How to calculate the moving average value of a variable by C-functions “Aver_N” or “Aver_F”?

Download FAQ-120 Demo

User may get this paper and the demo program “wpdmo81.pia” at the following web.
http://www.icpdas.com/en/faq/index.php?kind=280#751 > FAQ-120.

There is some applications to calculate the moving average value of a Real or Integer variable. The Real or Integer variable is sampled once and calculated the moving average value once at every fixed interval. To do that, user can use the “Aver_F” c-function to get the moving average value of a Real variable. (Or the “Aver_N” c-function to get the moving average value of an integer variable).

Algorithm for the above application:
Consider the sampled data F1, F2,..., F10,..., Fn at each interval step and the given sample number to calcualte is 5. Then the moving average value at each interval step will be as the following.

(5 x F1) / 5, (4 x F1 + F2) / 5, (3 x F1 + F2 + F3) / 5, (2 x F1 + F2 + F3 + F4) / 5,
(F1 + F2 + F3 + F4 + F5) / 5, (F2 + F3 + F4 + F5 + F6) / 5...
(F<n-4> + F<n-3> + F<n-2> + F<n-1> + Fn) / 5

The oldest sample value in the list will be erased sequentially by each interval step.

There is also some applications to calculate the average value of a Real or Integer variable. The Real or Integer variable is sampled once every fixed interval and calculated the average value during a given number of samples. To do that, user can use the “Gt_Ave_R” function block to get the average value of a Real variable. (or the “Gt_Ave_N” function block to get the average value of an integer variable). (Please refer to http://www.icpdas.com/en/faq/index.php?kind=280#751 > FAQ-099)

The “Aver_N” and “Aver_F” are ISaGRAF c-functions. The following ISaGRAF PAC driver version (or later versions) support them.
WP-8xx7: driver Ver. 1.20, VP-25W7/23W7: driver Ver. 1.11, XP-8xx7-CE6: since released.

The “Aver_N” and “Aver_F” can apply in the “for... end_for; “ loops of the ISaGRAF ST program. And also they can apply in the Ladder program one by one. (Refer to the FAQ-120).

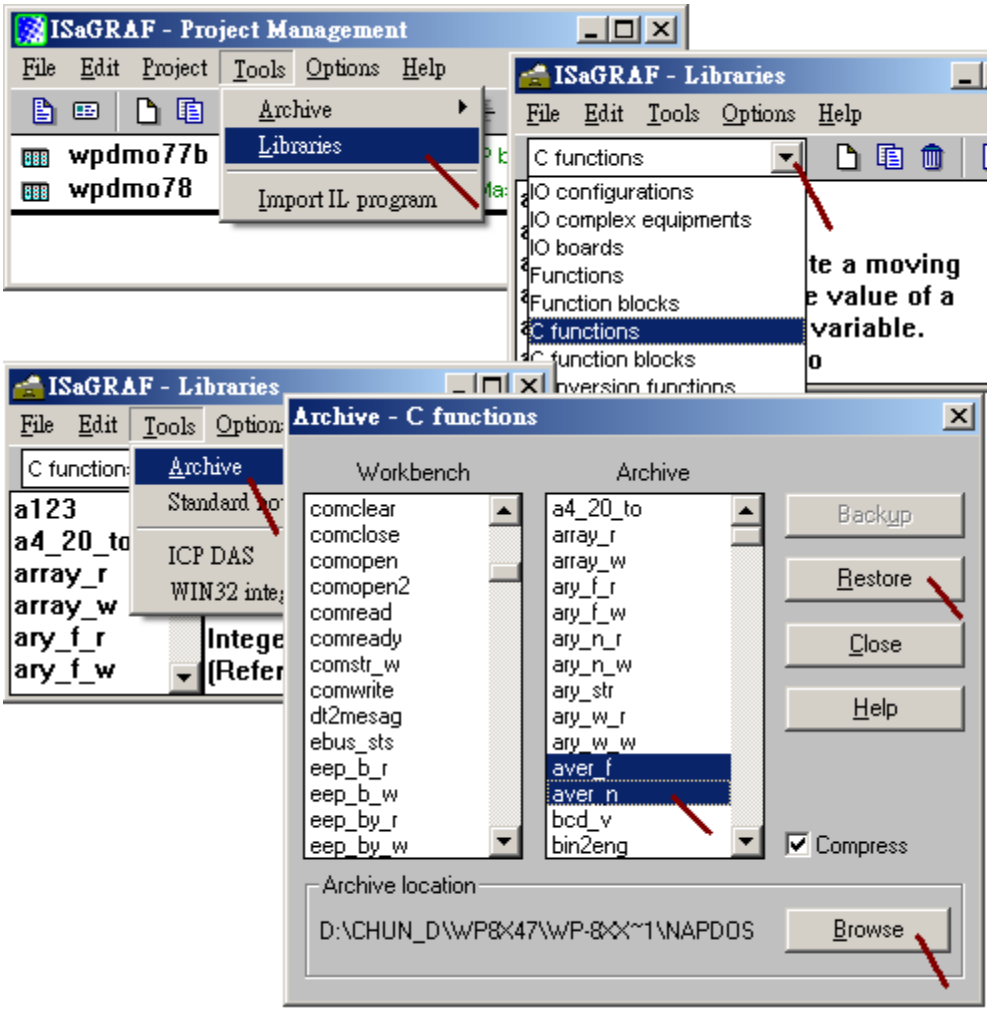
The “Averag_N” and “Averag_F” are ISaGRAF c-function-blocks. They cannot apply in the”for... end for; “loops. They can only apply in the program one by one. The following PAC support “Averag_N” and “Averag_F”.
WP-8xx7, VP-25W7/23W7, XP-8xx7-CE6, W-8xx7, iP-8xx7, uPAC-7186EG. (Refer to the FAQ-99)

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The “Gt_Ave_N” and “Gt_Ave_R” are ISaGRAF function-blocks. They cannot apply in the”for... end for; “loops. They can only apply in the program one by one. The following PAC support “Gt_Ave_N” and “Gt_Ave_R”.
WP-8xx7, VP-25W7/23W7, XP-8xx7-CE6, W-8xx7, iP-8xx7, uPAC-7186EG, I-8xx7-80, I-8xx7, I-7188EG/XG. (Refer to the FAQ-99)

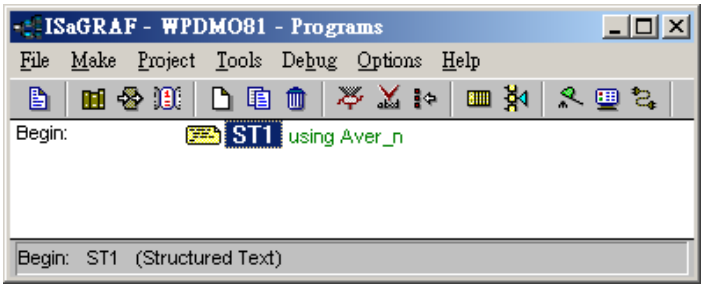
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To use the “Aver_N” and “Aver_F”, must restore them to your PC / ISaGRAF first. And make sure if the ISaGRAF PAC driver has support them (refer to the first page)



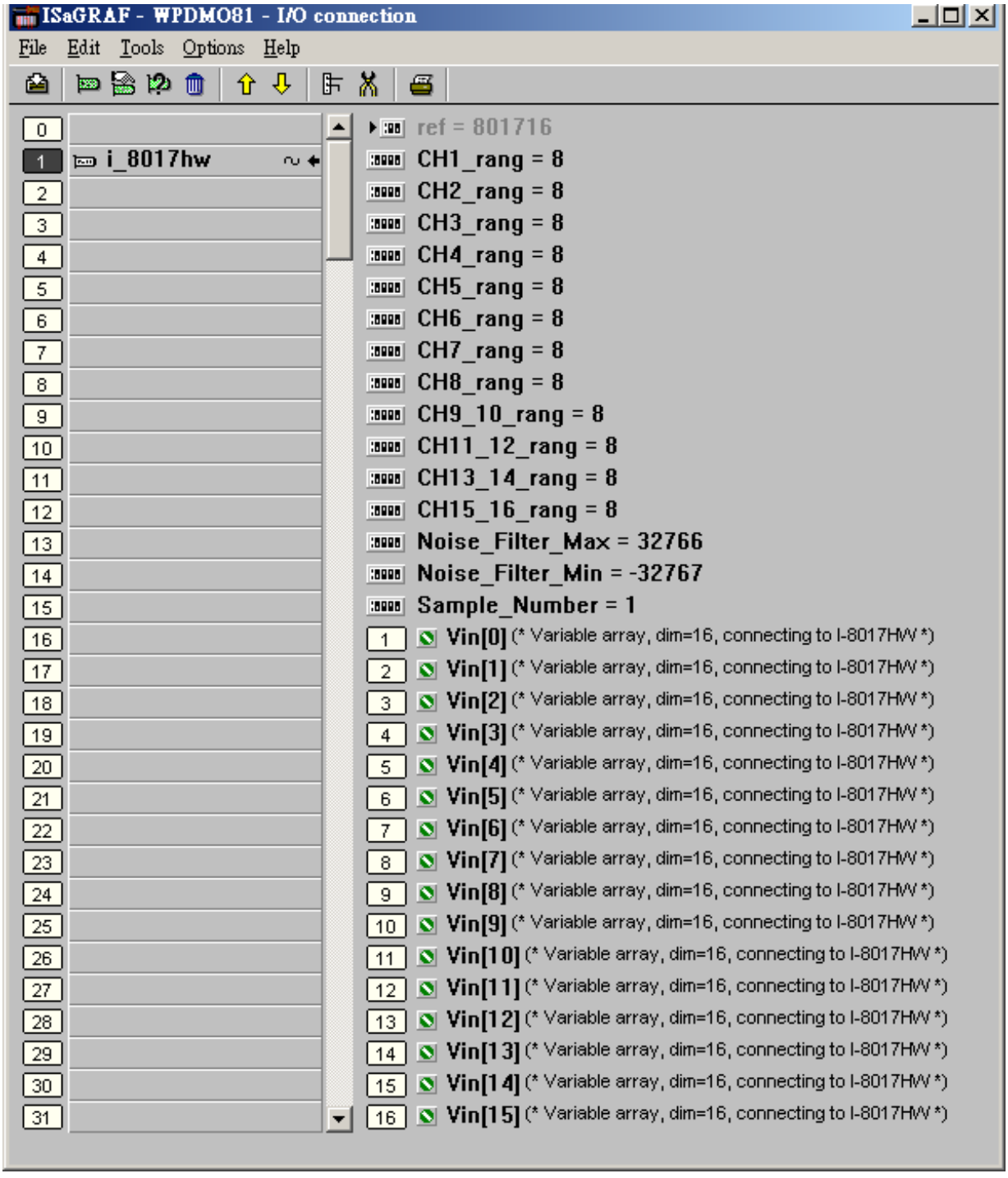
The demo program “wpdmo81.pia” can be obtained from the FAQ-120. It uses the hardware WP-8xx7 plus one I-8017HW in its I/O slot 1(Note: the leftmost I/O slot No. of the WP-8xx7 is 0). Please set the jumper of the I-8017HW to “single-end” and refer to the FAQ-039 for using ISaGRAF Variable array.

Project - “wpdmo81”:



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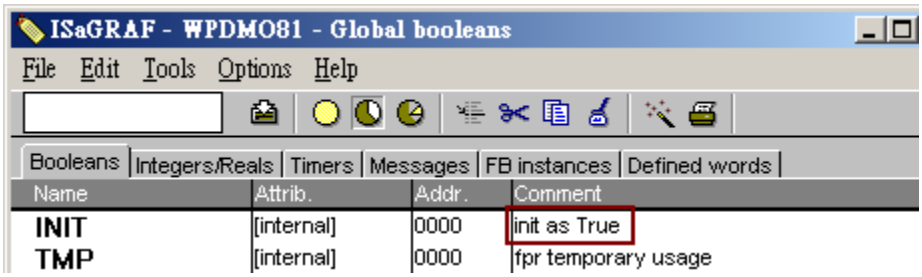
IO connection:



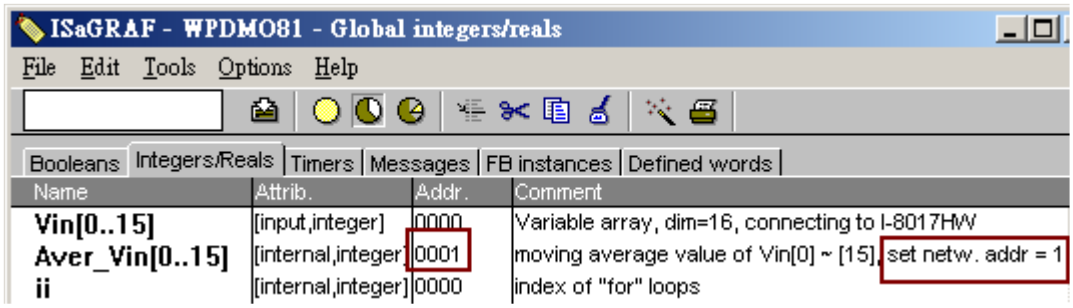
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Variables:

Boolean:



Integers/Reals:



ST1 program:

```
(* operations in the 1st PLC scan, must declare "INIT" with an initial value TRUE *)
if INIT then

  INIT: = False; (* no more *)

  (* Must declare “Aver_Vin” 's network address as 1 in the dictionary.
     assign Modbus network address No. 1,2,3,..., 16 to Variable Array Aver_Vin[0] ~ [15].
     then PC/SCADA/HMI can access to them by Modbus TCP or RTU protocol *)
  TMP:= s_mb_adr( 1, 16, 0);

end if;


(* Calculate a moving vaerage value for Vin[0] ~ [15] and store the result to Aver_Vin[0] ~ [15]. Using
"Aver_N" ID from 1 to 16. (Max. 1024 "Aver_N" and "Aver_F", ID=1 to 1024). The following code
apply sample number as 10 for each "Aver_N".
*)
for ii:= 0 to 15 by 1 do

  (* The last parameter (can be T#0ms, or T#10ms to T#1h), setting T#0ms means to
     sample and calculate the moving average once at each calling "Aver_N". *)
  Aver_Vin[ii]:= Aver_N( ii+1, TRUE, Vin[ii], 10, T#0ms);

end for;
```


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User may also program the “Aver_N” and “Aver_F” in the Ladder program as the following (Then you need to program 16 “Aver_N”).

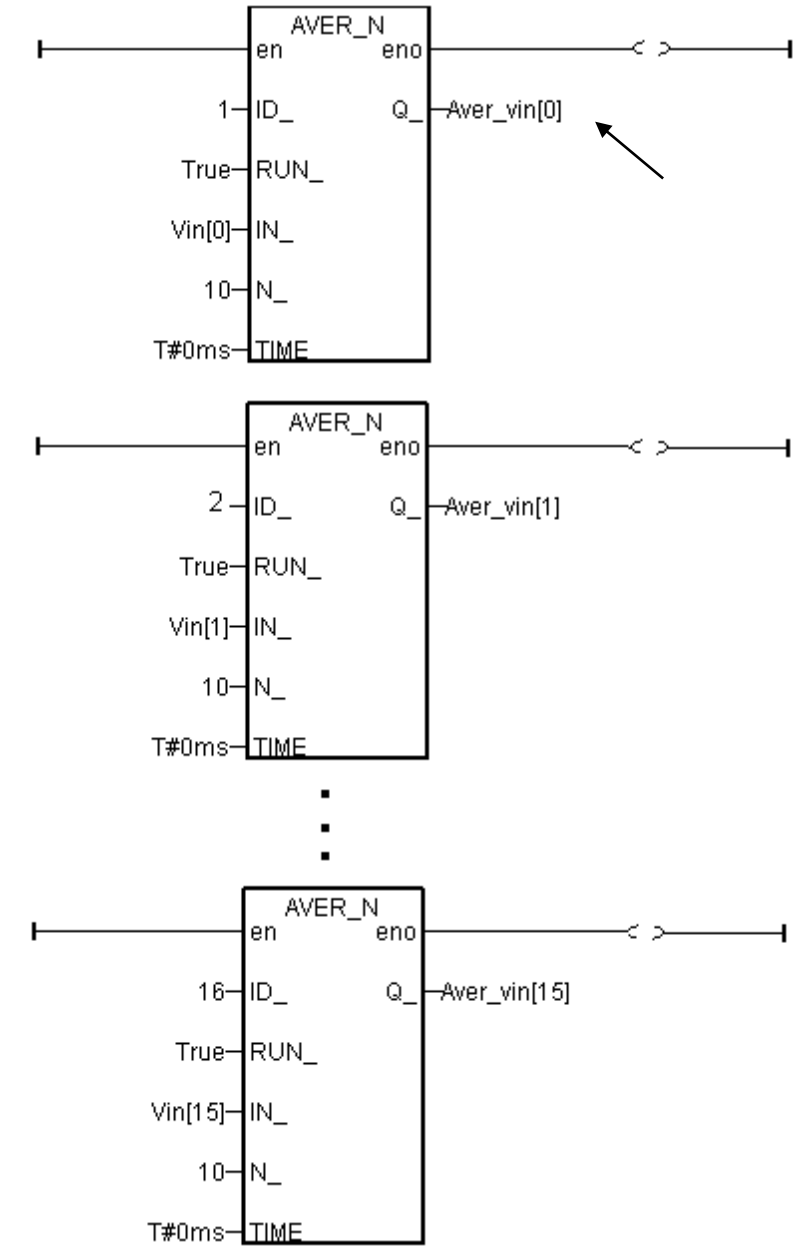
ID can be 1 to 1024.

RUN : Set as True to start sampling and calculating.
If set as False, then return
Q_ = IN_ (no calculation).

IN_ : the variable value to be calculated.

N_ : number of samples.
Can be 1 to 50.

TIME_ : Can be T#0ms or T#10ms to T#1h.
The interval to sample and calculate once.
Set as T#0ms means to sample and calculate once at each calling it.



The moving average value after calculation.

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