



# Stepping Drives

## Ever Stepper Drives

The Titanio family of drives from Ever Motion Solutions (formerly Ever Elettronica) are high performance vector stepper drives that provide industry-leading quality and control. The drives are available in Open Loop (no encoder feedback) and Closed Loop (motor-mounted encoder provides position feedback to the drive). Like most Closed Loop stepper drives, Ever's Titanio drives can alert the upper control system if a motor stalls (Stall Detection). However, the Ever Titanio drives also have Stall Detection capability in Open Loop control mode: the drive uses the motor's back EMF to monitor motor movement. This means the Titanio drives can detect and report Stall Detection without encoder feedback.

The Titanio drive technology is based on ELSE – Error Less Servo Efficient – technology pioneered by Ever. ELSE provides precise sinusoidal stepper motor current control. ELSE is built on the f4d2 (Fast Forward Feed Full Digital Drive) technology. The proprietary and patented f4d2 algorithms reduce the parasitic phase current harmonics that cause unnecessary motor heating and noisy/inefficient motor operation.

The breakthrough of ELSE technology and the f4d2 algorithms result in greatly improved phase current control and near “stepless” operation of stepper motors. The benefits of better and smoother current control include:

- drastic reduction of motor noise
- extremely smooth movement of the motor, regardless of microstep resolution
- significant damping of motor vibrations and resonances
- increased positioning accuracy
- better and more constant torque output at every rotational speed
- less heating and higher efficiency of the motor and drive system
- all drives with ELSE technology also have BEMF stall detection, with or without encoder feedback

For more information on f4d2: <https://www.everelettronica.com/en/technologies/f4d2-fast-forward-feed-full-digital-drive>

For more information on ELSE: <https://www.everelettronica.com/en/technologies/-else-technology-for-different-type-of-motors>

For more information on Closed Loop stepper technology: <https://www.everelettronica.com/en/technologies/closed-loop-of-torque-speed-and-position-systems>

The Titanio drives are available in models with complete drive setup using DIP switches only, as well as models that can be fine-tuned and set up with free Ever Studio software in addition to DIP switch setup.



## Features

- ELSE® (ErrorLess Servo Efficient) step loss detection without encoder
- Quiet and smooth operation
- 36 month warranty
- Closed Loop for drive LW4D
- Protection against short circuit and open circuit
- Alarms for over/under voltage, temperature, short circuit
- Basic setup configured by DIP switches, optional advanced software setup for LW3A and LW4D drives

| Ever Steppers – Drive Feature Comparison |                                                                           |                                                                                   |                                                        |
|------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------|
| Drive Model                              | LW4D3070N2I1-00                                                           | LW3D3070N0A1-00                                                                   | LW3A9030N2A1-00                                        |
| Price                                    | \$105.00                                                                  | \$205.00                                                                          | \$290.00                                               |
| Drawing                                  | <a href="#">PDF</a>                                                       | <a href="#">PDF</a>                                                               | <a href="#">PDF</a>                                    |
| Drive Type                               | 2-phase digital stepper drive for hybrid stepper motors                   |                                                                                   |                                                        |
| Supply Voltage                           | 24–75 VDC                                                                 | 24–80 VDC                                                                         | 100–240 VAC                                            |
| Pulse Input Type                         | Differential, Single-ended                                                |                                                                                   |                                                        |
| Step Input Modes                         | Differential, Single-ended, AB Quadrature                                 | Differential, Single-ended                                                        |                                                        |
| Digital Input Voltage                    | 5–24 VDC                                                                  | 2–24 VDC                                                                          | 5–24 VDC                                               |
| PPR Range                                | 200–25600 (DIP switch)<br>200–65536 (software)                            | 200–51200 (DIP switch)                                                            | 200–2000 (DIP switch)<br>200–65536 (software)          |
| Motor Output Current Range               | 0.0–7.1 (A/ph rms)<br>0.0–10.0 (A/ph peak)                                | 1.7–7.1 (A/ph rms)<br>2.4–10.0 (A/ph peak)                                        | 0.0–3.0 (A/ph rms)<br>0–4.2 (A/ph peak)                |
| Digital Output                           | 2 opto-isolated, 5–24 VDC, 100mA max NPN or PNP for Alarm and In Position | 1 opto-isolated, 24VDC, 400mA max, NPN or PNP for Alarm                           | 1 opto-isolated, 24VDC, 400mA max PNP or NPN for Alarm |
| Self-test Capable                        | Software-based (internal indexing)                                        | Pulse Input Test (LEDs signal if the incoming pulse rate is 0Hz, <1kHz, or ≥1kHz) | Software-based (internal indexing)                     |
| Special Features                         | Advanced software setup                                                   | –                                                                                 | Basic software setup                                   |

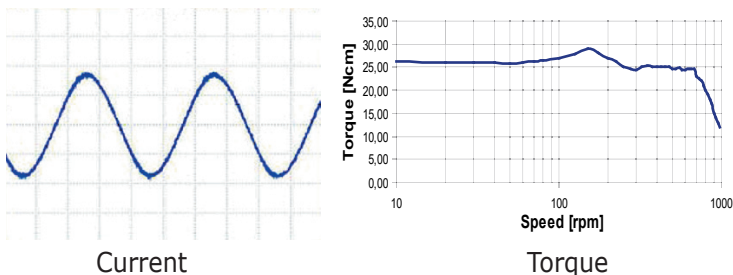


# Stepping Drives

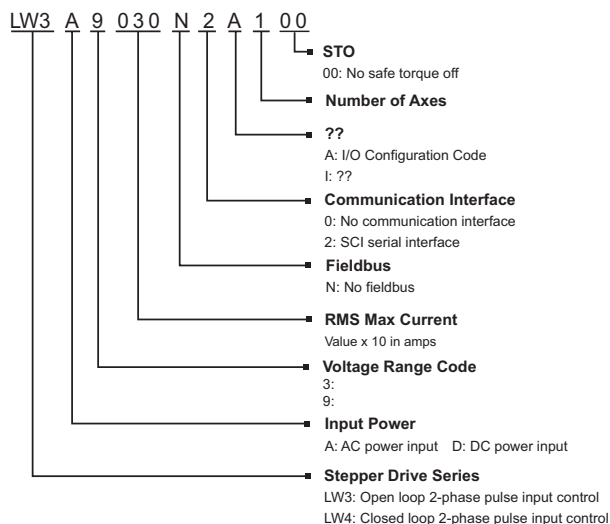
## Ever Stepper Drive Feature Overview

### Vector Control

The sinusoidal phase current with "ELSE" technology keeps the motor torque constant allowing smooth and noiseless movements.

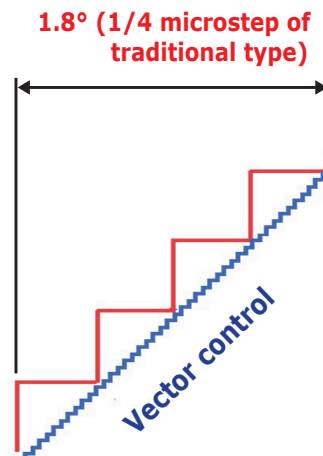
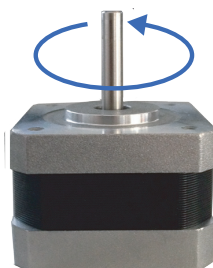
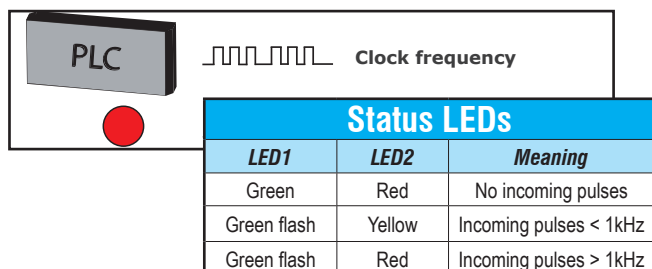
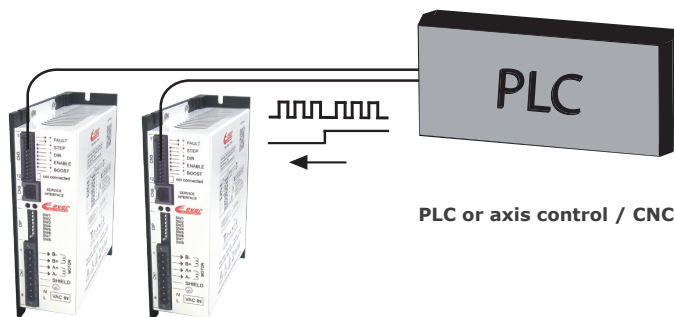


### Drive Model Number Explanation



### Easy Drive Configuration

- Set motor current value using dip-switches. Option to set motor current with Ever Studio software (LW3A and LW4D)
- Select step angle using roto-switches. Option to set motor current with Ever Studio software. Step angles have been emulated through software to maintain compatibility with traditional drives. Current regulation is always sinusoidal.
- Enable motor stall detection with DIP switches (LW3D, LW3A) or software (LW4D)..  
By reading the motor BEMF, LWx drivers detect step loss without encoder input. Drive displays alarm status with Fault digital OUT and an LED sequence.
- DIP switches to select Step/Direction or CW/CCW control mode.
- ENABLE input can be set for active high or active low.
- 30% or 70% automatic current reduction (when motor is not moving).
- Enable "Clock Test" function during drive installation to show the presence of the high speed pulse signals via status LED flashes (LW3D).





# Stepping Drives

## LW4D3070N2I1-00 Stepper Drive

The LW4D from Ever Motion Solutions (formerly Ever Elettronica) is a high-performance vector stepper drive from Ever's Titanio family. The LW4D is a two-phase stepper drive that can run in Open Loop mode (no encoder) or Closed Loop mode (motor-mounted encoder), will accept an incoming voltage of 24-75VDC, and can power hybrid bipolar stepper motors with up to 10A peak output current. The LW4D can be setup via DIP switches to run with many SureStep motors (see below), or can be configured via Ever Studio software to run almost any stepper motor.

The stepper drive utilizes Ever's ELSE (Error Less Servo Efficient) technology that supplies the motor with sinusoidal current, resulting in reduced harmonic currents, lower motor temperature, and smoother/quieter motor operation. The LW4D can detect motor stall in Closed Loop mode (monitoring the motor encoder), but also has **sensorless motor stall detection** when running in Open Loop mode to detect missed motor steps (machine jams, overload conditions, etc.). The drive has built-in protections that include overcurrent, under/over voltage, overheating, and motor output short circuit protection.

The LW4D has been pre-configured to work with SureStep motors that have encoders mounted on the rear shaft. A rotary DIP switch on the unit will automatically set up the drive to run these motors in Closed Loop (encoder feedback) mode. No software is needed to run these motors in Closed Loop mode.

| Rotary Switch Position | Preconfigured Motor Part Number |
|------------------------|---------------------------------|
| 0                      | STP-MTRL-14026E                 |
| 1                      | STP-MTRL-14034E                 |
| 2                      | STP-MTR-17040E                  |
| 3                      | STP-MTR-17048E                  |
| 4                      | STP-MTR-17060E                  |
| 5                      | STP-MTR-23055E                  |
| 6                      | STP-MTR-23079E                  |
| 7                      | STP-MTRH-23079E                 |
| 8                      | STP-MTR-34066D                  |
| 9                      | STP-MTRH-34066D                 |
| A                      | STP-MTRH-34097D                 |
| B                      | STP-MTRH-34127D                 |
| C                      | STP-MTRAC-42100D                |
| D                      | STP-MTRAC-42151D                |
| E                      | STP-MTRAC-42202D                |
| F                      | Software Configurable           |

To run one of the SureStep motors in Open Loop mode (no encoder feedback) or to configure the drive to run any other stepper motor, choose rotary position "F". The motor settings can then be configured with Ever Studio software. The software is available for free download at AutomationDirect (requires USB-serial cable EVER-PGM-1).

Ever Studio can be used to modify all drive parameters and can be used to troubleshoot your system. The software includes a built-in Oscilloscope feature to monitor values and has the ability to jog and index the motor without needing the PLC's high-speed pulses.

**Download the AutomationDirect LW4D QuickStart Guide** to get your system up and running quickly. The QSG can be found on the LW4D Item Page (link in chart below) and includes step by step instructions on how to configure the drive and navigate the Ever Studio software. Really. Download the QSG. Now.



### LW4D3070N2I1-00 Drive Specifications

| Drive Model                  | <u>LW4D3070N2I1-00</u>                                                                                                 |
|------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Power Supply Voltage</b>  | 24–75 VDC                                                                                                              |
| <b>Digital Input Voltage</b> | 5–24 VDC                                                                                                               |
| <b>Output current</b>        | 0.0–7.1 (A/ph rms)<br>0.0–10.0 (A/ph peak)                                                                             |
| <b>Control mode</b>          | Pulse + Direction, CW/CCW, AB Quadrature (quadrature only available through software when rotary switch is set to 'F') |
| <b>Power stage</b>           | H bridge bipolar chopper at 40 kHz                                                                                     |
| <b>Feedback Interface</b>    | Incremental encoder input 5VDC differential RS422 non-isolated                                                         |
| <b>Digital Inputs</b>        | 3 opto isolated 5–24VDC NPN or PNP or Line Driver                                                                      |
| <b>Digital Outputs</b>       | 2 opto isolated, 5–24 VDC, 100mA                                                                                       |
| <b>Open or Close Loop</b>    | Open or Closed                                                                                                         |
| <b>Step Resolution</b>       | From full step up to 1/128 and from full step up to 1/100 step (emulated).                                             |
| <b>PPR Range</b>             | 200–25600 (DIP switch)<br>200–65536 (software)                                                                         |
| <b>Safety Protections</b>    | Over/Under voltage, Over Current, Over Temperature, Short Circuit Phase/Phase and Phase/Ground                         |
| <b>Status Monitoring</b>     | 2 LEDs (green and red/yellow)                                                                                          |
| <b>Operating Temperature</b> | 5 to 40 °C [41 to 104 °F]                                                                                              |
| <b>Storage Temperature</b>   | -25 to +55 °C [-13 to 131 °F]                                                                                          |
| <b>Operating Humidity</b>    | 5–85 %                                                                                                                 |
| <b>Protection class</b>      | IP20                                                                                                                   |
| <b>Mounting</b>              | Wall mount                                                                                                             |
| <b>Dimensions H x L x W</b>  | 118.0 x 25.5 x 75.5 mm                                                                                                 |
| <b>Weight</b>                | 0.25 Kg                                                                                                                |
| <b>Agency Approvals</b>      | CE                                                                                                                     |

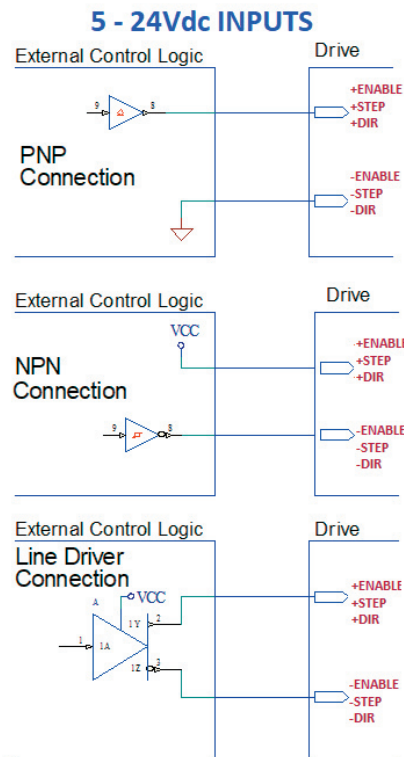


# Stepping Drives

## LW4D3070N2I1-00 Input/Output Wiring

### Digital Input Wiring

Differential PNP, NPN, and Line Driver type.

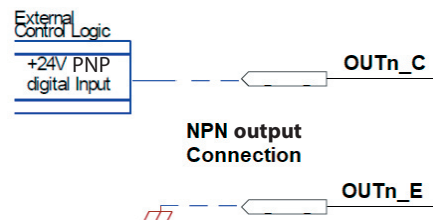
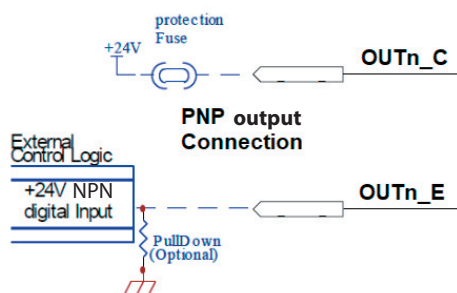


Note: EVER-PGM-1 connection to LW4D. Ensure the white and green/yellow wires are facing toward the front of the drive.



### Digital Output Wiring

Digital outputs are 5–24 VDC PNP/NPN,  $I_{OUT}=100\text{mA}$ ,  $F_{MAX}=2\text{kHz}$





# Stepping Drives

## LW4D3070N2I1-00 Drive with Preconfigured Motors

The LW4D stepper drive can run in both closed and open loop. The rotary switch is used to select from 14 different preconfigured motors in the drive. The table on this page shows these settings.

When selection 0 through E are chosen the drive configuration cannot be changed with software, but you can still troubleshoot and monitor the drive using Ever Studio. When set to positions 0-E the drive will not operate in open loop—it must have encoder feedback. Also, for positions 0-E the drive's micro-step resolution setting is 800 steps per revolution (1/8th step) and cannot be changed in software. If you need to run in open loop, a different resolution or encoder PPR, then choose rotary selection "F". AutomationDirect recommends Line driver encoders for this purpose, but open collector encoders will also work.

The SureStep NEMA 14, 17, and 23 "E" model motors already come with the correct encoder attached and the drive is configured for the default PPR on the encoder. Do not change the default encoder setting of 400 PPR. The drive is configured to use the x4 value of 1600 and cannot be changed when the rotary switch is set to 0 through 7. The encoder that is mounted to the rear end cap is a line driver encoder (AMT112Q-V). Purchase an AMT-17C-1-xxx signal cable to connect the AMT112Q encoder to the LW4D drive.



Note: The default PPR of the AMT112Q-V premounted to the "E" model motors is set for 400 PPR. If you purchase this encoder separately it will be configured by default to 2048 PPR. AMT-PGRM-17C programming cable will be required to change this to 400 PPR.

For the SureStep NEMA 34 and 42 stepper motors there are no "E" models (motors with encoders pre-mounted). You must purchase a dual shaft "D" motor (STP-MTR-34066D, STP-MTRAC-42100D, etc.) and field mount the encoder. We suggest using AMT132Q-V line driver encoders with these motors.

- The AMT132Q-V encoder is configured by default to 2048 pulses per revolution (quadrature = x4 = 8192 counts/rev). For NEMA 34 and 42 motor settings (LW4D rotary DIP switch positions 8 - E), the LW4D is set up to use the default AMT132Q-V default PPR, so there is no need to reconfigure the AMT132Q-V for use with the LW4D.
- To wire an AMT132Q-V encoder to the LW4D drive, purchase an encoder signal cable (AMT-18C-3-xxx).
- The NEMA 42 motors also require an encoder adapter mounting kit (STP-MTRA-42ENC).

| Preconfigured Motors with Ever Drives |                                        |                        |                              |                               |                                    |                         |                                           |                      |                                               |
|---------------------------------------|----------------------------------------|------------------------|------------------------------|-------------------------------|------------------------------------|-------------------------|-------------------------------------------|----------------------|-----------------------------------------------|
| <i>Rotary Switch Position</i>         | <i>Preconfigured Motor Part Number</i> | <i>NEMA Frame Size</i> | <i>Phase Current (A rms)</i> | <i>Holding Torque (oz-in)</i> | <i>Inertia (Kg-cm<sup>2</sup>)</i> | <i>Frame Stack Size</i> | <i>Encoder</i>                            | <i>Encoder Cable</i> | <i>Default PPR of Encoder (do not change)</i> |
| 0                                     | STP-MTRL-14026E                        | 14                     | 0.35                         | 8                             | 0.0003                             | Single                  | AMT112Q-V                                 | AMT-17C-1-xxx        | 400                                           |
| 1                                     | STP-MTRL-14034E                        | 14                     | 0.8                          | 20                            | 0.00035                            | Double                  |                                           |                      |                                               |
| 2                                     | STP-MTR-17040E                         | 17                     | 1.7                          | 61                            | 0.05                               | Single                  |                                           |                      |                                               |
| 3                                     | STP-MTR-17048E                         | 17                     | 2                            | 83                            | 0.07                               | Double                  |                                           |                      |                                               |
| 4                                     | STP-MTR-17060E                         | 17                     | 2                            | 115                           | 0.1                                | Triple                  |                                           |                      |                                               |
| 5                                     | STP-MTR-23055E                         | 23                     | 2.8                          | 166                           | 0.27                               | Single                  |                                           |                      |                                               |
| 6                                     | STP-MTR-23079E                         | 23                     | 2.8                          | 276                           | 0.48                               | Double                  |                                           |                      |                                               |
| 7                                     | STP-MTRH-23079E                        | 23                     | 5.6                          | 286                           | 0.48                               | Triple                  | AMT132Q-V                                 | AMT-18C-3-xxx        | 2048                                          |
| 8                                     | STP-MTR-34066D                         | 34                     | 2.8                          | 434                           | 1.4                                | Single                  |                                           |                      |                                               |
| 9                                     | STP-MTRH-34066D                        | 34                     | 6.3                          | 434                           | 1.4                                | Single                  |                                           |                      |                                               |
| A                                     | STP-MTRH-34097D                        | 34                     | 6.3                          | 800                           | 2.71                               | Double                  |                                           |                      |                                               |
| B                                     | STP-MTRH-34127D                        | 34                     | 6.3                          | 1288                          | 4.01                               | Triple                  |                                           |                      |                                               |
| C                                     | STP-MTRAC-42100D                       | 42                     | 4.2                          | 12.2 N-m                      | 5.5                                | Single                  | AMT132Q-V and mounting kit STP-MTRA-42ENC |                      |                                               |
| D                                     | STP-MTRAC-42151D                       | 42                     | 6                            | 22 N-m                        | 10.9                               | Double                  |                                           |                      |                                               |
| E                                     | STP-MTRAC-42202D                       | 42                     | 6                            | 31 N-m                        | 16.9                               | Triple                  |                                           |                      |                                               |
| F                                     | Software Configurable                  |                        |                              |                               |                                    |                         |                                           |                      |                                               |



# Stepping Drives

## Ever Stepper Drive Accessories

| Ever Stepper Drive Accessories      |         |                                                                                                                                                                                                                                          |                     |                                        |
|-------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------|
| Part Number                         | Price   | Description                                                                                                                                                                                                                              | Drawing Links       | Use With                               |
| <a href="#"><u>EVER-PGM-1</u></a>   | \$89.00 | Ever Elettronica programming cable, USB A connector to 4-pin connector, 6ft cable length. For use with Ever Elettronica LW4D3070N2I1-00 microstepping drive.                                                                             | <a href="#">n/a</a> | <a href="#"><u>LW4D3070N2I1-00</u></a> |
| <a href="#"><u>EVER-PGM-2</u></a>   | \$89.00 | Ever Elettronica programming cable, USB A connector to RJ11, 6ft cable length. For use with Ever Elettronica LW3A9030N2A1-00 microstepping drive.                                                                                        | <a href="#">n/a</a> | <a href="#"><u>LW3A9030N2A1-00</u></a> |
| <a href="#"><u>LW4D3KIT-C0</u></a>  | \$8.00  | Ever Elettronica connector kit, for use with Ever Elettronica LW4D3070N2I1-00 microstepping drive, includes (1) drive power connector, (1) motor power connector, (1) encoder connector and (1) control signal connector.                | <a href="#">n/a</a> | <a href="#"><u>LW4D3070N2I1-00</u></a> |
| <a href="#"><u>LW4D3KIT-050</u></a> | \$60.00 | Ever Elettronica cable kit, for use with Ever Elettronica LW4D3070N2I1-00 microstepping drive, includes (1) 1.6ft/0.5m power cable, (1) 1.6ft/0.5m motor extension cable, (1) 1.6ft/0.5m encoder cable and (1) control signal connector. | <a href="#">n/a</a> | <a href="#"><u>LW4D3070N2I1-00</u></a> |
| <a href="#"><u>LW3D-CON-A</u></a>   | \$10.00 | Ever Elettronica drive/motor power connector, replacement. For use with Ever Elettronica LW3D3070N0A1-00 microstepping drive.                                                                                                            | <a href="#">PDF</a> | <a href="#"><u>LW3D3070N0A1-00</u></a> |
| <a href="#"><u>LW3D-CON-B</u></a>   | \$18.00 | Ever Elettronica control signal connector, replacement. For use with Ever Elettronica LW3D3070N0A1-00 microstepping drive.                                                                                                               | <a href="#">PDF</a> | <a href="#"><u>LW3D3070N0A1-00</u></a> |
| <a href="#"><u>LW3A-CON-A</u></a>   | \$13.00 | Ever Elettronica drive/motor power connector, replacement. For use with Ever Elettronica LW3A9030N2A1-00 microstepping drive.                                                                                                            | <a href="#">PDF</a> | <a href="#"><u>LW3A9030N2A1-00</u></a> |
| <a href="#"><u>LW3A-CON-B</u></a>   | \$26.00 | Ever Elettronica control signal connector, replacement. For use with Ever Elettronica LW3A9030N2A1-00 microstepping drive.                                                                                                               | <a href="#">PDF</a> | <a href="#"><u>LW3A9030N2A1-00</u></a> |



**EVER-PGM-1**



**EVER-PGM-1 connection to drive**



**EVER-PGM-2**



**LW4D3KIT-C0**



**LW4D3KIT-050**



**LW3D-CON-A**



**LW3D-CON-B**



**LW3A-CON-A**



**LW3A-CON-B**



# Stepping Drive Accessories

## Ever Studio Drive Software

Ever Studio is a Windows PC software tool for the configuration of Ever's LW4D and LW3A series stepper drives. The software allows easy modification of drive parameters. Ever Studio allows more flexibility in configuring a motor than DIP switches. For example, LW3A has 6 DIP switch options for Step Angle, but Ever Studio can set the drive for many other microstep settings. Ever Studio also allows jogging/indexing of LW4D and has a built-in oscilloscope to help with tuning and debugging the LW4D.

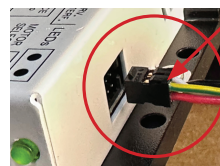
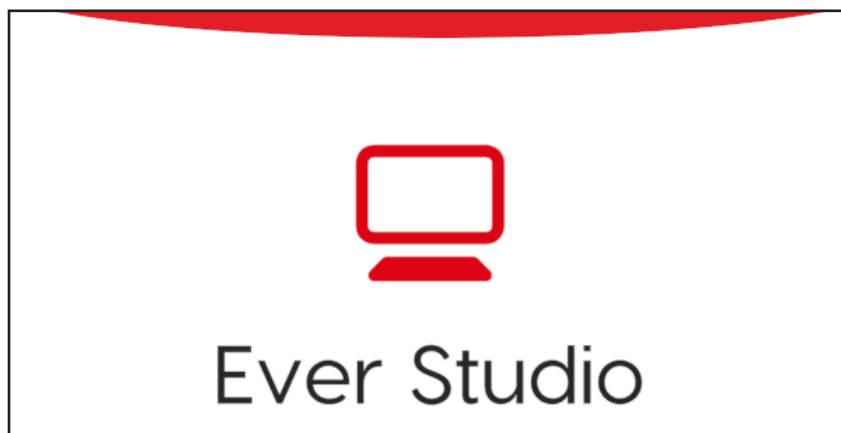
### System requirements:

- CPU: Intel i3 or better
- Operating System: Windows 7/8/8.1/10/11
- Memory: 512MB over the Windows OS requirement
- Hard Disk: 50MB free space
- Communications Interface: PC's USB to the drive's serial service interface (using [EVER-PGM-1](#) or [EVER-PGM-2](#) cable)



## Ever Studio

| Ever Stepper Drive Software |       |                                                                                                                                                                      |                                                                    |
|-----------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Part Number                 | Price | Description                                                                                                                                                          | Use With                                                           |
| <a href="#">EVER-STUDIO</a> | Free  | Ever Elettronica Windows configuration software, free download only. For use with Ever Elettronica stepper drives with service interface port. Requires PC USB port. | <a href="#">LW4D3070N2I1-00</a><br><a href="#">LW3A9030N2A1-00</a> |



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