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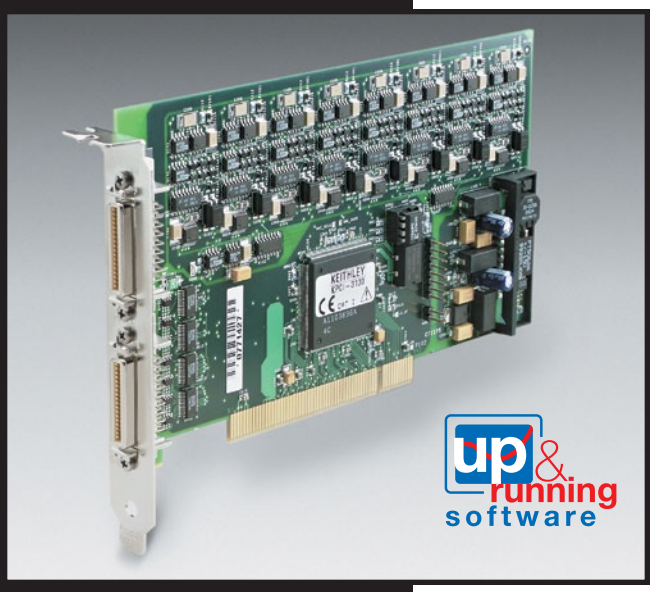
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Robust analog output and industrial digital I/O

DATA ACQUISITION PRODUCTS

KPCI-3130
KPCI-3132

Universal, Remote Sense Analog Output Boards



- **20mA output current without power supply**
- **Up to 8 analog outputs**
- **Remote sensing**
- **Wide 20-bit resolution for any application**
- **Automatic fault-circuit detection with 4-wire source**
- **Compatible with SSIO-24 and PB-24SM**
- **32 high-current digital I/O lines (user configurable, KPCI-3130 only)**
- **32-bit DriverLINX® drivers plus a suite of bundled software including ExceLINX™, VisualSCOPE™, and LabVIEW® drivers**
- **Not supported in Microsoft Windows 7 64-bit**

APPLICATIONS

- **Machine automation**
- **Product testing**
- **Servo control**
- **Gas flow, heater control**
- **Programmable voltage sources**
- **Simulation testing**

Keithley's KPCI-3130 Series of Universal Analog Output Source Boards are designed specifically for applications where robust analog output and industrial digital I/O control are required. Whether the application is on the factory floor or in the lab, the KPCI-3130 Series offers precision signal sourcing performance and unmatched quality at an economical price. Both boards lower the cost of automation and meet the needs of large ATE (automated test equipment) and machine automation applications.

The KPCI-3130 Series is a family of two value-priced analog output boards for the PCI-bus: the KPCI-3130 and -3132. These boards are ideal for applications requiring multiple analog outputs and control capabilities. Typical applications include semiconductor machine control, product testing, simulation testing, and servo control. The KPCI-3130 provides eight channels of industrial grade analog output channels along with 32 high current digital I/O channels designed for controlling solenoids, valves, actuators, or solid state relays. The KPCI-3132 offers two channels of wide resolution analog output that can be used for driving chart recorders, programming power supplies, motor control, or applications where a precise voltage is needed.

If your application requires that a constant current be supplied, the KPCI-3130 Series can be configured to source or sink up to 20mA without an external excitation source.

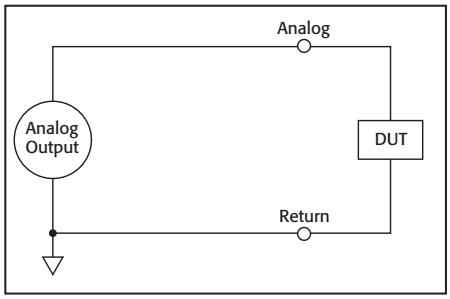


Figure 1: Conventional 2-Wire Analog Output Connections

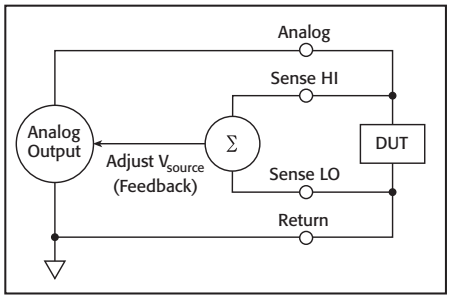


Figure 2: Analog Output With 4-Wire Remote Sense

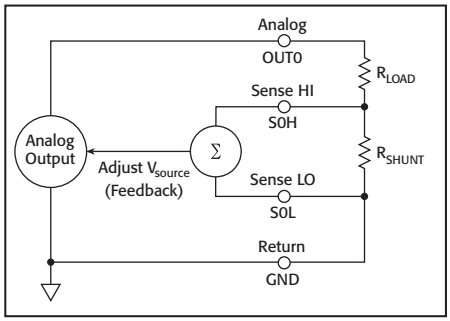


Figure 3: Constant Current Configuration

Functional Description

The KPCI-3130 Series of Universal Analog Output Source boards provides a wide resolution using a single ±10V range. With a universal resolution of 19μV, glitching problems normally encountered when switching to different ranges on conventional multi-range analog output boards are eliminated with a single range. This allows you to concentrate on the application without worrying about the complications range change glitches cause.

Most conventional PC-based analog output boards only provide you with a two-wire connection as shown in Figure 1. For most applications, this is more than adequate and will meet your application needs. However, when you are required to run a cable over a long distance between the source of the analog output and the point where the analog output voltage must be applied, significant voltage drops can occur as the result of cable resistances, device interconnections, and terminations; therefore, the programmed output value may not be the voltage delivered at the point where the voltage is being applied (such as at the DUT [Device Under Test], the device being controlled, etc.).

To correct the problem of voltage drops across long lead lengths, the KPCI-3130 Series allows you to connect the outputs in a four-wire remote sensing mode, similar to what is used on conventional power supplies. The 4-wire remote sense

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KPCI-3130
KPCI-3132

Universal, Remote Sense Analog Output Boards

Ordering Information

KPCI-3130 8-Channel Analog Output and Digital I/O, PCI-Bus Board

KPCI-3132 2-Channel Analog Output, PCI-bus Board

BENEFITS

- Glitch-free operations
- Elimination of lead line losses
- Improved load regulation
- Lower cost of automation
- Multiple control capabilities on a single card
- Easy to install, configure, and use
- Up & Running quickly

Every time you design and build a new ATE system, factory automation system, or turnkey solution, you're putting your reputation for quality work on the line. Keithley understands just how critical a role your manufacturing and production testing can play in improving product yield and your company's return on investment and financial success. For applications requiring analog output, it makes sense to choose a product designed for reliable, cost-effective performance.

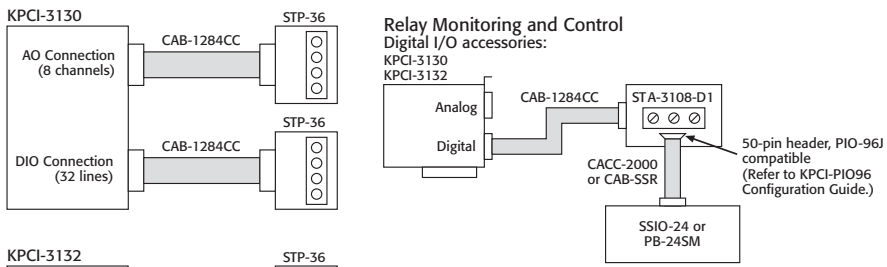
ACCESSORIES AVAILABLE

CAB-1284CC-.5	36-pin, Half-meter Shielded Cable
CAB-1284CC-2	36-pin, Two-meter Shielded Cable
CAB-SSR	3 ft Cable with PB-24SM to 50-pin Header Connection
CACC-2000	2 ft Cable with 50-pin Female Header Connectors
STA-3108-D1	Connector/Cable Adapter for use with digital I/O accessories
STP-36	36-pin Screw Terminal Panel
STP-ENCL	General purpose enclosure for STP-36

operation provides the ability to connect sense leads directly to the DUT. These sense high and low connections permit the card to measure (sense) the actual voltage present at the DUT. The analog output will then be automatically adjusted, transparent to the user, to ensure that the required voltage is supplied regardless of cable length and interconnection losses. A typical connection is shown in Figure 2. The ability to perform 4-wire remote sense operations provides a significant advantage over standard analog output hardware.

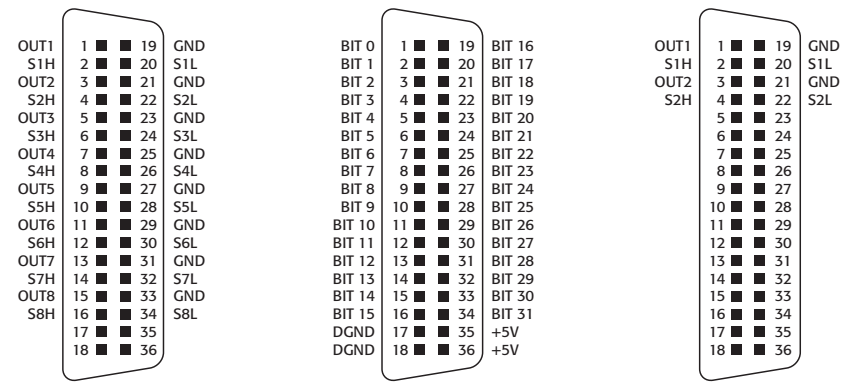
The KPCI-3130 Series boards can operate as a source, delivering power to a load, or as a sink, dissipating power. A typical connection is shown in Figure 3. No other analog output board of this type can offer this kind of performance and unmatched quality.

Configuration Guide



Connector Pin Assignments

The analog output connections are made with a 36-pin connector. The digital input and output connections on the KPCI-3130 are also made with a 36-pin connector.



Analog Output Connector for KPCI-3130

Digital I/O Connector for KPCI-3130

Analog Output Connector for KPCI-3132

Precision signal sourcing

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KPCI-3130
KPCI-3132

Universal, Remote Sense Analog Output Boards

ANALOG OUTPUTS

NUMBER OF CHANNELS:
KPCI-3130: 8.
KPCI-3132: 2.

RESOLUTION: 19.1μV/count per channel.

RANGE: ±10V for each channel.

ACCURACY: ±700μV ± 0.008% setting (Vdc), at 25°C ±1°C. To maintain this accuracy, all unused channel sense lines must be terminated (Sense HI to Output and Sense LO to GND/Return).

TEMPERATURE COEFFICIENT: 150μV/°C; ±20ppm setting/°C. Calibration at the operating temperature can remove this error.

OUTPUT CURRENT: 20mA per channel, four quadrant (shunt required if current sourcing/sinking).

SETTLING TIME: 15ms to 600μV (typ) (for transients between ±9.5V).

DIFFERENTIAL REMOTE SENSE: Differential remote sense eliminates errors due to long return lines. Enable current sourcing or sinking within voltage range with use of external sense resistor. Maintain accuracy with up to 82Ω of loop resistance in leads.

PROTECTION: Withstand continuous short circuit of Output + to Output – (GND), 35mA draw from short-circuit typical. Out of Range Alarm—can be detected as interrupt.

CAPACITIVE LOAD: Stable to 1μF or less.

POWER UP: 0V (±15mV).

DATA TRANSFER MODES: Target-mode transfers only.

D/A CONTROL MODES:

Target Mode: Update one D/A Converter with value by software command. Approximately 10ms/command execution. Readback of setting and calibration values.

D/A CALIBRATION: Separate 2-point calibration of each channel using software and a DMM; calibration through PCI interface.

HIGH CURRENT DIGITAL I/O (KPCI-3130 ONLY)

NUMBER OF BITS: 32 bits; four 74FCT652 bi-directional 8-bit registers. Each byte register is separately configurable as input or output.

DATA TRANSFER MODE: Target mode.

INPUT LOW:	V_{IL} = 0.8 V max.	I_{IL} = –0.2mA max.
INPUT HIGH:	V_{IH} = 2.0 V min.	I_{IH} = 20μA max.
OUTPUT LOW:	V_{OL} = 0.55 V max.	I_{OL} = 64mA max.
OUTPUT HIGH:	V_{OH} = 2.4 V min.	I_{OH} = –8mA max.
	V_{OH} = 2.0 V min.	I_{OH} = –15mA max.

POWER ON STATE: Input (High-Z).

GENERAL

POWER INPUT:
+5V: 72mA typ.
+12V: 485mA typ., 500mA max.

POWER OUTPUT:
+5V: 1.0A max. (May also be limited by computer or bus capability.)

ENVIRONMENT:

Temperature, Operating: 0°C to 65°C.

Temperature, Non-Operating: –40°C to 100°C.

Humidity: 0 to 90% relative (non-condensing), operating or non-operating.

WARMUP: 20 minutes to rated accuracy.

DIMENSIONS: 175mm (6.875 in) L × 108mm (4.25 in) H × 20mm (0.75 in) D. Standard-Size PCI Short Card.

EMC: Conforms to European Union Directive 89/336/EEC.

SAFETY: Meets EN61010-1/IEC 1010.

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