

21.5.2 AIN

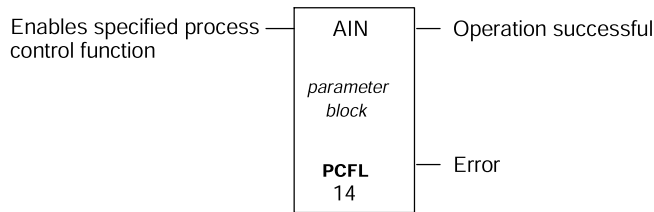
The AIN function scales the raw input produced by analog input modules to engineering values that can be used in the subsequent calculations. Three scaling options are available:

- ☐ Auto input scaling
- ☐ Manual input scaling
- ☐ Implementing process square root on the input to linearize the signal before scaling

AIN supports the following range resolutions:

Device Type	Resolution	Range		
		Valid	Under	Over
984 PLCs	4096 Normal	0 ... 4,096	0	4,096
	Elevated	4,096 ... 8,192	4,096	8,192
	8192 Normal	0 ... 8,192	0	8,192
	Offset	0 ... 6,000	0xC000	0x8000
	Unipolar	0 ... 7,500	0xC000	0x8000
	Bipolar	0 ... 15,000	0xC000	0x8000
	Scaled decimal	0 ... 10,000	0xC000	0x8000
Quantum Engineering Ranges	±10 V	768 ... 64,768	767	64,769
	±5 V	16,768 ... 48,768	16,767	48,769
	0 ... 10 V	0 ... 64,000	0	64,001
	0 ... 5 V	0 ... 32,000	0	32,001
	1 ... 5 V	6,400 ... 32,000	6,399	32,001
Quantum Thermocouple	TC degrees	454 ... +3,308		
	TC 0.1 degrees	4,540 ... +32,767		
	TC Raw Units	0 ... 65,535		
Quantum Voltmeter	±10 V	10,000 ... +10,000	10,001	+10,001
	±5 V	5,000 ... +5,000	5,001	+5,001
	0 ... 10 V	0 ... 10,000	0	10,001
	0 ... 5 V	0 ... 5,000	0	5,001
	1 ... 5 V	1,000 ... 5,000	999	5,001

Block Structure



Parameter Block Assignment

The length of the AIN parameter block is 14 registers:

Register	Content
Displayed	Input from a 3x register
First implied	
Second implied	Output status:

Standard output bits

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

1 = invalid Engineering Units

1 = invalid output mode selected

1 = echo over range from input module

1 = echo under range from input module

1 = input out of range

1 = with TC PSQRT, invalid;
in extrapolated range, PSQRT not used

Third implied

Input status:

1 = extrapolate over-/under-range for 984 auto mode
0 = clamp over-/under-range for 984 auto mode

1 = manual scaling mode
0 = auto scaling mode

1 = process square root on raw input

Standard input bits*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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0 0 0 0 0 = 1 ... 4,096

984 0 0 0 0 1 = 4,096 ... 8,192

Ranges 0 0 0 1 0 = 1 ... 8,191

0 0 0 1 1 = 1 ... 5,999

0 0 1 0 0 = 1 ... 7,499

0 0 1 0 1 = 1 ... 9,999

0 0 1 1 0 = 1 ... 14,999

Quantum Engineering Ranges

0 1 0 0 0 = ±10 V

0 1 0 0 1 = ±5 V

0 1 0 1 0 = 0 ... 10 V

0 1 0 1 1 = 0 ... 5 V

0 1 1 0 0 = 1 ... 5 V

Quantum Thermocouple

0 1 1 0 1 = TC degrees

0 1 1 1 0 = TC 0.1 degrees

0 1 1 1 1 = TC raw units

Quantum Voltmeter

1 0 0 0 0 = ±10 V

1 0 0 1 0 = ±5 V

1 0 1 0 0 = 0 ... 10 V

1 0 1 1 0 = 0 ... 5 V

1 1 0 0 0 = 1 ... 5 V

Fourth and fifth implied	Scale 100% engineering units
Sixth and seventh implied	Scale 0% engineering units
Eighth and ninth implied	Manual input
10th and 11th implied	Auto input
12th and 13th implied	Output

* Bit 4 in the third implied register is nonstandard use.

21.5.3 AOUT

The AOUT function is an interface for calculated signals for output modules. It converts the signal to a value in the range 0 ... 4,096, using the formula:

$$\text{output} = \frac{\text{scale} \times (\text{input} - \text{low engineering unit})}{(\text{high engineering unit} - \text{low engineering unit})}$$