

# drive.web<sup>®</sup> encoder

## Options 40, 42, 45 & 46 Incremental Encoder Module Installation & Operation Manual

<u>Contents</u>	<u>Page</u>
Description	1
CE, FCC, IC Approvals, Warnings	2
Installation	3, 4
Connections	5
System Integration	6, 7
<i>drive.web</i> Resources	8

 **Note:** This module is for *drive.web* products with option **16**, **18** or **23**.

 **i2i** Intelligent 2-Wire Interface. Easy, unpolarized, up to 500 feet range.

 Option **40** has one set of encoder inputs, option **42** is for dual encoders.

 Option **45** retransmits channels A and B with EIA(RS)485/422 signals. Option **46** retransmits with  $\pm 24V$  differential signals. Option **45** and **46** are mutually exclusive.

 Built in Voltage regulator accepts wide Power Voltage range, 20VDC to 35VDC max





Conformity Statements

EMC Standard, EN 61326-1: 2006, Electrical Equipment for Measurement, Control & Laboratory Use.

Emissions Class A, Commercial Equipment.

Immunity Table 2, Industrial Equipment.

LVD Standards, EN 61010-1: 2010, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use and;

EN 61010-2-030: Particular Requirements for Testing and Measuring Circuits.

**drive.web encoder** is an industrial device designed for permanent installation by qualified professionals. If it is used in a manner not specified herein the protection provided may be impaired.

**drive.web encoder** and its packaging contain recyclable materials.

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 Class [A] digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe [A] est conforme à la norme NMB-003 du Canada.

 **Warning!** It is essential that you read and understand this manual and the entire contents of the **drive.web** device manual, and the **savvy** software, “Help,” menu before proceeding with installation and product configuration. For more information and to download product manuals and software, go to [www.driveweb.com](http://www.driveweb.com).

 **Warning!** Your use of **savvy** software and **drive.web** devices may cause motors and machinery to power up with high voltages or start or operate in an unexpected, dangerous or lethal way. It is essential that you are completely familiar with **savvy** and all of the equipment and the system design before attempting to program or edit a program or connect to any live device. It is also essential that a risk assessment is conducted to identify hazards. Risks must be reduced to tolerable levels.

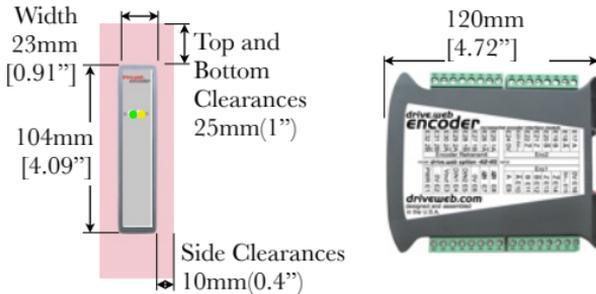
 **Warning!** You are entirely responsible for the configuration or use of any **drive.web** product. By configuring or using these products you agree to indemnify and hold harmless Bardac Corporation, its’ employees, directors, officers, distributors and resellers against the consequences of your configuration or use of the products.

 **Warning!** Information in this manual is subject to change without notice. You are responsible for verifying the proper operation of your system and Encoder module.

 **Warning!** Avoid permanent damage to your **drive.web** Encoder, never exceed any **min** or **max** values. Do not connect any **drive.web** Encoder terminal to mains circuits. See page 2 for I/O ratings.

## drive.web Incremental Encoder Module Installation

**Dimensions & Clearances:** Clearances must be provided for airflow.



**Weights:** Option **40** only - 128g(4.5oz). Option **42** with **45** - 176g(6.2oz)

**DIN Rail Mounting.** Use standard 35x7.5mm rail, IEC60715, EN50022.

**Power Requirement (PWR),** 20VDC min, 35VDC max, 25mA plus load.

**Environment** UL/IEC Pollution Degree 2, Operating temperature, 0°C min. to 50°C max. Storage temp, -20°C to 70°C. Humidity 95% max. non-condensing. Install in a metal enclosure with no RF noise sources.

**I/O Ratings:** Use shielded cable for runs over 30 meters. Do not connect to any mains circuit. Fast transient over-Voltage to 1kV per EN61000-4-4.

**Encoder Receivers,** differential, **±2V to ±24V max,** to 500kHz max.

**Z Marker Receivers** to 6000 rpm max. Note, unused Z marker receivers must be biased, i.e. connect Z to +5V and /Z to 0V. Oscillation from noise can interfere with digital input operation.

**Encoder Digital Inputs, DIN1, DIN2, -0.5V min to 25V max,** 50Hz max. Use with de-bounced source only. Digital input threshold = 8.2VDC ± 7%.

**drive.web Incremental Encoder Module Installation** continued...

**Encoder 5V Supply Output(s), 200mA max** each. Outputs are protected with auto-resetting fuses.

**0V Reference is Required** for receiver and retransmit operation. Connect from any 0V terminal with encoders powered from other sources. **Beware of 0V current loops!**

If power sources are widely separated, a 100Ω isolation resistor in series with this reference may be appropriate.

**i2i Connections** Not polarity sensitive. Connect to **drive.web** device with option **16, 18** or **23** at its two **i2i** terminals. 0V is not required. **i2i** receivers are isolated. Port 2 Receive LED on **drive.web** device is lit when **i2i** connection is made.

**Vout** provides regulated 24VDC for reference and supply, 150mA max. If Power Voltage is less than ~26VDC, Vout is less than 24VDC, (~Power - 2VDC).

**Wiring Notes** All signal wiring should be **twisted-pair**. All encoder power and signal wiring outside of the metal enclosure should be shielded cable with individually shielded twisted-pairs such as **Belden 8163**. Ground the shield at only one end, usually near the signal destination. Ground the shield with a 360° clamp where the shield enters your “quiet” metal enclosure. Separate all encoder wiring from RF noise sources and AC power cabling.



## drive.web Encoder Module Connections

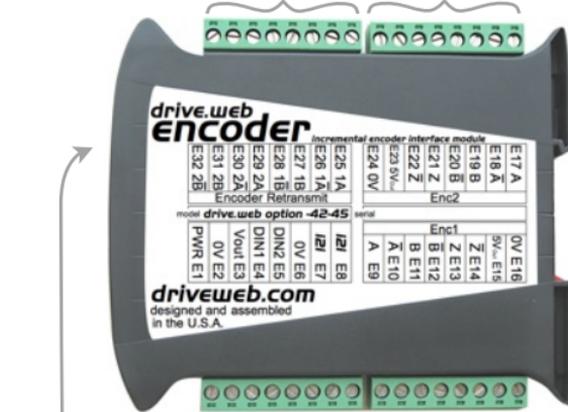
**Terminal Wiring:** Strip 7mm(0.28”) or use ferrules. Use 0.2mm<sup>2</sup> (AWG24) minimum. One wire, 2.5mm<sup>2</sup>(AWG12) maximum. Two wires, 1.5mm<sup>2</sup>(AWG14) maximum. Two wires with ferrules, 1mm<sup>2</sup>(AWG18) maximum.

**Terminal Tightening Torque:** 0.5 N·m (4.4 in·lbs)

E32	E31	E30	E29	E28	E27	E26	E25
$\overline{2B}$	2B	$\overline{2A}$	2A	$\overline{1B}$	1B	$\overline{1A}$	1A

Options 45,46  
Retransmit Outputs

ENC1	ENC2	Function
E9	E17	A
E10	E18	$\overline{A}$
E11	E19	B
E12	E20	$\overline{B}$
E13	E21	Z
E14	E22	$\overline{Z}$
E15	E23	5Vout
E16	E24	0V

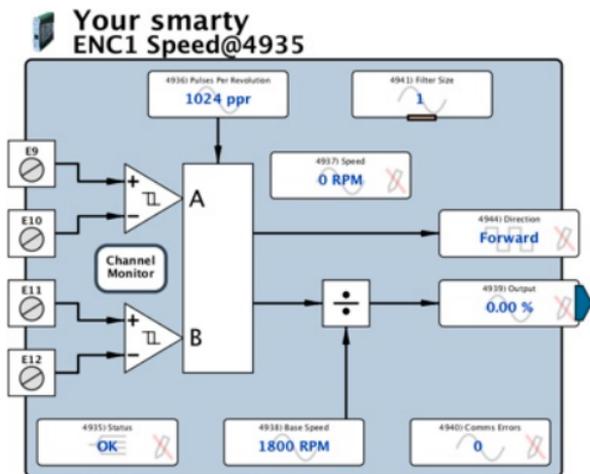


Green Power and  
Yellow Data  
Transmit LEDs  
Both should be lit.

E1	E2	E3	E4	E5	E6	E7	E8
PWR	0V	Vout	DIN1	DIN2	0V	I2I	I2I

## drive.web Encoders - System Integration

- Use **savvy** to complete your installation and integrate encoder signals into your **drive.web** control system.
- Navigate to your **drive.web** device function block engine and find the **Enc Speed** function block in the **I/O** listing. The **Channel Monitor** button will show the actual state of each channel A and B. **High** indicates A or B Voltage is higher than its complement, /A or /B.
- The **Enc Speed** function block **Output** is the percentage of the rpm value indicated in the **Base Speed** parameter.
- An adjustable Moving Average Filter is incorporated into the function block to reduce quantization noise. Higher PPR encoders or speeds may allow the filter size and therefore the response time to be reduced. The default 15 size indicates the speed is averaged over a period of  $15 \cdot 4.78\text{ms}$  time intervals.



**drive.web Encoders - System Integration** continued...

The **Status** parameter must read **OK** for proper function. All other indications will result in the speed **Output %** = 0.00 %. Channel Faults are detected with the conditions listed below.

**Encoder Receiver Fault Conditions**

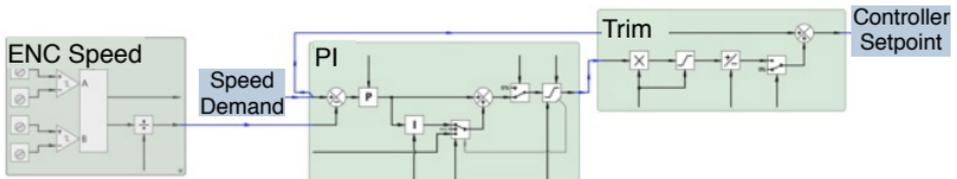
Short Circuit or Open Circuit

 $-10V < \text{Common Mode Voltage} < 13.2V$  $|\text{Differential Voltage}| < 275\sim 475mV$ 

For critical or sensitive applications, make a connection from the **Status** parameter to a fault contingency system.

If **Comms Fault** is indicated or if the **Comms Errors** parameter shows increasing values, there may be extreme RF noise coupling to your **drive.web** device, a wiring fault or a hardware fault. Check the **i2i** signal wires and **Wiring Notes**, page 4 of this manual. Contact us at **drive.web** for assistance.

**Outer Loop Speed Control Example:** Connect the **Enc Speed Output** to the **Feedback** parameter of a **PI** block or similar. Connect the speed demand setpoint to the **Setpoint** parameter both in a **PI** block and in a **Trim** block (option **05**) or similar. Connect the **PI Output** to the **Trim** parameter of the **Trim** block. The **Trim Output** is connected to the speed controller's setpoint:



## **drive.web Resources**

The following encoder application notes are available for download on the **Get savvy** page at **driveweb.com**:

Electronic Line Shaft, Speed Lock, Phase Lock, HG503058.

Encoder Positioning Overview, HG503059.

Encoder Cyclic Positioning and Indexing, HG502932.

Get expert help. Call, email **techsupport@driveweb.com** or browse the help menu in **savvy**.

Explore the full line of **drive.web** products and resources at **driveweb.com**.

Free **drive.web** online training seminars are held every week. They are interactive with the presenter and take about one hour. Learn essential elements:

Design control schemes, configure networks, create drive systems with almost any drive, generate signal flow documentation, configure drives, interface to external products such as operator stations, PLCs, etc. and work with your drives across the Internet.

More extensive online and factory technology training sessions are also available.

To register for a training seminar, please contact us; **training@driveweb.com** or phone +410-604-3400.

