

Timer Function Block (%Tmi)



Introduction

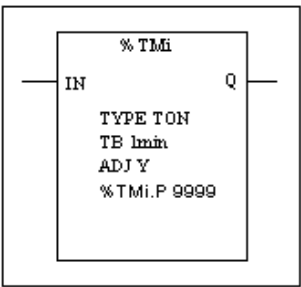
There are three types of Timer function blocks:

- TON (Timer On-Delay): Use this type of timer to control on-delay actions.
- TOF (Timer Off-Delay): Use this type of timer to control off-delay actions.
- TP (Timer - Pulse): Use this type of timer to create a pulse of a precise duration.

The delays or pulse periods are programmable and may be modified using the TwidoSoft.

Illustration

The following is an illustration of the Timer function block.



Timer function block

Parameters

The Timer function block has the following parameters:

Parameter	Label	Value
Timer number	%Tmi	0 to 63: TWDLC AA10DRF and TWDLC AA16DRF 0 to 127 for all other controllers.
Type	TON	• on-delay (by default)
	TOF	• off-delay
	TP	• pulse (monostable)
Time base	TB	1 min (default), 1s, 100ms, 10ms, 1ms
Current value	%Tmi.V	Word which increments from 0 to %Tmi.P when the timer is running. May be read and tested, but not written by the program. %Tmi.V can be modified using the Animation Tables Editor.

TON Type of Timer

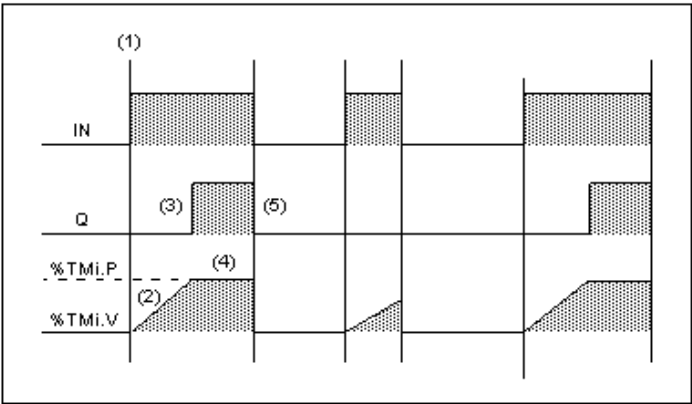


Introduction

The TON (Timer On-Delay) type of timer is used to control on-delay actions. This delay is programmable using the TwidoSoft.

Timing Diagram

The following timing diagram illustrates the operation of the TON type timer.



Operation

The following table describes the operation of the TON type timer.

Phase	Description
1	The timer starts on the rising edge of the IN input.
2	The current value %TMI.V increases from 0 to %TMI.P in increments of one unit for each pulse of the time base TB.
3	The %TMI.Q output bit is set to 1 when the current value has reached %TMI.P.
4	The %TMI.Q output bit remains at 1 while the IN input is at 1.
5	When a falling edge is detected at the IN input, the timer is stopped, even if the timer has not reached %TMI.P, and %TMI.V is set to 0.

TOF Type of Timer

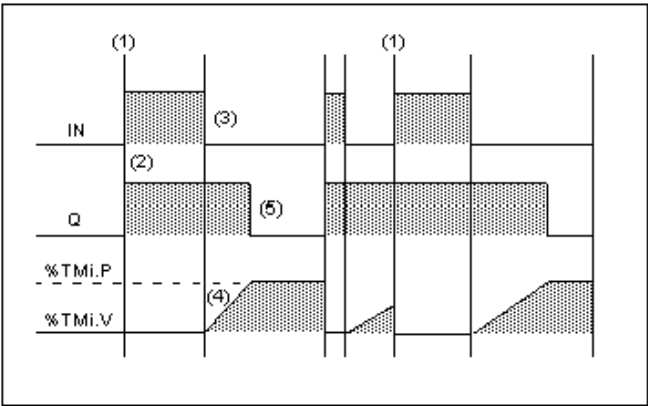


Introduction

Use the TOF (Timer Off-Delay) type of timer to control off-delay actions. This delay is programmable using TwidoSoft.

Timing Diagram

The following timing diagram illustrates the operation of the TOF type timer.



Operation

The following table describes the operation of the TOF type timer.

Phase	Description
1	The current value %TMI.V is set to 0 on a rising edge at input IN, even if the timer is running.
2	The %TMI.Q output bit is set to 1 when a rising edge is detected at input N.
3	The timer starts on the falling edge of input IN.
4	The current value %TMI.V increases to %TMI.P in increments of one unit for each pulse of the time base TB.
5	The %TMI.Q output bit is reset to 0 when the current value reaches %TMI.P.

TP Type of Timer

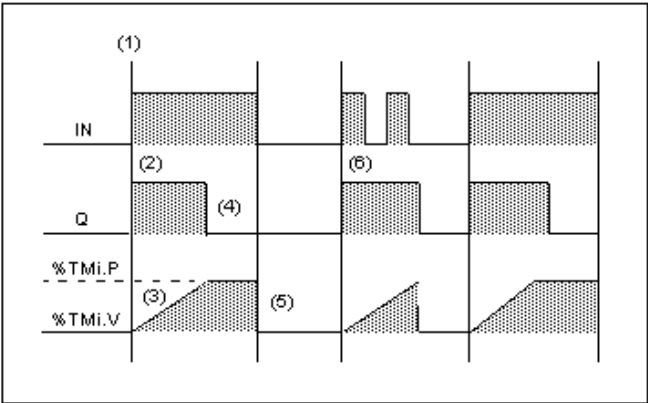


Introduction

The TP (Timer - Pulse) type of timer is used to create pulses of a precise duration. This delay is programmable using the TwidoSoft.

Timing Diagram

The following timing diagram illustrates the operation of the TP type timer.



Operation

The following table describes the operation of the TP type timer.

Phase	Description
1	The timer starts on the rising edge of the IN input. The current value %Tmi.V is set to 0 if the timer has not already started.
2	The %Tmi.Q output bit is set to 1 when the timer starts.
3	The current value %Tmi.V of the timer increases from 0 to %Tmi.P in increments of one unit per each pulse of the time base TB.
4	The %Tmi.Q output bit is set to 0 when the current value reaches %Tmi.P.
5	The current value %Tmi.V is set to 0 when %Tmi.V equals %Tmi.P and input IN returns to 0.
6	This timer cannot be reset. Once %Tmi.V equals %Tmi.P, and input IN is 0, then %Tmi.V is set to 0.

Up/Down Counter Function Block (%Ci)

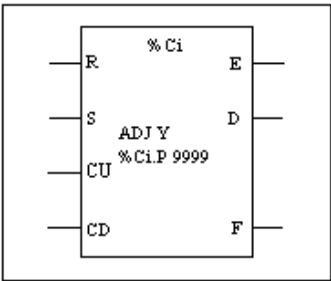


Introduction

The Counter function block (%Ci) provides up and down counting of events. These two operations can be done simultaneously.

Illustration

The following is an illustration of the up/down Counter function block.



Up/down counter function block

Parameters

The Counter function block has the following parameters:

Parameter	Label	Value
Counter number	%Ci	0 to 31
Current value	%Ci.V	Word is incremented or decremented according to inputs (or instructions) CU and CD. Can be read and tested but not written by the program. Use the Data Editor to modify %Ci.V.
Preset value	%Ci.P	0 <= %Ci.P <= 9999. Word can be read, tested, and written (default value: 9999).
Edit using the Animation Tables Editor	ADJ	<ul style="list-style-type: none">Y: Yes, the preset value can be modified by using the Animation Tables Editor.N: No, the preset value cannot be modified by using the Animation Tables Editor.
Reset input (or instruction)	R	At state 1: %Ci.V = 0.
Set input (or instruction)	S	At state 1: %Ci.V = %Ci.P.
Upcount input (or instruction)	CU	Increments %Ci.V on a rising edge.
Downcount input (or instruction)	CD	Decrements %Ci.V on a rising edge.
Underflow output	E (Empty)	The associated bit %Ci.E=1, when down counter %Ci.V changes from 0 to 9999 (set to 1 when %Ci.V reaches 9999, and reset to 0 if the counter continues to count down).
Preset output reached	ID (Done)	The associated bit %Ci.D=1, when %Ci.V=%Ci.P.