Synergy EN60947-4-2 product information

Rated operational voltages	**U_e**	200Vac to 480Vac		
Rated operational currents	**I_e**	See Rating Table		
Rating index		See Sizing Guide		
Rated frequency/frequencies		50 - 60Hz		
Rated duty		Uninterrupted.		
Form designation		SGY-101 to SGY-309	Form 1, Internally Bypassed	
		SGY-401 to SGY-505	Form 1	
Rated insulation voltage	**U_i**	480V		
Rated impulse withstand voltage	**U_{imp}**	Main circuit	4kV	
		Control supply circuit	2.5kV	
IP code		Main circuit	IP00 (IP 20 optional on SGY-101 to SGY-205)	
		Supply and Control circuit	IP20	
Pollution degree		2		
Rated conditional short-circuit current and type of co-ordination with associated short circuit protective device (SCPD)		Type 1 co-ordination See Short Circuit Protection Tables for rated conditional short-circuit current and required current rating and characteristics of the associated SCPD		
Rated control circuit voltage (programmable)	**U_c**	24Vdc, 110Vac or 230Vac	50 - 60Hz	Protect with 4A UL Listed fuse
Rated control supply voltage	**U_s**	See Rating Table, 2 Amp supply (cont.)		
Relay specification		AC-15, 230Vac, 1A DC-13 30Vdc, 0.7A		
Electronic Overload relay with manual reset	**Trip Class**	10, 20 or 30 (See Sizing Guide for associated I_e rating)		
	Current setting	50% I_m to 125% I_e		
	Rated frequency	50 to 60Hz		
	Time-current characteristics	See Fig.1 for trip curves		
EMC Emission levels	**EN 55011**	Class A ❶		
EMC Immunity levels	**IEC 61000-4-2**	8kV/air discharge or 4kV/contact discharge		
	IEC 61000-4-3	10 V/m		
	IEC 61000-4-4	2kV/5kHz (main and power ports)		
		1kV/5kHz (signal ports)		
	IEC 61000-4-5	2kV line-to-ground 1kV line-to-line		
	IEC 61000-4-6	10V		

❶ **NOTICE: This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances, in which case the user may be required to take adequate mitigation measures**

.

Short circuit protection

Size 1

Type designation (eg. SGY-101-4-01)			SGY101	SGY103	SGY105	SGY107	SGY109	SGY111	SGY113	SGY115	SGY117
Rated operational currents	I_e	A	17	22	29	35	41	55	66	80	100
Rated conditional short circuit current	I_q	kA	5	5	5	5	5	5	5	10	10
Class J time-delay fuse #1	Maximum rating Z_1	A	30	40	50	60	70	100	125	150	175
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	60	60	60	60	60	150	150	250	300
Semiconductor fuse (class aR) #2	Type		Mersen 6,9 URD 30 _ Bussmann 170M30__ Bussmann 170M31__ Bussmann 170M32__ SIBA 20 61___								
	Fuse rating	A	100A	100A	160A	160A	160A	200A	200A	250A	315A

Size 2 and 3

Type designation (eg. SGY-201-4-01)			SGY201	SGY203	SGY205	SGY301	SGY303	SGY305	SGY307	SGY309
Rated operational currents	I_e	A	132	160	195	242	302	361	430	500
Rated conditional short circuit current	I_q	kA	10	10	10	18	18	18	18	18
Class J time-delay fuse #1	Maximum rating Z_1	A	225	300	350	450	500	500	600	600
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	350	450	500	700	800	1000	1000	1000
Semiconductor fuse (class aR) #2	Type		Mersen 6,9 URD 31__ Bussmann 170M40__ Bussmann 170M41__ Bussmann 170M42__ SIBA 20 61___			Mersen 6,9 URD 33__ Bussmann 170M60__ Bussmann 170M61__ Bussmann 170M62__ SIBA 20 63___				
	Fuse rating	A	400	550	550	700	800	900	1000	1100

1. Suitable For Use On A Circuit Capable Of Delivering Not More Than ___I_q___ rms Symmetrical Amperes, 480 Volts Maximum, When Protected by Class J time delay Fuses with a Maximum Rating of ___Z_1___ or by a Circuit Breaker with a Maximum Rating of ___Z_2___.

2. Correctly selected semiconductor fuses can provide additional protection against damage to the synergy unit (This is sometimes referred to as type 2 co-ordination). These semiconductor fuses are recommended to provide this increased protection.

Size 4 and 5

Type designation (eg. SGY-401-4-02)			SGY401	SGY403	SGY501	SGY503	SGY505
Rated operational currents	I_e	A	610	722	850	960	1080
Rated conditional short circuit current	I_q	kA	30	30	42	42	42
Semiconductor fuse (class aR)	Bussmann Type		170M5466		170M6467		
	Siba Type		2067132.1000A		2068132.1400A		

Rating table

Size 1, 2 and 3

Minimum current ratings based on typical rated operation currents of motors for the corresponding rated operational powers
Current rating optimised for kW@400V & hp@440-480V - Ref IEC 60947-4-1:2009 Table G.1 where applicable.

Type	IEC, I_e A [3]	kW [1]		UL,FLA	Hp [2]				U_s
		230V	400V	A [4]	200V	208V	220-240V	440-480V	
SGY-101-4-01	**17**	4	7.5	**17**	3	5	5	10	
SGY-103-4-01	**22**	5.5	11	**21**	5	5	5	15	
SGY-105-4-01	**29**	7.5	15	**27**	7.5	7.5	7.5	20	
SGY-107-4-01	**35**	7.5	18.5	**34**	10	10	10	25	
SGY-109-4-01	**41**	11	22	**40**	10	10	10	30	24Vdc,
SGY-111-4-01	**55**	15	30	**52**	15	15	15	40	
SGY-113-4-01	**66**	18.5	37	**65**	20	20	20	50	110Vac
SGY-115-4-01	**80**	22	45	**77**	20	25	25	60	to
SGY-117-4-01	**100**	30	55	**96**	30	30	30	75	230Vac
SGY-201-4-01	**132**	37	75	**124**	40	40	40	100	
SGY-203-4-01	**160**	45	90	**156**	50	50	60	125	
SGY-205-4-01	**195**	55	110	**180**	60	60	60	150	
SGY-301-4-01	**242**	75	132	**242**	75	75	75	200	
SGY-303-4-01	**302**	90	160	**302**	100	100	100	250	
SGY-305-4-01	**361**	110	200	**361**	125	125	150	300	
SGY-307-4-02	**430**	132	250	**414**	150	150	150	350	110Vac
SGY-309-4-02	**500**	150	280	**477**	150	150	150	400	
SGY-307-4-03	**430**	132	250	**414**	150	150	150	350	230Vac
SGY-309-4-03	**500**	150	280	**477**	150	150	150	400	

[1] Rated operational powers in kW according to IEC 60072-1 (primary series) corresponding to IEC current rating.
[2] Rated operational powers in hp according to UL508 corresponding to FLA current rating.
[3] The IEC, Ie rating applies for EN 60947-4-2 max rating index 195A: AC-53a: 3.5-17: 90-5 and 500A: AC-53a: 3.5-17: 90-3
[4] The UL, FLA rating applies for a maximum surrounding air temperature of 50°C.

Size 4 and 5

Type	IEC, I_e A [3]	kW [1]		UL,FLA	Hp [2]				U_s
		230V	400V	A [4]	200V	208V	220-240V	440-480V	
SGY-401-4-02	**610**	200	355	**590**	200	200	200	500	110Vac
SGY-403-4-02	**722**	220	400	**722**	250	250	300	600	
SGY-501-4-02	**850**	280	500	**840**	300	300	350	700	
SGY-503-4-02	**960**	315	560	**960**	300	350	400	800	
SGY-505-4-02	**1080**	355	630	**1080**	350	400	450	900	
SGY-401-4-03	**610**	200	355	**590**	200	200	200	500	230Vac
SGY-403-4-03	**722**	220	400	**722**	250	250	300	600	
SGY-501-4-03	**850**	280	500	**840**	300	300	350	700	
SGY-503-4-03	**960**	315	560	**960**	300	350	400	800	
SGY-505-4-03	**1080**	355	630	**1080**	350	400	450	900	

[1] Rated operational powers in kW according to IEC 60072-1 (primary series) corresponding to IEC current rating
[2] Rated operational powers in hp based on Table 430.250 of the National Electrical Code, 2005® corresponding to FLA current rating.
[3] Ie rating applies for EN 60947-4-2 max rating index 1080A: AC-53a: 3.5-17: 60-3
[4] Ratings apply for a maximum surrounding air temperature of 40°C.

Sizing Guide

Size 1 and 2

IEC, I_e	kW		UL, FLA	Hp				Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	A	200V	208V	220-240V	440-480V	I_e: AC-53a: 3.5-17: 90-5	I_e: AC-53a: 4-19: 90-5	I_e: AC-53a: 4-29: 90-5
17	4	7.5	17	3	5	5	10	SGY-101	SGY-103	SGY-105
22	5.5	11	21	5	5	5	15	SGY-103	SGY-105	SGY-107
29	7.5	15	27	7.5	7.5	7.5	20	SGY-105	SGY-107	SGY-109
35	7.5	18.5	34	10	10	10	25	SGY-107	SGY-109	SGY-111
41	11	22	40	10	10	10	30	SGY-109	SGY-111	SGY-113
55	15	30	52	15	15	15	40	SGY-111	SGY-113	SGY-115
66	18.5	37	65	20	20	20	50	SGY-113	SGY-115	SGY-117
80	22	45	77	20	25	25	60	SGY-115	SGY-117	SGY-201
100	30	55	96	30	30	30	75	SGY-117	SGY-201	SGY-203
132	37	75	124	40	40	40	100	SGY-201	SGY-203	SGY-205
160	45	90	156	50	50	60	125	SGY-203	SGY-205	*See Size 3*
195	55	110	180	60	60	60	150	SGY-205	*See Size 3*	*See Size 3*

Size 3

IEC, I_e	kW		UL, FLA	Hp				Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	A	200V	208V	220-240V	440-480V	Ie: AC-53a: 3.5-17: 90-3	Ie: AC-53a: 4-19: 90-3	Ie: AC-53a: 4-29: 90-3
160	*45*	*90*	*156*	*50*	*50*	*60*	*125*	*See Size 2*	*See Size 2*	SGY-301
195	*55*	*110*	*180*	*60*	*60*	*60*	*150*	*See Size 2*	SGY-301	SGY-303
242	75	132	242	75	75	75	200	SGY-301	SGY-303	SGY-305
302	90	160	302	100	100	100	250	SGY-303	SGY-305	SGY-307
361	110	200	361	125	125	150	300	SGY-305	SGY-307	SGY-309
430	132	250	414	150	150	150	350	SGY-307	SGY-309	*See Size 4*
500	150	280	477	150	150	150	400	SGY-309	*See Size 4*	*See Size 4*

Size 4 and 5

IEC, I_e	kW		UL, FLA	Hp				Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	A	200V	208V	220-240V	440-480V	Ie: AC-53a: 3.5-17: 60-3	Ie: AC-53a: 4-19: 60-3	Ie: AC-53a: 4-29: 60-3
430	*132*	*250*	*414*	*150*	*150*	*150*	*350*	*See Size 3*	*See Size 3*	SGY-401
500	*150*	*280*	*477*	*150*	*150*	*150*	*400*	*See Size 3*	SGY-401	SGY-403
610	200	355	590	200	200	200	500	SGY-401	SGY-403	SGY-501
722	220	400	722	250	250	300	600	SGY-403	SGY-501	SGY-503
850	280	500	840	300	300	350	700	SGY-501	SGY-503	SGY-505
960	315	560	960	300	350	400	800	SGY-503	SGY-505	-
1080	355	630	1080	350	400	450	900	SGY-505	-	-

In-Delta Connection Sizing Guide

Size 1 and 2

IEC [1]	kW		UL [1]	Hp				Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	A	200V	208V	220-240V	440-480V			
29	7.5	15	29	7.5	7.5	10	20	SGY-101	SGY-103	SGY-105
38	11	18.5	36	10	10	10	25	SGY-103	SGY-105	SGY-107
50	11	22	47	10	15	15	30	SGY-105	SGY-107	SGY-109
61	18.5	30	59	15	15	20	40	SGY-107	SGY-109	SGY-111
71	18.5	37	69	20	20	25	50	SGY-109	SGY-111	SGY-113
95	22	45	90	25	30	30	60	SGY-111	SGY-113	SGY-115
114	30	55	113	30	30	40	75	SGY-113	SGY-115	SGY-117
139	37	75	133	40	40	50	100	SGY-115	SGY-117	SGY-201
173	55	90	166	50	50	60	125	SGY-117	SGY-201	SGY-203
229	55	110	215	60	75	75	150	SGY-201	SGY-203	SGY-205
277	75	150	270	75	75	100	200	SGY-203	SGY-205	*See Size 3*
338	90	185	312	100	100	125	250	SGY-205	*See Size 3*	*See Size 3*

Size 3

IEC [1]	kW		UL [1]	Hp				Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	A	200V	208V	220-240V	440-480V			
277	*75*	*150*	*270*	*75*	*75*	*100*	*200*	*See Size 2*	*See Size 2*	SGY-301
338	*90*	*185*	*312*	*100*	*100*	*125*	*250*	*See Size 2*	SGY-301	SGY-303
419	132	220	419	150	150	150	350	SGY-301	SGY-303	SGY-305
523	160	300	523	150	150	200	450	SGY-303	SGY-305	SGY-307
625	200	355	625	200	200	250	500	SGY-305	SGY-307	SGY-309
745	220	425	717	250	250	250	500	SGY-307	SGY-309	*See Size 4*
866	280	500	826	250	300	300	600	SGY-309	*See Size 4*	*See Size 4*

Size 4 and 5

IEC [1]	kW		UL [1]	Hp				Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	A	200V	208V	220-240V	440-480V			
745	*220*	*425*	*717*	*250*	*250*	*250*	*500*	*See Size 3*	*See Size 3*	SGY-401
866	*280*	*500*	*826*	*250*	*300*	*300*	*600*	*See Size 3*	SGY-401	SGY-403
1057	335	600	1022	350	350	400	800	SGY-401	SGY-403	SGY-501
1251	400	710	1251	450	450	500	1000	SGY-403	SGY-501	SGY-503
1472	475	850	1455	500	500	600	1100	SGY-501	SGY-503	SGY-505
1663	560	950	1663	600	600	600	1250	SGY-503	SGY-505	-
1871	630	1100	1871	600	700	700	1500	SGY-505	-	-

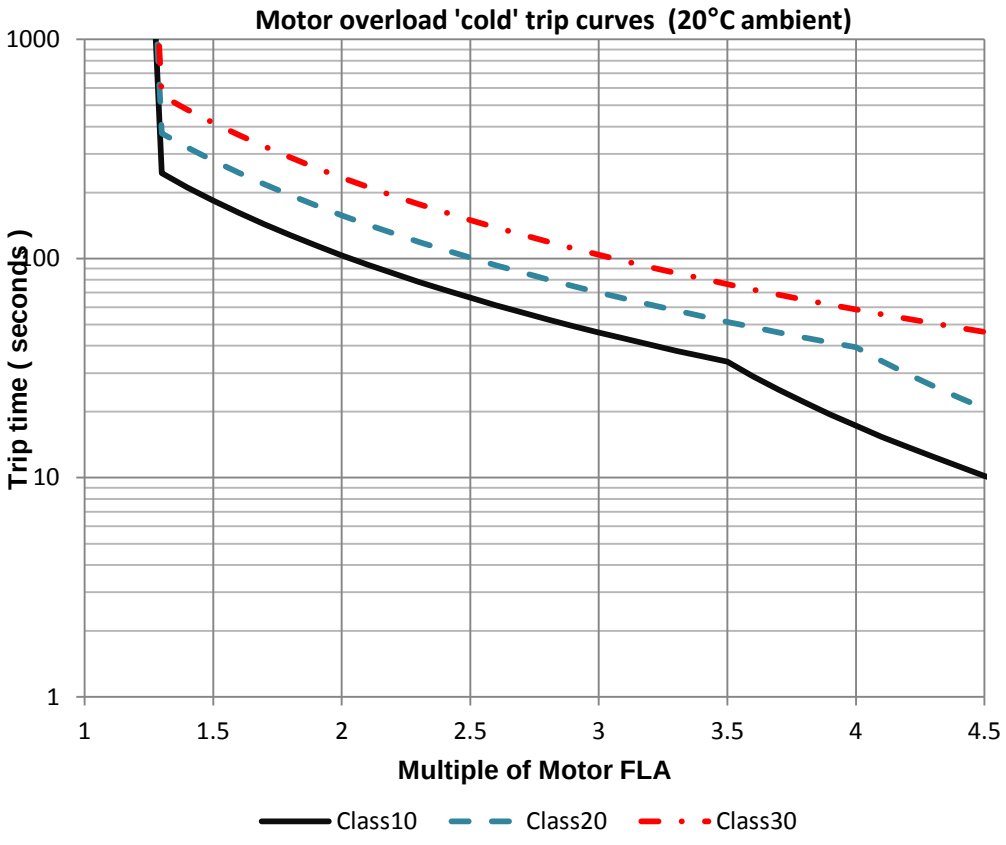
[1] Maximum motor line current indicated. For In-Delta connections, all six motor wires must be available for connection, and it is critical to exactly follow the In-Delta wiring diagram in the Synergy Quick Start Guide. The Soft Starter will only sense the Phase Current, which is about 58% of the motor line current.

Conductor size and torque requirements

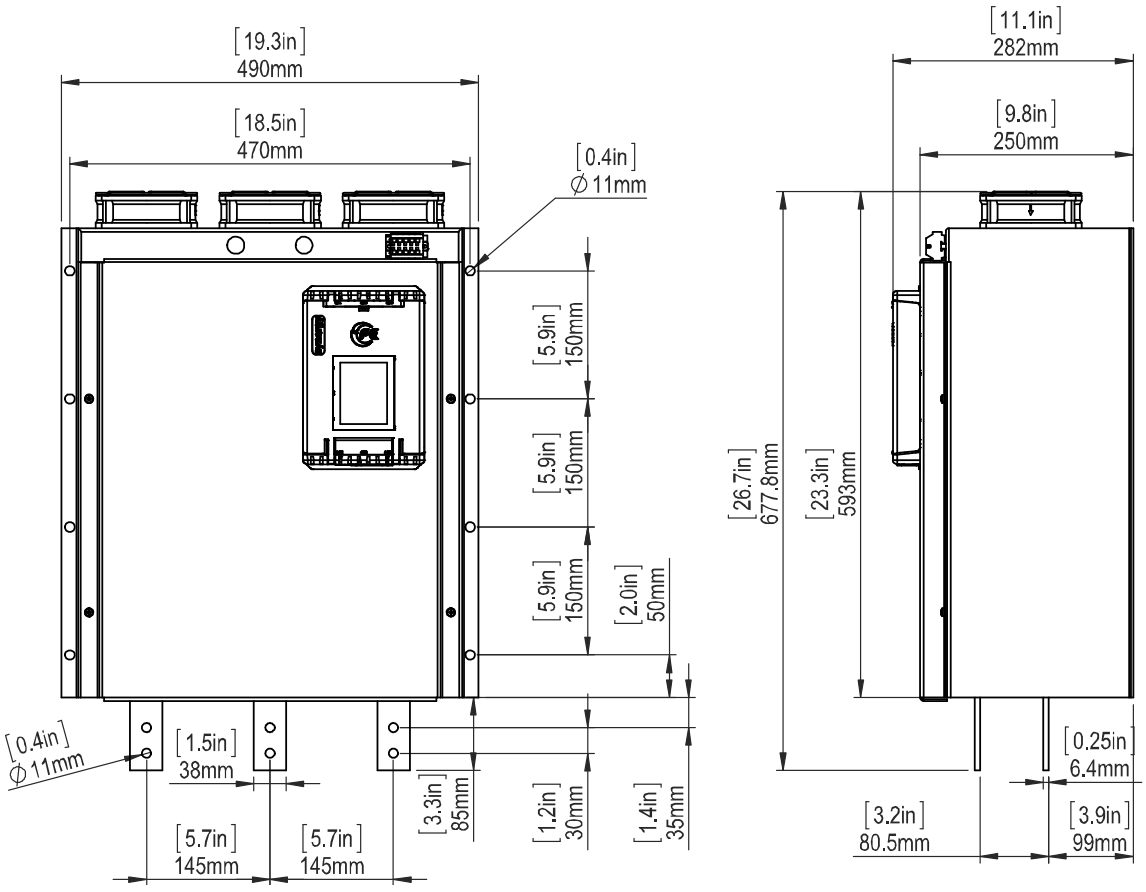
Terminal		Models	Wire/Busbar Size		Torque	
			Metric	Imperial	Nm	lb-in
Main Terminals Cu STR 75°C only	Terminal	SGY101 to SGY117	2.5 - 70mm^2	12- 2/0AWG	9	80
		SGY201 to SGY205	4 - 185mm^2	12 – 350MCM	14	123
	M10 bolt	SGY301 to SGY305	2 x 95mm^2	2 x 2/0AWG		
		SGY307 to SGY309	2 x 150mm^2	2 x 350MCM		
Main Terminals [2] Copper busbar	2 x M10 bolt	SGY401 to SGY403	50mm x 10mm	1.5in x 0.5in		
	M12 bolt	SGY501 to SGY503	60mm x 10mm	2.0in x 0.5in		
		SGY505	80mm x 10mm	2.5in x 0.5in		
Control terminals		All models	0.2–1.5mm^2	24-16AWG	0.5	4.5
Protective Earth [1] Cu only	M6 stud	SGY101	≥ 4mm^2	≥ 12AWG	8	70
		SGY103 to SGY111	≥ 6mm^2	≥ 10AWG		
		SGY113 to SGY117	≥ 10mm^2	≥ 8AWG		
	M8 stud	SGY201 to SGY205	≥ 16mm^2	≥ 6AWG	12	105
		SGY301	≥ 25mm^2	≥ 4AWG		
		SGY303 to SGY305	≥ 35mm^2	≥ 3AWG		
		SGY307 to SGY309	≥ 35mm^2	≥ 2AWG		
		SGY401 to SGY403	≥ 70mm^2	≥ 1/0AWG		
	M10 stud	SGY501 to SGY505	≥ 70mm^2	≥ 2/0AWG		
		SGY505	≥ 95mm^2	≥ 3/0AWG		

[1] Protective Earth wire size based on bonding conductor requirements of UL508 Table 6.4 and UL508A Table 15.1.
[2] Maximum busbar sizes based on IEC 60947-1 Table 11. The actual conductor used must comply with local wiring regulations.

Fig.1.



Synergy Size4 Dimensions

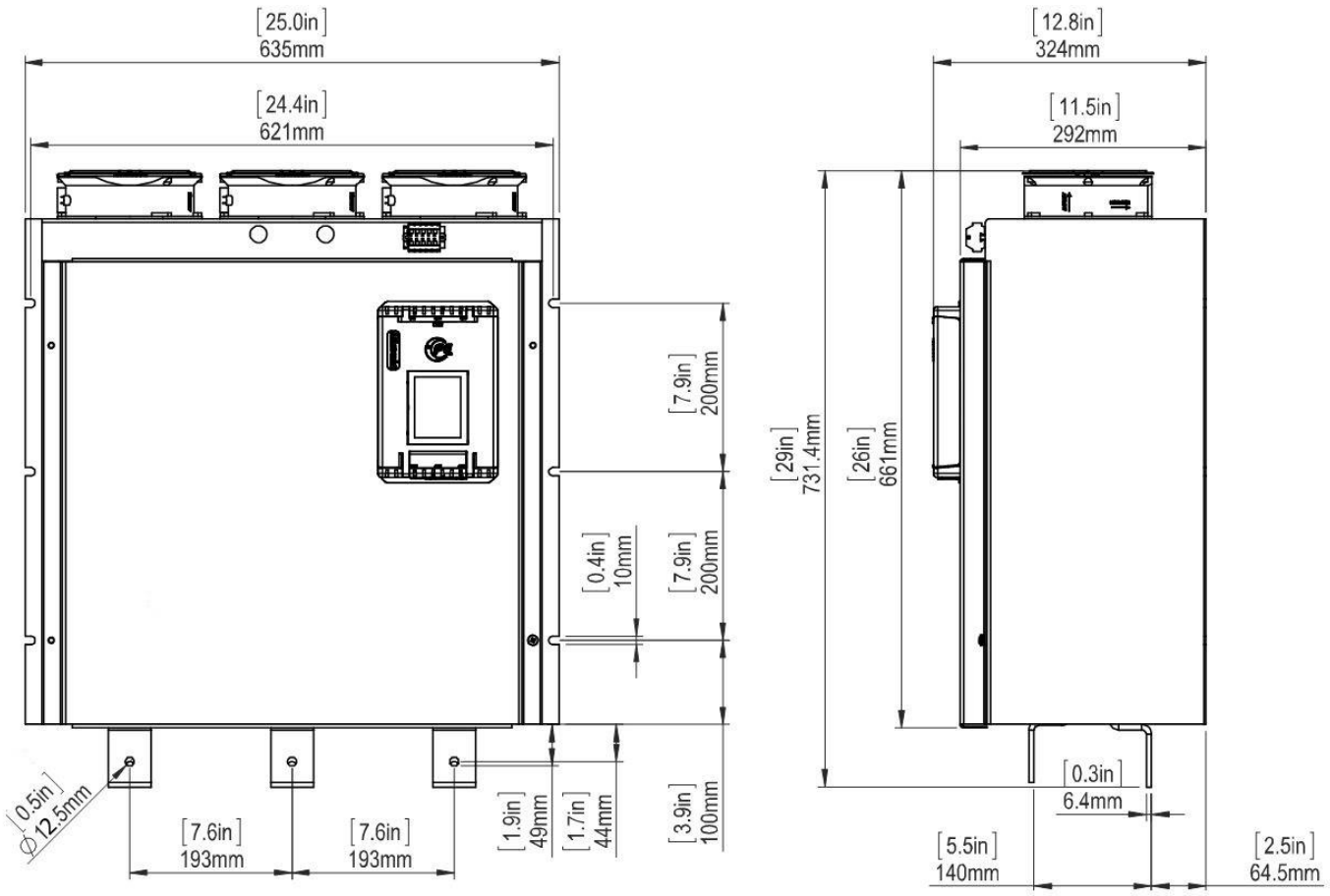


Size4

SGY-401 - Trip Class10 - 610Amp, Trip Class20 - 500A, Trip Class30 - 430A
SGY-403 - Trip Class10 - 722Amp, Trip Class20 - 610A, Trip Class30 - 500A

Current Transformers are located within the unit on this size.
If the Synergy Motor overload is required, these must be located outside the bypassed circuit to measure the motor current.

Synergy Size5 Dimensions



Size5

SGY-501 - Trip Class10 - 850Amp, Trip Class20 - 722A, Trip Class30 - 610A
SGY-503 - Trip Class10 - 960Amp, Trip Class20 - 850A, Trip Class30 - 722A
SGY-505 - Trip Class10 - 1080Amp, Trip Class20 - 960A, Trip Class30 - 850A

Current Transformers are supplied separately and must be fitted externally on this size.
If the Synergy Motor overload is required, when the unit is bypassed, these must be located outside the bypassed circuit to measure the motor current.

Warning/Caution

This document is only to support and provide specification information that may not yet be included in the Synergy Quick Start Guide.

Installers should read and understand the safety instructions in the Synergy Quick Start Guide prior to installing, operating or maintaining the Synergy soft starter.