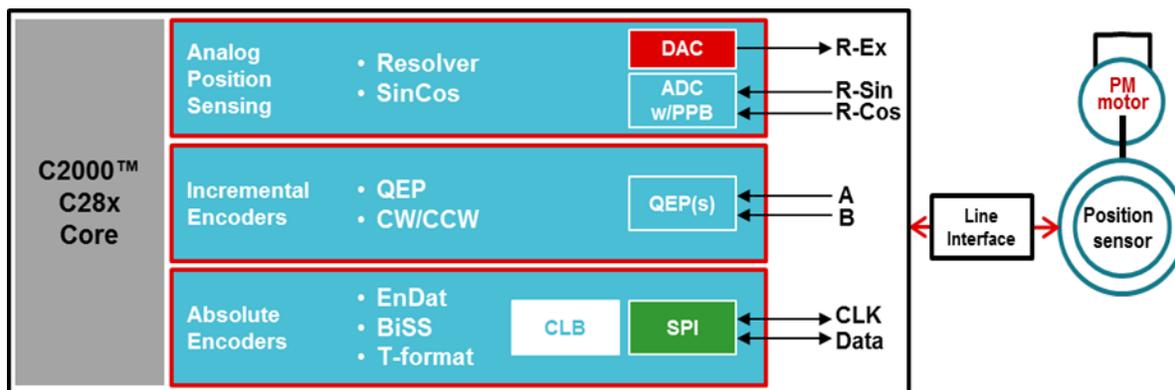


# A Cost-effective Option to Get Started with Integrated Position Sensing



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Starting with the C2000™ Delfino™ TMS320F28379D and TMS320F28379S microcontrollers (MCUs) and now with the [F280049C](#) and [F280041C](#), TI delivers DesignDRIVE Position Manager solutions for today's most popular off-the-shelf analog and digital position sensor interfaces ([Figure 1](#)).



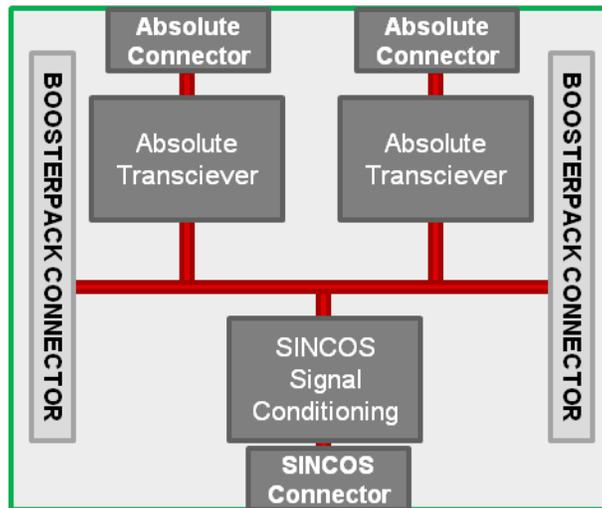
**Figure 1. DesignDRIVE Position Manager Solutions**

Industrial drive designers no longer need to develop sine/cosine, resolver or absolute encoder controller interfaces for EnDat, bidirectional/serial/synchronous (BiSS) or T-format on their own. They also benefit from the reduced system cost and enhanced feedback performance provided by the on-chip integration of the Position Manager solution. The lower latency provided by position manager technology directly improves the timing of critical current, speed and position loops. Moving the digital logic onto the MCU reduces gate-size requirements (and therefore the cost) of the field-programmable gate array (FPGA) on which the encoder interface logic has traditionally resided.

To date, TI has built position manager solutions for use on DesignDRIVE development kit hardware. Although this development kit is a solid servo drive reference design, TIDM-SERVODRIVE is made for exploring and experimenting with current sensing, position feedback and power topologies. If your evaluation scope is simply interfacing to position feedback sensors, it can be a somewhat expensive evaluation platform. The release of the new Position Manager BoosterPack™ module makes it much more cost-effective to evaluate C2000 solutions for interfacing to absolute encoders, as well as sine/cosine and resolver sensors.

The BoosterPack hardware contains RS-485 interfacing circuits to cover most absolute encoder transmission requirements. In fact, the board offers two SN65HVD78 devices capable of supporting 100m cable length requirements. The [Reference Design for an Interface to a Position Encoder with EnDat 2.2](#) includes the testing results of this transceiver for maximum frequencies vs. cable length, jitter and propagation delay. If you need long-haul RS-485 communications but not necessarily a Position Manager solution, the new BoosterPack hardware can be applicable as well.

As [Figure 2](#) shows, the board includes a signal-conditioning circuit for analog sine/cosine signals.



**Figure 2. Position Manager BoosterPack Module Block Diagram**

The C2000 Position Manager SinCos Library was released for the TMS320F2837x family, but you can port it to nearly any C2000 MCU that can sample two analog signals simultaneously. With the existing library, the new BoosterPack module and any compatible C2000 LaunchPad™ development kit, you can build your own sine/cosine transducer interface. You don't need configurable logic block (CLB)-enabled C2000 MCUs in order to use the sine/cosine solution. But if you do, you can concurrently operate both sine/cosine and absolute encoder interfaces with CLB-enabled devices.

### TI Reference Designs

If you are interested in leveraging the circuit design of the Position Manager BoosterPack module hardware for your own projects, they are available in three reference designs in the TI Designs reference design library:

- [EnDat 2.2 Absolute Encoder Master Interface Reference Design for C2000 MCUs.](#)
- [BiSS-C Absolute Encoder Master Interface Reference Design for C2000 MCUs.](#)
- [Tamagawa T-Format Absolute Encoder Master Interface Reference Design for C2000 MCUs.](#)

These reference designs include schematics, layout, bill of materials and a design guide to help you quickly integrate into your industrial drive or servo drive project. Software projects supporting EnDat, BiSS and Tamagawa T-format on this new BoosterPack hardware can be found in the C2000 controlSUITE™ package or individually as part of the design kit included with the reference designs.

### Additional Resources

To learn more about TI's DesignDRIVE Position Manager solutions for C2000 MCUs, check out:

- The [DesignDRIVE TI training portal.](#)
- The white paper, "[Designing the next generation of industrial drive and control systems.](#)"

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