



USER MANUAL FOR MEDRIA SENSORS

Range red

Translation of the French original

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1. PREAMBLE

This user manual concerns the Radio Base and the monitoring tools of the MEDRIA company.

Please read this manual carefully before using the equipment for the first time.

The **recipes** (documents provided with your monitoring equipment) remind you in a condensed manner the good practices and main points of care that we request you to follow everyday.

Keep the user manuals, recipes and all other directives that come with your monitoring tool so that you can refer to them when required.

Observe and respect all instructions described in this manual or affixed on the equipment and in particular the following precautions.

With a view to continuous improvement of our products, we reserve the right to modify their characteristics for technical advancement.

1.1. Precautions to be taken

The equipment described in this manual is for professional use only.

a) Sensors equipment.

Never expose the sensors to a temperature greater than 60° C (140° F)

Only use accessories specifically recommended by MEDRIA with the MEDRIA kits.

Store the sensors within a radius of 10 to 20 meters (32.8 to 65.6 ft) from the Radio Base to ensure regular communication between the Radio Base and the sensors. The purpose of this positioning is to limit the over-consumption of energy by the sensor, which would constantly attempt to communicate with the Radio Base, which would ultimately reduce its service life

b) Troubleshooting

For troubleshooting, contact MEDRIA by providing as reference the item number and serial number present on your kit components.

Any repair of kit components must be carried out by a service centre authorized by MEDRIA at the risk of cancellation of the guarantee.

1.2. Safety and responsibility

The equipment must be installed by a professional.

Under no circumstances may MEDRIA be held liable to the customer, his employees, successors and beneficiaries, for any special, consequential damage or financial loss of whatsoever description, including but not limited to losses, costs, damage, loss of revenue or interests, suffered by the customer or any third-party on account of a defect or loss of use of all or part of the kit.

It is expressly mentioned that MEDRIA may not be held liable for the non-receipt of an SMS message sent by the Radio Base to a fixed or mobile phone.

The transmission of SMS messages is the responsibility of telecommunication operators, the quality of whose services cannot be guaranteed by MEDRIA.

The total and cumulative responsibility of MEDRIA as part of or in connection with the use of the current Radio Base and the sensors for any purpose whatsoever will on no account exceed one hundred percent (100%) of the amount paid by the customer for the purchase of his monitoring tool.

Any changes or modifications not expressly approved by MEDRIA could void the user's authority to operate the equipment.

1.3. Disposal

During disposal of the equipment, its owner will have to ensure that the different components are discarded in accordance with the current legislation in the country where the equipment is destroyed.

These recommendations must be taken into account particularly for the following components:

- The Radio Base battery
- Metal components (welded or otherwise, untreated or painted, etc.)
- Plastic components (applicator, appendages, etc.)
- Electronic components (boards, display, antennae, etc.)
- Electrical components (charger, etc.)

2. VEL'PHONE

2.1. Description of the *Vel'Phone*®

The *Vel'Phone*® kit includes:

- The *Vel'Phone*® recipe;
- Vaginal thermometers
- Flexible appendages
- Thermometer applicator
- Two cleaning nets for the appendages

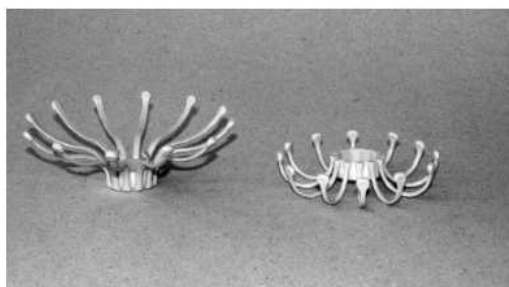
a) Vaginal thermometer and appendages

The thermometer is cylindrical:

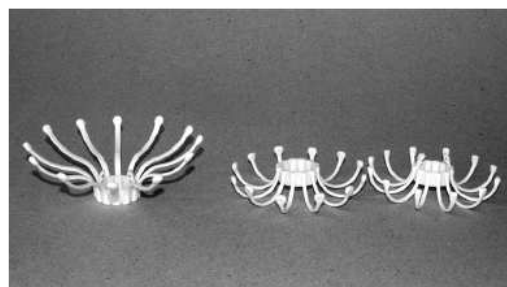


Vaginal thermometer

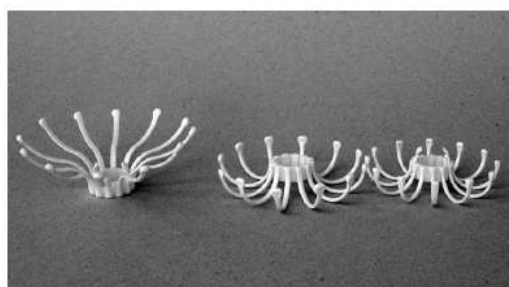
The appendages have different shapes and colors depending on their purpose:



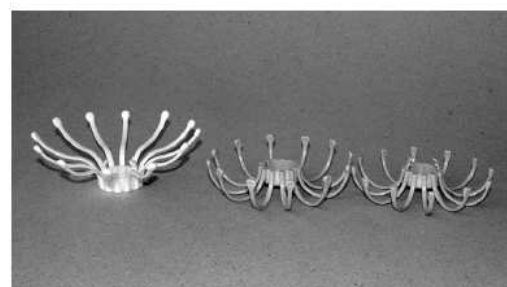
Heifer kit (turquoise)



Medium cow kit (white)



Large cow kit (yellow)



Very large cow kit (orange)

b) Vaginal applicator

The applicator is designed to facilitate the insertion of the thermometer into the animal's vaginal canal.



2.2. *The Vel'Phone®* SMS services.

The services provided by the *Vel'Phone®* consist of SMS messages sent by the Radio Base after inserting a vaginal thermometer into a cow or a heifer.

The different types of messages sent are described below.

a) SMS classification

The SMS sent by the Radio Base are differentiated by their level of urgency.

There are three urgency levels:

SMS type	Definition	SMS concerned
Urgent SMS	Sent without delay during and outside the work day	Low battery
		Radio Base test (GSM coverage)
Delayed SMS	Sent without delay during the work day and depending on the nightly delay configured outside the work day	TV activation
		TV expulsion
Information SMS	Sent only during the work day	Low battery
		Battery charged
		Radio Base restart
		Daily reports
		Calving prediction (probable/expected/low temperature)

b) Thermometer activation

After every insertion of a thermometer into an animal and the time (5 to 10 min) required for the temperature to rise above 36.4° C (97.5° F), the Radio Base sends an *Urgent SMS* such as: **00AB1 activation at 8h30** where **00AB1** designates the number of the thermometer used and **activation at 8h30** (8:30 a.m.) the event that has occurred and the time of detection of the event by the Radio Base.

This SMS is sent to each mobile phone activated in the Radio Base:

- It thus recalls the number of the thermometer that just opened a monitoring session
- It confirms the proper functioning of monitoring

c) Daily reports

As soon as the **Daily reports** function is activated in the Radio Base after configuring

The sending schedule selected by the farming supervisor, an *Information SMS* is sent every day in the morning and /or in the evening, to each activated mobile phone number.

This daily report is sent as long as a monitoring session is opened by one of the *Vel'Phone®* thermometers.

The daily report SMS provides the temperature measured in each animal during the half-hour prior to sending the SMS and enables to:

- Confirm every day the proper functioning of the monitoring
- Acquire or maintain the habit of monitoring the increase and decrease in the temperature of each cow to detect the preparation of calving then the labour phases of the animal

At the scheduled times for sending a daily temperature report, the Radio Base sends an SMS with the following information to each activated mobile phone number:

SMS			Meaning
<i>Report</i>	<i>1/1</i>	<i>18h30</i> (6:30 p.m.)	Daily report time
<i>00AB1</i>	<i>38.9</i> (<i>102° F</i>)		Thermometer number and temperature in ° C (° F)

If the last radio communication with one or more thermometers dates back to more than 30 minutes, information regarding the age of the corresponding temperature reading is provided along with the temperature, for example:

SMS			Meaning
00AB5	39.2 (103° F)	46 min	Last temperature measured 46 min ago
00AB1	38.8 (102° F)	+1 h	Last temperature measured more than an hour ago
00AB9	38.9 (102° F)	+1 d	Last temperature measured more than 24 hours ago

These thermometers find it difficult to communicate with the Radio Base and are probably at the radio's range limit. In this case, it may be necessary to move the Radio Base or the animals to improve the radio communications.

The non-receipt of the daily report when a monitoring session is open characterises an operating anomaly that requires you to get closer to the Radio Base as soon as possible.

A frequent cause of non-receipt of the daily report is the deactivation of the mobile phone number or the *Daily reports* function by an employee. Another cause is the momentary failure of the GSM operator's SMS service.

d) Calving prediction

The calving prediction aims to relieve the breeder of monitoring all animals by helping him focus his attention on those that require it.

The prediction has three main objectives:

- Inviting the breeder to isolate the cow and more particularly the heifer ready to calve, under the best conditions of accessibility, hygiene and safety before its waters burst; i.e. pasture or in a calving pen in the building
- Avoid moving or rushing the animal during calving to prevent any secretion of adrenaline while the animal must naturally secrete endomorphine, because "during calving, endomorphine is good, adrenaline is very bad!"
- Allow the breeder to focus his attention on the cows and heifers that are reported to be ready to calve within 48 hours

The calving prediction method used by the *Vel'Phone®* is based on the observation of the progressive rise in body temperature of each animal during the four or five days that precede the calving, then a relatively sudden lowering of the temperature in the 6 to 48 hours before calving.

Two algorithms concurrently monitor each animal after activation of the **Calving prediction** function which occurs within twelve hours following the insertion of the thermometer.

Activation of the **Calving prediction** function requires the recording of a temperature greater than the pre-programmed *model* normal circadian temperature of a cow.

The first algorithm monitors the absolute variation of the temperature that has dropped below 39° C (102.2° F) after having previously risen above 39° C (102.2° F).

The second algorithm monitors the relative variation of the temperature that has dropped close to 2° C (3.6° F) after having risen close to 41° C (105.8° F).

The combination of the two calving prediction algorithms enables the Radio Base to generate two different prediction SMS according to the amplitude of observed signals.

As shown in the SMSs texts given below, if the calving has not occurred within 48 hours, the breeder is inclined to believe that the animal is facing a calving problem.

The breeder may decide to carry out a clinical examination of the animal after 72 hours.

Message "**Possible calving in 48h**"

The first information SMS titled **00AB1, 2h00 possible calving in 48h** is created as soon as at least one of the two algorithms has crossed its triggering threshold:

- **00AB1** designates the thermometer and **2h00** (2 a.m) the message creation time

The message **Possible calving in 48 h** created outside a work day is sent only the next day by SMS, at the beginning of the work day.

The reliability of the message **Possible calving** is on the average greater than 75 %, but may vary depending on the breeds and environmental conditions.

Message "**Expected calving in 48h**"

The second information SMS titled **00AB1, 8h00 expected calving in 48 h** is created after the thresholds of both algorithms are crossed over a period of two hours:

- **00AB1** designates the thermometer and **8h00** (8 a.m) the message creation time

The message **Expected calving in 48 h** created outside a work day is sent only the next day by SMS, at the beginning of the work day.

The probability of receiving the message **Expected calving in 48 h** is on the average greater than 60 % for heifers and more than 40 % for cows.

The reliability of the message ***Expected calving in 48 h*** is on the average greater than 90 %, but may vary depending on the breeds and environmental conditions.

Clinical examination

It is recommended to carry out a clinical examination of the cow or the heifer when more than 72 hours have passed after the ***Expected calving in 48 h*** SMS is received.

e) Low temperature alert

When the Radio Base detects a body temperature lower than 37.8° C (100.0° F) for more than two consecutive hours, it creates an **Information SMS** titled ***00AB1, Low temperature alert < 37.8° C (100.0° F)***.

This type of message is relatively rare and is mainly created in case of milk fever in dairy cows or uterine torsion in the entire breed.

Metabolic disorder and loss of appetite then favour the lowering of the temperature.

This ***Low temperature*** alert calls for a clinical examination as soon as possible.

f) Absent thermometer alert

The objective of the ***TV alert absent*** function is to inform the breeder by SMS when a thermometer inserted into an animal has not communicated with the Radio Base for a duration greater than the maximum communication time defined in the Radio Base.

The *TV alert absent* SMS can be generated by the Radio Base only if the latter has communicated with the thermometer after its insertion into an animal, in order to observe the rise in temperature of the sensor confirming the insertion.

This observation is characterised by the receipt of the ***Activation SMS***.

It is therefore recommended to always pay attention to the proper receipt of the ***Activation SMS*** in the few minutes following the insertion of a thermometer into an animal.

The *TV alert absent* SMS will be generated only once for every activation following the insertion of the thermometer into an animal.

In case of persistent absence of the thermometer, it is the ***Daily report*** that reminds the breeder regarding the absence of the thermometer in question, by replacing the indication of its temperature by the indication ***TV absent since...***

The ***TV alert absent*** SMS is sent in the following format:

00KOH TV alert absent at 13h30

Where **00KOH** designates the thermometer number that no longer communicates with the Radio Base and **13h30** (1:30 p.m.) designates the time when the non communication period exceeded the maximum delay configured beforehand in the Radio Base.

g) Thermometer expulsion

As soon as a thermometer activated in a monitoring session – temperature greater than 36.4° C (97.5° F) – is expelled by the waters and observes its temperature falling below 36.0° C (96.8° F), the Radio Base creates a delayed *Expulsion SMS* of the type **00AB1 expulsion at 8h51**, where **00AB1** once again designates the thermometer used and **8h51** (8:51 a.m.) the precise time of detection of the temperature below 36.0° C (96.8° F).

Outside the work day, the *Delayed Expulsion SMS* is sent to the activated mobile phones only after expiry of the *Nightly delay* which may have been configured by the breeder on the Radio Base to between 0 minute and 2 hours.

If the nightly delay is set for a period of 45 minutes, the animal can work without being worried of a hasty arrival of the breeder.

However, the *Delayed Expulsion SMS* is sent without delay during the day.

For a heifer it is recommended to wait for about two hours between the time of expulsion of waters indicated in the SMS and the setting up of calving assistance.

For a cow, this waiting time before intervention may be reduced to less than an hour.

2.3. Configuration of the *Vel'Phone*® Services

a) Work day

The breeder can determine his **Work day** by configuring the start and end of the period. This configuration is important as it governs the sending of SMS.

b) Daily reports

The DWS can send you every day two temperature reports from equipped animals. These temperature reports are sent as an *Information SMS*.

The time for sending **Daily reports** is set in the time range predefined in the **Work day** sub-menu, in order to avoid receiving a **Daily report** during the night.

c) Nightly delay

This function enables to manage the *Delayed SMS*.

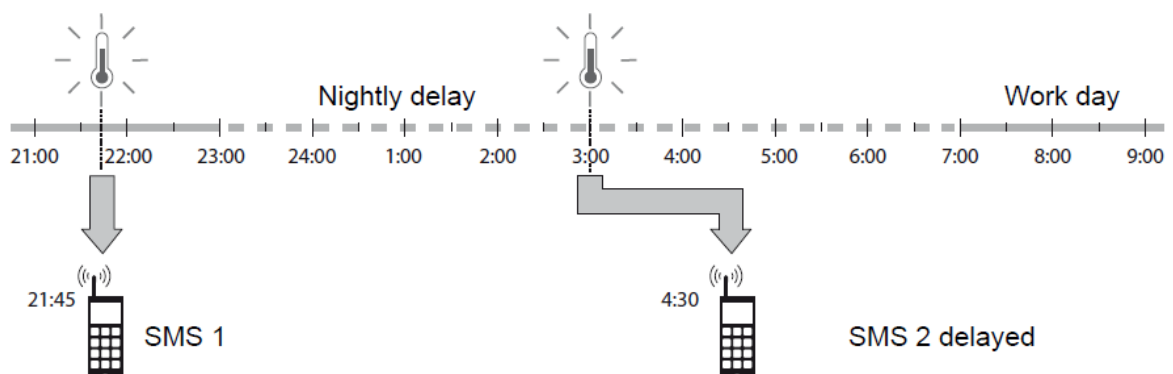
Only SMS managed outside the work day are delayed by the configured nightly time duration.

It is possible to delay an SMS by 0 minutes to 2 hours.

We recommend that the **Nightly delay** value must be set at 45 minutes.

This function has been developed to improve the user's comfort as well as to let the animal work without being worried about a hasty arrival of the breeder.

Operating principle



Consider that the SMS 1 and 2 are both of the *delayed type*:

- SMS 1 is sent immediately to the active numbers registered in the Radio Base as the triggering occurred during the work day.

SMS 2 will be sent at the triggering time plus the delay time that has been input into the **Nightly delay** function. For example, a thermometer is expelled at 3h00 (3 a.m) in the morning. If the nightly delay value is 1h30, the **Expulsion SMS** will be sent at 4h30 (4:30 a.m).

d) TV alert absent

The **TV alert absent** function enables to activate and configure the maximum non communication delay.

Configuration example:

Activation	Daytime active
Configuration	3:00 Delay fixed at maximum 3 hours

Operating example:

	1	2
Event	Receipt of a TV alert absent SMS	Receipt of a Daily report SMS
Message content	00KOH TV alert absent at 13h30 (1:30 p.m.)	Reported 1/1 18h00 (6 p.m.) 00KOH absent since 7h30 (7:30 a.m.)
Message type	SMS type TV alert absent	Indication of the absence delay
Meaning	The animal, released after 10 a.m. left for grazing with the rest of the herd. The 00KOH thermometer did not communicate with the Radio Base from 10:30 a.m. to 1:30 p.m.	The thermometer did not communicate with the Radio Base since 10:30 (6 p.m.) minus the observed delay of 7h30).

The **TV alert absent** SMS being generated only once after activation of the thermometer, it is the **Daily report** SMS that reminds the breeder about the absence of a thermometer by replacing the indication of its temperature by the indication : **00KOH absent since 7h30** (7:30 a.m.).

e) Calving prediction

The calving prediction is based on the analysis of temperature reports from animals equipped with vaginal thermometer

2.4. Setting up the *Vel'Phone*® thermometers

a) Recommended maintenance materials and products

In addition to the *Vel'Phone*® equipment, we recommend that you use the following materials and products for the maintenance and disinfection of appendages, setting up thermometers, hygiene and care of animals:

- Plastic brush with soft bristles
- Disposable cloth or absorbent paper towels
- Bucket with water at a temperature of 30° C (86° F) to 35° C (95° F), if possible
- Second bucket recommended in case of multiple insertions
- Chlorhexidine solution 5 % to be diluted
- *Bovigel* or *VetGel* type lubricating gel

Never use bleach solution, detergent or any iodised product for the maintenance of thermometers and appendages.

b) Moment of insertion

The vaginal thermometer must be inserted into the cows or heifers seven to ten days before the end of gestation, the objective being to observe the expulsion within the fifteen days following the insertion.

The due date at 280 days of gestation is not accurately known for a suckling breed when the gestation results from natural service. It is also more difficult to predict the end of gestation date in a suckling breed due to the extension of the gestation by more than two to three weeks after the due date. The first criterion for assessing the proper moment to insert a thermometer must be provided by the clinical examination of the animal.

Therefore we recommend that you maintain your habits of observing calving preparation signs, which may be specific to the breed of your cows.

We otherwise recommend that you insert the vaginal thermometer:

- One week before the due date for dairy breeds: Holstein, Brown Swiss, Jersey, etc.
- On the due date for mixed breeds: Normande, Montbéliarde, Abondance, Tarentaise, Simmental, etc.
- One week after the due date for suckling breeds: Charolaise, Limousine, Blonde d'Aquitaine, Rouge des Près, Parthenaise, Belgian Blue, etc.

c) Adaptation of the appendages to the animal













Take care to properly adapt the appendages to the morphology of the animal that you will equip, to ensure that the thermometer is maintained as required until the moment it has to be expelled by the waters.

The adaptation of appendages enables an essential compromise in order to:

- Limit the discomfort to animals
- Reduce the risk of injury to vaginal mucosa
- Reduce the risk of premature expulsion

Three or four types of appendages of different dimensions, materials and colors have been provided to you following the description you sent us regarding the breeds of your herd.

The turquoise /white /yellow /orange colors of appendages constitute a simple and legible code, easy to memorise to adapt the appendages to the characteristics of your cows.

CHARACTERISTICS		ASSEMBLY No. 1	ASSEMBLY No. 2	ASSEMBLY No. 3	ASSEMBLY No. 4
COLOUR	"S" Accessory	 Blue	 Blue	 Blue	 White
	"C" Accessory	 Turquoise	 White	 Yellow	 + "C" Orange with hooks
DIAMETER		Small	Medium	Large	Very Large
MATERIAL		Flexible	Intermediate	Rigid	Rigid
USE		Small females (eg. heifer) Females with small passages (eg. Belgian Blanc Bleu)	Multiparous cows Females with large passages (eg. charolais)	Large cows Multiparous cows with large passages	Assembly with 3 accessories 1 S White and 1 C Orange and 1 C Orange hooks Assembly for large sized cows
					

d) Installation of the appendages on the thermometer

Presentation

Appendages

Select the kit that is most suited to the morphology of the animal that you will equip.

There are two appendage kits depending on the size of the cow:

Appendage kit	Comments
Standard	2 rings with S shaped arm and 2 hooks 3 rings with C shaped arm
Large Cow	2 rings with S shaped arm and 2 hooks 3 rings with C shaped arm 1 ring with C shaped arm and 2 hooks

- **Rings with C shaped arms**

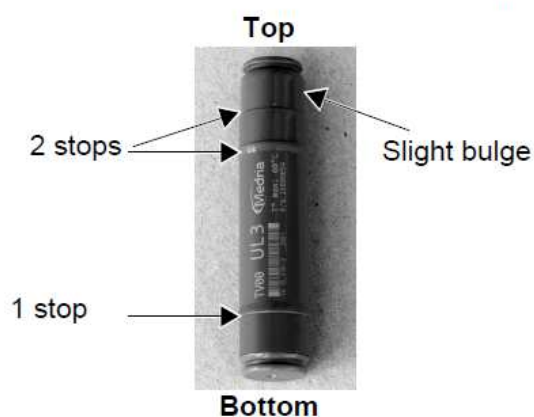
Help hold the thermometer in place.

- **Rings with S shaped arms**

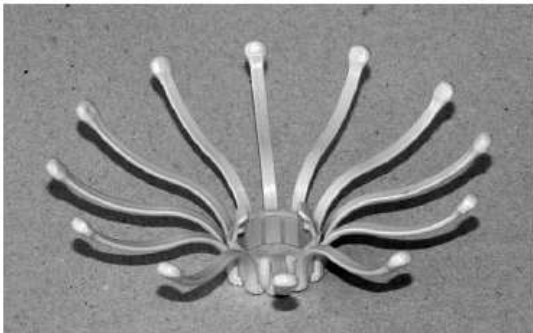
Receive the waters at the time of expulsion.

Thermometer

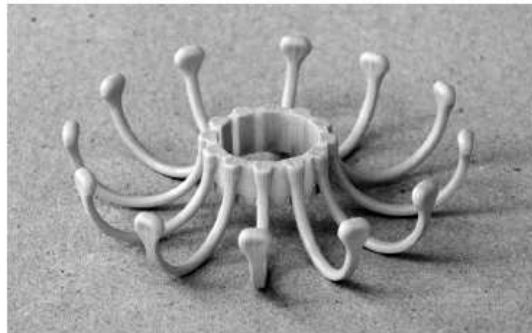
Identify the orientation of the thermometer to install the appendages correctly:



Installation of the appendages N°1, N°2 and N°3



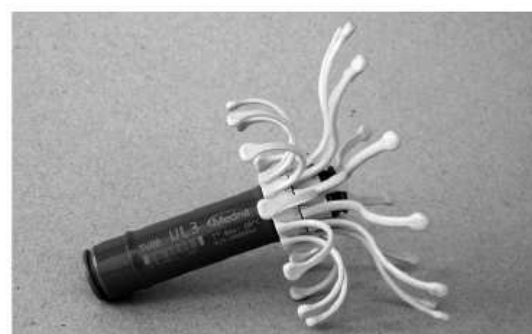
Turquoise appendage
S shaped arms – 2 hooks



Turquoise appendage C
shaped arms

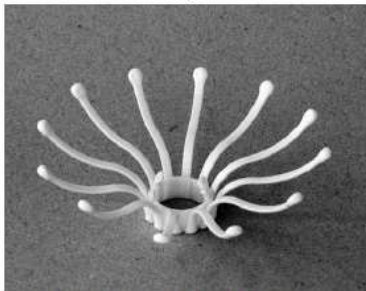


2. Slide the appendage with the **C** shaped arms on top of the thermometer, arms downward.

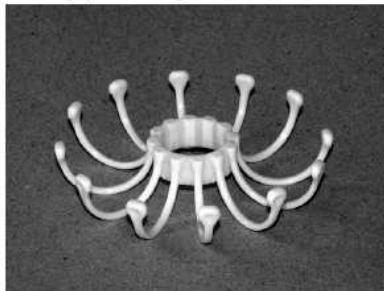


3. Slide the appendage with **S** shaped arms on top of the first appendage, arms upward.
4. Press on the appendage to lock the two hooks in the groove.

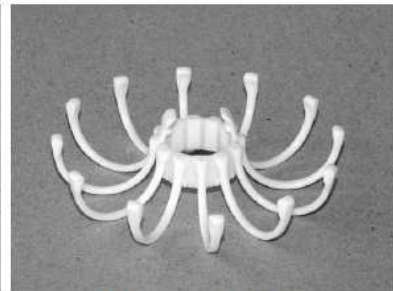
Installation of the appendages N°1, N°2 and N°3



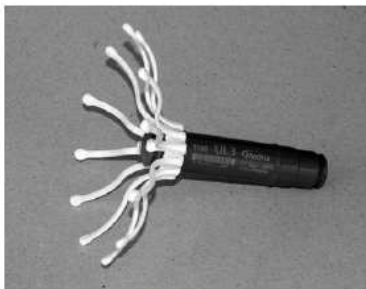
**White appendage
S shaped arms – 2 hooks**



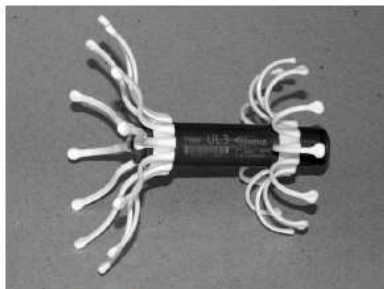
**White appendage
C shaped arms (without hook)**



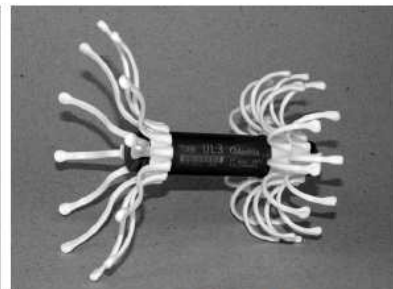
**White appendage
C shaped arms – 2 hooks**



2. Slide the appendage with the **S** shaped arms at the bottom of the thermometer, arms downward.
3. Press on the appendage to lock the two hooks in the groove.



4. Slide the white appendage with the **C** shaped arms on top of the thermometer, arms upward.



5. Slide the last appendage with **C** shaped arms and hooks on top of the second appendage, arms upward.
6. Press on the appendage to lock the two hooks in the groove.

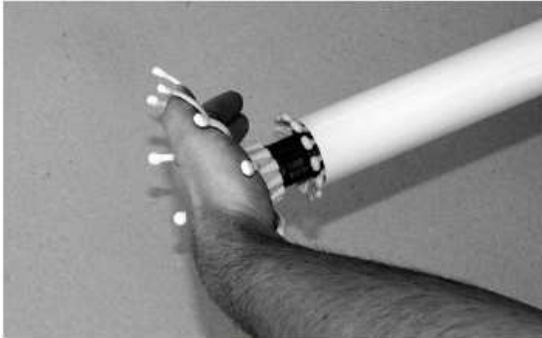
Disassembly of the appendages

Open the hooks in order to unlock the rings and slide to release the appendages from the thermometer.

e) Installation of the thermometer in the applicator

Insert the thermometer equipped with appendages into the tube by pushing with the flat of the hand

Push the thermometer into the applicator with the thumb



Step 1



Step 2-a



Step 2-b



Final appearance

Put the applicator back into the pre-soaking bucket

f) Disinfection by pre-soaking before reuse

The pre-soaking of thermometers and appendages is the only disinfection operation for the *Vel'Phone®* equipment.

In order for it to be effective, the disinfection by pre-soaking must be done for completely clean equipment. This is why we recommend that you clearly separate this disinfection operation from the prior cleaning operation that you have carried out after previous use.

The use of warm water adjusted to between 30° C (86° F) and 35° C (95° F) increases the effectiveness of the disinfection and significantly reduces the discomfort felt by the animals.

Disinfection by pre-soaking must be done before every new insertion.

Before you approach the animals to restrain them, provide for a clean bucket filled with about five liters of warm water with a temperature adjusted to between 30° C (86° F) and 35° C (95° F)

Pour 25 ml of 5 % chlorhexidine solution into the warm water with the dispenser, according to the dosage indicated on the dispenser.

Immerse the thermometers equipped with their appendages as well as the end of the applicator tube into the warm water. The time for disinfection by pre-soaking must not exceed fifteen minutes.

g) Hygiene, lubrication and insertion

Effective restraining of animals is an essential condition for proper insertion.

We request you to take all possible measures to prevent accidents and to reduce as much as possible the animal's mobility in order to avoid any risk of injury to you as well as to the animal, particularly during insertion of the applicator into the vaginal canal.

While maintaining a safe distance from the animals, take out the equipped thermometer from the bucket to insert it into the applicator before putting it back again into the pre-soaking bucket, ready for use.

With the animal restrained, carefully wash the animal's vulva using a disposable cloth or absorbent paper towelette dipped in pre-soaking water.

It is recommended to use a second bucket in case of multiple insertions in order not to contaminate the pre-soaking water.

Dry the vulva with the towelette or a new disposable absorbent paper before lubrication:

- Pour out a large knob of lubricating gel into your hand
- Spread the gel over the entire surface of the applicator tube
- Apply the rest of the gel on either side of the vulva
- Insert the applicator into the vaginal canal by gently parting the labia and by tilting it upward to get around the urinary meatus. Straighten it up horizontally to continue the insertion.

You will have to push gently to rupture the hymen in heifers having undergone artificial insemination.

Place the thermometer after the pelvic passage by pulling the white tube of the applicator towards you.

h) Retrieval of the thermometer

The vaginal thermometer must be retrieved in two cases:

- After receiving an SMS about the **Expulsion** of waters.

The thermometer equipped with its appendages must be retrieved as soon as possible after the expulsion during calving. It is then relatively easy to locate close to the area where the animal has settled down to give birth - and find it in the litter.

- When you wish to interrupt the monitoring of an animal that you have equipped to monitor its temperature.

Proceed as follows:

- Clean the vulva
- Lubricate the examination glove
- Search the vagina to extract the vaginal thermometer

i) Cleaning of the thermometers and appendages

We request you to clearly distinguish between the two following operations in order to perform them separately:

- **Mechanical cleaning with clean water** of the equipment after its last use

- **Disinfection of equipment by pre-soaking** before new insertion into an animal. After retrieving the thermometer, separate the appendages from the thermometer body by parting the clips with the thumbs, then remove the large particles by a first rinsing with clean water. Do not soak.

Cleaning of the thermometer body

This mechanical cleaning can be done with clean water or with neutral soap using a soft bristle brush or a cloth towelette. Rinse the thermometer thoroughly.

Cleaning of the appendages

The appendages are also cleaned mechanically and this can be done in two different ways:

- Cleaning in a linen washing machine [max 40° C (104° F)] in one of the nets provided for the purpose
- Cleaning with clean water with a soft bristle brush
- Make sure that the cleaned equipment is stored in the blue trunk.

Never use bleach solution, acidic or alkaline detergent or any iodised product for cleaning and disinfecting thermometers and appendages.

3. HEATPHONE

3.1. Description of the *HeatPhone*®

The *HeatPhone*® kit includes:

- The *HeatPhone*® recipe;
- *Axel*® sensors
- Straps

The *Axel*® sensor comes in the form of a sturdy box placed on the animal's collar using a strap provided with the *HeatPhone*® kit:

Principles of the *HeatPhone*®

The *HeatPhone*® detects heat in heifers, dairy cows and suckling cows. It informs you about the detection of heat by SMS on your mobile phone and asks you to approach your animals or to observe their activity reports on the *Daily Web Services*® (DWS®) when you consider it necessary.

The *HeatPhone*® operates in 4 stages:

- *Axel*® sensors constantly measure and record the activity of animals.
- The GSM Radio Base collects the reports and sends them to remote servers every 30 minutes.
- The servers archive the data, analyse them, then detect the heat.
- *DWS*® updates the information in your account and sends SMS.



3.3. Use of the *HeatPhone*®

a) Components of the *HeatPhone*®.

The operation of the *HeatPhone*® service relies on the use of the 4 following components:

The Radio Base

The Radio Base is the main equipment of the MEDRIA infrastructure, it communicates with all types of sensors. It must be placed in the middle of the stock and constantly powered by the low voltage charger or by a solar panel.

The Radio Base collects the data recorded by the *Axel*® sensors and then transmits them every 30 minutes by the GSM network to the computer servers of *DWS*® to feed the stock's database.

The Radio Base must be configured in *DWS*® mode in its **Radio base / Connection** menu.

The GSM mobile phone

An SMS on the user's mobile phone indicates the beginning of the heat.

Axel® sensors

The *Axel*® sensor placed in the animal's collar includes a 3-axis accelerometer that measures and records every 5 minutes - 9 statistical data of its activity, such as the angles, vertical and lateral accelerations.

This box is placed during the fertility period to detect the heat. It may remain continually on the animals to monitor all events relating to reproduction, health and performance.

These other detection services will complete MEDRIA's offer in the course of time.

The *Axel*® works for more than 6 years independently, records data of the last 7 days and can communicate with the Radio Base from more than 200 metres away depending on the environment. It is provided with the collar adapted to the morphology of your animals. It can also be installed on standard Automatic Feeding Station collars.

The Daily Web Services® or *DWS*®

DWS® is the internet application that provides monitoring and detection services designed by MEDRIA. The operation of *DWS*® relies on the use of a secure computer infrastructure to store and process stock data.

Its positioning on an externalised computer infrastructure enables it to be accessed from any location via the Internet and it is continuously updated without intervention on the user's personal computer equipment.

The processing of *Axel*® data enables to characterise and detect the behaviour of heat. It also enables to monitor rest, feeding behavior and ingestion and rumination times. A password-protected personal account is created at the address <http://dws.medria.fr> to provide access to services, data, curves and logs of the farm.

b) Configuration of the *HeatPhone*® service. on *Daily Web Services*®

The *My account* tab

The ***My account*** tab enables to configure the *DWS*® according to the user's wishes:

- Registration of his contact details;
- Modification of the password;
- Modification of the language used;
- Modification of the time zone of the farm;
- Choice of the temperature unit (degree Celsius or Fahrenheit);
- Registration of an unlimited number of users authorised to access the *DWS*® account with their controlled rights.

The *Services* tab

The ***Services*** tab enables to configure the *HeatPhone service*®:

Registration of employees who can receive SMSs and their telephone numbers;

In ***SMS recipient*** click on the ***Add a recipient*** button;

Enter the name and the telephone number in international format (+336...);

Indicate the time zone;

Check ***HeatPhone***® and ***System*** in the proposed services;

Then click on ***Save*** at the bottom of the page;

- Choice of the identification mode of animals included in the SMSs, work number, name, etc.;
- Choice of the SMS sending mode: instant or reports (at the selected times) for each recipient;
- Definition of hours of the work day during which SMSs will be sent;
- Adjust the sensitivity (if necessary) of heat detection for heifers and for cows.

The heifer/cow categorization is determined according to the age of the first calving. By default, *DWS*® considers that a milk heifer will calve at 26 months and that a suckling cow will have its first calving at 35 months.

c) The *HeatPhone*® every day

Installing collars on animals

- Place the Axel ® sensors 4 to 5 weeks before AI on the heifers and 3 weeks after calving on the cows;
- Check the installation of the sensor on the collar: the inscriptions will be against the animal's neck;

- Note down the sensor number and the number of the animal on which it will be placed;
- Direct the arrow marked on the *Axel*® sensor towards the animal's head;
- Place the collar on the narrowest portion of the neck just behind the ears;
- Tighten the collar so that it is properly adjusted to the neck's morphology. It is recommended to correctly adjust the tightening of the collar in order to allow at least the thickness of the hand to pass.;
- Remove the collar once the cow is confirmed pregnant, i.e. approximately 3 months after installation.

After installing the *Axel*® collar on the animal, it is recommended to create its assignment to an animal by identifying the latter in the **Equipment** tab of *DWS*®.

If the sensor is not assigned to an animal, the events detected by the *HeatPhone*® will be sent to the user but will refer to the sensor number and not the identification mode of animals selected by the user (name, work no., etc.).

The *HeatPhone*® automatically detects the installation and removal of *Axel*® collars on animals:

- It detects the installation of the *Axel*® collar after 2h30 of measuring the activity,
- Generates the installation event, then reinitialises the heat detection algorithm of the *Axel*® collar.

Removal of the *Axel*® collar after the gestation report

The *DWS*® automatically detects the removal when the *Axel*® collar is maintained immobile on the ground, or hooked on for more than 1 hour. It generates a removal event and stops its heat detection algorithm.

If a new animal is equipped immediately after removal of an *Axel*® collar, it is mandatory to delete as soon as possible the existing assignment on the *DWS*® in favor of the new assignment to correctly reinitialise the detection algorithm.

Operations on the *DWS*®

Connection to the *DWS*® interface

1. On the *DWS*® site <http://dws.medria.fr>;
2. Enter the user id (farm no.) and the password;
3. Click on **OK**.

It is recommended to use Mozilla Firefox as web browser (avoid Internet Explorer for *DWS*®).

Registration of the animals in *DWS*®

1. Go to the **Animals** tab;
2. Click on the **+ Add an animal** button;

3. Complete all the fields accurately: particularly the date of birth, the breed and the group (to be created, with a minimum of 5 animals in a group) which are determining elements for detections;
4. Click on **Save**.

The registration of animals can be done automatically and daily if your *DWS®* application accesses the stock database of the stock establishment that provides the MEDRIA solution.

Assignment of a sensor to an animal

It is strongly recommended to assign the *Axel®* collar with an animal to:

- Identify the animal in the SMSs, for every event generated on the *DWS®*, and for the archival of data;
- Reinitialise correctly the heat detection algorithm after installing the *Axel®* collar;
- Activate the group activity compensation on this *Axel®* collar.

If the *Axel®* collar is not assigned to an animal:

- The SMSs will indicate only the *Axel®* sensor number;
- The algorithm will not be able to take advantage of the group activity compensation.

Procedure

1. Go to the **Equipment** tab
2. Select the concerned sensor (AX for *Axel®* sensor);
3. Click on the **Create an assignment** button
4. Select the concerned animal from the drop-down list
5. Enter the precise date and time when the collar was installed
6. Click on **Create an assignment**.

The assignment on *DWS®* must be done within a maximum period of 5 days after installing the collars on the animals.

Deletion of an assignment between sensor/animal

1. Go to the **Equipment** tab
2. Select the row of the concerned sensor (AX for *Axel®*);
3. Click on the **Delete an assignment** button
4. Click on **Delete the assignment between sensor/animal**.

Constitution of animal groups

The constitution of animal groups on the *DWS®* enables to reserve a digital processing specific to every animal group to differentiate, for example, the group activity compensation of heifers and cows.

The compensation of the group activity operates from a minimum of 5 equipped animals onwards in a group. The movement of animals and the creation of groups are done very simply from the Groups tab of *DWS®*.

3.4. The *HeatPhone*® services

The services provided by the *HeatPhone*® consist in SMS messages sent by the MEDRIA servers and the availability of information analysed by the servers during consultation on the *Daily Web Services*® (*DWS*®).

These services follow on from the installation of an *Axel*® sensor on the neck of a cow or a heifer and the configuration of the generation of these messages by the user on the *DWS*®.

a) Heat detection SMSs

The SMSs sent by the MEDRIA server differ by their content. They inform the user about a specific event detected following the analysis of data acquired by the *Axel*® sensor.

Example of an SMS:

SMS	Meaning
<i>2988</i>	Designation of the animal according to the identification mode selected by the user on the <i>DWS</i> ®. Here it is the cow's work number
<i>(Default)</i>	Name of the group to which the animal belongs
<i>28/05/2013 02h30</i>	Date and time of the detected event
<i>confirmed heat</i>	Event type detected by the <i>HeatPhone</i> ®

Event types that can be detected

Event	Meaning
<i>Probable heat</i>	This event is detected if the animal has shown, within the 3 to 5 previous hours, an activity different from the last 5 days that the <i>HeatPhone</i> ® probably attributes to heat. Probable means that the heat signals are low or that the animal is beginning to indicate heat. Often followed by Confirmed heat within a variable period depending on the animal's activity. The minimum generation time between the two events Probable heat and Confirmed heat is 30 minutes.
<i>Confirmed heat</i>	Often preceded by Probable heat . Occurs if the animal has shown, within the 3 to 5 previous hours, an activity different from the last 5 days and strongly attributed to heat. Artificial insemination is recommended within 12 to 24 hours after the detection time indicated in the SMS.
<i>Probable cycled heat</i>	It is an event of Probable heat detected that is compared with a previous Confirmed heat or Confirmed cycled heat event at 22+/- 4 days. (The average heat cycle is considered as 22+/-4 days).
<i>Confirmed cycled heat</i>	It is an event of Confirmed heat that was compared with a previous Confirmed heat or Confirmed cycled heat event at 22+/- 4 days. (The average heat cycle is considered as 22+/-4 days).

Two heat events may not be generated at an interval of less than 72 hours, except for a confirmation preceded by a prediction (= probable).

b) The sensor installation and removal SMS

Sensor placed on the animal

This event is generated approximately 2h30 after installing the sensor on the animal, depending on the latter's activity.

Sensor not placed on the animal

This event is generated approximately 1h30 after removal of the sensor from the animal, provided that the *Axe*® sensor is motionless during this period.

c) The consultation of events on *DWS*®

The *DWS*® lists the events (that correspond to the SMS messages sent) sorted by Service, Animal or by Group.

It is possible at any time to print the list of events, as well as to add and record new events or observations that you wish keep a track of.

The list of events generated by the *HeatPhone*® can be consulted on the *DWS*® from the *Events* tab.

Furthermore, each event is placed on an activity curve specific to each animal, which can also be observed on the *DWS®*.

Consultation of *DWS®* activity curves

The activity curve that you observe in *DWS®* is the summary of several different algorithms whose data is processed on MEDRIA servers.

In order to detect heat, the *HeatPhone®* relies on the measurement and analysis of many criteria specific to each animal such as its age, its group, its daily activity outside the heat period, its rumination time, its behavioural variations, etc.

This complete algorithm generates SMS alerts to inform you about detected events.

Observing the curves on *DWS®* allows you to view these events and to assist you in your decision to inseminate.

How to consult the curves

- In the **Events** tab

Select the concerned animal

- Click on the **See curve** button

A period of 6 days is required after installing the collars to be able to observe the first curves.

Interpretation of *DWS®* activity curves

The interpretation is done according to 3 observation criteria:

- **The amplitude of the activity peak:** it must be significantly higher than the peaks that can be observed every day;
- **The hyperactivity duration:** it must be greater than 6 hours;
- **The cyclicity of 2 hyperactivities:** a heat cycle is considered to be between 18 and 26 days.

In general, we can visually confirm the heat when at least 2 of these criteria are observed on the *DWS®* activity curve.

Examples of DWS[®] activity curves

Example 1: Heat detected on a correctly cycled cow



- The 3 interpretation criteria are observed.
- The 2 hyperactivities observed are indeed heat.



We remark that for the same cow, 2 consecutive heats may be expressed differently.

Example 2: Heat detected on a non cycled cow



- 2 interpretation criteria are observed: the amplitude of the curve and the hyperactivity duration.
- The hyperactivity observed corresponds indeed to heat.

Example 3: Hyperactivity detected not linked to heat

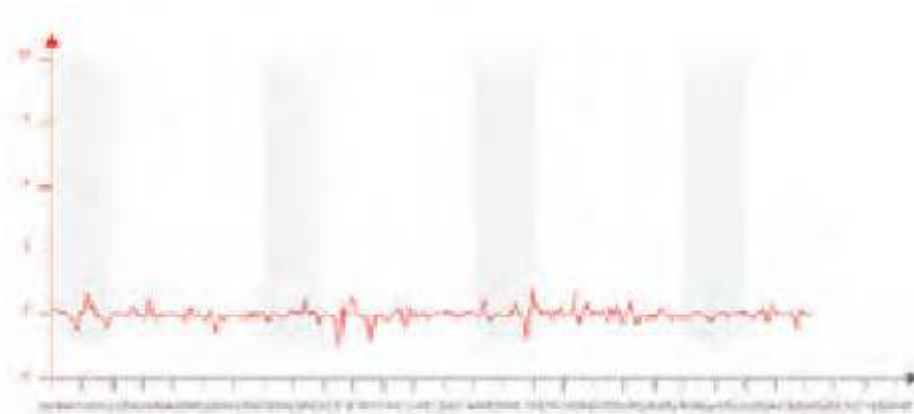


- Concerning this correctly cycled animal, the third event identified as a prediction does not correspond to its heat, only the curve amplitude criteria is observed.

Examination of reproductive disorders

Observing activity curves may reveal certain problems that the animals are suffering from. The consultants (inseminators, technicians, vets, etc.) may assist the user in finding the most suitable solutions for the various reproductive disorders observed.

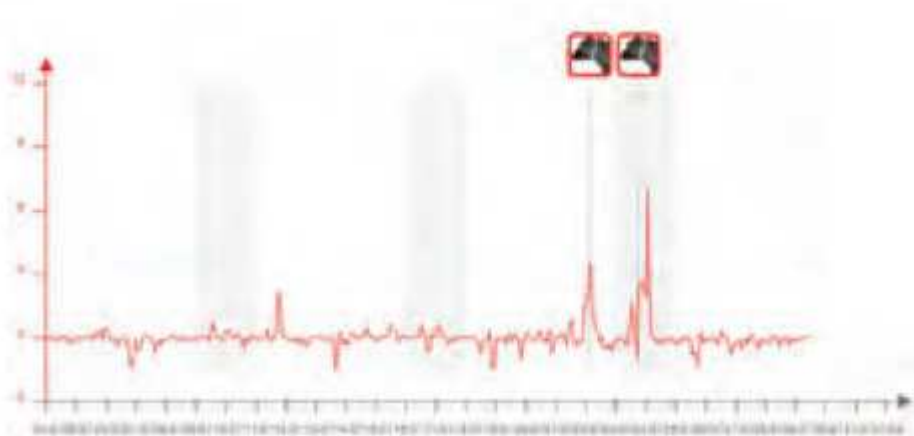
Example 1: Extended luteal phases



Example 2: Follicular waves



Example 3: Double heat



4. TROUBLESHOOTING

For any technical question, contact MEDRIA by e-mail: support@MEDRIA.fr or by telephone +33 (0)2 99 37 10 10.

5. APPENDICES

5.1. Technical and environmental specifications

Feature		Description
RF Interface		Internal Antenna
Power Requirement		Non-removable Lithium Battery 3.6V- 2.6Ah
Environmental Conditions		
	Operating Temperature Range	-20 ~ 55 °C
	Altitude	< 2000 m
	IP Protection Class	IP 67
	Pollution Degree	1
Size		
	Vel'Phone (TVi)	Ø : 2,65 cm – L : 11,6 cm (without appendix)
	HeatPhone (AXi)	L : 10 cm – l : 4,8 cm – H : 3 cm (without collar)
Weight		
	Vel'Phone (TVi)	87 g (without appendix)
	HeatPhone (AXi)	160 g (without collar)

5.2. Certifications

Any changes or modifications not expressly approved by MEDRIA could void the user's authority to operate the equipment.

a) CE trademark

MEDRIA hereby declares that this equipment complies with the essential requirements and other pertinent provisions of the directive 1999/5/CE.

A compliance declaration is available on the website www.MEDRIA.fr.

MEDRIA pursues a continuous development and improvement policy for its equipment and it is possible that some information in this document may not be up to date. Please contact your distributor to obtain all the updated product information.

b) Industry Canada (IC) Information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions :

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

c) FCC Part 15 Information :

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions :

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment complies with FCC's radiation exposure limits set forth for an uncontrolled environment under the following conditions :

1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

5.3. Glossary

Sensor	Device that enables to observe and record different signals
GSM	<i>Group System Mobile</i> Mobile telephony standard ideal for <i>voice</i> communications
Monitoring	Surveillance method to measure the activity of a system, a component, etc..
SMS	<i>Short Message Service</i> Enables to transmit short text messages via mobile telephony (among others)
SIM	<i>Subscriber Identity Module</i> Chip used in mobile telephony to store information specific to the subscriber of a mobile network


**ENSEMBLE, CONSTRUISONS
L'ÉLEVAGE DE DEMAIN**

Siège :
P.A. de la Gaultière
35220 Châteaubourg - FRANCE

Adresse postale :
CS 10031 Châteaubourg
35538 Noyal Sur Vilaine - FRANCE

Tél. : +33 (0)2 99 37 10 10
Fax. : +33 (0)2 99 37 10 15
www.medria.fr

