



INFORM : PROTECT : DEPLOY

Reactec Analytics Platform

HAVwear & RASOR System Overview

This document provides an overview of the HAVwear & RASOR system

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About this document

This document is supplied as a part of the Reactec Analytics Platform.

Intended Purpose This document provides an overview of the HAVwear & RASOR System and its components.

Intended Audience This document is intended for staff who are responsible for administering the HAVwear & RASOR system and operator activities on a day-to-day basis.

Conventions used This guide uses the following formats for safety notices:



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in moderate injury, damage the product, or lead to loss of data.

Notice

Indicates a hazardous situation which, if not avoided, may seriously impair operations.



Additional information relating to the current section.

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1 Reactec Analytics Platform

The Reactec Analytics Platform is a group of hardware and software components which allow the collection, organisation and analysis of HAV (Hand Arm Vibration) exposure data, proximity data and other health risk data. There are different types of hardware as summarised below with all data captured, reported in the Reactec Analytics reporting software.

HAVwear System	RASOR System
HAVwear	RASOR
Docking Station	Dual Charger
HAVwear Tool Tags	
Operator ID Cards	
Analytics Reports	



Figure 1: Reactec Analytics Platform data flow

HAV exposure data is collected and calculated during tool use by the HAVwear. A HAVwear can also collect data on the User's proximity to another Reactec device. A RASOR within 30m of any

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HAVwear will gather HAVwear data on a regular basis. RASOR can also detect proximity to another Reactec device. Subject to appropriate agreements between Reactec and a supplier of other Bluetooth enabled health risk sensors such as noise, gas and dust, RASOR will also gather data from these devices on a regular basis when the devices have been assigned to the RASOR operator. Operators are informed of their HAV exposure and proximity status by a display and indicator lights on the HAVwear. The RASOR operator is advised of his and his colleagues exposure levels for all the devices the RASOR connects to and he has access rights to. At the end of each shift the operators return the HAVwear to a Docking station which collects the HAV exposure and proximity data. For RASOR users; at the end of each shift the operators return the HAVwear and RASOR to a Docking Station and or Dual Charger to collect the HAV exposure and proximity data and data from any other connected sensors.

The HAV exposure data, proximity data and other sensor data is transmitted to the Reactec Analytics where it can be analysed. The Reactec Analytics allows organisations to monitor HAV exposure levels, proximity behaviour and other health risk data trends, so enabling them to implement effective control measures.

1.1 Employers Responsibility

1.1.1 Vibration Regulations

The traffic light systems employed in the Reactec Analytics Platform for the HAVwear indicator lights are related to the HSE Control of Vibration at Work Regulations 2005 (the Vibration Regulations).

The Vibration Regulations include an exposure action value (EAV) and an exposure limit value (ELV) based on a combination of the vibration at the grip point(s) on vibrating equipment and the time spent using it.

- **EAV** - daily exposure to vibrations of 2.5 m/s² over 8 hours that represents a clear risk requiring management
Equivalent to 100 points
- **ELV** - daily exposure to vibrations of 5 m/s² over 8 hours that represents a high risk above which employees should not be exposed
Equivalent to 400 points

Notice *Individual operators may have modified EAV and ELV values based on their risk factors or historical vibration exposure. Organisations may also use alternative values to suit their policies.*

The HAVwear calculates and records the HAV exposure caused by operating the tool. The HAVwear display shows the number of points the operator has accumulated during a shift as they work with vibrating tools. In addition, a 3 colour-coded indicator show the operator's HAV exposure relative to their EAV and ELV .

GREEN	GO	Below EAV. Aim to stay in this region.
AMBER	BE AWARE	EAV exceeded. Reduce tool usage, share workload – supervisors on alert.
RED	STOP	ELV exceeded. Stop using hand-held power tools.

Figure 1: HAVwear Indicators

1.1.2 Tool Tag Programming

It is the employer's responsibility to adhere to legal requirements applicable to workplace health and safety and to determine vibration magnitudes that are representative of the actual vibration emissions applicable during tool use. Further detailed information is available on the HSE web site: <http://www.hse.gov.uk/foi/internalops/fod/inspect/hav.pdf>

Commonly there are two sources of vibration data to use for the purpose of calculating HAV exposure points;

- The published Manufacturer's data, or
- Vibration measurements taken by a competent person in the workplace.

Manufacturer's test methods may not represent the levels in the workplace and measurement results can be highly variable. In either case, the employer is responsible for determining the most appropriate vibration magnitude to use in a HAV risk assessment, considering the influence of factors such as tool vibration magnitude variation over time, tool vibration magnitude variation by specific task, tool vibration magnitude variation by user, and correct maintenance of tools and accessories.

1.1.3 HAVwear Exposure Points

HAVwear calculates exposure points using the HSE points system as explained on the HSE website: <http://www.hse.gov.uk/vibration/hav/regulations.htm>

The HAVwear calculates vibration "exposure points" based on two methods.

1. Tool Exposure Points (TEP) - the length of time a tool is in use (trigger time) and the vibration value that is programmed on the HAVwear Tag. It is therefore important that the employer programs the HAVwear Tag with a vibration value that is representative of the actual vibration emission of the tool over time. This should take into account the specific tasks it is used for and other parameters that may cause variation.

2. Sensed Exposure Points (SEP) - HAVwear has an internal capability based on the use of a triaxial accelerometer to sense the vibration magnitude at the point to which the HAVwear is attached to the wrist. This vibration magnitude is not compliant to the ISO standard BS EN ISO 5349 as the standard defines methods required to make measurements on a tool. Concurrent tool testing can be used to determine if the HAVwear data is comparable with an ISO5349 evaluation of a tool on a periodic basis. The HAVwear uses the HSE calculation methodology to calculate Sensed Exposure Points based on the - the length of time a tool is in use (trigger time) and the vibration magnitude sensed by the HAVwear during use. This functionality is included for customers to determine if the sensed vibration is a more realistic representation of the risk experienced by the tool user than the static data programmed in the tool tag.



The employer of the tool user is responsible for determining if the HAVwear SEP is a safe estimate of the risk faced by their employees should they use this data to manage their employee's risk

1.1.4 Social Distancing

The SAFE-DISTANCE feature has been introduced to help employers manage the movements of their employees in line with Government guidance on social distancing. For example employers

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should plan work to ensure workers minimise the opportunity to be within close proximity and the time which can be spent within close proximity to colleagues. . As much as possible, keep groups of workers working together in teams that are as small as possible (cohorting).

SAFE-DISTANCE is designed to indicate when two Reactec devices are likely to have come within an unsafe distance of each other for a period of time that indicates they are not Social Distancing therefore potentially putting themselves at risk. SAFE-DISTANCE includes functionality to designate employees as belonging to a cohort, resulting in their proximity time as being recorded but not causing device alerts and areas to be designated as SAFE ZONES, whereby when within this SAFE ZONE, any detections of other devices would not be recorded as they would be regarded as false detections.



The employer is responsible with implementing social distancing policies. SAFE-DISTANCE is an aid to provide auditable confidence of employee adherence to policy.

1.2 Vibration Measurement Guidance

Reactec report the “sensed” data from the HAVwear within the Reactec Analytics Platform because the data collected at the point of attachment of the HAVwear to the tool operator’s wrist can be useful for the following:

- To indicate a more representative vibration exposure
- Identify tool tagging errors as indicated by large variations to tool tag values
- Monitor the wearing of tools as indicated by changing measured values with time
- Identify potential operator misuse or unsafe use of tools as indicated by large variations to the tool tag data and or large variations between operators using the same tool
- Assess tool tag programmed values for appropriateness to the actual use of the tool.

1.3 Data Group Management

To help analyse and report on operator HAV exposure, HAV data can be organised into groups to create granular reports. The Reactec Analytics can filter all reports to allow viewing of HAV data by Group, Region and/or Division.

Data can be assigned to Groups to reflect these relationships, for example, by project. You can capture additional levels of organisation by categorising Groups by Region and Division. There is no hierarchy between Regions and Divisions.

An organisation works on civil engineering projects throughout the UK. Management responsibility is organised by region and project type. Therefore, the management requires HSE reports for individual projects as well as for each region and project type.

This can be described by the following organisational units:

- Organisation Regions: for example, Scotland, Northern Ireland, England, Wales
- Organisation Divisions: for example, Roads, Rail, Demolition
- Individual projects split across locations

To produce the required Reports for this organisational structure using the Reactec Analytics Platform, you can set up the Reactec Analytics in the following manner:

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1. Create a Group for each project.
2. Assign operators or Docking Stations to the appropriate Group.
This ensures that HAV risk assessment exposure data for operators working on a project is assigned correctly, regardless of their location.
3. Create Divisions for each of the project types, and categorise the Groups (projects) to the appropriate Division.
4. Create Regions for each of the UK regions, and categorise the Groups (projects) to the appropriate Region.

Reports can now be run by filtering on parts of this organisation as required by management.

Table 1 Example of Group categorisation

Group	Organisation Region	Organisation Division
Project A	Scotland	Road
Project B	Scotland	Rail
Project C	Northern Ireland	Road
Project D	England	Demolition
Project E	England	Rail
Project F	Wales	Road

► For more information on setting up a group structure see section **Creating a Group** in the SW Administration Guide

1.4 Location Information

If a RASOR device is used by operators while using HAVwear, the RASOR will collate location information using GPS technology to associate the exposure data with a specific location. When collecting data from nearby colleagues the RASOR records the location of the RASOR user at the time it receives data from the colleagues' HAVwear device.



GPS technology only operates successfully outside of buildings.

1.5 Tool Management

To help analyse and report on tool performance, utilisation and to support maintenance schedules the Analytics Reports categorises tools into tool families and tool types. The HAVwear tracks trigger time activity to provide the data which reports tool use by manufacturer, tool family and tool type. The Reactec Analytics has a fixed list of tool families and tool types for organisations to categorise tools against.

2 Components Overview

This section provides an overview of the components of the Reactec Analytics Platform.

The equipment and ancillary components described within this manual are not suitable for use in locations where children are likely to be present.

2.1 HAVwear

The HAVwear is an easy-to-use and comfortable device that monitors hand arm vibration (HAV) exposure and breaches of social distance guidelines over the duration of an operator's shift.

A Docking station is used to charge, collect and transmit data from the HAVwear.

Operators sign a HAVwear module out of the Docking station at the start of each shift using their Operator ID Card. This assigns the HAVwear to the operator for that shift.

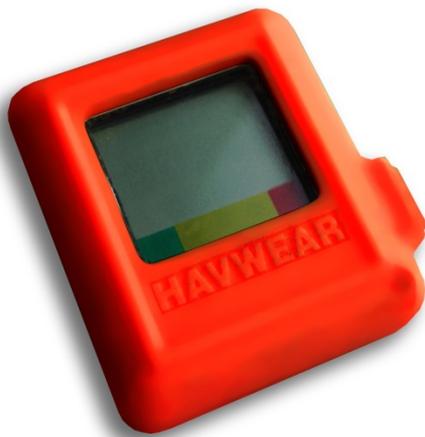


Figure 1: HAVwear

Before using each tool, press and release the HAVwear button and place the HAVwear face close to a HAVwear Tag, until a beep sounds which will indicate that the HAVwear is connected to a Tool Tag. This should happen within 5 seconds.

It is important to not continue to hold down the button when presenting the HAVwear to a Tool Tag, as a connection is not achievable until the button is released.

Current HAV risk assessment exposure levels are shown on the HAVwear display. The HAVwear indicator lights use a traffic light system (green, amber, red) to indicate when specified exposure action values are reached. This allows the operator to take action to limit further exposure.

A Docking station is used to charge, collect and transmit data from the HAVwear.

Operators sign a HAVwear module out of the Docking station at the start of each shift using their Operator ID Card. This assigns the HAVwear to the operator for that shift and ensures the correct HAV action exposure limits are on the HAVwear for that operator

2.1.1 Using HAVwear to Monitor HAV Exposure

If using HAVwear to monitor HAV exposure before using each tool within a shift press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for

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approximately 5 seconds or until a beep sound is made. Check the HAVwear display for the tool ID. If the tool ID does not match the tool tag, repeat the process. Repeat this process for each tool used during the shift. In the event an operator fails to tag a tool, and the HAVwear detects tool use, a sound and vibration alert will be made for 5 seconds.

The HAVwear remains connected to the tool after the tool use has ended unless it is connected to another tool, or the operator switches HAVwear OFF or connects it to an OFF tag.

Check the HAVwear display regularly during the shift to monitor exposure.

The HAVwear counts up the HAV exposure in points as the operator uses the power tool.

Lights	Description	Alerts	Operator Actions
Green	Remains below EAV (action value)		GO - Below EAV. Aim to stay in this region
Amber 1	<33% of Gap between EAV and ELV	2 second vibration and buzzer alert	BE AWARE – EAV Exceeded. Reduce tool usage, share workload – supervisors on alert
Amber 2	>33% < 66% of Gap between EAV and ELV	5 second vibration and buzzer alert	
Amber 3	>66% of Gap between EAV and ELV	10 second vibration and buzzer alert	
Red	Greater than ELV (limit value)	20 second vibration and buzzer alert	STOP – ELV exceeded. Stop using hand held power tools

Figure 2: HAVwear Indicator Lights & Alerts Table

At the end of the shift return the HAVwear to a Dual Charger or Docking Station.

When placing the HAVwear into a Dual Charger or Docking Station bay, the green LED next to the bay will light continuously after 10 seconds to confirm that the connection between the HAVwear and Docking Station is good. If the green LED is not on 10 seconds after docking, then there is an error with the connection. The HAVwear should be removed and the contact points on the back of the HAVwear cleaned to ensure there is no dirt contaminating the connection points. If the error remains contact Reactec technical support.

When a HAVwear is **not** being docked at the end of every shift it will automatically reset the operator exposure points displayed on the device when it senses a period of inactivity lasting 10 hours or more.

A HAVwear should not be removed from the wrist during a working shift. If there is reason to remove the HAVwear from the wrist, ensure an OFF tag is used prior to removal, or the HAVwear is switch OFF.



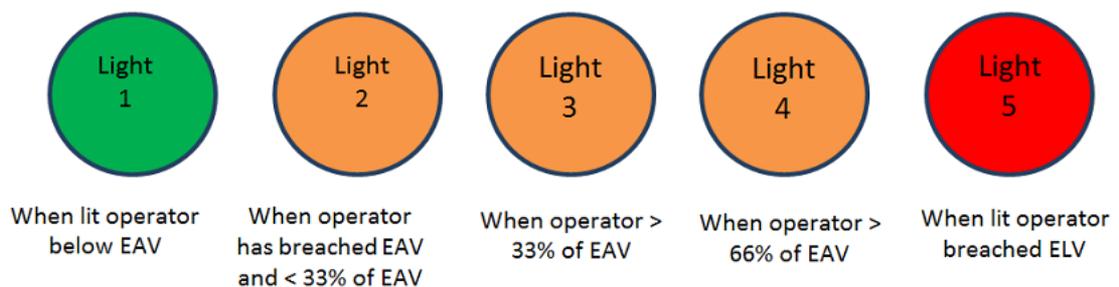
Place the module into the Docking Station or Dual Charger retaining clips and press down on the orange plastic moulding of the device to ensure it is firmly clipped into place. Do not press down on the LCD screen of the unit as repeated or excessive force to this window may damage the unit.

2.1.2 HAVwear HAV Exposure Display

When signed out to an operator, the HAVwear display shows the operator important HAV exposure data relating to their current shift.

The following information is displayed.

- **Operator's name.** Display as 4 characters. Character 1 of forename plus first 3 characters of surname
- **Exposure Points.** A customer will choose either Tool Exposure Points TEP or Sensed Exposure Points SEP. The display will show a letter which is either T or S followed by 3 digits for the calculated points.
- The tool which was last identified by the RFID read process. Display as alpha numeric characters, the first 4 characters of Tool manufacturer model number.
- Status of battery charge in increments of 25%, 50%, 75% and 100%.
- The stage along the exposure indicator scale on the following basis



The HAVwear alerts the wearer when an action threshold has been exceeded and indicator lights are 3 colour-coded lights which show the operator's HAV exposure relative to their EAV and ELV as they work with vibrating tools. The lights indicate when the operator must take corrective action.

► For more information about the EAV and ELV, see "Vibration Regulations" on page 2

HAVwear Indicator Lights Table

GREEN	GO	Below EAV. Aim to stay in this region.
AMBER	BE AWARE	EAV exceeded. Reduce tool usage, share workload – supervisors on alert.
RED	STOP	ELV exceeded. Stop using hand-held power tools.

► *For more information, see "HAVWEAR" on page 7*

When an operator's HAV exposure is below their EAV, the green indicator light is visible, indicating the operator's risk level and may continue working.

As an operator's HAV exposure reaches their EAV, the first amber indicator light is visible. This indicates that the operator should endeavour to reduce any further HAV exposure for that shift. This can be achieved, for example, by switching to a tool that has a lower vibration. The two further amber lights will become visible as the total exposure action value points increase.

If an operator's HAV exposure reaches their ELV, the red indicator light becomes visible. This indicates that the operator must stop using vibrating tools for the remainder of their shift.

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When a HAVwear Module is not docked at the end of a shift it will automatically reset the operator exposure points displayed on the device when it senses a period of inactivity lasting 10 hours or more.

2.1.3 HAV Alerts - Noise and Vibration

The HAVwear will create two types of alerts activated during non-trigger time.

Sound Alert

A sound will be used to alert the following

- When the personal EAV level is exceeded – the sound will beep for 2 secs
- When the personal EAV level is exceeded 33% - the sound alert will beep for 5 secs
- When the personal EAV is exceeded 66% - the sound alert will beep for 10 secs
- When the personal ELV is exceeded - the sound alert will beep for 20 secs

Vibration Alert

A vibration will be activated as follows

- When the personal EAV level is exceeded – the sound will vibrate for 2 secs
- When the personal EAV level is exceeded 33% - the sound alert will vibrate for 5 secs
- When the personal EAV is exceeded 66% - the sound alert will vibrate for 10 secs
- When the personal ELV is exceeded - the sound alert will vibrate for 20 secs

Failed to TAG Alert

- When a tool is used but the operator has not pressed the HAVwear button and placed it next to a tool tag to “connect” them the HAVwear will

- o Beep for 2 secs
- o Vibrate for 5 secs

Confirmation of communication with a Tool tag

- A single beep will sound to confirm a HAVwear has communicated with a tool tag once the HAVwear button has been pressed and held next to a tool tag.

2.1.4 Using HAVwear for SAFE-DISTANCE

If using HAVwear to monitor SAFE-DISTANCE exposure data only, simply sign out HAVwear from a Docking Station at the start of the shift and dock it back at the end of the shift. If HAVwear alerts to a proximity contact follow company guidelines on how to socially distance.

If given access to a SAFE-ZONE area as identified with a SAFE-ZONE tag it has been deemed that the area includes safeguards to physically protect you from the potential transmission of germs by nearby individuals.

When entering an “Enclosed” SAFE-ZONE as identified on the tag, press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made. Check the HAVwear displays SAFE. If another HAVwear or RASOR comes into close proximity while you are tagged to the SAFE-ZONE their proximity will not be detected and you will not be alerted.

When entering an “Open” SAFE-ZONE as identified on the tag, press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5

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seconds or until a beep sound is made. Check the HAVwear displays SAFE. If another HAVwear or RASOR comes into close proximity while you are tagged to the SAFE-ZONE their proximity will not be detected and you will not be alerted if they are also tagged into a SAFE-ZONE. If the approaching individuals have not been tagged into any type of SAFE ZONE their proximity will be detected and you will be alerted.

When leaving the a "SAFE-ZONE" press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made.

The SAFE ZONE tag includes a time out period. Within 1 minute from the time out period the HAVwear will beep to remind you to re-tag to the SAFE-ZONE tag should you continue to be within the safe area.

2.1.5 HAVwear SAFE-DISTANCE Display

When signed out to an operator, the HAVwear display shows HAV exposure data relating to their current shift unless it detects proximity contact with another device

When HAVwear has detected a proximity contact, the HAVwear will display the message **TOO NEAR**

The **TOO NEAR** message will remain on the display until the HAVwear detects that the other HAVwear has materially moved further away.

When connected to a SAFE ZONE tag, the display reads SAFE for SAFE-DISTANCE only HAVwear. For fully enabled HAVwear the display toggles between the word SAFE and HAV exposure.



Figure 3: HAVwear SAFE-DISTANCE image

2.1.6 SAFE-DISTANCE Alerts - Noise and Vibration

SAFE-DISTANCE proximity detection relies on the detection of a Bluetooth (BLE) signal within one device of a signal emitted by a second device.

The strength of the signal is used to indicate the proximity of the two devices. Field evaluations have resulted in the standard sensitivity setting within your device to most likely detect if the distance between the two devices is less than 2m. This creates a record of close proximity by the device.

Factors can influence the consistency with which a proximity is detected including the body significantly blocking the signal between the two devices or a reflective surface creating spurious signals.

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A REACTEC device will determine that a proximity has been detected should the signal strength indicate that the other unit is close and the strength of signal is maintained for at least 5 secs. This approach avoids devices being close for very short periods such as walking past raising false alarms.

1. The HAVwear constantly scans for other HAVwear devices
2. If a HAVwear detects a number of consistent signals that tells it another HAVwear is too close for > 5 secs the HAVwear receives a short buzz
3. The other HAVwear will only buzz if that HAVwear has also detected that another HAVwear is too close for > 5 secs. This is usually the case but not always as one HAVwear may have a different environment to the other eg how the HAVwear face is orientated relative to the body
4. Once the short buzz has been emitted if the HAVwear does not detect that you have moved away by 10% of the detected signal, it gives a second longer buzz after 30 secs
5. A long buzz will be repeated every 30 secs until you move away
6. There can be a delay until receiving the long buzz – which can therefore be received after you have moved away. The display will return to HAV points or SAFE when the device has detected that you have moved away
7. When not detecting a HAVwear TOO NEAR, the display shows HAV exposure points or will be blank for SAFE-DISTANCE only HAVwear.



When an operator connects to a SAFE-ZONE tag, he will no longer receive any alerts and individuals who come into close proximity to him will not be detected as it is assumed that while connected to the SAFE-ZONE tag he is physically protected by a barrier that may allow radio signals to transmit through.

2.1.7 HAVwear wrist holder

The HAVwear wrist holder comprises of two parts - HAVwear holder and wrist strap. The HAVwear is easily placed into the holder and using the strap, is secured and snugly placed around the wrist. Ensure strap is securely fastened and fitted to the wrist to minimise movement of the HAVwear.



Figure 4: HAVwear on wrist

2.1.8 HAVwear Module Specification

Power: Internal Lithium Ion Rechargeable Battery. Not user serviceable.

Charge Time: After a typical days use of HAV monitoring only with a fully charged unit the time to re-charge is 33 minutes. If a unit becomes fully discharged the time to full charge is 3 hrs. With SAFE-DISTANCE enabled a battery will be heavily depleted after one days use..

Battery Life: Max battery life 12 hours, when SAFE-DISTANCE is enabled. Max battery life when SAFE-DISTANCE is enabled is 36 hours.

Operating Temperature: -10C to +35C

Storage Temperature: -20C to +40C

Humidity: up to 100% RH

Ingress Rating: EN60529/IEC60529 to IP67

Tool Tag communications: 13.56MHz close range inductive data communication

Mobile Data communications: GSM-900 and GSM-1800

EMC and Radio Standards: EN301 489-1, EN301 489-3, EN302 291-2, EN61326-1

Safety Standards: EN61010-1

Dimensions: 37mm x 38mm x 15mm. LCD 17mm x 17mm

Weight: 38 grams

2.2 Docking Stations

Docking stations are central units which provide data archiving, transmission of data to the Reactec Analytics platform and charging for HAVwear Modules. Two variants of the Docking Station are available:

2.2.1 15 Bay Docking Station

The 15 Bay Docking Station performs the above mentioned functions for up to 15 HAVwear modules and features Ethernet and GPRS connectivity to the analytics platform.

The Docking station assigns a HAVwear to an operator when signed out at the start of a shift. When the HAVwear is returned, the Docking station automatically downloads tool usage (HAV exposure) data and recharges the HAVwear.

All data downloaded by the Docking station is transmitted by the Docking station to the Reactec Analytics Platform for analysis in the Reactec Analytics.

Connection to the Docking Station is simplest via a UK mobile network signal. In the event a signal is not available the communications module can be connected to a local area network by configuring the DHCP or a Static IP address.



Figure 5: 15 Bay Docking Station

2.2.1.1 15 Bay Docking Station display

The LCD screen displays continuously;

- Last GPRS successful communication date and time
- GPRS signal strength

The following will be displayed when required;

- Internal data memory reaching full – displayed when memory level >75% of capacity.
- Unable to read card message when presence of an Operator ID Card identified but cannot be read
- Internal battery available and charge level of battery – when mains power disconnected only
- Inadequate internal battery power. Switch the vehicle on to charge battery.

2.2.1.2 15 Bay Docking Station Specification

Power: 12V DC, 2.5A. Mains adaptor provided

Operating Temperature: 0C to +40C

Storage Temperature: 0C to +40C

Humidity: up to 95% RH

Ingress Rating: EN60529/IEC60529 to IP20

Tool Tag communications: 13.56MHz close range inductive data communication

Mobile Data communications: GSM-900 and GSM-1800

EMC and Radio Standards: EN301 489-1, EN301 489-3, EN301 511, EN302 291-2, EN55022, EN55024

Safety Standards: EN60950-1

Dimensions: 338mm x 180mm x 50mm. LCD 69mm x 69mm

Weight: 1025 grams

2.2.2 4 Bay Docking Station

The 4 Bay Docking Station performs the above mentioned functions for up to 4 HAVwear modules and features GPRS only connectivity to the analytics platform.

The Docking station assigns a HAVwear to an operator when signed out at the start of a shift. When the HAVwear is returned, the Docking station automatically downloads tool usage (HAV exposure) data and recharges the HAVwear.

All data downloaded by the Docking station is transmitted by the Docking station to the Reactec Analytics Platform for analysis in the Reactec Analytics.



Figure 6: 4 Bay Docking Station

2.2.2.1 4 Bay Docking Station Signal Strength LEDs

GPRS (mobile network) signal strength is displayed on the 4 Bay Docking Station using a series of 4 white LEDs. While the 4 Bay Docking Station can communicate with signal strength of less than 10 (one LED illuminated) it is recommended that the Docking Station is relocated to an area with stronger signal.

The LEDs will be illuminated incrementally based on the following GPRS signal strength levels

- <5 = no LEDs
- 5-10 = 1 LED
- 10-15 = 2 LEDs
- 15-20 = 3 LEDs
- >20 = 4 LEDs

2.2.2.2 4 Bay Docking Station Specification

Power: 12V DC, 2.5A. Mains adaptor provided

Operating Temperature: 0C to +40C

Storage Temperature: 0C to +40C

2 Components Overview

Humidity: up to 95% RH

Ingress Rating: EN60529/IEC60529 to IP20

Mobile Data communications: GSM-900 and GSM-1800

EMC and Radio Standards: EN301 489-1 v1.9.2, EN301 511 v9.0.2, EN301 489-7 v1.3.1, EN55022:2010, EN55024:2010

Safety Standards: EN60950-1

Dimensions: 180mm x 180mm x 50mm

Weight: 300 grams

2.2.3 15 Bay and 4 Bay Docking Station Bay LED Sequence

When a HAVwear is docked, the linking sequence is triggered by the Docking Station. The linking sequence has 3 possible results.

- If the communication between the HAVwear & Docking Station, and the HAVwear battery is OK then the green LED will stay on.
- If the communication between the HAVwear and Docking Station fails, the red LED will flash. If the red LED turns solid red, then the HAVwear should be removed and then re-docked.
- If the battery connection or charging process fails, then both the green LED and red LED will flash. In this condition the HAVwear should be removed and re-docked

If there is an error during the linking sequence, the Docking Station restarts sequence again. If, after 5 attempts, the error persists the LEDs will stay on as described in the last bullet point above.

If no LEDs are illuminated it is possible the HAVwear is not correctly seated in the bay, however it should be noted that immediately after a HAVwear is placed in the bay it may take a minute or two for all data to be downloaded and the HAVwear to be returned to active status during which time no LEDs will be illuminated.

2.3 RASOR

The RASOR is an easy-to-use device that gathers exposure data from HAVwear and other third-party sensors when within 30m of such sensors together with GPS location information. The RASOR will also detect when other HAVwear devices are within proximity to the RASOR. The RASOR also has the ability to record data on slips trips and falls and to give an automatic notification (Alarm) of a man-down situation while also allowing an operator to raise a Panic alarm through a sequence of button presses. The RASOR automatically communicates with the Reactec Analytics every 15 minutes when the RASOR can detect a suitably strong 2G communication signal.

The RASOR can be attached to a belt using the belt clip or attached using a lanyard or can remain stationary within a Dual Charger located to gather data from nearby workers.



Figure 7: RASOR

The RASOR may be carried by an individual to gather nearby colleague's data or by a supervisor to collect data from operators when passing them during his supervisory activities. Equally while docked in a Dual Charger with hub mode enabled, the RASOR will gather data from those passing nearby.

The RASOR display will notify the user from a menu of options

- The status of all data collected from HAVwear monitors (or other sensors) which have been in proximity to the RASOR since release of the RASOR.
- Information on received alerts and alarms from HAVwear monitors (or other sensors) which have been in proximity to the RASOR and the RASOR's intrinsic alerts and alarms since release of the RASOR.
- The sequence of actions required to follow a lone worker check-in check-out notification process.
- How to activate a Panic Alarm should an operator forget that this happens in response to both buttons on the RASOR being depressed for 6 seconds.
- Status information on the RASOR such as battery strength, location and last communication to the Reactec Analytics.

A Dual Charger is used to manage the charge of a RASOR and allow the RASOR to act as a communication hub for any HAVwear modules docked in the Dual Charger.

After removing a RASOR from a Dual Charger, an Operator assigns a RASOR to themselves using their Operator ID Card. This assigns the RASOR to the Operator and ensures the correct data access permissions.

2.3.1 RASOR Display

When assigned to an operator, the RASOR display shows the operator identity and battery level to indicate that it is ready for him to use through his shift.

The RASOR display will go blank after 2 minutes of inactivity, pressing any button will wake up the device which results in the top level menu being displayed. To move through the display menus and select the required data to view, the operator follows arrows on the display to press either the left or right button on the RASOR.

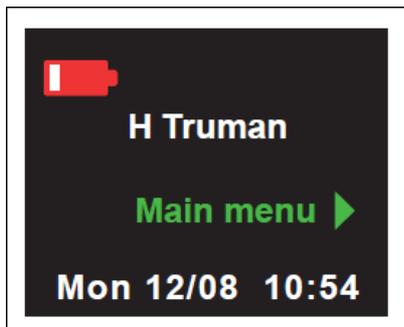


Figure 8: RASOR display

2.3.2 RASOR Alerts

The RASOR will create a noise alert in response to both routine Alerts and more critical Alarms.

Routine alerts will be transmitted every 15 minutes (default) and will contain details of the alert along with operator ID, time/date information and location of the RASOR at the time of the alert. The detection of a routine alert either from internal RASOR sensors or nearby HAVwear (or other sensors) will cause the RASOR to emit a short buzz (5 seconds) and prompt the RASOR user to acknowledge the alert. Regardless of whether the alert is acknowledged the RASOR will communicate the status change at the next scheduled upload.

Alert Notifications:

- HAV EAV breach
- Moderate SAFE-DISTANCE proximity contact
- A slip/trip/fall (not resulting in fall being detected)
- Data from 3rd party sensors not defined as critical

2.3.3 RASOR Alarms (Critical Alerts)

The detection of an Alarm either from internal RASOR sensors or nearby HAVwear (or other sensors) will cause the RASOR to emit a long buzz (20 seconds) and inform the user that an Alarm condition has been met. The RASOR user will be prompted to acknowledge the alarm. Data about the alarm will be communicated to the Reactec Analytics immediately. The Reactec Analytics can be configured to send an email and/or SMS message. If the wearer is also wearing a HAVwear then a message will be sent to the HAVwear and initiate the ELV breach notification on the HAVwear.

Alarm Notifications from Internal RASOR Sensors:

- Panic Button activated
- Man Down

Alarm Notifications from nearby HAVwear or third party sensors:

- HAV ELV breach
- Sustained SAFE-DISTANCE proximity contact
- Data from third party sensors defined as an Alarm

If the Check-In functionality is enabled an Alarm will be raised if the Operator fails to check in during the configured time. If the RASOR loses mobile connection an Alarm will be raised when the check in time expires, even if the operator has pushed the check in button on his RASOR. In this case, the

2 Components Overview

check in message will be sent from RASOR as soon as it reconnects with the mobile network, and this will cancel the Alarm. The Check In functionality can be disabled on the Operator Check-In Options page in the Analytics by clicking on Data/Project Manager and then clicking on Operator Check-In options:

Operator Check-In Options [Help](#)

Check In Feature Status Active Available Disabled

Standard Interval

Critical Interval

Grace Period

[Save](#)

Notice *Disabling Check-In also disables Fall Detection*

The Panic function can also be disabled on the RASOR options page in the analytics. Click on **Data/Project Manager** then click on **RASOR Options**

Razor Options [Help](#)

Upload Frequency	15 mins ▼
Location Frequency	1 min ▼
Alarm Grace Period	0 secs ▼
Alarm Resend Frequency	5 mins ▼
Time Zone	(UTC+00:00) Dublin, Edinburgh, Lisbon, London ▼
Panic Button Enabled	<input checked="" type="checkbox"/>
Fall Detection Enabled	<input type="checkbox"/>

Save

2.3.4 RASOR Specification

Power: Internal Lithium Ion Rechargeable Battery. Not user serviceable

Charge Time: After a typical days use of a fully charged unit the time to re-charge is 1hr. If a unit becomes fully discharged the time to full charge is 3 hrs. With SAFE-DISTANCE enabled a battery will be heavily depleted after one days use.

Battery Life: Max battery life 24 hours

Operating Temperature: -10C to +40C

Storage Temperature: -20C to +40C

Humidity: up to 100% RH

Ingress Rating: EN60529/IEC60529 to IP67

RFID communications: 13.56MHz close range inductive data communication

Mobile Data communications: GSM-900 and GSM-1800

Wireless Personal Area Network: Bluetooth Low Energy 4.2

EMC and Radio Standards: EN 55032, EN 55035, EN 301 489-1, EN 301 489-3, EN 301 489-17, EN 301 489-52, EN 300 330, EN 300 328, EN 301 511

Safety Standards: EN62368-1

Dimensions: 62mm x 92mm x 15mm (belt clip not fitted). Display 29mm x 36mm

Weight: 120 grams

2.4 Dual Charger

The Dual Charger is a central unit which provides charge management for the RASOR and up to two HAVwear modules and enables 2G connectivity to the Reactec Analytics via a docked RASOR device.



Figure 9: Dual Charger

The Dual Charger assigns a HAVwear to an operator when signed out at the start of a shift. When the HAVwear is returned, the Dual Charger automatically charges the HAVwear. When a RASOR is returned to the Dual Charger, the data gathered by both the RASOR and any previously or subsequently docked HAVwear are transmitted to the hosted Reactec Analytics for analysis.

2.4.1 Dual Charger HAVwear LED Sequence

When a HAVwear is docked, the linking sequence is triggered by the Dual Charger. The linking sequence has 3 possible results.

- If the communication between the HAVwear & Dual Charger, then the green LED will stay on.
- If the communication between the HAVwear and Dual Charger fails the red LED will flash. If the red LED turns solid red, then the HAVwear should be removed and then re-docked.
- If the battery connection or charging process fails then both the green LED and red LED will flash. In this condition the HAVwear should be removed and re-docked

If there is an error during the linking sequence, the Dual Charger restarts sequence again. If, after 5 attempts, the error persists the LEDs will stay on as described in the last bullet point above.

If no LEDs are illuminated it is possible the HAVwear is not correctly seated in the bay, however it should be noted that immediately after a HAVwear is placed in the bay it may take a minute or two for all data to be downloaded and the HAVwear to be returned to active status during which time no LEDs will be illuminated.

2.4.2 Dual Charger RASOR LED Sequence

When a RASOR is returned to a powered Dual Charger the screen will prompt the operator to log out by pressing the LH button. The operator should log out if his work is finished for the day. If his workday is not finished but he wishes to place the RASOR in the dual charger for safe keeping for

2 Components Overview

instance if he is driving to another location, he should simply return the RASOR to the dual charger and leave it in place. If a RASOR remains in a power dual charger for 4 hours with no further use, the RASOR will be automatically logged out and no longer assigned to the individual who had docked it. A RASOR which has not been logged OFF can be removed from the Dual Charger before the 4 hour period for ongoing use as an assigned device.

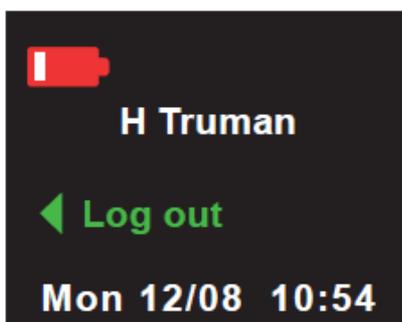


Figure 10: RASOR Display

When a RASOR is docked, the linking sequence is triggered by the Dual Charger. The linking sequence has 3 possible results.

- If the communication between the RASOR & Dual Charger, then the green LED will stay on.
- If the communication between the RASOR and Dual Charger fails the red LED will flash. If the red LED turns solid red, then the HAVwear should be removed and then re-docked.
- If the battery connection or charging process fails then both the green LED and red LED will flash. In this condition the RASOR should be removed and re-docked

If there is an error during the linking sequence, the Dual Charger restarts sequence again. If, after 5 attempts, the error persists the LEDs will stay on as described in the last bullet point above.

If log out is not selected the RASOR screen will display as below until the end of the 4 hour period, after which the display will go blank.

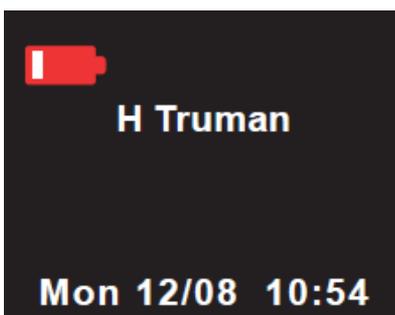


Figure 11: RASOR Display

2.4.3 Dual Charger Specification

Power: 12V DC, 2.5A. Mains adaptor provided

2 Components Overview

- Operating Temperature:** 0C to +40C
- Storage Temperature:** 0C to +40C
- Humidity:** up to 95% RH
- Ingress Rating:** EN60529/IEC529 to IP20
- EMC:** EN 55032, EN 55024, EN 55035
- Safety Standards:** EN62368-1
- Dimensions:** 180mm x 180mm x 50mm
- Weight:** 300 grams

2.5 HAVwear Tool Tags

HAVwear Tool Tags are small, robust components which are adhesively attached to all monitored vibrating equipment.

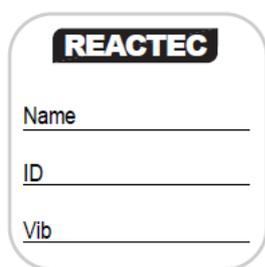


Figure 12: HAVwear Tag on tool

HAVwear Tool Tags contain tool specific data which is read by the HAVwear using RFID communication.

Ultimately customers will be responsible for deciding if any information is to be displayed on the HAVwear tag. Reactec would recommend the following be displayed

- Manufacturers model number for the tool
- Customer's asset number for the tool
- Tool vibration level programmed

2.6 SAFE-ZONE Tags

SAFE-ZONE Tags look similar to HAVwear Tool Tags with different external markings and intended for a very different application.



Figure 13: SAFE-ZONE Tag

SAFE-ZONE tags contain information that enables the proximity detection of a HAVwear to be switched off. This is intended for situations where an individual is physically protected from transmission of germs but may be able to detect signals from other devices which are in proximity.

The SAFE-ZONE tag is programmed with the following information

- The zone type – open or enclosed (see below)
- The name of the location of the tag (up to 32 characters)
- The number of minutes after which the operator will be automatically tagged out of the Safe Zone (defaults to 10 minutes, can be set to zero if no timeout is required).
- Optionally the latitude and longitude of the location of the tag

Ultimately customers will be responsible for deciding if any information is to be displayed on the SAFE-ZONE tag.

2.7 Operator Identity Cards

Operator Identity Cards are provided to each operator to uniquely identify them in the Analytics Platform.

**Figure 14: Operator Identity Cards**

Operator identity cards are used to sign out HAVwear at the start of a shift. This identifies the operator with the HAVwear ensuring the correct exposure action value (EAV) and exposure limit value (ELV) data is used.

A control is available within the Analytics to limit the potential for an Operator to sign out more than one HAVwear device within a configurable period. The default for this control is set to off, meaning that the same Operator ID Card can be used to sign out more than one HAVwear. To change this control please refer to section named Operator Sign Out Options

There are two possible types of Operator identity cards

1. RFID Cards (MIFARE Classic 1KB)
2. RFID CSCS Cards

Each operator must have their own Identity Card programmed with individual information.

2.8 Reactec Analytics Overview

The Reactec Analytics is a cloud-based software application with multiple functions to support the analysis and reporting of HAV risk assessment exposure data and social distance breaches collected by HAVwear and data gathered by RASOR devices. The Reactec Analytics provides fully

2 Components Overview

auditable and tamper proof data management, allowing Users to view a wide variety of online reports and manage the monitored risk.

- View Live collated exposure data and employee location.
- Assess daily HAV exposure trends and KPI's from specific teams to company-wide activity.
- Monitor Alerts and Alarms from daily activities.
- Monitor social distance proximity detections
- Track third party sensor exposure trends and KPI's.
- View reports by Division, Region or other categorisations, for example, by project.
- Email or download reports as PDF documents.
- Record interventions and control measures to support risk management.

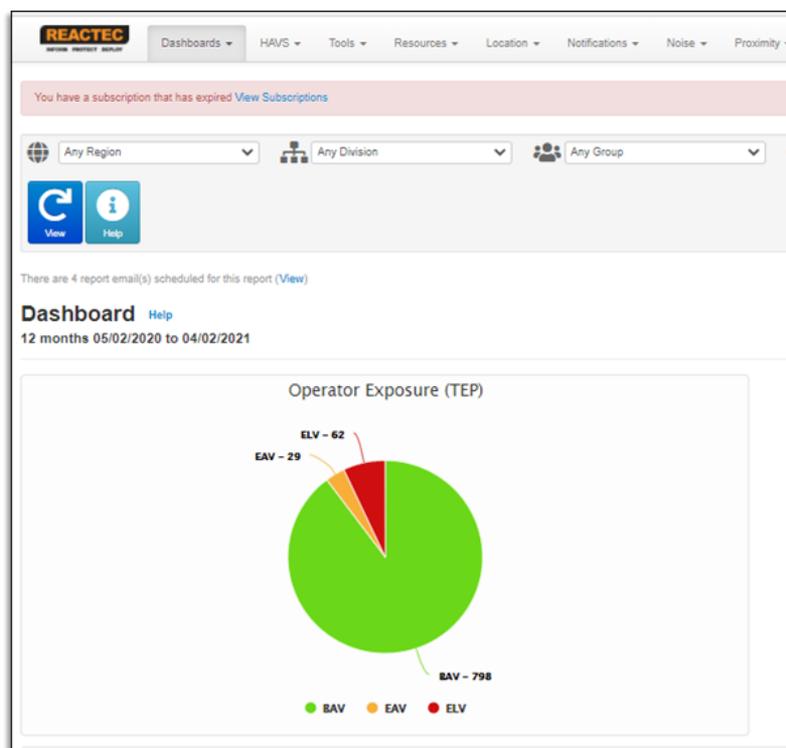


Figure 15: User interface

Employees require a Reactec Analytics user account to access the system. Four types of user account are available:

- Report - View reports and set up own alerts (no ability to add or amend any information within the Reactec Analytics.)
- Group Administrator – Manage Users, Operators, Asset Administration (Hardware & Tools), Manage Data, Control Measures and Interventions for specified groups.
- Administrator – In addition to the above, manage all Users accounts, all Groups, Permissions, HAV Options and Export Data

In addition to the above, an Administrator can give any User, access to the HAVwear SEP data reported in the Reactec Analytics.

User access can be restricted by Reports module and Groups. Users require an Administrator or Group Administrator user account to manage users.

3 Daily Routine

3.1 HAVwear Use

The HAVwear is designed to monitor an operator's HAV risk assessment exposure levels and/or SAFE-DISTANCE.

Operators sign out a HAVwear at the start of the shift, and return it at the end of the shift. This ensures that the operator's HAV exposure and proximity to other operators is gathered across their working shift. Signing out a device is achieved by the use of a personal ID card which should be unique to the operator. A control exists to help ensure that any operator ID card is only used once within a configurable period up to 4 hours. See 290-101 Software Administration Guide on how this control is implemented.

Notice

Operators can return their HAVwear to any available Dual charger or Docking Station at the end of the shift. This need not be the same Dual Charger or Docking Station it was signed out from.

Operators must use the following routine on each shift:

3.1.1 Sign out HAVwear from a 15 Bay Docking Station

1. Havwear is signed out from the Docking station by presenting an operator ID card to the screen area of the Docking Station. On successfully reading the card the Docking Station will emit a buzz.
2. Next to each Docking Station bay are two LED lights. The HAVwear to be used by the operator will be identified by the green LED flashing at the bay and the HAVwear screen becoming active. Remove the HAVwear from the bay with the flashing LED. Place the HAVwear into the holder and securely fasten it to the wrist.

3.1.2 Sign Out HAVwear from a 4 Bay Docking Station

1. To sign out HAVwear, press and release the Docking station button.
2. Wait until a red LED flashes next to a HAVwear. This identifies which HAVwear can be signed out.
3. Place a valid ID card on top of the HAVwear until a beep sounds.
4. Remove the ID card and the HAVwear will display the first name initial and first three letters of the ID card owner's surname.
5. The HAVwear is now allocated to the ID card owner and should be collected from the Docking Station.
6. Place the HAVwear into the holder and securely fasten it to the wrist.

3.1.3 Sign Out HAVwear from a Dual Charger

1. To sign out a HAVwear, press release the Dual Charger release button.
2. Wait until a red LED flashes next to a HAVwear. This identifies which HAVwear can be signed out.
3. Place a valid ID card on top of the HAVwear until a beep sounds.
4. Remove the ID card and the HAVwear will display the first name initial and first three letters of the ID card owner's surname.
5. The HAVwear is now allocated to the Operator ID card owner and should be collected from the Dual Charger
6. Place the HAVwear into the holder and securely fasten it to the wrist.

3.1.4 Using HAVwear

3.1.4.1 Using HAVwear for SAFE-DISTANCE

If using HAVwear to monitor SAFE-DISTANCE exposure data only, simply sign out HAVwear from a Docking Station at the start of the shift and dock it back at the end of the shift. If HAVwear alerts to a proximity contact follow company guidelines on how to socially distance.

If given access to a SAFE-ZONE area as identified with a SAFE-ZONE tag it has been deemed that the area includes safeguards to physically protect you from the potential transmission of germs by nearby individuals.

When entering an "Enclosed" SAFE-ZONE as identified on the tag, press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made. Check the HAVwear displays SAFE. If another HAVwear or RASOR comes into close proximity while you are tagged to the SAFE-ZONE their proximity will not be detected and you will not be alerted.

When entering an "Open" SAFE-ZONE as identified on the tag, press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made. Check the HAVwear displays SAFE. If another HAVwear or RASOR comes into close proximity while you are tagged to the SAFE-ZONE their proximity will not be detected and you will not be alerted if they are also tagged into a SAFE-ZONE. If the approaching individuals have not been tagged into any type of SAFE ZONE their proximity will be detected and you will be alerted.

When leaving the a "SAFE-ZONE" press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made.

The SAFE ZONE tag includes a time out period. Within 1 minute from the time out period the HAVwear will bleep to remind you to re-tag to the SAFE-ZONE tag should you continue to be within the safe area.

3.1.4.2 Using HAVwear to Monitor HAV Exposure

If using HAVwear to monitor HAV exposure before using each tool within a shift press and release the HAVwear button and place the HAVwear face close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made. Check the HAVwear display for the tool ID. If the tool ID does not match the tool tag, repeat the process. Repeat this process for each tool used

3 Daily Routine

during the shift. In the event an operator fails to tag a tool, and the HAVwear detects tool use, a sound and vibration alert will be made for 5 seconds.

The HAVwear remains connected to the tool after the tool use has ended unless it is connected to another tool, or the operator switches HAVwear OFF or connects it to an OFF tag.

Check the HAVwear display regularly during the shift to monitor exposure.

The HAVwear counts up the HAV exposure in points as the operator uses the power tool.

Lights	Description	Alerts	Operator Actions
Green	Remains below EAV (action value)		GO - Below EAV. Aim to stay in this region
Amber 1	<33% of Gap between EAV and ELV	2 second vibration and buzzer alert	BE AWARE – EAV Exceeded. Reduce tool usage, share workload – supervisors on alert
Amber 2	>33% < 66% of Gap between EAV and ELV	5 second vibration and buzzer alert	
Amber 3	>66% of Gap between EAV and ELV	10 second vibration and buzzer alert	
Red	Greater than ELV (limit value)	20 second vibration and buzzer alert	STOP – ELV exceeded. Stop using hand held power tools

Figure 16: HAVwear Indicator Lights & Alerts Table

At the end of the shift return the HAVwear to a Dual Charger or Docking Station.

When placing the HAVwear into a Dual Charger or Docking Station bay, the green LED next to the bay will light continuously after 10 seconds to confirm that the connection between the HAVwear and Docking Station is good. If the green LED is not on 10 seconds after docking, then there is an error with the connection. The HAVwear should be removed and the contact points on the back of the HAVwear cleaned to ensure there is no dirt contaminating the connection points. If the error remains contact Reactec technical support.

When a HAVwear is **not** being docked at the end of every shift it will automatically reset the operator exposure points displayed on the device when it senses a period of inactivity lasting 10 hours or more.

A HAVwear should not be removed from the wrist during a working shift. If there is reason to remove the HAVwear from the wrist, ensure an OFF tag is used prior to removal, or the HAVwear is switch OFF.



Place the module into the Docking Station or Dual Charger retaining clips and press down on the orange plastic moulding of the device to ensure it is firmly clipped into place. Do not press down on the LCD screen of the unit as repeated or excessive force to this window may damage the unit.

3.1.5 Switching HAVwear OFF for HAV Exposure Monitoring

Switching HAVwear OFF or use of an OFF tag is recommended after using tools with a vibration magnitude $>5\text{m/s}^2$ to ensure TEP points are not accumulated for non tool use, eg. riding in a vehicle. SEP points are not affected by the use of an OFF tag.

Switch HAVwear OFF:

HAVwear may be switched OFF by an operator. Before a HAVwear can be switched OFF a flag must be set with the Analytics Reports by a company Administrator to enable this functionality. See "Software Administration Guide". If the flag has been set within the Analytics Reports a tool user may prevent a HAVwear from registering exposure points by the following actions.

- Press and hold continuously the HAVwear button for 5 seconds until the display reads OFF? in the central points display line.
- Release the HAVwear button and press the HAVwear button again.
- The display will return to show exposure points in the central display line and will show OFF in the tool ID line.
- Once switched OFF the HAVwear display will remain on showing the points accumulated until it was switched OFF, but the HAVwear will not collect any more TEP exposure points until a tool tag is read. The HAVwear will continue to sense SEP points

The HAVwear is returned to an ON state by pressing the HAVwear button once and placing the HAVwear face close to a HAVwear Tag to enable communication for approximately 5 seconds or until a beep sound is made. The operator should take care to ensure the display identifies the tool ID and repeat the tag read process until it does.

To program an OFF tag, refer to the Tool Tag Manager Guide and use the following details

- Tool ID: OFF
- Manufacturer: OFF
- Model: OFF
- Description: OFF
- Vibration Level: 0m/s^2

3.1.6 Detect Missing Daily Dock

A module will track the time from first sign out. If the time exceeds 24 hours it will be assumed that the operator failed to dock between working days. When this is detected, if the module can detect a time of >8 hours of no trigger time then the exposure records before this break in trigger time will be attributed to day 1 activity and exposure points after the break in trigger time will be attributed to day 2 activity

3.2 RASOR Use

The RASOR is designed to gather data from internal and nearby HAVwear (or other third party) sensors and record the location of the RASOR at the time the data was recorded or received. The RASOR will also detect proximity to other Reactec devices. The RASOR will automatically transmit data every 15 minutes (default) when in range with a suitable mobile communications signal. Finally, the RASOR provides lone worker capabilities such as man-down and panic alarms to the user of a RASOR.

3.2.1 RASOR Modes

RASOR has two modes of working. One whereby the RASOR is assigned to an individual by signing out using an Operator ID Card – the **Operator Mode**. The second whereby the RASOR is permanently located in a powered Dual Charger for the purpose of collecting data for anyone who moves within range of the RASOR – the **Hub Mode**. The Hub Mode is a configurable mode set within the Reactec Analytics. The default setting is for this is Operator Mode. Companies wishing to operate a RASOR in a fixed location within a powered dual Charger should apply the Hub Mode setting in the Reactec Analytics.

3.2.1.1 RASOR Operator Mode

Operators assign a RASOR at the start of the shift and return it to a Dual Charger at the end of the shift to log off. This ensures that the Dual Charger can manage the battery performance of the RASOR.

Notice *A RASOR can be returned to a Dual Charger within a shift for safe keeping and need not be logged out.*

Assign a RASOR:

1. Remove the RASOR from the Dual Charger, the screen will display the need to assign the RASOR to a User by pressing the button.
2. The screen displays an instruction to place a valid Operator ID card onto the screen area. Once placed, remove the Operator ID Card when a beep sounds to confirm the RASOR has been assigned.
3. After assignment the screen will display the User's first name initial and last name. it will also display the option to select the button to view the main screen.
4. The main menu button controls are displayed at the top of the screen to navigate and select the menu options.
5. Clip the RASOR to a belt or use the lanyard to secure it.

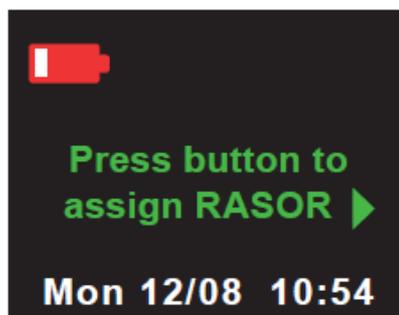


Figure 17: RASOR Display - Assign

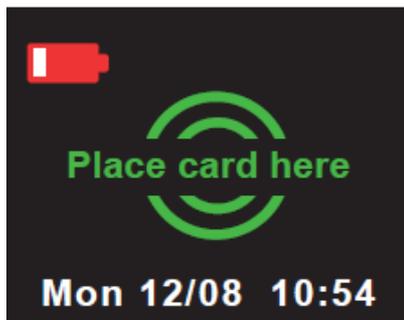


Figure 18: RASOR Display - Place an Operator ID Card

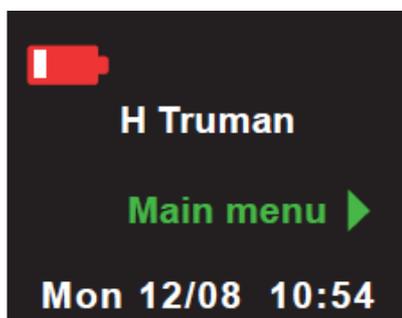


Figure 19: RASOR Display -Assigned

3.2.1.2 RASOR Hub Mode

When a RASOR is to be used for the hub mode the RASOR needs to be configured for this purpose by applying the setting in the Reactec Analytics. A RASOR to be used in Hub Mode, for instance in a fixed wall setting, should be permanently docked in a powered Dual Charger. If a RASOR is removed from the Dual Charger it will only have the ability for the system menu to be accessed to determine the status of the device and will display a message that it should be returned to a Dual Charger.

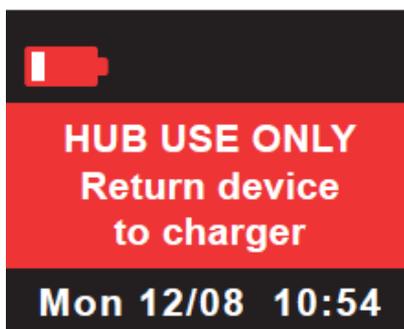
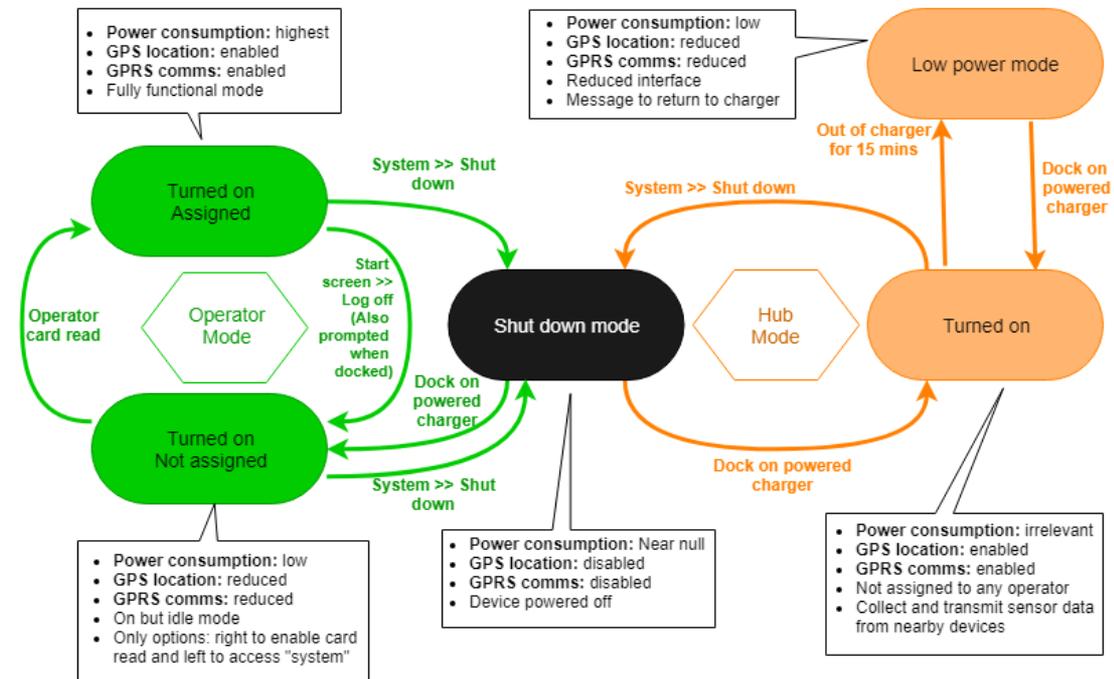


Figure 20: RASOR Display

A RASOR device can be configured in and out of Hub Mode by use of the setting in the Reactec Analytics. Once the setting has been changed in the Reactec Analytics the device will be reconfigured the next time there is a communication from the Reactec Analytics to the RASOR.

3.2.1.3 RASOR Modes Power Consumption

The below explains the active functionality within the RASOR when in it's various modes of operation. This has been designed to minimise battery consumption while optimising the required functions for the anticipated use of the RASOR when in use.



• Rasor device cannot detect an unpowered charging station. Docked on an unpowered station and not docked are equivalent.

Figure 21: Power Consumption Table

3.2.2 Using RASOR to View Colleague's Data

After assignment, the RASOR display will go blank after 2 minutes of inactivity. Pressing any button will wake up the device which results in the top level menu being displayed. To check any data that has been collected by the RASOR since it was assigned, press the LH button to select HAV data to view all HAVwear data collected by the RASOR and to enter Training mode

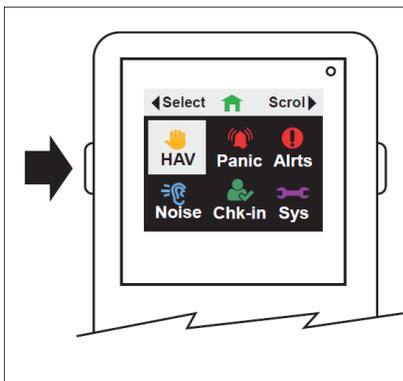


Figure 22: RASOR Display

Use the RH button to scroll across all colleague's data.

If the collected data is considered an Alert or Alarm the RASOR will allow the message to be confirmed. After scrolling right through all colleagues data the last scroll to the right returns the screen to the home menu.

3.2.3 Using RASOR for SAFE-DISTANCE

If using RASOR with SAFE-DISTANCE enabled, simply assign RASOR at the start of the shift and log off at the end of the shift. If RASOR alerts to a proximity contact follow company guidelines on how to socially distance.

If given access to a SAFE-ZONE area as identified with a SAFE-ZONE tag it has been deemed that the area includes safeguards to physically protect you from the potential transmission of germs by nearby individuals.

When entering an "Enclosed" SAFE-ZONE as identified on the tag, press the left hand button from the RASOR home page and place the RASOR close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made. Check the RASOR displays a shield symbol on the top bar. If another HAVwear or RASOR comes into close proximity while you are tagged to the SAFE-ZONE their proximity will not be detected and you will not be alerted.

When entering an "Open" SAFE-ZONE as identified on the tag, press the left hand button from the RASOR home page and place the RASOR close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made. Check the RASOR displays a shield symbol on the top bar. If another HAVwear or RASOR comes into close proximity while you are tagged to the SAFE-ZONE their proximity will not be detected and you will not be alerted if they are also tagged into a SAFE-ZONE. If the approaching individuals have not been tagged into any type of SAFE ZONE their proximity will be detected and you will be alerted.

When leaving the a "SAFE-ZONE" press the left hand button from the RASOR home page and place the RASOR close to the Tag to enable communication for approximately 5 seconds or until a beep sound is made.

The SAFE ZONE tag includes a time out period. Within 1 minute from the time out period the RASOR will beep to remind you to retag to the SAFE-ZONE tag should you continue to be within the safe area.

3.2.4 RASOR Training Aid

The Training Aid allows Supervisors to pro-actively guide their Operators in best use of a tool.

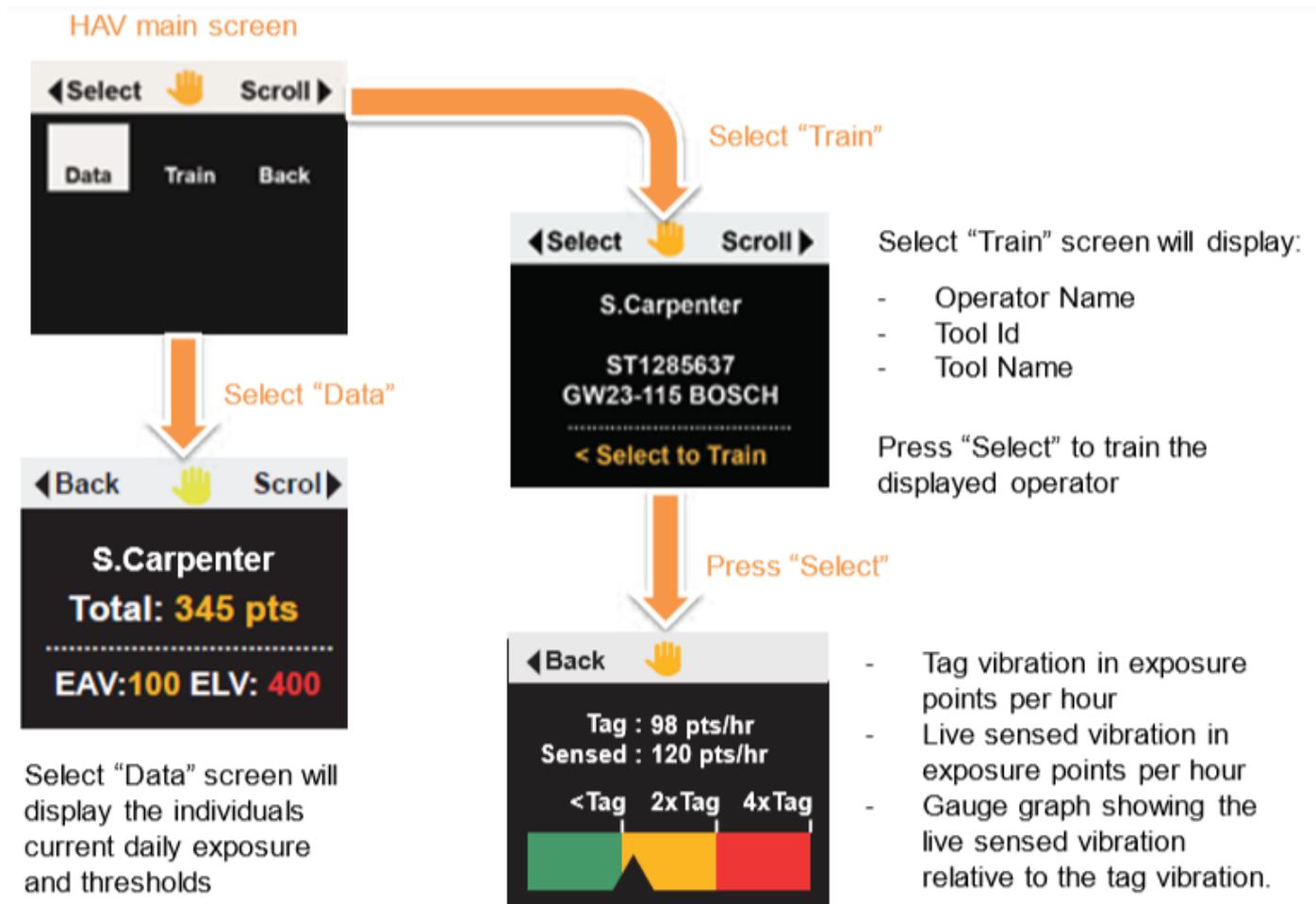


Figure 23: RASOR Display

3.2.5 Using RASOR to View and Confirm Received Alerts & Alarms

Enter the Alerts and Alarms menu by scrolling with the RH button to highlight Alerts and use the LH button to select. Scroll between alerts / alarms using the RH button and confirm as appropriate by using the LH button.

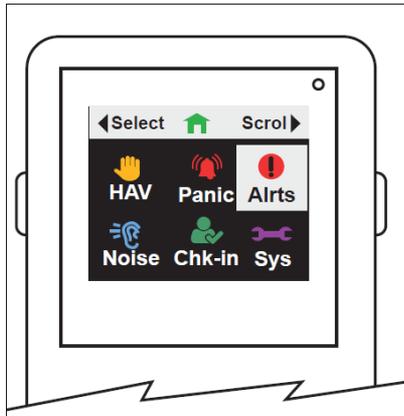


Figure 24: RASOR Display

3.2.6 Using a RASOR to Raise a Panic Alarm

An alarm can be generated at any time by pressing both buttons for 6 seconds. Instructions are included in the RASOR for situations where a user forgets how to trigger an Alarm.

When an alarm is activated there is an audible alert being generated by the RASOR and the following sequence of events.

1. After the alarm is activated there is a configurable wait period during which the operator can again cancel the alarm by pressing both LH and RH button simultaneously.
2. After the configurable wait, the Alarm is raised with the Reactec Analytics. Settings within the Reactec Analytics determine the consequence of the raised Alarm.
3. The Alarm signal will be resent to the Reactec Analytics at a configurable interval.
4. The operator can cancel the Alarm at any time in the above sequence by pressing the LH and RH button simultaneously

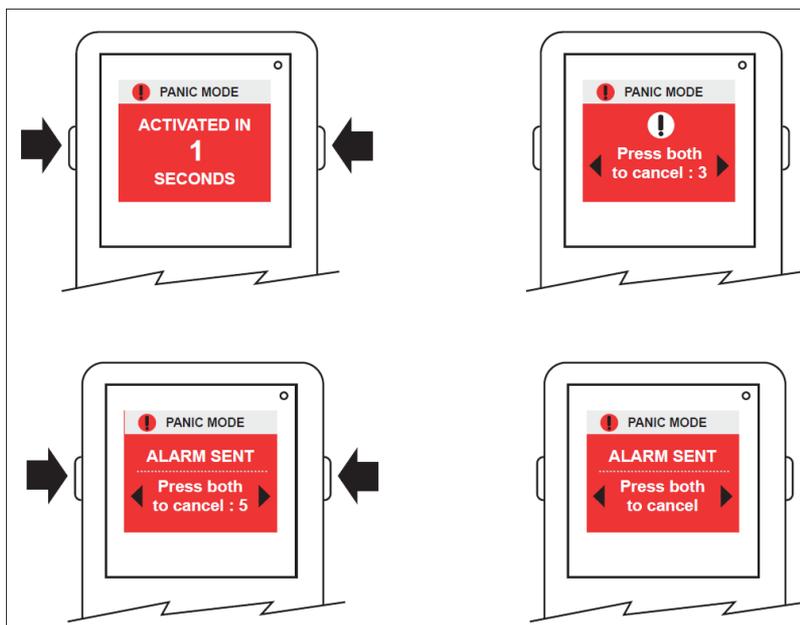


Figure 25: RASOR Panic mode Display

3.2.7 RASOR Fall Detection

A RASOR will detect if the user of the RASOR has fallen. Fall Detection is also referred to as the detection of slips, trips or falls. For best results the RASOR should be carried in a breast pocket. A combination of accelerometer and gyroscope readings determine if the motion sensed constitutes a fall as opposed to the device being dropped. This detection process should not be considered to be foolproof. Falls detected by the RASOR result in Alert notifications.

If the RASOR detects no motion of the RASOR device for more than 1 minute, after having detected a fall, the RASOR will immediately raise an Alarm notification to the Analytics..

Within the Analytics Fall Detection can be disabled. Fall Detection can be disabled at a company level or for individual RASOR's. The individual RASOR setting takes precedence over the company setting. Refer to 290-101 Software Admin Guide for details,

3.2.8 Using RASOR to Check In - Check Out

When the check in feature is configured to appear in the device menu it can be activated by either the device user or through analytics. The check in feature may be switched off through the RASOR and may also be remotely switched off and alarms cancelled through analytics.

Within analytics the duration of check in frequency can be configured within a drop-down menu ranging from 15 minutes to 4 hours. When the device is configured to enable an operator to switch on check in mode the operator will be allowed a choice of two check in frequencies defined by the customer through analytics. Refer to the Software Administration Guide for instructions on how to configure RASOR.

The operator will have the ability to check in early in which case the check in counter will be reset to the start of the defined check in frequency. This will be offered through a prompt to "check in" activated by a single button press while the device is operating in check in mode. A countdown

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clock will also be offered when the screen is awakened display "next check in". The operator will need to confirm this.

When an operator checks in a communication will be sent to analytics immediately (providing the RASOR has a mobile phone signal) and a confirmation returned and displayed on the RASOR.

When 90% of the check in time is reached, the RASOR will sound the buzzer for 10 seconds. The RASOR will display on screen a prompt to check in and the screen will remain active for the duration of the wait time until the check in time expires. Wait time is defined as 10 % of the check in interval. Once wait time has expired the RASOR will sound the buzzer again for 30 seconds and wait for a grace period before sending a failed to check in alarm to the analytics immediately. The grace period will be configurable in analytics. The grace period can be set to 0, which means no grace period and an alarm will be sent when the end of the check in interval is reached.

Once a failure to check in alarm has been triggered the buzzer will sound again for 30 seconds and continue to sound for 30 second at the configurable interval for resending Alarm notifications until the RASOR receives a cancel command. The operator can cancel a failed to check-in state by pressing and holding both buttons.

When analytics receives a failed to check in alarm from the RASOR, it will be reported in the "ALARM" notifications of the Analytics.



For all Analytics Users assigned to Groups, Alarms for any operator within a group will result in email notifications and text message notifications. (If a mobile phone info is entered for that User.)

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Figure 26: RASOR Check In Display

3.2.9 Returning RASOR to a Dual Charger

This need not be the same unit as it was signed out from.

When placing the RASOR on a Dual Charger the operator will be prompted to logout by pressing the LH side button. The operator should logout if they have no further use for the RASOR in the working day. A RASOR can be returned to a Dual Charger for safe keeping with the intention of using later in the working day. The RASOR should simply be placed in the Dual Charger without logging out. Note after 4 hours of being returned without being logged out the RASOR will be automatically logged out and returned to an unassigned status.

When placing the RASOR into a Dual Charger bay, the green LED next to the bay will light continuously after 10 seconds to confirm that the connection between the RASOR and unit is good. If the green LED is not on 10 seconds after docking, then there is an error in the connection. The RASOR should be removed and the contact points on the back of the RASOR cleaned to ensure there is no dirt contaminating the connection points. If the error remains, contact Reactec technical support

3.3 Reactec Analytics Reports Filtering

The Reactec Analytics Toolbar provides access to the available Reports modules. To access a report, click the drop-down menu for the required Reports module, for example **Tools**, then select a Report.

Use the Filter panel to filter the data used in a Report by the Group, Region or Division, and by date range. Labels can be assigned to Operators and provide a fine-grained method of dynamically grouping Operators. All reports that contain Operator data can be filtered by one or more labels. Where multiple Labels are selected, an Operator will be included in the report results if they are currently assigned to any one of the selected Labels.

Note. The Reactec Analytics will maintain a history of label assignments in order to allow reports run on historical data to be filtered using the labels that were assigned to the operators at the time the data was stored in the Reactec Analytics.

To filter the data, select the required filter criteria using the drop-down menus in the Filter panel, then click **View**.

The Report chart displays the data for the chosen Report, filtered according to the selected filter criteria.

3.4 Reactec Analytic Reports

Please see the tables below for a summary of the all reports from the Reactec Analytics.

3.4.1 HAV Management - Exposure Data Reports

Report	Description	Use	Frequency
LIVE Dashboard	Key statistics received from RASOR devices active within the day.	Monitor the exposure levels of deployed operators and track the locations of active RASOR's.	N/A
Dashboard	A general summary report that details HAV exposure data both by specific date range and by year. It also displays a status of all Docking Stations	This report is useful to view at a glance, exposure thresholds that have been exceeded and the Average Operator daily exposure for each project group. It also provides a status of Docking Stations that can highlight at a glance if they are actively being used. The Dashboard is interactive, by clicking and/or hovering over specific data will allow deeper analysis of each report. The dashboard is also configurable. Clicking on the 'Edit' button, allows the user to amend the view to show data which is of greatest importance to them.	Monthly /Quarterly/Annually
Workforce Aver-	General management	Review trend of overall HAV exposure	Monthly/Quarterly

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Age Exposure	report to show the exposure trend for a date range.	and the impact of either exposure reduction activity and or levels of workload in relation to average exposure levels.	
Exposure Levels Reached	General management report to show the number of operator days that fell into each HSE exposure level.	Monthly/Quarterly as part of the management review, total exposure level breaches and exposure level breaches over time.	Monthly/Quarterly
Workforce Daily Exposure	A graphical report to show the daily exposure data for each operator over the specified date range.	Review to see the spread of exposure points across the workforce or group, day by day. Useful for comparing operator's level of exposure.	Weekly/On Demand
Operator Daily Exposure	A detailed report to show the daily exposure data for each operator. The report shows the operator's total exposure as well as the time spent using tools and Intervention notes. The report will also inform in greyed out text active operators who have not used the system in the report period.	Review to see who has breached exposure levels, on what projects and from which tools they have accrued exposure. Also review tool sharing activity. This reports displays Intervention notes against specific operators where recorded. Interventions can be added by users with access to administer interventions by clicking the plus symbol. Details of any interventions recorded can be viewed by clicking the magnifying glass. Intervention details will include whether a signature has been collected against the intervention	Daily/Weekly
Operator Average Exposure	The report shows the number of days monitored for the specified date range and the same prior period. It also reports the number of times the operator has breached thresholds. The exposure variance illustrates increased or decreased exposure relative to the prior period. The report will also inform in greyed out text active operators who have not used the system in the report period.	Review operators most exposed overall and their exposure trends. Further view of tools used overall to understand main source of exposure as well as specific daily tool use and tool sharing. This information better supports exposure reduction planning.	Weekly/Monthly / Quarterly/Annually
LIVE Operator HAV Exposure	A report of all HAVwear data transmitted by RASOR devices for HAVwear devices which have not been docked.	Review operators HAV exposure levels during the working day	N/A
LIVE Operator HAV Location	Identifies the location of active RASOR devices at the time of their last communication.	Track the location of active RASOR devices.	N/A

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Operator Exposure Action	A detailed report to show the daily exposure data for each operator as well as the source of the exposure and any interventions logged against them. There is space for an operator signature in the case of companies who wish to download PDF copy and have the report signed and filed for personnel files.	Review to see who has concerning levels of exposure , which tools they have Driven the exposure and what interventions have been put in place. Where an intervention has been added a signature box is available to collect a signature against the intervention	Weekly/Monthly
Top Tool Exposure	A general management report to show the aggregate exposure to each tool for the selected date range.	Review which tools are most exposing operators to HAV overall and the trend of exposure. This can help in understanding actions that will provide the greatest benefit in reducing exposure to workers by identifying tool replacements or changes in working practices.	Monthly/Quarterly/ Annually
Control Measure Analysis	A rolling 12 month report that displays the average HAV daily exposure data expressed as a % of average ELV for each month against any HAV daily exposure targets set and any reported Control.	Track HAV exposure control measures and impact against targets to review company performance against targets and allow assessment of effectiveness of risk reduction activities. Control measures and targets can be created company-wide and by specific projects/groups.	Quarterly/Annually
Intervention Dashboard	For the selected date range, a graphical display of HAV exposure data and the number of Interventions recorded over the specified date range.	Review the HAV exposure levels, the number of recorded Interventions and the number of signatures collected against interventions.	Weekly/Monthly/Quarterly
Intervention List	A general management report that lists all Interventions with full details of who the Intervention has been logged against and when.	To record Interventions taken against concerning levels of exposure. Interventions can be recorded against individual operators and by project/ group.	Monthly/Quarterly
Blocked Data	A general management report that lists all Blocked Data records and who blocked it.	To review what data has been blocked and by whom.	On Demand

3.4.2 HAV Management - Tool Data Reports

Report	Description	Use	Frequency
Tool Tag Variation	Comparisons between tool programmed vibration magnitude and HAVwear sensed vibration.	To assess if tools are being used for the wrong task. Assess if tools are being used incorrectly by the operator. Assess if tool tags have been programmed incorrectly. <i>It is recommended that tool tag variations merit investigation only when it has been determined from the top tool exposure report that the tool is heavily used and creates a significantly higher SEP to TEP risk assessment.</i>	On Demand/ Monthly/Quarterly
Tool Usage	Shows use of individual tools ranked by trigger time.	Identify if tools are used more than others to address over reliance on specific tools and to support proactive and predictive tool maintenance. Assess overall tool use within a project or team. Assess numbers of days specific tool types are used to assess sufficient stock levels and remove redundant tools. Understand correct tool use for projects through viewing tool usage per day by operators.	Quarterly/Annually
Tool Utilisation	A report that displays tools grouped by manufacturer and tool type and reports on inventory and usage.	When tools have been assigned to Tool Types, this report allows the tracking of tool inventory and tool usage. Useful for anyone responsible for maintenance/replacement of tools.	Quarterly/Annually
Tool Vibration Trends	A 24 month report for all tools detailing average sensed vibration relative to tool tag vibration over set time periods.	Viewing sensed vibration level trend may highlight poor performing tools or poor tool use. Details of who has used the tool and the exposure points accrued can be listed from selecting the Details and Operators buttons.	On Demand/Quarterly/ Annually
Tool Service Status	The report displays the service status for each tool that has been configured for Track Service Management.	To review tools the service status of tools. The report details dates of the last and next service period, the trigger/hours remaining until the next service and the percentage of service period that has been used. useful for anyone responsible for maintenance/replacement of tools.	Monthly/ Quarterly/Annually
Devices Signed Out	This report shows what HAV devices are currently	HAV exposure data will not be reported until devices are returned to the Docking Station. This	On Demand

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	signed out, who signed them out and when.	report can assist with establishing when any HAVwear have not been returned. It can also help track lost HAVwear.	
Spot Check	A detailed report that provides daily operator HAV exposure data and tool usage history over the specified date range by each individual tool record.	This report is useful when viewing an employee's detailed HAV exposure data. It provides details, in one report, exposure data, which tools have been used and for how long. The HAVwear creates a new tool record for every tool tagged and for every instance vibration is determined after a 15 minute period.	On Demand
HAV Device Switched Off	Lists all operators who have switched HAVwear off and for how long over the specified data range.	Useful for tracking which operators have switched HAVwear off and for how long. By clicking on the details button, it will list, by day, the duration the device was switched off and the action that caused it to switch back on.	On Demand

3.4.3 HAV Management - Resource Data Reports

Report	Description	Use	Frequency
Devices Signed Out	This report shows what HAV devices are currently signed out, who signed them out and when.	HAV exposure data will not be reported until devices are returned to the Docking Station. This report can assist with establishing when any HAVwear have not been returned. It can also help track lost HAVwear.	On Demand
Spot Check	A detailed report that provides daily operator HAV exposure data and tool usage history over the specified date range by each individual tool record.	This report is useful when viewing an employee's detailed HAV exposure data. It provides details, in one report, exposure data, which tools have been used and for how long. The HAVwear creates a new tool record for every tool tagged and for every instance vibration is determined after a 15 minute period.	On Demand
HAV Device Switched Off	Lists all operators who have switched HAVwear off and for how long over the specified data range.	Useful for tracking which operators have switched HAVwear off and for how long. By clicking on the details button, it will list, by day, the duration the device was switched off and the action that caused it to switch back on.	On Demand

3.4.4 Location Reports

Report	Description	Use	Frequency
Live Workforce Location	Identifies the location of active RASOR devices at the time of their last communication.	Overview where RASOR devices are being actively used.	N/A

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Operator Location History	Illustrates the movements of active RASOR units since being assigned to an operator.	Allows tracking of RASOR operators.	N/A
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3.4.5 Notification Reports

Report	Description	Use	Frequency
Operator Check In's	Reports all open Check-in activity.	Track active lone workers being managed by Check-in notifications.	N/A
Operator Alarms	Reports all Alarm activity over a selected time period. Use of an action icon allows all details of the Alarm to be reviewed.	Ensure Alarms managed adequately and repeating patterns identified for action.	Weekly/Monthly
Operator Alerts	The same information reported for Alarms but covering notifications considered less critical and classified as Alerts.	Review Alert trends.	Monthly/Quarterly

3.4.6 Noise Reports

Report	Description	Use	Frequency
Operator Average Noise Exposure	The report shows the number of days monitored for the specified date range and the same prior period. It also reports the number of times the operator has breached thresholds. The exposure variance illustrates increased or decreased exposure relative to the prior period. The report will also inform in greyed out text active operators who have not used the system in the report period.	Review operators most exposed overall and their exposure trends. This information better supports exposure reduction planning.	Weekly/Monthly / Quarterly/Annually
LIVE Operator Noise Exposure	A report of all Noise data transmitted by RASOR devices for noise dosimeter devices which have not been docked.	Review operators noise exposure levels during the working day.	N/A

3.5 Social Distancing Reports

Report	Description	Use	Frequency
Workforce Contact Summary	A general summary report that details proximity detection data over time and by data group	This report is useful to view at a glance , the number of proximity detections, the trend in total contact time and a summary of performance by data group	Weekly / monthly
Workforce Contact	Report by operator of number of days monitored, total and average contact time and the number of contact Instances identified as short, moderate or sustained.	Identify employees or operations resulting in poor levels of social distancing to develop intervention measures. Action buttons allow an analysis for each individual of the key times of the day for contact or the key individuals. Contact instances within the same day with the same person are aggregated in the RAG (Red, Amber, Green), Short, Moderate and Sustained reporting, therefore if two individuals have two short interactions but the combined time is moderate, this will be reported as one moderate instance. Interventions can be added by users with access to administer interventions by clicking the plus symbol. Details of any interventions recorded can be viewed by clicking the magnifying glass. Intervention details will include whether a signature has been collected against the intervention.	Daily/Weekly
Contact Tracing	Report by operator of causes of social distance proximity records naming individuals and date and time of occurrence.	Identify cause of individual social distance behaviour and support contact tracing.	Daily/Weekly
Contact Spot Check	Details for each individual each day when they were monitored and the contact time within that period.	Ensure individuals are protected when you expect them to be.	Daily/Weekly
Safe Zone Time	Details for each operator the amount of time tagged into a safe zone and the total time tagged into a safe zone.	Ensure individuals are protected when you expect them to be. Click on the action button to see details of tagging in and out of safe zones.	N/A
Safe Zone Location	Identifies the location of safe zone tags for tags that have programmed latitude and longitude data.	Allows a visual rendering of the location of SAFE-ZONES.	N/A
Live Operator Contact Tracing	A report of all SAFE-DISTANCE social distance alert and alarm data transmitted by RASOR devices for HAVwear devices which have not been docked.	Review operators potentially unsafe contacts during the working day	N/A

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Operator Contact Exposure Action	A detailed report to show the daily SAFE-DISTANCE contact data for each operator. The report shows the operator's total contact time and time within cohorts, with the contact time graded as Short, Moderate or Sustained.	Review to see who has collated high levels of potentially unsafe contact. This report displays Intervention notes against specific operators where recorded. Where an intervention has been added a signature box is available to collect a signature against the intervention. The signature is made within the box using a touch screen or mouse movements.	Weekly/Monthly
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3.6 Scheduling a report

Scheduled reports are PDF copies of the Reports sent to one or more email addresses on a predefined schedule. These are useful to ensure key stakeholders are kept informed.

1. Login to the Reactec Analytics.
2. On the Toolbar, navigate to the report that you want to schedule, for example, **HAV > Exposure Levels Reached**.
3. Using the Filter panel, filter the report data as required then click **Email**. The Email PDF report window opens.
4. Enter an email address for each person you want to receive a PDF copy of the report and click **Add**
5. Select **Periodically**. The Schedule options are displayed.

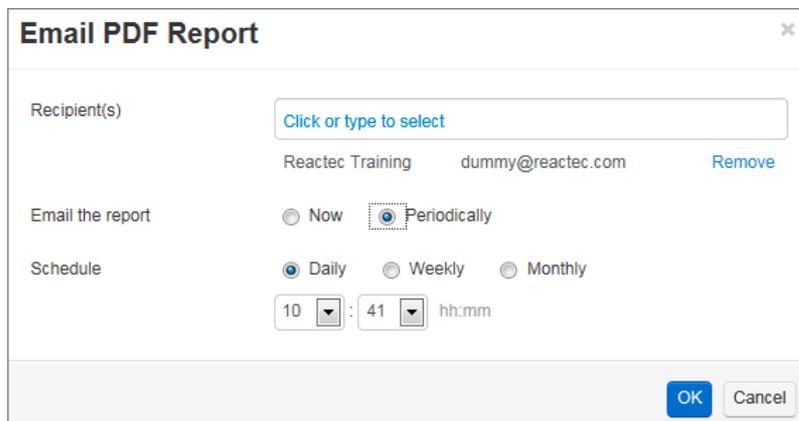


Figure 27: Email PDF Report page

6. Specify the frequency that the report should be sent.
7. Click **OK**. The pop-up closes and the scheduled report is added to the list on the **Report Emails** page.



You can edit scheduled reports on the **Report Emails** page.

3.7 Looking after your hardware

The Reactec Analytics Platform hardware components have been designed for use in multiple industries. The components are robust but not indestructible. So here is some information about

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looking after the components to ensure you get the most from them.

3.7.1 Docking Station care

The Docking station, in particular the HAVwear bays, should be kept clear of any debris to ensure a good connection between the HAVwear and Docking station. This ensures efficient recharging and downloading capabilities.

- An Isopropanol or similar alcohol based cleaning agent with an alcohol content of at least 70% is recommended for cleaning. This should be applied with a cloth and with the docking station powered down. Use of chemicals not fitting this description may cause damage.

3.7.2 Dual Charger Care

The Dual Charger in particular the RASOR and HAVwear bays, should be kept clear of any debris to ensure a good connection between the devices and the Small charger. This ensures efficient recharging and downloading capabilities.

- An Isopropanol or similar alcohol based cleaning agent with an alcohol content of at least 70% is recommended for cleaning. This should be applied with a cloth and with the dual charger powered down. Use of chemicals not fitting this description may cause damage.

3.7.3 HAVwear care

The HAVwear and in particular underneath of the HAVwear, should be kept clear of debris, dust and other items that could interfere between the HAVwear and Docking station communication.

An Isopropanol or similar alcohol based cleaning agent with an alcohol content of at least 70% is recommended for cleaning. Use of chemicals not fitting this description may cause damage.



The HAVwear should not be dismantled or modified in any manner. The HAVwear is a sealed unit and attempting to dismantle it will cause damage to the unit.

When placing the HAVwear back into a Docking Station or Dual Charger, do not press down on the LCD screen of the unit as repeated or excessive force to this window may damage the unit.

3.7.3.1 HAVwear battery care

The HAVwear is a re-chargeable product with the following battery life / charge requirements:

- Modules are only released from a docking station when the battery has a use life of typically 12 hours.
- After a typical days use of HAVwear monitoring only, a fully charged unit the time to re-charge is 33 minutes.
- If a unit becomes fully discharged the time to full charge is 3 hrs. With SAFE-DISTANCE enabled a battery will be heavily depleted after one days use.
- Max battery life 12 hours when SAFE-DISTANCE is enabled.
- Max battery life 36 hours when SAFE-DISTANCE is not enabled.

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- The HAVwear should be re-charged fully before being put into storage where not mounted in a powered up docking station. It is also recommended to recharge the unit on a regular basis (monthly) with a 1 hour top up charge.
- A HAVwear must not be allowed to be without recharging for a period of greater than 6 months.
- While a HAVwear is stored on a powered Docking station the Docking station tops up the HAVwear battery charge as required.



The HAVwear battery is not replaceable. Attempting to replace the battery will damage the HAVwear.

3.7.4 HAVwear Wrist Strap Maintenance & Hygiene



The HAVwear wrist strap is made from nylon webbing and is not impermeable to ingress of fluids, dirt and other contaminants and as such should be assessed for suitability prior to introduction into the workplace. The wrist strap is personal to the individual operator and should always be subject to appropriate occupational hygiene procedures regarding cleaning and replacement.

The HAVwear wrist strap is not suitable for hot work unless fully covered by appropriate gauntlets.

3.7.5 RASOR Care

The RASOR and in particular underneath of the RASOR, should be kept clear of debris, dust and other items that could interfere between the RASOR and Dual Charger communication.

An Isopropanol or similar alcohol based cleaning agent with an alcohol content of at least 70% is recommended for cleaning. Use of chemicals not fitting this description may cause damage.



The RASOR should not be dismantled or modified in any manner. The RASOR is a sealed unit and attempting to dismantle it will cause damage to the unit.

3.7.5.1 RASOR Battery Care

The RASOR is a re-chargeable product with the following battery life / charge requirements:

- After a typical days use of a fully charged unit the time to re-charge is 1 hour.
- If a unit becomes fully discharged the time to full charge is 3 hrs. With SAFE-DISTANCE enabled a battery will be heavily depleted after one days use.
- Max battery life 24 hours

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- The RASOR should be re-charged fully before being put into storage where not mounted in a powered up Dual Charger. It is also recommended to recharge the unit on a regular basis (monthly) with a 1 hour top up charge.
- A RASOR must not be allowed to be without recharging for a period of greater than 6 months.
- While a RASOR is stored on a powered Dual Charger the Dual Charger tops up the RASOR battery charge as required.



The RASOR battery is not replaceable. Attempting to replace the battery will damage the RASOR.

4 Warranty

The Limited Warranty is granted by and this Limitation of Liability is stipulated by Reactec Ltd, Vantage Point, 3 Cultins Road, Edinburgh EH11 4DF, UK.

4.1 What this Warranty Covers

Reactec Ltd warrants to you that the Hardware will be free from defects in workmanship and materials under normal use ('Defects') for a period of one year from the date that the Hardware was first purchased by you ('Warranty Period'). During the Warranty Period the Hardware will be repaired or replaced at Reactec's discretion ('Limited Warranty') without charge to you for either parts or labour. This Limited Warranty covers the replacement of the Hardware only.

4.2 What this Warranty Does Not Cover

The Limited Warranty does not apply to normal wear and tear, does not apply when the Hardware is opened or repaired by someone not authorised by Reactec and does not cover repair or replacement of any Hardware or part thereof damaged by: misuse, moisture, liquids, proximity or exposure to heat and accident, abuse, noncompliance with the instructions supplied with the Hardware, neglect or misapplication. The Limited Warranty does not cover physical damage to the surface of the Hardware. This Limited Warranty does not cover any software that may accompany or be installed on the Hardware. Defective LCD screens/displays on the Hardware (where applicable) are excluded from the Warranty except in the event that the screen/display becomes unreadable, provided that the relevant Hardware has only been subjected to fair wear and tear and the defect in the screen/display does not arise from misuse or negligent use.

4.3 How to make a Warranty Claim

In order to make a claim of a Defect, you must contact Reactec by email, telephone or through the online ticketing system (www.reactec.com/support) during the Warranty Period to explain the Defect and to obtain an RMA number (Return Materials Authorisation) if necessary. You must return the Hardware during the Warranty Period, along with an explanation of the Defect, to the address provided to you by Reactec.

4 Contacting Reactec support

Contact Reactec support with any issues using one of the following options:

Tel: +44 (0) 131 221 0920

Email: helpdesk@reactec.com

Website: www.reactec.com/support/customer_zone_support