SP200 AC Drive
Quick Start Guide

Commande SP200 AC
Guide de mise en route Quick Start

Frequenzumrichter SP200
Kurzanleitung

Inverter SP200
Guida di avviamento rapido

Inversor CA SP200
Guia de Inicialização Rápida

Guía rápida del variador de velocidad para motores de corriente alterna SP200

Manuel d'utilisation
Bedienerhandbuch
Manuale delle instruzioni
Manual de Instruções
Manual de instrucciones
Instruction Manual D2-3418-1

Rockwell Automation
Reliance Electric

The information in this manual is subject to change without notice.

Throughout this manual, the following notes are used to alert you to safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Important: Identifies information that is critical for successful application and understanding of the product.

ATTENTION: Only qualified personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this document in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: After disconnecting input power, wait three minutes to insure that DC bus capacitors are discharged. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The user is responsible for conforming with all applicable local and national codes. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Checking the direction of motor rotation requires rotating parts and/or electrical circuits to be exposed. Stay clear if the motor must be running. Disconnect, lockout, and tag the power source if contact must be made. Failure to observe this precaution could result in severe bodily injury or loss of life.

The SP200 Quick Start is intended to provide basic information about the SP200 AC Drive. It is intended for users experienced in installing and operating drives.

The SP200 AC Drive instruction manual (D2-3408) provides detailed information regarding drive installation, wiring, programming, and troubleshooting. Instruction manual D2-3408 is currently available in English only. However, if you indicate your choice of languages on the form on the following page, a manual in the requested language will be sent to you when it is available.

Le guide de mise en route SP200 Quick Start est conçu pour fournir l'information de base concernant le variateur de vitesse SP200. Il est prévu à l'usage des personnes possédant de l'expérience en matière d'installation et de fonctionnement de tels produits.

Le manuel d'utilisation du variateur SP200 (D2-3408) fournit des renseignements détaillés au sujet de l'installation, du câblage, de la programmation et du dépannage du variateur. Le manuel d'utilisation D2-3408 n'est actuellement disponible qu'en anglais. Toutefois, si vous indiquez la langue de votre choix sur le formulaire de la page suivante, un manuel vous sera expédié dans la langue demandée dès lors qu'il sera disponible.

Die Kurzanleitung SP200 enthält die wesentlichsten Angaben für den Frequenzumrichter SP200 und richtet sich an Bediener, die bereits Erfahrung mit der Montage und dem Betrieb von Antrieben aufweisen.

Das Bedienerhandbuch Frequenzumrichter SP200 (D2-3408) liefert detaillierte Angaben zu Montage, Verdrahtung, Programmierung und Fehlersuche. Das Bedienerhandbuch D2-3408 liegt gegenwärtig nur auf Englisch vor. Sollten Sie dieses jedoch in einer der auf der nächsten Seite angeführten Sprachen benötigen, so kreuzen Sie bitte die entsprechende Sprache an, und Sie erhalten das Handbuch in der gewünschten Sprache, sobald es verfügbar ist.

La guida di avviamento rapido dell'SP200 ha lo scopo di fornire informazioni di base sull'inverter SP200. La guida si rivolge ad utenti esperti nell'installazione e nell'uso degli inverter.

Il Manuale delle istruzioni sull'inverter SP200 (D2-3408) fornisce informazioni dettagliate sull'installazione, i collegamenti elettrici e la diagnostica dell'inverter. Al momento il manuale delle istruzioni è disponibile solo in Inglese. Tuttavia, se sul modulo a pagina seguente ci indicherete la vostra lingua preferita, una copia del manuale in detta lingua vi verrà spedito quando sarà disponibile.

O SP200 Quick Start é projetado para fornecer informações básicas sobre o Inversor CA SP200. É projetado para os usuários experientes na instalação e operação de inversores.

O manual de instrução do Inversor CA SP200 (D2-3408) fornece informações detalhadas com relação à instalação, fiação, programação e solução de problemas do inversor. Atualmente, o manual de instrução D2-3408 só está disponível em inglês. Contudo, se você indicar a sua opção de idiomas no formulário da página seguinte, lhe enviaremos um manual no idioma solicitado, quando estiver disponível.

La *Guía rápida SP200* está diseñada para proporcionarle información básica acerca del variador de velocidad para motores de corriente alterna SP200. La guía está orientada a los usuarios con experiencia en la instalación y funcionamiento de reguladores de velocidad variable.

El manual de instrucciones (D2-3408) del variador de velocidad para motores de corriente alterna SP200 ofrece información detallada acerca de la instalación, cableado, programación, identificación y solución de fallos del variador. Actualmente, el manual de instrucciones D2-3408 se encuentra disponible sólo en inglés. Sin embargo, si usted indica el idioma de su preferencia en el formulario que aparece en la siguiente página, se le enviará un manual en el idioma solicitado tan pronto como esté disponible.

=:

Request for SP200 AC Drive Instruction Manual D2-3408
Demande de Manuel d'utilisation D2-3408 pour le variateur de vitesse SP200
Vormerkung für Bedienerhandbuch D2-3408 für den Wechselstromantrieb SP200
Richiesta del manuale D2-3408 con le istruzioni sull'inverter SP200
Solicitação para o Manual D2-3408 de Instrução do SP200 AC
Solicitud de manual de instrucciones D2-3408 del variador de velocidad para motores de corriente alterna SP200

Copy this form. Complete the mailing information below. Mail or fax the completed form to:
Photocopier ce formulaire et remplir la partie ci-dessous concernant le destinataire. Envoyer par la poste ou télécopier le formulaire rempli à:
Kopieren Sie bitte dieses Formular und geben Sie Ihre genaue Anschrift an. Senden Sie das Formular per Post oder Fax an:
Copiare questo modulo. Compilarlo. Spedirlo per posta o fax a:
Copie este formulário. Preencha a informação para correspondência abaixo. Envie o formulário preenchido por correio ou fax.
Copie este formulario. Llene la información postal que aparece en la parte inferior. Envíe el formulario por correo o fax a:

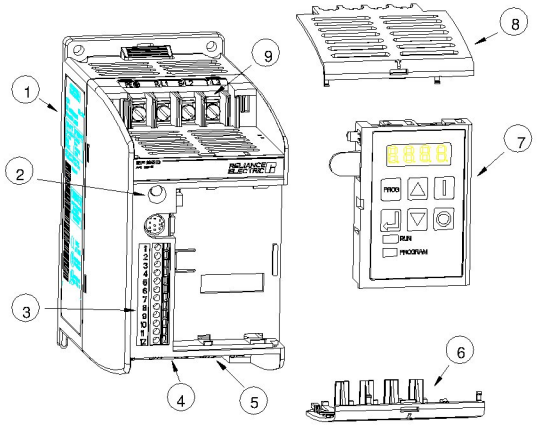
Reliance Electric Company
RGA - Attn: Annie Brown
25001 Tungsten Road
Cleveland, OH 44117
USA

Fax: 216.266.7120

- ❒ English
- ❒ Français
- ❒ Deutsch
- ❒ Italiano
- ❒ Português
- ❒ Español

Name/Nom/Nome/Nombre			
Company/Enterprise/Firma/Società/Empresa/Compañía			
Street Address/Adresse (Rue)/Straße/Indirizzo/Endereço/Dirección			
City/State/Ville/Stadt/Città/Cidade/Ciudad		Zip/Code Postal/Postleitzahl Codice Postale/Zona Postal/Zona	
Country/Pays/Land/Nazione/País			

Drive Identification



Item	Description
1	Nameplate
2	OK (green) / Fault (red) LED
3	Control Signal Terminal Block
4	Motor Output Terminal Block
5	Fan
6	Bottom Finger Guard
7	Optional Local Keypad
8	Top Finger Guard
9	AC Input Power Terminal Block

SP200 AC Drive Components

S20-4 0 3P5 A1 0 0 0

SP200

Voltage

Input / Output

2 = 200-240 V, 3-phase; 230 V, 3-phase

4 = 380-480 V, 3-phase; 460 V, 3-phase

X = Selectable:
100-120 V, 1-phase; 230 V, 3-phase
or
200-240 V, 1-phase; 230 V, 3-phase

Y = 200-240 V, 1-phase; 230 V, 3-phase

Enclosure Type

0 = Protected chassis

Output Current (Horsepower)

1P3 = 1.3 A (0.5 HP)
2P0 = 2.0 A (1.0 HP)
2P3 = 2.3 A (0.5 HP)
3P5 = 3.5 A (2.0 HP)
4P2 = 4.2 A (1.0 HP)
6P0 = 6.0 A (1.5 HP)
7P0 = 7.0 A (2.0 HP)

Model (Control Type)

A1 = Single Channel Analog
B1 = Preset Speed
C1 = Dual Channel Analog

(Reserved - not used)

(Reserved - not used)

(Reserved - not used)

Model Number Structure

Technical Specifications

AC Input Voltage[1]	AC Output Voltage	HP	Input Current (Amps)	Output Current (Amps)	Fuse Rating[2] (Amps)	Circuit Breaker Rating[3] (A)	Typical Power Loss (W)
100-120, 1-phase	230, 3-phase	0.5	9.4	2.3	15 or 16	15	25
		1.0	17.2	4.2	30	30	45
		1.5	24.6	6.0	40	40	70
200-240, 1-phase	230, 3-phase	0.5	4.7	2.3	10	10	25
		1.0	8.6	4.2	15 or 16	15	45
		1.5	12.3	6.0	20	20	70
		2.0	14.3	7.0	25	25	75
200-240, 3-phase	230, 3-phase	0.5	2.7	2.3	6	5	25
		1.0	5.0	4.2	10	7	40
		2.0	8.3	7.0	15 or 16	15	70
380-460, 3-phase	460, 3-phase	0.5	1.5	1.3	3 or 4	3	25
		1.0	2.4	2.0	6	4	30
		2.0	4.1	3.5	10	7	50

[1] The input voltage range has a tolerance of ±10%, 47 to 63 Hz.
[2] Recommended fuse type: UL Class J or CC, 600 V, time delay.
[3] Device must meet UL 489 for UL purposes.

Control Inputs

- Rated voltage: 10 VDC to 24 VDC (±10%)
- Load (each): 10 mA minimum, 20 mA maximum
- Maximum allowable off-state leakage current: 1.5 V / 2.0 mA

Speed Reference Input

- Analog input impedance: 0 to 10 V: ≥100 kΩ
  4 to 20 mA input: ~250 Ω

Relay Output

- Rated current and voltage: 0.5 A maximum at 125 VAC
  1.0 A maximum at 30 VDC

Operating Performance

- Input frequency resolution: 0.4% analog, 0.1 Hz digital
- Output frequency resolution: 0.1%
- Output voltage regulation: 3%
- Power dip control ride through time: 100 msec minimum

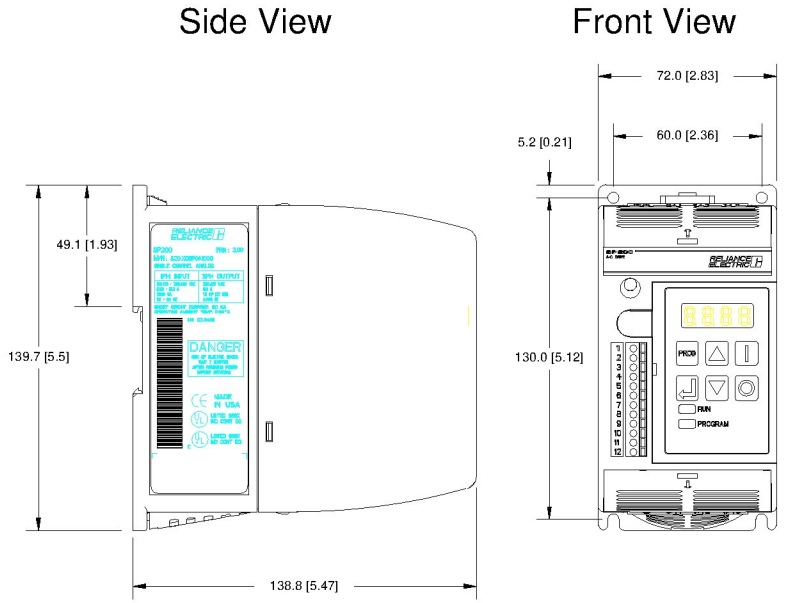
Ambient Conditions

- Operating temperature: 0 to 50°C (32°F to 122°F)
- Storage temperature: -40°C to 85°C (-40° F to 185°F)
- Humidity: 0 to 95% non-condensing
- Elevation: 1000 meters (3300 ft) maximum without derating. For every 91.4 meters (300 ft) above 1000 meters, derate the current by 1%. Above 3000 meters, (10,000 ft), consult your Reliance Electric Sales Office.

Standards and Approvals

- UL508C
- CSA22.2
- EN50178, EN60204-1 for Low Voltage Directive
- EN50081-1, EN50082-2, parts of EN61800-3 for EMC

Mounting and Clearance Dimensions



- Top and bottom clearance is 38.1 mm [1.5 in].
- Side clearance is 25.4 mm [1.0 in] on the right if installation/removal of the keypad is required.

Wiring AC Power and Control Terminals

The following Attention statements apply to the wiring diagram on the facing page:

ATTENTION: This equipment is at line voltage when AC power is connected. Disconnect and lockout all ungrounded conductors of the AC power line before working on the unit. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: Many local and national electrical codes require that an input disconnect be provided in the incoming power lines. Failure to observe this precaution could result in severe bodily injury or loss of life.

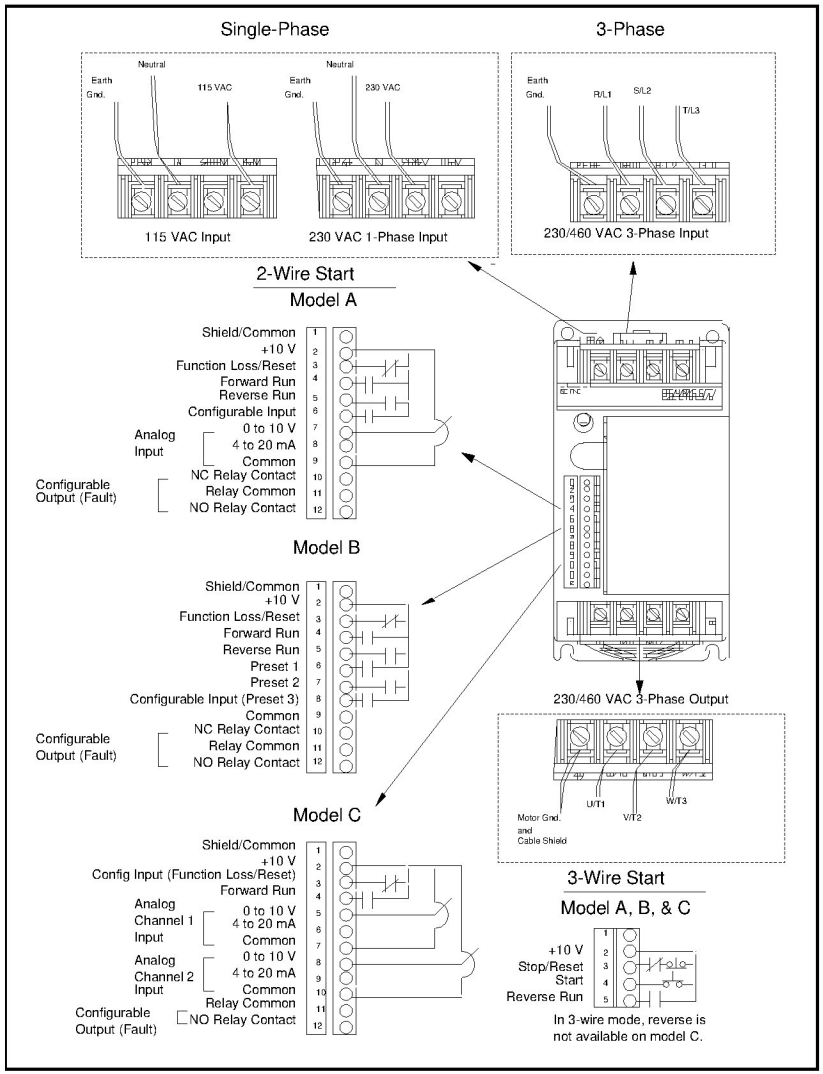
ATTENTION: Many local and national electrical codes require that upstream branch protection be provided to protect input power wiring. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: If the distribution system capacity exceeds the drive's maximum symmetrical fault short-circuit current of 100,000 amps, additional impedance must be added to the AC line supplying the drive to limit available current in the event of a fault. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ATTENTION: The user must provide an external, hardwired emergency stop circuit outside of the SP200 drive circuitry. This circuit must disable the system in case of improper operation. Uncontrolled machine operation may result if this procedure is not followed.Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: If 2-wire control is selected, the drive will immediately run when powered up in the presence of a forward or reverse run command. Failure to observe this precaution could result in severe bodily injury or loss of life.

ATTENTION: The 4-pin circular connector (located directly above the control terminals) may increase to a hazardous voltage level if the control shield terminal (terminal 1) is left ungrounded. Failure to observe this precaution could result in severe bodily injury or loss of life.



Power Terminal Information

- The terminal blocks accept up to 4 mm^2 (12 AWG) wire.
- The recommended tightening torque is 1.35 Nm (12 in-lb).

Control Terminal Information

- The terminal block is isolated from input power.
- Control wires should be shielded and routed separately from the power wires.
- The terminal block accepts 0.14 mm^2 (26 AWG) to 1.5 mm^2 (16 AWG) wire.
- The maximum control wire length is 30 meters (100 ft).

Motor Cable Recommendations

Drive-to-Motor Cable Distance

The cable distance between the drive and motor is limited for the following two reasons:

1. Long drive-to-motor cables can produce peak voltages that can damage motors having an electrical insulation system less than that of MG-1 (1600 V). The use of output line reactors can affect the limit. Use the table on the following page to determine the maximum distance that may be applied with a non MG-1 motor (for example, a motor with an insulation of 1000 V peak).
2. Long drive-to-motor cables also produce current that is capacitively coupled to ground. This can cause the drive to fault and misrepresent the cause. The use of output line reactors and cable shields or conduit can affect the limit. Use the table on the following page to determine the maximum distance under which the SP200 drive may be applied.

Both of the limitations described above must be considered for your installation. The smaller of these two numbers will dictate your final limit.

Drive-to-Motor Wire Type

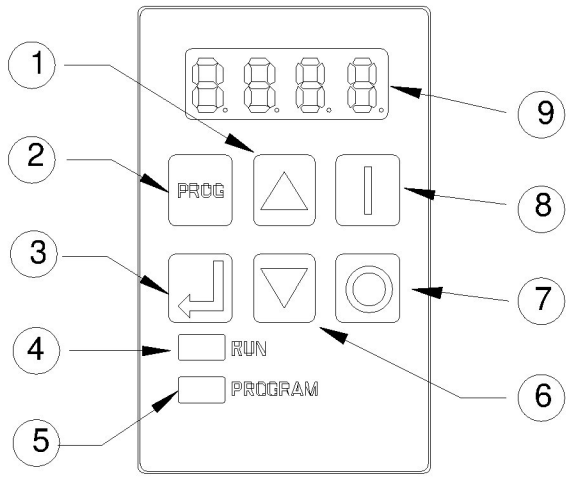
The type of wire that is recommended to be used between the drive and motor is dependent on the environment in which it is used. The use of wire with PVC (PolyVinyl Chloride) insulation is restricted to certain conditions. A common example of this wire type is THHN. In these conditions where PVC is not recommended, XLPE (Cross Linked PolyEthylene) is recommended. An example of this wire type is XHHW-2. The action of pulling wire through 90° bends in conduit removes some of the wire's insulation. For this reason, extra care should be taken during this process and a wire with above average insulation thickness should be chosen.

Condition	Recommended Wire Type(s)	
	Insulation Type(s)	Example(s)
Dry	PVC[1] XLPE	THHN XHHW-2
Wet	XLPE	XHHW-2

[1] When using wire with PVC type insulation, standard 15mil thickness is adequate under normal conditions; however, when multiple motor's wires are run in the same conduit for more than 50 ft (15m), and the voltage is greater than 240V + 10%, 20 mil or greater thickness is recommended.

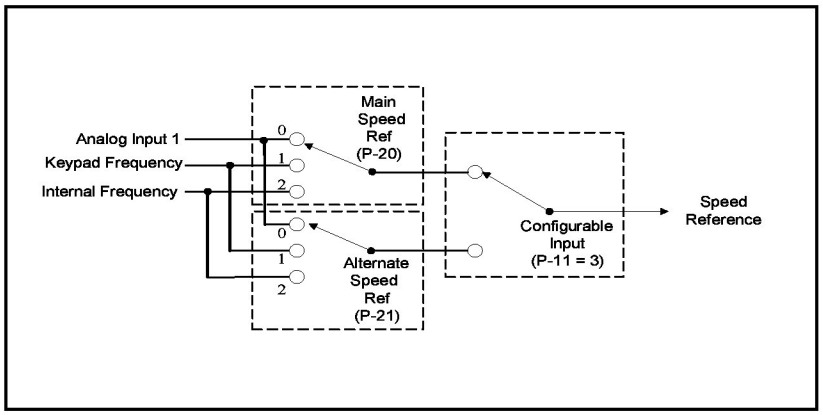
Reactor	Drive Rating		1000 V Motor Limit		SP200 Drive Limit															
					Shielded Cable or Wires in Conduit								Unshielded Cable							
					2 kHz		4 kHz		6 kHz		8 kHz		2 kHz		4 kHz		6 kHz		8 kHz	
	Input Volts	HP (kW)	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
None	120 / 240	0.5 (0.37)	—	—	250	76	250	76	250	76	200	61	600	183	600	183	600	183	600	183
	120 / 240	1.0 (0.75)	—	—	500	152	500	152	400	122	300	91	600	183	600	183	600	183	600	183
	120 / 240	1.5 (1.1)	—	—	600	183	600	183	500	152	300	91	600	183	600	183	600	183	600	183
	240	2.0 (1.5)	—	—	600	183	600	183	500	152	300	91	600	183	600	183	600	183	600	183
	460	0.5 (0.37)	50	15	100	30	100	30	100	30	90	27	175	53	175	53	175	53	150	46
	460	1.0 (0.75)	25	8	120	37	100	30	100	30	100	30	300	91	300	91	300	91	300	91
	460	2.0 (1.5)	20	6	220	67	180	55	180	55	100	30	400	122	400	122	400	122	400	122
3 % at Drive	120 / 240	0.5 (0.37)	—	—	400	122	300	91	300	91	100	30	600	183	600	183	600	183	600	183
	120 / 240	1.0 (0.75)	—	—	500	152	300	91	300	91	200	61	600	183	600	183	600	183	600	183
	120 / 240	1.5 (1.1)	—	—	600	183	400	122	300	91	200	61	600	183	600	183	600	183	600	183
	240	2.0 (1.5)	—	—	600	183	400	122	300	91	200	61	600	183	600	183	600	183	600	183
	460	0.5 (0.37)	15	5	120	37	100	30	100	30	90	27	200	61	200	61	200	61	150	46
	460	1.0 (0.75)	40	12	180	55	140	43	100	30	100	30	600	183	600	183	600	183	400	122
	460	2.0 (1.5)	80	24	220	67	200	61	170	52	130	40	600	183	600	183	600	183	200	183
3 % at Motor	120 / 240	0.5 (0.37)	—	—	300	91	280	85	280	85	280	85	600	183	600	183	600	183	600	183
	120 / 240	1.0 (0.75)	—	—	600	183	600	183	500	152	400	122	600	183	600	183	600	183	600	183
	120 / 240	1.5 (1.1)	—	—	600	183	600	183	500	152	300	91	600	183	600	183	600	183	600	183
	240	2.0 (1.5)	—	—	600	183	600	183	500	152	300	91	600	183	600	183	600	183	600	183
	460	0.5 (0.37)	300	91	100	30	100	30	100	30	90	27	175	53	175	53	175	53	150	46
	460	1.0 (0.75)	300	91	120	37	100	30	100	30	100	30	300	91	300	91	300	91	300	91
	460	2.0 (1.5)	300	91	200	61	200	61	200	61	170	52	400	122	400	122	400	122	400	122

Local Keypad Operation



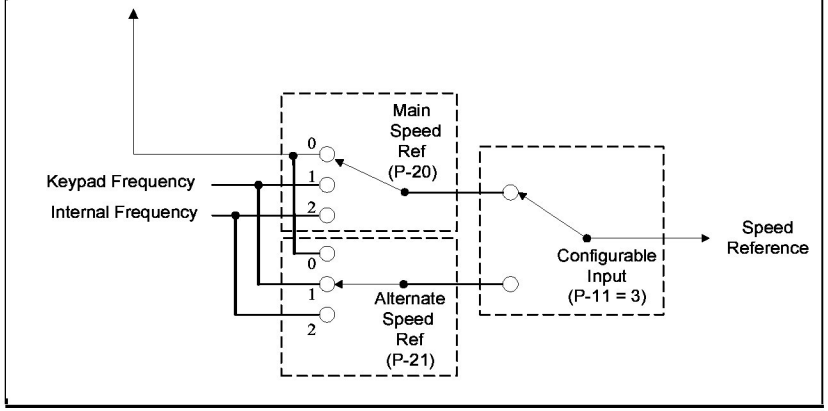
1	In display mode, the UP ARROW key increments the local speed reference. In program mode, this key increments the parameter number or parameter value.
2	The PROGRAM key toggles between display and program modes. The PROGRAM LED (5) turns on when the drive is in program mode.
3	In display mode, the ENTER key increments to the next display parameter. In program mode, this key toggles between the parameter number and parameter value.
4	The RUN LED turns on when the drive is running in either the foward or reverse direction. The RUN LED flashes while the drive is changing direction.
5	The PROGRAM LED turns on when the drive is in program mode.
6	In display mode, the DOWN ARROW key decrements the local speed reference. In program mode, this key decrements the parameter number or parameter value.
7	The STOP key issues stop and fault reset commands to the drive.
8	The START key issues start commands to the drive when P-10 = 1.
9	The display shows either a parameter number or a parameter value. The parameter numbers are preceded by either a “P-” or a “d-”.

Selecting a Speed Reference

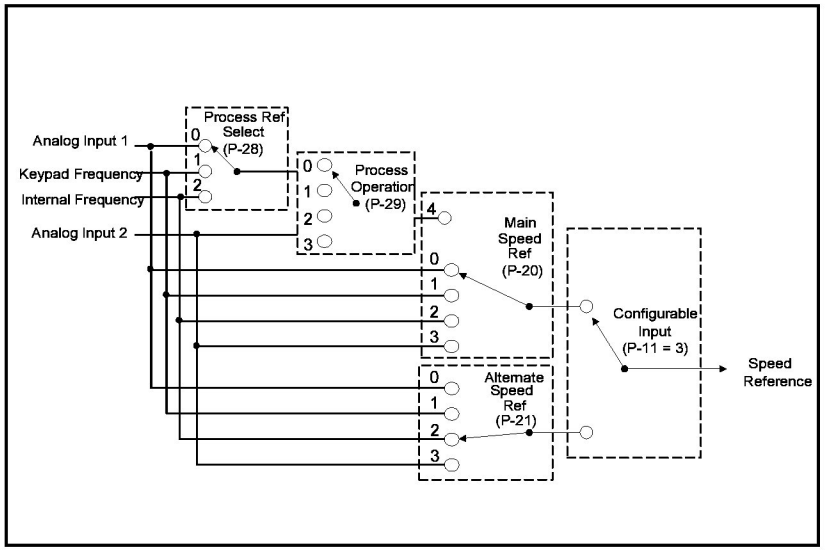


Speed Reference Source for Model A Drives

Input Terminal Status			Resulting Speed	
Term 8	Term 7	Term 6	Parameter	
0	0	0	41	Preset Speed 1
0	0	1	42	Preset Speed 2
0	1	0	43	Preset Speed 3
0	1	1	44	Preset Speed 4
1	0	0	45	Preset Speed 5
1	0	1	46	Preset Speed 6
1	1	0	47	Preset Speed 7
1	1	1	48	Preset Speed 8



Speed Reference Source for Model B Drives



Speed Reference Source for Model C Drives

Drive Parameters

Display Parameters (Read Only)						
No.	Name	Units / Default	Range	Model A	Model B	Model C
d-00	Command Frequency	0.1 Hz	0 - 240.0	x	x	x
d-01	Output Frequency	0.1 Hz	0 - 240.0	x	x	x
d-02	Output Current	0.1 A	0 - 200 (% of rated current)	x	x	x
d-03	Bus Voltage	1 V	0 - 1000	x	x	x
d-04	Fault Code	Annn	alphanumeric code	x	x	x
d-05	Input Status	decimal	0000 - 7111	x	x	x
d-06	Drive Rating	decimal		x	x	x
d-07	Firmware Version	Annn	alphanumeric code	x	x	x
d-08	Analog Input 1 Units	0.1 %	0 - 110.0	x		x
d-09	Analog Input 2 Units	0.1 %	0 - 110.0			x

Program Parameters (Parameters that can be programmed only while the drive is stopped are indicated by an asterisk *)						
No.	Name	Units / Default	Range	Model A	Model B	Model C
Group 0: Protection						
P-00	Minimum Speed *	0 Hz	0 - Maximum Speed	x	x	x
P-01	Maximum Speed *	60 Hz	Minimum Speed - 240	x	x	x
P-02	Motor Overload Current	x.x A	20% - 200% of drive's rated current	x	x	x
P-03	Reverse Disable *	0	0 = reverse enabled 1 = reverse disabled	x	x	x
P-04	Auto Restart Attempts	0	0 - 10	x	x	x
P-05	Current Limit	150 %	10% - 150% of drive's rated current	x	x	x
Group 1: Digital Input / Output						
P-10	Start Control *	2	1 = keypad control	x	x	x
			2 = 2-wire control	x	x	x
			3 = 3-wire control	x	x	x
P-11	Configurable Input *	2 (A)	0 = function loss (P-10 ≠ 3)			x
		1 (B)	1 = disabled	x		
		0 (C)	1 = preset		x	
			1 = reverse run (2-wire)			x
			2 = jog (P-10 ≠ 1)	x	x	
			2 = jog (P-10 ≠ 1 or 3)			x
			3 = alternate spd ref select	x	x	
			3 = alt spd ref select (P-10 ≠ 3)			x
			4 = n.c. coast-to-stop	x	x	
			4 = n.c. coast-to-stop (P-10 ≠ 3)			x
			5 = secondary accel/decel	x	x	
			5 = sec accel/decel (P-10 ≠ 3)			x

Program Parameters						
(Parameters that can be programmed only while the drive is stopped are indicated by an asterisk *)						
		Units /		Model		
No.	Name	Default	Range	A	B	C
P-12	Configurable Output	0	0 = no fault	x	x	x
			1 = no fault/auto restarting	x	x	x
			2 = run	x	x	x
			3 = at frequency	x	x	x
			4 = above frequency	x	x	x
			5 = above current	x	x	x
P-13	Configurable Output Level	0.0	0 - 999.9 (only when P-12 = 4 or 5)	x	x	x
Group 2: Speed Reference						
P-20	Main Speed Reference	0	0 = analog input 1	x		x
			0 = preset speeds		x	
			1 = keypad	x	x	x
			2 = Internal / Jog Frequency (P-40)	x	x	x
			3 = analog input 2			x
			4 = Process Operation (P-29) output			x
P-21	Alternate Speed Reference	1	0 = analog input 1	x		x
			0 = preset speeds		x	
			1 = keypad	x	x	x
			2 = Internal / Jog Frequency (P-40)	x	x	x
			3 = analog input 2			x
P-22	Analog Input 1 Offset	0.0 %	0 - 110.0	x		x
P-23	Analog Input 1 Gain	100.0 %	0 - 110.0	x		x
P-24	Analog Input 2 Offset	0.0 %	0 - 110.0			x
P-25	Analog Input 2 Gain	100.0 %	0 - 110.0			x
P-26	Process Proportional Gain	0.00	0 - 10.0 (0 = off)			x
P-27	Process Integral Gain	0.00	0 - 10.0 (0 = off)			x
P-28	Process Reference	0	0 = analog input 1			x
			1 = keypad			x
			2 = Internal / Jog Frequency (P-40)			x
P-29	Process Operation	0	0 = add Process Ref (P-28) and analog input 2			x
			1 = multiply Process Ref (P-28) and analog input 2			x
			2 = PI control			x
			3 = inverted PI control			x
Group 3: Dynamic Control						
P-30	Acceleration Time 1	5.0 sec	0 - 600.0	x	x	x
P-31	Deceleration Time 1	5.0 sec	0 - 600.0	x	x	x
P-32	Acceleration Time 2	10.0 sec	0 - 600.0	x	x	x
P-33	Deceleration Time 2	10.0 sec	0 - 600.0	x	x	x
P-34	Stop Control	0	0 = ramp-to-rest	x	x	x
			1 = coast-to-rest	x	x	x
			2 = DC injection	x	x	x
P-35	DC Brake Current	50 %	10 - 150	x	x	x
P-36	DC Brake Time at Stop	0.5 sec	0 - 20.0	x	x	x

Program Parameters						
(Parameters that can be programmed only while the drive is stopped are indicated by an asterisk *)						
No.	Name	Units / Default	Range	Model A	Model B	Model C
P-37	Avoidance Frequency	0.0 Hz	0 - 240.0	x	x	x
P-38	Avoidance Frequency Band	0.0 Hz	0 - 30.0	x	x	x
Group 4: Fixed Speeds						
P-40	Internal / Jog Frequency	60.0 Hz	0 - 240.0	x	x	x
P-41	Preset Speed 1	2.5 Hz	0 - 240.0		x	
P-42	Preset Speed 2	5.0 Hz	0 - 240.0		x	
P-43	Preset Speed 3	10.0 Hz	0 - 240.0		x	
P-44	Preset Speed 4	20.0 Hz	0 - 240.0		x	
P-45	Preset Speed 5	30.0 Hz	0 - 240.0		x	
P-46	Preset Speed 6	40.0 Hz	0 - 240.0		x	
P-47	Preset Speed 7	50.0 Hz	0 - 240.0		x	
P-48	Preset Speed 8	60.0 Hz	0 - 240.0		x	
Group 5: V / Hz						
P-50	Base Voltage	230 V / 460 V	0 - 230 or 0 - 460	x	x	x
P-51	Base Frequency	60 Hz	0 - 240	x	x	x
P-52	Breakpoint Voltage	0 V	0 - 230 or 0 - 460	x	x	x
P-53	Breakpoint Frequency	0 Hz	0 - 240	x	x	x
P-54	Boost Voltage	11 / 23 V	0 - 46 or 0 - 92	x	x	x
P-55	Auto Torque Boost	3.0 %	0 - 10	x	x	x
Group 6: Utility						
P-60	Reset to Defaults *	0	0 - 1; entering 1 performs a reset	x	x	x
P-61	Program Password	OFF	OFF / ON ; entering 257 toggles the setting	x	x	x
P-62	Units at Base Frequency	0	0 - 9999; scales d-00 and d-01 displays	x	x	x
P-63	Units at Analog Max	0	0 - 9999; scales d-08 and d-09 displays	x		x
P-64	Carrier Frequency	2 kHz	2 - 8	x	x	x

Compliance with EU Requirements

The SP200 drive is CE-marked for Low Voltage (LV) Directive 73/23/EEC and all applicable standards when installed as described within the Low Voltage section that follows. It also has been tested to meet Electromagnetic Compatibility (EMC) Directive 89/336/EEC when installed as described within the Electromagnetic Compatibility section that follows. Contact the Rockwell AutoFax service in the United States at 216-646-7777 (or your local Rockwell Automation office if outside the U.S.) for copies of the Declaration of Conformity (DOC).

Conformity of the SP200 drive to EU directives does not guarantee that the entire system will conform. For EMC, many other factors can affect the total installation, and only direct measurements can verify total conformity. It is the responsibility of the machine manufacturer (or end user, if the machine is being modified or used beyond manufacturer's specifications) to comply.

Low Voltage Directive 72/23/EEC

- Follow all general precautions and ATTENTION statements throughout this manual.
- Provide an earth ground connection to the PE terminal.
- Install in a protective enclosure which restricts access to IP 20 rated devices as required by your national and local codes and regulatory agencies.

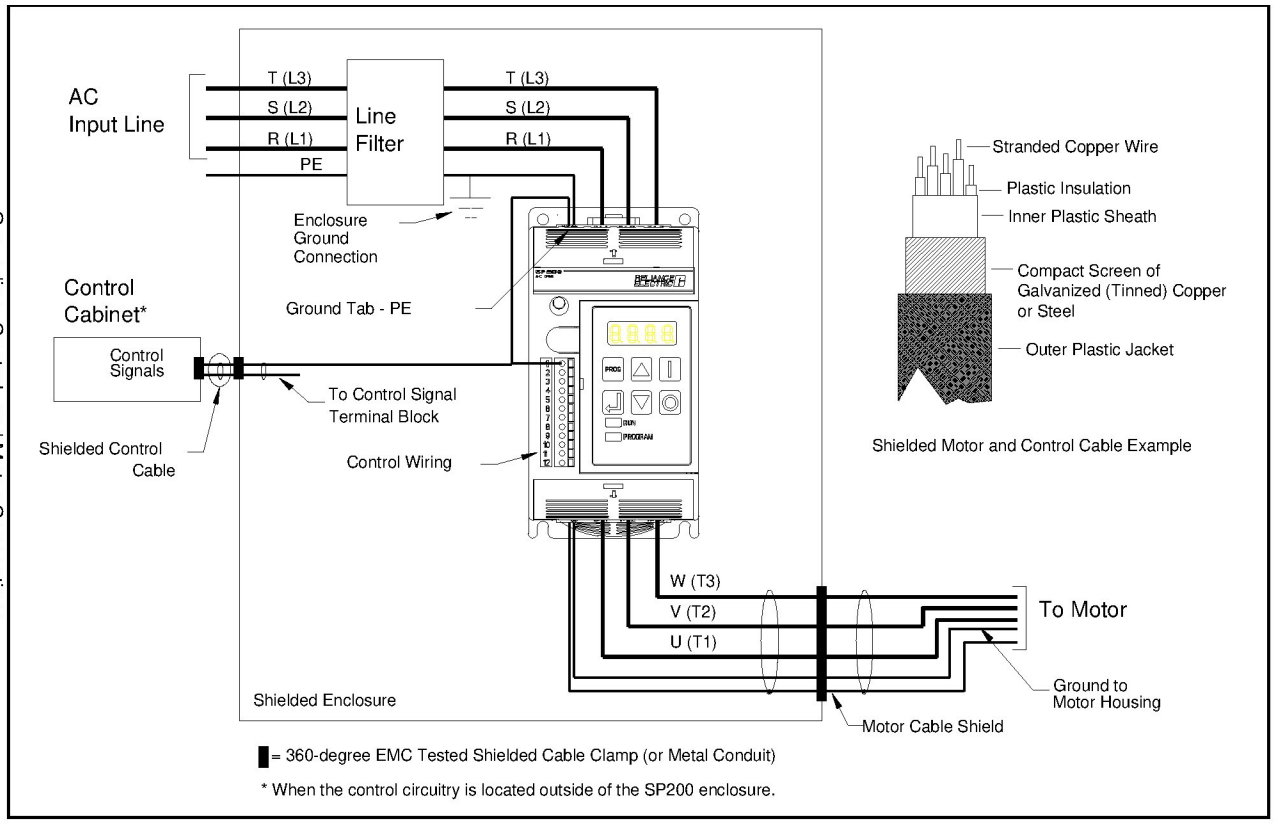
Electromagnetic Compatibility Directive 89/336/EEC

- Install the SP200 drive and Input Mains Filter (see the table below) in a typical IEC or NEMA metal (shielded) enclosure as shown in the figure on the following page. Adhere to maximum motor cable lengths as specified on page 7 (≤25 m).

Drive Model Number	Filter Model Number	Drive Model Number	Filter Model Number
S20-X02P3.....	S20-MF1-Y014	S20-204P2.....	S20-MF1-45P0
S20-X04P2.....	S20-MF1-Y014	S20-207P0.....	S20-MF1-49P5
S20-X06P0.....	S20-MF1-Y014	S20-401P3.....	S20-MF1-45P0
S20-Y07P0.....	S20-MF1-Y014	S20-402P0.....	S20-MF1-45P0
S20-202P3.....	S20-MF1-45P0	S20-402P3.....	S20-MF1-45P0

Refer to *SP200 Mains Filters* (D2-3420) for filter dimensions and weights.

- Keep all input power, output power, and control signal wiring, both inside and outside enclosure, physically separate from one another.
- Connect the enclosure to the SP200 PE input (top) terminal.
- Connect the enclosure to earth ground.
- Use shielded cable with a ground conductor or individual conductors in grounded metal conduit for motor power wiring on the output side of the drive, both inside and outside the enclosure, all the way to the motor. Bring the shield as close to the output power terminals as possible. Connect the motor cable ground and shield to the ground terminal on the output (bottom) side of the SP200 drive. Connect the opposite end of the motor cable ground conductor and shield to the motor housing.
- Use shielded cable or grounded metal conduit for control wiring both inside and outside the enclosure, all the way to the control source. Bring the shield as close to the control terminals as possible. Connect the shield to the SP200 shield/common (terminal 1) and to the PE terminal on the input side (top) of the SP200 drive. Also connect the opposite end of the shield to the common of the device that is controlling the SP200 drive.
- Use EMC-tested 360 degree cable clamps to connect the motor and control shields to the enclosure cable exit point(s) and to the motor housing. Contact points must be clean and free of paint or nonconductive coating.
- Make certain all ground connections provide a low impedance path for high frequency signals.


AC
Input Line
T (L3)
S (L2)
R (L1)
PE
Line
Filter
T (L3)
S (L2)
R (L1)
Enclosure
Ground
Connection
Ground Tab - PE
Control
Cabinet*
Control
Signals
Shielded Control
Cable
To Control Signal
Terminal Block
Control Wiring
W (T3)
V (T2)
U (T1)
To Motor
Ground to
Motor Housing
Motor Cable Shield
Shielded Enclosure
= 360-degree EMC Tested Shielded Cable Clamp (or Metal Conduit)
* When the control circuitry is located outside of the SP200 enclosure.
Stranded Copper Wire
Plastic Insulation
Inner Plastic Sheath
Compact Screen of
Galvanized (Tinned) Copper
or Steel
Outer Plastic Jacket
Shielded Motor and Control Cable Example

Fault Codes and Troubleshooting

- If no fault condition exists, the LED will be green.
- If a fault condition exists, the LED will be continuously red when a local keypad is connected, or flashing red when a local keypad is not connected.
- All faults can be reset by cycling the reset control input, pressing the stop key, or cycling power, except as noted in Corrective Action in the table below.

Display Code	Number of Fault LED Flashes	Fault Description	Fault Cause	Corrective Action
CF	2	Control Input	Illegal control input sequence.	- 3-wire: Verify Start and Jog inputs are not both ON. - 2-wire: Verify that only one input (Forward, Reverse, or Jog) is on.
FL	2	Function Loss	Start attempt while STOP (Function Loss) input is off.	Verify STOP (Function Loss) input is ON before attempting to start drive.
LU	3	Under Voltage[1]	- Low input line. - Temporary loss of input line.	Check input line to verify voltage is within operating specifications.
HU	4	Over Voltage[1]	- High input line. - Decel time too fast. - Overhauling load.	- Check input line to verify voltage is within operating specifications. - Increase decel time.
dO	5	Drive Overload[1]	Excessive driven load.	Reduce the load.
OL	5	Motor Overload[1]	Excessive driven load.	- Verify P-02 is set correctly. - Reduce the load.
OH	6	Over Temperature[1]	- Operating environment is too hot. - Fan is blocked or not operating. - Excessive driven load.	- Verify the ambient temperature is < 50 °. - Verify clearance above/ below drive. - Check for fan obstruction. Replace fan if required. - Reduce the carrier frequency (P-64). - Reduce the load.
OC	7	Over Current[1] (300%)	- Shaft rotation blocked. - Excessive driven load. - Output wiring is incorrect or shorted.	- Check for obstructions to shaft rotation or reduce excessive load. - Increase accel / decel time. - Verify output wiring is correct.
CL	8	Bad Keypad Connection	Bad connection from keypad to drive.	Verify keypad is properly connected to drive.
UF	9	Negative Slope	Conflicting parameter values.	Adjust values of parameters - P-50 through P-54.
J1	10	Ground Short	Phase U	- Verify output wiring is correct - Verify output phase is not grounded. - Verify motor is not damaged.
J2	10		Phase V	
J3	10		Phase W	
J4	10	Phase to Phase Short	Phase U - V	- Verify output wiring is correct. - Verify motor is not damaged.
J5	10		Phase U - W	
J6	10		Phase V - W	
CH	11	Checksum Failure	Parameter value out of range.	Load default parameter values (P-60 =1), then cycle power. If fault persists, replace drive.
UP	12	Microprocessor Fault	Internal processor error.	Cycle power. If fault persists, replace drive.

[1] Auto Resettable

Reliance Electric / 24703 Euclid Avenue / Cleveland, Ohio 44117 / (216) 266-7000

Rockwell Automation
Reliance Electric

Printed in U.S.A. D2-3418-1 June 1998