drive web dw250 Universal Automation Controller Installation Guide

Contents

drive web dw250 Universal Automation Controller

Product Information

Product Name	smarty drive.web
Model	dw250, dw254, dw258, & dw259
Product Type	Universal Automation Controller

Product Usage Instructions

To ensure safe and efficient usage of the smarty drive.web, please follow the instructions below:

1. Ensure that the smarty drive.web is installed by qualified professionals.
2. Avoid using the smarty drive.web in a manner not specified in the user manual, as it may impair the provided

protection.

3. Do not connect any smarty terminal to mains circuits.
4. Avoid exceeding any minimum or maximum values to prevent permanent damage to the smarty drive.web.
5. To find the smarty model and firmware version, use the savvy software and access the detailed information from the smarty contextual menu (refer to page 6).

smarty7 Models and Options

Model	Description	Software Options
dw250	Universal Automation Controller (UAC)	A=04 and 26
dw254	UAC for P2 industrial vector drive	B adds 05 and 25
dw258	UAC for E3 open-loop vector drive	C adds 06 and 39
dw259	UAC for CANopen server devices	D adds 10 and 29

Please refer to page 12 for more information on the software options available for the smarty7 models.

Note: The smarty drive. web is designed to comply with various standards, including EMC Standard, LVD Standards, and FCC Rules. It also contains recyclable materials.

Design Statements

This process control equipment to be supplied by Class2, LPS, limited power supply.
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.

SMAsmartyRTY , HSAVVYG504266Is, SA sVVY1.0 PANEL, nd D RIVE.WEB are trade markPas gofe 1Ba/12rdac Corporation, registered in the U.S. and other countries.

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.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR “AS IS” AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

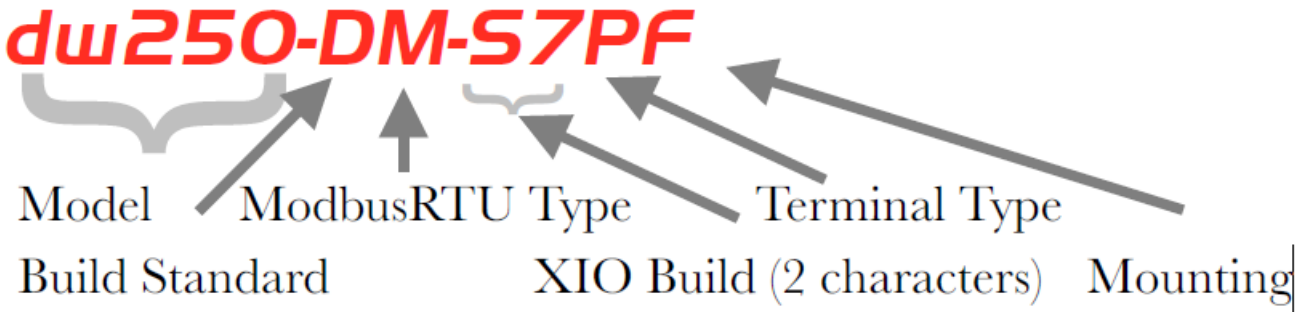
Product Identification

The smarty7 dw25x Series are Universal Automation Controllers (UAC) Find smarty model and firmware version. Use savvy, Get Detailed Info from smarty contextual menu. See page 6.

Product Identification – Part Numbers

Model number dw25x is appended with a three character extension.

Example;



smarty7 Models
dw250 Universal Automation Controller, (UAC).
dw254 UAC for P2 industrial vector drive.
dw258 UAC for E3 open-loop vector drive.
dw259 UAC for CANopen server devices.

Build Standard A, B, C, and D – Software Options

A=04 and 26, B adds 05 and 25, C adds 06 and 39, D adds 10 and 29. 04 ModbusTCP/IP – Server-slave. See page 12.

b Recommended for most applications.

06 Winder Control – Diameter Calc., Taper Tension, Torque Comp. 10 Math – With advanced math functions.

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.

39 Precision Motion – With event, length, position, shaft-lock, indexing, motion control, cam profile, and more. Page 12.

ModbusRTU Type, Options M, S, X

M – ModbusRTU Client-Master with speeds up to 500kbps. See page 12

S – ModbusRTU Server-Slave. Read or write any parameter in the device remotely. See page 12.

X – No ModbusRTU capability.

XIO Build S7, HV, CL, XD, XA

S7 – Standard, no XIO option installed.

HV – Ten Digital Inputs, presets for 24VAC, 120VAC, or 240VAC.

Six Digital Outputs, 24VAC to 240VAC, 0.5A with ZVS.

CL – Sixteen 4-20mA inputs.
Eight digital out/in, separate source up to 24VDC, 300mA shared.

XD – Sixteen digital inputs, 3V to 30V logic with 5V and 24V enumeration.
Sixteen digital outputs/inputs, separate source up to 24VDC, two 300mA shared banks.

XA – Four separately-isolated, milliVolt analog inputs w/ 5V excitation and cold-junction compensation for load-cell, thermocouples, RTDs, 2V max.

Terminal Type P

P – Plug-in screw terminals; six blocks of 10 terminals; 60 total. See page 4.

Mounting D, S, F, A, 4

D – DIN rail edge mounting without flex clip.

S – DIN rail side, flat mounting using standard clips.

F – Flex mounting; DIN rail edge or DIN rail flat with flex clip.

A- Spacer mounting with four bolt holes, see page 5.

4 – NEMA4X enclosed.

Installation

smarty is designed for permanent installation by qualified professionals. Install smarty in metal enclosure with no

RF noise source.
DIN rail mounting – Use 35×7.5mm rail per IEC 60715 or EN50022. Environment – UL/IEC Pollution Degree 2.

Operating temperature, 0°C min., 40°C max. Storage temperature, -20°C to 50°C. Altitude 3000m max. Humidity 95% max. non-condensing.

Clearances

must be provided all around to promote airflow, 5mm (0.2”) sides, 25mm (1”) above and below.

Terminal Naming and Ratings

Terminal names are consistent in the drive.web savvy software, on the terminal, and on the cover plate next to the terminal.

24VDC and 0V Terminals are internally connected.
Regulated DC Supply, 25.2Vmax, 22.8Vmin, 1A.
External 1A fast-acting fuse or current-limiting is required! Do not connect to a distributed DC power network.
Supply from Class 2, LPS, limited power supply, from within the same electrical enclosure, only.

AI – Analog inputs. -11VDC to +11VDC, 100kΩ, 1kHz, 16-bit. Also configurable for 5V or 24V logic digital input. 30V max.

AO – Analog outputs. Bipolar, -10.5VDC to +10.5VDC. 10mA.

DI – Digital inputs. 50VDCmax, 8VDC threshold, 3V hysteresis. 1kHz. Configurable as event inputs.

DO – Digital outputs. 24VDC source, up to 300mA, shared.

Resistive, general use, and pilot duty. Overcurrent protection and software indication. Also configurable as digital inputs. Maximum Voltage is 25.2VDC.

1A+ – Example: Encoder 1 Channel A+. Differential or single- ended, incremental, quadrature encoder input. 24VDC max, -0.5VDC min., Up to 1MHz. 2A and 2B can be configured as marker inputs.

FT – Frequency, timing, event, stepper, or digital input and output. 30Vmax.

Use FI function blocks for inputs 100kHz. Configurable for 24V logic or 5V logic with pull-up or pull-down. Configurable for frequency, counter, event, or digital input.
Use TO function blocks for outputs. Configurable for stepper, frequency, or digital sinking output. 20mA, 500kHz max.

TO7 – Same as FT TO above but also configurable as a digital input and a unipolar analog input with settable range.

+5V Power supply output for use with encoders, sensors, etc, 250mA max.

Terminal Wiring

Strip 7mm(0.28”). 1.5mm2 (AWG16) max. One wire with ferrule, 0.8mm2 (AWG18) maximum.
Use shielded cable for runs over 30 meters.

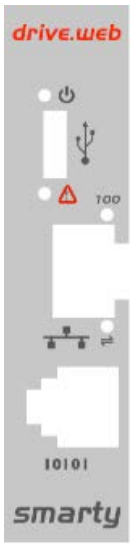
Fast transient over-Voltage 1kV per EN 61000-4-4.

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.
- Sep rom AC power cables or RF noise sources.

Front Panel



USB port – USB-C jack. Full/high speed. Can be used 10BaseT, Full Duplex, Auto Negotiation, Auto-MDIX, IEEE 802.3ab.

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

Indicator LEDs in front panel

Status – Blue LED. Status heartbeat pulses twice a second.

Fault – Red LED indicates a fault. Check power supply, connect with savvy, or contact us at drive .web for more info.

Ethernet link/activity – Orange LED indicates Ethernet connection and blinks for activity.

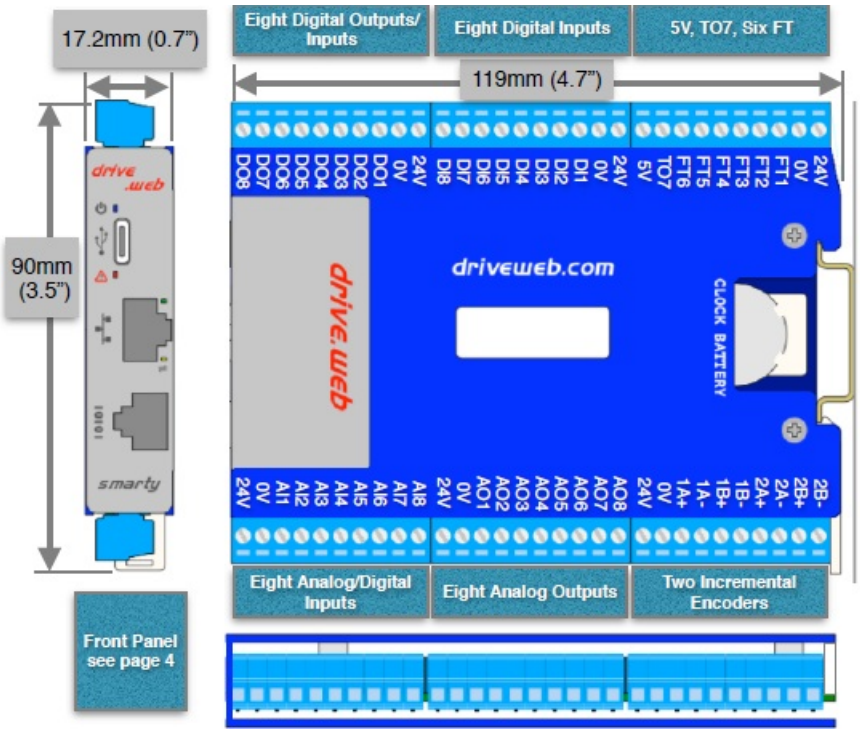
100BaseTX Green LED when connection is 100BaseTX.

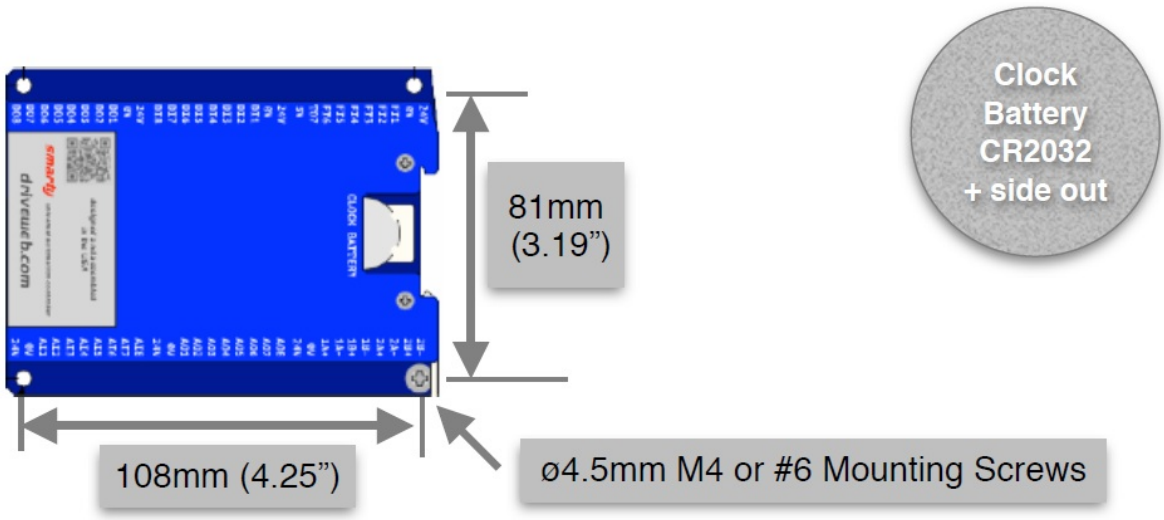
DRIVE Serial Port

- 6P6C Socket marked ‘10101’
- ModbusRTU EIA485. See page 12.
- CANbus connection for dw254, dw258, and dw259. See page 12. 1m max. cable length. Do not add

termination resistors. These are built-in.

Dimensions, Overview, and Terminal Map





Real-time Clock

- The real-time clock is only used for time of day and calendar functions. It can be set automatically by PTP to other drive. web devices, automatically upon discovery in the drive. web savvy software, per preferences, or via SNTP network time server protocol. See the savvy user manual for details.
- The real-time clock will be maintained for approximately 24hrs after supply power loss with no backup battery. Alternatively the clock can be powered by the USB port.
- Lithium button cell battery, CR2032, 3VDC, commonly found in convenience stores, is not provided from the factory due to shipping restrictions.

Frequency Input Notes (FI Terminals)

FI Digital and Event Input Function Blocks

- Maximum event frequency is 1/(2*FBE cycle (s)) Hz. E.g., for 5ms FBE cycle, the max event frequency is 1/10ms = 100Hz.
- Use Digital Input function block Input Type parameter to configure;

FI Input Type	Threshold VDC	Threshold Min. VDC	Threshold Max. VDC
5V Logic with pull- down	2.0	1.0	3.0
5V Logic with pullup	1.4	0.4	2.4
5V Logic	1.7	1.0	2.4
24V Logic with pull down	8.4	5.0	11.8

FI Counter Inputs – Provide frequency data with adjustable moving-average filter and count outputs for use with motion control function blocks.

FI Frequency Inputs – Useful for lower frequencies ~<10kHz. Duty cycle is also measured. Updates every FBE cycle or two-edge cycle.

Programming

Set up your computer – Get savvy

With free drive.web savvy software, easily program and monitor your smarty, perform data trending, and create distributed control systems.

- Go to **www.driveweb.com** and click on Get savvy, or contact us to get the latest version of savvy.

USB – Plug and Play
Plug-and-play access to smarty and its local Ethernet network.

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. are shipped with an IP address, 10.189.x.x, derived from the serial number. The six-octet serial number always starts with 0-4-bb-x. The last two octets are used to assign the as-shipped IP address; Example, if the serial number is 0-4-bb-00-1a-2b, 1a is converted from hexadecimal to decimal, 26. 2b, similarly, is 43, decimal. The as-shipped address is 10.189.26.43.
- 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.

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 with IP address beneath. Drive-dedicated models depict the actual frame size of the drive.

- If the icon at right appears, a network connection problem exists. Check connections, LEDs, and that the 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

- Modification to allow viewing the configuration, 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.

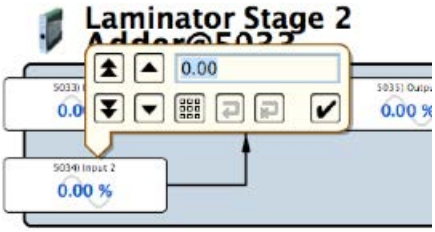
Connect between parameters and other drive.web devices.

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

Data is formatted, limited, and scaled depending on the parameter. Use Get Info or Re-Scale… to verify or change.

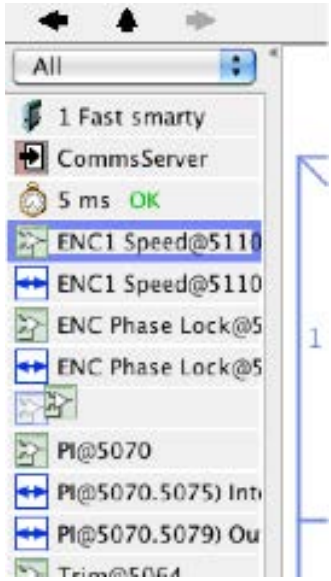


Click parameters for the Setter Box – Increment, decrement, default, last state, or keyboard entry.
Click blue connection block or arrow to jump to other end.

Upgrade savvy and smarty

- Upgrade savvy with SFD Signal Flow Diagram.
- Upgrade smarty with 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 Voucher codes on separate lines.
- To process Coupons, go to the Commerce menu and choose Coupon Manager. Enter codes in the top box and click the Add button and the coupon is recognized. Click Apply.

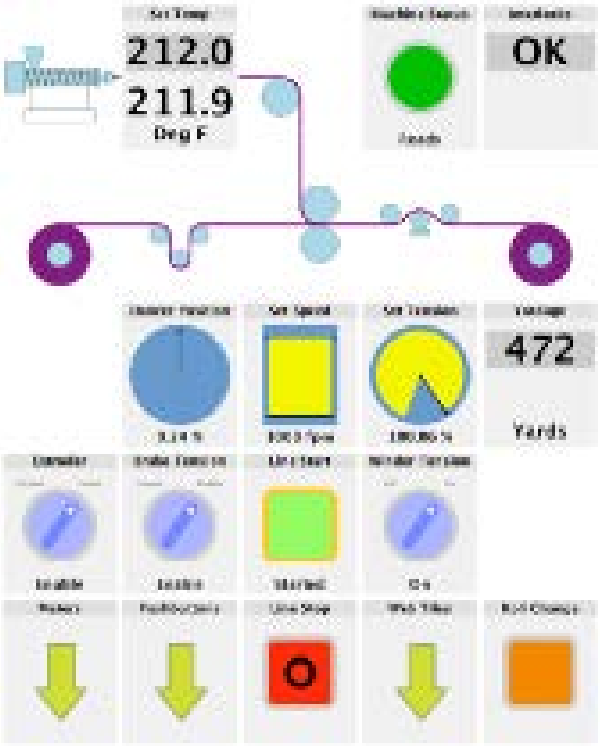
Signal Flow Diagram Upgrade



- With savvy-SFD, build systems graphically. The live drawings are stored in your smarty.
- Set drawing borders and annotate multi-page drawings.
- A filterable 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.

Operator Station

Computers, Apple®, and Android™ mobile digital devices are operator touch stations with savvyPanel. Requires Windows, Mac OS X, Linux-based Ubuntu, Android, or iOS®.



- Configurations are 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 Apple App Store℠ and Google Play

- When your mobile digital device 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 > Demo Mode > Discover Internet Demo Devices savvy Panel 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.

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 \ 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.

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.

Precision Motion Parameters, Connections

Special parameter and connection types from I/O function blocks.

Connections may also be over Ethernet to other drive.web devices without performance penalty.

Floating Point – IEEE-754 Binary32, wider range and resolution. Can be connected to or from standard, 16-bit parameters; 1.0000 float equals 100.00%.

Event – Events are associated with exact count values.
Maximum event frequency is (1/(FBE Timebase seconds)) Hz. Only the first event is processed per FBE cycle. Count – Position applications; shaft-lock, registration, motion

Comms Interfaces-CAN open, Modbus, EIP/PCCC

Warning! Use of smarty comms interfaces may cause motors and machinery to energize with high Voltages, or start, or operate in unexpected, dangerous, or lethal ways.

- For Modbus specs go to **http://modbus.org/specs.php** smarty Comms Server dwOption-04 and -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.

ModbusRTU
M=Master-Client, S=Slave-Server, X=None. See pages 2 and 4.

- Modbus Function Codes FC 01 through 06 and 16 are supported. Also special Yaskawa Holding Register.
- Each server's Modbus address must be unique on the network! All devices on the network must have the same baud rate, up to 500.0kbps, and the same character framing.

Generic CANopen Master

- Dedicated to a single server device at speeds up to 1Mbps.
- 1m max cable length.
- Do not use termination resistors. These are built-in.
- Use CANopen Setup function block to configure.

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** or call.

Documents / Resources

	**drive web dw250 Universal Automation Controller** [pdf] Installation Guide dw250, dw254, dw258, dw259, dw250 Universal Automation Controller, Universal Automation Controller, Automation Controller, Controller

References

- **Modbus Specifications and Implementation Guides**
- **Internet-Accessible Distributed Control Technology | drive.web**