

# What are the Benefits of Actuators with Integrated Servo Drives?

*Actuators with Integrated Servo Drive Technology (IDT) simplify cable management, control hardware, and commissioning while achieving outstanding performance in a compact size. They enable engineers to choose a proven solution to create compact designs while mitigating concerns of cable failures, the need for large control boxes, and individual selection of servo drives that also require installation and commissioning.*

## Q: How do IDT Actuators Simplify Cable Management?

**A:** Conventional actuators with connections to external servo drives require a motor power cable and a feedback cable from each actuator - typically with large diameters - causing challenges in routing the cables to the servo drives in the control box. Increased complications come in a six-axis robot, for example, which would require six power cables and six feedback cables to connect to six servo drives - with up to 90 connections. The solution is to design with Harmonic Drive® IDT actuators that connect to a common bus with one single cable of four conductors (+VDC, 0VDC, CANH, and CANL). This approach provides an easy solution for even the most complex cable routings.

## Q: What Impact does the use of IDT Actuators have on the Control Hardware?

**A:** The use of external servo drives require a large control box that provides proper spacing between each servo drive. With IDT actuators, external servo drives are not required, enabling the use of a smaller control box. In addition, IDT actuators provide greater scalability because there is no increase in the size of the control box if additional axis are added to the system.

## Q: Is there a Benefit to use IDT Actuators in a Mobile Robot Application?

**A:** Harmonic Drive IDT actuators are especially beneficial for autonomous systems such as AGVs that operate with batteries. In fact, battery life is improved with an overall system weight reduction. In addition, space is conserved as no external servo drives are required.

## Q: Do Actuators with Integrated Servo Drives have a Larger Footprint?

**A:** Although typical integrated motors on the market require a large housing on the back to enclose the servo drive, the compact Harmonic Drive IDT actuator designs have maintained the overall size and shape of the base actuators without a servo drive. The maximum axial length increase is only 3mm. In addition, SHA IDT actuators have a large hollow shaft for cables to pass through.

## Q: How Easy is it to Commission an IDT Actuator for a Given Application?

**A:** The Harmonic Drive IDT actuators are factory configured with the appropriate settings for plug-and-play operation. Users do not have to enter motor parameters and feedback settings into the servo drives. Once connected to CANbus, the actuator is recognized and ready to operate with little to no servo tuning required. HDL-IDE software allows for additional tuning and frequency response analysis with Bode Plots and Step Response features, if required.

## Q: What Functionality and Performance do IDT Actuators Deliver?

**A:** Zero Backlash Harmonic Drive actuators provide exceptional accuracy and torque density with a robust output bearing that can directly support large loads. The drives are CANopen® communication-certified to CiA DS402 and DS301 with up to 127 nodes on a single bus. The actuators come with dual absolute encoders for FHA mini and SHA actuators, which provide position data within one revolution of the output without the need for a battery. The IDT actuators also feature I/O option for two digital inputs and two programmable analog/digital inputs or outputs for CANopen addressable remote I/O. Operating modes include Position, Velocity, Torque (CST), CSP, and CSV. Harmonic Drive IDT actuators are available in eight different sizes and configurations from size 5 with 1.4 Nm of torque to size 32 with 477 Nm. EtherCAT® will also be available soon!

## Q: How does the Cost Compare vs. a Conventional Actuator and Servo Drive?

**A:** IDT actuators are very economical since they have eliminated the need for the power and feedback cables as well as the external servo drives of a conventional system. Because it's time consuming to route cables through the system and make up to 15 connections per cable, installation cost can be held to a minimum. Harmonic Drive IDT actuators require connecting only four conductors to the control box for the entire system, saving substantial installation time. There is also typically a cost savings in the purchase price of the IDT actuators compared to a conventional servo system (actuator plus external servo drive).

# HarmonicDrive®

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