SIEMENS

Strantrol® Impact
Motor Controller
Variable Frequency Drive

More Standard Features

Means better control of Centrifugal Pump applications

The global leader in products, technologies, and services for water and wastewater treatment, Siemens delivers the family of Strantrol IMPACT Variable Frequency Drives, designed specifically for centrifugal pump systems and applications. Using the latest IGBT technology, the Variable Frequency Drives are PWM drives loaded with features for variable torque applications such as speed control on fans and pumps. Since drives are preconfigured with the correct parameters, startup, and commissioning is faster, resulting in more cost-effective installations.

Standard features that out power the competition

- Built-in SWT P1 and JCI N2 (Metasys®) building automation system protocols for easy network integration
- Optional LON®, Modbus® and BACnet® (available 2006) interfaces
- Unique low harmonics design minimizing the need for external filtering
- Built-in PID for fast accurate pressure control
- Pump controller staging/cascading for constant pressure, constant flow applications

- Multi-level program access
- Loss of prime detection with or without an external sensor
- Essential service mode for critical applications requiring continuous, uninterrupted operation
- Accepts a wide variety of digital and analog I/O types, including direct Ni1000 sensor level inputs
- One common interface throughout all power ranges
- Advanced Operator Panel (AOP) for uploading/downloading of parameters
- Full form C relay contacts for digital outputs

Total Harmonic Distortion Reduction Comparison

In tests between a typical 6 pulse PWM drive with and without line reactors and DC link chokes versus the VFD, the Siemens IMPACT Motor Controller demonstrated superior harmonic performance. In typical centrifugal pump applications, the VFD can reduce harmonics by up to 25% more than other VFDs, even with line reactors and DC link chokes.
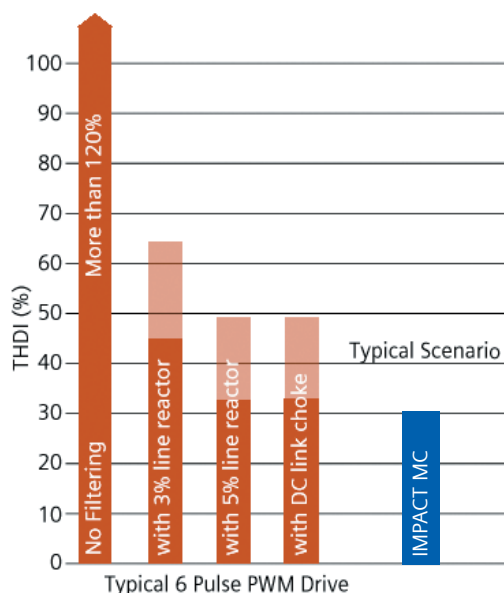
Lower harmonic design eliminates problems

The generation of harmonic currents on the AC line created by Variable Frequency Drives can lead to problems and increased installation costs. In addition, building design specifications often require compliance with IEEE 519 standard which limits the amount of harmonic current and voltage distortion allowed on the power system. Other products solve the problem by adding more equipment, more complexity and more cost.

The Siemens VFDs use a unique low harmonic design that eliminates the need for DC link chokes and line reactors. In addition, Harmonee® software calculates the harmonic distortions produced by the drive on your electrical system and compares them to IEEE standards to ensure compliance. The result is reduced expenses and the ability to use a smaller drive. That adds up to dollars and sense.

Complete offering, backed by Siemens

Siemens offers the most complete line of Variable Frequency Drives from a single source –UL/NEMA Type 1, 12, 3R, electronic bypass and conventional bypass options. In addition, Siemens delivers a comprehensive line of commercial pool and spa products. These include acid-free pH control systems, other water chemistry controllers, and mechanical accessories. All products are backed by Siemens expert technical support.

Key features and benefits

- Modular construction allows maximum flexibility in configuration
- Quiet motor operation
- Complete inverter and motor protection
- Main power and motor cable connections are separated for optimum electromagnetic capability
- Detachable operator panels for flexibility in installation
- Latest IGBT technology
- Digital microprocessor control for accuracy
- Flying restart eliminates the need for a mechanical break

- Slip compensation
- Automatic restart after power failure or fault to get you back up and running fast
- Auto-tuning PID controller for fast, accurate setup
- Programmable acceleration/deceleration, 0 to 650 seconds
- Ramp smoothing
- Fast current limit (FCL) for tip free operation
- Fast, repeatable digital input response time
- Fine speed adjustment using two high-resolution 10-bit analog inputs

General specifications

Input voltage and power ranges (3 phase)	200 to 240 Vac ± 10% 380 to 480 Vac ± 10% 500 to 600 Vac ± 10%	1/2 to 60 HP 1 to 125 HP 1 to 125 HP
Input frequency	47 to 63 Hz	
Output frequency	0 to 150 Hz	
Total power factor	≥0.9	
Displacement power factor	≥0.98	
VFD efficiency	96 to 97% or greater	
Overload capability	110% for 60 seconds	
Control method	Linear V/f, parabolic V/f (fan curve); flux current control (FCC) low-power mode	
PWM frequency	4 to 16 kHz (adjustable in 2 kHz increments)	
Fixed frequencies	15: programmable	
Skip frequency bands	4: programmable	
Setpoint resolution	0.01Hz digital 0.01Hz serial 10 bit analog	
Digital inputs (sink/source)	6: fully programmable and scalable isolated digital inputs, switchable	
Analog inputs	2: 0 to 10 VDC, 0/4 to 20 mA, can also be configured as digital inputs or Ni1000 input	
Relay outputs	2: configurable 30 VDC/5A (resistive), 250 VAC 2A (inductive)	
Analog outputs	2: programmable 0 to 10 VDC or 0/4 to 20 mA	
Serial interface	RS-485, SBT-P1; JCI-N2, Siemens USS bus (optional Modbus®, LON®, BACnet®)	
Protection level	IP20 (NEMA Type 1 with protective shield and gland plate installed); IP54 (NEMA Type 12)	
Temperature range	14 to 104°F (-10 to +40°C)	
Storage range	-40 to +158°F (-40 to +70°C)	
Humidity	95% RH – non-condensing	
Operational altitudes	Up to 1000 m above sea level without derating	
Protection features	Under-voltage Over-voltage Ground Fault Short circuit Stall prevention Locked motor Motor over temperature l 2t, PTC VFD over-temperature Parameter PIIN protection	
Standards	UL, cUL, CE, C-tick	
CE marked	Conformity with EC Low Voltage Directive 72/23/EEC and 89/336/EEC	

More connections for greater flexibility in applications

Power and control interface connection diagram
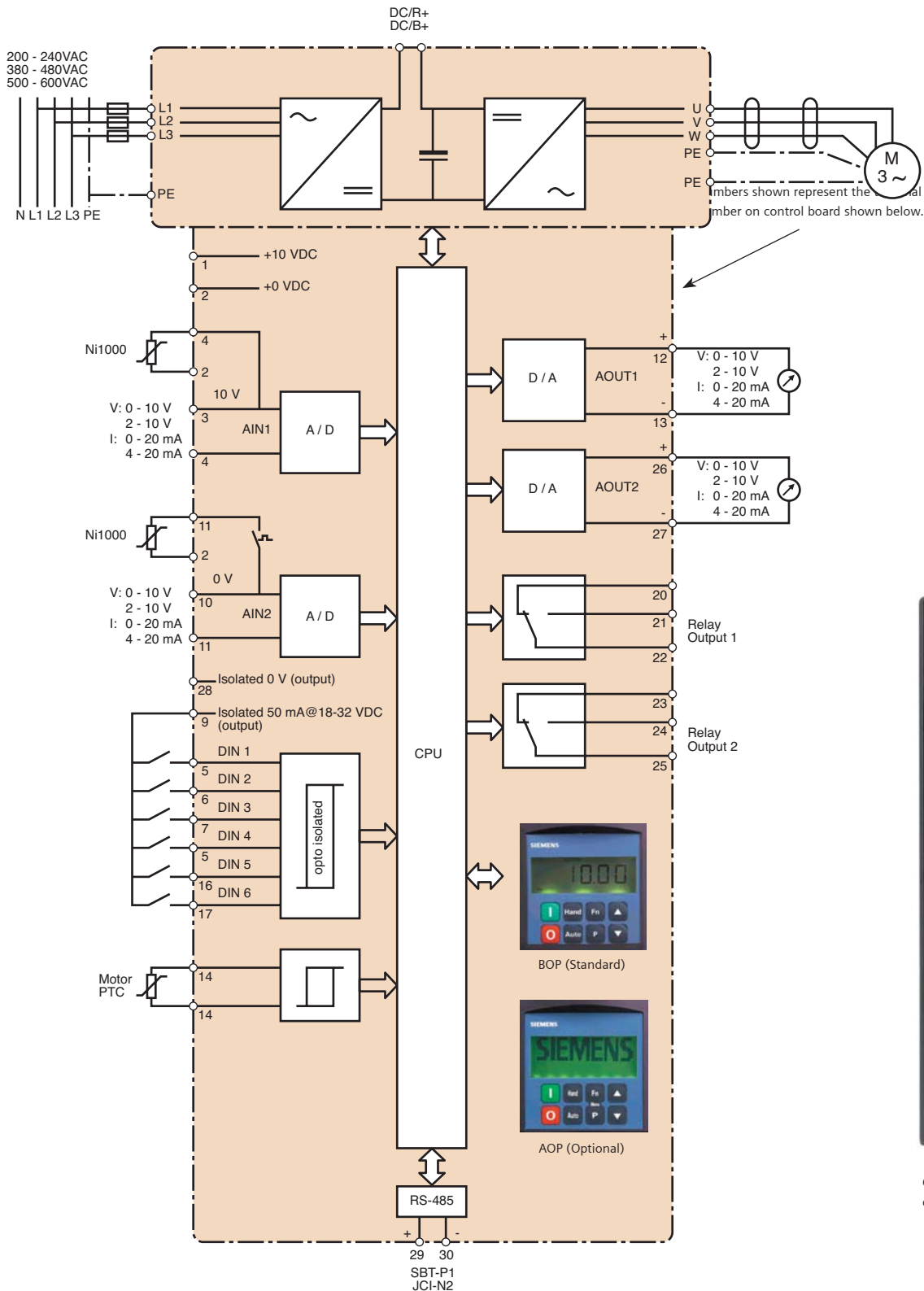
Control terminals of the VFD shown with cover removed.

Configuration guides

Instructions

To select a part number, perform the following with the chart provided.

Example: MC-0.75/21X

Motor Controller only, 0.75 kW, 200 to 240V, NEMA Type 1

Example: MCBA340.F120X

Motor Controller with bypass, 480V, 40 HP, fused disconnect, NEMA 1, 2-contractors

Ordering Notes

For ordering bypass-door mounted control devices, the following options are available:

2-Contractor units
- Drive-Off-Bypass selector
- Bypass pilot light

3-Contractor units
- Drive-Off-Bypass selector
- Bypass pilot light
- Drive Test On/Off selector

IMPACT-MC

Product Number		M	C	-	0	.	7	5	/	2	1	X		
Model														
	MC = Motor Controller Only													
kW														
	0.37, 0.55, 0.75, 1.1, 1.5, 2.2, 3, 4, 5.5, 7.5, 11, 15, 18.5, 22, 30, 37, 45, 55, 75, 90	(Uses 2 to 4 spaces plus "/" divider)												
Voltage														
	2 = 200 to 240V 3 = 380 to 480V 4 = 500 to 600V													
NEMA														
	2 = (IP20) 1 = NEMA Type 1 5 = NEMA Type 12 (IP54)													
Filter														
	X = Factory required designator													

IMPACT-MC with Bypass

Product Number		M	C	B	A	4	4	0	.	F	1	2	0			
Model																
	MCB = Motor Controller with Bypass															
Series																
	A = Conventional Bypass E = Electronic Bypass															
Voltage	1 = 208V 2 = 230 to 240V 3 = 380 to 480V 4 = 500 to 600V															
HP Rating	0.5, 0.7, 1.0, 1.5, 2.0, 3.0, 4.0 5.0, 7.5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 100, 125															
Disconnect	D = Disconnect F = Fused Connect B = Circuit Breaker															
NEMA rating	1 = NEMA Type 1 3 = NEMA type 3R															
Contractors	2 = 2 Contractors 3 = 3 Contractors															
Reactor	0 = None 3 = Line Reactor L = Load Reactor															
Filter	X = Factory required designator															
Options	HA1 = High amp rating HT1 = High temp rating (NEMA 3R only)															

Variable Frequency Drives

Designed specifically for Centrifugal Pump applications, the family of VFDs supports a wide variety of digital and analog inputs and outputs for maximum control flexibility. Built-in PID features control pumps and an integral system protocol can interface P1/N2 networks. Using the multi-level parameter access, operators can quickly pinpoint relevant data.

Features

- Built-in SWT P1 and JCI N2 (Metasys®) building automation system protocols for easy network integration
- Low harmonics design reduces noises and interference eliminates the need for filters/reactors in most installations
- Built-in PID for fast and accurate pressure control
- Pump staging for open loop, constant pressure, and constant flow-type applications
- Multi-level program access
- Loss of prime detection with or without an external sensor
- Service mode for applications requiring continuous, uninterruptible operation
- Accepts a wide variety of digital and analog I/O types, including direct Siemens Ni1000 RTD sensor level inputs
- One common interface throughout all power ranges
- Full form C relay contacts for digital outputs

Options

- LON® Interface
- Modbus® Interface
- BACnet® Interface
- Advanced Operator Panel (AOP) Module

VFD with Electronic (E) Bypass Option

Electronic (E) Bypass Options are companion packages for Variable Frequency Drives that provides electronic control and simple keypad operation to streamline installation, simplify control wiring, and improve system reliability.

E-Bypass Features

- Enhanced visual interface for improved monitoring and diagnostics
- E-Bypass guarantees continuous operation even it VFD fails
- Electronic touch-sensitive keypad
- Service mode isolates drive from the control scheme
- Six relay outputs for indication of operation
- LED indicators for monitoring and operation
- Six digital inputs Remote start via networking
- Contactors electrically and mechanically interlocked

2-Contactor: Output and Bypass with overload protection in bypass mode

3-Contactor (optional): Output, Bypass and Input providing drive test function and complete electrical isolation of drive

Input Device includes: disconnect, fused disconnect (optional) and circuit breaker (optional). All doors are interlocked and padlockable.

Reactor Options include: Line reactor mounted in bypass option enclosure; line reactor (in NEMA 1 enclosure) supplied separately; load reactor mounted in bypass option enclosure and load reactor (in NEMA 1 enclosure) supplied separately.

E-Bypass Control Features

Auto Bypass allows user to send the motor to bypass mode based on the drive's programmable relay, typically set to fault.

Two Enable Inputs are generally used for safety tie-ins; the motor will not operate in drive or bypass when open.

Common Remote Start/Stop can be used in both drive and bypass mode.

Essential Services Mode is typically used for smoke purge; the motor goes to bypass regardless of the selected mode. No call to stop will have an effect, including open safety or stop commands. Only turning the power off or opening this contact will stop the motor.

Options

- LON® Interface
- Modbus® Interface
- BACnet® Interface
- Advanced Operator Panel (AOP) Module

VFD with Conventional (A) Bypass Option

Conventional Bypass Options are companion packages for Variable Frequency Drives that streamlines installation and simplifies control wiring.

Bypass Power Features

2-Contactor: Output and Bypass provides overload protection in bypass mode with a step-down transformer with fused primary and secondary. Contactors are electrically and mechanically interlocked.

In addition to the 2-Contactor features, **3-Contactor (optional): Output, Bypass and Input**, providing drive test function and complete electrical isolation of drive.

Input Device includes: disconnect, fused disconnect (optional) and circuit breaker (optional). All doors are interlocked and padlockable.

Reactor Options include: Line reactor mounted in bypass option enclosure; line reactor (in NEMA 1 enclosure) supplied separately; load reactor mounted in bypass option enclosure and load reactor (in NEMA 1 enclosure) supplied separately.

Bypass Control Features

Auto Bypass allows user to send the motor to bypass mode based on the drive's programmable relay, typically set to fault.

Enable Input is generally used for safety tie-ins; the motor will not operate in drive or bypass when open.

Common Remote Start/Stop can be used in both drive and bypass mode.

Essential Services Mode is typically used for smoke purge; the motor goes to bypass regardless of the selected mode. No call to stop will have an effect, including open safety or stop commands. Only turning the power off or opening this contact will stop the motor.

Bypass-Door-Mounted Control Devices Features

2-Contactor Units include: Drive-Off-Bypass selector and bypass pilot light

3-Contactor Units include: Drive-Off-Bypass selector, Bypass pilot light and Drive Test On/Off selector.

Options

- LON® Interface
- Modbus® Interface
- BACnet® Interface
- Advanced Operator Panel (AOP) Module

VFD with NEMA 3R (A) Bypass Option or VFD only

The NEMA Type 3R Bypasses are companion packages for the family of IMPACT Variable Frequency Drives. NEMA Type 3R enclosed bypasses are manufactured for outdoor locations. The 3R rating provides a degree of protection to the enclosed VFD and electrical control components. A heater is supplied to protect against condensation.

Bypass Power Features

2-Contactor: Output and Bypass provides overload protection in bypass mode with a step-down transformer with fused primary and secondary. Contactors are electrically and mechanically interlocked.

In addition to the 2-Contactor features, *3-Contactor (optional): Output, Bypass and Input*, providing drive test function and complete electrical isolation of drive.

Input Device includes: disconnect and fused disconnect (optional). All doors are interlocked and padlockable.

Reactor Options include: Line reactor mounted in bypass option enclosure; line reactor (in NEMA 3R enclosure) supplied separately; load reactor mounted in bypass option enclosure and load reactor (in NEMA 3R enclosure) supplied separately.

Bypass Control Features

Auto Bypass allows user to send the motor to bypass mode based on the drive's programmable relay, typically set to fault.

Enable Input is generally used for safety tie-ins; the motor will not operate in drive or bypass when open.

Common Remote Start/Stop can be used in both drive and bypass mode.

Essential Services Mode is typically used for smoke purge; the motor goes to bypass regardless of the selected mode. No call to stop will have an effect, including open safety or stop commands. Only turning the power off or opening this contact will stop the motor.

Bypass-Door-Mounted Control Devices

2-Contactor Units include: Drive-Off-Bypass selector and bypass pilot light

3-Contactor Units include: Drive-Off-Bypass selector, Bypass pilot light and Drive Test On/Off selector.
3R Units available with no bypass

Options

- LON® Interface
- Modbus® Interface
- BACnet® Interface
- Advanced Operator Panel (AOP) Module

Options

Description	Quantity	Part No.
BOP/AOP Door Mounting Kit Allows remote mounting of operator panels and provides IP56 protection. No special cables needed. • Single VFD • Multiple VFDs	1 1	**5950021** **5950022**
Modbus® Interface Cable Converts VFDs USS bus to Modbus® RTU; 3' in length.	1	**1986002**
LON Interface Module Provides direct connection to LON network and communication with LONMARK® devices. Module allows read/write access to more than 40 parameters; mounts compactly behind operator panel and provides simple wiring access.	1	**5880122**
Advanced Operator Panel (AOP) • Plain text LCD display for reading VFD data in seven languages • Allows uploading and downloading of parameters from multiple VFDs • Up to 10 parameter sets can be stored and downloaded into separate VFDs • Includes an integrated scheduler function	1	**6489021**
EasyComm Drive Programming Software (requires PC Interface)	1	**7050008**
PC Interface	1	**6489022**
Harmonee® Software	1	**7050009**