The mission of Galil’s experienced Applications Department is to provide prompt and accurate technical assistance to help OEMs successfully deliver their products to market.

GALIL SUPPORT TEAM

New EtherCAT Drive

The EDD-3701x joins Galil’s EtherCAT Family. This family has grown to include two EtherCAT masters and an I/O slave with both digital and analog I/O points. The EDD-3701x is a motor amplifier that operates in an EtherCAT distributed system where there are up to 32 slave drives and one master. It has a daisy chain topology using standard CAT5 Ethernet cables. The EDD-3701x can interface with Galil masters (DMC-500x0 and DMC-52xx0) for sophisticated applications or with TwinCAT® for very simple applications.

(cont. pg 2)
The EDD-3701x series has the ability to control brushed, brushless, steppers, and microstepping motors (See Table 1 for more details). Unlike the competition, the EDD-3701x can both control a motor and also has 8 digital inputs, 4 digital outputs, 2 analog inputs, and 2 analog outputs. All I/O information from these drives are accessible by the EtherCAT master. This capability can eliminate the need for separate EtherCAT I/O devices.

The configuration of the EDD-3701x is done using the Galil’s GDK software. Simply connect to a PC via EDD-3701x’s USB port, follow the GDK configuration tool process, and start moving motors. The EDD-3701x also comes with a setup guide to get the user from taking the EDD out of the box to moving motors in a manner of minutes.

The EDD-3701x has a small form factor with just 3.9”x5.0”x1.5”. It can operate in either Cyclic Synchronous Position mode (CSP) or Cyclic Synchronous Torque mode (CST). It also accepts quadrature encoder feedback up to 15 MHz.

<table>
<thead>
<tr>
<th>Specification</th>
<th>EDD-37012</th>
<th>EDD-37016</th>
<th>EDD-37017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Type</td>
<td>Brushed/Brushless</td>
<td>2-Phase Stepper</td>
<td>2-Phase Stepper/2-Phase Brushless</td>
</tr>
<tr>
<td>Drive Type</td>
<td>PWM</td>
<td>Stepper</td>
<td>Micro-Stepper/PWM</td>
</tr>
<tr>
<td>Current</td>
<td>10A cont., 15A peak</td>
<td>1.4 A/Phase</td>
<td>10A cont., 15A peak</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>20-80 VDC</td>
<td>12-30 VDC</td>
<td>20-80 VDC</td>
</tr>
</tbody>
</table>

Table 1: EDD-3701x drive specifications

DMC-500x0 and DMC-52xx0 EtherCAT Masters

To command the EDD-3701x, Galil provides the DMC-52xx0 and DMC-500x0. The DMC-52xx0 is Galil’s pure EtherCAT controller that can interface with up to 32 axes of motion and 2 I/O slave devices. The DMC-50000 controls a combination of 8 local or EtherCAT axes. Both EtherCAT masters have onboard I/O with up to 8 digital inputs, 8 digital outputs, 8 analog inputs, and 8 analog outputs which can also eliminate the need for a separate I/O device.

Each Galil EtherCAT masters can interface with slave drives in Cycle Synchronous Position mode (CSP) and the DMC-500x0 can also use Cycle Synchronous Torque mode (CST). Both masters have an EtherCAT port to communicate with EtherCAT drives and I/O devices, and an Ethernet and serial port for communication with the host PC.

As with all of Galil’s products, the DMC-52xx0 and DMC-500x0 use Galil’s two-letter English like command language for both EtherCAT configuration and motion control execution.
RIO-574x0 EtherCAT I/O Slave

Galil offers the RIO-574x0 if the I/O on the Galil EtherCAT Master and/or the EDD-3701x is not sufficient for the application. It also provides flexibility if additional I/O is needed far from the DMC or EDD.

The RIO-574x0 is Galil’s EtherCAT I/O slave with up to 16 digital inputs and 16 digital outputs. Unlike the competition, the RIO-574x0 also offers 8 analog inputs and 8 analog outputs. It has two EtherCAT ports and one micro USB port for configuration using a host.

Full Featured EtherCAT Family

With the addition of the EDD-3701x Galil can now provide a complete EtherCAT solution for the most demanding applications. Contact a Galil Applications Engineer to learn more about what Galil’s EtherCAT Family can accomplish with your application. Email us at support@galil.com or give us a call at (916) 626-0101.
New Means of Communication for GDK Software

In keeping pace with advances in PC hardware and Operating Systems, Galil has released its latest generation of software tools for OEMs looking to develop fully featured, robust solutions to the most demanding motion control applications. This paper offers a brief overview a feature that may not be immediately familiar to long time Galil users, the gcaps server.

Galil’s newest generation software includes three components:

1. gcLib: a C based communications API for use with Galil Motion Controllers and PLCs. This library provides a collection of functions that make interfacing with a Galil Motion Controller from the PC a straightforward and simple process. This library is recommended for new applications.

2. GDK: Galil Design Kit. A replacement for previous generation software tools (WSDK, GalilTools, GalilSuite) providing communications, programming and design tools for Galil Motion Controllers and PLCs.

3. gcaps server: A background service on the host PC which manages communications between Galil hardware and software applications. The remainder of this paper will detail the capabilities and advantages of the gcaps server.

What is the gcaps server?

Although gcLib and GDK are replacements for Galil’s legacy software products and APIs, the gcaps server presents a new means of communication between the controller and PC. The core concept is laid out in Figure 1. Galil’s legacy libraries established a direct connection to the controller. Both solicited and unsolicited traffic are passed between the controller and PC. In the new gcaps architecture, the application instead connects to the server which in turn connects to the controller. The benefit of this architecture is that multiple applications on the PC can connect to the server and communicate with the controller simultaneously. The gcaps server ensures that communications are relayed between each of these components with minimal latency, eliminating race conditions and collisions.

Why should I use the gcaps server?

Where the gcaps server really shines is with its handling of unsolicited messaging and the controller data record. In legacy libraries, only one application could receive these data from a controller. In contrast, with the gcaps server, any number of applications can ‘subscribe’ to these data. This is particularly important during application development. Through the gcaps server, GDK can subscribe to and plot real time data to its oscilloscope tool while a separate host application is running. This was not possible with previous Galil communications libraries and software packages. In addition, this server architecture allows simultaneous communications with the controller regardless of communication bus, Ethernet, Serial or PCI.
How do I use the gcaps server?

The gcaps server is installed on the PC alongside either GDK or gclib and starts automatically as a background service. GDK and applications built on the gclib library will by default connect the server. This makes the new communications architecture virtually invisible to the user. At deployment, if the server is not desired and the developer wishes to ‘opt out’ of using it, a simple addition to the gclib connection function argument establishes a direct connection.

![Communications Architecture Diagram](image)

**Figure 1: Communications Architecture**
Drivetrains such as lead screws, belt and pulley, and gear trains are used in a variety of applications. However, there are tolerances and compliance associated with drivetrains that make them difficult to position accurately. This white paper discusses how to account for these issues. Please see the following link for white paper in its entirety.

Galil 2-day Live Training Coming in January 2018

Our next two-day product school is Thursday January 25, 2018 through Friday January 26, 2018. The training will be at our headquarters in Rocklin, CA (near Sacramento). This technical training provides an overview of Galil products, a description of system elements, tuning, motion programming, software, troubleshooting, and hands-on labs. On the afternoon of the second day there is an opportunity to spend one-on-one time with the application engineers to ask additional questions or discuss individual applications. If you are a new user to Galil or want to learn more, signup now! For more information and to register go to http://www.galil.com/learn/classes or contact Mark Middleton at Mark.Middleton@galil.com. Please register by January 10, 2018.
Galil. We Move the World.

With over 750,000 controllers installed worldwide, Galil is the leading supplier of motion and I/O controllers. Galil’s legacy of innovation began in 1983 with the introduction of the first microprocessor-based servo motion controller. Today, Galil continues its leadership by offering the most powerful, cost-effective, and easy-to-use controllers to accommodate all your motion and I/O needs.

Galil offers a broad array of motion controllers in a variety of formats: single and multi-axis, card-level and box-level, bus-based, and stand-alone. Galil’s Ethernet/RS232 and PCI controllers are available in an Econo version for lowest cost and Accelera version for ultra high-speed performance. Plug-in, multi-axis drives for steppers and servos save space, cost, and wiring. For intelligent I/O control, the RIO Pocket PLC is compact, low-cost, and packed with analog and digital I/O.

At Galil, we share our expertise with our customers. You will find a wealth of information on our website at http://www.galil.com. Here you can view any of Galil’s free web-tutorials, read an application note or white paper, post a question on our bulletin board, or download the latest software and manuals.

Exceptional application support is a top priority at Galil. Call Galil today at (800) 377-6329 (US only) or (916) 626-0101 (global) to discuss your project with one of our highly-trained applications engineers.

### ACCELERA CONTROLLERS AND DRIVES
- DMC-40x0 Ethernet/RS232
- DMC-42x0 Ethernet/RS232
- DMC-18x6 PCI

### ECONO CONTROLLERS AND DRIVES
- DMC-41x3 Ethernet/USB/RS232
- DMC-18x2 PCI

### SINGLE-AXIS CONTROLLERS AND DRIVES
- DMC-3x01x Ethernet/RS232
- EDD-3701x EtherCAT—NEW!

### EtherCAT MASTER CONTROLLERS
- DMC-500x0 Ethernet/RS232
- DMC-52xx0 Ethernet/USB

### POCKET PLC I/O CONTROLLER
- RIO-47xxx Ethernet/RS232
- RIO-574x0 EtherCAT

### SOFTWARE TOOLS
- GDK. Galil’s seamless software
- GalilTools. Servo Tuning and analysis software
- GalilSuite. New Version of GalilTools
- Frequency Analysis Software. Performs Servo Tuning in the frequency domain.
- Ladder Interface. Converts Ladder program into DMC code for RIO Pocket PLC.
- Galil PVT. Software tool for PVT mode of motion.

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- Customer stories and videos http://www.galil.com/learn/customer-stories