

Getting Started...

SITE LICENSE: A single copy of the MicroLAB software constitutes a site license. Installation is permitted on as many laboratory, network, or student computers as necessary. Students may download MicroLab software for use at home from the MicroLab web site, microlabinfo.com, without charge.

DO NOT CONNECT THE MICROLAB TO THE COMPUTER USB JACK YET!

MicroLAB software can be installed on the computer by following these steps:

1. Go to the MicroLab web site www.microlabinfo.com.
2. Select "Downloads" from the menu bar.
3. Select the most recent version of the MicroLab software.
 - a. The narrative will describe the latest improvements in this software version.
 - b. Click "Download Version 8.x.x, in the center left of this page. (Use the latest software release.) This will connect you to a Dropbox.
 - c. Download the software by clicking the "Download" button to the right.
4. Open the "Downloads" folder on your computer. Double click on the "Setup MicroLab" icon, and follow the instructions to install the software.
5. MicroLAB software will be installed on the computer in the specified directory. Click **Close** when the installation is completed.

NOW CONNECT THE USB CABLE BETWEEN THE MICROLAB AND THE COMPUTER

MicroLAB hardware connects to the computer with the **USB** cable.

1. Attach one end of the supplied USB cable to the MicroLAB hardware rear panel USB port
2. Attach the other end of the cable to any available USB port on the computer. **Note: Software installs for only one USB port. Mark the chosen port with a colored dot or tape (provided on the packing slip). This will probably be the USB port you started with. Always use this port when you connect a MicroLab to this computer.**

MicroLAB hardware requires a 12 volt **DC power source**.

3. Attach the supplied power adapter to the MicroLAB hardware rear power connector.
4. Plug the power adapter into a power outlet.
5. MicroLAB will turn on when power is applied to the USB port. There is a green pilot light in the "O" in MicroLab in the lower right part of the panel.

Click the blue MicroLab icon to start. A progress bar shows that calibration memory is being read. **Normally the USB driver is automatically installed. If software does not load, try a different USB port. If you still get an error message, call and one of our staff will walk you through the USB driver installation.** www.microlabinfo.com or (888) 586-3274. Alternatively, instructions for manually loading the USB driver are on the back of this flyer.

MicroLAB **sensors and accessories** are plugged into connectors on the front and back panels.

Using the MicroLab FS-528

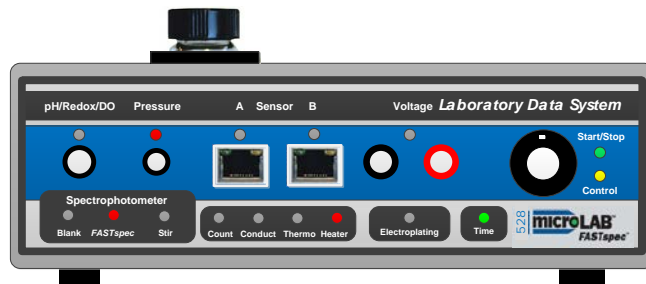
A good laboratory provides three kinds of tools: **Physical Tools** to help manage your sample and experimental conditions—to illuminate, stir, and heat; **Electronic Tools** to measure and control; and **Software Tools** to help you plan, collect data, and visualize, analyze and evaluate your experiment.

The MicroLab FS-528 and its software together serve as an integrated small sample laboratory. They can handle all of these tasks for almost any general or environmental chemistry experiment, producing near research-quality data.

The next two pages of this "Getting Started" guide illustrate the operation of tools to control experimental conditions – sample illumination, stirring, and heating.

Tutorial and operating/programming instructions

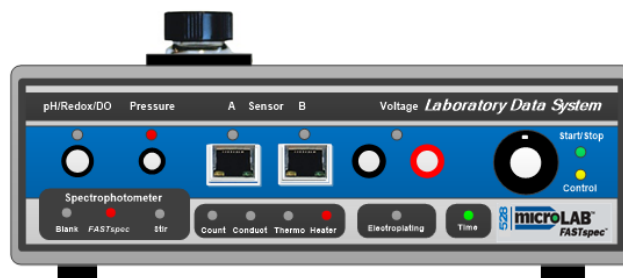
A student tutorial "Measurement – The Basic Science" may be downloaded from the MicroLab web site. Look under "Help Center, Manuals, MicroLab 500-Series Getting Started". This gives an overview of operation of the the software for experiment set-up, sensor selection and calibration, data collection, and graphical analysis of experimental data. The 'HELP' selection within the accessible on the software's top menu bar offers assistance as well.



What's New?

New in 2016, MicroLab's patented fifth-generation **FS-528 Laboratory Data System** retains the broad functionality, 16-bit high resolution/low-noise signal processing, and versatile **FASTspec™** scanning spectrophotometer of its predecessor FS-524.

The 528 adds five additional functions: (1) Sample Illumination and (2) Rotating Magnetic Field Stirring for small-sample titrations and kinetics, (3) a Constant Temperature Heater system, (4) a Regulated electroplating /Coulometry Power Supply, and (5) Real-Time Tactile Control of experimental variables.

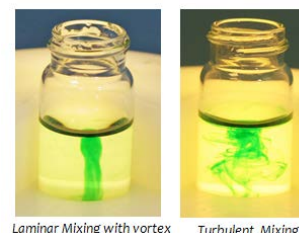
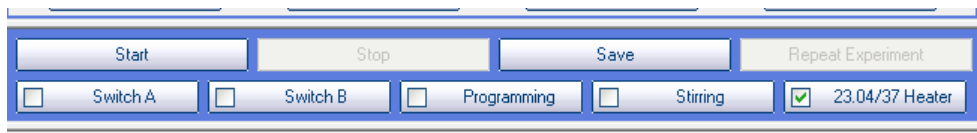


Rotating Magnetic Field Stirring Students can use small chemical samples and the MicroLab 528 to quickly create titration curves. An internal magnetic stir motor located below the large 28 mL spectrophotometer titration vial spins a stir bar in the vial. Because there are no moving parts in the motor, the rotational speed and spin direction may be changed instantaneously to produce either laminar mixing (below left, with unidirectional rotation) or more effective turbulent mixing (right). Reversing the spin direction every few seconds destroys the vortex. A programmed mixing time elapses after each addition of titrant before measurements are made.



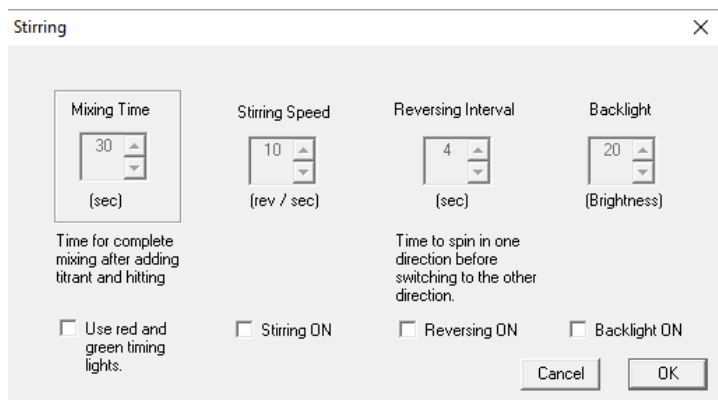
Sample Illumination: A removable translucent sample illumination module provides adjustable reflected backlighting for the sample so that students can watch indicators change during a titration, or watch the color fade in a kinetics experiment. The backlight goes off briefly while spectral absorbance measurements are being made.

Controls: Magnetic stirring and sample illumination are accessed by clicking the “Stirring” button in the control area of the MicroLab display.



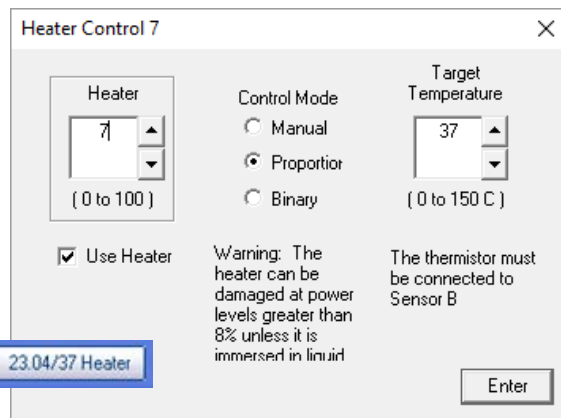
Stirring and Backlighting:

- Stirring and backlighting parameters may be set by mouse in the four control boxes, or by pressing the rotary control which moves the outlined box from on to another, and then rotating the control to change the variable.
- The Mixing Timer is used for titrations. The green light goes on when you can add titrant. Pressing “Enter” increments the MicroLab volume measurement, starts the mixing timer, and the red light goes on. When the mixing period is complete, the lights go off momentarily while data is collected, and the green light comes back on ready for another addition of titrant. Right now this function works only in the “Spectrophotometry” icon program.
- Stirring speed is self-explanatory.
- The reversing interval control allows the user to reverse the stir rotation every few seconds, resulting in turbulent mixing and destroying the vortex.
- The backlight illuminates the sample as indicators change color or as a the color in a kinetics experiment fades. The backlight goes off during spectrophotometric measurements.



Temperature Control:

- The heater dialog box is accessed by the “Heater” button. Heater power may be adjusted 0-99% of its 10-watt maximum. It can be run manually, in proportional mode, or in binary mode. Both current temperature and target temperature are displayed in the “Heater” button in the control console. The heater will switch on and off to maintain the target temperature. In proportional mode the heater power is reduced as the solution temperature (Thermistor B) approaches the target temperature set in heater control box. Binary operation simply means that the heater goes on below the target temperature and off above it.
- Do not run the heater above 8% power unless it is immersed in a liquid.



Real-time Experiment – Student Communication

The MicroLab 528’s ability to provide real-time visual and tactile communication between the student and the experiment is unique in the industry.

As in research instruments, LED’s indicate the status of sensor inputs and controls.

The new tactile rotary control may be “clicked” to start or stop the experiment. The green LED changes from steady “ON” (ready) to flashing when data is being collected.

If the control is held down for more than 1.2 seconds, the yellow “control” LED switches on. The control can then be rotated to change a selected variable during an experiment. A short “click” moves the control to another variable (see “Heater” in the heater control box above). In a photometric titration, this variable could be stir rate. Another long “click” returns the control to the start/stop function. Students are “in the loop” all of the time. They are not just observers.



10-watt variable power heater & sample illumination module

Experiment Selection

Experiment Set-up & Control

Data Presentation and Analysis

Software MicroLab’s software operates on four levels to match the goals of the experiment and the proficiency of the student

- Pre-written “tabbed” “Proof-of-Concept” experiments are accessible with a mouse click. They provide quick and reliable data to compare with known theory.
- Students use MicroLab’s “Drag-and drop” experiment design tools to select sensors and data presentation for application and inquiry experiments. They can design experiments and collect, organize, and evaluate data, and then synthesize new concepts from experimental results. Science educators call this “inquiry-based learning”. It is what a researcher does.
- Instrument programs (Icons) provide an intuitive display and analysis of complex spectrophotometric and electrochemical data, as illustrated in this flyer.
- Finally, advanced students and researchers can click to reveal a toolbar (shown in “Program Steps”) that enables them to design original programs for data acquisition and control

MicroLab FS-528

Instrument Performance Specifications

BNC Input: pH 0-14 pH, resolution 0.0015 pH unit.

Standard industrial pH electrode.

REDOX: ± 2500 mV, resolution 76 µV Standard industrial REDOX electrode.

Dissolved Oxygen, Galvanic sensor 0-14 mg/L, resolution 0.0025 mg/L.

Ion Selective Electrodes ± 2500 mV.

Uses standard industrial BNC IS electrodes.

Pressure: 0-2 atm (0-1500 torr), resolution 0.04 torr. Factory calibrated in torr, atm, inches Hg, kPa. Leur-lock input fitting.

MicroLab Multi-purpose Sensor Inputs (2)

Industry-standard Category-5 data connectors accept MicroLab sensors (temperature, light, and many more) and user-designed sensors.

Voltage input: ± 2500 mV, Resolution 76 µV

Current input: ± 25.0 mA, 2.5 mA, 250 µA Resolution 0.76 µA 0.076 µA, 0.0076µA

Digital to analog converter (DAC) output: ± 2.5 volts, 0-5 volts, 25 mA, 1 millivolt steps

Digital input: TTL Logic Levels . Amber LED indicates Logic 1 input.

Digital output: TTL Logic Levels. Source or sink 25 mA. Green LED indicates Logic 1 output. Software control of experiments

Sensor power supply: ±5 VDC, 50 mA, regulated

Heater: 12 VDC, 0-10 watt, pulse width modulation, constant temperature with proportional control

Magnetic Stirring: 1-12 rev/sec, reversible.

Sample Illumination: Adjustable, automatic off during spectrophotometer scan.

Electroplating / Coulometry: Adjustable / Regulated 0-5 VDC 750 mA, logs voltage, current, coulombs, moles of electrons delivered.

Thermocouple: Industrial type K thermocouple input, -200 to + 1000 °C, resolution 0.04 oC

Banana Jack Voltage Input: Four ranges, software selected. ± 10 volts, ± 2.5 volts, ±1.0 volts, ± 100 mV
Resolution 300 µV, 76 µV, 30 µV, 3 µV

Conductance: 0-2000 µS, resolution 0.03µS, 0-20,000 µS, resolution 0.3 µS

Counter: TTL logic levels, for drop counter and radiation counters.

Software-controlled timer: Read in seconds, minutes, hours. Resolution 0.001 seconds. Real time clock, programmable.

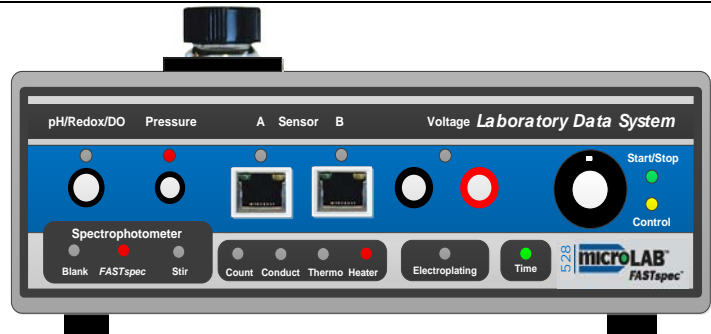
FASTspec™ Scanning Spectrophotometer: 360-880 nm, Simultaneous Fluorescence/ Absorbance / Scatter / Transmission, Color comparisons, Water quality tests. Timed Kinetics at up to 16 simultaneous wavelengths. Turbidity & nephelometry at 880 nm international standard wavelength. Visual Fluorescence. Quantitative fluorescence and scatter with 16 excitation wavelengths. Chromatographic fraction analysis, spectrophotometric titrations.

Power Supply: 90-264 VAC, international power supply, or 12VDC for battery-powered field operation.



Sensor Calibration: Any sensor that produces a voltage or a current in ranges about and fits a linear, log , power or polynomial response.

Operating Systems: Windows XP, 2000, Vista, Windows 7, 8, & 10, Macintosh with Windows Emulators.

MicroLAB Multi-Purpose CAT-5 Input Connections: Pin 1 (white/orange stripe) -5 VDC Pin 2 (orange) TTL Digital in Pin 3 (white/green stripe) Digital Out Pin 4 (blue) Voltage In Pin 5 (blue/white stripe) DAC Out Pin 6 (green) Ground Pin 7 (white/brown stripe) Current In Pin 8 (brown) +5 VDC.



If the USB drivers do not load immediately:

- Unplug the USB cable from the MicroLab FS-528.
- Find the MicroLab program file. It will be in C: Program Files (x86). Select this folder. Find the MicroLab Program folder –  MicroLab 8.1.xx. Click to open this folder.
- Click on the Drivers folder.
- Select the most recent driver. It will probably be CDM21216 Setup.
- Double click on this file and follow the on-screen instructions.
- When the installation is complete, connect the USB cable from your computer USB port to the MicroLab FS-528. Make sure the power pack is connected to the FS-528. The small power LED in the “O” in the MicroLab icon in the lower right corner of the panel will come on when the USB is connected and the computer power is on. 
- Click on the MicroLab icon on the desk top to start the program. Note that you must always use this USB port with the MicroLab FS-528.

Name	Date modified	Type	Size
Calibrations			
Drivers			
Saved Experiments			
Simulations			
Templates			
CycleLEDs			
CDM v2.12.00 WHQL Certified	5/26/2015 10:46 PM	Application	2,188 KB
CDM20802_Setup	12/28/2010 10:00 ...	Application	1,688 KB
CDM20814_Setup	8/2/2011 11:09 AM	Application	1,693 KB
CDM21216_Setup	4/19/2016 8:08 PM	Application	2,075 KB
CDMuninstallerGUI	12/28/2010 11:02 ...	Application	644 KB
DriverUtility.dll	8/24/2011 9:50 AM	Application extens...	36 KB
DriverUtility	8/24/2011 9:53 AM	Application	204 KB