Bardac Drives Catalog 2023 Issue 1

AutomationThings
Everything is...
... Internet accessible
... Ethernet workable, peer-to-peer
... Configurable from anywhere
... IIoT ready
AutomationThings.com

Everything normally in stock!
Since our founding in 1992 we have worked hard to build our reputation around key goals:

- Innovative technologies.
- Reliable products.
- Unrelenting customer support.
- All catalog items normally in stock.
- Competitive pricing.

Our Company President: Paul Crowhurst

Bardac ...the safe bet!

Seamlessly Integrated Automation

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**POWER QUALITY ~ MOTORS ~ ENGINEERING ~ SERVICE ~ SUPPORT ~ TRAINING**

Specifications .... At the time of going to press we believe the information in this catalog to be accurate. However, the specifications of products may be amended at any time, so please check with us when ordering to ensure that such changes will not affect your requirements.
Configure, connect & control everything ... in one environment
Internet accessible, peer-to-peer Ethernet with savvy tools
Cost effective for systems of any size or complexity

**smartPanel**
Universal Automation Controller & Distributed I/O

**savvy**
System Design & Configuration Tools

**DC Drives**

**AC Drives**

**speedy**
Universal Automation Controller
For embedding in drives & devices with Ethernet & USB port for total system access

**smarty dw240...**
Enables direct connection of field wiring to the controller, and thereby to all other drive.web distributed devices.
(see pages 15 - 17 for more information)

**Automation Things ... smart ... connected ... IIoT ready**
drive.web automation
total connectivity
enterprise management - machine operators - system engineering

drive.web

A Unique Architecture

1 drive.web devices connect peer-to-peer over ethernet to form a completely homogenous control environment.

2 drive.web devices provide a full featured programmable control environment. Each device processor contributes to the total system processing capacity so that as the system gets bigger it’s capacity increases.

3 An unlimited number of drive.web devices can be incorporated into a system to provide an unlimited amount of processing capacity and I/O with undiminished performance.

4 The drive.web devices store all the device and complete system configuration data including touch screen PC, iOS & Android display data - everything!

5 A speedy embedded in a drive takes over the entire drive; its setup, control, & memory management. It becomes an integral part of the drive and now looks just like the drive. Any actions from the drive keypad or terminals or serial ports are instantly synchronized.

6 savvyPanel touch screen PC, iOS & Android display graphics and configuration data all resides in the drive.web devices so that you can roam to any WiFi location with your iPad and view a system (subject to access permission).

7 Easily create a graphical interface to almost any control device to bring it into your unique, homogenous, drive.web environment.

Vector Drives
Easy setup & full featured, programmable control onboard drives

USB Port
- Easy drive configuration
- Plug & play drive interface
- System wide programming access

savvy
Graphical, function black tools
1. Easy drive configuration
2. Powerful systems design & integration
3. Trend charts
4. Signal flow diagrams
5. Internet access
6. Intuitive system navigation tools

Easy setup & full featured, programmable control onboard drives

USB Port
• Easy drive configuration
• Plug & play drive interface
• System wide programming access

savvyPanel
touch screen PC, iOS & Android display graphics and configuration data all resides in the drive.web devices so that you can roam to any WiFi location with your iPad and view a system (subject to access permission).

Easily create a graphical interface to almost any control device to bring it into your unique, homogenous, drive.web environment.
smart automation
production control - maintenance - tech support

**speedy**
Universal Automation Controllers
- Embedded available
- Easy gateway to instrumentation
- Fast data collection
- Mount anywhere DIN option

**savvyPanel**
Integrated touch screen HMI technology
For touch screen PC, Android or iOS devices

**smart**
Universal Automation Controllers
- Easy sensor interface
- Precision analog I/O
- Fast logic I/O with powerful state machine programming
- 16 precision analog & logic I/O
- Encoder I/O for indexing, registration, and shaft lock
- Multiple communications options
- Unlimited expansion with no loss of system bandwidth

**speedy**
Integrated Universal Automation Controller
- provides easy coordination of ECO drives in building energy systems
- easily interfaces to existing third party drives & controls
- add ethernet and USB device access
- boost network performance
- add full featured programmable control

**save energy**
Hi-res industrial stations

**save time**
Hi-res industrial stations
drive.web automation

drive.web

drive.web uses distributed control over Ethernet to provide cost effective, high performance integration of drives & controls in systems of any size or complexity.

Concept & Planning
From your initial sketches and notes create drive.web savvy “Phantoms” offline to identify all your drives, remote I/O, MMI interfaces, gateways, etc.

Design & Configuration
Place any control function blocks you need then drag & drop between parameters in your “Phantoms” to make all your device interconnections. The savvy Signal Flow Diagrams and powerful navigation aids give you a clear intuitive view of your work. Information and help is always on the spot with hover text, links to the manual, and contextual menus.

Construction & Testing
Simply connect all your drives and devices together over Ethernet and load your complete design into the devices from just one location. The System immediately comes alive for testing and monitoring.

Installation & Operation
Use drive.web savvy to provide real time monitoring and control of your entire system from any location. No running from drive to drive to check the setup or operational state! Use savvyPanel operator station technology to provide smart touch and roaming control from anywhere.

Management & Maintenance
Use savvy utilities to setup system performance criteria and monitor your productivity, machine state, and process trends locally or remotely over the internet.
smart automation

The innovative drive.web technology provides total control in one homogeneous environment with the entire system database resident in the drive.web devices.

- Configure & control individual drives & devices
- Design and operate complete drive systems
- Provide fast, peer-to-peer networking over ethernet
- Create clear, graphical signal flow system documentation
- Easily interface to most other drives, MMIs, PLCs, etc.
- Build cost effective systems of any size or complexity
- Add internet accessibility to your system
- Support worldwide enterprise integration

products

savvy Tools
Intuitive, graphical system design and device configuration tools with powerful navigation features, drag & drop connections, trend charting, online help.

savvyPanel Touch Screens
Innovative, touch screen operator station technology that runs on PC or iOS (iPad, iPhone, etc.) & Android. Build clear machine graphics, buttons, switches, meters, and instrumentation and link to your control scheme. Provides multi-user, multi-level, password protected access via WiFi from anywhere to any system.

smarty Universal Controller
A range of DIN mount drive.web programmable controllers with peer-to-peer networking over ethernet or stand alone capability and a wide range of I/O and communications options. Intuitive, easy function block configurations are stored on board for instant field access.

speedy Embedded Controller
Miniature, low cost, drive.web programmable controllers for easy embedding in drives & devices. Includes peer-to-peer networking over Ethernet & USB port.

Only 0.91”W x 0.83”H x 1.42”D!
drive.web automation

savvy... the smart automation tool.

• Configure drives, controllers & operator stations
• Design & build complete systems of any size or complexity
• Network & operate drives & systems over ethernet
• Provide multi-user, system wide access from anywhere

Engineering Info
In Complex products with a fixed set of features, such as drives, an “Engineering Info” window gives an organized overview of the key parameters, I/O, and controls features.

Graphical Function Blocks
Simply click on any function button to drill down to the detailed graphical function block and view or change parameter values.

Standard Features
• Online or offline design of drive systems using intuitive tools with pre-engineered function blocks.
• Internet access to drives and systems for remote configuration, monitoring, and process training.
• Provides easy import, export, and cloning of device configurations.
• Dynamic graphics show real time state of switches, indicators, parameter values, etc.
• Low cost, full featured, distributed control capability with peer-to-peer networking.
• Multiple users, local or remote, can have concurrent real-time access to drives or systems.
• Function Block Libraries for winder controls, PID, drive synchronization, arithmetic, logic, etc.
• Deterministic connections provide high performance links between drives, PLCs, Operator Stations, SCADA computer, and other control products.
• “drag & drop” techniques make easy parameter connections between drives, control devices, etc.
• “Dock” feature enables key system parameters to be monitored and trended from one location.
• Powerful navigation features include drill down (to detail layers in drives and controllers), search, connection tags, jump, browse, pan, and zoom for easy visual system comprehension.
• VPN (Virtual Private Networking) for secure Internet connectivity is supported.
• Password protection is provided at many levels for secure use.
Get savvy free online: www.driveweb.com

The savvy tools and utilities are platform independent and run on Windows, macOS, Unix, Linux, and Solaris and they are all automatically updated as new features before release.

Drives, programmable controllers, operator stations, and complete systems are configured by making simple drag & drop connections between graphical function blocks.

Engineering Info

Anywhere in the system you will have easy instant access to the information you need with several different types of resource...

- Right click on any active object such as a device, connection, parameter, or function block to open the contextual menu.
- “Hover” over any active object and see its key data appear at the top of the window.
- “Hover” over a button to see its function described.
- Look for the information button. This will jump you to the relevant location in the user manual.
- The “Help” menu links you to the full user manual, and other getting started guides.

Trend Charting

You can collect any parameters of interest in a “dock” window and display as a trend chart. The trend time scale can be adjusted from 10 seconds to 2 days and the data can be exported in a .csv format for separate spreadsheet analysis. Click on a point of interest to get the instantaneous, time stamped data values.
savvy-SFD ... Signal Flow Diagram

The savvy-SFD option provides a powerful, graphical, Signal Flow Diagram interface with enhanced system wide navigation and the ability to produce clear, annotated, device and system documentation.

Use savvy “phantoms” to create systems which can be downloaded later into the real devices.

savvy - easy, very smart

savvy-SFD features

- Basic savvyPanel operator station functions included
- Create your own customized drawing sheets with choice of ISO or ANSI formats
- Signal flow diagrams provide a clear vision of your control scheme and its functionality
- Tags clearly specify the source, destination and location of connections between multiple pages.
- Entire drawing is stored in the drive.web devices for instant access in the field.
- Key parameters can be shown at the Signal Flow Diagram level for enhanced monitoring and control
- Connections are “rubber banded” so that function blocks can be moved on pages or between pages
- Drag and drop connections can be made between any parameter anywhere in a system.
- Drawings can be user annotated.
- Powerful navigation features ensure fast searches and that you will never get lost.
- Password protection is provided at many levels for secure use.
savvy programming

It could not be easier, whether simply configuring a drive or designing a complete integrated system. A few simple steps are all that is needed to build a complete control scheme with signal flow documentation that is clear and easy to understand. Powerful navigation tools ensure that you will never get lost!

1. Create "phantom" devices or find real devices in your system in the "Device Directory" window

2. Right click on any device or object to open its contextual menu and get information, change names, import/export data, etc.

3. Click on a "Phantom" or device to drill down to the "Function Block Engine"

4. Right click to open the Function Block selector

5. Drag and drop to make connections

6. Click on a Function Block to drill down to the detail level

7. Click on a parameter to change its value or state

Function Blocks are complete engineered system components. Their graphics are dynamic so that objects such as switches, indicators, etc., show their instantaneous state. A function block such as the PID above includes all the presets, resets, scaling, filters, clamps, etc., that you need for reliable implementation in the real world.

savvy is your smart friend! With a few simple clicks you can build a system, set up a drive and document your work in a thoroughly professional manner - there is no equal!
savvyPanel
Smart, touch screen operator station technology
Provides unprecedented flexibility in instrumentation, control and monitoring.

- Runs native on a savvyPanel station high resolution, touch screen display.
- Also runs on any full featured, touch screen PC, Android, and iOS devices (iPad, iPhone, etc.)
- Extensive library of objects such as pushbuttons, switches, meters, indicators, lamps, buzzers, etc.
- Extensive library of graphical image “tiles” to build smart machine and process graphics.
- Machine graphic “tiles” can be linked to detail control screens.
- Full savvyPanel configuration is stored in the drive.web devices for instant WiFi roaming access.
- Supports multiple screens with multiple pages.
- Provides hierarchal access to system groups, individual systems and multiple operator levels.
- Powerful multi-level password protection.

Example - Extrusion Coating Line

Master System Control Station
Easily build your graphics and controls and link them to any location in your drives or process control system.

Operator Screen
Touch a graphic tile such as the “EXTRUDER” to drill down to the detail screen

Total Control
Touch an arrow link such as the “TEMP CONTROL” tile to drill down to the temperature control system
Touch the “MELT TEMP” tile in any screen to set the master temperature setpoint.
savvyPanel touch

Color Touch Screens
dw230-050
5” - 800x480p
5.9”x4.4”x1.1”
dw230-070
7” - 1024x600p
8.1”x5.5”x1.2”
dw230-097
9.7” - 1024x768p
9.9”x8.1”x1.3”

• Plug & Play, drive.web natively
• Competitively priced
• Easy setup
• Crisp, high visibility graphics
• IP65, NEMA 4 splash-proof front

savvy programing
No separate savvyPanel programming required. The savvyPanel touch display configuration resides in the drive.web drives or automation controllers. Everything is set up and accessed from the drive.web network using the intuitive savvy tools.

• IP20 rear
• 1 Ethernet port
10/100baseTX
• Power supply 24VDC
• Working Temp:
-20°C to 70°C

• Connect directly to any single drive.web device or to multiple devices with an Ethernet switch

enclosure for savvyPanel touch
• Impact resistant, flame retardant, polycarbonate industrial enclosure
• NEMA 4 (IP65), light gray.

Dimensions:
5” model dwOPTION-54-052
8.4x5.8x2.2” (213x142x56mm)
7” model dwOPTION-54-070
9.5x6.3x3.6” (241x160x92mm)
9.7” model dwOPTION-54-097
11.8x9.05x3.4” (300x230x86mm)

savvyPanel app for iOS & Android

Go mobile
Get secure machine access anywhere
Try it out now!
Download savvyPanel free from the Apple App Store or Google Play Store and get immediate access to a real, live drive system in Stevensville, Maryland, USA.

• Touch the “Roll Change” button to reset the length to zero
• Turn on all the section “On/Off” switches
• Touch the “Line Start” button - see the line run its auto cycle
• Touch the “Set Speed” indicator to change the line speed
• Touch the parameter name to get info
• Touch the square display symbol to close the setter
### Outperforms any PLC!  No Limits!

**Features**

<table>
<thead>
<tr>
<th>USB</th>
<th>USB-C</th>
<th>100baseTX Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td>8P8C</td>
<td>EtherCAT view</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ModbusTCP Client &amp; Server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TCP/IP and LLC</td>
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<td></td>
<td>ModbusTCP Client &amp; Server</td>
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<tr>
<td>Communications</td>
<td>6P6C</td>
<td>CANopen, CANopen P2 &amp; E3, CANopen Client</td>
</tr>
<tr>
<td>4V</td>
<td>Ground Reference</td>
<td>Both CANbus &amp; CANopen may be active simultaneously</td>
</tr>
<tr>
<td>24V</td>
<td>Power In</td>
<td>24V, 100mA plus loads</td>
</tr>
<tr>
<td></td>
<td>Supply from a SELV Class 2 LPS (Limited power source) only</td>
<td></td>
</tr>
<tr>
<td>5V</td>
<td>Power Out</td>
<td>5V, up to 250mA</td>
</tr>
<tr>
<td></td>
<td>Do not apply external power to 5V</td>
<td></td>
</tr>
<tr>
<td>LED Indicators</td>
<td>blue, red, yellow, green</td>
<td>Power &amp; heartbeat, Ethernet link + activity, Ethernet 100 full duplex</td>
</tr>
<tr>
<td>Clock Battery</td>
<td>CR2032 coin cell</td>
<td>Used only for real-time clock backup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Typically only one required per system, if NTP is not available</td>
</tr>
</tbody>
</table>

### Inputs and Outputs

| Analog Input | [8] Analog (±10V) inputs | 16-bit resolution, ±100kΩ impedance |
|             | Also configurable as Digital Input (5V or 24V logic) |
| Analog Output | [8] Analog (±10V) outputs | 16-bit resolution |
|             | Each AO can source or sink up to 10mA |
| AB (Encoder Inputs) | [2] Encoder inputs | RS-422, RS-485, 5V, 12V, and 24V encoders supported |
|             | Differential or single-ended |
|             | 2A & 2B also configurable as marker/event inputs |
| Digital Inputs | [8] Digital (24V logic) inputs | Also configurable as event inputs |
| Digital Outputs | [8] Digital (24V sourcing) outputs | Up to 300mA (shared by all DOs); with overcurrent fault detection |
|             | Also configurable as Digital Inputs (24V logic) |
| Frequency Inputs | [6] Frequency inputs | Configurable for 5V logic or 24V logic |
|             | Configurable for pull-down or pull-up (5V logic only) |
|             | Configurable as Frequency Input, Counter Input, Digital Input, Event Input |
| Timing Outputs | [7] Timing (sinking) outputs | Up to 24V |
|             | Each TO can sink up to 20mA |
|             | Configurable as Frequency Output, Stepper Output, or Digital Output |
|             | TO7 also configurable as a Digital Input, Analog Input (unipolar) |
| Frequency & Timing Output | F1-6 & TO 1-6 share a wiring terminal, labeled FT 1-6 |

### XIO Option Cards

- One or zero option cards are supported
- See separate sketch for dimensions and pinout
- Typically factory installed
- Field installation of CLIO & XDIO may be feasible with appropriate precautions

#### High Voltage Digital I/O (HVDI)

- [10] 120/240 VAC Digital Inputs
- [6] 120/240 VAC Digital Outputs

#### Current Loop I/O (CLIIO)

- [16] 4-20mA Analog Inputs
- [8] 4-20mA Analog Outputs
- [8] 24VDC Digital Outputs, also configurable as Digital Inputs

#### Extended Digital I/O (XDIIO)

- [16] 24VDC Digital Inputs
- [16] 24VDC Digital Outputs, also configurable as Digital Inputs
The **smarty dw240 series** comes fully loaded:

Install a dw240 on the customer interface terminal rail to save on wiring and installation costs!

- Floating point math for accurate and complex calculations.
- Count and Frequency with 64-bit count for precision positioning; to 1MHz input, 500kHz output.
- High speed event inputs for position markers and registration.
- Processing and networking speeds that are up to 10 times faster than the dw210, especially with larger configurations.
- Increased storage; four times more capacity.
- Up to six frequency inputs with multiple modes.
- Up to two current inputs; 0 to 20mA, 4-20mA.
- Up to seven timing outputs with multiple modes to 500kHz; frequency, stepper, and digital.
- Real-time clock with optional battery back up. Low-power mode allows real time clock to run without power from coin cell battery, USB power, or 24-hour internal storage.
- Sensor bus for large, smarty-dedicated networks to be announced.
- XIO, Extended I/O port for up to 10 fast-updating modules with up to 16 I/O on each. Modules for high current, high voltage, precision analog, load cells and more are planned.

Every **dw240** comes fully equipped with dw build options -04 -05 -06 -10 -25 -26 -29 -39 as standard! (**smarty**² and above)

Call for customized OEM builds!
The **smarty dw240 series** controller consists of a “cassette” that connects directly to system field wiring via four alternative, passive “terminal carriers”. This means big installation savings! The **smarty dw240** is available in four models...

### smarty1
**basic UAC - 37 terminals - Analog & Digital I/O**

**Core Stock Build Includes:**
- 100baseTX Ethernet, auto-negotiating, USB microB
- Power: 24VDC

**dw build options:** -04 -05 -25 -26, Clamp Terminals, DIN Rail Mounting

- **AI** analog in, -11V to +11VDC, 100KΩ, up to 1KHz (can be used as digital inputs)
- **AO** analog out, ±0.2 to +10.5VDC, 10mA, up to 1KHz (can be used as DO or reference voltages)
- **DI** digital in, 100KΩ, 8V threshold, ±3V hysteresis, 50V max, up to 1KHz (can also be used as event inputs)
- **DO** digital out, 24V source, up to 350mA (shared), over current protected

### smarty2
**advanced UAC - 37 terminals - Analog & Digital I/O**

**Core Stock Build Includes:**
- 100baseTX Ethernet, auto-negotiating, USB microB
- XIO Port for extended I/O options
- Battery back up for realtime clock
- Port options for CAN & ModbusRTU
- Power: 24VDC

**dw build options:** -04 -05 -06 -10 -25 -26 -29 -39, Master Modbus RTU (unisolated), Clamp Terminals, DIN Rail Mounting

- **AI** analog in, -11V to +11VDC, 100KΩ, up to 1KHz (can be used as digital inputs)
- **AO** analog out, ±10.5VDC, 10mA, up to 1KHz (can be used as DO or reference voltages)
- **DI** digital in, 100KΩ, 8V threshold, ±3V hysteresis, 50V max, up to 1KHz (can also be used as event inputs)
- **DO** digital out, 24V source, up to 350mA (shared), internally current limited

### smarty3
**advanced UAC - 61 terminals - with encoder and steppers**

**Core Stock Build Includes:**
- 100baseTX, auto-negotiating, USB microB | XIO Port for extended I/O options | Battery back up for realtime clock
- Clamp Terminals | DIN Rail Mounting

- **AI** analog in, -11V to +11VDC, 100KΩ, up to 1KHz (can be used as digital inputs)
- **AO** analog out, ±10.5VDC, 10mA, up to 1KHz (can be used as DO or reference voltages)
- **DI** digital in, 100KΩ, 8V threshold, ±3V hysteresis, 50V max, up to 1KHz (can be used as event inputs)
- **DO** digital out, 24V source, up to 350mA (shared), internally current limited
- **FT** Frequency/Timing
  - Frequency/event input: 5V max, up to 100KHz
  - Frequency/Stepper output: 5V sinking, up to 350mA (shared)
  - F inputs can be used as event inputs or digital inputs
  - F outputs can be used to generate frequency to 500KHz, control stepper amplifiers or as digital outputs
- **AB** Encoder, differential inputs (5.5V max), up to 1MHz
**smarty** advanced UAC - 103 terminals - with encoders, steppers, and more!

**Core Stock Build Includes:**
- 100baseTX Ethernet, auto-negotiating, USB microB
- XIO Port for extended I/O options
- Battery back up for realtime clock
- Port options for CAN & ModbusRTU
- Power: 24VDC
- dw build options -04 -05 -06 -10 -25 -26 -29 -39

**Master Modbus RTU (unisolated)**
- Clamp Terminals
- DIN Rail Mounting

![dw240-DM-C4CD](image)

**dw240-DM-C4CD**

only 8.27” wide x 3.5” high x 3.0” deep
(210mm x 89mm x 76mm)

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**smarty** advanced UAC - 103 terminals - with encoders, steppers, and more!

**Core Stock Build Includes:**
- 100baseTX Ethernet, auto-negotiating, USB microB
- XIO Port for extended I/O options
- Battery back up for realtime clock
- Port options for CAN & ModbusRTU
- Power: 24VDC
- dw build options -04 -05 -06 -10 -25 -26 -29 -39

**Master Modbus RTU (unisolated)**
- Clamp Terminals
- DIN Rail Mounting

8 AI analog in, -11V to +11VDC, 100KΩ, up to 1KHz (can be used as digital inputs)

8 AO analog out, ±10.5VDC, 10mA, up to 1KHz (can be used as DO or reference voltages)

8 DI digital in, 100KΩ, 8V threshold, ±3V hysteresis, 50V max, up to 1 KHz (can also be used as event inputs)

8 DO digital out, 24V source, up to 350mA (shared), internally current limited

2 CI Current Input, 4-20mA, 0-20mA, 20-4mA, 20-0mA, 100Ω

6 FI Frequency in: up to 100KHz, 30V max, 100KΩ with pull-up or pull-down. Can be event or digital inputs.

7 TO Timing Output, up to 500KHz, 30V max, sinking, pull-up, up to 350mA (shared). For frequencies, steppers or DO

2 ABZ Encoders, EIA-422/485 differential (5V max), up to 1MHz

2 AB Reconnect terminals for encoders

---

**only** 1.06” wide x 4.09” high x 4.96” deep
(27mm x 104mm x 126mm)
Universal Automation Controllers - smarty dw210

Standard Features:
- USB port for easy system wide programming and control
- Easy interface to most drives
- Use networked or stand alone
- Internet accessible
- Peer to peer deterministic Ethernet networking:
  * 100baseTX or 10baseT Ethernet with auto-negotiation
  * Full duplex supported
  * Auto-MDIX per IEEE802.3ab (auto-crossover resolution)
- Drive.web distributed control
- Intuitive, graphical function block programming tools
- Complete graphical configuration & documentation data stored in devices
- 16 basic I/O terminals each configurable includes:
  * 8: ±10V, 16 bit analog in or out or 24V digital in
  * 8: 0-10V 16 bit analog in or 24/12/5V dig in or 24V dig out, source or sink
- Firmware field upgradable
- All circuit boards conformal coated for very high reliability
- SNTP server time/date synchronization support
- 100% backward compatible with all existing drive.web installations
- Smart distributed control concept:
  - No system bandwidth degradation with systems of any size
  - One completely homogeneous environment for drives, controls, operator stations, I/O - everything!
  - Complete data consistency throughout a system
  - The ability to store the entire system configuration in the controllers for easy field total access
  - The ability to manage total system program thread and hierarchy
  - Consistent multi-level password protection

Key Features:
- Ethernet peer-to-peer networking
- Gateway options for ModbusTCP/IP, EIP CANopen, and others
- Internet access
- Graphical Signal Flow Diagram system documentation
- Additional I/O
- Easy interface to most operator stations, PLCs, SCADA, etc.
- Event driven emails from devices

Optional Features:
- Full savvyPanel touch screen PC and iOS device capability
- Encoder input without marker
- 1 or 2 encoder inputs with marker and retransmit via external module
- 1 or 2 isolated or unisolated RS485 ports
- High voltage digital I/O isolator
- 6 additional digital inputs
- 4 channel 20KHz frequency I/O
- 24 channel extended digital I/O
- 2 channel stepper drive controller - pulse, direction & fast event inputs
- External thermocouple and RTD inputs
- ModbusTCP/IP, ModbusRTU, EIP/PCCC
- USB port for system wide programming

Smart distributed control concept:
- No system bandwidth degradation with systems of any size
- One completely homogeneous environment for drives, controls, operator stations, I/O - everything!
- Complete data consistency throughout a system
- The ability to store the entire system configuration in the controllers for easy field total access
- The ability to manage total system program thread and hierarchy
- Consistent multi-level password protection

Standard savvyPanel library
- For iPad, iPhone, Android and touch screen PC operator stations with arrows, meters, start and stop pushbuttons

Standard function block library
- Adders, Subtracters, Multipliers, Dividers, Clamps, Switches, Logic
- Event driven email messages
- Full featured PI controllers

Optional function block libraries
- Advanced Process Control & PLC
- Winder Control
- Advanced Math
- Encoder Position & Indexing

automation without limits
<table>
<thead>
<tr>
<th>Feature</th>
<th>smarty1</th>
<th>smarty2</th>
<th>smarty3</th>
<th>smarty4</th>
<th>smarty5</th>
<th>smarty6</th>
<th>smarty7</th>
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<tbody>
<tr>
<td>Full Featured PLC Functions</td>
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<tr>
<td>Advanced Process Control</td>
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<td>Basic Motion Control</td>
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<tr>
<td>Advanced Motion Control</td>
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<tr>
<td>drive.web distributed control</td>
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<td>✔️</td>
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<td>100baseTX Ethernet</td>
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<tr>
<td>Modbus TCP/IP &amp; EIP/PCCC</td>
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<td>✔️</td>
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<td>USB microB port</td>
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<td>8 analog inputs</td>
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<td>✔️</td>
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<tr>
<td>8 analog outputs</td>
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<tr>
<td>(unipolar outputs)</td>
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<td>✔️</td>
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<tr>
<td>(bipolar outputs)</td>
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<tr>
<td>8 digital inputs</td>
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<tr>
<td>8 digital outputs</td>
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<td>4 status LEDs</td>
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<tr>
<td>Floating-point numbers and math</td>
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<tr>
<td>Battery backup for clock (battery not included)</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>ModbusRTU master (slave optional)</td>
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<td>Optional drive interface</td>
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<td>✔️</td>
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</tr>
<tr>
<td>Frequency/events inputs, timing/stepper outputs</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>6 inputs, 7 outputs</td>
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<tr>
<td>4 selectable inputs or outputs</td>
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<tr>
<td>1 encoder, diff. ABZ</td>
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<tr>
<td>2 encoders, diff. ABZ + reconnect terminals</td>
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<td>✔️</td>
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<tr>
<td>2 encoders, diff. ABZ</td>
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<tr>
<td>2 encoders, diff. ABZ</td>
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<td>Drive.web options included</td>
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<td>Drive.web options included</td>
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<tr>
<td>P2 Vector Drive UAC</td>
<td>dw244-DM-C2CD</td>
<td>dw244-DM-C2CD</td>
<td>dw244-DM-C4CD</td>
<td>dw244-DM-C6PD</td>
<td>dw244-DM-C6PD</td>
<td>dw254-DM-STPD</td>
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</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>4.11” x 3.50” x 3.00” (105 x 89 x 76mm)</td>
<td>4.11” x 3.50” x 3.00” (105 x 89 x 76mm)</td>
<td>5.51” x 3.43” x 3.00” (140 x 87 x 76mm)</td>
<td>8.27” x 3.50” x 3.00” (210 x 89 x 76mm)</td>
<td>1.06” x 4.09” x 4.96” (27 x 104 x 126mm)</td>
<td>0.70” x 3.50” x 4.70” (17.2 x 90 x 119mm)</td>
<td>1.06” x 4.09” x 4.96” (27 x 104 x 126mm)</td>
</tr>
</tbody>
</table>

Smarty7 certification is still in process, please contact the factory to check status.

faster » compact » versatile » expansive » intelligent » easily wirable » . . . Available!
speedy

Embedded & onboard controllers for total systems integration

so small it’s easy to miss, so smart it’s impossible to beat!

Only 0.91” wide x 0.83” high x 1.42” deep (23 x 21 x 36mm)

take a closer look ...

• The easiest, affordable way to get all your drives & devices up onto peer to peer Ethernet

• Improve your system bandwidth by reducing your RS485 network load

• Add full featured programmable control

• Same huge processing power as a smarty

• 100baseTX Ethernet peer to peer networking

• USB port for easy system wide programming

• Fast ModbusRTU or CAN bus device interface

• Very smart, very fast!
Universal Automation Controller

Unbeatable Performance

**speedy**

miniature, full featured controllers

Serial interfaced on-board drives and third party devices via ModbusRTU or CANopen to provide low cost, improved performance, peer-to-peer Ethernet networking and full featured programmable control functions.

A small package with big performance!

Includes USB port for system wide programming, Ethernet ModbusTCP/IP and **savvyPanel** interface. Available forms:

- Tether interface with either plug-in or 4-wire serial connection
- Optional DIN rail mount with screw terminals
- Customized form for embedding into drives and devices

configure, connect & control ... everything!

- Provides full featured **savvyPanel** operator station interface
- Add unlimited processing muscle to your system
- Add peer to peer Ethernet networking
- Add easy USB system access
- Use as a gateway

**speedy**

DIN mount, free standing controller

- Provide an Ethernet to ModbusRTU gateway to third party devices
- Provide extra system processing capacity & memory

**speedy**

for embedded or onboard control

- Provides an Ethernet to ModbusRTU gateway to third party devices
- Provide extra system processing capacity & memory

Film line winder

Cyclic indexing system
Smarty dw210 - Universal Automation Controllers

Industry leader since 2008
100% compatible with new dw240 and dw250

Smart controllers, DIN mount with 100baseTX Ethernet distributed control, USB port and wide range of I/O & communications options

16 standard I/O, each configurable as:
8: ±10V, 16 bit analog in or out or 24V digital in
8: 0-10V, 16 bit analog in or 24/12/5V dig in or 24V dig out, source or sink

dw210  smarty  for standalone or networked applications

General purpose programmable controller or drive interface controller

See page 26 for other drive and device integration apps

0.91" wide x 4.09" high x 4.72" deep
(23 x 104 x 120 mm)

Speedy dw220 Series

Mini smart controllers for use on-board or embedded in drives & devices with drive.web distributed control over 100baseTX Ethernet, ModbusTCP/IP, USB port, fast serial port (up to 500kbps), full-featured savvyPanel HMI, & communications options

dw220  speedy  generic interface controller with 500kbps ModbusRTU master & 15” wire interface

dw221  speedy plug-in automation controller for PL/X Series DC drive

dw222  speedy plug-in automation controller for ODE2 General Purpose VFD

dw223  speedy plug-in automation controller for ODP Sensorless Vector drive

dw224  speedy plug-in automation controller for P2 Closed Loop Vector drive

dw224S  speedy plug-in automation controller for SEW Eurodrive MLTP Closed Loop Vector drive

dw225  speedy automation controller for Yaskawa F7 drive with 15” wired interface

dw228  speedy plug-in automation controller for E3 Series General Purpose drive

dw229  speedy automation controller with generic CANopen device with 15” wired interface

Easy, on-board & embedded automation for drives & devices

Very small, very smart, very affordable
Goes anywhere - does everything!

DIN mount dwOPTION -50

Only 21 x 22 x 36 mm!
## smarty & speedy

### Product build options

<table>
<thead>
<tr>
<th>Function Block Libraries</th>
<th>smarty</th>
<th>speedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-05 Advanced Process Control Function Block Library (FBL)</td>
<td>X</td>
<td>X X X X X X X</td>
</tr>
<tr>
<td>(comparators, profilers, presets, latches, filters, counters, timers, PIDs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-06 Winder Control FBL (dia. calc., taper tension, torque comp.)</td>
<td>X</td>
<td>X X X X X X X</td>
</tr>
<tr>
<td>-10 Advanced Math FBL (trigonometric, log, exponential)</td>
<td></td>
<td>X X X X X X X</td>
</tr>
<tr>
<td>-11 Encoder Control FBL (shaft lock, indexing, registration for Options 40-44)</td>
<td>X</td>
<td></td>
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<tr>
<td>-29 Solar FBL with sun position calculator</td>
<td>X</td>
<td>X X X X X X X</td>
</tr>
<tr>
<td>-36 Motion Control FBL with Trapezoidal Motion &amp; Cam Profile</td>
<td>X</td>
<td>X X X X X X X</td>
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</table>

<table>
<thead>
<tr>
<th>Communications Options</th>
<th>smarty</th>
<th>speedy</th>
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</thead>
<tbody>
<tr>
<td>-04 Ethernet Modbus TCP/IP slave</td>
<td>X</td>
<td>S S S S S S S S</td>
</tr>
<tr>
<td>-25 Ethernet EIP/PCCC interface for AB PLCs</td>
<td>X</td>
<td>X X X X X X X</td>
</tr>
<tr>
<td>-17* ModbusRTU slave (RS485) isolated port</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>-18* ModbusRTU slave (RS485) isolated port + external encoder module port</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>-19* ModbusRTU slave (RS485) isolated port + ModbusRTU master non-iso</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>-23* ModbusRTU master (RS485) isolated port + external encoder module port</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I/O Options</th>
<th>smarty</th>
<th>speedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-24* 6 extra digital inputs, 24V</td>
<td>X</td>
<td>S S S S S S S S</td>
</tr>
<tr>
<td>-26 savvyPanel iPad/iPhone/Android &amp; touch screen PC operator station interface</td>
<td>X</td>
<td>S S S S S S S S</td>
</tr>
<tr>
<td>-27* Frequency I/O, up to 100KHz. 2 ~in, 2 ~I/O, with 12V, 400mA pwr supply</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>-30 115VAC digital I/O voltage isolator, up to 2/smarty (not CE or UL Listed)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(each with 2, NO contacts + common and 4, 115VAC inputs +common)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-31 230VAC digital I/O voltage isolator, up to 2/smarty (not CE or UL Listed)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(each with 2, NO contacts + common and 4, 230VAC inputs +common)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-37* 2-Channel, Open Loop Stepper Drive Controller with 2 fast event inputs</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>-38* 2-Channel, Closed Loop Stepper Drive Controller, i2i port for OPT-42-45</td>
<td>X</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Encoder I/O Option</th>
<th>smarty</th>
<th>speedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-15* Internal encoder input 2-24V, differential A &amp; B (no marker) w/5VDC</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>-16* External encoder module interface port</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**smarty external encoder module (needs a smarty dw210 option -16, -18, -23)**

-42-45 2 ext encoder, 2-24V, marker, 5VDC o/p, 2x 24V event in, RS422 RTX | X |  |
-42-46 2 ext encoder, 24V retransmit outputs (±1A, ±1B, ±2A, ±2B) | X |  |

<table>
<thead>
<tr>
<th>Mounting Options</th>
<th>smarty</th>
<th>speedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50 DIN rail mount with screw terminal connections</td>
<td>X</td>
<td>X X</td>
</tr>
</tbody>
</table>

* Options are mutually exclusive  
  X = Available if not excluded  
  S = Standard feature
smarty & speedy - stock controller options (un-configured)

speedy & smarty standard programmable controller dwOPTION -00

- Basic drive coordination and peer to peer networking over Ethernet
- Basic machine control

Includes 100baseTX Ethernet and USB port with system wide access together with:
basic arithmetic, logic, PI control, clamp, switches, basic savvyPanel touch screen PC, iOS & Android control, systems utilities, event email

smart systems controller - pack 1

dwOPTION -1121 for

- Process line drive coordination
- General purpose machine control

Includes all standard controller features together with:
advanced arithmetic, logic, process control, counters, timers, touch screen PC, iOS & Android control, systems utilities

Incorporates standard drive.web options
-04, ModbusTCP/IP slave Ethernet
-05, Advanced Process control Function Block Library
-25, EIP/PCCC Ethernet slave for Allen Bradley interface
-26, savvyPanel full featured, touch screen PC, iOS & Android operator station controller

smart systems, winders & motion - pack 2

dwOPTION -1122 for

- Full featured winder control with single or multi cores, turret indexing, auto splicing, open and closed loop, edging
- Web handling, tension control, accumulators, infeeds, center winding, slip core, surface winding

Includes all pack 1, dwOPTION -1121 features together with:
diameter calculation, linear and hyperbolic taper control, static/dynamic friction compensation, inertia compensation

Incorporates standard drive.web options
-04, ModbusTCP/IP slave Ethernet
-05, Advanced Process control Function Block Library
-06, Winder Control Function Block Library
-25, EIP/PCCC Ethernet slave for Allen Bradley interface
-26, savvyPanel full featured, touch screen PC, iOS & Android operator station controller
-36, Motion Control Function Block Library with trapezoidal & cam motion

precision smart control with 1 encoder - pack 3

dwOPTION -1123 for

- Basic precision speed, position or winder control
- Basic encoder count control

Includes all pack 2, dwOPTION -1122 features together with:
cyclic position, linear position, indexing

Incorporates standard drive.web options
-04, ModbusTCP/IP slave Ethernet
-05, Advanced Process control Function Block Library
-06, Winder Control Function Block Library
-11, Encoder Control Function Block Library
-15, Single bidirectional encoder input
-25, EIP/PCCC Ethernet slave for Allen Bradley interface
-26, savvyPanel full featured, touch screen PC, iOS & Android operator station controller
-36, Motion Control Function Block Library with trapezoidal & cam motion
**precision smart control with 2 encoders - pack 4**

*smarty dwOPTION -1124 for*
- Precision speed, position or winder control, registration, phase lock, fast event counting
- Encoder count control with home auto calibration
- Dual axis pick & place with trapezoidal motion
- Cut to length with cam motion control

Includes all pack 3, dwOPTION -1123 features together with:
- registration, fast event counting, speed lock, phase lock, precision ratio

**Incorporates standard drive.web options**
-04, ModbusTCP/IP slave Ethernet
-05, Advanced Process control Function Block Library
-06, Winder Control Function Block Library
-11, Encoder Control Function Block Library
-16, External encoder module interface port
-25, EIP/PCCC Ethernet slave for Allen Bradley interface
-26, savvyPanel full featured, touch screen PC, iOS & Android operator station controller
-36, Motion Control Function Block Library with trapezoidal & cam motion
-42-45, External dual, bidirectional encoder module with marker, fast event inputs, buffered encoder retransmit, 5VDC encoder supply

**precision stepper control with 2 encoders - pack 5**

*smarty dwOPTION -1125 for stepper drive control*
- Precision speed, position or winder control, registration, phase lock, fast event counting
- Encoder count control with home auto calibration
- Dual axis pick & place with trapezoidal motion
- Cut to length with cam motion control

Includes all pack 3, dwOPTION -1123 features together with:
- registration, fast event counting, speed lock, phase lock, precision ratio

**Incorporates standard drive.web options**
-04, ModbusTCP/IP slave Ethernet
-05, Advanced Process control Function Block Library
-06, Winder Control Function Block Library
-11, Encoder Control Function Block Library
-25, EIP/PCCC Ethernet slave for Allen Bradley interface
-26, savvyPanel full featured, touch screen PC, iOS & Android operator station controller
-36, Motion Control Function Block Library with trapezoidal & cam motion
-38, Dual stepper drive controller with external encoder module interface port
-42-45, External dual, bidirectional encoder module with marker, fast event inputs, buffered encoder retransmit, 5VDC encoder supply
drive.web automation

**drive.web device apps**

These apps can be installed in drive.web speedy and smarty Universal Automation Controllers to provide a plug & play interface to the key features of “other” drives or devices. The smarty or speedy then brings those “other” drives alive with:

- Full featured programmable control functions
- Ethernet networking
- USB port access

“Other” devices include almost any device that has a ModbusRTU port, including:

- AC drives
- DC Drives
- PLCs
- Process Controllers
- Temperature Controllers
- Smart I/O
- Power Controllers

Current “Other” device app list includes:

dwOPTION -4001 for Yaskawa A1000 Drives (with dwOPTION-1121)
dwOPTION -4002 for Yaskawa V1000 Drives (with dwOPTION-1121)
dwOPTION -4003 for V2 Series Fan & Pump Drives
dwOPTION -4004 for Schneider Altivar 312 Series Drives
dwOPTION -4005 for ABB ACS310 Series Drives
dwOPTION -4006 for Sanyo Denki Stepper Drives
dwOPTION -4007 for Thermal Edge Temperature Controllers
dwOPTION -4008 for V3 Series Eco Drives
dwOPTION -4009 for Fuji Frenic Mega Vector Drives
dwOPTION -4011 for Yaskawa A1000 (with dwOPTION-1124)
dwOPTION -4012 for ABB ACS310
dwOPTION -4013 for Fairford Electronics Synergy Soft Start

These **drive.web device apps** are easy for us to create, so don’t hesitate to contact if you have a new request.

Please call +410-604-3400 for the latest list or a new “other” app.

**speedy device app**

Connect a speedy to your “other” device via its ModbusRTU port to provide immediate drive.web savvy access to all its key parameters. Add any additional parameters you require to make savvy the only tool you need for your “other” drive configuration, control, systems integration and monitoring. The speedy is so small (about half the size of your thumb!) that it can easily be mounted unobtrusively onboard almost any drive or device.

**smarty device app**

Connect a smarty to your “other” device via its ModbusRTU port to provide immediate drive.web savvy access to all its key parameters together with 16 extra precision I/O (configurable analog or digital), and with options such as encoder inputs, (see the options lists on pages 23 - 25). Add any additional parameters you require to make savvy the only tool you need for your drive configuration, control and monitoring.

**drive.web**

One easy, homogeneous solution for systems integrators!
These options are pre-programmed units with generic solutions for key applications. The packages are a great design aid.

These generic configurations are easily edited to suit your specific installation using savvy with the SFD Signal Flow Diagram option and include the following features:

- detail signal flow diagram documentation
- savvyPanel touch screen PC, iOS & Android operator station configuration
- basic wiring drawing

**ADD CONFIGURED OPTIONS**

- 1101 Open loop constant tension center winder (with option 1122) x
- 1102 Closed loop dancer controlled winder (with option 1122) x
- 1103 Closed loop load cell controlled winder (with option 1122) x
- 1104 Slip core winder controller (with option 1122) x
- 1105 Speed lock w/encoder feedback (with option 1124) x
- 1106 Coordinated drive, line master controller (with option 1121) x
- 1107 Controller with networking for analog drives (with option 1121) x
- 1109 Phase lock, line shaft with registration (with option 1124) x
- 1110 Three PID Controllers with integral reset and hold (with option 1121) x
- 1113 2 channel pulse train follower (with options 05, 26, 27) x
- 1117 Encoder cyclic position/indexing (with option 1124) x
- 1118 Sun tracking for solar energy (with opts 05, 11, 16, 29, 42 & 45 or 46) x
- 1131 Encoder analog out, T13, Calibrated 1024PPR @1800RPM = 10V x

Please call +410-604-3400 for dw240 & dw250 pre-engineered solutions

**drive.web accessories**

- Industrial Ethernet switches
- Interconnection cables, connectors
- Touch screen PCs
- Wireless access points
- Communications gateways
- drive.web software & firmware upgrade vouchers

Please call +410-604-3400 for details
smartty automation controllers use the drive.web distributed control technology to bring easy, cost effective intelligence to high performance drive systems.

**smartty apps** are pre-configured generic packages for common applications:
- **smartty OPTION-1101** Open Loop Constant Tension Center Winder
- **smartty OPTION-1102** Closed Loop Dancer Controlled Center Winder
- **smartty OPTION-1103** Closed Loop Load Cell Controlled Center Winder
- **smartty OPTION-1104** Closed Loop Slip Core Winder

**Standard features include:**
- Fully editable configurations and drawings
- Drive Interface either serial port or analog
- Process control & winder function block libraries
- Web break sensing
- Diameter calculation, memory, preset and hold
- Linear or hyperbolic taper tension
- Friction, inertia & torque compensation
- Multiple core presets
- Integral reset
- Adaptive control for high speed systems
- Standstill tension mode
- Jog/run/slack take up modes
- Turret indexing mode
- Anti-reverse clamps
- Core speed matching

**Optional features include:**
- Over/under winding
- Line drive coordination
- Manual or auto-splicing modes
- Turret indexing
- Air pressure control
- Length & mass calculation
- Edge guide control
- Encoder inputs
- ModbusTCP/IP over Ethernet
- Serial communications
- ... and more.

These generic configurations can easily be edited by the intuitive drive.web savvy graphical tools to suit the particular application. The clear signal flow diagrams are stored in the controllers for reliable access in the field.

**savvyPanel** touch screen control
**smarty app** OPTION-1106 Process Line Coordination

Standard function blocks used in combinations of *smartys* and *speedys* can be easily configured to provide line drive coordination in systems of any size or complexity.

- Functions such as linear, S and hyperbolic ramps are used to provide master references.
- Programmable logic and switch functions are used to provide line run, line jog, local jog, interlocks, etc.
- PIDs, profilers, registration, indexing, phase lock and arithmetic blocks provide precise section control.

**smarty app** OPTION-1109 Registration & Electronic Line Shaft

The Registration & Electronic Line Shaft package is designed for applications such as print registration, synchronized component handling, position control, cut-to-length, etc., where precision drive coordination and spindle orientation are required.

- Standard graphical function blocks for registration and speed locking make these complex processes quick and easy to configure and use.
- The encoder retransmit option provides buffered encoder signals for secure use in multiple locations.
drive.web apps

motion control  OPTION-36 Motion Control Function Block Library

For multi-axis motion control of all types of drives - AC drives, DC drives, servos, steppers, hydraulic, linear actuator, etc., in a wide variety of general industrial position control applications including:

- Pick & place machines
- Packaging machines
- Painting robots
- Cut to length
- Automated assembly processes

Trapezoidal Motion

A key requirement for numerous machine controls

Key Features:
- Continuous target recalculation
- Easy system set up
- Easy performance optimization
- Pause with controlled accel/decel
- Hold with fast stop

Cam Profile

A key requirement for numerous machine controls

Key Features:
- Easy graphical profile editor
- Optional .csv file import
- Easy .csv file export
- Easy system set up
- Easy integration with multiple axes
- Up to 100 “knots” or points for complex profiles
- 16 bit signed input and output resolution for accurate cam forms

very smart!
**Motion Control Stepper Drive Controllers**

These stepper drive controller options are available for most versions of the *smarty* (see option selection table, page 23).

Both options include:
- 2 channels of pulse & direction
- 2 fast event inputs for count reset
- 64 bit pulse counts
- Automatic datum reset
- Easy set up
- Selectable count persistence with “clear on power up”

**dwOPTION -37 Open Loop Stepper Drive Controller**

In a typical open loop stepper drive application the “Position” parameter (derived from the pulse count) can be used to close the position control loop.

**dwOPTION -38 Closed Loop Stepper Drive Controller**

In a typical closed loop stepper drive application the position feedback can be provided by an encoder. The dwOPTION-42-45 encoder module also has two fast event inputs for auto count reset.
smarty app  OPTION-1117 Indexing & Cyclic Positioning

The optional Encoder Function Block Library available in the smarty includes a set of engineered function blocks for use in precision positioning applications such as packaging machines, machine center tool loaders, inventory carousels, stackers, etc.

Key Features
- Auto origin checking
- Auto index calculation
- Auto calculation of shortest move from point to point
- 64-bit encoder counts

smarty app  OPTION-1118 Sun Position Calculator

The Solar Function Block Library provides precise calculation of the sun zenith and azimuth angles in solar energy systems. It can be synchronized with the SNTP server time and date and include a ∆T input parameter to compensate for the difference between UTC and Terrestrial Time for precise positioning of solar concentrators.

Key Features
- Set up for any latitude, longitude and altitude.
- Fast calculation for use in mobile systems.
- SNTP synchronization support.
- Terrestrial Time correction input.

smarty app  OPTION-1115 Temperature Measurement & Control

smarty controllers provide up to 4 temperature measurement or control loops using standard IEC751, Class A, 100Ω RTD temperature sensors. Both 2 and 3-wire configurations are supported with programmable calibration, linearization, and filtering features. Use Application Note HG503599. Please call for other RTD or thermocouple options.

savvyPanel touch screens provide both your temperature control interface and your complete machine control functions.

smart function blocks

smart P ID

One of the most commonly required functions in industrial control.

In most PLCs you get the basics but you are left to sweat the details required to make it work reliably in the real world. We cover the bases by including, integral preset, reset and hold, output filter, upper and lower clamps.

Saves a lot of time and heartache!

Motorized Pot

This MOP block makes short work of figuring out all the functions you need for raise/lower push button control

No sweat!

S-Ramps

Ever tried to create an S-Ramp that works predictably in a typical PLC? We make it easy, intuitive and reliable!

No problem!
**smart function blocks** State Machine Logic

**Logic made easy and reliable!**

This powerful, Intuitive, 21st. century technology takes the stress out of logic programming. It’s very simple ..

1. Define your machine states such as STOP, RUN, JOG, FAST STOP, etc.
2. Define the transitions that get you from one state to another, for example:
   - START button gets you from STOP state to RUN state
   - JOG button takes you from STOP state to JOG state
   - FAST STOP button takes you from any state to FSTOP state
   (this can then look for a transition to ZERO SPEED before returning you to the STOP state)

**It’s that simple! No more sweating over relay interlocks, contact races, etc!**

**So obvious!**
**So smart!**
**So easy!**

---

**smart utilities** event email

The E-Mail function block available in every drive.web device enables you to send alerts, event notices, status reports, etc., to management, quality controllers, plant engineers in any location.

It is easy to set up and it ensures that key process issues are delivered to the right place at the right time.

---

**drive.web** smart ideas

**WiFi Roaming Interface**

There are many inexpensive third party WiFi routers that when plugged into a drive.web Ethernet network provide secure, robust, roaming system access in an industrial environment using iOS or Android smart devices.

**Enterprise Integration**

The powerful system wide access inherent in the drive.web technology provides a great backbone on which to build integrated solutions in your entire global enterprise without additional complex data processing requirements. Multilevel password protection enables safe access for offsite accountants, production controllers and corporate management.

**Online Training & System Support**

The IP addressing capability in every drive.web device ensures easy support for field service and live online training for machine operators, system designers and plant maintenance engineers. If an internet connection is available near your machine or process it takes less than 1 minute to set up a live connection to our engineers or any other off site location. drive.web provides system wide access from any single location on your LAN - very smart, very easy!
AC drives

TOUGH DRIVES FOR INDUSTRY

P2 Series
Closed Loop Vector

High performance coordinated drive for:
Process automation
Converting
Printing
Machine tools

Up to 100 HP at 230 volts
Up to 400 HP at 460 volts
Up to 150 HP at 600 volts

IP20 package up to 400 HP - 50°C *
Optional NEMA 4X (IP66) to 40 HP - 40°C *
NEMA 12 (IP55) 15 to 400 HP - 40°C *
* Approvals: UL, cUL, EAC, RCM

Closed loop speed better than 0.1%
150% overload, 60 secs (200%, 4 secs)
Up to 200% torque at zero speed
AC Induction, PM & Sync Rel motor modes
Built in brake transistor
EMC filter
Quiet - with switching up to 32KHz
Bright TFT display
DC Bus sharing
Safe Torque Off function
(IEC61508 SIL 2 & IEC62062 SIL 2)
Modbus or CANopen port
Plug-in control terminals

Options
drive.web programmable control
Extended I/O and USB
EIP, ModbusTCP, Profinet, DeviceNet
Remote keypad with TFT display
savvyPanel touch screen HMI

V3 Series - Energy Efficient Drives
For Fans & Pumps

Variable torque, fan & pump drive for:
HVAC
Water treatment
Building systems
Climate control
Flow control
Swimming pool control

Up to 100 HP at 230 volts
Up to 400 HP at 460 volts
Up to 175 HP at 600 volts

IP20 package up to 400 HP - 50°C *
NEMA 4X (IP66) to 40HP - 40°C (indoor) *
NEMA 12 (IP55) 15 to 400HP - 40°C *
* Approvals: UL, cUL, EAC, RCM

Motor options: Standard Induction - PM AC - Brushless DC - Synchronous Reluctance

Pump Features
Pump blockage detect/clear/stir
Pump preheat anti-condensation mode
Pump cascade control
Dry run protection

Options
drive.web programmable control
Extended I/O and USB
EIP, ModbusTCP, Profinet, DeviceNet
Remote keypad with TFT display
savvyPanel touch screen HMI

Fan Features
Drive fault auto bypass
Sleep mode with auto-boost
Fire override mode

drive.web distributed Ethernet control
Internet accessibility
Ethernet peer-to-peer networking
USB programming port
IIoT ready

Low input harmonic current distortion
Compliant with EN61000-3-12
>98% drive efficiency
Low audible motor noise
Internal EMC filter
Smart energy optimization
Resonance avoidance
Sleep/wake functions
Intelligent maintenance intervals
110% overload, 60 secs
Motor flux braking
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU, BACnet
Bright TFT display

Low audible motor noise
Internal EMC filter
Smart energy optimization
Resonance avoidance
Sleep/wake functions
Intelligent maintenance intervals
110% overload, 60 secs
Motor flux braking
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU, BACnet
Bright TFT display

Long input harmonic current distortion
Compliant with EN61000-3-12
>98% drive efficiency
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Smart energy optimization
Resonance avoidance
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Smart energy optimization
Resonance avoidance
Sleep/wake functions
Intelligent maintenance intervals
110% overload, 60 secs
Motor flux braking
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU, BACnet
Bright TFT display

Low audible motor noise
Internal EMC filter
Smart energy optimization
Resonance avoidance
Sleep/wake functions
Intelligent maintenance intervals
110% overload, 60 secs
Motor flux braking
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU, BACnet
Bright TFT display

Low audible motor noise
Internal EMC filter
Smart energy optimization
Resonance avoidance
Sleep/wake functions
Intelligent maintenance intervals
110% overload, 60 secs
Motor flux braking
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU, BACnet
Bright TFT display

Low audible motor noise
Internal EMC filter
Smart energy optimization
Resonance avoidance
Sleep/wake functions
Intelligent maintenance intervals
110% overload, 60 secs
Motor flux braking
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU, BACnet
Bright TFT display
E3 Series
General Purpose VFD

Constant torque, heavy duty drive for:
- General purpose machine control
- Pumps and blowers
- Conveyors
- Mixers

To 1.5 HP at 110V in, 230V 3Ø out
To 25 HP at 230 volts
To 50 HP at 460 volts

Sensorless vector control for:
- High starting torque & accurate speed
Motors: Induction, PM, BLDC, SynRM

Standard IP20 - 50°C
Optional NEMA 4X (IP66) to 30 HP, 40°C
Approvals: UL, CE, RCM

Industrial, Pump & Fan control modes
- 150% overload, 60 secs (175%, 2 secs)
- Spindraft into rotating motor
- Built in brake transistor (sizes 2, 3 & 4)
- Motor flux braking
- Adjustable skip frequency
- Quiet - with switching up to 32KHz
- Power loss ride through
- ModbusRTU port
- Configurable I/O
- Simple programming
- On board help card
- DIN rail and foot mount (IP20) (size 1 & 2)
- NEMA 4X

Options
- drive.web programmable control
- Extended I/O
- EIP, ModbusTCP, ProﬁbusDP, DeviceNet
- Remote keypad with TFT display

NEMA 4X - IP66 Series
For Harsh Environments

P2 Series Open/Closed Loop Vector Drives
E3 Series General Purpose VFDs
V3 Series Energy Efﬁcient Drives

Food processing
Agricultural, water treatment
Mining, cement, petrochemical

To 1.5 HP at 110V in, 230V 3Ø out (E3)
To 15 HP at 230 volts (E3, P2)
To 30 HP at 460 volts (E3, P2)

NEMA 4X (IP66) - 40°C
(outdoor rated)
Approvals: V3 - UL, cUL, EAC, RCM
P2 - UL, cUL, EAC, RCM
E3 - UL, CE, RCM

Open & closed loop vector or V/Hz
Washdown, dust tight
Chemical resistant ABS enclosure
Corrosion protected heat sink
Spindraft into rotating motor
Built in brake transistor (sizes 2 & 3)
Motor flux braking
Bright TFT Display
Adjustable skip frequency
Quiet - with switching up to 32KHz
Power loss ride through
ModbusRTU port
Compact packaging

Options
- drive.web programmable control
- Power isolator switch, speed pot, F/R switch
- EIP, ModbusTCP, ProﬁbusDP, DeviceNet
- Remote keypad with TFT display

E3 Single Phase VFD
For SP & PSC motors

Variable torque, fan & pump drive for:
- Fans & blowers
- Centrifugal pumps
- Fume extractors
- Air flow control

To 0.75 HP at 110 volts
To 1.5 HP at 230 volts

Standard IP20 - 50°C
Optional NEMA 4X (IP66) - 40°C
(outdoor rated)
Approvals: UL, CE, RCM

For motor types:
- Shaded Pole (SP)
- Permanent Split Capacitor (PSC)

Built in brake transistor (size 2)
Motor flux braking
Adjustable skip frequency
Quiet - with switching up to 32KHz
Bright TFT display
Power loss ride through
ModbusRTU port
Innovative smart boost start
Simple programming
DIN rail and foot mount (IP20)

Options
- drive.web programmable control
- Extended I/O
- EIP, ModbusTCP, ProﬁbusDP, DeviceNet
- Remote keypad with TFT display

savvyPanel touch screen HMI
AC drives

P2 Series
SYSTEMS VECTOR DRIVES
• High performance
• Induction, PM & Sync Rel Motor Control
• 230, 460, 600 volts models
• IP20 units up to 400HP
• NEMA12 units 15 - 400HP
• NEMA 4X up to 40HP

1 TO 400HP

FEATURES
Multiple Modes:
  • Closed Loop Vector for high performance
  • Open loop PM Motor Control
  • Sensorless vector & V/Hz control
Up to 200% torque at zero speed
Sensorless speed regulation better than 1%
Torque control
DC bus sharing
Safe Torque Off function
Output to 500Hz (V/F Mode), 100Hz (Vector Mode)
Built-in 100% rated DB transistor up to 400HP
Integral PI controller
drive.web savvy function block programming
Silent running with up to 32KHz switching
200% starting torque
Bipolar 12 bit analog input (isolated +/-10V or 4-20mA)
ModbusRTU, RS485 port
CANopen port
EMC Filters
Bright TFT Display
DC chokes in frame sizes 5 to 8
Single phase input up to 200HP
Power loss ride through
Process control options
Programmable I/O
Hours run log & trip log
Cartridge fans for easy maintenance (NEMA12 drives)
Options:
  • Encoder feedback
  • Additional basic & smarty I/O options
  • EIP, Modbus TCP/IP, Profibus, DeviceNet, BACnet
  • Memory stick with bluetooth interface
  • Remote keypad with bright TFT display
  • 2Khz output in V/Hz mode
  • Through panel mount for NEMA 12 versions

Smart drives for high performance coordinated drive systems and precision machine control
• Printing presses
• Extrusion & coating lines
• Automated assembly
• Indexing & registration
• Winders & web tension
• Material handling
• Cranes & hoists
• Textiles & fibres
• Metals industry
• Paper & cement mills
• Mining

NEMA 4X washdown models - see page 44

AC drives
P2 very smart drives

The drive.web automation technology uses distributed control over Ethernet to provide cost effective systems integration for systems of any size or complexity.

savvyPanel touch

Easy, high resolution, NEMA4, touch screen operator stations.

Also run savvyPanel on PCs, Android or iOS devices

drive.web smart automation
- powerful programmable control functions
- peer-to-peer over Ethernet
- smart iPad/Android or touch screen PC operation
- Easy system wide Internet access

**Input Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>200 - 240 ± 10%</td>
</tr>
<tr>
<td></td>
<td>380 - 480 ± 10%</td>
</tr>
<tr>
<td></td>
<td>500 - 600 ± 10%</td>
</tr>
<tr>
<td>Supply Frequency</td>
<td>48 - 62 Hz</td>
</tr>
<tr>
<td>Displacement PF</td>
<td>&gt; 0.98</td>
</tr>
<tr>
<td>Phase Imbalance</td>
<td>3% Maximum allowed</td>
</tr>
<tr>
<td>Inrush Current</td>
<td>&lt; Rated current</td>
</tr>
<tr>
<td>Power Cycles</td>
<td>120 per hour max, evenly spaced</td>
</tr>
</tbody>
</table>

**Output Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>230V, 1-ph in: 1-10 HP (0.75-7.5 kW)</td>
</tr>
<tr>
<td></td>
<td>230V, 3-ph in: 1-100 HP (0.75-75 kW)</td>
</tr>
<tr>
<td></td>
<td>400V, 3-ph in: 1-400 HP (0.75-250kW)</td>
</tr>
<tr>
<td>Overload Capacity</td>
<td>150% for 60 secs, 200% for 4 secs.</td>
</tr>
<tr>
<td>Output Frequency</td>
<td>0-500Hz in V/Hz mode (0.1 Hz res) (optional 2kHz)</td>
</tr>
<tr>
<td></td>
<td>0-100Hz in vector mode</td>
</tr>
</tbody>
</table>

**Ambient Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Storage: -40°C to 60°C</td>
</tr>
<tr>
<td></td>
<td>Operating: -10°C to 40°C (IP55 &amp; IP66)</td>
</tr>
<tr>
<td></td>
<td>-10°C to 50°C (IP20)</td>
</tr>
<tr>
<td>Altitude</td>
<td>Up to 1000m ASL without de-rating</td>
</tr>
<tr>
<td></td>
<td>Up to 2000m Max UL Approved</td>
</tr>
<tr>
<td></td>
<td>Up to 4000m Max (non UL)</td>
</tr>
<tr>
<td></td>
<td>Above 1000m, de-rate 1% per 100m</td>
</tr>
<tr>
<td>Humidity</td>
<td>95% non-condensing</td>
</tr>
</tbody>
</table>

**Enclosures**

| Ingress Protection   | IP20 - Frame sizes 2 - 6 & 8 |
|                      | IP55 (NEMA 12) - Frame sizes 4 - 8 |
|                      | IP66 (NEMA 4X) - Optional sizes 2 - 4 |

**Programming**

| Keypad               | Standard: built in keypad   |
|                      | Optional: Remote keypad     |
|                      | Optistick memory stick      |
|                      | drive.web savvy software    |
| Display              | Multi-language TFT Display (sizes 2 - 8) |

**Control & Monitoring**

| PID                  | Internal PID with feedback display |
|                      | Fault Memory                      |
|                      | Last 4 trips stored with time stamp |
|                      | Data Logging                      |
|                      | Current, temperature, DC Bus volts prior to trip |
|                      | Maintenance Indicator             |
|                      | Service life monitor with user adjustable interval |
|                      | Monitoring                        |
|                      | Hours run                         |
|                      | Resettable and non-resettable kWh meters |

**Communications Options**

| drive.web, ModbusTCP, EIP, DeviceNet, Profinet |

**Communications Options**

| drive.web, ModbusTCP, EIP, DeviceNet, Profinet |

**I/O Specification**

| Power Supply         | 24VDC, 100mA short protected 10VDC, 5mA for setpoint potentiometer |
| Programmable Inputs  | 3 x Digital 10 to 30 VDC, response <4ms 2 x Analog/digital |
| Programmable Outputs | 2 x Analog, 0-10V, 0-20mA, 4-20mA 2 x Relay NO, 6A @ 250VAC, 5A @ 30VDC |

**Control Modes**

- Closed Loop (encoder) speed control
- Closed Loop (encoder) torque control
- Open Loop PM vector control
- Sensorless vector speed control
- V/F Voltage vector
- Energy optimized V/F

**Modulation**

- 4 - 32 kHz effective

**Stop Mode**

- Ramp to stop - adjustable 0.1-600 secs
- Safe Torque Off mode

**Braking**

- Motor flux braking (DC injection)
- Built in brake transistor

**Skip Frequency**

- Single point user adjustable

**Analog Setpoint Control**

- 0-10V, 10-0V, ±10V
- 0-20mA, 20-0mA, 4-20mA, 20-4mA

**Preset Speeds**

- Up to 8

**Digital Setpoint Control**

- Keypad
- ModbusRTU
- CANopen

**Automation**

- Optional drive.web Ethernet distributed control + programmable control, extra I/O, operator stations

**Power Supply**

- 24VDC, 100mA short protected
- 10VDC, 5mA for setpoint potentiometer

**Programmable Inputs**

- 3 x Digital
- 10 to 30 VDC, response <4ms
- 2 x Analog/digital

**Programmable Outputs**

- 2 x Analog
- 0-10V, 0-20mA, 4-20mA
- 2 x Relay NO, 6A @ 250VAC, 5A @ 30VDC

**PID**

- Internal PID with feedback display

**Fault Memory**

- Last 4 trips stored with time stamp

**Data Logging**

- Current, temperature, DC Bus volts prior to trip

**Maintenance Indicator**

- Service life monitor with user adjustable interval

**Monitoring**

- Hours run
- Resettable and non-resettable kWh meters
## P2 Series Models & Ratings

### Standard IP20 Packages

**With EMC Filter & DB transistor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-22010-1HF42</td>
<td>1</td>
<td>4.3</td>
<td>2</td>
</tr>
<tr>
<td>P2-22020-1HF42</td>
<td>2</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>P2-22030-1HF42</td>
<td>3</td>
<td>10.5</td>
<td>2</td>
</tr>
</tbody>
</table>

**200-240V ± 10%, 3-ph in, 230V, 3-ph motor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-22010-3HF42</td>
<td>1</td>
<td>4.3</td>
<td>2</td>
</tr>
<tr>
<td>P2-22020-3HF42</td>
<td>2</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>P2-22030-3HF42</td>
<td>3</td>
<td>10.5</td>
<td>2</td>
</tr>
<tr>
<td>P2-32050-3HF42</td>
<td>5</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>P2-32075-3HF42</td>
<td>7.5</td>
<td>24</td>
<td>3</td>
</tr>
</tbody>
</table>

**380-480V ± 10%, 3-ph in, 460V, 3-ph motor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-24010-3HF42</td>
<td>1</td>
<td>2.2</td>
<td>2</td>
</tr>
<tr>
<td>P2-24020-3HF42</td>
<td>2</td>
<td>4.1</td>
<td>2</td>
</tr>
<tr>
<td>P2-24030-3HF42</td>
<td>3</td>
<td>5.8</td>
<td>2</td>
</tr>
<tr>
<td>P2-24050-3HF42</td>
<td>5</td>
<td>9.5</td>
<td>2</td>
</tr>
<tr>
<td>P2-34075-3HF42</td>
<td>7.5</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>P2-34100-3HF42</td>
<td>10</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>P2-34150-3HF42</td>
<td>15</td>
<td>24</td>
<td>3</td>
</tr>
</tbody>
</table>

### NEMA12 (IP55) Packages

**With EMC Filter, DB transistor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-42075-3HF4N</td>
<td>7.5</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>P2-42100-3HF4N</td>
<td>10</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>P2-42150-3HF4N</td>
<td>15</td>
<td>46</td>
<td>4</td>
</tr>
<tr>
<td>P2-52020-3HF4N</td>
<td>20</td>
<td>61</td>
<td>5</td>
</tr>
<tr>
<td>P2-52025-3HF4N</td>
<td>25</td>
<td>72</td>
<td>5</td>
</tr>
<tr>
<td>P2-62030-3HF4N</td>
<td>30</td>
<td>90</td>
<td>6</td>
</tr>
<tr>
<td>P2-62040-3HF4N</td>
<td>40</td>
<td>110</td>
<td>6</td>
</tr>
<tr>
<td>P2-62050-3HF4N</td>
<td>50</td>
<td>150</td>
<td>6</td>
</tr>
<tr>
<td>P2-62060-3HF4N</td>
<td>60</td>
<td>180</td>
<td>6</td>
</tr>
<tr>
<td>P2-72075-3HF4N</td>
<td>75</td>
<td>202</td>
<td>7</td>
</tr>
<tr>
<td>P2-72100-3HF4N</td>
<td>100</td>
<td>248</td>
<td>7</td>
</tr>
<tr>
<td>P2-72125-3HF4N</td>
<td>125</td>
<td>302</td>
<td>7</td>
</tr>
</tbody>
</table>

**380-480V ± 10%, 3-ph in, 460V, 3-ph motor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-44150-3HF4N</td>
<td>15</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>P2-44200-3HF4N</td>
<td>20</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>P2-44250-3HF4N</td>
<td>25</td>
<td>39</td>
<td>4</td>
</tr>
<tr>
<td>P2-44300-3HF4N</td>
<td>30</td>
<td>46</td>
<td>4</td>
</tr>
<tr>
<td>P2-54040-3HF4N</td>
<td>40</td>
<td>61</td>
<td>5</td>
</tr>
<tr>
<td>P2-54050-3HF4N</td>
<td>50</td>
<td>72</td>
<td>5</td>
</tr>
<tr>
<td>P2-64060-3HF4N</td>
<td>60</td>
<td>90</td>
<td>6</td>
</tr>
<tr>
<td>P2-64075-3HF4N</td>
<td>75</td>
<td>110</td>
<td>6</td>
</tr>
<tr>
<td>P2-64120-3HF4N</td>
<td>120</td>
<td>150</td>
<td>6</td>
</tr>
<tr>
<td>P2-64150-3HF4N</td>
<td>150</td>
<td>180</td>
<td>6</td>
</tr>
<tr>
<td>P2-74175-3HF4N</td>
<td>175</td>
<td>202</td>
<td>7</td>
</tr>
<tr>
<td>P2-74200-3HF4N</td>
<td>200</td>
<td>240</td>
<td>7</td>
</tr>
<tr>
<td>P2-74250-3HF4N</td>
<td>250</td>
<td>302</td>
<td>7</td>
</tr>
<tr>
<td>P2-84300-3HF4N</td>
<td>300</td>
<td>370</td>
<td>8</td>
</tr>
<tr>
<td>P2-84400-3HF4N</td>
<td>400</td>
<td>480</td>
<td>8</td>
</tr>
</tbody>
</table>

**Note:** Drives marked ‡ are also available in IP20 form. Please call for details, pricing, and availability.

## P2 Series 600 Volts Drives

### 600VAC DRIVES

#### Standard IP20 Packages to 20 HP

**500-600V ± 10%, 3-ph in, 500-600V, 3-ph motor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-26010-3H042</td>
<td>1</td>
<td>2.1</td>
<td>2</td>
</tr>
<tr>
<td>P2-26020-3H042</td>
<td>2</td>
<td>3.1</td>
<td>2</td>
</tr>
<tr>
<td>P2-26030-3H042</td>
<td>3</td>
<td>4.1</td>
<td>2</td>
</tr>
<tr>
<td>P2-26050-3H042</td>
<td>5</td>
<td>6.5</td>
<td>2</td>
</tr>
<tr>
<td>P2-26075-3H042</td>
<td>7.5</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>P2-36100-3H042</td>
<td>10</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>P2-36150-3H042</td>
<td>15</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>P2-36200-3H042</td>
<td>20</td>
<td>22</td>
<td>3</td>
</tr>
</tbody>
</table>

#### NEMA12 (IP55) Packages to 250 HP

**500-600V ± 10%, 3-ph in, 500-600V, 3-ph motor**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-46200-3H04N</td>
<td>20</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>P2-46250-3H04N</td>
<td>25</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>P2-46300-3H04N</td>
<td>30</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>P2-46400-3H04N</td>
<td>40</td>
<td>43</td>
<td>4</td>
</tr>
<tr>
<td>P2-56050-3H04N</td>
<td>50</td>
<td>54</td>
<td>5</td>
</tr>
<tr>
<td>P2-56060-3H04N</td>
<td>60</td>
<td>65</td>
<td>5</td>
</tr>
<tr>
<td>P2-56075-3H04N</td>
<td>75</td>
<td>78</td>
<td>6</td>
</tr>
<tr>
<td>P2-66100-3H04N</td>
<td>100</td>
<td>105</td>
<td>6</td>
</tr>
<tr>
<td>P2-66125-3H04N</td>
<td>125</td>
<td>130</td>
<td>6</td>
</tr>
<tr>
<td>P2-66150-3H04N</td>
<td>150</td>
<td>150</td>
<td>6</td>
</tr>
</tbody>
</table>

### P2 OPTIONS

- **T2-ENCOD-IN**: Encoder feedback module
- **T2-OPORT-IN**: Remote keypad & display
- **T3-OPPAD-IN**: Remote keypad w/TFT display

### Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (ins)</td>
<td>8.7</td>
<td>10.3</td>
<td>17.3</td>
<td>21.3</td>
<td>34.1</td>
<td>50.4</td>
<td>52.5</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>221</td>
<td>261</td>
<td>440</td>
<td>546</td>
<td>885</td>
<td>1280</td>
<td>1334</td>
</tr>
<tr>
<td>Width (ins)</td>
<td>4.4</td>
<td>5.2</td>
<td>6.8</td>
<td>8.3</td>
<td>13.0</td>
<td>13.0</td>
<td>17.5</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>112</td>
<td>131</td>
<td>173</td>
<td>235</td>
<td>330</td>
<td>330</td>
<td>444</td>
</tr>
<tr>
<td>Depth (ins)</td>
<td>7.3</td>
<td>8.1</td>
<td>9.1</td>
<td>10.9</td>
<td>13.5</td>
<td>14.4</td>
<td>16.7</td>
</tr>
<tr>
<td>Depth (mm)</td>
<td>185</td>
<td>205</td>
<td>230</td>
<td>270</td>
<td>340</td>
<td>370</td>
<td>423</td>
</tr>
<tr>
<td>Weight (LBS)</td>
<td>4</td>
<td>7.7</td>
<td>25.4</td>
<td>49.6</td>
<td>111</td>
<td>177</td>
<td>440</td>
</tr>
<tr>
<td>Weight (KG)</td>
<td>1.8</td>
<td>3.5</td>
<td>11.5</td>
<td>22.5</td>
<td>50</td>
<td>80</td>
<td>200</td>
</tr>
</tbody>
</table>
V3 ECO DRIVES
Energy Efficient Drives

Variable torque, fan & pump drive for:
- HVAC
- Building systems
- Climate control
- Flow control

Up to 400HP at 460 Volts

IP20 up to 400HP - 50°C
NEMA12 (IP55) 10 to 400HP - 40°C *
NEMA4X (IP66) to 40HP - 40°C (indoor) *

- Low input harmonic current distortion
- Compliant with EN61000-3-12
- >98% drive efficiency
- Low audible motor noise
- Clear, TFT, multi-language display
- Internal EMC filter
- Smart energy optimization
- Smart pump & fan functions
- Resonance avoidance
- Sleep/wake functions
- Intelligent maintenance intervals
- 110% overload, 60 secs
- Motor flux braking
- ModbusRTU, BACnet
- Energy optimization for max efficiency
- DC bus chokes in frames 5 - 8

Options
- drive.web savvy smart programmable automation
- Easy off site Internet access to complete systems
- Ethernet peer-to-peer networking
- Extended I/O
- EIP, ModbusTCP, ProfibusDP, DeviceNet
- Remote keypad with bright TFT display
- Power disconnect, sizes 2 & 3
- savvyPanel touch screen HMI

Motor compatibility:
- Induction motors
- PM AC motors
- Brushless DC motors
- Synchronous reluctance

V3 ECO DRIVE
With Smart Energy Optimization
Typically saves 2 to 4% energy over standard VFDs
Every 1% saves 1100 kWh per year for 50HP running 60 hours a week, 50 weeks a year!
**V3 ECO PUMP & FAN**

**FEATURES**
- Dedicated HVAC and centrifugal pump controller
- Built in EMC filter standard
- DC bus chokes built in, sizes 6 - 7
- Multi-language, plain text TFT display for ease of use
- Energy optimization for maximum efficiency
- BACnet and ModbusRTU as standard
- Built-in hours run and kWh meters
- Built-in PID controller
- Advanced application functions for easy programming
- High frequency switching (up to 32kHz) for quiet running
- Built-in motor flux braking
- Programmable I/O
- Power loss ride through 40°C ambient
- HVAC functions:
  - Bi-directional Fire Mode for emergency ventilation
  - Drive fault bypass select
  - Sleep mode with auto boost
- Pump functions:
  - Blockage detection/clear/stir
  - Adjustable cleaning cycle
  - Multi-pump cascade control
  - Dry run protection
  - Pump pre-heat anti condensation mode
- Standards - UL, cUL, EAC, and RCM

**Options:**
- drive.web savvy smart programmable automation
- savvyPanel graphical, touch screen operator technology
- Easy, off site Internet access to the complete system
- Ethernet peer to peer networking
- Remote keypad with bright TFT display
- Ethernet ModbusTCP and EIP
- 3 additional relay outputs for cascade control
- Additional smarty I/O option
- Built in power isolator switch sizes 2 & 3

### Specifications

<table>
<thead>
<tr>
<th>Input Ratings</th>
<th>Supply Voltage</th>
<th>200 - 240 ± 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>380 - 480 ± 10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>500 - 600 ± 10%</td>
<td></td>
</tr>
<tr>
<td>Supply Frequency</td>
<td>48 - 62 Hz</td>
<td></td>
</tr>
<tr>
<td>Displacement PF</td>
<td>&gt; 0.98</td>
<td></td>
</tr>
<tr>
<td>Phase Imbalance</td>
<td>3% Maximum allowed</td>
<td></td>
</tr>
<tr>
<td>Inrush Current</td>
<td>&lt; Rated current</td>
<td></td>
</tr>
<tr>
<td>Power Cycles</td>
<td>120 per hour max, evenly spaced</td>
<td></td>
</tr>
</tbody>
</table>

| Output Ratings | Power Output | 230V, 1-ph in: 1-10 HP (0.75-7.5 kW) |
|                |            | 230V, 3-ph in: 1-100 HP (0.75-75 kW) |
|                |            | 460V, 3-ph in: 1-400 HP (0.75-250kW) |
|                |            | 575V, 3-ph in: 1-175 HP (0.75-110kW) |
| Overload Capacity | 110% for 60 secs, 125% for 2 secs. |
| Output Frequency | 0-120Hz, 0.1 Hz resolution |

| Ambient Ratings | Temperature | Storage: -40°C to 60°C |
|                 | Operating: -10°C to 40°C |
|                 | Altitude | Up to 1000m ASL without de-rating |
|                 |          | Up to 2000m Max UL Approved |
|                 |          | Up to 4000m Max (non UL) |
|                 |          | Above 1000m, de-rate 1% per 100m |
|                 | Humidity | 95% non-condensing |

| Enclosures | Ingress Protection | NEMA4X sizes 2 - 4; NEMA12 sizes 4 - 8 |

| Programming | Keypad | Standard: built in keypad |
|            | Optional: Remote keypad | drive.web savvy software |
| Display | Multi-Language TFT Display |

### Control & Monitoring

| Power Supply | 24VDC, 100mA short protected |
|             | 10VDC, 5mA for setpoint potentiometer |
| Programmable Inputs | 3 x Digital | 10 to 30 VDC, response <5ms |
|                    | 2 x Analog | 0-20mA, 4-20mA |
| Programmable outputs | 2 x Analog | 0-10V, 0-20mA |
|                     | 2 x Relay NO | 6A @ 250VAC, 5A @ 30VDC |
| PID | Internal PID with feedback display |
| Fault Memory | Last 4 trips stored with time stamp |
| Data Logging | Current, temperature, DC Bus volts prior to trip |
| Maintenance Indicator | Service life monitor with user adjustable interval |
| Monitoring | Drive hours run & cooling fan run time |
|            | Repeatable and non-resettable kWh meters |

### Application functions

| HVAC Functions | Fan & pump features |
| Pump functions | Pump blockage detection |
|                | Pump cleaning cycles |
|                | Multi-pump cascade control |
|                | Pump stir mode |

### Input Ratings

**Supply Voltage**
- 200 - 240 ± 10%
- 380 - 480 ± 10%
- 500 - 600 ± 10%

**Supply Frequency**
- 48 - 62 Hz

**Displacement PF**
- > 0.98

**Phase Imbalance**
- 3% Maximum allowed

**Inrush Current**
- < Rated current

**Power Cycles**
- 120 per hour max, evenly spaced

### Output Ratings

**Power Output**
- 230V, 1-ph in: 1-10 HP (0.75-7.5 kW)
- 230V, 3-ph in: 1-100 HP (0.75-75 kW)
- 460V, 3-ph in: 1-400 HP (0.75-250kW)
- 575V, 3-ph in: 1-175 HP (0.75-110kW)

**Overload Capacity**
- 110% for 60 secs, 125% for 2 secs.

**Output Frequency**
- 0-120Hz, 0.1 Hz resolution

### Ambient Ratings

**Temperature**
- Storage: -40°C to 60°C
- Operating: -10°C to 40°C

**Altitude**
- Up to 1000m ASL without de-rating
- Up to 2000m Max UL Approved
- Up to 4000m Max (non UL)
- Above 1000m, de-rate 1% per 100m

**Humidity**
- 95% non-condensing

### Enclosures

**Ingress Protection**
- NEMA4X sizes 2 - 4; NEMA12 sizes 4 - 8

### Programming

| Keypad | Standard: built in keypad |
| Optional: Remote keypad | drive.web savvy software |

### Display

**Multi-Language TFT Display**
200-240V ± 10%, 1-ph in, 230V, 3-ph motor

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Amps</th>
<th>Size</th>
<th>NEMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>V3-220043-1F12</td>
<td>1</td>
<td>4.3</td>
<td>2</td>
<td>IP20</td>
</tr>
<tr>
<td>V3-220070-1F12</td>
<td>2</td>
<td>7</td>
<td>2</td>
<td>IP20</td>
</tr>
<tr>
<td>V3-220105-1F12</td>
<td>3</td>
<td>10.5</td>
<td>2</td>
<td>IP20</td>
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200-240V ± 10%, 3-ph in, 230V, 3-ph motor

<table>
<thead>
<tr>
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<th>HP</th>
<th>Amps</th>
<th>Size</th>
<th>NEMA</th>
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<tr>
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<tr>
<td>V3-220070-3F1A or E</td>
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<tr>
<td>V3-220105-3F1A or E</td>
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380-480V ± 10%, 3-ph in, 460V, 3-ph motor

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600 Volts Drives

500-600V ± 10%, 3-ph in

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NEMA 4X (IP66), with TFT text display

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<th>Size</th>
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<td>12</td>
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<td>V3-460280-301N</td>
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<td>28</td>
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<td>V3-460340-301N</td>
<td>30</td>
<td>34</td>
<td>4</td>
<td>12</td>
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</tbody>
</table>

Note:
Drives marked ‡ are also available in IP20 form. Please call for details, pricing, and availability.
E3 Sensorless Vector

General purpose drives with all purpose features
Up to 50 HP
Basic IP20 or NEMA 4X (IP66)
Basic control or full featured systems drive
3-Phase & single phase motor versions

Basic or loaded, the new E3 is designed to give the best in value, performance and ease of use.

Sensorless vector control for:
• High efficiency operation
• Selectable motor types
  Standard Induction, AC PM, BLDC, Sync Reluctance
• 3 selectable operating modes: Industrial, Fan, & Pump

Expandable
Economical
Easy
Enduring
Efficient

KEY FEATURES
Compact packaging
Simple mechanical and electrical installation
50°C ambient rating (IP20), 40°C ambient rating (NEMA 4X)
150% rating for 60 seconds, 175% for 2 seconds
Simple 14 parameter basic set up
Integral brake transistor, sizes 2, 3, 4, and 5 (100% continuous rated)
ModbusRTU serial port

Options:
Remote keypad and display
OPTISTICK plug in unit for fast up/down load of parameters
smarty remote I/O, programmable control & Ethernet networking
speedy programmable control & Ethernet networking
savvyPanel smart touch screen operator station technology
Integral RFI filter option

For NEMA 4X versions, see Page 44
### STANDARD IP20 DRIVES

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<th>Motor Phase</th>
<th>Power</th>
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<td>3Ø, 230V</td>
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<td>1</td>
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<td>3Ø, 230V</td>
<td>1.0HP</td>
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<td>1</td>
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<td>E3-210058-1042</td>
<td>1Ø, 115V</td>
<td>3Ø, 230V</td>
<td>1.5HP</td>
<td>5.8</td>
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<tr>
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<td>3Ø, 230V</td>
<td>0.5HP</td>
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<td>3Ø, 230V</td>
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<td>3Ø, 230V</td>
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<td>3Ø, 230V</td>
<td>2.0HP</td>
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<td>E3-220105-3042</td>
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<td>E3-440300-3012</td>
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<td>50.0HP</td>
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</tbody>
</table>

**Ambient Rating**
- 50°C except where marked
- 45°C Ambient Rating

**Cost effective either stand alone or networked in coordinated systems**

### SPECIFICATION

- **Output Frequency:** 0 to 500Hz. (Please call for special builds up to 2000Hz)
- **Supply options Frequency:** 48 - 62 Hz
- **Voltage/Phases:**
  - 1Ø, 115V 3Ø, 230V
  - 0.5HP 2.3 1
  - 1Ø, 230V 3Ø, 230V
  - 0.5HP 2.3 1
- **Environment Temperature:**
  - IP20: Operating, -10 to 50°C max | Storage, -40 to 60°C
  - NEMA 4X: Operating, -10 to 40°C max | Storage, -40 to 60°C
- **Altitude:**
  - 0-2000M, derate 1% per 100M above 1000M
- **Humidity:** up to 95%, non condensing
- **Ingress Protection:** Basic IP20, Optional IP66 (NEMA 4X outdoor rated)
- **Control Mode:** Voltage vector
- **PWM frequency:** 4 to 32KHz (effective)
- **V/Hz ratio:** Linear
- **Boost:** Yes
- **Stop modes:** Coast / ramp / DC brake
- **Skip frequency:** One point, adjustable frequency band
- **Setpoint reference:** 0-10VDC, 4-20mA, 20-4mA, 0-20mA, Keypad, Modbus
- **Preset speeds:** 4
- **PI control:** Direct & analog input trim
- **Spin start:** Starts safely into rotating motor
- **Acceler/decel:** 0 - 600 seconds + Ramp stop decel 0 - 600 seconds
- **Configurable I/O Input 1 Programable digital input
  Input 2 Programable digital input
  Input 3 Configurable analog or digital input
  Input 4 Configurable analog or digital input
- **Output 1 Configurable analog or digital output
  Output 2 Normally open relay contact 30VDC 5A, 250VAC 6A
- **Protection Drive trip:** Over/under volts, over current, external trip,
  **Motor:** Overload, over temperature, short circuit, ground fault
  **Trip memory:** Last 4 trips stored

### Standard IP20 Protected

- Ambient Rating 50°C except where marked
- *Ambient Rating 45°C*

---

**drive web**
- Smart automation
- Powerful programmable control functions
- Peer-to-peer over Ethernet
- Smart iPad, Android or touch screen PC operation
- Internet access

**savvyPanel**
- Operator station technology runs on iPad, iPhone, Android or touch screen PC

---

**Cost effective either stand alone or networked in coordinated systems**

---

Please call +410-604-3400 for availability
NEMA 4X (IP66) Enclosed Drives

For harsh, wet & dirty environments

Switched version with keypad, display, speed pot, forward/off/reverse switch & power isolator switch.

Unswitched version with keypad & display.

Key Features:
- 40°C ambient temperature
- Conduit cable entry
- Padlockable power switch
- ModbusRTU port
- ABS moldings & corrosion resistant heat sink
- All standard drive features included
- Brake standard on sizes 2 & 3
- Optional internal Ethernet size 2 & 3

**NEMA 4X (IP66) OUTDOOR RATED**

**E3 SERIES GENERAL PURPOSE VFD**

*Outdoor Applications will require a Sun Shade (not included)*

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<thead>
<tr>
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<th>HP</th>
<th>AMPS</th>
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<th>SWITCHED</th>
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<td>E3-210058-104B</td>
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**NEMA 4X (IP66) OUTDOOR RATED**

**P2 OPEN/CLOSED LOOP VECTOR DRIVES**

With EMC filter, brake transistor +/- DC bus

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<th>HP</th>
<th>AMPS</th>
<th>UNSWITCHED</th>
<th>SWITCHED</th>
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<td>P2-26010-3HF4A</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4.1</td>
<td>P2-26020-3HF4A</td>
<td>P2-26020-3HF4B</td>
</tr>
<tr>
<td>2</td>
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<td>P2-26030-3HF4A</td>
<td>P2-26030-3HF4B</td>
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<tr>
<td>2</td>
<td>5</td>
<td>6.5</td>
<td>P2-26050-3HF4A</td>
<td>P2-26050-3HF4B</td>
</tr>
<tr>
<td>7.5</td>
<td>9</td>
<td>P2-26075-3HF4A</td>
<td>P2-26075-3HF4B</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>P2-36100-3HF4A</td>
<td>P2-36100-3HF4B</td>
<td></td>
</tr>
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<td>15</td>
<td>17</td>
<td>P2-36150-3HF4A</td>
<td>P2-36150-3HF4B</td>
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</tr>
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</table>

Encoder feed back option T2-ENCOD-IN

Ethernet networking & smart programmable control option dw224-00

<table>
<thead>
<tr>
<th>SIZE</th>
<th>HP</th>
<th>AMPS</th>
<th>UNSWITCHED</th>
<th>SWITCHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10.1</td>
<td>257nm</td>
<td>7.4</td>
<td>186mm</td>
</tr>
<tr>
<td>3</td>
<td>12.2</td>
<td>310mm</td>
<td>8.3</td>
<td>211mm</td>
</tr>
</tbody>
</table>

**E3 Series NEMA 4X - Dimensions and Weight**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>HP</th>
<th>AMPS</th>
<th>UNSWITCHED</th>
<th>SWITCHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>9.1</td>
<td>232mm</td>
<td>6.4</td>
<td>161mm</td>
</tr>
<tr>
<td>2</td>
<td>10.1</td>
<td>257nm</td>
<td>7.4</td>
<td>186mm</td>
</tr>
<tr>
<td>3</td>
<td>12.2</td>
<td>310mm</td>
<td>8.3</td>
<td>211mm</td>
</tr>
<tr>
<td>4</td>
<td>14.2</td>
<td>360mm</td>
<td>9.5</td>
<td>240mm</td>
</tr>
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</table>
AC Drive Options

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch Screen Programmable Operator Stations</td>
<td>dw250+dw228 savvyPanel touch, programmable NEMA 4 display</td>
</tr>
<tr>
<td>T2-OPT-2-6</td>
<td>Remote Keypad</td>
</tr>
<tr>
<td>T2-OPT-1-6</td>
<td>Remote keypad with TFT display</td>
</tr>
<tr>
<td>Communications</td>
<td>shorty2 dw228 ModbusTCP/IP interface Module</td>
</tr>
<tr>
<td>Ongoing Interface</td>
<td>shorty2 dw228 USB Interface Module</td>
</tr>
<tr>
<td>Encoder Feedback</td>
<td>Encoder feedback module for P2</td>
</tr>
<tr>
<td>EMC Filters</td>
<td>Optifilter, EMC input filter, 1-phase, 10A, IP20</td>
</tr>
<tr>
<td>Brake Resistors (Case Type)</td>
<td>DB Resistor, drive size 2, 100G, 200W</td>
</tr>
<tr>
<td>Brake Resistors (Enclosed, vented with over temp switch)</td>
<td>Optifilter, EMC input filter, 3-phase, 5A, IP66</td>
</tr>
<tr>
<td>3-Phase Line Reactors for AC Drives</td>
<td>460 volts, 3% impedance, open construction for mounting in a protected enclosure</td>
</tr>
<tr>
<td>Options:</td>
<td>230 VAC ratings NEMA 1 &amp; NEMA 4X enclosed units Consult Factory</td>
</tr>
<tr>
<td>Drive.web smart drives</td>
<td>400 LMAC3440 500 0.05</td>
</tr>
<tr>
<td>Drive.web smart drives</td>
<td>40 LMAC3440 55 0.05</td>
</tr>
<tr>
<td>Drive.web smart drives</td>
<td>25 LMAC3425 320 0.075</td>
</tr>
</tbody>
</table>

Drive.web automation | Intuitive |
| Drive.web automation | Easy |
| Drive.web automation | Reliable |
| Drive.web automation | Very smart!
AC drives

E3 SINGLE PHASE

Single Phase Motor Controller
For Shaded Pole (SP) & Permanent Split Capacitor (PSC) motors used in direct drive, variable torque, fan and pump type applications only

THE BASICs
Compact packaging
Simple mechanical and electrical installation
50°C ambient rating
150% rating for 60 seconds, 175% for 2 seconds
Simple basic set up
Integral brake transistor (size 2, 100% rated)
ModbusRTU serial port
Remote keypad and display option
OPTISTICK plug-in for easy parameter up/down load

E3 Single Phase Motor Controller uses a unique boost control algorithm that ensures reliable starting and control.

- Energy saving
- Macros for fan & pump applications
- Built in PI control
- Bluetooth connectivity
- High frequency switching for quite running in:
  ~ Commercial and residential HVAC
  ~ Fume extraction
  ~ Laboratories
  ~ Quiet locations

Expandable • Versatile • Economical

Basic IP20 or NEMA4X (outdoor rated) versions
Basic or full featured systems drive
Basic or peer-to-peer networking over Ethernet

SPECIFICATION
Output Frequency 0 to 120Hz
Supply options Frequency 48 - 62 Hz, >0.98PF, inrush current < rated current
Volts/Phases 100 - 132 volts max, single phase (0.5 - .75HP)
180 - 264 volts max, 1-phase (0.5 - 1.5HP)
180 - 264 volts max, 3-phase (0.5 - 1.5HP, special order)

Environment Temperature IP20, operating, -10 to 50°C max, storage, -40 to 60°C
IP66, NEMA 4X, operating -10 to 40°C max, storage, -40 to 60°C
Altitude 0-2000M, derate 1% per 100M above 1000M
Humidity up to 95%, non condensing
Ingress Basic IP20
Optional IP66 (NEMA 4X), outdoor rated

Control Mode V/F voltage vector, with energy optimizer
PWM Hz 4 to 32KHz (effective)
Skip Freq Single point, user adjustable
Boost Automatic boost phase operation
Stop modes Coast / ramp / DC brake
Setpoint ref 0-10VDC, 4-20mA, 0-20mA, Keypad, Modbus
Presets 8 preset speeds
PI control Direct & analog input trim
Accel/Decel 0 - 600 secs + Ramp stop decel 0 - 600 secs

Configurable I/O Input 1 Programmable digital input
Input/output 2 Selectable digital input / output
Input 3 Configurable analog or digital input
Input 4 Configurable analog or digital input
Output 1 Configurable analog or digital output
Relay 1 Normally open relay contact 30VDC 5A, 250VAC 6A

Protection Drive trip Over/under volts, over current, external trip,
Motor Overload, over temp, short circuit, ground fault
Trip memory Last 4 trips stored
E3 Single Phase IP20

Single phase motor controller for use only with Shaded Pole (SP) or Permanent Split Capacitor (PSC) type motors on variable torque, direct drive fans and centrifugal pumps

<table>
<thead>
<tr>
<th>Model</th>
<th>Supply</th>
<th>Motor</th>
<th>Power</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3-110070-1012-01</td>
<td>1Ø, 115V</td>
<td>1Ø, 115V</td>
<td>0.5HP</td>
<td>7.0</td>
<td>1</td>
</tr>
<tr>
<td>E3-210105-1042-01</td>
<td>1Ø, 115V</td>
<td>1Ø, 115V</td>
<td>0.75HP</td>
<td>10.5</td>
<td>2</td>
</tr>
<tr>
<td>E3-120043-1012-01</td>
<td>1Ø, 230V</td>
<td>1Ø, 230V</td>
<td>0.5HP</td>
<td>4.3</td>
<td>1</td>
</tr>
<tr>
<td>E3-120070-1012-01</td>
<td>1Ø, 230V</td>
<td>1Ø, 230V</td>
<td>1HP</td>
<td>7.0</td>
<td>1</td>
</tr>
<tr>
<td>E3-220105-1042-01</td>
<td>1Ø, 230V</td>
<td>1Ø, 230V</td>
<td>1.5HP</td>
<td>10.5</td>
<td>2</td>
</tr>
</tbody>
</table>

DIMENSIONS & WEIGHT

<table>
<thead>
<tr>
<th>Size</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.8&quot; (173mm)</td>
<td>3.3&quot; (83mm)</td>
<td>4.9&quot; (123mm)</td>
<td>2.2lbs (1kg)</td>
</tr>
<tr>
<td>2</td>
<td>8.7&quot; (221mm)</td>
<td>4.4&quot; (110mm)</td>
<td>5.9&quot; (150mm)</td>
<td>3.8lbs (1.7kg)</td>
</tr>
</tbody>
</table>

E3 SINGLE PHASE, NEMA 4X (IP66)

Single phase motor controller for use only with Shaded Pole (SP) or Permanent Split Capacitor (PSC) type motors in variable torque, fan and centrifugal pump applications

Switched version with keypad, display, speed pot, forward/off switch & power isolator switch

Unswitched version with keypad & display

For outdoor and harsh, dirty indoor environments

- 40°C ambient temperature
- Conduit cable entry
- Padlockable power switch
- Wash down duty
- ModbusRTU port
- Compact packaging
- All standard drive features included
- Brake switch standard on 230V, size 2
- Optional internal Ethernet
- Optional internal drive.web smart control
- Sunshade required for outdoor use

<table>
<thead>
<tr>
<th>Model</th>
<th>Supply</th>
<th>Motor</th>
<th>Power</th>
<th>Amps</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3-110070-101#-01</td>
<td>1Ø, 115V</td>
<td>1Ø, 115V</td>
<td>0.5HP</td>
<td>7.0</td>
<td>1*</td>
</tr>
<tr>
<td>E3-210105-104#-01</td>
<td>1Ø, 115V</td>
<td>1Ø, 115V</td>
<td>0.75HP</td>
<td>10.5</td>
<td>2*</td>
</tr>
<tr>
<td>E3-120043-101#-01</td>
<td>1Ø, 230V</td>
<td>1Ø, 230V</td>
<td>0.5HP</td>
<td>4.3</td>
<td>1</td>
</tr>
<tr>
<td>E3-120070-101#-01</td>
<td>1Ø, 230V</td>
<td>1Ø, 230V</td>
<td>1HP</td>
<td>7.0</td>
<td>1</td>
</tr>
<tr>
<td>E3-220105-104#-01</td>
<td>1Ø, 230V</td>
<td>1Ø, 230V</td>
<td>1.5HP</td>
<td>10.5</td>
<td>2</td>
</tr>
</tbody>
</table>

# A = Unswitched, B = Switched

DIMENSIONS & WEIGHT

<table>
<thead>
<tr>
<th>Size</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.1&quot; (232mm)</td>
<td>6.4&quot; (161mm)</td>
<td>6.4&quot; (162mm)</td>
<td>5.5lb (2.5kg)</td>
</tr>
<tr>
<td>2</td>
<td>10.1&quot; (257mm)</td>
<td>7.4&quot; (188mm)</td>
<td>7.2&quot; (182mm)</td>
<td>7.7lb (3.5kg)</td>
</tr>
</tbody>
</table>
Regenerative & Non-regenerative

Enclosed, DIN rail mounting drives in elegant compact packages for both stand alone and systems applications.

**Standard features include:**
- Plug-in screw terminals
- Dual 115 & 230 volts, 50/60Hz supply
- Armature volts or tach feedback
- IP20 enclosure
- Output for ramps, speed demand, current demand
- Inputs for ramped speed, unramped speed, torque (current)
- Logic outputs for overload & trip
- Configurable level comparator & sign changer
- Standards: UL, cUL, CE

### MODEL RATING FEATURES TERMINALS

#### NON-ISOLATED

**K340**
- Armature current 3.4 amps
- 1/4HP 0.25kW @90Vdc
- 1/2HP 0.55kW @180Vdc
- Size 1.4”W x 4.2”H x 4.7”D
- Max Speed +10V
- Min Speed Min
- Up Ramp Input +
- IR Comp Common

**K680**
- Armature current 6.8 amps
- 1/2HP 0.55kW @90Vdc
- 1HP 0.75kW @180Vdc
- Size 1.8”W x 4.2”H x 4.7”D
- I max Run
- AVF/Tach switch Tach f/b
- Speed range switch AC voltage selector
- Field 1Amp 0.9x ac supply

**K1220**
- Armature current 12.2 amps
- 1HP 0.75kW @90Vdc
- 2HP 1.8kW @180Vdc
- Size 1.8”W x 4.2”H x 4.7”D
- Max Speed +10V ref
- Min Speed Min speed
- Up Ramp Input +
- Down Ramp Output +/-
- IR Comp Common
- Stability
- AVF/Tach switch Run
- Speed range switch Pushbutton +
- AC voltage selector Pushbutton -
- Level comparator
- Common
- Tach f/b

#### ISOLATED

**K340i**
- Armature current 3.4 amps
- 1/4HP 0.25kW @90Vdc
- 1/2HP 0.55kW @180Vdc
- Size 2.4”W x 4.2”H x 4.7”D
- Max Speed +10V ref
- Min Speed Min speed
- Up Ramp Input +
- Down Ramp Output +/-
- IR Comp Common
- Stability
- AVF/Tach switch Run
- Speed range switch Pushbutton +
- AC voltage selector Pushbutton -
- Level comparator
- Common
- Tach f/b

**K680i**
- Armature current 6.8 amps
- 1/2HP 0.55kW @90Vdc
- 1HP 0.75kW @180Vdc
- Size 2.8”W x 4.2”H x 4.7”D
- I max Run
- AVF/Tach switch Tach f/b
- Stability
- IR Comp
- Speed range switch
- Pushbutton +
- Pushbutton -
- Common
- AC voltage selector
- Tach f/b

**K1220i**
- Armature current 12.2 amps
- 1HP 0.75kW @90Vdc
- 2HP 1.8kW @180Vdc
- Size 2.8”W x 4.2”H x 4.7”D
- Max Speed +10V ref
- Min Speed Min speed
- Up Ramp Input +
- Down Ramp Output +/-
- IR Comp Common
- Stability
- AVF/Tach switch Run
- Speed range switch Pushbutton +
- AC voltage selector Pushbutton -
- Level comparator
- Common
- Tach f/b

#### 4-QUADRANT, REGENERATIVE, REVERSING, ISOLATED

**K340XRi**
- Armature current 3.4 amps
- 1/4HP 0.25kW @90Vdc
- 1/2HP 0.55kW @180Vdc
- Size 2.4”W x 4.2”H x 4.7”D
- Max Speed +10V ref
- Min Speed Min speed
- Up Ramp Input +
- Down Ramp Output +/-
- IR Comp Common
- Stability
- AVF/Tach switch Run
- Speed range switch Pushbutton +
- AC voltage selector Pushbutton -
- Level comparator
- Common
- Tach f/b

**K680XRi**
- Armature current 6.8 amps
- 1/2HP 0.55kW @90Vdc
- 1HP 0.75kW @180Vdc
- Size 2.8”W x 4.2”H x 4.7”D
- I max Run
- AVF/Tach switch Tach f/b
- Stability
- IR Comp
- Speed range switch
- Pushbutton +
- Pushbutton -
- Common
- AC voltage selector
- Tach f/b

**K1220XRi**
- Armature current 12.2 amps
- 1HP 0.75kW @90Vdc
- 2HP 1.8kW @180Vdc
- Size 2.8”W x 4.2”H x 4.7”D
- Max Speed +10V ref
- Min Speed Min speed
- Up Ramp Input +
- Down Ramp Output +/-
- IR Comp Common
- Stability
- AVF/Tach switch Run
- Speed range switch Pushbutton +
- AC voltage selector Pushbutton -
- Level comparator
- Common
- Tach f/b

### High Speed Fuse Kits - DIN Rail Mounting

- FLN-6.3 Line fuse kit K340
- FLL-6.3 Line/line fuse kit K340
- FLNR-6.3 Line & arm fuse kit K340XRi
- FLLR-6.3 Line/line & arm fuse kit K340XRi
- FLN-20 Line fuse kit all non-regen K
- FLL-20 Line/line fuse kit all non-regen K
- FLNR-20 Line & arm fuse kit all regen K
- FLLR-20 Line/line & arm fuse kit all regen K

Optional drive.web smarty

For complete process automation Model dw210-1107 uses discrete I/O interface to provide:
- Ethernet networking
- Internet access
- Powerful function blockprogramming
- ModbusRTU and ModbusTCP/IP
- Additional remote I/O
- savvyPanel smart touch screens (see page 27)
Single Phase DC Systems Drives

This family of single phase DC drives with isolated control circuitry, is designed to meet the most exacting requirements of high performance systems builders. It is a range of full featured products using advanced manufacturing technologies to give unequaled value and functionality to OEMs and System Integrators with world wide markets and demanding applications.

### NON-REGEN MODELS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage/DC Voltage</th>
<th>HP</th>
<th>Fuse Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>400i (4 amps)</td>
<td>230/180V DC</td>
<td>0.75</td>
<td>included</td>
</tr>
<tr>
<td>1600i (16 amps)</td>
<td>230/180V DC</td>
<td>3</td>
<td>F2-30</td>
</tr>
<tr>
<td>3200i/32 (32 amps)</td>
<td>230/180V DC</td>
<td>6</td>
<td>F2-60</td>
</tr>
<tr>
<td>3200i/48LL (48 amps)</td>
<td>240/180V DC</td>
<td>7.5</td>
<td>F2-80</td>
</tr>
<tr>
<td>3200i/32C109 (32 amps)</td>
<td>230/180V DC</td>
<td>8</td>
<td>F2-60</td>
</tr>
</tbody>
</table>

### 4-Q REGEN, REVERSING MODELS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage/DC Voltage</th>
<th>HP</th>
<th>Fuse Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3600XRi/16</td>
<td>230/180V DC</td>
<td>3</td>
<td>F3-30</td>
</tr>
<tr>
<td>3600XRi/32</td>
<td>230/180V DC</td>
<td>6</td>
<td>F3-60</td>
</tr>
<tr>
<td>3600XRi/36</td>
<td>230/180V DC</td>
<td>6.5</td>
<td>F3-60</td>
</tr>
<tr>
<td>3600XRi/36LL</td>
<td>240/180V DC</td>
<td>10</td>
<td>F3-60</td>
</tr>
<tr>
<td>3600XRi/32C132</td>
<td>240/180V DC</td>
<td>10</td>
<td>F3-60</td>
</tr>
</tbody>
</table>

## Standard Features
- Approvals: CE
- Linear torque control
- Armature voltage or tach feedback
- Calibration range switches
- Speed reference 0-10V or 4-20mA
- Maximum and minimum speed settings
- Adjustable current limit
- Current range switch selectable (not on 400i)
- Independently adjustable up and down ramps
- 150% overload capacity, 30 second stall timer
- Stall relay contact output (transistor on 400i)
- Zero speed relay contact (transistor on 400i)
- Control fuses fitted (Power fuse on 400i)
- Start inhibit after power loss
- Power on and stall indicator LEDs
- Speed signal output
- Current signal output
- Ramp signal output
- Total demand signal output
- Dual supply voltage 110 / 230 VAC, 50/60Hz
- Suitable for shunt or PM motors
- IR compensation
- Stability adjustment

## Additional Regen Drive Features
- Speed reference +/-10V or 4-20mA
- Speed trim input
- Independent up & down ramps in FWD & REV
- Separate adjustable current limits motor/brake
- Torque control in either 2 or 4 quadrants
- Relay for Stall, Zero speed, Reverse, Overload
- Control fuses fitted
- Fast, ramped or coast stop
- LEDs for + current, - current, stall & stall timer
- Momentary contact for reversing applications

### Optional drive.web smarty

For complete process automation
Model dw210-1107 uses discrete I/O interface to the drive and to provide:
- Ethernet networking
- Internet access
- Powerful function block programming
- ModbusRTU and ModbusTCP/IP
- Additional remote I/O
- savvyPanel smart touch screens
  (see page 18 for details)

## Enclosed Drives

Enclosed wall mounting versions of these drives and a wide range of other options are detailed in the “Modulus Drive Units” section of this catalog.
Single Phase DC Drives for OEMs

**Model 370 ... OEM Chassis Drives**
Compact, DC drives designed for low cost, non-regenerative, non-isolated machine controls.

**Basic Specification:**
- Rating: 1/4HP at 90VDC, 1/2HP at 180VDC
- Maximum and minimum speed settings
- Current limit
- Acceleration pot
- Suitable 110 or 230 volts, single phase, 50 or 60Hz (not isolated)
- For use with permanent magnet or shunt field motors
- Approval: CE

**Models 400, 800, 1200 ... OEM DC Drives (up to 2HP)**
Versatile, basic, low cost drives suitable for wide range of machine control applications

<table>
<thead>
<tr>
<th>Model</th>
<th>Amps</th>
<th>Description</th>
<th>@ 180VDC</th>
<th>@ 90VDC</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>4 amps</td>
<td>Open chassis with screw terminals</td>
<td>0.75HP</td>
<td>0.38HP</td>
<td>5.2&quot;x4.0&quot;x1.6&quot; (130x100x40mm)</td>
</tr>
<tr>
<td>800</td>
<td>8 amps</td>
<td>Open chassis with screw terminals</td>
<td>1.5HP</td>
<td>0.75HP</td>
<td>5.2&quot;x4.0&quot;x2.8&quot; (130x100x70mm)</td>
</tr>
<tr>
<td>1200</td>
<td>12 amps</td>
<td>Open chassis with screw terminals</td>
<td>2.0HP</td>
<td>1.0HP</td>
<td>5.2&quot;x4.0&quot;x2.8&quot; (130x100x70mm)</td>
</tr>
<tr>
<td>400E</td>
<td>4 amps</td>
<td>Enclosed NEMA 1 with pot, switch, fuse</td>
<td>0.75HP</td>
<td>0.38HP</td>
<td>9.9&quot;x7.0&quot;x3.8&quot; (250x177x95 mm)</td>
</tr>
<tr>
<td>800E</td>
<td>8 amps</td>
<td>Enclosed NEMA 1 with pot, switch, fuse</td>
<td>1.5HP</td>
<td>0.75HP</td>
<td>9.9&quot;x7.0&quot;x3.8&quot; (250x177x95 mm)</td>
</tr>
<tr>
<td>1200E</td>
<td>12 amps</td>
<td>Enclosed NEMA 1 with pot, switch, fuse</td>
<td>2.0HP</td>
<td>1.0HP</td>
<td>9.9&quot;x7.0&quot;x3.8&quot; (250x177x95 mm)</td>
</tr>
<tr>
<td>400ER</td>
<td>4 amps</td>
<td>Enclosed, pot, switch, brake, reverse, fuse</td>
<td>0.75HP</td>
<td>0.38HP</td>
<td>9.9&quot;x7.0&quot;x3.8&quot; (250x177x95 mm)</td>
</tr>
<tr>
<td>800ER</td>
<td>8 amps</td>
<td>Enclosed, pot, switch, brake, reverse, fuse</td>
<td>1.5HP</td>
<td>0.75HP</td>
<td>9.9&quot;x7.0&quot;x3.8&quot; (250x177x95 mm)</td>
</tr>
<tr>
<td>1200ER</td>
<td>12 amps</td>
<td>Enclosed, pot, switch, brake, reverse, fuse</td>
<td>2.0HP</td>
<td>1.0HP</td>
<td>9.9&quot;x7.0&quot;x3.8&quot; (250x177x95 mm)</td>
</tr>
</tbody>
</table>

**Standard features:**
- Linear torque control
- Armature voltage or tach feedback with IR compensation
- Calibration range switches (no component changes)
- Speed reference 0-10V or 4-20mA
- Maximum and minimum speed settings
- Adjustable current limit
- Independently adjustable up and down ramps
- 150% overload capacity with 30 second stall timer
- Stall and Zero Speed relay driver outputs
- Power fuse (up to 12 amps)
- Power on and stall indicator LEDs
- Stability adjustment
- Speed, Ramp Speed and Current signal outputs
- International supply voltages 110 / 230 VAC, 50/60Hz (not isolated)
- Suitable for shunt wound or permanent magnet motors

Approvals: CE
**DC Servo Drives**

These drives are designed for small, high performance position and speed control applications such as robotics, mechanical handling, automated assembly, packaging processes, machine tool axis, etc.

The units are miniature, fast response, reversing, linear transistor drives for brushed DC motors with armatures up to 48 volts. They operate from either a smoothed, unregulated, rectified DC, or battery supply, and include built in thermal protection, current limit with short term overcurrent capacity and resettable overload trip.

The control circuits are designed to ensure extremely low noise emissions, and will meet the most stringent of EMC (Electro-Magnetic Compliance) requirements.

**Model 200XLV 4-Quadrant DC Drive**

Miniature linear amplifier with built in “P” or “P+I” or “PID” (Proportional, Integral, Derivative) for closed loop position, speed or torque control.

**Optional configurations:**
1. Speed control, armature voltage feedback with IR compensation.
2. Speed control, tach feedback.
3. Position control, position feedback.
4. Torque control with armature current feedback

**Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Amps</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>200XLV</td>
<td>2</td>
<td>3.25” x 1.65” x 1.65” (82x40x40mm)</td>
</tr>
</tbody>
</table>

**Models 400XLV, 800XLV & 1200XLV 4-Quadrant DC, PWM Servo Drives**

These products are designed for small, high performance position and speed control applications such as robotics, mechanical handling, automated assembly, packaging processes, machine tool axis, etc.

**Standard Features**
- Speed, or Torque control modes
- Extremely low RF noise emissions
- Ready indicator light
- Motor voltage range: +/-6 VDC to +/-48 VDC
- Armature current (see specifications below)
- Supply voltage 12 to 48 VDC
- Precision 5v and 10v references
- Differential setpoint inputs (300K ohms)
- Overload trip
- Thermal protection
- Adjustable Maximum Speed
- Adjustable IR Compensation for arm volts f/b
- Plug-in terminals
- DIN rail mounting (optional on 200XLV)

**Smarty Motion Control Options**

Full featured motion controller with:
- Trapezoidal and cam motion functions
- Encoder speed & position feedback
- Ethernet, multi-axis networking
- *savvyPanel touch* industrial displays (see pages 30-31)
**Standard Features**
- Total digital control
- Basic peer-to-peer link
- 40 character backlit display
- Friendly, easy menu structure
- Modern, compact packaging
- Extensive, flexible, plug-in I/O
- RS232 serial port
- Easy configuration saving & cloning
- Built-in automatic field controller
- Built in programmable control functions for PID, winders, orientation, etc.
- Tach, encoder & arm volts feedback
- Easy reliable autotune

Size 4 & 5 drives include an embedded **speedy** Automation Controller (dw221) for safe, doors closed, start up & operation with:
- Easy USB port interface
- Peer-to-peer Ethernet communications
- drive.web programmable control
- ModbusTCP over Ethernet
- Easy, safe, **savvyPanel** “Quick Start”

Optional:
- ModbusRTU RS485 serial port
- Devicenet, Profibus DP, fieldbus

**powerDRIVE Packages**
PL/X DC drives up to 1200 horsepower are available in compact **powerDRIVE** packages complete with:
- Main contactor
- High speed 3-phase line fuses
- High speed armature fuse
- High speed control/field fuses
- Line filter (100HP & up)
- USB & Ethernet interface with **speedy dw221**
- Optional motor blower starter (100HP & up)

**LA503846**
dw Ethernet Through-Panel Port for closed door system access
Key Features

Analog Inputs & Outputs
8 analog inputs & 4 analog outputs (12 bits)
All outputs short circuit protected
All inputs over voltage protected up to +50v
Inputs configurable 5 to 30v
Input volts programmable up to +/-30v

Digital Inputs & Outputs
17 digital inputs & 7 digital outputs
Digital I/O short circuit protected
Digital inputs over volts protected to +50v
(with settable switching levels)
Digital outputs over volts protected to +50v

Speed Feedback - Standard
Analog tach
Encoder
Armature voltage
Encoder + armature volts
Encoder + analog tach

Field Configurations
Fixed Current
Fixed voltage
Automatic field weakening
Delayed field quench
Standby field setting
Field economy

Diagnostic Monitoring
Scope terminal monitors selectable values
All analog input voltages
All digital input states
All analog output voltages
All digital output states
Tach volts
Motor arm volts & amps
Field current
Output power Kw
AC supply volts

User Configurable Software Functions
PID blocks, Parameter profiler, Winder reel
diameter calculator, Winder taper tension
calculator, Winder torque/inertia/friction
compensator, Preset speed function, Two
summers, Software “motorized pot”, Interval
timer, Current profiling, Zero speed with shaft
position lock, Jog / crawl functions, Two filters,
Dual motor swap, Latch, Sample & hold
function, Auto self-tune current loop, Linear
and S-ramps, Slack take-up, Batch Counter, Draw control.

Engineered Configuration Packages
Pre-configured generic apps are available
for Open & Closed Loop Winders, Position
Controls, Coordinated Line Drives, Indexing,
registration and others.

Safe, “Doors Closed” Start Up & Operation
The optional dw221 Automation Controller is embed-
ded as standard in size 4 & 5 for easy system wide
access to configure, connect & control.

Protection
Interline device networks
High energy MOV’s
Instantaneous overcurrent
Overcurrent ( inverse time)
Field fail and overcurrent
Motor over temperature
SCR (thyristor) over temp
Main power phase loss
Armature over volts
Over speed protection
Speed feedback mismatch
Stall protection
Standstill logic
SCR (Thyristor) trigger failure
Digital output short circuit

Communications Ports*
drive.web peer-to-peer Ethernet
ModbusTCP/IP Ethernet
USB port for easy network wide set up
Serial port (RS232)

Optional Communications
Ethernet: EIP (PCCC)
ModbusRTU
Profibus DP

Easily add a savvyPanel touch screen HMI with
secure WiFi interface

- Simple, intuitive configuration techniques with clear
display of information
- No pots or switches to set
- Accurate display of voltages and currents
- Positive displacement pushbuttons for tactile feel
- High power processor and large memory will
ensure ease of product enhancement in the future
- 2-button reset gets users back to OEM set up
- Powerful savvy graphical configuration, diagnostics
& system design tools

The powerful savvy configuration tools are used for the
PL Series DC drives, AC drives, drive.web programmable
controllers, savvyPanel operator stations & complete systems.
### DC technology

**With fuses, contactor & power components** (shown hinged open for easy access)

**Models & Ratings**

**4-Quadrant, Regenerative Drives**

<table>
<thead>
<tr>
<th>HP @ 500V arm</th>
<th>HP @ 240V arm</th>
<th>Armature Amps DC @ 40°C</th>
<th>Field Amps DC</th>
<th>powerDRIVE Model</th>
<th>Dimensions (LBS)</th>
<th>Line Reactor Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td>36</td>
<td>5(S)</td>
<td>powerPLX50/123</td>
<td>8.5 x 11.4 x 11.7 (26)</td>
<td>PLX50/123</td>
</tr>
<tr>
<td>30</td>
<td>10</td>
<td>51</td>
<td>5(S)</td>
<td>powerPLX20/51d</td>
<td>8.5 x 11.4 x 11.7 (26)</td>
<td>PLX20/51</td>
</tr>
<tr>
<td>60</td>
<td>25</td>
<td>99</td>
<td>5(S)</td>
<td>powerPLX40/99d</td>
<td>8.5 x 11.4 x 11.7 (30)</td>
<td>PLX40/99</td>
</tr>
<tr>
<td>75</td>
<td>35</td>
<td>123</td>
<td>5(S)</td>
<td>powerPLX50/123d</td>
<td>8.5 x 11.4 x 11.7 (30)</td>
<td>PLX50/123</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>164</td>
<td>10(16)</td>
<td>powerPLX85/164d</td>
<td>16 x 33 x 9.7 (80)</td>
<td>PLX85/164</td>
</tr>
<tr>
<td>125</td>
<td>60</td>
<td>205</td>
<td>10(16)</td>
<td>powerPLX115/270d</td>
<td>16 x 33 x 9.7 (82)</td>
<td>PLX115/270</td>
</tr>
<tr>
<td>150</td>
<td>75</td>
<td>270</td>
<td>10(16)</td>
<td>powerPLX145/330d</td>
<td>16 x 33 x 9.7 (89)</td>
<td>PLX145/330</td>
</tr>
<tr>
<td>200</td>
<td>100</td>
<td>330</td>
<td>10(16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>125</td>
<td>405</td>
<td>20(32)</td>
<td>powerPLX185/405d</td>
<td>16 x 43.5 x 14.4 (143)</td>
<td>PLX185/405</td>
</tr>
<tr>
<td>300</td>
<td>150</td>
<td>480</td>
<td>20(32)</td>
<td>powerPLX225/480d</td>
<td>16 x 43.5 x 14.4 (145)</td>
<td>PLX225/480</td>
</tr>
</tbody>
</table>

**2-Quadrant, Non-Reversing Drives**

<table>
<thead>
<tr>
<th>HP @ 500V arm</th>
<th>HP @ 240V arm</th>
<th>Armature Amps DC @ 40°C</th>
<th>Field Amps DC</th>
<th>powerDRIVE Model</th>
<th>Dimensions (LBS)</th>
<th>Line Reactor Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>10</td>
<td>36</td>
<td>5(S)</td>
<td>powerPL15/36d</td>
<td>8.5 x 11.4 x 11.7 (26)</td>
<td>PL15/36</td>
</tr>
<tr>
<td>30</td>
<td>10</td>
<td>51</td>
<td>5(S)</td>
<td>powerPL20/51d</td>
<td>8.5 x 11.4 x 11.7 (26)</td>
<td>PL20/51</td>
</tr>
<tr>
<td>60</td>
<td>25</td>
<td>99</td>
<td>5(S)</td>
<td>powerPL40/99d</td>
<td>8.5 x 11.4 x 11.7 (30)</td>
<td>PL40/99</td>
</tr>
<tr>
<td>75</td>
<td>35</td>
<td>123</td>
<td>5(S)</td>
<td>powerPL50/123d</td>
<td>8.5 x 11.4 x 11.7 (30)</td>
<td>PL50/123</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>164</td>
<td>10(16)</td>
<td>powerPL65/164d</td>
<td>16 x 33 x 9.7 (80)</td>
<td>PL65/164</td>
</tr>
<tr>
<td>125</td>
<td>60</td>
<td>205</td>
<td>10(16)</td>
<td>powerPL85/205d</td>
<td>16 x 33 x 9.7 (80)</td>
<td>PL85/205</td>
</tr>
<tr>
<td>150</td>
<td>75</td>
<td>270</td>
<td>10(16)</td>
<td>powerPL115/270d</td>
<td>16 x 33 x 9.7 (82)</td>
<td>PL115/270</td>
</tr>
<tr>
<td>200</td>
<td>100</td>
<td>330</td>
<td>10(16)</td>
<td>powerPL145/330d</td>
<td>16 x 33 x 9.7 (89)</td>
<td>PL145/330</td>
</tr>
<tr>
<td>250</td>
<td>125</td>
<td>405</td>
<td>20(32)</td>
<td>powerPL185/405d</td>
<td>16 x 43.5 x 14.4 (143)</td>
<td>PL185/405</td>
</tr>
<tr>
<td>300</td>
<td>150</td>
<td>480</td>
<td>20(32)</td>
<td>powerPL225/480d</td>
<td>16 x 43.5 x 14.4 (145)</td>
<td>PL225/480</td>
</tr>
</tbody>
</table>

**basicDRIVES must be installed with new contactor and the correct high speed SCR fuses to maintain the warranty**

**drive.web options see pages 24 - 25**

USB cable for programming (USB A to USB-C), 2M long - part number LA504302, please call +410-604-3400

Computer RS232 Communications Cable - Drive to DB9 - part number LA102595, included with every drive

For details of Drive Isolation Transformers, Line Reactors and Line Filters, please call +410-604-3400
**PL-Series Drives to 2000HP**

**Models & Ratings**

DC drives 400 HP to 2000 HP are normally available as **basicDRIVES** but can be supplied with **powerKITS** including:

- High speed fuses for line, armature & field
- Main DC contactor
- Line filter
- Flexible bus bar kits

*(basicDRIVES must be installed with new power components to maintain the warranty)*

Drives are available for either 6-pulse or 12-pulse, 460, 600 or 690 VAC configurations - please call for further information.

SAFE, “DOORS CLOSED” START UP AND OPERATION

Drive models with suffix “d” include a speedy dw221 onboard controller with drive.web

---

### DC Drives - 500 VDC Armature, 480VAC Supply

<table>
<thead>
<tr>
<th>HP @ ARMATURE AMPS DC @ 40°C</th>
<th>FIELD AMPS DC Basic(Optional)</th>
<th>4-QUAD REGEN</th>
<th>OVERLOAD RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>basicDRIVE</strong></td>
<td><strong>basicDRIVE</strong></td>
<td>W x H x D (weight)</td>
<td>TOP CABLE ENTRY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>INCHES (lbs)</td>
<td></td>
</tr>
<tr>
<td>400 650 32 (50)</td>
<td>PLX275/650d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>450 750 32 (50)</td>
<td>PLX315/750d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>500 850 32 (50)</td>
<td>PLX360/850d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>575 950 32 (50)</td>
<td>PLX400/950d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>650 1050 32 (50)</td>
<td>PLX440/1050d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>750 1250 64</td>
<td>PLX520/1250d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>895 1450 64</td>
<td>PLX600/1450d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1000 1650 64</td>
<td>PLX700/1650d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1140 1850 64</td>
<td>PLX800/1850d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1260 2050 @35°C 64</td>
<td>PLX900/2050d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1380 2250 @35°C 64</td>
<td>PLX980/2250d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>100%, CONT</td>
</tr>
</tbody>
</table>

### DC Drives - 600 VDC Armature, 600VAC Supply

<table>
<thead>
<tr>
<th>HP @ ARMATURE AMPS DC @ 40°C</th>
<th>FIELD AMPS DC Basic(Optional)</th>
<th>4-QUAD REGEN</th>
<th>OVERLOAD RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>basicDRIVE</strong></td>
<td><strong>basicDRIVE</strong></td>
<td>W x H x D (weight)</td>
<td>TOP CABLE ENTRY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>INCHES (lbs)</td>
<td></td>
</tr>
<tr>
<td>480 650 32 (50)</td>
<td>PLX275MV/650d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>550 750 32 (50)</td>
<td>PLX315MV/750d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>630 850 32 (50)</td>
<td>PLX360MV/850d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>700 950 32 (50)</td>
<td>PLX400MV/950d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>775 1050 32 (50)</td>
<td>PLX440MV/1050d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>925 1250 64</td>
<td>PLX520MV/1250d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1075 1450 64</td>
<td>PLX600MV/1450d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1220 1650 64</td>
<td>PLX700MV/1650d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1370 1850 64</td>
<td>PLX800MV/1850d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1510 2050 @35°C 64</td>
<td>PLX900MV/2050d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1660 2250 @35°C 64</td>
<td>PLX980MV/2250d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>100%, CONT</td>
</tr>
</tbody>
</table>

### DC Drives - 700 VDC Armature, 690VAC Supply

<table>
<thead>
<tr>
<th>HP @ ARMATURE AMPS DC @ 40°C</th>
<th>FIELD AMPS DC Basic(Optional)</th>
<th>4-QUAD REGEN</th>
<th>OVERLOAD RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>basicDRIVE</strong></td>
<td><strong>basicDRIVE</strong></td>
<td>W x H x D (weight)</td>
<td>TOP CABLE ENTRY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>INCHES (lbs)</td>
<td></td>
</tr>
<tr>
<td>550 650 32 (50)</td>
<td>PLX275HV/650d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>650 750 32 (50)</td>
<td>PLX315HV/750d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>735 850 32 (50)</td>
<td>PLX360HV/850d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>820 950 32 (50)</td>
<td>PLX400HV/950d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>900 1050 32 (50)</td>
<td>PLX440HV/1050d</td>
<td>10 x 30 x 13.8 (120)</td>
<td></td>
</tr>
<tr>
<td>1080 1250 64</td>
<td>PLX520HV/1250d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1250 1450 64</td>
<td>PLX600HV/1450d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1420 1650 64</td>
<td>PLX700HV/1650d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1600 1850 64</td>
<td>PLX800HV/1850d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1770 2050 @35°C 64</td>
<td>PLX900HV/2050d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>150%, 25 SECS</td>
</tr>
<tr>
<td>1940 2250 @35°C 64</td>
<td>PLX980HV/2250d</td>
<td>20 x 30 x 13.8 (285)</td>
<td>100%, CONT</td>
</tr>
</tbody>
</table>
The PLXDd is a great retrofit option for controlling large separate SCR stacks in either 6 or 12-pulse DC drive configurations and also for wound rotor motor SCR stack control. The unit has all the standard PL/X series drive features together with:

- Available for stacks up to 690 volts AC, 700 volts DC
- Built-in 32 amps fully automatic field controller (optional 50 amps rating)
- Separate gate pulse driver unit for greater noise immunity and reliability
- Ethernet and drive.web distributed control
- Optional current transformers

Please call for details

---

DC technology

### DC powerDRIVES - 500 VDC Armature, 480 VAC Supply & powerKITS

<table>
<thead>
<tr>
<th>HP @ 500 VDC</th>
<th>480 VAC</th>
<th>AMT DC</th>
<th>FIELD</th>
<th>FRAME</th>
<th>powerDRIVE w/contactor &amp; fuses</th>
<th>Contactor Kit Contactor + mount bus bars &amp; h/w</th>
<th>Fuse Kit Line, Regen Arm &amp; Aux Fuses + mountings &amp; h/w</th>
<th>Fan Supply Kit 460/230V Transfmr Fuses + h/w</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>powerPLX275/650v2d CON-800V700A</td>
<td>FPX650 FANSUPPLY4</td>
<td></td>
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<tr>
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<td></td>
<td>powerPLX315/750v2d CON-800V850A</td>
<td>FPX750 FANSUPPLY4</td>
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<tr>
<td></td>
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<td>powerPLX360/850v2d CON-800V850A</td>
<td>FPX850 FANSUPPLY4</td>
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<tr>
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<td></td>
<td></td>
<td>powerPLX400/950v2d CON-800V1000A</td>
<td>FPX950 FANSUPPLY4</td>
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<td></td>
<td></td>
<td></td>
<td>PowerPLX520/1000d CON-800V1200A</td>
<td>FPX1000 FANSUPPLY5</td>
<td></td>
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</tr>
<tr>
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<td></td>
<td>PowerPLX600/1350d CON-800V1750A</td>
<td>FPX1350 FANSUPPLY5</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>PowerPLX700/1650d CON-800V1750A</td>
<td>FPX1650 FANSUPPLY5</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>PowerPLX800/1750d CON-800V2000A</td>
<td>FPX1750 FANSUPPLY5</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PowerPLX900/1950d CON-800V2000A</td>
<td>FPX1950 FANSUPPLY5</td>
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### REGENERATIVE, REVERSING, 4-QUADRANT DRIVES

<table>
<thead>
<tr>
<th>HP</th>
<th>AMPS DC</th>
<th>FIELD</th>
<th>FRAME</th>
<th>powerDRIVE w/contactor &amp; fuses</th>
<th>Contactor Kit Contactor + mount bus bars &amp; h/w</th>
<th>Fuse Kit Line, Regen Arm &amp; Aux Fuses + mountings &amp; h/w</th>
<th>Fan Supply Kit 460/230V Transfmr Fuses + h/w</th>
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</thead>
<tbody>
<tr>
<td>400</td>
<td>650</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX275/650v2d CON-800V700A</td>
<td>FPX650 FANSUPPLY4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450</td>
<td>750</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX315/750v2d CON-800V850A</td>
<td>FPX750 FANSUPPLY4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>850</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX360/850v2d CON-800V850A</td>
<td>FPX850 FANSUPPLY4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>575</td>
<td>950</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX400/950v2d CON-800V1000A</td>
<td>FPX950 FANSUPPLY4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1000</td>
<td>64</td>
<td>5</td>
<td>powerPLX520/1000d CON-800V1200A</td>
<td>FPX1000 FANSUPPLY5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1150</td>
<td>64</td>
<td>5</td>
<td>powerPLX600/1350d CON-800V1750A</td>
<td>FPX1350 FANSUPPLY5</td>
<td></td>
<td></td>
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<tr>
<td>800</td>
<td>1350</td>
<td>64</td>
<td>5</td>
<td>powerPLX700/1650d CON-800V1750A</td>
<td>FPX1650 FANSUPPLY5</td>
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</tr>
<tr>
<td>1000</td>
<td>1650</td>
<td>64</td>
<td>5</td>
<td>powerPLX800/1750d CON-800V2000A</td>
<td>FPX1750 FANSUPPLY5</td>
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<td></td>
</tr>
<tr>
<td>1100</td>
<td>1750</td>
<td>64</td>
<td>5</td>
<td>powerPLX900/1950d CON-800V2000A</td>
<td>FPX1950 FANSUPPLY5</td>
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<td></td>
</tr>
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</table>

### NON-REGENERATIVE, 2-QUADRANT DRIVES

<table>
<thead>
<tr>
<th>HP</th>
<th>AMPS DC</th>
<th>FIELD</th>
<th>FRAME</th>
<th>powerDRIVE w/contactor &amp; fuses</th>
<th>Contactor Kit Contactor + mount bus bars &amp; h/w</th>
<th>Fuse Kit Line, Regen Arm &amp; Aux Fuses + mountings &amp; h/w</th>
<th>Fan Supply Kit 460/230V Transfmr Fuses + h/w</th>
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</thead>
<tbody>
<tr>
<td>400</td>
<td>650</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX275/650v2d CON-800V700A</td>
<td>FPX650 FANSUPPLY4</td>
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<tr>
<td>450</td>
<td>750</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX315/750v2d CON-800V850A</td>
<td>FPX750 FANSUPPLY4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>850</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX360/850v2d CON-800V850A</td>
<td>FPX850 FANSUPPLY4</td>
<td></td>
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</tr>
<tr>
<td>575</td>
<td>950</td>
<td>32 (50)</td>
<td>4</td>
<td>powerPLX400/950v2d CON-800V1000A</td>
<td>FPX950 FANSUPPLY4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1150</td>
<td>64</td>
<td>5</td>
<td>powerPLX520/1150d CON-800V1200A</td>
<td>FPX1150 FANSUPPLY5</td>
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</tr>
<tr>
<td>800</td>
<td>1350</td>
<td>64</td>
<td>5</td>
<td>powerPLX600/1350d CON-800V1750A</td>
<td>FPX1350 FANSUPPLY5</td>
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<tr>
<td>1000</td>
<td>1650</td>
<td>64</td>
<td>5</td>
<td>powerPLX700/1650d CON-800V1750A</td>
<td>FPX1650 FANSUPPLY5</td>
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<td>1100</td>
<td>1750</td>
<td>64</td>
<td>5</td>
<td>powerPLX800/1750d CON-800V2000A</td>
<td>FPX1750 FANSUPPLY5</td>
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<tr>
<td>1200</td>
<td>1950</td>
<td>64</td>
<td>5</td>
<td>powerPLX900/1950d CON-800V2000A</td>
<td>FPX1950 FANSUPPLY5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTE 1:
To encourage “doors closed”, safe start up & maintenance practices, all size 4 & 5 powerDRIVES are fitted with a *du221 speedy* with isolated USB and Ethernet ports as standard for full remote configuration & control access.

### NOTE 2:
Due to the weight and dimensions, size 5 powerDRIVES are shipped in two parts (basic drive & power package panel) that will need to be assembled on site.

### Frame 4 Dimensions

<table>
<thead>
<tr>
<th>Drive</th>
<th>OH</th>
<th>OW</th>
<th>OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>powerPL275</td>
<td>53.0&quot;</td>
<td>18.5&quot;</td>
<td>14.9&quot;</td>
</tr>
<tr>
<td>powerPL315</td>
<td>56.0&quot;</td>
<td>18.5&quot;</td>
<td>16.0&quot;</td>
</tr>
<tr>
<td>powerPL400</td>
<td>60.0&quot;</td>
<td>18.5&quot;</td>
<td>16.9&quot;</td>
</tr>
</tbody>
</table>

### Frame 5 Dimensions

<table>
<thead>
<tr>
<th>Drive</th>
<th>OH</th>
<th>OW</th>
<th>OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>All frame 5 drives</td>
<td>67.0&quot;</td>
<td>30.0&quot;</td>
<td>16.0&quot;</td>
</tr>
</tbody>
</table>

### PLXdd Separate Stack Controller

The PLXdd is a great retrofit option for controlling large separate SCR stacks in either 6 or 12-pulse DC drive configurations and also for wound rotor motor SCR stack control. The unit has all the standard PL/X series drive features together with:

- Available for stacks up to 690 volts AC, 700 volts DC
- Built-in 32 amps fully automatic field controller (optional 50 amps rating)
- Separate gate pulse driver unit for greater noise immunity and reliability
- Ethernet and drive.web distributed control
- Optional current transformers

Please call for details
Add a drive.web module to any drive for unlimited automation capability:
- Powerful programmable control functions
- Peer-to-peer networking over Ethernet
- Smart iPad/Android or touch screen PC operation
- Internet access

smarty - adds programmable control & extra I/O
speedy - adds programmable control & gateway

- Get clear graphical signal flow system diagrams.
- Send event driven emails from your drive.
- All in one unique, intuitive, environment.

**Power Quality For DC Drives**

**Line Reactors For 3-Phase DC Drives**

<table>
<thead>
<tr>
<th>Model</th>
<th>HP at 230V</th>
<th>HP at 460V</th>
<th>Amps</th>
<th>Dimensions</th>
<th>Mount Holes</th>
<th>Weight</th>
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<tbody>
<tr>
<td>LM18</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>6.0’x4.8’x3.1’</td>
<td>2.1’x2.0’</td>
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<tr>
<td>LM37</td>
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<td>20</td>
<td>41</td>
<td>7.2’x5.6’x3.4’</td>
<td>2.3’x3.0’</td>
<td>11</td>
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<tr>
<td>LM52</td>
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<td>30</td>
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<td>7.2’x5.6’x3.8’</td>
<td>2.6’x3.0’</td>
<td>14</td>
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<tr>
<td>LM67</td>
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<td>40</td>
<td>75</td>
<td>9.0’x7.0’x4.8’</td>
<td>3.2’x3.0’</td>
<td>23</td>
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<td>LM82</td>
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<td>50</td>
<td>91</td>
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<td>LM120</td>
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<td>LM150</td>
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<td>3.5’x3.6’</td>
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<td>3.2’x3.6’</td>
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<td>LM240</td>
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<td>3.2’x3.6’</td>
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<td>LM300</td>
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<td>200</td>
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<td>10.8’x8.4’x6.0’</td>
<td>4.2’x3.6’</td>
<td>48</td>
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<tr>
<td>LM375</td>
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<td>250</td>
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<td>10.8’x8.2’x7.3’</td>
<td>4.2’x3.6’</td>
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<td>LM480</td>
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<td>300</td>
<td>533</td>
<td>14.8’x14.0’x10.2’</td>
<td>5.9’x4.6’</td>
<td>125</td>
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<td>LM600</td>
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<td>LM750</td>
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<td>500</td>
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<td>15.5’x14.0’x13.0’</td>
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<td>LM900</td>
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<td>600</td>
<td>1000</td>
<td>15.5’x14.0’x15.5’</td>
<td>9.3’x4.6’</td>
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<tr>
<td>LM1125</td>
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<td>750</td>
<td>1250</td>
<td>22.0’x20.0’x14.8’</td>
<td>9.5’x7.2’</td>
<td>400</td>
</tr>
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</table>

**Line Filter**

- LF3 Line Filter
- LF3-FX Line Filter
- Fuse Kit

**Drive Isolation Transformers**

- Standard specification: NEMA 1 enclosed for indoor use
- K-factor 4
- Windings: Delta Primary, Wye Secondary
- Aluminum or Copper windings as indicated
- Taps at ± 5%
- Approvals: UL, cUL
- Outdoor enclosures
- Frequencies other than 60Hz
- Voltages other than 230/460/575 pri, 230/460 sec
- Special Taps
- Fungus Proofing
- 80°C & 115°C Rise
- Copper Windings
- Electrostatic Shielding
- K-13, K-20, K-30
- Discount Schedule SX-1
Engineering & Support

AC and DC motors from fractional to over 2000 HP

All speed ranges, duties, enclosures and voltages complete with a full range of accessories such as encoders, tachs, thermal protection, brakes, blowers, filters, brushes and slide bases. Please call for details and competitive pricing.

Modulus Packaged Drives

Modulus solutions are a range of standard, pre-engineered drive packages with a selection of options for wide range common applications.

Using the flexible drive.web programmable automation technology it is possible to adapt a small range of hardware configurations to a wide range of applications thereby keeping design and manufacturing costs to a minimum.

Modulus drives are available either as packages mounted on an open panel, Modulus P, or as assemblies installed in an enclosure, Modulus E, to suit the type of operating environment and the control scheme required.

Every Modulus project is accompanied by a detailed, 50-point, Quality Control Report covering every facet of the product, its design, construction, testing and shipping.

User manuals for all products are available from www.bardac.com

Online Product Support

Using innovative, interactive, Internet online technologies we can provide either product training or product support through your browser from the comfort of your desk! Simply connect via your browser and get live interactive support where ever you are - with savvy running on your computer call +410-604-3400 and in less than a minute an engineer will be able to see your system live and give you the support you need.

... it’s as easy as that!

Unbeatable!
Online Training

Online product training courses are scheduled every week with options for users of all levels of interest and ability.

**Level 1 - drive.web introductory seminar - 1½ hours - Free!**
This provides an overview of the drive.web automation technology. Learn how to connect to drives, create drive "phantoms", navigate systems, create signal flow diagrams and system drawings, find information, identify object attributes, make connections, show trend charts, build savvyPanel operator stations, etc.

**Level 2 - drive.web design technology course - 3 hours (Level 1 is a prerequisite)**
Covers configuration of drives, basic system design concepts, Ethernet networking, password protection, system safety.

**Level 3 - drive.web system design and application courses (Level 2 is a prerequisite)**

3a) **Drive and device interfaces - 2 hours**
Covers the use of “Templates” and “Helpers” for documented drives, generic ModbusRTU master interfaces to third party drives, operator stations, etc.

3b) **Winder Control Systems - 3 hours**
Covers standard solutions for open loop CTCW winders, closed loop dancer controlled winders and closed loop load cell controlled winders.

3c) **Encoder Control Systems - 3 hours**
Covers applications such as “electronic line shaft”, spindle orientation, registration and position control.

3d) **Advanced Ethernet, Internet Access and Security - 3 hours**
Covers local and wide area network configuration, IP addressing, user access and device and system password protection.

For course details, registration, international training options and charges please call us at 1-888-667-7333 (toll free USA 888-ON SPEED) or international at +410-604-3400. Alternatively please contact training@driveweb.com

Terms of Sale & Payment
Complete Terms & Conditions of Sale are shown at www.bardac.com. Net 30 day credit terms are available subject to prior approval. Credit card payments are only accepted for payments made at the time of service or shipment of products and will be subject to a 4% surcharge.

Field Service, Service Center Repair, Training and Start-up - Call +410-604-3400
**Rates for the Continental United States**

<table>
<thead>
<tr>
<th>Charge Basis</th>
<th>Rates (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Basic Rate - Field Service, Training &amp; Start-up Assistance - up to 8 hours daily Monday to Friday, 7am to 6pm</td>
<td>$190 per hour</td>
</tr>
<tr>
<td>b. Standard Overtime - Weekdays 6pm to 7am &amp; all day Saturday - Total work time not to exceed 12 hrs in any 24 hrs</td>
<td>$285 per hour</td>
</tr>
<tr>
<td>c. Special Overtime - Sundays, Holidays and excess of 8 hours on Saturday</td>
<td>$380 per hour</td>
</tr>
<tr>
<td>d. Overnight - Includes meals, and hotel accommodation</td>
<td>$280 per night</td>
</tr>
<tr>
<td>e. Auto Travel - Covering cost of use of company or personal cars, distance to and from the local office</td>
<td>$0.655 per mile</td>
</tr>
<tr>
<td>f. Public Transport - Rental cars, Air fares, etc.</td>
<td>At Cost</td>
</tr>
<tr>
<td>g. Holdover &amp; Standby Time</td>
<td>Same as service</td>
</tr>
<tr>
<td>h. Travel Time - Time taken from Bardac to job site and return</td>
<td>Same as service</td>
</tr>
<tr>
<td>i. Basic Rate - Service Center Repair charges - Diagnosis &amp; repair time</td>
<td>$130 per hour + parts</td>
</tr>
<tr>
<td>j. Design or application engineering services</td>
<td>$220 per hour</td>
</tr>
</tbody>
</table>

Notes: 1. Minimum service billing is 4 hours for field services, 1 hour for service center services.
2. Parts, materials, special visas, duties, and extraordinary expenses will be charged extra.
3. Warranty credits will be identified on the Daily Field Service Report.

For rates and availability of sales and service outside the US, please call +410-604-3400

24/7 Tech Support
During normal business hours basic tech support will be provided free of charge. Outside normal business hours call +410-604-3535. Tech support will be provided at $340/hour (minimum of 1/2 hour per call) and this must be paid for with a credit card at the time of service.