Stellar® SR22 Compact Soft Starters

Overview

SR22 semi-conductor soft starters provide many advantages when used instead of electro-mechanical contactors to control 1-phase (split phase, cap run, or cap start / cap run motor) and 3-phase AC induction motors. The SR22 soft starters use thyristors for controlled reduced voltage motor starting and stopping, then switch to internal contacts for efficient running at rated speed.

Features

- 3–22A @ 110-240V 1Ph or 208–460V 3Ph Class 10 starting
- 5–40A @ 110-240V 1Ph or 208–460V 3Ph (lightly loaded)
- 24 VDC control voltage
- Easily and separately adjustable motor start and stop times
- Two-phase control
- Internal bypass contacts for run
- 35mm DIN rail mounting
- Two standard-size widths: 45 & 55 mm
- Six error/trip indications: AC Supply, Control Supply, Overheated, Bypass Failure, Shear Pin, Overcurrent

Standards & Approvals

- CE
- RoHS
- UL listed* (E333109) *(optional fans are UL recognized: E132139, E77551, E89936)

Optional Accessories

Cooling fan (increases # of starts/hour)

Applications

General purpose applications where traditional across-the-line starting or wye-delta starting would typically be appropriate.

Advantages

Mechanical Advantages

- Smooth acceleration; reduced shock and starting stress
- Extend lifespan of mechanical drive train components
- Fluid couplings and some clutches can be eliminated

Electrical Advantages

- Reduced starting current
- More motors or larger motors can be started from lower-capacity power sources
- Allows motors to be started more frequently
- Internal mechanical contacts open and close under reduced current, increasing lifespan and reliability

Economic Advantages

- Lower overall costs for new installations
- Reduced maintenance and replacement of mechanical drive train components
- Reduced starting current reduces electrical power costs

WARNING: NOT FOR USE WITH SINGLE PHASE, SHADED POLE MOTOR

SR22 Series Compact Soft Starters *										
Model		***SR22-05***	***SR22-07***	***SR22-09***	***SR22-12***	***SR22-16***	***SR22-22***	***SR22-30***	***SR22-36***	***SR22-40***
Price		$188.00	$208.00	$218.00	$247.00	$264.00	$312.00	$419.00	$521.00	$628.00
****Rated Motor Current***	***std Class 10 starting***	3A	4A	5A	6.5 A	9A	12A	16A	19A	22A
	lightly loaded Class 2 starting	5A	7A	9A	12A	16A	22A	30A	36A	40A
Rated Operational Voltage		110-240 VAC 1Ph or 208–460 VAC 3Ph (-15% +10%) @ 50–60 Hz (±2Hz); 3 phase (2 phases controlled)								
****Motor Rating***		Starters must be sized according to HP AND starting class. Refer to selection tables or to online selection tool (https://www.automationdirect.com/selectors/softstarters).								
Impulse Withstand Voltage		2.5 kV								
Insulation Voltage Rating		500V								
Short Circuit Current Rating		5kA Type 1 when protected by recommended semiconductor fuses								
Control Power		approx 4VA @ 24 VDC (external power supply required) (UL applications require max 4A UL listed fuse)								
Control Inputs		galvanically isolated opto-coupled inputs; require sourcing +24 VDC (control)								
Auxiliary Relay Output		250 VAC: 2.5A resistive, 0.2A inductive / 30 VDC: 3.0A resistive, 0.7A inductive								
Start Time Setting Range		1–30 seconds								
Start Voltage Setting Range		30–100%								
Stop Time Setting Range		0–30 seconds								
Start Duty		3 x full load current for 10 seconds @ Trip Class 10								
Starts / Hour (standard)		5 starts / hr								
Starts / Hour (with optional fan)		[(30 starts / hr) + (30 soft stops / hr)] internally bypassed								
Ambient Operating Temperature		0–40 °C [32–104 °F] – Above 40 °C [104 °F] derate linearly by 2% of unit FLC per °C to a max derate of 40% @ 60 °C [140 °F] *** NOT UL TESTED ABOVE 40 °C ***								
Transportation & Storage Temperature		-25–60 °C [-13–140 °F]								
Humidity		max 85% non-condensing; not exceeding 50% @ 40 °C [104 °F]								
Altitude		1000m [3281 ft]; 1000–2000m [3281–6562 ft] derate 1% of unit FLC per 100–2000m [328–6562 ft]								
Environmental Rating		IP20								
Shipping Weight		400g [14 oz]					680g [24 oz]	725g [26 oz]		
Dimensions [HxWxD]		143 x 45 x 117.8 mm [5.63 x 1.77 x 4.64 in]					167.5 x 55 x 117.8 mm [6.59 x 2.17 x 4.64 in]			
Accessories										
Cooling Fan (temperature controlled)**		***SR22-FAN-45***					***SR22-FAN-55***			
Price		$61.00					$64.00			
Dimensions		does not add to soft starter overall dimensions					adds 10 mm [0.39 in] to soft starter H dimension			

*** Important: Care must be taken to select the correct SR22 for the application to ensure that the SR22 is not undersized. Refer to Selection Tables or to online selection tool for deratings by application and overload trip class (https://www.automationdirect.com/selectors/softstarters).**

**** Cooling fans do not run continuously.**

Stellar® SR22 Compact Soft Starters

SR22 Soft Starters – Selection

Step 1: Select the application from the list and follow that column down.

	Standard Duty		Medium Duty		Heavy Duty	Light Duty
Typical applications	Default Agitator Bow Thruster - Zero Pitch Compressor - Rotary Vane Compressor - Scroll Conveyor - Unloaded Fan - Low Inertia < 85A Feeder - screw Lathe machines Mixer - Unloaded	Molding Machine Plastic and textile machines Pump - Submersible Centrifugal Pump - Submersible Rotodynamic Saw - Band Transformers, voltage regulators	Ball mill Bow Thruster - Loaded Compressor - Centrifugal Compressor - Reciprocating Compressor - Rotary Screw Conveyor - Loaded Grinder Hammer mill Mills - Flour, etc. Mixer - Loaded Pelletizers	Pump - Positive displacement Reciprocating Pump - Positive displacement Rotary Pump Jack Rolling mill Roots Blower Saw - Circular Screen - Vibrating Tumblers	Centrifuge* *For centrifuges make selection at I(A) = motor FLA x 2.3 Crusher Fan - High Inertia > 85A Shredder Wood chipper Press, flywheel	Unloaded / Lightly loaded motor

Step 2: Confirm the rated starting capability of the soft start against the application.

	10	20	30	2
Trip Class				
Rated Starting Capability	3x Motor Current - 23s 3.5x Motor Current - 17s	4x Motor Current - 19s	4x Motor Current - 29s	3x Motor Current - 5s
Max Starts per Hour	5 starts/hr (or 30 starts/hr with fan) Index Rating Standard (Class5) AC53b: 3-5: 355; Overcurrent = 3 x I_{rated} for 5 seconds			
	Warning: Applying more starts per hour than the specified 5 or 30 start/hr will cause the starter to overheat and fail.			

Step 3: Consider the operating environment and make the model selection on a higher horsepower rating.

Height Above Sea Level	Standard operating height is 3280ft. For every 328ft, increase motor HP by 1%, up to 6600ft. Example: For a 100HP motor at 4900ft, make model selection based on 105HP (5% higher).
Operating Temperature	Standard operating temperature is 122°F. For every 1°F above, increase motor HP by 2.2%, up to 140°F. Example: For a 100HP motor at 132°F, make model selection based on 122HP (22% higher).
Increased Starts per Hour	Use our online tool to select the model: https://www.automationdirect.com/selectors/softstarters

Step 4: Select SR22 model based on your motor Voltage and Horsepower (3Ph only; 1Ph on next page)

Motor HP						Trip Class			
208VAC		230VAC		460VAC		3-23:697	4-19:701	4-19:691	3-5:355
HP	I_e (A)	HP	I_e (A)	HP	I_e (A)	10	20	30**	2***
0.5	2.4	0.5	2.2	1.5	3	SR22-05	SR22-07	SR22-09	SR22-05
0.75	3.5	0.75	3.2	2	3.4	SR22-07	SR22-09	SR22-12	SR22-05
1	4.6	1	4.2	3	4.8	SR22-09	SR22-12	SR22-16	SR22-05
1.5	6.6	2	6.8	3	4.8	SR22-12	SR22-16	SR22-22	SR22-07
2	7.5	3	9.6	5	7.6	SR22-16	SR22-22	SR22-30	SR22-12
3	10.6	3	9.6	7.5	11	SR22-22	SR22-36	SR22-40	SR22-12
3	10.6	5	15.2	10	14	SR22-30	SR22-40	SR22-40 w/fan	SR22-16
5	16.7	5	15.2	10	14	SR22-36	SR22-40	SR22-40 w/fan	SR22-22
5	16.7	7.5	22	15	21	SR22-40	SR22-40 w/fan	–	SR22-22
7.5	24.2	10	28	20	27	SR22-40 w/fan	–	–	SR22-30

*** A separate overload protection device with a rating corresponding to the applicable trip class must be used with the SR22.**
**** The SR22 is not suitable for very high inertia loads such as centrifuges or loaded crushers with start times > 30s.**
***** Do NOT use the Class 2 rating when there is a possibility of the motor starting under a heavy load.**

Online Product Selection Tool:
https://www.automationdirect.com/selectors/softstarters

Stellar® SR22 Compact Soft Starters

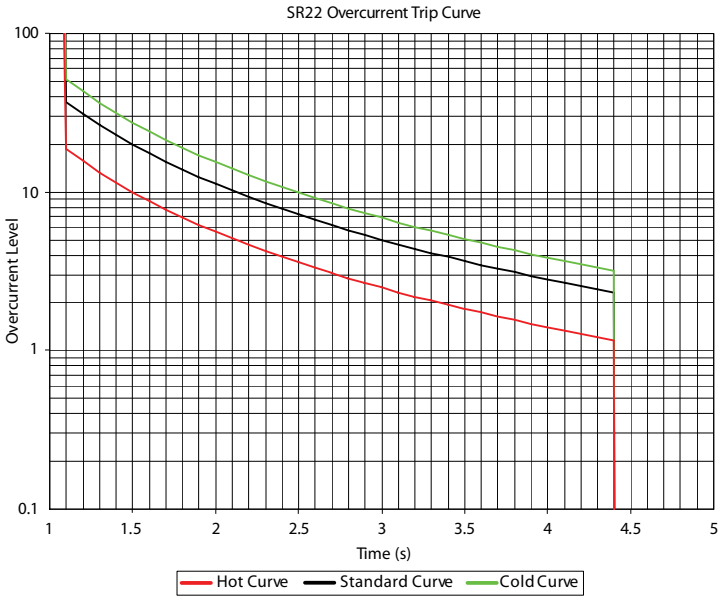
SR22 Soft Starters – Selection (Cont'd)							
Step 4: Select SR22 model based on your motor Voltage and Horsepower (1Ph only)							
Motor HP				*Trip Class*			
110-120V		*220-240V*		*3-23:697**	*4-19:701**	*4-29:691**	*3-5:355***
HP	*I_e (A)*	*HP*	*I_e (A)*	*10*	*20*	*30*	*2*
-	-		1.2	SR22-05	SR22-05	SR22-05	SR22-05
-	-	0.1	1.6	SR22-05	SR22-05	SR22-07	SR22-05
-	-	0.12	1.9	SR22-05	SR22-05	SR22-07	SR22-05
-	2.4	0.16	2.3	SR22-05	SR22-07	SR22-09	SR22-05
0.1	3.3	0.25	2.9	SR22-07	SR22-09	SR22-12	SR22-05
0.12	3.8	0.33	3.9	SR22-09	SR22-12	SR22-16	SR22-05
0.16	4.5	0.5	-	SR22-09	SR22-12	SR22-16	SR22-05
0.25	5.8	-	5.5	SR22-12	SR22-16	SR22-22	SR22-07
-	-	0.75	-	SR22-12	SR22-16	SR22-22	SR22-07
0.33	7.9	1	7.3	SR22-16	SR22-22	SR22-30	SR22-09
0.5	11	1.5	10	SR22-22	SR22-36	SR22-40	SR22-12
0.75	-	2	13	SR22-30	SR22-40	SR22-40 w/fan	SR22-16
1	15	3	-	SR22-40	SR22-40 w/fan		SR22-22
1.5	21	-	19	SR22-40	SR22-40 w/fan		SR22-22
2	26	-	24	SR22-40 w/fan			SR22-30
-	-	5	27	SR22-40 w/fan			SR22-30
-	-	-	30	SR22-40 w/fan			SR22-30
3	37	-	-				SR22-40
-	-	7.5	41				SR22-40

***5 starts/hour without fan; 30 starts/hour with fan**
****10 starts/hour without fan; 60 starts/hour with fan**

Online Product Selection Tool:
https://www.automationdirect.com/selectors/softstarters

SR22 Max UL Overcurrent Protection

SR22 Internal Overcurrent Trip Curve
The internal overcurrent trip of the soft starter does not replace the required external overcurrent device.



UL Maximum Overcurrent Protection Devices * for 5kA @ 480V Short Circuit Rating		
Soft Starter Model Number	*Maximum Non-Time-Delay Trip Rating **	
	*Fuse * – Class J or T (600V rated)*	*Circuit Breaker * (600V rated)*
SR22-05	15A	N/A
SR22-07	15A	
SR22-09	30A	
SR22-12	40A	
SR22-16	50A	
SR22-22	80A	80A
SR22-30	100A	100A
SR22-36	125A	125A
SR22-40	150A	150A

*** Maximum trip ratings are for non-time-delay overcurrent protection devices.**
*** Motor branch circuit protection must be based on MOTOR Full Load Current, and must comply with applicable local electrical codes. The 2008 NEC section 430.52 recommends a maximum of 175% (up to 225% absolute maximum) of motor FLC for time-delay fuses. (Class CC time-delay fuses are permitted up to the non-time-delay fuse maximum rating.)**

Stellar® SR22 Compact Soft Starters

45mm Stellar Compact Soft Starter

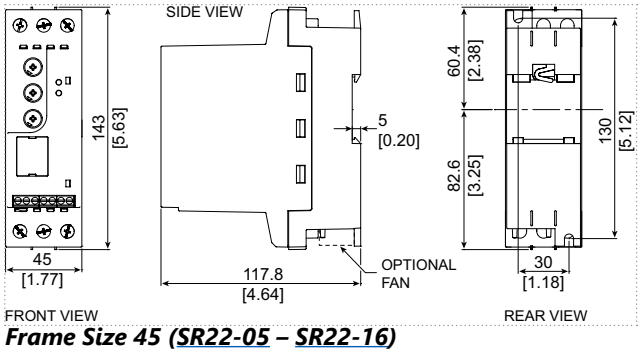
55mm Stellar Compact Soft Starter

Cooling Fan for 45mm Soft Starters

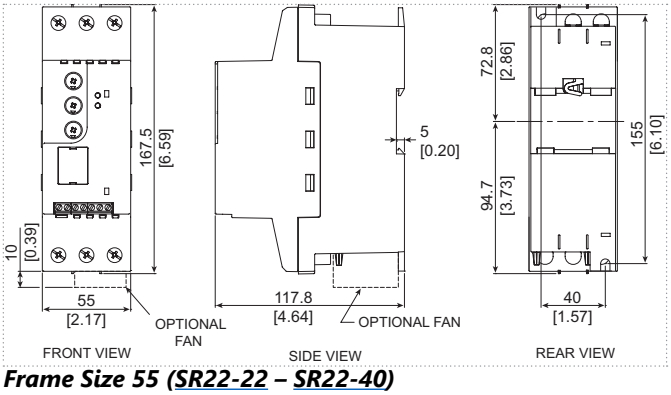
Cooling Fan for 55mm Soft Starters

SR22 Dimensions

Dimensions = mm [in]

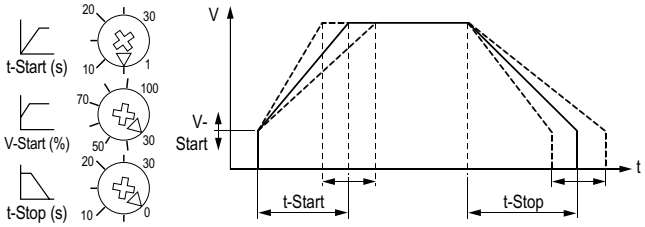


Frame Size 45 (SR22-05 – SR22-16)

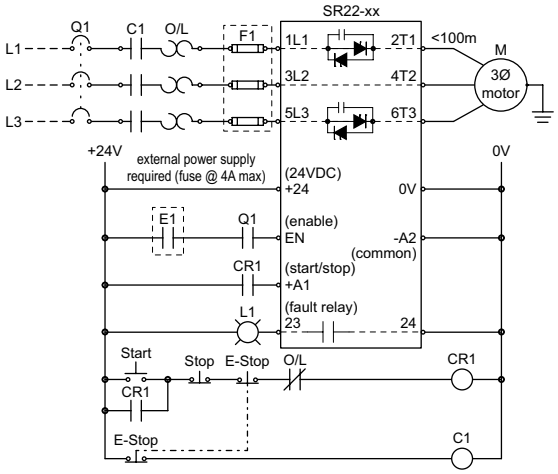


Frame Size 55 (SR22-22 – SR22-40)

SR22 Start/Stop Timing Diagram



SR22 Wiring Diagram



External Control Elements:
C1 = E-Stop contactor
CR1 = Start contactor
E1 = Optional switch to allow trip reset without opening main breaker Q1
F1 = Optional semiconductor fuse for Type 1 Coordination (in addition to Q1)
O/L = Overload relay
Q1 = Cable protection circuit breaker
L1 = Indicator lamp: ON = Ready; OFF = Fault
E-Stop/Start/Stop = E-Stop/Start/Stop pushbuttons

SR22 – PLC I/O Compatibility

SR22 – PLC & I/O Compatibility

Product Line	*Module Type*	*Module Numbers*
CLICK	PLC	C0-00AR-D, C0-00DD2-D, C0-00DR-D, C0-02DD2-D, C0-02DR-D
	DC Output	C0-08TD2, C0-16TD2
	Relay Output	C0-04TRS, C0-08TR
Productivity3000	DC Output	P3-08TD2S, P3-16TD2
	Relay Output	P3-08TAS, P3-16TA, P3-08TRS, P3-16TR, P3-08TRS-1
DL05	PLC	D0-05AR, D0-05DR, D0-05DR-D
DL06	PLC	D0-06AR, D0-06DD2, D0-06DD2-D, D0-06DR, D0-06DR-D
DL05/DL06	DC I/O	D0-07CDR
	DC Output	D0-10TD2, D0-16TD2, D0-08TR, F0-04TRS
DL105	PLC	F1-130-DR, F1-130-DR-D
DL205	DC I/O	D2-08CDR
	DC Output	D2-08TD2, D2-16TD2-2, D2-32TD2, F2-16TD2P
	Relay Output	D2-04TRS, D2-08TR, D2-12TR, F2-08TR, F2-08TRS
DL305	DC Output	D3-08TD2, D3-16TD2
	Relay Output	D3-08TR, D3-16TR
DL405	DC Output	D4-16TD2, D4-32TD2
	Relay Output	D4-08TR, D4-16TR, F4-08TRS-1, F4-08TRS-2
Terminator I/O	DC Output	T1K-08TD2-1, T1K-16TD2-1
	Relay Output	T1K-08TR, T1K-08TRS, T1K-16TR