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Find the *Measurement Computing WBK17* at our website: *Click HERE*

WBK17

8-Channel Counter/Encoder/High-Voltage Module

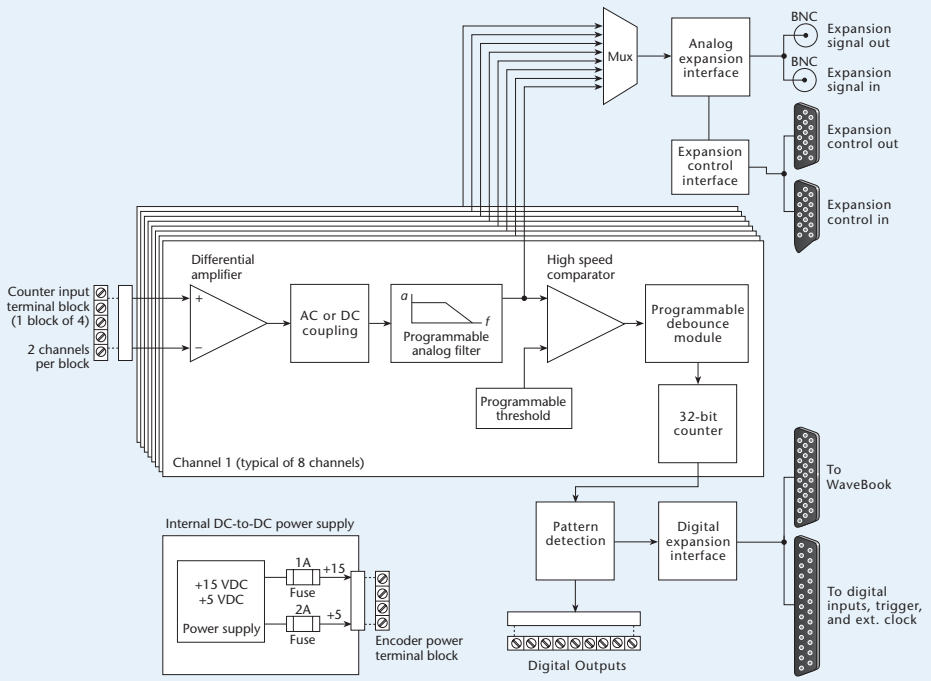
Features

- 8 independent 32-bit counters
  - Frequency measurements up to 5 MHz
  - 16 programmable debounce ranges per channel plus glitch detection
- 5 counter modes: totalize, period, pulsewidth, timing, and encoder
  - 4 time base settings with 10 ppm accuracy (0 to 50 ˚C)
  - 4 pattern detection modes: below preset value, above preset value and inside or outside a window
- Multi-axis quadrature encoder inputs
  - 2 channel with A (phase), B (phase) and Z (index)
  - 4 channel with A (phase) and B (phase)
  - x1, 2, and 4 count modes
  - Single-ended (TTL, CMOS, 12V, 24V, 30V) or differential (RS-422) inputs
- Power output for quadrature encoders (+5V @ 1000 mA and +15V @ 500 mA total)
- Analog input mode
  - 1 MHz aggregate sample rate
  - ±50V input range
  - AC/DC coupling, low-pass filtering, and trigger threshold settings programmable per channel
- 16 digital inputs
  - Can be scanned synchronously with counter or other analog input channels
- 8 programmable digital outputs
  - 150 mA sink current (system max)
  - Digital outputs optionally updated every scan period (1 µs min)
- AC, DC, or battery operable for bench top, industrial, and portable applications
- Up to eight WBK17s per Wavebook system
  - Fully compatible with other WBK signal conditioning modules



The WBK17 provides eight channels of 32-bit general-purpose counters, and is also capable of multi-axis quadrature encoder monitoring

WBK17 Multifunction Counter System Block Diagram

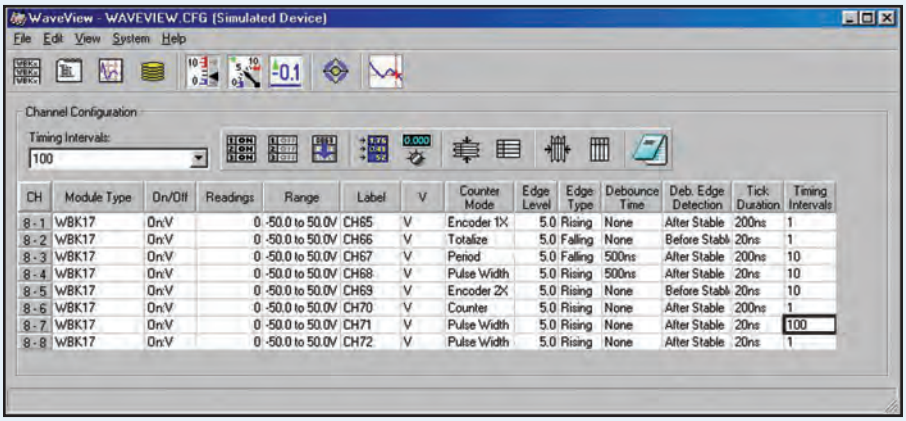


The WBK17 is an 8-channel multi-function counter/encoder module for Wavebook systems. Each of the high-speed, 32-bit counter channels can be configured for counter, period, pulse width, time between edges, or encoder modes. All channels are also capable of measuring analog inputs, which are digitized by the Wavebook at up to 1 MHz. With this unmatched versatility, the WBK17-based system can concurrently monitor time periods, frequencies, pulses, and other event-driven incremental occurrences directly from encoders, pulse generators, limit switches, proximity switches, and magnetic pick-ups.

WBK17
General Information

Software
Counter mode selection, AC/DC coupling, low-pass filter cut-off frequency, and other WBK17-specific configuration parameters are effortlessly handled with WaveView, IOtech's *Out-of-the-Box* software for the WaveBook. WaveView's spreadsheet-style (GUI) interface easily configures the WBK17 to make frequency measurements, period measurements, and quadrature encoder measurements.

In addition to the *Out-of-the-Box* software, the WBK17 is also supported by a complete set of language drivers and documentation for developing custom applications using high-level languages like Visual Basic®, and C++ for Windows® 98 or higher. For applications beyond the scope of WaveView that require sophisticated graphical analysis and control, the WaveBook and WBK17 are also supported by DASYLab®, and DaqCOM programming tools.



CH	Module Type	On/Off	Readings	Range	Label	V	Counter Mode	Edge Level	Edge Type	Debounce Time	Deb. Edge Detection	Tick Duration	Timing Intervals
8 - 1	WBK17	On:V	0	-50.0 to 50.0V	CH65	V	Encoder 1X	5.0	Rising	None	After Stable	200ns	1
8 - 2	WBK17	On:V	0	-50.0 to 50.0V	CH66	V	Totalize	5.0	Falling	None	Before Stabl	20ns	1
8 - 3	WBK17	On:V	0	-50.0 to 50.0V	CH67	V	Period	5.0	Falling	500ns	After Stable	200ns	10
8 - 4	WBK17	On:V	0	-50.0 to 50.0V	CH68	V	Pulse Width	5.0	Rising	500ns	After Stable	20ns	10
8 - 5	WBK17	On:V	0	-50.0 to 50.0V	CH69	V	Encoder 2X	5.0	Rising	None	Before Stabl	20ns	10
8 - 6	WBK17	On:V	0	-50.0 to 50.0V	CH70	V	Counter	5.0	Rising	None	After Stable	200ns	1
8 - 7	WBK17	On:V	0	-50.0 to 50.0V	CH71	V	Pulse Width	5.0	Rising	None	After Stable	20ns	100
8 - 8	WBK17	On:V	0	-50.0 to 50.0V	CH72	V	Pulse Width	5.0	Rising	None	After Stable	20ns	1

In encoder mode, the WBK17 accepts either differential or single-ended inputs and, unlike PC plug-in board solutions, provides power to the encoder(s). When reading A (phase), B (phase), and Z (index) signals the WBK17 provides position, direction, and velocity data. For higher measurement accuracy, x1, 2, or 4 modes are supported.

The WBK17 also features 16 digital inputs that can be read in the input scan sequence, and 8 fully programmable digital outputs. Another unique feature of the WBK17 is built-in pattern detection. In this mode, when digital pattern set-point conditions have been met, the digital outputs are instantaneously updated — without PC intervention. This real-time, intelligent response capability is often required for high-speed machine position monitoring and the high-speed motion-related vehicle testing. All I/O signals are conveniently accessed via removable screw-terminal blocks located on the WBK's front panel.

Other signal conditioning modules in the WBK family can be easily integrated into the system to measure strain, sound, vibration, and temperature.

Input Range & Bandwidth
The WBK17 measures waveforms up to 100 Vpp (±50V), accommodating a wide range of input signals, forwarding the signals to the Wavebook to be digitized at up to a 1 MHz aggregate sample rate.

Coupling & Filtering
Each channel of the WBK17 features programmable AC/DC coupling. Also available on each channel is a single-pole low-pass filter with three programmable cut-off frequencies of 30 Hz, 20 kHz, and 100 kHz.

Programmable Threshold with Hysteresis
The output of the WBK17's filter stage drives a high-speed comparator, with a programmable threshold from -12.5V to +12.5V in 100 mV steps. This function, in conjunction with the WBK17's ability to digitize a waveform, enable the user to identify where the threshold should be set. The WBK17 also features 50 mV of hysteresis to reject low-level noise.

Debounce Circuit
Each input can be debounced with 16 programmable debounce times from 500 ns to 25.5 ms. A glitch detect mode is also selectable. Together these programmable functions eliminate switch-induced transients typically associated with electro-mechanical devices including relays, proximity switches, and encoders.

Counter Modes
The WBK17 supports a variety of counter modes, programmable on a per-channel basis. There are 4 timebase settings (20 ns, 200 ns, 2 µs, 20 µs) for modes that require a timebase. The WBK17 timing source is a 50 MHz oscillator that is accurate to within 10 ppm (0 to 50 ˚C).

Counter. Totalizing, clear on read, alternate channel gating or decrementing.

Period. Measures x1, 10, 100, or 1000 periods.

Pulsewidth. Measures positive or negative pulsewidth of any input.

Timing. Measures the time between any two edges on any two inputs.

Encoder. Supports quadrature encoders with up to 2 billion ppr, 5 MHz frequencies, and x1, 2, and 4 count modes. With only A (phase) and B (phase) signals, 4 channels are supported; with A (phase), B (phase), and Z (index) signals, 2 channels are supported.

WBK17
General Information

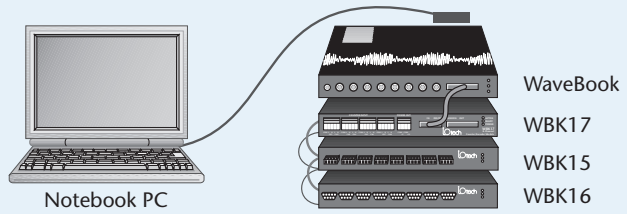
Digital Inputs
The WBK17 has 16 general-purpose digital inputs that can be scanned into an acquisition along with any other channel on the Wavebook.

Digital Outputs
The WBK17 has 8 fully programmable digital outputs. Each output is an open-drain DMOSFET that can sink up to 150 mA and is capable of directly controlling relays.

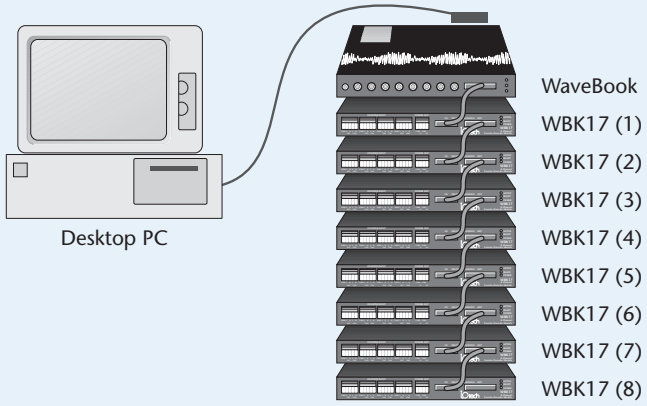
The digital outputs can be updated based on the condition of a related input channel value(s). Up to 16 set points (each with two 16-bit compare values, an 8-bit digital output port byte, an 8-bit mask byte, and a control byte) can be assigned to a channel. When a set point has been programmed (count value, period value, pulsewidth, position, or velocity) the two 16-bit values are compared, in real-time, to the measured value for that channel. When the comparison condition is met, the output port is updated instantaneously. Valid conditions include greater than value, less than value, inside the window, and outside the window. Since each set point has an 8-bit mask byte, any or all of the digital output bits can be updated. With 16 set points per channel, complex updating schemes can be defined to meet the most demanding applications. Additionally, any channel's pattern detection output can be fed back into any channel's input. The pattern detection output can gate a counter, increment a counter, decrement a counter, clear a counter, or latch an output value.

Power Output for Encoders
The WBK17 provides +5V at 1A and +15V at 500 mA output for encoders. This power is provided on a removable screw-terminal block on the front of the module.

Example Systems



With the WaveBook, WBK15, and WBK16, the WBK17 becomes part of a multifunction data acquisition system capable of measuring 8 isolated thermocouples (1500 VDC), 8 strain gage inputs, and 8 high-speed counter inputs.



Up to eight WBK17 modules can be added to the base Wavebook creating a compact system with a maximum of 64 high-speed counter inputs or 32 quadrature encoder inputs

WBK17

Specifications & Ordering Information

MEASUREMENT COMPUTING

Specifications

General

Power Consumption: 520 mA @ 15V input, 310 mA @ 25V input, (assumes no load on power output)
Power Requirements: 10 to 30 VDC or 120/240 VAC with included adapter
Input Power Fuse: 4A Mini ATO, user-replaceable
Power Output (to Quadrature Encoder): 5V ±10% @ 1000 mA and 15V ±10% @ 500 mA
Output Power Connector: Removable screw terminal block
Output Power Fuses: 2A (+5), 1A (+15), mini ATO, user-replaceable
Operating Temperature: 0 to 50 °C
Storage Temperature: 0 to 70 °C
Vibration: MIL STD 810E, category 1
Humidity: 0 to 95% RH, non-condensing
Dimensions: 285 mm W x 220 mm D x 35 mm H (11" x 8.5" x 1.375")
Weight: 1.5 kg (3.1 lbs)

Analog Inputs

Channels: 8 differential
Input Connections: COM, CH high, CH low
Input Connectors: Removable screw-terminal blocks (2 channels per block)
Input Impedance: 20k Ohm SE, 40k Ohm DE
Input Voltage Ranges: -50V to +50V specified, -75V to +75 maximum
Resolution (V/bit): 0.002307
DC Accuracy: 0.25% of reading + 200 mV offset
Noise: 5 mVrms (typical); 10 mVrms (maximum)
Common Mode Rejection: -70 dB typical (0 to 60 Hz); -40 dB guaranteed (0 to 60 Hz)
Coupling: AC or DC, programmable
Analog Sampling Bandwidth: DC to 1 MHz
Filtering: Programmable 30 Hz, 20 kHz, 100 kHz Single pole low pass filter

Comparator

Input Threshold: -12.5V to +12.5V referred to input, programmable in 100 mV steps
Threshold Accuracy: 2% of setting +125 mV offset
Input Hystersis: 50 mV minimum, 100 mV maximum
Input Frequency: DC to 5 MHz
Sensitivity: 500 mVpp DC to 1 MHz; 5 Vpp 1 MHz to 5 MHz

Debounce Module

Debounce Times: 16 selections from 500 ns to 25.5 ms
Positive or negative edge sensitive
Glitch detect mode or debounce mode

Counter Module

Time Base Accuracy: 10 ppm (0 to 50 °C)
Five Programmable Modes: Counter, Period, Pulsewidth, Timing, Encoder
Counter Mode Options: Totalize, Clear on Read, Rollover, Stop at all Fs, 16- or 32-bit, any other channel can gate or decrement the counter
Period Mode Options: Measure x1, 10, 100, or 1000 periods, 16- or 32-bit, 4 different time bases to choose from: 20 ns, 200 ns, 2 µs, 20 µs, any other channel can gate the period measurement
Pulsewidth Mode Options: 16- or 32-bit values, 4 different time bases to choose from: 20 ns, 200 ns, 2 µs, 20 µs, any other channel can gate the pulsewidth measurement
Timing Mode Options: 16- or 32-bit values, 4 different time bases to choose from: 20 ns, 200 ns, 2 µs, 20 µs
Encoder Mode Options: x1, 2, 4 options, 16- or 32-bit values, Z-channel clearing of counter, any other channel can gate the counter

Digital Inputs

8 Digital Inputs
Connector: DB25 female
Configuration: 16 TTL-compatible pins
Input Characteriestics: TTL-compatible
Input/Output Protection: Diode clamped to ground and +5V

Digital Outputs

8 Digital Outputs
Connector: Removable screw-terminal block
Output Type: Open-drain DMOSFET
Output Pullup Resistor: 27k Ohm to +5V
Output Sink Current: 150 mA/output continuous, 500 mA output peak (<100 µs), 150 mA total continuous (per bank of 8 outputs)
Output Voltage Range: 0 to +5V, no external pullup required; 0 to +30V, with external pullup resistor
Output Resistance: 10 Ohms maximum

Note: All digital outputs are fully programmable with masking.

Detection Circuit

Digital Pattern Detection Choices: Greater than value, less than value, inside the window, outside the window.
Detection Set Points Per Channel: 16
Each detection set point can be associated with a digital output port update (with mask.)

Ordering Information

Description	Part No.
8-channel multifunction counter signal conditioning module including AC adapter, digital expansion cable (CA-217), Wavebook expansion/control cable (CA-129), and a BNC expansion/signal cable (CA-128)	WBK17

Accessories & Cables

5-pin male DIN to 5-pin male DIN, 6 in.	CA-115
5-pin male DIN to automobile cigarette lighter power cable, 8 ft.	CA-116
DB25 to external clock BNC	CA-178
CE compliant, 1 male BNC to male BNC, 7 ft.	CA-150-1
CE compliant, 8 male BNC to male BNC, 7 ft.	CA-150-8

Product Compatibility

✔ WaveBook

Note: The WBK17 is not compatible with the WaveBook/512, but is compatible with the WaveBook/512A.

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