



# drive.web **smarty**®

Distributed Process Controller

model **dw214**

## Installation & Operation Manual



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### **UL Certification Statements**

This process control equipment to be supplied by Class2, LPS, limited power supply. **dwOption-30** and **-31** have not been evaluated for UL listing.

### **C Conformity Statements**

EMC Standard, EN 61326-1: 2006, Electrical Equipment for Measurement, Control and 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.

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

**smarty** and its packaging contain recyclable materials and a small rechargeable battery, classed as “portable”, that is permanently affixed to the underside of the main circuit board. The battery must be removed with wire-cutting pliers and separated for proper disposal.

SMARTY, SAVVY, SAVVYPANEL, Smarty, BARDAC, and DRIVE.WEB are trade marks of Bardac Corporation, registered in the U.S. and other countries.

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 entire manual and the entire contents of the **savvy** software **Help** menu before proceeding with your installation and configuration. See page 6 for **savvy** installation instructions. For more information and to download manuals and software, go to [www.driveweb.com](http://www.driveweb.com) or contact us. See page 12.

**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 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 **smarty**. Special care must be taken after loading new firmware or installing new options.

**Warning!** Avoid permanent damage to your **smarty**, never exceed any **min** or **max** values. Do not connect any **smarty** terminal to mains circuits. See page 5 for IO ratings.

hwIP is incorporated into **smarty** firmware. hwIP Copyright (c) 2001-2004 Swedish Institute of Computer Science. All rights reserved.

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## Product Identification - **smarty** for ODP-2, Model dw214

**smarty** is a programmable device using **drive.web** distributed control over Ethernet for industrial process automation. To program and use **smarty** you must get the **savvy** software tools from [www.driveweb.com](http://www.driveweb.com). See pages 6-9.

Find **smarty** firmware version. Use **savvy**, *Get Detailed Info* from **smarty** contextual menu. Page 6.

**dw214** for *Optidrive P2* AC vector drive.

### **smarty** Standard Features

- **drive.web** distributed process control.
- *Optidrive P2* CANopen link and drive function blocks promote complete configuration control.
- 10/100Base-T(X) Ethernet. See page 4.
- 8 flexible I/O: +25V, -13V 16-bit analog in,  $\pm 10V$  14-bit analog out, digital in.
- 8 flexible I/O: 0-25V 16-bit analog in, 24V digital out, digital in. Pages 5 and 10.
- $\pm 10V$  control reference outputs, 20mA max. Page 5.
- **Basic Control** function block library.



## smarty Software Options

Software options may be added using **savvy**. See page 8.

**04 ModbusTCP/IP** - Slave/server. See page 12.

**05 Process Control** - Recommended for most applications.

**06 Winder Control** - Diameter Calc., Taper Tension, Torque Comp.

**10 Math** - With internal 32-bit **Calculator**.

**11 Encoder Control** - Requires **15** or **16** encoder inputs.

**25 EIP/PCCC** - Slave/server. See page 12.

**26 savvyPanel** - Operator station interface. See pages 8, 9.

**29 Solar** - Calculates sun position azimuth and zenith.

**36 Motion Control** - With **Trapezoid Motion** and **Cam Profile**.



## smarty Internal Hardware Options pages 11, 12

Factory installed. All internal options are mutually exclusive.

**15 Internal Incremental Encoder**

**16 External Encoder i2i Port**

**17 Isolated ModbusRTU Server** - “Slave”, see separate manual, HG502421Iss2.

**18 Isolated ModbusRTU Server** - “Slave”, see separate manual, HG502421Iss2 + **i2i External Encoder Port**.

**19 Dual ModbusRTU** - Client and isolated server.

**23 Isolated ModbusRTU Client** - “Master”, see separate manual, HG502421Iss2 + **i2i External Encoder Port**.

**24 Add Six Digital Inputs** - See page 11.

**27 Frequency I/O** - See separate manual, HG503056.

**28 Extended Digital I/O** - See separate manual, HG503057.

**37 Stepper Controller with Event Inputs** - Dual pulse and direction outputs, two event inputs. See manual, HG503431.

**38 Stepper Controller w/ Encoder Inputs** - Dual pulse and direction outputs with **i2i** port for remote encoder. See manual, HG503431.

## smarty External Module Options

**40** & **42** are mutually exclusive.

**45** & **46** are mutually exclusive & require **40** or **42**.

**30 / 31 HVIO** - Isolator, 4 x 115VAC/230VAC digital in, 2 x NO relay out. See page 12. These options are not UL Listed.

**40 Single Remote Encoder** - 2V to 24V differential with marker. 5VDC, 200mA supply output. Two event inputs.

**42 Dual Remote Encoder** - 2V to 24V differential. Two 5VDC, 200mA supply outputs. Two event inputs.

**45 Encoder Retransmit** - EIA(RS)485 & 422 compliant.

**46 Encoder Retransmit** -  $\pm 24V$  differential signal out.



## smarty Installation

**smarty** is designed for permanent installation by qualified professionals.

Install **smarty** in metal enclosure with no RF noise source.

**Weight** - No hardware opts.-176g(6.2oz). W/ PoE & serial ports-213g(7.5oz).

**DIN rail mounting** - Use 35x7.5mm rail per IEC 60715 or EN50022.

**Environment** - UL/IEC Pollution Degree 2.

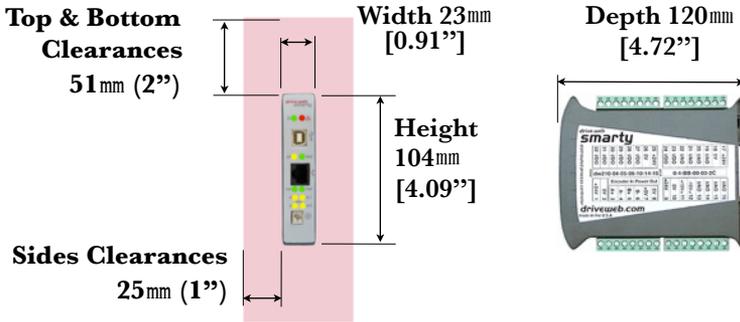
Operating temperature, 0°C min., 50°C max.

Storage temp, -20°C to 60°C.

Altitude 3000m max.

Humidity 95% max. non-condensing.

**Dimensions & clearances** - Clearances **must** be provided to promote airflow.



## smarty Front Panel

**USB port** - Peripheral-type micro-B jack.

**Ethernet port** - MDI 8P8C, “RJ45” jack, 100baseTX and 10BaseT, Full Duplex, Auto Negotiation, Auto-MDIX, IEEE 802.3ab.

**Indicator LEDs** in front panel.



**Power on** - Green LED.



**Fault** - Red LED. Check power supply, connect with **savvy**, or contact us at **drive.web** for more information.



**Ethernet link** - Green LED indicates Ethernet connection.



**Ethernet activity** - Yellow LED-Data transfer activity.



**100BaseTX** - Green LED when 100BaseTX connection



**Four yellow serial port LEDs** - See page 11.



**Earth** - Do NOT use for 0V or control wiring. Observe local electrical codes and best wiring practices.



**smarty I/O Four Removable Terminal Blocks**

ODP-2 Serial Port

T3	T4	T5	T6	T7	T8
Option dependent. See pages 11, 12 for more info.					

T9	T10	T11	T12	T13	T14	T15	T16
24VDC	0V	+10Vref	-10Vref	I/AO	I/AO	I/AO	I/AO
T17	T18	T19	T20	T21	T22	T23	T24
24VDC	0V	I/AO	I/AO	I/AO	I/AO	I/DO	I/DO
T25	T26	T27	T28	T29	T30	T31	T32
24VDC	0V	I/DO	I/DO	I/DO	I/DO	I/DO	I/DO

**smarty I/O Four Removable Terminal Blocks** cont'd.

**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 Nm (4.4 in·lbs).

**24VDC and 0V Terminals are internally connected. Regulated 24VDC ±5%, 100mA plus loads.**

Do not connect to a distributed DC power network.

**External 1A fast-acting fuse or current-limiting is required!**

Supply from Class 2, LPS, limited power supply only.

**I/O Ratings including ±10Vrefs**

Use shielded cable for runs over 30 meters.

Fast transient over-Voltage 1kV per EN 61000-4-4.

**±10Vrefs** +13V **max**, -13V **min**, 20mA source and sink.

**I/AO Terminals T13-T16 and T19-T22** +25V **max**, -13V **min**, 100kΩ input impedance. Bipolar Analog Output, Bipolar Analog Input and/or Digital Input.

**I/DO Terminals T23-T24 and T27-T32** +25V **max**, -0.6V **min**, 100kΩ input impedance. 24V Digital Output, Unipolar Analog Input and/or Digital Input.

**Warning! To avoid damaging smarty, do not apply low-impedance source to any I/DO terminals when smarty is powered off. A series 10kΩ isolation resistor is required.**

**smarty ODP-2 Serial Port**

**Warning! Dangerous Voltages and/or motor activation causing injury, death and property damage may result! You must read and understand the entirety of both this manual and the Optidrive P2 User Guide!**



**dw214** includes serial cable, LA503054, 1m long.

Check the following ODP-2 parameter settings are at default -

P5-01, Fieldbus Address = 1. P5-02, CANopen Baud Rate = 500kbps.

## Set up your computer - Get **savvy**

Use free **drive.web savvy** software to setup, program, monitor, and perform data trending.

- Go to [www.driveweb.com](http://www.driveweb.com) and click on *Get savvy*, or contact us to get the latest version of **savvy**.



## **smarty** USB - Plug and Play

Experience plug-and-play access to **smarty** and its local Ethernet network. Requires 0x201A firmware or later.

## **smarty** Ethernet Networking & Programming

Assigning an invalid or duplicate IP address will cause serious network malfunctions!

- Find useful networking information. Under the *Help* menu click on *Getting Started with savvy* section.
- **smarty**s are all shipped with the IP address, 10.189.189.189.
- Use *Category 5e* cable or better, with 8P8C/RJ-45 connectors for each **drive.web** device and the host computer.
- For systems with more than one **drive.web** device, use an Ethernet switch for all **drive.web** devices and computer.



## Get started with **savvy**

- We strongly recommend attending our free online training seminars. See page 12.
- We strongly recommend you read the *User Manual* and *Getting Started Guides* under the *Help* menu.
- Use *Create Phantom* in the *Directory* menu to explore **drive.web** products and options, design, and configure offline. *Export Data* to save your work. *Import Data* into phantoms to work offline.

**savvy** Window Title Bar indicates the current view.

**Status Bar**, above the viewing area, provides **Navigation Arrows** and object and location data.

- **savvy** views are hierarchical with the *Device Directory View* at top. Use the *Navigation Arrows* to go up, back, or forward. Window menus change as you navigate.

**Hover cursor over active object**, device, function block, connection, or parameter icon to view object information in the *Status Bar* and reveal a *Hover Button*.

**Click a Hover Button or right-click** an active object to access a *Contextual Menu*. See below.

**savvy** functions are limited by password-protected capability level. See *File > Capability...*



192.168.1.25

## Device Directory Window

**Warning!** Changing a device IP address **WILL** disrupt its network connections! If a **smarty** is communicating with other devices, be prepared for system disruption. In the **File** menu choose **Utility > Remap Export File** to remap a **dw-system** file with different IP address(es).

- Select **File>Administrate>Set IP Addresses for System**.
- **smarty** serial number is also its **MAC Address**.
- Enter a valid IP address and click OK.
- An icon appears showing the actual drive frame size. The question mark adornment at right indicates **smarty** is not communicating with the drive. See page 5.
- If the icon at right appears, a network connection problem exists. Check connections, LEDs, and that **smarty** IP address is within the computer's Ethernet subnet mask.

**Warning!** Importing data into your **smarty** will result in immediate execution of that configuration. **Dangerous Voltages and rotating machinery may result!** Use a phantom to preview a configuration.

- **Directory > Import / Export Data**. All device configurations and connections in the directory in one **.dw-system** file.

### smarty Icon Contextual Menu

- **Change Name** - Name your **smarty** for easy identification.
- **Import / Export Device Data...** - Load / save configuration data to / from this **smarty** only.
- **Unlock, Lock, Set Password** - Choose **Restrict Modification** for view-only, or **Restrict All Access**.

Click the **smarty** icon to view the device configuration.

### Function Block Engine Window - FBE Menu

(Standard **savvy**, no **SFD**)

- Add function blocks in the order to be processed. Processing order is left to right, top to bottom.

Click function blocks to view parameters and details.

Connect between parameters and other **drive.web** devices.

**Warning!** Making a connection results in immediate execution of that connection. **Dangerous Voltages and rotating machinery may result!**

- Under the **File** menu, choose **New Viewer...** and then, **File > Open Device Directory**.
- With two viewer windows, click a parameter, drag and drop onto a parameter in the other viewer.

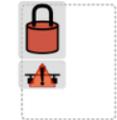
**Parameter Contextual Menu** - Most parameter data is 16-bit. Data is formatted, limited, and scaled depending on the parameter. Use **Get Info** or **Re-Scale...** to verify or change.

Click parameters for the **Setter Box** - Increment, decrement, default, last state, or keyboard entry.

Click blue connection block or arrow to jump to other end.



192.168.1.25



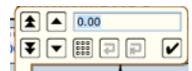
10.189.189.189



Laminator Stage 2



Laminator Stage 2



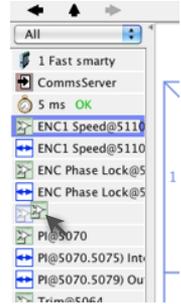
## Upgrade **savvy-SFD** and **smarty** Software Options

Process credit cards or **Vouchers** online or **Coupons** offline.

- To upgrade **savvy** go to the **Commerce** menu, select **Upgrade savvy**, check desired options, click OK.
- To upgrade **smarty**, choose **Upgrade Device...** in its contextual menu, check desired options, click OK.
- To process **Vouchers**, choose **Pay>Online Via Vouchers** in the **Shopping Cart**. Enter codes on separate lines.
- To process **Coupons**, use **Commerce** menu > **Coupon Manager**. Enter codes in the top box, click the **Add** button, and the coupon is recognized. Click **Apply**.

## **savvy-SFD** Signal Flow Diagram Upgrade

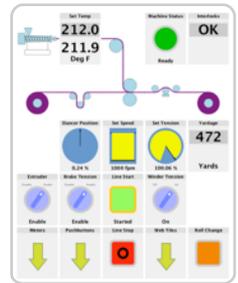
- With **savvy-SFD**, build systems graphically. The live drawings are stored in your **smarty**.
- Set drawing borders and annotate multi-page drawings.
- A list of function blocks and connections is at the left of the **Signal Flow Diagram** showing **program execution order** from top down. Change execution order by dragging function blocks up or down the list. In this picture, **ENC1 Speed** function block is moved so that it is processed after **ENC Phase Lock**.



## **savvyPanel** Operator Station

Computers, Apple® mobile digital devices; iPad®, iPhone®, and iPod Touch® are operator touch stations with **savvyPanel**. Requires Windows(XP, Vista, 7), Mac OS X, Linux-based Ubuntu, or iOS®.

- The configuration is stored in the **drive.web** devices.
- **savvy-SFD** upgrade is required to edit or build **savvyPanel** systems.
- **dwOption-26 savvyPanel**, must be installed in **drive.web** devices to enable the full suite of tiles. A limited set is available without the option.



## Get **savvyPanel** free from the Apple App Store<sup>SM</sup>

- When your iPad or iPhone is connected to the internet via WiFi, demo mode connects to a live drive system in our plant in Maryland, USA.
- Explore the demo with **savvy**. Select **File** menu> **Demo Mode** > **Discover Internet Demo Devices**.

## **savvyPanel** Pages

**Systems Page** where multiple **savvyPanel** systems are present.

- A **savvyPanel** system may contain tiles from many **drive.web** devices.
- A **drive.web** device contributes to only one **savvyPanel** system.
- Touch the systems button,  or , in the window bar to access the systems page from home page. Lock this button with home password.

**Home Page** is the first operator page in a **savvyPanel** system.

- Access home page from any operator page with the home button, . Lock with the home password.

**Operator Pages** show graphic, page-link, and parameter tiles.

- Pages can be renamed. Page name appears in window title bar.

## savvyPanel Tiles

**Parameter Tiles** - Touch a settable parameter to set. Setter includes slider; keypad, 1x and 10x increment and decrement, return-to-default, and revert.

**Graphic Tiles** - Create diagrams with process elements.

**Page-Link Tiles** - A graphic tile that is also a page-link. Touch to change the view to that page.

**Device Tiles** - Link to device's signal flow diagram in Java-based **savvyPanel**. Appears as graphic tile in iOS.

## Function blocks enable **savvyPanel** actions

**Alarm Annunciator** - Provides a system-wide alarm annunciation when active. Touch to view page 255.

**Presence Monitor** - Indicates the presence of a tagged **savvyPanel** application viewing a particular page.

**Latch and SR Latch** - For lighted start-stop pushbuttons.

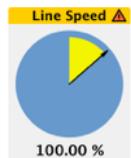
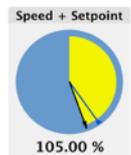
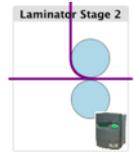
**Setpoint & Monitor** - Adjust meter and setter range. Dual blocks enable dual-display meters.

**Enumerated Parameter** - In **Utility** group. Only custom enumerations appear in the setter and multi-position switch.

## savvyPanel Launch, Setup, and Important Notes

- See the **savvy** user manual for detailed instructions.
- Launch **savvyPanel** via command line or batch file.
- Limit operators to **savvyPanel** only. Specify start system and page.
- Discover devices automatically, specifically by discovery file, or filtered by group and/or **savvyPanel** name.
- Operator's note: If communication with a **drive.web** device is interrupted, affected tiles indicate a yellow bar with a warning symbol. The tile is not updated.

**Important Design Note** - An over-range enumeration is required if an out-of-range value could cause a hazard.

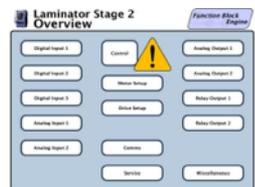


## Get Started, *Optidrive P2* Commissioning

- Drive parameters can be read by default, but the drive must be configured for control.
- **savvy** checks drive parameters and displays a yellow warning triangle in the drive **Overview** screen and in the **Control** function block if parameters are not set for control.

**Warning!** The drive will start if the drive's control terminal 2 is connected! Dangerous Voltages and rotating machinery may result!

1. Click the yellow triangle.
2. **savvy** prompts that it will set the relevant parameters to enable **drive.web** control. Click **Proceed**.
3. If you can not verify the control terminals or you do not wish to configure the drive's control terminals uncheck **Load Default FBE Program**.
4. Check that the yellow triangle does not appear in the drive **Overview** screen or **Control** function block.



## Get Started, *Optidrive P2* Commissioning continued...

- *Speed Setpoint* is scaled by Motor Rated Frequency, P1-09.

Clamp  $|\textit{Speed Setpoint}| \leq (\text{P1-01Hz}/\text{P1-09Hz}) \cdot 100\% \text{ max.}$

Larger values are ignored.

Use the *Scaler* parameter to change the base speed in both *Speed Setpoint* and *Speed Feedback* parameters in the *Control* function block.

- *Torque Setpoint* is only active in vector modes, P4-01 = 0 or 1, Vector Speed or Vector Torque.

## *smarty* Flexible Analog & Digital I/O Blocks

**Analog Input Function Block** - 16-bit resolution.

Available for all *I/AO* and *I/DO* terminals.

**4-20mA Input Example** - Connect external resistor, **R**, 100Ω to 500Ω, to a *0V* terminal.

$$\textit{Offset} = -25\%, \textit{Scaling} = 0.016 * \mathbf{R}\Omega.$$

### **Digital Input Function Block**

Available for all *I/AO* and *I/DO*.

**Selectable ranges 5V, 12V, & 24V.**

### **Analog Output Function Block**

Available for all *I/AO* terminals.

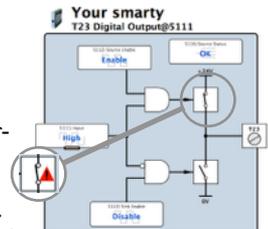
**±10.5V, 10mA max output.**

### **Digital Output Function Block**

Available for all *I/DO* terminals.

**+24V, 50mA max. Enable Source and/or Sink.**

Source drivers shut down in case of overheating or over-current. A warning triangle appears in the function block and its *Source Status* parameter indicates **Fault**. Click *Source Status* for a **Reset** button. Also, a **Reset** function block in the *I/O (I)* list set. **Note!** Resetting a digital output briefly resets all I/O!



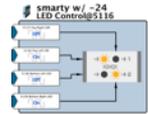
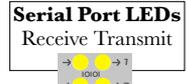
**Warning!** Avoid permanent damage to *smarty*. When *Sink Enable* is active, that terminal **MUST** be impedance-protected, current-limited, or fuse-protected with a **fast acting 0.1A fuse**.



## smarty Internal Hardware Options

Serial ports LEDs in *smarty* front panel.

- Data received and transmitted at Ports 1 and 2 with serial port options, **17** to **23**.
- Encoder options, **15**, **16**, **18**, **22**, and **23**, transmit *i2i* data to Port 2. Receive LED is always lit with option **15** or when remote encoder module is powered-up and connected.
- Custom LED control with options **24**, **27**, **28**, **37**, and **38**. Find *LED Control* block in the *I/O (1)* list set.



### Signal Wiring Notes

Use twisted-pair wiring for encoder and serial differential signals.

- Outside metal enclosure, use shielded cable with individually shielded twisted-pairs such as **Belden 8163**. Ground shield at one end with a 360° ground clamp where cable enters “quiet” metal enclosure.
- Separate wiring from AC power cables or RF noise sources.

### dwOption-15 Internal Incremental Encoder

- Encoder isolated supply output, +5Vi, 200mA max.**  
If encoder is powered from a different source, a connection from that 0V to *T8 0Vi*, is **required**.
- Differential inputs are **±2V to ±24V max**, up to **500kHz max**.
- Status* parameter must read *OK*. Other indications result in speed *Output* = 0.00 %. Faults are listed at right.
- Comms Fault* or *Comms Errors* may result from overloading **+5Vi**, extreme RF noise coupling, or a hardware fault.
- A filter in *ENC1 Speed* function block reduces quantization noise. Higher PPR encoders or speeds allow smaller filter size. Default, 15, provides filter size = 15 · 4.78ms.

Terminals	
T3	A
T4	$\bar{A}$
T5	B
T6	$\bar{B}$
T7	+5Vi
T8	0Vi

#### Encoder Fault Detection

Short Circuit or Open Circuit
-10V<V Common Mode<13.2V
Vdifferential  < 275~475mV

### dwOption-16 i2i External Encoder(s) on Port 2

Intelligent 2-wire Interface receiver. Unpolarized & isolated, 1000' max., for *dwOption-40* or *-42*, External Encoder Module. See separate manual, HG502613.

### dwOption-24 Add Six Digital Inputs at T3-T8

- +25V max, -0.6V min**, 8.2kΩ input impedance.
- See page 10 for *Digital Input* function block and threshold info.

## smarty Comms Interfaces-Modbus & EIP/PCCC

**Warning!** Use of **smarty** comms interfaces, ModbusTCP, ModbusRTU, and EIP/PCCC, may cause motors and machinery to energize with high Voltages, or start, or operate in an unexpected, dangerous, or lethal way.



- For Modbus specs go to <http://modbus.org/specs.php>

### smarty Comms Server *dwOption-04, -17, -18, & -25*

- **Note!** You cannot write or force parameters that are read-only or have incoming **drive.web** connections.
- Click the **Comms Server** icon in the **FBE** or **SFD** view.

#### **dwOption-04 ModbusTCP/IP slave/server**

- Supported Modbus Function Codes; 1 thru 6, 15, and 16.
- Supports up to **five simultaneous clients/masters**.

#### **dwOption-25 EIP/PCCC Server**

- Supports PLC5 Typed-Write and Typed-Read commands.
- See Appendix B of the **savvy** User Manual for information and **drive.web** parameter IDs mapping to PLC5.
- Supports up to **two simultaneous clients**.

## smarty Option Manuals Available Online

Go to the **Get savvy** page at [driveweb.com](http://driveweb.com) and scroll to the bottom.

#### **dwOption-17 to -23 ModbusRTU** Product manual HG502421.

- Dual serial ports. Bus-sharing and networking information.

#### **dwOption-27 Frequency IO** Product manual, HG503056.

- Input frequencies 1Hz to 100kHz. Outputs 10Hz to 20kHz.

#### **dwOption-30 & -31 High Voltage Digital I/O** Product manual HG502622.

- Two 3A, NO relay contacts, 4 opto-isolated AC digital inputs.

#### **dwOption-37, -38 Dual Stepper Controller** Product manual, HG503431.

- **5V Step and Direction Outputs**, up to 500kHz.
- High-speed event inputs or i2i remote encoder module input.

#### **dwOption-40 to -46 External Encoder Module** Product manual, HG502613.

- Dual encoders with retransmit for electronic line-shaft, registration, etc.

## drive.web Training Courses

Free online interactive training seminars take about one hour.

Specialized online and factory training sessions are also available.

To register email [training@driveweb.com](mailto:training@driveweb.com) or call.

