

22.2 Multiplication

MUL(_E)

FX5S FX5UJ FX5U FX5UC

These functions output the product input values ((s1)×(s2)× ... ×(s28)).

Ladder diagram, FBD/LD*1		Structured text*1
[Without EN/ENO]	[With EN/ENO]	[Without EN/ENO] d:=MUL(s1,s2); [With EN/ENO] d:=MUL_E(EN,ENO,s1,s2);

*1 The input variable "s" can be changed in the range of 2 to 28.

Setting data

■Descriptions, types, and data types

Argument	Description	Type	Data type
EN	Execution condition (TRUE: Execution, FALSE: Stop)	Input variable	BOOL
s1(IN1) to s28(IN28)	Input	Input variable	ANY_NUM
ENO	Output status (TRUE: Normal, FALSE: Abnormal)	Output variable	BOOL
d(MUL(_E))	Output	Output variable	ANY_NUM

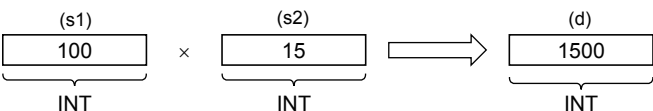
Processing details

■Operation processing

- These functions multiply the INT, DINT, or REAL type data input to (s1) to (s28) ((s1)×(s2)× ...×(s28)), and output the operation result from (d) in the same data type as (s).

Ex.

Data type is INT



- A value input to (s1) to (s28) is the INT, DINT, or REAL type data value.
- If an underflow occurs in the operation result, the result will be output as follows from (d).

Data type is INT	Data type is DINT	Data type is REAL
<ul style="list-style-type: none">Even if underflow or overflow occurs in the operation result, it is not regarded as an operation error. "MUL_E" outputs "TRUE" from ENO.Even when the operation result exceeds the INT type data range, the INT type data is output. (The operation result is the DINT type, however, the output data is the INT type data with high-order 16 bits deleted.)When the operation result exceeds the INT type data, convert an input value into the DINT type data by INT_TO_DINT then perform the operation.	<ul style="list-style-type: none">Even if underflow or overflow occurs in the operation result, it is not regarded as an operation error. "MUL_E" outputs "TRUE" from ENO.Even when the operation result exceeds the DINT type data range, the DINT type data is output. (The operation result is the 64-bit data, however, the output data is the DINT type data with high-order 32 bits deleted.)When the operation result exceeds the DINT type data, convert an input value into the REAL type data by DINT_TO_REAL then perform the operation.	An operation error occurs and an undefined value is output.

■ Operation result

1. Function without EN/ENO

The following table lists the operation results.

Operation result	(d)
No operation error occurred	Operation output value
An operation error occurred	Indefinite value

2. Function with EN/ENO

The following table lists the execution conditions and operation results.

Execution condition	Operation result	
EN	ENO	(d)
TRUE (Executes operation)	TRUE (Operation error did not occur)	Operation output value
	FALSE (Operation error occurred)*1	Indefinite value
FALSE (Stops operation)	FALSE*1	Indefinite value

*1 When FALSE is output from ENO, data output from (d) is undefined. In that case, modify a program so that the data output from (d) is not used.

Point

When the operation result exceeds the data type range, convert the data type of an input value then perform the operation.

22

Operation error

- (s1) to (s28) are REAL

Error code (SD0/SD8067)	Description
3402H	The data specified by (s1) to (s28) is -0, denormalized number, NaN (not a number), or $\pm\infty$.
3403H	(d) exceeds the following range. (An overflow has occurred.) $ (d) < 2^{128}$