i4 Automation Ltd
Innovative Solutions for Industry

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Servo Drive Startup Guide

This guide contains the minimum amount of setup required to make the servo motor spin. Please be aware that this may make machinery move and appropriate safety precautions should be taken.

Unilogic program: Ethercat Servo Startup.ulpr

One time out of the box procedure

Servo drives come with an absolute encoder, an absolute encoder requires a battery which is in the small plastic box on the encoder cable. This battery must have a voltage of more than 2.5V.

If an incremental encoder is required then a different encoder cable is used without a battery.

The servo drive is THE SAME in both cases but parameter PN002 needs to be set to indicate which mode the encoder is set too. Out of the box PN002 is set to 10 which is incremental encoder.

On first power up the drive will show A45~A48, A51 which is an encoder battery alarm.

Servo buttons left to right Mode/Select Up Down Enter

Enable servo drive parameter menu.

Go to Fn007 and press enter, display shows -200-.
Press up, down, down, up, display will not change.
Press enter, display shows Fn007.
PnXXX menu is now available until the next restart.

Navigate to PN002 and press enter, display will read b0010. Press Up several times to change the value to b0110. CYCLE THE POWER ON THE SERVO DRIVE.

Navigate to Fn010 and press enter to show c-PoS, press Mode/Select to show clr.

Press enter up to navigate to Fn011and press enter to show c-Err, press Mode/Select to show clr. CYCLE THE POWER ON THE SERVO DRIVE. The alarm should now have cleared and the display will alternate between not and Pot indicating the overtravel limits are operational.

If overtravel limits are used they must be wired into the servo drive CN1 connector to clear this error. If overtravel limits are not required they must be disabled. See later

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Common Servo Drive Operations

Not all of these need to be performed.

The buttons on the servo drive are from left to right

[Select] - [Up] - [Down] - [Enter]

Reset servo drive to factory default.

Go to Fn001 and press enter, display shows LOAD.
Press and hold enter until display shows DONE.
RESTART the servo drive to complete factory reset!

Enable servo drive parameter menu.

Go to Fn007 and press enter, display shows -200-.
Press up, down, down, up, display will not change.
Press enter, display shows Fn007.
PnXXX menu is now available until the next restart.

Set servo drive CAN ID

Set Pn704 to 2 as this is the CAN ID that Unilogic defaults to.
Restart the servo drive!

Disable the overtravel switches

If the overtravel switches are not required or not present then disable them.
Go to Pn000 and press enter then up until display shows 0110.
Restart the servo drive!

Note that if multiple parameters are changed that require a servo drive restart it is only necessary to restart the drive once after all changes are complete.

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Ethercat wiring

Connect the servo drive to the Ethercat module with a CAT5 or CAT6 patch cable. Use connector CN3, other servo drives can be connected by running a CAT5 patch lead from CN4 to CN3 of the other drive.

Servo Drive Startup

Switch on servo drive, assuming the above changes have been made the display will read.

. bb – Servo ready but not enabled.

There are three status LEDs just below the CN4 connector, Sys, Run and Err

Sys	Should be solid green	
Run	Slow green blink	
Err	Double red blink	Ethercat cable disconnected.

Connect the cable and RESET the Ethercat module via UniApps > System > Upgrade > Ethercat > Reset

Sys	Solid green
Run	Solid green
Err	Off

Ethercat module setup

The Ethercat module MUST be mounted immediately to the right of the PLC, only one module per PLC. On power up the module will show the Link LED as green and the Power LED as rapid red blink. Note there is an earth terminal that must be connected.

Out of the box the Ethercat module will need it's firmware updating by using the following procedure.

Firmware Update Procedure

Download the latest UAC-01EC2 firmware version from Unitronics website (www.unitronicsplc.com) > Technical Library > Unistream COM & IO > Communications

Make sure the system is idle with no movements in progress as the PLC will switch to STOP mode.

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Extract the ZIP compressed file and copy the BeagleBone folder to the root folder of your flash drive (DOK), the flash drive must be FAT32 formatted SO LESS THAN 32Gb!

Plug the USB flash drive into the UAC-01EC2 USB port.

Using the PLC UniApps menu, System tab, Upgrade, access the EtherCAT section.

Check the current UAC-01EC2 firmware version. If the displayed version matches the current downloaded version, don't perform the upgrade procedure, this might damage the unit.

If the displayed version is different from the upgrade, press the Upgrade button.

If there is no version displayed, press the Force Upgrade.

When finished, reboot the system completely, Uniapps will now show the version number and the Module Type will have changed from 0 to 1.

You should now have all green lights on the EtherCat module.

Unilogic setup

Open a new Unilogic project.

Under PLC Communications set the PLC IP address to 192.168.1.4 (factory default) or whatever you have set for an IP address.

Under VNC Server Management set the VNC Server Working Mode to Enabled, with or without a password.

Select Hardware Config > Uni I/O and COM > and from the right hand toolbox add a UAC-01EC2 to the right hand side of the PLC. There are no properties to set.

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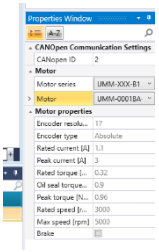
Select Hardware Config > Motion Drives > Servo > Servo Drives and from the right hand toolbox add a UMD-E3 drive, even if you have a B1 or B2 drive.



In the Properties window select the motor series and motor type. It is important to get this exactly correct then note the encoder resolution, it should be 20 or 23 bit.

The properties window now contains values relevant to the selected motor, note the max speed of 5000 or 6000 revs per minute.

Select Hardware Config > Motion Drives > Servo > Servo configurations and add a configuration for your drive. DO NOT EDIT IT, YET.

Select Motion > Axes and add an axis, selecting the drive you previously configured.

You will be asked if you want to import the in built motion program, select 'skip for now' to keep things simple. Select Axis 1 and note:

Under UNITS the pulses per revolution has been set to whatever the encoder resolution is for your motor. All of the motion control commands now work in revs not pulses.

Under Velocity Options the Max Velocity has been set to either 83 or 100, this is in revs per second and relates directly to the max speed in the motor properties window which is in revs per minute.

83 rps = 5000 rpm
100 rps = 6000 rpm

You cannot set the speed any higher than these values.

Under Homing the default home function is 35 which is 'set as zero position'. When the homing function is energised the current position is set to zero and taken as being the home position.

Select Ladder > Module 1 > Function 1

Add the following from the Motion Control toolbox.

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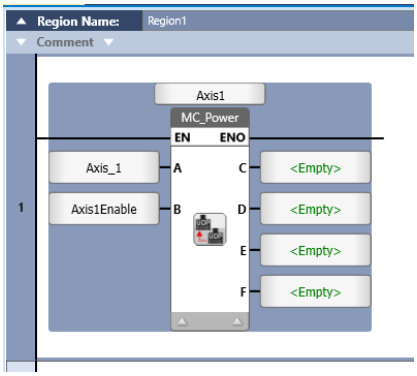
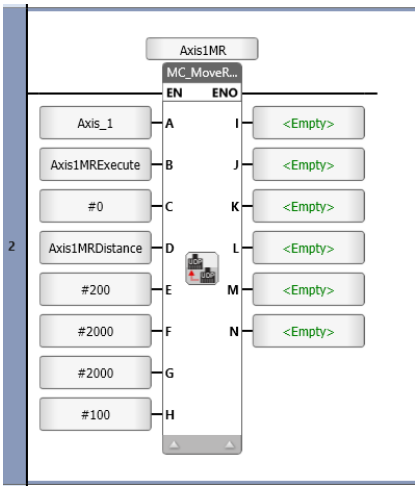


This function enables the servo and will 'lock' the motor so that it no longer freely rotates by hand. The servo must be enabled before any other commands are sent to it.



This function moves the servo motor by the number of revolutions specified in Axis1MRDistance on the rising edge of Axis1MRExecute.

Parameters E thru G are fixed in this instance but would normally be replaced with tags so that the speed and acceleration can be changed.

Green parameters are optional.

Be aware that this function will cause the servo to move at 200 revs (or the maximum speed of 83 or 100 rps) per second, you may wish make parameter E smaller.

Add a Binary Text Variable button to Screen 1 to control the servo enable function.

Add a Binary Text Variable button and a numeric object to Screen 1 to allow control of the Move Relative function.

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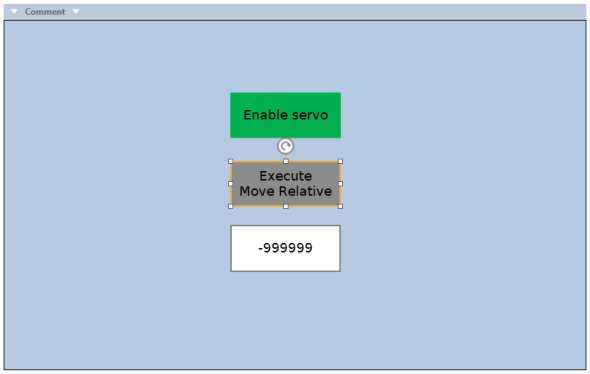

Tony Spearing
December 2023