

Radian Research, Inc.

# RD-BR1

CT Burden & Ratio Analysis Module

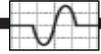
# Operations Manual



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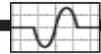




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## 1.0 Connection Status

The RD-BR1 must be used in combination with an RD standard and the RR-PCSuite control software. The RD standard must have Rev 7 hardware and have firmware version 07.06.00 or greater. The RR-PCSuite must be version 01.12.10 or greater.

Status LED

Flashing Orange

Busy

Solid Red

Hardware Error or Continuity Error

Green

Ready

Continuity errors are caused by the lack of a good connection of the 6mm current connectors of the RD-BR1 to the RD standard. Continuity is only checked upon initial power up of the RD-BR1.

## 1.1 Physical Connections



Figure 1.1.1

### Connecting and Disconnecting an RD-BR1 to an RD Standard

1) Insert the 6mm current plugs slowly into the current input receptacles on the RD standard. The red 6mm connector correlates to the bronze side of the test switch probe, connect this to an input that is not marked with a zero (0). The black 6mm connector correlates to the silver side of the test switch probe, connect this to the zero (0) marked input next to the red 6mm connector. Do not put excessive pressure on the plug when inserting. Only a minimal amount of force is required to engage the locking mechanism.



Figure 1.1.2

NOTE: Pushing the current plug too hard may engage and then disengage the locking mechanism in one move. To prevent this gently push the plug into the receptacle and allow the lock to engage.

2) Once the locking mechanism is engaged, pull on the current plug outward. You should NOT be able to remove the plug.



Figure 1.1.3

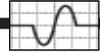
3) To disengage the locking plug, firmly insert the current input plug further into the receptacle as seen in Figure 1.1.4 until you feel a slight click. This click indicated that the locking mechanism is disengaged. You can then pull the current plug completely out of the receptacle as seen in Figure 1.1.5.



Figure 1.1.4



Figure 1.1.5



4) Insert the plastic six (6) pin connector of the RD-BR1 into the CT Input of the standard. Upon connection, the RD-BR1 will automatically run a self test of its hardware and the current connections before allowing the CT under test to flow current into the RD standard. To remove, grasp the base of the plug and pull slightly until released.

## 2.0 CT Burden and Ratio Testing

### CT Burden and Ratio Testing using the RR-PCSuite Control Software

With the use of clamp-on current transformers and an RD-BR1 Burden Analyzer, the internal measurement capability of the Dytronic Standard along with PCSuite allows a CT Burden and Ratio Test, see figure 2.0.1.

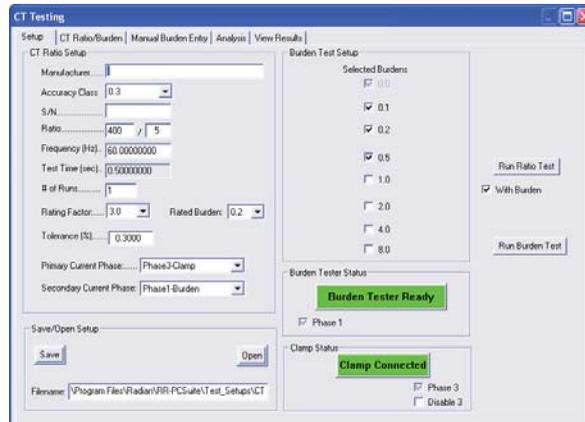


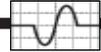
Figure 2.0.1

The CT Burden and Ratio Test will allow the Dytronic Standard to fully test the Current Transformer for VA output capabilities along with the primary to secondary ratio. For the burden test it will synchronize the zero crossings of the current signal with the insertion of the selected burden resistor(s) and compares the measurements. For the ratio test it compares the current sensed on a selected primary input verse the current sensed on the selected secondary input for the test time duration.



For the CT Setup enter the following information

<b>Manufacturer</b>	The manufactures name of the CT under test.
<b>Accuracy Class</b>	The accuracy of the CT. Choose from list and it selects the tolerance. Change tolerance below manually if choosing other.
<b>S/N</b>	The Serial number of the CT under test.
<b>Ratio</b>	This defines the Ratio of the CT under test.
<b>Frequency (Hz)</b>	This defines the Frequency at which the test is performed.
<b>Test Time (Sec)</b>	This defines how long to test the CT. The Dytronic will average the measurements over this period. For ratio testing only. Not to be used if burden testing is enabled.
<b># of Runs</b>	This defines how many times to repeat the test.
<b>Rating Factor</b>	This defines the current rating factor of the CT under test - Choose from list.
<b>Rated Burden</b>	This defines the amount of burden that the CT should drive and still meet the accuracy specification - Choose from list.
<b>Tolerance (%)</b>	This defines the error allowed for the test. If the tolerance is exceeded then the test will indicate failed. This value is set by an accuracy class selection. Change if custom value is needed.
<b>Primary Current Phase</b>	This defines the input to use as a primary current measurement - Choose from list.
<b>Secondary Current Phase</b>	This defines the input to use as a secondary current measurement - Choose from list.



The test setup can be saved for future use by selecting the Save button. After the button is selected the software will prompt for a name and location to save the test. If a test setup has already been completed it can be loaded prior to the test by selecting the Load button and choosing the setup file.

After the information has been entered the user has multiple Run options. To only run a ratio test, uncheck the With Burden box and select Run CT Test. To run a Burden test select the Run Burden Test. As a final option to run a Ration with Burden test, check the With Burden box and select Run CT Test. When the Test proceeds the screen will automatically change to the CT Ratio/ Burden Tab, see figure 2.0.2.

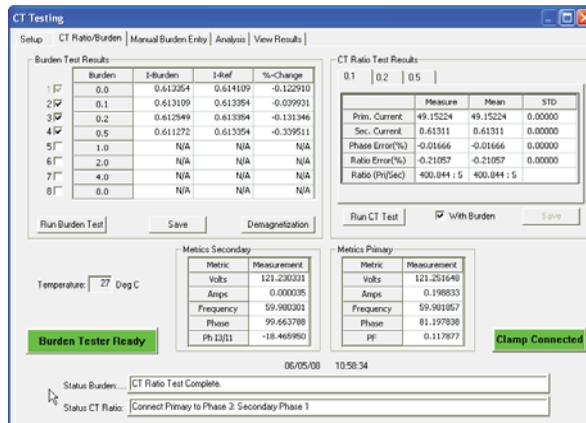


Figure 2.0.2

When the test is complete the screen will show the measured primary current, measured secondary current, phase error, ratio error and CT Ratio. The mean average along with the standard deviation is given for each measurement. If a burden and ratio test was performed select the tab in the CT Ratio Test Results box for the appropriate burden result to view.

If a burden test was selected then the screen will show the current reading with and without the burden inserted and then provide a percent change comparing the two measurements.

To save any of the results, select the Save Report. After the button is selected the software will prompt for and a name and location to be entered so the test can be saved.



A graphic representation of the data is available in the Analysis tab. An Accuracy parallelogram, (figure 2.0.3), Amplitude accuracy graph, (figure 2.0.4), Phase accuracy graph, (figure 2.0.5), Burden Accuracy, (figure 2.0.6), and Burden Amplitude graph, (figure 2.0.7) are available. The Graphs can be saved by selecting the Save button. After the button is selected the software will prompt for a name and location to be entered so the graphic and data can be saved.

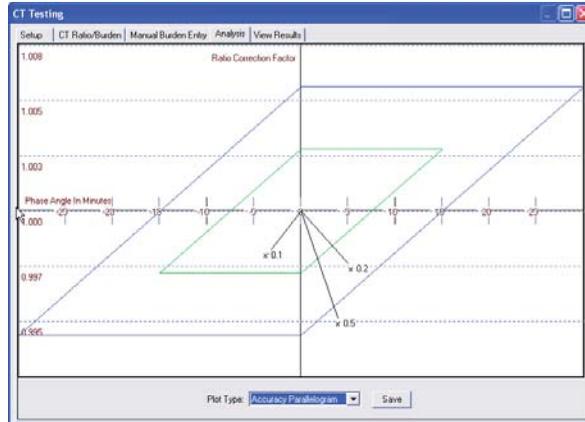


Figure 2.0.3

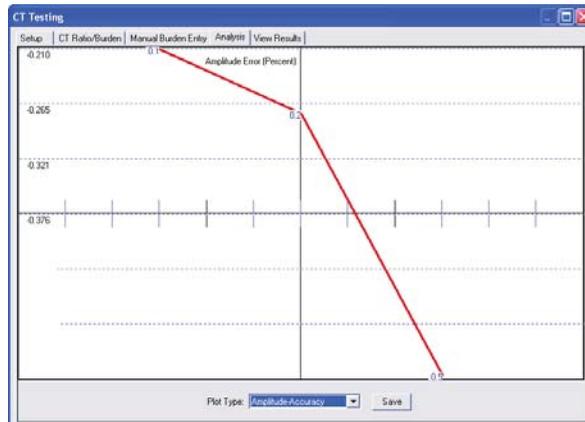


Figure 2.0.4

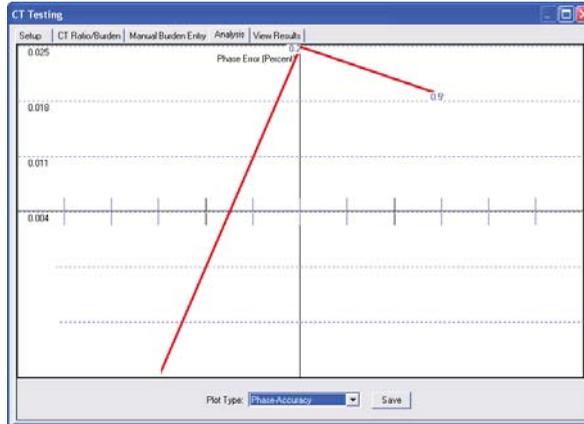
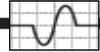


Figure 2.0.5

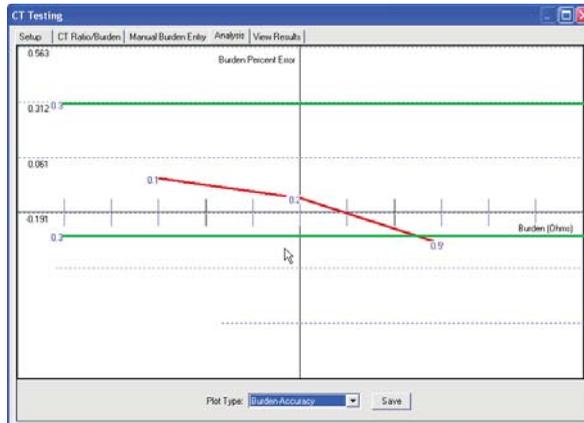


Figure 2.0.6

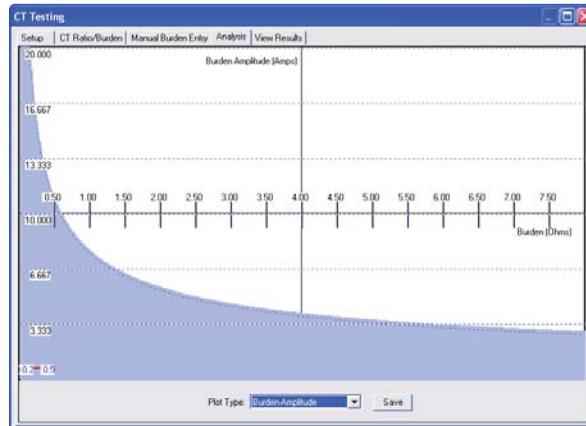


Figure 2.0.7

To view Test results, select the View Results tab and select the View Results button. Enter the serial number range and date of interest and select View, see figure 2.0.8. If no serial number or Date range is entered then all the results will be displayed.

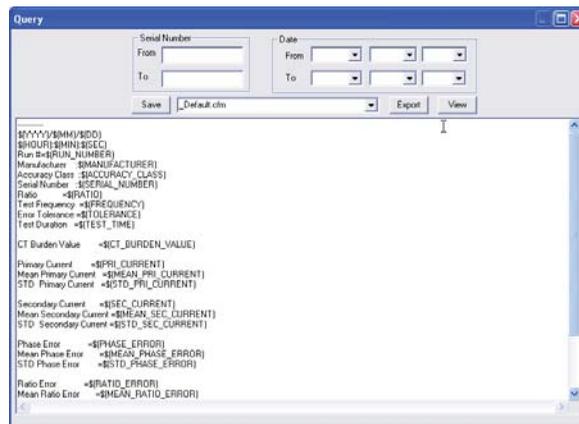
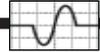


Figure 2.0.8



To change how the results are displayed use the dropdown menu. The options of \_Default, CSV\_No\_Quotes or CSV\_Quotes are available. CSV is defined as Comma Separated Variable. These two formats are commonly used when information is exported to third party software. To create a custom file format, select the variables and format in the loser window, enter the new file name in the file name box and select the save button. The file name must have .cfm as the file extension or PCSuite will not recognize the new file. The following is a list of variables available if you wish to create a custom file.

Year	\$(YYYY)
Month	\$(MM)
Day	\$(DD)
Hour	\$(HOUR)
Minute	\$(MIN)
Second	\$(SEC)
Run #	\$(RUN_NUMBER)
Manufacturer	\$(MANUFACTURER)
Accuracy Class	\$(ACCURACY_CLASS)
Serial Number	\$(SERIAL_NUMBER)
Ratio	\$(RATIO)
Test Frequency	\$(FREQUENCY)
Error Tolerance	\$(TOLERANCE)
Test Duration	\$(TEST_TIME)
Primary Current	\$(PRI_CURRENT)
Mean Primary Current	\$(MEAN_PRI_CURRENT)
Standard Dev Primary Current	\$(STD_PRI_CURRENT)



Secondary Current	\$(SEC_CURRENT)
Mean Secondary Current	\$(MEAN_SEC_CURRENT)
Standard Dev Secondary Current	\$(STD_SEC_CURRENT)
Phase Error	\$(PHASE_ERROR)
Mean Phase Error	\$(MEAN_PHASE_ERROR)
Standard Deviation Phase Error	\$(STD_PHASE_ERROR)
Ratio Error	\$(RATIO_ERROR)
Mean Ratio Error	\$(MEAN_RATIO_ERROR)
STD Ratio Error	\$(STD_RATIO_ERROR)
Measured Ratio	\$(MEAS_RATIO)
Measured Ratio Mean	\$(MEAS_RATIO_MEAN)
Burden Value (0-9)	\$(BURDEN_VALUE0)
I_None (0-9)	\$(I_NO_BURDEN0)
I_With Burden (0-9)	\$(I_WITH_BURDEN0)
Percent Change (0-9)	\$(PERCENT_CHANGE0)

To enter a header the Results Viewer has common characters for indicating a header. The header text must be inside brackets “[” and “]”. Below is a sample header.

[CT Testing Results]

[]

[]

[Year, Month, Day, Hour, Min, Sec, # Runs, S/N]



To export the results to a flat file, select the format and then select the Export button. The user can limit the saved data by using the search conditions. When selecting the Export button PCSuite prompts the user to provide a name to save the data. It is recommended to save the data as a .txt file. If the file is saved as a .txt file then the Windows system can view it using a text editor.