

# Ruminal Heart Rate/Temperature Data Logging System



External Sensor for advanced wildlife science and research



## A cooperation of Research Institute of Wildlife Ecology (FIWI) and Vectronic Aerospace

The Research Institute of Wildlife and Ecology (FIWI), in cooperation with Vectronic Aerospace, has developed a data logging system for long term measurements of heart rate and body temperature in free living ruminants.

The **Ruminal Heart Rate/Temperature Data Logging System** is an independent device with its own battery. However, it can be combined with the Vectronic VERTEX GPS collar including a 1D-5D battery, and/or a Vectronic Drop Off System.

### Operation overview

The main components of the **Ruminal Heart Rate/Temperature Data Logging System** are the Ruminal Implant Transmitter (RIT) and the Collar Data Logger. The RIT is placed in the rumen of the animal. The Collar Data Logger is integrated in the battery pack, which is attached to the collar around the animals neck. The RIT records raw heart rate based on vibration measurements during low activity periods of the animal as well as rumen temperature which is a proxy for body temperature. These data are transferred to the Collar Data Logger via UHF data link and are stored on board. Data download from the Collar Data Logger to a PC is possible via USB cable or wirelessly via the RumiLog Base Station.

### Collected data sets

**Recorded Raw Data** stored in the Collar Data Logger:

- raw activity of the animal: scan interval 180 s
- head-down time, number of head-up/down changes
- collar temperature: resolution 0.0625 °C, accuracy 0.5 °C
- body temperature: measurement interval 180 s, resolution 0.0625 °C, accuracy 0.1°C
- raw heart rate: scan time 180 s, scan interval 6, 9 or 12 minutes, detection range 15 ... 150 beats/minute

#### Post Processed Data

- for data processing an upload of recorded raw data to <https://rumina.fiw.at/> is necessary
- result: heart rate after removal of artifacts, body temperature and processed activity data (csv formatted)



moose with VERTEX Plus GSM collar  
with 5D-Drop Off battery

**GPS Collars made in Germany since 2000**



**VECTRONIC  
Aerospace**

# System components

## Ruminal Implant Transmitter - RIT

- tube made of stainless steel/ceramic
- dimensions of RIT: length 68 mm, Ø 19 mm, 73 g
- equipped with highly sensitive acceleration sensor and digital temperature sensor
- scan time of raw heart rate and measurement interval 180 s
- scan interval of heart rate 6,9 or 12 minutes (factory setting only)
- wireless UHF data link to Collar Data Logger with 180 s transmission interval
- lifetime 1 - 3 years depending on heart rate scan interval
- inserted via standard Ruminal bolus applicator (not included)

## Ruminal Implant Transmitter



## Collar Data Logger

- independent device with its own battery cell
- integrated in battery pack of GPS collar
- synchronized with the corresponding RIT
- equipped with activity and temperature sensor
- onboard nonvolatile memory with storage capacity of 64MByte
- data readout and configuration settings via USB cable or wireless data download via RumiLog Base Station
- lifetime 2 - 4 years depending on configuration of RIT

VERTEX Plus GPS collar  
with 2D Drop Off battery  
and integrated data  
logger in battery pack



## RumiLog Base Station

- wireless interface for Collar Data Logger via UHF data link
- USB powered
- to switch RIT ON/OFF and checking its operation
- for verifying operation and status of the Collar Data Logger and remote data download
- communication distance max. 100m under field conditions



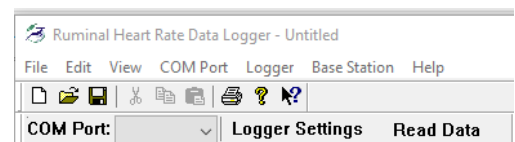
## RumiLog Base station

## Other equipment

- USB cable: Collar Data Logger - PC connection for data download and configuration settings
- LED Check Operation Device: operation check of Collar Data Logger and its synchronization with the Ruminal Implant Transmitter
- ON/OFF Switch Magnet: for switching on/off implant and logger in the field

## Graphical User Interface/GUI - RumiLog

- PC application software for windows
- for direct connection with Collar Data Logger or RumiLog Base Station
- for data download and change of settings



## Ruminal Heart Rate Data Filter Service

- <https://rumina.fwi.at/>
- upload and filter raw heart rate data
- result: heart rate without artifacts caused by animal movements
- download of post processed data (csv formatted)

## Ruminal Heart Rate Data Filter

<b>Choose binary File</b> <input type="button" value="Browse..."/> No file selected	<b>Log Settings:</b> Implant ID: Logger ID: Start Time: Number of Datasets: Interval Duration [s]:
--	---

## GPS Collars made in Germany since 2000

VECTRONIC Aerospace GmbH

Berlin, Germany

Phone: +49 30 6789 4990

Fax: +49 30 6789 5230

[www.vectronic-aerospace.com](http://www.vectronic-aerospace.com)

VECTRONIC Aerospace USA

Iowa, USA

Phone: +1 319 626 2267

Fax: +1 319 626 2268

[wildlife@vectronic-aerospace.com](mailto:wildlife@vectronic-aerospace.com)

VECTRONIC Aerospace CA

Ontario, Canada

Phone: +1 905 535 1514

Fax: +1 289 803 2539

