



Ultra small implantable loggers

TEMPERATURE
HEART RATE
ACTIVITY



ADVANTAGES AT A GLANCE

- Leadless, minimally invasive
- Safe to implant
- Accurate stress-free measurements
- Long battery life
- Reusable



STAR : ODDI

Logging Life Science

www.star-oddi.com

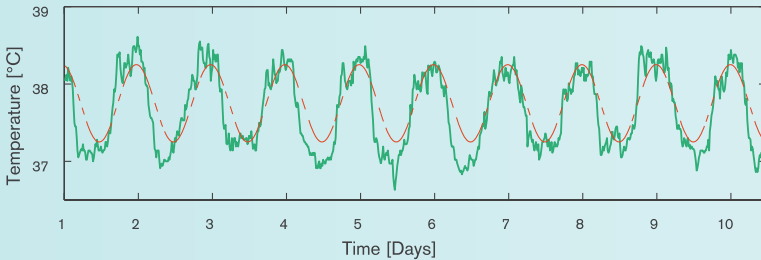
Temperature Measurements

UNDISTURBED CORE BODY TEMPERATURE

The temperature loggers are well suited for recording core body temperature throughout your research with no disturbance to the animal subject. This makes it possible to identify a variety of physiological changes, for example in circadian rhythm and hibernation patterns from months to years.

FOR ALL TYPES OF ANIMALS

The temperature loggers come in a wide range of sizes, the smallest weighing only 1 gram, making it possible to record temperature in a wide range of animal sizes.



Circadian rhythm recorded as core body temperature (green)

	DST nano-T	DST micro-T	DST milli-T	DST centi-T
Size (diameter x length)	6 mm x 17 mm	8.3 mm x 25.4mm	13 mm x 42 mm	15mm x 46mm
Weight	1 g	3.3g	12.8g	19g
Battery life	14 months*	28 months*	5 years*	9 years*
Memory capacity per sensor	43,477 measurements	65,535 measurements	1,398,100 measurements	174,000 measurements
Minimum measuring interval	1 sec	1 sec	1 sec	1 sec
Temperature range	5–45°C	5–45°C	Standard: 5–45°C Extended: -2–50°C	Standard: 5–45°C Extended: -2–50°C
Temperature resolution	0.032°C	0.003°C	0.032°C	0.032°C
Temperature accuracy	+/- 0.2 °C	+/- 0.06°C	+/-0.1°C	+/-0.1°C

*For sampling interval of 10 min

Heart Rate Measurements

LONG TERM HEART RATE AND BODY TEMPERATURE

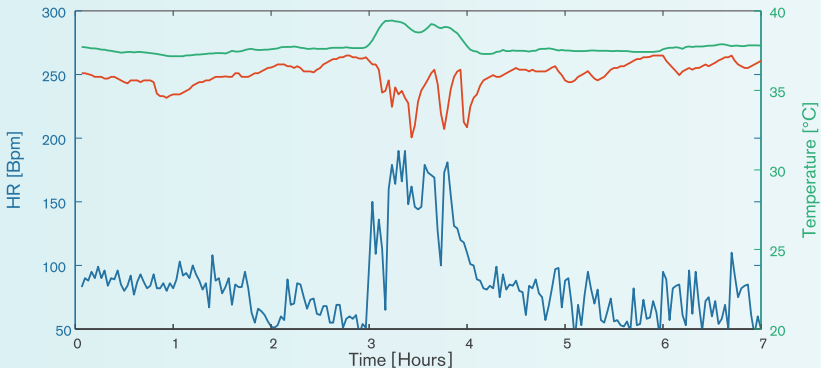
The DST HRT loggers simultaneously measure long term heart rate and body temperature. This makes them ideal for a variety of studies including circadian rhythm, stress response, baseline, metabolic and thermoregulation studies.

LEADLESS SINGLE CHANNEL ECG

The heart rate is derived from a leadless single channel ECG in which the electrodes are part of the housing material, making the logger especially easy to implant and explant. To calculate the heart rate the logger takes a short recording of ECG on any set time interval and calculates the mean heart rate for each recording. For validation purposes, each individual recording is graded with a quality index (QI).

SUITABLE FOR MEASURING A WIDE RANGE OF HEART RATES

The heart rate loggers can measure heart rates ranging from 5 bpm to 1022 bpm. For animals with slow heart rates, or periods of slow heart rate, the loggers can be set up to record an extended ECG record. The extended ECG record is 2.5 times longer than the standard recording. To optimize battery life, it is possible to switch between the two recording types during the study.



Stress response recorded through HR (blue), CB temperature (green) and SC temperature (red)

	DST micro-HRT	DST milli-HRT	DST centi-HRT
Size (diameter x length)	8.3mm x 25.4mm	13mm x 39.5mm	15mm x 46mm
Weight	3.3 g	12.4 g	19g
Battery life	3.5 months*	8.5 months*	19 months*
Memory capacity per sensor	43,690 measurements	699,051 measurements	699,051 measurements
Minimum measuring interval	15 sec	15 sec	15 sec
Temperature range	5–45°C	Standard: 5–45°C Extended: -2–50°C	Standard: 5–45°C Extended: -2–50°C
Temperature resolution	0.032°C	0.032°C	0.032°C
Temperature accuracy	+/- 0.2°C	+/- 0.2°C	+/- 0.2°C
HR sampling freq	80–800Hz	80–800Hz	80–800Hz

*For sampling interval of 10 min at Fs=600Hz. For extended ECG recordings contact us.

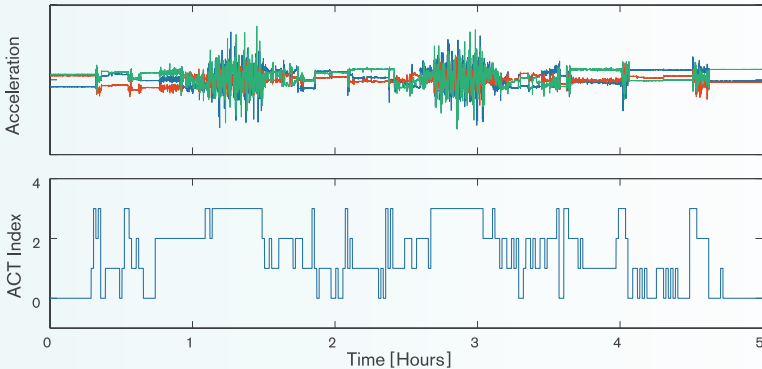
Activity Measurements

OVERVIEW OF CHANGES IN ACTIVITY OVER TIME

Measuring acceleration derived activity gives researchers the chance to get an overall view of changes in the study animals' activity for years. The DST activity loggers measure acceleration in three dimensions, in relation to earth's gravity field.

IDENTIFY CORRELATION BETWEEN HEART RATE AND ACTIVITY

The logger comes with the option of either two or three parameters: activity and temperature or activity, heart rate and temperature. Looking at activity, heart rate and temperature together gives researchers an opportunity to identify correlation between the parameters, for example in stress response, hibernation, circadian rhythm and behavioural studies.



(Top) Activity recorded through 3-axes accelerometer (Bottom) ACT index derived from the accelerometer data from 0 (low) to 3 (high)

	DST centi-ACT	DST centi-HRT ACT
Size (diameter x length)	15mm x 46mm	15mm x 46mm
Weight	19g	19g
Battery life	3 years*	19 months**
Memory capacity per sensor	279,620	233,017
Minimum measuring interval	1 sec	15 sec
Temperature range	Standard: 5–45°C Extended: -2–50°C	Standard: 5–45°C Extended: -2–50°C
Temperature resolution	0.032°C	0.032°C
Temperature accuracy	+/- 0.2°C	+/- 0.2°C
HR sampling freq		80-800Hz

*For sampling interval of 1 min **For sampling interval of 10 min at Fs=600Hz

LEADLESS AND MINIMALLY INVASIVE

Researchers appreciate the loggers' small size, high accuracy and biocompatibility. With the completely leadless design of the loggers the implantation surgery becomes minimally invasive which facilitates quick recovery.

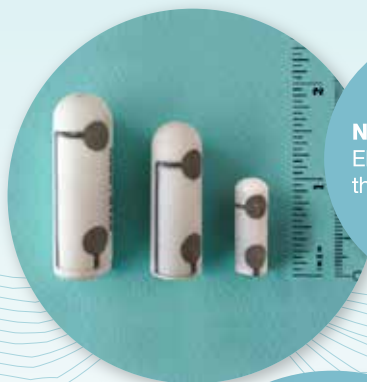
STRESS FREE ACCURATE MEASUREMENTS

The Star-Oddi loggers are small implantable recorders that measure heart rate, temperature and activity with high accuracy and store real-time data in their internal memory. All loggers are delivered with calibration certificates to ensure compliance with good laboratory practices (GLP).

LONG BATTERY LIFE AND REUSABLE

The Star-Oddi loggers are simple in use, from setup and surgery to data retrieval. The measurement data can be analyzed in graphic and tabular form and exported to other statistical analysis programs. The same logger can be reused for as long as the battery lasts. When data has been retrieved the logger can easily be sterilized and reset for new recordings.

Scientific publications using Star-Oddi's loggers are available at:
www.star-oddi.com/biomedical/publications



NO WIRES

Electrodes are part of the housing.

SMALL LOGGERS

The DST product family features four different sizes: centi, milli, micro and nano. The DST loggers vary in size, memory & battery life.



HIGH PERFORMANCE – SMALL SIZE

Star-Oddi has over 20 years of experience making small, high performing loggers for all types of wild animals, both on land and in aquatic environments, as well as for laboratory animals and pharmaceutical production.

COMMITTED TO PROVIDING SMALL RELIABLE LOGGERS

We are always focused on making long lasting loggers in the smallest possible sizes, never compromising on reliability.

OTHER SENSORS

Star-Oddi also provides the following sensors for other fields of research:

- **Pressure (depth)**
- **Conductivity (salinity)**
- **Tilt**
- **Compass**

For more information visit: <http://star-oddi.com/products>



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