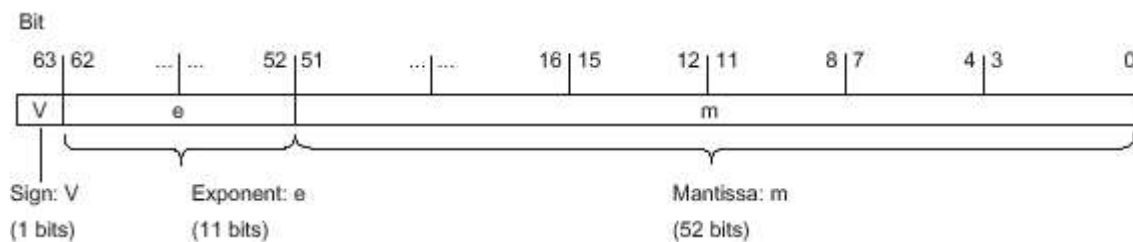# LREAL

Description

Operands of the data type LREAL have a length of 64 bits and are used to represent floating-point numbers. An operand of the LREAL data type consists of the following three components:

- Sign: The sign is determined by the signal state of bit 63. The bit 63 assumes the value "0" (positive) or "1" (negative).

- 11-bit exponents to base 2: The exponent is increased by a constant (base, +1023), so that it has a value range of 0 to 2047.

- 52-bit mantissa: Only the fraction part of the mantissa is shown. The integer part of the mantissa is always 1 with normalized floating-point numbers and is not stored.

The LREAL data type is processed with a precision of 15 digits.

The following figure shows the structure of the LREAL data type:

The following table shows the properties of data type LREAL:

Length (bits)	Format	Value range	Examples of value input
64	Floating-point numbers according to IEEE754	-1.7976931348623157e+308 to -2.2250738585072014e-308 ±0.0	1.0e-5; LREAL#1.0e-5
	Floating-point numbers	+2.2250738585072014e-308 to +1.7976931348623157e+308	1.0; LREAL#1.0

> **Note**
>
> With floating-point numbers, only the precision defined by the IEEE754 standard is stored. Additionally specified decimals are rounded off according to IEEE754.
>
> The number of decimal places may decrease for frequently nested arithmetic calculations.
>
> If more decimal places are specified than can be stored by the data type, the number is rounded to the corresponding value of the precision allowed by this value range .

See also

Overview of the valid data types
Basics of constants
Data type conversion for S7-1200 (S7-1200)
Calculating with floating-point numbers (REAL and LREAL) in SCL