
APPLICATION EXAMPLE

AC500 TIME OF OPERATION STORE TIME OF OPERATION IN AC500 V2 AND EXCHANGE IT WITH CP600



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2 Introduction

2.1 Scope of the document

Calculate the time of operation of any device with an extra function block.
Store this time and the number of starts as retain persistent variable.

In the CP600 these times can be shown and preset. Transfer from and to AC500 is made via several variables for seconds, minutes, hours and total seconds.

2.2 Compatibility

The application example explained in this document has been used with the below engineering system versions. This should also work with other versions, nevertheless some small adaptations may be necessary, for future versions.

- AC500 V2 PLC
- Automation Builder 2.4.1 or newer (export file can be imported in older versions)
- Panel Builder 2.8.1 (447)

2.3 Overview

The screenshot displays the Automation Builder interface for the 'PRG_TIME_OF_OPERATION (PRG-FBD)' project. The main window shows the function block 'FB_TO_Operation' with its inputs and outputs. The inputs include 'device_on' (TRUE), 'Number_of_starts' (3), and 'Time_of_operation_sec' (44200). The outputs include 'SECONDS' (40), 'MINUTES' (16), 'HOURS' (12), 'DAYS' (0), 'YEARS' (0), 'NO_STARTS' (3), 'BATT_WRN' (FALSE), and 'BATT_ERR' (FALSE). The function block is connected to a 'TIME_OF_OPERATION' block, which in turn is connected to a 'Global Variables' block. The 'Global Variables' block contains variables for 'dw_ToOp', 'dw_hhours', 'dw_minutes', 'dw_seconds', 't_ToOp', 't_ToOp_TOD', 'ui_Pre_Sec', 'ui_Pre_Min', 'ui_Pre_Hours', 'ui_Pre_Days', 'ui_Pre_Years', and 'xPreset'. The 'Global Variables' block also shows the 'Time of operation' as 44200 seconds, 12:16:40, and 44200 seconds total. The 'Global Variables' block is connected to the 'HMI Simulator' window, which displays the 'Time of operation' as 12:16:40 and 44200 seconds total. The 'HMI Simulator' window also shows a 'Preset' button and a 'Set' button.

TIME OF OPERATION			
PRG_TIME_OF_OPERATION.FB_TO_O DEV1			
ON	TRUE	SECONDS	40
RESET	FALSE	MINUTES	16
PRESET	FALSE	HOURS	12
PRE_SEC	0	DAYS	0
PRE_MIN	14	YEARS	0
PRE_HOUR	12	NO_STARTS	3
PRE_DAY	0	BATT_WRN	FALSE
PRE_YEAR	0	BATT_ERR	FALSE
Time of operation in seconds		44200	
Time of operation as TIME		T#736m40s0ms	
Time of operation as TOD		TOD#12:16:40	

Global Variables

Variable	Value
dw_ToOp	44200
dw_hhours	12
dw_minutes	16
dw_seconds	40
t_ToOp	T#736m40s0ms
t_ToOp_TOD	TOD#12:16:40
ui_Pre_Sec	0
ui_Pre_Min	14
ui_Pre_Hours	12
ui_Pre_Days	0
ui_Pre_Years	0
xPreset	FALSE

HMI Simulator

Time of operation

12 : 16 : 40 hh:mm:ss

44200 Seconds total

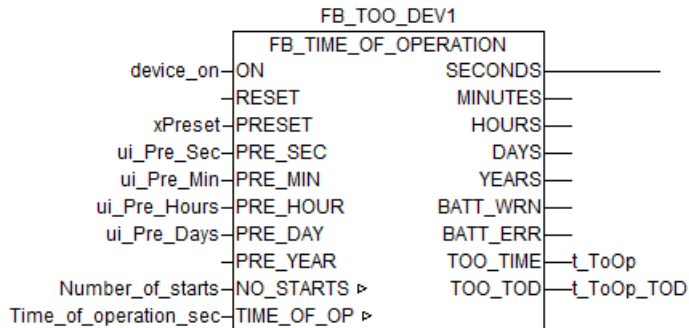
Preset

0: 12 : 14 : 0 dd:hh:mm:ss

Set

3 AC500 Program

3.1 Function block “FB_TIME_OF_OPERATION”



3.1.1 DESCRIPTION:

FB for measuring the time of operation of a device.

If ON Input is set the time count starts.

ACCURACY:

The internal time count is done in milliseconds.

Because of tolerances of the real time clock in PLC the calculated value can be up to 0,02% less than real operation time.

This means that the calculated operation time in one year can be 1hour 45min less than real operation time. (8760 h/year)

WARNING:

In_Output TIME_OF_OP must be declared as retain persistent variable to keep the value if PLC is powered off or the program is downloaded. Therefore, a battery must be used. Then only Online\Rest(cold) or input RESET at the FB will set the TIME_OF_OP to zero.

The BATT_WRN and BATT_ERR outputs reflect the battery status.

For AC500-eCo CPUs a battery is not needed.

FB takes STOP of PLC and PowerOn in consideration.

TIME_OF_OP, time of operation is counted in seconds. Maximum value reflects more than 136 years.

A visualization element VIS_TIME_OF_OPERATION is prepared to show values or preset time of operation. Use this element in a separate visualization and configure "Placeholder" to instance of FB_TIME_OF_OPERATION which you want to visualize.

RESTRICTIONS: use battery to keep value in case of power down or new download of program! AC500-eCo do not need to have battery.

3.1.2 Inputs

ON: **BOOL** := **FALSE**; (* device is in operating mode - timer counts *)
RESET: **BOOL** := **FALSE**; (* resets the time of operation to zero. Overwrites any PRESET value and set ON-input internal to FALSE *)
PRESET: **BOOL** := **FALSE**; (* set time of operation to value defined at PRE_VAL_x *)
PRE_SEC: **UINT** := 0; (* preset value for time of operation - seconds *)
PRE_MIN: **UINT** := 0; (* preset value for time of operation - minutes *)
PRE_HOUR: **UINT** := 0; (* preset value for time of operation - hours *)
PRE_DAY: **UINT** := 0; (* preset value for time of operation - days *)
PRE_YEAR: **UINT** := 0; (* preset value for time of operation - years (365 days) *)

3.1.3 In_Outputs

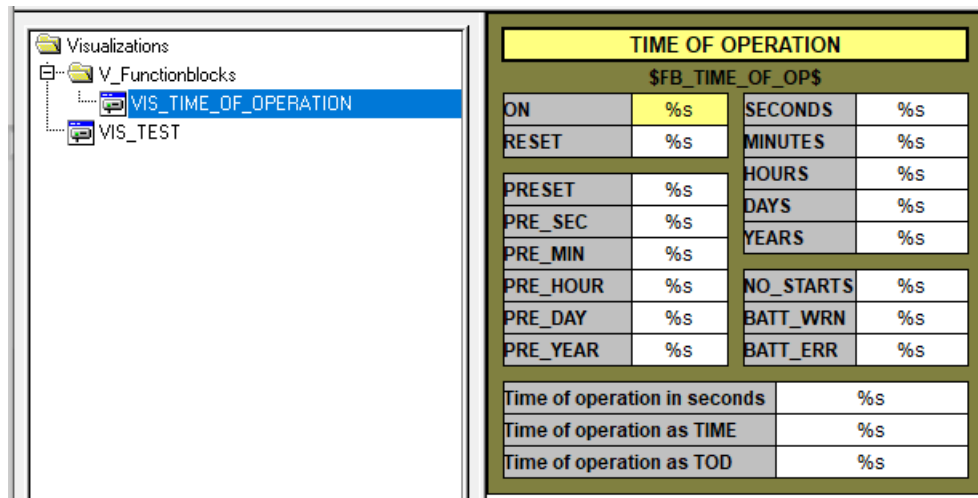
NO_STARTS: **UDINT**; (* number of starts - includes Starts of PLC program *)
TIME_OF_OP: **DWORD**; (* time of operation in seconds *) (* should be stored as permanent resistant variable in main program *)

3.1.4 Outputs

SECONDS: **UINT** := 0; (* seconds of time of operation *)
MINUTES: **UINT** := 0; (* minutes of time of operation *)
HOURS: **UINT** := 0; (* hours of time of operation *)
DAYS: **UINT** := 0; (* days of time of operation *)
YEARS: **UINT** := 0; (* years of time of operation *)
BATT_WRN: **BOOL** := **FALSE**; (* battery warning: charge is below 20%. Battery should be changed *)
BATT_ERR: **BOOL** := **FALSE**; (* battery empty - values will reset in case of power down or new download *)
TOO_TIME: **TIME**; (* time of operation in TIME format - hh:mm:ss,ms *)
TOO_TOD: **TOD**; (* time of operation in TOD format - hh:mm:ss,ms *)

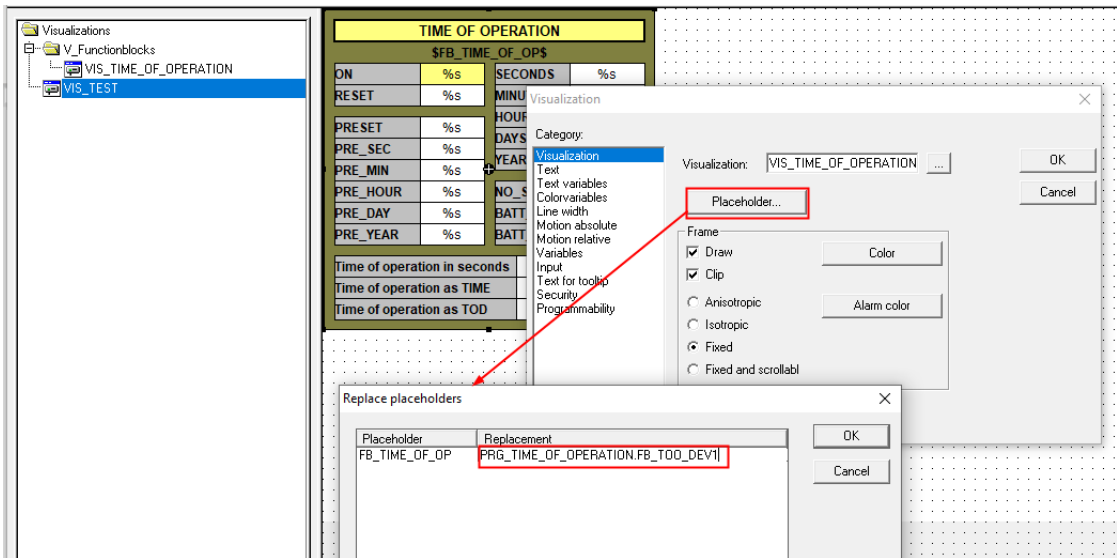
3.2 Visualization in CoDeSys

Webvisu template can be used to check and control and function block.

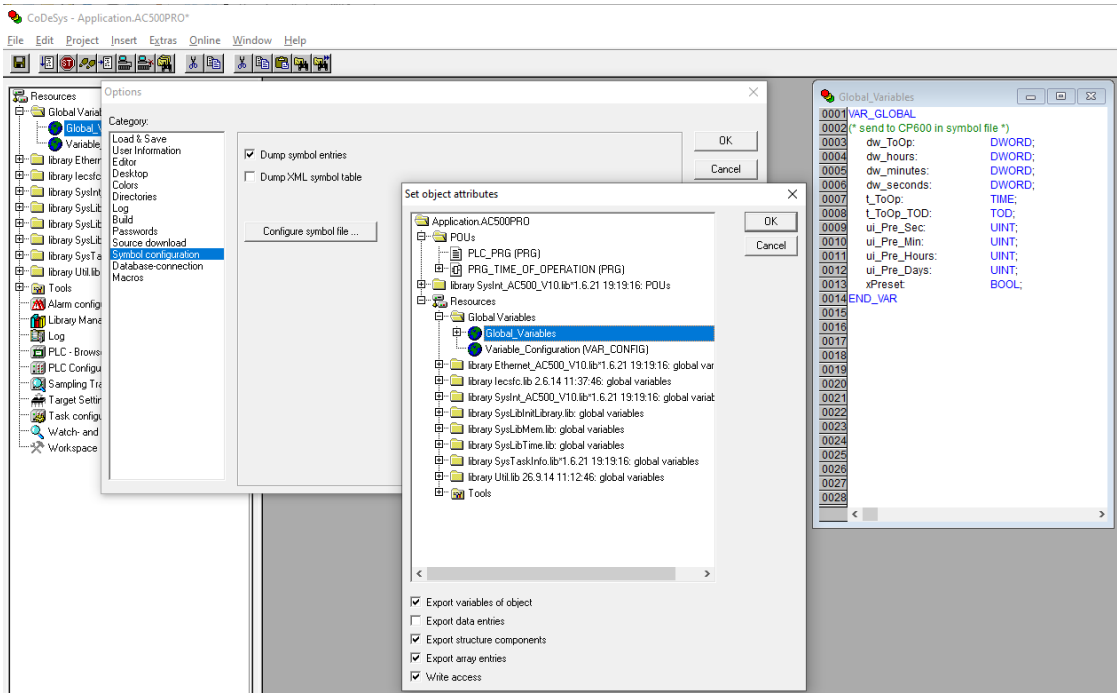


Set the placeholder to the instance of the block that should be visualized.

Inputs, which are not set in the program can be set from the visualization.



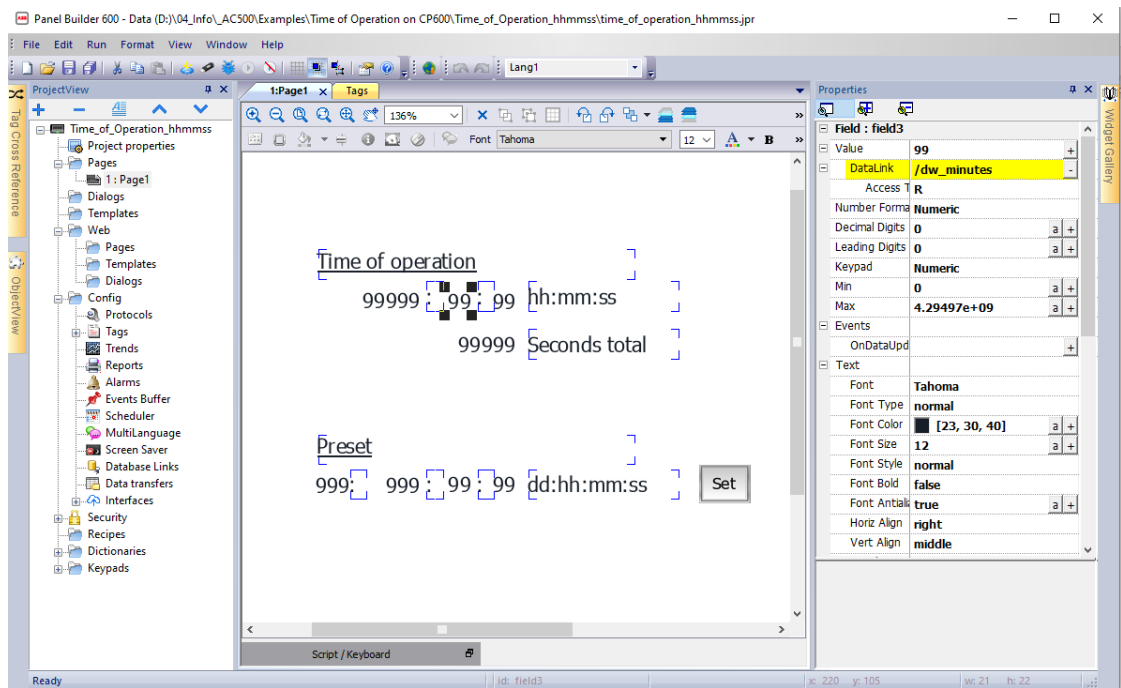
3.3 Symbol configuration for variables for CP600



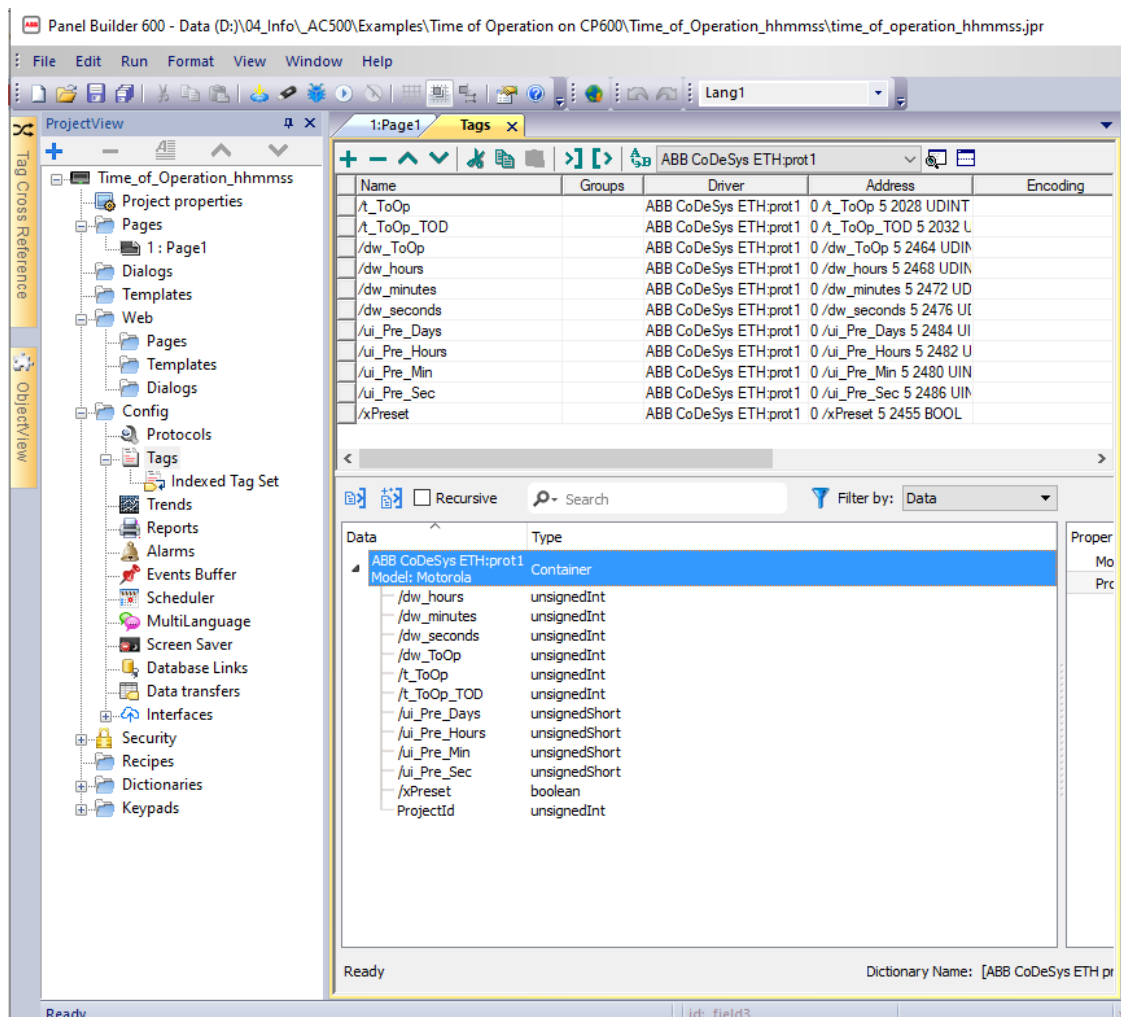
4 CP600 Project

4.1 Configuration

Main Page showing the actual time of operation and possibility to preset any time



Tags



4.2 Online Simulation

Time of operation

12 : 46 : 13 hh:mm:ss

45973 Seconds total

Preset

0: 12 : 14 : 0 dd:hh:mm:ss

Set

5 Distribution

5.1 Application project

The application program is available as Automation Builder 2.4.1 for an PM590-ETH and Panel Builder 2.8.1 (447) project for a CP635 with just one page and few tags.

This can be upgraded to any newer Automation Builder and the PLC type and CP600 type can also be changed without any disadvantages.

5.2 Export file

TIME_OF_OPERATION.exp for CODESYS 2.3.9 IEC61131 programming editor.

Use Project > Import function to integrate in your already existing project.

This includes the following parts:

- POU's
 - o Program: PRG_TIME_OF_OPERATION including the
 - Function block FB_TIME_OF_OPERATION
- Visualizations
 - o VIS_TIME_OF_OPERATION (template)
 - o VIS_TEST including the call of VIS_TIME_OF_OPERATION with the needed placeholder
- Global Varlist
 - o Global_Variables including the variables to be exchanged with CP600

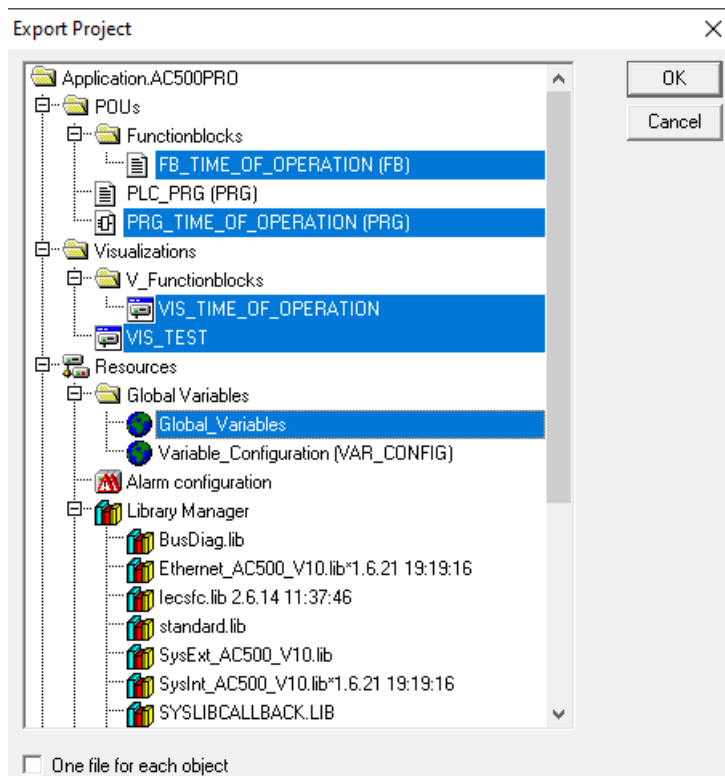


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