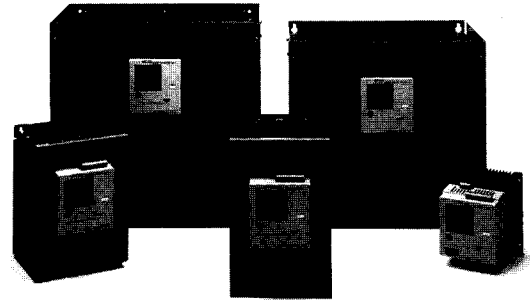


**GE Electrical Distribution & Control**

ASTAT-CD SOLID-STATE REDUCED VOLTAGE STARTERS

Overview

ASTAT-CD Solid-State Reduced Voltage Starters (also referred to as Soft Starters) provide smooth, stepless acceleration/deceleration of AC squirrel-cage induction motors from zero to full speed over an adjustable time period. Their advantages include the following:



Versatile Use

ASTAT-CD Solid-State Reduced Voltage Starters offer user-configurable functions including initial pedestal, kick start, acceleration ramp, current limit, soft stop, DC braking and slow/jog speed. Typical applications include:

Belted equipment	Conveyors	Mixers
Centrifuges	Crushers	Packaging equipment
Centrifugal fans	Extruders	Pumps
Compressors	Fans/blowers	Textile machinery

Simplified Setup

Equipped with a keypad and a digital display, ASTAT-CD Solid-State Reduced Voltage Starters are easy to use.

Reliable Performance

ASTAT-CD Solid-State Reduced Voltage Starters are built for reliable performance and include features such as digital technology controlled by a highly specialized microprocessor, surface-mounted circuit board technology, back-to-back SCRs, large heatsinks, rugged construction and built-in snubbers and MOVs to protect against harmful voltage spikes.

Built-in Diagnostics

Advanced microprocessor technology allows ASTAT-CD Solid-State Reduced Voltage Starters to identify 17 different faults. The last four faults are retained in memory to facilitate troubleshooting and minimize downtime.



Product Ratings

Table 1

Standard duty 300%, 30 sec Service Factor = 1.00
 Centrifugal pump and fan duty

Catalog No.	Current Rating Amps	Horsepower			KW			
		200V	230V	460V	220V	380V 415V	440V	480V 500V
QC2F*A	14	3	3	7.5	3	5.5	6.3	7.5
QC2G*A	17	3	3	10	4	7.5	7.5	10
QC2I*A	34	7.5	7.5	20	7.5	15	18.5	20
QC2J*A	48	15	15	30	13	22	25	30
QC2K*A	63	20	20	40	17	30	37	40
QC2L*A	72	20	25	50	20	37	40	45
QC2M*A	105	30	30	75	30	55	63	75
QC2N*A	156	50	60	125	40	75	80	90
QC2Q*A	240	75	75	200	63	110	132	147
QC2R*A	315	100	125	250	90	160	185	220
QC2S*A	370	125	150	300	110	200	220	250

Substitute asterisk(*) with one of the following letters:

- D = Digital Control Panel
- C = Digital Control Panel + Communications
- E = D + Linear Ramp, Tachometer
- F = C + Linear Ramp, Tachometer
- G = D + Jog (Slow) Speed
- H = C + Jog (Slow) Speed

Table 2

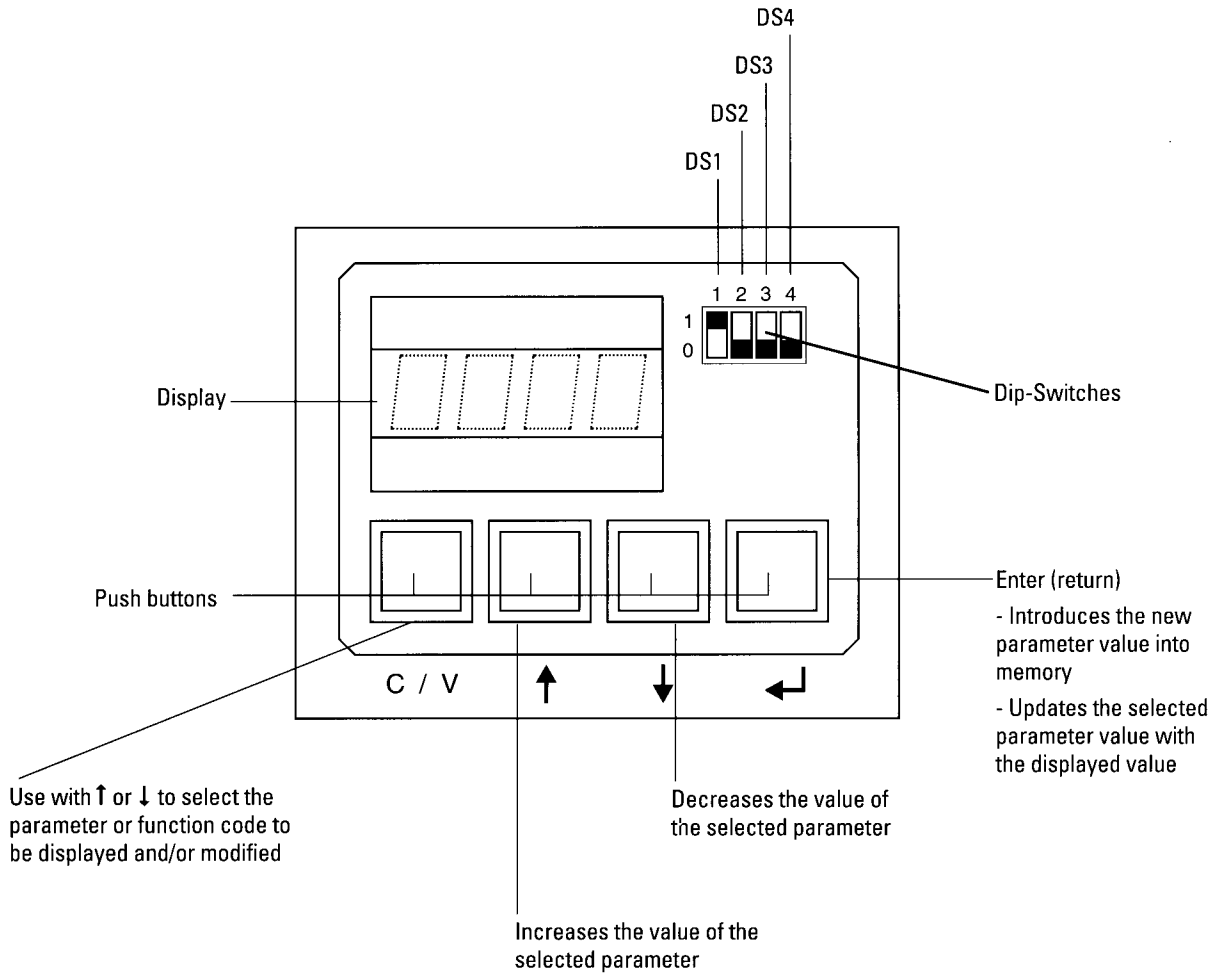
Heavy duty 450%, 30 sec Service Factor = 1.15
 Compressors, conveyors and large centrifugal blowers

Catalog No.	Current Rating Amps	Horsepower		
		200V	230V	460V
QC2F*A	14	3	3	7.5
QC2G*A	17	3	3	10
QC2I*A	34	7.5	7.5	20
QC2J*A	48	10	15	30
QC2K*A	63	15	20	40
QC2L*A	72	20	20	40
QC2M*A	105	30	30	60
QC2N*A	156	40	50	100
QC2Q*A	240	60	75	150
QC2R*A	315	75	100	200
QC2S*A	370	100	125	250

ASTAT-CD Solid-State Reduced Voltage Starters

Product Descriptions

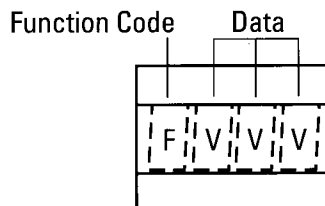
Control Panel





Product Descriptions (cont'd.)

Display Codes



F	V	V	V	Running code
0	N			Equipment is connected to main supply (equipment is ON)
S	T	O	P	Stop
L	O	C	K	Remote stop/lockout
P	U	L	S	Kick start
R	A	M	P	Acceleration ramp
F	U	L	L	Full conduction
S	A	V	E	Energy saving
S	O	F	T	Soft stop
D	C	B	K	DC braking
F	U	L	L	Override (full voltage)
I	N	C	H	Inching / Jog speed
T	A	C	H	Linear ramp (tach-generator)

F	V	V	V	Error code
E	0	1	0	Frequency out of range
E	0	1	1	Overload trip
E	0	1	2	Phase sequence lost
E	0	1	3	Loss of synchronism
E	0	1	4	Phase A SCR
E	0	1	5	Phase B SCR
E	0	1	6	Phase C SCR
E	0	1	7	Heatsink overtemperature
E	0	1	8	Motor thermistor
E	0	1	9	Phase A lost
E	0	2	0	Phase B lost
E	0	2	1	Phase C lost
E	0	2	2	Stalled rotor
E	0	2	3	Internal error
E	0	2	4	No motor load
E	0	2	5	Long start time(current limit)
E	0	2	6	Long Jog speed time

ASTAT-CD Solid-State Reduced Voltage Starters

Product Descriptions (cont'd.)

Display Functions

Function	Display	Description	Factory Default Settings
Error	E 0 x x	Error code displayed x x = 10 to 26	
Trace errors (last four errors can be displayed using key ↑ or ↓ at ON, STOP or LOCK status)	E y x x	y = 0 to 3, error number x x = 10 to 26, error code	
Motor current	M x x x	x x x = % In (read only)	
Nominal motor current (In)	N x x x	x x x = 40 to 100 % Ir (4)	N 1 0 0
Current limit	L x x x	x x x = 100 to 500 % In	L 3 0 0
Starting torque	T _ x x	x x = 10 to 90 % DOL	T _ 1 5
Acceleration ramp time	a x x x	x x x = 1 to 999 seconds	a _ 2 0
Deceleration ramp time	d x x x	x x x = 1 to 999 seconds	d _ 2 0
Kick start time	p x x x	x x x = 0 to 999 milliseconds	p 1 0 0
DC braking time	b _ x x	x x = 0 to 99 seconds	b _ _ 5
DC braking current	l x x x	x x x = 50 to 250 % In	l 1 5 0
Soft stop	S x x x	x x x = ON/OFF(soft stop/free stop)	S 0 F F
Kick - start	P x x x	x x x = ON/OFF	P 0 F F
Override	F x x x	x x x = ON/OFF (read only) (full voltage output / Energy saving)	Read Only
DC injection brake	B x x x	x x x = ON/OFF	B 0 F F
Run/Fault relay (1)	r x x x	x x x = ON (Fault relay output) OFF (Run relay output)	r 0 F F
Overload trip curve(2)	o l x x	x x = SD Standard duty curve x x = HD Heavy duty curve(3)	o l S D
EEPROM programming keyword	K x x x	x x x = 000 to 999 = ON (ON = 69 + ↓)	
EEPROM programming	W x x x	x x x = ON (writing = ON + ↓) = OFF	
Factory use only	R x x x		
Factory use only	x x x x		
Factory use only	V (x1) (x2)		

(1) Run mode: The contact 11-14 closes when the RUN order is given, and opens if either the STOP order is given or an error is found. Fault mode: The contact 11-14 closes as soon as control power is applied, and only opens if a fault is sensed.

(2) See overload time/current curves page.

(3) Caution: When selecting the heavy duty curve, make sure the maximum power of the motor is less than or equal to maximum power rating for soft starter, (Ir), according to Table 2 on page 2. Do not use the heavy duty overload setting on motor with standard duty starting characteristics limited to 3 times current for 30 seconds.

(4) Ir = Starter current rating (see page 2).

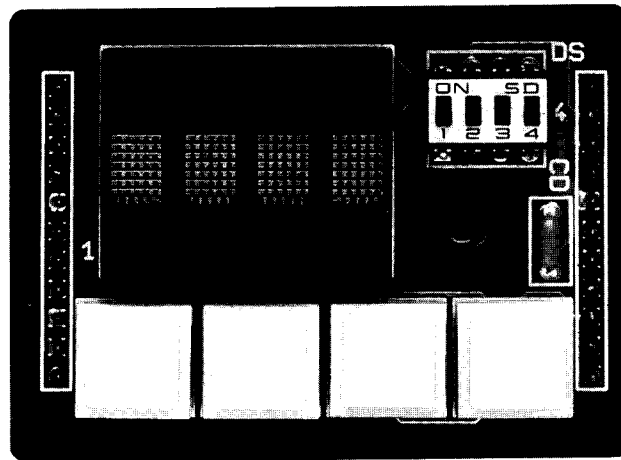


Product Descriptions (cont'd).

Dip-Switches

DS	Position	Function
1(*)	1	Selects REMOTE mode. In this position, equipment control is performed through serial communication (optional)
	0	Selects LOCAL mode. Equipment control is performed locally with terminals 1, 2, 3, 4, 7, 8 and 57
2	1	No load motor detection
	0	Disabled
3	1	Linear ramp with tach-generator feedback option (if DS4 = 0) High Jog speed selection (14%) (if DS4 = 1)
	0	Standard voltage ramp (if DS4 = 0) Low Jog speed selection (7%) (if DS4 = 1)
	4	Inching/Jog speed option. Control with terminals 4-57
4	1	Inching/Jog speed option. Control with terminals 4-57
	0	Disabled

(*) DS1 dip-switch is read at power-up or when the local stop input (terminals 2 - 57) is open.



ASTAT-CD Solid-State Reduced Voltage Starters

Technical Characteristics

Environmental	
Temperature	0 to +45°C (1)
Relative humidity	95% without condensation
Maximum altitude	3300 feet (1000m) (2)
Mounting positions	Vertical
Electrical characteristics	
Three phase supply voltage	500VAC +10% maximum
Frequency	48 - 62Hz
Rated Current	12 ratings, 14 - 370A
Motor horsepower(KW)	7.5 - 300HP at 480V, (7.5 - 250KW at 500V)
Motor voltages	200V, 230V, 460V (220V, 380/415V, 440V, 500V for IEC)
Control voltages	110/120VAC or 220/240VAC, 50/60Hz
Control characteristics	
Control system	Digital system with microcontroller Starting ramp with progressive increase in voltage and current limitation
Starting	
Initial voltage (pedestal)	30 to 95% line voltage
Initial (starting) torque	10 to 90% Full voltage starting torque
Kick start	95% line voltage (90% Full voltage starting torque), adjustable 0 to 999ms
(Full Load) Motor current (I _n)	0.4 to 1.0 x 6 rated starter current (I _r)
Current limit	100 to 450% I _n (FLA)
Acceleration ramp time	1 to 999 sec
Running	
Energy savings	Output voltage reduction according to power factor of running motor to optimize system energy consumption
Override - energy savings	Fixed output voltage permanently equal to supply voltage, energy saving mode turned OFF
Stopping	
Coasting	With no soft stop or DC brake, power removed from motor
Brake time by ramp	Soft stop, 1 to 999 sec adjustable independently of starting ramp time (longer than coast down time)
Brake time DC injection	DC brake, 0 to 99 sec (set no longer than time-to-actual-stop)
Braking current by DC injection	DC brake, 50 to 250% I _n
Reduced voltage starter operating modes	
Acceleration phase	Adjustable time, initial torque, kick start, current limit
Running phase	Energy savings or Full voltage (Override mode) choice
Stop phase	Power cut-off (coasting) / Ramp down (soft stop) / DC Braking
Options	
Linear ramp with tachogenerator feedback (selected with dip-switch 3)	1 to 999 sec
Slow speed (selected with dip-switch 4)	Current : I _n Time limit : 120 sec
Selectable (7% or 14% speed) with dip-switch 3)	

(1) Reduce rated controller current (I_r) by 1.5% / °C above 45°C, maximum 55°C.

(2) Reduce rated controller current (I_r) by 1% / 330 feet above 3300 feet, maximum 10000 feet (1% / 100 meters above 1000 meters, maximum 3000 meters).



Technical Characteristics (Cont'd.)

Inputs / Outputs

Starter control	Start/Stop/Bypass inputs
Inputs	4 isolated inputs for Start/Stop/Override energy saving/motor thermal protection input (PTC)
Input ratings	12VDC solid state optoisolators
Output auxiliary relays	1. Start/Fault (selectable, 1NO, 1NC) 2. Up to speed (1NO) 3. For DC brake contactor (1NO)
Relay output ratings	5A Maximum 120VAC 360VA, Pilot duty B300 & 1/3HP 45LRA 7.2FLA 240VAC 470VA Pilot duty B300 & 1/2HP 30LRA 5.0FLA General purpose DC ratings: 24VDC 8A 48VDC 0.8A 240VDC 0.1A

Protections

Current limit	Adjustable from 100 to 450% In
Overload (I2 x t)	See User Manual GEH-5951
Loss of input phase	Trip at 3 sec
Thyristor short circuit	Trip at 200ms
Heatsink overheating	Trip at 200ms (trips at 80°C +/- 5°C, reset at 50°C +/-10°C)
Motor thermistor	Trip at 200ms if thermistor impedance > response value
Loss of output phase	Trip at 3 sec
Stalled rotor	Trip at 200ms
Supply frequency error	If frequency < 48Hz or frequency > 62Hz, will not start
No motor load	10 sec
Error (CPU)	60ms
Memory	Last four error codes
Long start time	2 times accelerating time(ta), 240ms max. (Current limit ramp hold only)
Long slow speed time	120 sec

Features

- SCR repetitive peak inverse voltage rating - 1600V standard
 - Transient Protection - Metal Oxide Varistors - QC2F through QC2M use 120 joules devices protection
- QC2N through QC2QS use 220 joules devices protection
-

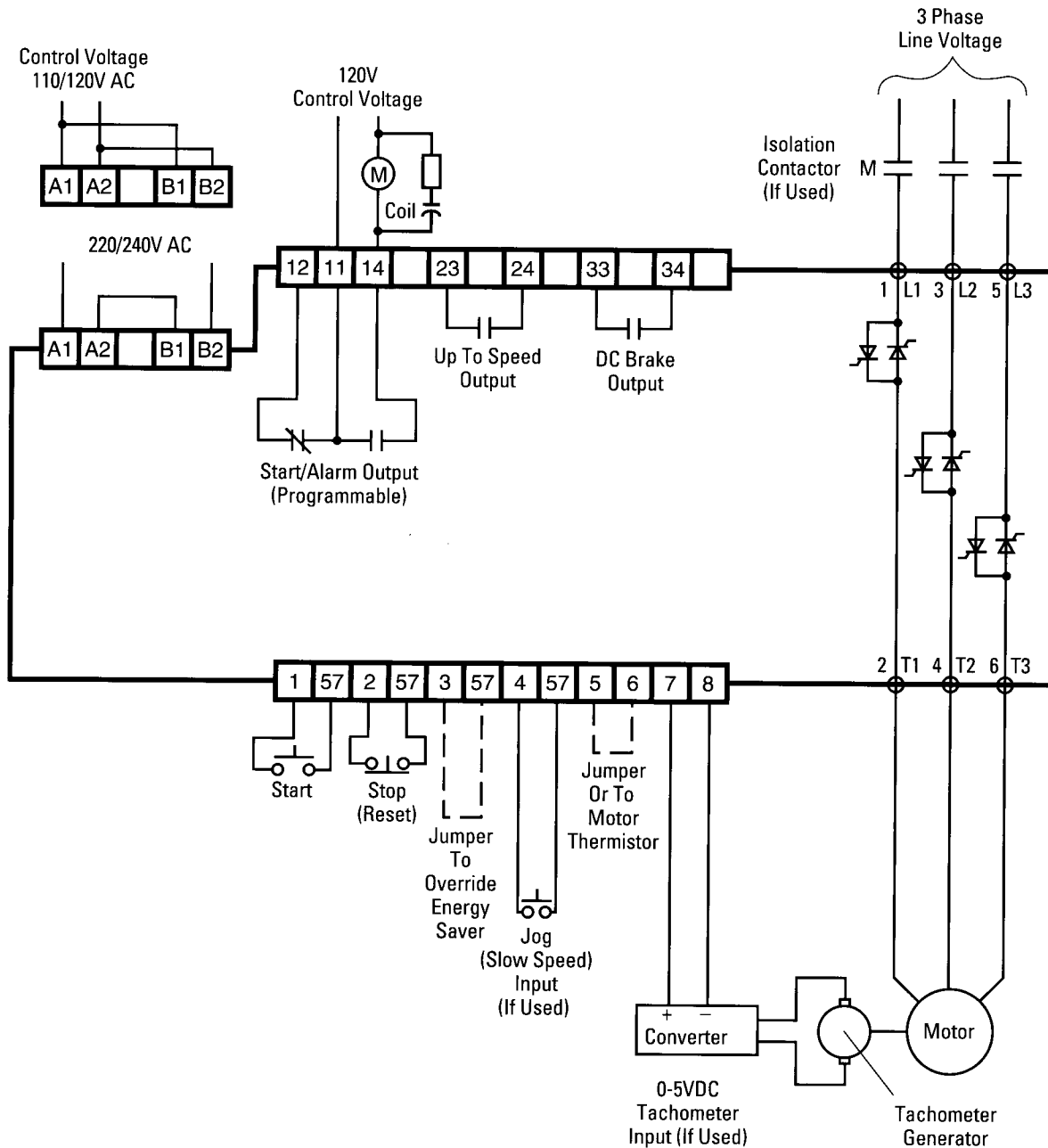
Communications (Option)

Transmission mode	RS-422 or RS-485; 2 or 4 wires; semiduplex; 1 : N
Transmission method	Asynchronous (1 bit START, 1 bit STOP, 8 bits ASCII DATA, selectable parity bit O/E/N)
Baud rate	9600, 4800, 3400 or 1200 selectable
Errors detection	Parity and CHECKSUM
Maximum distance	3300 feet (1000 meters)
Maximum number of ASTAT stations within the net	16

ASTAT-CD Solid-State Reduced Voltage Starters

Wiring Diagram (Typical)

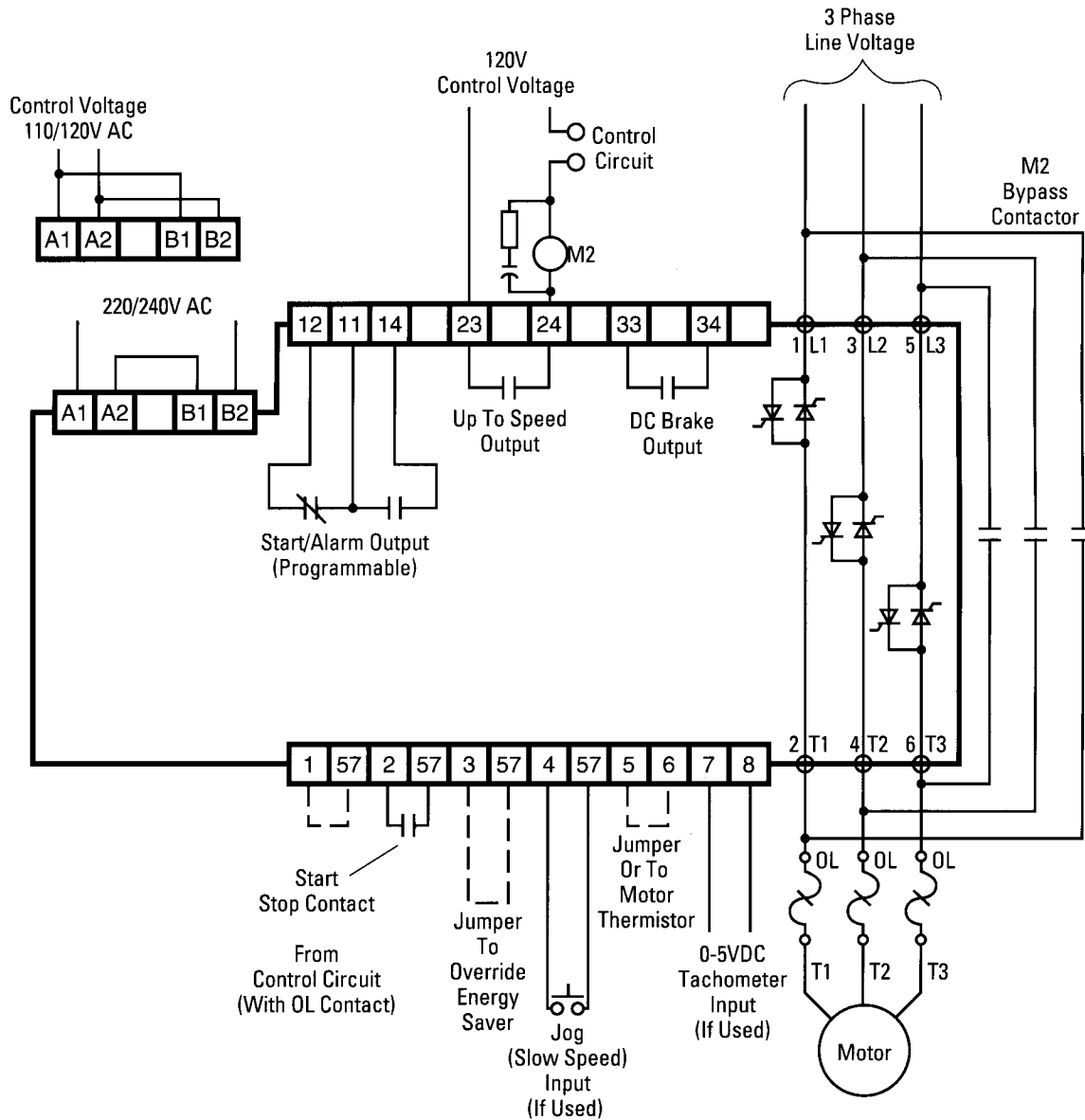
Figure 1. Soft Start with Optional Linear Ramp and Jog (Slow Speed) and Isolation Contactor





Wiring Diagram (Typical)

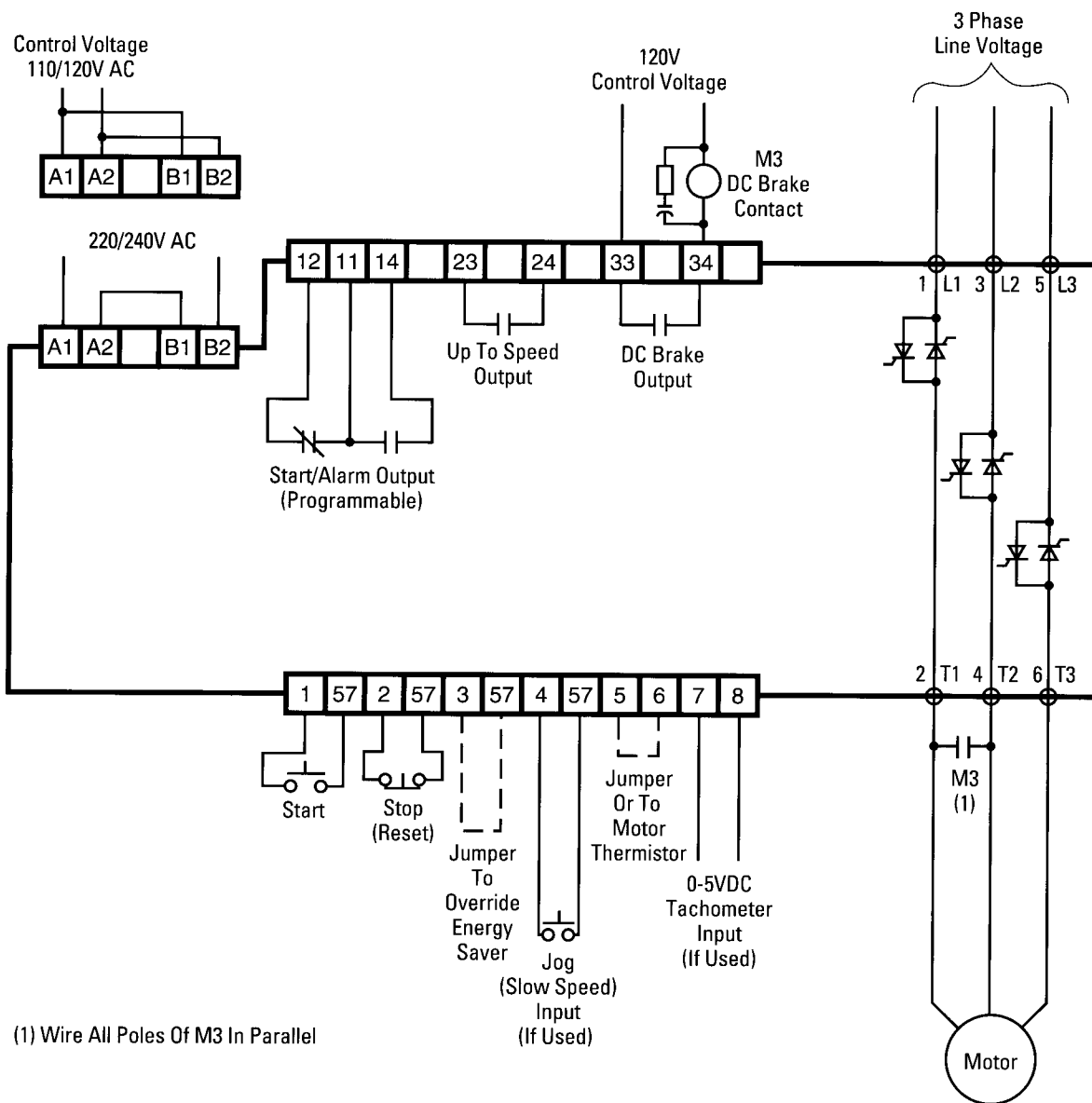
Figure 2. Soft Start with Bypass Contactor



ASTAT-CD Solid-State Reduced Voltage Starters

Wiring Diagram (Typical)

Figure 3. Soft Start with DC Brake Stop and Jog (Slow Speed) Option



(1) Wire All Poles Of M3 In Parallel



GE Electrical Distribution & Control

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