OMRON

Programmable Controller CPM1A-series

Replacement Guide
From CPM1A to CP1E

P083-E1-02

About this document

This document provides the reference information for replacing CPM1A PLC systems with CP1E series PLC.
This document does not include precautions and reminders; please read and understand the important precautions and reminders described on the manuals of PLCs (both of PLC used in the existing system and PLC you will use to replace the existing PLC) before attempting to start operation.

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■ Related Manuals

• CPM1A

Man. No.	Model	Manual
W317	CPM1A-☐☐CD☐-☐-V1	CPM1A Operation Manual
W353	CPM1A-☐☐CD☐-☐-V1	CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual

• CP1E

Man. No.	Model	Manual
W479	CP1E-E☐☐SD☐-☐ CP1E-N☐☐S□D☐-☐ CP1E-E☐☐D☐-☐ CP1E-N☐☐D☐-☐ CP1E-NA☐☐D☐-☐	CP1E CPU Unit Hardware User's Manual
W480	CP1E-E☐☐SD☐-☐ CP1E-N☐☐S☐D☐-☐ CP1E-E☐☐D☐-☐ CP1E-N☐☐D☐-☐ CP1E-NA☐☐D☐-☐	CP1E CPU Unit Software User's Manual
W483	CP1E-E☐☐SD☐-☐ CP1E-N☐☐S☐D☐-☐ CP1E-E☐☐D☐-☐ CP1E-N☐☐D☐-☐ CP1E-NA☐☐D☐-☐	CP1E CPU Unit Instructions Reference Manual

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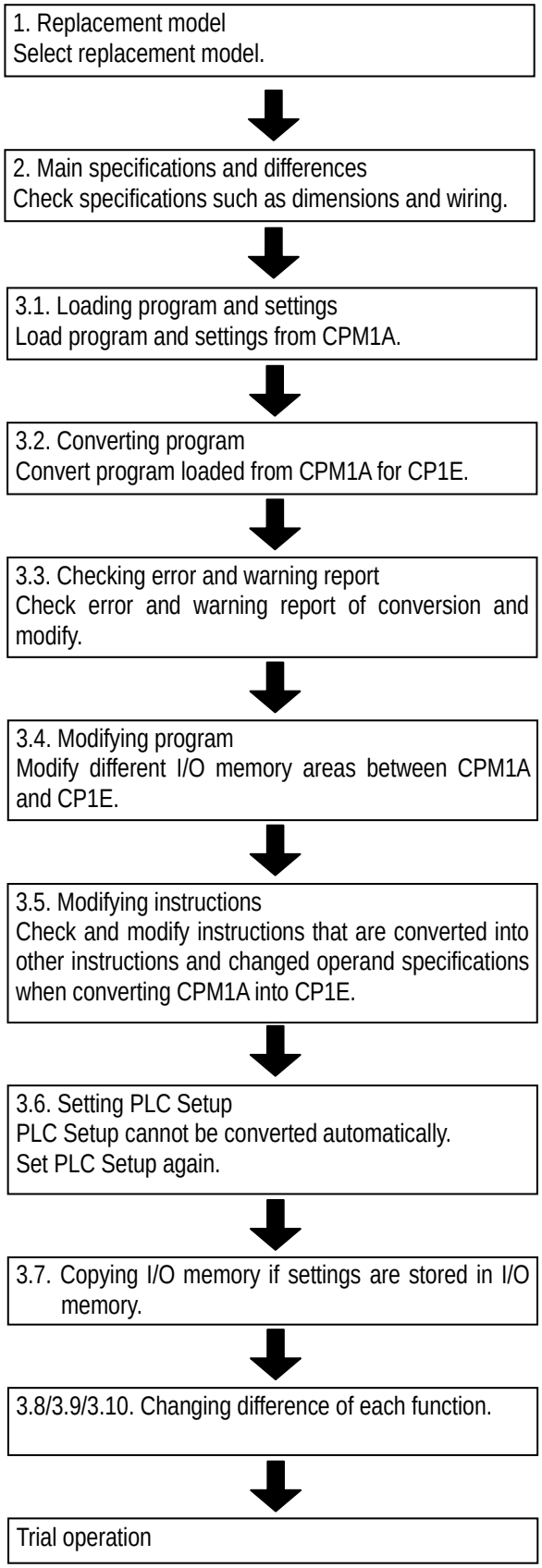
Replacement flow

The procedure to replace the CPM1A with the CP1E is as follows. (Each number shows the number of the section).



Note

After replacement, please perform trial operation before starting actual operation and check that the system operates correctly. This guide does not include sufficient specifications for replacement. Please refer to the manuals listed on the Related Manuals page and check the specifications before converting.

1. Replacement model

< Precaution for replacement >

The dimensions, specifications, program, settings, terminal arrangements and others are changed by replacing the CPM1A with the CP1E. Please refer to this replacement guide and the manuals of the CPM1A and CP1E for details.

Note:

This guide provides the procedure to replace the CPM1A with the CP1E. However, there are some differences in the functions and performance between the CPM1A and the CP1E, and all CPM1A cannot be replaced one on one with the CP1E. Please refer to this guide and the manuals to examine replacement carefully.

Replacement configuration (example)

Using the only CPM1A CPU Unit without using the CPM1-CIF01 or CPM1-CIF11

CPM1A CPU Unit	➡	CP1E E☐☐(S)-type CP1E N☐☐(S☐)-type

RS-232C Communications (example)

Using the CPM1A CPU Unit in combination with the CPM1-CIF01

CPM1A CPU Unit + CPM1-CIF01 (RS-232C Adaptor)	➡	CP1E N☐☐(S☐)-type (using built-in RS-232C port)

RS-422A/485 Communications (example)

Using the CPM1A CPU Unit in combination with the CPM1-CIF11

CPM1A CPU Unit + CPM1-CIF11 (RS-422 Adaptor)	➡	Mount CP1W-CIF11 or CP1W-CIF12 to CP1E N-type or CP1E N☐☐S1-type(RS-485 only)

Table of replacement models (example)

Power supply type	Output type	I/O points	Original Unit	Replacement Unit	
			CPM1A-V1	CP1E E-type	CP1E N-type N□□S：Built-in RS-232C N□□S1：Built-in RS-232C/RS-485 N□□S：RS-232C＋Option Board slot
AC type	Relay output	10	CPM1A-10CDR-A-V1	CP1E-E10DR-A	-
		20	CPM1A-20CDR-A-V1	CP1E-E20SDR-A CP1E-E20DR-A	CP1E-N20DR-A
		30	CPM1A-30CDR-A-V1	CP1E-E30SDR-A CP1E-E30DR-A	CP1E-N30SDR-A CP1E-N301SDR-A CP1E-N30DR-A
		40	CPM1A-40CDR-A-V1	CP1E-E40SDR-A CP1E-E40DR-A	CP1E-N40SDR-A CP1E-N401SDR-A CP1E-N40DR-A
	Transistor output (sinking)	10	CPM1A-10CDT-A-V1	CP1E-E10DT-A	-
		20	CPM1A-20CDT-A-V1	-	CP1E-N20DT-A
		30	CPM1A-30CDT-A-V1	-	CP1E-N30SDT-D CP1E-N30S1DT-D CP1E-N30DT-A
		40	CPM1A-40CDT-A-V1	-	CP1E-N40SDT-D CP1E-N40S1DT-D CP1E-N40DT-A
	Transistor output (sourcing)	10	CPM1A-10CDT1-A-V1	CP1E-E10DT1-A	-
		20	CPM1A-20CDT1-A-V1	-	CP1E-N20DT1-A
		30	CPM1A-30CDT1-A-V1	-	CP1E-N30DT1-A
		40	CPM1A-40CDT1-A-V1	-	CP1E-N40DT1-A
DC type	Relay output	10	CPM1A-10CDR-D-V1	CP1E-E10DR-D	-
		20	CPM1A-20CDR-D-V1	-	CP1E-N20DR-D
		30	CPM1A-30CDR-D-V1	-	CP1E-N30DR-D
		40	CPM1A-40CDR-D-V1	-	CP1E-N40DR-D
	Transistor output (sinking)	10	CPM1A-10CDT-D-V1	CP1E-E10DT-D	-
		20	CPM1A-20CDT-D-V1	-	CP1E-N20DT-D
		30	CPM1A-30CDT-D-V1	-	CP1E-N30DT-D
		40	CPM1A-40CDT-D-V1	-	CP1E-N40DT-D
	Transistor output (sourcing)	10	CPM1A-10CDT1-D-V1	CP1E-E10DT1-D	-
		20	CPM1A-20CDT1-D-V1	-	CP1E-N20DT1-D
		30	CPM1A-30CDT1-D-V1	-	CP1E-N30SDT-D CP1E-N30S1DT-D CP1E-N30DT1-D
		40	CPM1A-40CDT1-D-V1	-	CP1E-N40SDT-D CP1E-N40S1DT-D CP1E-N40DT1-D

2. Main specifications and differences between CP1E and CPM1A

2.1. Dimensions

The dimensions of the CP1E are different from that of the CPM1A. Secure the depth of the control panel because the depth of the CPU Unit will increase.

Dimension comparison table

Power supply type	I/O	Dimensions (W x H x D)		
		CPM1A-V1	CP1E-E☐☐ CP1E-N☐☐	CP1E-E☐☐S CP1E-N☐☐S(1)
DC type	10 points	66 x 90 x 50	66 x 90 x 85	-
	20 points	86 x 90 x 50	86 x 90 x 85	86×90×79
	30 points	130 x 90 x 50	130 x 90 x 85	130×90×79
	40 points	150 x 90 x 50	150 x 90 x 85	150×90×79
AC type	10 points	66 x 90 x 70	66 x 90 x 85	-
	20 points	86 x 90 x 70	86 x 90 x 85	86×90×79
	30 points	130 x 90 x 70	130 x 90 x 85	130×90×79
	40 points	150 x 90 x 70	150 x 90 x 85	150×90×79

2.2. Mounting

The DIN Track and mounting hole pitch of the CP1E are the same as those of the CPM1A though the depth is different.

2.3. Expansion Units

The Expansion Units that can be connected to the CPM1A are the CPM1A Expansion (I/O) Units, and the Expansion Units for the CP1E is the CP1W Expansion (I/O) Units.
Refer to the ***Appendix 7. Expansion Units*** for the Expansion (I/O) Units to replace.
The Expansion Units cannot be used for the CPM1A CPU Units with 10 and 20 I/O points or the CP1E CPU Units with 10, 14 and 20 I/O points CPU Units.

2.4. Supply voltage

The power consumption depends on the model though the power supply voltage and operating voltage range of the CP1E and CPM1A are the same.
Change to an appropriate power supply if power supply capacity is insufficient.
Refer to the ***Appendix 1. Specification and performance comparison between CPM1A and CP1E*** for the current consumption specifications.

2.5. External power supply

The CP1E CPU Units with 10 and 20 I/O points do not provide an external power supply.
When the external power supply is used for the CPM1A CPU Unit with 10 or 20 I/O points, another 24 VDC power supply is required.

Power supply type	I/O	External power supply specification	
		CPM1A-V1	CP1E
DC type	10 points	Not provided	Not provided
	20 points		
	30 points		
	40 points		
AC type	10 points	24VDC 200mA max.	Not provided When using, another 24 VDC Power Supply is required.
	20 points		
	30 points	24VDC 300mA max.	24VDC 300mA max.
	40 points		

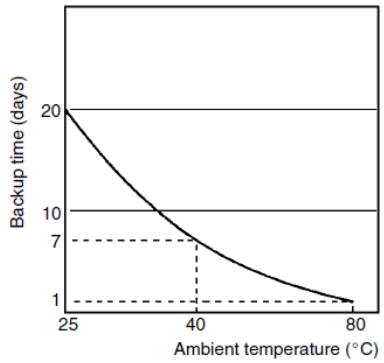
2.6. I/O memory backup time

The I/O memory backup time (to retain the contents of the DM Area and Holding Area, and Counter values) of the CP1E is shorter than that of the CPM1A.

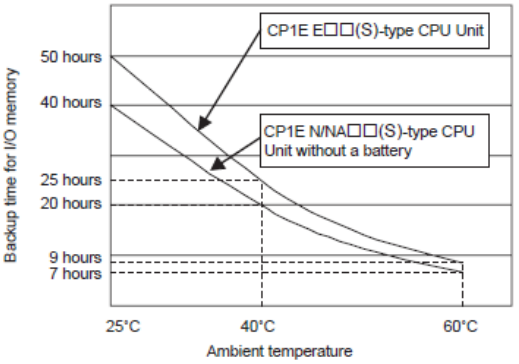
Use the CP1E N-type CPU Unit with an optional Battery (CP1W-BAT01) mounted, when the backup time of the CP1E is insufficient.

Note: The DM Area, Holding Area, and Counter Flags/PVs become unstable when power is interrupted for longer than the I/O memory backup time, which may cause the system to malfunction.

I/O memory backup time



Capacitor backup time of CPM1A



Capacitor backup time of CP1E

2.7. Wiring

Wire to the same I/O when the I/O is used as a normal I/O.

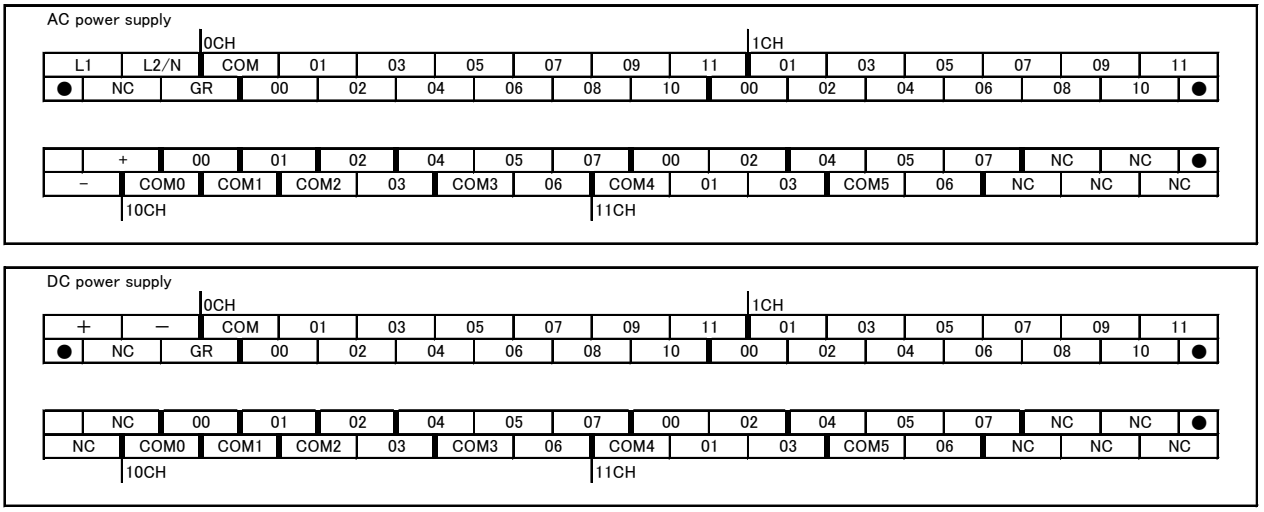
Note: Because both terminal blocks of the CPM1A-V1 and CP1E are fixed, rewiring is required. Review the wiring as the terminal arrangement is changed.

Method of terminal block and change in terminal arrangement

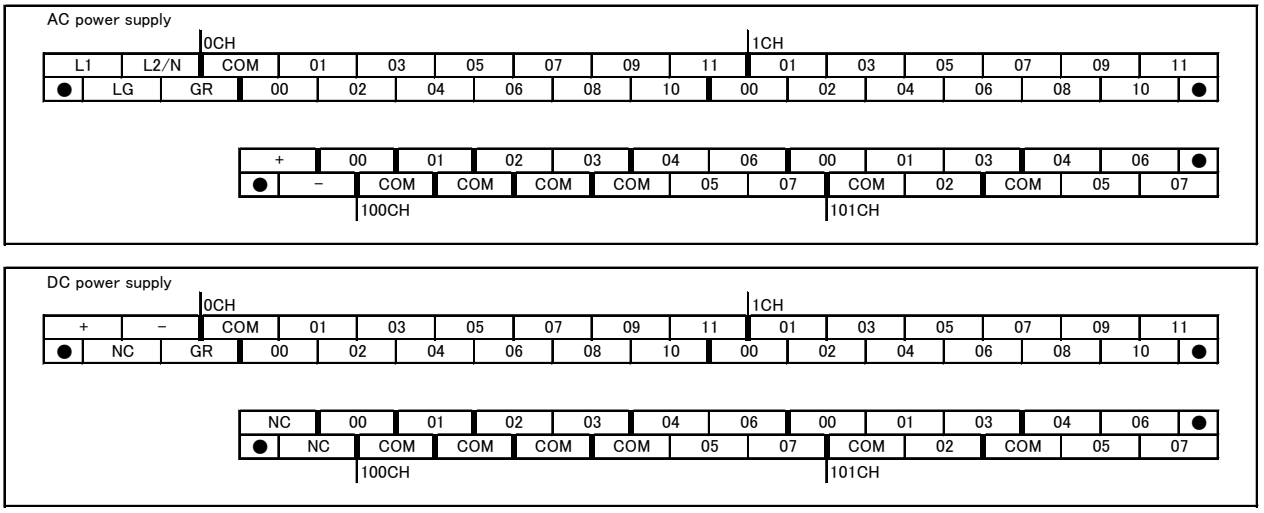
I/O	Terminal block		Change in terminal arangement by replacing CPM1A with CP1E
	CPM1A	CP1E	
10 points	Fixed	Fixed	Changed
20 points	Fixed	Fixed	Changed
30 points	Fixed	Fixed	Changed
40 points	Fixed	Fixed	Changed

2.7.1. Terminal arrangements for CPU Units with 40 I/O points

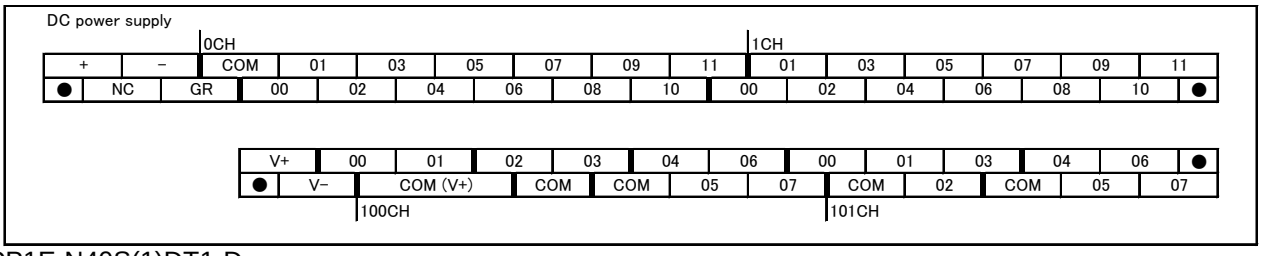
CPM1A-40D□□-□-V1



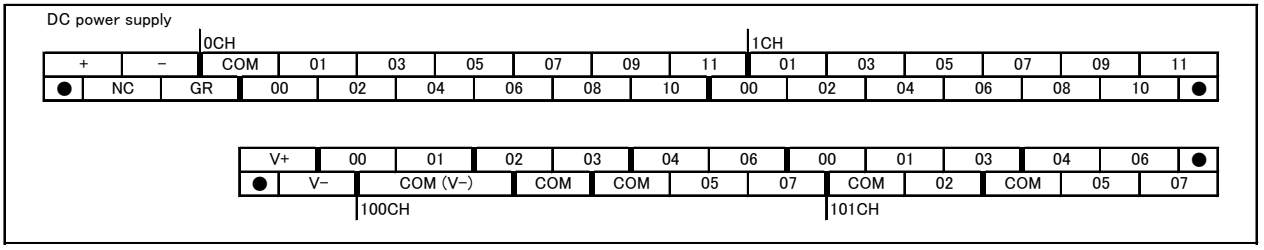
CP1E-□40(S□)D□□-□（Except CP1E-N40S(1)DT-D, CP1E-N40S(1)DT1-D）



CP1E-N40S(1)DT-D

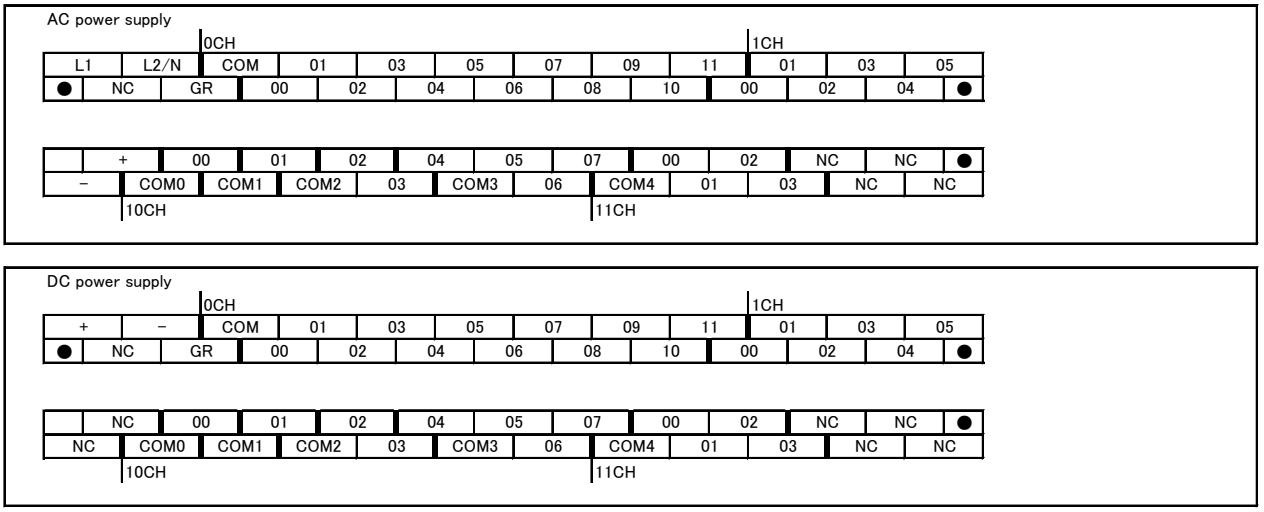


CP1E-N40S(1)DT1-D

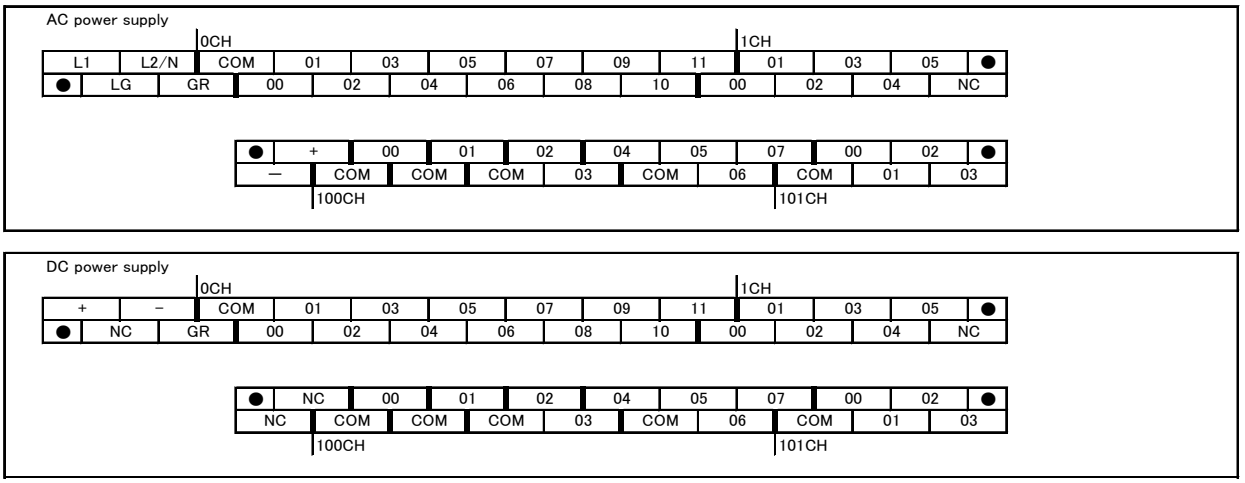


2.7.2. Terminal arrangements for CPU Units with 30 I/O points

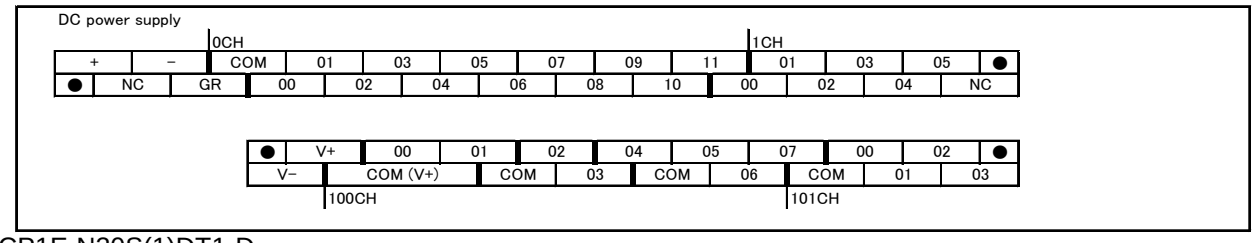
CPM1A-30D□□-□-V1



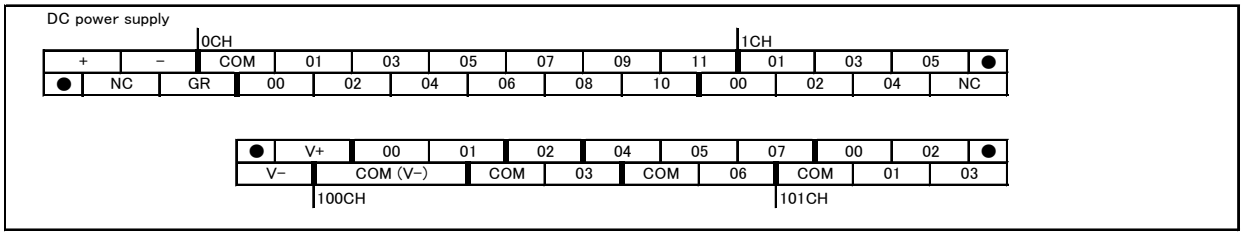
CP1E-□30(S□)D□□-□（Except CP1E-N30S(1)DT-D, CP1E-N30S(1)DT1-D）



CP1E-N30S(1)DT-D

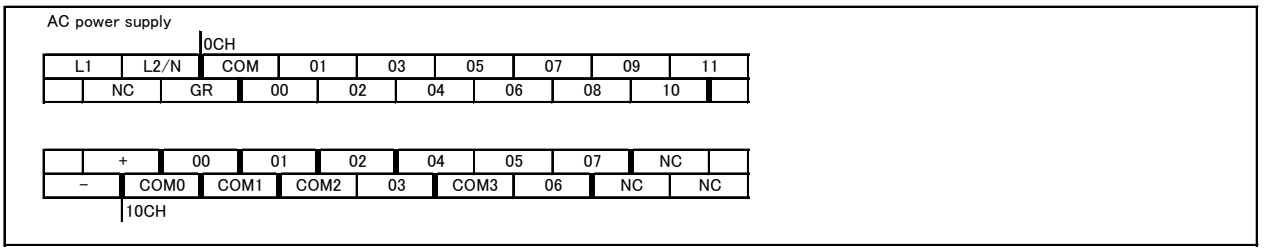


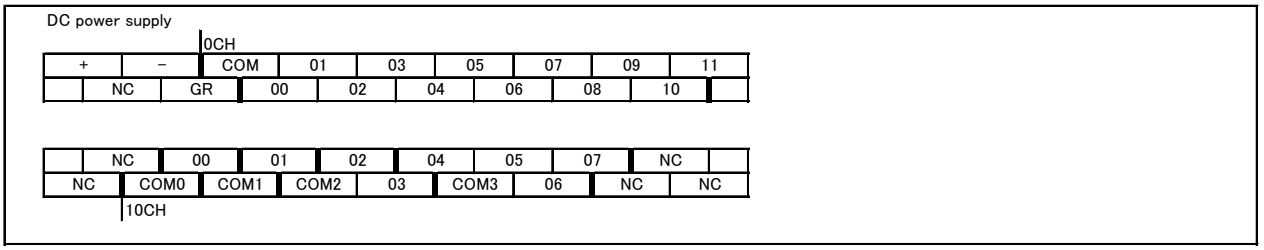
CP1E-N30S(1)DT1-D



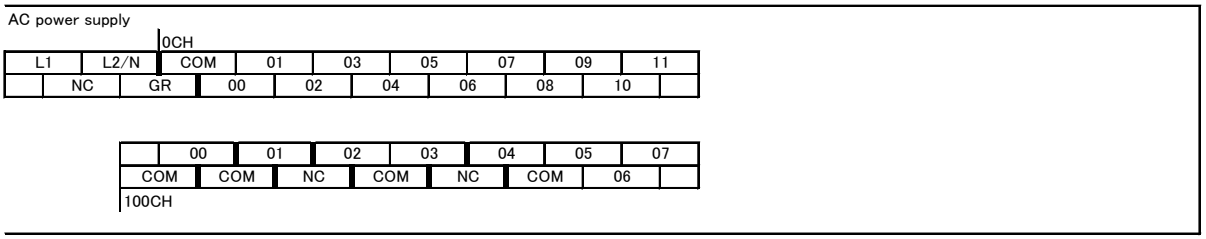
2.7.3. Terminal arrangements for CPU Units with 20 I/O points

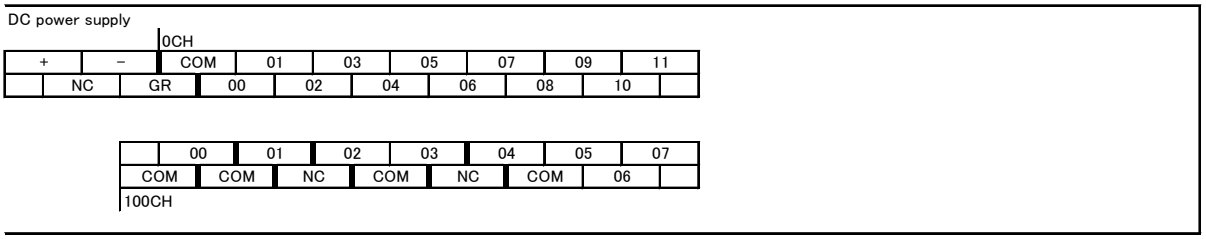
CPM1A-20D□□-□-V1





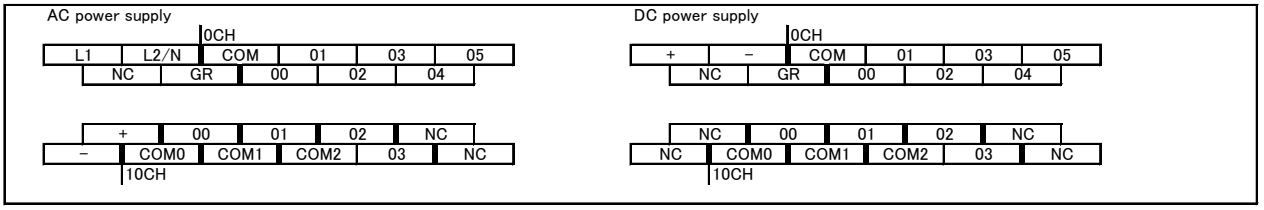
CP1E-□20(S)D□□-□



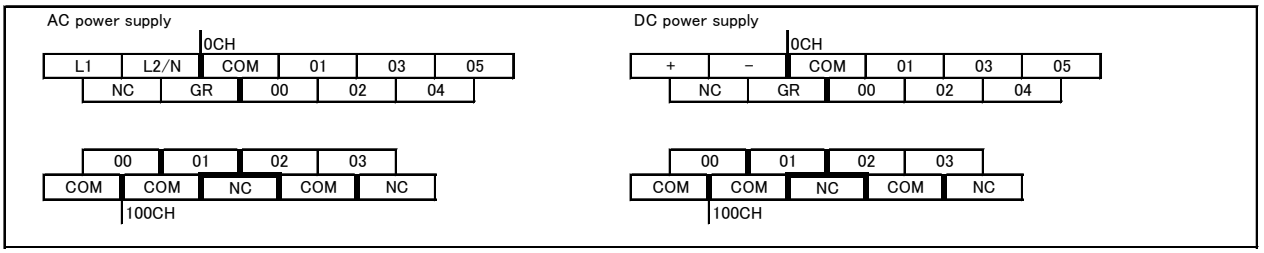


●Terminal arrangements for CPU Units with 10 I/O points

CPM1A-10D□□-□-V1



CP1E-E10D□□-□



2.7.4. Terminal arrangements for interrupt inputs, quick-response inputs, high-speed counter inputs, and pulse outputs

Note. As for the high-speed counter input and pulse output, the functions and terminal arrangement of the CP1E might be different from those of the CPM1A. Refer to this guide and the manuals and check that necessary functions can be performed before changing the wiring and programming for replacement.

(1) Using interrupt inputs and quick-response inputs

Note: When using interrupt inputs and quick-response inputs, it is required to change ladder programs and the PLC setup. Refer to the ***3.8. Converting when interrupt input is used*** and ***3.9. Converting when quick-response input is used*** for more info.

CIO	CPM1A	CP1E
0.00	-	-
0.01	-	-
0.02	-	Interrupt input 2/Quick-response input 2
0.03	Interrupt input 0/Quick-response input 0	Interrupt input 3/Quick-response input 3
0.04	Interrupt input 1/Quick-response input 1	Interrupt input 4/Quick-response input 4
0.05	Interrupt input 2/Quick-response input 2 ***2**	Interrupt input 5/Quick-response input 5
0.06 ***1**	Interrupt input 3/Quick-response input 3 ***2**	Interrupt input 6/Quick-response input 6
0.07 ***1**	-	Interrupt input 7/Quick-response input 7

***1**. The CP1E CPU Unit with 10 I/O points does not have CIO 0.06 and 0.07.

***2**. The CPM1A CPU Unit with 10 I/O only has 2 interrupt/quick response inputs.

(2) Using high-speed counter inputs

The terminal arrangement for high-speed counter inputs of the CPM1A is different from that of the CP1E.

- Using increment mode for CPM1A

  Use the increment pulse input for the CP1E. However, the CP1E does not support the reset input for the increment pulse input.

  When an external reset input is required in "increment mode" in the CPM1A, set to "up/down pulse input" in the CP1E, change the input from high-speed counter 0 (CIO 0.00) of the CPM1A to high-speed counter 0 up input (CIO 0.00) of the CP1E, and use reset input (CIO 0.04). In this case, connect nothing to high-speed counter 0 down input (CIO 0.01) of the CP1E.

  When CIO 0.01 of the CPM1A is used, change the input to an unused input bit of the CP1E, and change the input bit in the ladder program.

- Using up/down mode for CPM1A

  The input bit for phase Z/reset input is changed from CIO 0.02 of the CPM1A to CIO 0.04 of the CP1E.

  When CIO 0.04 of the CPM1A is used, change the input to CIO 0.02 of the CP1E, and change the input bit in the ladder program.

Comparison of input arrangement of high-speed counter between CPM1A and CP1E

CIO	CPM1A			CP1E		
	Increment mode	Up/down mode Differential phase x4	-	Increment pulse	Differential phase or up/down	Pulse + direction
0.00	High-speed counter 0	High-speed counter 0 (phase A)	-	High-speed counter 0	High-speed counter 0 (phase A/up input)	High-speed counter 0 (pulse input)
0.01	—	High-speed counter 0 (phase B)	-	High-speed counter 1	High-speed counter 0 (phase B/down input)	High-speed counter 1 (pulse input)
0.02	High-speed counter 0 (reset)	High-speed counter 0 (phase Z/reset)	-	High-speed counter 2	High-speed counter 1 (phase A/up input)	High-speed counter 0 (direction)
0.03	-	-	-	-	High-speed counter 1 (phase B/down input)	High-speed counter 1 (direction)
0.04	-	-	-	High-speed counter 3	High-speed counter 0 (phase Z/reset input)	High-speed counter 0 (reset input)
0.05	-	-	-	High-speed counter 4	High-speed counter 1 (phase Z/reset input)	High-speed counter 1 (reset input)
0.06	-	-	-	High-speed counter 5	-	-

Shaded item: Allocation of the CPM1A is different from that of the CP1E.

Grayed item: The item is not used for replacement of the CPM1A.

Note. The input that is not used as a high-speed counter of the CP1E can be used as a normal input.

(3) Using pulse outputs

Note. As the CP1E does not have a single-phase pulse mode, use the pulse + direction mode.
In this case, do not use a direction signal and do not wire anything.

CIO CP1E (CPM1A)	CPM1A	CP1E-N ***1***
	Single-phase output	Pulse + direction ***2***
100.00 (10.00)	Pulse output 0	Pulse output 0 (pulse)
100.01 (10.01)	Pulse output 1	Pulse output 1 (pulse)
100.02 (10.02)	-	Pulse output 0 (direction) ⇒ Do not use.
100.03 (10.03)	-	Pulse output 1 (direction) ⇒ Do not use.

Shaded item: Output allocation is changed when replacing the CPM1A with the CP1E.

1. The pulse output cannot be used with the CP1E-E type.

2. Use without a direction signal.

3. Converting program and settings

3.1. Transferring program and settings of CPM1A

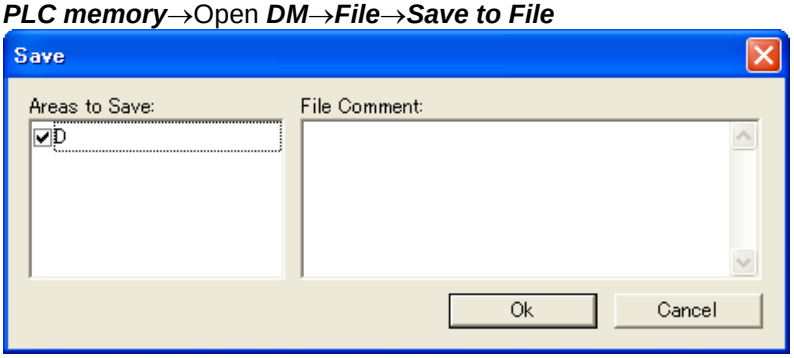
3.1.1. Transferring the user program

Transfer the user program and PLC Setup ***from PLC to PC*** with the CX-Programmer, and save them.

3.1.2. Transferring Data Memory (DM)

Transfer the DM data ***from PLC to PC***, and save them.

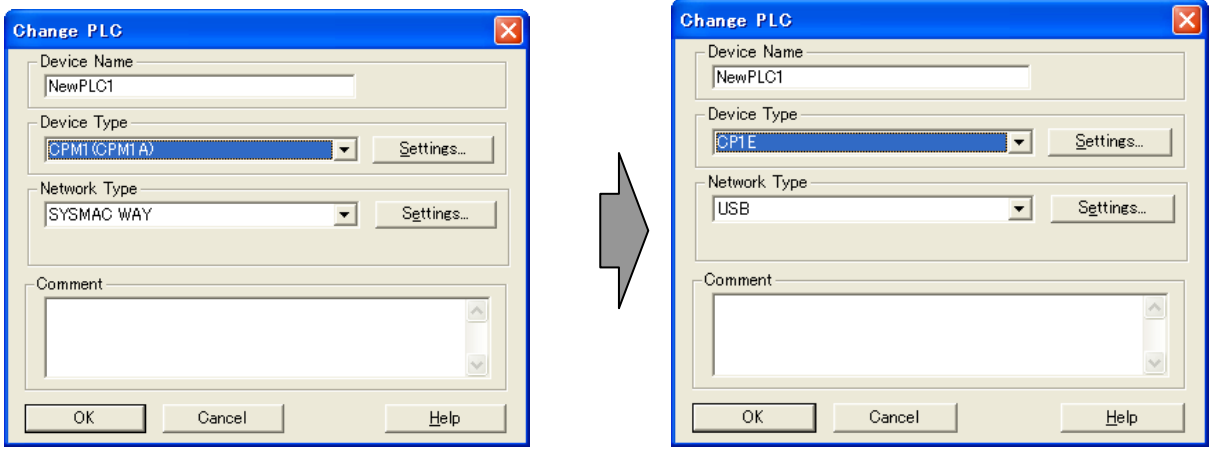
PLC memory→Open ***DM***→***File***→***Save to File***



3.2. Converting the user program

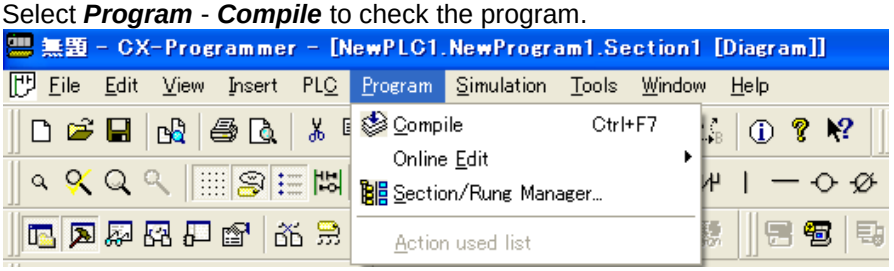
Changing the PLC type.

Change the Device Type of the user program for the CPM1A from "CPM1 (CPM1A)" to "CP1E" with the CX-Programmer.

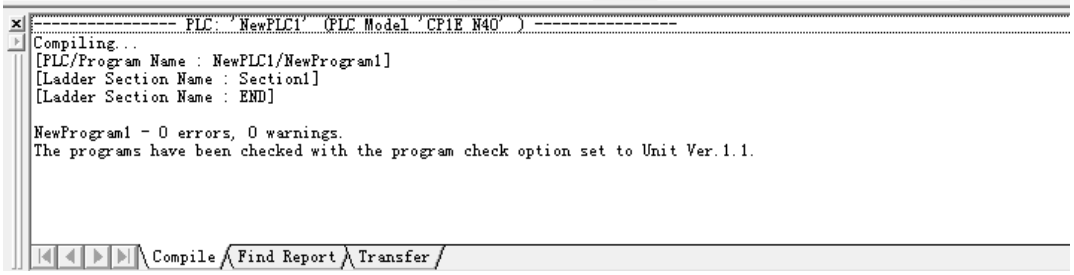


3.3. Checking error and warning report

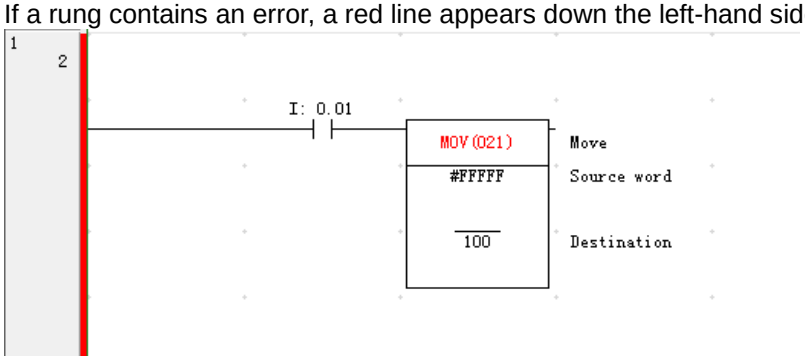
Select ***Program*** - ***Compile*** to check the program.



As the Output Window shows the errors and warnings, check them and modify the program.



If a rung contains an error, a red line appears down the left-hand side of the ladder rung.



Compile can check the following contents.

- Illegal data
- Instruction support by PLC
- Operand ranges
- Program capacity for PLC
- Syntax
- Ladder diagram structure
- Output duplication
- Tasks

Note. Some errors might not be detected and displayed by the above-mentioned way. Check with ***Compile*** to see if there are more errors.
Make sure to check the entire program to operate the system correctly after checking and modifying the contents in ***3.4. Modifying program*** and other sections.

3.4. Modifying program

3.4.1. Modifying I/O memory area

For some I/O memory areas it might be required to change them.
If the address that does not exist in the CP1E is specified, an error will be displayed as a rung error in the Output Window of the CX-Programmer when converted. (The error instruction is displayed in red on the Ladder Program Window).

Changing allocation of output bits

☞ The output bits must be modified because the output bits of the CPM1A starting from CIO 10 changed to those of the CP1E starting from CIO 100.

	CPM1A	CP1E
Output bits	CIO 10	CIO 100
	CIO 11	CIO 101
	...	...
	CIO 19	CIO 119

Example: CPU Unit with 40 I/O points
CPM1A : 010.00 to 010.07, 011.00 to 011.07 (starting from CIO10)
CP1E : 100.00 to 100.07, 101.00 to 101.07 (starting from CIO100)

The allocation of input bits does not need to be changed.

Refer to the ***I/O memory*** of the ***Appendix 1. Specification and performance comparison between CPM1A and CP1E*** for the range of the CIO Area.

3.4.2. Allocations of Auxiliary Area and Special Area

☞ Some bits and functions in the Auxiliary Area of the CP1E are different from those in the Auxiliary Area and Special Area of the CPM1A. The allocations of the Auxiliary Area and Special Area are not displayed as errors when converted. Refer to the Appendices 2 and 3, and reference manuals to change the bits and ladder program.
Note. The Special Area of the CPM1A is included in the Auxiliary Area in the CP1E.

Refer to the ***Appendix 2. Changes in Special Area*** for the difference of the Special Area.
Refer to the ***Appendix 3. Changes in Auxiliary Area*** for the difference of the Auxiliary Area.

3.4.3. Allocation of Link Words

Although the allocations of the Link Words of the CPM1A and the CP1E are different, the CX-Programmer does not convert. The Link Words are converted into the Work Area (W) for the CP1E as follows. If you use Serial Links with the CP1E, modify the Link Words to the Serial PLC Link Words of the CP1E.

	Link Words of CPM1A	When converted with CX-Programmer	Serial PLC Link Words of CP1E
Link Words (CPM1A) Serial PLC Link Words (CP1E)	LR0 to LR15	W0 to W15	CIO 200 to CIO 289

3.5. Modifying instructions

3.5.1. Converting instructions that are changed to different instructions for CP1E

☞ Some of the CPM1A instructions are changed to different instructions for the CP1E when converted.
Refer to the Instructions Reference Manuals in the reference manuals to modify the instructions for operations of the system.
Some instructions that exist in the CPM1A do not exist in the CP1E.
Modify or add the ladder program so that the system may work correctly by other methods.
Refer to the ***Appendix 4. Instructions changed by replacing CPM1A with CP1E*** for the instructions to be modified.

3.5.2. Modifying the CPM1A instructions that include changes of operand specifications

Some operand specifications of instructions that are supported by the CPM1A are changed for the CP1E.
Refer to the Instructions Reference Manual in the reference manuals to modify the operands for operations of the system. Review modified operands and all parts using the I/O memory that is used for the operands of the modified instructions, and check if operations are performed correctly.
Refer to the ***Appendix 5. Instruction specifications changed by replacing CPM1A with CP1E*** for the instructions changed the specifications and their details.

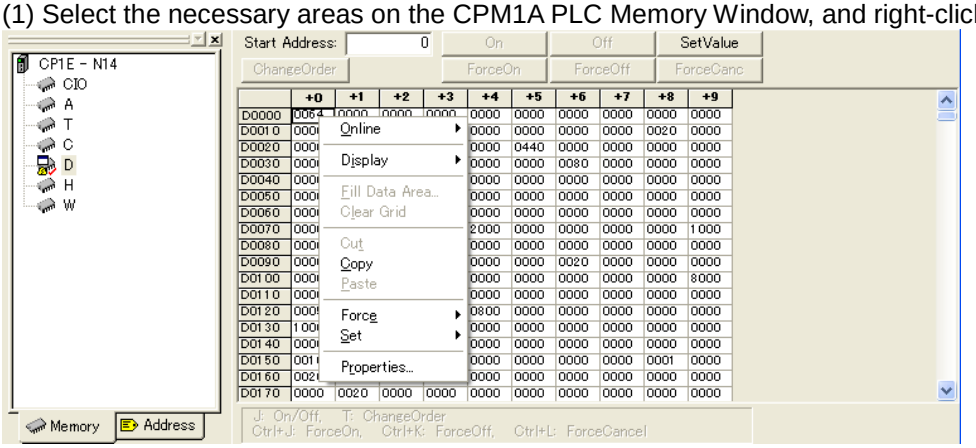
3.6. PLC Setup

The PLC Setup is not converted though the ladder program is converted by changing PLC Model.
The PLC Setup settings of the CP1E must be changed. Refer to the ***Appendix 6. PLC Setup changed by replacing CPM1A with CP1E*** for the difference in PLC Setup between the CPM1A and the CP1E.

3.7. I/O memory

When the data for the ladder program is set in the I/O memory (DM Area and Holding Area) of the CPM1A, it is necessary to copy it to the I/O memory area of the CP1E.
Open the screen of the PLC memory of the CPM1A, copy necessary data, and paste it onto the I/O memory of the CP1E.

(1) Select the necessary areas on the CPM1A PLC Memory Window, and right-click→***Copy***



(2)Open the PLC Memory Window of the CP1E, and paste the areas.

3.8. Converting when interrupt input is used

When the interrupt input is used, it is necessary to change the ladder program and PLC Setup settings.
The interrupt program operates in subroutine of the CPM1A and in the interrupt task of the CP1E.
The subroutine program must be modified to the interrupt task.

(1) PLC Setup

When the model is changed from the CPM1A to the CP1E, the PLC Setup is not converted.
Enter the settings for the interrupt input to be used from the PLC Setup.

(2)Changing the instruction for permitting interrupts

The CPM1A permits (enables) interrupt inputs with the INT instruction, but the CP1E with the MSKS instruction.

Note 1. When the model is changed, an error is output because the CP1E does not support the INT instruction. Change to the MSKS instruction.

Note 2. Specify the interrupt when the input turns ON, because the CP1E has two methods to execute the interrupt: when the input turns ON or when it turns OFF.
In the CPM1A, the interrupt is executed only when the input turns ON.

Note 3. Refer to the Instructions Reference Manuals for details of the instructions.

(3) Changing the interrupt ladder program

The ladder program of the CPM1A that is executed by the interrupt input is written between the subroutine instructions (between SBN and RET).
Copy the interrupt program in the cyclic task and paste it onto the interrupt task after changing the model to the CP1E.

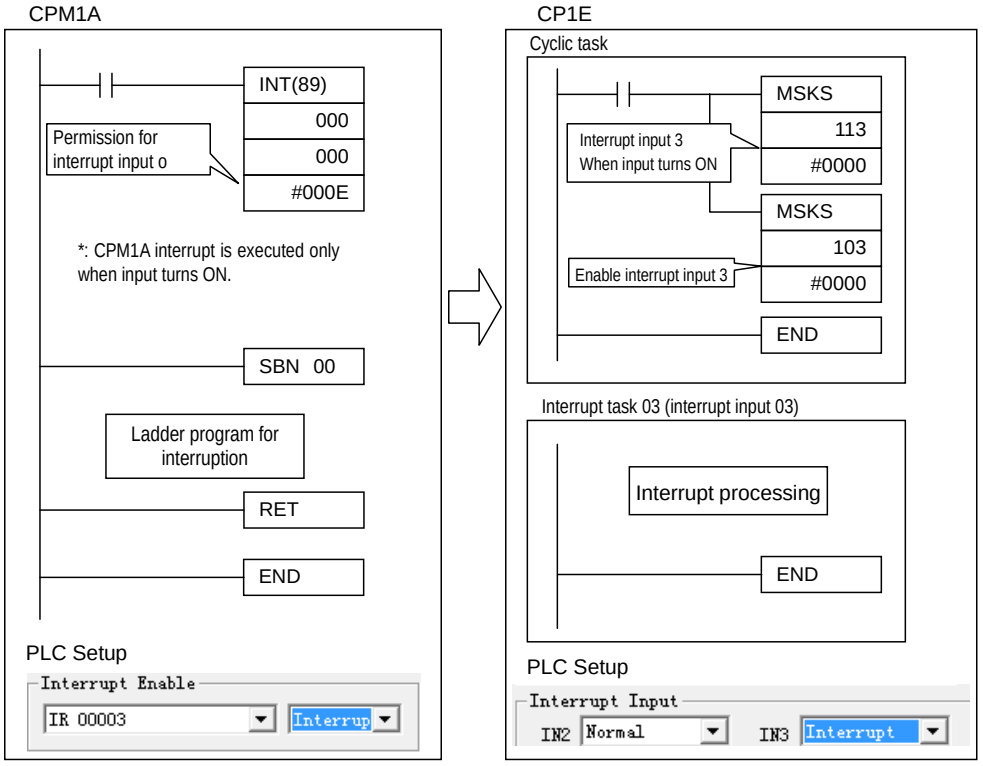
Note 1. Allocate the task type when creating an interrupt task. If the task type is not allocated, the ladder program in the interrupt task is not checked by ***compile*** on the CX-Programmer.

Interrupt inputs, subroutine numbers, and interrupt task numbers

CIO	CPM1A	CP1E
0.02	-	Interrupt input 2 (Interrupt task 02)
0.03	Interrupt input 0 (Subroutine number 0)	Interrupt input 3 (Interrupt task 03)
0.04	Interrupt input 1 (Subroutine number 01)	Interrupt input 4 (Interrupt task 04)
0.05	Interrupt input 2 (Subroutine number 02)	Interrupt input 5 (Interrupt task 05)
0.06 *1	Interrupt input 3 (Subroutine number 03)	Interrupt input 6 (Interrupt task 06)
0.07 *1	-	Interrupt input 7 (Interrupt task 07)

*1. The CP1E CPU Unit with 10 I/O points does not have CIO 0.06 and 0.07.

Example: Changing the CPM1A "0.03: Interrupt input 0" to the CP1E "0.03: Interrupt input 3"



3.9. Converting when quick-response input is used

When the quick-response input is used, it is necessary to change the PLC Setup settings.

(1) PLC Setup

When the model is changed from the CPM1A to the CP1E, the PLC Setup is not converted.
Enter the settings for the quick-response input to be used from the PLC Setup.

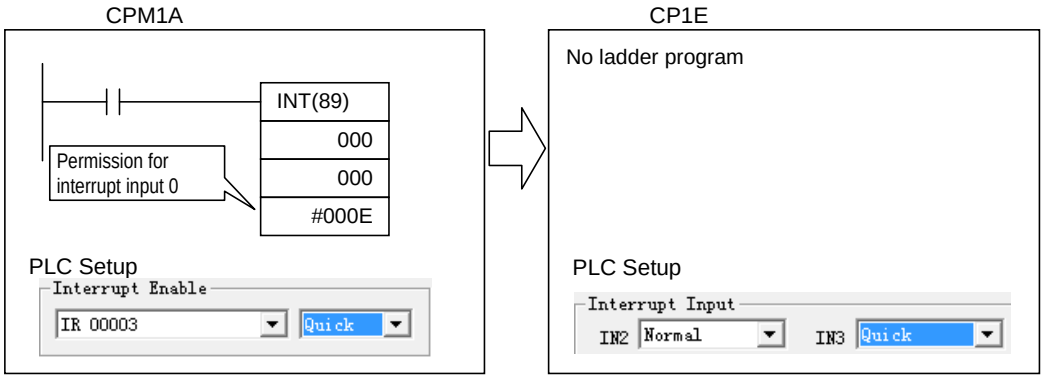
(2) Changing the instruction for permitting interrupts

The CPM1A permits (enables) quick-response inputs with the INT instruction, but the CP1E cannot permit with any instruction. Delete the INT instruction after changing the model.

Note 1. When the model is changed, an error is output because the CP1E does not support the INT instruction.

Note 2. The PLC Setup of the CP1E enables after the power supply is turned ON.

Example: Changing the CPM1A "0.03: Quick-response input 0" to theCP1E "0.03: Quick-response input 3"



3.10. Converting when high-speed counter is used

As for the high-speed counter, "up/down mode" and "incremental mode" of the CPM1A correspond to "differential phase input" and "increment pulse input or up/down pulse input" of the CP1E.

Comparison of high-speed counter specifications

Item	CPM1A	CP1E
Input mode	Up/down mode (differential phase inputs (x4))	Differential phase inputs (x4)
	Incremental mode (single-phase inputs)	Increment pulse inputs or up/down pulse inputs ***1**
		Pulse + direction inputs
Counting mode	Linear mode only	Linear mode
		Ring mode
Count values	Linear mode only Up/down mode: -32767 to +32767 Incremental mode: 0 to +65535	Linear mode 80000000 to 7FFFFFFF Hex Ring mode 00000000 to Ring SV
Control method	Target matching: Up to 16 target values Range comparison: Up to 8 target values	Target matching: Up to 6 target values Range comparison: Up to 6 target values ***2**
Input frequency	Up/down mode: 2.5kHz max.	Differential phase input: N-type 50kHz max. E-type 5kHz max.
	Single-phase input: 5kHz max.	Increment pulse input: N-type 100kHz max. E-type 10kHz max.
Reset method	Phase Z + software reset Software reset ***3**	Phase Z + software reset Software reset ***4**

***1**. Refer to the 2.6. (2) to select the mode when converting.
***2**. Examine to reduce to six or less target values on the system or to change to a high-end model such as the CP1L when seven or more target values are set in the CPM1A.
***3**. The comparison operation is always being executed.
***4**. The comparison operation can be set to be being executed or stopped.

(1) PLC Setup

When the model is changed from the CPM1A to the CP1E, the PLC Setup is not converted.
Enter the settings for the high-speed counter from the PLC Setup.

(2) Changing the comparison table of the high-speed counter comparison instruction (CTBL instruction)

Although the specifications of the CTBL instructions of the CPM1A and CP1E are same, the data formats of the comparison tables are different.
It is necessary to change target values of comparison tables (change from BCD to BIN) and to change from subroutine numbers to interrupt task numbers.
Note. Allocate the task type when creating an interrupt task. If the task type is not allocated, the ladder program in the interrupt task is not checked by ***compile*** on the CX-Programmer.

Target value comparison table

Item	CPM1A	CP1E
S	Number of target values	Number of target values
S+1 to S+2	Lower word of target value: BCD	Lower word of target value: BIN
S+3 to S+4	Upper word of target value: BCD	Upper word of target value: BIN
S+5	Subroutine number	Interrupt task number

Range comparison table

Item	CPM1A	CP1E
S to S +1	Lower word of target value: BCD	Lower word of target value: BIN
S +2 to S +3	Upper word of target value: BCD	Upper word of target value: BIN
S +4	Subroutine number	Interrupt task number

(3) Changing the ladder program for interrupt processing

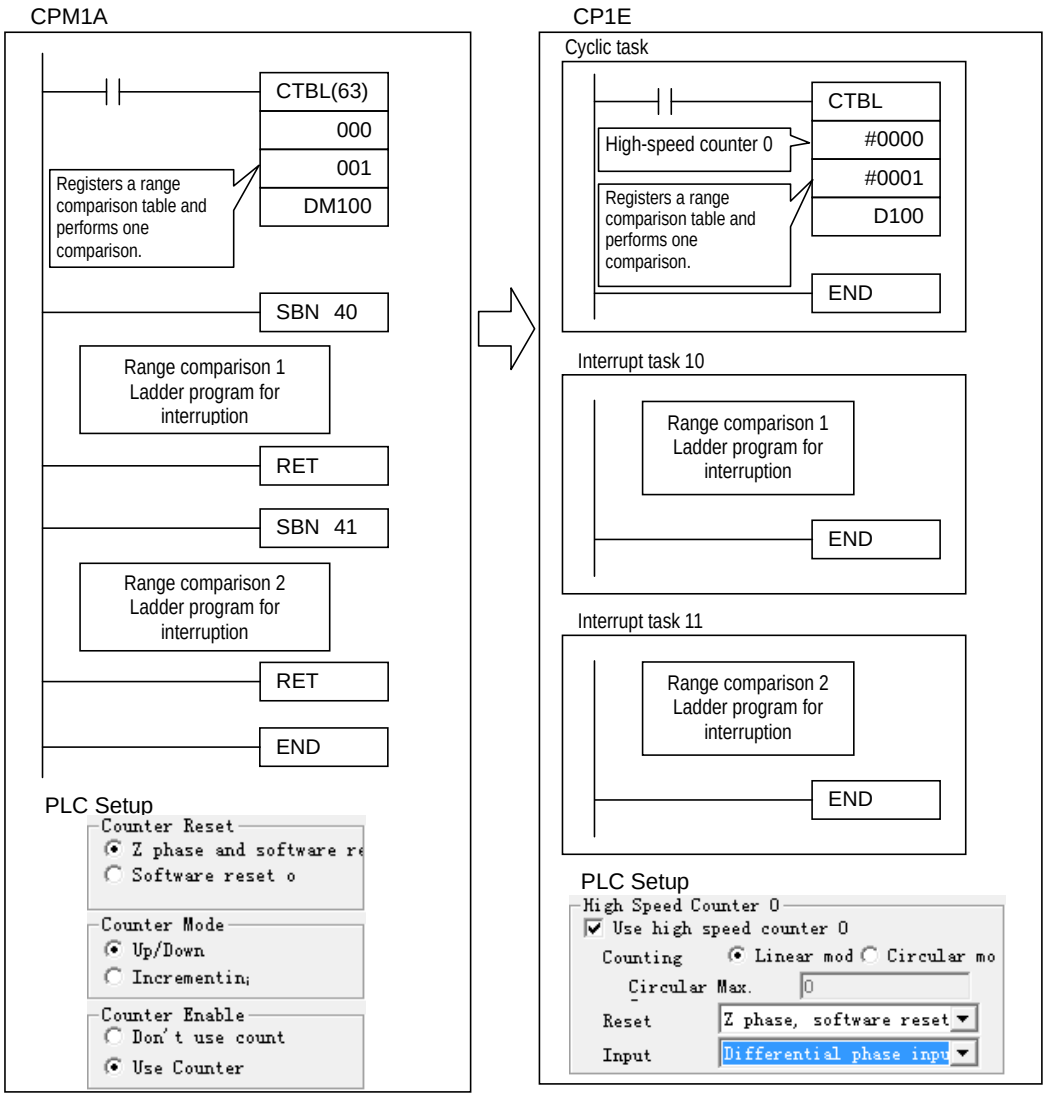
The ladder program for interrupt processing of the CPM1A is written between the subroutine instructions (between SBN and RET).

Copy the interrupt processing program in the cyclic task and paste it onto the interrupt task after changing the model to the CP1E.

Example:

Change the CPM1A “up/down mode: registers a range comparison table and performs one comparison” to the CP1E “differential phase input: registers a range comparison table and performs one comparison”.

Two comparison tables are "1500 to 3000" and "14500 to 16000".



DM setting for CTBL instruction

DM100	1500	Comparison table 1 Lower word
DM101	0000	
DM102	3000	Comparison table 1 Upper word
DM103	0000	
DM104	0040	Subroutine number
DM105	4500	Comparison table 2 Lower word
DM106	0001	
DM107	6000	Comparison table 2 Upper word
DM108	0001	
DM109	0041	Subroutine number

DM setting for CTBL instruction

D100	#05DC	Comparison table 1 Lower word 1500(5DC Hex)
D101	#0000	
D102	#0BB8	Comparison table 1 Upper word 3000(BB8 Hex)
D103	#0000	
D104	#000A	Interrupt task number No.10(A Hex)
D105	#38A4	Comparison table 2 Lower word 14500(38A4Hex)
D106	#0000	
D107	#3E80	Comparison table 2 Upper word 16000(3E80 Hex)
D108	#0000	
D109	#000B	Interrupt task number No.11(B Hex)

4. Transferring data

Transfer the program, settings, and data that had been converted and modified in Section 3 to the CP1E CPU Unit via the peripheral USB port.

5. Precaution

- When the input device such as a Touch Panel is connected, the words used in the Programmable Terminal might not be within the range of the I/O memory area of the CP1E. It is necessary to change the settings of the Touch Panel as well as the ladder program.

Appendix 1. Specification and performance comparison between CPM1A and CP1E

♦ Performance specifications

Item	CPM1A	CP1E E□□S type CP1E E□□-type	CP1E N□□S(1)-type CP1E N□□-type
Maximum number of I/O points	10 to 160 points	10 to 160 points	
Number of Expansion Units connected	10 and 20-point type: None 30 and 40-point type: 3 units	10, 14 and 20-point type: None 30, 40 and 60-point type: 3 units	
Power supply Operating voltage range Power consumption	AC power supply models: 100 to 240VAC Operating voltage range: 85 to 264VAC Power consumption 10, 20-point type: 30VA max. 30, 40-point type: 60VA max. DC power supply models: 24 VDC Operating voltage range: 20.4 to 26.4VDC Power consumption 10, 20-point type: 6W max. 30, 40 -point type: 20W max.	AC power supply models: 100 to 240VAC Operating voltage range: 85 to 264VAC Power consumption 10, 14 , 20-point type: 15VA max./100VAC, 25VA max./ 240VAC 30, 40, 60-point type: 50VA max./100VAC, 70VA max./240VAC DC power supply models: 24VDC Operating voltage range: 20.4 to 26.4VDC Power consumption 10-point type: 9W max., 14, 20-point type: 13W max. 30, 40, 60-point type: 20W max.	
Output type	Relay or transistor outputs	Relay or transistor outputs	
Terminal block	Fixed	Fixed	
External power supply	AC power supply models only 30/40-point CPU Unit: 300mA 10/20-point CPU Unit: 200mA	AC power supply models only 30/40/60-point CPU Unit: 300mA 10/14/20-point CPU Unit: None	
Program capacity (External specification. Add 1K steps for internal Specification)	2K words not including comments, symbol table, and program indices	2K steps including comments, symbol table, and program indices	8K steps including comments, symbol table, and program indices
DM Area capacity	1K words	2K words D0 to D1499 can be backed up to EEPROM.	8K words D0 to D6999 can be backed up to EEPROM.
Program language	Ladder diagram only	Ladder diagram only	
Function block	Not provided.	Not provided.	
SFC	Not provided.	Not provided.	
Instructions	Approximately 90 instructions	Approximately 200 instructions	
Instruction execution time	LD: 1.72μs, MOV: 16.3μs	LD: 1.19μs, MOV: 7.9μs	
High-speed counter input			
Mode	Incremental pulse inputs: 5kHz x 1 counter or Differential phase inputs (x4): 2.5kHz x 1counter	Up/down, pulse + direction inputs: 10kHz x 2 counters or Differential phase inputs (x4): 5kHz x 2 counters or Incremental pulse inputs: 10kHz x 6 counters Note. 10kHz x 5 counters for 10-point CPU Unit	Up/down inputs: 100kHz x 1 counter, 10kHz x 1 counter or Pulse + direction inputs: 100kHz x 2 counters or Differential phase inputs (x4): 50kHz x 1 counter, 5kHz x 1 counter or Incremental pulse inputs: 100kHz x 2 counters, 10kHz x 4 counters
Control method	Target matching/ Range comparison	Target matching/Range comparison	
Quick-response inputs	4 inputs	6 inputs (4 inputs only for 10 I/O inputs)	
Input interrupts	4 inputs Direct mode or counter mode	6 inputs (4 inputs only for 10 I/O inputs) Direct mode only	

Item		CPM1A	CP1E E□□S type CP1E E□□-type	CP1E N□□S(1)-type CP1E N□□-type
Pulse outputs	Pulse output method	Single-phase pulse	Pulse output function not included	Pulse + direction mode only
	Speed control	Included		Included
	Positioning	Included (trapezoidal control not included)		Included
	S-curve acceleration and deceleration	Not included		Not included
	Origin searches	Not included		Included
PWM outputs		Not included	Not included	1 output
DIP switch on front panel (SW)		None	None	
Analog adjusters		2 adjusters	2 adjusters：CP1E-E□□/N□□-type only Note：CP1E-E□□S/N□□S(1)-type do not have this function.	
Peripheral port		C-series peripheral port	USB2.0 Full-speed (12M)	
Programming Console		Can be connected	Cannot be connected	
Built-in serial communication port		None	None	N□□/N□□S：(RS-232C) N□□S1：RS-232C+RS-485
Serial option port		None	None	N□□ only 14/20-point CPU Unit: None 30/40/60-point CPU Unit: 1 port
Serial communication protocols		Connected CPM1-CIF01/CI F11 to peripheral port.	Not included	RS-232C port, RS-485 port or serial option port
	Baud rate	1200/2400/4800/9600/19.2k	No communication port	1200/2400/4800/9600/ 19.2k/38.4k/57.6k/115.2k
	Compatible protocols	Host Link Peripheral bus NT Link (1:1) 1:1 link (master) 1:1 link (slave) Refreshed at once when PLC Setup is changed.		Host Link No-protocol mode NT Link (1:N) ***1 *2** Serial PLC Links (master) ***3** Serial PLC Links (slave) Modbus-RTU Refreshed for power interruption after PLC Setup has been changed.

***1**. Only one PT can be connected.
***2**. PT programming console is not supported.
***3**. PTs participation is not possible.

Item	CPM1A	CP1E E□□S type CP1E E□□-type	CP1E N□□S(1)-type CP1E N□□-type
Item	CPM1A	CP1E E□□S type CP1E E□□-type	CP1E N□□S(1)-type CP1E N□□-type
Mountable Option Boards	Option Board cannot be mounted. The followings can be connected to peripheral port: RS-232C Adapter CPM1-CIF01 RS-422A Adapter CPM1-CIF11	Option Board cannot be mounted.	N□□ only RS-232C Option Board CP1W-CIF01 RS-422A/485 Option Board CP1W-CIF11/12 Ethernet Option Board CP1W-CIF41 The followings cannot be mounted: LCD Option Board CP1W-DAM01
Battery	None Battery cannot be mounted.	None Battery cannot be mounted.	None Optional battery (CP1W-BAT01) can be mounted.
Capacitor backup	20 days (at ambient temperature of 25°C)	50 hours (at ambient temperature of 25°C)	40 hours (at ambient temperature of 25°C)
Nonvolatile memory (Backup memory)	Built-in flash memory (contains user programs, parameters, DM Area initial values and comment files)	Built-in EEPROM (contains user programs, parameters, DM Area initial values and comment files)	
Backup function of DM Area to nonvolatile memory (The function to retain I/O memory data in battery-free operation)	Initial values in DM 6144 to DM 6599 can be changed from Programming Device. They cannot be overwritten from program during operation.	Any specified data (from D0) of DM Area can be backed up to backup memory by using Auxiliary Area control bits. Data can be restored to DM Area automatically when power is turned ON for settings in PLC Setup. Data that can be backed up E-type: D0 to D1499 (max.) N-type: D0 to D6999 (max.)	
Trace memory	Not included	Not included	
Clock (RTC)	Not included	Not included	Included
Address offsets	Not included	Included	
Number of cyclic tasks	1	1	
Number of interrupt tasks	None	16	
Number of subroutine	49	128	
Jump numbers	49	128	
Scheduled interrupt	1 Time unit: 0.1ms	1 Time unit: Only 0.1ms Interrupt intervals are fixed when MSKS instruction is executed. Only reset/start can be executed by MSKS instruction.	

♦ I/O memory

Item	CPM1A	CP1E E□□S type CP1E E□□-type	CP1E N□□S(1)-type CP1E N□□-type
CIO	320 bits CIO0.00 to CIO19.15 Input bits: Starting from CIO0.00 Output bits: Starting from CIO10.00	4640 bits CIO0.00 to CIO289.00 Input bits: Starting from CIO0.00 Output bits: Starting from CIO100.00	
Work Area (WR)	512 bits CIO 200.00 to CIO 231.15	1600 bits W0.00 to W99.15	
Link Area(LR)	256 bits LR0.00 to LR15.15	None (Serial PLC Link Words: CIO200.00 to 289.15)	
Temporary Relay Area	8 bits TR0 to TR7	16 bits TR0 to TR15	
Holding Area (HR)	320 bits H0.00 to H19.15	800 bits H0.00 to H49.15	
Auxiliary Area (AR) Special Area (CPM1A only)	Special Area 384bits SR232.00 to SR255.15 Auxiliary Area 384 bits A00.00 to A15.15	Auxiliary area Read only: 7168 bits A0 to A447 Read/write: 4896 bits A448 to A753	
Timer Area	128 timer numbers T0 to T127 (Using same numbers as counters)	256 timer numbers T0 to T255	
Counter Area	128 counter numbers C0 to C127 (Using same numbers as timers)	256 counter numbers C0 to C255	
Data Memory Area	1K words DM0 to 1023：Read/Write DM1000 to 1021: Error Log Area D6144 to 6599: Read-only D6600-6655: PLC Setup	2K words D0 to D2047 (D0 to D1499 can be backed up to EEPROM by using Auxiliary Area control bits. Data is restored to RAM when power is turned ON for settings in PLC Setup.)	8K words D0 to D8191 (D0 to D6999 can be backed up to EEPROM by using Auxiliary Area control bits. Data is restored to RAM when power is turned ON for settings in PLC Setup.)
Task Flag Area	None	1	
Index registers (IR)	None	None	
Data registers (DR)	None	None	
Trace memory	None	None	

Appendix 2. Changes in Special Area

Name	CPM1A Special Area	CP1E Auxiliary Area
Macro function output area	236 to 239	None
Input interrupt 3 counter mode SV	240	None
Input interrupt 4 counter mode SV	241	None
Input interrupt 5 counter mode SV	242	None
Input interrupt 6 counter mode SV	243	None
Input interrupt 3 counter mode PV	244	None
Input interrupt 4 counter mode PV	245	None
Input interrupt 5 counter mode PV	246	None
Input interrupt 6 counter mode PV	247	None
High-speed counter PV area	248 to 249	A270 to A271
Analog setting 0	250	A642：E□□/N□□-type only *：E□□S/N□□S(1)-type Fixed at “0000”
Analog setting 1	251	A643：E□□/N□□-type only *：E□□S/N□□S(1)-type Fixed at “0000”
High-speed counter reset bit	252.00	A531.00
Peripheral port reset bit	252.08	A526.01 (Serial option port restart)
PLC Setup reset bit	252.10	None
Forced status hold bit	252.11	A500.13
IOM hold bit	252.12	A500.12
Error log reset bit	252.14	A500.14
Error code	253.00 to 07	A400
Cycle time overrun flag	253.09	A401.08
Changing COMM port setup flag	253.12	None
Always ON flag	253.13	P_On
Always OFF flag	253.14	P_Off
First cycle flag	253.15	A200.11
1-minute clock pulse	254.00	P_1min
0.02-second clock pulse	254.01	P_0_02s
Negative flag	254.02	P_N
Differential monitor completed flag	254.06	A508.09
STEP execution flag	254.07	A200.12
0.1-second clock pulse	255.00	P_0_1s
0.2-second clock pulse	255.01	P_0_2s
1.0-second clock pulse	255.02	P_1s
Instruction execution error (ER) flag	255.03	P_ER
Carry (CY) flag	255.04	P_CY
Greater than flag	255.05	P_GT
Equals flag	255.06	P_EQ
Less than flag	255.07	P_LT

Appendix 3. Changes in Auxiliary Area

Name	CPM1A Auxiliary Area	CP1E Auxiliary Area
Expansion Unit error flag for 1st Unit	AR02.00	A436.00
Expansion Unit error flag for 2nd Unit	AR02.01	A436.01
Expansion Unit error flag for 3rd Unit	AR02.02	A436.02
Number of Expansion Units connected	AR02.08 to 11	A437
Peripheral port error code	AR08.08 to 11	None
Peripheral port communications error flag	AR08.12	A392.12
Power-off counter	AR10	A514
Range comparison flags	AR11.00 to 07	A274.00 to 05
Pulse output status	AR11.15	A280.04 (pulse 0) A281.04 (pulse 1)
Power-up PLC Setup error flag	AR13.00	A402.10
Start-up PLC Setup error flag	AR13.01	A402.10
RUN PLC Setup error flag	AR13.02	A402.10
Long cycle time flag	AR13.05	A401.08
UM Area specification error flag	AR13.08	None
FROM error flag	AR13.09	A315.15
Read-only DM error flag	AR13.10	None
PLC Setup error flag	AR13.11	A402.10
Program error flag	AR13.12	A401.15/A401.09
Data save error flag	AR13.14	None
Maximum cycle time	AR14	A262 to A263
Current cycle time	AR15	A264 to A265

Appendix 4. Instructions changed by replacing CPM1A with CP1E

Instruction		CPM1A	CP1E	Result of instruction conversion and measure
Shift instruction	ASYNCHRONOUS SHIFT REGISTER	ASFT	None	Displayed as error. As CP1E does not have alternative instruction, we recommend you to use CPIL/CP1H.
Increment /decrement instructions	INCREMENT	INC	++B	Converted
	DECREMENT	DEC	--B	Converted
Calculation instructions	BCD ADD	ADD	+BC	Converted
	BCD SUBTRACT	SUB	-BC	Converted
	BCD MULTIPLY	MUL	*B	Converted
	BCD DIVIDE	DIV	/B	Converted
	BINARY ADD	ADB	+C	Converted
	BINARY SUBTRACT	SBB	-C	Converted
	BINARY MULTIPLY	MLB	None SIGNED BINARY MULTIPLY: *	Displayed as error. Use SIGNED BINARY MULTIPLY instead.
	BINARY DIVIDE	DVB	None SIGNED BINARY DIVIDE: /	Displayed as error Use SIGNED BINARY DIVIDE instead.
	DOUBLE BCD ADD	ADDL	+BCL	Converted
	DOUBLE BCD SUBTRACT	SUBL	-BCL	Converted
	DOUBLE BCD MULTIPLY	MULL	*BL	Converted
	DOUBLE BCD DIVIDE	DIVL	/BL	Converted
Logic instruction	EXCLUSIVE NOR	XNRW	None (XORW+COM)	Displayed as error. Use combination of XORW instruction and COM instruction instead.
Subroutine instruction	MACRO	MCRO	None	Displayed as error. As CP1E does not have alternative instruction, change ladder program with multiple subroutines.
Interrupt control instructions	INTERVAL TIMER	STIM	MSKS	Displayed as error. Use MSKS instruction instead.
	INTERRUPT CONTROL	INT	MSKS	Displayed as error. Use MSKS instruction instead.
Special instruction	MESSAGE DISPLAY	MSG	None	Displayed as error. CP1E does not have alternative instruction because Programming Console cannot be used. We recommend you to use CP1W-DAM01.

Note. Refer to the Instructions Reference Manuals in the related manuals for details of the instructions.

Appendix 5. Instruction specifications changed by replacing CPM1A with CP1E

Instruction	Mnemonic	Operand number	Operand specification of CPM1A	Operand specification of CP1E	Modification after converting with CX-Programmer
SINGLE WORD DISTRIBUTE	DIST	3	C: Control word • C is BCD data when using for single-word distribution.	Of: Offset • Of is BIN data. • No stack operation.	• Change Of from BCD data to BIN data when using for single-word distribution. • Stack operation cannot be converted because CP1E does not have this function.
DATA COLLECT	COLL	2	C: Control word • C is BCD data when using for data collection.	Of: Offset • Of is BIN data. • No stack operation.	• Change Of to BIN data when using for data collection. • Stack operation cannot be converted because CP1E does not have this function.
WORD SHIFT	WSFT	1	St: Starting word	S: Source word S is store in St.	Although &0 data is input in S: Source word, operation is the same as CPM1A.
		2	E: End word	St: Starting word	
		3	-	E: End word	
SPEED OUTPUT	SPED	1	Single-phase pulse output	Pulse + direction only. Single-phase output cannot be specified.	Specify pulse output port and mode to be used.
		2	M: Output mode Output method and direction are not specified.	M: Output mode Output method and direction must be specified.	
		3	F: Target frequency Set BCD value in 10Hz.	F: Target frequency Set BIN value in Hz.	It is necessary to convert unit of target frequency and convert BCD data into BIN data.
SET PULSES	PULS	1	Single-phase pulse output Fixed at 000	Pulse output 0 Fixed at #0000	Specify pulse output port and mode to be used.
		2	Fixed at 000 (relative mode)	Fixed at #0000 (relative mode)	
		3	When specifying word, contents of word are BCD data	When specifying word, contents of word are BIN data	Change pulse output amount from BCD data to BIN data.
			When specifying constant, BCD data	When specifying constant, BIN data	
FAILURE ALARM	FAL	2	No second operand	Specify message word with second operand.	Second operand is converted to #0 data (no message).
SEVERE FAILURE ALARM	FALS	2	No second operand	Specify message word with second operand.	Second operand is converted to #0 data (no message).

Note. Refer to the Instructions Reference Manuals in the related manuals for details of the instructions.

Appendix 6. PLC Setup changed by replacing CPM1A with CP1E

It is necessary to set because the PLC Setup is not converted even if the model is changed.

CPM1A			CP1E		
Function	Item		Function	Item	
Startup	Startup mode	PROGRAM	Startup	Startup mode	PROGRAM
		MONITOR			MONITOR
		RUN			RUN
		Continue operating mode last used before power was turned OFF.			None
		Programming Console switch			None
	IOM hold	Reset/Maintain		None	None
	Forced status	Reset/Maintain		None	None
	Programming Console display language	Japanese		-	Programming Console cannot be connected.
	Program memory write-protection	Unprotected/Protected			Transition from PLC Setup. Various protections available.
	If data could not be saved with built-in capacitor	Memory error will be generated			Clear held memory to zero when power is turned ON.
Cycle time	Cycle monitor timer	Disable: fixed at 120ms Setting: 99s max. Monitor time = setting x unit Setting unit: 10ms/ 100ms/1s	Timing/ Interrupt	Watch cycle time	Default: 1000ms Any value can be set.
	Cycle time	Default: Variable Other: Minimum time		Constant cycle time	Default: Variable Other: Any value can be set.
	Servicing time for peripheral port	Peripheral port 0 to 99%of cycle time	Service for peripheral port	None	None
Interrupt／ Refreshing	Interrupt input	IR 00003 to 6	Built-in input	Interrupt input	IN2 to 7
	Input constant	IR 000 to 0009 IN0ch is set every 2bits. 1/2/4/8/16/32/64/128ms	Input constant	Input constant (0 to 17CH)	0 to 17CH All words including IN0ch are set at the same time. No filter/1/2/4/8/16/32ms
Host Link port	Communications setting	Standard	Built-in RS-232C	Communications setting	Standard
		Custom			Custom
	Baud rate	1200 to 19.2kbps		Baud rate	1200 to 115.2kbps
	Mode	Host Link		Mode	Host Link
		1:1 PC Link (slave)			Serial PLC Link (slave)
		1:1 PC Link (master)			Serial PLC Link (master)
		NT Link (1:1)			NT Link (1:N)
	Link words	LR00 to LR15		-	No setting (fixed value)
	Node number	0 to 31		Unit number	0 to 31
	Delay	0 to 9999ms		Delay	0 to 9999ms
Error log setting	Cycle time monitor	Detect (non-fatal error) / Not detect	Timing/ Interrupt	Watch cycle time	Check/Not check
				Cycle time	Check/Not check
	Style	Shift after 7 records has been stored / Store only first 7 records / Not store	-	-	No setting 20 records (fixed)
High-speed counter	Counter reset	Z phase + software reset Software reset only	Built-in input	High-speed counter 0	Select reset method.
	Counter mode	Differential phase input (2.5kHz)			Differential phase input (x4)
		Increment mode (5kHz)			Increment pulse input
	Counter enable	Not use/Use			Check "Use".

Shaded item: Specification of setting item is changed.

Appendix 7. Expansion Units

Model numbers of the Expansion Units when replacing the CPM1A with the CP1E

	CPM1A Expansion Unit	CP1W Expansion Unit	When replacement model does not exist
I/O Unit with 40 I/O points	CPM1A-40EDR	CP1W-40EDR	
	CPM1A-40EDT	CP1W-40EDT	
	CPM1A-40EDT1	CP1W-40EDT1	
I/O Unit with 20 I/O points	CPM1A-20EDR1	CP1W-20EDR1	
	CPM1A-20EDT	CP1W-20EDT	
	CPM1A-20EDT1	CP1W-20EDT1	
Input Unit with 8 inputs	CPM1A-8ED	CP1W-8ED	
Output Unit with 8 outputs	CPM1A-8ET	CP1W-8ET	
	CPM1A-8ET1	CP1W-8ET1	
Analog Input Unit	CPM1A-AD041	CP1W-AD041	
Analog Output Unit	CPM1A-DA041	CP1W-DA041	
Analog I/O Unit	CPM1A-MAD01	None	Replace with CP1W-MAD11.
	CPM1A-MAD11	CP1W-MAD11	
CompoBus/S I/O Link Unit	CPM1A-SRT21	CP1W-SRT21	
DeviceNet I/O Link Unit	CPM1A-DRT21	None	You can use CPM1A-DRT21 with CP1E.
Temperature Sensor Unit	CPM1A-TS001	CP1W-TS001	
	CPM1A-TS002	CP1W-TS002	
	CPM1A-TS101	CP1W-TS101	
	CPM1A-TS102	CP1W-TS102	

MEMO

MEMO