Calculating the natural logarithm of single-precision real number
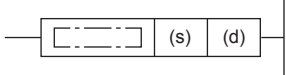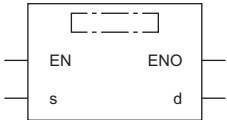
LOG(P)/DLOGE(P)

FX5S **FX5UJ** **FX5U** **FX5UC**

These instructions calculate the logarithm whose base is natural logarithm e of a value specified by (s), and store the operation result in the device specified by (d).

The LOG(P) instructions can also be used as DLOGE(P).

Ladder diagram	Structured text[1]
	ENO:=LOGP(EN,s,d);

FBD/LD[1]

[1] The LOG instruction is not supported by the ST language and the FBD/LD language. Use LOG of the standard function.
☞ Page 1287 LOG(_E)

### Setting data

■Descriptions, ranges, and data types

Operand	Description	Range	Data type	Data type (label)
(s)	Data whose natural logarithm is calculated or head device number where the data is stored	—	Single-precision real number	ANYREAL_32
(d)	Head device number for storing the operation result	—	Single-precision real number	ANYREAL_32
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	$	
(s)	—	○	○	—	○	—	○	—	○	—	—
(d)	—	○	○	—	○	—	○	—	—	—	—

Processing details

- These instructions calculate the logarithm whose base is natural logarithm e of a value specified by (s), and store the operation result in the device specified by (d).
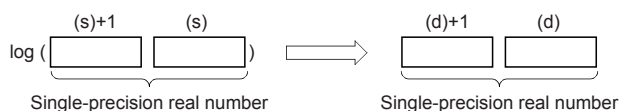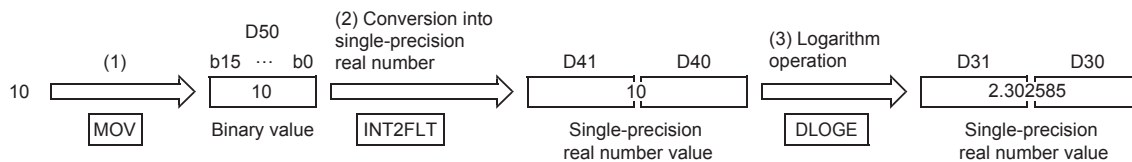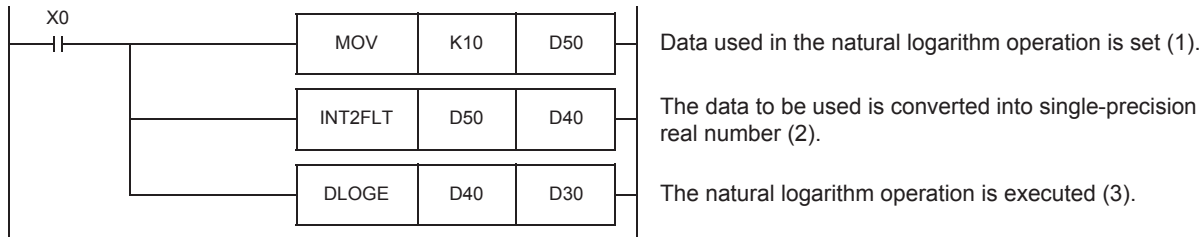

- Only a positive value can be set in (s). (The natural logarithm operation cannot be executed for a negative value).
- The table below shows the related devices.

Device	Name	Description	
		Condition	Operation
SM700	Carry	The absolute value of the operation result $\geq 2^{128}$	The value of (d) is the maximum value (2^{128}) of 32-bit real numbers and the carry flag SM700 turns on.

Device	Name	Description	
		Condition	**Operation**
SM8020	Zero	The operation result is true "0". (The mantissa part is "0").	The zero flag SM8020 turns on.
SM8021	Borrow	The absolute value of the operation result < 2^{-126}	The value of (d) is the minimum value (2^{-126}) of 32-bit real numbers and the borrow flag SM8021 turns on.
SM8022	Carry	The absolute value of the operation result $\geq 2^{128}$	The value of (d) is the maximum value (2^{128}) of 32-bit real numbers and the carry flag SM8022 turns on.

Program example

In the program example shown below, natural logarithm of "10" set in D50 is calculated, and stored to D30 and D31 when X0 turns ON.

Data used in the natural logarithm operation is set (1).

The data to be used is converted into single-precision real number (2).

The natural logarithm operation is executed (3).

Operation error

Error code (SD0/SD8067)	Description
3402H	The specified device value is denormalized number, NaN (not a number), or $\pm\infty$.
3405H	The value stored in a device specified in (s) is negative.
	The value stored in a device specified in (s) is 0.