Measurement of Wind Speed and Direction

Spring 2013

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	05103, 05103-45, an 05106
Wind Speed	
Range:	0-224 mph (0-100 m
Accuracy:	±0.6 mph (±0.3 m s^{-1} of reading
Starting threshold:	2.2 mph (1.0 m s^{-1}) 0 2.4 mph (1.1 m s^{-1}) 0
Distance constant (63% recovery):	8.9 ft (2.7 m)

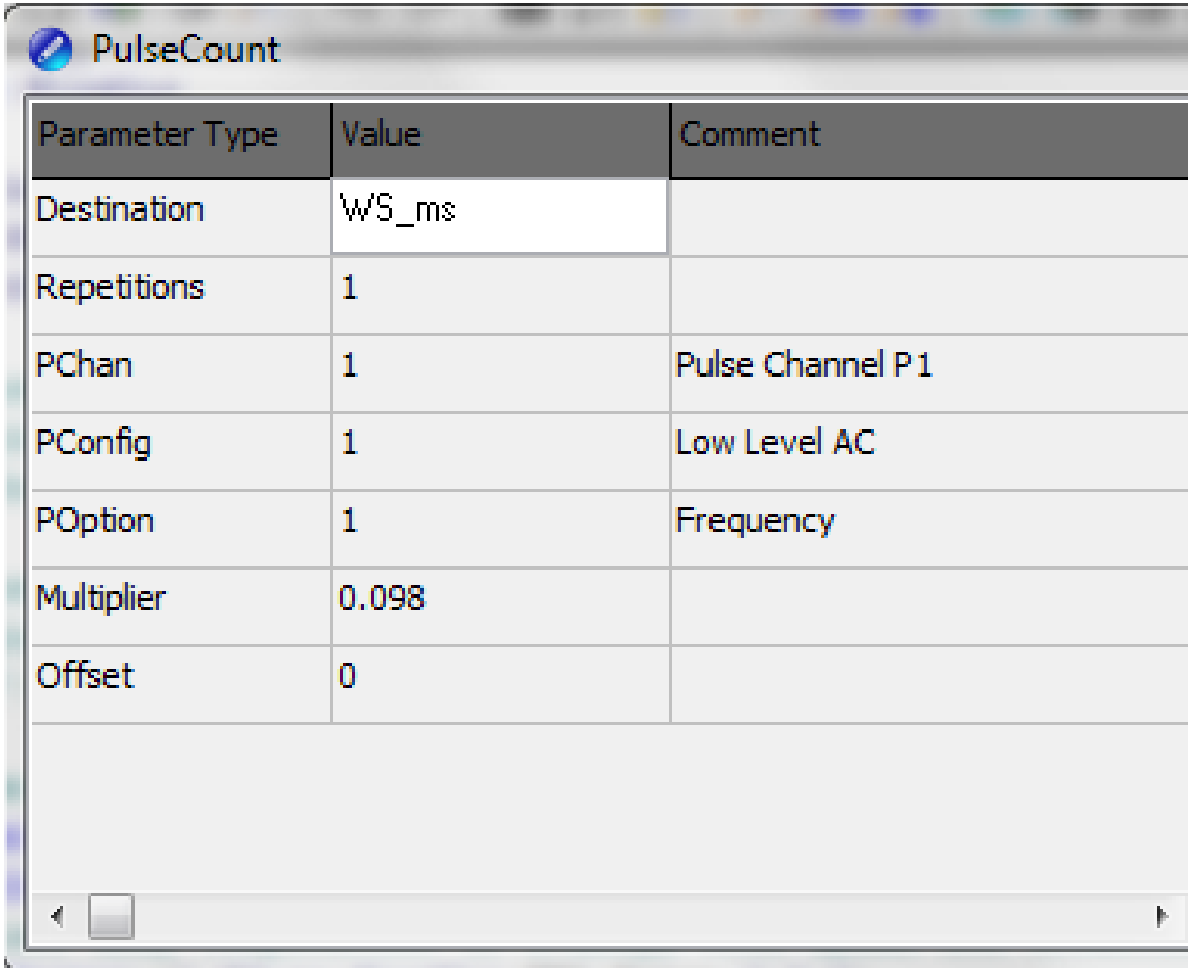
	05103, 05103-45, and 05106	05305
Resolution:	(0.2192 mph)/ (scan rate in seconds) or (0.0980 m s^{-1})/ (scan rate in seconds)	(0.2290 mph)/ (scan rate in seconds) or (0.1024 m s^{-1})/ (scan rate in seconds)
Output:	ac voltage (3 pulses per revolution). 1800 rpm (90 Hz) = 19.7 mph (8.8 m s^{-1})	ac voltage (3 pulses per revolution) 1800 rpm (90 Hz) = 20.6 mph (9.2 m s^{-1})
Wind Direction		
Range:	0-360° mechanical, 355° electrical (5° open)	Same
Accuracy:	±3° (05103, 05106) ±5° (05103-45)	±3°
Starting threshold at 10° displacement:	2.4 mph (1.1 m s^{-1})	1.0 mph (0.5 m s^{-1})
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

Wind Speed Measurement

- Pulse output
  - Output may be a switch closure, oscillating AC voltage, or square wave.

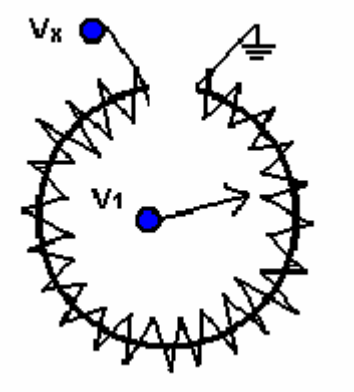
- Expression for wind speed (U) is:
  - $U = mx + b$
  - m is the _____, b is the _____.
  - x is the number of pulse per second.
  - For output in m/s, m = 0.0980.
  - Calibration passes through zero, so b = 0.

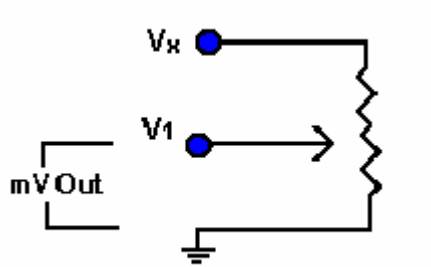
PulseCount instruction in CRBasic



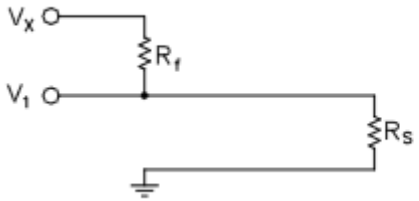
Wind Direction Measurement

Potentiometer





BrHalf



X = result w/mult = 1, offset = 0

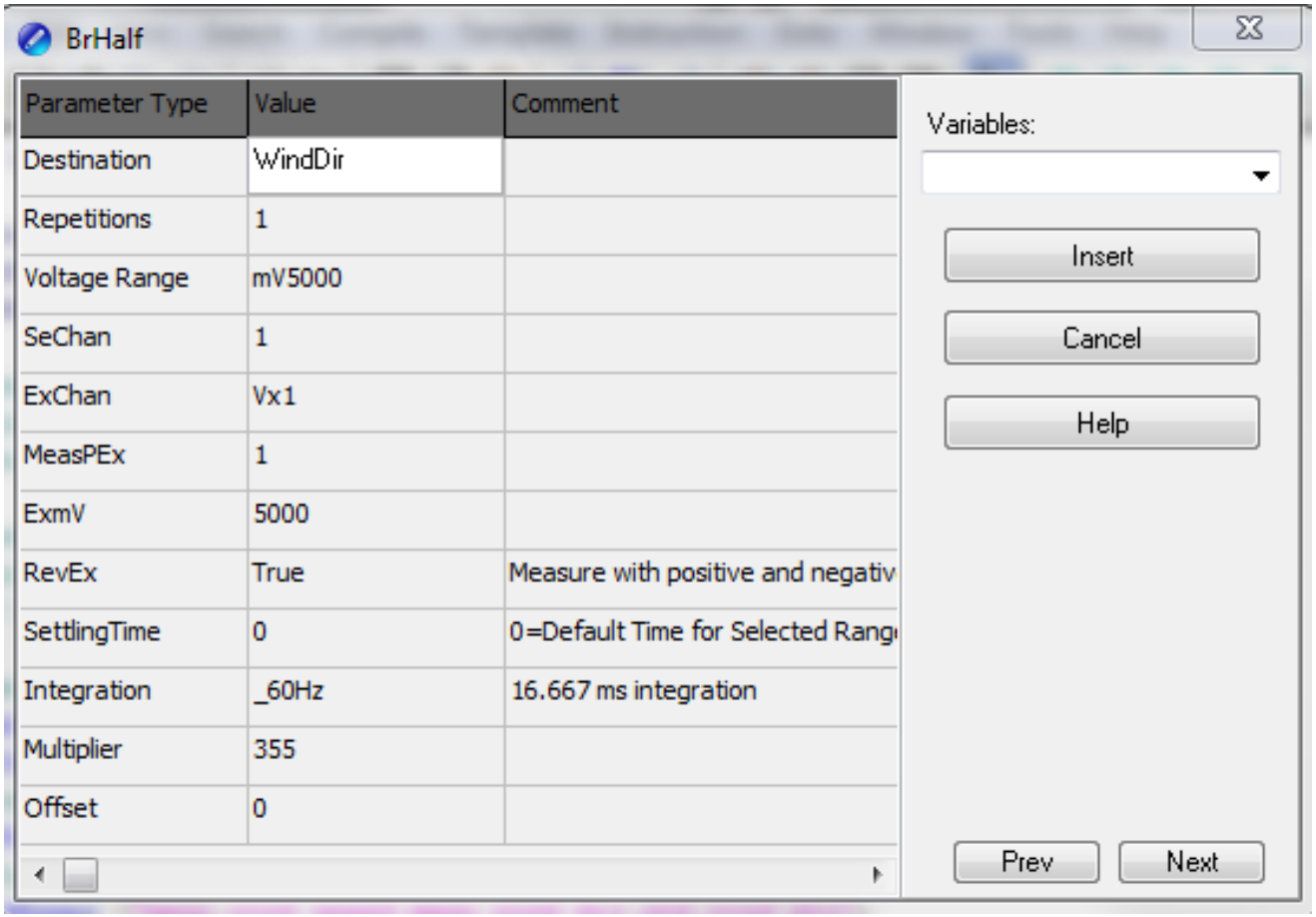
$$X = \frac{V_1}{V_X} = \frac{R_S}{R_S + R_f}$$

Result units: mV/mV

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

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

BrHalf instruction in CRBasic



Averaging Wind Speed and Direction

WindVector and FieldName instructions