

Description This intrinsic saturates an IQ value to the given Positive and Negative limits. This operation is useful in areas where there is potential for overflow in a calculation.

Declaration `_iq_IQsat(_iq A, long P, long N)`

Input **Global IQ function (IQ format = GLOBAL_Q)**
IQ number in GLOBAL_Q format

Output Format Global IQ function (IQ format = GLOBAL_Q)
Saturated output in GLOBAL_Q format

Usage **Example:**

Calculate the linear equation " $Y = M * X + B$ ", with saturation.

All variables are GLOBAL_Q = 26. However, there is a possibility that the variable ranges may cause overflow, so we must perform the calculation and saturate the result.

To do this, we perform the intermediate operations using IQ = 20 and then saturate before converting the result back to the appropriate GLOBAL_Q value:

```
#include "IQmathLib.h

void main(void)
{
    _iq Y, M, X, B;           // GLOBAL_Q = 26 (+/- 32 range)
    _iq20 temp;               // IQ = 20 (+/- 2048 range)

    temp = _IQ20mpy(_IQtoIQ20(M), _IQtoIQ20(X)) +
           _IQtoIQ20(B);
    temp = _IQsat(temp, _IQtoIQ20(MAX_IQ_POS),
                  _IQtoIQ20(MAX_IQ_NEG));

    Y = _IQ20toIQ(temp);
}
```