

## INVERTER



# E510





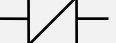
## PLC - Addendum

- Inputs
- Outputs
- Auxiliary commands
- Special registers
- Counter function
- Timer function
- Analog comparison function
- Operation control function
- Summation and subtraction function
- Multiplication and division function

## 1.0 Built-in PLC Function



The PLC ladder logic can be created and downloaded using the TECO link software.

### 1.1 Basic Command





				P			NO / NC
Inputs					I	i	I1~I6 / i1~i6
Outputs	Q	Q	Q	Q	Q	q	Q1~Q2 / q1~q2
Auxiliary command	M	M	M	M	M	m	M1~MF / m1~mF
Special registers							V1~V7
Counter function	C				C	c	C1~C8 / c1~c8
Timer function	T				T	t	T1~T8 / t1~t8
Analog comparison function	G				G	g	G1~G8 / g1~g8
Operation control function	F				F	f	F1~F8 / f1~f8
summation and subtraction function	AS						AS1~4
Multiplication and division function	MD						MD1~4

#### Description of registers

V1: Set frequency	Range: 0.1~1200.0Hz
V2: Operation frequency	Range: 0.1~1200.0Hz
V3: AI1 input value	Range: 0~1000
V4: AI2 input value	Range: 0~1000
V5: Keypad input value	Range: 0~1000
V6: Operation current	Range: 0.1~999.9A
V7: Torque value	Range: 0.1~200.0%

Command	Upper Differential	Lower Differential	Other command symbol
Differential command	D	d	
SET command			
RESET command			
P command			P

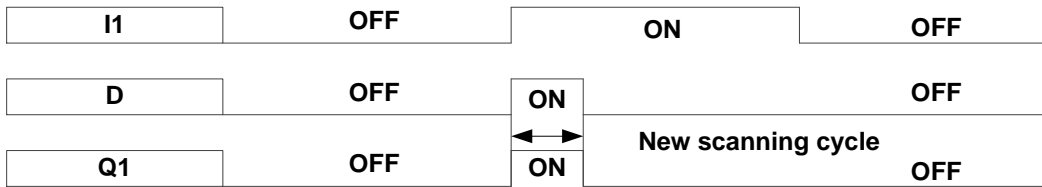
Open circuit	“ “	
Short circuit	“ _ ”	

Connection symbol	Definition
	Connect components on the left and right side
	Connects components on the left , right and top side
	Connects components on the left , right , top and bottom side
	Connects components on the left , right and bottom side

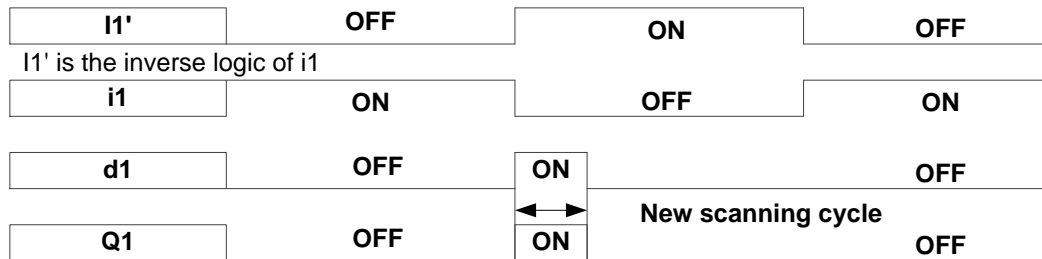
## 1.2 Basic Command Function

### © D (d) command function

Example 1: I1-D —[ Q1

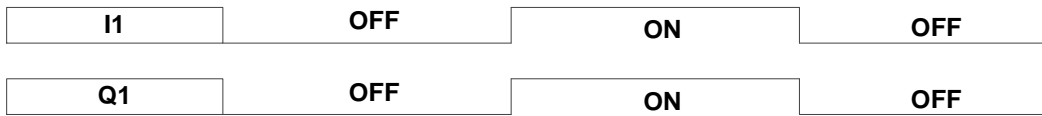


Example 2: i1-d —[ Q1



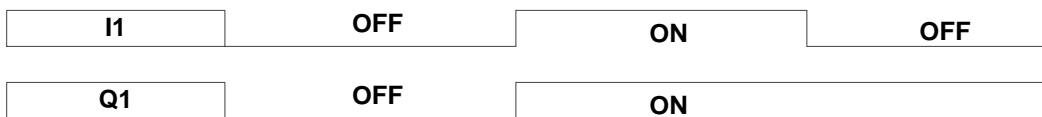
### © NORMAL ( - ) output

I1 —[ Q1



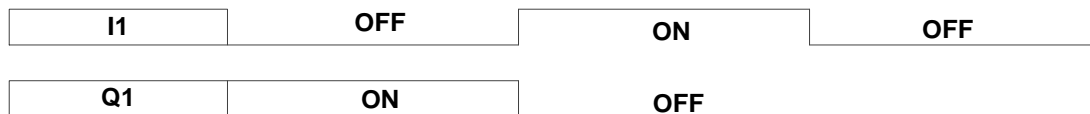
### © SET ( ^ ) output

I1 — ^ Q1



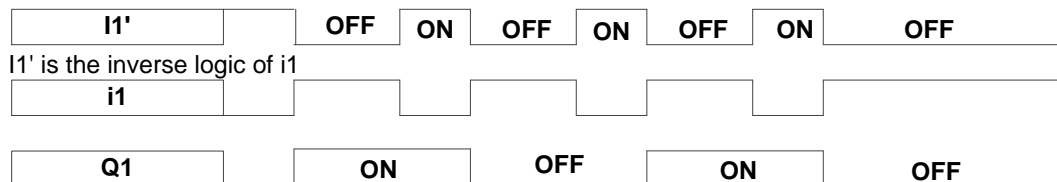
### © RESET ( v ) output

I1 — v Q1



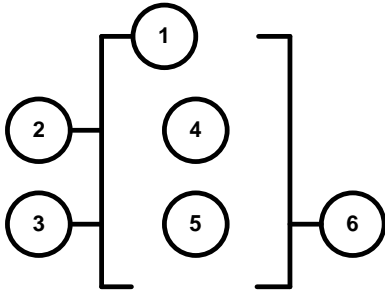
### © P output

i1 — PQ1



### 1.3 Application Functions

#### 1: Counter Function



Symbol	Description
①	Counter mode (1 ~ 4)
②	UP/Down counting modes can be set by (I1 ~ f8).
	OFF: Count up (0, 1, 2, 3...)
	ON: Count down (...3,2,1,0)
③	Use (I1~f8) to reset counting value
	ON: Internal count value is reset and counter output ⑥ is OFF
	OFF: Internal counter value retained
④	Internal counter value
⑤	Counter compare value (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7,constant)
⑥	Counter output (C1 to C8, there are a total of 8 counters)

#### Counter modes:

Mode 1: Counter value is locked to the set value. The value will not be retained when the power is cut off.

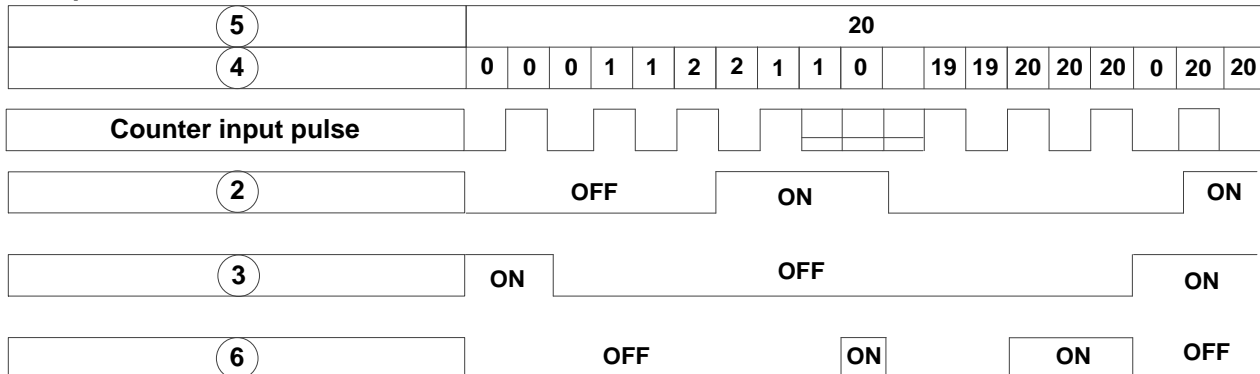
Mode 2: Counter value is not locked. The value will not be retained when the power is cut off.

Mode 3: Counter value is locked. The value will be retained when the power is cut off.

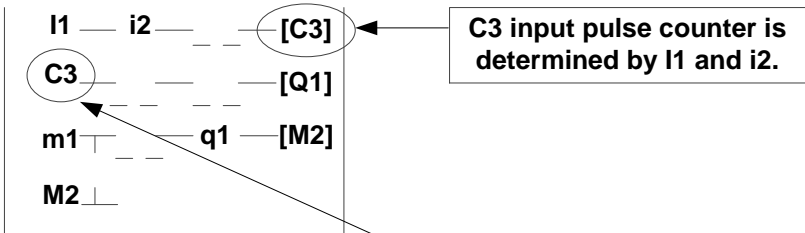
Mode 4: Counter value is not locked. The value will be retained when the power is cut off.

#### Counter mode 1

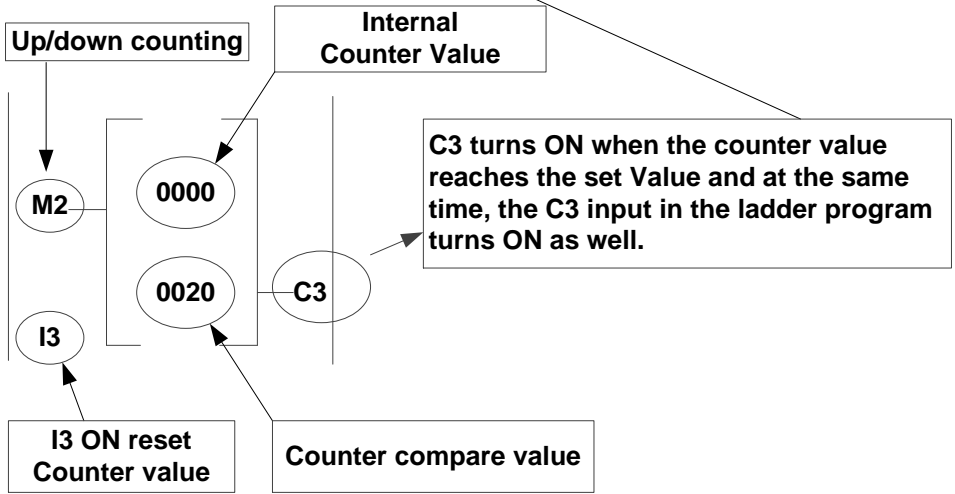
##### Example:



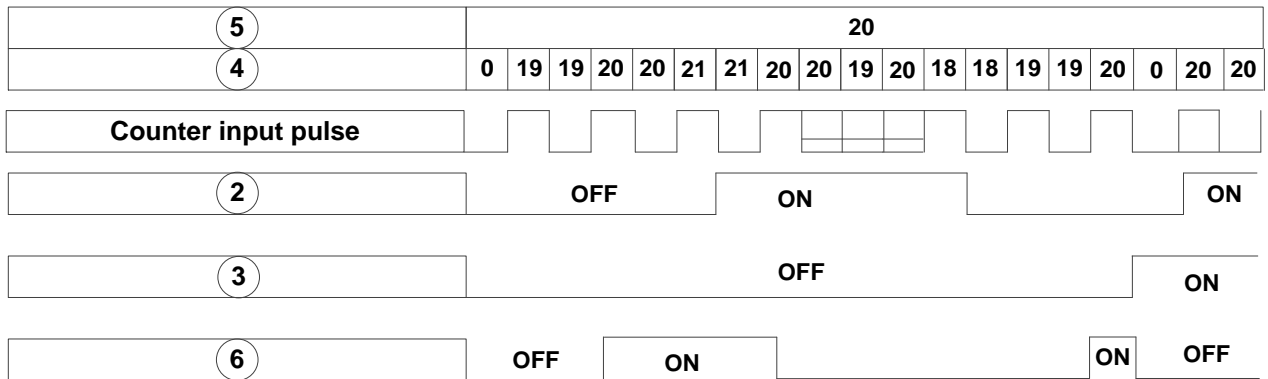
### Input from ladder program



### Input from the function program



### Counter mode 2

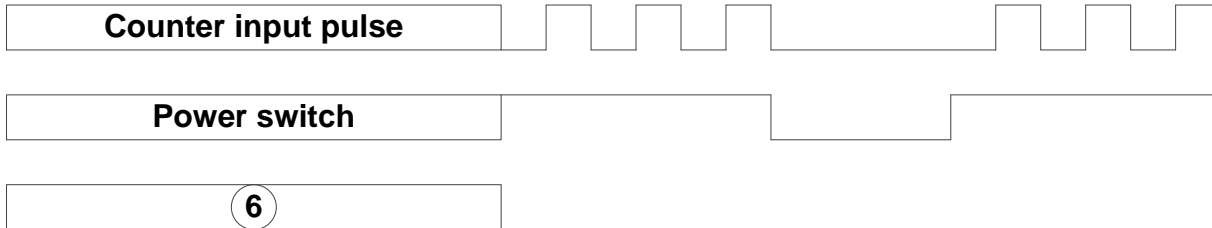


**Note:** In this mode the internal counter may increase past the counter compare value, unlike mode 1 where the internal counter value is limited to the counter compare value.

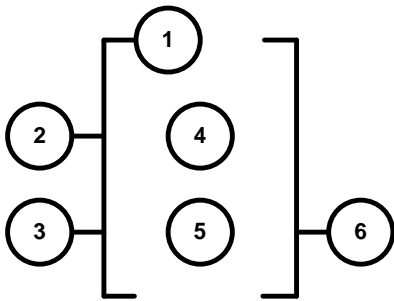
(1) Counter mode 3 is similar to the counter mode 1, with the exception that the counter value is saved when the drive is powered down and reloaded at power up.

(2) Counter mode 4 is similar to the counter mode 2, with the exception that the counter value is saved when the drive is powered down and reloaded at power up.

5		20												
4	<b>Mode 1 &amp; 2</b>	1	1	2	2					0	1	1	2	2
4	<b>Mode 3 &amp; 4</b>	1	1	2	2	3				3	4	4	5	5



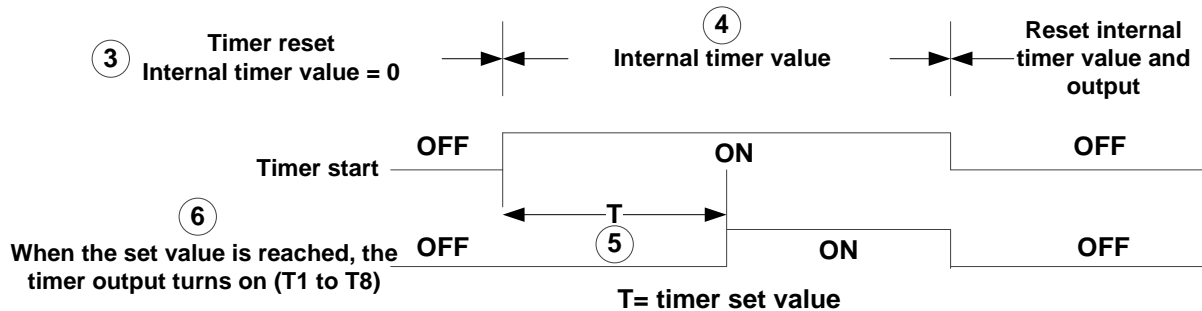
## 2: Timer Function



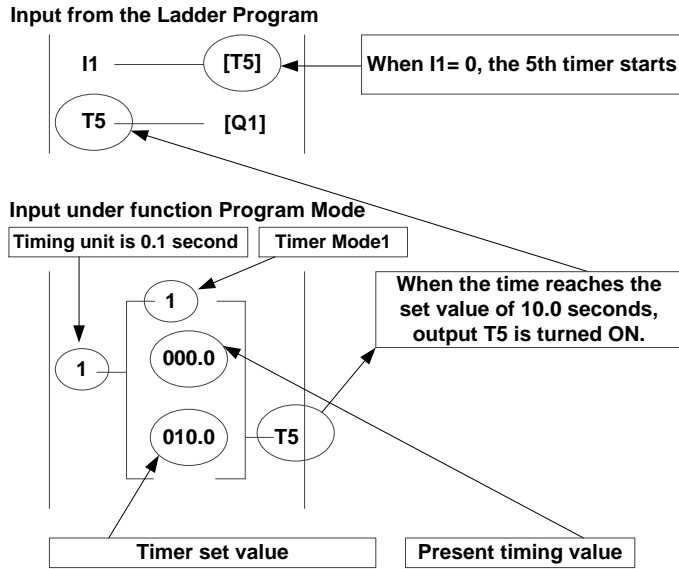
Symbol	Description
①	Timer mode (1-7)
②	Timing unit: 1:0.0~999.9 second
	2:0~9999 second
	3:0~9999 minute
③	Use (I1~f8) to reset timing value
	ON: Internal timing value is reset and timer output ⑥ is OFF
	OFF: Internal timer stays running
④	Internal timer value
⑤	Timer set value (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7,constant)
⑥	Timer output (T1 to T8, there are a total of 8 timers)

### Timer mode description:

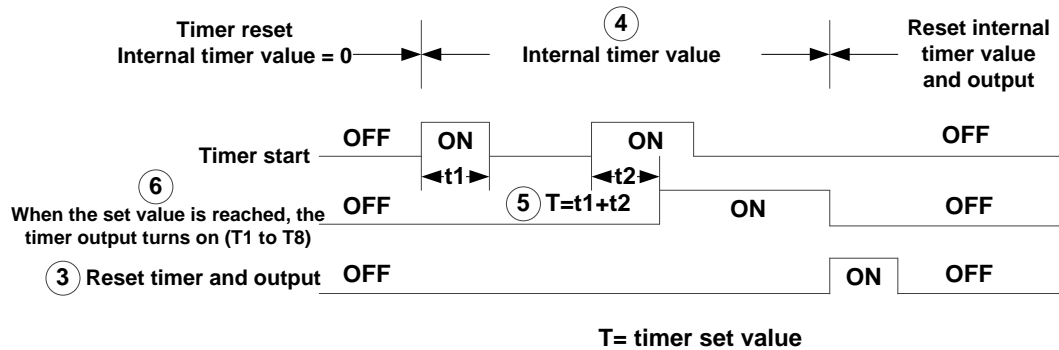
#### (1) Timer mode 1 (ON-delay Timer mode 1)



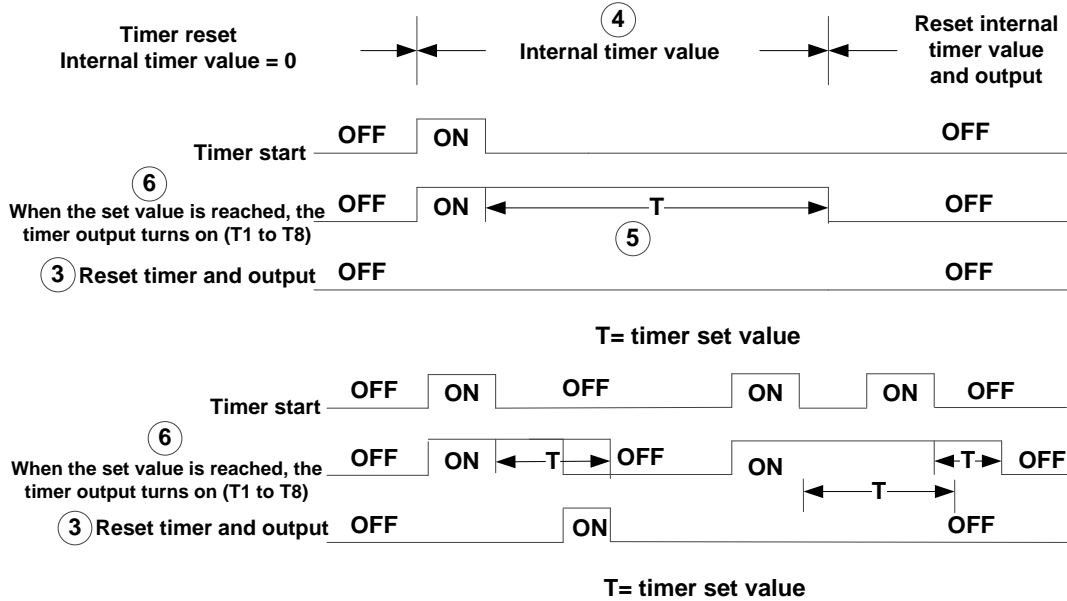
**Example:**



**(2) Timer mode 2 (ON-delay Timer mode 2)**

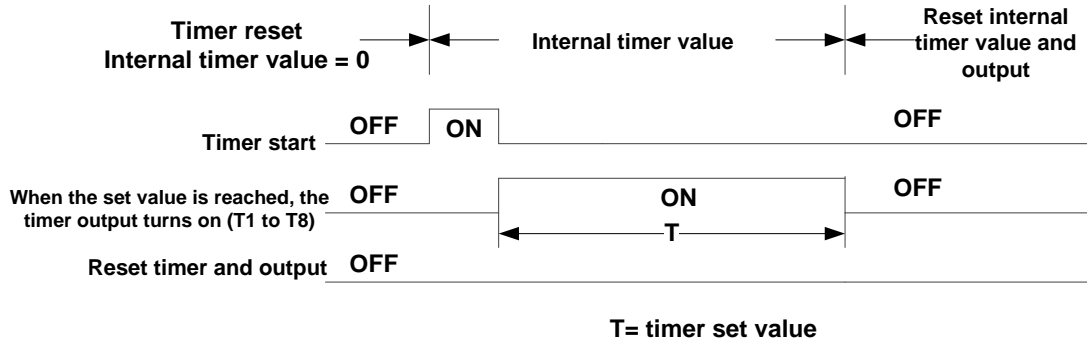


**(3) Timer mode 3 (OFF-delay Timer mode 1)**

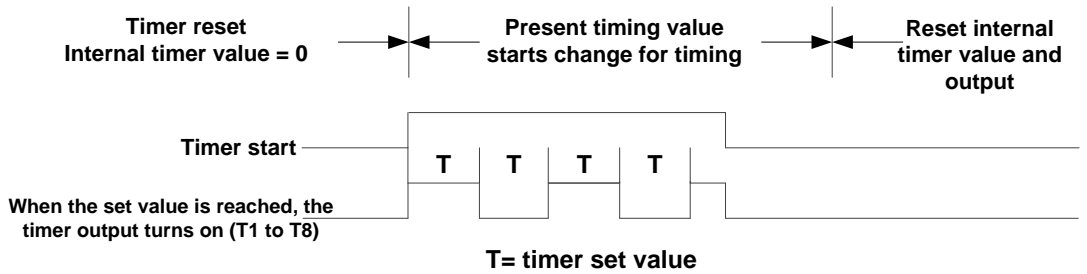




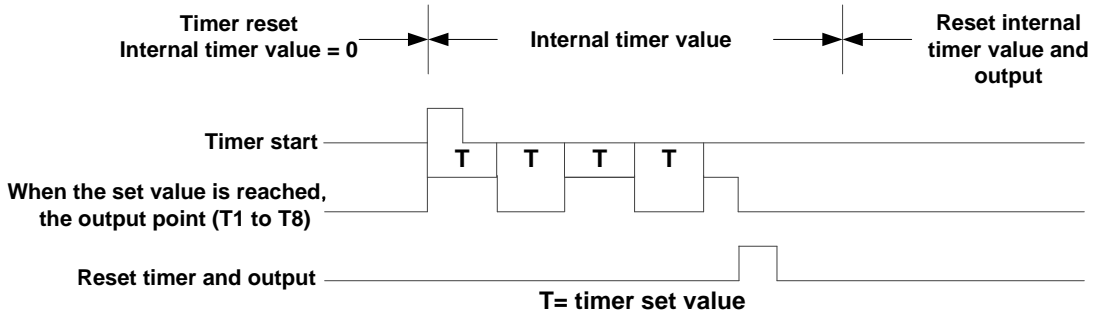
**(4) Timer mode 4 (OFF-delay Timer mode 2)**



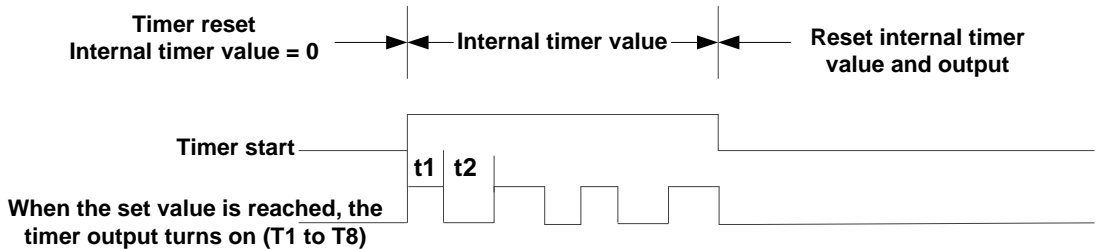
**(5) Timer mode 5 (FLASH Timer mode 1)**



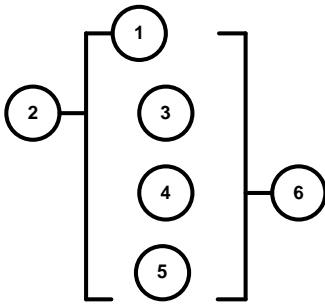
**(6) Timer mode 6 (FLASH Timer mode 2)**



**(7) Timer mode 7 (FLASH Timer mode 3)**



### 3: Analog comparator function



Symbol	Description
①	Analog comparator mode (1~3)
②	Input comparison value selection (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7)
③	Current analog input value
④	Set the reference comparison value (Upper limit) (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
⑤	Set the reference comparison value (lower limit) (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
⑥	Comparator output (G1 to G8, there are a total of 8 comparators)

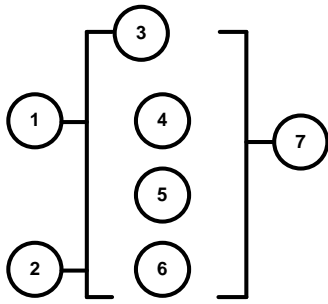
#### The description of analog comparison mode:

- (1) Analog comparison mode 1 (③ ≤ ⑤, ⑥ ON)
- (2) Analog comparison mode 2 (③ ≥ ④, ⑥ ON)
- (3) Analog comparison mode 3 (⑤ ≤ ③ ≤ ④, ⑥ ON)

#### Input comparison value selection (V1~V7)

- (1) Input comparison value selection = V1: Set frequency
- (2) Input comparison value selection = V2: Operation frequency
- (3) Input comparison value selection = V3: AI1 input value
- (4) Input comparison value selection = V4: AI2 input value
- (5) Input comparison value selection = V5: Keypad input value
- (6) Input comparison value selection = V6: Operation current
- (7) Input comparison value selection = V7: Torque value

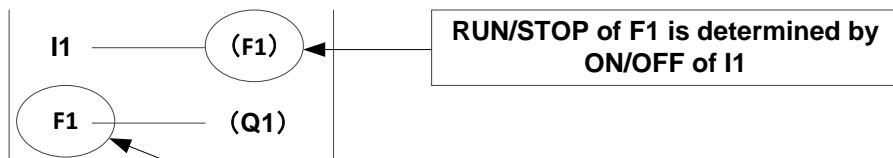
#### 4: Operation control function



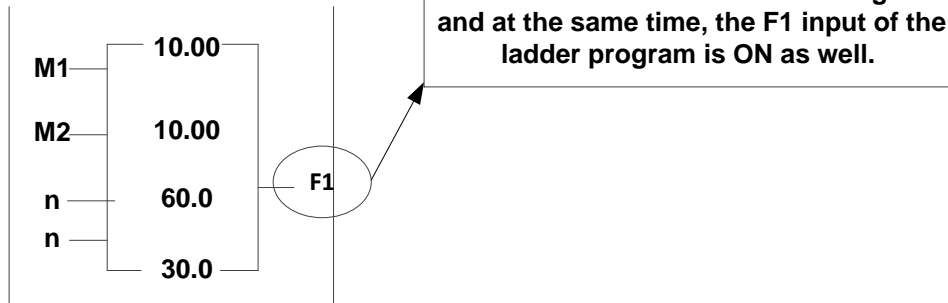
Symbol	Description
①	Forward /Reversal control can be set by ( I1~f8 ) OFF: Forward(FWD) ON: Reversal(REV)
②	Speed terminal control can be set by ( I1~f8 ) OFF: Operation based on ③ set frequency ON: Operation based on frequency of speed ④
③	Set frequency (can be constant or V3、 V4、 V5 )
④	Speed frequency (can be constant or V3、 V4、 V5)
⑤	Acceleration time (ACC Time)
⑥	Deceleration time (DEC Time)
⑦	Operation command output (F1 to F8, there are a total of 8 operation control functions)

#### Example:

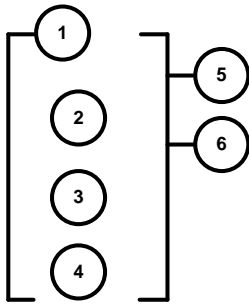
##### Input from the Ladder Program



##### Input from Function Program



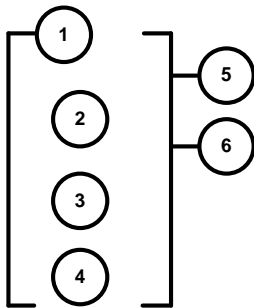
### 5: Summation and subtraction functions



RESULT (calculation result) = V1+ V2- V3

Symbol	Description
①	Calculation result : RESULT
②	Addition V1(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
③	Addition V2(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
④	Subtraction V3(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
⑤	Coil output of error signal (M1~MF)
⑥	Addition and subtraction modes number (AS1~AS4)

### 6: Multiplication and division modes



RESULT (calculation result) =V1\*V2/V3

Symbol	Description
①	Calculation result : RESULT
②	Multiplier V1(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
③	Multiplier V2(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
④	Divisor V3(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V7, constant )
⑤	Coil output of error signal (M1~MF)
⑥	Multiplication and division modes number (MD1~ MD4)

**TECO**   **Westinghouse**

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***INVERTER***

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**Ver 01: 2017.08**