MicroLog V3A

Three-channel multi-purpose datalogger

User's manual

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Content:

1 General information

MicroLog V3A is a small three-channel water-sealed datalogger designed for the measurement with voltage-output sensors.

The measuring range is up to ± 20 mV up to ± 2400 mV in eight ranges (V3A) or ±7.5 mV up to ± 1100 mV by older model MicroLog V3.

The datalogger case is made from high-density polyethylene allowing its long term leaving in soil. It also survives a temporary immersion to water.

Sensors have to be equipped with 4-pin Switchcraft EN3 connectors connected in a watertight manner.

Data memory can store typically 50,000 readings what means more than two years of continuous measurement in one hour interval. One record in memory generally represents the average of more measurement within the storing interval. Both intervals can be set independently.

The datalogger memory (non-volatile type) saves data also under totally discharged or damaged battery. Two ways of memory handling it is possible to choose during datalogger initialization: (i) system stops operation when the memory is full or (ii) it keeps running rewriting the oldest data with the newest ones.

PC with a Windows© system is required for datalogger setting and data handling. The communication between PC and datalogger is wireless, data are transferred by infrared communication by means of a special USB cable. Therefore, the data download does not need to open the enclosure; just to remove the soil covering the datalogger when it is buried.

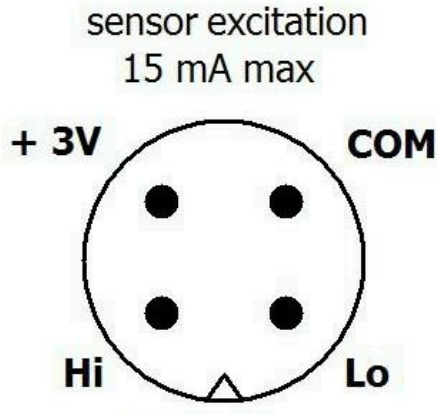
Mini32 fancy graphical software with many useful options including base statistics is a part of delivery.

Battery duration of 3.6 V lithium battery reaches up to five years of continuous work in hourly measuring intervals. The battery replacement can be easy done directly in the field.

2 Specifications

Channel types	Three differential voltages
Voltage inputs	± 20 mV up to ± 2400 mV in eight ranges (± 7.5 mV up to ± 1100 mV for V3)
Voltage limit	maximum +5 Volts and minimum +0.1 Volt from COM on any input terminal
Accuracy	0.03 % of full scale
Resolution	16 bits
Measuring interval	3 sec to 4 hrs
Averaging interval	3 sec to 4 hrs
Warm-up time	common, up to 5 sec, activated by selected channels
Exciting voltage	3 Volts, ± 2 mV
max. load	15 mA
Overvoltage protection	diode suppressors connected to each input terminal
Operating range	-20 to 60 °C
Battery lifetime:	Lithium LS14250CN 3,6 V; 900 mAh
- storage time/idle run (logging stopped)	5 years
- when measured every 10 minutes	3 years
- when measured every 1 hour	4.5 years
Size (diameter x length)	70 x 52 mm (incl. connectors)
Weight (incl. battery)	110 g

2.1 Connector pin assignment



Warning:
Note that minimum voltage applied to "Lo" terminal must be always higher than 0.1 Volt!

3 Operation

MicroLog V3A datalogger can be used in any environment non-aggressive against polyethylene and synthetic rubber. The operating temperature should not exceed the range -20 to 60 deg.C and the overpressure 0.2 bar (two meters of water column).

MicroLog V3A has no power switch. It is ready to run immediately after inserting of the battery before dispatching. The system configuration needs a connected PC running the Mini32 software and a special USB/IrDA cable made by EMS.

When it is not in use (operation off), the battery lasts for about five years what is comparable with the total battery lifetime.

3.1 Start operation

3.1.1 Basic setting

Make sure that the infrared cable is plugged into a USB port and the communication port is properly configured.

Run Mini32 software.

Put the magnetic head close to the marked point on the sensor lid. The sensor should respond with red light bellow the datalogger lid.

Hold the cable head up to 40 centimeters far from the sensor. Make sure that the rounded optical part on the cable head roughly points to the marked point on the sensor lid.

Push "Configuration" button. Set both interval of measurement and two-character device code.

Double click on a channel line opens a channel setting window. Set channel on, choose the sensor type (gauge) and add a description.

Left mouse click on ON/OFF button starts/stops data logging.

Press "Send" button in order to send the configuration to the datalogger.

3.1.2 Advanced setting

Push "More" button in "Configuration" window in order to approach advanced setting screen. This option enables:

- Datalogger reset (initialization). Initializing resets all system variables to default values, changes datalogger time and password, erases all the data from memory and sets the memory operation mode – see General information. System calls for initializing automatically always when the supply voltage has dropped bellow 2.9 Volts, i.e. after battery replacement or its total discharge. In such a case is the user asked for initializing after each communication attempt. Warning – save data always before initializing – they will be erased during initializing!
- Memory erase (RAM clear) should be performed when the memory is full and the data overwriting is disabled and also when the data continuity is senseless or

misleading – when the sensor in moved to different location for instance. Make sure the data were successfully saved before memory erasing!

- Hardcopy of memory (HCM). The whole memory content will be saved to file. Use it in case of problem with data conversion after downloading which could be caused by damaged data structure due to external factors. Send the file to producer for free encoding.
- Password. A four-character word can be introduced. Password disables unauthorized changes of configuration.

3.2 After battery replacement or power drop-out

It is necessary to initialize the datalogger always when the battery voltage drops bellow 2.9 Volt. This comes usually after the battery replacement or after its removing. See Advanced setting.

Note: The battery status is continuously calculated since the time of the last system reset. Naturally, the full capacity of the new battery (900 mAh) is supposed. Therefore, the battery duration will be overestimated in case of using a partially discharged battery. See also Battery replacement.

3.3 Battery lifetime

See specification. However, note that sensors requiring powering reduce the battery duration. See the calculation in the file *EMS_batt_mem.xls* available on the manufacturer's web site.

3.4 Memory capacity

Maximum number of days of the measurement stored in memory can be estimated according to formula

N = 50000/(n*k)

where

n = number of records stored each day

k = number of channels in use

Example: Soil water content measured by all three sensors stored to the memory in hourly intervals will fill up the memory in 790 days.

Note: When storing the data of fewer channels less often, the real memory capacity slightly decreases due to 15 bytes long system information stored into the data memory every day. When measuring in one channel once 4 hours (maximum time period of storing to the memory), the memory lasts for six years "only" instead of theoretically calculated 12 years.

4 Data processing

EMS Mini32 universal software supports also the data handling and processing.

Data download and saving process is activated after pushing "Download" button. All data from memory are saved in the file XY_2011_04_28.hex where XY is device code (see Basic setting) and 2011_04_28 is computer date (YMD). This HEX file contains the stored data and complete configuration information including the last battery voltage and datalogger time in a compressed format suitable for fast transfer to computer. Since this format is not usable for next data processing, the file is subsequently converted to another format - DCV (XY_2011_04_28.dcv). This file contains the same information as HEX one, it is typically four time larger but suitable for fast processing as file mixing and chaining, time averaging, drawing, editing, statistical processing etc. In case of accidental wrong data processing in DCV file it is easy to create the DCV file again after opening the original HEX file. Therefore, please save the original HEX files for archive purposes.

Mini32 software offers a wide range of data operation, mainly:

- connection files of the same configuration coming from different time periods
- mixing files of different systems
- calculation mean values of different time intervals (hours, days)
- drawing selected variables in time with the possibility of easy erasing of irrelevant values
- export of data to text or Excel format
- export of graphs to JPG format
- drawing of vertical profiles of variables it a certain time
- printing of graphs
- basic statistical analysis
- regression data analysis
- user defined calculation
- non-linear multi-regression analysis

5 Maintenance

Datalogger MicroLog V3A does not need any special maintenance except of cable and sensor checking.

5.1 Battery replacement

The battery replacement is easy so it can be done directly in the field (not under rainy condition if possible).

- Screw out the datalogger lid (use a specific tool supplied by manufacturer)
- Screw-out the battery from the battery terminals
- Short circuit the battery terminals with a metal part (pocket knife) in order to safely reset the battery life counter
- Screw-in a new battery, replace the desiccant bag
- Screw up the lid
- Make system reset. See After power drop-out.

6 Warranty

The producer warrants right function of the measuring system for three years after it is accepted by a customer. All the faults will be removed free of charge during this time, at the measuring device itself as well as at sensors. The producer is not responsible for the faults originated by careless manipulation, incorrect operations, wrong applications or theft. The warranty covers the battery failure for three months only. The fright to producer is paid by customer; the sending back is paid by the manufacturer.