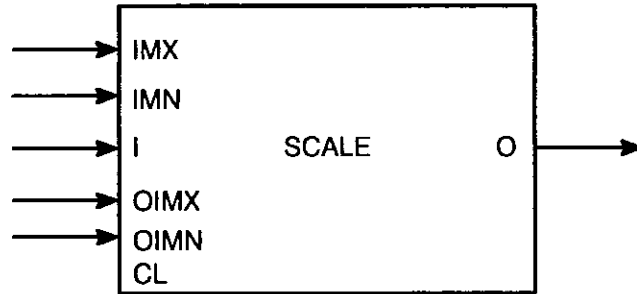


# 28.0 SCALE

This function can be used in AutoMax Control Block tasks and UDC Control Block tasks.



## Function

If CLAMP is TRUE and INPUT exceeds INPUT\_MAX or INPUT\_MIN, then the value of INPUT (not the actual input itself) is clamped at the proper limit.

$$\text{OUTPUT} = \frac{(\text{INPUT} - \text{INPUT\_MIN}) * (\text{OUTPUT\_IMAX} - \text{OUTPUT\_IMIN})}{\text{INPUT\_MAX} - \text{INPUT\_MIN}} + \text{OUTPUT\_IMIN}$$

## Program Statement

```
CALL SCALE(INPUT=input%, CLAMP=clamp@,      &
           INPUT_MAX=input_max%,          &
           INPUT_MIN=input_min%,          &
           OUTPUT_IMAX=output_imax%,      &
           OUTPUT_IMIN=output_imin%,      &
           OUTPUT=output%)
```

## Inputs

CL (CLAMP) =

Clamp input, type BOOLEAN. This parameter is optional. The default is FALSE. If CLAMP is TRUE and INPUT exceeds either INPUT\_MAX or INPUT\_MIN, then clamp the value of INPUT at the proper limit. If CLAMP is FALSE, then the value of INPUT is not clamped.

I (INPUT) =

Signal input, type INTEGER. This parameter must be specified as a numeric symbol only (literal value not accepted).

IMX (INPUT\_MAX) =

Maximum value for INPUT, type INTEGER. This parameter must be specified. If the value of INPUT is greater than INPUT\_MAX and CLAMP is TRUE, then INPUT is clamped at INPUT\_MAX.

IMN (INPUT\_MIN) =

Minimum value for INPUT, type INTEGER. This parameter must be specified. If the value of INPUT is less than INPUT\_MIN and CLAMP is TRUE, then INPUT is clamped at INPUT\_MIN.

OIMX (OUTPUT\_IMAX) =

Value for OUTPUT when INPUT is equal to INPUT\_MAX, type INTEGER. This parameter must be specified.

OIMN (OUTPUT\_IMIN) =

Value for OUTPUT when INPUT is equal to INPUT\_MIN, type INTEGER. This parameter must be specified.

## Outputs

O (OUTPUT) =

Data output, type INTEGER. This parameter must be specified. The value of OUTPUT is determined by the current values of INPUT, INPUT\_MAX, INPUT\_MIN, OUTPUT\_IMAX, and OUTPUT\_IMIN. See the functional description above.

## 28.1 Overflow Handling

If the computed answer for OUTPUT exceeds +32767 or -32768, then OUTPUT will be clamped to +32767 or -32768 and a run time error will be logged.

## 28.2 Application Notes

A typical use for the SCALE block would be to convert a 4 to 20 milliamp signal from a M/N 57C409 2 Channel Analog Input module to a linear signal with the range of 0 to 10000 counts to be used with the PID block.

The 4 to 20 mA input would normally require a 511 ohm load resistor to convert the current signal into a voltage signal so that it can be read by the input module. At 4 mA the voltage signal would approximate 2.00 VDC and at 20 mA the voltage signal would approximate 10.00 VDC.

If the A/D input card produces a count value of 4095 for a 10.00 VDC input, then a 4 mA signal would be 819 counts and a 20 mA signal would be 4095 counts. See figure 28.1.

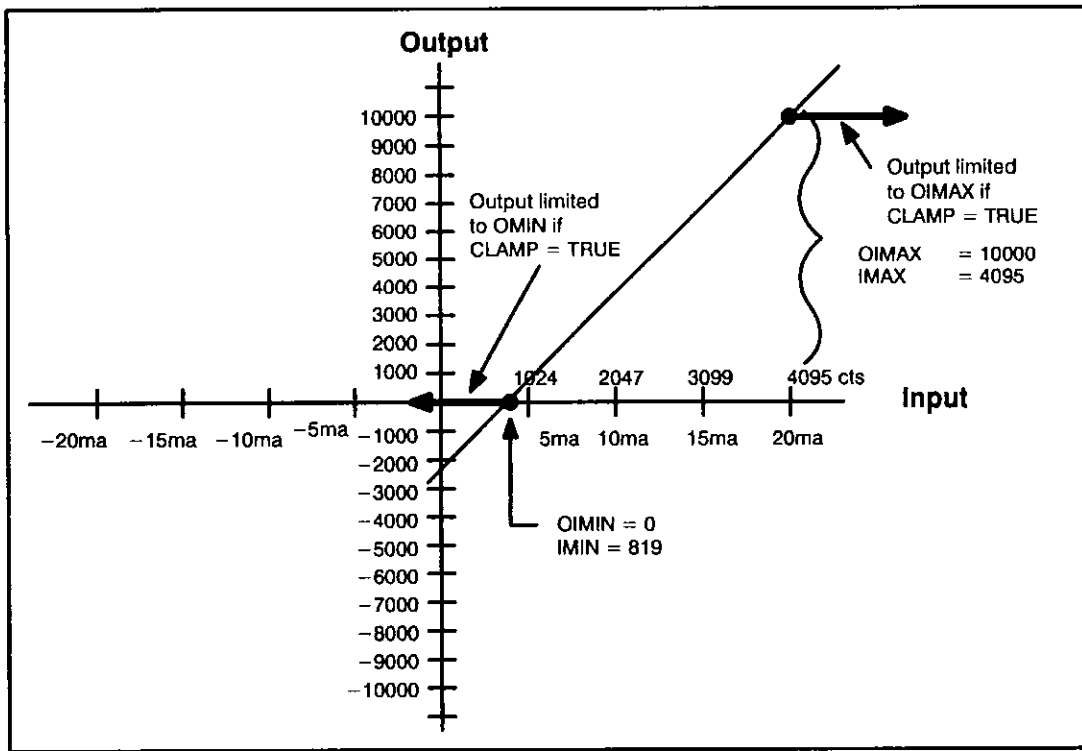


Figure 28.1 - Converting 4-20ma to 0-10000 counts

The SCALE block would be programmed as follows

```

nnnn CALL SCALE(INPUT = PROCESS_INPUT%,           &
                INPUT_MAX = 4095,                 &
                INPUT_MIN = 819,                  &
                OUTPUT_IMAX = 10000,             &
                OUTPUT_IMIN = 0,                 &
                OUTPUT = PROCESS_OUTPUT%)

```

If you want to limit the value of OUTPUT to the range specified by OUTPUT\_IMAX and OUTPUT\_IMIN even when the value of INPUT exceeds INPUT\_MAX or INPUT\_MIN, then the current value of the input CLAMP must be TRUE.