

Programmable Controller CJ1

# Replacement Guide From CJ1M/CJ1G to CJ2M

CJ1M-CPU□□

CJ1G-CPU4□(H)

CJ2M-CPU□□



Replace  
Guide

## ***About this document***

This document provides the reference information for replacing CJ1M/CJ1G PLC systems with CJ2M 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.

## Related Manuals

Man.No.	Manual
W472	CJ2 CPU Unit Hardware USER'S MANUAL
W473	CJ2 CPU Unit Software USER'S MANUAL
W486	CJ2M Pulse I/O Module USER'S MANUAL
W393	CJ Series OPERATION MANUAL
W441	CJ series CJ1M CPU Units with Ethernet Functions OPERATION MANUAL
W395	CJ series Built-in I/O CJ1M CPU Units OPERATION MANUAL
W394	CS/CJ/NSJ PROGRAMMING MANUAL
W474	CS/CJ/NSJ Series INSTRUCTIONS REFERENCE MANUAL
W342	CS/CJ/CP/NSJ Series Communications Commands REFERENCE MANUAL
W345	CS/CJ Series Analog I/O Units AD/DA/MAD42 OPERATION MANUAL
W368	CS/CJ Series Analog I/O Units OPERATION MANUAL
W466	CJ Series Universal Input Units OPERATION MANUAL
W396	CJ Series Temperature Control Units OPERATION MANUAL
W401	High-speed Counter Units OPERATION MANUAL
W465	EtherNet/IP Units OPERATION MANUAL
W420	CS and CJ Series Ethernet Units OPERATION MANUAL Construction of Networks
W343	CS/CJ Series Ethernet Units OPERATION MANUAL
W421	CS/CJ Series Ethernet Units OPERATION MANUAL Construction of Applications
Z174	CS/CJ Series ID SENSOR UNITS OPERATION MANUAL
W397	CJ Series Position Control Units CJ1W-NC□□3 OPERATION MANUAL
W477	CJ Series Position Control Units CJ1W-NC□□4 OPERATION MANUAL
W336	CS/CJ Series Serial Communications Boards Serial Communications Units OPERATION MANUAL
W426	CS/CJ Series Position Control Units CS1W-NC□□1/CJ1WNC□□1-MA OPERATION MANUAL
W435	CS/CJ series Motion Control Unit CS1W/CJ1W-MCH71 OPERATION MANUAL
W467	Controller Link Support Boards for PCI Bus INSTALLATION GUIDE
W309	Controller Link Units OPERATION MANUAL
V237	SPU-Console Ver.2.1 OPERATION MANUAL
W406	CS/CJ Series Loop Control Boards/Process-control CPU Units /Loop-control CPU Units OPERATION MANUAL
W407	CS/CJ Series Loop Control Boards/Process-control CPU Units /Loop-control CPU Units FUNCTION BLOCK REFERENCE MANUAL
W463	CX-One FA Integrated Tool Package SETUP MANUAL
W446	CX-Programmer OPERATION MANUAL
W447	CX-Programmer OPERATION MANUAL:Function Blocks/Structured Text
W469	CX-Programmer OPERATION MANUAL SFC Programming
W366	CX-Simulator OPERATION MANUAL
W464	CX-Integrator OPERATION MANUAL
W433	CX-Position OPERATION MANUAL
W436	CX-Motion-NCF OPERATION MANUAL
W448	CX-Motion-MCH OPERATION MANUAL

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### Appendix

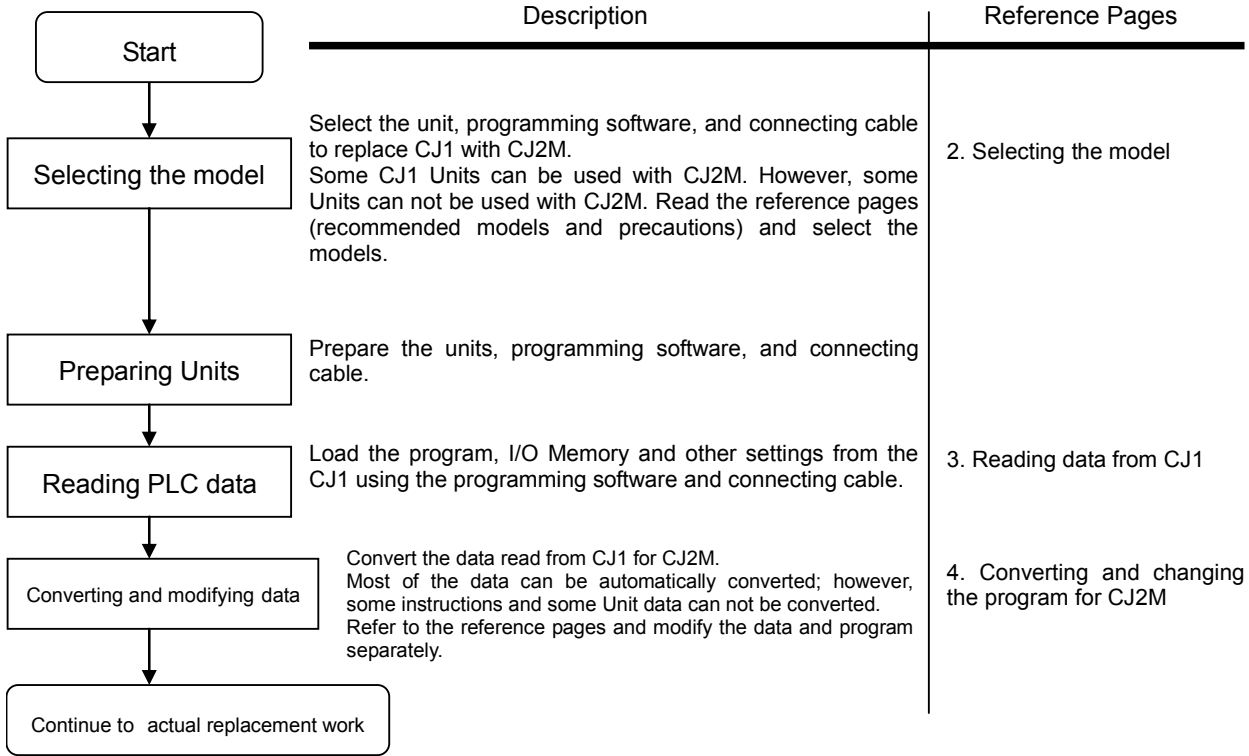
A-1 Instruction operations

A-2 Condition flag operations

This replacement guide describes the procedure to rebuild the system which uses the CJ1-series PLC by introducing the CJ2M-series PLC instead. The CJ2M-series has functions which can replace the functions and operation of CJ1-series PLC. Take the below work flow to replace your system. Also, refer to the reference pages for details.

**Work flow**

1) Preliminary Steps: Take the following steps before starting the replacement work.



2) Actual replacement work: Take the steps below to replace the CJ1 to CJ2M.



# 1. Performance specifications

## 1.1 CJ1M/CJ2M specifications comparison

The table below lists the major difference in specifications of the CJ1M series and CJ2M series.

Item		CJ1M-CPU**	CJ2M-CPU**
Number of I/O points		CPU*1: 160 points CPU*2: 320 points CPU*3: 640 points	2,560 points
Program capacity		CPU*1: 5k step CPU*2: 10k step CPU*3: 20k step	CPU*1: 5k step CPU*2: 10k step CPU*3: 20k step CPU*4: 30k step CPU*5: 60k step
Data memory		32k words	32k words
			EM CPU*1 to *3: 1 bank (32k) CPU*4 to *5: 4 banks (32k x 4)
Built-in I/O		CJ2*: In:10 points/Out:6 points	Built-in CPU function will be available by mounting CJ2M-MD211/CJ2M-MD212. Up to two units can be mounted. In:10 points/Out:6 points (when one unit is used) In:20 points/Out:12 points (when two units are used) Attention: It is possible to use the unit with the CPU Unit of unit version 2.0 or later.
Length of instructions		1-7 steps/one instruction	1-30 steps/one instruction
Execution time of instruction	LD instruction	0.10us	0.04us
	MOV instruction	0.30us	0.12us
Overhead processing time		CPU*1: 0.7ms CPU*2/*3: 0.5ms	CPU3*: 270us CPU1*: 160us
Maximum Number of Connectable Units		CPU*1/CPU*2: 10 units CPU*3: 20 units	40 units
Maximum Number of Expansion Racks		CPU*1/CPU*2: No expansion CPU*3: 1	3
Clock function		Equipped as a standard function	Equipped as a standard function
Dimensions (CPU Unit)		CPU*1: 90(H)x31(W)x65(D) CPU*2: 90(H)x49(W)x65(D)	CPU*1: 90(H) x 31(W) x 75(D) CPU*3: 90(H) x 62(W) x 75(D)
Programming software		CX-P	CX-P
Programming device connection	Programming device for personal computer	< Peripheral port connection > Connection with PC requires cables: CS1W-CN*** or CS1W-CN118 + XW2Z-***S-** < RS232C port connection > Connection with PC requires cables: XW2Z-***S-CV or XW2Z-***S (-V) .	< Peripheral (USB) port > A direct connection can be made between the USB port of the personal computer and the PLC using the commercially-available USB cable  < Serial (RS232C) port connection > Use the serial cable (XW2Z-200S-CV/500S-CV) to connect the PC and serial port on the CPU Unit. (The CPU3* does not have the RS232C port on it. Mount the RS232C option board (CP1W-CIF01) and connect the cable with the unit)
	Programming Console	Available C200H-PRO27 CQM1-PRO01	Not supported

## 1.2 CJ1G/CJ2M specifications comparison

The table below lists the major difference in specifications of the CJ1G and CJ2M series.

Item		CJ1G-CPU4*H/CPU4*	CJ2M-CPU**
Number of I/O points		CPU42H/43H: 960 points CPU44/45/44H/45H: 1280 points	2,560 points
Program capacity		CPU42H: 10k step CPU43H: 20k step CPU44/44H: 30k step CPU45/45H: 60k step	CPU*1: 5k step CPU*2: 10k step CPU*3: 20k step CPU*4: 30k step CPU*5: 60k step
Data memory		32k words	32k words
			EM CPU*1 to *3: 1 bank (32k) CPU*4 to *5: 4 banks (32k x 4)
Built-in I/O		-	Built-in CPU function will be available by adding the CJ2M-MD211/CJ2M-MD212. Up to two units can be mounted. In:10 points/Out:6 points (when one unit is used) In:20 points/Out:12 points (when two units are used) Attention: It is possible to use the unit with the CPU Unit of unit version 2.0 or later.
Length of instructions		1-7 steps/one instruction	1-30 steps/one instruction
Execution time of instruction	LD instruction	CPU4*H: 0.04us CPU4*: 0.08us	0.04us
	MOV instruction	CPU4*H: 0.20us CPU4*: 0.29us	0.12us
Overhead processing time		CPU4*H : 0.3ms CPU4* : 0.5ms	CPU3* : 270us CPU1* : 160us
Maximum Number of Connectable Units		40 units	40 units
Maximum Number of Expansion Racks		3	3
Clock function		Equipped as a standard function	Equipped as a standard function
Dimensions (CPU Unit)		90(H) x 62(W) x 65(D)	CPU1*: 90(H) x 31(W) x 75(D) CPU3*: 90(H) x 62(W) x 75(D)
Programming software		CX-P	CX-P
Programming device connection	Programming device for personal computer	< Peripheral port connection > Connection with PC requires cables: CS1W-CN*** or CS1W-CN118 + XW2Z-***S-** < RS232C port connection > Connection with PC requires cables: XW2Z-***S-CV or XW2Z-***S(-V)	< Peripheral (USB) port > A direct connection can be made between the USB port of the personal computer and the PLC using the commercially-available USB cable  < Serial (RS232C) port connection > Use the serial cable (XW2Z-200S-CV/500S-CV) to connect the PC and serial port on the CPU Unit. (The CPU3* does not have the RS232C port on it. Mount the RS232C option board (CP1W-CIF01) and connect the cable with the unit)
	Programming Console	Available C200H-PRO27 CQM1-PRO01	Not supported.

## 2. System Configurations

### 2.1 CJ1M/CJ1G/CJ2M system configuration comparison

Same Power Supply Unit, Special I/O Units, and Basic I/O Unit can be used for CJ1M/CJ1G Series and CJ2M Series.

◆ Built-in I/O

CJ1M	CJ1G	CJ2M
Built-in I/O function	Built-in I/O function not supported	Built-in CPU function will be available by adding the CJ2M-MD211/CJ2M-MD212 Up to two units can be mounted. *It is possible to use the unit with the CPU Unit of unit version 2.0 or later
In:10 points/Out:6 points Supported by CPU2* only	-	In:10 points/Out:6 points (when one unit is used) In:20 points/Out:12 points (when two units are used)

### 3. Memory area

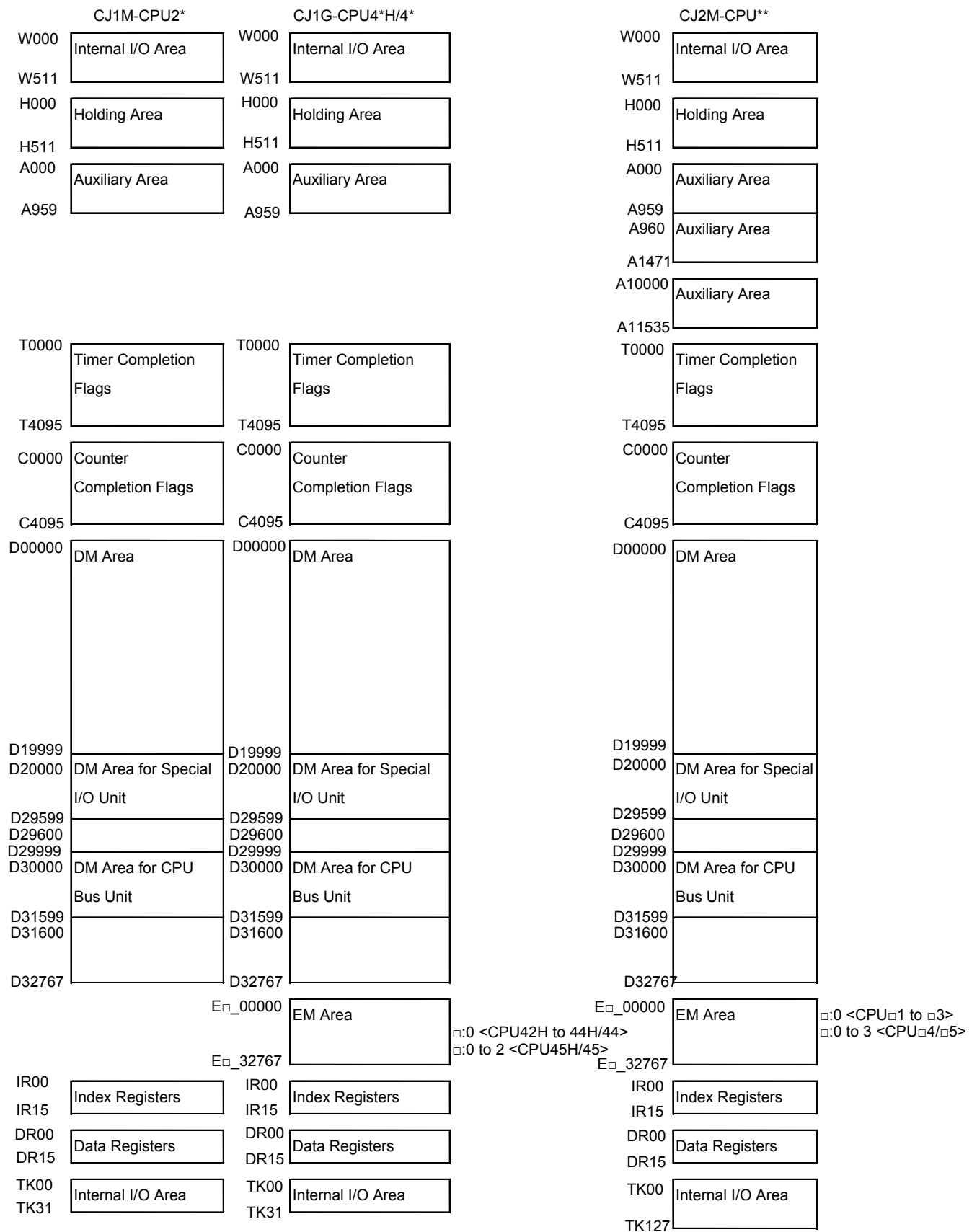
#### 3.1 CJ1M/CJ1G/CJ2M memory area comparison

This section explains the difference of the memory area of the CJ1M series, CJ1G series and CJ2M series, using an example of CJ1M-CPU2\*, CJ1G-CPU4\*H/4\* and CJ2M-CPU\*\*.

◆ CI/O area

CJ1M-CPU2*		CJ1G-CPU4*H/4*		CJ2M-CPU**	
0000	I/O Area	0000	I/O Area	0000	I/O Area
0039	Not used	0159	Not used	0159	Not used
0040					
0999		0999		0999	
1000	Data Link Area	1000	Data Link Area	1000	Data Link Area
1199	Internal I/O Area	1199	Internal I/O Area	1199	Not used
1200		1200			
1499		1499		1499	
1500	CPU Bus Unit Area	1500	CPU Bus Unit Area	1500	CPU Bus Unit Area
1899	Not used	1899	Not used	1899	Not used
1900		1900			
1999		1999		1999	
2000	Special I/O Unit Area	2000	Special I/O Unit Area	2000	Special I/O Unit Area
2959	Pulse I/O Area	2959	Not used	2959	Pulse I/O Area
2960		2960			
2961	Not used	3099	Not used	2963	Not used
2962				2964	
3099		3099		3099	
3100	Serial P L C Link Area	3100	Not used	3100	Serial P L C Link Area
3189	Not used	3199	DeviceNet Area	3189	Not used
3190				3199	
3199		3199		3199	
3200	DeviceNet Area	3200	DeviceNet Area	3200	DeviceNet Area
3799	Internal I/O Area	3799	Internal I/O Area	3799	Internal I/O Area
3800		3800			
6143		6143		6143	

◆ Area other than CIO Area



#### 4. Example of converting ladder program by CX-Programmer

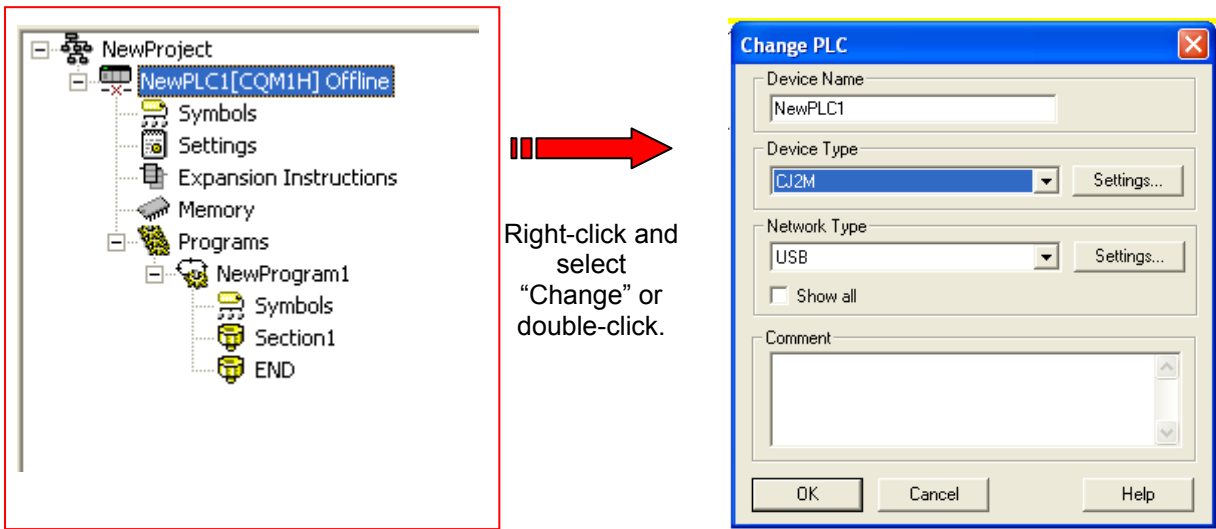
This section explains the method of converting the ladder program using CX-Programmer Ver.9.1. Here, convert the ladder program of CJ1M/CJ1G for CJ2M-CPU\*\* as an example.

◆ Changing model from CJ1M/CJ1G to CJ2M.

As shown on the below figure, select NewPLC1[CJ1M] and right-click or double click it to change the PLC model. Please set the CPU model to the Device Type.

The error report might be displayed if there are instructions which cannot be converted.

Please correct and modify the program using support software function or manually, and execute program check. If errors are detected by the program check, please correct them referring to the error report.



Right-click and select "Change" or double-click.

◆ Checking program

Check whether there is problem in the ladder program which was converted from the CJ1M/CJ1G series for CJ2M series.

■ Program check

There are 2 types of program check; automatic check on the CX-Programmer and check conducted by users. CX-Programmer checks the program when "Change model" is executed and the ladder program is converted.

• Automatic program check on the CX-Programmer

Timing of program check	Description
When PLC model is changed.	Program check for each PLC model Check for all instructions and all operands.

You can see the check result on the "Compile (Program check)" tab of the Output Window. The left bus-bar on the ladder section window turns red if there is an error in the rung.

• Program check conducted by users

This section describes the procedure of program check, an example of checking result, and explanation of error levels.

<Program check for one program (task)>

1. Select the ladder section window or nimonic window to check.
2. Select "Program" – "Compile (Program check)".

The results of program check will be displayed on the Output Window. Refer to "Results of program check" on the next page for details.

- Checking the entire program  
Select "PLC" – "Compile All PLC Programs".

You can see the program check results on the Output Window.  
Refer to "Results of program check" for details.

<Results of program check>

You can see the check result on the "Compile (Program check)" tab of the Output Window.  
There are three error levels; errors are divided and shown for each level.

#### When there is no error.

```

----- PLC: 'NewPLC1' (PLC Model 'CQM1H CPU11' to 'CJ2M CPU11') -----
Conversion issues...
[PLC/Program Name : Programs/NewProgram1]
[Ladder Section Name : Section1]
[Ladder Section Name : END]

NewPLC1 - 0 errors, 0 warnings.

```

#### When there are errors.

```

Compiling...
[PLC/Program Name : NewPLC1/NewProgram1]
[Ladder Section Name : Section1]
ERROR: Element at rung 0 (0, 0) is not connected at its output.
ERROR: Element at rung 0 (0, 1) is not connected at its output.
ERROR: Missing operand at rung 1 (1, 0).
ERROR: Missing operand at rung 1 (0, 0).
[Ladder Section Name : END]

NewProgram1 - 4 errors, 0 warnings.
The programs have been checked with the program check option set to Unit Ver.1.0.

```

Double-click an error on the Output Window to jump to the corresponding cell.

Numeric data in ( , ) shows the position of a cell with an error.

If you right-click on the Output Window, below menus are shown.

Menu	Functions
[Clear]	Clears the content of Output Window. Same as selecting "Edit" – "Clear Compile Window".
[Next Reference]	Jump to the error cell next to the error now selected. Same as selecting "Edit" – "Next Reference".
[Allow Docking]	Output Window is shown on the main window of the CX-Programmer. If uncheck the check box, Output Window will be shown on the separate window.
[Hide]	Close the output window. Same as selecting "View" – "Window" – "Output".
[Float In Main Window]	Output window will be changed to other window (ex. Ladder section window).

Conversion: \*\*= Support software converts the instruction./-= Support software converts the instruction, but it is necessary to manually modify it. /- = There is no corresponding instruction.  
 Blank cells: Support software converts the instructions, though there are some difference in CQM1H/CJ1M/CJ1G and CJ2M.

Instructions	CQM1H	CJ1M/CJ1G	Conversion	Difference between CQM1H and CJ1M/CJ1G/CJ2M (CQM1H->CJ1M/CJ1G/CJ2M)			BCD => BIN	Settings	Remarks
				Nemonic	FUN No.	Number of operand			
Sequence input instructions									
LOAD	LD	LD	**						
LOAD NOT	LD NOT	LD NOT	**						
AND	AND	AND	**						
AND NOT	AND NOT	AND NOT	**						
OR	OR	OR	**						
OR NOT	OR NOT	OR NOT	**						
AND LOAD	AND LD	AND LD	**						
OR LOAD	OR LD	OR LD	**						
Sequence output instructions									
OUTPUT	OUT	OUT	**						
OUTPUT NOT	OUT NOT	OUT NOT	**						
TR Bits	TR	TR	**						
KEEP	KEEP	KEEP	**						
DIFFERENTIATE UP	DIFU	DIFU	**						
DIFFERENTIATE DOWN	DIFD	DIFD	**						
SET	SET	SET	**						
RESET	RSET	RSET	**						
Sequence control instructions									
END	END	END	**						
NO OPERATION	NOP	NOP	**						
INTERLOCK	IL	IL	**						
INTERLOCK CLEAR	ILC	ILC	**						
JUMP	JMP	JMP	**				Jump No.		
JUMP END	JME	JME	**				Jump No.		
Timer and counter instructions									
TIMER	TIM	TIM	**						
HIGH-SPEED TIMER	TIMH	TIMH	**						
TOTALIZING TIMER	TTIM	TTIM	*		Expansion ->87				Operand3: reset input relay No will be deleted. Enter the reset input.
COUNTER	CNT	CNT	**						
REVERSIBLE COUNTER	CNTR	CNTR	**						
Comparison instructions									
COMPARE	CMP	CMP	**						
DOUBLE COMPARE	CMPL	CMPL	**		Expansion ->60	3 (None)->2			
SIGNED BINARY COMPARE	CPS	CPS	**		Expansion ->114	3 (None)->2			
DOUBLE SIGNED BINARY COMPARE	CPSL	CPSL	**		Expansion ->115	3 (None)->2			
MULTI-WORD COMPARE	MCMP	MCMP	**						
TABLE COMPARE	TCMP	TCMP	**						
BLOCK COMPARE	BCMP	BCMP	**						
AREA RANGE COMPARE	ZCP	ZCP	**		Expansion ->88				
DOUBLE AREA RANGE COMPARE	ZCPL	ZCPL	**		Expansion ->116				
Data movement instructions									
MOVE	MOV	MOV	**						
MOVE NOT	MVN	MVN	**						
MOVE BIT	MOV B	MOV B	*					Change bit position specification from in BCD to in BIN.	
		MOVBC	**		82->568				
		[Ver.3.0 or later]							
MOVE DIGIT	MOVD	MOVD	**						
TRANSFER BITS	XFRB	XFRB	**		Expansion ->62				
BLOCK TRANSFER	XFER	XFER	*					Number of words: BCD -> BIN	
		XFERC	**		70->565				
		[Ver.3.0 or later]							
BLOCK SET	BSET	BSET	**						
DATA EXCHANGE	XCHG	XCHG	**						
SINGLE WORD DISTRIBUTE	DIST	DIST	*					Stack length data set in words: BCD -> BIN	Use PUSH instruction instead, for stack operation.
		DISTC	**		80->566				
		[Ver.3.0 or later]							
DATA COLLECT	COLL	COLL	*					Stack length data set in words: BCD -> BIN	Use FIFO instruction instead, for stack operation and read FIFO. Use LIFO instruction instead, for stack operation and read LIFO.
		COLLC	**		81->567				
		[Ver.3.0 or later]							
Data shift instructions									
SHIFT REGISTER	SFT	SFT	**						
REVERSIBLE SHIFT REGISTER	SFTR	SFTR	**						
ASYNCHRONOUS SHIFT REGISTER	ASFT	ASFT	**						
WORD SHIFT	WSFT	WSFT	*			2->3			Set the shift data in the Operand 1.
ARITHMETIC SHIFT LEFT	ASL	ASL	**						
ARITHMETIC SHIFT RIGHT	ASR	ASR	**						
ROTATE LEFT	ROL	ROL	**						
ROTATE RIGHT	ROR	ROR	**						
ONE DIGIT SHIFT LEFT	SLD	SLD	**						
ONE DIGIT SHIFT RIGHT	SRD	SRD	**						
Increment/ decrement instructions									
INCREMENT	INC	++B	**	INC->++B	38->594				
BCD DECREMENT	DEC	--B	**	DEC->--B	39->596				
Symbol math instructions									
BINARY ADD	ADB	+C	**	ADB->+C	50->402				
DOUBLE BINARY ADD	ADBL	+CL	**	ADBL->+CL	Expansion ->403				
BCD ADD	ADD	+BC	**	ADD->+BC	30->406				
DOUBLE BCD ADD	ADDL	+BCL	**	ADDL->+BCL	54->407				
BINARY SUBTRACT	SBB	-C	**	SBB->-C	51->412				
DOUBLE BINARY SUBTRACT	SBBL	-CL	**	SBBL->-CL	Expansion ->413				
BCD SUBTRACT	SUB	-BC	**	SUB->-BC	31->416				
DOUBLE BCD SUBTRACT	SUBL	-BCL	**	SUBL->-BCL	55->417				
SIGNED BINARY MULTIPLY	MBS	*C	**	MBS->*C	Expansion ->420				
DOUBLE SIGNED BINARY MULTIPLY	MBSL	*L	**	MBSL->*L	Expansion ->421				
BINARY MULTIPLY	MLB	*U	**	MLB->*U	52->422				
BCD MULTIPLY	MUL	*B	**	MUL->*B	32->424				
DOUBLE BCD MULTIPLY	MULL	*BL	**	MULL->*BL	56->425				
SIGNED BINARY DIVIDE	DBS	/C	**	DBS->/C	Expansion ->430				
DOUBLE SIGNED BINARY DIVIDE	DBSL	/L	**	DBSL->/L	Expansion ->431				
BINARY DIVIDE	DVB	/U	**	DVB->/U	53->432				
BCD DIVIDE	DIV	/B	**	DIV->/B	33->434				
DOUBLE BCD DIVIDE	DIVL	/BL	**	DIVL->/BL	57->435				



Conversion: "\*"= Support software converts the instruction./"= Support software converts the instruction, but it is necessary to manually modify it. /- = There is no corresponding instruction.  
Blank cells: Support software converts the instructions, though there are some difference in CQM1H/CJ1M/CJ1G and CJ2M.

Instructions	CQM1H	CJ1M/CJ1G	Conversion	Difference between CQM1H and CJ1M/CJ1G/CJ2M (CQM1H->CJ1M/CJ1G/CJ2M)			Settings	Remarks
				Nemonic	FUN No.	Number of operand		
<b>Conversion instructions</b>								
BCD-TO-BINARY	BIN	BIN	**					
DOUBLE BCD-TO-DOUBLE BINARY	BINL	BINL	**					
BINARY TO BCD	BCD	BCD	**					
DOUBLE BINARY-TO-DOUBLE BCD	BCDL	BCDL	**					
2'S COMPLEMENT	NEG	NEG	**		Expansion ->160	3 (None)->2		
DOUBLE 2'S COMPLEMENT	NEGL	NEGL	**		Expansion ->161	3 (None)->2		
4-TO-16 DECODER	MLPX	MLPX	**					
16-TO-4 ENCODER	DMPX	DMPX	**					
ASCII CONVERT	ASC	ASC	**		Expansion ->162			
ASCII-TO-HEXADECIMAL	HEX	HEX	**		Expansion ->63		Bit number set in words: BCD -> BIN	
LINE	LINE	LINE	*				Bit number set in words: BCD -> BIN	
LINE TO COLUMN	COLM	COLM	*		Expansion ->64			
<b>Logic instructions</b>								
LOGICAL AND	ANDW	ANDW	**					
LOGICAL OR	ORW	ORW	**					
EXCLUSIVE OR	XORW	XORW	**					
EXCLUSIVE NOR	XNRW	XNRW	**					
COMPLEMENT	COM	COM	**					
<b>Special math instructions</b>								
BSQUARE ROOT	ROOT	ROOT	**					
ARITHMETIC PROCESS	APR	APR	*		Expansion ->69			
BIT COUNTER	BCNT	BCNT	*				Number of words set in words: BCD -> BIN	
		BCNTC [Ver.3.0 or later]	**		67->621			
<b>Floating point math instructions</b>								
FLOATING TO 16-BIT	FIX	FIX	**		Expansion ->450	3 (None)->2		
FLOATING TO 32-BIT	FIXL	FIXL	**		Expansion ->451	3 (None)->2		
16-BIT TO FLOATING	FLT	FLT	**		Expansion ->452	3 (None)->2		
32-BIT TO FLOATING	FLTL	FLTL	**		Expansion ->453	3 (None)->2		
FLOATING-POINT ADD	+F	+F	**		Expansion ->454			
FLOATING-POINT SUBTRACT	-F	-F	**		Expansion ->455			
FLOATING-POINT MULTIPLY	*F	*F	**		Expansion ->456			
FLOATING-POINT DIVIDE	/F	/F	**		Expansion ->457			
DEGREES TO RADIAN	RAD	RAD	**		Expansion ->458	3 (None)->2		
RADIANS TO DEGREES	DEG	DEG	**		Expansion ->459	3 (None)->2		
SINE	SIN	SIN	**		Expansion ->460	3 (None)->2		
COSINE	COS	COS	**		Expansion ->461	3 (None)->2		
TANGENT	TAN	TAN	**		Expansion ->462	3 (None)->2		
ARC SINE	ASIN	ASIN	**		Expansion ->463	3 (None)->2		
ARC COSINE	ACOS	ACOS	**		Expansion ->464	3 (None)->2		
ARC TANGENT	ATAN	ATAN	**		Expansion ->465	3 (None)->2		
SQUARE ROOT	SQRT	SQRT	**		Expansion ->466	3 (None)->2		
EXPONENT	EXP	EXP	**		Expansion ->467	3 (None)->2		
LOGARITHM	LOG	LOG	**		Expansion ->468	3 (None)->2		
<b>Table data processing instructions</b>								
DATA SEARCH	SRCH	SRCH	*		Expansion ->181		Number of words set in words: BCD -> BIN	Output selection to enable or disable the Outputs number of matches.
FIND MAXIMUM	MAX	MAX	*		Expansion ->182		Number of words in range: BCD -> BIN, Settings 12 bits -> 15 bits	Operand1: 1 word -> 2 words Comparison data, result word: C+1 -> Control data: 1word -> 2 word Output address: D+1 -> IR00
FIND MINIMUM	MIN	MIN	*		Expansion ->183		Number of words in range: BCD -> BIN, Settings 12 bits -> 15 bits	Select signed or unsigned/Outputs address to IR or not.
SUM	SUM	SUM	*		Expansion ->184		table length: BCD -> BIN, Settings 12 bits -> 15 bits	Select signed or unsigned/Outputs address to IR or not.
FCS CALCULATE	FCS	FCS	*		Expansion ->180		table length: BCD -> BIN, Settings 12 bits -> 15 bits	Set the Starting byte/Units/Data type/signed or not in C+1. Set the Starting byte/Units in C+1.
<b>Data control instructions</b>								
PID CONTROL	PID	PID	*		Expansion ->190		Set value: BCD -> BIN	Output selection to enable or disable the Outputs number of matches.
SCALING	SCL	SCL	*		66->194			PID parameter area: 33ch -> 39ch Acaled value: variable accepted -> variable not accepted
SIGNED BINARY TO BCD SCALING	SCL2	SCL2	**		Expansion ->486			
BCD TO SIGNED BINARY SCALING	SCL3	SCL3	**		Expansion ->487			
AVERAGE VALUE	AVG	AVG	*		Expansion ->195		Number of cycles set in words: BCD -> BIN	Average Valid Flag: None -> Processing information D15 bit
<b>Subroutines instructions</b>								
SUBROUTINE ENTRY	SBS	SBS	**					
MACRO	MCRO	MCRO	**					Macro area input words: 96 to 99 -> A600 to A603, 196 to 199 -> A604 to A607 (No influence on the ladder program).
SUBROUTINE DEFINE	SBN	SBN	**					
SUBROUTINE RETURN	RET	RET	**					
<b>Interrupt control instructions</b>								
INTERRUPT CONTROL	INT	MSKS MSKR CLI DI EI	*	INT000->MSKS INT001->CLI INT002->MSKR INT003->MSKS/INI (CJ1M built-in input only) INT100->DI INT200->EI	89->690 89->691 89->692 89->690/880 89->693 89->694		Interrupt unit/CJ1M built-in interrupt input: newly configure the settings.	Interrupt program: interrupt subroutine -> interrupt task (Also change the number again).
INTERVAL TIMER	STIM	MSKS MSKR	(Partly "-" Instruction will not be converted if timer start/stop time is specified.	STIM003 to 005->MSKS STIM006 to 008->MSKR	69->690 69->692		Set the operands in BCD ->BIN.	Newly configure the settings again.
<b>Step instructions</b>								
STEP DEFINE	STEP	STEP	**					
STEP START	SNXT	SNXT	**					

Conversion: \* = Support software converts the instruction. / = Support software converts the instruction, but it is necessary to manually modify it. - = There is no corresponding instruction.  
Blank cells: Support software converts the instructions, though there are some difference in CQM1H/CJ1M/CJ1G and CJ2M.

Instructions	CQM1H	CJ1M/CJ1G	Conversion	Difference between CQM1H and CJ1M/CJ1G/CJ2M (CQM1H->CJ1M/CJ1G/CJ2M)			Settings	Remarks	
				Nemonic	FUN No.	Number of operand			
<b>Basic I/O Unit instructions</b>									
I/O REFRESH	IORF	IORF	**						
7-SEGMENT DECODER	SDEC	SDEC	**						
7-SEGMENT DISPLAY OUTPUT	7SEG	7SEG	*			3->4		Set the address of First destination word.	
DIGITAL SWITCH	DSW	DSW	*			3->5		Set the Number of Digits and System Word.	
TEN KEY INPUT	TKY	TKY	**						
HEXADECIMAL KEY INPUT	HKY	HKY	*			3->4		Set the first register word.	
I/O COMMAND TRANSMISSION	IOTC	-	x						
<b>Serial communications instructions</b>									
PROTOCOL MACRO	PMCR	PMCR	*		Expansion ->260	3->4	Send/Receive sequence No.: BCD -> BIN Number of send/receive words: BCD -> BIN	Set the communications port and destination unit address. Enter the send/receive sequence No in the Operand2 (C2).	Change related relay settings.
TRANSMIT	TXD	TXD	*		48->236		Number of bytes specifies in words: BCD -> BIN		Peripheral port/serial communication can not be selected for port specifier. Change related relay settings.
RECEIVE	RXD	RXD	*		47->235		Number of bytes to store specified in words: BCD -> BIN		Peripheral port/serial communication can not be selected for port specifier. Change related relay settings.
CHANGE SERIAL PORT SETUP	STUP	STUP	*		Expansion ->237	3->2		Port specification method is changed.	Settings after turning off/on power: stored -> reset change the related relay settings.
<b>Network instructions</b>									
NETWORK SEND	SEND	SEND	*					Set the control data again.	Control data: 4 words -> 5 words Change related relays.
NETWORK RECEIVE	RECV	RECV	*					Set the control data again.	Control data: 4 words -> 5 words Change related relays.
DELIVER COMMAND	CMND	CMND	*		Expansion ->490			Set the control data again.	Control data: 5 words -> 6 words Change related relays.
<b>Display instructions</b>									
MESSAGE	MSG	MSG	*			1->2		Set the message number in the Operand1.	
<b>Clock instructions</b>									
HOURS TO SECONDS	SEC	SEC	**		Expansion ->65	3 (None)->2			
SECONDS TO HOURS	HMS	HMS	**		Expansion ->66	3 (None)->2			
<b>Debugging instructions</b>									
TRACE MEMORY SAMPLE	TRSM	TRSM	**						Change related relays.
<b>Failure diagnosis instructions</b>									
FAILURE ALARM AND RESET	FAL	FAL	*			1->2		In Operand, enter FAL00: Clears the non-fatal error with the corresponding FAL number. Not FAL00: Word to send message or Error code to generate or word containing the error details	
SEVERE FAILURE ALARM	FALS	FALS	*			1->2		In Operand2, set First message word or error code and error details	
FAILURE POINT DETECT	FPD	FPD	*				Monitoring time specified in words: BCD ->BIN	Configure the operands again if diagnostic output mode is set in Bit address and message output.	Output area: When output in codes = 2 words -> 4 words When output in character = 9 words -> 10 words
<b>Other instructions</b>									
SET CARRY	STC	STC	**						
CLEAR CARRY	CLC	CLC	**						
<b>High-speed counter/pulse output instructions</b>									
MODE CONTROL	INI	INI	*		61->880		First word with new PV: BCD ->BIN	Refer to 5.1 High-speed counter/pulse output instruction.	
HIGH-SPEED COUNTER PV READ	PRV	PRV	*		62->881		PV output in BCD -> BIN.	Refer to 5.1 High-speed counter/pulse output instruction.	Configure the reference position of status data.
COMPARISON TABLE LOAD	CTBL	CTBL	*		63->883		Number of target values/target value/Interrupt task number: BCD -> BIN	Refer to 5.1 High-speed counter/pulse output instruction.	In Ring mode, enter the ring value in the PLC settings. Interrupt program: interrupt subroutine -> interrupt task (Also change the task No.).
SET PULSES	PULS	PULS	*		65->886		Number of pulses: BCD -> BIN	Refer to 5.1 High-speed counter/pulse output instruction.	
SPEED OUTPUT	SPED	SPED	*		64->885		Target frequency specified in words: BCD -> BIN	Refer to 5.1 High-speed counter/pulse output instruction.	
ACCELERATION CONTROL	ACC	ACC	*		Expansion ->888		Acceleration/deceleration rate/target frequency: BCD -> BIN	Refer to 5.1 High-speed counter/pulse output instruction.	
PULSE OUTPUT	PLS2	PLS2	*		Expansion ->887	3->4	Acceleration/deceleration rate/target frequency/number of output pulses: BCD -> BIN	Refer to 5.1 High-speed counter/pulse output instruction.	
PULSE WITH VARIABLE DUTY FACTOR	PWM	PWM	*		Expansion ->891		Duty factor specified in words: BCD ->BIN	Refer to 5.1 High-speed counter/pulse output instruction.	

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 Condition flags: Left of "/" = Operation of CQM1H. Right of "/" = Operation of CJ1M/CJ1G/CJ2M No "/" = Same operation in CQM1H and CJ  
 \* = ON/OFF depending on the instruction status

Instructions	CQM1H	CJ1M/CJ1G /CJ2M	Conversion	Condition flags ( (CJ) = CQM1H does not have this settings.)									
				ER	GT(>)	GE (CJ)	EQ(=)	NE (CJ)	LT(<)	LE(CJ)	CY	UF	OF
Sequence input instructions													
LOAD	LD	LD	***										
LOAD NOT	LD NOT	LD NOT	***										
AND	AND	AND	***										
AND NOT	AND NOT	AND NOT	***										
OR	OR	OR	***										
OR NOT	OR NOT	OR NOT	***										
AND LOAD	AND LD	AND LD	***										
OR LOAD	OR LD	OR LD	***										
Sequence output instructions													
OUTPUT	OUT	OUT	***										
OUTPUT NOT	OUT NOT	OUT NOT	***										
TR Bits	TR	TR	***										
KEEP	KEEP	KEEP	***										
DIFFERENTIATE UP	DIFU	DIFU	***										
DIFFERENTIATE DOWN	DIFD	DIFD	***										
SET	SET	SET	***										
RSET	RSET	RSET	***										
Sequence control instructions													
END	END	END	-	OFF/	OFF/		OFF/			OFF/	OFF/	OFF/	
NO OPERATION	NOP	NOP	***										
INTERLOCK	IL	IL	***										
INTERLOCK CLEAR	ILC	ILC	***										
JUMP	JMP	JMP	-	/*									
JUMP END	JME	JME	***										
Timer and counter instructions													
TIMER	TIM	TIM	***	*									
HIGH-SPEED TIMER	TIMH	TIMH	***	*									
TOTALIZING TIMER	TTIM	TTIM	***	*									
COUNTER	CNT	CNT	***	*									
REVERSIBLE COUNTER	CNTR	CNTR	***	*									
Comparison instructions													
COMPARE	CMP	CMP	**	*	*	/*	*	/*	*	/*			
DOUBLE COMPARE	CMPL	CMPL	**	*	*	/*	*	/*	*	/*			
SIGNED BINARY COMPARE	CPS	CPS	**	*	*	/*	*	/*	*	/*			
DOUBLE SIGNED BINARY COMPARE	CPSL	CPSL	**	*	*	/*	*	/*	*	/*			
MULTI-WORD COMPARE	MCMP	MCMP	***	*			*						
TABLE COMPARE	TCMP	TCMP	**	*/OFF			*						
BLOCK COMPARE	BCMP	BCMP	**	*			/*						
AREA RANGE COMPARE	ZCP	ZCP	***	*	*		*			*			
DOUBLE AREA RANGE COMPARE	ZCPL	ZCPL	***	*	*		*			*			
Data movement instructions													
MOVE	MOV	MOV	**	*			*						/*
MOVE NOT	MVN	MVN	**	*			*						/*
MOVE BIT	MOVB	MOVB	***	*									
		MOVBC	***	*									
		[Ver.3.0 or later]											
MOVE DIGIT	MOVD	MOVD	***	*									
TRANSFER BITS	XFRB	XFRB	-	*/OFF									
BLOCK TRANSFER	XFER	XFER	-	*/OFF									
		XFERC	***	*									
		[Ver.3.0 or later]											
BLOCK SET	BSET	BSET	***	*									
DATA EXCHANGE	XCHG	XCHG	-	*/									
SINGLE WORD DISTRIBUTE	DIST	DIST	**	*/OFF			*						/*
		DISTC	**	*			*						/*
		[Ver.3.0 or later]											
DATA COLLECT	COLL	COLL	**	*/OFF			*						/*
		COLLC	**	*			*						/*
		[Ver.3.0 or later]											
Data shift instructions													
SHIFT REGISTER	SFT	SFT	-	/*									
REVERSIBLE SHIFT REGISTER	SFTR	SFTR	***	*							*		
ASYNCHRONOUS SHIFT REGISTER	ASFT	ASFT	***	*									
WORD SHIFT	WSFT	WSFT	***	*									
ARITHMETIC SHIFT LEFT	ASL	ASL	**	*/OFF			*			*			/*
ARITHMETIC SHIFT RIGHT	ASR	ASR	**	*/OFF			*			*			*/OFF
ROTATE LEFT	ROL	ROL	**	*/OFF			*			*			/*
ROTATE RIGHT	ROR	ROR	**	*/OFF			*			*			/*
ONE DIGIT SHIFT LEFT	SLD	SLD	***	*									
ONE DIGIT SHIFT RIGHT	SRD	SRD	***	*									
Increment/ decrement instructions													
INCREMENT	INC	++B	**	*			*				/*		
BCD DECREMENT	DEC	--B	**	*			*				/*		

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 \* = ON/OFF depending on the instruction status

Instructions	CQM1H	CJ1M/CJ1G /CJ2M	Conversion	Condition flags ( (CJ) = CQM1H does not have this settings.)										
				ER	GT(>)	GE (CJ)	EQ(=)	NE (CJ)	LT(<)	LE(CJ)	CY	UF	OF	N (CJ)
Symbol math instructions														
BINARY ADD	ADB	+C	**	*/OFF				*				*	*	/*
DOUBLE BINARY ADD	ADBL	+CL	**	*/OFF				*				*	*	/*
BCD ADD	ADD	+BC	***	*				*				*		
DOUBLE BCD ADD	ADDL	+BCL	***	*				*				*		
BINARY SUBTRACT	SBB	-C	**	*/OFF				*				*	*	/*
DOUBLE BINARY SUBTRACT	SBBL	-CL	**	*/OFF				*				*	*	/*
BCD SUBTRACT	SUB	-BC	***	*				*				*		
DOUBLE BCD SUBTRACT	SUBL	-BCL	***	*				*				*		
SIGNED BINARY MULTIPLY	MBS	*	**	*/OFF				*						/*
DOUBLE SIGNED BINARY MULTIPLY	MBSL	*L	**	*/OFF				*						/*
BINARY MULTIPLY	MLB	*U	**	*/OFF				*						/*
BCD MULTIPLY	MUL	*B	***	*				*						
DOUBLE BCD MULTIPLY	MULL	*BL	***	*				*						
SIGNED BINARY DIVIDE	DBS	/	**	*				*						/*
DOUBLE SIGNED BINARY DIVIDE	DBSL	/L	**	*				*						/*
BINARY DIVIDE	DVB	/U	**	*				*						/*
BCD DIVIDE	DIV	/B	***	*				*						
DOUBLE BCD DIVIDE	DIVL	/BL	***	*				*						
Conversion instructions														
BCD-TO-BINARY	BIN	BIN	**	*				*						*/OFF
DOUBLE BCD-TO-DOUBLE BINARY	BINL	BINL	**	*				*						*/OFF
BINARY TO BCD	BCD	BCD	***	*				*						
DOUBLE BINARY-TO-DOUBLE BCD	BCDL	BCDL	***	*				*						
2'S COMPLEMENT	NEG	NEG	**	*/OFF				*				*/		/*
DOUBLE 2'S COMPLEMENT	NEGL	NEGL	**	*/OFF				*				*/		/*
4-TO-16 DECODER	MLPX	MLPX	***	*				*						
16-TO-4 ENCODER	DMPX	DMPX	***	*				*						
ASCII CONVERT	ASC	ASC	***	*				*						
ASCII-TO-HEXADECIMAL	HEX	HEX	***	*				*						
LINE	LINE	LINE	***	*				*						
LINE TO COLUMN	COLM	COLM	***	*				*						
Logic instructions														
LOGICAL AND	ANDW	ANDW	**	*/OFF				*						/*
LOGICAL OR	ORW	ORW	**	*/OFF				*						/*
EXCLUSIVE OR	XORW	XORW	**	*/OFF				*						/*
EXCLUSIVE NOR	XNRW	XNRW	**	*/OFF				*						/*
COMPLEMENT	COM	COM	**	*/OFF				*						/*
Special math instructions														
BSQUARE ROOT	ROOT	ROOT	***	*				*						
ARITHMETIC PROCESS	APR	APR	**	*				*						/*
BIT COUNTER	BCNT	BCNT	***	*				*						
		BCNTC	***	*				*						
		[Ver.3.0 or later]												
Floating point math instructions														
FLOATING TO 16-BIT	FIX	FIX	**	*				*						/*
FLOATING TO 32-BIT	FIXL	FIXL	**	*				*						/*
16-BIT TO FLOATING	FLT	FLT	**	*/				*						/*
32-BIT TO FLOATING	FTL	FTL	**	*/				*						/*
FLOATING-POINT ADD	+F	+F	**	*				*				*	*	/*
FLOATING-POINT SUBTRACT	-F	-F	**	*				*				*	*	/*
FLOATING-POINT MULTIPLY	*F	*F	**	*				*				*	*	/*
FLOATING-POINT DIVIDE	/F	/F	**	*				*				*	*	/*
DEGREES TO RADIANS	RAD	RAD	**	*				*				*	*	/*
RADIANS TO DEGREES	DEG	DEG	**	*				*				*	*	/*
SINE	SIN	SIN	**	*				*				OFF/	OFF/	/*
COSINE	COS	COS	**	*				*				OFF/	OFF/	/*
TANGENT	TAN	TAN	**	*				*				OFF/	***	/*
ARC SINE	ASIN	ASIN	**	*				*				OFF/	OFF/	/*
ARC COSINE	ACOS	ACOS	**	*				*				OFF/	OFF/	/*
ARC TANGENT	ATAN	ATAN	**	*				*				OFF/	OFF/	/*
SQUARE ROOT	SQRT	SQRT	**	*				*				OFF/	*	/*
EXPONENT	EXP	EXP	***	*				*				*	*	/*
LOGARITHM	LOG	LOG	**	*				*				OFF/	*	/*
Table data processing instructions														
DATA SEARCH	SRCH	SRCH	***	*				*						
FIND MAXIMUM	MAX	MAX	**	*				*						/*
FIND MINIMUM	MIN	MIN	**	*				*						/*
SUM	SUM	SUM	**	*				*						/*
FCS CALCULATE	FCS	FCS	***	*				*						
Data control instructions														
PID CONTROL	PID	PID	**	*		/*				/*		*		
SCALING	SCL	SCL	***	*				*						
SIGNED BINARY TO BCD SCALING	SCL2	SCL2	***	*				*				*		
BCD TO SIGNED BINARY SCALING	SCL3	SCL3	***	*				*						/*
AVERAGE VALUE	AVG	AVG	***	*				*						
Subroutines instructions														
SUBROUTINE ENTRY	SBS	SBS	***	*				*						
MACRO	MCRO	MCRO	***	*				*						
SUBROUTINE DEFINE	SBN	SBN	***	*				*						
SUBROUTINE RETURN	RET	RET	***	*				*						

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 Condition flags: Left of "/" = Operation of CQM1H. Right of "/" = Operation of CJ1M/CJ1G/CJ2M No "/" = Same operation in CQM1H and CJ  
 \* = ON/OFF depending on the instruction status

Instructions	CQM1H	CJ1M/CJ1G /CJ2M	Conversion	Condition flags ( (CJ) = CQM1H does not have this settings.)										
				ER	GT(>)	GE (CJ)	EQ(=)	NE (CJ)	LT(<)	LE(CJ)	CY	UF	OF	N (CJ)
Interrupt control instructions														
INTERRUPT CONTROL	INT	MSKS MSKR CLI DI EI	None	*										
INTERVAL TIMER	STIM	MSKS MSKR	None	*										
Step instructions														
STEP DEFINE	STEP	STEP	-	/*										
STEP START	SNXT	SNXT	-	/*										
Basic I/O Unit instructions														
I/O REFRESH	IORF	IORF	-	/*										
7-SEGMENT DECODER	SDEC	SDEC	***	*										
7-SEGMENT DISPLAY OUTPUT	7SEG	7SEG [Ver.2.0 or later]	-	*/										
DIGITAL SWITCH	DSW	DSW [Ver.2.0 or later]	-	*/										
TEN KEY INPUT	TKY	TKY [Ver.2.0 or later]	-	*/										
HEXADECIMAL KEY INPUT	HKY	HKY [Ver.2.0 or later]	-	*/										
IO COMMAND TRANSMISSION	IOTC	-	None	*										
Serial communications instructions														
PROTOCOL MACRO	PMCR	PMCR	***	*										
TRANSMIT	TXD	TXD	***	*										
RECEIVE	RXD	RXD	***	*										
CHANGE SERIAL PORT SETUP	STUP	STUP	***	*										
Network instructions														
NETWORK SEND	SEND	SEND	***	*										
NETWORK RECEIVE	RECV	RECV	***	*										
DELIVER COMMAND	CMND	CMND	***	*										
Display instructions														
MESSAGE	MSG	MSG	***	*										
Clock instructions														
HOURS TO SECONDS	SEC	SEC	***	*			*							
SECONDS TO HOURS	HMS	HMS	***	*			*							
Debugging instructions														
TRACE MEMORY SAMPLE	TRSM	TRSM	***											
Failure diagnosis instructions														
FAILURE ALARM AND RESET	FAL	FAL	-	/*										
SEVERE FAILURE ALARM	FALS	FALS	-	/*								*		
FAILURE POINT DETECT	FPD	FPD	***	*										
Other instructions														
SET CARRY	STC	STC	***									ON		
CLEAR CARRY	CLC	CLC	***									OFF		
High-speed counter/pulse output instructions														
MODE CONTROL	INI	INI	***	*										
HIGH-SPEED COUNTER PV READ	PRV	PRV	***	*								ON/OFF depending on instruction operation (CJ2M only)		
COMPARISON TABLE LOAD	CTBL	CTBL	***	*										
SET PULSES	PULS	PULS	***	*										
SPEED OUTPUT	SPED	SPED	***	*										
ACCELERATION CONTROL	ACC	ACC	***	*										
PULSE OUTPUT	PLS2	PLS2	***	*										
PULSE WITH VARIABLE DUTY FACTOR	PWM	PWM	***	*										





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

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