

EXP Series

16-Channel Multiplexer and Signal Conditioning System



Keithley's EXP-800, EXP-1600, and EXP-1800 are multiplexer/amplifier accessories for use with KPCI and DAS Series data acquisition boards. For thermocouple applications, the EXP family offers cold junction compensation (CJC), open-TC detection, and low pass filtering. With a range of gain options, flexible packaging, and high performance, the EXP family offers a simple solution for a wide range of signal conditioning requirements.

There is an EXP model for many of Keithley's KPCI and DAS Series boards:

- **EXP-1800 for KPCI-3107/3108, DAS-1700/1800 family (except HC version)**
- **EXP-1600 for DAS-1600/1400/1200**
- **EXP-800 for DAS-800 family**

- **Flexible expansion and signal conditioning**
- **Scanning at up to 312 kilosamples/s (EXP-1800)**
- **Integrated packaging**
- **Voltage or current measurements**
- **Thermocouple measurements**
- **Removable screw terminals (optional)**
- **Easy setup on the bench or in the field**

Each EXP turns one single-ended input of your KPCI or DAS board into 16 differential inputs. By cascading additional EXPs, it is possible to configure a system with up to 256 channels.

The architecture of the EXP Series offers several features which increase flexibility and make application setup easier. Each unit uses per-channel switches instead of confusing jumpers or messy solder gaps. In addition, the Field Wiring Accessories (FWA), described below, provide for fast prototyping and lab use.

Signal Conditioning

The EXP-800 and EXP-1600 models contain a global instrumentation amplifier with switch-selectable gains of 1, 10, 100, and 500. The boards also contain a slide switch that allows the gain setting to be multiplied by factors of 1 or 1/2, resulting in eight input ranges.

The EXP-1800 provides gains of 1 and 50 which are software-selectable on a per-channel basis. These gains can be combined with those of the DAS-1800 or KPCI board to provide a wide set of input ranges.

Ordering Information

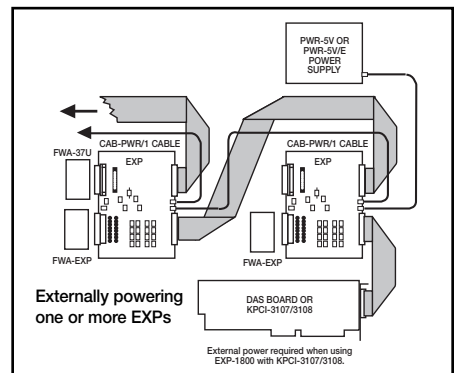
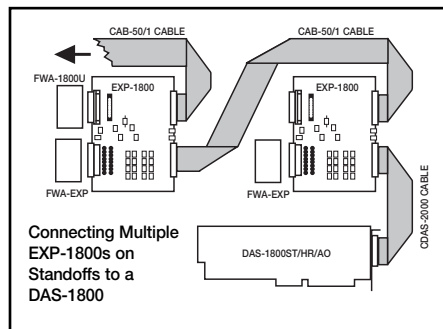
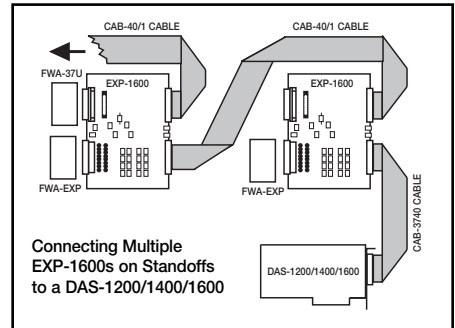
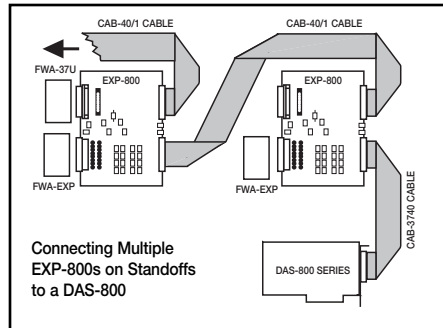
- EXP-1800** EXP for KPCI-3107/3108, DAS-1800ST/AO/HR
- EXP-1600** EXP for DAS-1600/1400/1200
- EXP-800** EXP for DAS-800 family

APPLICATIONS

- **Temperature logging**
- **Process monitoring**
- **Product test**
- **Energy management**

CONNECTIONS: TO DAS BOARDS, MULTIPLE EXPs, EXTERNAL POWER

NOTE: All DAS board input channels must be configured as single-ended.



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EXP Series

16-Channel Multiplexer and Signal Conditioning System

SPECIFICATIONS EXP-800/1600

OF ANALOG INPUTS: 16 single-ended or 16 differential (any combination).

AMPLIFIER

CONFIGURATION: Instrumentation amplifier with gains of 0.5, 1, 5, 10, 50, 100, 250, 500.

GAIN ACCURACY: $\pm 0.01\%$ of reading, typical; $\pm 0.02\%$ of reading, max.

RELATIVE ACCURACY: $\pm 0.001\%$ of reading, typical.

INPUT CHARACTERISTICS

INPUT OFFSET CURRENT: 0.6nA max. @ 25 °C 50nA max. @ 0 to 70 °C.

INPUT BIAS CURRENT: 1nA max. @ 25 °C; 100nA max. @ 0 to 70 °C.

INPUT OFFSET VOLTAGE: 6.0mV max., trimmable to zero.

CMRR

90dB typical @ gain = 1.

100dB typical @ gain = 10.

110dB typical @ gain = 100.

110dB typical @ gain = 500.

INPUT FILTER RESPONSE

Single-pole RC @ 80Hz $\pm 20\%$.

Two 1k Ω resistors connected differentially across 1 μ F capacitor.

TEMPERATURE COEFFICIENTS

GAIN: $\pm 5\text{ppm}/^\circ\text{C}$.

OFFSET: $\pm 10\mu\text{V}$ for gain = 1, typical; $\pm 2\mu\text{V}$ for gain = 50, typical.

BANDWIDTH (NO FILTER)

FULL-POWER BANDWIDTH:

150kHz @ gain = 1; 4kHz @ gain = 500.

SMALL-SIGNAL BANDWIDTH:

180kHz @ gain = 1; 5kHz @ gain = 500.

SETTLING TIME: 0.4 μs @ G = 1; 4.0 μs @ G = 10; 40 μs @ G = 100; 200 μs @ G = 500.

(Actual throughput is software and O/S dependent.)

NOISE

RMS: 1mV @ gain = 1; 8 μV @ gain = 500.

P-P: 5mV @ gain = 1; 50 μV @ gain = 500.

CJC

On EXP board or on FWA (switch-selectable).

OUTPUT: $+24\text{mV}/^\circ\text{C}$.

ACCURACY @ 25 °C: $\pm 0.4^\circ\text{C}$, typical; $\pm 1.0^\circ\text{C}$, max.

POWER REQUIREMENTS

+5V @ 160mA, typical; 250mA, max.

SPECIFICATIONS EXP-1800

NOTE: EXP-1800 can be used with the DAS-1802HR 16-bit A/D board, resulting in 12-bit accuracy and 16-bit resolution. Adding EXP-1800 to a KPCI or DAS board will degrade the accuracy and noise specifications of the KPCI or DAS board.

OF ANALOG INPUTS: 16 single-ended or 16 differential (any combination).

AMPLIFIER

CONFIGURATION: Two selectable instrumentation amplifiers with gains of 1 and 50.

GAIN ACCURACY: $\pm 0.01\%$ of reading, typical; $\pm 0.02\%$ of reading, max.

RELATIVE ACCURACY: $\pm 0.001\%$ of reading, typical.

INPUT CHARACTERISTICS

INPUT OFFSET CURRENT: 0.6nA max. @ 25 °C; 50nA max. @ 0 to 70 °C.

INPUT BIAS CURRENT: 1nA max. @ 25 °C; 100nA max. @ 0 to 70 °C.

CMRR

90dB typical @ gain = 1; 110dB typical @ gain = 50.

INPUT FILTER RESPONSE

Single-pole RC @ 80Hz $\pm 20\%$.

Two 1k Ω resistors connected differentially across 1 μ F capacitor.

TEMPERATURE COEFFICIENTS

GAIN: $\pm 5\text{ppm}/^\circ\text{C}$.

OFFSET: $\pm 10\mu\text{V}$ for gain = 1, typical; $\pm 2\mu\text{V}$ for gain = 50, typical.

BANDWIDTH (NO FILTER)

FULL-POWER BANDWIDTH:

330kHz @ gain = 1; 200kHz @ gain = 50.

SMALL-SIGNAL BANDWIDTH:

3MHz @ gain = 1; 3MHz @ gain = 50.

SYSTEM THROUGHPUT: 312kHz @ G = 1; 150kHz @ G = 50 (same gain on all channels, DAS gain = 1).

NOISE

RMS: 500 μV @ gain = 1; 10 μV @ gain = 50.

P-P: 3mV @ gain = 1; 70 μV @ gain = 50.

CJC

On EXP board or on FWA (switch-selectable).

OUTPUT: $+10\text{mV}/^\circ\text{C}$.

ACCURACY @ 25 °C: $\pm 0.4^\circ\text{C}$, typical; $\pm 1.0^\circ\text{C}$, max.

POWER REQUIREMENTS

+5V @ 300mA, typical; $\pm 15\text{V}$ $< 30\text{mA}$.

SPECIFICATIONS EXP ACCESSORIES

FWA

DIMENSIONS: 3.25in D \times 4.0in W \times 1.2in H.

WIRE SIZES ACCOMMODATED: Up to 16 AWG.

PWR-5V

OUTPUT: +5V @ 4A (cable lengths will limit output capability to powering 4 EXP boards maximum).

EQUIVALENT CONNECTOR: SWITCHCRAFT part # S760.

ENCL-1

DIMENSIONS: 8.5in D \times 10.6in W \times 1.4in H.

ENCL-2M

DIMENSIONS: 8.5in D \times 10.6in W \times 2.9in H.

ENCL-4M

DIMENSIONS: 8.5in D \times 10.6in W \times 5.3in H.

GENERAL

OPERATING TEMPERATURE: 0 °C to 50 °C.

STORAGE TEMPERATURE: -20 °C to 70 °C.

HUMIDITY: 0 to 90%, noncondensing.

DIMENSIONS: 6.3" \times 9.2" \times 1.2" (standard Eurocard 6U \times 6HP).

ACCESSORIES AVAILABLE

CAB-1284CC	Cable for KPCI-3107/3108 to STA-3108A1 for use with EXP-1800
CAB-3740/F	37-pin male to 40-pin female cable, 0.1m (0.3 ft)
CAB-40	Daisy-chain cable between EXP-1600s or EXP-800s (4")
CAB-40/1	Daisy-chain cable between EXP-1600s or EXP-800s (18")
CAB-50	Daisy-chain cable between EXP-1800s (4")
CAB-50/1	Daisy-chain cable between EXP-1800s (18")
CAB-PWR	Daisy-chain power cable between EXPs (4")
CAB-PWR/1	Daisy-chain power cable between EXPs (18")
CACC-2000	Daisy-chain cable between STA-3108-A1 and EXP-1800. Required for KPCI-3107/3108.
CDAS-2000	Cable from DAS-1800 to 1st EXP (24")
ENCL-2M	2-slot metal enclosure
ENCL-4M	4-slot metal enclosure
ENCL-BLANK	Blank front panel, covers one slot opening
FWA-EXP	Field Wiring Accessory for EXP channels
FWA-1800U	FWA feed-through for DAS signals (EXP-1800)
FWA-37U	FWA feed-through for DAS signals (EXP-1600, EXP-800)
PG-408A	DC-DC converter (EXP-1800 only)
PWR-5V	Power supply, 115/230VAC to 5VDC
STA-3108-A1	Adapter panel for KPCI-3107/3108 for use with EXP-1800

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