Scalable PLC AC500

AC500 CPU Diagnosis Basic module

Diagnosis
Contents

- Diagnosis System
- Local diagnosis at the CPU
- Local diagnosis at the modules
- Diagnosis in Control Builder Plus
- PS501 tools and status bar
- PS501 PLC-Browser
- Diagnosis by use of library SysInt_AC500_Vxx.LIB
- Diagnosis by use of library Diag_AC500_Vxx.LIB
- Extended diagnosis for fieldbus slaves

Diagnosis
Coming up

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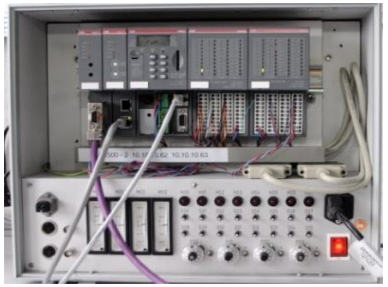
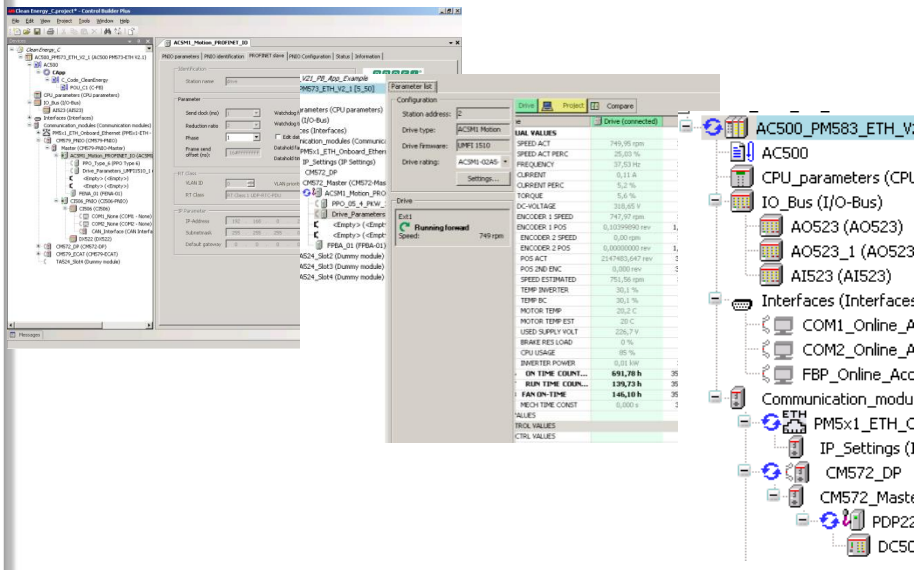
Diagnosis
Diagnosis Sources and Tools

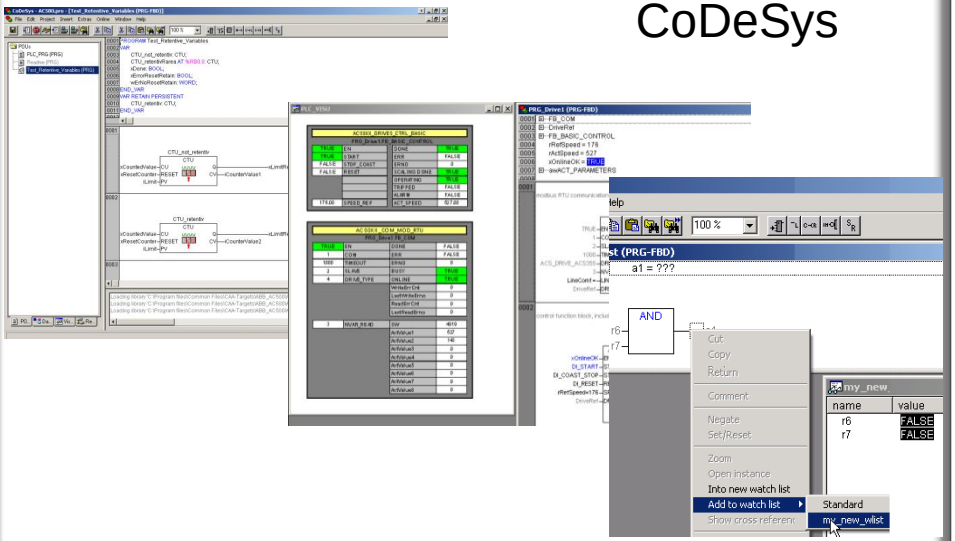
PLC:
- LEDs
- LCD display



Control Builder Plus



Programming tool CoDeSys



Diagnosis
Summary

Diagnosis functions of PS501are available offline or online and as Function Blocks

Diagnosis is used in following cases:

- Hardware configuration (fieldbus check)
- Program creation (compiler: syntax, semantic, variable mapping)
- Testing the logic without PLC (simulation mode and online functions)
- Testing the logic with PLC and commissioning on site
  - Setup/check for ETH-addresses
  - Wiring test, logic test
  - Trouble shooting: configuration errors, logic errors, PLC errors, wiring errors, sensor/actor errors, fieldbus /network errors…
  - Optimizing the cycle time for the task, check the file sizes in the memory
- Exploitation
  - Check of the firmware versions, check the PLC error buffer, check the project tree, check the project info and load
  - Check and trouble shooting: see commissioning

Diagnosis
Diagnosis System of AC500

- Up to 100 error messages are managed in a circular buffer LIFO
- Each message is provided with the time stamp and attribute:
  - Come
  - Gone
  - Acknowledgement
- The time stamp is generated by Real Time Clock (RTC) of the PLC
- If the RTC was not set or there is no battery in the PLC the time after power on is counted starting with:

  01. Januar 1970, 00:00 AM

Diagnosis
Trouble Shooting: Error Indication

The trouble shooting can be done by use of:

- Hardware
  - The CPU‘s LED „ERR“ „ and CPU‘s display after pushing the „DIAG“ key
  - LEDs at IO modules, communication modules, FieldbusPlugs

- Engineering tools:
  - Error cause in plain text in Control Builder Plus
  - Fieldbus and Ethernet diagnosis in Control Builder Plus
  - A message in the status line of the CoDeSys project in online mode
  - The command „diagshow all“ and further commands of PLC browser in online mode (Control Builder Plus and CoDeSys)

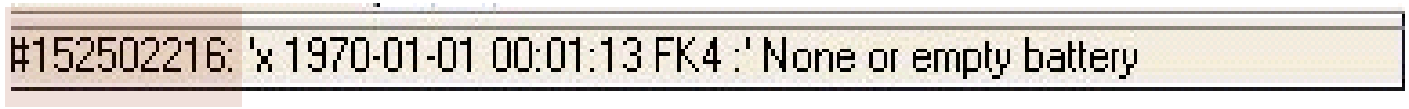
- User program
  - FBs from ABB library SysInt_AC500_Vxx.lib integrated in user program
  - FBs from ABB library Diag_AC500_Vxx.lib integrated in user program
  - FBs from ABB library of the appropriate fieldbus integrated in user program

Diagnosis
Error Number

Each error message has a unique error number providing the following information:

- State (come, gone, acknowledged)
- Error class
- Faulty component
- Faulty device
- Faulty module
- Faulty channel
- Error identifier

Error number



Diagnosis
The Error Classes

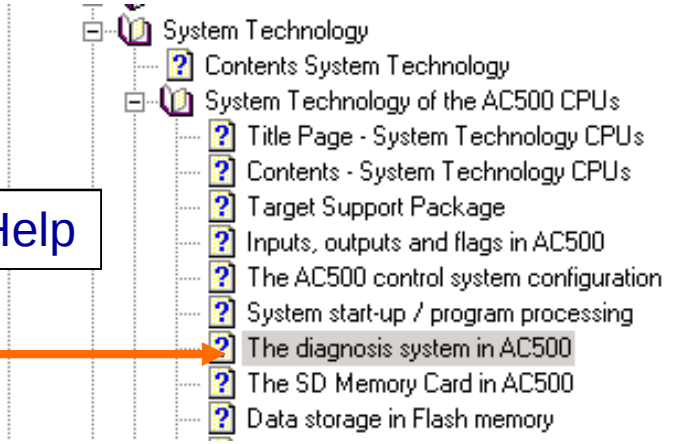
Error class

#152502216: 'x 1970-01-01 00:01:13 FK4 :' None or empty battery

The error classes:

E1	fatal	the operating system is insecure: PLC is STOPPED
E2	severe	the program execution is insecure: PLC is STOPPED
E3	light	PLC behavior is defined by project configuration
E4	warning	PLC behavior is defined by project configuration

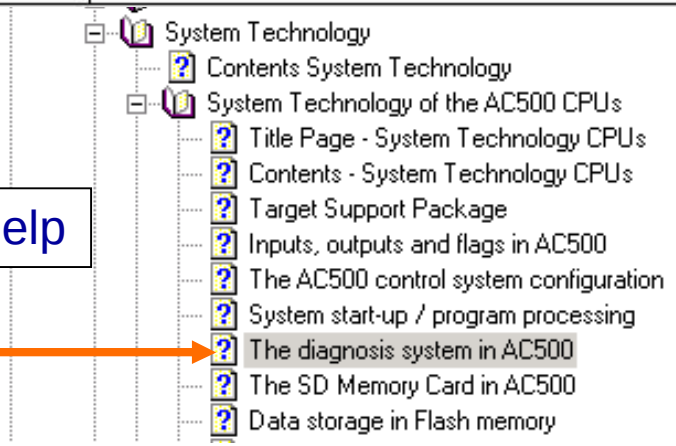
For more details see CoDeSys Help



Diagnosis
Error Lists: Example Battery Error

E1..E4	d1	d2	d3	d4	Identifier 000...063	AC500 display	
Class	Comp	Dev	Mod	Ch	Err	PS501 PLC browser	<- displayed in 5)
Byte 6 Bit 6..7	-	Byte 3	Byte 4	Byte 5	Byte 6 Bit 0..5	FBP-diagnosis block	
Class	Inter-face	De-vice	Mod-ule	Chan-nel	Error identifier	Error message	Remedy
	1)	2)	3)	4)			
AC500 CPU errors							
Errors directly reported by the CPU							
4	9	22	31	31	8	Missing or exhausted battery	Insert battery or set parameter "Check Battery" to "Off"

For more details see CoDeSys Help



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Coming up

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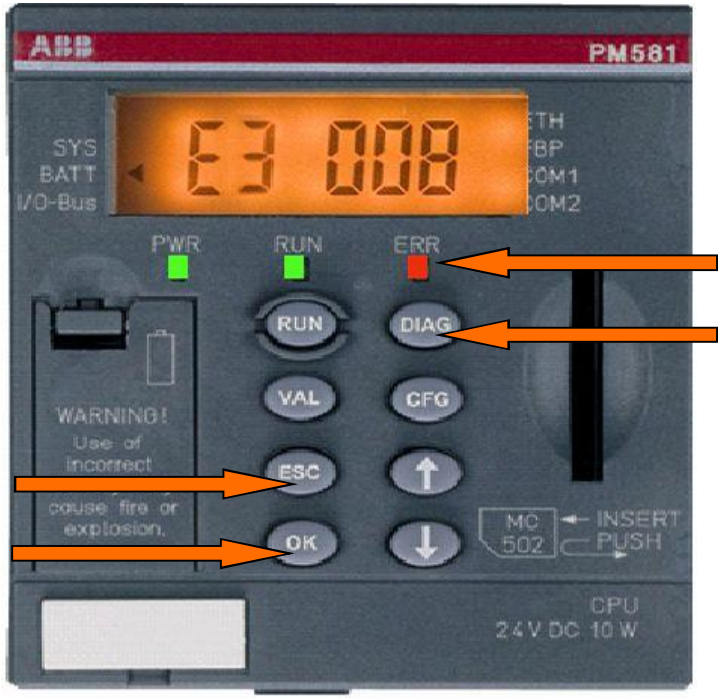
Diagnosis
Local Diagnosis by Means of CPU‘s LCD Display



Errors are indicated by:

- The CPU’s LED ERR
- The CPU’s display:
  Error class / error number
- For each detail information push repeatedly the DIAG key:

  detail information 1 = component
  detail information 2 = device
  detail information 3 = module
  detail information 4 = channel

  Exit display by pushing:
  ESC without error acknowledgement or
  OK with error acknowledgement

Diagnosis
Example: CPU display in case no battery/low battry voltage

Pushbutton	Display	Meaning
<DIAG>	E4 008	E4=Warning / Identifier = Empty/Not available
<DIAG>	d1 009	Detail information d1 = 009 -> Component=CPU
<DIAG>	d2 022	Detail information d2 = 022 -> Device=Battery
<DIAG>	d3 031	Detail information d3 = 031 -> Module=no specification
<DIAG>	d4 031	Detail information d4 = 031 -> Channel=no specification
<DIAG>	E4 008	E4=FK4 / Identifier = Empty/Not available
<ESC>	run/StoP	Diagnostic display is quit without error acknowledgement.
<DIAG>	E4 008	E4=FK4 / Identifier = Empty/Not available
<OK>	run/StoP	Diagnostic display is quit with error acknowledgement. If no further non-acknowledged errors exist, the LED "ERR" goes off.

Note: Diagnosis of AC500 PM55x and PM56x can only be shown by LED ERR at CPU

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Diagnosis
S500 I/O Modules: General

LED	Status	Color	LED = OFF	LED = ON	LED flashes
Inputs 00...31	digital input	yellow	Input = OFF	Input = ON (the input voltage is even displayed if the supply voltage is OFF).	--
UP	Process supply voltage 24 V DC via terminal	green	Process supply voltage is missing	Process supply voltage OK	--
CH-ERR1	Channel Error, error messages in groups (digital inputs combined into the groups 1, 2, 3, 4)	red	No error or process supply voltage is missing	Serious error within the corresponding group	Error on one channel of the corresponding group
CH-ERR2		red			
CH-ERR3		red			
CH-ERR4		red			
CH-ERR *)	Module Error	red	--	Internal error	--
*) All of the LEDs CH-ERR1 to CH-ERR4 light up together					

- Local diagnosis by means of LEDs on module
- Diagnosis over I/O-Bus or fieldbus
- Error description always to find in the documentation of the module

Diagnosis
Example AX521/AX522: LED Indication at Module

LED	Status	Color	LED = OFF	LED = ON	LED flashes
inputs 00...03 or 00...07	analog input	yellow	input is OFF	input is ON (brightness depends on the value of the analog signal)	--
outputs 00...03 or 00...07	analog output	yellow	output is OFF	output is ON (brightness depends on the value of the analog signal)	--
UP	process voltage 24 V DC via terminal	green	process voltage is missing	process voltage OK	--
CH-ERR2	Channel Error, error messages in groups (analog inputs or outputs combined into the groups 2 and 4)	red	no error or process voltage is missing	serious error within the corresponding group	error on one channel of the group
CH-ERR4		red			
CH-ERR *)	Module Error	red	--	internal error	--
*) Both LEDs (CH-ERR2 and CH-ERR4) light up together					

Diagnosis
Example AX521/AX522: Diagnosis (1)

E1..E4	d1	d2	d3	d4	Identifier 000..063	AC500 display	<– Display in
Class	Comp	Dev	Mod	Ch	Err	PS501 PLC browser	
Byte 6 Bit 6..7	-	Byte 3	Byte 4	Byte 5	Byte 6 Bit 0..5	FBP diagnosis block	

Class	Inter-face	De-vice	Mod-ule	Chan-nel	Error identifier	Error message	Remedy
	1)	2)	3)	4)			
Module error AX521 / AX522							
3	14	1..7	31	31	19	Checksum error in the I/O module	Replace I/O module
	11 / 12	ADR	1..7				

Diagnosis evaluation for module and channel errors:

- S500 modules at I/O-Bus: AC500 display
- S500 modules connected via fieldbus : FBP diagnosis block (by means of Function Blocks)

Diagnosis
Example AX521/AX522: Diagnosis (2)

E1..E4	d1	d2	d3	d4	Identifier 000..063	AC500 display	<-- Display in
Class	Comp	Dev	Mod	Ch	Err	PS501 PLC browser	
Byte 6 Bit 6..7	-	Byte 3	Byte 4	Byte 5	Byte 6 Bit 0..5	FBP diagnosis block	

Class	Inter-face	De-vice	Mod-ule	Chan-nel	Error identifier	Error message	Remedy
	1)	2)	3)	4)			
Channel error AX521 / AX522							
4	14	1...7	1	0...3 0...7	48	Analog value overflow or broken wire at an analog input	Check input value or terminal
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	7	Analog value underflow at an analog input	Check input value
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	47	Short-circuit at an analog input	Check terminal
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	48	Analog value overflow at an analog output	Check output value
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	7	Analog value underflow at an analog output	Check output value
	11 / 12	ADR	1...7				

Diagnosis
CS31 Bus Module DC551-CS31: Local Diagnosis

LED	Status	Color	LED = OFF	LED = ON	LED flashes
PWR	System voltage	green	Missing internal system voltage or field bus supply is missing	Internal system voltage is OK	--
CS31	CS31 communication	green	No communication at the CS31 bus module	Communication at the CS31 bus OK	Diagnosis mode
S-ERR	Sum Error	red	No error or system voltage is missing	Internal error (storing can be parameterized)	--
I/O-Bus	Communication via the I/O-Bus	green	No expansion modules connected or data error	Expansion modules connected	Error I/O-Bus
Reserved	Not defined				
I0...I7	Digital inputs	yellow	Input = OFF	Input = ON (the input voltage is even displayed if the supply voltage is OFF)	
C8...C23	Digital inputs/outputs	yellow	Input/output = OFF	Input/output = ON (the input voltage is even displayed if the supply voltage is OFF)	
UP	Process supply voltage and initialization	green	Process voltage is missing	Process voltage OK	--
CH-ERR2	Channel Error, error messages in groups (digital inputs/outputs combined into the groups 2 to 4)	red	No error	Serious error within the corresponding group	Error on one channel of the corresponding group (e.g. short-circuit at an output)
CH-ERR3		red			
CH-ERR4		red			
CH-ERR *)	Module Error	red	No error or process voltage is missing	Internal error	--
*) All LEDs CH-ERR2 to CH-ERR4 light up together					

Diagnosis
FBP Interface Module DC505-FBP (1)

LED	Status	Color	LED = OFF	LED = ON	LED flashes
PWR	System voltage (supply voltage 24 V DC via FBP)	green	Missing internal system voltage or field bus supply is missing	Internal system voltage is OK	--
FBP	FBP communication	green	Communication with the field bus plug does not work correctly	Communication with the field bus plug is OK	Diagnosis mode
S-ERR	Sum error	red	No error or system voltage is missing	Internal error (storing can be parameterized)	--
I/O-Bus	Communication via the I/O-Bus	green	No expansion modules connected or data error	Expansion modules connected	Device is initializing OR Error I/O-Bus
Reserved	not defined				

Diagnosis
FBP Interface Module DC505-FBP (2)

LED	Status	Color	LED = OFF	LED = ON	LED flashes
I0...I7	Digital inputs	yellow	Input = OFF	Input = ON (the input voltage is even displayed if the supply voltage is OFF).	
C8...C15	Digital inputs/outputs	yellow	Input/output = OFF	Input/output = ON (the input voltage is even displayed if the supply voltage is OFF).	
UP	Process supply voltage and initialization	green	Process voltage is missing	Process voltage OK	--
CH-ERR1	Channel Error, error messages in groups (digital inputs/outputs combined into the groups 1 and 2)	red	No error	Serious error within the corresponding group	Error on one channel of the corresponding group (e.g. short-circuit at an output)
CH-ERR2		red			
CH-ERR *)	Module Error	red	No error or process supply voltage is missing	Internal error	--
*) Both LEDs CH-ERR1 and CH-ERR2 light up together					

Diagnosis
FieldBusPlug FBP: Example PDP22

PROFIBUS status		Device status		Status / cause
LED green H1	LED red H2	LED green H3	LED red H4	
off	off	off	off	Power supply is missing
on	flashes			Possible errors: - No connection to the bus master, e.g. PROFIBUS is not operating - The PDP21/PDP22 has a slave address that is not configured in the bus master - Parameter length and slave address are correct but the I/O configuration of the slave does not meet the configuration sent by the bus master
flashes	on			The device parameters received from the bus master are formal incorrect, e.g. of other length
off	on			Connection to the bus master is interrupted longer than the timeout set by the bus master before interruption
on	**off**			Normal data exchange to the PROFIBUS DP master
		on	**off**	Normal data exchange to the terminal device
flashes	flashes	flashes	flashes	Plug is under self-test during power-up
		flashes	off	Plug is waiting for configuration data to be sent from the device (number of input/output bytes, number of parameter bytes, internal baud rate etc.) Note: If no data has been sent by the terminal device within 3 s, the plug switches to the parallel mode.
		off	flashes	Error: can be remedied, e.g. connection to the terminal device is broken
		off	on	Error: cannot be remedied, e.g. incorrect check sum in the Flash. Exchange the plug.

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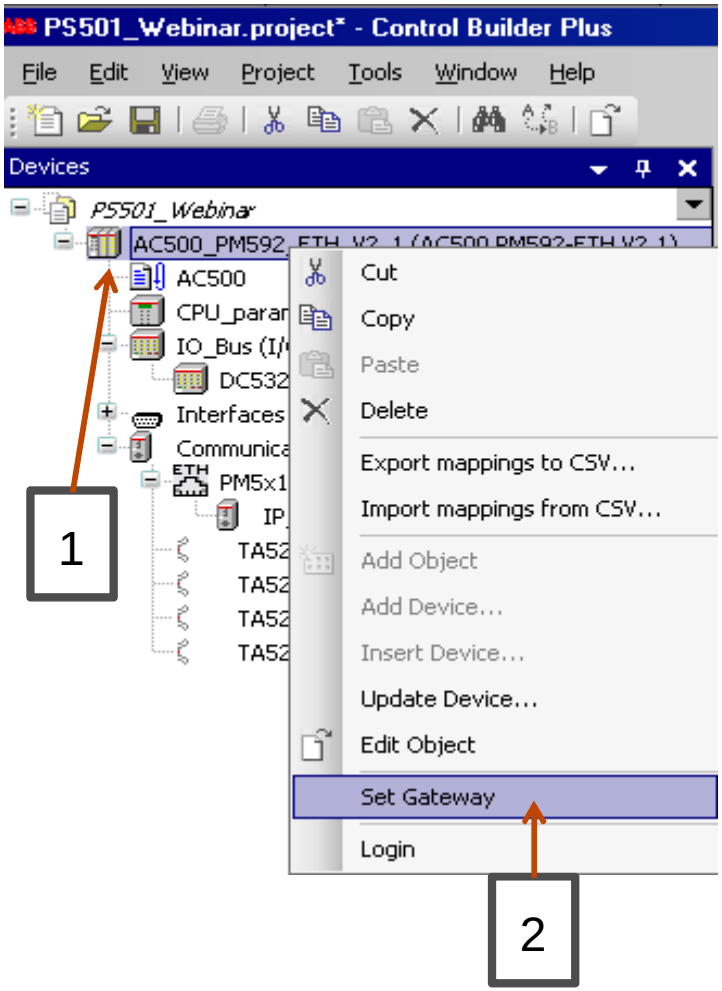
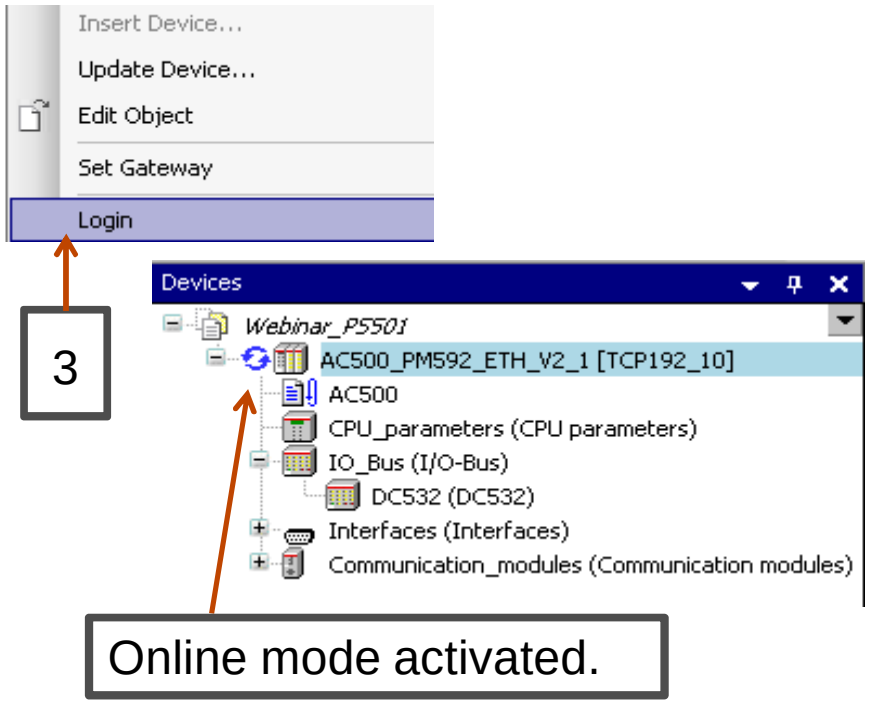
New features of PS501 Control Builder Plus

New diagnosis features – Online access in CBP



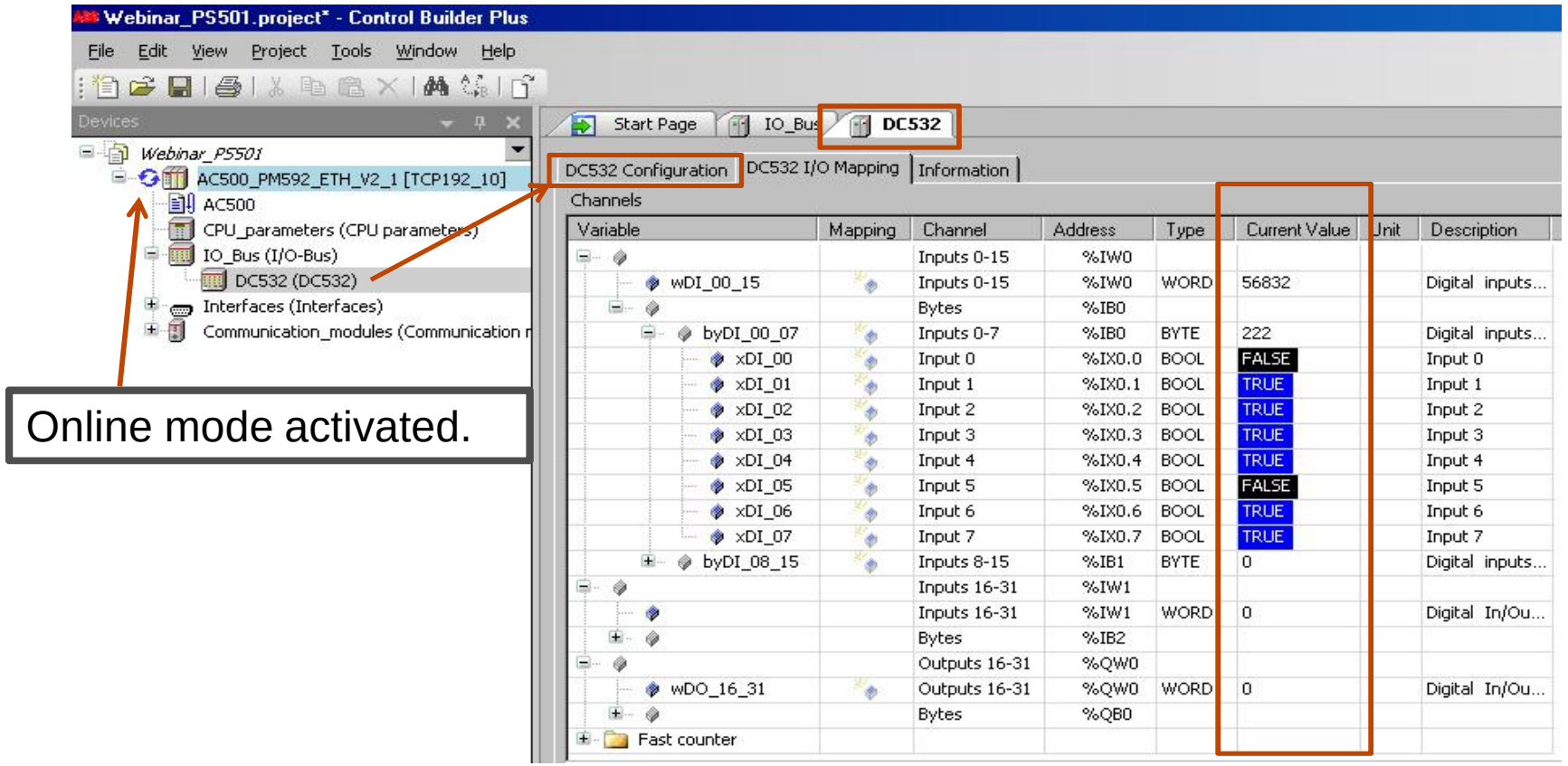
- The Online diagnostics consists of a set of partly animated, mostly read only views.



New features of PS501 Control Builder Plus

New diagnosis features – Online Monitoring I/O in CBP

In Online mode, I/O component mapping tables are showing animated live values which are updated every second. No forcing available.

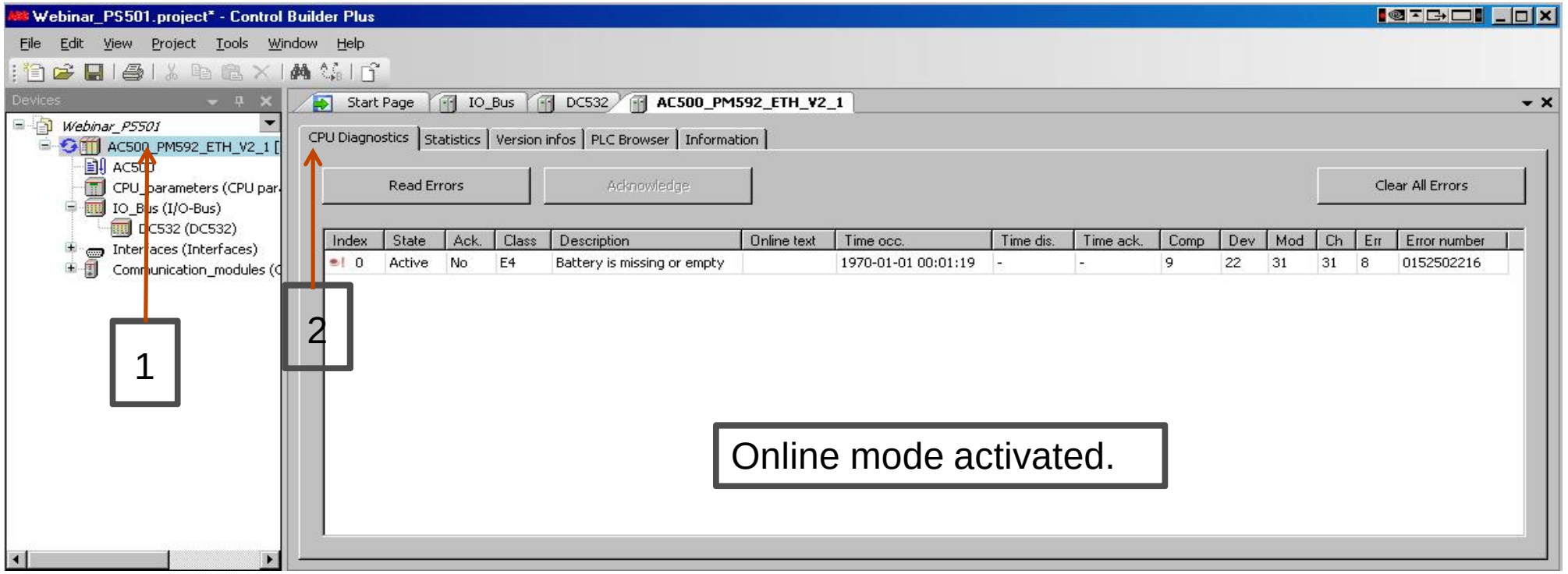


Variable	Mapping	Channel	Address	Type	Current Value	Unit	Description
		Inputs 0-15	%IW0				
wDI_00_15		Inputs 0-15	%IW0	WORD	56832		Digital inputs...
		Bytes	%IB0				
byDI_00_07		Inputs 0-7	%IB0	BYTE	222		Digital inputs...
xDI_00		Input 0	%IX0.0	BOOL	FALSE		Input 0
xDI_01		Input 1	%IX0.1	BOOL	TRUE		Input 1
xDI_02		Input 2	%IX0.2	BOOL	TRUE		Input 2
xDI_03		Input 3	%IX0.3	BOOL	TRUE		Input 3
xDI_04		Input 4	%IX0.4	BOOL	TRUE		Input 4
xDI_05		Input 5	%IX0.5	BOOL	FALSE		Input 5
xDI_06		Input 6	%IX0.6	BOOL	TRUE		Input 6
xDI_07		Input 7	%IX0.7	BOOL	TRUE		Input 7
byDI_08_15		Inputs 8-15	%IB1	BYTE	0		Digital inputs...
		Inputs 16-31	%IW1				
		Inputs 16-31	%IW1	WORD	0		Digital In/Ou...
		Bytes	%IB2				
		Outputs 16-31	%QW0				
wDO_16_31		Outputs 16-31	%QW0	WORD	0		Digital In/Ou...
		Bytes	%QB0				
Fast counter							

New features of PS501 Control Builder Plus

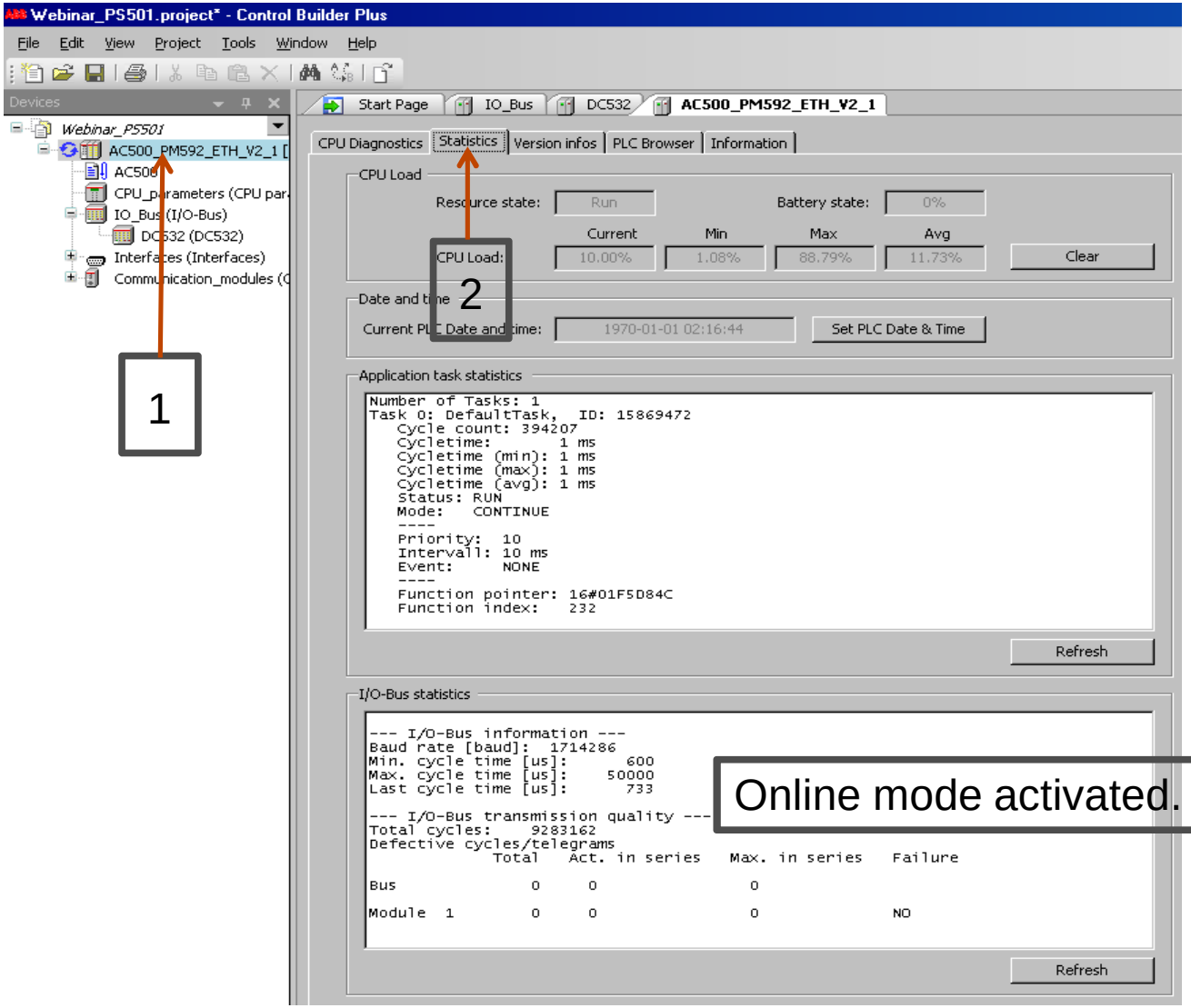
New diagnosis features – Online for CPU, I/O bus and CS31

Overview of the actual contents of the CPU diagnosis buffer



New features of PS501 Control Builder Plus

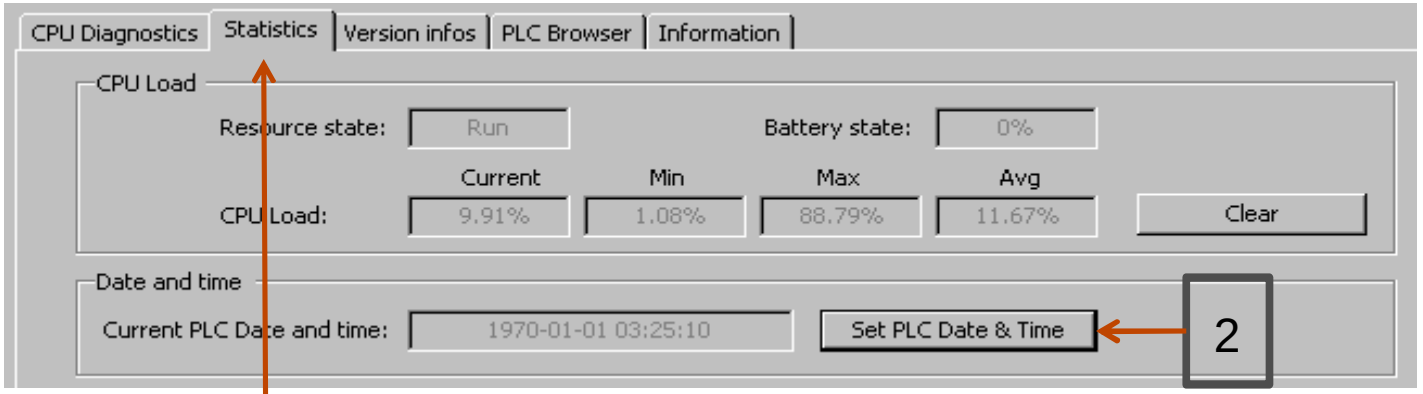
New diagnosis features – Online/Show CPU statistics

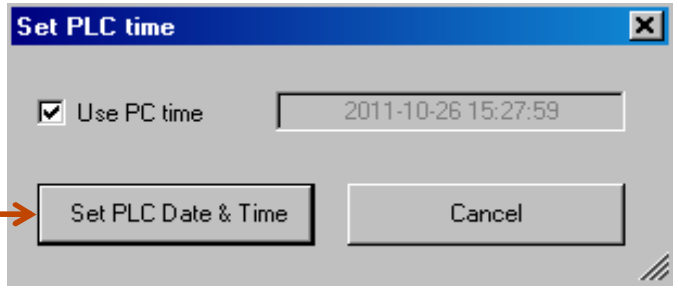


- Actual resource run & battery load states are shown
- Information about the number of application tasks
- Information about the locally connected I/O Modules

New features of PS501 Control Builder Plus
New protocols and parameters – Clock Synchronization

- Synchronize PLC RTC with PC clock

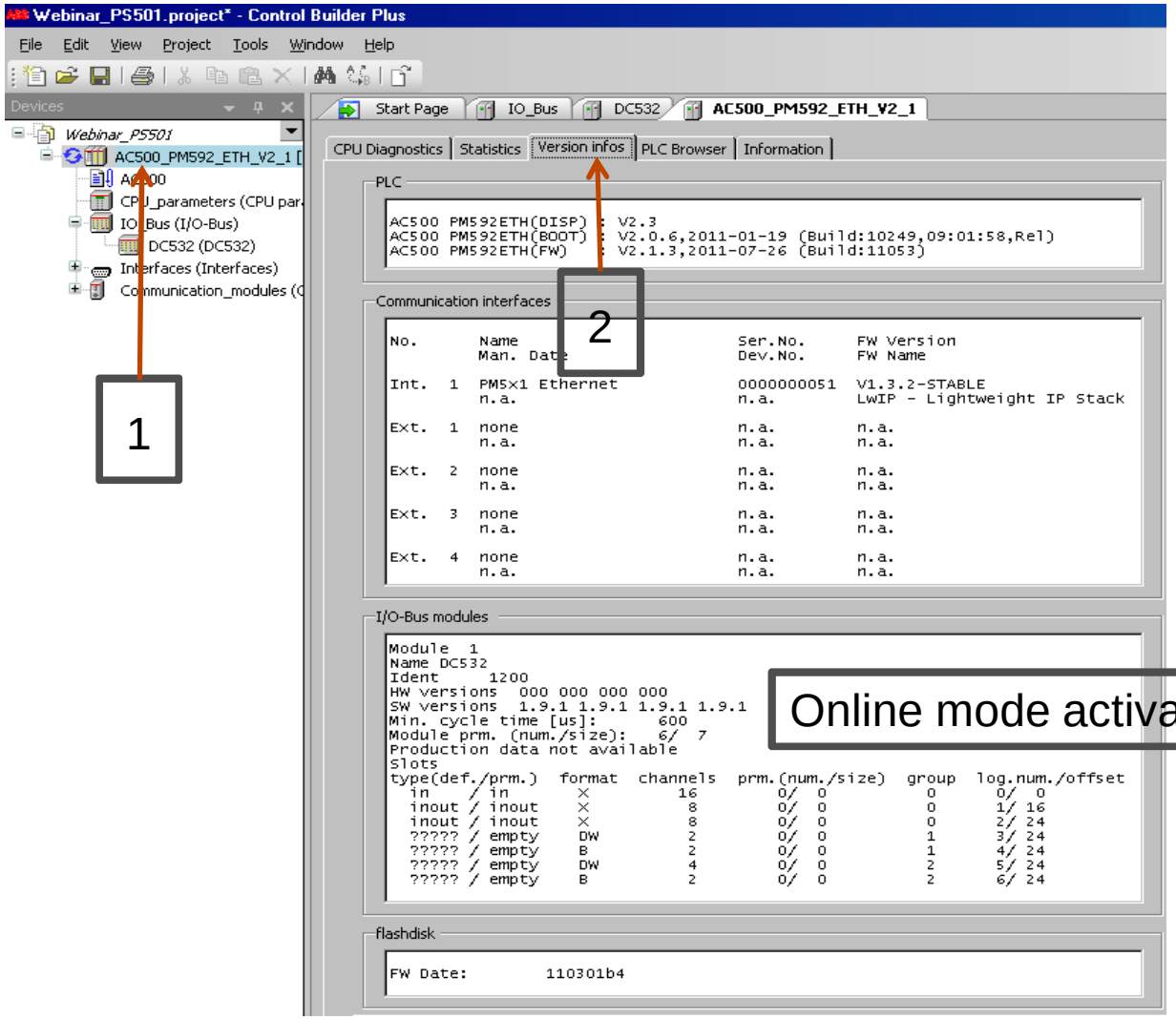




Online mode activated.

New features of PS501 Control Builder Plus

New diagnosis features – Online/Show Devices version info

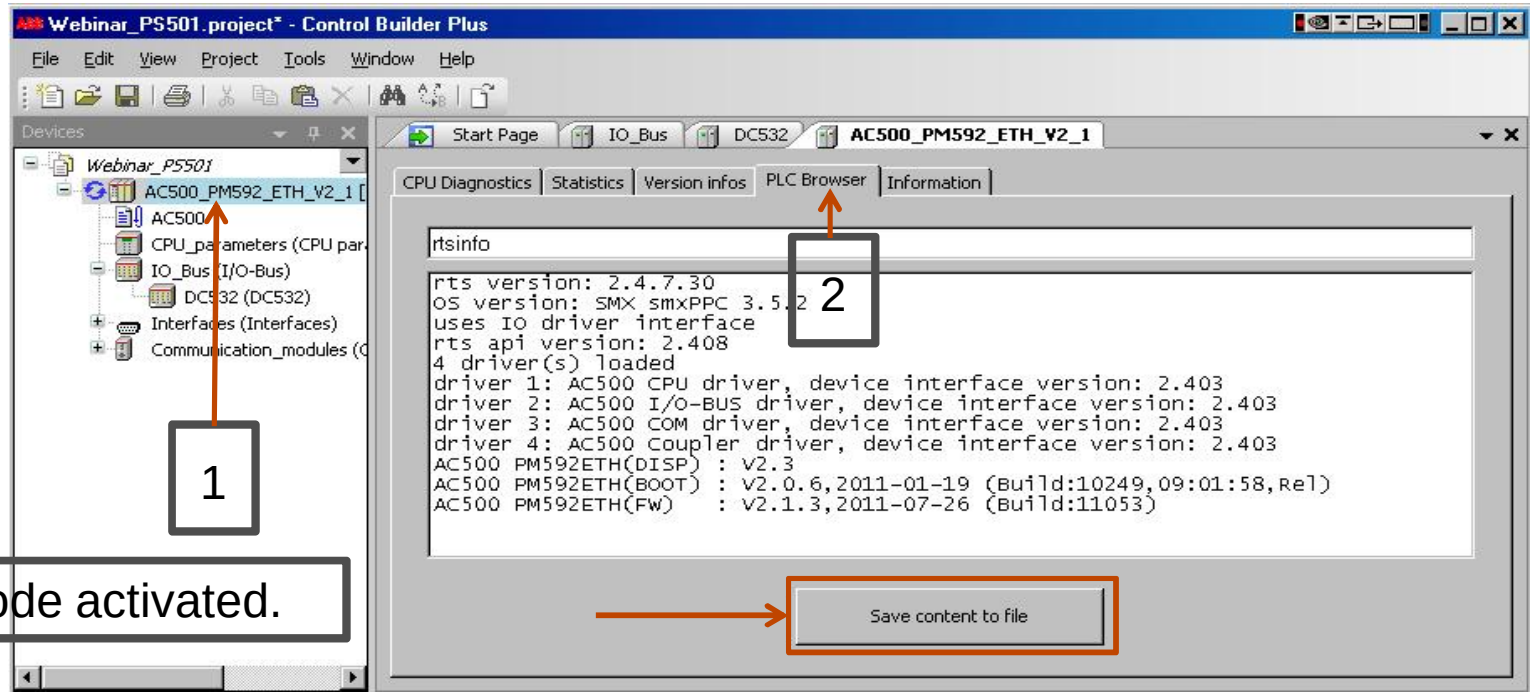


- CPU firmware versions, display, boot and FW
- All internal / external communication module firmware versions
- All versions figures of configured / mounted local I/O –modules

New features of PS501 Control Builder Plus

New diagnosis features – PLC Browser in CBP

- All supported PLC Browser commands can be entered.
- Via "*Save content to file*" the contents of window can be saved to a text file.

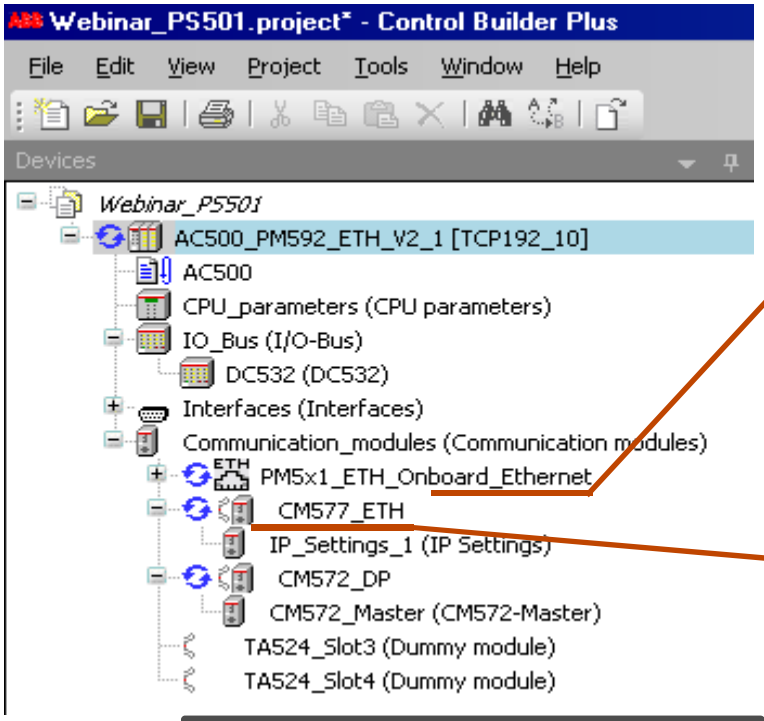


New features of PS501 Control Builder Plus

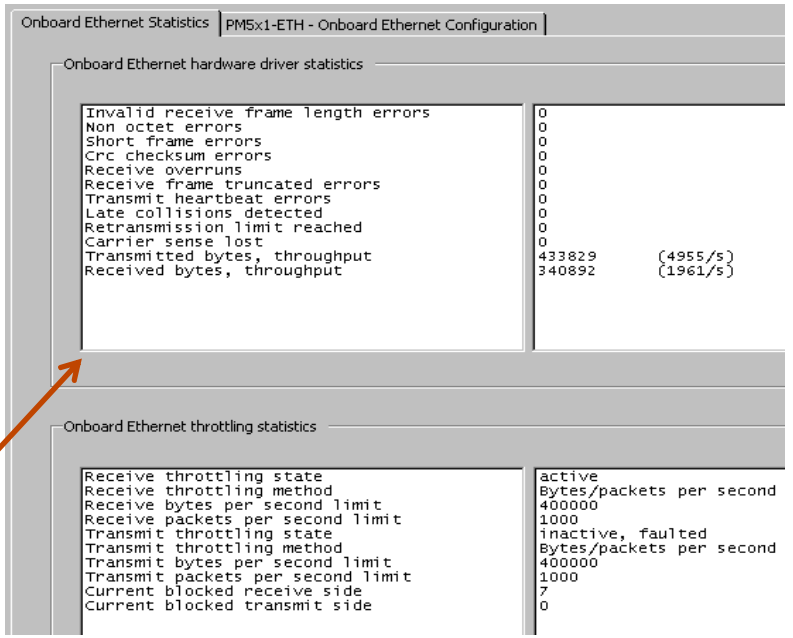
New diagnosis features – Online for Onboard-ETH & CM577

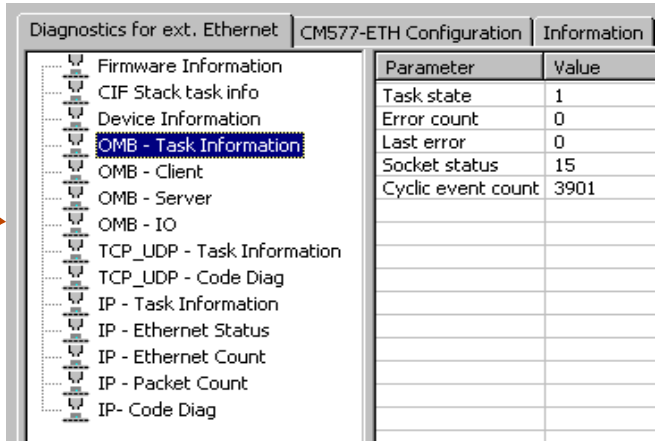
- Diagnosis on internal

  and external ETH couplers



Online mode activated.

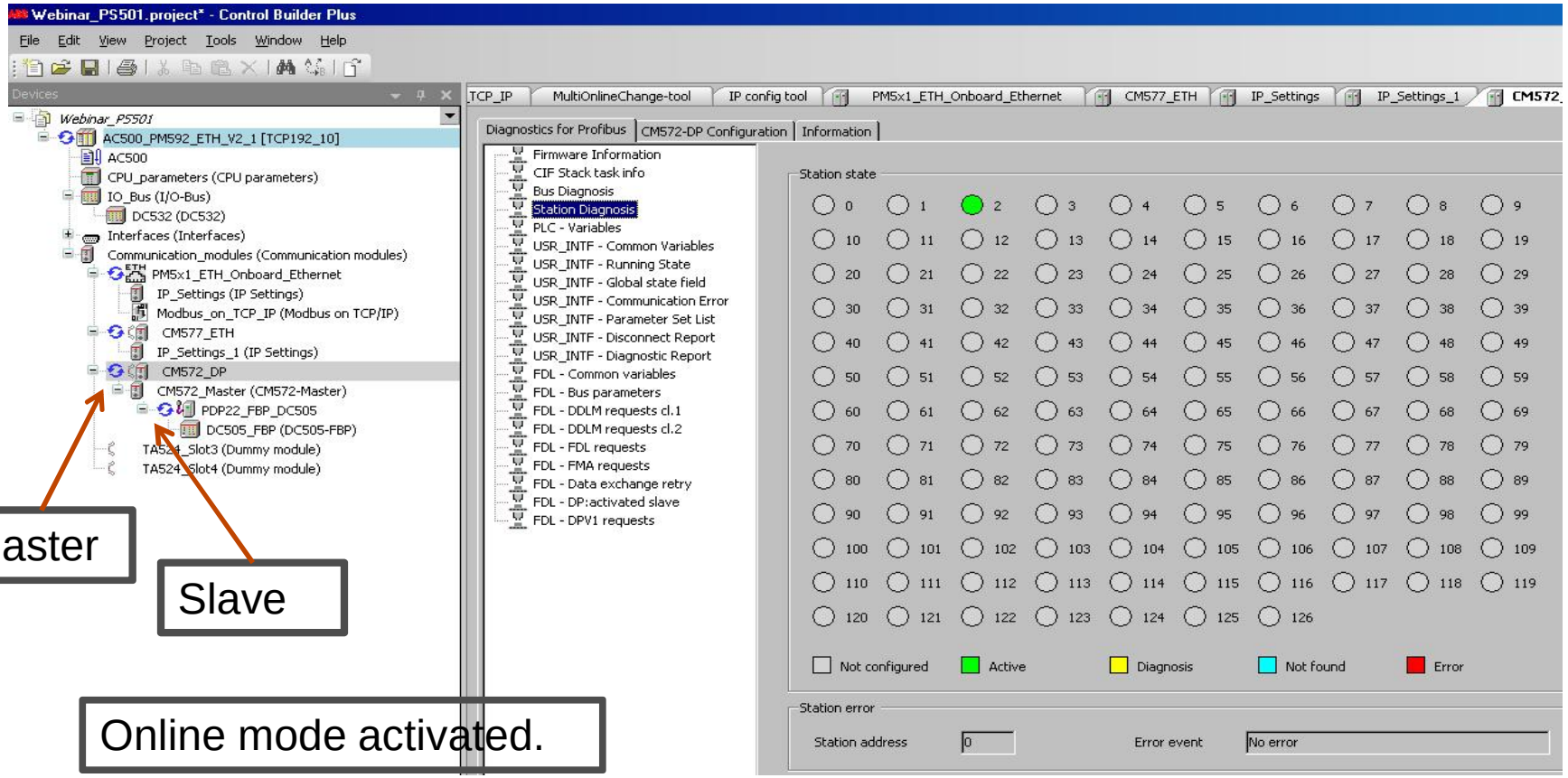




New features of PS501 Control Builder Plus

New diagnosis features – Online for Profibus Master/Slaves

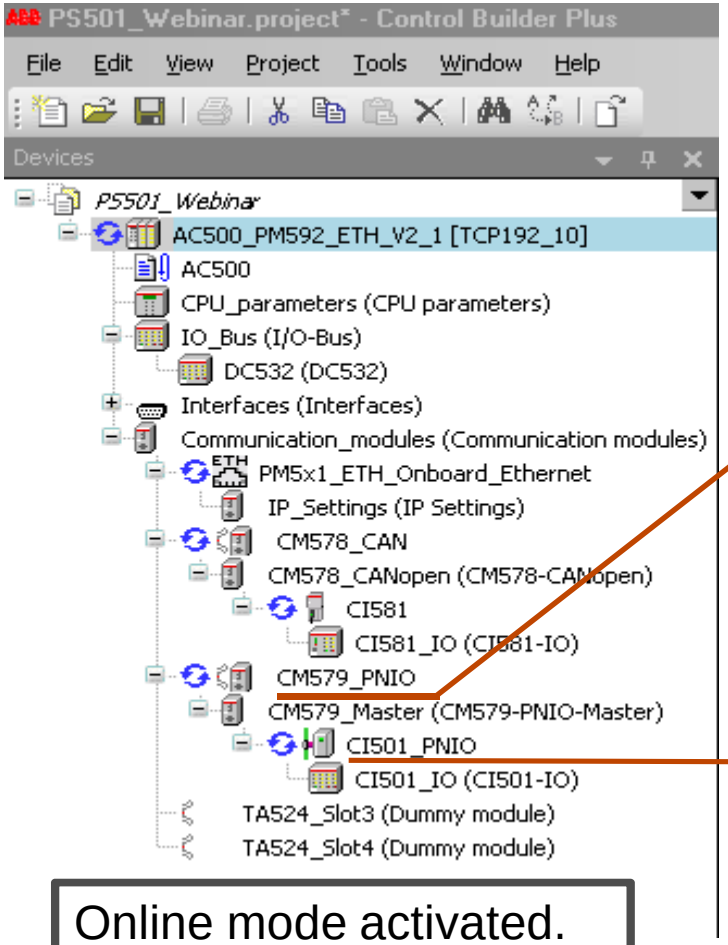
- Different diagnosis available for Profibus-DP Master / Slaves



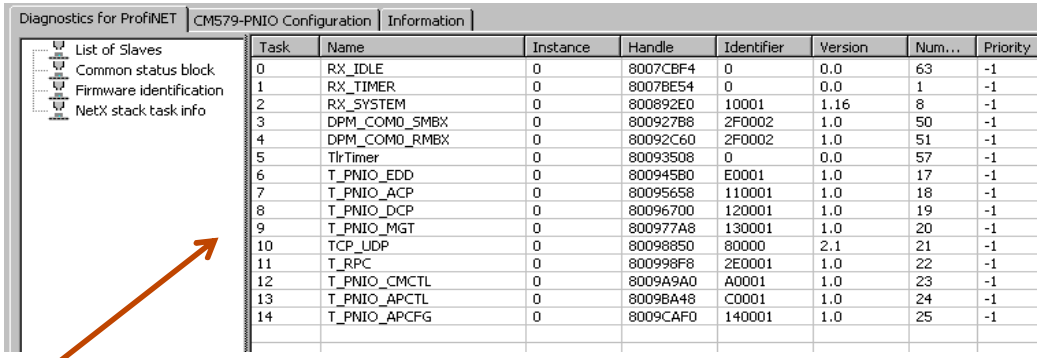
New features of PS501 Control Builder Plus

New diagnosis features – Online for Profinet Master/Slaves

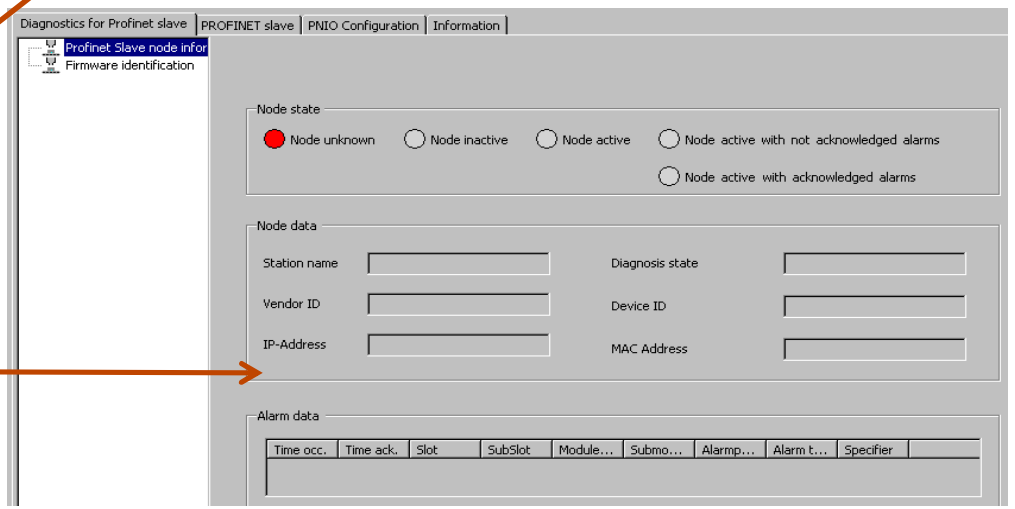
- Different diagnosis available for Profinet Master / Slaves



Online mode activated.



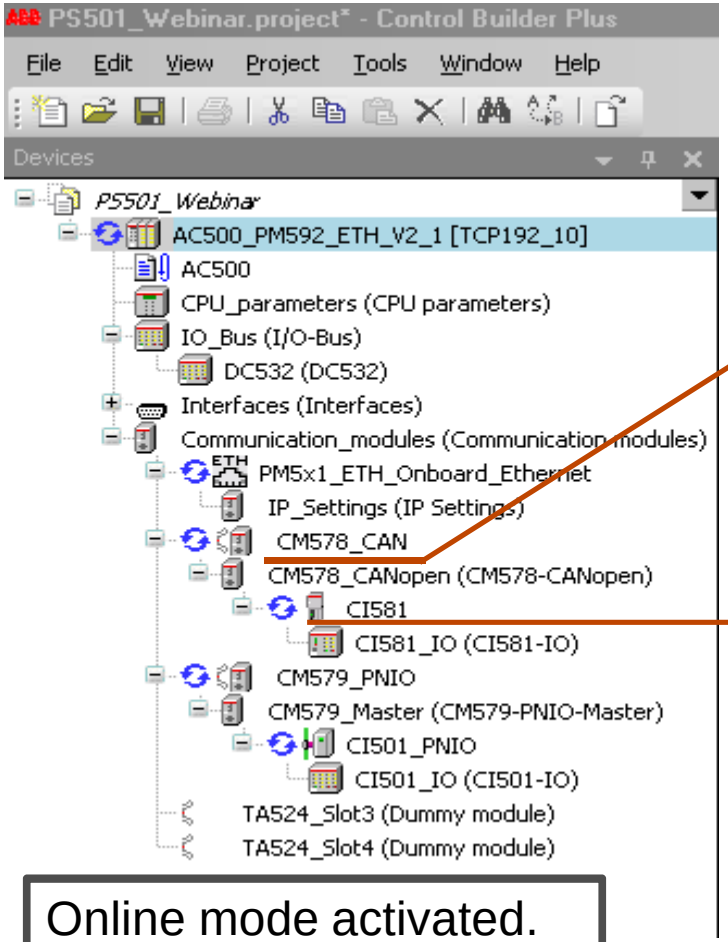
Task	Name	Instance	Handle	Identifier	Version	Num...	Priority
0	RX_IDLE	0	8007CBF4	0	0.0	63	-1
1	RX_TIMER	0	8007BE54	0	0.0	1	-1
2	RX_SYSTEM	0	800892E0	10001	1.16	8	-1
3	DPM_COM0_SMBX	0	800927B8	2F0002	1.0	50	-1
4	DPM_COM0_RMBX	0	80092C60	2F0002	1.0	51	-1
5	TlrTimer	0	80093508	0	0.0	57	-1
6	T_PNIO_EDD	0	800945B0	E0001	1.0	17	-1
7	T_PNIO_ACP	0	80095658	110001	1.0	18	-1
8	T_PNIO_DCP	0	80096700	120001	1.0	19	-1
9	T_PNIO_MGT	0	800977A8	130001	1.0	20	-1
10	TCP_UDP	0	80098850	80000	2.1	21	-1
11	T_RPC	0	800998F8	2E0001	1.0	22	-1
12	T_PNIO_CMCTL	0	8009A9A0	A0001	1.0	23	-1
13	T_PNIO_APCTL	0	8009BA48	C0001	1.0	24	-1
14	T_PNIO_APCFG	0	8009CAF0	140001	1.0	25	-1



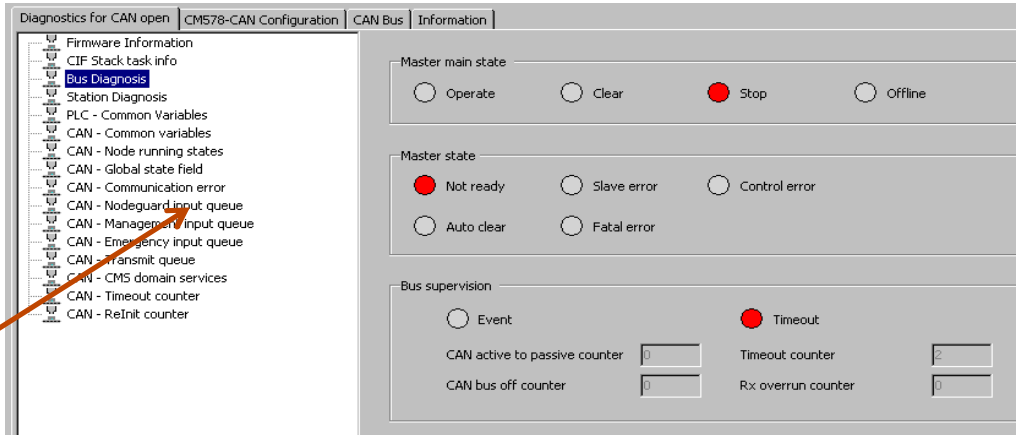
New features of PS501 Control Builder Plus

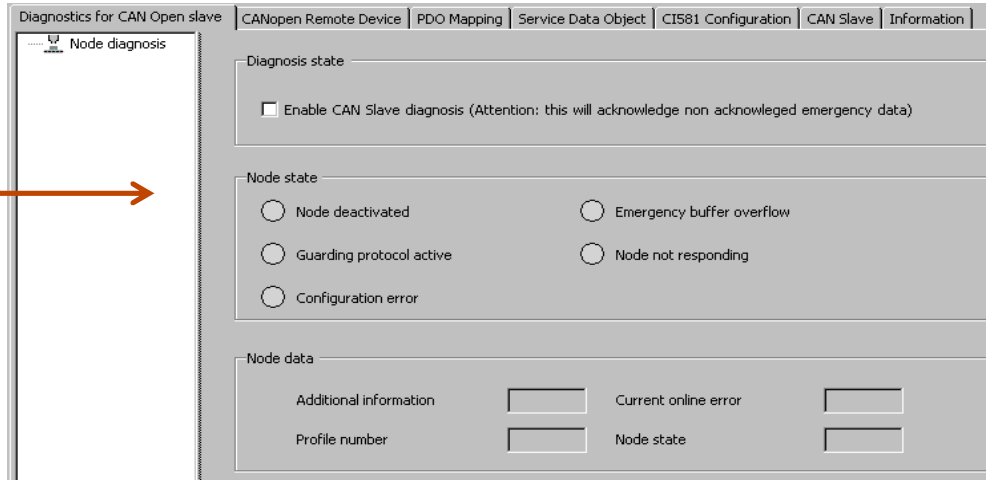
New diagnosis features – Online for Canopen Master/Slaves

- Different diagnosis available for CanOpen Master / Slaves



Online mode activated.

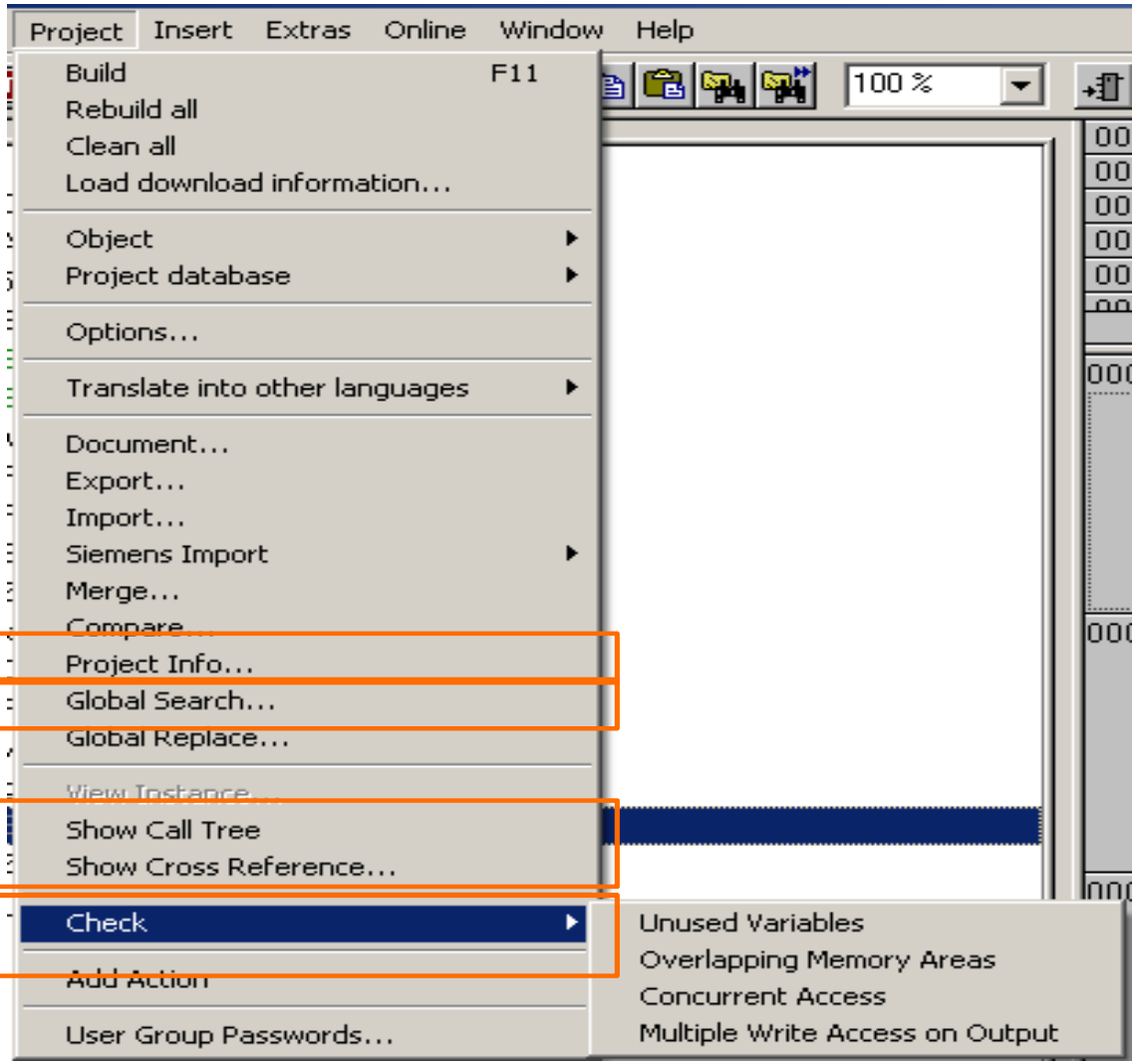




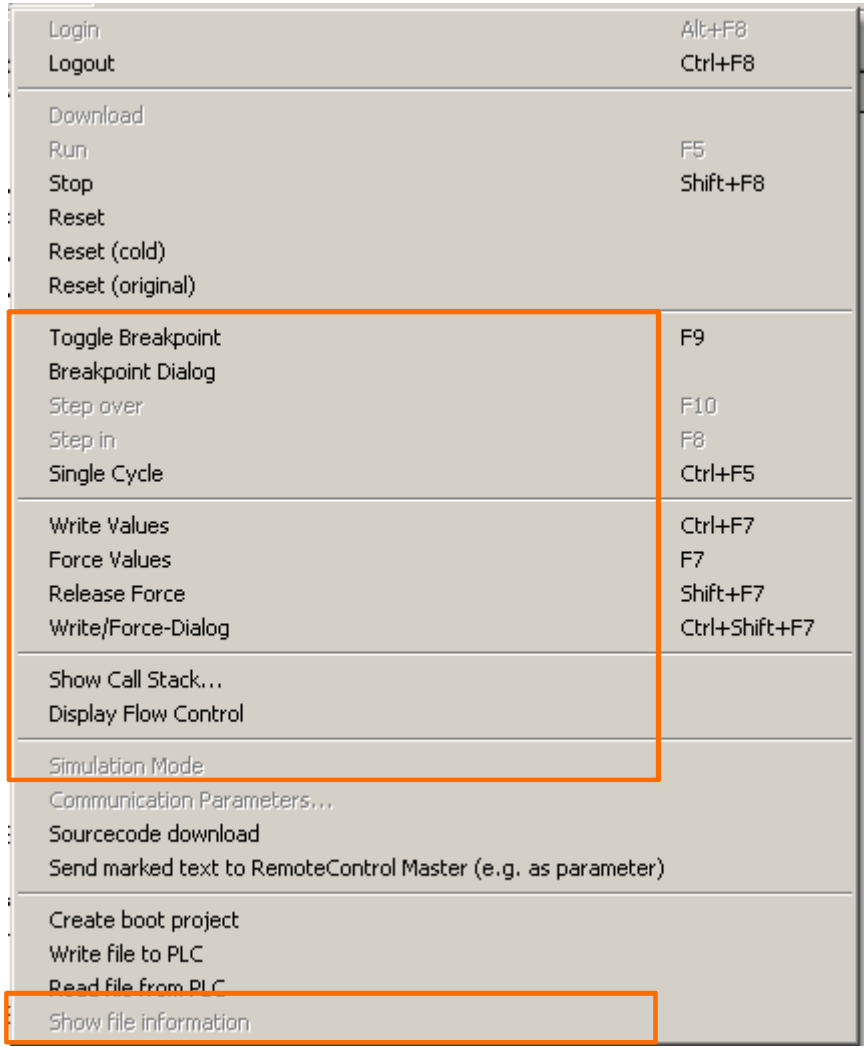
Diagnosis
Coming up

- Diagnosis System
- Local diagnosis at the CPU
- Local diagnosis at the modules
- Diagnosis in Control Builder Plus
- PS501 tools and status bar
- PS501 PLC-Browser
- Diagnosis by use of library SysInt_AC500_Vxx.LIB
- Diagnosis by use of library Diag_AC500_Vxx.LIB
- Extended diagnosis for fieldbus slaves

Diagnosis
Diagnosis tools in CoDeSys Project

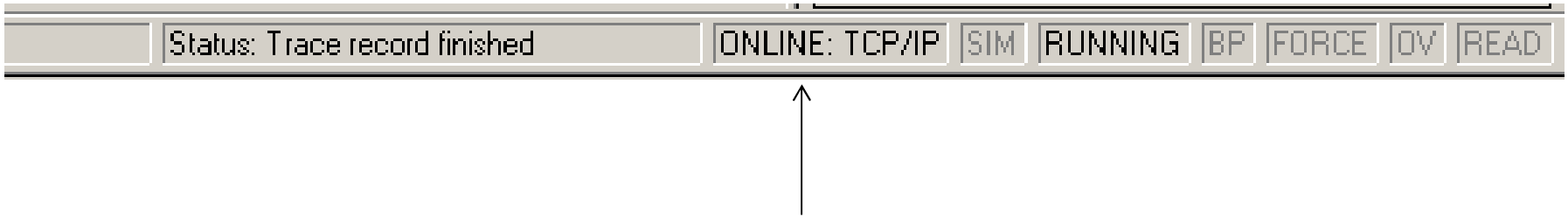


Diagnosis
Diagnosis tools in CoDeSys Project



Diagnosis
Status Line in PS501: Connection and PLC status

Visible in the right down corner of the screen.



Diagnosis
Status Line in PS501: Example Battery Error

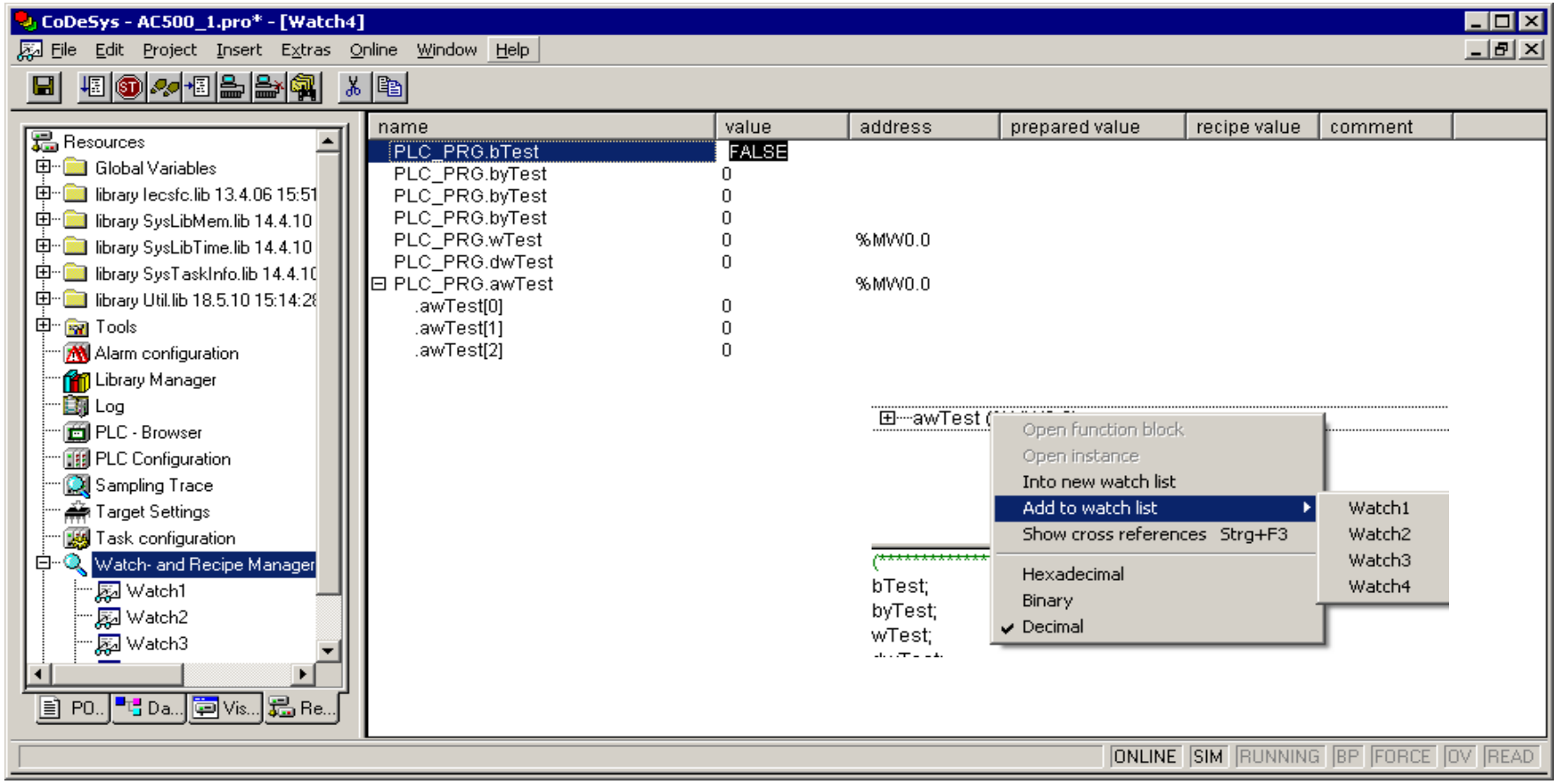
- Error number
- One of the attributes:
  - **+** come
  - **-** gone
  - **x** acknowledgement
- Time stamp
- Error class and description

The error text is read from the file Errors.ini located in the directory ..\Targets\ABB_AC500 or ..\Targets\ABB_AC500\AC500_V12

New features of PS501 Control Builder Plus

New diagnosis features – Watch & Receipt Manager

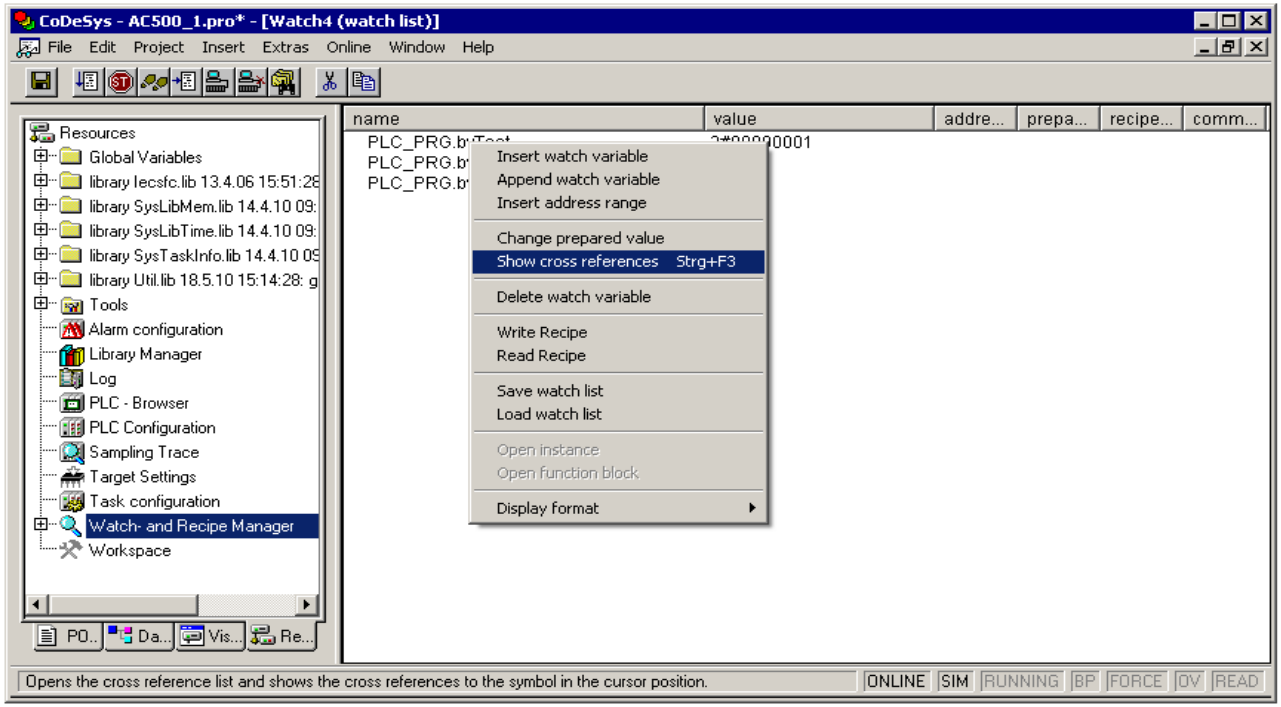
- Due to activate the new features set the check in “Project/Options/Desktop/Tabular watch editor“
- The watch window displays the values in a table oriented view



New features of PS501 Control Builder Plus

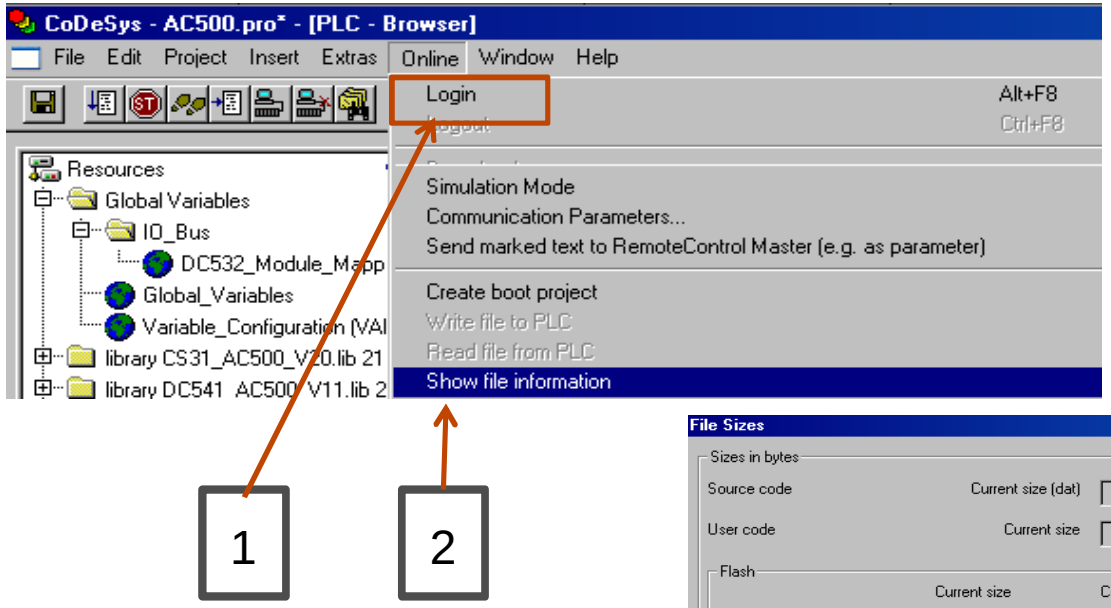
New diagnosis features – Cross references functions

- The cross reference list is extended with:
  - Open cross reference list from the watch window and list from language editor
  - Including the visualization to the cross reference list
  - Including arrays, structures and addresses

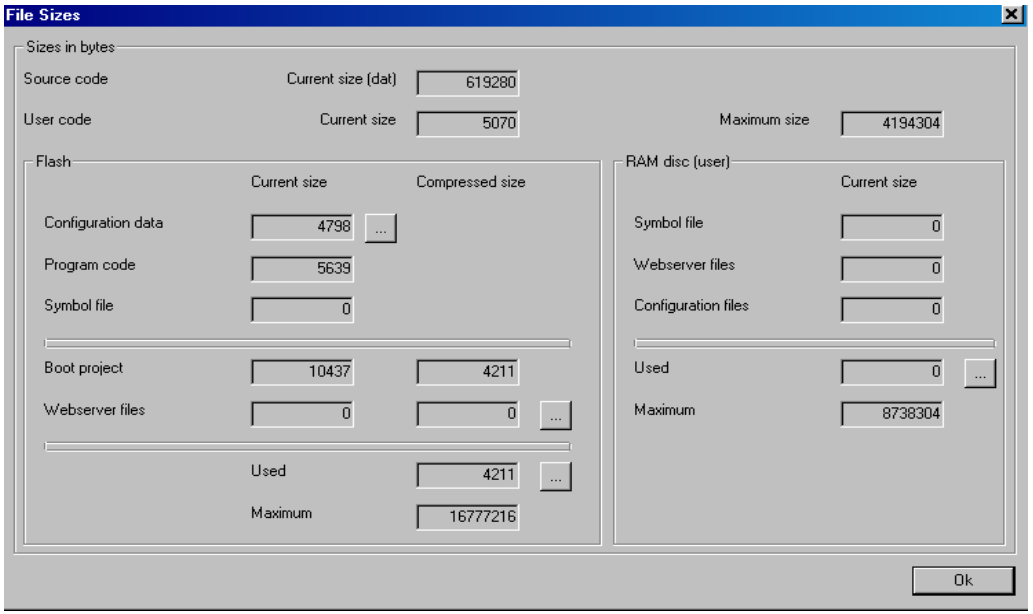


New features of PS501 Control Builder Plus

New diagnosis features – Online/Show file information



- Display sizes of programs & Visualization



Diagnosis
Coming up

- Diagnosis System
- Local diagnosis at the CPU
- Local diagnosis at the modules
- Diagnosis in Control Builder Plus
- PS501 tools and status bar
- PS501 PLC-Browser
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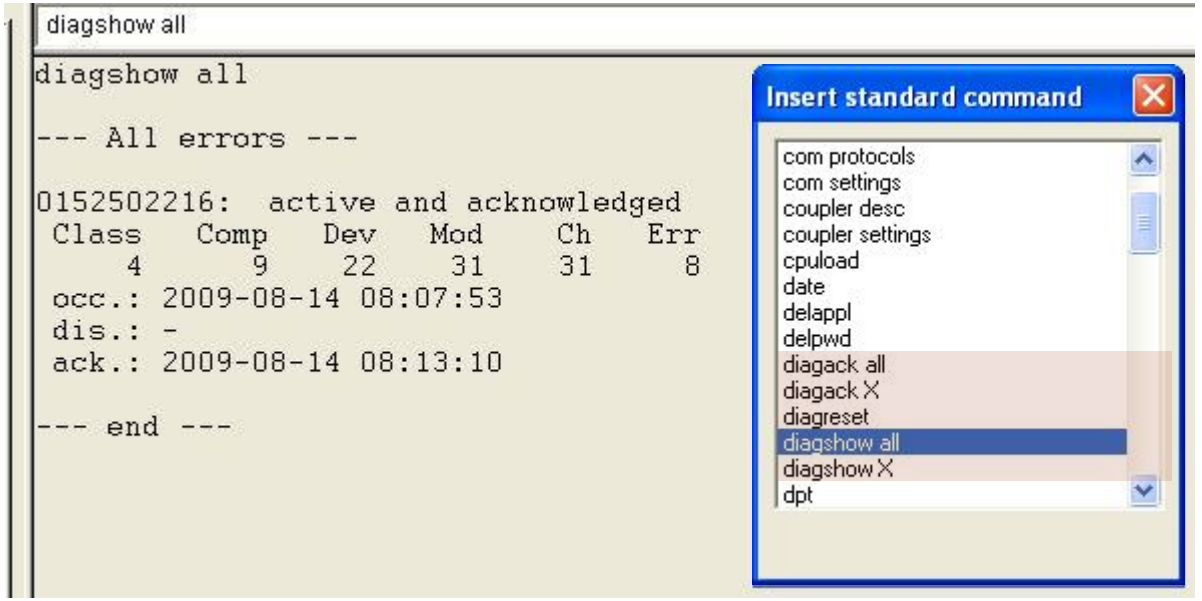
- Diagnosis by use of library Diag_AC500_Vxx.LIB
- Extended diagnosis for fieldbus slaves

Diagnosis
PLC- Browser: Commands for Diagnosis

1. Login into PLC
2. Click at “Resources“/ “PLC-Browser“
3. Click at “…“ button and select a command
4. Press <Enter> key



diagshow all: Shows all errors

diagshow X: Shows all errors of the class X (with X= 1...4)

diagack all: Acknowledges all errors (except errors that have to be quit exclusively)

diagack X: Acknowledges all errors of the class X (with X= 1...4)

diagreset: Resets the diagnosis system (clears error buffer)

Diagnosis
PLC- Browser: Example Battery Error (1)

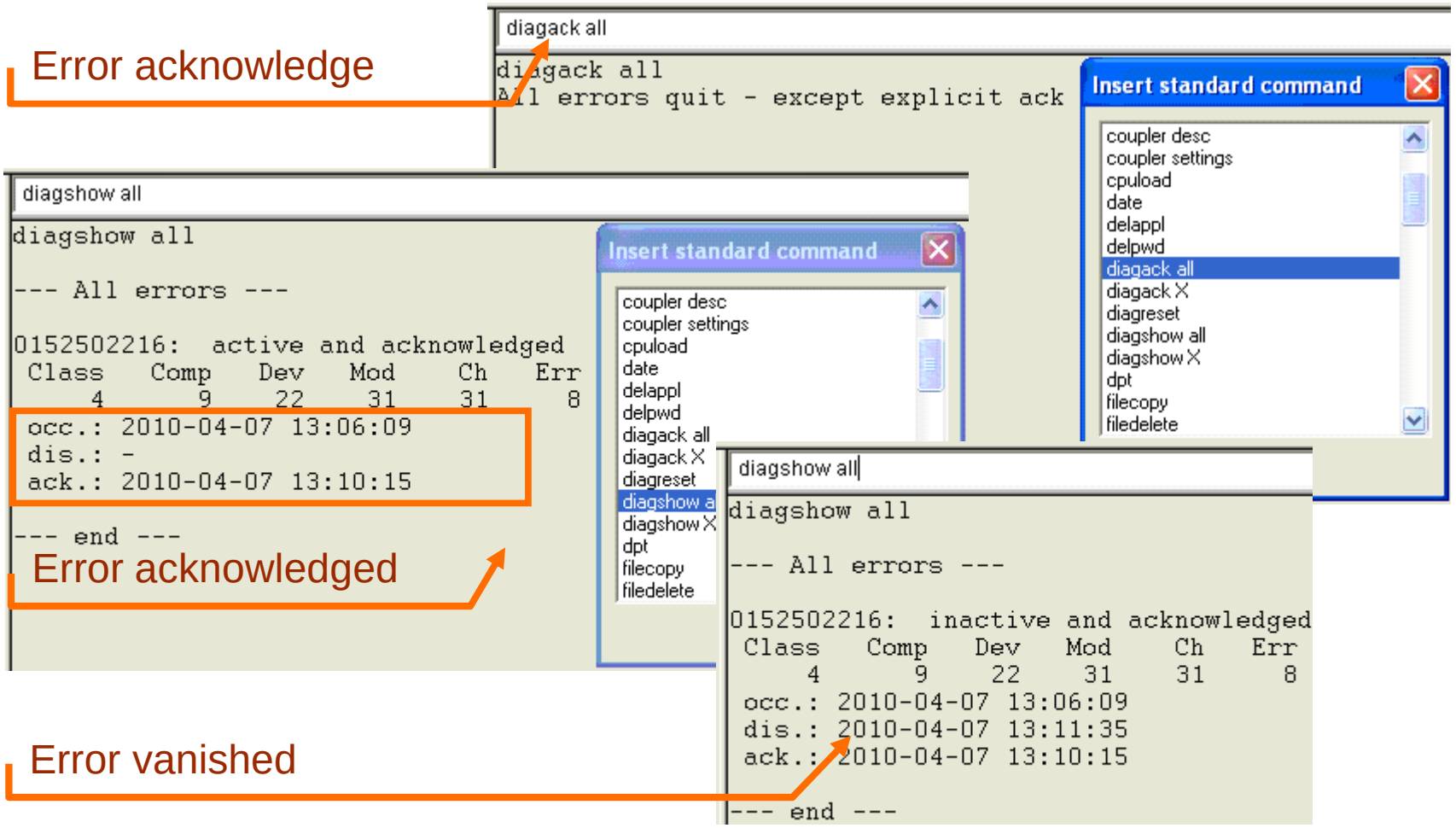
Error number

Error appearance

```
diagshow all

--- All errors ---

0152502216:  active not acknowledged
 Class    Comp    Dev    Mod     Ch    Err
     4       9     22     31     31      8
 occ.: 2010-04-07 13:06:09
 dis.: -
 ack.: -

--- end ---
```

E1..E4	d1	d2	d3	d4	Identifier 000...063	AC500 display 
Class	Comp	Dev	Mod	Ch	Err	PS501 PLC browser

Diagnosis
PLC- Browser: Example Battery Error (2)



Diagnosis
Coming up

- Diagnosis System
- Local diagnosis at the CPU
- Local diagnosis at the modules
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- PS501 PLC-Browser
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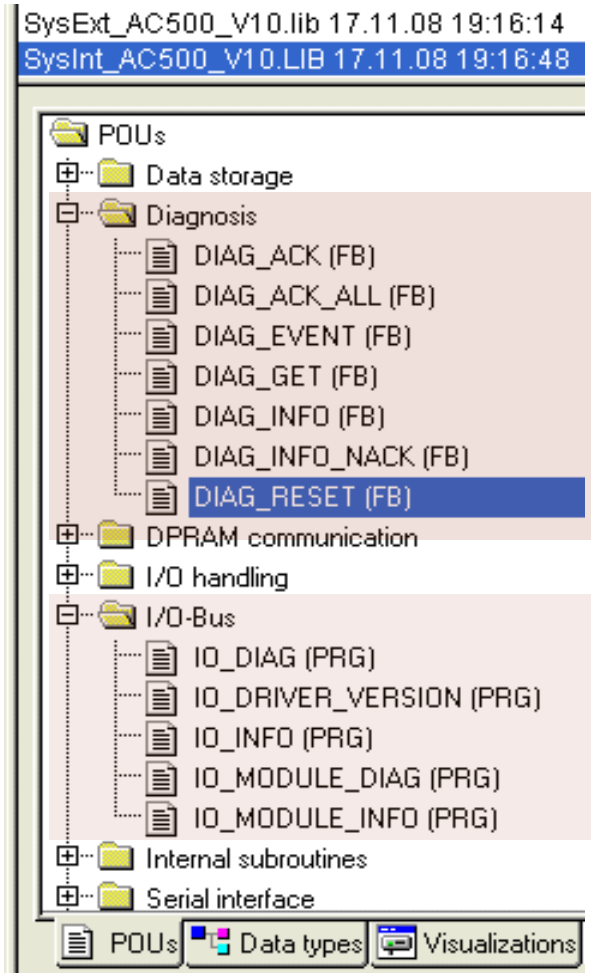
- Diagnosis by use of library Diag_AC500_Vxx.LIB
- Extended diagnosis for fieldbus slaves

Diagnosis
Library SysInt_AC500_Vxx.LIB



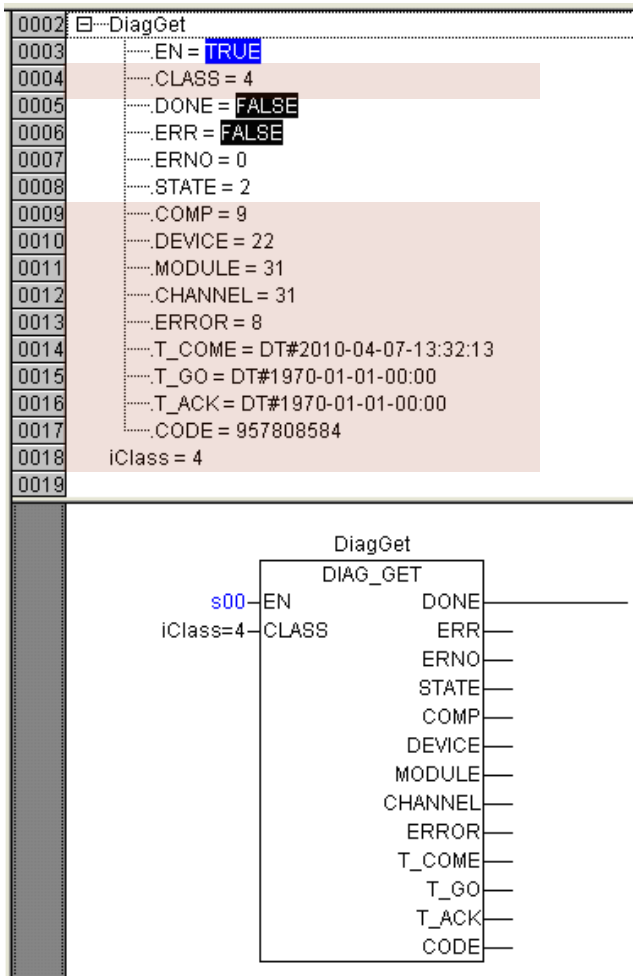
POUs Diagnosis

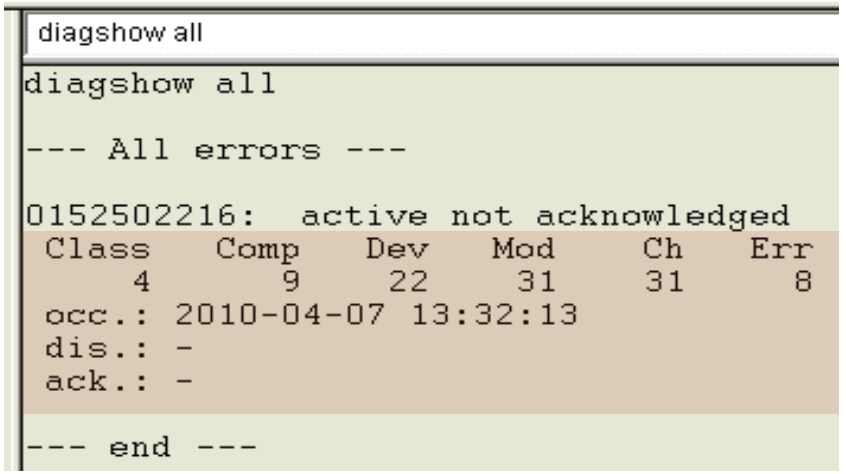
- Represent PLC- Browser commands in the PLC program and more
  Example:
  DIAG_RESET: Reset of the error buffer by means of external signal
- DIAG_EVENT for creating user defined error indication at CPU display
- Read the description before use!

POUs I/O-Bus

- I/O-Bus and module diagnosis
- Further information

Diagnosis
Example Battery Error





Function Block DIAG_GET:

- 0-1 edge on EN input reads the oldest not read error
- The next 0-1 edge on EN reads the next one

Diagnosis
Coming up

- Diagnosis System
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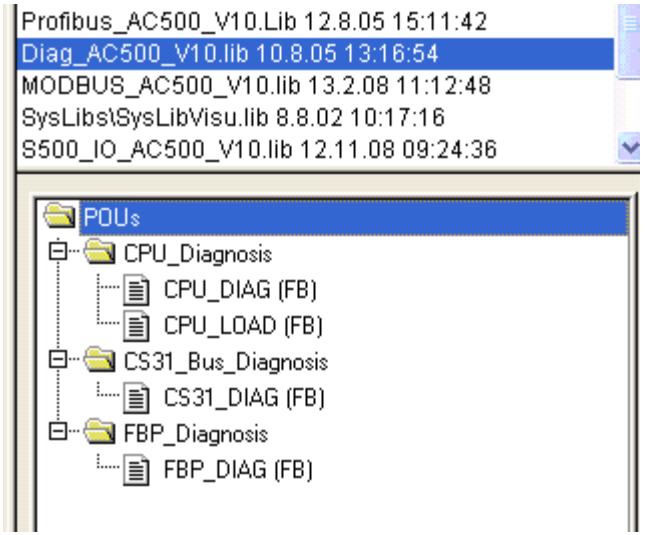
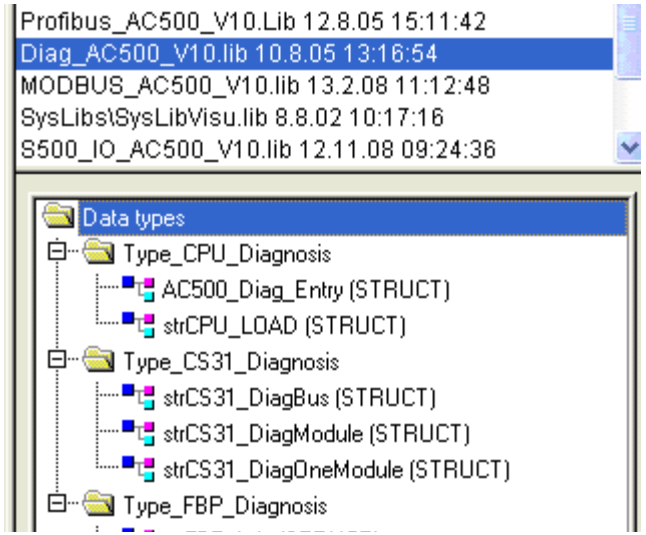
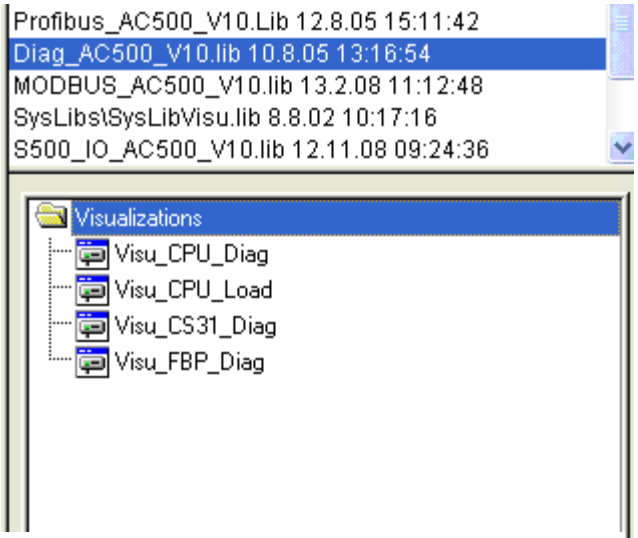
- Diagnosis by use of library Diag_AC500_Vxx.LIB
- Extended diagnosis for fieldbus slaves

Diagnosis
Library Diag_AC500_Vxx.LIB



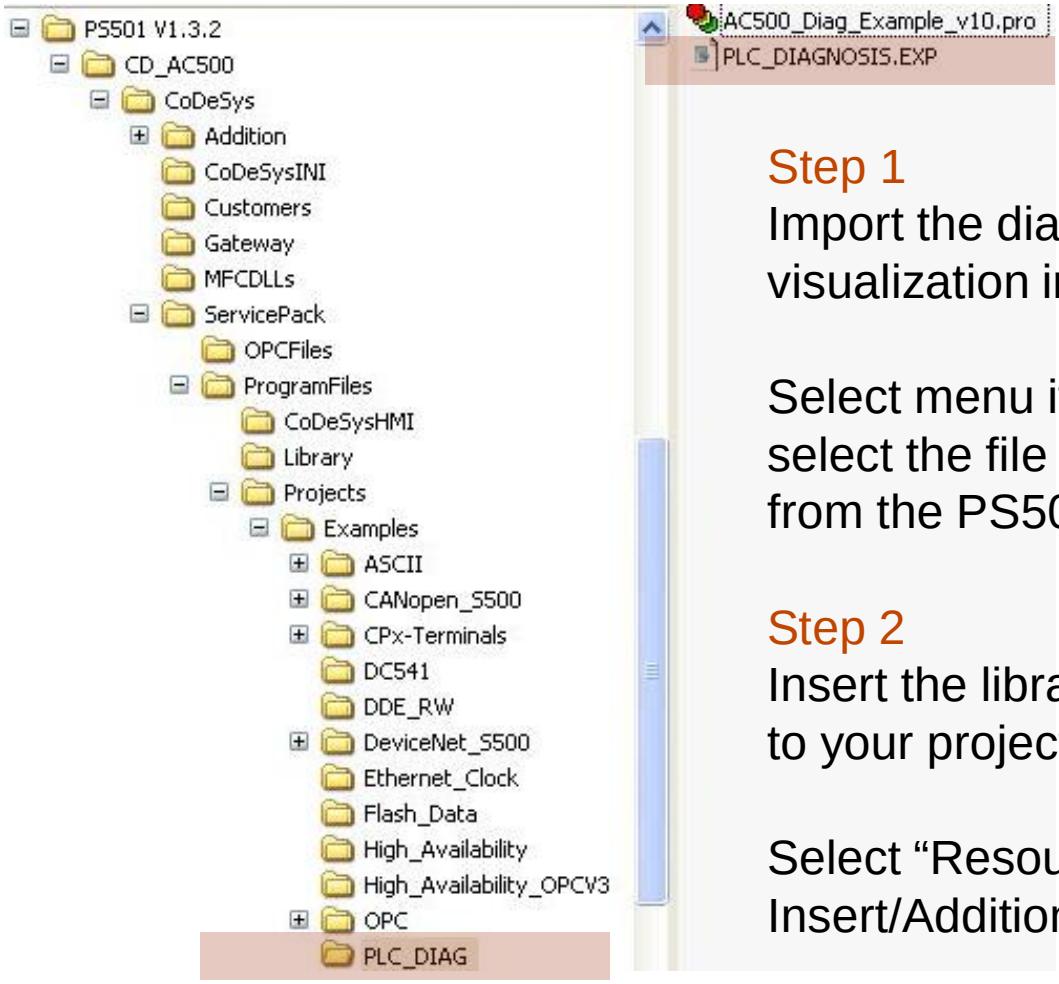




The library enables a direct access to following diagnosis with integrated visualisation:

- Reading the AC500 diagnosis buffer and CPU capacity utilization
- Diagnosis of the communication modules
- Diagnosis of S500 I/O modules mounted at I/O-Bus (central extension)
- Diagnosis of S500 I/O modules at CS31-Bus (decentral extension)
- Diagnosis of the FBP slave interface

Diagnosis
Import of the Prepared Diagnosis into a User Program (1)



Step 1

Import the diagnosis program and visualization into your project:

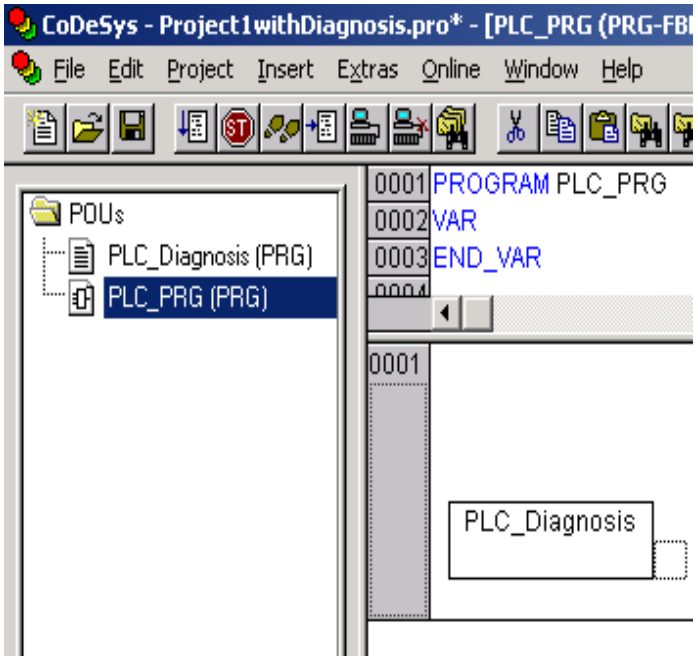
Select menu item “Project/Import“ and select the file PLC_DIAGNOSIS.EXP from the PS501 installation CD

Step 2

Insert the library DIAG_AC500_Vxx.LIB to your project:

Select “Resources/Library Manager/ Insert/Additional library…“

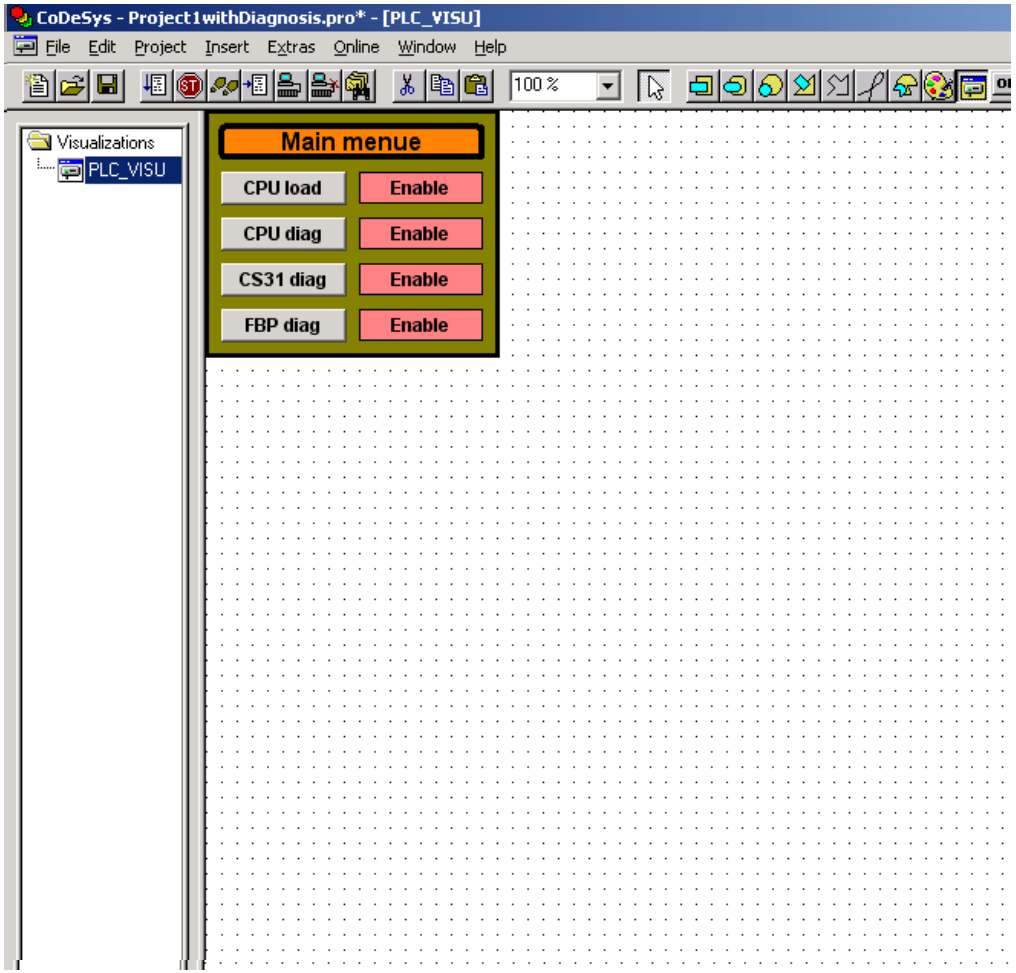
Diagnosis
Import of the Prepared Diagnosis into a User Program (2)



Step 3

The program PLC_Diagnosis has to be called in the task (here PLC_PRG)

Diagnosis
Import of the Prepared Diagnosis into a User Program (3)



Step 4

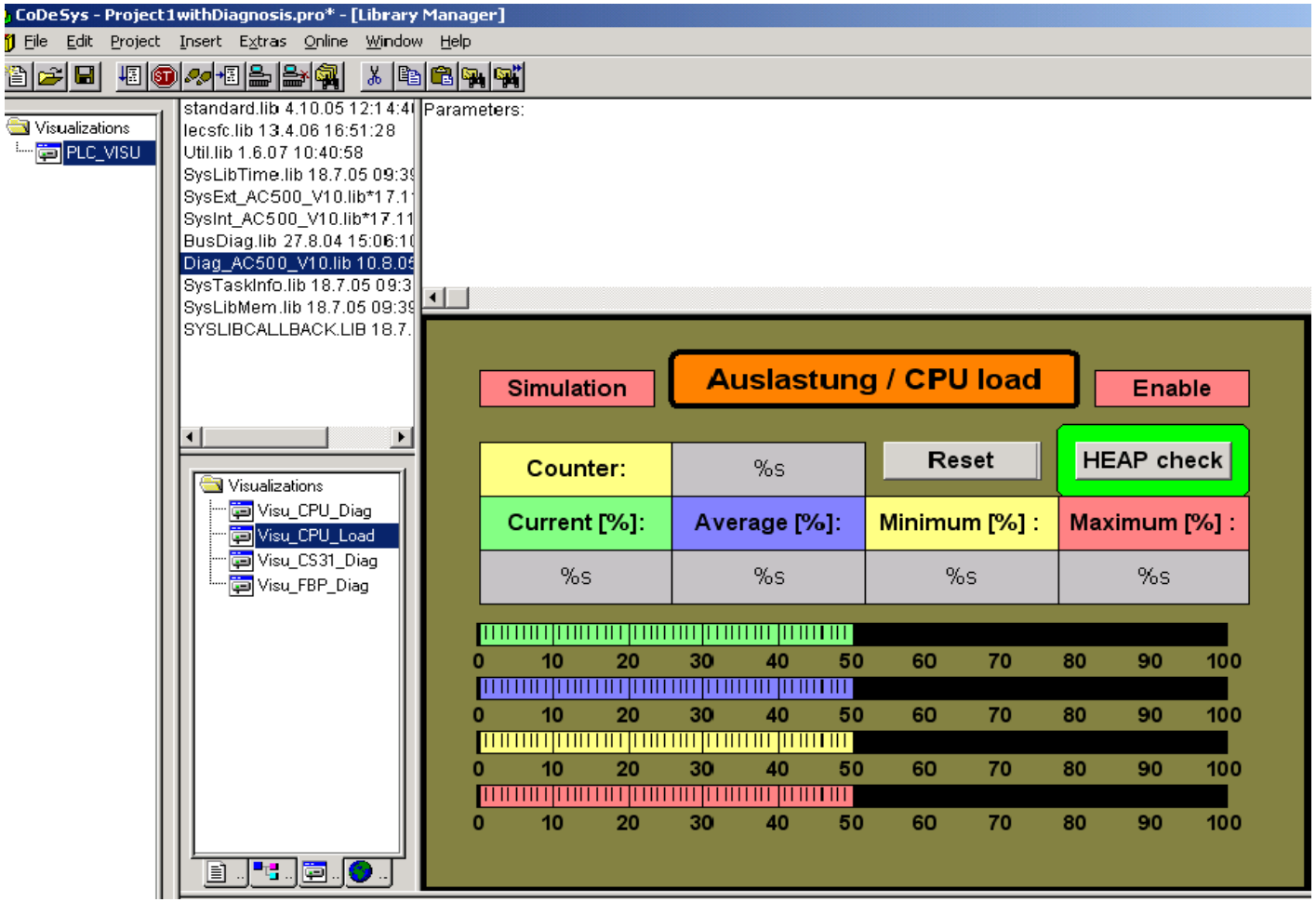
In the tab “Visualizations” there is a POU PLC_VISU

Use this start screen to enable and switch to 4 different diagnosis screens as:

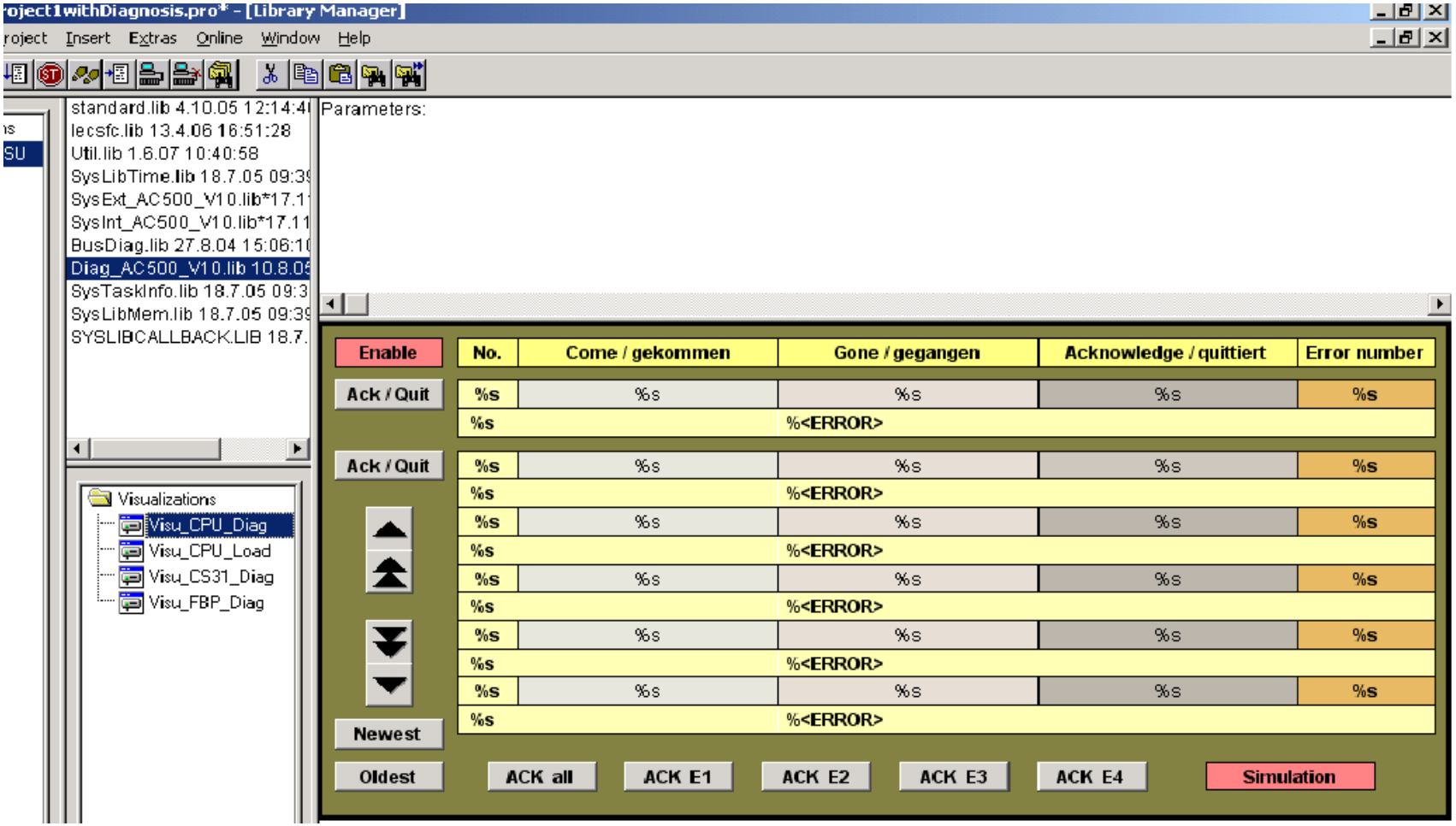
- CPU load
- CPU diag
- CS31 diag
- FBP diag

Use for each diagnosis a template from the library

Diagnosis
Visualization Template CPU Load

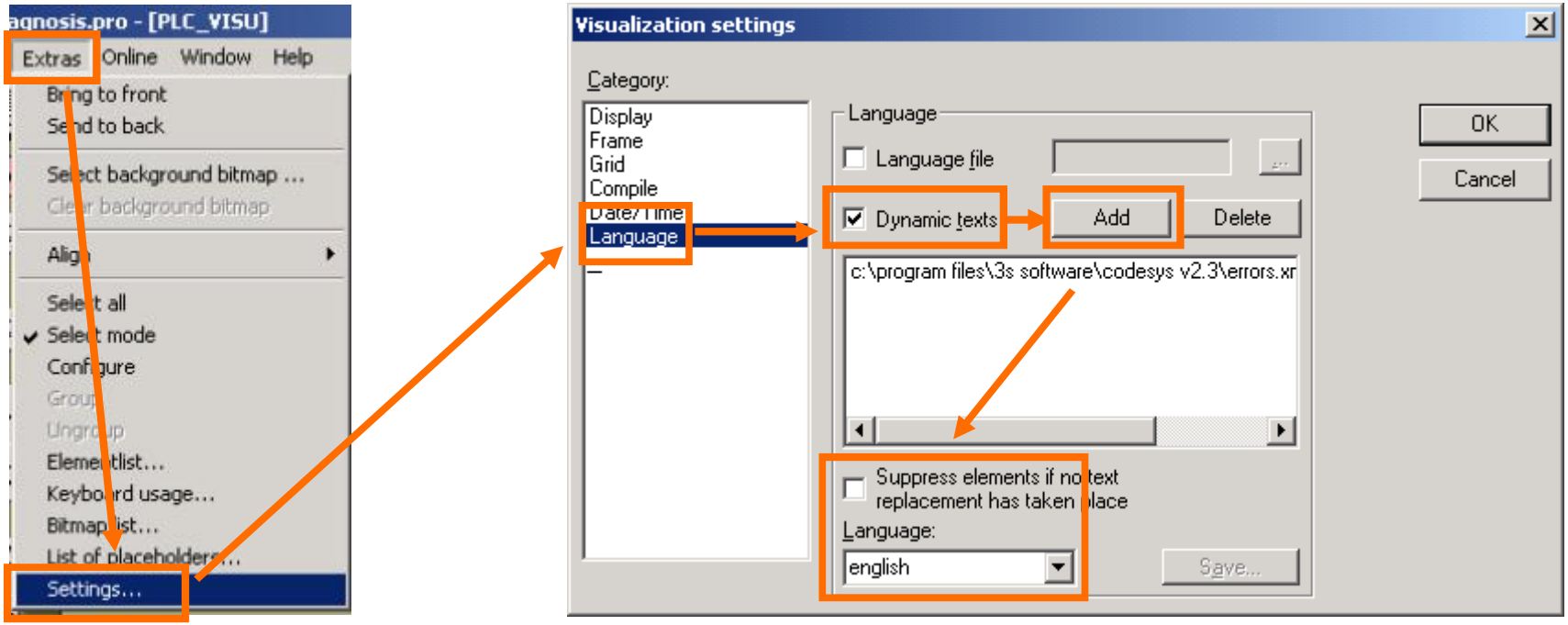


Diagnosis
Visualization Template CPU Diagnosis (1)

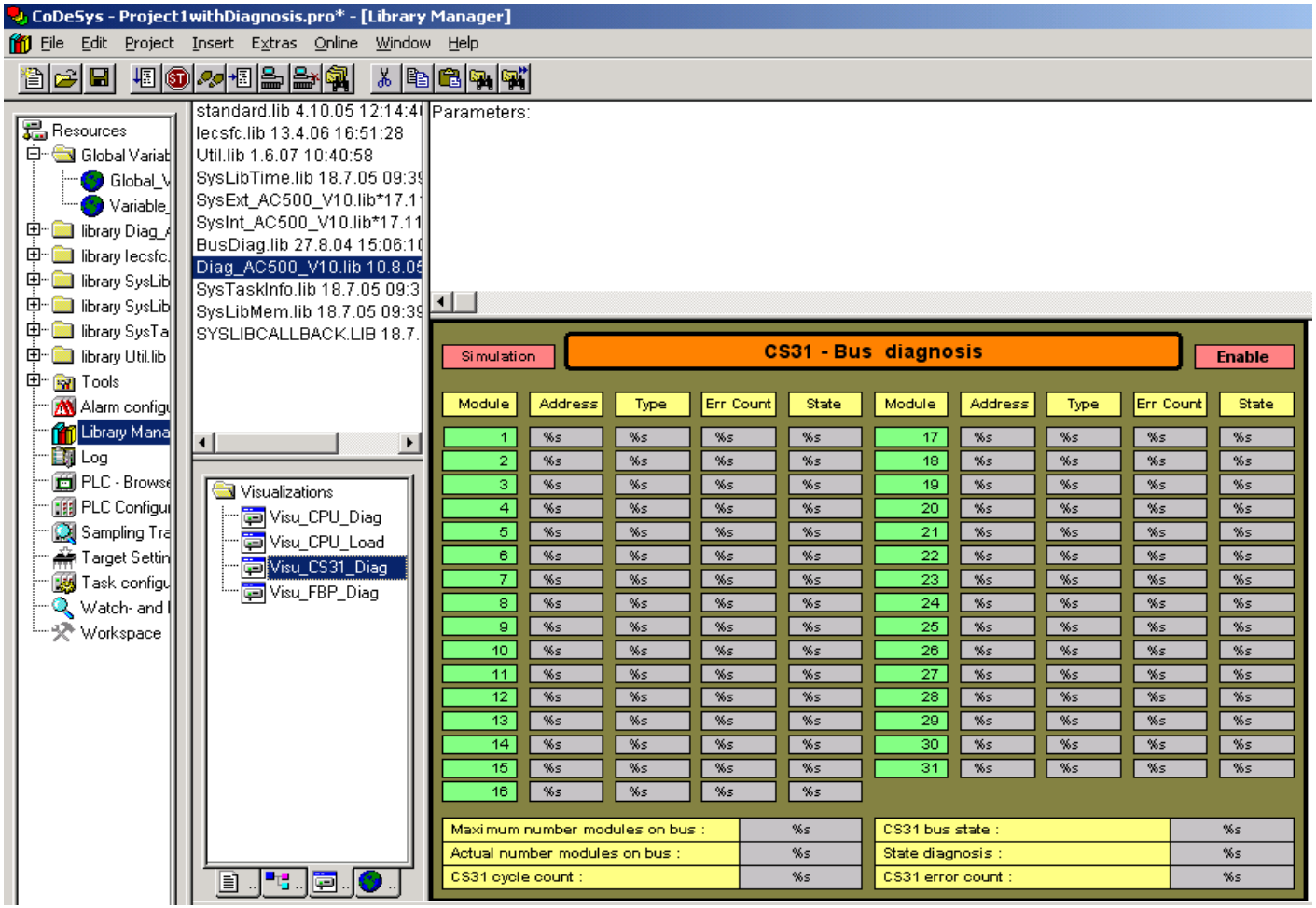


Diagnosis
Visualization Template CPU Diagnosis (2)

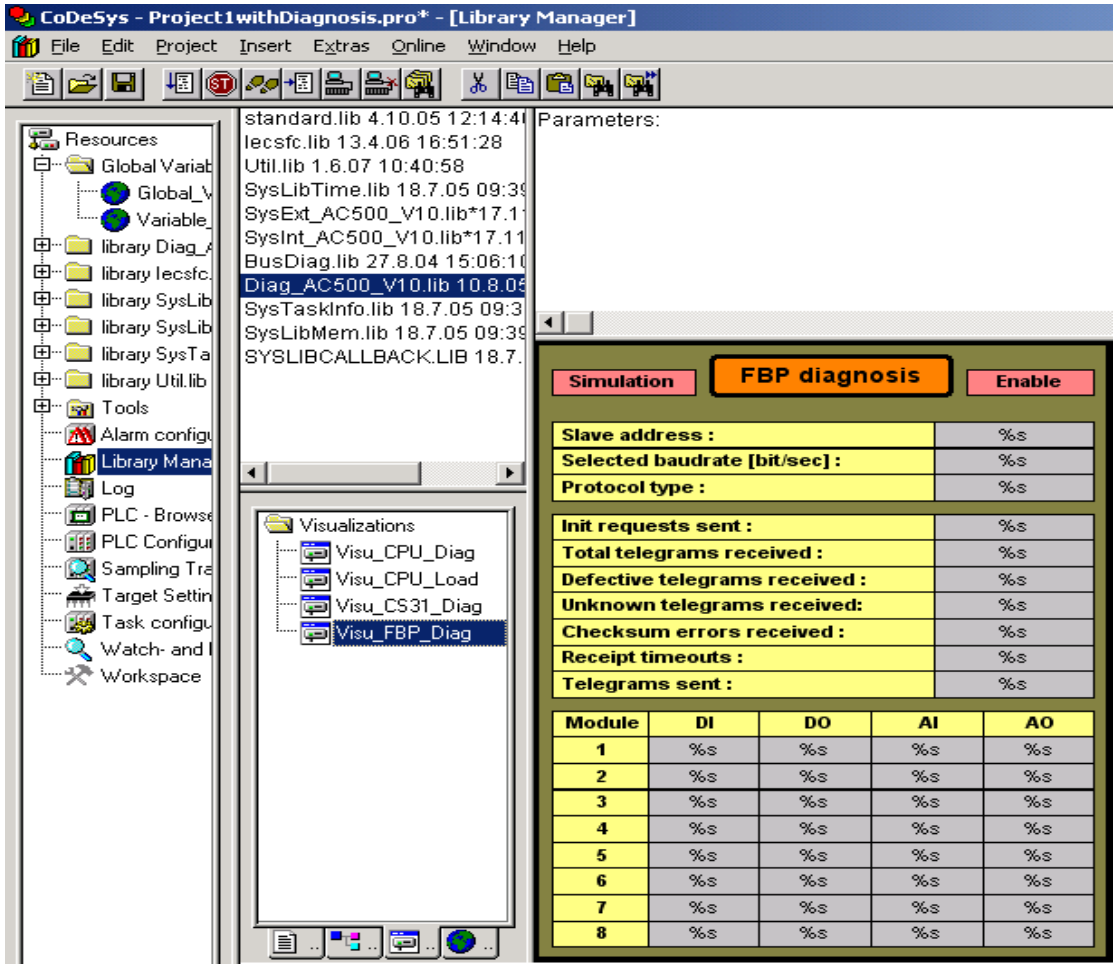
- Define the message language by click at the template and selecting “Extras/Settings…”
- Select the path of Errors.xml for dynamic texts as of C:\Program Files\3S Software\CoDeSys V2.3\Errors.xml



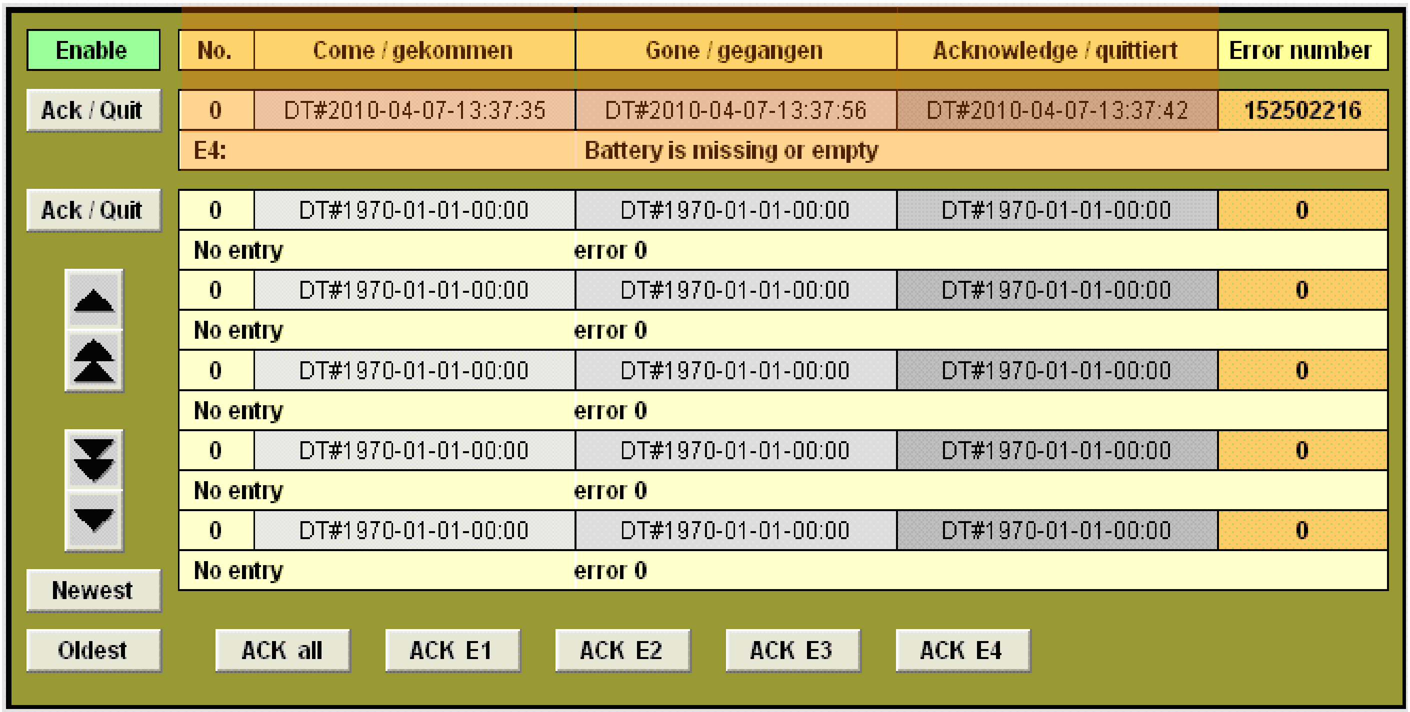
Diagnosis
Visualization Template CS31-Bus



Diagnosis
Visualization Template FBP Slave Interface



Diagnosis
Error messages: Example Battery Error



Error: Come Gone Acknowledge

Error class Message text

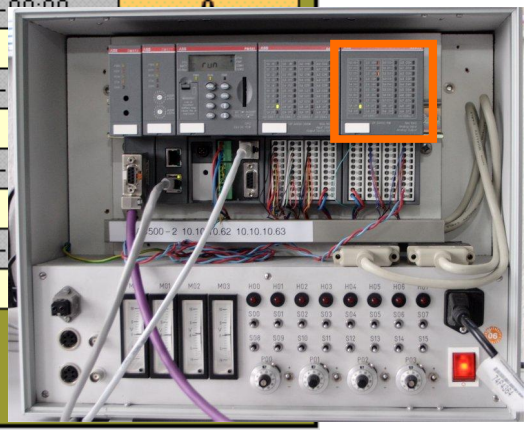
Diagnosis
AX522 at I/O-Bus (1)

Enable	No.	Come / gekommen	Gone / gegangen	Acknowledge / quittiert	Error number
Ack / Quit	0	DT#2010-04-08-08:12:54	DT#1970-01-01-00:00	DT#2010-04-08-08:13:37	234881031
	E4: I/O-Bus , Mod. 2, 1, 4		Measurement underflow at the I/O module		
Ack / Quit	0	DT#2010-04-08-08:12:54	DT#1970-01-01-00:00	DT#2010-04-08-08:13:37	234881031
	E4: I/O-Bus , Mod. 2, 1, 4		Measurement underflow at the I/O module		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00	DT#1970-01-01-	
	No entry		error 0		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00	DT#1970-01-01-	
	No entry		error 0		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00	DT#1970-01-01-	
	No entry		error 0		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00	DT#1970-01-01-	
	No entry		error 0		

Newest

Oldest

ACK all | ACK E1 | ACK E2 | ACK E3 | ACK E4



Warning from I/O-Bus module 2 (second module right to the CPU) type 1 (1 = analog input), channel 4

Error cause: Broken wire at input channel 4 (configured as 4.. 20 mA)

Diagnosis
AX522 at I/O-Bus (2)

```
diagshow all

diagshow all

--- All errors ---

0234881031:  active and acknowledged
 Class    Comp    Dev    Mod     Ch    Err
     4      14      2      1      4      7
 occ.: 2010-04-08 08:12:54
 dis.: -
 ack.: 2010-04-08 08:13:37

--- end ---
```

Error indication also by means of:

- CPU LCD display
- PLC browser
- Status line of PS501

PO... Dat... Visu.. Res...

#234881031: 'x 2010-04-08 08:13:37 E4: I/O-Bus , Mod. 2, 1, 4 ' Measurement underflow at the I/O module

Diagnosis
Coming up

- Diagnosis System
- Local diagnosis at the CPU
- Local diagnosis at the modules
- Diagnosis in Control Builder Plus
- PS501 tools and status bar
- PS501 PLC-Browser
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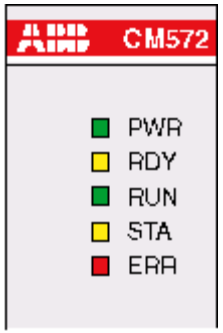
- Diagnosis by use of library Diag_AC500_Vxx.LIB
- Extended diagnosis for fieldbus slaves

Diagnosis
Fieldbus Diagnosis by means of LEDs of a Communication Module



LED	Color	Status	Meaning
PWR	green	ON (light)	Voltage is present
		OFF (dark)	Voltage is missing
RDY	yellow	ON	Coupler is ready
		flashes cyclic	Bootstrap Loader is active
		flashes non-cyclic	Hardware or system error
		OFF	Defective hardware
RUN	green	ON	Communication is running
		flashes cyclic	Ready for communication
		flashes non-cyclic	Parameterization error
		OFF	No communication
STA	yellow	ON	DP master: Transmits data or token on the network
		OFF	DP master: no token
ERR	red	ON	PROFIBUS error
		OFF	No error

Example

Indication: Connection error between the PROFIBUS DP Master and Slave 2

Diagnosis
Fieldbus Diagnosis by means of the Diagnosis System

Enable	No.	Come / gekommen	Gone / gegangen	Acknowledge / quittiert	Error number
Ack / Quit	0	DT#2010-04-08-08:17:53	DT#1970-01-01-00:00	DT#1970-01-01-00:00	167835713
	E4: Ext.2 CM572 PROFIBUS , Slave 2error 167835713				
Ack / Quit	0	DT#2010-04-08-08:17:53	DT#1970-01-01-00:00	DT#1970-01-01-00:00	167835713
	E4: Ext.2 CM572 PROFIBUS , Slave 2error 167835713				
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00	DT#1970-01-01-00:00	0
	No entry		error 0		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00	DT#1970-01-01-00:00	0
	No entry		error 0		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00		0
	No entry		error 0		
	0	DT#1970-01-01-00:00	DT#1970-01-01-00:00		
	No entry		error 0		

Newest | Oldest | ACK all | ACK E1 | ACK E2 | ACK E3

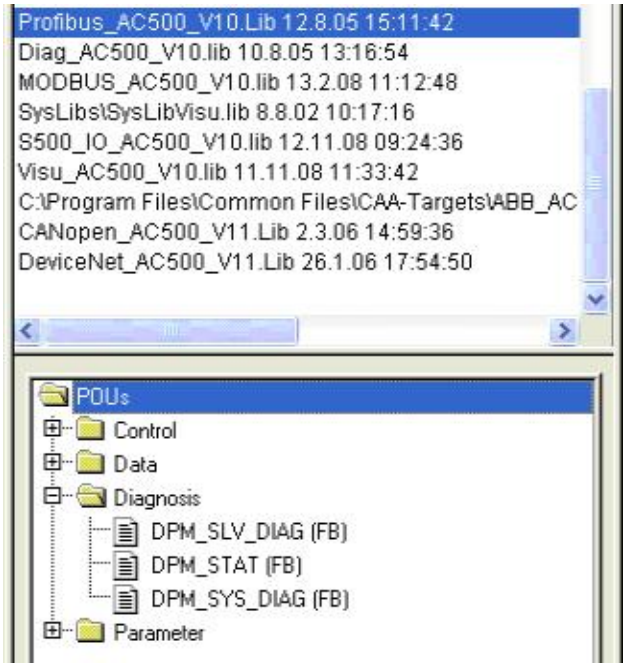
Runtime error #167835713 (+ 2010-04-08 08:17:53 E4: Ext.2 CM572 PROFIBUS , Slave 2)

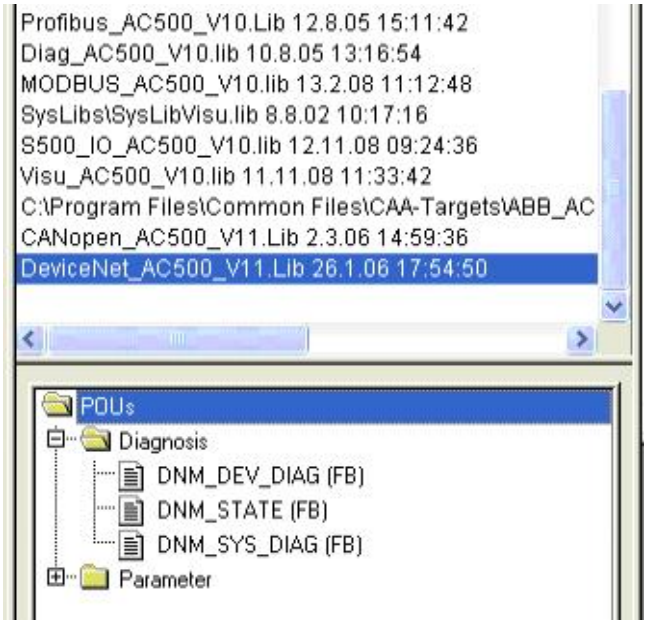
Indication by means of:

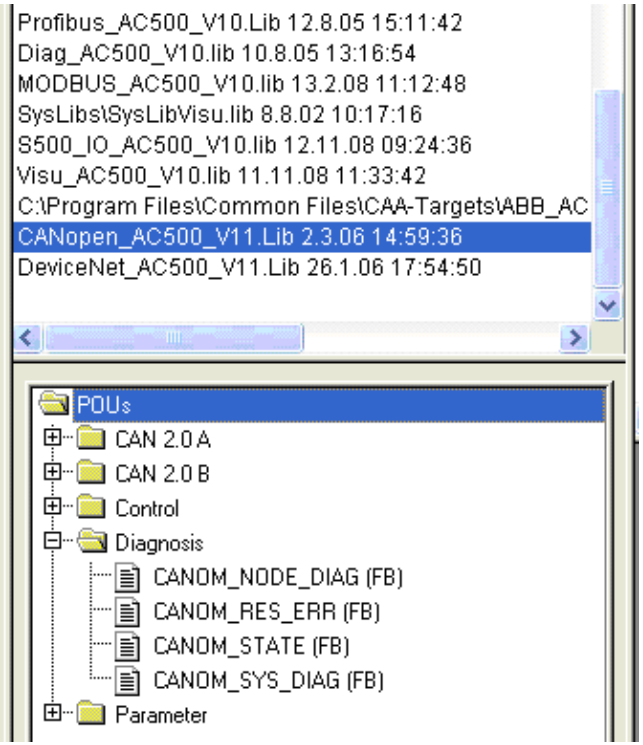
- CPU display
- Visualization
- Status line
- PLC- Browser

```
diagshow all

diagshow all

--- All errors ---

0167835713:  active not acknowledged
 Class    Comp    Dev    Mod     Ch    Err
     4       2      2     31      1      1
 occ.: 2010-04-08 08:17:53
 dis.: -
 ack.: -

--- end ---
```

Diagnosis
Extended Diagnosis by Means of Function Blocks



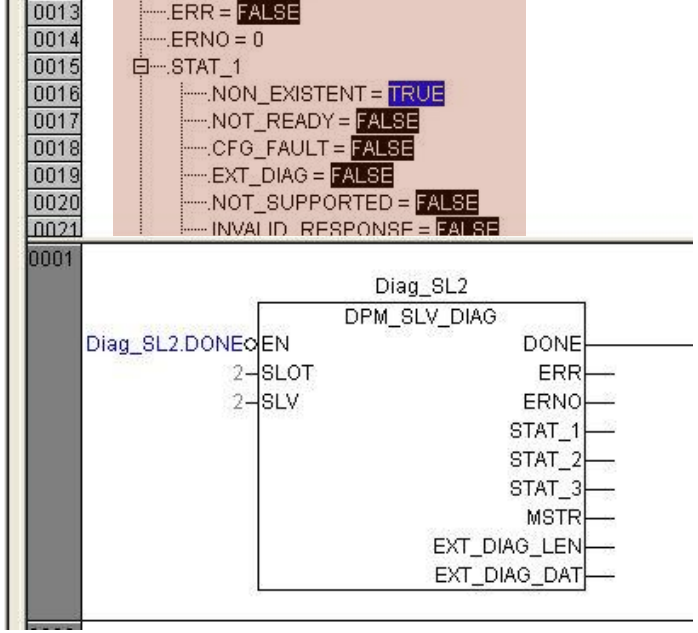


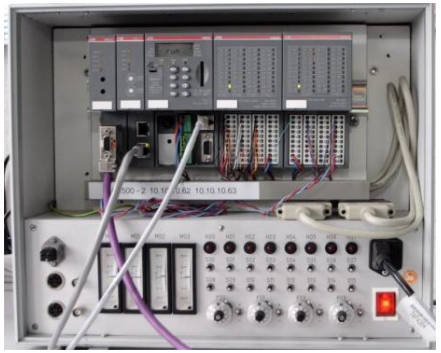


For more details see the Function Blocks in the appropriate fieldbus library

Diagnosis
Example: PROFIBUS DP Communication Error to Slave 2

```
0001 Diag_SL2
0002     .Access =
0003   + .psCouplerTel = <001f2ff0>
0004     .bEnOld = TRUE
0005     .bySlaveAdr = 2
0006     .wError = 0
0007     .byStep = 0
0008     .i = 239
0009     .EN = TRUE
0010     .SLOT = 2
0011     .SLV = 2
0012     .DONE = TRUE
0013     .ERR = FALSE
0014     .ERNO = 0
0015   - .STAT_1
0016       .NON_EXISTENT = TRUE
0017       .NOT_READY = FALSE
0018       .CFG_FAULT = FALSE
0019       .EXT_DIAG = FALSE
0020       .NOT_SUPPORTED = FALSE
0021       .INVALID_RESPONSE = FALSE
```



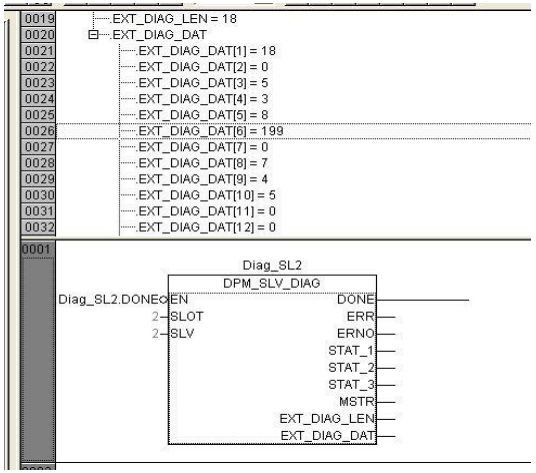


Configuration:

Master: CM572 mounted in slot 2

Slave: Dezentral extension with DC505 and PDP22. Address 2

Diagnosis
Example: AX522 Module Error of the Slave 2



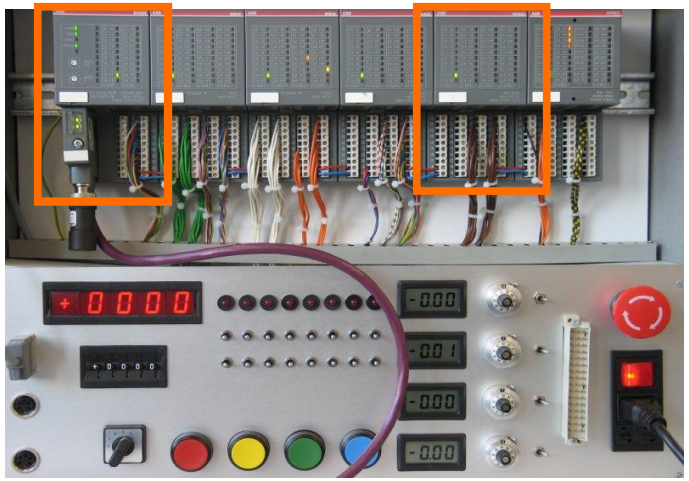
Error is not indicated by means of :

- CPU display
- Visualization
- Status line
- PLC- Browser

Error is indicated by means of:

- Local LEDs by decentral extension
- Diagnosis FBs from fieldbus library

Diagnosis
Local diagnosis by means of LEDs



DC505-FBP:

- LED S-ERR on
- LED I/O-Bus flashing

AX522:

- LED CH-ERR4 flashing
- Error in group 1 (slot 0)

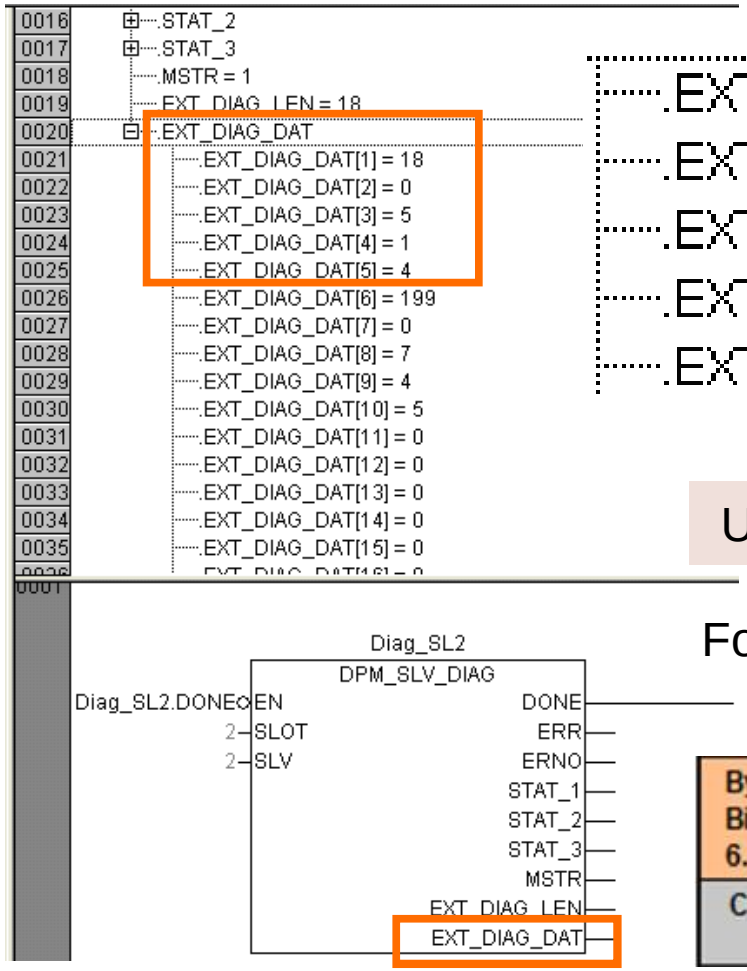
Error cause: Broken wire at input channel 4 (configured as 4.. 20 mA)

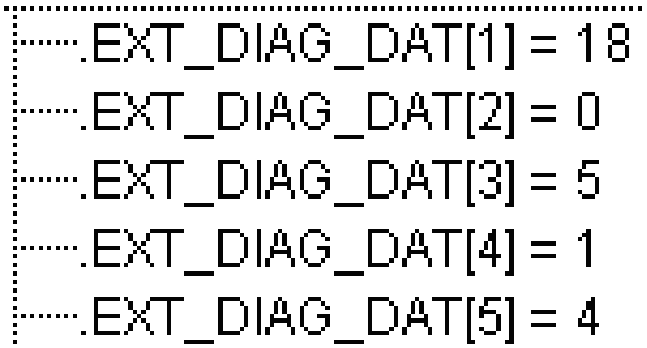
Diagnosis
AX522: Broken wire at an Input Channel

E1..E4	d1	d2	d3	d4	Identifier 000..063	AC500 display	
Class	Comp	Dev	Mod	Ch	Err	PS501 PLC browser	<– Display in
Byte 6 Bit 6..7	-	Byte 3	Byte 4	Byte 5	Byte 6 Bit 0..5	FBP diagnosis block	
Class	Inter-face	De-vice	Mod-ule	Chan-nel	Error identifier	Error message	Remedy
	1)	2)	3)	4)			
Channel error AX521 / AX522							
4	14	1...7	1	0...3 0...7	48	Analog value overflow or broken wire at an analog input	Check input value or terminal
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	7	Analog value underflow at an analog input	Check input value
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	47	Short-circuit at an analog input	Check terminal
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	48	Analog value overflow at an analog output	Check output value
	11 / 12	ADR	1...7				
4	14	1...7	1	0...3 0...7	7	Analog value underflow at an analog output	Check output value
	11 / 12	ADR	1...7				

FBP diagnosis block has to be analyzed

Diagnosis
Function Block DPM_SLV_DIAG: AX522 of Slave 2 (1)





Fixed value for DC505

Communication with DC505 OK

The fifth module right to DC505

Module type; 1 = analog input

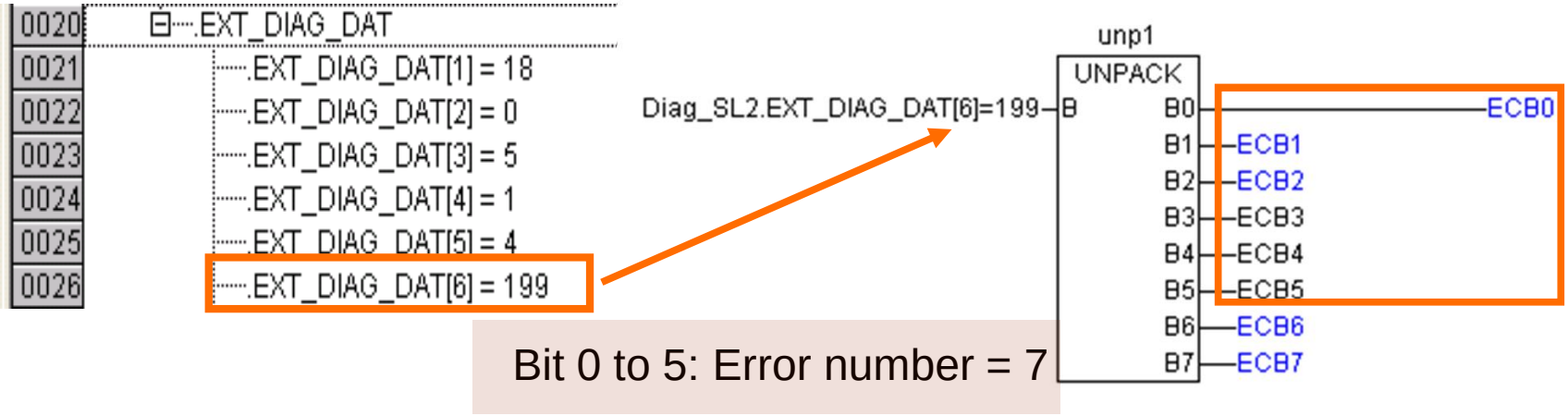
Channel 4

Use the slave description to evaluate the diagnosis block!

For decentral extension use the DC505-FBP description for the diagnosis bytes

Byte 6 Bit 6..7	-	Byte 3	Byte 4	Byte 5	Byte 6 Bit 0..5	FBP diagnosis block
Class	Inter-face	De-vice	Mod-ule	Chan-nel	Error identifier	

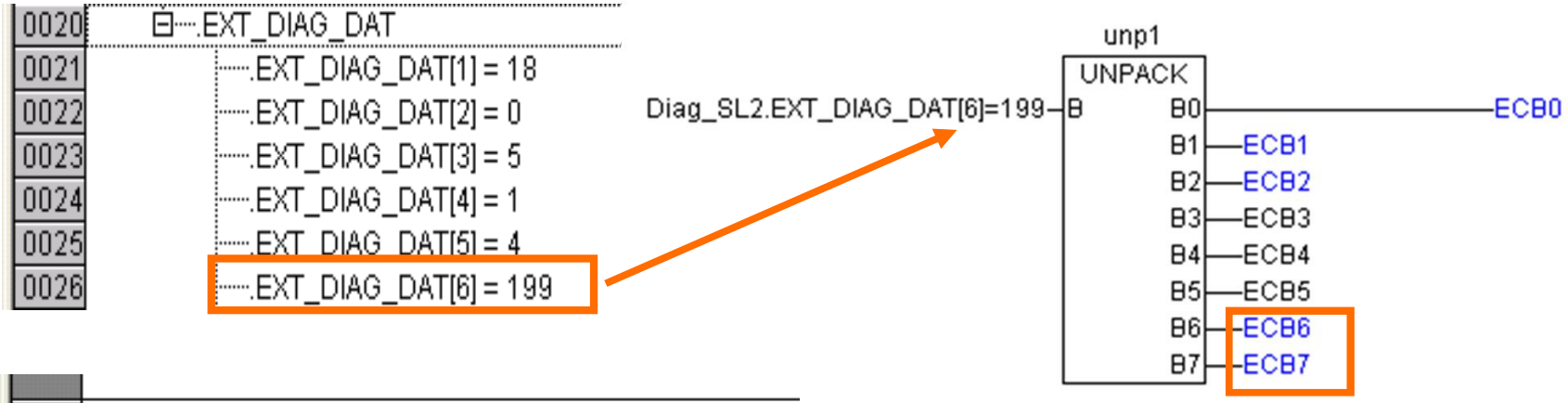
Diagnosis
Function Block DPM_SLV_DIAG: AX522 of the Slave 2 (2)



For decentral extension use the module description to find the error cause by means of error number!

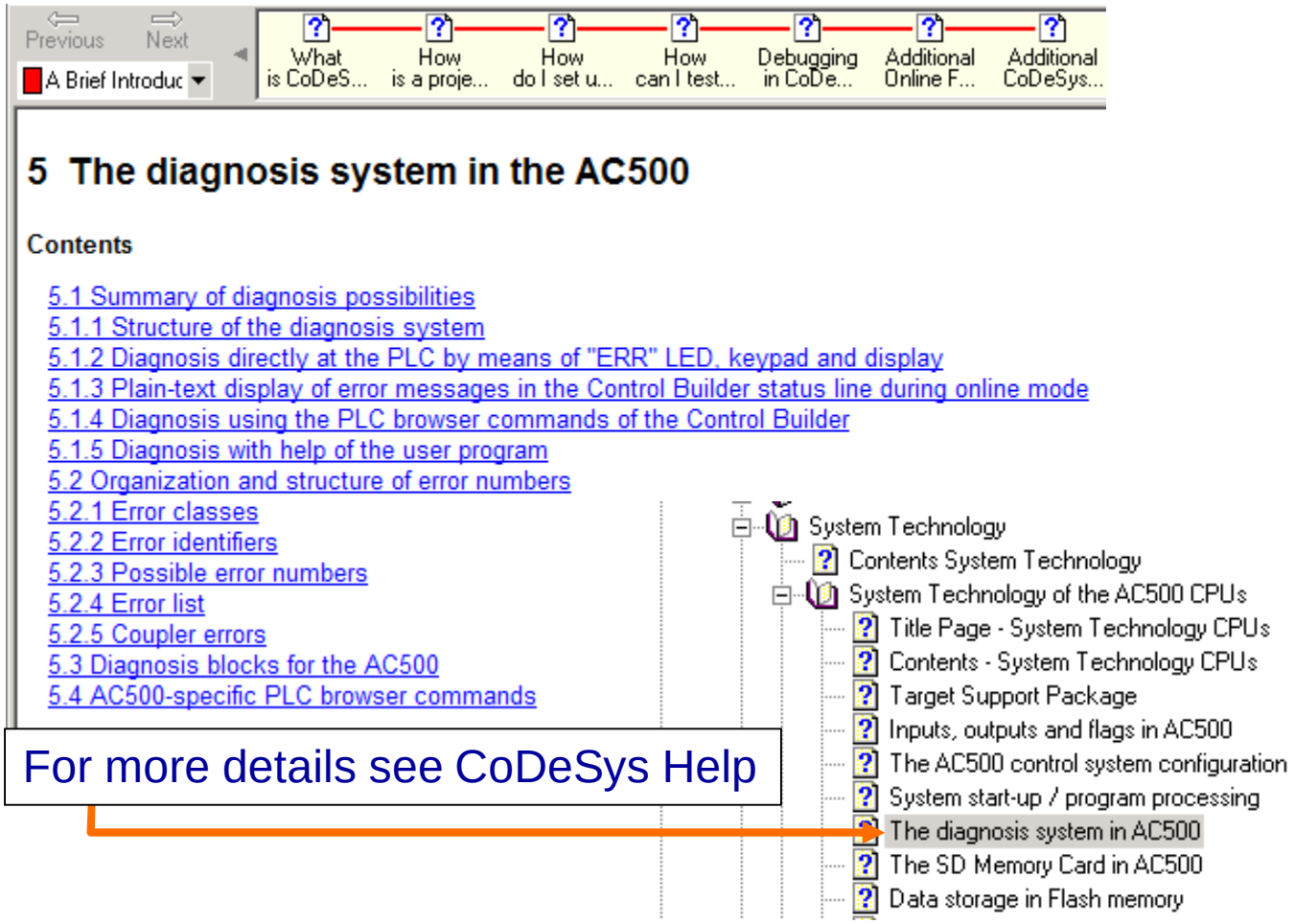
Byte 6 Bit 6..7	-	Byte 3	Byte 4	Byte 5	Byte 6 Bit 0..5	FBP diagnosis block	<– Display in
Class	Inter-face	De-vice	Mod-ule	Chan-nel	Error identifier	Error message	Remedy
4	14	1...7	1	0...3	7	Analog value underflow at an analog input	Check input value
	11 / 12	ADR	1...7	0...7			

Diagnosis
Function Block DPM_SLV_DIAG: AX522 of the Slave 2 (3)



Bit 6 and bit 7 + 1: Error class

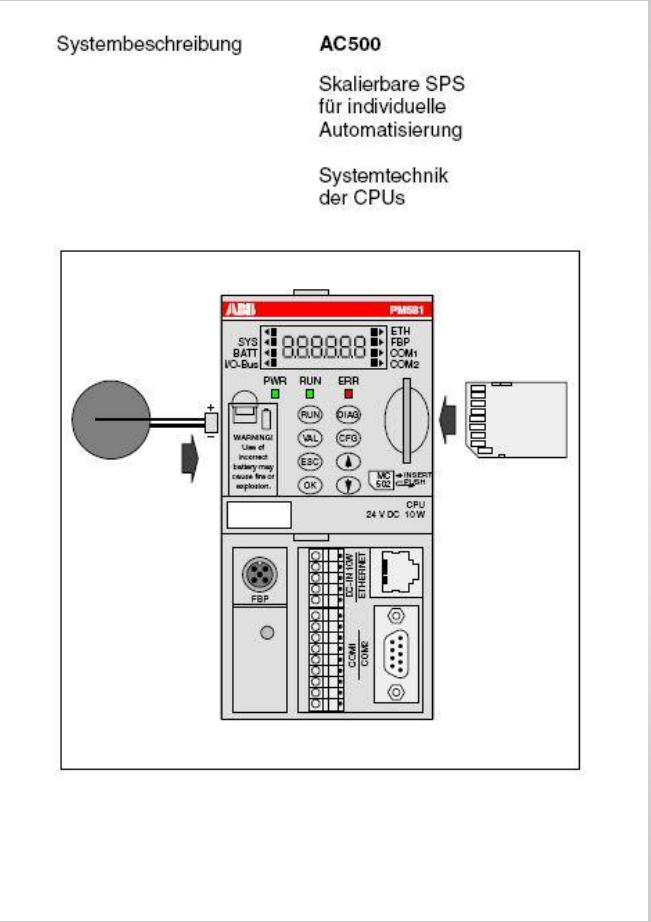
Diagnosis
Cross-References to Documentation (1)



Diagnosis
Cross-References to Documentation (2)

1. CoDeSys Help\Target System\AC500 / S500\ System Technology\System Technology of the AC500 CPUs\The diagnosis system in the AC500

2. CoDeSys Help\Target System\AC500 / S500\ Function Block Libraries AC500



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