

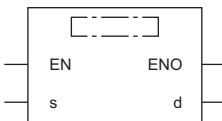
# Calculating the arc tangent of single-precision real number

## ATAN(P)/DATAN(P)

FX5S FX5UJ FX5U FX5UC

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

The ATAN(P) instructions can also be used as DATAN(P).

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

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

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## Setting data

### ■ Descriptions, ranges, and data types

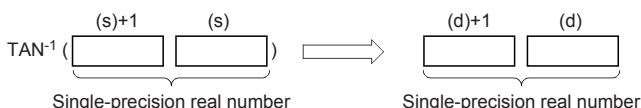
Operand	Description	Range		Data type		Data type (label)	
(s)	A tangent value used in the TAN <sup>-1</sup> (arc tangent) operation or head device number storing the tangent value	—		Single-precision real number		ANYREAL_32	
(d)	Head device number for storing the operation result	-π/2 to +π/2		Single-precision 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
		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 tangent of the angle specified by (s), and store the operation result in the device specified by (d).



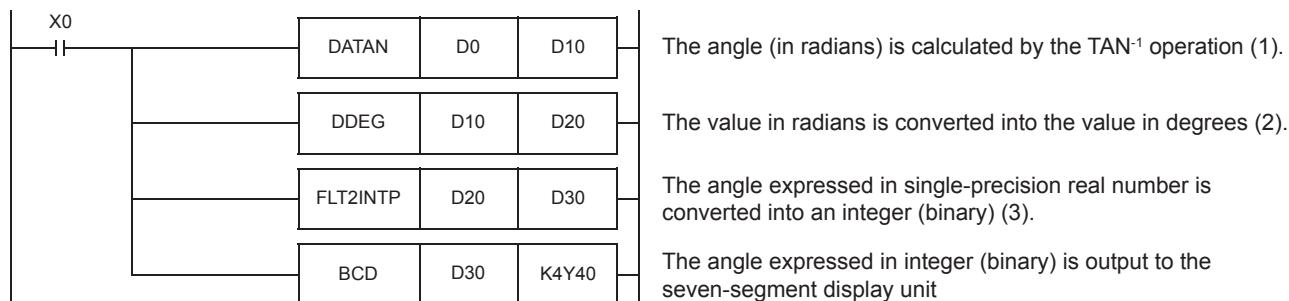
- The angle (operation result) stored in (d) is expressed in radians (from -π/2 to π/2).
- The table below shows the related devices.

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.	

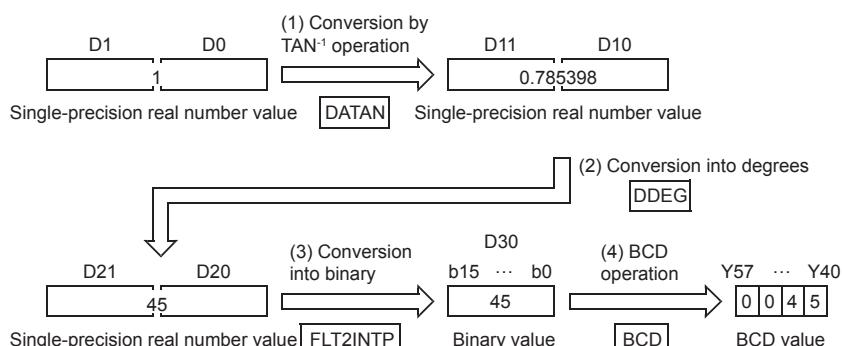
Device	Name	Description		
		Condition	Operation	
SM8020	Zero	The operation result is true "0". (The mantissa part is "0").	The zero flag SM8020 turns on.	
SM8021	Borrow	The absolute value of the operation result $< 2^{-126}$	The value of (d) is the minimum value ( $2^{-126}$ ) of 32-bit real numbers 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, the  $\tan^{-1}$  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 "1" is stored in D0 and D1



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## Operation error

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



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)