synergy™

fairford Soft Start Technology

Quick Start Guide



iERS Intelligent Energy Recovery System

CE

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CSA 22.2
No. 14

Redefining Motor Control

synergy™

The original pioneers of soft start technology, Fairford Electronics Limited have been at the forefront of motor control innovation since the 1970's. Fairford have manufactured and supplied over 1 million products into the market place and are recognised as the reference point for many control solution providers worldwide.

In 2009, the need for a new technology that bridged the gap between drive technology and soft start was recognised and the development process began for synergy™, a new form of motor control that met the needs of those requiring the functionality of a drive in a fixed speed application. The key aspects of a drive (energy saving and communications) as well as original features of a soft start including internal bypass and lower cost, meant the base design was enhanced even further.

iERS (intelligent Energy Recovery System) is Fairford's patented energy saving system with a combined internal bypass to save energy on lightly loaded motors. iERS reduces the voltage and current supplied to lightly loaded motors to only allow the motor to consume the exact amount of energy required to maintain the speed at that load.

When the motor is at full load the internal bypass closes, this reduces the losses produced by the control element. This combined approach enables iERS to save more energy in more applications than any other competing technology.

iERS has been market proven over the past 10 years and has now reached its latest development realising even greater savings. Applications such as compressors, refrigerators, pump jacks, moulding machines and chillers can typically see savings of around 8-40% of total energy consumption when lightly loaded.

With size and cabinet capacity an ever increasing focus, Fairford developed the world's smallest power to size ratio motor controller. Synergy™ utilised Fairford's globally renowned Automatic Setup feature to programme the unit to each individual application using only a 8 button process. Since then it has removed buttons and uses touch screen technology bringing the user interface to even greater management levels.

With full motor overload protection as well as full data logging, upgradeable software in the field and extensive input/output programmability, synergy™ meets all of the key design criteria.

iERS
Intelligent Energy Recovery System

Important information
Installers should read and understand the instructions in this guide prior to installing, operating and maintaining the soft start. The following symbols may appear in this guide or on the soft start to warn of potential hazards or to draw attention to certain information.

 **Dangerous Voltage**
Indicates the presence of a hazardous voltage which could result in personal injury or death.
Tension dangereuse
Indique la présence d'une tension dangereuse qui peut entaîner des blessures ou la mort.

 **Warning/Caution**
Indicates a potential hazard. Any instructions that follow this symbol should be obeyed to avoid possible damage to the equipment, and personal injury or death.
Avertissement/Mise en garde
Indique un danger potentiel. Toutes les instructions suivant ce symbole doivent être observées, afin d'éviter les dommages de l'équipement et les blessures ou la mort.

 **Protective Earth (Ground)**
Indicates a terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault.
Mise à la terre (Masse)
Indique une borne dont l'usage prévu est d'être connecter à conducteur externe pour assurer la protection contre les chocs électriques en cas de défauts.

Caution Statements
The examples and diagrams in this manual are included solely for illustrative purposes. The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.
Mises en garde
Les exemples et les schémas de ce manuel ne sont donnés qu'à titre illustratif. Les informations présentées dans ce manuel peuvent être modifiées sans avis préalable.
En aucun cas nous n'assumons la responsabilité ou l'obligation pour les dommages directs, indirects ou consécutifs qui résultent de l'utilisation ou application de cet équipement.

Short Circuit
Fairford soft starts are not short circuit proof. After severe overload or short circuit, the operation of the soft start should be fully tested by an authorised service agent.
Court-circuit
Les démarreurs progressifs Fairford ne sont pas à l'épreuve des courts-circuits. Après une forte surcharge ou un court-circuit, le fonctionnement du démarreur progressif doit être intégralement vérifié par un agent de maintenance agréé.

Safety (continued)

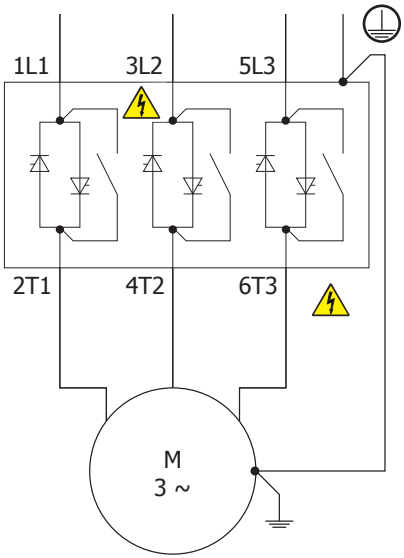
- Synergy™ soft starts contain dangerous voltages when connected to the mains supply. Only qualified personnel that have been completely trained and authorised, should carry out installation, operation and maintenance of this equipment.
- *Les démarreurs progressifs Synergy ™ contiennent des tensions dangereuses, lorsqu'ils sont connectés à la tension secteur. Les activités d'installation, d'utilisation et d'entretien de cet équipement doivent être effectuées par un personnel qualifié, dûment formé et habilité.*

- Installation of the soft start must be made in accordance with existing local and national electrical codes and regulations and have a minimum protection rating.
- *Le démarreur progressif doit être installer conformément au code local et nationale d'électricité et à la réglementation en vigueur, et il doit avoir un indice de protection minimal.*

- It is the responsibility of the installer to provide suitable grounding and branch circuit protection in accordance with local electrical safety codes.
- *Il appartient à l'installeur d'assurer la mise à la terre et la protection du circuit de branchement, conformément au code de sécurité électrique local.*

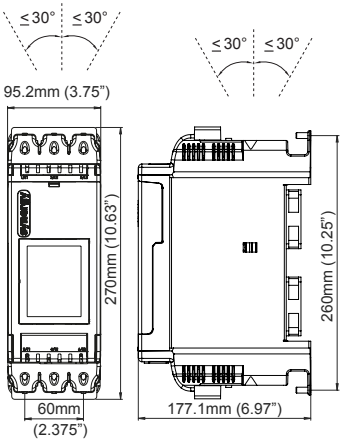
- This soft start contains no serviceable or re-usable parts.
- *Ce démarreur progressif ne contient pas de pièces réparables ou réutilisables.*

- The STOP function of the soft start does not isolate dangerous voltages from the output of the soft start. An approved electrical isolation device must be used to disconnect the soft start from the incoming supply before accessing electrical connections.
- *La fonction STOP du démarreur progressif n'isole pas les tension dangereuses en sortie du démarreur progressif. Avant d'accéder aux raccordement électriques, il faut utiliser un dispositif d'isolation électrique approuvé pour déconnecter le démarreur progressif de la tension d'entrée.*



synergy™ Size 1, SGY-101 to SGY-117.

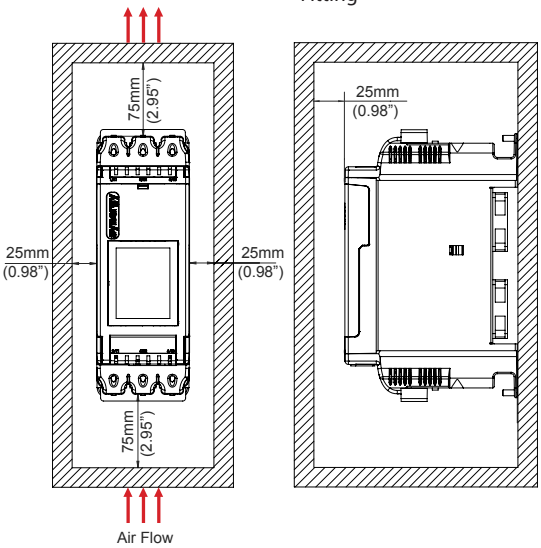
Dimensions



SGY-101 to SGY-105 lower fan only

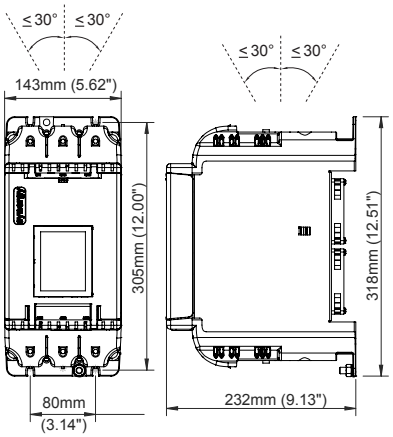
Weight = 3.50 kg (7.71 lbs)

Fitting



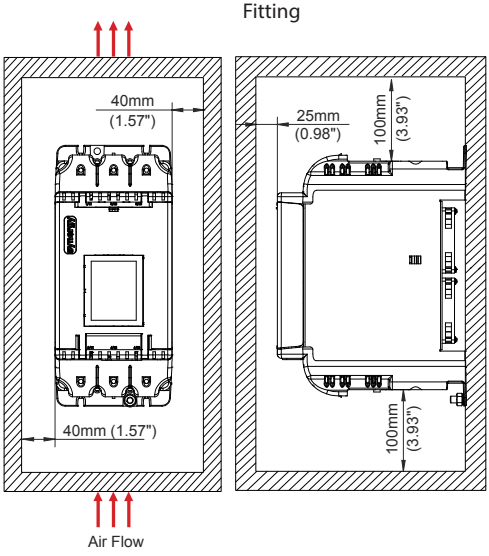
synergy™ Size 2, SGY-201 to SGY-205

Dimensions



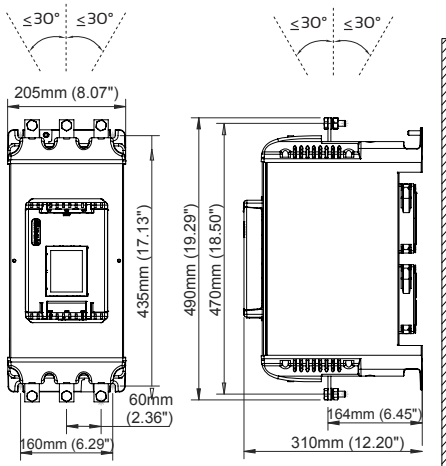
Weight = 6.50 kg (14.33 lbs)

Fitting

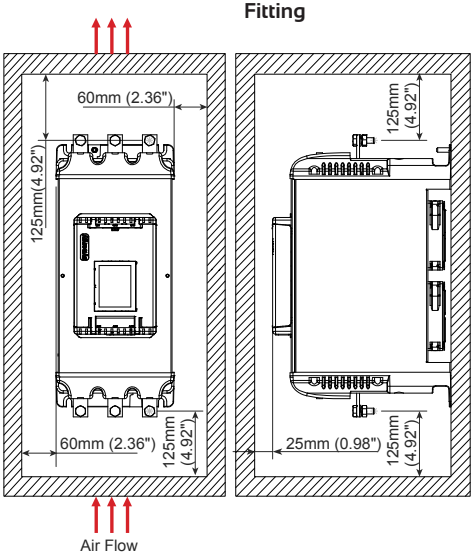


synergy™ Size 3, SGY - 301 to SGY - 305

Dimensions

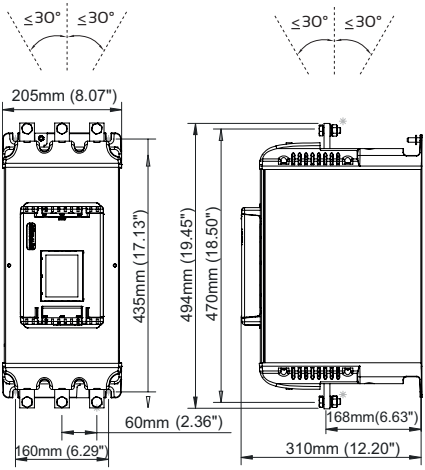


Fitting

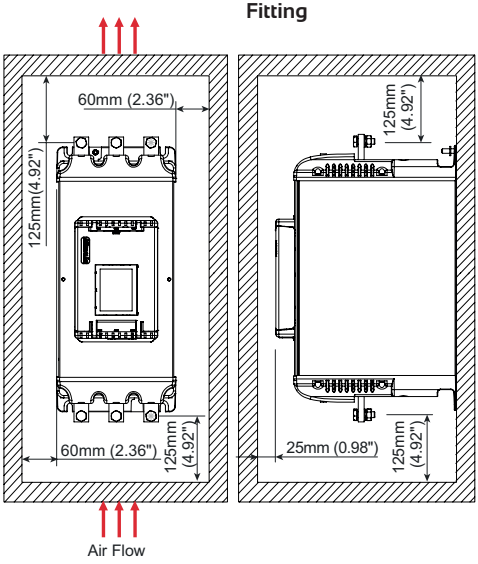


Weight = 16.00 kg (35.27lbs)

synergy™ Size 3, SGY - 307 & SGY - 309



Fitting



Weight = 21.20 kg (46.73lbs)

Environment - installation

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Enclosure Ventilation

When fitting synergy™ into a cabinet, ventilation must be provided if the heat output of the unit is greater than the cabinet will dissipate. Use the following formula to determine the fan requirement. An allowance has been incorporated into the formula so that the figure for Q is the air delivery in the fan suppliers data.

The maximum power dissipation occurs when energy saving.
Heat dissipated can be approximated with the formula:-
Watts (synergy™) = 1/2 x synergy™ current rating x 3

Ventilation intérieure

Lorsque synergy™ *est installé dans une armoire, il faut assurer sa ventilation, si la chaleur produite de l'unité est plus important que la capacité de dissipation de l'armoire. Utiliser la formule suivante pour déterminer la demande de ventilateur. Une tolérence a été incorporé dans la formule, ainsi la figure donnée dans Q est le débit d'air indiqué dans les données du fournisseur du ventilateur.*

La puissance maximale de dissipation est atteint en mode économie d'énergie.
La chaleur dissipée peut être estimée par la formule suivante :
Watts (synergy™) *= 1/2 x courant nominal* synergy™ *x 3*

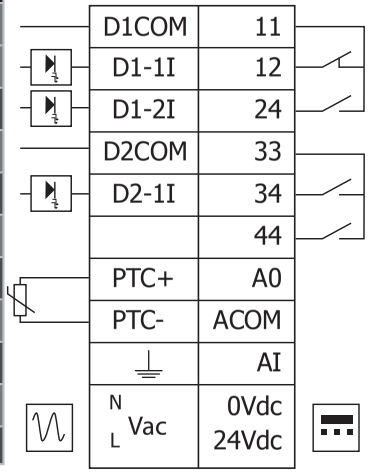
$$Q = \frac{4xWt}{(T_{max} - T_{amb})}$$

Q = volume of air (cubic metres per hour-m^3/h)
Wt = Heat produced by the unit and all other heat sources within the enclosure (Watts)
Tmax = Maximum permissible temperature within the enclosure
(50°C for a fully rated synergy™)
Tamb = Temperature of the air entering the enclosure (°C)
If you prefer to work in CFM, substitute °F for °C. Q is now in CFM

Q = quantité d'air (mètre cube par heure - m^3/h)
Wt = Chaleur produite par l'unité et toutes autres sources de chaleur dans l'armoire (Watts)
Tmax = Température maximale admissible dans l'armoire (50°C pour synergy™ *en puissance maximale)*
Tamb = Température de l'air entrant dans l'armoire (°C)
Pour calculer en CFM, remplacer °C par °F. Ainsi Q est en CFM.

⚠	Required rating	Programmable	Default	Description
#1				Group 1 input common
#1	SEE TABLE 1, U_C	yes	start/ stop	opto-coupled input
#1	SEE TABLE 1, U_C	yes	None	opto-coupled input
				group 2 input common
	SEE TABLE 1 ,U_C	yes	reset	opto-coupled input
				not used
	3 x PTC in series (130°C)		OFF	thermistor
	3 x PTC in series (130°C)		OFF	thermistor
				signal ground
#3	SEE TABLE 1 U_S			control supply
#3	SEE TABLE 1 U_S			control supply

Representative of terminal label. See TABLE 1, U_S for AC supply rating as marked on actual Synergy model.



Description	Default	Programmable	Required rating	⚠
group 1 relay common				
relay N/C	fault	yes	230Vac 1A ACI5, 30Vdc 0.5A Resistive	
relay N/O	fault	yes	230Vac 1A ACI5, 30Vdc 0.5A Resistive	
group 2 relay common				
relay N/O	running	yes	230Vac 1A ACI5, 30Vdc 0.5A Resistive	
relay N/O	end of start	yes	230Vac 1A ACI5, 30Vdc 0.5A Resistive	
analog output	0-10V	yes	0 to 10V 10mA / 4-20mA	
analog 0V			0V	
analog input	0-10V	Yes	0 to 10V 10mA / 4-20mA	
control supply			SEE TABLE 1 , U_S	#3
control supply			SEE TABLE 1, U_S	#3

SGY-101 to SGY-305 Control Power Consumption 60W
SGY-307 to SGY-309 Control Power Consumption 120W

Table 1:- Interface Control Voltages, 2 Amp supply (continuous).

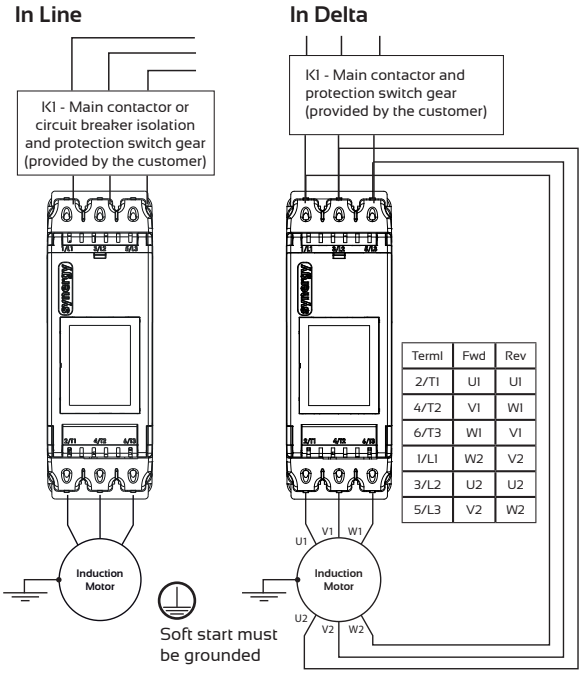
Model No (s):	U_S (+10% -15%)	U_C (+10% -15%)	Notes
SGY-101-4-01 to SGY-305-4-01	110 - 230Vac or 24Vdc	110Vac or 230Vac or 24Vdc. ⚠ 230Vac factory default. 230Vac défaut d'usine. #4	⚠ The system can have either a 110/230Vac mains or 24Vdc input NOT both. Le système peut avoir soit une alimentation principale de 110/230 Vac ou de 24 Vdc, mais en aucun cas les deux simultanement.
SGY-307-4-02 / SGY-309-4-02	110Vac		
SGY-307-4-03 / SGY-309-4-03	230Vac		

***24Vdc Specification**
24Vdc 60W
Residual ripple 100mV
Spikes/switching Peaks 240mV
Turn On/Off response
No overshoot of V out
Overvoltage voltage protection output voltage must be clamped to <30Vdc

Notes ⚠	
#1	The programmed digital input setting on **D1COM**, D1-1I, D1-2I must correspond to the voltage applied to these terminals to avoid risk of damage to the equipment. Afin d'éviter d'endommager l'équipement, le réglage de l'entrée numérique programmé sur D1COM, D1-1I, D1-2I doit correspondre à la tension appliquée à ces bornes.
#2	The programmed digital input setting on **D2COM, D2-1I** must correspond to the voltage applied to these terminals to avoid risk of damage to the equipment. Afin d'éviter d'endommager l'équipement, le réglage de l'entrée numérique programmé sur D2COM, D2-1I doit correspondre à la tension appliquée à ces bornes.
#3	The control supply can be 110 to 230Vac applied to the N, L terminals or 24Vdc applied to the 0Vdc, 24V input terminals. The correct voltage as specified must only be applied to one of these supply inputs to avoid risk of damage to the equipment. L'alimentation contrôle peut être 110 à 230 Vca, appliquée aux bornes N et L, ou 24 Vcc, appliquée aux bornes d'entrée de 0 Vcc, 24 V. Afin d'éviter d'endommager l'équipement, la tension appropriée selon les indications ne doit être appliquée qu'à une entrée d'alimentation.
#4	Refer to Synergy Programming Manual MAN-SGY-001 for factory default settings. Référer au la Manuel de Programmation Synergy MAN-SGY-001 pour des paramètres par défaut d'usine

Wiring connection

synergy™



Terml	Fwd	Rev
2/T1	U1	U1
4/T2	V1	W1
6/T3	W1	V1
1/L1	W2	V2
3/L2	U2	U2
5/L3	V2	W2

Note: Circuit breaker isolation alone is not allowed for In Delta operation. KI (Main contactor) controlled by the Running relay MUST be used for isolation.

For suitable short circuit protection devices (SCPD's) see short Circuit Protection in the Technical Information/ standards section of this guide.

Pour un dispositif de protection approprié contre le court-circuit, voir la protection contre le court-circuit dans la section « Informations techniques/normes » du présent guide.

For wire size and torque requirements see Technical Information/ standards section of this guide.

Pour les dimensions de câble et les besoins en couple, voir la section « Informations techniques/normes » du présent guide.

In Delta

For this configuration applying the equation.

synergy™ Ie =

ie (motor)/ $\sqrt{3}$

Allows lower current rating synergy™ than the motor.

When In Delta configuration is used a line contactor controlled by synergy™ **MUST** be used with the In Delta Firing Mode selected in the advanced menu.

En Delta

Pour cette configuration, appliquer l'équation.

suivante : synergy™ Ie =

Ie (moteur)/ $\sqrt{3}$

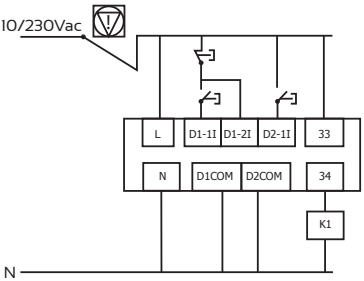
Cela permet le courant nominal inférieur de synergy™ *par rapport au moteur.*

Lorsque En Delta configuration est utilisée, **IL FAUT** *utiliser un sectionneur principal contrôlé par* synergy™*, En Delta mode de fonctionnement, sélectionné dans le menu avancé.*

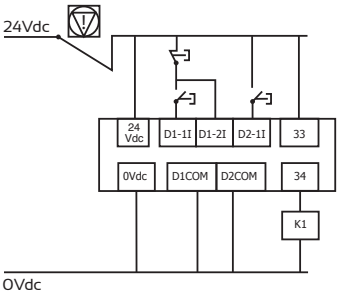
Wiring connection

synergy™

3 Wire Control Diagram 110/230Vac control supply (U_S) and digital input (U_C) programming.



3 wire Control Diagram 24Vdc control supply (U_S) and digital input (U_C) programming (only applicable for SGY-101 to SGY-305).

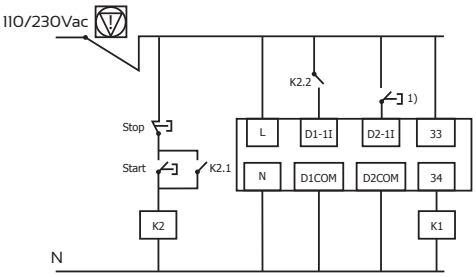


Digital input programming

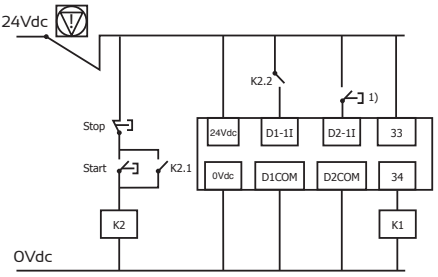
D1 - 1I = Start
D1 - 2I = Stop
D2 - 1I = Reset

⚠	CAUTION
#1	REFER to TABLE 1 on page 8 for input control voltages. These recommended wiring diagrams are specifically where the control supply voltage (U_S) is identical to the control circuit voltage (U_C) and not to be supplied separately. Other wiring configurations must also be in accordance with existing local and national codes and regulations. RÉFÉRER au TABLEU 1 à la page 8 pour des tensions de contrôle d'entrée. Ces schémas de câblage sont recommandées spécifiquement lorsque la tension d'alimentation de commande (U_S) est identique à la tension du circuit de commande (U_C). U_S et U_C ne doivent pas être alimentés séparément. Toutes les configurations de câblage doivent également être en conformité avec les codes et les règlements locaux et nationaux en vigueur.
#2	Power factor correction capacitors must NOT be positioned between the soft start and the motor or there is a risk of damaging thyristors due to current peaks. Condensateurs de correction de facteur de puissance NE doivent pas être placés entre le moteur at le démarreur progressif ou il y a un risqué d'endommager les thyristors en raison des pics de courants.

110/230Vac (U_S) and (U_C) user programmable control diagram



24Vdc (U_S) and (U_C) user programmable control diagram (only applicable for SGY-101 to SGY-305)



User programmable Inputs are fully programmable

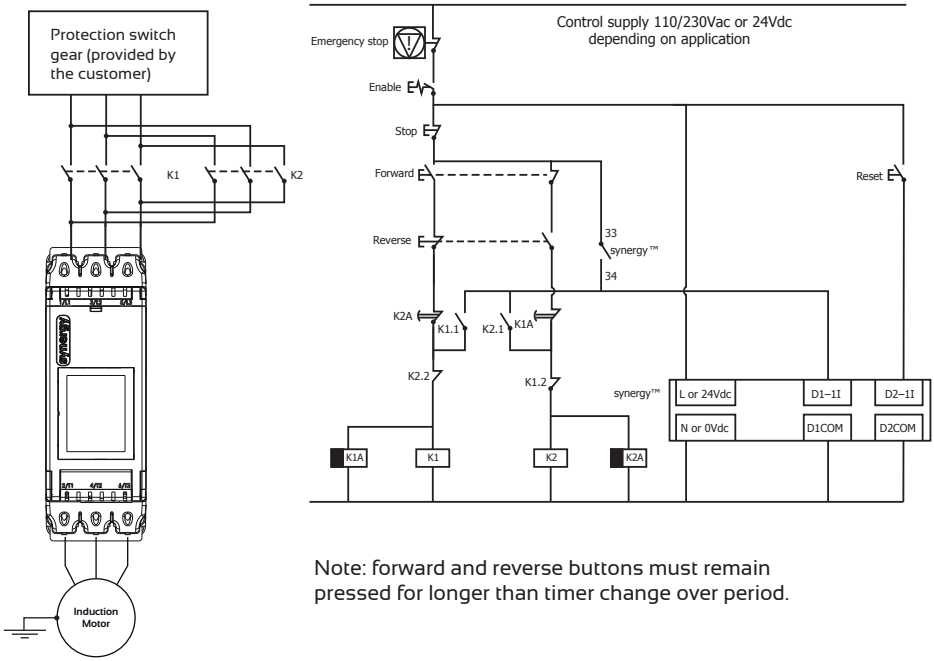
D1 - 1I = High Start / Low Stop
D1 - 2I = None
D2 - 1I = High Reset

1) Optional high reset. If this reset is required ensure "User Programmable" is selected in the control method menu found in the Digital Inputs menu. If you would prefer the reset to work by removing and reapplying the Start Signal on DI - II then select "Two wire control" in the control method menu.

Soft start motor reversing circuit

synergy™

Below is a soft start reversing circuit without soft stop, it shows the main components required. You must follow your local wiring and electrical regulations when constructing this circuit, set to 'User Programmable' control.



Note: forward and reverse buttons must remain pressed for longer than timer change over period.

⚠ CAUTION

REFER to TABLE 1 on page 8 for input control voltages.
RÉFÉRER au TABLEU 1 à la page 8 pour des tensions de contrôle d'entrée.

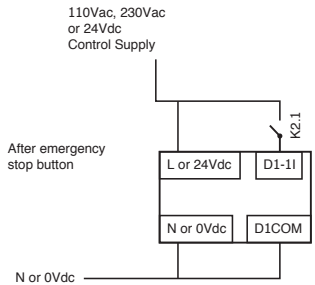
Item	Description
K1, K2	AC3 rated forward/reverse contactors
K1A, K2A	1 second drop out delay timers
synergy™	synergy™ soft start

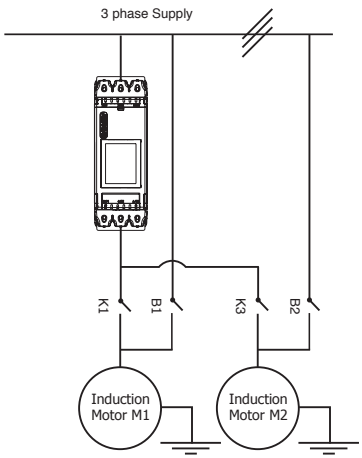
These are the major components of the system. Local wiring regulations should be observed. Note the use of timers to ensure that a reversed voltage is not applied to the starter/motor before the motor field has had some chance to die away.

The thermal capabilities of synergy™ should be considered.

Sequential Soft Start diagram

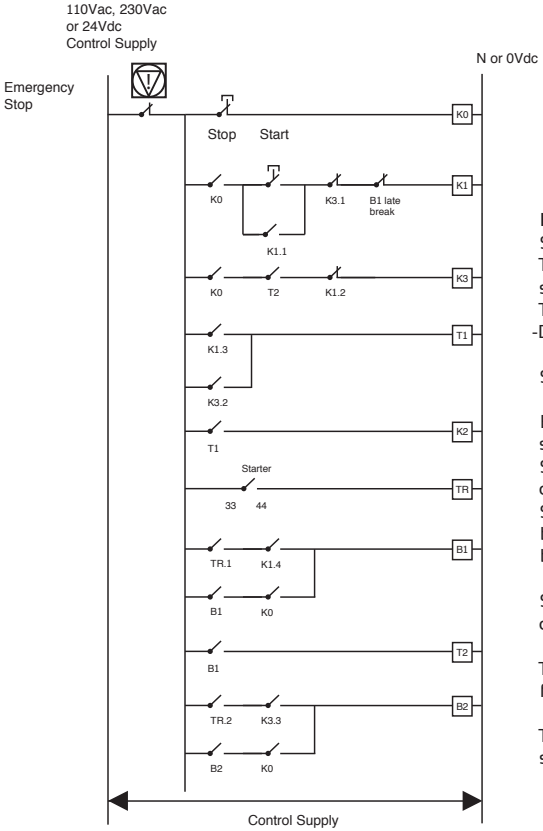
synergy™





CAUTION

REFER to TABLE 1 on page 8 for input control voltages.
RÉFÉRER au TABLEU 1 à la page 8 pour des tensions de contrôle d'entrée.



Notes

Soft Starter must have stop time set to 0

T1 Time between K1 or K3 closing and the starter being energised - 0.5 sec minimum.

T2 Time between B1 closing and K3 closing -Dependant on application - 0.5 sec minimum.

Set to 'Two wire control'

Emergency stop switch cuts off control supply and drops out starter and motors.

Stop switch drops control supply from contactors and timers stopping both motors.

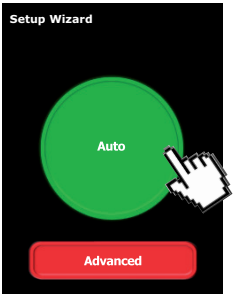
Start switch initiates softstart then bypass of motor 1 immediately followed by softstart then bypass of motor 2.

Soft Starter must be rated for combined starting duty.

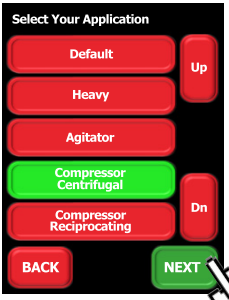
The control logic can be continued for more motors.

The thermal capabilities of synergy™ should be considered.

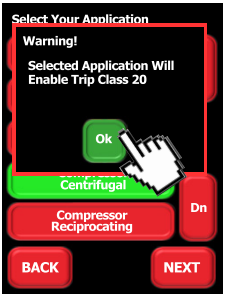
1.



2.

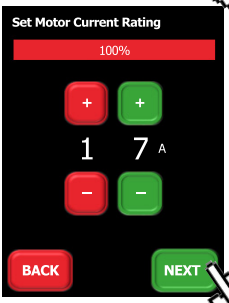


3.

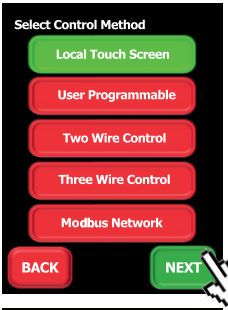


Please note; Only appears if application with a trip class higher than 10 is selected

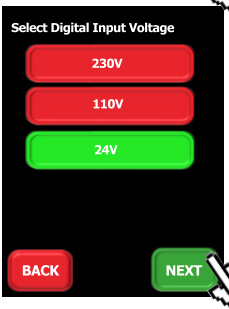
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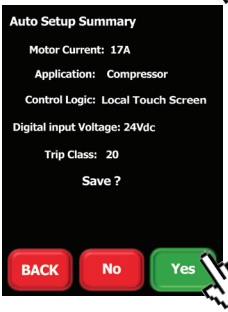
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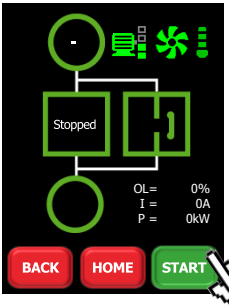
6.



7.



8.



Rating table

synergy™

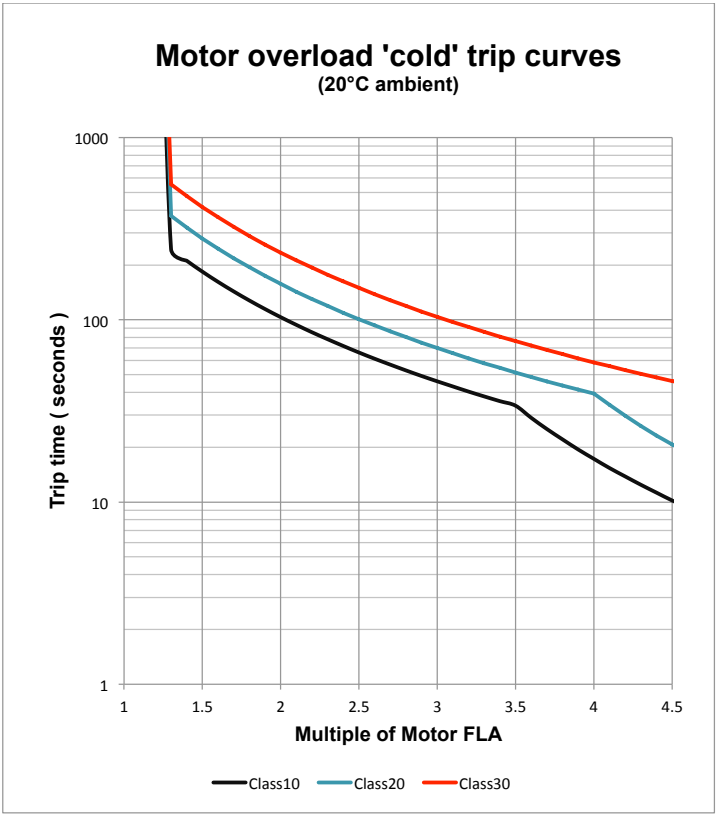
Type	IEC, I_e A [3]	kW [1]		UL, FLA A [4]	HP [2]				Control supply U_s
		230V	400V		200V	208V	220-240V	440-480V	
SGY-101-4-01	17	4	7.5	17	3	5	5	10	24Vdc or 110Vac to 230Vac
SGY-103-4-01	22	5.5	11	21	5	5	5	15	
SGY-105-4-01	29	7.5	15	27	7.5	7.5	7.5	20	
SGY-107-4-01	35	7.5	18.5	34	10	10	10	25	
SGY-109-4-01	41	11	22	40	10	10	10	30	
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	
SGY-115-4-01	80	22	45	77	20	25	25	60	
SGY-117-4-01	100	30	55	96	30	30	30	75	
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 will apply 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.



* Please note: When the overload has tripped there is a forced cooling time to allow the overload to recover before the next start.

Rated operational voltages	U_e	200Vac to 480Vac	
Rated operational current	I_e	See Rating table	
Rating index		SGY-101 to SGY-205	Ie: AC-53a: 3.5-17: 90-5
		SGY-301 to SGY-309	Ie: AC-53a: 3.5-17: 90-3
Rated frequency		50 to 60Hz	
Rated duty		Uninterrupted	
Form designation		Form 1 Internally bypassed	
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)
		Supply and control circuit	IP 20
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 table 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	Protect with 4A UL Listed fuse
Rated control supply voltage	U_s	See Rating table, 2 Amp supply (continuous).	
Relay specification		AC-15 230Vac, 1A DC-13 30Vdc, 0.7A	
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 power and ports) 1kV/5kHz (signal ports)	
	IEC 61000-4-5	2kV line-to-ground 1kV line-to-line	
	IEC 61000-4-6	10V	
Humidity		Max. 85% non-condensing, not exceeding 50% at 40°C	

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.

Standards

synergy™

-20°C (-4°F) to 50°C (122°F). Above 50°C de-rate linearly by 4% of synergy™ Ie per °C to a maximum of 60°C (140°F).



Altitude above sea level 1000m (3281ft). Above 1000m de rate by 1% of **synergy**™ Ie per 100m (328ft) to a maximum altitude of 2000m (6562ft).

Please note for higher temperatures and altitudes contact your supplier.

synergy™ models bearing the ETL listing mark are ETL UL508 and CSA C22.2 No.14 listed to US and Canadian safety standards respectively.

Short circuit protection

#1 Suitable for use in a circuit delivering not more than __Iq__ rms Symmetrical Amperes, 480 Volts maximum, when protected by Class J time delay fuses with a maximum rating of __Z1__ or by a circuit breaker with a maximum rating of __Z2___ as in table below.

#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

Type designation (e.g. SGY 101, SGY117)			SGY 101	SGY 103	SGY 105	SGY 107	SGY 109	SGY 111	SGY 113	SGY 115	SGY 117
Rated operational current	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	100	100	160	160	160	200	200	250	315

Short Circuit protection (continued).

Type designation (e.g. SGY-201)			SGY 201	SGY 203	SGY 205	SGY 301	SGY 303	SGY 305	SGY 307	SGY 309
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	A	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

Wire sizes and torques

Terminal		Models	Wire Size		Torque	
			mm^2	AWG	Nm	lb-in
Main Terminals Cu STR 75°C only	Terminal	SGY-101 to SGY-117	2.5 – 70	12 – 2/0	9	80
		SGY-201 to SGY-205	4 - 185	12-350MCM	14	123
	M10 bolt	SGY-301 to SGY-305	2 x 95	2 x 2/0		
		SGY-307 to SGY-309	2 x 150	2 x 350MCM		
Control terminals		All models	0.2-1.5	24-16	0.5	4.5
⏚ Protective Earth [1] Cu Only Single conductor	M6 stud	SGY-101	≥ 4	≥ 12	8	70
		SGY-103 to SGY-111	≥ 6	≥ 10		
		SGY-113 to SGY-117	≥ 10	≥ 8		
	M8 stud	SGY-201 to SGY-205	≥ 16	≥ 6	12	105
		SGY-301	≥ 25	≥ 4		
		SGY-303 to SGY-305	≥ 35	≥ 3		
		SGY-307 to SGY-309	≥ 35	≥ 2		

1) Protective Earth wire size based on bonding conductor requirements of UL508 and UL508A and CSA C22. No.14

Notes

synergy™

Quick Start Guide

(en) **Electric current! Danger to life!**
Only skilled or instructed persons may carry out the operations.

(de) **Lebensgefahr durch Strom!**
Nur Elektrofachkräfte und elektrotechnisch unterwiesene Personen dürfen die im Folgenden beschriebenen Arbeiten ausführen.

(fr) **Tension électrique dangereuse!**
Seules les personnes qualifiées et averties doivent exécuter les travaux ci-après.

(es) **¡Corriente eléctrica! ¡Peligro de muerte!**
El trabajo a continuación descrito debe ser realizado por personas cualificadas y advertidas.

(it) **Tensione elettrica: Pericolo di morte!**
Solo persone abilitate e qualificate possono eseguire le operazioni di seguito riportate.

(zh) 触电危险！
只允许专业人员和受过专业训练的人员进行下列工作。

(ru) **Электрический ток! Опасно для жизни!**
Только специалисты или проинструктированные лица могут выполнять следующие операции.

(nl) **Levensgevaar door elektrische stroom!**
Uitsluitelijk deskundigen in elektriciteit en elektrotechnisch geinstrueerde personen is het toegestaan, de navolgend beschrevene werkzaamheden uit te voeren.

(da) **Livsfare på grund af elektrisk strøm!**
Kun uddannede el-installatører og personer der e instruerede i elektrotekniske arbejdsopgaver, må udføre de nedenfor anførte arbejder.

(el) **Προσοχή, κίνδυνος ηλεκτροπληξίας!**
Οι εργασίες που αναφέρονται στη συνέχεια θα πρέπει να εκτελούνται μόνο από ηλεκτρολόγους και ηλεκτροτεχνίτες.

(pt) **Perigo de vida devido a corrente eléctrica!**
Apenas electricistas e pessoas com formação electrotécnica podem executar os trabalhos que a seguir se descrevem.

(sv) **Livsfara genom elektrisk ström!**
Endast utbildade elektriker och personer som undervisats i elektroteknik får utföra de arbeten som beskrivs nedan.

(fi) **Hengenvaarallinen jännite!**
Vain pätevät sähköasentajat ja opastusta saaneet henkilöt saavat suorittaa seuraavat työt.

(cs) **Nebezpečí úrazu elektrickým proudem!**
Níže uvedené práce smějí provádět pouze osoby s elektrotechnickým vzděláním.

(et) **Eluohtlik! Elektrilöögioht!**
Järgnevalt kirjeldatud töid tohib teostada ainult elektriala spetsialist või elektrotehnilise instrueerimise läbinud personal.

(hu) **Életveszély az elektromos áram révén!**
Csak elektromos szakemberek és elektrotechnikában képzett személyek végezhetik el a következőkben leírt munkákat.

(lv) **Elektriskā strāva apdraud dzīvību!**
Tālāk aprakstītos darbus drīkst veikt tikai elektrospeciālisti un darbam ar elektrotehniskām iekārtām instruētās personas!

(lt) **Pavojus gyvybei dėl elektros srovės!**
Tik elektrikai ir elektrotechnikos specialistai gali atlikti žemiau aprašytus darbus.

(pl) **Porażenie prądem elektrycznym stanowi zagrożenie dla życia!**
Opisane poniżej prace mogą przeprowadzać tylko wykwalifikowani elektrycy oraz osoby odpowiednio poinstruowane w zakresie elektrotechniki.

(sl) **Življenjska nevarnost zaradi električnega toka!**
Spodaj opisana dela smejo izvajati samo elektrostrokovnjaki in elektrotehnično poučene osebe.

(sk) **Nebezpečenstvo ohrozenia života elektrickým prúdom!**
Práce, ktoré sú nižšie opísané, smú vykonávať iba elektroodborníci a osoby s elektrotechnickým vzdelaním.

(bg) **Опасност за живота от електрически ток!**
Операциите, описани в следващите раздели, могат да се извършват само от специалисти-електротехници и инструктиран електротехнически персонал.

(ro) **Atenţie! Pericol electric!**
Toate lucrările descrise trebuie efectuate numai de personal de specialitate calificat şi de persoane cu cunoştiinţe profunde în electrotehnică.

Ref. MAN-SGY-013-V03
Nov 2015

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CE