Preface

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual. This manual describes the functions, performance, and application methods needed for optimum use of the ZEN Programmable Relay.

The ZEN is a compact and highly functional controller that can be used to easily automate small-scale applications. Its development has drawn on OMRON's advanced control technology and expertise in manufacturing various types of controllers.

Before using the ZEN, read this manual carefully so that you can use the ZEN correctly. Keep the manual close at hand so that you can refer to it whenever necessary.

Notice

(1) All rights reserved. No part of this manual may be reprinted or copied without the prior written permission of OMRON.
(2) The specifications and other information in this manual are subject to change without notice for product improvement.
(3) Considerable care has been taken in the preparation of this manual; however, OMRON assumes no responsibility or liability for any errors or inaccuracies that may appear. In the event that a problem is discovered, please contact one of the OMRON offices or agents listed at the end of the manual, and provide the catalog number shown on the cover of the manual.
# Warranty and Application Considerations

## Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

## Warranty and Limitations of Liability

### Warranty

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

### Limitations of Liability

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In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.
**Application Considerations**

<table>
<thead>
<tr>
<th><strong>SUITABILITY FOR USE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.</td>
</tr>
<tr>
<td>At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.</td>
</tr>
<tr>
<td>The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:</td>
</tr>
<tr>
<td>• Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.</td>
</tr>
<tr>
<td>• Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.</td>
</tr>
<tr>
<td>• Systems, machines, and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to the products.</td>
</tr>
<tr>
<td>NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PROGRAMMABLE PRODUCTS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.</td>
</tr>
</tbody>
</table>
## Disclaimers

<table>
<thead>
<tr>
<th>Disclaimers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHANGE IN SPECIFICATIONS</strong></td>
</tr>
<tr>
<td>Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.</td>
</tr>
</tbody>
</table>

| DIMENSIONS AND WEIGHTS |
| Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown. |

| PERFORMANCE DATA |
| Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON’s test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability. |

| ERRORS AND OMISSIONS |
| The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions. |

## Copyright and Copy Permission

<table>
<thead>
<tr>
<th>Copyright and Copy Permission</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COPYRIGHT AND COPY PERMISSION</strong></td>
</tr>
<tr>
<td>This document shall not be copied for sales or promotions without permission. This document is protected by copyright and is intended solely for use in conjunction with the product. Please notify us before copying or reproducing this document in any manner, for any other purpose. If copying or transmitting this document to another, please copy or transmit it in its entirety.</td>
</tr>
</tbody>
</table>
OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

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Software License Agreement

Note  Read this Agreement prior to using the software.
This software (hereafter called the “Software”) shall be used only after the user
(hereafter called the “User” and referring to either individuals or companies) has agreed
to the following conditions for usage (hereafter called the “Agreement”). This Agreement
is a legal contract that is formed between the User and OMRON Corporation (hereafter
called “OMRON”). The act of installing, copying, or using the Software shall imply that
the User agrees to the items of this Agreement. In the event that the User does not
agree to the items of this Agreement, OMRON shall not grant the right for the User to
install, copy, or use the Software.

1. In this Agreement, Software means the computer program and related
documentation contained in the package of this program. Copyright of the Software
remains the sole property of OMRON or the third party who has licensed the
Software to OMRON and shall not be assigned to the User under this Agreement.

2. OMRON grants the User a non-exclusive, non-transferable, and limited license to
use the Software on one or more computer(s) owned by the User.

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without prior written consent of OMRON.

4. The User may copy the Software for backup purposes only. The User may not
decompile, reverse engineer, nor otherwise attempt to discern the source code of the
Software.

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no warranties, expressed or implied, including but not limited to, warranty of
merchantability or fitness for particular purpose. In no event, will OMRON be liable
for any direct, indirect, incidental, special, or consequential damages arising out of
this agreement or use of the software.

6. If the User breaches this Agreement, OMRON may terminate this Agreement upon
notice to the User. In that event, the User shall return the Software and all copies
thereof.
Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. Z184-E1-04

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

<table>
<thead>
<tr>
<th>Revision code</th>
<th>Date</th>
<th>Revised content</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>May 2003</td>
<td>Original production</td>
</tr>
<tr>
<td>02</td>
<td>August 2005</td>
<td>Modifications and additions for Version 3.0 of the ZEN system software and Version 4.0 of the ZEN support software. Applicable models: ZEN-10C3-R-V2</td>
</tr>
<tr>
<td>03</td>
<td>January 2006</td>
<td>Modifications and additions for Version 3.0 of the ZEN system software and Version 4.1 of the ZEN support software including the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added 8-digit counters, 8-digit comparators, and event relays.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added twin timers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added multiple-day operation and pulse-output operation for weekly timers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added daylight saving time settings for Australia and New Zealand.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added RS-485 communications settings for models with communications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deleted contrast control settings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modified and added to warranty and safety information.</td>
</tr>
<tr>
<td>04</td>
<td>December 2008</td>
<td>Added Vista for operating system of compatible computers.</td>
</tr>
</tbody>
</table>
About this Manual

This manual describes the installation and operation of the ZEN-SOFT01 ZEN Support Software and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate the ZEN Support Software. Be sure to read the precautions provided in the following section.

**Precautions** provide general precautions for using the ZEN Support Software and related devices.

Section 1 describes how to install and start the ZEN Support Software. The screen configuration is also explained, along with the submenus for the Menu Bar, Toolbar, and Status Bar.

Section 2 describes how to create, save, edit, and print ladder programs.

Section 3 describes how to connect to the ZEN and how to transfer programs between the ZEN and the ZEN Support Software.

Section 4 describes the ZEN system settings, how to set passwords to protect the ZEN ladder programs, and how to clear the ZEN memory.

Section 5 describes the simulation function, which can be used to simulate ladder program execution without downloading the program to the ZEN.

Section 6 describes errors that may occur while using the ZEN Support Software and possible countermeasures.

The following two manuals are provided for the ZEN Programmable Relays. Refer to them as required in operation.

<table>
<thead>
<tr>
<th>Manual</th>
<th>Contents</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEN Programmable Relays Operation Manual</td>
<td>The ZEN specifications, functions, and operating methods.</td>
<td>V1 or Pre-V1 CPU Units Z183 V2 CPU Units Z211</td>
</tr>
<tr>
<td>ZEN Programmable Relays Communications Manual</td>
<td>The ZEN-10C4 communications functions and operation.</td>
<td>Z212</td>
</tr>
<tr>
<td>ZEN Support Software Operation Manual</td>
<td>Installation and operating procedures for the ZEN Support Software</td>
<td>Z184</td>
</tr>
</tbody>
</table>

**Note** On the ZEN Support Software displays, bits in ZEN memory are called “relays,” program input bits are called “contacts,” and program output bits are called “coils.”

**WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.
Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

*Note*  Indicates information of particular interest for efficient and convenient operation of the product.

1,2,3...  1. Indicates lists of one sort or another, such as procedures, checklists, etc.

*Precaution*  Indicates precautionary information that should be heeded in using the ZEN.
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PRECAUTIONS

This section provides general precautions for using the ZEN Support Software for the ZEN Programmable Relays.

The information contained in this section is important for the safe and reliable application of the ZEN. You must read this section and understand the information contained before attempting to set up or operate a ZEN.

1 General Precautions ...................................................... xvi
2 Safety Precautions ....................................................... xvi
3 Application Precautions ............................................... xvii
1 General Precautions

The user must operate the product according to the performance specifications described in the operation manual.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for installing and operating OMRON Motion Control Units. Be sure to read this manual before operation and keep this manual close at hand for reference during operation.

⚠️ WARNING ⚠️ It is extremely important that a PC and all PC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PC system to the above mentioned applications.

2 Safety Precautions

Confirm safety before attempting any of the following operations.

- Transferring the user program
- Changing the user program
- Changing the operating mode of the ZEN
- Turning relays ON or OFF

Always perform a program check on any program after writing it and before transferring it to the ZEN. Also confirm the operation of the program completely before using it for actual system operation.

Always disconnect the output circuits before performing operating tests on systems in which the loads connected to the output circuits can have a serious effect on human life or property if incorrect operation occurs.
3 Application Precautions

Observe the following precautions when using the ZEN Support Software.

- Observe the following precautions before starting the ZEN Support Software:
  - Close all software programs not related to the ZEN Support Software. It is particularly important to close all programs that start periodically or intermittently, such as screen savers, virus checkers, email and other communications programs, and schedulers.
  - Do not share hard disks, printers, or other devices with other network computers while running the ZEN Support Software.
  - Some notebook computers set the RS-232C port to modem or infrared application by default. Change the settings according to the operating instructions for your computer so that the RS-232C port can be used as a normal serial communications port.
  - Some notebook computers set the RS-232C port to not supply power (5 V) to the port to save energy by default. Change the settings according to the operating instructions for your computer to provide power to the port. (There are Windows settings and also possibly settings for computer-specific utilities or BIOS settings to save power.)
  - Do not turn OFF the power supply to the ZEN or disconnect the connecting cable while the ZEN Support Software is online with the ZEN. The computer may malfunction.

-
Application Precautions
SECTION 1
Installation and Startup

This section describes how to install and start the ZEN Support Software. The screen configuration is also explained, along with the submenus for the Menu Bar, Toolbar, and Status Bar.

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   1-1-2 Compatible Computers ............................................. 2
1-2 Installing and Uninstalling the ZEN Support Software .......... 3
   1-2-1 Installation ............................................................ 3
   1-2-2 Uninstalling the ZEN Support Software ....................... 4
1-3 Starting and Quitting ........................................................... 5
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1-4 Screen Configuration .......................................................... 6
Before Operation

Section 1-1

1-1 Before Operation

1-1-1 Product Contents

Check that the package for the ZEN Support Software (ZEN-SOFT01-V4) contains one CD-ROM setup disk.

1-1-2 Compatible Computers

The following table shows the computers that support the ZEN Support Software.

<table>
<thead>
<tr>
<th>Item</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system</td>
<td>Windows 98, 98SE, ME, 2000, XP, NT4.0 Service Pack 3, or Vista</td>
</tr>
<tr>
<td>CPU</td>
<td>Pentium 133 MHz or faster</td>
</tr>
<tr>
<td></td>
<td>Pentium 200 MHz or faster recommended.</td>
</tr>
<tr>
<td>Memory</td>
<td>64 Mbytes or more</td>
</tr>
<tr>
<td>HDD</td>
<td>40 Mbytes or more of available disk capacity</td>
</tr>
<tr>
<td>CD-ROM drive</td>
<td>Required</td>
</tr>
<tr>
<td>Communications</td>
<td>1 serial port (COM port)</td>
</tr>
<tr>
<td>Keyboard and mouse</td>
<td>Required</td>
</tr>
<tr>
<td>Monitor</td>
<td>800 x 600 dots (SVGA) min., 256 colors min.</td>
</tr>
</tbody>
</table>
1-2 Installing and Uninstalling the ZEN Support Software

1-2-1 Installation

1. Insert the Setup Disk in the CD-ROM drive of the computer. After a short while, the Language Selection Screen will be displayed. Select the required language and click the Next Button.

Note
• If the Language Selection Screen is not displayed when the CD-ROM is inserted, go to My Computer, open the Setup Disk (CD-ROM) icon, and double-click the Setup.exe file.
• If a previous version of the ZEN Support Software is already installed, a confirmation dialog box for file deletion will appear when the CD-ROM is inserted. Click the OK Button. The previous version will be deleted and the maintenance completion dialog box will be displayed. Click the Finish Button, insert the CD-ROM again, and install the new version of the ZEN Support Software.

2. The Setup Screen will be displayed. Check the details, enter the required information, and click the Next Button.
3. When the setup operation has been completed, the following screen will be displayed. Click the Finish Button.

1-2-2 Uninstalling the ZEN Support Software

Use the following procedure to uninstall the ZEN Support Software from a computer.

1. Select Settings/Control panel from the Windows Start Menu.
2. Select Add or delete applications from the Windows Control Panel and then select and delete OMRON ZEN Support Software.
1-3 Starting and Quitting

1-3-1 Starting the ZEN Support Software

This section explains the procedure for starting and quitting the ZEN Support Software.

1,2,3...

1. Select \textit{Program/Omron/ZEN Support Software/ZEN Support Software} from the Windows Start Menu. After a moment the initial screen will be displayed.

2. When display of the opening screen is finished, the following screen will be displayed. Select \textit{Create a new program} and click the OK Button.

Note

a) Click \textit{Load programs from files} and double-click the OK Button to open existing ladder programs when starting up the ZEN Support Software. Refer to 2-6-2 Opening Saved Files for the rest of the procedure for opening existing ladder programs.

b) If uploading a program from the ZEN is selected, the following will be performed automatically.

- Using the ZEN online function, the contents of the property settings (ZEN model and Expansion I/O Unit configuration) will be read from the ZEN and the settings will be made.
- The program will be transferred from the ZEN to the computer.
- The ladder diagram will be displayed.
3. The Property Settings Screen will be displayed. Enter the ZEN model and configuration (i.e., whether or not Expansion I/O Units are connected), the project name, and a comment and press the OK Button.

4. The ZEN Support Software will start.

1-3-2 Quitting the ZEN Support Software

Select **File(F)/Exit(E)** from the Menu Bar to close the ZEN Support Software.

1-4 Screen Configuration

The ZEN Support Software allows the display to be set to either a Ladder Diagram Display or an Electric Circuit Display. The functionality of the ZEN Support Software is the same regardless of which display is used.
Screen Configuration

Section 1-4

Ladder Diagram Display

Menu bar

Toolbars

Mouse cursor

Ladder view of program

Bit information

Status bar

Electrical Circuit Display

Menu bar

Toolbars

Mouse cursor

Electrical diagram

Bit information

Status bar

Note To switch between the ladder diagram and electrical diagram displays, either click on the buttons in the Toolbar or else select View(V)/Circuit display method/Ladder rung diagram/Electrical circuit diagram from the File menu.
Menu Bar

File (F)
- New (N)
- Open (O)
- Save (S)
- Save As (A)
- Load Symbol Comments
- Print Setup (R)
- Print Preview (V)
- Print (P)
- Communications Settings
  (ZEN ↔ Computer)
- Properties
- Recent File
- Exit (X)

Edit (E)
- Undo (U)
- Redo (R)
- Cut (T)
- Copy (C)
- Paste (P)
- Select All (A)
- Delete
- Delete Rung
- Find (F)
- Find Next
- Replace
- Edit (E)
- Edit Comments
- Edit Rung Comments
- Select Objects

View (V)
- Show Symbol Comments
- Toolbar
- Status Bar (S)
- Grid
- Circuit display method
  - Standard
  - Ladder
  - ZEN Simulator
  - Insert (I)
  - Ladder rung diagram
  - Electrical circuit diagram
  - Vertical (V)

Zoom Out
Zoom In
Zoom to
- 50%
- 100%
- 150%
- 200%

Help (H)
- Contents (N)
- Find Topics (T)
- About ZEN (A)

ZEN (Z)
- Go Online/Offline (W)
- Change operating mode (M)
- Monitor (O)
- Start Simulator/Stop Simulator
- Program Check
- Display Check
- Transfer (R)
- Protect (P)
- Set/Reset Operation
- Error Clear
- All Clear Within ZEN
- Set Protection (E)
- ZEN Information (S)
- RUN (R)
- STOP (S)
- Transfer from ZEN (T)
- Transfer to ZEN (R)
- Compare with ZEN (C)
- Release (L)
- Set (S)
- Set Operation (W)
- Reset Operation (F)
- Settings (S)
- Time Setting (T)
- Set Password (P)

Note: On the ZEN Support Software displays, bits in the ZEN memory are called “relays,” program input bits are called “contacts,” and program output bits are called “coils.”
Screen Configuration  

Section 1-4

Toolbars  
The following shortcut keys can be used from the Toolbars. Select View(V)/Toolbar from the Menu Bar to display or not display the Toolbars.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Ladder</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Select objects</td>
</tr>
<tr>
<td>Open</td>
<td>Insert Contact (input condition)</td>
</tr>
<tr>
<td>Save</td>
<td>Insert Coil (output)</td>
</tr>
<tr>
<td>Print</td>
<td>Insert Horizontal</td>
</tr>
<tr>
<td>Print Preview</td>
<td>Insert Vertical</td>
</tr>
<tr>
<td>Cut</td>
<td>Zoom Out</td>
</tr>
<tr>
<td>Copy</td>
<td>Zoom In</td>
</tr>
<tr>
<td>Paste</td>
<td>Show Grid</td>
</tr>
<tr>
<td>Delete</td>
<td>Show Comments</td>
</tr>
<tr>
<td>Undo</td>
<td>Ladder rung diagram</td>
</tr>
<tr>
<td>Redo</td>
<td>Electrical circuit diagram</td>
</tr>
<tr>
<td>Find</td>
<td></td>
</tr>
<tr>
<td>About ZEN</td>
<td></td>
</tr>
</tbody>
</table>

ZEN  
- Go Online/Offline
- Toggle Monitoring
- Transfer to ZEN
- Transfer from ZEN
- Compare with ZEN
- Set Protection
- Release Protection

Simulator  
- RUN
- STOP
- ZEN Image Display
- Present Value List Display
- Clock Display
- Start/Exit Simulator

Note  
On the ZEN Support Software displays, bits in the ZEN memory are called “relays,” program input bits are called “contacts,” and program output bits are called “coils.”

Mouse Cursors  
There are two types of cursors used with the ZEN. A right-click menu can be used with either of them.

Pencil Cursor  
Appears when performing ladder program input operations.
Arrow Cursor

Appears when performing operations from the Menu Bar or the Toolbar. Also used for specifying the range when editing ladder programs.

Right-click Menu

- Edit (E)
- Find (F)
- Cut (T)
- Copy (C)
- Paste (P)
- Delete (D)
- Set/Reset (S)
- Rung (L)
- Set (W)
- Reset (F)
- Insert (W)
- Remove (R)

Bit Information

Information on bits is displayed in the Bit Information Area.

Status Bar

The Status Bar displays information on the model of the connected ZEN, the connection status, operating status, and comments.

<table>
<thead>
<tr>
<th>Error</th>
<th>ZEN-100/++A</th>
<th>Online</th>
<th>STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connected ZEN model</td>
<td>Displays the model of the ZEN selected at startup.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Connection status</td>
<td>Indicates online or offline status.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Operating status</td>
<td>Indicates RUN or STOP (displayed only when online).</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Comments</td>
<td>Displays operation explanations and online errors.</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 2
Creating Ladder Programs

This section describes how to create, save, edit, and print ladder programs.

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  2-1-1 Ladder Programs ............................................................... 12
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2-1 Circuit Diagrams and Ladder Programs

In preparation for creating ladder programs, this section describes the relationship between relay circuits and ladder programs.

2-1-1 Ladder Programs

The ZEN uses ladder programs that appear like relay circuit diagrams.

2-1-2 Basic Configuration of the ZEN Ladder Programs

The ZEN can execute up to 96 lines of programming, with 3 inputs and 1 output per line. Outputs can be specified at the right ends of lines only. Inputs cannot be specified after outputs.

The ladder program inputs and outputs are displayed on the ZEN Support Software screen as shown below.
Circuit Diagrams and Ladder Programs  

Section 2-1

Electrical Circuit Display

Note  On the ZEN Support Software displays, bits in the ZEN memory are called “relays,” program input bits are called “contacts,” and program output bits are called “coils.”

2-1-3 Memory Areas

The following table shows the memory areas that can be used in the ZEN ladder programs.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Function</th>
<th>Usable as input condition</th>
<th>Usable as output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CPU Unit input bits</td>
<td>Correspond to CPU Unit input terminals.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>X</td>
<td>Expansion I/O Unit input bits</td>
<td>Correspond to Expansion I/O Unit input terminals.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>B</td>
<td>Button input bits</td>
<td>Turn ON/OFF when operation buttons are pressed on the CPU Unit during ZEN operation.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>A</td>
<td>Analog comparator bits</td>
<td>Compares present analog values to setting values and outputs the compared results for CPU Units with DC power supply inputs. (The analog input terminals correspond to I4 and I5 in 10-point CPU Units, and to Ia and Ib in 20-point CPU Units.)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>P</td>
<td>Timer/counter comparator bits</td>
<td>Compares timer/counter present values and timer/counter present values and settings and outputs the compared results.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>G</td>
<td>8-digit comparator bits</td>
<td>Compares 8-digit counter present value to preset value and outputs the compared results.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>@</td>
<td>Weekly timers</td>
<td>Turns ON/OFF at the specified day/time</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
### Circuit Diagrams and Ladder Programs

#### Section 2-1

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Function</th>
<th>Usable as input condition</th>
<th>Usable as output</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>Calendar timers</td>
<td>Turns ON/OFF between specified dates.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Q</td>
<td>CPU Unit output bits</td>
<td>Correspond to CPU Unit output terminals.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Y</td>
<td>Expansion I/O Unit output bits</td>
<td>Correspond to Expansion I/O Unit output terminals.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>M</td>
<td>Work bits</td>
<td>Bits that can be used in the ladder program.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H</td>
<td>Holding bits</td>
<td>Bits that maintain ON/OFF status at power interruptions and can be used in the ladder program.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>T</td>
<td>Timers</td>
<td>Timers can be used for ON delay (X), OFF delay (■), One-shot pulse (O), Flashing pulse (F), or Twin (W) operation.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>#</td>
<td>Holding timers</td>
<td>Timers that maintain the present value at power interruptions. (ON delay operation only.)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>Counters</td>
<td>Incremental or decremental counters</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>F</td>
<td>8-digit Counter</td>
<td>Incremental or decremental counter with 8-digit capacity.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>D</td>
<td>Display bits</td>
<td>Display character strings, month/day, time, timer/counter present value, or analog conversion value on CPU Unit LCD display.</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## 2-1-4 Memory Area Differences between Versions

The following table shows the differences between different models and different versions with respect to the memory areas that can be used.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Bit number (See note 1.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>CPU Unit input bits</td>
<td>ZEN-20C-V2 0 to b (12 bits) / ZEN-10C-V2 0 to 5 (6 bits)</td>
</tr>
<tr>
<td>O</td>
<td>CPU Unit output bits</td>
<td>ZEN-20C-V2 0 to 7 (8 bits) / ZEN-10C-V2 0 to 3 (4 bits) (See note 5.)</td>
</tr>
<tr>
<td>X</td>
<td>Expansion I/O Unit input bits (See note 2.)</td>
<td>0 to b (12 bits max.)</td>
</tr>
<tr>
<td>Y</td>
<td>Expansion I/O Unit output bits (See note 2.)</td>
<td>0 to b (12 bits max.)</td>
</tr>
<tr>
<td>M</td>
<td>Work bits</td>
<td>0 to f (16 bits)</td>
</tr>
<tr>
<td>H</td>
<td>Holding bits</td>
<td>0 to f (16 bits)</td>
</tr>
<tr>
<td>B</td>
<td>Button input bits (See note 3.)</td>
<td>0 to 7 (8 bits)</td>
</tr>
<tr>
<td>A</td>
<td>Analog comparator bits (See note 4.)</td>
<td>0 to 3 (4 bits)</td>
</tr>
<tr>
<td>P</td>
<td>Timer/counter comparator bits</td>
<td>0 to f (16 bits)</td>
</tr>
<tr>
<td>T</td>
<td>Timers</td>
<td>0 to f (16 timers) / 0 to 7 (8 timers)</td>
</tr>
<tr>
<td>#</td>
<td>Holding timers</td>
<td>0 to f (16 timers) / 0 to 7 (8 timers)</td>
</tr>
<tr>
<td>C</td>
<td>Counters</td>
<td>0 to f (16 counters) / 0 to 7 (8 counters)</td>
</tr>
<tr>
<td>@</td>
<td>Weekly timers (See note 3.)</td>
<td>0 to f (16 timers) / 0 to 7 (8 timers)</td>
</tr>
<tr>
<td>*</td>
<td>Calendar timers (See note 3.)</td>
<td>0 to f (16 timers) / 0 to 7 (8 timers)</td>
</tr>
<tr>
<td>D</td>
<td>Display bits (See note 3.)</td>
<td>0 to f (16 bits) / 0 to 7 (8 bits)</td>
</tr>
<tr>
<td>F</td>
<td>8-digit counter</td>
<td>0 (1 counter) / ---</td>
</tr>
<tr>
<td>G</td>
<td>8-digit comparator bits</td>
<td>0 to 3 (4 bits) / ---</td>
</tr>
</tbody>
</table>
### Note

1. Bit numbers are specified in hexadecimal (0, 1, 2, 3, ..., 9, a, b, ..., e, f).
2. The bit numbers that can be used depend on the Expansion I/O Unit connection configuration.
3. Supported only by the LCD-type CPU Unit.
4. Supported only by the CPU Units with a DC power supply.
5. Three bits (0 to 2) for CPU Units with Communications.

### 2-2 Inputting Ladder Programs

This section describes how to input the following simple program using the ZEN Support Software.

#### Example Ladder Program

![Diagram of Example Ladder Program]

1. If the ZEN Support Software has not been started, select Programs/Omron/ZEN Support Software/ZEN Support Software from the Windows Start Menu. Select Create a new program and press the OK Button.

If the ZEN Support Software has already been started, click the New Button on the Toolbar. Alternatively, select File(F)/New(N) from the Menu Bar.
2. The Property Settings Screen will be displayed. Enter the ZEN type, configuration (i.e., Expansion I/O Units), project name, and comment, and then click the OK Button.

3. An empty screen in ladder-view format will be displayed. Double-click the mouse on the position for the first input condition.

Note: Input positions for input and output bits can be set by using the mouse or cursor keys to move to the input or output position and then use any of the following methods.

- Press the Enter Key.
- Double-click.
- Click the Insert Input or Insert Output Button on the Toolbar.
- Select Insert(I)/Contact (input bit)/Coil (output bit) from the Menu Bar.
- Select Edit(E)/Edit(E) from the Menu Bar.
- Right-click and select Edit.
4. The Edit Contact Dialog Box will be displayed. Specify the bit type, type of input, and bit number, and enter a comment if required.

![Edit Contact Dialog Box](image)

- Bit name: I
- Input: Normally open
- Bit number: 0
- Comment: CPU Unit input 0 (Up to 31 characters can be entered.)

Note: Parameter settings for timers and counters are set on the Edit Contact Dialog Box.

5. Double-click the mouse on the next input position.
6. The Edit Input Dialog Box will be displayed again. Specify the bit type, type of input, bit number, and enter a comment if required, just as you did in step 4.

7. Move the mouse to the output bit position and double-click the mouse.
8. The Edit Output Dialog Box will be displayed. Specify the bit type, function, and bit number, and enter a comment if required.

```
Bit name: Q
Normal output ([), Set (S)/Reset (R), or Alternate (A): Normal output ([)
Bit number: 0
Comment: CPU Unit output 0 (Up to 31 characters can be entered.)
```

9. Move the mouse to the input position on the next line and double-click.
10. The Edit Input Dialog Box will be displayed. Specify the bit type, type of input, and bit number, and enter a comment if required, just as you did in step 4.

Note The comment will be automatically displayed for bit types and bit numbers that have comments.

11. Drag the mouse vertically to draw the connecting line.
Inputting Ladder Programs

Section 2-2

Note  

a) Horizontal connection lines can be drawn by using the mouse or Cursor Keys to move to the connection line position and then use any of the following methods.

- Pressing the – Key.
- Click the Insert/Horizontal Button on the Toolbar.
- Select Insert(I)/Horizontal(H) from the Menu Bar.

b) Vertical connection lines can also be drawn by using the mouse or Cursor Keys to move to the connection line position and then use any of the following methods:

- Press the | Key.
- Click the Insert Vertical Button on the Toolbar.
- Select Insert(I)/Vertical(V) from the Menu Bar. The vertical line will be drawn down from the cursor position.

12. The ladder program has now been completed.

13. Double-click in the rung comment area to write rung comments for the ladder program. It is also possible to write comments by first using either the mouse or the cursor keys to move to the rung comment area, and then selecting Edit(E)/Edit rung comments.
Checking Ladder Programs  

Section 2-3

Note Up to 63 characters can be entered for a rung comment.

2-3 Checking Ladder Programs

2-3-1 Program Check

Select ZEN(Z)/Program Check from the Menu Bar and check the program. The following dialog box will be displayed if the program check was completed without finding any errors.

Note For details on error messages during program checking, refer to 6-2 Program Check Errors and Warnings.

2-3-2 Display Check

Select ZEN(Z)/Display Check from the Menu Bar, and then use the Display Check Dialog Box to check the display contents for the display bits D0 to Df that are used in the program. The contents of
2-4 Editing Ladder Programs

This section describes how to edit existing ladder programs.

2-4-1 Searching for Inputs and Outputs

Click the Find Button on the Toolbar or select Edit(E)/Find(F) from the Menu Bar.

Finding by Rung Number

Finding by Bit Type or Bit Number

Rung numbers: 0 to 95

Bit type number

2-4-2 Replacing Inputs

To replace an input, select Edit(E)/Replace from the Menu Bar.

Replace the inputs while doing the search. (As each input is found, confirm whether or not it is to be replaced.)

Replace all of the inputs in the ladder program (without confirming them individually).
2-4-3 Changing Inputs, Outputs, and Settings

Input positions for input and output bits can be changed by using the mouse or cursor keys to move to the input or output position and then use any of the following methods.

- Press the Enter Key.
- Double-click.
- Click the Insert Input or Insert Output Button on the Toolbar.
- Select Insert(I)/Contact (input bit)/Coil (output bit) from the Menu Bar.
- Select Edit(E)/Edit(E) from the Menu Bar.
- Right-click and select Edit.

1,2,3...

1. For this example, double-click CPU unit output Q0.

2. The Edit Output Dialog Box will be displayed.
3. Change the bit type in the Edit Output Dialog Box from Q to M (holding bit), specify the function and bit number, and enter a comment if necessary.

4. The output change has now been completed.

2-4-4 Inserting Inputs

Input positions for input and output bits can be inserted by using the mouse or cursor keys to move to the input or output position and then

- Press the Enter Key.
- Double-click.
- Click the Insert Input Button on the Toolbar.
- Select Insert(I)/Contact (input bit)/Coil (output bit) from the Menu Bar.
- Select Edit(E)/Edit(E) from the Menu Bar.
- Right-click and select Edit.
1,2,3... 1. Double-click the ladder program connection line.

2. Use the Edit Input Dialog Box to insert an input at the connection line.

2-4-5 Deleting Inputs and Outputs

To delete an input or output, first use the mouse or the cursor keys to highlight the input or output that is to be deleted. Then use any of the following methods.

- Click the Delete Button in the Toolbar.
- Select Edit(E)/Delete from the Menu Bar.
- Right-click and select Delete(D).
- Press the Delete Key on the keyboard.

1,2,3... 1. Move the cursor to the input.
2. Click the **Delete** Button on the Toolbar.

3. The input will be deleted.

**Note** All inputs and outputs within a specified area can be deleted at once if the method to specify an area outlined under 2-4-8 Copying, Cutting, and Pasting Inputs and Outputs is used.

### 2-4-6 Inserting Rungs

Using either the mouse or cursor keys, highlight the position where the rung is to be inserted, and then use any of the following methods to insert a blank rung.

- Select **Insert(I)/Rung(M)** from the Menu Bar.
- Right-click and select **Rung(L)/Insert(W)**.
1. Highlight the position and then select **Insert(I)/Rung(M)** from the Menu Bar.

2. The blank rung will be inserted above the highlighted position.

---

2-4-7  **Editing Connection Lines**

Use the following procedure to delete connection lines.

1. Drag the mouse along the existing line.
2. Use the mouse or Cursor Keys to move to the connection line and then use any of the following methods.
   - Click the **Delete** Button on the Toolbar.
   - Select **Edit(E)/Delete** from the Menu Bar.
   - Press the **Delete** Key on the keyboard.
Use the following procedure to create new connection lines.

1, 2, 3...

1. Drag the mouse from the desired position to create a new line.
2. Use the mouse or Cursor Keys to move to the desired position for the connection line and then use any of the following methods.
   - Click the **Insert Horizontal** or **Insert Vertical** Button on the Toolbar.
   - Select **Insert(I)/Horizontal(H)** or **Insert(I)/Vertical(V)** from the Menu Bar.
   - Press the – or I Key on the keyboard.

**2-4-8 Copying, Cutting, and Pasting Inputs and Outputs**

Inputs and outputs within a specified range can be easily copied and moved if the cut, copy, or paste functions are used.

**Copying, Cutting and Pasting Individual Objects**

1, 2, 3...

1. Using the mouse or cursor keys, select the input or output that is to be copied or cut.
2. Use any of the following procedures for copying and moving.
3. Any of the following methods can be used to paste inputs and outputs after moving the cursor to desired position with the mouse or cursor keys.
   - Click the Paste Button on the Toolbar.
   - Select Edit(E)/Paste(P) from the Menu Bar.
   - Right-click and select Paste.

**Note** Either the pencil or arrow cursor can be used to copy, cut, and paste individual objects.
Editing Ladder Programs

Section 2-4

Copying, Cutting, and Pasting a Specified Range

1,2,3...

1. Click the Select objects Button on the Toolbar or select Edit(E)/Select Objects from the Menu Bar.

Note Connection lines cannot be drawn while the Select objects Button on the Toolbar is pressed. To return to normal program edit mode, click the Select Objects Button again or press the Esc Key.
2. Drag the mouse from the start of the range to the end of the range.

3. Use any of the following procedures for copying and moving.
4. Any of the following methods can be used to paste inputs and outputs after moving the cursor to desired position with the mouse or cursor keys.

- Click the Paste Button on the Toolbar.
- Select Edit(E)/Paste(P) from the Menu Bar.
- Right-click and select Paste.

Note A program saved in a ladder program file can be pasted after copying the program and then starting up the ZEN Support Software in a separate window.
2-4-9 Deleting Rungs

Using either the mouse or cursor keys, highlight the rung that is to be deleted. Then use any of the following methods to delete the rung.

- Select **Edit (E)/Delete Rung** from the Menu Bar.
- Right-click and select **Rung (L)/Delete (R).**

1,2,3...
1. Highlight the position and then select **Edit (E)/Delete Rung** from the Menu Bar.
2. The highlighted rung will be deleted, and the next rung will be moved up.

2-5 Editing Comments

The comment edit function is used to display or edit all I/O comments by bit type.

1,2,3...
1. Select **Edit (E)/Edit Comments** from the Menu Bar.
2-6 Saving Ladder Programs

This section describes how to save ladder programs to file.

2-6-1 Saving to File

1,2,3...

1. Select **File(F)/Save As(A)** from the Menu Bar.

2. The Save As Dialog Box will be displayed. Select the save destination and enter the file name, and then click the **Save** Button.

Note  1. When saving existing ladder programs that have been edited since they were saved, you can also click the **Save** Button on the
Printing Ladder Programs

Section 2-7

Toobar or select File(F)/Save(S) from the Menu Bar to overwrite the existing file.

2. The system settings and password set under ZEN/Set Protection will also be saved with the file.

2-6-2 Opening Saved Files

1,2,3...

1. Click the Open Button on the Toolbar or select File(F)/Open(O) from the Menu Bar to open saved files.

2. The Open File Dialog Box will be displayed. Specify the file location and file name and click the Open Button.

2-7 Printing Ladder Programs

2-7-1 Print Settings

This section describes the layout and heading settings that must be made before printing ladder programs.

1,2,3...

1. Select File(F)/Print Setup(R) from the Menu Bar.

2. The Print Settings Dialog Box will be displayed. Make the settings for each item.
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Printing Ladder Programs

Section 2-7

<table>
<thead>
<tr>
<th>Setting</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program frame display</td>
<td>Check this box to print the print frame.</td>
</tr>
<tr>
<td>Parameter settings information</td>
<td>Check this box to print the timer, counter, and other parameter settings. Information will be printed only for portions of the memory areas that are being used.</td>
</tr>
<tr>
<td>Print title</td>
<td>Check this box to print the title.</td>
</tr>
<tr>
<td>Drawing name</td>
<td>Enter the drawing name.</td>
</tr>
<tr>
<td>Figure No.</td>
<td>Enter the drawing number.</td>
</tr>
<tr>
<td>Revision mark</td>
<td>Enter the revision mark.</td>
</tr>
<tr>
<td>Prepared by</td>
<td>Enter the name of the person who wrote the program.</td>
</tr>
<tr>
<td>Date</td>
<td>Enter the date the program was written.</td>
</tr>
</tbody>
</table>

3. Click the OK Button to save the settings as the print settings for the ZEN Support Software. Click the Cancel Button to discard the settings.

Note

a) To specify whether I/O comments are to be printed, either click the Show Comments Button on the Toolbar or select View(V)/Show Symbol Comments from the Menu Bar.

b) To specify whether a ladder diagram or electrical circuit diagram is to be printed, either click the Ladder rung diagram Button or the Electrical circuit diagram Button on the Toolbar or else select View(V)/Circuit display method/Ladder rung diagram or Electrical circuit diagram from the Menu Bar.

2-7-2 Print Preview

1,2,3... 1. Click the Print Preview Button on the Toolbar or select File(F)/Print Preview(V) from the Menu Bar to check the print layout.
2. The Print Preview Screen will be displayed.

2-7-3 Printing

1,2,3...

1. Click the Print Button on the Toolbar or select File(F)/Print(P) from the Menu Bar.

2. The Print Dialog Box will be displayed. Make settings for each item and click the OK Button.
SECTION 3
Transferring and Monitoring Programs

This section describes how to connect to the ZEN and how to transfer programs between the ZEN and the ZEN Support Software.

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3-1 Connecting the ZEN and Communications Settings

3-1-1 Connecting to the ZEN

Use a ZEN-CIF01 Computer Connecting Cable to connect the ZEN and a serial port (COM port) of the computer.

Note  The connector on the computer side of the ZEN-CIF01 Computer Connecting Cable is a 9-pin D-sub connector. When connecting to a computer that does not have a serial port, connect an RS-232C-USB Conversion Cable to the ZEN-CIF01 Computer Connecting Cable. An OMRON CS1W-CIF31 Conversion Cable can be used (cable length: 50 cm).
3-1-2 Communications Settings for Connecting to the ZEN

Communications settings must be made in the ZEN Support Software before commencing communications with the ZEN.

1,2,3...

1. Select `File(F)/Communications Settings (Computer ↔ ZEN)` from the Menu Bar.

2. The Communications Settings Dialog Box will be displayed. Make the settings for each item.

   a) When using a -V2 CPU Unit

   ![Communications Settings Dialog Box]

<table>
<thead>
<tr>
<th>Setting</th>
<th>Details</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port name</td>
<td>Select a COM port that can be connected to the personal computer.</td>
<td>COM 1</td>
</tr>
<tr>
<td>Monitor time</td>
<td>Specify the communications monitor time between 1 and 30 s.</td>
<td>2</td>
</tr>
</tbody>
</table>

   b) When using a -V1 or earlier CPU Unit.

   ![Communications Settings Dialog Box]

<table>
<thead>
<tr>
<th>Setting</th>
<th>Details</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port name</td>
<td>Select a COM port that can be connected to the personal computer.</td>
<td>COM 1</td>
</tr>
<tr>
<td>Node No.</td>
<td>Use 0 for the node number. If the node number is different from the node number of the ZEN, communications will not be possible.</td>
<td>0</td>
</tr>
<tr>
<td>Monitor time</td>
<td>Specify the communications monitor time between 1 and 30 s.</td>
<td>2</td>
</tr>
</tbody>
</table>
Connecting Online

Section 3-2

Specifications Changes from Version 3.0 Support Software

Modem-related settings (Modem, Local information, Connect to) that could not be used have been deleted.

3. Click the OK Button to save the settings in the project.
   Click the Cancel Button to discard the settings.
   Click the Defaults Button to return to the default settings.

3-2 Connecting Online

Check communications with the ZEN before transferring or verifying programs. Connect the computer to the ZEN and perform the check operation with the project file open.

1, 2, 3...

1. Select File(F)/Properties from the Menu Bar and make the ZEN model and Expansion I/O Units 1 to 3 settings in the Properties Dialog Box to match the system configuration of the ZEN to be connected online.

2. Turn OFF the ZEN power, connect the ZEN to the computer with the Computer Connecting Cable, then turn ON the ZEN power again.
   When using a ZEN that supports external communications, a confirmation message that says, “RS-485 will stop. Y/N” will be displayed on the ZEN when you turn ON the power. Select Yes, then click the OK Button.

3. Open the project file. Click the Go Online Button on the Toolbar or select ZEN(Z)/Go Online/Offline(W) from the Menu Bar. A confirmation dialog box will be displayed. Click the OK Button.

4. Check that the Status Bar display has changed from Offline to Online. The background color for the ladder view area will change to gray when the ZEN is online.

Click the Go Online Button on the Toolbar again or select ZEN(Z)/Go Online/Go Offline(W) from the Menu Bar. The display on the Status Bar will return from Online to Offline. The background color for the ladder view area will change back to white.
Transferring Programs to the ZEN

Section 3-3

Note

a) Ladder programs cannot be edited when online. Always go offline before creating or editing ladder programs.

b) Select ZEN/ZEN Information(S) from the Menu Bar while online to obtain information about the connected ZEN.

3-3 Transferring Programs to the ZEN

This section describes how to transfer ladder programs created using the ZEN Support Software to the ZEN.

The ZEN must be connected and online and the project file opened before the program transfer operation can be executed.

Precaution

Perform adequate safety checks before transferring the program to the ZEN.

1,2,3...

1. Click the Transfer to ZEN Button on the Toolbar or select ZEN(Z)/Transfer(R)/Transfer to ZEN(T) from the Menu Bar. The Transfer to ZEN Dialog Box will be displayed. Click the OK Button to transfer the program to the ZEN. Click the Cancel Button to cancel the transfer.

Settings Details

- Select The settings are downloaded too in the Transfer to ZEN Dialog Box to download the ZEN settings in the ZEN Support Software at the same time. Refer to 4-1 ZEN Settings for information on the various ZEN settings.

- Select Protection is set in the Transfer to ZEN Dialog Box if the ZEN is to be protected by the password set in the ZEN Support Software. Do not select this option if no password has been set. Refer to 4-2 Setting a Password for information on setting passwords.

Note

1. With version 4.0 or higher, it is possible to transfer programs to the ZEN even if the Expansion I/O Units are not connected, so long
as the CPU Unit is the same type as that specified in the property settings of the Support Software.
When going online, a confirmation message, such as the example shown below, will be displayed. Select "Y" (yes) to connect, and then perform the transfer operation.

"ZEN model in properties settings (10C1A*-A-V2) does not match model being connected (10C1A*-A-V2+8E1**). Go online? Y/N"

2. Refer to 6-2 Program Check Errors and Warnings for information on error messages that occur during transfer from the computer to the ZEN.

3-4 Transferring Programs from the ZEN

This section describes how to transfer the ZEN ladder programs to the ZEN Support Software.

The ZEN must be connected and online and the project file opened before the program transfer operation can be executed.

1. Click the Transfer From ZEN Button on the Toolbar or select ZEN(Z)/Transfer(R)/Transfer from ZEN(T) from the Menu Bar. The Transfer From ZEN Dialog Box will be displayed. Click the OK Button to transfer the program from the ZEN. Click the Cancel Button to cancel the transfer.

Settings Details
Select The settings are uploaded too in the Transfer From ZEN Dialog Box to upload the ZEN settings at the same time.

Note
a) If a password has been set for the previously opened project file (see 4-2 Setting a Password), the password will be cleared, and a confirmation dialog box will be displayed.

b) Refer to 6-2 Program Check Errors and Warnings for information on error messages that occur during transfer from the ZEN to the computer.
Verifying Programs with the ZEN

Section 3-5

3-5 Verifying Programs with the ZEN

This section describes how to compare the programs in the ZEN and the ZEN Support Software to verify that they are the same.

The ZEN must be connected and online and the project file opened before the program verification operation can be executed.

1. Click the Compare with ZEN Button on the Toolbar or select ZEN(Z)/Transfer(R)/Compare with ZEN(C) from the Menu Bar. The Compare With ZEN Dialog Box will be displayed. Click the OK Button to compare the ZEN and the ZEN Support Software programs. Click the Cancel Button to cancel the verification.

Settings Details
Select The settings are compared too in the Compare With ZEN Dialog Box to compare the ZEN and the ZEN Support Software settings at the same time.

2. A confirmation dialog box will be displayed if the verification has been completed normally.

When Programs Are the Same
When Programs Are Different

Note Refer to 6-2 Program Check Errors and Warnings for information on error messages that occur during verification.
3-6 Operating and Stopping the ZEN

Operating and Stopping the ZEN

This section describes how to operate and stop the ZEN from the ZEN Support Software.

The ZEN must be connected and online and the project file opened before these operations can be executed.

Precaution
Perform adequate safety checks before changing the operating mode (RUN/STOP).

1,2,3...

1. Select ZEN(Z)/Change operating mode(M)/RUN(R) from the Menu Bar.

2. Check that the Status Bar display changes from STOP to RUN.

3. Select ZEN(Z)/Change operating mode(M)/STOP(S) from the Menu Bar to stop ZEN operation. The Status Bar display will change from RUN to STOP.

3-7 Monitoring Programs

3-7-1 Monitor

This section describes how to monitor programs being executed by the ZEN.

The ZEN must be connected and online and the project file opened before the programs can be monitored. The ZEN and the ZEN Support Software programs must be the same before programs can be monitored. Use the procedures outlined under 3-3 Transferring Programs to the ZEN (page 45), 3-4 Transferring Programs from the ZEN (page 46), and 3-5 Verifying Programs with the ZEN (page 47) to transfer and verify the programs.

1,2,3...

1. Use the procedure outlined under 3-6 Operating and Stopping the ZEN (page 48) to start ZEN operation. Check that the Status Bar display changes from STOP to RUN.

2. Click the Toggle Monitoring Button on the Toolbar or select ZEN(Z)/Monitor(O) from the Menu Bar.
Monitoring Programs

3. When the mode is changed to MONITOR, the closed circuits of the ZEN ladder program are highlighted in green.

3-7-2 Displaying Present Values

Present values, the ON/OFF status of inputs, etc., can be displayed during monitoring of programs being executed by the ZEN.

During monitoring, moving the mouse or cursor to a timer/counter or other output will cause the present value to be displayed in the Status Bar.

3-7-3 Changing Settings Online

Set values can be changed while connected to the ZEN online.

1,2,3...

1. While online, use either the mouse or the cursor keys to highlight the output that is to be changed. Then use any of the following methods to change the setting.

   - Press the Enter Key or double-click.
   - Select Edit(E)/Edit(E) from the Menu Bar.
2. The Edit Dialog Box will be displayed. When the settings are changed and the dialog box closed, the changes will be transferred to the ZEN and reflected there.

Note The following table shows the settings that can be changed online.

<table>
<thead>
<tr>
<th>Bit type</th>
<th>Content of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer (T)</td>
<td>Time setting</td>
</tr>
<tr>
<td>Holding timer (#)</td>
<td>Time setting</td>
</tr>
<tr>
<td>Counter (C)</td>
<td>Counter setting</td>
</tr>
<tr>
<td>8-digit counter (F) (See note.)</td>
<td>Counter setting</td>
</tr>
<tr>
<td>Weekly timer (@)</td>
<td>Start/stop day of week, time</td>
</tr>
<tr>
<td></td>
<td>Pulse output time (See note.)</td>
</tr>
<tr>
<td>Calendar timer (*)</td>
<td>Start/stop months, days</td>
</tr>
<tr>
<td>Analog comparator (A)</td>
<td>Constants, operators</td>
</tr>
</tbody>
</table>

Note The 8-digit counters and pulse output time can be used when using a -V2 CPU Unit.
Setting and Resetting Inputs

3-8 Setting and Resetting Inputs

This section describes how to set (turn ON) and reset (turn OFF) the ZEN bits from the ZEN Support Software.

The ZEN must be connected and online and the project file opened before inputs can be set or reset. Also, the ZEN and the ZEN Support Software programs must be the same before inputs can be set or reset. Use the procedures outlined under 3-3 Transferring Programs to the ZEN (page 45), 3-4 Transferring Programs from the ZEN (page 46), and 3-5 Verifying Programs with the ZEN (page 47) to transfer and verify the programs.

Precaution

Confirm safety before turning relays ON or OFF.

1,2,3...

1. Use the procedure outlined under 3-6 Operating and Stopping the ZEN to start ZEN operation. Check that the Status Bar display changes from STOP to RUN.

2. Use the procedure outlined under 3-7 Monitoring Programs to change to MONITOR mode.

3. Use the mouse or cursor keys to move to the input that is to be set or reset, and then perform either of the following operations:

- Select ZEN(Z)/Set/Reset Operation and then either Set Operation(W) or Reset Operation(F) from the Menu Bar.

- Right-click and then select Set/Reset Operation and then either Set Operation(W) or Reset Operation(F).

Note

The following table shows the inputs that can be set or reset.

<table>
<thead>
<tr>
<th>Bit type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Unit input bits (I)</td>
<td>Input terminal ON/OFF status has priority.</td>
</tr>
<tr>
<td>CPU Unit output bits (Q)</td>
<td>Set/reset possible for inputs only. (Not possible for outputs.)</td>
</tr>
<tr>
<td>Expansion I/O Unit input bits (X)</td>
<td>Input terminal ON/OFF status has priority.</td>
</tr>
<tr>
<td>Expansion I/O Unit output bits (Y)</td>
<td>Set/reset possible for inputs only. (Not possible for outputs.)</td>
</tr>
<tr>
<td>Work bits (M)</td>
<td></td>
</tr>
<tr>
<td>Holding bits (H)</td>
<td></td>
</tr>
</tbody>
</table>
3-9 Clearing Errors

If an error occurs, use the following procedure to clear the error and then remove the cause of the error.

The ZEN must be connected and online for this operation.

1, 2, 3...

1. Select ZEN(Z)/Error Clear from the Menu Bar to clear the error.
2. Repeat this step to clear multiple errors.

Note

a) Refer to Section 6 Troubleshooting in the ZEN Operation Manual (Z183) for information on ZEN errors.
b) ZEN errors that occur while online will be displayed in the Status Bar.

<table>
<thead>
<tr>
<th>Error display</th>
<th>ZEN-OCM-4A</th>
<th>Online</th>
<th>STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Error</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 4
System Settings

This section describes the ZEN system settings, how to set passwords to protect the ZEN ladder programs, and how to clear the ZEN memory.

4-1  ZEN Settings ............................................................... 54
    4-1-1  Settings............................................................. 54
    4-1-2  Time Settings ..................................................... 56
4-2  Setting a Password ..................................................... 57
4-3  Protecting Programs ................................................... 58
    4-3-1  Setting Program Protection .................................... 58
    4-3-2  Removing Program Protection ................................. 58
4-4  Clearing the ZEN Memory .............................................. 59
4-5  RS-485 Communications Settings ................................. 60
ZEN Settings

Section 4-1

4-1 ZEN Settings

This section describes how to change the ZEN settings from the ZEN Support Software.

4-1-1 Settings

1,2,3...

1. Select ZEN(Z)/Set Protection(E)/Settings(S) from the Menu Bar.

2. The Settings Dialog Box will be displayed. Make the settings for each item.

   a) When Using a -V2 CPU Unit

<table>
<thead>
<tr>
<th>Setting</th>
<th>Details</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylight saving time (See note a.)</td>
<td>None, manual, EU Type, US Type, AU Type, NZ Type</td>
<td>None</td>
</tr>
<tr>
<td>Display language (See note a.)</td>
<td>English, Japanese, German, French, Italian, Spanish</td>
<td>English</td>
</tr>
<tr>
<td>Backlight control (See note a.)</td>
<td>2 min, 10 min, 30 min, always</td>
<td>2 min</td>
</tr>
<tr>
<td>Input filter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU Unit</td>
<td>OFF: No input filter</td>
<td>OFF</td>
</tr>
<tr>
<td>Expansion I/O Unit 1 (See note b.)</td>
<td>ON: With input filter</td>
<td></td>
</tr>
<tr>
<td>Expansion I/O Unit 2 (See note b.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expansion I/O Unit 3 (See note b.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Send delay time (See note c.)</td>
<td>Send delay time for the initialization command to the modem set in the ZEN</td>
<td>0</td>
</tr>
<tr>
<td>Initialize modem (See note c.)</td>
<td>Initializes the modem set in the ZEN</td>
<td>...</td>
</tr>
</tbody>
</table>

Note  a) The display language and background settings can be used for LCD-type CPU Units.
**ZEN Settings**

### Section 4-1

b) Input filters can be set only for Expansion I/O Units that exist in the system configuration.

c) Do not change these settings. They are for future functional expansions. (These settings are not displayed for models with communications.)

b) When Using a -V1 or Earlier CPU Unit

<table>
<thead>
<tr>
<th>Setting</th>
<th>Details</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylight saving time</td>
<td>None, manually, EU Type, US Type</td>
<td>None</td>
</tr>
<tr>
<td>Display language</td>
<td>English, Japanese, German, French, Italian, Spanish</td>
<td>English</td>
</tr>
<tr>
<td>Contrast control</td>
<td>Light, Medium light, Medium, Medium dark, Dark</td>
<td></td>
</tr>
<tr>
<td>Backlight control</td>
<td>2 min, 10 min, 30 min, always</td>
<td>2 min</td>
</tr>
<tr>
<td>Input filter</td>
<td>CPU Unit On: With input filter</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>Expansion I/O Unit 1 (See note b.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expansion I/O Unit 2 (See note b.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expansion I/O Unit 3 (See note b.)</td>
<td></td>
</tr>
<tr>
<td>Send delay time</td>
<td>Send delay time for the initialization command to the modem set in the ZEN</td>
<td>0</td>
</tr>
<tr>
<td>Initialize modem</td>
<td>Initializes the modem set in the ZEN.</td>
<td>---</td>
</tr>
</tbody>
</table>

**Note**

a) The display language and background settings can be used for LCD-type CPU Units.

b) Input filters can be set only for Expansion I/O Units that exist in the system configuration.

c) Do not change these settings. They are for future functional expansions.
ZEN Settings  Section 4-1

3. Click the **OK** Button to save the settings.  
   Click the **Cancel** Button to discard the settings.  
   Click the **Initialization** Button to return to the default settings.

4. Settings can be sent between the ZEN and the ZEN Support Software if the ZEN is online.  
   Click the **Transfer to ZEN** Button to transfer the settings to the 
   ZEN or the **Transfer from ZEN** Button to transfer the settings 
   from the ZEN to the ZEN Support Software.  
   Press the **Compare with ZEN** Button to compare the settings on 
   the computer and the ZEN.

4-1-2 Time Settings

With the LCD-type CPU Units, time and date settings are performed 
online.

1,2,3...  
1. Select **ZEN(Z)/Set Protection(E)/Time Setting(T)** from the 
   Menu Bar.  
2. The Time Settings Dialog Box will be displayed. Set the date and 
   time for the ZEN internal clock.

3. Click the **OK** Button to send the settings to the ZEN.  
   Click the **Cancel** Button to discard the settings.  
   Click the **Synchronization** Button to use the computer date and 
   time as the ZEN date and time. When the Synchronization Button

<table>
<thead>
<tr>
<th>Settings</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEN internal clock</td>
<td>Date Edit the ZEN date. (Date read from the ZEN at startup or same date as computer)</td>
</tr>
<tr>
<td></td>
<td>Time Edit the ZEN time. (Time read from the ZEN at startup or same time as computer)</td>
</tr>
<tr>
<td>PC time</td>
<td>Date Displays the computer date.</td>
</tr>
<tr>
<td></td>
<td>Time Displays the computer time.</td>
</tr>
</tbody>
</table>

**Note**  To set the date and time display styles, select **Settings/Control Panel/Regional Settings** from the **Start** menu. Select **Date** to set a date style or **Time** to set a time style (when using Windows 2000).

3. Click the **OK** Button to send the settings to the ZEN.  
   Click the **Cancel** Button to discard the settings.  
   Click the **Synchronization** Button to use the computer date and 
   time as the ZEN date and time. When the Synchronization Button
Setting a Password

Section 4-2

is clicked, the computer date and time will be shown under the ZEN date and time on the screen, but these settings will not be sent to the ZEN. To transfer the computer date and time to the ZEN, click the Synchronization Button and then click the OK Button.

4-2 Setting a Password

This section describes how to set a password for the ZEN. This password is used to set and clear protection for the ZEN programs.

Note

1. Refer to 4-3 Protecting Programs for information on how to set and clear ZEN program protection.
2. When setting a password, be sure to record it. If you forget the password, it will not be possible to set or clear protection for the ZEN program.

1,2,3...

1. Select ZEN(Z)/Set Protection(E)/Set Password(T) from the Menu Bar.
2. The Set Password Dialog Box will be displayed. Enter the password and confirm the password.

The password can be only 4 digits long.

3. Click the OK Button to set the password as entered. Click the Cancel Button to clear the entered password. Click the Delete Password Button to delete an existing password.
4-3 Protecting Programs

This section describes how to protect the ZEN programs from intentional or unintentional alteration by other users. Protected ZEN programs cannot be altered until the protection is removed and the protection can only be removed if the password is input correctly. For these reasons, care must be taken when using program protection.

The ZEN must be connected and online before program protection can be executed.

Note

a) Refer to 4-2 Setting a Password for information on how to set and change passwords.

b) If the password is forgotten, it can only be cleared by performing the ZEN's memory all clear operation (see 4-4 Clearing the ZEN Memory).

4-3-1 Setting Program Protection

1. Click the Set Protection Button on the Toolbar or select ZEN(Z)/Protect(P)/Set(S) from the Menu Bar. The Set Protection Dialog Box will be displayed.

2. Enter the 4-digit password set under the password settings.

3. Once the above procedure has been completed, programs cannot be transferred to or from the ZEN or compared with the ZEN until the protection is removed.

4-3-2 Removing Program Protection

1. Click the Release Protection Button on the Toolbar or select ZEN(Z)/Protect(P)/Release(L) from the Menu Bar. The Release Protection Dialog Box will be displayed.

2. Enter the 4-digit password set under the password settings.

Programs can now be transferred to or from the ZEN or compared with the ZEN.
4-4 Clearing the ZEN Memory

This section describes how to clear the ZEN memory from the ZEN Support Software. The ZEN must be connected and online to perform this operation.

<table>
<thead>
<tr>
<th>ZEN memory data</th>
<th>Status after memory cleared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladder programs (including parameter settings information)</td>
<td>Ladder program code is completely cleared. No ladder programming will remain.</td>
</tr>
<tr>
<td>Password settings</td>
<td>The password will be cleared and program protection removed.</td>
</tr>
<tr>
<td>I/O bits</td>
<td>All inputs will be reset (turned OFF) and holding timer and counter present values cleared to 0.</td>
</tr>
</tbody>
</table>

1. Select **ZEN(Z)/All Clear within ZEN** from the Menu Bar.

2. Click the **OK** Button to clear all memory in the ZEN. Click the **Cancel** Button to cancel the all clear operation.
RS-485 Communications Settings

4-5 RS-485 Communications Settings

The ZEN-10C4-R-V2 is equipped with an RS-485 communications output, supporting external communications using the CompoWay/F communications protocol.

1,2,3...
1. Select ZEN(Z)/Set Protection(E)/Settings(S) from the Menu Bar.
2. The Settings Dialog Box will be displayed. Click the RS-485 Button.
3. The RS-485 Communications Settings Dialog Box will be displayed. Set each item.

<table>
<thead>
<tr>
<th>Settings</th>
<th>Details</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Length</td>
<td>7 or 8 bits</td>
<td>7</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1 or 2 bits</td>
<td>2</td>
</tr>
<tr>
<td>Parity</td>
<td>None, even, or odd</td>
<td>Even</td>
</tr>
<tr>
<td>Baud Rate</td>
<td>4800, 9600, or 19200 bps</td>
<td>9,600</td>
</tr>
<tr>
<td>Node No.</td>
<td>Specify a node number between 0 and 99. Supports broadcasting (node No.: XX).</td>
<td>1</td>
</tr>
</tbody>
</table>

4. To save the settings click the OK Button. To clear the settings click the Cancel Button. Click the Initialize Button to return the settings to the default values.
SECTION 5
Simulation Function

This section describes the simulation function and corresponding displays.

5-1 Starting and Stopping the Simulation Function .......................... 62
5-2 ZEN Image Display .......................................................... 63
5-3 Present Value List Display ............................................... 65
5-4 Clock Display ................................................................. 66
5-1 Starting and Stopping the Simulation Function

A ladder program created with the Support Software can be run by the Support Software without transferring it to the ZEN.

1,2,3...

1. Display the ladder program for which operation is to be simulated and then click the Start/Stop Simulator Button on the Toolbar or select ZEN(Z)/Start/Stop Simulator from the Menu Bar.

2. When the simulator is started, the background color will change to yellow and the RUN, STOP, ZEN Image Display, Present Value List Display, Clock Display, and Start/Stop Simulator Buttons on the Toolbar will be enabled. Also, depending on the content of the ladder program, the ZEN Image Window, the Present Value List Window, and the Clock Window will be opened.

3. To start the simulation, click the RUN Button on the Toolbar. To stop the simulation, click the STOP Button on the Toolbar.

4. To stop the simulator, click the Start/Stop Simulator Button on the Toolbar or select ZEN(Z)/Start/Stop Simulator from the Menu Bar. The background color for the simulator view area will change back to white.

Toolbar Button Functions

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="RUN Button" /></td>
<td>Execute the ladder program.</td>
</tr>
<tr>
<td><img src="image" alt="STOP Button" /></td>
<td>Stops the ladder program execution.</td>
</tr>
<tr>
<td><img src="image" alt="ZEN Image Display Button" /></td>
<td>Specifies whether or not the ZEN Image Window will be displayed.</td>
</tr>
</tbody>
</table>

Note: Set values can be changed during simulation. For details, refer to Changing Settings Online in 3-7 Monitoring Programs.
5-2 ZEN Image Display

CPU Unit and Expansion I/O Unit images are displayed according to the configuration in the property settings, and input switches and lamps are allocated to the I/O bits used in the ladder program.

![ZEN Image Display Diagram]

**Note** To display or hide the ZEN Image Window, click the **ZEN Image Display** Button on the Toolbar.

Input switch specifications can be changed by right-clicking the input switch symbol.

**Input Switch Symbols**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Input specifications</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Symbol](NO Momentary.png)</td>
<td>Momentary: NO condition</td>
<td>Normally OFF. ON only when left mouse button is held down.</td>
</tr>
<tr>
<td>![Symbol](NC Momentary.png)</td>
<td>Momentary: NC condition</td>
<td>Normally ON. OFF only when left mouse button is held down.</td>
</tr>
</tbody>
</table>
With LCD-type CPU Units, operation buttons can be used by the simulator. Either momentary or alternate operation can be selected by right-clicking the operation button symbols.

**Operation Button Symbols**

<table>
<thead>
<tr>
<th>Input specifications</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Momentary</td>
<td>Normally OFF. ON only when left mouse button is held down.</td>
</tr>
<tr>
<td>Alternate</td>
<td>Remains ON after being clicked. Remains OFF after being clicked again.</td>
</tr>
</tbody>
</table>

- External inputs can be turned ON and OFF by clicking the input symbols. When an external input is turned ON, the color of the connection line between the input symbol and the ZEN terminal changes to green.
- The results of ladder program processing can be checked by observing the status of lamp symbols connected to output terminals (RUN mode only).

**Lamp Symbols**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Output terminal OFF" /></td>
<td>Output terminal OFF</td>
</tr>
<tr>
<td><img src="image" alt="Output terminal ON" /></td>
<td>Output terminal ON</td>
</tr>
</tbody>
</table>

- When a display bit (D) is used in the ladder program, the display conditions are shown on the ZEN display (RUN mode only).
Multiple display bits (D) can be executed simultaneously, and their display conditions monitored.

5-3 Present Value List Display

The present values for timers, holding timers, weekly timers, calendar timers, counters, analog comparators, comparators, and other programming elements used in the ladder program are displayed in list format.

Note To specify whether or not the Present Value List Window is to be displayed, click the Present Value List Display Button on the Toolbar.

Present values can be changed by double-clicking on the Present Value Dialog Box.
5-4 Clock Display

When weekly timers or calendar timers are used in the ladder program, present dates and times can be simulated.

**Note**

1. To specify whether or not the Clock Display Window is to be displayed, click the Clock Display Button on the Toolbar.
2. To set the date and time display styles, select **Settings/Control Panel/Regional Settings** from the Start Menu. Select **Date** to set a date style or **Time** to set a time style.

**Setting the Clock Forward or Back**
The present date and time can be set forward or back in whatever units are set (seconds/minutes/hour/day/month/year) by clicking the Forward or Reverse Buttons.

**Changing the Present Time**
The present time can be changed by clicking on **Time Setting** to open the Time Settings Dialog Box.
SECTION 6
Troubleshooting

This section describes errors that may occur while using the ZEN Support Software and possible countermeasures.

6-1 Online Errors and Warnings ............................................. 68
6-2 Program Check Errors and Warnings .............................. 69
6-3 Protect Setting and Clearing Errors ............................... 70
Online Errors and Warnings

6-1 Online Errors and Warnings

Error messages: Messages indicating fatal errors

<table>
<thead>
<tr>
<th>Message</th>
<th>Probable cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Error has occurred.</td>
<td>No response to a command from the ZEN Support Software. Communications timed out.</td>
<td>Check that the Computer Connecting Cable is connected properly to the ZEN and the computer serial port. Check that the communications settings match the connection configuration of the ZEN.</td>
</tr>
<tr>
<td>Failed to connect to ZEN. The connected ZEN type ( ) does not match the project's ZEN type ( ). Cannot continue.</td>
<td>Online connection attempted while the ZEN system configuration and the ZEN model in the ZEN Support Software property settings are not the same.</td>
<td>Change the ZEN model in the property settings and the Expansion I/O Unit settings to match the system configuration of the ZEN to be connected online. When only the Expansion I/O Unit configuration is different, the following warning message (bottom line) will be displayed.</td>
</tr>
<tr>
<td>Operation failed since ZEN is in RUN mode. STOP ZEN running.</td>
<td>Command executed from the ZEN Support Software while the ZEN is in RUN mode.</td>
<td>Change the ZEN to STOP mode and re-execute the command.</td>
</tr>
<tr>
<td>Operation failed since ZEN is protected. Release the protection.</td>
<td>Command executed from the ZEN Support Software while the ZEN is protected.</td>
<td>Remove the protection from the ZEN and re-execute the command.</td>
</tr>
<tr>
<td>Operation failed since LCD is operating. Restore the main screen of LCD.</td>
<td>Command executed from the ZEN Support Software while LCD operations being performed on the ZEN.</td>
<td>Return the LCD operations to the Main Screen and re-execute the command.</td>
</tr>
<tr>
<td>Error rung found in the program. Program transfer is cancelled.</td>
<td>There is an error in the program.</td>
<td>Refer to the probable causes and countermeasures for Program Check error messages.</td>
</tr>
</tbody>
</table>

Warning messages: Dialog boxes are displayed for determining processing. Follow the instructions given in the dialog boxes.

<table>
<thead>
<tr>
<th>Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEN is in RUN mode; execution not possible. Change to STOP mode? Y/N</td>
</tr>
<tr>
<td>Return to RUN mode? Y/N</td>
</tr>
<tr>
<td>A circuit in the program generated a warning. Continue program transfer?</td>
</tr>
<tr>
<td>ZEN model in properties settings (<strong><strong>) does not match model being connected (</strong></strong>). Go online? Y/N (See note.)</td>
</tr>
</tbody>
</table>

Note: This message is displayed when an attempt is made to go online with only the CPU Unit specified in the property settings in the Support Software, without having the Expansion I/O Unit connected. Select “Y” to connect, and transfer the program. This is supported for version 4.0 or higher.
6-2 Program Check Errors and Warnings

Error messages: Message indicating fatal errors
The Program Check Results Dialog Box will be displayed.

<table>
<thead>
<tr>
<th>Message</th>
<th>Probable cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>A bit (&quot;relay&quot;) type unsupported by the system is used. Check the ladder program.</td>
<td>Bit type used in ladder program that cannot be used with the system configuration set under property settings.</td>
<td>Revise the system configuration set under property settings or change the bit types. Example: The following bit types cannot be used with the following ZEN models: LED-type CPU Units Weekly timers (@) Calendar timers (¥) Display bits (D) CPU Units with AC Power Supply Analog comparator bits (A) Designated display bits for analog comparator. CPU Units with DC Power Supply/NPN Connections Analog comparators (A) The following bit types cannot be used when no Expansion I/O Units are connected: Expansion I/O Unit input bits (X) Expansion I/O Unit output bits (Y) Also, the bit addresses that can be used depend on the configuration of Expansion I/O Units.</td>
</tr>
<tr>
<td>The setting unsupported in the connected ZEN is used.</td>
<td>An operation has been written that cannot be set for this ZEN version.</td>
<td>The following operations cannot be used with versions prior to 1.10: Setting the date (DAT1) for display with a display bit (D). Setting clear (C) as a function.</td>
</tr>
</tbody>
</table>

Warning messages: The Program Check Results Dialog Box will be displayed with messages to prompt corrective actions.

<table>
<thead>
<tr>
<th>Message</th>
<th>Probable cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>No contact (input) or coil (output) is connected, or a connection line is disconnected.</td>
<td>Ladder program input, output, or connection line not connected.</td>
<td>Check the horizontal connections for inputs and outputs and the vertical and horizontal connections for connection lines in ladder programs. Correct any breaks.</td>
</tr>
<tr>
<td>Duplicated coil (output)</td>
<td>The same output is used more than once in the ladder program.</td>
<td>Check the program and correct any duplications.</td>
</tr>
<tr>
<td>Duplicated timer number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duplicated counter number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6-3 Protect Setting and Clearing Errors

Warning messages: A dialog box will be displayed warning of errors in the password.

<table>
<thead>
<tr>
<th>Error message</th>
<th>Probable cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The password is incorrect.</td>
<td>A different password has been entered from the password that was set under the password settings or protect settings. The password and the reconfirmation of the password differ or more or less than 4 digits were input as the password.</td>
<td>Re-enter the correct 4 digits set under the password settings or protect settings. Enter the same 4 digits in both the password and password confirmation text boxes.</td>
</tr>
</tbody>
</table>

Descriptive messages: A dialog box will be displayed prompting operation. Follow the instructions given in the dialog box.

<table>
<thead>
<tr>
<th>Error message</th>
<th>Probable cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>No password is set. Set a password, and try again.</td>
<td>The ZEN protect operation has been attempted while no password has been set.</td>
<td>Enter and reconfirm a password under the password settings and re-execute the protect operation.</td>
</tr>
</tbody>
</table>
# Appendix A
## Shortcut Keys and Hot Keys

### Shortcut Keys

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
<th>Menu bar equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctrl + A</td>
<td>Select All</td>
<td>Edit (E) – Select All (A)</td>
</tr>
<tr>
<td>Ctrl + C</td>
<td>Copy</td>
<td>Edit (E) – Copy (C)</td>
</tr>
<tr>
<td>Ctrl + F</td>
<td>Find</td>
<td>Edit (E) – Find (F)</td>
</tr>
<tr>
<td>Ctrl + N</td>
<td>Create</td>
<td>File (F) – New (N)</td>
</tr>
<tr>
<td>Ctrl + O</td>
<td>Open</td>
<td>File (F) – Open (O)</td>
</tr>
<tr>
<td>Ctrl + P</td>
<td>Print</td>
<td>File (F) – Print (P)</td>
</tr>
<tr>
<td>Ctrl + R</td>
<td>Edit Rung comments</td>
<td></td>
</tr>
<tr>
<td>Ctrl + S</td>
<td>Save</td>
<td>File (F) – Save (S)</td>
</tr>
<tr>
<td>Ctrl + V</td>
<td>Paste</td>
<td>Edit (E) – Paste (P)</td>
</tr>
<tr>
<td>Ctrl + W</td>
<td>Online Connect/Disconnect</td>
<td>ZEN (Z) – Go Online/Offline (W)</td>
</tr>
<tr>
<td>Ctrl + X</td>
<td>Cut</td>
<td>Edit (E) – Cut (C)</td>
</tr>
<tr>
<td>Ctrl + Y</td>
<td>Redo</td>
<td>Edit (E) – Undo (U)</td>
</tr>
<tr>
<td>Ctrl + Z</td>
<td>Undo</td>
<td>Edit (E) – Redo (Y)</td>
</tr>
<tr>
<td>Ctrl + Alt + DOWN</td>
<td>Insert Rung</td>
<td>Insert (I) – Rung (M)</td>
</tr>
<tr>
<td>Alt + LEFT</td>
<td>Zoom Out</td>
<td>View (V) – Zoom Out</td>
</tr>
<tr>
<td>Alt + RIGHT</td>
<td>Zoom In</td>
<td>View (V) – Zoom In</td>
</tr>
<tr>
<td>Alt + F4</td>
<td>Quit</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>CPU Unit Input Bit</td>
<td>Edit Dialog Box Display</td>
</tr>
<tr>
<td>Q</td>
<td>CPU Unit Output Bit</td>
<td>Edit Dialog Box Display</td>
</tr>
<tr>
<td>X</td>
<td>Expansion I/O Unit Input Bit</td>
<td>Edit Dialog Box Display</td>
</tr>
<tr>
<td>Y</td>
<td>Expansion I/O Unit Output Bit</td>
<td>Edit Dialog Box Display</td>
</tr>
<tr>
<td>M</td>
<td>Work Bit Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Holding Bit Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Button Switch Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Timer Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Holding Timer Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>@</td>
<td>Weekly Timer Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>*</td>
<td>Calendar Timer Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Counter Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>8-digit Counter Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Analog Comparator Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Comparator Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>8-digit Comparator Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Display Edit Dialog Box Display</td>
<td></td>
</tr>
<tr>
<td>Delete</td>
<td>Delete</td>
<td></td>
</tr>
</tbody>
</table>
Shortcut Keys and Hot Keys

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
<th>Menu bar equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>Find Next</td>
<td>Edit (E) – Find Next</td>
</tr>
<tr>
<td>F1</td>
<td>Help</td>
<td></td>
</tr>
</tbody>
</table>

**Hot Keys**

Hot keys can be used to insert a programming element into a selected cell. If inputs and outputs are already set, however, the existing data will be given priority.

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHIFT + I</td>
<td>Insert Input (Input Edit Dialog Box Display)</td>
</tr>
<tr>
<td>SHIFT + O</td>
<td>Insert Output (Output Edit Dialog Box Display)</td>
</tr>
<tr>
<td>-</td>
<td>Insert Horizontal Connection Line</td>
</tr>
<tr>
<td>1</td>
<td>Insert Vertical Connection Line</td>
</tr>
</tbody>
</table>
Appendix B
Support Software Version Upgrades

The following table shows the relationship between the version and functions of the ZEN Support Software and the ZEN CPU Unit.

<table>
<thead>
<tr>
<th>Date of revision</th>
<th>ZEN CPU Unit</th>
<th>ZEN Support Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2002</td>
<td>System Software (See note 1.)</td>
<td>Changes Applicable from Version 2.0 (ZEN-SOFT01-V2)</td>
</tr>
<tr>
<td></td>
<td>The system software was upgraded to version 1.1.</td>
<td>• Changed to handle additional display functions.</td>
</tr>
<tr>
<td></td>
<td>Main Changes</td>
<td>• Simulation function added.</td>
</tr>
<tr>
<td></td>
<td>The following display functions have been added to LCD-type CPU Units.</td>
<td>• Improvements made to functions, operability, and display.</td>
</tr>
<tr>
<td></td>
<td>• Clear display function</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The display object DAT1 (day/month)</td>
<td></td>
</tr>
<tr>
<td>April 2003</td>
<td>System Software (See note 1.)</td>
<td>Changes Applicable from Version 3.0 (ZEN-SOFT01-V3)</td>
</tr>
<tr>
<td></td>
<td>The system software was upgraded to version 2.0.</td>
<td>• Changed to handle the memory area expansion in &quot;.-V1&quot; CPU Units.</td>
</tr>
<tr>
<td></td>
<td>(&quot;-V1&quot; was added to the CPU Unit model number.)</td>
<td>• Changed to handle addition of 20-point CPU Units.</td>
</tr>
<tr>
<td></td>
<td>Main Changes (See note 2.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The number of timers, counters, weekly timers, calendar timers, and display bits was increased from 8 to 16. The number of holding timers was increased from 4 to 8.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• A 20-point CPU Unit was added to the lineup.</td>
<td></td>
</tr>
<tr>
<td>January 2006</td>
<td>System Software (See note 1.)</td>
<td>Support for Version 4.0 or Higher (ZEN-SOFT01-V4)</td>
</tr>
<tr>
<td></td>
<td>The system software was upgraded to version 3.0 (&quot;-V2&quot; was added to the CPU Unit model number.)</td>
<td>• Supports CPU Units with enhanced functionality (-V2)</td>
</tr>
<tr>
<td></td>
<td>Main Changes (See note 2.)</td>
<td>• Supports half-sized I/O Expansion I/O Units (-8E1)</td>
</tr>
<tr>
<td></td>
<td>• Addition of multiple-day operation and pulse-output operation to the weekly timers</td>
<td>• When the type of the CPU Unit (the CPU Unit and Expansion I/O Unit configuration) is the same as that specified in the property settings of the Support Software, program transfer is possible even if Expansion I/O Units are not connected.</td>
</tr>
<tr>
<td></td>
<td>• Addition of twin time operation to the timers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Addition of an 8-digit counter and 8-digit comparators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Addition of models with communications (10-point models only) and economy CPU Units</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Addition of daylight saving time settings for Australia and New Zealand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Deletion of contrast control</td>
<td></td>
</tr>
</tbody>
</table>

Note 1. “System software” is the software for processing the CPU Unit’s program. With LCD-type CPU Units, the system software version can be read by selecting Other/System information from the menu. With "-V2" CPU Units, “V03.00” will be displayed as the system software version.

2. Refer to page 15 for the memory area differences between versions.
Support Software Version Upgrades

Appendix B

Compatibility between Support Software and Data

<table>
<thead>
<tr>
<th>Data created with Ver. 1.0</th>
<th>Ver. 1.0</th>
<th>Ver. 1.1</th>
<th>Ver. 2.0</th>
<th>Ver. 3.0</th>
<th>Ver. 4.0 or 4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data created with Ver. 1.1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>No (See note.)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Data created with Ver. 2.0</td>
<td>No (See note.)</td>
<td>No (See note.)</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No (See note.)</td>
<td>No (See note.)</td>
<td>No (See note.)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Data created with Ver. 4.0 or 4.1</td>
<td>No (See note.)</td>
<td>No (See note.)</td>
<td>No (See note.)</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Note  A message saying that it was not possible to read the file will be displayed if an attempt is made to read incompatible data.

Compatibility between the ZEN CPU Unit and the Support Software

<table>
<thead>
<tr>
<th>Version of CPU Unit (See note 1.)</th>
<th>Version of the ZEN Support Software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ver. 1.0</td>
</tr>
<tr>
<td>Ver. 1.0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ver. 1.1</td>
<td>Partial (See note 3.)</td>
</tr>
<tr>
<td>Ver. 2.0 (~V1&quot; CPU Units)</td>
<td>Partial (See notes 3 and 4.)</td>
</tr>
<tr>
<td>Ver. 3.0 (~V2&quot; CPU Units)</td>
<td>No</td>
</tr>
</tbody>
</table>

Note 1. With LCD-type CPU Units, the system software version can be read by selecting Other/System information from the menu. With "~V2" CPU Units, "V03.00" will be displayed as the system software version.

2. The setting for a display bit (D) will appear as follows:

- If "DAT1: day/month" is set for display, the LCD display will show T# and the display function will not operate.
- If "C (clear)" is set, the LCD display will appear as [---] [--------0D0] and the display function will not operate.

Note  The above operations were not supported in ZEN versions prior to 1.1.
Support Software Version Upgrades

Appendix B

3. When reading out the program from the ZEN, the following items will be determined based on the display function (D) settings contained in the program.
   - If "DAT1: day/month" is set, CHR (character designation) will be set.
   - If "C (clear)" is set, the display function (D) will be deleted from the program.

Note  The above operations were not supported by ZEN Support Software versions lower than 2.0.

4. Cannot be used with 20-point CPU Units.
   Restricted to use within the memory area range of Pre-V1 CPU Units.
Support Software Version Upgrades

Appendix B
Terms and Conditions of Sale

1. Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product with Buyer’s application, including earthquakes, fires, floods, storms or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.

2. Property; Confidentiality. Any information in the Products is the exclusive warranty of the Product sold hereunder. Buyer shall in any event remain liable for all unpaid accounts.

3. Force Majeure. Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including merchandise, fire, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.

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5. Errors and Omissions. Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

6. Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or export of the Products.

7. Taxes. All taxes, duties and other governmental charges (other than general sales and use taxes) are deemed to be paid by the Seller. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in the invoice). OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS, WHETHER OR NOT ACKNOWLEDGED. OMROM MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS, WHETHER OR NOT ACKNOWLEDGED. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS, WHETHER OR NOT ACKNOWLEDGED. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS, WHETHER OR NOT ACKNOWLEDGED.

8. Delivery. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days from the date of sale as shown in the invoice. If any invoice is not paid according to Omron’s payment terms and (ii) Buyer has no past due amounts.

9. Cancellation; Etc. The only action brought against such Companies to the extent based on a claim that any Product made to乙方 specifications infringed intellectual property rights of any other party.

10. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to “forbidden” or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.

11. Property; Confidentiality. Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.

12. Assignment of Rights. Buyer may not assign its rights hereunder without Omron’s written consent. (c) Law. Any advice, recommendations or information given orally or in writing, including without limitation; and “Omron Companies” (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

13. Exclusion of Liability. Actual performance is subject to the Omron’s Warranty and Limitations of Liability. These Terms constitute the entire agreement between Omron and Buyer as to the Products. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is Purchasing the Products (without regard to conflict of law principles which may differ from the law of the jurisdiction of the home office), and constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless signed by the parties. (e) Severability. If any provision of these Terms is held to be invalid, such provision shall be stricken from these Terms and the remaining provisions hereof are rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the purchase price of the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend and set off any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of any other party.

14. Miscellaneoua. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron’s written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is Purchasing the Products (without regard to conflict of law principles which may differ from the law of the jurisdiction of the home office), and constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless signed by the parties. (e) Severability. If any provision of these Terms is held to be invalid, such provision shall be stricken from these Terms and the remaining provisions hereof are rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the purchase price of the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend and set off any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of any other party.

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16. Property; Confidentiality. Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.

17. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to “forbidden” or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.

18.Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron’s written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is Purchasing the Products (without regard to conflict of law principles which may differ from the law of the jurisdiction of the home office), and constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless signed by the parties. (e) Severability. If any provision of these Terms is held to be invalid, such provision shall be stricken from these Terms and the remaining provisions hereof are rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the purchase price of the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend and set off any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of any other party.

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