CENTERLINE 1500 Medium Voltage Motor Control Centers

Bulletin Numbers 1506, 1512A, 1512AD, 1512AT, 1512B, 1512BP, 1512BS, 1512BD, 1512BT, 1512BU, 1512DM, 1512DO, 1512M, 1522E, 1522F/G, 1560F, 1562F, 1572, 1576, 1582, 1591A, 1591B, 1592B, 1592BF, 1592BS, 1592F/M, 1594F/M, 1594T, 1599, 1906B, 1906L, 1912B, 1912L

Allen-Bradley
by ROCKWELL AUTOMATION

Selection Guide

What's Inside

What's New

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes. Translated versions are not always available for each revision.

Topic	Page
Updated Bulletin 1506 power circuit schematic	40
Updated weight and dimension data for Bulletin 1562F starter specifications	44
Replaced Bulletin 1560F and 1562F power circuit schematics	45
Removed Withstand/Fault ratings as these are applicable	62
Corrected the IntelliVAC control module input voltage	63

Overview

Your critical applications rely on medium voltage motors for safe, repeatable operation in harsh industrial environments. To help improve the protection and performance of your systems, choose Allen-Bradley® CENTERLINE® 1500 medium voltage motor control centers (MVMCCs)—built tough to meet your application demands.

With one of the broadest suites of motor controls in the marketplace, CENTERLINE 1500 MVMCCs deliver premium quality, tailored solutions in a centralized package that integrates control and power in one efficient solution.

Matched to your requirements, our UL and NEMA certified medium voltage solutions are designed to mitigate risk and support an extensive range of control formats and configurations. The result? Smart, cost-effective systems that can deliver power, control, information, and safety capabilities on a common platform.

To extend system performance further, incorporate additional features—like industry-leading ArcShield™ arc-resistant enclosures and IntelliCENTER® technology, our built-in network and software package. Our flexible and scalable approach to design means you can choose the capabilities that you need to enhance safety and maximize productivity.

For nearly 80 years, Rockwell Automation has provided leading medium voltage motor control solutions—solutions like the CENTERLINE 1500 MVMCC.

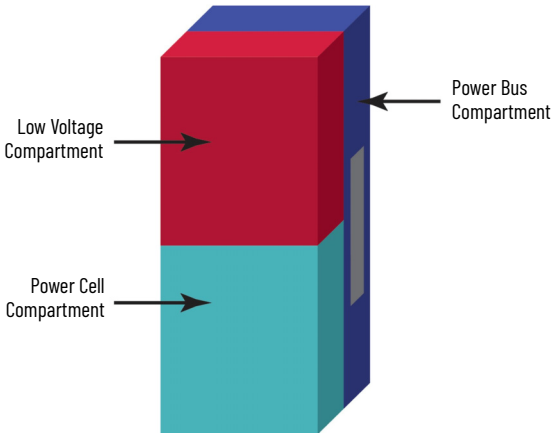
Motor Control Center Design

The CENTERLINE 1500 Medium Voltage Motor Control Centers (MVMCCs) robust structures consist of sections, wireways, doors, and mountable intelligent motor control (IMC) devices.

CENTERLINE 1500 MVMCCs come in an array of enclosure types, in compliance with multiple standards.

Each CENTERLINE 1500 MV MCC is assembled with completely isolated, easily accessible, and modular compartments:

- Centralized power bus compartment
- One or more medium voltage power cell compartments
- One or more low voltage compartments



Power Bus Compartment

The CENTERLINE 1500 MVMCC features a centralized horizontal power bus compartment with removable cover plates for premium accessibility and power distribution throughout the entire lineup.

- Controllers are expandable from the left-to-right or right-to-left
- Designed for direct connection of incoming line cables, from top or bottom
- Horizontal edge-to-edge bus bar configuration opposes magnetic forces, moisture, and dust collection
- One-piece 3-phase bus brace helps reduce maintenance and provides excellent distribution of forces during faults
- Side and rear access, which is protected by removable, bolted grounded plates; power bus accessible from the front for all motor controllers

Power Cell Compartment

The MVMCC power cell compartment is the heart of the controller. It contains all power circuitry, including proprietary non-load break isolation switches, integrated power fuses, contactors, and current and control power transformers. The MVMCC power cell compartment is fully interlocked (electrically and mechanically) to provide an enhanced safety level.

Low Voltage Compartment

The unique swing-out, low voltage compartment provides a separate and fully isolated area. All CENTERLINE 1500 low voltage compartments include these features.

- Enables controller testing and troubleshooting without exposing personnel to medium voltage for maximum safety
- By using the unique Test Selector Switch and external test power supply receptacle, all low voltage components can be configured and tested safely without medium voltage applied
- The Test Selector Switch additionally helps help prevent backfeeding through the control transformer
- All low voltage panels are painted white, providing increased visibility, better component identification, simple access, easy product integration, and higher maintainability

The low voltage compartment can house various low voltage Intelligent Motor Control (IMC) devices for diverse protection and measurement capabilities. These IMC devices include:

- Bulletin 193: E300™ Electronic Overload Relay
- Bulletin 1426: PowerMonitor™ 5000
- Bulletin 1503VC: IntelliVAC™ Contactor Control Module[(a)]
- Bulletin 1794: Flex™ I/O

(a) A Flex I/O module or E300 relay is needed.

IntelliCENTER Technology

IntelliCENTER technology enhances the intelligence of the CENTERLINE 1500 MV MCC by using built-in networking to capture information used for predictive maintenance, process monitoring, and advanced diagnostics. IntelliCENTER technology can save you time because each MV MCC is pre-wired, and the network is pre-programmed and validated at the factory. Network devices are preconfigured with node addresses and communication rates, ready to communicate so you can configure device parameters (such as acceleration time and full load amps) via the network.

IntelliCENTER Software

The addition of IntelliCENTER software provides the ultimate window into your MV MCC. The preconfigured software provides maintenance personnel with easy access to real-time critical CENTERLINE MV MCC configured information and process data for troubleshooting. The configurable graphic views provide system status at a glance and help keep facilities running with electronic documentation, remote diagnostics, and predictive maintenance. IntelliCENTER software significantly reduces HMI programming time and PLC development time with automatic tag generation and even complete network configuration before the MV MCC is powered up.

Integration Assistant

With IntelliCENTER Integration Assistant, you can seamlessly integrate your IntelliCENTER MV MCCs into Studio 5000® programming software. This feature helps reduce programming time by automatically adding the CENTERLINE MCC devices to the Studio 5000 I/O tree.

IntelliCENTER Energy

IntelliCENTER Energy offers a preconfigured setup of FactoryTalk® EnergyMetrix™ software for intelligent motor control devices in the MV MCC, including variable speed drives, overload relays, and SMCs. With IntelliCENTER Energy, you can view energy consumption at the device level directly from IntelliCENTER software, making it easier to monitor and manage energy usage in the industrial facility.

ArcShield Technology

Allen-Bradley CENTERLINE 1500 MV MCCs with ArcShield arc-resistant enclosures provide rugged process control for applications that require a higher level of personnel protection. Products with ArcShield enclosures are tested and compliant to the IEEE C37.20.7 standard, and provide Type 2B protection during a 40 kA or 50 kA arc flash.

The ArcShield controller helps safely redirect the arc flash energy out the top of the unit and away from personnel. This level of protection is also maintained, even when the low voltage door is open for maintenance purposes.

All ArcShield products have a robust enclosure design, which contains the arc flash energy and exhaust materials until vents on top of the enclosure open. Once opened, the vents provide a path for materials to exit the enclosure. An overhead plenum is used to direct the materials to a safe location away from personnel.

An optional chimney design redirects arc flash materials safely into clear space above the enclosure. The low voltage panel is reinforced and sealed, to help prevent arc flash exhaust materials from entering this compartment.

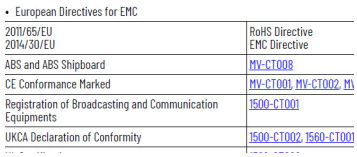
As standard, a plenum exhaust section is provided with each new ArcShield order. The plenum exhaust section can be mounted on either the left or right end of the line-up, and it extends past the end of the line-up. Engineered plenum designs are also available.

Features

- Reinforced cabinet and power cell door closure mechanism
- Multi-point latching mechanism, reinforced cross bracing and gasket sealing
- Reinforced back plates–added support plates that are secured with multiple bolts provide increased rigidity and security
- Reinforced low voltage panel to withstand arc flash energy and shield maintenance personnel while working in the isolated low voltage compartment
- Arc ‘Pressure Relief’ vent to vent arc gases and material safely away from personnel during an arc flash
- Available with removable arc exhaust plenum or exhaust chimneys

Selection Process

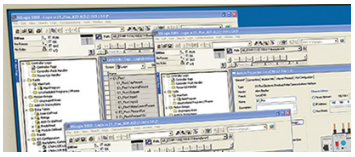
Use the following sections in this publication to select a CENTERLINE 1500 Motor Control Center.


• European Directives for EMC

2011/65/EU 2014/30/EU	RoHS Directive EMC Directive
ABS and ABS Shipboard	MV-CT008
CE Conformance Marked	MV-CT001, MV-CT002, M1
Registration of Broadcasting and Communication Equipments	1500-CT001
UKCA Declaration of Conformity	1500-CT002, 1560-CT001

Step 1: Technical Specifications

Determine what certifications, ratings, and other technical specifications are needed for your application. Step 1 starts on page 9.



Step 2: Network Technology

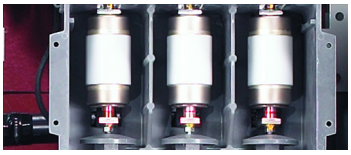
Choose the level and type of networking technology, diagnostic, and HMI software tools. Step 2 starts on page 11.

Step 3: Structure Options

Choose enclosure type, optional ArcShield protection, and paint. Step 3 starts on page 15.

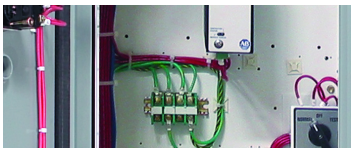
Step 4: Power Bus Compartment

Understand the design of the Power Bus Compartment. Step 4 starts on page 19.



Step 5: Power Cell Compartment

Review standard power components offered. Step 5 starts on page 21.

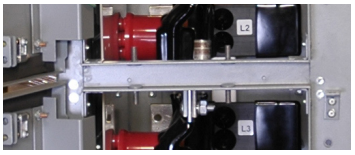


Step 6: Low Voltage Compartment

Choose from a variety of Intelligent Motor Control Devices to populate the LV compartment. Step 6 starts on page 27.

Step 7: Medium Voltage Control Types

Choose your MV control type. Step 7 starts on page 31.

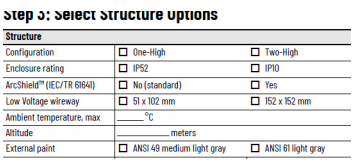


Step 8: Incoming Line Units

Choose your incoming line unit type. Step 8 starts on page 53.

Step 9: Low Voltage Compartment Door Options

Choose interface options. Step 9 starts on page 59.


Step 3: Select Structure Options

Structure		
Configuration	☐ One-High	☐ Two-High
Enclosure rating	☐ IP52	☐ IP10
ArcShield™ (IEC/TR 61641)	☐ No (standard)	☐ Yes
Low Voltage wireway	☐ 51 x 102 mm	☐ 152 x 152 mm
Ambient temperature, max	_____ °C	
Altitude	_____ meters	
External paint	☐ ANSI 49 medium light gray	☐ ANSI 61 light gray

Selection Checklist

Complete each corresponding part of the selection checklist as you work through each step. A completed checklist helps your local sales office better understand your needs. The summary checklist starts on page 61.

Notes:

The following certifications can be found at the Rockwell Automation Literature Library: https://rok.auto/literature.

Standards	• Underwriters Laboratories, Inc. (UL), High Voltage Industrial Control Equipment 347 • Canadian Standards Association (CSA), Industrial Control Equipment C22.2 No. 253 (harmonized with UL 347, fifth edition) • National Electrical Manufacturers Association (NEMA), Medium Voltage Controllers Rated 1501...7200V AC ICS 3-2 (formerly ICS 2-324) • American Nation Standards Institute (ANSI), Instrument Transformers C57.13 • Institute of Electrical and Electronic Engineers (IEEE) 519-1992 • IEEE C37.20.7, Type 2B for arc resistance • National Electrical Code (NEC) • Canadian Electrical Code (CEC) • Occupational Safety and Health Act (OSHA) • European Directives for EMC		
EC Directives	2011/65/EU 2014/30/EU		RoHS Directive EMC Directive
Certifications and Markings	ABS and ABS Shipboard		MV-CT008
	CE Conformance Marked		MV-CT001, MV-CT002, MV-CT003
	Registration of Broadcasting and Communication Equipments		1500-CT001
	UKCA Declaration of Conformity		1500-CT002, 1560-CT001
	UL Certification		1560-CT002
Rated Voltages	Maximum Rated Voltage		5000V or 7200V, 3 Phase
	Nominal Voltage Ratings		2400V, 3300V, 4160V, 4800V, 6600V, 6900V
	Rated Frequency		50...60 Hz
Rated Currents (Main Horizontal Power Bus)	Continuous Current Rating		1200, 2000, 3000 A
	Short Circuit Peak Withstand		130 kA Peak
	Short Time Withstand Rating		50 kA RMS SYM (80 ka ASYM) for 0.5 second
Creepage Distances and Clearances	Basic Impulse Level (BIL)		60 kV(1)
	Minimum Insulation Creepage-to-Ground and Between Phases		89 mm (3.5 in.)
	Dielectric Voltage Withstand Rating (Insulation Test) for 60 s	2400...5000V	13.25 kV
		7200V	18.2 kV
Bus Material and Plating	Main horizontal power bus		Copper, tin plated
	Vertical power bus		Copper, tin plated
	Ground bus		Copper, unplated
Enclosure Types	NEMA Enclosure/IEC 60529		• Type 1/IP21 • Type 1 with Gasket/IP21 • Type 12/IP52 • Type 3R/IP34 • Arc-resistant Type 2B (Type 12/IP52)
Structural Surface Treatments	Interior(2)		High gloss white (RAL 9003)
	Exterior		• ANSI 49 medium light gray • ANSI 61 light gray • Additional colors available as custom option
Environment(3)	Operating temperature range		0...40°C (32...104°F)
	Storage and transportation temperature range		-20...+75°C (-4...+149°F)
	Altitude(4)		1000 m (3300 ft)
	Humidity		5...95% (non condensing)
	Pollution degree		2
	Seismic (UBC rating)(5)		1, 2, 3, 4

(1) The BIL rating must be derated for altitudes about 1000 m (3300 ft).
(2) All metal back plates in the power cell and low voltage compartment.
(3) UL/CSA/NEMA/IEC.
(4) De-ratings apply for higher altitudes.
(5) Some units may require special bracing. Contact factory for more information.

Notes:

An EtherNet/IP™ network enhances integration, helps reduce your MCC set-up time, and increases the network speed. With EtherNet/IP technology, you can quickly monitor, troubleshoot, and diagnose your MCC from anywhere. CENTERLINE® MCCs provide robust motor control capabilities with access to the real-time data you need by using a network that communicates with your entire enterprise. Use of an EtherNet/IP network enables IntelliCENTER® Integration Assistant that automatically configures and populates your I/O tree and network configuration.

The cost and performance of a EtherNet/IP network makes them ideal for MCC applications. Open specifications and protocol, managed by the Open DeviceNet Vendor Association (ODVA), means that vendors are not required to purchase hardware, software, or licensing rights to connect to a system.

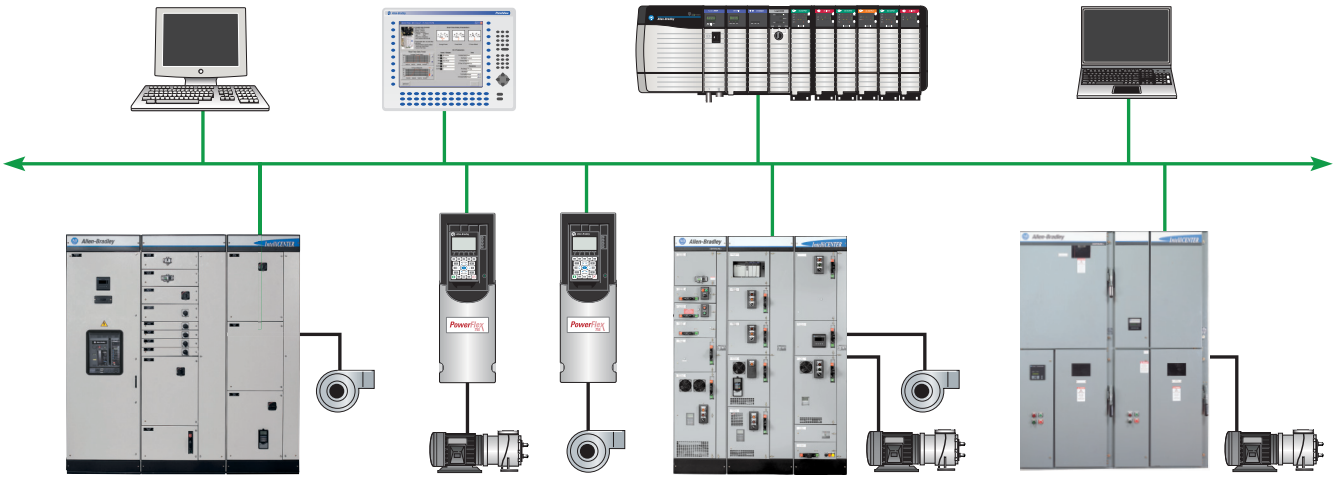
An EtherNet/IP system is qualified to communicate and perform under normal and adverse electrical environments. Its application can be plant-wide and over multiple disciplines through commercial off-the-shelf (COTS) products like Ethernet switches and devices.

An EtherNet/IP system has the following capabilities:

- Automatic Device Configuration (ADC) automatically downloads the IP address, firmware, and device parameter settings to a newly replaced device without user interaction.
- Switch-level linear or switch-level ring topologies provide network flexibility for any sized operation.
- Heavy traffic performance.
- Add or subtract nodes on-the-fly.
- Advanced network configuration, security, and diagnostics are provided by layer-2 managed Ethernet switches.
- The EtherNet/IP system in the MCC is designed to operate at 100 Mbaud.

For more information on how to configure MCCs with EtherNet/IP, refer to CENTERLINE 1500 Motor Control Center with IntelliCENTER Technology Using an EtherNet/IP Network Technical Data, publication 1500-TD001.

Example of an EtherNet/IP Network



EtherNet/IP Components

Unit Components

Each unit can be provided with an EtherNet/IP component.

- Starter units can be provided with a solid-state overload relay, like the E300™ Electronic Overload Relay.
- AC drives can be provided with an EtherNet/IP communication module and/or an embedded option.
- Solid-state controllers can be provided with EtherNet/IP communication modules and, in some instances, an EtherNet/IP POINT I/O™ system.
- Feeder circuits can be provided with an EtherNet/IP POINT I/O system.

Each EtherNet/IP component in an MCC unit is connected to the network through a port in the control and network wireway. Adding or removing units from the network does not interrupt the other units operating in the system. Network wireways are isolated from the power wire.

Cabling

Ethernet cables are routed through the low voltage wireway, located on the top of each MV MCC section, to prevent accidental mechanical damage during MV MCC installation.

Ethernet cables are routed into the low voltage control panel of each MV MCC unit. The EtherNet/IP devices within each low voltage compartment are factory connected to a managed Ethernet switch in the LV compartment using 600V UL PLTC rated cable.

IntelliCENTER Software Features

The CENTERLINE 1500 MCC is available with preconfigured IntelliCENTER software. IntelliCENTER software is an intuitive software package that is customized to your MCC. The software is a monitoring and diagnostics tool capable of viewing, managing, and configuring multiple MCC line-ups. The IntelliCENTER software communication driver lets the software be installed and operated on an EtherNet/IP network. The IntelliCENTER software can function as a standalone software package or as an ActiveX control in an HMI.

The IntelliCENTER software features:

- Integration Assistant - takes customized MCC information within the IntelliCENTER software and exports it to Studio 5000® programming software, providing quick device integration and reducing programming time.
- IntelliCENTER Energy - energy monitoring and management with integration to FactoryTalk® EnergyMetrix™ software.
- Elevation View - an easy-to-identify, graphical representation of your entire MCC lineup.
- Monitor View - an overview of the intelligent motor control device being monitored, with configurable gauges, trend graphs, I/O status on the device and configurable data fields.
- Spreadsheet View - for sorting and editing data that seldom changes, including network address, device type and description, and nameplate data.
- Event Log View - a history of changes to equipment parameters, like trip settings, warnings, and faults.
- Documentation Management - access to the complete documentation for your MCC, including wiring diagrams, device manuals, and spare parts list.

IntelliCENTER Database

The IntelliCENTER software replicates the MCC lineup on a computer screen, complete with nameplates and indicators on each door to show status (on, off, warning, fault, communication failure). Graphical views of individual MCC units display device data so you can quickly view critical amperes, time-to-trip, trip cause, ground fault amperes, and on/off status. Each screen is pre-configured to show the parameters typically of greatest interest, and you can easily customize parameters. Many screens feature trending graphs and analog dials.

The IntelliCENTER software provides spare parts information, AutoCAD documentation, and event logging. The software also contains ActiveX controls. These controls provide key views of the software that can be displayed inside Human Machine Interfaces (HMIs) such as RSView® software.

For EtherNet/IP networks, the configuration file can help in determining the installed firmware revision to properly configure the Studio 5000 environment Add-on Profile (AOP) that generates all tags for each EtherNet/IP device in the MCC.

Two datasets are available for IntelliCENTER software. Both must be ordered separately from the MCC unit.

Standard Dataset–The standard dataset is the second component of the IntelliCENTER software. The information arrives as a digital download, and contains data files specific to a particular MCC. This information includes unit nameplates, unit details, wiring diagrams, user manuals, spare parts, and other details.

Energy Dataset–The energy dataset includes all components of the standard dataset. Additionally, it includes the ability to use the features of IntelliCENTER Energy (version 4.0 and later) and the additional installation software needed.

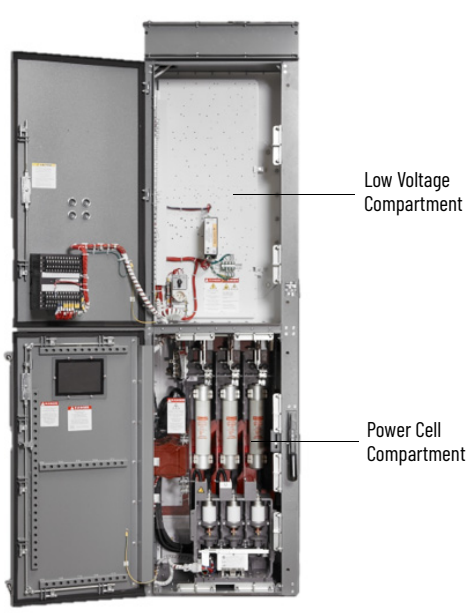
Notes:

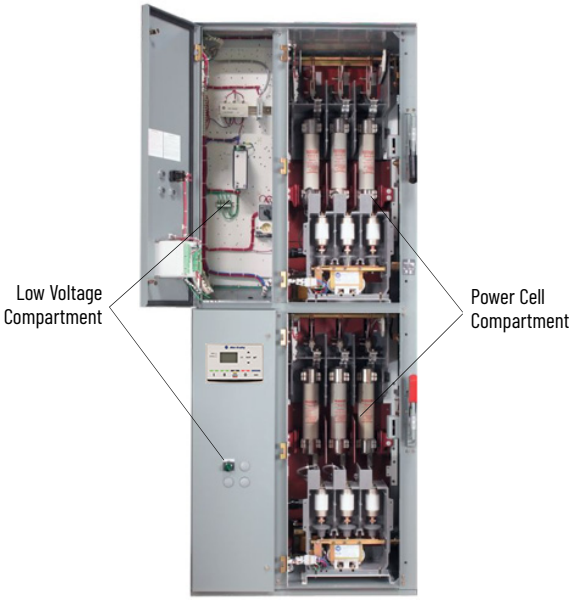
The medium voltage controllers feature two basic styles:

- 1-High: One medium voltage controller in one vertical section
- 2-High: Two medium voltage controllers in one vertical section

These controllers can be a single structure or line up of structures with expansion to the left or right.

Medium Voltage Controller Configurations





Enclosure Types

- Arc-resistant Type 2B, 40 kA or 50 kA (NEMA Type 12, IP52)
- NEMA Type 1 – General-purpose (IP10)
- NEMA Type 1 w/g – General-purpose with gasket (IP21)
- NEMA Type 12 – Dust-tight and drip proof (IP52)
- NEMA Type 3R – Non walk-in weatherproof (IP34)

Motor Control Centers with ArcShield Enclosure Options

Allen-Bradley CENTERLINE 1500 MVMCCs with ArcShield arc-resistant enclosures provide rugged process control for applications that require a higher level of personnel protection. Products with ArcShield enclosures are tested and compliant to the IEEE C37.20.7 standard, and provide Type 2B protection during a 40 kA or 50 kA arc flash.

The ArcShield controller helps safely redirect the arc flash energy out the top of the unit and away from personnel. This level of protection is also maintained, even when the low voltage door is open for maintenance purposes.

All ArcShield products have a robust enclosure design, which contains the arc flash energy and exhaust materials until vents on top of the enclosure open. Once opened, the vents provide a path for materials to exit the enclosure. An overhead plenum is used to direct the materials to a safe location away from personnel.

An optional chimney design redirects arc flash materials safely into clear space above the enclosure. The low voltage panel is reinforced and sealed, to help prevent arc flash exhaust materials from entering this compartment.

As standard, a plenum exhaust section is provided with each new ArcShield order. The plenum exhaust section can be mounted on either the left or right end of the line-up, and it extends past the end of the line-up. Engineered plenum designs are also available.

ArcShield enclosures provide these engineered safety features:

- Reinforced cabinet and power cell door closure mechanism
- Multi-point latching mechanism, reinforced cross bracing and gasket sealing
- Reinforced back plates–added support plates that are secured with multiple bolts provide increased rigidity and security
- Reinforced low voltage panel to withstand arc flash energy and shield maintenance personnel while working in the isolated low voltage compartment
- Arc 'Pressure Relief' vent to vent arc gases and material safely away from personnel during an arc flash
- Available with removable arc exhaust plenum or exhaust chimneys

These medium voltage controller bulletin numbers are available with ArcShield enclosures.

ArcShield Enclosure Specifications

Bulletin Number	Controller Size	Dimensions, mm (in.) approx.			Weight, kg (lb) approx.	Page
		Width	Depth	Height		
1506	200/400[1]	915 (36)	915 (36)	3264 (128.5)	1050 (2310)	40
1512A	200/400/450[1]	661 (26)			600 (1320)	31
	200/400/450[2]	1118 (44)			1107 (2435)	
	600[1]	915 (36)			773 (1700)	
	600[2]	1372 (54)			1250 (2750)	
	800[1]	1575 (62)			1400 (3080)	
	800[2]	2032 (80)			1882 (4135)	
1512AT	200/400/450[1]	661 (26)			600 (1320)	32
	600[1]	915 (36)			773 (1700)	
1512B	200/400[1]	915 (36)			1050 (2310)	34
	200/400[2]	1372 (54)			1530 (3365)	
1512BT	200/400[1]	915 (36)			1050 (2310)	35
1562F	200/400	915 (36)			886 (1950)	43
	200/400[2]	1372 (54)			1364 (3000)	
1591A/B	18[3]	457 (18)		2315 (91)[4]	432 (950)	53
	18[5]			3264 (128.5)	464 (1020)	
	36[1][6]	915 (36)			663 (1459)	
	36[5]					

(1) Arc-resistant with plenum.
(2) Arc-resistant with plenum plus PFCC option.
(3) Arc-resistant without plenum.
(4) Added height above standard 91 in. (2315 mm) for the plenum.
(5) Arc-resistant with plenum c/w low voltage panel.
(6) 1591B.

Paint

All metal back plates in the power cell and low voltage compartments are painted high gloss white for high visibility. For all other exterior and interior metal parts, choose ANSI 49 medium light gray (standard) or ANSI 61 (optional) or specify a custom paint color.

Description	Hybrid epoxy powder paint
Standard color	ANSI 49 medium light gray (optional ANSI 61 light gray)
Procedure	Continuous paint line. All parts are painted before assembly.
Preparation	Alkaline wash/rinse/iron phosphate rinse/iron-chrome sealer rinse/recirculated de-ionizedwater rinse and virgin de-ionized water rinse.
Painting	Air-atomized electrostatic spray Total paint thickness - 0.051 in.(0.002 mm) min
Baking	Natural gas oven at 179 °C (355 °F) min

IMPORTANT When optional custom paint colors are specified (including ANSI 61), all external surfaces are painted to the custom color requirement, except for the external isolating switch handle assembly, lifting angles, and lifting brackets.

All unpainted steel parts are plated for corrosion resistance.

Nameplates

Choose a 3- or 6-line nameplate with black letters on a white background, or white letters on black background.

Low Voltage Wireway

An optional low voltage wireway is located across the roof of the structure.

There are two sizes of low voltage wireway available:

- 51 x 102 mm (2 x 4 in.)
- 152 x 152 mm (6 x 6 in.)

The low voltage wireway provides a convenient method of interconnecting control wire from one controller to another when interfacing with a master panel or with programmable controller circuits.

Notes:

The power bus provides a number of useful functions, such as incoming line cables can be terminated directly to the power bus. Additionally, the power bus of several cabinets can be joined together to form an electrically continuous lineup. There are bolted 12 gauge back plates that allow access from the rear. There are removable side plates on each side of the cabinet for side access.

Horizontal Bus

The main horizontal power bus is located at the center rear of the structure to provide optimum heat distribution, ease of maintenance, and splicing. The power bus is mounted on the edge to a molded bus support insulator in a common vertical plane. This mounting method provides superior short-circuit withstand capability and protection against the accumulation of dust and tracking between phases. Access must be provided to the bus compartment from the front or the rear of the structure to allow for installation and regular maintenance of the power and ground bus splice connections. Choose one of the following continuous current ratings: 1200, 2000, or 3000 amps.

The power bus is tin-plated copper (standard) but silver-plated option is available. In addition, for the main horizontal bus, you choose the option of an insulated bus.

The material is a sleeve-type, heat shrink insulating material with good flame resistance and self-extinguishing properties. This material has a minimum wall thickness of 1.4 mm (0.055 in.), and provides a minimum dielectric strength of 49.5 kV (900V/mil).

Vertical Bus

Vertical power bus risers are provided from the main horizontal power bus to the unit isolating switch line terminals. Risers are made of tin-plated copper and rated according to the unit size.

Bus and Cable Bracing

The horizontal/vertical bus work and the cabling/bus in the main power cell are braced and tested in accordance with NEMA ICS 3-2 and UL 347 to withstand the let-through energy allowed by the largest fuse during a short-circuit fault.

Ground Bus

The standard ground bus is 9.5 x 51 mm (3/8 x 2 in.) bare copper with an option for tin plating.

A mechanical lug for 8-1/0 AWG or 6-250 MCM cable is supplied at the incoming end of the lineup.

Notes:

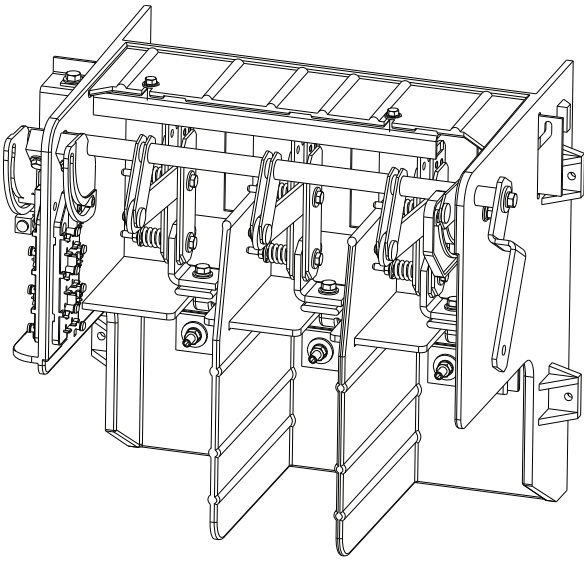
The power cell is the heart of the controller. It consists of five basic component groups:

- Non-load break isolation switch
- Current limiting power fuses
- Control power transformer
- Vacuum contactor
- Current transformers

Non-load Break Isolation Switch

The isolation switch is a non-load break type switch, and is available in clip-on or bolt-on fuse versions. The isolation switch works in conjunction with the contactor and the isolation switch handle to isolate the power cell when the isolation switch handle is moved to the OFF position.

The power cell door is interlocked with the handle mechanism to help prevent the door from being opened when the cell is energized. The state of the isolation switch can be quickly determined through a polycarbonate viewing window.



Standard Features

- Three pole, gang operated
- 400, 600, or 800 A full load current
- Auxiliary contacts
  - 2 N.O./2 N.C. are standard
  - Provisions for 3 N.O. /3 N.C.
- Contact type: Catalog No. 700-CPM
- Contact Rating: NEMA 2 x A600 and 2 x P600
- Clip-on or bolt-on fuses supported
- Line and load fuse clips or bolt-on locations
- Electrically and mechanically interlocked when used with the Allen-Bradley handle module and contactor
- Shutter mechanism fully isolates the power cell from medium voltage power bus
- Switch blades are grounded in the off position

Mechanical Interlocking

- A simple, heavy duty, direct drive mechanism improves reliability and helps provide excellent operator safety
- All mechanical interlock mechanisms remain part of the enclosure to minimize setup adjustment

Catalog Numbers

Non-load-break Isolation Switch Product Selection

Switch Size[1]	Non-Load-Break Isolation Switch Options	Cat. No.
400 A	Clip-on fuse clips	1503S-4C
	Bolt-on fuse clips	1503S-4B
600 A	Clip-on fuse clips	1503S-6C
	Bolt-on fuse clips	1503S-6B
800 A	Bolt-on fuse clips	1503S-8B

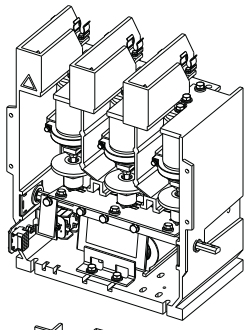
(1) Enclosed rating at 40 °C (104 °F).

Vacuum Contactors

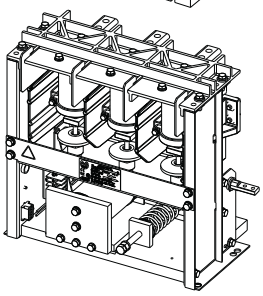
Compact and high-performance vacuum contactors are implemented within the power cell compartment of CENTERLINE 1500 MVMCCs. These vacuum contactors are designed to enable repeatable activation and deactivation of the connected load. Their compact and low maintenance design also reduces the need to remove the contactor to replace power or control circuit transformer fuses, or do testing.

These contactors are designed as fixed mounted devices for heavy-duty industrial performance. This design helps reduce the maintenance and reliability concerns that are associated with drawout-style contactors. Also, there are no drawout stab and finger assemblies, which require routine maintenance. The contactors are designed to operate with Rockwell Automation's IntelliVAC family of control modules or optional pilot relay-type control.

450 A



800 A



Advantages

- Lightweight, compact design
- Minimal maintenance required
- High interrupting capability
- Low chop current
- Visual contact wear indicator (no measurement tools required)
- Mechanical interlocking to the non-load break isolation switch
- Excellent dielectric recovery for high switching frequency
- Single coil/core magnet assembly (800 A only)
- Control power transformer primary-fuse holders (400 A only)
- All major components are easily accessed from the front
- Mechanical latch design version (optional)
- Easily integrated into control circuit with quick connector and wire harness (optional)
- Optimized to complement the advanced features of the IntelliVAC control module

Applications

- Medium voltage (1000...7200V) vacuum switching for motor starter loads (asynchronous, synchronous)
  - Full-voltage
  - Reduced voltage
  - Variable-frequency drives
- Transformer feeder unit loads
- Capacitor loads

Bulletin 1502 Vacuum Contactors

Contactor Current Rating	Control Circuit	Vacuum Contactor Type	Cat. No.	Wire Harness Cat.No. (1)
450 A(2)(3)	Electromechanical	Fixed-mounted, Electrically-held(4)(5)	1502-V4DBDA-__	1503-WHE4D
		Fixed-mounted, Electrically-held (fast drop-out)(4)(5)(6)	1502-V4DBDD-__	
		Fixed-mounted, Mechanical Latch(4)	1502-VC4DBDB-__	1503-WHM4D
	IntelliVAC module	Fixed-mounted, Electrically-held(6)(7)(8)	1502-VC4DBDA-0	1503-WHE4V
		Fixed-mounted, Mechanical Latch	1502-VC4DBDB-0	1503-WHM4V
800 A	Electromechanical	Fixed-mounted, Electrically-held(4)(5)(6)	1502-V8DXDA-__	1503-WHE8D
		Fixed-mounted, Electrically-held (fast drop-out)(4)(5)(6)	1502-V8DXDD-__	
		Fixed-mounted, Mechanical Latch(4)	1502-V8DXDB-__	1503-WHM8D
	IntelliVAC module	Fixed-mounted, Electrically-held(8)	1502-VC8DXDA-__	1503-WHE8V
		Fixed-mounted, Mechanical Latch	1502-VC8DXDB-__	1503-WHM8V

(1) If a 1503F OEM power cell and frame, a 1503C, or 1503E control panel are ordered, a wire harness is provided.
(2) The contactors listed include integrated fuse clips for 5.0 kV max. control power transformer primary fuses. Change the fifth position of the catalog number from 'B' to 'C' for contactors with 7.2 kV max. fuse clips, e.g. 1502-V4DCDA-1. No extra charge applies.
(3) 450A rating is applicable for class E1 controllers only. For class E2 controllers, 400A rating should be considered for the maximum rating based on power fuse coordination.
(4) Complete the contactor catalog numbers by selecting the altitude rating from Appendix B, e.g. 1502-V4DBDA-2. This altitude code is valid for electrically held and mechanical latch contactors. If a mechanical latch contactor is used with electromechanical control, select altitude code 1...5. These contactors must only be used with electromechanical (relay) control.
(5) The electrically held contactors are also available with 210V DC coils (210V DC coils are not available for mechanical latch contactors and they are not required when using IntelliVAC control). Change the sixth position of the contactor catalog number from 'D' to E' (e.g. 1502-V4DCEA-1). Change the last position of the wire harness catalog number from 'D' to 'E'. No extra charge.
(6) For use as bypass contactors with Bulletin 1503E MV SMC™-50 controllers.
(7) When IntelliVAC control is used, select altitude code zero (0) which allows the same contactor to be used from -1000...5000 m.
(8) 1502-VC electrically-held contactors are provided as fast drop out type, and drop out delays are controlled by the IntelliVAC control module.

Power Fuses

Three R-rated current-limiting power fuses are applied with the vacuum contactors so no transient overload current reaches the motor.

E-rated power fuses are implemented for some sizes of transformer controllers. Both bolt-on and clip-on styles are available.

Clip-on

Bolt-on

Recommended Clip-on Power Fuses

Fuse Rating(1)	Maximum Full Load Current (A)	Maximum Locked Rotor Current (A)	Clip-on Fuses			
			5 kV Allen-Bradley Part Number	5 kV Mersen Part Number	7.2 kV Allen-Bradley Part Number	7.2 kV Mersen Part Number
2R, 70 A	32	160	25173-555-01(2)	A480R-2R(2)	80025-650-01(2)	A072F1D0R0-2R(2)
3R, 100 A	45	235	25173-555-02(2)	A480R-3R(2)	80025-650-02(2)	A072F1D0R0-3R(2)
4R, 130 A	65	325	25173-555-03(2)	A480R-4R(2)	80025-650-03(2)	A072F1D0R0-4R(2)
5R, 150 A	80	405	25173-555-09(2)	A480R-5R(2)	80025-650-04(2)	A072F1D0R0-5R(2)
6R, 170 A	95	490	25173-555-04(2)	A480R-6R(2)	80025-650-05(2)	A072F1D0R0-6R(2)
9R, 200 A	140	725	25173-555-05(2)	A480R-9R(2)	80025-650-06(2)	A072F1D0R0-9R(2)
12R, 230 A	190	950	25173-555-06(2)	A480R-12R(2)	80025-650-07(2)	A072F1D0R0-12R(2)

(1) Continuous ampere rating at 40 °C (104 °F) as recommended by fuse manufacturer. The fuse rating must be derated if the internal temperature exceeds 40 °C (104 °F). Rockwell Automation recommends that the continuous load current does not exceed 80% of the fuse rating.
(2) Single-barrel fuse.

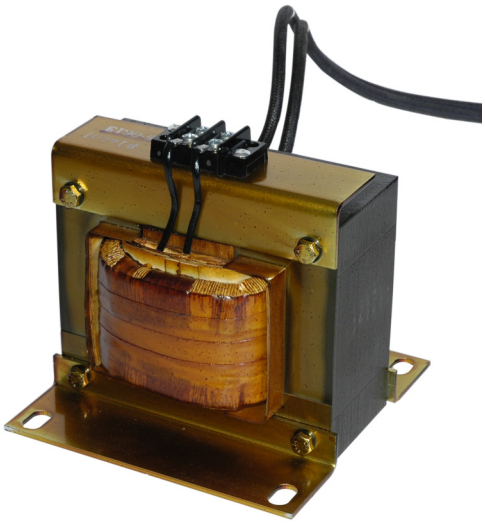
Recommended Bolt-on Power Fuses

Fuse Rating(1)	Maximum Full Load Current (A)	Maximum Locked Rotor Current (A)	Bolt-on Fuses			
			5 kV Allen-Bradley Part Number	5 kV Mersen Part Number	7.2 kV Allen-Bradley Part Number	7.2 kV Mersen Part Number
18R, 390 A	280	1450	80025-296-07(4)	A051B1DAR0-18R(4)	80025-651-01(4)	A072B2DAR0-18R(4)
19R, 315 A(2)	275	1470(3)	80025-296-10(5)	A051B1DAR0-19R(5)	80026-437-01(5)	A072B1D0R0-19R(5)
24R, 450 A	360	1980	80025-296-08(4)	A051B1DAR0-24R(4)	80025-651-02(4)	A072B2DAR0-24R(4)
32R, 600 A	440	2450	80025-296-13(4)	A051B2DAR0-32R(4)	80026-437-02(4)	A072B2D0R0-32R(4)
38R, 700 A	525	2820	80025-296-09(4)	A051B2DAR0-38R(4)	80026-437-03(4)	A072B2D0R0-38R(4)
48X, 750 A	600	3545	80025-296-12(4)	A051B3DAR0-48X(4)	80026-437-04(4)	A072B3DBR0-48X(4)
57X, 900 A	745	4230	80025-296-11(6)	A051B3DAR0-57X(6)	80026-437-05(6)	A072B3DBR0-57X(6)

(1) Continuous ampere inch rating at an internal temperature of 40 °C (104 °F) as recommended by fuse manufacturer. The fuse rating must be derated if the internal temperature exceeds an internal temperature of 40 °C (104 °F). Rockwell Automation recommends that the continuous load current does not exceed 80% of the fuse rating.
(2) 7.2 kV: 300 A.
(3) 7.2 kV: 1455 A
(4) Double-barrel fuse.
(5) Single-barrel fuse.
(6) Triple-barrel fuse.

Control Power Transformers

The standard CPT transforms the primary side medium voltage to a single-phase 120V or 240 V secondary side voltage to run the control circuitry efficiently in the isolated low voltage compartment. The CPT features a standard accuracy of ±4%, with the option of ±1% accuracy per customer request.



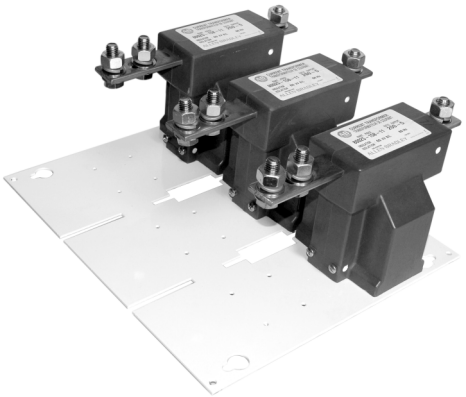
As standard, the dry-type CPT must be 500 VA in size, with approximately 350 VA extra capacity. Appropriately sized primary and secondary fuses are supplied. Optional sizes of 1000 VA, 2000 VA and 3000 VA control power transformers must also be available. The secondary circuit of the transformer is disconnected from the control circuit by means of the isolating switch auxiliary contacts to prevent backfeeding through the transformer and to isolate the power cell when the control circuit is in the test mode.

IMPORTANT The control power transformers may be used for metering, but only if the accuracy of the application does not require conformance to any potential transformer accuracy ratings.

The maximum quantity/size of the CPT available in a two-high FVNR controller rated 7200 volts is two 500 VA (with bolt-on power fuses), or one 1000 VA and one 500 VA (with clip-on power fuses).

Current Transformers

CENTERLINE 1500 MVMCCs use two styles of current transformers; donut type and bar type. Three of either types are used for overload protection and metering. Optional ground fault (zero sequence style) current transformers are also available.

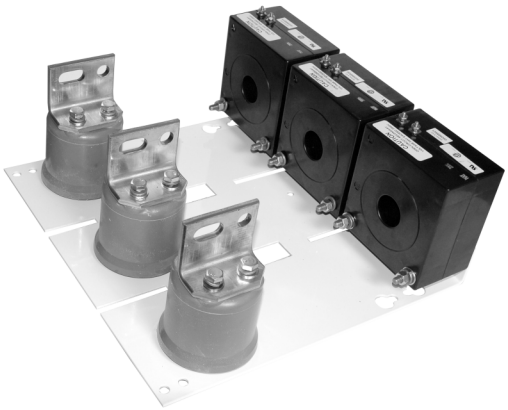


The medium voltage power cell includes three current transformers of sufficient VA capacity to meet the requirements of all the devices connected to them.

Each current transformer has the primary rating sized appropriately in relation to the full-load current rating of the load. The secondary of the current transformers has a 5 A output and an accuracy suitable for the type and quantity of protection or metering devices connected to it. All current transformer control wiring are terminated on the current transformer with locking-type, fork tongue lugs.

Ground Fault Current Transformer

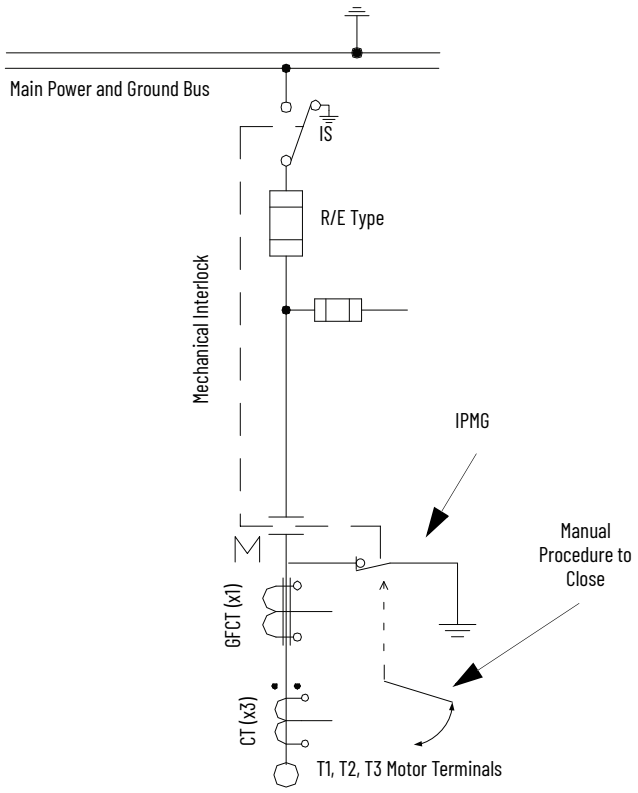
The power cell has provisions to locate a toroid (donut) style, ground fault sensing current transformer, when the optional zero sequence ground fault protection feature is required.



Load Cable Terminations

When either bar- or donut-type current transformers are supplied, appropriate load termination points is provided to accommodate lugs with single or two-hole mounting to connect the load cables.

Integrated Protective Maintenance Grounding Device



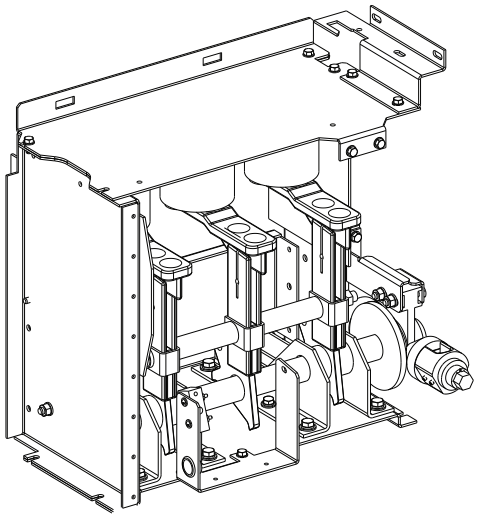
The Integrated Protective Maintenance Grounding device (IPMG) is an optional feature that provides an over-center, spring loaded, snap action device that provides a low impedance grounding path for all load connections on CENTERLINE™ Bulletin 1500/1900 medium voltage motor controllers. The IPMG device can make and withstand short-circuit currents within its capabilities, from both feeding directions within the motor controller, without any latching mechanism. It is applied to safely ground/earth the load connections to three-phase motors, power transformers, and power capacitors ensuring that no harmful voltages are left or become present on the load connections before maintenance personnel enter the motor controller or service the equipment at the end of the load cable connections.

The compact design of the IPMG device does not compromise its rugged construction and proven performance under industrial operating conditions. Requiring minimal maintenance, this manually operated device is controlled from the outside of the standard and arc-resistant (ArcShield™) medium voltage controllers. It is mechanically interlocked to both the main vacuum contactor and our non-load break isolation switch. These features, along with its high electrical and mechanical endurance capabilities, help to provide a long-life and dependable maintenance-free operation.

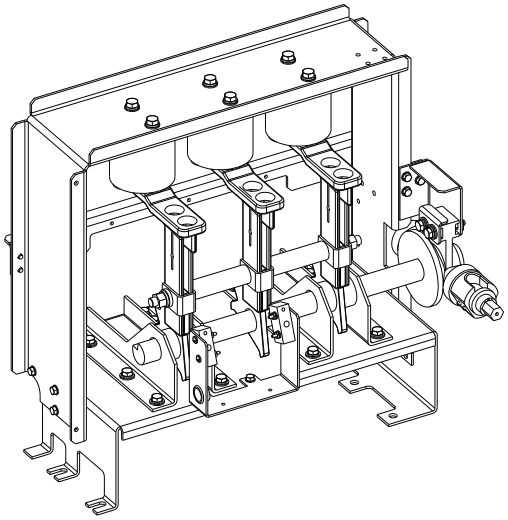
To help fulfill your safety program requirements, a visual indication of the blade positions of the IPMG device (OPEN or CLOSED) is available through the standard viewing window on the medium voltage compartment door. The IPMG device is mounted on the controller floor plate or on the top of the main medium voltage vacuum contactor (for 600/800 A controllers). It is connected to the three load phases within the main controller using copper bus bars. Redundant, flexible grounding conductors ensures the lowest impedance path to ground is maintained when the IPMG device is closed. Flexible grounding conductors provide low impedance back to the main ground bus to complete the grounding (earthing) process.

Integrated Protective Mounting Grounding Device

400 A IPMG



800 A IPMG



Notes:

The isolated low voltage compartment allows testing and troubleshooting of the power cell with no exposure to medium voltage. The standard components housed in the low voltage panel are:

- Normal-Off-Test selector switch
- Male test power receptacle
- Rectifier bridge
- CR1 and CR2 control relays
- Motor protection relay(s)

Bulletin 193/592 E300 Electronic Overload Relay

The Allen-Bradley E300 Electronic Overload Relay is the next generation electronic overload relay. Its modular design, communication options, diagnostic information, simplified wiring, and integration into Logix 5000® controllers make it the ideal overload for motor control applications in an automation system.

The E300 Overload Relay provides flexibility, helps reduce engineering time, and maximizes uptime for important motor starter applications.

Modular Design

For exacting application needs

- Wide current range
- Multiple sensing capabilities
- Expansion I/O
- Operator interface

Intelligent Motor Control

Easy automation system integration

- Network connectivity
- Native I/O
- DeviceLogix technology enabled
- Integrated into Logix
- Preprogrammed operating modes

Diagnostic Information

Monitor motor performance, which includes:

- Voltage, current, and energy
- Trip/warning histories
- Percentage of thermal capacity use
- Time to reset
- Operational hours
- Number of starts

Bulletin 1503VC IntelliVAC Contactor Control Modules

The Bulletin 1503VC IntelliVAC controllers offer an excellent, efficient, and flexible means to control Bulletin 1502 vacuum contactors. The IntelliVAC control module family offers a scalable solution for multiple medium voltage control applications. A wire harness for 1502 vacuum contactors is generally required.

IntelliVAC Control Module

The IntelliVAC module provides basic control capabilities for 400 A, 450 A, and 800 A contactors (electrically held and mechanical latch) using a single device. It offers enhanced reliability through better diagnostics and coordination between the power fuses and the vacuum contactor drop-out time. Productivity is improved using the power loss ride through (TDUV) and contactor re-closing control features.

- Universal input voltage (110...240V AC, 50/60 Hz or 110...250V DC)
- Consistent vacuum contactor pick-up time
- Selectable and repeatable vacuum contactor drop-out times (50, 75, 100, 130, 150, 175, 200, or 240 ms)
- Altitude compensation (-1000...+5000 m) eliminates mechanical hardware changes at high altitude (450 A vacuum contactors)
- Power loss ride-through logic (TDUV) with selectable drop out time (0.2, 0.5, 1.0, or 2.0 s) requires only an external capacitor
- Re-closing control features (anti-kiss and anti-pumping protection)
- Status indication (LEDs and relay outputs) allows integration in control system and aids troubleshooting
- Temporary motor jog function (separate input) to allow process set-up
- Delayed motor re-start prevents rapid cycling of vacuum contactor, protecting the connector motor

IntelliVAC Control Module Specifications

IntelliVAC Catalog Numbers(1)		**Vacuum Contactor Type**	
1503VC-BMC5	IntelliVAC Module	Electrically Held or Mechanical Latch	
Ratings and Approvals			
Input Voltage		AC	110...240V, 47...63 Hz(2)
		DC	110...250V
Input Current(3)	AC(2)	Inrush (max.)	25 A (1/2 cycle)
		Idle (max.)	125 mA
		Close (max.)	11.3 A
		Hold (max.)	300 mA
		Latch Trip (max.)	7.0 A
	DC	Inrush (max.)	25 A
		Idle (max.)	35 mA
		Close (max.)	4.8 A
		Hold (max.)	100 mA
		Latch Trip (max.)	3.7 A
Command Inputs		AC	70...240V rms
		DC	70...250V
Status Output Contacts		AC	250V rms, 5 A, R load; 2 A (reactive), PF = 0.4
		DC	30V, 5 A, R load; 2 A (reactive), L/R = 7 ms
Standards and Approval		cULus, CE	

(1) A wire harness is required for Bulletin 1502 vacuum contactors when an IntelliVAC control module is used.
(2) All AC values are rms, except where noted.
(3) The maximum currents shown are for either the 450A or 800A Bulletin 1502 vacuum contactors. Close current duration is 200 milliseconds.

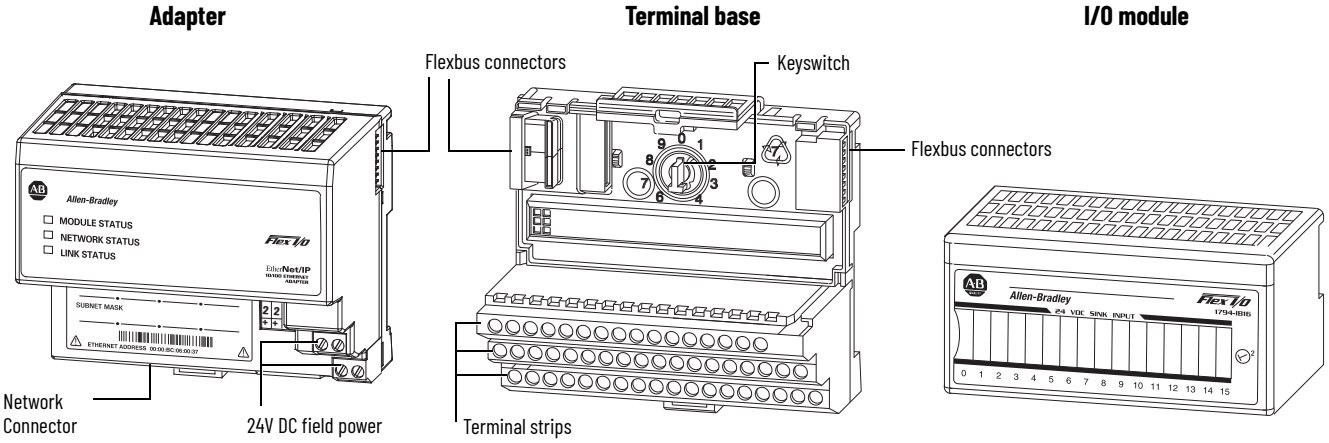
Bulletin 1794 FLEX I/O

Bulletin 1794 FLEX™ I/O modules offer flexibility for your application with digital, analog, HART analog, and specialty I/O, with 4…32 points per module. It complements all Rockwell Automation controller platforms and can communicate on EtherNet/IP for a distributed I/O solution.

FLEX I/O offers all the functions of larger rack-based I/O without the space requirements. Its cost effectiveness, flexibility, modularity, and reliability have made it one of the most popular distributed I/O platforms.

FLEX I/O helps eliminate multiple long wiring runs, reduces terminations, decreases engineering and installation costs and time, and substantially reduces down time.

The FLEX I/O system can communicate on EtherNet/IP, ControlNet®, DeviceNet®, and many other open networks including, but not limited to, Remote I/O, PROFIBUS DP™, and Interbus-S. You can independently select the I/O, termination style, and network to meet your application needs.



Bulletin 1426 PowerMonitor 5000

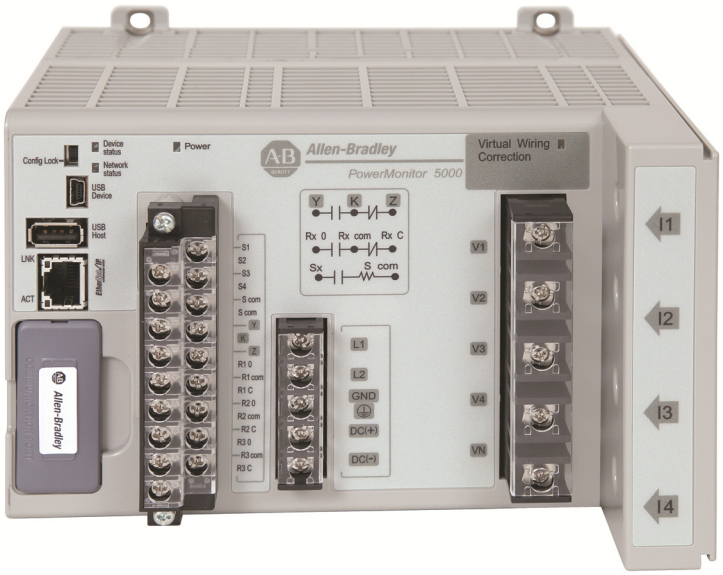
The PowerMonitor family of meters provides advanced technology, fast response, and excellent accuracy.

The M5 model is the base version and provides an extensive range of metering functionality.

The M6 model expands the metering capabilities of the M5 with basic power quality monitoring functionality, including harmonics up to the 63rd, waveforms and logging, and classification of power quality events.

The M8 model adds advanced power quality monitoring functions, including flicker that is caused by voltage fluctuations, sub-cycle transient capture, harmonics up to the 127th order, and inter-harmonic groups up to the 50th order.

The PowerMonitor 5000 unit communicates power and energy parameters to controllers, HMI software, and other applications over the EtherNet/IP network.



Notes:

CENTERLINE® 1500 Medium Voltage Motor Control Centers (MCCs) are available in control formats that include arc resistant enclosures. Controller options include full-voltage, reversing, reduced-voltage, solid-state reduced-voltage, multi-speed, and synchronous control. These controllers include load break switches that provide integrated intelligence and the lowest-cost solution for starting motor applications.

Bulletin 1512A One-high Full-voltage Non-reversing Motor Starter

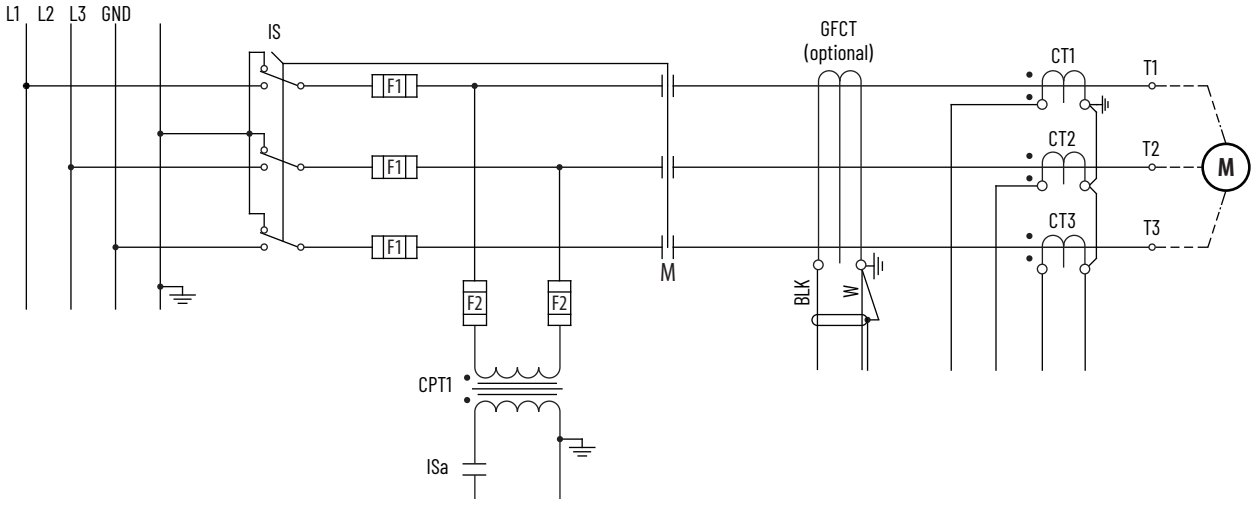
- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three R-rated current-limiting power fuses
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features
- Additional low voltage control panel accessories which include:
  - 'NORMAL-OFF-TEST' circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- Two-high structure design for two complete motor controllers
- Available in optional ArcShield enclosure
- Also available as 'Prepared Space' (Bulletin 1512BP) and Starter Kits (Bulletin 1512BS)

Bulletin 1512A Starter Specifications

Starter Size (A)	Hp, max						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	800	1000	1250	1500	2250	2500	661 (26)	915 (36)	2311 (91)[1]	490 (1075)[2]
400	1500	2250	2750	3000	4500	5000				
600	2750	3500	4500	5500	8000		915 (36)			611 (1350)[2]
800	3000	5000	6000	7000	9000		1422 (56)[3]			816 (1800)

(1) Height is 3264 mm (128.5 in.) with ArcShield enclosure with plenum.
(2) Weight is different with ArcShield enclosure.
(3) Width is 1576 mm (62 in.) with ArcShield enclosure.

Bulletin 1512A Power Circuit Schematic



Bulletin 1512AT Full-voltage Transformer Feeder Unit Starter

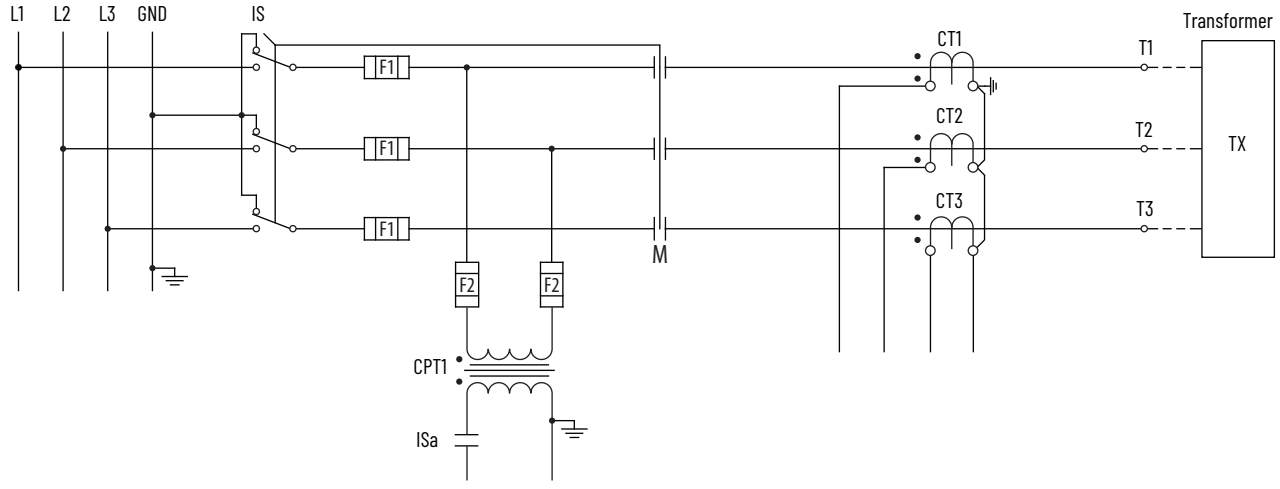
- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three E-rated current-limiting power fuses (R-rated power fuses that are used for controller sizes and voltages)
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features
- Additional low voltage control panel accessories which include:
  - 'NORMAL-OFF-TEST' circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- One-high structure design for one complete motor controller
- Available in optional ArcShield enclosure
- Also available as 'Prepared Space' (Bulletin 1512AP, only in 200 A and 400 A) or Feeder Kits (Bulletin 1512AU)

Bulletin 1512AT Starter Specifications

Starter Size (A)	Transformer Size (kVA)						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	700	1000	1250		2000		660 (26)	914 (36)	2311 (91)(1)	490 (1075)(2)
400	1250	2000	2500	2750	4500					
600	2250	3000	4000	4500	6500		914 (36)			611 (1350)(2)
800	3000	4000	5500	6000	8000		1422 (56)(3)		2311 (91)	816 (1800)

(1) Height is 3264 mm (128.5 in.) with ArcShield enclosure with plenum.
(2) Weight is different with ArcShield enclosure.
(3) Width is 1576 mm (62 in.) with ArcShield enclosure.

Bulletin 1512AT Power Circuit Schematic



Bulletin 1512AD One-high Full-voltage Non-reversing Drive Input Starter Controller

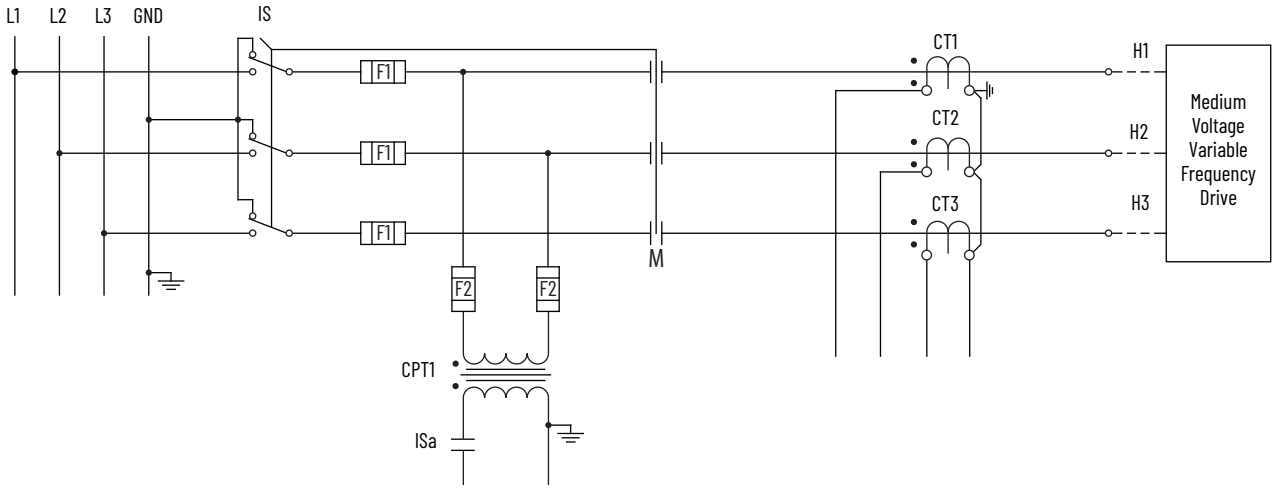
- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three current-limiting power fuses
- Three current transformers
  - Segregated low voltage panel to house circuit control fusing that includes:
  - 'NORMAL-OFF-TEST' circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- Optional hardware for unit control and monitoring
  - IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features:
  - Selectable vacuum contactor drop-out time and consistent pickup time
  - Altitude compensation
  - Anti-kiss and anti-plugging protection
  - Set of control circuit terminal blocks
- Unit output must be cabled to VFD input. Customer is responsible for inter-wiring between input contactor unit and variable-frequency drive (VFD)

Bulletin 1512AD Starter Specifications

Starter Size (A)	Transformer Size (kVA)	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.[1]
	2400...6900 V	Width	Depth	Height	
200	Sized based on variable-frequency drive and continuous current of the motor	660 (26)	914 (36)	2311 (91)[2]	488 (1075)
400					
600		914 (36)			611 (1350)
800		1423 (56)[3]			816 (1800)

(1) Weight is different with ArcShield enclosure.
(2) Height is 3264 mm (128.5 in.) with ArcShield enclosure with plenum.
(3) Width is 1576 mm (62 in.) with ArcShield enclosure.

Bulletin 1512AD Power Circuit Schematic



Bulletin 1512B Two-high Full-voltage Non-reversing Motor Starter

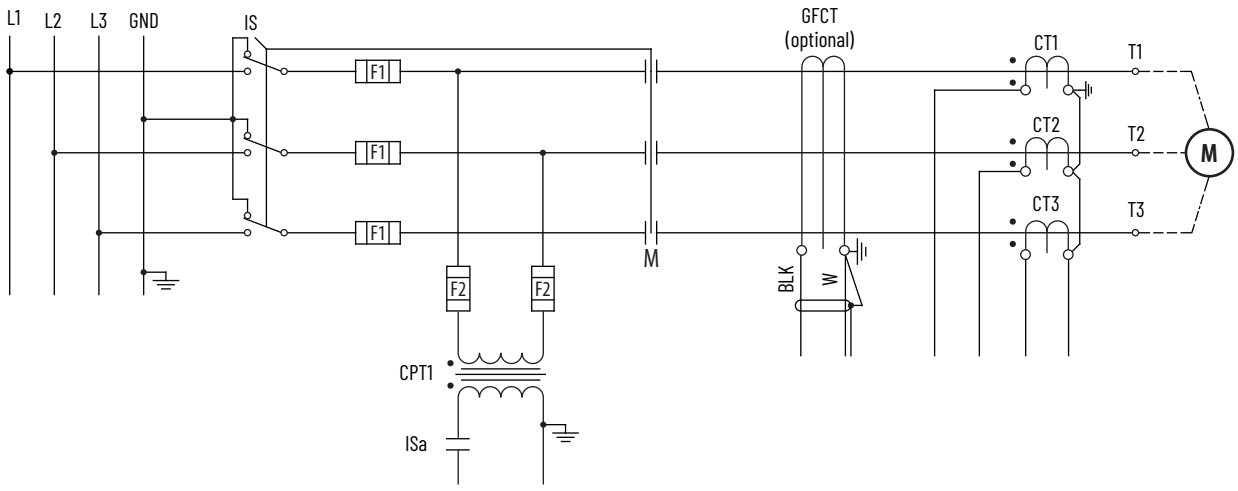
- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three R-rated current-limiting power fuses
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features
- Additional low voltage control panel accessories that include:
  - 'NORMAL-OFF-TEST' circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- Two-high structure design for two complete motor controllers
- Available in optional ArcShield enclosure
- Also available as 'Prepared Space' (Bulletin 1512BP) and Starter Kits (Bulletin 1512BS)

Bulletin 1512B Starter Specifications

Starter Size (A)	Hp, max						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	800	1000	1250	1500	2250	2500	915 (36)	915 (36)	2311 (91)(1)	802 (1770)(2)
400	1500	2250	2750	3000	4000	4000				

(1) Height is 3264 mm (128.5 in) with ArcShield enclosure with plenum.
(2) Weight is different with ArcShield enclosure.

Bulletin 1512B Power Circuit Schematic



Bulletin 1512BT Two-high Full-voltage Transformer Feeder Unit Starter

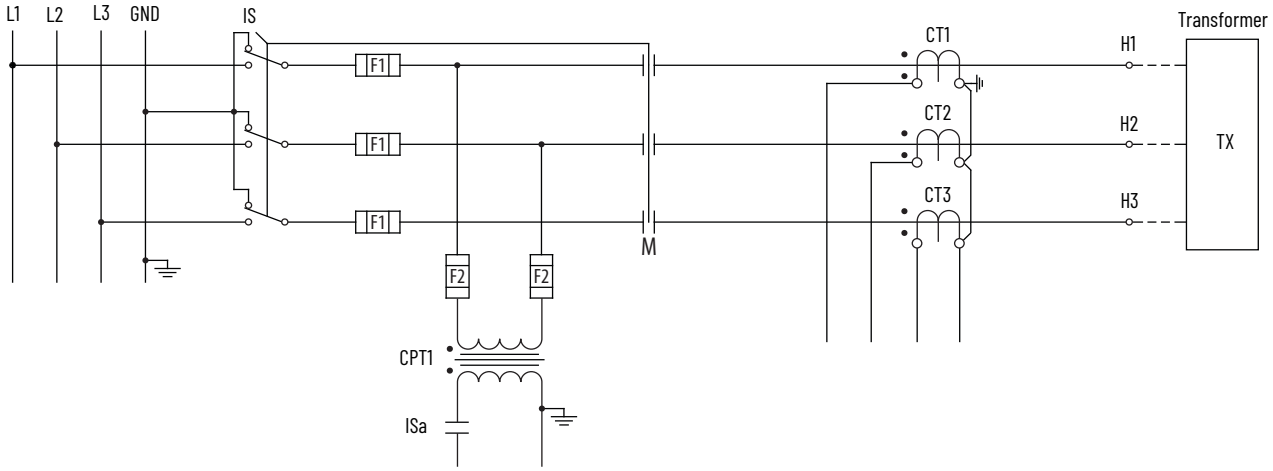
- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three E-rated or R-rated current-limiting power fuses
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features
- Additional low voltage control panel accessories that include:
  - 'NORMAL-OFF-TEST' circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- Two-high structure design for one complete motor controller
- Available in optional ArcShield enclosure
- Also available as 'Prepared Space' (Bulletin 1512BP) or Starter Kit (Bulletin 1512BU)

Bulletin 1512BT Starter Specifications

Starter Size (A)	Transformer Size (kVA)						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	700	1000	1250		2000		915 (36)	915 (36)	2311 (91)(1)	802 (1770)(2)
400	1500	2000	2500	2750	4000					

(1) Height is 3264 mm (128.5 in.) with ArcShield enclosure with plenum.
(2) Weight is different with ArcShield enclosure.

Bulletin 1512BT Power Circuit Schematic



Bulletin 1512BD Two-high Full-voltage Non-reversing Drive Input Starter Controller

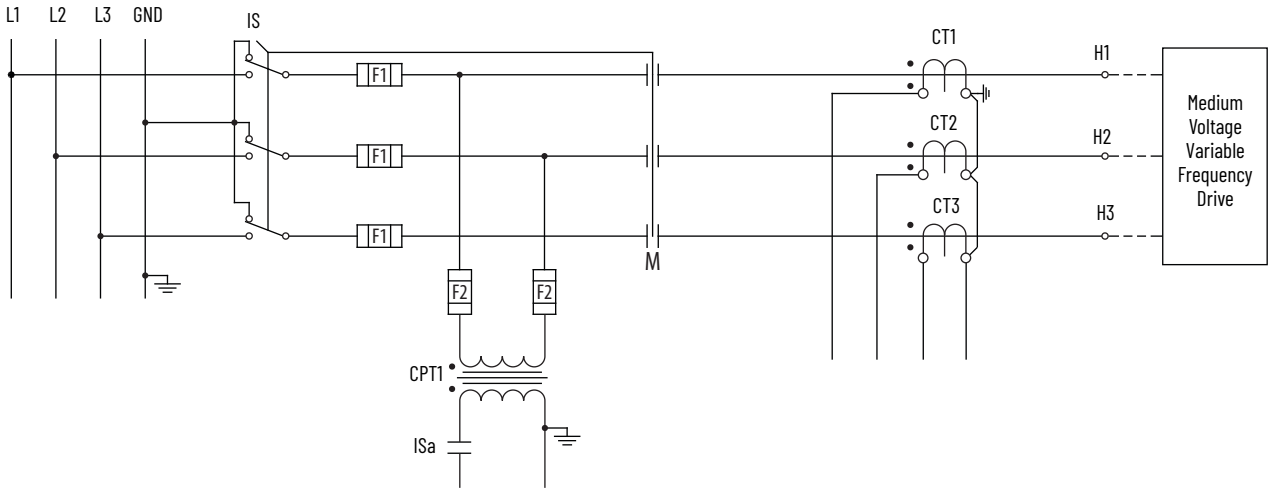
- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three R-rated current-limiting power fuses
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features:
  - Selectable vacuum contactor drop-out time and consistent pickup time
  - Altitude compensation
  - Anti-kiss and anti-plugging protection
- Unit output must be cabled to VFD input. Customer is responsible for inter-wiring between input contactor unit and VFD.

Bulletin 1512BD Starter Specifications

Starter Size (A)	Transformer Size (kVA)	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400...6900V	Width	Depth	Height	
200	Sized based on VFD and continuous current of the motor	915 (36)	915 (36)	2311 (91)(1)	802 (1770)(2)
400					

(1) Height is 3264 mm (128.5 in) with ArcShield enclosure with plenum.
(2) Weight is different with ArcShield enclosure.

Bulletin 1512BD Power Circuit Schematic



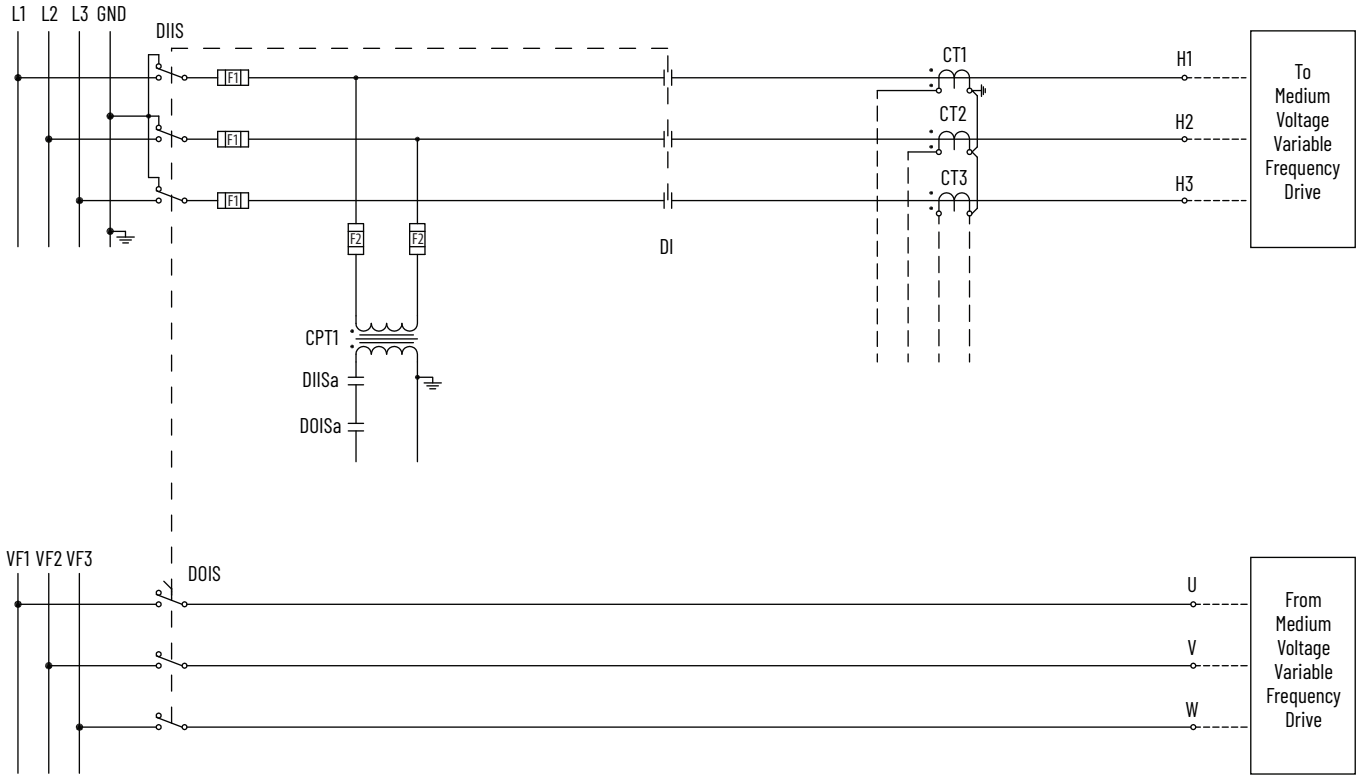
Bulletin 1512DM Variable Frequency Drive Input Contactor with Output Isolator Unit

- Fixed mounted vacuum contactor
- 400A rated unit includes two three-pole, gang-operated, non-load break isolating switches with one external operating handle. Both switches are mechanically interlocked with each other, the main contactor and the power cell doors. The 600A and 800A rated units are mechanically interlocked using key interlocks and a separate external operating handle for each isolating switch
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three current-limiting power fuses
- Three current transformers
- Segregated low voltage panel to house control circuit fusing, "NORMAL-OFF-TEST" circuit, receptacle for external test power supply, set of control circuit terminal blocks and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features:
  - Selectable vacuum contactor drop-out time and consistent pick-up time
  - Altitude compensation
  - Anti-kiss and anti-plugging protection
- Additional variable frequency output power bus (1200A rating) located in the top of the power bus compartment

Bulletin 1512DM Starter Specifications

Starter Size (A)	Transformer Size (kVA)	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400...6900V	Width	Depth	Height	
200/400	Sized based on VFD and continuous current of the motor	915 (36)	915 (36)	231 (91)	805 (1770)
600		1829 (72)	915 (36)	231 (91)	1228 (2700)
800		2845 (112)	915 (36)	231 (91)	1591 (3500)

Bulletin 1512DM Power Circuit Schematic



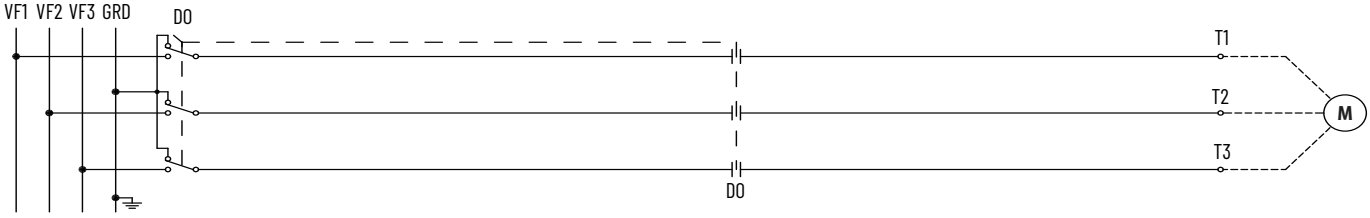
Bulletin 1512D0 Variable Frequency Drive Output Contactor Unit

- Fixed mounted vacuum contactor
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Segregated low voltage panel to house control circuit fusing, "NORMAL-OFF-TEST" circuit, receptacle for external test power supply, set of control circuit terminal blocks and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features:
  - Selectable vacuum contactor drop-out time and consistent pick-up time
  - Altitude compensation
  - Anti-kiss and anti-plugging protection
- Additional variable frequency output power bus (1200 A rating) located in the top of the power bus compartment

Bulletin 1512D0 Starter Specifications

Starter Size (A)	Hp, max	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400...6900V	Width	Depth	Height	
200	Sized based on VFD and continuous current of the motor	660 (26)	914 (36)	2311 (91)	488 (1075)
400					
600		914 (36)			611 (1350)

Bulletin 1512D0 Power Circuit Schematic



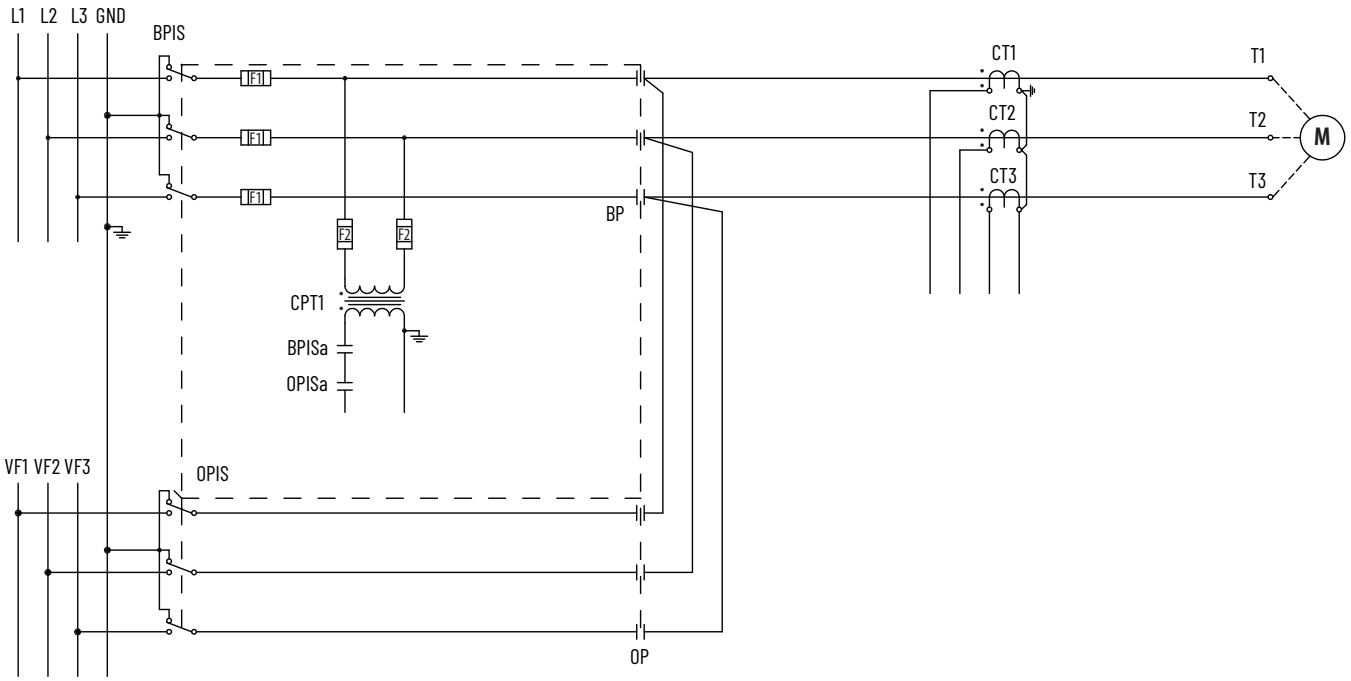
Bulletin 1512M Full Voltage Non-Reversing, Output Bypass Starter Unit with Vacuum Contactors (FVOP)

- Fixed mounted "OUTPUT" and "BYPASS" vacuum contactors
- 400 A rated unit includes two three-pole, gang-operated, non-load break isolating switches with one external operating handle. Both switches are mechanically interlocked with each other, the contactor and the power cell doors. The 600 A and 800 A rated units are mechanically interlocked using key interlocks and a separate external operating handle for each isolating switch.
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three current-limiting power fuses
- Three current transformers
- Two segregated low voltage panels to house control circuit fusing, "NORMAL-OFF-TEST" circuit, receptacle for external test power supply, set of control circuit terminal blocks and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features:
  - Selectable vacuum contactor drop-out time and consistent pick-up time
  - Altitude compensation
  - Anti-kiss and anti-plugging protection
- Additional variable frequency output power bus (1200 A rating) located in the top of the power bus compartment

Bulletin 1512M Starter Specifications

Starter Size (A)	Hp, max	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400...6600V	Width	Depth	Height	
200/400	Sized based on VFD and continuous current of the motor	915 (36)	915 (36)	231 (91)	805 (1770)
600		1829 (72)	915 (36)	231 (91)	1228 (2700)
800		2845 (112)	915 (36)	231 (91)	1591 (3500)

Bulletin 1512M Power Circuit Schematic



Bulletin 1506 Full-voltage Reversing Motor Starter

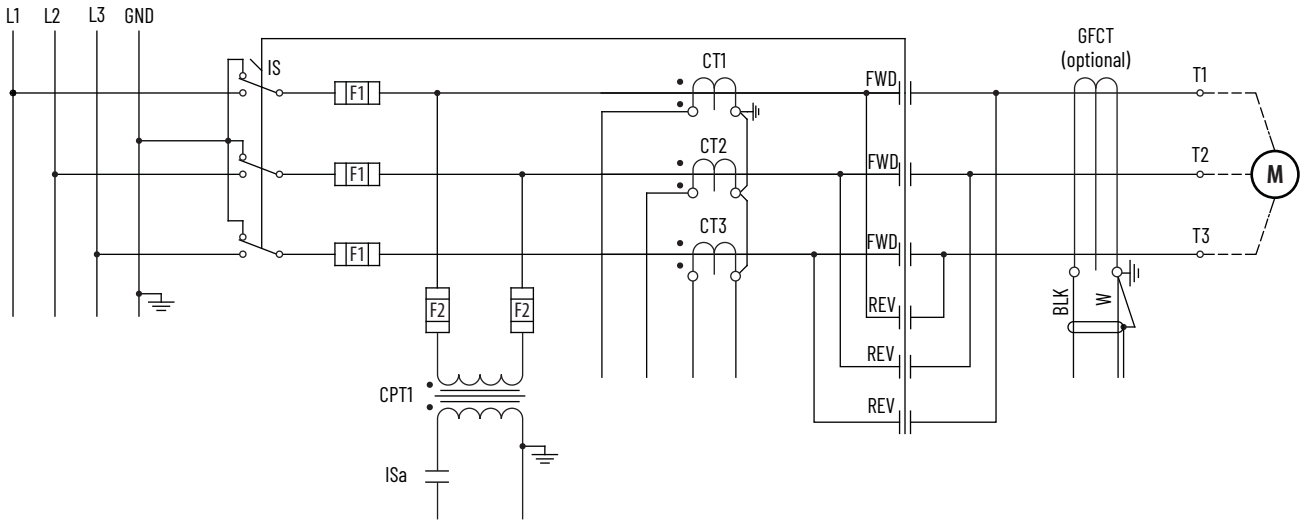
- Fixed mounted vacuum contactors (forward and reverse)
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three R-rated current-limiting power fuses
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features:
- Additional low voltage control panel accessories that include:
  - "NORMAL-OFF-TEST" circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- Available for motor loads
- Plugging or anti-plugging duty
- Mechanically and electrically interlocked contactors

Bulletin 1506 Starter Specifications

Starter Size (A)	Hp, max				Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	Width	Depth	Height	
200	800	1000	1250	1500	914 (36)	914 (36)	2311 (91)(1)	1770 (802)(2)
400	1500	2250	2750	3000				
800	3500	5000	6000	7000	1422 (56)		2311 (91)	1950 (885)

(1) Height is 3264 mm (128.5 in) with ArcShield enclosure with plenum.
(2) Weight is different with ArcShield enclosure.

Bulletin 1506 Power Circuit Schematic



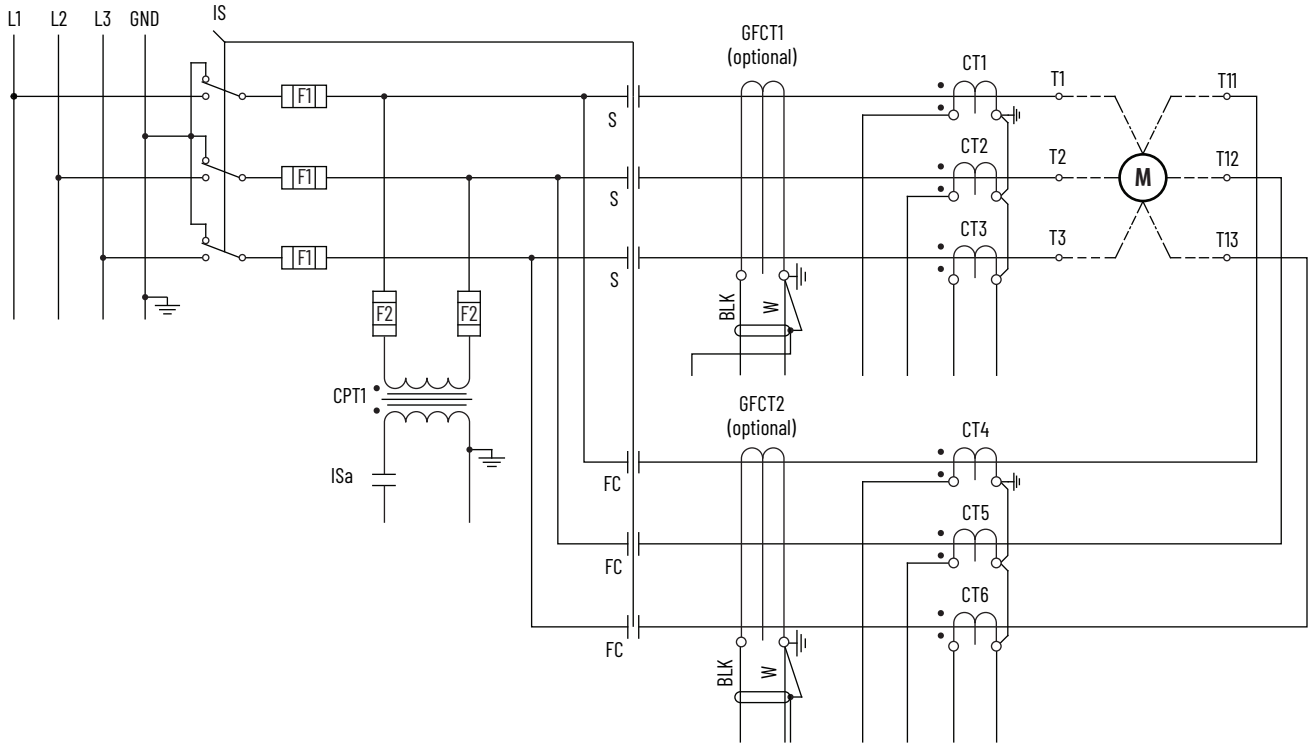
Bulletin 1522E/F/G Two-speed Non-reversing Motor Starter

- Fixed mounted vacuum contactor
- HIGH and LOW speed settings for two-speed separate winding, Bulletin 1522E starter
- HIGH/LOW speeds and HIGH SPEED SHORTING settings for two-speed consequent pole, Bulletin 1522F/G starter
- Three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three R-rated current-limiting power fuses
- Six current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features
- Additional low voltage control panel accessories that include:
  - 'NORMAL-OFF-TEST' circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- Constant or variable torque, and constant horsepower applications

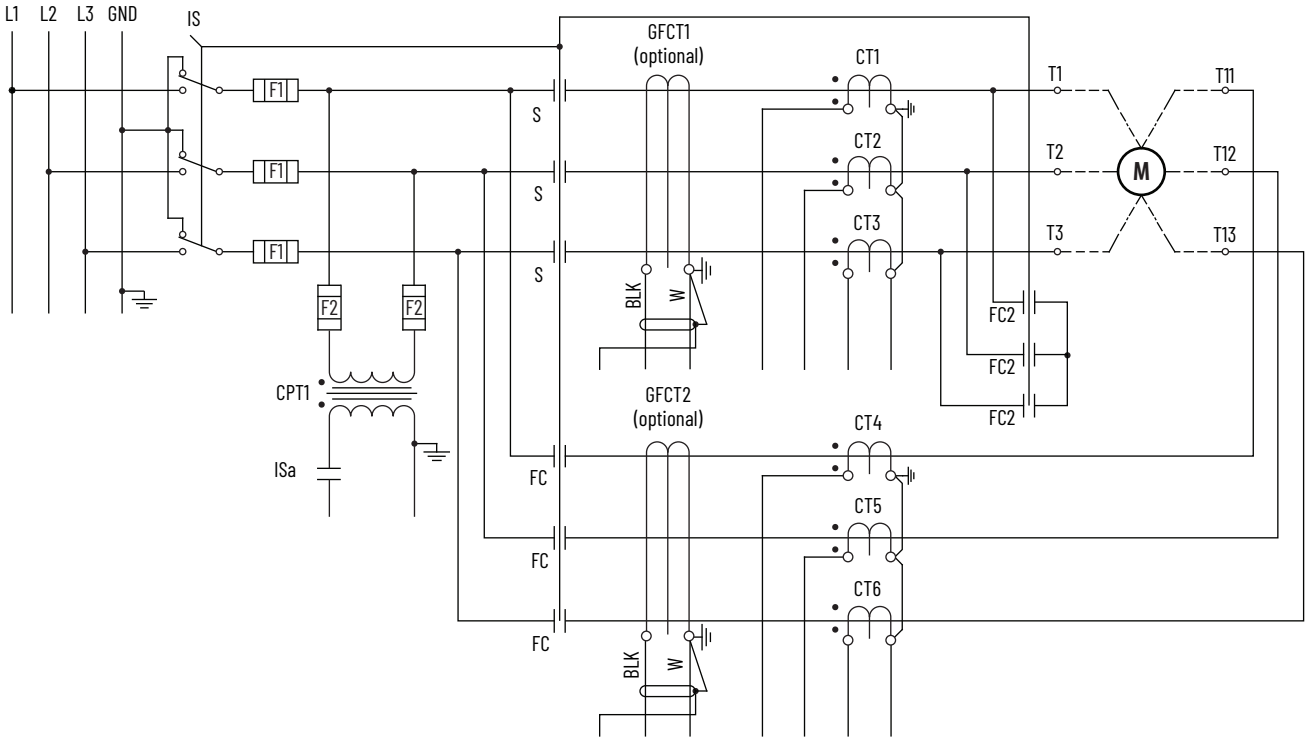
Bulletin 1522E/F/G Starter Specifications

Starter Size (A)	Hp, max				Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	Width	Depth	Height	
200	800	1000	1250	1500	915 (36)	915 (36)	2311 (91)	802 (1770)
400	1500	2250	2750	3000				

Bulletin 1522E Power Circuit Schematic



Bulletin 1522E Power Circuit Schematic



Bulletin 1560F/1562F SMC-50 Smart Electronic Soft Start Motor Controller

The Bulletin 1562F is a flexible combination motor controller available in two main configurations:

- A modified two-high cabinet (two complete controllers)
- A combination of a one-high full-voltage non-reversing (FVNR) cabinet and a 1560F unit (one complete controller)

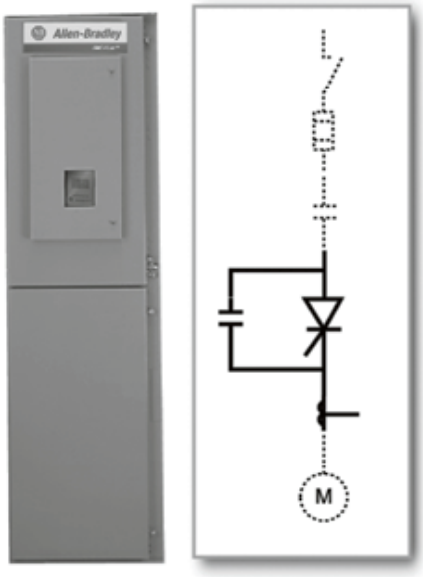
Based around the SMC™-50 Smart motor control module, we offer various advanced controlling and electronic motor-starting styles:

- Soft start with Selectable Kickstart
- Soft stop
- Pump control start/stop
- Torque control
- Current limit start with Selectable Kickstart
- Sensorless linear speed acceleration with Selectable Kickstart
- Sensorless linear speed deceleration
- Dual ramp with Selectable Kickstart
- Emergency run (full-voltage)

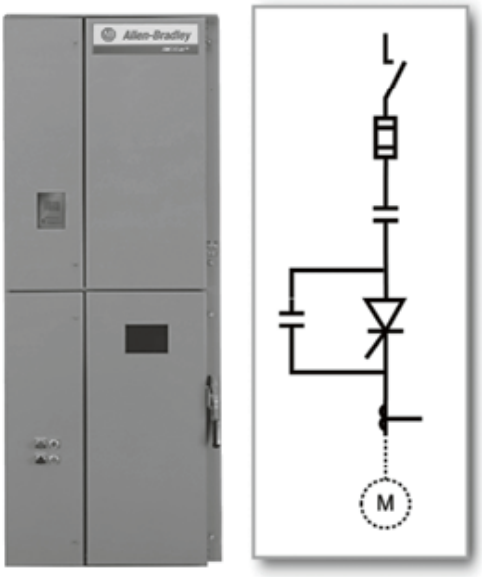
The SMC-50 control module offers advanced monitoring/metering functions, and provides motor and controller protection.

The Bulletin 1562F features both isolation and bypass vacuum contactors. The Bulletin 1560F is a retrofit controller that is specifically designed to integrate smoothly with an existing customer-supplied starter to enable all combination controls listed in this section.

Bulletin 1560F and Bulletin 1562F Controllers



Retrofit Controller



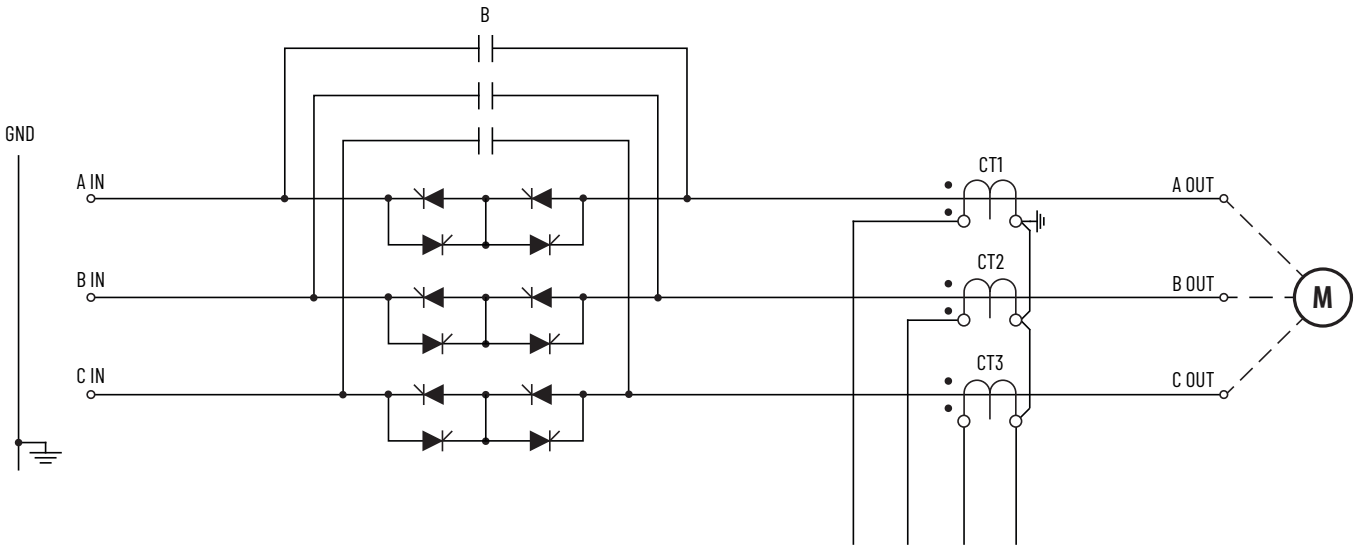
Combination Controller

Bulletin 1560F/1562F Starter Specifications

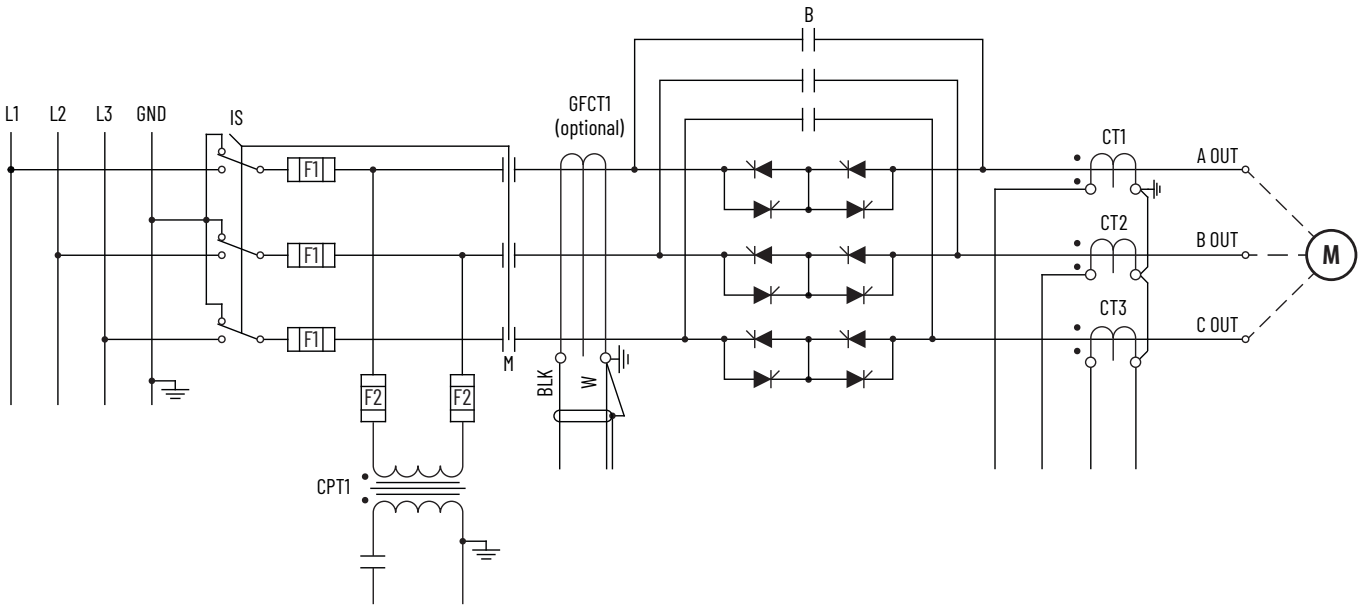
Bulletin	Voltage	Starter Size (A)	Hp, max	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
				Width	Depth	Height	
1560F	2400	200	800	660 (26)	914 (36)	2311 (91)	363 (800)
		400	1500				
		600	2750	1118 (44)			590 (1300)
	3300	200	1000	660 (26)			363 (800)
		400	2250				
		600	4000	1118 (44)			590 (1300)
	4160	200	1250	660 (26)			363 (800)
		400	2750				
		600	4500	1118 (44)			590 (1300)
	6600	200	2250	914 (36)			636 (1400)
		400	4500				
		600	7500	1118 (44)			590 (1300)
	6900	200	2500	914 (36)			554 (1220)
		400	5000				
		600	7500	1118 (44)			590 (1300)
1562F	2400	200	800	914 (36)	914 (36)(1)	2311 (91)(2)	636 (1400)(3)
		400	1500				
		600	2750	2032 (80)	914 (36)	2311 (91)	1227 (2700)
	3300	200	1000	914 (36)	914 (36)(1)	2311 (91)(2)	636 (1400)(3)
		400	2250				
		600	4000	2032 (80)	914 (36)	2311 (91)	1227 (2700)
	4160	200	1250	914 (36)	914 (36)(1)	2311 (91)	636 (1400)(3)
		400	2750				
		600	4500	2032 (80)	914 (36)	2311 (91)	1227 (2700)
	6600	200	2250	1575 (62)	914 (36)		1056 (2325)
		400	4500				
		600	7500	2032 (80)			1227 (2700)
	6900	200	2500	1575 (62)	914 (36)	2311 (91)	1056 (2325)
		400	5000				
		600	7500	2032 (80)	914 (36)	2311 (91)	1227 (2700)

(1) Depth is 1168 mm (46 in.) with ArcShield enclosure with plenum.
(2) Height is 3264 mm (128.5 in.) with ArcShield enclosure with plenum.
(3) Weight is different with ArcShield enclosure.

Bulletin 1560F Power Circuit Schematic



Bulletin 1562F Power Circuit Schematic



Bulletin 1572/1576/1582 Reduced Voltage Reversing and Non-reversing Autotransformer and Reactor Motor Starter

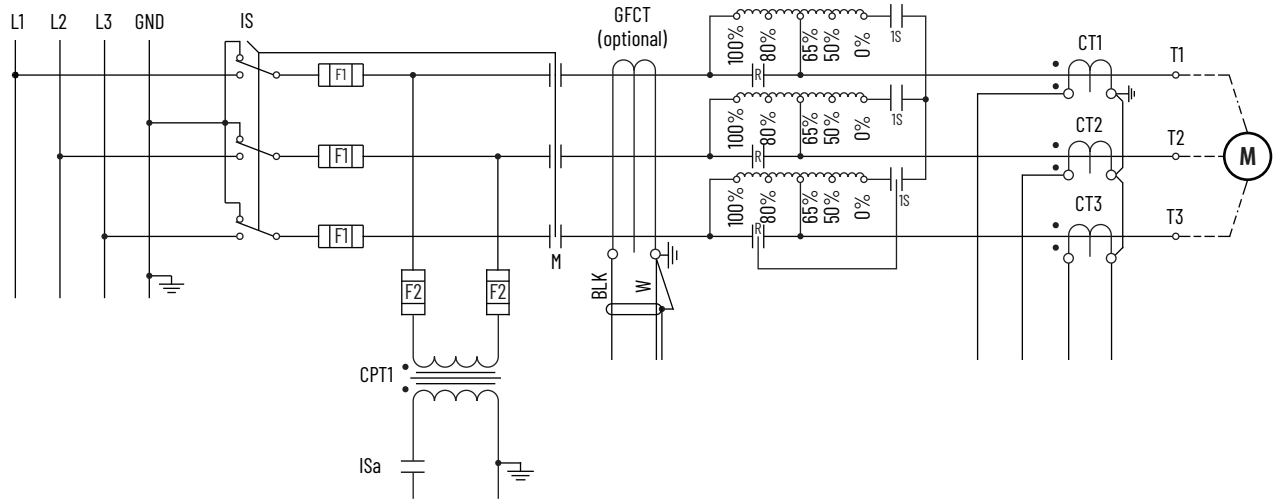
- Fixed mounted vacuum contactors
- (1S, 2S, and RUN) contactors, with closed transition operation, Bulletin 1572 non-reversing starter
- (1S, FORWARD, REVERSE, and RUN) contactors, with closed transition operation, Bulletin 1576 reversing starter
- A three-pole, gang-operated, non-load break isolating switch with an external operating handle, fully interlocked with main contactor and power cell doors
- A polycarbonate viewing window in the power cell door to view the position of the isolating switch
- Three R-rated current-limiting power fuses
- Three current transformers
- Control power transformer with primary and secondary fuses
- Segregated low voltage panel to house standard and optional hardware for unit control and monitoring
- IntelliVAC control module for each vacuum contactor, mounted in low voltage panel, with advanced features
- Additional low voltage control panel accessories that include:
  - "NORMAL-OFF-TEST" circuit
  - Receptacle for external test power supply
  - Set of control circuit terminal blocks
- NEMA medium duty, dry type, three-winding autotransformer with 50%, 65% and 80% taps. The 65% tap is used unless otherwise specified.

Bulletin 1572/1576/1582 Starter Specifications

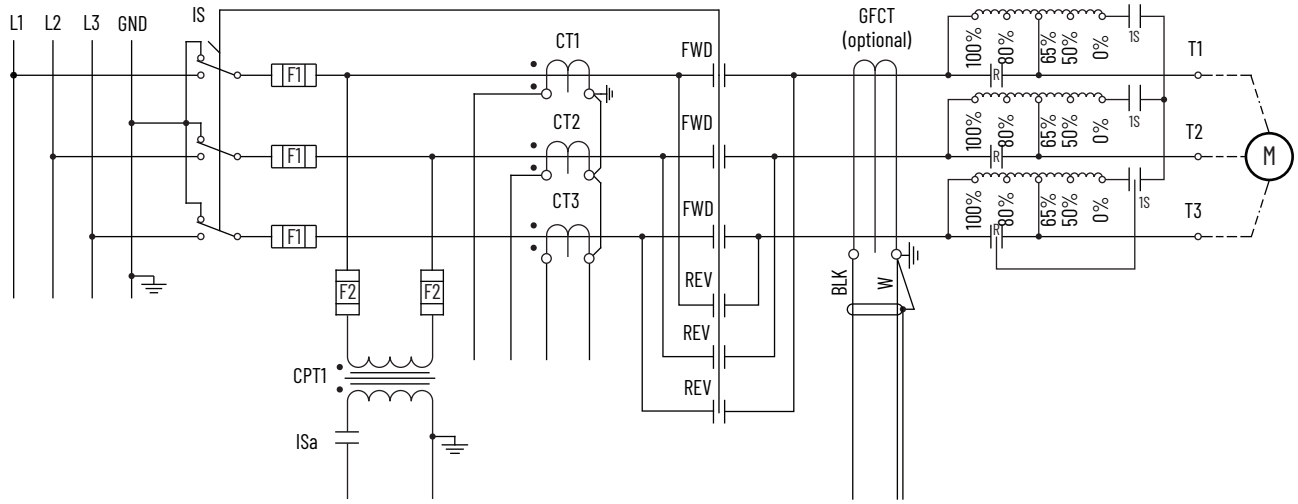
Controller Type	Starter Size (A)	Hp, max				Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
		2400V	3300V	4160V	4800V	Width	Depth	Height	
1572	200	800	1000	1250	1500	1422 (56)	914 (36)	2311 (91)	1703 (3750)
	400	1500	2250	2750	3000				
	600	2250	4000	4500	5500	2032 (80)			2270 (5000)
	800	3500	5000	6000	7000				
1576	200	800	1000	1250	1500	2032 (80)			1703 (3750)
	400	1500	2250	2750	3000				
	800	3500	5000	6000	7000	2540 (100)			2270 (5000)
1582	200	800	1000	1250	1500	1422 (56)			1703 (3750)
	400	1500	2250	2750	3000				
	600[1]	2250	4000	4500	5500	2032 (80)			2270 (5000)
	800[1]	3500	5000	6000	7000	2540 (100)			

(1) 600 A and 800 A controllers require a separately quoted autotransformer with minimum dimensions of 1321 x 1168 x 1676 mm (52 x 46 x 66 in.).

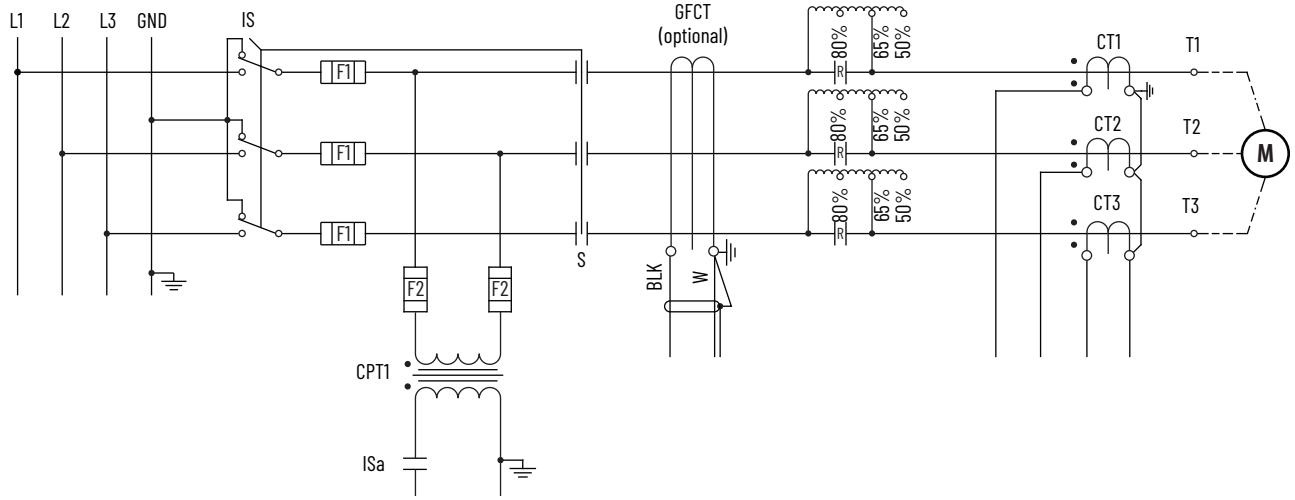
Bulletin 1572 Power Circuit Schematic



Bulletin 1576 Power Circuit Schematic



Bulletin 1582 Power Circuit Schematic



Bulletin 1906B/1912B Full-voltage Reversing and Non-reversing Brush-type Synchronous Motor Starter

- Bulletins 1906B and 1912B are designed as a complete reversing and non-reversing synchronous starter, respectively[a]
- Available with or without static exciter
- Features a control power transformer (CPT) with primary and secondary fuses for converting line voltage to single-phase 120V for low voltage devices
- Forward-mounted vacuum contactors are implemented within the Bulletin 1906B starter
- The Bulletin 1912B starter showcases both forward and reverse vacuum contactors
- Standard SyncProIIB field application and protection system

Bulletin 1906B Starter Specifications

Starter Size (A)	Hp, max				Dimensions, mm (in.), approx.[1]			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	Width	Depth	Height	
200	800	1000	1250	1500	660 (26)	914 (36)	2311 (91)	490 (1075)
400	1500	2250	2750	3000				
800	3500	5000	6000	7000	2337 (92)			1619 (3570)

(1) These dimensions exclude static exciter.

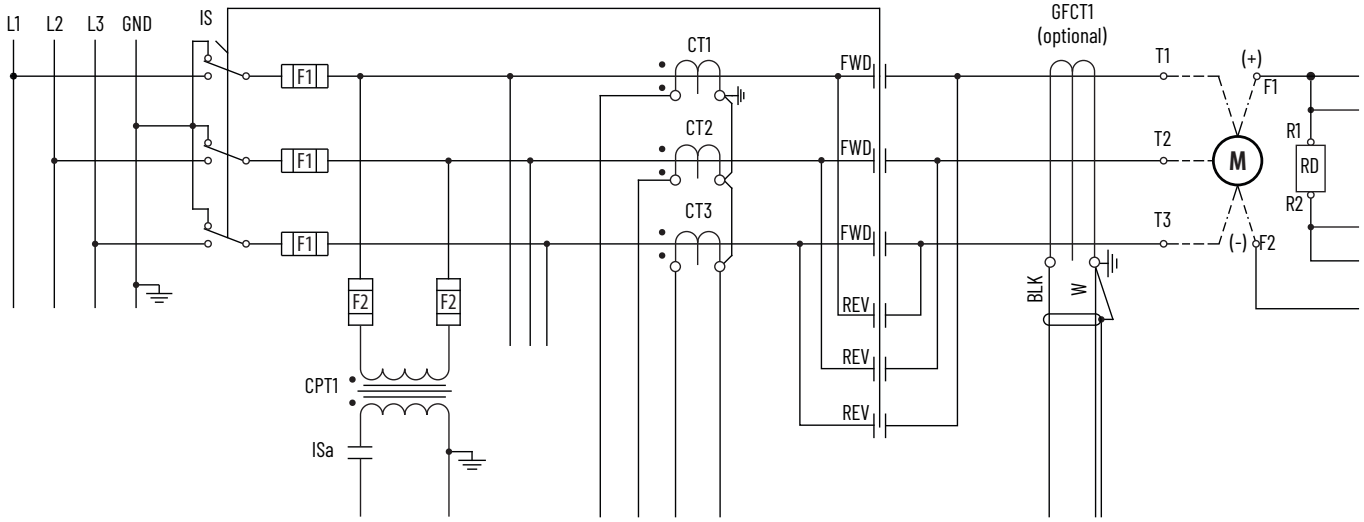
Bulletin 1912B Starter Specifications

Starter Size (A)	Hp, max						Dimensions, mm (in.), approx.[1]			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	800	1000	1250	1500	2000	2250	660 (26)	914 (36)	2311 (91)	490 (1075)
400	1500	2250	2750	3000	4500					
600	2750	3500	4500	5500	Contact factory		914 (36)			773 (1700)
800	3500	5000	6000	7000			1422 (56)			885 (1950)

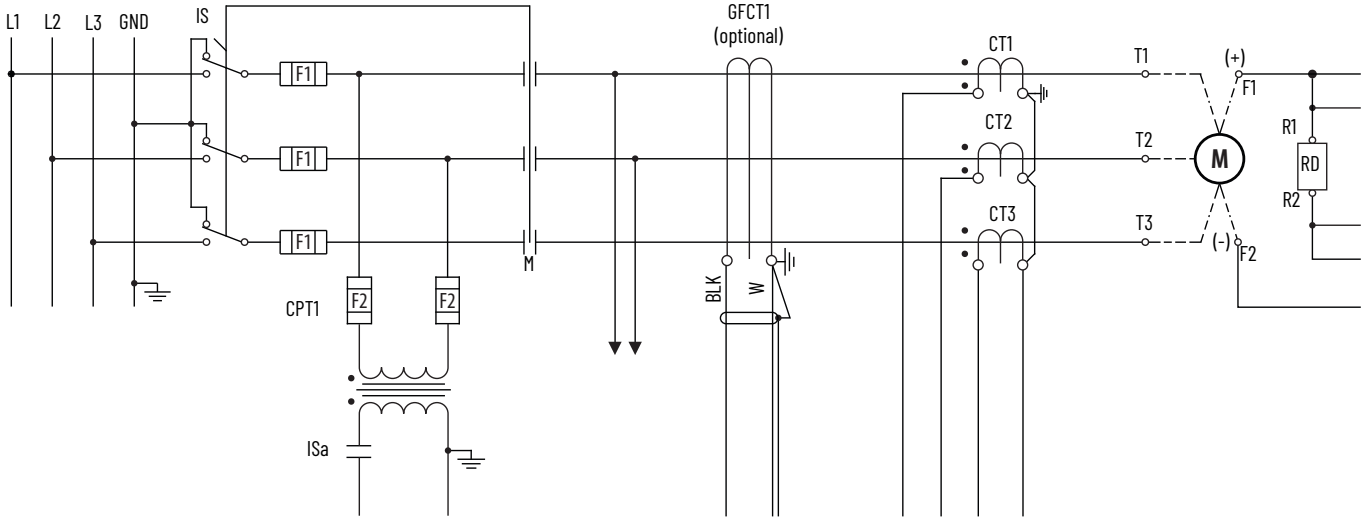
(1) These dimensions exclude static exciter.

(a) See the standard features provided with the Bulletin 1506 and 1512 motor controllers.

Bulletin 1906B Power Circuit Schematic



Bulletin 1912B Power Circuit Schematic



Bulletin 1906L/1912LFull-voltage Reversing and Non-reversing Brushless Synchronous Motor Starter

- Bulletins 1906L and 1912L are designed as complete reversing and non-reversing synchronous starters, respectively[a]
- Available with or without static exciter
- Features a control power transformer (CPT) with primary and secondary fuses for converting line voltage to single phase 120V for low voltage devices
- Forward-mounted vacuum contactors are implemented within the Bulletin 1906B starter
- The Bulletin 1912L starter showcases both forward and reverse vacuum contactors

Bulletin 1906L Starter Specifications

Starter Size (A)	Hp, max				Dimensions, mm (in.), approx.[1]			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	Width	Depth	Height	
200	800	1000	1250	1500	1372 (54)	914 (36)	2311 (91)	1076 (2370)
400	1500	2250	2750	3000				
800	3500	5000	6000	7000	1880 (74)			1090 (2400)

(1) These dimensions exclude static exciter.

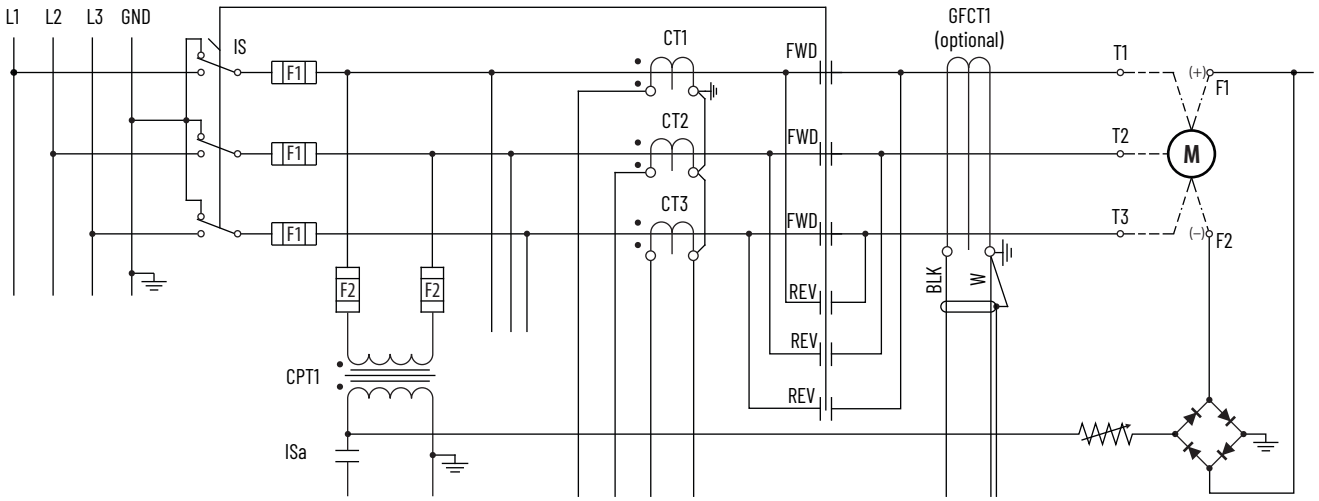
Bulletin 1912L Starter Specifications

Starter Size (A)	Hp, max						Dimensions, mm (in.), approx.[1]			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	800	1000	1250	1500	Contact factory		660 (26)	914 (36)	2311 (91)	490 (1075)
400	1500	2250	2750	3000						
600	2750	3500	4500	5500			1372 (54)			885 (1950)
800	3500	5000	6000	7000			1880 (74)			1090 (2400)

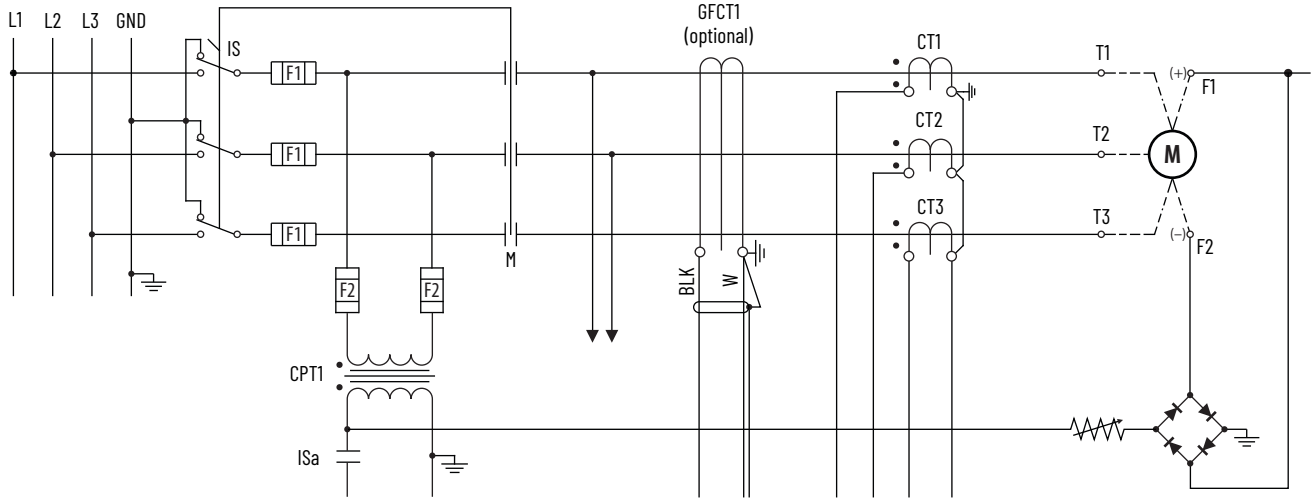
(1) These dimensions exclude static exciter.

(a) See the standard features provided with the Bulletin 1506 and 1512 motor controllers.

Bulletin 1906L Power Circuit Schematic



Bulletin 1912L Power Circuit Schematic



Notes:

Bulletin 1591A/B Incoming Line Units

- Incoming bus arrangement for top or bottom cables
- Provision for the low voltage panel and door
- Metering CTs and PTs available
- Lug pad with provision for multiple incoming cable lug terminations
- Only Bulletin 1591B comes as a two-high structure; also available in ArcShield designs

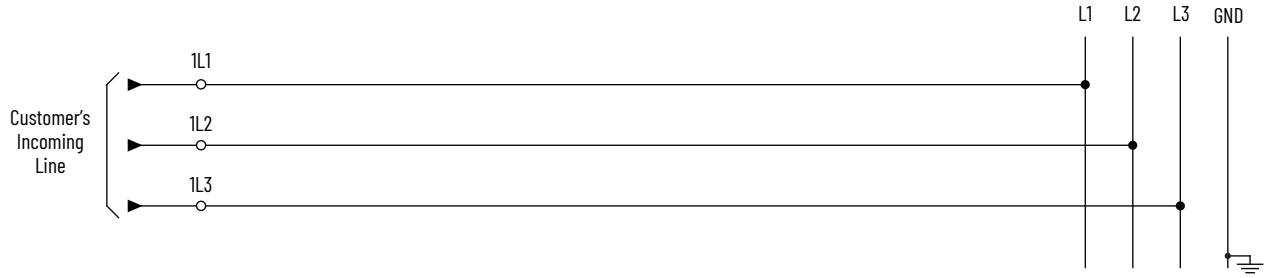
1591A 1591B

Bulletin 1591A/B Incoming Line Units Specifications

Voltage Rating (V)	Incomer Size, mm (in.)	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
		Width	Depth	Height	
2400...6900	457 (18)	457 (18)	914 (36)	2311 (91)(1)(2)	272 (600)(3)
	914 (36)	914 (36)		2311 (91)(1)	363 (800)(3)
	1118 (44)(4)	1118 (44)		2311 (91)	545 (1200)

(1) Height is 128. in. (3264 mm) with ArcShield enclosure with plenum.
(2) Only available size for 1591B.
(3) Weight is different with ArcShield enclosure.
(4) A 44-in. (1118-mm) incomer is only available when a 3000 A power bus is used.

Bulletin 1591A/B Power Circuit Schematic



Bulletin 1592BF, 1592F/M, and 1594F/M Fused and Non-fused Load-break Switches

- Main load break switch for switching primary power source
- Feeder load break switch for switching other loads
- Isolation between upper and lower power cells
- The operating handle is fully interlocked with the power cell door
- Provisions on the operating handle for key interlocking
- A polycarbonate viewing window in the power cell door to view the position of the isolation handle
- Protective guard over the line terminals, inside the power cell, to barrier off medium voltage when the power door is open
- Feeders for two-high structures
- Bulletin 1592BF – fused load break switch, which is designed as a feeder for two-high structures[a]
- Bulletin 1592F/M – fused load break switch, fused feeder, and mains
- Bulletin 1594F/M – non-fused load break switch for feeder and mains

Bulletin 1592BF Switch Specifications[1]

Starter Size (A)	Transformer Size (kVA)						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.[2]
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
200	700	1000	1250		2000		914 (36)		2311 (91)	804 (1770)[3]
400	1500	2000	2500	2750	–					804 (1770)

(1) One 1592BF occupies half of a two-high structure.
(2) Weight is different with ArcShield enclosure.
(3) Includes complete two-high structure weight with two 1592BF units.

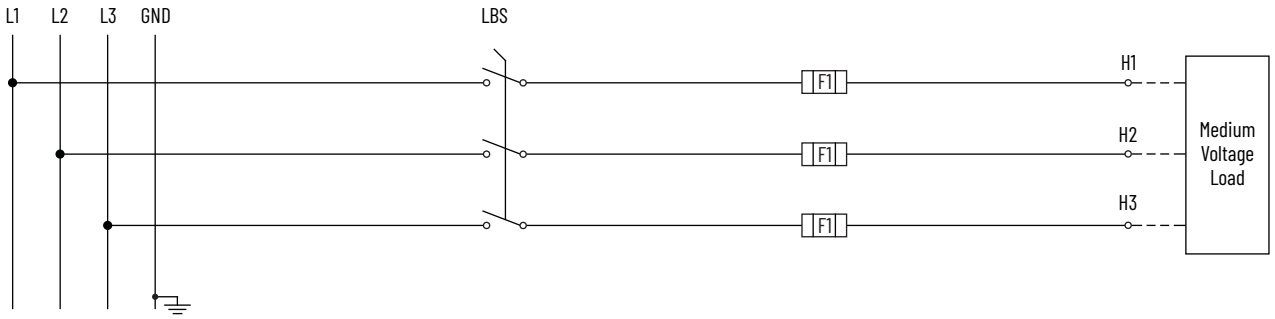
Bulletins 1592F/M and 1594F/M Switch Specifications

Switch Size (A)	Switch Size, max						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
600	(1)						914 (36)[2]	914 (36)	91 (2311)	804 (1770)
1200					–		1372 (54)[3]	1067 (42)		1135 (2500)

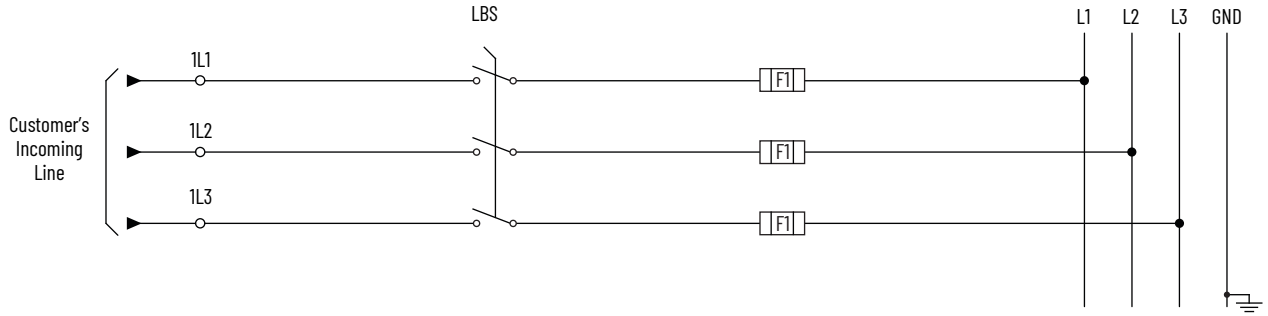
(1) Available in all sizes except 1200 A at 6600V and 6900V.
(2) If an isolated, low-voltage panel is required, the width increases by 457 mm (18 in.) and weight increases accordingly.
(3) If an isolated, low-voltage panel is required or incoming cables are fed from the bottom, the width increases by 457 mm (18 in.) and the weight increases accordingly. If the 1067 mm (42 in.) deep unit is positioned on either end of 36 in. (914 mm) deep structures, the width increases by an additional 4 in. (102 mm).

(a) Also available as prepared space (Bulletin 1592BP) and starter kits (Bulletin 1592BS).

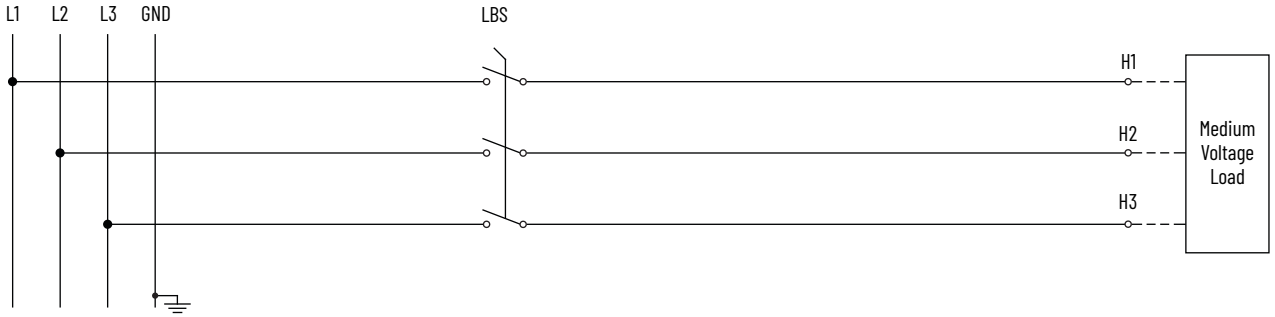
Bulletin 1592BF/1592F Power Circuit Schematic



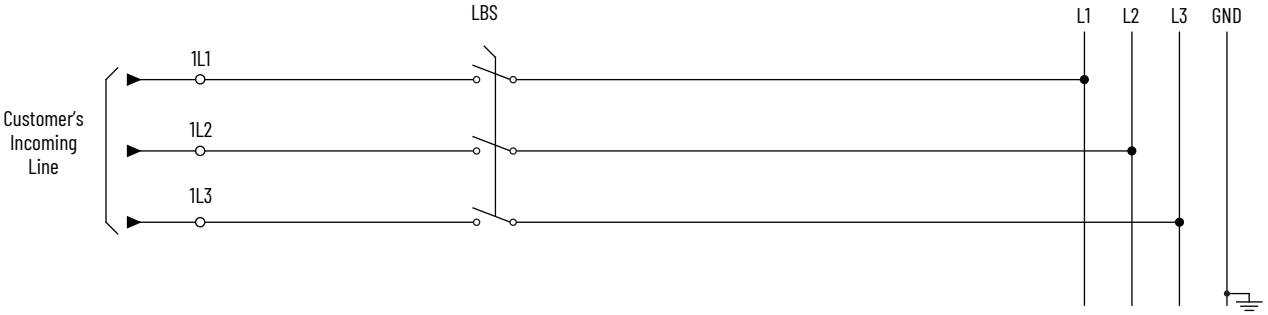
Bulletin 1592M Power Circuit Schematic



Bulletins 1592F and 1594F Power Circuit Schematics



Bulletins 1592M and 1594M Power Circuit Schematics



Bulletin 1594T Non-Fused Load Break Switch Tie Switch Arrangements

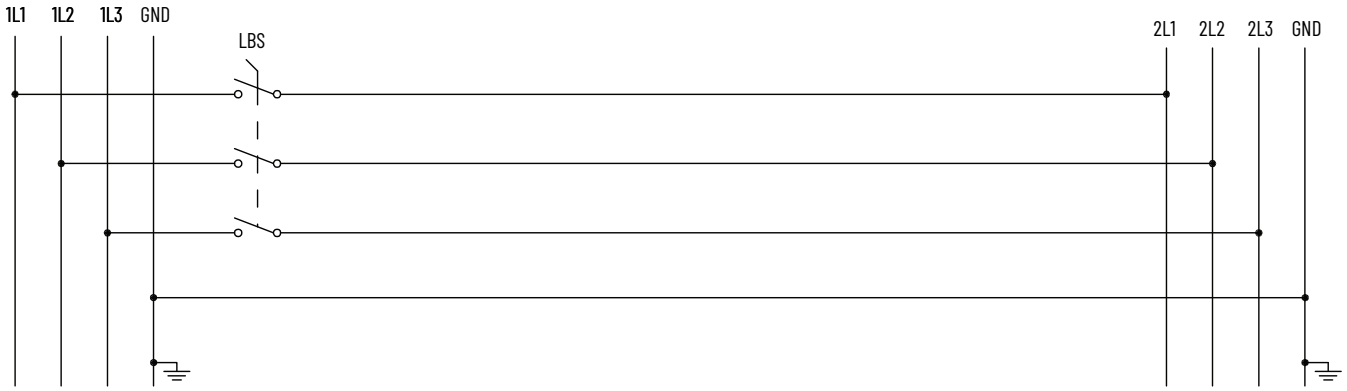
- Three-pole, gang-operated load break switch with an external operating handle
- The operating handle is fully interlocked with the power cell door
- Provisions on the operating handle for key interlocking
- Power cell door with a viewing window to examine the position of the switch
- Protective guard over the line terminals, inside the power cell, to barrier off medium voltage when the power door is open

Bulletin 1594T Switch Specifications

Switch Size (A)	Switch Size, max						Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	2400V	3300V	4160V	4800V	6600V	6900V	Width	Depth	Height	
600	(1)						914 (36)	914 (36)	91 (2311)	804 (1770)
1200					–		1372 (54)	1067 (42)		1135 (2500)

(1) Available in all sizes except 1200 A at 6600V and 6900V.

Bulletin 1594T Power Circuit Schematic



Bulletin 1599 Auxiliary Unit/Structure

- Completely customizable interior (typically used to hold metering equipment and/or low voltage control devices.
- Dimensions equivalent to other Bulletin 1500/1900 units D x H (914 x 2311 mm [36 x 91 in.])
- Large full-height door is available
- For arc-resistant enclosures, contact your local Rockwell Automation sales office or Allen-Bradley distributor

Bulletin 1599 Starter Specifications

Starter Size (A)	Dimensions, mm (in.), approx.			Weight, kg (lb), approx.
	Width	Depth	Height	
N/A	458 (18)	915 (36)	2312 (91)	273 (600)
N/A	915 (36)	915 (36)	2312 (91)	614 (1350)

Notes:

You can select push buttons, pilot lights, or selector switches for the low voltage compartment door. Options vary based on type of starter unit that you selected.

Push Buttons

- Green/Red options available for the following functions:
  - On
  - Off
  - Start
  - Forward
  - Reverse
  - Emergency Stop (push/pull)



Selector Switches

- Selector switch on the LV compartment door can be used for the following functions:
  - Hand-Off-Auto
  - Normal-Emergency-Bypass
  - Forward-Off-Reverse
  - Local-Off-Remote
  - On-Off


Pilot Lights

- Pilot lights[(a)] available to indicate:
  - On
  - Off
  - Forward
  - Reverse
  - Run
  - Tripped
  - Current Loop Fault


E300 Overload Relay

- E300 Basic Overload Relay with Voltage Sensing (if PTs specified)
  - Ground fault sensing
  - Six 120V AC inputs
  - Four 120V AC relay outputs
  - Twelve RTD inputs[(b)]
  - Four universal analog outputs[(b)]
  - EtherNet/IP communication
  - Door mounted diagnostic station

Test Blocks

- 4- or 6-pole GE PK2

(a) Push-to-test options available
(b) Option 7FE3B only.

GE Multilin 369/869 Motor Protection Relay[(a)]

- RTD inputs and metering package, enhanced diagnostics
- Voltage/power monitoring
- Differential protection
- 120V AC Inputs
- 120V AC Form C Relay Outputs
- Modbus TCP/Modbus RTU communications

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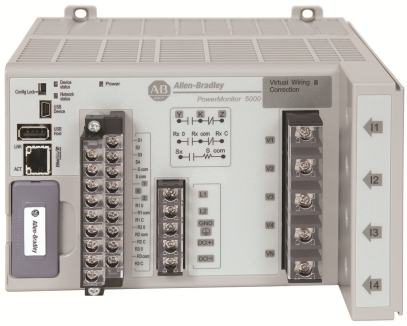
SEL 710(-5) Motor Protection Relay[(a)]

- Voltage/power monitoring
- 120V AC/DC inputs
- 120V AC/DC relay outputs
- RTD inputs
- 4...20 mA output and Modbus TCP/IEC 61850 communications
- 20 mA/10V inputs
- 20 mA/10V outputs and Modbus TCP communications

Images courtesy of Schweitzer Engineering Laboratories, Inc. © 2021.

Digital Metering

- Allen-Bradley Bulletin 1426-M5E (-DNT, -CNT) PowerMonitor 5000
  - ControlNet communication with 1426-DM display module
  - DeviceNet communication with 1426-DM display module
  - Ethernet communication with 1426-DM display module



Panel Type or Switchboard Type Metering

- AC ammeter and ammeter switch
- Voltmeter switch
- Operations counter
- Elapsed time meter

Lockout Relays

- Bulletin 700DC-PL lockout relay with a "RESET" pushbutton in the LV door
- Electroswitch Series 24 lockout relay, manual reset

(a) Options vary based on option number.

CENTERLINE 1500 Medium Voltage Motor Control Centers Selection Checklist

Use this checklist to help you configure your CENTERLINE® 1500 Motor Control Center.

Customer:	User:
Office:	

Step 1: Review MCC Technical Specifications

Certifications and Markings					
☐ UL Labeled	☐ NEMA	☐ ICS Specification No._____	☐ CSA Certified	☐ Service Entrance	☐ ABS and ABS Shipboard
☐ Other (specify):					

Step 2: Select Network and IntelliCENTER® Options

Embedded Network			
EtherNet/IP™	☐ No	☐ Yes	
IntelliCENTER Options			
Compact disc (CD)	☐ None	☐ Standard data	☐ IntelliCENTER software and data

Step 3: Select Structure Options

Structure				
Configuration	☐ One-High	☐ Two-High		
Enclosure rating	☐ IP52	☐ IP10	☐ IP21	☐ IP34
ArcShield™ enclosure (Type 2B)	☐ No (standard)	☐ Yes		
Low voltage wireway	☐ 51 x 102 mm	☐ 152 x 152 mm	☐ Export crating	☐ Arc resistant
Ambient temperature, max	_____ °C			
Altitude	_____ meters			
External paint	☐ ANSI 49 medium light gray	☐ ANSI 61 light gray	☐ Other (specify):	
Internal paint	☐ High visibility gloss white	☐ Other (specify):		
Master nameplate	☐ No			
	☐ Yes (3 line; 40 characters maximum per line)			
	Line 1:			
	Line 2:			
	Line 3:			
	☐ Yes (6 line; 40 characters maximum per line)			
	Line 1:			
	Line 2:			
	Line 3:			
	Line 4:			
	Line 5:			
	Line 6:			
Master nameplate lettering	☐ White letters on black background		☐ Black letters on white background	
Options	☐ Space heater with thermostat	☐ Cable supports for vertical wireways		
	☐ Other (specify):			

Step 4: Power Bus Compartment

Incoming Power				
Line voltage	☐ 2400V	☐ 3300V	☐ 4160V	☐ 4800V
	☐ 6000V	☐ 6600V	☐ 7200V	☐ Other:
Frequency	☐ 50 Hz	☐ 60 Hz		
Available fault current	_____kA			
Bus				
Horizontal power bus rating	☐ 1200 A	☐ 2000 A	☐ 3000 A	
Horizontal power bus material	☐ Copper, tin plated (standard)	☐ Copper, unplated		
Horizontal ground bus material	☐ Copper, tin plated (standard)		☐ Copper, unplated	

Step 5: Select Power Cell Compartments

Load Termination				
Outgoing load cable connection	☐ Top	☐ Bottom		
Load cable per phase	☐ 1	☐ 2		
	Cable size: _____			
Non-load Break Isolation Switch				
Switch size	☐ 400 A	☐ 600 A	☐ 800 A	
Fuse clips	☐ Clip-on	☐ Bolt-on		
Isolation switch handle module	☐ 400 A	☐ 600/800 A		
Vacuum Contactors				
Current rating	☐ 450 A	☐ 800 A		
Control circuit	☐ Electromechanical	☐ IntelliVAC module		
Vacuum contactor type	☐ Fixed-mounted, electrically held	☐ Fixed-mounted, mechanical latch	☐ Fixed-mounted, electrically held (fast dropout)	
Power Fuses				
Clip-on fuse	☐ 2R, 70 A	☐ 3R, 100 A	☐ 4R, 130 A	☐ 5R, 150 A
	☐ 6R, 170 A	☐ 9R, 200 A	☐ 12R, 230 A	
Bolt-on fuses	☐ 19R, 315 A(1)	☐ 18 R, 390 A	☐ 24R, 450 A	☐ 48X, 750 A
	☐ 32R, 600 A	☐ 38R, 700 A	☐ 57X, 900 A	
Control Power				
Separate control	☐ 120V	☐ Other:		
Control power transformer	☐ 120V/s	☐ 120/240V/s	☐ 500VA (standard)	
	☐ 1000VA	☐ 2000VA	☐ 3000VA	
Ground Fault Current Transformer				
Style	☐ Bar	☐ Donut		
Integrated Protective Maintenance Grounding Device				
Rating	☐ 450 A	☐ 600/800 A		

(1) 300 A, 7.2 kV.

Step 6: Select Low Voltage Components

Relay Control Panel			
Voltage	☐ 110/120V AC, 50/60 Hz	☐ 220/230V AC, 50/60 Hz	
Contactor type	☐ Electrically held, 450 A	☐ Mechanical latch, 450 A	
	☐ Electrically held, 800 A	☐ Mechanical latch, 800 A	
Control Module			
IntelliVAC module	Input voltage:		
	☐ 110...240V AC (47...63 Hz)	☐ 100...250V DC	
	High altitude application:		
	☐ 1001...2000 m	☐ 2001...3000 m	
	☐ 3001...4000 m	☐ 4001...5000 m	
Other Components			
Motor protection relay	☐ E300 electronic overload relay	☐ SEL 710(-5) motor protection relay	☐ GE Multilin 369/869 motor protection relay
	☐ GE Multilin 869 or SEL 710-5 with Synchronous motor protection	☐ SyncPro IIB field application and protection system	
Metering	☐ Bulletin 1426 PowerMonitor 5000	☐ Panel type (3.5 in.)	☐ Switchboard type (4.5 in.)
Control network interface	☐ POINT I/O module	☐ FLEX I/O	☐ Other:

Step 7: Select Medium Voltage Control Type

Combination Starter Unit			
Starter type	☐ Full voltage, non-reversing (One-high)	☐ Full voltage, non-reversing (Two-high)	☐ Full voltage, reversing
	☐ Reduced voltage, autotransformer	☐ Reduced voltage, reactor	☐ Prepared space(1)
	☐ Brush-type, sychronous	☐ Brushless, synchronous	☐ Other:

(1) Full voltage, non-reversing only.

Step 8: Select Incoming Line Unit Options

To Main Power Bus				
Cable location	Section number: _____	☐ Top	☐ Bottom	Number per phase: _____ Cable size: _____
Lugs	☐ By others	☐ Crimp compression		
Incoming Line Unit				
Cable location	Section number: _____	☐ Top	☐ Bottom	Number per phase: _____ Cable size: _____
Lugs	☐ By others	☐ Crimp compression		
Main Load Break Switch				
Ampere	Size: _____	☐ Fused	☐ Non-fused	
Cable location	Section number: _____	☐ Top	☐ Bottom	Number per phase: _____ Cable size: _____
Lugs	☐ By others	☐ Crimp compression		
Incoming Metering				
Ampere	Size: _____	☐ Fused	☐ Non-fused	
Cable location	Section number: _____	☐ Top	☐ Bottom	Number per phase: _____ Cable size: _____
Transition				
Existing structure	☐ Series number:			
	☐ Other - describe:			
Outgoing Load Termination				
Load cable connection	☐ Top	☐ Bottom		
Load cables per phase	☐ 1	☐ 2		
Load cable size	Specify:			

Step 9: Select Low Voltage Door Options

Options and Accessories			
Pilot lights (light-emitting diode [LED])	☐ Standard light ☐ Push-to-test light		
	☐ ON	☐ OFF	☐ FORWARD
	☐ REVERSE	☐ RUN	☐ TRIPPED
	☐ CURRENT LOOP FAULT	☐ No pilot light	
Push buttons	☐ Green On	☐ Red Off	☐ Green Start
	☐ Green Forward	☐ Green Reverse	☐ Red Stop
	☐ Red Emergency Stop	☐ Red Emergency Stop(1)	☐ No push button
Selector switch	☐ HAND-OFF-AUTO	☐ NORMAL-EMERGENCY-BYPASS	☐ FORWARD-OFF-REVERSE
	☐ LOCAL-OFF-REMOTE	☐ ON-OFF	☐ No selector switch

(1) Illuminated when control power is present.

Notes:

CENTERLINE 1500 Medium Voltage Motor Control Center Notes

CENTERLINE 1500 Medium Voltage Motor Control Center Notes

CENTERLINE 1500 Medium Voltage Motor Control Center Notes

CENTERLINE 1500 Medium Voltage Motor Control Center Notes

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
General Handling Procedures for Medium Voltage Controllers, publication MV-QS050	Provides information around receiving, storing, and moving medium voltage controllers
CENTERLINE 200/400 A Two-High Cabinet, Standard and Arc-Resistant Enclosure, publication 1500-UM055	Provides information on installation (standard and arc-resistant), maintenance, spare parts, and ArcShield enclosures for 200/400 A Two-High controllers
CENTERLINE 400 A One-High Cabinet, Standard and Arc-Resistant Enclosure User Manual, publication 1512A-UM100	Provides information on installation (standard and arc-resistant), maintenance, spare parts, and ArcShield enclosures for 400 A One-High controllers
CENTERLINE 600 A One-High Cabinet, Standard and Arc-Resistant Enclosure User Manual, publication 1512A-UM101	Provides information on installation (standard and arc-resistant), maintenance, spare parts, and ArcShield enclosures for 600 A One-High controllers
CENTERLINE 800 A One-High Cabinet, Standard and Arc-Resistant Enclosure User Manual, publication 1512A-UM102	Provides information on installation (standard and arc-resistant), maintenance, spare parts, and ArcShield enclosures for 800 A One-High controllers
CENTERLINE Medium Voltage SMC-50 Motor Controller User Manual, publication 1560F-UM001	Provides information on installation, commissioning, programming, metering, communications, diagnostics, maintenance, parameters, and ArcShield enclosures for SMC-50 motor controllers
Medium Voltage 450 A Contactor, Series G User Manual, publication 1502-UM060	Provides information on handling, installing, maintaining and troubleshooting 450 A medium voltage contactors
Medium Voltage Contactor 800 A, 2400...7200V (Series F) User Manual, publication 1502-UM054	Provides information on handling, installing, maintaining and troubleshooting 800 A medium voltage contactors
IntelliVAC Contactor Control Module, Series F User Manual, publication 1503-UM060	Provides information on storing, installing, commissioning, troubleshooting, spare parts, and product description for IntelliVAC Series F control module
E300/E200 Electronic Overload Relay Specifications, publication 193-TD006	Provides product overview, specifications, dimensions, catalog number explanation and features of the E300/E200 relay
E300 Electronic Overload Relay User Manual, publication 193-UM015	Provides information on system configuration, operating modes, trip and warning functions, metering diagnostics, troubleshooting, and wiring diagrams for the E300 relay
PowerMonitor 5000 Unit User Manual, publication 1426-UM001	Provides information on installing, metering, monitoring, maintenance, specifications, and product overview for the PowerMonitor 5000 Unit
FLEX I/O and FLEX I/O-XT Selection Guide, publication 1794-SG002	Provides information on FLEX I/O modules, communication adapters, terminal base units, power supplies, and accessories
30 mm Push Button Specifications, publication 800-TD009	Provides technical specifications for push buttons, selector switches, pilot lights, specialty devices, and accessories
EtherNet/IP Network Devices User Manual, ENET-UM006	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.
Ethernet Reference Manual, ENET-RM002	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.
System Security Design Guidelines Reference Manual, SECURE-RM001	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
UL Standards Listing for Industrial Control Products, publication CMPNTS-SR002	Assists original equipment manufacturers (OEMs) with construction of panels, to help ensure that they conform to the requirements of Underwriters Laboratories.
American Standards, Configurations, and Ratings: Introduction to Motor Circuit Design, publication IC-AT001	Provides an overview of American motor circuit design based on methods that are outlined in the NEC.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002	Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications.	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
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Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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