

PSS Softstarters  
208V – 690V





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# Specification guide

## 1) Introduction

This specification guide covers the general requirements for design, manufacturing and installation of low voltage softstarters controlling the start and stop of AC squirrel cage induction motors.

## 2) Codes and Standards

- A) The softstarter shall be designed, built and tested according to the latest editions of applicable IEC standards.
- B) The softstarter shall be approved and/or certified by the following organizations:
  - 1) Underwriters Laboratories (UL)
  - 2) Canada Standards Association (CSA)
- C) Combination starters shall be UL listed.

## 3) Product Features

The softstarter shall be ABB Type PSS Series or pre-approved equal. The softstarter shall contain the following standard features and adjustments.

- A) The softstarter shall come complete with the following acceleration and deceleration settings as a minimum:
  - 1) Starting Torque: Initial torque shall be adjustable from 30-70% of maximum locked rotor torque.
  - 2) Ramp Time: The time between starting torque and maximum torque shall be adjustable between 1 and 30 seconds using a 16-position switch.
  - 3) Deceleration Time (often called soft stop): Deceleration control shall be adjustable between 0 (off) to 30 seconds using a 16-position switch.
- B) The softstarter shall be provided with inputs for an optional current limiting transformer with an output current of 1 amp maximum. The current limit feature shall have the following characteristics:
  - 1) Maximum Current Limit: The maximum allowed current during start shall be adjustable from 150% to 400% of softstarter maximum current rating.
  - 2) Starting torque shall be fixed at 40% when utilizing the current limit function.
- C) The following input and output features shall be provided as standard.
  - 1) Inputs shall be provided for 2-wire or 3-wire control schemes. A seal-in relay contact for the 3-wire control scheme shall be internal

to the softstarter. Control schemes shall be through dry contact closures only.

- 2) The softstarter shall be provided with a functional ground to remove and/or minimize electrical noise injected on the softstarter control board.
- 3) Normally open output relays shall be provided for faults and up-to-speed. Normally closed contacts for fault relays shall be provided as an option.
- D) The softstarter shall be designed to operate in-line or inside the delta.
  - 1) The softstarter shall be provided with a 2-position dipswitch to select between the normal in-line connection (3-lead motor) and inside the delta (6-lead or 12-lead delta wound motors).
  - 2) The inside the delta operation shall allow the softstarter to be sized at only 58% of the motor nameplate HP rating.
- E) The softstarter shall be provided with the following LED indications.
  - 1) Power On shall indicate that control power is supplied to the softstarter.
  - 2) Top of Ramp shall indicate that the softstarter has achieved full SCR conduction and 100% voltage is supplied to the motor.
  - 3) General Fault shall indicate a fault condition has occurred internal to the softstarter or loss of phase on motor side connections.
  - 4) External Fault shall indicate a phase-loss on the line side of softstarter.

## 4) Design Specifications

The softstarter shall be controlled completely through solid state design algorithms. No moving electro-mechanical contacts shall be allowed. The softstarter shall be designed for three-phase control with two anti-parallel SCRs in each phase. The softstarters shall be designed to the following specifications:

### A) Power Ratings

- 1) Input: 200-690V +/-10%, 3-Phase 50/60 Hz. Softstarters shall be phase sequence insensitive.
- 2) Output: Reduced voltage three phase AC derived from phase-angle fired inverse-parallel SCRs, ramped to full voltage.
- 3) Current Rating: 18A to 300A inline and 30A to 515A inside delta.

# Specification guide

- 4) Output Capacity: 115% of softstarter rated current continuously to accommodate motors with a 1.15 service factor without de-rating. The softstarter shall be capable of 500% rated current for 30 seconds.
- 5) Control Power: 120VAC or as an option 240VAC both at 50/60 Hz.

## B) SCR Devices

- 1) PIV Ratings
  - (a) 208-480V: 1600V Minimum
  - (b) 600-690V: 1800V Minimum
- 2) Efficiency: 99.7% through SCRs

## C) Ambient Conditions

The softstarter shall be capable of withstanding the following environmental conditions during operation and may not cause any electrical/ mechanical damage or degradation of performance.

- 1) Ambient Temperature: As a standard of softstarter design quality, the softstarter shall be documented to show that the open chassis design has been tested for  $-20^{\circ}\text{C}$  -  $60^{\circ}\text{C}$  ( $-13^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ ) operation with de-rating above  $+40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ). Enclosed ventilated units shall be designed for standard airflow at  $0$ - $40^{\circ}\text{C}$  ( $32^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ )
- 2) Altitude: 1000m (3300 ft) maximum without de-rating.
- 3) Humidity: 0-95% Relative Humidity, non-condensing
- 4) Thermal: The softstarter shall be equipped with a heat sink temperature switch designed to trip at  $105^{\circ}\text{C}$  ( $221^{\circ}\text{F}$ ).
- 5) Storage: The softstarter shall be able to be stored within a temperature range of  $-40^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $158^{\circ}\text{F}$ ).

## 5) Mechanical Construction

- A) Open chassis softstarters shall be housed in a plastic material and termination points provided to accommodate the required incoming cables for the line and load connections.
- B) All enclosed softstarters shall include a control power transformer and overload relay as standard.
  - 1) NEMA 1 enclosed softstarters shall be ventilated and forced air cooled if necessary. A bypass contactor may be used in lieu of fans.
  - 2) NEMA 12/4/4X enclosed softstarters shall be supplied with a shunt bypass contactor. The

bypass contactor shall be rated for across-the-line starting.

## 6) Quality Requirements

- A) The vendor shall be certified to ISO 9001 (quality certification) and ISO 14001 (environmental certification).
- B) A complete environmental product declaration (EPD) shall be available upon request. The EPD shall describe the material used for the softstarter, energy consumption, losses, etc.
- C) Tables indicating global warming, ozone depletion potential, and acidification potential shall be provided upon request.
- D) The complete softstarter system shall be functionally tested prior to shipment to assure proper operation per specification.

## 7) Spare Parts

The following items shall be available to assist in installation, maintenance, and/or repair of the softstarter.

- A) Cable termination kits for power cables
- B) Shrouds to increase protection rating to IP20
- C) Printed Circuit Boards
- D) SCRs
- E) Cooling Fans

Spare parts shall be available for a reasonable amount of time should the softstarter be phased out of production due to the availability of newer more advanced softstarter developments.

## 8) Documentation

The softstarter shall be shipped with a complete set of documentation to include the following items:

- A) Installation and Maintenance Manual
- B) Assembly and wiring schematics
- C) Dimensional drawings

## 9) Startup and Adjustment

- A) Startup procedures shall be intuitive and simple enough so as not to require factory assistance or training.
- B) All adjustments shall be made from the front of the softstarter using rotating switches that have sixteen fixed positions.



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