttons once entering the menu, S2, S3 and S4.
- **“CH” key (S1):** There are two input signal channels available on this Board, HDMI and DVI. When both input signals are applied, pressing this key can change the input channel from one into the other. ASLOC Poles have only one of the two input signals applied (HDMI); therefore, the board will auto select the channel that has signal feed, thus, this Key (S1) does not have function as a Hot Key.

Display MENU

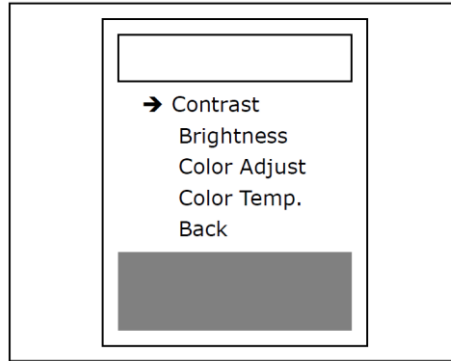
When pressing S2 under normal display conditions, the screen settings menu will become active with the following sub menus:

- Colour
- Image Setting
- OSD Menu
- Signal Source
- Audio
- Misc
- Exit

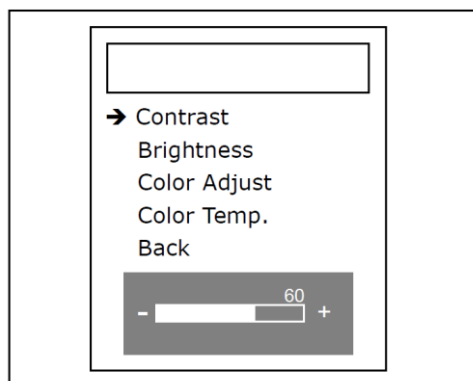
At this point only three Keys S2, S3, S4 are valid. The functions are as follows:

- Pressing the **Menu** (S2) key will change the key into an **“ENTER”** key, it will also bring up the first layer menu screen.

- **S3 (-)** key and **S4 (+)** key are used to scroll to the function needed in the menu with **S2** being the enter function. After pressing enter the display will show sub menus. Scrolling down and selecting “**EXIT**” on the menu, will bring the menu up one layer.
- Press the **Menu/Enter (S2)** key while at the “**Color**” Bar and you will enter the second layer to adjust the picture quality of the display.

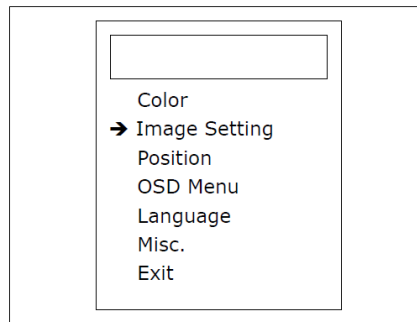


- By pressing the **S3 (-)** key or **S4 (+)** key, select the function bar needed. Press the **S2 (ENTER)** key to enter (select) that function and enter the 3rd layer, which will populate the shaded block below the options.



- By pressing the **S3 (-)** key or **S4 (+)** key, adjust the selected Value (e.g. contrast in the example above). Press the **S2 (ENTER)** key or select the “**BACK**” Bar can move **layer 3** into **Layer 2**.

- Press the **Menu/Enter (S2)** key while at the Layer 1, **Image Setting Bar**, will enter the second layer to adjust **the picture Setting**.



Second Layer options:

- Clock
 - Phase
 - Sharpness
 - H. Position
 - V. Position
 - Back
-
- By pressing the **S3 (-)** key or **S4 (+)** key, select the function bar needed. Press the **S2 (ENTER)** key to enter (select) that function and move into the 3rd layer to adjust settings.
 - Press the **Menu/Enter (S2)** key at a specific option to adjust, adjustment is made using the **S3 (-)** key or **S4 (+)** key, **Menu/Enter (S2)** will bring you back out of the option also.
 - Press the **Menu/Enter (S2)** key while at the Layer 1, to highlight the **OSD Menu Bar**. This will enter the second layer to adjust **the OSD ICON's position and Timer**.
 - The following options are available.
 - OSD H.Pos
 - OSD V. Pos
 - OSD Timer
 - Language
 - Back
 - By pressing the **S3 (-)** key or **S4 (+)** key, select the function needed. Press the **S2 (ENTER)** key to enter (select) that function and move into the 3rd layer, pressing **S3 (-)** key or **S4 (+)** will adjust, pressing **S2** will go back out of the layer.
 - The signal source can also be selected from the 1st layer menu, this cycles the the interface sources to the screen, in ASLOC the source is **HDMI**.
 - There is also an audio option in the 1st layer to adjust volume and mute, however the ASLOC as standard does not provide interfacing audio speakers to the screen.

- There is also a **Misc** option on the 1st layer menus, which is scrolled down or up to using **S3 (-)/S4 (+)**, pressing **S2** over the **Misc** option will enter into the Misc menu. By pressing the **S3 (-)** key or **S4 (+)** key, select the function bar needed. Misc provides the following functions
 - Auto Adjust – this will auto adjust the screen with the source.
 - Color Adjust – this will auto adjust the colour with the source.
 - Reset – This will reset the display to factory functions.
 - Back

Press the **S2 (ENTER)** key to enter (select) that function.

- When settings are changed, those changes are stored only when user leaves the menu through proper path using BACK or EXIT functions to leave the layer menu. Should the user leave the menu without any motion after the pre-set time out, the menu will be closed without memorising changed settings.

5. Cleaning and Maintenance

The ASLOC Imaging system is predominantly maintenance free. The system is designed to work indoor, without the presence of high dust levels. The outer casing and front screen can be cleaned, it is recommended that the front camera unit is kept clean of dust particles, especially within the areas of where the camera lens and LED illumination are located, as seen in shaded blue areas of figure 6 below.

The outer casing and screen can be cleaned with a soft anti-static microfibre cloth. The camera unit has a hardened coating applied to prevent major scratches forming, however it is recommended not to use any abrasive pads or products when cleaning the device. It is important to keep the camera lens location free of scratches, obstructions or marks. If using cleaning products on the ASLOC, it is recommended to avoid any containing acetic acid (vinegars).

It is not recommended to operate the touchscreen with any sharp objects, doing so would scratch and potentially break the touchscreen. The screen is a resistive touchscreen and can be operated by people wearing gloves. Please do not spray any cleaning products directly onto the touchscreen. To clean the touchscreen we recommend gently applying a soft brush to remove loose contaminants/dust. Please ensure no to little pressure is applied directly to the touchscreen, otherwise the screen could become scratched. To disinfect the touchscreen we recommend very gently applying an alcohol-based disinfecting wipe to the screen (the wipe can be dampened with alcohol-based solution, but not soaked). We recommend drying the touchscreen directly afterwards with a clean anti-static microfibre cloth.

Please **do not** spray or apply liquid cleaning products (including alcohol-based cleaning liquid) directly onto the touchscreen. Doing this will allow liquid to soak into the resistive screen causing a conductive path between the resistive touchscreen configuration and can cause the screen to fail. A small amount (one spray) of alcohol-based disinfecting touchscreen safe cleaner can be applied to a soft, dry anti-static microfibre cloth. The cloth can then be used to gently clean the screen. Please dry the screen with a dry, clean and anti-static microfibre cloth immediately afterwards.

Please note that any area on the front of the camera unit between the LED illumination and camera lens (between the blue shaded areas on figure 4) is a free area that does not affect the functionality of the system.

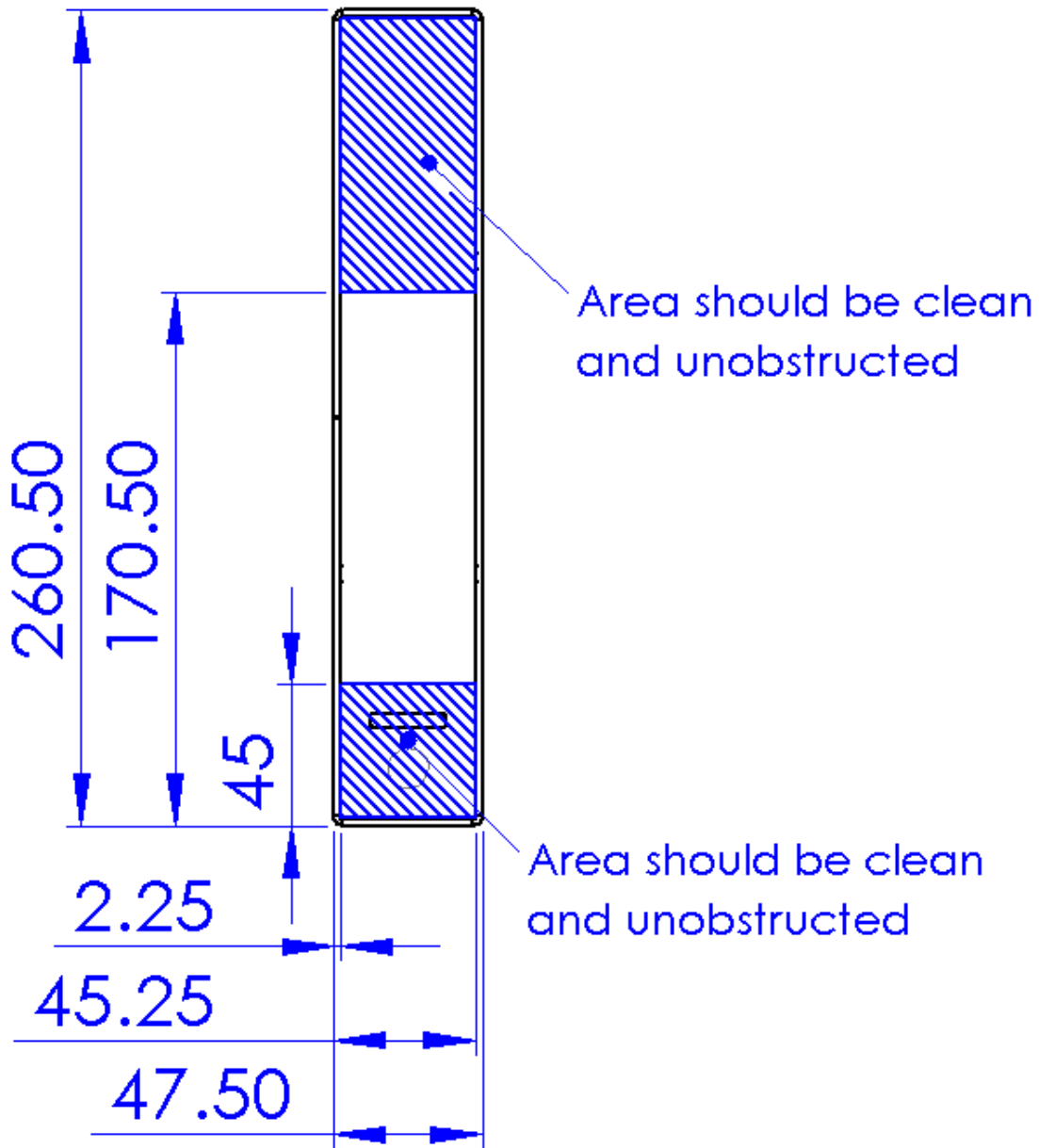


Figure 5: Cleaning and free areas on ASLOC Camera unit

6. Error Condition Handling

The hardware has a programmable watchdog function, which will verify successful communication with the host. Data is bulk transferred from the camera over USB2 to the host. The watchdog can detect inactivity over a set timeout period between the hardware and host and undertake a reset of both camera and host USB to reinitiate enumeration. In this case, a change in colours will be seen on the status central LED from green to yellow, then back to green once enumeration has been reinitiated. The resets work as a full power down and restart of the system. The system also has a primary watchdog built in to restart the camera, if it detects any processing problems. Any other error conditioning would be defined and run through the host software.

7. Specification

Camera

Resolution	756x482
Response	Monochrome with NIR response to 900nm
Frame speed	33fps maximum
Shutter	Electronic global shutter
Minimum exposure time	85µS
maximum exposure time	200mS
Typical exposure with flash	200µS

Programmable watchdog recommended minimum 60 seconds extendible to 999.999 seconds or off

Status LEDs	5xRGB programmable over USB
Ambient temperature range	0°C to 60°C
Data transfer	USB2 High Speed Bulk transfer via WinUSB/Libusb
Wavelength	NIR with 850nm centre wavelength
Operating current	110mA
Maximum cable length	3 metres
Control protocol	Proprietary via open source LIBPSINC

Illumination

LED	18 SFH4235 arranged in 3 banks
Peak wavelength	860nm
Supply voltage	Min 8V max 14V
Supply current idle mode	40mA typical
Supply current short-term peak	2.5A for 7mS
Power consumption idle	0.5W
Power consumption operating	0.8W typical
Maximum power consumption	4.2W (fuse limited)
Ambient temperature range	0°C to 60°C
Over temperature trip	80°C (75°C reset)
Power inlet	2.1mm DC connector Centre Pin +VE

Power supply

Ideal Power PSU part no.	25HK-AB-120A250-CP6 PSU,12V 2.5A
Input voltage	90-265 VAC 50Hz
Output	12V @ 2.5A
Type	Switch mode regulated
Insulation resistance	>50M ohm with 500VDC applied
Withstand voltage	3.0KV for 2 seconds
Approval	EN 62368-1:2014+A11, BS EN 62368-1:2014+A11, UL 62368-1 & CSA C222.2 No. 62368-1-14 Audio/Video Information and communication Technology Equipment – Part 1: Safety Requirements AS/NZ 62368.1:2018, GB4943.1-2001, CNS14336-1 (99) and J62368-1(H30)
Environment	Indoor use only
Protection	Short circuit and overload with auto recovery

Landscape Screen

Active area	174 x 104.4 mm
Native resolution	800 (W) x 480 (H)
Aspect Ratio	16:9
View Angle (U/D/L/R)	80/80/80/80
Brightness	900 nits
Colour Depth	16.7 million colours
LED Lamp Life	100,000 hours to half brightness
Touchscreen	Resistor type 5 wire. USB interface
Interface	HDMI

Enclosure

Material	Dry powder coated aluminium
Main body diameter	61.5mm
Stand body diameter	86mm
Circular mounting flange	150mm diameter
Enclosure height	713mm (With Base) 710mm (Without Base)
Flange mounting holes	3x8mm blind threaded holes on 110mm circle (<i>see diagram</i>)
Cable entry	1 cable entry hole to be provided by the client (entry through centre section of stand)
Mean Time Before Failure of ASLOC (MTBF)	Significantly over 100,000 Hours
Approvals	CE compliant with low voltage directive certified power supply unit RoHS phthalates compliant (amended 2015/863) EMC compliant (<i>EN 55032:2015, EN55035:2017, EN61000-6-1:2019</i>)

8. Copyright Information

No part of this manual, the accompanying documentation pack or the products and firmware described in it may be transmitted, transcribed, stored in a retrieval system or translated into any language in any form or by any means (except documentation kept by the purchaser for backup purposes) without the express written permission of Perception Sensors and Instrumentation Limited.

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9. Limitation of Liability

Under no circumstances is Perception Sensors and Instrumentation Limited, its suppliers and agents liable for any of the following: (1) Third-party claims against you for damages; (2) Loss of, or damage to, your records or data, (3) Special, incidental, or indirect damages or for any economic consequential damages (including but not limited to loss of profits, savings, reduced productivity, damage to equipment, damage to or loss of stock or product, loss of profits, interruption to or loss of business) due to malfunction, fault, downtime or operation (proper or improper) of the ASLOC system.

10. Declaration Statement and Safety Notices



Perception Sensors and Instrumentation Limited hereby declares that the device is in compliance with the essential requirements and other relevant provisions of electromagnetic compatibility directive 2014/30/EU, meeting performance criteria set by EN 55032:2015 (Electromagnetic compatibility of multimedia equipment – emission requirements), EN55035:2017 (Electromagnetic compatibility of multimedia equipment – immunity requirements) and EN61000-6-1:2019 (Electromagnetic compatibility: Generic Standards – Immunity standard for residential commercial and light industrial environments). The Imaging unit fulfils the requirements of BS EN 62471:2008, Photobiological safety of lamps and lamp systems, with a lamp classification of exempt to IEC 62471:2006, meeting the requirements of Directive 2006/25/EU, Artificial Optical Radiation. The ASLOC device itself is a 12 V DC unit; however, is provided with a certified power supply unit of supply 90 – 264V AC (47 to 63Hz). This power supply is certified to the following safety standards EN 62368-1:2014+A11, BS EN 62368-1:2014+A11, UL 62368-1 & CSA C222.2 No. 62368-1-14 Audio/Video Information and communication Technology Equipment – Part 1: Safety Requirements, AS/NZ 62368.1:2018, GB4943.1-2001, CNS14336-1 (99) and J62368-1(H30). Perception Sensors and Instrumentation Ltd. declare the certified power supply follows the essential requirements of the Low Voltage Directive 2014/35/EU. The ASLOC device follows the Restriction of Hazardous Substances in Electrical and Electronic Equipment directive 2011/65/EU (Amended by 2015/863) and is phthalates compliant.

Safety notices:

CAUTION

Do not use this product near water



Indoor Use Only



RECYCLING This product bears the selective sorting symbol for Waste Electrical and Electronic Equipment (WEEE). This means that this product must be handled pursuant to European directive 2012/19/EU in order to be recycled or dismantled to minimise its impact on the environment. The user has the choice to give this product to a competent recycling organisation or to the supplier when they buy replacement electrical or electronic equipment. Perception Sensors and Instrumentation Ltd. is a business to business (B2B) Producer under UK registration number WEE/FB4237XX.