**SOLVITA® DIGITAL COLOR READER (DCR)**
**SOLVITA® DCReader SOFTWARE**

The Solvita DCR is a portable digital colorimeter which enables rapid and precise quantification of Solvita test probe color responses. Two models are available: the **Mulit-Mode DCR** and the **Field DCR**.

The Multi-Mode DCR is programmed to read all Solvita probes including: *High-CO2* (used for compost maturity), *Low-CO2* (used for soils) and *Ammonia-NH3* (used for SLAN and Compost).
The Field DCR is intended for field soil use and is pre-programmed for Low-CO2 probes.

Both DCR models are battery and USB-powered. They may be connected to a PC and in combination with **DCReade**r software will enable the user to upload readings and export data for use in spreadsheets.

## OVERVIEW of the SOLVITA® DCR

MODE SELECTORS: These buttons select which specific test is being conducted.

MULTI-MODE MODEL DCR (yellow case):
There are 4 choices:
**Mode #1** ("CO2-High") Compost CO2 test according to the
high level CO2 #1-8 color chart.
**Mode #2** ("CO2-Low") Soil CO2-Burst Test according to the
low level CO2 #0-5 color system
**Mode #3** ("NH3") Ammonia test according to NH3 #1-5 color system
**Mode #4** ("Basal Rate") Basal Respiration test for as-is soils or Grain Test

FIELD MODEL DCR (green case):
**Single Mode**: READ button actuates "CO2-Low" for soil probe readings
according to the modified #0-6 color system.

**POWER**: The DCR is powered by a 9V battery or alternatively by a USB connector. In battery mode the DCR is stable to voltage from 6-9V and a single battery lasts several months. The DCR flashes a battery check when turned on and should be replaced as it approaches 6V. If the unit is left on for an extended period, the battery will be drained.

**SOLVITA® DCR OPERATION:**

1. Battery: Turn on power switch located on the back-left side. The LCD screen will power up and run a battery check, reporting <Ready> in standby mode
2. USB: Simply plug in the cable; the USB will override it and automatically turn on. It may still be used manually in the status or connected via software for uploading.
3. Select Mode: Determine which Solvita test you are performing and press the appropriate button on the Multi-Mode Unit. There is no selection needed on the Field DCR.
4. The LCD will change from <READY> to indicate the actual selected test mode.
5. Remove detector probe from test jar at the correct time. Slide the probe **gel facing up** into slot on the bottom front until it stops (a small portion of the paddle be sticking out). Verify that the mode is waiting in the correct state, and press the READ button. The unit will scan the gel and the results will appear within 1sec.
6. In manual mode, record the data from the LCD screen and process to the next probe, simply pressing READ. Change mode switch only if a different test is performed.
7. In PC mode, with DCReader installed, the data will be captured with each Read. The DCReader software prompts for a file name to store the csv data.
8. Probes for other Solvita tests can be inserted alternately, as long as the mode switch is used accordingly.

**TIPS FOR SUCCESSFUL READING:**

- **Cleanliness**: Be certain no compost or soil is sticking to the probe or gel when inserting inside the DCR.
- **Temperature**: Use DCR at a similar temperature as the test, e.g. 20-25˚C. The display color number varies by about 20% with a 10˚C (18˚F) change.
- **Mode Selection**: When pressing the mode buttons you should hear a snap-click and the screen should change immediately. If not, press again.
- **Color Check**: You may visually check the probe colors by matching to the standard color charts. Visual color should agree closely to the DCR result.
- **Battery**: Always turn power off when not in use. During prolonged use, occasionally observe battery voltage at power up. Batteries typically rebound when not in use. The unit functions normally at 6 Volt or higher.

## Tips on Best Operation

The DCR reads Solvita probe color by comparing three wavelengths of light-emission when illuminated by internal white LEDs. Therefore, if the gel surface has been damaged by touching or discolored with soil or compost specs, it may affect the readings. The gel surface may be lightly brushed with the gloved finger or clean instrument to remove flecks.

The LCD screen only holds the reading until the next test, so it should be promptly recorded. The gel probes are affected at the atmosphere and therefore should not be re-tested unless immediately due to color changes within minutes.  For each mode selected the LCD screen will display appropriate units related to the selected test.

## CONNECTING TO COMPUTER / DCReader SOFTWARE

**DCReader®** software is designed to interact with all DCR models.  It may be installed from the Solvita.com website or the DCReader.exe file may be dragged from the Thumb-Drive provided with new DCRs. If downloading from the Solvita website there is a brief registration prompt. To download go to https://solvita.com/digital-color-reader/

To connect to a PC, a standard USB/mini cable is used and is provided with each new DCR. The first time the DCR is connected, the PC may take several minutes to automatically identify and install the appropriate device drivers. These drivers are also located on the Thumb-Drive that comes with each DCR unit.

To capture DCR data, open **DCReader** and connect the DCR to your PC. DCReader should automatically recognize and connect to the DCR as indicated by a Green "Found" button identifying the port and serial number. You can also click on "File" to connect or disconnect.



There are several choices at this point. You can read the results on the screen with each click of the DCR READ button and the software will also interpolate the color as well as the proper test mode. You can use DCReader to create a csv file by clicking "Begin test run". It will provide a choice of inserting text markers into the spreadsheet (to identify samples, or a project).

At the end of a run, close the file by clicking "End test run" and it will prompt to insert an optional ending text marker.  The csv file can also be opened and viewed at any time by clicking "Open last file". **NOTE**: Since the software saves files in comma-separated-versions, editing is limited. You can edit the file within Excel after DCReader has closed it. If you want to continue measuring samples and appending to the same file, you must keep the .csv extension otherwise DCReader will not open the file again. In this case you can also save changes made to an .xls extension.

**For Apple OSX users** (Vers 10.4 and higher): You can access the DCR via the built in PPP terminal or download QuickTerm, a free RS-232/serial terminal emulator that works with the USB port. Follow instructions to open a terminal window.

**Readability**: Solvita® DCRs are factory calibrated for Solvita probes and Solvita test methods. DCR units may vary within the limits of accuracy and precision by ± 0.25 color units and precision is ± 0.02 color units. A DCR Color-Balance Card may be obtained from Woods End Labs and is provided with new DCRs. This is used to monitor overall DCR optical performance.

**Warranties:** Woods End Laboratories warrants Solvita DCRs to be free of any manufacturing or workmanship defects for one (1) year from the date of purchase from the manufacturer. Units outside warranty may be returned at any time for cleaning and re-calibration for a small fee.

## DCR FIRMWARE REVISIONS

All DCRs are currently programmed to the proper Firmware Revision level at time of sale. That rev level is identified at power-up on the LCD screen as "700.6" or "12.3" etc. Earlier revision DCRs may be upgraded to current operation by downloading the appropriate firmware. Two Versions are identified below.

**Note**: In cases of early DCR models (Model 600 or lower) the firmware upgrade may also require hardware updates – please check with Solvita technical staff (solvita@woodsend.com). There may be costs involved for hardware upgrades.

### Multi-Mode DCR FIRMWARE (pre-installed on yellow DCRs)

Solvita DCR-firmware **700.6** controls the behavior of the multi-mode DCR relative to the selected test and expands the readability range over earlier models. Downloading this package is only necessary to upgrade earlier DCR models (Vers 700.1 or lower).

**Notice**: Firmware upgrades are specific to Model numbers. This firmware is for the multi-mode (yellow case) DCR *only*. It will load on a Field DCR but not function properly. To download go to
https://solvita.com/digital-color-reader/

### FIELD DCR FIRMWARE (pre-installed on Green field DCRs)

Solvita DCR firmware **12.3** controls the behavior of the **Field DCR**, a model which reads Low-level $CO_2$ probes for field soil testing. The current firmware rev presents color value displayed on the LCD screen and converts to display $CO_2$ as pounds per acre (lb/a) or optionally kilograms/hectare (kg/ha). This firmware includes a memory module to store up to 2,000 results before downloading via DCReader.

**Notice:**  This firmware is for the Field DCR (green case) *only*. It will load on the Yellow DCR but will only work in field Low-$CO_2$ mode. To download go to https://solvita.com/digital-color-reader/