# AC500 PLC and ABB ACS355 Drive via Modbus TCP/IP with ABB Standard Library

# 1 Description

This application note will take you through the hardware installation and configuration of ABB ACS355 Drives and eCo PLC in order to prepare for Modbus TCP/IP protocol control. AC500 ABB-specific ready-made function blocks and visualizations from the PS553- DRIVES library will be used for the control of the drives.

### 2 Objectives:

In this aplication note, we use an AC500 eCo PLC and ACS355 drive with Modbus TCP/IP communication. The personal computer will connect to PLC and drive via unmanaged switch box. The eCo PLC controls drive via Modbus TCP/IP connection.

#### Equipment List

Description	Quantity
PC with AB V1.0 software installed	1
ABB eCo CPU PM556 ETH CPU	1
CAT5 Ethernet Patch cable	3
FENA-01 Fieldbus module	1
Unmanaged switch	1

#### 3 Connection diagram



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- 1. Install the FENA-01 field bus module into this ACS355 drive
- 2. Connect the Ethernet cable from PC to PM583 ETH CPU to unmanaged switch box
- 3. Connect the Ethernet cable from ACS355 drive's FENA-01 to unmanaged switch box

## 4 ACS355 drive's parameter setup

All parameter settings are based on drive default settings. If the drive has been parameterized previously, return to default settings before continuing. It can be done by:

Changing macro (and then changing back again) in parameter 99.02 for ACS355 drive

- Power up the drive
- Enter/verify the parameters as shown below

#### Minimum required parameter settings (based on factory default)

Parameter	Description	Setting	Comment
98.02	COMM PROT SEL	EXT FBA	Activates fieldbus module
51.01	FBA TYPE	ETHERNET	Type of the connected fieldbus module. Read only
51.02	PROTOCOL/	1	0=ModbusTCP ABB Drives profile classic
	PROFILE		1 = ModbusTCP ABB Drives profile enhanced
51.03	COMMRATE	0	Bit rate for the Ethernet interface.
51.04	IP	0 (Static IP)	Sets the method for configuring the IP address.
	CONFIGURATION		0 = Disable DCHP ->static IP address
51.05	IP ADDRESS 1	[IP address 1]	192
51.06	IP ADDRESS 2	[IP address 2]	168
51.07	IP ADDRESS 3	[IP address 3]	3
51.08	IP ADDRESS 4	[IP address 4]	66
51.09	SUBNET CIDR	[Subnet	24 = 255.255.255.0
54.01		102	Speed (rpm)
54.02		104	Current (A)
54.03		105	Torque (%)
54.04		106	Power kW
51.20	MODBUS/TCP	20 *)	Timeout = (MODBUS/TCP Timeout value) * 100
	TIMEOUT		milliseconds.*) 20 = 2 seconds
51.27	REFRESH	1	Updates fieldbus settings (groups 51 to 55)

10.01	EXT 1	COMM	Fieldbus interface as source for start and stop
11.02	EXT1/EXT2 SEL	COMM	Fieldbus interface as source to switch to EXT2
11.03	REF1 SELECT	COMM	Fieldbus interface as source for speed reference
16.04	FAULT RESET SEL	COMM	Fieldbus interface as source for fault reset
11.05	REF1 MAX		Max speed/frequency scaling value. Must be less or
			equal



#### Create new PLC project in Automation Builder software tool: 5

5.1 Double click on ABB Automation Builder software tool icon on the desktop.

(If Automation Builder icon is not available on your desktop, click Start, go to All Programs, select ABB folder and click on Automation Builder software tool.)

- 5.2 The Automation Builder Screen will appear as shown below, if Internet access is available Automation Builder will show the default ABB homepage for PLC products
- 5.3 Create a new project by clicking the New button or selecting the File > New Project
- 5.4 Enter project name as shown in example below: AC500 and ACS355 with Modbus RTU project
- 5.5 Select the location to store the project in PC
- 5.6 Select OK to start the project

#### Specifying the hardware configuration: 6

To specify the hardware configuration, the I/Os and their symbolic names have to be defined. Configure your I/O by double clicking I/O (Onboard I/Os) and refer to the mapping tab window opened on the right side where you can give variable names to each I/O points.

- 6.1 Double click AC500 (PM564-ETH) on the left to open this hardware menu
- 6.2 Change the value of Check battery from **ON** to **OFF** (if no battery present for this example)

Elle Edit View Broject Online Icols Window Help					
0 <b>≈∎</b>  @ 000  <b>8</b> % 0					
Jevices • a	X PLC_AC500 X				
My First eCo R.C project	PMS64-ETH Configuration CMS64-ETH Hardwa	are Information			
PLC_ACS00 (PMS64ETH)	Parameter	Type	Value	Default Value Unit	Description
OBIO (601+600+241+140)	Error LED / Falsafe function	Enumeration of BYTE	On	On	Error LED off by error dass
10.84	Check battery	Enumeration of BYTE	Off	0n	Check battery state (if Off and no battery then no error message)
	Behaviour of outputs in stop	Enumeration of BYTE	Off in hardware and online	Off in hardware and online	Behaviour of outputs on stop Off in hardware and online Off in hardware and actual state online Actu
COM1 Online Access (COM1 - Online Access)	Stop on error class	Enumeration of BYTE	E2	E2	Stop PLC program by error class
( COM2_None (COM2 - None)	Varmstart	Enumeration of BYTE	Off	Off	Warmstart on E2 failure
= 25 Ethernet	Reaction on floating point exception	Enumeration of BYTE	E2 failure	E2 failure	Reaction on floating point exception
- II ETH1 (ETH1)	Flexible configuration	Enumeration of BYTE	None	None	Flexible configuration
Protocols (Protocols)	Flexible configuration timeout	WORD(0_65535)	1000	1000 s	Flexible configuration timeout
	Free wheeling pause	BYTE(0.255)	10	10 ms	Free wheeling pause
	Start PERSISTENT %R80.x	WORD(0.,1023)	0	0	Set start address for PERSISTENT segment in area %RB0.x
	Brid PERSISTENT NORD V	WORD(0.1023)	0	0	Set end address for PERSISTENT segment in area SKRE0.x

#### 7 Setup the Ethernet communication in Windows:

Before you are able to download the compiled program the first time from the PC to the PLC, you have to setup the communication parameter. There are two options you can use to login to the PLC, either with Ethernet or serial with TK503 USB cable.

For this exercise, we are using Ethernet connection for online access to this PLC.

Make sure that your PC address is in the same class as the CPU's IP address. The factory setting of the CPU for IP address is 192.168.0.10. Then the IP of the PC should be 192.168.0.x. x should be different number than 10 so that it will not have an IP conflict with the CPU. Subnet mask should be 255.255.255.0.



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To change the IP address in your PC:

- 7.1 Windows Control Panel > Network and Internet > Network and Sharing Center
- 7.2 Click on Change adapter settings
- 7.3 Select Local Area Connection (in this example is PLC network connection below) and right click it to open the menu.

File Lide Yew Tools Help	Control Parel Barra • Test-out and Sharing Carter	• Fig. Search Contra Faced	2 P
Control Panel Home Manage windless networks Charge stiggter settings councy session to the top settings	View your basic network information and set up US-120205 (Drv respect) Very you attive retrects Very you attive retrects Come network Come	connections Sector may be and Sector and Sector may connect of Second mathematical Sector Sec	
	Unidentified schucek Acceleration	en type: Táo Internet access methons: 🐺 FLC naturali	C (ii) 20 C (iii) 20 C (iii) 20 Search Network and Internet > Network Connections > (iii) 49 Search Network Connections (iii)
	Overge your networking settings Set by a new Langetten or network Set up a werker, brochand, dar-up, at hor, or VPH	Loonvections or set up a model or access point.	File Edit View Tools Advanced Help Organize = Disable this network device Diagnose this connection Rename this condiction ====================================
Sex also Hone-Sexup Hotel 5 PIOSe: Weeks 1 tools Hoter of Options Werdows Firenull	Connect to a natural' Connect or reconnect to a wheteou, whet, club-up, or Connect or reconnect to a wheteou, whet, club-up, or Access The and private backed on other instruction co Texahard and gradients Degree and agent relations	VPN network connection. mputers, or change sharing settings. esherotog information.	All Cop network     abc.com     betel/lip Ethemet Connection DIT/      Wrides Network Connection     Wrides Network Connection     Wrides Network Connected     Microsoft Virtual W/Fi Minipert A

Choose **Properties** (the status is active when the Ethernet connection between PC and PLC is active) 7.4 Select **Internet Protocol Version 4 (TCP/IPv4)** and double click to see properties.

7.5 Type in your desired IP address and subnet mask then click OK.

PLC network Status	PLC network Properties	Internet Protocol Version 4 (TCP/IPv4) Properties
General	Networking Sharing	General
Connection IPv4 Connectivity: No Internet access	ASIX AX88772 USB2.0 to Fast Ethernet Adapter	this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
IPv6 Connectivity: No network access Media State: Enabled	Configure This connection uses the following items:	Obtain an IP address automatically
Speed: 100.0 Mbps	Client for Microsoft Networks	IP address: 192.168.3.249
Details		Subnet mask:     255 . 255 . 255 . 0       Default gateway:
Activity		Obtain DNS server address automatically     Use the following DNS server addresses
Sent — Received	Instal Uninstal Properties	Preferred DNS server:
Broastia Displa	Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication	Alternate DNS server:
	across diverse interconnected networks.	Advanced
Close	OK Cancel	OK Cancel

#### 8 Setup the IP address in Automation Builder software:

8.1 Make sure the CPU's RUN switch is STOP position8.2 Click IP-Configuration to access Scan tool

Ble Edit New Broject Online Loois	ndow telp	
evices	• # X / PLC ACSOO / ET OBIO / ET IL X / IP-Config	uration
My First eCo FLC project     B    PLC_ACS00 (PMS64-ETH)     Application	P settings	
0810 (501+600+2A1+140)	A management	
TO_Bus     To_fine     Comit_Online_Access (COM     Comit_None (COM2-None     Ethernet     Ethernet	Chine Access)	
ETH1 (ETH1)	DHCP	
	3P address 0 . 0 . 0	
	Subnetmask 255 , 255 , 255 , 0	
	Default gateway	
	Note: The priority sequence is 800TP, DHCP, Fix IP addre	ess
	Link mode Auto Negatistion +	
	Remote configuration	
	ABBNetConfig protocol active	



- 8.3 Click on Scan button for searching active PLC on the network
- 8.4 Highlight the active IP address in the search window
- 8.5 Change the IP address to new IP address such as 192.168.3.20
- 8.6 Click on Send Configuration button to send new IP address to PLC.

🛑 My Fint eCo PLC project/project* - Autometion Builder Pre	criwa 1 Year							
Die GAR Dew Switch Online Date Burgen 1949		My First of o PLC project project" - Automation Builder Prem	um 1 Your					
Denne - + x	Call an array (10 min) (10 min) (10 min) (10 min)	je pi je jest get get gete ge ]get⊈(g)						
	20         30           WG Libbs         Destroare         Factor         Sections         Destroare         Adv.apr           -05-059+05.4         MISHON         Pactor         Sections         SEctions         SEctions	Desimin         9         # / Strendon Rupper         9         # / Strendon Rupper         Im         # / Strendon Rupper         # / Strendon Rupper	I ALACIONI SIN MACACIONI D DI BLANDAL	Devonante Posto migliantes Sant	9 Configuration Serial number DE000000	N Device D Current P Addre Mail 110 (1843) (1	Configured IP Address 192 (HKL) 1	Auth supp w
B (Proj Proj B Harven Petrole)	Derived, Insere I Insures           PMSSE T. ETH [SN-000005329, ID-0x00]           Netrochysters           Inserchysters           Inserchysters	- (0.002/ters/cm + Garar J. Bickso J. Nass Paral	Teachtrist, sealaid 1 PHS54-T-EIIII Ner configuration 2 okt 19 2 okt 19 5 and 19 5 a	940 7 10 10 10 10 10 10 10 10 10 10 10 10 10	let Grigona			

- The warning message window display is shown below for this change.
- This screen shows the progress of IP address settings is sending to CPU. Wait about 30 seconds ٠ for CPU to register new IP address (the RUN and ERR lights are flashing during this process).
- Click OK to accept this new IP address for this CPU. •

Automatic	on Builder
<b></b>	Attention ! Setting the IP address will lead to a reset of the PLC in order to take over the new address.
	OK Cancel

Press "Scan" button again to verify the IP address of CPU. This window shows the Configured IP • address sent to CPU successfully. This IP address will be used in IEC 61131-3 CoDeSys to download your PLC project to CPU.

	Auth. supp
00-24-59-04-03-A1 PM554-T-ETH Slot 0 0000005929 0x00 192.168.3.20 192.168.3.20	no

- 8.7 Click File > Save Project to save the configuration settings for this lab.
- 8.8 Right on AC500 > Create Configuration data to save the settings before go to CoDeSys window.



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### 9 Modbus TCP/IP configuration:

- 9.1 Right click on Protocols > Add object to access Protocols menu
- 9.2 Select Modbus TCP/IP Server for this connection

Devices	<b>→</b> ↓ X	AC500 eCo 🗙 👔	COM2 Online Access 1	ETH1	Prote	ocols
PM564_ACS355_ModbusTCP_Final		PM564-ETH Configuration	M564-ETH Hardware Information			
AC500_eCo (PM564-ETH)			Hore and a second second			
AC500		Parameter	Type			Valu
OBIO (6DI+6DO+2AI+1AO)	Add object be	low : Protocols				
IO Bus						
	Object path	1:				
-C COM1 Online Access 1 (COM1 - Online Access)	AC500 eC	o\Interfaces\Ethernet\Protocol	9			
COM2 Online Access 1 (COM2 - Online Access)	-					
S TH Ethernet	Object nan	18:				
- जिन्हा (सामा)						
Protocols (Protocols)	Categories	•				
	. Ethernet	protocols	Name	Version	Order Number	Short D
			FTP Server	2.4.1.0		
			HEC 60870-5-104 Controlstation	2.4.0.0		
			HEC 60870-5-104 Substation	2.4.0.0		
			Modbus TCP/IP Client	2.4.1.0		
			Modbus TCP/IP Server	2.4.1.0		
			SMTP Client	2.4.1.0		
			SNTP Client	2.4.1.0		
			IDP (no AC21 header)	2.4.1.0		
			IDP data exchange	2.4.1.0		
			Web Server	2410		
				2.4.1.0		
			I ■ 100 mm	-		F
	Close this	dialog after each transaction	Display all versions			
	Reset filt	er		object	Clos	e

9.3 Set Server connections = 4.

Note: Server Connections are for Maximum number of logical parallel connections, that are kept for connection requests by clients in operation mode as server.

Devices 👻 👎	x	AC500_eCo 🔐 C	OM2_Online_Access_1	ETH1
PM564_ACS355_ModbusTCP_Final		Modbus TCP/IP Server Settings	Modbus Server Settings	Information
🖻 🗐 AC500_eCo (PM564-ETH)			·····,	
OBIO (6DI+6DO+2AI+1AO)				
IO_Bus		Modbus TCP/IP Server		
🗐 🍙 Interfaces		Server connections	4	
-\$ COM1_Online_Access_1 (COM1 - Online Access) \$ COM2_Online_Access_1 (COM2 - Online Access)		Task timeout	2000	(ms)
Ethernet		OMB time	1000	(ms)
ETH1 (ETH1)		Conditionant		(
Medbus TCD ID Server (Medbus TCD/ID Server)		Send timeout	0	(ms)
		Connect timeout	18000	(ms)
		Closetimeout	0	(ms)
		Byte order	Big endian 🔻	
		Set default values		

- 10 IEC61131-3 Application (CoDeSys):
  - 10.1 Double-click "Application" from the Device tree in Automation Builder project to access the IEC61131-3 application (CoDeSys)





10.2 Open the Library Manager by double-clicking "Library Manager" from "Resources" tab 10.3 Right-click in the library field and choose "Additional Library"



- 10.4 Select the "ACSDrivesBase\_AC500\_V20.lib" and "ACSDrivesComModTCP\_AC500\_V22.lib" from the PS553-DRIVES folder (under the standard CODESYS library folder)
- 10.5 Click "Open" to add the libraries to the project

#### Create new PLC logic in FBD (Function Block Diagram)

10.6 Compile your project, choose "**Rebuild all**" from the "Project" menu.



- 10.7 Right-click "PLC\_PRG" in the "POUs" tab
- 10.8 Choose "Convert Object"
  - a. Choose Target Language "FBD"
- 10.9 Click **"OK**"



Convert Object		×
Converting POU:	PLC_PRG	OK
New POU name:	PLC_PRG	Cancel
Target Language -		1
OL G	FBD CLD	

- 10.10 Right-click in the POUs field and choose "Add Object"
- 10.11 Set Type of POU to "Program"

	🞭 CoDeSys - AC500./	AC500PRO*	-					
	<u>File Edit Project</u>	<u>I</u> nsert E <u>x</u> tras	<u>O</u> nline	<u>W</u> indow	<u>H</u> elp	New POU		
		¥ 🕵 🕺 🖻	🐰 🖻			Name of the new POU:	ACS850	OK
						Type of POU	Language of the POU	Cancel
	🔁 POUs			Program	CL			
		RG)				Function Block	0.00	
		bbA	Object			C Function	<ul> <li>FBD</li> </ul>	
			objectili		_	Return Type:	C SFC	
	Rename Object			- 88	BOOL	C ST		
		Edit	Object		- 88		C CFC	
10.12	Set language of	the POte	<b>∞"</b> EBC	)"	- 88			



- 10.13 Name the Program and click "OK" e.g. "Drive1"
- 10.14 Double-click "PLC\_PRG" to open the main program
- 10.15 Select the dotted box in Network 0001
- 10.16 Right-mouse Click to insert a box



10.17 Press the F2 key and select your program from the list as shown below

nput assistant		<b>×</b>
Stardurd Functions Ustar defined Functions Blocks Standard Function Blocks User defined Function Blocks FBD Operators Standard Programs User defined Programs Conversion Operators	User defined Programs	OK Cancel
	✓ Structured	

- 11 ACS\_COM\_MOD\_TCP Function Block Creation
  - 11.1 Double-click your new program: Drive1
  - 11.2 Add a box
  - 11.3 Press F2 while the block title is selected
  - 11.4 Choose "ACS\_COM\_MOD\_TCP\_ENHANCED" from "Standard Function Blocks",
  - 11.5 Click "OK"

Tip: Check  $\sqrt{}$  the "Structured" box in the Input assistant menu

Input assistant		X
Standard Functions         User defined Functions         Standard Functions         Standard Functions         Standard Functions Blocks         Diget defined Functions         Standard Programs         Conversion Operators         Conversion Operators <td>IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVETHERNET_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVETHERNET_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVSYSEXT_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVSYSEXT_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTCP_AC500_V22.LIB FB) ENHANCED [FB] IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVM0DBUS_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVM0DBUS_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVM0DBUS_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTU_AC500_V22.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTU_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTU_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESVAC5DRIVESCAMDDRTU_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVSTANDARD.LIB</td> <td>E Cancel</td>	IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVETHERNET_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVETHERNET_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVSYSEXT_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVSYSEXT_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTCP_AC500_V22.LIB FB) ENHANCED [FB] IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVM0DBUS_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVM0DBUS_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVM0DBUS_AC500_V10.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTU_AC500_V22.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTU_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESCOMMODTU_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESVAC5DRIVESCAMDDRTU_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVP5553DRIVESVAC5DRIVESBASE_AC500_V20.LIB IN FILESVCAA-TARGETSVABB_AC500VAC500_V12VLIBRARYVSTANDARD.LIB	E Cancel

11.6 Give the instance of the drive communication block a name



11.7 Declare it as of type "ACS\_COM\_MOD\_TCP"

a. The type is automatically listed after the function block is selected.

Declare Variable			×
<u>C</u> lass VAR ▼ <u>Symbol list</u> Global_Variables ▼ Comment:	Name Drive_Access Initial Value	Ivpe       ACS_COM_MOD_TCP       Address	OK Cancel CONSTANT <u>R</u> ETAIN <u>P</u> ERSISTENT

- 11.8 Open the program again from the "POUs" tab and connect the function block inputs as shown
- 11.9 In the example below, the block will always be enabled
- 11.10 Slot 0 of the PLC is used for Modbus TCP/IP (Slot 0 is CPU's onboard Ethernet port)
- 11.11 The drive's IP Address 192.168.3.66
- 11.12 Type number 4 as Drive type is for ACS355 drive
- 11.13 Connect the variable **DrivePointer** to DRIVE\_DATA
  - a. **DrivePointer**: ACS\_DRIVE\_DATA\_TYPE;



## 12 ACS\_DRIVES\_CTRL\_STANDARD Function Block Creation

Create a second Network After (Ctrl +T) in the Drive1 program

- 12.1 Add the block "ACS\_DRIVES\_CTRL\_STANDARD" as shown previously
- 12.2 Name this function block is Drive\_Control
- 12.3 Connect the function block inputs as shown below
- 12.4 Other than Enable input the complete block will be controlled by using the Visualization.

NOTE: The variable connected to "ACS\_DRIVES\_CTRL\_STANDARD" -> "DRIVE\_DATA" must be the same as the one connected to "ACS\_COM\_MOD\_TCP" -> "DRIVE\_DATA" and must be of type "ACS\_DRIVE\_DATA\_TYPE".





- 13 Create Visualizations to control ACS355 drive
  - 13.1 Click Visualizations tab in the bottom left of IEC61131-3 programming environment



13.2 Right-click "Visualizations" in the "Visualizations" tab



- 13.3 Choose "Add Object", give the visualization page a name
  - a. E.g. PLC\_VISU



13.4 From the new page, choose "Visualization" from the "Insert" menu and draw a box

13.5 Select Visualization "ACS\_COM\_MOD\_TCP\_ENHANCED\_VISU\_PH" as shown below





- 13.6 Double click on the visualization to view the configuration dialog
- 13.7 Select "Placeholder..."
- 13.8 Place the cursor in the "Replacement" Column, and press the F2 key

		)	TCP ENHANCED	1					
-		SFE	35						
%s	%s EN DONE %s								
%s	SLOT	1	ERR	%s					
%s	IP-A DDRES S	1	ERNO	%s					
Visual	ization	1							
e Visu Text Colo Colo Line Moti e Visu Colo Line Variu e Variu e Variu e Prog e e e e e	gory: alsa von variables width on relative bibles for tooltip <i>rity</i> rammability C C	aliz P Dra Clip Iso Fix	ation: ACS_COM_MOD_ laceholder aw isotropic A tropic ed ed and scrollabl	Color	OK Cancel				
Replace	e placeholders				OK Cancel				

13.9 Select the Drive\_Access object as shown below

•



13.10 Press "OK" to accept and exit



# 14 Create ACS\_DRIVES\_CTRL\_STANDARD Visualization template

- 14.1 From the same page as previously described, choose "Visualization" Im from menu and draw a box in visualization screen
- 14.2 Select Visualization "ACS\_DRIVES\_CTRL\_STANDARD\_VISU\_PH" template



- 14.3 Double click on the visualization to view the configuration dialog
- 14.4 Select "Placeholder..."
- 14.5 Place the cursor in the "Replacement" Column, and press the F2 key
- 14.6 Select the Drive\_Control object as shown below

ACS_DRIVES_CTRL_STANDARD										
	\$1									
%s	EN	DONE %s								
%s	%s START ERR %s									
%s	EMCY_COAST	ERNO	%s							
%s	EMCY_RAMP	READY	%s							
Visualizati	ion			23						
Category:       Visualization:       ACS_DRIVES_CTRL_STAN       OK         Fest       Fest       Cancel       Cancel         Fest       Placeholder.       Cancel       Cancel         Mation.absolute       Placeholder.       Cancel       Cancel         Placeholders       Cancel       Cancel       Cancel         Placeholders       Cancel       Cancel       Cancel         Input assistant       Cancel       Cancel       Cancel         Valch Expressions       CVPROGRAM FILES (X86)\COMMON FILES\CAA-TARGETS\ABB_ACS(COMCON FILES\CAA-TARGETS\ABB_ACS										
Control (ACS_DRIVES_CTRL_STANDARD)      Dive_Control (ACS_DRIVES_CTRL_STANDARD)      DiveDointer (ACS_DRIVE_DATA_TYPE)										

14.7 Press "OK" to accept and exit

Here is the complete PLC codes for this Application Note:



😓 CoDeSys - AC500.AC500PRO -	[Drive1 (PRG-FBD)]
🎭 File Edit Project Insert	Extras Online Window Help
🖬 🗐 🛷 +3 🖴 🚔 🗳	
POUs         000           Divel (PRG)         000           PLC_PRG (PRG)         000           000         000	IPROGRAM Drive1         VAR         3       Drive_Access: ACS_COM_MOD_TCP_ENHANCED;         4       Drive_Control: ACS_DRIVE_OATA_TYPE;         5       Drive_Control: ACS_DRIVE_OATA_TYPE;         6       FB_TCP: ACS_COM_MOD_TCP_ENHANCED;         7       FB_TCP: ACS_COM_MOD_TCP_ENHANCED;         8       Drive_Data: ACS_DRIVE_DATA_TYPE;         9       XONIn:e BOOL;         9       FB_ReadValues: ARRAY [112] OF INT;         1       FB_Scaling: ACS_REF_SCALING;         2       SpeedReiPercent REAL;         3       Drive_Access         4       END_VAR         4       END_VAR         5       SLOT         9       SLOT         9       SLOT         9       SLOT         9       SLOT         1152:105.305       SLOT         4       SLOT         9       SLOT         9
	-NVAR_WRITE READ_VALUES -WRITE_VALUES DrivePointer-DRIVE_DATA ⊳
000:	2 Drive_Control ACS_DRIVES_CTRL_STANDARD -EN DONE -START ERR -STOP_EMCY_COAST ERNO -STOP_COAST OPERATING -RESET TRIPPED -STOT_COAST OPERATING -RESET TRIPPED -EXT_CTRL_LOC ALARM -SPEED_REF EXT_RUN_ENABLE -DrivePointer-DRIVE_DATA P EXT_CTRL_LOC_ACT ACT_SPEED ACT_SW USED_CW

# 15 Download program to PLC and Go online:

15.1 From **Online** menu, select **Communication Parameters**.

CoDeSys - AC500.pro*		
le Edit Project Insert Extras	Online Window Help	
▋▋®ፇ₽₽₽₽	Login Logout	Alt+F8 Ctrl+F8
🔄 POUs 🕕 PLC_PRG (PRG)	Download Run Stop Reset Reset (cold) Reset (original)	F5 Shift+F8
	Toggle Breakpoint Breakpoint Dialog Step over Step In Single Cycle	F9 F10 F8 Ctrl+F5
	Write Values Force Values Release Force Write/Force-Dialog	Ctrl+F7 F7 Shift+F7 Ctrl+Shift+
	Show Call Stack Display Flow Control	
	Simulation Mode Communication Parameters	

- 15.2 In the **Communication Parameter** dialog box, **click New...** button to add a new channel. Type the name for this channel. In this example below, **192.168.3.35** is the name for this channel.
- 15.3 In the popup Communication Parameters: New Channel dialog, fill in the "Name" field with 192.168.3.35, select TCP/IP in Device window then click OK.
- 15.4 Double click in Value field, type **192.168.3.35** for PLC's IP address.



	Communication Parameters			×
	Communication Parameters:	New Channel	×	- ок
	Name 192.168.3.35			Cancel
	Device		Cancel	New
	Name	Info 🔺		New
	ABB Arcnet AC ABB RS232 AC	ABB SST Arcnet AC ABB RS232 AC drive		Remove
L L	APP Tcp/lp Level 2 AC	ABB SST Tcp/lp Le-		
	Seriar (RS232)	3S Serial RS232 driv		Gateway
	Serial (RS232, 8 bit) Tcp/lp (Level 2)	3S Serial RS232 driv 3S Tcp/lp level 2 dri ▼I		
	■			
	192.168.3.35			
	192.168.3.100 ▼			

15.5 Click Gateway then select Local for Connection from popup Communication Parameters: Gateway window as shown below.

<b>Communication Paramet</b>	ers						×
Channels							
TK503	Tcp/lp		AC5	0.AC500PR0	1	OK	
192.168.3.20	, 					T Cancel	
gross	Name		Value	Comment			- L
192.168.3.4	Address		192.168.3.35	IP address c	or hostname		F
192 168 3 32	Motorola	a byteorder	Yes			New	
192.168.3.35							- 1
192.168.3.3						Remove	
192.168.3.3	1						
192.168.3.27						Calanaa	
192.168.3.34	6	mmunicat	ion Paramet	ers: Gate a			
PM591		minumeut	ion runumet			Update	
192,168,3,3						,   <u> </u>	-
- 192.168.3.3		Jonnection:	Local	-	OK	]	
- 192.168.3.1		oddress:	_		Connel	1	
		localhost		<b>T</b>	Lancer	J	
	1	Password:				P ok	
				_		ault_	
			1210			code -	
ault maant Avian Kar						AX1s	o_ke

- 15.6 **Double click** in each Value field to replace with
  - Address: **192.168.3.35**
  - Port: **1201**
  - Motorola byteorder: Yes

Click OK to accept these entries.

communication Parame	eters		×
Channels			
TK503	▲ Tcp/lp	AC500.AC500PR0	
	Name	Communit	- Cancel
- 192.168.3.4	Address	192,168,3,35 JP address or hostname	
- 192.168.3.32	Port	1201	1
	Motorola byte	eorde <mark>n</mark> Yes	New
192.168.3.35			Bemove
192.168.3.3			
192.168.3.3			
- 192,168,3,34			Gateway
192.168.3.35			
PM591			Update
192.168.3.33			
192.168.3.100	<b>▼</b>		

15.7 Click Online>login in top menu to download the changes and go online with CPU.

15.8 Click Yes when message appear below.

 ▶ File Edit Project Inset Extra Online Window Help

 ▶ Bit Project Inset Extra Online Window Help

 ▶ Bit Project Inset Extra Online Window Help

 ▶ Bit Project Inset Extra Online Window Help

 ▶ Download

 ▶ PLC\_PRIG (PRG)

 ▶ Plc\_PRIG (PRG)

 Provide

 Provide

15.9 The download progress as shown below.

🖪 CoDeSys		×
	Downloading All	
	0 of 137662 bytes	

#### 16 Create boot project

In "Online" mode (Login), choose "Create boot project" from the "Online" menu. With this command, the compiled project is stored to the flash in such a way that the PLC will load it automatically when CPU re-started.

	Login	Alt+F8
	Logout	Ctrl+FF
2008	Download	
DI Drivet (PRG)	Bun	F
	Stop	Shift+F
	Reset	3.000-10
	Reset (cold)	
	Reset (original)	
	Toggle Breakpoint	F
	Breakpoint Dialog	
	Step over	F10
	Step in	FI
	Single Cycle	Ctrl+F!
	Write Values	Ctrl+F7
	Force Values	E
	Release Force	Shift+F
	Write/Force-Dialog	Ctrl+Shift+F7
	Show Call Stack	
	Display Flow Control	
	Simulation Mode	
	Communication Parameters	
	Write file to PLC	
	Read file from PLC	

# 17 Run PLC Program

- 17.1 Click **Online** then **Login** to go online with CPU
- 17.2 Click RUN to put CPU in RUN mode. Verify the PLC is in run mode at Status line in bottom right of the window.
- 17.3 Reset the Drive if needed



a. Click Start button in ACS\_DRIVES\_CTRL\_STANDARD visualization template

#### 17.4 Enter a SPEED\_REF

- a. The speed ref is in counts (+/- 20,000)
- b. Refer to drive parameters 11.05 for motor speed RPM scaling
- 17.5 Verify the drive's motor running.

#### Here is the visualization for this project:



ONLINE: 192.168.3.12 SIM RUNNING BP FORCE OV READ

