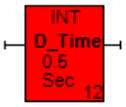
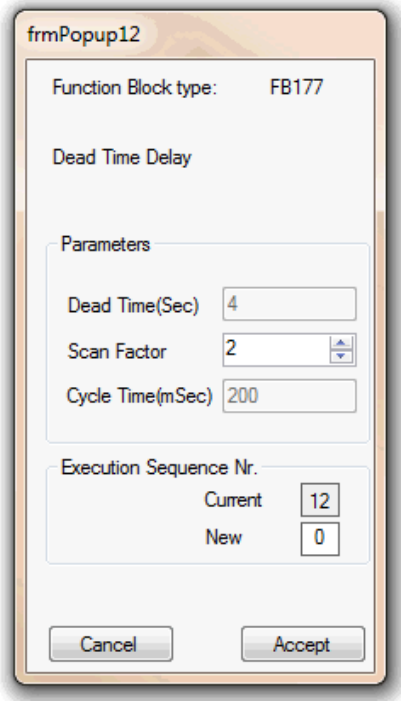
Function Block 177 Dead-Time Signal Delay





Function Description
The output is a copy of the input delayed by a fixed time period called the dead time.

Popup Parameters

- Dead Time (Sec) Indicates value of T_D as calculated below.
- Scan Factor Adjustable from 1 to 255, see *X* below.
- Cycle Time (mSec) Indicates task cycle time.

Algorithm Description
This function block uses a FIFO queue of 10 values. On each execution the value in the 10th position in the queue is transferred to the output, then all values from the 1st position to the 9th position are shifted down one position in the queue, and lastly the input value is entered into the queue's first position. This means 11 executions (10 time-periods) are required for a value to propagate through the queue from input to the output. If the time between executions is defined as T_S, then the time taken for a value to move through the queue is:

$$T_D = 10 \bullet T_S$$ Where:

T_D = Dead time in seconds.
T_S = Time between executions in seconds

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To make the delay time longer without increasing the length of the queue we can arrange to execute the algorithm every Xth cycle. This will give the following relationship:

$$T_D = X(10 \bullet T_S)$$ Where *X* is the Scan Factor

While this is a method to obtain a longer dead time, we are in fact ignoring some samples. For slow changing signals this is not a problem.

The time between executions T_S is referred to as the cycle time, and is usually expressed in mili-seconds. Our formula for the dead-time then becomes:

$$T_D = \frac{X \bullet T_S}{100}$$ Where:

T_D = Dead time in seconds.
T_S = Cycle time in mili-seconds

Input/Output and Parameters

Type	Description	Data Type	Range
Input	Input signal	INT	-32768 ----32767
Output	Output signal	INT	-32768 ----32767
Dead Time (T_D)	Parameter	N/A	Calculated
Scan Factor	Parameter	BYTE	1 ---- 255
Cycle Time (T_S)	Task Cycle Time (mSec)	N/A	10,20,40,50,100,200

Application

This function block is used mainly in the simulation of a process delay, which is handy when testing close-loop controllers. Another application is if you keep in mind the difference between input and output is the amount the signal changed during time T_D, then you have the rate-of-change of the input value. This is handy for slow-changing signals where differentiation (FB171) is impractical.

Notes

As it is required that Function Block 177 is executed every Ts seconds, the editor will only allow this function block to be placed in code pages assigned to Time Tasks.
