MOTORTRONICS™

Solid State AC Motor Control

VMX-Synergy Plus™

IEC - QUICK START GUIDE

200 - 600V, 17 - 850Amps

iERS
Intelligent Energy Recovery System

- Removable 3.5" Color Touch Screen rated IP66/N4X
- 42 Smart Application profiles - easy setup in 1 minute
- Auto Pedestal to control spinning motors
- Built-in iERS – intelligent Energy Recovery System
- Advanced motor protection with memory
- Life Time Event Logging Diagnostics
- Metering for power, voltage and current
- Integral Bypass

CE UL c UL

Safety

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
Motortronics 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 authorized service agent.

Court-circuit
Les démarreurs progressifs Motortronics 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

• VMX-Synergy Plus™ soft starts contain dangerous voltages when connected to the mains supply. Only qualified personnel that have been completely trained and authorized, should carry out installation, operation and maintenance of this equipment.

• Les démarreurs progressifs VMX-Synergy Plus ™ 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.

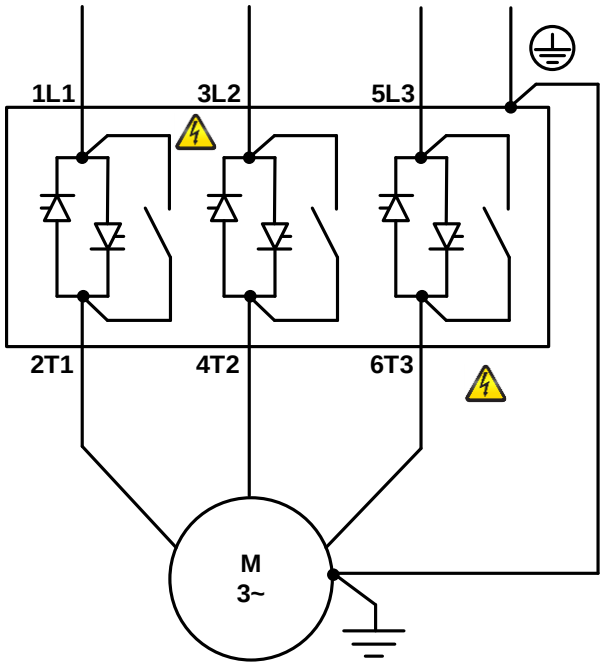
• Il appartient à l'installeur d'assurer la mise à la terre et la protection du circuit de branchement, conformément au code de sécurité électrique local.

• 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.



Model Number Description

It is essential to check the VMX-Synergy Plus nameplate and make sure that the soft starter is properly sized for your AC motor.

VMX-SGY-I-17-6-XX-XX

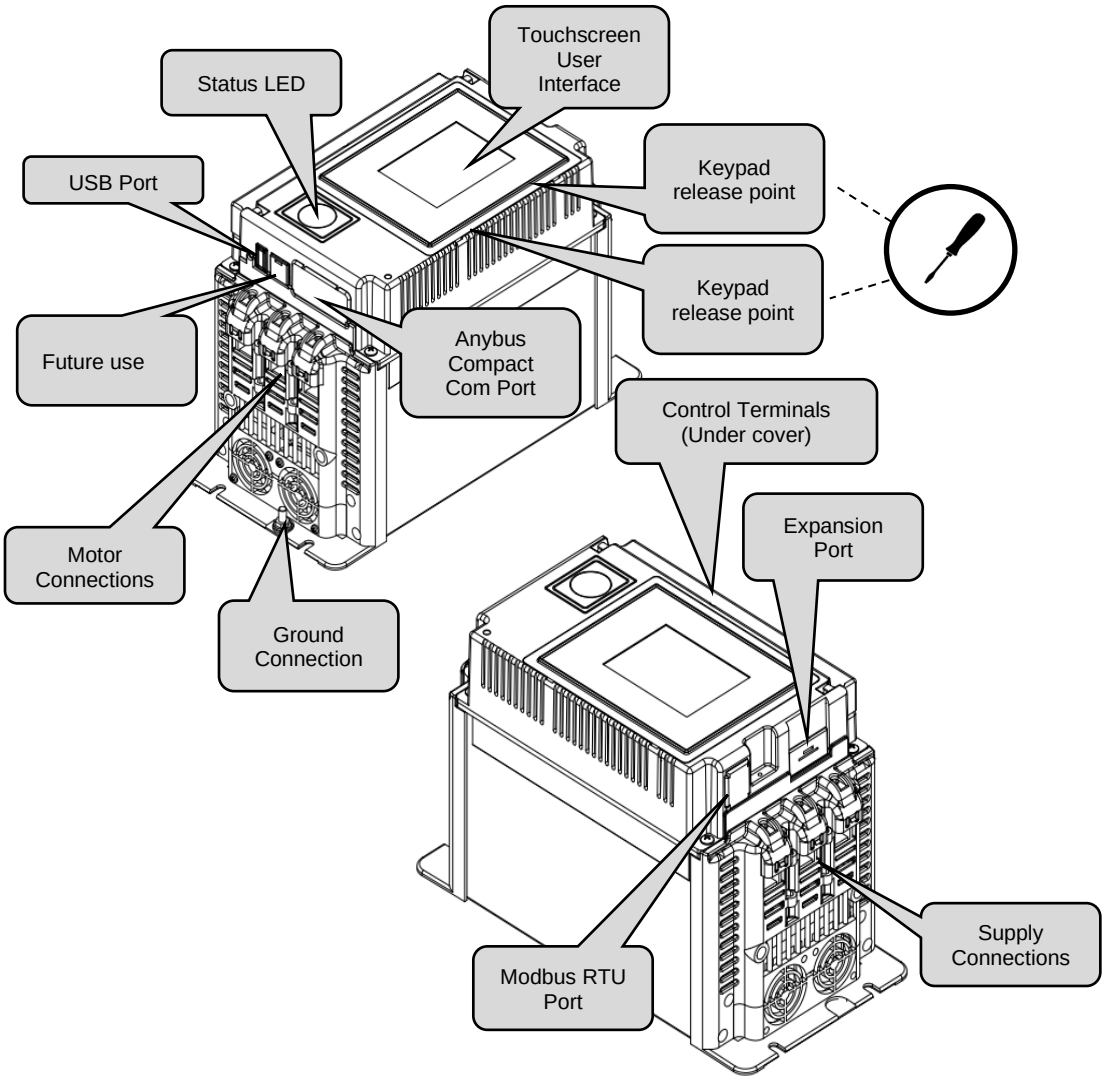
Option
Non-critical customer options
(may be blank)

Control supply U_s
01 – U_s = 24Vdc, 110VAC or 230VAC
02 – U_s = 110VAC
03 – U_s = 230VAC

Main Supply voltage
6 – 200VAC to 600VAC, U_i 600V

Model rating designation
VMX-SGY-I-17 to VMX-SGY-I-850

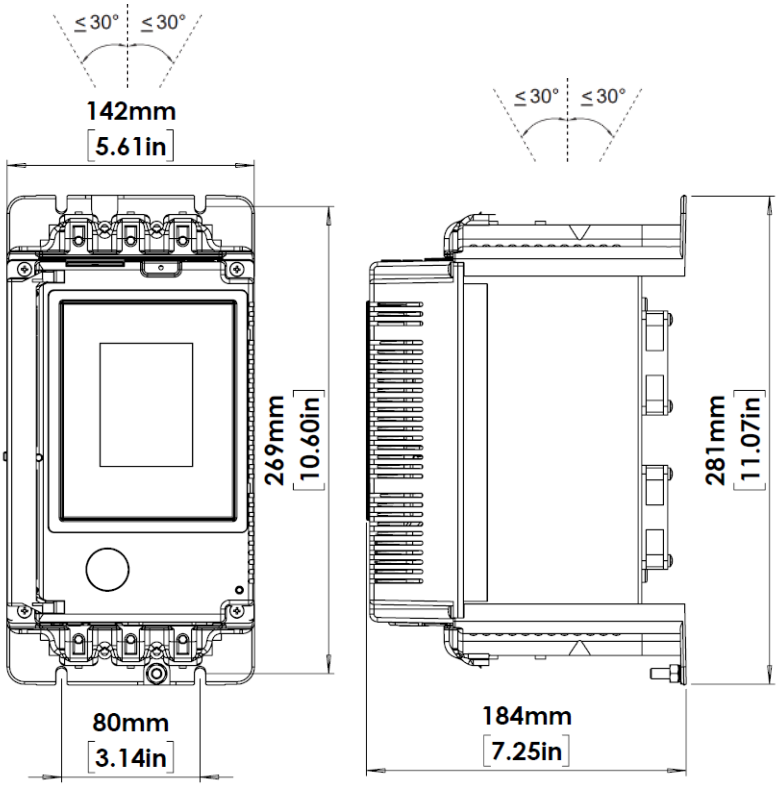
Key features



Weights and Dimensions

VMX-SGY-I-17 to VMX-SGY-I-100 (Size 1)

Dimensions



VMX-SGY-I-17
to
VMX-SGY-I-29

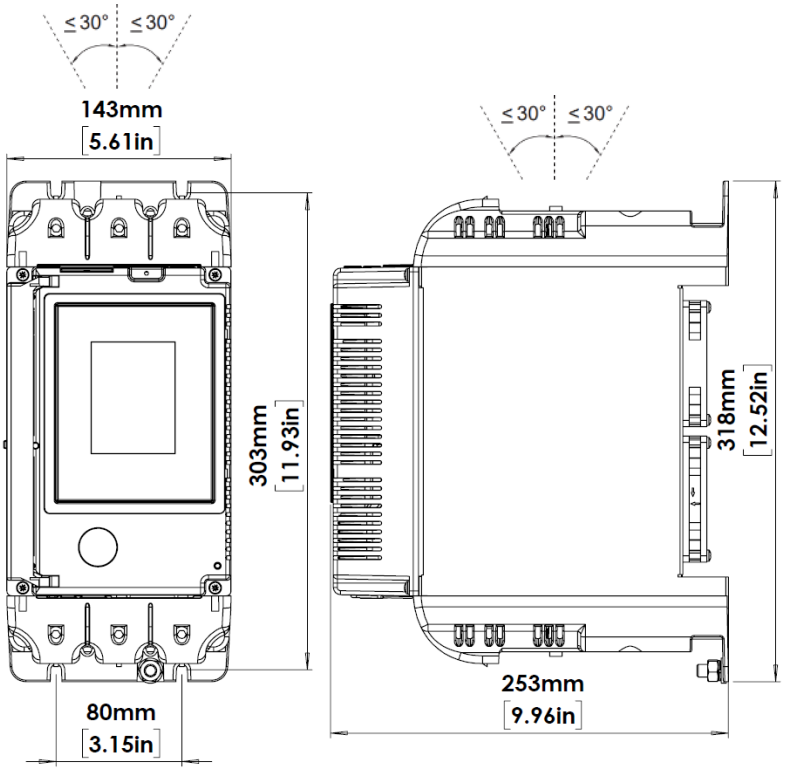
Weight = 3.9 kg (8.6 lbs)

VMX-SGY-I-35
to
VMX-SGY-I-100

Weight = 4.2 kg (9.26 lbs)

VMX-SGY-I-132 to VMX-SGY-I-195 (Size 2)

Dimensions



VMX-SGY-I-132

Weight = 6.7 kg (14.78 lbs)

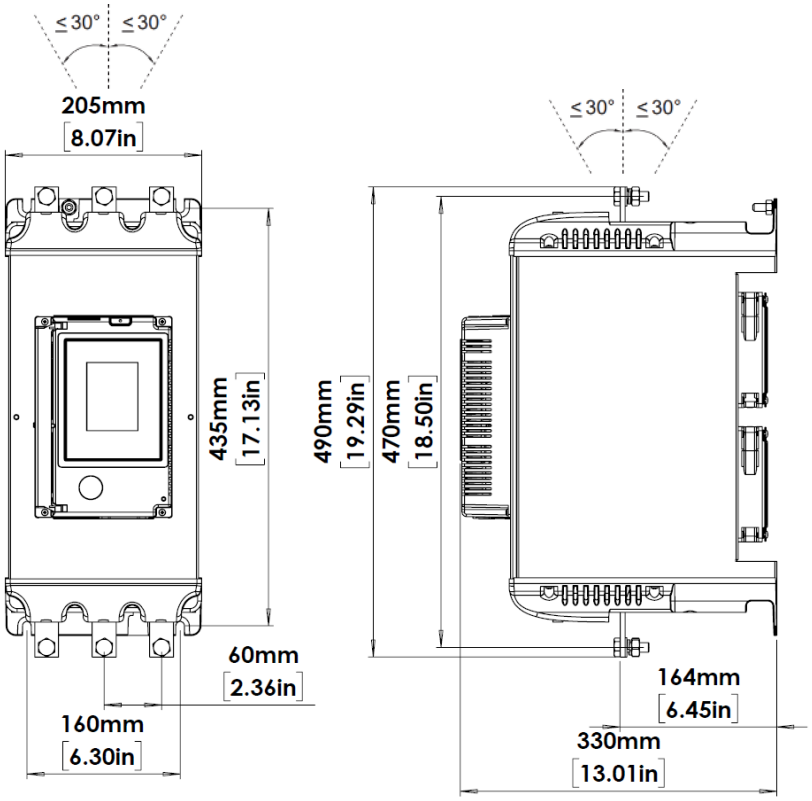
VMX-SGY-I-160
to
VMX-SGY-I-195

Weight = 7.0 kg (15.44 lbs)

Weights and Dimensions

VMX-SGY-I-242 to VMX-SGY-I-361 (Size 3)

Dimensions

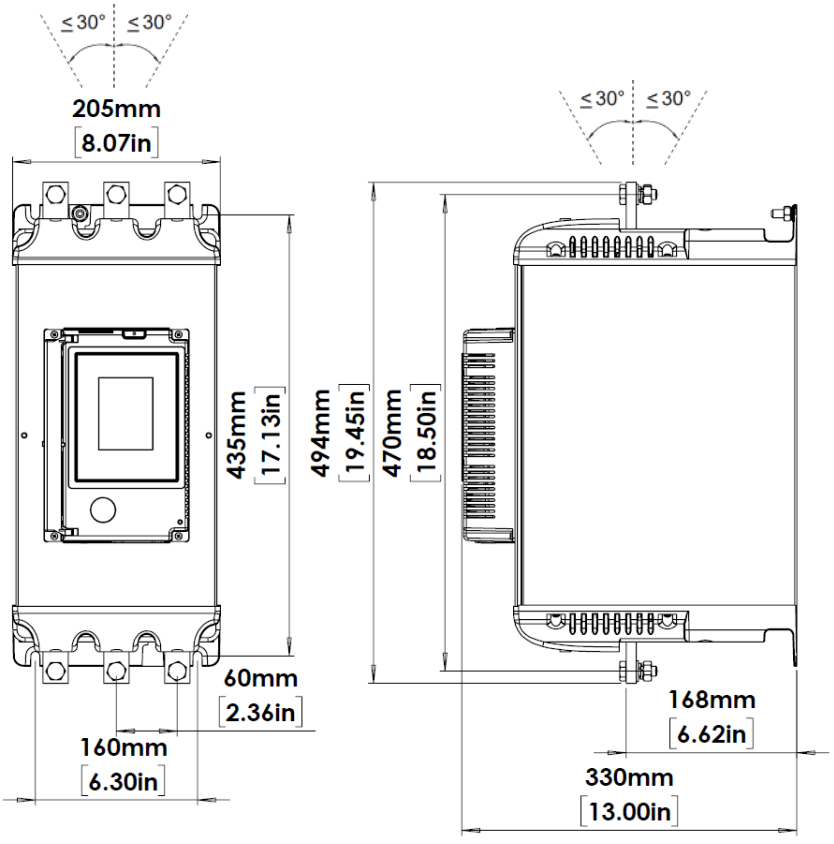


VMX-SGY-I-242
to
VMX-SGY-I-361

Weight = 17.0 kg (37.5 lbs)

VMX-SGY-I-430 to VMX-SGY-I-500 (Size 3)

Dimensions



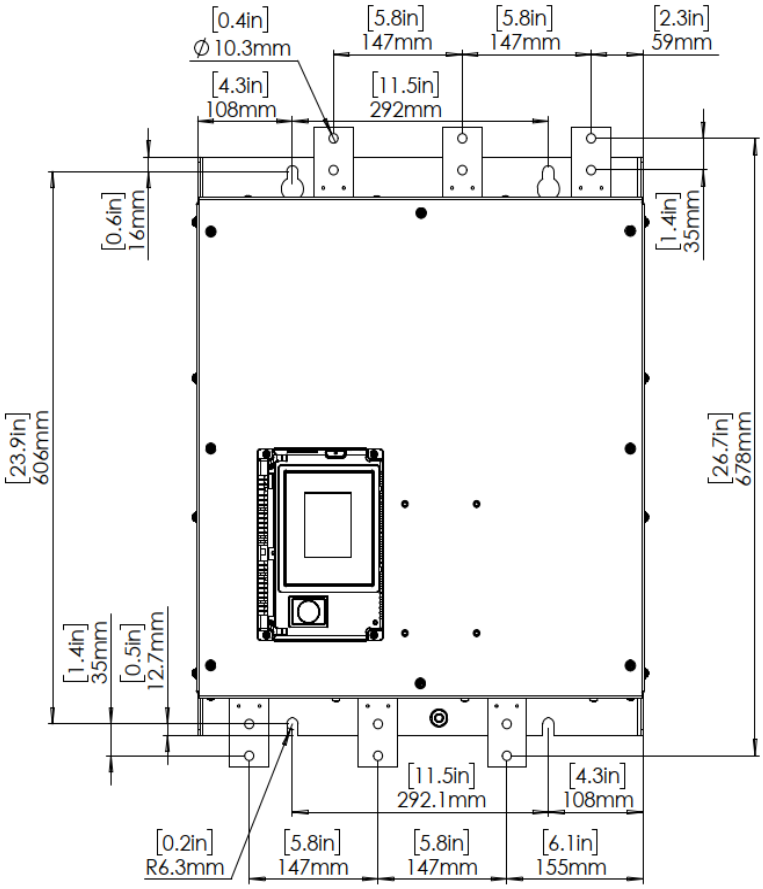
VMX-SGY-I-430
to
VMX-SGY-I-500

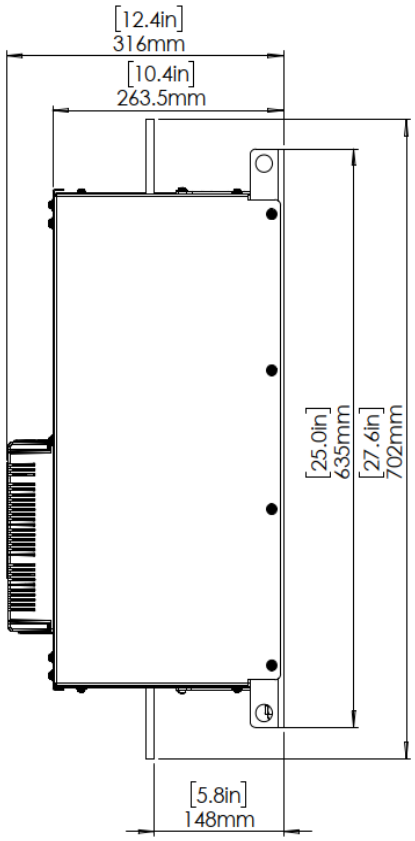
Weight = 22 kg (48.5 lbs)

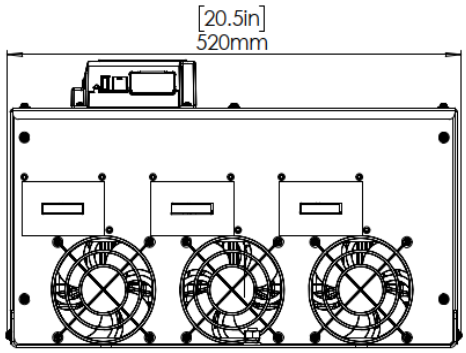
Weights and Dimensions

VMX-SGY-I-625 to VMX-SGY-I-850 (Size 4)

Dimensions







VMX-SGY-I-625
to
VMX-SGY-I-850

Weight = 54 kg (119 lbs)

Enclosure ventilation

Enclosure Ventilation

When installing a VMX-Synergy Plus™ into an enclosure, 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 supplier's data.

Heat dissipated can be approximated with the formulas: -

Starting
Watts (VMX-Synergy Plus ™) = start current(A) x start time(s) x number of starts per hour/1200

iERs Disabled
Watts (VMX-Synergy Plus ™) = (VMX-Synergy Plus ™ current rating) x 0.6

iERs Enabled
The maximum power dissipation occurs when energy saving and the iERS is turned on
Watts (VMX-Synergy Plus ™) = (VMX-Synergy Plus ™ current rating) x 1.5

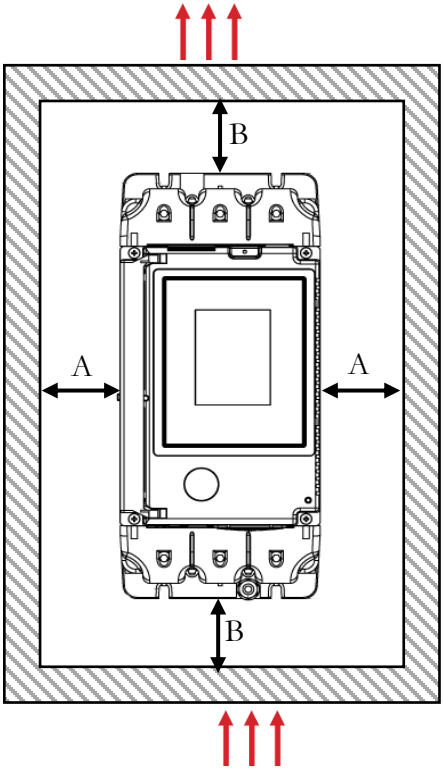
$$Q = \frac{4xWt}{(T_{max} - T_{amb})}$$

Q = volume of air (cubic metres per hour-m3/h)

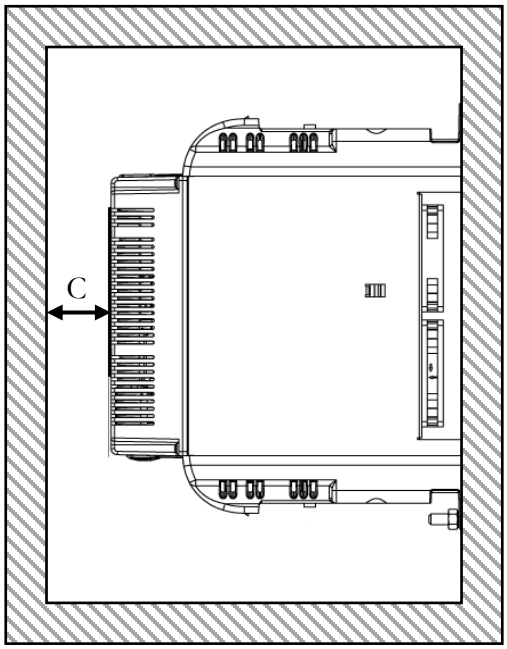
Wt = Heat produced by the unit and all other heat sources within the enclosure (Watts)
Tmax = Maximum permissible temperature within the enclosure (50°C for a fully rated VMX-Synergy Plus™)
Tamb = Temperature of the air entering the enclosure (°C)

If you prefer to work in CFM, substitute °F for °C. Q is now in CFM

Enclosure internal clearances



Air Flow



Model	A		B		C	
	mm	inch	mm	inch	mm	inch
VMX-SGY-I-17 to VMX-SGY-I-100	25	0.98	75	2.95	25	0.98
VMX-SGY-I-132 to VMX-SGY-I-195	40	1.57	100	3.93	25	0.98
VMX-SGY-I-242 to VMX-SGY-I-500	60	2.36	125	4.92	25	0.98
VMX-SGY-I-625 to VMX-SGY-I-850	100	3.94	250	9.84	25	0.98

Temperature and Altitude

VMX-SGY-I-17 to VMX-SGY-I-500
-20°C (-4°F) to 50°C (122°F). Above 50°C (122°F) de-rate linearly by 4 % of VMX-Synergy Plus Ie per °C to a maximum of 60°C (140°F).

VMX-SGY-I-625 to VMX-SGY-I-850
-20°C (-4°F) to 40°C (122°F). Above 40°C (104°F) de-rate linearly by 2 % of VMX-Synergy Plus Ie per °C to a maximum of 60°C (140°F)

Altitude above sea level 1000m (3281ft). Above 1000m (3281ft) de rate by 1% of VMX-Synergy Plus Ie per 100m (328ft) to a maximum altitude of 2000m (6562ft). Please note for higher temperatures and altitudes contact your supplier.

Conductor size and torque requirements

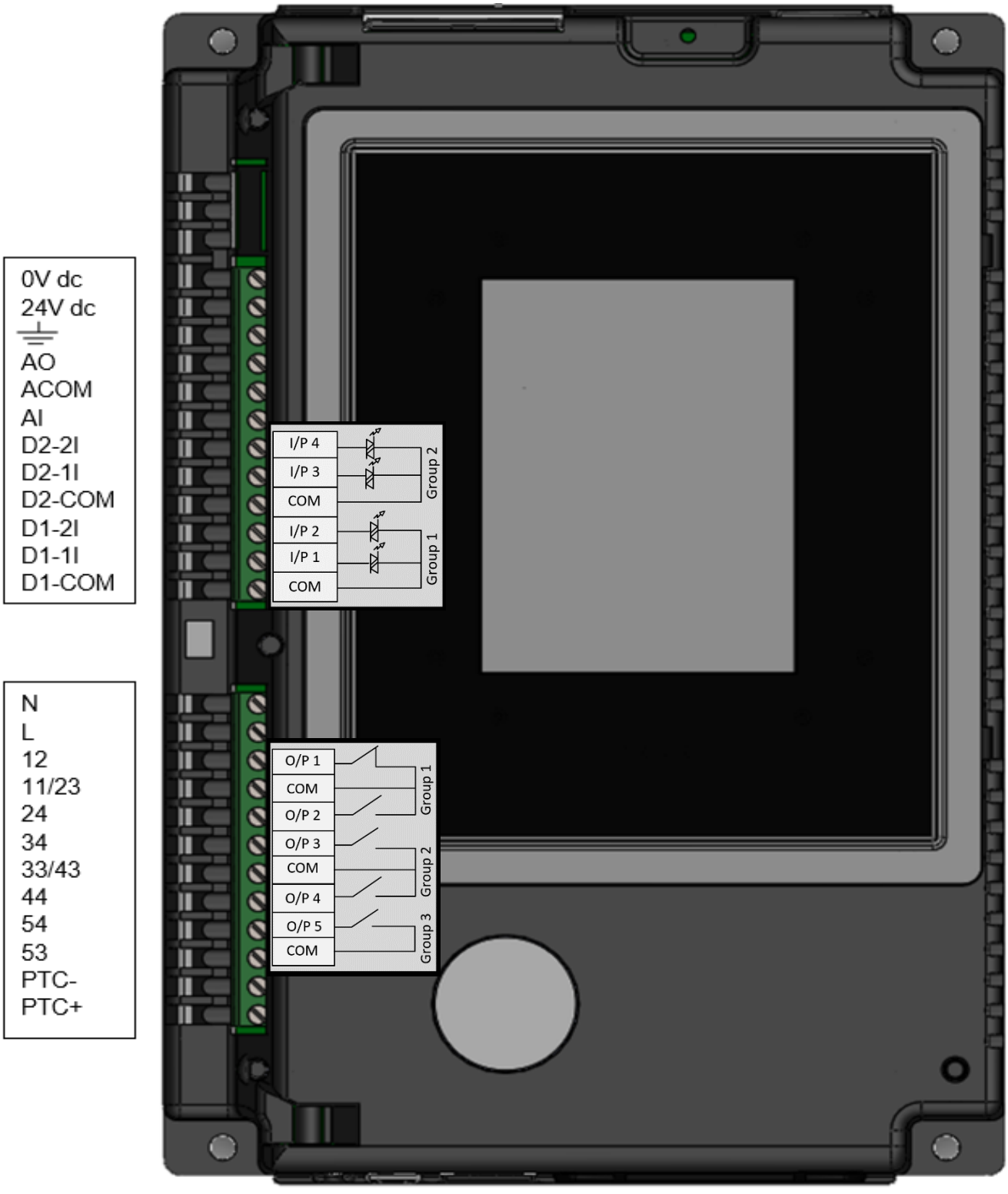
Terminal		Models	Conductor Size		Torque	
			Metric	Imperial	Nm	lb-in
Main Terminals **Cu STR 75ºC only**	**Terminal**	VMX-SGY-I-17 to VMX-SGY-I-100	2.5 - 70mm^2	12-2/0AWG	9	80
		VMX-SGY-I-132 to VMX-SGY-I-195	4 - 185mm^2	12 – 350MCM	14	124
	M10 bolt	VMX-SGY-I-242 to VMX-SGY-I-361	2 x 95mm^2	2 x 4/0AWG	28	248
		VMX-SGY-I-430 to VMX-SGY-I-500	2 x 150mm^2	2 x 350MCM		
	2 x M10 bolt	VMX-SGY-I-625 to VMX-SGY-I-850	3 x 240 mm^2	3 x 400MCM		
Main Terminals Copper busbar [2]	**2 x M10 bolt**	VMX-SGY-I-625 to VMX-SGY-I-850	60mm x 10mm	2.0in x 0.5in		
Control terminals		All models	0.2–1.5mm^2	24-16AWG	0.7	6.0
Protective Earth [1]  **Cu only**	**M6 stud**	VMX-SGY-I-17 to VMX-SGY-I-41	≥ 6mm^2	≥ 10AWG	8	71
		VMX-SGY-I-55 to VMX-SGY-I-80	≥ 10mm^2	≥ 8AWG		
		VMX-SGY-I-100	≥ 16mm^2	≥ 6AWG		
	M8 stud	VMX-SGY-I-132 to VMX-SGY-I-160	≥ 16mm^2	≥ 6AWG	12	106
		VMX-SGY-I-195	≥ 25mm^2	≥ 4AWG		
		VMX-SGY-I-242	≥ 35mm^2	≥ 3AWG		
		VMX-SGY-I-302	≥ 35mm^2	≥ 2AWG		
		VMX-SGY-I-361	≥ 50mm^2	≥ 1AWG		
		VMX-SGY-I-430 to VMX-SGY-I-500	≥ 70mm^2	≥ 1/0AWG		
		VMX-SGY-I-625 to VMX-SGY-I-850	≥ 85mm^2	≥ 3/0AWG		

[1] Protective Earth wire size based on bonding conductor requirements of UL508 Table 7.4 and UL508A Table 15.1, with suitable equivalent metric conductor sizes as per IEC 60947-1 Table 7a.

[2] Maximum busbar sizes based on IEC 60947-1 Table 11.

[3] The actual conductor used must comply with local wiring regulations.

Terminal Designations and Wiring Connection



Terminal Description

Terminal Name	Description	Programmable	Default	Rating	Notes
0V dc	Control Supply			See **Table 1**, Us	#3
24V dc					
⏚	Signal ground				
AO	Analog Output	0-10V or 4-20mA			
ACOM	Analog Common				
AI	Analog Input	0-10V or 4-20mA			
D2-2I	Digital Input 4 - Group 2	See **Table 1**, Uc	None		#2
D2-1I	Digital Input 3 - Group 2	See **Table 1**, Uc	Reset		#2
D2-COM	Digital Input - Group 2 Common				#2
D1-2I	Digital Input 2 - Group 1	See **Table 1**, Uc	None		#1
D1-1I	Digital Input 1 - Group 1	See **Table 1**, Uc	Start / Stop		#1
D1-COM	Digital Input - Group 1 Common				#1
N	Control supply			See **Table 1**, Us	#3
L					
12	Digital Output 1 - Group 1 relay N/C	Yes	Fault	230VAC 1A AC15	
11 / 23	Digital Output - Group 1 Common				
24	Digital Output 2 - Group 1 relay N/O	Yes	Fault	230VAC 1A AC15	
34	Digital Output 3 - Group 2 relay N/O	Yes	Running	230VAC 1A AC15	
33 / 43	Digital Output - Group 2 Common				
44	Digital Output 4 - Group 2 relay N/O	Yes	End of Start	230VAC 1A AC15	
54	Digital Output 5 - Group 3 relay N/O	Yes	Running	230VAC 3A AC15	
53	Digital Output 5 - Group 3 Common				
PTC-	3 x PTC in series (130°C)				
PTC+	3 x PTC in series (130 °C)				

Notes	
#1	The programmed digital input setting on D1-COM, 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 D1-COM, D1-1I, D1-2I doit correspondre à la tension appliquée à ces bornes.
#2	The programmed digital input setting on D2-COM, D2-1I, D2-2I 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 D2-COM, D2-1I, D2-2I 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, 24Vdc 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 ā 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.

Control Supply and Control Circuit (Us and Uc)

Table 1: Interface control Voltages, 2A supply (continuous)

Model No (s)	U_S (+10% -15%)	U_C (+10% -15%)	Notes
VMX-SGY-I-17-6-01 to VMX-SGY-I-361-6-01	110-230Vac or 24Vdc	110Vac or 230Vac or 24Vdc 230Vac factory default. 230Vac défaut d'usine #1	The system can have either a 110/230Vac mains or 24Vdc input NOT both. Le système peut avoir soit une alimentation principale de 110/230Vac ou de 24 Vdc, mais en aucun cas les deux imultanement
VMX-SGY-I-430-6-02 to VMX-SGY-I-850-6-02	110Vac		
VMX-SGY-I-430-6-03 to VMX-SGY-I-850-6-03	230Vac		

Notes	
#1	Refer to VMX-Synergy Plus User Manual for factory default settings. Référer au la Manuel de Programmation pour des paramètres par défaut d'usine

Power consumption

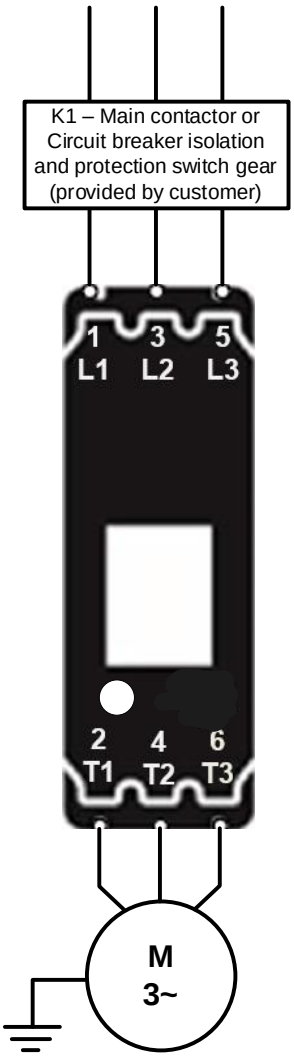
Model No (s)	Power consumption
VMX-SGY-I-17 to VMX-SGY-I-361	60VA
VMX-SGY-I-430 to VMX-SGY-I-500	120VA
VMX-SGY-I-625 to VMX-SGY-I -850	180VA

24Vdc supply specification

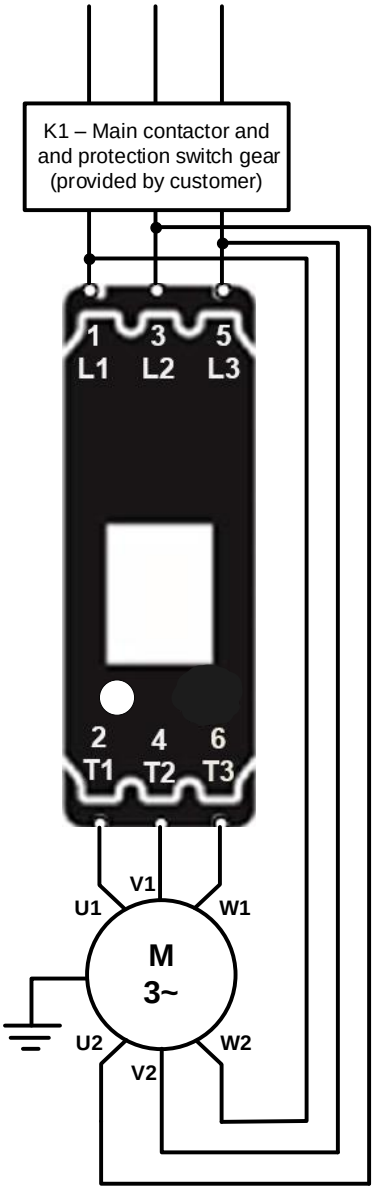
Model No (s)	Power consumption
VMX-SGY-I-17 to VMX-SGY-I-361	24Vdc 60W. Residual ripple 100mV. Spikes/switching peaks 240mV. Turn On/Off no overshoot of V out. Overvoltage protection output voltage must be clamped to <30Vdc

Wiring Connection

In Line



In Delta

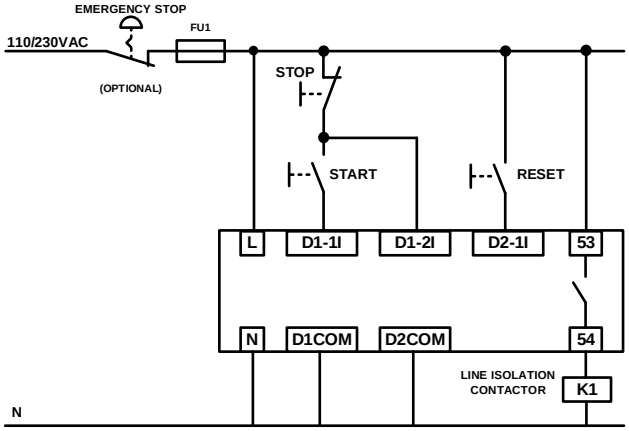


Terml	FWD	REV
2/T1	U1	U1
4/T2	V1	W1
6/T3	W1	V1
1/L1	W2	V2
3/L2	U2	U2
5/L3	V2	W2

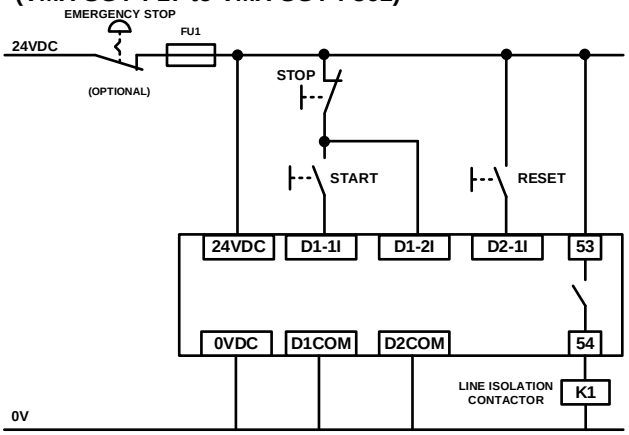
⚠ For suitable short circuit protection devices (SCPD's) see short Circuit Protection in the Technical Information/ standards section of this guide. Pour un dispositif de protection approprié contre le court-circuit, voir la protection contre le court-circuit dans la section « Informations techniques/normes » 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. VMX-Synergy Plus Ie = ie (motor) / √3 Allows lower current rating VMX-Synergy Plus than the motor. The contactor K1 can also be connected inside the delta circuit. When connected in the delta K1 current rating = ie (motor) / √3	⚠ En Delta Pour cette configuration, appliquer l'équation.suivante: VMX-Synergy Plus Ie = Ie (moteur)/ √3 Cela permet le courant nominal inférieur de VMX-Synergy Plus par rapport au moteur.

Wiring Connection

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

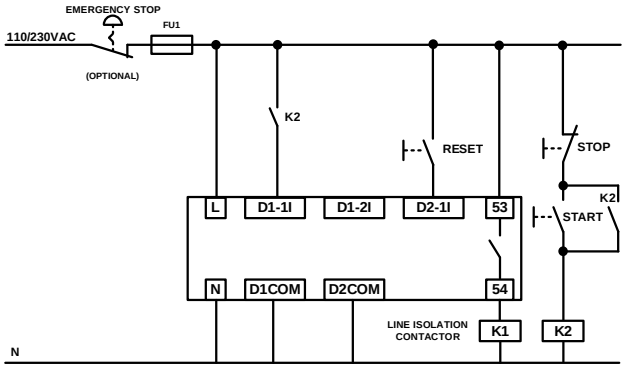


3 Wire Control Diagram
24Vdc control supply (U_S)
and digital input (U_C) programming.
(VMX-SGY-I-17 to VMX-SGY-I-361)

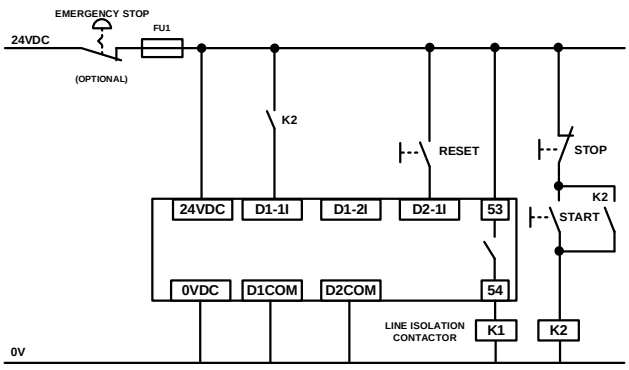


	CAUTION
#1	Refer to **TABLE 1** page 13 for input control voltages. These recommended wiring diagrams are specifically where the control supply voltage (US) is identical to the control circuit voltage (UC) and not to be supplied separately. Other wiring configurations must also be in accordance with existing local and national codes and regulations. RÉFÉRER au TABLEU 1 à la page 13 pour des tensions de contrôle d'entrée. Ces schémas de câblage sont recommandées spécifiquement lorsque la tension d'alimentation de commande (US) est identique à la tension du circuit de commande (UC). US et UC 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 courant.

110/230Vac (US) and (UC) user programmable control diagram



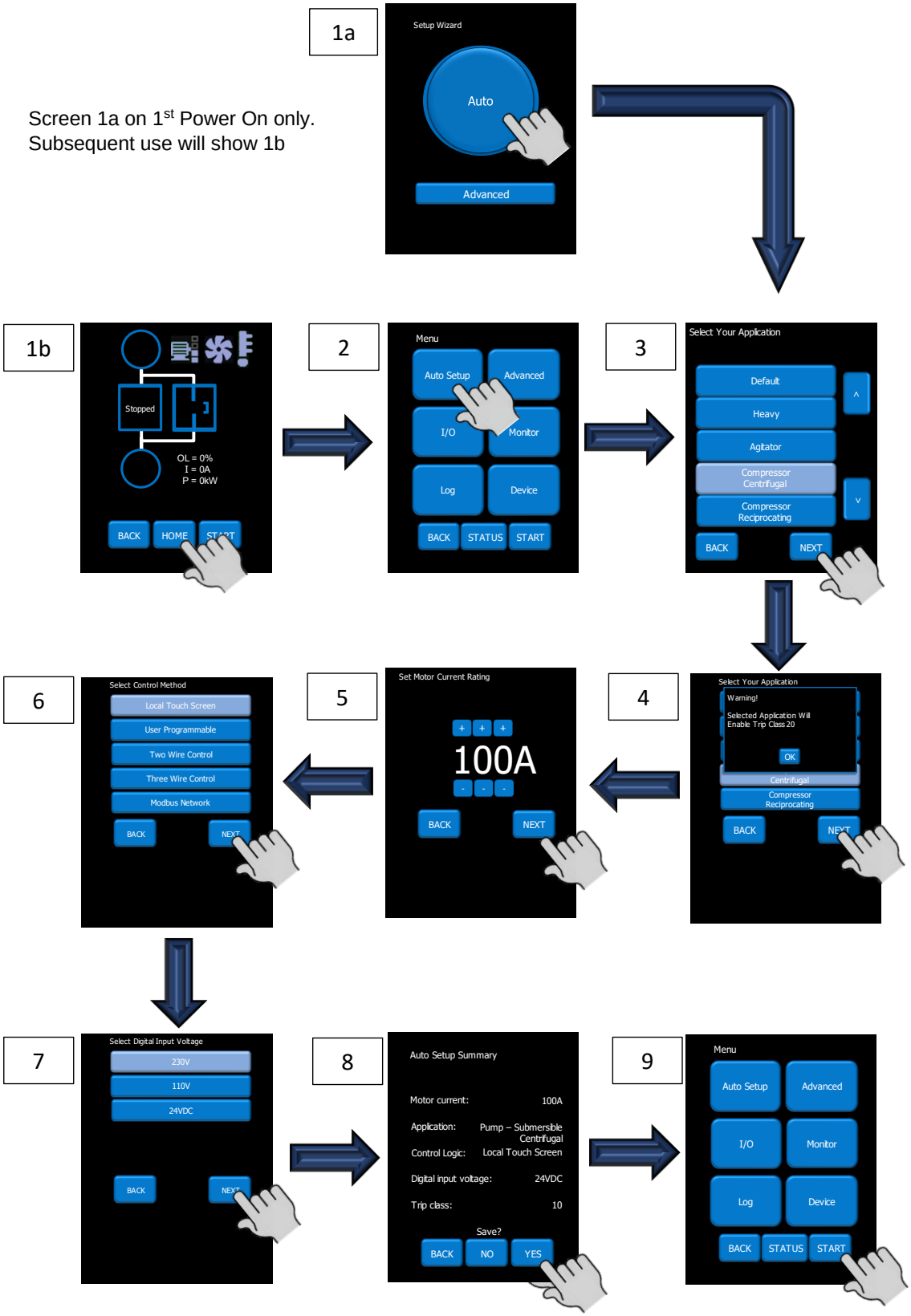
24Vdc (US) and (UC) user programmable control diagram (VMX-SGY-I-17 to VMX-SGY-I-361)



User programmable inputs are full programmable	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 D1 - 1I then select "Two wire control" in the control method menu.
D1 – 1I = High Start / Low Stop	
D1 – 2I = None	
D2 – 1I = High Reset	

Programming

Screen 1a on 1st Power On only.
Subsequent use will show 1b



Rating Table

Minimum current ratings based on typical rated operation currents of motors for the corresponding rated operational powers
Current rating optimized for kW@600V & hp@550-600V - Ref IEC 60947-4-1 Table G.1 where applicable.

Size 1,2 and 3

Type	I_e	kW [1]			FLA	Hp [2]					U_s
	A [3]	230V	400V	500V	A [3]	200V	208V	220-240V	440-480V	550-600V	
VMX-SGY-I-17-6-01	17	4	7.5	7.5	17	3	5	5	10	15	24VDC, 110VAC to 230VAC
VMX-SGY-I-22-6-01	22	5.5	11	11	22	5	5	5	15	20	
VMX-SGY-I-29-6-01	29	7.5	15	15	27	7.5	7.5	7.5	20	25	
VMX-SGY-I-35-6-01	35	7.5	18.5	22	34	10	10	10	25	30	
VMX-SGY-I-41-6-01	41	11	22	22	41	10	10	10	30	40	
VMX-SGY-I-55-6-01	55	15	30	37	52	15	15	15	40	50	
VMX-SGY-I-66-6-01	66	18.5	37	45	65	20	20	20	50	60	
VMX-SGY-I-80-6-01	80	22	45	55	77	20	25	25	60	75	
VMX-SGY-I-100-6-01	100	30	55	55	99	30	30	30	75	100	
VMX-SGY-I-132-6-01	132	37	75	90	125	40	40	40	100	125	
VMX-SGY-I-160-6-01	160	45	90	110	156	50	50	60	125	150	
VMX-SGY-I-195-6-01	195	55	110	132	192	60	60	75	150	200	
VMX-SGY-I-242-6-01	242	75	132	160	242	75	75	75	200	250	
VMX-SGY-I-302-6-01	302	90	160	200	302	100	100	100	250	300	
VMX-SGY-I-361-6-01	361	110	200	250	361	125	125	150	300	350	
VMX-SGY-I-430-6-02	430	132	250	250	414	150	150	150	350	450	110VAC
VMX-SGY-I-500-6-02	500	150	280	355	480	150	150	150	400	500	
VMX-SGY-I-430-6-03	430	132	250	250	414	150	150	150	350	450	230VAC
VMX-SGY-I-500-6-03	500	150	280	355	480	150	150	150	400	500	

Size 4

Type	I_e	kW [1]			FLA	Hp [2]					U_s
	A [4]	230V	400V	500V	A [4]	200V	208V	220-240V	440-480V	550-600V	
VMX-SGY-I-625-6-02	625	200	355	425	625	200	200	250	500	600	110VAC
VMX-SGY-I-722-6-02	722	220	400	530	722	250	250	300	600	700	
VMX-SGY-I-850-6-02	850	280	500	630	850	300	300	350	700	800	
VMX-SGY-I-625-6-03	625	200	355	425	625	200	200	250	500	600	230VAC
VMX-SGY-I-722-6-03	722	220	400	530	722	250	250	300	600	700	
VMX-SGY-I-850-6-03	850	280	500	630	850	300	300	350	700	800	

[1] Rated operational powers in kW as per IEC 60072-1 (primary series) corresponding to IEC current rating.
[2] Rated operational powers in hp corresponding to FLA current rating according to UL508 and Table 430.250 of the National Electrical Code.
[3] The I_e and FLA rating applies for a maximum surrounding air temperature of 50°C. Above 50°C de-rate linearly by 4% of Ie or FLA per °C to a maximum of 60°C.
[4] The I_e and FLA rating applies for a maximum surrounding air temperature of 40°C. Above 40°C de-rate linearly by 2% of Ie or FLA per °C to a maximum of 60°C.

Sizing Guide

In-Line Connection

Use tables to determine the size of the VMX-SGY-I required for the motor selected

Size 1 and 2

I_e	kW			FLA	Hp					Trip Class 10	Trip Class 20	Trip Class 30
A	**230V**	**400V**	**500V**	**A**	**200V**	**208V**	**220-240V**	**440-480V**	**550-600V**	**I_e: AC-53a: 3.5-17: 90-5 VMX-**	**I_e: AC-53a: 4-19: 90-5 VMX-**	**I_e: AC-53a: 4-29: 90-5 VMX-**
17	4	7.5	7.5	17	3	5	5	10	15	SGY-I-17	SGY-I-22	SGY-I-29
22	5.5	11	11	22	5	5	5	15	20	SGY-I-22	SGY-I-29	SGY-I-35
29	7.5	15	15	27	7.5	7.5	7.5	20	25	SGY-I-29	SGY-I-35	SGY-I-41
35	7.5	18.5	22	34	10	10	10	25	30	SGY-I-35	SGY-I-41	SGY-I-55
41	11	22	22	41	10	10	10	30	40	SGY-I-41	SGY-I-55	SGY-I-66
55	15	30	37	52	15	15	15	40	50	SGY-I-55	SGY-I-66	SGY-I-80
66	18.5	37	45	65	20	20	20	50	60	SGY-I-66	SGY-I-80	SGY-I-100
80	22	45	55	77	20	25	25	60	75	SGY-I-80	SGY-I-100	SGY-I-132
100	30	55	55	99	30	30	30	75	100	SGY-I-100	SGY-I-132	SGY-I-160
132	37	75	90	125	40	40	40	100	125	SGY-I-132	SGY-I-160	SGY-I-195
160	45	90	110	156	50	50	60	125	150	SGY-I-160	SGY-I-195	*See Size 3*
195	55	110	132	192	60	60	75	150	200	SGY-I-195	*See Size 3*	*See Size 3*

Size 3 and 4

I_e	kW			FLA	Hp					Trip Class 10	Trip Class 20	Trip Class 30
A	**230 V**	**400V**	**500V**	**A**	**200V**	**208V**	**220-240V**	**440-480V**	**550-600V**	**I_e: AC-53a: 3.5-17: 90-3 VMX-**	**I_e: AC-53a: 4-19: 90-3 VMX-**	**I_e: AC-53a: 4-29: 90-3 VMX-**
160	*45*	*90*	*110*	*156*	*50*	*50*	*60*	*125*	*150*	*See Size 2*	*See Size 2*	SGY-I-242
195	*55*	*110*	*132*	*192*	*60*	*60*	*75*	*150*	*200*	*See Size 2*	SGY-I-242	SGY-I-302
242	75	132	160	242	75	75	75	200	250	SGY-I-242	SGY-I-302	SGY-I-361
302	90	160	200	302	100	100	100	250	300	SGY-I-302	SGY-I-361	SGY-I-430
361	110	200	250	361	125	125	150	300	350	SGY-I-361	SGY-I-430	SGY-I-500
430	132	250	250	414	150	150	150	350	450	SGY-I-430	SGY-I-500	SGY-I-625
500	150	280	355	480	150	150	150	400	500	SGY-I-500	SGY-I-625	SGY-I-722
625	200	355	425	625	200	200	250	500	600	SGY-I-625	SGY-I-722	SGY-I-850
722	220	400	530	722	250	250	300	600	700	SGY-I-722	SGY-I-850	-
850	280	500	630	850	300	300	350	700	800	SGY-I-850	-	-

Sizing Guide

In-Delta Connection

Use tables to determine the size of the VMX-SGY-I required for the motor selected

Size 1 and 2

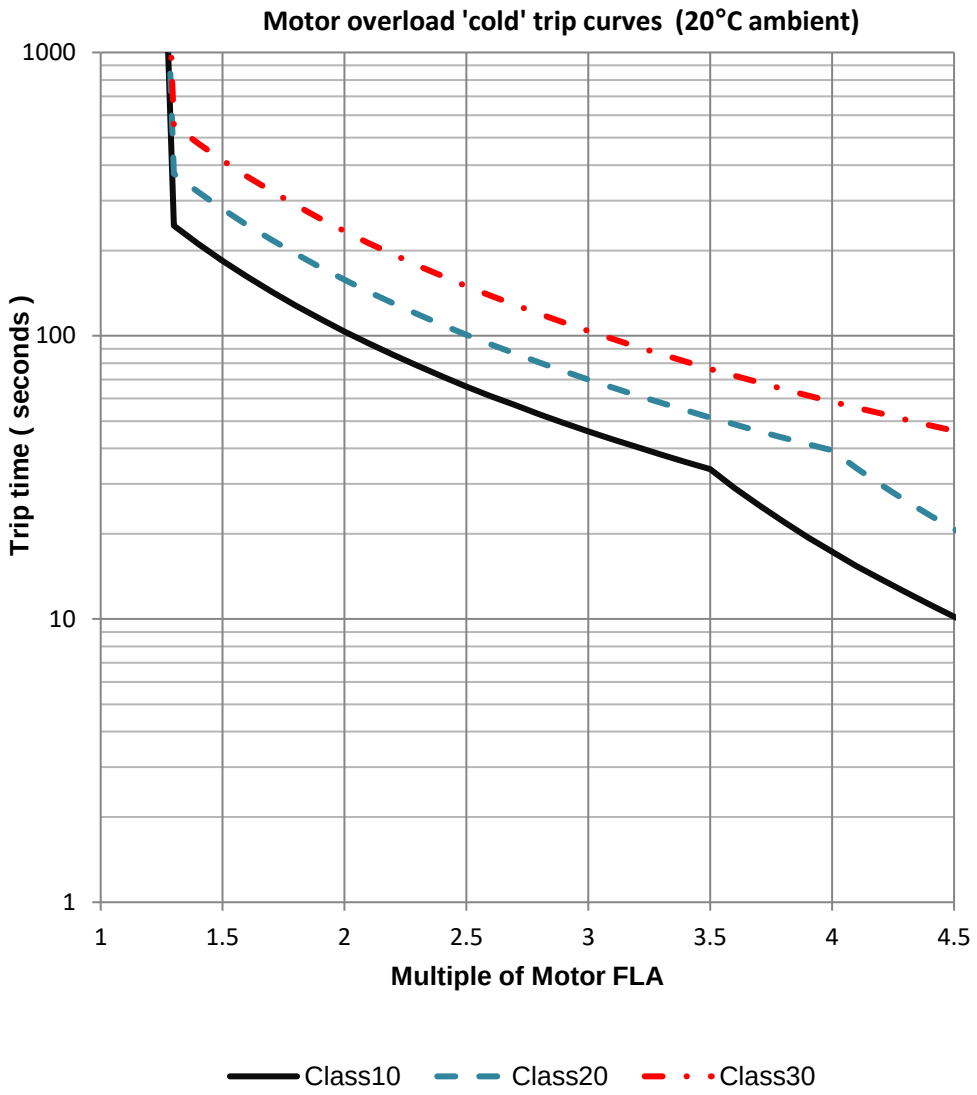
I_e [1]	kW			FLA [1]	Hp					Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	500V	A	200V	208V	220-240V	440-480V	550-600V	I_e: AC-53a: 3.5-17: 90-5 VMX-	I_e: AC-53a: 4-19: 90-5 VMX-	I_e: AC-53a: 4-29: 90-5 VMX-
29	7.5	15	18.5	29	7.5	7.5	10	20	25	SGY-I-17	SGY-I-22	SGY-I-29
38	11	18.5	22	38	10	10	10	25	30	SGY-I-22	SGY-I-29	SGY-I-35
50	11	22	30	47	10	15	15	30	40	SGY-I-29	SGY-I-35	SGY-I-41
61	18.5	30	37	59	15	15	20	40	50	SGY-I-35	SGY-I-41	SGY-I-55
71	18.5	37	45	71	20	20	25	50	60	SGY-I-41	SGY-I-55	SGY-I-66
95	22	45	55	90	25	30	30	60	75	SGY-I-55	SGY-I-66	SGY-I-80
114	30	55	75	113	30	30	40	75	100	SGY-I-66	SGY-I-80	SGY-I-100
139	37	75	90	133	40	40	50	100	125	SGY-I-80	SGY-I-100	SGY-I-132
173	55	90	110	171	50	60	60	125	150	SGY-I-100	SGY-I-132	SGY-I-160
229	55	110	160	217	60	75	75	150	200	SGY-I-132	SGY-I-160	SGY-I-195
277	75	150	185	270	75	75	100	200	250	SGY-I-160	SGY-I-195	*See Size 3*
338	90	185	220	333	100	100	125	250	300	SGY-I-195	*See Size 3*	*See Size 3*

Size 3 and 4

I_e [1]	kW			FLA [1]	Hp					Trip Class 10	Trip Class 20	Trip Class 30
A	230V	400V	500V	A	200V	208V	220-240V	440-480V	550-600V	I_e: AC-53a: 3.5-17: 90-3 VMX-	I_e: AC-53a: 4-19: 90-3 VMX-	I_e: AC-53a: 4-29: 90-3 VMX-
277	*75*	*150*	*185*	*270*	*75*	*75*	*100*	*200*	*250*	*See Size 2*	*See Size 2*	SGY-I-242
338	*90*	*185*	*220*	*312*	*100*	*100*	*125*	*250*	*300*	*See Size 2*	SGY-I-242	SGY-I-302
419	132	220	300	419	150	150	150	350	450	SGY-I-242	SGY-I-302	SGY-I-361
523	160	300	375	523	150	150	200	450	500	SGY-I-302	SGY-I-361	SGY-I-430
625	200	355	425	625	200	200	250	500	600	SGY-I-361	SGY-I-430	SGY-I-500
745	220	425	530	717	250	250	250	500	700	SGY-I-430	SGY-I-500	SGY-I-625
866	280	500	630	831	250	300	300	600	800	SGY-I-500	SGY-I-625	SGY-I-722
1083	335	600	800	1083	350	350	400	800	1000	SGY-I-625	SGY-I-722	SGY-I-850
1251	400	710	900	1251	450	450	500	1000	1250	SGY-I-722	SGY-I-850	-
1472	475	850	1000	1472	500	500	600	1100	1500	SGY-I-850	-	-

[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 57.7% of the motor line current.

Overload Trip Curves



Note: When the overload has tripped, there is a forced cooling time to allow the overload to recover before the next start. The ‘warm’ trip times are 50% of the ‘cold’ trip time

Technical Information & Standards

Rated operational voltages	**U_e**	200VAC to 600VAC		
Rated operational currents	**I_e**	See Rating Table		
Rating index		See Sizing Guide		
Rated frequency		50 - 60Hz ± 5Hz		
Rated duty		Uninterrupted.		
Form designation		Form 1, Internally Bypassed		
Rated insulation voltage	**U_i**	600V		
Rated impulse withstand voltage	**U_{imp}**	Main circuit	6kV	
IP code		Main circuit	IP00 (IP 20 optional on VMX-SGY-I-17 to VMX-SGY-I-195)	
		Supply and Control circuit	IP20	
Pollution Degree		3		
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 ±5Hz	Protect with UL listed fuse rated max.4A.
Rated control supply voltage	**U_s**	See Rating Table, 2 Amp supply (cont.)		
Relay specification	**11/23, 12, 24 and 33/43, 34, 44**	AC-15, 230VAC, 1A DC-13 30VDC, 0.7A		
	53, 54	AC-15, 250VAC, 3A DC-13 24VDC, 2A		
Electronic Overload relay with manual reset	**Trip Class**	10, 20 or 30 (See Sizing Guide for associated I_e rating)		
	Current setting	10% I_e to I_e		
	Rated frequency	50 to 60Hz ± 5Hz		
	Time-current characteristics	See Fig.1 for trip curves (Trip time T_p ± 20%)		
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		
The safety functions were not evaluated by UL.				
Transient surge suppression shall be installed on the line side of this equipment and shall be rated 600_V (phase to phase), suitable for overvoltage category III, and shall provide protection for a rated impulse withstand voltage peak of 6 kV" – or equivalent.				
The control circuits are to be supplied by class 2, limited voltage current or protected by a 4A UL 248 listed fuse.				
Control and auxiliary circuits have an overvoltage withstand capacity of 2.5kV				
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. VMX-SGY-I-...)			**17**	**22**	**29**	**35**	**41**	**55**	**66**	**80**	**100**
Rated operational currents	I_e	A	17	22	29	35	41	55	66	80	100
Rated conditional short circuit current	I_q	kA	10	10	10	10	10	10	10	10	10
Class J time-delay fuse #1	Maximum rating Z_1	A	25	30	40	45	60	70	90	100	125
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	25	30	40	45	60	70	90	100	125
Semiconductor fuse (class aR) #2	Type		Mersen 6,9 URD 30 _ Bussmann 170M30__ Bussmann 170M31__ Bussmann 170M32__ SIBA 20 61___				Mersen 6,9 URD 31__ Bussmann 170M40__ Bussmann 170M41__ Bussmann 170M42__ SIBA 20 61___				
	Fuse rating	A	100	100	160	160	200	200	200	315	315

Size 2 and 3

Type designation (eg. VMX-SGY-I-...)			**132**	**160**	**195**	**242**	**302**	**361**	**430**	**500**
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	30	30
Class J time-delay fuse #1	Maximum rating Z_1	A	175	200	250	350	400	450	600	600
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	175	200	250	400	500	600	700	800
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___			Mersen 6,9 URD 33__ SIBA 20 63___	
	Fuse rating	A	400	550	550	900	900	900	1000	1000

Size 4

Type designation (eg. VMX-SGY-I-...)			**625**	**722**	**850**
Rated operational currents	I_e	A	625	722	850
Rated conditional short circuit current	I_q	kA	42	42	42
Class L time delay fuse #1	Maximum rating Z_1	A	800	1000	1200
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	1000	1200	1200
Semiconductor fuse (class aR) #2	Type		Mersen PC36UD69V**CP11 SIBA 20 688 32		
	Fuse rating	A	1800	1800	2000

Note: For Mersen fuses ** is 18 for 1800A fuse and 20 for 2000A fuse.

1. Suitable For Use On A Circuit Capable Of Delivering Not More Than ___I_q___ rms Symmetrical Amperes, 600 Volts Maximum, When Protected by Class J or Class L time delay Fuses as indicated 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. These semiconductor fuses are recommended to provide this increased protection.

Electric current, Danger to life!
Only skilled or instructed persons may carry out the operations.

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

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

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

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

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。

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

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

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

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

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

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

Hengenvaarallinen jännite!
Vain pätevät sähköasentajat ja opastusta saaneet henkilöt saavat suorittaa seuraavat työt.

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

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

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

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

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

Livsfara genom elektrisk ström!
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Hengenvaarallinen jännite!
Vain pätevät sähköasentajat ja opastusta saaneet henkilöt saavat suorittaa seuraavat työt.

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

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

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Tālāk aprakstītos darbus drīkst veikt tikai elektrospeciālisti un darbam ar elektrotehniskām iekārtām instruētās personas!

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

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

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

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

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

Atenţie! Pericol electric!
Toate lucrările descrise trebuie efectuate numai de personal de specialitate calificat şi de persoane cu cunoştinţe profunde în electrotehnică.

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Tik elektrikai ir elektrotechnikos specialistai gali atlikti žemiau aprašytus darbus.

California Customers: California Proposition 65 Warning

WARNING: this product and associated accessories may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information visit https://p65warnings.ca.gov

For further regulatory information, please see Article33 Declaration on website. Unit specific SCIP details are also available upon request.

To assist with assessing your Environmental Impact, International Recycling codes are printed/stamped on unit boxes, to cover all enclosed packaging materials.

Motortronics UK aim to ensure that any battery used within their products is readily removable and replaceable by the end-user. Instructions on this are available on the Motortronics website.

Please refer to the full user manual MAN-VMX-SGY-I-UM for further details

MOTORTRONICS™

Solid State AC Motor Control

VMX-Synergy Plus™

Premium Digital Soft Starter

www.motortronics.com