

## Adding 32-bit binary data

D+(P)(\_U) instruction and DADD(P)(\_U) instruction can be used for addition of 32-bit binary data.

### D+(P)(\_U) [using two operands]

FX5S

FX5UJ

FX5U

FX5UC

These instructions add the 32-bit binary data in the device specified by (d) and the 32-bit binary data in the device specified by (s), and store the result in the device specified by (d).

| Ladder diagram  | Structured text  |
|---|--|
|   | Not supported<br>📖 Page 222 D+(P)(_U) [using three operands] |
| FBD/LD  |  |
| Not supported.<br>📖 Page 222 D+(P)(_U) [using three operands] |  |

### Setting data

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

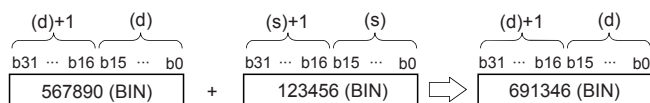
| Operand | Description | Range                      | Data type              | Data type (label) |
|---------|-------------|----------------------------|------------------------|-------------------|
| (s)     | D+(P)       | -2147483648 to +2147483647 | 32-bit signed binary   | ANY32_S           |
|         | D+(P)_U     | 0 to 4294967295            | 32-bit unsigned binary | ANY32_U           |
| (d)     | D+(P)       | -2147483648 to +2147483647 | 32-bit signed binary   | ANY32_S           |
|         | D+(P)_U     | 0 to 4294967295            | 32-bit unsigned binary | ANY32_U           |

#### ■Applicable devices

| Operand | Bit                         | Word                      |       |   | Double word |    | Indirect specification | Constant |   |    | Others |
|---------|-----------------------------|---------------------------|-------|---|-------------|----|------------------------|----------|---|----|--------|
|         | X, Y, M, L, SM, F, B, SB, S | T, ST, C, D, W, SD, SW, R | U□\G□ | Z | LC          | LZ |                        | K, H     | E | \$ |        |
| (s)     | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | ○        | — | —  | —      |
| (d)     | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | —        | — | —  | —      |

## Processing details

- These instructions add the 32-bit binary data in the device specified by (d) and the 32-bit binary data in the device specified by (s), and store the addition result in the device specified by (d).



- When underflow or overflow occurs in the operation result, the following processing is executed. In this case, the carry flag (SM700, SM8022) does not turn ON.

In case of D+(P)



In case of D+(P)(\_U)



## Operation error

There is no operation error.

## D+(P)(\_U) [using three operands]

FX5S

FX5UJ

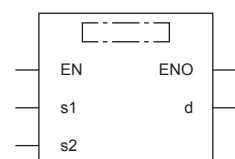
FX5U

FX5UC

These instructions add the 32-bit binary data in the device specified by (s1) and the 32-bit binary data in the device specified by (s2), and store the result in the device specified by (d).

| Ladder diagram | Structured text                                     |   |
|----------------|---|---|
|                | ENO:=DPLUS(EN,s1,s2,d);<br>ENO:=DPLUSP(EN,s1,s2,d); | ENO:=DPLUS_U(EN,s1,s2,d);<br>ENO:=DPLUSP_U(EN,s1,s2,d); |

### FBD/LD



("DPLUS", "DPLUSP", "DPLUS\_U", "DPLUSP\_U" enters □.)

## Setting data

### ■Descriptions, ranges, and data types

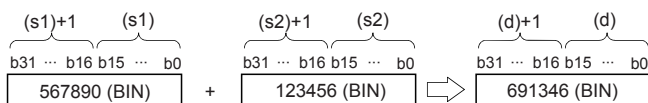
| Operand | Description         | Range                      | Data type              | Data type (label) |
|---------|---------------------|----------------------------|------------------------|-------------------|
| (s1)    | D+(P)               | -2147483648 to +2147483647 | 32-bit signed binary   | ANY32_S           |
|         | D+(P)_U             | 0 to 4294967295            | 32-bit unsigned binary | ANY32_U           |
| (s2)    | D+(P)               | -2147483648 to +2147483647 | 32-bit signed binary   | ANY32_S           |
|         | D+(P)_U             | 0 to 4294967295            | 32-bit unsigned binary | ANY32_U           |
| (d)     | D+(P)               | —                          | 32-bit signed binary   | ANY32_S           |
|         | D+(P)_U             | —                          | 32-bit unsigned binary | ANY32_U           |
| EN      | Execution condition | —                          | Bit                    | BOOL              |
| ENO     | Execution result    | —                          | Bit                    | BOOL              |

### ■Applicable devices

| Operand | Bit                         | Word                      |       |   | Double word |    | Indirect specification | Constant |   |    | Others |
|---------|-----------------------------|---------------------------|-------|---|-------------|----|------------------------|----------|---|----|--------|
|         | X, Y, M, L, SM, F, B, SB, S | T, ST, C, D, W, SD, SW, R | U□\G□ | Z | LC          | LZ |                        | K, H     | E | \$ |        |
| (s1)    | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | ○        | — | —  | —      |
| (s2)    | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | ○        | — | —  | —      |
| (d)     | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | —        | — | —  | —      |

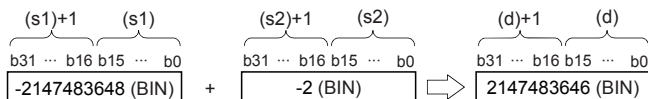
## Processing details

- These instructions add the 32-bit binary data in the device specified by (s1) and the 32-bit binary data in the device specified by (s2), and store the addition result in the device specified by (d).



- When underflow or overflow occurs in the operation result, the following processing is executed. In this case, the carry flag (SM700, SM8022) does not turn ON.

In case of D+(P)



In case of D+(P)(\_U)



## Operation error

There is no operation error.

## DADD(P)(\_U)

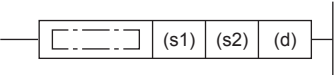
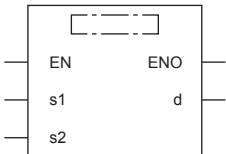
FX5S

FX5UJ

FX5U

FX5UC

These instructions add the 32-bit binary data in the device specified by (s1) and the 32-bit binary data in the device specified by (s2), and store the result in the device specified by (d).

| Ladder diagram  | Structured text                                   |   |
|---|---|---|
|  | ENO:=DADD(EN,s1,s2,d);<br>ENO:=DADDP(EN,s1,s2,d); | ENO:=DADD_U(EN,s1,s2,d);<br>ENO:=DADDP_U(EN,s1,s2,d); |
| FBD/LD  |   |   |
|  |   |   |

## Setting data

### ■Descriptions, ranges, and data types

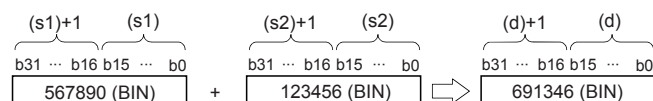
| Operand | Description         | Range                      | Data type              | Data type (label) |
|---------|---------------------|----------------------------|------------------------|-------------------|
| (s1)    | DADD(P)             | -2147483648 to +2147483647 | 32-bit signed binary   | ANY32_S           |
|         | DADD(P)_U           | 0 to 4294967295            | 32-bit unsigned binary | ANY32_U           |
| (s2)    | DADD(P)             | -2147483648 to +2147483647 | 32-bit signed binary   | ANY32_S           |
|         | DADD(P)_U           | 0 to 4294967295            | 32-bit unsigned binary | ANY32_U           |
| (d)     | DADD(P)             | —                          | 32-bit signed binary   | ANY32_S           |
|         | DADD(P)_U           | —                          | 32-bit unsigned binary | ANY32_U           |
| EN      | Execution condition | —                          | Bit                    | BOOL              |
| ENO     | Execution result    | —                          | Bit                    | BOOL              |

### ■Applicable devices

| Operand | Bit                         | Word                      |       |   | Double word |    | Indirect specification | Constant |   |    | Others |
|---------|-----------------------------|---------------------------|-------|---|-------------|----|------------------------|----------|---|----|--------|
|         | X, Y, M, L, SM, F, B, SB, S | T, ST, C, D, W, SD, SW, R | U□\G□ | Z | LC          | LZ |                        | K, H     | E | \$ |        |
| (s1)    | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | ○        | — | —  | —      |
| (s2)    | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | ○        | — | —  | —      |
| (d)     | ○                           | ○                         | ○     | ○ | ○           | ○  | ○                      | —        | — | —  | —      |

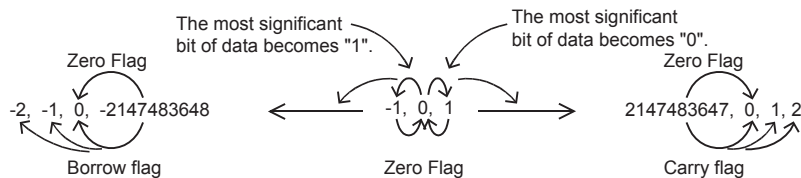
## Processing details

- These instructions add the 32-bit binary data in the device specified by (s1) and the 32-bit binary data in the device specified by (s2), and store the addition result in the device specified by (d).



## Relationship between the flag operation and the sign (positive or negative) of a numeric value

| Device        | Name   | Description   |
|---------------|--------|---|
| SM700, SM8022 | Carry  | When the operation result exceeds the upper limit of the data setting range, the carry flag is turned ON.       |
| SM8020        | Zero   | When the operation result is 0, the zero flag is turned ON.   |
| SM8021        | Borrow | When the operation result is less than the lower limit of the data setting range, the borrow flag is turned ON. |



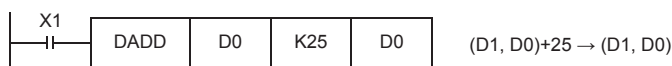
## Precautions

### When DADD instruction is used

When specifying word devices, a device for the lower-order 16-bits is specified first, and then a word device with the next device number is set for the higher-order 16 bits. To prevent number overlap, it is recommended to always specify an even number.

### When specifying the same device in the source and destination

The same device number can be specified for both the source and the destination. In this case, note that the addition result changes in every operation cycle if a continuous operation type ADD instruction is used.



### Difference between DADD(P) instruction, D+(P) instruction, and DINC(P) instruction in a program for adding "+1"

When DADD(P) instruction is used to add 1 to the contents of D0 every time X1 turns from OFF to ON, DADD(P) instruction is similar to D+(P) instruction and DINC(P) instruction described later except for the contents shown in the table below.

|                              | DADD(P) instruction  | D+(P) instruction, DINC(P) instruction  |
|------------------------------|--|---|
| Flag (zero, borrow or carry) | Operates   | Does not operate  |
| Operation result             | $(s)+1=(d)$<br>$+2147483647 \rightarrow 0 \rightarrow +1 \rightarrow +2 \rightarrow \dots$ | $+2147483647 \rightarrow -2147483648 \rightarrow -2147483647 \rightarrow \dots$ |

## Operation error

There is no operation error.