



MOTORTRONICS™

Solid State AC Motor Control

VMX-Synergy Plus™

ANSI - QUICK START GUIDE

200 - 600V, 18 - 1250 Amps



- 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
- 65kA rating with breakers
- Advanced motor protection with memory
- Life Time Event Logging Diagnostics
- Metering for power, voltage and current
- Integral Bypass



Intelligent Energy Recovery (iERS)

iERS can produce energy savings in suitable applications. However, the user should have an understanding of the application and load characteristic before enabling the feature.

Loads which exhibit frequent changes in motor torque may cause the VMX-Synergy Plus™ to switch rapidly between the iERS on state and the 'bypassed' state as the motor torque changes. If left unchecked, such switching may cause premature wear of the internal bypass components and may invalidate the warranty.

If the loaded / unloaded state changes more than 4 times per minute, iERS should not be enabled.

Applications that are typically well suited to the iERS feature include; Artificial Lift Pump Jacks, Injection Molding Machines, Mixers, Saws, Rolling Mills, Grinders, Hydraulic Pumps, Crushers, Conveyors, Compressors and Vertical Transport applications.

If the user requires further support regarding the suitability of the application, he should seek support from Motortronics Inc or an Authorized Distributor before enabling the iERS function.



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 entraîner 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.

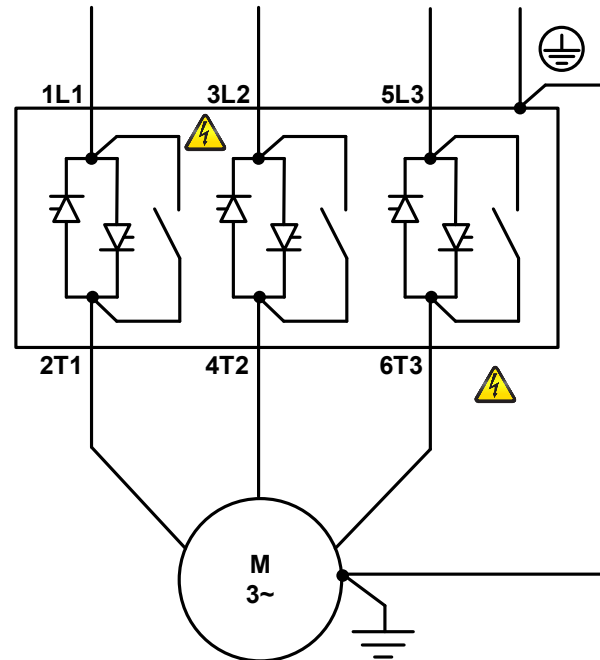
- *Il appartient à l'installateur d'assurer la mise à la terre et la protection du circuit de branchement, conformément au code de sécurité électrique local.*

- 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.

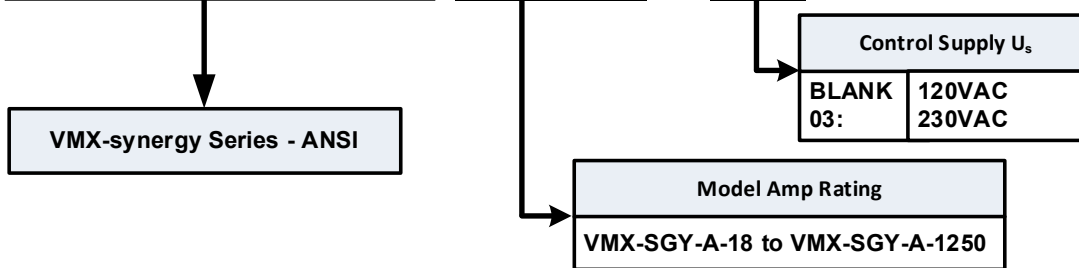
- *La fonction STOP du démarreur progressif n'isole pas les tension dangereuses en sortie du démarreur progressif. Avant d'accéder aux raccordement électriques, il faut utiliser un dispositif d'isolation électrique approuvé pour déconnecter le démarreur progressif de la tension d'entrée.*



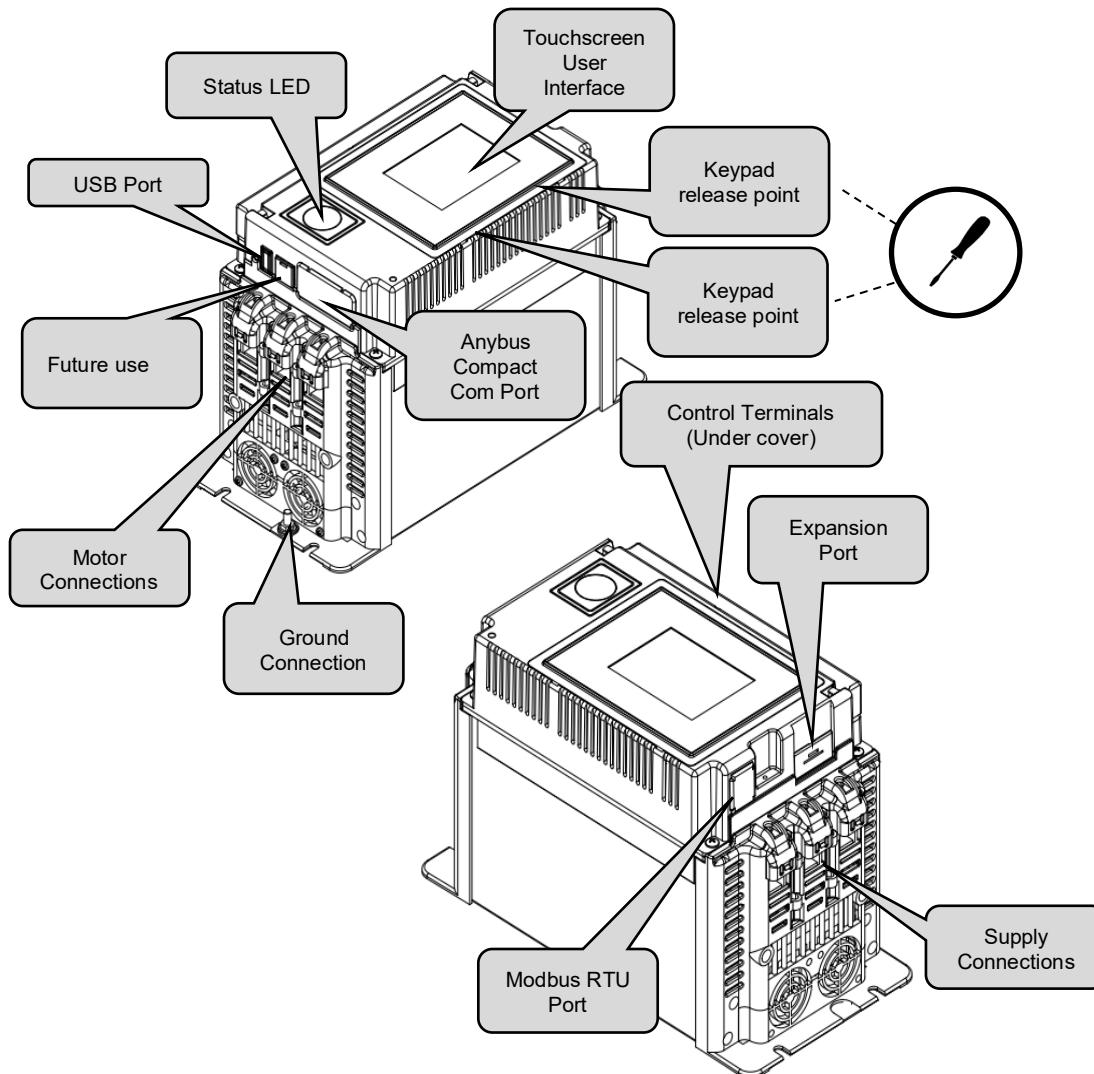
Model Number Description

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-A-XXXX - XX



Key Features



Environment - Installation

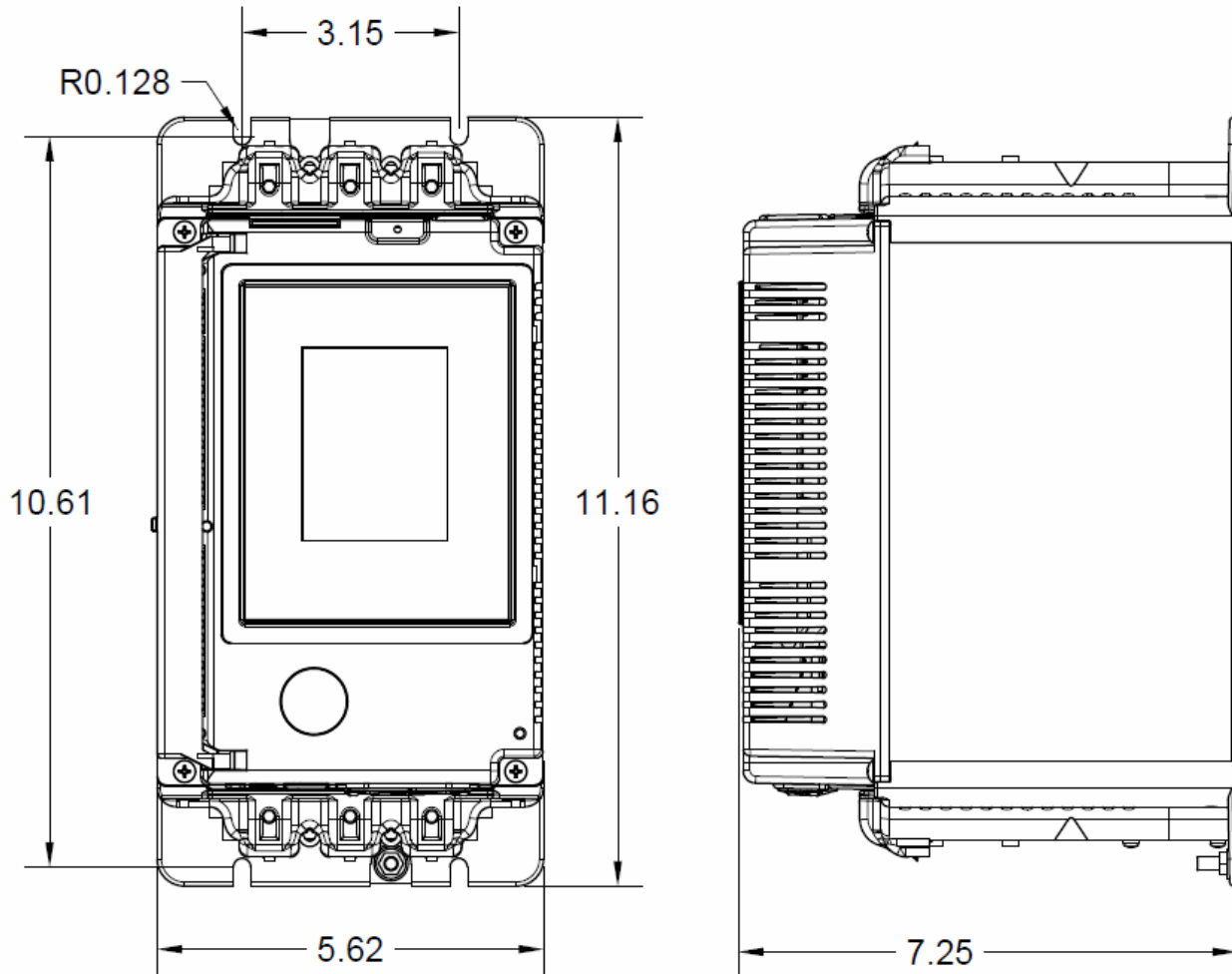
Model (VMX-SGY-A-)	18-48	62	78	92	112	150	160	210	275
Frame Size	1	2			3		4		
Control Power (VA)	48	60			100		300	300	
Weight lb [kg]	8.8 [4.0]	23 [10]			33 [15]		130 [59]	140 [64]	
Model (VMX-SGY-A-)	361	450	550	600	862	900	1006	1250	
Frame Size	4				5		6		
Control Power (VA)	350				500		750		
Weight [lb] kg	145 [66]		165 [75]		325 [147]		400 [181]		
Model (VMX-SGY-A-)	18 to 1250								
Ambient Operating Temp.	-4°F [-20°C] to 104°F [40°C]; not above 122°F (50°C)								
Transportation and Storage Temperature	[-13°F to 158°F (-25°C to 70°C) continuous								
Humidity	max 85% non-condensing, not exceeding 50% @ 40°C [104°F]								
Maximum Altitude	3281ft [1,000m] above 1000m derate by 1% of VMX-Synergy Plus™ current rating per 328ft (100m) to a maximum altitude of 6562ft (2,000m)								
Environmental Rating	Main Circuit: Open Chassis (Optional finger guards available for power terminals on VMX-SGY-A-18 to 48); Control Circuit: NEMA 1; No corrosive gases permitted								

Model (VMX-SGY-A-)	Recommended minimum CPT Rating (VA)
VMX-SGY-A-18 to 48	100
VMX-SGY-A-62 to 112	250
VMX-SGY-A-150 to 160	500
VMX-SGY-A-210 to 276	500
VMX-SGY-A-361 to 600	750
VMX-SGY-A-862 to 900	1000
VMX-SGY-A-1006 to 1250	1500

Environment - Installation

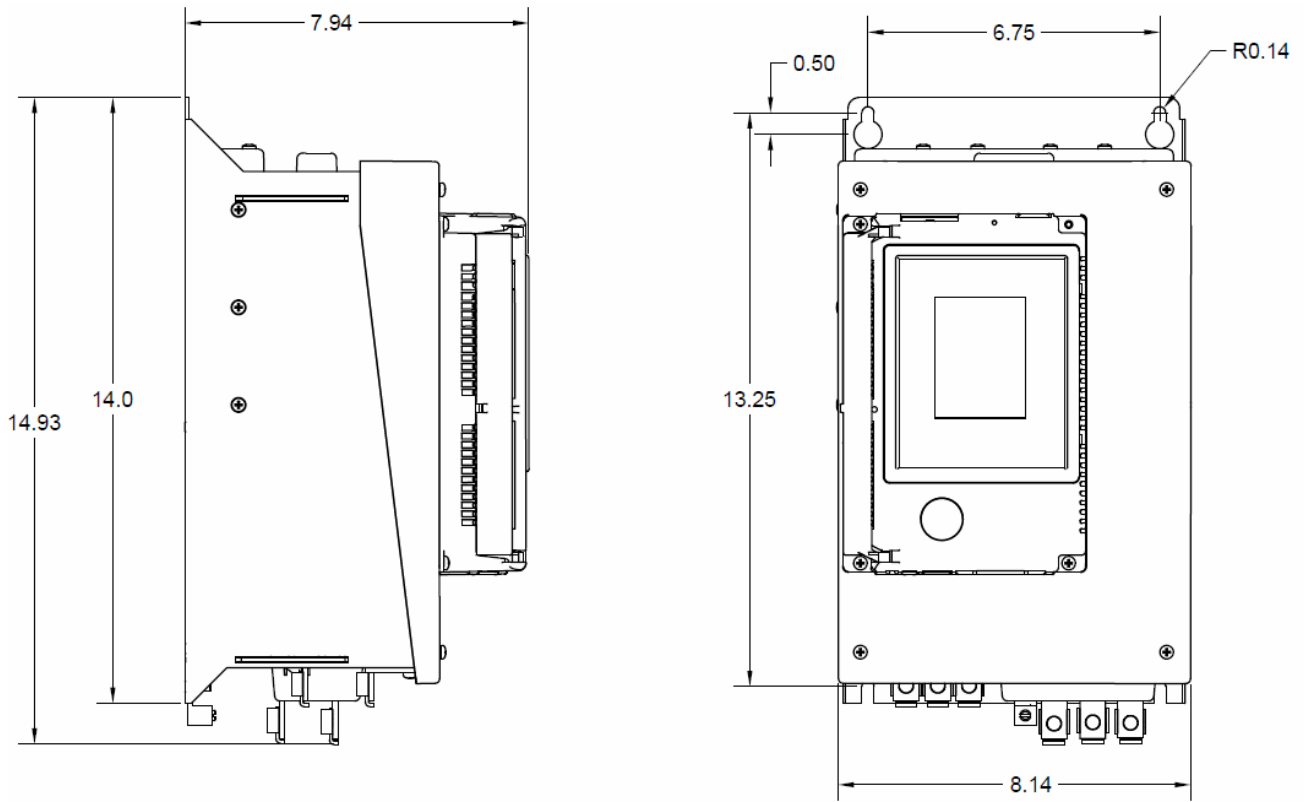
Dimensions

VMX-SGY-A-18 to VMX-SGY-A-48



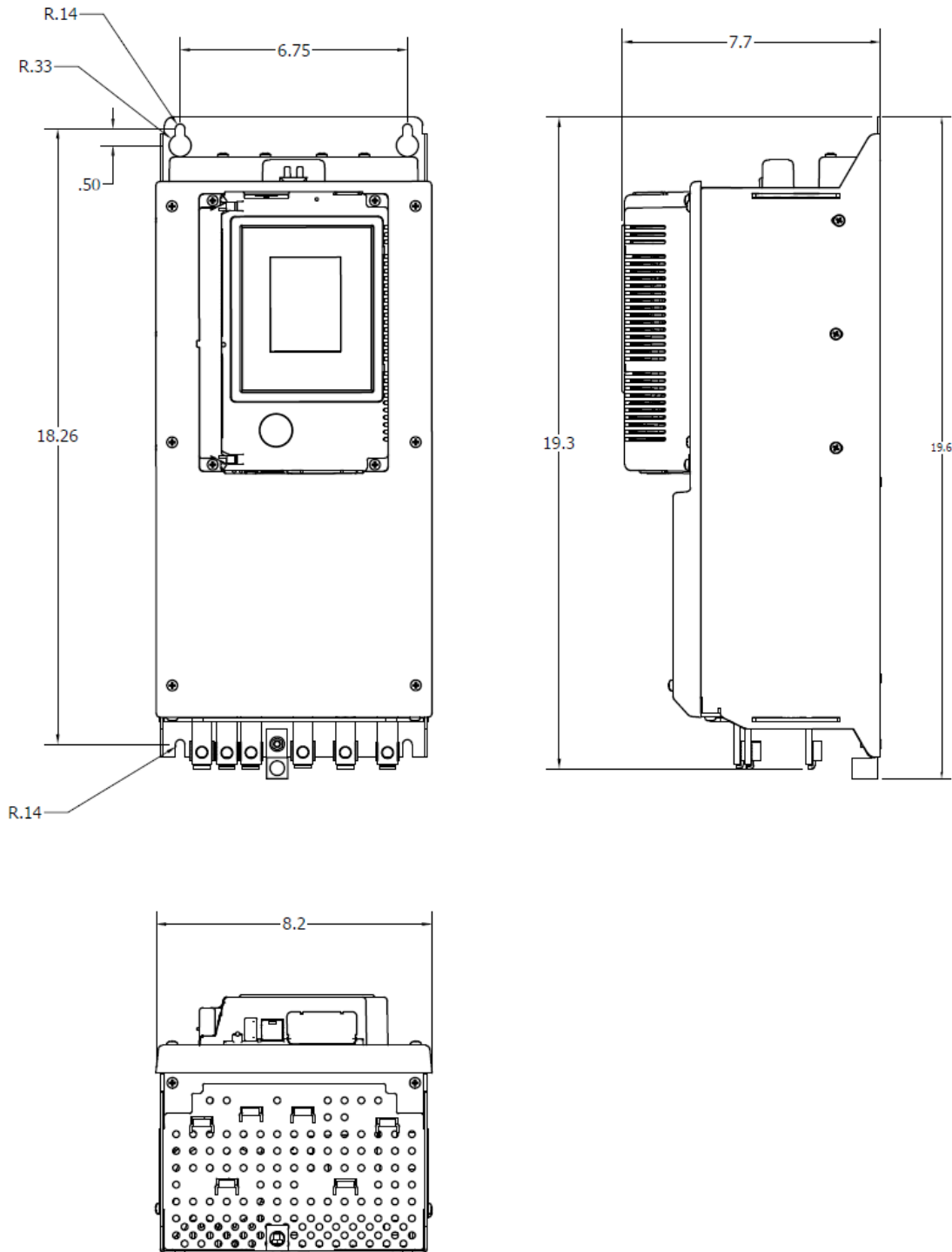
Environment - Installation

VMX-SGY-A-62 to VMX-SGY-A-112



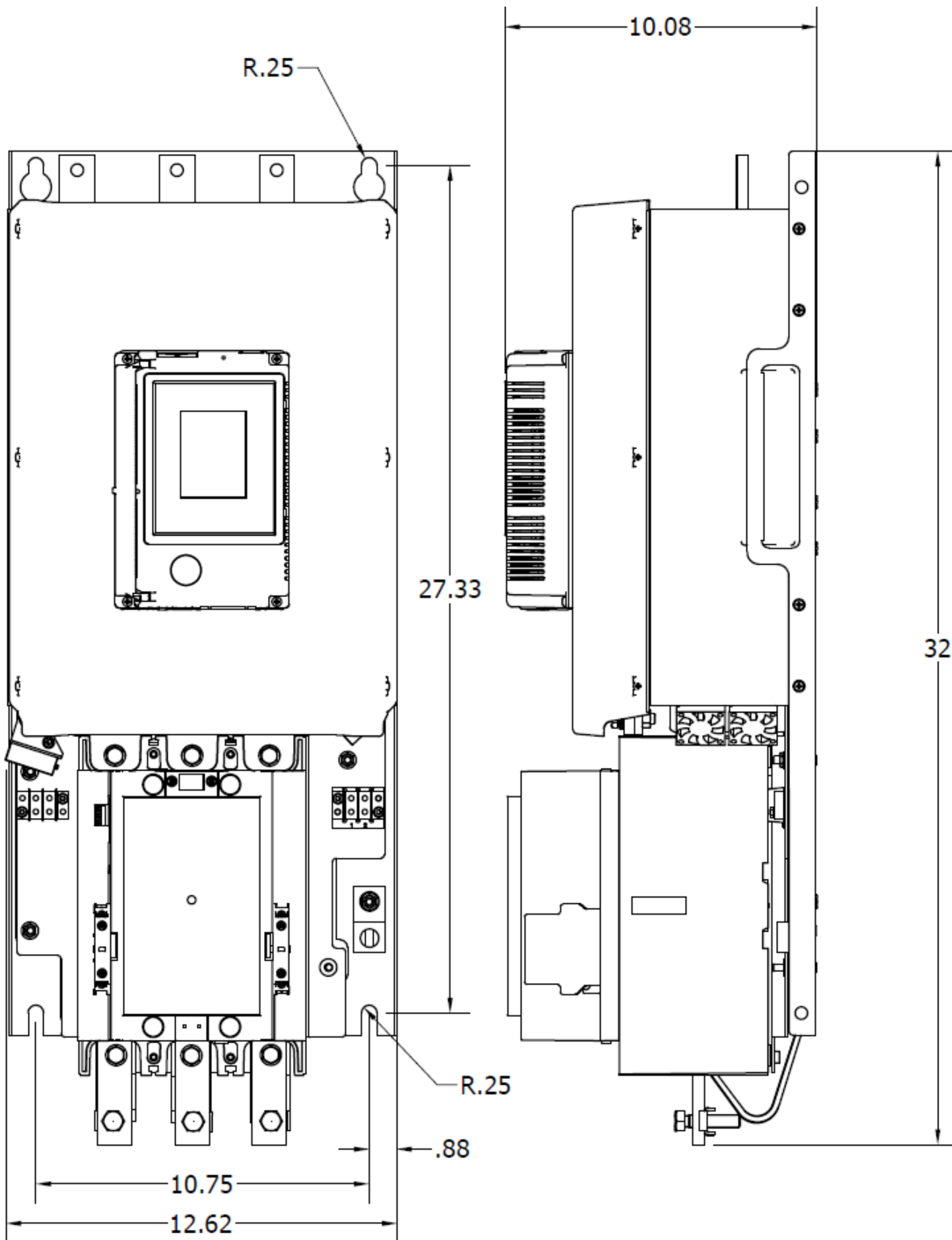
Environment - Installation

VMX-SGY-A-150 to VMX-SGY-A-160



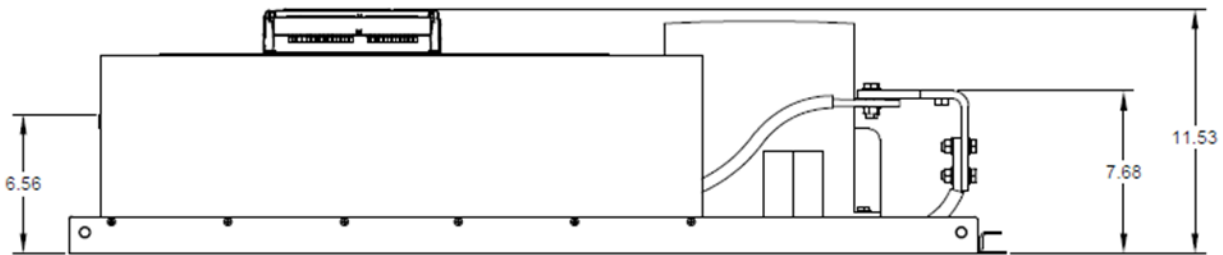
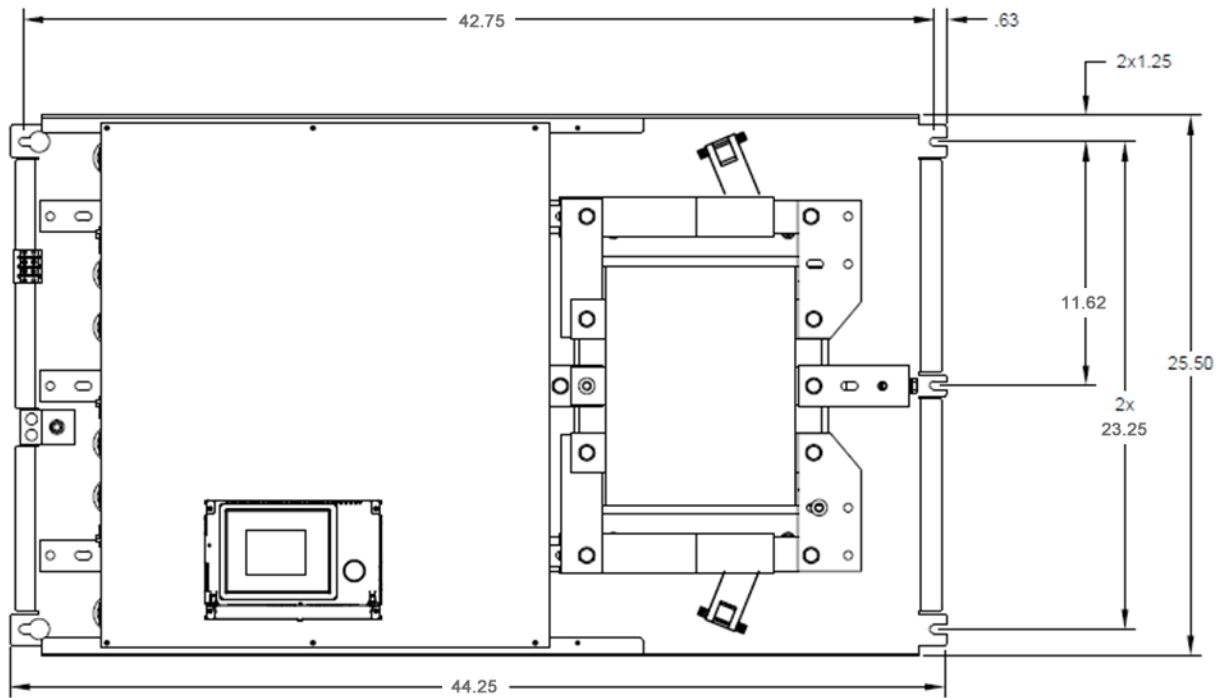
Environment - Installation

VMX-SGY-A-210 to VMX-SGY-A-600



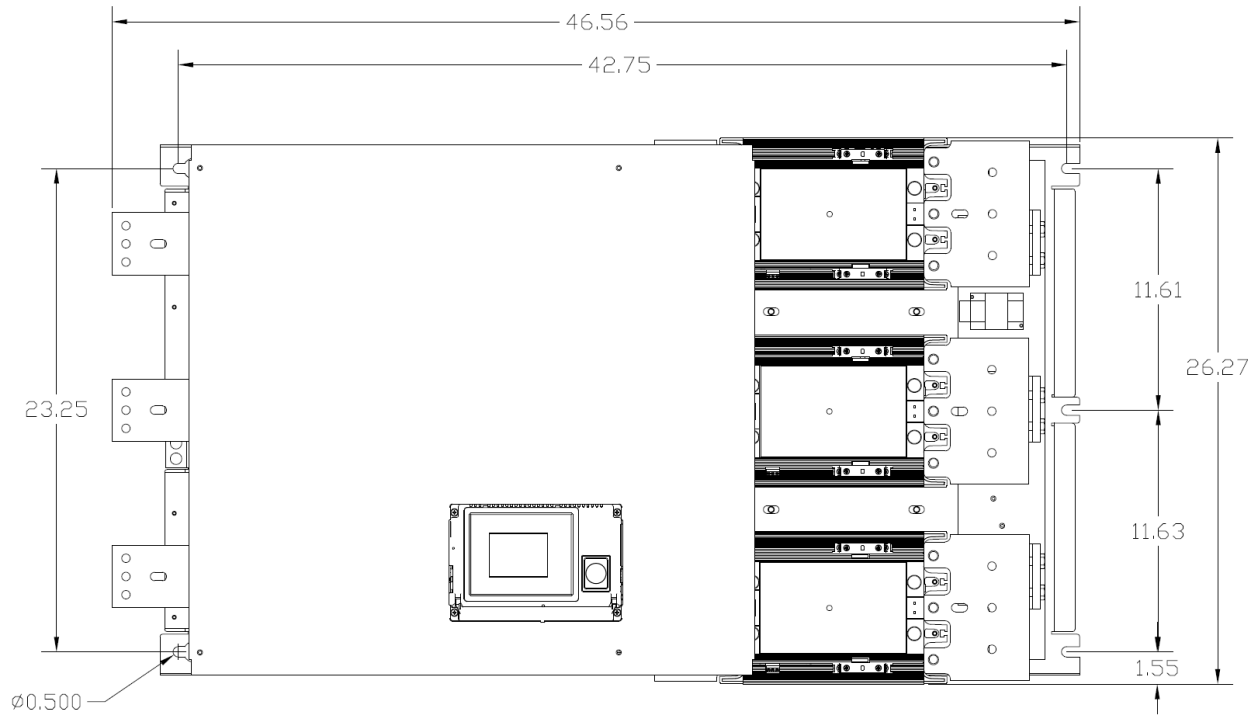
Environment - Installation

VMX-SGY-A-862 to VMX-SGY-A-900



Environment - Installation

VMX-SGY-A-1006 to VMX-SGY-A-1250



Environment - Installation



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

$$Q = \frac{4 \times Wt}{(T_{\max} - T_{\text{amb}})}$$

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

Wt = Heat produced by the unit and all other heat sources within the enclosure (Watts)

T_{max} = Maximum permissible temperature within the enclosure (50°C for a fully rated VMX-Synergy Plus™)

T_{amb} = Temperature of the air entering the enclosure (°C)

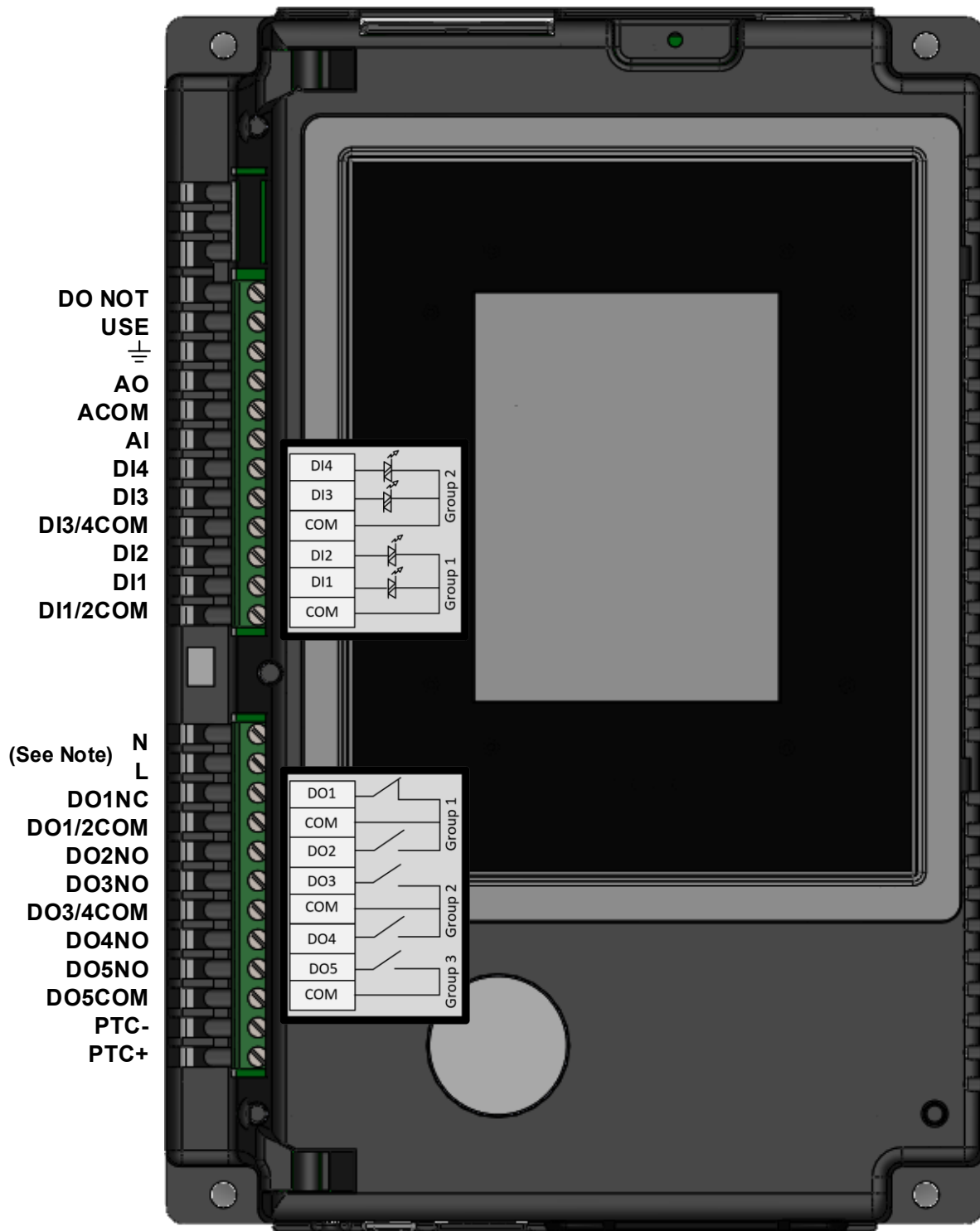
If you prefer to work in CFM, substitute °F for °C. Q is now in CFM

Conductor Size & Torque Requirements

Model Number	Current Range Min.- Max.	Suggested Wire Size AWG	Tightening Torque in.-lbs.	Screw / Bolt Size	Tightening Torque Nm	Recommended Terminal (or equivalent)
VMX-SGY-A-18 to 48	18 - 48	6	80	*	9	*
VMX-SGY-A-62	36 - 62	4	130	1 x M8 (included)	15	ILSCO TA-250
VMX-SGY-A-78	39 - 78	3				
VMX-SGY-A-92	46 - 92	2				
VMX-SGY-A-112	56 - 112	1/0				
VMX-SGY-A-150	75 - 150	3/0				
VMX-SGY-A-160	80 - 160	3/0				
VMX-SGY-A-210	105 - 210	300 kCMIL	200	1 x M10 (included)	22	ILSCO TA-500
VMX-SGY-A-275	138 - 275	500 kCMIL				ILSCO TA-500 2x (Top & Bottom)
VMX-SGY-A-361	180 - 361	2 x 4/0				
VMX-SGY-A-450	225 - 450	2 x 300 kCMIL				
VMX-SGY-A-550	275 - 550	2 x 500 kCMIL				
VMX-SGY-A-600	300 - 600	2 x 500 kCMIL				
VMX-SGY-A-862	431 - 862	3 x 500 kCMIL	Hardware not supplied	1 x 0.38" hole (M10) for User supplied lugs	Hardware not supplied	ILSCO PB3-600
VMX-SGY-A-900	450 - 900	3 x 500 kCMIL				ILSCO PB4-600
VMX-SGY-A-1006	503 - 1006	4 x 400 kCMIL				
VMX-SGY-A-1250	625 - 1250	4 x 600 kCMIL				

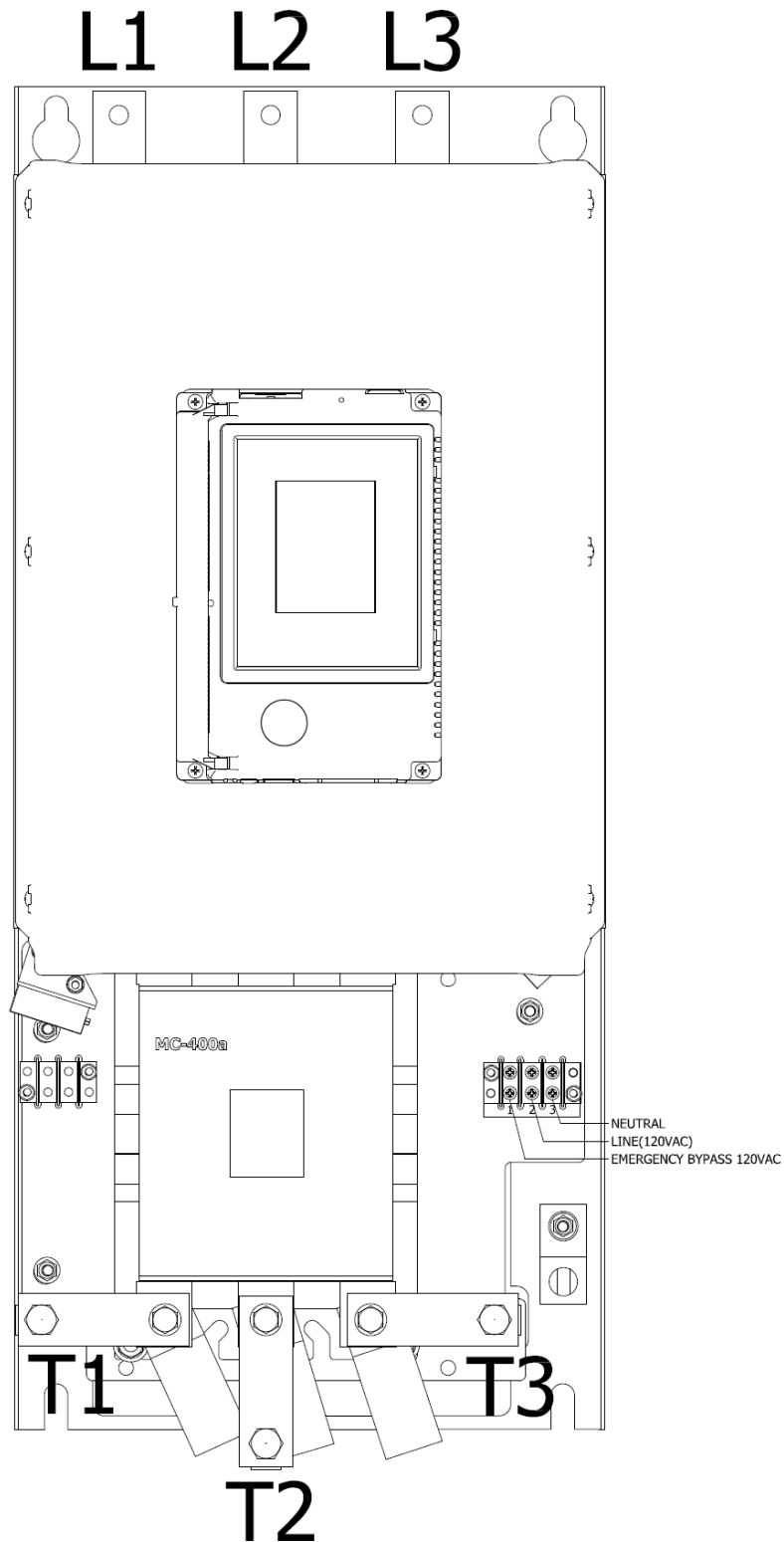
* Saddle Clamp Terminal 12-2/0 AWG

Terminal Designations and Wiring Connection



NOTE: AC Input terminals L & N on starter module only available on models VMX-SGY-A-18 to VMX-SGY-A-160. For all other models the control power input is located on the chassis frame mounted terminal block (see next page).

Control power input location for VMX-SGY-A-210 and up



Supply 120 VAC control power to terminal 2 and 3 of the 120 VAC control power terminal block shown above. To close the contactor for Emergency purposes put a jumper between terminal 1 to 2 or supply 120 VAC to terminal 1 and 3.”

Terminal Description

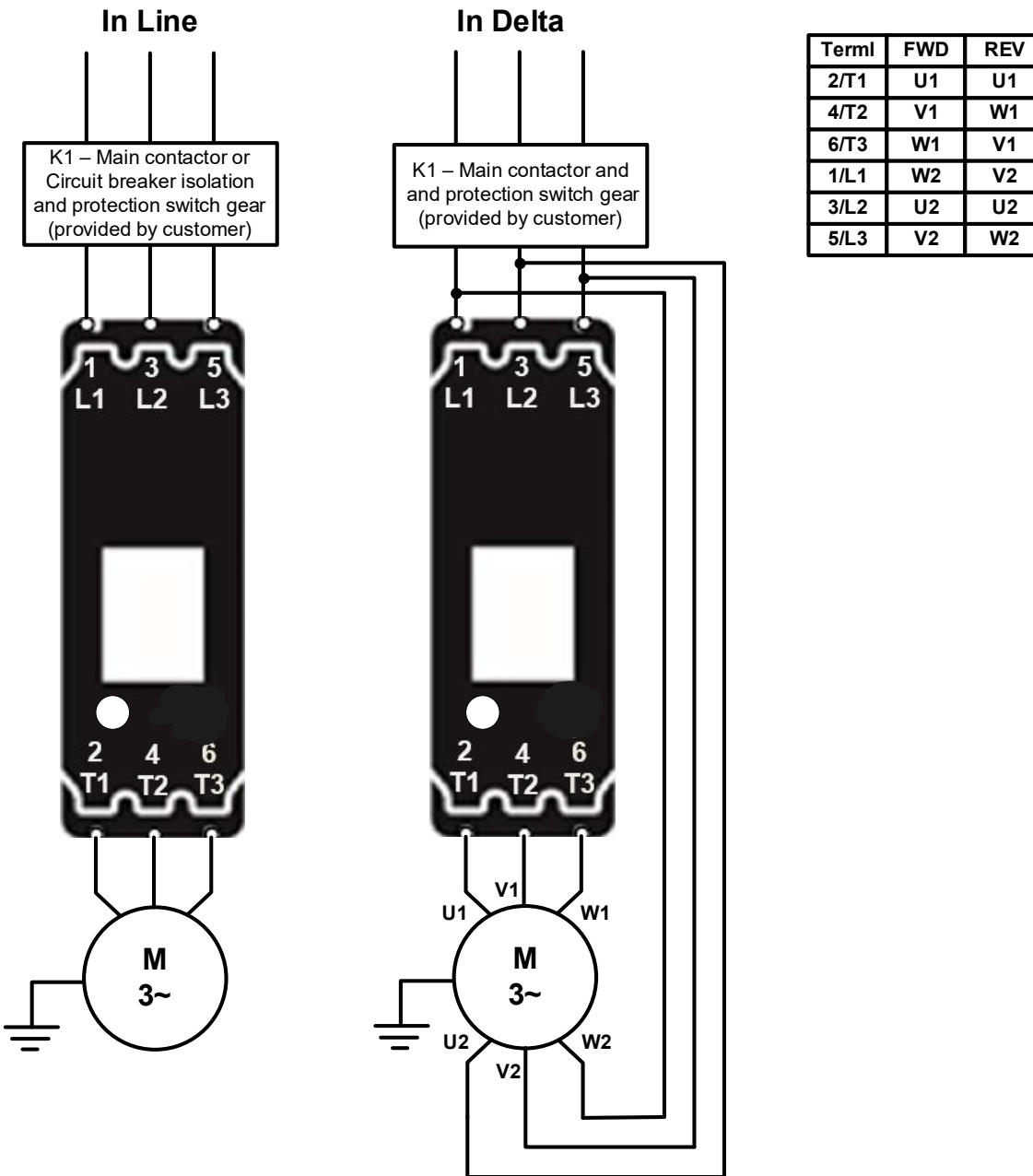
Terminal Name	Description	Programmable		Rating	Notes
AO	Analog Output	0-10V or 4-20mA			
ACOM	Analog Common				
AI	Analog Input	0-10V or 4-20mA			
DI4	Digital Input Group 2	240VAC or 120VAC			#1
DI3	Digital Input Group 2	240VAC or 120VAC			#1
DI3/4COM	Digital Input Group 2 Common				#1
DI2	Digital Input Group 1	240VAC or 120VAC	None		#1
DI1	Digital Input Group 1	240VAC or 120VAC	Start / Stop		#1
DI1/2COM	Digital Input Group 1 Common				#1
N	Neutral - Control supply			120VAC-240VAC	#2
L	Line - Control supply				#2
DO1NC	Group 1 relay N/C	Yes	Fault	240VAC 1A AC15	
DO1/2COM	Group 1 relay common				
DO2NO	Group 1 relay N/O	Yes	Fault	240VAC 1A AC15	
DO3NO	Group 2 relay N/O	Yes	Running	240VAC 1A AC15	
DO3/4COM	Group 2 relay common				
DO4NO	Group 2 relay N/O	Yes	End of Start	240VAC 1A AC15	
DO5NO	Group 3 relay N/O	Yes	Running	240VAC 3A AC15	
DO5COM	Group 3 relay common				
PTC-	PTC Temperature sensor input				
PTC+	PTC Temperature sensor input				

TABLE 1

Notes

#1	Digital input voltage must be set to the voltage applied to the digital input terminals DI1/2COM, DI3/4COM, DI1-DI4. Afin d'éviter d'endommager l'équipement, le réglage de l'entrée numérique programmé sur DI1/2COM, DI3/4COM, DI1-DI4 doit correspondre à la tension appliquée à ces bornes.
#2	The control supply can be 120 to 240V applied to the N, L. The correct voltage is specified by model # at time of order. L'alimentation contrôle peut être 120 à 240 Vca, appliquée aux bornes N et L. Afin d'éviter d'endommager l'équipement, la tension appropriée selon les indications ne doit être appliquée qu'à une entrée d'alimentation.

Wiring Connection



<p>⚠ For suitable short circuit protection devices (SCPD's) see short Circuit Protection in the Technical Information/ standards section of this guide.</p> <p>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.</p>	<p>⚠ For wire size and torque requirements see Technical Information/ standards section of this guide.</p> <p>Pour les dimensions de câble et les besoins en couple, voir la section « Informations techniques/normes » du présent guide.</p>	<p>⚠ In Delta For this configuration applying the equation.</p> <p>$VMX\text{-Synergy Plus } I_e = I_e(\text{motor}) / \sqrt{3}$</p> <p>Allows lower current rating VMX-Synergy Plus than the motor.</p> <p>The contactor K1 can also be connected inside the delta circuit.</p> <p>When connected in the delta $K1 \text{ current rating} = I_e(\text{motor}) / \sqrt{3}$</p>	<p>⚠ En Delta Pour cette configuration, appliquer l'équation suivante:</p> <p>$VMX\text{-Synergy Plus } I_e = I_e(\text{moteur}) / \sqrt{3}$</p> <p>Cela permet le courant nominal inférieur de VMX-Synergy Plus par rapport au moteur.</p>
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Wiring Connection



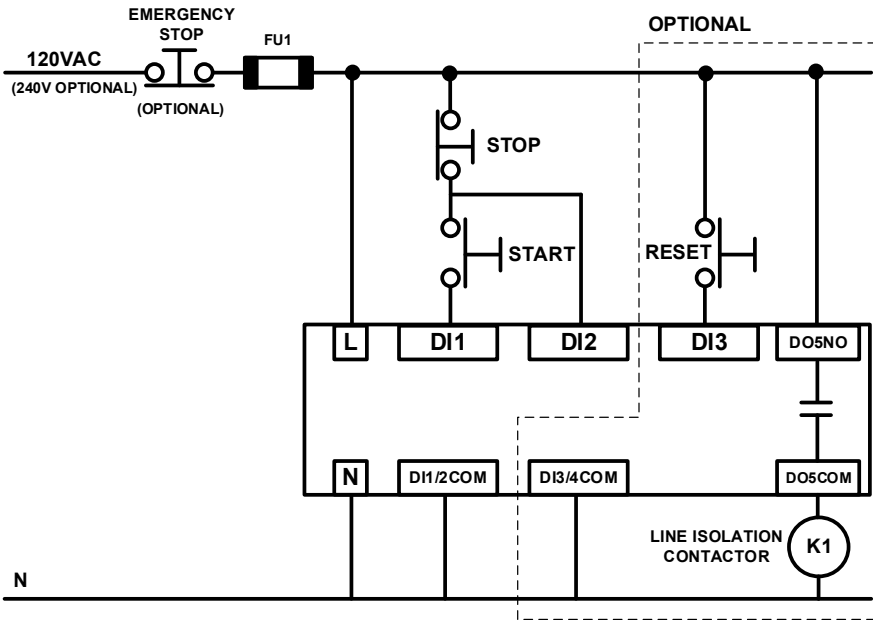
The programmed digital input voltage settings match the voltage applied to these terminals to avoid risk of damage to the equipment.



The control supply can be 120 to 240Vac applied to the N, L terminals. Check model number to determine correct control supply voltage (240AC is optional) to avoid risk of damage to the equipment.

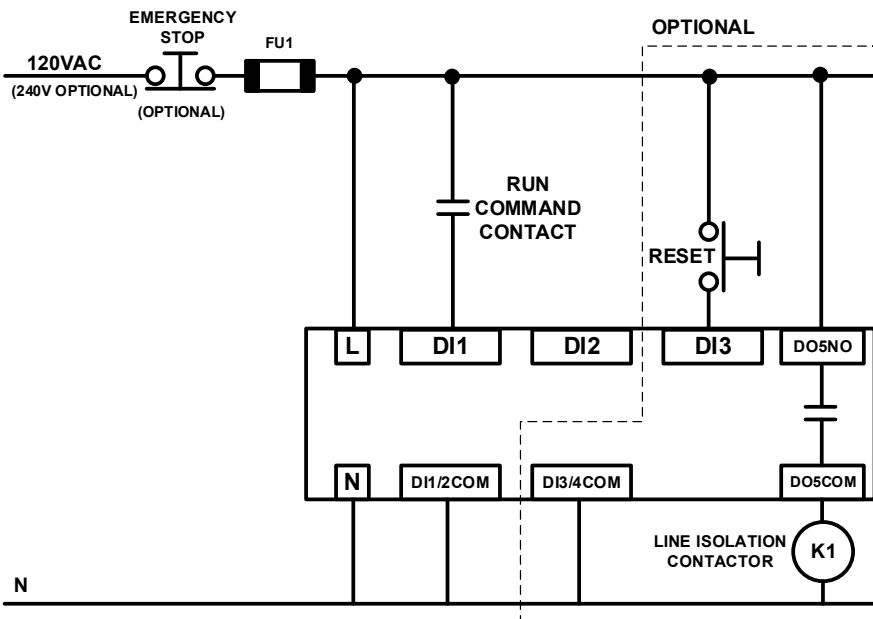
Three Wire Control

3 Wire Control Diagram 120VAC control supply and digital input programming.




Two Wire Control

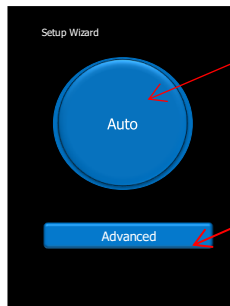
2 Wire Control Diagram 120VAC control supply and digital input programming.



On Screen Menus

Initial Screen

 Displayed on **FIRST** switch-on **ONLY**.



Auto Setup wizard.

Advanced menu

Status Screen

Supply Status
Turns **RED** if unit has tripped on supply failure

Motor Overload Status
Turns **RED** if unit has tripped on overload

Status Messages

Motor Side Status
Turns **RED** if unit has tripped on motor side phase loss

Returns to previous screen/menu

Enters Sub-Menus

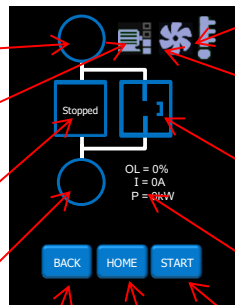
Temperature Status
Turns **RED** if unit has tripped on over temperature

Cooling Fan Status
Turns **RED** if unit has tripped on fan failure

Internal Bypass Status (open/closed)

Displays Overload Percentage, Instantaneous running Current and power

Start/Stop Motor
Only active if Local Control Enabled



Home Screen

Auto-Setup Menu

Input/Output Menu

Logging Menu

Advanced Menus

Monitor Screens

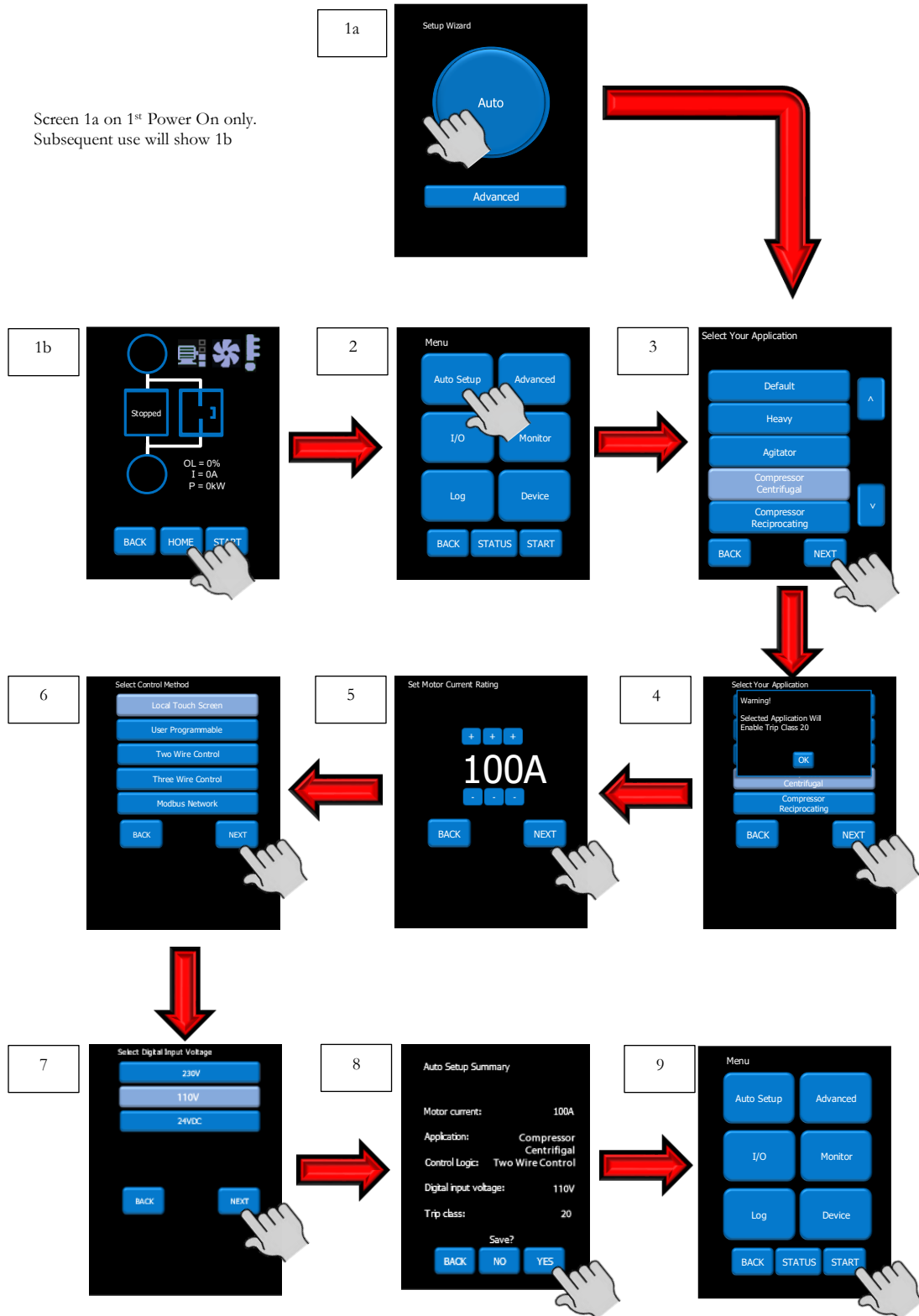
Device Menu

See 'Status Screen'



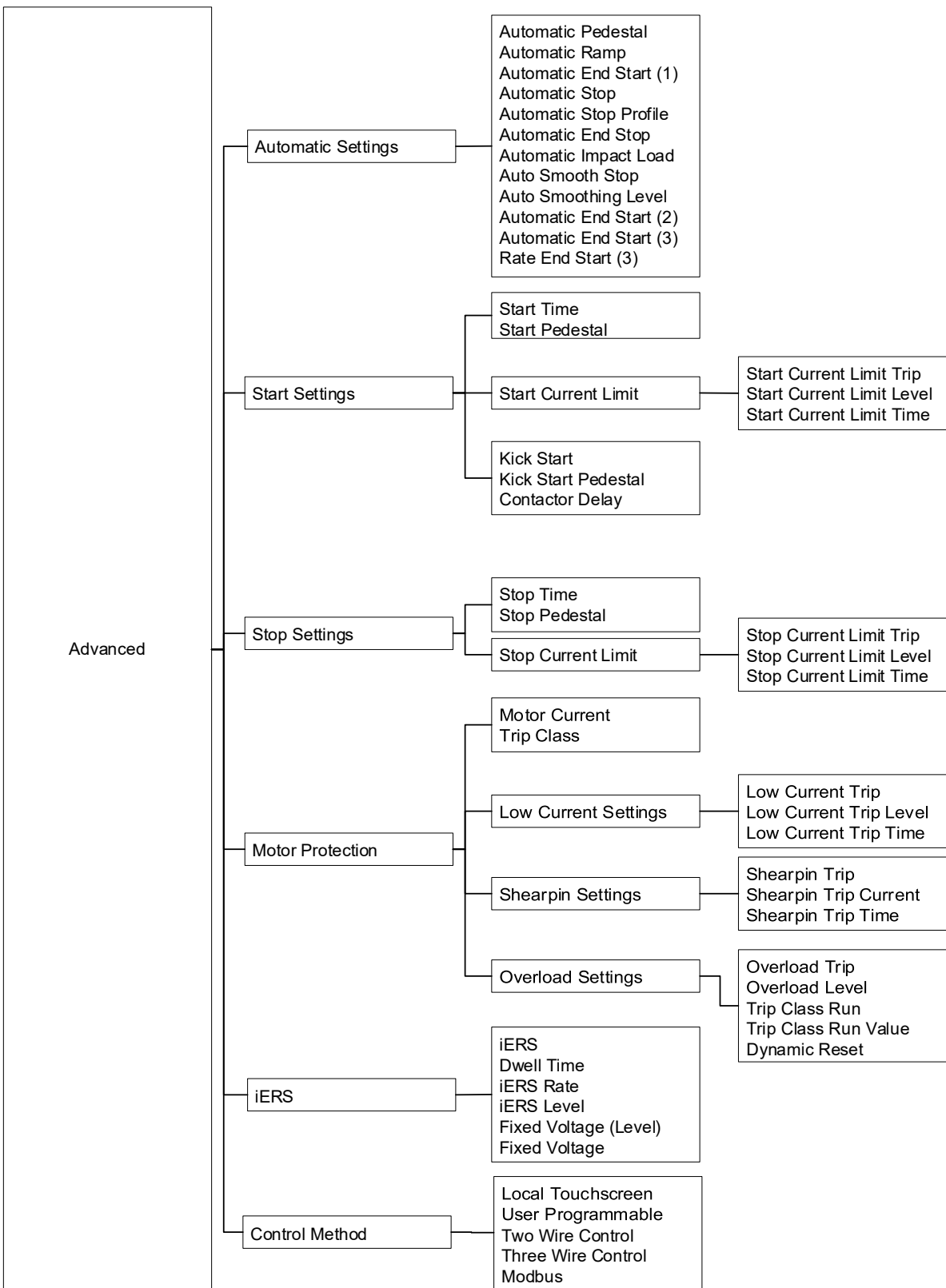
Auto Setup Example

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

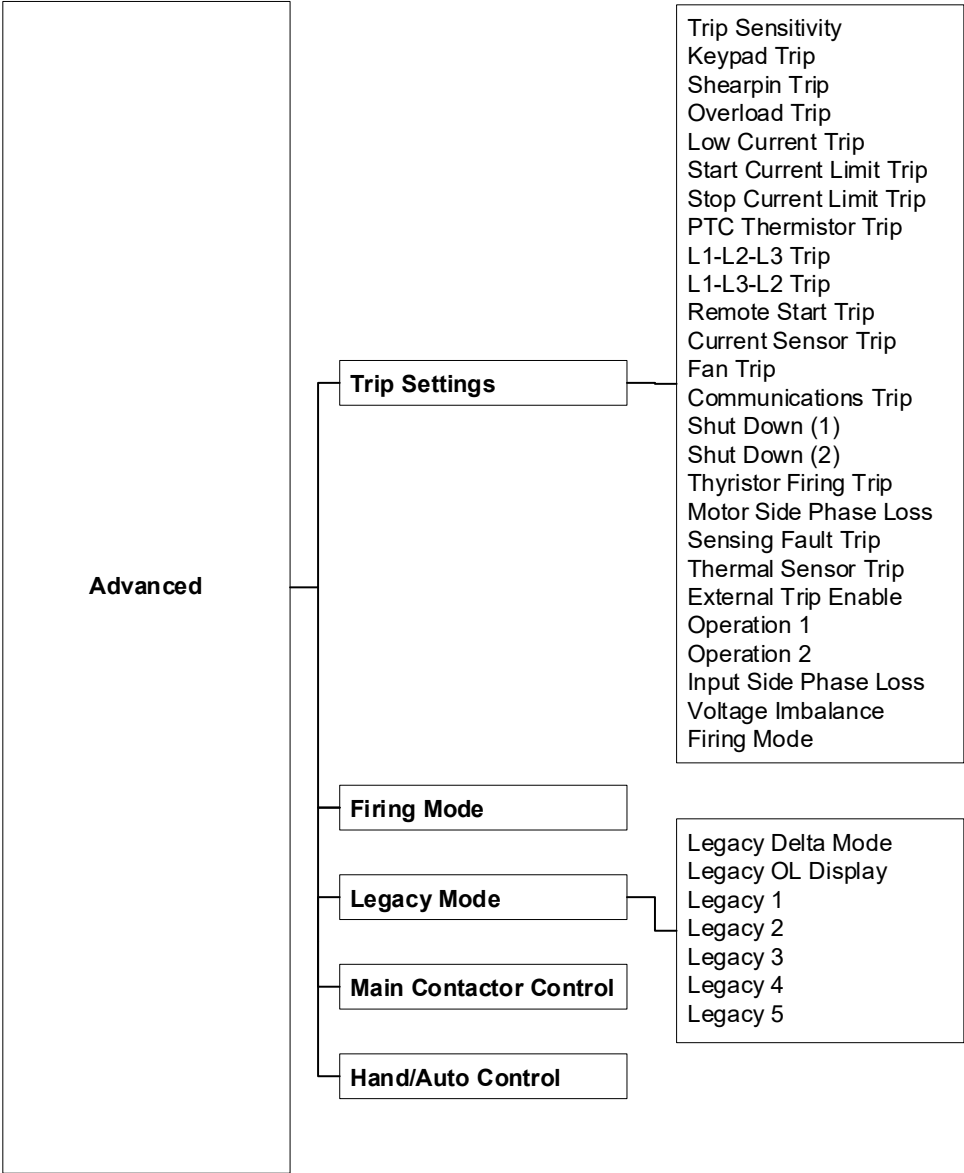


Programming Menu Structure

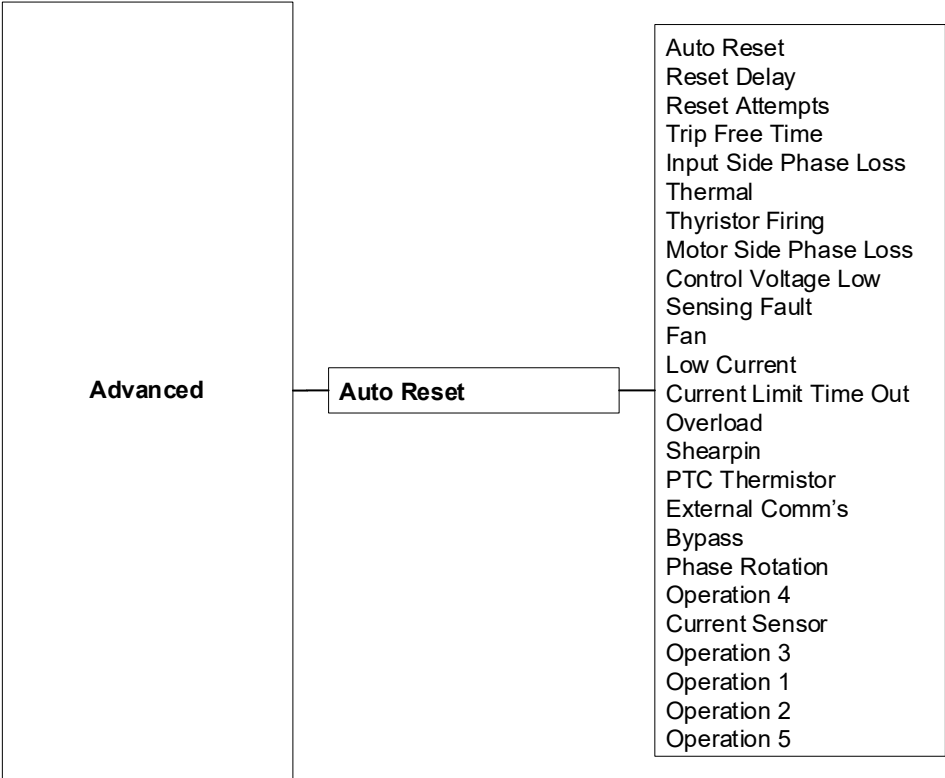
Advanced Menu



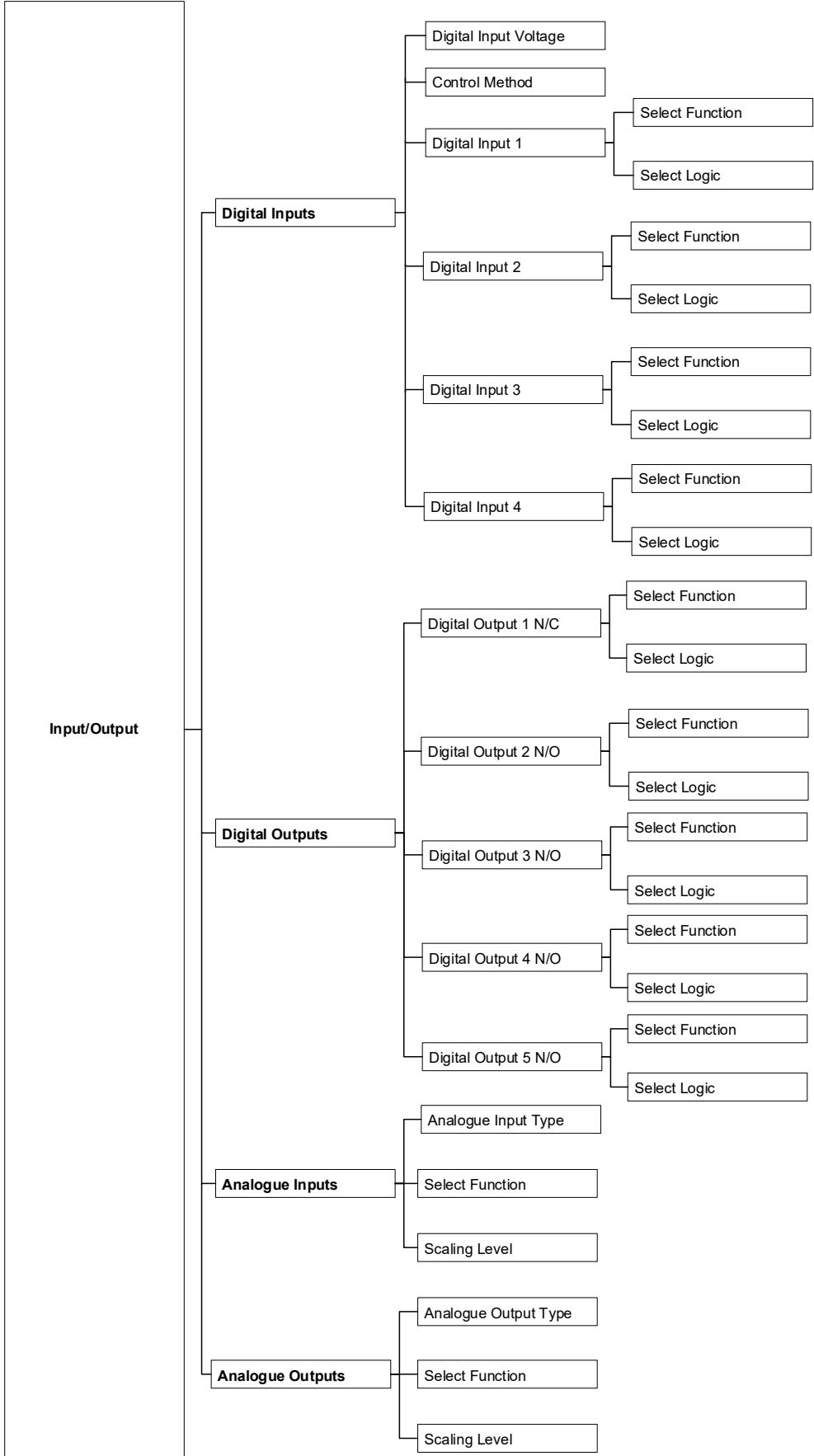
Advanced (continued)



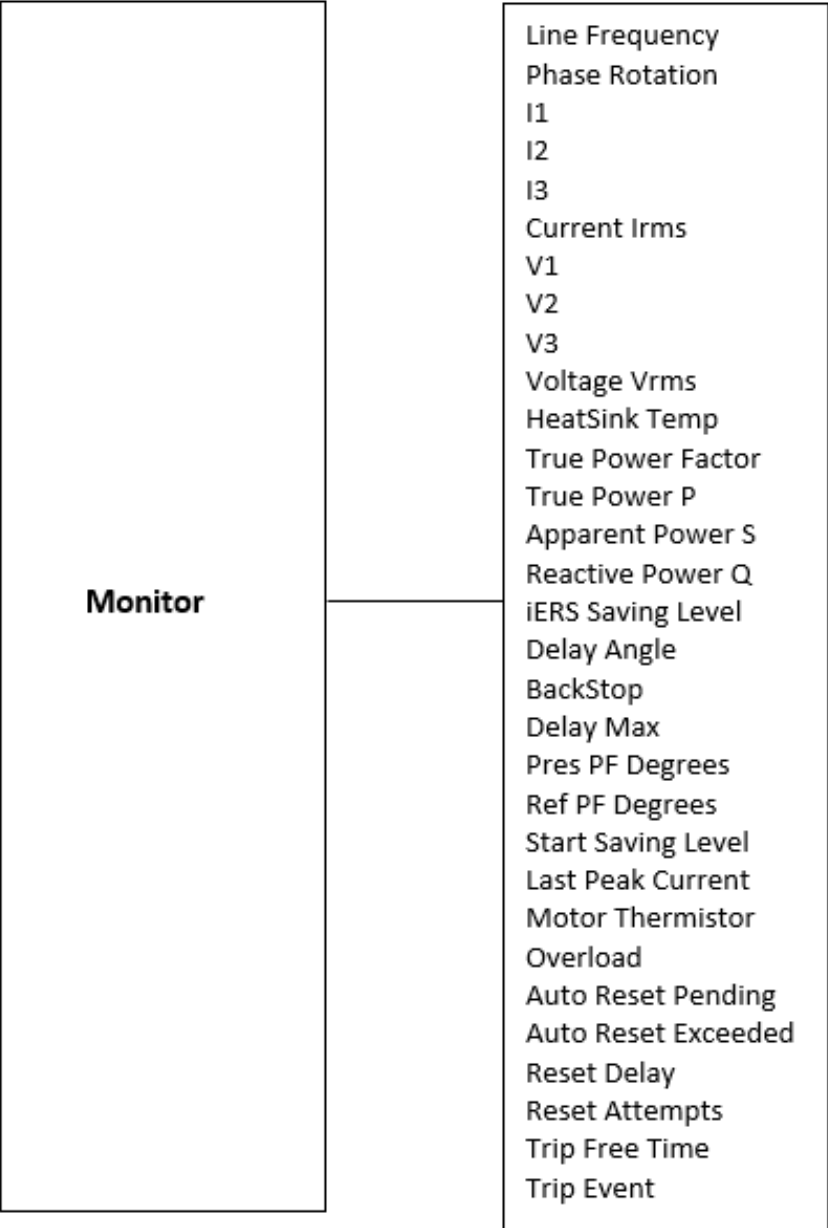
Advanced (continued)



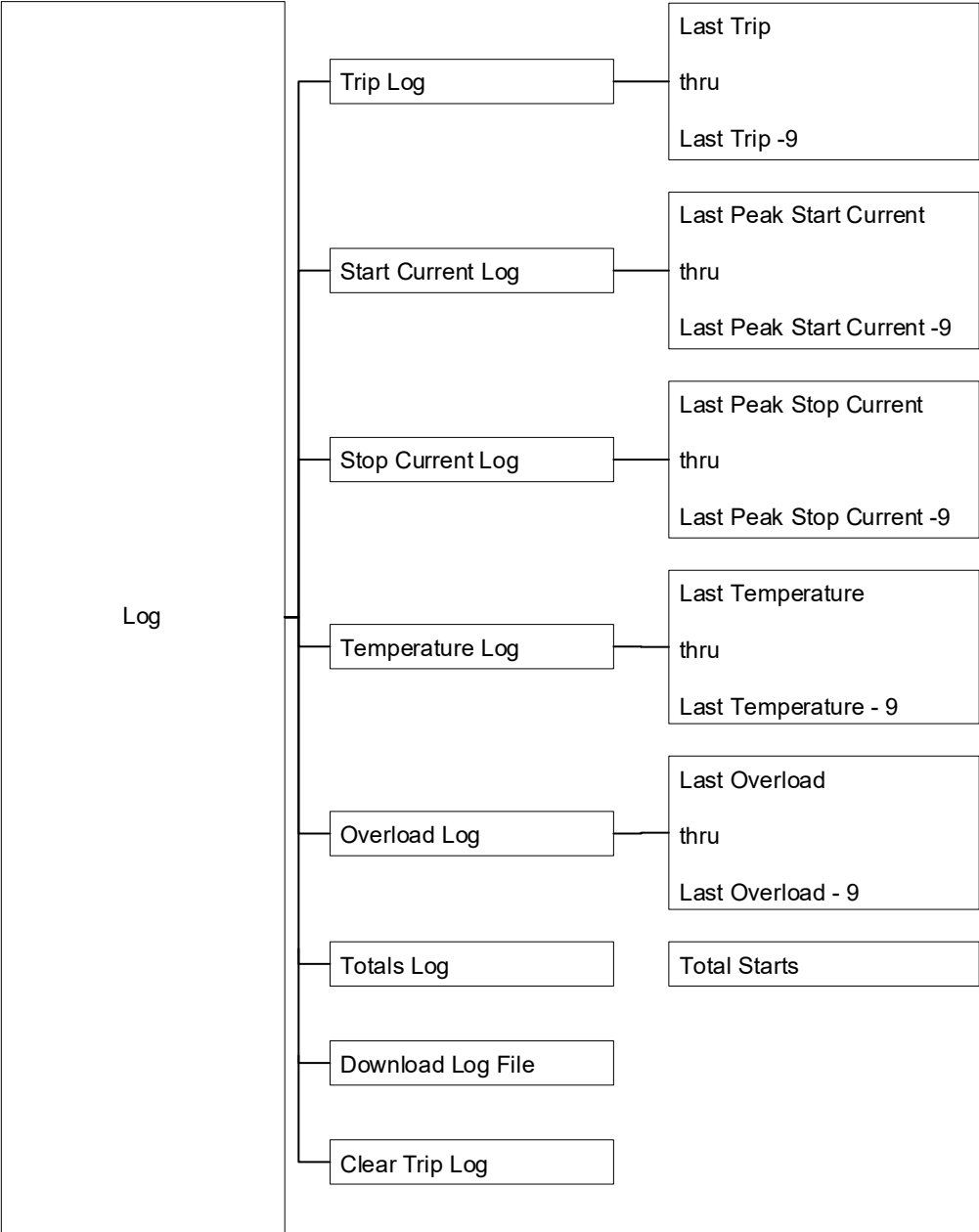
Input / Output Menu



Monitor



Log Menu



Fault Code List

Fault Code	Description
F101 - F117	Input Side Phase Loss
F101 - F208	Soft Start Temperature Trip
F300 - F357	Thyristor Firing Trip
F401 - F403	Motor Side Phase Loss
F601	Control Voltage too low
F701 – F710	Sensing Fault Trip (check all power connections)
F801 – F802	Fan Problem
F1001	Shorted Thyristor (SCR)
F1201 – F1202	Current Limit Timeout Trip
F1301 – F1302	Overload Trip
F1401	Shearpin Trip
F1501	PTC Thermistor Trip (Motor Temperature Sensor)
F1701	Communications Trip
F1801 – F1803	Bypass Relay Trip
F2001	Remote Start is enabled (Remove Run Command and Reset)
F2101 – F2103	Rotation Trip
F2201 – F2209	MPU (Main Processing Unit) Trip
F2402 – F2406	Main Board Trip
F2501 – F2581	Touchscreen Trip
F2601 – F2603	Logging Trip

Rating Table

Minimum current ratings based on typical rated operation currents of motors for the corresponding rated operational powers

Model Number	Amps	208V / HP		240V / HP		480V / HP		600V / HP	
		Shunt Bypass	Start Bypass	Shunt Bypass	Start Bypass	Shunt Bypass	Start Bypass	Shunt Bypass	Start Bypass
VMX-SGY-A-18	9-18	5	3	5	5	10	10	15	10
VMX-SGY-A-28	14-28	7.5	7.5	7.5	7.5	20	15	15	20
VMX-SGY-A-39	19-39	10	10	10	10	25	25	30	30
VMX-SGY-A-48	24-48	15	10	15	15	30	30	40	30
VMX-SGY-A-62	31-62	20	15	20	20	40	40	50	50
VMX-SGY-A-78	39-78	25	20	25	25	60	50	60	60
VMX-SGY-A-92	46-92	30	25	30	30	60	60	75	75
VMX-SGY-A-112	56-112	30	30	40	30	75	75	100	75
VMX-SGY-A-150	75-150	40	40	50	50	100	100	125	75
VMX-SGY-A-160	80-160	50	40	60	50	125	100	150	75
VMX-SGY-A-210	105-210	60	50	75	60	150	150	200	150
VMX-SGY-A-275	138-275	75	60	100	75	200	150	200	150
VMX-SGY-A-361	181-361	125	75	125	125	300	250	350	300
VMX-SGY-A-450	225-450	150	125	150	150	350	300	450	300
VMX-SGY-A-550	275-550	150	150	200	200	450	400	500	500
VMX-SGY-A-600	300-600	200	200	200	200	500	500	600	600
VMX-SGY-A-862	431-862	250	250	300	300	600	500	700	600
VMX-SGY-A-900	450-900	300	250	350	300	700	600	900	600
VMX-SGY-A-1006	503-1006	350	300	400	400	800	800	1,000	900
VMX-SGY-A-1250	625-1250	450	350	500	450	1,000	900	1,200	1,000

- 1) Rated operational powers in HP corresponding to FLA current rating according to UL508 and Table 430.250 of the National Electrical Code.
- 2) The FLA rating applies for a maximum surrounding air temperature of 122 °F (50°C).
- 3) 690V Rated units available – Contact Factory.
- 4) Size the Soft Starter based on the actual motor nameplate FLA.
- 5) All VMX-SGY-A units rated 500% current 60 sec; Start bypass ratings allow for use of 1.15 service factor motors.
- 6) VMX-SGY-A-600 @ 480V and 600VAC is 1.0 S.F.
- 7) Control power is required for all units.
- 8) Fuses are required for 65kA SCCR on all Models

Short Circuit Protection

Type designation (e.g., VMX-SGY-A-...)			18-48	62	78	92	112	150	160
Rated operational currents	I_e	A	18-48	62	78	92	112	150	160
Rated short circuit current at 600V	I_q	kA	10kA	10kA	10kA	10kA	10kA	10kA	10kA
Class RK5 time-delay fuse #1	Maximum rating Z_1	A	-	-	-	-	-	-	-
Class J time-delay fuse #1	Maximum rating Z_1	A	100A	-	-	-	-	-	-

Type designation (e.g., VMX-SGY-A-...)			210	275	361	450	550	600	862	900	1006	1250
Rated operational currents	I_e	A	210	275	361	450	550	600	862	900	1006	1250
Rated short circuit current at 600V	I_q	kA	10kA	10kA	18kA	30kA	30kA	30kA	42kA	42kA	85kA	85kA
Class RK1 time-delay fuse #1	Maximum rating Z_1	A	-	-	600A	-	-	-	-	-	-	-
Class L time-delay fuse #1	Maximum rating Z_1	A	-	-	-	1000A	-	-	1200A	1200A	1600A	1600A
Class J time-delay fuse #1	Maximum rating Z_1	A	600A	600A	-	-	800A	800A	-	-	-	-
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	400A	400A	600A	-	-	-	-	-	1600A	1600A

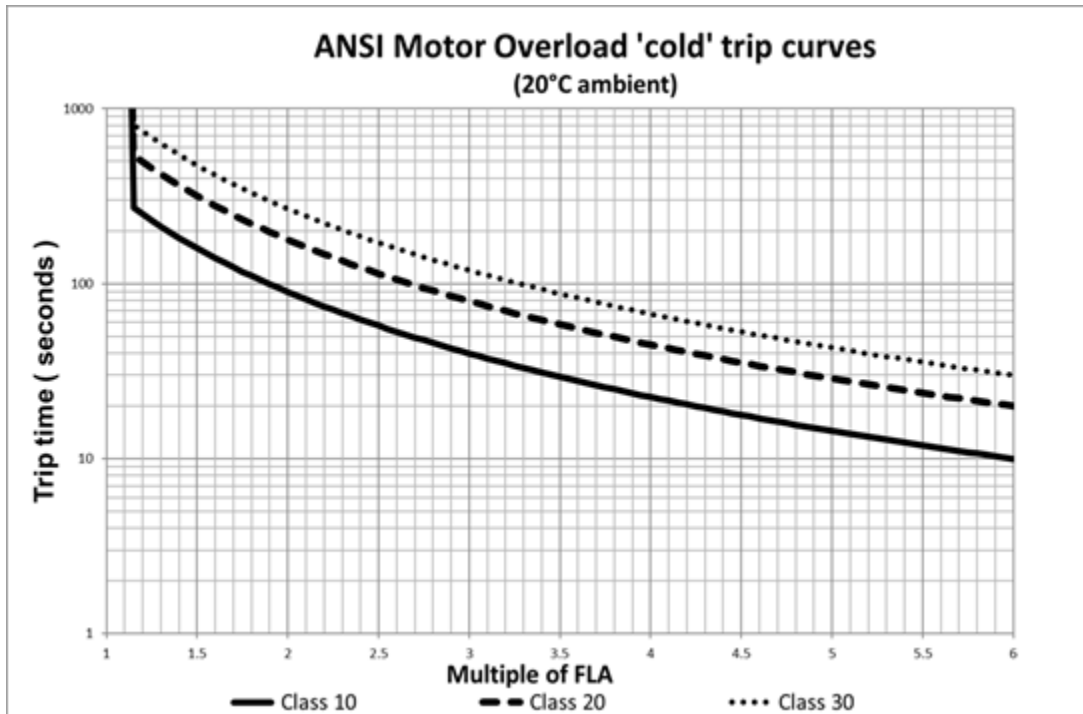
Type designation (e.g., VMX-SGY-A-...)			18-48	62	78	92	112	150	160
Rated operational currents	I_e	A	18-48	62	78	92	112	150	160
Short circuit current at 208-480V	I_q	kA	65kA	65kA	65kA	65kA	65kA	65kA	65kA
Class J time-delay fuse #1	Maximum rating Z_1	A	100A	200A	200A	200A	200A	200A	200A
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	N/A	250A	250A	250A	250A	250A	250A

Type designation (e.g., VMX-SGY-A-...)			210	275	361	450	550	600	862	900	1006	1250
Rated operational currents	I_e	A	210	275	361	450	550	600	862	900	1006	1250
Short circuit current at 208-480V	I_q	kA	65kA	65kA	65kA	65kA	65kA	65kA	65kA	65kA	85kA	85kA
Class J time-delay fuse #1	Maximum rating Z_1	A	300A	300A	500A	500A	-	-	-	-	-	-
Class L time-delay fuse #1	Maximum rating Z_1	A	-	-	-	-	800A	800A	1200A	1200A	1600A	1600A
UL Listed inverse-time delay circuit breaker #1	Maximum rating Z_2	A	600A	600A	600A	600A	800A	800A	N/A	N/A	1600A	1600A

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 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 VMX-Synergy Plus unit (This is sometimes referred to as type 2 co-ordination).

Technical Information

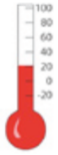


Note: When the overload has tripped, there is a forced cooling time to allow the overload to recover before the next start. The 'warm' trip times are 50% of the 'cold' trip time

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 \pm 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	
		Control supply circuit	4kV	
Enclosure Rating		Main circuit	Open chassis / Panel Mount	
		Supply and Control circuit		
Pollution Degree		3		
Humidity		Max 85% non-condensing, not exceeding 50% at 40°C		
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 \pm 5Hz	Protect with UL listed fuse rated max.4A
Rated control supply voltage	U_s	See Rating Table, 2 Amp supply (cont.)		
Relay specification	RELAY GROUP 1 RELAY GROUP 2	AC-15, 230VAC, 1A DC-13 30VDC, 0.7A		
	RELAY GROUP 3	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 \pm 5Hz		
	Time-current characteristics	See Fig.1 for trip curves (Trip time $T_p \pm 20\%$)		
EMC Emission levels	EN 55011	Class A ⓐ		
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				
ⓐ 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				

Altitude



-4°F (-20°C) to 122°F (50°C).



Altitude above sea level 3281ft (1000m). Above 3281ft de rate by 1% of VMX-Synergy Plus™ le per 328ft (100m) to a maximum altitude of 6532ft (2000m)
Please note for higher temperatures and altitudes contact your supplier.
VMX-Synergy Plus™ models are listed CE, UL508 and cUL508.

(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!
Uitsluitend deskundigen in elektriciteit en elektotechnisch geïnstrueerde 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 er 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!
Niže uvedené práce smějí provádět pouze osoby s elektrotechnickým vzděláním.

(et) Eluhtlik! 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 elektrotehnikām 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) Atenție! Pericol electric!
Toate lucrările descrise trebuie efectuate numai de personal de specialitate calificat și de persoane cu cunoștințe profunde în electrotehnică.

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>



MOTORTRONICS™

Solid State AC Motor Control

VMX-Synergy Plus™

Premium Digital Soft Starter

www.motortronics.com