■ General Specifications

Item	Specification	
	ZEN-10C□AR-A	ZEN-10C□DR-D
Power supply voltage	100 to 240 VAC	24 VDC
Rated power supply voltage	85 to 264 VAC	20.4 to 26.4 VDC
Power consumption	30 VA max.	6.5 W max.
Inrush current	40 A max.	20 A max.
Insulation resistance	Between power supply AC external and input terminals, and relay output terminals 20 MΩ min. (at 500 VDC)	
Dielectric strength	Between power supply AC external and input terminals, and relay output terminals 2,300 VAC, 50/60 Hz for 1 minute with leakage current of 1 mA max.	
Noise immunity	Conforms to IEC61000-4-4, 2 KV (power supply line)	
Vibration resistance	Conforms to JIS C0040, 10 to 57 Hz, amplitude 0.075 mm, 57 to 1,500 Hz, acceleration: 9.8 m/s² 80 minutes in X, Y, and Z directions (sweep time: 8 min (No. sweeps: 10 = 80 min.))	
Shock resistance	Conforms to JIS C0041. 147 m/s², 3 times in X, Y, and Z directions.	
Ambient temperature	LCD-type CPU Unit (operation panel and calendar/clock function): 0 to 55°C LED-type CPU Unit (no operation panel or calendar/clock function): -25 to 55°C	
Ambient humidity	10% to 90% (with no condensation)	
Ambient conditions	No corrosive gases	
Ambient storage temperature	LCD-type CPU Unit (operation panel and calendar/clock function): -20 to 75°C LED-type CPU Unit (no operation panel or calendar/clock function): -40 to 75°C	

■ Performance Specifications

Item	Specification
Control method	Stored program control
I/O control method	Cyclic scan
Programming language	Ladder diagram
Program capacity	96 lines (3 inputs conditions and 1 output per line)
Max. No. of control I/O points	34 points CPU Unit: 6 inputs and 4 outputs Expansion I/O Units: 4 inputs and 4 outputs each, up to 3 Units.
LCD display	12 characters (4 lines, with backlight (LCD-type CPU Unit only)
Operation keys	8 (4 cursor keys and 4 operation keys) (LCD-type CPU Unit only)
Memory backup	●Internal EEPROM (or optional Memory Cassette) • User programs • Parameter settings ●Internal RAM, super-capacitor hold (or optional Battery Unit) • Holding bits • Holding timer and counter values ●Super capacitor hold (or optional Battery Unit) • Calendar and clock
Time function (RTC)	ZEN-10C1□R-□only, accuracy: 1 to 2 min/month (at 25°C)
Terminal block	Solid-line terminal block (Use solid lines or fine wiring terminals.)
Power supply holding time	ZEN-10C□AR-A: 10 ms min. ZEN-10C□DR-D: 2 ms min.
Weight	300 g max.

■ Models

Model	Unit name	No. of I/O points	Power supply	Inputs		Outputs		LCD	Calendar/ clock
ZEN-10C1AR-A	CPU Unit	10	AC	6	AC	4	Relay	Yes	Yes
ZEN-10C2AR-A		10	AC	6	AC	4	Relay	No	No
ZEN-10C1DR-D		10	DC	6	DC	4	Relay	Yes	Yes
ZEN-10C2DR-D		10	DC	6	DC	4	Relay	Yes	No
ZEN-8EAR	Expansion I/O Unit	8	—	4	AC	4	Relay	—	—
ZEN-8EDR		8	—	4	DC	4	Relay	—	—
ZEN-4EA		4	—	4	AC	—	—	—	—
ZEN-4ED		4	—	4	DC	—	—	—	—
ZEN-4ER		4	—	—	—	4	Relay	—	—
ZEN-ME01	Memory Cassette								
ZEN-CIF01	Connecting Cable								
ZEN-BAT01	Battery Unit								
ZEN-SOFT01	ZEN Support Software (CD-ROM)								
ZEN-KIT01	Set containing CPU Unit (ZEN-10C1AR-A), Support Software Connecting Cable, ZEN Support Software, and manual.								

Note: Do not use this document to operate the Unit.

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Note: Specifications subject to change without notice.

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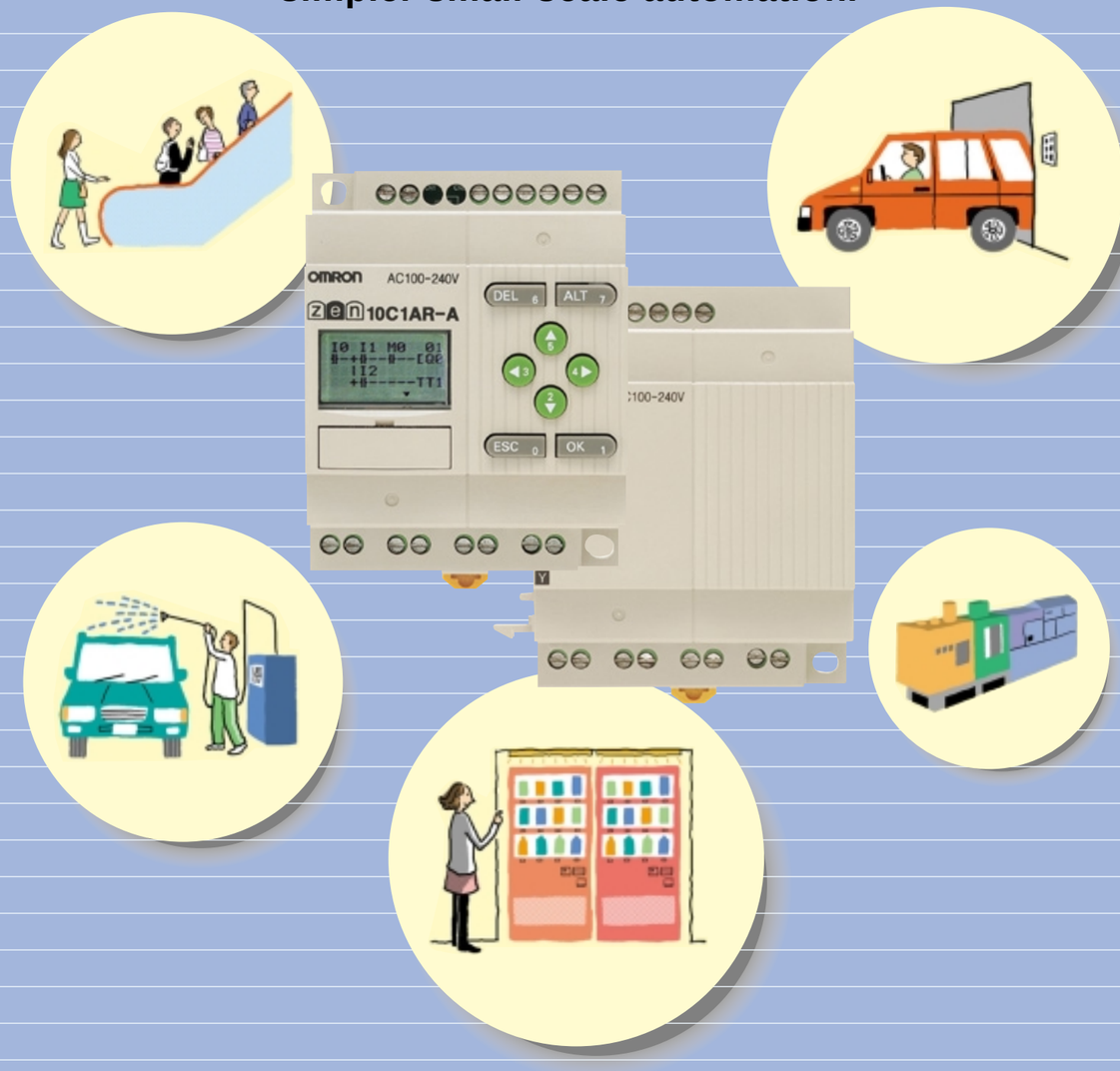
Printed in Japan
0401-2M

OMRON

ZEN

Programmable Relays

The ZEN from OMRON for easier and simpler small-scale automation.

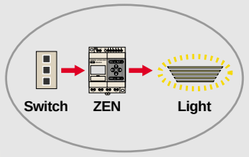


Just a few examples of what the ZEN can do: Enormous added value in automating everyday facilities

Easier small-scale automatic control. That is what the ZEN from OMRON provides. The ZEN can be used almost as easily as wiring materials. The ZEN enables quick automation of small machines or facilities. Add to this the LCD screen and 8 buttons on the front panel for easy ladder program input. You want a more compact control panel or reduced assembly or wiring? AC inputs, easier circuit design, or multiple-timer control? The OMRON ZEN gives you these, and more, to fill all your automation requirements. Increase system convenience and added value using the automation excellence provided by the ZEN.

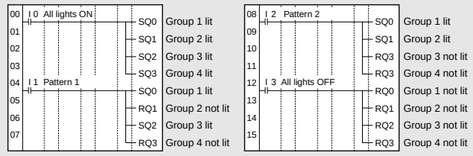
Lighting Pattern Control

Application of Bit Logic



Set the required light patterns and change between patterns with the flick of a switch to save energy by improving lighting efficiency.

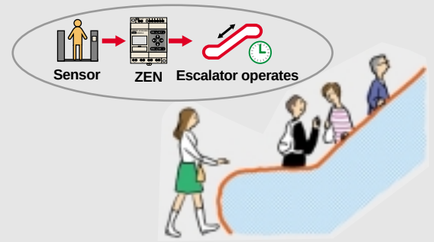
■ Example Program



Switch 1 (I0) turned ON, all lights turn ON.
Switch 2 (I1) turned ON, light groups 1 and 3 turn ON.
Switch 3 (I2) turned ON, light groups 1 and 2 turn ON.
Switch 4 (I3) turned ON, all lights turn OFF.

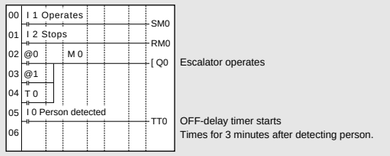
Automatic Escalator

Application of Bit Logic, Timer Function, and Weekly Timers



An escalator can operate continuously between specified days and times. It can also be set to conserve energy by operating outside those times only when a person approaches the escalator.

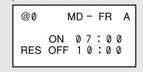
■ Example Program



Two weekly timers are used to operate the escalator between 7:00 and 10:00 am and 5:00 and 10:00 pm on weekdays.
Outside those times, the escalator uses the OFF-delay timer to operate for 3 minutes after a person has been detected.

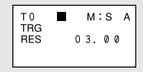
■ Parameter Settings

Weekly Timer @0
(Mon to Fri: 7:00 to 10:00)



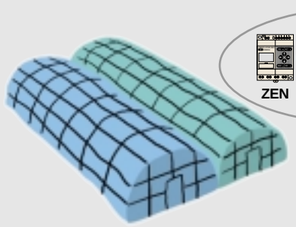
Weekly Timer @1
(Mon to Fri: 17:00 to 22:00)

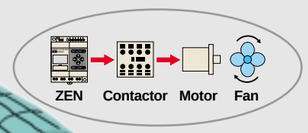
OFF-delay Timer T0



Greenhouse Air Circulator Control

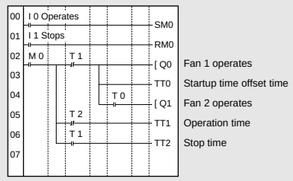
Application of Bit Logic and Timer Functions





The ZEN can be used to circulate carbon dioxide or warm air. Two circulation fans can be operated at regular intervals. Startup current can also be reduced by staggering operation of the two fans.

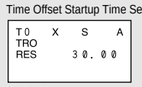
■ Example Program



When the operation switch is pressed, fan 1 starts and 30 seconds later fan 2 starts. The fans repeat a cycle of 1 hour operating, 1 hour 30 minutes stopped.

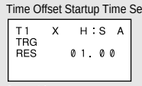
■ Parameter Settings

Time Offset Startup Time Setting T0



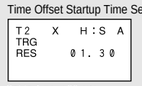
Set to 30 s.

Time Offset Startup Time Setting T1



Set to 1 h.

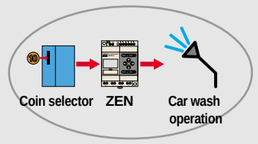
Time Offset Startup Time Setting T2



Set to 1 hour 30 min.

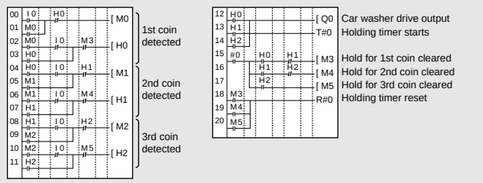
Coin-operated Car Wash

Application of Bit Logic and Timer Functions



The ZEN can be used to change the operating time depending on the number of coins inserted.
If a holding timer (#) is used with holding bits (H) in self-holding programming, so that the remaining time will not be reset even if there are unexpected power interruptions.

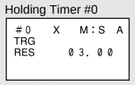
■ Example Program



The car wash operates for 3 minutes for one coin, 6 minutes for two coins, and 9 minutes for 3 coins.

■ Parameter Settings

Holding Timer #0



Set to 3 min.

For Automatic Doors

Days and times can be easily set for doors to automatically open and close.

For Lighting Control at Vending Machines

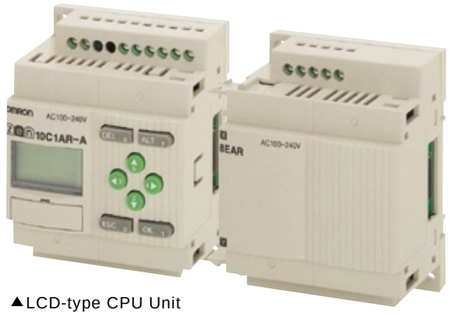
Lighting can be set to operate continually between certain days and times and then outside those times when people approach the vending machine.

For Control of Water Supply Tanks

In addition to water supply control, the ZEN can control an inverter based on water capacity within the tank.

For Automatic Warm-up of Molding Machines

Molding can be started on the molding machine as soon as the work shift starts, without any loss of time.



▲LCD-type CPU Unit

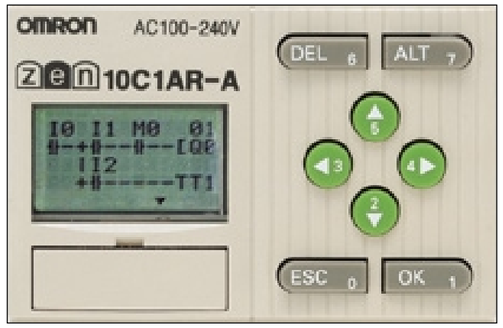
▲ Expansion I/O Unit with 8 I/O points

The Main Features of the Light-weight and Easy-to-use ZEN

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.

*For LCD-type CPU Units only.



Hold Functions for Peace of Mind

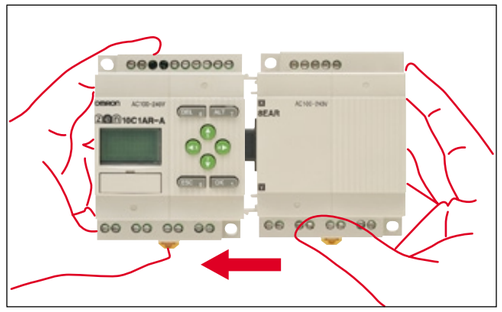
The ZEN has holding timers and holding bits to give peace of mind against unexpected power failures. These functions hold the previous status so that operation can continue with the same status after power has been restored. You can also mount a Battery Unit (optional) to back up the calendar and clock functions for 10 years or more. Ladder programs and parameter settings can be backed up to the CPU Unit's internal EEPROM, ensuring no data will be lost even if a Battery Unit is not installed.

Operations Determined after Wiring

Hardware relays or timers can normally be selected only after operations have been decided. The ZEN is different. You can wire the ZEN first and then carefully consider operating details later. This makes programming and maintenance after wiring a simple matter.

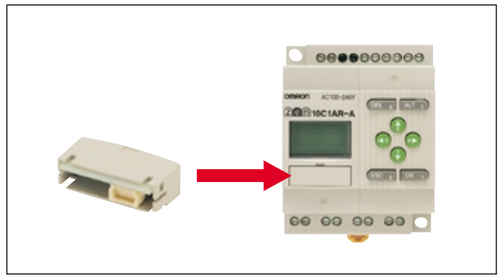
Flexible Expansion

The ZEN can be used effectively for lighting and other applications requiring many output points. Expansion I/O Units can be added easily if there are not enough I/O points. The compact ZEN takes up little space.



Memory Cassettes

Optional Memory Cassettes have a wide range of uses - programs can be easily saved or downloaded or copied to other ZEN.



Many Other Functions

Standard Functions on All CPU Units

- Two types of power supply specifications: 100 to 240 VAC or 24 VDC
- Input filters to prevent noise-related malfunctions
- Analog inputs
- Outputs have large a switching capacity (8 A at 250 VAC). All 4 outputs have independent contacts.
- Up to 34 I/O points if Expansion I/O Units is added.
- Conforms to UL/CSA standards and EC Directives.
- Programming using ZEN Support Software on Windows 95, 98, 2000, ME, or NT 4.0 Service Pack 3

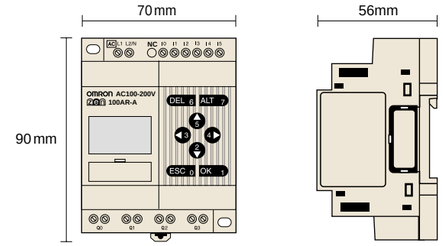
Functions Unique to LCD-type CPU Units

- Displays in 6 languages.
- Calendar and clock functions.
- Password protection.
- Display user-set messages or converted values.

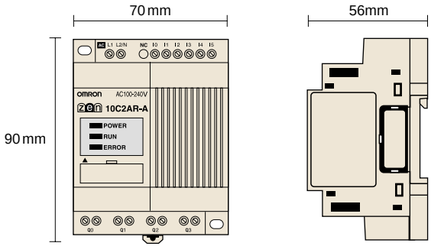
The More You Get to Know It, the Better It IsThe Amazing ZEN

Dimensions

LCD -type CPU Unit



LED-type CPU Unit



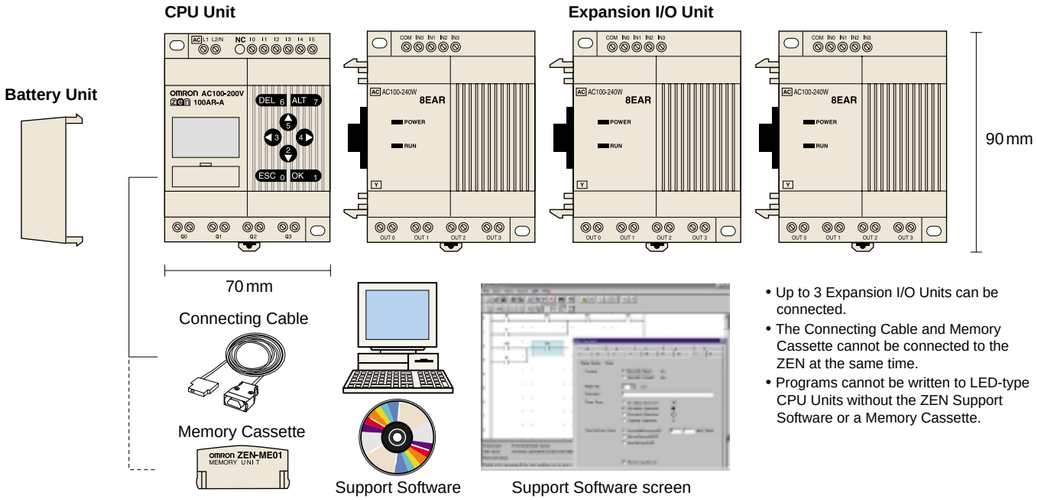
CPU Units and Expansion I/O Units

Name	Type	Model number	No. of I/O points	Power supply voltage	Inputs		Outputs		LCD and buttons	Calendar and clock	Analog input
CPU Units	LCD	ZEN-10C1AR-A	10	100 to 240 VAC	6	100 to 240 VAC	4	Relays	Yes	Yes	No
	LED	ZEN-10C2AR-A							No	No	No
	LCD	ZEN-10C1DR-D		24 VDC	6	24 VDC	4	Relays	Yes	Yes	Yes
	LED	ZEN-10C2DR-D							No	No	Yes
Expansion I/O Units		ZEN-8EAR	8	–	4	100 to 240 VAC	4	Relays	–	–	–
		ZEN-8EDR		–	4	24 VDC	4	Relays	–	–	–
		ZEN-4EA	4	–	4	100 to 240 VAC	–	–	–	–	–
		ZEN-4ED		–	4	24 VDC	–	–	–	–	–
		ZEN-4ER		–	–	–	4	Relays	–	–	–

Optional Units

Name	Model number	Specifications	Remarks
Memory Cassette	ZEN-ME01	EERPROM	Enables programs and parameter settings to be saved or copied to another ZEN.
Connecting Cable	ZEN-CIF01	2-m RS-232C (9-pin D-sub connector)	–
Battery Unit	ZEN-BAT01	10 year min. battery life (at 25˚C)	Use to prevent loss of calendar, clock, holding bits, holding timer present values, counter present values, and other data when the power is turned OFF for an extended time (for 2 days or more at 25˚C).
ZEN Support Software	ZEN-SOFT01	Runs on Windows 95, 98, 2000, ME, or NT 4.0.	Specifically designed for the ZEN (CD-ROM).

System Configuration



- Up to 3 Expansion I/O Units can be connected.
- The Connecting Cable and Memory Cassette cannot be connected to the ZEN at the same time.
- Programs cannot be written to LED-type CPU Units without the ZEN Support Software or a Memory Cassette.

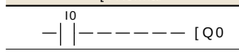
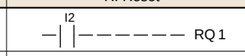
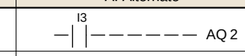
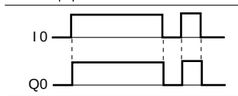
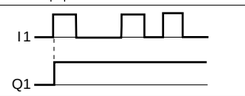
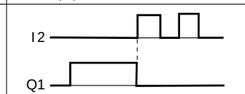
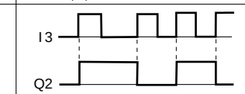
Flexible Control with a Wide Variety of Instruct ions

Programs can consist of up to 96 lines with 3 program inputs and 1 output per line.

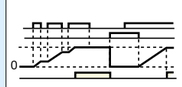
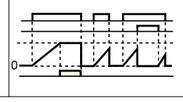
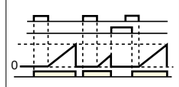
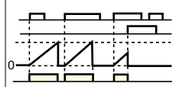
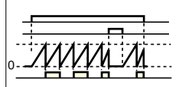
Bits

Name	Symbol	Bit addresses	No. of points	Operation	Details
Input bits	I	I0 to I5	6	Reflect the ON/OFF status of the input devices connected to the input terminals on the CPU Unit.	—
Expansion input bits	X	X0 to Xb	12	Reflect the ON/OFF status of the input devices connected to the input terminals on the Expansion I/O Units.	
Output bits	Q	Q0 to Q3	4	The ON/OFF status of these output bits is used to control the output devices connected to the output terminals on the CPU Unit.	1
Expansion output bits	Y	Y0 to Yb	12	The ON/OFF status of these output bits is used to control to the output devices connected to the output terminals on the Expansion I/O Units.	
Work bits	M	M0 to Mf	16	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).	
Holding bits	H	H0 to Hf	16	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.	
Timers	T	T0 to T7	8	X: ON-delay timer ■: (box) OFF-delay timer O: One-shot timer F: Flashing pulse timer Functions are selected from the screen when parameter settings are made.	2
Holding timers	#	#0 to #3	4	Hold the present value being counted even if the trigger input or power supply is turned OFF and continues timing when the trigger input or power is restored.	
Counters	C	C0 to C7	8	Reversible counter that can be incremented and decremented.	3
Weekly timers	@	@0 to @7	8	Turn ON and OFF during specified times on specified days.	4
Calendar timers	*	*0 to *7	8	Turn ON and OFF between specified dates.	5
Display bits	D	D0 to D7	8	Display any character string, time, or analog-converted display of timer or counter present values.	6
Analog comparitor bits	A	A0 to A3	4	Used as program input conditions to output analog comparitor comparison results. These bits can be used only for 24-VDC input CPU Units.	7
Timer/counter comparitor bits	P	P0 to P1	16	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.	8
Button input bits	B	B0 to B7	8	Used as program input conditions and turn ON when operation keys are pressed in RUN Mode. These input bits can be used only with LCD-type CPU Units.	9

1 Additional Bit Output Functions

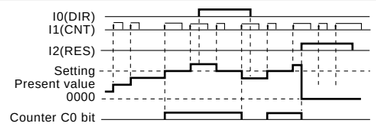
[: Normal	S: Set	R: Reset	A: Alternate
			
			
Q0 will turn ON or OFF depending on the ON/OFF status of the execution condition I0.	Q1 will stay ON once the execution condition I1 has turned ON once. A reset is used to turn Q1 OFF.	Q1 is forced OFF when the execution condition I2 is turned ON.	Q2 alternates between turning ON and OFF when the execution condition I3 turns ON.

2 Using Timers and Holding Timers

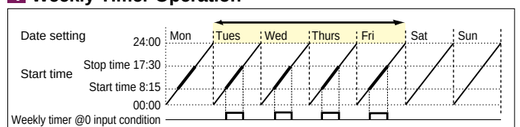
Available timers	Holding timers (#0 to #3)	Timers (T0 to T7)			
Timer type	X	X	■	O	F
	ON-delay timer only	ON-delay timer	ON-delay timer	One-shot pulse timer	Flashing pulse timer
Operation	Turns ON after set delay after the trigger input turns ON.	Turns ON after set delay after the trigger input turns ON.	Stays ON while the trigger input is ON and turns OFF after a set delay after the trigger input has turned OFF.	Turns ON for a set period after the trigger input turns ON and regardless of how long the trigger input remains ON.	Repeatedly turns ON and OFF in a set cycle while the switch is ON.
Trigger input Reset input Setting Present value Timer input condition					
Main applications	When delayed operation or a time lag is required.		Useful for OFF delay circuits for lights or fans.	Useful for set operations where operation is always required during a regular period only.	Useful for flashing emergency lights or sounding buzzers as the output for an alarm circuit.

3 Counter Operation

The counter bit turns ON when the counter value (present value) reaches the set value (present value (setting). The count returns to 0 and the counter bit turns OFF when the reset input turns ON. Count inputs are not accepted while the reset input is turned ON. The counter present value and counter bit (ON/OFF) are held even if the operating mode is changed or the power supply is interrupted.

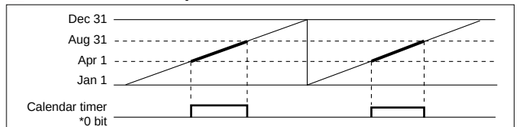


4 Weekly Timer Operation



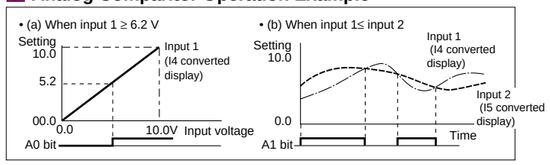
Input condition @0 turns ON between 8:15 and 17:30, Tuesday to Friday every week.

5 Calendar Timer Operation

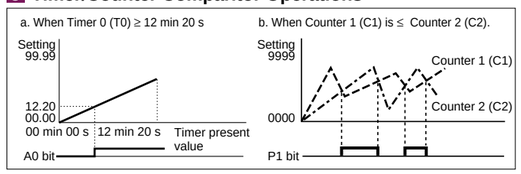


Bit *0 turns ON between April 1 and August 31.

7 Analog Comparitor Operation Example



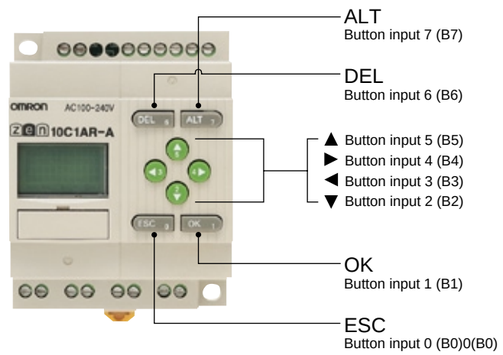
8 Timer/Counter Comparitor Operations



6 Display Settings

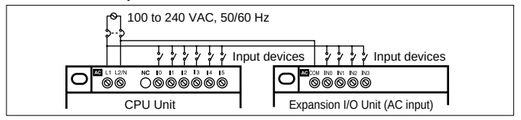
Backlight Terminal mode switching	L0: Backlight does not turn ON (ignored if already ON) L1: Backlight turns ON L2: Terminal mode switching (backlight not ON) L3: Terminal mode switching (backlight ON)	
Display start position	X (digit): 00 to 11 Y (line): 0 to 3	X00 X11 / Y0 to Y3
Display object	CHR	Characters (up to 12 characters - English, numerals, symbols)
	DAT	Month/day (5 digits □□/□□)
	CLK	Hour/minute (5 digits □□:□□)
	I4 to I5	Analog-converted value (4 digits□□:□)
	T0 to Tf	Timer present value (5 digits □□.□□)
	#0 to #7	Holding timer present value (5 digits □□.□□)
	C0 to C1	Counter present value (4 digits □□□□)
Monitoring	A: Can read settings during operation. D: Cannot read settings during operation.	

9 Specifications for Button Input Bits



I/O Specifications

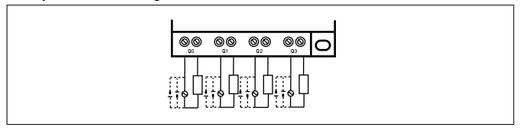
●Units with AC Input



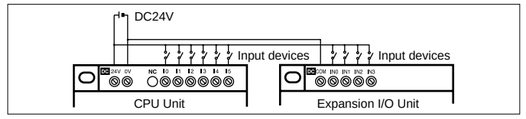
• Input Specifications (AC Input)

		CPU Unit	Expansion I/O Unit
Input voltage		100 to 240 VAC (+10% /- 15%), 50/60 Hz	
Input impedance		680 kΩ	83 kΩ
Input current		0.15 mA at 100 VAC 0.35 mA at 240 VAC	1.2 mA at 100 VAC 2.9 mA at 240 VAC
ON voltage		80 VAC min.	
OFF voltage		25 VAC max.	
ON response time	100 VAC	50 or 70 ms max. (Use input filter settings to switch.)	
	240 VAC	100 or 120 ms max. (Use input filter settings to switch.)	
OFF response time	100 VAC	50 or 70 ms max. (Use input filter settings to switch.)	
	240 VAC	100 or 120 ms max. (Use input filter settings to switch.)	
Isolation method		Not isolated	Input terminals and internal signals: Photocoupler isolation

●Output Circuit Wiring



●Units with DC Input



• Input specifications

	CPU Unit/Expansion I/O Unit
Input voltage	24 VDC +10% /- 15%
Input impedance	CPU Unit DC input: 4.8 kΩ; CPU Unit shared AD input: 5.0 kΩ; Expansion I/O: 4.7 kΩ
Input current	5 mA typical
ON voltage	16.0 VDC min.
OFF voltage	5.0 VDC max.
ON response time	15 or 50 ms (Use input filter settings to switch.)
OFF response time	15 or 50 ms max. (Use input filter settings to switch.)

• Analog Specifications (IN4 and IN5)

Input range	0 to 10 V
Input impedance	150 kΩ
Resolution	0.1 V (1/100 FS)
Overall precision (at -25 to 55°C)	10% FS
Analog-digital conversion monitor	0 to 10.5 V

• Output Specifications

Maximum switching capacity	8 A at 250 VAC (COSø= 1), 5A at 24 VDC
Minimum switching capacity	10 mA at 5 VDC
Relay life	Electrical: 50,000 operations Mechanical: 10 million operations
ON response time	15 ms max.
OFF response time	5 ms max.