METEOROLOGICAL INSTRUMENTS

INSTRUCTIONS

WIND MONITOR-AQ

MODEL 05305V

WITH VOLTAGE OUTPUTS

CE

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P/N: 05305V-90
REV: I111215

MODEL 05305V
WIND MONITOR - AQ
with VOLTAGE OUTPUTS

WIND SPEED SPECIFICATION SUMMARY

Range	0 to 50 m/s (112 mph)
Sensor	20 cm diameter 4-blade helicoid carbon fiber thermoplastic propeller, 30.7 cm air passage per revolution
Distance Constant	2.1 m (6.9 ft.) for 63% recovery
Threshold Sensitivity	0.4 m/s (0.9 mph)
Transducer	Centrally mounted stationary coil, 2K ohm nominal DC resistance
Output Signal	50 mV per M/S

WIND DIRECTION (AZIMUTH) SPECIFICATION SUMMARY

Range	360° mechanical, 355° electrical (5° open)
Sensor	Balanced vane, 48.3 cm (19 in) turning radius.
Damping Ratio	0.45
Delay Distance	1.2 m (3.9 ft) for 50% recovery
Threshold Sensitivity	0.5 m/s (1.0 mph) at 10° displacement
Damped Natural Wavelength	4.9 m (16.1 ft)
Undamped Natural Wavelength	4.4 m (14.4 ft)
Transducer	Precision conductive plastic potentiometer, 10K ohm resistance (±20%), 0.25% linearity, life expectancy 50 million revolutions, rated 1 watt at 40°C, 0 watts at 125°C
Output Signal	13.9 mV per degree

GENERAL

Power Requirement:	8 - 24 VDC (5mA @ 12 VDC)
Operating temperature:	-50 to 50°C (-58 to 122°F)

INTRODUCTION

The Wind Monitor measures horizontal wind speed and direction. It is rugged and corrosion resistant, yet accurate and lightweight. The housing, nose cone, propeller, and other components are injection molded U.V. stabilized plastic. Both the propeller and vertical shafts use stainless steel precision grade ball bearings.

Propeller rotation produces an AC sine wave signal with frequency proportional to wind speed. Internal circuitry converts the raw signal to a linear voltage output.

Vane position is sensed by a 10K ohm precision conductive plastic potentiometer. This signal is also converted to voltage output.

The instrument mounts directly on standard one inch pipe, outside diameter 34 mm (1.34"). An orientation ring is provided so the instrument can be removed for maintenance and re-installed without loss of wind direction reference. Both the sensor and the orientation ring are secured to the mounting pipe by stainless steel band clamps. Electrical connections are made in a junction box at the base.

INITIAL CHECKOUT

When the Wind Monitor is unpacked it should be checked carefully for any signs of shipping damage.

Remove the plastic nut on the propeller shaft. Install the propeller on the shaft with the serial number of the propeller facing forward (into the wind). The instrument is aligned, balanced and fully calibrated before shipment; however, it should be checked both mechanically and electrically before installation. The vane and propeller should easily rotate 360° without friction. Check vane balance by holding the instrument base so the vane surface is horizontal. It should have near neutral torque without any particular tendency to rotate. A slight imbalance will not degrade performance.

INSTALLATION

Proper placement of the instrument is very important. Eddies from trees, buildings, or other structures can greatly influence wind speed and wind direction observations. To get meaningful data for most applications, locate the instrument well above or upwind from obstructions. As a general rule, the air flow around a structure is disturbed to twice the height of the structure upwind, six times the height downwind, and up to twice the height of the structure above ground. For some applications it may not be practical or necessary to meet these requirements.

FAILURE TO PROPERLY GROUND THE WIND MONITOR MAY RESULT IN ERRONEOUS SIGNALS OR TRANSDUCER DAMAGE.

Grounding the Wind Monitor is vitally important. Without proper grounding, static electrical charge can build up during certain atmospheric conditions and discharge through the transducers. This discharge may cause erroneous signals or transducer failure. To direct the discharge away from the transducers, the mounting post assembly in which the transducers are mounted is made with a special anti-static plastic. It is important that the mounting post be connected to a good earth ground. There are two ways this may be accomplished. First, the Wind Monitor may be mounted on a metal pipe which is connected to earth ground. The mounting pipe should not be painted where the Wind Monitor is mounted. Towers or masts set in concrete should be connected to one or more grounding rods. If it is difficult to ground the mounting post in this manner, the following method should be used. Inside the junction box the terminal labeled EARTH GND is internally connected to the anti-static mounting post. This terminal should be connected to an earth ground (Refer to wiring diagram). Initial installation is most easily done with two people; one to adjust the instrument position and the other to observe the indicating device. After initial installation, the instrument can be removed

and returned to its mounting without realigning the vane since the orientation ring preserves the wind direction reference. Install the Wind Monitor following these steps:

1. MOUNT WIND MONITOR
   a) Place orientation ring on mounting post. Do Not tighten band clamp yet.
   b) Place Wind Monitor on mounting post. Do Not tighten band clamp yet.
2. CONNECT SENSOR CABLE
   a) Slide junction box cover up.
   b) Route cable thru strain relief opening at bottom of junction box. Secure cable by tightening packing nut.
   c) Connect sensor cable to terminals. See wiring diagram.
   d) Slide junction box cover down.
3. ALIGN VANE
   a) Connect instrument to an indicator.
   d b) Choose a known wind direction reference point on the horizon.
   c) Sighting down instrument centerline, point nose cone at reference point on horizon.
   d) While holding vane in position, slowly turn base until indicator shows proper value.

CALIBRATION FORMULAS

Model 05305V Wind Monitor w / 08254 Propeller

WIND SPEED vs PROPELLER RPM		
m/s	=	0.00512 x rpm
knots	=	0.00995 x rpm
mph	=	0.01145 x rpm
km/h	=	0.01843 x rpm

WIND SPEED vs 0-5 VDC OUTPUT		
m/s	=	mV x 0.0200
knots	=	mV x 0.0389
mph	=	mV x 0.0447
km/h	=	mV x 0.0720

WIND DIRECTION vs 0-5 VDC OUTPUT		
DEGREES	=	mV x 0.072

MAINTENANCE

Given proper care, the Wind Monitor should provide years of service. The only components likely to need replacement due to normal wear are the precision ball bearings and the wind direction potentiometer. Only a qualified instrument technician should perform the replacement. If service facilities are not available, return the instrument to the company. Refer to the drawings to become familiar with part names and locations. The asterisk * which appears in the following outlines is a reminder that maximum torque on all set screws is 80 oz-in.

POTENTIOMETER REPLACEMENT

The potentiometer has a life expectancy of fifty million revolutions. As it becomes worn, the element may begin to produce noisy signals or become nonlinear. When signal noise or non-linearity becomes unacceptable, replace the potentiometer. Refer to exploded view drawing and proceed as follows:

1. REMOVE MAIN HOUSING
   a) Unscrew nose cone from main housing. Set o-ring aside for later use.
   b) Gently push main housing latch.
   c) While pushing latch, lift main housing up and remove it from vertical shaft bearing rotor.
2. UNSOLDER TRANSDUCER WIRE
   a) Remove junction box cover, exposing circuit board.
   b) Remove screws holding circuit board.
   c) Unsolder three potentiometer wires (white, green, black), two wind speed coil wires (red, black) and earth ground wire (red) from board.
3. REMOVE POTENTIOMETER
   a) Loosen set screw on potentiometer coupling and remove it from potentiometer adjust thumbwheel.
   b) Loosen set screw on potentiometer adjust thumbwheel and remove it from potentiometer shaft.
   c) Loosen two set screws at base of transducer assembly and remove assembly from vertical shaft.
   d) Unscrew potentiometer housing from potentiometer mounting & coil assembly.
   e) Push potentiometer out of potentiometer mounting & coil assembly by applying firm but gentle pressure on potentiometer shaft. Make sure that the shaft o-ring comes out with the potentiometer. If not, then gently push it out from the top of the coil assembly.

EMC COMPLIANCE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

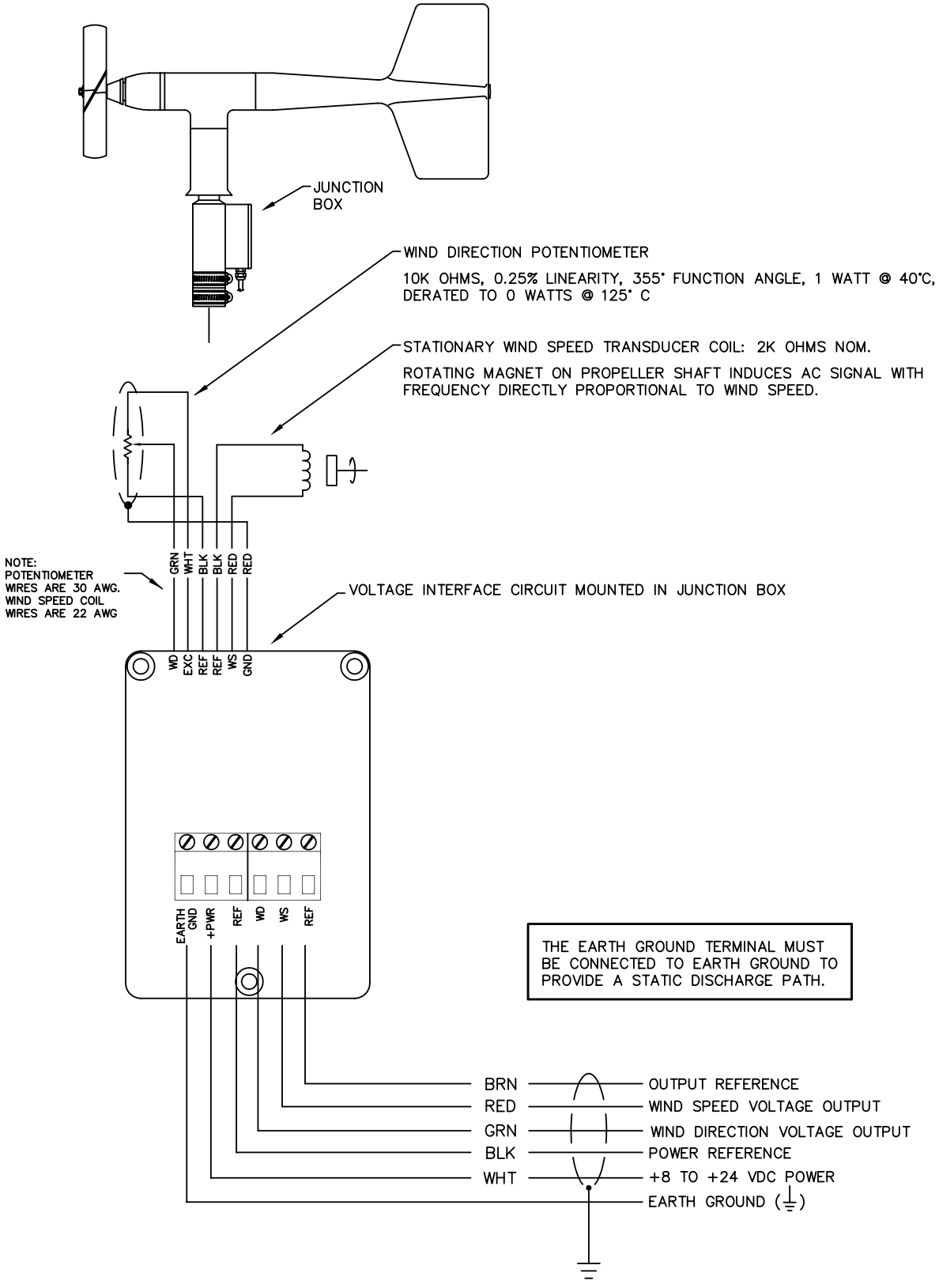
This ISM device complies with Canadian ICES-001.
Cet appareil ISM est conforme à Ia norme NMB-001 du Canada.
EN55011/CISPR 11, Group 1, Class B device.

Class B equipment is suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Note:

CABLE & WIRING DIAGRAM

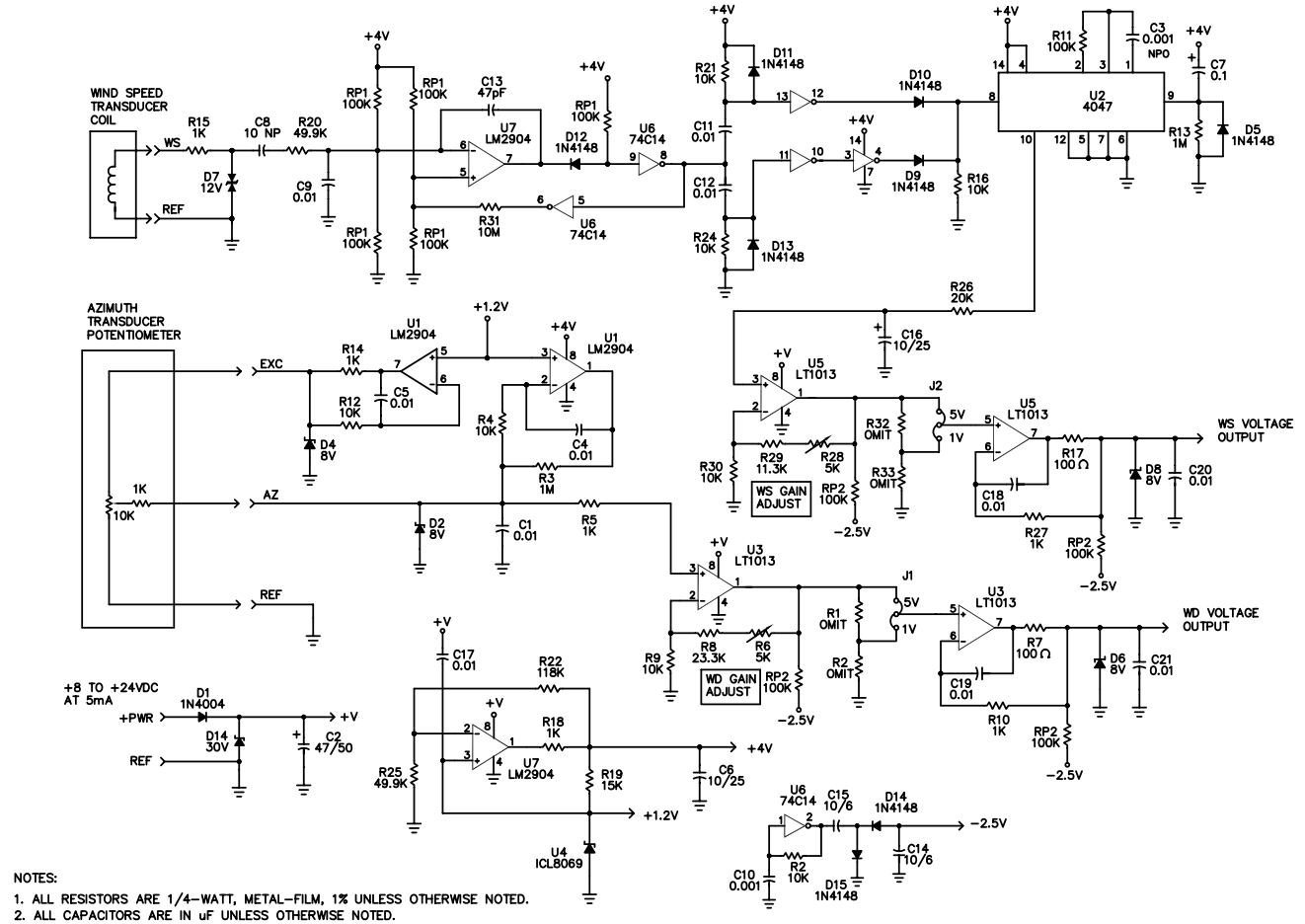
MODEL 05305V WIND MONITOR-AQ

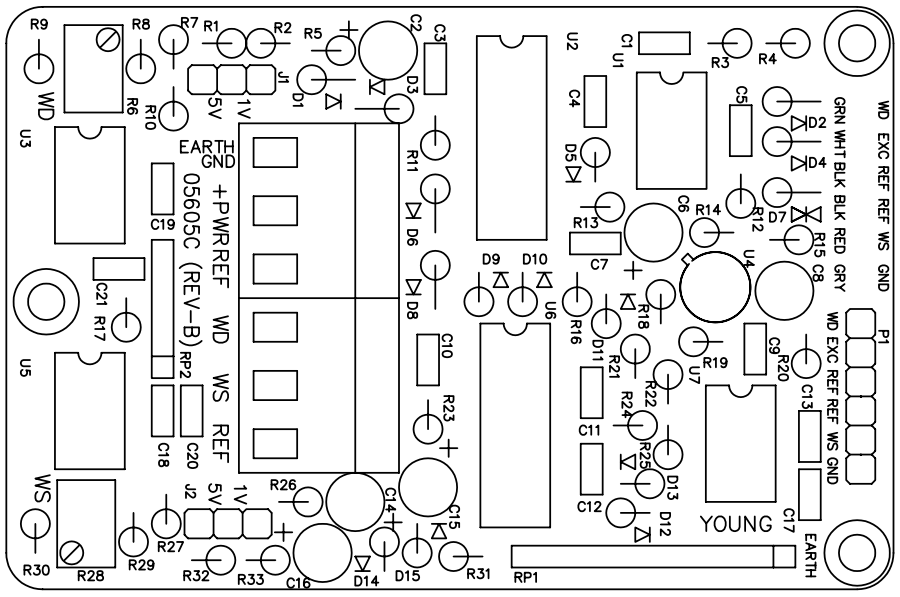


05305V-90(I)

CIRCUIT DIAGRAM

MODEL 05305V WIND MONITOR-AQ





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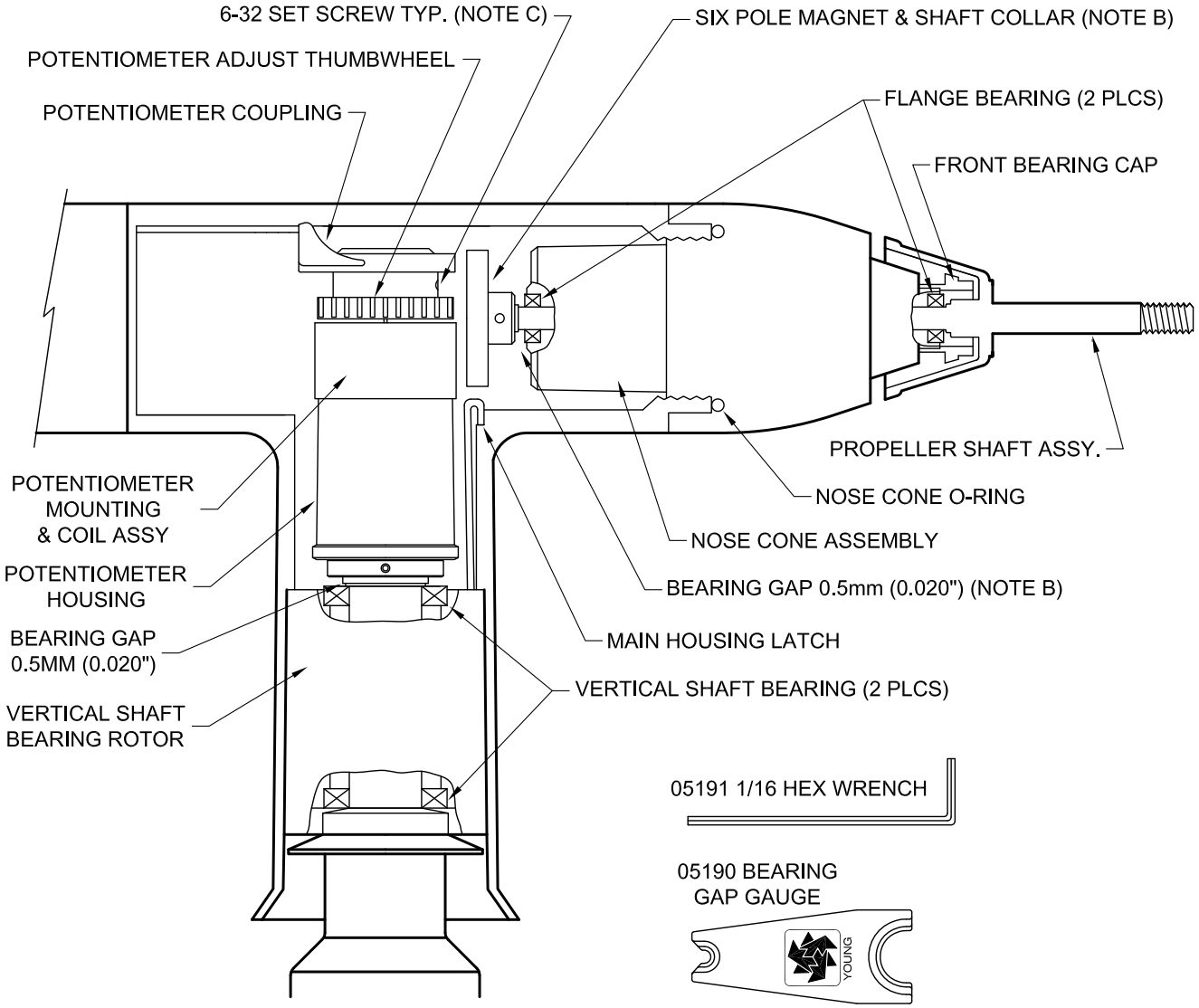
BEARING REPLACEMENT & POTENTIOMETER ADJUSTMENT

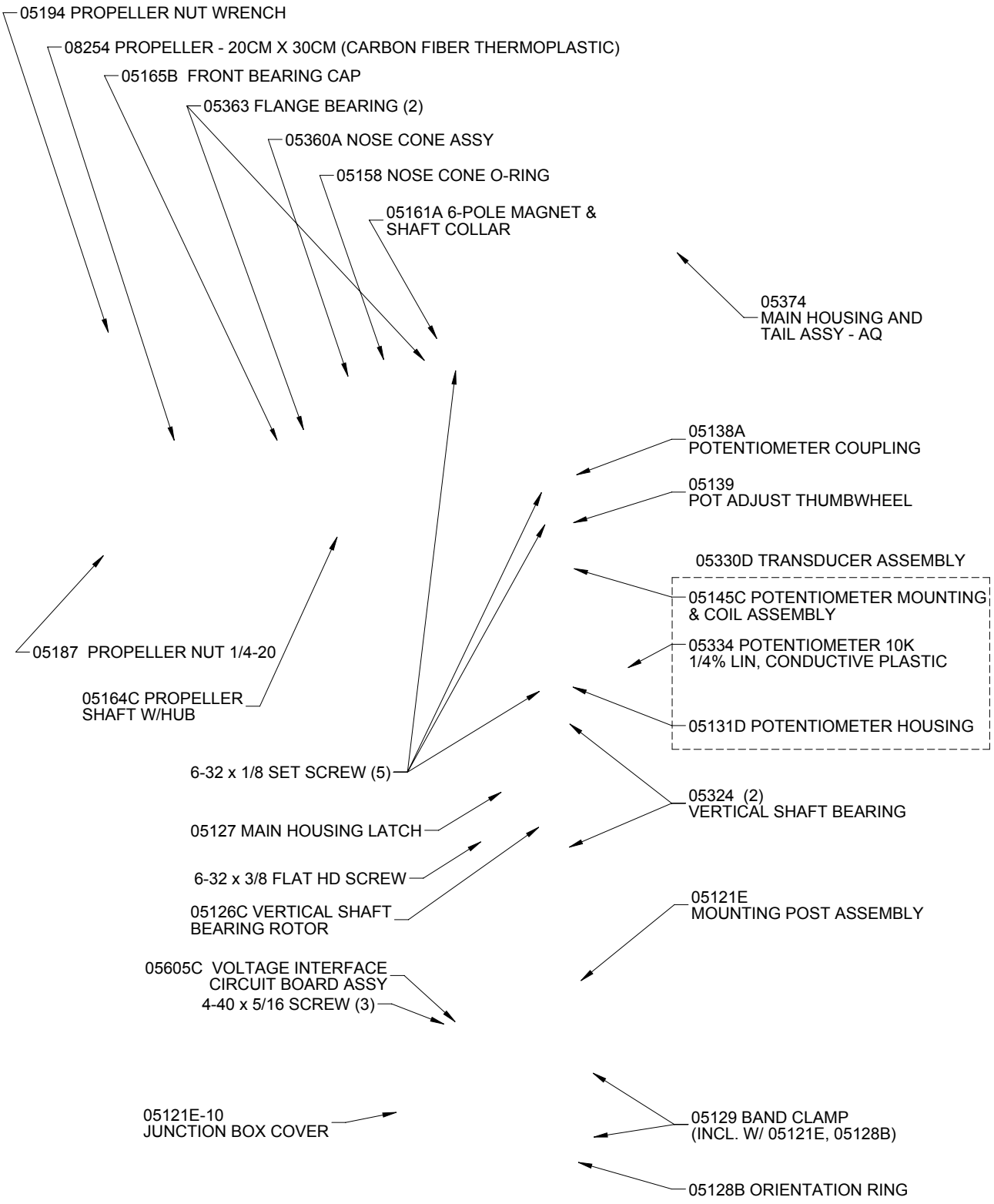


NOTES:

A. TO REMOVE HOUSING - UNTHREAD NOSE CONE ASSEMBLY, PUSH MAIN HOUSING LATCH, LIFT UPWARD.

B. TO REPLACE ANEMOMETER FLANGE BEARINGS - UNTHREAD NOSE CONE, REMOVE SIX POLE MAGNET, SLIDE PROPELLER SHAFT AND HUB ASSEMBLY FOREWARD, REMOVE FLANGE BEARINGS. AFTER BEARING REPLACEMENT, SET BEARING GAP TO 0.5mm (0.020")

C. TO ADJUST POTENTIOMETER OUTPUT SIGNAL - REMOVE NOSE CONE, LOOSEN SET SCREW IN POTENTIOMETER COUPLING, ADJUST OUTPUT SIGNAL BY MEANS OF POTENTIOMETER ADJUSTMENT THUMBWHEEL, RE-TIGHTEN SET SCREW.


05194 PROPELLER NUT WRENCH
08254 PROPELLER - 20CM X 30CM (CARBON FIBER THERMOPLASTIC)
05165B FRONT BEARING CAP
05363 FLANGE BEARING (2)
05360A NOSE CONE ASSY
05158 NOSE CONE O-RING
05161A 6-POLE MAGNET & SHAFT COLLAR
05374 MAIN HOUSING AND TAIL ASSY - AQ
05138A POTENTIOMETER COUPLING
05139 POT ADJUST THUMBWHEEL
05330D TRANSDUCER ASSEMBLY
05145C POTENTIOMETER MOUNTING & COIL ASSEMBLY
05334 POTENTIOMETER 10K 1/4% LIN, CONDUCTIVE PLASTIC
05131D POTENTIOMETER HOUSING
05187 PROPELLER NUT 1/4-20
05164C PROPELLER SHAFT W/HUB
6-32 x 1/8 SET SCREW (5)
05324 (2) VERTICAL SHAFT BEARING
05127 MAIN HOUSING LATCH
6-32 x 3/8 FLAT HD SCREW
05126C VERTICAL SHAFT BEARING ROTOR
05121E MOUNTING POST ASSEMBLY
05605C VOLTAGE INTERFACE CIRCUIT BOARD ASSY
4-40 x 5/16 SCREW (3)
05121E-10 JUNCTION BOX COVER
05129 BAND CLAMP (INCL. W/ 05121E, 05128B)
05128B ORIENTATION RING

Calibration Accessories

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Model 18802 Anemometer Drive provides a convenient and accurate way to rotate an anemometer shaft at a known rate. The motor may be set to rotate clockwise or counter-clockwise at any rate between 200 and 15,000 RPM in 100 RPM increments. The LCD display is referenced to an accurate and stable quartz timebase. For completely portable operation, the unit can be operated on internal batteries. For extended operation, an AC wall adapter is included.

Model 18811 Anemometer Drive is identical to Model 18802 except the drive motor incorporates a gear reducer for operation in the range of 20 to 990 RPM in 10 RPM increments. The lower range is recommended for cup anemometer calibration.

Model 18112 Vane Angle Bench Stand is used for benchtop wind direction calibration of the Wind Monitor family of sensors. The mounting post engages the direction orientation notch on the Wind Monitor. An easy to read pointer indicates 0 to 360 degrees with $^1/_2$ degree resolution.

Model 18212 Vane Angle Fixture - Tower Mount similar to the Model 18112, the tower mount feature allows use on the tower as well as the bench top. The fixture is temporarily placed on the tower between the Wind Monitor and its tower mounting. Index keys and notches are engaged to preserve direction reference.

Model 18310 Propeller Torque Disc checks anemometer bearing torque with 0.1 gm/cm resolution. The disc temporarily replaces the propeller for torque measurement or simple yet accurate pass/fail checks. Charts included with the unit relate torque to propeller threshold with limits for acceptable bearing performance.

Model 18312 Cup-Wheel Torque Disc checks cup anemometer bearing torque.

Model 18331 Vane Torque Gauge checks vane bearing torque of the Wind Monitor family sensors. Slip the fixture over the main housing and make simple yet accurate vane torque measurements. Charts relating vane torque to vane threshold provide limits for acceptable bearing performance.

Model 18301 Vane Alignment Rod helps align the vane of a wind sensor to a known direction reference during installation. The base of the device has an index key that engages the direction orientation notch in the sensor allowing the sensor to be removed without losing wind direction reference.

Ordering Information

	MODEL
ANEMOMETER DRIVE *200 to 15,000 RPM*	**18802**
ANEMOMETER DRIVE *20 TO 990 RPM*	**18811**
230V / 50-60 HZ INPUT POWER	***ADD SUFFIX "H"***
VANE ANGLE BENCH STAND	**18112**
VANE ANGLE FIXTURE - TOWER MOUNT	**18212**
PROPELLER TORQUE DISC	**18310**
CUP-WHEEL TORQUE DISC	**18312**
VANE TORQUE GAUGE	**18331**
VANE ALIGNMENT ROD	**18301**

Specifications

MODEL 18802 **ANEMOMETER DRIVE** **(Replaces 18801)**

Range:
200 to 15,000 RPM in 100 RPM increments

Rotation:
Clockwise or Counter-Clockwise

Display Resolution:
1 RPM

Quartz Timebase Reference:
0.1 RPM

Power Requirement:
2 x 9 V (alkaline or lithium) batteries
115 VAC wall adapter included
(230 VAC – add suffix H)

MODEL 18811 **ANEMOMETER DRIVE** **(Replaces 18810)**

Range:
20 to 990 RPM in 10 RPM increments

Display Resolution:
0.1 RPM

MODEL 18112, 18212 **VANE ANGLE CALIBRATION DEVICES**

Range:
0 to 360 degrees

Resolution:
0.5 degree

MODEL 18310, 18312 **TORQUE DISC DEVICES**

Range:
0 to 5.4 gm-cm

Resolution:
0.1 gm-cm

MODEL 18331 **VANE TORQUE GAUGE**

Range:
0 to 50 gm-cm

Resolution:
5 gm-cm

Specifications subject to change without notice.

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