



**How to use CIMON PLC Device Memory?**



**CIMON PLC uses 17 differently named devices.  
Each device has its own symbol and is denoted by a capital character.**

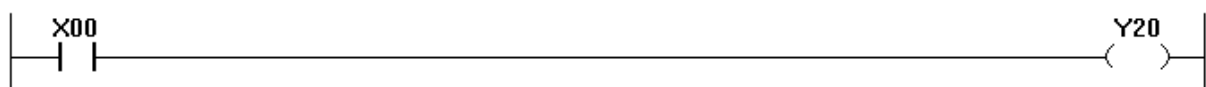
#### Memory Monitor

X Dev  
X Dev  
Y Dev  
M Dev  
L Dev  
K Dev  
F Dev  
T Dev  
C Dev  
S Dev  
D Dev  
R Dev  
T Cnt  
T Set  
C Cnt  
C Set  
Z Dev  
Q Dev

## X Device (Bit / Input)

- X device is an input contact that receives a signal from the input module.
- It accepts the signal from the input device such as a push button switch or limit switch.
- Since the input status of X device is stored inside the PLC, a user can use A and B contacts.
- If used as a word type, X device can be used according to the bit device's word usage.
- It is a read-only device that a user cannot enter a value.
- X Device Allocation for PLC modules (Input and special modules) other than CPU:
  1. PLC card occupies 16 points (1 Word).
  2. Input card with 16 points or less: occupies 16 points (1 Word).
  3. Input card with 32 points: occupies 32 points (2 Word).
  4. Special cards other than input cards occupy 16 points (1 Word).

Example)

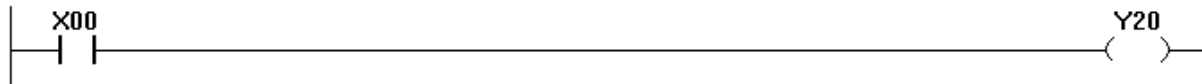


Turning on X00 device will output Y20.

## Y Device (Bit / Output)

- Y device is an output contact that delivers the operation result to output devices such as solenoid valves, motors and lamps.
- If used as a word type, Y device can be used according to the bit device's word usage.
- Y device can only use and output Contact A.
- Y Device Allocation for PLC modules (Output and special modules) other than CPU:
  1. PLC card occupies 16 points (1 Word).
  2. Output card with 16 points or less: occupies 16 points (1 Word).
  3. Output card with 32 points: occupies 32 points (2 Word).
  4. Special cards other than output cards occupy 16 points (1 Word).

Example)

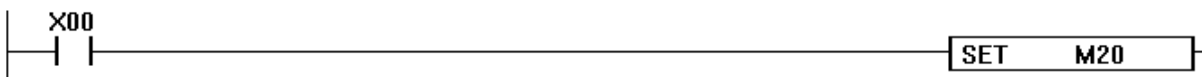


Turning on X00 device will output Y20.

## M Device (Bit / Internal Auxiliary Relay)

- M device is an internal input and output digital device that cannot output the operation result to external devices. But the output in connection with I/O contacts can be made possible.
- It can be used in applications such as intermediate data storage, virtual I/O and word data storage.
- M device can use Contact A and B.

Example)



Turning on X00 device will turn on M20. SET instruction keeps M20 ON even if X00 turns OFF.

## L Device (Bit / Link Relay)

- L device can be used as a special contact for computer link and data link modules.
- If not used as a link, L device can be used as same as M device.
- If used as a word type, L device can be used according to the bit device's word usage.

Example)

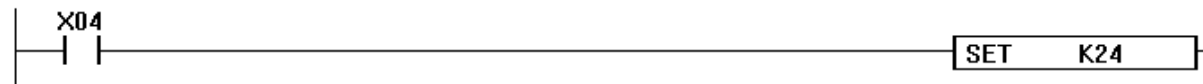


Turning on L00 device will send Frame No. 0 of the Program ID No. 1 and saves the sending result in M100 device.

## K Device (Bit / Latch Relay)

- The usage of K device is very similar to M device. But K device has additional functionality of latch.
- All data in this K device are retained even when power is OFF and CPU stops the operation.
- If used as a word type, K device can be used according to the bit device's word usage.

Example)



Turning on X04 device will turn on K24 device.

## F Device (Bit / Flag)

- F Device is used as a contact for notifying PLC status, scan status, time, date and many other flags.
- It is a read-only device that a user cannot enter a value.
- Descriptions and variables of the F device are pre-registered.

Example)



F10: Always ON Flag

F11: Always OFF Flag

F30: Major CPU Error Flag

F31: Minor CPU Error Flag

F110: CPU Calculation Error Flag

## T Device (Bit), TC (Word), TS (Word) / Timer Device

- T device is auxiliary relay for timer instructions.
- A user can configure 100 m/s or 10 m/s in the parameter's timer settings.
- T / TC / TS devices exist respectively and operate as a single unit with the same index number.
- T device is a bit device that delivers the result value of the timer instructions.
- TC device is a word device that shows the current time value of the timer instructions.
- TS device is a word device that shows the setting time value of the timer instructions.

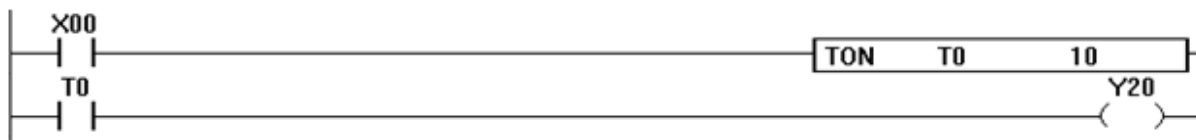
Bit data type represents timer output status in LOAD instructions and timer reset output for RST instruction. Word data types are setting and ticking values. The set value can be written only by TIMER instructions (TRM, TON, TOFF, TMON, TRIG). The tick value can be modified or verified by various word instructions such as MOV, INC, comparative instructions and so on.

Symbol character for all these devices is 'T' in sequence programming point of view. But in monitoring point of view, two more symbol characters are used. 'T' represents the output status of timer, 'TC' represents the tick counter of timer and 'TS' represents set value of timer. These two new

symbols of word are utilized in device memory monitoring window of CIMON and in communication protocols for HMI.

Device 'T' In Monitoring		
Symbols	Data Types	Descriptions
T	Bit	The status of timer output
TC	Word	The tick count of timer (0 ~ 65,535)
TS	Word	The set value of timer (0 ~ 65,535)

Example)



When X00 is ON for 1000 m/s, T0 device gets turned ON and outputs Y20.

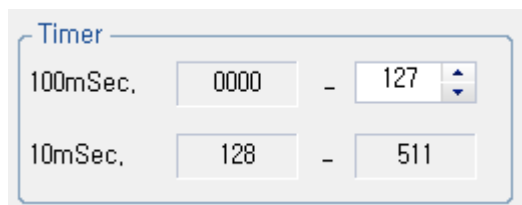
In this example, TS 0 (Timer's set value) is 10 while TC 0 is the time during which X00 is turned ON.

When TC 0 "time value" reaches TS 0 "set value", T 0 "bit device" gets turned ON.

### PLC Parameter Timer Setting

- Configures the operation unit of the timer device.

- 100 mSec: configures the range of the timer whose single unit is 100 m/s.
- 10 mSec: configures the range of the timer whose single unit is 10 m/s.



### C Device (Bit), CC (Word), CS (Word) / Counter Device

- C device is auxiliary relay for counter instructions.

- C / CC / CS devices exist respectively and operate as a single unit with the same index number.

- C device is a bit device that delivers the result value of the counter instructions.

- CC device is a word device that shows the counting value of the counter instructions.

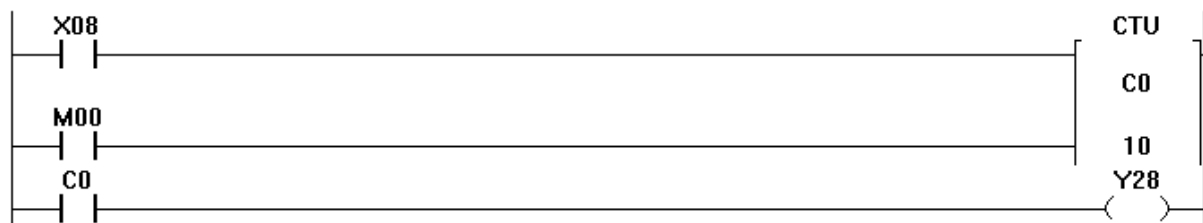
- CS device is a word device that shows the setting value of the counter instructions.

Bit data type represents counter output status in LOAD instructions. Word data types are setting and counting values. The set value can be written only by COUNTER instructions (CTU, CTD, CTUD, CTR). The count value can be modified or verified by various word instructions such as MOV, INC, comparative instructions and so on.

Symbol character for all these devices is 'C' in sequence programming point of view. But in monitoring point of view, two more symbol characters are used. 'C' represents just the output status of counter, 'CC' represents the counted value of counter and 'CS' represents set value of counter. These two new symbols of word are utilized in device memory monitoring window of CIMON and in communication protocols for HMI.

Device 'C' In Monitoring		
Symbols	Data Types	Descriptions
C	Bit	The status of counter output
CC	Word	The counting value of counter (-32,768 ~ 32,767)
CS	Word	The set value of counter (-32,768 ~ 32,767)

Example)



When X08 gets turned ON for 10 times, C0 will be turned ON and output Y28.

CS0 (Counter's set value) is 10 while CC0 is X08's counting value.

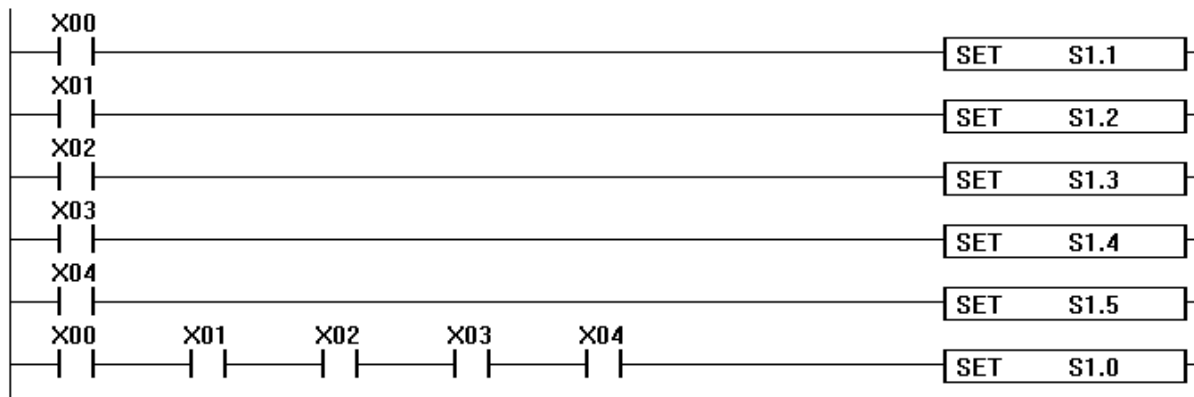
When CC0 "counting value" reaches CS0 "set value", C0 "bit device" gets turned ON.

## S Device (Step Controller)

- S device is a special purpose relay for control algorithm which proceeds step by step.
- CIMON PLC supports up to 100 cards of step controller (S00.nn ~ S99.nn).
- Each step controller has 100 differently numbered state (Sxx.00~Sxx.99).
- S device can be used with OUT or SET instruction.
- OUT instruction sets (activates) one designated state and there are no restrictions on operation.

- SET instruction also sets (activates) one designated state (assume the state number is 'n'), however, with one condition that the previous state (state number 'n-1') must be on active state in order to move on to the next step.

Example for SET instruction)



Turning on X00 will turn on S1.1.

Device X01 has to be turned on in order to activate S1.2.

While S1.2 is OFF and X04 gets on, it will NOT turn on S1.5. (S1.2, S1.3 and S1.4 have to be turned on)

When all the devices from X00 to X04 turn on, it will clear and erase all the values of Step No. 1 (S1.00 ~ S1.99).

## D Device (Word / Data Register)

- D device stores internal data either in Word or Double Word.

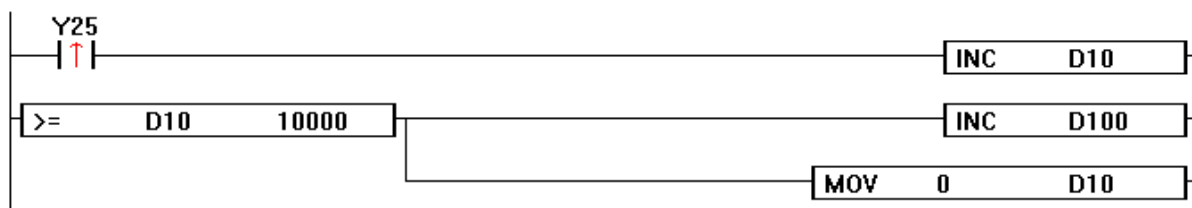
- It is used to read and write 16 bit (Word) and 32 bit (Double Word).

- For 32 Bit, specified number is the lower 16 bit whereas the number + 1 is the upper 16 bit

Ex) Using D0010 for 32 Bit, D10 is the lower 16 bit.

D11 is the upper 16 bit.

Example)

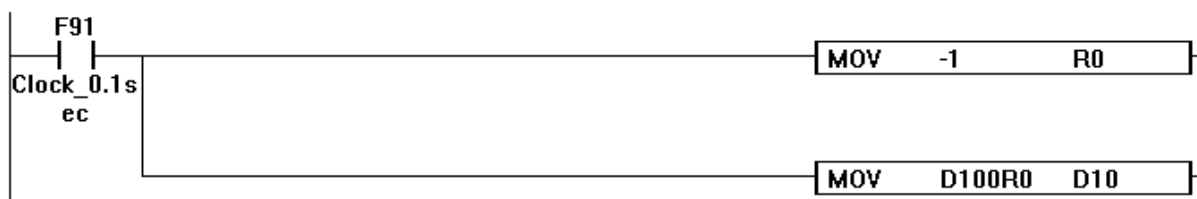


Turning on Y25 will increase the value of D10 by 1. When the value of D10 reaches 10,000, it will increase the value of 100 by 1 and clear the data of D10 as 0.

## R Device (Index Register)

- R device is used for index qualification (indirect addressing) of a device in sequence program.
- CIMON PLC CPU offers a total of 16 index registers.
- Index qualification uses one index register and is specified by 16 bit data (-32767 – 32767 or 0000h – FFFFh)
- Index registers are represented as 'R00' – 'R15.'

Example)



- 1 is stored in R0.
- D100R0 is the Index Qualification.
- Data of D100R0 (=D99) is stored in D10.

## Z Device (Word / Subroutine)

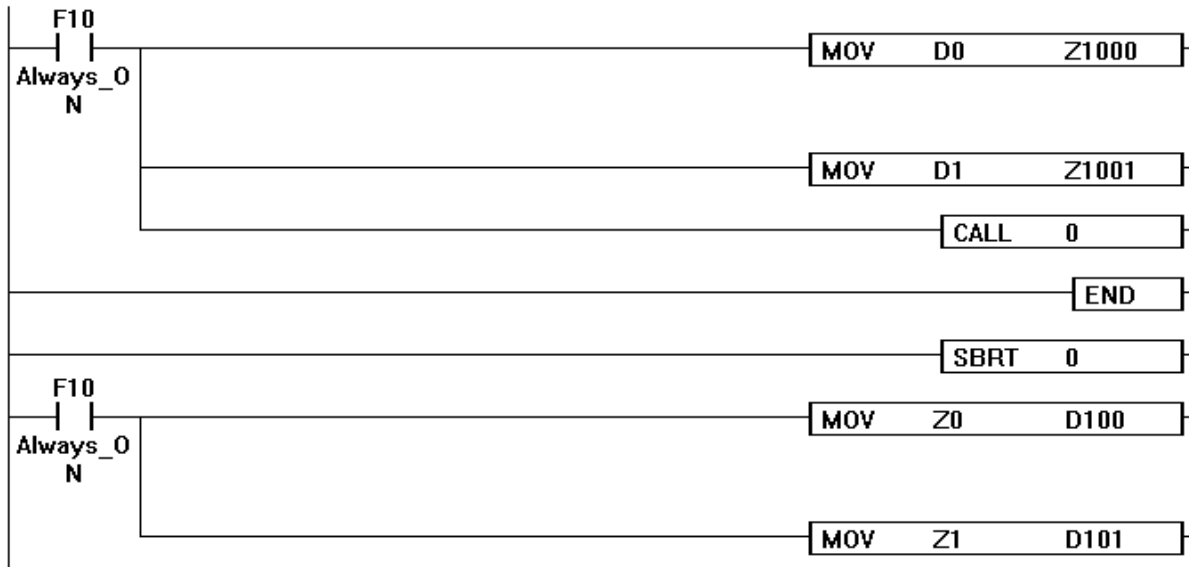
- Z device is used for exchanging data with subroutine programs.
- Every running scan program has two 64 words of Z memory area. (One for scan / one for subroutine)
- Its own memory area (parameter) can be accessed with Z1000 to Z1063.
- Subroutine's memory can be accessed with Z0000 to Z0063.

If there is some data to transfer to subroutine, just store them in 'Z1000' to 'Z1063' and next call the subroutine. Then, the called subroutine can read and process the data and store the result at the address of 'Z0000' to 'Z0063'.

At any time a sequence program can access two 64 words blocks of 'Z' memory. And the total size of physical 'Z' device is 1024 words that the reason maximum call level is restricted to 16. The relationship between physical memory and programming address of 'Z' device at different call level was explained more precisely in following drawing.



Example)



After inserting the value of D0 to Z1000 and the value of D1 to Z1001, a subroutine is called.

In the subroutine, it transfers the value of Z0 to D100 and the value of Z1 to D101 and then ends.

In other words, this is how the above scan program processes the data:

D0 → Z1000 → Subroutine jump → Z0 → D100

D1 → Z1001 → Subroutine jump → Z1 → D101

## Q Device (Bit / Sequential Function Chart)

- Q device is used only for the SFC program.
- Descriptions and variables of the Q device are pre-registered.
- Only PLCs (CM3) CPU series can utilize the Q device.
- If used as a word type, Q device can be used according to the bit device's word usage.