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Soft Start Controllers

Contents

Product Overview

DS7

Eaton's DS7 line of reduced voltage solid-state soft start controllers is very compact, multi-functional, easy to install and easy to commission. Designed to control the acceleration and deceleration of three-phase motors with the ability to adjust initial torque, ramp up and down time, the device is available for current ranges from 4 to 32 A in four frame sizes.

Type S701

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-phase motors. The S701 provides the user with the ability to adjust initial torque, ramp up and down time, and also select kick start for high inertial loads.

Type S701 with Auxiliary Contact

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-phase motors. With the auxiliary contact, it is possible to control an external bypass to reduce heating and increase acceleration and deceleration times.

The unit provides the user with the ability to adjust initial torque, ramp up and down time and also select kick start for high inertia loads.

Type S701 with Brake

The S701 soft start controller with DC injection brake is designed to control acceleration and deceleration of three-phase motors. Brake current is adjustable from 0–50 A DC. The ramp-up feature is adjustable from 0.5–10 seconds. Torque adjustment is adjustable with or without break loose (kick start) function.

Type S511 Semiconductor Reversing Contactor

The S511 device is a semiconductor reversing contactor designed to switch three-phase motors forward and reverse. Unicore electronics and thermal design ensures high switching capacity and long lifetime.

DS7 Soft Start Controllers

Contents

DS7 Soft Start Controllers

Product Description

The DS7 is available in standard and SmartWire-DT® communications configurations.

Standard (Non SmartWire-DT)

Eaton's DS7 line of reduced voltage solid-state soft start controllers is very compact, multi-functional, easy to install and easy to commission. Designed to control the acceleration and deceleration of three-phase motors, the device is available for current ranges from 4 to 200 FLA in four frame sizes. It is available with 24 Vdc, 24 Vdc/24 Vac, or 110/230 Vac control voltage options. A low temperature version is available with 24 Vac/Vdc control voltage with operation ambient temperature minimum of –40 °C.

SmartWire-DT

Our SmartWire-DT interface completely eliminates the need for conventional control wiring. This has several advantages:

- No incorrect wiring
- Faster wiring
- Cost saving

The interface can be used to send control commands to the DS7 SmartWire-DT and change and diagnose its parameter configuration; in addition, the control electronics can be powered via the SmartWire-DT cable. The device is controlled with one of the selectable profiles:

- A "start/stop" profile
- An 8 bit-wide profile for the soft starter, which is provided the same way for the variable frequency drive and features more options

Regardless of the profile chosen, the DS7 SmartWire-DT's parameters can be read and written to at any time by using acyclic communications services.

DS7 SmartWire-DT makes it possible to read and write to all device parameters. It is also possible to overwrite the potentiometer settings on the DS7 SmartWire-DT, which can come in handy, for instance, when a change made to the machine needs to be performed remotely.

The DS7 SmartWire-DT comes with a detailed diagnostic system with options that extend far beyond those of wired devices. In addition to having an error log, the DS7 SmartWire-DT can detect and report nine different device faults. A warning parameter reports any present warning messages. Moreover, the response to each individual fault can be customized. Finally, there are 35 additional messages for communication errors. Using the DS7 SmartWire-DT in connection with the PKE series motor protective circuit breakers opens up new functionalities that were previously thought impossible to implement with a low-cost soft starter and that were reserved to significantly more expensive devices. Combining a PKE unit and a DS7 SmartWire-DT makes it possible to completely protect the DS7 SmartWire-DT device against overloads. In addition, it provides a current limiting function and can report thermal capacity utilization levels to higher level controllers.

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Application Description

With its small size, it can easily fit in place of existing soft starters, wye-delta starters, or across-the-line NEMA® and IEC starters. This feature allows easy upgrades to existing systems. The product is designed to be wired in the three-phase line feeding the three motor input leads as is done for normal across-the-line starting. The starter uses silicon controlled rectifiers (SCRs) to ramp the voltage to the motor, providing smooth acceleration and deceleration of the load. After the motor is started, the internal run bypass relay closes, resulting in the motor running directly across-the-line. Internal run bypass significantly reduces the heat generated as compared to non-bypass starters. The soft stop option allows for a ramp stop time that may be longer than the coast-to-stop time. An external overload protection relay or circuit breaker is needed.

Operation

Voltage Ramp Start

This start method provides a voltage ramp to the motor, resulting in a constant torque increase. This most commonly used form of soft start mode allows you to set the initial voltage value and the duration of the ramp to full voltage conditions.

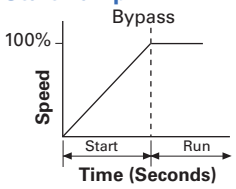
- Adjustable initial voltage 30–92% of full voltage (120/230 Vac control voltage)
- Adjustable initial voltage 30–100% of full voltage (24 Vac/Vdc control voltage)
- Adjustable initial voltage 30–92% of full voltage (24 Vdc control voltage—SmartWire-DT)
- Adjustable ramp time 1–30 seconds
- Bypass relays close at the end the ramp time (TOR)

Soft Stop

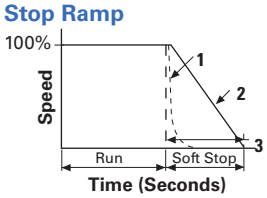
Allows for a controlled stopping of load. Used when a stop-time that is greater than the coast-to-stop time is desired. Often used with high friction loads where a sudden stop may cause system or product damage. Setting the soft stop time to a value of 0 turns off this feature.

- Soft stop time = 0–30 seconds

Start Ramp



Stop Ramp



1 = Coast to Stop (Speed)
2 = Soft Stop Ramp (Voltage)
3 = Soft Stop Time

Auxiliary Contacts

Auxiliary contacts are provided to indicate soft start controller status.

Frame Size 1 (4A to 12A)—One Relay

The auxiliary relay indicates when the soft starter is at Top-of-Ramp (TOR).

Frame Size 2, 3 and 4 (16A to 200A)—Two Relays

One auxiliary relay indicates when the soft starter is at Top-of-Ramp (TOR).

One auxiliary relay indicates that a RUN command is present, including start ramp, bypass, and stop ramp times.

Features and Benefits

- Run bypass mode greatly reduces internal heating created by the power dissipation across the SCRs. The bypass relay directly connects the motor to the line and improves system efficiency by reducing internal power losses
- Less heat minimizes enclosure size and cooling requirements, and maximizes the life of all devices in the enclosure
- LED displays device status and provides fault indication
- Variable ramp times and voltage control (torque control) settings provide unlimited starting configurations, allowing for maximum application flexibility

Single-Phase Applications

All DS7 frame sizes can be configured for single-phase operation at 200–480 Vac main voltages in accordance to the single-phase application note AP039006EN.

- Soft stop control suits applications where an abrupt stop of the load is not acceptable. Soft acceleration and deceleration reduces wear on belts, gears, chains, clutches, shafts, and bearings
- Minimizes the peak inrush current's stress on the power system. Peak starting torque can be managed to diminish mechanical system wear and damage.
- 24 Vac/Vdc control voltage enhances personnel and equipment safety. 110/230 Vac control voltage is also available
- Auxiliary relays indicate status of the soft start controllers
  - The TOR relay is active until motor stop command is received and/or the soft start controller detects a fault condition
  - RUN relay is active during the start ramp, bypass, and stop ramp

Protective Features

- Mains connection—The mains connection is monitored for a phase loss and/or undervoltage during ramp up
- Motor connection—The motor connection is monitored for an open condition during the ramp
- SCR faults—SCR performance is monitored during the ramp cycle for proper operation
- Heat sink over/under temperature—High ambient temperatures, extended ramp times, and high duty cycle conditions may cause the DS7 to exceed its thermal rating. When temperature goes under –5 °C (–40 °C for low temperature units), unit will trip as well. The DS7 is equipped with sensors that monitor the temperature of the device as well. The soft starter will trip in over/under temperature conditions, preventing device failure
- Warning is indicated for an over temperature condition for the next start
- Bypass relay
  - The DS7 can detect if the bypass relay fails to close after the ramp start or opens while the motor is running
  - The DS7 will also detect a condition whereas the bypass relay is closed when the RUN command is given
  - The DS7 will trip on a bypass dropout fault if either of these conditions occur

Standards and Certifications

- IEC 60947-4-2
- EN 60947-4-2
- UL® listed
- CSA certified
- CE marked
- C-Tick

Instructional Leaflets

- Instruction Leaflet IL03901001E

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Catalog Number Selection

DS7 Soft Start Controllers

DS7 - 3 4 0 SX 004 N 0 - N

Device Series
DS7 = Generation 7

Number of Phases
3 = Three-phase mains supply voltage

Voltage Class
4 = 400 V (380 V –15% to 480 V +10%)

Control Voltage Supply
0 = 24 Vac/Vdc
2 = 110/230 Vac
D = 24 Vdc SmartWire-DT

Device Version
SX = Standard soft starters with internal bypass

Rated Operational Current
004 = 4A
⋮
200 = 200A

Radio Interference Suppression Filters
4 = No internal radio interference suppression filters

Protection Type
0 = IP20

Options
N = No option
D = SmartWire-DT
L = Low temperature

Product Selection

DS7 Soft Start Horsepower Ratings

Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 1 and 2

DS7 Soft Start Controllers—Horsepower Ratings—10 Second Ramp, One Start per Hour, 300% Current Limit at 40 °C ①

Rated Current (A)	Motor Power (hp) 200 V	230 V	480 V	Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload (Direct Connect) ②	Recommended XTOE Overload ②	PKE MMP	MMP ②	Connection Kit to MMP	Catalog Number
3.7	0.75	0.75	2	HFD3015	15A Class RK5	XTOB004BC1	XTOE005BCS	XTPE012BCS	XTPR004BC1	XTPAXTPCB	**DS7-340SX004N0-N** ④⑤
											DS7-342SX004N0-N ⑥
											DS7-34DSX004N0-D ⑦
6.9	1.5	2	3	HFD3015	15A Class RK5	XTOB006BC1 ③	XTOE020BCS	XTPE012BCS	XTPR6P3BC1	XTPAXTPCB	**DS7-340SX007N0-N** ④⑤
											DS7-342SX007N0-N ⑥
											DS7-34DSX007N0-D ⑦
7.8	2	2	5	HFD3020	20A Class RK5	XTOB010BC1	XTOE020BCS	XTPE012BCS	XTPR010BC1	XTPAXTPCB	**DS7-340SX009N0-N** ④⑤
											DS7-342SX009N0-N ⑥
											DS7-34DSX009N0-D ⑦
11	3	3	7.5	HFD3030	20A Class RK5	XTOB012BC1	XTOE020BCS	XTPE032BCS	XTPR012BC1	XTPAXTPCB	**DS7-340SX012N0-N** ④⑤
											DS7-342SX012N0-N ⑥
											DS7-34DSX012N0-D ⑦
15.2	3	5	10	HFD3035	25A Class RK5	XTOB016CC1	XTOE020CCS	XTPE032BCS	XTPR016BC1	XTPAXTPCC	**DS7-340SX016N0-N** ④⑤
											DS7-342SX016N0-N ⑥
											DS7-34DSX016N0-D ⑦
22	5	7.5	15	HFD3060	40A Class RK5	XTOB024CC1	XTOE045CCS	XTPE032BCS	XTPR025BC1	XTPAXTPCC	**DS7-340SX024N0-N** ④⑤
											DS7-342SX024N0-N ⑥
											DS7-34DSX024N0-D ⑦
32	7.5	10	20	HFD3070	50A Class RK5	XTOB032CC1	XTOE045CCS	XTPE032BCS	XTPR032BC1	XTPAXTPCC	**DS7-340SX032N0-N** ④⑤
											DS7-342SX032N0-N ⑥
											DS7-34DSX032N0-D ⑦

Notes

① Actual motor FLAs vary. Verify these devices cover the motor specific FLA.
② Selections are based on motor FLA value at 480 V.
③ Not to be used with 230 V.
④ 24 Vac/Vdc device.
⑤ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑥ 110/230 Vac device.
⑦ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

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Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 3 and 4

DS7 Soft Start Controllers—Horsepower Ratings—10 Second Ramp, One Start per Hour, 300% Current Limit at 40 °C

Rated Current (A)	Motor Power (hp) 200 V	230 V	460 V	Maximum Allowable Breaker Size ①	Maximum Allowable Fuse Size ①	Recommended XTOB Overload	Recommended C440 Overload	Catalog Number
40	10	10	30	HFD3150L	150A Class RK5	XTOB040DC1 ②	C440A1A045SAX	**DS7-340SX041N0-N** ⑤⑥
								DS7-342SX041N0-N ⑦
								DS7-34DSX041N0-D ⑧
52	15	20	40	HFD3200L	200A Class RK5	XTOB057DC1 ②	C440B1A100SAX	**DS7-340SX055N0-N** ⑤⑥
								DS7-342SX055N0-N ⑦
								DS7-34DSX055N0-D ⑧
65	20	25	50	HJD3250	200A Class RK5	XTOB065DC1 ②	C440B1A100SAX	**DS7-340SX070N0-N** ⑤⑥
								DS7-342SX070N0-N ⑦
								DS7-34DSX070N0-D ⑧
77	25	30	60	HKD3300	300A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX081N0-N** ⑤⑥
								DS7-342SX081N0-N ⑦
								DS7-34DSX081N0-D ⑧
96	30	30	75	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX100N0-N** ⑤⑥
								DS7-342SX100N0-N ⑦
								DS7-34DSX100N0-D ⑧
124	40	50	100	HKD3400	500A Class RK5	XTOB125GC1S	C440A1A005SAX ④	**DS7-340SX135N0-N** ⑤⑥
								DS7-342SX135N0-N ⑦
								DS7-34DSX135N0-D ⑧
156	50	60	125	HLD3450	500A Class RK5	XTOB160LC1 ③	C440A1A005SAX ④	**DS7-340SX160N0-N** ⑤⑥
								DS7-342SX160N0-N ⑦
								DS7-34DSX160N0-D ⑧
180	60	75	150	HLD3500	500A Class RK5	XTOB220LC1 ③	C440A1A005SAX ④	**DS7-340SX200N0-N** ⑤⑥
								DS7-342SX200N0-N ⑦
								DS7-34DSX200N0-D ⑧

Notes

① Maximum values may be higher than allowed per NEC® 430.52 and UL 508A 31.1.
② XTOBXDIND Panel Mounting Adapter must be used with this overload.
③ XTOBXTLL line and load lugs must be used with this overload.
④ ZEB-XCT300 current transformer must be used with this overload.
⑤ 24 Vac/Vdc device.
⑥ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑦ 110/230 Vac device.
⑧ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 1 and 2

DS7 Soft Start Controllers—Horsepower Ratings—10 Second Ramp, One Start per Hour, 400% Current Limit at 40 °C ①

Rated Current (A)	Motor Power (hp) 200 V	230 V	480 V	Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload (Direct Connect) ②	Recommended XTOE Overload ②	PKE MMP	MMP ②	Connection Kit to MMP	Catalog Number
3	0.5	0.5	1.5	HFD3015	15A Class RK5	XTOB004BC1	XTOE005BCS	XTPE012BCS	XTPR004BC1	XTPAXTPCB	**DS7-340SX004N0-N** ④⑤
											DS7-342SX004N0-N ⑤
											DS7-34DSX004N0-D ⑥
4.8	1	1	3	HFD3015	15A Class RK5	XTOB006BC1 ③	XTOE020BCS	XTPE012BCS	XTPR6P3BC1	XTPAXTPCB	**DS7-340SX007N0-N** ④⑤
											DS7-342SX007N0-N ⑤
											DS7-34DSX007N0-D ⑥
6.9	1.5	2	3	HFD3020	20A Class RK5	XTOB006BC1	XTOE020BCS	XTPE012BCS	XTPR6P3BC1	XTPAXTPCB	**DS7-340SX009N0-N** ④⑤
											DS7-342SX009N0-N ⑤
											DS7-34DSX009N0-D ⑥
9	2	2	5	HFD3030	20A Class RK5	XTOB010BC1	XTOE020BCS	XTPE032BCS	XTPR010BC1	XTPAXTPCB	**DS7-340SX012N0-N** ④⑤
											DS7-342SX012N0-N ⑤
											DS7-34DSX012N0-D ⑥
11	3	3	7.5	HFD3035	25A Class RK5	XTOB016CC1	XTOE020CCS	XTPE032BCS	XTPR016BC1	XTPAXTPCC	**DS7-340SX016N0-N** ④⑤
											DS7-342SX016N0-N ⑤
											DS7-34DSX016N0-D ⑥
17.5	5	5	10	HFD3060	40A Class RK5	XTOB016CC1	XTOE045CCS	XTPE032BCS	XTPR016BC1	XTPAXTPCC	**DS7-340SX024N0-N** ④⑤
											DS7-342SX024N0-N ⑤
											DS7-34DSX024N0-D ⑥
22	5	7.5	15	HFD3070	50A Class RK5	XTOB024CC1	XTOE045CCS	XTPE032BCS	XTPR025BC1	XTPAXTPCC	**DS7-340SX032N0-N** ④⑤
											DS7-342SX032N0-N ⑤
											DS7-34DSX032N0-D ⑥

Notes

① Actual motor FLAs vary. Verify these devices cover the motor specific FLA.
② Selections are based on motor FLA value at 480 V.
③ Not to be used with 230 V.
④ 24 Vac/Vdc device.
⑤ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑥ 110/230 Vac device.
⑦ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

1

Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 3 and 4

DS7 Soft Start Controllers—Horsepower Ratings—10 Second Ramp, One Start per Hour, 400% Current Limit at 40 °C

Rated Current (A)	Motor Power (hp) 200 V	230 V	460 V	Maximum Allowable Breaker Size ①	Maximum Allowable Fuse Size ①	Recommended XTOB Overload	Recommended C440 Overload	Catalog Number
27	7.5	10	20	HFD3150L	150A Class RK5	XTOB040DC1	C440A1A045SAX	**DS7-340SX041N0-N** ④⑤
								DS7-342SX041N0-N ⑥
								DS7-34DSX041N0-D ⑦
34	10	10	30	HFD3200L	200A Class RK5	XTOB040DC1	C440A1A045SAX	**DS7-340SX055N0-N** ④⑤
								DS7-342SX055N0-N ⑥
								DS7-34DSX055N0-D ⑦
40	15	15	30	HJD3250	200A Class RK5	XTOB057DC1 ②	C440A1A045SAX	**DS7-340SX070N0-N** ④⑤
								DS7-342SX070N0-N ⑥
								DS7-34DSX070N0-D ⑦
52	15	20	40	HKD3300	300A Class RK5	XTOB057DC1 ②	C440B1A100SAX	**DS7-340SX081N0-N** ④⑤
								DS7-342SX081N0-N ⑥
								DS7-34DSX081N0-D ⑦
65	20	25	50	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX100N0-N** ④⑤
								DS7-342SX100N0-N ⑥
								DS7-34DSX100N0-D ⑦
80	30	30	75	HKD3350	500A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX135N0-N** ④⑤
								DS7-342SX135N0-N ⑥
								DS7-34DSX135N0-D ⑦
96	30	40	75	HLD3450	500A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX160N0-N** ④⑤
								DS7-342SX160N0-N ⑥
								DS7-34DSX160N0-D ⑦
124	40	50	100	HLD3500	500A Class RK5	XTOB150GC1S	C440A1A005SAX ③	**DS7-340SX200N0-N** ④⑤
								DS7-342SX200N0-N ⑥
								DS7-34DSX200N0-D ⑦

Notes

① Maximum values may be higher than allowed per NEC® 430.52 and UL 508A 31.1.
② XTOBXDIND Panel Mounting Adapter must be used with this overload.
③ ZEB-XCT300 current transformer must be used with this overload.
④ 24 Vac/Vdc device.
⑤ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑥ 110/230 Vac device.
⑦ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
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Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

DS7 Soft Start kW Ratings

Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 1 and 2

DS7 Soft Start Controllers—kW Ratings According to IEC 60947-4-2—10 Second Ramp, One Start per Hour, 300% Current Limit at 40 °C ①

Rated Current (A)	Motor Power (kW) 230 V	400 V	Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload (Direct Connect) ②	Recommended XTOE Overload ②	PKE MMP	MMP ②	Connection Kit to MMP	Catalog Number
3.8	0.75	1.5	HFD3015	15A Class RK5	XTOB004BC1	XTOE005BCS	XTPE012BCS	XTPR004BC1	XTPAXTPCB	**DS7-340SX004N0-N** ④⑤
										DS7-342SX004N0-N ⑥
										DS7-34DSX004N0-D ⑦
7	1.5	3	HFD3015	15A Class RK5	XTOB006BC1 ③	XTOE020BCS	XTPE012BCS	XTPR6P3BC1	XTPAXTPCB	**DS7-340SX007N0-N** ④⑤
										DS7-342SX007N0-N ⑥
										DS7-34DSX007N0-D ⑦
9	2.2	4	HFD3020	20A Class RK5	XTOB010BC1	XTOE020BCS	XTPE012BCS	XTPR010BC1	XTPAXTPCB	**DS7-340SX009N0-N** ④⑤
										DS7-342SX009N0-N ⑥
										DS7-34DSX009N0-D ⑦
12	3	5.5	HFD3030	20A Class RK5	XTOB012BC1	XTOE020BCS	XTPE032BCS	XTPR012BC1	XTPAXTPCB	**DS7-340SX012N0-N** ④⑤
										DS7-342SX012N0-N ⑥
										DS7-34DSX012N0-D ⑦
16	4	7.5	HFD3035	25A Class RK5	XTOB016CC1	XTOE020CCS	XTPE032BCS	XTPR016BC1	XTPAXTPCC	**DS7-340SX016N0-N** ④⑤
										DS7-342SX016N0-N ⑥
										DS7-34DSX016N0-D ⑦
24	5.5	11	HFD3060	40A Class RK5	XTOB024CC1	XTOE045CCS	XTPE032BCS	XTPR025BC1	XTPAXTPCC	**DS7-340SX024N0-N** ④⑤
										DS7-342SX024N0-N ⑥
										DS7-34DSX024N0-D ⑦
32	7.5	15	HFD3070	50A Class RK5	XTOB032CC1	XTOE045CCS	XTPE032BCS	XTPR032BC1	XTPAXTPCC	**DS7-340SX032N0-N** ④⑤
										DS7-342SX032N0-N ⑥
										DS7-34DSX032N0-D ⑦

Notes

① Actual motor FLAs vary. Verify these devices cover the motor specific FLA.
② Selections are based on motor FLA value at 480 V.
③ Not to be used with 230 V.
④ 24 Vac/Vdc device.
⑤ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑥ 110/230 Vac device.
⑦ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

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Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 3 and 4

DS7 Soft Start Controllers—kW Ratings According to IEC 60947-4-2—10 Second Ramp, One Start per Hour, 300% Current Limit at 40 °C

Rated Current (A)	Motor Power (kW) 230 V	400 V	Maximum Allowable Breaker Size ①	Maximum Allowable Fuse Size ①	Recommended XTOB Overload	Recommended C440 Overload	Catalog Number
41	11	22	HFD3150L	150A Class RK5	XTOB057DC1 ②	C440A1A045SAX	**DS7-340SX041N0-N** ⑤⑥
							DS7-342SX041N0-N ⑦
							DS7-34DSX041N0-D ⑧
55	15	30	HFD3200L	200A Class RK5	XTOB057DC1 ②	C440B1A100SAX	**DS7-340SX055N0-N** ⑤⑥
							DS7-342SX055N0-N ⑦
							DS7-34DSX055N0-D ⑧
68	15	37	HJD3250	200A Class RK5	XTOB070GC1 ②	C440B1A100SAX	**DS7-340SX070N0-N** ⑤⑥
							DS7-342SX070N0-N ⑦
							DS7-34DSX070N0-D ⑧
81	22	45	HKD3300	300A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX081N0-N** ⑤⑥
							DS7-342SX081N0-N ⑦
							DS7-34DSX081N0-D ⑧
99	30	55	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX100N0-N** ⑤⑥
							DS7-342SX100N0-N ⑦
							DS7-34DSX041N0-D ⑧
134	30	75	HKD3400	500A Class RK5	XTOB150GC1S	C440A1A005SAX ④	**DS7-340SX135N0-N** ⑤⑥
							DS7-342SX135N0-N ⑦
							DS7-34DSX135N0-D ⑧
160	45	90	HLD3450	500A Class RK5	XTOB160LC1 ③	C440A1A005SAX ④	**DS7-340SX160N0-N** ⑤⑥
							DS7-342SX160N0-N ⑦
							DS7-34DSX160N0-D ⑧
196	55	110	HLD3500	500A Class RK5	XTOB220LC1 ③	C440A1A005SAX ④	**DS7-340SX200N0-N** ⑤⑥
							DS7-342SX200N0-N ⑦
							DS7-34DSX200N0-D ⑧

Notes

① Maximum values may be higher than allowed per NEC 430.52 and UL 508A 31.1.
② XTOBXDIND Panel Mounting Adapter must be used with this overload.
③ XTOBXTLL line and load lugs must be used with this overload.
④ ZEB-XCT300 current transformer must be used with this overload.
⑤ 24 Vac/Vdc device.
⑥ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑦ 110/230 Vac device.
⑧ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 1 and 2

DS7 Soft Start Controllers—kW Ratings According to IEC 60947-4-2—10 Second Ramp, One Start per Hour, 400% Current Limit at 40 °C ①

Rated Current (A)	Motor Power (kW) 230 V	400 V	Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload (Direct Connect) ②	Recommended XTOE Overload ②	PKE MMP	MMP ②	Connection Kit to MMP	Catalog Number
2.5	0.33	1	HFD3015	15A Class RK5	XTOB004BC1	XTOE005BCS	XTPE012BCS	XTPR004BC1	XTPAXTPCB	**DS7-340SX004N0-N** ④⑤
										DS7-342SX004N0-N ⑥
										DS7-34DSX004N0-D ⑦
3.8	0.75	1.5	HFD3015	15A Class RK5	XTOB006BC1 ③	XTOE020BCS	XTPE012BCS	XTPR6P3BC1	XTPAXTPCB	**DS7-340SX007N0-N** ④⑤
										DS7-342SX007N0-N ⑥
										DS7-34DSX007N0-D ⑦
7	1.5	3	HFD3020	20A Class RK5	XTOB006BC1	XTOE020BCS	XTPE012BCS	XTPR6P3BC1	XTPAXTPCB	**DS7-340SX009N0-N** ④⑤
										DS7-342SX009N0-N ⑥
										DS7-34DSX009N0-D ⑦
9	2.2	4	HFD3030	20A Class RK5	XTOB010BC1	XTOE020BCS	XTPE032BCS	XTPR010BC1	XTPAXTPCB	**DS7-340SX012N0-N** ④⑤
										DS7-342SX012N0-N ⑥
										DS7-34DSX012N0-D ⑦
12	3	5.5	HFD3035	25A Class RK5	XTOB016CC1	XTOE020CCS	XTPE032BCS	XTPR016BC1	XTPAXTPCC	**DS7-340SX016N0-N** ④⑤
										DS7-342SX016N0-N ⑥
										DS7-34DSX016N0-D ⑦
16	4	7.5	HFD3060	40A Class RK5	XTOB016CC1	XTOE045CCS	XTPE032BCS	XTPR016BC1	XTPAXTPCC	**DS7-340SX024N0-N** ④⑤
										DS7-342SX024N0-N ⑥
										DS7-34DSX016N0-D ⑦
24	5.5	11	HFD3070	50A Class RK5	XTOB024CC1	XTOE045CCS	XTPE032BCS	XTPR025BC1	XTPAXTPCC	**DS7-340SX032N0-N** ④⑤
										DS7-342SX032N0-N ⑥
										DS7-34DSX032N0-D ⑦

Notes

① Actual motor FLAs vary. Verify these devices cover the motor specific FLA.
② Selections are based on motor FLA value at 480 V.
③ Not to be used with 230 V.
④ 24 Vac/Vdc device.
⑤ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑥ 110/230 Vac device.
⑦ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

Please refer to Application Note AP039004EN for additional information on proper size selection.

DS7 Soft Start Controller—Frames 3 and 4

DS7 Soft Start Controllers—kW Ratings According to IEC 60947-4-2—10 Second Ramp, One Start per Hour, 400% Current Limit at 40 °C

Rated Current (A)	Motor Power (kW) 230 V	400 V	Maximum Allowable Breaker Size ①	Maximum Allowable Fuse Size ①	Recommended XTOB Overload	Recommended C440 Overload	Catalog Number
28.8	7.5	11	HFD3150L	150A Class RK5	XTOB040DC1	C440A1A045SAX	**DS7-340SX041N0-N** ⑤⑥
							DS7-342SX041N0-N ⑦
							DS7-34DSX041N0-D ⑧
37.5	11	18.5	HFD3200L	200A Class RK5	XTOB040DC1	C440A1A045SAX	**DS7-340SX055N0-N** ⑤⑥
							DS7-342SX055N0-N ⑦
							DS7-34DSX055N0-D ⑧
46	11	22	HJD3250	200A Class RK5	XTOB057DC1 ②	C440B1A100SAX	**DS7-340SX070N0-N** ⑤⑥
							DS7-342SX070N0-N ⑦
							DS7-34DSX070N0-D ⑧
56	15	30	HKD3300	300A Class RK5	XTOB065DC1 ②	C440B1A100SAX	**DS7-340SX081N0-N** ⑤⑥
							DS7-342SX081N0-N ⑦
							DS7-34DSX081N0-D ⑧
68	18.5	37	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX100N0-N** ⑤⑥
							DS7-342SX100N0-N ⑦
							DS7-34DSX100N0-D ⑧
90	22	45	HKD3350	500A Class RK5	XTOB100GC1S	C440B1A100SAX	**DS7-340SX135N0-N** ⑤⑥
							DS7-342SX135N0-N ⑦
							DS7-34DSX135N0-D ⑧
106	30	55	HLD3450	500A Class RK5	XTOB160LC1 ③	C440A1A005SAX ④	**DS7-340SX160N0-N** ⑤⑥
							DS7-342SX160N0-N ⑦
							DS7-34DSX160N0-D ⑧
134	37	75	HLD3500	500A Class RK5	XTOB160LC1 ③	C440A1A005SAX ④	**DS7-340SX200N0-N** ⑤⑥
							DS7-342SX200N0-N ⑦
							DS7-34DSX200N0-D ⑧

Notes

① Maximum values may be higher than allowed per NEC 430.52 and UL 508A 31.1.
② XTOBXDIND Panel Mounting Adapter must be used with this overload.
③ XTOBXTLL line and load lugs must be used with this overload.
④ ZEB-XCT300 current transformer must be used with this overload.
⑤ 24 Vac/Vdc device.
⑥ –40 °C rated low temperature version available in 24 Vac/Vdc, change to "N0-L."
⑦ 110/230 Vac device.
⑧ 24 Vdc for SmartWire-DT device.

Considerations

1. Either XTOB, C306 or C440 series or equivalent overload protection devices may be selected.
2. Contactor is optional for normal applications. It is recommended for mains isolation.

Power Supply

Eaton's PSG and ELC power supplies are recommended as a compact and low-cost source for 24 Vdc power. The lightweight, DIN rail mounted devices have a wide input voltage range, and robust screw terminals make these power supplies easy to install and use. These power supplies are available in 1A and 2A models.

Power Supply Selection

Description	Catalog Number
85–264 V input and 24 Vdc output	**ELC-PS01**
100–240 V input and 24 Vdc output	**PSG60E**
400–500 V input and 24 Vdc output	**PSG60F24RM**

Accessories

Device Fans

Description	For Use With …	Std. Pack	Catalog Number
DS7-FAN-032  Device fan for increasing the load cycle (more starts per hour higher or longer ramp times exceeding 10 seconds.	DS7-34…SX004… DS7-34…SX007… DS7-34…SX009… DS7-34…SX012… DS7-34…SX016… DS7-34…SX024… DS7-34…SX032…	1 off	**DS7-FAN-032** ①

Note

① NA Certification. Request filed for UL and CSA.

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Technical Data and Specifications

DS7 Soft Start Controllers

Rated Control Circuit

Voltage 24 Vac/Vdc Voltage 110/230 Vac Voltage 24 Vdc	Unit	DS7-340SX004N0-N DS7-342SX004N0-N DS7-34DSX004N0-D	DS7-340SX007N0-N DS7-342SX007N0-N DS7-34DSX007N0-D	DS7-340SX009N0-N DS7-342SX009N0-N DS7-34DSX009N0-D	DS7-340SX012N0-N DS7-342SX012N0-N DS7-34DSX012N0-D
General					
Standards		IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking
Certifications/marking		UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick
Ambient temperature (operation)	°C	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version
Ambient temperature (storage)	°C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C
Altitude		0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m
Installation		Vertical	Vertical	Vertical	Vertical
Protection class		IP20	IP20	IP20	IP20
Protection class applies to the front and operator control and display elements. Protection type from all sides is IP00.		With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved
Busbar tag shroud		Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)
Overvoltage category/ pollution degree		II/2	II/2	II/2	II/2
Shock resistance		8g/11ms	8g/11ms	8g/11ms	8g/11ms
Vibration resistance according to EN 60721-3-2		2M2	2M2	2M2	2M2
Mean heat dissipation at rated duty cycle	W	0.2	0.35	0.35	0.6
Radio interference		B	B	B	B
Dimensions (W x H x D)					
DS7-340… and DS7-342…	in (mm)	1.77 x 5.12 x 3.74 (45 x 130 x 95)	1.77 x 5.12 x 3.74 (45 x 130 x 95)	1.77 x 5.12 x 3.74 (45 x 130 x 95)	1.77 x 5.12 x 3.74 (45 x 130 x 95)
DS7-34D…	in (mm)	1.77 x 5.31 x 3.74 (45 x 135 x 95)	1.77 x 5.31 x 3.74 (45 x 135 x 95)	1.77 x 5.31 x 3.74 (45 x 135 x 95)	1.77 x 5.31 x 3.74 (45 x 135 x 95)
Weight					
DS7-340…	lb (kg)	0.77 (0.35)	0.77 (0.35)	0.77 (0.35)	0.77 (0.35)
DS7-342…	lb (kg)	0.88 (0.40)	0.88 (0.40)	0.88 (0.40)	0.88 (0.40)
DS7-34D…	lb (kg)	0.90 (0.41)	0.90 (0.41)	0.90 (0.41)	0.90 (0.41)
Main Circuit					
Rated operational voltage	V	230–460 Vac	230–460 Vac	230–460 Vac	230–460 Vac
Mains frequency	Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated operation current AC 53	I_e	4	7	9	12
Motor Power Ratings					
200 V	hp	0.75	1.5	2	3
230 V	hp	0.75	2	2	5
480 V	hp	2	3	5	10
230 V	kW	0.75	1.5	2.2	3
400 V	kW	1.5	3	4	5.5
Overload cycle according to EN 60947-4-2		4A: AC53a; 3-5; 75-10	7A: AC53a; 3-5; 75-10	9A: AC53a; 3-5; 75-10	12A: AC53a; 3-5; 75-10

DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc **Voltage 110/230 Vac** **Voltage 24 Vdc**	**Unit**	**DS7-340SX004N0-N** **DS7-342SX004N0-N** **DS7-34DSX004N0-D**	**DS7-340SX007N0-N** **DS7-342SX007N0-N** **DS7-34DSX007N0-D**	**DS7-340SX009N0-N** **DS7-342SX009N0-N** **DS7-34DSX009N0-D**	**DS7-340SX012N0-N** **DS7-342SX012N0-N** **DS7-34DSX012N0-D**
Wire Specifications					
Power terminals					
Single conductor—solid or stranded	AWG	18–10	18–10	18–10	18–10
Terminal torque	lb-in	11	11	11	11
Control signals					
Single conductor—solid or stranded	AWG	18–10	18–10	18–10	18–10
Terminal torque	lb-in	11	11	11	11
Power Section					
Rated impulse withstand voltage	U_{imp} 1.2/ 50 s	4 kV	4 kV	4 kV	4 kV
Rated insulation voltage		500	500	500	500
Control Commands—Vac/Vdc					
Supply voltage control board U_s nominal	Vac/Vdc	20.4–26.4	20.4–26.4	20.4–26.4	20.4–26.4
Current consumption at 24 Vac/Vdc	mA	1.6	1.6	1.6	1.6
Pick-up voltage		+17.3–+27	+17.3–+27	+17.3–+27	+17.3–+27
Drop-out voltage		+3–0	+3–0	+3–0	+3–0
Relay Outputs					
Number of relays		1 (TOR)	1 (TOR)	1 (TOR)	1 (TOR)
Maximum voltage	Vac	250	250	250	250
Maximum current	A	1A	1A	1A	1A
Soft Start Functions					
Ramp times					
Start ramp	s	1–30	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30	0–30
Initial voltage % line voltage					
DS7-342…		30–92%	30–92%	30–92%	30–92%
DS7-340…		30–100%	30–100%	30–100%	30–100%
DS7-34D…		30–92%	30–92%	30–92%	30–92%
Control Commands—Vac					
Supply voltage control board U_s nominal	Vac	102–253	102–253	102–253	102–253
Current consumption at 24 Vac/Vdc	mA	4	4	4	4
Pick-up voltage	Vac	102–230	102–230	102–230	102–230
Drop-out voltage	Vac	0–28	0–28	0–28	0–28
Relay Outputs					
Number of relays		1 (TOR)	1 (TOR)	1 (TOR)	1 (TOR)
Maximum voltage	Vac	250	250	250	250
Maximum current	A	3A	3A	3A	3A
Soft Start Functions					
Ramp times					
Start ramp	s	1–30	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30	0–30
Initial voltage % line voltage		30–92%	30–92%	30–92%	30–92%

DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc Voltage 110/230 Vac Voltage 24 Vdc	**Unit**	**DS7-340SX016N0-N DS7-342SX016N0-N DS7-34DSX016N0-D**	**DS7-340SX024N0-N DS7-342SX024N0-N DS7-34DSX024N0-D**	**DS7-340SX032N0-N DS7-342SX032N0-N DS7-34DSX032N0-D**
General				
Standards		IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking
Certifications/marking		UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick
Ambient temperature (operation)	°C	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version
Ambient temperature (storage)	°C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C
Altitude		0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m
Installation		Vertical	Vertical	Vertical
Protection class		IP20	IP20	IP20
Protection class applies to the front and operator control and display elements. Protection type from all sides is IP00.		With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved
Busbar tag shroud		Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)
Overvoltage category/ pollution degree		II/2	II/2	II/2
Shock resistance		8g/11ms	8g/11ms	8g/11ms
Vibration resistance according to EN 60721-3-2		2M2	2M2	2M2
Mean heat dissipation at rated duty cycle	W	0.8	1.1	1.5
Radio interference		B	B	B
Dimensions (W x H x D)				
DS7-340… and DS7-342…	in (mm)	1.77 x 5.91 x 4.65 (45 x 150 x 118)	1.77 x 5.91 x 4.65 (45 x 150 x 118)	1.77 x 5.91 x 4.65 (45 x 150 x 118)
DS7-34D…	in (mm)	1.77 x 5.91 x 4.65 (45 x 150 x 118)	1.77 x 5.91 x 4.65 (45 x 150 x 118)	1.77 x 5.91 x 4.65 (45 x 150 x 118)
Weight				
DS7-340…	lb (kg)	0.88 (0.40)	0.88 (0.40)	0.88 (0.40)
DS7-342…	lb (kg)	0.99 (0.45)	0.99 (0.45)	0.99 (0.45)
DS7-34D…	lb (kg)	0.90 (0.41)	0.90 (0.41)	0.90 (0.41)
Main Circuit				
Rated operational voltage	V	230–460 Vac	230–460 Vac	230–460 Vac
Mains frequency	Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated operation current AC 53	I_e	16	24	32
Motor Power Ratings				
200 V	hp	3	5	10
230 V	hp	5	7.5	10
480 V	hp	10	15	25
230 V	kW	4	5.5	7.5
400 V	kW	7.5	11	15
Overload cycle according to EN 60947-4-2		16A: AC53a; 3-5; 75-10	24A: AC53a; 3-5; 75-10	32A: AC53a; 3-5; 75-10

DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc **Voltage 110/230 Vac** **Voltage 24 Vdc**	**Unit**	**DS7-340SX016N0-N** **DS7-342SX016N0-N** **DS7-34DSX016N0-D**	**DS7-340SX024N0-N** **DS7-342SX024N0-N** **DS7-34DSX024N0-D**	**DS7-340SX032N0-N** **DS7-342SX032N0-N** **DS7-34DSX032N0-D**
Wire Specifications				
Power terminals				
Single conductor—solid or stranded	AWG	18–6	18–6	18–6
Terminal torque	lb-in	11	11	11
Control Signals				
Single conductor—solid or stranded	AWG	18–10	18–10	18–10
Terminal torque	lb-in	11	11	11
Power Section				
Rated impulse withstand voltage	U_{imp} 1.2/ 50 s	4 kV	4 kV	4 kV
Rated insulation voltage		500	500	500
Control Commands—Vac/Vdc				
Supply voltage control board U_S nominal	Vac/Vdc	20.4–26.4	20.4–26.4	20.4–26.4
Current consumption at 24 Vac/Vdc	mA	1.6	1.6	1.6
Pick-up voltage		+17.3–+27	+17.3–+27	+17.3–+27
Drop-out voltage		+3–0	+3–0	+3–0
Relay Outputs				
Number of relays		2 (TOR, Ready)	2 (TOR, Ready)	2 (TOR, Ready)
Maximum voltage	Vac	250	250	250
Maximum current	A	1A	1A	1A
Soft Start Functions				
Ramp times				
Start ramp	s	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30
Initial voltage % line voltage				
DS7-342…		30–92%	30–92%	30–92%
DS7-340…		30–100%	30–100%	30–100%
DS7-34D…		30–92%	30–92%	30–92%
Control Commands—Vac				
Supply voltage control board U_S nominal	Vac	102–253	102–253	102–253
Current consumption at 102–253 Vac	mA	4	4	4
Pick-up voltage	Vac	102–230	102–230	102–230
Drop-out voltage	Vac	0–28	0–28	0–28
Relay Outputs				
Number of relays		2 (TOR, Run)	2 (TOR, Run)	2 (TOR, Run)
Maximum voltage	Vac	250	250	250
Maximum current	A	3A	3A	3A
Soft Start Functions				
Ramp times				
Start ramp	s	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30
Initial voltage % line voltage		30–92%	30–92%	30–92%

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DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc Voltage 110/230 Vac Voltage 24 Vdc	Unit	DS7-340SX041N0-N DS7-342SX041N0-N DS7-34DSX041N0-D	DS7-340SX055N0-N DS7-342SX055N0-N DS7-34DSX055N0-D	DS7-340SX070N0-N DS7-342SX070N0-N DS7-34DSX070N0-D	DS7-340SX081N0-N DS7-342SX081N0-N DS7-34DSX081N0-D
General					
Standards		IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking
Certifications/marking		UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick
Ambient temperature (operation)	°C	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version
Ambient temperature (storage)	°C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C
Altitude		0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m
Installation		Vertical	Vertical	Vertical	Vertical
Protection class		IP20	IP20	IP20	IP20
Protection class applies to the front and operator control and display elements. Protection type from all sides is IP00.		With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved
Busbar tag shroud		Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)
Overvoltage category/ pollution degree		II/2	II/2	II/2	II/2
Shock resistance		8g/11ms	8g/11ms	8g/11ms	8g/11ms
Vibration resistance according to EN 60721-3-2		2M2	2M2	2M2	2M2
Mean heat dissipation at rated duty cycle	W	7	10	13	18
Radio interference		B	B	B	B
Dimensions (W x H x D)					
DS7-340…, DS7-342… and DS7-34D…	in (mm)	3.66 x 6.89 x 5.47 (93 x 175 x 139)	3.66 x 6.89 x 5.47 (93 x 175 x 139)	3.66 x 6.89 x 5.47 (93 x 175 x 139)	3.66 x 6.89 x 5.47 (93 x 175 x 139)
Weight					
DS7-340…, DS7-342… and DS7-34D…	lb (kg)	3.97 (1.8)	3.97 (1.8)	3.97 (1.8)	3.97 (1.8)
Main Circuit					
Rated operational voltage	V	230–460 Vac	230–460 Vac	230–460 Vac	230–460 Vac
Mains frequency	Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated operation current AC 53	I_e	41	55	70	81
Motor Power Ratings					
200 V	hp	10	15	20	25
230 V	hp	10	20	25	30
480 V	hp	30	40	50	60
230 V	kW	11	15	15	22
400 V	kW	22	30	37	45
Overload cycle according to EN 60947-4-2		41A: AC53a; 3-5; 75-10	55A: AC53a; 3-5; 75-10	70A: AC53a; 3-5; 75-10	81A: AC53a; 3-5; 75-10

DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc **Voltage 110/230 Vac** **Voltage 24 Vdc**	**Unit**	**DS7-340SX041N0-N** **DS7-342SX041N0-N** **DS7-34DSX041N0-D**	**DS7-340SX055N0-N** **DS7-342SX055N0-N** **DS7-34DSX055N0-D**	**DS7-340SX070N0-N** **DS7-342SX070N0-N** **DS7-34DSX070N0-D**	**DS7-340SX081N0-N** **DS7-342SX081N0-N** **DS7-34DSX081N0-D**
Wire Specifications					
Power terminals					
Single conductor—solid or stranded	AWG	12–2/0	12–2/0	12–2/0	12–2/0
Terminal torque	lb-in	53–80	53–80	53–80	53–80
Control signals					
Single conductor—solid or stranded	AWG	18–10	18–10	18–10	18–10
Terminal torque	lb-in	11	11	11	11
Power Section					
Rated impulse withstand voltage	U_{imp} 1.2/ 50 s	4 kV	4 kV	4 kV	4 kV
Rated insulation voltage		500	500	500	500
Control Commands—24 Vac/Vdc					
Supply voltage control board U_s nominal	Vac/Vdc	20.4–26.4	20.4–26.4	20.4–26.4	20.4–26.4
Current consumption at 24 Vac/Vdc	mA	65	65	65	65
Pick-up voltage		+17.3–+27	+17.3–+27	+17.3–+27	+17.3–+27
Drop-out voltage		+3–0	+3–0	+3–0	+3–0
Relay Outputs					
Number of relays		2 (TOR)	2 (TOR)	2 (TOR)	2 (TOR)
Maximum voltage	Vac	250	250	250	250
Maximum current	A	1A	1A	1A	1A
Soft Start Functions					
Ramp times					
Start ramp	s	1–30	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30	0–30
Initial voltage % line voltage					
DS7-342…		30–92%	30–92%	30–92%	30–92%
DS7-340…		30–100%	30–100%	30–100%	30–100%
DS7-34D…		30–92%	30–92%	30–92%	30–92%
Control Commands—110–230 Vac					
Supply voltage control board U_s nominal	Vac	102–253	102–253	102–253	102–253
Current consumption at 24 Vac/Vdc	mA	14	14	14	14
Pick-up voltage	Vac	102–230	102–230	102–230	102–230
Drop-out voltage	Vac	0–28	0–28	0–28	0–28
Relay Outputs					
Number of relays		2 (TOR)	2 (TOR)	2 (TOR)	2 (TOR)
Maximum voltage	Vac	250	250	250	250
Maximum current	A	3A	3A	3A	3A
Soft Start Functions					
Ramp times					
Start ramp	s	1–30	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30	0–30
Initial voltage % line voltage		30–92%	30–92%	30–92%	30–92%

DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc Voltage 110/230 Vac Voltage 24 Vdc	Unit	DS7-340SX100N0-N DS7-342SX100N0-N DS7-34DSX100N0-D	DS7-340SX135N0-N DS7-342SX135N0-N DS7-34DSX135N0-D	DS7-340SX160N0-N DS7-342SX160N0-N DS7-34DSX160N0-D	DS7-340SX200N0-N DS7-342SX200N0-N DS7-34DSX200N0-D
General					
Standards		IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking	IEC/EN 60947-4-2; GB14048.6; UL508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking
Certifications/marking		UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick	UL/CE/CSA/C-Tick
Ambient temperature (operation)	°C	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version	0 to 40 °C, above 40 °C de-rate linearly by 1% of rated current per Celsius to 60 °C –40 to +40 °C for low temperature version
Ambient temperature (storage)	°C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C
Altitude		0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m	0–1000m, above 1000m de-rate linearly by 2.5% of rated current per 100m to a maximum of 2000m
Installation		Vertical	Vertical	Vertical	Vertical
Protection class		IP20	IP20	IP20	IP20
Protection class applies to the front and operator control and display elements. Protection type from all sides is IP00.		With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved	With optional covers from the NZM range, protection type IP40 from all sides can be achieved
Busbar tag shroud		Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)	Back of hand and finger-proof (from front face)
Overvoltage category/ pollution degree		II/2	II/2	II/2	II/2
Shock resistance		8g/11ms	8g/11ms	8g/11ms	8g/11ms
Vibration resistance according to EN 60721-3-2		2M2	2M2	2M2	2M2
Mean heat dissipation at rated duty cycle	W	25	24	30	42
Radio interference		B	B	B	B
Dimensions (W x H x D)					
DS7-340…, DS7-342… and DS7-34D…	in (mm)	3.66 x 6.89 x 5.47 (93 x 175 x 139)	4.25 x 8.46 x 7.01 (108 x 215 x 178)	4.25 x 8.46 x 7.01 (108 x 215 x 178)	4.25 x 8.46 x 7.01 (108 x 215 x 178)
Weight					
DS7-340…, DS7-342… and DS7-34D…	lb (kg)	3.97 (1.8)	8.16 (3.7)	8.16 (3.7)	8.16 (3.7)
Main Circuit					
Rated operational voltage	V	230–460 Vac	230–460 Vac	230–460 Vac	230–460 Vac
Mains frequency	Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated operation current AC 53	I_e	100	135	160	200
Motor Power Ratings					
200 V	hp	30	40	50	60
230 V	hp	30	50	60	75
480 V	hp	75	100	125	150
230 V	kW	30	30	45	55
400 V	kW	55	75	90	110
Overload cycle according to EN 60947-4-2		100A: AC53a; 3-5; 75-10	135A: AC53a; 3-5; 75-10	160A: AC53a; 3-5; 75-10	200A: AC53a; 3-5; 75-10

DS7 Soft Start Controllers, continued

Rated Control Circuit

Voltage 24 Vac/Vdc Voltage 110/230 Vac Voltage 24 Vdc	Unit	DS7-340SX100N0-N DS7-342SX100N0-N DS7-34DSX100N0-D	DS7-340SX135N0-N DS7-342SX135N0-N DS7-34DSX135N0-D	DS7-340SX160N0-N DS7-342SX160N0-N DS7-34DSX160N0-D	DS7-340SX200N0-N DS7-342SX200N0-N DS7-34DSX200N0-D
Wire Specifications					
Power terminals					
Single conductor—solid or stranded	AWG	12–2/0	12–350 kcmil	12–350 kcmil	12–350 kcmil
Terminal torque	lb-in	53–80	44–123	44–123	44–123
Control signals					
Single conductor—solid or stranded	AWG	18–10	18–10	18–10	18–10
Terminal torque	lb-in	11	11	11	11
Power Section					
Rated impulse withstand voltage	U_{imp} 1.2/ 50 s	4 kV	4 kV	4 kV	4 kV
Rated insulation voltage		500	500	500	500
Control Commands—24 Vac/Vdc					
Supply voltage control board U_s nominal	Vac/Vdc	20.4–26.4	20.4–26.4	20.4–26.4	20.4–26.4
Current consumption at 24 Vac/Vdc	mA	65	65	65	65
Pick-up voltage		+17.3–+27	+17.3–+27	+17.3–+27	+17.3–+27
Drop-out voltage		+3–0	+3–0	+3–0	+3–0
Relay Outputs					
Number of relays		2 (TOR)	2 (TOR)	2 (TOR)	2 (TOR)
Maximum voltage	Vac	250	250	250	250
Maximum current	A	1A	1A	1A	1A
Soft Start Functions					
Ramp times					
Start ramp	s	1–30	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30	0–30
Initial voltage % line voltage					
DS7-342…		30–92%	30–92%	30–92%	30–92%
DS7-340…		30–100%	30–100%	30–100%	30–100%
DS7-34D…		30–92%	30–92%	30–92%	30–92%
Control Commands—110–230 Vac					
Supply voltage control board U_s nominal	Vac	102–253	102–253	102–253	102–253
Current consumption at 24 Vac/Vdc	mA	14	14	14	14
Pick-up voltage	Vac	102–230	102–230	102–230	102–230
Drop-out voltage	Vac	0–28	0–28	0–28	0–28
Relay Outputs					
Number of relays		2 (TOR)	2 (TOR)	2 (TOR)	2 (TOR)
Maximum voltage	Vac	250	250	250	250
Maximum current	A	3A	3A	3A	3A
Soft Start Functions					
Ramp times					
Start ramp	s	1–30	1–30	1–30	1–30
Stop ramp	s	0–30	0–30	0–30	0–30
Initial voltage % line voltage		30–92%	30–92%	30–92%	30–92%

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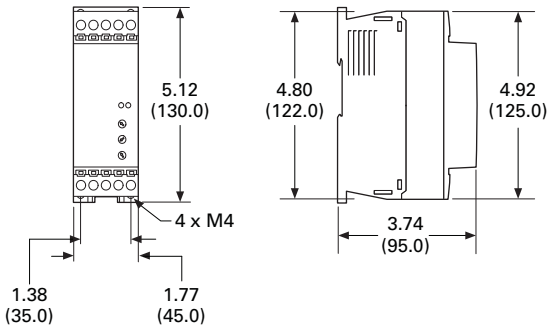
Dimensions

Approximate Dimensions in Inches (mm)

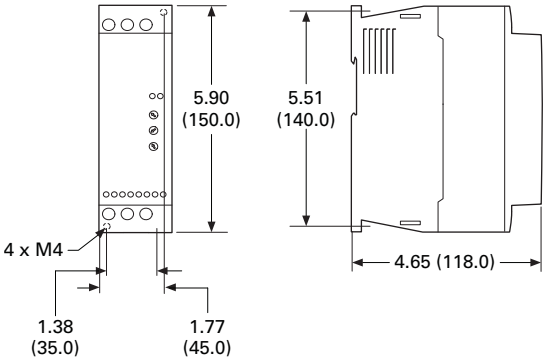
Frame 1



Catalog Numbers

DS7-340SX004N0-N	DS7-342SX004N0-N
DS7-340SX007N0-N	DS7-342SX007N0-N
DS7-340SX009N0-N	DS7-342SX009N0-N
DS7-340SX012N0-N	DS7-342SX012N0-N

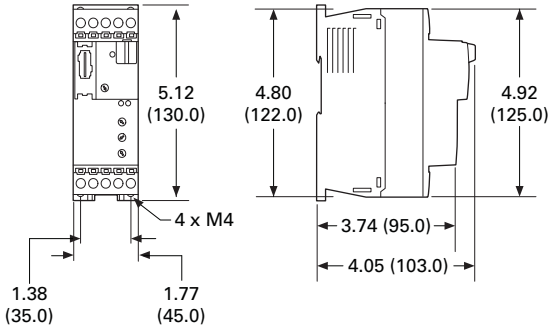
Frame 2



Catalog Numbers

DS7-340SX016N0-N	DS7-342SX016N0-N
DS7-340SX024N0-N	DS7-342SX024N0-N
DS7-340SX032N0-N	DS7-342SX032N0-N

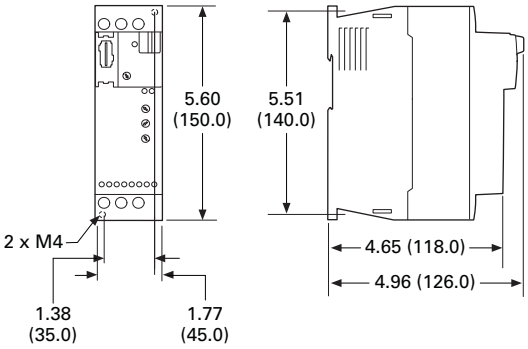
Frame 1—SmartWire-DT



Catalog Numbers

DS7-34DSX004N0-D	DS7-34DSX009N0-D
DS7-34DSX007N0-D	DS7-34DSX012N0-D

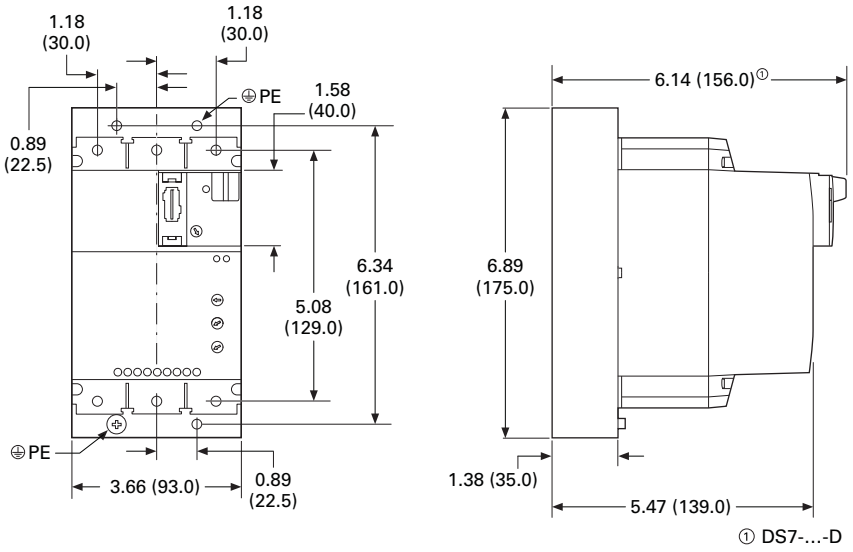
Frame 2—SmartWire-DT



Catalog Numbers

DS7-34DSX016N0-D
DS7-34DSX024N0-D
DS7-34DSX032N0-D

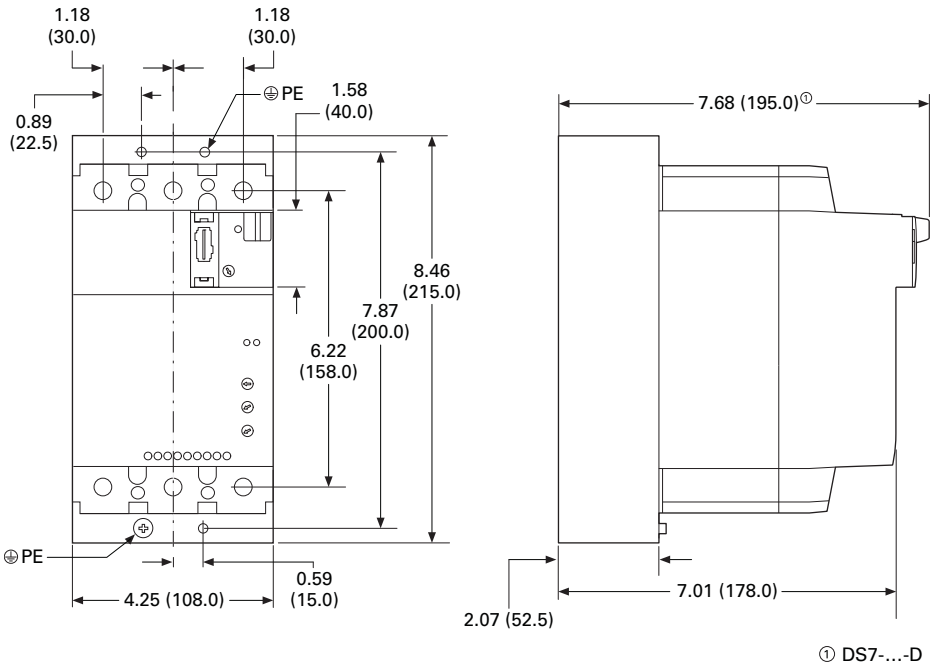
Frame 3—SmartWire-DT and Standard (Non SmartWire-DT)



Catalog Numbers

DS7-340SX041N0-N	DS7-342SX041N0-N	DS7-34DSX041N0-D
DS7-340SX055N0-N	DS7-342SX055N0-N	DS7-34DSX055N0-D
DS7-340SX070N0-N	DS7-342SX070N0-N	DS7-34DSX070N0-D
DS7-340SX081N0-N	DS7-342SX081N0-N	DS7-34DSX081N0-D
DS7-340SX100N0-N	DS7-342SX100N0-N	DS7-34DSX100N0-D

Frame 4—SmartWire-DT and Standard (Non SmartWire-DT)



Catalog Numbers

DS7-342SX135N0-N	DS7-340SX135N0-N	DS7-34DSX135N0-D
DS7-342SX160N0-N	DS7-340SX160N0-N	DS7-34DSX160N0-D
DS7-342SX200N0-N	DS7-340SX200N0-N	DS7-34DSX200N0-D

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Type S701, Soft Start Controllers

Contents

Type S701, Soft Start Controllers

Product Description

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-phase motors. The S701 provides the user with the ability to adjust initial torque, ramp up and down time, and also select kick start for high inertial loads.

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) three-phase motors. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a manual motor starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 600 Vac
- Control voltage range from 24–480 Vac/Vdc
- Adjustable ramp times (0.5–10 seconds)
- Adjustable initial torque control (0–85%)
- Kick start feature
- Soft stop (0.5–10 seconds)
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- Fractional to 15 hp motors at 480 V (20 hp at 600 V)

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- CSA certified
- UL listed (E108212)
- cUL listed

Listed Listed

Catalog Number Selection

S701 Soft Starters

S701 C 15 N 3 S

Soft Start Controller

Line Voltage
C = 208–240 Vac
D = 380–415 Vac
E = 380–480 Vac
G = 550–600 Vac

Ampere Rating
03 = 3.5A
15 = 15A
25 = 25A

Options
N = No special options
B = Braking

Number of Poles
3 = (Only three at this time)

Control Options
S = Standard
BP = Auxiliary contact

Product Selection

S701E15N3S

S701E25N3S

Soft Start Controllers

Rated Current	Line Voltage	Control Voltage (Vac/Vdc)	Three-Phase Motor kW Rating (50 Hz)			hp Rating (60 Hz)								Catalog Number
						200 V		230 V		460 V		575 V		
			230 V	380–400 V	440 V	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	
3.5	208–240	24–230	7.5	N/A	N/A	1	1	1	1	N/A	N/A	N/A	N/A	**S701C03N3S**
3.5	380–415	24–415	N/A	1.1	N/A	N/A	N/A	N/A	N/A	1-1/2	1-1/2	N/A	N/A	**S701D03N3S**
3.5	440–480	24–480	N/A	N/A	1.5	N/A	N/A	N/A	N/A	2	2	N/A	N/A	**S701E03N3S**
3.5	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	2	**S701G03N3S**
15	208–240	24–230	4	N/A	N/A	3	3	3	3	N/A	N/A	N/A	N/A	**S701C15N3S**
15	380–480	24–480	N/A	5.5	7.5	N/A	N/A	N/A	N/A	10	7-1/2	N/A	N/A	**S701E15N3S**
15	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	10	**S701G15N3S**
25	208–240	24–230	7.5	N/A	N/A	5	5	7-1/2	5	N/A	N/A	N/A	N/A	**S701C25N3S**
25	380–480	24–480	N/A	11	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	**S701E25N3S**
25	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	**S701G25N3S**

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Technical Data and Specifications

Soft Starters—S701…03N3S

Description	S701C03N3S	S701D03N3S	S701E03N3S	S701G03N3S
Maximum current capacity	3.5	3.5	3.5	3.5
Trip Class				
10A	3.5	3.5	3.5	3.5
10	3.5	3.5	3.5	3.5
20	2.8	2.8	2.8	2.8
30	2.1	2.1	2.1	2.1
Electrical Characteristics				
Line voltage (Vac)	208–240	380–415	440–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–230	24–415	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms	70 ms
Control Characteristics				
Ramp time (secs)	0.5–10	0.5–10	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%	85%
Soft stop (secs)	0.5–10	0.5–10	0.5–10	0.5–10
Environment Characteristics				
Temperature–operating (no derating)	–30 ° to 40 °C	–30 ° to 40 °C	–30 ° to 40 °C	–30 ° to 40 °C
Current rating 50 °C	N/A	N/A	N/A	N/A
Limited duty cycle 50 °C	N/A	N/A	N/A	N/A
Current rating 60 °C	N/A	N/A	N/A	N/A
Limited duty cycle 60 °C	N/A	N/A	N/A	N/A
Temperature–storage	–30 ° to 80 °C	–30 ° to 80 °C	–30 ° to 80 °C	–30 ° to 80 °C
Altitude (meters)–no derating	2000	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30 °	Vertical ±30 °	Vertical ±30 °	Vertical ±30 °
Impulse withstand voltage IEC 947-4-1	4000 V	4000 V	4000 V	4000 V
Rated insulation voltage (Ui)	660 V	660 V	660 V	660 V
Installation category	III	III	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle
Power dissipation for continuous operation	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle
Cooling method	Natural convection	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20	IP20
Pollution degree	3	3	3	3
Agency approvals	UL, cUL, CE	UL, cUL, CE	UL, cUL, CE	UL, cUL, CE

Soft Starters—S701…15N3S

Description	S701C15N3S	S701E15N3S	S701G15N3S
Maximum current capacity	15	15	15
Trip Class			
10A	15	15	15
10	15	15	15
20	12	12	12
30	10	10	10
Electrical Characteristics			
Line voltage (Vac)	208–240	380–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–230	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms
Control Characteristics			
Ramp time (secs)	0.5–10	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%
Soft stop (secs)	0.5–10	0.5–10	0.5–10
Environment Characteristics			
Temperature–operating (no derating)	–30 ° to 40 °C	–30 ° to 40 °C	–30 ° to 40 °C
Current rating 50 °C	12.5A	12.5A	12.5A
Limited duty cycle 50 °C	15A on-time max. 15 min. duty cycle max. 0.8	15A on-time max. 15 min. duty cycle max. 0.8	15A on-time max. 15 min. duty cycle max. 0.8
Current rating 60 °C	10A	10A	10A
Limited duty cycle 60 °C	15A on-time max. 15 min. duty cycle max. 0.65	15A on-time max. 15 min. duty cycle max. 0.65	15A on-time max. 15 min. duty cycle max. 0.65
Temperature–storage	–30 ° to 80 °C	–30 ° to 80 °C	–30 ° to 80 °C
Altitude (meters)–no derating	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30 °	Vertical ±30 °	Vertical ±30 °
Impulse withstand voltage IEC 947-4-1	4000 V	4000 V	4000 V
Rated insulation voltage (Ui)	660 V	660 V	660 V
Installation category	III	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	2 W/A x duty cycle	2 W/A x duty cycle	2 W/A x duty cycle
Power dissipation for continuous operation	2 W/A	2 W/A	2 W/A
Cooling method	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20
Pollution degree	3	3	3
Agency approvals	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE

Soft Starters—S701…25N3S

Description	S701C25N3S	S701E25N3S	S701G25N3S
Maximum current capacity	25	25	25
Trip Class			
10A	25	25	25
10	25	25	25
20	20	20	20
30	15	15	15
Electrical Characteristics			
Line voltage (Vac)	208–240	380–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–230	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms
Control Characteristics			
Ramp time (secs)	0.5–10	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%
Soft stop (secs)	0.5–10	0.5–10	0.5–10
Environment Characteristics			
Temperature–operating (no derating)	–30 ° to 40 °C	–30 ° to 40 °C	–30 ° to 40 °C
Current rating 50 °C	20A	20A	20A
Limited duty cycle 50 °C	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8
Current rating 60 °C	17A	17A	17A
Limited duty cycle 60 °C	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65
Temperature–storage	–30 ° to 80 °C	–30 ° to 80 °C	–30 ° to 80 °C
Altitude (meters)–no derating	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30 °	Vertical ±30 °	Vertical ±30 °
Impulse withstand voltage IEC 947-4-1	4000 V	4000 V	4000 V
Rated insulation voltage (Ui)	660 V	660 V	660 V
Installation category	III	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	2 W/A x duty cycle	2 W/A x duty cycle	2 W/A x duty cycle
Power dissipation for continuous operation	2 W/A	2 W/A	2 W/A
Cooling method	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20
Pollution degree	3	3	3
Agency approvals	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE

Dimensions

Approximate Dimensions in Inches (mm)

Soft Starters—S701…N3S

Catalog Number	W	H	D	Weight in lb (kg)
S701C03N3S	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
S701D03N3S	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
S701E03N3S	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
S701G03N3S	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
S701C15N3S	1.77 (45)	3.94 (100)	5.04 (128)	1.52 (690)
S701E15N3S	1.77 (45)	3.94 (100)	5.04 (128)	1.52 (690)
S701G15N3S	1.77 (45)	3.94 (100)	5.04 (128)	1.52 (690)
S701C25N3S	3.54 (90)	3.94 (100)	5.04 (128)	2.53 (1150)
S701E25N3S	3.54 (90)	3.94 (100)	5.04 (128)	2.53 (1150)
S701G25N3S	3.54 (90)	3.94 (100)	5.04 (128.	2.53 (1150)

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Type S701, Soft Start Controllers with Auxiliary Contact

Contents

Type S701, Soft Start Controllers with Auxiliary Contact

Product Description

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-phase motors. With the auxiliary contact, it is possible to control an external bypass to reduce heating and increase acceleration and deceleration times.

The unit provides the user with the ability to adjust initial torque, ramp up and down time and also select kick start for high inertia loads.

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) three-phase motors. The auxiliary contact is designed to work in conjunction with an across-the-line contactor. The purpose of the contactor is to provide a parallel current path once the soft starter has brought the motor up to speed. Once the soft start controller reaches end of ramp, the auxiliary contact will close and send a signal to close the bypass contactor, thus providing a low impedance path for the current to the motor. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a manual motor protector or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 600 Vac
- Control voltage range from 24–300 Vac/Vdc
- Adjustable ramp times (0.5–20 seconds)
- Adjustable initial torque control (0–85%)
- Kick start feature (0–85% adjustment)
- Kick start for 200 ms
- Soft stop (0.5–20 seconds)
- IP20 finger protection
- Available up to 30A (with Bypass installed)
- Auxiliary contact for up-to-speed indication

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Bypass option allows for greater current capacity in the unit
- Bypass option helps to reduce heat in the enclosure
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- UL listed (E108212)
- cUL listed

CE UL Listed c UL Listed

Product Selection

For S701 catalog number selection, see **Page V6-T1-27**.

S701

Soft Start Controllers with Auxiliary Contact

Rated Current	Line Voltage	Control Voltage (Vac/Vdc)	Three-Phase Motor kW Rating (50 Hz) 230 V	380–400 V	440 V	hp Rating 200 V 1.0 SF	200 V 1.15 SF	230 V 1.0 SF	230 V 1.15 SF	460 V 1.0 SF	460 V 1.15 SF	575 V 1.0 SF	575 V 1.15 SF	Catalog Number
Ratings without Bypass														
25	208–240	24–230	5.5	N/A	N/A	5	5	7-1/2	5	N/A	N/A	N/A	N/A	**S701C25N3BP**
25	380–480	24–480	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	**S701E25N3BP**
25	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	**S701G25N3BP**
Ratings with Bypass														
30	208–240	24–230	7.5	N/A	N/A	7-1/2	7-1/2	10	7-1/2	N/A	N/A	N/A	N/A	**S701C25N3BP**
30	380–480	24–480	N/A	15	15	N/A	N/A	N/A	N/A	20	15	N/A	N/A	**S701E25N3BP**
30	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	20	**S701G25N3BP**

Technical Data and Specifications

Soft Starters with Auxiliary Contact—S701…25N3BP

Description	S701C25N3BP	S701E25N3BP	S701G25N3BP
Maximum current capacity with bypass (without bypass)	30 (25)	30 (25)	30 (25)
Trip Class			
10A	30 (25)	30 (25)	30 (25)
10	30 (25)	30 (25)	30 (25)
20	24 (20)	24 (20)	24 (20)
30	19.5 (15)	19.5 (15)	19.5 (15)
Electrical Characteristics			
Line voltage (Vac)	208–240	380–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–230	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms

Soft Starters with Auxiliary Contact—S701…25N3BP, continued

Description	S701C25N3BP	S701E25N3BP	S701G25N3BP
Control Characteristics			
Ramp time (secs)	0.5–20	0.5–20	0.5–20
Ramp settings (% LRT)	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%
Soft stop (secs)	0.5–20	0.5–20	0.5–20
Environmental Characteristics			
Temperature—operating (no derating)	–30 ° to 40 °C	–30 ° to 40 °C	–30 ° to 40 °C
Current rating 50 °C	20A	20A	20A
Limited duty cycle 50 °C	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8
Current rating 60 °C	17A	17A	17A
Limited duty cycle 60 °C	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65
Temperature—storage	–30 ° to 80 °C	–30 ° to 80 °C	–30 ° to 80 °C
Altitude (meters)—no derating	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30 °	Vertical ±30 °	Vertical ±30 °
Impulse withstand voltage IEC 947-4-1	4000 V	4000 V	4000 V
Rated insulation voltage (Ui)	660 V	660 V	660 V
Installation category	III	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for continuous operation	2 W/A without bypass	2 W/A without bypass	2 W/A without bypass
Power dissipation with semiconductor bypassed	5 W/A max. with bypass	5 W/A max. with bypass	5 W/A max. with bypass
Cooling method	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20
Pollution degree	3	3	3
Agency approvals	UL, cUL, CE	UL, cUL, CE	UL, cUL, CE

Dimensions

Approximate Dimensions in Inches (mm)

Soft Starters with Auxiliary Contact—S701…25N3BP

Catalog Number	W	H	D	Weight in lb (kg)
S701C25N3BP	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)
S701E25N3BP	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)
S701G25N3BP	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)

Type S701, Soft Start Controllers with Brake

Contents

Type S701, Soft Start Controllers with Brake

Product Description

The S701 soft start controller with DC injection brake is designed to control acceleration and deceleration of three-phase motors. Brake current is adjustable from 0–50A DC. The ramp-up feature is adjustable from 0.5–10 seconds. Torque adjustment is adjustable with or without break loose (kick start) function.

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) three-phase motors. The braking option is a DC injection system, allowing for fast stopping of a three-phase motor. The S701 unit controls current on two of the three phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a manual motor starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 480 Vac
- Control voltage range from 24–300 Vac/Vdc
- Adjustable ramp times (0.5–20 seconds)
- Adjustable initial torque control (0–85%)
- Kick start feature (0–85% adjustment)
- Kick start for 200 ms
- IP20 finger protection
- Braking control adjustable from 0–50A DC
- Slow speed: 7.5% or 10% of nominal speed

Benefits

- Reduced wear on bolts, gears, chains, clutches, shafts and bearings
- Braking option allows for quick stopping of loads
- Brake control can help eliminate expensive mechanical brakes
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- UL listed (E108212)
- cUL listed

CE UL Listed c UL Listed

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Product Selection

For S701 catalog number selection, see **Page V6-T1-27**.

S701E25B3S

Soft Start Controllers with Brake

Rated Current	Line Voltage	Control Voltage (Vac/Vdc)	Three-Phase Motor kW Rating (50 Hz) 230 V	380–400 V	440 V	hp Rating 200 V 1.0 SF	200 V 1.15 SF	230 V 1.0 SF	230 V 1.15 SF	460 V 1.0 SF	460 V 1.15 SF	Catalog Number
25	208–240	24–230	5.5	N/A	N/A	5	5	7-1/2	5	N/A	N/A	**S701C25B3S**
25	380–480	24–480	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15	**S701E25B3S**

Technical Data and Specifications

Soft Starters with Brake—S701…25B3S

Description	S701C25B3S	S701E25B3S
Maximum current capacity	25	25
Trip Class		
10A	25	25
10	25	25
20	20	20
30	15	15
Electrical Characteristics		
Line voltage (Vac)	208–240	380–480
Operating frequency (Hz)	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.
Minimum operational current	1A	1A
Control voltage (Vac/Vdc)	24–230	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA
Response time max.	100 ms	100 ms
Control Characteristics		
Ramp time (secs)	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%
Kick start settings (% LRT)	85%	85%
Soft stop (secs)	0.5–10	0.5–10
Brake current	0–50 Vdc	0–50 Vdc

Soft Starters with Brake—S701…25B3S, continued

Description	S701C25B3S	S701E25B3S
Environmental Characteristics		
Temperature—operating	–30 ° to 40 °C	–30 ° to 40 °C
Current rating 50 °C	20A	20A
Limited duty cycle 50 °C	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8
Current rating 60 °C	17A	17A
Limited duty cycle 60 °C	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65
Temperature—storage	–30 ° to 80 °C	–30 ° to 80 °C
Altitude (meters)—no derating	2000	2000
Humidity	95% noncondensing	95% noncondensing
Operating position	Vertical ± 0 °	Vertical ± 0 °
Impulse withstand voltage IEC 947-4-1	4000 V	4000 V
Rated insulation voltage (Ui)	660 V	660 V
Installation category	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	2 W/A x duty cycle	2 W/A x duty cycle
Power dissipation for continuous operation	2 W/A	2 W/A
Cooling method	Natural convection	Natural convection
Degree of protection	IP20	IP20
Pollution degree	3	3
Agency approvals	UL, cUL, CE	UL, cUL, CE

Dimensions

Approximate Dimensions in Inches (mm)

Soft Starters with Brake—S701…25B3S

Catalog Number	W	H	D	Weight in lb (kg)
S701C25B3S	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)
S701E25B3S	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)

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Contents

Type S511, Semiconductor Reversing Contactors

Product Description

The S511 device is a semiconductor reversing contactor designed to switch three-phase motors forward and reverse. Unicore electronics and thermal design ensures high switching capacity and long lifetime.

Application Description

The S511 line of solid-state reversing contactors is specifically designed for high speed operations or when long contactor life is required. The reversing contactors are intended for small motor applications (5 hp and below). The S511 unit can be used in a variety of applications including fans, pumps, conveyors, doors, hoists, cranes, etc. It is designed to be used with a manual motor starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 480 Vac
- Control voltage ranges of 5–24 Vdc and 24–240 Vac/Vdc
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- AC-3 current rating of 10A
- AC-4 current rating of 8A

Benefits

- Extremely high switching rates possible
- Very long life expectancy and no contacts or movable parts to replace
- Compact design (45 mm wide) leads to significant panel savings

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- CSA certified
- UL listed

Listed

Product Selection

Reversing Solid-State Contactors

Rated Current	Line Voltage	Control Voltage	Three-Phase Motor kW Rating (50 Hz) 230 V	380–400 V	440 V	hp Rating 200 V 1.0 SF	200 V 1.15 SF	230 V 1.0 SF	230 V 1.15 SF	460 V 1.0 SF	460 V 1.15 SF	Catalog Number
10	208–480	5–24 Vdc	2.2	4	4	2	2	3	2	5	5	**S511E10N3D**
10	208–480	24–240 Vac/Vdc	2.2	4	4	2	2	3	2	5	5	**S511E10N3S**

Technical Data and Specifications

Semiconductor Reversing Contactors—S511E10N3…

Description	S511E10N3D	S511E10N3S
Maximum current capacity	10	10
Trip Class		
10A	10	10
10	10	10
20	8	8
30	6.5	6.5
Electrical Characteristics		
Line Voltage (Vac)	208–480	208–480
Operating frequency (Hz)	50/60	50/60
Control voltage	5–24 Vdc	24–240 Vac/Vdc
Pickup voltage max.	4.25 Vdc	20.4 Vac/Vdc
Dropout voltage min.	1.5 Vdc	7.2 Vac/Vdc
Max. control voltage	26.4 Vdc	253 Vac/Vdc
Response time max.	1/2 cycle	1 cycle
Interlock time max.	80 ms	150 ms
Control Characteristics		
Operation current AC-3	10	10
Operation current AC-4	8	8
Duty cycle	Continuous operation	Continuous operation
Leakage current	1 mA AC max.	1 mA AC max.
Minimum operation current	10 mA AC	10 mA AC
Environmental Characteristics		
Temperature—operating	0 ° to 60 °C	0 ° to 60 °C
Temperature—storage	–20 ° to 80 °C	–20 ° to 80 °C
Altitude (meters)	2000	2000
Humidity	95% noncondensing	95% noncondensing
Operating position	Vertical ±30 °	Vertical ±30 °
Impulse withstand voltage IEC 947-4-1	4000 V	4000 V
Rated insulation voltage (Ui)	660 V	660 V
Installation category	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	2.2 W/A x duty cycle	2.2 W/A x duty cycle
Power dissipation for continuous operation	2.2 W/A	2.2 W/A
Cooling method	Natural convection	Natural convection
Degree of protection	IP20	IP20
Pollution degree	3	3
Agency approvals	UL, CSA, CE	UL, CSA, CE

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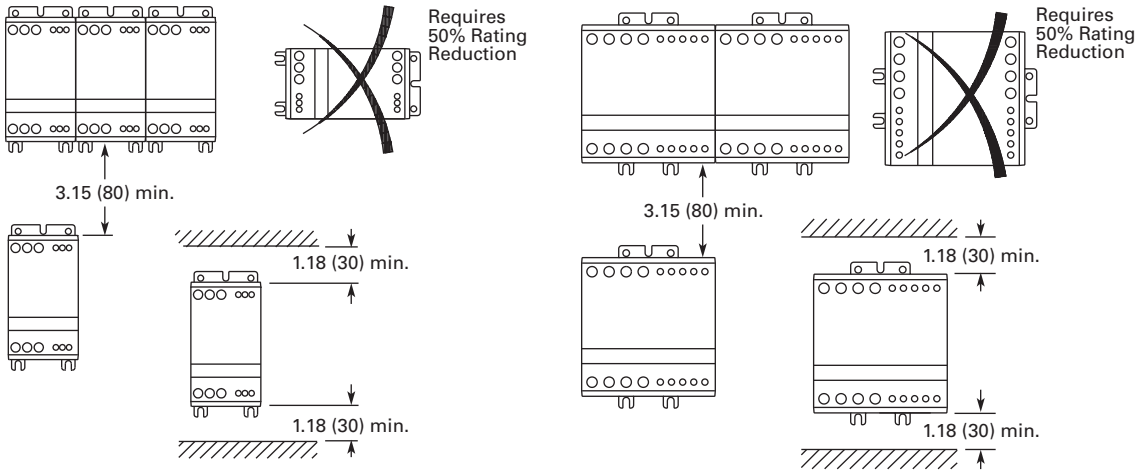
Mounting Instructions

IMPORTANT: The controller is designed for vertical mounting in free air. If the controller is mounted horizontally, the load current must be reduced to 50% of rated current.

Recommended Mounting Distances



Dimensions

Approximate Dimensions in Inches (mm)

Semiconductor Reversing Contactors—S511E10N3...

Catalog Number	W	H	D	Weight in lb (kg)
S511E10N3D	1.77 (45.0)	3.94 (100.1)	5.04 (128.0)	1.52 (690)
S511E10N3S	1.77 (45.0)	3.94 (100.1)	5.04 (128.0)	1.52 (690)

Also refer to dimension drawings on **Page V6-T1-41**.

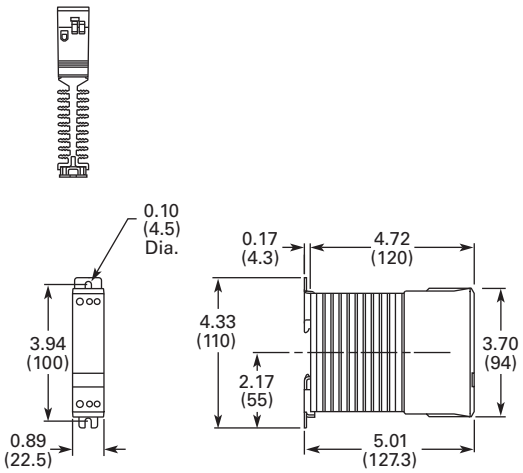
Cable Requirements and Sizing

75 °C	AWG (mm^2)	AWG (mm^2)
	18–12 (0.75–4)	20–16 (0.5–1.5)
	2–18 (2 x 1)	2 x 20–18 (2 x 0.5–0.75)
	18–10 (0.75–4)	20–16 (0.5–1.5)
	2 x 18–14 (2 x 0.75–2.5)	2 x 20–16 (2 x 0.5–1.5)
	18–10 (0.75–4)	20–16 (0.5–1.5)
	2 x 18–16 (0.75–6)	2 x 20–16 (2 x 0.5–1.5)
	Posidrive 1 4.4 in-lb. max. 0.5 Nm max.)	N/A
	4 mm 4.4 in-lb max. (0.5 Nm max.)	3 mm 3.5 in-lb max. (0.4 Nm max.)

Approximate Dimensions in Inches (mm)

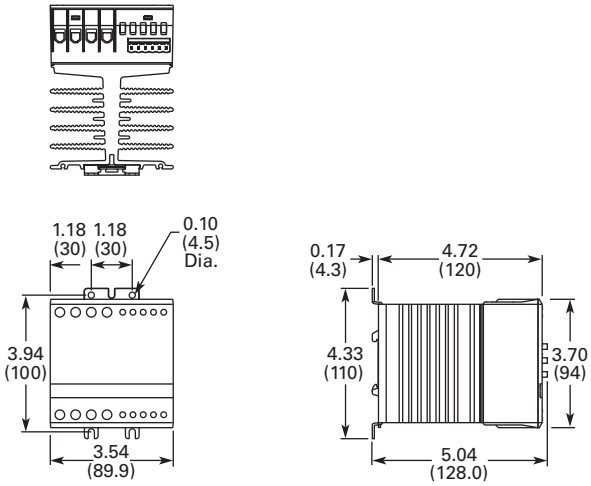
22.5 mm Frame

S511E10N3D, S511E10N3S



90 mm Frame

S511E10N3D, S511E10N3S



45 mm Frame

S511E10N3D, S511E10N3S