Rockwell Automation Lab Seminar:

Allen-Bradley Programming
PowerFlex753 Series VFDs

Time:
1:00PM  Tuesday, April 26
10:00AM  Wednesday, April 27

Presenters:
Rick Nusbaum – Schaedler YESCO
Dan Dillon – Schaedler YESCO
Paul Ricken – Rockwell Automation
PowerFlex 750-Series AC Drives
Low Voltage Drives
PowerFlex®
Family of Low Voltage Drives

- PowerFlex drives meet worldwide standards out of-the-box, achieving EMC, global voltage and safety requirements. All PowerFlex drives offer commonality in networks, operator interface and programming — factors that significantly contribute to ease-of-use and faster application start-up.

- **PowerFlex Compact drives** offer cost-effective motor control for machine-level and stand-alone applications (PowerFlex 4, 4M, 40, 40P)

- **PowerFlex Standard drives** are designed for application flexibility and control system integration (PowerFlex 400, 70, 700, 753)

- **PowerFlex Premium drives** are designed for advanced applications with tight control system integration and extended Power Ranges (PowerFlex 700L, 700H, 700S, 755)
PowerFlex 753

- Speed and torque control
- Premier Integration to Rockwell Automation Architecture
- Embedded I/O
- General purpose applications
- DeviceLogix for standalone applications
- Wall mount construction
- Power range:
  - 0.75 to 250 kW @ 400V
  - 1.0 to 350 Hp @ 480 V
  - .5 to 300 Hp @ 600V
  - 5.5 to 250 kW @ 690V
PowerFlex 755

- Speed, torque and position control
- Embedded EtherNet/IP port
- Performance applications
  - Coordinated drive systems applications
  - Positioning applications
  - Torqueprove (lifting)
- DeviceLogix to complement system capabilities
- Use of embedded instructions within RSLogix 5000 (CIP Motion)
- Wall mount and floor mount construction
- Power range
  - 0.75 to 1400 kW @ 400V
  - 1.0 to 2000 Hp @ 480V
  - .5 to 1500 Hp @ 600V
  - 5.5 to 1500 kW @ 690V
PowerFlex 750-Series

**Premier Integration into Logix**
- Reduction in the time required to develop and commission application
- Elimination of address mismatch errors
- Automatic Device Configuration

**Flexibility – Base Drive + Option Cards**
- Hardware investment limited to what’s specifically required
- Common HW Options consistent across all models and power ratings
- Open backplane allowing 3rd parties to develop specific option card

**Enhanced Safety**
- Minimum incremental investment to achieve Safety Integrity Level (SIL) required by the application
- Safe Torque Off / Safe Speed Monitor

**Power Density**
- Maximized Power Ratings in Small Packages
- Smaller footprint and lower installation costs
- Easily Configured for AC and DC Common Bus Systems

*User-Optimized Features Enhance Drive Benefits*
PowerFlex 750-Series

- **Advanced Diagnostic capabilities**
  - Predictive maintenance for both drive and motor
  - Blown Fuse Detection
  - MOV Status Indicators

- **Embedded DeviceLogix**
  - User logic controlling I/O connected to the drive as standalone application or complementing automation system
  - Maximizes onboard capabilities

- **Flexible Packaging Options**
  - Deployment in multiple physical environments
  - Conformal coated boards for all environments
  - Consistent with most global packaging requirements

- **Ease of Use**
  - Simplified learning curve, reduction of training expenses
  - HIM Wizards and common software configuration tools
  - Serviceability and maintenance

*User-Optimized Features Enhance Drive Benefits*
PowerFlex 750-Series AC Drives

**PowerFlex 753**
General Purpose AC Drive

- Panel Mount Drives
  - 0.75 to 250 kW @ 400V
  - 1.0 to 350 Hp @ 480 V
  - 0.5 to 300 Hp @ 600V
  - 5.5 to 250 kW @ 690V

- Ratings to 250 kW / 350 Hp

**PowerFlex 755**
Premium Integration AC Drive

- Panel Mount Drives
  - 0.75 to 250 kW @ 400V
  - 1.0 to 350 Hp @ 480V
  - 0.5 to 350 Hp @ 600V
  - 5.5 to 250 kW @ 690V

- Floor Mount AC Drives
  - 315 to 1400 kW @ 400V
  - 400 to 2000 Hp @ 480V
  - 250 to 1500 Hp @ 600V
  - 200 to 1500 kW @ 690V

- Ratings to 1500 kW / 2000 Hp
PowerFlex 750-Series
Control and Option slots

PowerFlex 755
- Power Ratings:
  - 400/480V AC: 0.75…1400 kW / 1.0…2000 Hp
  - 600/690V AC: .5…1500 Hp / 5.5…1500 kW
- 5 option slots for communications, safety, feedback, I/O, and auxiliary power supply
  - 3 option slots for frame 1
- Standard embedded EtherNet/IP port

PowerFlex 753
- Power Ratings:
  - 400/480V: 0.75…250 kW/ 1.0…350 Hp
  - 600/690V: .5…300 Hp / 5.5…250 kW
- 3 option slots for communications, safety, feedback and additional I/O
- Standard embedded I/O
### PowerFlex 750-Series AC Drives Inputs and Outputs

<table>
<thead>
<tr>
<th></th>
<th>PowerFlex 753</th>
<th>PowerFlex 755</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embedded I/O</strong></td>
<td>3 Digital Inputs</td>
<td>1 Digital Input standard</td>
</tr>
<tr>
<td></td>
<td>• 1 - selectable 24VDC or 115VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2 - 24VDC only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Selectable sinking or sourcing</td>
<td></td>
</tr>
<tr>
<td><strong>1 Relay Output</strong></td>
<td>1 Relay Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Contact rated at 2 Amps Max</td>
<td></td>
</tr>
<tr>
<td><strong>1 Transistor Output</strong></td>
<td>1 Transistor Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 24V DC 250mA Max Load</td>
<td></td>
</tr>
<tr>
<td><strong>1 Analog Input</strong></td>
<td>1 Analog Input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Isolated, bipolar, differential, ±10V,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 4-20 mA, 11 bit &amp; sign, 88k ohm input impedance</td>
<td></td>
</tr>
<tr>
<td><strong>1 Analog Output</strong></td>
<td>1 Analog Output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bipolar, ±10V, 11 bit &amp; sign, 2 k ohm min load</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 4-20 mA, 11 bit &amp; sign, 400 ohm max load</td>
<td></td>
</tr>
<tr>
<td><strong>1 PTC Input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Option cards</strong></td>
<td>Multiple I/O options to support multiple voltages</td>
<td>Multiple I/O options to support multiple voltages</td>
</tr>
<tr>
<td></td>
<td>• 24V DC</td>
<td>• 24V DC</td>
</tr>
<tr>
<td></td>
<td>• 115V AC</td>
<td>• 115V AC</td>
</tr>
<tr>
<td></td>
<td>• Control I/O features include</td>
<td>• Control I/O features include</td>
</tr>
<tr>
<td></td>
<td>• Analog loss detection</td>
<td>• Analog loss detection</td>
</tr>
<tr>
<td></td>
<td>• Timed outputs</td>
<td>• Timed outputs</td>
</tr>
<tr>
<td></td>
<td>• PTC input</td>
<td>• PTC input</td>
</tr>
</tbody>
</table>
### PowerFlex 750 – Encoder Feedback options

<table>
<thead>
<tr>
<th>Description</th>
<th>Cat. No.</th>
<th>PF 753</th>
<th>PF 755</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Incremental Encoder</td>
<td>20-750-ENC-1</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Dual Incremental Encoder</td>
<td>20-750-DENC-1</td>
<td>✓</td>
<td>✓</td>
<td>1</td>
</tr>
<tr>
<td>Universal Feedback</td>
<td>20-750-UFB-1</td>
<td>No</td>
<td>✓</td>
<td>1,2,3</td>
</tr>
</tbody>
</table>

**Notes:**

1. Using the Safe Speed Monitor card requires Dual Incremental Encoder or Universal Feedback option.

2. Homing and registration functions not supported when using Embedded Motion Control Instructions in Logix controllers (CIP Motion) – Must use Universal Feedback card.

3. Rotary Incremental, Linear, high resolution, Sine Cos (SC), Full Digital (FD), Heidenhain EnDat (2.1 and 2.2), Stegmann Hiperface, SSI, BiSS, “Temposonic”, “Stahl”
## PowerFlex 750-Series Communication Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Cat No.</th>
<th>753</th>
<th>755</th>
</tr>
</thead>
<tbody>
<tr>
<td>EtherNet/IP</td>
<td>20-COMM-E*</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Dual-port EtherNet/IP</td>
<td>20-750-ENETR</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>ControlNet</td>
<td>20-750-CNETC</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>20-750-DNET</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Profibus DPV1</td>
<td>20-750-PBUS</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Profinet IO</td>
<td>20-750-PNET</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Modbus RTU</td>
<td>20-COMM-H*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Metasys N2</td>
<td>20-COMM-H*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>P1 FLN</td>
<td>20-COMM-H*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>LonWorks</td>
<td>20-COMM-L*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>BACnet/IP</td>
<td>20-750-BNETIP</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Mobus/TCP</td>
<td>20-COMM-M*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>CANopen</td>
<td>20-COMM-K*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>ControlNet Fiber</td>
<td>20-COMM-Q*</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>RS485 DF1</td>
<td>20-COMM-S*</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

*PowerFlex 750-Series support existing 20-COMM communication cards with 20-750-20COMM carrier option.*
All PowerFlex 750-Series drives can be configured using:
- Drive HIM module
- DriveTools SP, DriveExplorer, CCW
- RSLogix 5000 Add-On Profiles — Premier Integration

PowerFlex 755 drives additionally can be configured using:
- RSLogix 5000 embedded instructions (CIP Motion)
- Seamless integration with Logix platform
- Automatic device Configuration (ADC) for PF755
- Reduced Engineering and commissioning time
- PowerFlex 755 native to RSLogix 5000
- Program with motion control instructions
- CIP Motion technology from 1 to 2000 HP
Automatic Device Configuration (ADC)

- A v20 Logix-based feature that allows a user to configure their Logix system to automatically download a “large” device’s configuration - typically after it has been replaced
  - Configuration data for “large” devices resides in the ACD file and the Logix controller, but the download was a manual process in v16-v19

- Also compliments:
  - Stratix 6000 & 8000 switches
    - Automatically assigns IP Address (if desired for the application)
  - Firmware Supervisor
    - Flash the drive and/or peripherals (if desired for the application)
Maintain
Device Replacement Process

- Animation

2:00 AM

EtherNet/IP

Configuration

Flash

Stratix 6000 / 8000

IP Address
## PowerFlex 755 Floor Mounted

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Frame 8</th>
<th>Frame 9</th>
<th>Frame 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 V</td>
<td>200 to 450 kW</td>
<td>400 to 900 kW</td>
<td>710 to 1400 kW</td>
</tr>
<tr>
<td>480 V</td>
<td>300 to 700 HP</td>
<td>600 to 1350 HP</td>
<td>1100 to 2000 HP</td>
</tr>
<tr>
<td>600 V</td>
<td>250 to 550 HP</td>
<td>500 to 1100 HP</td>
<td>1000 to 1500 HP</td>
</tr>
<tr>
<td>690 V</td>
<td>200 to 530 kW</td>
<td>450 to 1000 kW</td>
<td>900 to 1500 kW</td>
</tr>
</tbody>
</table>

- Common experience from low to high power
- **Highly Robust & Reliable**
  - Conformal coating as standard
  - Efficient cooling with use of external air (sealed cooling channel)
  - Fiber Optic Paralleling Method
- **Application Flexibility**
  - AC or Common DC Bus input
  - NEMA 1, NEMA 12, Open Type
  - IP00, IP20 and IP54 Enclosures
  - Top and/or bottom cable entry
  - Segregated power and control wire channels
PowerFlex 750-Series AC Drives
Conformal Coating Standard

- Standard on all PowerFlex 750-Series drives
- In harsh environments increases drive reliability
  - Protects components with micro lead spacings which are otherwise vulnerable to dust and moisture build up
  - Without coating, unintentional conductive paths can be formed, leading to circuit failure

- Enclosures must still be considered in the overall application of a drive

See Conformal Coating for Variable Speed Drives white paper for more information
PowerFlex 750-Series AC Drives DeviceLogix

- Standard feature on PF750-Series
- Embedded Logic Control for
  - I/O Processing
  - Changing Dynamic Gains and Limits, etc.
- Allows Customization of Drive Control for Applications
  - Stand Alone
  - Complimentary to supervisory control
  - Drive can make decisions in case of loss of communication with a controller
- Programmed with Drive Software Tools
  - DriveExplorer v6.02 (and higher)
  - DriveTools SP v5.02 (and higher)
  - RSLogix 5000 Drive AOPs v3.01 (and higher)
<table>
<thead>
<tr>
<th>PowerFlex® 750-Series AC Drive</th>
<th>Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerFlex 750-Series Product Profile</td>
<td>750-PP001</td>
</tr>
<tr>
<td>PowerFlex 750-Series Technical Data</td>
<td>750-TD001</td>
</tr>
<tr>
<td>PowerFlex 750-Series Installation Instructions</td>
<td>750-IN001</td>
</tr>
<tr>
<td>PowerFlex 750-Series Programming Manual</td>
<td>750-PM001</td>
</tr>
<tr>
<td>Firmware Updates</td>
<td>Web Link</td>
</tr>
<tr>
<td>PowerFlex Family Selection Guide</td>
<td>PFLEX-SG002</td>
</tr>
<tr>
<td>PowerFlex Family Brochure</td>
<td>PFLEX-BR008</td>
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