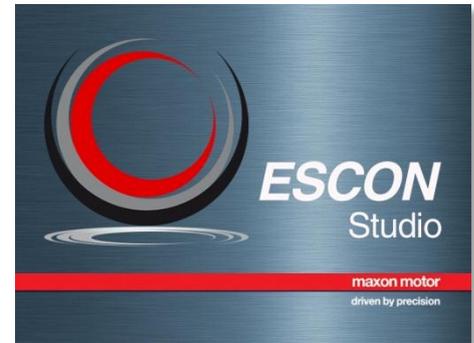# Practical Training with the ESCON Studio

Purpose and goals

The purpose of the exercises is to get familiar with some of the tools and wizards of the ESCON Studio. In particular the download wizard for new firmware and the different tools of the ESCON (i.e. the set value possibilities). These exercises are to be done after the Getting Started procedure.

Material and Documentation

ESCON 36/2 DC (#403112)	ESCON 36/3 EC (#414533)	ESCON 50/5 (#409510)
		ESCON Module 50/5 (#438725) & ESCON Module Motherboard (#438779)
USB 2.0 cable Type A micro-B #403968		
• **DC motor with Encoder** (e.g. Motor A-max 22 #110164 with Encoder MR #201937) • **DC motor with DC Tacho** (e.g. Motor RE 25 #339152 with DC Tacho DCT 22 #118909)	• **EC motor with Hall sensors** ➢ **Direct connection:** EC 13 (30 W, 50 W), EC 16, EC 22, EC 32, EC-max 16, EC-max 22, EC-max 30*, EC-max 40*, EC-4pole 22, EC 45 flat (50 W) and EC-i 40* * *remove plug* ➢ **Adapter BLACK #418719:** EC 10, EC 13 (6 W, 13 W), EC 20 flat, EC 32 flat and EC 45 flat (12 W, 30 W) ➢ **Adapter BLUE #418723:** EC 8 and EC 9.2 flat ➢ **Adapter GREEN #418721:** EC 6 and EC 10 flat	• **EC motor with Hall sensors and Encoder** (e.g. EC 32 # 118889 with Enc. HEDL #110514) • **DC motor with Encoder** (e.g. Motor RE 30 #310007 with Encoder MR #228452) • **DC motor with DC Tacho** (e.g. Motor RE 35 #273753 with DC Tacho DCT 22 #118910)
• **ESCON Evaluation I/O Board** or set of cables (Analog I/O Cable #403964, Digital I/O Cable #403965, switches and pots)	• **ESCON Evaluation I/O Board** or set of cables (Analog I/O Cable #403964, Digital I/O Cable #403965, switches and pots)	• **ESCON Evaluation I/O Board** or set of cables with switches and pots
• **Power Cable** #403957	• **Power Cable** #403957	
• **Power supply** (max. 36V, approx. 2-4A)	• **Power supply** (max. 36V, approx. 2,7-9A)	• **Power supply** (max. 50V, approx. 5-10A)
• **Screwdriver**, slotted, size '00'	• **Screwdriver**, slotted, size '00'	• **Screwdriver**, slotted, size '0'

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Exercise overview

Remarks:

- By pushing the 'F1' key you get direct help for the respective window.

- On www.maxonmotor.com you can find various Video Tutorials about different aspects of the commissioning of an ESCON System.

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Preparation

Exercise A: Latest ESCON Studio Version
Goal: Make sure you have installed the current ESCON Studio version on your computer.

1. If there is no ESCON Studio installed on your computer, please jump directly to point 5.

2. Visit www.maxonmotor.com and check the current version of the ESCON Studio.

3. On your computer open "Start → Programs → maxon motor ag → ESCON Servo Controller → Release Notes.pdf" and compare the version with the one on www.maxonmotor.com.

4. If the version on your computer is older than the one on www.maxonmotor.com, uninstall the current version on your computer.

5. Install the latest ESCON Studio version from www.maxonmotor.com , from escon.maxonmotor.com or from the USB Stick.

Exercise B: Firmware Update Wizard
Goal: Download the current firmware to the **ESCON**.

1. Check the current firmware of the ESCON (click on 'Help' – 'About ESCON Controller') and compare with the latest available on www.maxonmotor.com or on escon.maxonmotor.com

2. If the firmware on the maxon website is newer than the current one, download the new firmware from the maxon website and save it to your computer.
   Remark: Check also the ESCON Video Tutorial about the Firmware Update Tool.

3. Start the ESCON Studio

4. Exit "Startup Wizard" by clicking on 'Cancel'

5. Start the "Firmware Update" Wizard: (Tools window left)

   Step 1: Read the warning, and confirm. Click 'Next'.
   Step 2: Select the Update Options for the firmware and parameter update mode. Click 'Next'.
   Step 3: Select the new firmware version. Click 'Next'.
   Step 4: Start the download with the 'Start' button.
   Step 5: After the successful Firmware update, click on 'Finish'.

System Configuration

Exercise 1: Startup wizard for Speed Controller (Closed Loop)
Goal: Configure the ESCON system in Closed Loop Speed Control for a maxon motor with incremental encoder, Hall sensors or DC tacho, external switch as 'enable' and external potentiometer as an 'analog set value'.

Remark: When using a DC tacho together with the mmc ESCON I/O switch board (S11065 or S11066), please make sure that the jumpers of the Analog Input used for the DC Tacho on the mmc ESCON I/O switch board (S11065 or S11066) are open.

Work through the 'Startup Wizard' of the ESCON Studio

1. *Start ESCON Studio:* Double-click 'ESCON Studio.exe' shortcut on your desktop. «ESCON Studio» will start.

2. *ESCON Studio actuality:* Make sure that you are using the latest version of «ESCON Studio». If you are in doubt on the version you are currently using, go back to *Exercise A: Latest ESCON Studio Version*.

3. *Start Startup Wizard:* If the 'Startup Wizard' does not start automatically, double click on 'Startup Wizard' in the 'tools' window on the left. The 'Startup Wizard' starts.

4. *Safety Instructions:* Read the 'Safety Instructions', and confirm. Select 'Next'.
   Remark: By clicking on 'Help', the respective part of the document "Hardware Reference" opens.

5. *Introduction:* Select 'Next'.
   Remark: By clicking on 'Help' or 'Help contents', the document "Hardware Reference" opens.

6. *Motor Type (only if different types are possible):* Select type of motor 'maxon DC motor' or 'maxon EC motor'

7. *Motor Data:* Enter motor characteristics (consult maxon-catalog for details). Select 'Next'.

8. *System Data:* Enter system data. Select 'Next'.

9. *Detection of Rotor Position (only for EC motors):* Select type of sensor 'Digital Hall Sensor' and the Polarity 'maxon'. Select 'Next'.

10. *Speed Sensor:*
    - with encoder feedback:
      Select type of sensor 'Digital Incremental Encoder', the Encoder Resolution and the Encoder Direction (e.g. Digital Incremental Encoder, 500 Counts/turn, maxon).
    - with DC tacho feedback:
      Select type of sensor 'DC Tacho', the Input, the DC Tacho Constant and the DC Tacho Direction. (e.g. DC Tacho, Analog Input 2, 0.52V/1000 rpm, maxon).
    - without encoder feedback (only EC motors):
      Select type of sensor 'Available Hall Sensors'

    Select 'Next'.
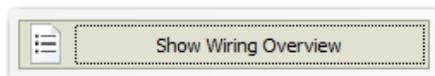
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11. *Mode of Operation:* Select mode of operation (Speed Controller (Closed Loop)). Select 'Next'.

12. *Enable:* Select type of <Enable> functionality (Enable, Digital Input 1). Select 'Next'.

13. *Set Value:* Select type of <Set Value> functionality (Analog Set Value, Analog Input 1). Enter the desired scaling of the Set Value. Select 'Next'.

14. *Current Limit:* Select type of <Current Limit> functionality (e.g. Fixed current Limit) and enter the desired Current Limit value. Select 'Next'.

15. *Speed Ramp:* Select type of <Ramp> functionality (e.g. Fixed Ramp) and enter the desired Acceleration and Deceleration values. Select 'Next'.

16. *Minimal Speed (only EC motors):* Control performance is limited due to low speed sensor resolution. It may be useful to configure a minimal speed. (e.g. Minimal Speed: 500 rpm) Select 'Next'.

17. *Offset:* Select type of <Offset> functionality (e.g. Fixed Offset) and enter the desired Offset value. Select 'Next'.

18. *Digital Inputs and Outputs:* Select functionalities for digital inputs and outputs (e.g. Digital Input 2 → Stop). Select 'Next'.

19. *Analog Inputs:* Select functionalities for analog inputs if desired. Select 'Next'.

20. *Analog Outputs:* Select functionalities for analog outputs if desired. Select 'Next'.

21. *Configuration Summary:* Check your settings. Tick 'Show Wiring Overview'.
Continue with *Exercise 2: System wiring motor*.

Exercise 2: System wiring motor
Goal: Wire up the ESCON system including motor and sensor.

1.1 Use the button 'Show Wiring Overview' on the 'Configuration Summary' at the end of the 'Startup Wizard' or open it via 'File' → 'Wiring Overview'.

1.2 Tick 'Show Startup Wizard after program start' and 'Open Regulation Tuning' if desired. Select 'Finish'.

Or:

2.1 Work through the document "Hardware Reference". (to be found under C:\Program Files (x86)\maxon motor ag\ESCON Servo Controller\ESCON XY-Z_en, escon.maxonmotor.com or www.maxonmotor.com)

2.2 Connect your motor according to chapter 4 of the document "Hardware Reference".

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Exercise 3: Regulation Gains Tuning
Goal: Configure the ESCON system by tuning regulation gains.

Work through the 'Regulation Tuning' Wizard of the ESCON Studio
Remark: Check also the ESCON Video Tutorial about the Auto Tuning Mode.

1. Switch on ESCON power supply.
2. If the 'Regulation Tuning' Wizard does not start automatically, double-click on 'Regulation Tuning' in the 'tools' window on the left. The 'Regulation Tuning' window opens.
3. *Tuning Type:* Choose tuning method. → Auto Tuning. Select 'Next'.
4. *Auto Tuning:* Click 'Start'.
5. *Warning:* Consider message carefully. Make sure that the motor shaft is free running. Click 'Yes' to initiate Auto Tuning.
6. Auto Tuning will now commence. In turn, for each regulator (current, closed loop and open loop speed), a two-step procedure will be executed:
   - First, control parameters will be identified – during this process, the motor shaft will oscillate, the respective red status bar will be moving
   - Then, identified control parameters will be verified by evaluating their step response – during this process, the motor shaft will oscillate, the respective green status bar will be moving
7. Auto Tuning is completed successfully as all status bars changed to green. Click 'Finish' to confirm end of Auto Tuning and save the Tuning Parameter.
8. Switch on the 'Enable' input to run the motor and change the speed with the potentiometer.

Perform an "Expert Tuning" according to your needs.
Remark: Check also the ESCON Video Tutorial about the Expert Tuning Mode.

1. *Tuning Type:* Choose tuning method. → Expert Tuning. Select 'Next'.
2. *Tuning Mode:* Choose mode of operation to be tuned. (e.g. Speed Controller (Closed Loop), Inner Current Control Loop) Select 'Next'.
3. *Expert Tuning:* Click 'Start'.
4. Note the differences in the result between soft and stiff control parameter. Slide 'Controller Stiffness'. Click 'Start'.
5. Try to improve the parameters. Perform a manual tuning on the ESCON. Click 'Show Parameters', select 'Manual Dimensioning' and change values. Click 'OK'. Click 'Start'.
6. Tuning is complete as all status bars changed to green. Click 'Finish' to confirm end of Tuning and save the Tuning Parameter.
7. Switch on the 'Enable' input to run the motor and change the speed with the potentiometer.

Additional features

Exercise 4: Diagnostics
Goal: Find out about the 'Diagnostics' Tool of the ESCON Studio.

Configure the ESCON system in Closed Loop Speed Control for a maxon motor with incremental encoder, Hall sensors or DC tacho, external switch as 'enable' and external potentiometer as an 'analog set value'. See also *Exercise 1: Startup wizard for Speed Controller* and *Exercise 2: System wiring motor*.

1. Do a wiring mistake or a wrong sensor direction setup on purpose. (E.g. one motor wire not connected, motor wires swapped, hall sensor wires swapped, wrong encoder or Hall sensor direction setup, …)
2. Work through the 'Diagnostics' Tool of the ESCON Studio.
   Remark: Check also the ESCON Video Tutorial about the Diagnostics Tool.
3. Correct your wiring mistake or wrong sensor direction setup from step 1.
4. Work again through the 'Diagnostics' Tool of the ESCON Studio.

Exercise 5: Data Recorder
Goal: Find out about the 'Data Recorder' Tool of the ESCON Studio.

Configure the ESCON system in Closed Loop Speed Control for a maxon motor with incremental encoder, Hall sensors or DC tacho, external switch as 'enable' and 'Fixed Set Value' of 500 rpm.
See also *Exercise 1: Startup wizard for Speed Controller* and *Exercise 2: System wiring motor*.

Start the 'Data Recorder' Tool of the ESCON Studio.

1. Recorder configuration:
   Step 1: Click the button 'Settings'.
   Step 2: In the Configure Recorder window select the button 'Channel 1 Inactive' to activate Channel 1 and select the button 'Channel 2 Inactive' to activate Channel 2.
   Step 3: Select the value 'Demand Speed' in the pull down menu for Channel 1 and 'Actual Speed Averaged' in the pull down menu for Channel 2.
   Step 4: Change the scaling to 0…600 rpm for Channel 1 and 2.
   Step 5: Change the sampling period to 2ms.
   Step 6: Change the Trigger Configuration to 'Single Trigger', 'Digital Signals', 'Enable', 'Disable -> Enable'.
   Step 7: Click on the 'OK' button.

2. Enable controller:
   Step 1: Set a 'Fixed Set Value' of 500 rpm ('Controller Monitor' -> 'Properties' -> 'Controller' -> 'Set Value').
   Step 2: Enable the ESCON with external switch.

3. Check the recorded data:
   Step 1: Select the Tab 'DataRecorder'.
   Step 2: Select 'Cursor' 'On' and check the speed values by moving the black cursor line.
   Step 3: Zoom in by clicking and dragging on the selected position. Zoom out by right-clicking.
   Step 4: Export the recorded data to a *.zip file (contains a Microsoft Excel *.csv file and a *.png picture file).
       Hint: Use right mouse button on diagram.
   Step 5: Open the exported file in the Excel.

Exercise 6: Configure Virtual Controller

Goal: Configure a virtual ESCON system by using the ESCON Virtual Controller functionality (only possible with ESCON Studio 2.0 and higher).

Configure the ESCON system for any chosen maxon motor with incremental encoder, Hall sensors or DC tacho.

Work through the 'Startup Wizard' of the ESCON Studio

1. *Start ESCON Studio:* Double-click 'ESCON Studio.exe' shortcut on your desktop. «ESCON Studio» will start. Make sure there is **no** ESCON Servocontroller conneted to your computer.

2. *ESCON Studio actuality:* Make sure that you are using the latest version of «ESCON Studio». If you are in doubt on the version you are currently using, go back to *Exercise A: Latest ESCON Studio Version*.

3. *Start Startup Wizard:* If the 'Startup Wizard' does not start automatically, double click on 'Startup Wizard' in the 'tools' window on the left. The 'Startup Wizard' starts.

4. *Safety Instructions:* Read the 'Safety Instructions', and confirm. Select 'Next'.
   Remark: By clicking on 'Help', the document "Hardware Reference" opens.

5. *ESCON Controller Scanning:* Select 'Use Virtual Controller'. Select 'Next'.

6. *Controller Selection:* Select any of the 'Virtual Controllers' for configuration. Select 'Next'.

7. Follow steps 5 – 20 of *Exercise 1: Startup wizard for Speed Controller* for your maxon motor with incremental encoder, Hall sensors or DC tacho.

8. *Configuration Summary:* Check your settings. Untick 'Show Startup Wizard after program start' and 'Open Regulation Tuning' if desired. Select 'Finish'.

9. *Start Upload Parameter:* Double click on 'Upload Parameter' under 'File' in the menu bar. The 'Save As' window opens.

10. *Save Parameter File:* Choose a name and a directory for the parameter file and select 'Save'.

Remarks:

The saved parameter file can now be downloaded to a real ESCON Servocontroller of the same type.

The saved parameter file from a real ESCON Servocontroller can also be downloaded to a virtual ESCON Servocontroller.

For searching virtual controllers select 'File' – 'Options' – 'Virtual Controller', tick 'Scan for Virtual Controllers', click 'OK' and click on 'Search Controllers'.

Operation Modes

Exercise 7: Startup wizard for Speed Controller (Open Loop)
Goal: Configure the ESCON system in Open Loop Speed Control for a DC motor without sensor or an EC motor with Hall sensor, external switch as 'enable' and external potentiometer as an 'analog set value'.

Work through the 'Startup Wizard' of the ESCON Studio

1. Double-click 'ESCON Studio.exe' shortcut on your desktop. «ESCON Studio» will start.
2. Make sure that you are using the latest version of «ESCON Studio». If you are in doubt on the version you are currently using, go back to *Exercise A: Latest ESCON Studio Version*.
3. If the 'Startup Wizard' does not start automatically, double-click on 'Startup Wizard' in the 'tools' window on the left. The 'Startup Wizard' starts.
4. *Safety Instructions:* Read the 'Safety Instructions', and confirm. Select 'Next'.
   Remark: By clicking on 'Help', the document "Hardware Reference" opens.
5. *Instruction:* Select 'Next'.
   Remark: By clicking on 'Help' or 'Help contents', the "Hardware Reference" opens.
6. *Motor Type:* Select type of motor 'maxon EC motor' or 'maxon DC motor'. Select 'Next'.
7. *Motor Data:* Enter motor characteristics (consult maxon-catalog for details). Select 'Next'.
8. *System Data:* Enter system data. Select 'Next'.
9. *Detection of Rotor Position (only EC motor):* Select type of sensor 'Digital Hall Sensor' and the Polarity 'maxon'. Select 'Next'.
10. *Speed Sensor:*
    - DC motor: Select type of sensor 'No Sensor available'. Select 'Next'.
    - EC motor: Select type of sensor 'Available Hall Sensors'. Select 'Next'.
11. *Mode of Operation:*
    - DC motor: Select mode of operation 'Speed Controller (Open Loop)'. Select 'Next'.
    - EC motor: Select mode of operation 'Speed Controller (Open Loop)', 'Static IxR-Compensation'. Select 'Next'.
12. *Enable:* Select type of <Enable> functionality (Enable, e.g. Digital Input 1). Select 'Next'.
13. *Set Value:* Select type of <Set Value> functionality (Analog Set Value, e.g. Analog Input 1). Enter the desired scaling of the Set Value. Select 'Next'.
14. *Current Limit:* Select type of <Current Limit> functionality (e.g. Fixed current Limit) and enter the desired Current Limit value. Select 'Next'.
15. *Speed Ramp:* Select type of <Ramp> functionality (e.g. Fixed Ramp) and enter the desired Acceleration and Deceleration values. Select 'Next'.
16. *Offset:* Select type of <Offset> functionality (e.g. Fixed Offset) and enter the desired Offset value. Select 'Next'.
17. *Digital Inputs and Outputs:* Select functionalities for digital inputs and outputs if desired. Select 'Next'.
18. *Analog Inputs:* Select functionalities for analog inputs if desired. Select 'Next'.
19. *Analog Outputs:* Select functionalities for analog outputs if desired. Select 'Next'.
20. *Configuration Summary:* Check your settings. Tick 'Show Wiring Overview', 'Show Startup Wizard after program start' and 'Open Regulation Tuning' if desired. Select 'Finish'.
21. If necessary perform the *Exercise 2: System wiring motor* and *Exercise 3: Regulation Gains Tuning.*
22. 'Enable' the ESCON to run the motor.

Exercise 8: Startup wizard for Current Controller

Goal: Configure the ESCON system in Current Control for a DC motor without sensor or an EC motor with Hall sensor, external switch as 'enable' and external potentiometer as an 'analog set value'.

Work through the 'Startup Wizard' of the ESCON Studio

1. Double-click 'ESCON Studio.exe' shortcut on your desktop. «ESCON Studio» will start.

2. Make sure that you are using the latest version of «ESCON Studio». If you are in doubt on the version you are currently using, go back to *Exercise A: Latest ESCON Studio Version*.

3. If the 'Startup Wizard' does not start automatically, double-click on 'Startup Wizard' in the 'tools' window on the left. The 'Startup Wizard' starts.

4. *Safety Instructions:* Read the 'Safety Instructions', and confirm. Select 'Next'.
   Remark: By clicking on 'Help', the document "Hardware Reference" opens.

5. *Instruction:* Select 'Next'.
   Remark: By clicking on 'Help' or 'Help contents', the "Hardware Reference" opens.

6. *Motor Type:* Select type of motor 'maxon EC motor' or 'maxon DC motor' (only if different types are possible). Select 'Next'.

7. *Motor Data:* Enter motor characteristics (consult maxon-catalog for details). Select 'Next'.

8. *System Data:* Enter system data. Select 'Next'.

9. *Detection of Rotor Position (only EC motor):* Select type of sensor 'Digital Hall Sensor' and the Polarity 'maxon'. Select 'Next'.

10. *Speed Sensor:*
    - DC motor: Select type of sensor 'No Sensor available'. Select 'Next'.
    - EC motor: Select type of sensor 'Available Hall Sensors'. Select 'Next'.

11. *Mode of Operation:* Select mode of operation 'Current Controller'. Select 'Next'.

12. *Enable:* Select type of <Enable> functionality (Enable, e.g. Digital Input 1). Select 'Next'.

13. *Set Value:* Select type of <Set Value> functionality (Analog Set Value, e.g. Analog Input 1). Enter the desired scaling of the Set Value. Select 'Next'.

14. *Offset:* Select type of <Offset> functionality (e.g. Fixed Offset) and enter the desired Offset value. Select 'Next'.

15. *Digital Inputs and Outputs:* Select functionalities for digital inputs and outputs if desired. Select 'Next'.

16. *Analog Inputs:* Select functionalities for analog inputs if desired. Select 'Next'.

17. *Analog Outputs:* Select functionalities for analog outputs if desired. Select 'Next'.

18. *Configuration Summary:* Check your settings. Tick 'Show Wiring Overview', 'Show Startup Wizard after program start' and 'Open Regulation Tuning' if desired. Select 'Finish'.

19. If necessary perform the *Exercise 2: System wiring motor* and *Exercise 3: Regulation Gains Tuning.*

20. 'Enable' the ESCON to run the motor.

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Standard Functionalities

Exercise 9: 'Enable CW & CCW' and 'Stop' function
Goal: Find out about the functions 'Enable CW & CCW' and 'Stop'.

Configure the ESCON system in Closed Loop Speed Control for a DC motor (with encoder or DC tacho) or an EC motor (with Hall sensors (and encoder)), external switches as 'Enable CW & CCW', 'Stop' and internal potentiometer 1 as an 'analog set value'.

Additional questions about speed control:
- How does the controller measure the motor speed?

- How does the system react if you apply an additional torque?

Questions about "Enable CW &CCW":
- How to run the motor counter clock wise?

- How can it be seen that the power stage is disabled?

- How long does it take for the motor to slow down if the power stage is disabled?

- If the power stage is disabled, how does the motor react if you rotate the shaft manually

Questions about "Stop":
- How can it be seen that the ‚Stop' function is on?

- How long does it take for the motor to slow down if the ‚Stop' function is activated?

- If 'Stop' is on, how does the motor react if you rotate the shaft manually?

Exercise 10: Speed Ramp and Direction

Goal: Find out about the functions ‚Speed Ramp' and ‚Enable & Direction'.

Configure the ESCON system in Closed Loop Speed Control for a DC motor (with encoder or DC tacho) or an EC motor (with Hall sensors (and encoder)), external switches as 'Enable & Direction', 'Speed Ramp' 'Analog Ramp' with internal potentiometer 1 and external potentiometer as an 'analog set value'.

Questions about speed control:
- How long does it take to accomplish an abrupt set value increase? What is the influence of the internal potentiometer 1?

- How long does it take to accomplish an abrupt set value decrease? What is the influence of the internal potentiometer 1?

Questions about reaction time:
- What's the influence of the internal potentiometer 1on the motor reaction time?

- Does potentiometer 1 affect acceleration and deceleration in the same manner? Why?

Questions about direction change:
- How does the motor react to a direction change?

- How can the motor reaction be influenced?

Exercise 11: Closed Loop Speed Control with Two Speeds and Ready output

Goal: Find out about the functions '2 Fixed Set Values' and 'Ready'.

Configure the ESCON system in Closed Loop Speed Control for two speeds for a DC or EC motor, external switches as 'Enable' and '2 Fixed Set Values' as well as an external output as 'Ready'.

Questions about speed control with two different speeds:
- How can the motor speed be changed between the two values?

- Is it possible to have speed 1 higher than speed 2?

Question about ‚Ready' output:
- When is the 'Ready' output switched active?

Exercise 12: Analog outputs
Goal: Find out about the functions 'Actual Current Averaged' and 'Actual Speed'.

Configure the ESCON system in Closed Loop Speed Control with Analog Output 1 as 'Actual Current Averaged' and Analog Output 2 as 'Actual Speed'. Measure the analog outputs 1 and 2 with a meter.

Difference between 'Actual Current' and 'Actual Current Averaged'
- What is the difference between the 'Actual Current' and the 'Actual Current Averaged'? (Use the 'F1' key to get more information!)

Analog output 'Actual Current Averaged'
Set a low speed and observe the voltage change on the Analog Output 1 'Actual Current Averaged' while braking the motor shaft with your fingers. Compare the value with the one of the Controller Monitor display in the ESCON Studio.

- What voltage do you expect, when you block the motor shaft?

Analog output 'Actual Speed'
Change the motor speed and observe the voltage change on the Analog Output 2 'Actual Speed'. Compare the value with the one of the Controller Monitor display in the ESCON Studio.

- What voltage do you expect for a set motor speed of 1200 rpm CW?

- What voltage do you expect for a set motor speed of 1200 rpm CW?

Exercise 13: Speed Comparator
Goal: See how the 'Speed Comparator' needs to be set up and find out about its function.

Configure the ESCON system in Closed Loop Speed Control for a DC or EC motor, external switch as 'Enable' and 'external potentiometer as 'analog set value' as well as an external output as 'Speed Comparator'.

Question about 'Speed Comparator' output:
Change the motor speed and observe the 'Speed Comparator' output.

- When is the 'Speed Comparator' output switched active?

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