Model R5H-RS
PC CONFIGURATOR
(model: R5HRSCFG)

Users Manual

Contents

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1. GETTING STARTED

1.1 HARDWARE REQUIREMENTS

• IBM PC/AT compatible PC; Pentium 120 MHz minimum (Pentium II 266 MHz or higher recommended)
Windows 98SE, Windows NT 4.0, Windows 2000 or Windows XP Pro
48 MB RAM (24 MB for Windows 98SE)
30 MB minimum free hard disk space
15-inch 800x600 Super VGA screen (17-inch 1024x768 Ultra VGA or higher recommended)
Serial Port (COM1, COM2, COM3 or COM4)
• Non-isolated Cable (model: MCN-CON)

1.2 INSTALLING THE R5HRSCFG

This programming tool is based on Agilent VEE Pro. In order to operate the tool, the user must first install Agilent VEE Pro 6.2 RunTime Version [VEE Pro] and [IO Lib]. If you already have them installed on your PC, skip the installation procedure for them.

(1) Start up Windows.
(2) Insert R5HCFG Setup CD-ROM into the CD drive on your PC. The Setup program automatically starts and shows the setup dialog box on the screen.

⚠ If the program does not automatically start, install manually by starting up Disk:\Setup.exe.

⚠ DO NOT change from the default setting the hard disk drive where the R5HRSCFG is to be installed.

(3) Choose “VEE Pro.”
–> Windows starts the installation program for Agilent VEE Pro 6.2 RunTime. Follow instructions on the screen and click Next or Yes.
–> Click Finish and exit the installation program.
(4) Choose “IO Lib.”
–> Windows starts the installation program for Agilent IO Libraries. Follow instructions on the screen and click Next or Yes.
During the process appears dialog boxes in which you should specify as follows:
“Select the Installation Option.” –> Choose “Runtime Installation.”
When “Agilent IO Libraries runtime have been successfully installed” is displayed on the screen, choose “RUN IO Config.” and then click Finish.
“Agilent IO Libraries Configuration – IO Config” –> Choose “Auto config.”
–> Click OK and exit the installation program.
(5) Choose “R5HRSCFG.”
–> Windows starts the installation program for R5HRSCFG software. Follow instructions on the screen and click Next.
–> Click Finish and exit the installation program.
(6) Click Exit.

Now the R5HRSCFG program has been installed.

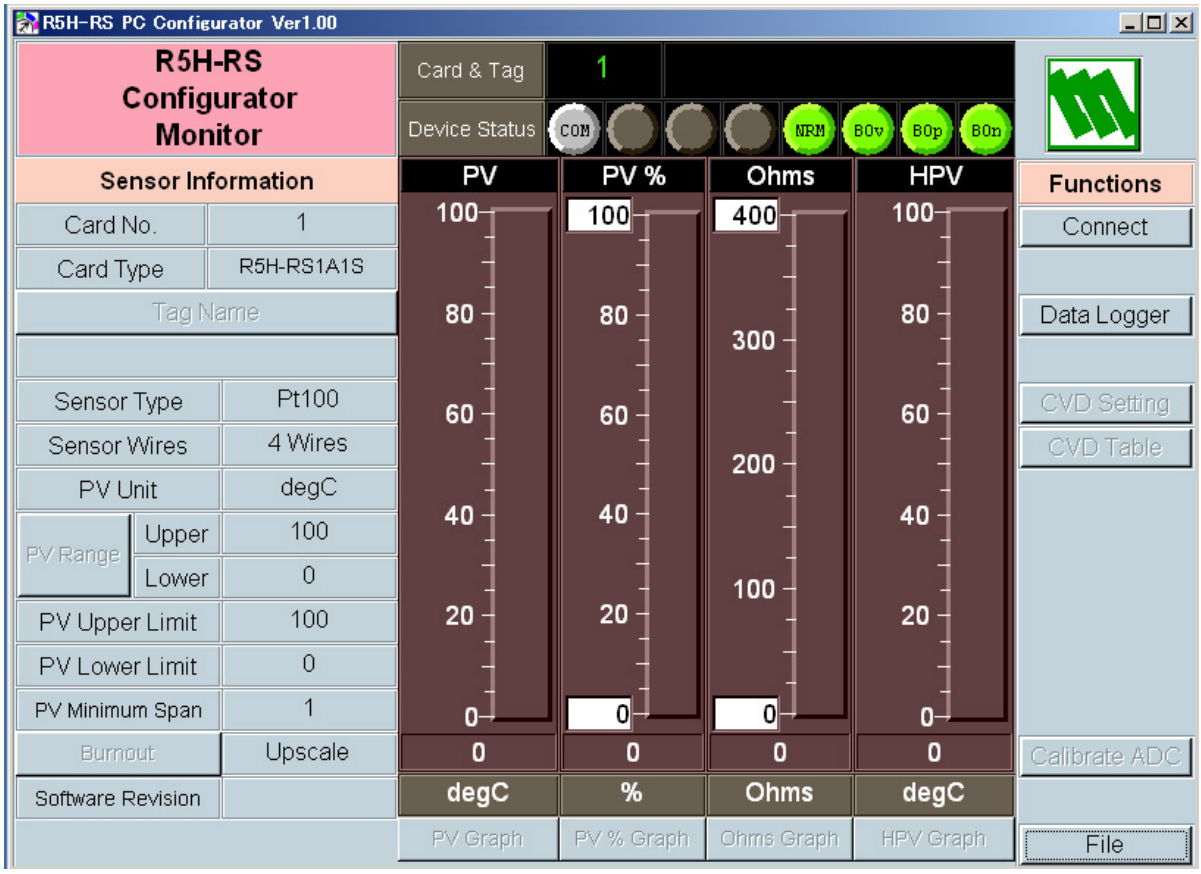
1.3 STARTING UP THE R5HRSCFG

Connect the R5 Series Network Interface Module to the PC via the non-isolated cable.
Press Start on the task bar and choose R5HRSCFG from the Program menu.

2. OPERATING THE R5HRSCFG PC CONFIGURATOR

Figure 1 shows the initial view of the R5HRSCFG PC Configurator window.
In order to enable the tools shown on the screen, the R5 Series Network Interface Module must be connected to the PC via the non-isolated cable.

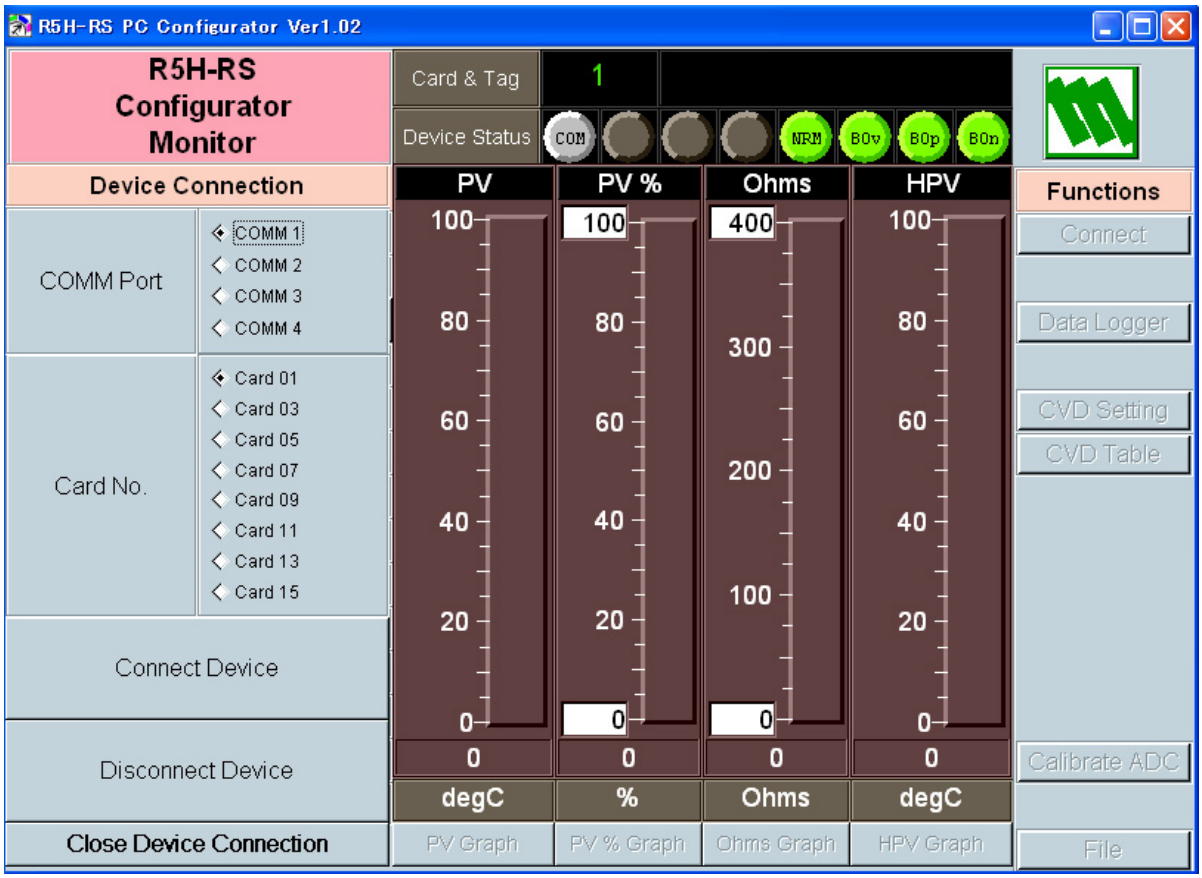
Figure 1. Initial View



2.1 CONNECTING THE DEVICE (R5H-RS)

On the initial view, click [Connect] and the Device Connection menu appears on the screen.

Figure 2. Device Connection



[COMM Port] Choose COM1, COM2, COM3 or COM4 that connects to the R5H-RS.

[Card No.] Choose a slot number for the R5H-RS to be programmed. (The R5H-RS is mountable only in odd-number slots.)

[Connect Device] Connects the device. Once the connection is established, the program uploads the device's configuration information and automatically calls up the Sensor Information view. The Device Information view is the base for various operations to configure the R5H-RS.

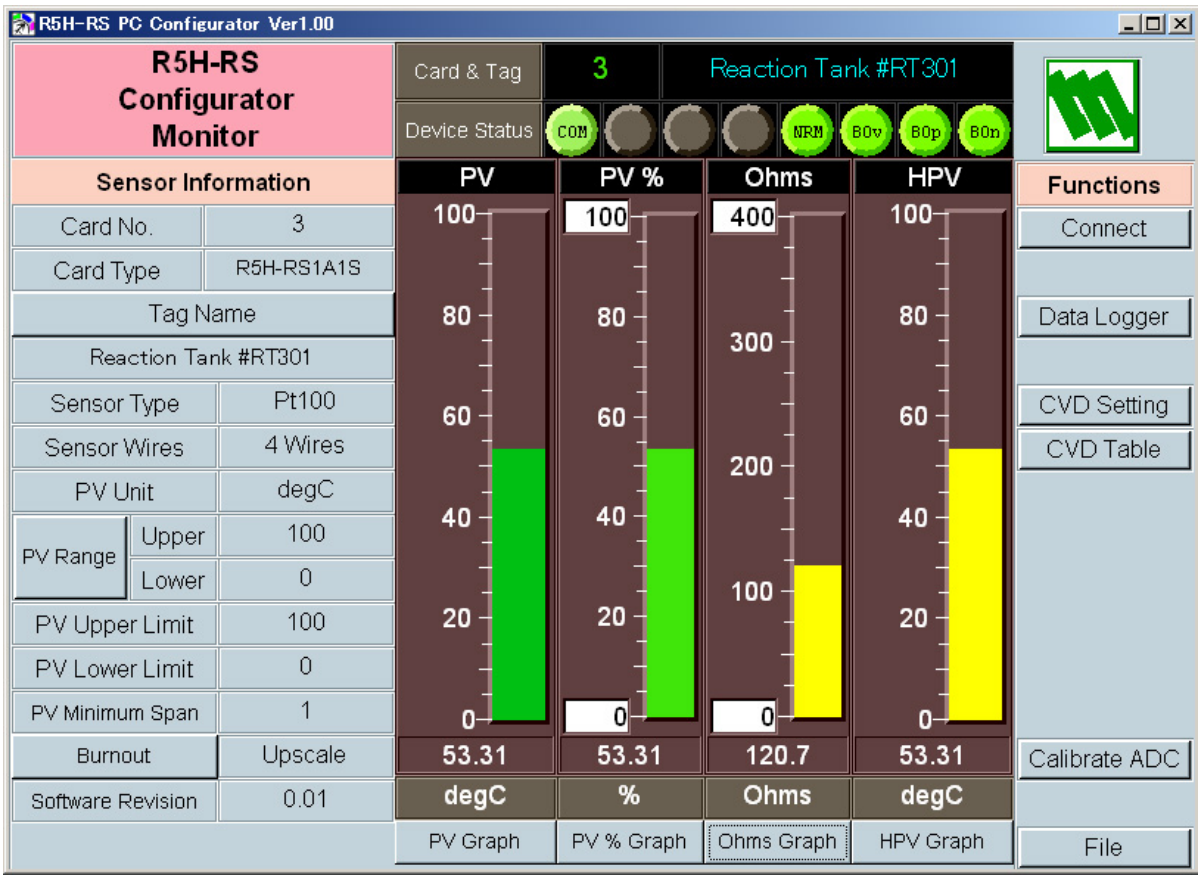
[Disconnect Device] Disconnects the currently connected device.

[Close Device Connection] Quits the Device Connection view.

2.2 MONITORING TRENDS

Once the device is connected, the Sensor Information menu and the trend monitors appears on the screen. The user can configure various parameters of the R5H-RS.

Figure 3. Sensor Information



2.2.1 Card & Tag

Card & Tag field shows the slot number of the R5H-RS module and its tag name.

2.2.2 Device Status

Device Status summarizes the current device status by lamps.

[COM] lamp — Shows communication status when the device is in the monitor mode. Blinks in the normal communications condition. If it is not blinking, it means that the module is not in normal communication conditions, or not in the monitor mode.

[NRM] lamp — Shows the ADC's hardware status (Green: normal, Red: error). Red light turns on with the ADC's hardware error or with a communication error with the ADC.

[Bov] lamp — Shows Line 1 (wire connected to the terminal 1) connection status (Green: normal, Red: error). Red light turns on with Line 1 wire breakdown.

[Bop] lamp — Shows Line 2 (wire connected to the terminal 2) connection status (Green: normal, Red: error). Red light turns on with Line 2 wire breakdown.

[Bon] lamp — Shows Line 3 (wire connected to the terminal 3) connection status (Green: normal, Red: error). Red light turns on with Line 3 wire breakdown.

Wire breakdown detection is active only when Upscale or Downscale is specified for Burnout. When a Burnout is detected, the PV goes to 323°C (Upscale) or -274°C (Downscale) according to the setting.

2.2.3 Sensor Information

The Sensor Information menu on the left shows the basic configuration information of the connected sensor. When you need to change configurations, click the left button for the required item to modify the setting.

[Card No.] — Shows the slot number of the R5H-RS module.

[Card Type] — Shows the model number and suffix codes for the R5H-RS.

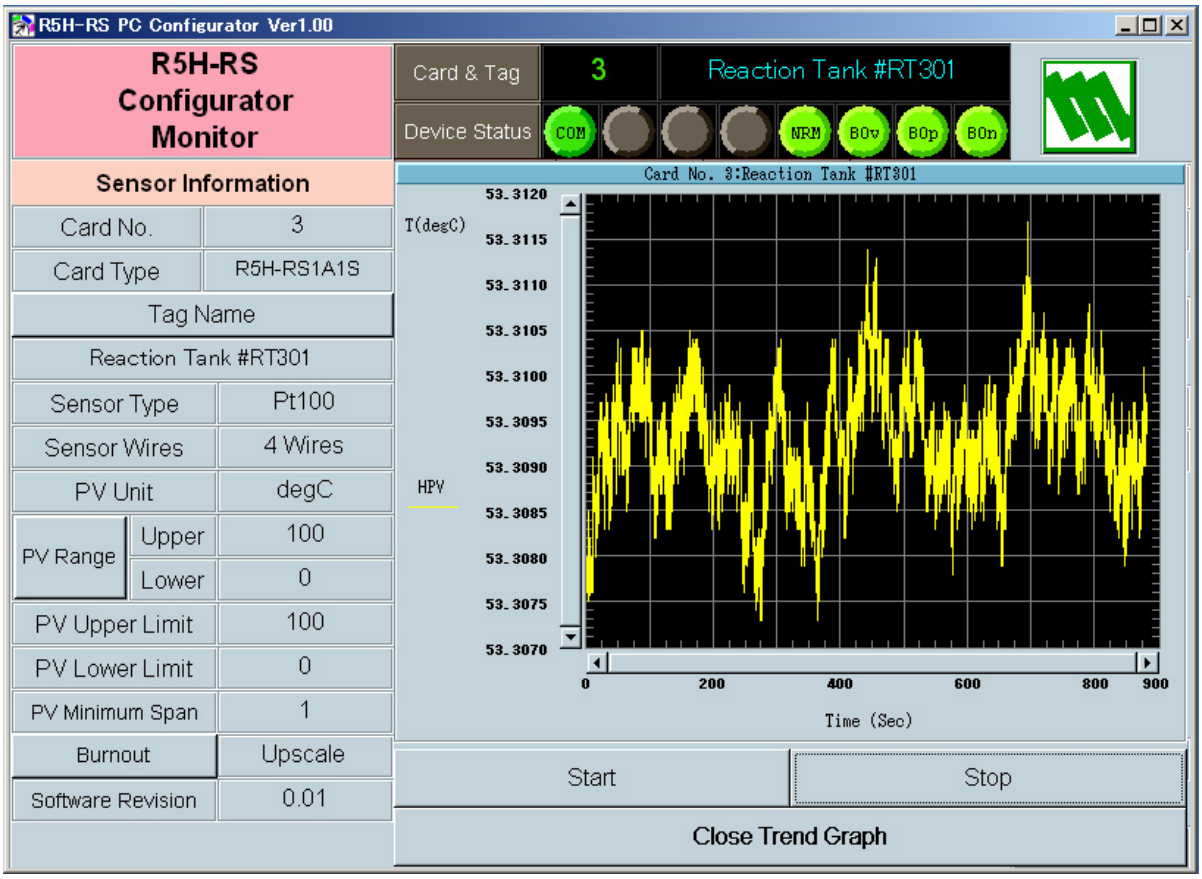
[Tag Name] — Shows the tag name of the R5H-RS module. You can enter a tag name using up to 24 alphanumerical characters.

[Sensor Type] Shows the input type determined by the model number and suffix code. Not modifiable.
[Sensor Wires] Shows the number of wires for the sensor. Fixed at 4 Wires for the R5H-RS.
[PV Unit] Shows the engineering unit for the PV. Fixed at degC (°C) for the R5H-RS.
[PV Range] Specifies the input range (PV and HPV) used to calculated PV% on the PC Configurator window. This setting does not affect the module's internal computation.
[Burnout] Specifies either the PV should go upscale (323°C) or downscale (-274°C) in case that a burnout is detected. No burnout action when 'None' is selected.
[Software Revision] Firmware and software version automatically indicated.

2.2.4 Bargraph & Trend Graph

Four bargraphs indicating the measured temperature (PV) in engineering unit, PV in % of the selected range, the resistance value (Ohms) and the high accuracy temperature value (HPV) in engineering unit are available. The PV value is shown in 0.01°C resolution, while the HPV value has seven (7) significant figures. The resistance value also has seven (7) significant figures.
The graph scales for the PV in % and Ohms can be modified unlike the PV or HPV in engineering unit of which the scale is automatically determined and fixed according to the selected range.
At the bottom of each bargraph is [Graph] button which opens a trend graph for the item. The example below shows the trend graph for [HPV Graph]. Use [Start] and [Stop] buttons to activate/deactivate trending, and click [Close] to quit the graph view.
The horizontal scale shows time in seconds, and the vertical scale is determined by the selected bargraph. Card No. and Tag Name is indicated at the top of the trend graph window.

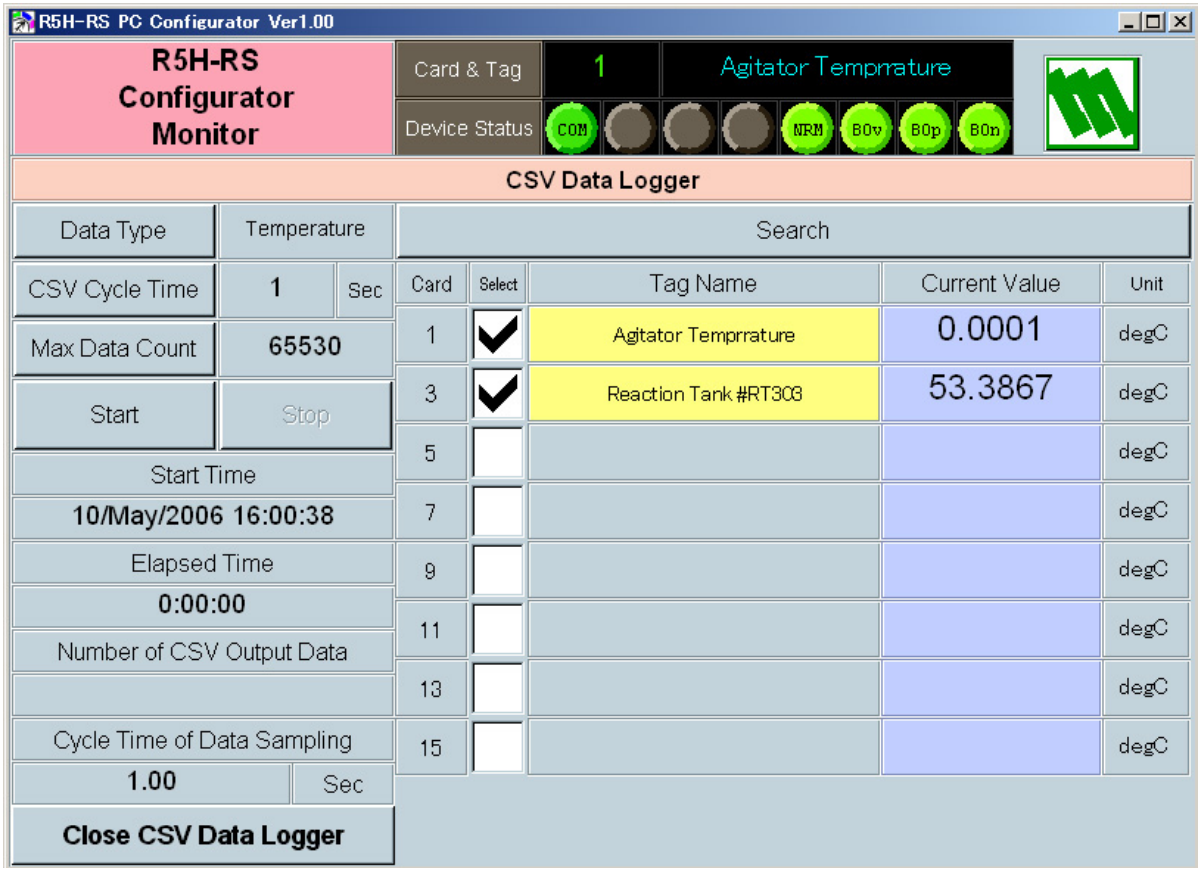
Figure 4. Trend Graph



2.3 CSV DATA LOGGER

In Figure 3, clicking [Data Logger] on the right control panel opens the [CSV Data Logger] control menu as shown in Figure 5. Data from multiple modules can be stored and exported in CSV format file in a predetermined cycle.

Figure 5. Data Logger



[Data Type] Specifies either Temperature, Resistance or Temp./Resis. (temperature and resistance) data should be stored.

[CSV Cycle Time] Specifies the time interval to export the data into CSV. Choose between 1 second and 600 seconds. The CSV Cycle Time must be greater than Cycle Time of Data Sampling which shows the minimum time required to store data of the selected module.

[Max Data Count] Specifies the maximum set of data to be exported into CSV. When the data exportation reaches the maximum count specified, the data logging is automatically ended. For example, if you set CSV Cycle Time to 10 seconds, and Max Data Count to 60, the data logging is ended after 10 minutes. Maximum selectable count is 65530.

[Start] Starts data logging.

[Stop] Forcibly stops data logging.

[Start Time] Shows the start time of data logging. It is not exactly the moment of your pressing the button, but a next possible second multiplied by CSV Cycle Time.

[Elapsed Time] Shows the time duration since the data logging started.

[Number of CSV Output Data] Shows how many samples have been exported into the CSV. When the data logging is complete normally, the number should show 'Max. Data Count' + 1.

[Cycle Time of Data Sampling] Shows the minimum time required to store data of the selected module. When you have selected more number of modules, longer time is required. The CSV Cycle Time must be longer than Cycle Time of Data Sampling.

When you press [Search] button, the configurator searches the R5H-RS modules mounted on the base and shows the Tag Names on Light Yellow background. When you choose the input modules by clicking check boxes under Select, figures in Current Value and Cycle Time of Data Sampling are automatically updated.

[Close CSV Data Logger] quits the view.

2.3.1 DATA LOGGING PROCEDURE

(1) Press [Search]. The R5H-RS modules mounted on the base are searched and indicated.
(2) Specify Data Type.
(3) Specify of which modules you want to store data under Select column. Current Value is automatically updated.
(4) Confirm how long one data logging cycles takes under Cycle Time of Data Sampling.
(5) Specify CSV Cycle Time, longer than Cycle Time of Data Sampling.
(6) Specify the number of data samples you want to export to CSV under Max Data Count.
(7) Press [Start].
(8) If you want to stop the data logging before the preset time, press [Stop].

2.3.2 CSV FILE EXAMPLE

An example of exported data in CSV format is shown in Figure 6.

Figure 6. CSV File Example

r5htest_t.csv

	A	B	C	D	E	F	G	H	I	J
1	Card No		1	3	5	7	9	11	13	15
2	Tag Name		Agitator Temperature	Reaction Tank #RT301						
3	Date	Time	degC	degC	degC	degC	degC	degC	degC	degC
4	13-Apr-06	19:33:00	0.0031	53.3113						
5	13-Apr-06	19:33:10	0.0033	53.3103						
6	13-Apr-06	19:33:20	0.0033	53.3112						
7	13-Apr-06	19:33:30	0.0038	53.3109						
8	13-Apr-06	19:33:40	0.0028	53.3101						
9	13-Apr-06	19:33:50	0.0024	53.3099						
10	13-Apr-06	19:34:00	0.0029	53.311						
11	13-Apr-06	19:34:10	0.0026	53.3097						
12	13-Apr-06	19:34:20	0.0029	53.3096						
13	13-Apr-06	19:34:30	0.0028	53.3104						
14	13-Apr-06	19:34:40	0.0033	53.3105						
15										

r5htest_t

2.4 CALIBRATED RTD

The R5H-RS supports the calibrated RTD function. In order to use this function, RTD's characteristics data must be defined and registered.

Callendar-Van Dusen approximation formula as shown below is used.

$Rt = R0 * (1 + A*T + B*T^2 + C*(T - 100)*T^3)$ (if $T \geq 0$, $C = 0$)

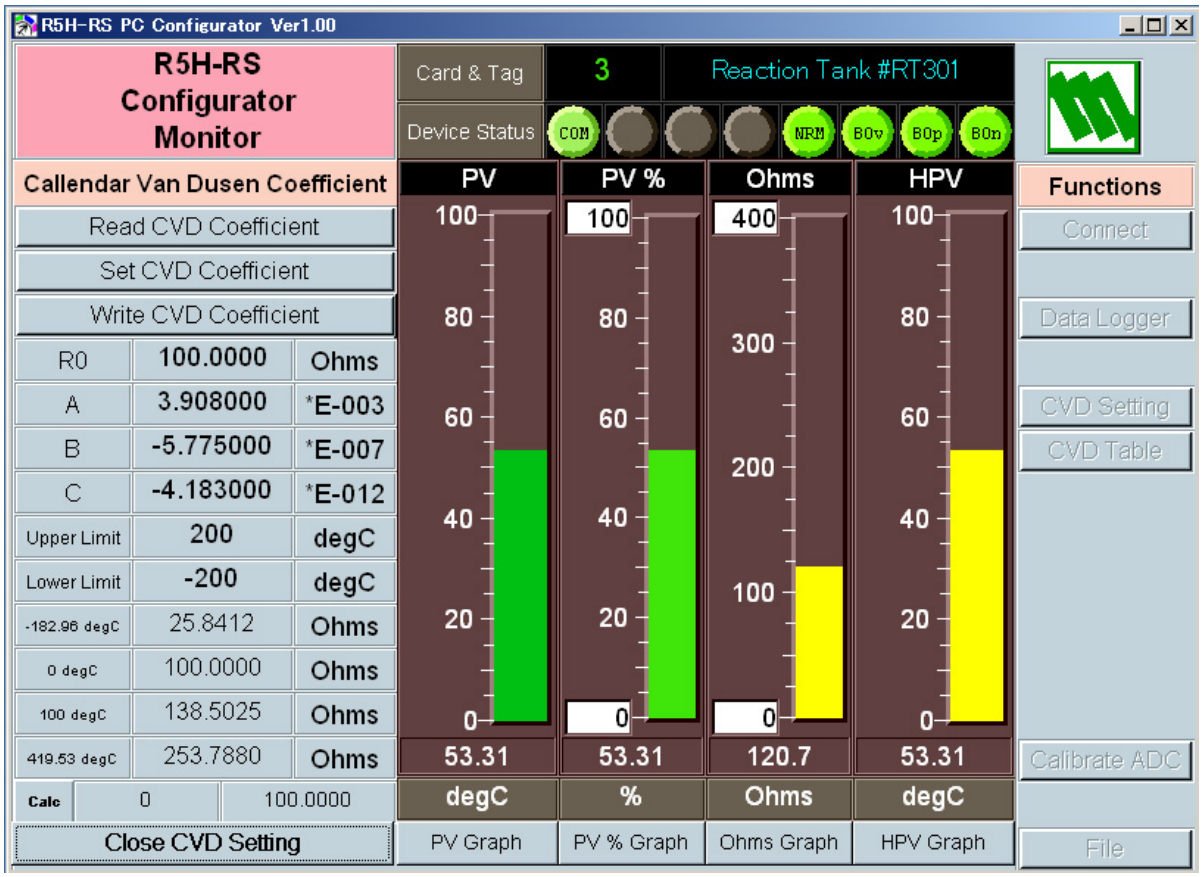
Pt 100 according to IEC 751-1995 (JIS C1604-1997) has the following coefficients:

$R0 = 100$ ohms
$A = 3.9083 \times 10^{-3}$
$B = -5.775 \times 10^{-7}$
$C = -4.183 \times 10^{-12}$

Usually, calibrating an RTD at 4 calibration points determines the above coefficients A, B, C and R0. When these values are entered, a calibration data table is automatically generated. These data can be confirmed on the CVD Table window and exported into a text format file.

In Figure 3, clicking [CVD Setting] on the right control panel opens the [Callendar Van Dusen Coefficient] control menu as shown in Figure 7.

Figure 7. CVD Setting



[Read CVD Coefficient] Uploads the coefficients and display them on the window. When you open the CVD Setting window, the configurator automatically updates these values.

[Set CVD Coefficient] Enter these values (R0, A, B, C, Upper Limit and Lower Limit) to automatically create a sensor characteristic data. The configurator cannot double-check if the entered data are appropriate. Be careful not to enter wrong values.

[Write CVD Coefficient] Once the data is set, [Write CVD Coefficient] to download the values.

[R0], [A], [B] and [C] Show each coefficient in the CVD approximation formula.

[Upper Limit] and [Lower Limit] Shows the highest and lowest values in the calibration table generated by the CVD formula. If the input is out of the specified range, its temperature is extrapolated.

Maximum number of calibration points is limited to 201. Wider the temperature range is, greater the temperature step becomes.

[-182.96 degC], [0 degC], [100 degC] and [419.53 degC] show resistance values at four (4) reference calibration points using these coefficients, used to confirm that they are appropriately selected.

The four points are typical calibration points as shown below:

Boiling point of oxygen	(-182.96 degC)
Freezing point of water	(0 degC)
Boiling point of water	(100 degC)
Freezing point of zinc	(419.53 degC)

[Calc] Specify a certain temperature, a corresponding resistance value is calculated and displayed on the screen. Use this function to confirm input values.

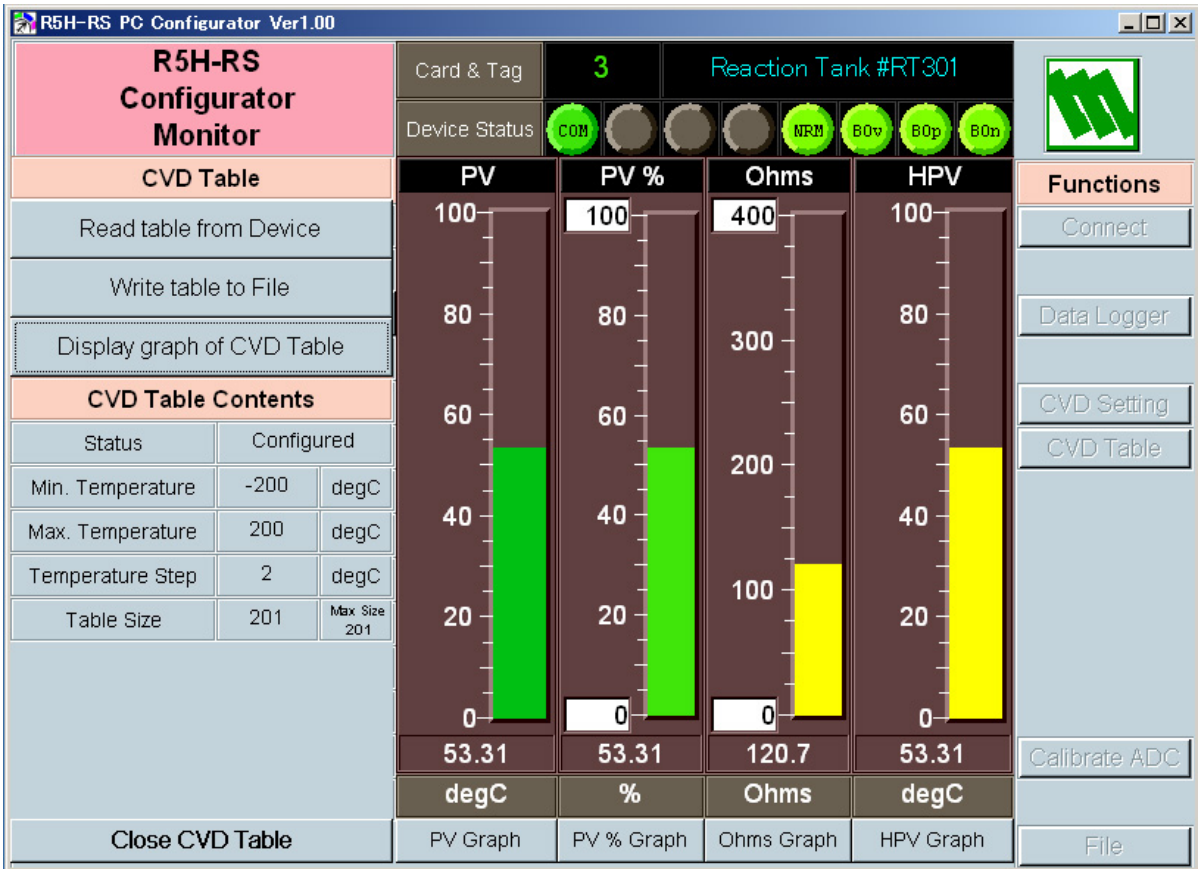
[Close CVD Setting] Quits the view.

2.5 CVD TABLE

Calibrated RTD's temperature table can be read in, displayed and confirmed on the screen, and exported into a text file.

In Figure 3, clicking [CVD Table] on the right control panel opens the [Callendar Van Dusen Coefficient] control menu as shown in Figure 8.

Figure 8. CVD Table



[Read table from Device] The program uploads the resistance-temperature table registered in the R5H-RS. When uploaded, the data contents summary is indicated under CVD Table Contents.

[Status] 'Configured' under [Status] indicates if the table is appropriately generated.

[Min. Temperature] and [Max. Temperature] Show the minimum and the maximum temperature values in the table, which are equal to [Lower Limit] and [Upper Limit] in the CVD Setting.

[Temperature Step] Shows the temperature increment for the resistance values.

[Table Size] Shows the currently stored resistance-temperature data sets. Max. 201. [Temperature Step] is automatically determined by the minimum and maxi

[Write table to File] The program saves the currently displayed characteristics data to a file (Example in Figure 10).

[Display graph of CVD Table] The characteristics data can be shown in a graph (Figure 9).

[Close CVD Table] Quits the view.

Figure 9. Display Graph of CVD Table

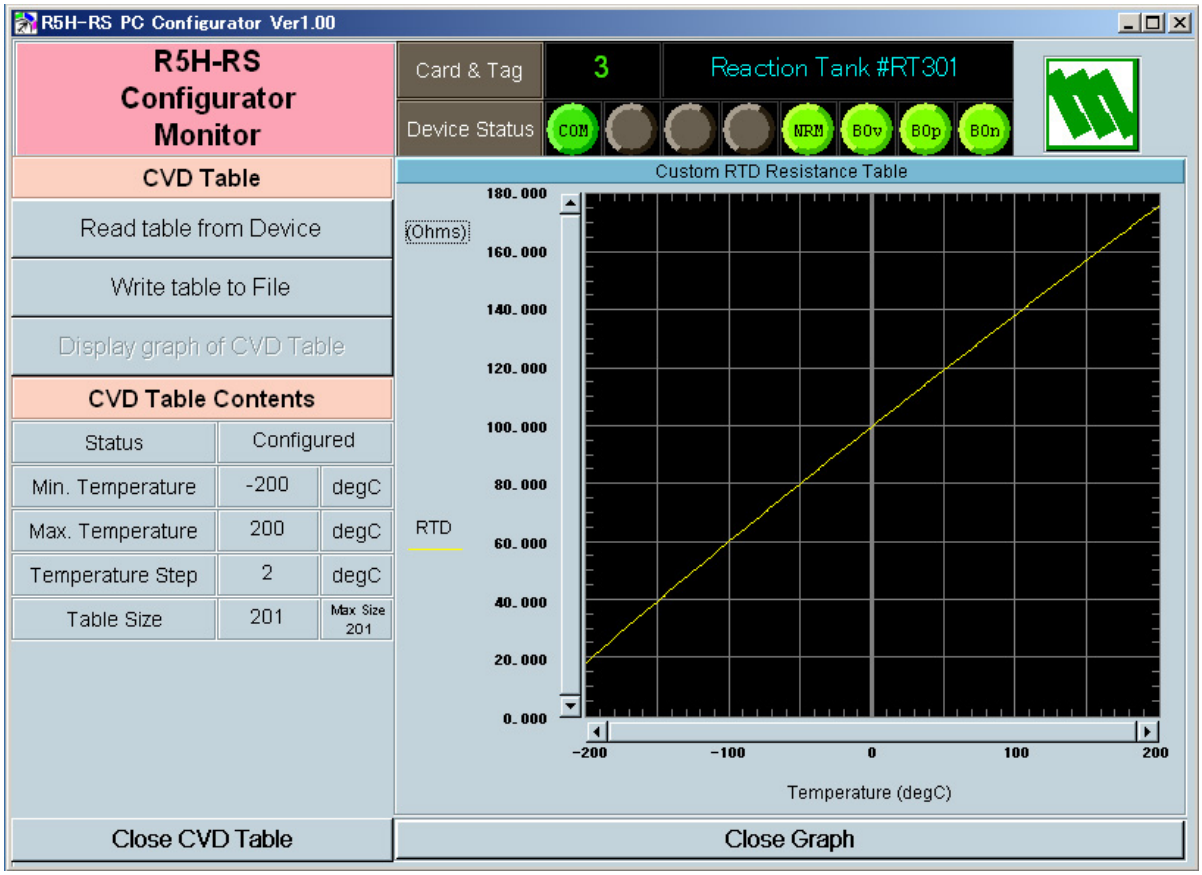
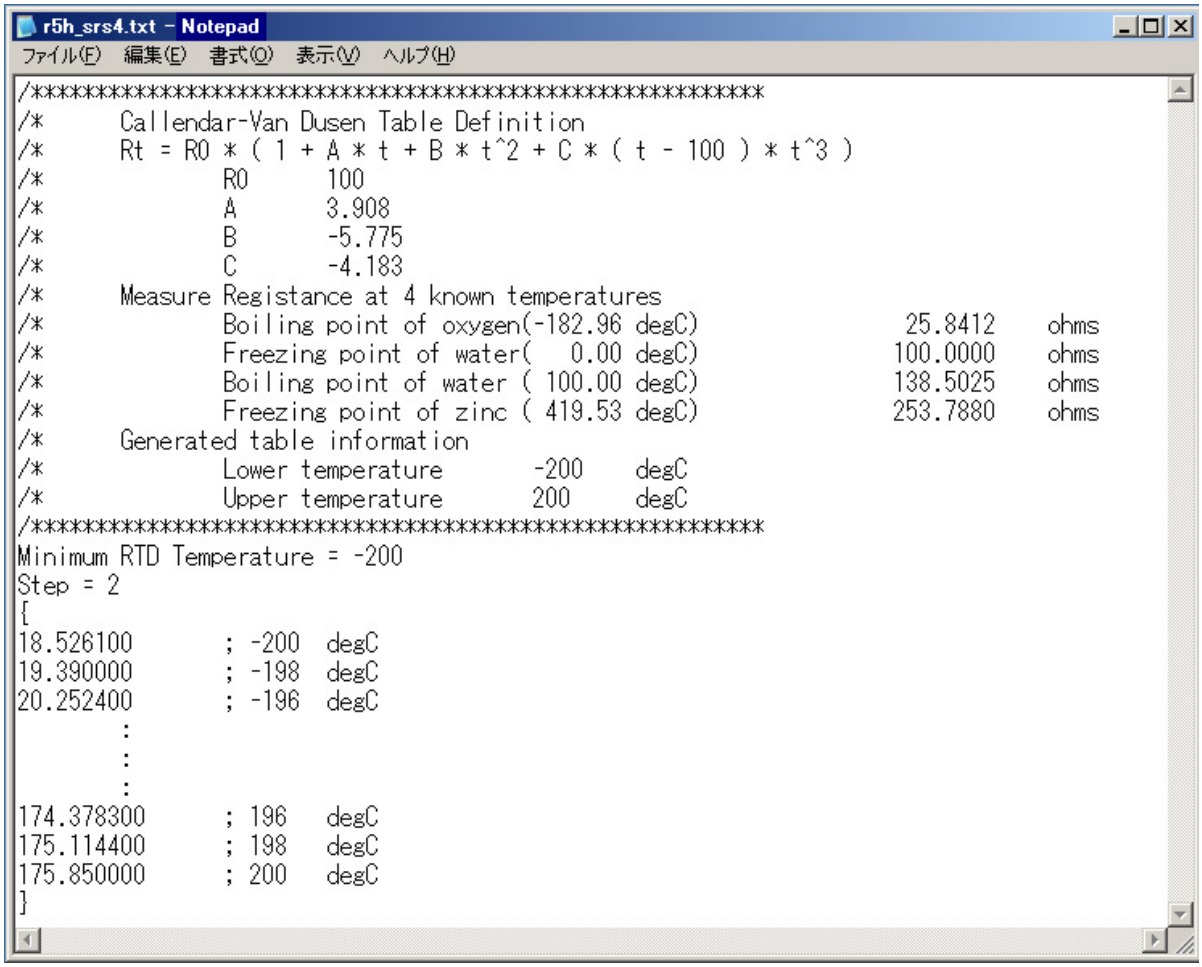


Figure 10. Calibration table example

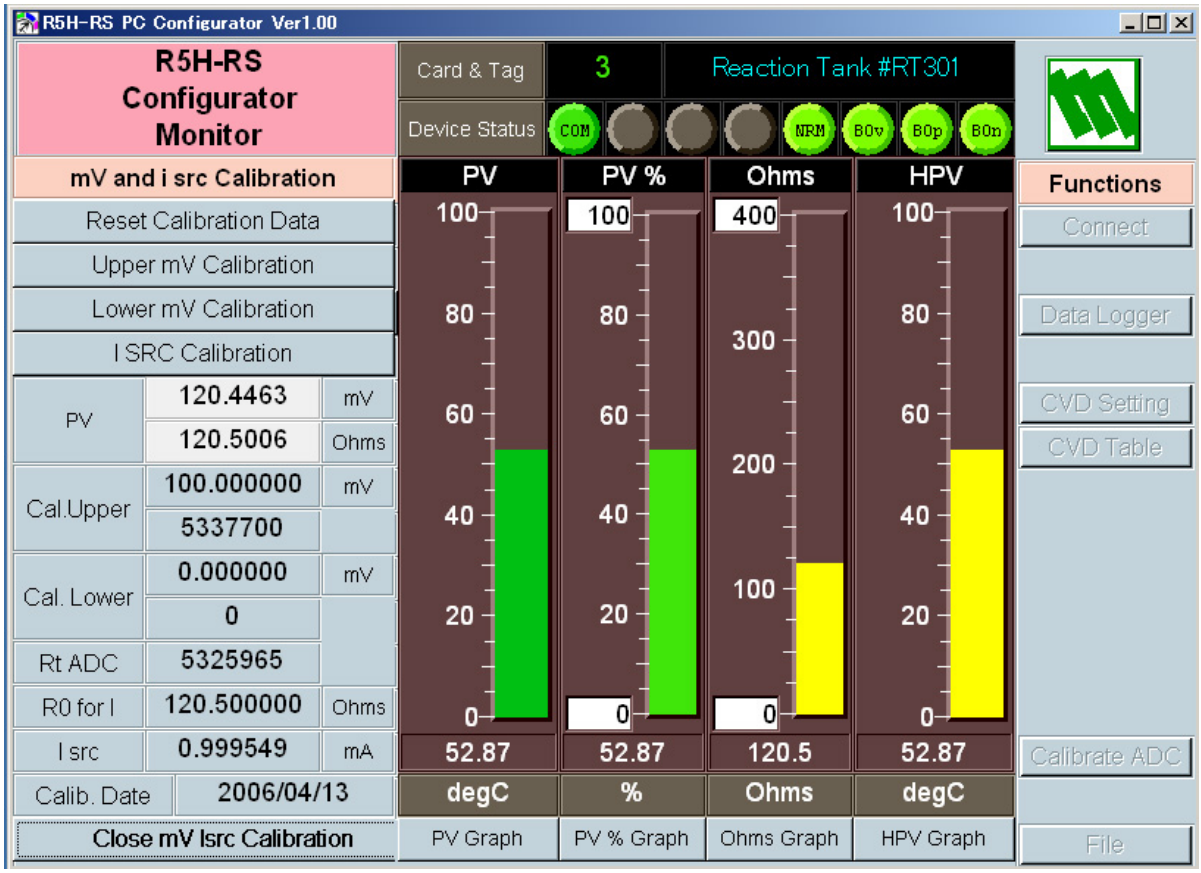


2.6 ADC CALIBRATION

The input ADC can be calibrated with proper instruments: high accuracy, high input impedance DC voltmeter and two sets of resistor of good temperature characteristics. One of the resistor must be calibrated as reference.

Click [Calibrate ADC] button to open the mV and i src Calibration view as shown in Figure 11.

Figure 11. mV and i src Calibration



[Reset Calibration Data] Resets all calibration data to the system's default values.

[Upper mV Calibration] Calibrates the upper range input value to the ADC. Connect a resistor for the temperature close to the upper limit and enter mV value measured with the DC voltmeter.

[Lower mV Calibration] Calibrates the lower range input value to the ADC. Connect a resistor for the temperature lower than the lower limit and enter mV value measured with the DC voltmeter.

[I SRC Calibration] Calibrates the excitation current to the RTD probe. Connect a reference resistor and enter its resistance value.

[PV] Shows the presently measured voltage and resistance values.

[Cal. Upper] Shows the ADC's upper calibration value. mV value and ADC at the moment of the calibration.

[Cal. Lower] Shows the ADC's lower calibration value. mV value and ADC at the moment of the calibration.

[Rt ADC] Shows the ADC value across the reference resistor for temperature compensation.

[R0 for I] Shows the resistance value entered for I SRC Calibration.

[I src] Shows the calibrated excitation current value.

[Cali. Date] Shows the calibration date. Updated if one or more values are updated.

[Close mV Isrc Calibration] Quits the view.

2.6.1 ADC Procedure

The following example is applied to model R5H-RS1A1S.

(1) The following instruments are required:
- High accuracy DC voltmeter (used in high impedance mode exceeding 10 GΩ)
- Resistor of good temperature coefficient characteristics, 150 Ω for upper range calibration
- Resistor of good temperature coefficient characteristics, 100 Ω for lower range calibration, calibrated resistance value: 100.087 Ω.

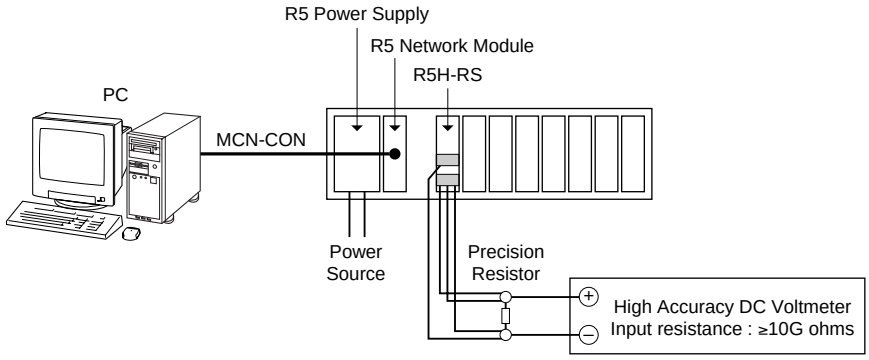
(2) Turn on the power supply and wait for 10 minutes for warming up.

(3) Connect 100 Ω resistor and click [Lower mV Calibration]. Wait until the voltmeter shows a stable value, and enter the value on the screen.

(4) Connect 150 Ω resistor and click [Upper mV Calibration]. Wait until the voltmeter shows a stable value, and enter the value on the screen.

(5) Connect 100 Ω resistor and click [I SRC Calibration]. Wait until the PV shows a stable value, and enter 100.087 Ω on the screen.

(6) If you want to store the calibration data as a file, use File Management functions. Click [File] > [Upload] > [All Copy <<] > [Write File]. For more information, refer to Section 2.7.



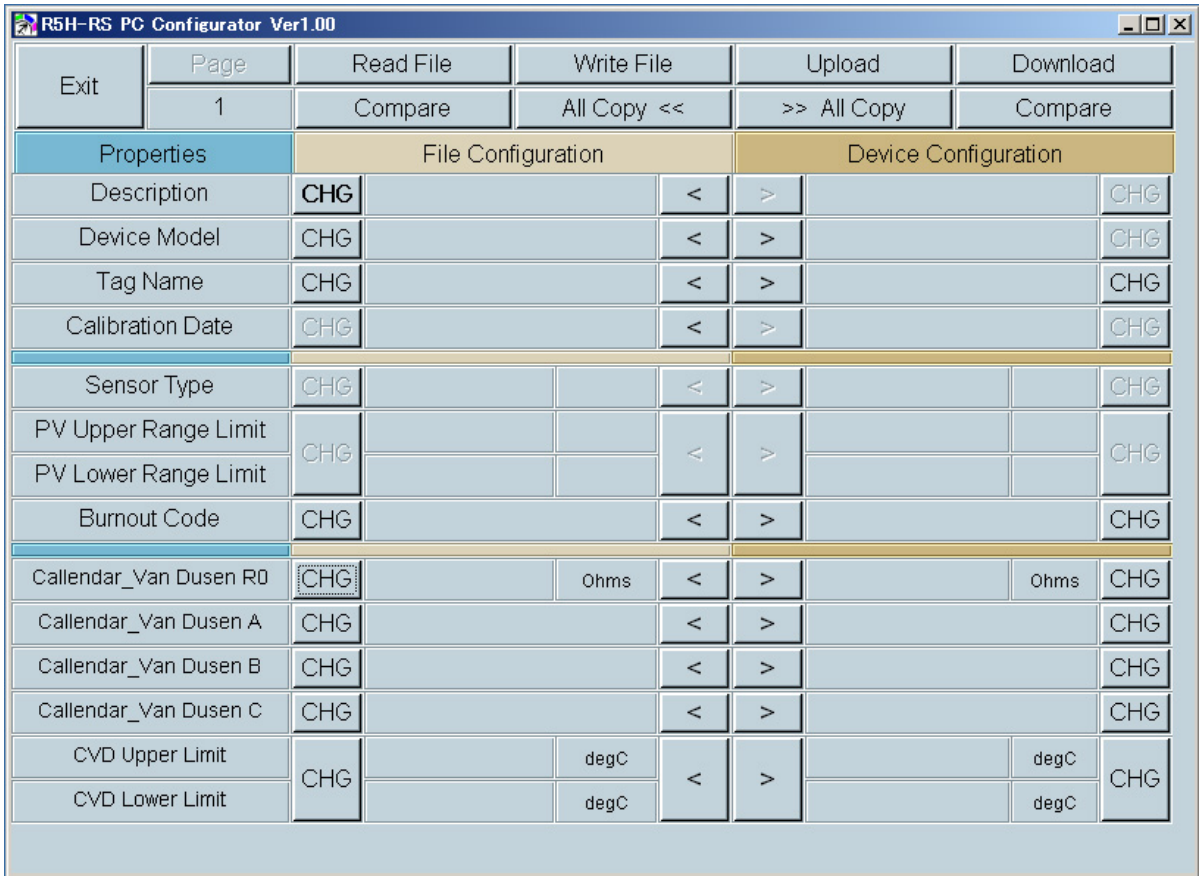
ADC Calibration Connection Example

2.7 FILE MANAGEMENT

The R5H-RS's configurations can be saved in a file and then read out to be downloaded to multiple modules.
Click [File] button to open the File Management view as shown in Figure 12.
While this view is active, the device connection is severed, therefore the R5H-RS module can be connected and disconnected freely except during Upload or Download operations.
The view is separated in two areas: 'File Configuration' and 'Device Configuration.' 'File Configuration' shows data transfer (Read or Write) between the PC Configurator and the PC, while 'Device Configuration' shows data transfer (Upload or Download) between the configurator and the R5H-RS module.
Click [Exit] to complete the file management operations. The device will remain disconnected and must be 'Connected' to start monitoring.

Note:
The validity of the selected range values is not verified in this view. Please make sure to set them according to the described specifications.

Figure 12. File



2.7.1 TRANSFERRING DATA TO/FROM DEVICE

Click [Upload] button to connect to the R5H-RS module, to read out its configuration data and to show it in 'Device Configuration' area on the screen (Figure 13). All background colors are back to the initial state.

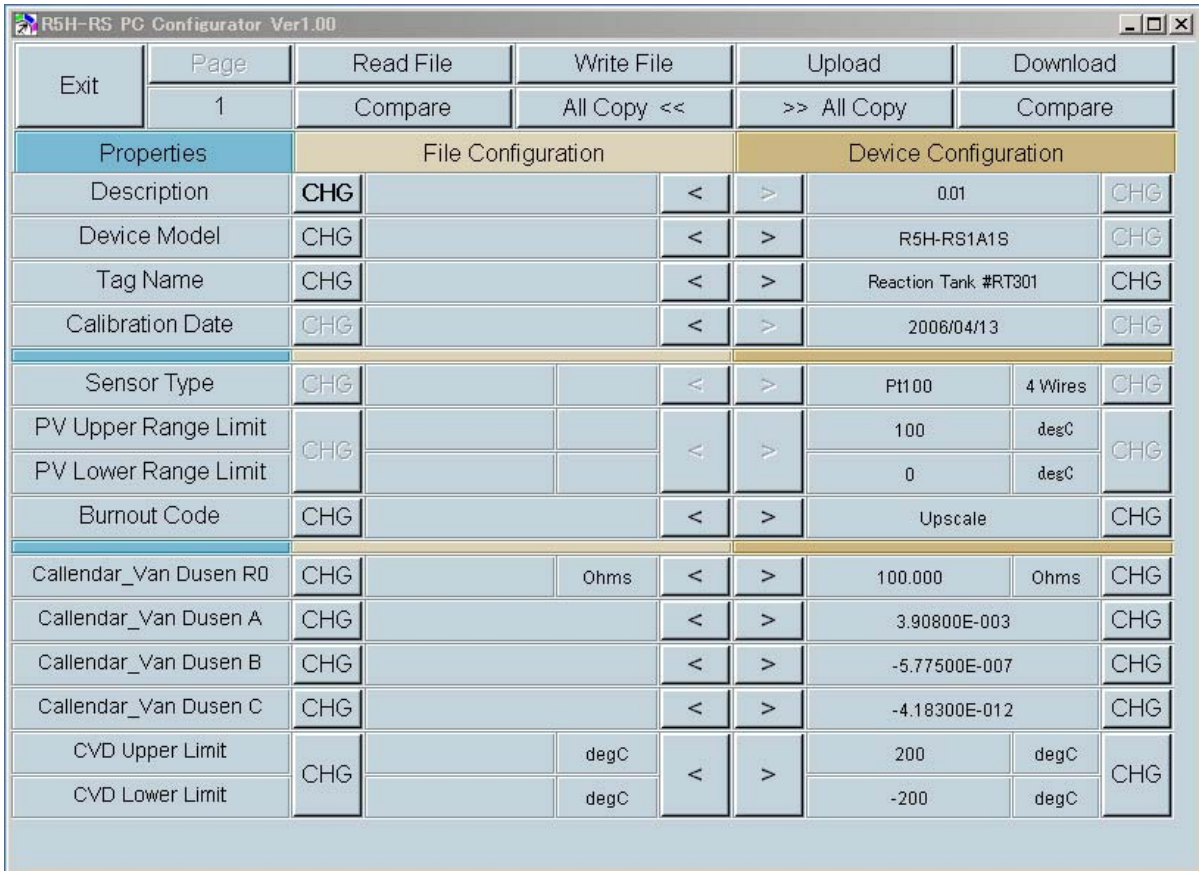
'Description' indicates the serial number of the product, which cannot be modified or copied from 'File Configuration' area.

Click [Download] button to connect and write the configuration data in 'Device Configuration' area to the R5H-RS module.

If an error occurs and downloading is stopped during the process, erred data field is highlighted in med pale red background color.

When the downloading is successfully complete, the configuration data is automatically uploaded and the background color returns to the initial state.

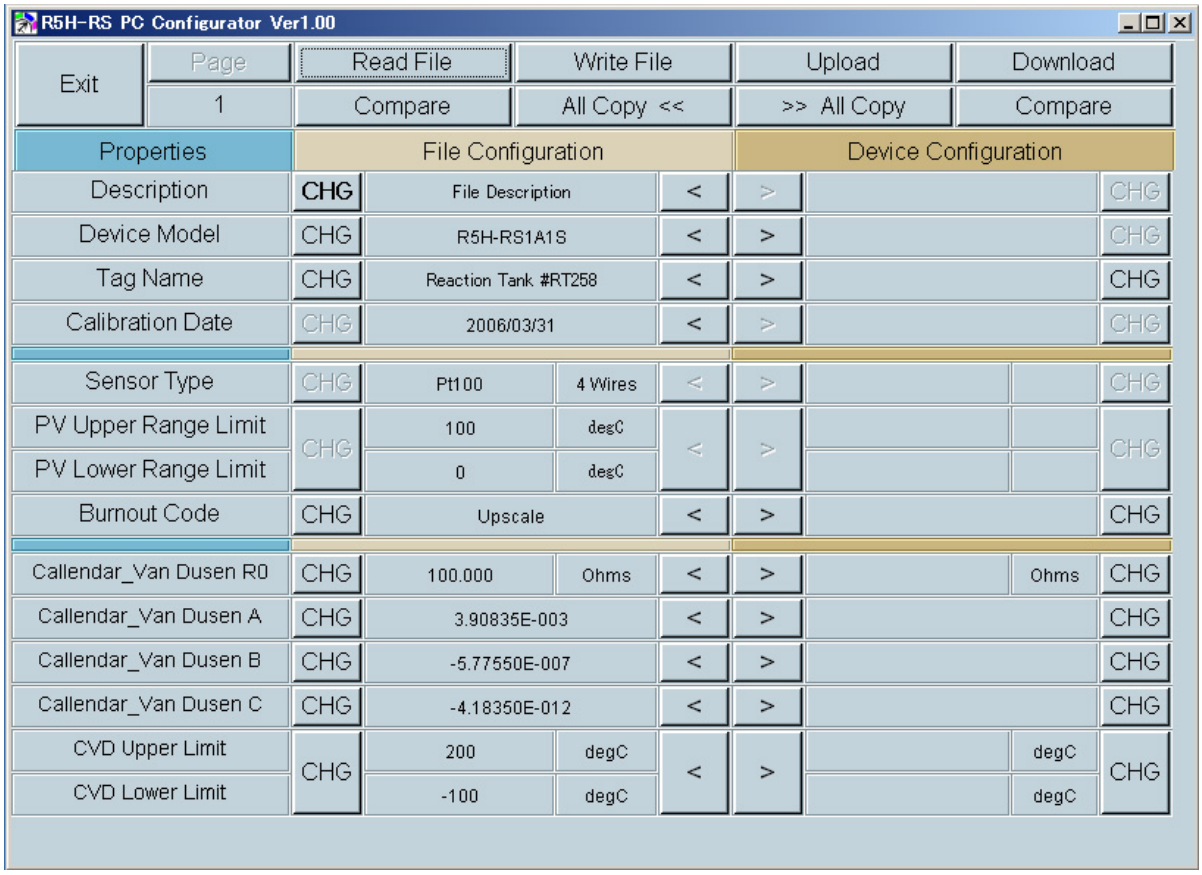
Figure 13. Data Uploaded



2.7.2 READING/WRITING FILES

Click [Read File] button to read the configuration data from a specified file and to show it in 'File Configuration' area on the screen (Figure 14). All background colors are back to the initial state.
Click [Write File] button to write the configuration data in 'File Configuration' area to a specified file.
You can write down some reference to the specific information in 'Description' field.

Figure 14. File Read Out



2.7.3 MODIFYING PARAMETERS

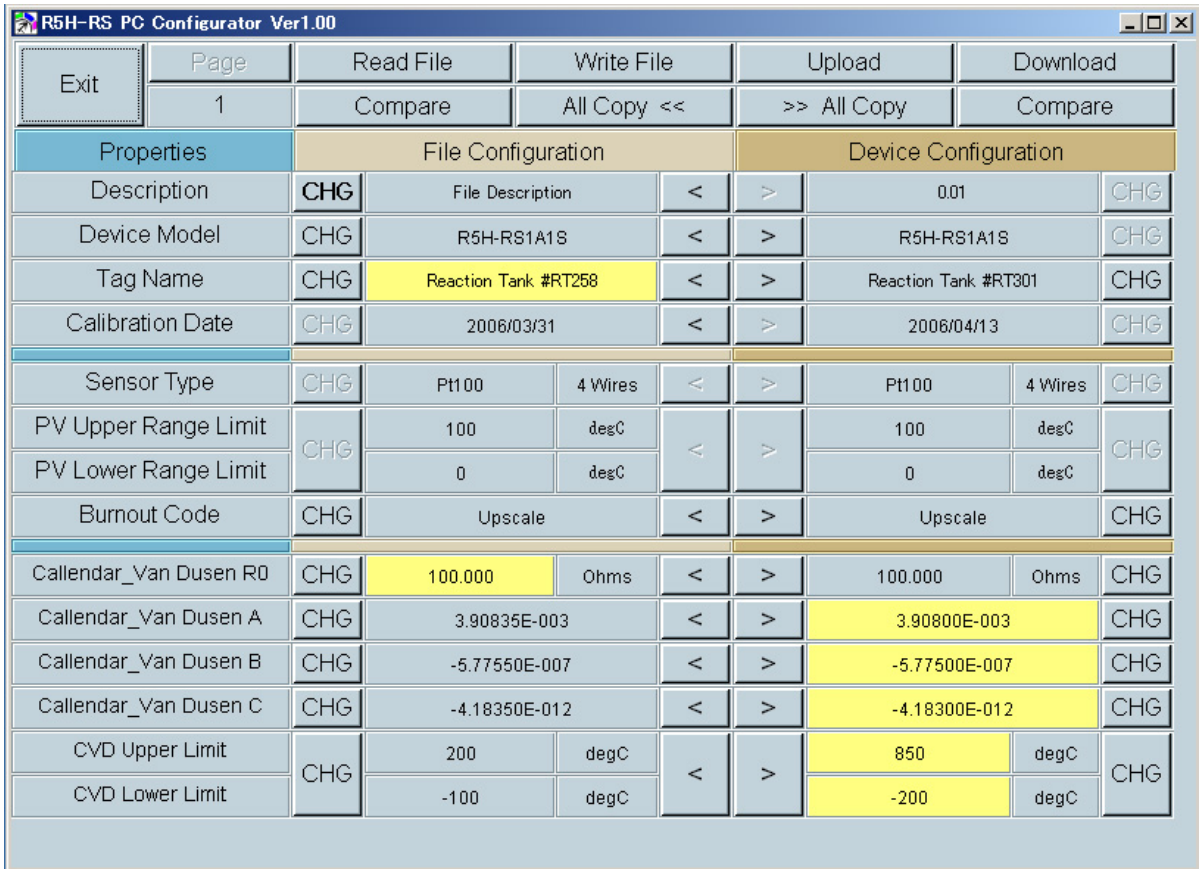
Click [CHG] button at the left of each field to modify the parameter. The field in which the parameter has been changed will be highlighted in light yellow background color. [CHG] buttons placed across multiple fields indicate that these parameters can be modified in single sequence.

When one parameter has been changed, related fields are also affected. For example, when 'Sensor Type' is modified, 'Sensor Unit' and 'PV Range' may be automatically changed.

Parameters can be copied between 'File Configuration' and 'Device Configuration' using [<] and [>] buttons. Copied fields will be highlighted in light yellow background color.

Using [All Copy <<] or [All Copy >>] buttons enables transferring all parameters between the areas. Copied fields will be highlighted in light yellow background color.

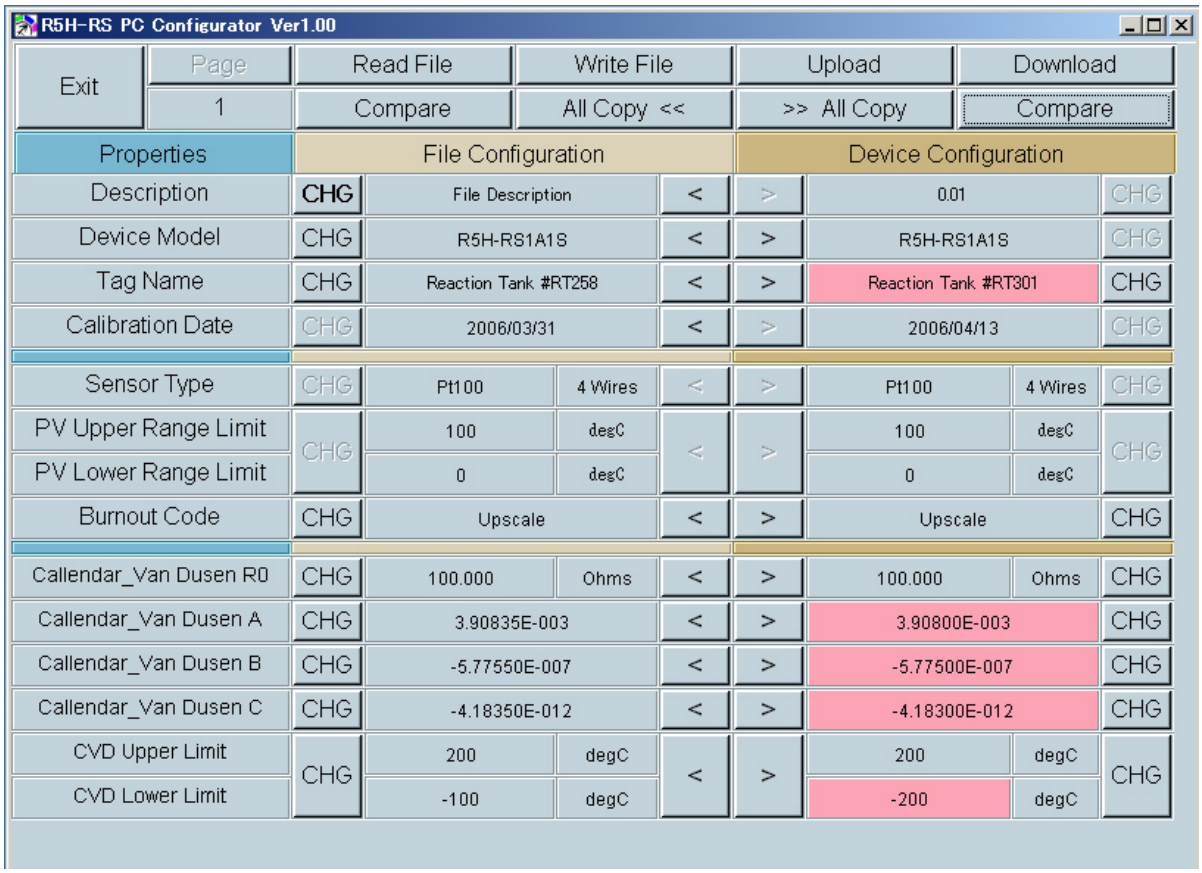
Figure 15. Parameters Modified



2.7.4 COMPARING FILE TO DEVICE

You can compare the configuration data in 'File Configuration' area and 'Device Configuration' area.
Click [Compare] button in 'Device Configuration' area to compare its data to those in 'File Configuration' area. Deviations will be highlighted in med pale red background color.
Click [Compare] button in 'File Configuration' area to compare its data to those in 'Device Configuration' area. Deviations will be highlighted in med pale red background color.
[Description] field is not compared.

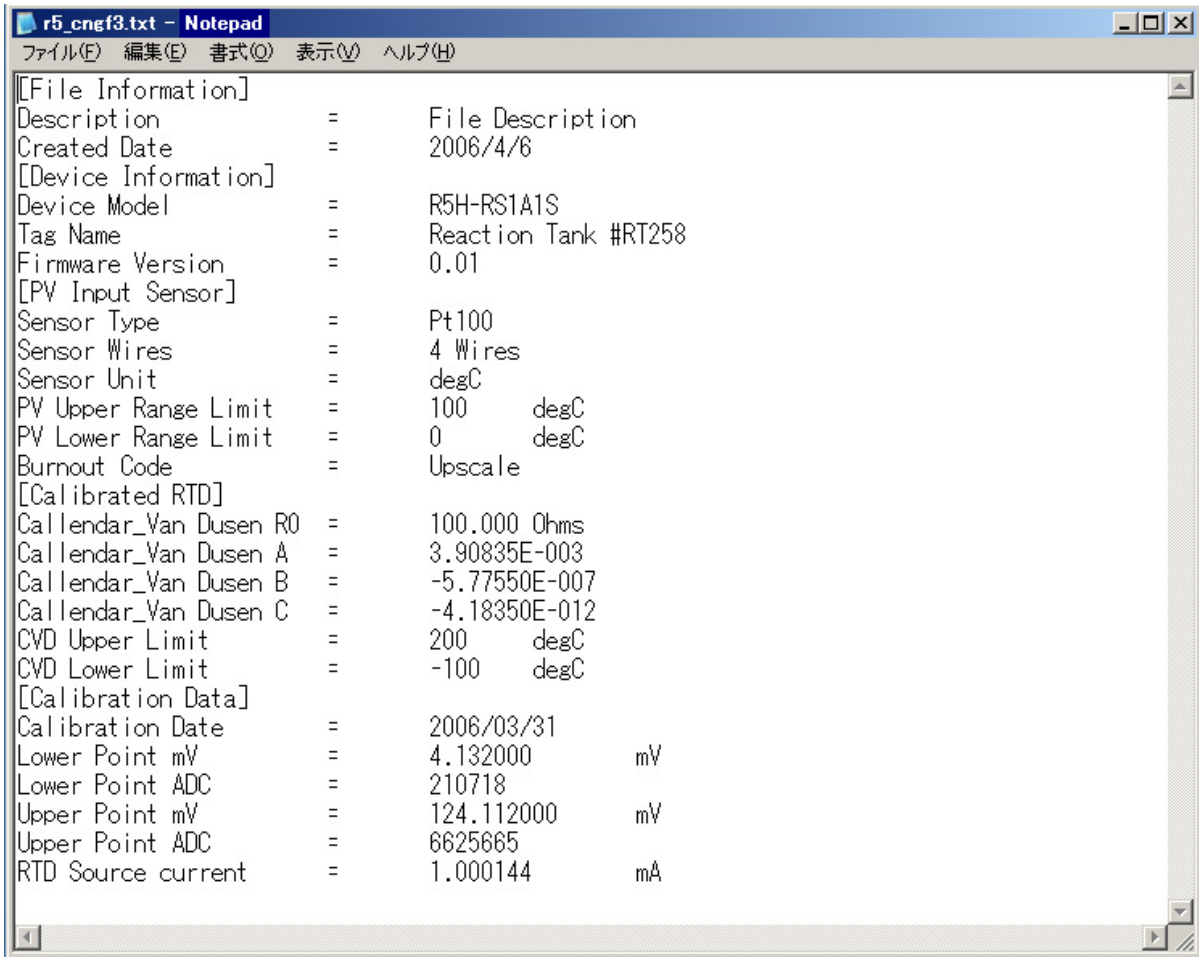
Figure 16. Parameters Compared



2.7.5 CONFIGURATION DATA STORED IN A FILE

Stored configuration contents are shown in Figure 17. Calibration data is also included in the file but it is not used to write in the device, nor it is used for 'Compare.'

Figure 17. Parameters Stored in a File



2.8 TROUBLESHOOTING

2.8.1 COM PORT CONFIGURATION

COM Port No. 1 through 4 are selectable with the R5HRSCFG.

Even when the device is connected to the assigned COM port, the R5HRSCFG may still fail in establishing device connection due to 'Configuration Error' during the start up or the Connect procedure. In most cases, it is because the Windows system is not recognizing the COM port, or the COM port is not assigned to match the Agilent IO Control program.

Especially when an USB port is used, the latter case often occurs due to the USB's dynamic COM port assigning. The device must be operational when the COM port is assigned. Once it is set correctly, the setting is stored.

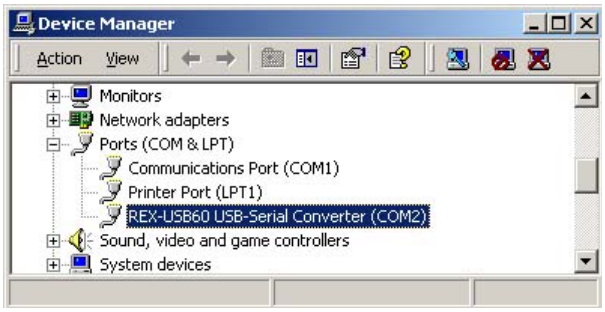
Hardware and software configurations must be correct to each other in order to communicate, especially in the case of USB.

If the communication is not established, confirm the right configuration by the following procedures:

[Example] Connecting the R5H-RS module to COM Port 2 using an USB-Serial Converter.

(1) Install the USB-Serial Converter and confirm the right configuration using Device Manager. In the example below, the hardware is connected correctly to COM Port 2.

Figure 18-1. Device Manager



(2) Start the program Agilent IO Libraries – IO Config tool (Figure 18-2). Figure 18-3 shows IO Config window.

Figure 18-2. Starting IO Config Tool

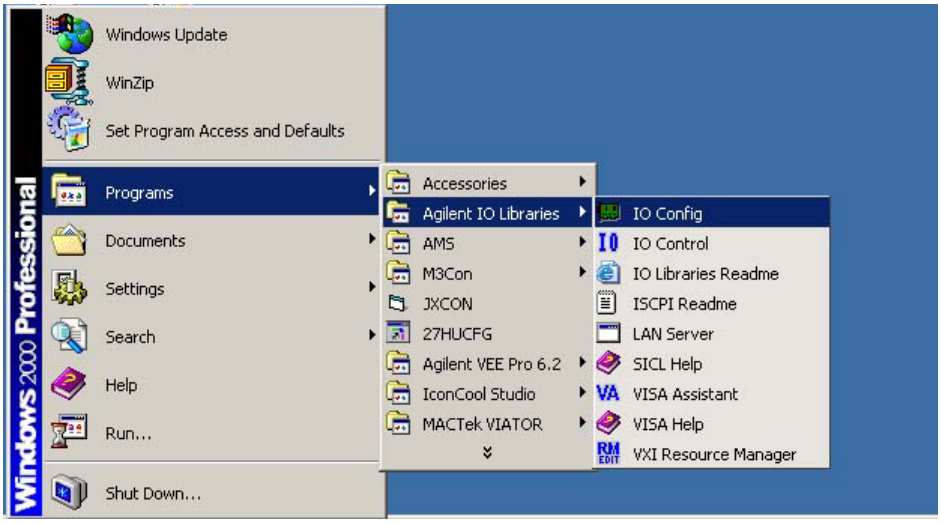
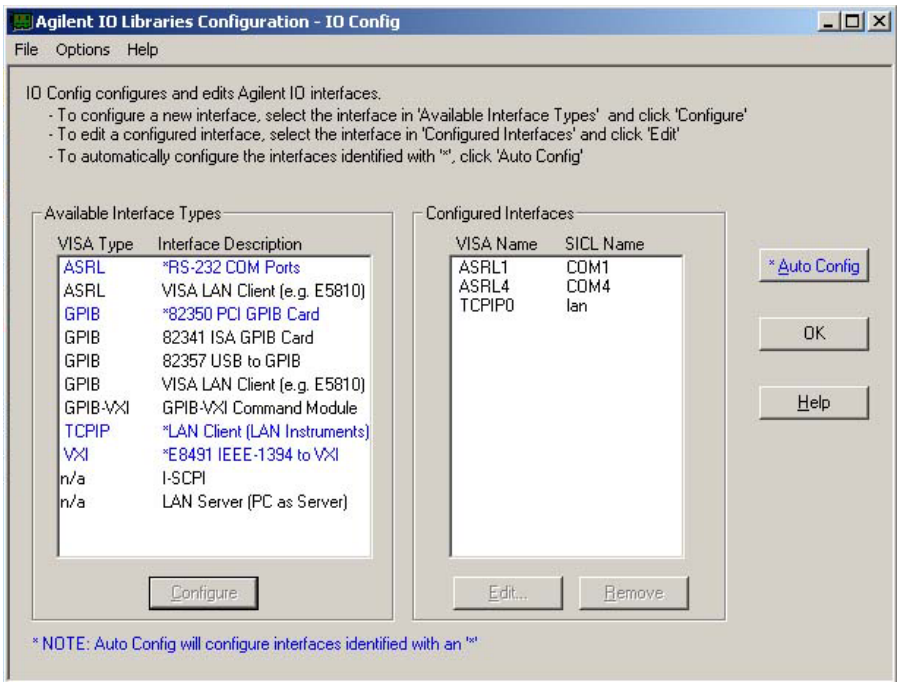
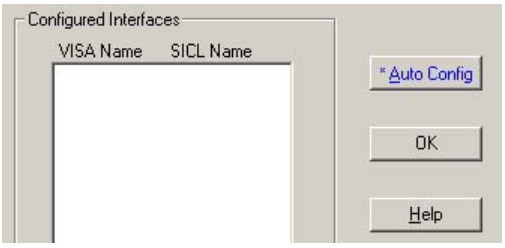


Figure 18-3. IO Config Window



(3) Select all COM devices (COMx under SICL Name) in Configured Interfaces field and remove them. Configured Interfaces field is now blank (Figure 18-4).

Figure 18-4. Configured Interfaces (removed)



(4) Click [Auto Config] button. Currently available COM devices are configured automatically. Figure 18-5 shows COM1 and COM2 under Configured Interfaces, available for use. Then the R5H-RS module is connectable to the COM Port 2 via the USB-Serial Converter.

Figure 18-5. IO Config Window after Reconfiguration