Welcome to the CoDeSys training module for the DCS800, ABB DC Drives.
If you need help navigating this module, please click the Help button in the top right-hand corner. To view the presenter notes as text, please click the Notes button in the bottom right corner.
After completing this module, you will be able to
• Install CoDeSys correctly
• Work with several types of program organization units (POU)
• Split a project into task sections
• Work with DCS800 interface function blocks
• Create new parameters
The installation of the CoDeSys software tool is the first step when working with applications.
Installation from the “DCS800 Customer CD” is the easiest way of obtaining the software.
All necessary files for the “DCS800 Control Builder” will be installed automatically.
This automatic setup is more user-friendly, because all configurations are automatically performed during the installation process.
Upgrade of existing CoDeSys software is also possible if a version of CoDeSys has been previously installed on the PC. In this case the installation of the configuration files can be performed manually.
 Afterwards a configuration of the complete CoDeSys system is necessary. The files which define the DCS800 application system are the target, configuration and library files. For a better presentation, the bitmap files, which are displayed inside the function blocks, are also needed.
If a manual installation has been executed, the CoDeSys system must be configured. The configuration window inside CoDeSys can be opened by selecting the item “Options” in the “Project” menu. It is necessary, that the target pointer points to the directory, where the target library files are located. The green box on the right-hand side shows all files which must be listed in the directory. Note that these settings only must be modified if a manual installation procedure has been executed otherwise all parameters will be set automatically!
An upgrade of existing CoDeSys software is also possible if the software version is out of date or software bugs are in the compiler.

An update is also necessary if the CoDeSys software has previously been used for other PLC manufacturers or the software has to be updated for the newer system.

An upgrade is possible anytime. The CoDeSys software is upward compatible so the newer CoDeSys version can be installed without uninstalling the older software version. The target and library files will not be modified during a software update.

Existing projects can still be used as well with the newer software.

Note a CoDeSys software update also changes the compiler. Please be careful with older projects as they may not be compatible!
In CoDeSys there is an organization structure to manage programs, function blocks and functions. This structure is called “Program Organization Unit”. Typically, there are three types of units available.

The first unit is the “Program” with the abbreviation “PRG”. This structure provides a platform to connect blocks. It is a completely closed section. That means it is able to work independently of other programs.

The next unit is the “Function” unit. Functions are similar to function blocks with the limitation that several inputs can be created but they only have one output without any memory functionality.

Function blocks offers the biggest functionality of all boxes. Several inputs and outputs can be defined and inside the block it is possible to save values.

Each type of organization unit has a special icon which allows the user to distinguish between the type of unit and the programming language being used. This makes the handling of the entire project easier. The type of unit can be seen in the brackets after the name of the program organization unit. The complete handling of CoDeSys is based on this organization structure which makes it easy to switch from one window to another.
There are several reasons to split an application program into small parts. This is recommended for bigger projects to provide a better overview about the program.

Further advantages include the possibility to better identify program parts, to use structured programming and to assign the split program parts to several task cycles.

It is also useful to disable programs during the debug process and to perform fast jumps to program parts.

Another advantage for big projects is that several developers are able to work at the same time on one project.

Each “Program Organization Unit” can be imported from or exported to other CoDeSys projects.
An important part in CoDeSys is the “Task Configuration”. The DCS800 only works externally task triggered. That means the CoDeSys program code will be assigned to the prepared task cycles inside the drive.

In the “Task Manager” all task cycles must be configured, and the current program organization unit has to be attached to the corresponding task.

If all program parts are configured in the “Task Manager”, it will appear like the graphic above. Each task cycle is shown with the attached program.

Note, with the DCS800 an endless loop is not possible.
Another way to split programs is by using “Program Calls”. There is one program for each task cycle. This program is the main program which calls the subroutines in a free selectable execution order.

An example is shown in the graphic. The main program “PRG_10ms” consists of five subroutines which are called in the several networks. So, in network one, the subroutine “Cust In Logic” and in network two “Logic In Group” are called.

The main program starts in network one and jumps to the first subroutine. If the subroutine is completely finalized, the program jumps back to the main program and then to the next network.

The execution order is beginning from network one to the last network.
The task configuration can be performed in the “Task manager” inside the CoDeSys software tool. To do this, define a new task and select a “task cycle time”. The next step is to append a “program call” with the needed program part. It is possible to attach more than one program call if, for example, several programs have to work with the same task cycle time.

If more than one task cycle time is necessary, add further task cycles and programs in the same manner.
Interface function blocks for communication with the drive can be found in the DCS800 library. This library is installed automatically with the “DCS800 Customer CD”.

The library includes function blocks for analog and digital inputs and outputs of the drive. Other function blocks are used for the definition and triggering of user events. A parameter read and write functionality is also included in the special function blocks.

Attention: The name “DCS800 Lib” is reserved for the interface library. If library updates should be performed, check the software version - by right clicking it - before using!
Analog values coming from the drive terminal are connected directly with the drive parameters. For example, the value of “analog input 1”, connected with parameter 5.03 is available in the function block “Read Analog Inputs”, called “AnIn”. The scaling in CoDeSys accords to the parameter setting of the analog inputs and outputs. The default setting is that 10 volts are equal to 10000 in integer values.

The analog outputs of the drive can also be controlled via the CoDeSys program. The function block “AnOut” is used to write an integer value to the “Control Word”. If “analog output 1” should be controlled, the function block “AnOut” will write to parameter 15.02 which is scaled like selected in the parameter group.
For the handling of digital inputs and outputs there are two function blocks available. Function block “DigIn” is used to read the status of digital inputs and shows the result of parameter 8.05 of the drives firmware. The function block “DigOut” writes the bit status to parameter 7.05. In this case the hardware output remains idle because a second setting is necessary in parameter group 14. Parameter 7.05 includes the information in “Packed Boolean” format. That means “bit 0” is connected with digital input or output 1. The coding appears like the table!
One of the best features of the DCS800 is the user parameter section. Up to 250 new parameters can be created which have the same priority and functionality as system parameters. These parameters can be used for application programs. We distinguish between parameter read and write functions. Hiding and protecting parameters is also possible with a special function block.
User parameters will be designed in the “Parameter Manager” inside CoDeSys. There the definition of these user parameters can be specified. Parameter groups 60 through 69 are reserved for new user parameters. For each parameter it is possible to define the parameter text, the working range and the unit. All user parameters have the same quality and functionality as normal firmware parameters.
All declarations and configurations are performed in the “Parameter Manager” which can be found in the “resources” menu. The name of the parameter group is shown in the middle window. The next steps are to set the group and the index, define the parameter name and connect the parameter with the CoDeSys program. Additional settings are “Data Type”, “Decimal Point”, “Read Only” and “No Save”.

![User parameters](image-url)
The new user parameter can be seen in “DriveWindow light”, “DriveWindow” or the “DCS800 panel”. The parameters are only active if the “ABB Memory Card” is placed in slot 4 of the “CON-4-board”. If a loaded “ABB Memory Card” is inside the slot and activated, the new parameters will be generated and displayed in the parameter list.

In the drive’s parameter list, the new parameter will appear like a normal system parameter.
In this module you should have learned about the installation and the task handling of the CoDeSys software tool. Another topic discussed was the interface library with the special function blocks for the DCS800. Last but not least, the handling of user parameters was described.
Additional information

- Links to related information
  - 3S-software.com
  - DC-Drive-News (Intranet)

- Additional references
  - Application Manual (3ADW000199)
  - Firmware Manual (3ADW000193)
  - Hardware Manual (3ADW000194)
  - Training Material
Glossary

- **CoDeSys**
  Controller Development System (software tool)

- **Memory Card**
  Flash memory

- **DriveWindow Light**
  Software Tool for commissioning and maintenance using AC/DC

- **Target**
  Interface between Drive and CoDeSys tool

- **Control Builder**
  Whole system with software and hardware

- **PLC_PRG**
  Main program which is used in all applications

- **POU**
  Program Organization Unit

- **Library**
  Includes function blocks which are given or designed by other users
Thank you for your attention. You may now go ahead and move on to the next unit.