

# dw117 to 121 Installation & Operation Manual

## drive.web speedy485

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### Warning!

It is essential that you read and understand this entire manual, the Product Manual(s) for all devices connected with Modbus or **drive.web** and the entire contents of the **savvy** software “Help” menu before proceeding with your installation and product configuration. For more information and copies of product manuals and software, go to [www.driveweb.com](http://www.driveweb.com).



### Warning!

Your use of **savvy** software, **drive.web** devices with Modbus 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 you are working with before attempting to program or edit a program or connect to any live device.



### 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.

## drive.web Introduction

Rugged, versatile, and easy to use process and drives management system. Interface, add functionality and internet connectivity to any ModbusRTU enabled devices:

**Generic Modbus RTU Master**, dw117 and dw121.

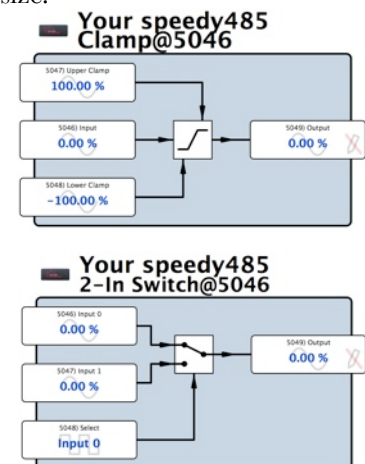
**Invertek Optidrive Plus and VTC** with dw118 and dw121.

**Yaskawa YF7** with dw119 and **Yaskawa V1000** with dw120.

Create large integrated systems. Processing bandwidth is not affected by system size.

## speedy485 Features

- drive.web** distributed process control over **Ethernet**
- Modbus TCP/IP Slave** Ethernet enabled slave/server included.
- Internet accessible** configuration, monitoring & control.
- “**Drag ‘n drop**” easy connections with graphical documentation.
- Automated, on-line upgrades with **savvy** software.
- Optional Function Block Libraries** Process, Winder and Math.
- Function Blocks**; Complete drive control and monitoring with dw118-120, Math, logic, PID, comparator, filter, latch, timer, counter, ramps, winder diameter, taper tension, torque compensator, more.



## speedy485 Base Models

All **speedy485** models include **drive.web** over Ethernet distributed process control, **Basic Control** Function Block Library with arithmetic, logic, PI, clamps, data switches and more. See page 8 Also, **Modbus TCP/IP Slave**. See page 6.

**dw117 speedy485** controller with ModbusRTU Master or Client, EIA485 via standard terminal block, up to 115kbps.

**dw118 speedy485-o** Control your **Invertek Optidrive Plus** with dedicated serial link and extensive parameter control and monitoring.

**dw119 speedy485-yf7** Control your Yaskawa F7 Drive with dedicated EIA485 serial link via a standard terminal block. Extensive drive parameter control and monitoring.

**dw120 speedy485-v1000** Under Development, Please Call.

**dw121 speedy485-6p6c** controller with ModbusRTU Master or Client, EIA485 via 6P6C RJ jack, up to 115kbps.



## speedy485 Available Options

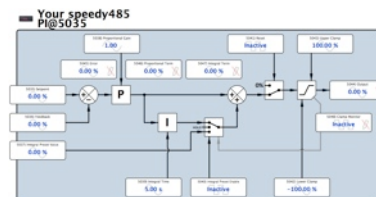
See Appendix A for a complete listing of function blocks by library and option.

**05 Process Control.** Function Block Library 1 - Math, Logic, PID, Switches, Comparators, User log, Latch, Filters and more.

**06 Winder Control** Function Block Library 2 - Diameter Calculator, Taper Tension, Torque Compensator.

**10 Advanced Math** Function Block Library 3 - Trig, Polynomials, Roots, Log, Exponent, more.

**Options Important Note**, these software options are easily field installed, follow the upgrade guide under the **Commerce** menu in **savvy**.



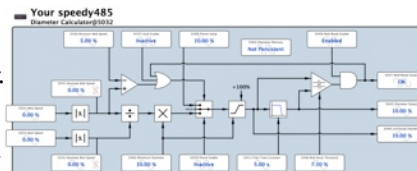
## speedy485 Winder Specials

Include options **05** and **06** and pre-installed winder **system configuration**

**1101 speedy485 winder 1** Open Loop Constant Tension Center Winder.

**1102 speedy485 winder 2** Closed Loop Dancer Control Center Winder.

**1103 speedy485 winder 3** Closed Loop Loadcell Control Center Winder.



## speedy485 Installation



**Warning!** **Dangerous, High Voltages** that may cause **injury or death** are present on drives, motor controllers and other industrial devices!

Only qualified personnel who are completely familiar with the device that the **speedy485** will connect to should proceed!



**Dimensions and Weight:** 4.25”(dw117,119 4.7”) x 1.8” x 1.15” (107(119) x 46 x 30 mm). 3.4oz(97g).

**Power Requirement:** 24VDC ±15%, ~50mA, ~1.2W.

**Storage and Operation Environment:** Clean air, Temperature range; 0 to 50C.

Humidity less than 95% non-condensing.

**Ethernet Port** Standard RJ45 8P8C, 10BaseT, Link and Activity LED's

**Mounting:** Adhere the **speedy485**'s self-adhesive hook and loop strip on or near the drive or EIA485 device. Be careful not to obstruct any air vent holes or access points and do not obscure any product labels. Do not attach the **speedy485** near any hot spots such as heatsinks, cooling fans, etc., nor near to drive power terminals.

**speedy485 Installation** continued...

**Wiring Notes** All signal wiring should be **twisted-pair**. All 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 metal enclosure. Route all wiring away from RF noise sources and AC power cabling.

<u>Data</u>	<u>EIA485 Name</u>	<u>Description</u>
A	A or "Data -"	Inverting Pin
B	B or "Data +"	Non-Inverting Pin
C	Data 0V	EIA485 Reference Common



- ⚡ A and B must share a single twisted pair. C may use one or both conductors in another pair. Do NOT pair C with any other signal.
- ⚡ Industrial wiring practices usually recommend **cable shields land at only one end** to prevent ground loops so C connection may not be properly made with the shield.
- ⚡ Long cable runs can mean large potential ground differences. Connect a 100 Ohm isolation resistor in series between C and a **Data 0V** or **Reference Common** terminal on your networked device. **Note.** **drive.web** devices with **option 02, 12, 18, 19 or 23** include this resistor and a dedicated C terminal.
- ⚡ If you require a network over 150 meters long, contact us for technical manual HG502436.

**dw118 Set up Your Optidrive Plus**

- ⚡ Check your **model number** and **firmware revision**. **P0-28** and **P0-29** should indicate 2.2 or higher. Model number must end in **-M** for firmware revisions less than 3.0.
- ⚡ Check that **baud rate** and **drive communication address** are at default settings. **P2-26** must be **115.2 kbps** and **P2-27** must be **1**.
- ⚡ If your **ODP** is part of an **Optibus** network, use the Data Cable Splitter, OD485SP-IS to allow communication with your **speedy485**. The **speedy485** will only communicate with the master.

**dw119 Set up Your Yaskawa yf7**

- ⚡ Check parameter **U1-14**, Flash ID = 3020. This is currently the only supported software.
- ⚡ You will need to connect the terminals, **S-** and **R-**, together for **EIA485-** or **A**. **S+** and **R+** connected together make the **EIA485+** or **B** connection.
- ⚡ Set the **baud rate** at parameter **H5-02 to 4** for 19.2 kbps.
- ⚡ Check the **Modbus Unit address, Parity and Delay times** are at default settings:
  - H5-01 = 1F = Address, decimal 31
  - H5-03 = 00 No Parity
  - H5-06 = 05 Minimum delay, 5ms
- ⚡ Set H5-04, Stopping Method and H5-05, Serial Fault Detect to set drive response to serial coms loss.
- ⚡ **Important Note:** You must cycle the **YF7**'s power, waiting for the screen to blank before repowering, in order for the changes to take effect.

## speedy485 Ethernet and savvy

It is important to have a basic understanding of Ethernet TCP/IP networks. Assigning an invalid or duplicate IP address will cause serious network malfunctions! **speedy485s** are all shipped with the IP address, 10.189.189.189. Consult your company's IT department for an appropriate, unique IP address.

Find useful networking information in the *Basic Network Administration* in the **savvy** user manual under the *Help* menu.

### Set up Your Physical Ethernet Network - You Will Need:

A standard Category 5e cable (with 8P8C/RJ-45 connectors on both ends) for each **drive.web** device and your computer.

For systems with more than one **drive.web** device, an Ethernet switch with sufficient ports to support all your **drive.web** devices and your computer.

### Set up Your Computer - Get savvy

With free **drive.web savvy** software, easily program and monitor your **speedy485**, perform data trending and create distributed control systems.

Download the latest version of **savvy** and view the **savvy** user manual. Go to [driveweb.com](http://driveweb.com), click on *Get savvy* or get **savvy** on the **Bardac Infodisk**.

**Windows** users will need to have **Java Runtime Environment** installed to run **savvy**. There is a link on the *Get savvy* page to download Java for free.

### Get started with savvy

Before proceeding with your systems designs it is very important to familiarize yourself with **savvy**, the configuration software.

We strongly recommend that you read the introductory guides under the *Help* menu; *Getting Started with savvy*, *Getting Started with savvy-SFD*, and *savvy-SFD and the PL series drive*.

Use *Create Phantom* in the *Directory* menu to practice, explore all **drive.web** products and options and design and configure off-line. Design systems in Phantom devices and *Export Data* under the *Directory* menu for later use in live devices. *Import Data* into phantoms to work off-line.

We strongly recommend you attend our free on-line training seminars. Call us or email [training@driveweb.com](mailto:training@driveweb.com) to register.

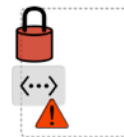
Under *Directory* menu, click *Discover All Local Devices*. If your **speedy485** is powered up on the same local network as your computer, an icon should appear.

Discover **drive.web** devices anywhere on the internet unless they are protected by firewalls or other network security devices. Assign a public IP address or use a VPN. Under the *Directory* menu, click on *Discover Device...*

If the icon at right appears with the red padlock and comms-fail indication, a network connection problem exists. Check connections, LEDs and that the **speedy485** IP address is within your computer's subnet mask.

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

Under the *File* menu, click *Administrate > Set IP Addresses for System*. Locate the serial number on the product label of your **speedy485**. Enter a unique IP address that is within your computer's subnet mask and click OK. A device icon should appear with IP address beneath.



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192.168.1.25

Get started with **savvy** continued...

- Right-click on the device icon and choose **Export Device Data** to save the configuration as a **dw-system** file. Alternatively, **Export Data** under the **Directory** menu saves all devices' configurations and connections in one file. **Note! Import (Device) Data** overwrites the configuration(s) with data in the **dw-system** file.
- savvy** views are hierarchical from **Directory** view at top to **Function Block** view at lower level. Use the navigation arrows in the top margin to view the next higher level or go backward and forward through views. Note that menus change as you navigate.
- savvy** function may be limited if you do not have the required password capability level, a device is locked with a password, a parameter has an incoming connection or a crossed-out pen is shown, indicating read-only.
- Hover cursor over devices, function blocks, connections and parameters to see topical information in the top margin.
- Click any blue connection to jump views to the other end.
- Right-click on the device icon in any view for its Contextual Menu. Choose **Change Name** to name your device for easy identification. A powerful **Find Parameter...** function locates and jumps views. Simply enter a number, name or partial name.
- If serial connection with your drive is lost, its' icon will include a yellow warning triangle adornment and, if no serial connection has been made, a question mark.
- Click the device icon to view the **Device Overview** screen (Standard **savvy**, no **SFD**). Click on native drive functions, **Function Block Engine** or **Modbus** to view.
- In the Function Block Engine view (Standard **savvy**, no **SFD**), click the **FBE** menu and select function blocks in the order that you want them to be processed. Processing order is from left to right, then top to bottom.
- Click on a function block to view its parameters and functional detail.
- Right-click on a parameter for its Contextual Menu. **Get Info**, **Add to Dock**, **Copy**, **Connect to...** start or end connections, **Re-name...**, and **Re-scale...**
- Effortlessly connect between parameters and to parameters in other **drive.web** devices over Ethernet.
- Under the File menu, choose **New Viewer...** and then **Open Device Directory**. Now you can click on a parameter, **drag** a connection and **drop** onto a destination parameter in the other viewer.
- Click on parameters to open the Setter Box. Adjust the value with convenient graphical buttons or keyboard entry.
- Most **drive.web** parameters use 16 bit words allowing raw decimal integer values **0 to 65535 or ±32767**. These raw values are formatted, limited and scaled depending on the parameter. Use **Get Info** or **Re-Scale** to verify or change.
- A blank rectangle connected to or from a parameter indicates a remote device is not discovered in **savvy**.
- Right-click on any **drive.web**-over-Ethernet or **drive.web**-to-drive connection to **Change Sample Period...** Shorter periods mean faster response and higher loading.
- High loading by complex function block configurations, numerous, fast Ethernet, Modbus and/or drive connections may produce **Timebase Ovrerrun** indications at the **System** function block. Performance **WILL** be affected. Right click on the **System** block to adjust the **Timebase Setpoint**. Make a connection from **Program Status** parameter to log these occurrences, provide contingencies or warning signals.



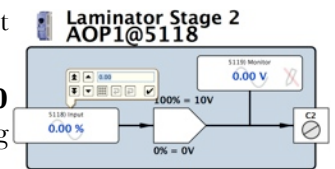
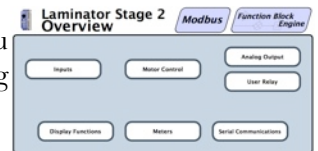
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Laminator Stage 2

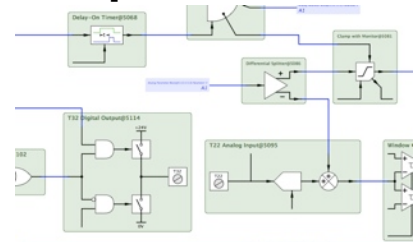


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## Upgrade *savvy* with Signal Flow Diagram Option - SFD

- With *savvy-SFD*, build systems graphically while creating live drawings that are stored in your *speedy485*.
- Set borders, drag and drop connections, zoom, pan, cross-reference and annotate multi-page drawings.
- A separate function block and connection listing shows program execution order from top down. Change execution order by dragging function blocks up or down.
- Select *Upgrade savvy* under the *Commerce* menu. Process a *Voucher* or credit card on-line any time. Contact us with the *savvy* ID shown in the *About drive.web savvy* window for an off-line upgrade *Coupon*.



drive.web ME78347.1  
 Title: Line 5 Master  
 Use With All Processes  
 A1 speedy485  
 Drawing Number: ME78347.1  
 Designed By: Ja  
 Date:   
 192.168.3

## *speedy485* ModbusTCP/IP Server

Conformance Class 0, Function Codes 03 & 16.

Supports up to three simultaneous masters.

View the *Modbus Slave* function block by clicking on the *Modbus* icon in your *savvy* system configuration.

**ModbusTCP Slave Port 502** is the standard specified in the protocol. You can change to match the Modbus master in the unusual case that it is non-standard.

Laminator Stage 2 Modbus

4112 ModbusTCP Slave Port Standard (502) Changes to the port will affect new TCP connections	4104 Modbus Slave Indirect 0 5118	4108 Modbus Slave Indirect 4 5349
	4105 Modbus Slave Indirect 1 5102	4109 Modbus Slave Indirect 5 0
	4106 Modbus Slave Indirect 2 5223	4110 Modbus Slave Indirect 6 0
	4107 Modbus Slave Indirect 3 44	4111 Modbus Slave Indirect 7 0

**Modbus Slave Indirect** parameters are sequentially numbered so all or groups can be read or written with one command. Enter any parameter number in your function block engine in these parameters. Create more *Modbus Slave Indirect* blocks from the *Utility* function block list group.

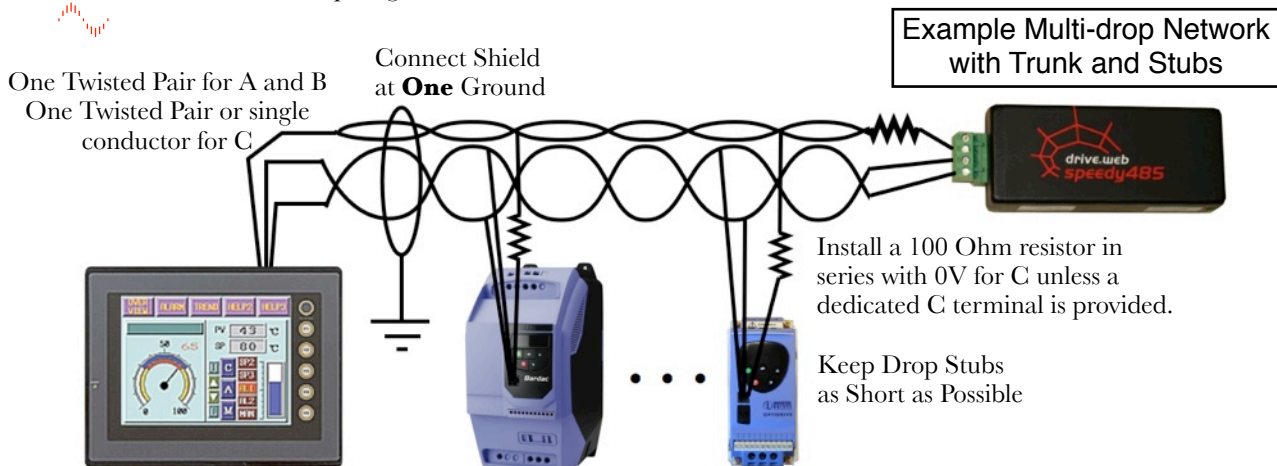
You are not required to use the *Modbus Slave Indirect* blocks. Your ModbusRTU master can directly address any numbered parameter in your function block engine.

Right-click on parameters and *Get Info*. You cannot write or force parameters that cannot have incoming *drive.web* connections nor parameters with incoming *drive.web* connections indicated by a blue arrow at left side of the parameter block.

## dw117 and dw121 Generic ModbusRTU Master

Supports Modbus Function Codes 03, 06 & 16.

EIA485 allows **multi-drops**. One master or client device can poll many slave or server devices individually. Correct multi-drop topology is daisy chain or one trunk with a device at each end and other devices on individual short stubs. Star, ring, or extended branch topologies are NOT recommended.



**speedy485 dw117 and dw121 ModbusRTU Master** continued...

It is possible to connect up to 128 EIA485 **drive.web** devices on the same electrical network, but note that this number may be reduced by other network factors.

**Comms Port Function Block**

Configure your serial port with the **ModbusRTU Comms Port** function block.

**Comms Speed.** Communications rate in bits per second (b/s). Set between **300 bps** and **115.2 kbps**. Must match the slave device's settings.

**Comms Configuration.** The character framing format is **8 Data bits-Parity-Stop bits**.

Supported character framing is:

- 8-N-1      8 Data Bits, No Parity, 1 Stop Bit
- 8-O-1      8 Data Bits, Odd Parity, 1 Stop Bit
- 8-E-1      8 Data Bits, Even Parity, 1 Stop Bit
- 8-N-2      8 Data Bits, No Parity, 2 Stop Bits

**Actual Polling Period** Read-only. Time in milliseconds, ms, required to poll all parameters defined in all the Modbus Holding Register blocks. The period is directly affected by the number of registers, comms errors, comms timeouts, and the comms sleep time.

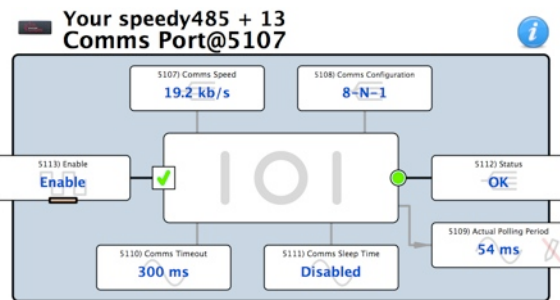
**Comms Timeout.** Time in milliseconds, ms, for the master or client to wait for a reply before moving to the next parameter in the polling cycle.

Range=0 to 30000 ms

**Comms Sleep Time.** The time delay in milliseconds, ms, between the end of the previous and the start of the next polling cycle. May be adjusted to limit microprocessor loading of the **drive.web** or slave device if serial link update performance is not a critical factor.

**Status.** Any of the Last Errors of the individual Holding Register function blocks. All individual Last Error codes can be cleared by clicking on the parameter and using the Reset button.

**Enable.** You may globally disable the serial 485 communications here.



**Holding Register INT16 or UINT16 Function Blocks**

Define the data point and the slave or server device. Create multiple instances of these blocks, one for each remote parameter. The **Holding Register's Value** parameter may have **drive.web** connections to and/or from it, allowing read and/or writes to the remote parameter.

**Modbus Address** is the unique address number between 1 and 247 assigned to your slave or server device.

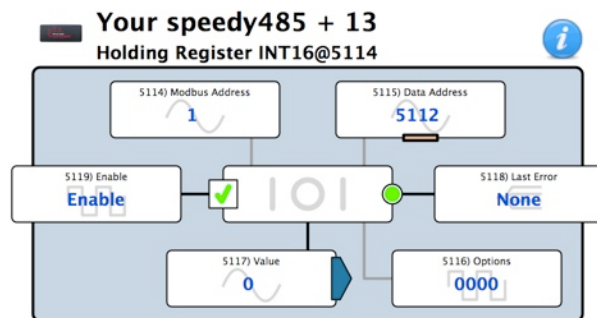
**Data Address** is the parameter identification number, PIN or register number in your server that you wish to read and/or write to/from.

**Enable** allows this register's comms to be disabled to reduce polling periods. Make a **drive.web** connection to this block for dynamic control.

**Last Error** records the last error communicating to this address. Click to reveal the Reset button.

**Options:** A check box for certain devices that require function 06 instead of 16. There is another check box for Yaskawa drives' special Yaskawa Accept/Enter function.

**Value** shows the decimal integer which is read/written to/from the slave's/ server's addressed register.



# speedy485 Appendix A Function Blocks by Library and Option

Subject to change without notice.

## Basic speedy485

<b>Arithmetic</b> 3 Adder 3 Divider 3 Multiplier 3 Subtractor	<b>Control</b> 15 PI <b>Drive Helper</b> 11 Optidrive Helper <b>Logic Gates</b> 3 AND 2 NOT	3 OR <b>Switches</b> 4 2-In Switch 4 2-Out Switch <b>Utility</b> 1 Dev. Comms Monitor 1 Indicator	4 Parameter Block 6 Watchdog 1 Watchdog Driver
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## Process Control Library Option 05

<b>Arithmetic</b> 3 Differential Splitter 4 Multiplier-Divider 3 Sign And Value 3 Sign Changer	15 PI 20 PID 8 Profiler <b>Counters</b> 17 Up/Down Counter <b>Drive Helper</b> 11 Optidrive Helper <b>Filters</b> 4 Low Pass Filter 5 Moving Average Filter	<b>Logic</b> 17 16-Bit Binary Encod. 17 16-Bit Binary Decod. 5 4-Bit Binary Encoder 16 4-Bit Priority Encod. 3 Bitwise AND 2 Bitwise NOT 3 Bitwise OR 3 Bitwise Shift 3 Bitwise XOR	17 S Ramp <b>Switches</b> 18 16-In Switch 18 16-Out Switch 6 4-In Switch 6 4-Out Switch 10 8-In Switch 10 8-Out Switch 3 Track and Hold
<b>Clamps</b> 5 Clamp with Monitor 4 Deadband 4 Skipband	<b>Drive Helper</b> 11 Optidrive Helper <b>Latches</b> 4 D Latch 5 D Latch with Reset 5 D Latch with Set 6 D Latch w/Set, Reset	<b>Logic Gates</b> 3 NAND 3 NOR 3 XNOR 3 XOR	<b>Timers</b> 5 Delay-Off Timer 5 Delay-On Timer 3 One Shot 5 Oscillator 8 Underlap
<b>Comparators</b> 4 Comparator 5 Equality Comparator 3 Maximum 3 Minimum 6 Window Comparator	<b>Control</b> 3 SR Latch 4 T Latch	<b>Ramps</b> 7 Linear Ramp 11 MOP	<b>Utility</b> 4 User Logger

## Option 04

<b>Utility</b> 4 Modbus Indirect
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## Option 06

<b>Winder</b> 18 Diameter Calculator 7 Taper Tension 30 Torque Compensator
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## Option 10

<b>Math</b> 2 ArcCosine 2 ArcSine 2 ArcTangent 2 Cosine 2 Cube 2 Cube Root 2 Exponential	2 Logarithm 2 Reciprocal 2 Sine 2 Square 2 Square Root 2 Tangent
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## dw117, dw121

<b>ModbusRTU Master</b> 7 Comms Port 48EurothermERCFW09 6 Holding Reg. INT16 6 Holding Reg. UINT16 54 Optidrive Plus 54 Optidrive VTC 48 WEG CFW09
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## Appendix B drive.web Product Line Overview

**smarty** distributed process controller simultaneously manages varied process components and drives with analog and digital I/O, up to two incremental encoders, dual serial ports, ModbusTCP/IP and RTU.

**speedy sp** and **speedy485** Processing power, tailored for your drive or generic, Ethernet, EIA485.

**savvy-SFD Signal Flow Diagram Option** Easily implement your systems designs. “**Drag n’ Drop**” connections with graphical documentation created in one step and stored in your device.

**Free drive.web Training Courses**-online training seminars 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 training available. Call or email [training@driveweb.com](mailto:training@driveweb.com) to register.

**drive.web** 40 Log Canoe Circle, Stevensville, MD 21666 USA.  
Ph. 410-604-3400, Fax 410-604-3500, [www.driveweb.com](http://www.driveweb.com)