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1. Caution Statements

Caution Statements cannot cover every potential cause of equipment damage but can highlight common causes of damage. It is the installer's responsibility to read and understand all instructions in this manual prior to installing, operating or maintaining the equipment, to follow good electrical practice including applying appropriate personal protective equipment and to seek advice before operating this equipment in a manner other than as described in this manual.

- Isolate the VersiStart i II completely from the power supply before attempting any work on the VersiStart i II or motor.
- Cables to the control inputs must be segregated from mains voltage and motor cabling.
- Some electronic contactor coils are not suitable for direct switching with PCB mount relays. Consult the contactor manufacturer/supplier to confirm suitability.
- Do not apply incorrect voltages to the control input terminals.
- Power factor correction capacitors must be connected to the supply side of the soft starter. Connecting static power factor correction to the output side will damage the soft starter.

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.



WARNING - ELECTRICAL SHOCK HAZARD

The VersiStart i II contains dangerous voltages when connected to mains voltage. Only a qualified electrician should carry out the electrical installation. Improper installation of the motor or the VersiStart i II may cause equipment failure, serious injury or death. Follow this manual and local electrical safety codes.



GROUNDING AND BRANCH CIRCUIT PROTECTION

It is the responsibility of the user or person installing the VersiStart i II to provide proper grounding and branch circuit protection according to local electrical safety codes.



SHORT CIRCUIT

The VersiStart i II is not short circuit proof. After severe overload or short circuit, the operation of the VersiStart i II should be fully tested by an authorised service agent.

1.1 Avertissements à l'attention des clients canadiens



AVERTISSEMENT

L'icône AVERTISSEMENT ci-contre signale les informations concernant des risques pouvant entraîner des blessures graves, voire mortelles. Pour votre sécurité, veuillez consulter les avertissements sur cette page ou demander une copie du présent manuel en français auprès de votre distributeur local.



AVERTISSEMENT

Isoler complètement le VersiStart i II de l'alimentation secteur avant de tenter toute intervention sur le VersiStart i II ou sur le moteur. Les bornes de commande peuvent être au potentiel de la tension de phase.



AVERTISSEMENT - DANGER D'ÉLECTROCUTION

Le VersiStart i II contient des tensions dangereuses lorsqu'il est raccordé à l'alimentation secteur. Seul un électricien compétent peut effectuer l'installation électrique. Une mauvaise installation du moteur ou du VersiStart i II peut déclencher une panne d'équipement, provoquer de graves blessures ou même la mort. Suivre les instructions de ce manuel et des codes locaux concernant la sécurité électrique.



AVERTISSEMENT

Toujours appliquer la tension de commande avant (ou en même temps que) la tension secteur.

2. Declaration of conformity

In industrial linguistic usage the drive controllers of the type series VersiStart i II are called "devices", however, in the sense of the "law on the safety of equipment", the "EMC-law" or the "EC-machinery directive" they are not devices or machines ready for use or connection but they are components. It is only possible to define their final function, when these components are integrated into the design and construction of the user.

To be able to use the devices to their intended purpose, it requires power supply networks according to DIN EN 50160 (IEC 60038).

The user takes the responsibility that the user's design and construction comply with the applicable legal provisions.

The commissioning is strictly forbidden as long as the conformity of the final system with the guidelines 2006/42/EC (Machinery directive) and 2014/35/EU (Low voltage directive) is not proved.

The devices of the VersiStart i II series are electrical equipment that is used in industrial electrical power installations. They are designed for application in machines, in order to reduce the starting torque and starting current peaks as well as the tripping torque of drives with three-phase induction motors. With due regard to the installation guidelines they meet the following requirements:

Emitted interference:	Continuous duty	EN 61000-6-3:2005
	Acceleration, decel.	EN 60947-4-2
Immunity to interference:		EN 61000-6-2:2005

VersiStart i II has been designed to meet the standards specified in EN 60947-4-2: Low voltage switchgear – Part 4-2 Contactors and motor-starters – AC Semiconductor motor controllers and starters, for low voltage safety, operation and EMC.

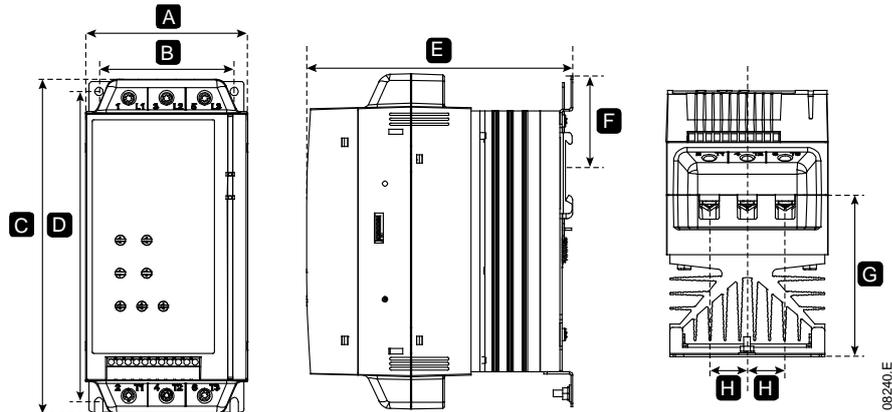
This product has been designed as Class A equipment. Use of this product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

Dr. Thomas Stiller
Managing director



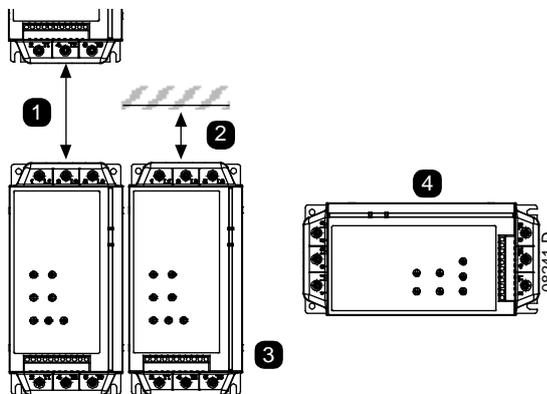
3. Mechanical Installation

3.1 Dimensions and Weights



Model	Width mm (inch)		Height mm (inch)		Depth mm (inch)	mm (inch)	mm (inch)	mm (inch)	Weight kg (lb)
	A	B	C	D	E	F	G	H	
VS i II 018 VS i II 034 VS i II 042 VS i II 048 VS i II 060	98 (3.85)	82 (3.22)	201 (7.91)	188 (7.40)	165 (6.49)	55 (2.16)	90.5 (3.6)	23 (0.9)	2.2 (4.85)
VS i II 075 VS i II 085 VS i II 100	145 (5.70)	124 (4.88)	215 (8.46)	196 (7.71)	193 (7.59)	-	110.5 (4.4)	37 (1.5)	4.0 (8.81)
VS i II 140 VS i II 170 VS i II 200	200 (7.87)	160 (6.30)	240 (9.44)	216 (8.50)	214 (8.43)	-	114.5 (4.5)	51 (2.0)	6.5 (14.33)

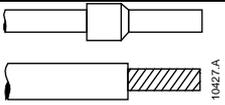
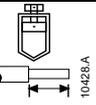
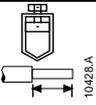
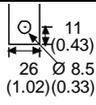
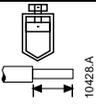
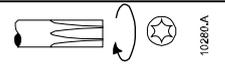
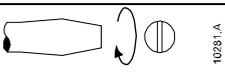
3.2 Physical Installation



1	VS i II 018 ~ VS i II 100: Allow 100 mm (3.9 inch) between soft starters. VS i II 140 ~ VS i II 200: Allow 200 mm (7.9 inch) between soft starters.
2	VS i II 018 ~ VS i II 100: Allow 50 mm (2.0 inch) between the soft starter and solid surfaces. VS i II 140 ~ VS i II 200: Allow 200 mm (7.9 inch) between the soft starter and solid surfaces.
3	Soft starters may be mounted side by side with no clearance (that is, if mounted without communications modules).
4	The soft starter may be mounted on its side. Derate the soft starter's rated current by 15%.

4. Electrical Installation

4.1 Power Terminations

	L1/1, L2/3, L3/5, T1/2, T2/4, T3/6 mm ² (AWG)			A1, A2, A3, 01, 02, B4, B5, 13, 14, 23, 24 mm ² (AWG)				
	018 - 060		075 - 100	140 - 200				
	10 - 35 (8 - 2)	 14 mm (0.55 inch)	25 - 50 (4 - 1/10)	 14 mm (0.55 inch)	n/a	 11 26 Ø 8.5 (1.02)(0.33) mm (inch)	0.14 - 1.5 (26 - 16)	 6 mm (0.24 inch)
	Torx (T20) 3 Nm 2.2 ft-lb		Torx (T20) 4 Nm 2.9 ft-lb		n/a		n/a	
	7 mm 3 Nm 2.2 ft-lb		7 mm 4 Nm 2.9 ft-lb		n/a		3.5 mm 0.5 Nm max 4.4 in-lb max	

4.2 Control Voltages

VersiStart i II soft starters can be supplied in either of two control voltage configurations:

VS i II xxx xxx C1 110-240 VAC (+ 10% / - 15%) or 380-440 VAC (+ 10% / - 15%)

VS i II xxx xxx C2 24 VAC/VDC (± 20%)



WARNING

Always apply control voltage before (or with) mains voltage.



CAUTION

With 24 VAC/VDC use contacts rated for low voltage and low current (gold flash or similar).

4.3 Control Circuits



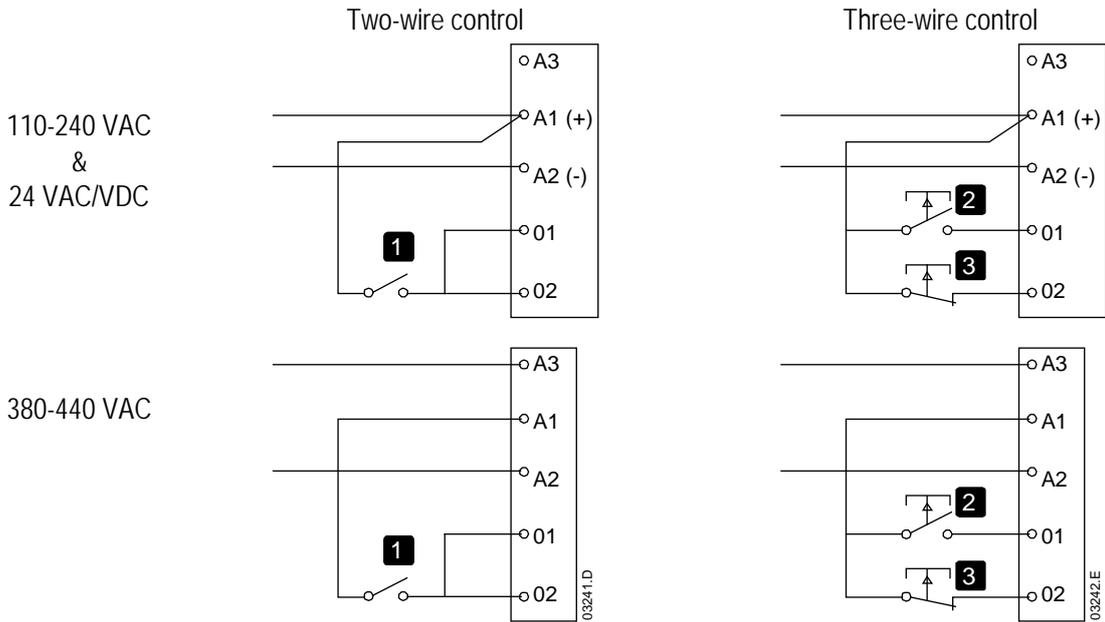
WARNING

Isolate the VersiStart i II completely from the power supply before attempting any work on the VersiStart i II or motor. Control terminals may be at phase voltage potential.



CAUTION

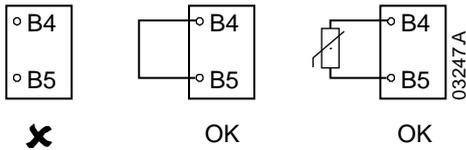
For VS i II xxxxxxC2 (24 VAC/VDC control voltage) units you can connect an external 24 VDC supply into the control input terminals 01, 02.



1	Start/stop. To reset a trip, open then close 02.
2	Start.
3	Stop. To reset a trip, open then close 02.

4.3.1 Motor Thermistor

Motor thermistors can be connected directly to the VersiStart i II terminals B4, B5. If motor thermistors are not used, there must be a link between B4, B5 (the VersiStart i II is supplied with a link fitted).



4.4 Outputs

4.4.1 Main Contactor Output

The Main Contactor output (terminals 13, 14) closes as soon as the soft starter receives a start command and remains closed while the soft starter is controlling the motor (until the motor starts a coast to stop, or until the end of a soft stop). The Main Contactor output will also open if the soft starter trips.

The Main Contactor output can be used to directly control a main contactor coil.

4.4.2 Programmable Output

The programmable output relay (terminals 23, 24) can be used to signal either trip or run status. This relay is normally open.

Trip:

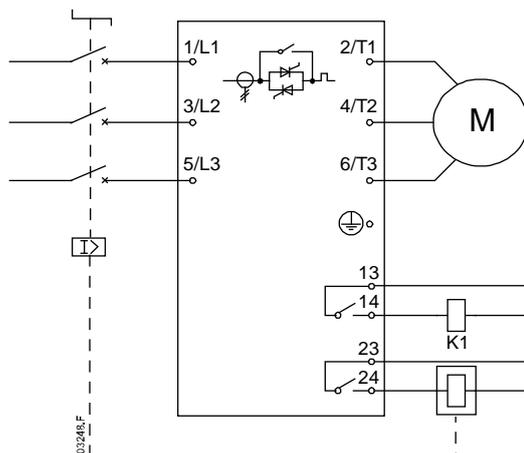
The relay closes when the VersiStart i II trips. The relay can be used to operate the shunt-trip mechanism of an upstream circuit breaker (in order to isolate the motor branch circuit), or to signal the trip to an automation system or externally. The relay will open when the trip is reset.

Run:

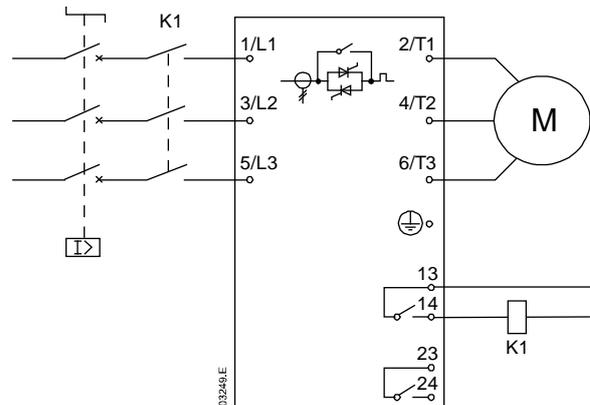
The relay operates when the soft start is complete, the bypass relays are closed and full voltage is being applied to the motor. The relay can be used to operate a contactor for power factor correction capacitors, or to signal soft starter run status to an automation system.

4.5 Electrical Schematics

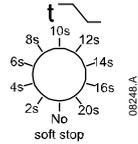
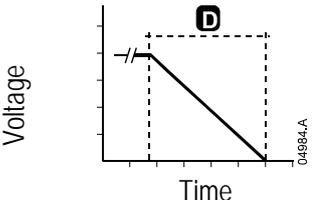
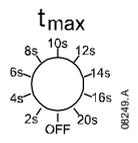
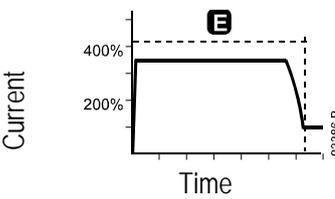
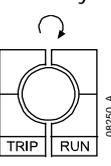
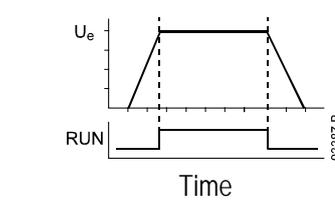
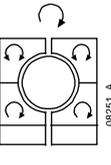
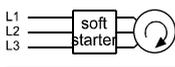
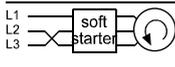
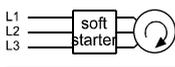
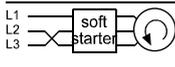
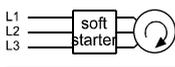
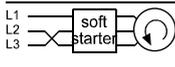
Soft starter installed with a system protection circuit breaker complete with a shunt trip device



Soft starter installed with a system protection circuit breaker and main contactor



M	Motor (three phase)
K1	Main contactor
13, 14	Main contactor output
23, 24	Programmable output (set to Trip)

<p>5 Soft Stop Time</p>  <p>Select the soft stop ramp time (D). Soft stop extends the time soft starter takes to reduce voltage to zero. The ramp time does not control the time the motor will take to stop completely.</p>										
<p>6 Excess Start Time</p>  <p>Configure the soft starter's excess start time protection. Select a time slightly longer than the motor requires for a normal healthy start. The soft starter will trip if the start does not complete within the selected time (E).</p>										
<p>7 Auxiliary Relay Function</p>  <p>Select the function of the soft starter's programmable output (terminals 23, 24). When set to "Run", the relay will operate when the soft start is complete. When set to "Trip", the relay will operate when the soft starter trips.</p>										
<p>8 Phase Sequence Protection</p>  <p>Configure the soft starter's phase sequence protection. Select the allowable phase sequences. A setting of "Fwd" allows forward sequence (positive rotation) only and a setting of "Any" defeats the protection.</p>	<table border="1" data-bbox="1077 1055 1412 1220"> <thead> <tr> <th></th> <th>FWD</th> <th>ANY</th> </tr> </thead> <tbody> <tr> <td>  </td> <td>✓</td> <td>✓</td> </tr> <tr> <td>  </td> <td>✗</td> <td>✓</td> </tr> </tbody> </table> <p>Reference: 04982.A</p>		FWD	ANY		✓	✓		✗	✓
	FWD	ANY								
	✓	✓								
	✗	✓								

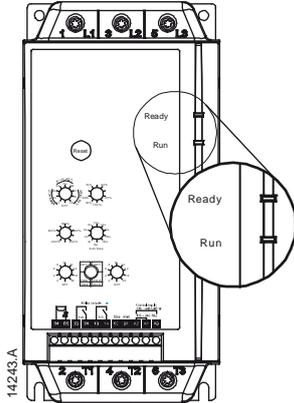


NOTE

Auxiliary relay function and phase sequence are configured using a shared switch. Set the auxiliary relay function as required, then set phase sequence protection.

6. Troubleshooting

6.1 LEDs



LED Status	Ready	Run
Off	No control power	Motor not running
On	Ready	Motor running at full speed
Flash	Starter tripped	Motor starting or stopping

6.2 Trip Codes

The Ready LED will flash a different number of times to indicate the cause of the trip.

Ready LED	Description
 x 1	Power Circuit: Check mains supply (L1, L2, L3), motor circuit (T1, T2, T3), soft starter SCRs and bypass relays.
 x 2	Excess Start Time: Check load, increase Current Limit or adjust Excess Start Time setting.
 x 3	Motor Overload: Allow motor to cool, reset soft starter and restart. The soft starter cannot be reset until the motor has cooled.
 x 4	Motor Thermistor: Check motor ventilation and thermistor connection B4, B5. Allow motor to cool.
 x 5	Current imbalance: Check for mains supply or line current imbalance (L1, L2, L3).
 x 6	Supply Frequency: Check mains voltage is available and supply frequency is in range.
 x 7	Phase sequence: Check for correct phase sequence.
 x 8	Network Communication Failure (between module and network): Check network connections, settings and configuration.
 x 9	Starter Communication Failure (between starter and module): Remove and refit accessory module.
 x 10	Bypass Overload: Starter rating may be too low for the application.

6.3 Protections

The VersiStart i II includes the following types of protection for the motor and starter:

6.3.1 Excess Start Time Protection

The VersiStart i II will trip on excess start time if the motor does not successfully start within the time selected in the Excess Start Time setting. This may indicate that the load has stalled.

If the soft starter frequently trips on excess start time:

- check that the Current Limit setting is high enough for the application
- check that the Excess Start Time setting is long enough for the application
- check that the load has not stalled or increased since the soft starter was installed

6.3.2 Motor Overload Protection

The VersiStart i II will trip on motor overload if it calculates that the motor has been running above its operating range for longer than the time selected in the Motor Trip Class setting. Motor Trip Class should be set to match the motor's locked rotor time. If this information is not available from the motor datasheet, use the default setting (Motor Trip Class = 10). Using a higher setting can damage the motor.

**NOTE**

Motor overload protection does not protect the soft starter, and does not protect the motor from short circuit.

6.3.3 Current Imbalance Protection

The VersiStart i II will trip on current imbalance if the highest and lowest currents on the three phases vary by an average of 30% for more than 3 seconds. Current imbalance protection is not adjustable, and is only active when the average motor current is 50% or more of the programmed motor FLC.

If the soft starter frequently trips on current imbalance:

- check that there is no imbalance on the mains voltage (on the input side of the soft starter)
- insulation test the motor
- move all input cables over one position (move L1 cable to L2, move L2 cable to L3, move L3 cable to L1) to rule out a cabling fault

6.3.4 Supply Frequency Protection

The soft starter will trip on supply frequency if the frequency rises above 72 Hz or falls below 40 Hz for more than five seconds while the soft starter is running. These trip points are not adjustable.

In pre-start, starting and stopping modes the high and low frequency limits both apply with no time delay.

A supply frequency trip will also occur if:

- all three input phases are lost while the soft starter is running
- all three input phases fall below 120 VAC at start or while the soft starter is running
- the line contactor opens while running

6.3.5 Bypass Overload Protection

Bypass overload protection protects the soft starter from severe operating overloads while running. The protection is not adjustable and has two components:

- The soft starter will trip if it detects overcurrent at 600% of the programmed motor full load current.
- The soft starter models the temperature of the internal bypass relays and will trip if the temperature exceeds the safe operating level.

If the trip occurs frequently, this indicates that the soft starter has not been selected correctly for the application.

6.4 Reset

Trips can be cleared by pressing the Reset button on the soft starter, sending a Reset command from the serial communications network, or by switching the control inputs.

To clear a trip via the control inputs, the soft starter requires a closed to open transition on the stop input (O2).

- In three-wire control, use the external stop button to momentarily open the stop input (open A1-O2).
- In two-wire control, if the soft starter tripped with a start signal present, remove the start signal (open A1 to O1, O2).
- In two wire control, if the VersiStart i II tripped with no start signal present (eg VersiStart i II motor thermistor trip), apply then remove the start signal (close then reopen A1 to O1, O2).

The Reset button is located on the front of the unit, above the adjustment switches.

The soft starter will trip again immediately if the cause of the trip still exists.

7. Accessories

7.1 Finger Guard Kit

Finger guards may be specified for personnel safety. Finger guards fit over the soft starter terminals to prevent accidental contact with live terminals. Finger guards provide IP20 protection when used with cable of diameter 22 mm or greater.

7.2 Remote Operator

The Remote Operator can control and monitor the soft starter's performance. Functionality includes:

- Operational control (Start, Stop, Reset, Quick Stop)
- Starter status monitoring (Ready, Starting, Running, Stopping, Tripped)
- Performance monitoring (motor current, motor temperature)
- Trip code display
- 4-20 mA analog output (Motor Current)

7.3 Communication Modules

VersiStart i II soft starters support network communication via easy-to-install communications modules. Each soft starter can support one communications module at a time.

Available protocols:

Ethernet (Profinet, Modbus TCP, Ethernet/IP), Profibus, DeviceNet, Modbus RTU, and USB.



NOTE

Ethernet communication modules are not suitable for use with VersiStart i II starters using 380/440 VAC control voltage.

7.4 PC Software

WinMaster can be used with Peter Electronic soft starters to provide the following functionality for networks of up to 99 soft starters:

- Operational control (Start, Stop, Reset, Quick Stop)
- Starter status monitoring (Ready, Starting, Running, Stopping, Tripped)
- Performance monitoring (motor current, motor temperature)

To use WinMaster with the VersiStart i II, the soft starter must be fitted with a USB Module, Modbus Module or a Remote Operator.

8. Specifications

8.1 General Technical Data

Mains Supply

Mains voltage (L1, L2, L3)

440 3 x 200 VAC ~ 440 VAC (+ 10% / - 15%)

575 3 x 200 VAC ~ 575 VAC (+ 10% / - 15%)

Mains frequency (at start) 45 Hz to 66 Hz

Rated insulation voltage 600 VAC

Form designation Bypassed semiconductor motor starter form 1

Control Voltage (A1, A2, A3)

VS i II xxx xxx C1 110-240 VAC (+ 10% / - 15%)

..... or 380-440 VAC (+ 10% / - 15%)

VS i II xxx xxx C2 24 VAC/VDC (\pm 20%)

Current consumption (during run) < 100 mA

Current consumption (inrush)

VS i II xxx xxx C1 10 A

VS i II xxx xxx C2 2 A

Inputs

Start (terminal 01) Normally open

..... 150 k Ω @ 300 VAC and 5.6 k Ω @ 24 VAC/VDC

Stop (terminal 02) Normally closed

..... 150 k Ω @ 300 VAC and 5.6 k Ω @ 24 VAC/VDC

Outputs

Main contactor relay (terminals 13, 14) Normally open

..... 6 A, 30 VDC / 6 A, 250 VAC resistive

Programmable relay (terminals 23, 24) Normally open

..... 6 A, 30 VDC / 6 A, 250 VAC resistive

Environmental

Degree of Protection VS i II 018 to VS i II 100 IP20

Degree of Protection VS i II 140 to VS i II 200 IP00

Operating temperature - 10 °C to + 60 °C

Storage temperature -25 °C to + 60 °C (to +70 °C for less than 24 hours)

Humidity 5% to 95% Relative Humidity

Pollution degree Pollution Degree 3

Vibration IEC 60068 Test Fc Sinusoidal

..... 4 Hz to 13.2 Hz: \pm 1 mm displacement

..... 13.2 Hz to 200 Hz: \pm 0.7 g

EMC Emission

Equipment class (EMC) Class B

Conducted radio frequency emission 0.15 MHz to 0.5 MHz: < 56-46 dB (μ V)

..... 0.5 MHz to 5 MHz: < 46 dB (μ V)

..... 5 MHz to 30 MHz: < 50 dB (μ V)

Radiated radio frequency emission 30 MHz to 230 MHz: < 30 dB (μ V/m)

..... 230 MHz to 1000 MHz: < 37 dB (μ V/m)

EMC Immunity

Electrostatic discharge	4 kV contact discharge, 8 kV air discharge
Radio frequency electromagnetic field	0.15 MHz to 1000 MHz: 140 dB (µV)
Rated impulse withstand voltage (Fast transients 5/50 ns)	2 kV line to earth, 1 kV line to line
Voltage dip and short time interruption	100 ms (at 40% nominal voltage)
Harmonics and distortion	IEC61000-2-4 (Class 3), EN/IEC61800-3

Short Circuit

Rated short-circuit current VS i II 018 to VS i II 048	5 kA ¹
Rated short-circuit current VS i II 060 to VS i II 200	10 kA ¹

¹ These short circuit ratings are with fuses used as given in the table under *Semiconductor Fuses* on page 16.

Heat Dissipation

During Start	3 watts / ampere
During Run	10 watts typical

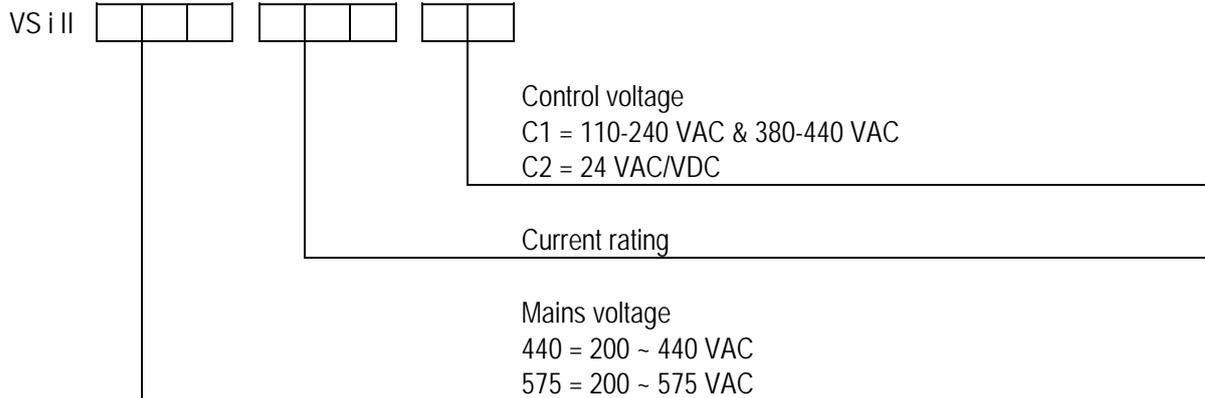
Standards Approvals

CE	EN 60947-4-2
Lloyds	IEC 60947-4-2
UL / C-UL	UL 508

Operational Life

VS i II 018-100	1,000,000 operations
VS i II 140-200	30,000 operations

8.2 Model Code



8.3 Current Ratings

	AC53b 4-6:354 < 1000 metres		AC53b 4-20:340 < 1000 metres	
	40 °C	50 °C	40 °C	50 °C
VS i II 018	18 A	17 A	17 A	15 A
VS i II 034	34 A	32 A	30 A	28 A
VS i II 042	42 A	40 A	36 A	33 A
VS i II 048	48 A	44 A	40 A	36 A
VS i II 060	60 A	55 A	49 A	45 A
	AC53b 4-6:594 < 1000 metres		AC53b 4-20:580 < 1000 metres	
	40 °C	50 °C	40 °C	50 °C
VS i II 075	75 A	68 A	65 A	59 A
VS i II 085	85 A	78 A	73 A	67 A
VS i II 100	100 A	100 A	96 A	87 A
VS i II 140	140 A	133 A	120 A	110 A
VS i II 170	170 A	157 A	142 A	130 A
VS i II 200	200 A	186 A	165 A	152 A

8.4 Semiconductor Fuses

Semiconductor fuses can be used with VersiStart i II soft starters to reduce the potential for damage to SCRs from transient overload currents and for Type 2 coordination. VersiStart i II soft starters have been tested to achieve Type 2 coordination with semiconductor fuses. Suitable Bussmann and Ferraz/Mersen semiconductor fuses are detailed below.

Model	SCR I ² t (A ² s)	Ferraz/Mersen Fuse European/IEC Style (North American Style)	Bussmann Fuse Square Body (170M)	Bussmann Fuse British Style (BS88)
VS i II 018	1150	6.6URD30xxxA0063 (A070URD30xxx0063)	170M-1314	63 FE
VS i II 034	8000	6.6URD30xxxA0125 (A070URD30xxx0125)	170M-1317	160 FEE
VS i II 042	10500	6.6URD30xxxA0160 (A070URD30xxx0160)	170M-1318	160 FEE
VS i II 048	15000	6.6URD30xxxA0160 (A070URD30xxx0160)	170M-1318	180 FM
VS i II 060	18000	6.6URD30xxxA0160 (A070URD30xxx0160)	170M-1319	180 FM
VS i II 075	51200	6.6URD30xxxA0250 (A070URD30xxx0250)	170M-1321	250 FM
VS i II 085	80000	6.6URD30xxxA0315 (A070URD30xxx0315)	170M-1321	250 FM
VS i II 100	97000	6.6URD30xxxA0315 (A070URD30xxx0315)	170M-1321	250 FM
VS i II 140	168000	6.6URD31xxxA0450 (A070URD31xxx0450)	170M-1322	500 FMM
VS i II 170	245000	6.6URD31xxxA0450 (A070URD31xxx0450)	170M-3022	500 FMM
VS i II 200	320000	6.6URD31xxxA0450 (A070URD31xxx0450)	170M-3022	500 FMM

xxx = Blade Type. Contact Ferraz/Mersen for options.

8.5 Disposal Instructions



Equipment containing electrical components may not be disposed of together with domestic waste.

It must be collected separately as electrical and electronic waste according to local and currently valid legislation.