

O
P
E
R
A
T
I
O
N

M
A
N
U
A
L

EQSS Model6253 – OverWatch™

User Manual



ORIGINAL INSTRUCTIONS

The OverWatch™ is an aid to the operator and this system should not in any way replace operator training. The system relies on optical detection principles and may not work in all situations and environments. The system must be properly maintained, and preoperational checks must be completed.



REV 1.7

20/05/2020

Model6253 OverWatch™ User Manual

DOC# DO001195 – ORIGINAL INSTRUCTIONS

AUTHORS:

Kieren Grogan, Greg Santucci, Jay Nandakumar

AUTHORISED BY:

Kieren Grogan

CHECKED BY:

Andrew Donegan

DOCUMENT ABSTRACT:

This User Manual details the use and operation of the Model6253 OverWatch™

PRODUCT NAME:

Model6253 OverWatch™ Operator Detection System

CURRENT DOCUMENT REVISION:

1.7

REVISION INFORMATION:

- 1.1 Initial Document Creation
- 1.2 Inclusion of drill guides and update of electrical connection schematics
- 1.3 Inclusion of Wi-Fi front end use cases and web pages
- 1.4 Inclusion of detail images to add in explanation of functionality and addition of part ID
- 1.5 Conformity changes and grammar check
- 1.6 Addition of emergency lowering notices and WiFi access procedures
- 1.7 Added additional detail to the operation of the motionless detection / horn event and added warning for correct operator standing position

Important Information

Information contained in this publication regarding this device's applications, and the like, is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that the application of our equipment meets with your specifications.

EQUIPMENT SAFETY SYSTEMS MAKE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO, IT'S CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE.

Equipment Safety Systems disclaims all liability arising from this information and its use. Use of Equipment Safety Systems' products as critical components in life support systems is not authorised, except with express written approval by Equipment Safety Systems. No licenses are conveyed, implicitly or otherwise, under any Equipment Safety Systems' intellectual property rights.



N23041

This is a class A product certified to AS/NZS CISPR 22:2006. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.



Table of Contents

Principle of Operation.....	5
Preoperational Checks.....	6
Operational Instructions.....	7
Standing Position	7
Session Calibration.....	8
Crush Event Cutout.....	9
Shear Event Cutout.....	10
System Override.....	11
Visual & Audio Notifications	11
Obstructed Operator Sensor.....	12
Cutout Behaviour Processing.....	13
Elevate Mode	13
Drive Mode	14
Wi-Fi Access	15
General Use.....	15
Minimum system requirements	15
Enable Wi-Fi Connection.....	15
Accessing the Home Page	16
Diagnostics.....	17
Retrieving Event logs	18
Inspection & Maintenance	19
Periodic Maintenance	19
Periodic Testing.....	20
Component Identification.....	21
System Components	21

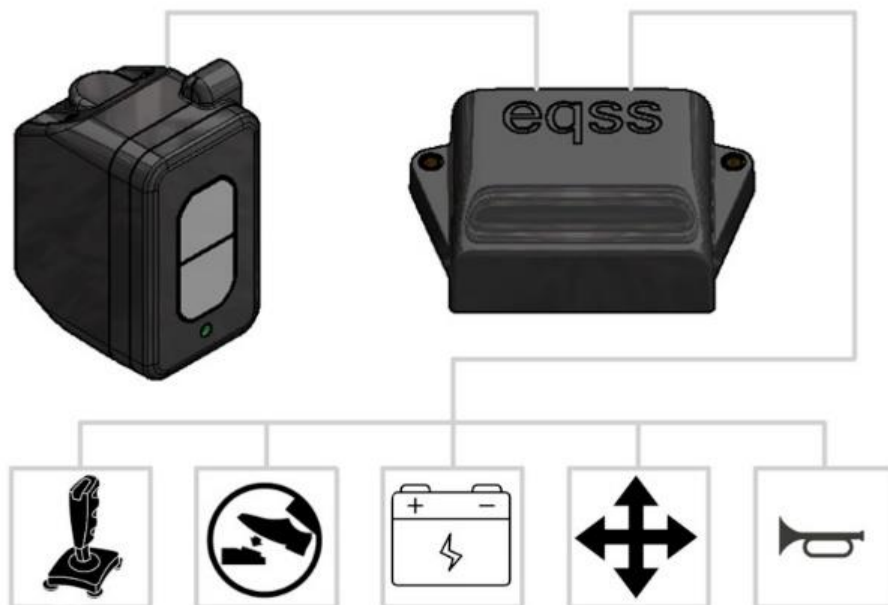
Principle of Operation

The OverWatch™ is an innovative system designed as an aid to the operator. The system does not replace operator training.

The system works on the premise of detecting the operator’s position and movements, with respect to the scissor lift’s direction of movement in real time. This information is used to determine if a crushing or shearing event is about to occur. This is determined by the physical movements and position of the operator’s body, with respect to the platform control box.

When the operator pushes the dead-man trigger, the system calibrates the position of the operator relative to the control box. The system senses the machine’s mode of operation (Drive or Elevate) and determines the position of the joystick. This initial calibration is done each time the dead-man trigger is pushed; therefore, the system calibrates for each use session with the specific operator and environmental conditions at that point in time.

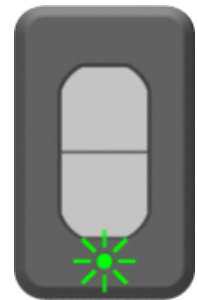
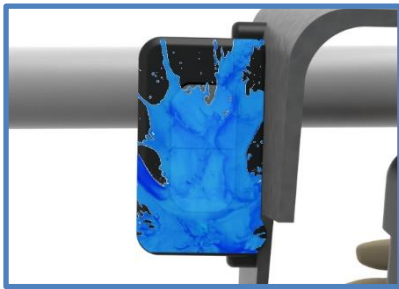
The system constantly measures the operator’s position, acceleration and velocity. The system will trigger and cut the machine operation if the system detects movements above the threshold limits. For example, if the machine is driving forward and the operator moves forward to look over the front of the platform, the system will not trigger. If the machine is driving backwards and the operator moves towards the platform controls quickly with a high acceleration, this may indicate a dangerous shearing event, and therefore, the system will trigger.



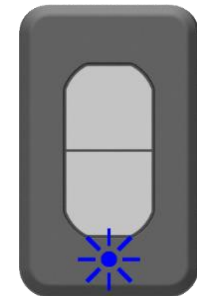
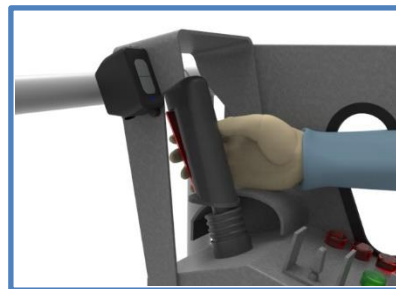
Preoperational Checks

The OverWatch™ is an electronic detection system and is an aid the operator. Before use make sure that the system is in good working condition. Conduct the following pre-operation checks.

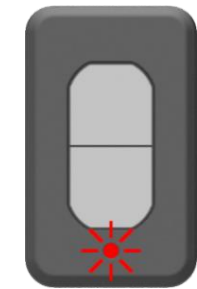
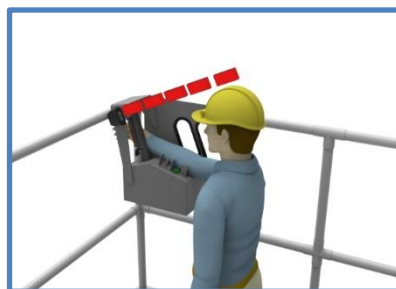
1. *Make sure the sensor optics are clean, free of dust, water, paint, etc. Power up the system. Make sure you hear the ‘welcome tone’ and the green light is active*



2. *Select the drive mode. Stand in position. Make sure the light goes blue and you hear “Drive”*



3. *Drive the machine forward slowly. Duck down into the basket, then the system light will change to red and it will say “Cutout” and the machine will stop.*



Operational Instructions

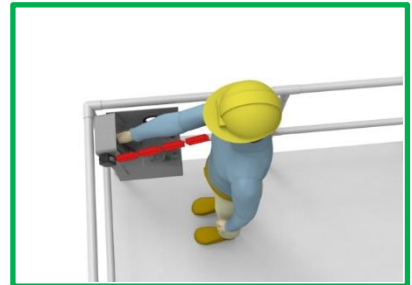
Standing Position

Warning: Risk of Severe Injury or Death

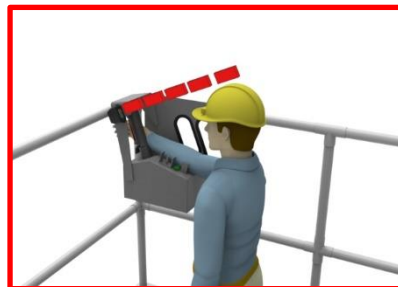
* The OverWatch™ is an aid to the operator and this system should not in any way replace operator training. The system relies on optical detection principals and may not work in all situations and environments. The operator must use the machine while standing in front of the control box at all times in the natural standing position.

The OverWatch™ Sensor is mounted on the platform control box. This sensor is an infrared (invisible) LIDAR, which is used to measure the operator's position, acceleration and velocity. The OverWatch™ must always maintain a visible line of sight to the operator. The operator must always remain in position and maintain normal movements in order to control the machine functions.

The operator must stand in the following position for the OverWatch™ to function correctly and allow control of the machine functions.



The OverWatch™ will not allow control of the machine functions if the operator is not in position. In most cases the OverWatch™ stops operation of the machine in the conditions shown below.

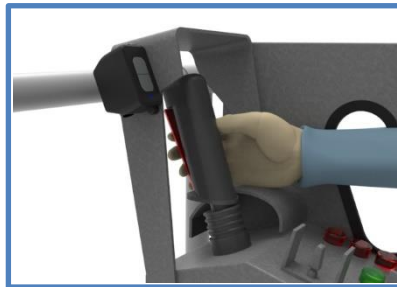


Session Calibration

The OverWatch™ starts sensing the operator from the time the platform's dead-man trigger is pressed. When the machine is powered, and the system is functional, the operator will see a green light on the OverWatch™ sensor. This indicates that the OverWatch™ is ready for use.



When the operator pushes the joystick dead-man trigger, the system will calibrate to the operator's current position. If the calibration is successful, the light will change to blue and an audio announcement of either "Drive" or "Elevate" will be made, depending on the platform's mode of operation.



When the operator pushes the joystick dead-man trigger, and if the operator is not detected or is standing too close or too far away from the sensor, the light will change to purple with an audio announcement of "Operator Zone". If the system is not able to calibrate, the operator must release the joystick dead-man trigger and move into the correct working position.

Crush Event Cutout

Warning: Risk of Severe Injury or Death

* The OverWatch™ is an aid to the operator and this system should not in any way replace operator training. The system relies on optical detection principals and may not work in all situations and environments.

* The OverWatch™ only applies the cutout to the upper control panel, the lower panel can be used at any time to take control of the machine and lower the platform.

A normal crush event can occur when the platform is in elevate mode and the operator becomes pressed against the platform handrail and an object above. With the OverWatch™ this event is detected based on the operator's acceleration, velocity and current position. An illustration of a crush event is shown below.



If a crush event is detected by the OverWatch™, the machine cutout will be applied, and the operator will be disabled from elevating the machine and the system will announce "Cutout". The operator can always descend the platform or apply the system override to regain control and move out of the dangerous situation. Since the OverWatch™ only applies the cutout to the upper control panel, the lower panel can be used at any time to take control of the machine and lower the platform.

In the situation where a crush event has been detected, and the OverWatch™ has sensed that the operator has not moved position in 5 seconds since cutout, the OverWatch™ calculates that the operator may be pinned, stuck or incapacitated. The OverWatch™ will sound the machine's horn 3 times every 10 seconds. This is to alert surrounding workers about the situation, so that they may assist where required. If the operator releases and then presses the joystick trigger, the OverWatch™ determines that the operator is not incapacitated and is able to control the machine and cancels the horn alert.

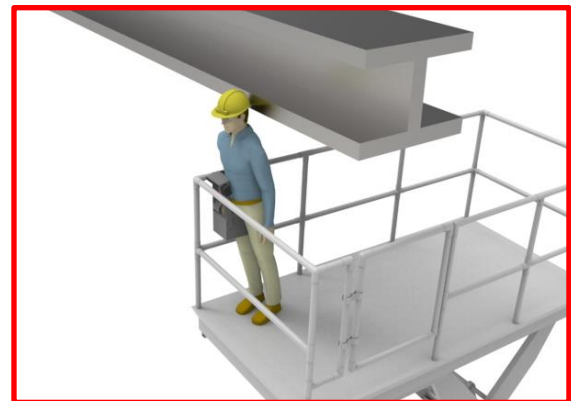
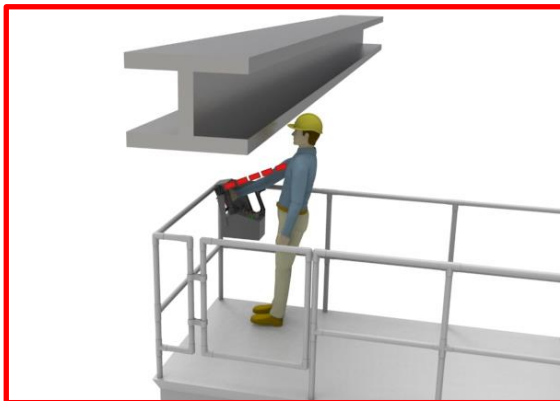
Shear Event Cutout

Warning: Risk of Severe Injury or Death

* The OverWatch™ is an aid to the operator and this system should not in any way replace operator training. The system relies on optical detection principals and may not work in all situations and environments.

* The OverWatch™ only applies the cutout to the upper control panel, the lower panel can be used at any time to take control of the machine and lower the platform.

A shear event can occur when the platform is in drive mode and the operator is struck by a stationary object. This event is detected based off the operator's acceleration, velocity and current position. The direction of the operator's movement is opposite to the movement of the platform. For example, if driving forward the operator can move forward to look over the front of the platform when driving, and when driving forward, if a shear event occurs, the object would push the operator backwards. If the operator is driving backwards, a shear event would push the operator forward towards the control box.



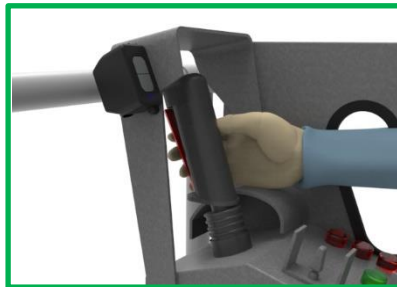
If a shear event is detected, the machine cutout will be applied, and the operator will be prevented from driving the machine. The system will then announce "Cutout". The operator can always regain control of the machine by moving back into the correct working position or by applying the system override to move out of the dangerous situation. Since the OverWatch™ only applies the cutout to the upper control panel, the lower panel can be used at any time to take control of the machine and lower the platform.

In the situation where a shear event has been detected, and the OverWatch™ has sensed that the operator has not moved position within 5 seconds, the OverWatch™ calculates that the operator may be pinned, stuck or incapacitated. As with a crush event and subsequent pinning of the operator, the OverWatch™ will sound the machine's horn 3 times every 10 seconds. This is to alert surrounding workers about the situation, so that they may assist where required. If the operator releases and then presses the joystick trigger, the OverWatch™ determines that the operator is not incapacitated and is able to control the machine and cancels the horn alert.

System Override

The OverWatch™ has an override function. This function will allow free control of the machine for 15 seconds. This function is only available for 15 seconds and can only be used every 60 seconds.

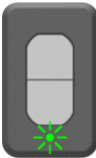
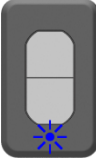
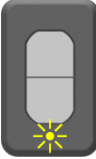
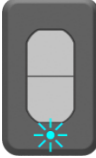
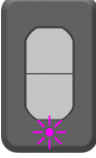
To activate the override, the operator must press and release the joystick dead-man trigger 3 times within 2 seconds. When this triple tap occurs, the system will announce “Override Active” and the light will change to orange. When the override times-out, the system will announce “Override Expired”. If the operator tries to enable the override again within 60 seconds, the system will announce “Override Unavailable”. This 60 second time-out is referred to as the ‘override cool down period’.

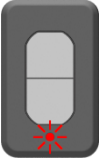
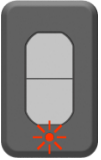
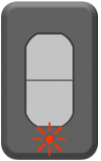
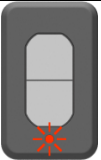


To Override:
3 quick presses of
the joystick trigger

“Triple Tap”

Visual & Audio Notifications

Light – Colour	Audio Announcement	Description
	Welcome chime at start up	System has started, is powered up and is working with no errors
	Drive / Elevate	Trigger pressed, movement selection determined, system calibrated to operator’s position. System sensing
	Sensor Obstruction	There is an object covering the sensor (e.g. dust, water, paint, etc) or the operator is too close to the sensor
	Operator Zone	The operator has moved out of sight of the sensor
	None	The sensor is pointing on a reflective surface, such as the reflective stripes on a safety vest

	Cutout	The EWP movements have been cutout to prevent injury to the operator
	Override Active	The OverWatch™ is in override mode to allow full control when the operator is in a compromised position
	Override Expired	The override mode has timed out and the OverWatch™ has returned to normal operation
	Override Unavailable	The override mode has been disabled

Obstructed Operator Sensor

The OverWatch™ can detect if the operator sensor is obstructed. An obstruction may occur if the sensor is physically covered with an object or a material such as dust, water or paint, etc. The OverWatch™ will announce “Sensor Obstruction”. The operator must then clean the sensor in order to operate the machine. Alternatively, if the sensor is damaged, the system override may be used to regain control and move the machine.



Cutout Behaviour Processing

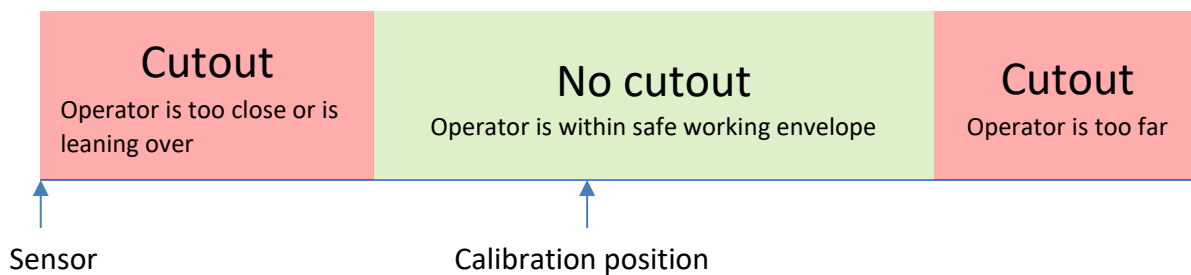
For the system to start functioning and release the machine’s cutout so that the operator can gain control of the machine, the following conditions must be established:

1. The OverWatch™ system must be powered
2. The OverWatch™ system must be operational and pass all self-checks
3. The operator must be present and within the defined zone when the enable trigger is pressed. At this point, the system measures the operator’s position relative to the platform control box. This calibration position is reset when the enable trigger is released.
4. The operator sensor must not be obstructed

Elevate Mode

The OverWatch™ will apply the cutout when the machine mode is Elevate according to the following table:

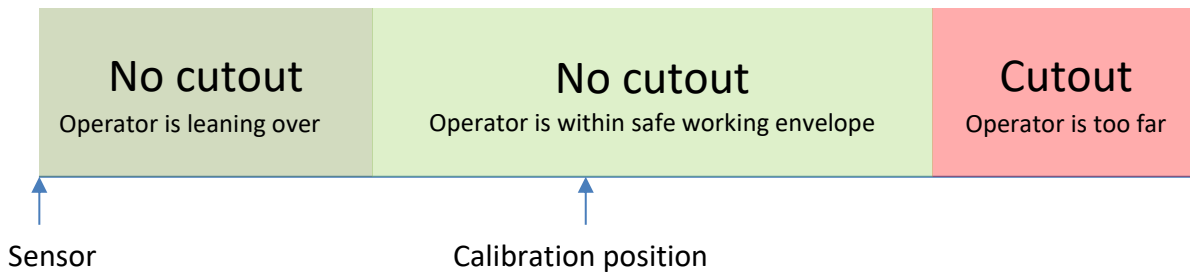
Operator action	Elevate	Descend
Operator leaning over sensor	Cutout	No cutout
Operator far from sensor	Cutout	No cutout
Operator ducks down	Cutout	No cutout
Operator moving rapidly toward sensor	Cutout	No cutout
Operator moving rapidly away from sensor	Cutout	No cutout



Drive Mode

The OverWatch™ will apply the cutout when the machine mode is Drive according to the following table:

Operator action	Drive forward	Drive backward
Operator leaning over sensor	No cutout	Cutout
Operator far from sensor	Cutout	Cutout
Operator ducks down	Cutout	Cutout
Operator moving rapidly toward sensor	No cutout	Cutout
Operator moving rapidly away from sensor	Cutout	Cutout



Wi-Fi Access

General Use

The OverWatch™ includes an embedded web server, accessible via Wi-Fi. The use of this interface is limited to viewing the system's diagnostic information, performing routine tests on all inputs / outputs and accessing the time stamped log files.

Minimum system requirements

Any smart phone, tablet or laptop that meets the following requirements:

- The device can connect to a Wi-Fi access point
- The device has an up to date web browser installed (2019 onwards). Firefox or Chrome are recommended.

Enable Wi-Fi Connection

The system's Wi-Fi module is disabled by default. In order to enable Wi-Fi, the user must turn the machine on and allow the OverWatch™ to bootup until the green light is visible. Within 10 seconds of power up, the user must press the dead-man trigger 10 consecutive times. The OverWatch™ will announce "Wi-Fi On" and the user can access the web page by connecting to the module's web server, using its SSID and generic password. Follow the instructions below to switch on the OverWatch™ Wi-Fi with the dead-man trigger switch.

1. Power down the platform control box with the ESTOP
2. Wait 10 seconds
3. Power up the platform control box with the ESTOP
4. Toggle the dead-man joystick trigger 10 times or more within 10 seconds after power up
5. When the OverWatch™ detects more than 10 trigger presses an announcement "Wi-Fi On" will occur

In the event that there is a system fault, and the OverWatch™ cannot sense the dead-man trigger input signal, the system's Wi-Fi can be enabled by following the instructions below to switch on the OverWatch™ Wi-Fi using the operator sensor:

1. Power down the platform control box with the ESTOP
2. Wait 10 seconds
3. Power up the platform control box with the ESTOP
4. While standing in the operator position, switch on the OverWatch™
5. As the welcome chime starts to play, cover the sensor. The LED will flash white then black to acknowledge.
6. Remove your hand from the sensor. The LED will flash white then black to acknowledge.
7. After covering then uncovering the sensor this way 2 more times, "Wi-Fi On" will be announced.

After the Wi-Fi is enabled, the user may connect to the Wi-Fi network. The SSID OverWatch_6253E_XXXX_XXXX will appear, the XXXX_XXXX being the device's unique serial number. Connect to the Wi-Fi network and enter the generic access point password which is 12345678.

SSID	OverWatch_6253E_XXXX_XXXX
Password	12345678

Accessing the Home Page

Once the user's Wi-Fi enabled device is connected to the OverWatch™, open a web browser and enter the IP address of the device's internal web server 192.168.4.1. Press enter and the following main page will be displayed:

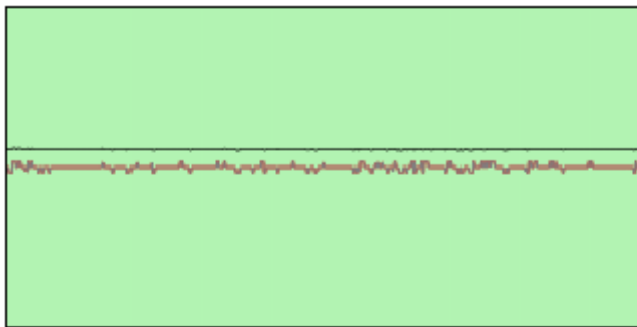


Diagnostics

The diagnostics page allows real time monitoring of the sensor data. The graph shows the raw position, raw velocity, computed displacement and velocity.

Below the graph the diagnostics page also shows the state of the various subsystems in the OverWatch™.

OverWatch Diagnostics



Velocity : 0.0

Displacement : 17

```
main_state : calibrating
movement_rule : idle or driving backward
driving_state : drive
joystick_state : idle
max_displacement_reached : 1549
max_velocity_reached : -7866.667
calibration_state : not set
motionless_operator_state : idle
horn_state : off
click_state : off
override_state : listening
throttled_state : normal
overwatch_state : active
test_lidar_state : ok
test_deadman_state : bypassed
input_deadman_adc : 0
input_elevate_adc : 0
input_drive_adc : 4095
input_aux1_adc : 0
input_joystick_adc : 1375
input_aux2_adc : 2101
```

[Download graph data file](#)

Retrieving Event logs

The Log Viewer page allows viewing and downloading of the log file information. The log information is time stamped and details the event and associated parameters / measurements at the time of the event. The log data can be downloaded in a csv format if required. This page also allows adjustment of the system's real time clock and calendar if required. Please note, any time or date change is logged and recorded.

OverWatch Log Viewer

Set Date and Time

Date

Time

Set date and time

Read OverWatch date and time





Download CSV

Timestamp	Description	State	Drive mode	Joystick	Calibration	Displacement	Maximum displacement	Velocity	Maximum velocity
102:102:02 81/101/2000	BOOT: OverWatch started	calibrating	not set	idle	100	0	0	0.00	0.00
102:103:44 81/101/2000	BOOT: OverWatch started	calibrating	not set	idle	100	0	0	0.00	0.00
102:107:32 81/101/2000	CAL: OK	calibrating	drive	idle	54	-34	-44	4.95	-56.12
102:107:32 81/101/2000	CAL: Begin scanning	calibrating	drive	idle	54	-34	-44	4.95	-56.12
102:107:32 81/101/2000	CUTOUT: Position	calibrating	drive	idle	54	-34	-44	4.95	-56.12
102:107:32 81/101/2000	CUTOUT: Resume calibration	calibrating	drive	idle	54	-34	-44	4.95	-56.12
11:33:01 30/04/2020	Date and time set to undefined NaN 2020	NaN:NaN	calibrating	drive	idle	54	602	607	187.82 197.97
11:33:01 30/04/2020	Date and time set to undefined NaN 2020	NaN:NaN	calibrating	drive	idle	54	603	607	187.82 197.97
11:40:01 30/04/2020	Date and time set to Apr 30 2020	11:40	calibrating	drive	idle	54	603	607	187.82 197.97
11:57:46 30/04/2020	CAL: OK	calibrating	drive	backward	68	-7	-19	-10.00	60.61
11:57:46 30/04/2020	CAL: Begin scanning	calibrating	drive	backward	68	-7	-19	-10.00	60.61
11:57:46 30/04/2020	SCAN: Resume calibration	calibrating	drive	backward	68	-7	-19	-10.00	60.61
11:57:58 30/04/2020	CAL: OK	calibrating	drive	backward	63	6	13	-15.08	276.32
11:57:58 30/04/2020	CAL: Begin scanning	calibrating	drive	backward	63	6	13	-15.08	276.32
11:57:58 30/04/2020	CUTOUT: Movement	calibrating	drive	backward	63	6	13	-15.08	276.32
11:57:58 30/04/2020	CUTOUT: Resume calibration	calibrating	drive	backward	63	6	13	-15.08	276.32
11:59:05 30/04/2020	CAL: OK	calibrating	drive	idle	63	-3	-3	1000.00	1000.00
11:59:05 30/04/2020	CAL: Begin scanning	calibrating	drive	idle	63	-3	-3	1000.00	1000.00
11:59:05 30/04/2020	SCAN: Resume calibration	calibrating	drive	idle	63	-3	-3	1000.00	1000.00
11:59:21 30/04/2020	CAL: OK	calibrating	drive	backward	49	2	8	40.00	46.15
11:59:22 30/04/2020	CAL: Begin scanning	calibrating	drive	backward	49	2	8	40.00	46.15

Inspection & Maintenance

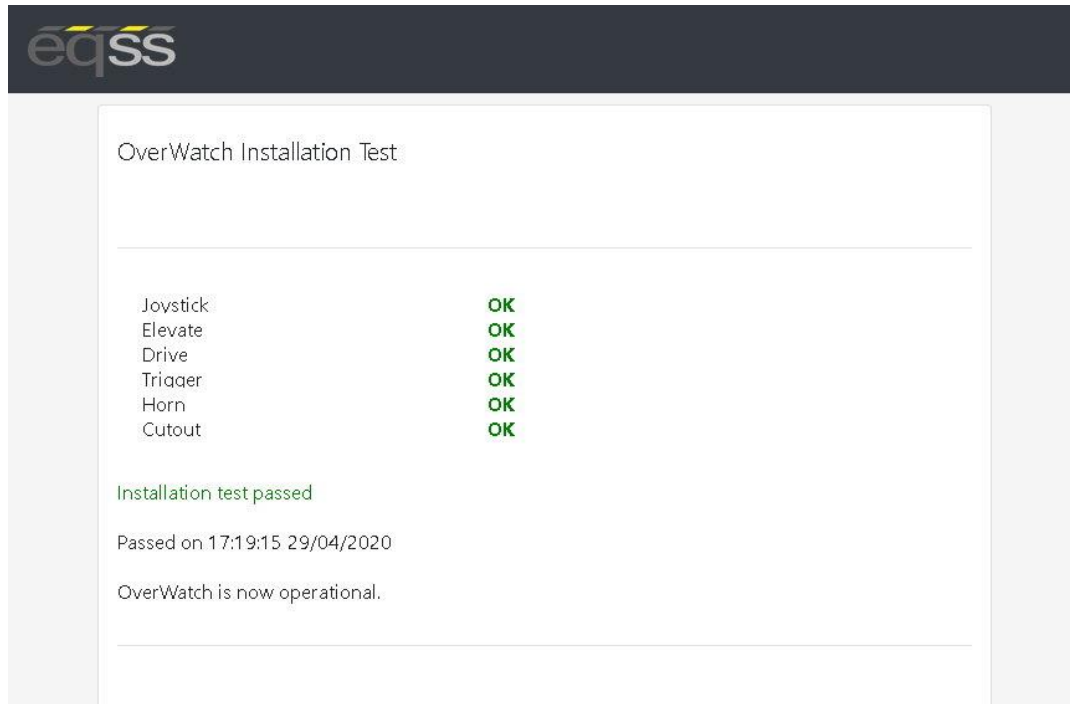
Periodic Maintenance

Regular maintenance must be performed on the OverWatch™ components to ensure the system operates correctly. This maintenance must be performed every 12 months in a rental situation, or before the machine is released to the hire customer.

<p>Inspect the sensor module for any cracks or damage that may compromise the seal. Replace the sensor module, if required.</p>	
<p>Clean the surface of the sensor using soap and water. DO NOT HIGH-PRESSURE WASH. Replace the screen protectors on the Lidar, if required.</p>	
<p>Blow out any dust that may block or muffle the speaker behind the sensor module. This can be done with low pressure < 10 psi compressed air.</p>	
<p>Inspect the cable running from the sensor to the cable gland and into the EWP control box. Check for any cuts or wear on the cable especially around the entry points for any exposed wires. Patch or replace the cable, if required.</p>	

Periodic Testing







Testing must be performed on the OverWatch™ components to ensure the system operates correctly. This testing must be performed every 12 months or after any type of maintenance or repair work has been carried out on the machine's control box. Connect to the OverWatch™ Wi-Fi, then access the main page and select the test menu. Follow the instructions on the screen to complete the system test.



Component Identification

System Components

Shown below is a list of the replaceable components which make up the OverWatch™:

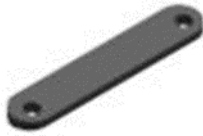
Part Number	Description	Drawing
AS001910	OverWatch™ Operator Sensor Assembly	
AS001916	OverWatch™ ECU Module	
AS001915	Operator Sensor Cable	
AS001907	ECU Loom	
ME001794	Operator Sensor Guard	
ME001793	Cable Gland Guard	

REV 1.7

20/05/2020

Model6253 OverWatch™ User Manual

DOC# DO001195 – ORIGINAL INSTRUCTIONS

ME001798	7.5° Operator Sensor Positioning Wedge	
ME001797	Operator Sensor Screen Protector	