



# LifeShirt®

## Real-time life sign monitoring of First Responders

The **LifeShirt** was created to meet the needs of first responders, HazMat workers, firefighters, industrial cleanup crews, and homeland security. The **LifeShirt** is a durable, lightweight chest strap embedded with sensors that continuously collect life sign information. Breath rate, heart rate, activity, posture, and skin temperature are all monitored by the sensors in the strap. Using a RAELink2 Modem, it easily integrates into an AreaRAE Network for real-time remote monitoring and data collection at a remote command center, where a commander can simultaneously monitor multiple team members. All of the collected data is stored and can be used for post-event analysis.

The **LifeShirt** system provides real-time life sign information in an easy-to-read visual display, allowing commanders to make informed decisions and proactively intervene to assist their teams in completing critical missions.

With the **LifeShirt**, thresholds can be set for each physiologic parameter. The system alerts when a threshold is reached. Trends can also be viewed to see how each parameter changes over time. Data is transmitted wirelessly via a RAELink2 Modem and AreaRAE Network to a remote monitoring station, where trained personnel, such as a commander, can monitor physiologic changes in real time during exercise, training, exertion, and rest.

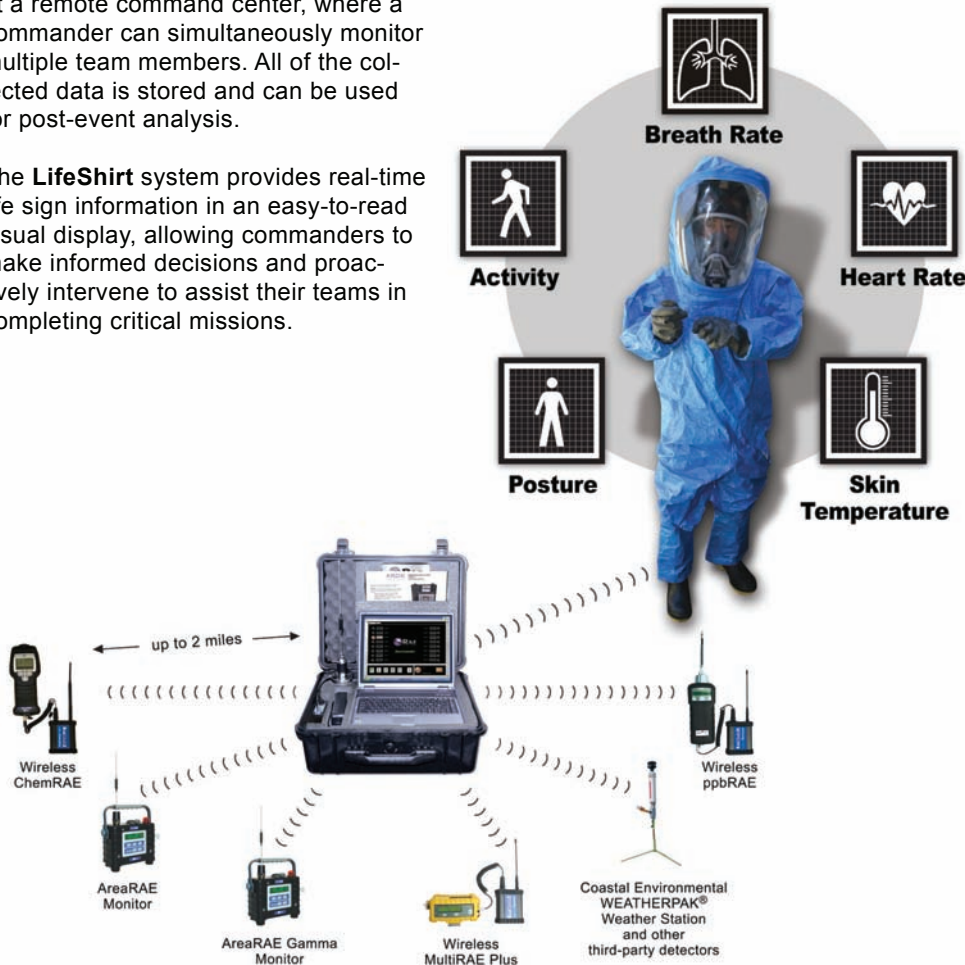
In emergency situations, people can push themselves too hard, leading to inefficiency and safety concerns. The data from the **LifeShirt** helps commanders determine when to rotate out team members for restorative breaks, to improve efficiency. The **LifeShirt** is also helpful when situations call for teams to wear heavy protective clothing. These outfits can lead to potential performance issues, including heat stress.

### Key Features

- Wireless integration into AreaRAE networks
- Adjustable sensitivity
- Light weight
- Simple one-hand operation
- Low life-cycle cost with no consumable components

### Applications

- First Responder monitor
- Personal Protection monitor
- HazMat management



## Specifications\*

### LifeShirt® Specifications\*

Environmental Limits	
Altitude	26,000 ft (7,920 m)
Humidity	100%
Temperature	-10° F to 154° F (-23° C to 68° C)
Battery	
Cell Technology	Lithium-ion, 1950mAh
Battery Voltage	3.7V nominal
Full Charge Duration	220 hours
Recharge Time	3 hours
Charger Power Req	5V 1A
Strap	
Fabric Composition	84% nylon, 16% spandex
Strap Weight	(without wearlink):6.6 oz (187grams)
Strap Weight (with wearlink)	7.5 oz (212 grams)
Strap Dimensions	53" x 2.75" x 0.25" (135cm x 6.98cm x 0.64cm)
Fits sizes	Small to 4XL
Washing Temperature	Cold
Drying	Hang Dry
Sensor Module	
Dimensions	3.75" x 1.75" x 0.74" (9.53cm x 4.44cm x 1.88cm)
Weight	4 oz (113 grams)
Connector type and model:	Hirose
Housing	ABS Plastic, injection molded
Measurement Ranges & Accuracy	
Heart Rate	15 BPM to 208 BPM, accurate to ±10% or ±5%, 8 beat rolling average R-R inst. time
Respiration	3 to 75 valid breaths per minute, accurate to ±5% of rate or 2 breaths per minute (whichever is greater), 60-second rolling average
Position	±2G vertical, accurate to 8 bits of resolution ±2G horizontal (side-side), accurate to 8 bits of resolution ±2G horizontal (front-back), accurate to 8 bits of resolution
Activity	Accurate to 8 bits of resolution
Skin Temperature	Valid measurement range: 68° F to 158° F (20° C to 70° C)
Accelerometer	±2G mapped to arbitrary units with 255 range (mapping linearity is not calibrated)

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### RAELink2 Specifications\*

<b>Operating Mode</b>	Point to multi-point
<b>Size</b>	4.4" L x 3.4" W x 2.0" H 112mm x 87mm x 50 mm) without antenna
<b>Weight</b>	0.9 lbs. (0.4 kg) with built-in battery pack
<b>Battery</b>	Rechargeable, 7.4V/1.8Ah, Lithium-ion battery pack with built-in charger (less than 10 hours charge time)
<b>Operating Hours</b>	24 hours continuous operation
<b>Frequency</b>	902 - 928 MHz (license-free ISM band)
<b>Spreading Method</b>	Frequency hopping
<b>Hopping Patterns</b>	15
<b>Hopping Channels</b>	50 to 112
<b>Range</b>	Up to 2 miles (varies with antenna)
<b>Peak RF Power</b>	1 watt (+30 dBm)
<b>Modulation</b>	Spread spectrum GSK, 120 or 170 kbps
<b>Occupied Bandwidth</b>	230 kHz
<b>Receiver</b>	
<b>Sensitivity</b>	-108 dBm at 10 <sup>-6</sup> raw bit error rate
<b>Selectivity</b>	40 dB at fc, 230 kHz 60 dB at fc, 460 kHz
<b>Data Transmission</b>	
<b>Error Detection</b>	32 bit CRC, resend on error
<b>Link Throughput</b>	115 kbps
<b>Interface</b>	RS-232, 19.2 kbps
<b>Intrinsic Safety</b>	RAELink2 and ChemRAE are not rated for intrinsically safe applications.

\*Specifications are subject to change



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 Government Services  
 REAL-TIME LIFE-SIGNS

