DL 18
Data Logger

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User Manual

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1. Introduction

Thank you for purchasing our ECOMATIK DL 18 data logger set. The DL 18 is an outstanding choice to be used in combination with ECOMATIK dendrometers (all models), temperature sensors (leaf: LAT-B2; air, surface, tissue, soil: T-Surface/-Tissue/-Soil), air temperature and humidity sensor (T/RH-Sens), soil moisture sensor (EM 35) or light sensors (PAR: EM 20, Pyranometer: EM 25). Using the four channels of the DL 18 you can operate up to 4 dendrometers, or other combinations of the above listed sensors. The logger is powered by two user replaceable batteries. With standard use the batteries will last more than one year.

2. Components

After unpacking you should have following items:

1 dendrometer logger with two AAA alkaline batteries

1 weather box for using the logger under outdoor conditions

1 bag of desiccant (dry silica gel)

2 two wood screws for mounting the logger

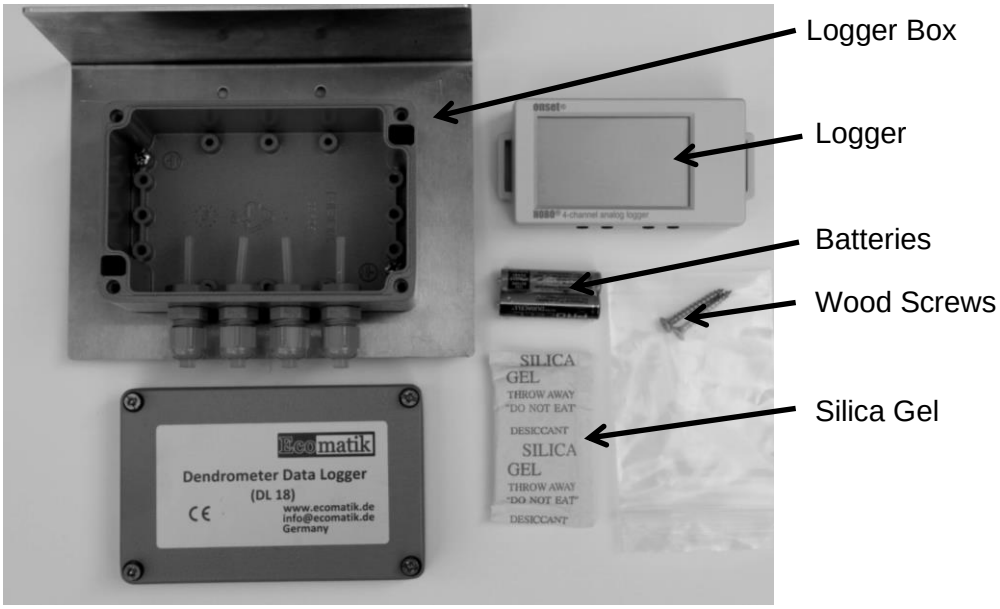


Fig. 1 Dendrometer Data Logger (DL18)

If you have purchased software, you will additionally receive following items:

1 Software USB Stick

1 logger-computer communication cable

Fig. 2 Software and Data Cable

3. Safety information and Maintenance

For the functionality it is very important to protect the logger against moisture. Screw the cable gland firmly and replace the silica gel if necessary. In tropical regions the protection from moisture is particularly important.

In normal use the battery lasts for more than a year. But remember, some batteries have poor quality. Therefore, it is useful to log the battery voltage. Check the battery indicator at data download. If you are planning a long measurement period under low temperature, you should use Lithium batteries instead of provided alkaline batteries. Lithium battery has much better properties at low temperature.

4. Connecting dendrometers to the logger

As the fig. 3 shows, you can connect up to 4 dendrometers to the logger.

It is very important to protect the logger against moisture. Screw the cable gland firmly, and never remove the rubber plug from the unused cable gland.

Fig. 3 Connecting dendrometers to the logger

5. Installing the software

To install the software from the USB Stick:

Insert the stick in your computer, select the folder

Ecomatik\software\windows\Hoboware_Free_Setup.exe for Windows computer

or ecomatik\software\mac\Hoboware_Free_Installer.dmg for Mac computer

6. Configuring the logger

The software has many features. For dendrometers you mainly need only 4 functions (fig. 4):

Lauch Logger: Configure the logger.

Data Readout: Download measured data.

Logger Status: Shows what the logger is doing.

Data Export: Export data in CSV format for processing with Excel etc.

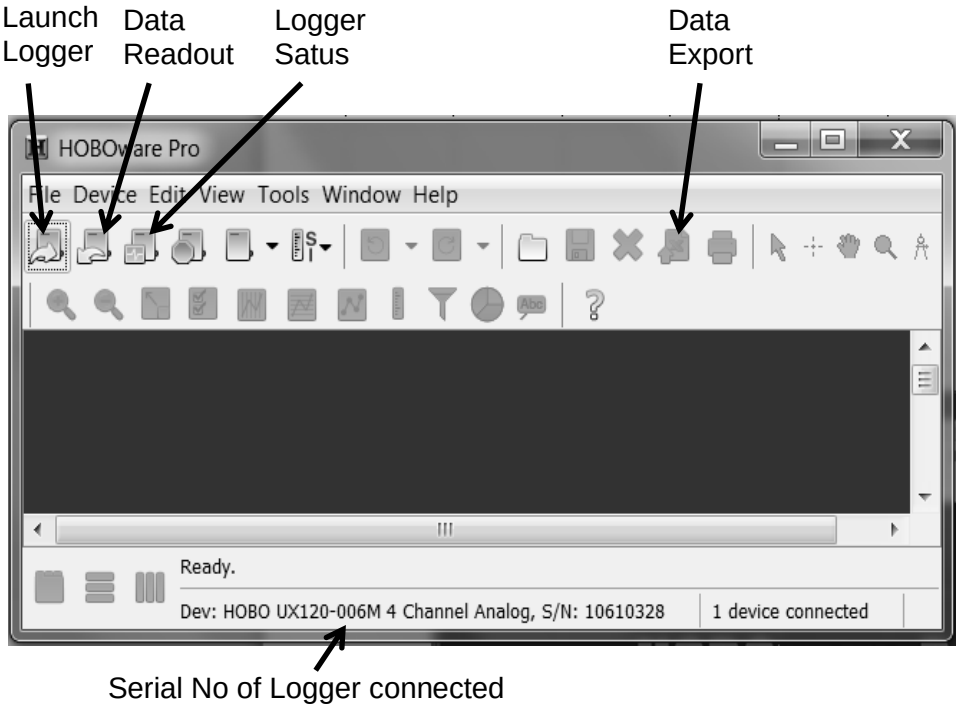


Fig. 4 Main functions for dendrometer use

Launching logger:

Connect the logger to USB port

Click the Launch icon on the toolbar (This displays the logger's Launch window looking similar to the following)

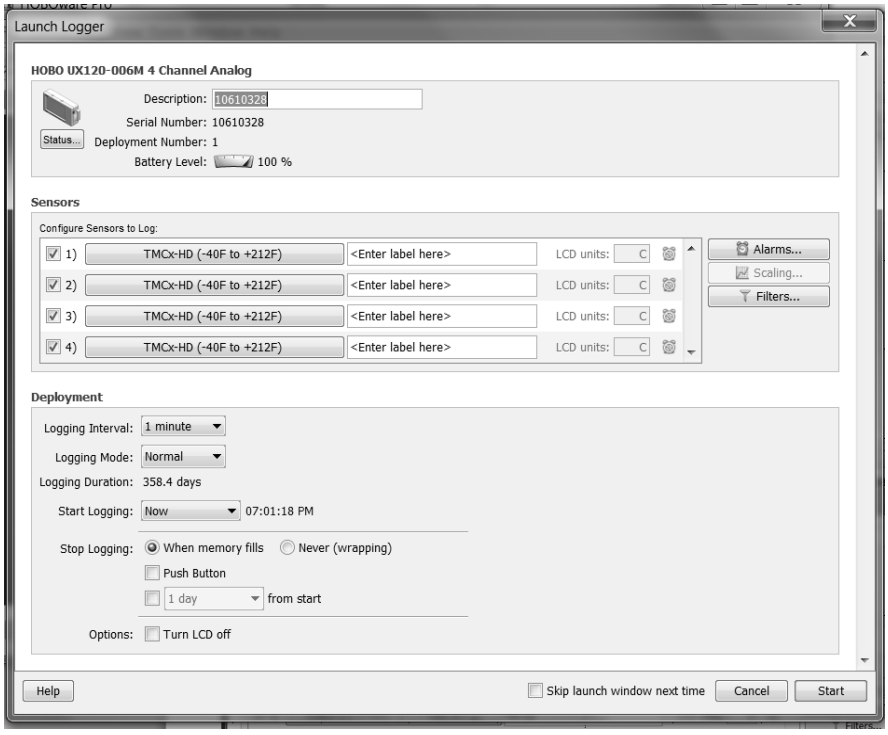


Fig. 5 Launch window

Select measuring function **Adapter Cable, Cable-2.5-Stereo (0-2.5 Volts DC)** (fig. 6)

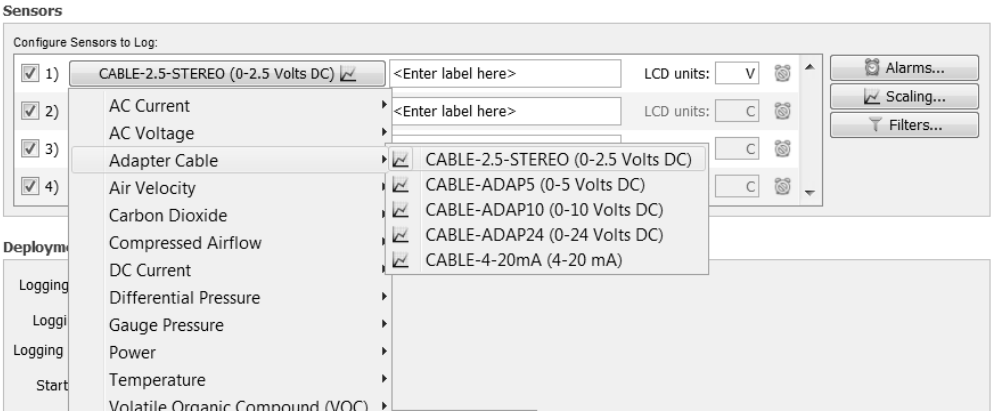


Fig. 6 Measuring mode for dendrometer: **Cable-2.5-Stereo (0-2.5 Volts DC**)

Select **Logging Interval** and other parameters

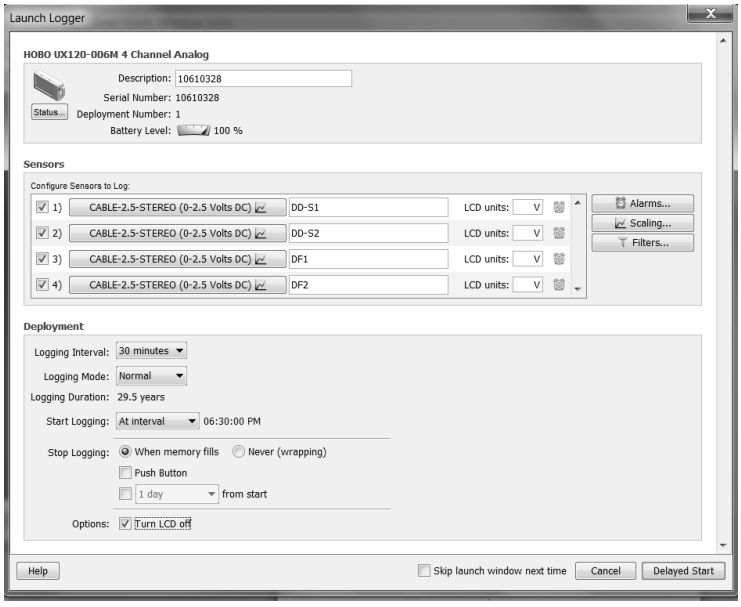


Fig. 7 A typical configuration for 4 dendrometers without Scaling (LCD units V)

Click **Delayed Start** for Lauching Logger.

7. Data conversion

The measured data with previous configuration (fig. 7) are in units of volts. For dendrometers there are 2 ways to convert the raw data in micrometer: With your personal computer or with the scaling function of the data logger.

Data conversion with personal computer

The raw dendrometer data from the logger has the unit Volt. You get micrometers values by using the following formula:

For Dendrometer types DR1, DR3, DD-L1, DD-S1, DD-S2, DRO, DRW, DDW, DC1, DV
Micrometer = raw data (V) x 4400

For Dendrometer types DF1, DC2
Micrometer = raw data (V) x 6000

For Dendrometer type DC3, DD-L2, DR2, DF2
Micrometer = raw data (V) x 10160

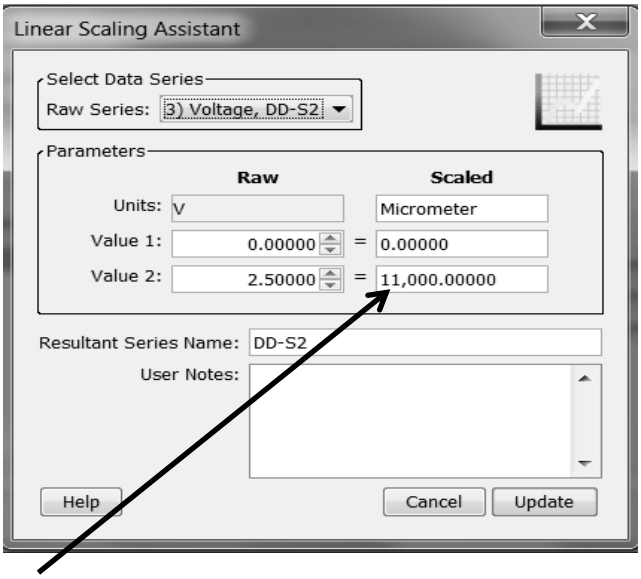
For Dendrometer type DC4, DD-L3, DF3
Micrometer = raw data (V) x 20320

For other sensor types, e.g. leaf temperature (LAT-B2), surface, tissue or soil temperature (T-Surface/-Tissue/-Soil), air temperature/humidity (T/RH-Sens) or soil moisture, raw sensor signal will also be recorded in volts. Due to the complex conversion functions of these sensor types, raw sensor values have to be converted manually after data download to your personal computer. For conversion, please use the conversion functions as given in the user's manual of the respective sensor (Excel programs for data conversion are available on request).

Data conversion with the scaling function of the data logger

The scaling function of the DL 18 can be used to automatically convert raw volt signals from dendrometer measurements into micrometers. For channels connected with other sensor types (LAT-B2, T-Surface/-Tissue/-Soil, T/RH-Sens, soil moisture), please do not use the scaling function. In those cases the raw sensor signals will be recorded in volts and have to be converted manually after data download.

To enable the scaling function for dendrometers, click the scaling button (fig. 7, right side) and enter the following data in the table "**Linear Scaling Assistant**".



Change the value in this field as follows. Other 3 data fields remain unchanged.
11,000.00000 for DR1, DR3, DD-L1, DD-S1, DD-S2, DRO, DRW, DDW, DC1, DV
15,000.00000 for DF1, DC2
25,400.00000 for DC3, DD-L2, DR2, DF2
50,800.00000 for DC4, DD-L3, DF3

Fig. 8 Enter linearization data

Confirm the input and back to the Launch logger window.

Click **Delayed Start** for Lauching Logger (Fig. 9).

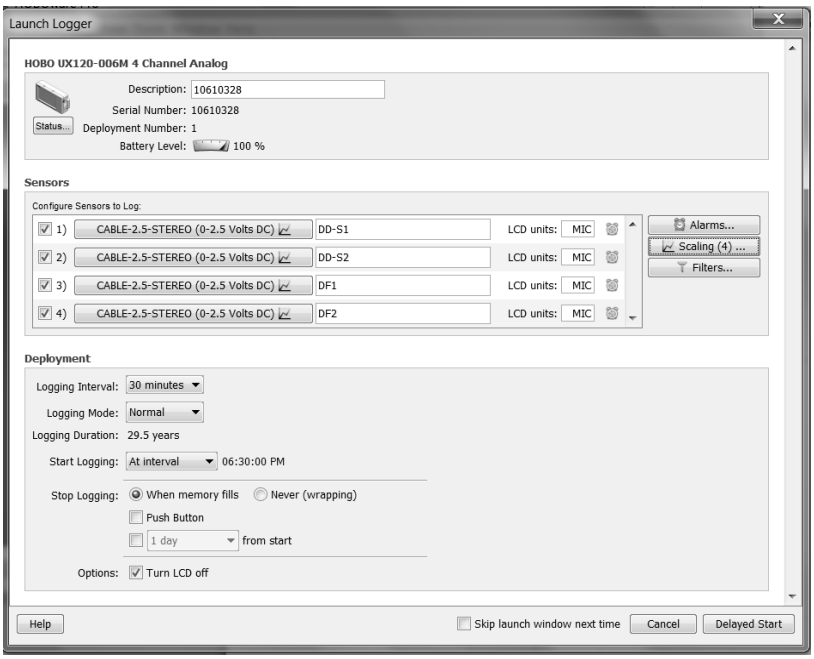


Fig. 9 A typical configuration for 4 dendrometers with scaling (LCD units micrometer)

8. Technical Specifications

Memory	1 900 000 readings If you connect 4 dendrometers, and collect data every 30 minutes, the memory will store data of 7900 days
Resolution	0.2 µm for Dendrometer types: DR1, DR3, DD-L1, DD-S1, DD-S2, DRO, DRW, DDW, DC1, DV 0.3 µm for Dendrometer types: DC2, DF1 0.5 µm for Dendrometer type: DC3, DD-L2, DR2, DF2 1.0 µm for Dendrometer type: DC4, DD-L3, DF3
Accuracy	±0.1% of reading
Interface	USB interface to PC
Channel	4, for connecting up to 4 dendrometers
Logging Interval	1 sec. to 18 hours, user selectable
Battery Life	1 year typical with logging rate of 1 minute and sampling interval of 15 seconds or greater, user replaceable 2 AAA battery
Environment	Logging -20° to 70°C (-4 to 158°F); 0 to 95% RH (non-condensing)
Other compatible Sensor types	- soil moisture (EM 35) - leaf temperature (LAT-B2) - surface, tissue or soil temperature (T-Surface/-Tissue/-Soil) - air temperature/humidity (T/RH-Sens) - light (PAR: EM 20, Pyranometer: EM 25)