drive.web smarty

dw110 - Installation & Operation Manual

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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 product configuration. For more information and to download product manuals and software, go to ***www.driveweb.com***.

Warning!

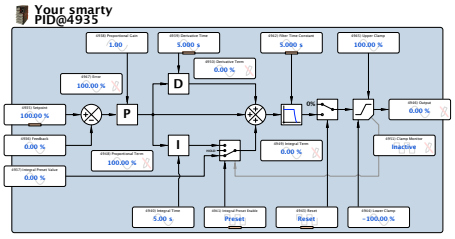
Your use of *savvy* software and *drive.web* devices may cause motors and machinery to power up with high voltages or start or operate in an unexpected, dangerous or lethal way. It is essential that you are completely familiar with *savvy* and all of the equipment and the system design you are working 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.

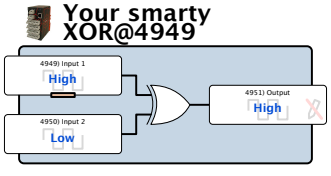
drive.web Introduction

Rugged, versatile, and easy to use process and drives management systems add computation power & connectivity to a wide range of industrial applications. Processing bandwidth not affected by system size.

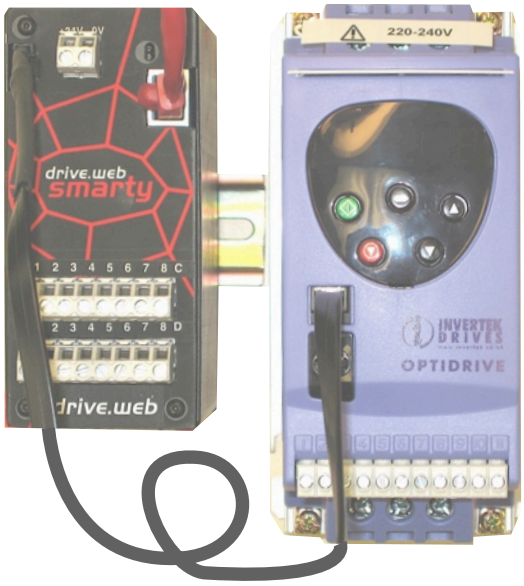


smarty Features

- *drive.web* Distributed Process Control over **Ethernet**
- **Modbus TCP/IP Slave over Ethernet** with option 04.
- **Internet accessible** configuration, monitoring & control.
- **"Drag 'n drop,"** easy connections with graphical documentation.
- Automated, on-line upgrades with *savvy* software.
- **System libraries** Basic, Process Control, Winders, Math & Encoders.
- **Function Blocks**; Arithmetic, logic, advanced PID, comparator, filter, latch, timer, profiler, counter, drive control, ramps, diameter calculator, taper tension, torque compensator for winders and more.
- **I/O options;** Universal In, Analog Out, Digital I/O, Two Encoders, Serial and Ethernet.



smarty Base Models



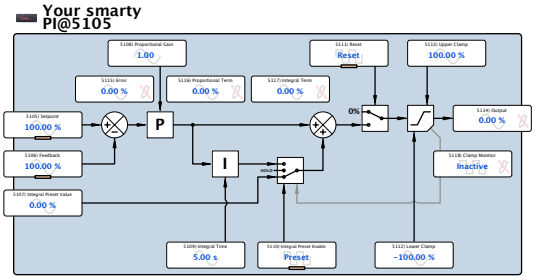
All *smarty* models include *drive.web* over Ethernet, Distributed Process Control and the **Basic Control** Function Block Library with arithmetic, logic, full-featured PI, clamps, data switches and more. Please see Appendix A for a complete listing of function blocks by library and option.

dw110- *smarty* Standard Distributed Process Controller.

dw113- *smarty-o* for Optidrive Plus AC Sensorless Vector Drives. Standard *smarty* features plus serial data link and comprehensive drive control and monitoring function blocks. Includes user manual HG502172.

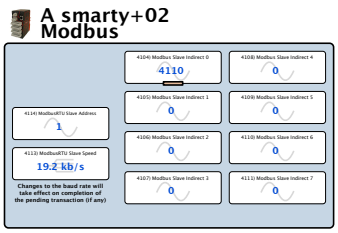
dw114- *smarty-k* for K-series and models 400i, 1600i, 3200i, 3600i single phase DC drives. Current sinking analog/logic interface to drive, standard smarty features.
Includes user manual HG502121 with application notes.

dw115- *smarty-yf7* for Yaskawa F7 Vector Drives. Standard *smarty* features plus dedicated serial data link and comprehensive drive control and monitoring function blocks. Includes user manual HG502253



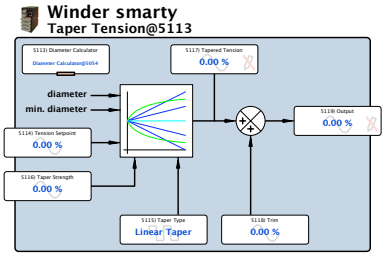
smarty Available Options

02 Modbus RTU slave. 250V isolated EIA485(RS485), up to 19.2 kbps



03 I/O Package - Please see pages 5 and 6 for details.
Seven Universal Inputs multi-range analog, digital, differential, **200V max.**
Two Analog Outputs 0 to 10V, 10 bit resolution, **10mA max.**
Three configurable Digital Inputs or Outputs. 24V, **50mA max out.**
10V Ref. w/ **10mA max.**

04 ModbusTCP/IP. Ethernet, 10baseT enabled Modbus slave/server.

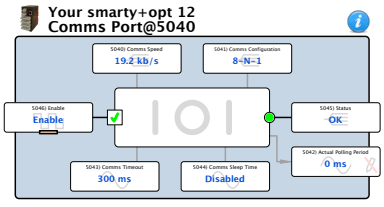


05 Process Control. Function Block Library 1 - Math, Logic, PID, Switches, Comparators, User data log, Profiler, Presets, Latch, Filters, Counters, Timers and more, see Appendix A.

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

07 & 08 Incremental Encoder 1 & 2 Inputs. Bi-directional with marker, EIA 422/485, up to 300kHz, 24V. Encoder logic, speed functions.

09 Real time clock-battery backup, calendar, and event time-stamp.

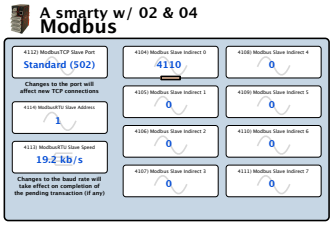


10 Advanced Math Function Block Library 3 - Trig, Polynomials, Log, Exponent, more, see Appendix A.

11 Encoder Control (Requires Option 07 and 08) Function Block Library 4 - Speed Lock, Registration, Position

12 Modbus RTU Master. 250V isolated EIA485/RS485 serial, to 115kbps

smarty Options Important Notes:



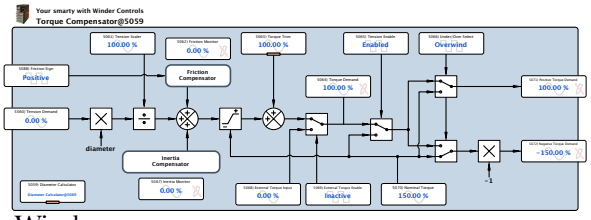
Modbus Options 02, 04 and 12 enable communication with a wide range of industrial devices from drives to operator stations, PLCs and SCADA and may cause motors and machinery to power up with high voltages or start or operate in an unexpected, dangerous or lethal way It is essential that you read and understand the entire ***drive.web*** Modbus Installation and Operation Manual, HG502421, included with these options before using them.

Options 04, 05, 06, 10 and 11 are software options, easily installed in field, using ***savvy*** to process credit cards, vouchers or coupons.

Options 02 and 12 are mutually exclusive.

Options 02 and 12 are not available with 2 encoder inputs for **dw113 & dw115**.

smarty Winder Specials

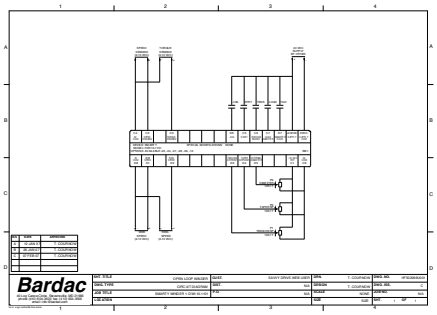


Include options **05** and **06**, pre-installed generic winder **system configuration** and a wiring diagram drawing for fast commissioning of a wide range of winder applications.

1101 ***smarty winder 1*** Open Loop Constant Tension Center Winder.
Includes wiring diagram HF502096

1102 ***smarty winder 2*** Closed Loop Dancer Control Center Winder.
Includes wiring diagram HF502106

1103 ***smarty winder 3*** Closed Loop Loadcell Control Center Winder.
Includes wiring diagram HF502118



smarty Physical Installation

Mount on DIN rail in an electrical enclosure that provides the required environmental protection.

smarty **Dimensions and Weight:** 2.3"w, 4.5"h, 4.7"d (59, 115, 120mm) 1.0 lb (0.45 Kg)

smarty **Power Requirements:** Regulated 24VDC ±15%, 50mA plus loads.

smarty is fitted with a 1A auto reset fuse

smarty **Storage and Operation Environment:** Clean Air, temperature range, 0 to 50C. Humidity less than 95% non-condensing.

smarty **Ethernet Port** MDI 8P8C, "RJ45," jack, 10BaseT, Green, link and yellow, activity LED's

smarty Ethernet Networking & Programming

Before proceeding, 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! ***smarty***s are all shipped with the **same IP address, 10.189.189.189**. Consult your company's IT department for an appropriate, unique IP address.

You can find useful networking information in the Basic Network Administration Section 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.

An Ethernet switch with sufficient ports to support your ***drive.web*** devices and your computer.

Set up Your Computer - Get *savvy*

The free ***drive.web savvy*** software allows you to easily program and monitor your ***smarty*** and create distributed control systems.

- Windows users must have **Java Runtime Environment** installed. A link on the, "get savvy," page at ***www.driveweb.com*** downloads Java for free.
- To download the latest version of ***savvy*** and to view the ***savvy*** user manual, go to ***www.driveweb.com*** and click on, "get savvy."

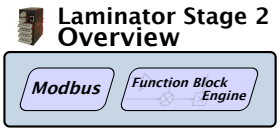
Get started with *savvy*

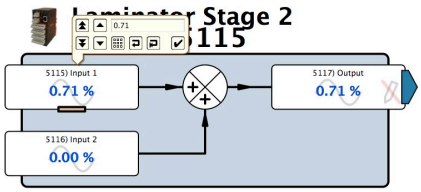
- Before proceeding with your systems designs it is very important to familiarize yourself with ***savvy***, the configuration software.
- We strongly recommend that you read the introductory guides, "Getting Started with ***savvy***," "Getting Started with ***savvy-SFD***," and , "***savvy-SFD*** and the PL series drive." Find these guides under the Help menu.
- Use the unique, " Create Phantom," feature to practice your design and configuration techniques. Design a system in any Phantom ***drive.web*** device and export it for use in your devices.
- We also strongly recommend that you attend one of our regular on-line training seminars. Contact us at **training@driveweb.com** or **call 410-604-3400** to register.
- Under the Directory menu, click on, "Discover All Local Devices." If your ***smarty*** is powered up and physically connected to the same local network as your computer, an icon should appear on the screen.
- If the red padlock icon shown above appears, your computer's subnet mask may be preventing communication with the ***smarty***. In the ***savvy*** File Menu, click, "Administrate - Set IP Addresses for System." A list will appear with a serial number that should match the label on the bottom of your ***smarty***.
- Enter a **unique IP address** that is within your computer's subnet mask. A ***smarty*** icon should now appear with the IP address underneath.
- Right click on the icon and choose, "Change Name," to name your ***smarty*** for easy identification. Now left click on the icon to view and configure.
- The first level under the icon is the Device Overview Screen. You will see the Function Block Engine and if you have option 02, 04, or 12, a Modbus icon. Left click on icons to drill to the function block level.
- Left click on function blocks to view and adjust parameters.
- Left click on parameters to open the Setter Box unless they show a crossed-out pen meaning that they are read-only. You can adjust the parameter value with mouse or keys.
- Right click on parameters to get info, add to a dock, copy, start or end connections, rename, and rescale.
- ***drive.web*** works with 16 bit words allowing raw decimal integer values **0 to 65535 or ±32767.** These raw values are limited and/or scaled depending on the parameter. This prevents illegal values and presents numbers in the most useful formats. Right click on parameters to adjust scaling to fit your needs. Check scaling when making connections.

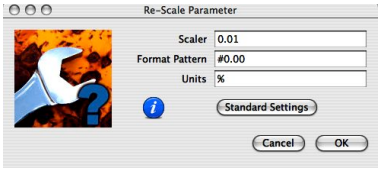
10.189.189.189

192.168.1.25

Laminator Stage 2



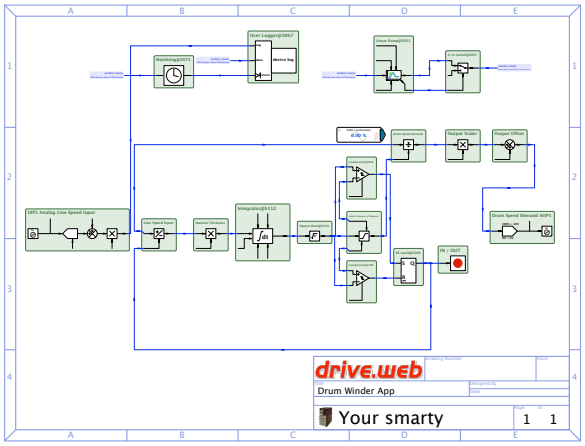




Upgrade *savvy* with Signal Flow Diagram Option - SFD

Standard ***savvy*** provides active graphical lists of function blocks or connections and can export text lists of parameters, connections and function block execution sequence. We strongly recommend that you upgrade to ***savvy-SFD***.

- With ***savvy-SFD***, your systems are implemented in a graphical manner. Professional quality engineering drawings are created and stored in your ***smarty***.
- Set borders, "drag and drop," connections, zoom pan and see your system clearly. Multi-page drawings with cross referencing and annotation are easy to create.
- You can get the ***savvy-SFD*** upgrade on-line under the Commerce menu. Select, "Upgrade ***savvy***," and install by processing a Voucher, coupon or credit card.
- Find a useful guide to this upgrade, "Getting Started with ***savvy-SFD***," under the help menu.



smarty Terminals

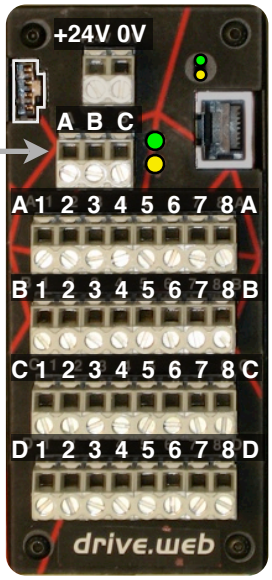
24VDC power supply input

Unisolated Serial port for dw113, ODP Interface

Serial Port-Isolated shown, Grn=Rec'd, Yellow=Xmit
(Option 02, 12, dw113 & dw115 with 07 &08)

Terminal Block A
Encoder 2 Input (Option 08)

Terminal block C
10V Ref., Analog Out & Digital Input/Outputs



10base T Ethernet port, RJ45 with Link & Activity LEDs for programming and networking

Terminal Block B
Encoder 1 Input (Option 07)

Terminal Block D
Universal Input/Outputs, 0V Ref.

smarty Option 03 AOP, DIO & UIP

Terminal	Function
C1	+10V Ref.
C2	AOUT1
C3	AOUT2
C4	0V
C5	DIO1
C6	DIO2
C7	DIO3
C8	0V

Terminal	Function
D1	UIP1
D2	UIP2
D3	UIP3
D4	UIP4
D5	UIP5
D6	UIP6
D7	UIP7
D8	0V

Terminal Block C ~ 10V, Analog Outputs and Digital I/O

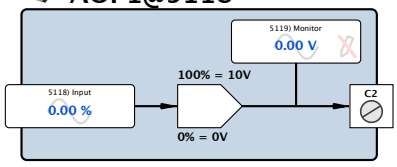
C1, 10V Reference. Supplies **10mA max** current.

C2, C3, Two Analog Outputs. 0V to 10V, **10mA max**. 10 bit res. Input parameter 0% to 100% translates to 0V to 10V output.

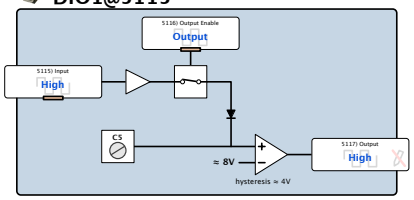
C5, C6, C7, Three Digital I/O Terminals. Click on the, "Output Enable," parameter to change from input to output. Connect, 0 = Input and 1 = Output to dynamically configure the I/O, "on the fly."

- **Output Configuration; 24V with 50mA** max. source current is output to the terminal when the function block's input parameter is set to, "High" or ≥ 1.
  Note: The standard dw110 digital outputs will not sink current. For compatibility with devices whose inputs float in the high, 24V state, such as Bardac K-Series drives, specify the ***smarty-k***, dw115.
- **Input Configuration**: Input parameter is ignored and output parameter follows 24V logic at the terminal. High = 1 and Low = 0. Threshold is ~8V with 4V hysteresis. 12V logic may NOT function properly.

smarty + option 03
AOP1@5118



smarty + option 03
DIO1@5115

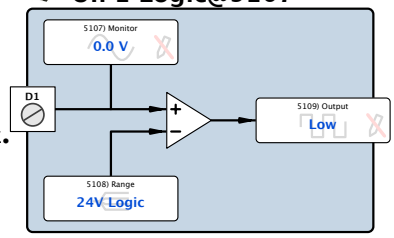


Terminal Block D ~ Universal Analog/Logic Inputs

D1 - D7, Seven UIP's 100KΩ input impedance, 12-bit resolution. **200V max.**

- You may monitor a terminal as an analog, logic, or differential input in separate function blocks.
- You may dynamically configure logic and analog ranges by connecting to the Range parameter.
- Set the Differential Block Range to the maximum expected voltage difference between the two input terminals. The output is the percentage difference between the terminals over this range.

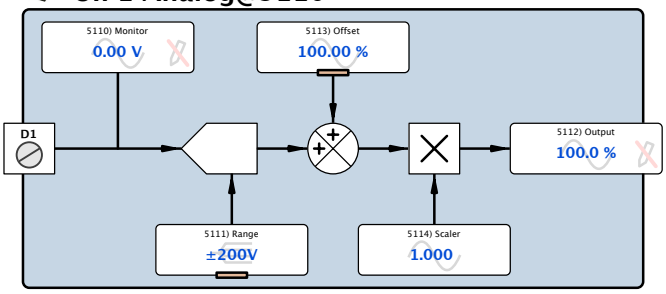
smarty + option 03
UIP1 Logic@5107



UIP Logic Block

Range Parameter	Logic Range
0	5V Logic
1	12V Logic
2	24V Logic

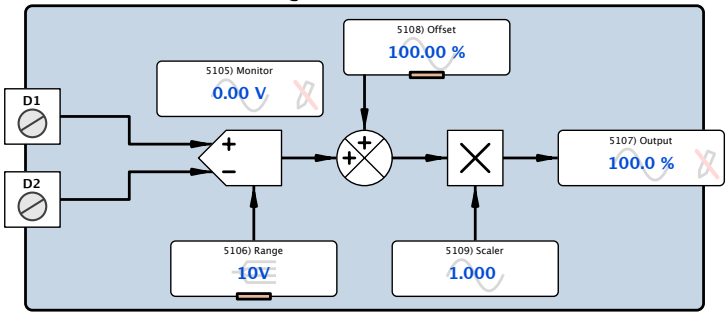
smarty + option 03
UIP1 Analog@5110



UIP Analog Block

Range Parameter	Analog Range
0	± 100 mV
1	± 5 V
2	± 10 V
3	± 100 V
4	± 200 V

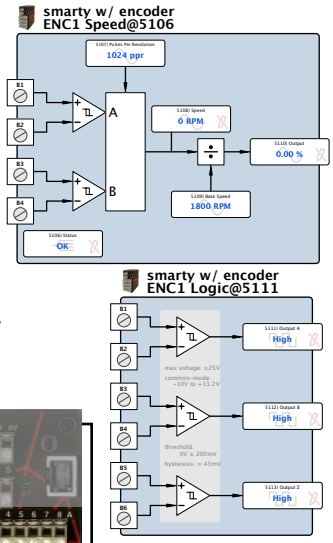
smarty + option 03
UIP1&2 Differential@5105



UIP Differential Block

Range Parameter	Input Ranges
0	100 mV
1	5 V
2	10 V

smarty Option 07 and 08, Encoder Inputs

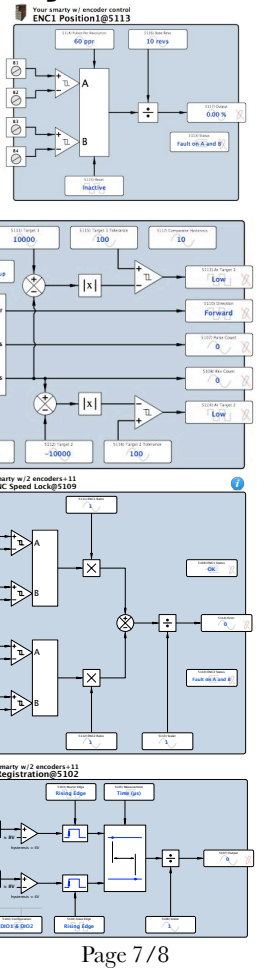


- Encoder inputs are EIA422/EIA485 receivers, **up to 300KHz, 24V max.**
- Connect your encoder using shielded cable with individually shielded twisted pairs such as **Belden 8163**. Ground the shield at only one end.
- Two function block types provide bidirectional speed and logic information.
- EIA422/485 signals are differential-balanced. The, "+," line must swing negative with respect to the, "-," line for proper operation. For compatibility with a single sided logic signal provide a DC bias at the, "-," terminal at least 250mV higher than logic low at the, "+," terminal and 250mV lower than the logic high.
- Speed block Status parameter shows encoder faults on A and/or B.

Encoder Terminals:

Enc.1 Opt. 07	Enc.2 Opt. 08	Description
B1	**A1**	Encoder A+
B2	**A2**	Encoder A-
B3	**A3**	Encoder B+
B4	**A4**	Encoder B-
B5	**A5**	Encoder Marker Z+
B6	**A6**	Encoder Marker Z-
B7	**A7**	+24VDC encoder power supply, **200mA max**.
B8	**A8**	0V

smarty Option 11 Encoder Control F. B. Library 4



Encoder Position 1 Function Block

Input encoder PPR and revolutions required to move from 0 to 100%

Update 0% position with a signal connected to the, "Reset," parameter.

Output position from -327.67% to +327.67%

Encoder Position 2 Function Block

Input encoder PPR and quadrature, power off persistence, two target locations with sizes and hysteresis, zero position reset.

Output encoder status, two at-target flags, direction, pulse count and revolutions count.

Encoder Speed Lock Function Block (Requires **07** & **08**)

Use this block to provide a numerical speed error signal.

Check *savvy* User Manual, Appendix A for detailed information on the following system implementations:

Create a Master speed follower system:

Condition the error signal through a PID function block and output a speed reference to a follower drive.

Create a Phase Lock system:

Condition the error signal through an integrator and PI function blocks and output to drive.

Encoder Registration Function Block

Use this block to measure time or pulse delay between markers.

Choose whether registration markers are DIO inputs 1 and 2, Encoder Z marker or combinations of DIO's and Z's.

smarty Appendix A Function Blocks by Library and Option

Subject to change without notice.

Basic smarty

Arithmetic
- Adder
- Divider
- Multiplier
- Subtracter

Clamps
- Clamp

Control
- PI

Drive Helper
- Optidrive Helper

Logic Gates
- AND
- NOT
- OR

Switches
- 2-In Switch
- 2-Out Switch

Utility
- Dev. Comms Monitor
- Indicator
- Parameter Block
- Watchdog
- Watchdog Driver

Process Control Library Option 05

Arithmetic
- Differential Splitter
- Multiplier-Divider
- Sign And Value
- Sign Changer

Clamps
- Clamp with Monitor
- Deadband
- Skipband

Comparators
- Comparator
- Equality Comparator
- Maximum
- Minimum
- Window Comparator

Control
- Differentiator
- Integrator
- PI
- PID
- Profiler

Counters
- Up/Down Counter

Drive Helper
- Optidrive Helper

Filters
- Low Pass Filter
- Moving Average Filter

Latches
- D Latch
- D Latch with Reset
- D Latch with Set
- D Latch w/Set, Reset
- SR Latch
- T Latch

Logic
- 16-Bit Binary Encoder
- 16-Bit Binarty Decoder
- 4-Bit Binary Encoder
- 4-Bit Priority Encoder
- Bitwise AND
- Bitwise NOT
- Bitwise OR
- Bitwise Shift
- Bitwise XOR

Logic Gates
- NAND
- NOR
- XNOR
- XOR

Ramps
- Linear Ramp
- MOP
- S Ramp

Switches
- 16-In Switch
- 16-Out Switch
- 4-In Switch
- 4-Out Switch
- 8-In Switch
- 8-Out Switch
- Track and Hold

Timers
- Delay-Off Timer
- Delay-On Timer
- One Shot
- Oscillator
- Underlap

Utility
- User Logger

Option 02, 04

Utility
- Modbus Indirect

Option 03

I/O
- AOP's
- DIO's
- UIP Differential
- UIP Analog
- UIP Logic

Option 06

Winder
- Diameter Calculator
- Taper Tension
- Torque Compensator

Options 07,08

I/O
- ENC Logic
- ENC Speed

Option 10

Math
- ArcCosine
- ArcSine
- ArcTangent
- Cosine
- Cube
- Cube Root
- Exponential
- Logarithm
- Reciprocal
- Sine
- Square
- Square Root
- Tangent

Option 11

I/O
- Encoder Position 1
- Encoder Position 2
- Encoder Speed Lock
- Registration

Option 12

ModbusRTU Master
- Comms Port
- EurothermERCFW09
- Holding Reg. INT16
- Holding Reg. UINT16
- Optidrive Plus
- Optidrive VTC
- WEG CFW09

Appendix B drive.web Product Line Overview

smarty Distributed Process Controller simultaneously manages varied process components and drives.

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

savvy Signal Flow Diagram Option Easily implement your systems designs. **"Drag n' Drop,"** connections with complete, graphical documentation created in one step and stored in your device.

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