

# float.h in C

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The header file named float.h of Library C contains a set of diverse constants (platform dependent) related to floating point real number values. These constants are proposed by ANSI C. Before understanding these constants, you need to know the floating-point real number of 4 components:

Composition Description (+/-) b Representation of base: binary is 2, decimal is 10, hexadecimal is 16, . e exponent (exponent), an integer between  $e_{\min}$  and  $e_{\max}$  p Meaning decimal number (Precision)

Based on the above 4 components, a floating point number will have its value expressed as follows:

$$s \text{ ? } \text{th ? c d ? u ch ? m ?? ng} = ( S ) \text{ p x b }^e \text{ ho ? c s ? th ? c d}$$

$$\text{? u ch ? m ?? ng} = (+/-) \text{ precision x base }^{\text{exponent}}$$

## Macros are defined in float.h

The following values ??are separate implementers and are defined with #define directives, but these values ?? cannot be lowercase. Note that all FLT references to float type, DBL refers to double and LDBL refers to long double.

**Macro Description** FLT\_ROUNDS Defining the rounding mode allows the addition of floating point numbers and it can have any of the following values:

- 1 - Unknown
  - 0 - Round to 0
  - 1 - Rounding to the nearest value
  - 2 - Towards positive infinity
  - 3 - Towards infinity negative
- FLT\_RADIX 2 Definition represents the radix of the exponent. Base-2 is binary, base-10 is a decimal system .

FLT\_MANT\_DIG

DBL\_MANT\_DIG

LDBL\_MANT\_DIG

These macros define the number of digits to represent the real number (in FLT\_RADIX base)

FLT\_DIG 6

DBL\_DIG 10

LDBL\_DIG 10

These macros determine the maximum number of decimal places (base-10) that can be represented without changing after rounding.

FLT\_MIN\_EXP

DBL\_MIN\_EXP

LDBL\_MIN\_EXP

These macros determine the smallest vowel value for exponent in FLT\_RADIX radix

FLT\_MIN\_10\_EXP -37

DBL\_MIN\_10\_EXP -37

LDBL\_MIN\_10\_EXP -37

These macros define the smallest vowel value for an exponent in base 10

FLT\_MAX\_EXP

DBL\_MAX\_EXP

LDBL\_MAX\_EXP

These macros define the maximum integer value for an exponent in FLT\_RADIX base

FLT\_MAX\_10\_EXP +37

DBL\_MAX\_10\_EXP +37

LDBL\_MAX\_10\_EXP +37

These macros define the maximum integer value for an exponent in base 10

FLT\_MAX 1E + 37

DBL\_MAX 1E + 37

LDBL\_MAX 1E + 37

These macros determine the largest floating point real number value

FLT\_EPSILON 1E-5

DBL\_EPSILON 1E-9

LDBL\_EPSILON 1E-9

These macros define the least significant digit that can be represented

FLT\_MIN 1E-37

DBL\_MIN 1E-37

LDBL\_MIN 1E-37

These macros define the smallest floating point real number values  
For example

The following program C illustrates the usage of some constants defined in float.h.

```
#include <float.h>
int main () { printf ( "Gia tri max cua mot so thuc = %.10e\n", DBL_MAX );
printf ( "Gia tri min cua mot so thuc = %.10e\n", DBL_MIN );
printf ( "So ky so de bieu dien mot so = %d\n", FLT_MANTISSA_DIGITS );
return 0; }
```

Compiling and running the above C program will result:

```
-----
Gia tri max cua mot so thuc = 3.4028234664e+038
Gia tri min cua mot so thuc = 1.1754943508e-038
So ky so de bieu dien mot so = 1.1857575500e-322
-----
```

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