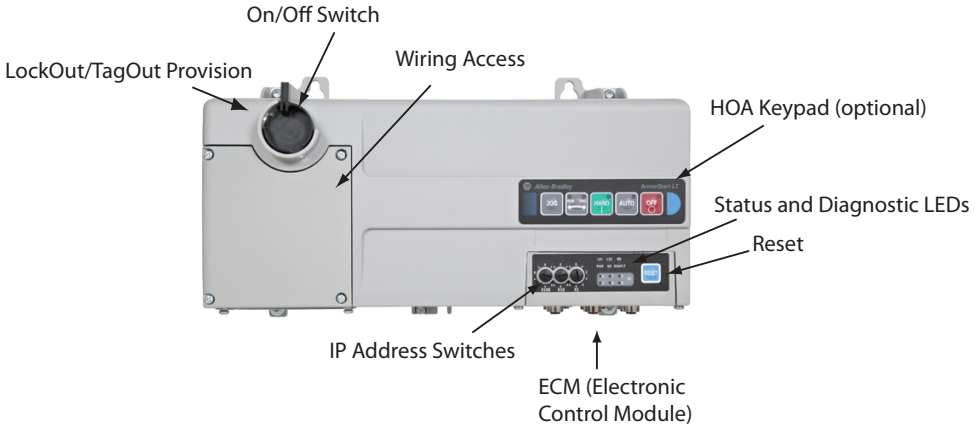
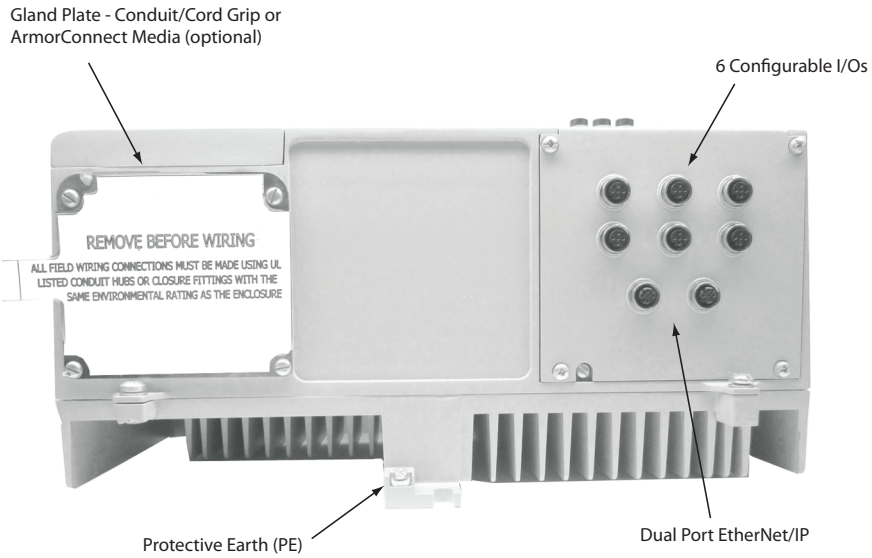
## Bulletin 294E Feature Diagram



| Electrical Ratings | | |
|---|---|---|
| **Power Circuit** | Application | Three-phase |
| | Number of Poles | 3 |
| | Input Power Terminals | L1, L2, L3 |
| | Motor Power Terminals | T1, T2, T3 |
| | PE (Earth Ground) Terminal | 4 PE terminals |
| | Maximum Rated Operating Voltage | 400Y/230…480Y/277 (-15%, +10%) |
| | Rated Impulsed Voltage ($U_{imp}$) | 4 kV |
| | Dielectric Withstand | **UL**: 1960V AC, **IEC**: 2500V AC |
| | Operating Frequency | 50/60 Hz (±10%) |

| Electrical Ratings — Variable Frequency Drive | | | | | | |
|---|---|---|---|---|---|---|
| **Power Circuit** | Maximum Rated Operating Current | **Cat. No.** | **Hp (kW)** | **Input Amps 400V AC, 50 Hz** | **Input Amps 480V AC, 60 Hz** | **Output Amps** |
| | | 294_-FD1P5* | 0.5 (0.4) | 2.0 | 1.8 | 1.5 |
| | | 294_-FD2P5* | 1.0 (0.75) | 3.7 | 3.0 | 2.5 |
| | | 294_-FD4P2* | 2.0 (1.5) | 6.5 | 5.5 | 4.2 |
| | Overload Protection | Solid-state $I^2T$ type | 150% for 60 s or 200% for 3 s | | | |
| | | Trip Class | Class 10 protection with speed sensitive response and power-down overload retention function | | | |
| | | Overcurrent Protection | 200% hardware limit, 300% instantaneous fault | | | |
| | Overvoltage Category | | III | | | |
| | Reset Mode | | Automatic or manual | | | |
| | Output Frequency | | 0…400 Hz (programmable) | | | |
| | Efficiency | | 97.5% typical | | | |
| | Overvoltage | | 380…480V AC Input – Trip occurs at 810V DC bus voltage (equivalent to 575V AC incoming line) | | | |
| | Undervoltage | | 380…480V AC Input – Trip occurs at 390V DC bus voltage (equivalent to 275V AC incoming line) | | | |
| | Control Ride Through | | Minimum ride through is 0.5 s — typical value is 2 s | | | |
| | Faultless Power Ride Through | | 10 ms | | | |
| | Carrier Frequency | | 2…10 kHz, drive rating based on 4 kHz | | | |
| | Speed Regulation — Open Loop with Slip Compensation | | ±2% of base speed across a 40:1 speed range | | | |
| | Acceleration/Deceleration | | Two independently programmable acceleration and deceleration times. Each time may be programmed from 0…600 s, in 0.1 s increments. | | | |
| | Maximum Motor Cable Lengths (Reflected Wave Protection)§ | | 10 m (32 ft) | | | |

§ The reflected wave data applies to all frequencies 2…10 kHz.

| Electrical Ratings | | | | |
|---|---|---|---|---|
| **Control Circuit (External Source)** | Power Supply | NEC Class 2 | | |
| | Rated Operating Voltage | 24V DC (+10%, -20%) | | |
| | Overvoltage Protection | Reverse-polarity protected | | |
| | Unswitched Power Supply Requirements | Voltage | 19.2…26.4V DC | |
| | | Nominal Current | 150 mA | |
| | | Power | 3.6 W | |
| | | Input Current (each)★ | 50 mA | |
| | | Maximum Current | 450 mA | |
| | | Maximum Power | 11 W | |
| | | Peak Inrush‡ | <5 A for 35 ms | |
| | Switched Power Supply Requirements | Voltage | 19.2…26.4V DC | |
| | | Nominal Current | 125 mA | |
| | | Power | 3 W | |
| | | Output Current (each)★ | 500 mA | |
| | | Maximum Current | 1.625 A | |
| | | Maximum Power | 11 W | |
| | | Peak Inrush‡ | <5 A for 35 ms | |
| | Switched and Unswitched Power Supply Requirements | Voltage | 19.2…26.4V DC | |
| | | Nominal Current | 275 mA | |
| | | Power | 6.6 W | |
| | | Number of Inputs (x 50 mA) | user defined | |
| | | Number of Outputs (x 500 mA) | user defined | |
| | | Maximum Current | 275 mA + user defined | |
| | | Maximum Power | 6.6 W + (24 x user defined) | |
| | | Peak Inrush‡ | <10 A for 35 ms | |
| **Control Circuit (Internal Source)** | An internal 60 W isolated flyback power converter sources input, outputs, and main control board with 24V DC power. | | | |

| | **Cat. No.** | **Sym. Amps RMS** | **Circuit Breaker** | **Fuse** |
|---|---|---|---|---|
| **Short Circuit Current Rating (SCCR)** | 294_-* | 10 kA @ 480Y/277 | When used with Allen-Bradley Cat. No. 140U-D6D3-C30 | CC, J, or T fuse (maximum 45 A) |
| | 294_-* | 5 kA @ 480Y/277 | — | UL Class RK5 fuse |
| | Short Circuit Coordination | Type 1 | | |
| | | Size per NFPA 70 (NEC) or NFPA 79 for Group Motor Applications | | |

★ I/O is configurable to either input or output.
‡ Assumes zero wire resistance. Wire impedance will reduce current inrush.

| Input and Output Ratings | | |
|---|---|---|
| **Input** | Supply Voltage | Unswitched power A3/A2 |
| | Type of Inputs | 24V DC current sinking |
| | Connection Type | Single keyed M12 , quick disconnect |
| | Input per Connection | 1/each |
| | Rated Operating Voltage | 24V DC |
| | On-State Input Voltage (pin 4) | 10…26.4V DC, nominal 24V DC |
| | Off-State Input Voltage | 5V DC |
| | On-State Input Current (pin 4) | 1…3.7 mA, 2.6 mA @ 24V DC |
| | Off-State Input Current | <1.5 mA |
| | Maximum Sensor Leakage Current | <2.5 mA |
| | Maximum Number of Input Devices | 6 |
| | Maximum Sensor Sourcing Current (pin 1) | 50 mA per point<br>(maximum 300 mA total for sourcing one device) |
| | Sensor Operating Voltage Range | 19.2…26V DC |
| | Input Bounce Filter∆<br>(Software Configurable) | Off-On or On-Off: 0.5 ms + 64 ms |
| | Filtering | 100 µs |
| | DeviceLogix I/O Response | 2 ms (500 Hz) |
| **Output** | Supply Voltage (Switched Power) | A1/A2 |
| | Type of Outputs | DC sourcing |
| | Load Types | Resistive or light inductive |
| | Utilization Category (IEC) | DC-1, DC-13 |
| | Output State | Normally Open (N.O.) |
| | Connection Type | Single keyed M12 , quick disconnect |
| | Output per Connection | 1/each |
| | Overcurrent Protection♣ | 1.5 A (the sum of all outputs can not exceed this value) |
| | Rated Insulation Voltage ($U_i$) | **UL**: 1500V AC, **IEC**: 2000V AC |
| | Rated Operating Voltage ($U_e$) | 19.2…26.4V DC |
| | Maximum Blocking Voltage | 35V DC |
| | Nominal Operating Current ($I_e$) | 500 mA per point |
| | Maximum Thermal Current ($I_{the}$) | 500 mA per point |
| | Maximum Off-state Leakage Current | 1 µA |
| | Maximum Number of Outputs | 6 |
| | Surge Suppression | Integrated diode to protect against switching loads |

∆ Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.
♣ If an output exceeds 1.5 A for greater than 7 ms, a fault is generated.

| Environmental Ratings | |
|---|---|
| Operating Temperature Range | -20…+40 °C (-4…+104 °F)<br>50 °C (122 °F) without derating, when properly rated line reactors are installed in branch circuit. |
| Storage and Transportation Temperature Range | –25...+85 °C (–13…+185 °F) |
| Altitude | 1000 m |
| Humidity | 5…95% (non-condensing) |
| Pollution Degree | 3 |
| Enclosure Ratings | IP66 or UL Type 4 |
| Approximate Shipping Weight | 7.3 kg (16 lb) |

| Mechanical Ratings | | | | | | |
|---|---|---|---|---|---|---|
| Resistance to Shock | Operational | 30 G (exceeds IEC 61800-5-1) | | | | |
| | Non-Operational | 50 G (exceeds IEC 61800-5-1) | | | | |
| Resistance to Vibration | Operational | 2.5 G, MIL-STD-810G, (exceeds IEC 61800-5-1) | | | | |
| | Non-Operational | 5 G, MIL-STD-810G, (exceeds IEC 61800-5-1) | | | | |
| Disconnect Lock Out | Maximum of 3/8 in. (9.5 mm) diameter lock shackle or hasp | | | | | |
| Disconnect LOTO Locks | Up to 2 locks or hasps are supported | | | | | |
| Disconnect Mechanical Life | 200 000 operations | | | | | |
| | **Power Terminals** | **Motor Terminals** | **Control Terminals** | **PE/Ground** | **Source Brake** | |
| Wire Size | (2) #18…#10 AWG (0.8…5.2 mm²) per terminal | (2) #18…#10 AWG (0.8…5.2 mm²) per terminal | (2) #18…#10 AWG (0.8…5.2 mm²) per terminal | (2) #16…#10 AWG (1.3…5.2 mm²) per terminal | #16 …#10 AWG (1.0…4.0 mm²) per terminal | |
| Wire Type | Multi-strand/solid copper wire | | | | | |
| Tightening Torque | 10.6 ± 2 lb•in (1.2 ± 0.2 N•m ) | | | 18 ± 2 lb•in (2 ± 0.2 N•m ) | 4.8 ± 2 lb•in (0.5 ± 0.2 N•m ) | |
| Wire Strip Length | 0.35 ± 0.01 in. (9 ± 2 mm) | | | | | |
| Power Rating | 600V AC/25 Amp VAC | 600V AC/10 Amp VAC | 600V AC/10 Amp VAC | — | 600V AC/10 Amp VAC | |

| Emission and Immunity Ratings | | |
|---|---|---|
| **Emission** | Conducted | EN 55011 Class Group 2 |
| | Radiated | |
| | Electrostatic Discharge | 4 kV contact, 8 kV air |
| | Radio Frequency Electromagnetic Field | EN 61800-3 10V/m, 80 MHz…1 GHz |
| **Immunity** | Fast Transient | 2 kV (Power) 2 kV (PE) 1 kV (Communication and control) |
| | Surge Transient | 1 kV (12) $_{L-L}$, 2 kV (2) $_{L-N}$ (earth) |
| | Radio Frequency Conducted Disturbance | 10V, 150 kHz…80 MHz |

| Standards Compliance and Certifications | | | |
|---|---|---|---|
| | **UL/CSA** | **EN/IEC** | **Other Agencies** |
| **Standards Compliance** | UL 508C Power Conversion Equipment – Suitable for Group Installation CSA C22.2, No. 14 | EN 61800 - Adjustable Speed Electrical Power Drive Systems, Part 3: EMC Requirements and Specific Test Methods, CE Marked per EMC Directive 2004/108/EC, Part 5-1: Safety Requirements – Electrical, Thermal and Energy, CE Marked per Low Voltage Directive 2005/95/EC | CCC (Pending) C-Tick (Pending) ODVA for EtherNet/IP |
| **Certifications** | cULus (File No. E207834, Guides NMMS, NMMS7) | | |

| Communication Ratings | | |
|---|---|---|
| | Rated Insulation Voltage | 250V |
| | Operating Dielectric Withstand | **UL/NEMA**: 1500V AC, **IEC**: 2000V AC |
| **EtherNet/IP** | EtherNet/IP ODVA - Conformance Testing | EtherNet/IP Interoperability Performance – Per A9 PF 2.1 |
| | Ethernet Communication Rate | 10/100 Mbps, half or full-duplex |
| | Ethernet Ports | 2 (embedded switch) |
| | Ethernet Network Topologies Supported | Star, Tree, Linear, and Ring |
| | Device Level Ring Support | Beacon Performance, IEEE 1583 Transparent Clock |
| | Ethernet Connector | M12, D code, female, with Ethernet keying, 4 Pin |
| | Ethernet Cable | Category 5e: Shielded or unshielded |
| | IP Configuration | Static, DHCP, or BootP |
| | DHCP Timeout | 30 s |
| | Data | Transported over both TCP and UDP |
| | Packet Rate (pps) | 500 packets-per-second (2000 µs), Tx<br>500 packets-per-second (2000 µs), Rx |
| | Consume Instance (Command) | Default of 4 words (Instance 154) |
| | Produce Instance (Status) | Default of 16 words (Instance 156) |
| | Message Support | Unicast or Multicast |
| | Address Conflict Detection (ACD) | IP v4 Address Conflict Detection for EtherNet/IP devices |
| | Sockets | 150 maximum |
| **Web Server** | Security | Login and password configurable |
| | E-mail | Support Simple Mail Transfer Protocol (SMTP) |
| | Webpage Features | Status, diagnostics, configuration |
| | Concurrent Sessions | 20 |
| | Web Server | HTTP 1.1 |
| **Network Connections** | Concurrent TCP Connections | Maximum of 5 encapsulated messages over both TCP and UDP |
| | Maximum I/O Connections (CIP Class 1) | Supports up to 2 Class 1 CIP connections (Exclusive owner (data) or listen-only). One connection per PLC. Listen-only connection requires a data connection to be established. |
| | Maximum Concurrent Explicit Messages (CIP Class 3) | 6 |
| | Class 1 Connection API | 2…3200 ms |
| | Class 3 Connection API | 100…10 000 ms |
| | Request Packet Interval (RPI) | 20 ms default (2 ms minimum) |

## Motor Overload Trip Curves

Motor overload current parameter provides class 10 overload protection. Ambient insensitivity is inherent in the electronic design of the overload.