User's
Manual

# Model LL200
# PC-based
# Custom Computation
# Building Tool

NEW GREEN SERIES

IM 05G01B22-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 05G01B22-01E
7th Edition

# Introduction

This user's manual describes the functions of Model LL200 PC-based Custom Computation Building Tool (hereinafter, simply referred to as the LL200 tool in the main text), which is used with Model UT750/UP750 Green series Controllers (hereinafter, simply referred to as the UT750/UP750 controller in the main text), and how to operate the tool.

The LL200 tool consists of the following component tools.

- Custom computation building tool
- Parameters setting tool

This manual focuses exclusively on the custom computation building tool. For details on the handling of the parameters setting tool, see the Model LL100 PC-based Parameters Setting Tool user's manual (IM 05G01B12-01E).

## ■ Intended Readers

This manual is intended for people familiar with the functions of the UT750/UP750 controller and capable of working with Windows 98/2000/XP or Windows NT 4.0, such as instrumentation and control engineers and personnel in charge of maintaining instrumentation and control equipment.

## ■ Related Documents

The following user's manuals all relate to the LL200 PC-based Custom Computation Building Tool. Read them as necessary. The codes enclosed in parentheses are the document numbers.

### ● Model UT750 User's Manual for Single-loop Control (IM 05D01B02-01E to -05E)

Explains the basic operation of the UT750 controller.

### ● Model UP750 User's Manual for Single-loop Control (IM 05E01B02-01E to -07E)

Explains the basic operation of the UP750 controller.

### ● GREEN Series User's Manual (Reference) (IM 05D01A02-01E)

Explains the functions of the GREEN Series controllers in detail.

### ● GREEN Series Communication Functions (IM 05G01B02-01E)

Explains the communication functions and communication protocols of the GREEN Series in detail.

### ● GREEN Series Communication Reference (IM 05G01B02-02E)

Provides detailed information about GREEN Series controller's internal registers that can be accessed by communication.


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● **Model LL200 PC-based Custom Computation Building Tool (IM 05G01B22-01E)**

A user's manual for creating GREEN Series custom computations on a personal computer.

● **Model LL200 PC-based Custom Computation Building Tool User's Reference for UT750 (IM 05G01B22-02E)**

● **Model LL200 PC-based Custom Computation Building Tool User's Reference for UP750 (IM 05G01B22-03E)**

User's manuals that describe the functions needed to create custom computations of UT750 and UP750. Refer to these manuals if you are unfamiliar with the types of functions available or how these functions work.

## ■ Trademarks

Windows 98/2000/XP and Windows NT 4.0 are registered trademarks of Microsoft Corporation, USA.

"Ethernet" is registered trademark of XEROX Corporation.

# Visual Inspection and Cross-check of Accessories

Visually inspect the purchased product upon delivery to make sure it is not damaged in any way. Store the box and inner packing material of the package in a safe location - they may be needed should the product fail and need to be sent back to the manufacturer for repair.

## ■ Cross-check of Model and Suffix Codes

Refer to the following table to make sure the model and suffix codes of the LL200 tool are as specified in your order.

| Model Code | Suffix Code | Description |
|---|---|---|
| LL200 | | Custom computation building tool for UT750/UP750* |
| | -E10 | Model for use with IBM PC/AT-compatible personal computers |

* The LL200 tool includes the same parameter setting function as the LL100 PC-based Parameters Setting Tool.

## ■ Confirmation of the Model and Suffix Codes

Make sure the delivered package contains all of the following items. If any item is missing or found to be damaged, immediately contact the sales office or dealership from which you purchased the product.

- 3.5-in. floppy disks (5 disks)
- Dedicated adapter, supplied with two AAA-size batteries (one unit)
- Dedicated cable (one cable)
- GREEN Series User's Manual (Reference) (CD-ROM version)

# Documentation Conventions

## ■ Notational Conventions in This Manual

This manual uses the following notational conventions.

[ ]:

indicates the name of a dialog box or message, or a view name (name indicated in the upper-left corner of a dialog box.)

Example: • The [Input Block] dialog box appears.

< >:

indicates the name of a command in a dialog box or the name of a tool menu (or a command in the menu).

Examples:
- Click the <OK> button.
- Click the <Cancel> button.
- Click the <Input Block> button.
- From the tool menus, choose <File>, then <Open>.

“ ”:

indicates the text typed.

Example: • Type “ABCD” in the <xxx> text box.

**NOTE**

Draws attention to information that is essential for understanding the operation and/or features of the product.

### TIP

Gives additional information to complement the present topic and/or describe terms used in this document.

### See Also

Gives reference locations for further information on the topic.

## ■ Description of Displays

(1) Some of the representations of product displays shown in this manual may be exaggerated, simplified, or partially omitted for reasons of convenience when explaining them.

(2) Figures and illustrations representing the controller’s displays may differ from the real displays in regard to the position and/or indicated characters (upper-case or lower-case, for example), to the extent that they do not impair a correct understanding of the functions and the proper operation and monitoring of the system.

# Notices

## ■ Regarding This User's Manual

(1) This manual should be passed on to the end user. Keep at least one extra copy of the manual in a safe place.

(2) Read this manual carefully to gain a thorough understanding of how to operate this product before you start using it.

(3) This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa Electric) does not guarantee that these functions are suited to the particular purpose of the user.

(4) Under absolutely no circumstance may the contents of this manual, in part or in whole, be transcribed or copied without permission.

(5) The contents of this manual are subject to change without prior notice.

(6) Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention however, please contact your nearest Yokogawa representative or our sales office.

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(1) In order to protect the product and the system controlled by it against damage and ensure its safe use, make sure that all of the instructions and precautions relating to safety contained in this document are strictly adhered to. Yokogawa does not guarantee safety if products are not handled according to these instructions.

(2) The following safety symbols are used on the product and/or in this manual.

### ● Symbols Used on the Product and in This Manual

**CAUTION**

This symbol on the product indicates that the operator must refer to an explanation in the instruction manual to avoid the risk of injury or death of personnel or damage to the instrument. The manual describes how the operator should exercise special care to avoid electrical shock or other dangers that may result in injury or loss of life.

Protective Grounding Terminal

This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

Functional Grounding Terminal

This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

### ● Symbol Used in This Manual Only

**WARNING**

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

## ■ Force Majeure

(1) Yokogawa Electric does not make any warranties regarding the product except those mentioned in the WARRANTY provided separately.

(2) Yokogawa Electric assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

(3) Be sure to use the spare parts approved by Yokogawa Electric when replacing parts or consumables.

(4) Modification of the product is strictly prohibited.

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# Model LL200
# PC-based Custom Computation Building Tool

IM 05G01B22-01E 7th Edition

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# 1. Overview

This chapter first explains what custom computation is and then introduces the tool used to configure these computations and the model and suffix codes of the Green series controllers models to which the tool applies.

This chapter also discusses the system requirements that must be met to be able to use the LL200 tool and shows external views of the dedicated adapter and cable.

## 1.1 Function Overview of the LL200 Tool

The LL200 tool is designed to run on a personal computer connected to the UT750/UP750 controller. You can set a variety of functions for the UT750/UP750 controller from the personal computer. Inversely, you can read the settings from the UT750/UP750 controller.

In addition to these operations, you can set the various parameters of the UT750/UP750. This particular function is the same as the one offered by Model LL100 PC-based Parameters Setting Tool, another tool used with the Green series controllers. This manual does not therefore discuss this function in particular. When you use this function in your practical applications, refer to the Model LL100 PC-based Parameters Setting Tool user's manual (supplied together with this manual).

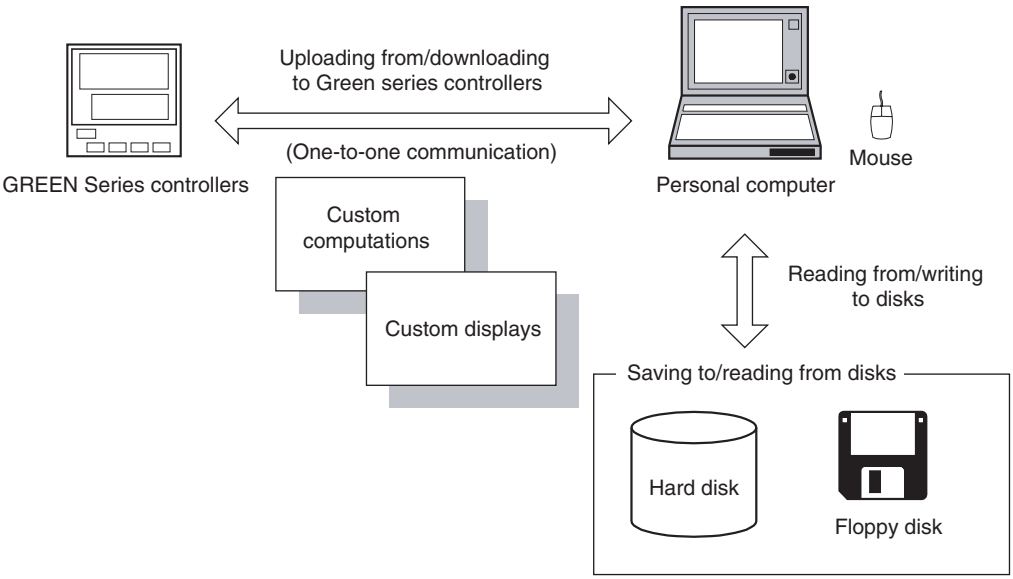


**Figure 1.1.1 Conceptual View of LL200 Tool**

The LL200 tool is designed to run under Windows 98/2000/XP or Windows NT 4.0. For details on how to use the personal computer and Windows software, see their respective instruction manuals.

The Green series controllers come with built-in control functions and various controller modes (UT/UP modes) that provide different I/O computing functions. These modes are designed to support their respective control applications. From these choices, you can choose one that best meets your application needs.

In some control applications, however, you may want to execute special computations based upon specific input data or have a contact output of a specific data item in a specific control sequence. To be able to meet these needs, the UT750/UP750 controller provides a separate controller mode with which you can freely program your own computations. Computing functions available in these modes are referred to as custom computations.

Custom computations allow you to perform a variety of calculations based on input and output signals. These calculations include not only the four arithmetic operations and logical operations but also ten-segment linear approximations, temperature and humidity computations, temperature-based correction coefficient computations, pressure-based correction coefficient computations, and so on.

For example, you can use the four arithmetic operations to apply the desired type of correction to input signals, or use a logical operation to program a sequencing process that works between input and output contacts.

Custom computations are configured using the given methods of block connection, as shown in Figures 1.1.2 and 1.1.3.

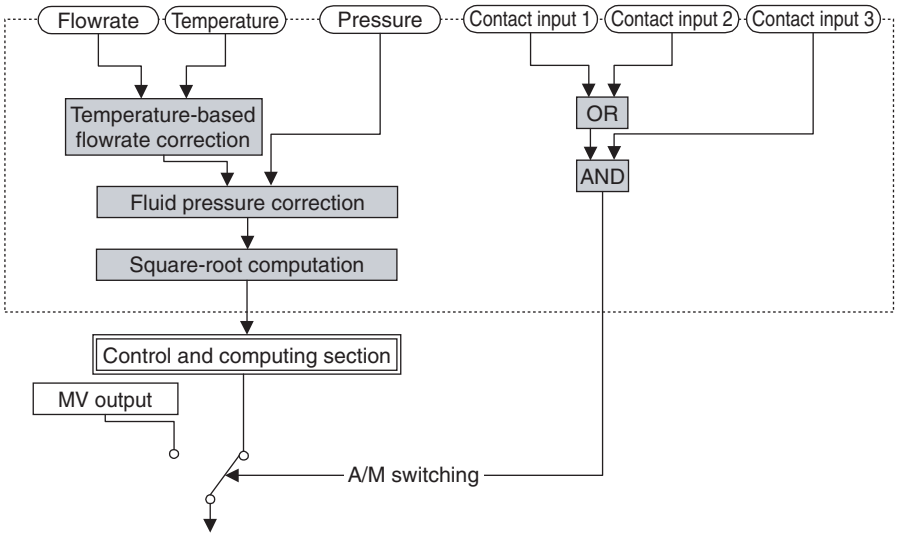


**Figure 1.1.2 Custom Computations Applied to Input Signals**

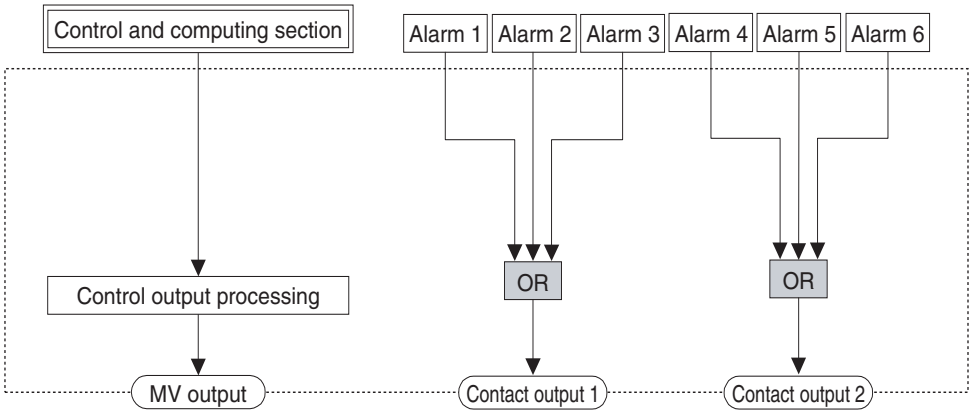


**Figure 1.1.3 Custom Computations Applied to Output Signals**

When custom computations are in use, you can also freely configure the operation displays of the UT750/UP750 controller to suit your desired view. This function is designed so that you can choose from the preset menus the types of data items, the sequence in which the data items are shown, and the conditions required to show them on the PV and SP digital displays of the UT750/UP750 controller. The displays thus configured are referred to as custom displays.

Normally, the term “custom computing function” is used to include both the custom computation and custom display functions.

# 1.2 Operating Environment of the LL200 Tool and Wiring Specifications

## ■ System Requirements

- Personal computer: Windows 98/2000/XP- or Windows NT 4.0-enabled IBM PC/AT-compatible model
- Operating system: Windows 98/2000/XP or Windows NT 4.0 (SP3 or superior)
- CPU: 300-MHz Pentium processor or superior is recommended.
- Main memory: 128 MB minimum for Windows 98/2000/XP or 24 MB minimum for Windows NT 4.0 is recommended.
- Hard disk

  Memory space required to store the tool's programs: 15 MB minimum

  Memory space required to store the parameter data: 2 MB minimum
- CRT display

  800 x 600 pixels or superior

  Should be capable of handling at least 256 colors.

  Smaller fonts should be used.
- RS-232C communication ports: One channel(COM1 to COM16), with 9-pin D-Sub connector
- 3.5-inch floppy disk drive: One drive.
- Printer: As necessary.

## ■ Dedicated Adapter

- Communication method

  Green series controller: Optical, contactless, bidirectional serial communication

  Personal computer: RS-232C half-duplex communication using the dedicated cable
- Power supply: Two AAA-size batteries or external power source

  Use of an external power source is recommended for tuning over a prolonged time period.
- Battery life: Approximately 50 hours (when the adapter is continuously operated on alkaline batteries)
- Specifications of external power source
- Should comply with EIAJ RC-6705.

  Input ratings: 5 V DC/50 mA

  (Purchase a commercially available plug and AC adapter for the external power source.)
- Ambient temperature range: 0 to 50˚C
- Ambient humidity range: 20 to 90%RH (non-condensing)
- Transport and storage conditions: -25 to 70˚C, 5 to 95%RH (non-condensing)
- Dust- and water-proof construction: Not applied.
- Standards: CE Marking approved (EMC only)

**WARNING**

The dedicated adapter is not waterproof. Do not use the adapter in locations that are likely to be exposed to splashes of water or other liquids.

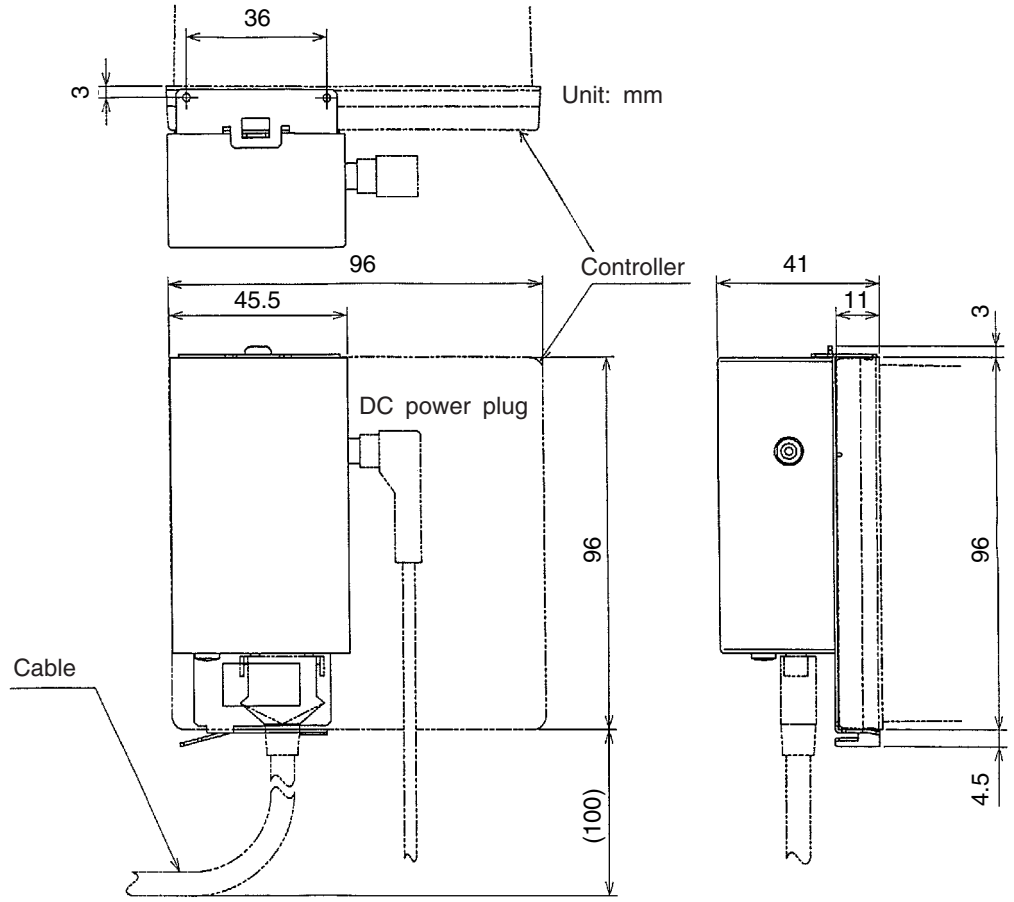


**Figure 1.2.1 External View of the Dedicated Adapter**

unit : mm(approx. inch)

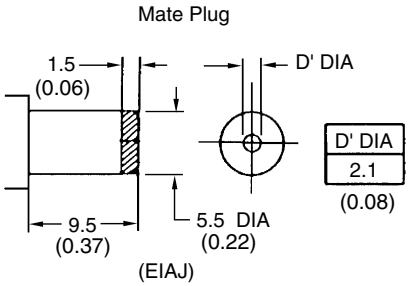


**Figure 1.2.2 External View of the External Power Inlet on the Dedicated Adapter**

## ■ Dedicated Cable

Cable with 9-pin D-Sub connector for IBM PC/AT-compatible models: 3-m long

unit : mm(approx. inch)

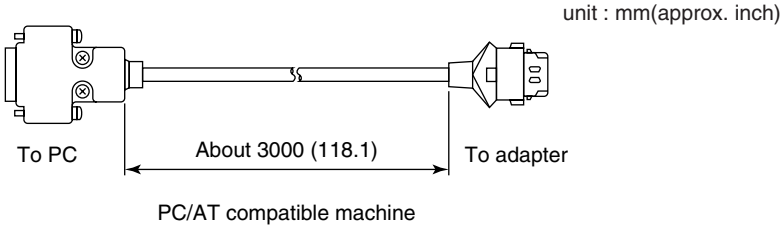


**Figure 1.2.3 External View of the Dedicated Cable**

# 1.3 Model and Suffix Codes of Applicable Green series Controller Models

The controller models allowing for custom computations are as follows.

## ■ Digtal Indicating Controller

| Model Code | Suffix & Optional codes | | Description |
|---|---|---|---|
| **UT750** | -□□ | | Digital Indicating Controller (provided with Custom Computation Function) |
| Type | -0 | | Single-loop type |
| | -1 | | Position proportional type |
| | -5 | | Dual-loop type |
| Optional functions | | 0 | None |
| | | 1 | With communication, auxiliary analog (remote) input |

## ■ Program Controller

| Model Code | Suffix & Optional codes | | Description |
|---|---|---|---|
| **UP750** | -□□ | | Program Controller (provided with Custom Computation Function) |
| Type | -0 | | Single-loop type |
| | -5 | | Dual-loop type |
| Optional functions | | 0 | None |
| | | 1 | With communication, auxiliary analog input |

# 2. Setup

This chapter explains how to set up the hardware and software necessary to work with the LL200 tool.

## 2.1 Installing the LL200 Tool

**NOTE**

Before installing LL200, quit all running applications.

When using Windows 2000 or XP :

Log on using the user name of Administrators group.

The program does not start normally if the user name not belonging to the Administrators group is used for logging on.

(1) Insert Disk 1 of the LL200 tool into the floppy drive.

(2) From the Start menu of Windows, choose <Run . . .>. Type the name of the floppy drive as \Setup.exe and click the <OK> button.

(3) To continue, follow the instructions given in each dialog box.

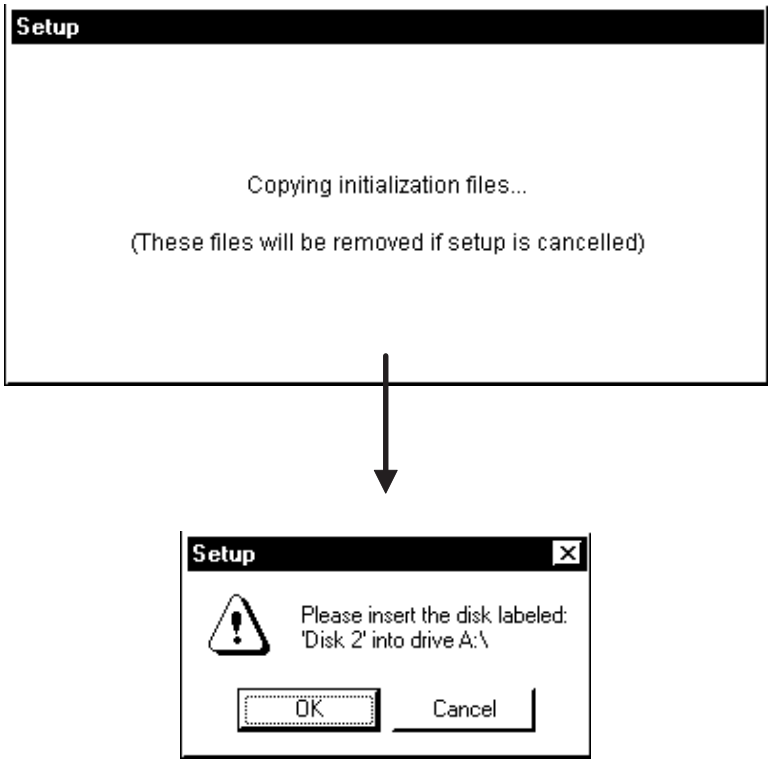


**Figure 2.1.1 Window for Installation Operations**

# ■ LL200 File Package and Files of Information on Configured Custom Computations

The LL200 package files comprise a set of the files that are needed to run the LL200 tool, the installation program, sample files, and so on.

**NOTE**

The file names should contain no more than 16 half-byte alphanumeric characters, and their extensions should be as shown in the following tables.

## ● LL200 Package Files

When the installation of the LL200 tool is complete, the folders in the following table are set up.

| Folder Name | File |
|---|---|
| LL200 | Package file |
| LL200\SAMPLE\UT750 | Sample file (UTm##.tec) ##: number |
| LL200\SAMPLE\UP750 | Sample file (UPm##.pec) ##: number |
| LL200\USER\UT750 | User file (*.t7d, *.e7d, *.tec, *.csv) |
| LL200\USER\UP750 | User file (*.p7d, *.e7d, *.pec, *.e7p, *.p7c, *.csv) |

## ■ Sample Files

The sample files contain information on custom computations in the I/O blocks of controller modes (UT modes or UP modes) 1 to 15.

| Sample file for each controll mode | UT750 | UP750 |
|---|---|---|
| Controller mode1:Single–loop control | Utm01.tec | Upm01.pec |
| Controller mode1:Single–loop control (Enhanced) | | Upm01e.pec |
| Controller mode2:Cascade primary–loop control | Utm02.tec | Upm02.pec |
| Controller mode2:Cascade primary–loop control (Enhanced) | | Upm02e.pec |
| Controller mode3:Cascade secondary–loop control | Utm03.tec | – |
| Controller mode4:Cascade control | Utm04.tec | Upm04.pec |
| Controller mode4:Cascade control (Enhanced) | | Upm04e.pec |
| Controller mode5:Loop control for back up | Utm05.tec | – |
| Controller mode6:Loop control with PV switching | Utm06.tec | Upm06.pec |
| Controller mode6:Loop control with PV switching (Enhanced) | | Upm06e.pec |
| Controller mode7:Loop control with PV auto–selector | Utm07.tec | Upm07.pec |
| Controller mode6:Loop control with PV auto–selector (Enhanced) | | Upm07e.pec |
| Controller mode11:Dual–loop control | Utm11.tec | Upm11.pec |
| Controller mode11:Dual–loop control (Enhanced) | | Upm11e.pec |
| Controller mode12:Temperature and Humidity control | Utm12.tec | Upm12.pec |
| Controller mode12:Temperature and Humidity control (Enhanced) | | Upm12e.pec |
| Controller mode13:Cascade control with two universal inputs | Utm13.tec | Upm13.pec |
| Controller mode13:Cascade control with two universal inputs (Enhanced) | | Upm13e.pec |
| Controller mode14:Loop control with PV switching and two universal inputs | Utm14.tec | Upm14.pec |
| Controller mode14:Loop control with PV switching and two universal inputs (Enhanced) | Utm14e.tec | Upm14e.pec |
| Controller mode15:Loop control with PV auto–selector and two universal inputs | Utm15.tec | Upm15.pec |
| Controller mode15:Loop control with PV auto–selector and two universal inputs (Enhanced) | | Upm15e.pec |

## ■ User Files

The user files contain information on user-created custom computations.

| Type of User File | UT750 | UP750 |
|---|---|---|
| Data file for custom computations and displays | *.t7c | *.p7c |
| Results of comparison between custom-computation data (text file) | *.e7c | |
| Parameter data file | *.t7d | *.p7d |
| Results of comparison between parmeter data (text file) | *.e7d | |
| Data for printouts (CSV-format file) | *.csv | |
| Program pattern data file | ———— | *.p7p |
| Result of comparison between program pattern data (text file) | ———— | *.e7p |

# 2.2 Uninstalling the LL200 Tool

(1) Double-click the <Add/Remove Programs> icon in the Control Panel menu of Windows.

(2) Choose <LL200>, and then click the <Add/Remove . . .> button.

(3) To continue, follow the instructions given in each dialog box.


**Figure 2.2.1 Dialog Box for Uninstallation Operations**

# 2.3 Connecting the Controller to the Personal Computer

The controller can be connected to a personal computer in two ways; using either the optical communication interface on the controller's front panel or the RS-485 communication terminal on the rear panel (if the controller has the optional communication function).

This section discusses the way the controller is connected to the personal computer using the optical communication interface.

Connect the controller to the computer either before or after you configure the custom computations. See Section 3.2, "Flow of Working with the LL200 Tool," for more information.

### See Also

Chapter 2, "Setup," in the Green series-Communication Functions user's manual (IM 05G01B02-01E), for details on how to wire the controller using the RS-485 communication terminal.

### NOTE

The dedicated adapter has an internal switch (located where the adapter comes into contact with the controller). Exercise care to avoid breaking the switch when attaching the adapter onto the controller. Installing the adapter in place automatically turns on the switch, causing the batteries to discharge even if no communication is done. If you have no immediate plan to communicate, keep the adapter removed from the controller.

### WARNING

When using an external power source, take care to ensure that the polarities of the AC adapter are correct. Do not apply power from the AC adapter in excess of the power ratings of the dedicated adapter. Either of these cases may result in damage to the equipments.

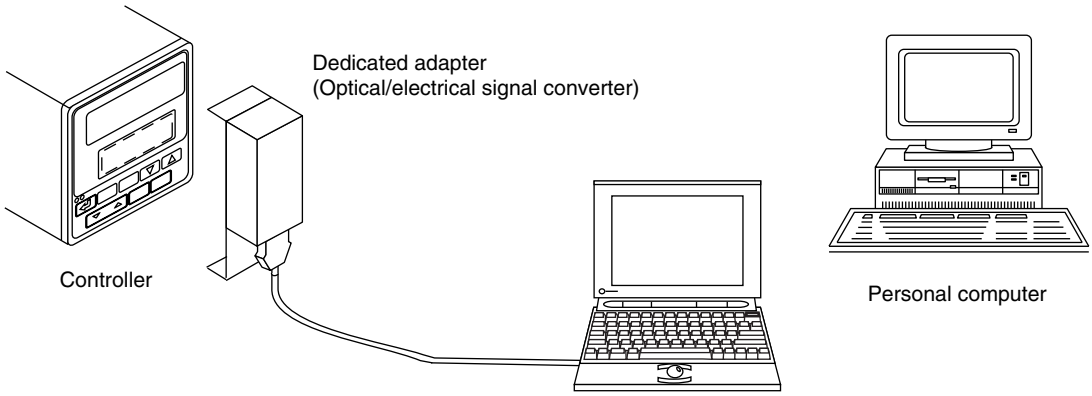


**Figure 2.3.1 Connection of the Green series Controllers to the Personal Computer using the Optical Communication Interface**

Follow the steps below to connect the controller to a personal computer.

(1) Connect the dedicated adapter to the RS-232C communication port of a personal computer using the dedicated cable.

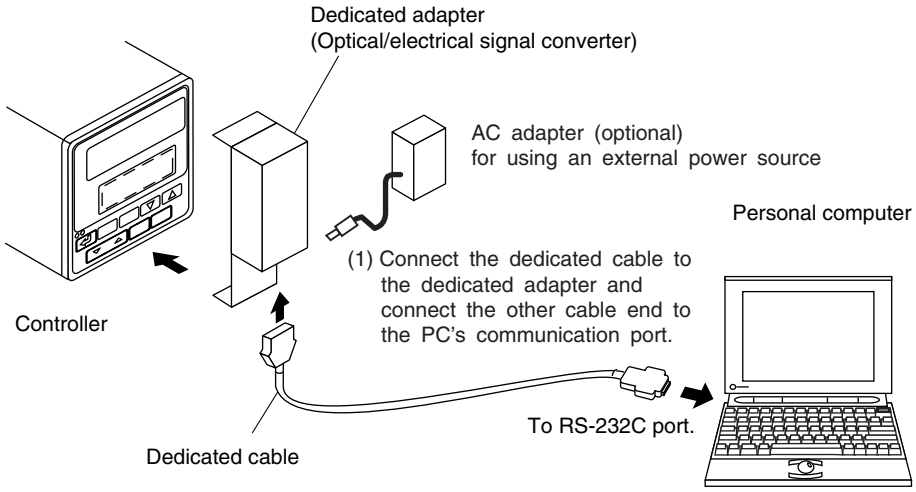


**Figure 2.3.2 Connection via Dedicated Adapter**

(2) As shown in Figure 2.3.3, hang the dedicated adapter from the top groove of the controller.

(3) Push the adapter to the controller's front panel to securely fix it in place.

**NOTE**

Make sure the adapter is attached to the controller in a vertical orientation. Communication is not possible if the dedicated adapter is attached in a slanting position.

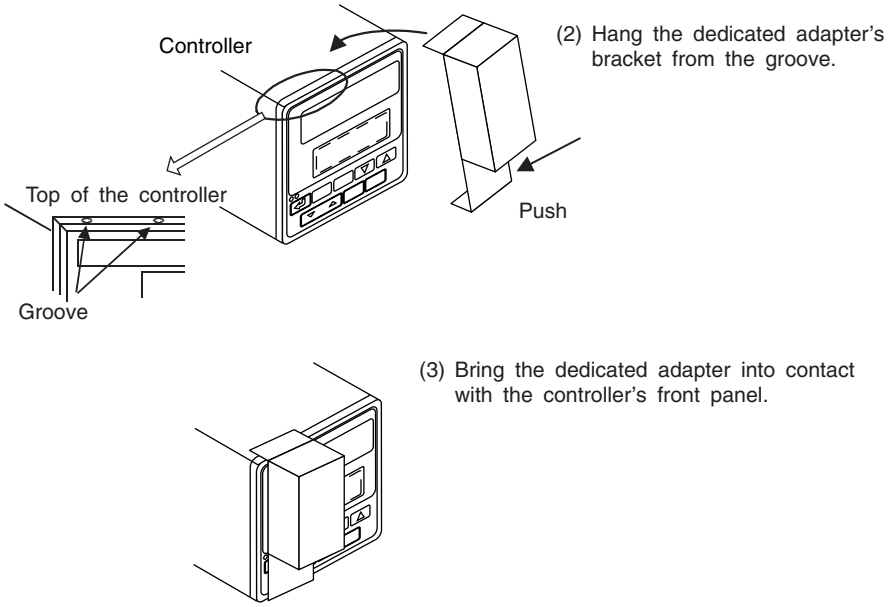


**Figure 2.3.3 Attaching the Dedicated Adapter**

# 3. Using the LL200 Tool

This chapter explains how to use the LL200 tool. Be sure to read this chapter before you proceed any further.

## 3.1 Starting and Exiting the LL200 Tool

**NOTE**

Before installing LL200, quit all running applications.

When using Windows 2000 or XP :

Log on using the user name of Administrators group.

The program does not start normally if the user name not belonging to the Administrators group is used for logging on.

### 3.1.1 Starting the LL200 Tool

(1) From the Start menu of Windows, choose <Programs>, then <Green Series LL200>.

(2) The LL200 tool starts up and the following dialog box appears.

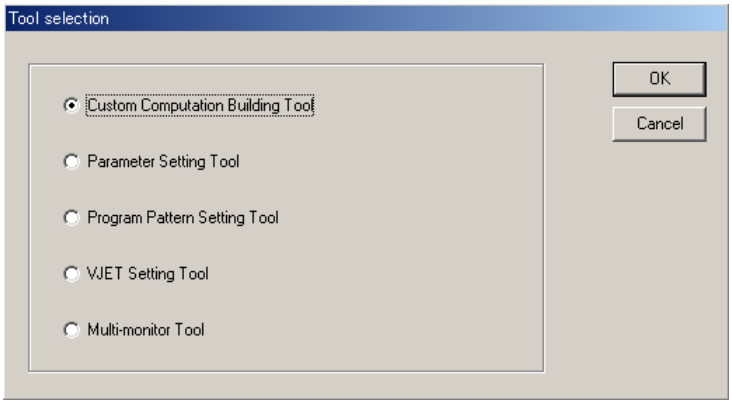


**Figure 3.1.1 [Tool selection] Dialog Box Appears When the LL200 Tool Starts Up**

(3) Select the Custom Computation Building Tool, and click the <OK> button.

(4) The [Select Series] dialog box appears.

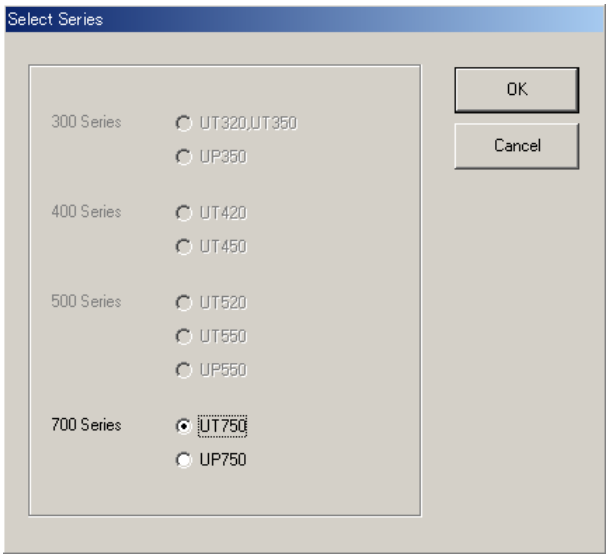


**Figure. 3.1.2 [Select Series] Dialog Box**

(5) Select the controller model (UT750 or UP750) and click the <OK> button.

(6) The [New/Modification] dialog box appears. (Fig. 3.1.3)

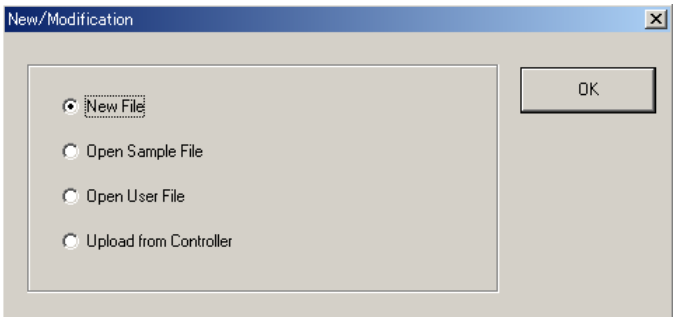


**Figure 3.1.3 [New/Modification] Dialog Box**

(7) Click the option button which you want to use, and the <OK> button.

(8) The [Select Model and Suffix Codes] dialog box appears. (Fig. 3.1.4)

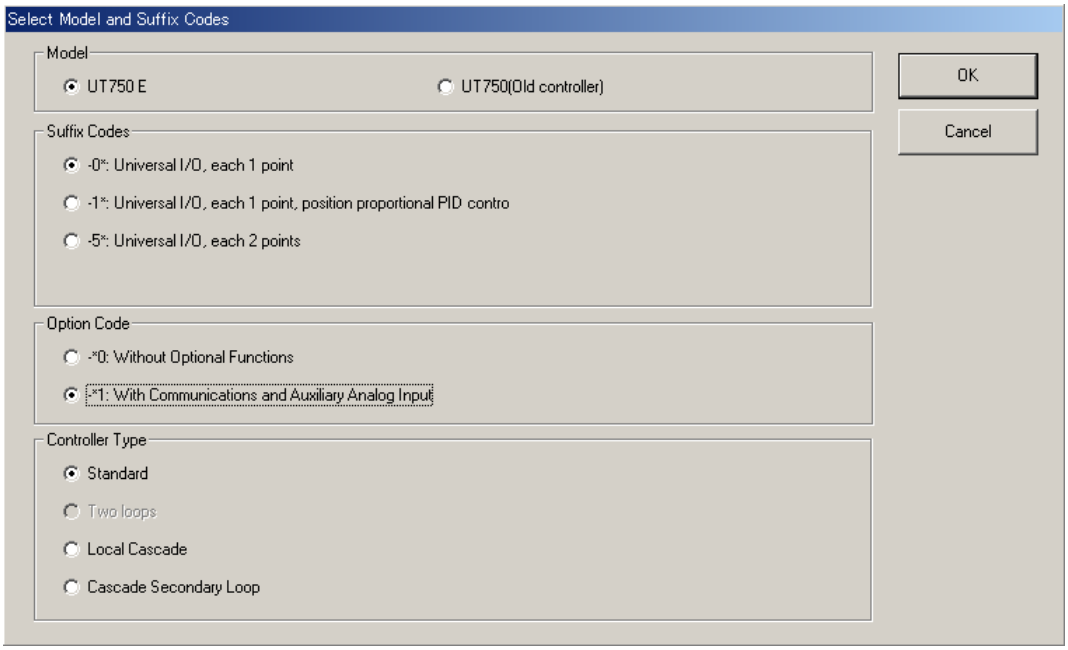


**Figure 3.1.4 [Select Model and Suffix Codes] Dialog Box**

(9) Click the <OK> button.

(10) The [Costom Computation Configuration Menu] dialog appears. (Fig. 3.1.5)

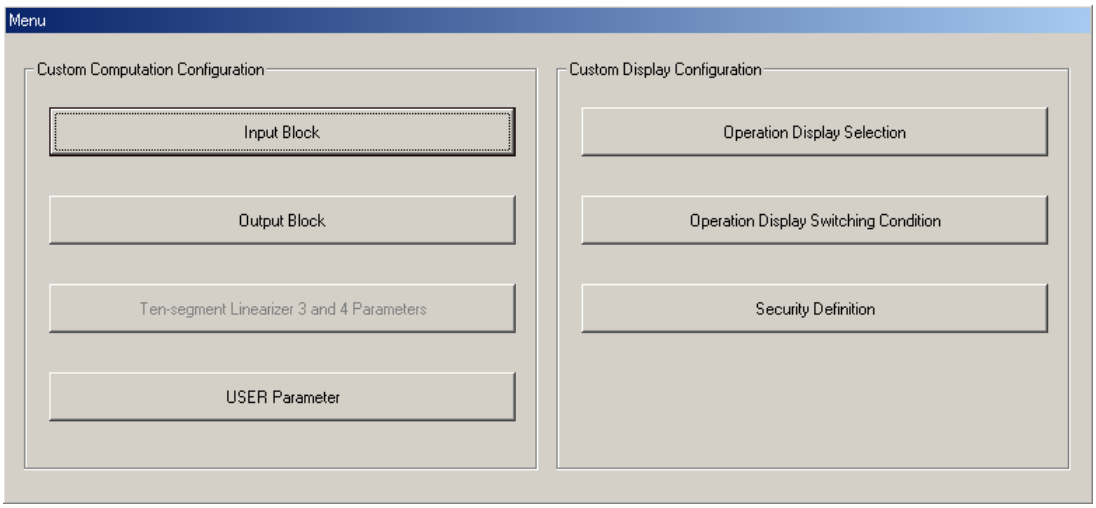


**Figure 3.1.5 [Custom Computations Configuration Menu] Dialog Box**

## 3.1.2 Exiting the Tool

(1) From the LL200 tool menus, choose <File [F]>, then <Exit [X]>.

(2) The following message box appears.

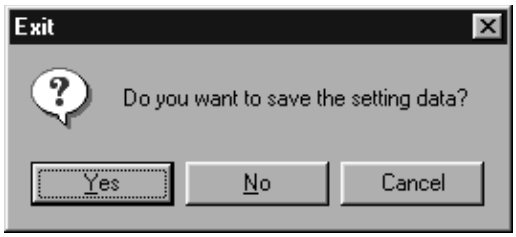


**Figure 3.1.6**

- To save the data of your current work, click the <Yes> button.

(3) The [Save As] dialog box appears. (See Subsection 7.3.2)
Input the file name (Note) and click the <Save> button.

(Note): The file name should contain no more than 16 half-byte alphanumeric characters.

- If the data need not be saved, click the <No> button.

(4) The following message box appears. (Fig.3.1.7)

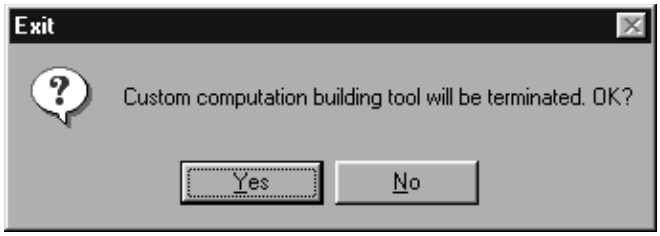


**Figure 3.1.7**

(5) To exit the LL200 tool, click the <Yes> button.

# 3.2 Flow of Working with the LL200 Tool

Figure 3.2.1 shows the flow of work for configuring custom computations and displays.

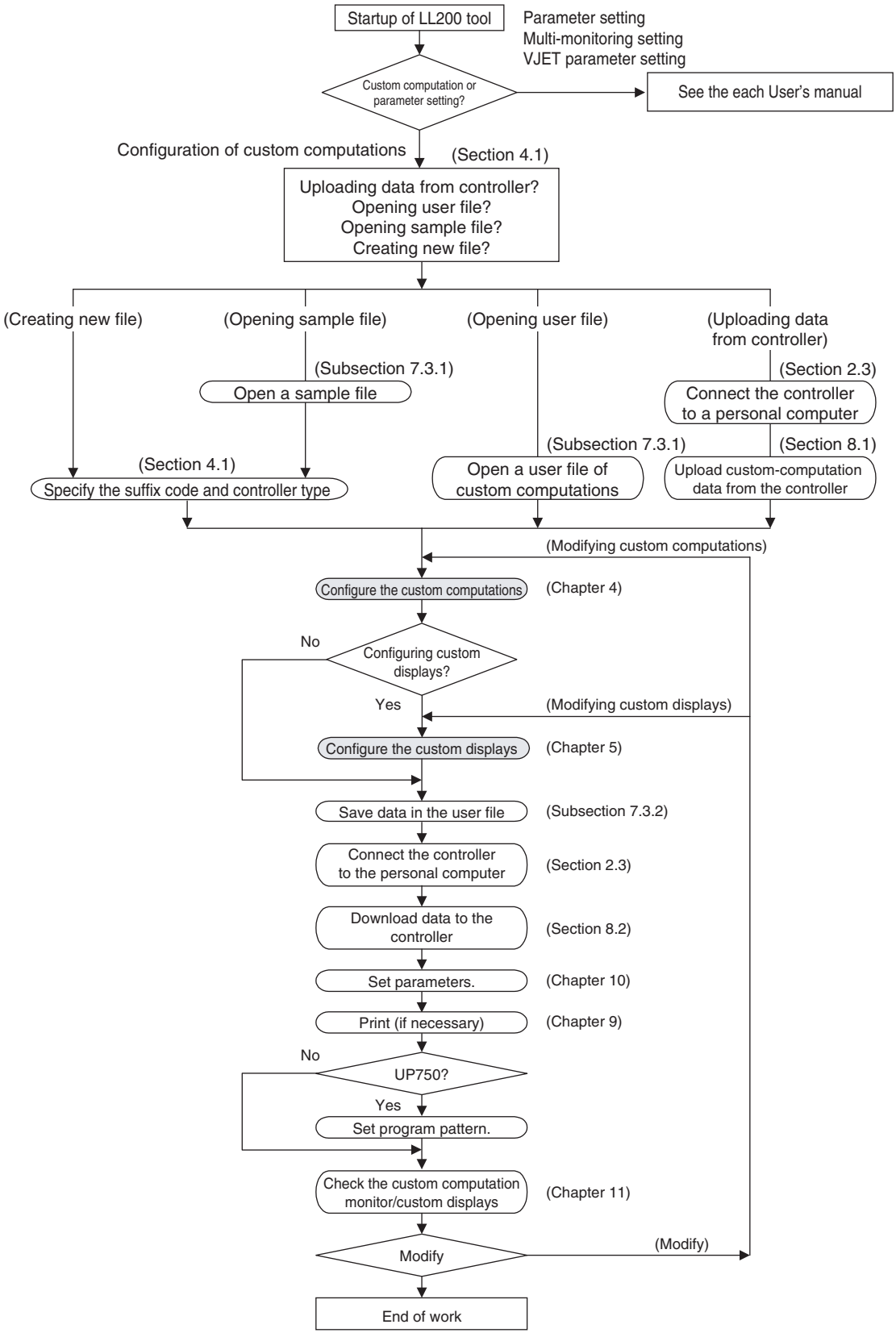


**Figure 3.2.1 Flow of Work for Configuring Functions Using the LL200 Tool**

# 3.3 Tool Menus

The Tool Menus can be used with LL200 tool.

## ● Operation

(1) Click the item (you want to use) in the tool menus.

(2) The pull down menu appears, and select the command you want to use.

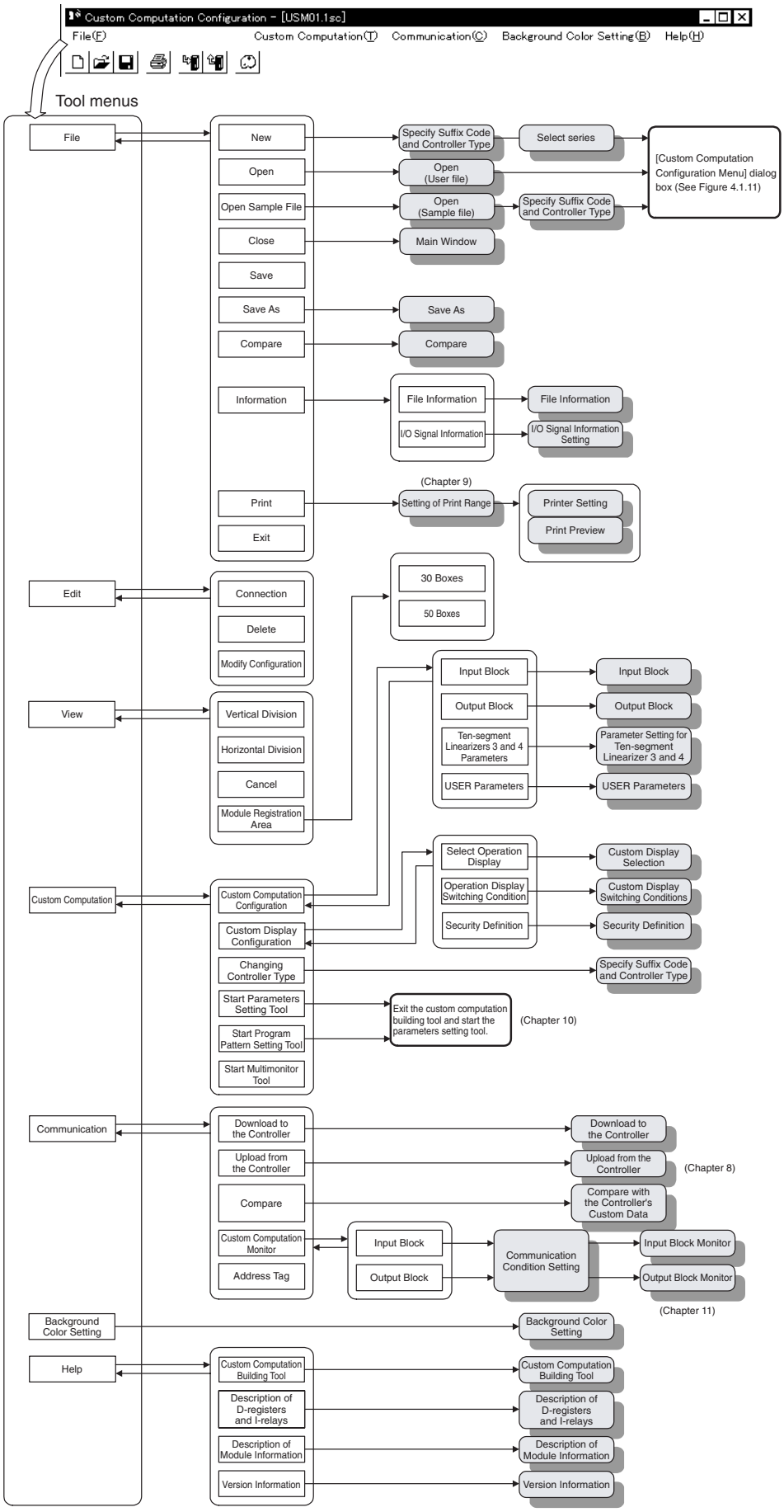


**Figure 3.3.1 Tool Menus Outline**

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# 4. Basic Operations for Configuring Custom Computations and Relevant Explanations

This chapter explains the procedure for configuring custom computations.

For details on the preparatory work for using the LL200 tool, see Chapter 2, “Setup.” Likewise, for an overview of the procedure for configuring custom computations and displays, see Chapter 3, “Using the LL200 Tool.”

Also refer to Chapter 4, “List of Computation Modules and Their Functions,” in the Model LL200 PC-based Custom Computation Building Tool-User’s Reference user’s manual (Note), for detailed specifications of the computation modules.

(Note): When your controller is UT750, refer to an user’s manual (IM 05G01B22-02E).
When your controller is UP750, refer to an user’s manual (IM 05G01B22-03E).

In order to configure custom computations, follow the steps shown below.

- **Step 1: Choosing the Way Computations Are Configured ---------- (Section 4.1)**
- **Step 2: Configuring Custom Computations in an Input Block -------- (Section 4.2)**
- **Step 3: Configuring Custom Computations in an Output Block ----- (Section 4.3)**
- **Step 4: Configuring the parameters of Ten-segment Linearizers 3 and 4 Parameters (as necessary) ---------- (Section 4.4)**
- **Step 5: Configuring USER Parameters (as necessary) ---------- (Section 4.5)**

When you are finished with these steps, download the configured custom computations to the UT750/UP750 controller (see Section 8.2). Then, verify their performance by means of custom computation monitoring (see Chapter 11).

# 4.1 Step 1: Choosing the Way Computations Are Configured

When you start the LL200 tool, a dialog box appears as shown in Figure 4.1.1.

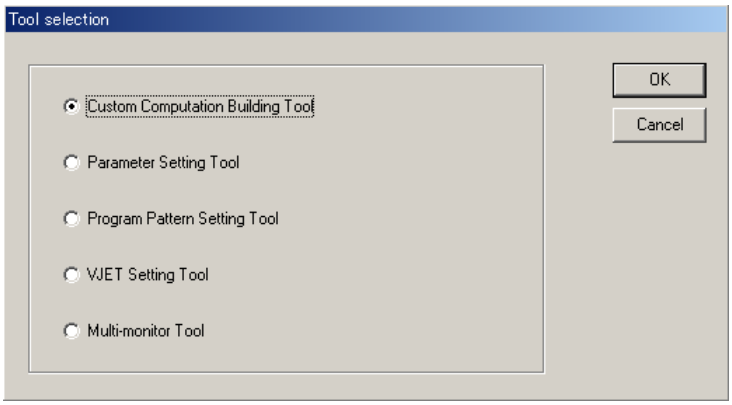



**Figure 4.1.1 [Tool Selection] Dialog Box**

Click the <Custom Computation Building Tool> option button, and then the <OK> button. The [Select Series] dialog box (Figure 4.1.2) appears.

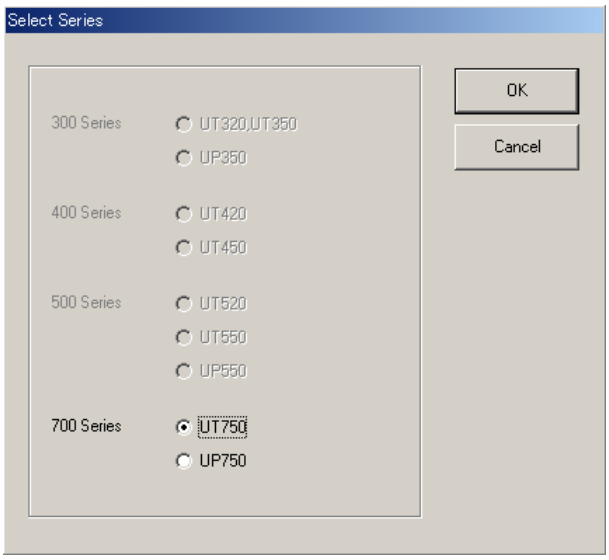



**Figure 4.1.2 [Select Series] Dialog Box**

Select a controller model you want to use. Click the option button of the controller model, and the <OK> button.

The [New/Modification] dialog box (Figure 4.1.3) appears.

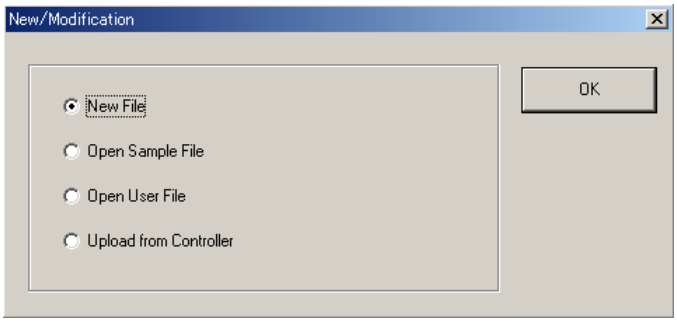



**Figure 4.1.3 [New/Modification] Dialog Box**

There are four ways of configuring custom computations, as described below. Choose one of these four ways.

**TIP**

If you are configuring custom computations for the first time, it is advisable that you use a sample file.

For your information, Section 4.2, “Step 2: Configuring Custom Computations in an Input Block,” uses the sample file (Utm01.tec) for single-loop control to explain all the operating procedures that follow that particular section.

**NOTE**

When uploading custom computation information from Green series controller, set the controller mode to “21.”

(1) If you are configuring a custom computation from scratch, choose <New File>.

Click the <New File> option button, then the <OK> button. The [Select Model and Suffix Codes] dialog box (Figure 4.1.4) appears.

(2) If you are configuring a custom computation using a sample file, choose <Open Sample File>.

Click the <Open Sample File> option button, and then the <OK> button. The [Open Sample File] dialog box (Figure 4.1.5) appears.

(3) If you are configuring a custom computation using a user file, choose <Open User File>.

Click the <Open User File> option button, and then the <OK> button. The [Open User File] dialog box (Figure 4.1.7) appears.

(4) If you are configuring a custom computation by uploading data from the Green series controller, choose <Upload from Controller>.

Click the <Upload from Controller> option button, and then the <OK> button. The [Reading Custom Computation Information] dialog box (Figure 4.1.9) appears.

## ■ [Select Model and Suffix Codes] Dialog Box

If you choose <New File> in the [New/Modification] dialog box (Figure 4.1.3), the [Select Model and Suffix Codes] dialog box (Figure 4.1.4) appears. This dialog box also appears if you choose <Open Sample File>.

In the [Select Model and Suffix Codes] dialog box, click the <OK> button. The [Custom Computation Configuration Menu] dialog box (Figure 4.1.11) appears.

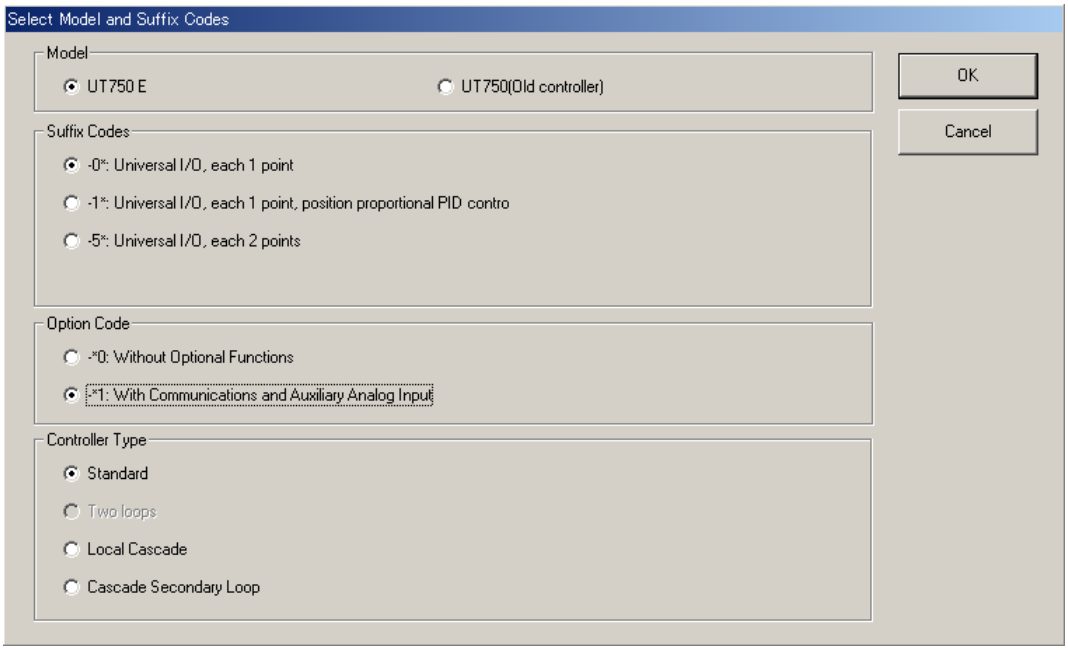



**Figure 4.1.4 [Select Model and Suffix Codes] Dialog Box**

The suffix code must be specified because the code needs to be verified when you download information on the custom computations you configured using the LL200 tool, to the UT750/UP750 controller. Likewise, the controller type must be specified because you must decide upon the desired operating conditions for the UT750/UP750 controller.

| Controller Type | Criteria for Choice |
|---|---|
| -0*: Universal I/O, each 1 point<br>-1*: Universal I/O, each 1 point, position proportional PID control | • Normal PID control<br>• Internal cascade control (-*1: Auxiliary analogue input)<br>• Cascade secondary - loop control (-*1: Auxiliary analogue input) |
| -5*: Universal I/O, each 2 points | • Normal PID control<br>• Dual - loop control<br>• Internal cascade control (-*1: Auxiliary analogue input)<br>• Cascade secondary - loop control (-*1: Auxiliary analogue input) |

**NOTE**

Data cannot be downloaded to UT750/UP750 controllers whose suffix codes do not match the one specified.

Check the suffix and optional suffix codes of the UT750/UP750 controller to which you download data.

## ■ Open Sample File

In the [New/Modification] dialog box, click the <Open Sample File> button, and then the <OK> button. The [Open Sample file] dialog box (Figure 4.1.5) appears.

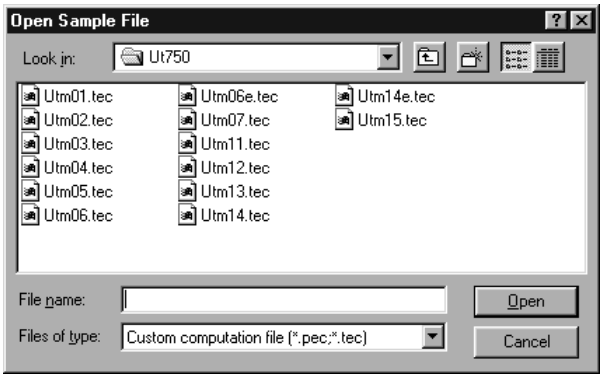



**Figure 4.1.5 [Open Sample File] Dialog Box**

In the [Open Sample File] dialog box, choose the file you wish to use and click the <Open> button. The message in the Figure 4.1.6 appears.

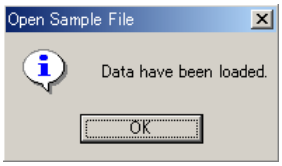



**Figure 4.1.6**

Click the <OK> button. The [Select Model and Suffix Codes] dialog box (Fig.4.1.4) appears.

## ■ Open User File

**NOTE**

Use the “Open User File” for up-loading the “Custom computation data” when your controller is not enhanced model.

In the [New/Modification] dialog box, click the <Open User File> button, and then the <OK> button. The [Open User File] dialog box (Figure 4.1.7) appears.

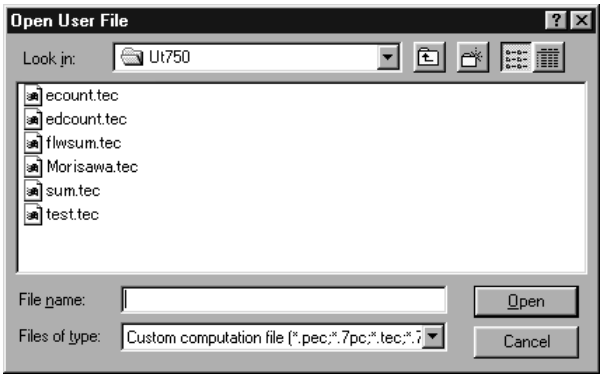



**Figure 4.1.7 [Open User File] Dialog Box**

In the [Open User File] dialog box, choose the file you wish to use and click the <Open> button. (The operation after this is similar to that of “Open Sample File”, and refer to them if necessary.)

## ■ Upload from Controller

If you choose <Upload from Controller> in the [New/Modification] dialog box, the [Reading Custom Computation Information] dialog box (Figure 4.1.9) appears.

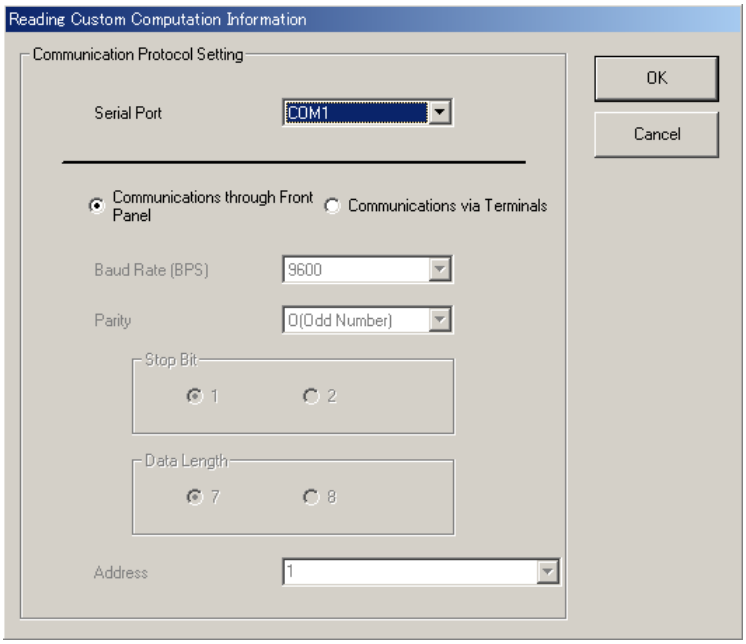



**Figure 4.1.9 [Reading Custom Computation Information] Dialog Box**

You can communicate with the controller in either of the following two ways.

- Communication Using the Front-panel Optical Interface

(1) In the [Reading Custom Computation Information] dialog box, click the <Communications through Front Panel> option button.

Note: The following message appers when the controller is not communicated with the PC.

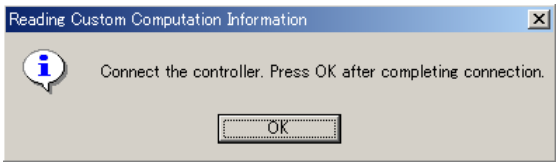



**Figure 4.1.10**

(2) From the <Serial Port> drop-down list box, choose either COM1 to COM16.

(3) Click the <OK> button. Data are uploaded from the controller.

(4) When uploading is complete, the [Custom Computation Configuration Menu] dialog box (Figure 4.1.11) appears.

(5) For the subsequent operations, see Section 4.2 and the sections/subsections that follow.

- Communication Using the RS-485 Interface

(1) In the [Reading Custom Computation Information] dialog box, click the <Communications via Terminals> option button.

(2) From the <Serial Port> drop-down list box, choose either COM1 to COM16. Then, from the <Baud Rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop Bit> and <Data Length> sections.

Match the communication conditions of the controller with those of the personal computer.

(3) Click the <Execute> button. The LL200 tool begins uploading data from the controller.

(4) When uploading is complete, the [Custom Computation Configuration Menu] dialog box (Figure 4.1.11) appears.

(5) For the subsequent operations, see Section 4.2 and the sections/subsections that follow.

**NOTE**

If you have chosen RS-485 communication, set the communication protocol of the controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

## ■ Custom Computation Configuration Menu

The dialog box shown below is the first to appear when you configure custom computations. For further operations after this Custom Computation Configuration Menu dialog box, see Section 4.2 and the sections/subsections that follow.

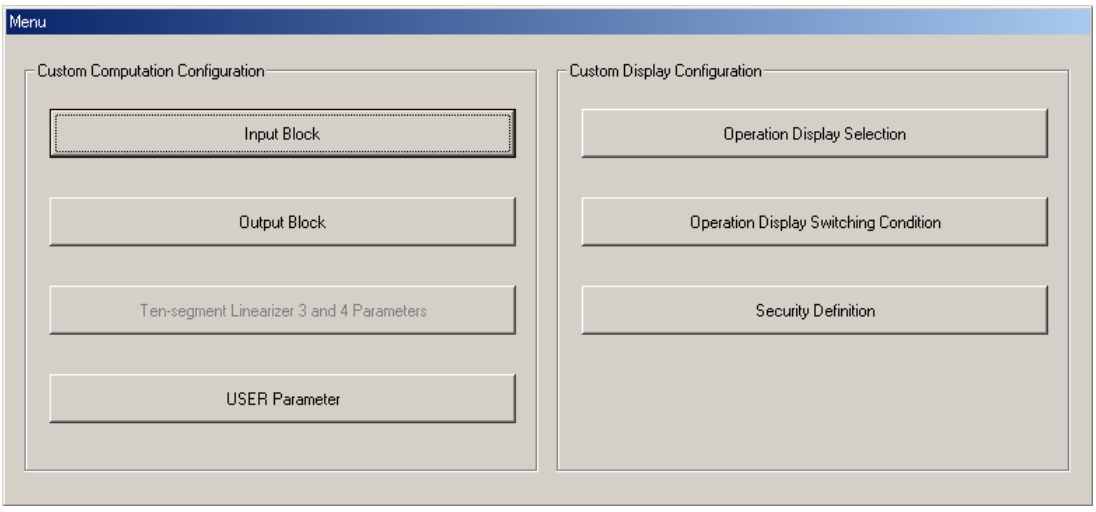



**Figure 4.1.11 [Custom Computation Configuration Menu] Dialog Box**

# 4.2 Step 2: Configuring Custom Computations in an Input Block

The flow of work in step 2 is as follows.

This section explains the work flow using the single-loop control sample file (Utm01. tec). Read the sample file onto your personal computer before you start this step.

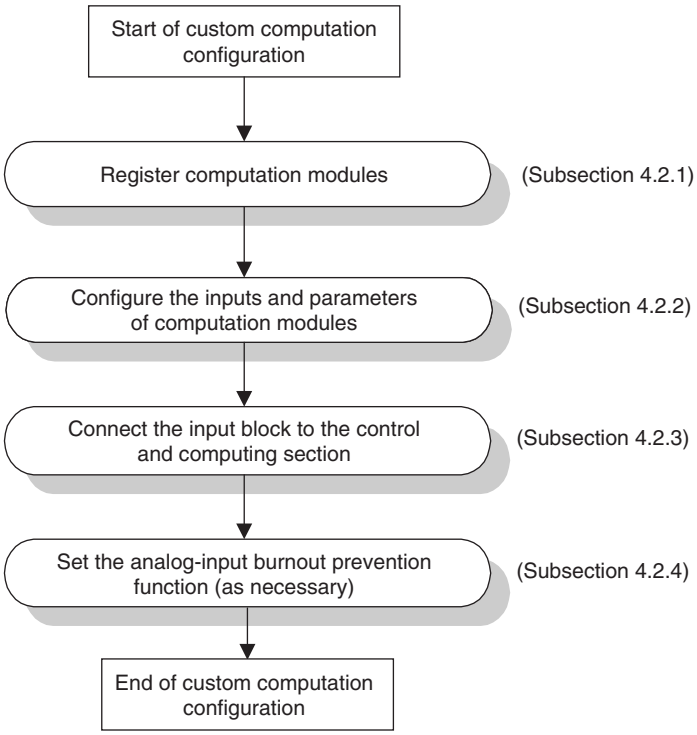



**Figure 4.2.1 Flow of Work for Configuring Custom Computations in an Input Block**

Figure 4.2.2 shows the [Custom Computation Configuration Menu] dialog box used to configure custom computations.

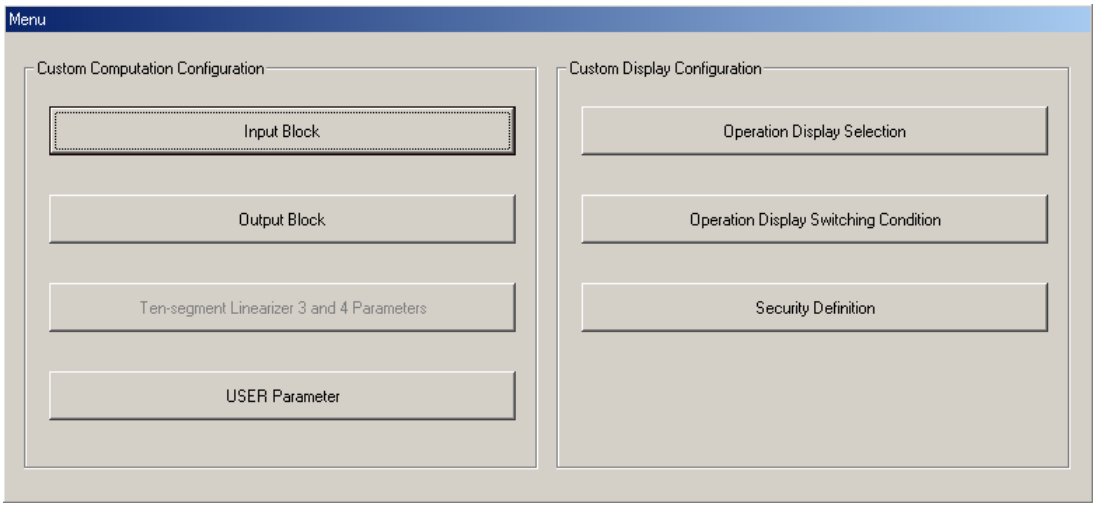



**Figure 4.2.2 [Custom Computation Configuration Menu] Dialog Box**

# 4.2.1 Step 2-1: Registering Computation Modules

## ● Explanation

This step involves registering the computation modules you want to perform operations in an input block, in the order they are executed. You can register a maximum of 30 computation modules.

(A maximum 50 box can be used when the module register area is specified to “50” in the display menu.)

Figure 4.2.3 shows an input block for single-loop control where a module for a logical “NOT” operation is added. The following paragraphs explain how to add a NOT module to the diagram of an input block for single-loop control.

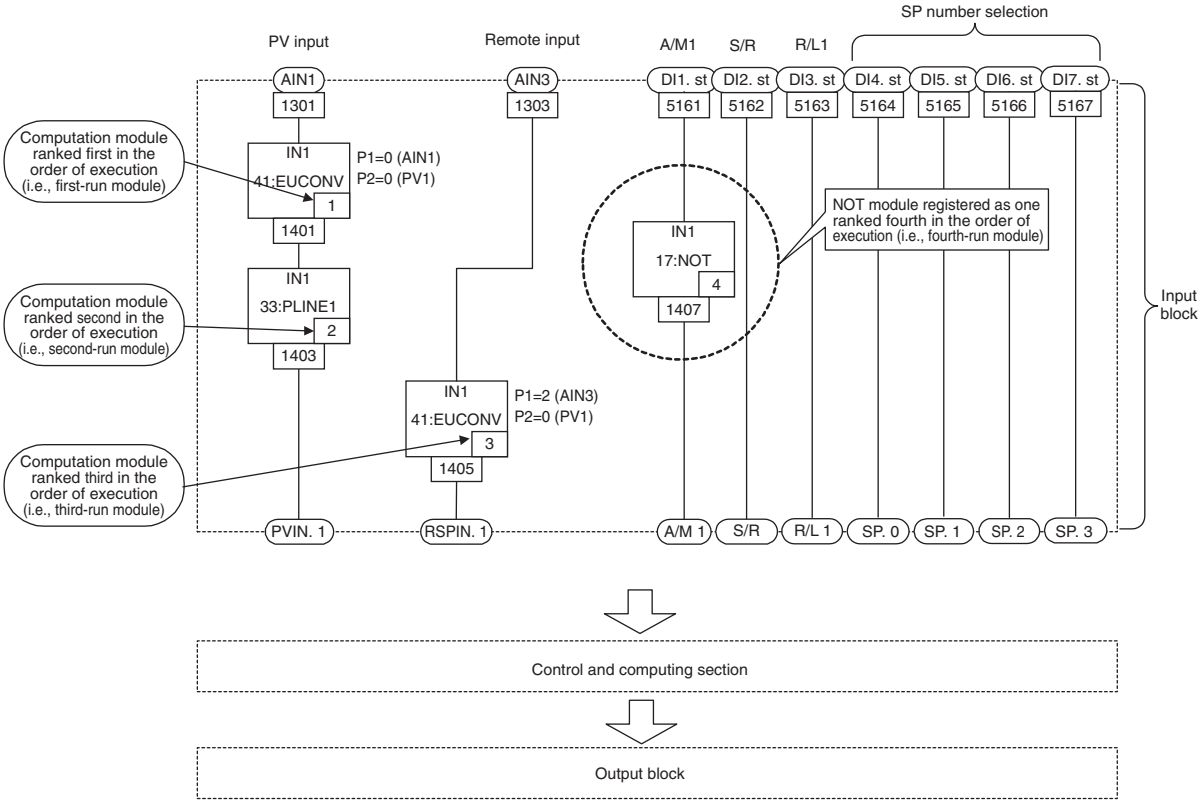



**Figure 4.2.3 Addition of a NOT Module to the Diagram of an Input Block for Single-loop Control**

## ● Operation: Registering the Modules

### TIP

Computation modules can be positioned anywhere within the input block. You should however locate them as close as possible to the input signals (AIN1 to AIN3 and DI1.st to DI7.st) for the input block connected to the modules. This strategy makes wiring between module I/Os visible and simple.

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 4.2.2), click the <Input Block> button. The [Input Block] dialog box appears. Figure 4.2.4 illustrates the [Input Block] dialog box for single-loop control (Utm01.tec).

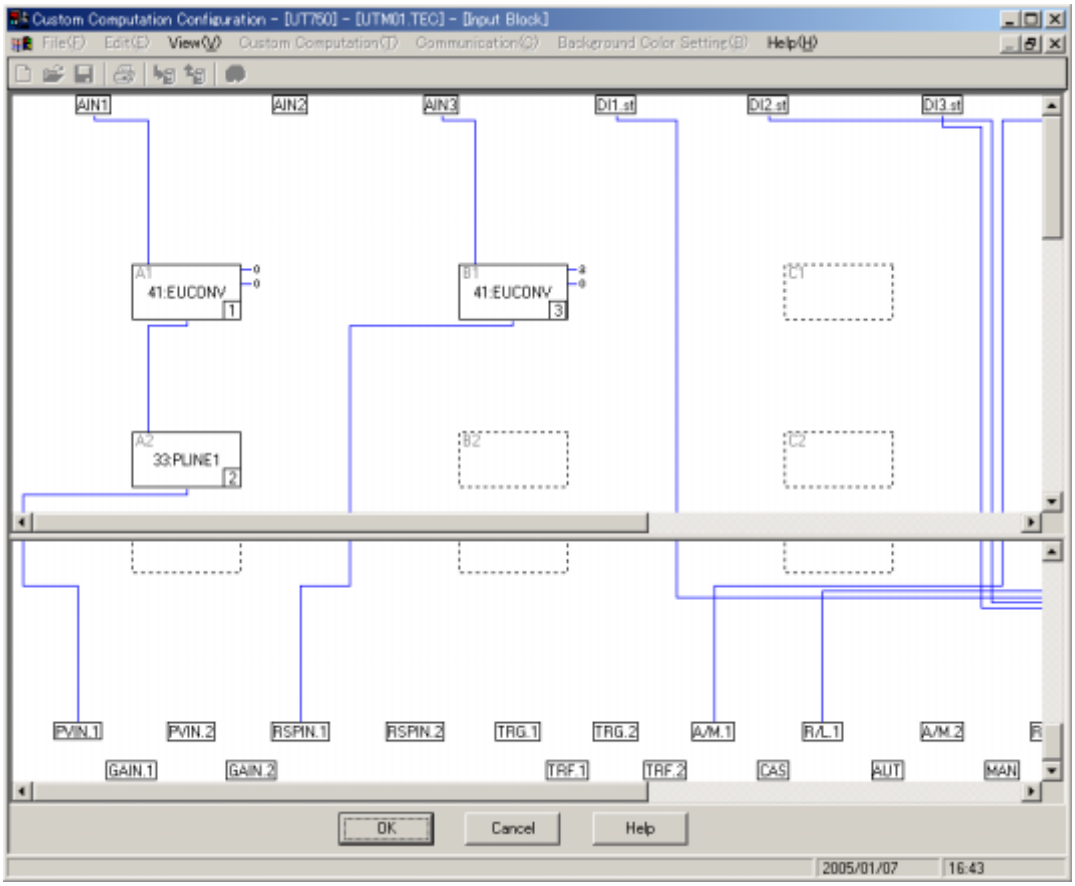



**Figure 4.2.4 [Input Block] Dialog Box for Single-loop Control**

(2) In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 4.2.5) appears. For ease of selection, modules are classified into four types; arithmetic operation, logical operation, special operation and special function.

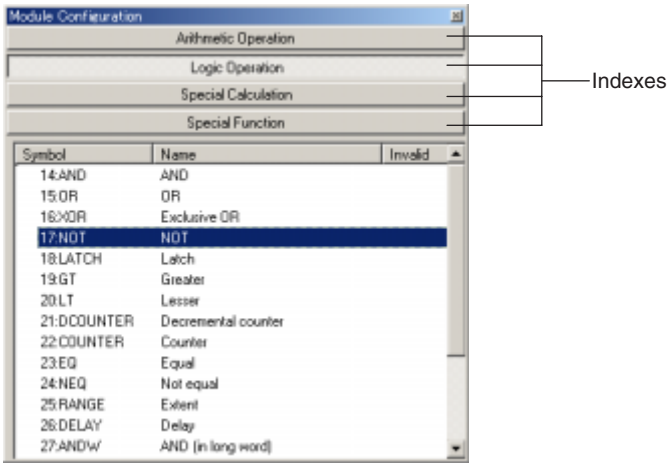



**Figure 4.2.5 [Module Configuration] Dialog Box**

(3) Click the index that contains the computation module you register.

(4) Double-clicking the module registers it.

Figure 4.2.6 shows an example where the <17: NOT> option in the <Logical Operation> index is registered.

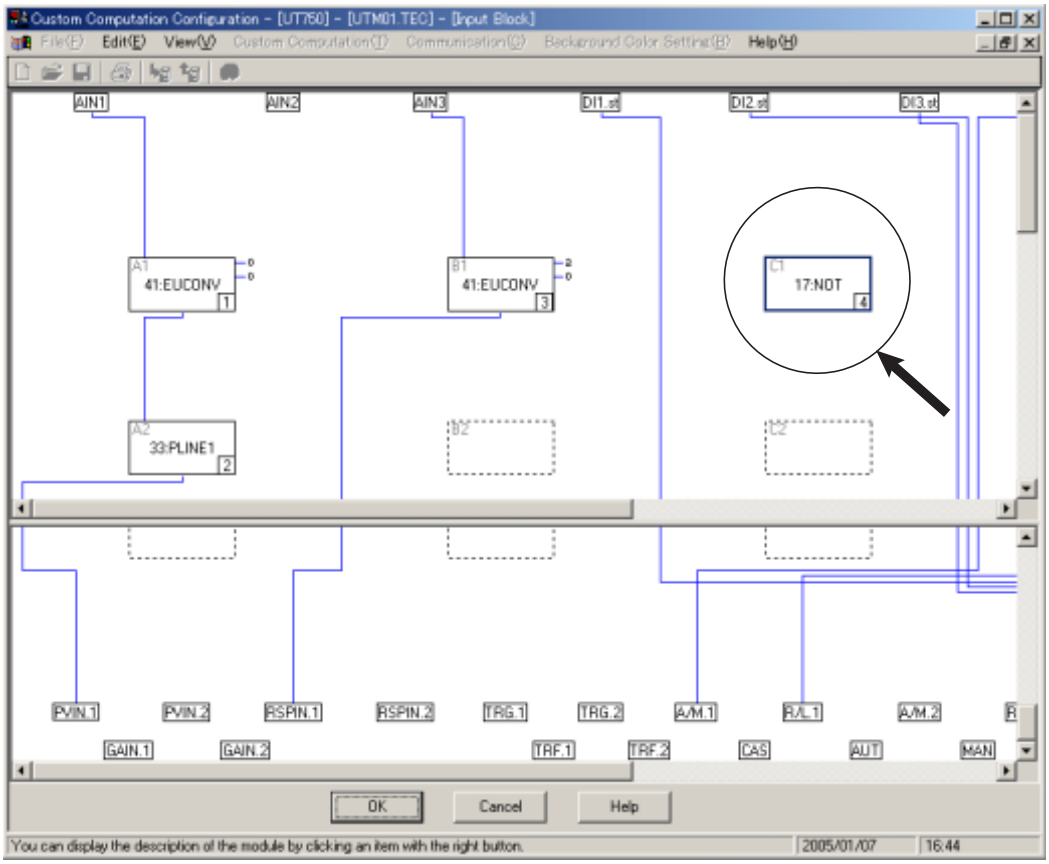



**Figure 4.2.6 Example where a NOT Module Is Registered as the Fourth-Run Module**

Repeat steps (2) to (4) to register other necessary computation modules also.

When you have finished registering modules, proceed to subsection 4.2.2, “Step 2-2: Configuring the Inputs and Parameters of Computation Modules.”

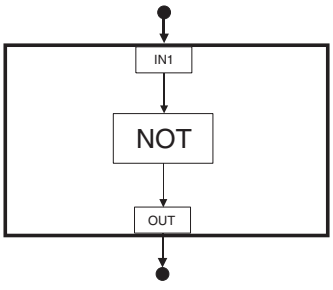
## TIP

To view an explanation on the selected module, refer to the manual.
When your controller is UT750, refer to the manual (IM 05G01B22-02E).
When your controller is UP750, refer to the manual (IM 05G01B22-03E).

| Module No. | 17 | Category | Logical Operation |
|---|---|---|---|
| Module Name | NOT Logic | Module Code Name | NOT |

| Module Input | | |
|---|---|---|
| IN1 | ● | Input 1 |
| IN2 | | |
| IN3 | | |
| IN4 | | |
| IN5 | | |
| IN6 | | |
| IN7 | | |
| IN8 | | |
| Module Parameter | | |
| P1 | | |
| P2 | | |
| P3 | | |
| P4 | | |
| Module Output | | |
| OUT | ● | NOT logic result |
| Work Area | | |
| Limitation on Usage | | |

**[Computational Expression]**
OUT = $\overline{IN1}$




**[Explanation]**
The module outputs the value of IN1 after inverting it.

Example: 1 = $\overline{0}$, 0 = $\overline{1}$

| IN1 | OUT |
|---|---|
| 0 | 1 |
| 1 | 0 |

**Figure 4.2.7**

## 4.2.2 Step 2-2: Configuring the Inputs and Parameters of Computation Modules

### ● Explanation

Each computation module has inputs (8 maximum), parameters (4 maximum) and an output. This step involves configuring inputs and parameters only. The results of computation provided by the output are automatically stored, according to the module's order of execution, in the data storage area of the controller.

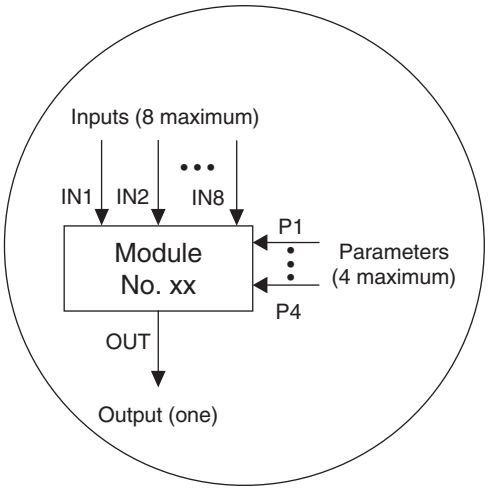



**Figure 4.2.8 Conceptual View of Module Configuration**

As was the case in the previous subsection, Figure 4.2.9 shows an input block for single-loop control where a logical NOT operation module is added.

In this block diagram, analog input 1 (AIN1) is connected to the input of an EUCONV module ranked first in the order of execution. Since the EUCONV module requires parameters, a constant data value of 0 is set for both parameters P1 and P2.

For more information on the handling of P1 and P2 parameters, see Chapter 4, "List of Computation Modules and Their Functions," in the Model LL200 PC-based Custom Computation Building Tool-User's Reference user's manual (for UT750: IM 05G01B22-02E, for UP750: IM 05G01B22-03E).

The output of the EUCONV module, which is ranked first in the order of execution, is connected to the input of the PLINE1 module which is ranked second in the order of execution. The PLINE1 module has no parameters. Analog input AIN3 is connected to the input of the EUCONV module ranked third in the order of execution. The constant data values of 2 and 0 are set in parameters P1 and P2 of the EUCONV module. In addition, contact input 1 is connected to the input of the NOT module which was registered in the previous subsection and is ranked fourth in the order of execution.

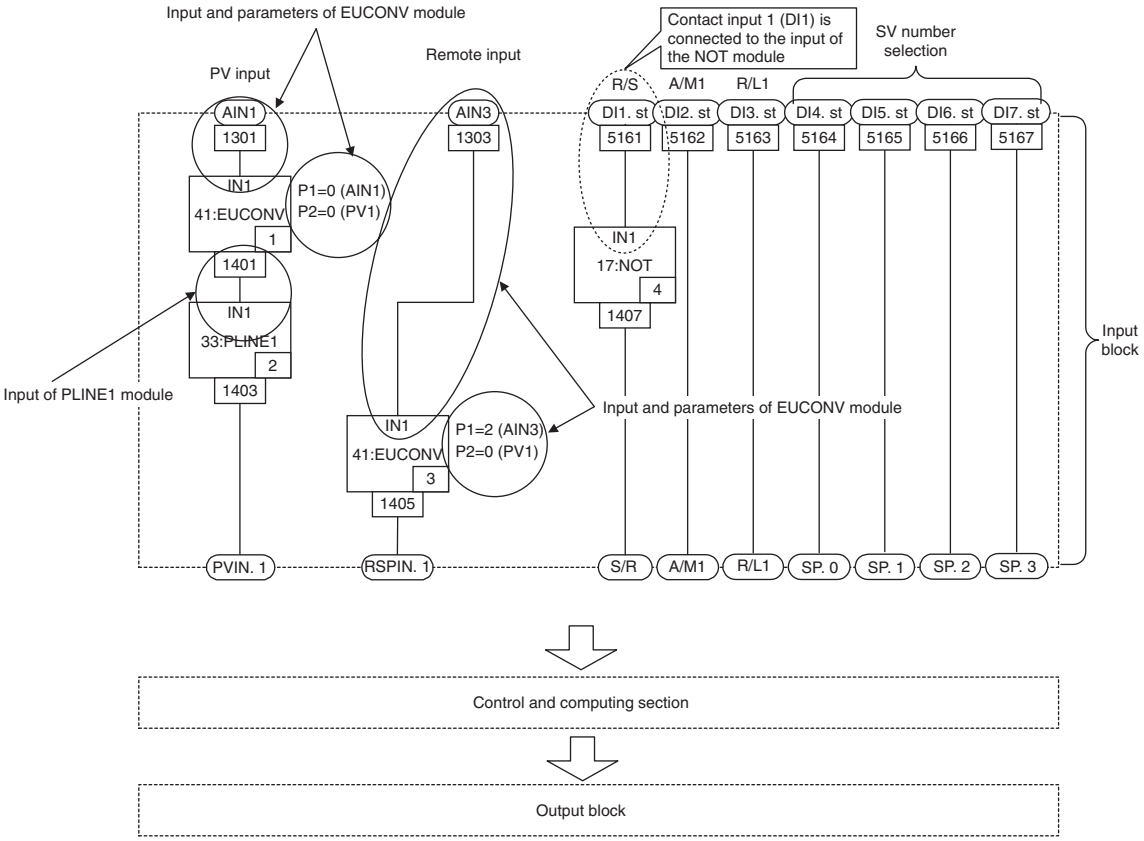



**Figure 4.2.9 Contact Input 1 Connected to the Input of the NOT Module**

## ● Operation: Configuring the Modules

This operation involves configuring the inputs and parameters of the computation modules.

(1) In the [Input Block] dialog box, click the module whose inputs and parameters you want to configure. In the example shown in Figure 4.2.6, click the NOT module.

(2) From the tool menus, choose <Edit [E]>, then <Connection [C]>.
The [Module Setting] dialog box (Figure 4.2.10) appears.

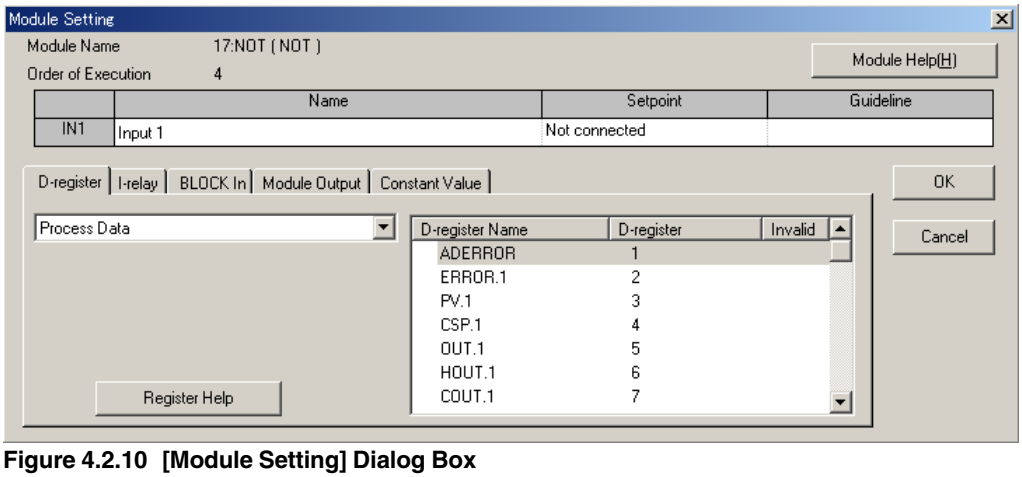



**Figure 4.2.10 [Module Setting] Dialog Box**

(3) Click the input from among <IN1> to <IN8> or the parameter from among <P1> to <P4>, that need to be configured.

{However, the step (3) is not need to operate in this case (Not Module connecting), and forward to step (4)}

(4) Click the appropriate index.

Indexes are classified into <D-register>, <I-relay>, <BLOCK In>, <Module Output>, and <Constant Value>.

● Description of Indexes

| Index | Description | Remarks |
|---|---|---|
| D-Register | Process data, mode data, operation parameters, setup parameters | See chapter 5 in the User's Reference user's manual (for UT750 : IM 05G01B22-02E, for UP750 : IM05G01B22-03E) |
| I-Relay | ON/OFF status, ON status, OFF status, SPNO, PIDNO, timer flags, power-on flags, alarm flags, etc. | |
| BLOCK In | AIN1: Analog Input 1<br>AIN2: Analog Input 2<br>AIN3: Analog Input 3 | Analog input data fed to input block |
| | DI1.st: Contact Input 1<br>DI2.st: Contact Input 2<br>DI3.st: Contact Input 3<br>DI4.st: Contact Input 4<br>DI5.st: Contact Input 5<br>DI6.st: Contact Input 6<br>DI7.st: Contact Input 7<br>etc. | Contact input data fed to input block |
| Module Output | IMO1L to IMO50L (outputs of input-block computation modules)<br>OMO1L to OMO50L (outputs of output-block computation modules) | See Appendix 1, "Areas for Storing Data Output from Computation Modules." |
| Constant Value | Configurable range: -19999 to 3000 | |

(5) Double-clicking the appropriate input source configures the selected index.

To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. The Figure 4.2.11 shows an example of how to configure contact input 1 <DI1.st>.

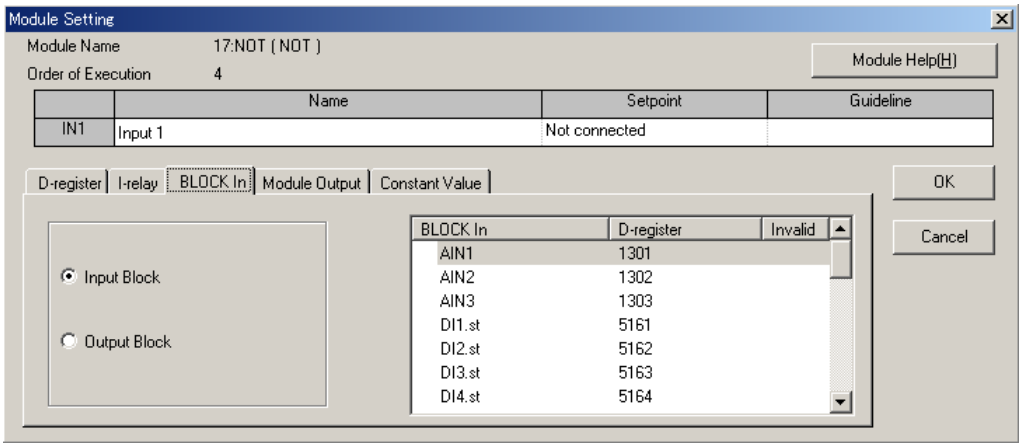



**Figure 4.2.11 Setting the Contact Input 1 <DI1.st>**

(6) Repeat steps (3) to (5) to configure the other necessary inputs among <IN1> to <IN8> or parameters among <P1> to <P4>.

(7) Clicking the <OK> button closes the [Module Setting] dialog box. When the dialog box closes, the computation modules are automatically wired according to the inputs and parameters you configured.

(8) Repeat steps (1) to (7) to configure other computation modules also.

When you have finished configuring the inputs and parameters of computation modules, proceed to subsection 4.2.3, "Step 2-3: Connecting Computation Modules to the Control and Computing Section."

# 4.2.3 Step 2-3: Connecting Computation Modules to the Control and Computing Section

## ● Explanation

This step involves making the settings needed to pass the results of computation to the control and computing section after completing the module configuration and settings discussed so far.

As was the case in the previous subsection, Figure 4.2.12 shows an input block for single-loop control where a logical NOT operation module is added.

In this block diagram, the output of the ten-segment linearizer 1 (PLINE1) module ranked second in the order of execution is connected to the loop-1 PV input (PVIN.1). The output of the EU range conversion (EUCONV) module ranked third in the order of execution is connected to the loop-1 cascade input (RSPIN.1). In addition, the output of the NOT module ranked fourth in the order of execution is connected to the RUN/STOP mode (S/R) output signal.

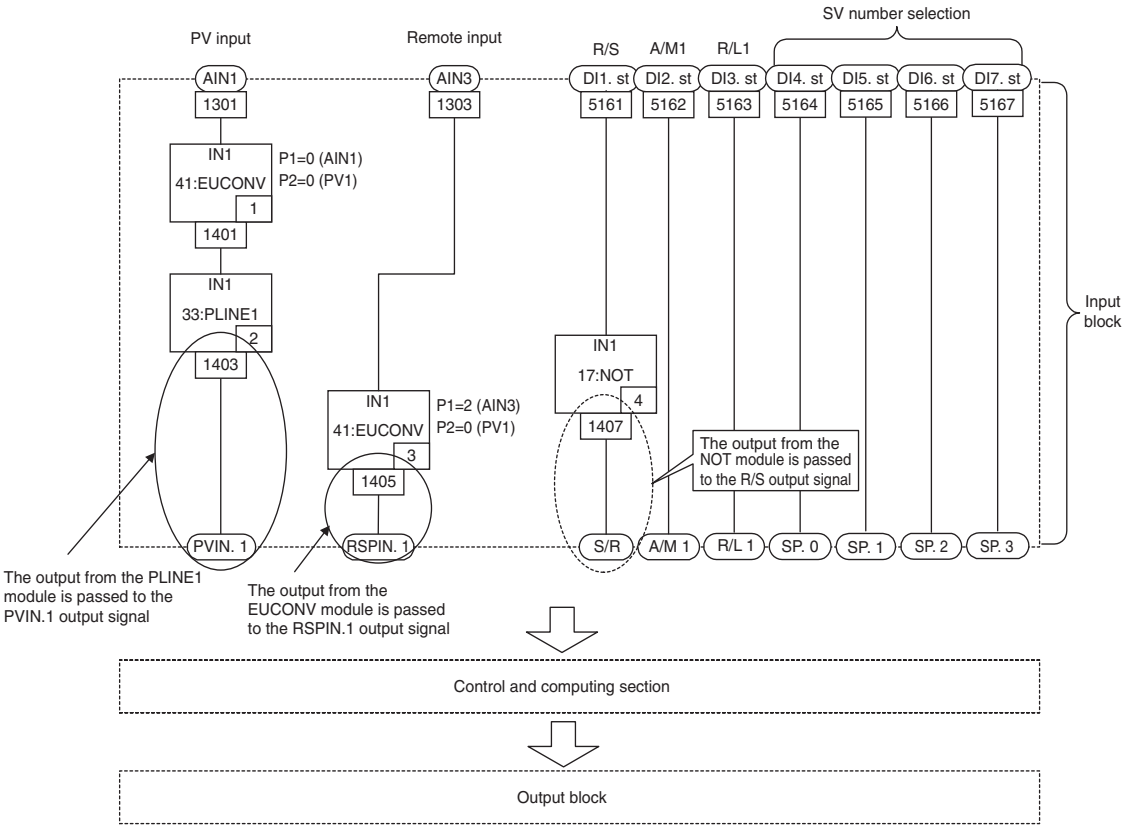



**Figure 4.2.12 Connection of the NOT Module's Output to the Control and Computing Section**

## ● Operation: Connecting to the Control and Computing Section

This operation involves making the settings needed to pass the results of computation in the input block to the control and computing section.

(1) In the [Input Block] dialog box (Figure 4.2.13), click the appropriate output signal. In this example, click [S/R].

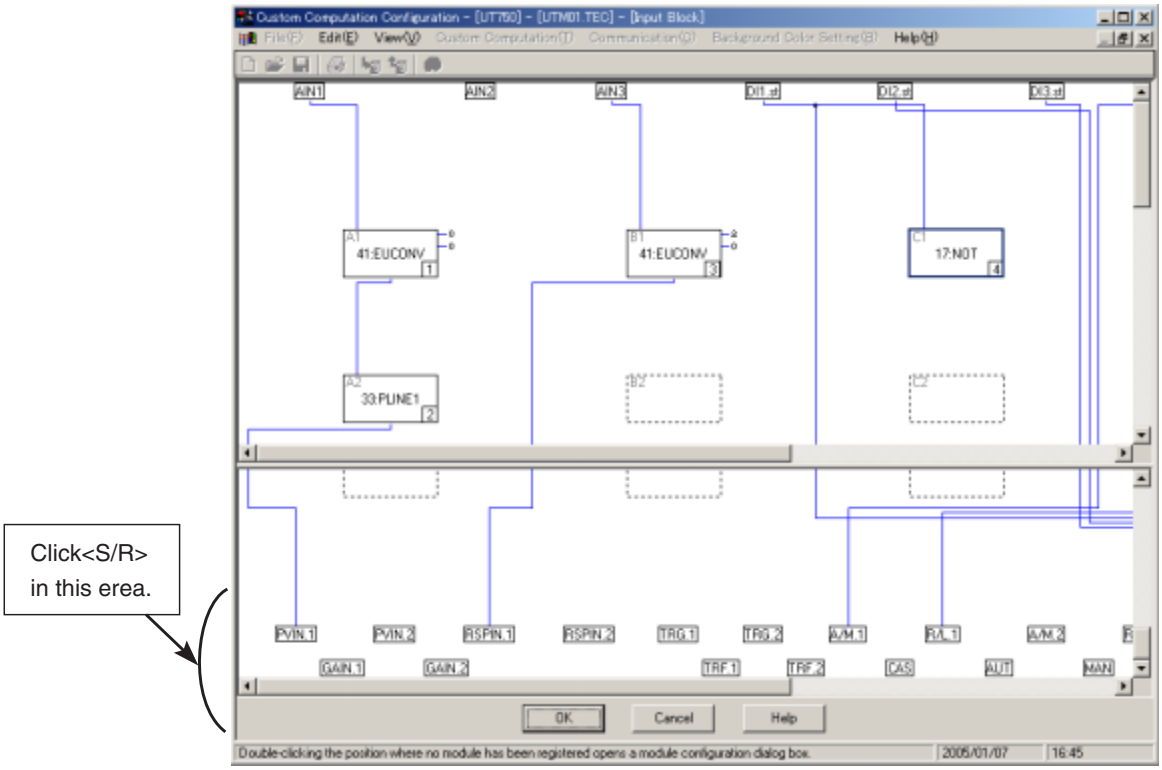



**Figure 4.2.13 Output Signals Fed by the Input Block**

## ● Description of Output Signals Fed by the Input Block

○ : The controller has the register of the Signal.

| Signal Name | Description | | UT 750 | UP 750 |
|---|---|---|---|---|
| PVIN.1 | Loop 1 PV input | 1331 | ○ | ○ |
| PVIN.2 | Loop 2 PV input | 1332 | ○ | ○ |
| RSPIN.1 | Loop 1 remote input | 1333 | ○ | ○ |
| RSPIN.2 | Loop 2 remote input | 1334 | ○ | ○ |
| GAIN.1 | Loop 1 gain setting value | 1335 | ○ | ○ |
| GAIN.2 | Loop 2 gain setting value | 1336 | ○ | ○ |
| TRG.1 | Loop 1 tracking input | 1337 | ○ | ○ |
| TRG.2 | Loop 2 tracking input | 1338 | ○ | ○ |
| TRF.1 | Loop 1 tracking flag | 1339 | ○ | ○ |
| TRF.2 | Loop 2 tracking flag | 1340 | ○ | ○ |
| A/M1 | Loop 1 A/M switch | 1343 | ○ | |
| A/M2 | Loop 2 A/M switch | 1344 | ○ | |
| R/L1 | Loop 1 R/L switch | 1345 | ○ | |
| R/L2 | Loop 2 R/L switch | 1346 | ○ | |
| S/R | STOP/RUN switch | 1347 | ○ | |
| CAS | Cascade mode | 1348 | ○ | |
| AUT | Auto mode | 1349 | ○ | |
| MAN | Manual mode | 1350 | ○ | |
| SP.0 | Bit 0 of SP number | 1351 | ○ | |
| SP.1 | Bit 1 of SP number | 1352 | ○ | |
| SP.2 | Bit 2 of SP number | 1353 | ○ | |
| SP.3 | Bit 3 of SP number | 1354 | ○ | |
| DP1 | Operation display for interruption 1 | 1355 | ○ | |
| DP2 | Operation display for interruption 2 | 1356 | ○ | |
| MG1 | Interruptive message display 1 | 1357 | ○ | |
| MG2 | Interruptive message display 2 | 1358 | ○ | |
| MG3 | Interruptive message display 3 | 1359 | ○ | |
| MG4 | Interruptive message display 4 | 1360 | ○ | |
| PROG | Program operation | 1361 | | ○ |
| RESET | Reset | 1362 | | ○ |
| LOCAL | Local | 1363 | | ○ |
| HOLD | Hold | 1364 | | ○ |
| ADV | Advance | 1365 | | ○ |
| A/M1 | Loop 1 A/M switch | 1366 | | ○ |
| A/M2 | Loop 2 A/M switch | 1367 | | ○ |
| LSP/CAS | Main loop Local/cascade | 1368 | | ○ |
| PTNO.b0 | Bit 0 of Pattern number | 1369 | | ○ |
| PTNO.b1 | Bit 1 of Pattern number | 1370 | | ○ |
| PTNO.b2 | Bit 2 of Pattern number | 1371 | | ○ |
| PTNO.b3 | Bit 3 of Pattern number | 1372 | | ○ |
| PTNO.b4 | Bit 4 of Pattern number | 1373 | | ○ |
| PTNO.b5 | Bit 5 of Pattern number | 1374 | | ○ |
| PTNO.b6 | Bit 6 of Pattern number | 1375 | | ○ |
| PTNO.b7 | Bit 7 of Pattern number | 1376 | | ○ |
| PTNO.b8 | Bit 8 of Pattern number | 1377 | | ○ |
| DP1 | Operation display for interruption 1 | 1378 | | ○ |
| DP2 | Operation display for interruption 2 | 1379 | | ○ |
| MG1 | Interruptive message display 1 | 1380 | | ○ |
| MG2 | Interruptive message display 2 | 1381 | | ○ |
| MG3 | Interruptive message display 3 | 1382 | | ○ |
| MG4 | Interruptive message display 4 | 1383 | | ○ |

(2) From the tool menus, choose <Edit [E]>, then <Connection>.
The [Setting Input Block Assignment] dialog box (Figure 4.2.14) appears.

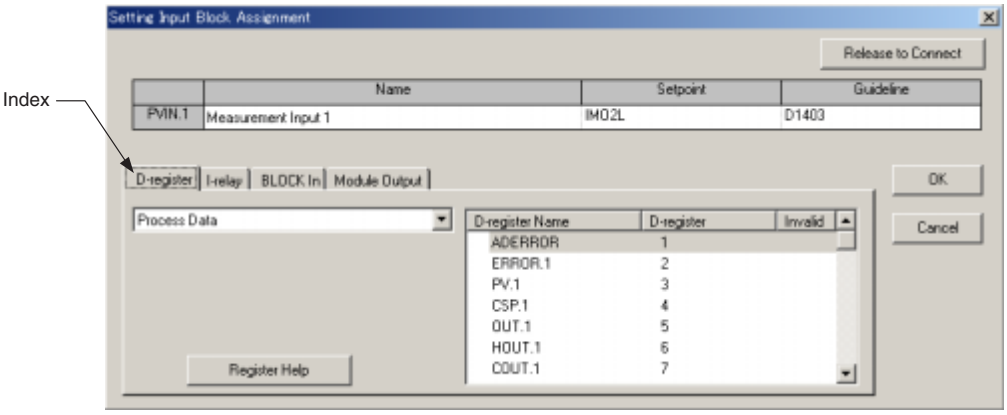



**Figure 4.2.14 [Setting Input Block Assignment] Dialog Box**

(3) Click the appropriate index.
Indexes are classified into <D-register>, <I-relay>, <BLOCK In>, <Module Output>.
In this case (for example), click the <Module Output> index.

● Description of Indexes

| Index | Description | Remarks |
|---|---|---|
| D-Register | Process data, mode data, operation parameters, setup parameters | See chapter 5 in the User's Reference user's manual (for UT750 : IM 05G01B22-02E, for UP750 : IM05G01B22-03E) |
| I-Relay | ON/OFF status, ON status, OFF status, SPNO, PIDNO, timer flags, power-on flags, alarm flags, etc. | |
| BLOCK In | AIN1: Analog Input 1<br>AIN2: Analog Input 2<br>AIN3: Analog Input 3 | Analog input data fed to input block |
| | DI1.st: Contact Input 1<br>DI2.st: Contact Input 2<br>DI3.st: Contact Input 3<br>DI4.st: Contact Input 4<br>DI5.st: Contact Input 5<br>DI6.st: Contact Input 6<br>DI7.st: Contact Input 7<br>etc. | Contact input data fed to input block |
| Module Output | IMO1L to IMO50L (outputs of input-block computation modules)<br>OMO1L to OMO50L (outputs of output-block computation modules) | See Appendix 1, "Areas for Storing Data Output from Computation Modules." |

(4) Double-clicking the appropriate input source configures the selected index.
The Figure 4.2.15 indicates the setting example of [IM04L] module.

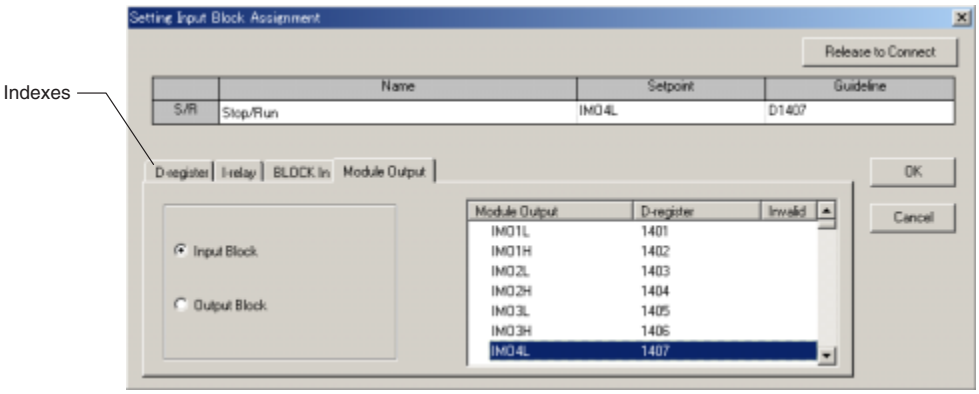



**Figure 4.2.15 Configuring <IMO4L>, the Fourth Input-block Computation Module to Be Carried Out**

(5) Clicking the <OK> button after the configuration is completed closes the [Setting of Input Block Connection Assignment] dialog box. When the dialog box closes, the computation modules are automatically wired according to the settings you defined.

(6) Repeat steps (1) to (5) to define the connection of other necessary output signals also.

Figure 4.2.16 shows the input block with the configuration and setting of computation modules, as well as their connection to the control and computing block, completed.

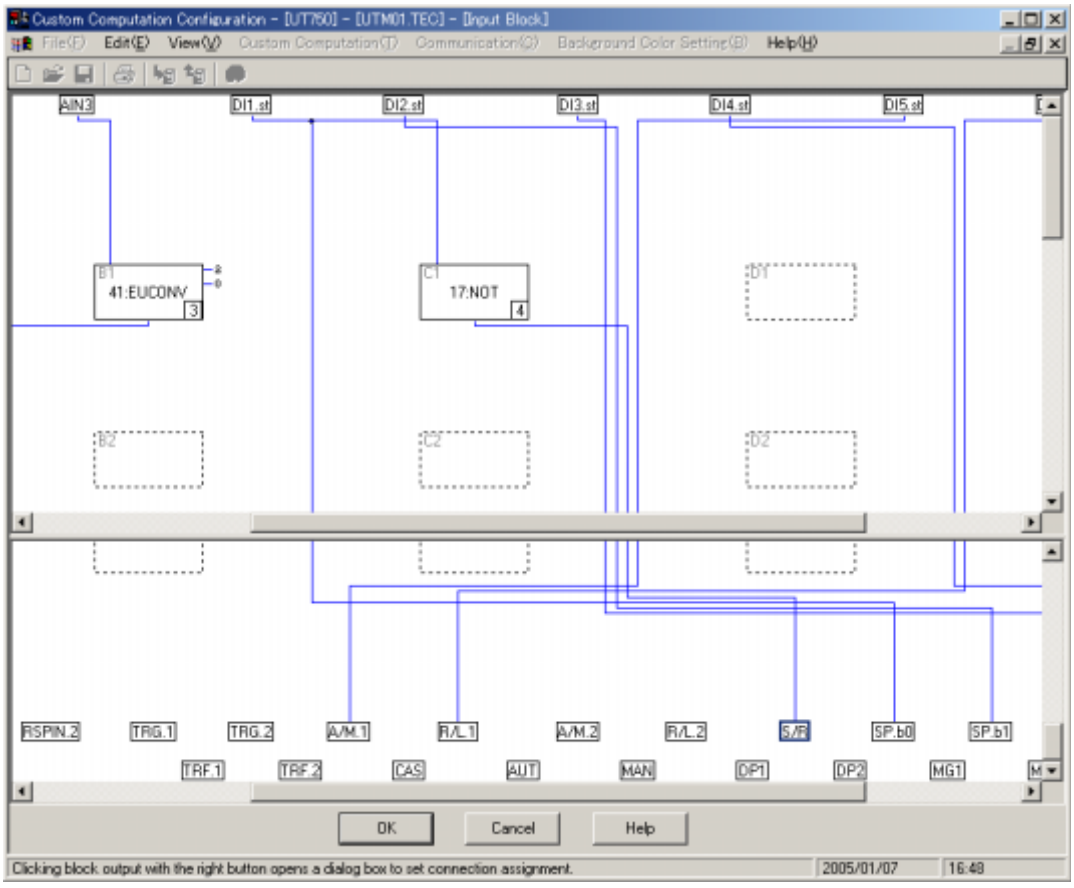



**Figure 4.2.16 Registration of a NOT Module in the Diagram of an Input Block for Single-loop Control (Finished View)**

(7) Click the <OK> button (in the Figure 4.2.16) to display [Connection of Analog Input Burnout Information] dialog box (Fig.4.2.17). (Refer to the subsection 4.2.4, Step 2-4: Setting the Analog-input Burnout Function for more details.)

## 4.2.4 Step 2-4: Setting the Analog-input Burnout Function

### ● Explanation

The controller has a function designed to switch the output of a loop in use to the preset value in the event of an A/D conversion failure or analog-input burnout. This function is configured in the following step.

To use the function, determine which output signal among PV1, PV2, RSP1 and RSP2 should be coupled with signals coming in through the AIN1, AIN2 and AIN3 inputs.

In the example shown in the [Connection of Analog Input Burnout Information] dialog box (Figure 4.2.17), AIN1 is coupled with PV1 and AIN3 with RSP1. This configuration switches the loop-1 MV output value to the preset one if a burnout occurs at either the AIN1 or AIN3 input.

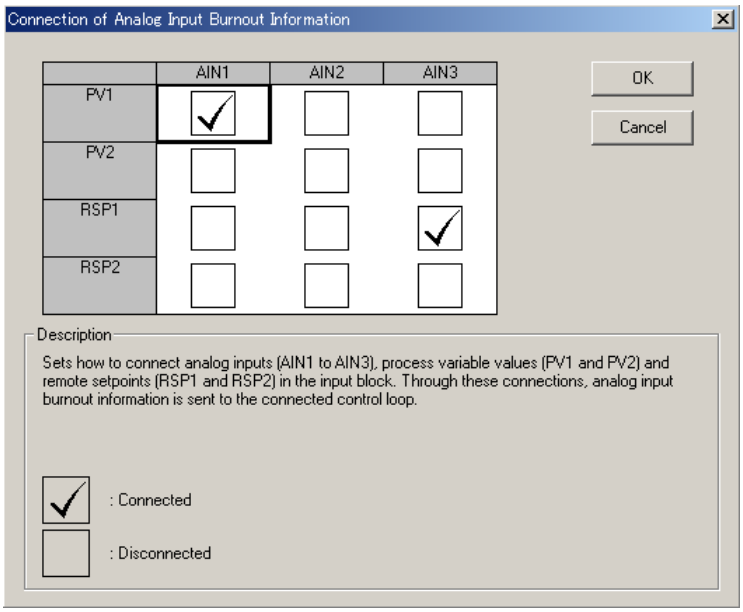



**Figure 4.2.17 [Connection of Analog Input Burnout Information] Dialog Box**

### ● Operation

(1) The [Connection of Analog Input Burnout Information] dialog box appears when you finish configuring custom computations in the [Input Block] dialog box and click the <OK> button.

If you do not need to set any analog-input burnout information, simply click the <OK> button.

(2) In the [Connection of Analog Input Burnout Information] dialog box, click the appropriate blank box. A check mark (✔) appears in the box. The setting is complete if the box shows a check mark.

(3) When the setting is complete, click the <OK> button. The display returns to the [Custom Computation Configuration Menu] dialog box (Figure 4.2.2).

If you also want to configure custom computations in the output block after you finish configuring the input-block custom computations, proceed to the next section.

# 4.3 Step 3: Configuring Custom Computations in an Output Block

The flow of work in step 3 is as follows.

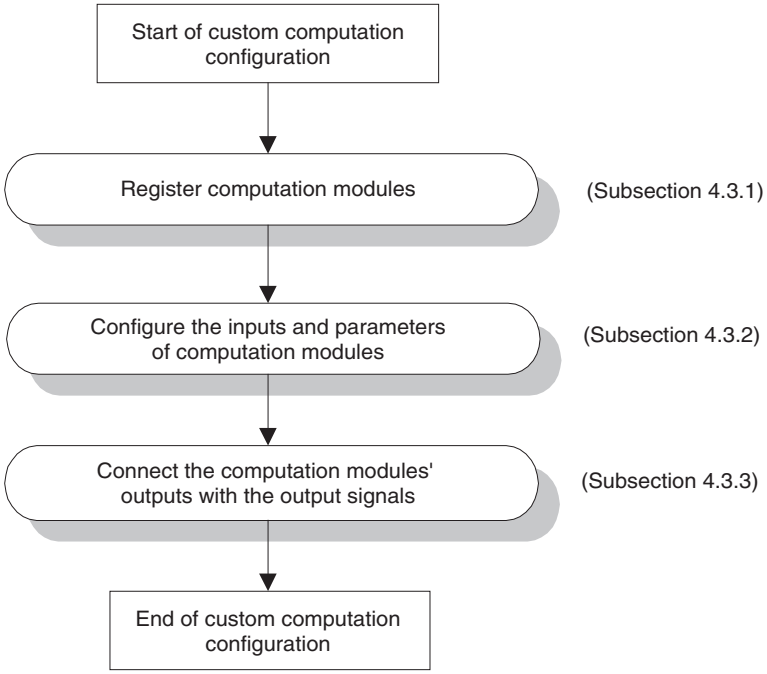



**Figure 4.3.1 Flow of Work for Configuring Custom Computations in an Output Block**

Figure 4.3.2 shows the [Custom Computation Configuration Menu] dialog box used to configure custom computations.

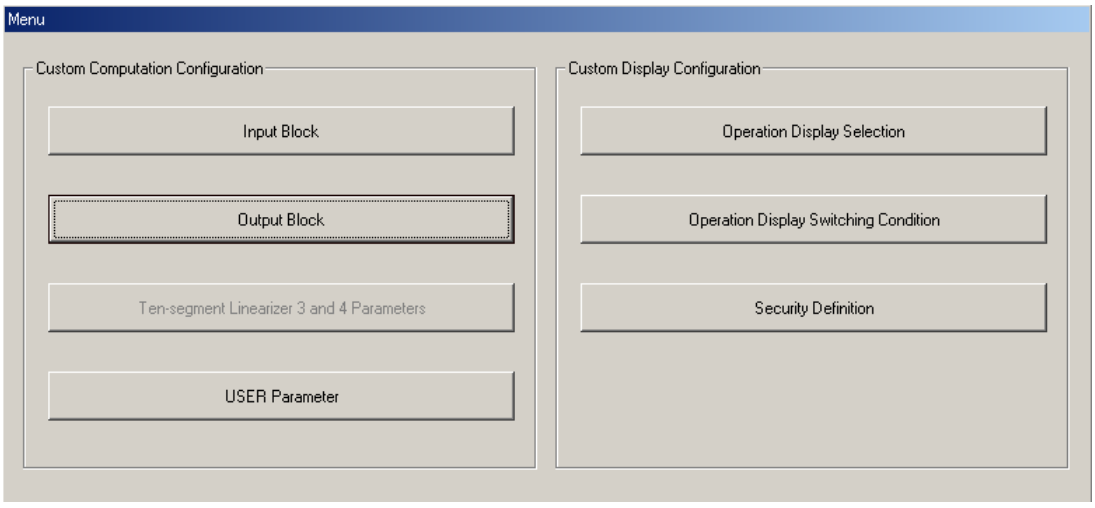



**Figure 4.3.2 [Custom Computation Configuration Menu] Dialog Box**

## 4.3.1 Step 3-1: Registering Computation Modules

### ● Explanation

This step involves registering the computation modules you want to perform operations in an output block, in the order they are executed. You can register a maximum of 30 computation modules. (A maximum 50 box can be uced when the modull register area is specified to “50” in the display menu.)

**NOTE**

It is recommended that the output blocks included in the UT or UP mode of controller be used as they are. The output selection modules listed below can be used to select the output type using the output selection parameter (OT1 or OT2). If you make any change to the way an output selection module is connected, the output in question may fail to function correctly.

Available output selection modules: OUTSEL1, OUTSEL11, OUTSEL12, OUTSEL13, OUTSEL2 and OUTSEL21

**NOTE**

When applying time-proportional PID computation, do not allow the computation to be carried out between the output selection module and an output signal (OUT1A, OUT2A, OUT1R or OUT2R).

Figure 4.3.3 shows an output block for single-loop control. The following paragraphs explain how to add an OR module to the diagram of an output block for single-loop control.

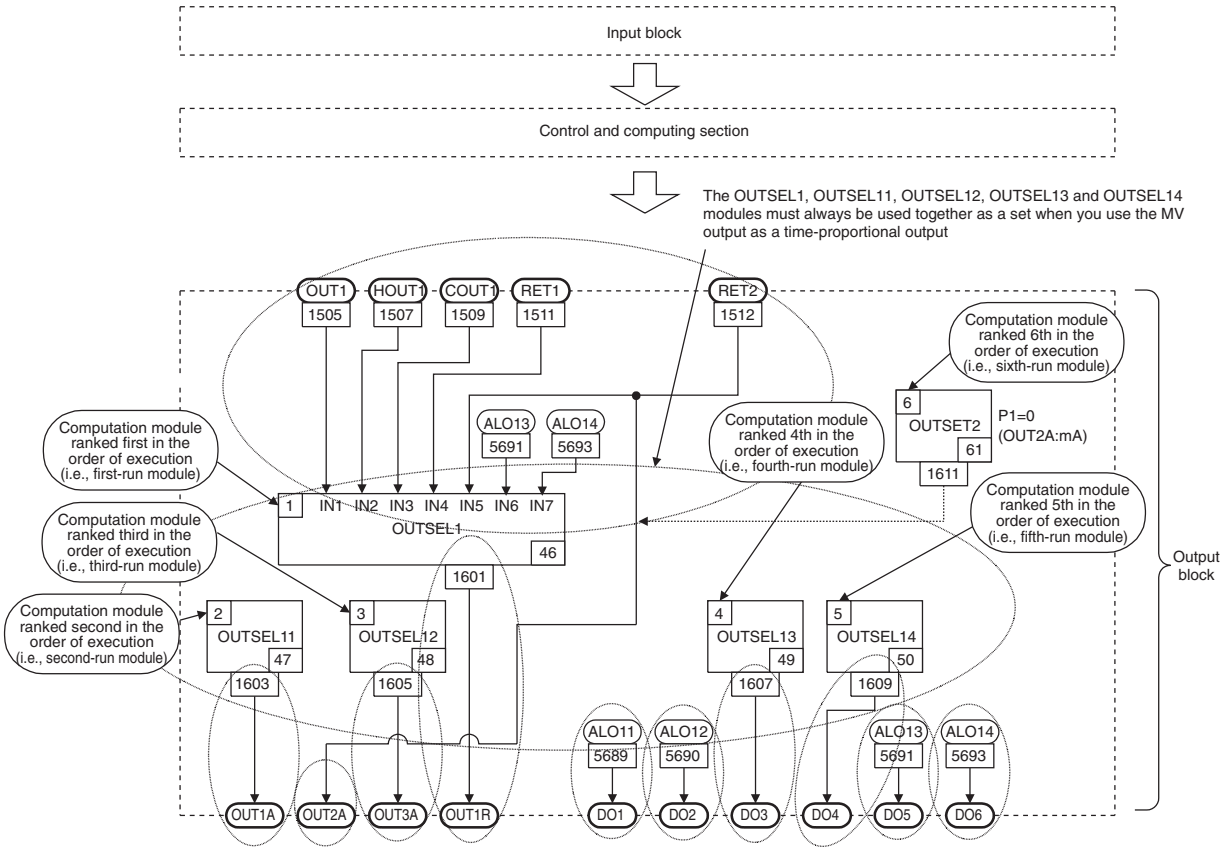



**Figure 4.3.3 Addition of an OR Module to the Diagram of an Output Block for Single-loop Control**

## ● Operation: Registering the Modules

### TIP

Computation modules can be positioned anywhere within the output block. You should however locate them as close as possible to the output signals (PV.1, PV.2, CSP.1, CSP.2, OUT.1, OUT.2, HOUT.1, HOUT.2, COUT.1, COUT.2, RET1, RET2) for the output block connected to the modules. This strategy makes wiring between module I/Os visible and simple.

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 4.3.2), click the <Output Block> button. The [Output Block] dialog box appears. Figure 4.3.4 illustrates the [Output Block] dialog box for single-loop control (Sample file: Utm01.tec) of UT750.

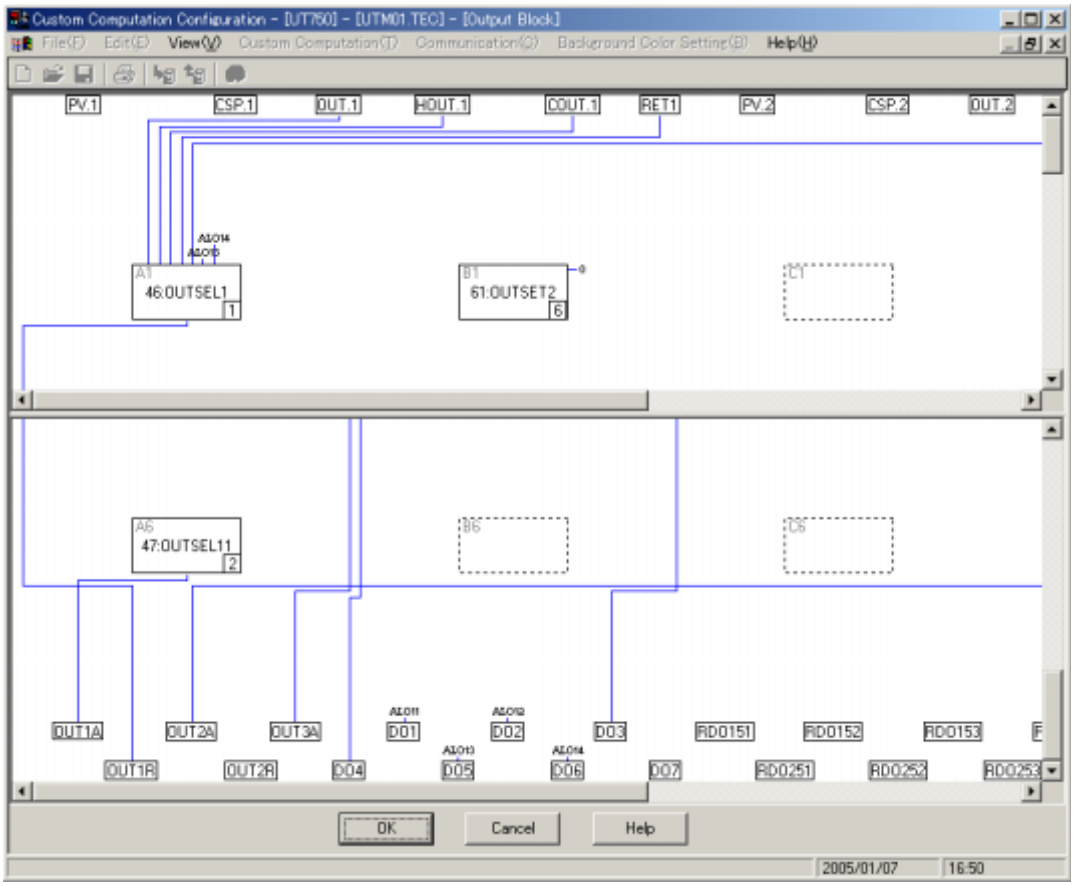



**Figure 4.3.4 [Output Block] Dialog Box for Single-loop Control**

(2) In the [Output Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 4.3.5) appears. For ease of selection, modules are classified into four types; arithmetic operation, logical operation, special calculation and special function.

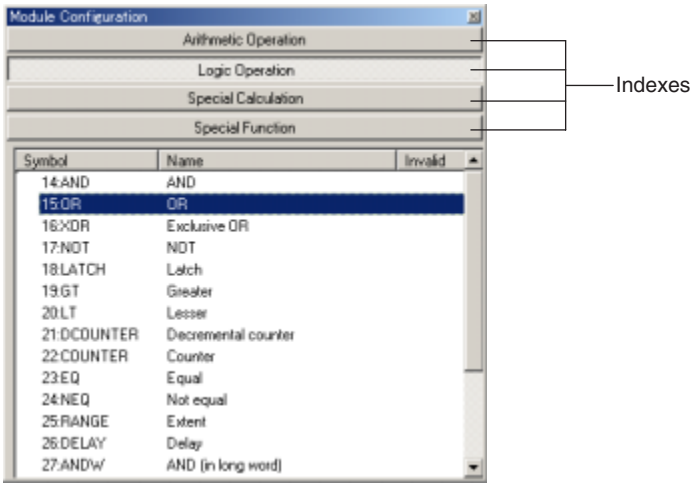



**Figure 4.3.5 [Module Configuration] Dialog Box**

(1) Click the index that contains the computation module you register.

(2) Double-clicking the module registers it.

Figure 4.3.6 shows an example where the <15: OR> option in the <Logical Operation> index is registered.

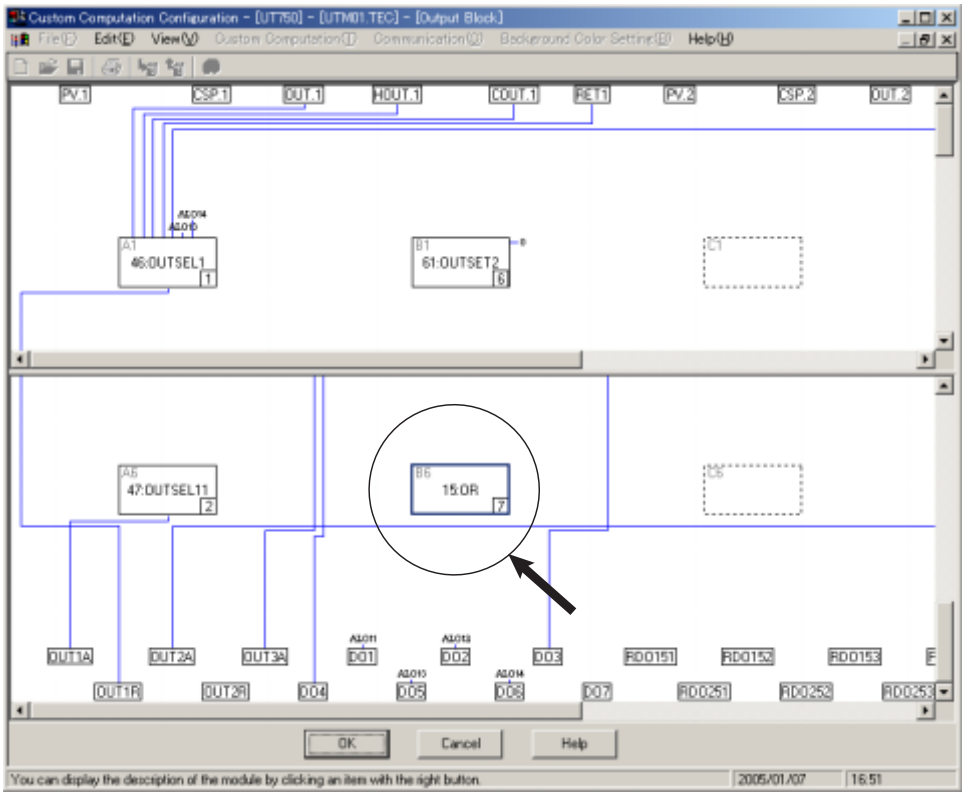



**Figure 4.3.6 Example where an OR Module Is Registered as the Sixth-run Module**

Repeat steps (2) to (4) to register the other necessary computation modules also.

When you have finished registering modules, proceed to subsection 4.3.2, “Step 3-2: Configuring the Inputs and Parameters of Computation Modules.”

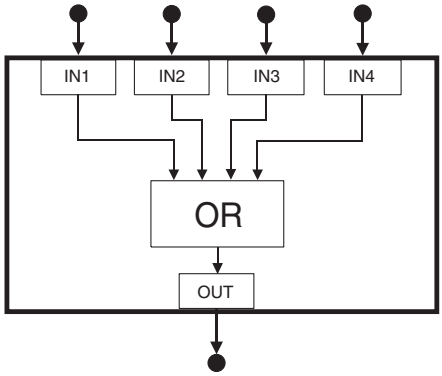
**TIP**

To view an explanation on the selected module, refer to the manual.
When your controller is UT750, refer to the manual (IM 05G01B22-02E).
When your controller is UP750, refer to the manual (IM 05G01B22-03E).

| Module No. | 15 | Category | Logical Operation |
|---|---|---|---|
| Module Name | OR Logic | Module Code Name | OR |

| Module Input | | |
|---|---|---|
| IN1 | ● | Input 1 |
| IN2 | ● | Input 2 |
| IN3 | ● | Input 3 |
| IN4 | ● | Input 4 |
| IN5 | | |
| IN6 | | |
| IN7 | | |
| IN8 | | |
| Module Parameter | | |
| P1 | | |
| P2 | | |
| P3 | | |
| P4 | | |
| Module Output | | |
| OUT | ● | OR logic result |
| Work Area | | |
| Limitation on Usage | | |

**[Computational Expression]**
OUT = IN1∨IN2∨IN3∨IN4




**[Explanation]**
The module outputs the OR logic for IN1 to IN4.

Example: 1 = 1∨0∨0∨1

| IN1 | IN2 | IN3 | IN4 | OUT |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

**Figure 4.3.7**

## 4.3.2 Step 3-2: Configuring the Inputs and Parameters of Computation Modules

### ● Explanation

Each computation module has inputs (8 maximum), parameters (4 maximum) and an output. This step involves configuring inputs and parameters only. The results of computation provided by the output are automatically stored, according to the module's order of execution, in the data storage area of the controller.

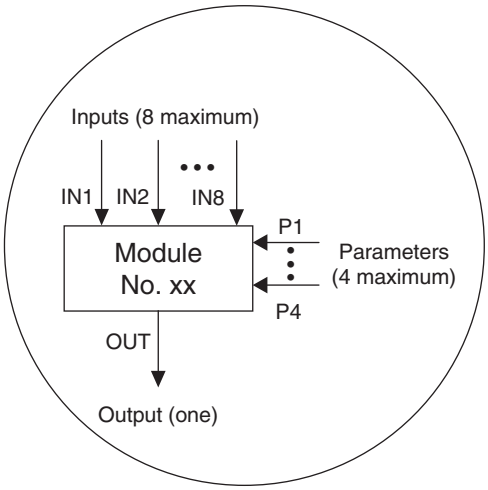



**Figure 4.3.8 Conceptual View of Module Configuration**

As was the case in the previous subsection, Figure 4.3.9 shows an output block for single-loop control where a logical OR operation module is added.

In this block diagram, the OUT1, HOUT1, COUT1, RET1 and RET2 control and computing signals are connected to the inputs of an OUTSEL1 module ranked first in the order of execution. This module has no parameters. The OUTSEL11, OUTSEL12, OUTSEL13 and OUTSEL14 modules, which are ranked second, third, fourth and fifth in the order of execution, respectively, have neither inputs nor parameters. In addition, the output statuses of alarms 1 to 4 are coupled with the inputs of the OR module which was registered in the previous subsection and is ranked seventh in the order of execution.

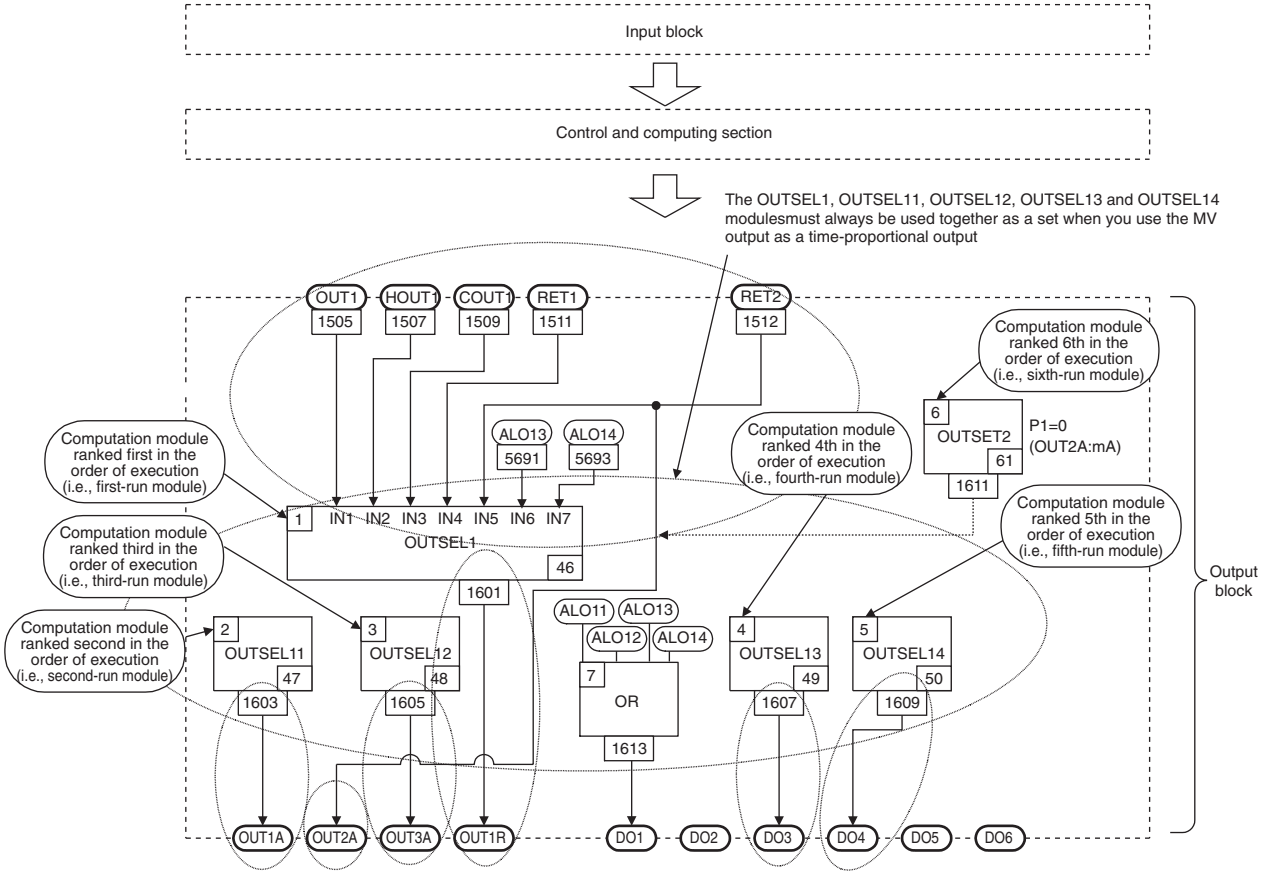



**Figure 4.3.9 Coupling of the Output Statuses of Alarms 1 to 4 with the Inputs of an OR Module**

## ● Operation: Configuring the Modules

This operation involves configuring the inputs and parameters of the computation modules.

(1) In the [Output Block] dialog box, click the module whose inputs and parameters you want to configure. In the example shown in Figure 4.3.6, click the OR module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>.

The [Module Setting] dialog box (Figure 4.3.10) appears.

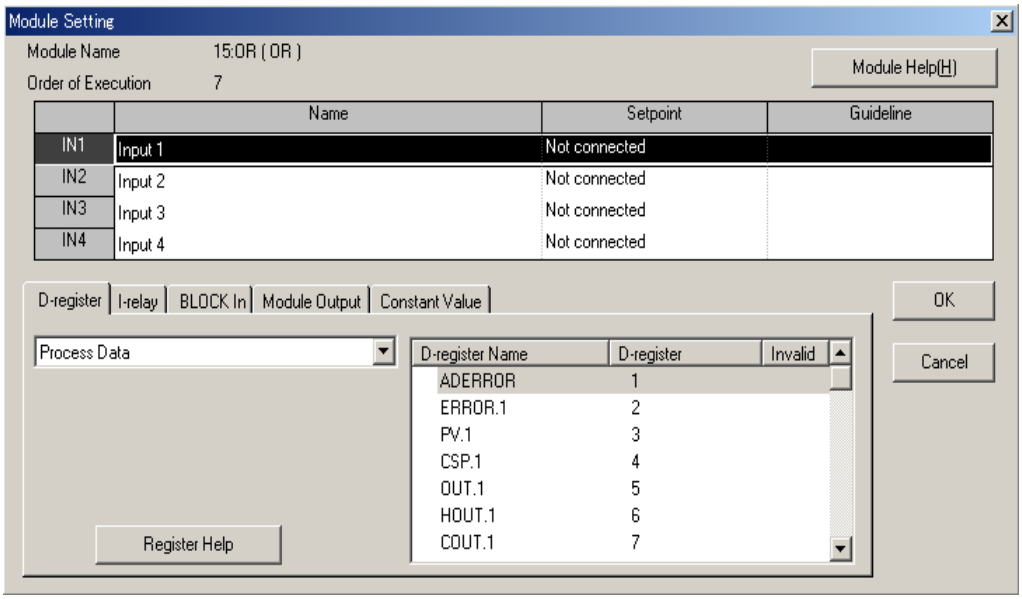



**Figure 4.3.10 [Module Setting] Dialog Box**

(3) Click the input from among <IN1> to <IN8> or the parameter from among <P1> to <P4>, that needs to be configured.

(4) Click the appropriate index.

Indexes are classified into <D-register>, <I-relay>, <BLOCK In>, <Module Output>, and <Constant Value>.

● Description of Indexes

| Index | Description | Remarks |
|---|---|---|
| D-Register | Process data, mode data, operation parameters, setup parameters | See chapter 5 in the User's Reference user's manual (for UT750 : IM 05G01B22-02E, for UP750 : IM05G01B22-03E) |
| I-Relay | ON/OFF status, ON status, OFF status, SPNO, PIDNO, timer flags, power-on flags, alarm flags, etc. | |
| BLOCK In | AIN1: Analog Input 1<br>AIN2: Analog Input 2<br>AIN3: Analog Input 3 | Analog input data fed to input block |
| | DI1.st: Contact Input 1<br>DI2.st: Contact Input 2<br>DI3.st: Contact Input 3<br>DI4.st: Contact Input 4<br>DI5.st: Contact Input 5<br>DI6.st: Contact Input 6<br>DI7.st: Contact Input 7<br>etc. | Contact input data fed to input block |
| Module Output | IMO1L to IMO50L (outputs of input-block computation modules)<br>OMO1L to OMO50L (outputs of output-block computation modules) | See Appendix 1, "Areas for Storing Data Output from Computation Modules." |
| Constant Value | Configurable range: -19999 to 3000 | |

(5) Double-clicking the appropriate input source configures the selected index.

To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. Fig. 4.3.11 shows the setting example of [ALOI1]-[ALOI4] modules.

(6) Repeat steps (3) to (5) to configure the other necessary inputs among <IN1>to <IN8> or parameters among <P1> to <P4>.

(7) Clicking the <OK> button closes the [Module Setting] dialog box. When the dialog box closes, the computation modules are automatically wired according to the inputs and parameters you configured.

(8) Repeat steps (1) to (7) to configure other computation modules also.

When you have finished configuring the inputs and parameters of computation modules, proceed to subsection 4.3.3, "Step 3-3: Connecting Computation Modules to Output Signals."

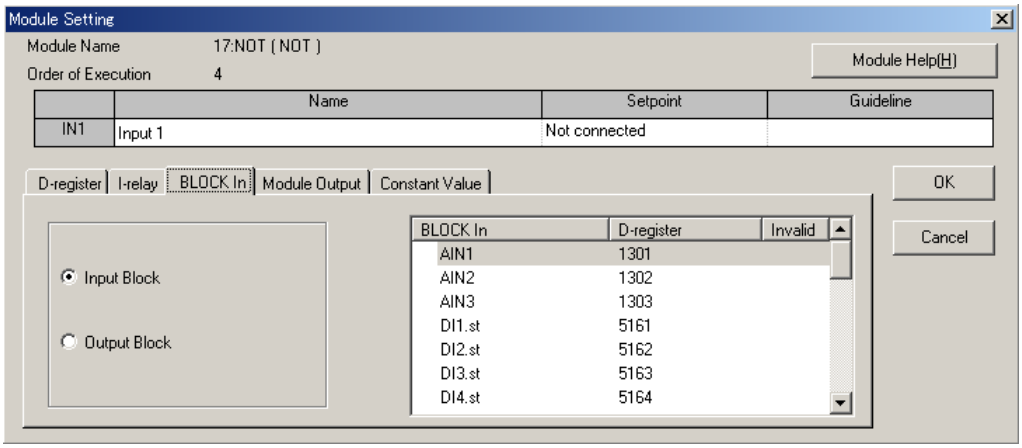



**Figure 4.3.11**

# 4.3.3 Step 3-3: Connecting Computation Modules to Output Signals

## ● Explanation

This step involves making the settings needed to pass the results of computation to the output signals after completing the module configuration and setting discussed so far.

As was the case in the previous subsection, Figure 4.3.12 shows an output block for single-loop control where a logical OR operation module is added.

In this block diagram, the outputs of the OUTSEL1, OUTSEL11, OUTSEL12 and OUTSEL13 modules, which are ranked first, second, third and fourth in the order of execution, are connected to OUT1R, OUT1A, OUT3A and DO3 signals, respectively. In addition, the output of the OR module ranked seventh in the order of execution is connected to the DO1 signal.

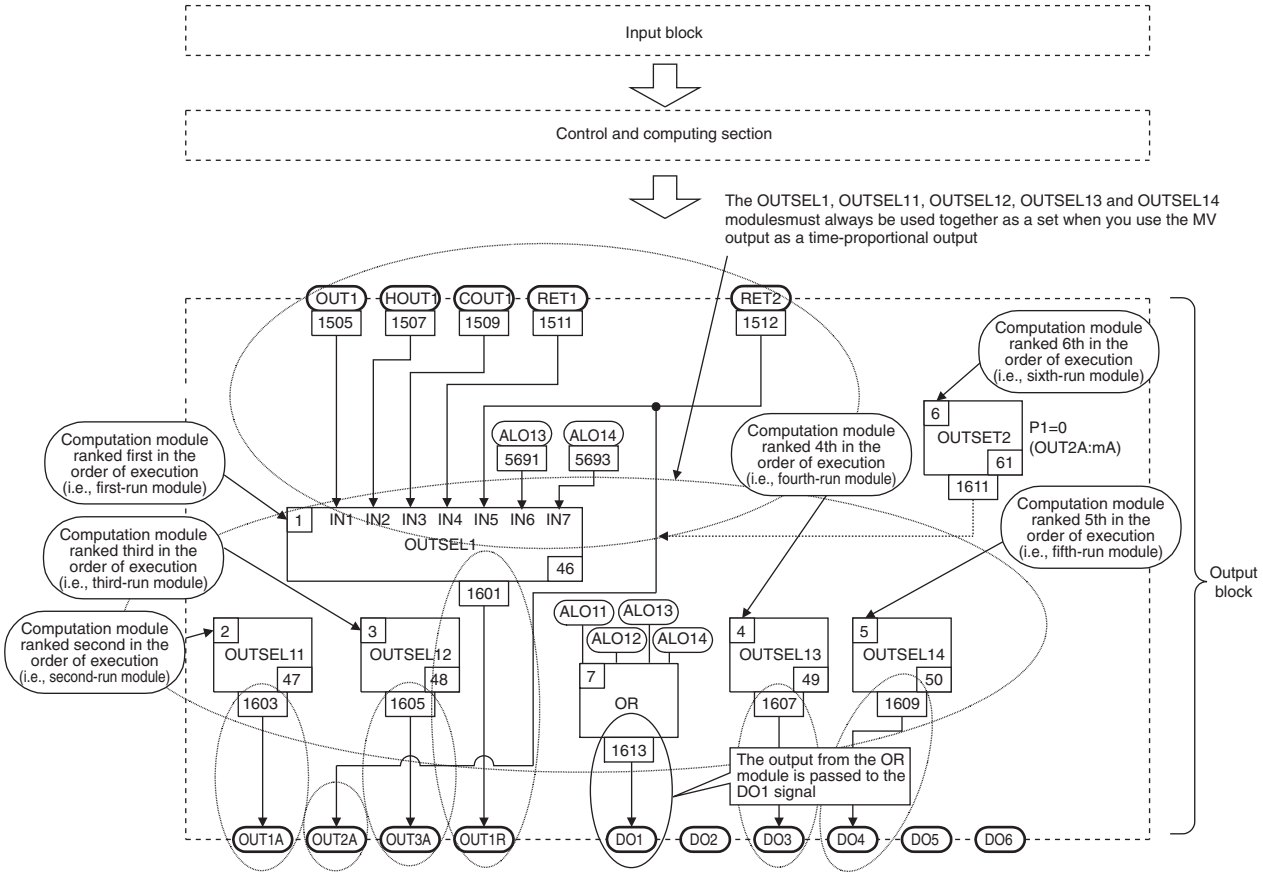



**Figure 4.3.12 Connection of the OR Module's Output to an Output Signal**

## ● Operation: Connecting to Output Signals

This operation involves making the settings needed to pass the results of computation in the output block to output signals.

(1) In the [Output Block] dialog box (Figure 4.3.13), click the appropriate output signal.

In this case (for example), click the <D01>.

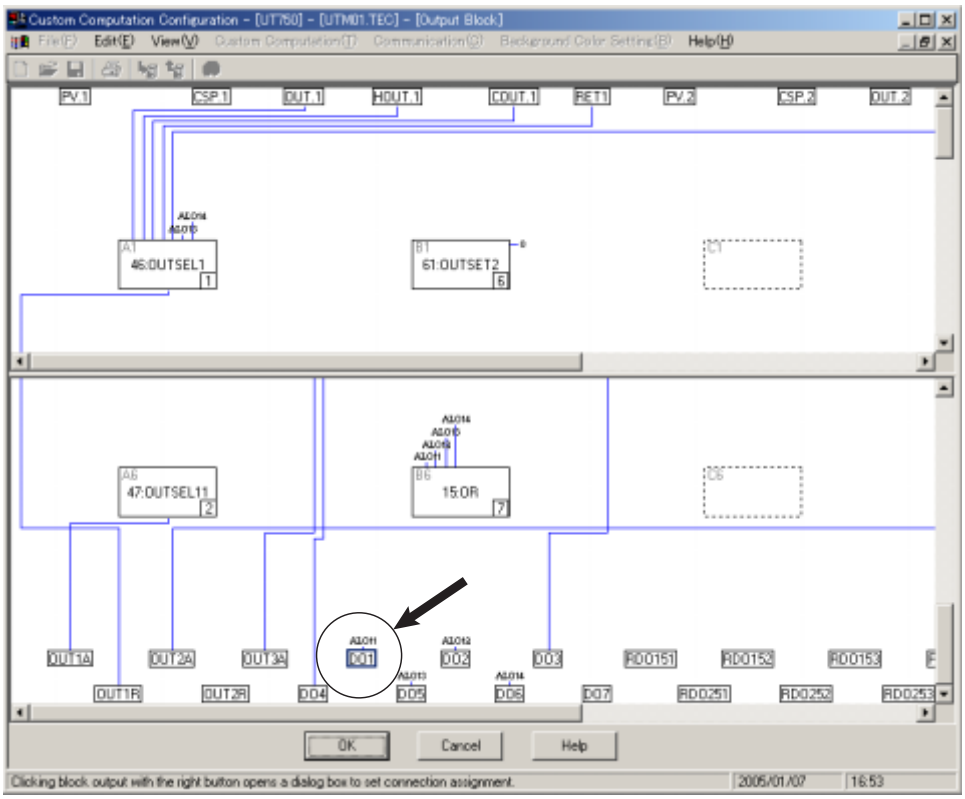



**Figure 4.3.13 Output Signals Fed by the Output Block**

● Description of Output Signals Fed by the Output Block

| Output signal | D-register No. | Specification | | |
|---|---|---|---|---|
| | | Description | Data type | Remarks |
| OUT1A | 1531 | Control output1 (Continuous/voltage pulse) | % | Current output or Voltage pulse output<br>Display range:-1500 to 31500 |
| OUT2A | 1532 | Control output2 (Continuous/voltage pulse) | | |
| OUT3A | 1533 | Retransmission output | | Current output<br>Display range:-1500 to 31500 |
| OUT1R | 1534 | Relay output1 | flag or % | The data type in the time proportional control output "%" .<br>Display range:-1500 to 31500 |
| OUT2R | 1535 | Relay output2 | | |
| DO1 | 1536 | Contact output1 (Relay) | flag | 0:Off, 1:ON |
| DO2 | 1537 | Contact output2 (Relay) | flag | 0:Off, 1:ON |
| DO3 | 1538 | Contact output3 (Relay) | flag | 0:Off, 1:ON |
| DO4 | 1539 | Contact output4 (Open collector) | flag | 0:Off, 1:ON |
| DO5 | 1540 | Contact output5 (Open collector) | flag | 0:Off, 1:ON |
| DO6 | 1541 | Contact output6 (Open collector) | flag | 0:Off, 1:ON |
| DO7 | 1542 | Contact output7 (Open collector) | flag | 0:Off, 1:ON |
| RDO151 | 1543 | Expansion contact output1 | flag | 0:Off, 1:ON |
| RDO152 | 1544 | Expansion contact output2 | flag | 0:Off, 1:ON |
| RDO153 | 1545 | Expansion contact output3 | flag | 0:Off, 1:ON |
| RDO154 | 1546 | Expansion contact output4 | flag | 0:Off, 1:ON |
| RDO155 | 1547 | Expansion contact output5 | flag | 0:Off, 1:ON |
| RDO156 | 1548 | Expansion contact output6 | flag | 0:Off, 1:ON |
| RDO157 | 1549 | Expansion contact output7 | flag | 0:Off, 1:ON |
| RDO158 | 1550 | Expansion contact output8 | flag | 0:Off, 1:ON |
| RDO251 | 1551 | Expansion contact output9 | flag | 0:Off, 1:ON |
| RDO252 | 1552 | Expansion contact output10 | flag | 0:Off, 1:ON |
| RDO253 | 1553 | Expansion contact output11 | flag | 0:Off, 1:ON |
| RDO254 | 1554 | Expansion contact output12 | flag | 0:Off, 1:ON |
| RDO255 | 1555 | Expansion contact output13 | flag | 0:Off, 1:ON |
| RDO256 | 1556 | Expansion contact output14 | flag | 0:Off, 1:ON |
| RDO257 | 1557 | Expansion contact output15 | flag | 0:Off, 1:ON |
| RDO258 | 1558 | Expansion contact output16 | flag | 0:Off, 1:ON |

(2) From the tool menus, choose <Edit [E]>, then <Connection>.
The [Setting Output Block Assignment] dialog box (Figure 4.3.14) appears.

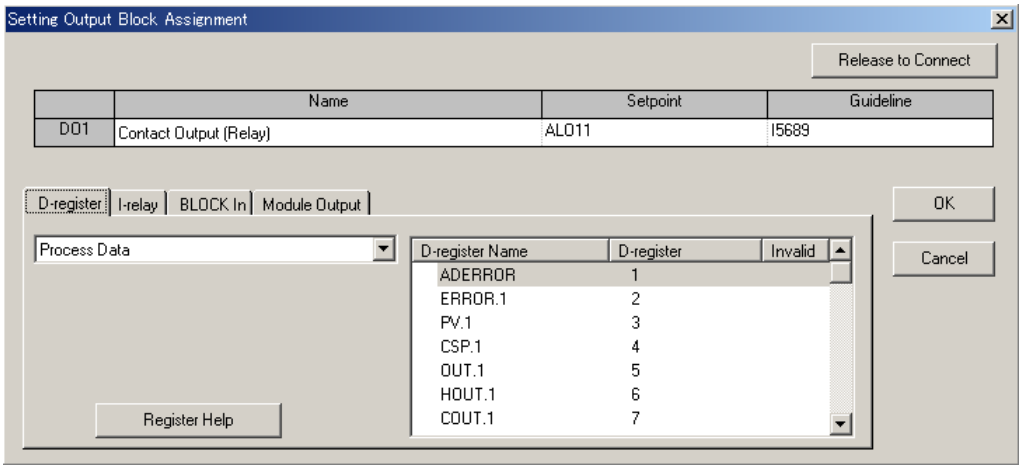



**Figure 4.3.14 [Setting Output Block Assignment] Dialog Box**

(3) Click the appropriate index.

● Description of Indexes

| Index | Description | Remarks |
|---|---|---|
| D-Register | Process data, mode data, operation parameters, setup parameters | See chapter 5 in the User's Reference user's manual (for UT750 : IM 05G01B22-02E, for UP750 : IM05G01B22-03E) |
| I-Relay | ON/OFF status, ON status, OFF status, SPNO, PIDNO, timer flags, power-on flags, alarm flags, etc. | |
| BLOCK In | AIN1: Analog Input 1<br>AIN2: Analog Input 2<br>AIN3: Analog Input 3 | Analog input data fed to input block |
| | DI1.st: Contact Input 1<br>DI2.st: Contact Input 2<br>DI3.st: Contact Input 3<br>DI4.st: Contact Input 4<br>DI5.st: Contact Input 5<br>DI6.st: Contact Input 6<br>DI7.st: Contact Input 7<br>etc. | Contact input data fed to input block |
| Module Output | IMO1L to IMO30L (outputs of input-block computation modules)<br>OMO1L to OMO30L (outputs of output-block computation modules) | See Appendix 1, "Areas for Storing Data Output from Computation Modules." |
| Constant Value | Configurable range: -19999 to 3000 | |

(4) Double-clicking the appropriate input source configures the selected index.

To configure the <Constant Value> index, type a value in the text box, and then press the <Enter> key. The Figure 4.3.15 shows an example of how to configure <OMO6L>, the sixth output-block computation module to be carried out.

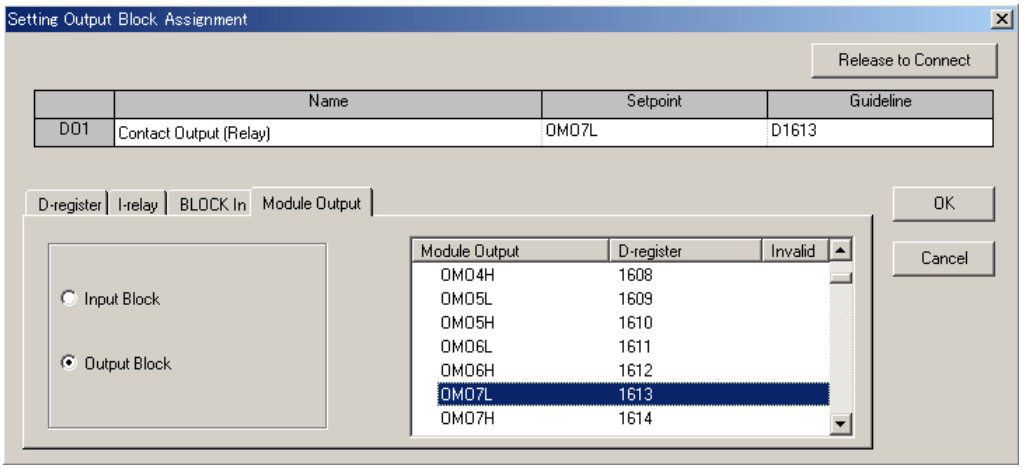



**Figure 4.3.15**

(5) Clicking the <OK> button after the configuration is completed closes the [Setting of Output Block Connection Assignment] dialog box. When the dialog box closes, the computation modules are automatically wired according to the settings you defined.

(6) Repeat steps (1) to (5) to define the connection of other necessary output signals also.

Figure 4.3.16 shows the output block with the configuration and setting of computation modules, as well as their connection to the output signals, completed.

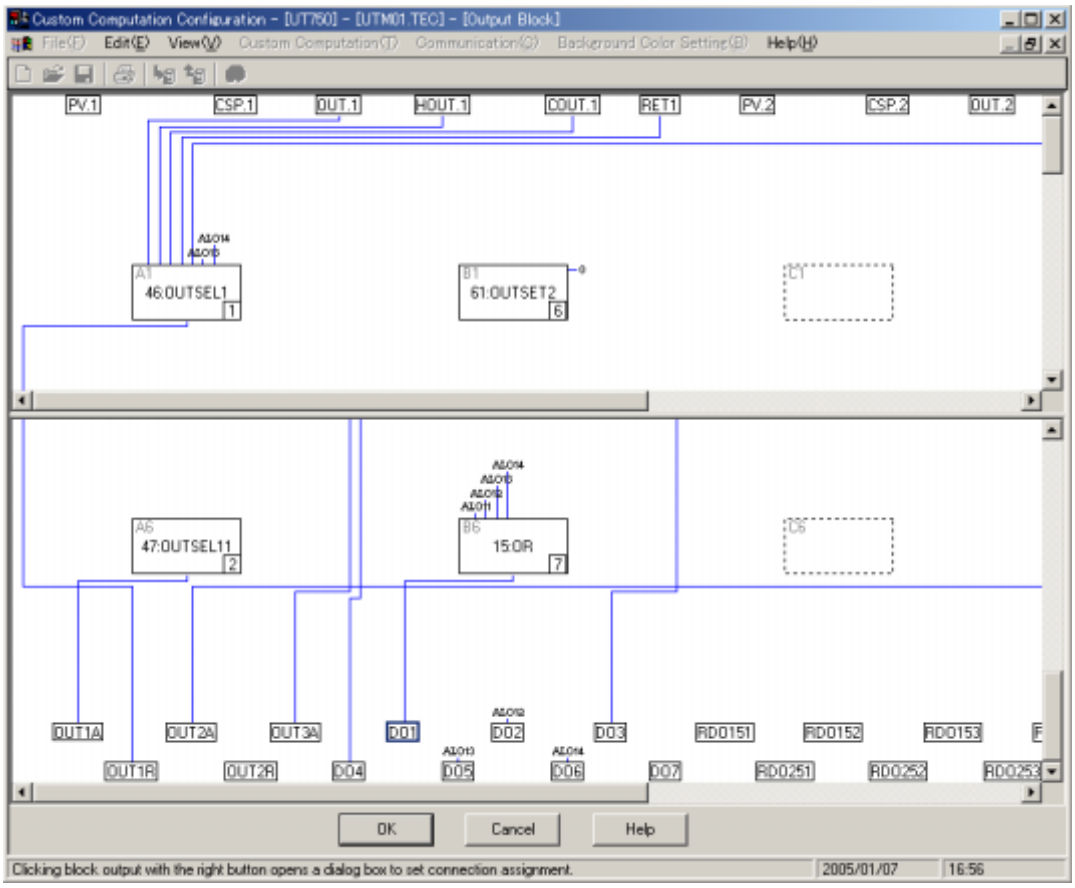



**Figure 4.3.16 Registration of an OR Module with the Diagram of an Output Block for Single-loop Control (Finished View)**

Now, you have finished configuring custom computations in a output block.

# 4.4 Step 4: Configuring the Parameters of Ten-segment Linearizers 3 and 4 (as necessary)

The settings of the parameters of ten-segment linearizers 3 and 4 can be used only if the ten-segment linearizers 3 and 4 (PLINE3 and PLINE4) modules are registered in an input or output block. Since these functions are designed for exclusive use with custom computations, the available unit of computation is “ABS0 (-19999 to 30000, with the maximum span of 30000)” only.

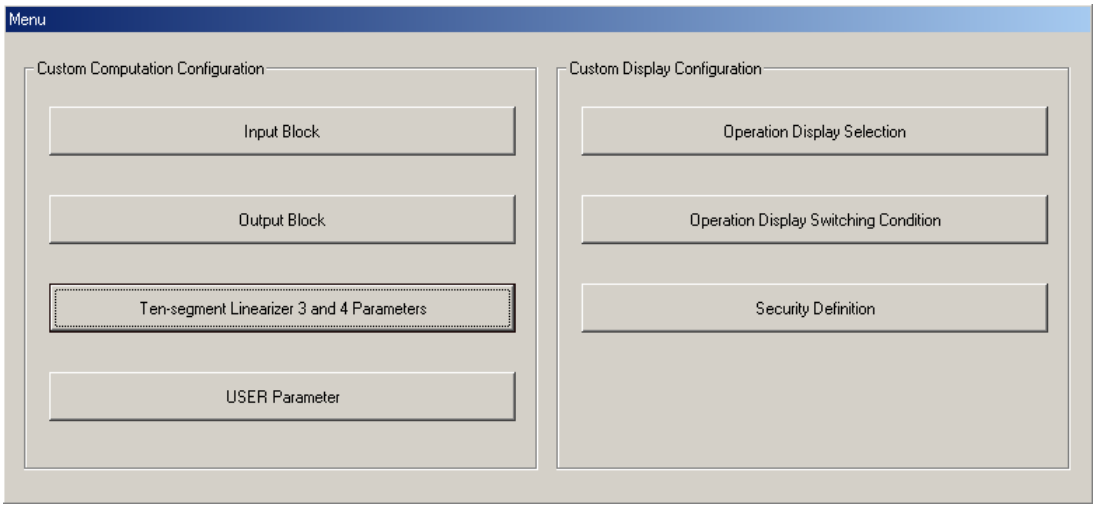
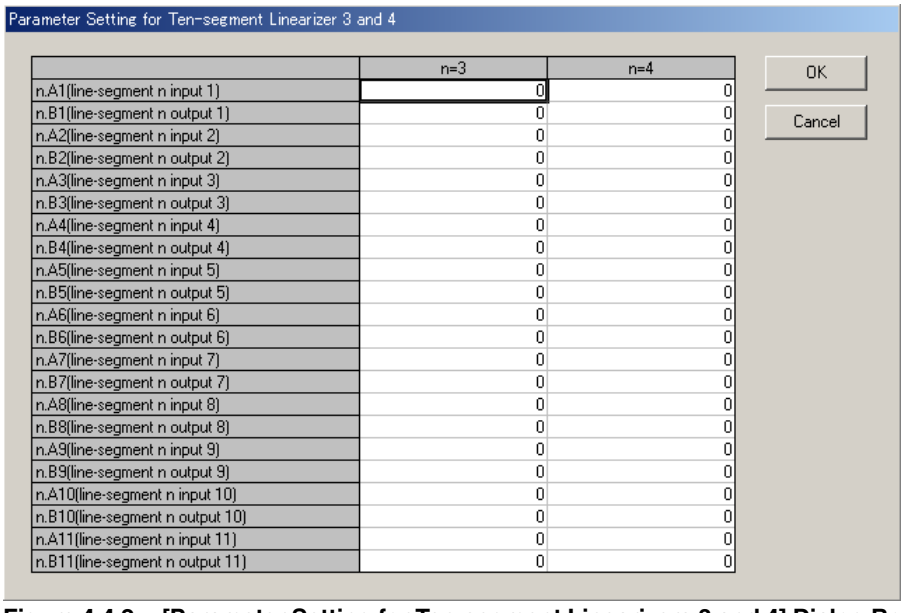



**Figure 4.4.1 [Custom Computation Configuration Menu] Dialog Box**

## ● Operation

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 4.4.1), click the <Ten-segment Linearizers 3 and 4 Parameters> button. The [Parameter Setting for Ten-segment Linearizers 3 and 4] dialog box (Figure 4.4.2) appears.




| | n=3 | n=4 |
|---|---|---|
| n.A1(line-segment n input 1) | 0 | 0 |
| n.B1(line-segment n output 1) | 0 | 0 |
| n.A2(line-segment n input 2) | 0 | 0 |
| n.B2(line-segment n output 2) | 0 | 0 |
| n.A3(line-segment n input 3) | 0 | 0 |
| n.B3(line-segment n output 3) | 0 | 0 |
| n.A4(line-segment n input 4) | 0 | 0 |
| n.B4(line-segment n output 4) | 0 | 0 |
| n.A5(line-segment n input 5) | 0 | 0 |
| n.B5(line-segment n output 5) | 0 | 0 |
| n.A6(line-segment n input 6) | 0 | 0 |
| n.B6(line-segment n output 6) | 0 | 0 |
| n.A7(line-segment n input 7) | 0 | 0 |
| n.B7(line-segment n output 7) | 0 | 0 |
| n.A8(line-segment n input 8) | 0 | 0 |
| n.B8(line-segment n output 8) | 0 | 0 |
| n.A9(line-segment n input 9) | 0 | 0 |
| n.B9(line-segment n output 9) | 0 | 0 |
| n.A10(line-segment n input 10) | 0 | 0 |
| n.B10(line-segment n output 10) | 0 | 0 |
| n.A11(line-segment n input 11) | 0 | 0 |
| n.B11(line-segment n output 11) | 0 | 0 |

**Figure 4.4.2 [Parameter Setting for Ten-segment Linearizers 3 and 4] Dialog Box**

The <n=3> and <n=4> fields in the dialog box denote ten-segment linearizers 3 and 4, respectively.

(2) In the [Parameter Setting for Ten-segment Linearizers 3 and 4] dialog box, click the appropriate I/O parameters to input data.

(3) When you are finished with all the necessary parameters, click the <OK> button. The [Parameter Setting for Ten-segment Linearizers 3 and 4] dialog box closes.

Step 4, “Configuring the Parameters of Ten-segment Linearizers 3 and 4 (as necessary),” is now complete.

# 4.5 Step 5: Configuring USER Parameters (as necessary)

This step involves defining the setpoints and units of USER parameters.

For details on how to use USER parameters, see “Example of Using User Parameters,” later in this section.

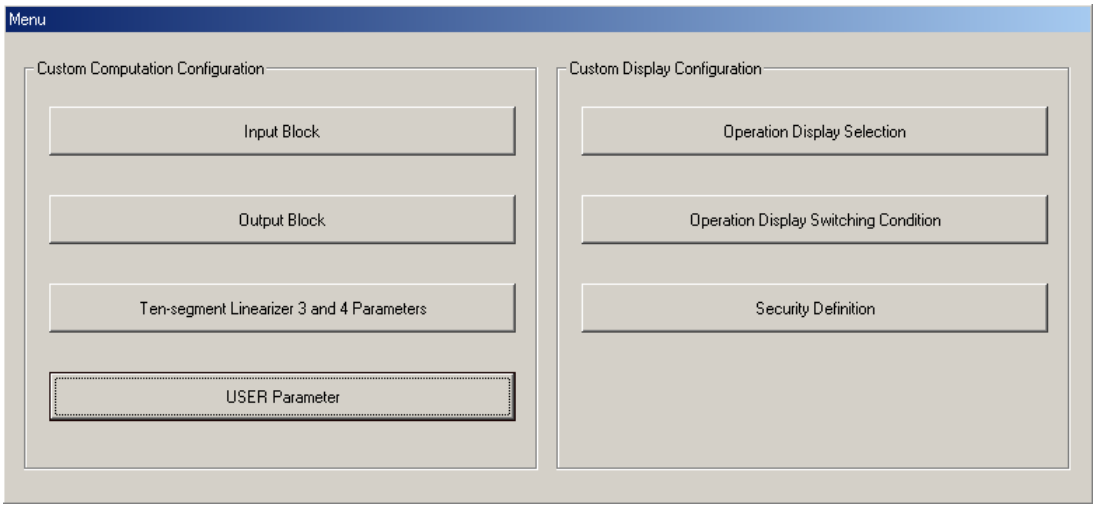



**Figure 4.5.1 [Custom Computation Configuration Menu] Dialog Box**

## ● Operation

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 4.5.1), click the <USER Parameter> button. The [User Parameter Definition] dialog box (Figure 4.5.2) appears.

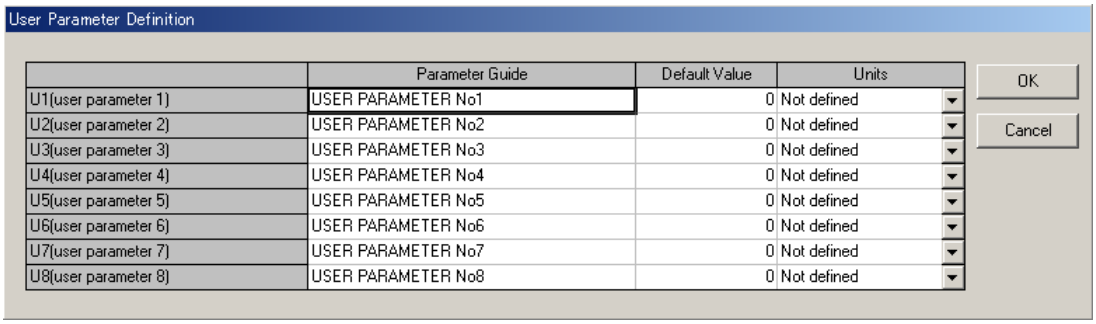



**Figure 4.5.2 [User Parameter Definition] Dialog Box**

(2) From the given drop-down list box, choose the unit of the USER parameter in question.

| Unit | Description |
|---|---|
| % | % data type |
| ABS0 | Absolute-vale data without decimal point |
| ABS1 | Absolute-vale data with one decimal place |
| ABS2 | Absolute-vale data with two decimal places |
| ABS3 | Absolute-vale data with three decimal places |
| ABS4 | Absolute-vale data with four decimal places |
| EU(AIN1) | Engineering unit of AIN1 range |
| EUS(AIN1) | Engineering-unit span of AIN1 range |
| EU(AIN2) | Engineering unit of AIN2 range |
| EUS(AIN2) | Engineering-unit span of AIN2 range |
| EU(AIN3) | Engineering unit of AIN3 range |
| EUS(AIN3) | Engineering-unit span of AIN3 range |
| EU(PV1) | Engineering unit of PV1 range |
| EUS(PV1) | Engineering-unit span of PV1 range |
| EU(PV2) | Engineering unit of PV2 range |
| EUS(PV2) | Engineering-unit span of PV2 range |

(3) Type the setting value of the USER parameter in the <Setpoint> text box.

(Note:This setting can be done only when the unit is set to %, ABS0, ABS1, ABS2 or ABS3.)

**NOTE**

If you specify an EU (engineering unit) or EUS (engineering-unit span), the default is fixed to “0” (a value equivalent to 0%). This is because you are not allowed to specify a range of custom-computation data or engineering-unit span data.

Alternatively, set the range in the [Analog Input Setting] dialog box of the parameters setting tool (Figure 4.5.3). Then, change the default to your desired value in the tool’s [USER Parameter Setting] dialog box (Figure 4.5.4).

(4) Repeat steps (2) and (3) to configure other necessary USER parameters.

(5) Click the <OK> button.

The [User Parameter Definition] dialog box closes.

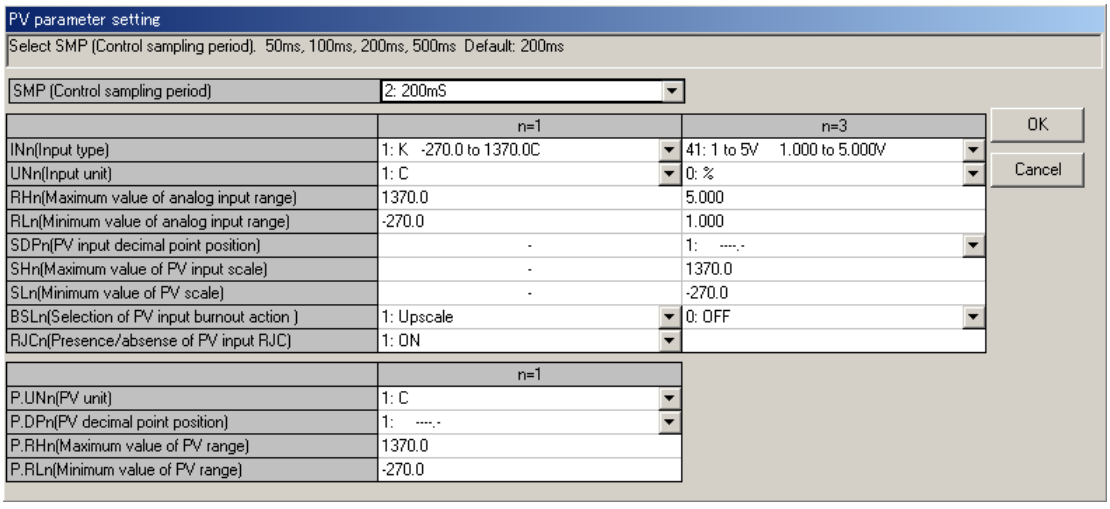



**Figure 4.5.3 [Analog Input Setting] Dialog Box (Parameters Setting Tool)**

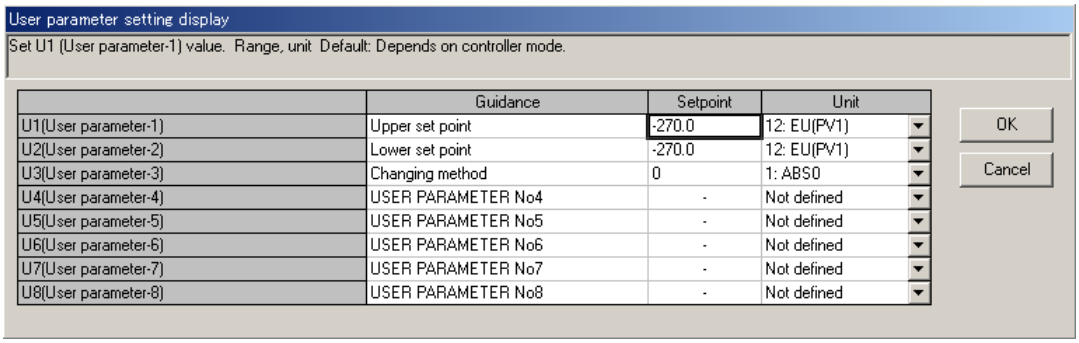



**Figure 4.5.4 [USER Parameters Setting] Dialog Box (Parameters Setting Tool)**

## ■ Example of Using USER Parameters

Figure 4.5.5 shows an input block for a case where the controller mode is the Loop control with PV switching.

Switching between PV input 1 and PV input 2 is achieved using the SELECT2 module. The SELECT2 module requires parameters and, thus, USER parameters U1, U2 and U3 are coupled with the inputs for these parameters.

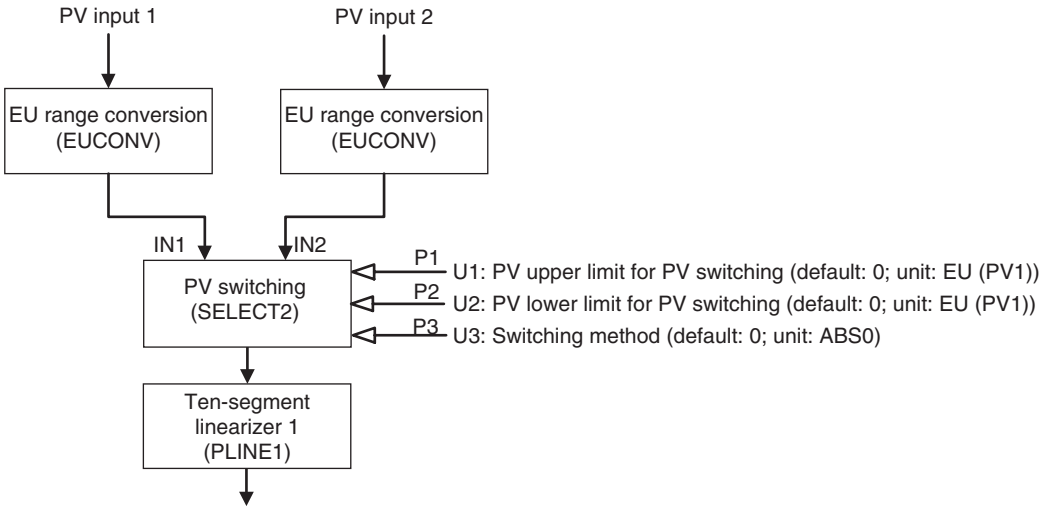



**Figure 4.5.5 Example of Using User Parameters**

### TIP

USER parameters are used for the controller mode (UT or UP mode) 6, 7, 14 or 15 standard with the controller.

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# 5. Basic Operations for Configuring Custom Displays and Relevant Explanations

This chapter explains the procedure for configuring custom displays.

For details on how to prepare the LL200 tool for use, see Chapter 2, “Setup.”

Also refer to Chapter 6, “Specifications of Custom Display Functions,” in the Model LL200 PC-based Custom Computation Building Tool—User’s Reference user’s manual (Note), for details on the available displays and the data items they show.

(Note): When your controller is UT750, refer to an user’s manual (IM 05G01B22-02E).
When your controller is UP750, refer to an user’s manual (IM 05G01B22-03E).

In order to configure custom displays, you must follow the steps shown below.

- **Step 1: Choosing the Method of Custom Display Configuration (if no custom computations are configured yet) ---------- (Section 5.1)**
- **Step 2-1: Choosing the Custom Display(s) ---------- (Subsection 5.2.1)**
- **Step 2-2: Setting Conditions Necessary to Switch to Custom Displays ---------- (Subsection 5.2.2)**
- **Step 3: Defining the Security Function (as necessary) ---------- (Section 5.3)**

When you finish configuring custom computations and displays, download the created data to the GREEN SERIES controller (see Section 8.2). Then, verify their performance using the custom computation monitor (see Chapter 11).

# 5.1 Step 1: Choosing the Method of Custom Display Configuration

If you have configured custom computations already, refer to Section 5.2 and subsequent subsections/paragraphs.

If you are configuring custom displays and no custom computations have been configured yet, follow the instructions below to retrieve the [Custom Display Configuration Menu] dialog box.

When you start the LL200 tool, a dialog box appears as shown in Figure 5.1.1.

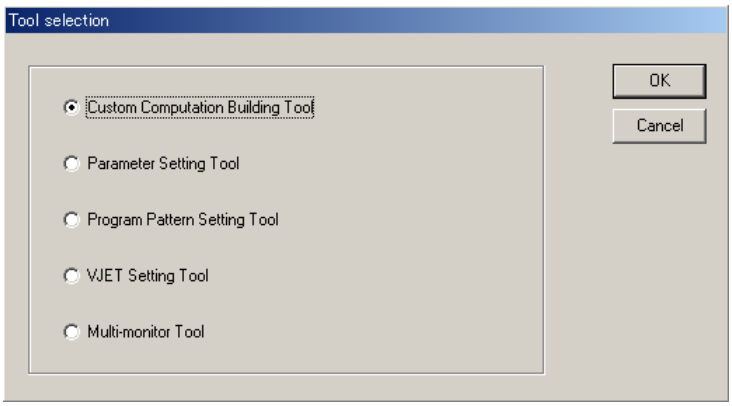


**Figure 5.1.1 [Tool Selection] Dialog Box**

Click the <Custom Computation Building Tool> option button, and then the <OK> button. The [Select series] dialog box (Figure 5.1.2) appears.

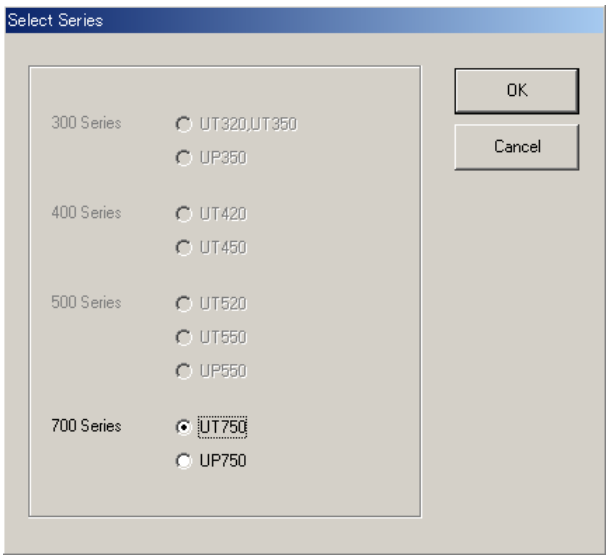


**Figure 5.1.2 [Select series] Dialog Box**

Click the option button to select the model to be used with the LL200 (UT750 or UP750), and then the <OK> button.

The [New/Modifiction] dialog box (Figure 5.1.3) appears.

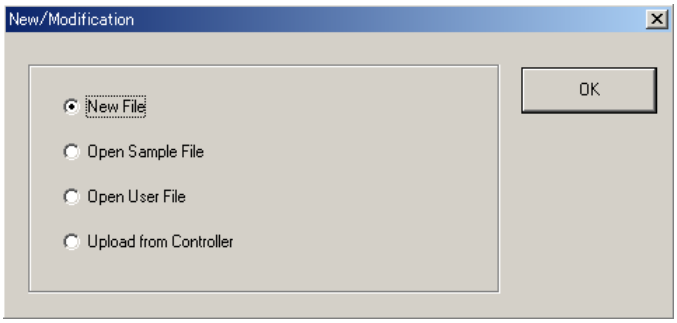


**Figure 5.1.3 [New/Modification] Dialog Box**

There are four ways of configuring custom displays, as described below. Choose one of these four ways.

**TIP**

If you are configuring custom displays for the first time, it is advisable that you use a sample file.

Section 5.2, “Step 2: Configuring Custom Displays,” uses a sample file to explain all the operating procedures in that section.

**NOTE**

When uploading custom computation information from GREEN SERIES controller, set the controller mode to “21.”

(1) If you are configuring a custom display for the first time, choose <New File>.

Click the <New File> option button, then the <OK> button. The [Select Model and Suffix Codes] dialog box (Figure 5.1.4) appears.

(2) If you are configuring a custom display using a sample file, choose <Open Sample File>.

Click the <Open Sample File> option button, then the <OK> button. The [Open Sample File] dialog box (Figure 5.1.5) appears.

(3) If you are configuring a custom display using a user file, choose <Open User File>.

Click the <Open User File> option button, then the <OK> button. The [Open User File] dialog box (Figure 5.1.7) appears.

(4) If you are configuring a custom display by uploading data from the controller, choose <Upload from Controller>.

Click the <Upload from Controller> option button, then the <OK> button. The [Reading Custom Computation Information] dialog box (Figure 5.1.9) appears.

## ■ [Select Model and Suffix Codes] Dialog Box

If you choose <New File> in the [New/Modification] dialog box (Figure 5.1.3), the [Select Model and Suffix Codes] dialog box (Figure 5.1.4) appears.

In the [Select Model and Suffix Codes] dialog box, click the <OK> button. The [Custom Computation Configuration Menu] dialog box (Figure 5.1.11) appears.

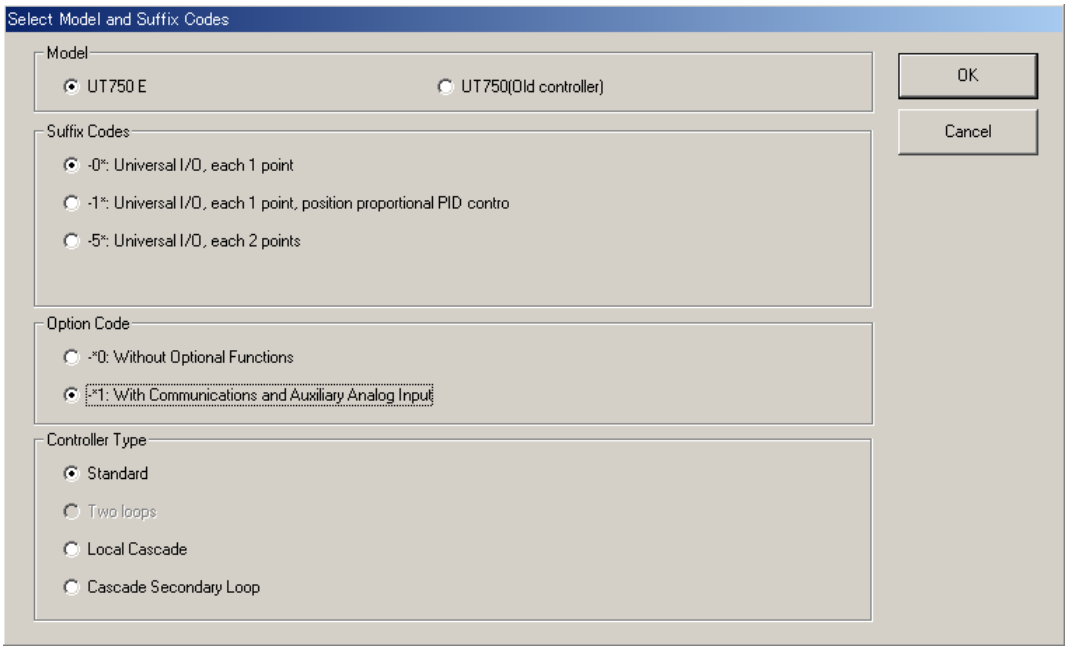


**Figure 5.1.4 [Select Model and Suffix Codes] Dialog Box**

The suffix code must be specified because the code needs to be verified when you download information on the custom computations you configured using the LL200 tool, to the controller.

Likewise, the controller type must be specified because you must decide upon the desired operating conditions for the controller.

● Explanation of the [Select Model and Suffix Codes] Dialog Box

| Controller Type | Criteria for Choice |
|---|---|
| -0*: Universal I/O, each 1 point<br>-1*: Universal I/O, each 1 point, position proportional PID control | • Normal PID control<br>• Internal cascade control (-*1: Auxiliary analogue input)<br>• Cascade secondary - loop control (-*1: Auxiliary analogue input) |
| -5*: Universal I/O, each 2 points | • Normal PID control<br>• Dual - loop control<br>• Internal cascade control (-*1: Auxiliary analogue input)<br>• Cascade secondary - loop control (-*1: Auxiliary analogue input) |

**NOTE**

Data cannot be downloaded to the controllers whose suffix codes do not match the one specified.

Check the suffix and optional suffix codes of the controller to which you download data.

## ■ Open Sample File

In the [New/Modification] dialog box, click the “Open Sample File” option button and the <Open> button. The [Open Sample file] dialog box (Figure 5.1.5) appears.

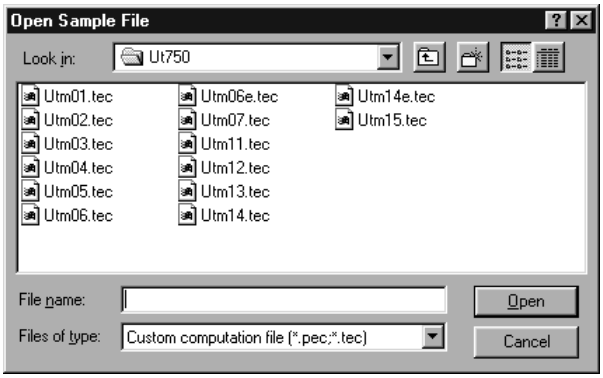


**Figure 5.1.5 [Open Sample File] Dialog Box**

In the [Open Sample File] dialog box, choose the file you want to use and click the <Open> button. The following message appears. (Figure 5.1.6)

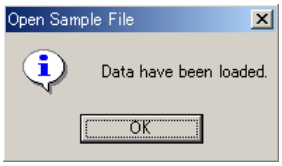


**Figure 5.1.6**

Click the <OK> button. The [Select Model and Suffix Codes] dialog box (Figure 5.1.4) appears.

## ■ Open User File

**NOTE**

Use the “Open User File” for up-loading the “Custom computations data” when your controller is not enhanced model.

In the [New/Modification] dialog box, click the “Open User File” option button and the <Open> button. The [Open User File] dialog box (Figure 5.1.7) appears.

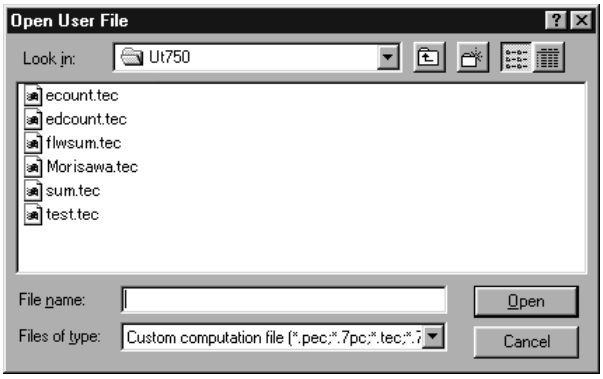


**Figure 5.1.7 [Open User File] Dialog Box**

In the [Open User File] dialog box, choose the file you want to use and click the <Open> button.

The following message appears. (Figure 5.1.8)

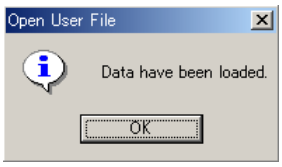


**Figure 5.1.8**

Click the <OK> button. The [Custom Computation Configration Menu] dialog box (Figure 5.1.11) appears.

## ■ Upload from Controller

If you choose <Upload from Controller> in the [New/Modification] dialog box (Figure 5.1.3), the [Reading Custom Computation Information] dialog box (Figure 5.1.9) appears.

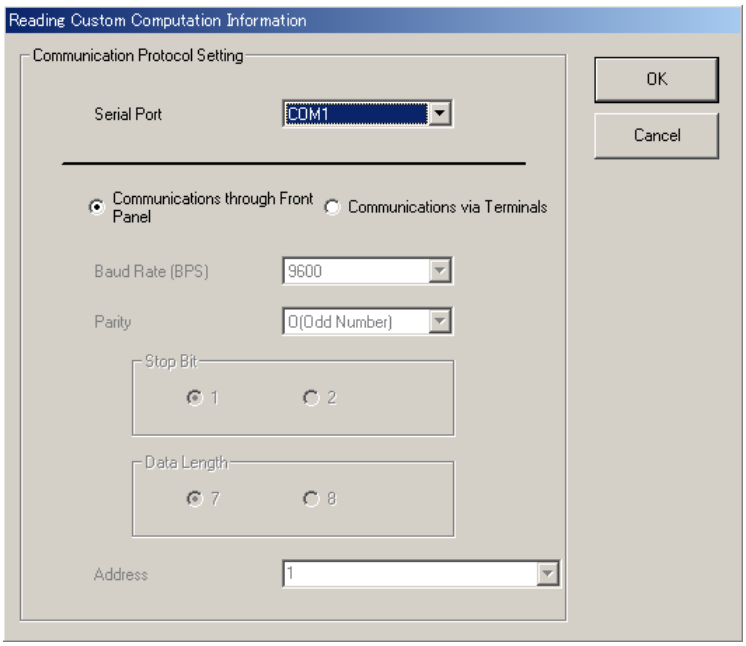


**Figure 5.1.9 [Reading Custom Computation Information] dialog box**

You can communicate with the controller in either of the following two ways.

- Communication Using the Front-panel Optical Interface

  (1) In the [Reading Custom Computation Information] dialog box, click the <Communication through Front Panel> option button.

  Note: If the front-panel optical interface is not connected to the controller, the following message appears.

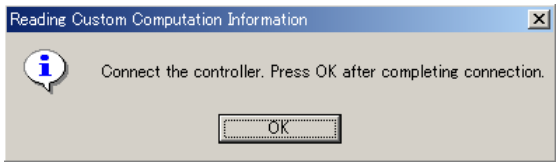


**Figure 5.1.10**

(2) From the <Serial Port> drop-down list box, choose either COM1 to COM16.

(3) Click the <OK> button. Data are uploaded from the controller.

(4) When uploading is complete, the [Custom Computation Configuration Menu] dialog box (Figure 5.1.11) appears.

(5) For the subsequent operations, see Section 5.2 and the sections/subsections that follow.

- Communication Using the RS-485 Interface

(1) In the [Reading Custom Computation Information] dialog box, click the <Communications via Terminals> option button.

Note: If the RS-485 Interface is not connected to the controller, Figure 5.1.10 appears.

(2) From the <Serial Port> drop-down list box, choose either COM1 to COM16. Then, from the <Baud Rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop Bit> and <Data Length> sections.

Fit the communication conditions to those for UT750 and UP750.

(3) Click the <OK> button. The LL200 tool begins uploading data from the controller.

(4) When uploading is complete, the [Custom Computation Configuration Menu] dialog box (Figure 5.1.11) appears.

(5) For the subsequent operations, see Section 5.2 and the sections/subsections that follow.

**NOTE**

If you have chosen RS-485 communication, set the communication protocol of the controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

## ■ Custom Display Configuration Menu

The dialog box shown below is the first to appear when you configure custom display. For further operations after this [Custom Computation Configuration Menu] dialog box, see Section 5.2 and subsections that follow.

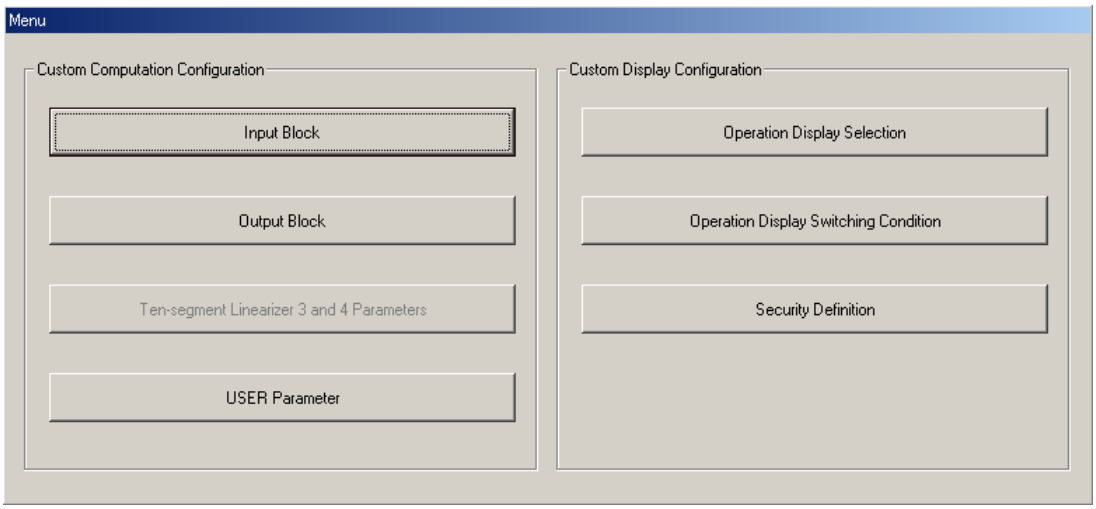


**Figure 5.1.11 [Custom Computation Configuration Menu] Dialog Box**

# 5.2 Step 2: Configuring Custom Displays

The flow of work in step 2 is as follows.

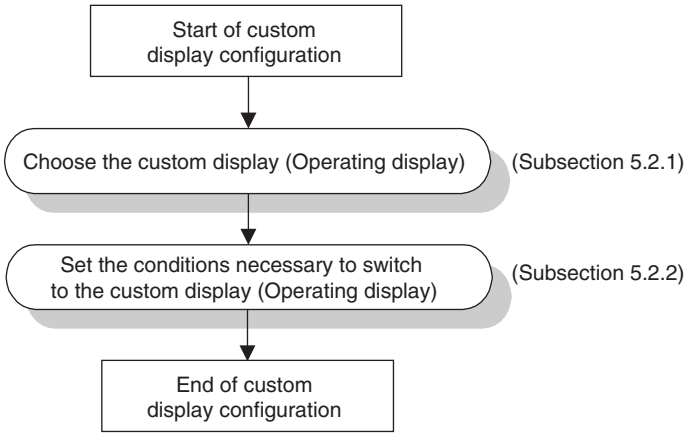


**Figure 5.2.1 Flow of Work for Configuring Custom Displays**

Figure 5.2.2 shows the [Custom Display Configuration Menu] dialog box used to configure custom displays.

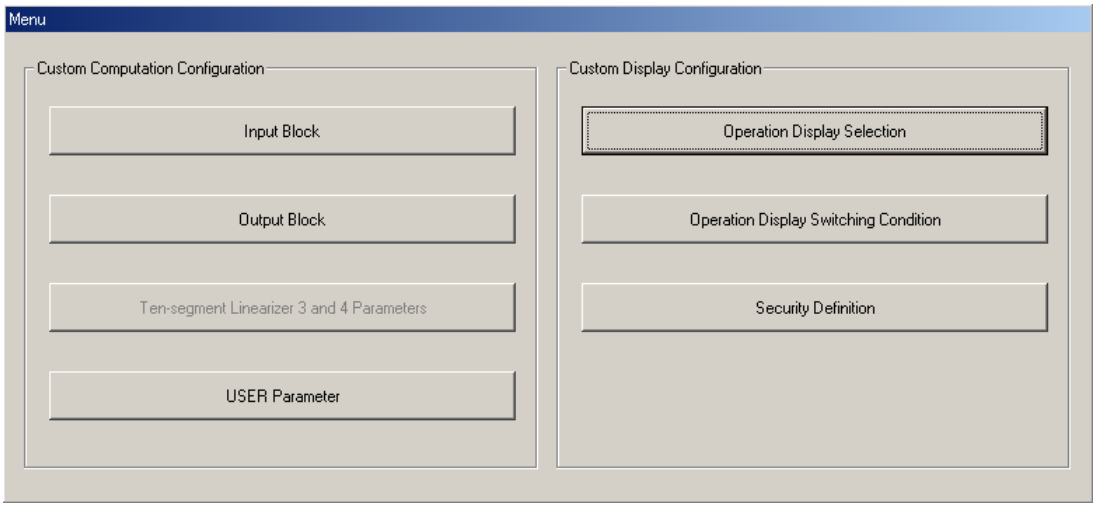


**Figure 5.2.2 [Custom Display Configuration Menu] Dialog Box**

## 5.2.1 Step 2-1: Choosing the Custom Display (Operating Display)

### ● Operation

This step explains the procedure for registering the PV/SP/DV display to the Operating Display 1 and the PV/SP/OUT display to the Operating Display 2, as shown in Figure 5.2.3.

Note: For using the custom computation, the registration of display discribed here is required. Not displayed without registration, as these displays are not registered in advance.

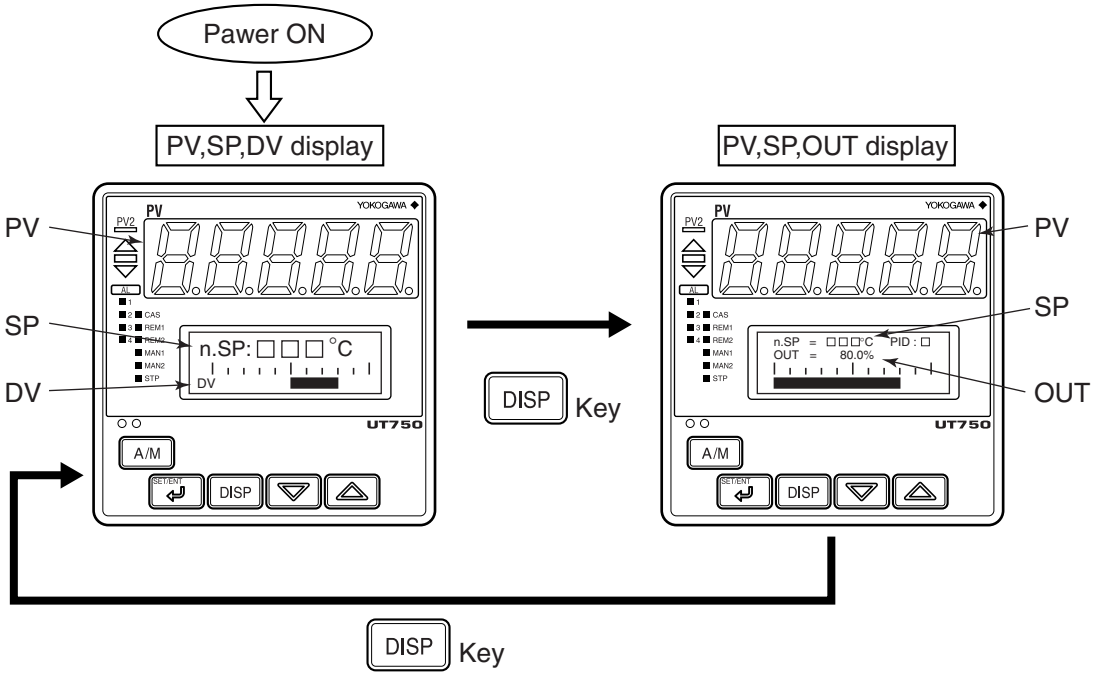


**Figure 5.2.3**

(1) In the [Custom Display Configuration Menu] dialog box (Figure 5.2.2), click the <Operation Display Selection> button. The [Operating Display Selection] dialog box appears. Figure 5.2.5 illustrates the choices of custom displays for single-loop control.

However, at the 1st time of operation, the following message appears.

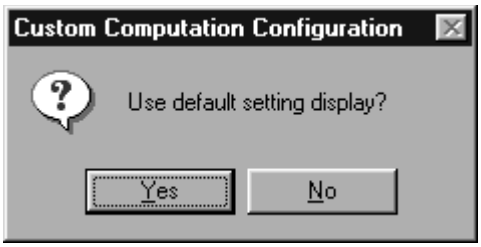


**Figure 5.2.4**

- When using the default operating display (operating display registered in advance), choose <Yes>. For example, 7 types of operating displays are registered in advance for UT750.
- When registering only PV/ SP/ PV display and PV/ SP/ OUT display as the procedure described here, choosing <No> is recommended. Because you can save the time to delete the unnecessary operating displays registered in advance.

Select <Yes> or <No> and click the button.

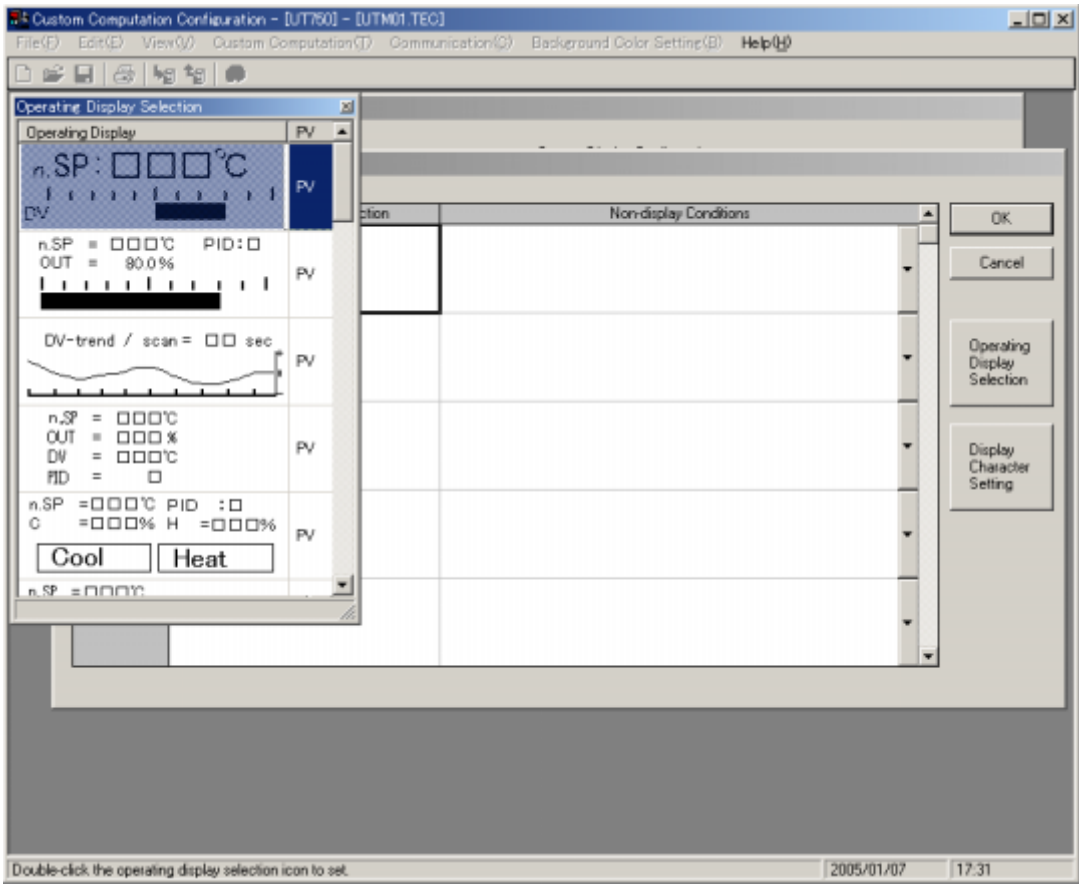


**Figure 5.2.5 Choices of Custom Displays for Single-loop Control**

(2) In the [Operating Display Selection] dialog box (Figure 5.2.5), click the cell of the rightmost box.

Click the cell of the Operating Display 1 for example.

(3) Select the operating display (in the [Operating Display Selection] dialog box) you want to use for controllers operating display.

To register the “PV, nSP, DV” display for example, double click the top display in the [Operating Display Selection] dialog box. (Figure 5.2.6)

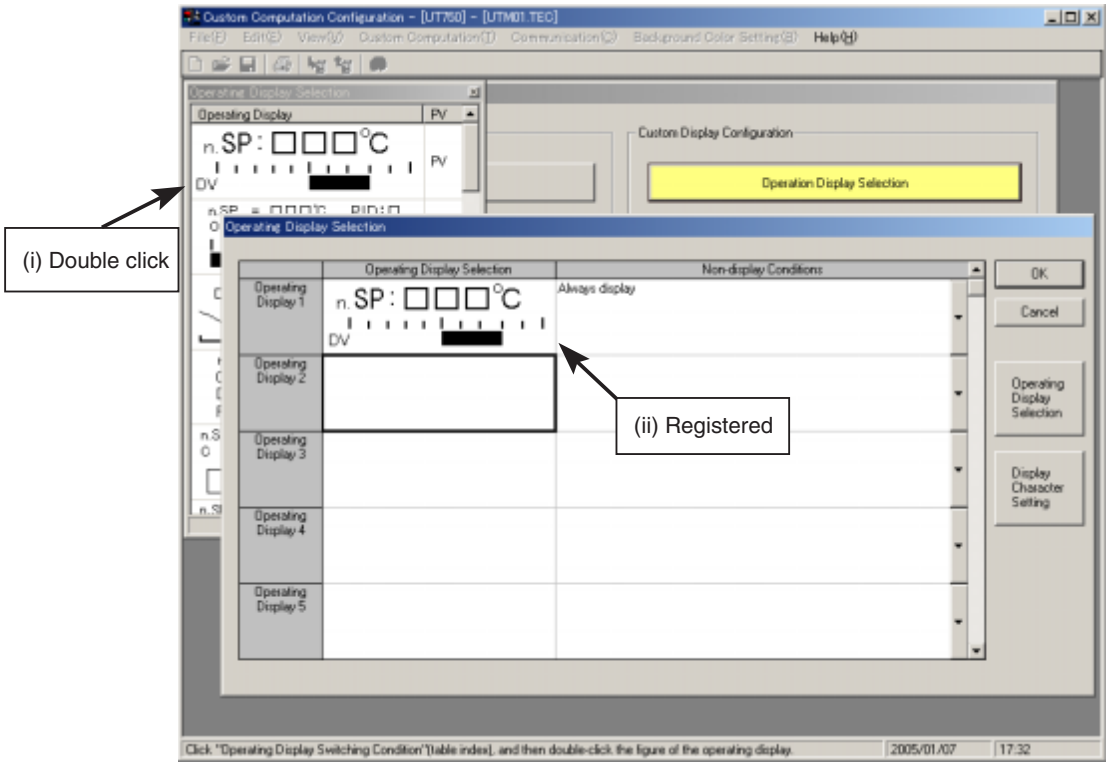


**Figure 5.2.6**

(4) After registering operating displays, set the display conditions. Click the Display Conditions drop-down list box (Figure 5.2.7).

The default is “Always display.”

When you do not want to display the operating display under operating of Heating/ cooling control mode, select the <Not displayed when on H/C control>.

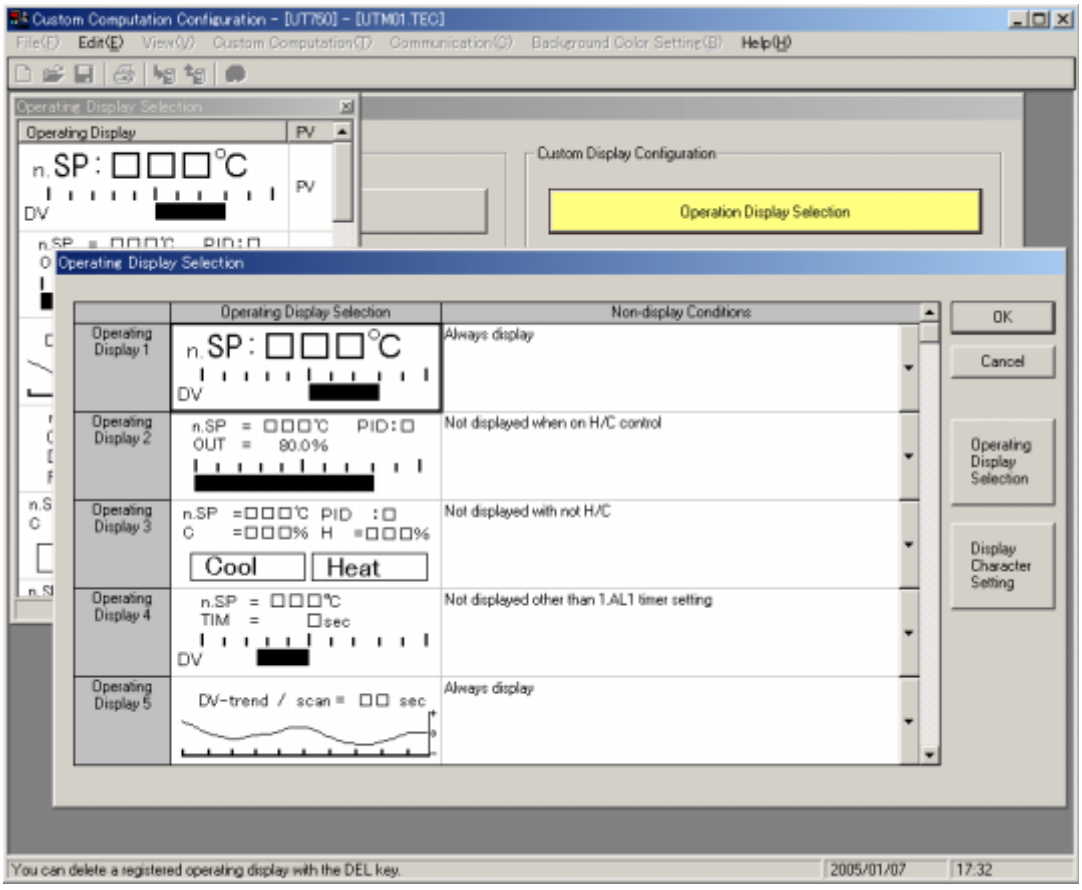


**Figure 5.2.7**

(5) Click the <OK> button. When you complete the registering. The [Operating Display Selection] dialog box closes and the [Custom Computation Configuration Menu] dialog box (Figure 5.2.8) appears.

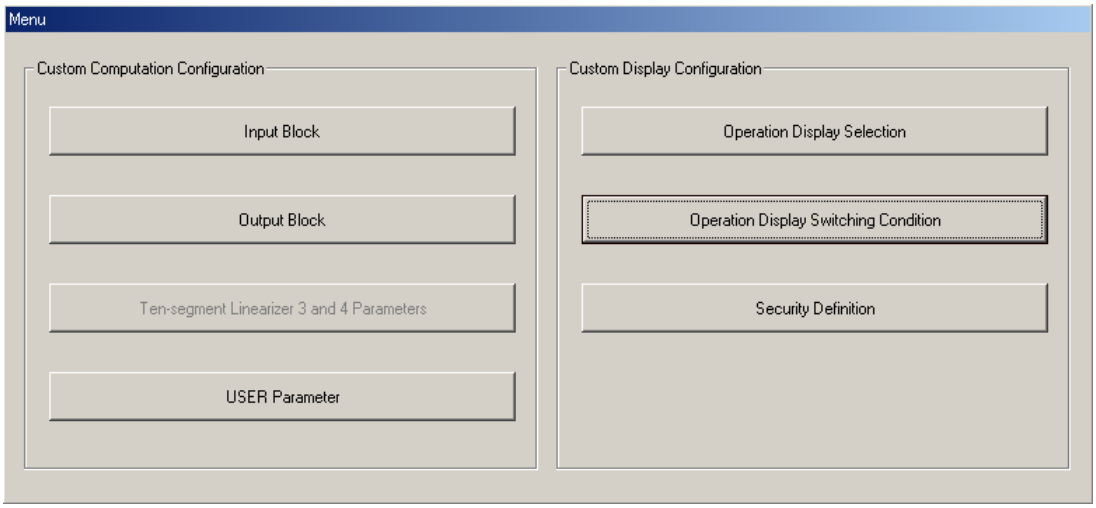


**Figure 5.2.8 [Custom Computation Configuration Menu] dialog box**

## ■ Text Setting

The dialog box shown in Figure 5.2.9 appears if you click the <Display Charcter Setting> button in the [Operating Display Selection] dialog box.

You will need to use the <Display Charcter Setting> button when you register the DISP1 or DISP2 user display as the custom display.

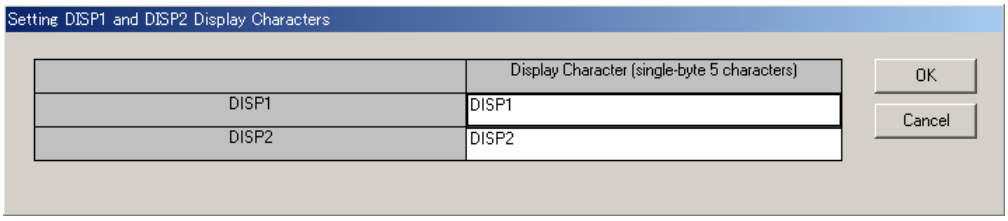


**Figure 5.2.9 [Setting DISP1 and DISP2 Display Characters] Dialog Box**

(1) Click the cell of DISP1 or DISP2.

(2) Register the characters (no more than 5 half-byte alphanumeric characters) you want to use from the keyboard of PC.

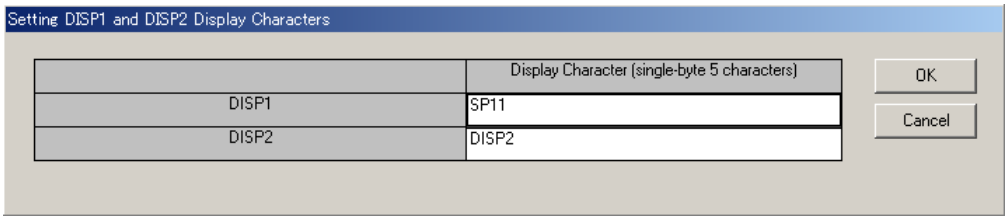


**Figure 5.2.10**

(3) Click the <OK> button. The [Setting DISP1 and DISP2 Display Characters] dialog box closes.

(4) After registering the operating displays, click <OK> button of [Operating Display Selection] dialog box. The [Custom Computation Configuration Menu] dialog box (Figure 5.2.8) appears.

Step 2-1, “Choosing the Custom Display,” is now complete.

When you finish selecting the custom displays, proceed to subsection 5.2.2, “Step 2-2: Setting Conditions Needed to Switch to Custom Displays.”

## 5.2.2 Step 2-2: Setting Conditions Needed to Switch to Custom Displays (Operating Displays)

### ● Operation

You can preset the desired conditions for the custom displays registered in the previous subsection so that those displays are switched to when the selected conditions become true. To achieve this, you must specify a custom display for each switching condition.

**NOTE**

Complete Step 2-1, “Choosing the Custom Display (Operating Display)” before setting “Operating Display Switching Condition” in this step. “Operating Display Switching Condition” can not be set without the completion of Step 2-1.

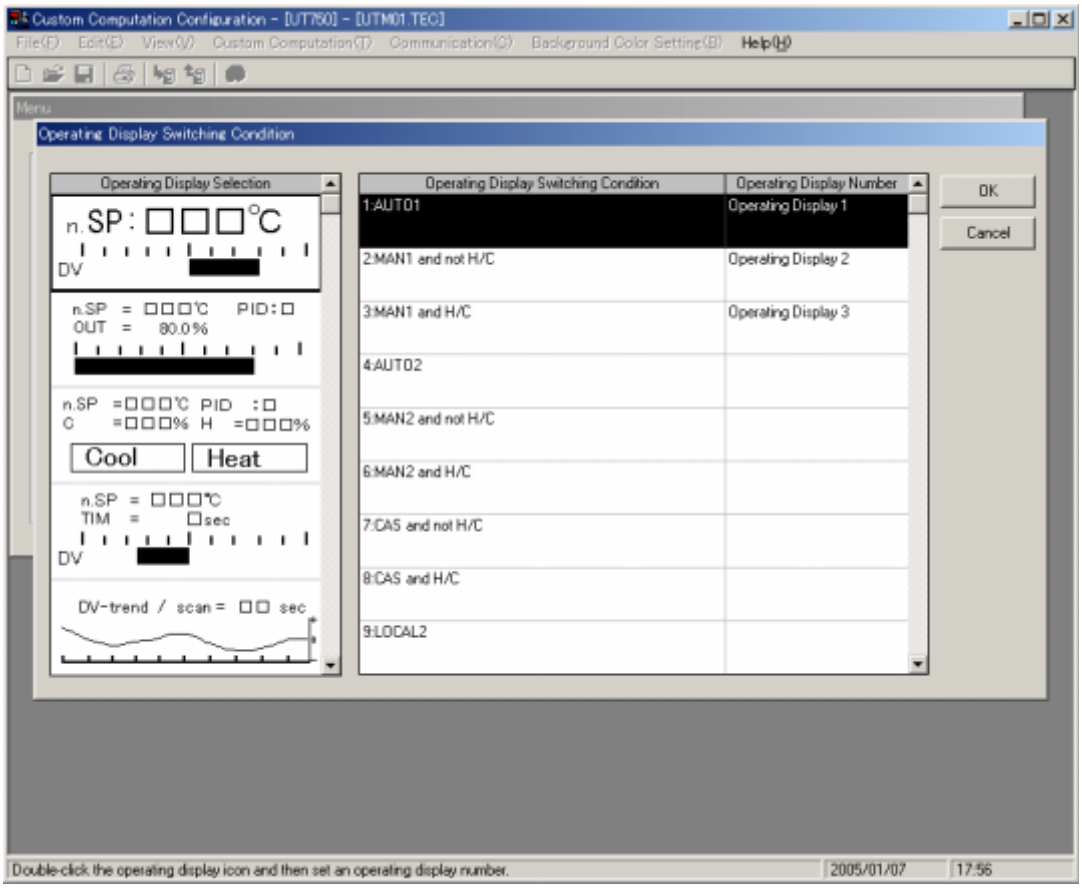


**Figure 5.2.11**

(1) The registered operating display number appears in each cell for the “Operating Display Number Setting” in the right-hand side area. And the corresponding condition to switch to the operating display appears in each cell for the “Operating Display Switching Condition.”

To change the operating display number corresponding to the displayed switching condition, follow the instructions below.

1) Click the cell for “Operating Display Number Setting” you want to change. (It becomes highlighted.)
2) In the [Operating Display Selection] dialog box in the left-hand side area, select the display you want to change, and double-click.
3) Confirm that the operating display number is changed.

Step 2-2, “Setting Conditions Needed to Switch to Custom Displays (Operating Displays),” is now complete.

# 5.3 Step 3: Defining the Security Function (as necessary)

This section explains the procedure for setting the security function.

Security is defined by configuring the keylock setup and menu-lock setup parameters of the controller.

| Code | Description |
|---|---|
| ▲, ▼(data-set key lock) | Prohibits the use of data setting keys. |
| A/M(A/M key lock) | Prohibits the use of A/M (Auto/Manual Switehing) key. |
| MODE | Prohibits the showing fo the MODE menu (Operation Parameter menu) |
| LP1 | Prohibits the showing fo the LP1 menu (Operation Parameter menu) |
| LP2 | Prohibits the showing fo the LP2 menu (Operation Parameter menu) |
| PID | Prohibits the showing fo the PID menu (Operation Parameter menu) |
| USR | Prohibits the showing fo the USR menu (Operation Parameter menu) |
| PYS1 | Prohibits the showing fo the PYS1 menu (Operation Parameter menu) |
| PYS2 | Prohibits the showing fo the PYS2 menu (Operation Parameter menu) |

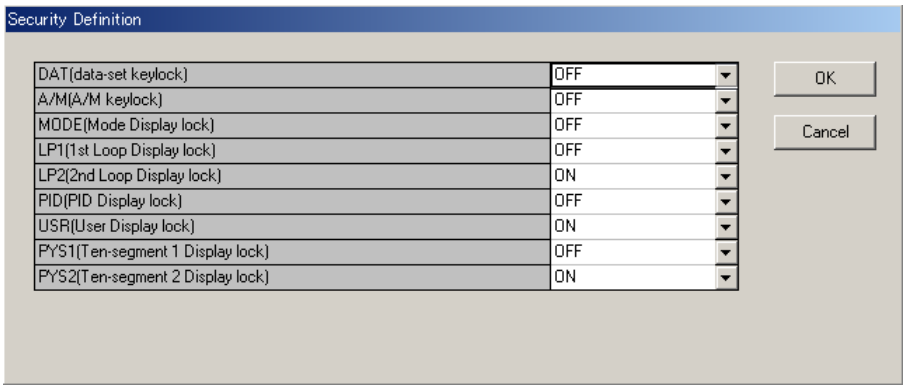


**Figure 5.3.1 [Security Definition] Dialog Box**

## ● Operation

(1) From the drop-down list box, choose the parameter whose security function you want to set up.

ON: Lock; OFF: Unlock

(2) Click the <OK> button.

Step 3, “Defining the Security Function,” is now complete.

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# 6. Editing

This chapter explains the procedure for editing custom computations and displays.

( This section explains the work flow using the single-loop control sample file (Utm01.tec). Read the sample file on to your personal computer before you start this step. )

## 6.1 Editing Custom Computations

### 6.1.1 Moving Computation Modules

The operations discussed here are used only for the purpose of moving computation modules visually. Use them when the automatic wiring is too complex or when you want to add a computation module or modules.

These operations are possible in full-screen windows, horizontally-split windows or vertically-split windows.

The following example shows a case where these operations are used within an input block; the operations can also be used within an output block.

● **Operation**

(1) In the [Input Block] or [Output Block] dialog box, click the computation module you want to move.

(2) Use a drag-and-drop operation to move the module to its destination (Figures 6.1.1 and 6.1.2).

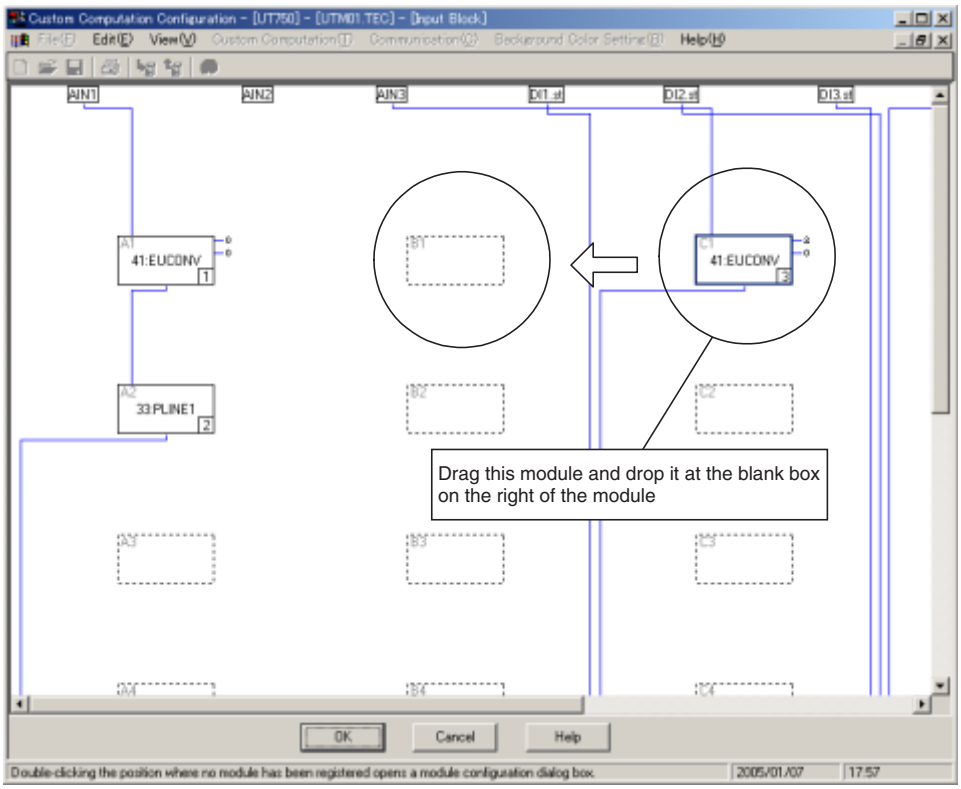


**Figure 6.1.1 Computation Module before Move**

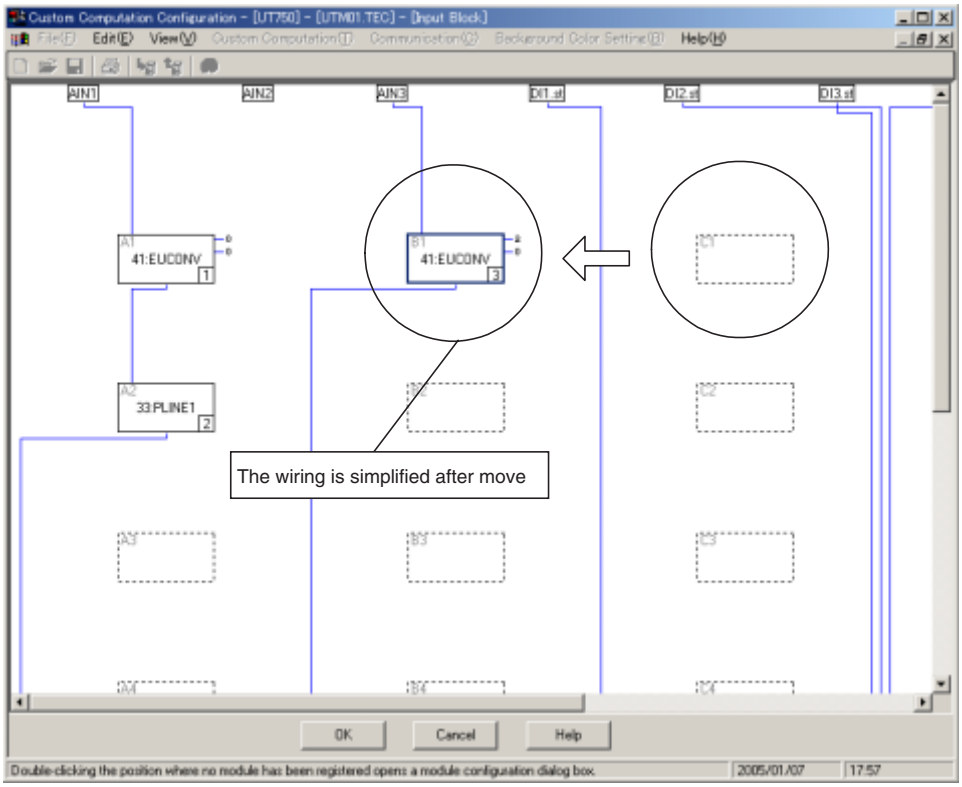


**Figure 6.1.2 Computation Module after Move**

## 6.1.2 Deleting Computation Modules

This subsection explains the procedure for deleting registered computation modules.

The operations in this procedure are possible in full-screen windows, horizontally-split windows or vertically-split windows.

The following example shows a case where these operations are used within an input block; the operations can also be used within an output block.

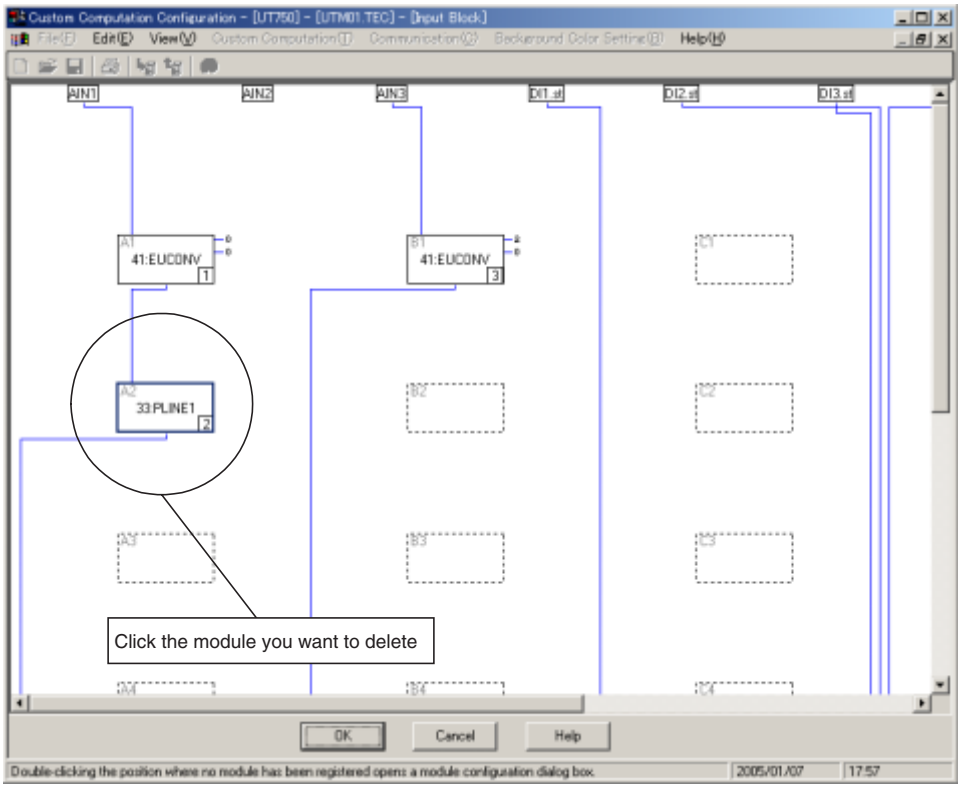


**Figure 6.1.3 Deletion of Computation Modules**

**NOTE**

If you delete a computation module, the lines wired to the module are also deleted.

### ● Operation

(1) In the [Input Block] or [Output Block] dialog box, click the computation module you want to delete.

(2) From the tool menus, choose <Editing>, then <Delete>.

## 6.1.3 Adding Computation Modules

You can add computation modules using the same procedure as used for configuring new custom computations.

The operations in this procedure are possible in full-screen windows, horizontally-split windows or vertically-split windows.

### See Also

"Adding computation modules within an input block" in subsection 4.2.1, "Step 2-1: Registering Computation Modules," and subsection 4.2.2, "Step 2-2: Configuring the Inputs and Parameters of Computation Modules."

"Adding computation modules within an output block" in subsection 4.3.1, "Step 3-1: Registering Computation Modules," and subsection 4.3.2, "Step 3-2: Configuring the Inputs and Parameters of Computation Modules."

## 6.1.4 Changing the Order in Which Computation Modules Run

This subsection explains the procedure for changing the order in which registered computation modules are run.

The operations in this procedure are possible in full-screen windows, horizontally-split windows or vertically-split windows.

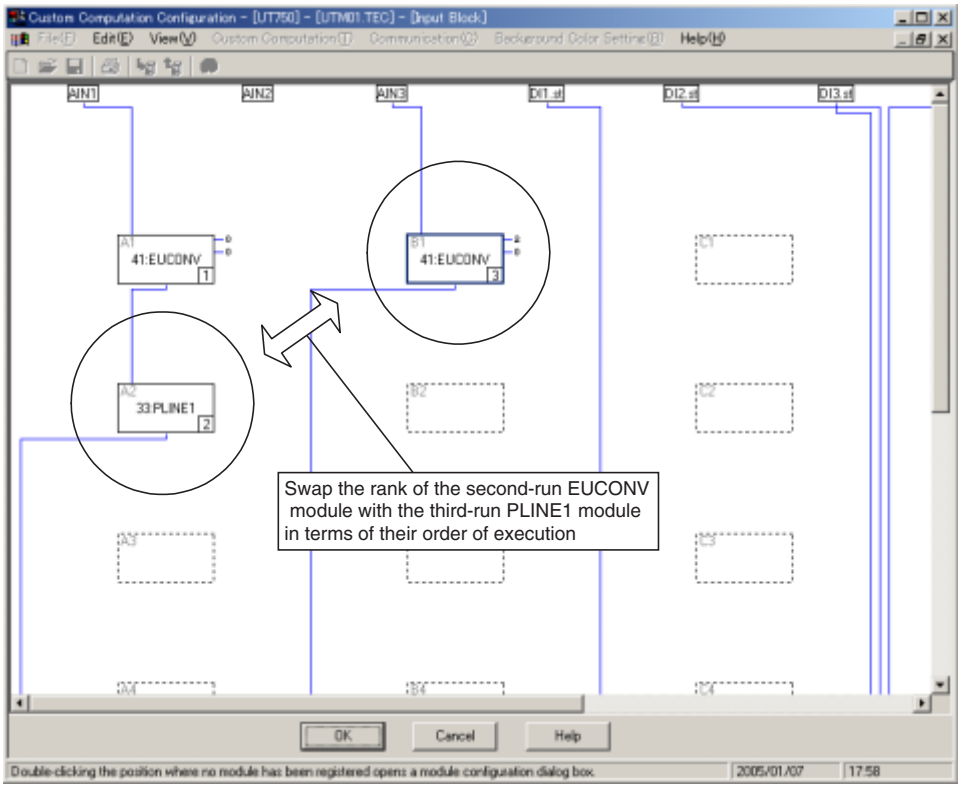


**Figure 6.1.4 Change in Computation Modules' Order of Execution**

## ● Operation

(1) With the [Input Block] or [Output Block] dialog box shown, click the computation module, and choose <Edit [E]> from the tool menus, and then <Modify Configuration>, from the Editing menu. The [Modify Configuration] dialog box (Figure 6.1.5) appears. This dialog box lists the preregistered computation modules in their order of execution.

Click the third-run EUCONV, and then the <Up> button. The EUCONV module and the second-run PLINE1 module swap positions with each other

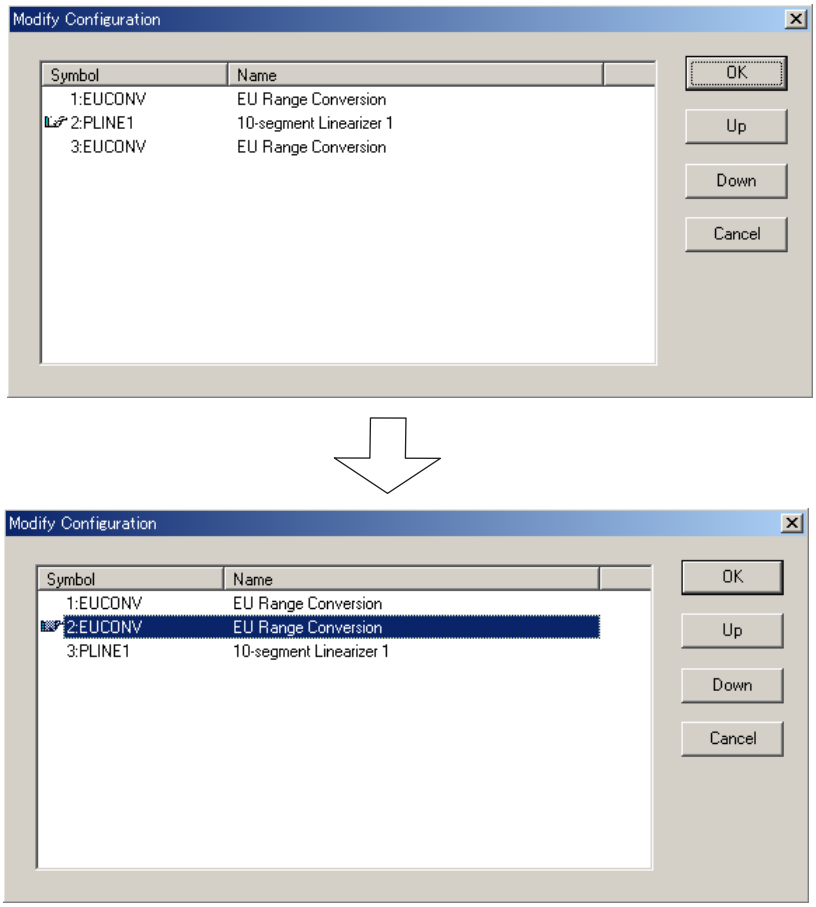


**Figure 6.1.5 [Modify Configuration] Dialog Box**

(2) Click the computation module whose order of execution you want to change.

(3) Click the <Up> or <Down> button. The module moves up or down one line.

(4) When the module is repositioned to the desired rank, click the <OK> button.

(5) In the [Input Block] or [Output Block] dialog box, make sure the order of execution has been changed.

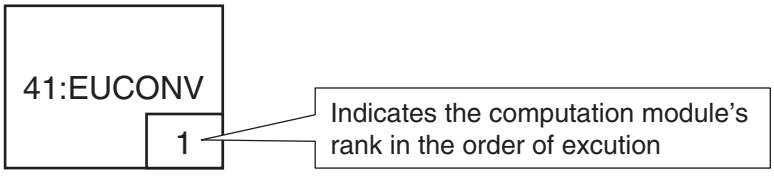


**Figure 6.1.6 Computation Module's Rank in the Order of Execution**

# 6.1.5 Changing the Way Computation Modules Are Connected

This subsection explains the procedure for changing the inputs and parameters of computation modules and for changing and deleting the way the modules are connected to the control and computing section and the output signals.

## ■ Reconfiguration of Module's Inputs and Parameters

### ● Operation

(1) In the [Input Block] or [Output Block] dialog box, click the computation module whose inputs or parameters you want to reconfigure.

(2) From the tool menus, choose <Edit [E]>, then <Connection>.

The [Module Setting] dialog box (Figure 6.1.7) appears.

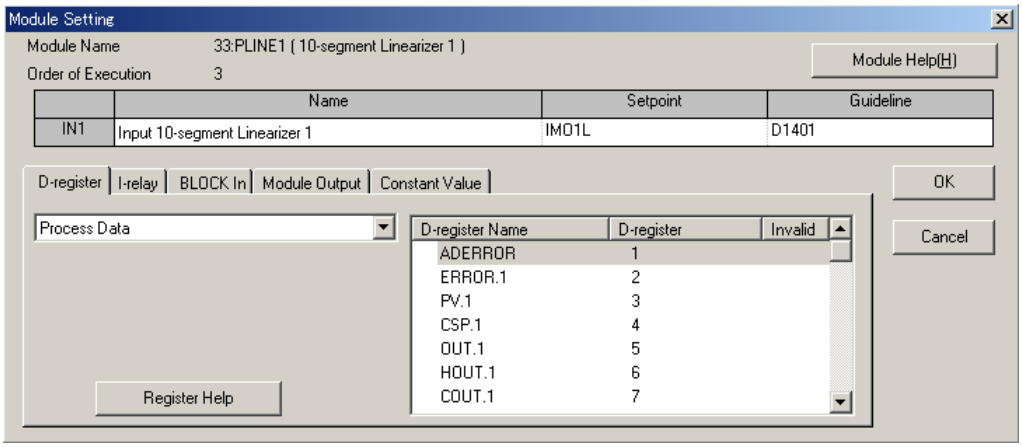


**Figure 6.1.7 [Module Setting] Dialog Box**

(3) Click the input or parameter you want to reconfigure from among <IN1> to <IN8> and <P1> to <P4>, respectively.

(4) Click the appropriate index.

Indexes are classified into <D-register>, <I-relay>, <BLOCK In>, <Module Output> and <Constant Value>.

● Description of Indexes

| Index | Description | Remarks |
|---|---|---|
| D-Register | Process data, mode data, operation parameters, setup parameters | See Chapter 5 in the *User's Reference* user's manual (for UT750 : IM 05G01B22-025 for UP750 : IM 05G01B22-03E) |
| I-Relay | ON/OFF status, ON status, OFF status, SPNO, PIDNO, timer flags, power-on flags, alarm flags, etc. | |
| BLOCK In | AIN1: Analog Input 1<br>AIN2: Analog Input 2<br>AIN3: Analog Input 3 | Analog input data fed to input block |
| | DI1.st: Contact Input 1<br>DI2.st: Contact Input 2<br>DI3.st: Contact Input 3<br>DI4.st: Contact Input 4<br>DI5.st: Contact Input 5<br>DI6.st: Contact Input 6<br>DI7.st: Contact Input 7<br>etc. | Contact input data fed to input block |
| Module Output | IMO1L to IMO30L (outputs of input-block computation modules)<br>OMO1L to OMO30L (outputs of output-block computation modules) | See Appendix 1, "Areas for Storing Data Output from Computation Modules." |
| Constant Value | Configurable range: -19999 to 30000 | |

(5) Double-clicking the appropriate input source reconfigures the selected index.

To reconfigure the <Constant Value> index, type a value in the text box, and then press the <Enter> key.

(6) Repeat steps (3)to (5) to reconfigure other necessary inputs among <IN1> to <IN8> or parameters among <P1> to <P4>.

(7) Clicking the <OK> button closes the [Module Setting] dialog box. When the dialog box closes, the computation modules are rewired according to the inputs and parameters you reconfigured.

**TIP**

- See the subsection “4.2.3 Step 2-3” for connecting to the control and computing section.
- See the subsection “4.3.3 Step 3-3” for connecting to the output signals.

# 6.2 Editing Custom Displays

## 6.2.1 Deleting Custom Displays

### ● Operation

(1) In the [Operating Display Selection] dialog box (Figure 6.2.1), click the custom display you want to delete.

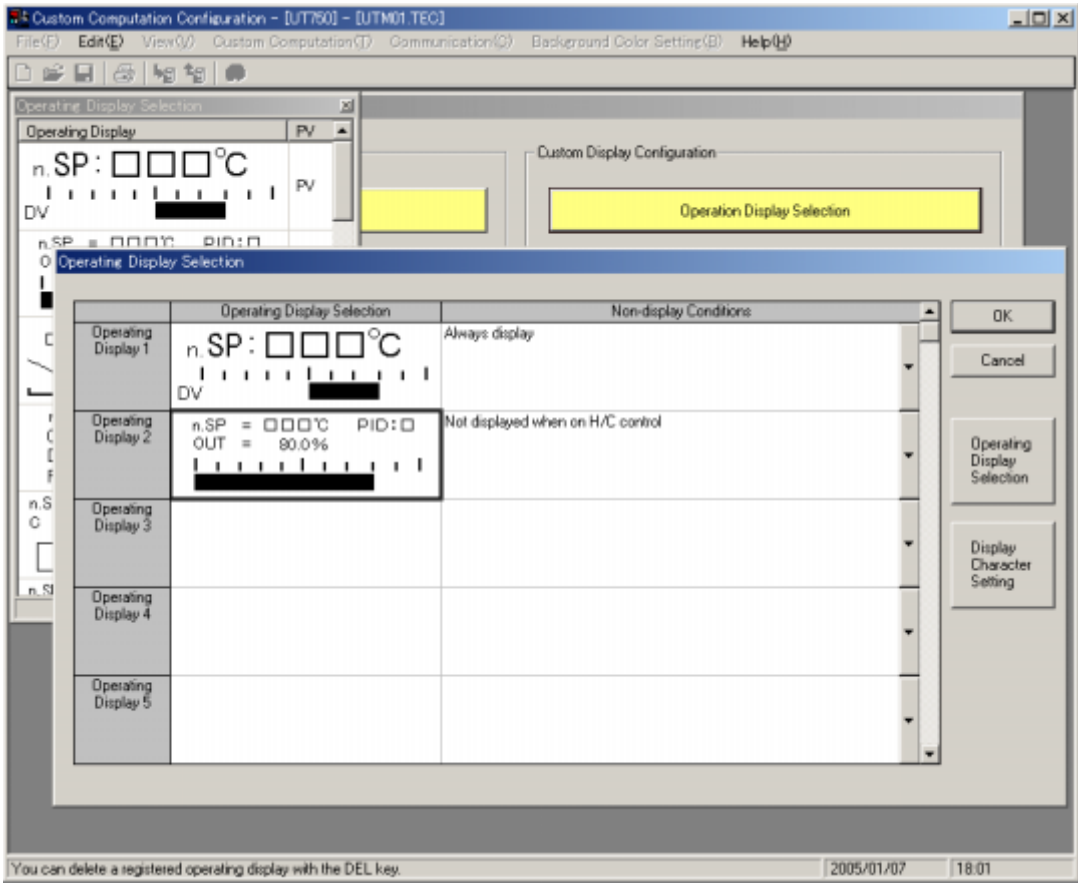


**Figure 6.2.1 [Custom Display Selection] Dialog Box**

(2) From the tool menus, click <Edit [E]>, then <Delete>.

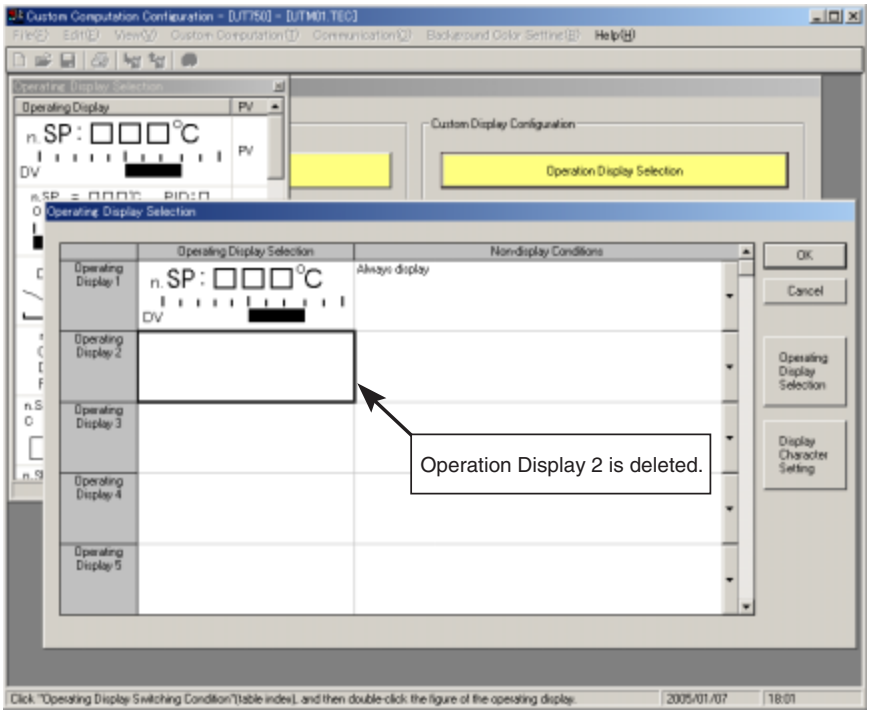


**Figure 6.2.2 After Deleting the Operating Display 2**

## 6.2.2 Adding Custom Displays

New custom displays are added to the end of the list of preregistered custom displays in the dialog box. You cannot add a new display between any two options of the preregistered displays. For details on the procedure for adding custom displays, see Chapter 5, “Basic Operations for Configuring Custom Displays and Relevant Explanations.”

### TIP

You cannot change the order in which custom displays are shown in the dialog box.

After adding custom displays, refer to Chapter 5, “Basic Operations for Configuring Custom Displays and Relevant Explanations,” to reregister the displays.

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# 7. Working with Custom Computation and Custom Display Data Files

This chapter explains the procedure for saving custom-computation data, which is newly created or uploaded from the controller on disk, and the procedure for reading files saved on the disk into the LL200 tool. You can set user information, such as the creator, the date of creation and comments, in files to be saved on disk.

## 7.1 Setting the File Information

Before saving data in a created custom-computation data file, you can set the title, the creator, the date of creation and comments in the file.

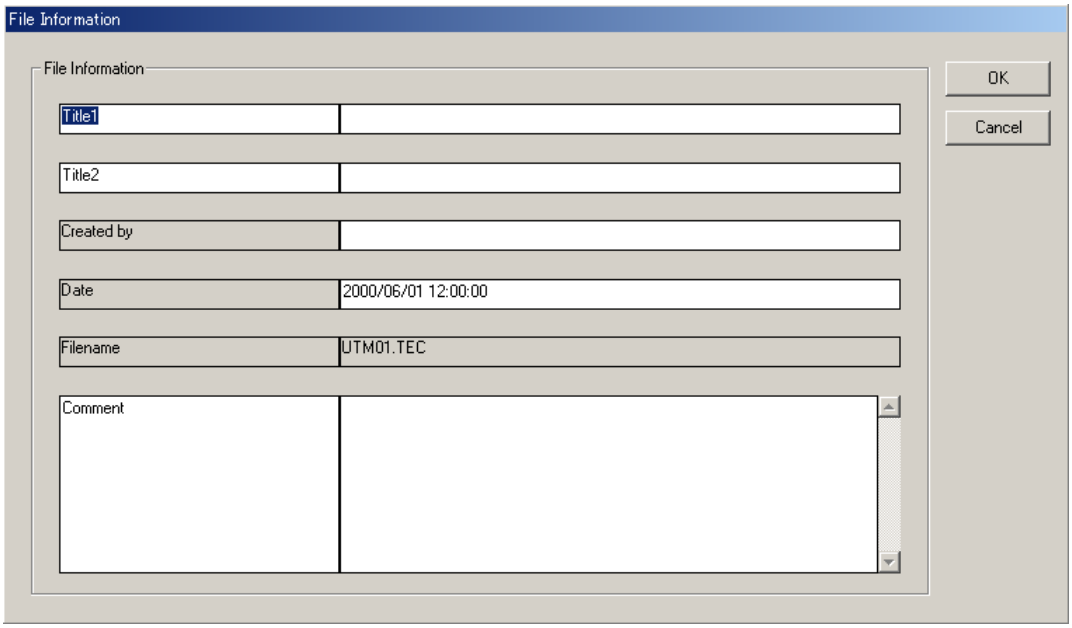


**Figure 7.1.1 [File Information] Dialog Box**

### ● Operation

(1) From the tool menus, click <File>, then <Information>, then <File Information>. The [File Information] dialog box (Figure 7.1.1) appears.

(2) Type the necessary item of file information in each text box. (Use the “enter” key of PC to register the necessary items)

(3) Click the <OK> button. The [File Information] dialog box closes.

(4) Finally, save the data on disk.

#### See Also

Subsection 7.3.2, “Saving Data on Disk”

# 7.2 Setting Comments for I/O Signals

Before saving data in a file, you can set comments (temperature input, flowrate input, status signal, MV output, etc.) for the I/O signals of custom computations.

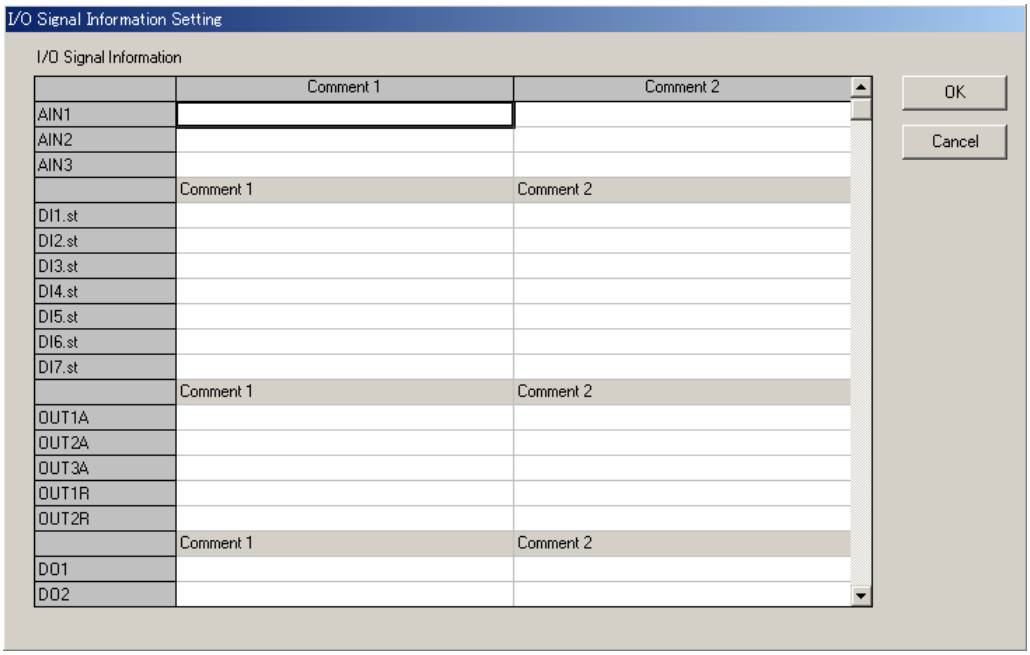


**Figure 7.2.1 [I/O Signal Information Setting] Dialog Box**

## ● Operation

(1) From the tool menus, click <File>, then <Information>, then <I/O Signal Information>. The [I/O Signal Information Setting] dialog box (Figure 7.2.1) appears.

(2) Type the necessary comments in a text box for each signal. (Use the “enter” key of PC to register the necessary comments)

(3) Click the <OK> button. The [I/O Signal Information Setting] dialog box closes.

(4) Finally, save the data on disk.

### See Also

Subsection 7.3.2, “Saving Data on Disk”

# 7.3 Reading/Saving Data from/on Disk

## 7.3.1 Reading Data from Disk

**NOTE**

If you read new data from a disk, it entirely replaces the current data of the LL200 tool. If you need the current data, save it on disk before you read the new data.

### ■ Open User File

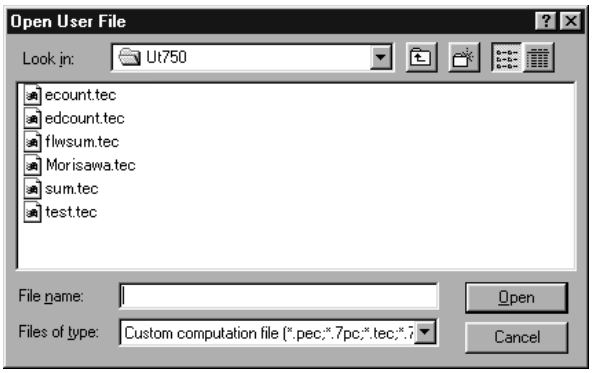


**Figure 7.3.1 [Open User File] Dialog Box**

#### ● Operation

(1) From the tool menus, click <File>, then <Open...>. The [Open User File] dialog box (Figure 7.3.1) appears.

(2) From the list box, choose the file in question.

(3) Click the <Open> button.

(4) When file reading is complete, the message of [Data have been loaded] appears. Click the <OK> button. The [Custom Computation Configuration Menu] dialog box appears.

# ■ Open Sample File

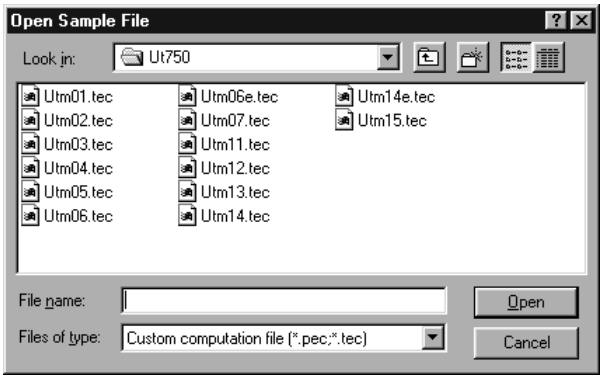


**Figure 7.3.2 [Open Sample File] Dialog Box**

## ● Operation

(1) From the tool menus, click <File>, then <Open Sample File...>. The [Open Sample File] dialog box (Figure 7.3.2) appears.

(2) From the list box, choose the file in question.

(3) Click the <Open> button.

(4) When file reading is complete, the message of [Data have been loaded] appears. The [Custom Computation Configuration Menu] dialog box appears.

(5) Click the <OK> button.
The [Select Model and Suffix Codes] dialog box appears.

(6) Select the items in the dialog box, and click <OK> button.

### See Also

"Sample files" in Section 2.1, " ■ LL200 File Package and Files of Information on Configured Custom Computations."

## 7.3.2 Saving Data on Disk

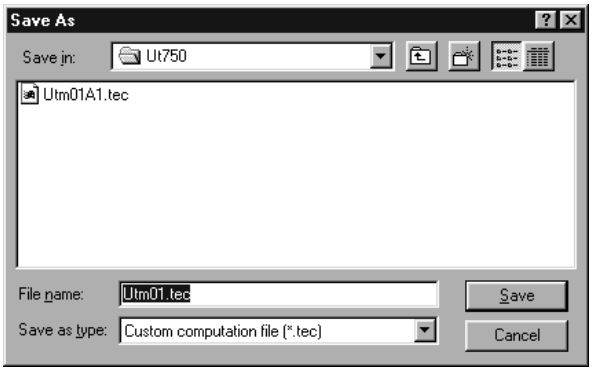


**Figure 7.3.3 [Save As...] Dialog Box**

### ● Operation

(1) From the tool menus, click <File>, then <Save As...>. The [Save As...] dialog box (Figure 7.3.3) appears.

(2) Type a name in the File Name text box, and then click the <Save> button. The file is saved as a user file (********. tec).

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# 8. Uploading/Downloading Data from/to Controller and Comparing between Data Values

This chapter explains the procedures for uploading data from the controller, downloading data to the controller, and comparing data values with those of the controller.

## 8.1 Uploading Data from the Controller

This section explains the procedure for uploading the custom-computation data from the controller to the LL200 tool.

### See Also

Section 2.3, “Connecting the Controller to the Personal Computer,” for details on how to connect the personal computer to the controller.

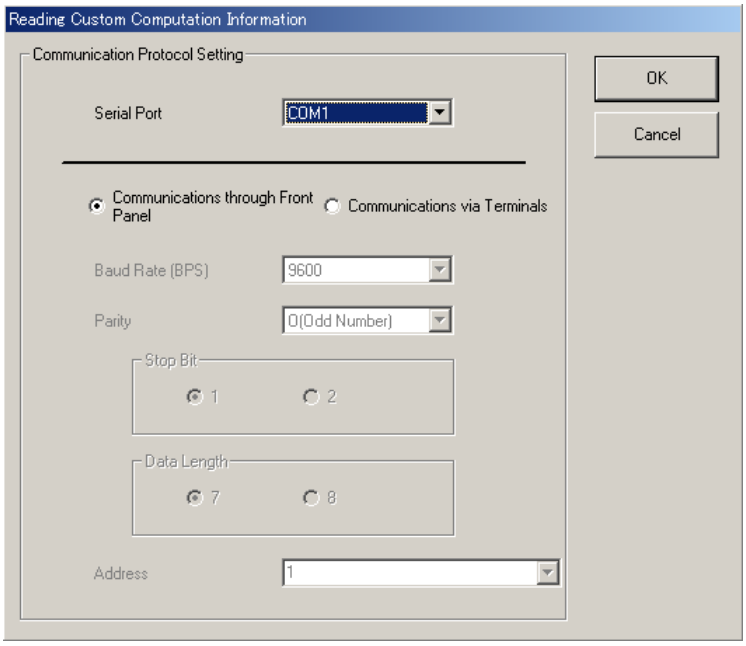



**Figure 8.1.1 [Writing Custom Computation Information] (Communication Protocol Setting) Dialog Box**

**NOTE**

If you have chosen RS-485 communication, set the communication protocol of the controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

**NOTE**

When uploading custom computation information from the controller, set the controller mode (UT or UP mode) to “21.”

## ● Operation (Communication via Front Panel)

(1) From the tool menus, click <Communication>, then <Upload from Controller...>. The [Reading Custom Computation Information] (Communication Protocol Setting) dialog box (Figure 8.1.1) appears.

(2) In the dialog box, click the <Communications through Front Panel> option button.

(3) From the <Serial Port> drop-down list box, choose either COM1 to COM16.

(4) Click the <OK> button.

(5) A message appears, informing that the reading of information on custom computations is complete.

(6) When reading is complete, the [Custom Computation Configuration Menu] dialog box appears.

## ● Operation (Communication via Rear Terminal)

(1) From the tool menus, click <Communication>, then <Upload from Controller...>. The [Reading Custom Computation Information] (Communication Protocol Setting) dialog box appears.

(2) In the dialog box, click the <Communication via terminals> option button.

(3) From the <Serial Port> drop-down list box, choose either COM1 to COM16. Then, from the <Baud rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data length> sections.

Match the communication conditions of the controller with those of the personal computer.

(4) Click the <OK> button.

(5) A message appears, informing that the reading of custom-computation data is complete.

(6) When reading is complete, the [Custom Computation Configuration Menu] dialog box appears.

# 8.2 Downloading Data to the Controller

This section explains the procedure for downloading custom-computation data created using the LL200 tool to the controller.

Note that, before downloading custom-computation data, you must rename that data file to a user filename. Files with the filename of a sample file cannot be downloaded.

### See Also

Section 2.3, “Connecting the Controller to the Personal Computer” for details on how to connect the personal computer to the controller.

**WARNING**

It is hazardous to download any custom computation to the controller while the controller is in operation because unexpected adverse effects may be inflicted upon the process. Be SURE to change the operating mode to STOP before you download custom computations.

**NOTE**

Data cannot be downloaded to the connected controller if its suffix code does not match the one you set in the [Specify Suffix Code and Controller Type] dialog box.

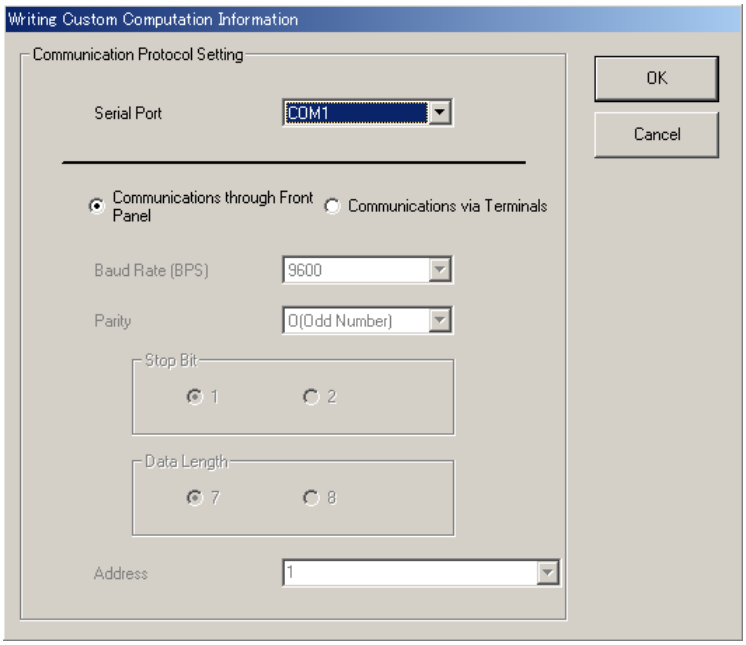



**Figure 8.2.1 [Writing Custom Computation Information] Dialog Box**

**NOTE**

If you have chosen RS-485 communication, set the communication protocol of the controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

## ● Operation (Communication via Front Panel)

(1) From the tool menus, click <Communication>, then <Download to Controller...>. The [Writing Custom Computation Information] dialog box (Figure 8.2.1) appears.

(2) In the dialog box, click the <Communications through Front Panel> option button.

(3) From the <Serial Port> drop-down list box, choose either COM1 to COM4.

(4) Click the <OK> button.

(5) A message appears, informing that the reading of custom-computation data is complete.

(6) When reading is complete, the [Custom Computation Configuration Menu] dialog box appears.

## ● Operation (Communication via Rear Terminal)

(1) From the tool menus, click <Communication>, then <Download to Controller...>. The [Writing Custom Computation Information] dialog box appears.

(2) In the dialog box, click the <Communications via terminals> option button.

(3) From the <Serial Port> drop-down list box, choose either COM1 to COM4. Then, from the <Baud rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data length> sections.

Match the communication conditions of the controller with those of the personal computer.

(4) Click the <OK> button.

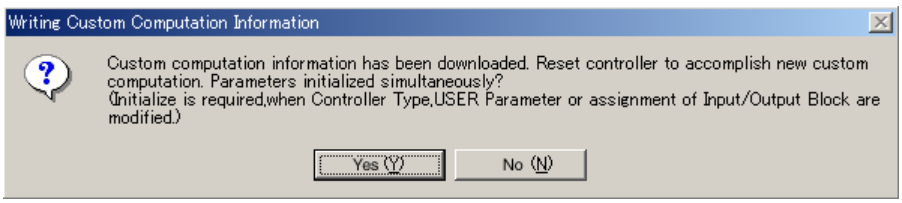
(5) A message appears, informing that the writing of custom-computation data is complete.

(6) When reading is complete, the [Custom Computation Configuration Menu] dialog box appears.

**NOTE**

When executing download during controler mode (UT-mode or UP-mode) of the controller is set to “21”, the following message appears.
Choose <Yes> or < No > according to the details of modified custom computation.

When choosing <Yes>, all the parameter values are initialized.
When choosing < No >, the parameter values are not modified.



# 8.3 Comparing Data Values with Those of the Controller

This section explains the procedure for comparing the custom-computation data downloaded to the controller with those of the LL200 tool.

### See Also

Section 2.3, “Connecting the Controller to the Personal Computer” for details on how to connect the personal computer to the controller.

**NOTE**

Data comparison is not possible if its suffix code does not match the one you set in the [Select Model and Suffix Codes] dialog box.

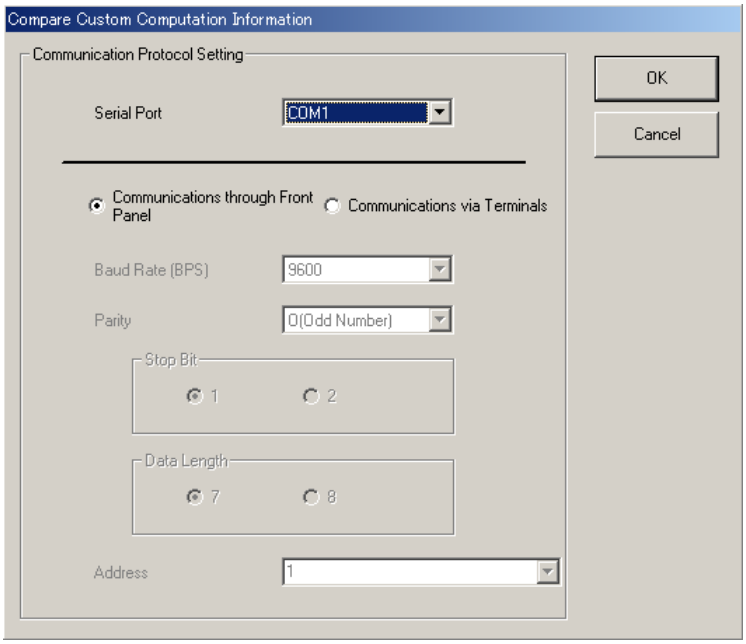



**Figure 8.3.1 [Compare Custom Computation Information] Dialog Box**

**NOTE**

If you have chosen RS-485 communication, set the communication protocol of the controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

## ● Operation (Communication via Front Terminal)

(1) From the tool menus, click <Communication>, then <Compare...>. The [Compare Custom Computation Information] dialog box (Figure 8.3.1) appears.

(2) In the dialog box, click the <Communications through Front Panel> option button.

(3) From the <Serial Port> drop-down list box, choose either COM1 to COM16.

(4) Click the <OK> button.

(5) As a result of data comparison, the message “Match” or “No match” appears.

When the data do not match, you can view a list of the unmatched data items. You can also save the unmatched data items as a file. Files of comparison results have the 1ec extension, as in “********.e7c.”

## ● Operation (Communication via Rear Terminal)

(1) From the tool menus, click <Communication>, then <Compare...>. The [Compare Custom Computation Information] dialog box (Figure 8.3.1) appears.

(2) In the dialog box, click the <Communications via Terminals> option button.

(3) From the <Serial Port> drop-down list box, choose either COM1 to COM16. Then, from the <Baud rate>, <Parity> and <Address> drop-down list boxes, choose the options of the three communication conditions, the baud rate, parity and address. Also choose the options of the two communication conditions, the stop bit and data length, by clicking the appropriate option buttons in the <Stop bit> and <Data length> sections.

Match the communication conditions of the controller with those of the personal computer.

(4) Click the <OK> button.

(5) As a result of data comparison, the message “Match” or “No match” appears.

When the data do not match, you can view a list of the unmatched data items. You can also save the unmatched data items as a file. Files of comparison results have the 1ec extension, as in “********.e7c.”

# 9. Printing Custom Computations

This chapter explains the procedure for printing the current custom-computation data of the LL200 tool. You can save the printout data as a text file.

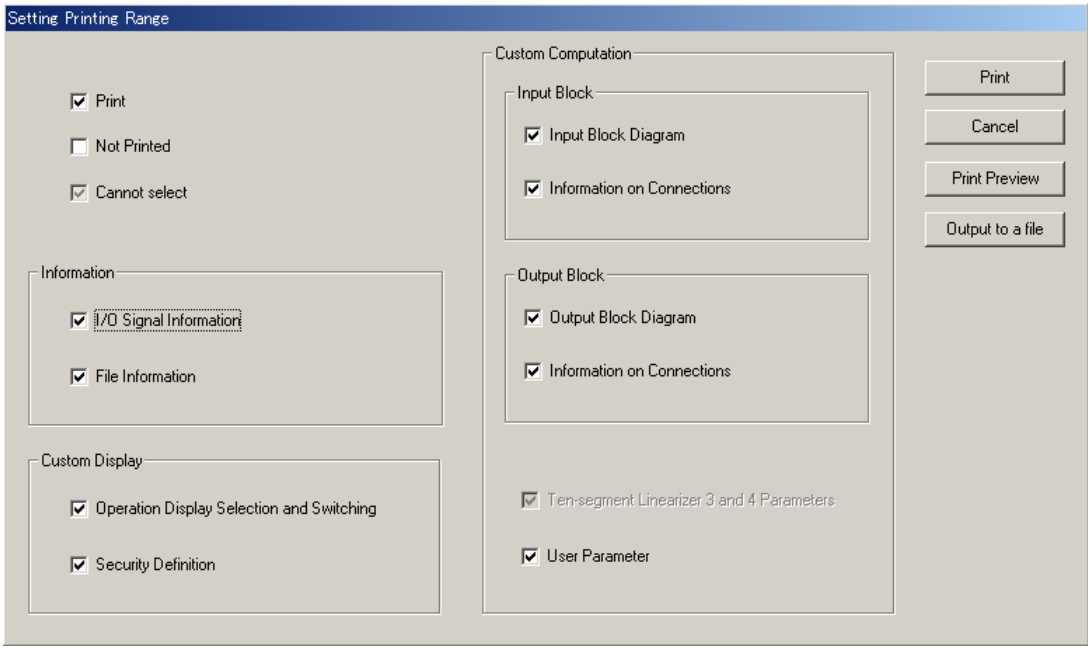



**Figure 9.1.1 [Setting Printing Range] Dialog Box**

## ● Operation

(1) Make sure the printer is connected to the personal computer.

(2) From the tool menus, click <File>, then <Print...>. The [Setting Printing Range] dialog box (Figure 9.1.1) appears.

(3) Click the check boxes to choose the data items to be printed.

(4) Click the <Print> button. The [Print Setup] dialog box appears.

(5) In the [Print Setup] dialog box, click the <OK> button to begin printing.

**NOTE**

The printout may be on a larger or smaller scale according to the type of printer in use.

In this case, modify the resolution before printing. Refer to the instruction manual for printer regarding to the modification of resolution.

If you click the <Print Preview> button in the dialog box shown in Figure 9.1.1, the dialog box shown in Figure 9.1.2 appears.

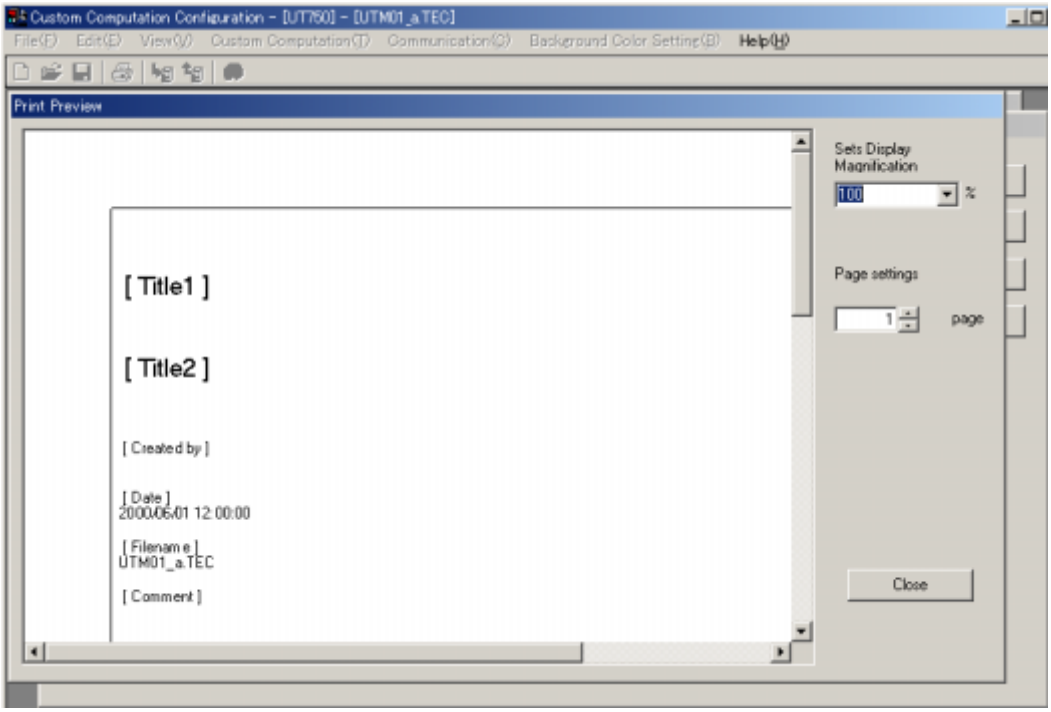



**Figure 9.1.2 Example of Print Preview Window**

If you click the <Output to a File> button in the dialog box shown in Figure 9.1.1, the dialog box shown in Figure 9.1.3 appears. The file extension used to save data as a file is ********.csv.

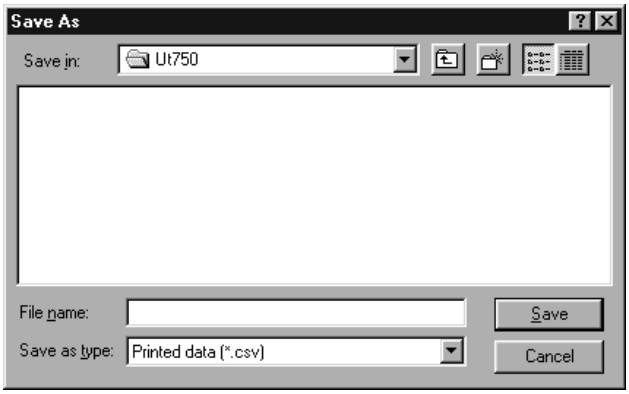



**Figure 9.1.3 [Save As] Dialog Box**

# 10. Configuring Parameters

This chapter explains the procedure for starting the parameters setting tool after custom computations are configured. For details on how to work with the parameters setting tool, see the Model LL100 PC-based Parameters Setting Tool user's manual (IM 05G01B12 - 01E).

**NOTE**

If you start the parameters setting tool, the current custom-computation data in the tool will be deleted. Before starting up the tool, either download the data to the controller or save the data in a file.

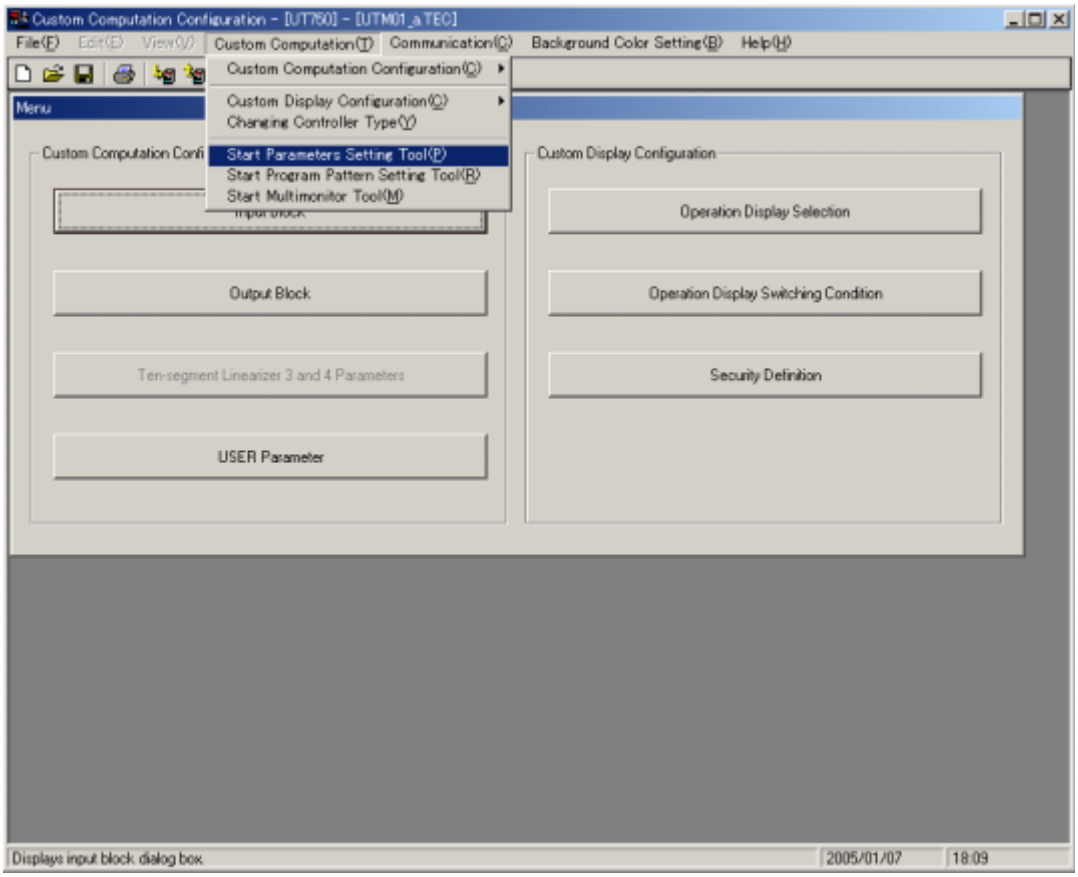



**Figure 10.1.1 Startup of the Parameters Setting Tool**

## ● Operation

(1) From the tool menus, click <Custom Computation>, then <Start Parameters Setting Tool>. The [Select series] dialog box (Figure 10.1.2) appears.

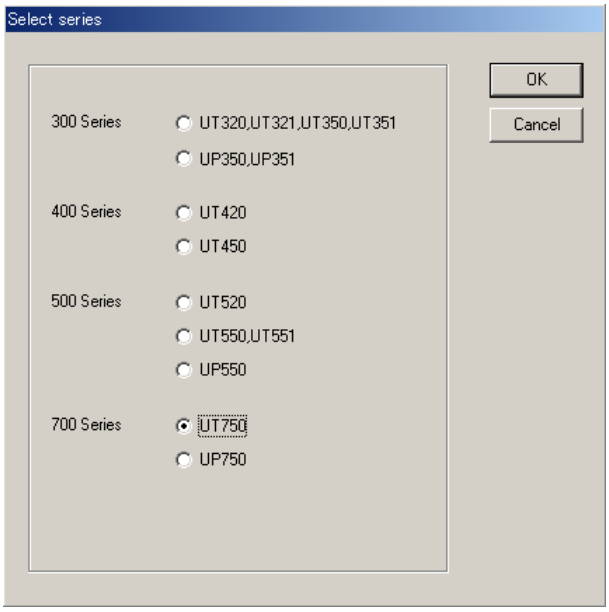



**Figure 10.1.2 [Select series] Dialog Box**

(2) Select the controller model, and click the <OK> button to start uploading LL100 PC-based parameters setting tool.

# 11. Custom Computation Monitor

This chapter explains the procedure for monitoring custom computations downloaded to the controller.

Note that you cannot monitor custom displays, however. After downloading the custom-display data to the controller, use the <DISP> key (of the controller) to verify the custom displays.

**NOTE**

You cannot monitor custom computations if the suffix code you set in the [Select Model and Suffix Codes] dialog box does not match that of the connected controller.

**NOTE**

If you have chosen RS-485 communication, set the communication protocol of the controller to [PC-link Communication]. Communication is not possible if you set the protocol to [PC-link Communication with Sum Check], [Modbus (RTU)] or [Modbus (ASCII)].

**NOTE**

In order to monitor the custom computation of the controller, the mode (UT or UP mode) of the controller must be set to “21.”

# 11.1 Preparations for Monitoring of Custom Computations

1. Procure equipment that supplies analog input signals to the controller, and wire them properly.
2. Procure equipment that supplies contact input signals to the controller, and wire them properly. Contact input signals can also be supplied by directly short-circuiting the contact-input terminals or by alternative means.
3. Make a printout of custom-computation data.

**See Also**

Chapter 9, “Printing Custom Computations”

4. Connect the personal computer to the controller.

# 11.2 Monitoring Custom Computations Configured in an Input Block

You can monitor the data values (analog and contact input signals) coming into an input block, as well as the data values (computation and flag data) emitted from the input block. You can also monitor data values fed to computation modules, as well as their parameter values.

## 11.2.1 Monitoring Data Values Fed to/from an Input Block

In the [Input Block Monitor] view (Figure 11.2.2), you can monitor the signals listed in the following table.

○ : The controller has the register of the Signal

| | Signal Name | Description | | UT 750 | UP 750 |
|---|---|---|---|---|---|
| Analog input data fed to input block | AIN1 | Analog input 1 | 1301 | ○ | ○ |
| | AIN2 | Analog input 2 | 1302 | ○ | ○ |
| | AIN3 | Analog input 3 | 1303 | ○ | ○ |
| Contact input data fed to input block | DI1 | Contact input 1 | 5161 | ○ | ○ |
| | DI2 | Contact input 2 | 5162 | ○ | ○ |
| | DI3 | Contact input 3 | 5163 | ○ | ○ |
| | DI4 | Contact input 4 | 5164 | ○ | ○ |
| | DI5 | Contact input 5 | 5165 | ○ | ○ |
| | DI6 | Contact input 6 | 5166 | ○ | ○ |
| | DI7 | Contact input 7 | 5167 | ○ | ○ |
| | | | | | |
| Computation data fed from input block | PVIN.1 | Loop 1 PV input | 1331 | ○ | ○ |
| | PVIN.2 | Loop 2 PV input | 1332 | ○ | ○ |
| | RSPIN.1 | Loop 1 remote input | 1333 | ○ | ○ |
| | RSPIN.2 | Loop 2 remote input | 1334 | ○ | ○ |
| | GAIN.1 | Loop 1 gain setting value | 1335 | ○ | ○ |
| | GAIN.2 | Loop 2 gain setting value | 1336 | ○ | ○ |
| | TRG.1 | Loop 1 tracking input | 1337 | ○ | ○ |
| | TRG.2 | Loop 2 tracking input | 1338 | ○ | ○ |
| | TRF.1 | Loop 1 tracking flag | 1339 | ○ | ○ |
| | TRF.2 | Loop 2 tracking flag | 1340 | ○ | ○ |
| | A/M1 | Loop 1 A/M switch | 1343 | ○ | |
| | A/M2 | Loop 2 A/M switch | 1344 | ○ | |
| | R/L1 | Loop 1 R/L switch | 1345 | ○ | |
| | R/L2 | Loop 2 R/L switch | 1346 | ○ | |
| | S/R | STOP/RUN switch | 1347 | ○ | |
| Computation flags fed from input block | CAS | Cascade mode | 1348 | ○ | |
| | AUT | Auto mode | 1349 | ○ | |
| | MAN | Manual mode | 1350 | ○ | |
| | SP.0 | Bit 0 of SP number | 1351 | ○ | |
| | SP.1 | Bit 1 of SP number | 1352 | ○ | |
| | SP.2 | Bit 2 of SP number | 1353 | ○ | |
| | SP.3 | Bit 3 of SP number | 1354 | ○ | |
| | DP1 | Operation display for interruption 1 | 1355 | ○ | |
| | DP2 | Operation display for interruption 2 | 1356 | ○ | |
| | MG1 | Interruptive message display 1 | 1357 | ○ | |
| | MG2 | Interruptive message display 2 | 1358 | ○ | |
| | MG3 | Interruptive message display 3 | 1359 | ○ | |
| | MG4 | Interruptive message display 4 | 1360 | ○ | |
| | PROG | Program operation | 1361 | | ○ |
| | RESET | Reset | 1362 | | ○ |
| | LOCAL | Local | 1363 | | ○ |
| | HOLD | Hold | 1364 | | ○ |
| | ADV | Advance | 1365 | | ○ |
| | A/M1 | Loop 1 A/M switch | 1366 | | ○ |
| | A/M2 | Loop 2 A/M switch | 1367 | | ○ |
| | LSP/CAS | Main loop Local/cascade | 1368 | | ○ |
| | PTNO.b0 | Bit 0 of Pattern number | 1369 | | ○ |
| | PTNO.b1 | Bit 1 of Pattern number | 1370 | | ○ |
| | PTNO.b2 | Bit 2 of Pattern number | 1371 | | ○ |
| | PTNO.b3 | Bit 3 of Pattern number | 1372 | | ○ |
| | PTNO.b4 | Bit 4 of Pattern number | 1373 | | ○ |
| | PTNO.b5 | Bit 5 of Pattern number | 1374 | | ○ |
| | PTNO.b6 | Bit 6 of Pattern number | 1375 | | ○ |
| | PTNO.b7 | Bit 7 of Pattern number | 1376 | | ○ |
| | PTNO.b8 | Bit 8 of Pattern number | 1377 | | ○ |
| | DP1 | Operation display for interruption 1 | 1378 | | ○ |
| | DP2 | Operation display for interruption 2 | 1379 | | ○ |
| | MG1 | Interruptive message display 1 | 1380 | | ○ |
| | MG2 | Interruptive message display 2 | 1381 | | ○ |
| | MG3 | Interruptive message display 3 | 1382 | | ○ |
| | MG4 | Interruptive message display 4 | 1383 | | ○ |

## ● Operation

(1) From the tool menus, click <Communication>, then <Custom Computation Monitor>, then <Input Block>. The [Communications Protocol Setting] dialog box (Figure 11.2.1) appears.

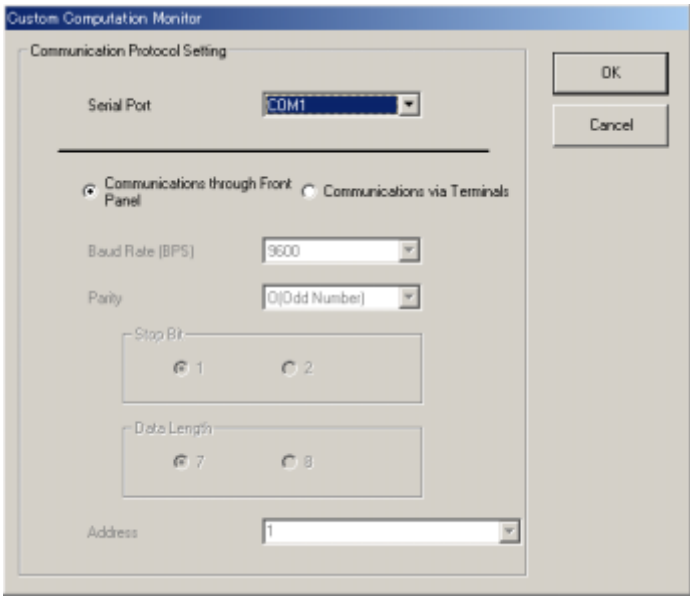



**Figure 11.2.1 [Communication Protocol Setting] Dialog Box**

(2) Match the communication conditions of the controller with those of the personal computer, and then click the <OK> button.

(3) The [Input Block Monitor] view (Figure 11.2.2) appears.

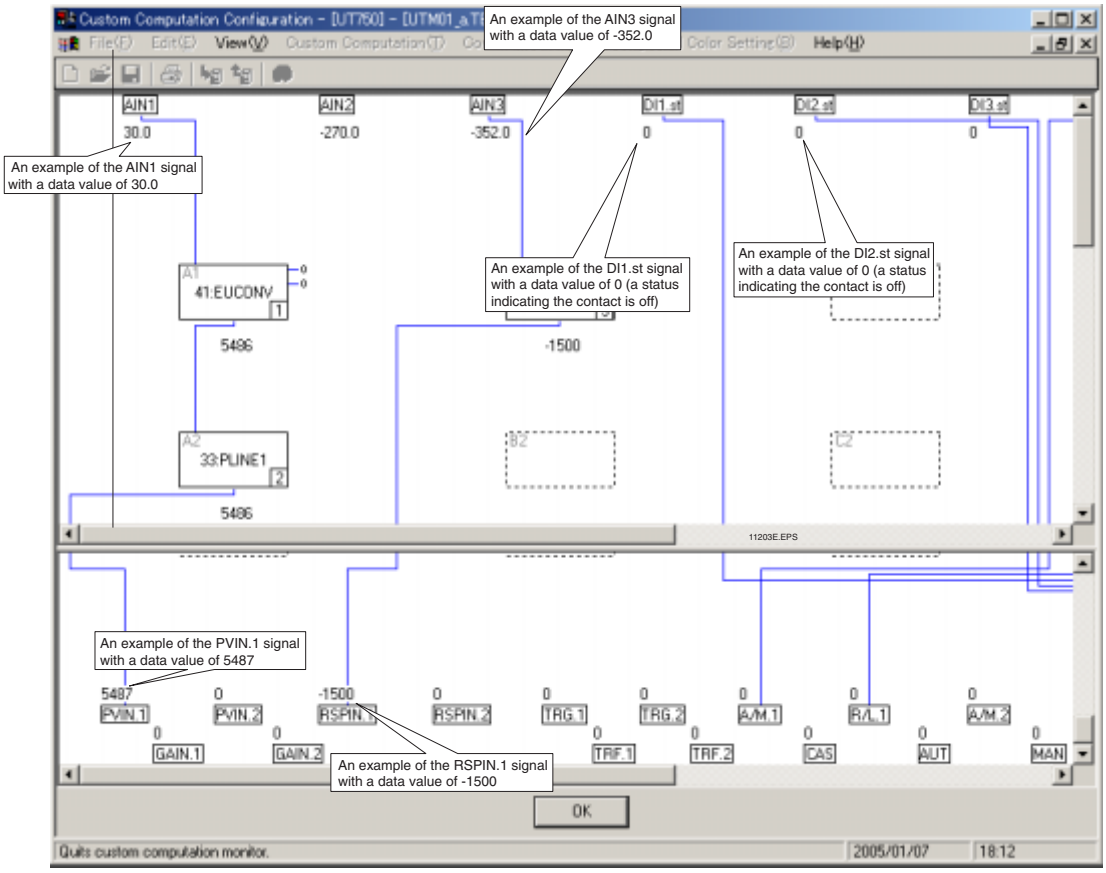



**Figure 11.2.2 Example of [Input Block Monitor] View**

## 11.2.2 Monitoring the Inputs and Parameters of Computation Modules

In the [Module Monitor] view (Figure 11.2.3), you can monitor the signals listed in the following table, module by module.

| | Signal Name | Description |
|---|---|---|
| Inputs of computation modules | IN1 | These signals take one of the following data ranges depending on the type of computation module.<br>The numbers of inputs and parameters also depend on the type of computation module.<br>• Signed 4-byte data<br>• Signed 2-byte data<br>• Flag data of 0 or 1 |
| | IN2 | |
| | IN3 | |
| | IN4 | |
| | IN5 | |
| | IN6 | |
| | IN7 | |
| | IN8 | |
| Parameters of computation modules | P1 | |
| | P2 | |
| | P3 | |
| | P4 | |
| Outputs of computation modules | OUT | |

### ● Operation

(1) Double-click the computation module in the [Input Block Monitor] view (Figure 11.2.2). The [Module Monitor] view (Figure 11.2.3) appears.

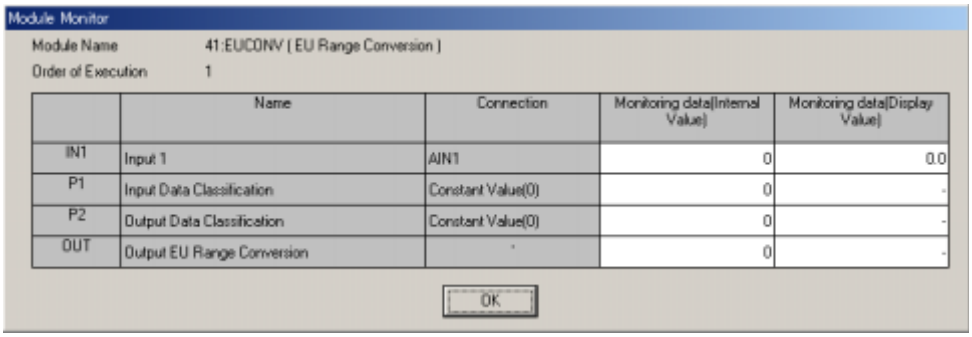



**Figure 11.2.3 Example of [Module Monitor] View**

# 11.3 Monitoring Custom Computations Configured in an Output Block

You can monitor the data values (control and computing data) coming into an output block, as well as the data values (analog and relay output data) emitted from the output block. You can also monitor the data values fed to computation modules, as well as their parameter values.

## 11.3.1 Monitoring Data Values Fed to/from an Output Block

In the [Output Block Monitor] view (Figure 11.3.2), you can monitor the signals listed in the following table.

◯ : The controller has the register of the Signal.

| | Signal Name | Description | | UT 750 | UP 750 |
|---|---|---|---|---|---|
| Control and computing data fed to output block | PV.1 | Loop 1 PVinput | 1501 | ◯ | ◯ |
| | PV.2 | Loop 2 PVinput | 1502 | ◯ | ◯ |
| | CSP.1 | Loop 1 Setpoint | 1503 | ◯ | ◯ |
| | CSP.2 | Loop 2 Setpoint | 1504 | ◯ | ◯ |
| | OUT.1 | Loop 1 Control output | 1505 | ◯ | ◯ |
| | OUT.2 | Loop 2 Control output | 1506 | ◯ | ◯ |
| | HOUT.1 | Loop 1 Heating side output | 1507 | ◯ | ◯ |
| | HOUT.2 | Loop 2 Heating side output | 1508 | ◯ | ◯ |
| | COUT.1 | Loop 1 Cooling side output | 1509 | ◯ | ◯ |
| | COUT.2 | Loop 2 Cooling side output | 1510 | ◯ | ◯ |
| | RET1 | Retransmission 1 | 1511 | ◯ | ◯ |
| | RET2 | Retransmission 2 | 1512 | ◯ | ◯ |
| | | | | | |
| Analog data fed from output block | OUT1A | Analog output 1 (Current/voltage pulse) | 1531 | ◯ | ◯ |
| | OUT2A | Analog output 1 (Current/voltage pulse) | 1532 | ◯ | ◯ |
| | OUT3A | Analog output 1 (Current) | 1533 | ◯ | ◯ |
| Contact output data from output block | OUT1R | Control output 1 (relay) | 1534 | ◯ | ◯ |
| | OUT2R | Control output 2 (relay) | 1535 | ◯ | ◯ |
| | DO1 | Contact output 1 (relay) | 1536 | ◯ | ◯ |
| | DO2 | Contact output 2 (relay) | 1537 | ◯ | ◯ |
| | DO3 | Contact output 3 (relay) | 1538 | ◯ | ◯ |
| | DO4 | Contact output 4 (open collector) | 1539 | ◯ | ◯ |
| | DO5 | Contact output 5 (open collector) | 1540 | ◯ | ◯ |
| | DO6 | Contact output 6 (open collector) | 1541 | ◯ | ◯ |
| | DO7 | Contact output 7 (open collector) | 1542 | ◯ | ◯ |
| | RDO151 | Contact output 1 (expansion 1) | 1543 | ◯ | ◯ |
| | RDO152 | Contact output 2 (expansion 1) | 1544 | ◯ | ◯ |
| | RDO153 | Contact output 3 (expansion 1) | 1545 | ◯ | ◯ |
| | RDO154 | Contact output 4 (expansion 1) | 1546 | ◯ | ◯ |
| | RDO155 | Contact output 5 (expansion 1) | 1547 | ◯ | ◯ |
| | RDO156 | Contact output 6 (expansion 1) | 1548 | ◯ | ◯ |
| | RDO157 | Contact output 7 (expansion 1) | 1549 | ◯ | ◯ |
| | RDO158 | Contact output 8 (expansion 1) | 1550 | ◯ | ◯ |
| | RDO251 | Contact output 1 (expansion 2) | 1551 | ◯ | ◯ |
| | RDO252 | Contact output 2 (expansion 2) | 1552 | ◯ | ◯ |
| | RDO253 | Contact output 3 (expansion 2) | 1553 | ◯ | ◯ |
| | RDO254 | Contact output 4 (expansion 2) | 1554 | ◯ | ◯ |
| | RDO255 | Contact output 5 (expansion 2) | 1555 | ◯ | ◯ |
| | RDO256 | Contact output 6 (expansion 2) | 1556 | ◯ | ◯ |
| | RDO257 | Contact output 7 (expansion 2) | 1557 | ◯ | ◯ |
| | RDO258 | Contact output 8 (expansion 2) | 1558 | ◯ | ◯ |
| | | | | | |

## ● Operation

(1) From the tool menus, choose <Communication>, then <Custom Computation Monitor>, then <Output Block>. The [Communication Protocol Setting] dialog box (Figure 11.3.1) appears.

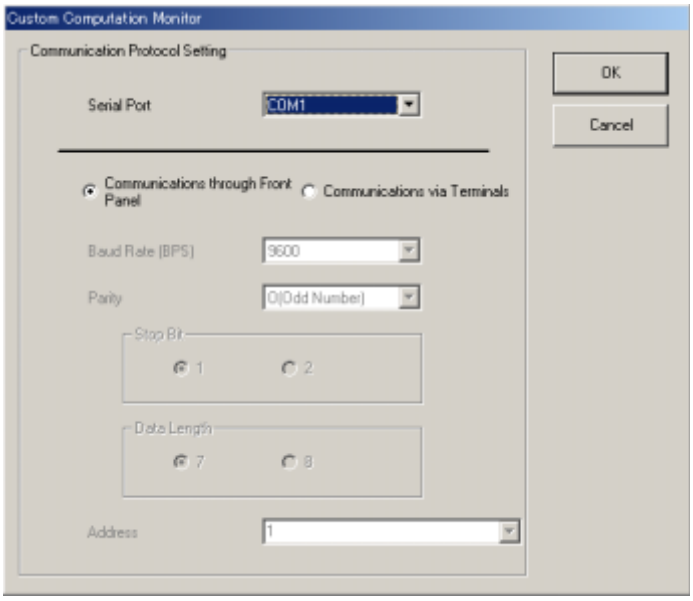



**Figure 11.3.1 [Communication Protocol Setting] Dialog Box**

(2) Match the communication conditions of the controller with those of the personal computer, and then click the <OK> button.

(3) The [Output Block Monitor] view (Figure 11.3.2) appears.

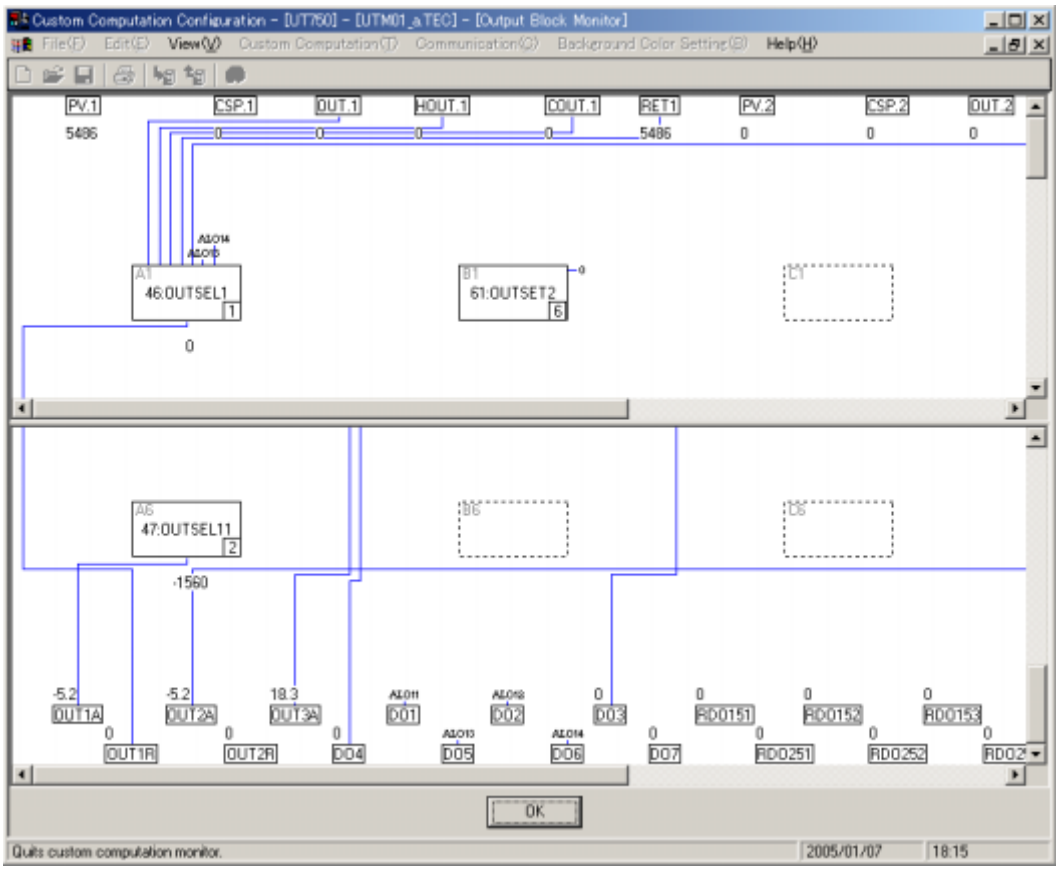



**Figure 11.3.2 Example of [Output Block Monitor] View**

## 11.3.2 Monitoring the Inputs and Parameters of Computation Modules

In the [Module Monitor] view, you can monitor the signals listed in the following table, module by module.

| | Signal Name | Description |
|---|---|---|
| Inputs of computation modules | IN1 | These signals take one of the following data ranges depending on the type of computation module.<br>The numbers of inputs and parameters also depend on the type of computation module.<br>• Signed 4-byte data<br>• Signed 2-byte data<br>• Flag data of 0 or 1 |
| | IN2 | |
| | IN3 | |
| | IN4 | |
| | IN5 | |
| | IN6 | |
| | IN7 | |
| | IN8 | |
| Parameters of computation modules | P1 | |
| | P2 | |
| | P3 | |
| | P4 | |
| Outputs of computation modules | OUT | |

### ● Operation

(1) Double-click the computation module in the [Output Block Monitor] view (Figure 11.3.2). The [Module Monitor] (Figure 11.3.3) view appears.

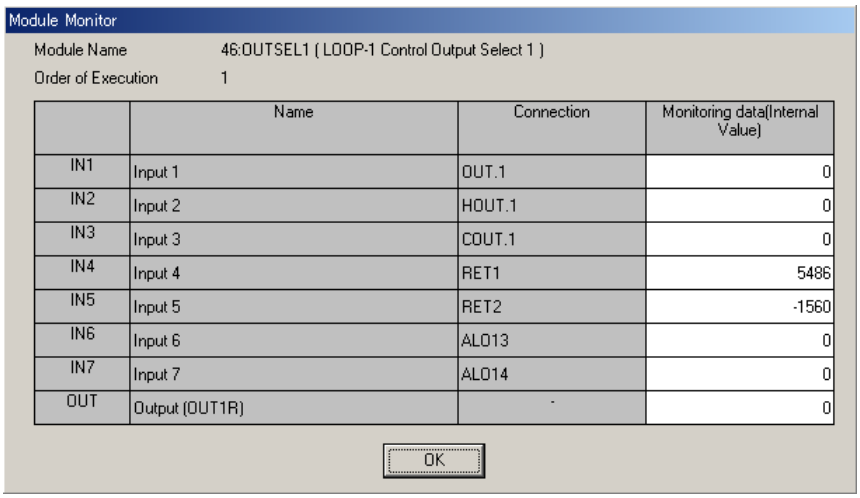



**Figure 11.3.3 Example of [Module Monitor] View**

# 12. Examples of Custom Computation and Custom Display Configurations

This chapter gives examples of the configurations of custom computations and custom displays. When configuring custom computations and displays according to these examples, it is recommended that you read the sample files first and then either modify their settings or make the configurations from scratch. In this chapter, the sample file (file name: Utm01.tec) for single-loop control is used for the explanation.

## ■ Preparations for configuring sample file

When you start the LL200 tool, the [Tool Selection] dialog box (Figure 12.0.1) appears.

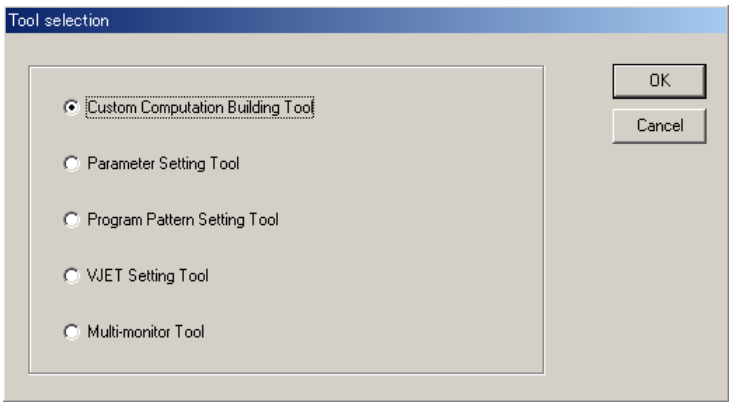



**Figure 12.0.1 [Tool Selection] Dialog Box**

To read a sample file for single-loop control, follow the steps shown below.

(1) In the [Tool Selection] dialog box, click the <Custom Computation Building Tool> option button. Then, click the <OK> button.

(2) In the [New/Modification] dialog box, click the <Open Sample File> option button. Then, click the <OK> button.

(3) In the [Open Sample File] dialog box, choose the sample for single-loop control (file name: Utm01.tec) as the file to be read.

(4) In the [Select Model and Suffix Codes] dialog box, choose <Standard type> as the controller type. Specify the same suffix and optional suffix codes as those of the controller you will connect to the system.

(5) In the [Select Model and Suffix Codes] dialog box, click the <OK> button. The [Custom Computation Configuration Menu] dialog box (Figure 12.0.2) appears.

(6) Now, you are ready to configure the same custom computations and displays as the examples discussed later in this chapter.

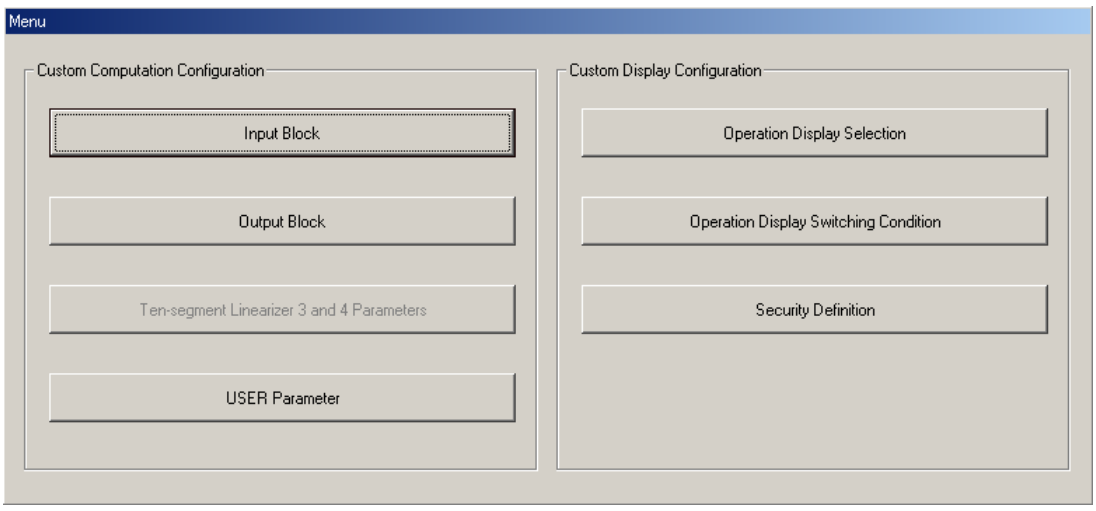



**Figure 12.0.2**

# 12.1 Example 1: Applying Corrective Computation to the PV Input

In this example, you introduce a 1 to 5-V correction signal through the AIN3 analog input. The purpose of this correction signal is to correct the PV signal by multiplying the PV signal fed to the AIN1 analog input.

## ■ Preparations for Applying Corrective Computation to the PV Input

Multiply the AIN1 analog input by the AIN3 analog input, which is regarded as a multiplier of 0.5 to 1.5, as shown in the following formula.

**PV1 input = AIN1 analog input x AIN3 analog input**

Configure the range and scale of the AIN3 analog input as shown below. Note that the parameters listed below are setup parameters.

| | |
|---|---|
| RH3 (maximum value of analog input-3 range): | 5.000 (V) |
| RL3 (minimum value of analog input-3 range): | 1.000 (V) |
| SH3 (maximum value of analog input-3 scale): | 1500 |
| SL3 (minimum value of analog input-3 scale): | 500 |
| SDP3 (analog input-3 decimal point position): | 3 |

The readouts of the AIN3 analog input are used as the correction factors and are as shown below.

For a 5-V signal, the AIN3 analog input reads 1.500.

For a 3-V signal, the AIN3 analog input reads 1.000.

For a 1-V signal, the AIN3 analog input reads 0.500.

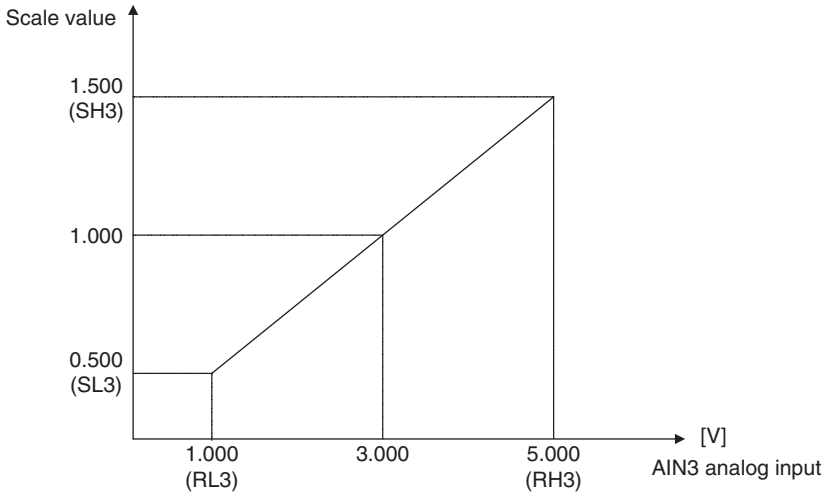



**Figure 12.1.1 AIN3 Analog Input vs. Scale Value**

The AIN1 analog input reads 0.5 times, or half, the actual value if a 1-V signal is applied to the AIN3 analog input. Likewise, it reads 1.5 times the actual value if a 5-V signal is applied to the AIN3 analog input.

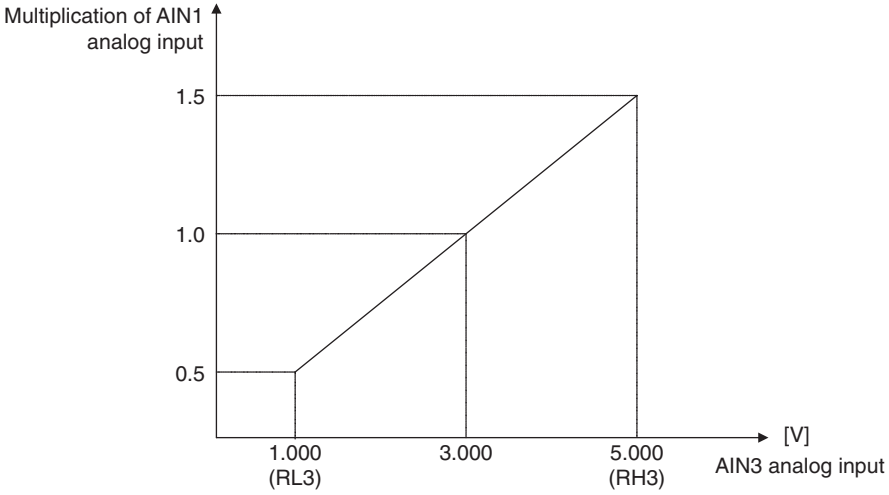



**Figure 12.1.2 Multiplication of AIN1 Analog Input vs. AIN3 Analog Input**

For the maximum and minimum value of analog input scale, however, each internal data value for custom computation is represented as an integer ranging from 0 to 30000. Hence, the correction factors (multiplications of the AIN1 analog input) of 0.500, 1.000 and 1.500 discussed above are represented as 0, 15000 and 30000, respectively. The PV signal coming in through the AIN1 analog input is multiplied by the specific internal data value determined. If the AIN1 analog input is multiplied simply in this way, the resulting value of the input is 15000 times the actual value for a 3-V signal applied to the AIN3 analog input. In order for the multiplication to become 1.000 in actual application, the following conversion formula must be executed before the AIN1 analog input is multiplied.

$$\text{AIN1 internal data value} \times \frac{\text{AIN2 internal data value}}{30000} + 0.5 \quad \text{----------} \ ①$$

Since all data values are handled internally as integers, the fraction of 0.5 cannot be used in this formula. Its use would also prevent you from obtaining the correct result because a fraction is truncated if you first divide the AIN3 value by 30000. To solve these problems, formula ① must be transformed into formula ② shown below.

$$\text{AIN1 internal data value} \times \frac{\text{AIN2 internal data value} + 15000}{30000} \quad \text{----------} \ ②$$

Now, you are ready to introduce the correction signal.

## ■ Diagram Showing How Customized Computation Modules for Correcting the PV Input Are Connected

Figure 12.1.3 is a block diagram showing how customized computation modules are connected to implement the process discussed in the previous section.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

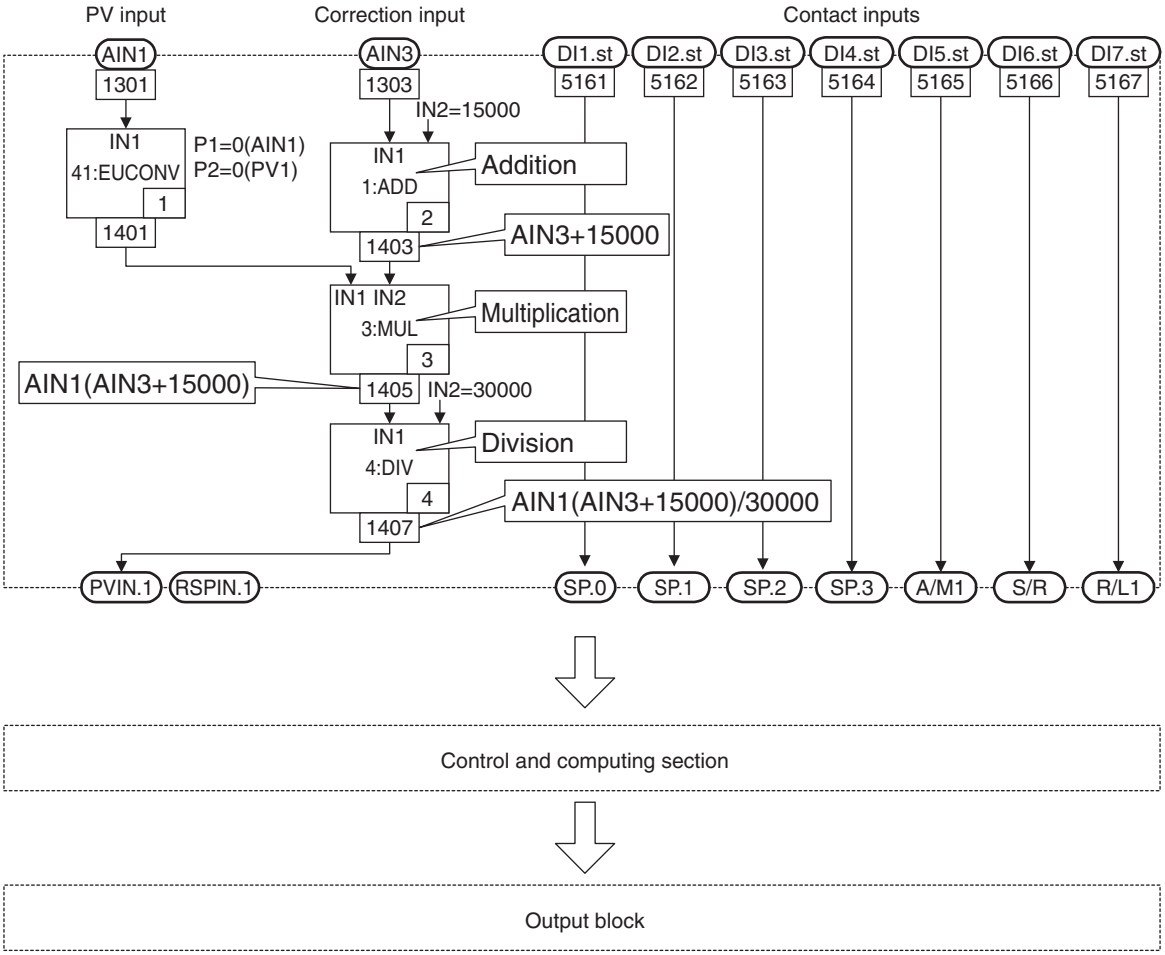



**Figure 12.1.3 Diagram Showing How Customized Computation Modules for Correcting the PV Input Are Connected (Input Block)**

# ■ Procedure for Configuring Custom Computations

Before you begin configuring custom computations, read the sample file for single-loop control (file name: Utm01.tec). To read the file, see subsection 7.3.1, “Reading Data from Disk.” Next, delete all of the computation modules that exist in the input block, leaving the contact inputs wired as they are. For details on how to delete the computation modules, see Section 6.1.2, “Deleting Computation Modules.”

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

## ● Operation I: Module Configuration

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. After deleting of all computation modules, the [Input Block] dialog box (Figure 12.1.4) appears.

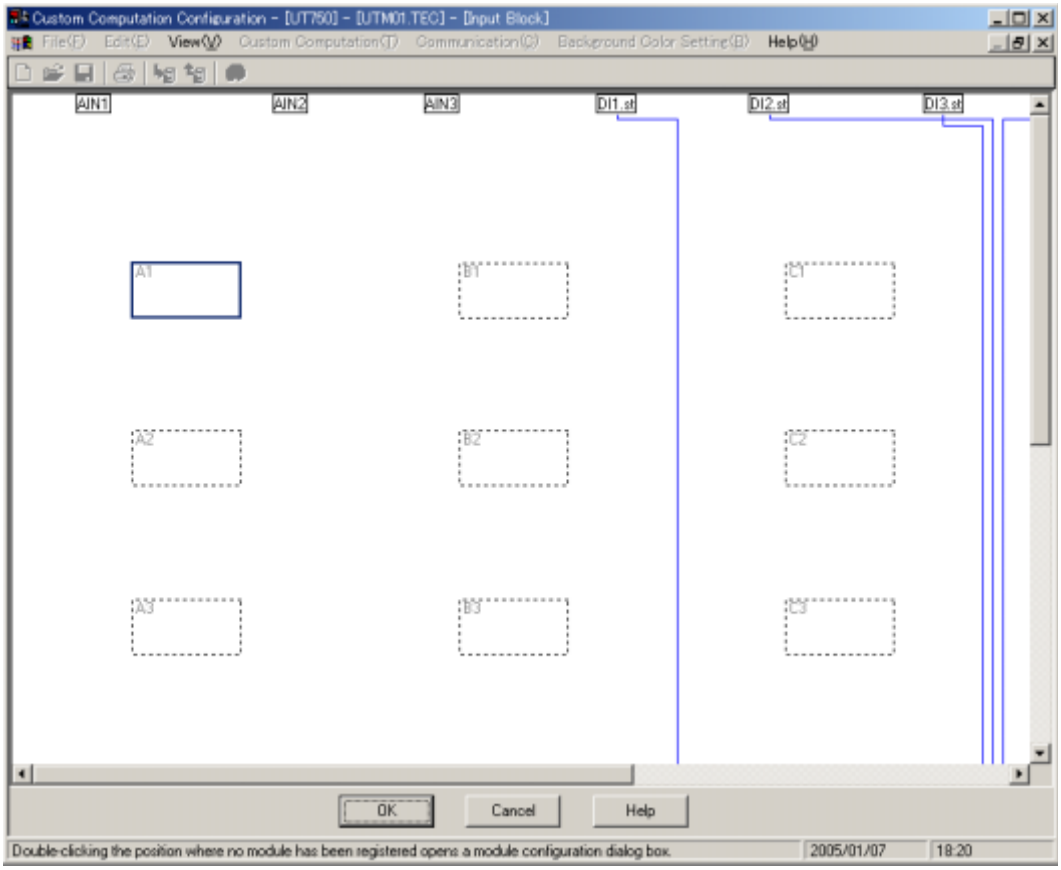



**Figure 12.1.4 [Input Block] Dialog Box**

(2) In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.1.5) appears.

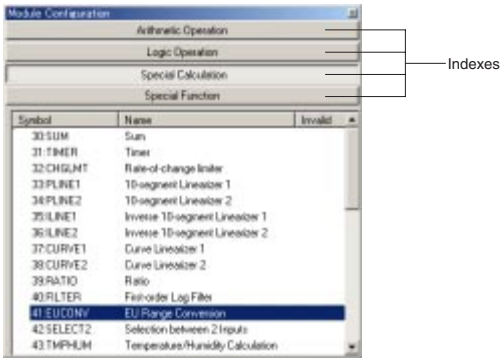



**Figure 12.1.5 [Module Configuration] Dialog Box**

(3) Click the <Special Calculation> index.

(4) Double-click <41: EUCONV>. The EUCONV module is registered with the [Input Block] dialog box, as shown in Figure 12.1.6.

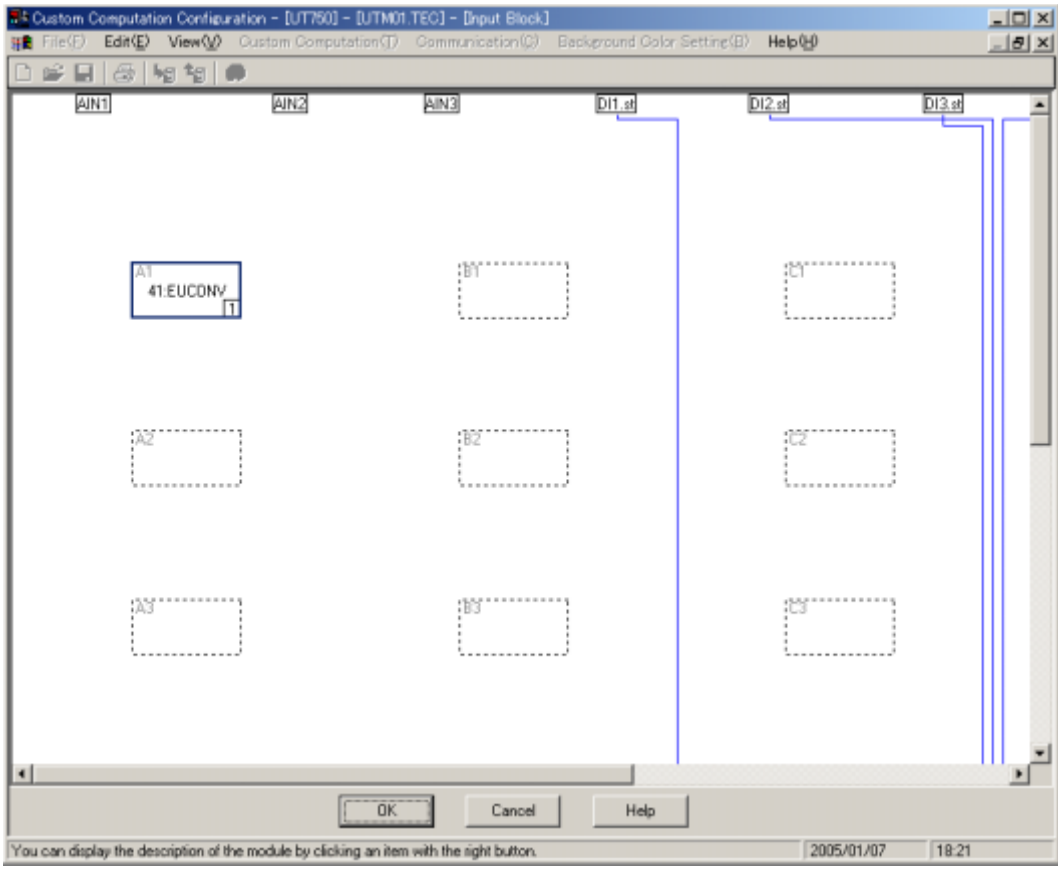



**Figure 12.1.6 Example of the [Input Block] Dialog Box where the EUCONV Module Is Registered As the First-run Module**

(5) Repeat steps (2) to (4) to register the Addition (ADD), Multiplication (MUL) and Division (DIV) modules. Register these modules in the order of ADD, MUL and then DIV modules.

Figure 12.1.7 is an example of the [Input Block] dialog box where the EUCONV, ADD, MUL and DIV modules are registered.

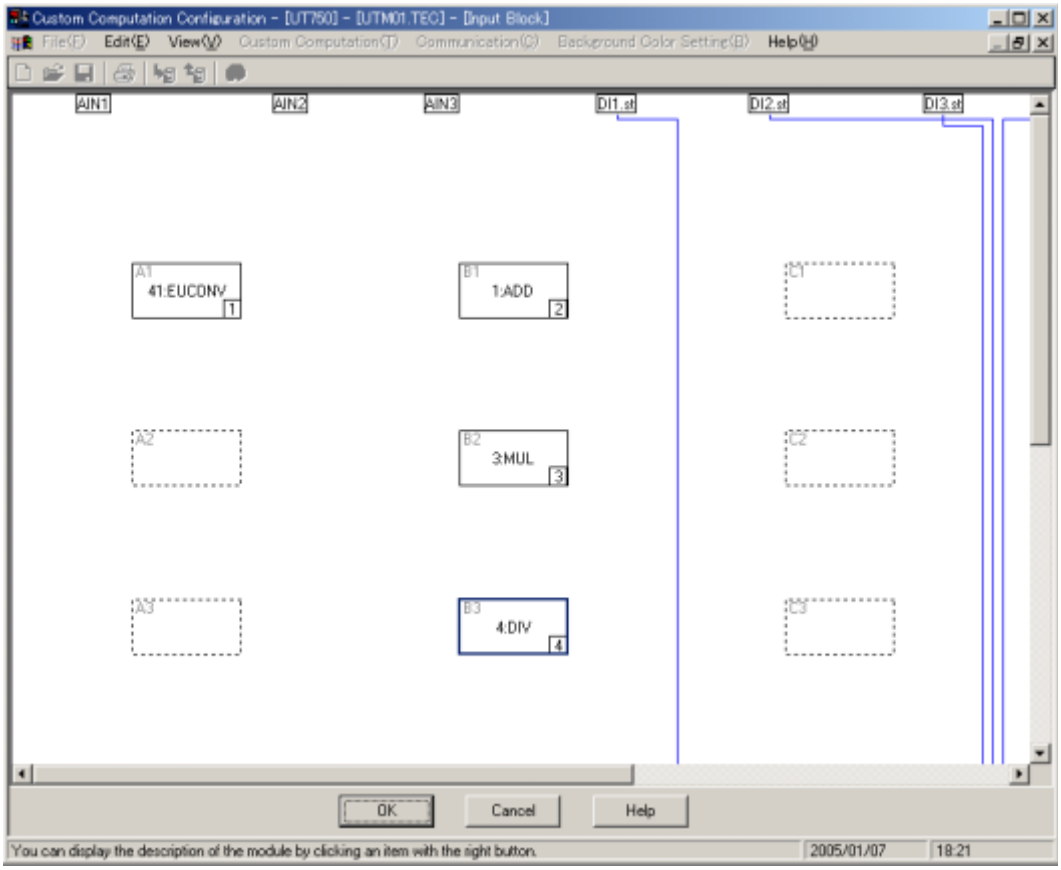



**Figure 12.1.7 Example of the [Input Block] Dialog Box where the EUCONV, ADD, MUL and DIV Modules Are Registered**

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

## ● Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

(1) Click the registered first-run EUCONV module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Module Setting] dialog box (Figure 12.1.8) appears.

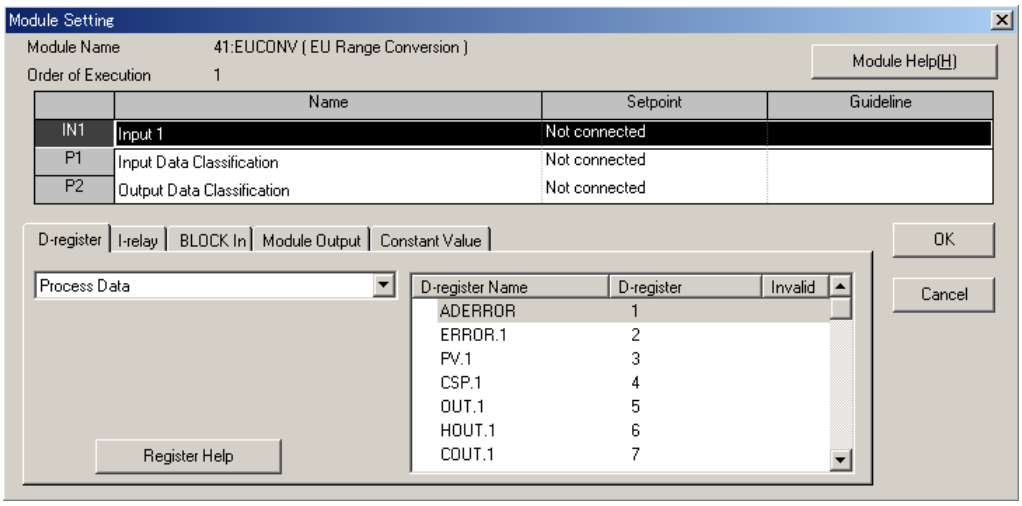



**Figure 12.1.8 [Module Setting] Dialog Box**

(3) Click the [BLOCK In] index.

(4) Double click the [AIN1] in the list box. (Setpoint: AIN1) and (Guideline: D1301) appears in the cell of [IN1].

(5) The [P1] module parameter is waiting for the data setting.

(6) Click the [Constant Value] index.

(7) Enter “0” by keyboad of PC. (To register “0”, press the enter key of PC.) (Figure 12.1.9)

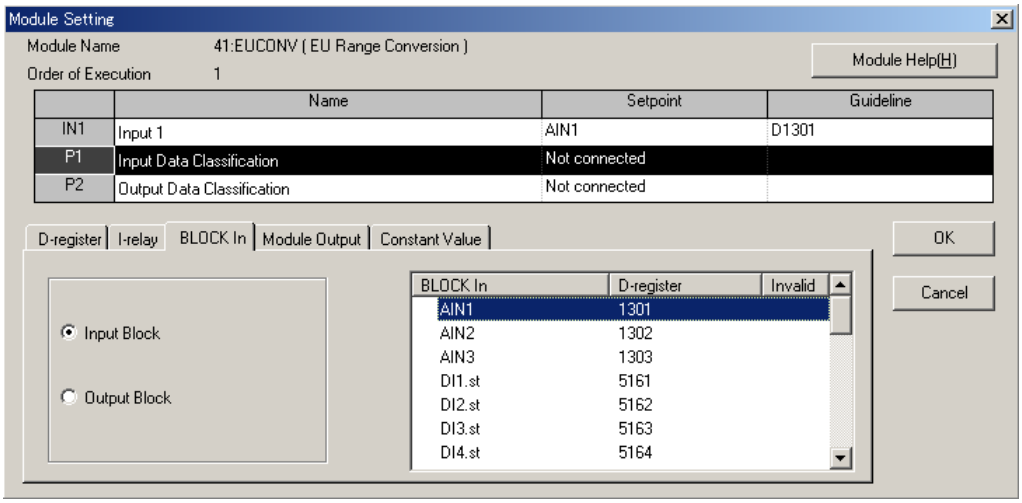



**Figure 12.1.9 Configuration of the <IN1> Input**

(8) The [P2] module parameter is waiting for the data setting.

(9) Click the [Constant Value] index.

(10) Enter “0” by key board of PC.

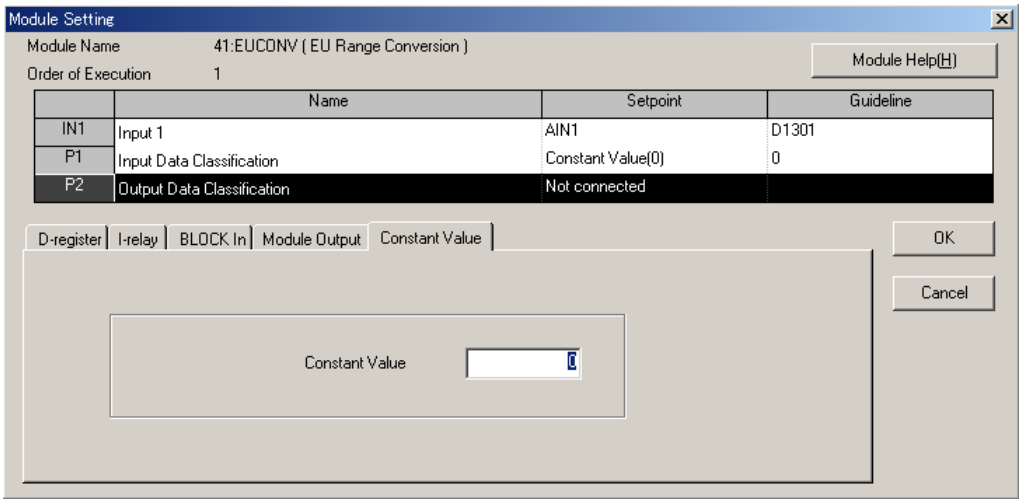



**Figure 12.1.10**

(11) Click the <OK> button.

Repeat steps (1) to (11) to configure the inputs and parameters of the Addition (ADD), Multiplication (MUL) and Division (DIV) modules also.

The setpoints of the inputs for which connection is made are as follows.

ADD module:

| | | |
|---|---|---|
| Inputs | IN1 | Index: [BLOCK In]<br>Selection: [AIN3 (1303)] |
| | IN2 | Index: [Constant Value]<br>Setpoint: [15000] |

MUL module:

| | | |
|---|---|---|
| Inputs | IN1 | Index: [Module Output]<br>Group box: [Input Block]<br>Selection: [IMO1L (1401)] |
| | IN2 | Index: [Module Output]<br>Group box: [Input Block]<br>Selection: [IMO2L (1403)] |

DIV module:

| | | |
|---|---|---|
| Inputs | IN1 | Index: [Module Output]<br>Group box: [Input Block]<br>Selection: [IMO3L (1405)] |
| | IN2 | IN2 Index: [Constant Value]<br>Setpoint: [30000] |

When you finish configuring the computation modules' inputs and parameters, proceed to "Operation III: Connection to the Control and Computing Section."

## ● Operation III: Connection to the Control and Computing Section

This operation involves defining the settings needed to pass the results of computation in the input block to the control and computing section.

(1) In the [Input Block] dialog box (Figure 12.1.11), click the <PVIN.1> output signal.

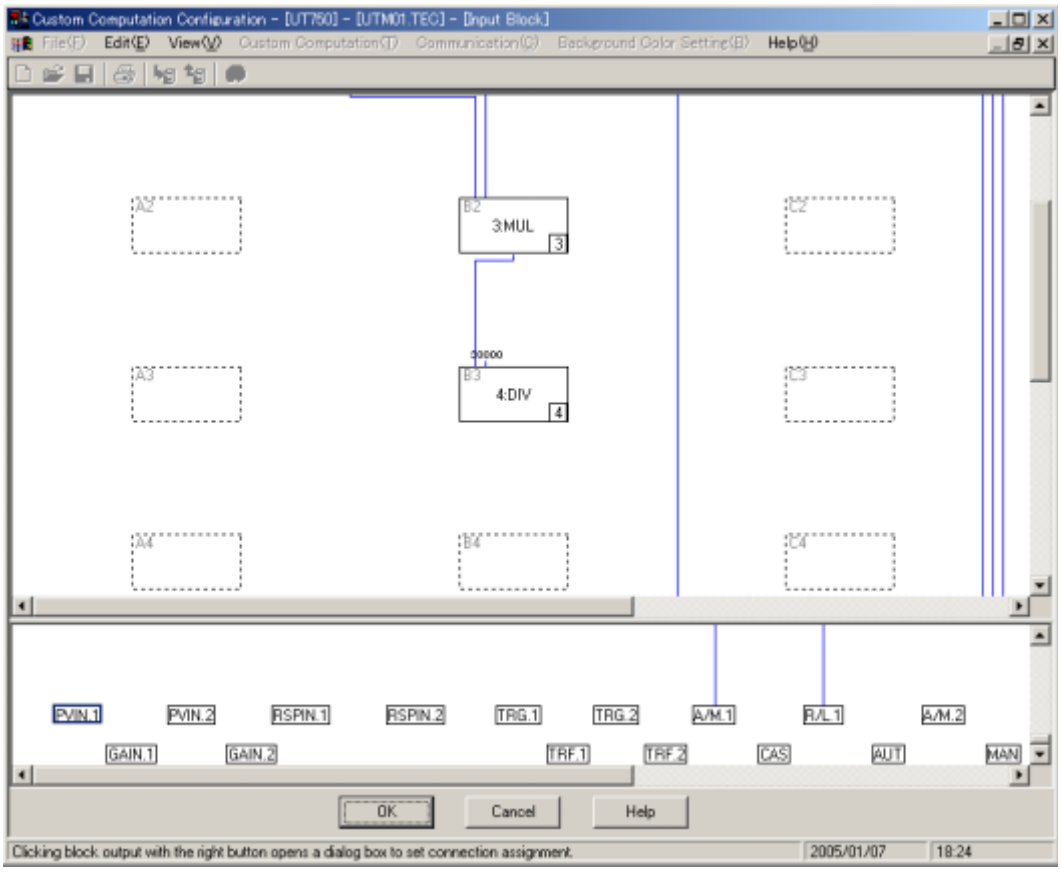



**Figure 12.1.11 Output Signal Fed by Input Block**

(2) From the tool menus, click <Edit [E]>, then <Connection>. The [Setting Input Block Assignment] dialog box (Figure 12.1.12) appears.

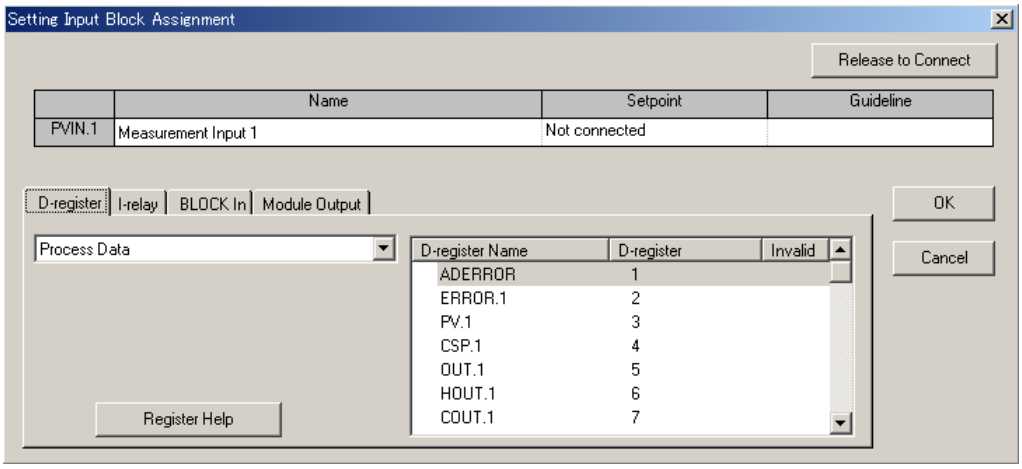



**Figure 12.1.12 [Setting Input Block Assignment] Dialog Box**

(3) Click the <Module Output> index.

(4) Click the <Input Block> option button in the group box.

(5) Double-click <IMO4L> in the list box. The <IMO4L (Setpoint column)> and <D1407 (Guideline column)> options appear in the <PVIN.1> row.

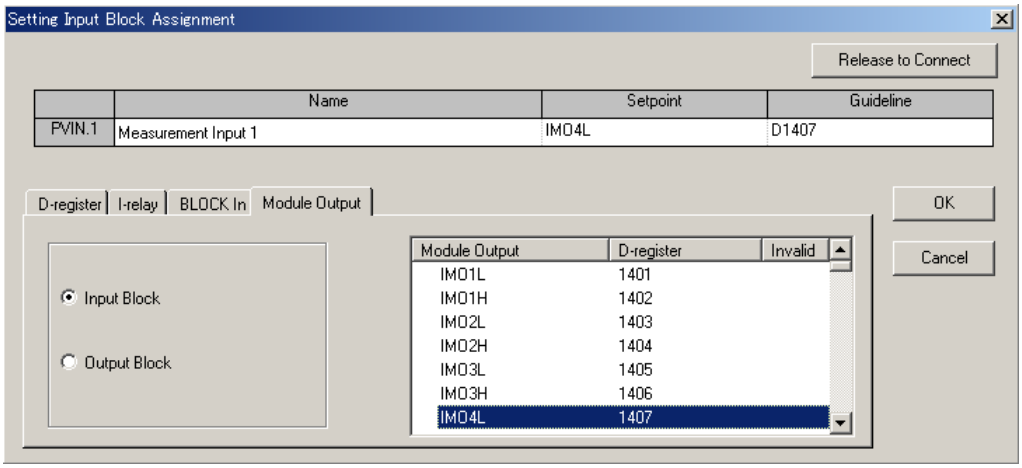



**Figure 12.1.13 Configuration of the <IMO4L> Output**

(6) Click the <OK> button.

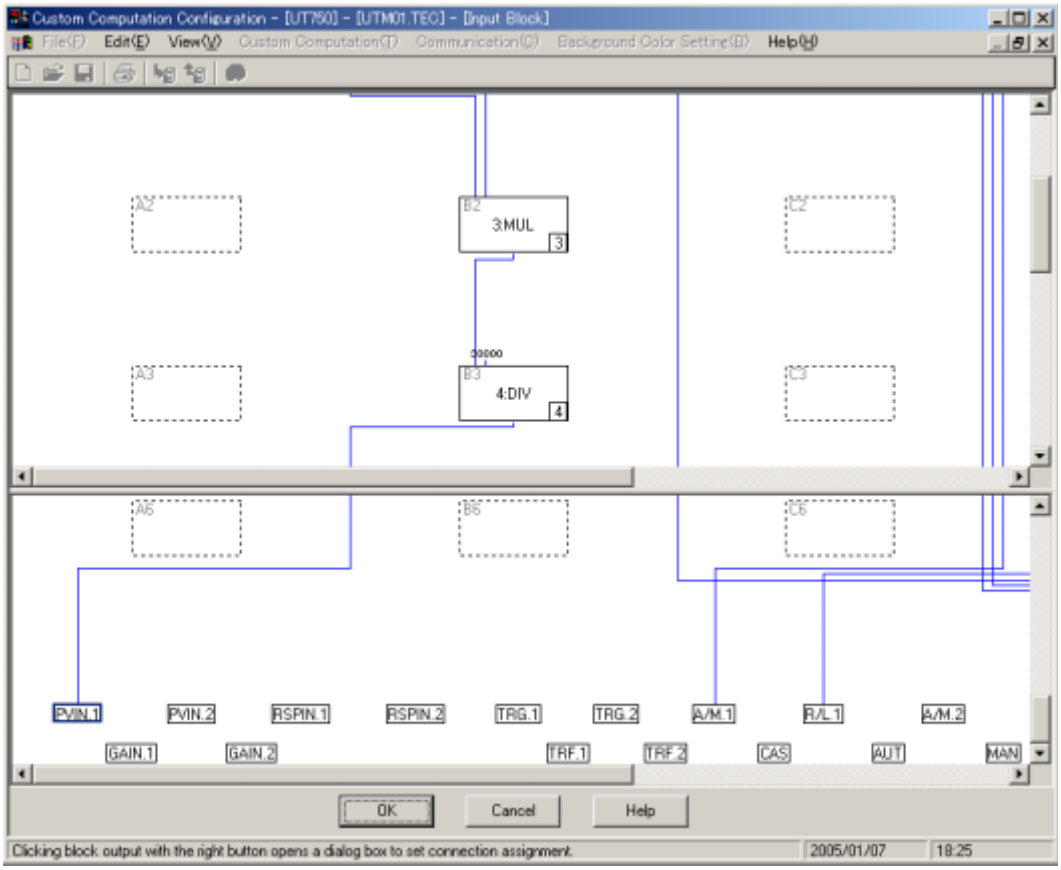



**Figure 12.1.14 Example of the [Input Block] Dialog Box (finished view) Where Corrective Computation Is Applied to the PV Input**

You have now finished this example of configuring custom computations for correcting the PV input.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

# 12.2 Example 2: Showing the PV Input Value before Corrective Computation

In this example, you use the custom computations you configured in Section 12.1 to show the PV input value before corrective computation on the controller's digital display.

This involves first configuring custom computations for this purpose, and then configuring the custom displays.

When you finish the operations in this section, you can view the [DISP1 & DISP2] display on the operation display panel, in succession with each press of the <DISP> key.

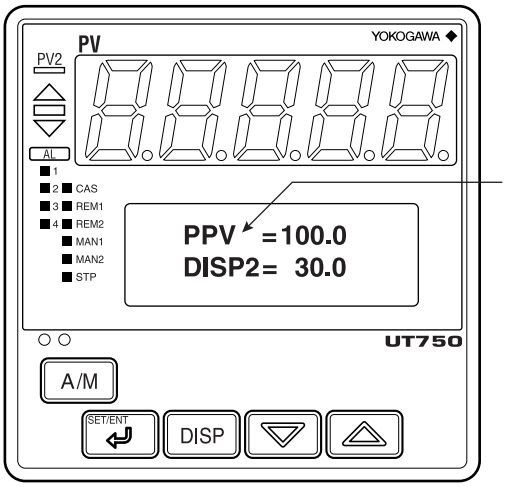



**Figure 12.2.1 The [DISP1: PPV & DISP2] Display**

# ■ Procedure for Configuring Custom Computations

To configure the custom computations, follow the instructions in “Operation I” and “Operation II” here, in this order.

## ● Operation I: Module Configuration

(1) In the [Input Block] dialog box (Figure 12.1.15), double-click a blank box. The [Module Configuration] dialog box (Figure 12.2.2) appears.

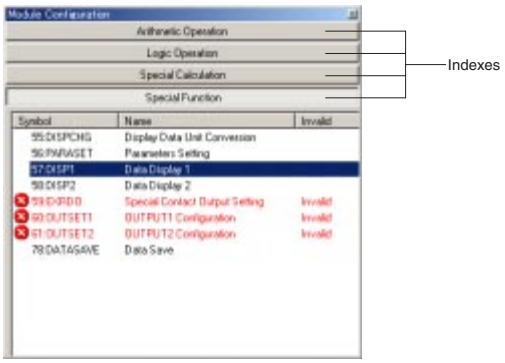



**Figure 12.2.2 [Module Configuration] Dialog Box**

(2) Click the <Special Function> index.

(3) Double-click <57: DISP1>. The DISP1 module is registered with the [Input Block] dialog box, as shown in Figure 12.2.3.

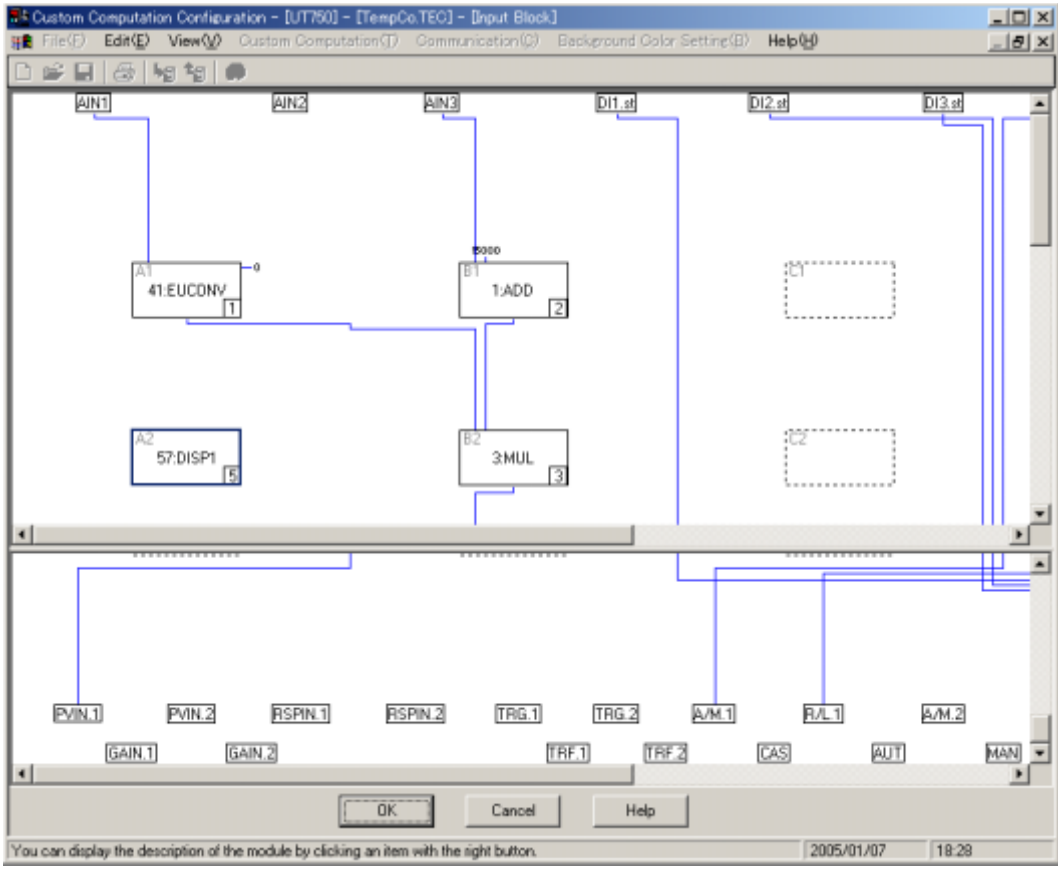



**Figure 12.2.3 Example of the [Input Block] Dialog Box where the DISP1 Module Is Registered as the Fifth-run Module**

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

## ● Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

(1) Click the registered fifth-run DISP1 module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Module Setting] dialog box (Figure 12.2.4) appears.

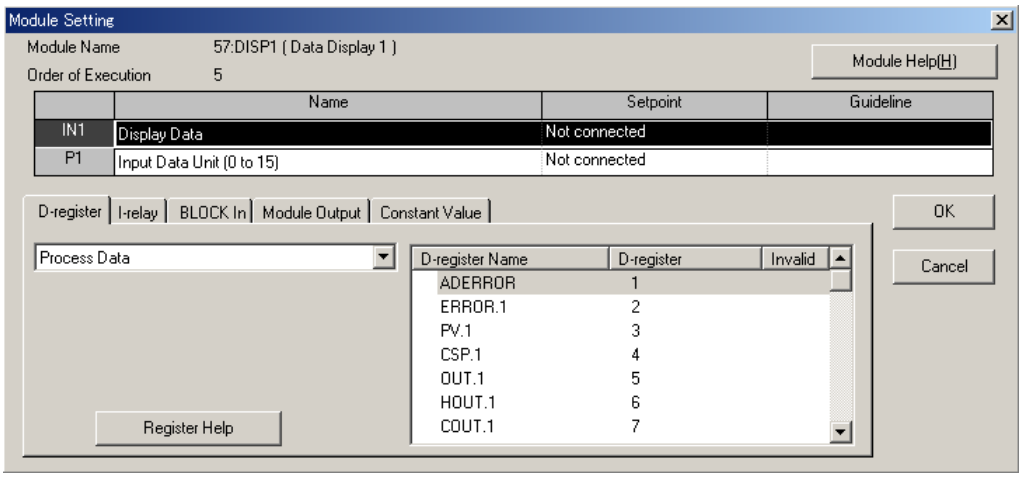



**Figure 12.2.4 [Module Setting] Dialog Box**

(3) The <IN1> module input is waiting for the data setting.

(4) Click the <Module Output> index.

(5) Click the <Input Block> option button in the group box.

(6) Double-click <IMO1L> in the list box. The <IMO1L (Setpoint column)> and <D1401 (Guideline column)> options appear in the <IN1> row.

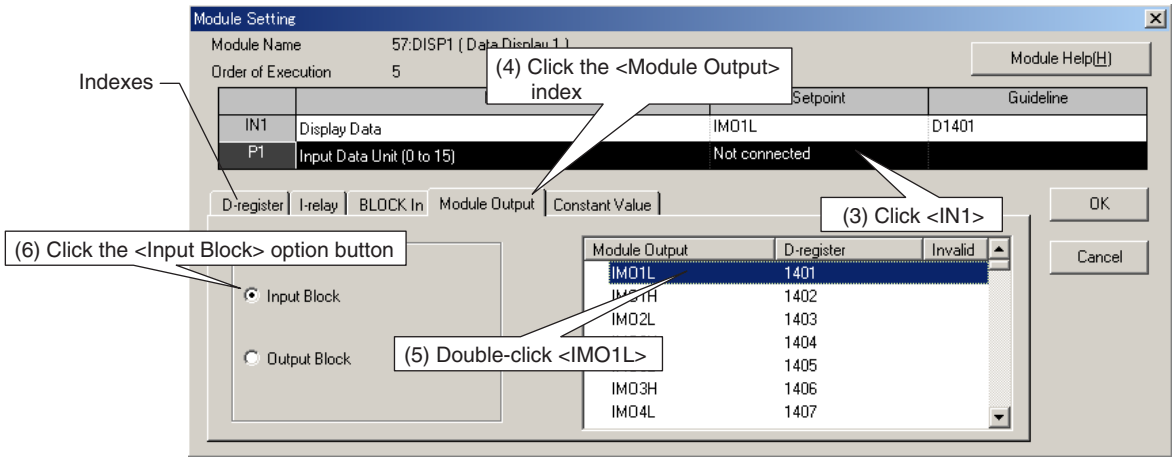



**Figure 12.2.5 Configuration of the <IN1> Input**

(7) The <P1> module parameter is waiting for the data setting.

(8) Click the <Constant Value> index.

(9) Type “6” in the text box and press the <Enter> key.

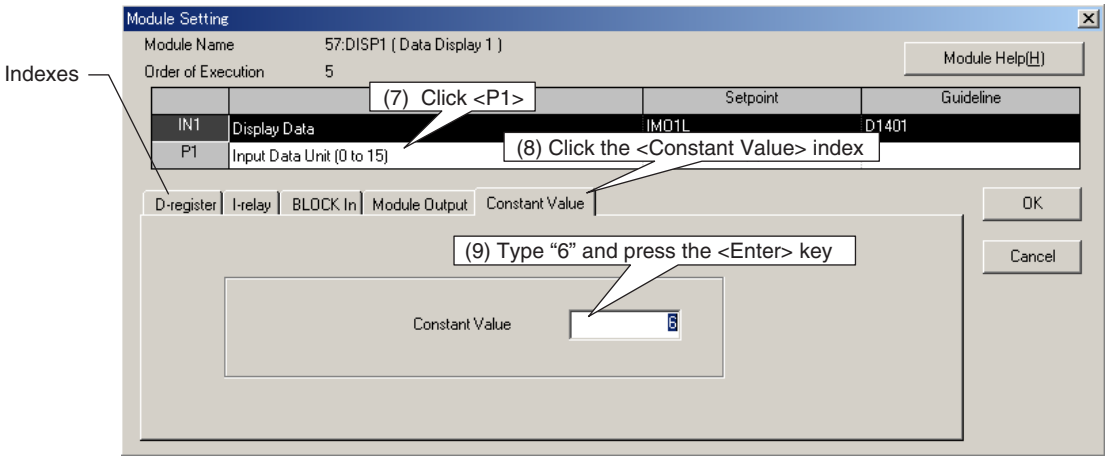



**Figure 12.2.6 Configuration of the <P1> Parameter**

(10) Click the <OK> button.

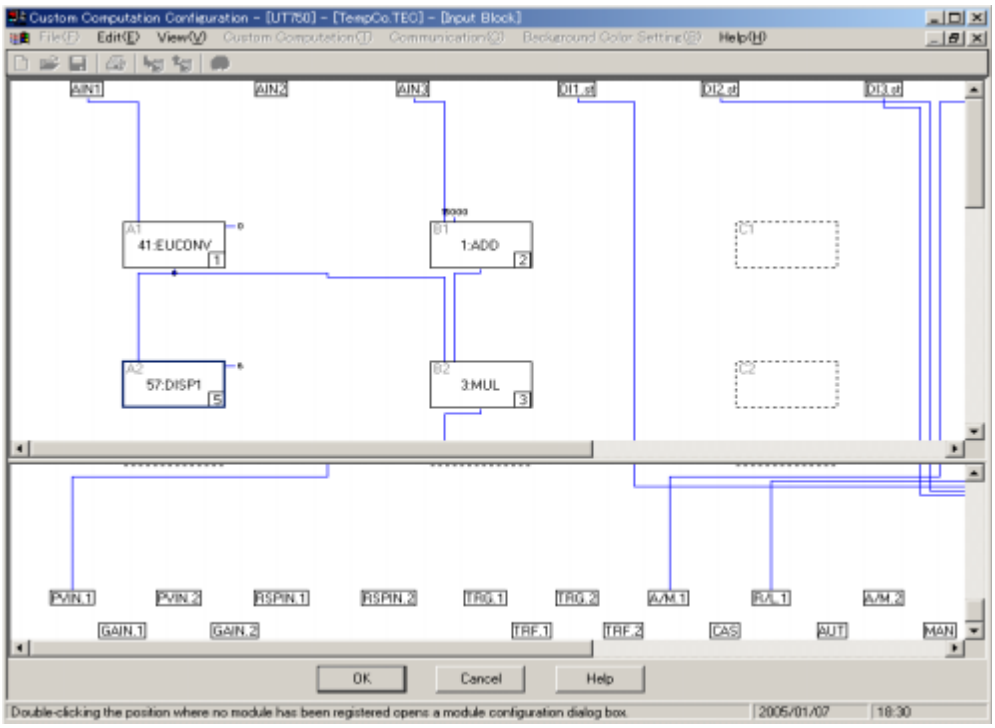



**Figure 12.2.7 [Input Block] Dialog Box (finished view) for Showing the PV Input Value before Corrective Computation**

You have now finished the configuration of custom computations, and must now configure the custom displays.

# ■ Procedure for Configuring Custom Displays

To configure the custom displays, follow the instructions in “Operation I” and “Operation II” here, in this order.

## ● Operation I: Custom Display Selection

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Operation Display Selection>. The [Operating Display Selection] dialog box (Figure 12.2.8) for single-loop control appears.

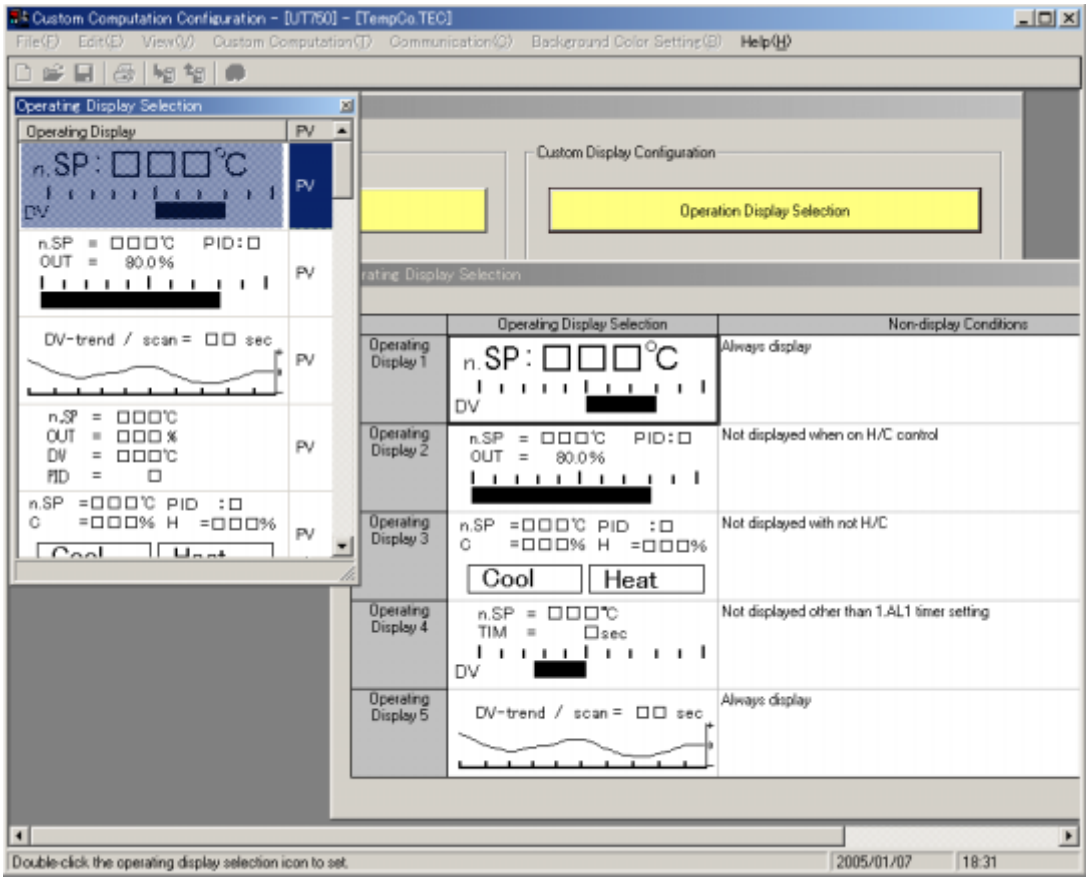



**Figure 12.2.8 [Operating Display Selection] Dialog Box**

(2) In the [Operating Display Selection] dialog box, click the <Operating Display Selection> cell in the <Operating Display 8> section of the rightmost box.

(3) Click the [Operating Display Selection] button, and the [Operating Display Selection] dialog box appears. Select the [DISP1 & DISP2] display from the dialog box, and double click it to register as an operating display.

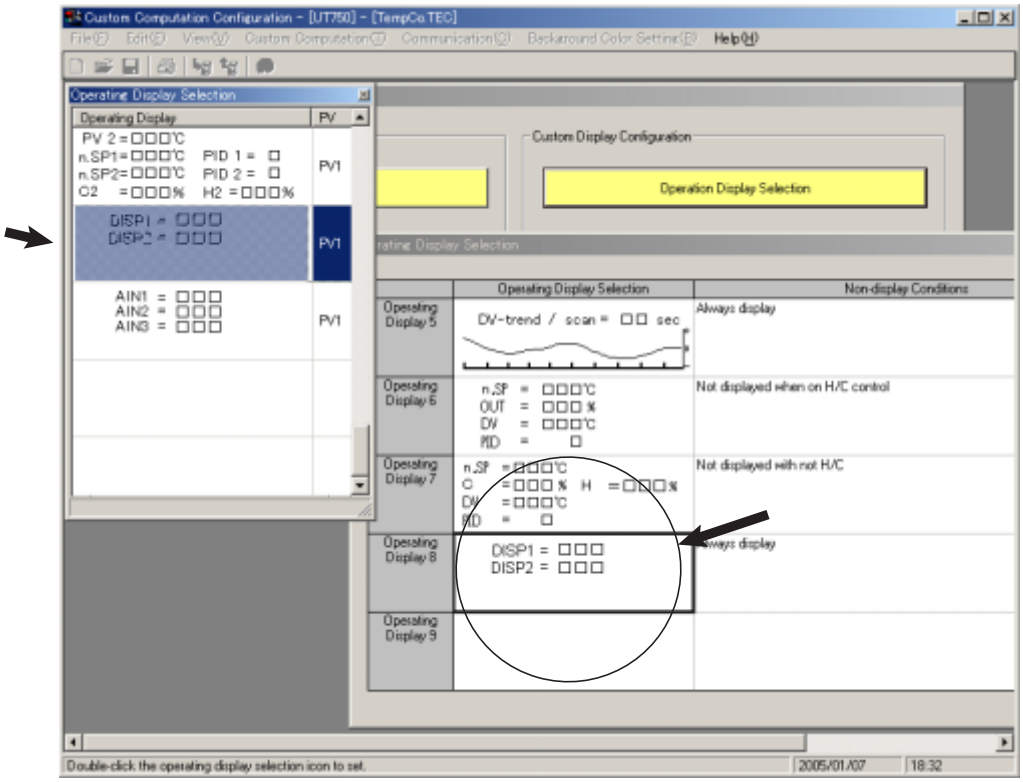



**Figure 12.2.9 Registration of [DISP1 & DISP2] Display**

(4) Click the <OK> button.

## ● Operation II: Text Setting

This operation involves setting the text you want to show on the PV digital display of the DISP1 display. If you skip the steps noted below, the PV digital display shows <DISP1> or <DISP2> .

(1) Click <Display Character Setting> in the dialog box shown in Figure 12.2.9. The [Setting DISP1 and DISP2 Display Characters] dialog box (Figure 12.2.10) appears.

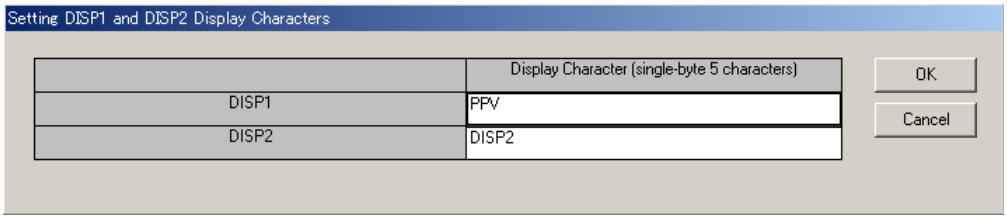



**Figure 12.2.10 [Setting DISP1 and DISP2 Display Characters] Dialog Box**

(2) In the text box, type the text you want to show on the PV digital display. You can type a maximum of five half-byte alphanumeric characters. Figure 12.2.11 is an example where “PPV” is set as the text.

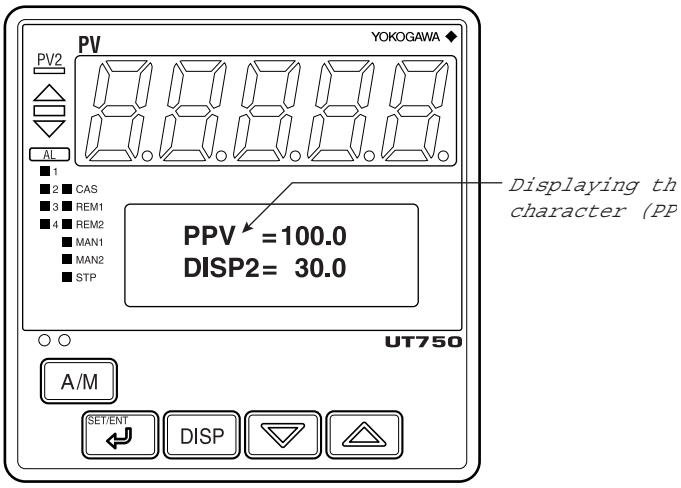



**Figure 12.2.11 Example of the DISP1 Display Configured to Show “PPV” on Digital Display**

(3) Click the <OK> button.

The PV digital display of the DISP1 display is now configured to show “PPV” as the text.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

# 12.3 Example 3: Implementing Simple Logic Operations

This section introduces an example where two signals are switched between by turning on and off the contact input.

The example shown here is explained using the block diagram of the custom computations configured in Section 12.1.

## ■ Connection of Customized Computation Modules for Specifying the Presence/Absence of Corrective Computation

In this section, a process which specifies the presence or absence of custom computation depending on the on/off state of contact input 7 (DI7) is added to the block diagram configured in Section 12.1.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

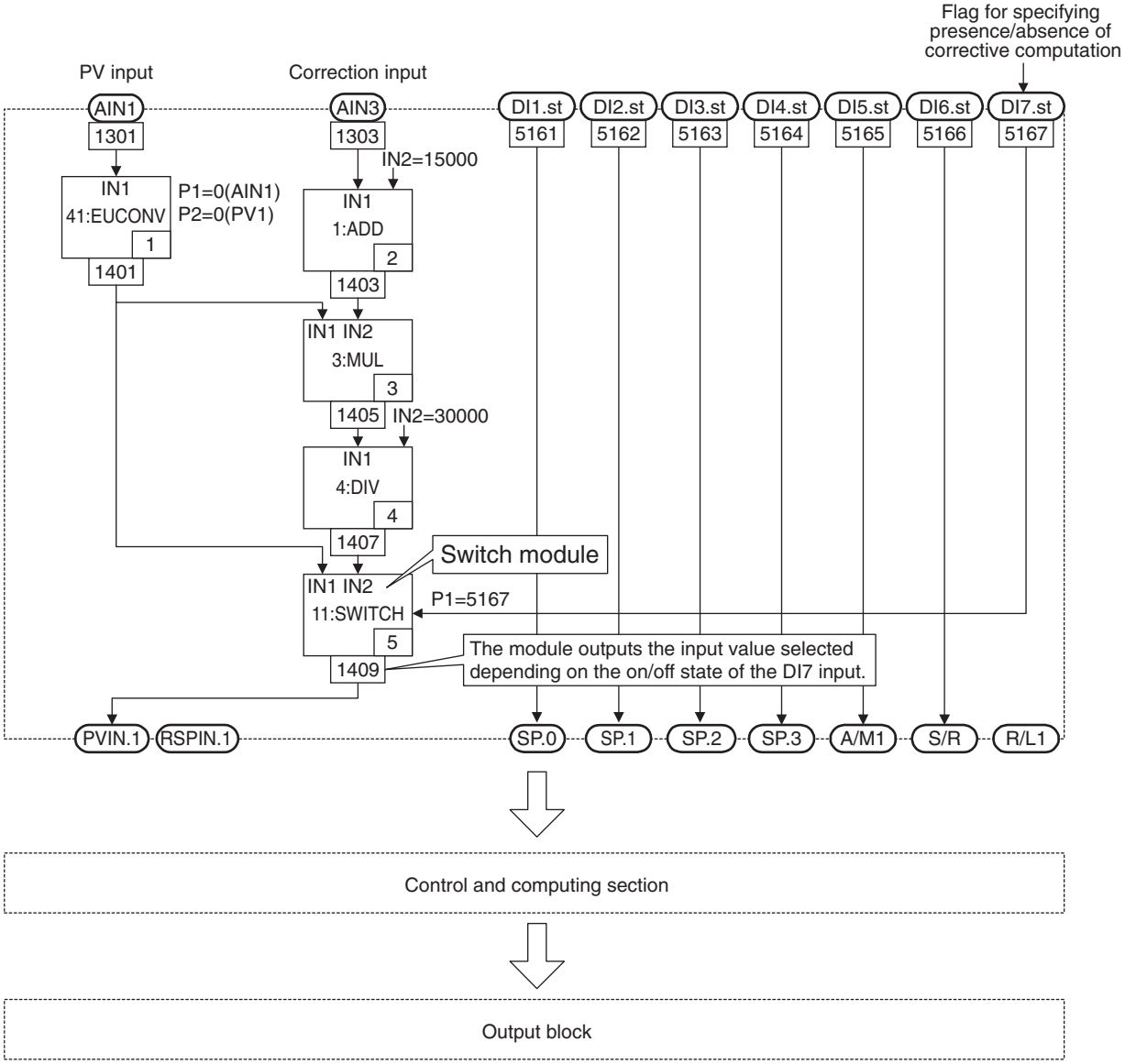



**Figure 12.3.1 Connection of Customized Computation Modules for Specifying the Presence/Absence of Corrective Computation (Diagram of Input Block)**

# ■ Procedure for Configuring Custom Computations

Cancel the connection of contact input 7. To cancel, see subsection 6.1.5, “Changing the Way Computation Modules Are Connected.”

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III” here, in this order.

## ● Operation I: Module Configuration

(1) Configure custom computations as per Section 12.1, “Example 1: Applying Corrective Computation to the PV Input.”

(2) In the [Input Block] dialog box (Figure 12.1.15), double-click a blank box. The [Module Configuration] dialog box (Figure 12.3.2) appears.

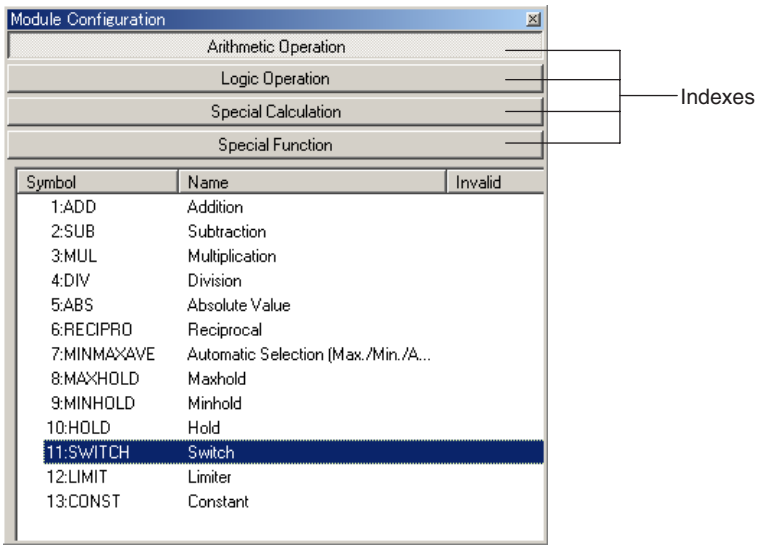



**Figure 12.3.2 [Module Configuration] Dialog Box**

(3) Click the <Arithmetic Operation> index.

(4) Double-click <11: SWITCH>. The SWITCH module is registered with the [Input Block] dialog box, as shown in Figure 12.3.3.

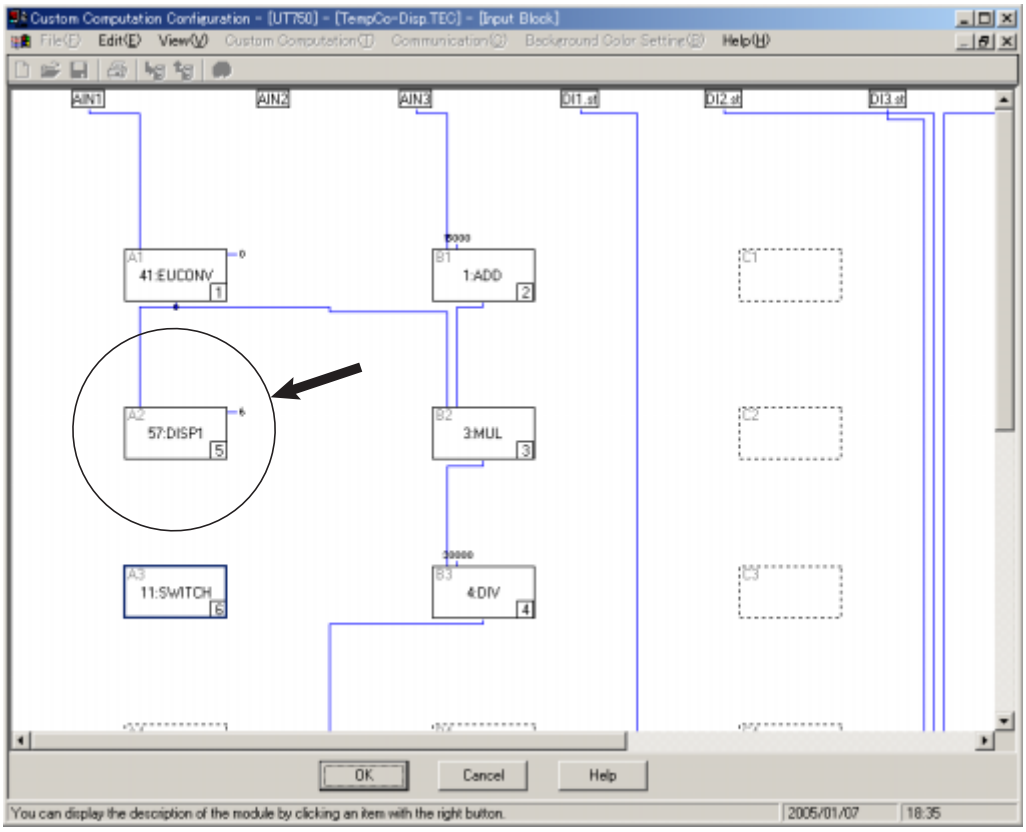



**Figure 12.3.3 Example of the [Input Block] Dialog Box where the SWITCH Module Is Registered As the Fifth-run Module**

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

## ● Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

(1) Click the registered fifth-run SWITCH module.

(2) From the tool menus, choose <Editing>, then <Connection>. The [Module Setting] dialog box (Figure 12.3.4) appears.

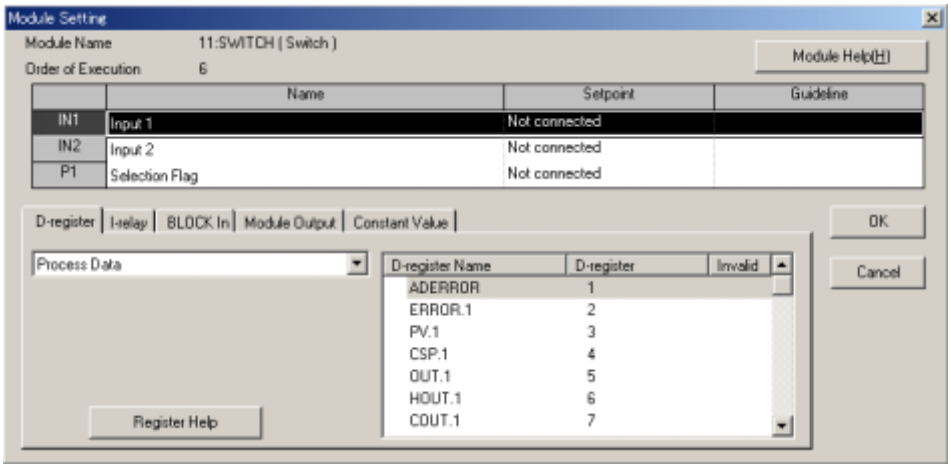



**Figure 12.3.4 [Module Setting] Dialog Box**

(3) The <IN1> module input is waiting for the data setting.

(4) Click the <Module Output> index.

(5) Click the [Input Block] option button in the group box.

(6) Double-click <IMO1L> in the list box. The <IMO1L (Setpoint column)> and <D1401 (Guideline column)> options appear in the <IN1> row.

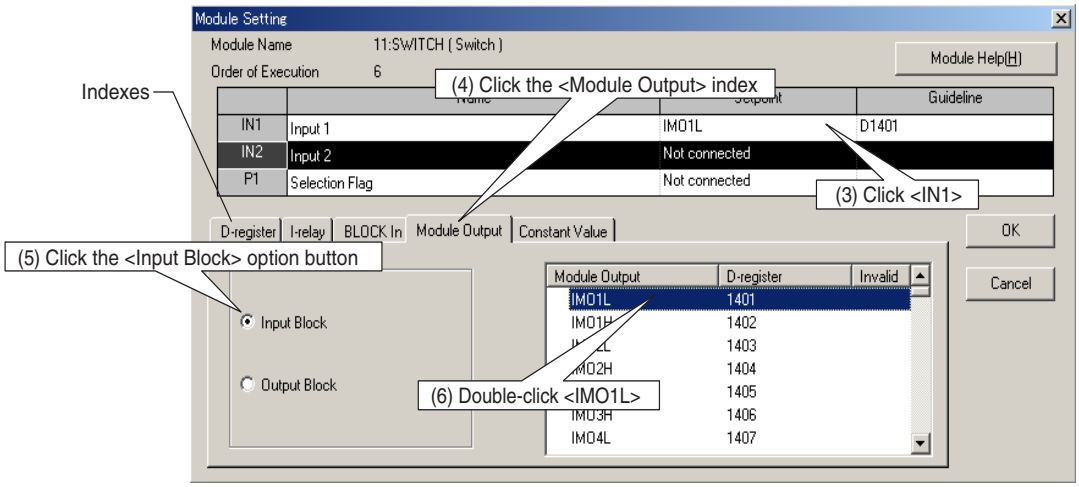



**Figure 12.3.5 Configuration of the <IN1> Input**

(7) The <IN2> module input is waiting for the data setting.

(8) Click the <Module Output> index.

(9) Click the <Input Block> option button in the group box.

(10) Double-click <IMO4L> in the list box. The <IMO4L (Setpoint column)> and <D1407 (Guideline column)> options appear in the <IN2> row.

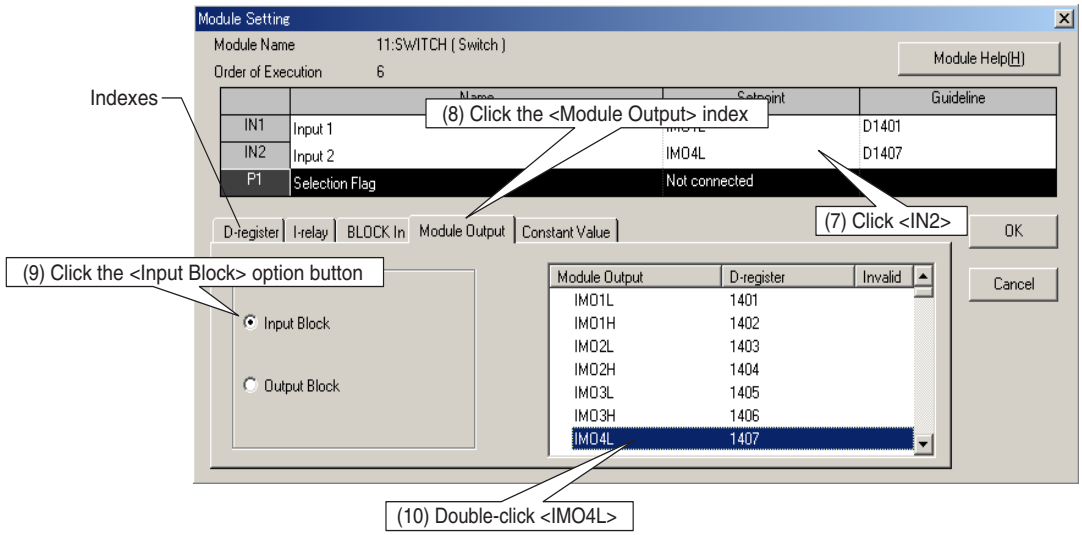



**Figure 12.3.6 Configuration of the <IN2> Input**

(11) The <P1> module parameter is waiting for the data setting.

(12) Click the <BLOCK In> index.

(13) Double-click <DI7.st> in the drop-down list box. The <DI7.st (Setpoint column)> and <I5167 (Guideline column)> options appear in the <P1> row.

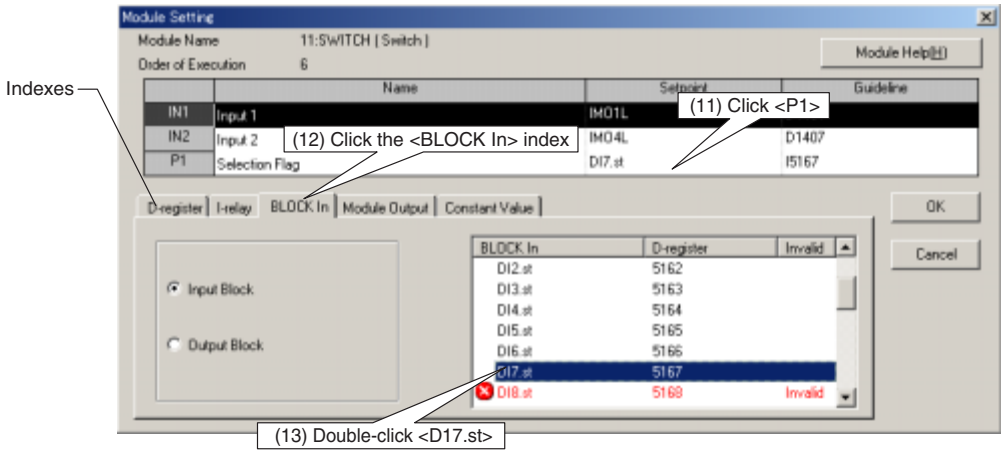



**Figure 12.3.7 Configuration of the <P1> Parameter**

(14) Click the [OK] button.

When you finish configuring the inputs and parameters of computation modules, proceed to "Operation III: Connection to the Control and Computing Section."

## ● Operation III: Connection to the Control and Computing Section

This operation involves defining the settings needed to pass the results of computation in the input block to the control and computing section.

(1) In the [Input Block] dialog box (Figure 12.3.8), click the <PVIN.1> output signal.

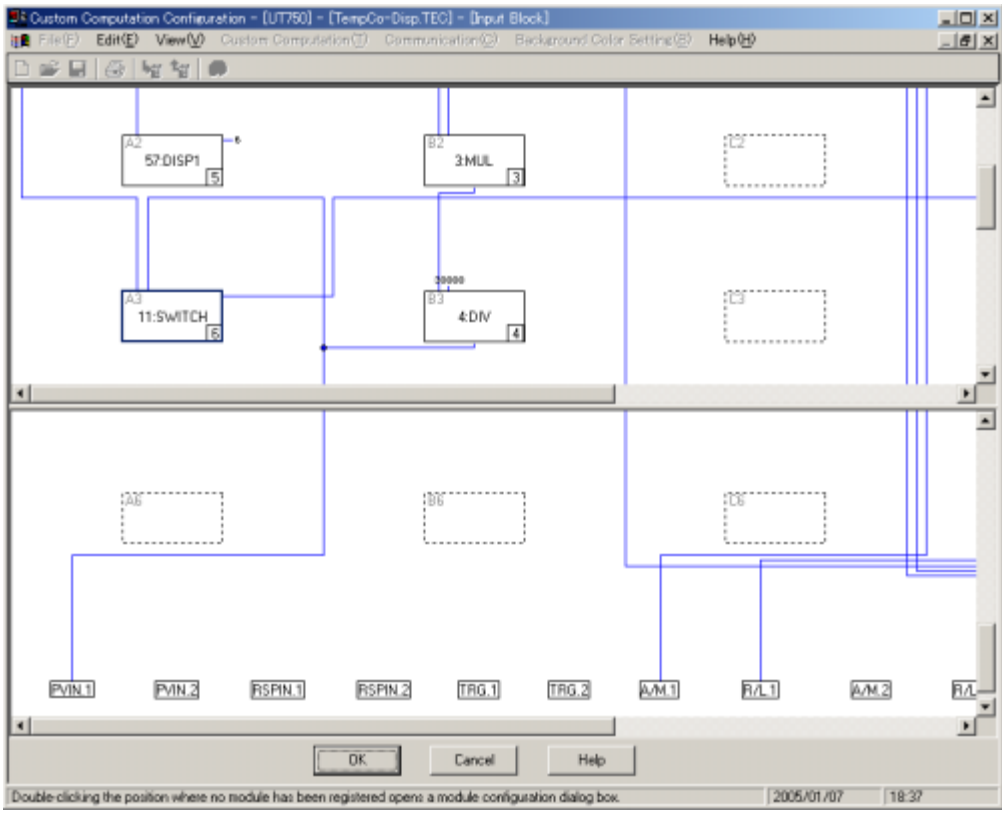



**Figure 12.3.8 Output Signal Fed by Input Block**

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Setting of Input Block Connection Assignment] dialog box (Figure 12.3.9) appears.

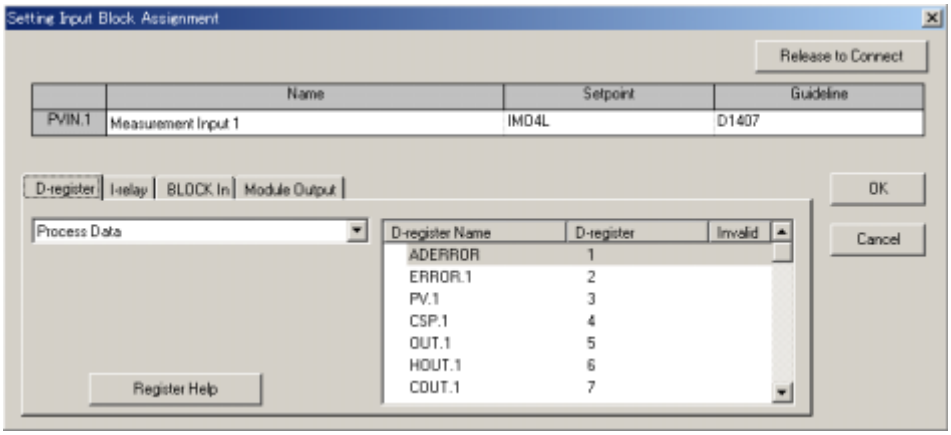



**Figure 12.3.9 [Setting Input Block Assignment] Dialog Box**

(3) Click the <Module Output> index.

(4) Double-click <IMO5L> in the list box. The <IMO5L (Setpoint column)> and <D1409 (Guideline column)> options appear in the <PVIN.1> row.

(5) Click the <OK> button.

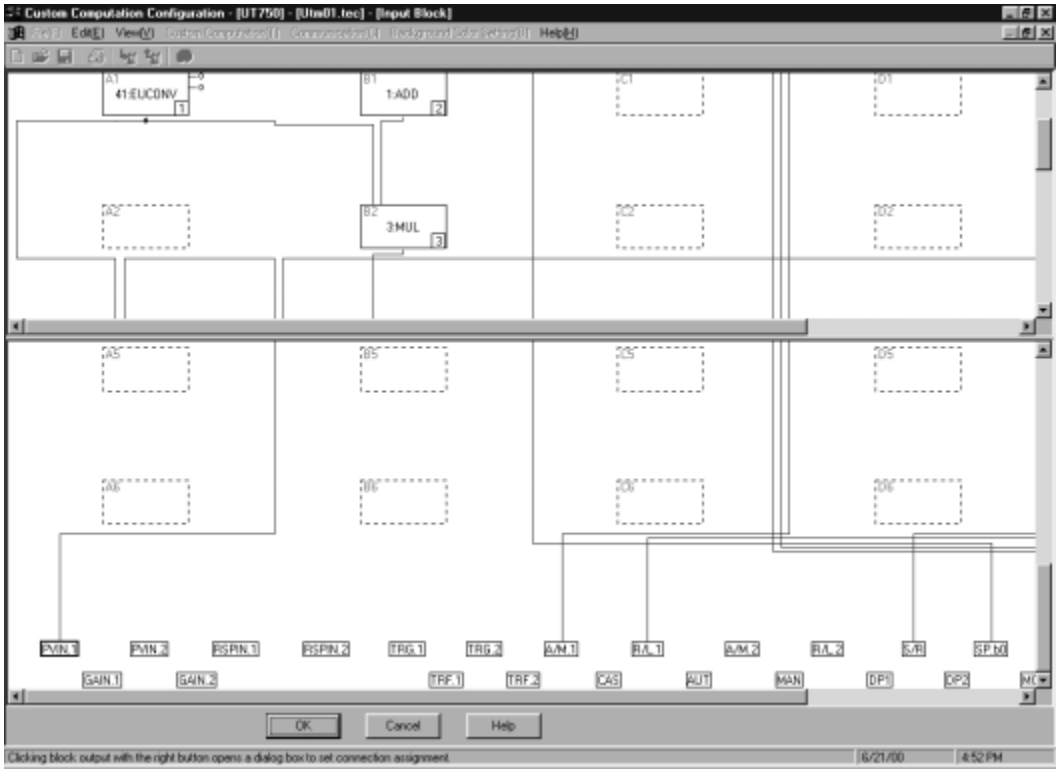



**Figure 12.3.10 Example of [Input Block] Dialog Box (finished view) Where a Process for Specifying the Presence/Absence of Corrective Computation Is Added**

You have now finished this example of configuring custom computations for correcting the PV input and adding a process for specifying the presence/absence of corrective computation.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

# 12.4 Example 4: Applying Temperature-based Flowrate Corrections to the PV Input

This section introduces an example where the flowrate is corrected according to temperature levels. You can correct the flowrate by the ratio of the current temperature to the reference temperature.

## ■ Connection of Customized Computation Modules for Making Temperature-based Flowrate Corrections

This paragraph introduces an example of flowrate correction where the minimum and maximum temperature range are set to 0.0°C and 100.0°C, respectively, and the span of the temperature range is set to 273.0°C.

In this example, the reference temperature is assumed to be 40.0°C.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

The equation applied is

$$\text{PV input value (PV1)} = \text{analog input 3 (AIN3)} \times \frac{\text{analog input 1 (AIN1)} + \text{span of temperature range}}{\text{reference temperature} + \text{span of temperature range}}$$

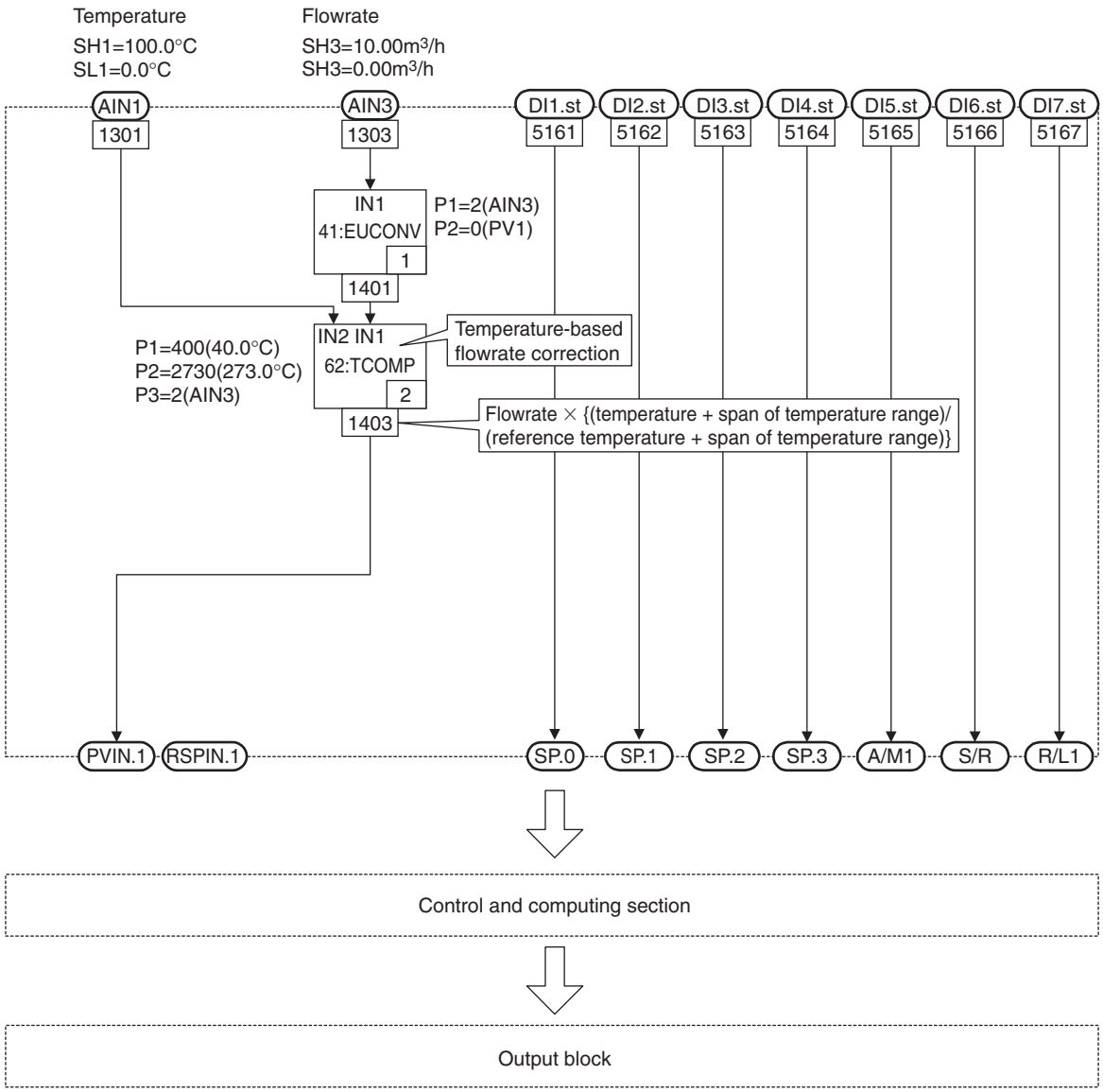



**Figure 12.4.1 Connection of Customized Computation Modules for Making Temperature-based Flowrate Corrections (Diagram of Input Block)**

# ■ Procedure for Configuring Custom Computations

Before you begin configuring custom computations, read the sample file for single-loop control (file name: Utm01.tec). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

Next, delete all of the computation modules that exist in the input block, leaving the contact inputs wired as they are. For details on how to delete the computation modules, see subsection 6.1.2, “Deleting Computation Modules.”

If you carry out the configurations discussed in this section, you will no longer be able to use the functions of cascade and feedforward inputs available in single-loop control.

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

## ● Operation I: Module Configuration

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.4.2) appears.

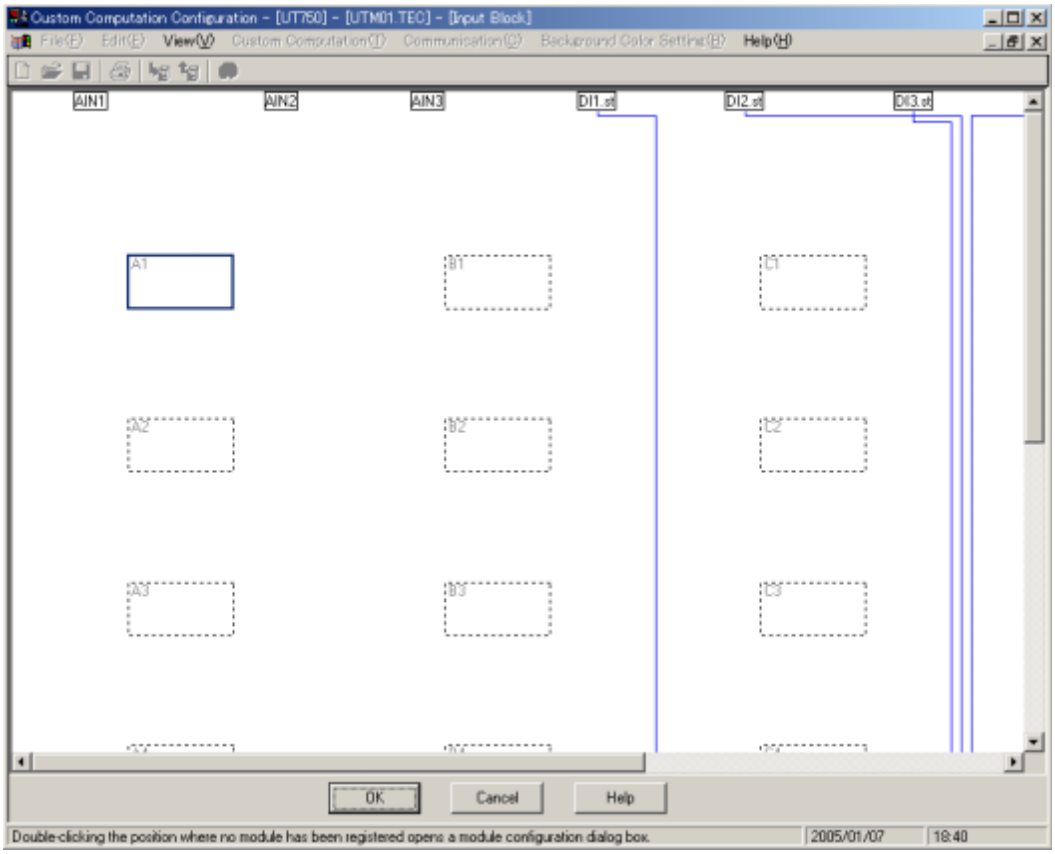



**Figure 12.4.2 [Input Block] Dialog Box**

(2) In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.4.3) appears.

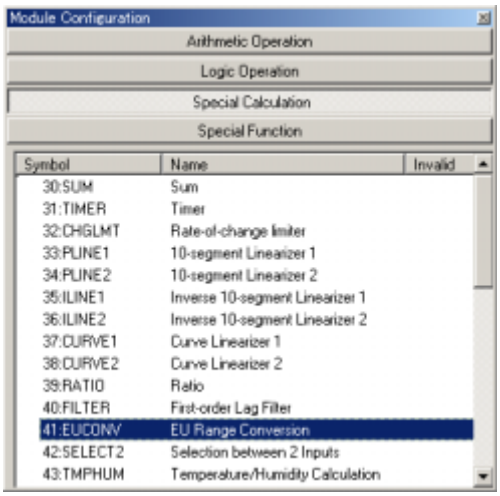



**Figure 12.4.3 [Module Configuration] Dialog Box**

(3) Click the <Special Calculation> index.

(4) Double-click <41: EUCONV>. The EUCONV module is registered with the [Input Block] dialog box, as shown in Figure 12.4.4.

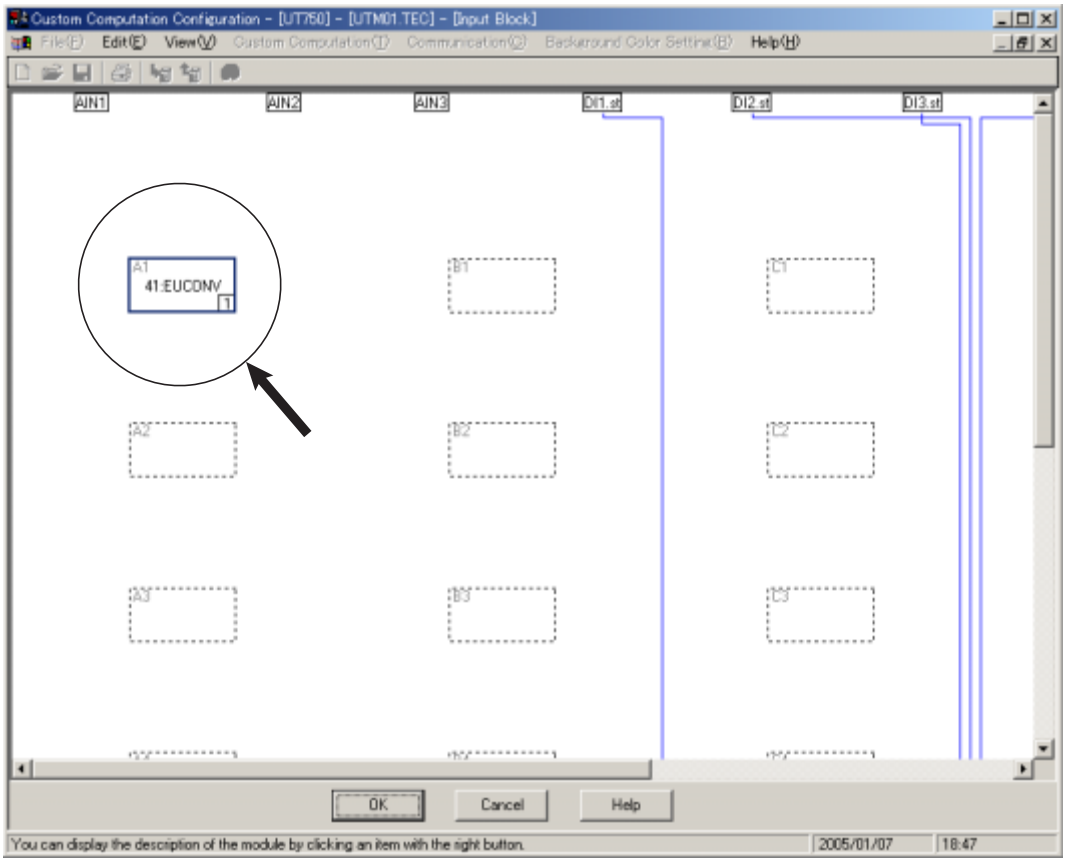



**Figure 12.4.4 Example of the [Input Block] Dialog Box where the EUCONV Module Is Registered As the First-run Module**

(5) To register the Fluid Temperature Compensation (TCOMP) module also, repeat steps (2) to (4).

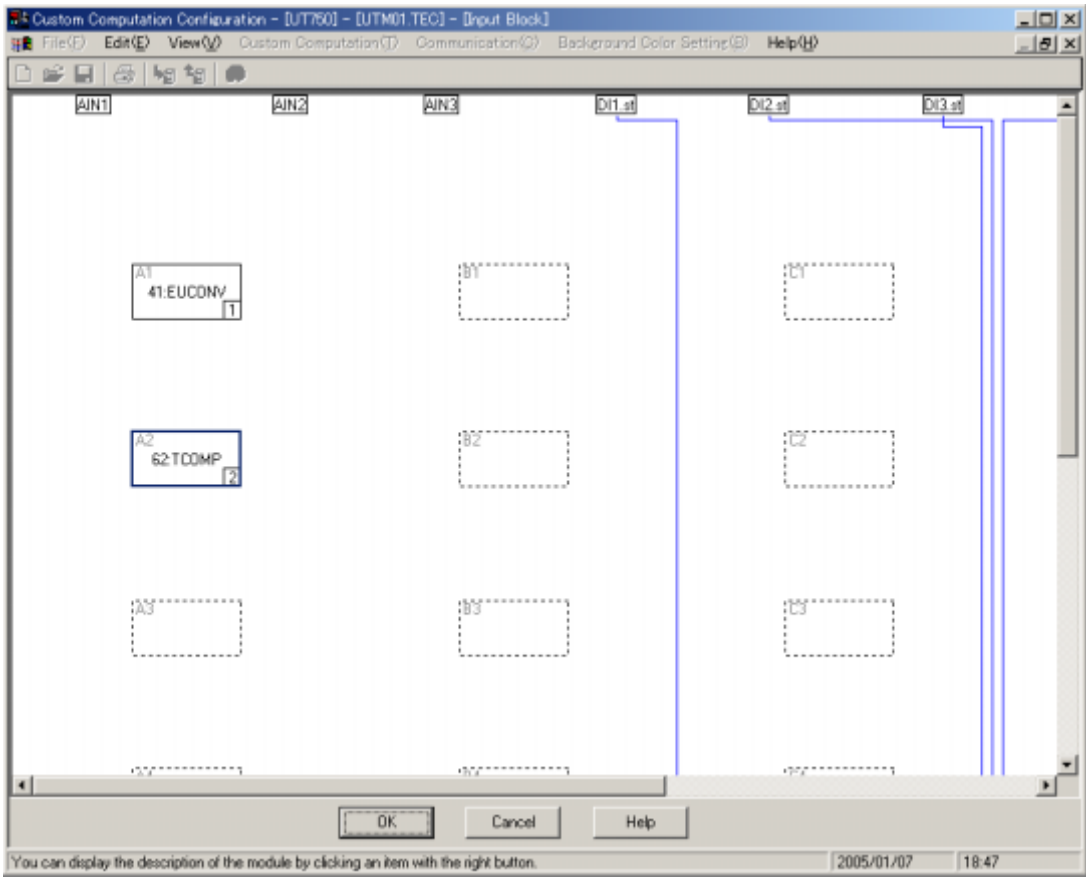



**Figure 12.4.5 Example of the [Input Block] Dialog Box where the EUCONV and TCOMP Modules Are Registered**

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

## ● Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

(1) Click the registered first-run EUCONV module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Module Setting] dialog box (Figure 12.4.6) appears.

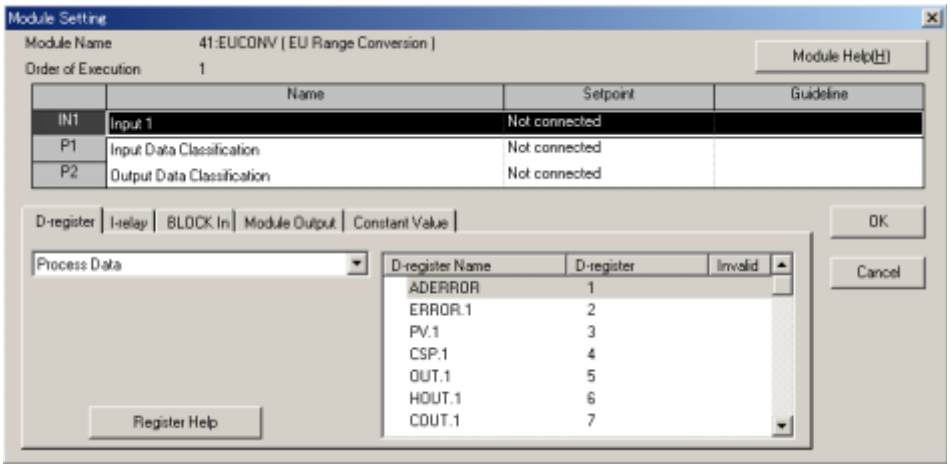



**Figure 12.4.6 [Module Setting] Dialog Box**

(3) The <IN1> module input is waiting for the data setting.

(4) Click the <BLOCK In> index.

(5) Double-click <AIN3> in the list box. The <AIN3 (Setpoint column)> and <D1303 (Guideline column)> options appear in the <IN1> row.

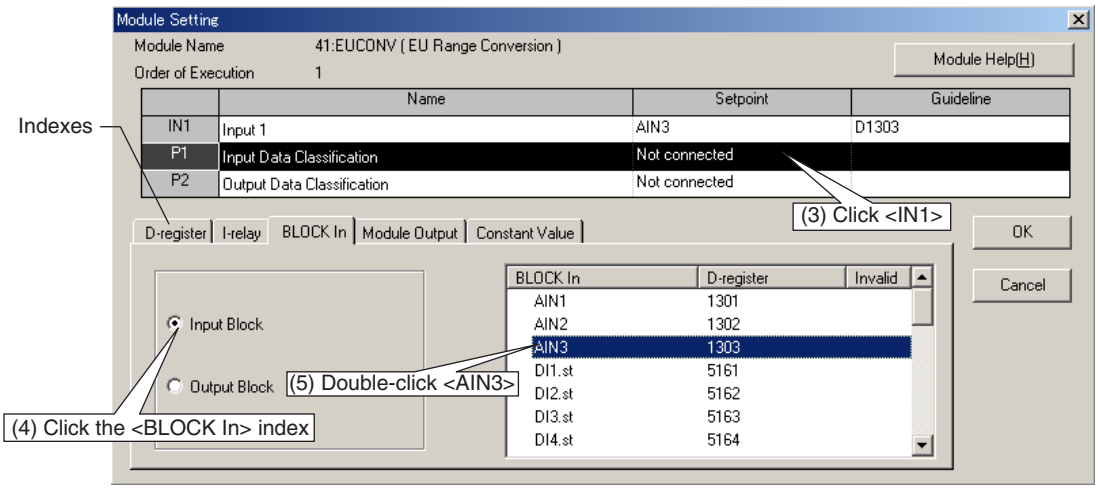



**Figure 12.4.7 Configuration of the <IN1> Input**

(6) The <P1> module parameter is waiting for the data setting.

(7) Click the <Constant Value> index.

(8) Type “2” in the text box and press the <Enter> key.

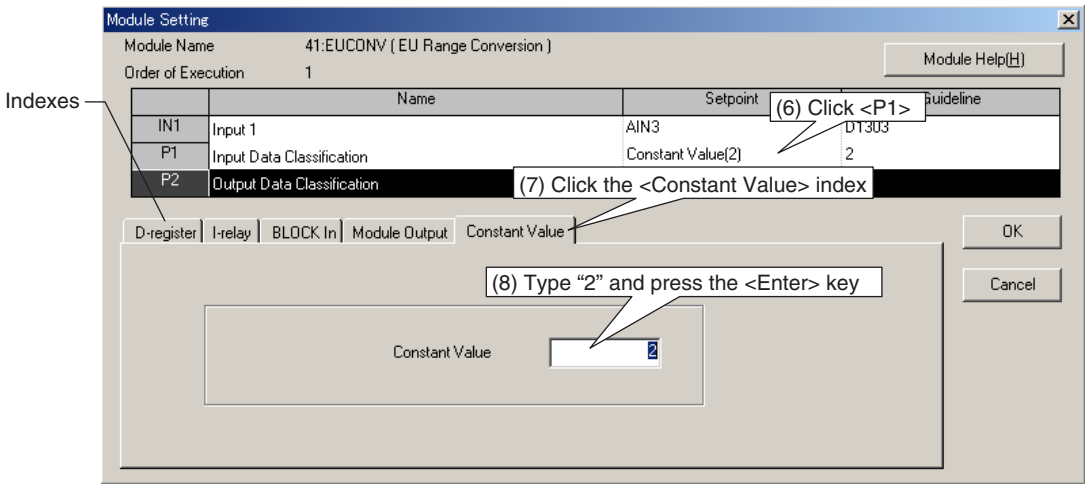



**Figure 12.4.8 Configuration of the <P1> Parameter**

(9) The <P2> module parameter is waiting for the data setting.

(10) Click the <Constant Value> index.

(11) Type “0” in the text box and press the <Enter> key.

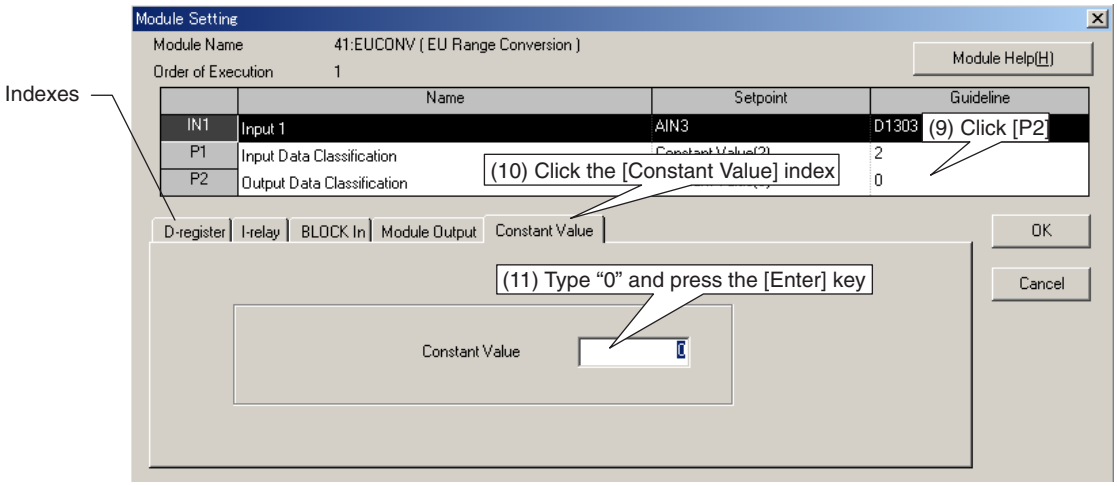



**Figure 12.4.9 Configuration of the <P2> Parameter**

(12) Click the [OK] button.

Repeat steps (1) to (12) to configure the other inputs and parameters of the TCOMP module

The setpoints of the inputs and parameters for which connection is made, are as follows.

| | | |
|---|---|---|
| Inputs | IN1 | Index: [Module Output]<br>Group box: [Input Block]<br>Selection: [IMO1L (1401)] |
| | IN2 | Index: [BLOCK In]<br>Selection: [AIN1] |
| Parameters | P1 | Index: [Constant Value]<br>Setpoint: [400] |
| | P2 | Index: [Constant Value]<br>Setpoint: [2730] |
| | P3 | Index: [2] |

When you finish configuring the computation modules' inputs and parameters, proceed to "Operation III: Connection to the Control and Computing Section."

## ● Operation III: Connection to the Control and Computing Section

This operation involves defining the settings needed to pass the results of computation in the input block to the control and computing section.

(1) In the [Input Block] dialog box (Figure 12.4.10), click the <PVIN.1> output signal.

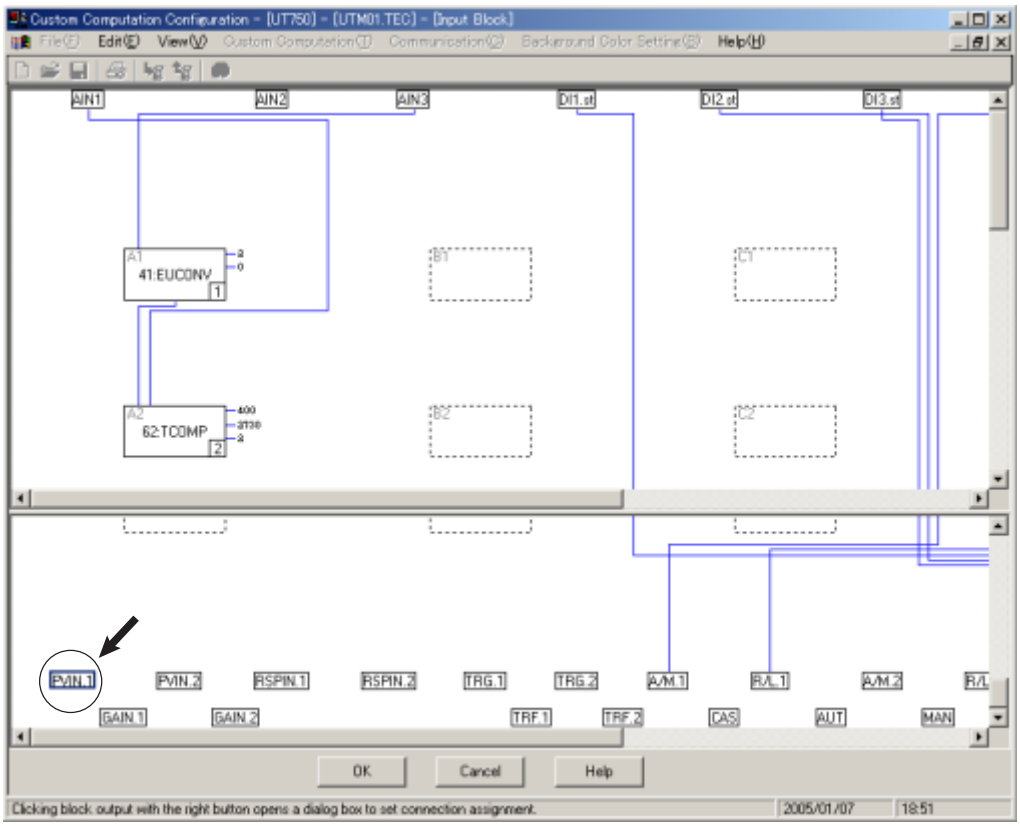



**Figure 12.4.10 Output Signal Fed by Input Block**

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Setting Input Block Assignment] dialog box (Figure 12.4.11) appears.

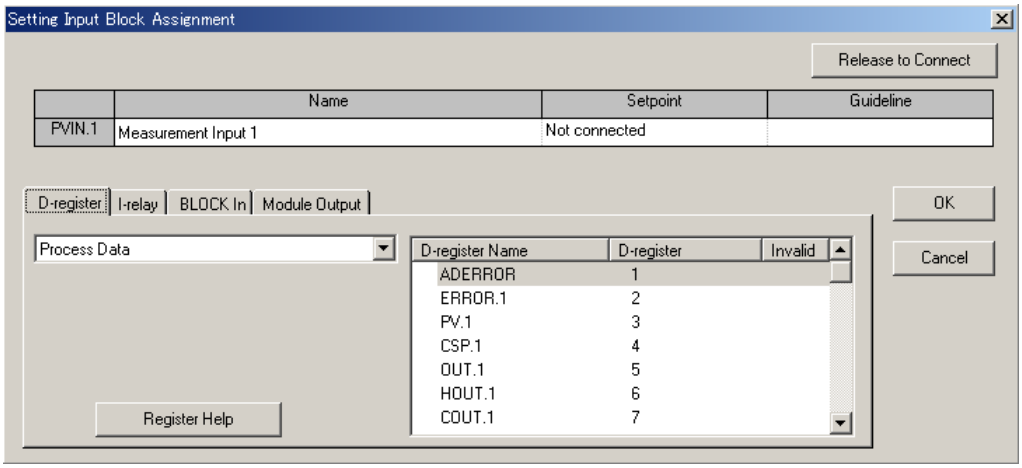



**Figure 12.4.11 [Setting Input Block Assignment] Dialog Box**

(3) Click the <Module Output> index.

(4) Click the <Input Block> option button in the group box.

(5) Double-click <IMO2L> in the list box. The <IMO2L (Setpoint column)> and <D1403 (Guideline column)> options appear in the <PVIN.1> row.

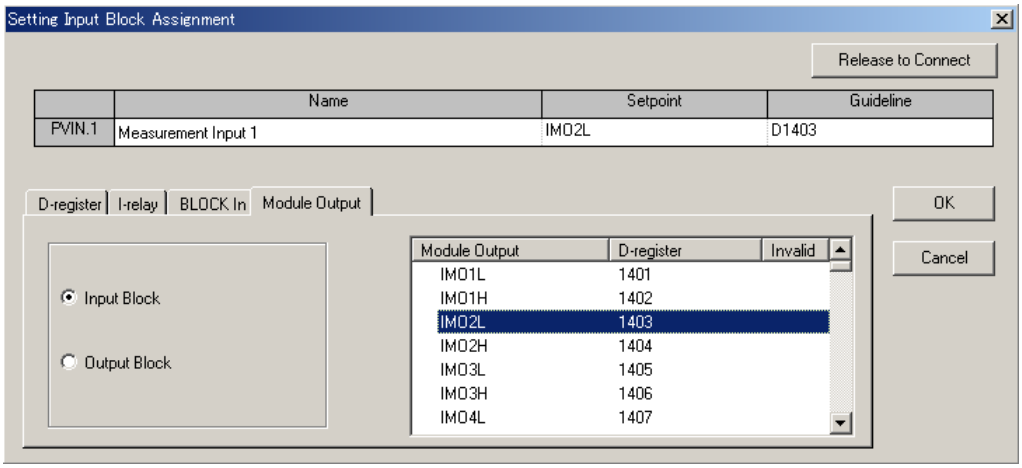



**Figure 12.4.12 Configuration of the <IMO2L> Output**

(6) Click the <OK> button.

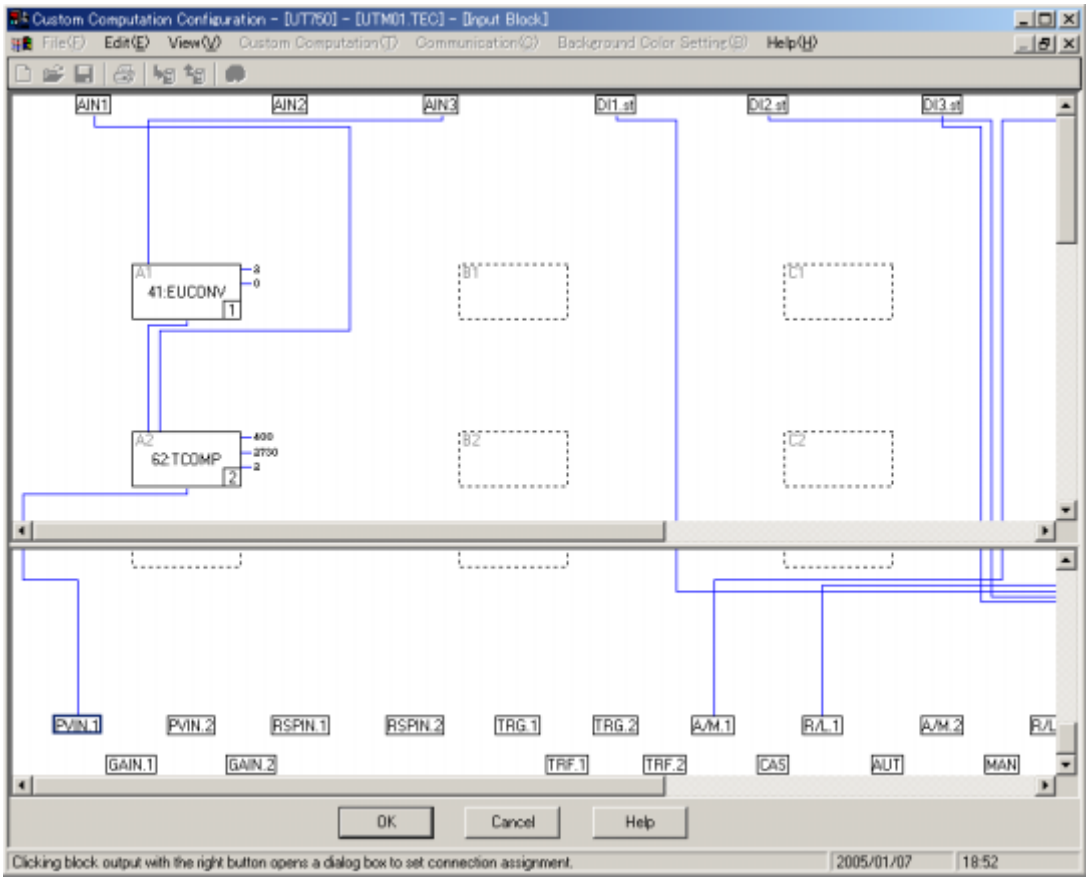



**Figure 12.4.13 [Input Block] Dialog Box (finished view) as an Example of Making Temperature-based Flowrate Corrections**

You have now finished this example of configuring custom computations for making temperature-based flowrate corrections.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

# 12.5 Example 5: Configuring Timers

## 12.5.1 Configuring a Four-second Timer

### ■ Connection of Customized Computation Modules for Configuring a Four-second Timer

In this example, you add a timer to the input block for single-loop control. Since the timer does not automatically initialize itself, the timer output latches to the “on” state four seconds after the start of the timer. The timer I/Os are assigned as:

DI6: enable flag; DI7: initialization flag; DO3: timer output.

The procedure for configuring this block diagram is explained in the paragraph, “ ■ Procedure for Configuring Custom Computations,” that follows.

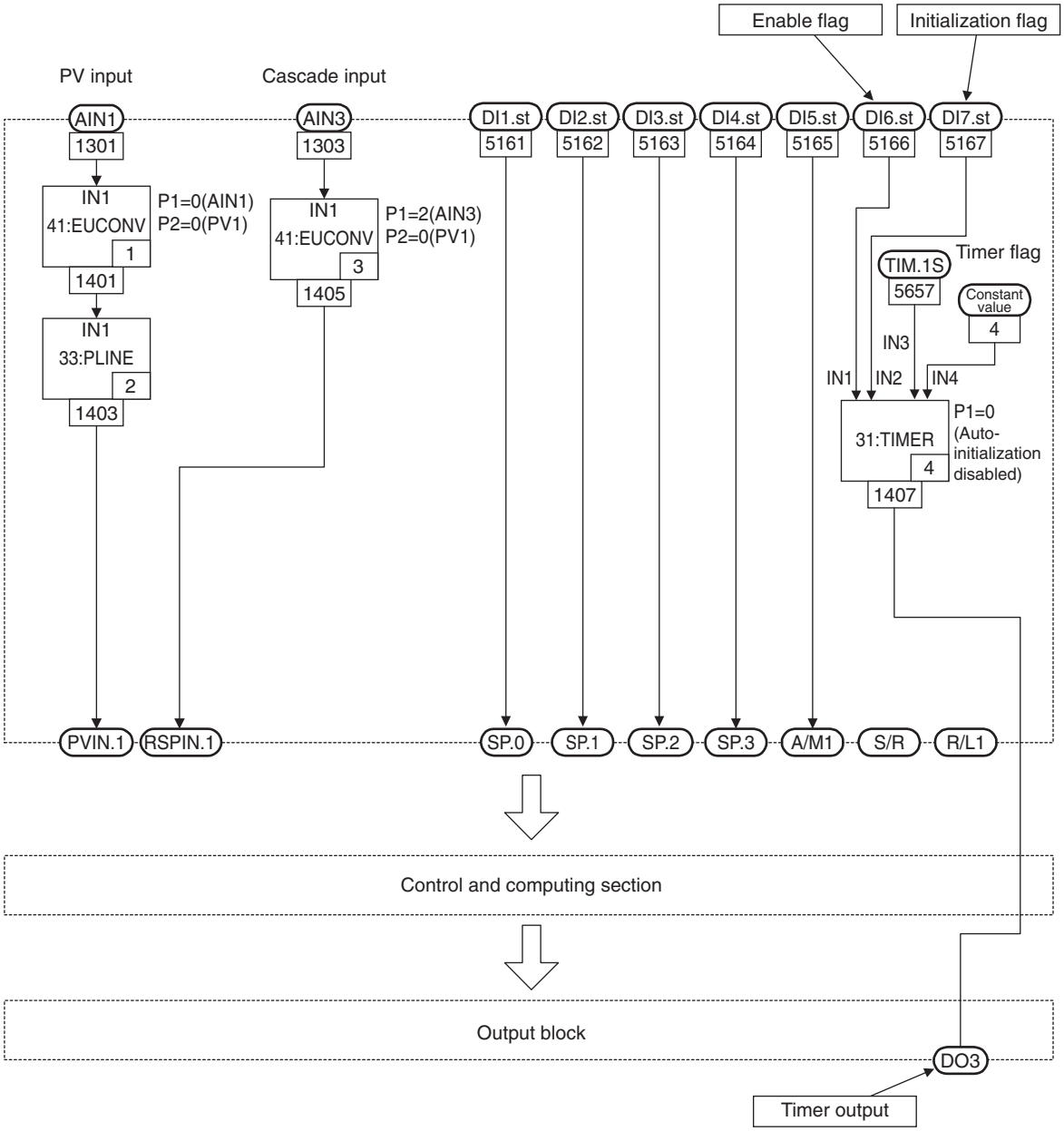



**Figure 12.5.1 Connection of Customized Computation Modules for Configuring a Four-second Timer (example for a control period of 200 ms)**

Figure 12.5.2 is the timing chart of a four-second timer where the control period is 200 ms and the clock pulse duration is one second. In the example shown, a maximum error of no more than one second will occur since the timer value is decremented at either the rising or falling edge of each clock pulse.

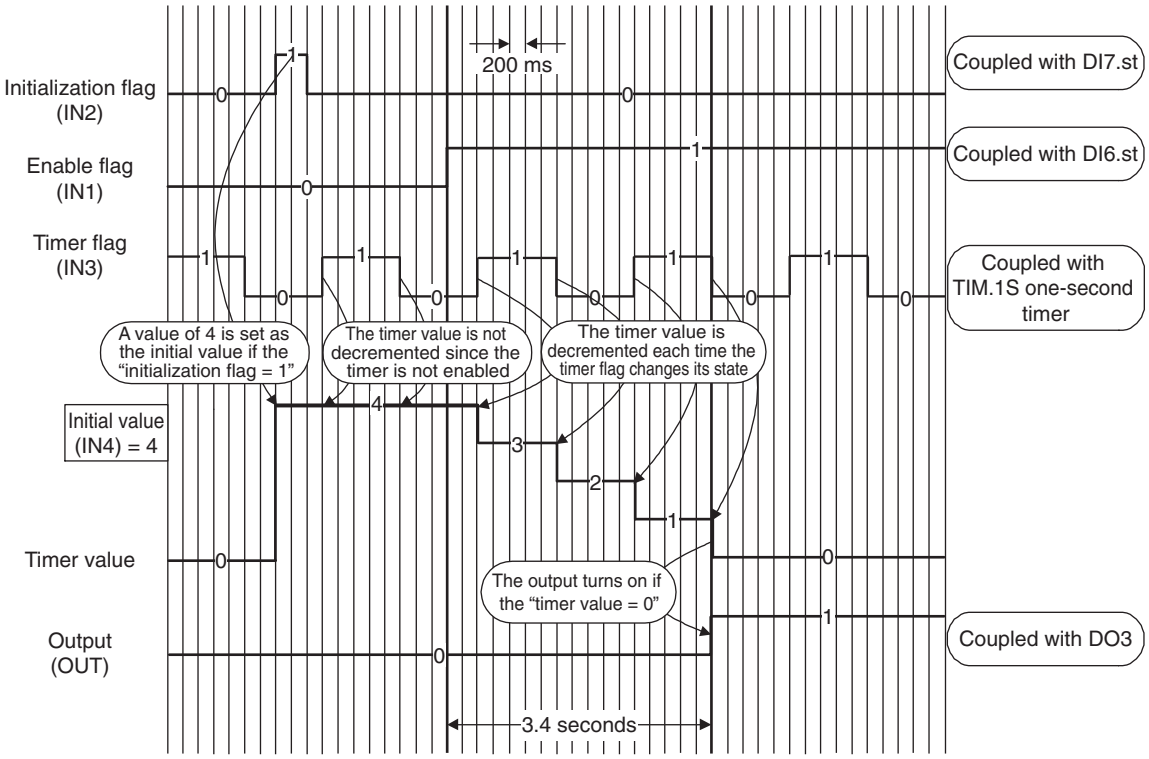



**Figure 12.5.2 Timing Chart of a Four-second Timer (example for a control period of 200 ms)**

## ■ Procedure for Configuring Custom Computations

Before you begin configuring custom computations, read the sample file for single-loop control (file name: Utm01.tec). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

Next, cancel the wiring to contact inputs 6 and 7. For details on how to cancel the wiring, see subsection 6.1.5, “Changing the Way Computation Modules Are Connected.”

To configure the custom computations, follow the instructions in “Operation I,” “Operation II” and “Operation III,” in this order.

### ● Operation I: Module Configuration

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.5.3) appears.

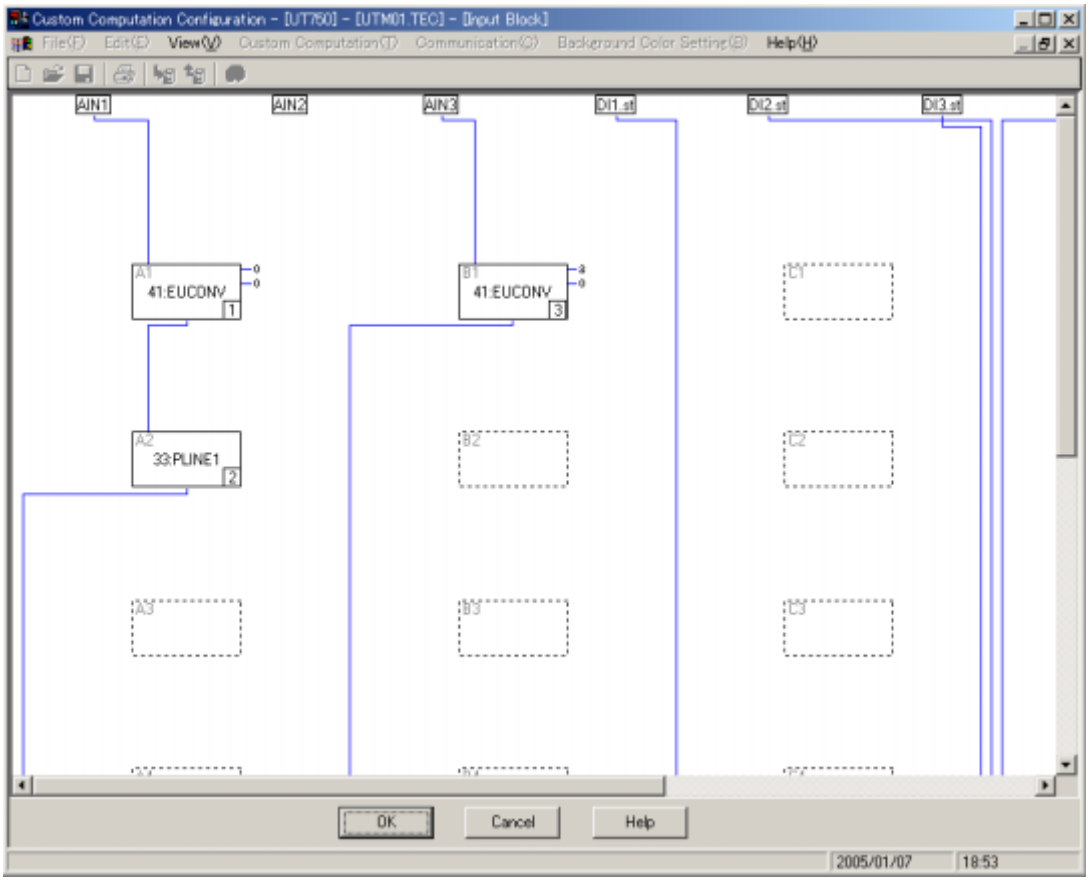



**Figure 12.5.3 [Input Block] Dialog Box**

(2) In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.5.4) appears.

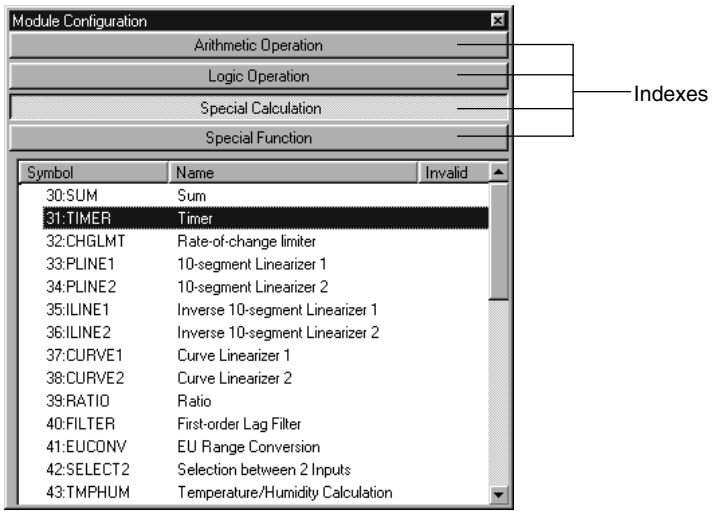



**Figure 12.5.4 [Module Configuration] Dialog Box**

(3) Click the <Special Calculation> index.

(4) Double-click <31: TIMER>. The TIMER module is registered with the [Input Block] dialog box, as shown in Figure 12.5.5.

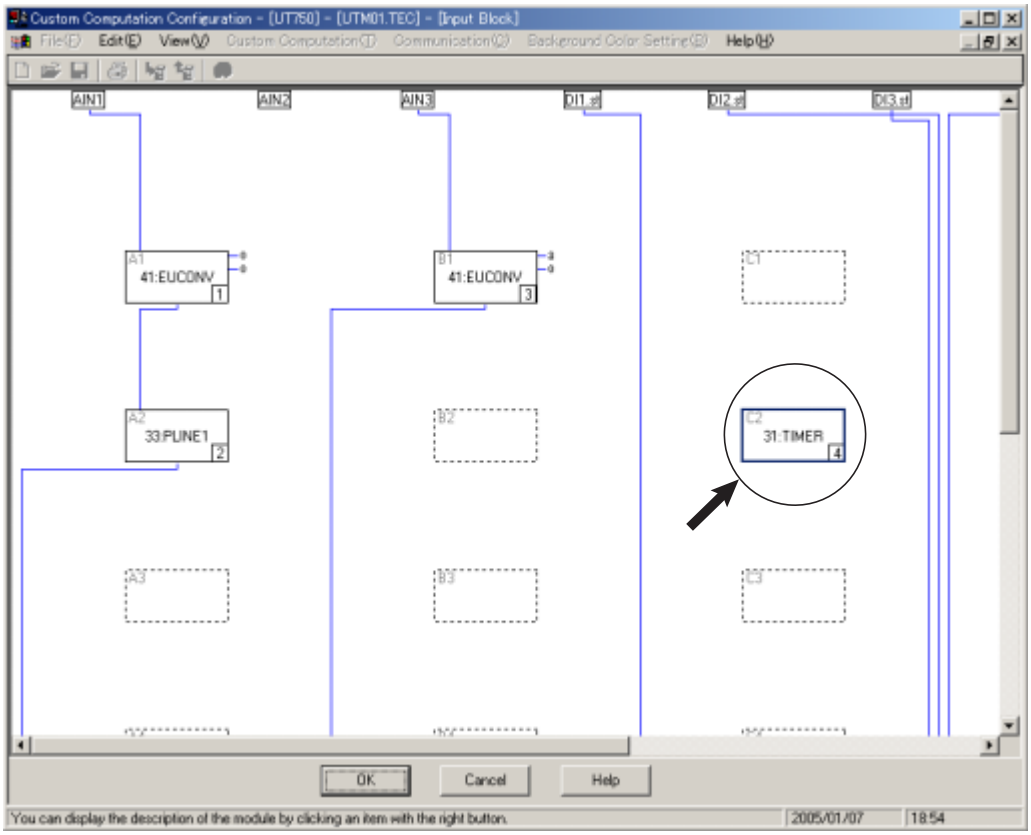



**Figure 12.5.5 Example of the [Input Block] Dialog Box where the TIMER Module Is Registered As the Fourth-run Module**

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

## ● Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

(1) Click the registered fourth-run TIMER module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Module Setting] dialog box (Figure 12.5.6) appears.

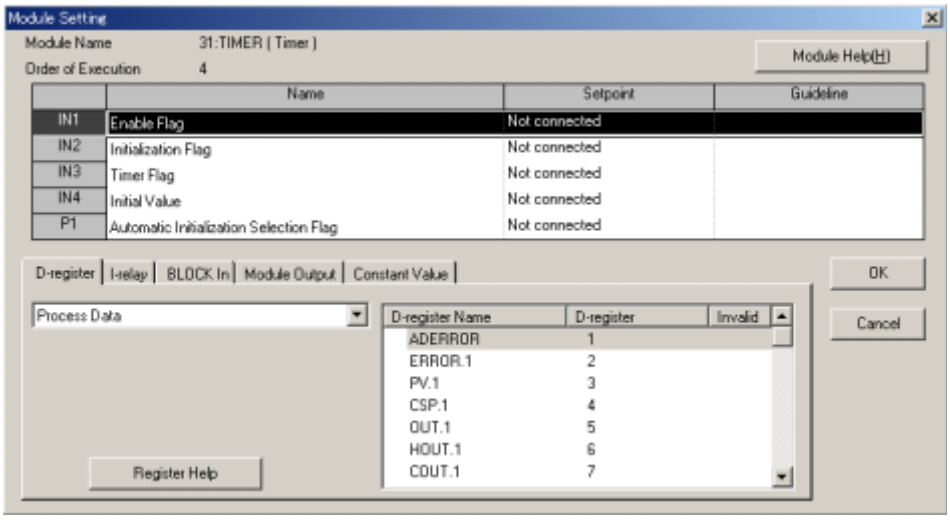



**Figure 12.5.6 [Module Setting] Dialog Box**

(3) The <IN1> module input is waiting for the data setting.

(4) Click the <BLOCK In> index.

(5) Double-click <DI6.st> in the list box. The <DI6.st (Setpoint column)> and <I5166 (Guideline column)> options appear in the <IN1> row. (Figure 12.5.7)

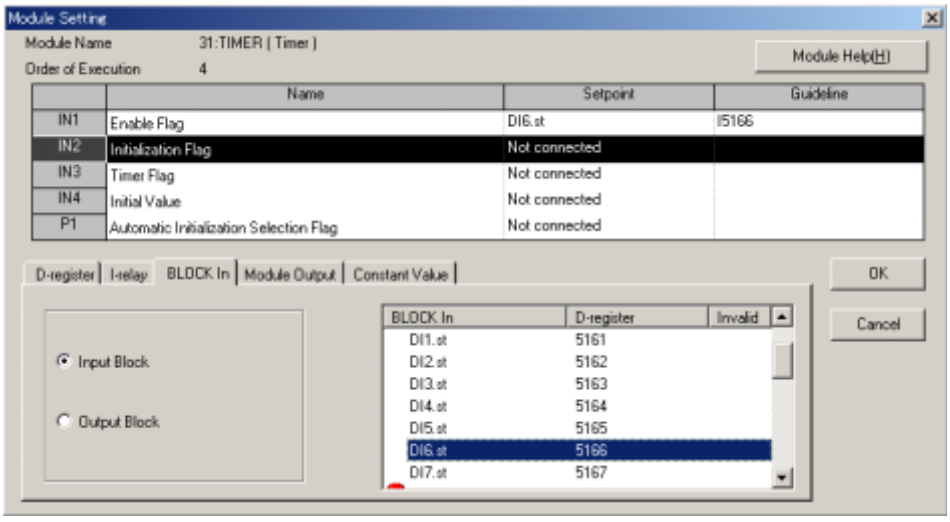



**Figure 12.5.7 Configuration of the <IN1> Input**

(6) The <IN2> module input is waiting for the data setting.

(7) Click the <BLOCK In> index.

(8) Double-click <DI7.st> in the list box. The < DI7.st (Setpoint column)> and <I5167 (Guideline column)> options appear in the <IN2> row. (Figure 12.5.8)

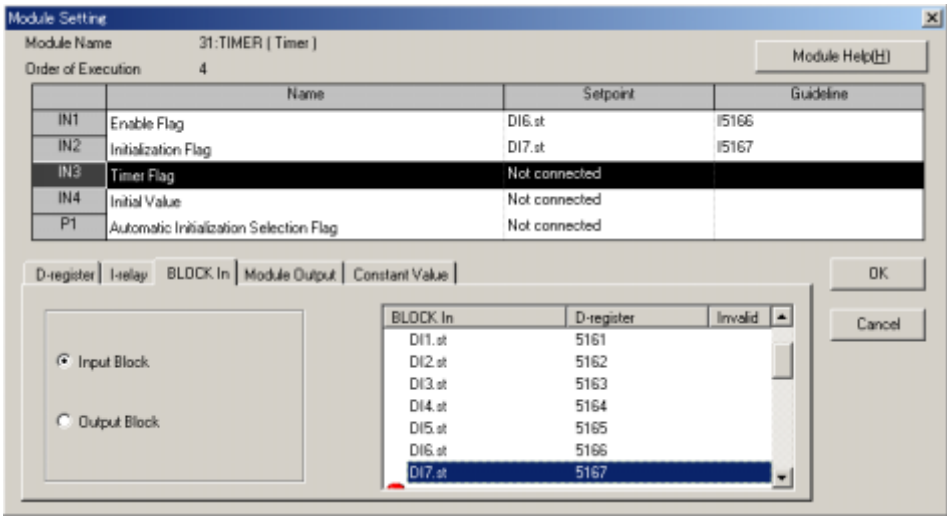



**Figure 12.5.8 Configuration of the <IN2> Input**

(9) The <IN3> module input is waiting for the data setting.

(10) Click the <I-relay> index.

(11) Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.

(12) Double-click <TIM.1S> in the list box. The <TIM.1S (Setpoint column)> and <I5657 (Guideline column)> options appear in the <IN3> row. (Figure 12.5.9)

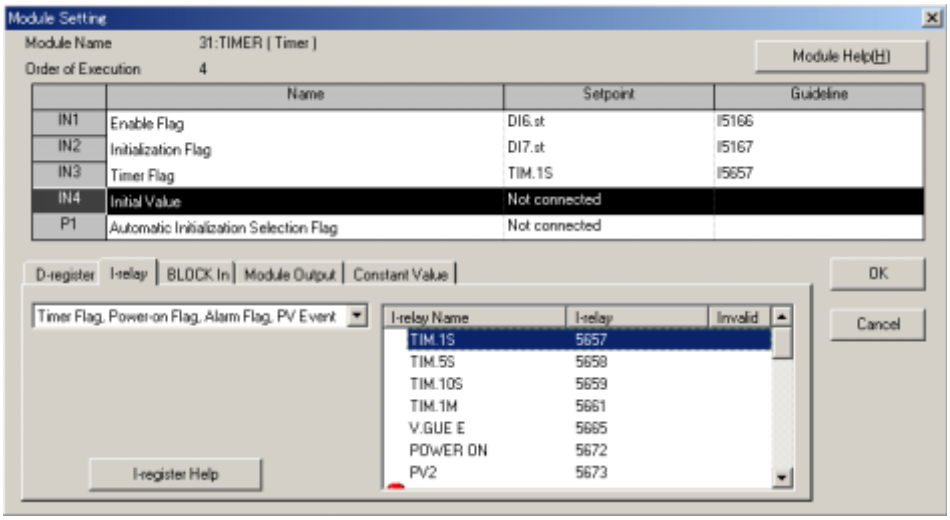



**Figure 12.5.9 Configuration of the <IN3> Input**

(13) The <IN4> module input is waiting for the data setting.

(14) Click the <Constant Value> index.

(15) Type “4” in the text box and press the <Enter> key. (Figure 12.5.10)

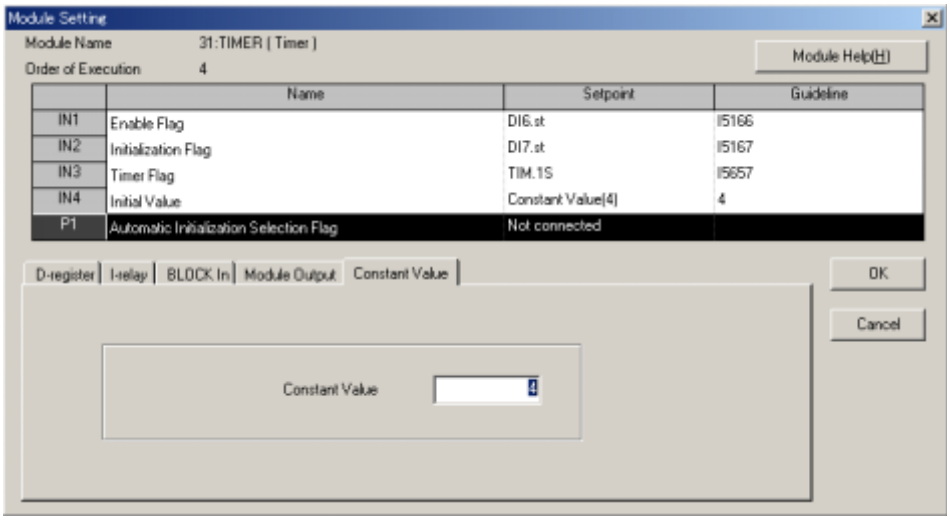



**Figure 12.5.10 Configuration of the <IN4> Input**

(16) The <P1> module parameter is waiting for the data setting.

(17) Click the <Constant Value> index.

(18) Type “0” in the text box and press the <Enter> key. (Figure 12.5.11)

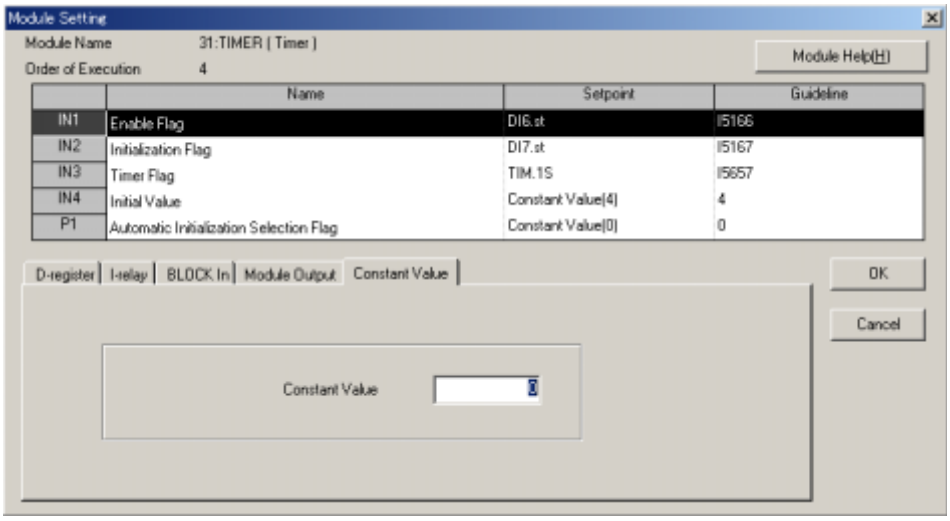



**Figure 12.5.11 Configuration of the <P1> Parameter**

(19) Click the <OK> button.

(20) In the [Input Block] dialog box, click the <OK> button.

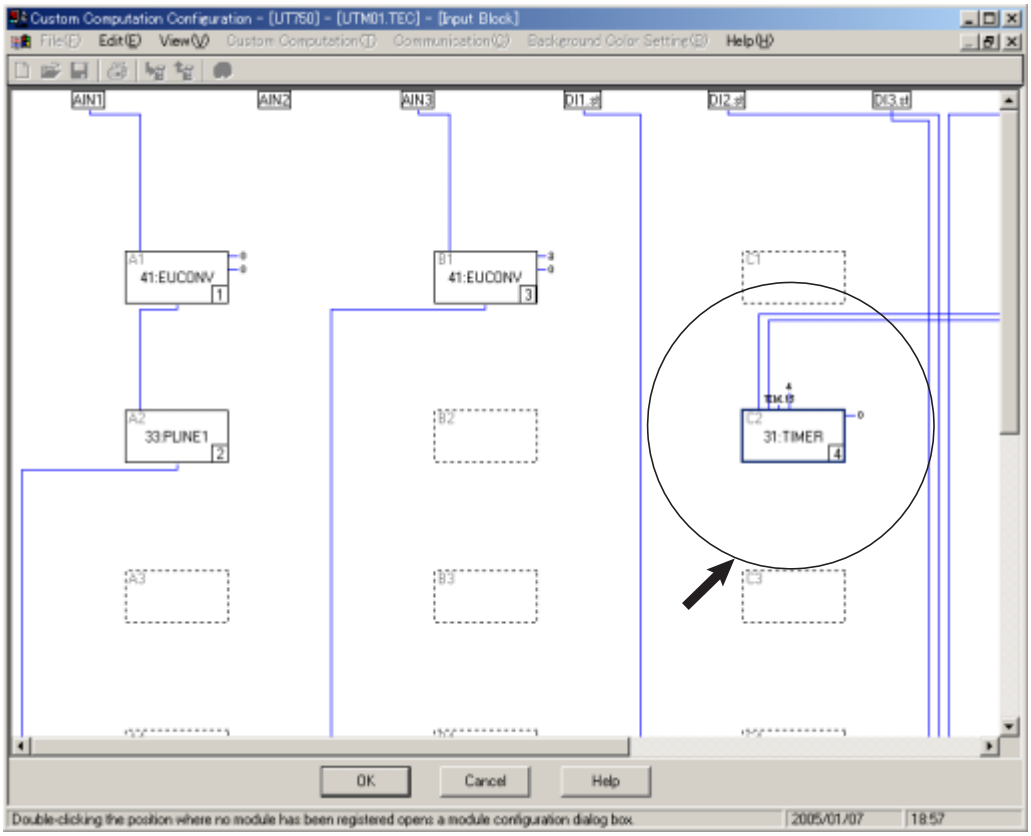



**Figure 12.5.12 Example of the [Input Block] Dialog Box (finished view) Where a Four-second Timer Is Implemented**

When you finish configuring the computation modules' inputs and parameters, proceed to "Operation III: Connection to the Output Signal."

## ● Operation III: Connection to the Output Signal

This operation involves configuring the TIMER module's output in the output block. In the output block, you can view the block diagram of single-loop control.

(1) In the [Output Block] dialog box (Figure 12.5.13), click the <DO3> output signal.

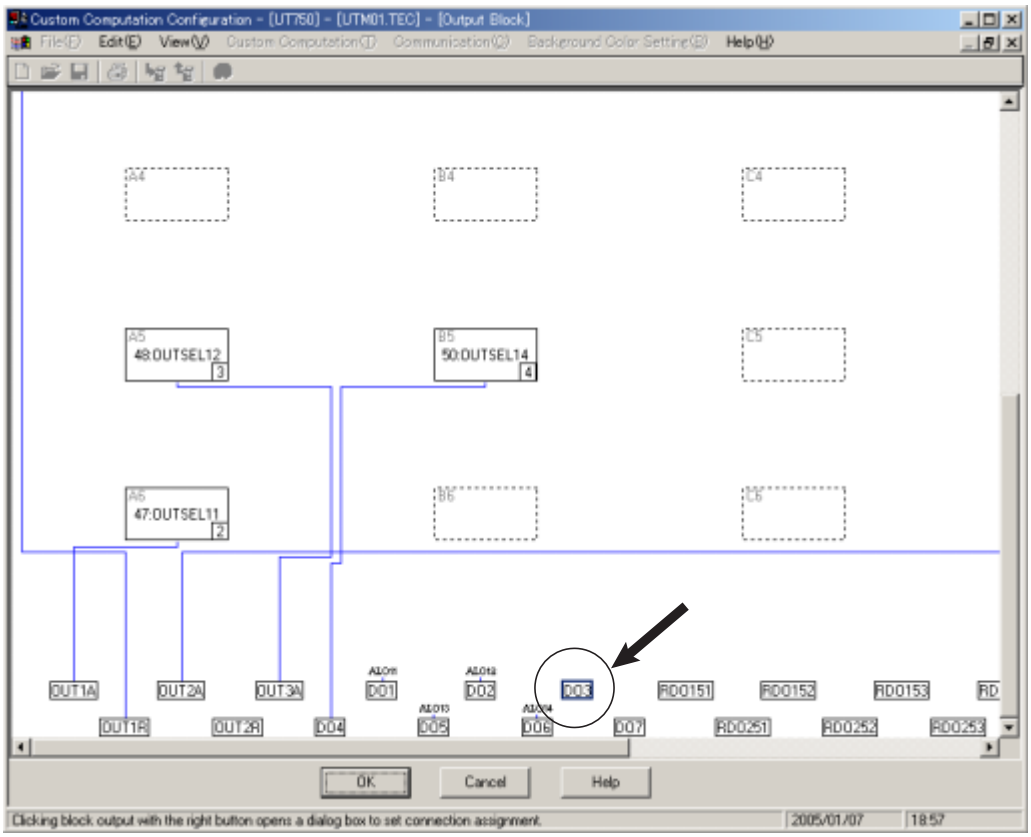



**Figure 12.5.13 [Output Block] Dialog Box**

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Setting Output Block Assignment] dialog box (Figure 12.5.14) appears.

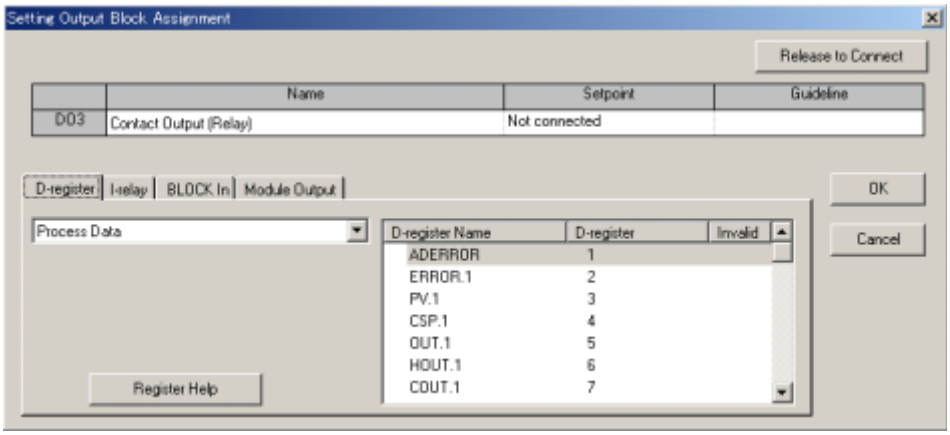



**Figure 12.5.14 [Setting of Output Block Connection Assignment] Dialog Box**

(3) Click the <Module Output> index.

(4) Click the <Input Block> option button in the group box.

(5) Double-click <OMO4L> in the list box. The <OMO4L (Setpoint column)> and <D1607 (Guideline column)> options appear in the <DO3> row.

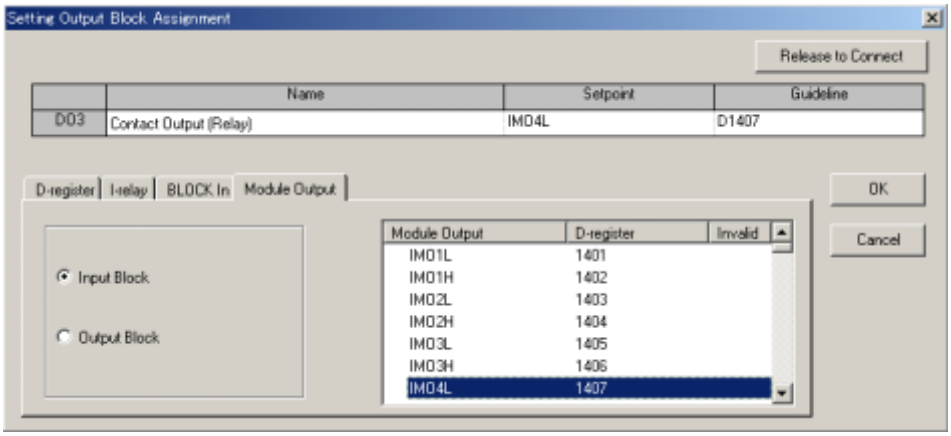



**Figure 12.5.15 Configuration of the <OMO4L> Output**

(6) Click the <OK> button.

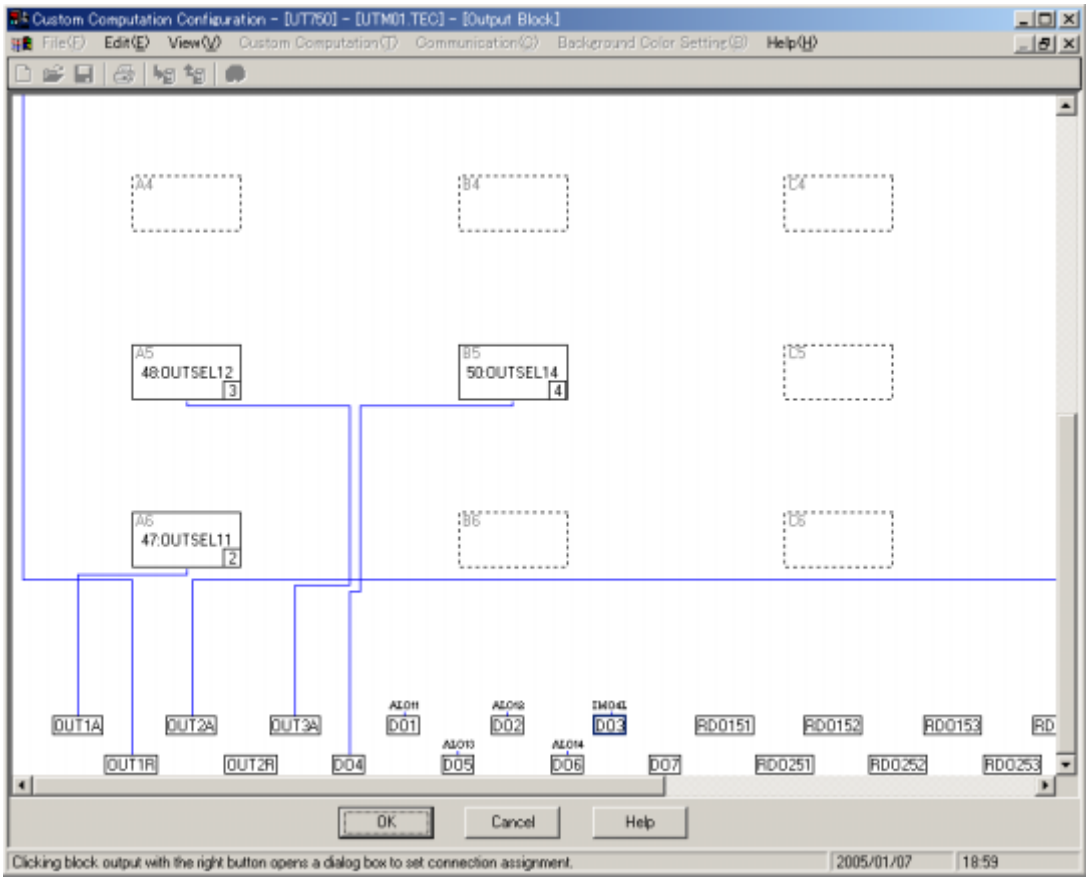



**Figure 12.5.16 Example of the [Output Block] Dialog Box (finished view) Where a Four-second Timer Is Implemented**

You have now finished this example of configuring custom computations for implementing a four-second timer.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

## 12.5.2 Configuring a Fixed-interval Five-second Timer

In this example, the block diagram of custom computations created in the previous subsection is used to explain how to configure a five-second timer.

### ■ Connection of Customized Computation Modules for Configuring a Fixed-interval Five-second Timer

To be able to configure any fixed-interval timer, you must define it as one having the automatic initialization capability. A fixed-interval timer repeats its operation every five seconds once the timer output turns on. After each five-second period, the output remains turned on for the duration of the timer flag.

The five-second timer can be implemented by reconfiguring the inputs and parameters of the TIMER module for the custom computations configured in the previous subsection.

The procedure for configuring this block diagram is explained in the paragraph, "■ Procedure for Configuring Custom Computations," that follows.

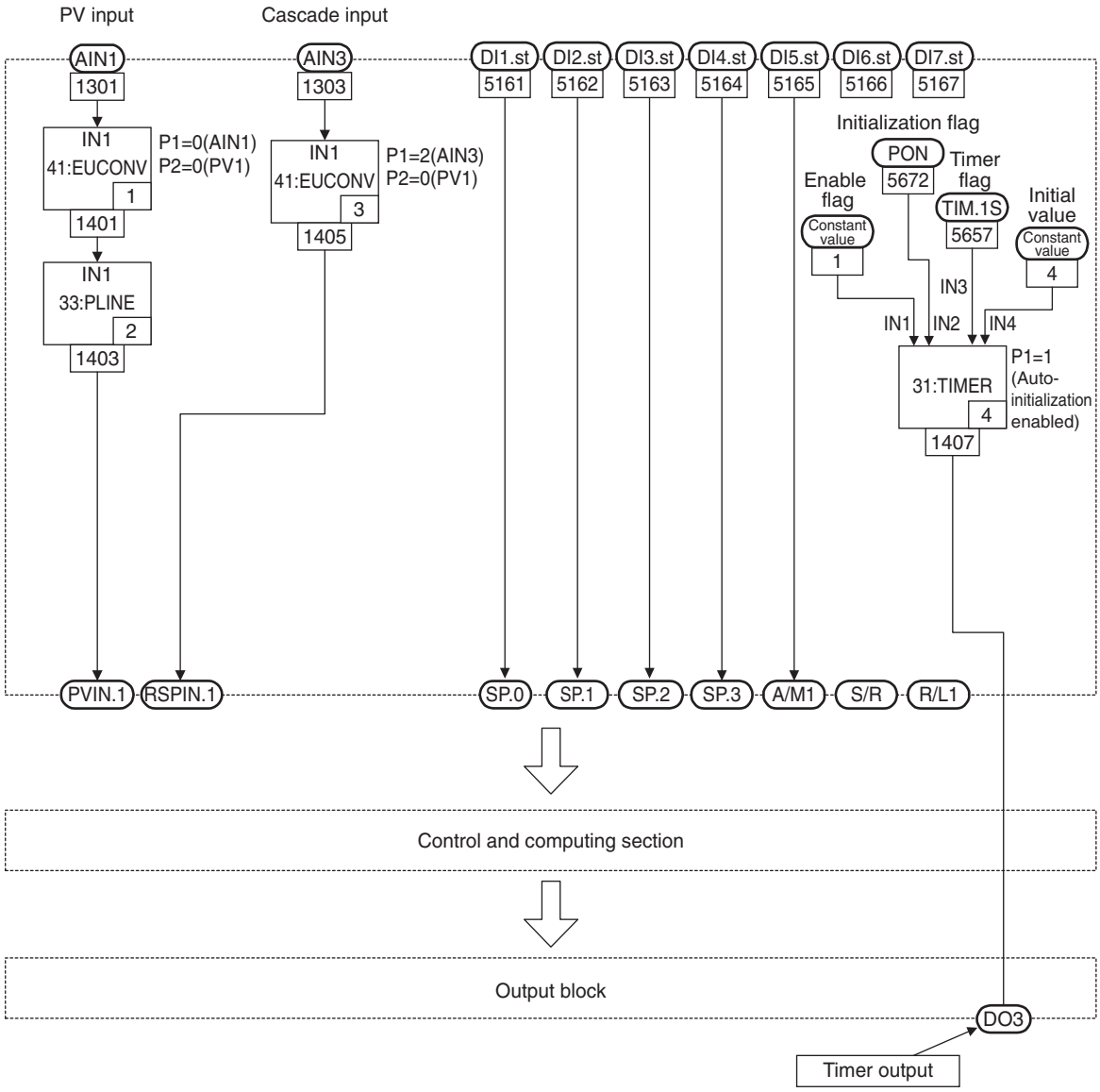



**Figure 12.5.17 Connection of Customized Computation Modules for Configuring a Fixed-interval Five-second Timer (example for a control period of 200 ms)**

Figure 12.5.18 is the timing chart of a five-second timer where the control period is 200 ms and the clock pulse duration is one second.

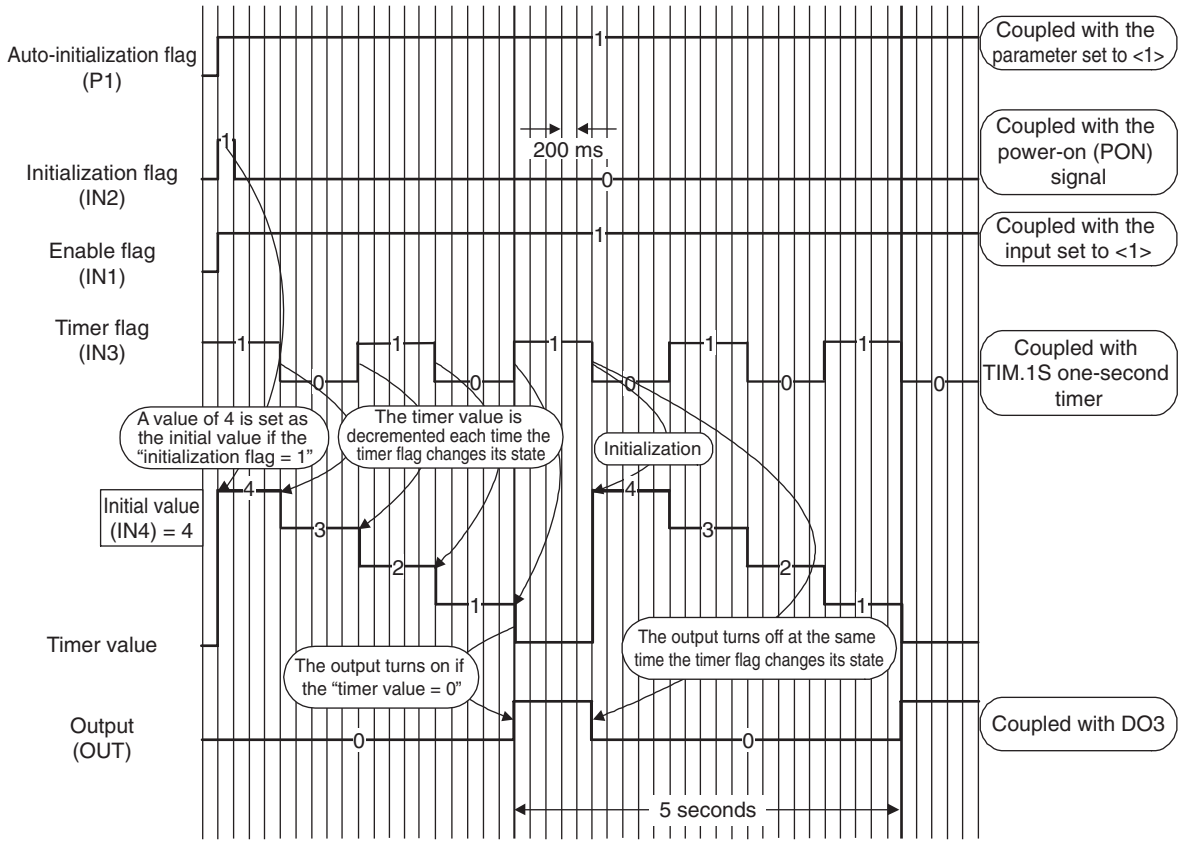



**Figure 12.5.18 Timing Chart of a Fixed-interval Five-second Timer (example for a control period of 200 ms)**

## ■ Procedure for Configuring Custom Computations

(1) In the [Input Block] dialog box (Figure 12.5.12), click the registered TIMER module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Module Setting] dialog box (Figure 12.5.19) appears.

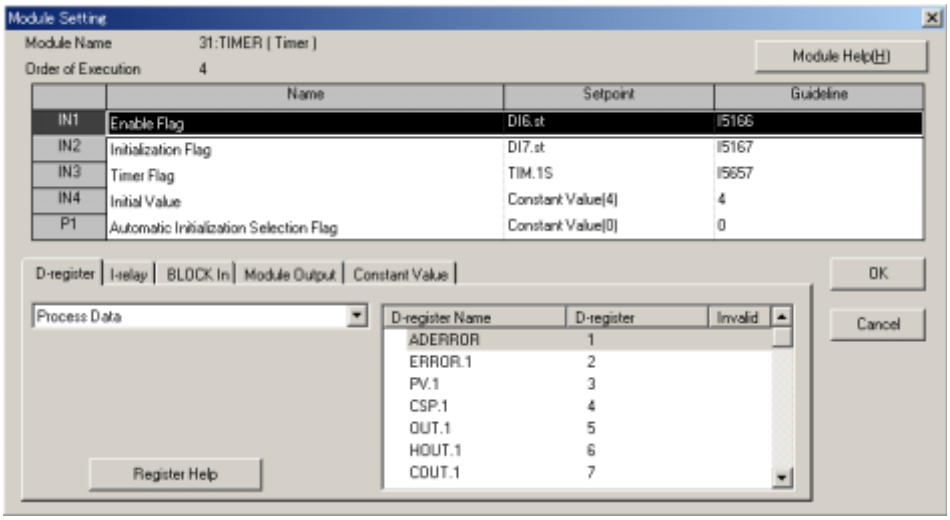



**Figure 12.5.19 [Module Setting] Dialog Box**

(3) The <IN1> module input is waiting for the data setting.

(4) Click the <Constant Value> index.

(5) Type “1” in the text box and press the <Enter> key. (Figure 12.5.20)

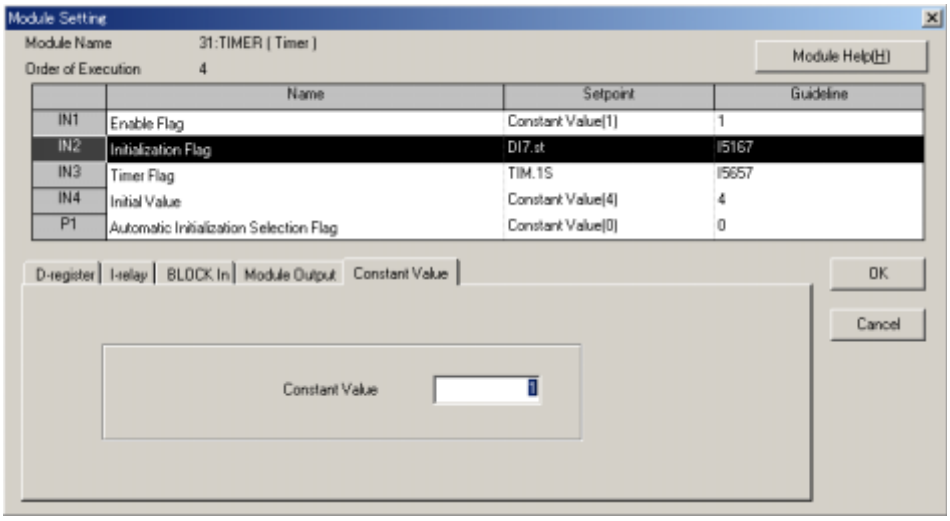



**Figure 12.5.20 Configuration of the <IN1> Input**

(6) The <IN2> module input is waiting for the data setting.

(7) Click the <I-relay> index.

(8) Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.

(9) Double-click <POWER ON> in the list box. The <POWER ON (Setpoint column)> and <I5672 (Guideline column)> options appear in the <IN2> row. (Figure 12.5.21)

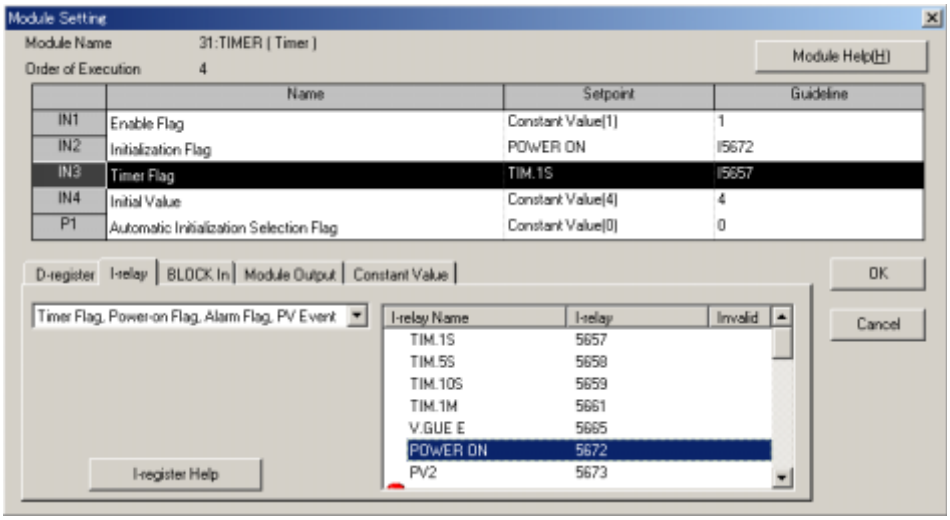



**Figure 12.5.21 Configuration of the <IN2> Input**

(10) The <IN3> module input is waiting for the data setting.

(11) Click the <I-relay> index.

(12) Click <Timer flag, power-on flag, alarm flag> in the drop-down list box.

(13) Double-click <TIM.1S> in the list box. The <TIM.1S (Setpoint column)> and <I5657 (Guideline column)> options appear in the <IN3> row. (Figure 12.5.22)

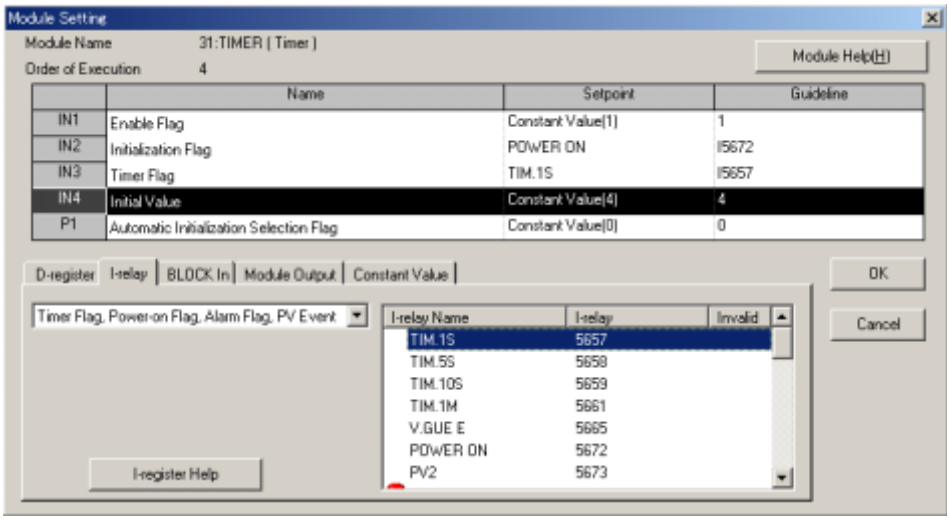



**Figure 12.5.22 Configuration of the <IN3> Input**

(14) The <IN4> module input is waiting for the data setting.

(15) Click the <Constant Value> index.

(16) Type “4” in the text box and press the <Enter> key.

(17) The <P1> module parameter is waiting for the data setting.

(18) Click the <Constant Value> index.

(19) Type “1” in the text box and press the <Enter> key.

(20) Click the <OK> button.

(21) In the [Input Block] dialog box, click the <OK> button.

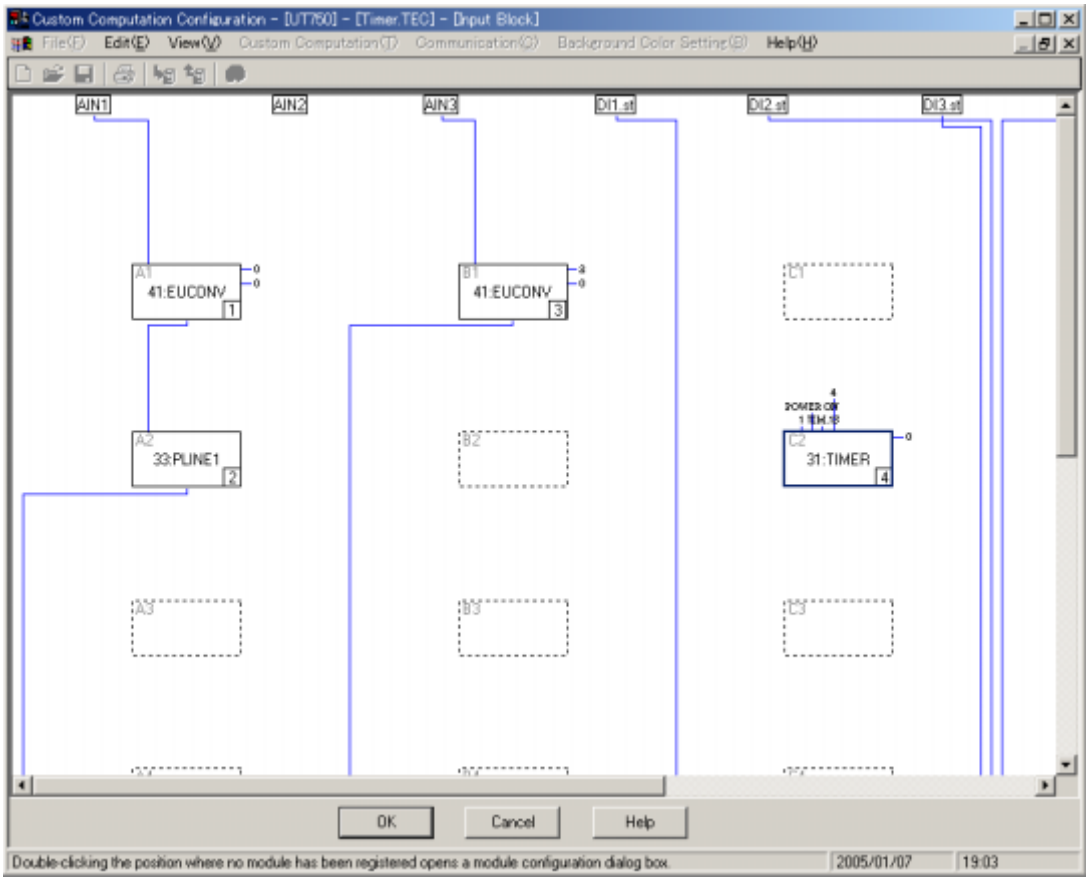



**Figure 12.5.23 Example of the [Output Block] Dialog Box (finished view) Where a Fixed-interval Five-second Timer Is Implemented**

You have now finished this example of configuring custom computations for implementing a fixed-interval five-second timer.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

# 12.6 Example 6: Setting Parameters

## ■ Connection of Customized Computation Modules for Setting Parameters

In this paragraph, you configure computation modules so that a value of 200.0°C is written into the target-setpoint register (numbered 301) when contact input 7 turns on.

The procedure for configuring this block diagram is explained in the paragraph, " ■ Procedure for Configuring Custom Computations," that follows.

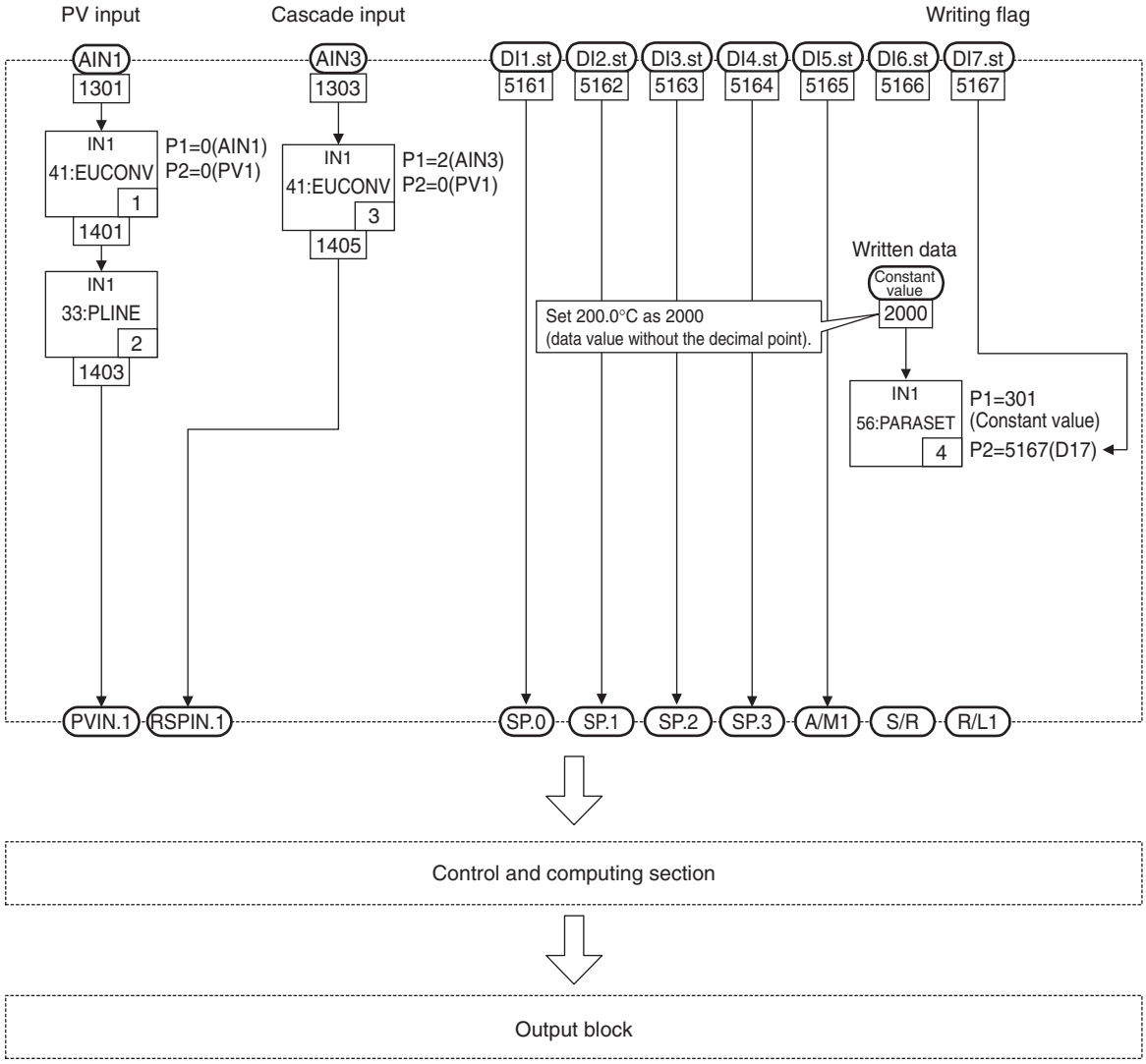



**Figure 12.6.1 Connection of Customized Computation Modules for Setting Parameters (diagram of input block)**

# ■ Procedure for Configuring Custom Computations

Before you begin configuring custom computations, read the sample file for single-loop control (file name: Utm01.tec). To read the file, see subsection 7.3.1, “Reading Data from Disk.”

Next, cancel the wiring to contact input 7. For details on how to cancel the wiring, see subsection 6.1.5, “Changing the Way Computation Modules Are Connected.”

To configure the custom computations, follow the instructions in “Operation I” and “Operation II,” in this order.

## ● Operation I: Module Configuration

(1) In the [Custom Computation Configuration Menu] dialog box (Figure 12.0.2), click <Input Block>. The [Input Block] dialog box (Figure 12.6.2) appears.

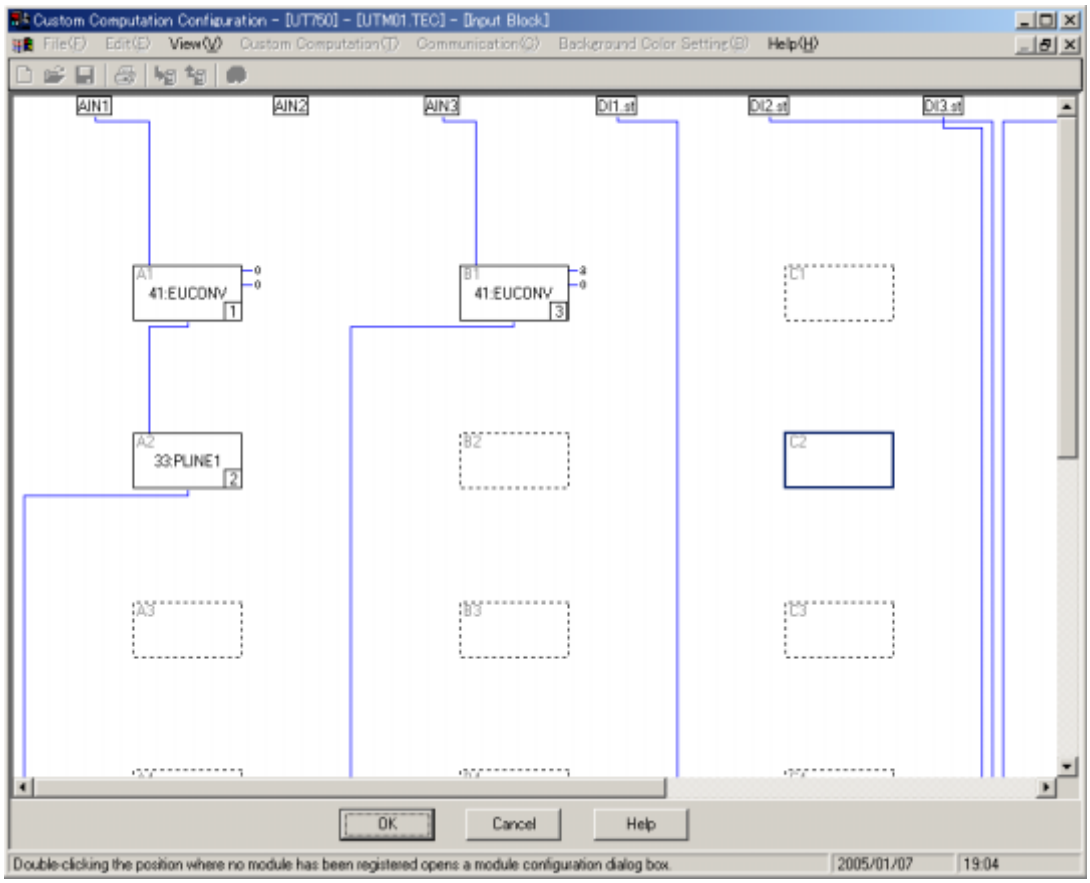



**Figure 12.6.2 [Input Block] Dialog Box**

(2) In the [Input Block] dialog box, double-click a blank box. The [Module Configuration] dialog box (Figure 12.6.3) appears.

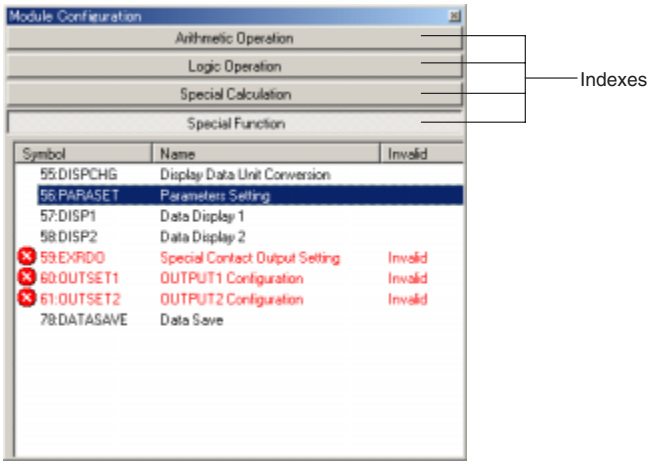



**Figure 12.6.3 [Module Configuration] Dialog Box**

(3) Click the <Special Function> index.

(4) Double-click <56: PARASET>. The PARASET module is registered with the [Input Block] dialog box, as shown in Figure 12.6.4.

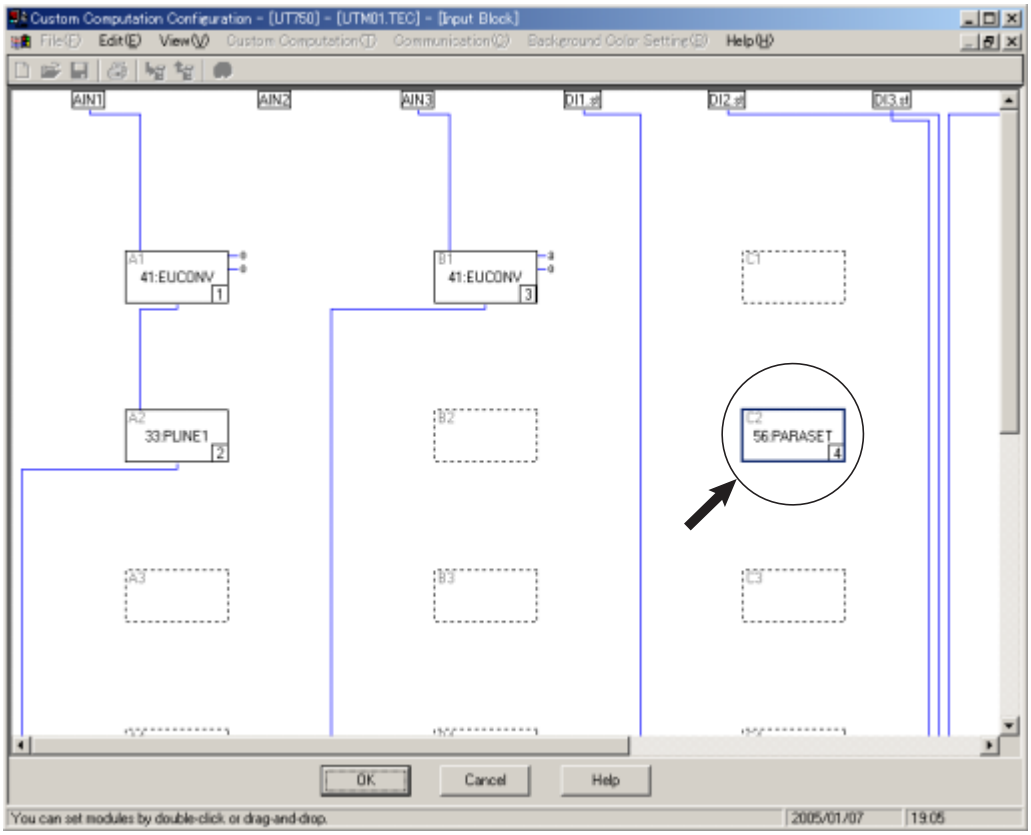



**Figure 12.6.4 Example of the [Input Block] Dialog Box where the PARASET Module Is Registered As the Fourth-run Module**

When you finish registering the computation modules, proceed to “Operation II: Module Setting.”

## ● Operation II: Module Setting

This operation involves configuring the inputs and parameters of computation modules.

(1) Click the registered fourth-run PARASET module.

(2) From the tool menus, choose <Edit [E]>, then <Connection>. The [Module Setting] dialog box appears.

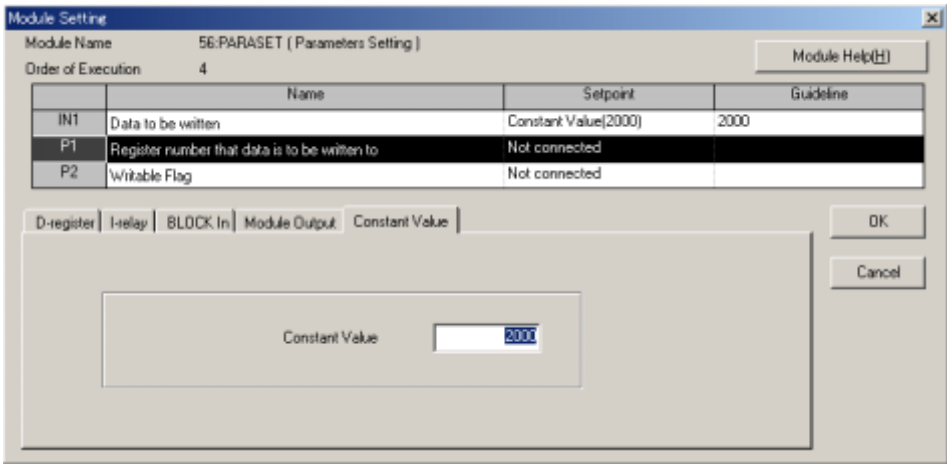



**Figure 12.6.5 [Module Setting] Dialog Box**

(3) The <IN1> module input is waiting for the data setting.

(4) Click the <Constant Value> index.

(5) Type “2000” in the text box and press the <Enter> key. (Figure 12.6.5)

(6) The <P1> module parameter is waiting for the data setting.

(7) Click the <Constant Value> index.

(8) Type “301” in the text box and press the <Enter> key.

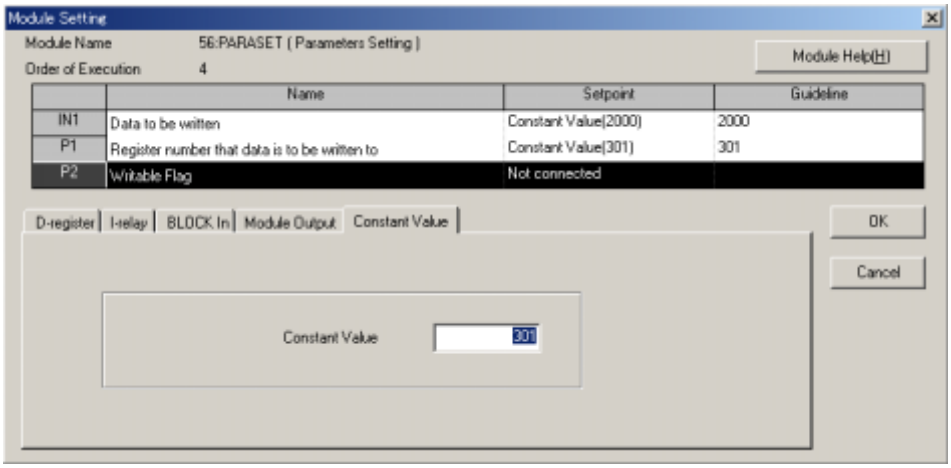



**Figure 12.6.6 Configuration of the <P1> Parameter**

(9) The <P2> module parameter is waiting for the data setting.

(10) Click the <BLOCK In> index.

(11) Double-click <DI7.st> in the drop-down list box. The <DI7.st (Setpoint column)> and <I5167 (Guideline column)> options appear in the <P2> row.

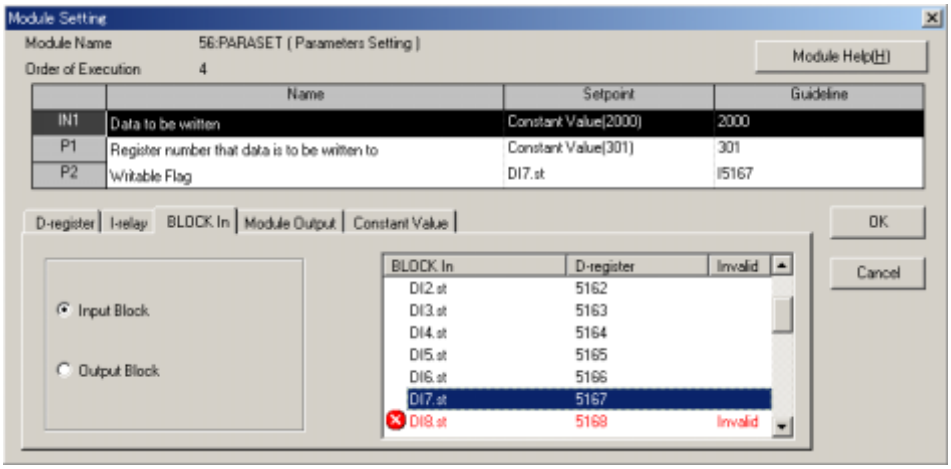



**Figure 12.6.7 Configuration of the <P2> Parameter**

(12) Click the <OK> button.

(13) In the [Input Block] dialog box, click the <OK> button.

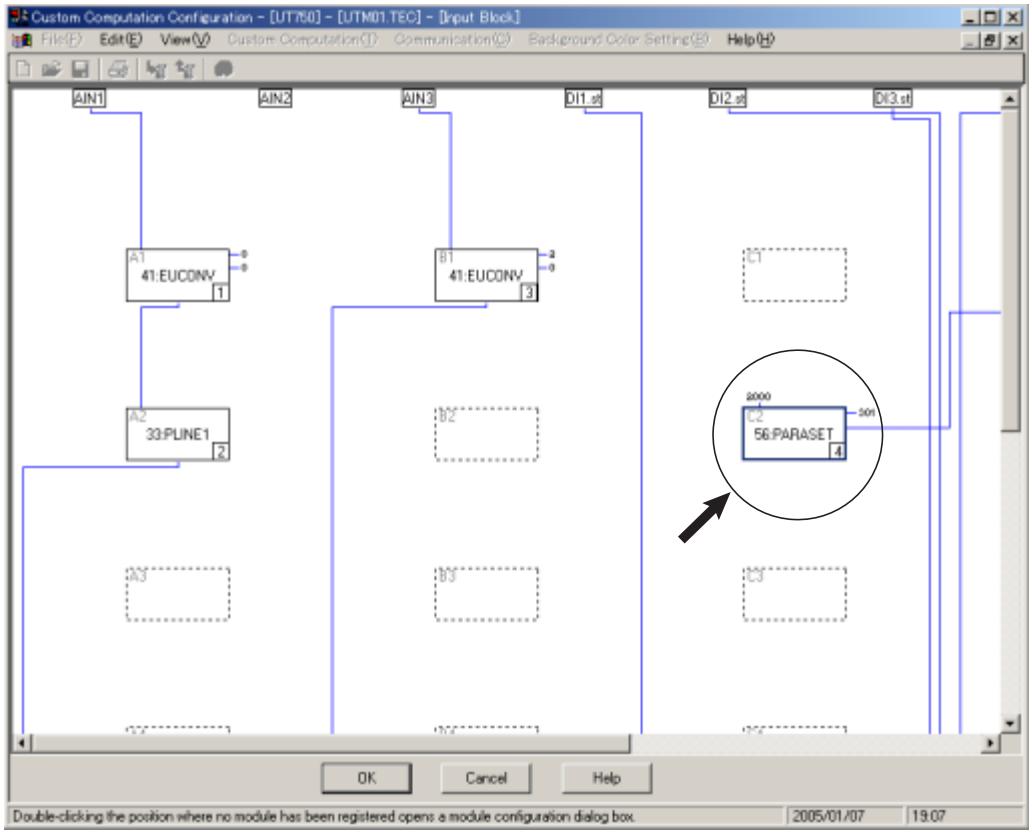



**Figure 12.6.8 Example of the [Input Block] Dialog Box (finished view) Edited for Parameter Setting**

You have now finished this example of configuring custom computations for setting parameters.

The final step when configuring actual custom computations (after this example), is to download the computations to the controller (see Section 8.2), as necessary, in order to verify their performance by means of custom computation monitoring (see Chapter 11).

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# 13. Maintenance and Troubleshooting

This chapter explains how to replace the batteries in the dedicated adapter and methods for solving problems that may occur when the LL200 tool is in use.

## 13.1 Replacing the Batteries

When replacing the batteries in the dedicated adapter, follow the procedure noted below.

**NOTE**

The dedicated adapter is equipped with an internal switch (where the adapter comes into contact with the controller). Be careful not to break the switch when installing the adapter on the controller.

Installing the adapter in place automatically turns on the switch, causing the batteries to discharge even if there is no communication.

If you have no immediate plan to communicate, do not attach the adapter to the controller.

(1) Remove the screw from the bottom side of the adapter.

(2) Slide the cover approximately 5 mm downward, and then remove it.

(3) Replace the existing two units of AAA-size batteries with new ones.

(4) Place the cover back on the adapter while making sure the cover's hook properly engages with the opening on the adapter's top.

(5) Slide the cover upward until you feel a click.

(6) Fasten the screw in the bottom side of the adapter.

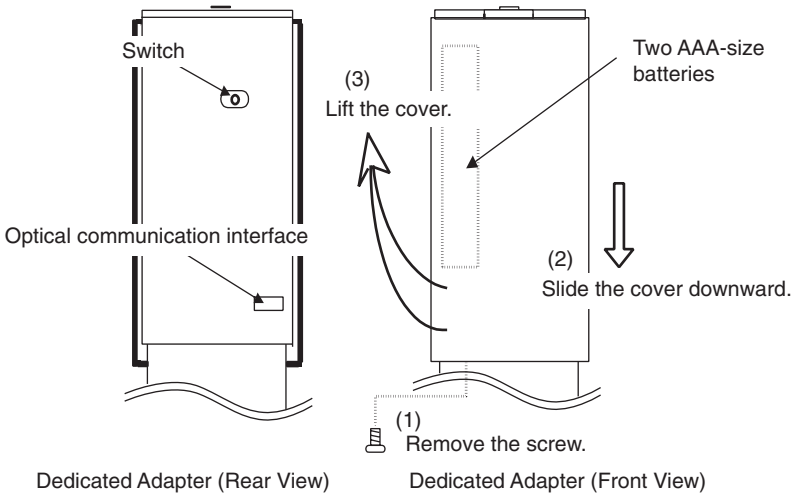


**Figure 13.1.1 Removal of the Cover from the Dedicated Adapter**

**WARNING**

Replace both of the existing batteries at the same time with new batteries of the same type.

Do not loosen screws that fasten the printed circuit board; otherwise your attempt to communicate will fail.

The batteries used are not rechargeable. If you attempt to recharge the batteries, the internal fluid may leak, possibly resulting in damage to the adapter.

Be careful about the polarities of the batteries; use of the batteries with wrong polarities may also lead to fluid leakage and thereby damage the adapter.

# 13.2 Troubleshooting Problems with the Display and Communication Functions

## 13.2.1 Problems with the Display Functions

### ■ Improper Views of Windows

For the operating environment requirements, Yokogawa Electric recommends that you use a display unit that has a resolution of 800 X 600 pixels or superior, is capable of handling at least 256 colors, and is configured to operate with smaller fonts. Make sure your system satisfies these requirements.

If you have any difficulties in viewing windows due to an improper background color, you can edit the LL200 tool's <Background Color Setting> menu to adjust the color.

## 13.2.2 Problems with the Communication Functions

Check your system according to each of the following instructions.

### ■ Cases When Communication Is Carried Out via the Front Terminal (Optical Interface)

- Make sure the dedicated adapter is installed correctly.
- Check if the dedicated cable is disconnected.
- Check if the batteries in the dedicated adapter have run out.
- Make sure you are using the correct serial ports (COM1 to COM16) of the personal computer.

### ■ Cases When Communication Is Carried Out via the Rear Terminal (RS-485 Interface)

- Make sure the rear terminal is wired correctly.
- Make sure the communication address and baud rate of the controller are consistent with those of the personal computer.
- Make sure the communication protocol is set to [PC-link Communication]. Communication is not possible if the protocol is set to [PC-link Communication with Sum Check].
- Make sure you are using the correct serial ports (COM1 to COM16) of the personal computer.

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# Appendix 1. Areas for Storing Data Output from Computation Modules

Custom computations are configured using the given methods of block connection. In order to connect computation modules, you must familiarize yourself with the code names of the D registers where data output from the computation modules are stored.

## ■ Data Output from Input-block Computation Modules

Two registers are reserved for the output of each computation module configured within the input block.

For example, assume that an EU Range Conversion (EUCONV) module is configured as the first-run module and a Ten-segment Linearizer 1 (PLINE1) module as the second-run module. The EUCONV module's output data are stored in the two D registers code-named IMO1L and IMO1H. Similarly, the PLINE1 module's output data are stored in the two D registers code-named IMO2L and IMO2H.

When connecting a computation module using the LL200 tool (see Figures App.1.2 and App.1.3), you must specify the code name of the D register (i.e., D-register number) for the lower-order word—a code name ending with "L."

As shown in Figure App.1.1, the output of the EUCONV module is connected to the IN1 input of the PLINE1 module.

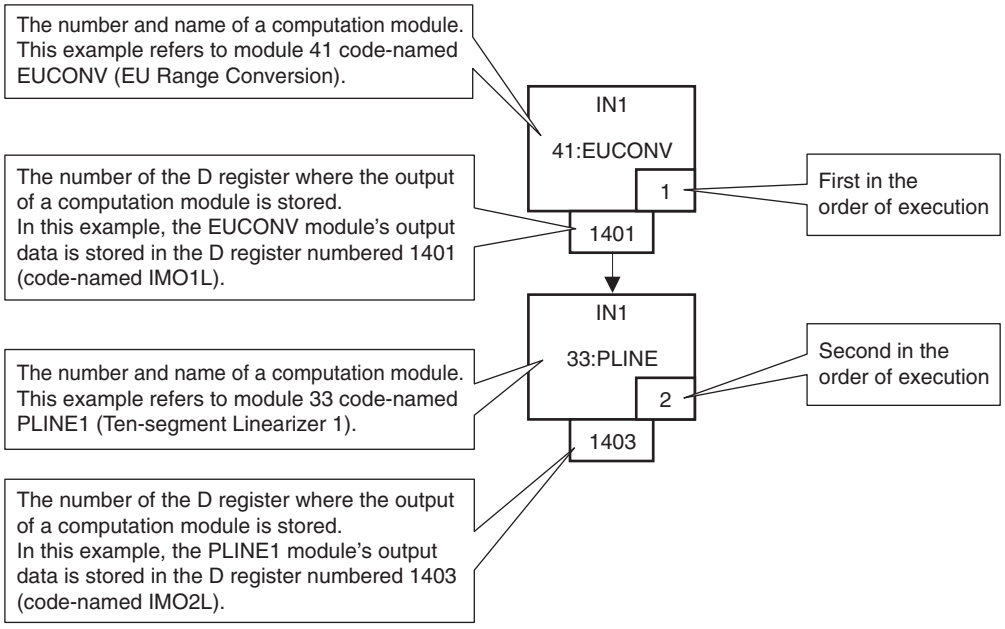


**Figure App.1.1 Illustrated Explanation of Computation Modules' Outputs**

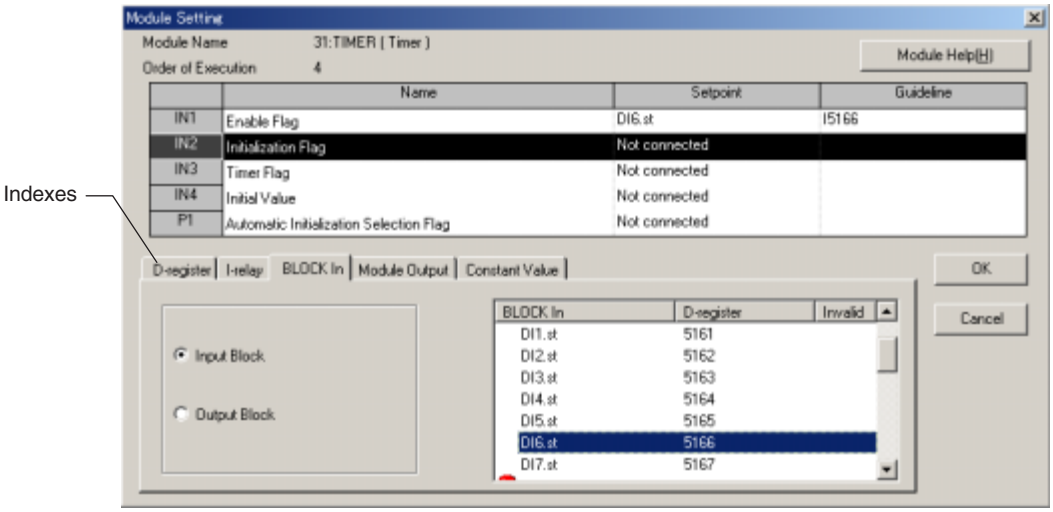


**Figure App.1.2 [Module Setting] Dialog Box**

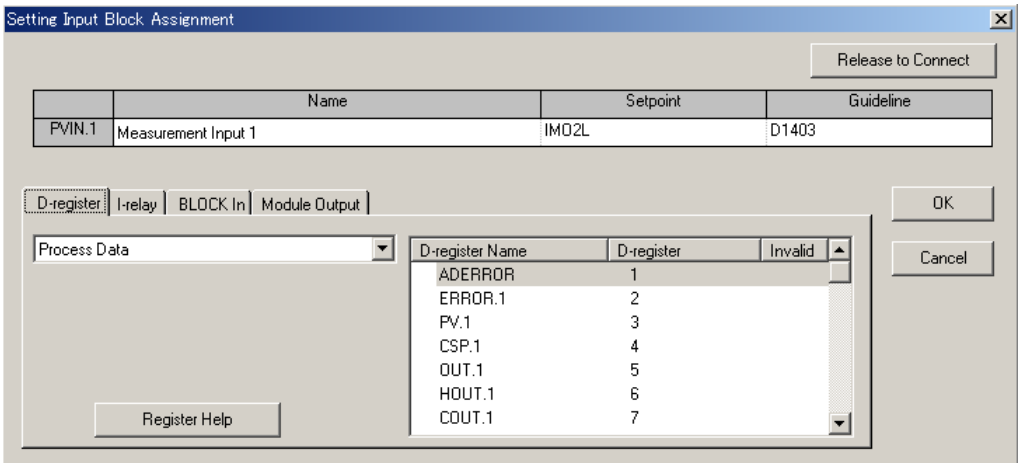


**Figure App.1.3 [Setting Input Block Assignment] Dialog Box**

| Computation Modules Listed In the Order of Execution | Code Name of D Register | D-register Number |
|---|---|---|
| Output of first-run computation module | IMO1L (lower-order word) | 1401 |
| | IMO1H (higher-order word) | 1402 |
| Output of second-run computation module | IMO2L (lower-order word) | 1403 |
| | IMO2H (higher-order word) | 1404 |
| Output of third-run computation module | IMO3L (lower-order word) | 1405 |
| | IMO3H (higher-order word) | 1406 |
| . . . | . . . | . . . |
| Output of 29th-run computation module | IMO29L (lower-order word) | 1457 |
| | IMO29H (higher-order word) | 1458 |
| Output of 30th-run computation module | IMO30L (lower-order word) | 1459 |
| | IMO30H (higher-order word) | 1460 |

# ■ Data Output from Output-block Computation Modules

Two registers are reserved for the output of each computation module configured within the output block.

When connecting a computation module using the LL200 tool (see Figures App.1.4 and App.1.5), you must specify the code name of the D register (i.e., D-register number) for the lower-order word—a code name ending with “L.”

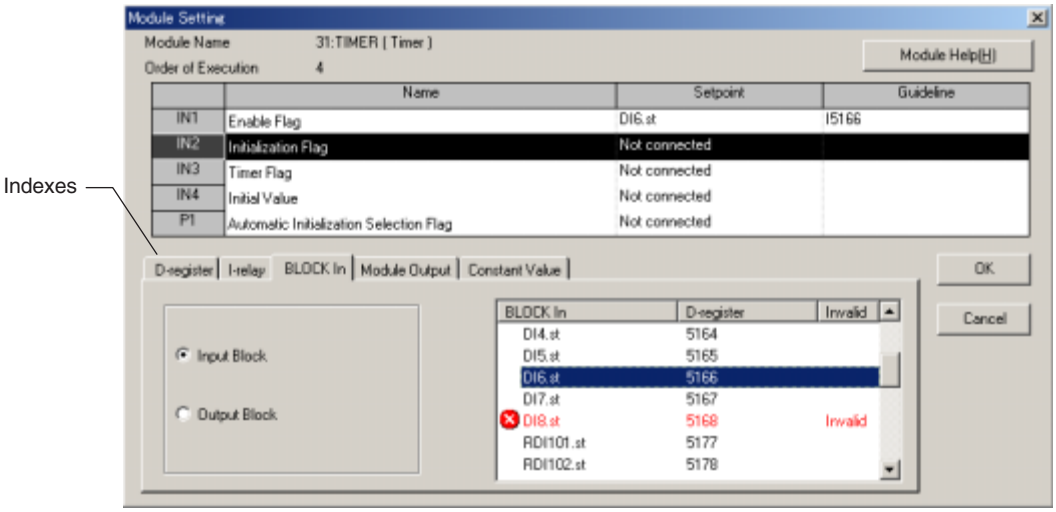


**Figure App.1.4 [Module Setting] Dialog Box**

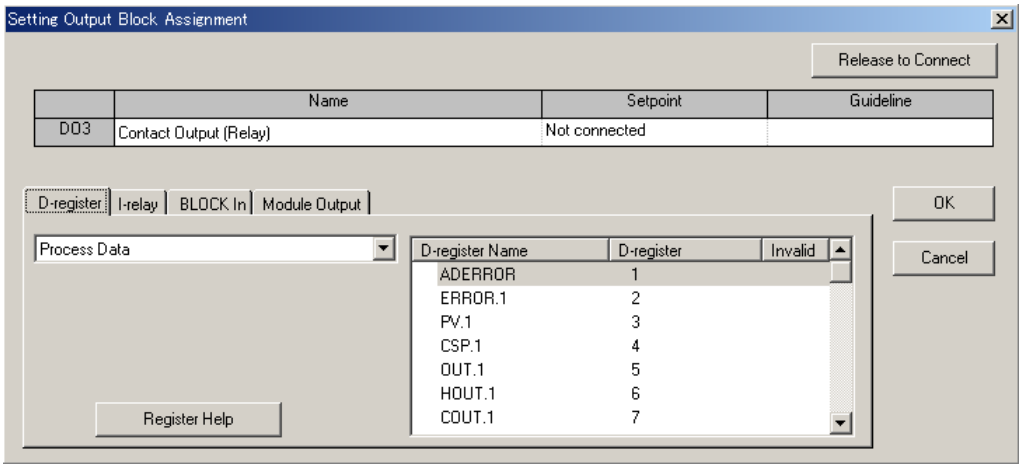


**Figure App.1.5 [Setting Output Block Assignment] Dialog Box**

| Computation Modules Listed In the Order of Execution | Code Name of D Register | D-register Number |
|---|---|---|
| Output of first-run computation module | OMO1L (lower-order word) | 1601 |
| | OMO1H (higher-order word) | 1602 |
| Output of second-run computation module | OMO2L (lower-order word) | 1603 |
| | OMO2H (higher-order word) | 1604 |
| Output of third-run computation module | OMO3L (lower-order word) | 1605 |
| | OMO3H (higher-order word) | 1606 |
| . . . | . . . | . . . |
| Output of 29th-run computation module | OMO29L (lower-order word) | 1657 |
| | OMO29H (higher-order word) | 1658 |
| Output of 30th-run computation module | OMO30L (lower-order word) | 1659 |
| | OMO30H (higher-order word) | 1660 |

# Appendix 2. DATASHEET

# DATASHEET

| | | | |
|---|---|---|---|
| Specifications No. (Doc No.) | | | P. / |
| Order No. | Sec. | Loop | Item |
| Instrument No. (Serial No.) | | | |
| Customer | Model and Suffix Codes | | |
| System (Plant) Name | TAG No. | | |

| Data Specifications | | Remarks | Standard Value | Scale Values for Range 0 | Scale Values for Range 100 |
|---|---|---|---|---|---|
| Analog Inputs | AIN1 | | | | |
| | AIN2 | | | | |
| | AIN3 | | | | |
| Analog Outputs | OUT1A | | | | |
| | OUT2A | | | | |
| | OUT3A | | | | |
| Variable Constants (USER Parameters) | U1 | | | | |
| | U2 | | | | |
| | U3 | | | | |
| | U4 | | | | |
| | U5 | | | | |
| | U6 | | | | |
| | U7 | | | | |
| | U8 | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Controller Mode | | | | | | | | | | | |
| Controller Type | | | | | | | | | | | |
| Control Period | | | | | | | | | | | ms |
| Setup Data Items | Input 1 | | | Input 2 | | | Input 3 | | | | |
| Input Type | | | | | | | | | | | |
| Unit Specification | | | | | | | | | | | |
| Range Maximum | | | | | | | | | | | |
| Range Minimum | | | | | | | | | | | |
| Scale Maximum | | | | | | | | | | | |
| Scale Minimum | | | | | | | | | | | |
| “Burnout” Action | | | | | | | | | | | |
| RJC Selection | | | | | | | | | | | |
| Retransmission Outputs | RET1 | | | RET2 | | | RET3 | | | | |
| Type of Retransmission Output | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Digital Inputs | | Ten-segment Linearizer 1 | | | | Ten-segment Linearizer 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | DI1 | x1 | | y1 | | x1 | | y1 | |
| | DI2 | x2 | | y2 | | x2 | | y2 | |
| | DI3 | x3 | | y3 | | x3 | | y3 | |
| | DI4 | x4 | | y4 | | x4 | | y4 | |
| | DI5 | x5 | | y5 | | x5 | | y5 | |
| | DI6 | x6 | | y6 | | x6 | | y6 | |
| | DI7 | x7 | | y7 | | x7 | | y7 | |
| Digital Outputs (Relays) | DO1 | x8 | | y8 | | x8 | | y8 | |
| | DO2 | x9 | | y9 | | x9 | | y9 | |
| | DO3 | x10 | | y10 | | x10 | | y10 | |
| Digital Outputs (Transistors) | DO4 | x11 | | y11 | | x11 | | y11 | |
| | DO5 | | | | | | | | |
| | DO6 | Ten-segment Linearizer 3 | | | | Ten-segment Linearizer 4 | | | |
| | DO7 | x1 | | y1 | | x1 | | y1 | |
| | | x2 | | y2 | | x2 | | y2 | |
| | | x3 | | y3 | | x3 | | y3 | |
| | | x4 | | y4 | | x4 | | y4 | |
| | | x5 | | y5 | | x5 | | y5 | |
| | | x6 | | y6 | | x6 | | y6 | |

| Alarm Outputs | | Type | Remarks | Setpoint | Hysteresis |
|---|---|---|---|---|---|
| | AL1 | | | | |
| | AL2 | | | | |
| | AL3 | | | | |
| | AL4 | | | | |

| | | | | | Customer | | Rep. | | Engineer | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| △ | | | | | | | | | | | |
| △ | | | | | DR. | CH. | DR. | CH. | DR. | CH. | |
| △ | | | | | | | | | | | |
| Rev | n | Remarks | Date | Rev.By | | | | | | | |

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