

NEWSLETTER July 2007

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NEWSLETTER MAIL LIST:

This newsletter is being sent to everyone who has contacted us regarding DASCOR's LRCpH Ruminant Data Loggers and provided an email address. The newsletter will be used primarily to bring you up to date on our current technology and marketing efforts, and announce changes in performance, new software releases, and technical notes on relevant topics. It will be sent on an irregular, as-needed basis.

Contributions and requests for information are more than welcome. However, if you are not interested in receiving it, please let us know!

DSA-PSA-AMPA-ASAS SHOW IN SAN ANTONIO:

I want to extend our thanks to those of you who stopped by our small booth in San Antonio, and came to the workshop Wednesday evening instead of the closing party next door! With your input, we are planning additional changes to the performance of the Rumen Logger, and have a good idea of where to head next. The items below reflect the more critical issues that were raised and resolved during the show.

DASCOR is already committed to attend the next show in 2008, and would like to get your ideas on future workshops.... content, scheduling, multiple or repeat sessions at different times to allow more people to attend, etc.

NEXT BUILD & REQUEST FOR YOUR ESTIMATE OF NEAR TERM PURCHASES:

We are starting a new production run of the current design. To minimize waiting for any units you may want, we would like to include them in this build.

We will be starting the build in about a week, and the next build probably won't be for at least another six months. So, if you anticipate needing loggers, NOW is the time to let us know your intentions. A reply email to me is adequate, and will not be a firm commitment to buy, but will help us to insure that we will have units in stock when you are ready to order. Please let me know how many units and when you anticipate purchasing in the next 6 months, and the type and quantity for any options. As always, we will do our best to match deliveries to your test schedules, but once our inventory is depleted, it can take 6-8 weeks to get new units in stock.

PH AND ORP/REDOX FULL SCALE RANGE CHANGES:

A consensus appears to have been reached on the useable range for the pH sensor. Originally, the full 0-14 pH range was covered, with reduced resolution. All new loggers will be shipped with a full-scale pH range of 3-9, which will give roughly a 2:1 improvement in resolution--unless you clearly specify otherwise in your order. Full-scale range on the ORP/REDOX sensor will also be reduced from -2000 to +2000 mV to -500 to +275 mV for a 5:1 improvement in resolution.

If you already have a logger in a gray machined PVC body, and would like to have the ranges changed to the new values, we will be happy to do this for you. On unused loggers the charge is a flat \$25 per logger, plus return shipping. On loggers that have been in the rumen, the price goes up to \$50 + shipping.

SENSOR WISH LIST

The standard data logger has the capability of reading and storing eight channels of data. The current order is: pH, Temperature, Battery Voltage, and ORP/REDOX. This leaves four unused channels. During the conference there was much discussion regarding possible additional sensors. We are actively investigating the sensors listed below. In general, gas sensors for methane and carbon dioxide do not like water, and draw excessive power for a battery powered logger, but we are looking into new technology using MEMS type sensors that show some promise.

As we identify possible sensors, and develop prototypes, we would be interested in providing development units on a loan basis to research groups that are particularly interested in testing the new logger/sensor combinations. If you know of any sensors that might work, or sensors for measurements not listed, do let us know.

Pressure was commonly mentioned for two reasons: determining motility, and detecting bloat. Technology to do this is off the shelf, and we are currently identifying vendors and models. A guesstimate for budgetary purposes would be around \$175-\$200 to add a pressure sensor to the logger.

Ammonia Ion was also repeatedly mentioned, followed by methane and carbon dioxide. As of this afternoon, the only sensors we have identified used technology that was either based on “wet chemistry,” sensors that did not like exposure to water, or were either very large, very power hungry, or very expensive. Spectrometers are also a possibility, and we have seen them in a module the size of a pack of cigarettes. If you know of candidate sensors that might survive and operate in the rumen, please let me know!

Conductivity is also possible. Two types of sensors are available: “contacting” (also called “conductive”), and; “inductive” (also called “toroidal”). The contacting style sensors are not appropriate for the rumen as they would require periodic maintenance and replacement. The inductive sensors, on the other hand, are intended for harsh environments such as the rumen, and require no maintenance. However, the inductive sensors tend to be relatively large and somewhat power hungry. Conductivity sensors have no tempco of their own, but the measured fluids definitely do!!! Tempco’s of water based fluids can range from 0 to 5% per degC, and can only be determined empirically. In the case of the rumen, the tempco will most likely change with the contents.

QUALIFICATIONS FOR A UNIVERSITY RESEARCH DISCOUNT

We have been asked to clarify the requirements to receive the University discount of 20% off list price for the loggers.

To receive this discount, the purchase must be made in a way that title to the equipment is held permanently by a recognized University or non-profit research group for the exclusive use of its faculty, staff, and students. If the purchase originates with a for-profit company, the receiving university or research group must independently verify that they will receive the units directly from DASCOR as their property, without restrictions by the donor company. Also, in order to be able to continue the discount, we ask that whenever possible, payment accompany the order. We accept checks, credit cards, and PayPal transfers.

NEW PRICING SCHEDULE

We have also been asked to offer additional sensors as options, rather than being automatically included in all new units. This will result in a modification to our pricing structure as follows:

Base price for a single new unit with pH and temperature capability is \$1185. This does not include weights or the pH sensor itself, which are considered to be consumable items. Software is always available for download without charge. An interface cable set is provided without charge with the first unit, and with every additional order of five or more units. An ORP/REDOX sensor (permanent) mounted during manufacturing is \$155. This, and other optional sensor packages that may become available in the future, cannot be retrofit economically, so it is best to purchase the units with any additionally desired sensors installed.

Base LRCpH Data Logger with pH and temperature capability. A class “B” platinum RTD temperature sensor is included.

Quantity 1-4		\$1185
Quantity 5-9	(-5%)	\$1126
Quantity 10-19	(-10%)	\$1067
Quantity 20+	(-15%)	\$1007

The following are additional options:

(No quantity or University discounts apply to options, regretfully)

LRCpH-1KG	One 1 Kg surgical Stainless Steel Weight	\$55
LRCpH-2KG	Set of two 1 Kg surgical Stainless Steel Weights	\$100
LRCpH-Case/1	Pelican transportation case for one logger, weights, cable.	\$200
LRCpH-Case/2	Pelican transportation case for two loggers, weights, cable.	\$250
LRCpH-Case/5	Pelican transportation case for Five loggers, weights, cable.	\$300
S655CD-HT	pH sensor with solid electrolyte	\$138
Cal-Kit	Packets of dry chemicals to make up 100 ml of calibration solutions of pH 4.00, 7.00, & 10.01 (one kit included with every 10 sensors ordered)	\$15

One set of the following two items are provided free with the first logger ordered by a customer, and with every additional order of 5 or more loggers:

LRCpH-USBIO	USB to Serial Interface Adapter	\$35
LRCpH-Cable	Interface cable from Logger to Comm port on PC	\$25

TEMPERATURE COMPENSATION NOTES

All sensors and electronic systems are subject to temperature-induced variations. The change in value with temperature is generally referred to as the “temperature coefficient” or “tempco” for short. In fact, the ability to measure temperature with a platinum RTD (Resistive Temperature Device) is due to its highly predictable change in resistance due to temperature. DASCOR’s data logger electronics are designed to have a minimal tempco, and any changes in the measurements due to the electronics are usually well below the accuracy of the sensors, and can be ignored for most purposes.

However, pH measurements are subject to temperature effects, which often cannot be ignored. The following is extracted from a white paper¹ on the Sensorex website, which includes some excellent tutorial material on pH probes in general.²

“When measuring pH using a pH electrode the temperature error from the electrode varies based on the Nernst Equation as 0.03pH/10C/unit of pH away from pH7. As shown in the table below, the error due to temperature is a function of both temperature and the pH being measured. Note that there is no error at pH7 and 25 Deg C. Temperature compensation can be achieved manually or automatically. Manual

¹ http://www.sensorex.com/support/education/pH_education.html

² The following link takes you to the Sensorex support page, which is well worth exploring: <http://www.sensorex.com/support/support.html>

temperature compensation is usually achieved by entering the temperature of the fluid being measured into the instruments menu and then the instrument will display a "Temperature Compensated" pH reading. This means that the temperature is corrected to the value expected at 25 Deg C. Automatic temperature compensation requires input from a temperature sensor and constantly sends a compensated pH signal to the display. Automatic temperature compensation is useful for measuring pH in systems with wide variations in temperature."

pH vs. Temperature Error Chart

	pH 2	pH 3	pH 4	pH 5	pH 6	pH 7	pH 8	pH 9	pH 10	pH 11	pH 12
5°	.30	.24	.18	.12	.06	0	.06	.12	.18	.24	.30
15°	.15	.12	.09	.06	.03	0	.03	.06	.09	.12	.15
25°	0	0	0	0	0	0	0	0	0	0	0
35°	.15	.12	.09	.06	.03	0	.03	.06	.09	.12	.15
45°	.30	.24	.18	.12	.06	0	.06	.12	.18	.24	.30
55°	.45	.36	.27	.18	.09	0	.09	.18	.27	.36	.45
65°	.60	.48	.36	.24	.12	0	.12	.24	.36	.48	.60
75°	.75	.60	.45	.30	.15	0	.15	.30	.45	.60	.75
85°	.90	.72	.54	.36	.18	0	.18	.36	.54	.72	.90

Note: Values in light blue are less than .1 error and may not require temperature compensation. Values in gray are temperature and pH in which there is no error in pH from temperature.

Note that at 25 degC, or at a pH of 7, there is no effect of temperature. However, as the pH and/or temperature move away from the central point, the "error" can approach 1 pH! When measuring pH in the rumen and also when calibrating the probes, it is always a good idea to correct the measurements back to a standard temperature—whether it be 25 degC, or the average rumen temperature. Calibration solution temperatures should be held as constant as possible at a known temperature.

When the data logger downloads the collected data to your PC, a .CSV file is generated. The rightmost columns (temperature and battery voltage) are based on factory calibration, and the values given are correct, and in engineering units such as degC and Volts. The pH column, however, is based on a generic calibration, and is NOT temperature compensated at the present time. However, the temperature is available, and can be applied to the raw data to provide a pH value corrected to a specified standard temperature. If you would be interested in seeing this done automatically in a future release of the software, please drop me a note.

PH SENSOR STORAGE NOTES

According to the folks at Sensorex, the pH sensors must be kept wet by a storage solution during periods when the sensor is not in use. When the sensors are shipped to you, the bulb end is covered by a black plastic cap filled with a storage solution of pH-4 buffer with additional KCl. We are told that as long as there is enough liquid in the cap to keep the humidity high (one drop?), it does not matter whether air is present or not. It should also make no difference whether the sensor is stored probe-end up or down. Also,

pH-4 buffer solution (made up from the calibration packets many of you received at the conference) will work as well, as will regular pH-4 calibration solution.

However, reports from the field suggest that it might be best to use a syringe needle or toothpick to allow any air to escape from the cap as it is placed on the probe, so that the bulb and reference junction are fully immersed, and then to store the sensor with the bulb down. When Sensorex places the caps on the sensors at the factory, they do “burp” out the air. After that, the sensors are stored in almost any position. The S655CD-HT probes are specifically designed to operate in any position, and are not limited to vertical +/- 30 degrees as are many of the lab probes.

Buffer solution that leaks out around the cap quite often crystallizes. Just rinse it off, or wipe it off with a damp towel. It’s messy, but not dangerous.

NEW SOFTWARE, MANUALS, AND TUTORIAL INFORMATION

Many of you have requested copies of the PowerPoint presentations used during the workshop in San Antonio, along with an upgraded manual. Both are being revised, and we hope to release an Operator’s Tutorial on the data loggers and software shortly. This will be announced by an email with complete instructions for downloading the files from our FTP site on the web. The new tutorial will include the latest hardware version currently being released. If you need a copy of the tutorial which covers only the units currently in the field, drop me an email, and we’ll get one to you.

We always provide software with our systems at no charge, and an updated version is in the works, but probably is a few weeks away. All loggers currently in the field and in production should work with Release 5.0 or greater. If you are having any problems, please give us a call! We can’t fix it if we don’t know about it.

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We have been getting an incredible amount of spam in recent months, and have had to tighten up our email filters at the risk of losing your emails. Please **call** if you don’t get an expected response in a reasonable amount of time!