

# WECON

# Programming



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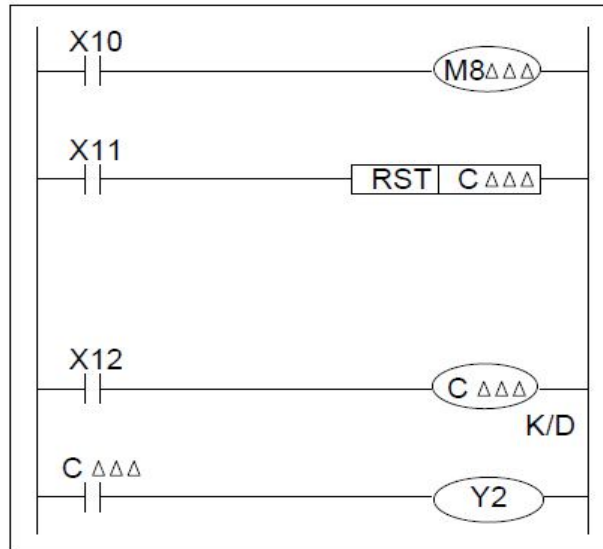
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# How to make a high speed input counter

## 1.Introduce

High speed counters have selectable count directions. The directions are selected by driving the appropriate special auxiliary M coil. The example shown to the right works in the following manner; when X10 is ON, counting down takes place. When X10 is OFF counting up takes place.

In the example the output contacts of counter C△△△ and its associated current count values are reset to “0” when X11 is turned ON. When X12 is turned ON the driven counter is enabled. This means it will be able to start counting its assigned input signal



The following device table outlines the range of available high speed counters on both the LX3V PLC.

I N P U T	1 Phase counter user start/reset						1 Phase counter assigned start/reset					2 Phase counter bi-directional					A/B Phase counter				
	C235	C236	C237	C238	C239	C240	C241	C242	C243	C244	C245	C246	C247	C248	C249	C250	C251	C252	C253	C254	C255
X0 ◆	U/D						U/D			U/D		U	U		U		A	A		A	
X1 P		U/D					R			R		D	D		D		B	B		B	
X2 ◆			U/D					U/D			U/D		R		R			R		R	
X3 ◆				U/D				R		S	R			U	S	U			A		A
X4 P					U/D				U/D					D		D			B		B
X5 P						U/D			R					R		R			R		R
X6										S					S					S	
X7											S					S					S

Key:

U - up counter input

R - reset counter (input)

A - A phase counter input

D - down counter input

S - start counter (input)

B - B phase counter input

### Input assignment:

- X6 and X7 are also high speed inputs, but function only as start signals. They cannot be used as the counted inputs for high speed counters.
- Different types of counters can be used at the same time but their inputs must not coincide. For example, if counter C247 is used, then the following counters and instructions cannot be used; C235, C236, C237, C241, C242, C244, C245, C246, C249, C251, C252, C254, I0\_\_, I1\_\_, I2\_\_.
- Inputs X0 and X1 are equipped with special hardware that allows very high speed counting as follows  
 LX3V PLC X0 and X1 support up to 200KHZ. X2---X5 support up to 10K HZ.

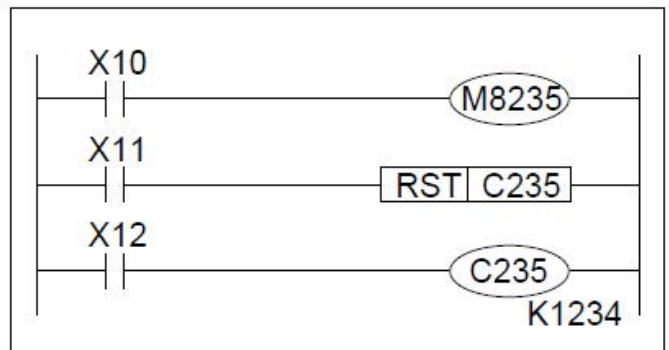
## 2.Operation:

### 2.1Phase Counters - User Start and Reset (C235 - C240)

These counters only use one input each. When direction flag M8235 is ON, counter C235 counts down. When it is OFF, C235 counts up.

When X11 is ON, C235 resets to 0 (zero). All contacts of the counter C235 are also reset.

When X12 is ON, C235 is selected. From the previous counter tables, the corresponding counted input for C235 is X0. C235 therefore counts the number of times X0 switches from OFF to ON.



### Device specification:

- All of these counters are 32bit up/down ring counters. Their counting and contact operations are the same as normal 32bit up/down.

When the counters current value reaches its maximum or setting value, the counters associated contacts are set and held when the counter is counting upwards.

However, when the counter is counting downwards the contacts are reset.

### Setting range:

- -2,147,483,648 to +2,147,483,647

### Direction setting:

- The counting direction for 1 phase counters is dependent on their corresponding flag M8\_\_; where \_\_ is the number of the corresponding counter, (C235 to C240).

When M8\_\_ is ON the counter counts down,

When M8\_\_ is OFF the counter counts up.

### Using the SPD instruction:

- Care should be taken when using the SPD applied instruction. This instruction has both high speed counter and interrupt characteristics, therefore input devices X0 through X5 may be used as the source device for the SPD instruction. In common with all high speed processes the selected source device of the SPD instruction must not coincide with any other high speed function which is operating, i.e. high speed counters

or interrupts using the same input.

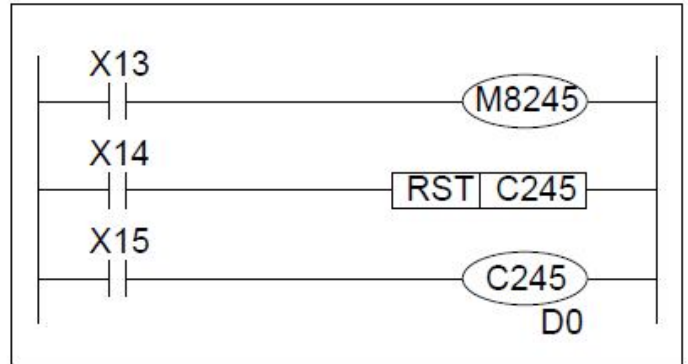
When the SPD instruction is used it is considered by the system to be a 1 phase high speed counter. This should be taken into account when summing the maximum combined input signal frequencies - see the previous section.

## 2.2 Phase Counters - Assigned Start and Reset (C241 to C245)

These counters have one countable input and 1 reset input each. Counters C244 and C245 also have a start input.

When the direction flag M8245 is ON, C245 counts down. When it is OFF C245 will count up.

When X14 is ON, C245 resets in the same manner as normal internal 32bit counters, but C245 can also be reset by input X3. This is assigned automatically when counter C245 is used (see previous counter tables).



Counter C245 also has an external start contact, again automatically assigned. This is actually input X7. Once again this data can be found on the previous counter tables.

When X7 is ON, C245 starts counting, conversely when X7 is OFF C245 stops counting. The input X15 selects and reserves the assigned inputs for the selected counter, i.e. in this case C245.

The reason why these counters use assigned start (X7) and reset (X3) inputs is because they are not affected by the cycle (scan) time of the program. This means their operation is immediate and direct.

In this example C245 actual counts the number of OFF to ON events of input X2.

Note: Because C245 is a 32bit counter, its setting data, specified here by a data register also has to be of a 32bit format. This means that data registers D1 and D0 are used as a pair to provide the 32bit data format required.

### Device specification:

- All of these counters are 32bit up/down ring counters. Their counting and contact operations are the same as normal 32bit up/down.

When the counters current value reaches its maximum or setting value, the counters associated contacts are set and held when the counter is counting upwards.

However, when the counter is counting downwards the contacts are reset.

### Setting range:

- -2,147,483,648 to +2,147,483,647

### Direction setting:

- The counting direction for 1 phase counters is dependent on their corresponding flag M8\_\_\_; where \_\_\_ is the number of the corresponding counter, (C241 to C245).

- When M8\_\_\_ is ON the counter counts down.

- When M8\_\_\_ is OFF the counter counts up.

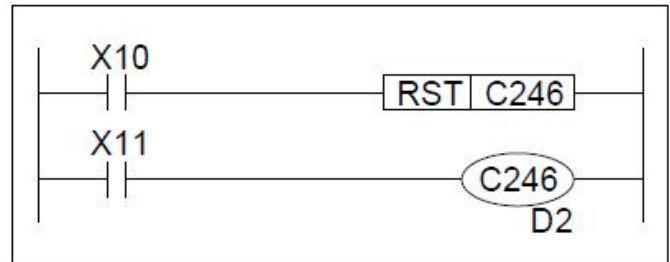
### 2.3 Phase Bi-directional Counters (C246 to C250)

These counters have one input for counting up and one input for counting down. Certain counters also have reset and start inputs as well.

When X10 is ON, C246 resets in the same way as standard 32bit counters.

Counter C246 uses inputs;  
 X0 to count up and  
 X1 to count down

For any counting to take place the drive input X11 must be ON to set and reserve the assigned inputs for the attached counter. i.e. C246.

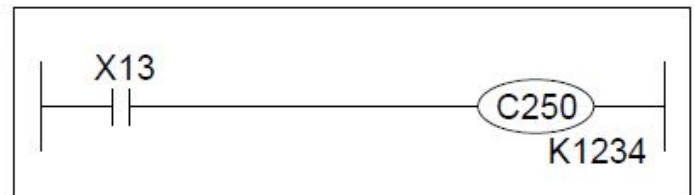


Note:

X0 moving from OFF to ON will increment C246 by one  
 X1 moving from ON to OFF will decrement C246 by one

Bi-directional counter C250 can be seen to have X5 as its reset input and X7 as its start input. Therefore, a reset operation can be made externally without the need for the RST C250 instruction.

X13 must be ON to select C250. But start input X7 must be ON to allow C250 to actually count. If X7 goes OFF counting ceases. Counter C250 uses input X3 to count up and input X4 to count down.



#### Device size:

- All of these counters have 32bit operation.

#### Setting range:

- -2,147,483,648 to +2,147,483,647

#### Direction setting:

- The counting direction for 1 phase counters is dependent on their corresponding flag M8\_\_\_; where \_\_\_ is the number of the corresponding counter, (C241 to C245).
  - When M8\_\_\_ is ON the counter counts down,
  - When M8\_\_\_ is OFF the counter counts up.

### 2.4 A/B Phase Counters (C252 to C255)

With these counters only the input identified in the previous high speed counter tables can be used for counting. The counting performed by these devices is independent of the program cycle (scan) time. Depending on the counter used, start, reset and other associated inputs are automatically allocated.

The A phase, B phase input signal not only provide the counted signals but their relationship to each other will also dictate the counted direction.

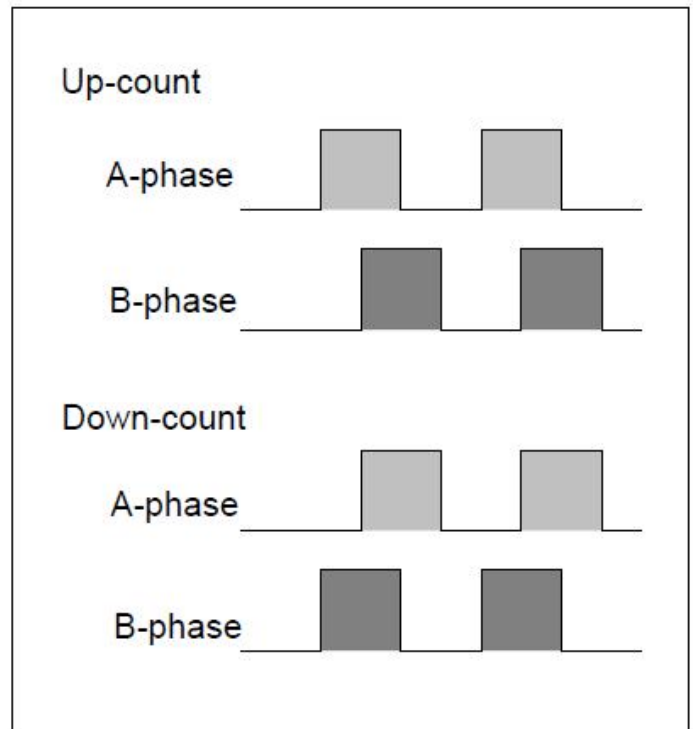
While the wave form of the A phase is in the ON state and...

the B phase moves from OFF to ON the counter will be counting up.

However, if...

the B phase moves from ON to OFF the counter will be in a down configuration.

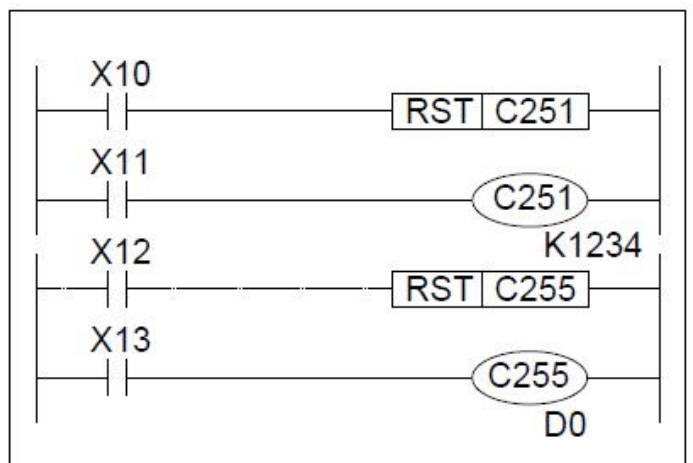
One count is registered after both A and B phase inputs have been given and released in the correct order.



C251 counts the ON/OFF events of input X0 (the A phase input) and input X1 (the B phase input) while X11 is ON.

C255 starts counting immediately when X7 is turned ON while X13 is ON. The counting inputs are X3 (A phase) and X4 (B phase).

C255 is reset when X5 is turned ON. It can also be reset with X12 in the sequence.



#### Device specification:

- A maximum of 2 points - 2 phase, 32bit, up/down counters can be used. The operation of the output contact in relation to the counted data is the same as standard 32bit counters

#### Setting range:

- -2,147,483,648 to +2,147,483,647

#### Direction setting:

- Check the corresponding special relay M8\_\_\_ to determine if the counter is counting up or down.

### 3.Program Example



If X0 input pulse number  $\geq 800$ , The Y0 will set ON.

X6 means reset C235.

X7 means reset Y0.

You also could use M register instead of X registers. (M is a auxiliary register

**Note: Wecon PLC X input need power DC24V signal.**  
X0 and X1 support upto 200KHZ. X2-----X5 upto 10K.

## LX2N/3V Series PLC

