

Mini Field Station

User Documentation (v6-1.0)

Thank you for purchasing a Mini Field Station from Hise Scientific Instrumentation, LLC. The Mini Field Station (MFS) is a 2-channel data logger for collecting environmental data. Data is stored in the Micro SD card and can also be uploaded automatically to the EcoSensorNetwork.com website (with the optional radio).

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Required Components

- 4 x NiMH rechargeable AA batteries.
- 16Gb MicroSD card (16Gb max)
- Mounting accessories
- Wireless Access Point if using the optional WiFi radio module. AP must support WEP2 Authentication
- Method for reading/writing to MicroSD card OR
- MicroUSB cable

First Steps

Initial Setup

You can the configuration settings of your Mini Field Station via the mfs.cfg file found on the SD card or you can use the built in menu system using a micro-USB cable. The only setting you cannot change via the configuration file is the current date and time.

To set your computer up to use the built-in menu system, you must install a driver and download a terminal client application.

Install the USB to UART driver for your operating system from Silicon Labs:

<https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers>

Install a serial terminal client. We recommend CoolTerm, which can be found here:

<http://www.freeware.the-meiers.org/>

Insert the batteries into your Mini Field Station and connect the USB cable from the MFS to your computer.

Start the CoolTerm application. On first start, you can select to leave default settings.

In the CoolTerm application:

1. Click Options Button
2. Select Terminal from list
3. Select Line Mode from Terminal Mode
4. Click Serial Port from list
5. Next to Port: Select the com port your MFS is connected to. If you don't know, simply choose one and click OK at the bottom of the window.
6. Now click Connect.
7. In the terminal output window, you should see "Mini Field Station v6.10". If you do not, click Disconnect, Options and the select a different Com port and go back to step 6.

Mini Field Station Utility Mode

When starting up, your MFS will prompt you to enter Utility Mode by pressing D. In the input line below the terminal output window, enter the letter D and press enter.

You will see a menu of options. To access an option, enter the corresponding letter and press enter.

S - Show Status

The status screen shows configuration details about your MFS as well as the current date and time and channel values.

N - Set Device Name

Your MFS has a serial number that is unique to that device and it also has a device name. By default the device name is set to the serial number. The device name is used in the data log as a column value. You may wish to change your device name to something specific to your research project, such as "Site 1A".

T - Set Current Date and Time

You must set the date and time of your MFS. To do this, press T+Enter. You will be shown the system's current date and time and asked if you want to change the value. To change the current date and time, press Y+Enter. You will then need to specify the current date and time as well as the weekday number. This must be provided in a very specific format of **YYYY/MM/DD HH:II:SS D**. The hours are 24 and values less than 10 must have a preceding 0. The D, for day of the week, starts as 1 for Monday, 2 for Tuesday, etc. For example, to set the date and time of Oct 26, 2021 2:05PM, you would enter: **2021/10/26 14:05:00 2+Enter**.

W - Setup WiFi

To connect your MFS to the Internet, press W+Enter. When prompted, press E+Enter to enable WiFi. If you do not intend to use WiFi, you can enter D+Enter. You will then be asked to enter the WiFi username and password, press Y+Enter. When prompted, enter your WiFi username and press enter. Then enter your WiFi password, and again press enter. To check the connection, test the connection from the main menu as described below.

C - Test WiFi Connection

Press C+Enter. The system will attempt to connect to WiFi. If it connects, you will see "Connecting to WiFi...Connected". If not, check your username and password as well as your proximity to the WiFi access point.

F - Set Recording Frequency

Press F+Enter to change the frequency interval in which your logger records channel data. When asked to change frequency, press Y+Enter. Enter one of the options and press enter (ie. 1H+Enter).

- 30M - Record data on the half and top of every hour (ie. 12:00, 12:30, 13:00, 13:30...)
- 1H - Record data at the top of every hour.
- 6H - Record data at 00:00, 6:00, 12:00 and 18:00
- 12H - Record data at 00:00 and 12:00
- 24H - Record data at 00:00

O - Save Settings to File

Other than changing the date and time, all other settings must be saved. To do this, press O+Enter. This will save your settings to the mfs.cfg configuration file on the SD card.

D - Download Channel Data

You can have the entire contents of the log file displayed in the terminal output window by pressing D+Enter.

X - Exit Utility

To exit Utility Mode and put the MFS back into normal recording mode, press X+Enter.

Editing the MFS configuration file

In the top directory of the SD card must be a configuration file named "mfs.cfg". Sometimes MS Windows will include a hidden ".txt" extension on all text files. This will cause your configuration file to not be recognized by your MFS. To ensure this doesn't happen, be sure that Windows Explorer is not hiding known file extensions.

Your mfs.cfg should contain the following options. Please note spaces are not allowed around the "=" sign as well as the end of the line. For example, "password= mypassword " will be assumed that your password has a space at the end.

ssid	The SSID of your WiFi access point	If using WiFi module
password	The password for your WiFi access point	If using WiFi module
log_freq	Frequency of device logging	30M,1H,6H,12H,24H
wifi	Enable WiFi	1 or 0, Default: 1
dhcp_to	Seconds to wait for DHCP	Integer value, default 15
device_name	Your name for the device.	ie. Plot 3

Example mfs.cfg file

```
ssid=yourssid
password=yourpassword
dhcp_to=15
log_freq=30M
device_name=Plot 3
wifi=1
```

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Inserting the card into the MFS

To insert the MicroSD card into the device, place according to the visual diagram on the board. Remember that you must press the reset button after inserting the card. Also, it is easier to insert the card if the unit is placed horizontally.

Inserting batteries

Only NiMH rechargeable batteries can be used with the MFS if solar charging is utilized.

Mounting the MFS

Your MFS should be mounted to a fixed object in the field. This can be either a tree or post. If mounting to a tree, using the strap mount accessories, be sure your MFS is facing the WiFi access point if using the optional WiFi radio module. If mounting to a post, using the mounting bracket and u-bolt accessories, ensure there are no obstacle that could interfere with WiFi radio signal.

Confirming Success

Once the MFS has been mounted and batteries and MicroSD card have been inserted, press the reset button and note the LED status light. This light should illuminate for approximately 4 seconds. This indicates the SD card is being accessed and the configuration file successfully loaded.

The next set of status lights indicates WiFi connection success. This pattern is given as 2 quick flashes, followed by a number of longer flashes. If there are 10 quick flashes after the initial 2 quick flashes, the MFS has successfully connected to your WiFi access point. If there are a series of flashes, the table below will help interpret them. It is recommended the MFS be configured and tested near the AP first, before installing on tree.

Flashes	Code Number	Status
2 Long	WIFI-02	General Connection Error
3 Long	WIFI-03	Waiting for DHCP server
4 Long	WIFI-04	Wrong password
10 Short	WIFI-10	The unit successfully connected to WiFi.
5 Long	WIFI-05	The unit has failed to connect to WiFi after 10 attempts.

Accessing Data

To access your data, you can utilize one or both of the following methods.

MicroSD card

Remove the MicroSD card from your MFS and insert into a MicroSD card reader connected to your computer. When the drive is available, copy the log file to your computer and open with your preferred program. Typically, this will be opened by MS Excel. It is easier to remove and replace the MicroSD card when the unit is horizontal. The data file will be a plain-text, csv file with the following headers.

DEVICE: This is the name of your MFS. Each MFS has its own device name, which you can change through the settings, and is shown in this column.

YYYY/MM/DD-HH:MM:SS: This is the date and time the sensor value was recorded as UTM. This is also the format. An example would “2020/6/1-13:5:0” for June 1, 2020 at 1:05PM.

Battery: The battery voltage is provided in this column.

Channel_1: The value from channel 1

Channel_2: The value from channel 2

EcoSensorNetwork.com

Log into <https://ecosensornetwork.com/> with your account.

Navigate to your device and click, “download all data on channel n”, for the channel you are interested in.

In order to access your data through Eco Sensor Network (ESN), you must first activate your device. Your device ships with a Device ID and Activation Key. You must use both Device ID and Activation keys to activate your device on ESN.

Troubleshooting

Problem	Solution
When I place the batteries in the device or press the reset button, there are no LED indicator light patterns.	This is due to either dead-batteries or a battery that is installed incorrectly. Check your batteries with a multi-meter.
The WiFi indicator status only indicates “Waiting for DHCP server”	Try a different access point.
I’ve tried to change the AP but it’s still not connecting.	Make sure you press the reset button on your board after re-inserting the MicroSD card.
The MFS successfully connects to WiFi, but no data is uploaded to ESN.	Change the dhcp_to value in the configuration file. Add 10 seconds and see if the performance improves. Also note that data is not recorded on ESN until the MFS is activated.
I’ve made changes to the configuration file and it seems like they aren’t being used.	Remember to press the reset button after you insert the SD card into the MFS. This can also be achieved by removing and replacing a battery.
When I reset the device, I only get a WIFI-02 indicator.	Try removing a battery, waiting 3 seconds, then reinserting the battery.

Questions

Q: If the unit is unable to connect to the WiFi access point, will the data still be recorded on the MicroSD card?

A: Yes, the unit attempts to connect 10 times before it gives up, but the data is still recorded to the data file before an attempt is made to upload data to ESN.

Q: What is the largest capacity MicroSD card I am able to use?

A: The unit is compatible with MicroSD cards of 16Gb or smaller.

Q: What other sensors am I able to use on this MFS?

A: Right now, HSI only provides the Dendrometer sensor. However, if you have the skills and tools, you can create any other variable resistance type sensor with the 3.5mm jack connector. The voltage range for each channel is 0-3.3V.

Q: Part of the unit was damaged. Do you offer replacement parts?

A: Yes, we do offer replacements for essentially every component of the device. Email support for additional information.

Q: Can I use 2 sensors on the same device?

A: As the MFS is a 2-channel data logger, you can use 2 sensors. The data file will contain readings from both channels.

Q: I have downloaded the data from the SD card, but don't know what the values for channel 1 and 2 are.

A: These are the "raw" values received from the sensor. They are a unitless value from a theoretical 0-32,767. You will need to convert this number to the units of which you are measuring. For example, using the dendrometer sensor from HSI, you have to convert the above range to a range of 0-1cm, or more precisely, 10,000 μm . For example, if you have 2 readings, you can find the difference in micrometers using the following formula. If attached to a tree, this will be the radius.

Difference in μm = (sensor reading value 1/ 3.2767) - (sensor reading value 2/3.2767)

This calculation is done for you in EcoSensorNetwork.com if you supply tree diameter and date/time that measurement was taken. These calculated values can be accessed through the Graph Builder.

Q: I purchased a MFS without the radio. Can I add this later?

A: Yes, you can purchase the radio module and add later. When you do, you will receive the activation code with the module.

Support

You can contact support via email at support@hisescientific.com.