METEOROLOGICAL INSTRUMENTS

INSTRUCTIONS

SERIAL INTERFACE
MODEL 32400-21

CE

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P/N: 32400-21-90
REV: C061421

MODEL 32400-21
SERIAL INTERFACE

SERIAL INTERFACE SPECIFICATION SUMMARY*

Wind Speed Input:
- Sensor Type: AC Frequency Generator
- Sensitivity: 50mV p-p at 10Hz
- Range: 0-2000 Hz

Wind Direction Input:
- Sensor Type: Potentiometer
- Range: 0-5000mV = 0 to 355 degrees
- Excitation: 5000mV (limited to 5 mA)

Voltage Inputs (Auxiliary Sensor Inputs):
- Resolution: 12-bit
- VIN1 and VIN2 0-1000mV
- VIN3 and VIN4 0-5000mV

Voltage Outputs:
- OUT1 0-5000mV 0-100 m/s wind speed
- OUT2 0-5000mV 0-360° wind direction

Serial Output: Full duplex RS-232, Half duplex RS-485 (2 mS turnaround), Baud: 1200, 4800, 9600, 19.2K, & 38.4K, 8 data, 1 stop, no parity

Operating Temp: -50°C to 50°C

Power: 11 to 30 VDC, 40 mA

Mounting: Stainless steel U-bolt mounting clamp fits vertical pipe 25-50 mm (Ø1-2 in) (1 inch IPS (Ø1.34 inch actual)

Size: 7.50" (19.0cm) H
3.00" (7.6cm) W
3.00" (7.6cm) D

*Specifications subject to change

1.0 INTRODUCTION

The Model 32400-21 SERIAL INTERFACE measures wind speed and direction signals from YOUNG sensors and signals from four general purpose voltage inputs. The voltage inputs may be used with YOUNG temperature, humidity, barometric pressure, precipitation, or other sensors. One of the voltage inputs may also be used with a tipping bucket precipitation gauge. These input signals are converted into scaled values and placed in a serial string, which is output at up to 15 hertz.

The serial output is available in several serial data formats in either full duplex RS-232 or half-duplex RS-485 signals. Both continuous and polled serial outputs are available. When polled, up to 16 units can be networked together. For marine applications the 32400-21 produces a NMEA serial output sentences. Calibrated voltage outputs for wind speed and direction are also provided when the 32400-21 is connected to a YOUNG wind sensor.

2.0 INSTALLATION

The 32400-21 is supplied in a weather-resistant enclosure that mounts with a stainless steel U-bolt that will fit a 25 to 50 mm (1-2 in.) diameter vertical pipe. Refer to the WIRING DIAGRAM for electrical connection details and jumper settings.

3.0 OPERATION

Operation begins automatically when power is applied. Jumper settings configure the 32400-21 for common output formats as well as output type. Input signal connections are dependent upon the serial output format.

3.1 JUMPER CONFIGURATIONS

W1 JUMPERS A, B, and C, determine serial output format. Jumper configurations and associated output format are listed below: 1 signifies that jumper is installed, 0 signifies that jumper is omitted. See the SERIAL FORMAT DIAGRAM for more details.

A	B	C	SERIAL OUTPUT FORMAT (Baud Rate, Output Rate)
0	0	0	ASCII Ouput (9600, 2Hz)
0	0	1	Polled ASCII (9600)
0	1	0	NMEA1 (4800, 2 Hz)
0	1	1	NMEA2 (4800, 2 Hz)
1	0	0	RMYT (9600, 15 Hz)
1	0	1	PRECIP (9600, 15 Hz)
1	1	0	PRECIP POLLED (9600)
1	1	1	SOFTWARE Mode (set by user, see section 4.2)

ASCII and POLLED ASCII are general purpose outputs that may be used with the YOUNG 26800 or devices that can communicate serially.

NMEA1 and NMEA2 outputs are generally for marine applications. NMEA1 produces a "$WIMVW" string containing speed and direction values.NMEA2 produces both a "$WIMVW" and "$WIMDA" string, the latter containing temperature, humidity and pressure values.

RMYT is a binary format for use with the YOUNG Wind Tracker.

PRECIP and PRECIP POLLED configure VIN4 as a special input to count tipping bucket precipitation gauge switch closures. (Requires a 10K ohm resistor from VIN4 to EXC terminal.)

SOFTWARE mode allows output format and other parameters to be set using serial commands. Please see section 4.0 SERIAL COMMUNICATION and the SERIAL FORMAT DIAGRAM for more information.

W2 & W3 JUMPERS determine output connection type. Only one connection type may be used at a time. Please refer to the WIRING DIAGRAM for jumper location and connection details.

JUMPERS	OUTPUT TYPE
VOUT	Calibrated output for wind speed and direction OUT1 0-5000mV = 0-100 m/s Wind Speed OUT2 0-5000mV = 0-360 degrees Wind Direction
232	RS-232 full duplex serial
485	RS-485 half duplex serial

3.2 SIGNAL INPUTS

The 32400-21 has two special inputs for wind speed and direction from YOUNG wind sensors and four voltage input channels for connection to temperature, humidity, barometric pressure, precipitation, or other sensors. For best performance, sensors should be installed within 3m (10ft.) of the 32400-21.

Measurements from the voltage input channels are converted to numerical values (0-4000) when ASCII, POLLED ASCII, PRECIP, or PRECIP POLLED are used. VIN1 and VIN2 full scale input is 1000mV DC (serial value = input mV x 4); VIN3 and VIN4 full scale input is 5000mV (serial value = input mV x 0.8). Note that VIN4 is used to count tipping bucket precipitation sensor tips when PRECIP or PRECIP POLLED are used.

When NMEA1 or NMEA2 are used the measurements from the voltage input channels are converted to following:

VIN1 (0 to 1000mV must = -50 to +50 C),Temperature (C);
VIN2 (0 to 1000mV must = 0 to 100%), Humidity (%);
VIN3, Barometric Pressure (hPa);
VIN4, not used. [Wind speed, (Knots)]

Please refer to SERIAL FORMAT DIAGRAM and WIRING DIAGRAM in the back of this manual for additional details.

4.0 SERIAL COMMUNICATION

The 32400-21 uses either full-duplex RS-232 or half-duplex RS-485 signals for serial communication. RS-232 is the most simple and operates up to distances of 30m (100ft). The RS-485 option is preferred in electrically noisy environments, in applications where multiple units must be networked, or in NMEA marine applications where RS-485 signals are required.

The full duplex RS-232 connection may transmit and receive serial data at the same time.

The RS-485 connection is half-duplex meaning the unit cannot transmit and receive at the same time. The 32400-21 internally manages the switch between modes.

Many applications require the 32400-21 to transmit only. However, RS-485 applications that require polling the 32400-21 or sending commands to it require that the externally connected serial devices must be capable of managing its own half-duplex switching from transmit to receive.

At low baud rates with proper cable installation and connections, transmission distances up to 7km (4mi) are possible using RS-485.

Baud rates of 1200, 4800, 9600, 19.2K, and 38.4K baud are available. Most jumper-selected output formats force the baud rate to a predetermined value. All serial signals use 1 start, 8 data, and 1 stop bit. Any externally connected serial device must be set to the same baud rate as the 32400-21.

4.1 POLLING

When the serial output format is ASCII POLLED or PRECIP POLLED (See the SERIAL FORMAT DIAGRAM), the 32400-21 sends data only when it receives a serial polling command: **"M**c**!"** where 'c' is the unique address of the unit. The default address is 'A' but any alpha or numeric character may be used (section 4.2 SERIAL COMMANDS).

4.2 SERIAL COMMANDS

Serial commands set operating parameters and report settings. Jumper W1 must be configured for SOFTWARE mode for serial command settings to be retained, otherwise default settings based on jumper configuration will take effect at next power up.

Commands may be sent using a PC and simple communications programs such as HyperTerm or any other properly configured serial device. All commands that begin with CMD must end with a carriage return (ASCII 13).

Commands may be sent at any time but it may be more convenient to pause 32400-21 serial output. This is especially necessary with half-duplex RS-485 communication.

Please refer to the table on the following page for commands and definitions.

5.0 MAINTENANCE

The 32400-21 requires no maintenance in normal use.
Periodic inspection is recommended to verify correct operation.

6.0 WARRANTY

This product is warranted to be free of defects in materials and construction for a period of 12 months from date of initial purchase. Liability is limited to repair or replacement of defective item. A copy of the warranty policy may be obtained from R. M. Young Company.

7.0 CE COMPLIANCE

This product complies with European CE requirements for the EMC Directive. Please note that shielded cable must be used.

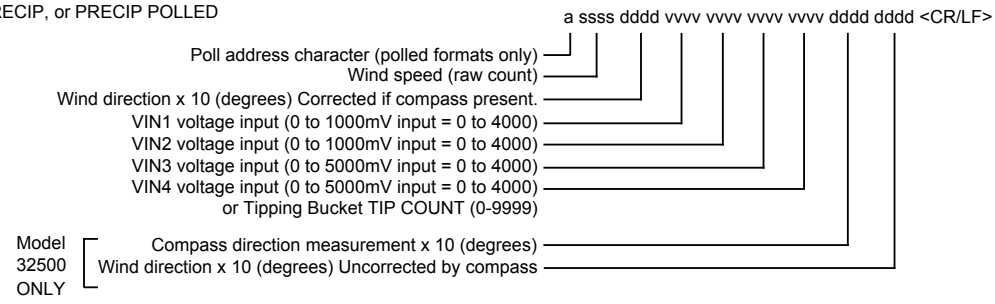
SERIAL COMMANDS TABLE

Command	Description	Notes:
CMD100	OPERATE	Places unit in continuous or polled operation
CMD110	PAUSE	Interrupts/pauses operation
CMD200 n	DAMPING (0=NONE, 1=FAST, 2=SLOW)	Determines compass measurement averaging (32500 Only)
CMD210 n	FORMAT: 0 ASCII 1 POLLED ASCII 2 NMEA (KTS, DIR) 3 NMEA (KTS, DIR, TEMP, RH, BARO) 4 RMYT 5 PRECIP 6 PRECIP POLLED 7 ASCII 2 9 DIAGNOSTIC	Determines serial output format. See section 3.1 for more detailed information. PRECIP formats substitute tipping bucket precipitation counts for the VIN4 voltage measurement. ASCII 2 omits VIN measurement values from the output string
CMD220 n	OUTPUT RATE (0=15Hz, 1=0.1Hz, 2=2Hz)	The rate at which serial data strings are sent.
CMD230 c	POLL CHARACTER (0-9, A-Z)	Sets the unique, single alphanumeric character polling address
CMD240 nn	BAUD RATE: 12 = 1200, 48 = 4800, 96 = 9600, 192 = 19200, 384 = 38400	Selects one of several preset baud rates. If you change baud rate while connected, your external device must also be changed in order to continue communicating with the 32400
CMD250 n	INPUT TYPE (1 = PULSE/POT, 2 = VIN3/VIN4)	Determines wind speed & direction inputs to use for output calculation. Type 2 requires 0 to 5000 mV = 0 to 100 m/s (VIN1) and 0 to 540 degrees (VIN2). Type 2 typically used for 86000 family of 2D Ultrasonic Anemometers.
CMD260 nnnn	BARO RANGE LOW (hPa)	Sets barometer low range at 0.0VDC (0500 hPa default)
CMD270 nnnn	BARO RANGE HIGH (hPa)	Sets barometer high range at 5.0VDC (1100 hPa default)
CMD280 nnn	PROPELLER PITCH (mm/rev)	Sets sensor cup wheel/propeller pitch 03002: 750 mm/rev 04101/4106/05103/05106: 294 mm/rev (default) 05108: 500 mm/rev 05305: 307 mm/rev
CMD900	REPORT PARAMETER SETTINGS	Returns list of current settings in unit
CMD910	START COMPASS CALIBRATION	See section 3.1 (32500 only)
CMD920	STOP COMPASS CALIBRATION	See section 3.1 (32500 only)
X	Alternative command to enter OPERATE mode	Places unit in continuous or polled operation
3xESC	Alternative command to PAUSE	Interrupts/pauses operation
3xCNTL-S	Alternative command to START calibration	See section 3.1 (32500 only)
3xCNTL-X	Alternative command to STOP calibration	See section 3.1 (32500 only)

SERIAL OUTPUT FORMATS

MODEL 32400-21

ASCII, POLLED ASCII, PRECIP, or PRECIP POLLED



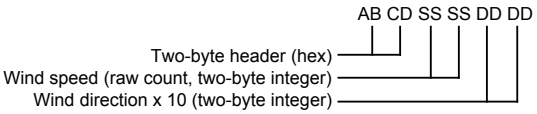
WIND SENSOR	M/S	MPH	KNOTS	KM/HR
03002 *	M=0.3752 O=0.2	M=0.8390 O=0.4	M=0.7285 O=0.4	M=1.3505 O=0.7
04101	0.04903	0.1097	0.09526	0.1765
04106	0.04903	0.1097	0.09526	0.1765
05103	0.04903	0.1097	0.09526	0.1765
05106	0.04903	0.1097	0.09526	0.1765
05108	0.0834	0.1864	0.1620	0.3001
05305	0.05123	0.1146	0.09956	0.1844

The adjacent chart shows multipliers to convert raw pulse count values to standard wind speed units.

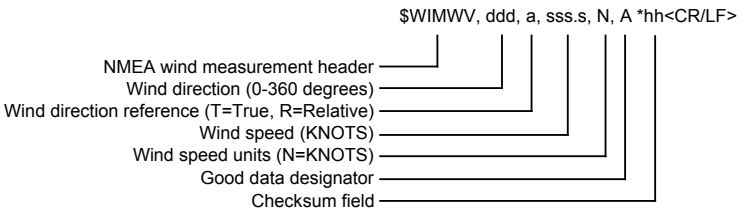
* Model 03002 is a cup-wheel type sensor therefore wind speed calculation must use multiplier (M) and offsett (O).

Example:
Sensor = 05103 Wind Monitor
Raw pulse count in serial string = 323
MPH Multiplier = 0.1097
Wind Speed = 323 x 0.1097 = 35.4 MPH

RMYT serial output for YOUNG Wind Tracker
Six bytes in binary format.

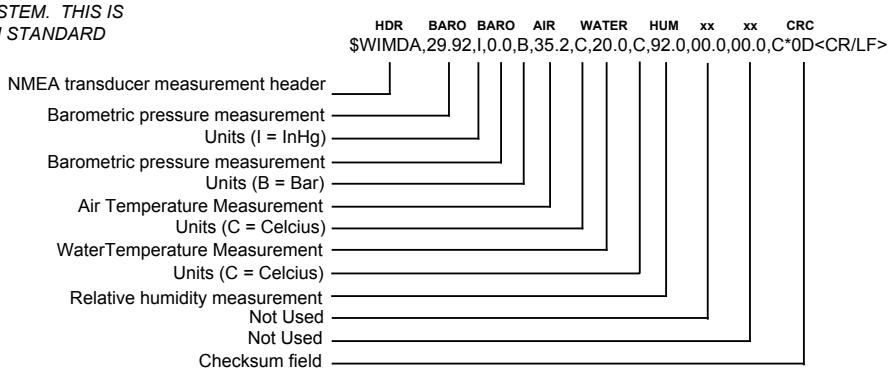


NMEA 1 sentence sends wind speed in KNOTS and wind direction in degrees. Model 32500 designates wind direction as TRUE due to compass correction. Model 32400 designates direction as RELATIVE.



NMEA 2 serial output alternates between the NMEA 1 wind sentence and the following transducer sentence which includes measurements for temperature, relative humidity, and barometric pressure.

NOTE: THE NMEA HEADER (MDA) IS CUSTOM FOR USE ONLY WITH THE FURUNO RD33 DISPLAY SYSTEM. THIS IS NOT AN APPROVED SENTENCE FORMAT ON STANDARD NMEA 0183, VER 3.00.



Note:
For correct NMEA 2 serial output string, sensors MUST be connected as follows:

VIN1 = Temp
VIN2 = Humidity
VIN3 = Barometer
VIN4 = N/A

32400-21-90(C)

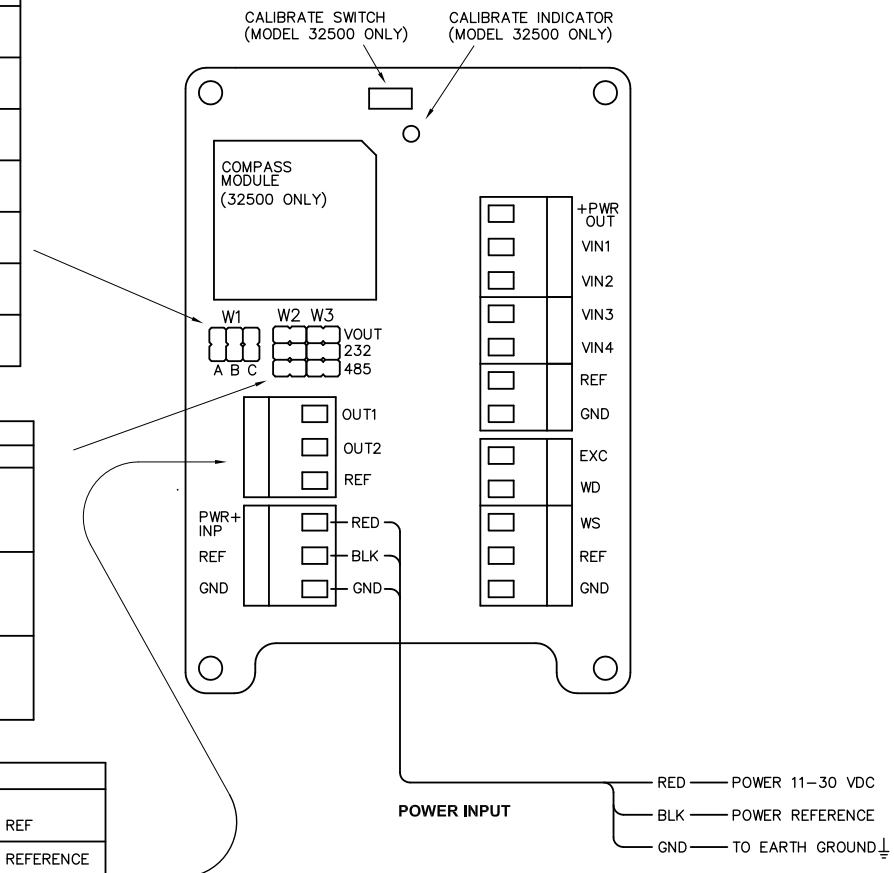
WIRING DIAGRAM

MODEL 32400 JUMPER CONFIGURATIONS & POWER

SERIAL FORMAT	A B C JUMPER W1
ASCII	
ASCII POLLED	
NMEA 1	
NMEA 2	
RMYT	
PRECIP	
PRECIP POLLED	
SOFTWARE	

OUTPUT TYPE SUMMARY	
OUTPUT	W2 W3
VOLTAGE 0–5000 mV	VOUT
SERIAL RS–232	232
SERIAL RS–485	485

OUTPUT TERMINAL FUNCTIONS			
SELECTED OUTPUT	OUT 1	OUT 2	REF
RS485	(B)	(A)	REFERENCE
RS232	RECEIVE	TRANSMIT	REFERENCE
VOLTAGE 0–5000 mV	WIND SPEED 0–100 m/s	WIND DIRECTION 0–360°	REFERENCE

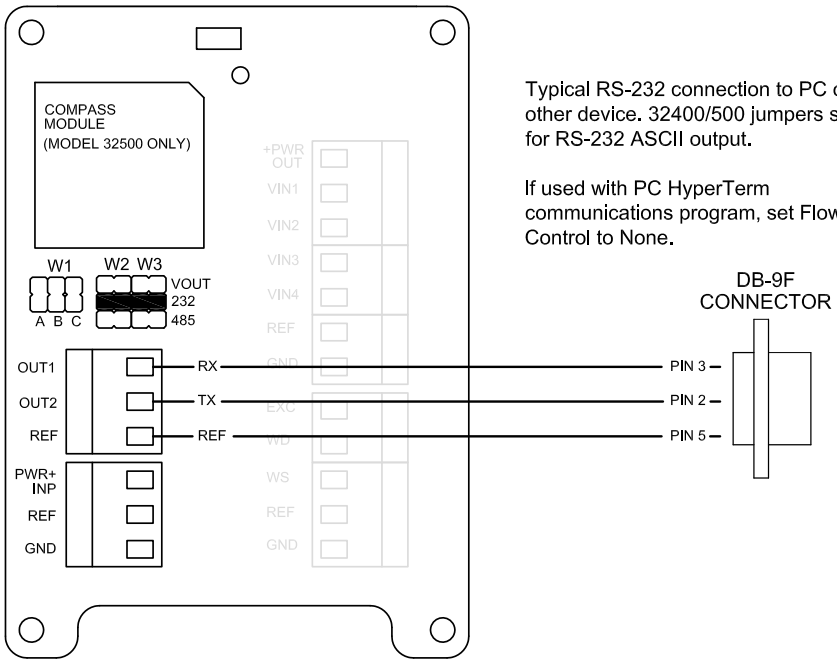


32400-21-90(C)

SERIAL WIRING CONNECTION

MODEL 32400

RS-232 SERIAL OUTPUT

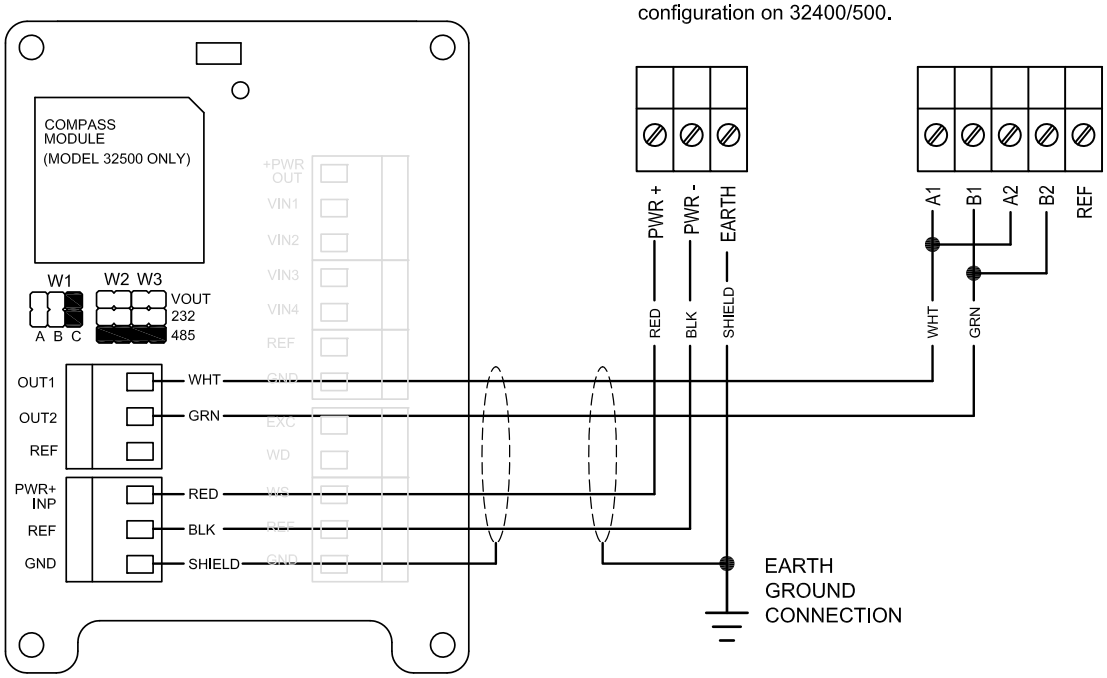


Typical RS-232 connection to PC or other device. 32400/500 jumpers set for RS-232 ASCII output.

If used with PC HyperTerm communications program, set Flow Control to None.

RS-485 SERIAL OUTPUT

Polled ASCII RS-485 half-duplex serial connection to YOUNG 26800. Note jumper configuration on 32400/500.



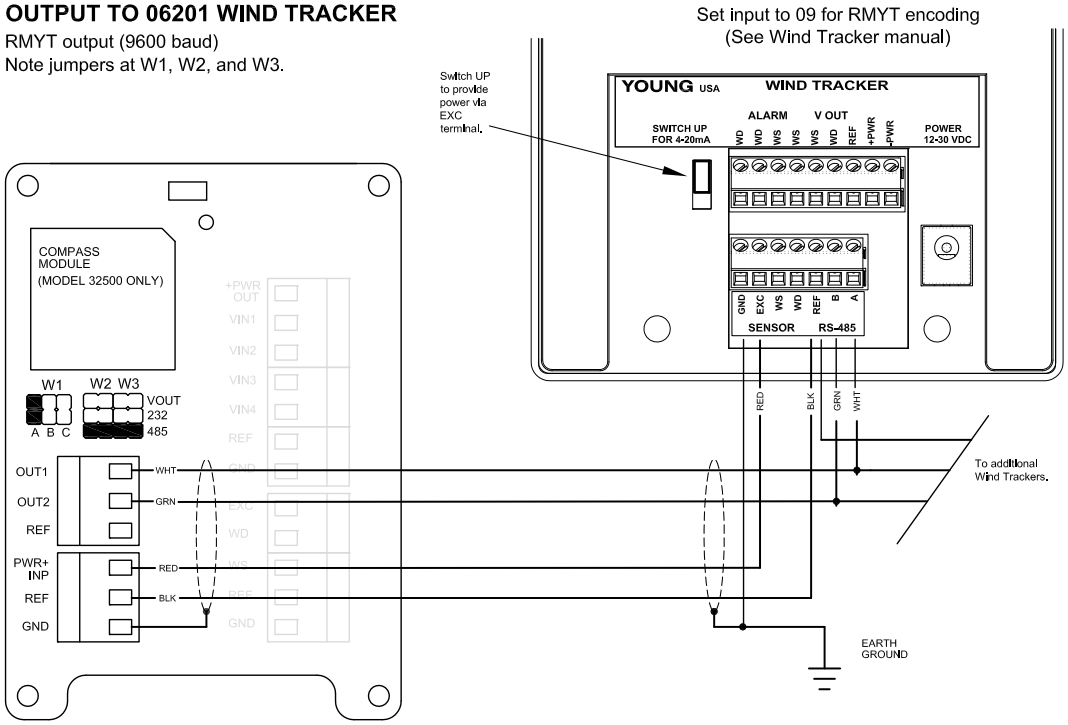
32400-21-90(C)

WIRING DIAGRAM

Output to 06201 Wind Tracker or 06206 Marine Wind Tracker

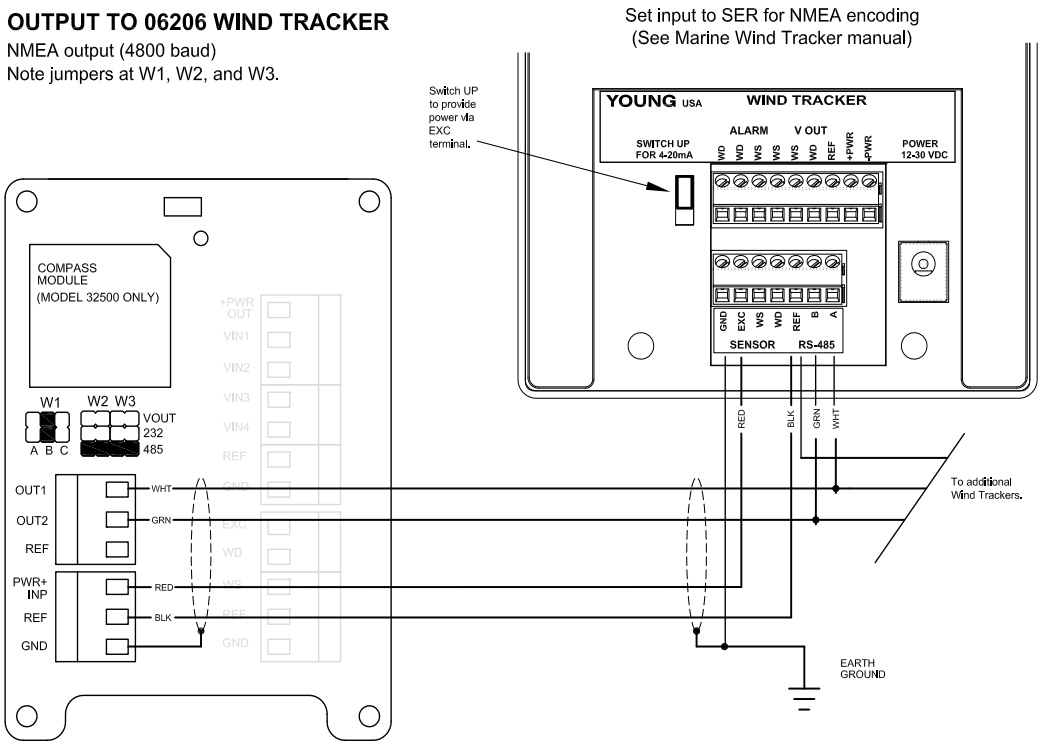
OUTPUT TO 06201 WIND TRACKER

RMYT output (9600 baud)
Note jumpers at W1, W2, and W3.



OUTPUT TO 06206 WIND TRACKER

NMEA output (4800 baud)
Note jumpers at W1, W2, and W3.

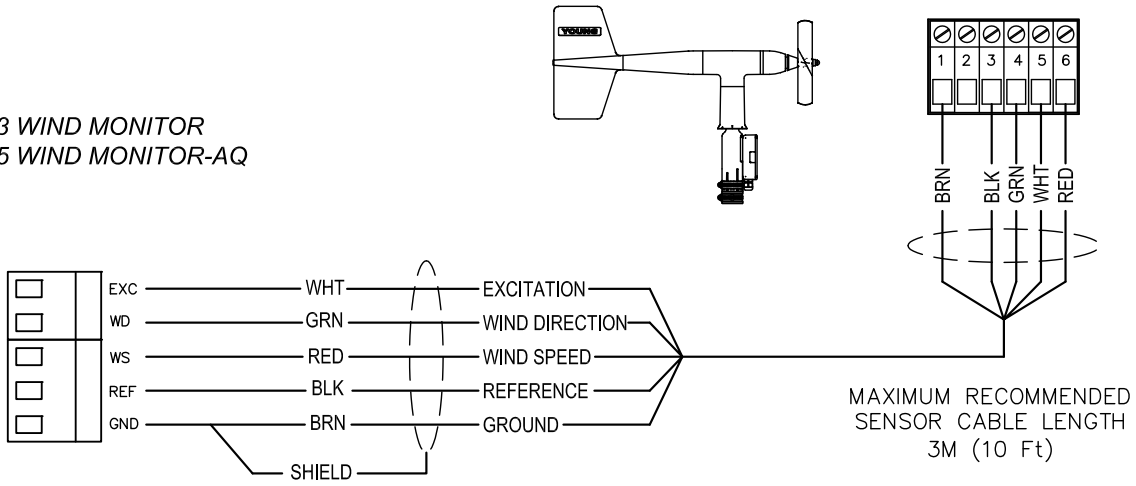


32400-21-90(C)

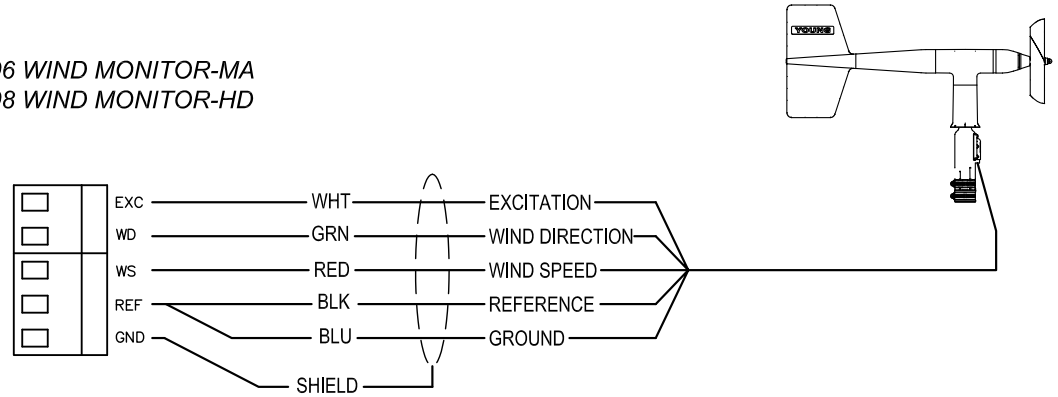
WIRING DIAGRAM

TYPICAL APPLICATION WIRING

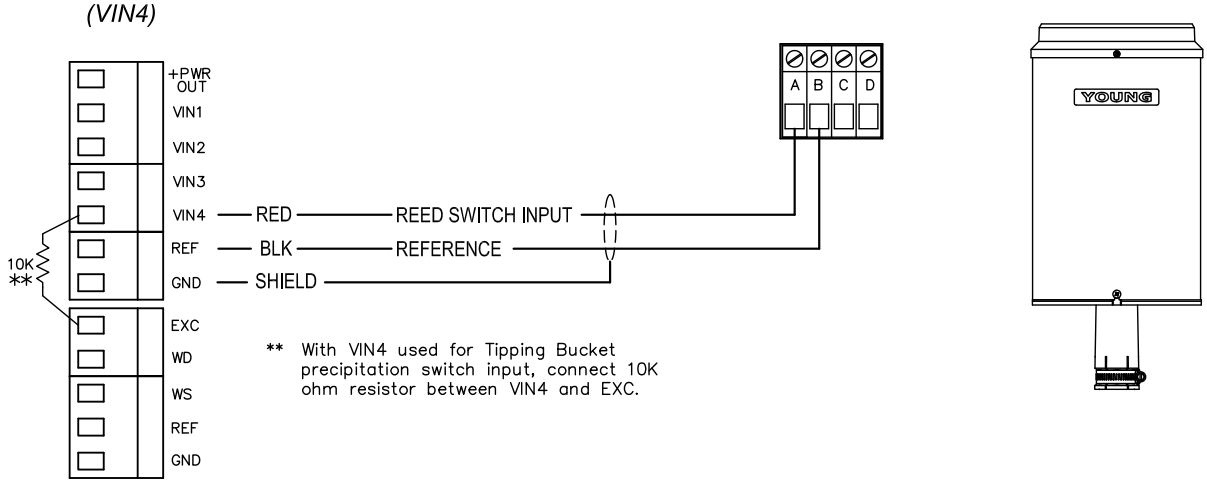
05103 WIND MONITOR
05305 WIND MONITOR-AQ



05106 WIND MONITOR-MA
05108 WIND MONITOR-HD



52202 TIPPING BUCKET
(VIN4)

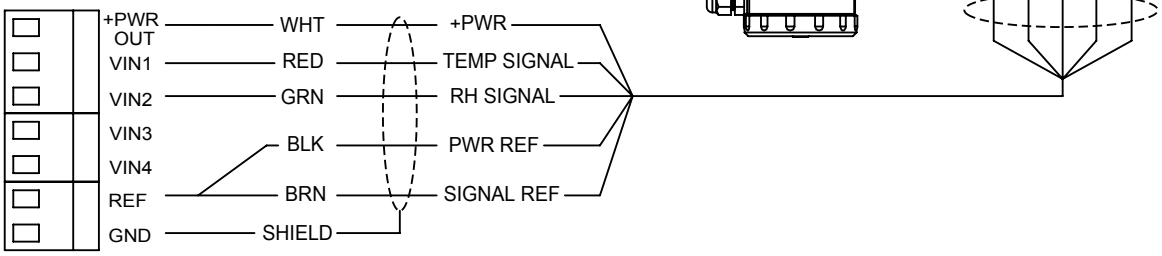
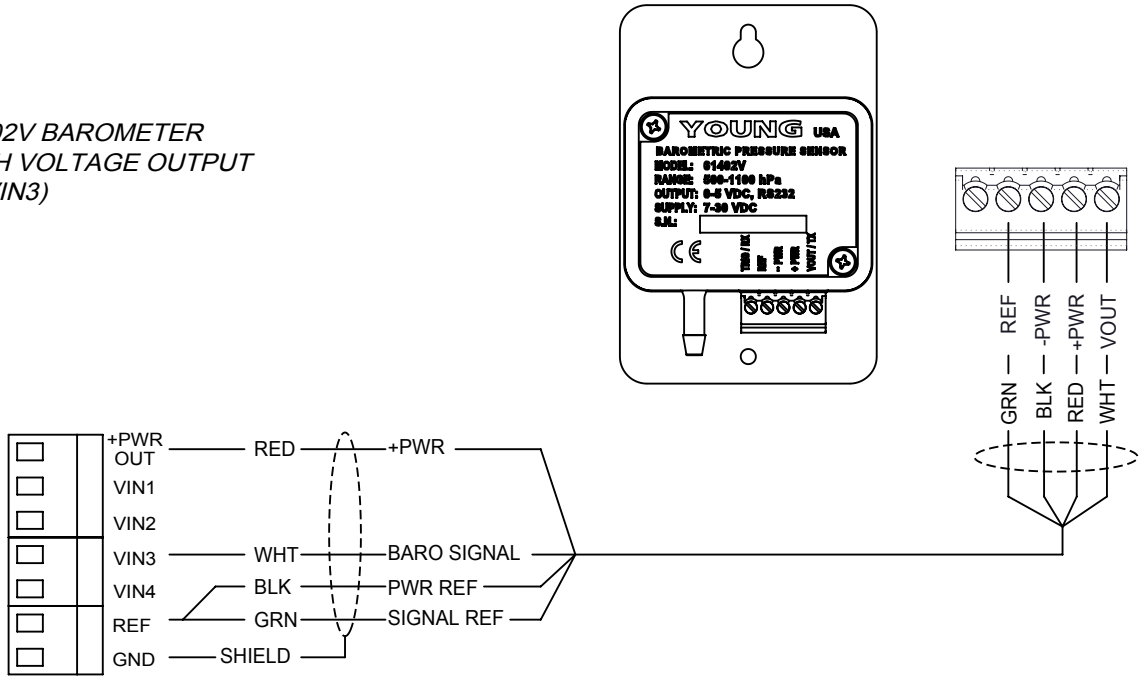


WIRING DIAGRAM

NMEA2 TYPICAL WIRING

WHEN USING NMEA2 FORMAT
SENSORS MUST BE CONNECTED AS SHOWN
FOR PROPER DATA REPORTING

41382VC/F TEMPERATURE / RH SENSOR
WITH VOLTAGE OUTPUT
(VIN1 & VIN2)



61402V BAROMETER
WITH VOLTAGE OUTPUT
(VIN3)