

# Calculating the arc cosine of single-precision real number

## ACOS(P)/DACOS(P)

FX5S

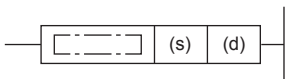
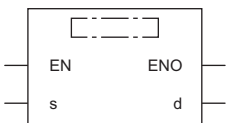
FX5UJ

FX5U

FX5UC

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

The ACOS(P) instructions can also be used as DACOS(P).

Ladder diagram	Structured text <sup>*1</sup>
	ENO:=ACOSP(EN,s,d)
FBD/LD <sup>*1</sup>	
	

<sup>\*1</sup> The ACOS instruction is not supported by the ST language and the FBD/LD language. Use ACOS of the standard function.

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## Setting data

### ■Descriptions, ranges, and data types

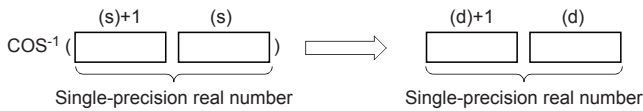
Operand	Description	Range	Data type	Data type (label)
(s)	A cosine value used in $\text{COS}^{-1}$ (arc cosine) operation or head device number storing the cosine value	-1.0 to +1.0	Single-precision real number	ANYREAL_32
(d)	Head device number for storing the operation result	0 to $\pi$	Single-precision 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 cosine of the angle specified by (s), and store the operation result in the device specified by (d).

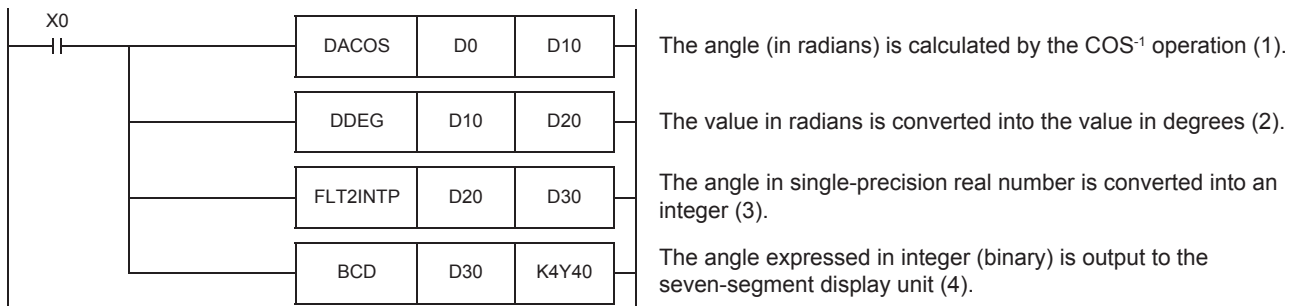


- The cosine value specified by (s) can be set ranging from -1.0 to 1.0
- The angle (operation result) stored in (d) is expressed in radians (0 to  $\pi$ ).
- The table below shows the related devices.

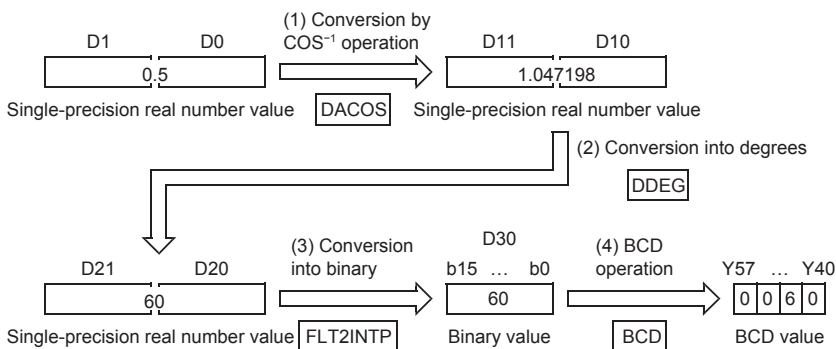
Device	Name	Description	
		Condition	Operation
SM700	Carry	The absolute value of the operation result $\geq 2^{128}$	The value of (d) is the maximum value ( $2^{128}$ ) of 32-bit real numbers and the carry flag SM700 turns on.
SM8020	Zero	The operation result is true "0". (The mantissa part is "0").	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, the  $\text{COS}^{-1}$  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.



- 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 $\pm\infty$ .
3405H	A value specified in (s) is outside the range from -1.0 to 1.0.

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For the radian $\leftrightarrow$ 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)

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