

Type S701, Soft Start Controller

Soft Start Controllers



S701E15N3S

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

- Soft Stop (.5 – 10 seconds)
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- Fractional to 15 hp motors @ 480V (20 hp @ 600V)

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pump-ing applications
- Less shock to product on conveyor lines and material handling gear

Features

- Rated operational voltage up to 600V AC
- Control voltage range from 24 to 480V AC/DC
- Adjustable ramp times (.5 – 10 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- CSA Certified
- UL Listed
- cUL Listed

Product Description

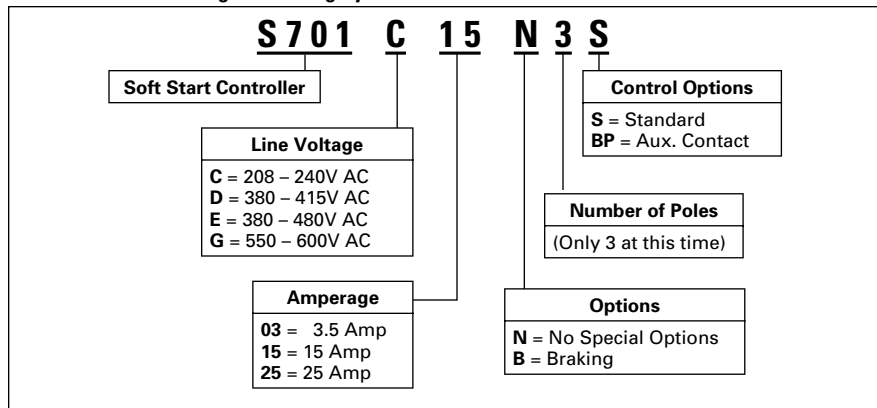
The S701 device is a Reduced Voltage Soft Start Controller designed to control acceleration and deceleration of 3-phase motors. The S701 provides the user with the ability to adjust initial torque, ramp up and down time and also select Kick Start for high inertial loads.



S701E25N3S

Catalog Number Selection — S701

Table 39-4. S701 Catalog Numbering System



Product Selection

Table 39-3. Soft Start Controllers

Max. Current	Line Voltage	Control Voltage (V AC/V DC)	3-Phase Motor											Catalog Number	Price U.S. \$
			kW Rating (50 Hertz)			Horsepower Rating (60 Hertz)									
			230V	380 – 400V	440V	200V		230V		460V		575V			
			1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF			
3.5	208 – 240	24 – 240	7.5	N/A	N/A	1	1	1	1	N/A	N/A	N/A	N/A	S701C03N3S	
3.5	380 – 415	24 – 300	N/A	1.1	N/A	N/A	N/A	N/A	N/A	1-1/2	1-1/2	N/A	N/A	S701D03N3S	
3.5	440 – 480	24 – 300	N/A	N/A	1.5	N/A	N/A	N/A	N/A	2	2	N/A	N/A	S701E03N3S	
3.5	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	2	S701G03N3S	
15	208 – 240	24 – 240	4	N/A	N/A	3	3	3	3	N/A	N/A	N/A	N/A	S701C15N3S	
15	380 – 480	24 – 300	N/A	5.5	7.5	N/A	N/A	N/A	N/A	10	7-1/2	N/A	N/A	S701E15N3S	
15	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	10	N/A	S701G15N3S	
25	208 – 240	24 – 240	7.5	N/A	N/A	5	5	7-1/2	5	N/A	N/A	N/A	N/A	S701C25N3S	
25	380 – 480	24 – 300	N/A	11	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	S701E25N3S	
25	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	N/A	S701G25N3S	

Discount Symbol 1CD-1

Technical Data — Specifications

Table 39-5. Soft Starter — S701XXN3S

	S701C03N3S	S701D03N3S	S701E03N3S	S701G03N3S
Maximum Current Capacity	3.5	3.5	3.5	3.5
Trip Class — 10A	3.5	3.5	3.5	3.5
— 10	3.5	3.5	3.5	3.5
— 20	2.8	2.8	2.8	2.8
— 30	2.1	2.1	2.1	2.1

Dimensions

Width in Inches (mm)	.89 (22.5)	.89 (22.5)	.89 (22.5)	.89 (22.5)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.01 (127)	5.01 (127)	5.01 (127)	5.01 (127)
Weight in lbs. (kg)	.6 (270)	.6 (270)	.6 (270)	.6 (270)
Drawing	See Figure 39-2 (Page 39-13)			

Electrical Characteristics

Line Voltage (V AC)	208 – 240	380 – 415	440 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60	50/60
Leakage Current	5 mA AC Max.			
Minimum Operational Current	50 mA			
Control Voltage (V AC/V DC)	24 – 240	24 – 300	24 – 300	24 – 300
Pick-Up Voltage Max.	20.4V AC/DC			
Drop out Voltage Min.	5V AC/DC			
Max. Control Current for No Operation	1 mA	1 mA	1 mA	1 mA
Response Time Max.	70 mS	70 mS	70 mS	70 mS

Control Characteristics

Ramp Time (Secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Ramp Settings (% LRT)	85%	85%	85%	85%
Kick Start Settings (% LRT)	85%	85%	85%	85%
Soft Stop (secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10

Environment Characteristics

Temperature – Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	NA	NA	NA	NA
Limited Duty Cycle 50°C	NA			
Current Rating 60°C	NA	NA	NA	NA
Limited Duty Cycle 60°C	NA			
Temperature – Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) – No Derating	2000	2000	2000	2000
Humidity	95% Non-condensing			
Operating Position (no derating)	Vertical ± 30°			
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V			
Installation Category	III			
Vibration	IEC 68-2-6 5g 10 – 150 Hz			
Power Dissipation for Intermittent Operation	4 W/A x Duty Cycle			
Power Dissipation for Continuous Operation	4 W/A x Duty Cycle			
Cooling Method	Natural Convection			
Degree of Protection	IP20	IP20	IP20	IP20
Pollution Degree	3	3	3	3
Agency Approvals	UL, cUL, CE			

Type S701, Soft Start Controller

Table 39-5. Soft Starter — S701XXXN3S (Continued)

	S701C15N3S	S701E15N3S	S701G15N3S	S701C25N3S	S701E25N3S	S701G25N3S
Maximum Current Capacity	15	15	15	25	25	25
Trip Class — 10A	15	15	15	25	25	25
— 10	15	15	15	25	25	25
— 20	12	12	12	20	20	20
— 30	10	10	10	15	15	15
Dimensions						
Width in Inches (mm)	1.77 (45)	1.77 (45)	1.77 (45)	3.54 (90)	3.54 (90)	3.54 (90)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	1.52 (690)	1.52 (690)	1.52 (690)	2.53 (1150)	2.53 (1150)	2.53 (1150)
Drawing	See Figure 39-3 (Page 39-13)			See Figure 39-4 (Page 39-13)		
Electrical Characteristics						
Line Voltage (V AC)	208 – 240	380 – 480	500 – 600	208 – 240	380 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60
Leakage Current	5 mA AC max.			5 mA AC max.		
Minimum Operational Current	50 mA			50 mA		
Control Voltage (V AC/V DC)	24 – 240	24 – 480	24 – 480	24 – 240	24 – 300	24 – 300
Pick-Up Voltage Max.	20.4V AC/DC			20.4 V AC/DC		
Drop Out Voltage Min.	5V AC/DC			5V AC/DC		
Max. Control Current for No Operation	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Response Time Max.	70 mS	70 mS	70 mS	70 mS	70 mS	70 mS
Control Characteristics						
Ramp Time (secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Ramp Settings (% LRT)	85%	85%	85%	85%	85%	85%
Kick Start Settings (% LRT)	85%	85%	85%	85%	85%	85%
Soft Stop (secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Environment Characteristics						
Temperature — Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	12.5 Amps	12.5 Amps	12.5 Amps	20 Amps	20 Amps	20 Amps
Limited Duty Cycle 50°C	15A on-time max. 15 min. duty cycle max. .8			25A on-time max. 15 min. duty cycle max. .8		
Current Rating 60°C	10 Amps	10 Amps	10 Amps	17 Amps	17 Amps	17 Amps
Limited Duty Cycle 60°C	15A on-time max. 15 min. duty cycle max. .65			25A on-time max. 15 min. duty cycle max. .65		
Temperature — Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) — No Derating	2000	2000	2000	2000	2000	2000
Humidity	95% Non-condensing					
Operating Position (no derating)	Vertical ± 30°					
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V			660V		
Installation Category	III			III		
Vibration	IEC 68-2-6 5g 10 – 150 Hz			IEC 68-2-6 5g 10 – 150 Hz		
Power Dissipation for Intermittent Operation	2 W/A x Duty Cycle			2 W/A x Duty Cycle		
Power Dissipation for Continuous Operation	2 W/A			2 W/A		
Cooling Method	Natural Convection					
Degree of Protection	IP20	IP20	IP20	IP20	IP20	IP20
Pollution Degree	3	3	3	3	3	3
Agency Approvals	UL, CSA, CE					

Type S701, Soft Start with Auxiliary Contact

Soft Start Controllers with Auxiliary Contact

Product Description

The S701 device is a Reduced Voltage Soft Start Controller designed to control acceleration and deceleration of 3-phase motors. With the Auxiliary Contact, it is possible to control an external bypass to reduce heating and increase acceleration and deceleration times.

The unit provides the user with the ability to adjust initial torque, ramp up and down time and also select Kick Start for high inertia loads.

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The Auxiliary Contact is designed to work in conjunction with an across-the-line contactor. The purpose of the contactor is to provide a parallel current path once the soft starter has brought the motor up to speed. Once the soft start controller reaches end of ramp, the

auxiliary contact will close and send a signal to close the bypass contactor, thus providing a low impedance path for the current to the motor. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Protector or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 600V AC
- Control voltage range from 24 to 300V AC/DC
- Adjustable ramp times (.5 – 20 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature (0 – 85% adjustment)
- Kick Start for 200 mS
- Soft Stop (.5 – 20 seconds)

- IP20 finger protection
- Available up to 30 Amps (with Bypass installed)
- Auxiliary contact for up-to-speed indication

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Bypass option allows for greater current capacity in the unit
- Bypass option helps to reduce heat in the enclosure
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- cUL Listed
- UL Listed

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Product Selection

Table 39-6. Soft Start Controller with Auxiliary Contact

Max. Current	Line Voltage	Control Voltage (V AC/V DC)	3-Phase Motor										Catalog Number	Price U.S. \$	
			kW Rating (50 Hertz)			Horsepower Rating									
			230V	380 – 400V	440V	200V		230V		460V		575V			
			1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF					
Ratings without Bypass															
25	208 – 240	24 – 240	5.5	N/A	N/A	5	5	7-1/2	5	N/A	N/A	N/A	N/A	S701C25N3BP	
25	380 – 480	24 – 300	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	S701E25N3BP	
25	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	S701G25N3BP	
Ratings with Bypass															
30	208 – 240	24 – 240	7.5	N/A	N/A	7-1/2	7-1/2	10	7-1/2	N/A	N/A	N/A	N/A	S701C25N3BP	
30	380 – 480	24 – 300	N/A	15	15	N/A	N/A	N/A	N/A	20	15	N/A	N/A	S701E25N3BP	
30	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	20	S701G25N3BP	

Note: For S701 Catalog Number Selection, see **Table 39-4, Page 39-4.**

Discount Symbol **1CD-1**

Type S701, Soft Start with Auxiliary Contact

Technical Data — Specifications

Table 39-7. Soft Starter — S701XXXN3BP

	S701C25N3BP	S701E25N3BP	S701G25N3BP
Maximum Current Capacity with Bypass (without Bypass)	30 (25)	30 (25)	30 (25)
Trip Class			
— 10A	30 (25)	30 (25)	30 (25)
— 10	30 (25)	30 (25)	30 (25)
— 20	24 (20)	24 (20)	24 (20)
— 30	19.5 (15)	19.5 (15)	19.5 (15)

Dimensions

Width in Inches (mm)	3.54 (90)	3.54 (90)	3.54 (90)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	2.53 (1150)	2.53 (1150)	2.53 (1150)
Drawing	See Figure 39-4 (Page 39-13)		

Electrical Characteristics

Line Voltage (V AC)	208 – 240	380 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60
Leakage Current	5 mA AC max.		
Minimum Operational Current	50 mA		
Control Voltage (V AC/V DC)	24 – 240	24 – 300	24 – 300
Pick-Up Voltage Max.	20.4 V AC/DC		
Drop Out Voltage Min.	5V AC/DC		
Max. Control Current for No Operation	1 mA	1 mA	1 mA
Response Time Max.	70 mS	70 mS	70 mS

Control Characteristics

Ramp Time (secs)	.5 – 20	.5 – 20	.5 – 20
Ramp Settings (% LRT)	85%	85%	85%
Kick Start Settings (% LRT)	85%	85%	85%
Soft Stop (secs)	.5 – 20	.5 – 20	.5 – 20

Environmental Characteristics

Temperature — Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	20 Amps	20 Amps	20 Amps
Limited Duty Cycle 50°C	25A on-time max. 15 min. duty cycle max. .8		
Current Rating 60°C	17 Amps	17 Amps	17 Amps
Limited Duty Cycle 60°C	25A on-time max. 15 min. duty cycle max. .65		
Temperature — Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) — No Derating	2000	2000	2000
Humidity	95% Non-condensing		
Operating Position (no derating)	Vertical ± 30°		
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V	660V	660V
Installation Category	III	III	III
Vibration	IEC 68-2-6 5g 10 – 150 Hz		
Power Dissipation for Continuous Operation	2 W/A without Bypass		
Power Dissipation with Semiconductor Bypassed	5 W/A max. with Bypass		
Cooling Method	Natural Convection		
Degree of Protection	IP20	IP20	IP20
Pollution Degree	3	3	3
Agency Approvals	UL, cUL, CE		

Type S701, Soft Start with Brake

Soft Start Controllers with Brake



S701E25B3S

Product Description

The S701 Soft Start Controller with DC Injection Brake is designed to control acceleration and deceleration of 3-phase motors. Brake current is adjustable from 0 – 50A DC. The ramp-up feature is adjustable from .5 – 10 seconds. Torque adjustment is adjustable with or without break loose (Kick Start) function.

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The braking option is a DC injection system, allowing for fast stopping of a 3-phase motor. The S701 unit controls current on two of the three phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 480V AC
- Control voltage range from 24 to 300V AC/DC
- Adjustable ramp times (.5 – 20 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature (0 – 85% adjustment)

- Kick Start for 200 mS
- IP20 finger protection
- Braking control adjustable from 0 – 50A DC
- Slow speed: 7.5% or 10% of nominal speed

Benefits

- Reduced wear on bolts, gears, chains, clutches, shafts and bearings
- Braking option allows for quick stopping of loads
- Brake control can help eliminate expensive mechanical brakes
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- cUL Listed
- UL Listed

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Product Selection

Table 39-8. Soft Start Controller with Brake

Max. Current	Line Voltage	Control Voltage (V AC/V DC)	3-Phase Motor									Catalog Number	Price U.S. \$
			kW Rating (50 Hertz)			Horsepower Rating							
			230V	380 – 400V	440V	200V		230V		460V			
			1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF					
25	208 – 240	24 – 240	5.5	N/A	N/A	5	5	7-1/2	5	N/A	N/A	S701C25B3S S701E25B3S	
25	380 – 480	24 – 300	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15		

Note: For S701 Catalog Number Selection, see Table 39-4, Page 39-4.

Discount Symbol **1CD-1**

Type S701, Soft Start with Brake

Technical Data — Specifications

Table 39-9. Soft Start Controller with Brake — S701XXB3S

	S701C25B3S	S701E25B3S
Maximum Current Capacity	25	25
Trip Class — 10A	25	25
— 10	25	25
— 20	20	20
— 30	15	15

Dimensions

Width in Inches (mm)	3.54 (90)	3.54 (90)
Height in Inches (mm)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	2.53 (1150)	2.53 (1150)
Drawing	See Figure 39-4 (Page 39-13)	

Electrical Characteristics

Line Voltage (V AC)	208 – 240	380 – 480
Operating Frequency (Hz)	50/60	50/60
Leakage Current	5 mA AC max.	
Minimum Operational Current	1 Amp	
Control Voltage (V AC/V DC)	24 – 240	24 – 300
Pick-Up Voltage Max.	20.4V AC/DC	
Drop Out Voltage Min.	5V AC/DC	
Max. Control Current for No Operation	1 mA	1 mA
Response Time Max.	100 mS	100 mS

Control Characteristics

Ramp Time (secs)	.5 – 10	.5 – 10
Ramp Settings (% LRT)	85%	85%
Kick Start Settings (% LRT)	85%	85%
Soft Stop (secs)	.5 – 10	.5 – 10
Brake Current	0 – 50V DC	

	S701C25B3S	S701E25B3S
Environment Characteristics		
Temperature — Operating	-30° – 40°C	-30° – 40°C
Current Rating 50°C	20 Amps	20 Amps
Limited Duty Cycle 50°C	25A on-time max. 15 min. duty cycle max. .8	
Current Rating 60°C	17 Amps	17 Amps
Limited Duty Cycle 60°C	25A on-time max. 15 min. duty cycle max. .65	
Temperature — Storage	-30° – 80°C	-30° – 80°C
Altitude (Meters) — No Derating	2000	2000
Humidity	95% Non-condensing	
Operating Position	Vertical ± 30°	
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V
Rated Insulation Voltage (Ui)	660V	660V
Installation Category	III	III
Vibration	IEC 68-2-6 5g 10 – 150 Hz	
Power Dissipation for Intermittent Operation	2 W/A x Duty Cycle	
Power Dissipation for Continuous Operation	2 W/A	
Cooling Method	Natural Convection	
Degree of Protection	IP20	IP20
Pollution Degree	3	3
Agency Approvals	UL, cUL, CE	

Dimensions

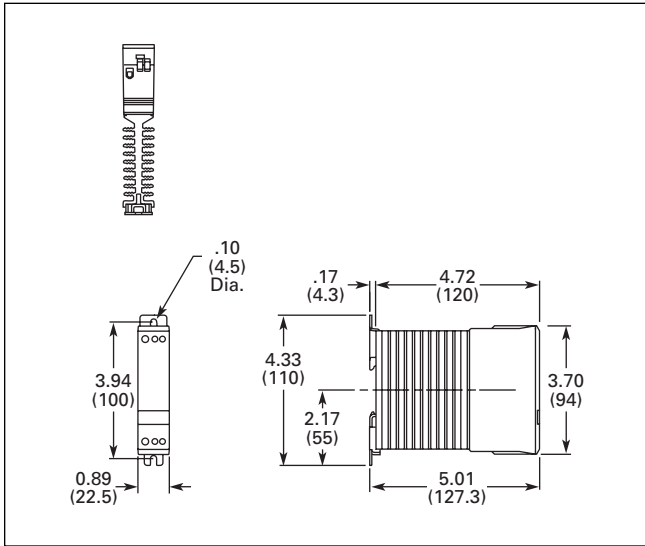


Figure 39-2. 22.5 mm Frame — Approximate Dimensions in Inches (mm)

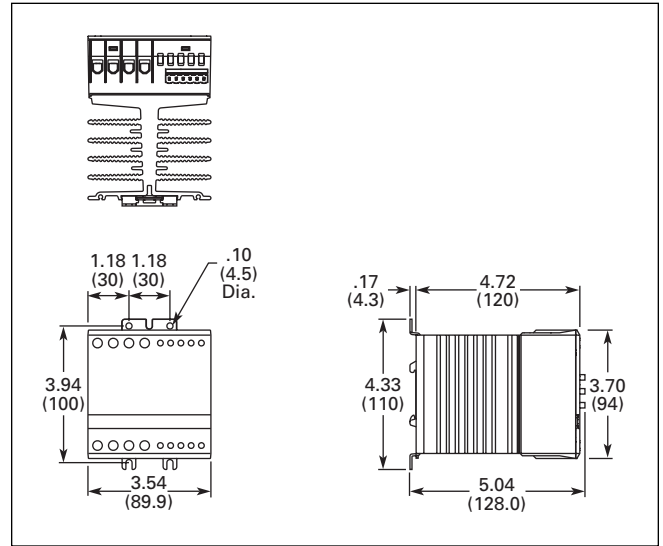


Figure 39-4. 90 mm Frame — Approximate Dimensions in Inches (mm)

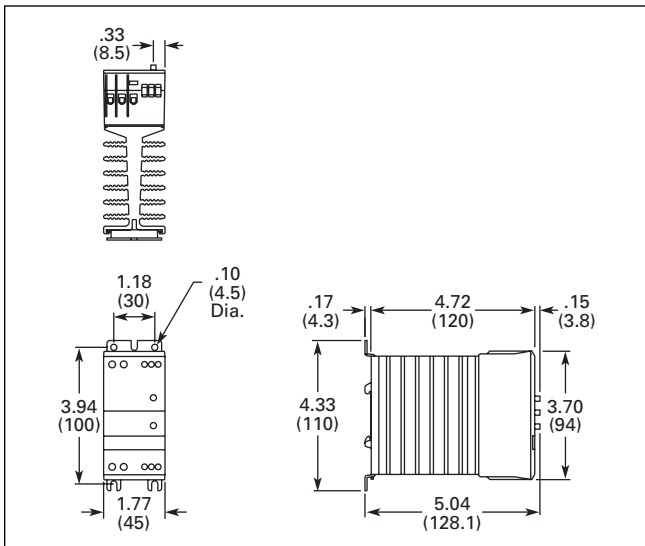


Figure 39-3. 45 mm Frame — Approximate Dimensions in Inches (mm)