

PowerFlex 40P AC Drive Features

Flexible Packaging and Mounting Options

- Versatile packaging options allow for **panel mount NEMA 1/IP30** as well as **NEMA 4/IP66** (with like enclosure) using the plate/flange drives.
- **Plate drives** also allow for a reduction in overall enclosure size based on a 75% reduction in enclosed Watts.
- Installation can be a virtual snap using the **DIN rail mounting** feature on B frame drives. Panel mounting is also available, providing added flexibility.
- An optional **IP30 (NEMA 1) conduit box** is easily adapted to the standard IP20 (NEMA Type Open) product, providing increased environmental ratings.
- **Zero Stacking™** is allowable for ambient temperatures up to 40°C, saving valuable panel space. 50°C ambient temperatures are permitted with minimal spacing between drives.
- **External filters** are available for all PowerFlex 40P drive ratings to meet EN55011, Class A and B EMC requirements.



Start Up, Programming and Operation

- PowerFlex 40P drive programming is achieved by the use of an **external HIM** or via the resident DSI connection and the **PC programming tool**.
 - DriveTools™ SP
 - DriveExplorer™
 - Pocket DriveExplorer™
- **StepLogic™ wizards** available for DriveTools SP and DriveExplorer (Lite or Full) assist in setup of position or velocity StepLogic programming
- An **integral display and reset button** allows user to change display parameters and reset the drive if a fault occurs.
- **4 digit display** with 10 additional LED indicators provides an intuitive display of drive status and information.
- Integral **RS485 communications** can be used for programming from a PC. It can also be used in a multi-drop network configuration. A serial converter module provides connectivity to any controller with a DF1 port.
- The 10 most common application parameters are contained in the **Basic Program Group**. Common parameters shared with PowerFlex 40 are in the **Advanced Program Group**, and additional position control and fibers parameters located in **Enhanced Program Group**.
- A **NEMA Type 4X remote** and **NEMA Type 1 hand-held LCD keypad** provide additional programming and control flexibility, both featuring the popular CopyCat function.



StepLogic wizards available for ease of position or velocity StepLogic programming using drive software tools.



PowerFlex 40P PC Programming Software

Through the use of a Serial Converter Module and **DriveExplorer™** or **DriveTools™ SP** software, programming can be greatly simplified.

DriveExplorer Software

- View and modify drive and adapter parameters in a method similar to the file management capability of Microsoft Windows Explorer.
- Operate the drive via an on-screen Control Bar, which is a tool that allows you to start, stop, and change the speed reference of the drive.
- Save, restore and print parameter information.
- Compare current parameters with factory defaults or previously saved parameter values.
- Edit, upload and download parameters.
- StepLogic setup wizards available for ease of programming.
- DriveTools SP Software
- Online and offline programming capability.
- In-grid and dialog-based parameter editing.
- Immediate visual indication of drive and communication status when viewing online drive.
- Integrated HTML Help architecture.
- StepLogic setup wizards available for ease of programming.



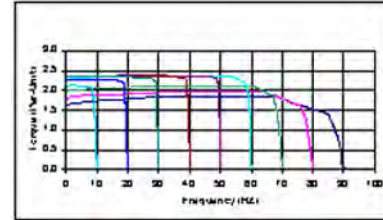
Optimized Performance

- **Removable MOV** to ground provides trouble-free operation when used on ungrounded distribution systems.
- A **relay pre-charge** limits inrush current.
- **Integral brake transistor**, available on all ratings, provides dynamic braking capability with simple low cost brake resistors.
- DIP switch settable **24V DC sink or source control** for control wiring flexibility.
- 150% overload for 60 seconds or 200% overload for 3 seconds provides **robust overload protection**.
- **Adjustable PWM frequency up to 16 kHz** ensures quiet operation.



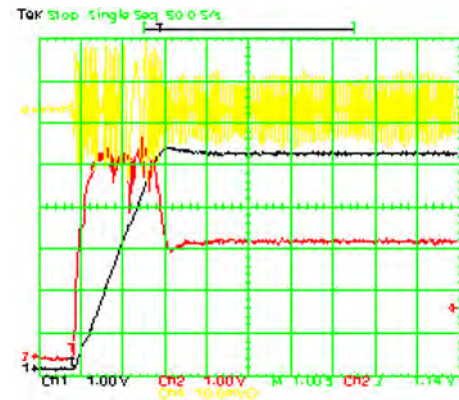
Sensorless Vector Control

- **Sensorless Vector Control** provides exceptional speed regulation and very high levels of torque across the entire speed range of the drive.
- The **Autotune feature** allows the PowerFlex 40P AC drive to adapt to individual motor characteristics.
- **Closed loop** with encoder feedback replaces slip compensation with trim for improved speed range and regulation.



Performance (Open Loop)

- This graph depicts the ability of a PowerFlex 40P drive to accelerate into at least 150% load.
- At 100% motor load, the drive will run the motor at synchronous speed.
- Excellent current regulation.
- Linear acceleration.
- Best in class digital input response time and repeatability.



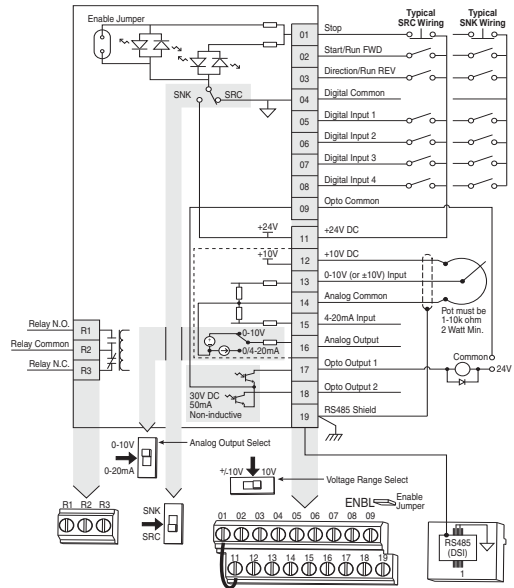
Control Performance

- **V/Hz Motor Control**
- **Sensorless Vector Control** with Autotune feature develops high torque over a wide speed range and adapts to individual motor characteristics.
 - Slip compensation or encoder trim
- Integral **PID** functionality enhances application flexibility.
- **Position control** regulator mode.
- **Timer, Counter, Basic Logic and StepLogic™ functions** can reduce hardware design costs and simplify control schemes.
 - **Timer function:** Relay or opto outputs controlled by drive performing timer function. Timer is initiated by activating a digital input programmed as “Timer Start.”
 - **Counter function:** Relay or opto outputs controlled by drive performing counter function. Counter function is activated by a digital input programmed as “Counter Input.”
 - **Basic Logic:** Relay or opto outputs controlled by status of digital inputs programmed as “Logic Inputs.” Performs basic Boolean logic.
 - **Velocity and Position StepLogic™** function available providing repeatable speed or position changes based on StepLogic application profile.



I/O

- Two (2) semi-programmable digital inputs.
 - Dedicated for start and stop
 - Simplifies wiring and troubleshooting
- Five (5) fully programmable digital inputs provide application versatility.
 - Standard 27 different settings, same as PowerFlex 40 AC drive providing application versatility
 - Additional 9 settings for Fibers and basic positioning enhancements
 - Reverse DI is now fully programmable via E202 [Digital Term 3]
- One (1) programmable form C relay output and two (2) opto output can be used to indicate various drive or motor conditions.
- One (1) analog output is DIP Switch selectable for either voltage (0-10V) or current (0-20 mA). This scalable, 10-bit output is suitable for metering or as a speed reference for another drive.
- One (1) analog input is DIP switch selectable for either voltage or current. Input is isolated from the rest of the drive I/O. Bipolar mode offers improved zero-cross performance.



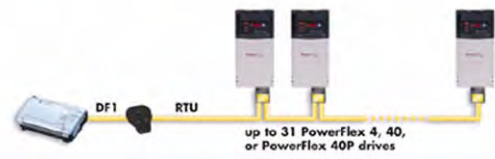
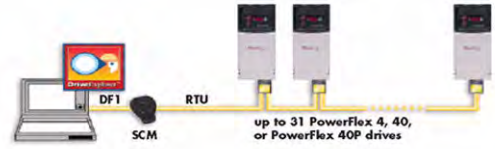
Communications

- Integral communication cards such as **DeviceNet™**, **EtherNet/IP™**, **PROFIBUS™ DP**, **LonWorks®** and **ControlNet™** can improve machine performance.
- The DSI **Wireless Interface Module (WIM)** provides a wireless communication interface between a Pocket PC, laptop computer or desktop computer equipped with **Bluetooth®** wireless technology, and any Allen-Bradley® product supporting the DSI™ protocol.
- **Field installed option** allows for future addition of stand-alone drives to a network.
- **Online EDS file creation** with RSNetWorx™ providing ease of set-up on a network.



Communication Options

- PowerFlex 40P AC drives are compatible with any device that acts as a **RTU Master** and supports standard 03, 06 and 16 RTU commands.
- A network can be configured using PowerFlex 40P AC drives with **optional communication cards** for high performance and flexible configuration capabilities.
 - DeviceNet
 - EtherNet/IP
 - PROFIBUS DP
 - LonWorks
 - ControlNet
- A **multi-drive solution** can be reached using a single PowerFlex 40P AC drive DeviceNet option, with the ability for up to five (5) drives to reside on one (1) node.
- **Integral RS485** communications enable the drives to be used in a multi-drop network configuration. A serial converter module (SCM) provides connectivity to any controller with a DF1 port. The SCM can be eliminated if the controller acts as a RTU Master.



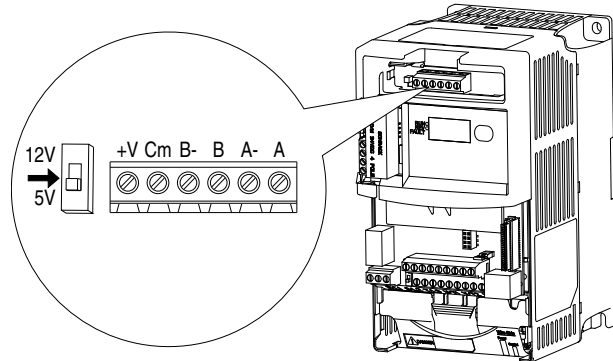
PowerFlex 40P AC Drive Advanced Features

Closed Loop

Encoder/Pulse Train Input Standard

The PowerFlex 40P AC drive allows for configurable closed loop control for either speed or position feedback for **improved speed regulation, basic position control**, or other **pulse inputs** for motor control.

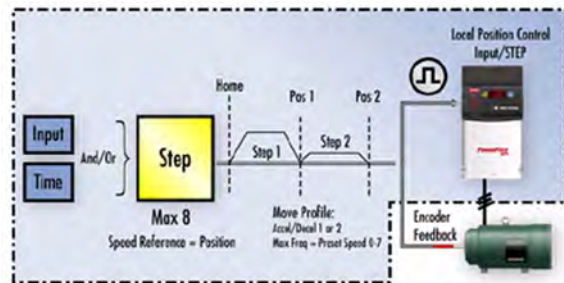
- Improved speed regulation
- Basic position control



Basic Position Control

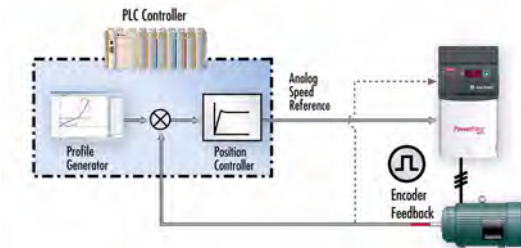
Local Position Control

- **Position regulator with Step Logics**
 - 8 positions (local logic)
 - Infinite if write to single step over multiple field bus networks (external logic)



Outer Position Control Loop

- **Analog input bipolar mode** offers improved zero-cross performance.
- **Simple motion control** applications with more complex position profiles.
- **Speed reference** supplied to Drive via Analog Input or over multiple field bus network options.
- **Speed ratio** available for simple draw applications.



Feedback Details

- Line Driver Type Incremental Encoder Quadrature (dual channel) or Single Channel.
 - 5/12V DC supply, 10mA min per channel
 - Single Ended or Differential (A,B Channel)
 - Duty Cycle of 50%, +10%
- Pulse Train Input.
 - Configurable Input Voltage 5V/12V/ 24V DC autodetect
 - Frequency controlled PWM
- Allowable Pulse Frequency DC to 250 kHz.

I/O	Connection Example	I/O	Connection Example
Encoder Power – Internal Drive Power Internal (drive) 12V DC, 250mA		Encoder Power – External Power Source	
Encoder Signal – Single-Ended, Dual Channel		Encoder Signal – Differential, Dual Channel	

Improved Ride Through

Operation Down to 1/2 Line Voltage

The PowerFlex 40P AC drive allows for the selection of **1/2 DC Bus operation**, for use in critical applications where continued drive output is desired even in the event of brown out or low voltage conditions. The PowerFlex 40P AC drive also supports **enhanced inertia ride through** for additional low voltage mitigation.

- Selectable 1/2 line voltage operation.
- Increased power loss ride through.



Optimized for Common DC Bus Installations

Enhanced Control of Internal Pre-charge

Common DC Bus offers additional inherent breaking capabilities by utilizing all the drives/loads on the bus for energy absorption offering higher efficiency and cost savings. The PowerFlex 40P AC drive has been optimized for use in **Common DC Bus or Shared DC bus** installations.

- Configurable pre-charge control using digital inputs.
- Direct DC Bus connection to power terminal blocks.

Safety Inside using DriveGuard® Safe-off Option

With the **DriveGuard option**, category 3 Safe-off combines safety and productivity with zone control and cost savings through the reduction of components. The PowerFlex 40P AC drive with the Allen-Bradley DriveGuard relay board option is a certified safety solution for AC drive control per EN954-1.



DriveGuard® 
Series B, 20-DG01

Installation Considerations

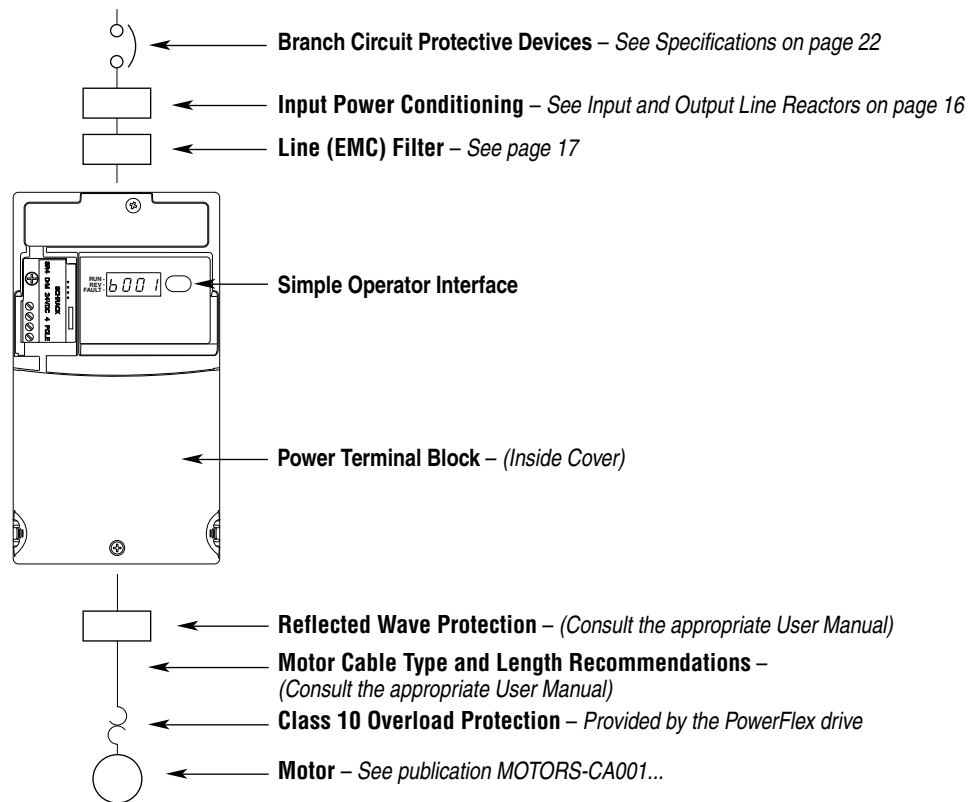
Power Wiring

PowerFlex 40P drives have the following built in protective features to help simplify installation.

- Ground fault protection while starting and running ensures reliable operation
- Electronic motor overload protection increases motor life
- 6kV transient protection provides increased robustness for 380-480V system voltages

There are many other factors that must be considered for optimal performance in any given application. The block diagram below highlights the primary installation considerations. Consult the PowerFlex 40P *User Manual*, Publication 22D-UM001... available online at <http://www.rockwellautomation.com/literature>, for detailed recommendations on input power conditioning, CE conformance (EMC filtering), FCC Compliance, reflected wave protection, motor cable types and motor cable distances.

Block Diagram

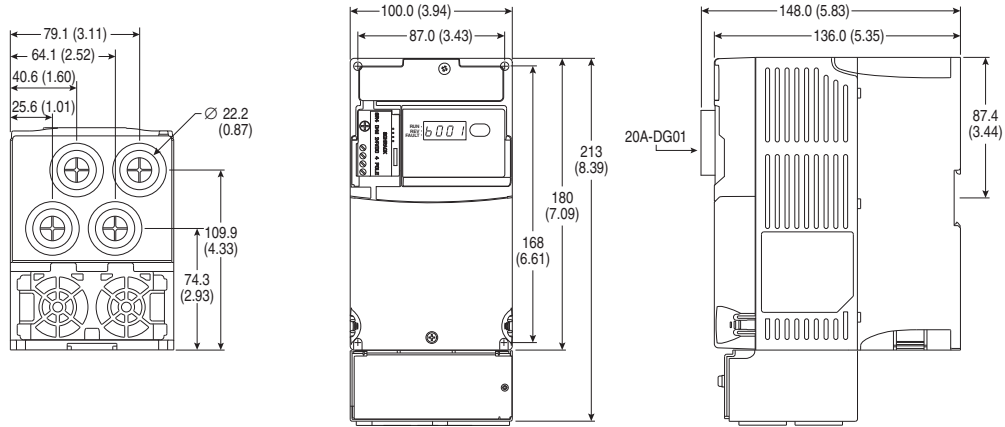


Approximate Dimensions

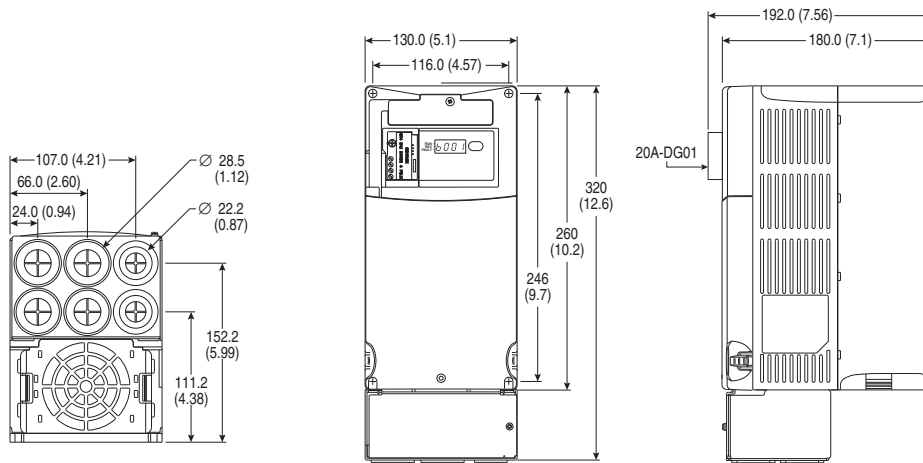
Ratings are in kW and (HP).

Frame	240V AC – 3-Phase		480V AC – 3-Phase		600V AC – 3-Phase	
B	0.4 (0.5)	2.2 (3.0)	0.4 (0.5)	2.2 (3.0)	0.75 (1.0)	2.2 (3.0)
	0.75 (1.0)	3.7 (5.0)	0.75 (1.0)	4.0 (5.0)	1.5 (2.0)	4.0 (5.0)
	1.5 (2.0)		1.5 (2.0)			
C	11.0 (15.0)	18.5 (25.0)	5.5 (7.5)	11.0 (15.0)	5.5 (7.5)	11.0 (15.0)
	15.0 (20.0)	22.0 (30.0)	7.5 (10.0)		7.5 (10.0)	

IP 30/NEMA 1/ UL Type 1 Option Kit without Communication Option

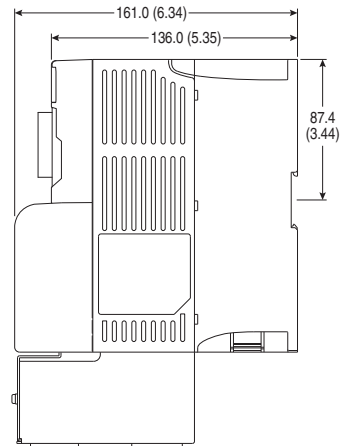
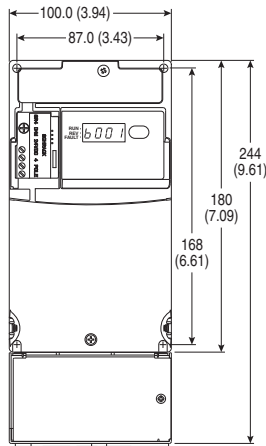
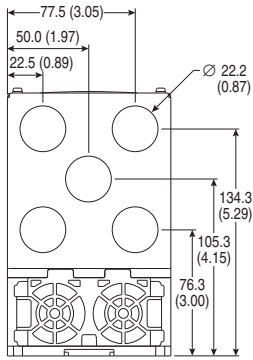


Frame B
(Shown with IP30/NEMA 1/UL Type 1 conversion kit.)

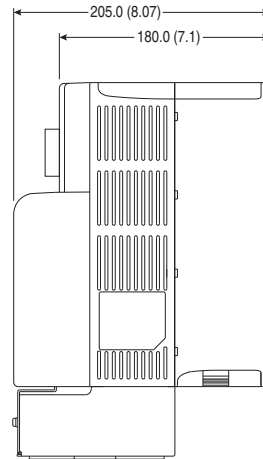
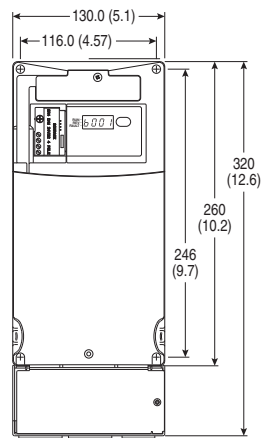
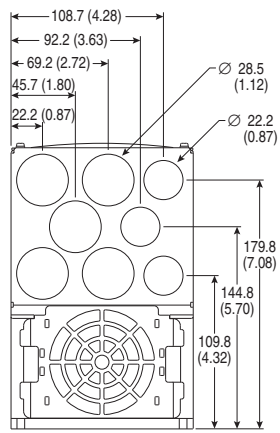


Frame C
(Shown with IP30/NEMA 1/UL Type 1 conversion kit.)

IP 30/NEMA 1/UL Type 1 Option Kit with Communication Option

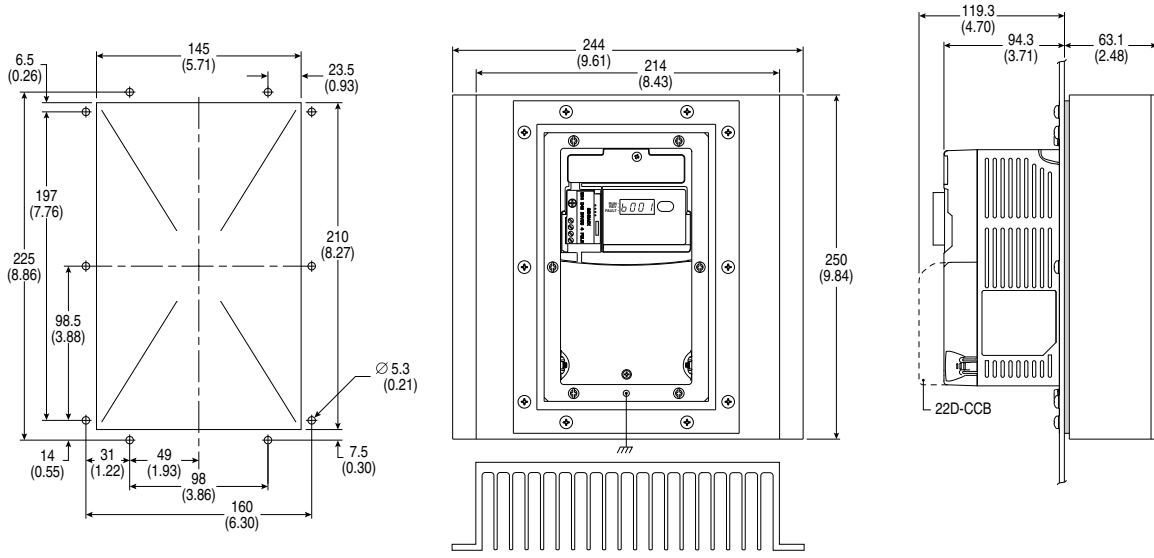


Frame B - 22-JBCB

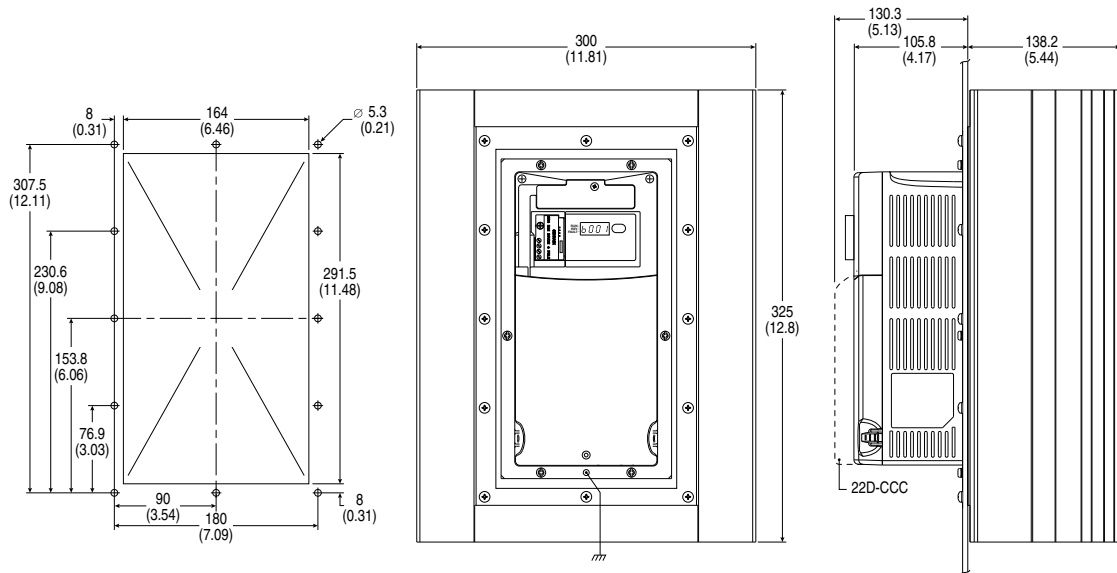


Frame C - 22-JBCC

Flange Mount Drive

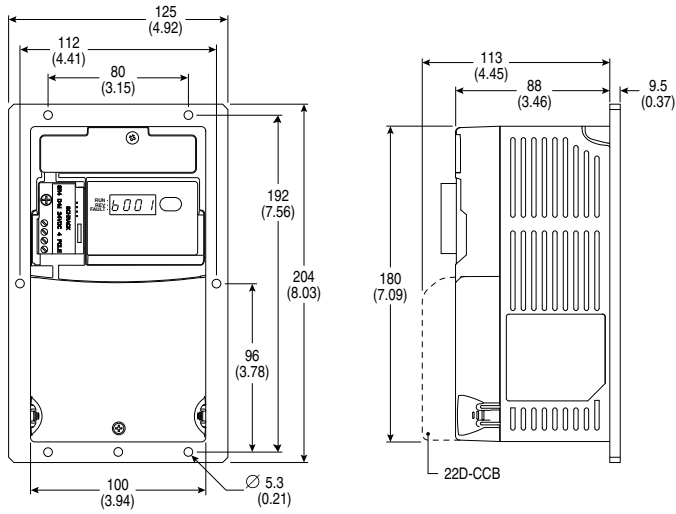


Frame B — Flange Mount

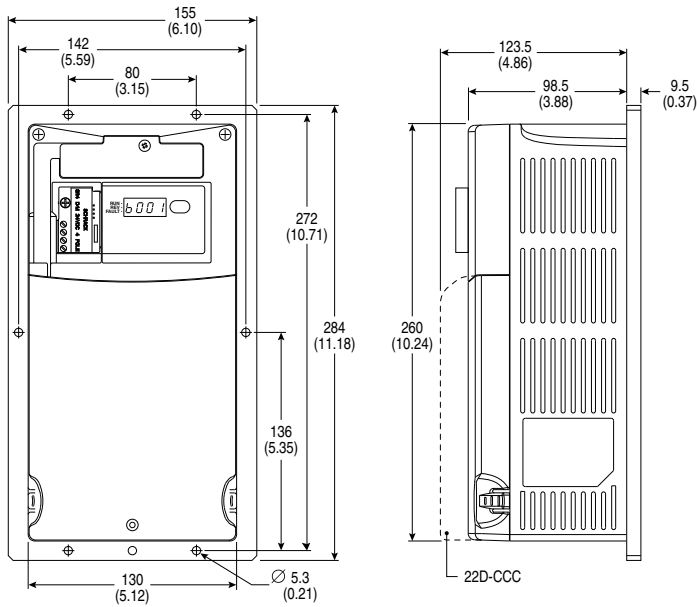


Frame C — Flange Mount

Plate Drive



Frame B — Plate Drive



Frame C — Plate Drive