



## SYSTEM SETUP / CALIBRATION

The system is shipped from the factory calibrated for immediate use. The user can perform most system calibrations if necessary.

To start the CI-340, press . After a brief warm-up time, the instrument will display the basic display as follows:

Fri 12 Mar 2004 16:06:38  
CI-340 version 5.004  
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The following screens are accessed in order by pressing the arrow keys,  to move up and  to move down:












Starting Screen:

|                          |                            |
|--------------------------|----------------------------|
| ENTER to select          | Calibrate Temp.            |
| ENTER to select          | Calibrate Flow             |
| ENTER to select          | Set baud rate              |
| ENTER to select          | Calibrate ATM Pr           |
| ENTER->file menu         |                            |
| Fri 12 Mar 2004 16:06:38 |                            |
| START/ENTER to go        | 16:06:38                   |
| ENTER to select          | Change clock               |
| ENTER to select          | Calibrate CO <sub>2</sub>  |
| ENTER to select          | Calibrate H <sub>2</sub> O |

## CALENDAR AND TIME SETUP

The purpose of these functions is to provide the user current information of local date and time. This method can be extremely useful to further establish when measurement data are collected or saved, or simply another form of time keeping. The factory-calibrated date and time are the default values.

ENTER to select    Change clock

To change the date and time, scroll to choose “Change clock” under the “ENTER to select” function (press the  key twice from the initial display). The time function will be the first selection. Begin by using the  or  keys followed by the  or  keys to adjust and move to the hour, minute and second of choice. With the time function set, the date function will follow. Once again, use the  or  keys followed by the  or  keys to adjust and move to the month, day and year of choice. Press the  key to save your selection and continue. Note that at any point of this setup, pressing the  key will suspend any further actions and return to the screen display above.



## LEAF/AIR TEMPERATURE SENSOR

**Suggested Calibration Schedule:** None. Check to see that the TSCAL1 values on the back of the sensor are the same as the calibrated values.

This function sets the calibration values for a given leaf/air temperature sensor. The included temperature sensor has been initially tested and calibrated by the manufacturer.

ENTER to select    Calibrate Temp

To change the leaf/air temperature values, scroll to choose “Calibrate Temp” under the “ENTER to select” function.

Enter the pre-calibrated “TSCAL1” value printed on the back of the included IR temperature sensor. Press the  key to save your selection. Do the same for the “TSCAL2” value. The CI-340 will assume any entry(ies) left unentered as the last entered values, respectively. Pressing the  key will also refer to the last entered values.

## ATMOSPHERIC PRESSURE

The CI-340 pressure sensor is capable of measuring absolute atmospheric pressure. This value is used in calibrations for Photosynthesis, Transpiration and Stomatal Conductance values. The sensor is calibrated at the factory, and normally does not need to be recalibrated.

ENTER to select    Calibrate ATM Pr

To change the atmospheric pressure (ATM) value, scroll to choose the “Calibrate ATM Pr” under the “ENTER to select” function. Enter the desired ATM value in K Pa. Press  to accept the entered value or  to abort the process, and continue to another step.

## FLOW RATE

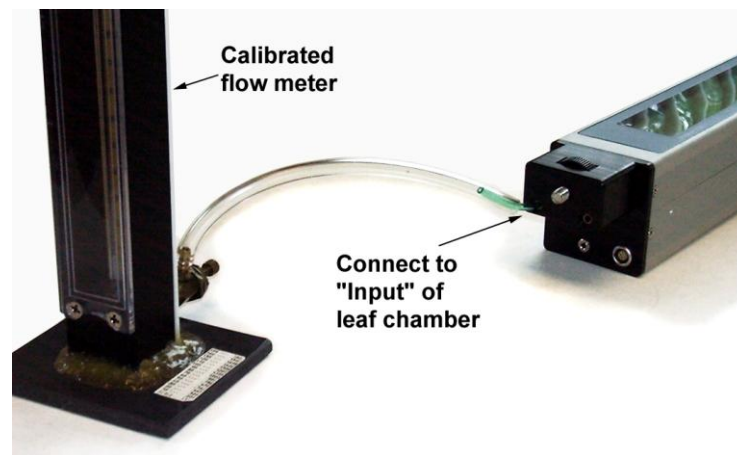


Figure 5.0

The CI-340 is capable of maintaining a steady airflow once the unit begins taking measurements. After the initial warm-up time (one minute), the instrument will generate the entered flow rate to regulate the accuracy of the measurements. The instrument is capable of automatically controlling the flow rate from 0.2 ~ 0.999 lpm. Flow rates of 0.3 lpm give increased accuracy to photosynthesis measurements unless very active leaves are being measured.

The internal flow sensor is calibrated by the manufacturer but can be calibrated again by the user. Suggested calibration schedule is once every six months. Scroll to choose the “Calibrate flow rate” function.

ENTER to select    Calibrate flow rate

The instrument will briefly run through stabilizing steps and then ask the user to adjust the flow, using the   keys for major changes or the   keys for minor changes, from .2 to 1 lpm. For calibration, the flow **MUST** be measured by a **CALIBRATED** external flow meter at the port on the end of the instrument where the leaf chamber plugs in (upper left part as you read the

keypad). For this calibration, the flow rate is measured at the input to the leaf chamber (see figure 5.0). A well-calibrated flow meter with little backpressure should be used as the standard. **NOTE:** *If the flow calibration was performed incorrectly during the procedure, the EXIT key will return back to the beginning of the flow calibration.* Once the calibration procedure is completed, in a few moments the instrument will reset and return back to the above screen display.

## CO<sub>2</sub> AND H<sub>2</sub>O

**NOTE:** For greater changes in ambient temperatures between sample measurements, it may be necessary to recalibrate to CO<sub>2</sub> “zero setting” at each temperature (i.e. 0°C sample and 40°C sample). Suggested calibration schedule: Zero setting once a week for CO<sub>2</sub> and H<sub>2</sub>O; span setting once a week for CO<sub>2</sub>. Check H<sub>2</sub>O once every six months.

This instrument allows calibration with a range of CO<sub>2</sub> from 100 to 1000 ppm, and H<sub>2</sub>O from 1 to 7.5 kPa.

ENTER to select      Calibrate CO<sub>2</sub>

To change the calibration of CO<sub>2</sub>, scroll to choose the “Calibrate CO<sub>2</sub>” under the “ENTER to select” function. While the instrument stabilizes to the setup state, it will first ask if you want to calibrate zero.

Start to set zero, else Exit

Press the START  
ENTER key to calibrate the zero or press the EXIT key to skip the calibrate zero function.

Use 0 ppm CO<sub>2</sub> gas      Press START/ENTER

Allow the zero ppm CO<sub>2</sub> gas (dry nitrogen or soda lime) to flow for approximately one minute (three minutes for soda lime) prior to pressing the START  
ENTER key to flush the system completely. Always use a “T” connector. A small amount of flow out of the one-meter tube ensures a sufficient quantity of gas is flowing to the system (see Figure 5-1) in the gas line when supplying gas from a low-pressure regulator in order to avoid excessive flow through the system. Alternately, use soda lime connected between the intake and exhaust with the small plastic tube where the chamber usually goes to form a closed loop.

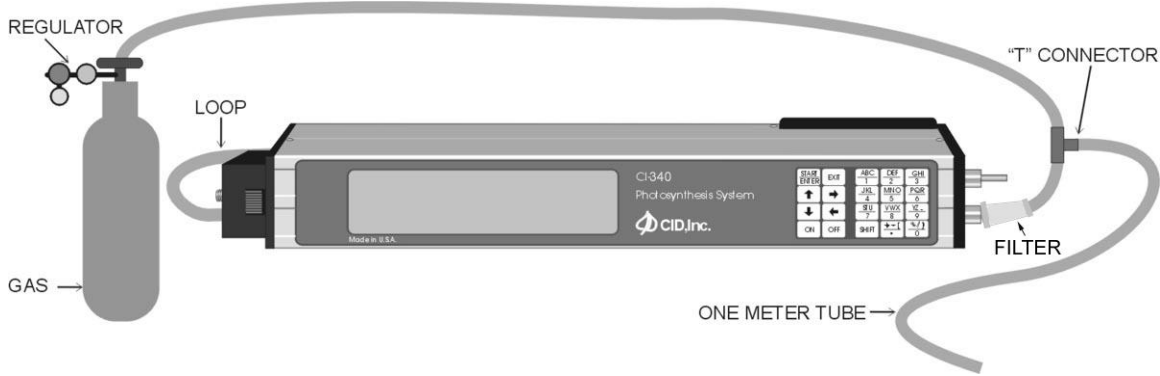


Figure 5-1. Configuration using compressed gas.

After the system zero is established, use a gas with known concentration of CO<sub>2</sub> to calibrate span.

Use the **EXIT** key to skip the “calibrate the span” setting.

Use known CO<sub>2</sub>

Press the **START/ENTER** key to proceed.

Enter the concentration of CO<sub>2</sub> in ppm at the following display:

Concentration ?  
\_\_ ppm

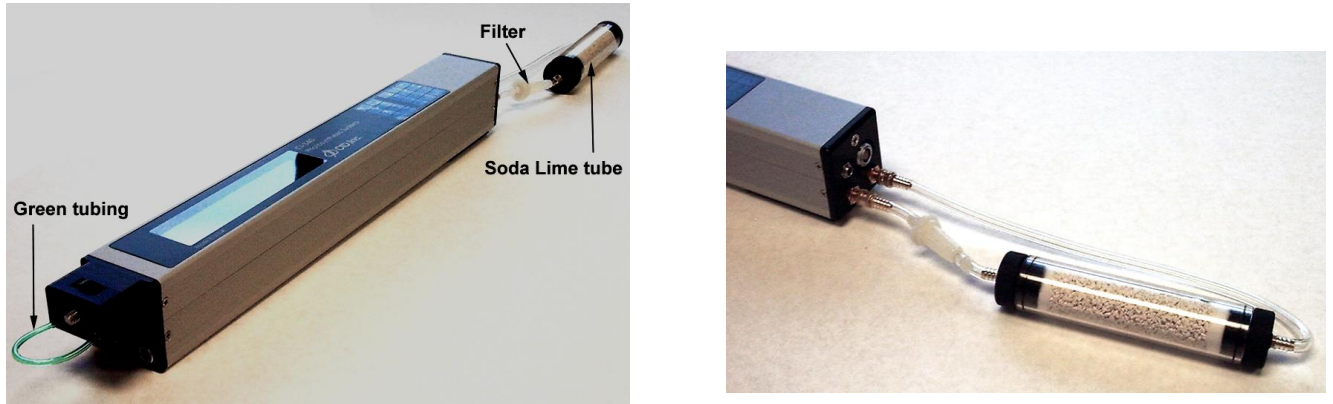
The known concentration should flow for approximately one minute.

Press **START/ENTER** to save your selection. The system will then return to the following screen display and reset:

ENTER to select      Calibrate CO<sub>2</sub>

H<sub>2</sub>O calibration follows similar procedures. Dry nitrogen gas or silicon gel can be used for the H<sub>2</sub>O zero, and a known partial pressure of H<sub>2</sub>O is used for the known H<sub>2</sub>O. A “DOS” program is provided to convert relative humidity and temperature to kPa partial pressure. Run *RH2KPA.EXE* under DOS or in a DOS window on a PC. Windows XP will automatically launch a DOS window if you double click on the file name in Windows Explorer.

**NOTE:** H<sub>2</sub>O span setting should not be calibrated except once every six months. However, it is suggested that it be checked often by conducting a photosynthesis test with the “loop back” tube in place of a leaf chamber and sampling a known humidity of the atmosphere.



*Figure 5-2. Configuration using Soda Lime for CO<sub>2</sub> zero calibration.*



*Figure 5-3. Configuration using Silica Gel for H<sub>2</sub>O calibration.*