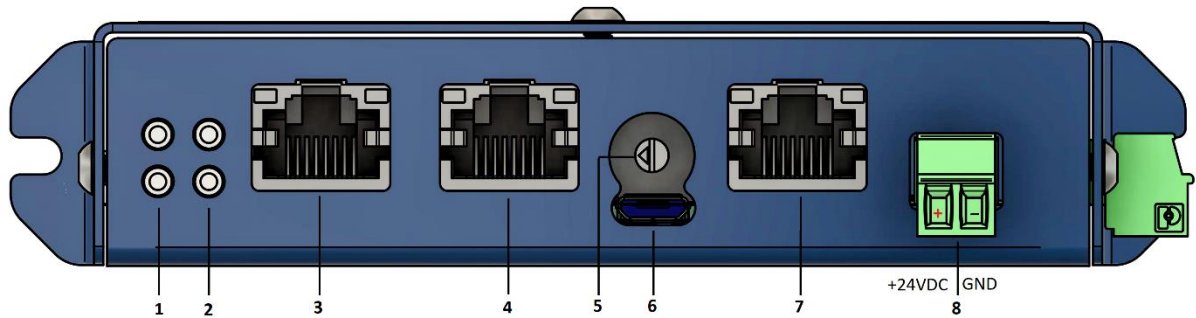


ETHERFOX

Quickstart Guide

V1.0.0

Setup



| Item | Description | Connector |
|------|--|-----------|
| 1 | Ethercat LEDs | |
| 2 | EtherFox status LEDs | |
| 3 | Ethercat Port 0 | X1 |
| 4 | Ethercat Port 1 | X2 |
| 5 | Rotary switch | |
| 6 | Micro USB connector (Enabled only when Rotary is set to 0) | X3 |
| 7 | Simplemotion bus port | X4 |
| 8 | Power supply connector (24VDC) | X5 |

Connect Ethercat

Connect Ethernet cable from Ethercat Master to Etherfox Ethercat Port 0 –connector (X1).

Ethercat master is typically PC or PLC with Ethercat master software.

Connect Simplemotion

Connect Simplemotion cable from Etherfox bus port (X4) to slave drive Simple motion port.

Connect Power Supply

Do not connect the cable when power supply is ON.

Connect 24VDC power supply to Etherfox X5 connector.

Configure drives using USB-connector


1. Connect USB cable between EtherFox USB port (X3) and PC USB host port
2. Select position 0 form rotary switch
3. Power up the device and drives
4. Start Granity software and select USB-COM port
5. Configure drives using Granity (<https://granitedevices.com/wiki/Granity>)
6. Exit Granity
7. Select rotary position that indicates the number of drives connected to Simplemotion bus
8. Disconnect USB cable

Configuring Etherfox with Twincat 3

Twincat installation can be read from Beckhoff information system documentation and is not described in this document.

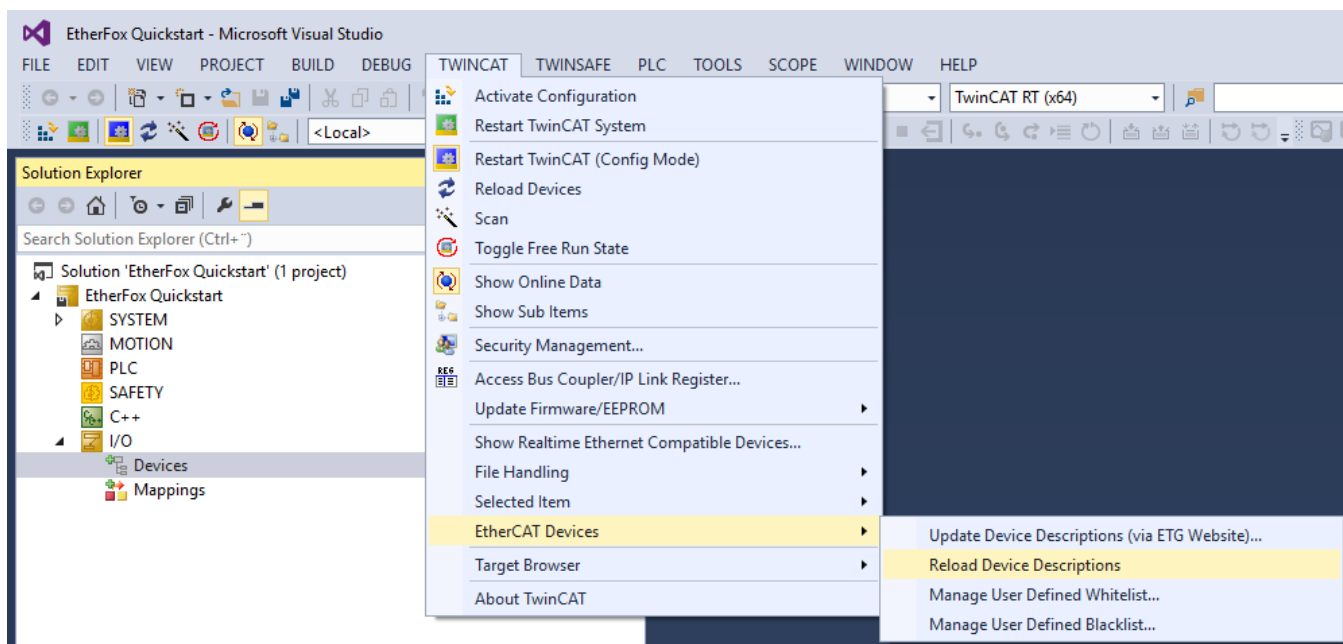
Copy description file

Copy EtherFOX.xml description file to Twincat installation directory*.

 > This PC > Local Disk (C:) > TwinCAT > 3.1 > Config > Io > EtherCAT

**Installation directory may vary depending on installation settings*

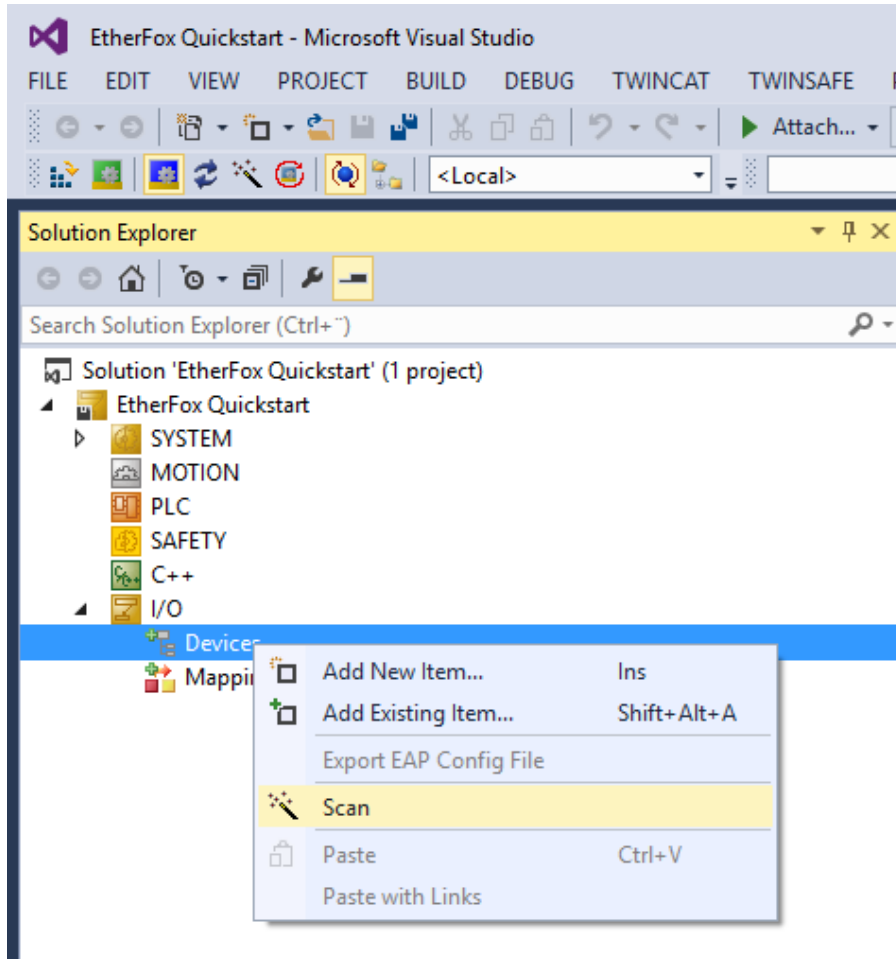
Reload Device Descriptions from using TWINCAT dropdown menu from Twincat.



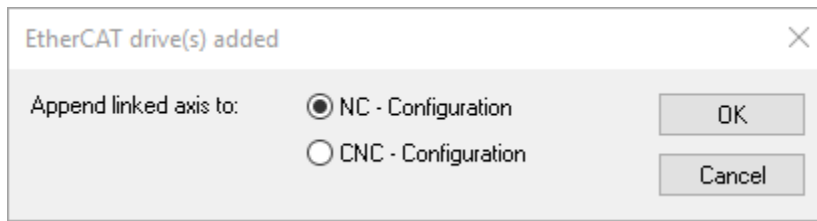
Create a Project

Create new project.

Scan devices.

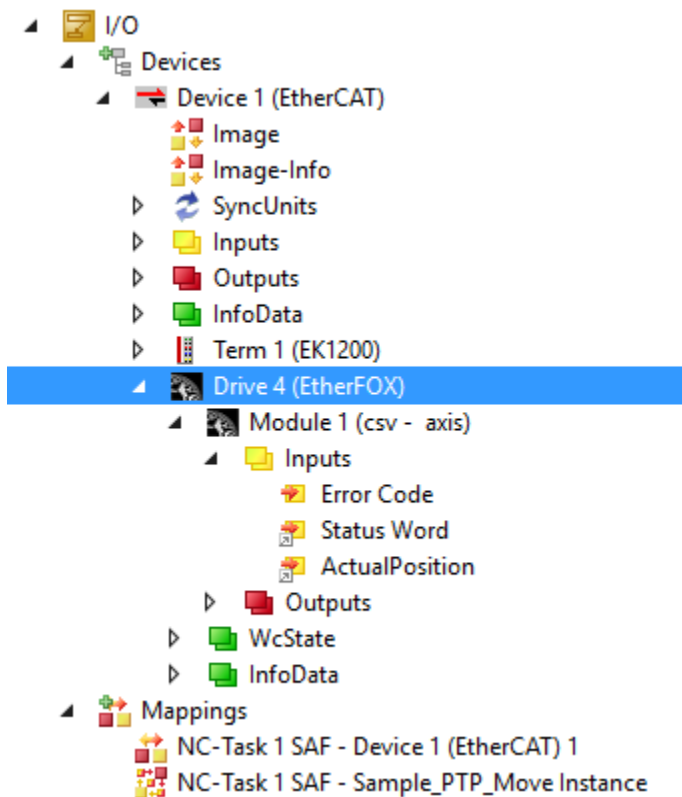


Append NC- configuration to Twincat Project.

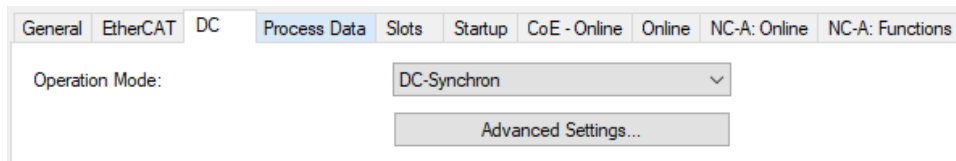


Select Operation mode

Set drive operation mode from Drive settings

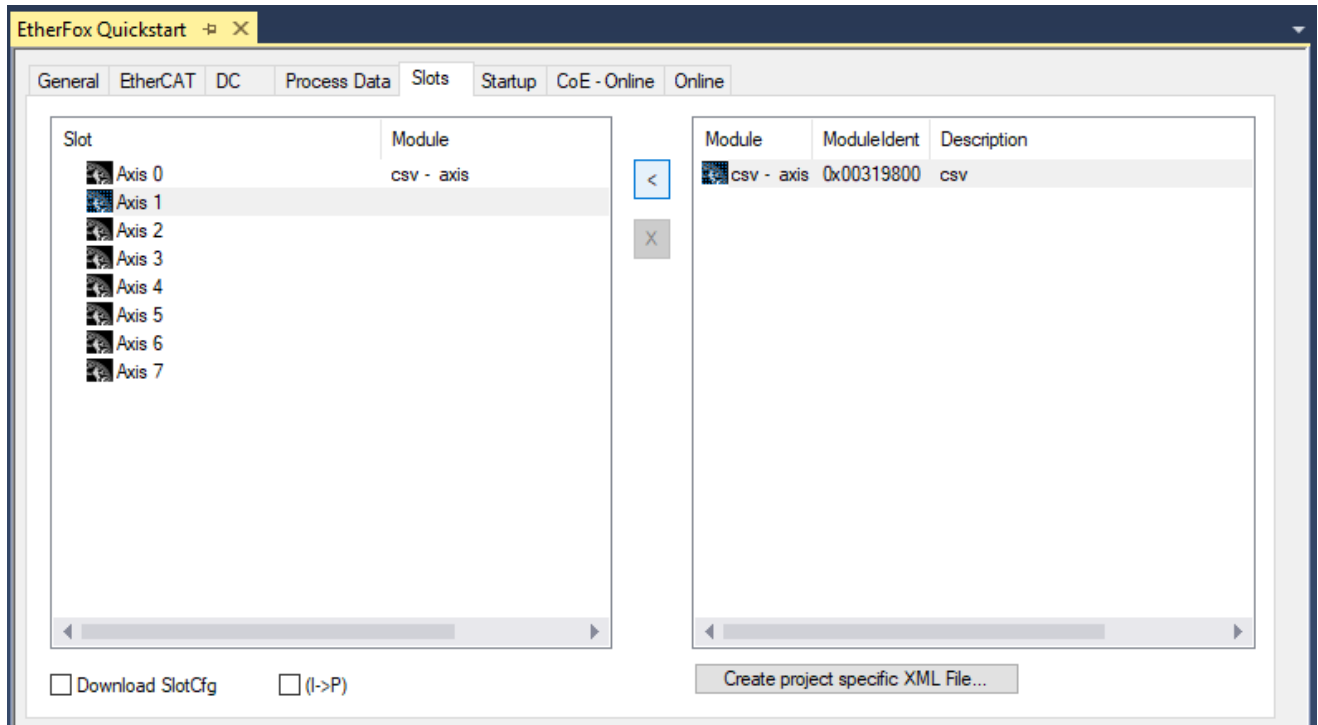


Set operation mode value from DC page to DC-Synchron



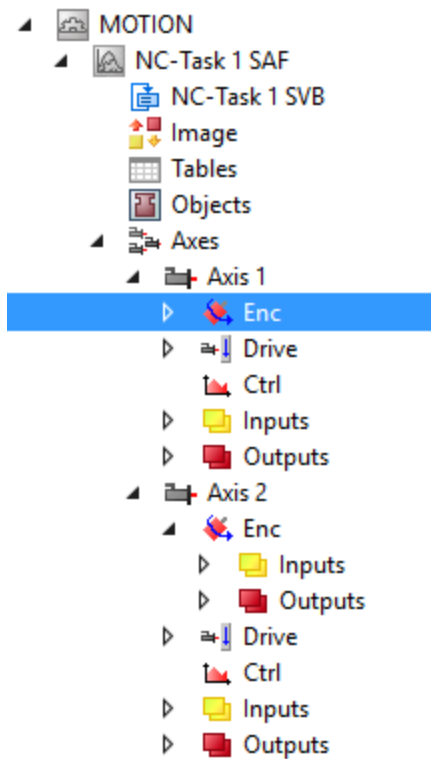
Configuring number of drives

Set number of drives from Slots page. Select axis from slot and select csv – axis from right panel. Use middle buttons to select module to a slot.



Configure Encoder settings

Select Encoder settings from Axis menu.



Set following values to Encoder parameters:

| | |
|---|------------|
| Encoder Scaling Factor value | 0.0140625 |
| Encoder Mask (maximum encoder value) | 0x3FFFFFFF |
| Encoder Sub Mask (absolute range maximum value) | 0x00006400 |

| Parameter | Offline Value |
|---|---------------|
| Encoder Evaluation: | |
| Invert Encoder Counting Direction | FALSE |
| Scaling Factor Numerator | 0.0140625 |
| Scaling Factor Denominator (default: 1.0) | 1.0 |
| Position Bias | 0.0 |
| Modulo Factor (e.g. 360.0°) | 360.0 |
| Tolerance Window for Modulo Start | 0.0 |
| Encoder Mask (maximum encoder value) | 0x3FFFFFFF |
| Encoder Sub Mask (absolute range maximum value) | 0x00006400 |
| Reference System | 'INCREMENTAL' |
| Limit Switches: | |
| Soft Position Limit Minimum Monitoring | FALSE |
| Minimum Position | 0.0 |
| Soft Position Limit Maximum Monitoring | FALSE |
| Maximum Position | 0.0 |
| Filter: | |
| Homing: | |
| Other Settings: | |

Axis Type should be CANopen DS402.

Link to PLC is appended only if a PLC item is appended to project and is not necessary for testing

General
Settings
Parameter
Dynamics
Online
Functions
Coupling
Compensation

Link To I/O...
Drive 1 (EtherFOX) # A

Link To PLC...

Axis Type:
CANopen DS402/Profile MDP 742 (e.g. EtherCAT CoE Drive)

Unit:
mm
Display (Only)
Position:
☐ μm
☐ Modulo
Velocity:
☐ mm/min

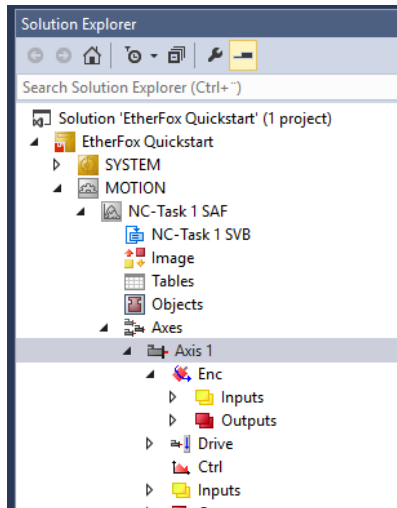
Result
Position:
mm
Velocity:
mm/s
Acceleration:
mm/s²
Jerk:
mm/s³

Axis Cycle Time / Access Divider
Divider:
1
Cycle Time (ms):
2.000
Modulo:
0

Configure Axis parameters

Configure axis limits and motion parameters to match your drive configuration values.

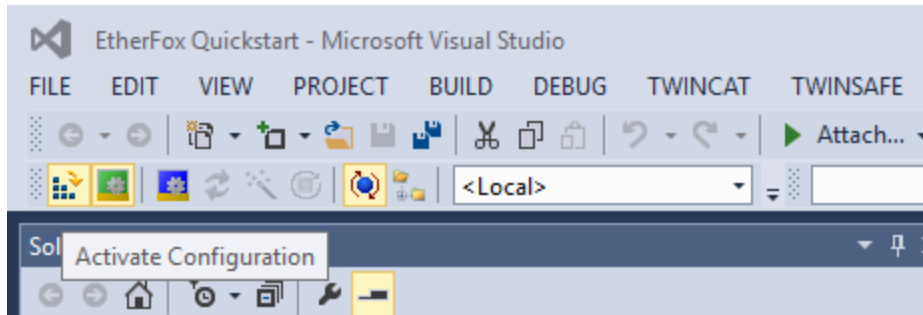
Set limit values to less or equal to drive configuration parameters to avoid drive faults.



| General | Settings | Parameter | Dynamics | Online | Functions | Coupling | Compensation |
|---------|-----------------------------------|-----------|---------------|--------|-----------|----------|--------------|
| | | Parameter | Offline Value | | | | |
| - | Maximum Dynamics: | | | | | | |
| | Reference Velocity | | 500.0 | | | | |
| | Maximum Velocity | | 400.0 | | | | |
| | Maximum Acceleration | | 10000.0 | | | | |
| | Maximum Deceleration | | 10000.0 | | | | |
| - | Default Dynamics: | | | | | | |
| | Default Acceleration | | 1000.0 | | | | |
| | Default Deceleration | | 1000.0 | | | | |
| | Default Jerk | | 1150.0 | | | | |
| - | Manual Motion and Homing: | | | | | | |
| | Homing Velocity (towards plc cam) | | 30.0 | | | | |
| | Homing Velocity (off plc cam) | | 30.0 | | | | |
| | Manual Velocity (Fast) | | 400.0 | | | | |
| | Manual Velocity (Slow) | | 100.0 | | | | |
| | Jog Increment (Forward) | | 5.0 | | | | |
| | Jog Increment (Backward) | | 5.0 | | | | |
| + | Fast Axis Stop: | | | | | | |
| + | Limit Switches: | | | | | | |
| + | Monitoring: | | | | | | |
| + | Setpoint Generator: | | | | | | |
| + | NCI Parameter: | | | | | | |
| + | Other Settings: | | | | | | |

Activate current configuration

Activate current configuration and set Run mode



Check that InputToggle variable changes states between 0 and 1.

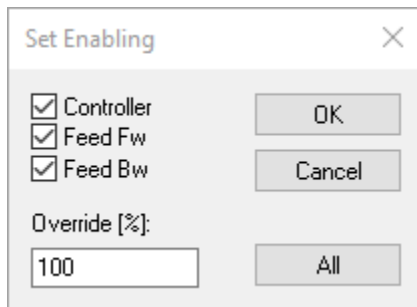
| Name | Online |
|----------------|----------------|
| Error Code | 0 |
| Status Word | X 4641 |
| ActualPosition | X 0 |
| WcState | X 0 |
| InputToggle | X 1 |
| State | 8 |
| AdsAddr | 192.168.0.1... |
| Chn0 | 0 |
| DcOutputShift | X 610300 |
| DcInputShift | X 3389700 |
| Control Word | X 6 |
| TargetVelocity | X 0 |

Select Axis menu item from MOTION and select Online page

| General | | Settings | Parameter | Dynamics | Online | Functions | Coupling | Compensation |
|---|--|----------|-----------|----------|--|-----------|----------|--------------|
| <div> <div>0.0000</div> <div>Setpoint Position: [mm]</div> </div> | | | | | <div>0.0000</div> <div>Setpoint Velocity: [mm/s]</div> | | | |
| <div> <div>0.0000 (0.000, 0.000)</div> <div>Lag Distance (min/max): [mm]</div> </div> | | | | | <div> <div>0.0000</div> <div>Actual Velocity: [mm/s]</div> </div> | | | |
| <div> <div>0.0000 %</div> <div>Override: [%]</div> </div> | | | | | <div> <div>0.00 / 0.00 %</div> <div>Total / Control Output: [%]</div> </div> | | | |
| <div> <div>0 (0x0)</div> <div>Error:</div> </div> | | | | | | | | |
| <div> <div> <input type="checkbox"/> Ready <input checked="" type="checkbox"/> NOT Moving <input type="checkbox"/> Coupled Mode </div> <div> <input type="checkbox"/> Calibrated <input type="checkbox"/> Moving Fw <input type="checkbox"/> In Target Pos. </div> <div> <input type="checkbox"/> Has Job <input type="checkbox"/> Moving Bw <input type="checkbox"/> In Pos. Range </div> </div> | | | | | <div> <div> <input type="checkbox"/> Controller <input type="checkbox"/> Feed Fw <input type="checkbox"/> Feed Bw </div> <div>Set</div> </div> | | | |
| <div> <div>1</div> <div>Controller Kv-Factor: [mm/s/mm]</div> </div> | | | | | <div> <div>500</div> <div>Reference Velocity: [mm/s]</div> </div> | | | |
| <div> <div>0</div> <div>Target Position: [mm]</div> </div> | | | | | <div> <div>0</div> <div>Target Velocity: [mm/s]</div> </div> | | | |
| <div> <div>F1</div> <div>F2</div> <div>F3</div> <div>F4</div> <div>F5</div> <div>F6</div> <div>F8</div> <div>F9</div> </div> | | | | | | | | |

Make sure that motor can run safely before enabling drive. Make sure that there nothing connected to Axis on test phase.

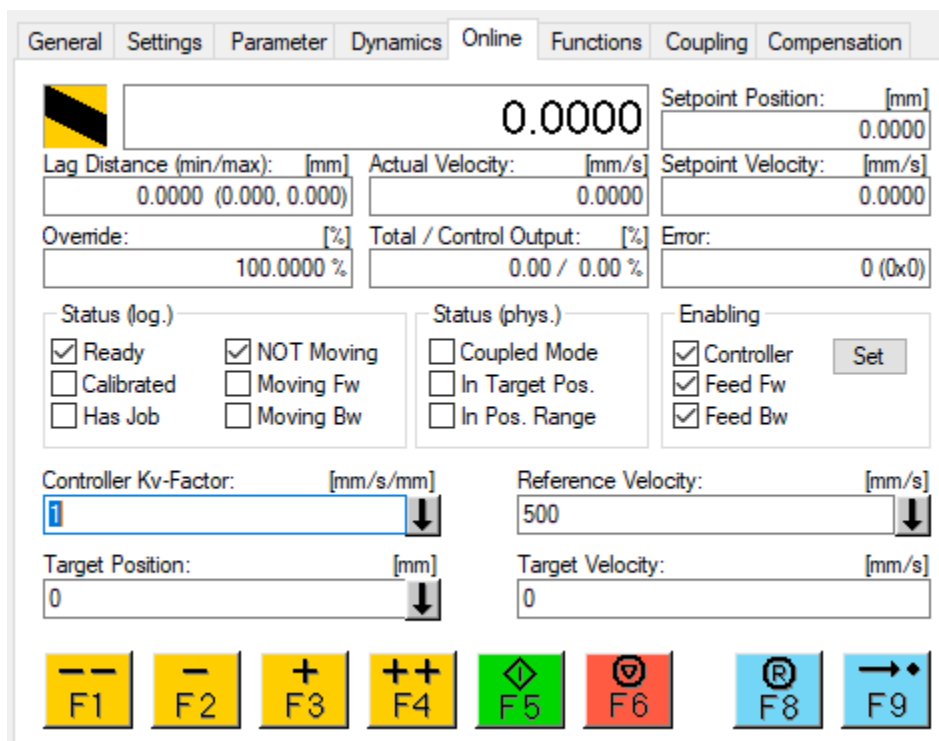
Axis torque can be enabled using Enable sections Set - button.



The 'Set Enabling' dialog box contains the following elements:

- Three checked checkboxes: ☒ Controller, ☒ Feed Fw, and ☒ Feed Bw.
- Buttons: OK, Cancel, and All.
- An 'Override [%]' label above a text input field containing '100'.

Axis status should be Ready and Not moving.



The main control interface features a tabbed menu at the top: General, Settings, Parameter, Dynamics, Online, Functions, Coupling, and Compensation. The 'Online' tab is active, displaying a large digital readout (0.0000) and a yellow/black diagonal warning flag. Below the DRO are fields for Lag Distance (0.0000), Actual Velocity (0.0000), Setpoint Position (0.0000), Setpoint Velocity (0.0000), Override (100.0000%), Total / Control Output (0.00 / 0.00 %), and Error (0 (0x0)).

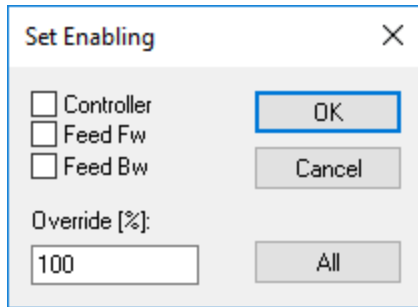
Three status sections are present:

- Status (log.):** Includes checked boxes for Ready and NOT Moving, and unchecked boxes for Calibrated, Has Job, Moving Fw, and Moving Bw.
- Status (phys.):** Includes unchecked boxes for Coupled Mode, In Target Pos., and In Pos. Range.
- Enabling:** Includes checked boxes for Controller, Feed Fw, and Feed Bw, along with a 'Set' button.

Control parameters include Controller Kv-Factor (set to 1), Reference Velocity (500), Target Position (0), and Target Velocity (0). At the bottom is a row of function buttons: F1 (Jog Left), F2 (Jog Right), F3 (Jog Stop), F4 (Jog Home), F5 (Diamond icon), F6 (Stop icon), F8 (Refresh icon), and F9 (Move icon).

Use F1 / F2 buttons to Jog axis.

Disable controller after test session.



Drive Inputs

Actual Position

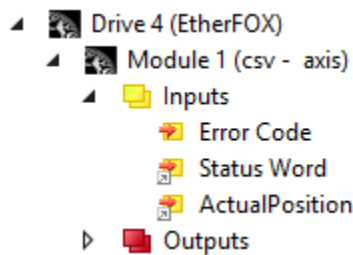
CiA402 Specific actual position.

Status Word

CiA402 Specific status word bits. No vendor specific values.

Error Codes - 0x603

Drive and Etherfox error codes can be read from Error Code input.



Etherfox bridge error codes listed below:

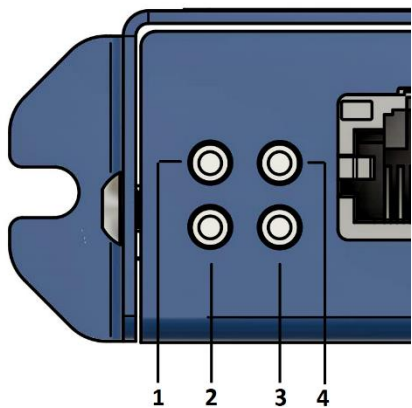
| Error Code (HEX) | Description |
|------------------|---|
| 0xEC01 | Invalid gain or division value in drive configuration parameters |
| 0xEC02 | Invalid drive configuration mode, use supported drive mode (Velocity) |
| 0xEC03 | Simplemotion bus read/write error |
| 0xEC04 | Drive does not support Ethercat feature set |
| 0xEC05 | System init failure |
| 0xEC06 | Communication error |
| 0xEC07 | Drive fault stop |
| 0xEC08 | Drive STO active |
| 0xEC09 | Drive in permanent stop mode |
| 0xEC0A | Drive status bits indicate error |
| 0xEC0B | Servo ready status invalid from fast update response |
| 0xEC0C | Cia402 CSP mode not supported use CSV mode |
| 0xEC0D | SM Sync not supported, use DC-sync |

If drive fault is active, drive specific error codes are shown directly on error code input.

Drive specific error codes are listed on the following web page:

https://granitedevices.com/wiki/Fault_location

Troubleshooting



| LED 1 | LED 2 | LED 3 | LED 4 | Descption |
|-------|-------|-------|-------|---|
| | | Blink | Blink | When LED1 & LED2 blinks at startup constantly the number of drives found does not mismatch the drives configured with rotary switch. Please check drive count with Granity tool and select correct drive count with rotary switch |
| | | | | |