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AN-528 APPLICATION NOTE

Designing a 5B Series System Design Considerations

FEATURES

- Module Pins Fit Widely Available Sockets
- Single Threaded Insert for Module Hold-Down
- Cold Junction Compensation Sensors Available—Model AC1361
- Input Modules Have Internal Series Output Switches

OVERVIEW

The 5B Series was designed to facilitate integration by a system designer into a circuit board or backplane. Only a single 3.0 mm threaded insert is required for module hold-down. Module pins are accommodated by widely available sockets, and a temperature sensor for thermocouple cold junction compensation is available as a one-piece precalibrated unit.

The 5B Series was also designed to minimize system interface space and cost. Each input module has an internal series output switch controlled by a TTL-compatible enable signal eliminating the need for external multiplexers so all modules can be served by a single input bus. Each output module has a track-and-hold that allows a single digital-to-analog converter to serve numerous channels. Alternatively, the module enable lines can be grounded, the 5B Series input modules can be used with a conventional mux and the output modules with one DAC per channel.

Ease of system application of these modules is enhanced by the fact that modules have enable and signal input pin assignments that do not coincide with the enable and output pins of the input modules. This means that in a single mix-and-match backplane environment the reading of inputs and the writing and refreshing of outputs are completely independent and can occur simultaneously. For example, the input system may dwell for a long time on a single channel to collect thousands of samples without having to interrupt the process to do an output refresh or set a new output value. Similarly, a "dumb" refresh circuit can be built that can maintain outputs without even knowing which channels have output modules; it can refresh all channels, and those that are inputs will ignore the operation.

BASIC DESIGN GUIDELINES

Modules may be mounted in any position and will normally be placed next to the screw terminals connecting to the associated field wiring. The temperature sensor is only used by thermocouple modules, but it is normally installed in all channel locations to enable "mix-and-match" applications. This sensor must be physically close to the terminals where the thermocouple wire connects to copper. Because the low power dissipation of the 5B Series minimizes temperature gradients on the backplane, no special precautions are needed to obtain accurate temperature sensing. Provision must also be made on each channel for the 5B32's current conversion resistor.

The width of the modules is intended to permit installation on 0.6" centers where required, but consideration must be given in each application to the required distance between backplane conductors where large interchannel voltages exist or where code requirements apply. The nature of the screw terminals used for field wiring will also be a factor in determining practical interchannel spacing.

The *5B Series User's Manual* includes an extensive discussion of system design issues. This manual includes the design of backplanes that take full advantage of the 5B Series' capabilities by maintaining 1500 V rms isolation between each channel (channel-to-channel isolation) as well as 1500 V rms isolation between each input to output (input-to-output isolation).

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