User Manual

ZCARE: Warning Wristband

References: ZCARE 2.0

Revision: 1.0

Date: 08/31/2018

State: Beta

Reference: UM_ZCARE_20180605_001_01_00

CLEODE

Avant toute utilisation du wristband ZCare, veuillez lire attentivement l'avertissement suivant :

Before any use of the product, please read carefully the following warning:

> ⚠️ **Le produit ZCare ne peut en aucun cas être considéré comme un wristband médicalisé ou médical**.
>
> En conséquence, la société CLEODE ne peut être tenue responsable de la non détection d'une anomalie qu'elle soit relative à une chute ou une alerte manuelle.
>
> Ce produit doit être considéré comme une aide supplémentaire apportée à une équipe médicalisée qui par ailleurs effectuera elle-même les vérifications sur l'état de santé du porteur du wristband ZCare.
>
> L'utilisation du produit ZCare sous-entend de la part de l'utilisateur et de l'équipe de surveillance (si elle existe) une connaissance des termes ci-dessus et un accord sur la non responsabilité de CLEODE en cas de non détection d'anomalie.
>
> *This product is not a medical wristband.*
>
> *Accordingly, the company, CLEODE, may not be held responsible for the non-detection of a real anomaly, whatever its nature.*
>
> *The use of this product sub-intends for the user and the monitoring team (if it exists) knowledge of the terms above and an agreement on the non-responsibility of CLEODE in case of the non-detection of anomaly.*

Warranty

The device supplied to the buyer and/or the recipient is guaranteed by CLEODE against any malfunctions originating from a design and/or manufacturing flaw, for a period of twelve (12) months following delivery. The buyer and/or recipient is (are) responsible for proving the existence of the said defects or flaws. This warranty is applicable in accordance with articles 1641 to 1648 of the French Civil Code and in compliance with the French statutory warranty. The warranty covers the replacement free of charge of devices and parts affected by a design and/or manufacturing flaw excluding conspicuous defects in the device that are covered by the buyer and/or the recipient.

In order to invoke the warranty, the buyer must immediately send written notice to CLEODE of the flaws that it attributes to the device. It must enable CLEODE to have access to the device to observe these defects and repair them. The warranty provided by CLEODE is strictly limited to the equipment provided and shall only have for effect the replacement or repair, at CLEODE's expense, on its own premises, of all devices or parts that are not functioning as a result of defects or flaws. CLEODE reserves the right to modify the devices in order to comply with the warranty.

The warranty does not apply to replacement or repairs that may result from normal wear and tear of devices, systems or products, damage or accidents resulting from negligence, failure to supervise or maintain, or incorrect use of the devices, systems and/or products.

The maintenance service is provided by CLEODE with all reasonable care possible and in compliance with the current state of the arts.

The exchange of parts or repairs performed under the warranty cannot result in extending the length of the warranty. In no event can the unavailability of the device due to servicing give rise to compensation for any reason whatsoever. The seller is released from all obligations relating to the warranty if the product or device has been modified without prior written consent, or if original parts have been replaced by parts which it has not manufactured without prior consent. If unforeseen damage is caused by the device, it is expressly agreed that the seller can only be liable for the reimbursement of monies received for the purchase of the device if it has been destroyed. Under no circumstances can the seller be held liable for indirect or contingent damage. The seller is released from any liability and the buyer waives any rights against it if an accident or direct or indirect damage is caused to the buyer following a defect, incorrect usage, incorrect maintenance or normal wear of the device sold.

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Version	Author(s)	Version description	Date
0.1	CLEODE	Initial version	05/22/2018
1.0	CLEODE	Validated document	05/29/2018

Sommaire

List of figures

I. Presentation

ZCare is wrist watch ZigBee® to issue radio frequency alerts of type:

1. Manual alert by pressing the call button

2. Fall detection

3. Low battery detection

The figure shows the product:

Warning light

Call button

Warning charge

I.1   Main features

The main features are the following:

Réseau *Network*	ZigBee® sécurisé Home Automation 1.2 *ZigBee® secure Home Automation 1.2*
Modes de fonctionnement	▪ Alerte manuel *Manual alert* ▪ Détection de chute *Warning fall* ▪ Géolocalisation dans un réseau ZigBee® avec routeurs CLEODE de type ***Vigilance*** *Geolocation in a ZigBee® network with CLEODE routers of the Vigilance type*
Acquittement Alerte *Acknoledgment alert*	Via aimant directement sur le wristband *Via magnet directly on the wristband*
Alimentation *Power*	Batterie rechargeable sans fil Li-Polymer *Battery Li-Polymer (rechargeable with wireless charger QI compliant)*

I.2   Technical Caracteristic

BATTERIE / BATTERY

Tension nominale *Nominal Voltage*	+3.6V DC
Plage de fonctionnement *Voltage range*	+3.0V to +4.2V DC
Type de batterie *Battery Type*	Li-Polymer 150mAH
Type de chargeur *Charger Type*	Chargeur sans fil compatible QI V1.2 (WPC) *Wireless charger QI (WPC) compliant*

RF

Norme radio *Radio Standard*	ZigBee® mode sécurisé *ZigBee® secure mode*
Fréquence *Frequency*	2.4GHz
Puissance de sortie *Output power*	<10dBm
Sensibilité *Sensibility*	-97 dBm
Antenne *Antenna*	Interne *Internal*
Approbation *Approval*	Conforme à la norme radio ZigBee® *Conforms to radio standard for ZigBee®*

ENVIRONNEMENT / ENVIRONMENT

Protection	Boitier IP65 : pas de pénétration de poussière, protégé contre les jets d'eau à basse pression provenant de toutes les directions
Environmental protection	*IP65 enclosure: no ingress of dust, protected against low pressure jets of water from all directions*
Température d'utilisation *Operating temperature range*	-20°C to +70°C ambient
Température de stockage *Storage temperature range*	-40°C to +80°C ambient

MECANIQUE / MECHANICAL

Dimension *Overall dimension*	55x46x17 mm
RoHS	RoHS 6

FIABILITE / RELIABILITY

Durée de vie Lifetime	>5 years @ 25°C
MTBF	>60,000 hours @ 25°C

II. Quick start

1) Proceed the peering of the wristband (for more details, look at chapter Peering III.2)
2) Activate functions of the wristband (for more details, look at chapter Configuration IV.1)
3) Shift in regular mode (for more details, look at chapter Configuration III.3)
4) Manage the warnings realise (for more details, look at chapter Configuration 0)
5) Refill the wristband (for more details, look at chapter Configuration IV.5)

III. Implementation

III.1 Cycle of operating mode

Wristband ZCare can be positionned in 3 functioning modes:

1. Standby mode: the wristband ZCare doesn't manage ZigBee® communication neither the calling and falling functions
2. Mode Config : the wristband ZCare is under maintenance, included in ZigBee® Network and available. The call and fall functions stay inactive
3. Standard mode: the wristband ZCare is integrated in the ZigBee® Network and available. The call and fall functions are activated according to the layout done during the maintenance.
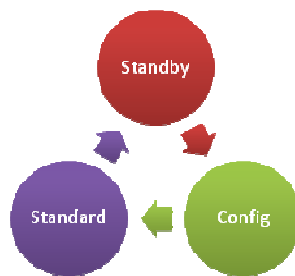
Cycle of working periods is the following:

Fig 1 : Cycle of working period

> **ℹ** In the firs commissioning, le wristband ZCare is in Standby mode and and is never been paired to a ZigBee® network.
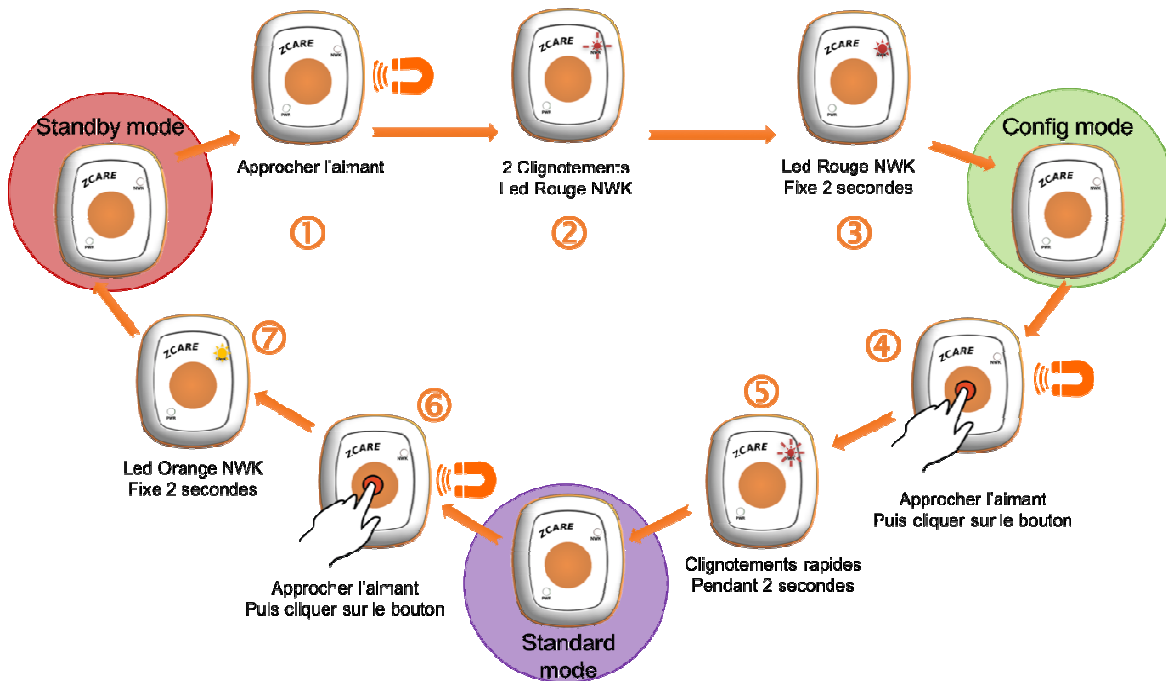

Fig 2: Inter mode switching procedures

III.2 Pairing in a ZigBee® network

To integrate a ZCare product in an existing ZigBee® network existant, proceed as folows:

Fig 3 : Integration procedure in the ZCare product in a ZigBee®network

III.2.1 Procedure for a first use

1) ZCare product must be initialy in Standby mode: for a first use
2) Open the ZigBee® network pairing windows in which the Zcare product must be integrated (Cf. manual of coordinator network)
3) Approach the magnet of the side of LED NWK : ①
4) ZCare product fashes 2 times Red to report its research phase of ZigBee® network : ②
5) Then the appairing done, the Zcare product reports its integration in the ZigBee®network in switching the LED NWK in fixing red during 2 seconds : ③
6) ZCare produtc then swithovers in configuration mode, it is reachable by devices of integration network (POLL_RATE of (1) second)

> 🛈 Once configurated, it is recommanded to swith in standard mode to preserve battery.

III.2.2 Procedure for a ZCare product integrated in the ZigBee® network

In that case, it is useful to erase settings network to allow parameters network in another ZigBee®network.
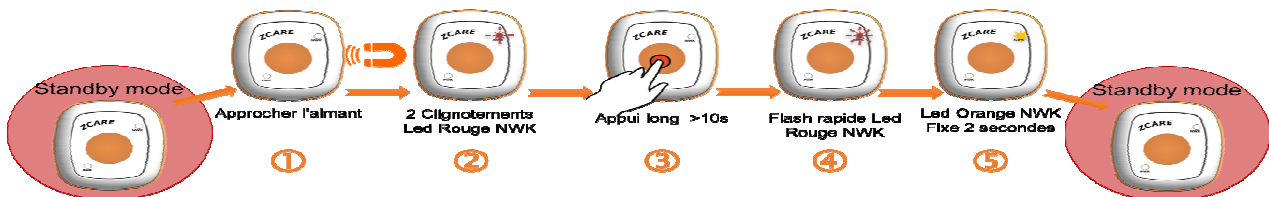
Figure 4 : Erasing ZigBee® network settings

1) ZCare must be initially in Standby mode : in function of the wristband Zcare, performs the useful operations to switch in Standby mode(Cf. Cycle of mode of operation)
2) To approach the magnet on the LED NWK side: ①
3) ZCare flashes 2 times Red to report the research phase of ZigBee® network: ②
4) Push 10 seconds minimum on the call button of the Zcare to delete the settings network and obtain a new setting of pairing: ③
5) LED NWK quick flashes in red to inform the erasing network parameters: ④

6) ZCare gets in Standby mode and report itself to switch on the LED NWK in static orange during 2 seconds: ⑤

Once the network parameters have been erased, it is possible to integrate the wristband into a ZigBee ZigBee® network in the same way as for a first use: see paragraph III.2.1.

III.3 Swing procedure in Standard mode

To swing a ZCare in standard mode proceed as follow:

Fig 5 : Swing procedure in standard mode

Zcare must be first in standard mode: if necessary perform the previous procedures to arrive at this state.

1) **Approach the magnet on the** LED NWK side then click on the call button : ①
2) The ZCare flashes 2 quickly Red to signal new status (Standard mode) : ②

> ℹ️ Once is Standard mode, the ZCare is no longer reachable on the ZigBee® network. However, it issues alarm notifications (manual warning, fall warning, and et battery waring) at all devices which there is a configured binding, depending on its configuration

III.4 Swiching Procedure in Standby mode

Standby mode allows to disabled all features of the Zcare and positions the wristband waiting mode :

1. The wristband falls asleep to preserve battery
2. No more features are enabled
3. The wristband is no longer reachable on the network

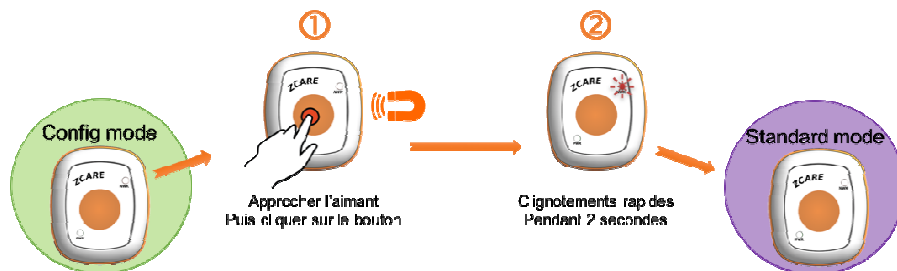To swing a Zcare in Standby mode proceed as follow:
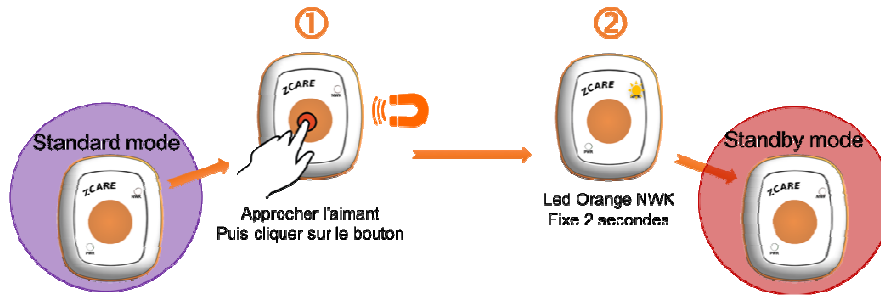
Figure 6 : Swinging Procedure in Standard mode

1) The Zcare has to be first in Standard mode: if necessary perform the previous procedures to arrives at this state
2) **Approach the magnet on the** LED NWK side then click on call button: ①
3) The ZCare switches on LED NWK in fixe Orange during 2 seconds to inform its new state (Standby mode) : ②

III.5 Procedure to switch in config mode

Config mode allows to configure the functions of the wristband (Cf. Chapter Software Interface V).

 To switch in configuration mode, proceed as below (we consider here that the wristband is already associated to the ZigBee® network) :

Figure 7 : Procedure to switch in config mode

1) The Zcare must be initially in Standby mode : if necessary perform the previous procedures to reach this state
2) Approach the magnet to the LED NWK side: ①
3) The ZCare flashes 2 times Red to signal its search phase to the ZigBee® network: ②
4) After pairing the Zcare signals its reintegration in the ZigBee® network by lighting the LED NWK in solid red during 2 seconds : ③
5) The ZCare switch in configuration mode, it is reachable by the devices of the integrated network (POLL_RATE one (1) second)

IV. Proceedings

IV.1 Activate/Desactivate fonctionnalities of wristband

Two main functions can be active/desactive on the wristband:

1. Management of emergency calls
2. Management of fall detections

IV.2 Management of emergency calls

Activation/desactivation of the management of emergency calls is done via the attribut *ManualFunction* of the cluster *Care Configuration* (Cf. paragraph V.2.2.6)

To activate the management of emergency call, put the attribute at 1

To desactive the management of emergency call, put the attribute to 0

> **i** By default, this feature is activated ➔ the attribut *ManualFunction* is set by default to **1**.
>
> To modify the value of this attribute, it is necessary to switch the wristband in config mode : Cf. paragraph III.5

When an emergency call is sent off by pushing on the call button, the wristband inform that the call has been seen by flashing during 2 seconds the LED NWK in red

IV.3 Management of falls detections

Activation/desactivation of the management of falls detactions is done via the attribute *FallFunction* of the cluster *Care Configuration* (Cf. paragraph V.2.2.6)

To active the management of falls detection, put the attribute to 1

To desactive the management of falls detection, put the attribute to 0

> **i** By default, this feature is desactivated ➔ the attribute *FallFunction* is set by default to **0**.
>
> To modify the value of this attribute, it is necessary to switch the wristband in config mode : Cf. paragraph III.5

When a fall is detected by the wristband Zcare, the wristband inform that an alert has been done in flashing 2 seconds the LED NWK in red.

IV.4 Settlement

To settle an emergency fall or an emergency call direct to the wristband via a magnet.
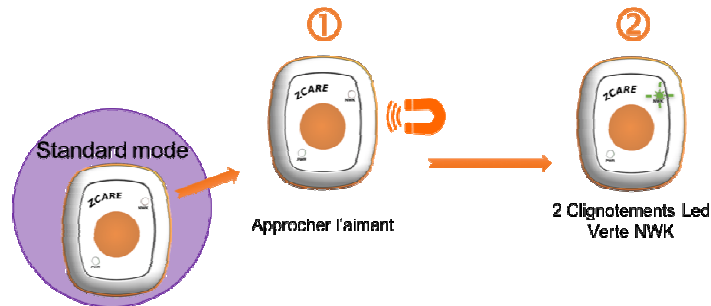
Proceed as follow:

Figure 8 : Settlement of emergency on ZCare wristband

1) Approach a magnet near the wristband LED NWK side
2) The wristband show the settlement by flashing the LED NWK in green color during 2 seconds
3) The status change notification is immediately issued to cluster IASZone subscribers

> ℹ️ If this procedure is applied to a wristband Zcare which is not in emergency, LED NWK doesn't switch on in green color. None notification of change status will be done by the wristband ZCare.

IV.5 Wristband loading

Wristband ZCare is loading by a standard wireless charger QI V1.2.

Proceed as follow:

1) Put the wristband on the loading place.
2) The wristband signal the activation of the charging function in switching the LED POWER in fixed green
3) As soon as the battery is loaded the la LED POWER switches off

> ⚠️ When the wristband is positioned on the wireless loading base and when the charge is in progress, the wristband doesn't communicate anymore with the paired network.
>
> When the charge is finished, the wristband goes automatically in Standby mode,
>
> To put it on again, it is necessary to switch in Config mode (Cf. paragraph III.5). The wristband will automatically switch in Standard mode in 3 minutes. To restart it is possible manually switch the wristband in Config mode to Standard (Cf. paragraph III.3).

V. Software interface

V.1 Presentation

The wristband ZCare is ZigBee® pro compliant, and Home Automation 1.2 compliant ZigBee® Alliance. It has IASZone application and manages 2 alarms :

1) A fall detection alarm
2) A manual press alarm

V.2 ZCare Application

The signaling of an alarm is done by means of a comand IASZone cluster.

V.2.1 Application Description

- Device ID : IAS Zone
- Endpoint number : 1
- Clusters :

Serveur	Customer
Basic (0x0000)	/
Power Configuration (0x0001)	/
Identify (0x0003)	/
Alarms (0x0009)	/
IAS Zone (0x0500)	/
Care Configuration (0xFC0A)	/

V.2.2 Clusters Description

The Clusters description and attributes managed by ZCare is as follow:

V.2.2.1 Cluster Basic

Attribute	Attribute ID
ZCLVersion	0x0000
ApplicationVersion	0x0001
StackVersion	0x0002
HWVersion	0x0003
ManufacturerName	0x0004
ModelIdentfier	0x0005
DateCode	0x0006
PowerSource	0x0007
LocationDescription	0x0010
PhysicalEnvironment	0x0011
DeviceEnabled	0x0012
AlarmMask	0x0013

V.2.2.2 Cluster Power Configuration

This cluster allows to config this low battery alarms and to have an information of the battery value. The attributs follows are managed:

Attribute	Attribute ID
BatteryVoltage	0x0020
BatteryAlarmMask	0x0035
BatteryVoltageMinThreshold	0x0036

V.2.2.3 Cluster Identify

This cluster is used to identify physically the ZCare in ZigBee® network. On writing a value in the attribute *IdentifyTime*, the wristband will flash the LED NWK in red during the specified value (in seconds).

Attribute	AttributeID
IdentifyTime	0x0000

V.2.2.4 Cluster Alarms

This Cluster allows to manage the emergencies (like emergency for low batteries).

If you level of battery is too low, the attribute *AlamCount* goes at 1 and an emergency message is done.

Attribute	Attribute ID
AlarmCount	0x0000

V.2.2.5 Cluster IAS Zone

This Cluster allows to inform, with the value of attribute *ZoneStatus* if it is an emergency fall or an manual emergency as been detected. When emergency is detected, *ZoneStatusChangeNotification*, specific to the cluster, is done on the network to the peripherals (Binding) to signal the new value of the attribute *ZoneStatus*.

Attribut	Attribut ID
ZoneState	0x0000
ZoneType	0x0001
ZoneStatus	0x0002
IAS_CIE_Address	0x0010

The attribute ZoneState allows to know if the wristband is enlisted in the ZigBee® network monitoring system: by default there is none.

The attribute *ZoneType* identify the type of alarme managed. In the ZCare case, the value is 0x002C with an emergency management type « *Personal emergency device* » who manage for emergency 1 the fall and the emergency 2 emergency call.

The attribute ZoneStatus is an attribute type Bitmap as description as follow:

Bit	Description	Value	Managed
0	Alarm1 : Emergency fall	1 : Alarmed 0 : Non alarmed	Yes
1	Alarm2 : Emergency call	1 : Alarmed 0 : Non alarmed	Yes
2	Tamper	-	No
3	Battery : battery	1 : Low Battery 0 : Battery OK	Yes
4	Supervision Notify	-	No
5	Restore Notify	-	No
6	Trouble	-	No
7	AC (mains)	-	No
8-15	Reserved	-	

Attribute *IAS_CIE_Address* specify the address where the order are generated by the server have to be sent.

V.2.2.6 Cluster Care Configuration

Cluster allows to config the fall detection and emergency call features.

The specific cluster is available by the manufacturer code 0x10B9.

Managed attributes as follows:

Attribute	Attribute ID	Type	Description
ManualFunction	0x0000	bool	0 : Emergency call management disabled 1 : Emergency call management actived Value manufacture : 1
FallFunction	0x0001	bool	0 : Fall detection management disabled 1 : fall detection management actived
ThresholdFreeFall	0x0100	uint8	Free fall detection threshold (62.5mg/LSB). The acceleration on all axes is compared to this value to determine a free fall. . Value between 0x05 and 0x09 (300mg à 600mg) is recommended Value manufacture: 0x09
TimeFreeFall	0x101	uint8	Temporal threshold of characterization of a free fall (5ms/LSB) This is the minimum time during which freefall detection is detected. A value between 100ms and 300ms is recommended (0x14-0x46). Value manufacture: 0x15
ThresholdInactivity	0x0102	uint8	Threshold of characterization of inactivity (62.5mg/LSB) Value manufacture: 0x03
ThresholdDeltaVectorSum	0x0103	uint16	Characterization value of a position change: $\sum_{x}^{z} \Delta_{Acc}^2$ With Δ_{Acc} characterized by the difference of acceleration of an axe between the beginning of detection of the free fall and the end of the fall and g = 0xFF Example: 0x7D70 correspond to a difference of place of $(0.7 * g)^2$ Then, more ThresholdDeltaVectorSum ist low less the position change is think about by the algorithm of fall detection. A threshold of value 0x0000 nn long takes count of the finale position of the wristband. Default value: 0x01F4 (500) → $(0.09 * g)^2$
NoMovementTime	0x0104	uint8	Characterization of idle time after a fall in seconds. Value between 0 et 10s is recommended A value 0s takes account of types of fall A value of 10s takes account only the heavy falls (the person is unconsciente and doesn't move) Default value: 0x00 → take account of type of falls
ApplyButtonTime	0x0105	uint16	Time threshold for taking into account pressing the emergency call button in milliseconds Default value: 0x C8 (200ms)

Taking account the absence of move after the fall detection is interpreted as follow by the algorithm of the ZCare:

1) If attribute *NoMovementTime* = 0 : the fall is directly validated, an order type *ZoneStatusChangeNotification* is done with alarm1
2) If attribute *NoMovementTime* > 0, the algorithm will look for a tomporel window of (*NoMovementTime* * 1.5) seconds a period of inactivity of *NoMovementTime* seconds.
   a. If a none activity is detected then an order type *ZoneStatusChangeNotification* is donce with an alarm1
   b. If not, the fall is not detected, it is considerate that the person who has potentially fall can use the emergency fall button if necessary.
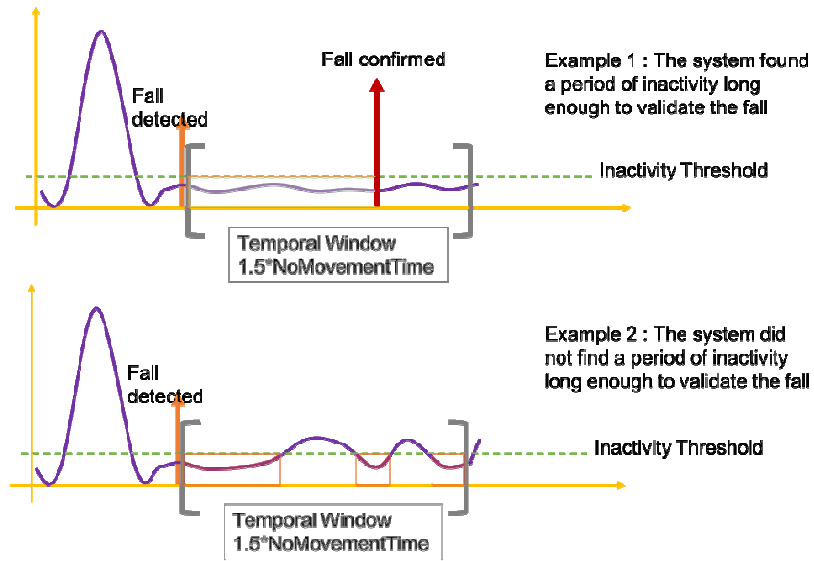
Fall detected

Fall confirmed

Example 1 : The system found a period of inactivity long enough to validate the fall

Inactivity Threshold

Temporal Window
1.5*NoMovementTime

Fall detected

Example 2 : The system did not find a period of inactivity long enough to validate the fall

Inactivity Threshold

Temporal Window
1.5*NoMovementTime

Fig 9 : Principe of validation of a heavy fall

Repair and maintenance

The defective material elements will have returned to CLEODE accompanied by:

- A copy of the delivery note,
- A description of the failure observed and context.

The delay is about 4 weeks. Repair is done Repair is assured by the manufacturers of the material elements to not cancel the guarantee of the element.

The information on the label is as follows:

- model,
- year of production
- reference and revision,
- Serial number.

This information could be asked by CLEODE to identify your product.

Remark: A FAQ (Frequently Asked Questions) is available on the www.cleode.com web site

Any request for support should be send to the postal address or by e-mail
At support@cleode.com :

CLEODE S.A.S

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User Manual End