Model B3HU
PC CONFIGURATOR
(model: B3HUCON)

Users Manual

Contents

M·SYSTEM CO.,LTD.

EM-7502-C Rev.1

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, NT 4.0, 2000 or XP Pro
  24 MB RAM for Windows 98SE; 48 MB for Windows NT4.0, 2000 or XP Pro
  30 MB minimum free hard disk space
  15-inch 800x600 Super VGA screen (17-inch 1024x768 Ultra VGA or higher recommended)
  CD-R/ROM Drive
  Serial Port (COM1 or COM2)
- HART Modem Cable

1.2 INSTALLING THE B3HUCON

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 B3HUCON 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 B3HUCON 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 “B3HUCON.”
–> Windows starts the installation program for B3HUCON software. Follow instructions on the screen and click Next.
–> Click Finish and exit the installation program.

(6) Click Exit.
Now the B3HUCON program has been installed.

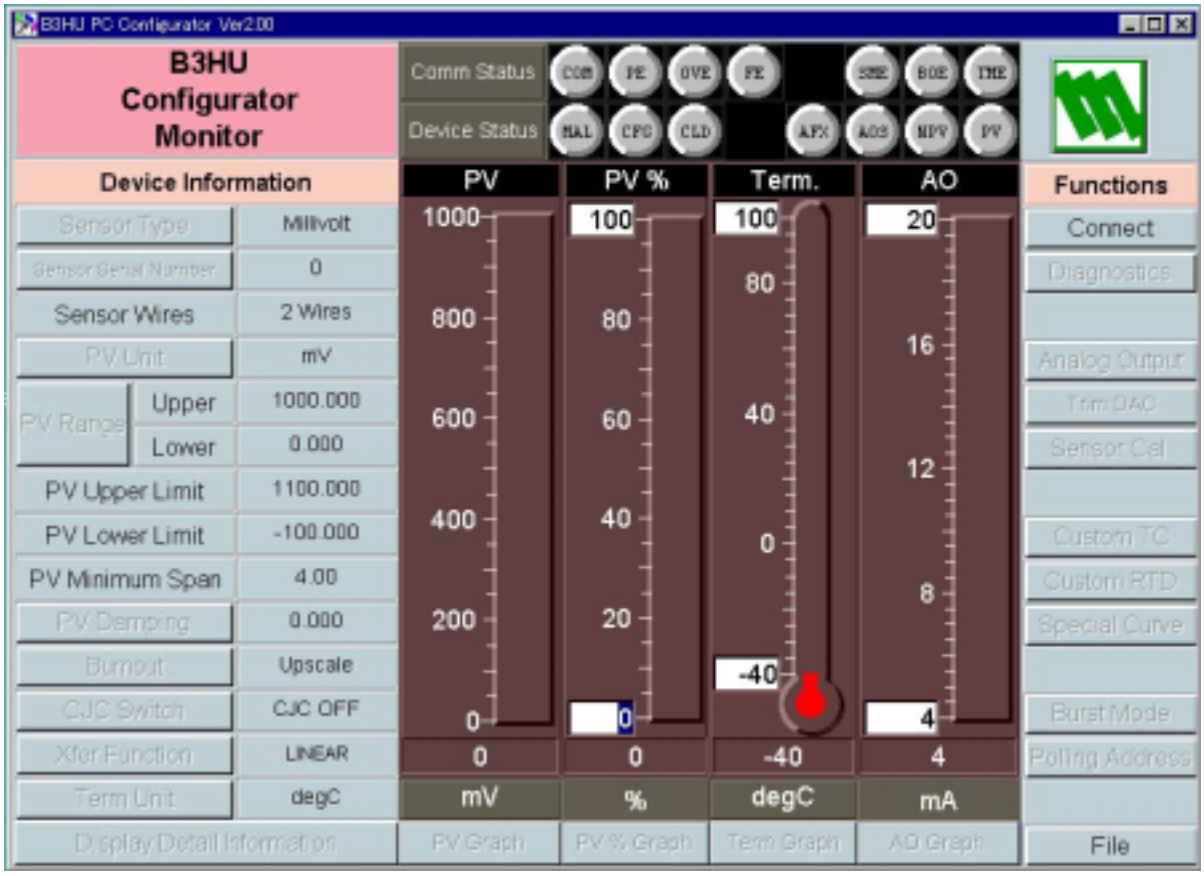
1.3 STARTING UP THE B3HUCON

Press Start on the task bar and choose B3HUCON from the Program menu.
The model B3HU Universal Temperature Transmitter must be connected to the PC via a HART modem.

2. OPERATING THE B3HUCON PC CONFIGURATOR

Figure 1 shows the initial view of the B3HUCON PC Configurator window.
In order to enable the tools shown on the screen, the model B3HU Universal Temperature Transmitter must be connected to the PC via a HART modem.

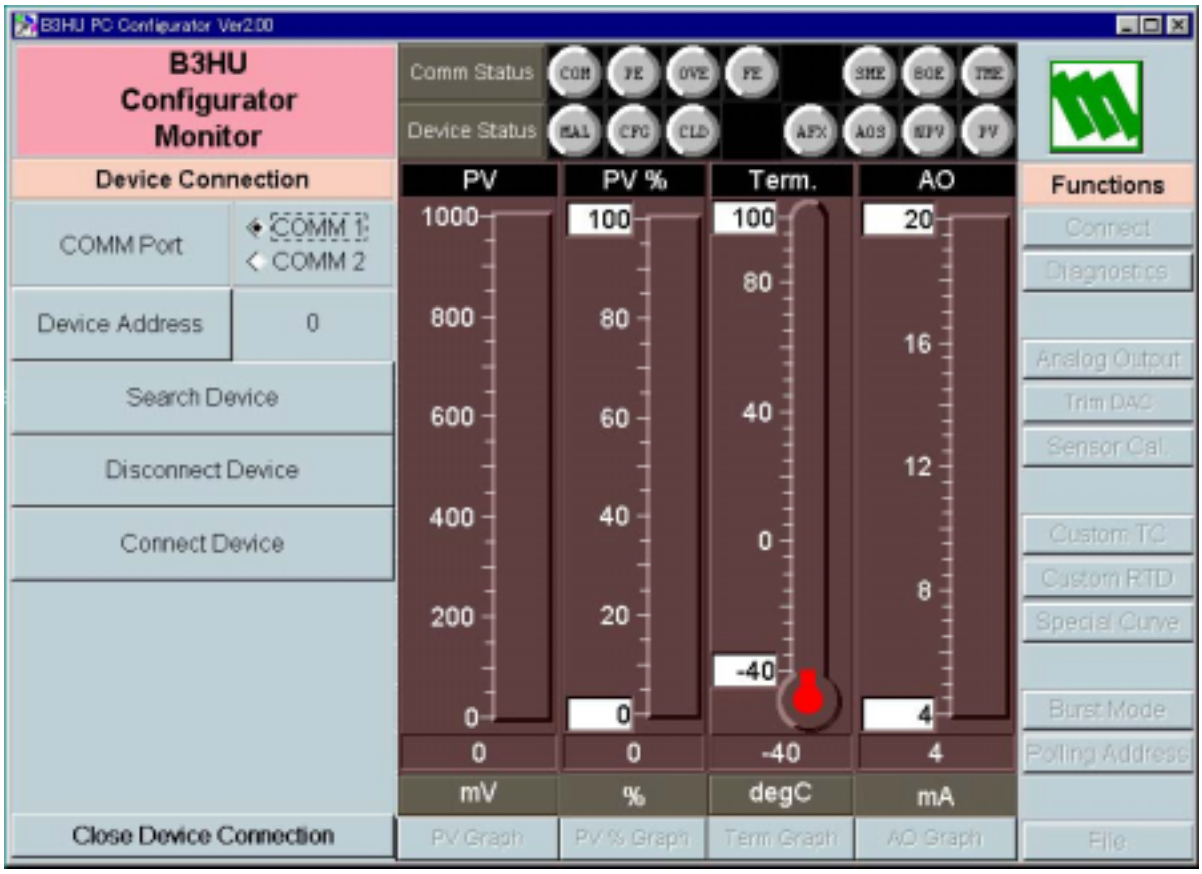
Figure 1. Initial View



2.1 CONNECTING THE DEVICE (B3HU)

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

Figure 2. Device Connection



[Device 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.

[Disconnect Device] Disconnects the currently connected device.

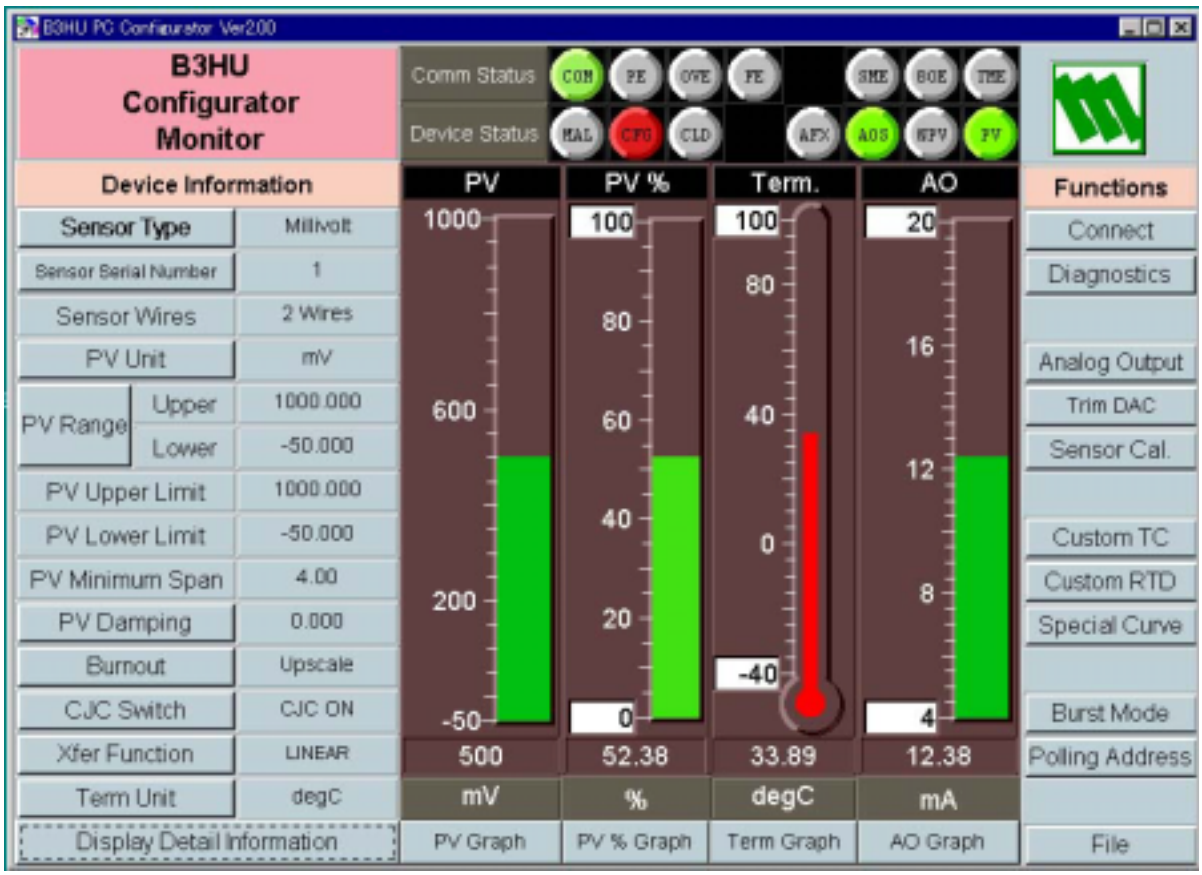
[Connect Device] Connects the device of which polling address is specified in the Device Address. Once the connection is established, the program uploads the device's configuration information and automatically calls up the Device Information view. The Device Information view is the base for various operations to configure the B3HU.

[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 B3HU.

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.
[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.
[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.

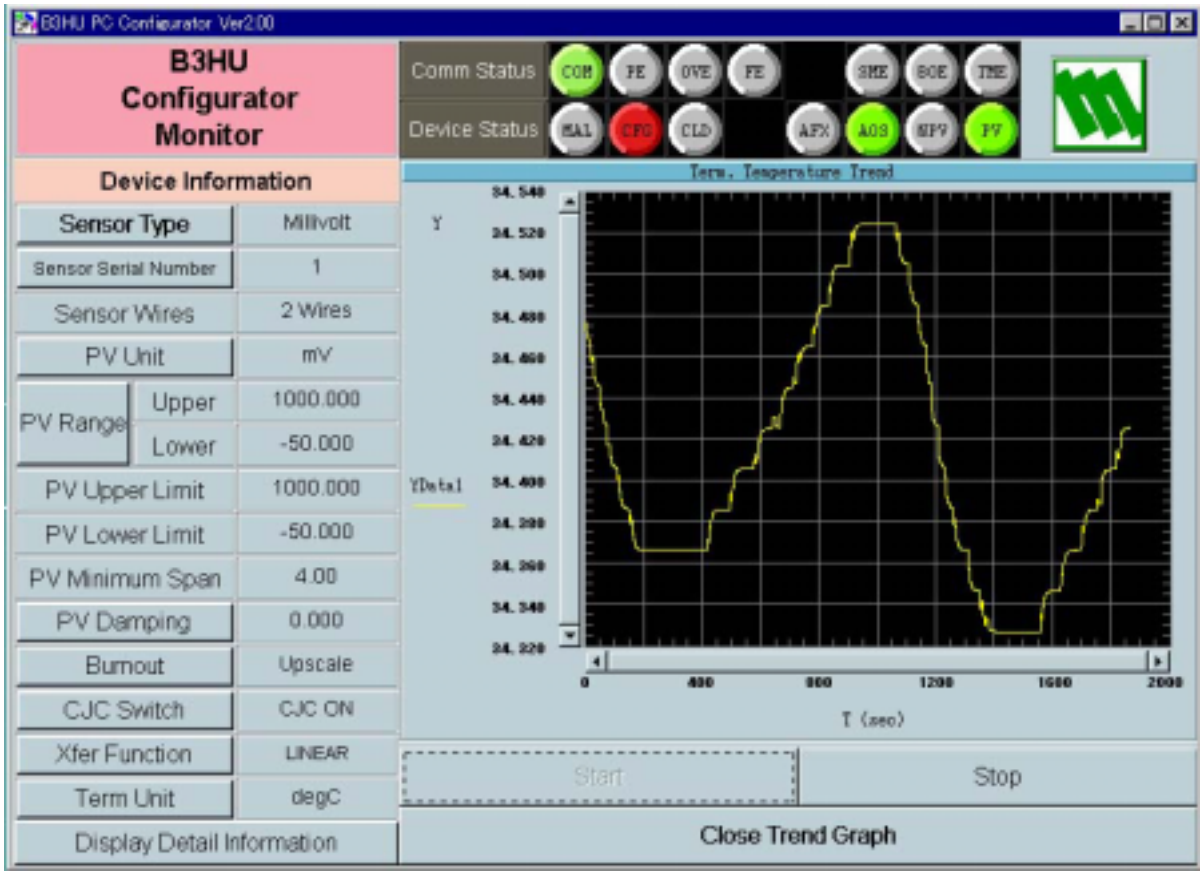
2.2.3 Bargraph & Trend Graph

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] 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 Number] 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] Specifies either the output should go upscale or downscale in case that a burnout is detected.

[CJC Switch] Enables/disables the cold junction compensation for thermocouple input. When a thermocouple is specified as the input sensor, the CJC Switch is set to ON at default.

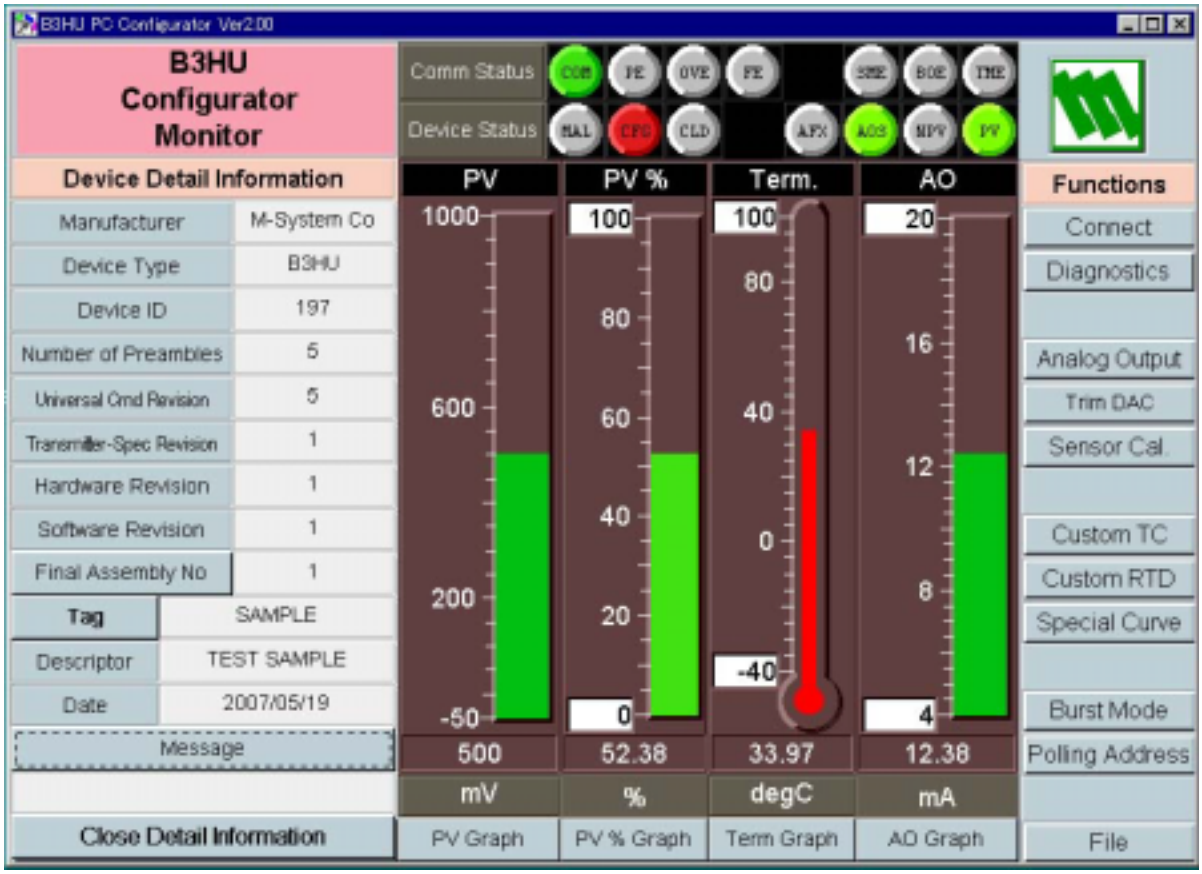
[Xfer Function] Enables/disables the Xfer Function, specifying either the output should be linear to the input signal or linearized to a custom curve data.
Selecting this function without a pre-defined Special_Curve is defined as Error.

[Term Unit] Specifies the temperature unit at the cold junction terminal.

2.4 DEVICE DETAIL INFORMATION

In Figure 3, clicking [Display Detail Information] on the left bottom opens the [Device Detail Information] menu as shown in Figure 5.

Figure 5. Device Detail Information



The menu shows the following items: Manufacturer, Device Type, Device ID, Number of Preambles, Universal Command Revision, Transmitter-Specific Revision, Hardware Revision, Software Revision, Final Assembly No., Tag, Descriptor, Date and Message.

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

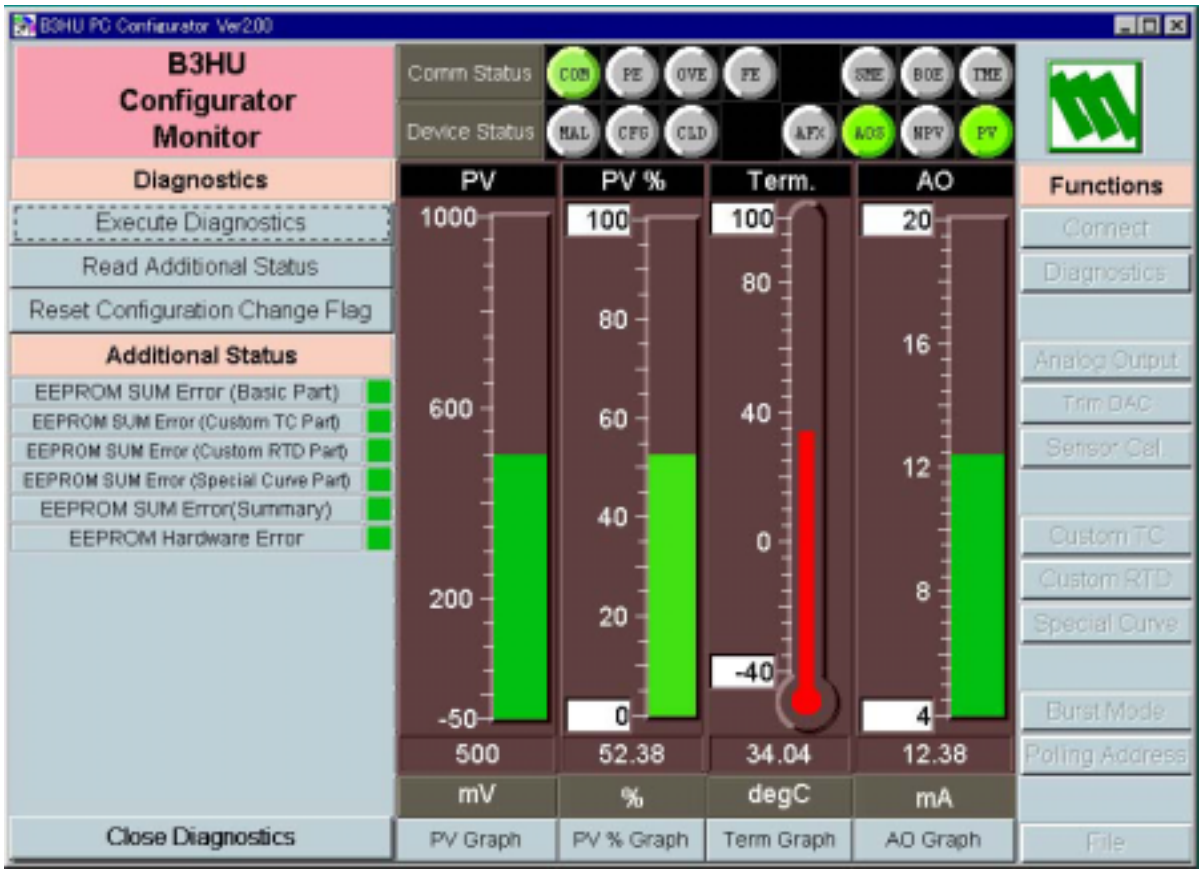
[Message] You can enter a memo in this area.

[Close Detail 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.

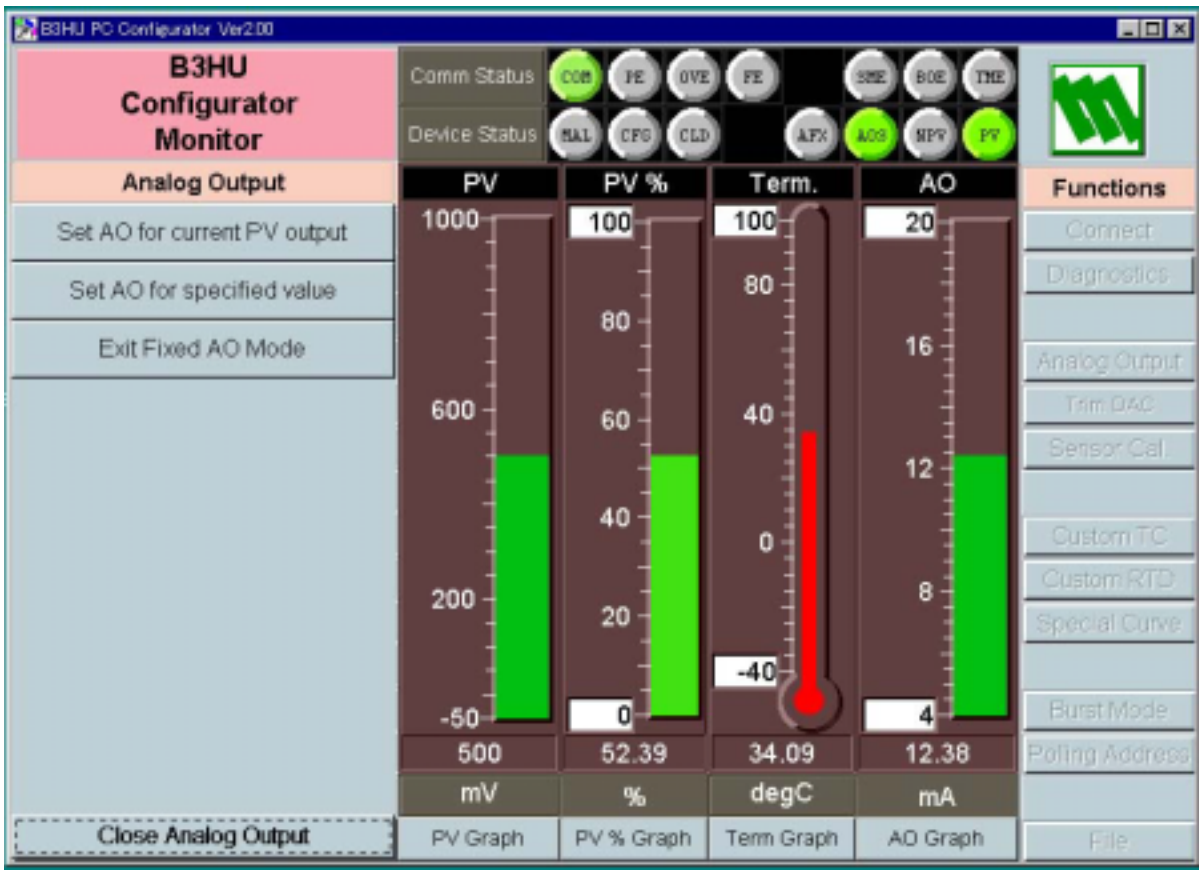
[Reset Configuration Change Flag] Turns off the CFG lamp in Device Status.

[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.

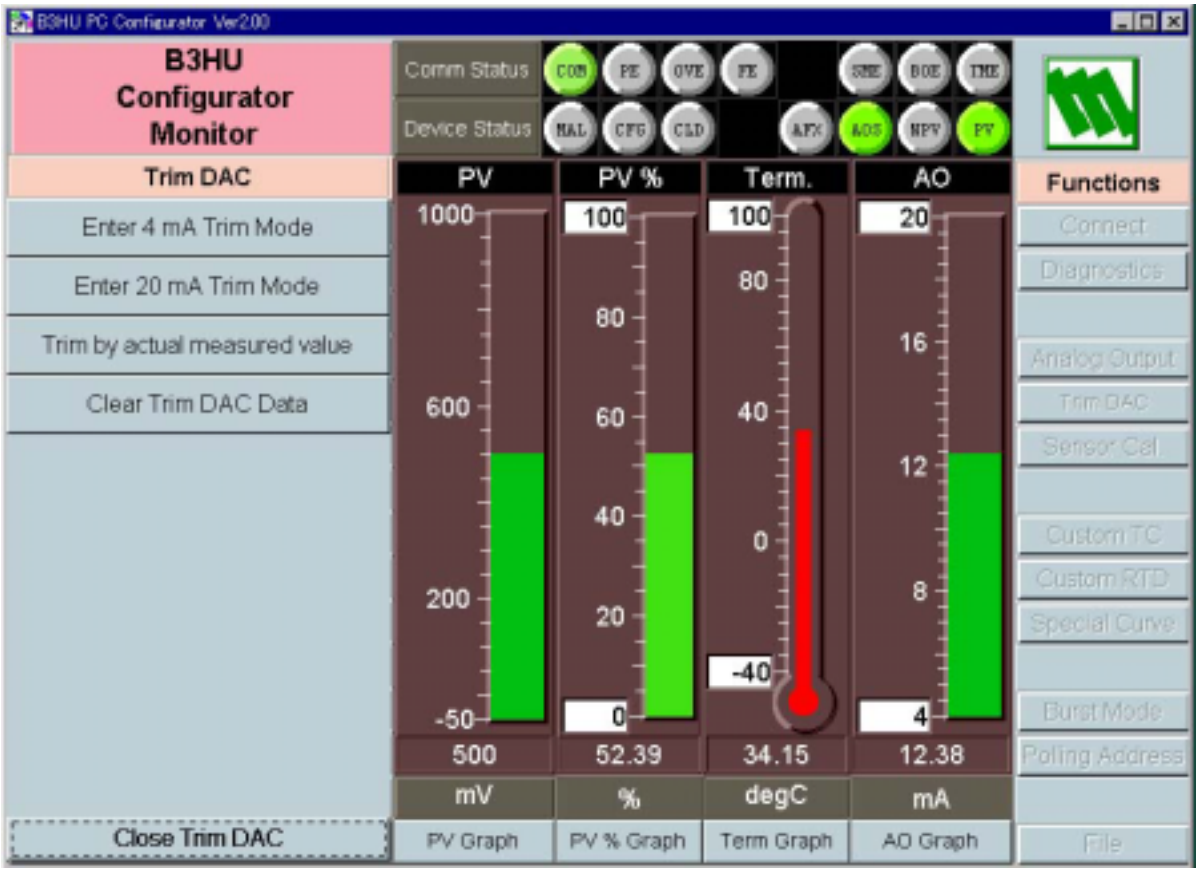
[Exit Fixed AO Mode] Cancel the fixed output mode to return the device into normal output mode. It is recommended to fix the analog output signal while those parameters affecting the output signal are configured, and then to reset the device to normal mode after the setting is done.

[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]. 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] 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]. 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] to set the measured value. The actual value can be set from 19.8mA up to 20.0mA.
(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] to return the device to the factory default trimming values.
[Close Trim DAC] quits the view.

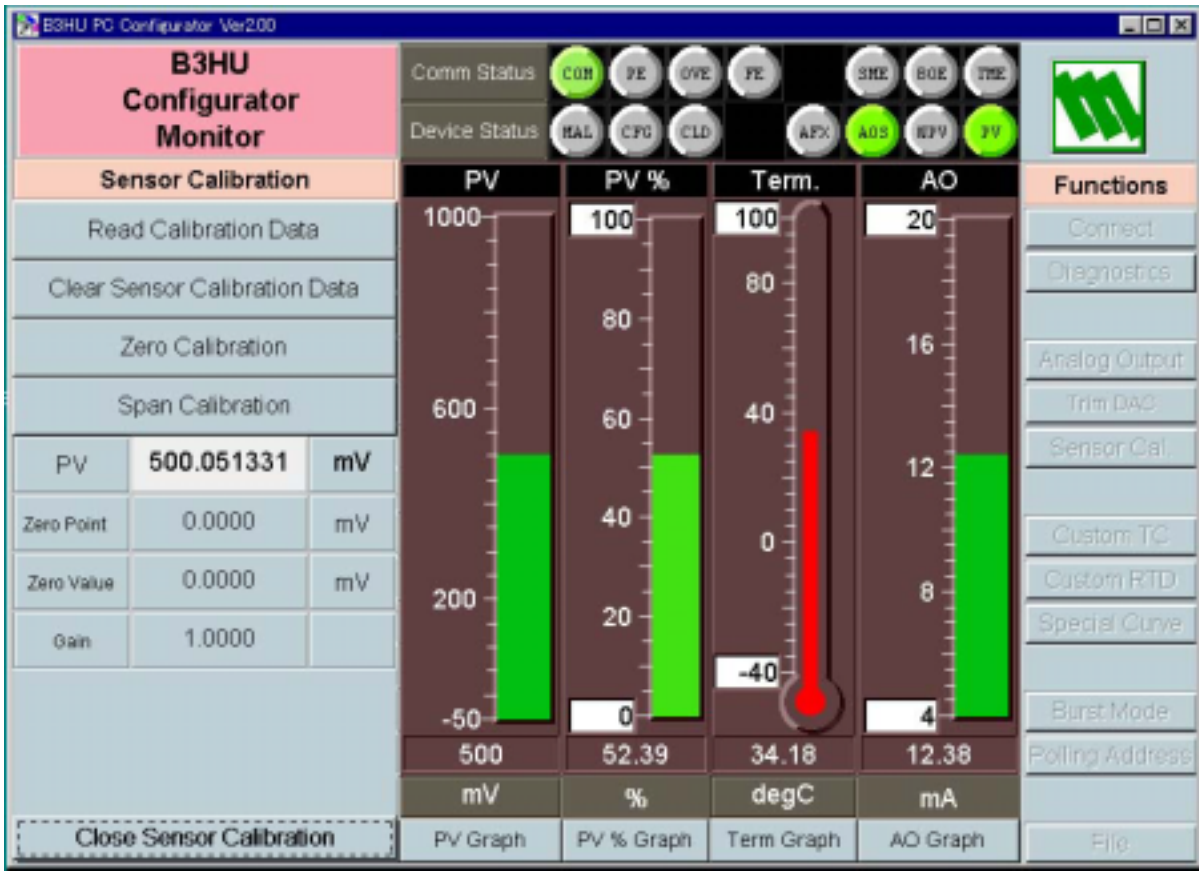
2.8 SENSOR CALIBRATION

The input sensor can be calibrated with Zero and Span: the Zero is represented as offset at the calibration point, while the Span is represented as gain against the zero point. The gain must be set from 0.1 to 10.0.

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 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 the middle. Refer to this value when calibrating the sensor. It takes 5 or 6 seconds for the calibration result affects the measured value on the display.

Apply the zero calibration point input signal and click [Zero Calibration] 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] 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 values in these fields.

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

Factory Default

DC and thermocouple inputs	Zero Point = Zero Value = 0mV Gain = 1.0
RTD input	Zero Point = Zero Value = Resistance (Ω) at 0°C Gain = 1.0

When the sensor type is changed, the calibration data are reset to these factory default values.

[Close Sensor Calibration] quits the view.

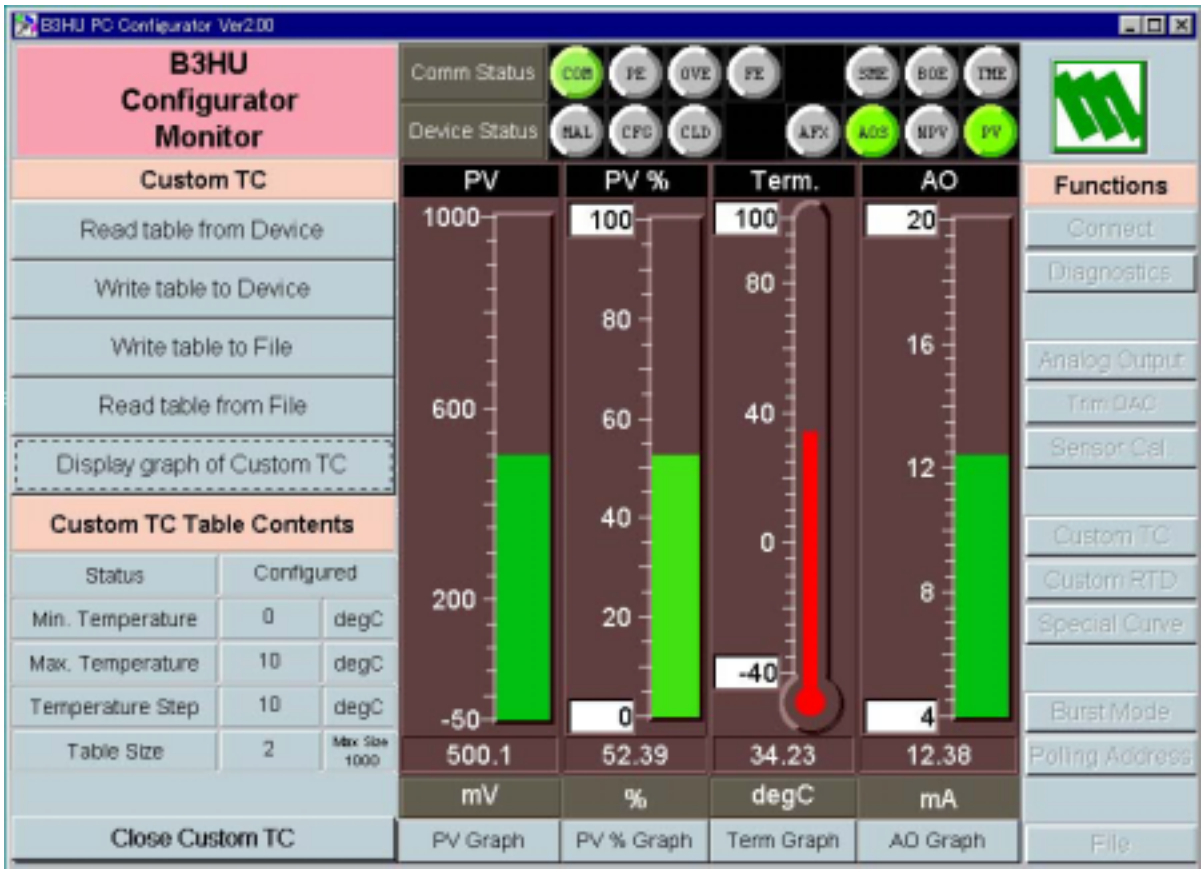
2.9 CUSTOM TC

The B3HU 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.
Specify the Temperature Steps used in the table, from 1°C to 50°C.
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)
/*              -100<=Xi<1000mV
/*              Xi<Xi+1
/*              2<=Size<=1000
/************************************************************
Minimum TC Temperature=0          <– Minimum temperature T0 (°C)
Step=10                           <– Temperature step (°C)
{
10.0000                           <– Voltage value for T0 (mV)
 :
20.0000                           <– Voltage value for Tmax (mV)
}
```

Once the data file is ready, register the file on the B3HUCON.
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 graph of TC table] 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 B3HU.
When the downloading is successfully complete, Status under Custom TC table Contents shows 'Configured.' Then the option 'TC Spec (Custom TC)' become available to choose among the Sensor Type selections. 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 B3HU. If there is no file registered, Status under Custom TC table Contents shows 'Non configured.'

[Close Custom TC] Quits the view.

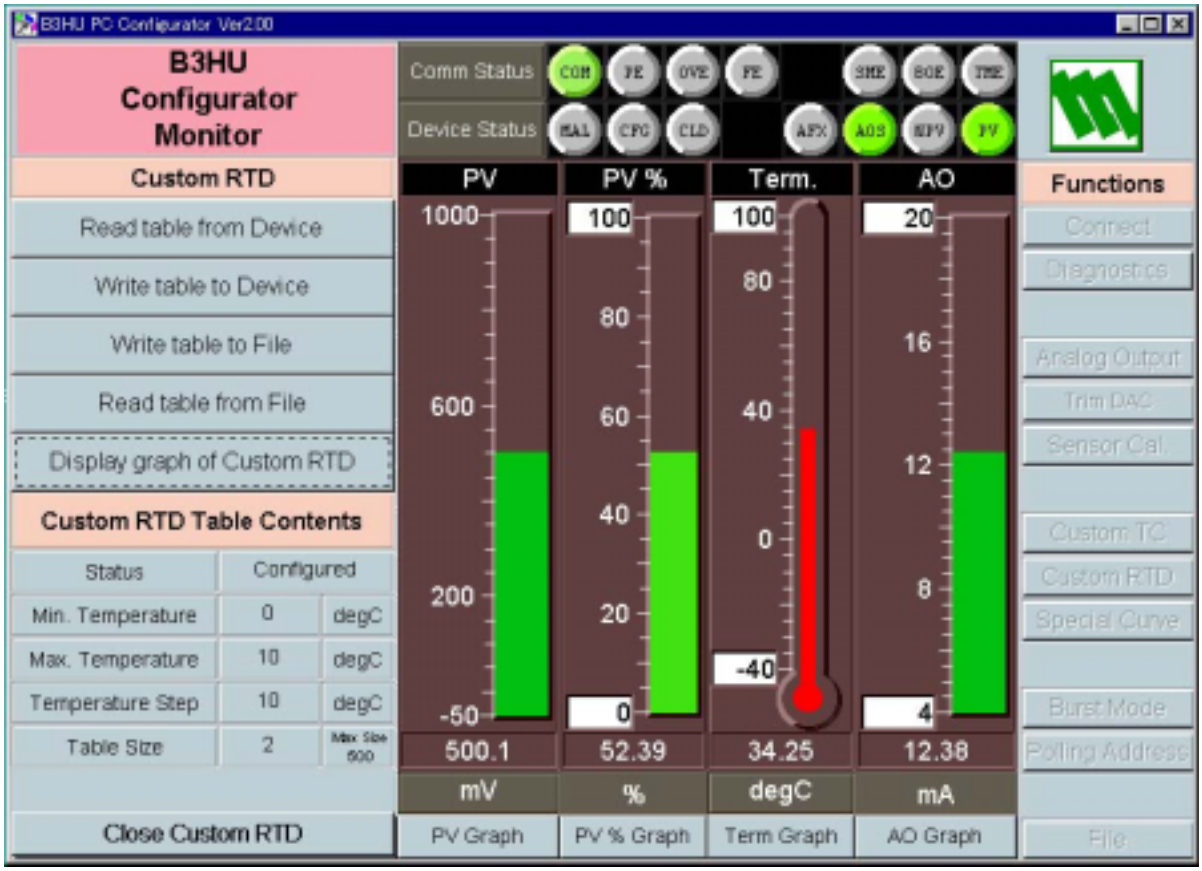
2.10 CUSTOM RTD

The B3HU 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.
Specify the Temperature Step used in the table, from 1°C to 50°C.
Describe the characteristics data within { }. Data must be entered in ohms. Up to 500 points can be specified.

```
/*************************************************************
/*     Custom RTD Table Definition
/*     Ti=f(Xi)    (0<=i<Size)
/*              Temperature Step (1 to 50 degC)
/*              -100<=Xi<4000 Ohm
/*              Xi<Xi+1
/*              2<=Size<=500
/*************************************************************
Minimum RTD Temperature=0          <– Minimum temperature T0 (°C)
Step=10                            <– Temperature step (°C)
{
100.000000                         <– Resistance value for T0 (Ω)
 :
200.000000                         <– Resistance for Tmax (Ω)
}
```

Once the data file is ready, register the file on the B3HUCON.
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 graph of RTD table] 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 B3HU.
When the downloading is successfully complete, Status under Custom RTD table Contents shows 'Configured.' Then the option 'RTD Spec (Custom RTD)' become available to choose among the Sensor Type selections. 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 B3HU. If there is no file registered, Status under Custom RTD table Contents shows 'Non configured.'

[Close Custom RTD] Quits the view.

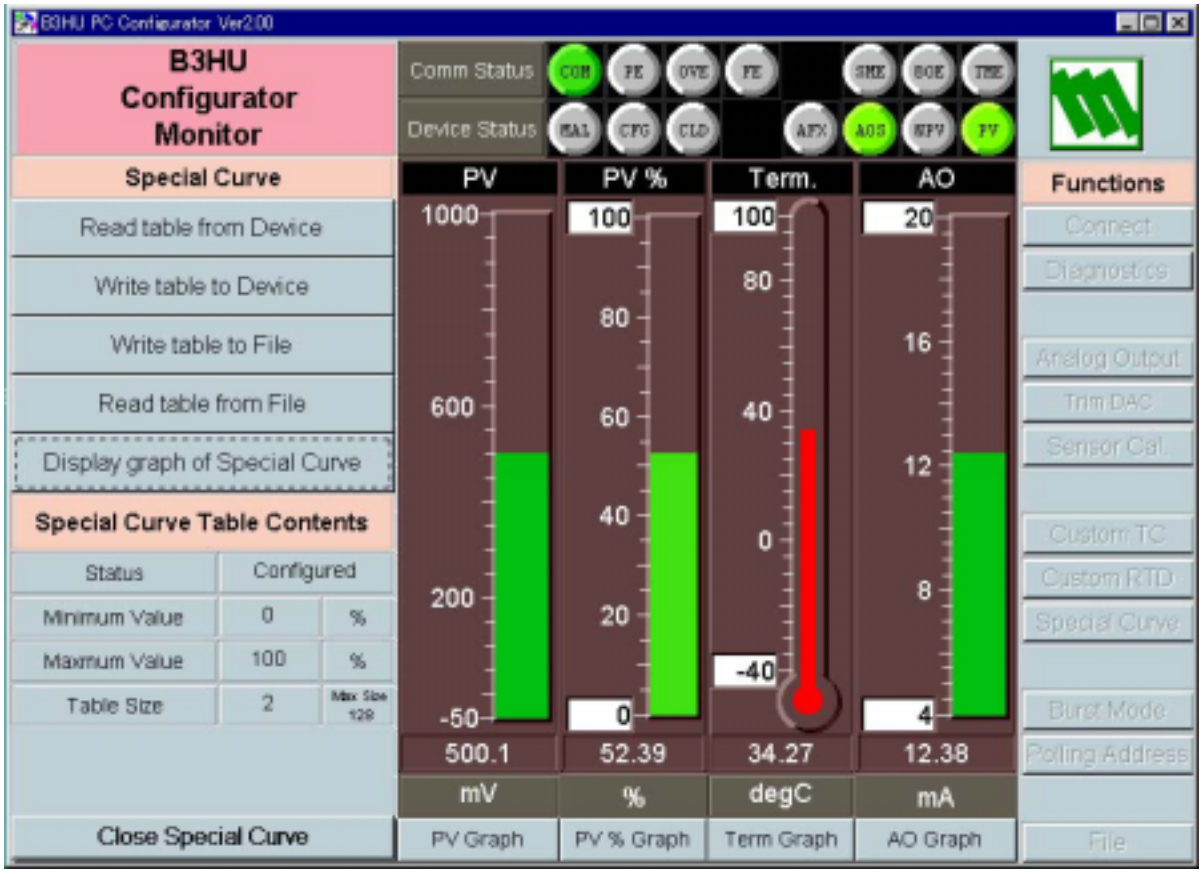
2.11 LINEARIZATION TABLE SETTING

The B3HU 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,Y<115
/*              Xi<Xi+1
/*              2<=Size<=128
/*********************************************************
{
0.000000,       0.000000                <– The minimum X and Y values
 :
100.000000,   100.000000                <– The maximum X and Y values
}
```

Once the data file is ready, register the file on the B3HUCON.
Click [Special Curve] button to open the Special Curve as shown in Figure 12.

Figure 12. 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. The I/O characteristic data longer than 128 points are ignored.

[Display graph of Special Table] 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 B3HU.
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 Xfer Function selections. If 'Special_Curve' has been already selected before this setting is done, you can not download a particular data file.

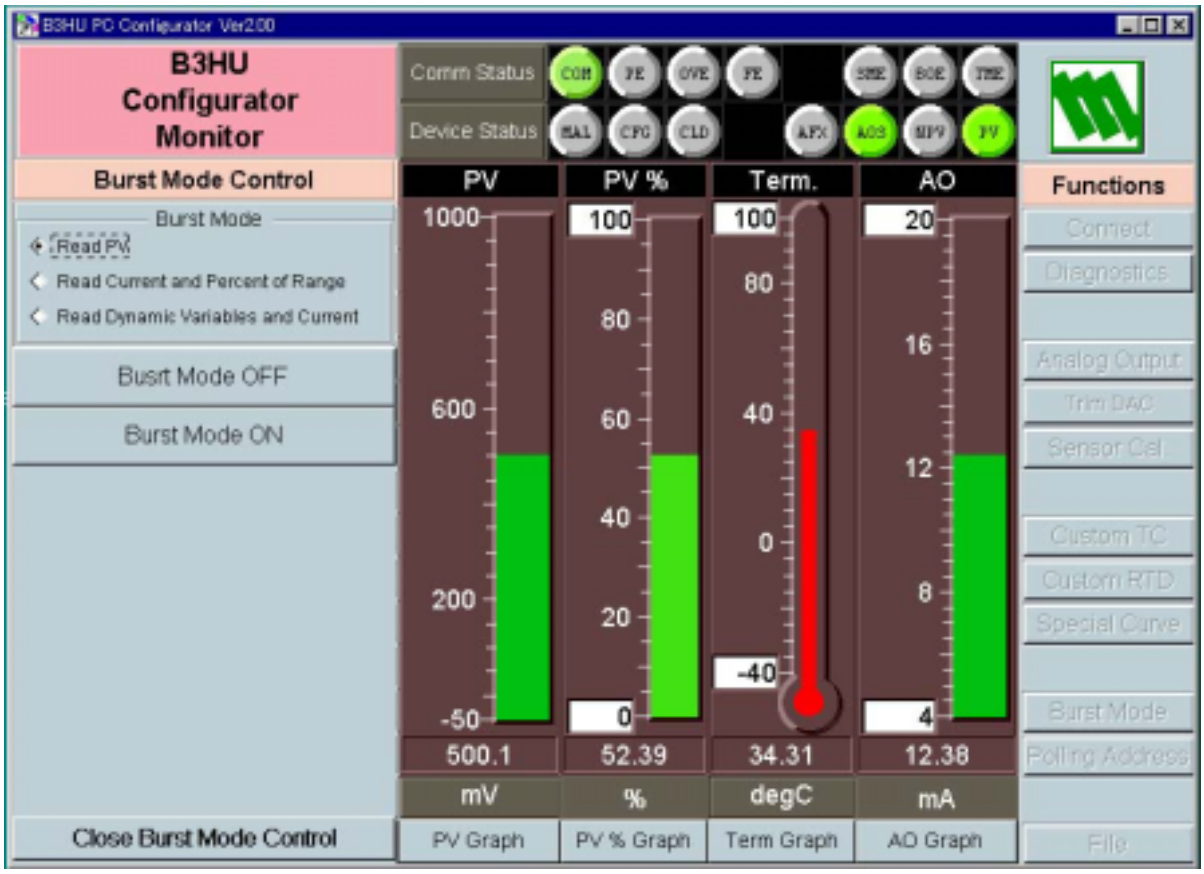
[Read table from Device] The program uploads the I/O characteristics cable registered in the B3HU. If there is no file registered, Status under Special Curve Table Contents shows 'Non configured.'

[Close Special Table] Quits the view.

2.12 BURST MODE

Click Burst Mode button to open the Burst Mode Control view as shown in Figure 13.

Figure 13. Burst Mode Control

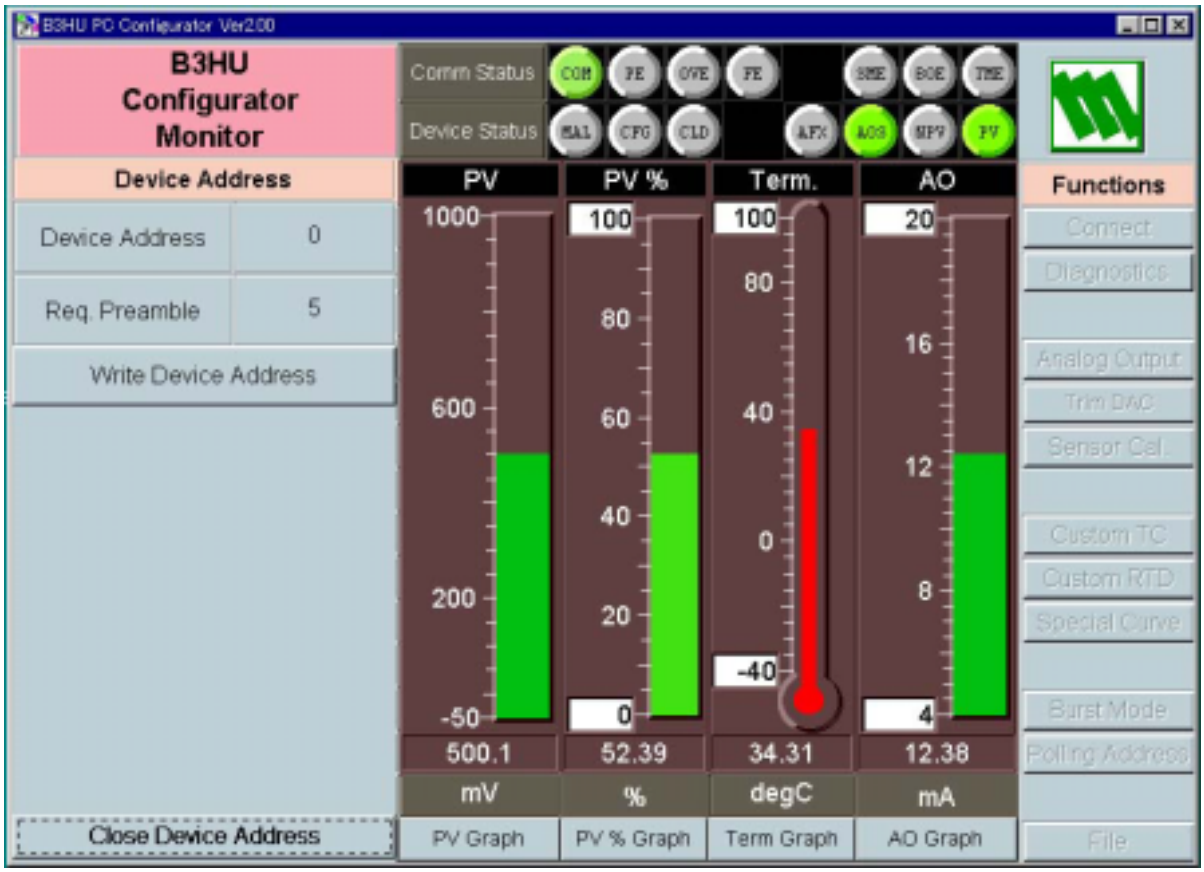


[Burst Mode ON] Enables the burst mode as specified in the menu.
[Burst Mode OFF] Disables the burst mode.
[Close Burst Mode Control] Quits the Burst Mode Control view.

2.13 POLLING ADDRESS

Click Polling Address button to open the Device Address view as shown in Figure 14.

Figure 14. Device Address



[Device Address] Shows the polling address of currently connected device.

[Req. Preamble] Shows the required number of preambles for HART communications. Cannot be changed.

[Write Device Address] Write to the device a new polling address. Selectable addresses are from 0 to 15. The device operates in multi-drop mode when addresses other than 0 is selected. The output current is fixed to 4mA, and [Analog Output] or [Trim DAC] functions become unavailable.

[Close Device Address] Quits the Device Address view.

2.14 FILE MANAGEMENT

The B3HU'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 15-1.

While this view is active, the device connection is severed, therefore the B3HU device 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 B3HU device.

The B3HUCON's configuration views consist of two pages. Click [Page] button to switch between pages. The second page appears as follows (Figure 15-2).

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.

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

Figure 15-1. File, 1st Page

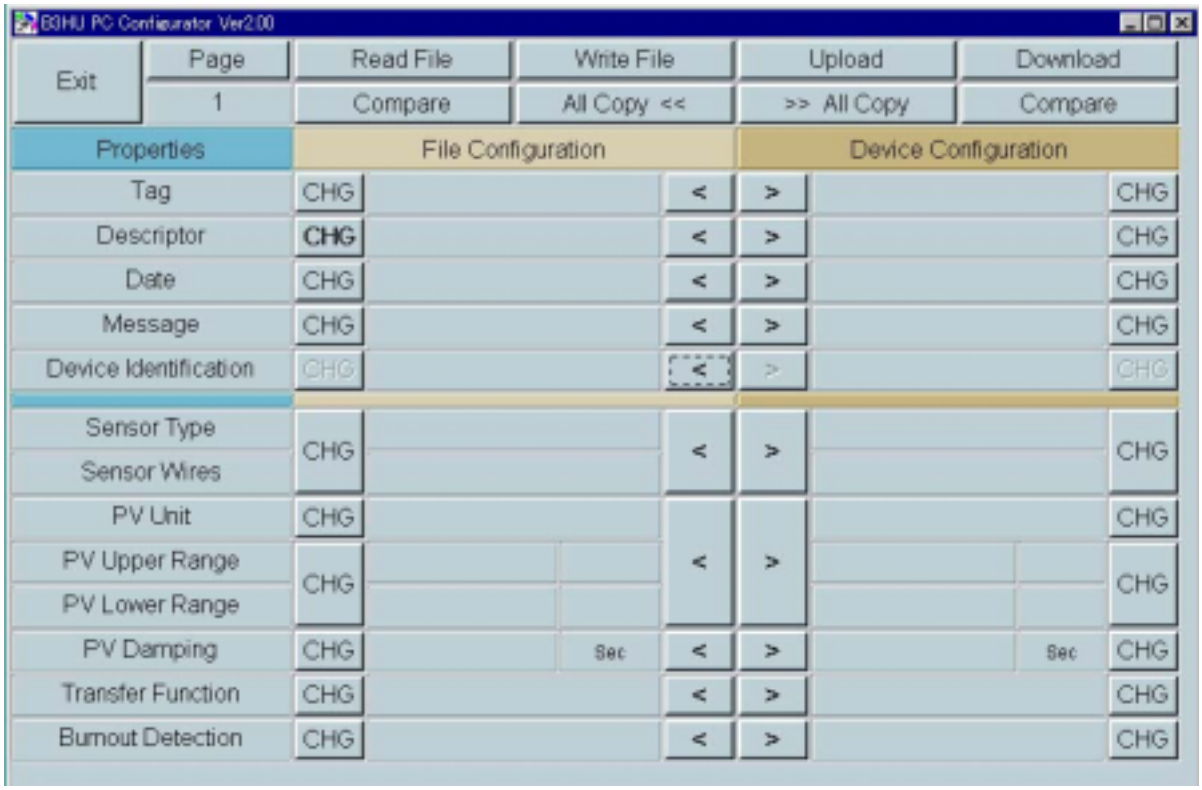
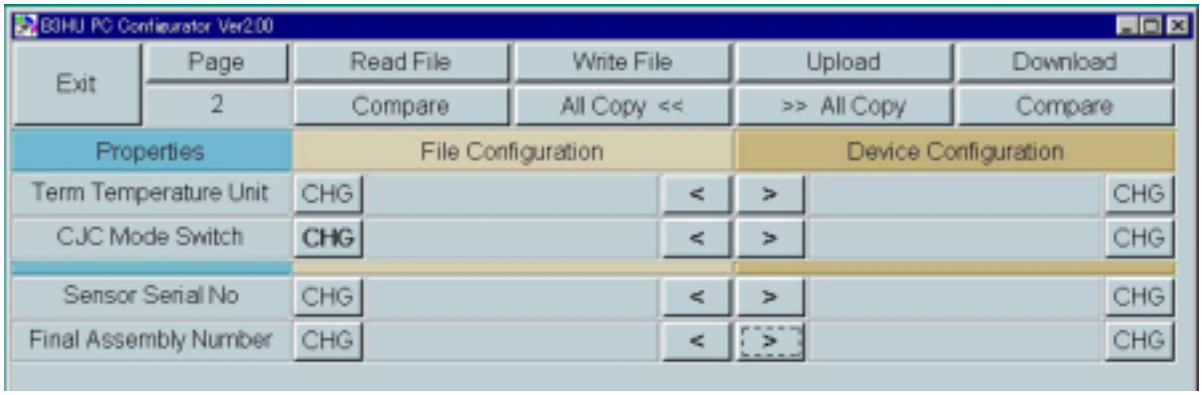


Figure 15-2, File, 2nd Page

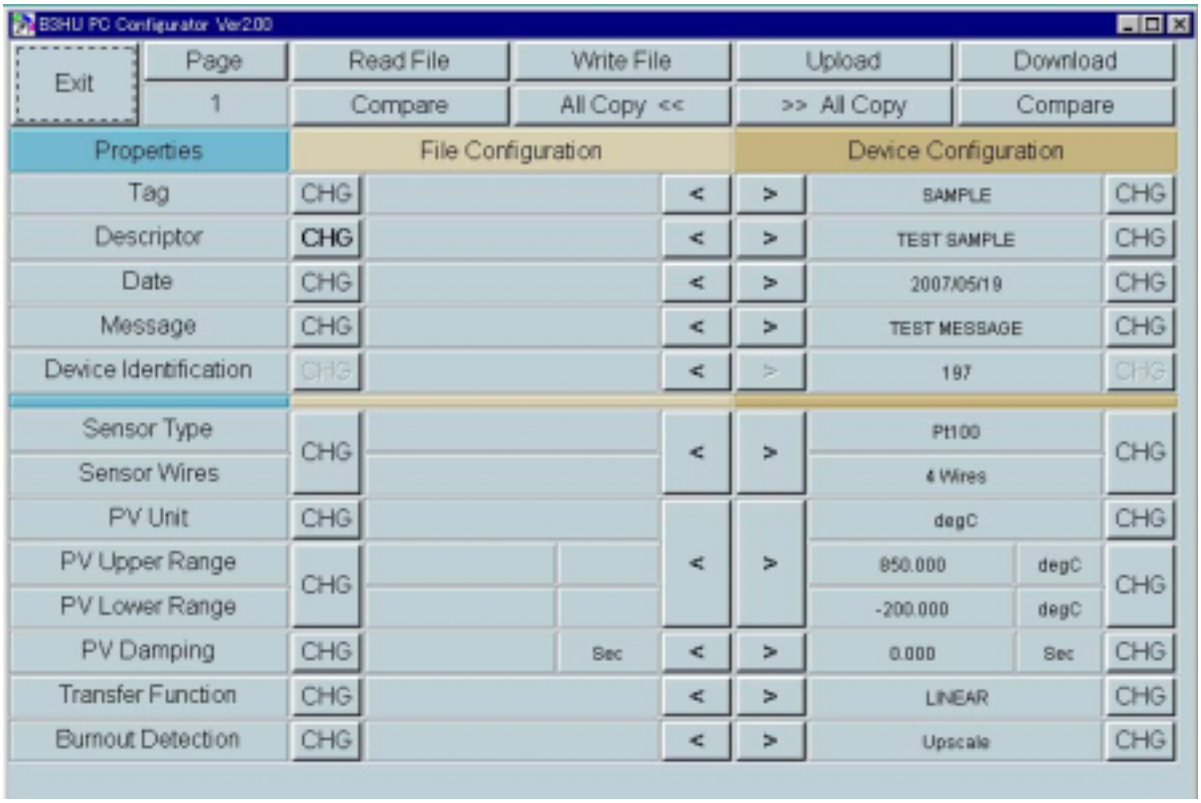


2.14.1 TRANSFERRING DATA TO/FROM DEVICE

Click [Upload] button to connect to the B3HU device, to read out its configuration data and to show it in 'Device Configuration' area on the screen (Figure 16). COM port and Device Address can be changed in 'Connect' view. Once the uploading is complete, 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 B3HU device.
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.
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.

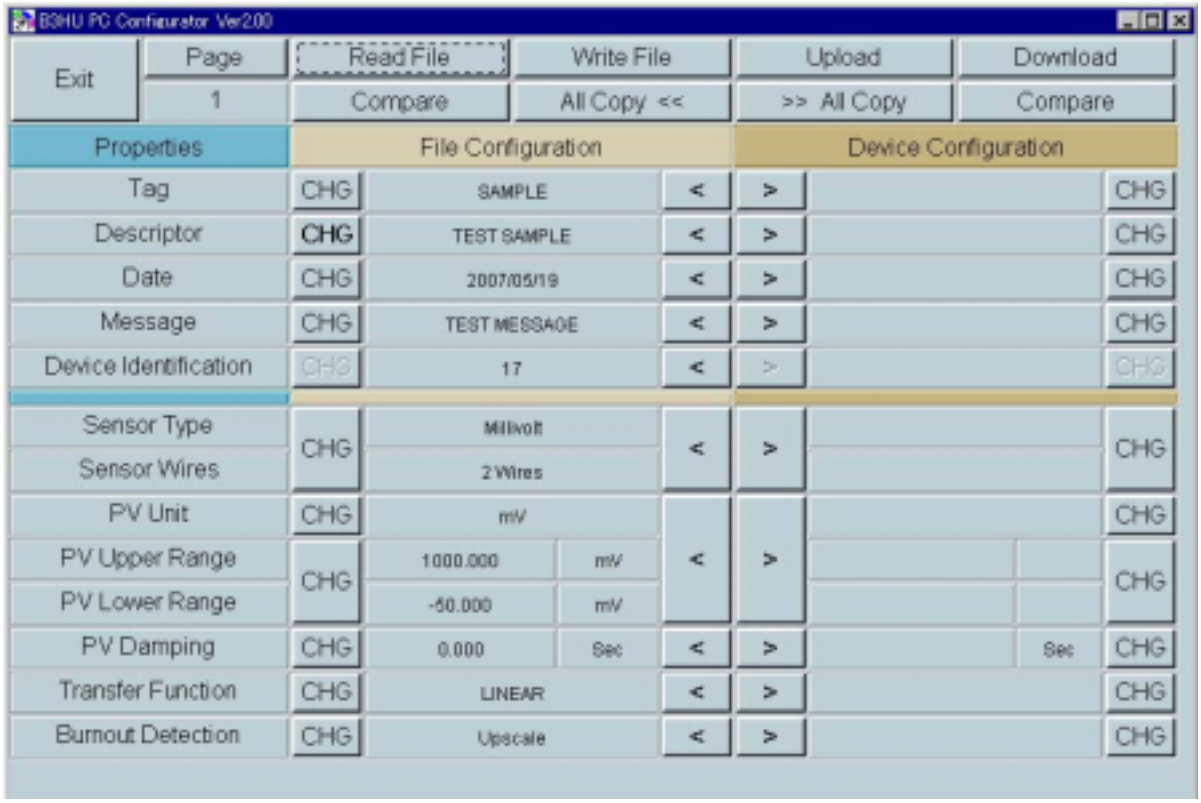
Figure 16. Data Uploaded



2.14.2 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 17). 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 17. File Read Out



2.14.3 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.

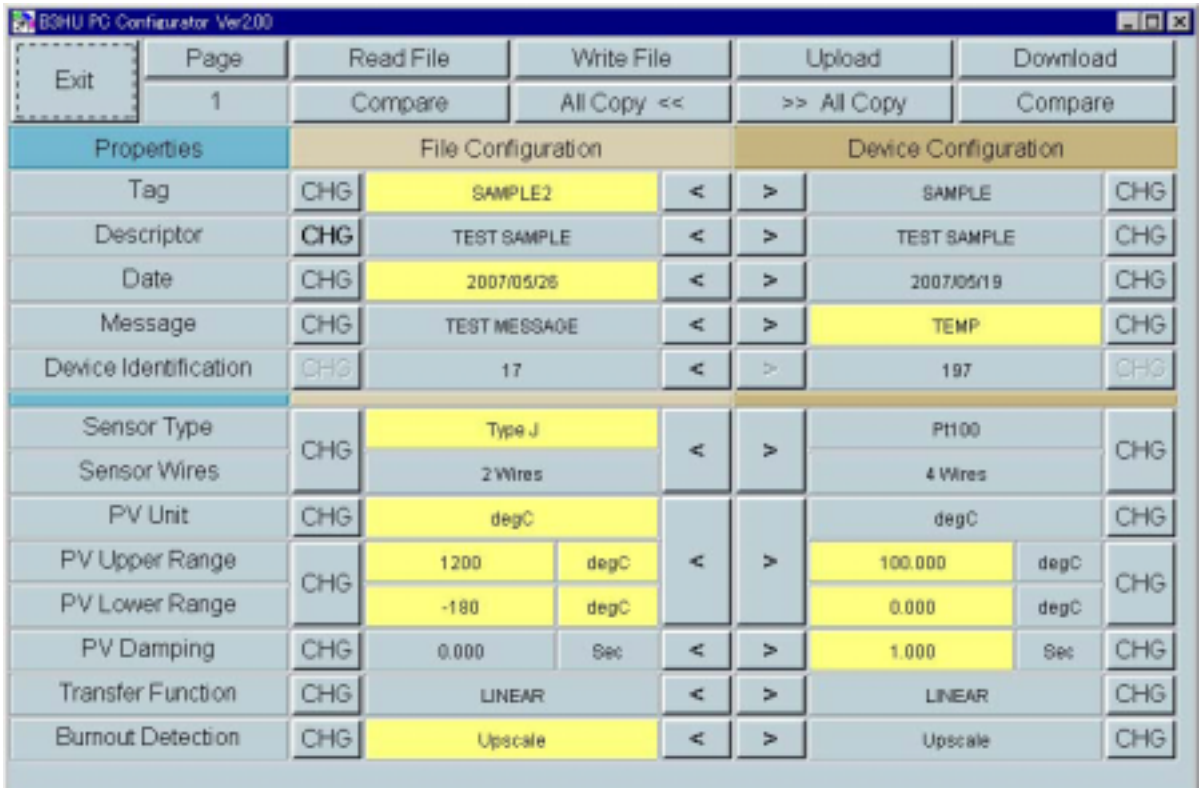
Note:

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

Only capital letters are 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.

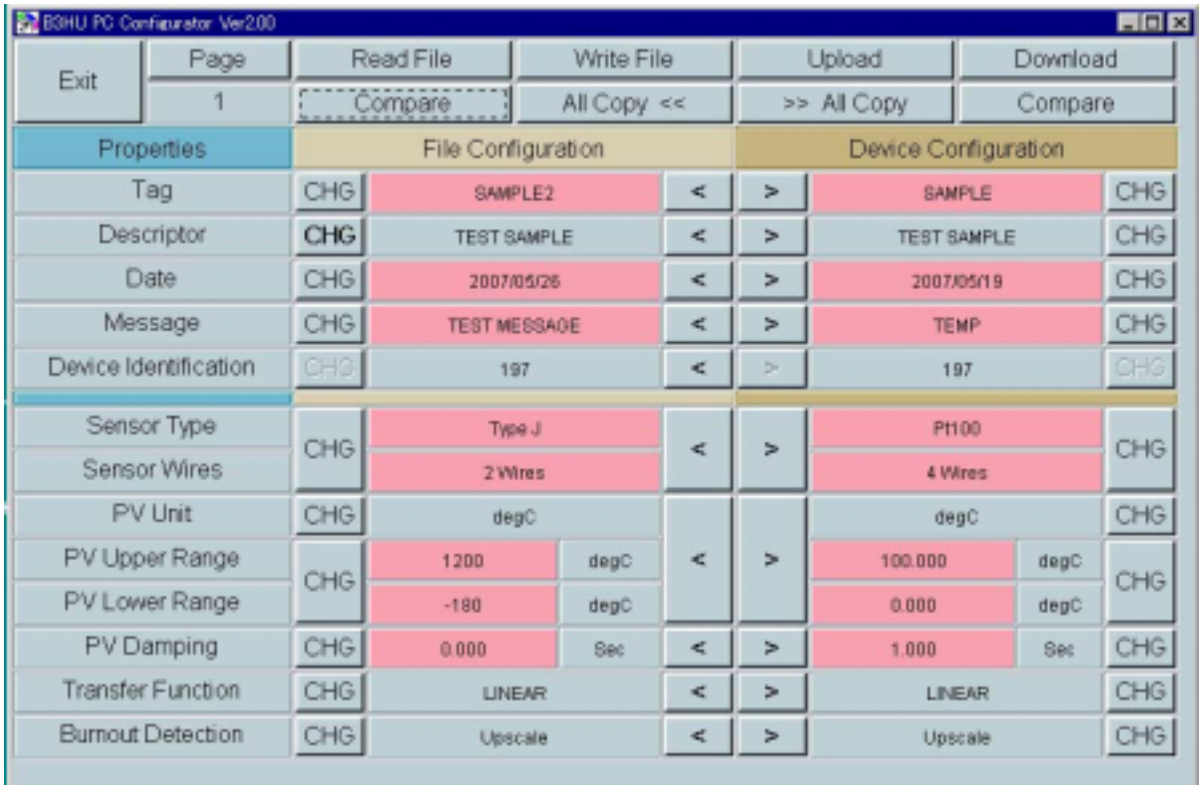
Figure 18. Parameters Modified



2.14.4 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 19. Parameters Compared



3 TROUBLESHOOTING

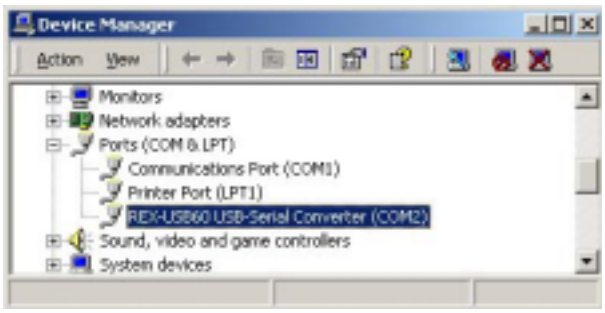
3.1 COM PORT CONFIGURATION

COM Port No. 1 or 2 are selectable with this configuration tool. 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 a USB HART Modem to COM Port 2.

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

Figure 20-1. Device Manager



(2) Start the program Agilent IO Libraries – IO Config tool (Figure 20-2).
Figure 20-3 shows IO Config window.

Figure 20-2. Starting IO Config Tool

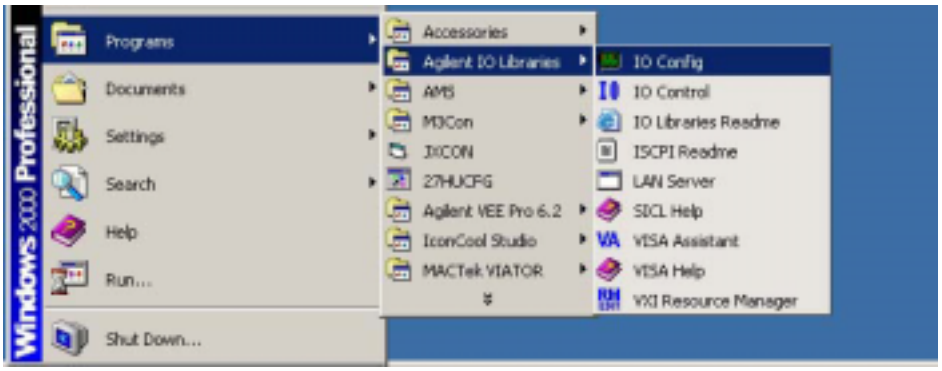
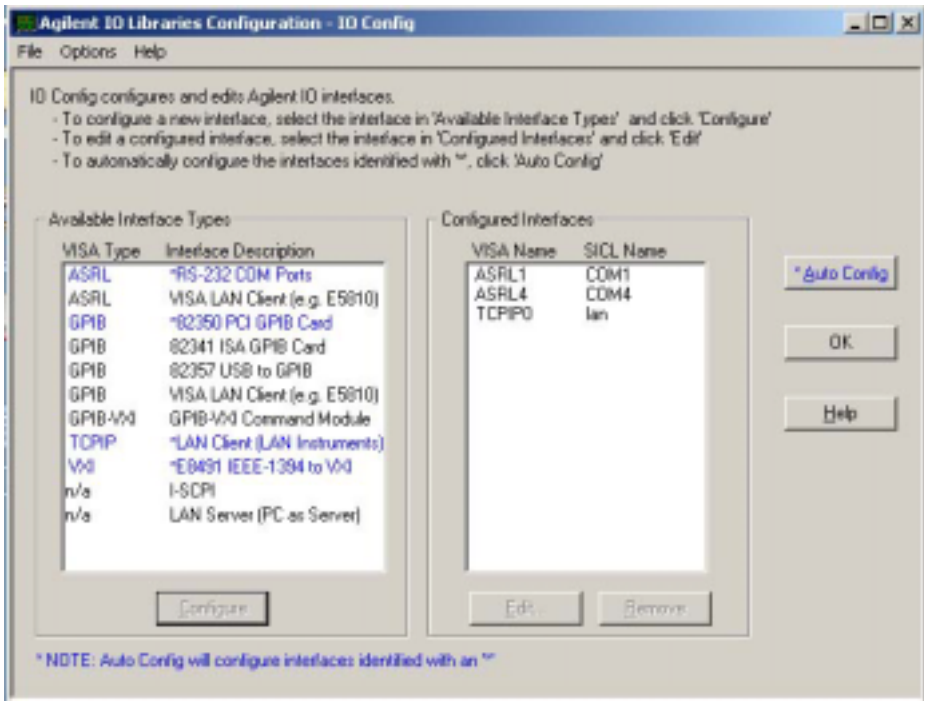
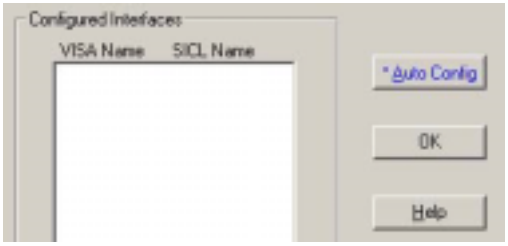


Figure 20-3. IO Config Window



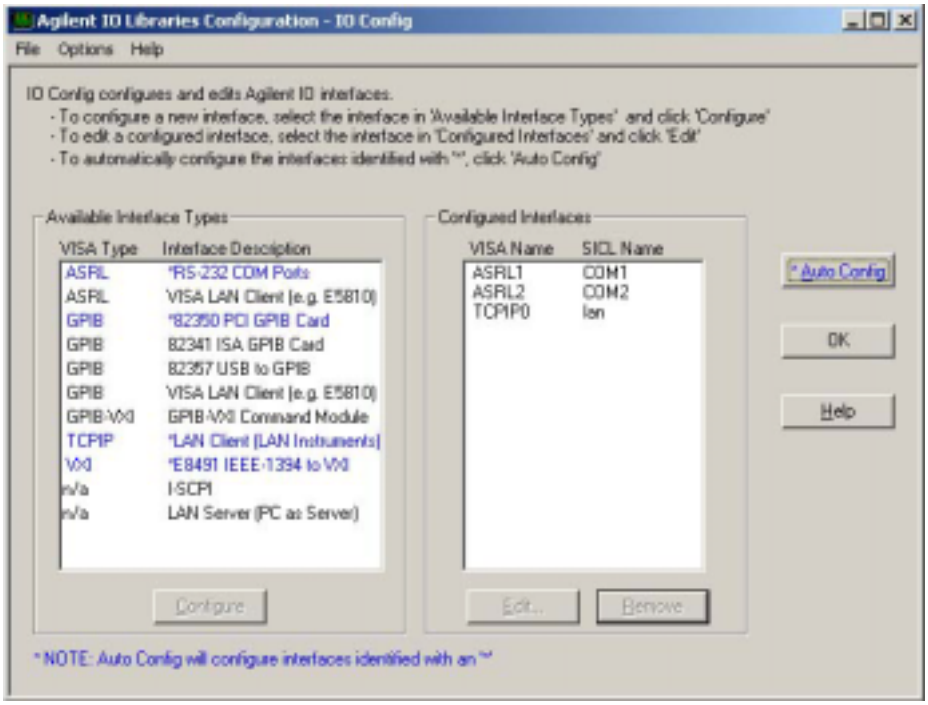
(3) Select all COM devices (COMx under SIDL Name) in Configured Interfaces field and remove them. Configured Interfaces field is now blank (Figure 20-4).

Figure 20-4. Configured Interfaces (removed)



(4) Click [Auto Config] button. Currently available COM devices are configured automatically. Figure 20-5 shows COM2 under Configured Interfaces, available for use.

Figure 20-5. IO Config Window after Reconfiguration



M-SYSTEM WARRANTY

1. What is covered.

M-System Co., Ltd. ("M-System") warrants, only to the original purchaser of new M-System products purchased directly from M-System, or from M-System's authorized distributors or resellers, for its own use not for resale, that the M-System products shall be free from defects in materials and workmanship and shall conform to the specifications set forth in the product catalogue applicable to the M-System products for the Warranty Period (see Paragraph 5 below for the Warranty Period of each product).

THE ABOVE WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THE M-SYSTEM PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

2. What is not covered.

This warranty does not cover any M-System product which has been: (1) modified, altered or subjected to abuse, misuse, negligence or accident; (2) improperly installed or installed in conjunction with any equipment for which it was not designed; or (3) damaged or destroyed by disasters such as fire, flood, lightning or earthquake.

In no event shall M-System be liable for any special, incidental, consequential or other damages, costs or expenses (including, but not limited to, loss of time, loss of profits, inconvenience or loss of use of any equipment).

3. Remedies.

If a defective product is returned to M-System in accordance with the procedures described below, M-System will, at its sole option and expense, either: (1) repair the defective product; (2) replace the defective product; or (3) refund the purchase price for the defective product paid by the purchaser. Except as otherwise provided by applicable state law, these remedies constitute the purchaser's **sole and exclusive** remedies and M-System's sole and exclusive obligation under this warranty.

4. Warranty Procedure.

If the purchaser discovers a failure of the M-System products to conform to the terms of this warranty within the Warranty Period, the purchaser must promptly (and, in any event not more than 30 days after the discovery of such failure) notify the relevant party as described below either by telephone or in writing at the below address to obtain an Authorized Return (AR) number and return the defective product to the relevant party. The designated AR number should be marked on the outside of the return package and on all correspondence related to the defective product. The purchaser shall return, at purchaser's expense, defective products only upon receiving an AR number. In order to avoid processing delays, the purchaser must include: copies of the original purchase order and sales invoice; the purchaser's name, address and phone number; the model and serial numbers of the returned product; and a detailed description of the alleged defect.

5. Warranty Period.

Signal Conditioner:	36 months from the date of purchase.
M-Rester:	12 months from the date of purchase.
Valve Actuator:	18 months from the date of shipment from M-System or 12 months from the date of its installation, whichever comes first.
Other Products:	36 months from the date of purchase.

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