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You can read the recommendations in the user guide, the technical guide or the installation guide for OMRON ZEN V2. You'll find the answers to all your questions on the OMRON ZEN V2 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

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OMRON

Programmable Relay
ZEN V2 Units

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments. Refer to "*Warranty and Application Considerations*" on page 36, and "*Precautions for Safe Use*" on page 34.

Even Broader Applications with Increased Functionality and Higher Precision

- Increased functionality in a compact body (70 mm wide × 90 mm high).
- Easy programming is available using the LCD and operation buttons. (See note 1.)
- This single Unit easily provides relay, timer, counter, and time switch functions.
- Expansion is easy with Expansion I/O Units, allowing up to 44 I/O points. (See note 2.)
- Economy-type and Communications-type CPU Units have been added to series.
- Improved Weekly Timers (See note 1.)
  Increased timing accuracy with a monthly deviation of ±15 s max. Multiple-day operation and pulse output operation have been added.
- Select from two power supply options:
  100 to 240 VAC or 12 to 24 VDC.

Note: 1. Not supported for ZEN-□C2□□-□-V2 models.
2. When using CPU Units with 20 I/O points.

NEW

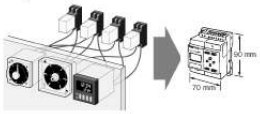
The information in this document applies to V2 Units. Refer to page 28 for details on differences with previous products.

Features

■ Easy and Simple Programming for Automatic Small-scale Control

Saves Space, Wiring, and Installation Steps

- Versatile functionality in a compact body (70 mm wide × 90 mm high)
- This single Unit easily provides relay, timer, counter, and time switch functions. Wiring work is greatly reduced because separate wiring is not required for devices such as timers and counters.



Easy Programming

The LCD screen comes with 8 operation buttons on the front panel to enable programming in ladder view format. The LCD screen also has a backlight, making it easier to see when the ZEN is used in dark locations.

Note: Not supported for ZEN-□C2□□-□-V2 models.

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Manual abstract:

) · This single Unit easily provides relay, timer, counter, and time switch functions. · Expansion is easy with Expansion I/O Units, allowing up to 44 I/O points. (See note 2.) · Economy-type and Communications-type CPU Units have been added to series. · Improved Weekly Timers (See note 1.) Increased timing accuracy with a monthly deviation of ±15 s max. Multiple-day operation and pulse output operation have been added. · Select from two power supply options: 100 to 240 VAC or 12 to 24 VDC. Note: 1. Not supported for ZEN-@C2@@-@-V2 models.

2. When using CPU Units with 20 I/O points. The information in this document applies to V2 Units. Refer to page 28 for details on differences with previous products. Features Easy and Simple Programming for Automatic Small-scale Control Saves Space, Wiring, and Installation Steps · Versatile functionality in a compact body (70 mm wide × 90 mm high).

· This single Unit easily provides relay, timer, counter, and time switch functions. Wiring work is greatly reduced because separate wiring is not required for devices such as timers and counters. Easy Programming The LCD screen comes with 8 operation buttons on the front panel to enable programming in ladder view format. The LCD screen also has a backlight, making it easier to see when the ZEN is used in dark locations. Note: Not supported for ZEN-@C2@@-@-V2 models.

90 mm 70 mm Programmable Relay ZEN V2 Units 1 Flexible Expansion Enables Up to 44 I/O Points Up to three Expansion I/O Units can be connected if there are not enough I/O points. Expansion I/O Units are only 35 mm wide. Note: CPU Units with 10 I/O points can be expanded to 34 I/O points. Expansion I/O Units cannot be connected to Economy-type CPU Units. Support Software with Simulation Function · Programs can be easily written, saved, and monitored by personal computer. · Programs can be simulated on the personal computer without connecting to the ZEN. Note: For notebook computers that do not have an RS-232C serial port, connect the computer to the ZEN by connecting an OMRON CS1W-CIF31 USB-Serial Conversion Cable to the ZEN-CIF01 Connecting Cable. Other Versatile Functions · Use of a Memory Cassette makes it easy to copy and save programs. · Equipped with two analog input channels (CPU Units with DC power supply only). · Password function ensures security.

(See note.) · Multi-language display in six languages (English, Japanese, German, French, Spanish, Italian). (See note.) · Display user-set messages or analog-converted values. (See note.) Note: Not supported for ZEN-@C2@@-@-V2 models. Enhanced Features of V2 CPU Units Improved Weekly Timer and Calendar Timer Functions Note: Not supported for ZEN-@C2@@-@-V2 models. · The time precision has been increased. Conventional model: 2-min difference/month -V2 models: ±15-s difference/month (at 25°C) · Multiple-day operation and pulse-output operation are now possible. · These improved functions are convenient for time-controlled applications such as lighting and air conditioning control.

RS-485 Communications Model Added to Series Production line conditions can be remotely monitored by monitoring the ZEN control status. Production line Office More Precise Analog Input Conventional model: ± 10% FS -V2 models: ± 1.5% FS DC power supply models are equipped with two analog inputs (0 to 10 V). There are four analog comparators. The increased precision makes it even easier to use the Unit in simple control applications with voltage, current, temperature, and other analog values.

Lighting control Air conditioning control Economy-type Added to the Series · Economy-type CPU Units with a more affordable price have been added to the series, although Expansion I/O Units cannot be added. 8-digit Counter, 150-Hz Counter · An 8-digit counter and 8-digit comparator have been added. · The maximum count for DC power supply models is 150 Hz. 12 to 24 VDC Line Voltage Operation Operation is now possible with 12 VDC. Twin-timer Operation Added Twin-timer operation allows you to set ON and OFF times separately, greatly simplifying intermittent operation.

Expansion I/O Units have been reduced to half-size (35 mm wide). 2 Programmable Relay ZEN V2 Units Series Configuration CPU Units Power supply voltage: 100 to 240 VAC, 12 to 24 VDC, Output: Relay, transistor output With LCD display, operation buttons, and calendar/clock function LED type 10 I/O points 20 I/O points 10 I/O points 20 I/O points ZEN-10C2@ ZEN-20C2@ This CPU Unit has no LCD, operation buttons, or calendar/clock function. Standard LCD type Economy type Communications type Standard LCD type Economy type ZEN-10C1@ ZEN-10C3@ Expansion I/O Units cannot be connected. ZEN-10C4@ RS-485 communications type. ZEN-20C1@ ZEN-20C3@ Expansion I/O Units cannot be connected. (10 I/O points) Expansion I/O Units Only 35-mm wide. 4 input, 4 output points Power Supply Unit Same shape and design as ZEN. 24 VDC, 30 W Support Software Allows easy programming and operation simulation. Programmable Relay ZEN V2 Units 3 Model Number Structure Model Number Legend Note: This model number legend includes combinations that are not available. Please check "List of Models" for availability.

CPU Units ZEN-@C@@@-@-V2 1 234 5 3. Input type A: AC input D: DC input 4. Output type R: Relay T: Transistor 5. Supply voltage A: AC power supply D: DC power supply 1. Number of I/O points 10: 6 inputs and 4 outputs (See note.) 20: 12 inputs and 8 outputs 2. Type classifier 1: Standard LCD type with display 2: LED type without display 3: Economy type with display (Expansion I/O Units cannot be connected.) 4: Communications type with display Note: The Communications-type CPU Unit has 6 inputs and 3 outputs. Expansion I/O Units ZEN-8E1@@ 1 234 1. Number of I/O points 8: 4 inputs and 4 outputs 2.

Unit version classifier E1: Can connect to V2 CPU Units (See note.) 3. Input type A: AC input D: DC input 4. Output type R: Relay T: Transistor Note: Use a ZEN-8E@@/-4E@ to connect to pre-V1 and V1 CPU Units. This data sheet is provided as a guideline for selecting products.

Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product. ZEN Operation Manual (Cat. No. Z211) ZEN Communications Manual (Cat. No.

Z212) ZEN Support Software Operation Manual (Cat. No. Z184-E1-03) The PDF versions of these manuals can be downloaded from the following website. ZEN Website http://www.zen.omron.co.jp/eng/index.html 4 Programmable Relay ZEN V2 Units Ordering Information List of Models CPU Units and Expansion I/O Units Unit Name No. of I/O points 10 LCD display Yes Power supply voltage 100 to 240 VAC 12 to 24 VDC 20 100 to 240 VAC 12 to 24 VDC LED type 10 without display (See note 1.

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) 20 No 100 to 240 VAC 12 to 24 VDC 100 to 240 VAC 12 to 24 VDC Economy type (Expansion I/O Units cannot be connected) 10 20 Yes 100 to 240 VAC 12 to 24 VDC 100 to 240 VAC 12 to 24 VDC 100 to 240 VAC 12 to 24 VDC 6 12 6 12 6 12 6 Inputs Outputs Buttons, calendar, and clock Yes Analog input No Yes Transistors 100 to 240 VAC 12 to 24 VDC Transistors 100 to 240 VAC 12 to 24 VDC Transistors 100 to 240V AC 12 to 24 VDC Transistors 100 to 240 VAC 12 to 24 VDC 100 to 240 VAC 12 to 24 VDC 100 to 240 VAC 12 to 24 VDC 3 Relays 8 Relays 4 Relays Yes No Yes No Yes No Yes 8 Relays No Yes 4 Relays No No Yes 8 Relays No Yes Model CPU Units Standard LCD type 100 to 240 VAC 12 to 24 VDC 4 Relays ZEN-10C1AR-A-V2 ZEN-10C1DR-D-V2 ZEN-10C1DT-D-V2 ZEN-20C1AR-A-V2 ZEN-20C1DR-D-V2 ZEN-20C1DT-D-V2 ZEN-10C2AR-A-V2 ZEN-10C2DR-D-V2 ZEN-10C2DT-D-V2 ZEN-20C2AR-A-V2 ZEN-20C2DR-D-V2 ZEN-20C2DT-D-V2 ZEN-10C3AR-A-V2 ZEN-10C3DR-D-V2 ZEN-20C3AR-A-V2 ZEN-20C3DR-D-V2 ZEN-10C4AR-A-V2 ZEN-10C4DR-D-V2 ZEN-KIT01-EV4 ZEN-KIT02-EV4 ZEN-8E1AR (See notes 2, 3.) ZEN-8E1DR (See note 2.) Communica- 10 tions type ZEN Kit Expansion I/O Units Set containing CPU Unit (ZEN-10C1AR-A-V2), Connecting Cable, ZEN Support Software, and manual. Set containing CPU Unit (ZEN-10C1DR-D-V2), Connecting Cable, ZEN Support Software, and manual. 8 --100 to 240 VAC 12 to 24 VDC 4 100 to 240 VAC 12 to 24 VDC Transistors 4 Relays --- --- ZEN-8E1DT (See note 2.) Note: 1. Programming is not possible using only the CPU in the LED-type CPU Unit. ZEN Support Software or a Memory Cassette is required. 2. Cannot be connected to pre-V1 and V1 CPU Units.

3. The ZEN-8E1AR cannot be connected to a CPU Unit with DC power supply. Power Supply Unit Power ratings 30 W Input voltage 100 to 240 VAC Output voltage 24 VDC 1.3 A Output current Model ZEN-PA03024 Note: Refer to the ZEN-PA03024 Datasheet (Cat. No.

L103) for detailed specifications. Programmable Relay ZEN V2 Units 5 Accessories (Order Separately) Name Specifications Remarks Enables programs and parameter settings to be saved or copied to another ZEN. (See note 1.) LCD-type CPU Unit with LED-type CPU Unit without display (See note 2.) display (See note 3.

) Transfer from ZEN to Memory Transfer from Memory Cassette to ZEN Memory Cassette initialization Connecting Cable 2 m RS-232C (9-pin Dsub connector) Battery Unit --Supported Supported Supported Not supported Automatic transfer when power turned ON Not supported ZEN-CIF01 Model ZEN-ME01 Memory Cassette EEPROM (for data security and copying) 10 years min. Battery life Ladder programs and parameter settings are saved to the CPU Unit EEP-ROM ZEN-BAT01 (at 25°C) but calendar, clock, and holding timer bits and holding timer/counter present values are held by the capacitor. Therefore, if the power supply is interrupted for 2 days or more (at 25°C), this data will be reset. Use a Battery Unit for systems where the power supply may be interrupted for long periods. Runs on Windows 95, 98, Specifically designed for the ZEN (CD-ROM). 2000, ME, XP, or NT 4.0. ZEN-SOFT01-V4 ZEN Support Software Note: 1. Memory Cassettes created using a CPU Unit can be read to other CPU Units, regardless of which model is used. Restrictions, apply, however, to the functions that can be used, depending on the CPU Unit version combination.

For details, refer to "Memory Cassette and CPU Unit Combinations" on page 33. 2. Standard LCD-type, Economy-type, and Communications-type CPU Units (i.e., excluding ZEN-@C2@@-@-V2 models). 3. LED-type CPU Unit without display (i.e., ZEN-@C2@@-@-V2 models). Mounting Accessories (Order Separately) Name Mounting Track Specifications 50 cm (l) × 7.

3 mm (t) 1 m (l) × 7.3 mm (t) 1 m (l) × 16 mm (t) End Plate Spacer Model PFP-50N PFP-100N PFP-100N2 PFP-M PFP-S System Configuration Power Supply Unit Battery Unit CPU Unit Expansion I/O Units Connecting Cable Memory Cassette Support Software Note: 1. Up to 3 Expansion I/O Units can be connected to any type of CPU Unit except for Economy-type CPU Units. Expansion I/O Units with AC Inputs, however, cannot be connected to CPU Units with DC Power Supplies. 2.

The Connecting Cable and Memory Cassette cannot be connected to the ZEN at the same time. 3. Programs cannot be written to LED-type CPU Units (i.e., ZEN-@C2@@-@-V2 models) without the ZEN Support Software or a Memory Cassette.

6 Programmable Relay ZEN V2 Units Specifications Ratings Item ZEN-@C@AR-A-V2/ZEN-8E1AR Rated supply voltage Operating voltage range Power consumption 100 to 240 VAC, 50/60 Hz 85 to 264 VAC CPU Units without Expansion I/O Units · ZEN-10C1AR-A-V2/ZEN-10C2AR-A-V2/ ZEN-10C3AR-A-V2 100 V AC: 5 VA max. 240 V AC: 7 VA max. · ZEN-10C4AR-A-V2 100 V AC: 6 VA max. 240 V AC: 8 VA max. · ZEN-20C@AR-A-V2 100 V AC: 7 VA max. 240 V AC: 10 VA max. CPU Units with three Expansion I/O Units · ZEN-10C1AR-A-V2/ZEN-10C2AR-A-V2 100 V AC: 6 VA max. 240 V AC: 8 VA max. · ZEN-10C4AR-A-V2 100 V AC: 7 VA max. 240 V AC: 9 VA max.

· ZEN-20C@AR-A-V2 100 V AC: 8 VA max. 240 V AC: 11 VA max. Expansion I/O Units · ZEN-8E1AR 100 V AC: 3 VA max. 240 V AC: 4 VA max. Inrush current Zrruption hold Operation buttons (See note 2.) 8 (4 cursor buttons and 4 operation buttons) Calendar and clock function (See note 2.) Timer accuracy Maximum counting speed Insulation resistance Insulation Dielectric strength Vibration resistance Shock resistance Weight Note: 1. Up to 34 points for CPU Units with 10 I/O points. With Communications-type CPU Units, however, the CPU Unit has 6 inputs and 3 outputs, for a maximum of 33 I/O points. 2. Not provided for LED-type CPU Unit without display (i.e., ZEN-@C2@@-@-V2 models). Communications Specifications (Communications-type CPU Units) Item Communications Synchronization method Baud rate Transmission code Data bit length Stop bit length Error detection Flow control Interface Retry function Node number RS-485 (two-wire, half duplex) Start-stop synchronization 4800, 9600, or 19200 bps ASCII 7 or 8 bits 1 or 2 bits Vertical parity (none, even, odd), Block check character (BCC) None RS-485 None 0 to 99 (default: 1), XX (broadcasting) ZEN-10C4@R-@-V2 8 Programmable Relay ZEN V2 Units Approved Standards Item Safety standards Specification cULus: UL508/CSA C22.2 No.

142 Class I Div2 Conforms to EN/IEC 61131-2 clause 11, excluding 11.7.2.2 (Overvoltage category 2 and Pollution degree II conforms to IEC 60664-1) Radiation Field Emission Noise Terminal Voltage Emission Electrostatic Discharge Immunity Electromagnetic Field Immunity Electrical Fast Transient/Burst Immunity CISPR11 CISPR11 IEC61000-4-2 IEC61000-4-3 IEC61000-4-4 Class A, Group 1 Class A, Group 1 EMC (See note.) In air: 8 kV, In contact: 6 kV 10 V/m Power line AC I/O: 2 kV DC I/O: 1 kV Surge Immunity IEC61000-4-5 Normal Noise AC power supply, AC I/O: 1 kV DC power supply, DC I/O: 0.

5 kV Common Noise AC power supply, AC I/O: 2 kV DC power supply: 1 kV DC I/O: 0.

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5 kV Immunity to Conducted Disturbances Induced by Radio-frequency Fields IEC61000-4-6 3V Momentary Power Interruption Immunity IEC61131-2 CPU Units with AC Power Supplies: 10 ms max. CPU Units with DC Power Supplies: 2 ms max. (level: PS1) Note: EMC conforms to EN 61131-2 clause 8 except in the following cases. · When Expansion I/O Units with DC inputs are connected to a CPU Unit with an AC power supply, the burst immunity between power supplies will be 1 kv. · When the signal wire for transistor outputs exceeds 10 m, the surge immunity of DC output signal lines will not conform. Input Specifications CPU Units AC Inputs (Not Isolated) Item Input voltage Input impedance Input current ON voltage OFF voltage ON response time OFF response time 680 k 0.15 mA/100 VAC, 0.35 mA/240 VAC 80 VAC min. 25 VAC max.

50 ms or 70 ms at 100 VAC (See note.) 100 ms or 120 ms at 240 VAC (See note.) 100 to 240 VAC N L Specifications 100 to 240 VAC +10%, -15%, 50/60 Hz Circuit drawing IN 330 k 300 k IN 51 k Internal circuit Note: Can be selected using the filter settings. DC Inputs: I0 to I3 for Units with 10 I/O points, I0 to I9 for Units with 20 I/O Points (Not Isolated) Item Input voltage Input impedance Input current ON voltage OFF voltage ON response time OFF response time Note: Can be selected using the input filter settings, except when I0 is being used for an 8-digit counter with a high-speed input. 5.3 k 4.5 mA (typ.)/24 VDC 8 VDC min. 5 VDC max. 15 ms or 50 ms (See note.)
) 12 to 24 VDC IN 5.1 k 1.8 k IN Internal circuit COM Specifications 12 to 24 VDC +20%, -10% Circuit drawing Programmable Relay ZEN V2 Units 9 DC Inputs: I4 and I5 for Units with 10 I/O points, Ia and Ib for Units with 20 I/O Points (Not Isolated) Item DC Inputs Input voltage Input impedance PNP: NPN: Input current ON voltage OFF voltage ON response time OFF response time Analog Inputs Input range External input impedance Resolution Accuracy 0 to 10 V 100 k min. 0.1 V (1/100 FS) PNP: NPN: 8 VDC min.
3 VDC max. 15 ms or 50 ms (See note.) Specifications 12 to 24 VDC +20%, -10% 5.5 k/14 VDC min. 100 k/14 VDC max.
5.2 k Internal circuit Internal circuit Circuit drawing 4.3 mA (typ.)/24 VDC 4.6 mA (typ.)/24 VDC Analog voltage output device + 150 k IN 47 k 220 k 27 k 6.2 k - COM 12 to 24 VDC 47 k 5.6 k ±1.5% FS (at ambient operating temperature within rated range) AD conversion data 0 to 10.5 V (in increments of 0.

1 V) Note: Can be selected using the input filter settings. Expansion I/O Units AC Inputs (Not Isolated) Item Input voltage Input impedance Input current ON voltage OFF voltage ON response time Off response time 680 k 0.15 mA/100 VAC, 0.35 mA/240 VAC 80 VAC min. 25 VAC max. 50 ms or 70 ms at 100 VAC (See note.) 100 ms or 120 ms at 240 VAC (See note.) 100 to 240 VAC N L IN IN Specifications 100 to 240 VAC +10%, -15%, 50/60 Hz Circuit drawing 330 k 300 k 51 k Note: Can be selected using the input filter settings. DC Inputs (ZEN-8E1DR: Not Isolated, ZEN-8E1DT: Photocoupler Isolated) Item Input voltage Input impedance Input current ON voltage OFF voltage ON response time OFF response time Note: 1. Can be selected using the input filter settings. 2. The ZEN-8E1DT has no +/- terminals. There is no need to supply power. 6.5 k 3.
7 mA (typ.)/24 VDC 8 VDC min. 5 VDC max. 15 ms or 50 ms (See note 1.) 12 to 24 VDC Specifications 12 to 24 VDC +20%, -10% IN IN ± COM Circuit drawing 6.
2 k (See note 2.) 1.8 k 10 Programmable Relay ZEN V2 Units Internal circuit Output Specifications (CPU Units and Expansion I/O Units) Units with Relay Outputs Item Specifications Circuit drawing Maximum switching capacity 250 VAC/8 A (resistive load: cos = 1) 24 VDC/5 A (resistive load) Use the following values for the total of all outputs. CPU Units with 10 I/O points: 20 A max. (15 A max. for Communications-type CPU Units) CPU Units with 20 I/O points: 40 A max. Expansion I/O Units: 20 A max. Minimum switching capacity 5 VDC/10 mA (resistive load) Relay life Electrical Mechanical ON response time OFF response time Resistive load: 50,000 times (cos = 1) Inductive load: 50,000 times (cos = 0.4) 10 million times 15 ms max. 5 ms max.

L Q5/Q7 Q0 to Q3/OUT0 to OUT3 L Internal circuit Q4/Q6 L COM Models with 20 I/O points only The life under the worst conditions, of the output contacts used in ZEN relay outputs is given in the above table. Guidelines for the normal life of the relays are shown in the diagram on the right. Note: The switching capacity, switching durability, and applicable load area when actually using the relay depend on the type of load, environmental conditions, and switching conditions. Therefore, be sure to confirm these conditions for the actual machine before use. Life-test Curve (Reference Value) Usage: 360 times/hour Life (× 103) 1,000 500 300 250-VAC resistive load 24-VDC resistive load/ 250-VAC inductive load 24-VDC inductive load (t = 7 ms) 100 50 30 10 0 2 4 6 8 10 Contact current (A) Units with Transistor Outputs Item Specifications Circuit drawing Each circuit is configured with an independent common circuit 390 Maximum switching capacity 24 VDC +20%, 500 mA Q0 to Q3/OUT0 to OUT3 L L Leakage current 0.1 mA max. 28.8 VDC max. 1 k Residual voltage 1.5 V max.
Internal circuit COM + L 28.8 VDC max. Models with 20 I/O points only ON response time 1 ms max. Q4/Q6 OFF response time 1 ms max. L Q5/Q7 Programmable Relay ZEN V2 Units 11 Connections Input Connections Units with AC Power Supply Note: 1.
Supply power to both the CPU Unit and Expansion I/O Units from the same power supply and turn them ON and OFF at the same time. 2. The input circuit commons for CPU Units with AC power supply are internally connected to the N terminal of the power supply circuit. Wire the L terminal to the power supply of the input device. 3.
The input circuit commons for Expansion I/O Units with AC power supply are internally connected to the N terminal of the power supply circuit. Wire the L terminal to the power supply of the input device. CPU Units with 10 I/O Points and Expansion I/O Units 100 to 240 VAC, 50/60 Hz L N Circuit protector Input device L N NC I0 I1 I2 I3 I4 I5 L N IN0 IN1 IN2 IN3 CPU Unit with 10 I/O points ZEN-8E1AR Expansion I/O Unit (AC input type) CPU Units with 20 I/O Points and Expansion I/O Units 100 to 240 VAC, 50/60 Hz L Circuit protector N Input device L N NC I0 I1 I2 I3 I4 I5 NC I6 I7 I8 I9 Ia Ib L N IN0 IN1 IN2 IN3 CPU Unit with 20 I/O points ZEN-8E1AR Expansion I/O Unit (AC input type) Connecting Expansion I/O Units with DC Inputs 100 to 240 VAC, 50/60 Hz L Circuit protector Input device L N NC I0 I1 I2 I3 I4 I5 DC power supply N Input device COM IN0 IN1 IN2 IN3 COM IN0 IN1 IN2 IN3 CPU Unit with 10 I/O points ZEN-8E1DR Expansion I/O Unit (DC inputs and relay outputs) ZEN-8E1DT Expansion I/O Unit (DC inputs and transistor outputs) Note: When connecting Expansion I/O Units with DC inputs to a CPU Unit with an AC power supply, the burst noise immunity will be 1 kV (IEC 61000-4-4).


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12 Programmable Relay ZEN V2 Units Units with DC Power Supply Note: 1. Be sure to connect the COM terminal before turning ON the power supply. If the COM terminal is disconnected, or if the wiring is changed after turning ON the power supply, a malfunction may occur. 2. Apply the power supply voltage through a relay or switch in such a way that the voltage reaches the rated value within 4 s. If the voltage is applied gradually, the power may not be reset or unstable output operations may result. CPU Units with 10 I/O Points For Connections to Negative (-) Common (PNP Connection) 12 to 24 VDC Input device COM CPU Unit with 10 I/O points For Connecting Analog Input Devices to Input Terminals I4 and I5 12 to 24 VDC COM I 0 I1 I2 I3 I4 I5 CPU Unit with 10 I/O points Note: When connecting an analog input device, always connect the negative side to the COM terminal.

For Connections to Positive (+) Common (NPN Connection) 12 to 24 VDC Input device + - COM I0 I1 I2 I3 I4 I5 CPU Unit with 10 I/O points Note: When connected to the positive (+) common, I4 and I5 cannot be used as analog inputs. Programmable Relay ZEN V2 Units 13 CPU Units with 20 I/O Points For Connections to a Negative Common (PNP Connection) 12 to 24 VDC Input device COM I0 I1 I2 I3 I4 I5 NC I6 I7 I8 I9 Ia Ib CPU Unit with 20 I/O points For Connecting Analog Input Devices to Input Terminals Ia and Ib 12 to 24 VDC COM I 0 I1 I2 I3 I4 I5 N C I6 I 7 I8 I9 Ia Ib CPU Unit with 20 I/O points Note: When connecting an analog input device, always connect the negative side to the COM terminal. For Connections to Positive (+) Common (NPN Connection) 12 to 24 VDC Input device + - COM I0 I1 I2 I3 I4 I5 NC I6 I7 I8 I9 Ia Ib CPU Units with 20 I/O points Note: When connected to the positive (+) common, Ia and Ib cannot be used as analog inputs. Expansion I/O Units Note: 1. Supply power to both the CPU Unit and Expansion I/O Units from the same power supply and turn them ON and OFF at the same time. 2. ZEN-8E1AR Expansion I/O Units with AC inputs cannot be connected to CPU Units with DC power supply. 3. The input circuit commons for ZEN-8E1DR Expansion I/O Units with relay outputs are each internally connected to one side of the power supply circuit (COM terminal). 4.
ZEN-8E1DT Expansion I/O Units with transistor outputs do not need to be connected to a power supply. For Connections to Negative (-) Common 12 to 24 VDC Input device + - COM I0 I1 I2 I3 I4 I5 Input device NC COM IN0 IN1 IN2 IN3 ±COM IN0 IN1 IN2 IN3 CPU Unit with 10 I/O points ZEN-8E1DR Expansion I/O Unit (DC input, relay output) ZEN-8E1DT Expansion I/O Unit (DC input, transistor output) For Connections to Positive (+) Common 12 to 24 VDC Input device + - COM I0 I1 I2 I3 I4 I5 Input device NC COM IN0 IN1 IN2 IN3 ±COM IN0 IN1 IN2 IN3 CPU Unit with 10 I/O points ZEN-8E1DR Expansion I/O Unit (DC input, relay output) ZEN-8E1DT Expansion I/O Unit (DC input, transistor output) 14 Programmable Relay ZEN V2 Units Output Connections Units with Relay Outputs All four relay output circuits in both CPU Units with 10 I/O points and Expansion I/O Units have independent contacts. CPU Units with 20 I/O points have 4 independent contacts (Q0 to Q3) and the remaining four (Q4 to Q7) have 2 points/common. There are no restrictions for polarity. Standard LCD-type CPU Units, LED-type CPU Units, and Economy-type CPU Units CPU Unit with 10 I/O Points CPU Unit with 20 I/O Points Q0 Q1 Q2 Q3 Q0 Q1 Q2 Q3 Q4 Q5 Q6 Q7 Load Load Load Load Load Load Load Load Load Load Load Communications-type CPU Units Communications-type CPU Unit Expansion I/O Units Expansion I/O Unit Q0 Q1 Q2 B (+) A (-) OUT 2 OUT OUT 0 1 Load Load OUT 3 Load Load Load RS-485 Load Load Units with Transistor Outputs For CPU Units with 10 I/O points and Expansion I/O Units, all 4 outputs in the transistor output circuits have independent circuits.
The terminals of output have polarity given on the terminal block, but no problem will result from reversing the connection positions of the power supply and load. For CPU Units with 20 I/O points, outputs Q0 to Q3 in the transistor output circuits have independent circuits and outputs Q4 to Q7 have 2 points per common. The terminals of output Q0 to Q3 have polarity given on the terminal block, but no problem will result from reversing the connection positions of the power supply and load. Note: Do not exceed a cable length of 10 m when connecting transistor outputs. Standard LCD-type CPU Units and LED-type CPU Units without Display CPU Unit with 10 I/O Points CPU Unit with 20 I/O Points +- Q0 +- Q1 +- Q2 +- Q3 +- Q0 +- Q1 +- Q2 +- Q3 -+- Q4 Q5 -+- Q6 Q7 Load Load Load Load Load Load Load Load Load Load Load Load Load Q0 to Q3 Load Q0 to Q3 Load Expansion I/O Units Expansion I/O Unit - + -+ OUT2 OUT3 + - OUT0 Load Load - OUT1 Load Load + OUT0 to OUT3 Load Programmable Relay ZEN V2 Units 15 Nomenclature Standard LCD-type, Economy-type, and Communications-type CPU Units (Except for ZEN-@C2@@-@-V2 Models) CPU Units with 10 I/O Points Left side Front Power supply Input terminals terminals Right side Display screen Operation buttons Display Screen Output terminals (See note 1.
) Battery Unit connector (Remove the seal to connect the Battery Unit.) ZEN Support Software connector (also used for Memory Cassette.) Expansion Unit connector cover (See note 2.) Do not remove this cover until connecting an Expansion Unit. RUN ERR Icon Meanings Icon RUN Meaning Display while in RUN mode. Indicates an error. Displayed when there is a higher-level menu or ladder program line than the one currently displayed. Displayed when there is a lower-level menu or ladder program line than the one currently displayed. Displayed when a password had been set. CPU Units with 20 I/O Points Left side Power supply terminals Front Input terminals Right side ERR I6 I7 I8 I9 Ia Ib 20C1AR-A-V2 Display screen Operation buttons Q4 Q5 Q6 Q7 Output terminals Battery Unit connector (Remove the seal to connect the Battery Unit.

) ZEN Support Software connector (also used for Memory Cassette.) Expansion Unit connector cover (See note 2.) Do not remove this cover until connecting an Expansion Unit. Note: 1. With Communications-type CPU Units, the Q3 terminal is used as the RS-485 terminal. For details, refer to "Output Connections" on page 15. 2. Economy-type CPU Units are not provided with an Expansion Unit connector. Do not remove the cover. 16 Programmable Relay ZEN V2 Units Operation Buttons DEL Button ALT Button Operation Button Names and Operations Button Menus Function Writing ladder program Setting parameters Button input bit (See page 24.


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) B6 ON Cursor Buttons DEL --- Deletes inputs, outputs, connection --lines, and blank lines. · Switches between normally open --and normally closed conditions. · Changes to connection line write mode. · Inserts a line. ALT ESC Button OK Button --- B7 ON Up Moves the cursor · Moves the cursor up and down.

up and down. · Selects bit types and functions. Down · Moves the cursor up B5 ON and down. · Changes numerals and parameters. B2 ON Left --- Moves the cursor right and left.

Moves the cursor right B3 ON and left. B4 ON Right ESC Returns to the Cancels the setting and returns to previous screen. the previous operation. Selects the Confirms the setting. menu item at the cursor position. Cancels the setting and returns to the previous operation. Confirms the setting. B0 ON OK B1 ON Programmable Relay ZEN V2 Units 17 LED-type CPU Units without Display (ZEN-@C2@@-@-V2) CPU Units with 10 I/O Points Left side Front Power supply terminals Input terminals Right side LED indicators LED Indicators Battery Unit connector (Remove the seal to connect the Battery Unit.) Output terminals ZEN Support Software connector (also used for Memory Cassette.) Expansion Unit connector cover Do not remove this cover until connecting an Expansion Unit.

Name POWER RUN LED Green Lit Not lit Green Lit Not lit Status Power is ON. Power is OFF. Operating (RUN) Stopped (STOP) Error occurred. Normal CPU Units with 20 I/O Points Left side Power supply terminals Front Input terminals Right side ERROR I8 I9 Ia Ib Red Lit Not lit I6 I7 20C2AR-A-V2 Q4 Q5 Q6 Q7 Output terminals Battery Unit connector (Remove the seal to connect the Battery Unit.) ZEN Support Software connector (also used for Memory Cassette.) LED indicators Expansion Unit connector cover Do not remove this cover until connecting an Expansion I/O Unit. Expansion I/O Units (ZEN-8E1@@) Left side Front Power supply terminals Input terminals Right side Output terminals Expansion I/O Unit connector Expansion I/O Unit connector cover Do not remove this cover until connecting an Expansion I/O Unit. Precaution when Using Expansion I/O Units: Up to three Expansion I/O Units can be connected. When removing the Expansion Unit connector cover from the side of the CPU Unit, use a Phillips screwdriver to remove the cover screw, and then insert a flat-blade screw driver in the cover gap to remove the cover, as shown at the right. Phillips screwdriver Flat-blade screwdriver 18 Programmable Relay ZEN V2 Units Operation Bits Name Symbol Bit addresses No.

of points Operation Details (See note 1.) --Input bits Expansion input bits Output bits Expansion output bits Work bits Holding bits Timers I X Q Y M H T I0 to Ib 12 (See note 2.) X0 to Xb 12 Reflect the ON/OFF status of the input devices connected to the input terminals on the CPU Unit. Reflect the ON/OFF status of the input devices connected to the input terminals on the Expansion I/O Units. The ON/OFF status of these output bits is used to control the output devices connected to the output terminals on the CPU Unit.

The ON/OFF status of these output bits is used to control the output devices connected to the output terminals on the Expansion I/O Units. Work bits can be used only within the ZEN program. I/Os for external devices cannot be made (i.e., all I/O is internal).

Used the same as the work bits. However, if the power to the ZEN is turned OFF, these bits also maintain the previous ON/OFF status. X: ON-delay timer : OFF-delay timer O: One-shot pulse timer F: Flashing pulse timer W: Twin timer Holding timers Counters 8-digit counter # C F #0 to #7 C0 to Cf F0 8 16 1 Hold the present value being counted even if the trigger input or power supply is turned OFF and continue timing when the trigger input or power is restored. Reversible 4-digit counters that can be incremented and decremented. Reversible 8-digit counters that can be incremented and decremented. CPU Units with DC power supply support a high-speed counter up to 150 Hz. For details, refer to "8-digit Counter Operation" on page 21. Turn ON and OFF during specified times on specified days. Turn ON and OFF between specified dates. Display user-specified messages, times, timer/counter present values, or analog-converted values.

Used as program input conditions to output analog comparator comparison results. These bits can be used only for CPU Units with DC power supply. Compare the present values of timers (T), holding timers (#), and counters (C). Comparison can be made between the same two counters or timers, or with constants. Used to compare the present values of 8-digit counters (F) and output the comparison results. Used as program input conditions and turn ON when operation buttons are pressed in RUN Mode. Functions are selected from the screen when parameter settings are made. Time units can be selected from the following: 0.01-s unit: 0.01 to 99.

*99 s min/s unit: 00 min 01 s to 99 min 59 s h/s unit: 00 h 01 min to 99 h 59 min Q0 to Q7 8 (See note 2.) Y0 to Yb M0 to Mf H0 to Hf T0 to Tf 12 16 16 16 1 2 3 4 5 6 7 8 9 10 11 12 Weekly timers (See note 3.) Calendar timers (See note 3.) Display bits (See note 3.) @ * D @0 to @f *0 to *f D0 to Df A0 to A3 P0 to Pf 16 16 16 4 16 Analog comparator bits A Timer/counter comparator bits 8-digit counter comparator bits Button input bits (See note 3.*

) P G B G0 to G3 B0 to B7 4 8 Note: 1. For details, refer to the indicated item numbers on the following pages. 2. CPU Units with 10 I/O points have 6 input bits (I0 to I5) and 4 output bits (Q0 to Q3). Output bit Q3 of Communications-type CPU Units, however, cannot be output externally.

It can be used as a work bit. 3. These input bits are not supported by LED-type CPU Units without display. 1. Additional Bit Output Functions [: Normal S: Set I0 [Q0 I1 SQ1 I2 RQ1 Set/Reset operation R: Reset I3 A: Alternate AQ2 I0 I1 I2 I3 Q0 Q1 Q1 Q2 Q0 will turn ON or OFF depending Q1 will stay ON once the execution Q1 is forced OFF when the on the ON/OFF status of the condition I1 has turned ON once. A execution condition I2 is turned execution condition I0. reset is used to turn Q1 OFF. ON. Q2 alternates between turning ON and OFF when the execution condition I3 turns ON. Programmable Relay ZEN V2 Units 19 2.

Using Timers and Holding Timers X: ON-delay timer Trigger input Reset input Setting Present value 0 Timer bit Output Trigger input Timing Turns ON after set delay after the trigger input turns ON. Basic Operation Main Applications When delayed operation or a time lag is required. Stays ON while the trigger input is ON and turns OFF after a set delay after the trigger input has turned OFF. Basic Operation Trigger input Timing Output : OFF-delay timer Trigger input Reset input Setting Present value 0 Timer bit Main Applications Useful for OFF delay circuits for lights or fans Turns ON for a set period after the trigger input turns ON and regardless of how long the trigger input remains ON.


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Basic Operation Trigger input O: One-shot pulse timer Trigger input Reset input Setting Present value 0 Timer bit Timing Output Main Applications Useful for set operations where operation is always required during a regular period only. @@Basic Operation Trigger input Timing Output Timing Timing Timing F: Flashing pulse timer Trigger input Reset input Setting Present value 0 Timer bit Main Applications Useful for flashing emergency lights or sounding buzzers as the output for an alarm circuit. @@Independent ON- and OFF-time settings are possible. @@@@The present value is held while the trigger input is OFF. @@@@@@@@Count inputs are not accepted while the reset input is turned ON. @@@@@@Count inputs are not accepted while the reset input is turned ON.

@@@@@@@@@@@@@@@@@@The execution times are provided as a guide. @@@@@@@@Display Settings (Only for Standard LCD-type, Economy-type, and Communications-type CPU Units) Backlight/display L0: No backlight; No switching to display function screen (See note 1.) function screen L1: Backlight; No switching to display function screen (See note 1.) switching L2: No backlight; Switching to display function screen (See note 2.) L3: Backlight; Switching to display function screen (See note 2.

) Display start position Display object X (digit): 00 to 11 Y (line): 0 to 3 CHR DAT CLK I4 to I5 T0 to Tf #0 to #7 C0 to Cf F0 Monitoring X00 Y0 to Y3 X11 Characters (Up to 12 characters - English, numerals, symbols) Month/day (5 digits @@/@@) hour/minute (5 digits @@:@@) Analog-converted value (4 digits @@:@) Timer present value (5 digits @@.) Holding timer present value (5 digits @@.) Counter present value (4 digits @@@@) 8-digit counter present value(8 digits @@@@@@@@) A: Can read settings during operation. D: Cannot read settings during operation. Note: 1.

When L0 or L1 are selected to disable the display function screen, the display function screen will not be displayed automatically. Use operation buttons to move to the display function screen. 2. When L2 or L3 are selected, the ZEN switches to the display function screen if the display function is enabled and the specified data is displayed. The Main Screen will no longer be displayed. To display the Main Screen, change the CPU Unit to STOP mode. 9. Analog Comparator Operation · Example 1 (When comparison shows analog input 1 5.2 V) Setting 10.5 10.

0 · Example 2 (When comparison shows analog input 1 is analog input 2) Converted value 10.0 Analog input 1 5.2 Analog input 2 00.0 0.0 Analog comparator bit 10.5 V 10.0 V Input voltage 00.0 Analog comparator bit 10. Timer/Counter Comparator Operation · Example 1 (When comparison setting is holding timer #0 12 min 34 s) Setting 12 min 34 s C2 present value 0 Comparator bit Comparator bit #0 present value · Example 2 (When comparison setting is counter 1 (C1) counter 2 (C2)) C1 present value 11. 8-digit Counter Comparator Operation · When comparison setting is 8-digit counter F0 12000000 12000000 F0 present value 0 8-digit counter comparator bit Programmable Relay ZEN V2 Units 23 12.

Specifications for Button Input Bits (Only for Standard LCD-type, Economy-type, and Communications-type CPU Units) The operation buttons are used to perform operations for input bits. They are useful when checking program operations or forcefully resetting holding timers or counters. ALT Button input 7 (B7) DEL Button input 6 (B6) Button input 5 (B5) Button input 4 (B4) Button input 3 (B3) Button input 2 (B2) OK Button input 1 (B1) ESC Button input 0 (B0)

Password Function (Only for Standard LCD-type, Economy-type, and Communications-type CPU Units) The ZEN has a password function to prevent incorrect manipulation of ladder programs or settings data by other operators. When the password (0000 to 9999) is set, the following operations will not be possible unless the password is input correctly. · · · · · · · Editing ladder program Program all clear Monitoring ladder programs Changing/clearing password Changing backlight OFF time Setting input filter Setting RS-485 communications 24 Programmable Relay ZEN V2 Units ZEN Support Software Functions Note: Always use ZEN-SOFT01-V4 as the Support Software for the V2 CPU Unit.

Creating Ladder Programs ZEN ladder programs can be created with ease. Simulating Ladder Programs The simulation function makes it possible to check whether correct operation is performed without connecting to the ZEN. Note: The Edit Input Dialog Box is displayed when an input bit is inserted. Timer, counter, and other parameter settings are also set in the Edit Input Dialog Box. They cannot be set in the Edit Output Dialog Box.

Monitoring Ladder Programs The operating status can be monitored from the Support Software by connecting to the ZEN using a Connecting Cable (ZEN-CIF01). Printing Ladder Programs Ladder programs and I/O comments, as well as timer, counter and other parameter settings can be printed. Note: Both RS-485 communications and the ZEN monitoring function cannot be used at the same time with Communications-type CPU Units. The Support Software can also be used to save files and edit comments. Refer to the ZEN Support Software Operation Manual (Cat. No. Z184-E1-03) for details. Programmable Relay ZEN V2 Units 25 Dimensions Note: All units are in millimeters unless otherwise indicated. CPU Units CPU Units with 10 I/O Points ZEN-10C@@@-@-V2 70 60 56 44 Unit Mounting Holes 4.5 5.

*5 Note: Use M4 screws for mounting. 90 80 45 Mounting Hole Dimensions Two, M4 4.7 (Sliding: 13 max.) CPU Units with 20 I/O Points ZEN-20C@@@-@-V2 80 122.5 112.5 I6 I7 I8 I9 Ia Ib 56 44 60 (112.5) * 20C1AR-A-V2 * The dimensions in parentheses refer to models with 20 I/O points. 45 90 80 Q4 Q5 Q6 Q7 4.7 (Sliding: 13 max.) Dimensions with Battery Unit CPU Units with 10 I/O Points 87.*

5 44 17.5 70 17.5 CPU Units with 20 I/O Points 140 122.5 I6 I7 I8 I9 Ia Ib 26 Programmable Relay ZEN ZEN-BAT01 20C1AR-A-V2 45 45 Q4 Q5 Q6 Q7 V2 Units Expansion I/O Units ZEN-8E1@@ 2 35 DIN Track Hook (Using Slide) Mounting Hole Dimensions 7.6 Two, 3.

5 dia. 54 44 17.5 Two, M3 90 97 45 90 97 2 7.6 Power Supply Unit ZEN-PA03024 70 60 56 44 Mounting Hole Dimensions Two, M4 90 80 45 80 60 4.7 (Sliding: 13 max.

*) Accessories (Order Separately) Battery Unit ZEN-BAT01 Memory Cassette ZEN-ME01 Connecting Cable ZEN-CIF01 Cable length: 2m Programmable Relay ZEN V2 Units 27 Track Mounting Accessories (Order Separately) Mounting Track PFP-100N PFP-50N PFP-100N2 7.3±0.15 4.5 35±0.3 27±0.15 4.5 35±0.3 27 24 16 29.2 15 25 10 25 1,000 (500) * 25 10 25 15 (5) * 1 15 25 10 25 1,000 25 10 25 15 1 1.*

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*5 * The numbers in parentheses () are dimensions for the PFP-50N.*

End Plate PFP-M M4 × 8 pan-head screw 10 6.2 1.8 Spacer 5 16 12 PFP-S 34.8 44.3 1 35.5 35.3 1.8 50 11.5 10 1.3 4.
8 M4 spring washer 16.5 Precautions when Selecting ZEN Programmable Relays Changes in Comparison with Previous Models · The power supply and transistor output voltage ranges for CPU Units and Expansion I/O Units with DC power supply has been expanded to 10.8 to 28.8 VDC. · The width of Expansion I/O Units has been reduced by half and only 8-point models are available.
· The connection method between the CPU Unit and Expansion I/O Units has changed. · Twin timer operation has been added to timers. · Multiple-day operation and pulse-output operation has been added to weekly timers. · An 8-digit counter and 8-digit comparators have been added. · The accuracy of analog inputs has been increased to ±1.
5% FS. · The timing accuracy of weekly timers and calendar timers has been increased to ±15 s or less per month (at 25°C). · Australia and New Zealand Daylight Saving Time (DST) settings have been added. · CPU Units with RS-485 communications and economic CPU Units have been added. · The heat slits in the cases of CPU Units and Expansion I/O Units have been removed to prevent foreign matter from entering. Model numbers have been changed to reflect the improved functionality. Previous Model Numbers ZEN-@C@@@-@ ZEN-@C@@@-@-V1 ZEN-@E@@ (Pre-V1 CPU Units) (V1 CPU Units) (4E/8E-type Expansion I/O Units) New Model Numbers ZEN-@C@@@-@-V2 ZEN-8E1@@ (V2 CPU Units) (8E1-type Expansion I/O Unit) Memory Cassettes, Connecting Cables, and Battery Units have not been changed and can be used as they are with the new models. 28 Programmable Relay ZEN V2 Units Precautions when Switching from Previous Units Previous models of Expansion I/O Units cannot be connected to V2 CPU Units. ZEN-8E1@R Expansion I/O Units with relay outputs need to be connected to a power supply. A ZEN-@C@D@-D-V2 CPU Unit with DC power supply cannot be connected to an Expansion I/O Unit with AC inputs.

When connecting Expansion I/O Units with DC inputs to a CPU Unit with an AC power supply, the burst noise immunity will be 1 kV (IEC 610004-4). · There is no change to the 8 A per contact for relay output, but the total output for all contacts must be as follows: Units with 10 I/O Points: 20 A max. (15 A max. for Communications-type CPU Units) Units with 20 I/O Points: 40 A max. Expansion I/O Units: 20 A max. · Always use the ZEN-SOFT01-V4 Support Software for V2 CPU Units. · Input wiring for CPU Units with DC power supplies differs from that for Pre-V1 CPU Units. Refer to the following diagrams. V2 and V1 CPU Units COM wiring depends on whether a negative common or positive common is being used. Negative (-) COM Wiring 24 VDC COM wiring required. Analog inputs possible. Input devices + - COM · · · · Pre-V1 CPU Units The input circuit common terminal is connected internally to the negative (-) side of the power supply circuit. 24 VDC Analog inputs possible. Input devices +- CPU Unit with 10 I/O Points NC Positive (+) COM Wiring 24 VDC COM wiring required. Input devices +- COM CPU Unit with 10 I/O Points Note: I4 and I5 (Ia and Ib for CPU Units with 20 I/O points) cannot be used as analog input terminals.
CPU Unit with 10 I/O Points Changes Ratings and Specifications CPU Units Item Rated power Models with DC supply voltage power supply Power consumption Models with AC power supply Models with DC power supply Inrush current Models with AC power supply Models with DC power supply DC inputs I0 to I3 (See note 1.) Input impedance ON voltage Input common Models with 10 I/O points: 4.5 A max. Models with 20 I/O points: 4.5 A max. Models with 10 I/O points: 30 A max. Models with 20 I/O points: 30 A max. 5.3 k 8 VDC min. Independent common terminal 10.8 to 28.8 VDC See Ratings on page 7. V2 Units V1 Units 20.4 to 26.4 VDC 30 VA max.

(with 3 Expansion I/O Units connected) 6.5 W max. (with 3 Expansion I/O Units connected) 40 A max. 20 A max. 5 k 16 VDC min. Internally connected to power supply terminal 4.8 k Pre-V1 Units Programmable Relay ZEN V2 Units 29 Item DC inputs I4 to I5 (See note 2.) Input impedance ON voltage OFF voltage Analog inputs Input impedance I4 to I5 Accuracy (See note 2.) Control outputs Relay outputs 5.2 to 5.
5 k 8 VDC min. 3 VDC max. 100 k min. V2 Units 5 k V1 Units 16 VDC min. 5 VDC max.
150 k min. Pre-V1 Units ±1.5% FS (at ambient operating temperature within rated range) 8 A per output Total for all outputs must be as follows: Units with 10 I/O Points: 20 A max. (15 A max. for Communications-type CPU Units) Units with 20 I/O Points: 40 A max.
±10% FS (at ambient operating temperature within rated range) 8 A per output Transistor outputs 28.8 V max. Timing accuracy of weekly and calendar timers Mounting direction Terminal block tightening torque Connectable Expansion I/O Units Case structure 26.4 V max. ±15 s or less per month (at 25°C) ±2 min per month Standard (vertical) installation and horizontal installation Standard (vertical) installation 0.565 to 0.6 N·m (5 to 5.3 in-lb) ZEN-8E1@ (See note 3.) No heat slits 0.5 to 0.

6 N·m ZEN-4E@ and ZEN-8E@ Heat slits Note: 1. Units with 20 I/O Points: I0 to I9 2. Units with 20 I/O Points: Ia to Ib 3. Refer to page 32 for details on compatible combinations of CPU Units and Expansion I/O Units. Expansion I/O Units Item Model AC inputs Input impedance Isolation Input common DC inputs Input voltage Input impedance Isolation ON voltage Input common 680 k No isolation Internally connected to power supply terminal 10.8 to 28.8 VDC 6.5 k ZEN-8E1DR: No isolation ZEN-8E1DT: Photocoupler 8 VDC min. 8E1 type Unit with 8 I/O Points 83 k Photocoupler Independent common terminal 20.4 to 26.
4 VDC 4.7 k Photocoupler 16 VDC min. 4E/8E type Units with 4 input, 4 output, or 8 I/O points ZEN-8E1DR: Internally connected to power supply Independent common terminal terminal ZEN-8E1DT: Independent common terminal 8 A per output Total for all outputs must be as follows: Units with 10 I/O Points: 20 A max. Units with 20 I/O Points: 40 A max. 28.
8 V max. M3 (mounting holes on DIN Track hooks) V2 CPU Units (See note.) 90 × 35 × 56 mm No heat slits 8 A per output Control output Relay outputs Transistor outputs Mounting screws Connectable CPU Unit Dimensions (H × W × D) Case structure 26.4 V max. M4 (mounting holes on Unit) V1 or Pre-V1 CPU Units 90 × 70 × 56 mm Heat slits Note: Refer to page 32 for details on compatible combinations of CPU Units and Expansion I/O Units.
30 Programmable Relay ZEN V2 Units Other Functions Item Bits Timer operation Weekly timer operation Addition of bits Daylight Saving Time (DST) Setting Items set for password V2 Units ON-delay, OFF-delay, one-shot pulse, flushing pulse, twin timer operation Timer operation, multiple-day operation, pulseoutput operation 8-digit counter (1 counter, up to 150 Hz) 8-digit comparators (4 comparators) Manual, EU, US.


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Australia, New Zealand Ladder program editing Program all clear Ladder monitoring Password change/clear Backlight shut-off time Input filter settings Node number setting (See note.) Not possible Node number setting window deleted (except for Units with communications). Modem initialization window deleted (except for Units with communications). Models added with communications. ZEN-10C4@R-@-V2 Possible Node number setting window displayed. Modem initialization window displayed. V1 Units Pre-V1 Units ON-delay, OFF-delay, one-shot pulse, flushing pulse Timer operation --Manual, EU, US Ladder program editing Ladder monitoring Password change/clear Backlight shut-off time Input filter settings Node number setting LCD contrast adjustment Menus Node number setting window Modem initialization window RS-485 communications Economy-type CPU Units --- --Economy-type models added. ZEN-@C3@R-@-V2 Expansion I/O Units cannot be connected. Other functions are the same as the standard LCD models.

*Note: Not displayed for V2 CPU Units except for Units with Communications. Bits Name V2 Units 10 I/O points Input bits Output bits Timers Holding timers Counters Weekly timers Calendar timers Display bits Work bits Holding bits Expansion input bits Expansion output bits Analog comparator bits Timer/counter comparator bits 8-digit counter I Q T # C * D H X Y A P F 6 points 16 points 8 points 16 points 16 points 16 points 16 points 12 points 12 points 4 points 16 points 1 point 4 points ----20 I/O points 12 points 6 points 4 points CPU Unit V1 Units 10 I/O points 20 I/O points 12 points 8 points Pre-V1 Units 10 I/O points 6 points 4 points 8 points 4 points 8 points 8 points 8 points 8 points 4 points (See note.) 8 points @ 16 points M 16 points 8-digit counter comparator bits G Note: Output bit Q3 of Communications-type CPU Units cannot be output externally. It can be used as a work bit. Programmable Relay ZEN V2 Units 31 Compatible Combinations of CPU Units and Expansion I/O Units The Expansion I/O Units that can be connected to V2 CPU Units are different from those that can be connected to V1 CPU Units and previous CPU Units. Expansion I/O Units with AC Inputs cannot be connected to V2 CPU Units with DC Power Supplies. Expansion I/O Units cannot be connected to Economy-type CPU Units. CPU Units Version V2 CPU Unit type Standard LCD type LED type Communications type Standard LCD type LED type Economy type V1 and Pre-V1 Standard LCD type LED type Power supply AC Model ZEN-@C1AR-A-V2 ZEN-@C2AR-A-V2 ZEN-10C4AR-A-V2 ZEN-@C1D@-D-V2 ZEN-@C2D@-D-V2 ZEN-@C3AR-A-V2 ZEN-@C3DR-D-V2 ZEN-@C1AR-A-V1 ZEN-@C1AR-A ZEN-@C2AR-A-V1 ZEN-@C2AR-A ZEN-@C1D@-D-V1 ZEN-@C1D@-D ZEN-@C2D@-D-V1 ZEN-@C2D@-D ZEN-4EA ZEN-4ED ZEN-4ER ZEN-8EAR ZEN-8EDR ZEN-8EDT Supported Expansion I/O Units ZEN-8E1AR ZEN-8E1DR ZEN-8E1DT ZEN-8E1DR ZEN-8E1DT Not supported. DC AC DC AC DC 32 Programmable Relay ZEN V2 Units Memory Cassette and CPU Unit Combinations Be aware of the following restrictions when using a Memory Cassette containing a program that was stored from a CPU Unit with a different version of system software. System software version of CPU Unit used to write the Memory Cassette Ver.*
1.0 Ver. 1.1 Ver. 2.
0 (V1 CPU Units) Ver. 3.0 (V2 CPU Units) OK Restrictions (See note 1.) 10 I/O points Restrictions (See notes 1 and 2.) System software version of CPU Unit used to read the Memory Cassette Ver.
1.0 OK OK Restrictions (See note 2.) Ver. 1.1 OK OK OK Restrictions (See note 3.) Restrictions (See note 4.) Ver. 2.0 (V1 CPU Units) 10 I/O points 20 I/O points OK OK OK OK Restrictions (See note 4.) Restrictions (See note 4.

) OK OK OK Restrictions (See note 3.) OK Restrictions (See note 3.) Ver. 3.0 (V2 CPU Units) 10 I/O points 20 I/O points OK OK OK OK OK OK 20 I/O points Restrictions Restrictions (See notes 1, 2, and 3.) (See notes 2 and 3.) 10 I/O points Restrictions Restrictions (See notes 1, 2, and 4.) (See notes 2 and 4.) 20 I/O points Restrictions (See notes 1 to 4.) Restrictions Restrictions (See notes 2, 3, and 4.
) (See note 4.) Note: 1. The display functions (display clear: -CD@ and day/month display: DAT1) cannot be used and will be ignored. 2. Only the memory area ranges supported by the pre-V1 CPU Units can be used for Timers, Holding Timers, Counters, Weekly Timers, Calendar Timers, and Displays (i.e., only half of each). 3. Only 6 inputs and 4 outputs can be used in the CPU Unit I/O bits. Any others will be ignored.
4. Twin timer operation for timers, multiple-day operation and pulse operation for weekly timers, the 8-digit counter, and 8-digit comparators cannot be used. New Zealand and Australia cannot be set for Daylight Saving Time (DST). Support Software and CPU Unit Combinations CPU Unit system software Ver. 1.0 ZEN-SOFT01 Ver. 1.0 (Pre-V1 Units) Ver. 1.1 (Pre-V1 Units) Ver.

2.0 (V1 CPU Units) OK Restrictions (See note 1.) 10 I/O points Restrictions (See notes 1 and 2.) 20 I/O points Not applicable. Ver. 3.0 (V2 CPU Units) Not applicable. OK OK Restrictions (See note 2.) Not applicable. Not applicable.
Support Software Ver. 2.0 ZEN-SOFT01-V2 Ver. 3.0 ZEN-SOFT01-V3 Restrictions (See notes 1 and 2.
) Restrictions (See note 2.) OK OK Not applicable. Ver. 4.1 ZEN-SOFT01-V4 Restrictions (See notes 1, 2, and 3.
) Restrictions (See notes 2 and 3.) Restrictions (See note 3.) Restrictions (See note 3.) OK Note: 1. The display functions (display clear: -CD@ and day/month display: DAT1) cannot be used and will be ignored. 2. Only the memory area ranges supported by the pre-V1 CPU Units can be used for Timers, Holding Timers, Counters, Weekly Timers, Calendar Timers, and Displays (i.e., only half of each). 3.

Twin timer operation for timers, multiple-day operation and pulse operation for weekly timers, the 8-digit counter, and 8-digit comparators cannot be used. New Zealand and Australia cannot be set for Daylight Saving Time (DST). Difference between ZEN Programmable Relays and PLC Ladder Program Execution ZEN Programmable Relays I0 0 Q0 1 I3 2 3 4 Bus bar I4 T0 [Q1 TT0 [Q2 Executed sequentially from the bus bar. OMRON SYSMAC PLCs I0 0 Q0 1 I3 2 3 4 I4 T0 [Q1 TT0 [Q2 END I1 I2 [Q0 I1 I2 [Q0 ZEN executes the entire ladder program (up to 96 lines) from the first to last line at one time. Each row is executed in order from left to right starting from the left bus bar. PLCs execute ladder programs one rung (circuit) at a time, starting with the top rung and executing it in order from the left. When the END instruction is reached, the program is executed again from the first rung. The ON/OFF status produced by an output contact will not be used as the input contact status in the same cycle, but it can be used in the next cycle. I0 0 M0 1 [Q0 [M0 I0 M0 Q0 1 cycle 1 cycle When the following instructions are executed, Q0 turns ON/OFF at the same time as the other bits. I0 0 M0 1 [Q0 [M0 I0 M0 Q0 Programmable Relay ZEN V2 Units 33 Precautions !WARNING Serious human hazard may occasionally occur due to ignition or rupture of the lithium battery used in the Battery Unit.


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Do not short the battery terminals or charge, disassemble, deform under pressure, or incinerate the battery. Never use any battery that has been dropped on the floor or otherwise subjected to excessive shock. System Startup and Program Changes · Check the user program for proper execution before actually running it on the Unit. · Disconnect the output lines from the system before testing operation in any system in which incorrect operation can result in injury or equipment damage. · Confirm safety before attempting any of the following operations.

· Changing the operating mode (RUN/STOP). · Using the button switches. · Changing bit status or parameter settings. · Double-check all wiring before turning ON the power supply. · Refer to "Cycle Time Calculation Method" on page 21 and confirm that the increase in the cycle time will not affect operation. If the cycle time is too long, it may become impossible to read input signals accurately. The increase in the cycle time will be particularly noticeable when set values are written in RUN mode for a CPU Unit with communications (ZEN-10C4@R-@-V2). !CAUTION Electric shock, fire, or malfunction may occur. Do not disassemble, modify, or repair the ZEN or touch any of the internal parts. Electric shock may occur. Never touch the I/O terminals, computer connector, or Battery Unit connector while power is being supplied. Electric shock may occur. Do not remove the Expansion Unit connector cover unless an Expansion I/O Unit will be permanently installed. Fire may occasionally occur. Tighten the terminal screws to a torque of 0.

565 to 0.6 N·m (5 to 5.3 in-lb). Installation and Wiring · Do not allow the ZEN to fall during installation. · Be sure that the DIN Track mounting levers, Memory Cassettes, Battery Units, cable connectors, and other items with locking devices are properly locked into place. Improper locking may result in malfunction. · For surface mounting, tighten mounting screws to the following torque. CPU Units: 1.03 N·m max. Expansion I/O Units: 0.

46 N·m max. · Use wires with cross-sectional areas of 0.2 to 2.5 mm2 (equivalent to AWG24 to AWG14) for wiring and strip them for 6.5 mm. Precautions for Safe Use Please observe the following precautions for safe use of this product. Circuit Design · All interface connectors and battery connectors are live parts. They may not be directly connected to a Safety Extra Low Voltage (SELV) circuit or to accessible conductive parts. For programming units and personal computers use only the connecting cable ZEN-CIF01 (optional accessory) manufactured by OMRON. ZEN-CIF01 provides safe (reinforced) insulation between personal computers and ZEN.

· Provide emergency stop circuits, external interlock circuits, limit circuits, and other safety circuits in addition to any provided within the ZEN control circuits to ensure safety of the overall system in the event of ZEN failure or external factors. · If the ZEN discovers an error during self-diagnosis, operation will be stopped and all outputs will be turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the overall system. · Outputs from the ZEN may remain ON or OFF due to faults in internal circuits such as output relay fusing or burning, or output transistor destruction. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the overall system. · Fail-safe measures must be taken by the user to ensure overall system safety in the event of broken signal lines or momentary power interruptions. · The durability of the output relays is largely affected by the switching conditions. Confirm the operation of the system under actual operating conditions and set the switching frequency to ensure that adequate performance will be provided. Insulation faults and burning in the ZEN may result if relays are used after their performance has deteriorated. Handling · The environment of use for the ZEN is "Pollution degree 2" and "Overvoltage category II" specified in IEC60664-1.

· Always use the ZEN within the rated ambient operating temperature and humidity. The rated ambient operating temperature is 0 to 55°C (-25 to 55°C for LED-type CPU Units). If the ZEN is used near sources of heat, such as a power supply, the internal temperature of the ZEN may increase, lowering the durability of the ZEN. · Discharge static electricity from your body, e.g., by touching a grounded metal plate, before touching any Unit. · The exterior of the Units will be damaged if it comes into contact with organic solvents (e.g., benzene or paint thinner), strong alkalies, or strong acids. Never allow such substances to come into contact with the Units.

· Do not apply voltages exceeding the rated voltages. Internal elements may be destroyed. · Short failures or open failures may result from the destruction of output elements. Do not use loads that exceed the rated output current. Maintenance When replacing a CPU Unit, transfer to the new Unit and confirm all settings for clock data, internal holding bits, holding timers, and counters before starting operation again.

Connecting Expansion I/O Units · Supply power to both the CPU Unit and Expansion I/O Units from the same power supply and turn them ON and OFF at the same time. · When connecting Expansion I/O Units with DC inputs to a CPU Unit with an AC power supply, the burst noise immunity will be 1 kV (IEC 61000-4-4). · Expansion I/O Units with AC inputs (ZEN-8E1AR) cannot be connected to a CPU Unit with a DC power supply. Transportation and Storage · Use special packing boxes when transporting the ZEN and do not subject it to excessive shock or vibration or drop it during shipment. · Store the ZEN within the rated ranges.

If the ZEN has been stored at -10°C or lower, allow it to stand at room temperature for three hours or longer before turning ON the power supply. 34 Programmable Relay ZEN V2 Units Precautions for Correct Use Installation Environment · Do not install the ZEN in the following locations. · Locations subject to radical changes in temperature · Locations with high humidity subject to condensation · Locations subject to excessive dust or dirt · Locations subject to corrosive gas · Locations subject to direct sunlight · Do not install the ZEN in locations subject to shock or vibration. Extended use in such locations may cause damage from stress. · In environments subject to static electricity (e.g., close to pipes conveying forming materials, powders, or fluid materials), separate the ZEN as far as possible from the source of static electricity. · The ZEN is neither waterproof nor oil-proof. Do not use it in locations subject to water or oil.

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