

Explosion-Proof Starters and Controllers



Sprecher+Schuh's Explosion-proof Starters and Controllers are precisely engineered to provide protection in a wide range of hazardous gas (Type 7) and hazardous dust (Type 9) environments. In addition, NEMA 4 gaskets are standard on most enclosures, providing watertight protection.

- Promotes efficiency while providing safety in hazardous environments
- Wide range of explosion-proof choices and motor needs
- Custom enclosures, multiple starters, softstarters & combination softstarters, viewing windows, pilot devices, higher horsepower and reversing for specialized applications



Type 7 and Type 9 protection

Type 7 enclosures are designed to provide protection against an internal explosion when operated in a hazardous gas environment. Type 9 enclosures protect from internal explosion in a hazardous dust environment. Both types must also prevent enclosed heat generating mechanisms from causing external surfaces to reach temperatures capable of igniting explosive gas-air mixtures in the surrounding atmosphere.

Starting with the best

At the heart of all explosion-proof starters is Sprecher + Schuh's CAT7 and CAT6 line of motor starters. These starters are compact and offer intermediate sizes to better match specific motor requirements. This equates to generous wiring space and less wasted horsepower capacity. Compact components means a smaller cast aluminium enclosure and a smaller price.

Top line protection...

CAT7 and CAT6 Explosion Proof starters are equipped with Sprecher + Schuh's CEP7 solid state overload relay. Unlike traditional thermal overload relays that indirectly sense motor current through heater elements, CEP7 solid state overload relays measure motor current directly through integrated current transformers and on board electronics. The electronics provide numerous advantages like adjustable trip class and the ability to apply side-mount modules for extra protection.

Combination starters for protection and convenience

Explosion-proof combination starters can include either a UL489 approved Thermal Magnetic Circuit Breaker (MCCB) or non-fusible disconnect. The MCCB utilizes the instantaneous trip ability of a magnetic breaker for short circuit currents combined with the overload tolerance of thermal circuit breakers for normal starting demands. An MCCB can also be quickly reset after the fault has been cleared.

Explosion-Proof Uses

Sprecher + Schuh Explosion-Proof Enclosures for starters and motor controllers are durable and contain state-of-the-art technology. Refer to the SSNA Sprecher + Schuh catalog for more detailed specifications.

Contact your Sprecher + Schuh representative for more information and quick-ship availability.

CAT7 & CAT6 Starters

ACROSS-THE-LINE STARTER

- Quick availability for standard units
- CEP7 Electronic Overload Relay
- Ample conduit holes standard
- Compact Design

COMBINATION STARTERS

- Molded case Thermal-Magnetic Circuit Breaker provides single phasing protection
- CAT7 or CAT6 Contactor
- CEP7 Electronic Overload Relay
- FVNR and FVR




KTA7 Manual Motor Controller

- Manual self-protected combo starter (or “Type E” as noted)
- Through-the-door motor disconnect rated
- Class 10 Thermal Overload
- Compact design
- Type 4 Gasket on EY model

CX7 Combination Controller

- “Type E/F” self-protected combo starter
- Heavy duty enclosure
- Through-the-door motor disconnect rated
- Type 4 Gasket
- CA7 Contactor for remote operation
- Class 10 Thermal Overload

		CAT6 & CAT7	KTA7__EX	KTA7__EY	CX7
		Across-the-Line or Combination	Manual Motor Controller / Type E	Manual Motor Controller / Type E	Type E/F Combo self-protected
Industry Standards & Uses		Indoor, Outdoor, Gas, Dust	Indoor, Gas, Dust	Indoor, Outdoor, Gas, Dust	Indoor, Outdoor Gas, Dust
NEMA 7, 9		✓	✓	✓	✓
cUL Type: 3, 3R, 4 & 12		✓	~	✓	✓
NEC: Class I, Group B		✓	~	✓	✓
Class I, Groups C&D		✓	✓	✓	✓
Class II, Groups E,F&G		✓	✓	✓	✓
Class III		✓	~	✓	✓
Max. Horsepower 3-Phase	200V	150	7-1/2 / 5	7-1/2 / 7-1/2	10
	230V	175	10 / 5	10 / 7-1/2	15
	460V	350	25 / 10	25 / 15	30
	575V	400	30 / 3	30 / 10	30
Options					
Breather + Drain		Optional	Optional	Optional	Optional
Pilot Devices		Optional	~	~	Optional
ATEX Certified 		Optional	~	~	~
Features		Full-functioning and Economical	Compact and Economical	Can accommodate shunt or undervoltage module	CA7 Contactor for remote operation

Series CA6 Motor Protection Contactors

CA6 contactors utilize the latest modular design techniques that speed installation, reduce panel space and facilitate maintenance

Main Terminal Set

- Accommodation for single or dual connections to each pole
- Accepts flat or round conductors
- Touch safe to IP20 according to IEC 60529
- Eliminates need for Terminal Shields

Screw type lug set

- Accommodation for single or dual connections to each pole
- Accepts round conductors only
- Copper construction

Aux. Contact Blocks

- Up to four auxiliary contact blocks (8 poles) may be mounted on the side of the CA6 contactor.

Surge Suppressor

- Limits voltage spikes when switching off coil.
- Attaches to all CA6 contactors.

CA6-115-EI 3-pole Non-Reversing Contactor

- Connects directly to a low level signal source
- Very low pull-in and holding current
- Threshold voltages for pull-in and drop-out are very precisely defined, eliminating "chattering"
- Supply voltage dips are bridged without extra equipment
- "-EI" designates contactor with Electronic Interface coil. "EI" coils cover a much wider voltage range with only one coil
- Other voltages available

CA6-140-EI 3-pole Non-Reversing Contactor

- Ratings for Switching AC Motors (AC-2 / AC-3) are higher for contactors with electronic coil:

CA6-140-EI-11-*	CA6-180-EI-11-*
500V = 98 kW	500V = 126 kW
690V = 135 kW	690V = 176 kW

- AC or DC coils
- Non-reversing NEMA size available (CAN6)

NON-REVERSING, Three Pole Contactors With AC Coil, Series CA6 (Open type only)

I _e [A]		Ratings for Switching AC Motors (AC2 / AC3)										Auxiliary Contacts per Contactor		Open Type	
		kW (50 Hz)					UL/CSA HP (60 Hz)								
		230V	400V/415V	500V	690V	115V	230V	200V	230V	460V	575V				1 Ø
AC-3	AC-1												NO	NC	Catalog Number
115	250	37	64/66	80	111	10	25	40	40	75	100	1	1	CA6-115-11-*	CA6-115-EI-11-*
140	250	45	78/82	80	111	15	30	40	50	100	125	1	1	CA6-140-11-*	CA6-140-EI-11-*
180	250	57	101/105	98	135	~	40	50	60	150	150	1	1	CA6-180-11-*	CA6-180-EI-11-*
210	350	67	118/122	147	205	~	50	60	75	150	200	1	1	CA6-210-EI-11-*	
250	350	80	140/145	177	250	~	~	75	100	200	250	1	1	CA6-250-EI-11-*	
300	450	97	170/176	213	293	~	~	100	125	250	300	1	1	CA6-300-EI-11-*	
420	540	135	238/250	298	424	~	~	150	175	350	400	1	1	CA6-420-EI-11-*	
630	800	200	355	450	500	~	~	200	250	500	600	1	1	CA6-630-EI-11-*	
860	1000	250	500	560	~	~	~	250	300	600	700	1	1	CA6-860-EI-11-*	

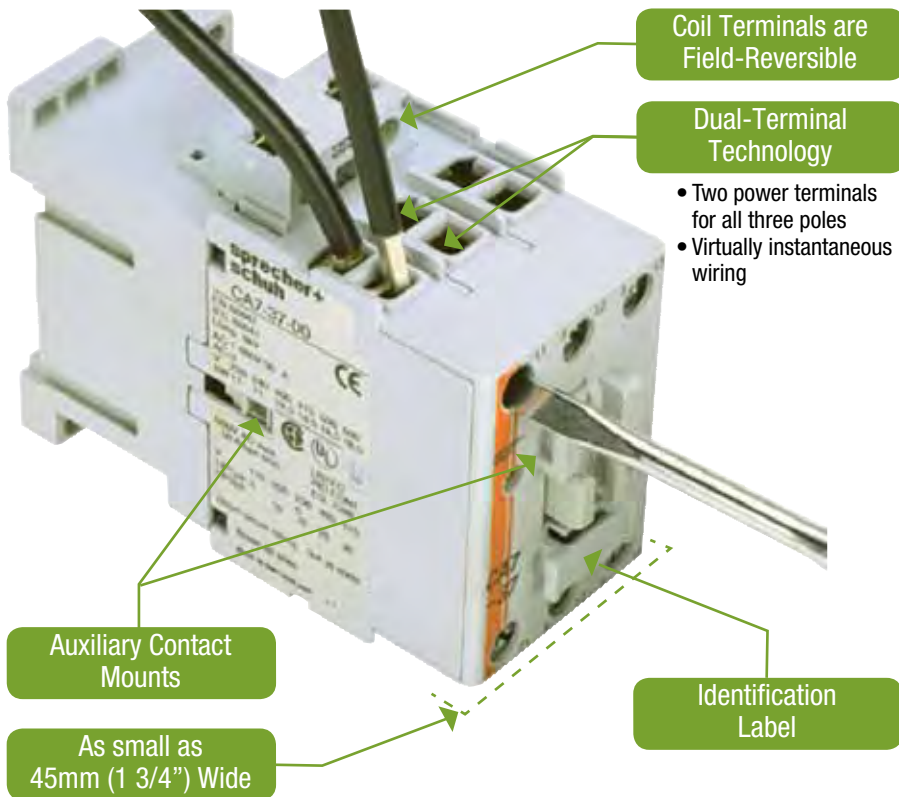
CA6-115 / 140 / 180		
AC Coil Code	Voltage Range	
	50 Hz	60 Hz
24	~	24V
120B	110V	120V
208	~	208V
240B	220-230V	260V
277	240V	277V
380	380-400V	440V
480	415V	480V
575	500V	575V

CA6-115-EI ...CA6-420-EI		
AC Coil Code	Voltage Range	
	50 Hz / 60 Hz	
24	24V	
120	110-130V	
220W	208-277V	
460W	380-500V	

CA6-630-EI ...CA6-860-EI		
AC Coil Code	Voltage Range	
	50 Hz / 60 Hz	
120	110-130V	
208W	200-220V	
240W	230-250V	
277	277V	
480	440-480V	

Series CA7 Power Control Contactors

Modular Design with Universal Accessories



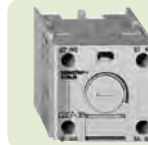
Accessories

All accessories are interchangeable among all CA7 contactors and CS7 control relays. Top and side mount auxiliary contacts are available.



Auxiliary Contact Blocks

- 1- and 2-pole side-mounts and 2- and 4- pole top-mounts.
- Two way numbering for right or left side mounting on the contactor
- Snap-on design



Pneumatic Timing Module

The contacts in the Pneumatic Timing Element switch after the delay time. The contacts on the main contactor continue to operate without delay.



Reversing Power Wiring Kit

Provides a solid “wireless” connection for reversing applications. May be used with both solid state and thermal O/L relays.



Electronic Timing Module – Wye-Delta Transition Timer

- Switching delay at 50ms
- Continuous adjustment range
- High repeat accuracy



3 Pole Paralleling Link

Allows smaller CA7 contactors to be used on single-phase resistive applications. By paralleling the three power poles, the contacts see only a portion of the actual load.

See Sprecher + Schuh's general catalog for complete information and pricing on CA7 contactors and accessories.

CA7 Selected Horsepower Ratings

Catalog Number	AC-1 Amp Rating 40°C	Maximum Horsepower						Max. Aux. Contacts	CAN7 NEMA Rating
		Single Phase			Three Phase				
		115V	230V	200V	230V	460V	575V		
CA7-9	32	1/3	1	2	2	5	7-1/2	9	~
CA7-12	32	1/2	2	3	3	7-1/2	10	9	00
CA7-16	32	1	3	5	5	10	15	9	0
CA7-23	32	2	3	5	7-1/2	15	15	9	~
CA7-30	65	2	5	7-1/2	10	20	25	8	~
CA7-37	65	3	5	10	10	25	30	8	1
CA7-43	85	3	7-1/2	10	15	30	30	8	2
CA7-60	100	5	10	15	20	40	50	8	~
CA7-72	100	5	15	20	25	50	60	8	~
CA7-85	100	7-1/2	15	25	30	60	60	8	3
CA7-97	130	10	20	30	30	75	75	8	~



Series CEP7 Motor Protection Solid State Overload Relays



Second Generation Advantage

- Selectable tripping class
- Choice of reset options
- More robust design
- Increased accuracy
- Improved motor protection
- Self-powered design
- Lowers energy requirements
- Reduces panel space
- Superior phase failure protection
- Improved Flexibility

Superior phase failure protection

The CEP7's on-board electronics are constantly monitoring all three phases. If the ASIC board senses that one phase is missing during a steady state running condition on a fully loaded motor, it will trigger in 3 seconds. If a single phase condition is present during starting, the CEP7 will trip within 8 seconds (for a motor >80% loaded). These times are much faster than any thermal bimetallic overload relay. In addition, CEP7 overload relays detect a 50% phase imbalance in the same way as a phase loss.

Shown above: CEP7-EE

Robust design

The CEP7 design physically extends to the back-pan, therefore aligning the mounting of the overload with the corresponding contactor. Further, the mechanical attachment and direct electrical connection to the contactor has been "beefed-up." This provides for a more robust mounting which means less damage from shipping or during field wire installation. The bipolar latching relay are self-enclosed therefore insulating the electromagnet and shielding against airborne metal particles and other potential environmental debris. The CEP7 has been tested to operate in -20°C (-4°F) or up to 60°C (140°F) and withstand 3G of vibration or 30G of shock on a mountain up to an altitude of 2000m or in a jungle at 95% humidity.

Reliability under every conceivable environmental condition is a quality built into the design of this second generation of CEP7 electronic overload relay.

Side Mount Modules

The CEP7 has a wide variety of side mount modules, providing an extensive array of control options, including: Remote Reset, Jam Protection with Remote Reset, Thermistor Relay/Remote Reset, Network Communication modules, Ground Fault Protection with Remote Reset and Jam, and the Intellibutton Remote Reset indication device. Individual literature is available for each of these modules.

All these options make the CEP7 Electronic Overload relay the only device you need to stock.



Overload Protection Relay Modules



CEP7-ERR: Remote Reset Module

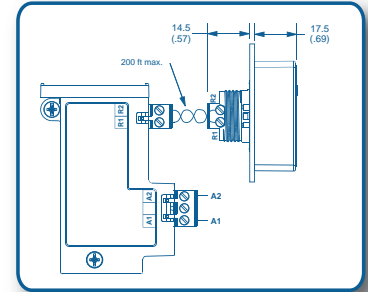
Side module connects to a CEP7-ERID

- or connect to a D7pilot device reset pushbutton

Dip switch adjustable reset mode & type

- Automatic or Manual reset mode
- 1- or 3-Phase relay type operation

Provision for reset after trip from remote pilot device



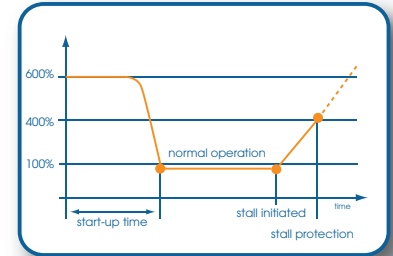
CEP7-EJM: Jam Protection and Remote Reset Module

The Jam module can help you control applications that involve frequent overload and locked rotor condition like mixers, crushers, cranes, saws and conveyors.

Dip switch adjustable Jam Protection

- Jam set points - 100%, 125%, 150%, 200%, 300%, 400% or 600% FLA
- Trip delay - 0.1, 0.5, 1, 2, 3, 4, 5 or 10 sec.

Provision for reset after trip from remote pilot device



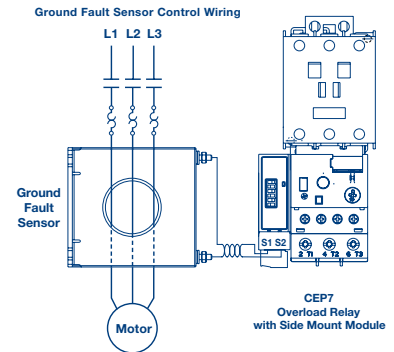
CEP7-EGF: Ground Fault Protection and Remote Reset Module

Dip switch adjustable

- GF current range set points
- 20...100mA; 100...500mA; 0.2...1.0A; 1.0...5.0A
- GF Trip level 20% - 100%

LED status indication

Provision for reset after trip from remote pilot device



CEP7-EGJ: Ground Fault/Jam Protection and Remote Reset Module

Dip switch adjustable

- GF current range set points
- 20...100mA; 100...500mA; 0.2...1.0A; 1.0...5.0A; GF Trip level 20% - 100%

LED status indication

Jam trip when the motor current exceeds 400% FLA setting when enabled

Provision for reset after trip from remote pilot device



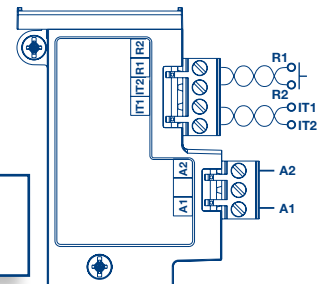
CEP7-EPT: Thermistor (PTC) Relay and Remote Reset Module

PTC Protection and LED Status Indication

- PTC response time 500ms...800ms
- Number of sensors - 6

Provision for reset after trip from remote pilot device

- Apply 24 - 240V, 47 - 63HZ or DC to terminals A1 and A2 for control power.
- Connect remote reset pilot device to Terminals R1 and R2
- Connect Terminal IT1 and IT2 to PTC Chain



The CEP7-ERID Remote Indication Display “Intelli-button” is the latest technology in communicating with the solid state overload relay. It provides convenient up-to-date notifications on the CEP7’s status as well as

easy accessibility to reset the overload relay. It works with a variety of side mount modules providing additional motor protection functionality traditionally found only on more expensive models.

Series PCS Softstarter Intelligent Controller

Easy Set-up

Digital rotary switches quickly and easily set exact value. LED indication of all faults.

Line or Delta Compatible

The PCS is capable of running a 3-wire or 6-wire motor via a DIP switch setting.

Built-in Overload Protection

Electronic overload protection with selectable trip class. Overload trip class selection includes OFF, 10, 15 or 20 seconds. Manual or automatic trip reset.

Bypass Contactor

Bypass contactor on each phase. Once the motor is up to speed, the load is removed from the SCRs.

Over Temperature Protection

Internal thermistors monitor the SCR junction temperature. If overheated, microcomputer switches off the PCS and a TEMP fault is indicated via LED.

Phase Reversal Protection

When enabled via a DIP-switch, 3-phase input power will be verified before starting, ensuring the motor rotates in the same direction.

Phase Loss / Open Load

Automatic protection from motor burnout during single phase starting.



As little as 45mm (1-3/4") wide

Phase Imbalance

The unit monitors for imbalance between phase currents. Tripping occurs when the difference between the minimum phase current and the maximum phase current exceeds 65% for 3 seconds, and a fault will be indicated.

Shorted SCR

Prior to every start and during starting, the unit will check all SCRs for shorts and unit load connections to the motor.

Push to Test Function

The unit with control wiring can be tested for fault conditions or reset.

Fault Diagnostics

Faults indicated by blinking LED

- Overload
- Overtemperature
- Phase Reversal
- Phase Loss/Open Load
- Phase Imbalance
- Shorted SCR
- Test

Auxiliary Contacts

The PCS is equipped with an internal NO auxiliary contact. Additional 1 or 2-pole auxiliary contacts can be snapped on the right side.

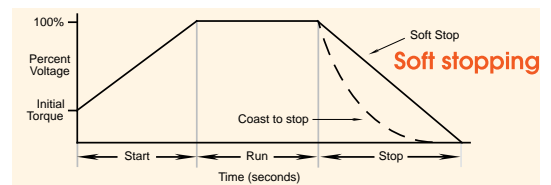
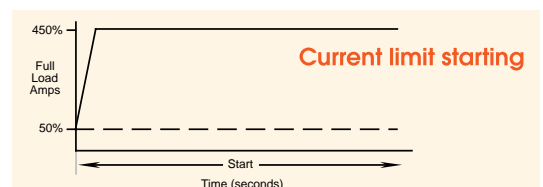
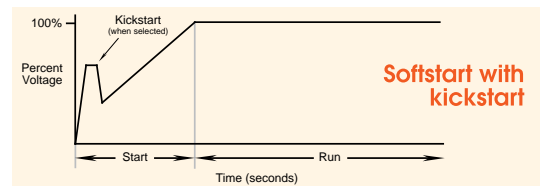
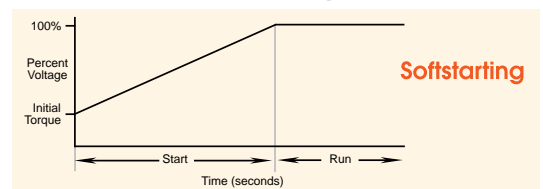
PCS Selected Technical Data

Maximum Horsepower Three Phase ②				Current Rating	Overload Adjustment Range	With 100...240V AC Control Voltage ①
200V	230V	460V	575V			
Starting Duty (350%)						Catalog Number
200...600V AC Max. Applications						
0.5	0.5	1.5	2	3	1...3	PCS-003-600V
2	2	5	7.5	9	3...9	PCS-009-600V
3	5	10	10	16	5.3...16	PCS-016-600V
5	5	10	15	19	6.3...19	PCS-019-600V
7.5	7.5	15	20	25	8.3...25	PCS-025-600V
7.5	10	20	25	30	10...30	PCS-030-600V
10	10	25	30	37	12.3...37	PCS-037-600V
10	15	30	40	43	14.3...43	PCS-043-600V
15	20	40	50	60	20...60	PCS-060-600V
25	30	60	75	85	28.3...85	PCS-085-600V
30	40	75	100	108	27...108	PCS-108-600V
40	50	100	125	135	34...135	PCS-135-600V
60	75	150	200	201	67...201	PCS-201-600V
75	100	200	250	251	84...251	PCS-251-600V
100	125	250	300	317	106...317	PCS-317-600V
125	150	300	350	361	120...361	PCS-361-600V
150	200	400	500	480	160...480	PCS-480-600V

① For units with 24V AC/DC Control Voltage add "-024" to end of Catalog Number.

② See Sprecher+Schuh catalog for Wye-Delta HP ratings.

Four Modes of Operation



PF Softstarter Motor Control Intelligent Controller

Product Overview

Modular Design

The PF Softstarter provides intelligence, unmatched performance, flexibility and diagnostics in a modular compact design for controlling either a standard squirrel-cage induction motor or a star-delta motor.

Compact Size

The PF Softstarter integrates a bypass to minimize heat generation during run time. The bypass automatically closes when the motor reaches its nominal speed, resulting in a cooler-running component and reduction in enclosure size.

Standard Modes of Operation

- Soft Start with selectable kick start
- Current Limit Starting
- Dual ramp start
- Full voltage starting
- Linear speed acceleration
- Preset slow speed
- Soft stop

Voltage Range

Control Range

100...240V AC or 24V AC/DC

Motor Voltage Range

200...600V AC, 50/60 Hz

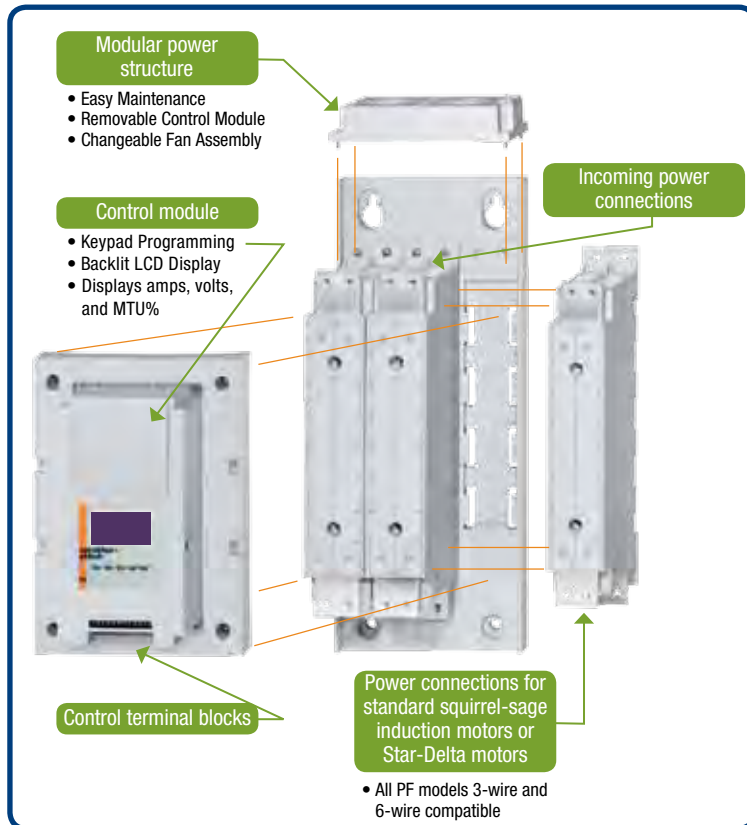
Horsepower Range

0.5...1000hp@480V AC

0.5...1400hp@480V AC (Delta Connected)

Option Modes of Operation

- Pump Control
- Brake Control - Includes Smart Motor Brake, Accu-stop and Slow Speed with Braking



Current Range - 16 Models

Product Rating	Line Current	Delta Current
5	5	9
25	25	43
43	43	74
60	60	104
85	85	147
108	108	187
135	135	234
201	201	348
251	251	435
317	317	549
361	361	625
480	480	831
625	625	850
780	780	900
970	970	1200
1250	1250	1600

Starting Modes

	PFS Standard	PFB Pump Control	PFD Braking Control
Soft Start	X	X	X
Soft Stop	X	~	~
Current Limit	X	X	X
Full Voltage	X	X	X
Kick Start	X	X	X
Preset Slow Speed	X	~	X
Linear Speed Start and Stop	X	~	~
Dual Ramp	X	~	~
Pump Start and Stop	~	X	~
Smart Motor Brake	~	~	X
Accu-Stop	~	~	X
Slow Speed with Braking	~	~	X

The PF Softstarter controller meets applicable requirements as a motor overload protective device.



Sprecher + Schuh US Division Headquarters
 15910 International Plaza Dr., Houston, TX 77032
 Customer Service: (877) 721-5913; Fax: (800) 739-7370

