TECO Westinghouse

INVERTER

F510

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

DOCUMENT - TECO-F510-AC002
Ver 02: 2020.01

1.0 Built-in PLC Function

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

1.0.1 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~V8
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：0.1~400.0Hz**
V2：Operation frequency	**Range：0.1~400.0Hz**
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%**
V8：PID Target Value	**Range：0.1~400.0Hz**

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

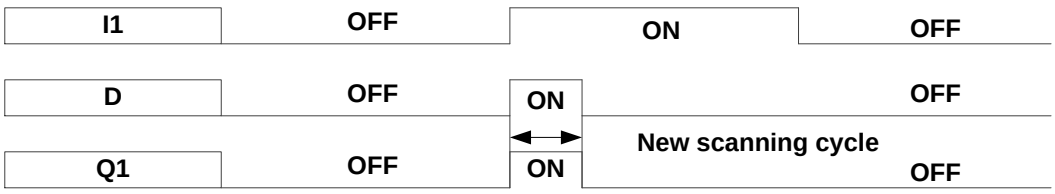
Open circuit	“ “	
Short circuit	“--”	

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

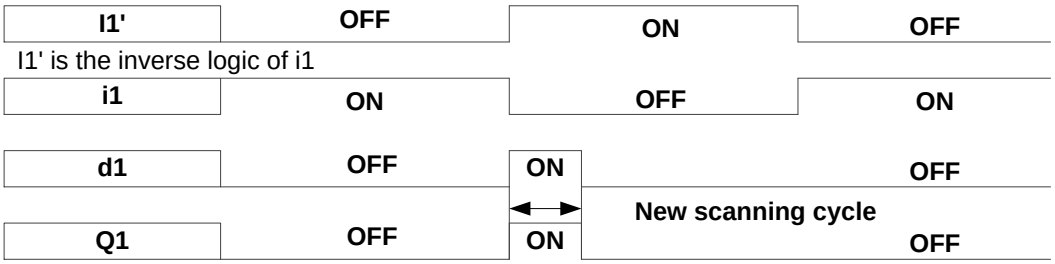
1.0.2 Basic Command Function

◎ D（d）command function

Example 1： I1—D ——[Q1

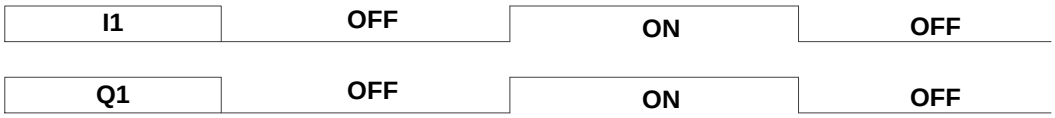


Example 2： i1—d ——[Q1



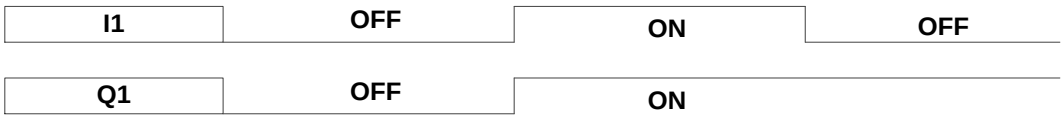
◎ NORMAL(-[ ) output

I1——[Q1



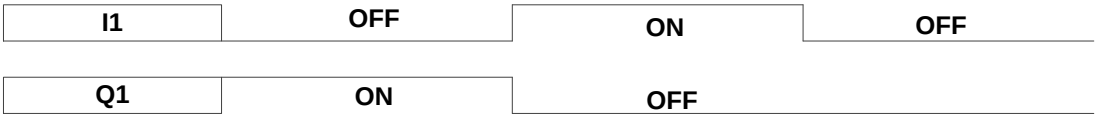
◎ SET（∧）output

I1—— ∧ Q1



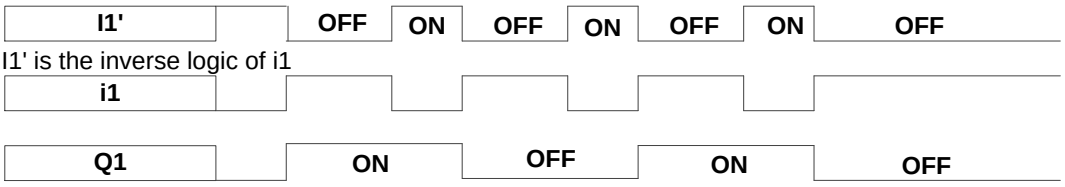
◎ RESET（∨）output

I1—— ∨ Q1



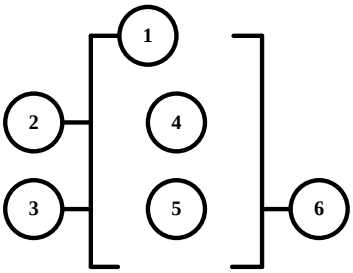
◎ P output

i1——PQ1



1.0.3 Application Functions

1: Counter Function



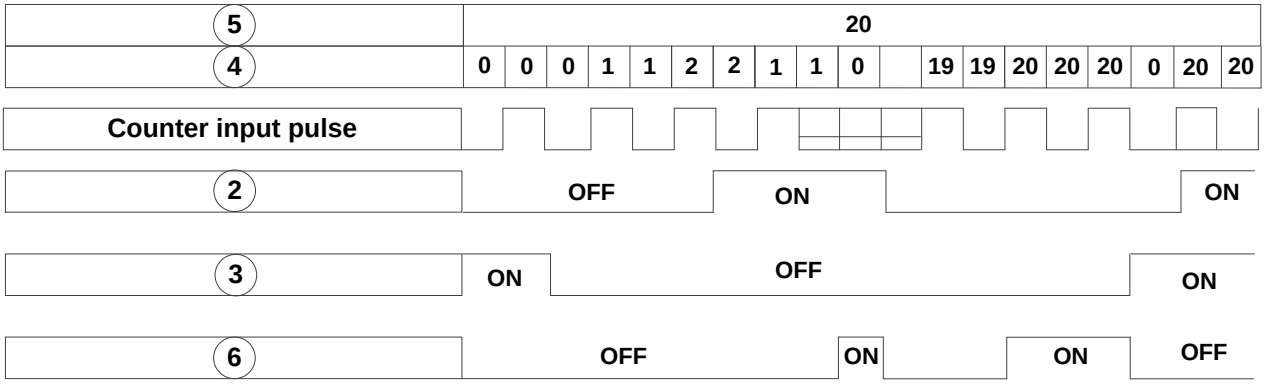
Symbol	Description
①	Counter mode (1 ~ 4)
②	UP/Down counting modes can be set by (I1 ~ f8).
	OFF: Count up (0, 1, 2, 3…)
	ON: Count down (…3,2,1,0)
③	Use (I1~f8) to reset counting value
	ON: Internal count value is reset and counter output ⑥ is OFF
	OFF: Internal counter value retained
④	Internal counter value
⑤	Counter compare value (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8,constant)
⑥	Counter output (C1 to C8, there are a total of 8 counters)

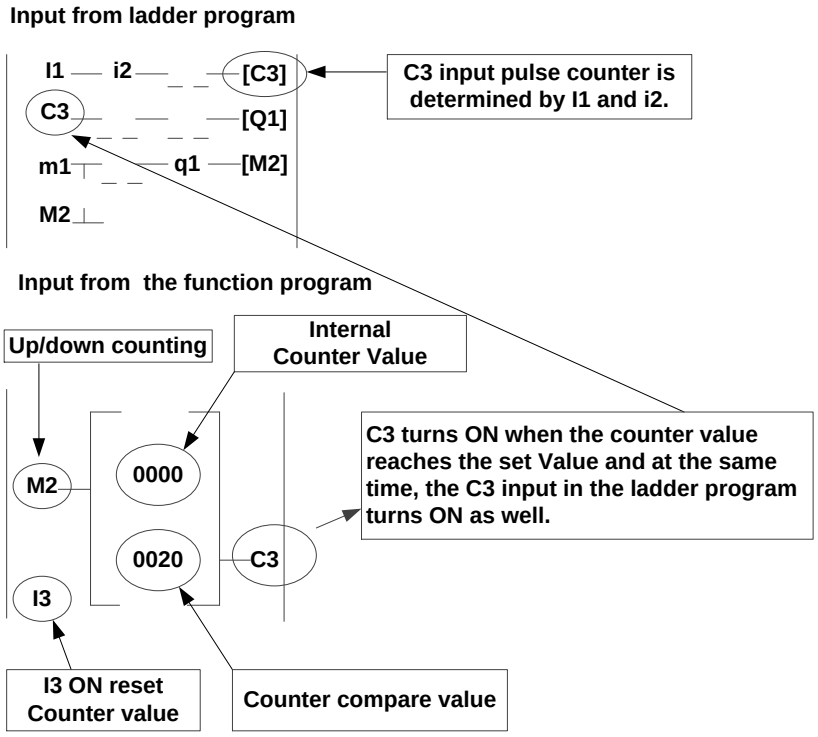
Counter modes:

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.

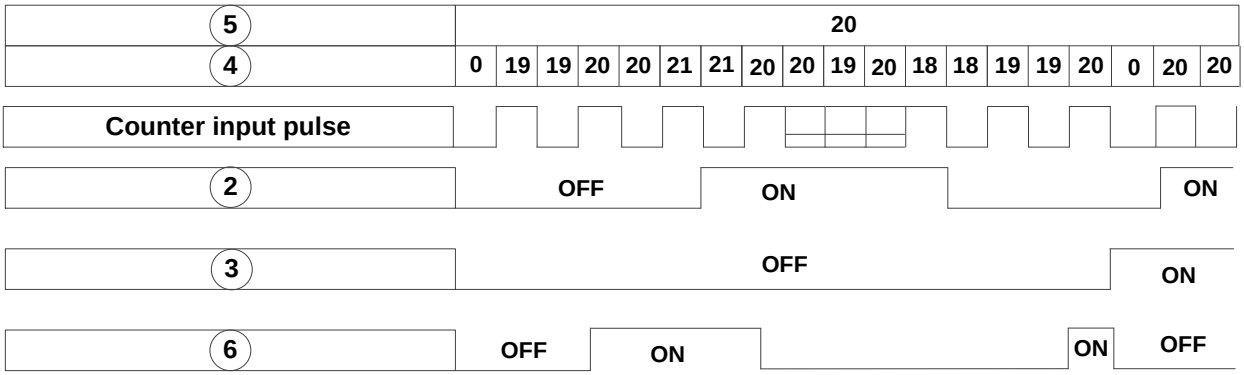
Counter mode 1

Example:





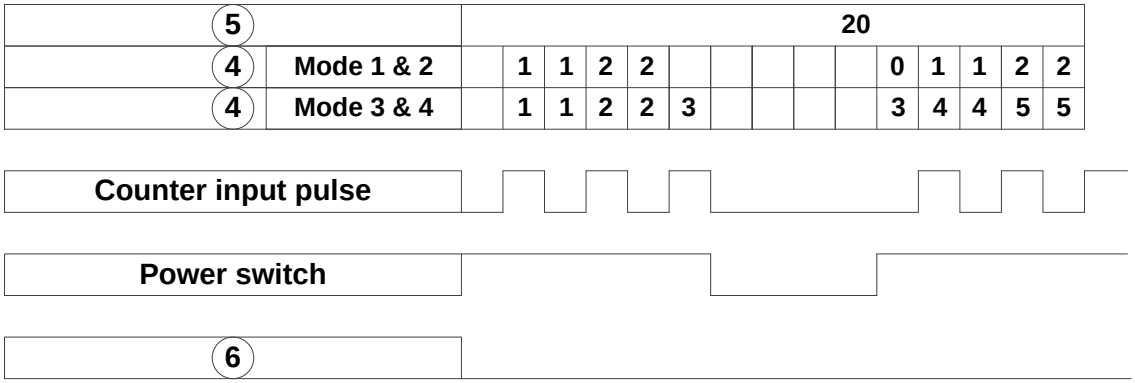
Counter mode 2



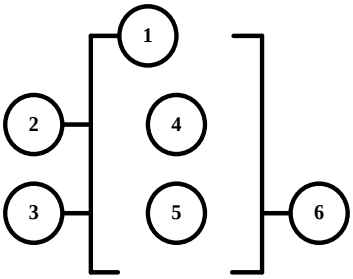
Note: In this mode the internal counter may increase past the counter compare value, unlike mode 1 where the internal counter value is limited to the counter compare value.

(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.



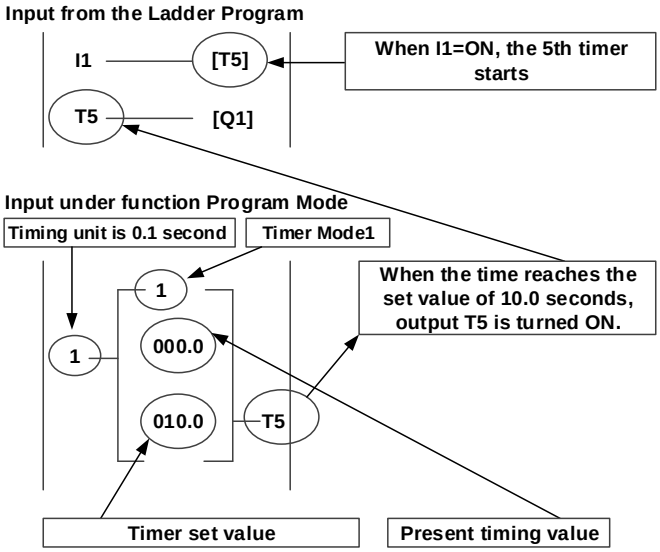
2: Timer Function



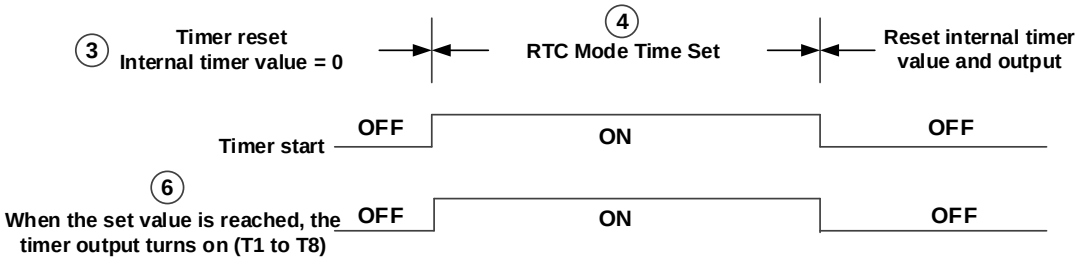
Symbol	Description
①	Timer mode (0-7)
②	Timing unit: 1:0.0~999.9 second
	2:0~9999 second
	3:0~9999 minute
③	Use (I1~f8) to reset timing value
	ON: Internal timing value is reset and timer output ⑥ is OFF
	OFF: Internal timer stays running
④	Internal timer value
⑤	Timer set value (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8,constant)
⑥	Timer output (T1 to T8, there are a total of 8 timers)

Timer mode description：

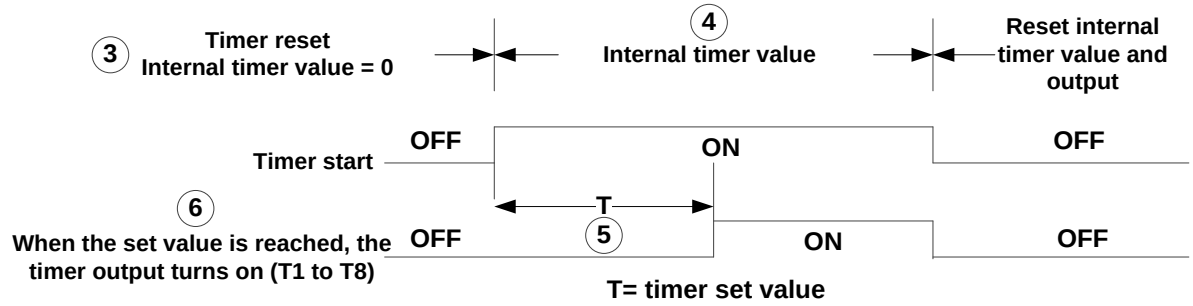
Example:



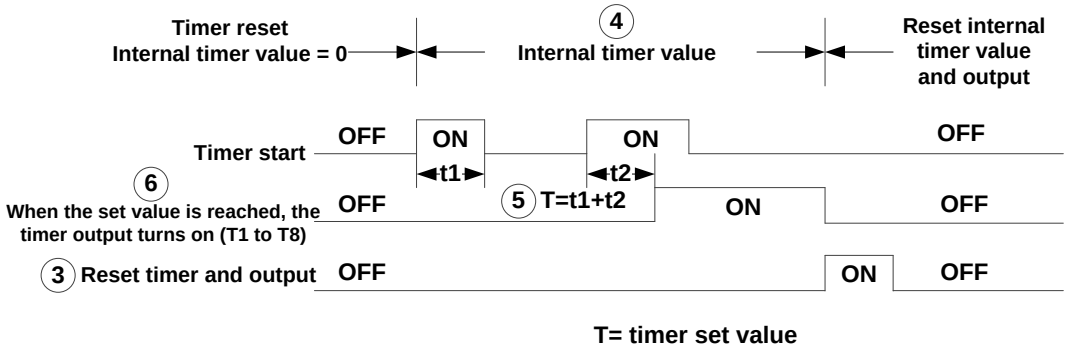
(1) Timer mode description 0 (ON-RTC Mode)



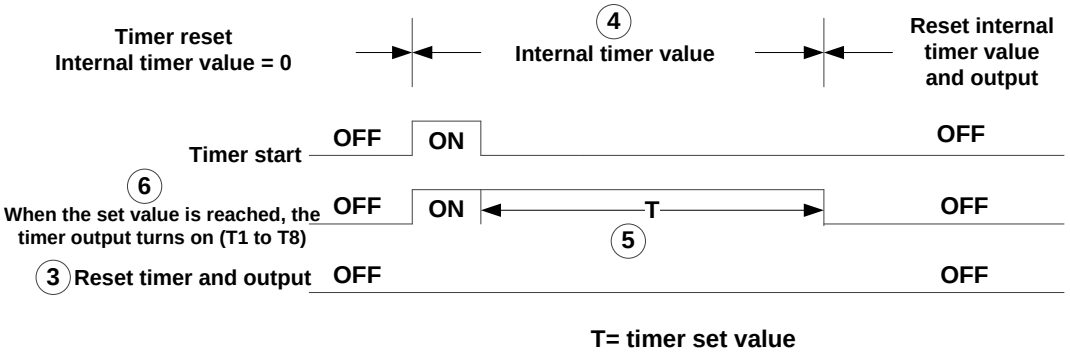
(2) Timer mode 1 (ON-delay Timer mode 1)

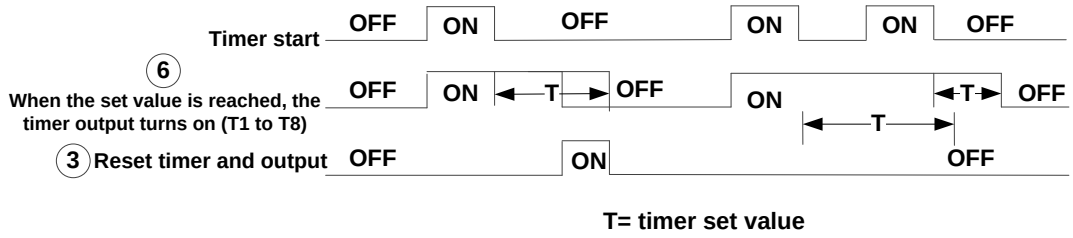


(3) Timer mode 2 (ON-delay Timer mode 2)



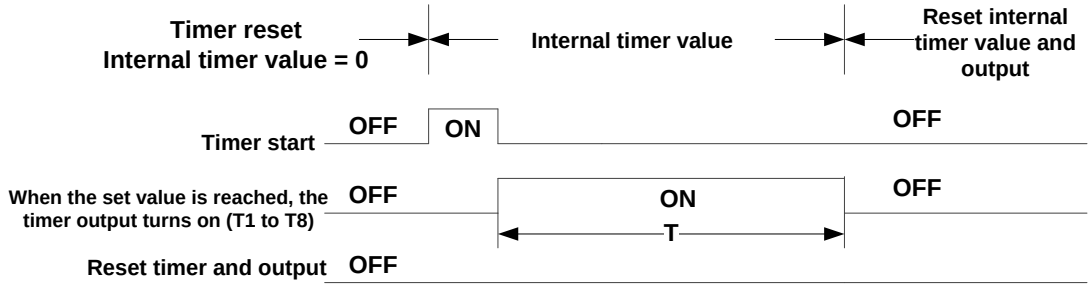
(4) Timer mode 3 (OFF-delay Timer mode 1)





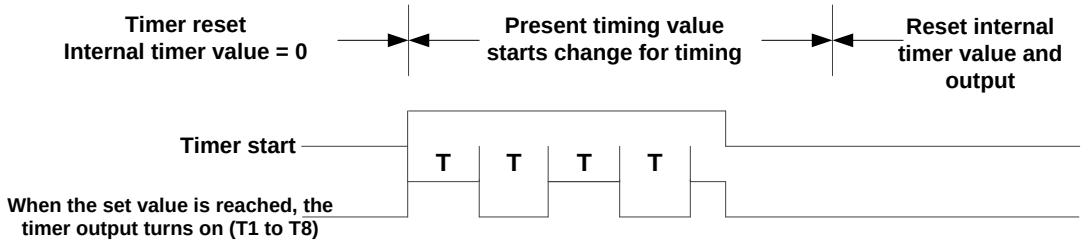
T= timer set value

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



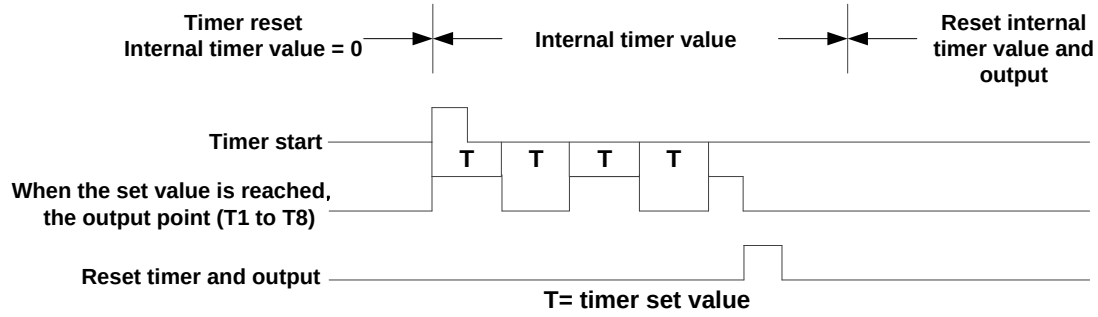
T= timer set value

(6) Timer mode 5 (FLASH Timer mode 1)



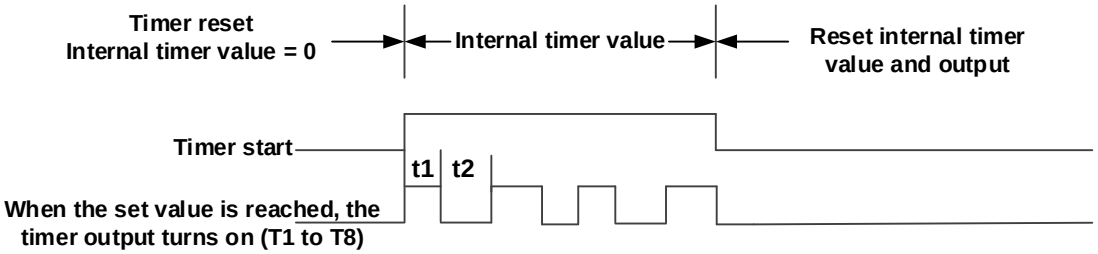
T= timer set value

(7) Timer mode 6 (FLASH Timer mode 2)



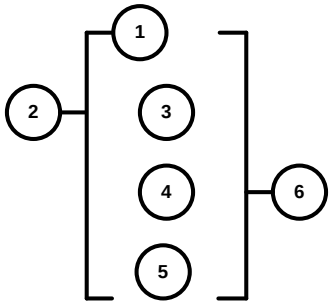
T= timer set value

(8) Timer mode 7 (FLASH Timer mode 3)



t1= 1st timer set value
t2= 2nd timer set value

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~V8)
③	Current analog input value
④	Set the reference comparison value (Upper limit) (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, constant)
⑤	Set the reference comparison value (lower limit) (AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, constant)
⑥	Comparator output (G1 to G8, there are a total of 8 comparators)

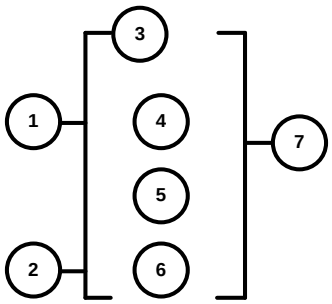
The description of analog comparison mode:

(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
(8) Input comparison value selection = V8: PID Target Value

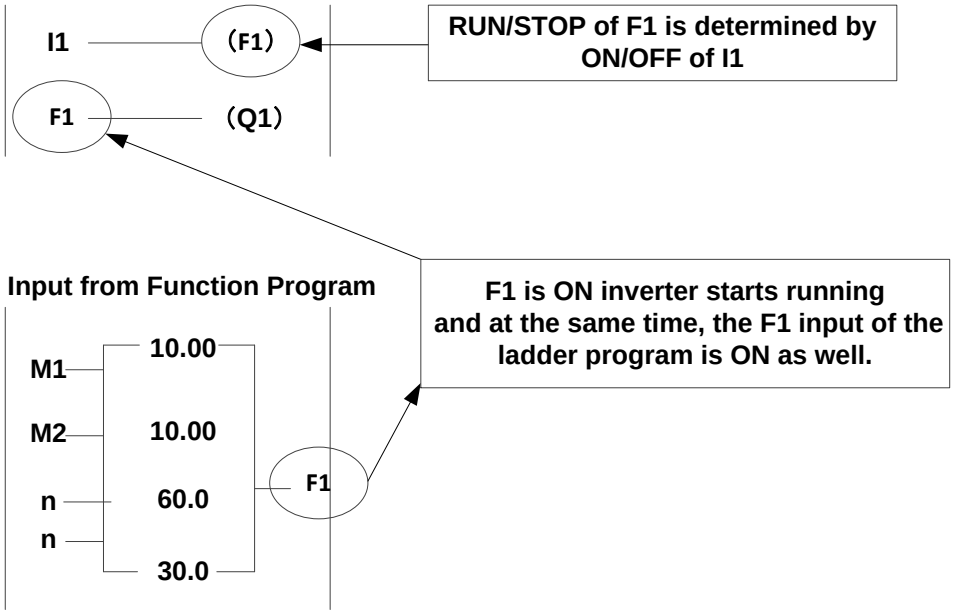
4: Operation control function



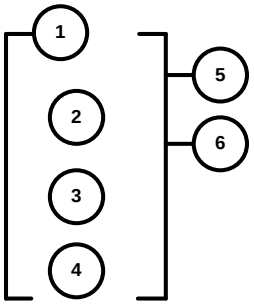
Symbol	Description
①	Forward /Reversal control can be set by (I1~f8) OFF: Forward(FWD) ON: Reversal(REV)
②	Speed terminal control can be set by (I1~f8)
	OFF: Operation based on ③ set frequency
	ON: Operation based on frequency of speed ④
③	Set frequency (can be constant or V3, V4, V5, V8)
④	Speed frequency (can be constant or V3, V4, V5, V8)
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



5: Summation and subtraction functions

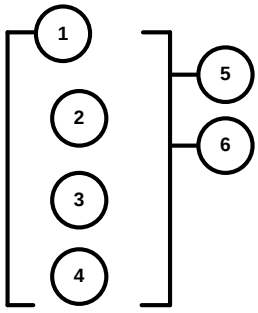


RESULT (calculation result) = V1+ V2- V3

Symbol	Description
①	Calculation result : RESULT
②	Addend V1(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, constant)
③	Addend V2(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, constant)
④	Subtrahend V3(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, 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~V8, constant)
③	Multiplier V2(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, constant)
④	Divisor V3(AS1~AS4,MD1~MD4,T1~T8,C1~C8,V1~V8, constant)
⑤	Coil output of error signal（M1~MF）
⑥	Multiplication and division modes number (MD1~ MD4)

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Distributor

Teco-Westinghouse Motor Company
5100 N. IH-35
Round Rock, Texas 78681
1-800-279-4007
www.tecowestinghouse.com

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