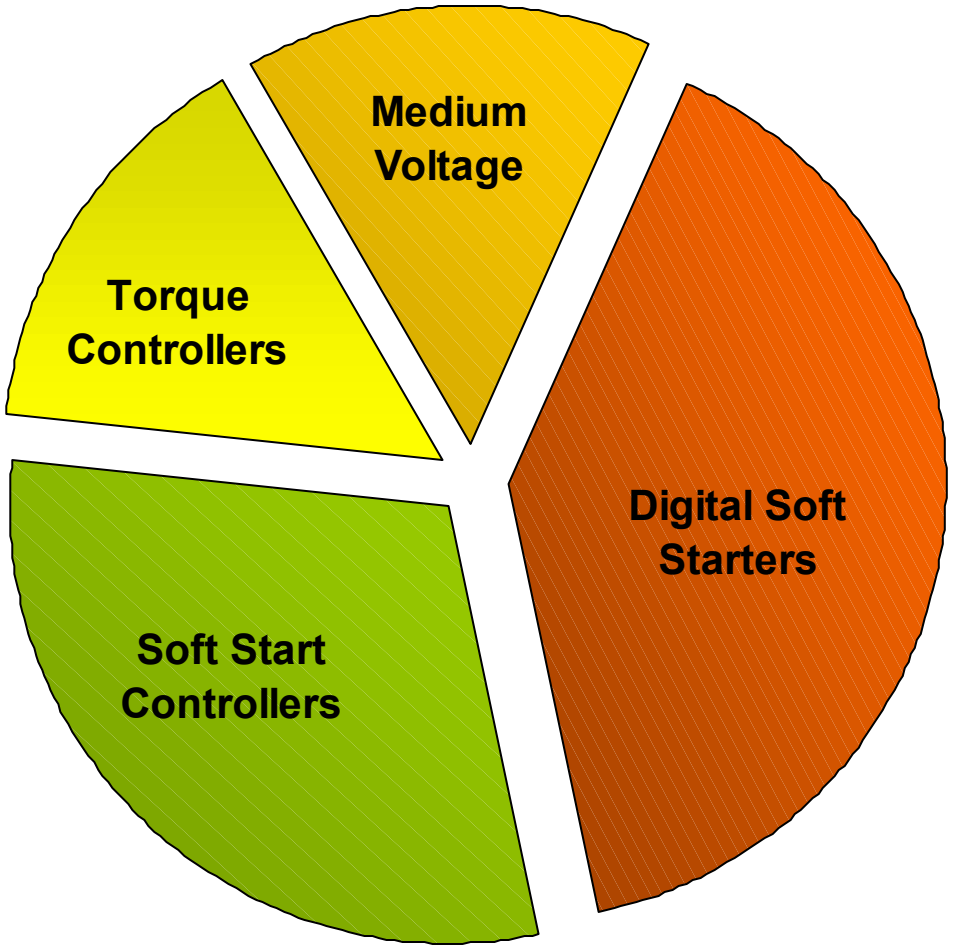
CSX Series

A *new* addition to the AuCom family of soft starters

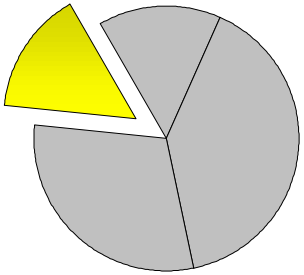
AuCom

Soft Start Market Segmentation

The soft start market is currently divided into four segments.



Torque Controllers



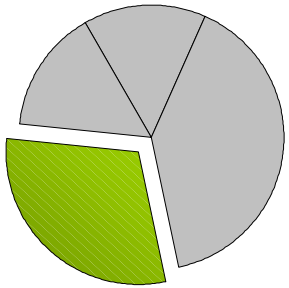
- Single phase control
- No motor protection
- Very low kW sizes
- Smallest segment ($)

Key drivers:
- Size & price

Schneider
LH4N1

Allen Bradley
STC

Soft Start Controllers



- Typically two phase control
- No motor protection
- Low-medium kW sizes
- Fastest growing segment ($)

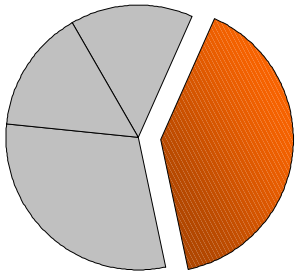
Key drivers:
- Size & price

Allen Bradley
SMC2

Schneider
LH4N2

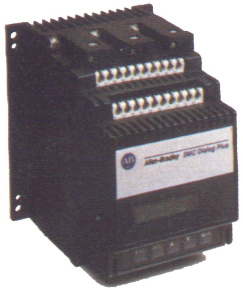
Siemens
Sirius

Digital Soft Starters



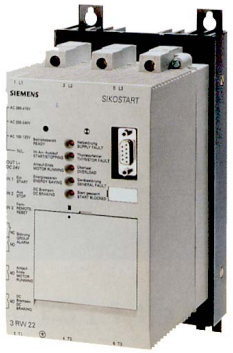
- Three phase control
- Motor and system protection
- Interface and indication
- All kW sizes
- Largest segment ($)

Key drivers:
- Sophistication & features



Allen Bradley
SMC Dialog Plus

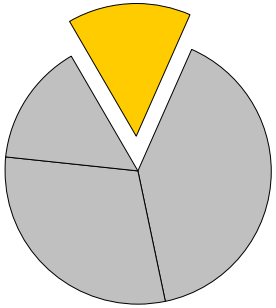
Schneider
ATS48



Siemens
Sikostart

AuCom
IMS2

Medium Voltage Soft Starters



- 2.3 ~ 13 kV
- Full featured
- All kW sizes
- Specialist market

Key drivers:

- Sophistication & engineering support

Benshaw, Motortronics, AB, Solcon

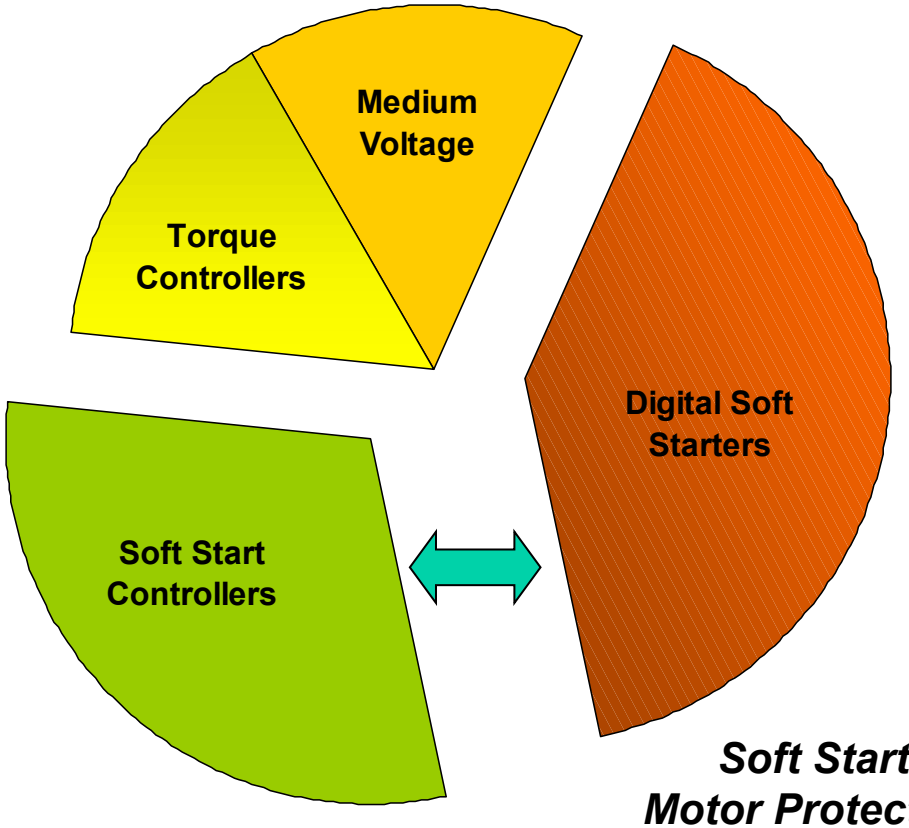
Market Opportunity

A technology gap exists between the soft start controller and digital soft starter segments.

Soft start controllers provide voltage ramp soft start technology. Typically only 3 user settings.

Digital soft starters provide all that is possible in electronic motor starting. Typically 50+ user settings.

What about clients requiring soft start and essential motor protection features only?



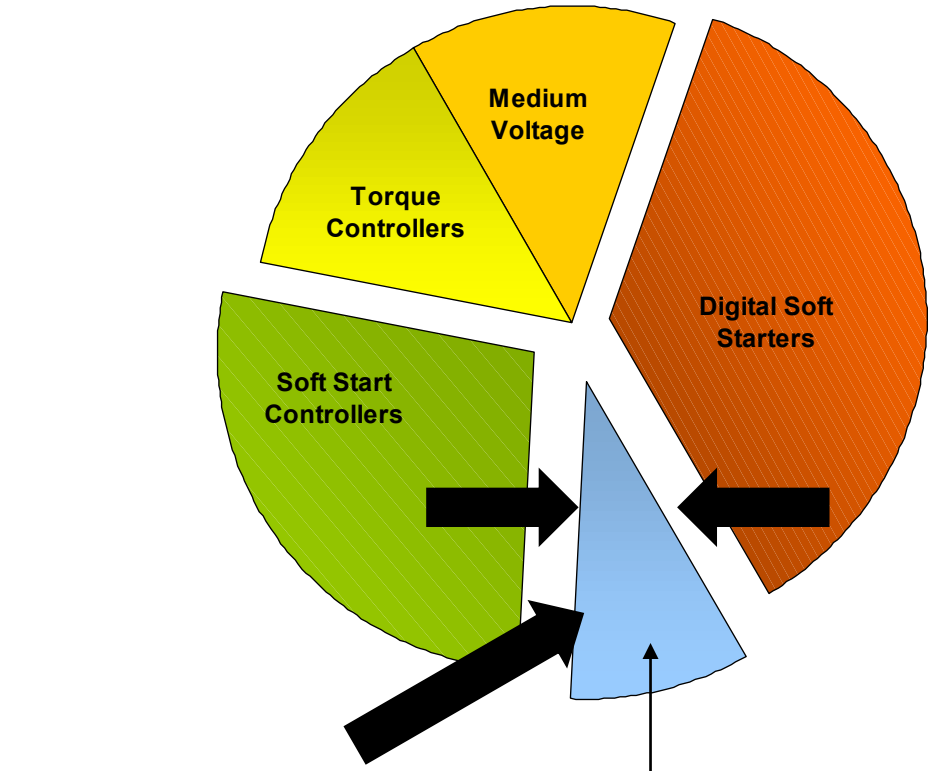
Soft Start Only

Soft Start + Motor Protection + System Protection + Human Interface + Serial Comms

Compact Soft Starters – the newest Market Segment

The compact soft start market segment will:

- Take clients away from the soft start controller market
- Take clients from the digital soft starter market
- Attract new clients to soft start from other reduced voltage starting systems



The CSX Series

The Range

2 Styles

CSX - without motor protection
CSX*i* - with motor protection

11 Models

- 7.5 ~ 110 kW @ 400 VAC

2 Voltage Ranges

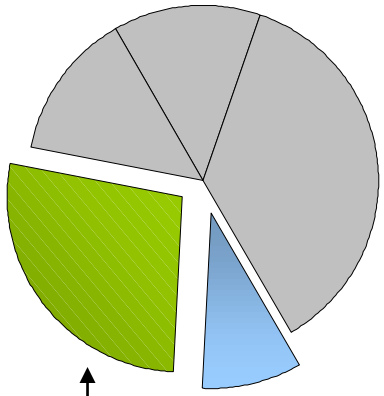
- 200 - 440 VAC
- 200 - 575 VAC

Protection

- IP20 (7.5 ~ 55 kW)
- IP00 (75 ~ 110 kW)

Approvals

- CE
- UL508
- CSA
- CCC
- C✓



CSXi Series

Compact Soft Starter

Current limit soft start
+ motor protection

CSX Series

Soft Start Controller

Voltage ramp soft start/stop

Common Specifications

CSX Series

CSXi Series

AuCom

The Range

3 Frame Sizes

There are three frame sizes in the CSX range.

7.5 ~ 30 kW

37 ~ 55 kW

75 ~ 110 kW

CSX and CSX*i* models can be identified by their colour.

CSX Series

CSXi Series

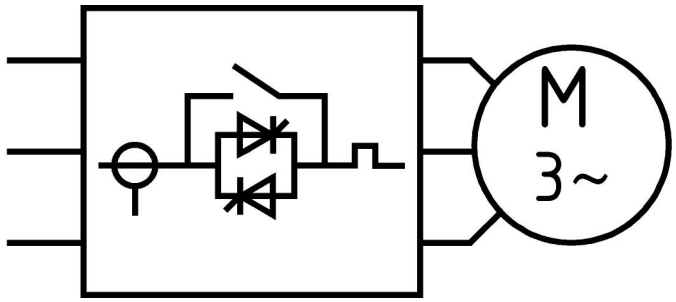
AuCom

Integral Bypass Contactors

CSX series soft starters feature integral bypass contactors.

CSX ratings are expressed using the AC53b utilisation codes.

The internal bypass contactors allow CSX starters to be easily installed into switchboards or motor control cubicles without need for extra ventilation or external bypass contactors.



Ratings

The CSX model code specifies a typical kW size assuming a 400 VAC supply, allowing for the following start conditions.

- 400% start current
- 6 seconds start time
- 10 starts per hour (≤ 30 kW)
- 6 starts per hour (≥ 37 kW)

CSX soft starter ratings are superior to most competing soft start controllers and compact soft starters.

The CSX User Manual lists starter ratings for other start duties.

CSX-090-V4-C1

Typical Motor kW @ 400 VAC

???A: AC53b 4.0-6:354

- Off Time
- Start Time (seconds)
- Start Current (multiple of FLC)
- CSX Current Rating

Supply Voltages

All CSX models are available in two mains supply voltage ranges.

CSX-090-V4-C1

Maximum Voltage Rating

V4 = 200-440 VAC 50/60 Hz

V6 = 200-575 VAC 50/60 Hz

Control Voltages

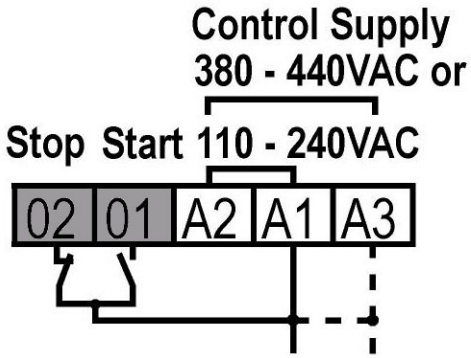
All CSX models are available in two control voltage configurations.

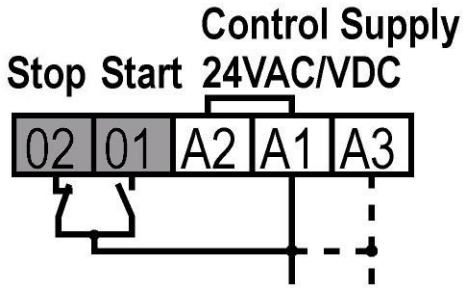
CSX-090-T4-C1

Control Supply Voltage

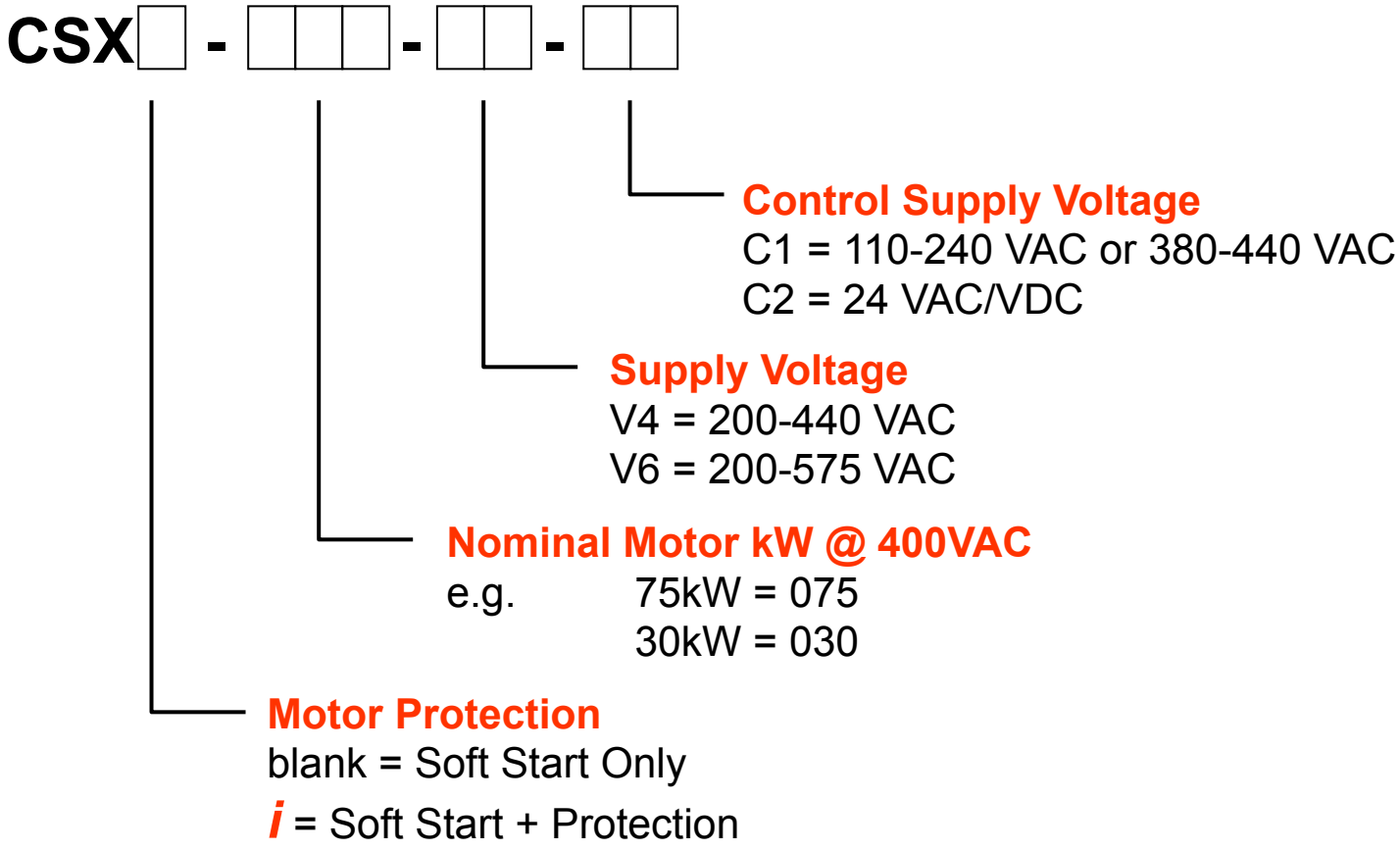
C1 = 110-240 VAC or 380-440 VAC

C2 = 24 VAC / VDC





Model Code

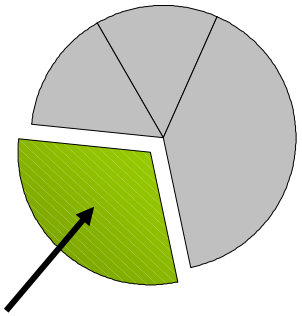

CSX□ - □□□ - □□ - □□
Control Supply Voltage
C1 = 110-240 VAC or 380-440 VAC
C2 = 24 VAC/VDC
Supply Voltage
V4 = 200-440 VAC
V6 = 200-575 VAC
Nominal Motor kW @ 400VAC
e.g. 75kW = 075
30kW = 030
Motor Protection
blank = Soft Start Only
i = Soft Start + Protection

The CSX Range

CSX Series

AuCom

Soft Start Controller Market Segment



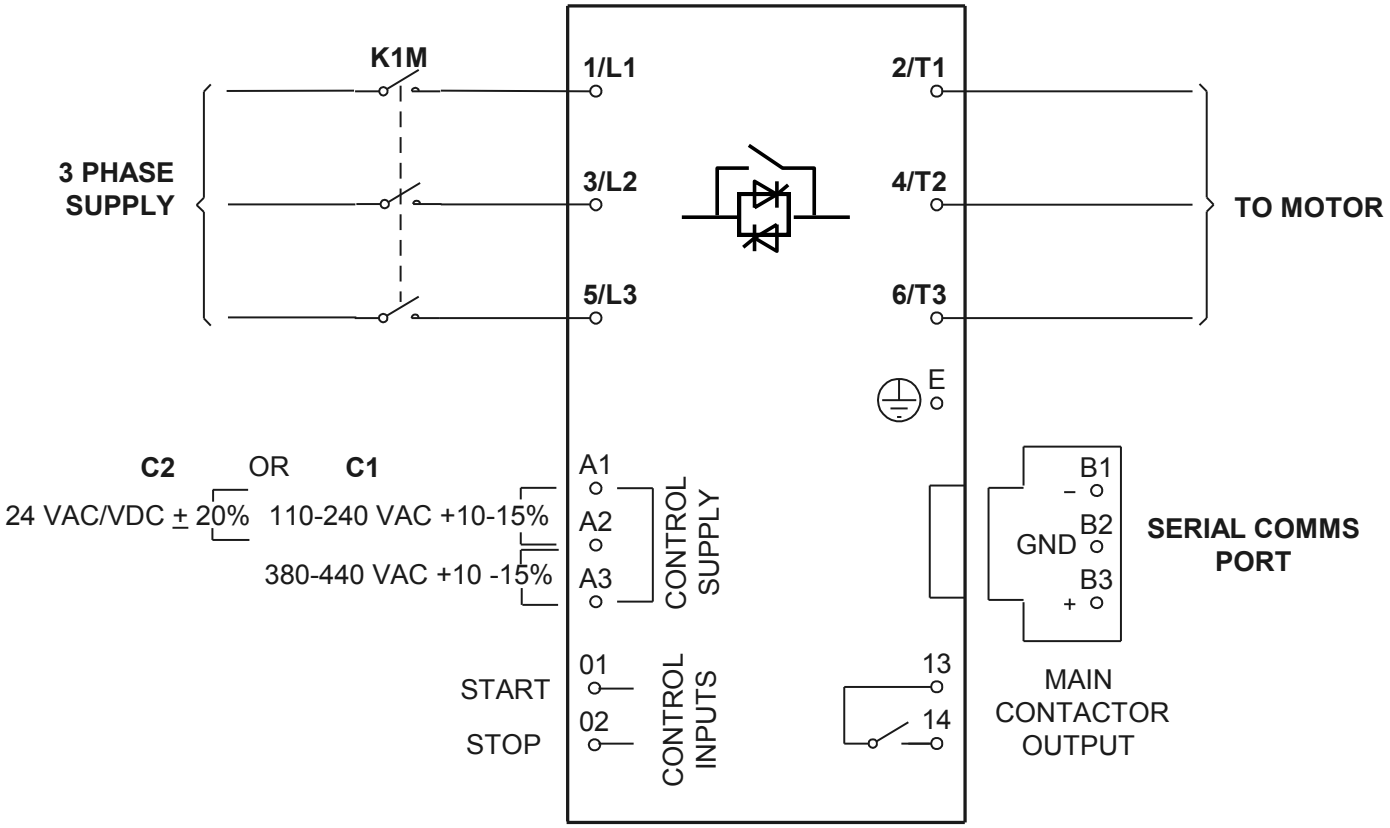
Soft Start Controllers

Voltage Ramp Soft Start

Competes with:

- Siemens Sirius
- Schneider LH4 N2
- Allen Bradley SMC2

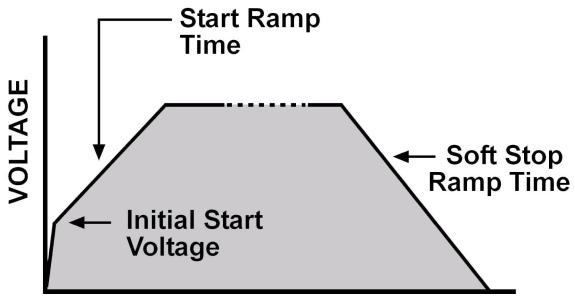
Electrical Schematic



Adjustments

Three adjustments can be made on the CSX soft starters:

- Initial Start Voltage
- Start Ramp Time
- Soft Stop Ramp Time



Indication

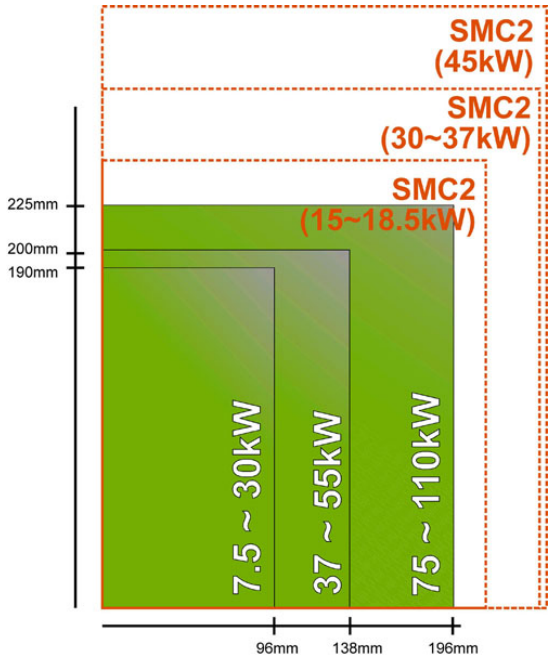
Two LED indicators are provided on CSX soft starters:

- Ready
- Run

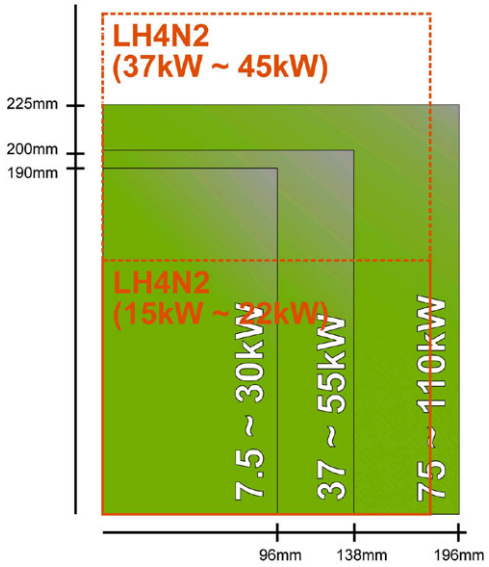
Each LED can be off, on or flashing.

	READY LED	RUN LED
●	Ready	Motor Running
☼	Tripped	Starting/Stopping

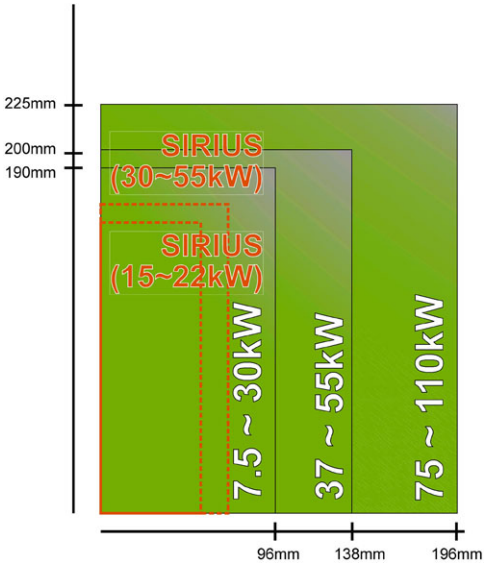
Physical Size



Rockwell



Schneider



Siemens

CSX soft starters are smaller than most competing brands

Feature Comparisons

	CSX	SMC2 AB	LH4N2 SCHNEIDER	3RW SIEMENS
Soft Start - TVR	●	●	●	●
Soft Stop	●	● **	●	●
LED Indication	2		2	2
Relay Outputs	1	2 **	2 *	2
Serial Comms	MODBUS DeviceNet Profibus, ASI **			ASI **
Remote Display	● * *			

CSX features are the equal of market leaders, with supeiror communications options

* 1 x Standard / 1 x Optional

* * Optional

kW Range

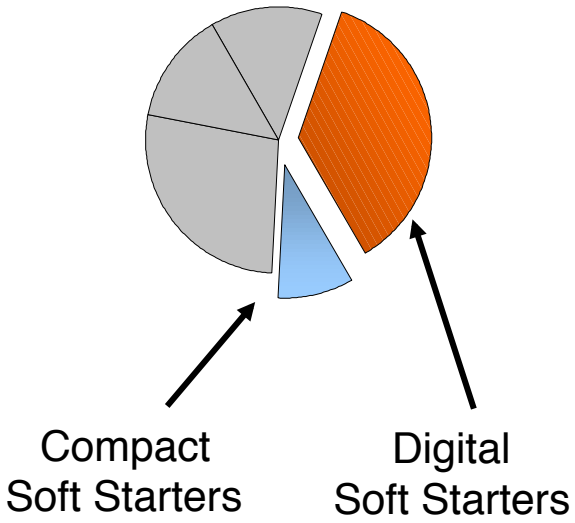
	CSX	SMC2 AB	LH4N2 SCHNIEDER	3RW SIEMENS
110 kW	●			
90 kW	●			
75 kW	●			
55 kW	●	●		●
45 kW	●		●	●
37 kW	●	●	●	●
30 kW	●	●		●
22 kW	●	●	●	●
18.5 kW	●			●
15 kW	●	●	●	●
7.5 kW	●	●	●	●
4 kW		●	●	●
2.2 kW		●		●
1.1 kW				

CSX soft starters cover larger kW motors

The CSX*i* Range

AuCom

Compact Soft Start Market Segment

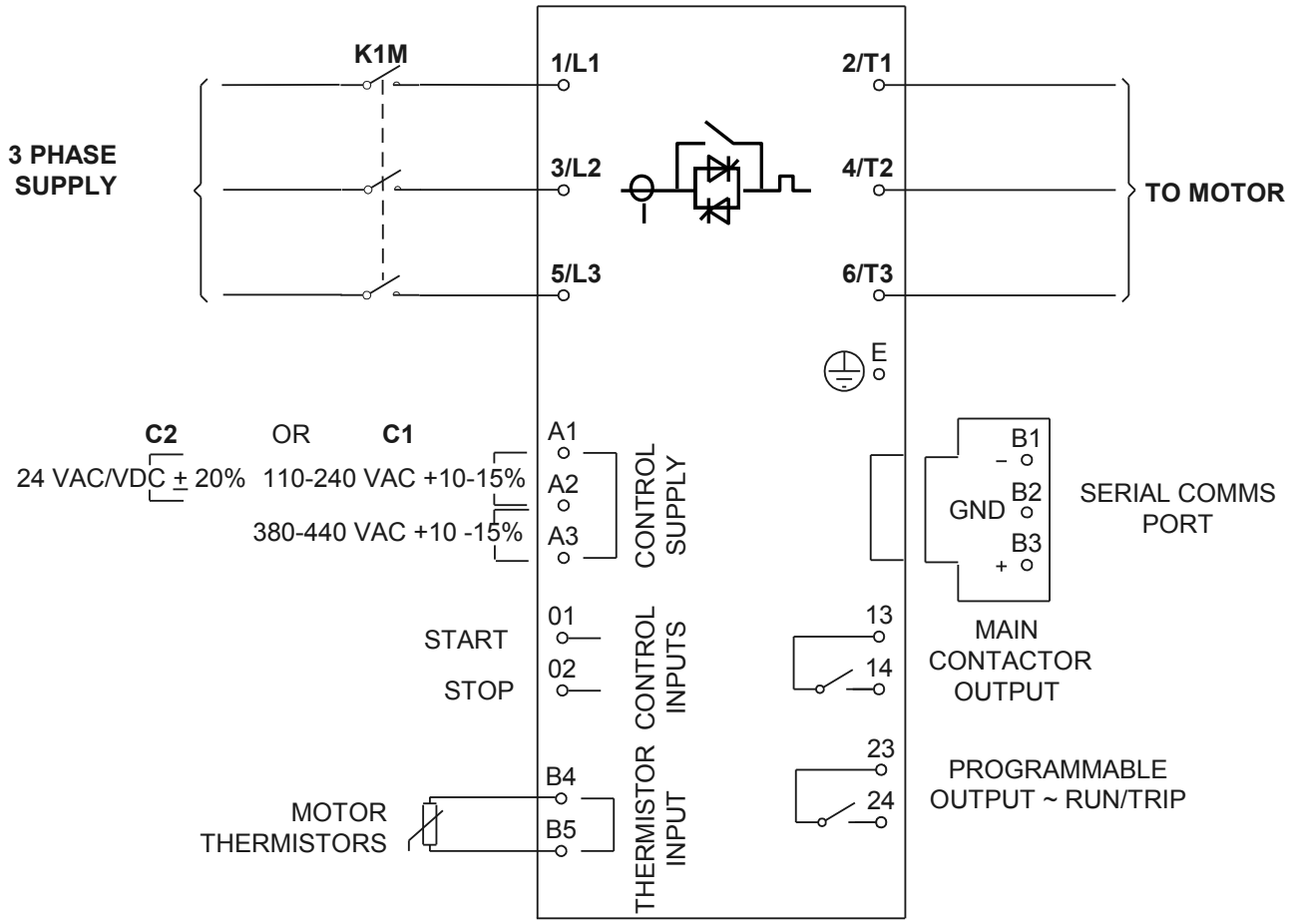


Current Limit Soft Start and Motor Protection

Competes directly with other compact starters:
- Allen Bradley SMC-3
- WEG SSW-05

Competes against Digital Soft Starters where top-end functions not required:
- IMS2
- Schneider ATS48
- Allen Bradley Dialog Plus

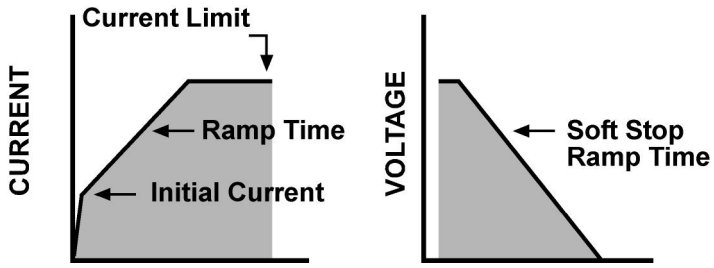
Electrical Schematic



Adjustments

Eight adjustments can be made on the CSX*i* soft starters:

- Current Limit
- Current Ramp
- Stop Ramp Time
- Motor FLC
- Motor Trip Class
- Excess Start Time
- Phase Sequence Protection
- Auxiliary Relay Function



Indication

Two LED Indicators are provided on CSX*i* soft starters:

- Ready
- Run

Each LED can be off, on or flashing.

	READY LED	RUN LED
●	Ready	Motor Running
☼	Tripped (See codes)	Starting/Stopping

Trip Codes

1. Phase Loss	5. Phase Imbalance
2. Excess Start Time	6. Supply Frequency
3. Motor Overload	7. Phase Sequence
4. Thermistor	8. Serial Comms

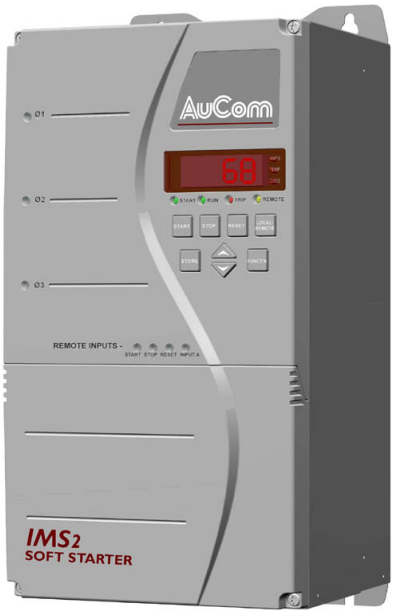
Physical Size

CSX*i* soft starters are considerably smaller than the IMS2 and other brands they compete against.

CSXi
7.5 ~ 30 kW

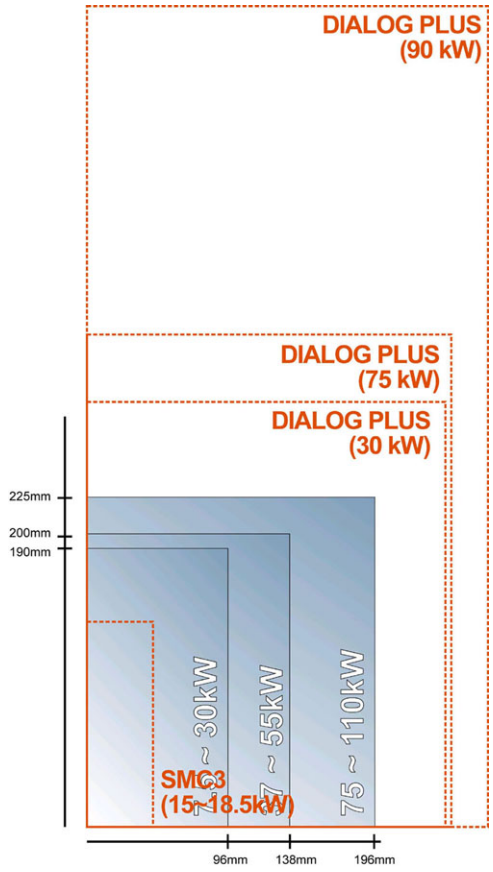
CSXi
37 ~ 55 kW

CSXi
75 ~ 110 kW

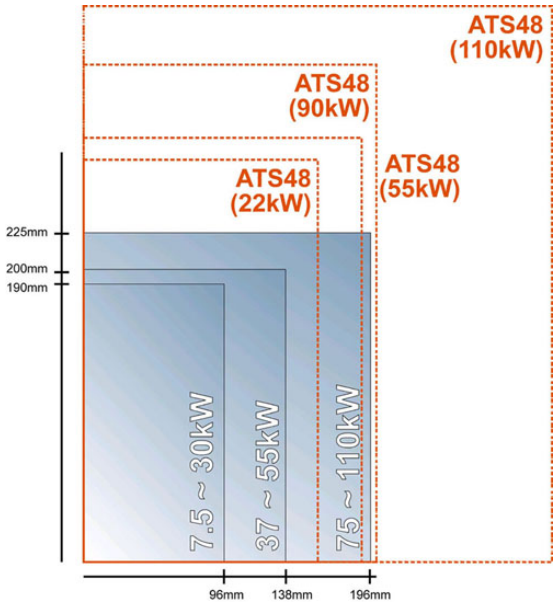


IMS2
7.5 ~ 55 kW

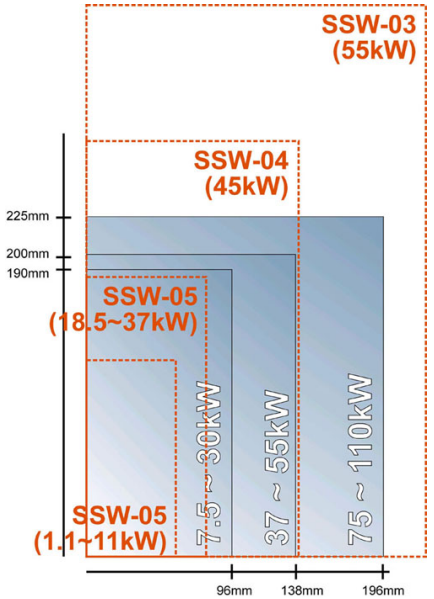
Physical Size



Allen Bradley
Dialog Plus



Schneider
ATS48

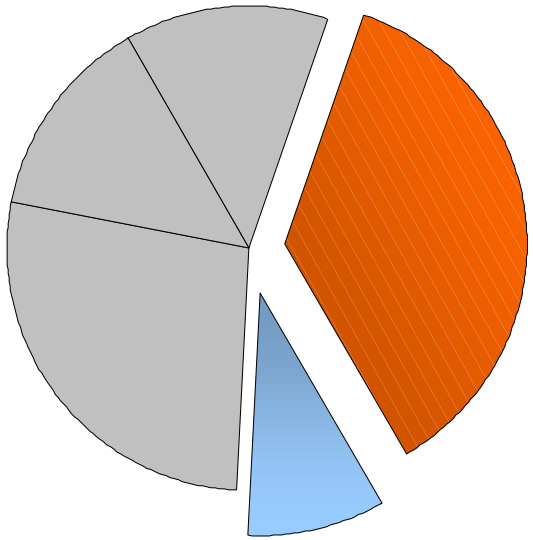


WEG
SSW

Feature Comparisons

The CSXi competes directly against other compact starters as well as digital soft starters.

Digital soft start customers not using the advanced functions available in these products will be attracted by the CSX*i* size, price and feature set.



Digital Soft Starters
Soft start + comprehensive protection and interface features.

Compact Soft Starters
Soft start + essential motor protection features in a compact package.

Feature Comparisons

	Compact Starters			Digital Starters		
	SMC3 AB	SSW-05 WEG	CSX*i*	IMS2	DIALOG PLUS AB	ATS48 SCHNEIDER
Soft Start						
- Voltage ramp	●	●				
- Current limit	●		●	●	●	●
- Current ramp	●		●	●	●	●
- Torque control				●	●	●
- Kickstart	●			●	●	●
- Dual parameter sets				●		●
Soft Stop	●	●	●	●	●	●

All the most commonly used soft start and soft stop features are provided by the CSXi soft starters

Feature Comparisons

	Compact Starters			Digital Starters		
	SMC3 AB	SSW-05 WEG	CSX*i*	IMS2	DIALOG PLUS AB	ATS48 SCHNEIDER
Protection						
- Overload	●	●	●	●	●	●
- Phase rotation	●	●	●	●	●	●
- Phase imbalance	●	●	●	●	●	●
- Motor thermistor			●	●		●
- Excess start time		●	●	●		●
- Shorted SCR	●	●	●	●	●	●
- Supply fault	●		●	●	●	●
- Undercurrent				●	●	●
- Shearpin				●	●	●
- Auxiliary trip						●
- Starter overtemperature	●			●	●	●

CSXi soft starters include all the most commonly required protection features

Feature Comparisons

	Compact Starters			Digital Starters		
	SMC3 AB	SSW-05 WEG	CSX*i*	IMS2	DIALOG PLUS AB	ATS48 SCHNEIDER
Auto-Reset				●	●	●
4-20mA Output			● *			●
Relay Outputs	2	2	**2**	**4**	**3**	**3**
- Trip (common)	●		●	●	●	●
- Trip (individual faults)				●	●	●
- Line contactor	●	●	●	●	●	●
- Run	●	●	●	●	●	●
- High current flag				●	●	●
- Low current flag				●	●	●
- Motor overload flag				●	●	●

CSXi soft starters include all essential relay functions

* Optional

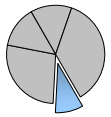
Feature Comparisons

	Compact Starters			Digital Starters		
	SMC3 AB	SSW-05 WEG	CSX*i*	IMS2	DIALOG PLUS AB	ATS48 SCHNEIDER
Numeric Display		● *	● *	●	●	●
Trip Log				●	●	●
Parameter Protection				●	●	●
Serial Comms		●	● *	●	● *	● *

CSXi models have extensive communications options

* Optional

kW Range
Compact Soft Starters



CSXi Series

	CSXi	SMC3 AB	SSW-05 WEG
110 kW	●		
90 kW	●		
75 kW	●		
55 kW	●		
45 kW	●		●
37 kW	●		
30 kW	●		●
22 kW	●		●
18.5 kW	●	●	
15 kW	●	●	●
7.5 kW	●	●	●
4 kW		●	●
2.2 kW			
1.1 kW		●	●

CSXi soft starters cover larger kW motors

kW Range
Digital Soft Starters

	CSX*i*	IMS2	DIALOG PLUS AB	ATS48 SCHNEIDER
> 220 kW		●	●	●
185 kW		●		●
132 kW		●	●	●
110 kW	●	●		●
90 kW	●	●	●	●
75 kW	●	●	●	●
55 kW	●	●		●
45 kW	●	●	●	●
37 kW	●	●		●
30 kW	●	●		●
22 kW	●	●	●	●
18.5 kW	●	●	●	●
15 kW	●	●	●	●
7.5 kW	●	●		●

CSXi soft starters cover all but the largest motor sizes

Accessories

AuCom

Remote Operator

CSX Series

- Push button control
  (start, stop, reset)
- Operational LEDs
  (start, run, trip, RS485)
- Trip codes

CSXi Series

- Push button control
  (start, stop, reset)
- Operational LEDs
  (start, run, trip, RS485)
- Trip codes
- Current display
- Motor temperature display
- 4-20mA output current

AuCom

Serial Comms

An optional Serial Comms plug-in module is available for the following protocols:

- MODBUS
- DeviceNet
- Profibus
- AS-i

Comms Module

PC Software

The CSX soft starters can be controlled and monitored, but not programmed, using the PC Software.

Feature Summary

Competitive Advantages

CSX *plus* CSX*i*: two product types increases competitiveness by allowing selection of the product type that best matches client needs.

Compact Size: physically small compared to competition.

Built-in Bypass Contactor: makes installation simple and reduces ventilation requirements.

Current Controlled: superior start performance over TVR controllers.

Motor Protections: overload, phase loss, phase rotation, excess start time, motor thermistor, supply fault.

Extensive kW Range: wide range up to 110 kW.

Serial Communications: MODBUS, DeviceNet, Profibus, AS-i.

Advanced Accessories: Remote Operator, PC Software

An Integrated Package

PC Software
Control
Monitoring
Programming

Serial Comms
ASCII, Modbus
DeviceNet, Interbus
Profibus

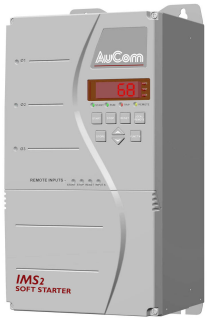
RS 485

RCM
Remote Operator
Current Meter
Status Display
Local Push Buttons

CSX
Soft Start
15~200 A
200-575 VAC

CSX*i*
Soft Start
Motor Protection
15~200 A
200-575 VAC

IMS2
Fully Featured
18~2360 A
200-690 VAC
Marine Version

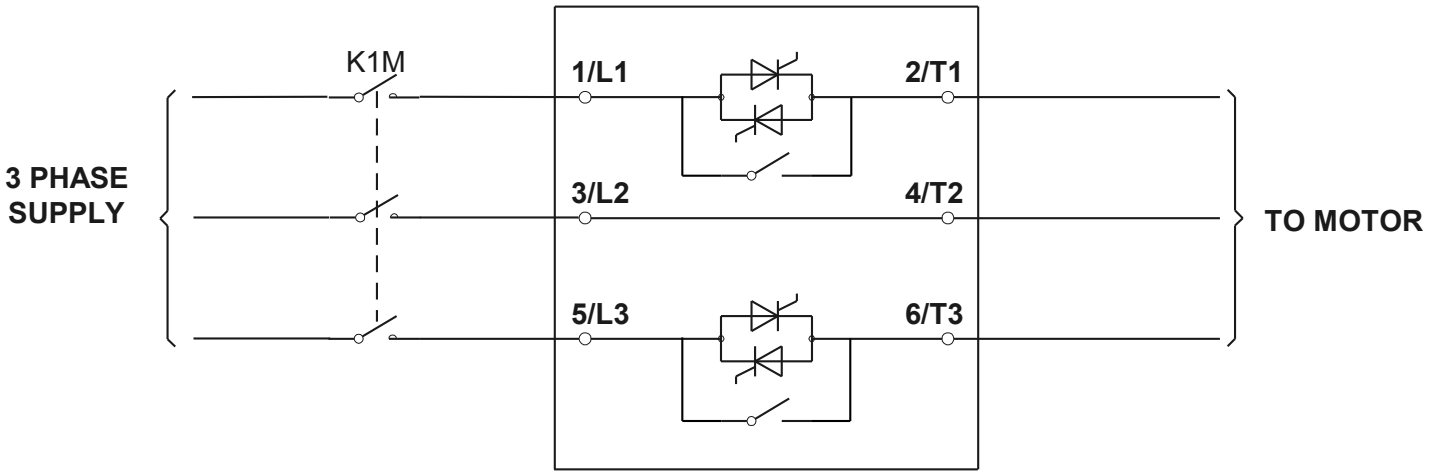


MVS
Fully Featured
50~460 A
2300~7200 VAC

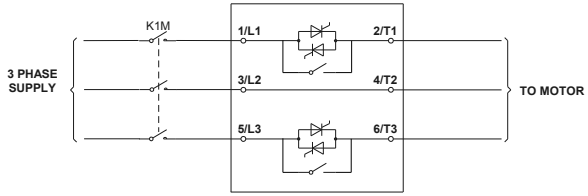
Dec 2003

AuCom

Two Phase Control



Two Phase Control



Depending on their design, soft starters control one, two or three phases.

The CSX controls only two phases because this allows the product to be smaller and more price competitive.

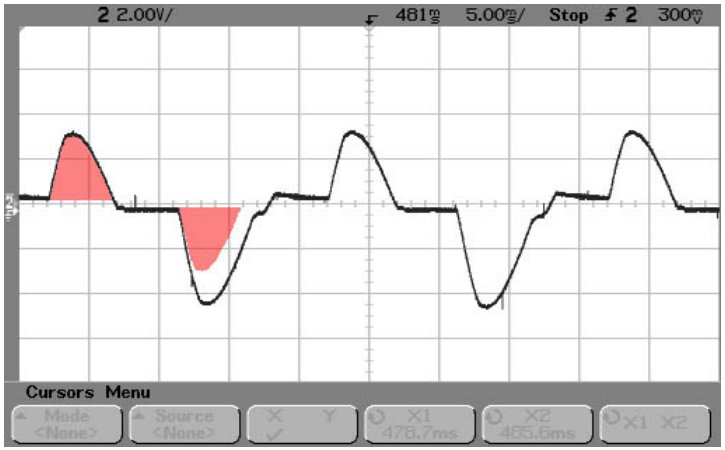
Many soft start customers do not know and/or care how many phases are controlled by the soft start products they use. Price, size and functionality are most important.

However there will be some customers and competitors who will question two phase control. The two main arguments relate to output waveforms and electrical isolation.

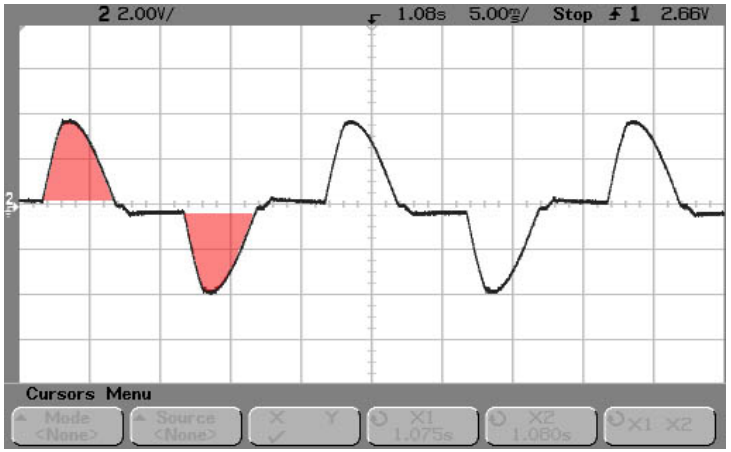
Two Phase Control Output Waveforms

Three phase control is perceived by many as technically superior to two phase control.

In the past soft starters using two phase control have caused extra heating in the motor and require higher starting currents because the output waveform is not symmetrical.



Typical Two Phase Controller Waveform



Typical Three Phase Controller Waveform

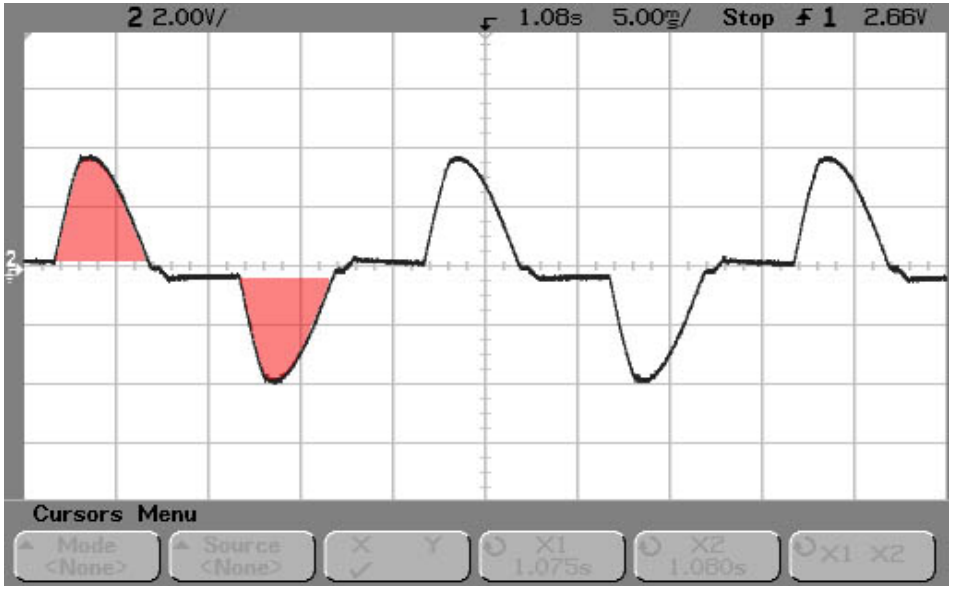
Equi-Vec™

CSX soft starters control only two phases, but include Equi-Vec™ balanced vector control technology.

Equi-Vec™ balances the output waveform making it symmetrical.

This eliminates previous limitations of two phase controllers such as:

- Limited starts per hour
- Limited to light loads only
- Limited to motor < 55 kW



Equi-Vec™ Waveform

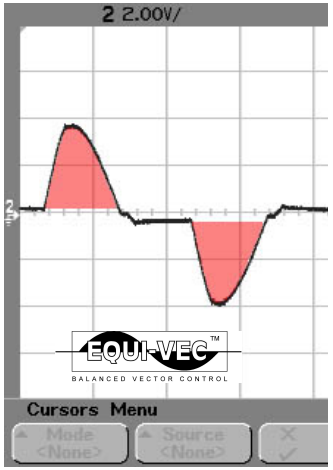
EQUI-VEC™

BALANCED VECTOR CONTROL

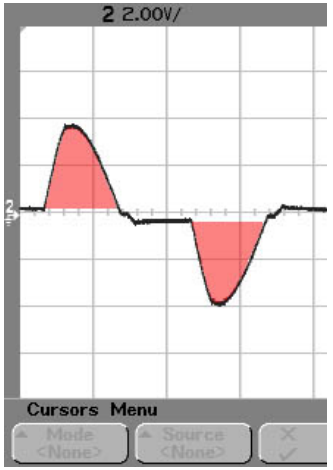
Superior Performance

Equi-Vec™ allows the CSX to provide superior performance over existing two phase controllers.

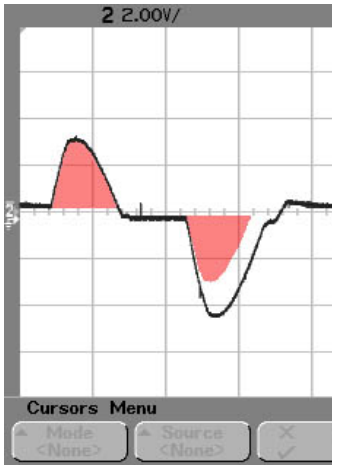
This creates a sales advantage against existing two phase controllers as well as nullifying preference for three phase control.



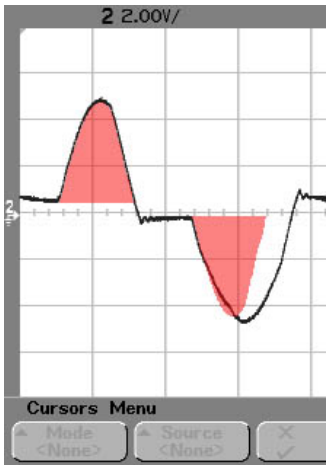
CSX
Starting Waveform



Three Phase
Starting Waveform



Siemens Sirius
Starting Waveform



Schneider LH4
Starting Waveform

Line Contactors

Q. CSX soft starters control only two phases, leaving one phase connected to the supply. Does this mean an additional line contactor must be employed in a circuit breaker/CSX motor branch circuit ?

A. No. Use of a two phase soft starter does not require an additional line contactor as compared with a three phase soft starter.

Like switches, contactors and other semiconductor devices, two phase soft starters are acceptable devices for operational switching of motors.

Note however that regulations also generally require use of a switching device that provides a break function. Typically this is a circuit breaker.

Isolation

Q. Can the CSX provide electrical isolation between the supply and motor terminals ?

A. No, nor can any form of electronic switching device including three phase soft starters or frequency converters.

If work is to be carried out on a motor the switching device (soft starter, frequency converter, etc) must be switched off by means of a disconnection device such as a circuit breaker or isolator.

CSX Installations

The requirements for motor switching and isolation are the same for three phase and two phase soft starters.

CSX soft starters are most simply installed with a Motor Protection Circuit Breaker.

CSX*i* soft starters are most simply installed with a System Protection Circuit Breaker fitted with a shunt trip.