

Measurement of Wind Speed and Direction

Spring 2013

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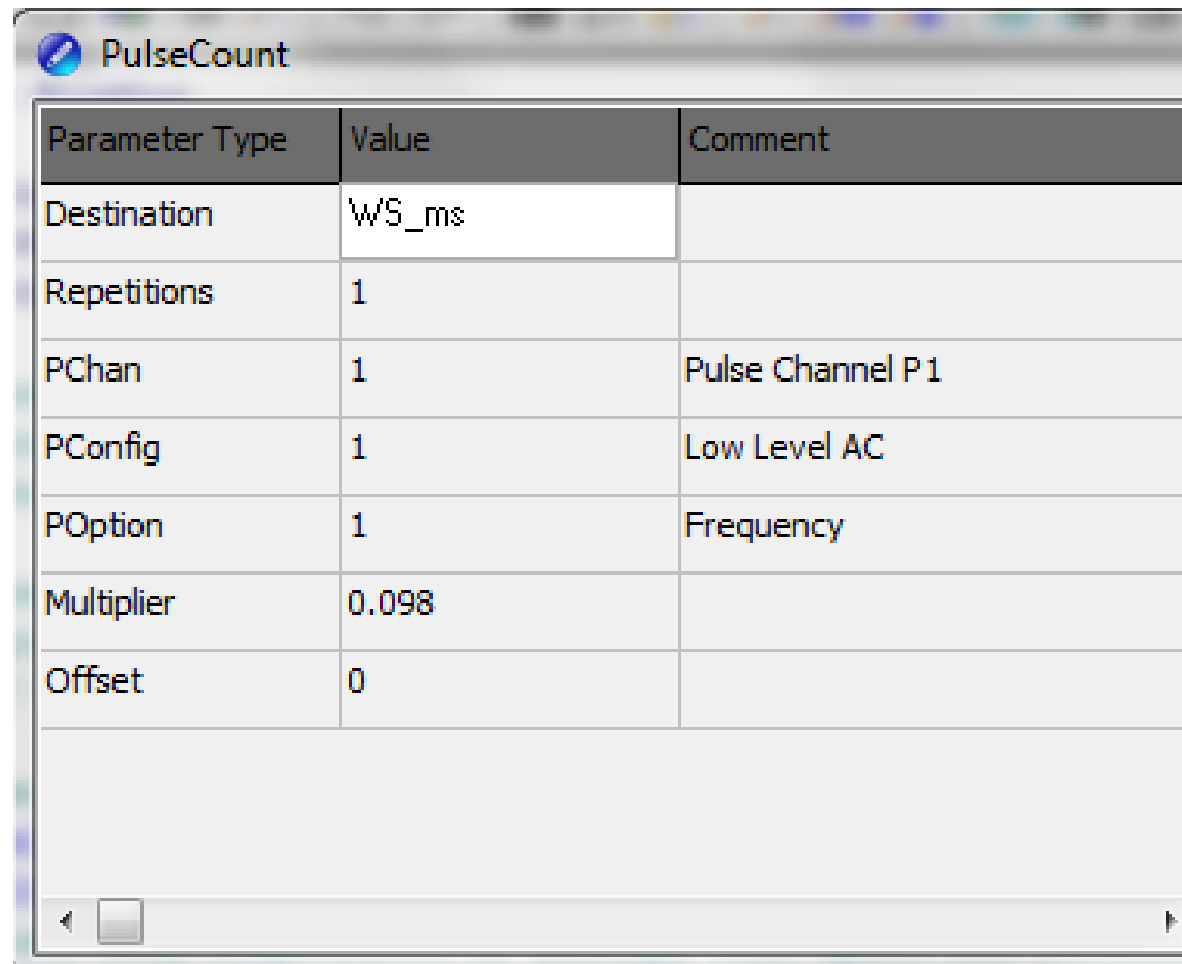
		<u>05103, 05103-45, and 05106</u>	<u>05305</u>	
		Resolution:	(0.2192 mph)/ (scan rate in seconds) or (0.0980 m s ⁻¹)/ (scan rate in seconds)	(0.2290 mph)/ (scan rate in seconds) or (0.1024 m s ⁻¹)/ (scan rate in seconds)
		Output:	ac voltage (3 pulses per revolution). 1800 rpm (90 Hz) = 19.7 mph (8.8 m s ⁻¹)	ac voltage (3 pulses per revolution) 1800 rpm (90 Hz) = 20.6 mph (9.2 m s ⁻¹)
		<u>05103, 05103-45, and 05106</u>		
Wind Speed		Wind Direction		
Range:	0-224 mph (0-100 m s ⁻¹)	Range:	0-360° mechanical, 355° electrical (5° open)	Same
Accuracy:	±0.6 mph (±0.3 m s ⁻¹ of reading)	Accuracy:	±3° (05103, 05106) ±5° (05103-45)	±3°
Starting threshold:	2.2 mph (1.0 m s ⁻¹) 0 2.4 mph (1.1 m s ⁻¹) 0	Starting threshold at 10° displacement:	2.4 mph (1.1 m s ⁻¹)	1.0 mph (0.5 m s ⁻¹)
Distance constant (63% recovery):	8.9 ft (2.7 m)	Delay distance (50% recovery):	4.3 ft (1.3 m)	3.9 ft (1.2 m)
		Damping ratio:	0.3	0.45
		Damped natural wavelength:	24.3 ft (7.4 m)	16.1 ft (4.9 m)
		Undamped natural wavelength:	23.6 ft (7.2 m)	14.4 ft (4.4 m)
		Output:	Analog dc voltage from potentiometer – resistance 10 kΩ, linearity 0.25%, life expectancy 50 million revolutions.	Same
		Power	Switched excitation voltage supplied by the datalogger.	Same
		Physical Operating Temperature	-50° to +50°C, assuming non-riming conditions	-50° to +50°C, assuming non-riming conditions

Dr

Wind Speed Measurement

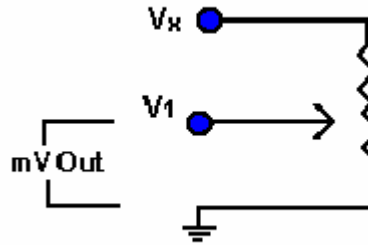
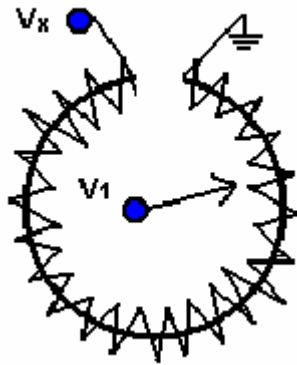
- Pulse output
 - Output may be a switch closure, oscillating AC voltage, or square wave.
- Expression for wind speed (U) is:
 - $U = mx + b$
 - m is the _____, b is the _____.
 - x is the number of pulse per second.
 - For output in m/s, $m = 0.0980$.
 - Calibration passes through zero, so $b = 0$.

PulseCount instruction in CRBasic

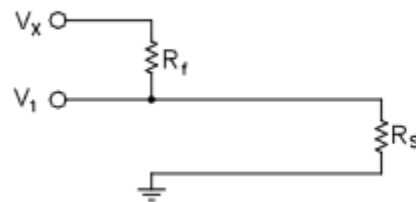


Parameter Type	Value	Comment
Destination	WS_ms	
Repetitions	1	
PChan	1	Pulse Channel P1
PConfig	1	Low Level AC
POption	1	Frequency
Multiplier	0.098	
Offset	0	

Wind Direction Measurement Potentiometer



BrHalf



$X = \text{result w/mult} = 1, \text{ offset} = 0$

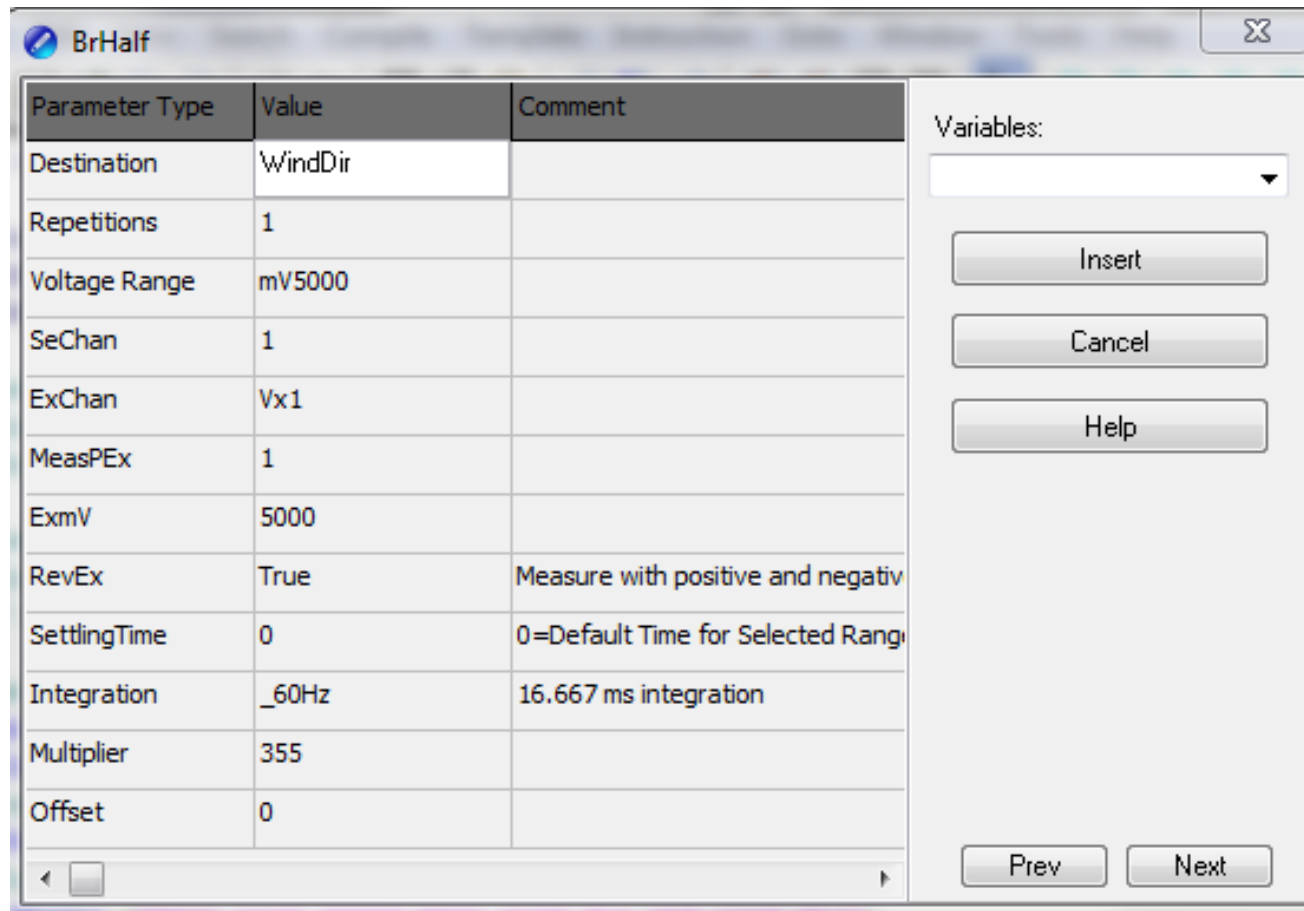
$$X = \frac{V_1}{V_x} = \frac{R_s}{R_s + R_f}$$

Result units: mV/mV

$$R_s = R_f \frac{X}{1 - X}$$

$$R_f = \frac{R_s(1 - X)}{X}$$

BrHalf instruction in CRBasic



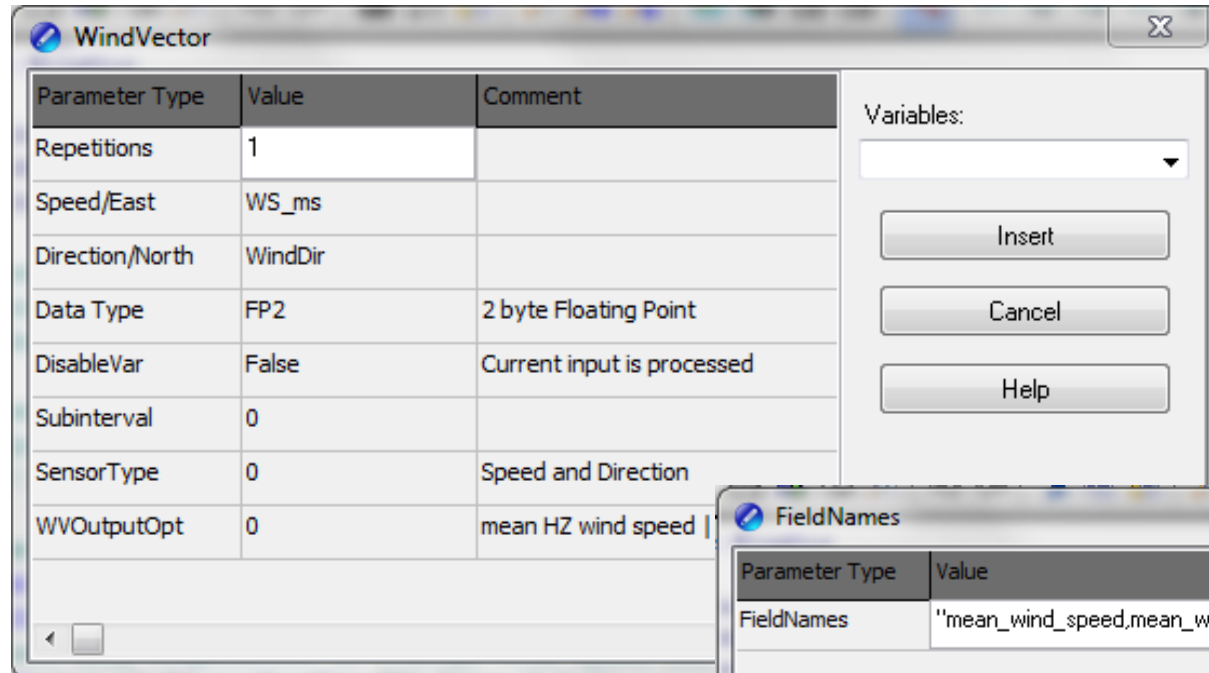
The screenshot shows the 'BrHalf' configuration dialog box. It features a table with columns for 'Parameter Type', 'Value', and 'Comment'. The table contains the following data:

Parameter Type	Value	Comment
Destination	WindDir	
Repetitions	1	
Voltage Range	mV5000	
SeChan	1	
ExChan	Vx1	
MeasPEx	1	
ExmV	5000	
RevEx	True	Measure with positive and negative
SettlingTime	0	0=Default Time for Selected Range
Integration	_60Hz	16.667 ms integration
Multiplier	355	
Offset	0	

Below the table is a scroll bar. To the right of the table is a 'Variables:' section with a dropdown menu and three buttons: 'Insert', 'Cancel', and 'Help'. At the bottom right are 'Prev' and 'Next' buttons.

Averaging Wind Speed and Direction

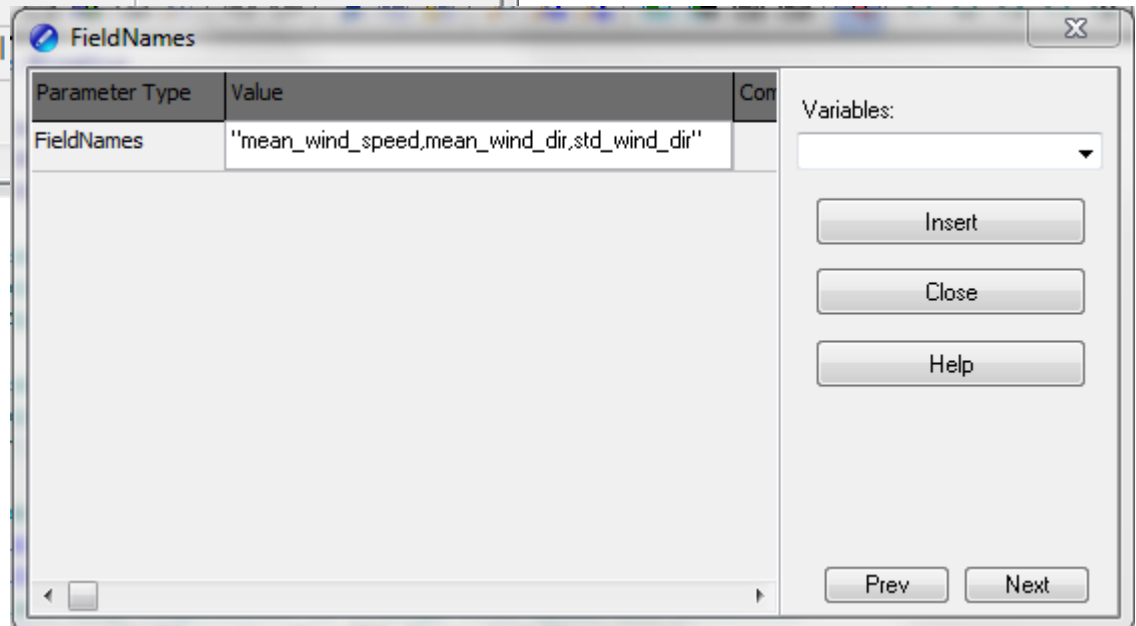
WindVector and FieldName instructions



The WindVector dialog box contains a table with the following data:

Parameter Type	Value	Comment
Repetitions	1	
Speed/East	WS_ms	
Direction/North	WindDir	
Data Type	FP2	2 byte Floating Point
DisableVar	False	Current input is processed
Subinterval	0	
SensorType	0	Speed and Direction
WVOutputOpt	0	mean HZ wind speed

On the right side of the dialog, there is a 'Variables:' dropdown menu and three buttons: 'Insert', 'Cancel', and 'Help'.



The FieldNames dialog box contains a table with the following data:

Parameter Type	Value	Comment
FieldNames	"mean_wind_speed,mean_wind_dir,std_wind_dir"	

On the right side of the dialog, there is a 'Variables:' dropdown menu and three buttons: 'Insert', 'Close', and 'Help'. At the bottom right, there are two additional buttons: 'Prev' and 'Next'.