Realize your IoT goals with Fujitsu Human Centric technology
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Introduction
Enabling a Human Centric world

A hyperconnected business will be able to exploit the data and insights from IoT to ultimately: see more; act faster; predict rather than react; optimize every aspect of a business; and change the way it creates and delivers value.

Being a Hyperconnected Business means better informed business decisions, faster business growth, significant competitive advantage, individual empowerment and operational efficiencies.

IoT is a core enabler for the future hyperconnected business and a key driver of digital transformation and business innovation. Hyperconnectivity will see the connection of people, information and things in ways that fundamentally change business and society. The World Economic Forum in 2014 stated that Hyperconnectivity will be to the 21st Century what the Combustion engine was to the 20th Century.

Fujitsu aims to create an environment to support innovation on a proven IoT platform, powering digital transformation with IoT solutions and services for the transformative enterprise. Our strong portfolio of our own intellectual property is combined with a broad ecosystem of partners. Our IoT solutions range from enterprise wearable devices, middleware software, cloud platforms to standardized business solutions for customer verticals. They leverage both our own, and partners, expertise in analytics and AI.
Digital Innovation made real

A hyperconnected society is a world where people, information and things / infrastructure are connected together to fundamentally change the way that we live and work.

UBIQUITOUSWARE is Fujitsu’s brand for the front-end interface for Human Centric IoT. Ubiquitouswear is a range of solutions designed to convert raw sensor data into valuable business insights.

SoE (System of Engagement) for Digital Business Innovation
- Innovation in Business Processes
- Creation of new Products / Services
- Expansion of Company Ecosystems

SoR (System of Record) for Existing Information System
- Operational Efficiency
- Cost Reduction

SoE & SoR Collaboration

By implementing IoT, you can understand your users’ needs and fulfill them with tangible products. We call this the “Value Proposition Cycle”

Human Centric IoT, Fujitsu’s Goal

Function
Device
Sensor

Understand people’s needs based on their activities
Provide value to individuals and companies
Provide value through tangible products
The advantages of UBIQUITOUSWARE

Immediate On-site use
As a comprehensive solution, from sensors to software, UBIQUITOUSWARE can be used wherever the customer is located.

Use only what you need
UBIQUITOUSWARE can be provided on-premises via the cloud or through partial incorporation in your products — whatever best meets your needs.

Highly accurate algorithms
Over 68 rich algorithms can be used to detect the behavior of humans and objects in a highly accurate way. More than 49 patents* have been obtained after proving accurate human centered analysis of falls, heat stress and worker wellbeing etc.

*As of July 2017

UBIQUITOUSWARE Components

UBIQUITOUSWARE Customization
Fujitsu UBIQUITOUSWARE Solutions, including Cloud based SaaS, are tailored to meet customer needs.

UBIQUITOUSWARE Benefits

Worker Safety
Monitoring of workers in harsh environments can realize a safer workplace.

Location Monitoring
Analysis of tracking data allows accurate assessment of worker locations and optimization of staffing and layout.

Driver Safety
The driver receives support that enhances driver safety.

Intelligent Care
By focusing on sounds, resident safety is improves without impacting privacy.

Worker Efficiency
Remote Support and AR help improve operational efficiencies.
Benefits of algorithms

Analyzing Sensor Data via algorithms

Motion
Fall Detection
Posture Detection

Location
Indoor Location Positioning
Outdoor Location Positioning

Vital
Heat Stress Estimate\(^1\)
Physical Load Estimate\(^2\)

Sensor algorithm data from the Cloud and learnt from people’s behavioural patterns. Data Noise is automatically eliminated to improve Detection Precision

Results can be applied to various services through a combination of Sensors and Algorithms

Take Advantage of Fujitsu’s Know-how
Fujitsu sensing data analysis know-how, long cultivated in mobile phones and other devices, can be employed in your products and services. Fujitsu has more than 68 types of rich sensor algorithm and 49* of them received patents.
*As of July 2017

Obtain valuable data from sensor algorithms
The sensor algorithms transform sensor data into valuable event information. For example, acceleration and atmospheric pressure data can be used to determine notifiable events such as how much a person walked or whether he or she fell down.

Quickly and easily implementation
Fujitsu’s original algorithms can significantly reduce development man hours. Our sensors and solutions can be incorporated into your systems including your own algorithms which can also be developed in the system.

\(^1\) Heat stress level is calculate by pulse rate and environment level (Meteorological Society of Japan’s WBGT level in relation to temperature and humidity)

\(^2\) Physical load measurement based on the Karvonen formula and person’s pulse.
The advantage of Sensor Algorithms

Where the Sensor may be worn
The sensor can be worn in various places on the body, including anywhere on the arm or torso.

Highly Accurate Step Measurement
Individual walking characteristics such as step timing, speed and stride are taken into account to accurately track personnel in real-time.

Tracking
Walking speed and direction of movement can be calculated by analyzing individual pace characteristics such as step timing and stride.

Estimate of orientation when moving
Highly precise direction estimation

Fall Detection
Multiple Sensors estimate worker condition and detect falls. Fall detection takes postural data into account to distinguish between falling and jumping or lying down.

Competing solutions
Most competing solutions use acceleration data only, making it difficult to determine if the wearer has fallen or not.

Sensor Functions
- Posture Detection
- Fall Over Detection
- Fall Down Detection
- Activity Amount
- Step Count
- Indoor Location Information
- Outdoor Location Information
- Map Matching
- Geofencing
- Physical Load
- Estimate Hot Environments
- Index for Body *1
- Estimate Heat Stress Level *1
- Estimate Pulse Rate *1
- Wearing Detection

*1: Not all sensors can measure pulse, temperature and humidity.

Hardware Line-up
- Remote Monitoring Station
- Vital Sensing Band
- Driver Drowsiness Detector
- Location Tag
- Core Module
- Location Badge
- Head Mounted Display
- Locator / Focusing Locator
The Fujitsu Driver Drowsiness Detector is a wearable sensor device that detects when drivers are drowsy based on their pulse. The product, which uses a proprietary algorithm developed by Fujitsu Laboratories, monitors the driver’s pulse via a sensor attached to the earlobe, gauges drowsiness based on that and notifies the driver and their vehicle fleet manager.

The device is worn round the neck with a small sensor clip attached to the driver’s earlobe which picks up pulse waves, the proprietary algorithm can then detect any sign of drowsiness of which the driver may not be conscious. The device also includes a learning and calibration algorithm meaning an individual’s profile accuracy is improved through continued usage.

The product can be used at individual level connecting via the driver’s Smartphone in this instance the driver can access an on device dashboard of their current status as well as looking at time logs of a day or journey to identify moments on increased drowsiness.

In an instance where the solution believes the driver is at an increased level of risk the device can vibrate to alert the driver whilst also informing the remote fleet manager/supervisor of the increased risk levels.

Once the data has been captured it is possible to analyze potential routes causing drowsiness using the web application dashboard and plan route swaps to avoid tiredness caused by repetitiveness. From our discussions fleet operators are already using on-board telematics as a way to reduce insurance premiums so the solution will be positioned in this way as well as the immediate Health & Safety benefits to Drivers, other road users and pedestrians.

The sensor is both waterproof and dustproof to stand up to daily usage and has a planned battery life of 45 hours (9hrs per/day x 5 days per/week).

Name of Solution: Driver Safety
What it does: A Wearable solution to alert drivers when attention/drowsiness is detected
How is it used: The sensor is worn round the neck of drivers and measures their biorhythms, the device identifies a loss in attention which is part of a drowsiness curve allowing a driver to self-manage their level of drowsiness and in parallel allowing the organization to optimize route planning.
What is the benefit: Driver Health and Safety/Wellness
Who is the customer: Horizontal Transportation Offering

Fig. 1 - Example Scenario
Driving Safety support features

A user-friendly sensor detects drowsiness

Lightweight 94 gram (approx.) design
The smart design is easy to use. Worn around the neck, it weighs only about 94 grams and includes a sensor on the earlobe that measures vital signs such as pulse.

Selectable alert by sound or vibration
Fujitsu’s proprietary algorithm determines the drowsiness of each driver, even before the driver realizes it him or herself, and the device uses sound or vibration to alert the driver.

The battery is extremely long lasting
The battery was designed with long-haul driving in mind and supports five continuous days of operation.

High-precision detection of drowsiness optimized for each driver
The system automatically calibrates reference values for each individual driver. Its learning function adapts to vital signs that vary from day to day for each driver to ensure accurate drowsiness detection.

Effective driving safety management through driver and manager collaboration
Visualization of driver status is realized by linking the driver with the fleet-operation management system. By grasping driver status in real time and employing accumulated data, effective driving management becomes possible for the driver and fleet manager.

Automatic Calibration
(drowsiness reference values) and learning function)

Drowsiness reference values are stored in memory for each driver

The Learning Function continuously refines drowsiness reference values

The correct values automatically download when the sensor is attached
When considering worker efficiency for field working specifically there are 2 major issues, firstly related to first time fix rates where 1 in 3 is the average fix rate performance and secondly the significant predicted shortage in field engineers over the next 10 years.

To improve first time fix rates the solution can be used to ensure engineers have either a clearly defined Augmented Reality (AR) Process Flow to follow supporting the more efficient repair and maintenance of equipment. This can also be enhanced by an AR Overlay by enhancing a view of a piece of equipment and supplying the engineer with online stored material such as maintenance records & installation manuals. Both AR Process Flow and AR Overlays additionally allow centrally held information to be updated and stored in real time.

Key for Remote Support is around bridging the engineering skills gap allowing experienced/specialist engineers to support multiple new engineers in the field accelerating the transfer of knowledge and experience. The Remote Support (Over the Shoulder/See what I can See) can then be utilized for less skilled/experienced engineers plus education/support and remote site evaluations.

**HMD & Web application Solution:**
The FUJITSU Head Mounted Display (HMD) acts as a communication tool between operators and their supervisor delivering support and sharing remote imagery in real time. Using the web application client we can create/support and enable the workforce with the materials and support they need.

The HMD is the perfect partner for augmented reality environments delivering hands free ease of use to enhance remote support, maintenance and training through the robust industry focused design. It consists of an adjustable non see-through display positioned in front of either eye, wearable keyboard, integrated camera and voice control/command. In addition, the device contains a variety of sensors to detect the users’ environment and behavior.

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**Name of Solution:**
Worker Efficiency

**What it does:**
HMD and Web application Augmented Reality solution

**How is it used:**
To deliver improved worker efficiency and help bridge the engineering skills gap through the use of Head Mounted Display and web application AR Process Flows/Head Mounted Display and web application AR overlays/Head Mounted Display and Web application Remote support

**What is the benefit:**
Improved worker efficiency and centralized support functions, bridging the engineering skills gap

**Who is the customer:**
Horizontal Offering

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1 An Engineer is sent out for a site inspection
2 During his shift he needs to repair a piece of equipment and uses AR to guide him through the repair process by overlaying information related to the part and what needs to be done. The HMD shows this information via the eyepiece.
3 The Engineer starts work but comes across an unfamiliar mechanism, and is unsure how to proceed. He decides to call his Manager for assistance
4 The Manager assists the Engineer in fixing the faulty equipment via the HMD
5 Captured Voice Recordings, Videos and Photos with overlaying comments can also be relayed to convey the whole scope of each scenario
6 Once the equipment is fixed, relevant data and media is stored for future use

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**Fig. 2 - Example Scenario**
Features of on-site operation support

**Usable anywhere, hands free**
Even when working at precarious heights where both hands are needed, workers can make voice commands and continue using hands for operation. The headset can be attached to a safety helmet. Readability is assured even at outdoor worksites in sunny weather. With a non-transparent extension positioned in front of one eye, workers can easily check necessary data.

**Augmented reality enhancing efficiency**
Augmented Reality (AR) can be broken down in 2 defined areas: AR Process Flow and AR Overlays. AR Process Flow used to deliver a step by step supported repair process which is a more efficient way to repair and maintain equipment. AR Overlay's can also be used to enhance the view of equipment with online stored material such as maintenance records & installation manuals. Both AR Process Flow and AR Overlays additionally allow centrally held information to be updated and stored in real time.

**Remote support delivering experience in every location**
Remote Support can be used to bridge the engineering skills gap allowing an experienced engineer to support multiple new engineers in the field accelerating the transfer of knowledge and experience. To compensate for the engineering shortfall over the coming years, organizations can remove experienced engineers earlier from the field with the use of Remote Support. The remote support (Over the Shoulder/See what I can See) can then be utilized for less skilled/experienced engineers plus education/support and remote site evaluations.

**Ideal for crucial worksites, whether indoors or out**
The sturdy device survives drops from a height of <1.5 meters. Water- and dust-resistant, it functions reliably in poor weather and at sites exposed to dust or water.

*IP5X/IP7X (water-resistant), IP5X (dust-resistant)*

**The sensor detects human movements to make quick discovery possible**
The built-in sensor captures up and down movements and the image is accurately displayed whether worn under the left or right eye. The light sensor detects surrounding light and automatically adjusts display brightness for optimal visibility.
When using IoT solutions to support worker safety we look at 3 key aspects: Predict/Measure/Respond. Predict an issue before it happens, Measure accurately to avoid false alarms, and Respond ensuring businesses can effectively manage an incident based on accurate location information and details.

Managing worker safety is paramount, especially in the field or when operating alone, so the ability to predict issues such as heat stress or increased levels of risk associated with working at height is crucial. However, incidents still happen so the accuracy of measurement is key. For example, in order to ensure fall detection is as accurate as possible we take data related to Acceleration / Barometric pressure changes but as important is a period of nothing to determine if the worker has jumped or fallen. If you jump you continue on your way but if you fall you remain for a short period. Once you accurately detect a fall then a response can be sent to the identified location.

1. A worker is operating on in elevated environment
2. His Vital Sensing Band measures his surrounding environment and his pulse and estimates any increased risk of heat stress
3. Alerts received by the platform can automatically generate SMS, e-mail and phone calls to a local agreed representative directing them to the location of the employee and the nature of the reported event
4. This allows the worker time to recuperate
5. The web management tool can be used to review events over time, across locations and employees, to pro-actively investigate high levels of events occurring in defined areas

Name of Solution: Worker Safety
What it does: A Wearable solution for lone/field workers
How is it used: This solution is delivered as a combination of Sensor and Algorithm - The Vital Band links through the IoT platform which contains Fujitsu proprietary algorithms to help highlight levels of risk, ‘Predict’ then ‘Measure’ any incident as accurately as possible when it happens and then ‘Respond’ based on this knowledge.
What is the benefit: Health and Safety/Wellness
Who is the customer: Horizontal Offering
The benefits of safe labor management

Detection of high and low falls based on analysis of atmospheric pressure and acceleration

The movement of tumbling or falling can be determined by a combination of changes in atmospheric pressure and acceleration. This allows for much more accurate detection than when using only acceleration data.

Review onsite status through a web app

Web application allows the remote manager to confirm the conditions of workers on site, determine whether an alarm has been activated and verify whether responsive measures have been taken. The supervisor on site can change the alarm status via smartphone application where available.

The heat stress alarm takes worker physical state into account

Heat stress is evaluated based on more than temperature and humidity. The environmental index and physical state of each wearer of the device are also taken into account and an alert is displayed if predetermined levels are reached.

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1 A location badge enables fall detection and a vital sensing band enables fall probability assessments.

2 Development and evaluation are jointly performed by Ohara Memorial Institute of Labor Sciences and a Public Interest Foundation.
Solution
Location Monitoring

Challenges
Key when managing a workforce is understanding the location of the workers to ensure that when an issue arises any response can be effectively sent to the right location, this can be automated using our proprietary algorithms and delivered seamlessly between Outdoor and Indoor locations.

Location monitoring is an effective tool when assessing operational efficiency and work flow optimization. The solution has been developed to help you understand where people or assets are; for example shared equipment on site, in addition where a business needs to understand how many workers are on site or they enter restricted or dangerous areas. All allowing responses to be made when needed or analytics and insights to be gathered from the flow of workforces to improve process and optimization within the work environment.

Name of Solution: Location Monitoring
What it does: A wearable location solution for lone/field workers
How is it used: The location monitoring solution is delivered as a combination of Sensor and Algorithms - The solution uses both GPS for Outdoor monitoring and RTLS or Beacons indoors allowing worker location to be accurately monitored or used to ‘Respond’ when an incident occurs
What is the benefit: Health and Safety/Wellness

1 A security guard at a chemical storage facility does a routine patrol round the site perimeter. The Location Badge is used to confirm his status
2 As the security guard moves indoors, the Locator (placed on the ceiling) activates, this allows for seamless movement from one environment to the next
3 A guard, unfortunately slipped on a liquid that had leaked
4 Alerts received by the web management tool can automatically generate SMS, e-mail and phone calls to a local agreed representative directing them to the location of the employee and the nature of the reported event
5 A specialist is given the exact location of the guard and is sent in response

Fig. 4 - Example Scenario
The advantages of monitoring

Two positioning methods are combined for efficiency
Extensive positioning tracks people and things with minimal equipment via movement path reckoning technology that uses unique algorithms (PDR). In addition, high-precision real-time positioning tracks the location of staff members, customers, and objects with a high level of accuracy and low level of latency (an accuracy of approximately > 30cm). Where Real Time Location Solutions (RTLS) are not required, beacons can be used as a lower cost / lower precision option.

Geofencing is a valuable feature, this is when specific location areas can be identified and alerts given when objects or individuals move into or out of these defined areas.

Tracking data (including time spent stationary) is accumulated in the cloud and analyzed
In combination with sensor algorithms, the sensor learns behavioral patterns from the accumulated data. The efficiency of operations can be raised by detecting abnormalities and adding them to tracking analysis data. It is also possible to incorporate pinpointed data in a production line simulator and connect it to the logistics system to perform the analysis*.

* A separate connecting system/service is required.

Fall detection can be combined with location detection
Falls can be detected with the location badge, prompt measures can be taken when accidents occur during patrolling and other duties. With the optional notification button on the location badge, employees can request help from a supervisor or central support who can monitor anything out of the ordinary.
Solution
Intelligent care

Challenges
Today’s care solutions are created based on fixed time schedules and with the knowledge and understanding of the last visit. For these residents or vulnerable individuals at home this means the care they are given is targeted based on their general needs and in care homes there is the challenge of a residents privacy. The Remote Monitoring Station has been developed to help deliver a more intelligent solution. The Intelligent Care Solution works to capture and analyse live sound speech, coughs, breathing using Fujitsu’s proprietary sound-analysis. The real time environmental data temperature and humidity can also be monitored.

By having this level of insight, care givers can tailor solutions to the specific needs of an individual to avoid intruding on their privacy when everything is ok but being able to react based on changing circumstances or environment. This enables alerts to be given intelligently to carers and family members all helping to keep people at home longer, be less intrusive and help to reduce overall costs but most importantly promote a healthier and more intelligently supported lifestyle.

1. A Remote Monitoring Station monitors a resident’s daily routine. This information can be used to form a basis that determines whether or not a resident is in a stable condition

2. At one point, the resident develops unusual behavioral patterns. The monitor identifies an increased risk and highlights this to a central location

3. This data is received by a qualified nurse who assesses the situation and alerts the authorities

4. Emergency services are able to respond and assist the resident before it’s too late

Name of Solution: Intelligent Care
What it does: A Remote Monitoring device to support home living
How is it used: The Remote Monitoring Station is delivered as a combination of Sensors and Algorithms - The solution monitors the environment using sensors and based on this real time information it allows care givers to respond intelligently based on the needs of residents
What is the benefit: Health and Safety/Wellness

Fig. 5 - Example Scenario
Monitoring features

**Original sound analysis technology maintains privacy**
Fujitsu’s remote monitoring system employs original sound analysis and sensing technology developed for smartphones to enable monitoring of a large living-room-size (>50-square-meter) area from a single unit. The camera-free system recognizes “events” through sound analysis, while maintaining privacy and preventing the leakage of personal information.

**Various types of monitoring via sensing technology**
The system detects behavioral and health anomalies by analyzing data from various sensors. Data from a microphone helps determine the frequency and loudness of coughing and snoring and the presence of extraordinary noise, etc. Data from human presence sensors helps determine the location of residents, temperature and humidity sensors help determine room conditions that may affect health.

**Direct conversation with the Call Center in emergencies**
In emergencies, guests can press the “emergency” or “consultation” button to speak hands-free with someone at the Call Center. Call Center staff can also speak through the equipment whenever behavioral anomalies are detected to check on resident status.
## Product Specifications

### Head Mounted Display IOT001

**Description**
- **Processor:** Qualcomm APQ8026
- **Quad Core 1.2GHz**
- **Operating System:** Android 4.4.4

**Wireless connection**
- Bluetooth® Version 3.0 compatibility Profiles: HFP v1.1 (HS only); HDB v1.1
- **Wi-Fi Display:** Miracast, HDCP 2.2
- **Wi-Fi** 802.11a/b/g/n, 2.4GHz, 5GHz

**Audio**
- Mono speaker
- Dual-Mic
- **Headphone Jack:** 3.5 mm, 4-conductor

**External storage**
- **Form:** microSD, microSDHC, up to 32 GB
- **Bus interface:** High Speed UHS-I
- **File system:** FAT16, FAT32

**Chemical resistance**
- Ethanol, IPA, sodium hypochlorite

**Dustproof**
- IP5X

**Water resistant**
- **IPX5 / IPX7**

**Resilience**
- MIL-STD 810G

**Form**
- Monocular, non see-through

**Sensors**
- Ambient Light Sensor
- Gyroscope
- Accelerometer
- Magnetic Field Sensor

**Memory**
- 2GB

**Storage**
- 8GB

**USB**
- micro USB [Type AB] USB 2.0
- High Speed MTP mode
- USB Host (USB On-The-Go)

**Dimension details**
- 400 x 350 x 37 mm (W x D x H) display arm extended
- 290 x 180 x 60 mm (W x D x H) display arm retracted

**Weight**
- Main unit & battery: approx. 315 g
- Belts: approx. 72 g
- Helmet attachment clip: approx. 66 g

**Operating ambient temperature**
- 5 - 35 °C

**Operating relative humidity**
- 20 - 80 % (relative humidity, non-condensing)

### Location Unit

<table>
<thead>
<tr>
<th>Location Unit (S) IOT004</th>
<th>Location Unit (L) IOT005</th>
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<tbody>
<tr>
<td><strong>Notes</strong></td>
<td>The product is not for medical use and requires additional software to provide functionality</td>
</tr>
<tr>
<td><strong>Wireless connection</strong></td>
<td>Bluetooth® Smart GPS</td>
</tr>
<tr>
<td><strong>Chemical resistance</strong></td>
<td>Ethanol, IPA, sodium hypochlorite</td>
</tr>
<tr>
<td><strong>Dustproof</strong></td>
<td>IP5X</td>
</tr>
<tr>
<td><strong>Waterproof</strong></td>
<td>IPX5 / IPX7</td>
</tr>
<tr>
<td><strong>Resilience</strong></td>
<td>MIL-STD 810G</td>
</tr>
</tbody>
</table>
| **Sensors** | Accelerometer
- Gyroscope
- Geomagnetic
- Barometric pressure |
| **Indicator** | Colored LED x 1 |
| **Operation** | Button x 1
- Power ON/OFF
- Notification button 1 (Configurable)
- Notification button 2 (Configurable) |
| **Battery Charger** | Battery Type: Li-ion 290mAh (non removable battery)
- Battery Life: Continuous working time approx. 50hr (approx. 6 days for 8hr usage per day)*
- *Battery life will vary depending on the usage
- Charging method: Charging Terminal connecting to a dedicated charging cradle
- Charging time: approx. 150mins |
| **Battery Charger** | Battery Type: Li-ion 1470mAh (non removable battery)
- Battery Life: Continuous working time approx. 487hr (approx. 60 days for 8hr usage per day)*
- *Battery life will vary depending on the usage
- Charging method: Charging Terminal connecting to a dedicated charging cradle
- Charging time: approx. 395mins |
| **Dimension details** | approx. 30 x 59 x 10.4mm |
| **Weight** | approx. 22 g |
| **Operating ambient temperature** | 0 - 50 °C |
| **Operating relative humidity** | 20 - 80 % |
### Driver Drowsiness Detector FPCDVR77

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<th>Notes</th>
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<tr>
<td>Wireless connection</td>
<td>Bluetooth® 4.0 Low Energy</td>
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<td>Chemical resistance</td>
<td>IPA</td>
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<td>Sensors</td>
<td>Pulse Sensor</td>
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<tr>
<td>Indicator</td>
<td>Indicator, Colored LED x1</td>
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<tr>
<td>Operation</td>
<td>Button x 1</td>
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<tr>
<td>Vibrator</td>
<td>Built-in</td>
</tr>
<tr>
<td>Battery Charger</td>
<td>Electric supply: AC adapter (Input: AC 100-240 V 50/60 Hz, 0.3 A) (Output: DC 5 V, 2 A)  Charging time: 4 hours with AC adapter above  Battery Life: Continuous working time approx. 45hr (approx. 5 days for 9hr usage per day)</td>
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<tr>
<td>Dimensions (W x D x H)</td>
<td>130 x 170 x 24 mm</td>
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<tr>
<td>Weight</td>
<td>94 g</td>
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<tr>
<td>Operating ambient temperature</td>
<td>0 - 45 °C</td>
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<tr>
<td>Operating relative humidity</td>
<td>10 - 90 % (relative humidity)</td>
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### Vital Sensing Unit IOT003

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<th>Notes</th>
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<tr>
<td>Wireless connection</td>
<td>Bluetooth® Smart</td>
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<tr>
<td>Chemical resistance</td>
<td>Ethanol, IPA, Hypochlorite</td>
</tr>
<tr>
<td>Dustproof</td>
<td>IP5X</td>
</tr>
<tr>
<td>Waterproof</td>
<td>IPX5 / IPX7</td>
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<tr>
<td>Resilience</td>
<td>MIL-STD 810G</td>
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<tr>
<td>Sensors</td>
<td>Accelerometer  Gyroscope  Geomagnetic  Barometric pressure  Temperature/Humidity  Pulse</td>
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<tr>
<td>Indicator</td>
<td>Button x 1</td>
</tr>
<tr>
<td>Operation</td>
<td>RGB</td>
</tr>
<tr>
<td>Vibrator</td>
<td>Built-in</td>
</tr>
<tr>
<td>Battery Charger</td>
<td>Battery Type: Li-ion 145mAh (non removable battery)  Battery Life: Continuous working time approx. 35hr (approx. 4 days for 8hr usage per day)  *Battery life will vary depending on the usage  Charging method: Charging terminal connecting to a dedicated charging cradle  Charging time = approx. 150mins</td>
</tr>
<tr>
<td>Dimension details</td>
<td>approx. 36 × 38 × 10.7 mm</td>
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<tr>
<td>Weight</td>
<td>approx. 18 g</td>
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<tr>
<td>Operating ambient temperature</td>
<td>0 - 50 °C</td>
</tr>
<tr>
<td>Operating relative humidity</td>
<td>20 - 80 %</td>
</tr>
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</table>

### Locator / Focusing Locator

<table>
<thead>
<tr>
<th>Notes</th>
<th>The product is not for medical use and requires additional software to provide functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>RF transceiver using the 2.4 GHz frequencies</td>
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<tr>
<td>Radio transmission</td>
<td>Bi-directional</td>
</tr>
<tr>
<td>Number of channels</td>
<td>81 channels (1 MHz) but only one at the same time</td>
</tr>
<tr>
<td>Operating frequency range</td>
<td>2401…2481MHz</td>
</tr>
<tr>
<td>Modulation</td>
<td>GFSK</td>
</tr>
<tr>
<td>Transmission Power</td>
<td>2.5mW</td>
</tr>
<tr>
<td>Antenna</td>
<td>Integrated printed patch antenna with -6 dBi gain</td>
</tr>
<tr>
<td>Antenna connector</td>
<td>N/A</td>
</tr>
<tr>
<td>Operating voltage when using PoE</td>
<td>48V</td>
</tr>
<tr>
<td>Typical power consumption</td>
<td>2 W</td>
</tr>
<tr>
<td>Indicator</td>
<td>Colored LED x 1  *Refer to the Instruction Manual for the details</td>
</tr>
<tr>
<td>Dimension details</td>
<td>approx. Ø: 202 mm, h: 40 mm  Dimensions Locator mounting bracket: approx. Ø: 120 mm, h: 5 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 500 g</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0°C...+60°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>1°C...+70°C</td>
</tr>
</tbody>
</table>