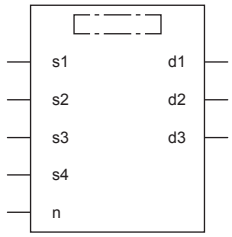
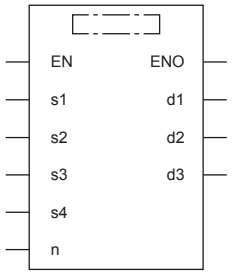
# 31.3 Up-down Counter

## CTUD(_E)

FX5S FX5UJ FX5U FX5UC

These functions count up/down the number of times of rising of a signal.

| Ladder diagram, FBD/LD | | Structured text |
|---|---|---|
| [Without EN/ENO]<br>  <br> | [With EN/ENO]<br>  <br> | [Without EN/ENO]<br>CTUD_1(CU:=s1,CD:=s2,R:=s3,LD:=s4,PV:=n,QU:=d1,QD:=d2,CV:=d3);<br>[With EN/ENO]<br>CTUD_E_1(EN:=EN,ENO:=ENO,CU:=s1,CD:=s2,R:=s3,LD:=s4,PV:=n,QU:=d1,QD:=d2,CV:=d3); |

### Setting data

#### ■Descriptions, types, and data types

| Argument | Description | Type | Data type |
|---|---|---|---|
| EN | Execution condition (TRUE: Execution, FALSE: Stop) | Input variable | BOOL |
| s1(CU) | Count up signal input | Input variable | BOOL |
| s2(CD) | Count down signal input | Input variable | BOOL |
| s3(R) | Count value reset | Input variable | BOOL |
| s4(LD) | Count value set | Input variable | BOOL |
| n(PV) | Count maximum value/start value | Input variable | INT |
| ENO | Output status (TRUE: Normal, FALSE: Abnormal) | Output variable | BOOL |
| d1(QU) | Count up end | Output variable | BOOL |
| d2(QD) | Count down end | Output variable | BOOL |
| d3(CV) | Current count value | Output variable | INT |

### Processing details

#### ■Operation processing

***1.*** Count up

- These function blocks count up (add "1" to) the value of (d3) when (s1) turns ON from OFF.
- When the value of (d3) reaches the value of (n), (d1) turns ON and the function blocks stop counting up.
- Set the maximum value of the counter for (n). When (s3) is turned ON, (d1) turns OFF and (d3) is set to 0.

***2.*** Count down

- These function blocks count down (subtract "-1" from) the value of (d3) when (s2) turns ON from OFF.
- When the value of (d3) is 0, (d2) turns ON and the function blocks stop counting down.
- Set the counter start value for (n). When (s4) is turned ON, (d2) turns OFF and (n) is set for (d3).

***3.*** Count maximum value/start value

The effective setting range of (n) is from 0 to 32767.

***4.*** Others

- When (s1) and (s2) are simultaneously turned ON from OFF, (s1) is prioritized and the function blocks count up (add "1" to) the value of (d3).
- When (s3) and (s4) are simultaneously turned ON, (s3) is prioritized and the value of (d3) is set to 0.

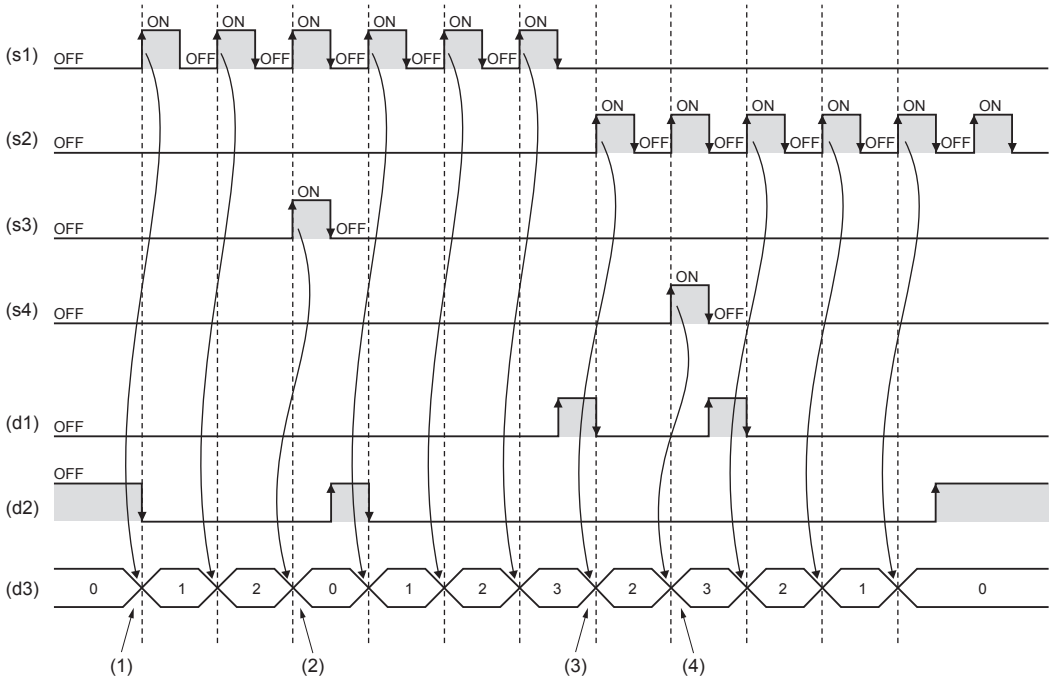
## ■Operation result

### *1.* Function block without EN/ENO

The operation processing is executed. The operation output value is output from (d1), (d2), and (d3).

- Timing chart

When 3 is specified in n




(1): When (s1) turns on from off, (d3) counts up.
(2): When (s3) turns on from off, (d3) is initialized.
(3): When (s2) turns on from off, (d3) counts down.
(4): When (s4) turns on from off, (d3) is initialized.

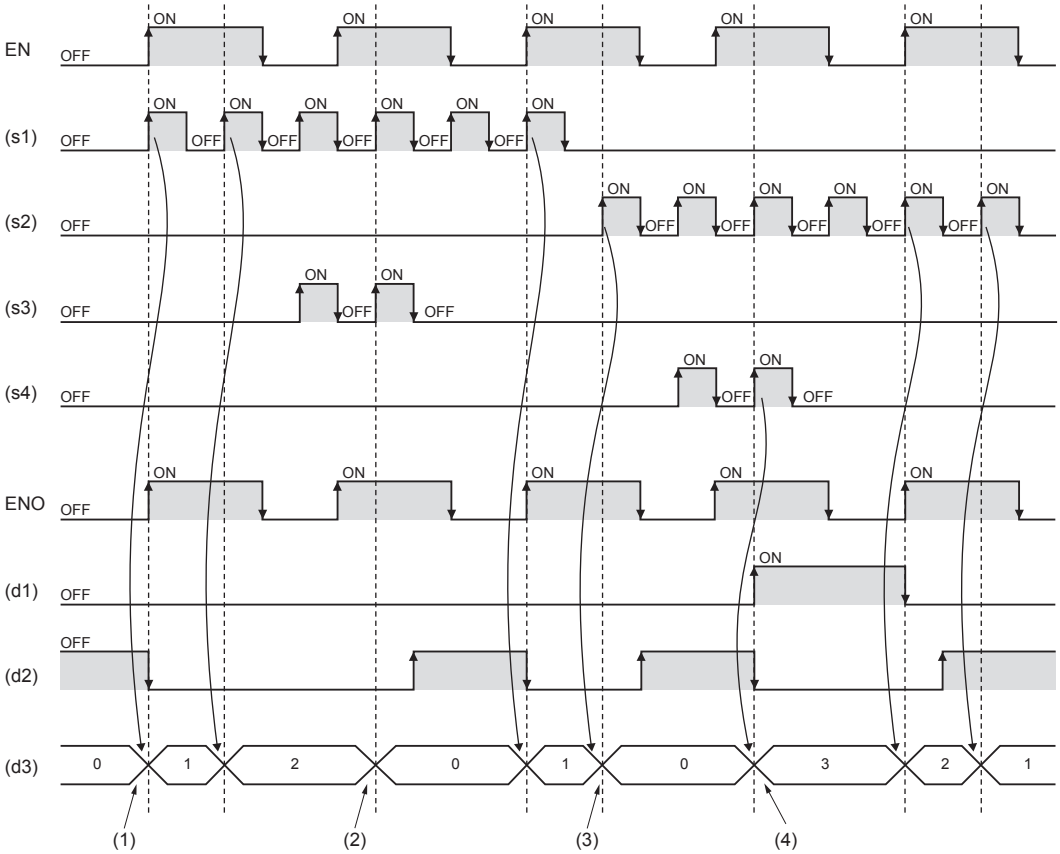
### 2. Function block with EN/ENO

The following table lists the execution conditions and operation results.

| Execution condition | Operation result | |
|---|---|---|
| **EN** | **ENO** | **(d1), (d2), (d3)** |
| TRUE (Executes operation) | TRUE | Operation output value |
| FALSE (Stops operation) | FALSE | Previous output value |

- Timing chart

When 3 is specified in n




(1): When EN is on and (s1) turns on from off, (d3) is counts up.
(2): When EN is on and (s3) turns on from off, (d3) is cleared to 0.
(3): When EN is on and (s2) turns on from off, (d3) is counts down.
(4): When EN is on and (s4) turns on from off, (d3) is initialized.

## Operation error

There is no operation error.