Model B3HU2 Universal Transmitter

PC CONFIGURATOR SOFTWARE

Model: B3HU2CFG

Users Manual

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1. INSTALLING THE B3HU2CFG

1.1. PC REQUIREMENTS

The following PC performance is required for adequate operation of the B3HU2CFG.

PC	IBM PC compatible
OS	Windows 7 (32-bit / 64-bit) Windows 8.1 (32-bit / 64-bit) Windows 10 (32-bit / 64-bit) The software may not operate adequately in certain conditions.
CPU	Must meet the relevant Windows' requirements.
Memory	Must meet the relevant Windows' requirements.
Network port	COM port (RS-232-C) or USB port

One of the dedicated cables as listed below is also required to connect the device to the PC.

Port	PC Configurator Cable Model No.
RS-232-C	HART Modem Cable
USB	COP-HU

1.2. INSTALLING & DELETING THE PROGRAM

INSTALL

The program is provided as compressed archive delivered by M-System. Decompress the archive and execute 'setup.exe' to start up the B3HU2CFG installer program. Follow instructions on the Windows.

DELETE

Open Control Panel > Add/Remove Program. Select the B3HU2CFG from the program list and click Delete button.

1.3. STARTING UP THE B3HU2CFG

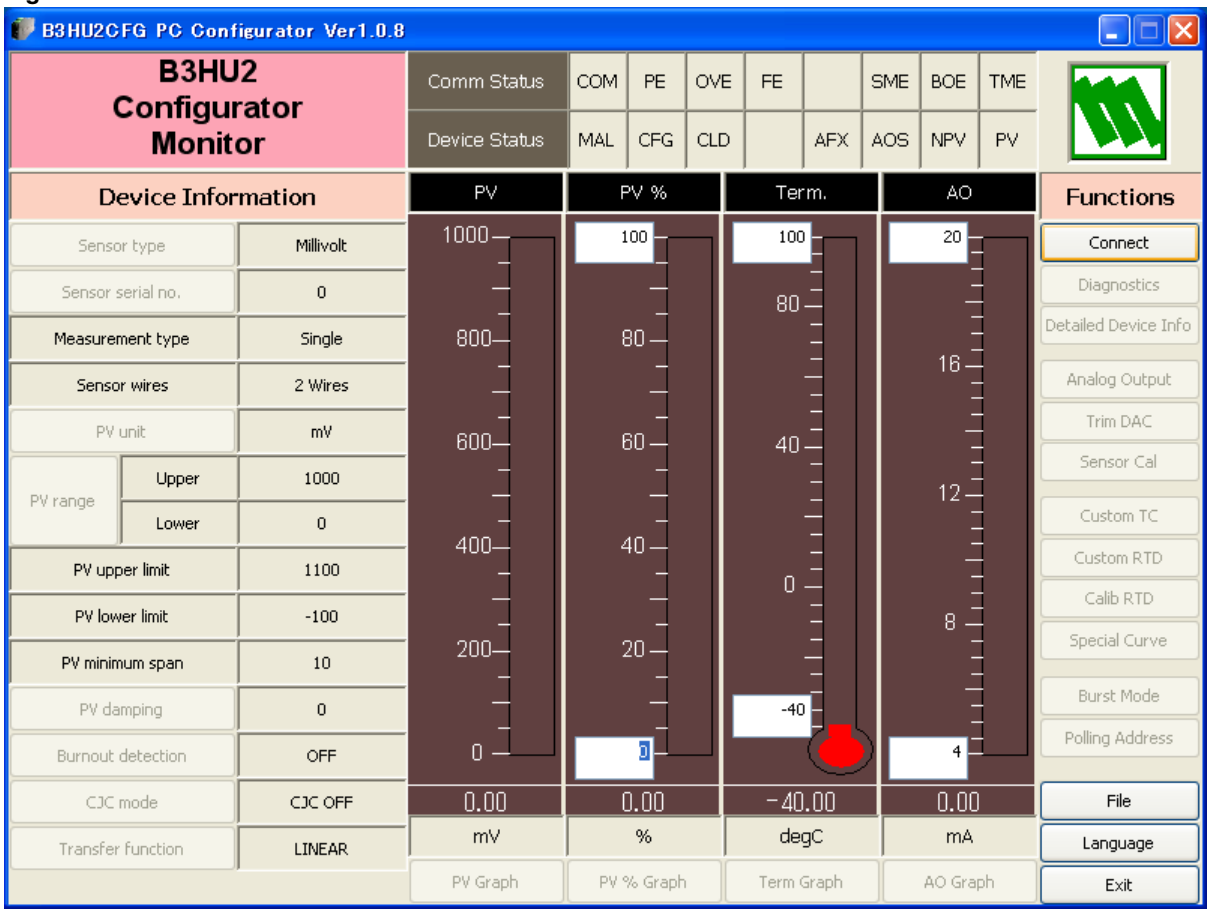
Open Program > M-SYSTEM > Configurator > B3HU2CFG to start up the B3HU2CFG. In order to use this program, the B3HU2 must be connected via a HART modem.

2. OPERATING THE B3HU2CFG PC CONFIGURATOR

Figure 1 shows the initial view of the B3HU2CFG PC Configurator window.

In order to enable the tools shown on the screen, the model B3HU2 Universal Temperature Transmitter must be connected to the PC via a HART modem.

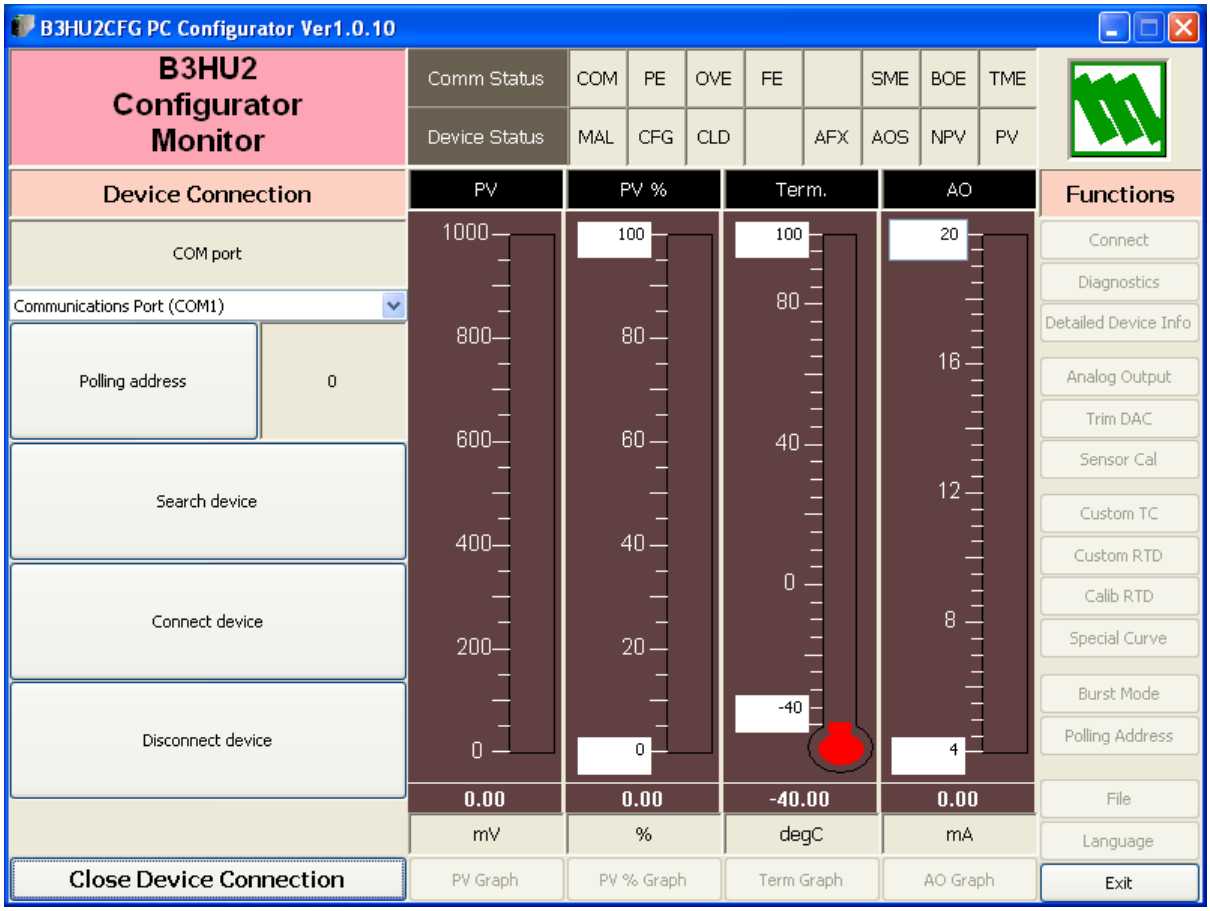
Figure 1. Initial View



2.1 CONNECTING THE DEVICE (B3HU2)

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

Figure 2. Device Connection

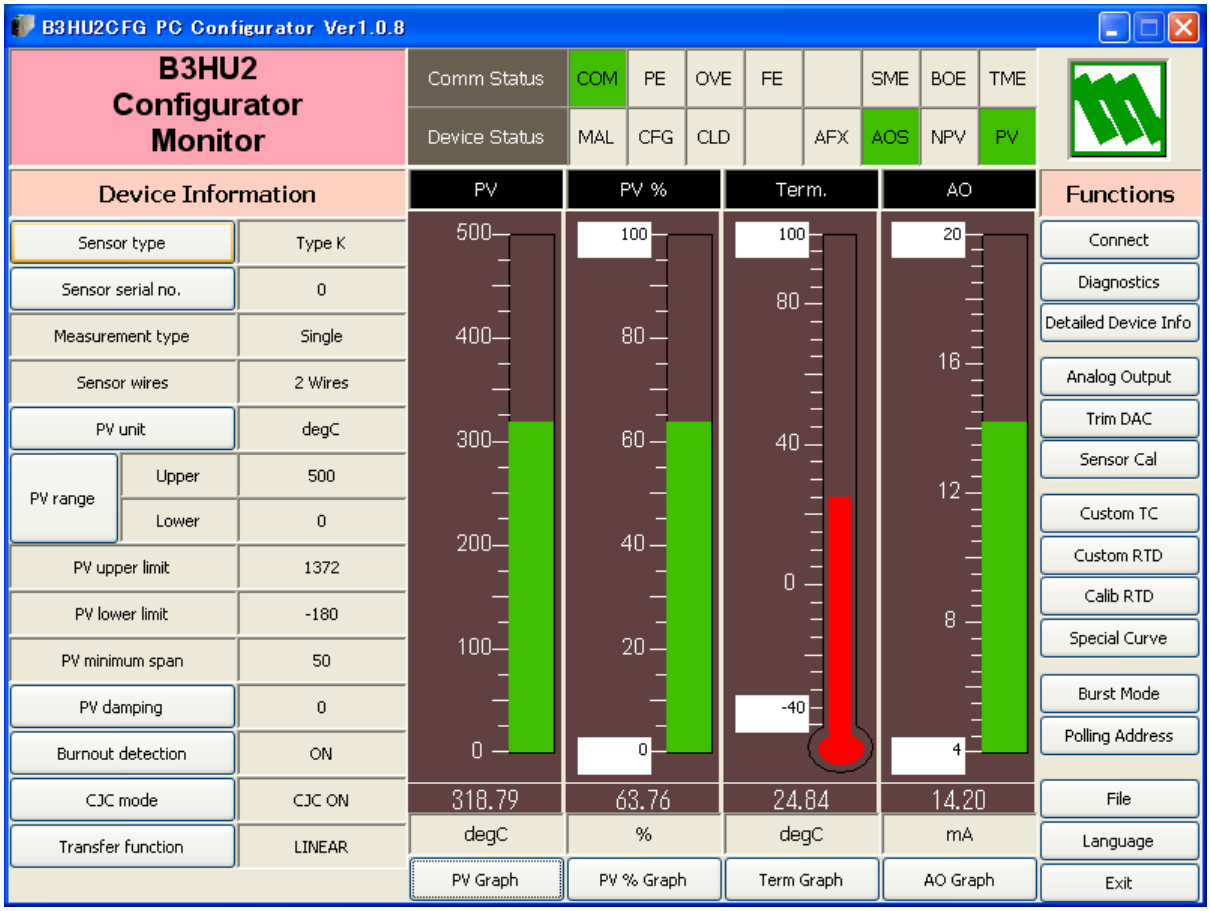


[Polling address]	Specify the polling address of the device to be connected.
[Search device]	Searches the connected devices among the ones whose polling address is already set.
[Connect device]	Connects the device of which polling address is specified in the Device Address. Once the connection is established, the program uploads the device's configuration information and automatically calls up the Device Information view. The Device Information view is the base for various operations to configure the B3HU2.
[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 Device Information menu and the trend monitors appears on the screen. The user can configure various parameters of the B3HU2.

Figure 3. Device Information



2.2.1 Communication Status

[Comm Status] summarizes the current communications status by lamps showing the communication status byte contents in the HART commands.

[COM] lamp	Blinks with the normal communications condition.
[PE] lamp	Red light turns on when the device detects Parity Error.
[OVE] lamp	Red light turns on when the device detects Overrun Error.
[FE] lamp	Red light turns on when the device detects Framing Error.
[SME] lamp	Red light turns on when the device detects Sum Check Error.
[BOE] lamp	Red light turns on when the device detects Buffer Over Flow Error.
[TME] lamp	Red light turns on when the device detects the communications time out.

2.2.2 Device Status

[Device Status] summarizes the current device status by lamps showing the device status byte contents in the HART commands.

[MAL] lamp	Red light turns on when malfunction(s) occur(s) in the device.
[CFG] lamp	Red light turns on when the device configuration is modified. This lamp can be turned off by [Reset configuration change flag] in the Diagnostics view.
[CLD] lamp	Always off.
[AFX] lamp	Red light turns on when the analog output entered in Fixed Output mode.
[AOS] lamp	Green light turns on when the analog output is diagnosed to be normal. Red light turns on when the output is saturated upscale or downscale.
[NPV] lamp	Always off.
[PV] lamp	Green light turns on when the sensor input is in the specified range. Red light turns on when it is out of the range.

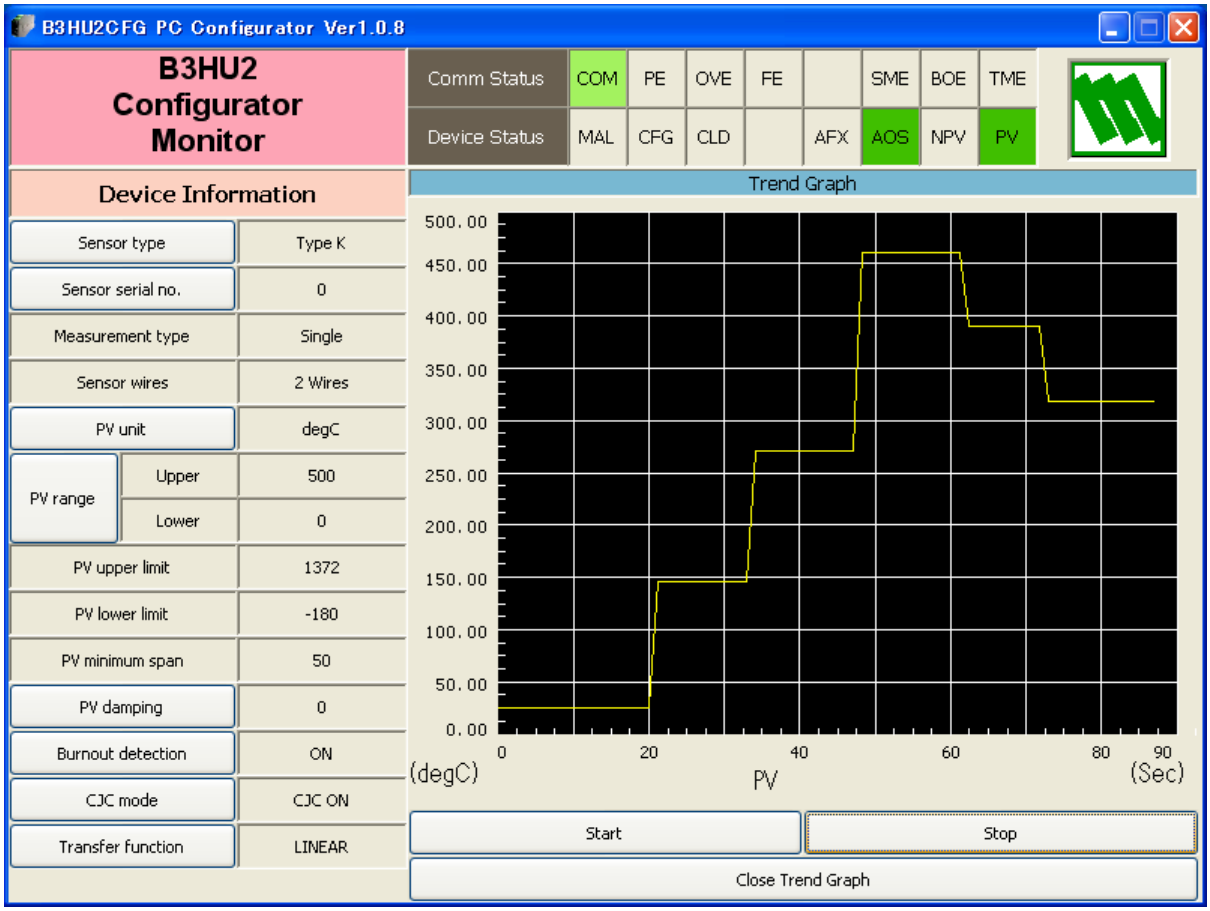
2.2.3 Bargraph & Trend Graph

Four bargraphs indicating PV in engineering unit, PV in % of the selected range, the terminal temperature and analog output current are available.

The graph scales can be modified except for the PV in engineering unit of which the scales are 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 [Term Graph]. Use [Start] and [Stop] buttons to activate/deactivate trending, and click [Close Trend Graph] button to quit the graph view.

Figure 4. Trend Graph



2.3 DEVICE CONFIGURATION

In Figure 3, the Device Information menu on the left shows the basic configuration information of the connected device. When you need to change configurations, click the left button for the required item to modify the setting.

[Sensor type] Specifies the sensor type and number of extension wires. When a new sensor type is chosen, other default settings are automatically selected.

[Sensor serial no.] Specifies a serial number for the sensor.

[PV unit] Specifies the engineering unit for the PV. When this setting is changed, other related items such as [PV range], Upper/Lower Limits, PV Minimum Span are automatically shown in the new unit.

[Burnout detection] Enables/disables the burnout function.

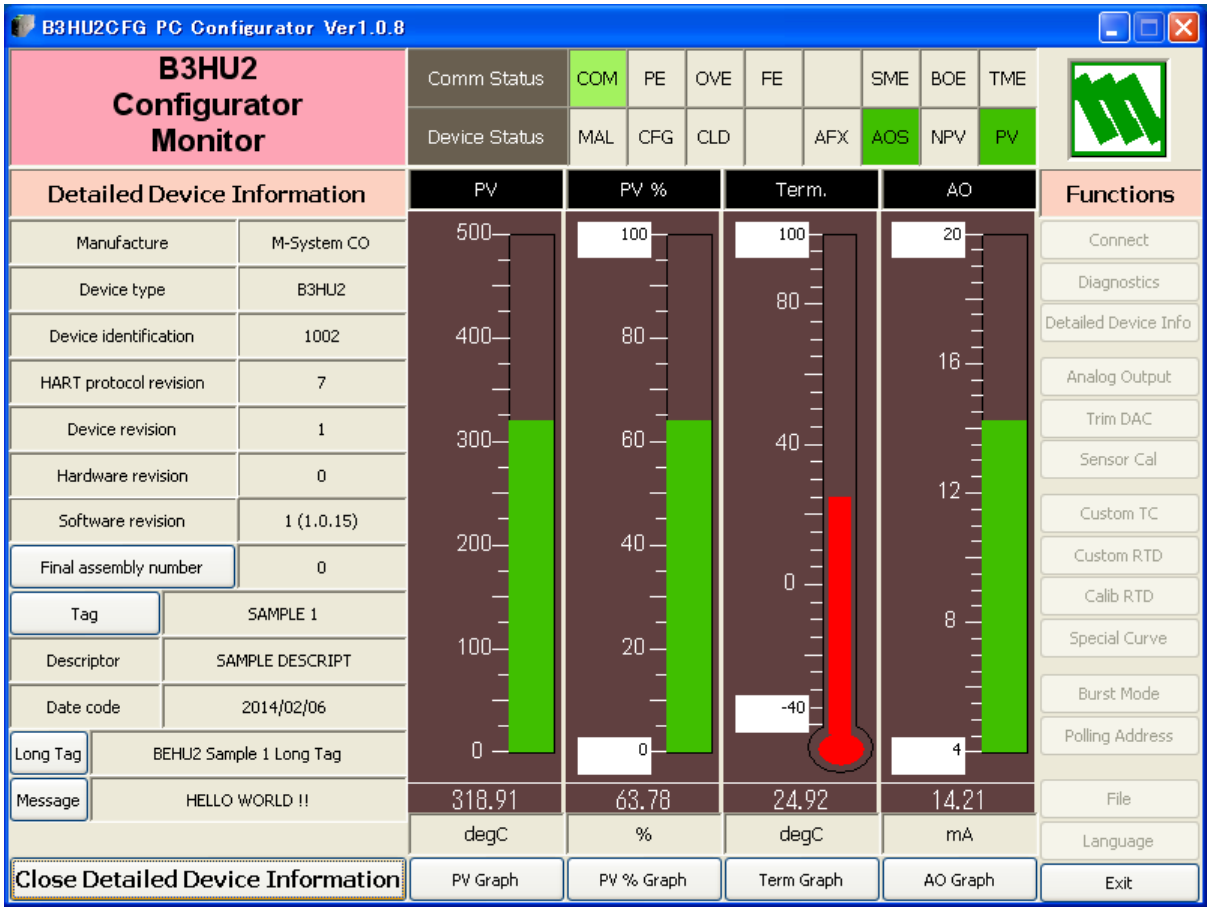
[CJC mode] Enables/disables the cold junction compensation for thermocouple input. When the sensor type is not a thermocouple, this function is not available

[Transfer Function] Enables/disables the Transfer Function, specifying either the output should be linear to the input signal or linearized to a custom curve data.
Selecting this function without a pre-defined Special_Curve is defined as Error.

2.4 DEVICE DETAIL INFORMATION

In Figure 3, clicking [Detailed Device Info] button opens the [Detailed Device Information] menu as shown in Figure 5.

Figure 5. Detailed Device Information



The menu shows the following items: Manufacturer, Device type, Device identification, HART protocol revision, Device revision, Hardware revision, Software revision, Final assembly number, Tag, Descriptor, Date code, Long Tag and Message.

[Tag] You can enter a tag name and descriptor name. Date is automatically set at the data modified date.

[Long Tag] You can set a long tag.

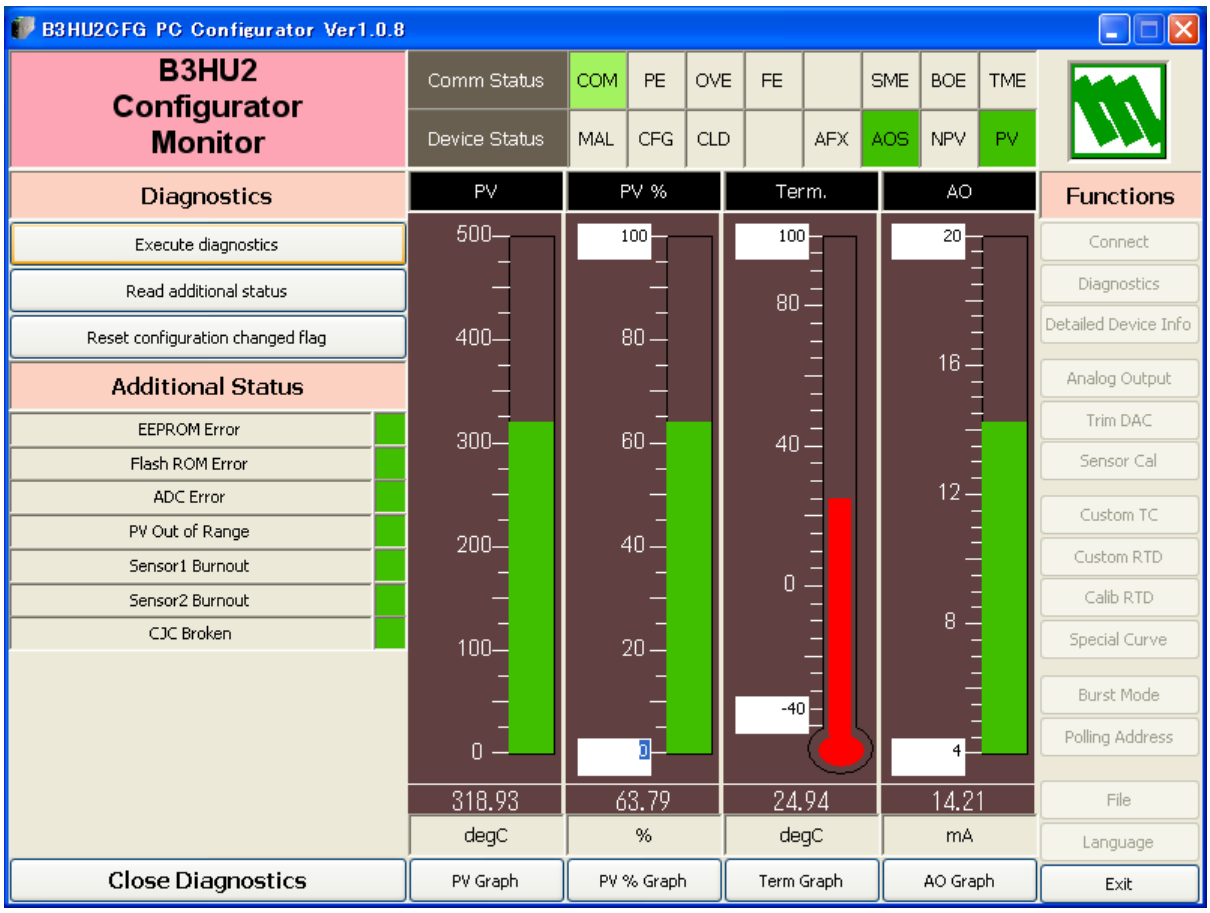
[Message] You can enter a memo in this area.

[Close Detailed Device Information] Quits the view.

2.5 DIAGNOSTICS

Click [Diagnostics] button to open the Diagnostics view as shown in Figure 6.

Figure 6. Diagnostics



[Execute diagnostics] Activates the diagnostics program and the results are displayed under the Additional Status.
The Additional Status section shows each Additional Status item and its status: green in normal status, while red in error.

[Read additional status] Calls up the current contents of Additional Status.

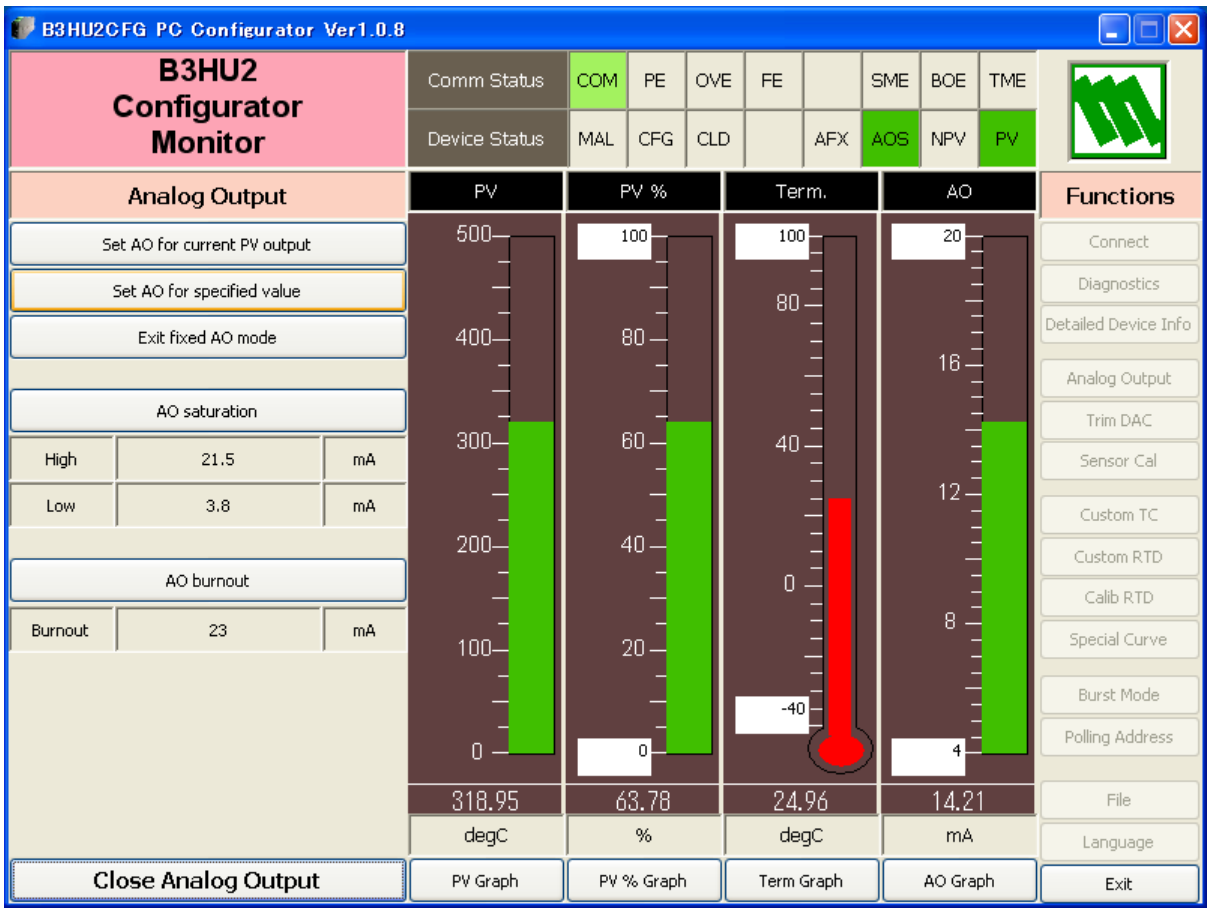
[Reset configuration changed flag] Turns off the CFG lamp in Device Status.

[Close Diagnostics] Quits the view.

2.6 FIXED ANALOG OUTPUT

Click [Analog Output] button to open the Analog Output view as shown in Figure 7.

Figure 7. Analog Output



[Set AO for current PV output] The output current is held at the current value.

[Set AO for specified value] You can set a specific value to fix the output.

[Exit fixed AO mode] Cancel the fixed output mode to return the device into normal output mode. It is recommended to fix the analog output signal while those parameters affecting the output signal are configured, and then to reset the device to normal mode after the setting is done.

[AO saturation] Sets the limit of analog output proportional to the PV.

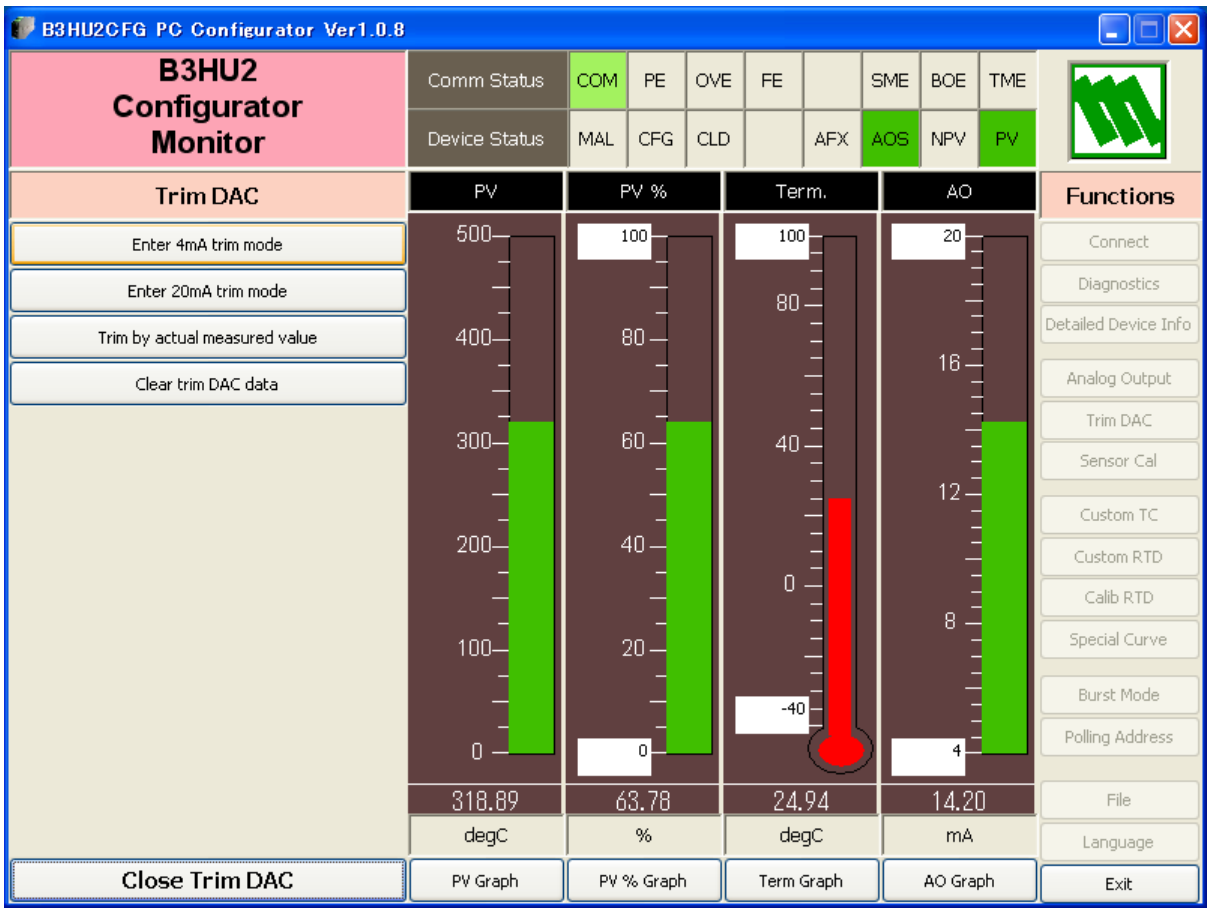
[AO burnout] Sets the analog output value at burnout.

[Close Analog Output] Quits the view.

2.7 DAC TRIMMING

Click [Trim DAC] button to open the Trim DAC view as shown in Figure 8.

Figure 8. Trim DAC



2.7.1 Enter 4mA Trim Mode

(1) Click [Enter 4mA trim mode] button. The device outputs a fixed 4mA signal.

(2) Measure the actual output current at the receiving instrument to which the device output should be matched.

(3) Click [Trim by actual measured value] button to set the measured value. The actual value can be set from 3.8mA up to 4.2mA.

(4) Repeat setting [Trim by actual measured value] until the measured output shows 4mA.

2.7.2 Enter 20mA Trim Mode

(1) Click [Enter 20mA trim mode] button. The device outputs a fixed 20mA signal.

(2) Measure the actual output current at the receiving instrument to which the device output should be matched.

(3) Click [Trim by actual measured value] button to set the measured value. The actual value can be set from 19.8mA up to 20.2mA.

(4) Repeat setting [Trim by actual measured value] until the measured output shows 20mA.

2.7.3 Resetting to the Default

Click [Clear trim DAC data] button to return the device to the factory default trimming values.

[Close Trim DAC] button quits the view.

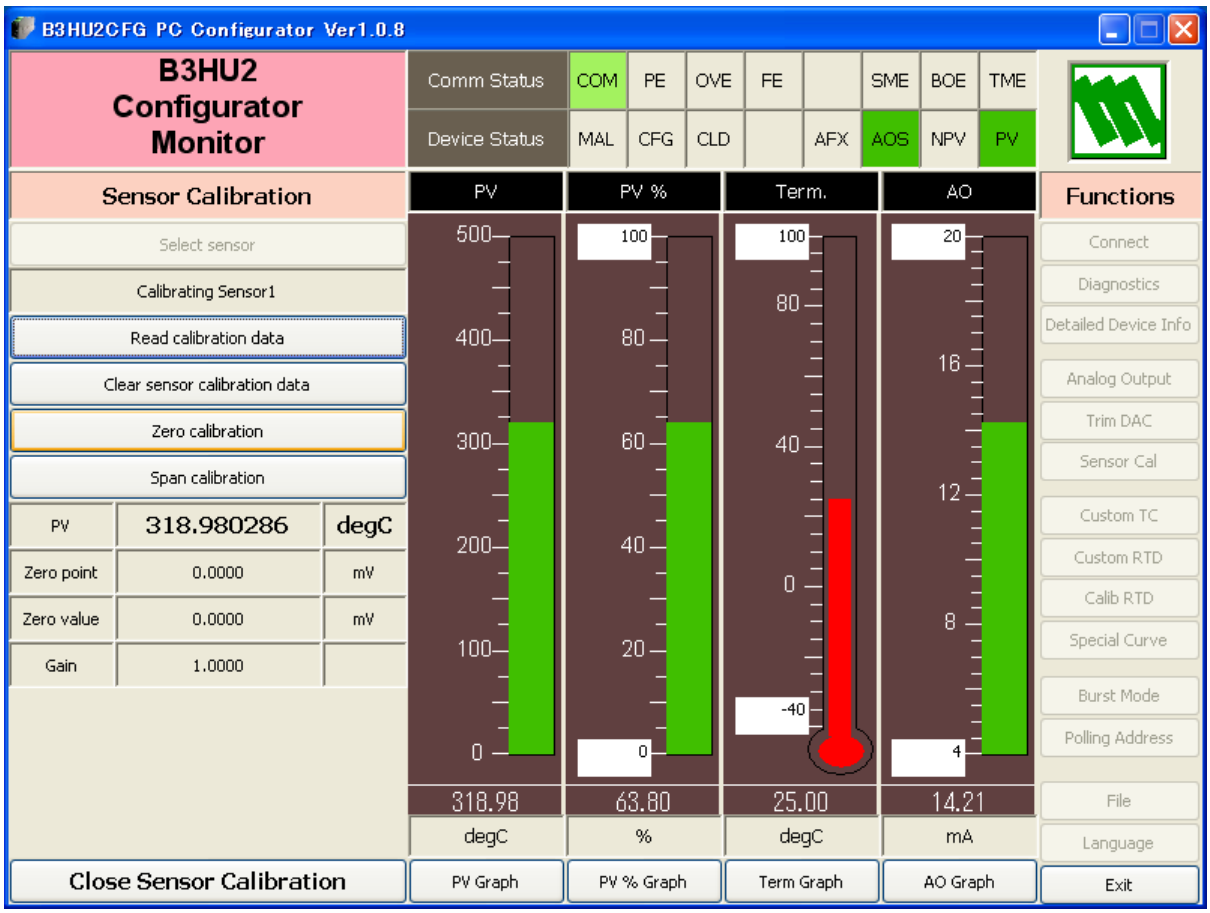
2.8 SENSOR CALIBRATION

The input sensor can be calibrated.

Calibration points can be specified to any point within the measuring range. The mV and thermocouple inputs are calibrated against the measured voltage; while the resistance and RTD input is against the measured resistance. Errors caused by extension wire resistance for 2-wire RTDs and by imbalance in that for 3-wire RTDs can be calibrated by the Zero adjustment.

Click [Sensor Cal] button to open the Sensor Calibration view as shown in Figure 9.

Figure 9. Sensor Calibration



The present measured value is indicated in [PV]. Refer to this value when calibrating the sensor. It takes approx. 5 seconds for the calibration result affects the measured value on the display.

Apply the zero calibration point input signal and click [Zero calibration] button to open the field where you can enter the target value. The result is shown in the PV display field. The data before calibration is shown in the Zero point field, while the data after calibration is shown in the Zero value field.

Apply the span calibration point input signal and click [Span calibration] button to open the field where you can enter the target value. The result is shown in the PV display field. The gain between the zero point and the span point is shown in the Gain field.

[Read calibration data] calls up and display the present calibrated Zero point, Zero value and Gain.

Click [Clear Sensor Calibration Data] button to return the device to the factory default status.

2.9 CUSTOM TC

The B3HU2 supports the user-specific thermocouple table function. In order to use a user-specific table, the data in text format must be defined and registered.

The file format is as following.

Define the minimum temperature value in Celsius at Minimum TC Temperature (in °C, -300 to 5000, integer).

Specify the Temperature Steps used in the table (in °C, 1 to 50, integer).

Describe the characteristics data within { }. Data must be entered in mV. Up to 1000 points can be specified.

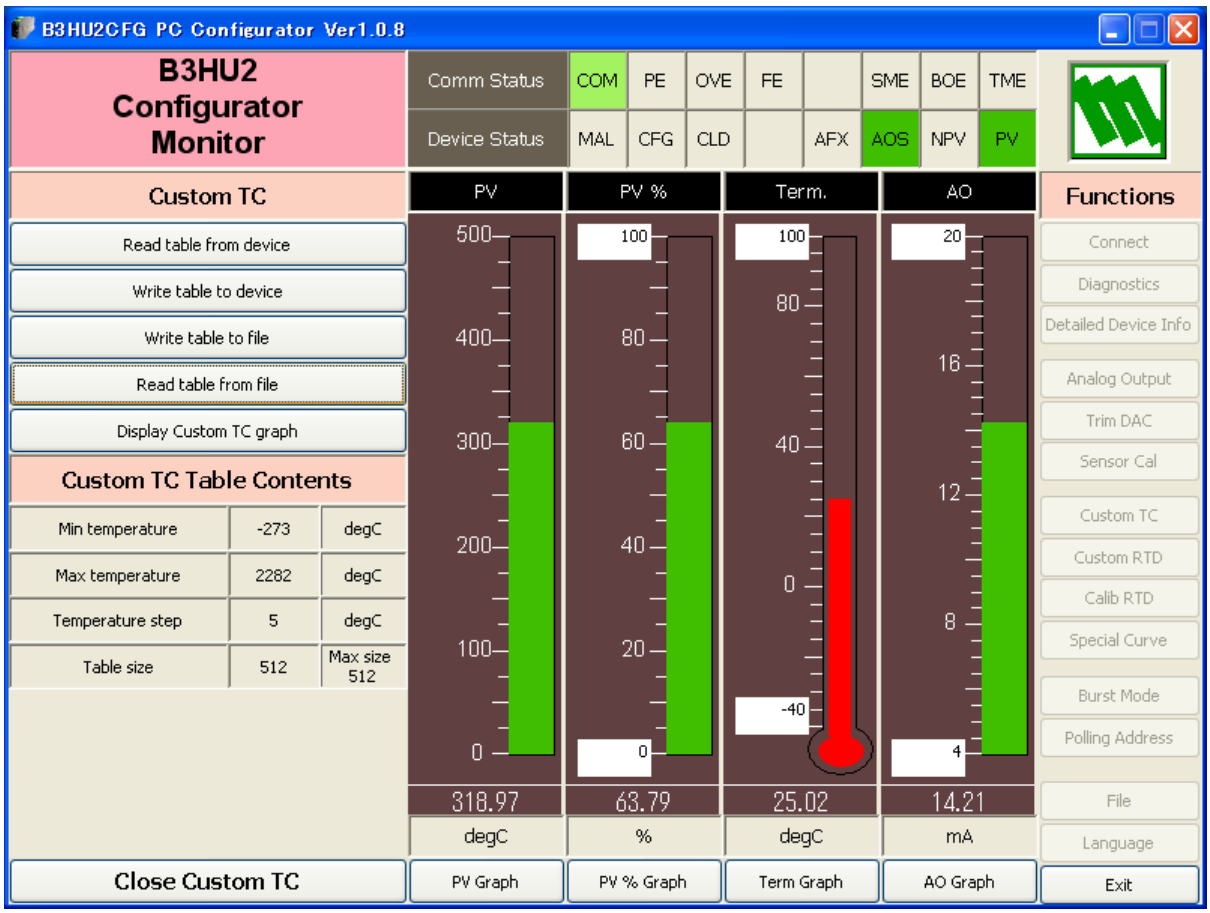
```
/*********************************************************
/*  Custom TC Table Definition
/*  Ti=f(Xi)   (0<=i<Size)
/*       Temperature Step (1 to 50 degC)
/*       -10<=X(i)<=100mV
/*       X(i)<X(i+1)
/*       2<=Size<=512
/*********************************************************
Minimum TC Temperature=0        <– Minimum temperature T0 (-300 to 5000°C, integer)
Step=5                          <– Temperature step (1 to 50°C, integer)
{
-8.2568                         <– Voltage value for T0 (-10 to 100mV, decimal point available)
 :
75.3333                         <– Voltage value for Tmax (-10 to 100mV, decimal point available)
}
```

Note: Each line must not be followed by characters such as space, etc.

Once the data file is ready, register the file on the B3HU2.

Click [Custom TC] button to open the Custom TC as shown in Figure 10.

Figure 10. Custom TC



[Read table from file] The program uploads a file stored in the PC. When uploaded, the file contents summery is indicated under Custom TC Table Contents. The I/O characteristic data longer than 1000 points are ignored.

[Display Custom TC graph] The I/O characteristics data can be shown in a graph.

[Write table to file] The program saves the currently displayed I/O characteristics data to a file.

[Write table to device] The program downloads the currently displayed I/O characteristics to the B3HU2. If 'TC Spec' has been already selected before this setting is done, you can not download a particular data file.

[Read table from device] The program uploads the I/O characteristics cable registered in the B3HU2. The values of 2 points are written as factory default.

[Close Custom TC] Quits the view.

2.10 CUSTOM RTD

The B3HU2 supports the user-specific RTD table function. In order to use a user-specific table, the data in text format must be defined and registered.

The file format is as following.

Define the minimum temperature value in Celsius at Minimum RTD Temperature (in °C, -300 to 5000, integer).

Specify the Temperature Step used in the table (in °C, 1 to 50, integer).

Describe the characteristics data within { }. Data must be entered in ohms (0 to 4000 ohms). Up to 512 points can be specified.

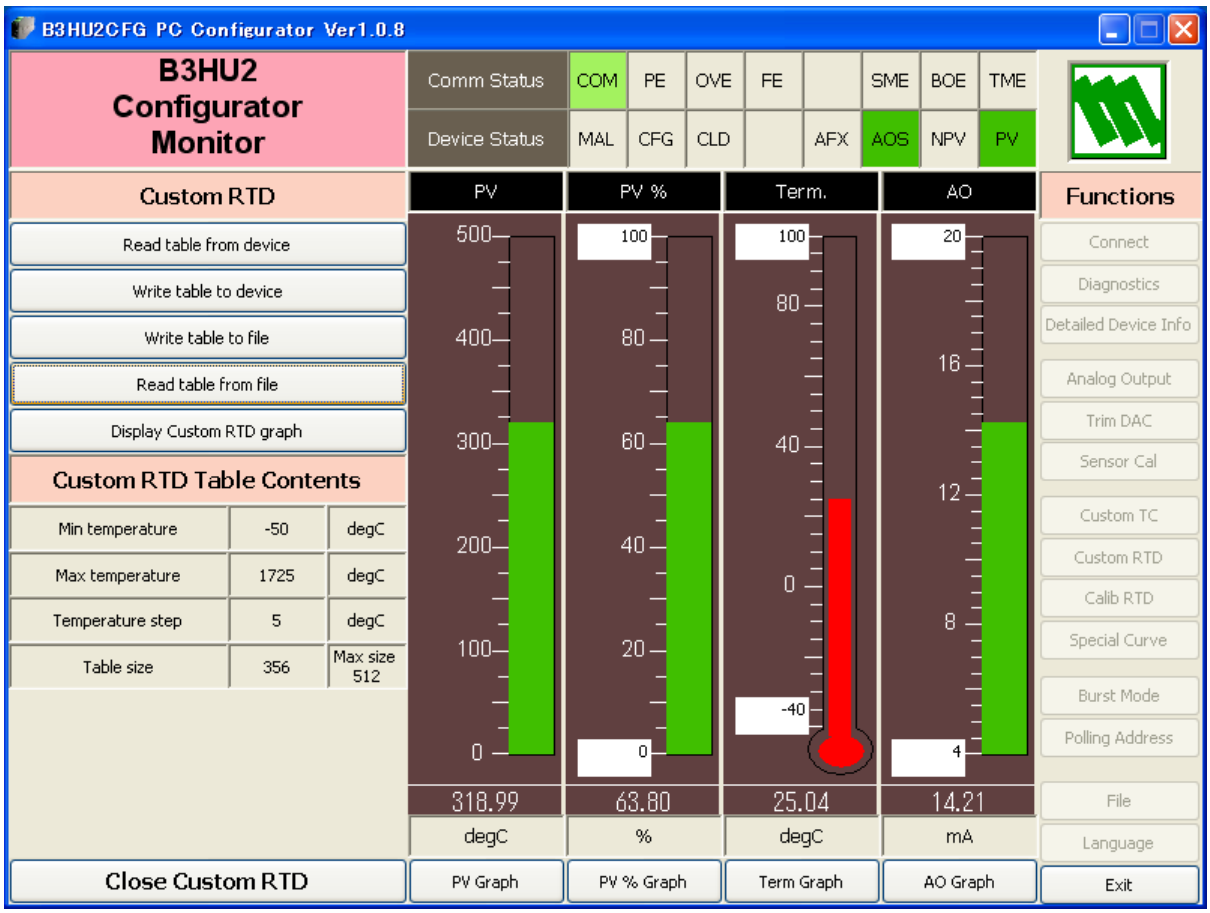
```
/*************************************************************
/*  Custom RTD Table Definition
/*  Ti=f(Xi)   (0<=i<Size)
/*       Temperature Step (1 to 50 degC)
/*       0<X(i)<=4000 Ohms
/*       X(i)<X(i+1)
/*       2<=Size<=512
/*************************************************************
Minimum RTD Temperature=-200   <– Minimum temperature T0 (-300 to 5000°C, integer)
Step=10                        <– Temperature step (°C)
{
12.3456                        <– Resistance value for T0 (0 to 4000 ohms, decimal point available)
 :
777.7777                       <– Resistance for Tmax (0 to 4000 ohms, decimal point available)
}
```

Note: Each line must not be followed by characters such as space, etc.

Once the data file is ready, register the file on the B3HU2.

Click [Custom RTD] button to open the Custom RTD as shown in Figure 11.

Figure 11. Custom RTD



[Read table from file] The program uploads a file stored in the PC. When uploaded, the file contents summery is indicated under Custom RTD table Contents. The I/O characteristic data longer than 500 points are ignored.

[Display Custom RTD graph] The I/O characteristics data can be shown in a graph.

[Write table to file] The program saves the currently displayed I/O characteristics data to a file.

[Write table to device] The program downloads the currently displayed I/O characteristics to the B3HU2. If 'RTD Spec' has been already selected before this setting is done, you can not download a particular data file.

[Read table from device] The program uploads the I/O characteristics cable registered in the B3HU2. The values of 2 points are written as factory default.

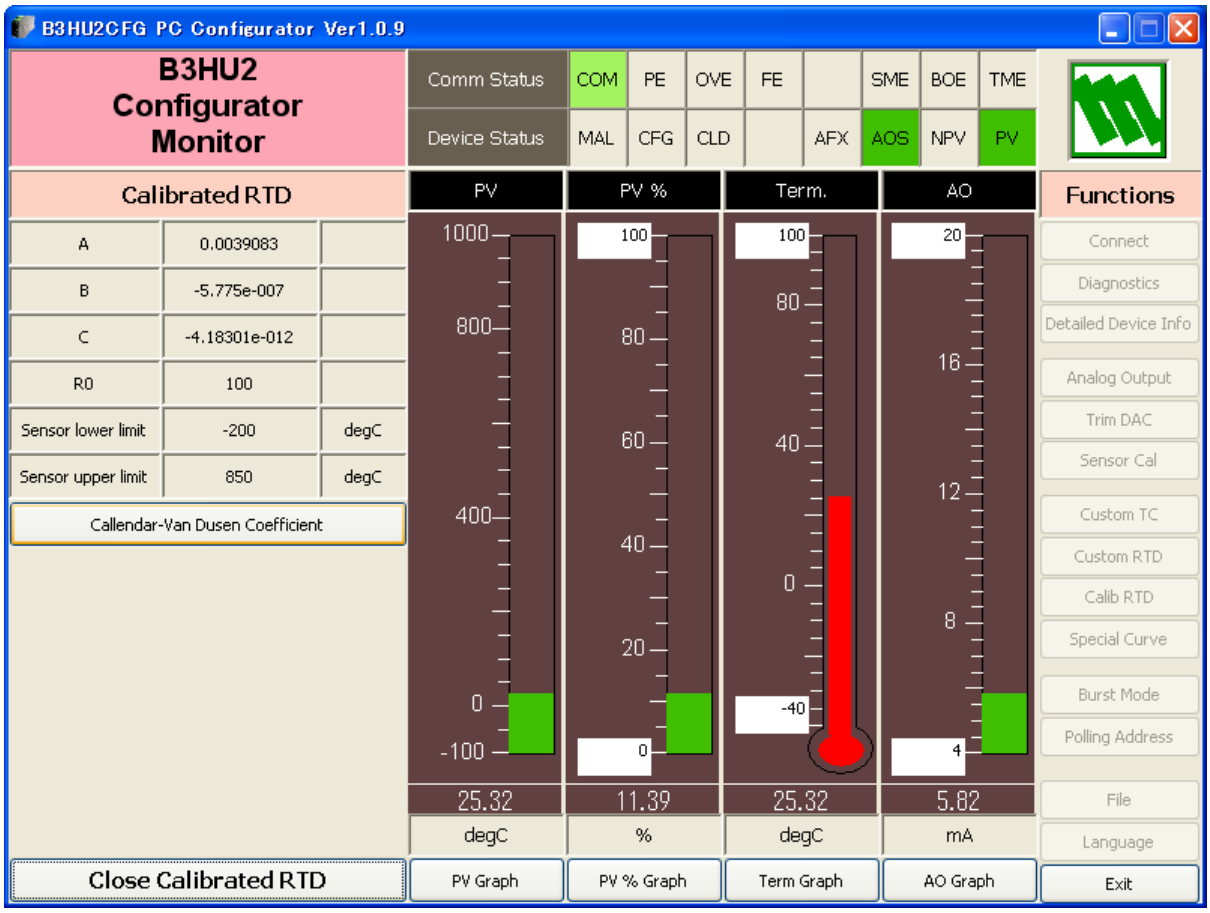
[Close Custom RTD] Quits the view.

2.11 CALIBRATED RTD SETTING

RTD table of B3HU2 can be specified with Callendar-Van Dusen approximation formula.

Click [Calib RTD] button to open Calibrated RTD view, in which you can set the RTD table. Then the data stored in the device are shown (see Figure 12). When you choose [Calibrated RTD] in [Sensor type] in Figure 3, these data are available.

Figure 12. Calibrated RTD



Click [Callender-Van Dusen Coefficient] button in order to set coefficients.

Callender-Van Dusen formula:

$T < 0°C$: $R_T = R_0 \{1 + AT + BT^2 - (T - 100) CT^3\}$

$T >= 0°C$: $R_T = R_0 (1 + AT + BT^2)$

Click [Close Calibrated RTD] button to quit the view.

2.12 LINEARIZATION TABLE SETTING

The B3HU2 supports the user-specific linearization table function (Special_Curve). In order to use the Special_ Curve, the data in text format must be defined and registered.

The file format is as following.

Describe the characteristics data within { }. Sets of X and Y values must be entered in %. Up to 128 points can be specified.

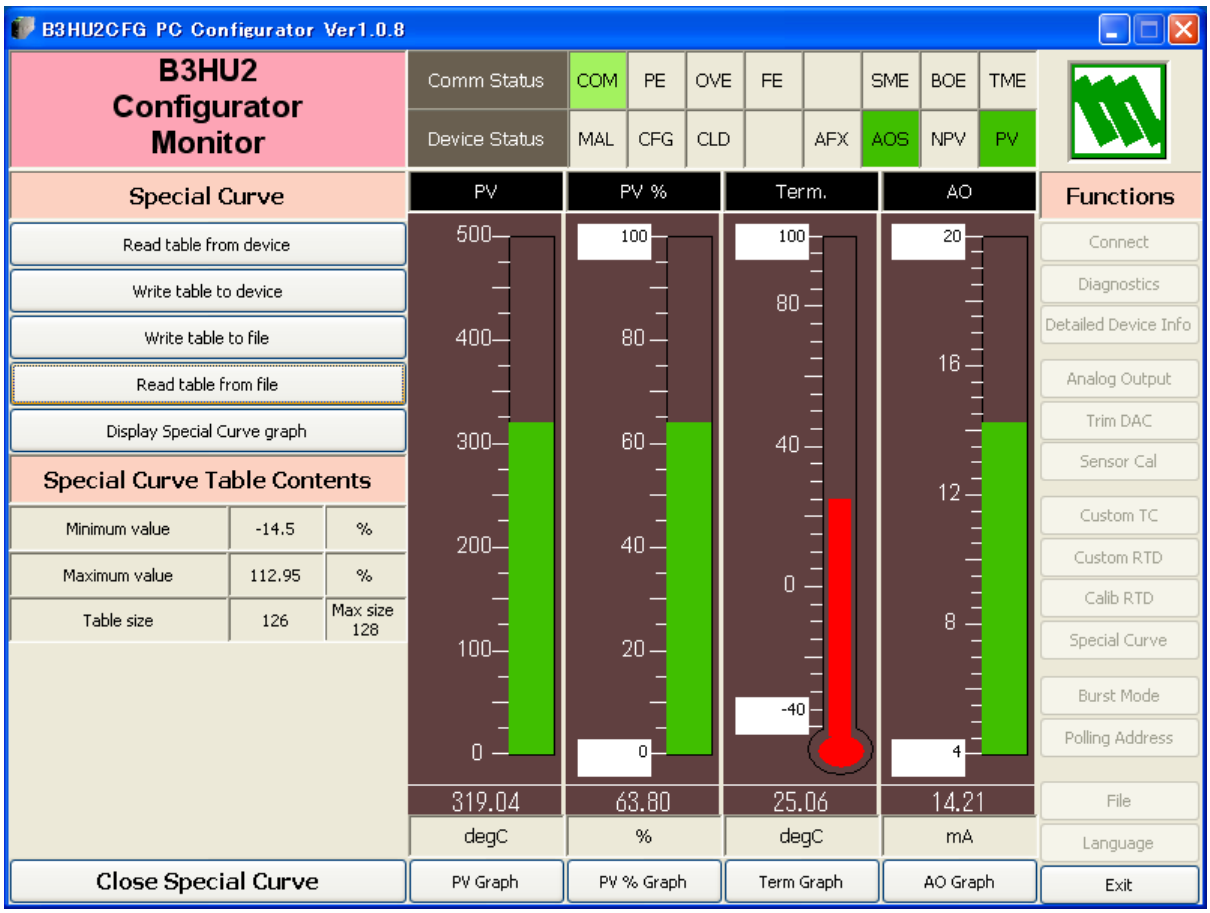
```
/************************************************************
/*   Linearization Table (Special Curve) Definition
/*   Yi=f(Xi)    (0<=i<Size)
/*         -15<=X(i),Y(i)<=115%
/*         X(i)<X(i+1)
/*         2<=Size<=128
/************************************************************
{
-10.56,-8.1234          <– The minimum X and Y values (-15 to 115%, decimal point available)
 :
100.00,96.5432          <– The maximum X and Y values (-15 to 115%, decimal point available)
}
```

Note: Each line must not be followed by characters such as space, etc.

Once the data file is ready, register the file on the B3HU2.

Click [Special Curve] button to open the Special Curve as shown in Figure 13.

Figure 13. Special Curve



[Read table from file] The program uploads a file stored in the PC. When uploaded, the file contents summery is indicated under Special Curve Table Contents.

[Display Special Curve graph] The I/O characteristics data can be shown in a graph.

[Write table to file] The program saves the currently displayed I/O characteristics data to a file.

[Write table to device] The program downloads the currently displayed I/O characteristics to the B3HU2. When the downloading is successfully complete, Status under Special Curve Table Contents shows 'Configured.' Then the option 'Special_Curve' become available to choose among the Transfer Function selections. If 'Special_Curve' has been already selected before this setting is done, you can not download a particular data file.

[Read table from device] The program uploads the I/O characteristics cable registered in the B3HU2. If there is no file registered, Status under Special Curve Table Contents shows 'Non configured.'

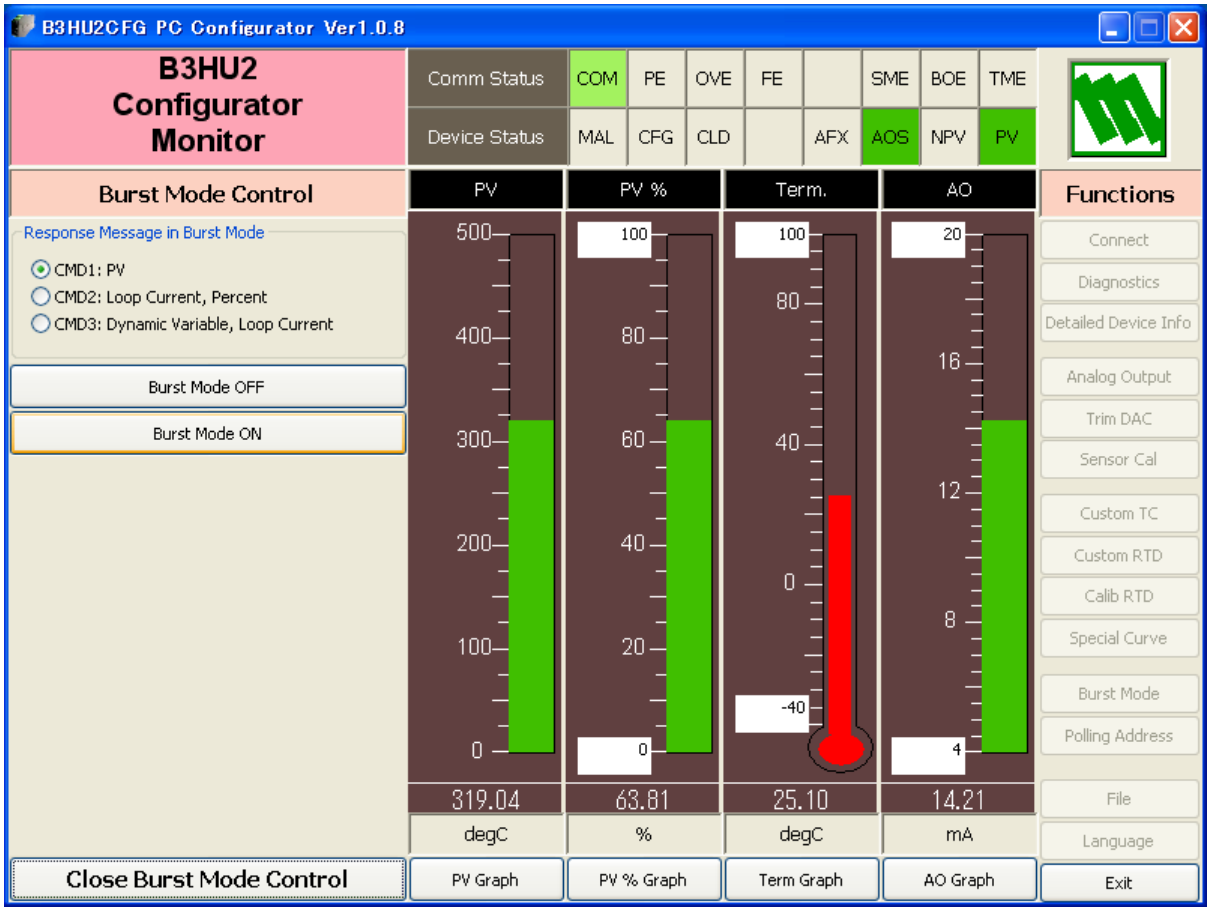
[Close Special Curve] Quits the view.

2.13 BURST MODE

Click [Burst Mode] button to open the Burst Mode Control view as shown in Figure 14.

B3HU2CFG is compatible with HART 6 burst mode.

Figure 14. Burst Mode Control



Choose a command in [Response Message in Burst Mode].

[Burst Mode ON] Enables the burst mode as specified in the menu.

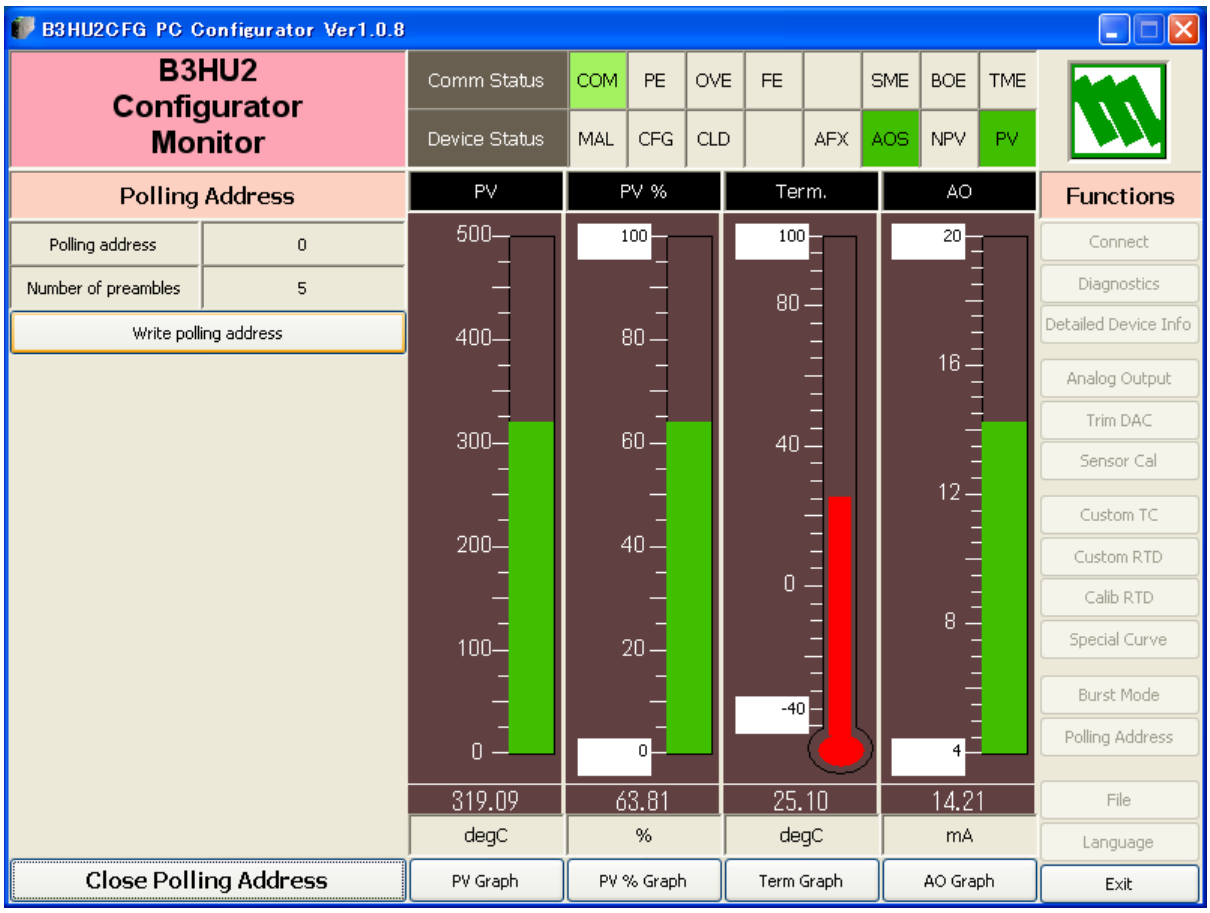
[Burst Mode OFF] Disables the burst mode.

[Close Burst Mode Control] Quits the Burst Mode Control view.

2.14 POLLING ADDRESS

Click [Polling Address] button to open the Device Address view as shown in Figure 15.

Figure 15. Device Address



[Polling Address]	Shows the polling address of currently connected device.
[Number of preambles]	Shows the required number of preambles for HART communications. Cannot be changed.
[Write polling address]	Write to the device a new polling address. Selectable addresses are from 0 to 63. The device operates in multi-drop mode when addresses other than 0 is selected. The output current is fixed to 4mA.
[Close Polling Address]	Quits the Device Address view.

2.15 FILE MANAGEMENT

The B3HU2'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 16.

While this view is active, the device is disconnected.

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 B3HU2 device.

The B3HU2CFG's configuration views consist of two pages. Click [Page] button to switch between pages. The second page appears as follows (Figure 17).

Click [Exit] button 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. Also values read from files are not verified.

Custom TC, Custom RTD or Linearization Table data are not handled in this view but in each specific function view.

Figure 16. File, 1st Page

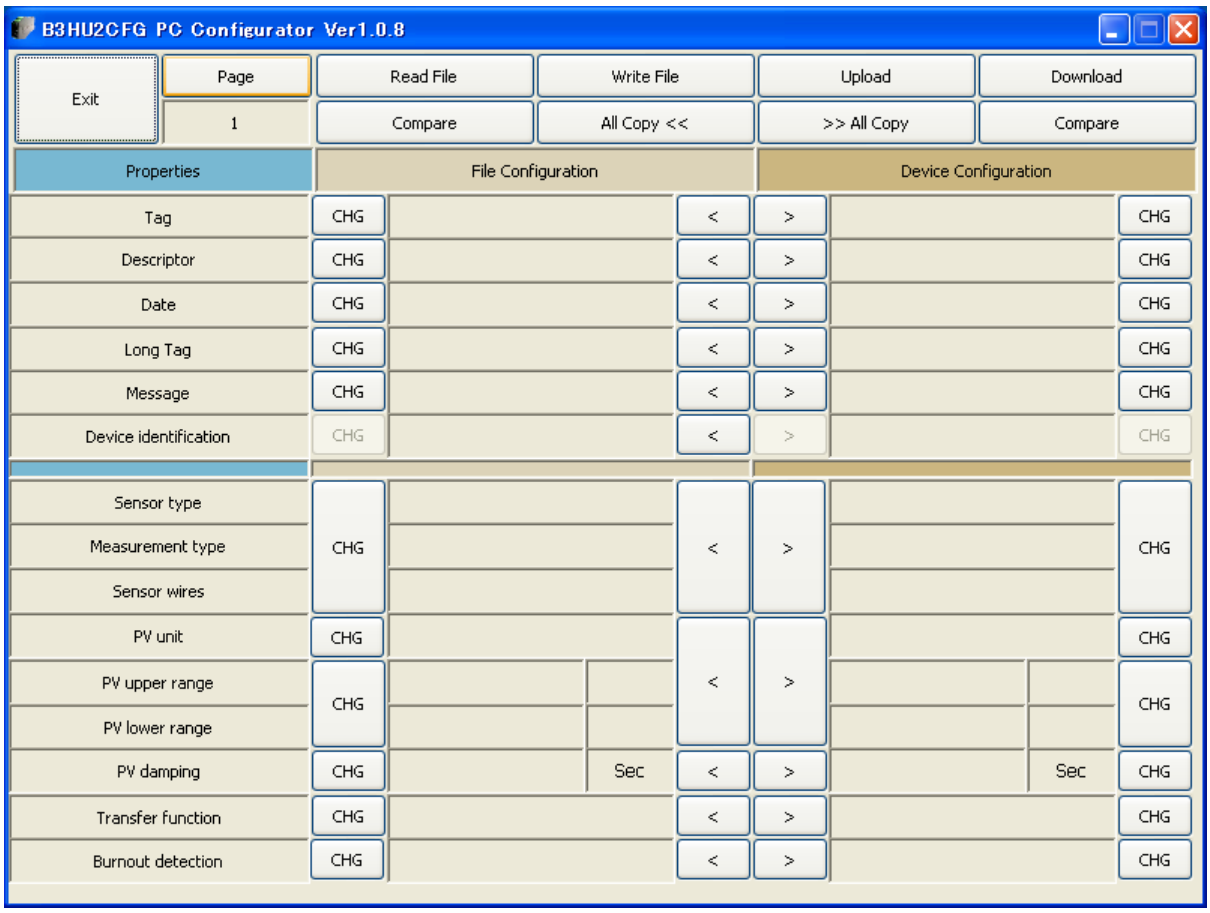
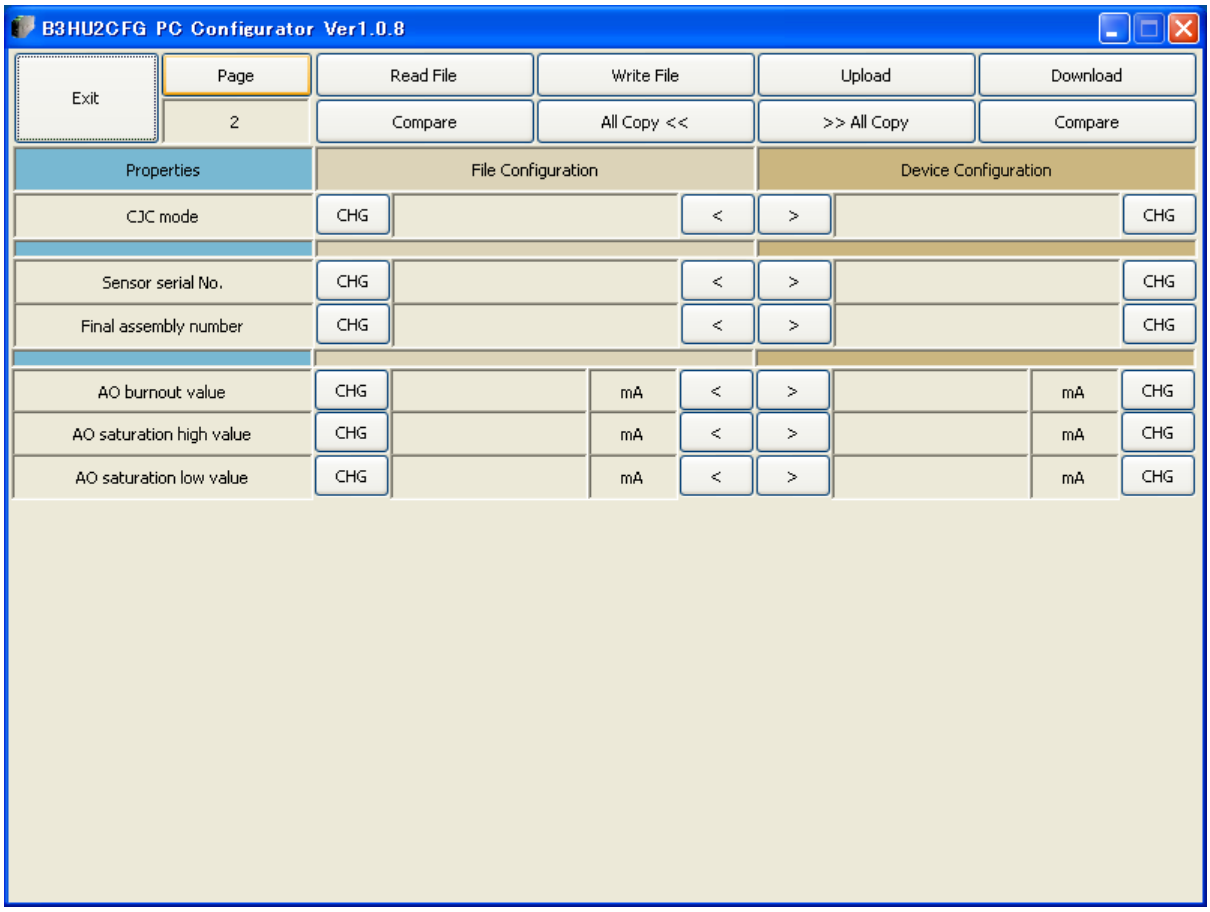


Figure 17. File, 2nd Page



2.15.1 TRANSFERRING DATA TO/FROM DEVICE

Click [Upload] button to connect to the B3HU2 device, to read out its configuration data and to show it in [Device Configuration] area on the screen (Figure 18).

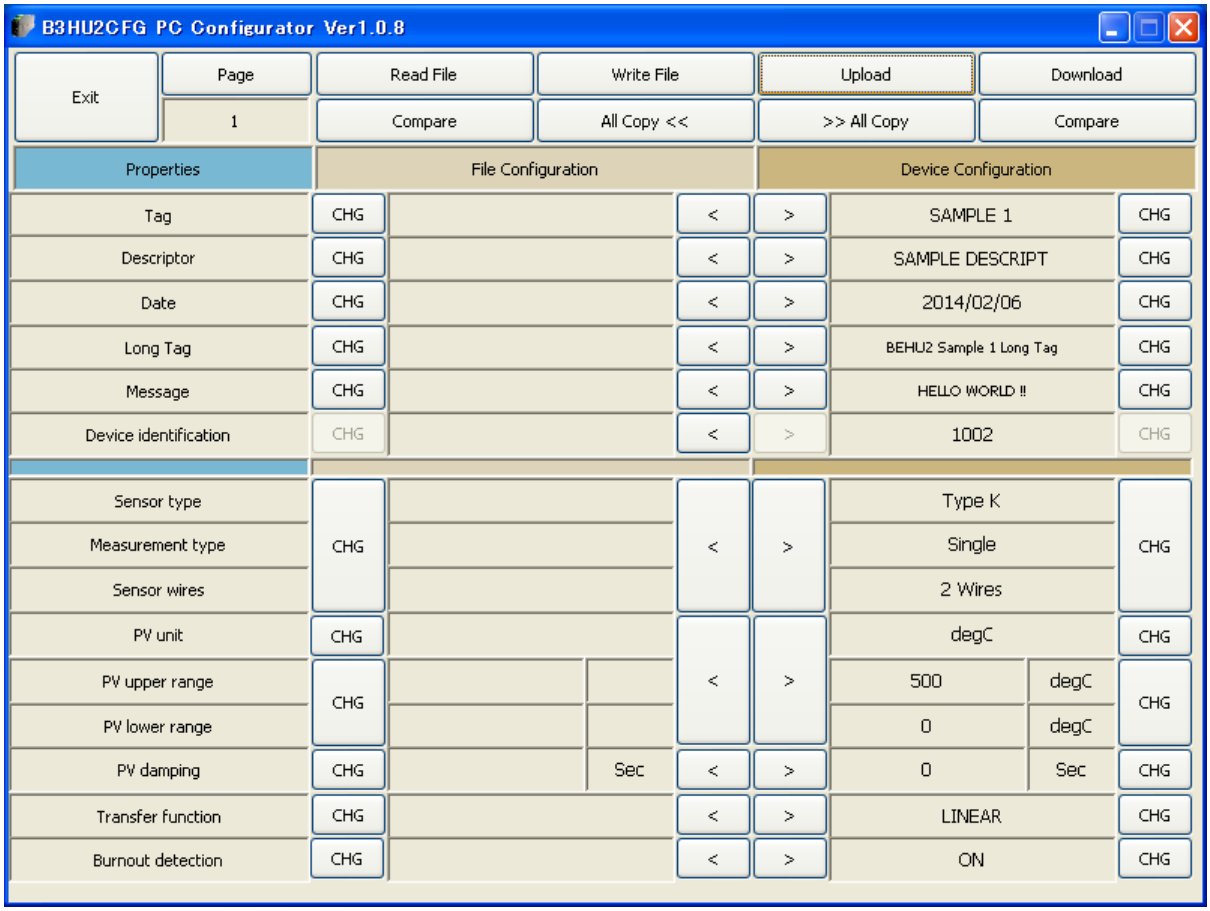
Click [Download] button to connect and write the configuration data in [Device Configuration] area to the B3HU2 device.

Connection to the device is automatically severed after each uploading or downloading, to allow it removed.

Note:

[Device identification] is an identifier inherent to each device. It cannot be changed or downloaded to a device.

Figure 18. Data Uploaded

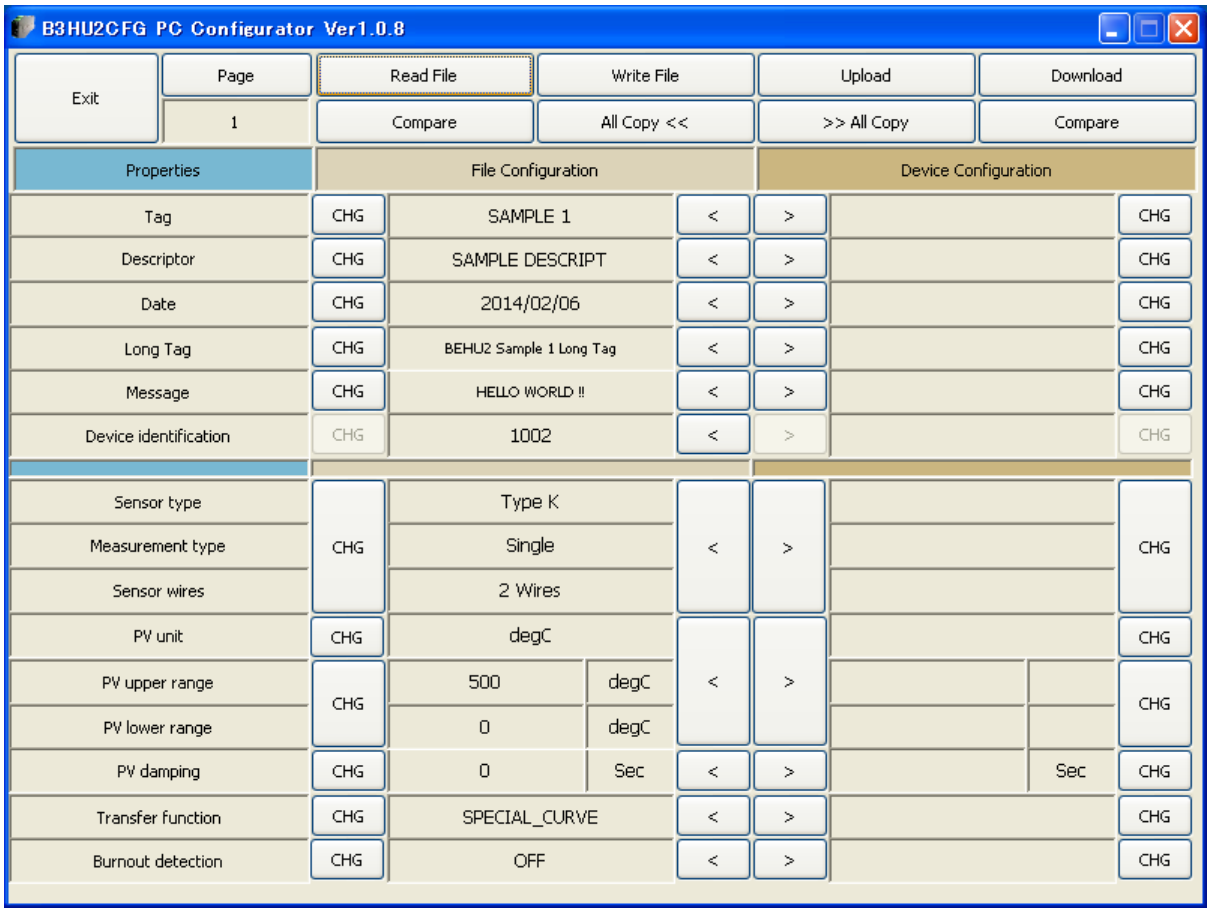


2.15.2 READING/WRITING FILES

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 19).

Click [Write File] button to write the configuration data in [File Configuration] area to a specified file.

Figure 19. File Read Out



2.15.3 MODIFYING PARAMETERS

Click [CHG] button at the side 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.

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

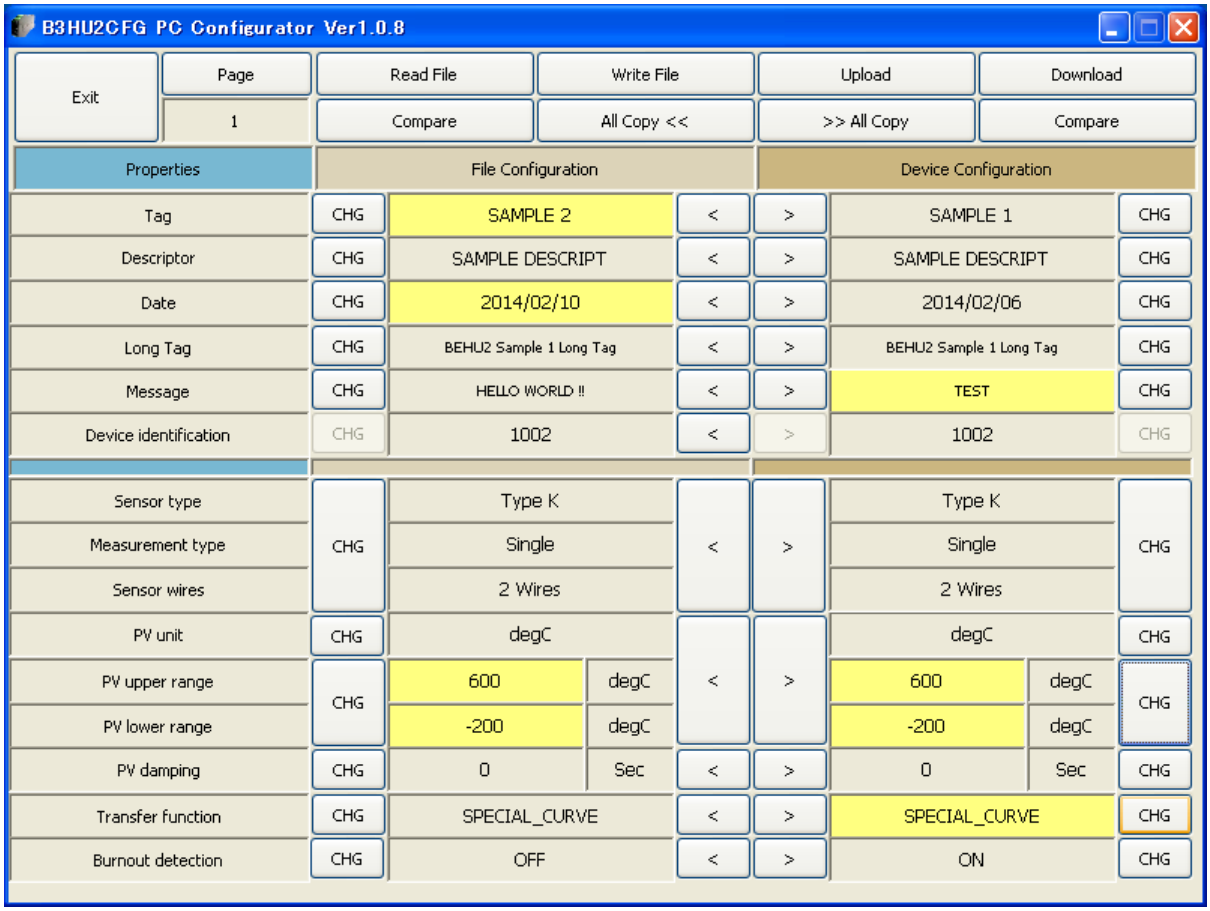
Using [All Copy <<] or [>> All Copy] buttons enables transferring all parameters between the areas. Copied fields will be highlighted in light yellow background color.

[Date] is automatically set to the day when [Tag] and/or [Descriptor] are changed. [Date] can be modifiable.

Only capital letters and figures used as [Tag], [Descriptor] and [Message] Small letters will be automatically converted to capital letters.

[Device identification] is an identifier inherent to each device. It cannot be copied from [File Configuration] to [Device Configuration] area.

Figure 20. Parameters Modified



2.15.4 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.

Figure 21. Parameters Compared