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advanced motion solutions

Why Pay For More Than You Need?

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Today's technology brings servo manufacturers many options when it comes to designing their motor drives and controls. With all the different possible functions that can be implemented in a servo drive, many manufacturers are tempted to pack them all into one "full-featured" product. This can be a problem however for the OEM when it comes time to select the right one for their application.

Jay Becker, Senior Applications Engineer, offers tips to help select the correct integral control brushless motor for your application.

Although these types of drives might be sufficient for the end user or smaller-volume, custom machine builder, they are usually not economically viable options for the OEM who needs to design for manufacturability with higher volume, cost-reducing strategies. In the case of the end user and custom machine builder, they may prefer to have a "does-everything" drive that they can use in all of their applications, most of which are likely different from one to the next. The downside to this is that they often must pay many times the price compared to the servo drive that they actually need for a particular application. The OEM cannot afford to wrap dollars around unnecessary features and hardware if it expects to remain competitive. It needs a servo drive with features that are tailored to the application at a price tailored according to those features. Dunkermotoren provides exactly these types of servo systems which help create the winning advantage for the OEM.

The following paragraphs will describe the different levels of capability of Dunkermotoren's servo motor/drives. All of them have this in common; they all have integrated electronics. An integrated solution increases reliability due to the close proximity of the drive/control electronics to the motor itself, virtually eliminating the possibility of interference from the outside world. Having the electronics inside the motor also dramatically reduces the panel space for a given machine, saving cost in materials as well as time in wiring.

KI – Commutation Electronics Integrated

Many OEMs which traditionally employed brush-type DC motors are looking for longer life in a motor. Since the limiting factor in a brushed motor is the life of the brushes, a brushless servo motor is desirable but often too expensive. The KI motor offers brushless technology with simple, two-wire control as it would have in a brush-type motor. Many medical and industrial pump applications fall into this category. In many cases, the OEM can drop it right in and take the place of the brushed motor without having to change anything else in the control scheme. Varying the DC voltage to the motor varies the speed, and in most cases the life of the motor is easily increased by a factor of 5 or more. 2-wire KI motors are for single-direction applications. Other KI motors have the ability to reverse direction, and stop & hold via more IO.

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SI – Speed Electronics Integrated

If 4-quadrant digital speed control is required, SI motors are the next step in functionality. This motor can be commanded to run in either direction, stop and hold with torque, and stop without torque (coast). These are all accomplished through digital inputs. Other inputs can switch between pre-set speeds (field programmable) or allow for a variable analog speed reference. The accel/decel ramps can also be field programmed. Digital outputs are also provided which can give hall-effect pulses, direction of rotation and ready/error state information back to a PLC for example. Where brush life is not a concern, the SI electronics are also available with brush-type motors.

PI – Parameterization Electronics Integrated

In addition to closing current and speed control loops, the PI can also close a position loop. Utilizing Dunkermotoren's PC-based graphical user interface (Drive Assistant) the mode of operation is selected, the parameters for the motor are set and then downloaded to the motor. Once the motor is parameterized it runs as a stand-alone, programmed servo which interfaces to the rest of the machine via digital and analog IO. There are many different modes of operation to choose from, such as analog or digital torque control, analog or digital speed control and digitally selectable position control *(relative, absolute, & modulo)*.

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CI – CANopen Electronics Integrated

Another trend in machine/system design is the utilization of distributed control of not only IO devices, but motors as well. The CI motor combines both of these in one as a single node on a Controller Area Network. The OEM's CANopen master provides the overall control of all of the nodes (up to 127) on the network. The CI slave motor's motion is controlled by the master via Dunkermotoren's object dictionary or CAN in Automation's DSP 402, drives profile. In some cases, the ability to access each motor's IO through the CAN network may eliminate the need for separate IO modules and/or PLC altogether.

PB – Profibus Electronics Integrated

Similar to the CI above but with Profibus, the PB motor is a slave on a Profibus DP network. Profibus communication capabilities are according to DPV0 for cyclic data exchange and DPV1 for both cyclic and acyclic data exchange. Configuration via Siemens SIMATIC-Manager is also supported.

EC – EtherCAT Electronics Integrated

The EC motor is designed to be a slave on an EtherCAT network. CoE (CANopen over Ethernet) is supported in EC motors using the CANopen object dictionary.

MI – Master Electronics Integrated

The MI motor has the ability to be a master in a network of several other motors. It is similar to the PI such that it is a stand-alone motor which requires no higher level controller. It is similar to the CI in that it communicates over CANopen. In addition to these similarities, the MI is freely programmable. It is not limited to just the standard operating modules (behaviors) that are used to parameterize the PI. Therefore it can be completely tailored to the application needs. Also like the CI and PI, it can close current, velocity, and position loops as required by the application. In addition to controlling slave node motors (e.g. CI), the MI could just as easily control SI or PI motors via digital IO.

To conclude, having many different levels of integrated functionality allows the OEM to select and purchase what the application requires without being forced to pay for bells and whistles that will never be used. Dunkermotoren USA, Inc. is happy to help you choose and/or develop the best solution for your next application.

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Dunker Motor BLDC Motors

Dunker Motor PMDC Motors