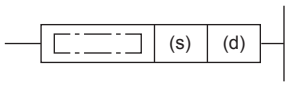
Calculating the arc sine of single-precision real number

ASIN(P)/DASIN(P)

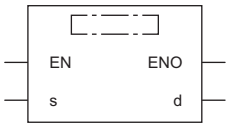
FX5S FX5UJ FX5U FX5UC

These instructions calculate the angle from the sine of the angle specified by (s), and store the operation result in the word device specified by (d).

The ASIN(P) instructions can also be used as DASIN(P).

Ladder diagram	Structured text*1
	ENO:=ASINP(EN,s,d);

FBD/LD*1



*1 The ASIN instruction is not supported by the ST language and the FBD/LD language. Use ASIN of the standard function.
☞ Page 1294 ASIN(_E)

Setting data

■Descriptions, ranges, and data types

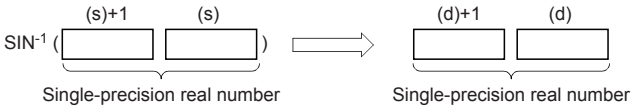
Operand	Description	Range	Data type	Data type (label)
(s)	A sine value used in SIN^{-1} (arc sine) operation or head device number storing the sine value	-1.0 to +1.0	Single-precision real number	ANYREAL_32
(d)	Head device number for storing the operation result	$-\pi/2$ to $+\pi/2$	Single-precision 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 angle from the sine of the angle specified by (s), and store the operation result in the device specified by (d).

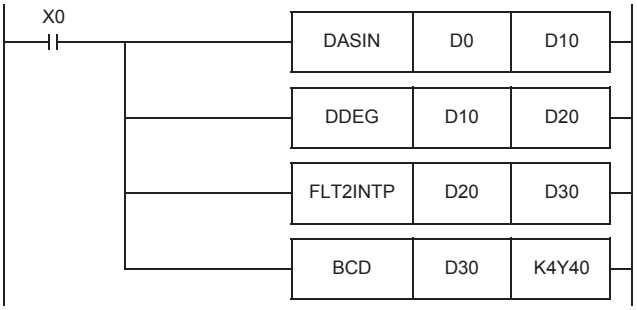


- The sine value specified by (s) can be set ranging from -1.0 to 1.0.
- The angle (operation result) stored in (d) is expressed in radians (from $(-\pi/2)$ to $(\pi/2)$).
- The table below shows the related devices.

Device	Name	Description	
		Condition	Operation
SM700	Carry	The absolute value of the operation result ≥ 2^{128}	The value of (d) is the maximum value (2^{128}) of 32-bit real numbers and the carry flag SM700 turns on.
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 ≥ 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, the SIN^{-1} value of data (single-precision real number) stored in D0 and D1 is calculated, and the angle is output in 4-digit BCD to Y40 to Y57 when X0 turns ON.



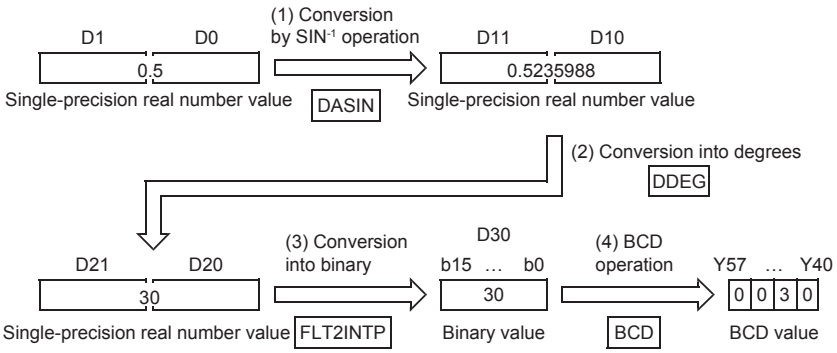
The angle (in radians) is calculated by the SIN^{-1} operation (1).

The value in radians is converted into the value in degrees (2).

The angle expressed in single-precision real number is converted into an integer (binary) (3).

The angle expressed in integer (binary) is output to the seven-segment display unit (4).

- Operation when "0.5" is stored in D0 and D1



Operation error

Error code (SD0/SD8067)	Description
3402H	The specified device value is -0, denormalized number, NaN (not a number), or ±∞.
3405H	A value specified in (s) is outside the range from -1.0 to 1.0.

Point

For the radian↔angle conversion, refer to the DRAD(P) and DDEG(P) instructions.
(☞ Page 716 Converting single-precision real number angle to radian, Page 718 Converting single-precision real number radian to angle)