

LISTEN.
THINK.
SOLVE.SM

PowerFlex Architecture Class Drives

Rick Nusbaum
Schaedler Yesco Distribution

PowerFlex 70 AC Drive

PowerFlex 700 AC Drive

PowerFlex 700L AC Drive

PowerFlex 700S AC Drive

PowerFlex 700H AC Drive

PowerFlex
Architecture Class Drives
Communications

PowerFlex
Architecture Class Drives
HIMs



PowerFlex Drives
Software

PowerFlex Drives
Add On Profiles

PowerFlex Family = COMMONALITY!

PowerFlex 7 Class

**Common
Operator Interfaces**



**Unique Family of Products Built on
Identical Core Features & Functionality**

**PowerFlex
70**



**PowerFlex
700**



**PowerFlex
7000**
Powerful Performance. Flexible Control.



**Common
Software Tools**

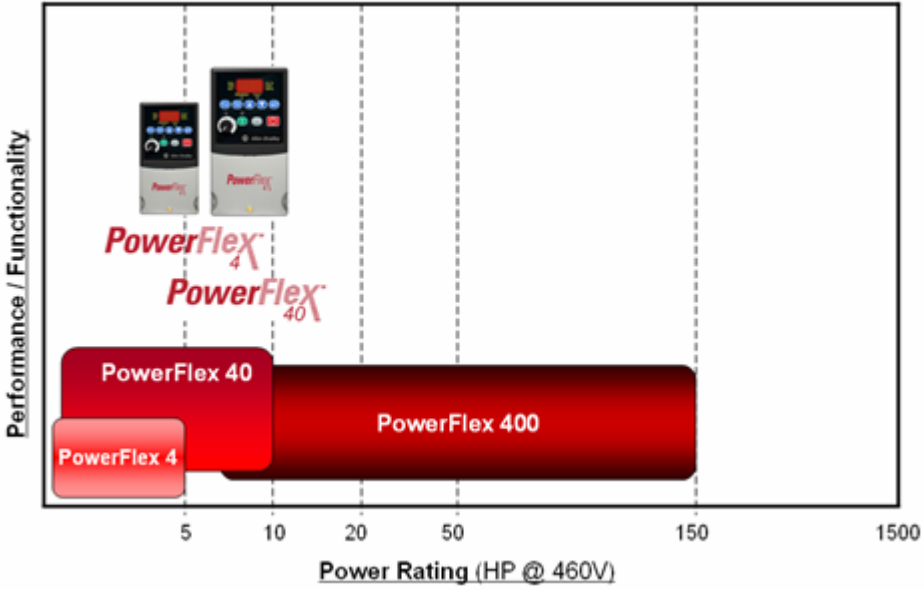


**Common Communication
Options Support NetLinx &
Open Networks**

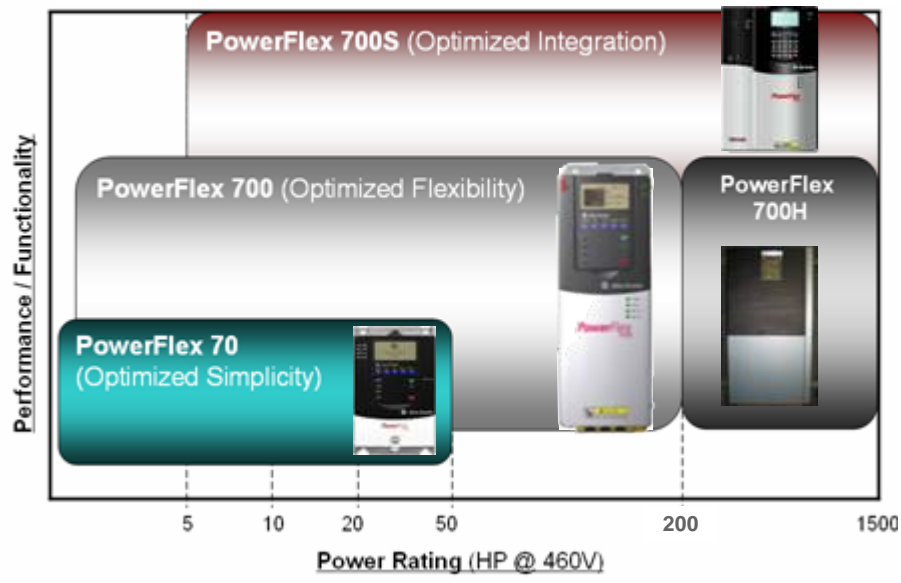


PowerFlex Family

Component-Class Products - 2005



Architecture-Class Products - 2005



PowerFlex 70 Dedicated Enclosure Styles

NEMA 1/IP20 (50°C)



Flange (50°C)

Front = NEMA1 / IP20
Backside = NEMA 4X / IP66
(Indoor & Outdoor)



NEMA 4X (40°C)

Also NEMA 12 & IP66
(indoor only)



PowerFlex[®] 70 AC Drive - Specifications

- Drive Ratings (normal duty)
 - 240V, 0.37-18.5 kW (0.5-25 Hp)
 - 480V, 0.37-37 kW (0.5-50 Hp)
 - 600V, 0.37-37 kW (0.5-50 Hp)
- Motor Control
 - Vector Control with FORCE™ Technology
 - Sensorless Vector Control
 - Slip Compensation
 - Encoder Speed Control
 - Encoderless Speed Control
 - Torque Regulation
 - V/Hz Motor Control
- Ambient Temperature Limit for Enclosures
 - NEMA/UL Type 1/IP 20 Open = 50° C
 - Flange = 50° C
 - NEMA/UL Type 4X/12, IP 66 = 40° C
- Features
 - User Sets
 - Multi Language
 - Adv. Drive Overload Protection
 - Adv. Bus Regulation
 - Adv PID Control (Spd or Trq)
 - Droop
 - Analog Trim/Invert
 - Adv. Flying Start
 - Motor Overload Protection
 - Flux Braking
 - Fiber Features
 - DriveGuard[®] Safe-Off



DriveGuard[®] 

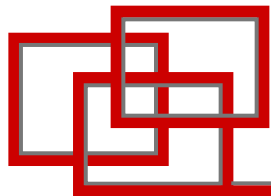


Saves Panel Space - Zero Stacking™

- IP00 (open) drives can be mounted “touching”
- Minimizes panel space requirements
- Articulated hinge allows complete access to inside of drive Drives Mounted “touching”
- Removable Control Terminal Block. Improved access for ease of wiring.
- Removable conduit entry plate allows easy drive replacement



Minimized panel space = Lower installed cost



PowerFlex[®] 700 AC Drive with Vector Control - Specifications

• Drive Ratings (normal duty)

- 240V, 0.5-100 Hp (2.2-260 A)
- 400V, 0.37-500 kW (1.3-875 A)
- 480V, 0.5-700 Hp (1.1-875 A)
- 600V, 1-150 Hp (1.7-144 A)
- 690V, 45-132 kW (52-136 A)

• Motor Control

- Vector Control with FORCE[™] Technology
- Sensorless Vector Control
- Slip Compensation
- Encoder Speed Control
- Encoderless Speed Control
- Torque Regulation
- V/Hz Motor Control
- Adjustable Voltage Control

• Ambient Temperature Limit for Enclosures

- IP 20 / Open = 50° C
- IP 20 / NEMA/UL Type 1 = 40° C
- IP 54 NEMA/UL Type 12 = 40° C (Frames 5-6)
- IP 00 / Open = 40° C

- Flange mount -- heatsink out the back on Frames 5 – 10

• Features

- User Sets
- Multi Language
- Adv. Drive Overload Protection
- Adv. Bus Regulation
- Adv PID Control (Spd or Trq)
- Flux Braking
- Fast Stop
- Scale Blocks
- Droop
- TorqProve[™]
- Position Indexing/Speed Profiler
- Adv. Flying Start
- Motor Overload Protection
- Common Bus Capability
- Parameter Linking
- Open Motor Lead Detection



What is the PowerFlex 700L AC Drive?

- The PowerFlex 700L AC Drive is an extension of the PowerFlex drive family that incorporates the following:
 - Liquid-cooled power structure
 - Regenerative converter (Active Converter)
 - Dual control capabilities
 - PF700 Vector Control
 - PF700S Phase II Control
 - Uses PowerFlex HIMs, communication modules & software tools

PowerFlex[®] 700L Liquid-Cooled AC Drive - Specifications

- **Drive Ratings (normal duty)**
 - 400V, 200-715 kW (268-960Hp)
 - 480V, 224-860 kW (300-1150Hp)
 - 600V, 345-650 kW (465-870Hp)
 - 690V, 355-657 kW (475-881Hp)
- **Motor Control**
 - Either PowerFlex 700 or 700S control
 - Vector Control w/FORCE[™] Technology
 - Sensorless Vector Control
 - Slip Compensation
 - Encoder & Encoderless Speed Control
 - Torque Regulation
 - V/Hz Motor Control
 - Permanent Magnet Control
 - Adjustable Voltage Control
- **Ambient Temperature Limit for Enclosures**
 - IP00 / Open Type = 50°C – Frame 2
 - IP20 / Type 1 = 40°C – Frames 3A and 3B
- **Enclosure Styles**
 - Panel Mount IP00 / Open Type – Frame 2
 - Floorstanding IP20 / NEMA/UL Type 1 Rittal Style "A" – Frames 3A and 3B

- **Features**
 - Small Footprint for Space Savings
 - Integrated Regeneration for Energy Savings
 - Low AC Line Harmonics w/ Active Converter to meet IEEE-519 and CE
 - User Sets
 - Adv. Drive Overload Protection
 - Adv PID Control (Spd or Trq)
 - Flux Braking
 - Scale Blocks
 - TorqProve[™] for lifting Applications
 - Adv. Flying Start
 - DriveLogix[™] Option
 - Inertia Adaptation
 - Integral Position Loop
 - SynchLink[™] (high speed data link)
 - DriveGuard[®] Safe-off
 - Stegmann Interface
 - Heidenhain[™] Interface
 - Resolver Interface



PowerFlex[®] 700S AC Drive - Specifications

- **Drive Ratings (normal duty)**
 - 240V, 1-100Hp (4.2-260A)
 - 400V, 0.75-800 kW (2.1-1450A)
 - 480V, 1-1250Hp (2.1-1450A)
 - 600V, 1-1600Hp (1.7-1500A)
 - 690V, 45-1500 kW (52-1500A)
- **Motor Control**
 - Vector Control with FORCE[™] Technology
 - Slip Compensation
 - Encoder Speed Control
 - Encoderless Speed Control
 - Torque Regulation
 - V/Hz Motor Control
 - Permanent Magnet Motor Control
- **Ambient Temperature Limit for Enclosures**
 - IP 20 / Open = 50° C (Frames 1-6)
 - IP 20 / NEMA/UL Type 1 = 40° C (Frames 1-6)
 - IP 21 / NEMA/UL Type 1 = 40° C (Frames 9-14)

- **Features**
 - Motor Overload Retention
 - DriveGuard[®] Safe-off
 - Assisted Start-up Routine
 - Advanced Diagnostics
 - Analog Loss Detection
 - Feedback Loss Switchover (in speed mode)
 - Stegmann Interface
 - Heidenhain[™] Interface
 - Resolver Interface
 - Stahltronic and Temposonics[®] SSI Interface
 - Integral Position Loop
 - SynchLink[™] (high speed data link)
 - DriveLogix[™] Option
 - Inertia Adaptation
 - User Function Blocks
 - Common Bus Capability
 - Adv. Drive Overload Protection
 - Bus Regulation



DriveGuard[®] 



PowerFlex® 700S - Drive Overview



- Selectable Motor Control Algorithms
 - Vector Control with Force Technology™ – with or without an encoder
 - Permanent Magnet Motor
 - V/Hz control
- Performance Features
 - Point to Point, Direct or Interpolated (Course to Fine) positioning
 - Feedback Loss Switchover “On the Fly” (in Speed Mode)
 - Inertia Adaption - Can increase speed regulator BW x4
 - SynchLink (High Speed Data Link)
- Feedback Options
 - Encoder – (1) Standard, 2nd Optional
 - Resolver – “Transmitter” type
 - High Resolution Feedback – Stegmann or Heidenhain
 - MDI – Stegmann and Linear Feedback (Stahltronis or Temposonics w/SSI)
- DriveGuard Safe-Off Option
 - Meets EN954-1, category 3(for safe-off and protection against restart)
 - This option includes a 2nd encoder board

The Heidenhain option is only available as a field installable option through Drive Systems



PowerFlex® 700S - Drive Overview

- Digital I/O – High speed (250 μ Sec update)
 - (6) 24V DC Digital Inputs, (3) are switch able to 120 V AC
 - (2) 24V DC Digital Outputs
 - (1) Form-C relay, rated for 24V DC and 120V AC
- Analog I/O – High speed High Resolution (250 μ Sec update)
 - (2) Analog Inputs – 14bit Resolution, voltage or current
 - (1) Analog Input – 10bit Resolution, voltage only
 - (2) Analog Outputs – 12bit Resolution, voltage or current
- User Functions
 - Bit Swaps, Peak Detects, Position Watch, Switch blocks, Real – DINT conversion, Scale blocks, Logic blocks, Compare blocks, MOP, Basic Indexer, Timers blocks, Add/Subtract blocks, Multiply/Divide blocks
- Ease of Use
 - Assisted Start enables programming without using a manual
 - Pull-apart I/O terminal blocks
 - Control cassette common across all ratings
 - Advanced Diagnostics - Integral 4 Channel Trending, Multiple Test points



DriveLogix5730 - Part of the Logix Family

Reusability of Communication Cards



Reusability of Compact I/O

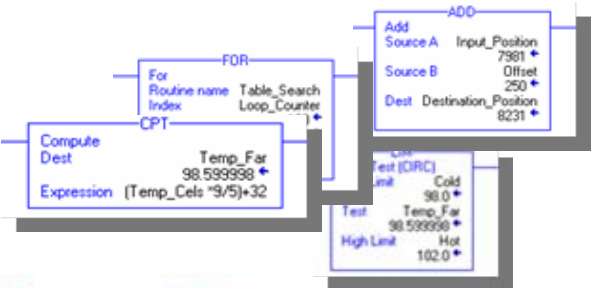


Single Programming and Network Package providing re-use of programming code



- RSLogix5000
- RSLinx
- RSNetWorx

Single Instruction Set means reduced learning curve & training



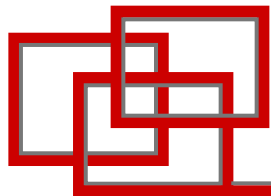
PowerFlex™
with DriveLogix 700S



Single Data Model

- **Symbolic Addressing** for self-documented code
- **User Defined Structures** to provide Data Encapsulation.

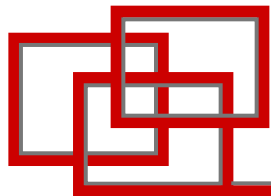




PowerFlex[®] 700S High Power AC Drive - Specifications

- **Drive Ratings (normal duty)**
 - 400V, 132-800 kW (261-1450A)
 - 480V, 200-1250Hp (261-1450A)
 - 600V, 150-1600Hp (170-1500A)
 - 690V, 160-1500 kW (170-1500A)
- **Motor Control**
 - Vector Control with FORCE[™] Technology
 - Slip Compensation
 - Encoder Speed Control
 - Encoderless Speed Control
 - Torque Regulation
 - V/Hz Motor Control
 - Permanent Magnet Motor Control
- **Ambient Temperature Limit for Enclosures**
 - IP 21 / NEMA/UL Type 1 = 40° C
- **Enclosure Styles (Wall mount)**
 - IP21 / NEMA/UL Type 1 – Frame 9
- **Enclosure Styles (Floorstanding)**
 - Rittal Style "A" – Frames 10-14
 - IP21 / NEMA/UL Type 1
 - MCC Style "B" – Frames 10-12 (400,480, and 600V)
 - IP21 / NEMA/UL Type 1
- **Features**
 - DriveGuard[®] Safe-off
 - Assisted Start-up Routine
 - Analog Loss Detection
 - Multiple Feedback Interfaces
 - Integral Position Loop
 - SynchLink[™] (high speed data link)
 - DriveLogix[™] Option
 - Inertia Adaptation
 - User Function Blocks
 - Common Bus Capability
 - Adv. Drive Overload Protection
 - Motor Overload Retention
 - Bus Regulation
 - Feedback Loss Switchover (in speed mode)





PowerFlex[®] 700H High Power AC Drive - Specifications

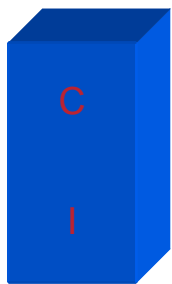
- **Drive Ratings (normal duty)**
 - 400V , 132-1600 kW (261-2700A)
 - 480V, 200-2300Hp (261-2200A)
 - 600V, 150-2400Hp (170-2250A)
 - 690V, 160-2000 kW (170-2250A)
- **Motor Control**
 - V/Hz Motor Control
 - Sensorless Vector
 - Slip Compensation
- **Ambient Temperature Limit for Enclosures**
 - IP 21 / NEMA/UL Type 1 Normal Duty = 40° C
 - IP 54 / NEMA /UL Type 12 Normal Duty = 40° C
- **Enclosure Styles**
 - Wall mount IP21 / NEMA/UL Type 1 – Frame 9
 - Floorstanding
 - IP21 / NEMA/UL Type 1 Rittal Style “A” – Frames 10-14
 - IP21 / NEMA/UL Type 1 MCC Style “B” – Frame 10-12 400-480 and 600V
 - IP 54 / NEMA/UL Type 12 Rittal Style “H” Frame 10- 12
 - Conformal coating

- **Features**
 - User Sets
 - Multi Language
 - Drive Overload Protection
 - Bus Regulation
 - PID Control Speed
 - Droop
 - Analog Trim
 - Flying Start
 - Motor OL Protection

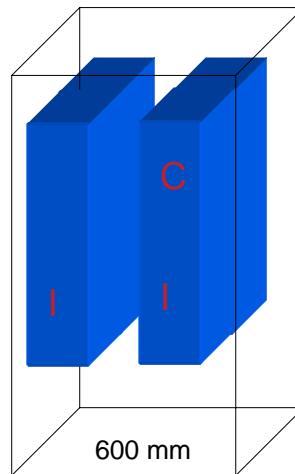


Expected Normal Duty Ratings

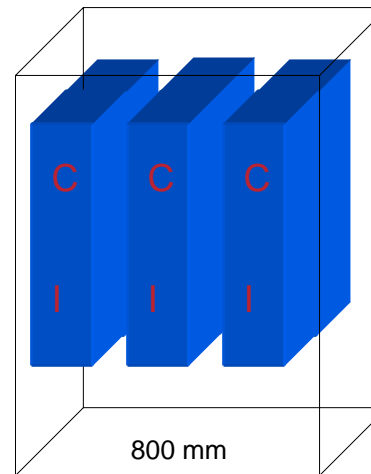
Frame 9



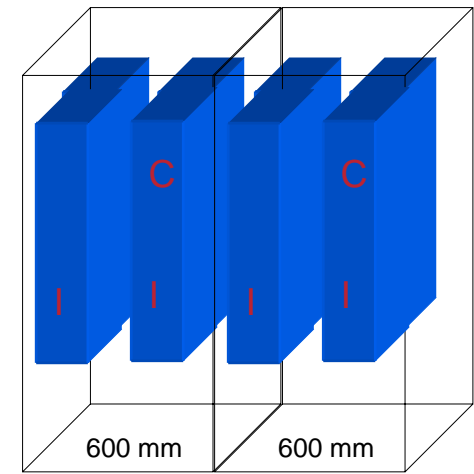
Frame 10



Frame 11



Frame 12



400V : 132 – 160 kW (300A)
480V : 200 – 250 Hp (300A)
 600V : 125 – 200 Hp (204A)
 690V : 132 – 200 kW (204A)

400V : 200 – 280 kW (500A)
480V : 300 – 450 Hp (500A)
 600V : 250 – 400 Hp (408A)
 690V : 250 – 400 kW (408A)

400V : 300 – 400 kW (715A)
 480V : 500 – 600 Hp (715A)
 600V : 450 – 600 Hp (578A)
 690V : 450 – 560 kW (578A)

400V : 450 – 560 kW (1009A)
 480V : 700 – 900 Hp (1009A)
 600V : 700 – 800 Hp (803A)
 690V : 630 – 800 kW (803A)



Note: Ratings in **bold red** letters are final – others are preliminary



PowerFlex[®] DC Drive - Specifications

- **Drive Ratings**
 - 230V, 1.2-112 kW (1.5-150 Hp)
 - 460V, 1.5-298 kW (2-400 Hp)
- **Motor Control**
 - 2 Quadrant, non-regenerative
 - 4 Quadrant, regenerative
- **Enclosure and Ambient Temperature Limit**
 - IP20, NEMA/UL Type 0 = 0°-50°C without derating
 - NEMA/UL Type 1 = 0°- 45°C
 - Panel Mount – IP00, NEMA/UL Type 0 = 0°- 45°C
- **Features**
 - Shared software, accessories, communications and HIM with PowerFlex AC drives
 - Fully regulated field supply
 - Integrated tachometer and encoder
 - Motor overload protection



DPI Communication Products



1203-SSS
RS-232 DF1



20-COMM-E
EtherNet/IP™



20-COMM-C
ControlNet™



20-COMM-Q
ControlNet™



20-COMM-D
DeviceNet™



20-COMM-R
Remote I/O



20-COMM-S
RS-485 DF1



20-COMM-P
Profibus™



20-COMM-I
Interbus



20-COMM-H
RS485 HVAC



20-COMM-L
LonWorks®



20-XCOMM
Ext. DPI Kit



20-WIM-N*
Bluetooth®



1769-SM1
Compact I/O



20-COMM-B
BACnet® MS/TP



1203-USB
USB Converter



20-COMM-M
Modbus/TCP



PowerFlex[®] Architecture Class - HIM's

NEMA/UL Type 1 (Hand-held / Drive Mount / Bezel Mount)



-A3



-A5

NEMA/UL Type 4 (Remote Mount)



-C3S



-C5S



-B1

NEMA/UL Type 1 Bezel Kit



Software Tools

- DriveExplorer™



- An intuitive, Windows Explorer-like software package for basic online programming of Allen-Bradley drive products
- Multiple versions:
 - DriveExplorer Full
 - DriveExplorer Lite – Freeware.
 - Pocket DriveExplorer

- DriveTools™ SP

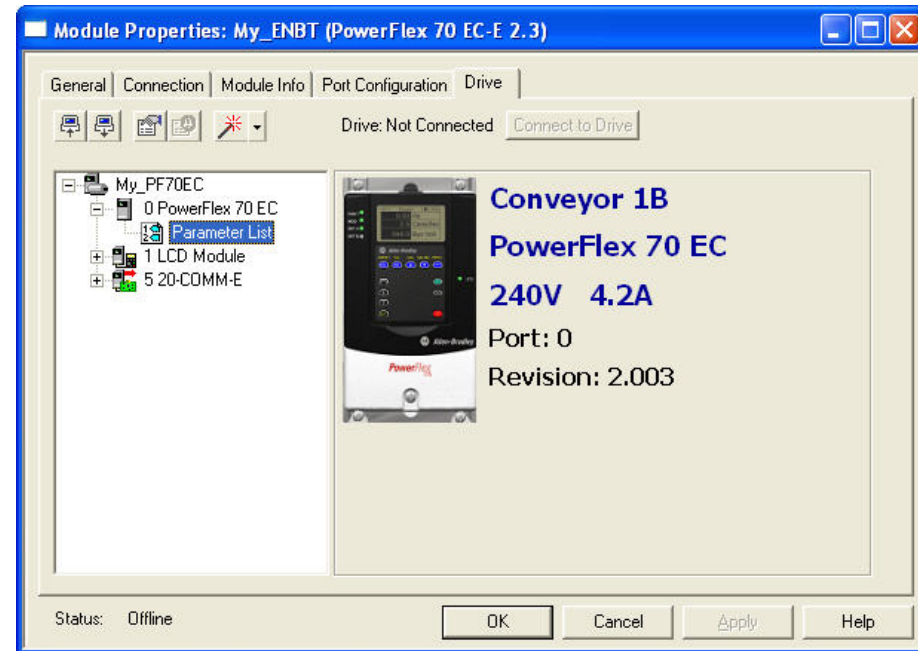


- A family of software planned and designed to accommodate demanding user requirements:
 - DriveExecutive™ - Online/offline drive configuration tool
 - DriveObserver™ - Samples and plots parameter values



Software Tools - Premier Integration with PowerFlex® AC Drives

- RSLogix 5000 v16 Drive Add-On Profiles (AOPs)
 - Auto-generation of descriptive tag names with respective data types
 - Utilizes existing features found in our drive software tools today, such as:
 - Linear List / File Group Editor
 - Wizards
 - Diagnostics
 - Fault / Alarm / Event Queues
 - Flash



Module Properties window in RSLogix 5000 v16

- Drive configuration stored in RSLogix 5000 .ACD file and in the controller
- Allows stand-alone software tool use

