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WBK10, WBK10H, and WBK10A - Expansion Modules

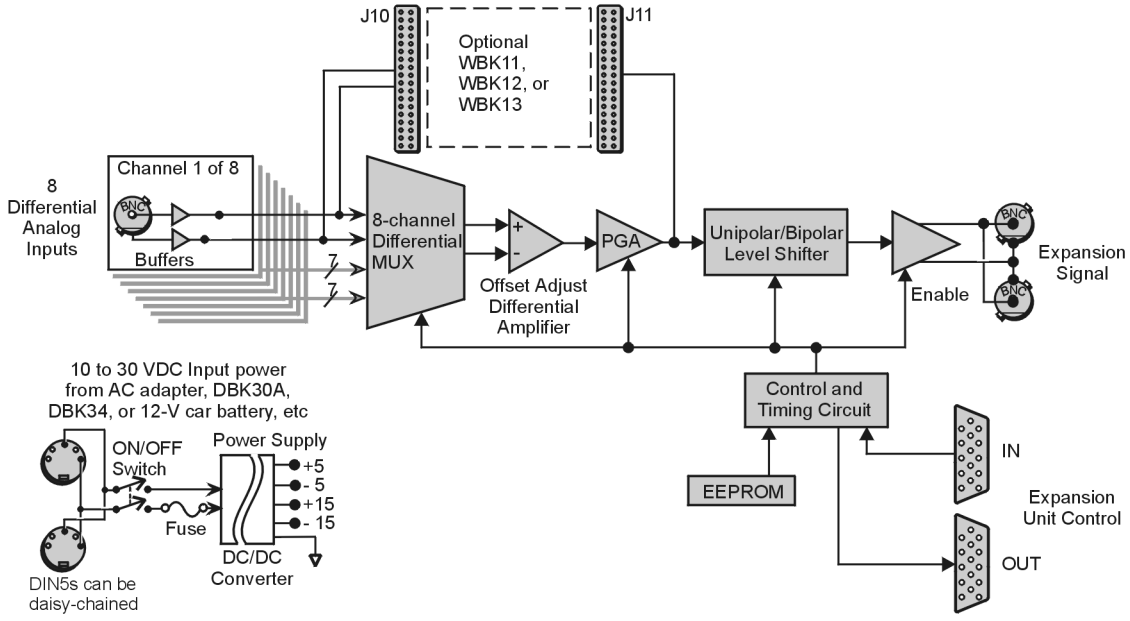
Important Notice Regarding the WaveBook/516 and the WBK10A:
Cards for the WaveBook/516 and the WBK10A are installed at the factory per customer order. Users are not to remove or install cards for these two products as the applicable cards are not "plug-and-play" for these devices and erroneous signal values could result. If you desire to remove or add a card to these products, contact your service representative.

Each WBK10 series module can be used to provide WaveBook with 8 additional differential-analog-inputs. The modules are equipped with a programmable gain instrumentation amplifier (PGA) and, like the WaveBook, each has a built-in expansion bus.

Up to eight WBK10 series modules can be cascaded together for a system capacity of 72 differential channels. Each module is capable of supporting a WBK11, WBK12, or WBK13 series option card.

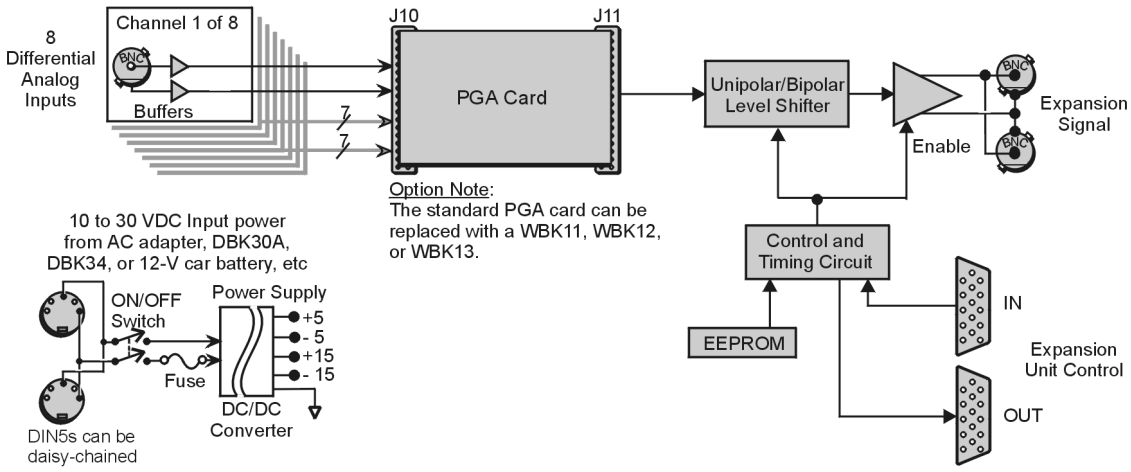
Note 1: WBK10A can be ordered with a PGA, WBK11, WBK12, or WBK13 series card.

Note 2: WBK10A provides the unipolar ranges of the WBK10, the bipolar ranges of the WBK10H, and one additional low voltage bipolar range. Specifications are included in this document module.



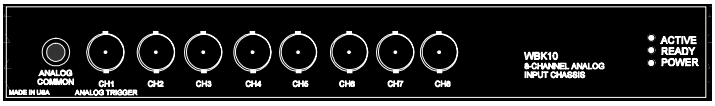
WBK10/10H, Block Diagram

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WBK10A Block Diagram

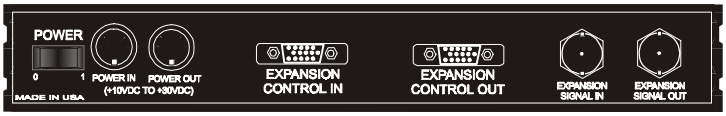
The **front panel** of each WBK10 series module has the following connectors and indicators:



Front Panel

- 1 Analog Common binding post for reference.
- 8 BNC connectors for analog inputs. Channels are labeled 1 through 8.
- 3 Status LEDs (Active, Ready, Power).

The **rear panel** of a WBK10 series module has a power switch and the following connectors:



Rear Panel

- 2 DIN5 connectors [one for Power In, one for Power Out]
- 1 HD-15M Expansion Control In
- 1 HD-15F Expansion Control Out
- 2 BNC connectors [one for analog Expansion Signal In, one for analog Expansion Signal Out]

Reference Notes:

(1) Setup information pertaining to power, expansion control, and expansion signal connections is contained in chapter 3 of the *WaveBook User's Manual*.

(2) You will need to set several parameters so WaveView can best meet your application requirements. For software setup information, refer to the "Software Setup" section in chapter 3 of the *WaveBook User's Manual*. For detailed WaveView information, refer to the *WaveView Document Module*.

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*WBK10 and WBK10H – Specifications**

Channels: 8 differential
Connector: BNC
Accuracy (for WBK10 and WBK10H):
With WaveBook/516: ±0.03% of reading; ±0.008% of range
With WaveBook/512: ±0.04% of reading; ±0.01% of range
With WaveBook/512H: ±0.04% of reading; ±0.01% of range
Offset: ±1 LSB max
Maximum Overvoltage: 30 VDC
Sampling Rate: 1 MHz (1 µs)
Common mode rejection: >70 dB from 0 to 100 Hz
Ranges (WBK10): Unipolar/Bipolar operation is software selectable via sequencer
Unipolar: 0 to +10 V, 0 to +5 V, 0 to +2 V, 0 to +1 V
Bipolar: -5 to +5 V, -2.5 to +2.5 V, -1 to +1 V, -0.5 to +0.5 V
Ranges (WBK10H):
Unipolar (Note 1): 0 to +10 V, 0 to +4 V, 0 to +2 V
Bipolar: -10 to +10 V, -5 to +5 V, -2 to +2 V, -01 to +1 V
Input Current: 50 nA typical, 500 nA max
Input Impedance
Single-ended: 5 MΩ in parallel 30 pF
Differential: 10 MΩ in parallel 30 pF
Power:
WBK10: 0.30A max @ 15 VDC
WBK10H: 0.33A max @ 15 VDC
Dimensions: 220 mm wide × 285 mm long × 35 mm high (8.5” × 11” × 1.375”)
Weight: 1.3 kg (2.8 lb)

Environmental:
Gain Temperature Coefficient: 5 ppm/°C typical
Offset Temperature Coefficient: 12 uV/°C max
Operating Temperature: 0 to 50°C
Storage Temperature: 0 to 70°C
Humidity: 0 to 95% RH, non-condensing

Note 1: No unipolar range is available when WBK10H used with a WBK11, WBK12, or WBK13 series option card.

Note 2: WBK10A specifications begin on page 4.

*Specifications are subject to change without notice.

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Wavebook/516 and WBK10A Specifications

Option	Function	Internal/External
WBK11A	8-Channel Simultaneous Sample and Hold	Internal
WBK12A	8-Channel Programmable Low-pass Filter	Internal
WBK13A	8-Channel Programmable Low-pass Filter with Simultaneous Sample and Hold	Internal
WBK61, 62	High Voltage Adapters and Probes	External

Analog Specifications (WaveBook/516 stand alone, or WBK10A with a WaveBook/516):

Channels: 8 differential, expandable up to 72 differential

Input Connector: BNC, center conductor is Channel Hi, outer conductor is Channel Low

Input Voltage Ranges (DC Specifications):

	Standard Unit			With WBK11A (Note 3)			With WBK12A/13A (Note 3)			
Voltage Range	Accuracy (Note 2) One Year, 18-28°C		Input Noise LSB rms DC-500KHz (typical) (Note 4)	Accuracy (Note 2) One Year, 18-28°C		Input Noise LSB rms DC-500KHz (typical)	Accuracy (Note 2) One Year, 18-28°C		Input Noise LSB rms (typical)	
	± % reading	± % range		± % reading	± % range		± % reading	± % range	1KHz Filter	Filter Bypass
0 to +10V	.012%	.008%	2	.012%	.008%	2	.012%	.008%	2.2	2.2
0 to +5V (10A) 0 to +4V (516)	.012%	.009%	2	.012%	.009%	2	.012%	.009%	2.2	2.2
0 to +2V	.012%	.012%	3	.012%	.012%	3	.012%	.012%	2.2	3
0 to +1V (10A only)	.012%	.018%	3	.012%	.018%	3	.012%	.018%	2.2	3
0 to +.5V				.018%	.033%	6	.018%	.033%	2.2	6
0 to +.2V				.018%	.08%	8	.018%	.08%	2.2	12
0 to +.1V				.018%	.16%	15	.018%	.16%	2.2	20
-10 to +10V	.012%	.008%	2	.012%	.008%	2	.012%	.008%	2.2	2.2
-5 to +5V	.012%	.008%	2	.012%	.008%	2	.012%	.008%	2.2	2.2
-2 to +2V	.012%	.009%	2	.012%	.009%	2	.012%	.009%	2.2	3
-1 to +1V	.018%	.012%	3	.018%	.012%	3	.018%	.012%	2.2	3.3
-.5 to +.5V (10A only)	.018%	.018%	5	.018%	.018%	6	.018%	.018%	2.2	6
-.2 to +.2V				.018%	.033%	8	.018%	.033%	2.2	12
-.1 to +.1V				.018%	.08%	15	.018%	.08%	2.2	20
-.05 to +.05V (10A only)				.018%	.16%	26	.018%	.16%	4	40

Notes: 1. Specifications assume differential input scan, unfiltered
2. Accuracy specification is exclusive of noise.
3. Unipolar ranges unavailable for 516 with WBK11A, 12A, or 13A options installed. Available with WBK10A and any option.
4. Maximum limit is 1.3X typical.

System Performance: one year, 18-28°C unless otherwise noted

Differential Nonlinearity: ±2 LSB max

Total Harmonic Distortion (10Hz-20KHz): -84dB typical

Signal to Noise and Distortion (SINAD, 10Hz-20KHz): -74dB typical (-72dB with WBK10A)

Temperature Coefficient of Accuracy (0-18 and 28-50°C):

With PGA and WBK11A: ± (.002% + 0.6 LSB)/°C typical, -10 to +10V range

With WBK12A/13A: ± (.002% + 1 LSB)/°C typical, -10 to +10V range

Input Resistance: 5MΩ (single ended); 10MΩ (differential), in parallel with 30pF

Bias Current: <400 nA (0 to 35°C)

Common Mode Rejection: >70dB minimum; >80dB typical; DC-20KHz

Input Bandwidth: DC to 500KHz

Hostile Channel-to-channel Crosstalk (5Vrms input signal, DC-100KHz): -88dB typical

Over-Voltage Protection: ±35 V relative to analog common

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PGA Filter

Filter Type: 20KHz low pass, Butterworth, 5-pole filter

WBK11A Functions

Input Voltage Ranges: Software programmable prior to a scan sequence
Aperture Uncertainty (SSH): 75ps max
Voltage Droop (SSH): 0.01mV/ms typical

WBK12A/13A Functions

Input Voltage Ranges: Software programmable prior to a scan sequence
Low Pass Filter Type: Software selectable, 8-Pole elliptic or linear phase
Anti-Aliasing Filters: Single-pole pre and post filters, automatically set depending on filter frequency selected
Low-Pass Filter Frequency Cutoff Range: 100KHz, 75KHz, 60KHz…400Hz
bypass (fc = 300KHz/N where N = 3 to 750)
Filter Grouping: 4 Channels each in two programmable banks
Aperture Uncertainty (SSH): 75ps max
Voltage Droop (SSH): 0.01mV/ms typical

Triggering

Channel 1 Analog Trigger
Input Signal Range: -10 to +10V
Input Characteristics and Protection: Same as channel inputs
Latency: 300ns

Multi-Channel Analog Trigger (up to 72 channels):
Range: Selectable per channel to input range
Latency: 2us/channel, plus 4us maximum

TTL Trigger:
Input Signal Range: 0-5V
Input Characteristics: TTL-compatible with 10K ohm pull-up resistor
Input Protection: Zener clamped –0.7 to +5V
Latency: 300ns

Software Trigger
Latency: 100us typical

Pulse Trigger
Input Signal Range: 0-5V
Input Characteristics: 75 ohms
Input Protection: ±10V maximum
Minimum Pulse Width: 100ns
Latency: 300ns

External Clock

Connector: Available on DB25 digital input
Input Signal Range: 5V TTL compatible
Input Characteristics: 50K ohms pull up (to +5V) in parallel with 50pF
Input Protection: Zener clamped –0.7 to +5V
Delay: 200ns
Signal Slew Rate Requirement: 20V/us minimum
Rate: Up to 1MHz
Divisor ratio: Divide by 1 through 255, selectable
Clock Counter Accuracy: <0.02% error
Clock Counter Range: 0.01Hz to 100KHz

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Sequencer

Operation: Programmable for channel, gain, and for unipolar/bipolar range in random order
Depth: 128 location
Channel-to-Channel Rate: 1.0-1.1us/channel, all channels equal
Maximum Repeat Rate: 1MHz
Minimum Repeat Rate: 100 seconds per scan
Expansion Channel Sample Rate: Same as on-board channels

High-Speed Digital Inputs/General-Purpose Outputs

Connector: DB25 Female
Configuration: 16 TTL-compatible pins, selectable for input or output
Input Characteristics: TTL-compatible
Output Characteristics: ALS TTL output in series with 33 ohms
Output Updates: Outputs may be changed via program control
Input/Output Protection: Diode clamped to ground and +5V

General Specifications

Warm-up: 30 minutes to rated specifications
Environment:
Operating: 0-50°C, 0-95% RH (non-condensing)
Storage: -20 to 70°C
Power Consumption: 1.4A max @ 15VDC (WBK10A or 516 with WBK13A installed)
Input Power Range: 10-30VDC
Vibration: MIL Std 810E, Category 1 and 10
Dimensions: 220 deep X 285 wide X 45 mm high (8.5 X 11 X 1.75 inches)
Weight: 1.5kg (3.3 lbs)

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