

# How to select the correct size DS7 soft start controller



## Application

The DS7 is a two phase control soft start controller utilized to accomplish motor starting using the reduced voltage method. Typically, the motor Horsepower or kW rating is used to determine the minimum required size of the soft start controller. This document addresses ramp time (T-Start) and start voltage (U-Start) parameters that require consideration in accomplishing the proper match of soft start controller to the load.

## Overview

Soft start controller sizing is typically determined beginning with the Horsepower or kW rating of the motor, coupled with the mains operating voltage. Using this information, a table or graph is consulted to factor in the starting time (t-Start) to determine the minimum size soft start controller that is appropriate for the application. If the application is considered to be severe duty due to a higher current inrush and/or longer starting time, it is commonplace to select a larger rated soft start controller to accommodate the higher loading on the SCR's.

The graphs and tables published for the DS7 are based on an inrush value of 300% FLA or 400% FLA of the motor. A NEMA category B motor that is very common will demonstrate a 300% current rise during the start under normal conditions. If the actual inrush current approaches a value of 400% FLA as would be the case with higher NEMA Motor Code Letters, the maximum allowable ramp times are significantly affected. The t-Start starting time must be seriously considered and kept as short as practical (5 seconds). As the start time parameter is increased, the maximum allowable current capacity is decreased. When selecting the size of the DS7 soft start controller, Tables 4 - 7 may be used if the anticipated starting time is 10 seconds or less. Please note that either 300% or 400% Current Limit refers to the maximum anticipated start current in terms of motor FLA (3x or 4x). The DS7 does not have a current limiter function. If the starting time is expected to be longer, Tables 8 - 14 should be reviewed to ensure that the soft starter is not subjected to excessive current resulting in SCR failure. The size of the soft start controller may be required to be increased specifically due to a longer ramp time.

**Note:** The DS7 Soft Start controller may be incorrectly sized if based solely on motor Horsepower or kW rating and mains voltage alone.

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**The DS7 Soft Starter requires that specific attention is given to two factors:**

- **Ultimate load** – the maximum inrush current that the soft start controller will transmit anytime during the start process.
- **Ramp time** – the expected, or required, starting time required for the motor to achieve synchronous speed.

**Example 1**

7.5HP Motor (11A FLA) Motor Code Letter B @ 460V Application, with an estimated starting time of 8 seconds and 4 starts per hour.

First, the locked rotor current (LRC) is used to determine the initial current rise when the motor is energized. This information may be noted on the Motor Nameplate. If the LRC is not indicated on the nameplate, the LRC may be calculated from the formula shown in Equation 1. Calculations indicate an LRC range of 29.1 - 33.4 amps. A 300% current rise for this motor yields 33 amps (3 x 11 amps), so the 300% Current Rise Table will be used for basic product selection. Consulting Table 4, the DS7-340SX012N0-N soft start controller shows an acceptable maximum motor size of 7.5HP. Please note that Tables 4 thru 7 indicate maximum allowable start ramp times of 10 seconds @ 1 start/hr for these selections. Consulting Table 11 and/or Figure 4, the maximum allowable start current is noted as 36A, @ 8 second start time. If needed, the starting time could be increased to 10 seconds as the maximum allowable start current is 33.6 amps. Under these conditions, a DS7-340SX012N0-N soft starter is the appropriate selection for this application.

**Example 2**

With the same operating conditions as in Example 1, it is determined that the starting time must be extended to 12 seconds for the motor to achieve synchronous speed. Consulting Table 11 and/or Figure 4, the maximum allowable start current for 12 seconds is indicated as 31.2 amps, less than the required 33A (3 x 11 amps). Under these conditions, the DS7-340SX012N0-N soft start controller would not be an appropriate selection. Table 12 and/or Figure 5 for the next higher size unit, lists the maximum allowable start current @ 12 seconds as approximately 36.8A. If needed, the starting time could be increased to 15 seconds as the maximum allowable start current is 33.6 amps. Under these new conditions, the next size higher soft start controller, DS7-340SX016N0-N is the suitable choice, as the maximum allowable start current for these conditions is sufficient for proper operation.

**Example 3**

With the same operating conditions as in Example 1, it is discovered that the Motor Code Letter is "D" instead of "B". Using Equation 1, the LRC current is 37.7 to 42.3 amps, so Table 5 (400% current rise) will be used for basic product selection.

Table 5 indicates the DS7-340SX016N0-N is the appropriate selection for this 7.5 hp motor. Consulting Table 12 and/or Figure 5, the maximum allowable start current for 8 seconds is 46.4 amps.

Please note that this product selection is at the maximum allowable starting time. Consulting Table 12 and/or Figure 5 shows the maximum allowable current for a 9 second start time is 43.2 amps. A larger soft start controller, the DS7-340SX024N0-N should be seriously considered if the starting time may exceed 8 seconds. This operating condition will also require a larger capacity unit (DS7-340SX016N0-N) to accommodate the higher operating current (44 amps) during the starting time.

**Note:** Examples 1 - 3 refer to LRC values at full mains voltage. Please keep in mind that these values are very close to the ultimate maximum rating of the SCR's. Setting the U-Start potentiometer to settings below 100% will lower the currents and extend the service life of the unit. Eaton does not recommend DS7 soft start controller sizing based on U-Start settings below 100%.

Control Voltages for the DS7

DS7-340SX...N0-N = 24 Vac/Vdc Uc

DS7-342SX...N0-N = 120/240 Vac Uc

DS7-34DSX...N0-D = 24 Vdc Uc

**Supporting documentation**

Manuals	Reference Number
DS7 User Manual	MN03901001Z-EN
DS7 Instructional Leaflet	IL03901003 - Frame 1 (4 - 12A) IL03901004E - Frame 2 (16 - 32A) IL03902005Z - Frames 3 & 4 (41 - 200A)
Program Files	none
Outline Drawings	<a href="http://eaton-moeller.partcommunity.com/3d-cad-models/">http://eaton-moeller.partcommunity.com/3d-cad-models/</a>

**Additional help**

In the event additional help is needed, please contact the Technical Resource Center at **1-877-ETN-CARE, Option 2, Sub Option 2.**

**Determining initial current based on locked rotor current**

The National Electrical Code requires that all alternating current motors of 1/2 horsepower and higher must have code letters on the data plate indicating motor current in a locked rotor condition. This code denotes the Kilovolt-Ampere per horsepower of the motor. The KVAhp value is obtained from NEMA and/or NEC publications. The table below is provided as a reference. Locked rotor current of a three phase motor may be calculated using the following formula:

**Equation 1:** Calculating Locked Rotor Current (LRC):

$$\text{Locked Rotor Current} = \frac{\text{Horsepower} \times \text{KVAhp} \times 1000}{\text{E} \times 1.73}$$

**Example 4**

To calculate the locked rotor current range of a 50 horsepower motor operating at 460 volts with a code letter B, proceed as follows;

$$\text{Locked Rotor Current (minimum)} = \frac{50 \times 3.15 \times 1000}{460 \times 1.73} = 197.91 \text{ Amperes}$$

$$\text{Locked Rotor Current (maximum)} = \frac{50 \times 3.54 \times 1000}{460 \times 1.73} = 222.42 \text{ Amperes}$$

**Table 1. Motor Code Letter Locked Rotor kV-Amp / hp**

Code Letter	Motor Code Letters	
	Locked Rotor Kilovolt-Ampere per hp	
	Minimum	Maximum
A	0	3.14
B	3.15	3.54
C	3.55	3.99
D	4.00	4.49
E	4.50	4.99
F	5.00	5.59
G	5.60	6.29
H	6.30	7.09
J	7.10	7.99
K	8.00	8.99
L	9.00	9.99
M	10.00	11.19
N	11.20	12.49
P	12.50	13.99
R	14.00	15.99
S	16.00	17.99
T	18.00	19.99
U	20.00	22.39
V	22.40	22.41

**Note:** The current in the motor circuit will be subject to the total impedance of the motor circuit, so actual values may be slightly different than calculated values.

**DS7 Parameterization**

To determine the expected Initial Current value after determining the locked rotor current, apply the corresponding current reduction value based on the U-Start setting of the soft start controller in Table 1. Selecting a value of 53 (4th increment mark) , the expected current will be 53% of the above values, or 104.89 amps to 117.88 amps respectively. Please note that the motor will develop approximately 28% of full voltage torque which is very similar to the starting current of a wye-delta configuration.

**Note:** The values in Table 1 correspond to the increment marks on the U-Start potentiometer.

**Table 2. U-Start Initial Current**




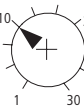



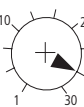


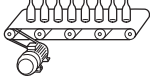

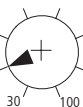


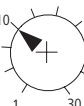

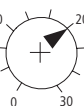
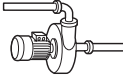
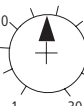
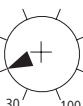
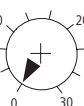
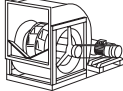
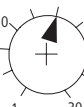
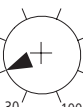

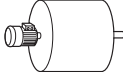
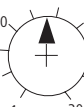
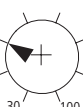
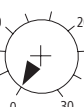
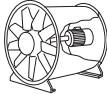
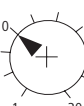
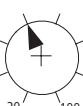
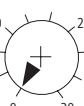
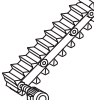
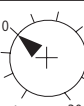



U-Start Settings		
U-Start	Current %	Torque %
100	100	100
93	93	86
85	85	72
77	77	59
69	69	47
61	61	37
53	53	28
45	45	20
37	37	14
30	30	9

The diagrams below show various potentiometer settings that have proven to be effective for standard application in real-life environments.

**Examples**

The following default settings are recommended for an application:

**Table 3. Parameterization Examples**

 t - Start (s)	 U - Start (%)	 t - Stop (s)	Application examples	
~10 	~30 	0 		J → 0 Low flywheel mass
~25 	~30 	~30 		Conveyor belt with loose belt
~20 	~40 	0 		Roller conveyers
~10 	~30 	~20 		Centrifugal pump
~15 	~40 	0 		Fan general (building) with belt drive
~18 	~40 	0 		J → 0 ∞ High flywheel mass → DS7 > P <sub>Motor</sub>
~15 	~50 	0 		Tunnel fan Axial fan → DS7 > P <sub>Motor</sub>
~10 	~60 	0 		Bulk conveyer Escalator
~10 	~60 	0 		Mixers Agitators → DS7 > P <sub>Motor</sub>

**DS7 Soft Start Controllers—Horsepower Ratings—**

**Table 4. 10 Second Ramp, 1 Start per Hour, 300% Current Limit @ 40°C.**

	Rated Current Amps	Motor Power (hp)			Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload	Recommended C440 Overload
		200V	230V	480V				
DS7-340SX004N0-N	3.7	0.75	0.75	2	HFD3015	15A Class RK5	XTOB040DC1 <sup>1</sup>	C440A1A005SAX
DS7-342SX004N0-N								
DS7-34DSX004N0-D	6.9	1.5	2	3	HFD3015	15A Class RK5	XTOB057DC1 <sup>1</sup>	C440A1A020SAX
DS7-340SX007N0-N								
DS7-342SX007N0-N	7.8	2	2	5	HFD3020	20A Class RK5	XTOB065DC1 <sup>1</sup>	C440A1A020SAX
DS7-34DSX007N0-D								
DS7-340SX009N0-N	11	3	3	7.5	HFD3030	20A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-342SX009N0-N								
DS7-34DSX009N0-D	15.2	3	5	10	HFD3035	25A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-340SX012N0-N								
DS7-342SX012N0-N	22	5	7.5	15	HFD3060	40A Class RK5	XTOB125GC1S <sup>2</sup>	C440A1A045SAX
DS7-34DSX012N0-D								
DS7-340SX016N0-N	32	7.5	10	20	HFD3070	50A Class RK5	XTOB160GC1S <sup>2</sup>	C440A1A045SAX
DS7-342SX016N0-N								
DS7-34DSX016N0-D	40	10	10	30	HFD3150L	150A Class RK5	XTOB040DC1 <sup>2</sup>	C440A1A045SAX
DS7-340SX024N0-N								
DS7-342SX024N0-N	52	15	20	40	HFD3200L	200A Class RK5	XTOB057DC1 <sup>2</sup>	C440B1A100SAX
DS7-34DSX024N0-D								
DS7-340SX032N0-N	65	20	25	50	HJD3250	200A Class RK5	XTOB065DC1 <sup>2</sup>	C440B1A100SAX
DS7-342SX032N0-N								
DS7-34DSX032N0-D	77	25	30	60	HKD3300	300A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-340SX041N0-N								
DS7-342SX041N0-N	96	30	30	75	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-34DSX041N0-D								
DS7-340SX055N0-N	124	40	50	100	HKD3400	500A Class RK5	XTOB125GC1S	C440A1A005SAX <sup>4</sup>
DS7-342SX055N0-N								
DS7-34DSX055N0-D	156	50	60	125	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-340SX070N0-N								
DS7-342SX070N0-N	180	60	75	150	HLD3500	500A Class RK5	XTOB220LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-34DSX070N0-D								
DS7-340SX081N0-N	96	30	30	75	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX081N0-N								
DS7-34DSX081N0-D	124	40	50	100	HKD3400	500A Class RK5	XTOB125GC1S	C440A1A005SAX <sup>4</sup>
DS7-340SX100N0-N								
DS7-342SX100N0-N	156	50	60	125	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-34DSX100N0-D								
DS7-340SX135N0-N	180	60	75	150	HLD3500	500A Class RK5	XTOB220LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-342SX135N0-N								
DS7-34DSX135N0-D	156	50	60	125	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-340SX160N0-N								
DS7-342SX160N0-N	96	30	30	75	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-34DSX160N0-D								
DS7-340SX200N0-N	124	40	50	100	HKD3400	500A Class RK5	XTOB125GC1S	C440A1A005SAX <sup>4</sup>
DS7-342SX200N0-N								
DS7-34DSX200N0-D	156	50	60	125	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-340SX200N0-N								

<sup>1</sup> XTOBXDIND Panel Mounting Adapter must be used with this overload.

<sup>2</sup> XTOBXTLL line and load lugs must be used with this overload.

**DS7 Soft Start Controllers—Horsepower Ratings—**

**Table 5. 10 Second Ramp, 1 Start per Hour, 400% Current Limit @ 40°C.**

	Rated Current Amps	Motor Power (hp)			Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload	Recommended C440 Overload
		200V	230V	480V				
DS7-340SX004N0-N	3	0.5	0.5	1.5	HFD3015	15A Class RK5	XTOB040DC1 <sup>1</sup>	C440A1A005SAX
DS7-342SX004N0-N								
DS7-34DSX004N0-D								
DS7-340SX007N0-N	4.8	1	1	3	HFD3015	15A Class RK5	XTOB057DC1 <sup>1</sup>	C440A1A020SAX
DS7-342SX007N0-N								
DS7-34DSX007N0-D								
DS7-340SX009N0-N	6.9	1.5	2	3	HFD3020	20A Class RK5	XTOB065DC1 <sup>1</sup>	C440A1A020SAX
DS7-342SX009N0-N								
DS7-34DSX009N0-D								
DS7-340SX012N0-N	9	2	2	5	HFD3030	20A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-342SX012N0-N								
DS7-34DSX012N0-D								
DS7-340SX016N0-N	11	3	3	7.5	HFD3035	25A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-342SX016N0-N								
DS7-34DSX016N0-D								
DS7-340SX024N0-N	17.5	5	5	10	HFD3060	40A Class RK5	XTOB125GC1S <sup>2</sup>	C440A1A045SAX
DS7-342SX024N0-N								
DS7-34DSX024N0-D								
DS7-340SX032N0-N	22	5	7.5	15	HFD3070	50A Class RK5	XTOB160GC1S <sup>2</sup>	C440A1A045SAX
DS7-342SX032N0-N								
DS7-34DSX032N0-D								
DS7-340SX041N0-N	27	7.5	10	20	HFD3150L	150A Class RK5	XTOB040DC1	C440A1A045SAX
DS7-342SX041N0-N								
DS7-34DSX041N0-D								
DS7-340SX055N0-N	34	10	10	30	HFD3200L	200A Class RK5	XTOB040DC1	C440A1A045SAX
DS7-342SX055N0-N								
DS7-34DSX055N0-D								
DS7-340SX070N0-N	40	15	15	30	HJD3250	200A Class RK5	XTOB057DC1 <sup>2</sup>	C440A1A045SAX
DS7-342SX070N0-N								
DS7-34DSX070N0-D								
DS7-340SX081N0-N	52	15	20	40	HKD3300	300A Class RK5	XTOB057DC1 <sup>2</sup>	C440B1A100SAX
DS7-342SX081N0-N								
DS7-34DSX081N0-D								
DS7-340SX100N0-N	65	20	25	50	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX100N0-N								
DS7-34DSX100N0-D								
DS7-340SX135N0-N	80	30	30	75	HKD3350	500A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX135N0-N								
DS7-34DSX135N0-D								
DS7-340SX160N0-N	96	30	40	75	HLD3450	500A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX160N0-N								
DS7-34DSX160N0-D								
DS7-340SX200N0-N	124	40	50	100	HLD3500	500A Class RK5	XTOB150GC1S	C440A1A005SAX <sup>3</sup>
DS7-342SX200N0-N								
DS7-34DSX200N0-D								

<sup>1</sup> XTOBXDIND Panel Mounting Adapter must be used with this overload.

<sup>2</sup> XTOBXTLL line and load lugs must be used with this overload.

**DS7 Soft Start Controllers—kW Ratings According to IEC 60947-4-2—**

**Table 6. 10 Second Ramp, 1 Start per Hour, 300% Current Limit @ 40°C.**

	Rated Current Amps	Motor Power (kW)		Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload	Recommended C440 Overload
		230V	400V				
DS7-340SX004N0-N	3.8	0.75	1.5	HFD3015	15A Class RK5	XTOB040DC1 <sup>1</sup>	C440A1A005SAX
DS7-342SX004N0-N							
DS7-34DSX004N0-D							
DS7-340SX007N0-N	7	1.5	3	HFD3015	15A Class RK5	XTOB057DC1 <sup>1</sup>	C440A1A020SAX
DS7-342SX007N0-N							
DS7-34DSX007N0-D							
DS7-340SX009N0-N	9	2.2	4	HFD3020	20A Class RK5	XTOB065DC1 <sup>1</sup>	C440A1A020SAX
DS7-342SX009N0-N							
DS7-34DSX009N0-D							
DS7-340SX012N0-N	12	3	5.5	HFD3030	20A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-342SX012N0-N							
DS7-34DSX012N0-D							
DS7-340SX016N0-N	16	4	7.5	HFD3035	25A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-342SX016N0-N							
DS7-34DSX016N0-D							
DS7-340SX024N0-N	24	5.5	11	HFD3060	40A Class RK5	XTOB125GC1S <sup>2</sup>	C440A1A045SAX
DS7-342SX024N0-N							
DS7-34DSX024N0-D							
DS7-340SX032N0-N	32	7.5	15	HFD3070	50A Class RK5	XTOB160GC1S <sup>2</sup>	C440A1A045SAX
DS7-342SX032N0-N							
DS7-34DSX032N0-D							
DS7-340SX041N0-N	41	11	22	HFD3150L	150A Class RK5	XTOB057DC1 <sup>2</sup>	C440A1A045SAX
DS7-342SX041N0-N							
DS7-34DSX041N0-D							
DS7-340SX055N0-N	55	15	30	HFD3200L	200A Class RK5	XTOB057DC1 <sup>2</sup>	C440B1A100SAX
DS7-342SX055N0-N							
DS7-34DSX055N0-D							
DS7-340SX070N0-N	68	15	37	HJD3250	200A Class RK5	XTOB070GC1 <sup>2</sup>	C440B1A100SAX
DS7-342SX070N0-N							
DS7-34DSX070N0-D							
DS7-340SX081N0-N	81	22	45	HKD3300	300A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX081N0-N							
DS7-34DSX081N0-D							
DS7-340SX100N0-N	99	30	55	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX100N0-N							
DS7-34DSX100N0-D							
DS7-340SX135N0-N	134	30	75	HKD3400	500A Class RK5	XTOB150GC1S	C440A1A005SAX <sup>4</sup>
DS7-342SX135N0-N							
DS7-34DSX135N0-D							
DS7-340SX160N0-N	160	45	90	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-342SX160N0-N							
DS7-34DSX160N0-D							
DS7-340SX200N0-N	196	55	110	HLD3500	500A Class RK5	XTOB220LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-342SX200N0-N							
DS7-34DSX200N0-D							

<sup>1</sup> XTOBXDIND Panel Mounting Adapter must be used with this overload.

<sup>2</sup> XTOBXTLL line and load lugs must be used with this overload.

**DS7 Soft Start Controllers—kW Ratings According to IEC 60947-4-2—**

**Table 7. 10 Second Ramp, 1 Start per Hour, 400% Current Limit @ 40°C.**

	Rated Current Amps	Motor Power (kW)		Maximum Allowable Breaker Size	Maximum Allowable Fuse Size	Recommended XTOB Overload	Recommended C440 Overload
		230V	400V				
DS7-340SX004N0-N	2.5	0.33	1	HFD3015	15A Class RK5	XTOB040DC1 <sup>1</sup>	C440A1A005SAX
DS7-342SX004N0-N							
DS7-34DSX004N0-D	3.8	0.75	1.5	HFD3015	15A Class RK5	XTOB057DC1 <sup>1</sup>	C440A1A020SAX
DS7-340SX007N0-N							
DS7-342SX007N0-N	7	1.5	3	HFD3020	20A Class RK5	XTOB065DC1 <sup>1</sup>	C440A1A020SAX
DS7-34DSX007N0-D							
DS7-340SX009N0-N	9	2.2	4	HFD3030	20A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-342SX009N0-N							
DS7-34DSX009N0-D	12	3	5.5	HFD3035	25A Class RK5	XTOB100GC1S <sup>2</sup>	C440A1A020SAX
DS7-340SX012N0-N							
DS7-342SX012N0-N	16	4	7.5	HFD3060	40A Class RK5	XTOB125GC1S <sup>2</sup>	C440A1A045SAX
DS7-34DSX012N0-D							
DS7-340SX016N0-N	24	5.5	11	HFD3070	50A Class RK5	XTOB160GC1S <sup>2</sup>	C440A1A045SAX
DS7-342SX016N0-N							
DS7-34DSX016N0-D	28.8	7.5	11	HFD3150L	150A Class RK5	XTOB040DC1	C440A1A045SAX
DS7-340SX024N0-N							
DS7-342SX024N0-N	37.5	11	18.5	HFD3200L	200A Class RK5	XTOB040DC1	C440A1A045SAX
DS7-34DSX024N0-D							
DS7-340SX032N0-N	46	11	22	HJD3250	200A Class RK5	XTOB057DC1 <sup>2</sup>	C440B1A100SAX
DS7-342SX032N0-N							
DS7-34DSX032N0-D	56	15	30	HKD3300	300A Class RK5	XTOB065DC1 <sup>2</sup>	C440B1A100SAX
DS7-340SX041N0-N							
DS7-342SX041N0-N	68	18.5	37	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-34DSX041N0-D							
DS7-340SX055N0-N	90	22	45	HKD3350	500A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX055N0-N							
DS7-34DSX055N0-D	106	30	55	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-340SX070N0-N							
DS7-342SX070N0-N	134	37	75	HLD3500	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-34DSX070N0-D							
DS7-340SX081N0-N	106	30	55	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-342SX081N0-N							
DS7-34DSX081N0-D	134	37	75	HLD3500	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-340SX100N0-N							
DS7-342SX100N0-N	68	18.5	37	HKD3350	350A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-34DSX100N0-D							
DS7-340SX135N0-N	90	22	45	HKD3350	500A Class RK5	XTOB100GC1S	C440B1A100SAX
DS7-342SX135N0-N							
DS7-34DSX135N0-D	106	30	55	HLD3450	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-340SX160N0-N							
DS7-342SX160N0-N	134	37	75	HLD3500	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-34DSX160N0-D							
DS7-340SX200N0-N	134	37	75	HLD3500	500A Class RK5	XTOB160LC1 <sup>3</sup>	C440A1A005SAX <sup>4</sup>
DS7-342SX200N0-N							
DS7-34DSX200N0-D							

<sup>1</sup> XTOBXDIND Panel Mounting Adapter must be used with this overload.

<sup>2</sup> XTOBXTLL line and load lugs must be used with this overload.



Figure 1: 4 Amp Rated DS7-340SX004N0-N, DS7-342SX004N0-N, DS7-34DSX004N0-D

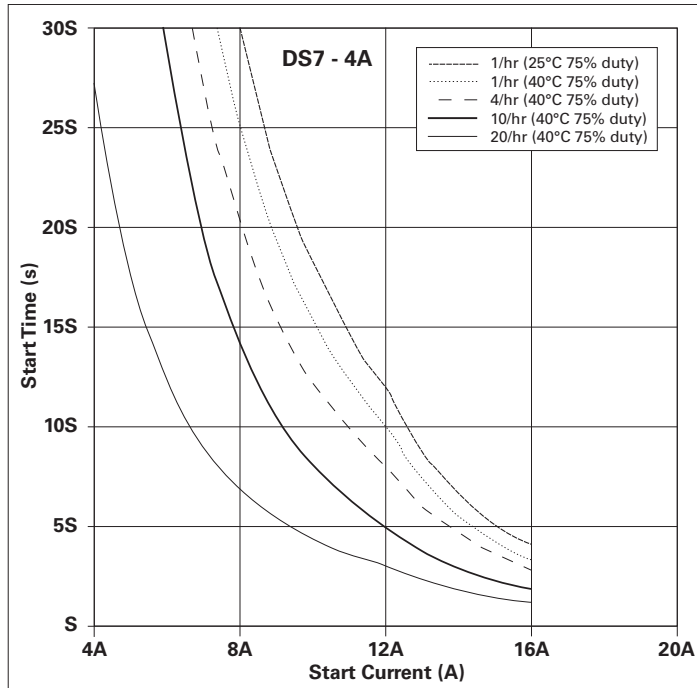


Table 8.

DS7-340SX004N0-N, DS7-342SX004N0-N, DS7-34DSX004N0-D

4 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Time (Seconds)	75% duty	75% duty	75% duty	75% duty	75% duty
1	16.4 A	16.4 A	16.4 A	16.4 A	16.4 A
2	16.4 A	16.4 A	16.4 A	15.6 A	13.6 A
3	16.4 A	16.4 A	16.0 A	14.0 A	12.0 A
4	16.0 A	15.2 A	14.8 A	12.8 A	10.4 A
5	15.2 A	14.4 A	13.6 A	12.0 A	9.6 A
6	14.4 A	14.0 A	13.2 A	11.2 A	8.8 A
7	14.0 A	13.2 A	12.8 A	10.8 A	8.0 A
8	13.6 A	12.8 A	12.0 A	10.0 A	7.6 A
9	13.2 A	12.4 A	11.6 A	9.6 A	7.2 A
10	12.8 A	12.0 A	11.2 A	9.2 A	6.8 A
11	12.4 A	11.6 A	10.8 A	9.2 A	6.4 A
12	12.0 A	11.2 A	10.4 A	8.8 A	6.4 A
13	11.6 A	10.8 A	10.0 A	8.4 A	6.0 A
14	11.6 A	10.4 A	9.6 A	8.4 A	5.6 A
15	11.2 A	10.4 A	9.2 A	8.0 A	5.6 A
16	10.8 A	10.0 A	9.2 A	7.6 A	5.6 A
17	10.4 A	9.6 A	8.8 A	7.6 A	5.2 A
18	10.4 A	9.6 A	8.4 A	7.6 A	5.2 A
19	10.0 A	9.2 A	8.4 A	7.2 A	5.2 A
20	9.6 A	9.2 A	8.0 A	7.2 A	4.8 A
21	9.6 A	8.8 A	8.0 A	6.8 A	4.8 A
22	9.2 A	8.8 A	8.0 A	6.8 A	4.8 A
23	9.2 A	8.4 A	7.6 A	6.8 A	4.4 A
24	9.2 A	8.4 A	7.6 A	6.8 A	4.4 A
25	8.8 A	8.0 A	7.6 A	6.4 A	4.4 A
26	8.8 A	8.0 A	7.2 A	6.4 A	4.4 A
27	8.4 A	8.0 A	7.2 A	6.4 A	4.4 A
28	8.4 A	7.6 A	7.2 A	6.4 A	4.0 A
29	8.4 A	7.6 A	6.8 A	6.0 A	4.0 A
30	8.0 A	7.6 A	6.8 A	6.0 A	4.0 A

Figure 2: 7 Amp Rated DS7-340SX007N0-N, DS7-342SX007N0-N, DS7-34DSX007N0-D

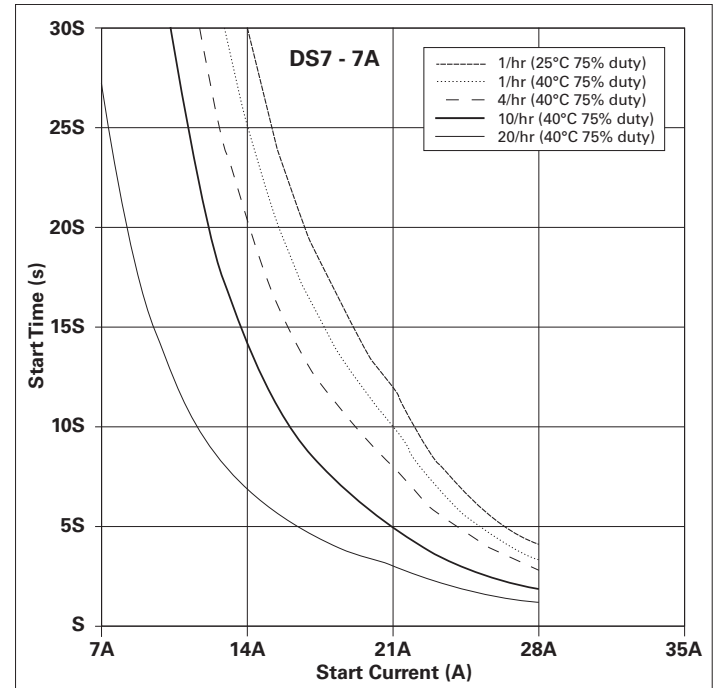


Table 9.

DS7-340SX007N0-N, DS7-342SX007N0-N, DS7-34DSX007N0-D

7 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Time (Seconds)	75% duty	75% duty	75% duty	75% duty	75% duty
1	28.7 A	28.7 A	28.7 A	28.7 A	28.7 A
2	28.7 A	28.7 A	28.7 A	27.3 A	23.8 A
3	28.7 A	28.7 A	28.0 A	24.5 A	21.0 A
4	28.0 A	26.6 A	25.9 A	22.4 A	18.2 A
5	26.6 A	25.2 A	23.8 A	21.0 A	16.8 A
6	25.2 A	24.5 A	23.1 A	19.6 A	15.4 A
7	24.5 A	23.1 A	22.4 A	18.9 A	14.0 A
8	23.8 A	22.4 A	21.0 A	17.5 A	13.3 A
9	23.1 A	21.7 A	20.3 A	16.8 A	12.6 A
10	22.4 A	21.0 A	19.6 A	16.1 A	11.9 A
11	21.7 A	20.3 A	18.9 A	16.1 A	11.2 A
12	21.0 A	19.6 A	18.2 A	15.4 A	11.2 A
13	20.3 A	18.9 A	17.5 A	14.7 A	10.5 A
14	20.3 A	18.2 A	16.8 A	14.7 A	9.8 A
15	19.6 A	18.2 A	16.1 A	14.0 A	9.8 A
16	18.9 A	17.5 A	16.1 A	13.3 A	9.8 A
17	18.2 A	16.8 A	15.4 A	13.3 A	9.1 A
18	18.2 A	16.8 A	14.7 A	13.3 A	9.1 A
19	17.5 A	16.1 A	14.7 A	12.6 A	9.1 A
20	16.8 A	16.1 A	14.0 A	12.6 A	8.4 A
21	16.8 A	15.4 A	14.0 A	11.9 A	8.4 A
22	16.1 A	15.4 A	14.0 A	11.9 A	8.4 A
23	16.1 A	14.7 A	13.3 A	11.9 A	7.7 A
24	16.1 A	14.7 A	13.3 A	11.9 A	7.7 A
25	15.4 A	14.0 A	13.3 A	11.2 A	7.7 A
26	15.4 A	14.0 A	12.6 A	11.2 A	7.7 A
27	14.7 A	14.0 A	12.6 A	11.2 A	7.7 A
28	14.7 A	13.3 A	12.6 A	11.2 A	7.0 A
29	14.7 A	13.3 A	11.9 A	10.5 A	7.0 A
30	14.0 A	13.3 A	11.9 A	10.5 A	7.0 A

Figure 3: 9 Amp Rated DS7-340SX009N0-N, DS7-342SX009N0-N, DS7-34DSX009N0-D

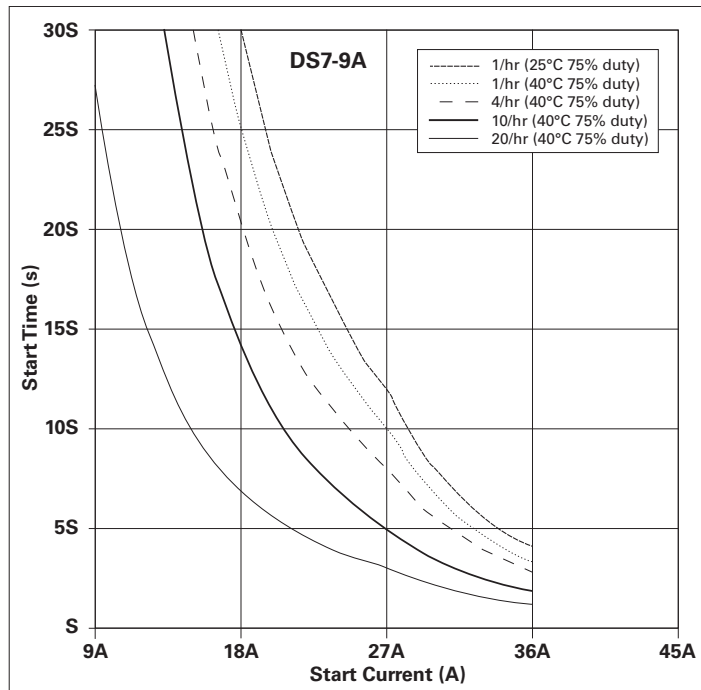


Figure 4: 12 Amp Rated DS7-340SX012N0-N, DS7-342SX012N0-N, DS7-34DSX012N0-D

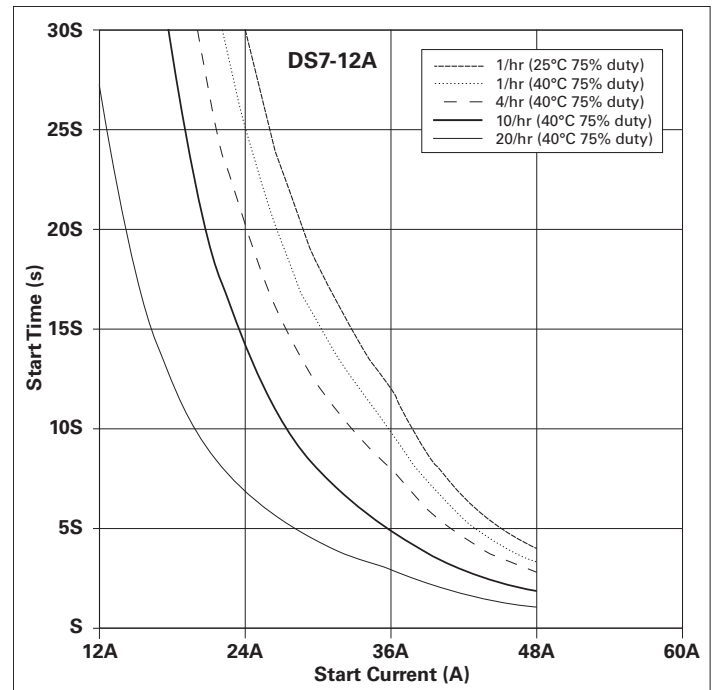


Table 10.

DS7-340SX009N0-N, DS7-342SX009N0-N, DS7-34DSX009N0-D

9 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Time (Seconds)	75% duty	75% duty	75% duty	75% duty	75% duty
1	36.9 A	36.9 A	36.9 A	36.9 A	36.9 A
2	36.9 A	36.9 A	36.9 A	35.1 A	30.6 A
3	36.9 A	36.9 A	36.0 A	31.5 A	27.0 A
4	36.0 A	34.2 A	33.3 A	28.8 A	23.4 A
5	34.2 A	32.4 A	30.6 A	27.0 A	21.6 A
6	32.4 A	31.5 A	29.7 A	25.2 A	19.8 A
7	31.5 A	29.7 A	28.8 A	24.3 A	18.0 A
8	30.6 A	28.8 A	27.0 A	22.5 A	17.1 A
9	29.7 A	27.9 A	26.1 A	21.6 A	16.2 A
10	28.8 A	27.0 A	25.2 A	20.7 A	15.3 A
11	27.9 A	26.1 A	24.3 A	20.7 A	14.4 A
12	27.0 A	25.2 A	23.4 A	19.8 A	14.4 A
13	26.1 A	24.3 A	22.5 A	18.9 A	13.5 A
14	26.1 A	23.4 A	21.6 A	18.9 A	12.6 A
15	25.2 A	23.4 A	20.7 A	18.0 A	12.6 A
16	24.3 A	22.5 A	20.7 A	17.1 A	12.6 A
17	23.4 A	21.6 A	19.8 A	17.1 A	11.7 A
18	23.4 A	21.6 A	18.9 A	17.1 A	11.7 A
19	22.5 A	20.7 A	18.9 A	16.2 A	11.7 A
20	21.6 A	20.7 A	18.0 A	16.2 A	10.8 A
21	21.6 A	19.8 A	18.0 A	15.3 A	10.8 A
22	20.7 A	19.8 A	18.0 A	15.3 A	10.8 A
23	20.7 A	18.9 A	17.1 A	15.3 A	9.9 A
24	20.7 A	18.9 A	17.1 A	15.3 A	9.9 A
25	19.8 A	18.0 A	17.1 A	14.4 A	9.9 A
26	19.8 A	18.0 A	16.2 A	14.4 A	9.9 A
27	18.9 A	18.0 A	16.2 A	14.4 A	9.9 A
28	18.9 A	17.1 A	16.2 A	14.4 A	9.0 A
29	18.9 A	17.1 A	15.3 A	13.5 A	9.0 A
30	18.0 A	17.1 A	15.3 A	13.5 A	9.0 A

Table 11.

DS7-340SX012N0-N, DS7342SX012N0-N, DS7-34DSX012N0-D

12 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Time (Seconds)	75% duty	75% duty	75% duty	75% duty	75% duty
1	49.2 A	49.2 A	49.2 A	49.2 A	49.2 A
2	49.2 A	49.2 A	49.2 A	46.8 A	40.8 A
3	49.2 A	49.2 A	48.0 A	42.0 A	36.0 A
4	48.0 A	45.6 A	44.4 A	38.4 A	31.2 A
5	45.6 A	43.2 A	40.8 A	36.0 A	28.8 A
6	43.2 A	42.0 A	39.6 A	33.6 A	26.4 A
7	42.0 A	39.6 A	38.4 A	32.4 A	24.0 A
8	40.8 A	38.4 A	36.0 A	30.0 A	22.8 A
9	39.6 A	37.2 A	34.8 A	28.8 A	21.6 A
10	38.4 A	36.0 A	33.6 A	27.6 A	20.4 A
11	37.2 A	34.8 A	32.4 A	27.6 A	19.2 A
12	36.0 A	33.6 A	31.2 A	26.4 A	19.2 A
13	34.8 A	32.4 A	30.0 A	25.2 A	18.0 A
14	34.8 A	31.2 A	28.8 A	25.2 A	16.8 A
15	33.6 A	31.2 A	27.6 A	24.0 A	16.8 A
16	32.4 A	30.0 A	27.6 A	22.8 A	16.8 A
17	31.2 A	28.8 A	26.4 A	22.8 A	15.6 A
18	31.2 A	28.8 A	25.2 A	22.8 A	15.6 A
19	30.0 A	27.6 A	25.2 A	21.6 A	15.6 A
20	28.8 A	27.6 A	24.0 A	21.6 A	14.4 A
21	28.8 A	26.4 A	24.0 A	20.4 A	14.4 A
22	27.6 A	26.4 A	24.0 A	20.4 A	14.4 A
23	27.6 A	25.2 A	22.8 A	20.4 A	13.2 A
24	27.6 A	25.2 A	22.8 A	20.4 A	13.2 A
25	26.4 A	24.0 A	22.8 A	19.2 A	13.2 A
26	26.4 A	24.0 A	21.6 A	19.2 A	13.2 A
27	25.2 A	24.0 A	21.6 A	19.2 A	13.2 A
28	25.2 A	22.8 A	21.6 A	19.2 A	12.0 A
29	25.2 A	22.8 A	20.4 A	18.0 A	12.0 A
30	24.0 A	22.8 A	20.4 A	18.0 A	12.0 A

Figure 5: 16 Amp Rated DS7-340SX016N0-N,  
DS7-342SX016N0-N, DS7-34DSX016N0-D

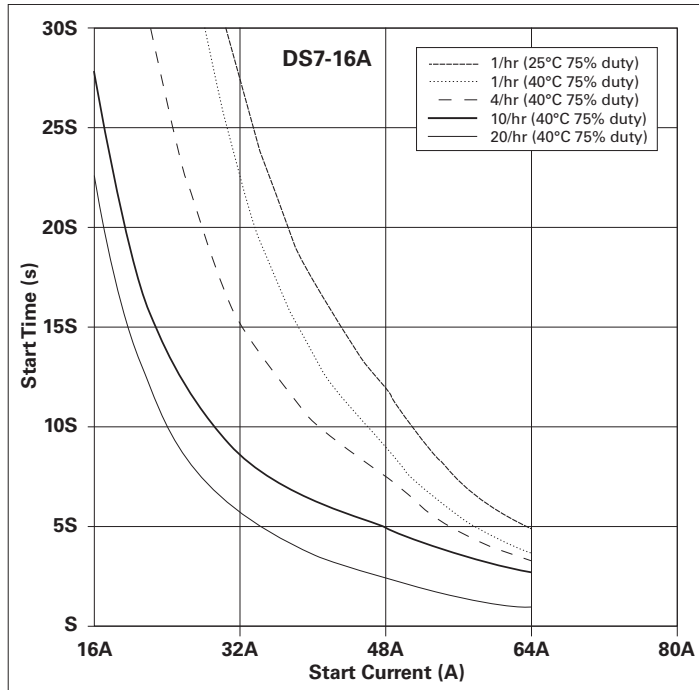


Table 12.

DS7-340SX016N0-N, DS7-342SX016N0-N, DS7-34DSX016N0-D

16 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C 75% duty	40°C 75% duty	40°C 75% duty	40°C 75% duty	40°C 75% duty
1	65.6 A	65.6 A	65.6 A	65.6 A	62.4 A
2	65.6 A	65.6 A	65.6 A	65.6 A	51.2 A
3	65.6 A	65.6 A	65.6 A	60.8 A	44.8 A
4	65.6 A	64.0 A	60.8 A	54.4 A	38.4 A
5	64.0 A	60.8 A	56.0 A	48.0 A	35.2 A
6	60.8 A	57.6 A	52.8 A	41.6 A	32.0 A
7	57.6 A	54.4 A	49.6 A	36.8 A	28.8 A
8	56.0 A	52.8 A	46.4 A	33.6 A	27.2 A
9	52.8 A	49.6 A	43.2 A	32.0 A	25.6 A
10	51.2 A	48.0 A	41.6 A	30.4 A	25.6 A
11	49.6 A	46.4 A	40.0 A	28.8 A	24.0 A
12	48.0 A	44.8 A	36.8 A	27.2 A	22.4 A
13	46.4 A	43.2 A	35.2 A	25.6 A	22.4 A
14	44.8 A	41.6 A	33.6 A	24.0 A	20.8 A
15	43.2 A	40.0 A	33.6 A	24.0 A	20.8 A
16	41.6 A	38.4 A	32.0 A	22.4 A	19.2 A
17	41.6 A	38.4 A	30.4 A	22.4 A	19.2 A
18	40.0 A	36.8 A	30.4 A	20.8 A	19.2 A
19	38.4 A	35.2 A	28.8 A	20.8 A	17.6 A
20	38.4 A	35.2 A	28.8 A	20.8 A	17.6 A
21	36.8 A	33.6 A	27.2 A	19.2 A	17.6 A
22	36.8 A	33.6 A	27.2 A	19.2 A	17.6 A
23	35.2 A	32.0 A	27.2 A	19.2 A	16.0 A
24	35.2 A	32.0 A	25.6 A	17.6 A	16.0 A
25	33.6 A	32.0 A	25.6 A	17.6 A	16.0 A
26	33.6 A	30.4 A	25.6 A	17.6 A	16.0 A
27	33.6 A	30.4 A	24.0 A	17.6 A	16.0 A
28	32.0 A	30.4 A	24.0 A	17.6 A	16.0 A
29	32.0 A	28.8 A	24.0 A	16.0 A	16.0 A
30	32.0 A	28.8 A	22.4 A	16.0 A	16.0 A

Figure 6: 24 Amp Rated DS7-340SX024N0-N,  
DS7-342SX024N0-N, DS7-34DSX024N0-D

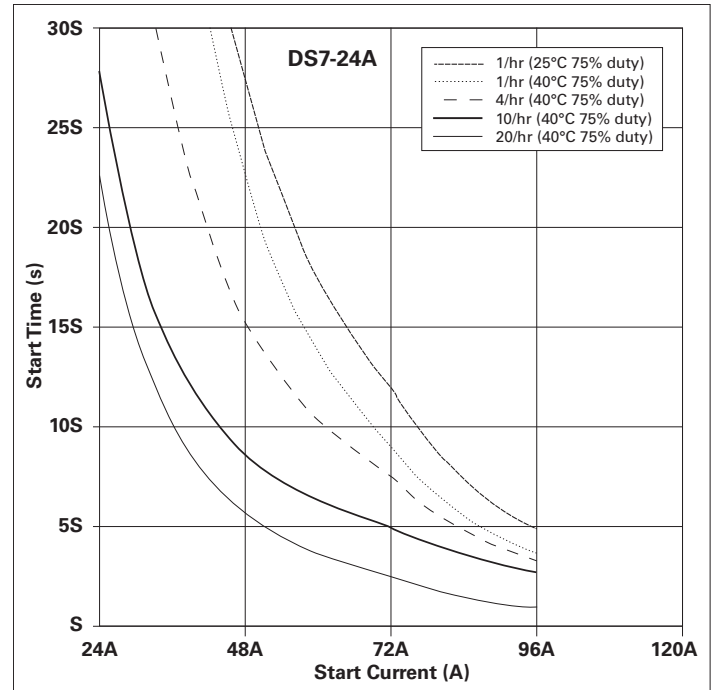
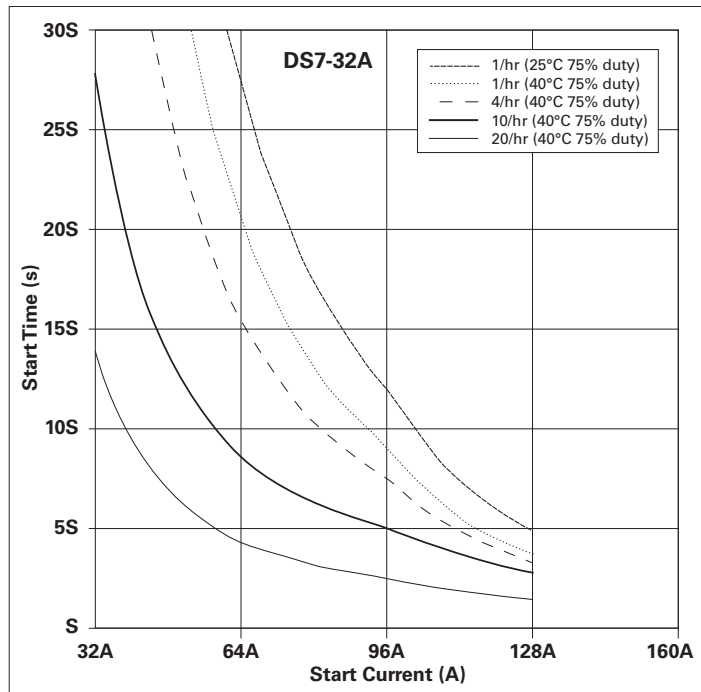


Table 13.

DS7-340SX024N0-N, DS7-342SX024N0-N, DS7-34DSX024N0-D

24 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C 75% duty	40°C 75% duty	40°C 75% duty	40°C 75% duty	40°C 75% duty
1	98.4 A	98.4 A	98.4 A	98.4 A	93.6 A
2	98.4 A	98.4 A	98.4 A	98.4 A	76.8 A
3	98.4 A	98.4 A	98.4 A	91.2 A	67.2 A
4	98.4 A	96.0 A	91.2 A	81.6 A	57.6 A
5	96.0 A	91.2 A	84.0 A	72.0 A	52.8 A
6	91.2 A	86.4 A	79.2 A	62.4 A	48.0 A
7	86.4 A	81.6 A	74.4 A	55.2 A	43.2 A
8	84.0 A	79.2 A	69.6 A	50.4 A	40.8 A
9	79.2 A	74.4 A	64.8 A	48.0 A	38.4 A
10	76.8 A	72.0 A	62.4 A	45.6 A	38.4 A
11	74.4 A	69.6 A	60.0 A	43.2 A	36.0 A
12	72.0 A	67.2 A	55.2 A	40.8 A	33.6 A
13	69.6 A	64.8 A	52.8 A	38.4 A	33.6 A
14	67.2 A	62.4 A	50.4 A	36.0 A	31.2 A
15	64.8 A	60.0 A	50.4 A	36.0 A	31.2 A
16	62.4 A	57.6 A	48.0 A	33.6 A	28.8 A
17	62.4 A	57.6 A	45.6 A	33.6 A	28.8 A
18	60.0 A	55.2 A	45.6 A	31.2 A	28.8 A
19	57.6 A	52.8 A	43.2 A	31.2 A	26.4 A
20	57.6 A	52.8 A	43.2 A	31.2 A	26.4 A
21	55.2 A	50.4 A	40.8 A	28.8 A	26.4 A
22	55.2 A	50.4 A	40.8 A	28.8 A	26.4 A
23	52.8 A	48.0 A	40.8 A	28.8 A	24.0 A
24	52.8 A	48.0 A	38.4 A	26.4 A	24.0 A
25	50.4 A	48.0 A	38.4 A	26.4 A	24.0 A
26	50.4 A	45.6 A	38.4 A	26.4 A	24.0 A
27	50.4 A	45.6 A	36.0 A	26.4 A	24.0 A
28	48.0 A	45.6 A	36.0 A	26.4 A	24.0 A
29	48.0 A	43.2 A	36.0 A	24.0 A	24.0 A
30	48.0 A	43.2 A	33.6 A	24.0 A	24.0 A

**Figure 7: 32 Amp Rated DS7-340SX032N0-N, DS7-342SX032N0-N, DS7-34DSX032N0-D**



**Table 14.**

**DS7-340SX032N0-N, DS7-342SX032N0-N, DS7-34DSX032N0-D**

32 A	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Time (Seconds)	75% duty	75% duty	75% duty	75% duty	75% duty
1	131.2 A	131.2 A	131.2 A	131.2 A	131.2 A
2	131.2 A	131.2 A	131.2 A	131.2 A	108.8 A
3	131.2 A	131.2 A	131.2 A	124.8 A	83.2 A
4	131.2 A	128.0 A	121.6 A	108.8 A	67.2 A
5	128.0 A	121.6 A	112.0 A	96.0 A	60.8 A
6	121.6 A	115.2 A	105.6 A	83.2 A	54.4 A
7	115.2 A	108.8 A	99.2 A	73.6 A	48.0 A
8	112.0 A	105.6 A	92.8 A	67.2 A	44.8 A
9	105.6 A	99.2 A	86.4 A	64.0 A	41.6 A
10	102.4 A	96.0 A	83.2 A	60.8 A	41.6 A
11	99.2 A	92.8 A	80.0 A	57.6 A	38.4 A
12	96.0 A	89.6 A	73.6 A	54.4 A	35.2 A
13	92.8 A	86.4 A	70.4 A	51.2 A	35.2 A
14	89.6 A	83.2 A	67.2 A	48.0 A	35.2 A
15	86.4 A	80.0 A	67.2 A	48.0 A	32.0 A
16	83.2 A	76.8 A	64.0 A	44.8 A	32.0 A
17	83.2 A	76.8 A	60.8 A	44.8 A	32.0 A
18	80.0 A	73.6 A	60.8 A	41.6 A	32.0 A
19	76.8 A	70.4 A	57.6 A	41.6 A	32.0 A
20	76.8 A	70.4 A	57.6 A	41.6 A	32.0 A
21	73.6 A	67.2 A	54.4 A	38.4 A	32.0 A
22	73.6 A	67.2 A	54.4 A	38.4 A	32.0 A
23	70.4 A	64.0 A	54.4 A	38.4 A	32.0 A
24	70.4 A	64.0 A	51.2 A	35.2 A	32.0 A
25	67.2 A	64.0 A	51.2 A	35.2 A	32.0 A
26	67.2 A	60.8 A	51.2 A	35.2 A	32.0 A
27	67.2 A	60.8 A	48.0 A	35.2 A	32.0 A
28	64.0 A	60.8 A	48.0 A	35.2 A	32.0 A
29	64.0 A	57.6 A	48.0 A	32.0 A	32.0 A
30	64.0 A	57.6 A	44.8 A	32.0 A	32.0 A

**Table 15. See also Figure 8**

DS7-340SX041N0-N, DS7-342SX041N0-N, DS7-34DSX041N0-D					
41 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Ramp Time	75% duty	75% duty	75% duty	75% duty	75% duty
1	155A	136A	133A	129A	127A
3	152A	133A	131A	129A	127A
4	150A	131A	128A	126A	124A
5	149A	129A	126A	124A	121A
6	146A	128A	125A	121A	118A
7	145A	126A	123A	119A	115A
8	144A	125A	121A	117A	113A
9	142A	124A	120A	115A	111A
10	142A	123A	118A	114A	108A
12	123A	111A	104A	98A	94A
13	121A	108A	102A	96A	91A
15	117A	105A	99A	92A	87A
19	112A	101A	93A	86A	80A
20	111A	100A	92A	84A	79A
23	109A	97A	89A	81A	73A
26	108A	96A	87A	79A	67A
29	106A	94A	85A	77A	62A
30	105A	94A	85A	76A	60A

**Table 16. See also Figure 9**

DS7-340SX055N0-N, DS7-342SX055N0-N, DS7-34DSX055N0-D					
55 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Ramp Time	75% duty	75% duty	75% duty	75% duty	75% duty
1	209A	183A	178A	173A	170A
3	204A	178A	176A	173A	170A
4	201A	175A	172A	169A	166A
5	199A	173A	170A	166A	162A
6	196A	171A	167A	163A	158A
7	195A	169A	176A	160A	155A
8	193A	168A	162A	157A	152A
9	191A	166A	160A	155A	148A
10	190A	165A	159A	153A	145A
12	165A	148A	140A	132A	126A
13	162A	145A	137A	129A	121A
15	157A	141A	132A	123A	116A
19	150A	135A	125A	115A	108A
20	149A	134A	123A	113A	106A
23	146A	131A	120A	109A	98A
26	144A	129A	117A	106A	89A
29	142A	127A	115A	103A	83A
30	141A	126A	114A	102A	81A

**Table 17. See also Figure 10**

DS7-340SX070N0-N, DS7-342SX070N0-N, DS7-34DSX070N0-D					
68 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	40°C	40°C	40°C	40°C
Ramp Time	75% duty	75% duty	75% duty	75% duty	75% duty
1	258A	226A	220A	214A	210A
3	253A	221A	217A	214A	210A
4	249A	217A	213A	209A	205A
5	246A	214A	210A	205A	200A
6	242A	212A	207A	201A	195A
7	241A	209A	203A	198A	191A
8	239A	208A	201A	194A	187A
9	236A	205A	198A	191A	183A
10	235A	204A	196A	189A	180A
12	204A	183A	173A	163A	155A
13	200A	180A	169A	159A	150A
15	194A	174A	164A	153A	144A
19	186A	167A	155A	142A	133A
20	185A	166A	153A	140A	131A
23	181A	162A	148A	135A	121A
26	178A	159A	145A	131A	110A
29	176A	157A	142A	127A	103A
30	174A	155A	140A	126A	100A

**Table 18. See also Figure 11**

DS7-340SX081N0-N, DS7-342SX081N0-N, DS7-34DSX081N0-D					
81 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
	25°C	25°C	40°C	40°C	40°C
Ramp Time	75% duty	75% duty	75% duty	75% duty	75% duty
1	307A	269A	262A	255A	251A
3	301A	263A	259A	255A	251A
4	296A	258A	254A	249A	245A
5	293A	255A	250A	245A	238A
6	289A	252A	246A	240A	232A
7	287A	249A	242A	235A	228A
8	284A	248A	239A	231A	223A
9	281A	245A	236A	228A	219A
10	280A	243A	234A	225A	214A
12	243A	219A	206A	194A	185A
13	238A	214A	202A	190A	179A
15	231A	208A	195A	182A	171A
19	222A	199A	184A	170A	159A
20	220A	197A	182A	167A	156A
23	215A	193A	177A	160A	144A
26	212A	190A	173A	156A	131A
29	209A	186A	169A	151A	122A
30	208A	185A	167A	150A	119A

**Table 19. See also Figure 12**

DS7-340SX100N0-N, DS7-342SX100N0-N, DS7-34DSX100N0-D					
99 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
Ramp Time	25°C	40°C	40°C	40°C	40°C
	75% duty	75% duty	75% duty	75% duty	75% duty
1	375A	329A	320A	312A	306A
3	368A	321A	317A	312A	306A
4	362A	316A	310A	304A	299A
5	359A	312A	305A	299A	291A
6	353A	308A	301A	293A	284A
7	351A	304A	296A	288A	278A
8	347A	303A	292A	282A	273A
9	344A	299A	289A	278A	267A
10	342A	297A	286A	275A	262A
12	297A	267A	252A	237A	226A
13	291A	262A	247A	232A	219A
15	282A	254A	238A	222A	209A
19	271A	243A	225A	207A	194A
20	269A	241A	222A	204A	191A
23	263A	235A	216A	196A	176A
26	260A	232A	211A	191A	161A
29	256A	228A	206A	185A	149A
30	254A	226A	205A	183A	146A

**Table 20. See also Figure 13**

DS7-340SX135N0-N, DS7-342SX135N0-N, DS7-34DSX135N0-D					
134 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
Ramp Time	25°C	40°C	40°C	40°C	40°C
	75% duty	75% duty	75% duty	75% duty	75% duty
1	540A	482A	473A	440A	429A
3	532A	461A	462A	440A	429A
4	520A	450A	448A	424A	410A
5	511A	442A	437A	411A	395A
6	503A	436A	429A	400A	382A
7	497A	430A	421A	390A	370A
8	491A	425A	413A	381A	360A
9	486A	420A	407A	373A	335A
10	481A	416A	401A	365A	310A
12	434A	388A	379A	351A	272A
13	416A	371A	367A	344A	257A
15	398A	355A	329A	287A	231A
19	378A	337A	308A	264A	193A
20	374A	333A	304A	259A	185A
23	363A	323A	291A	245A	166A
26	354A	314A	281A	233A	150A
29	346A	307A	272A	223A	138A
30	343A	305A	269A	220A	134A

**Table 21. See also Figure 14**

DS7-340SX160N0-N, DS7-342SX160N0-N, DS7-34DSX160N0-D					
160 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
Ramp Time	25°C	40°C	40°C	40°C	40°C
	75% duty	75% duty	75% duty	75% duty	75% duty
1	640A	571A	560A	521A	508A
3	631A	546A	548A	521A	508A
4	616A	533A	531A	503A	486A
5	606A	524A	518A	487A	468A
6	596A	516A	508A	474A	453A
7	589A	510A	498A	462A	439A
8	582A	504A	490A	452A	427A
9	576A	498A	482A	442A	397A
10	570A	493A	475A	433A	367A
12	514A	460A	449A	416A	322A
13	493A	440A	435A	408A	305A
15	472A	421A	390A	340A	274A
19	448A	399A	365A	313A	229A
20	443A	395A	360A	307A	219A
23	430A	383A	345A	290A	197A
26	420A	372A	332A	276A	178A
29	410A	364A	322A	264A	164A
30	407A	361A	319A	261A	159A

**Table 22. See also Figure 15**

DS7-340SX200N0-N, DS7-342SX200N0-N, DS7-DSX200N0-D					
196 Amps	Maximum Starting Current				
	1/hr	1/hr	4/hr	10/hr	20/hr
Ramp Time	25°C	40°C	40°C	40°C	40°C
	75% duty	75% duty	75% duty	75% duty	75% duty
1	800A	714A	700A	652A	636A
3	788A	683A	685A	652A	636A
4	770A	667A	664A	628A	607A
5	757A	655A	648A	609A	585A
6	745A	646A	635A	593A	566A
7	736A	637A	623A	578A	548A
8	727A	630A	612A	564A	533A
9	720A	622A	602A	553A	496A
10	713A	616A	593A	541A	459A
12	643A	575A	561A	520A	403A
13	616A	550A	543A	510A	381A
15	590A	526A	488A	425A	342A
19	560A	499A	457A	391A	286A
20	554A	493A	450A	384A	274A
23	538A	479A	432A	363A	246A
26	524A	465A	416A	345A	222A
29	513A	455A	403A	330A	204A
30	508A	452A	399A	326A	199A

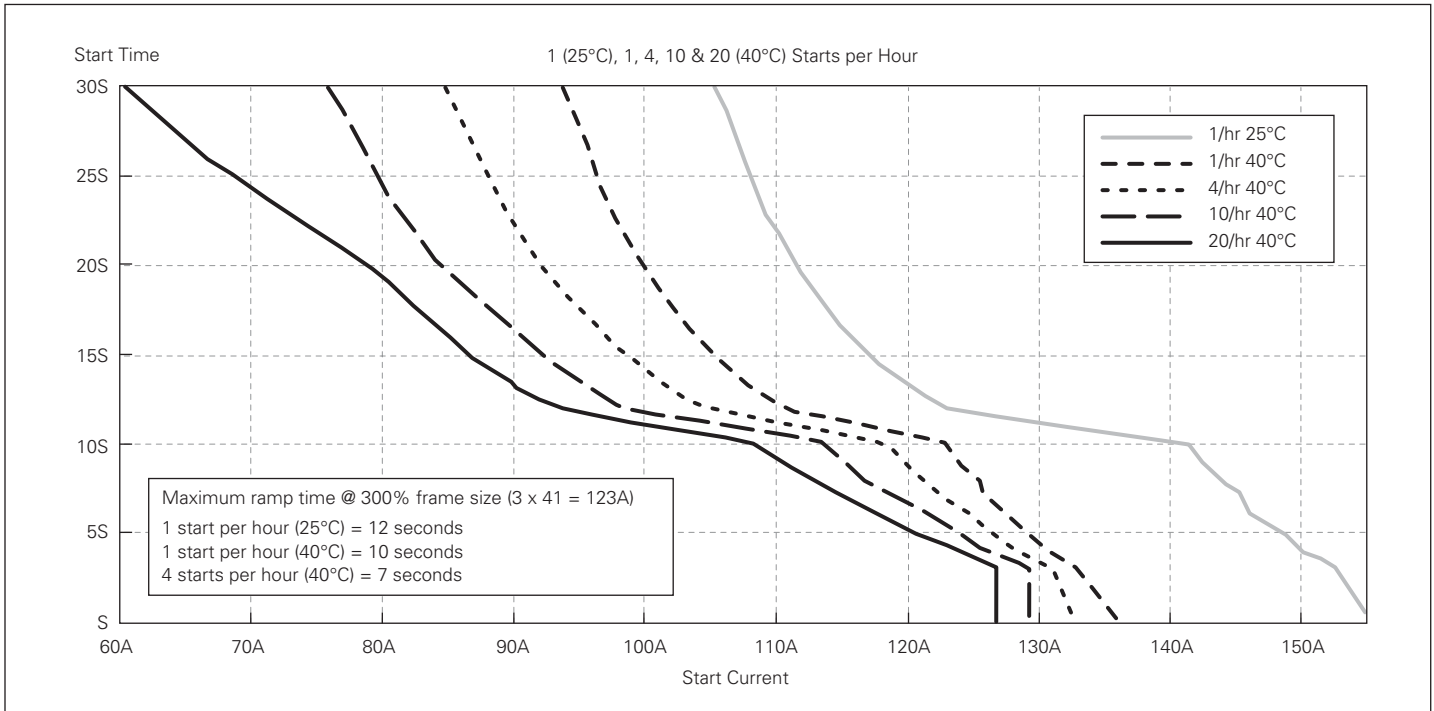


Figure 8. 41A Rated DS7-340SX041N0-N, DS7-342SX041N0-N, DS7-34DSX041N0-D

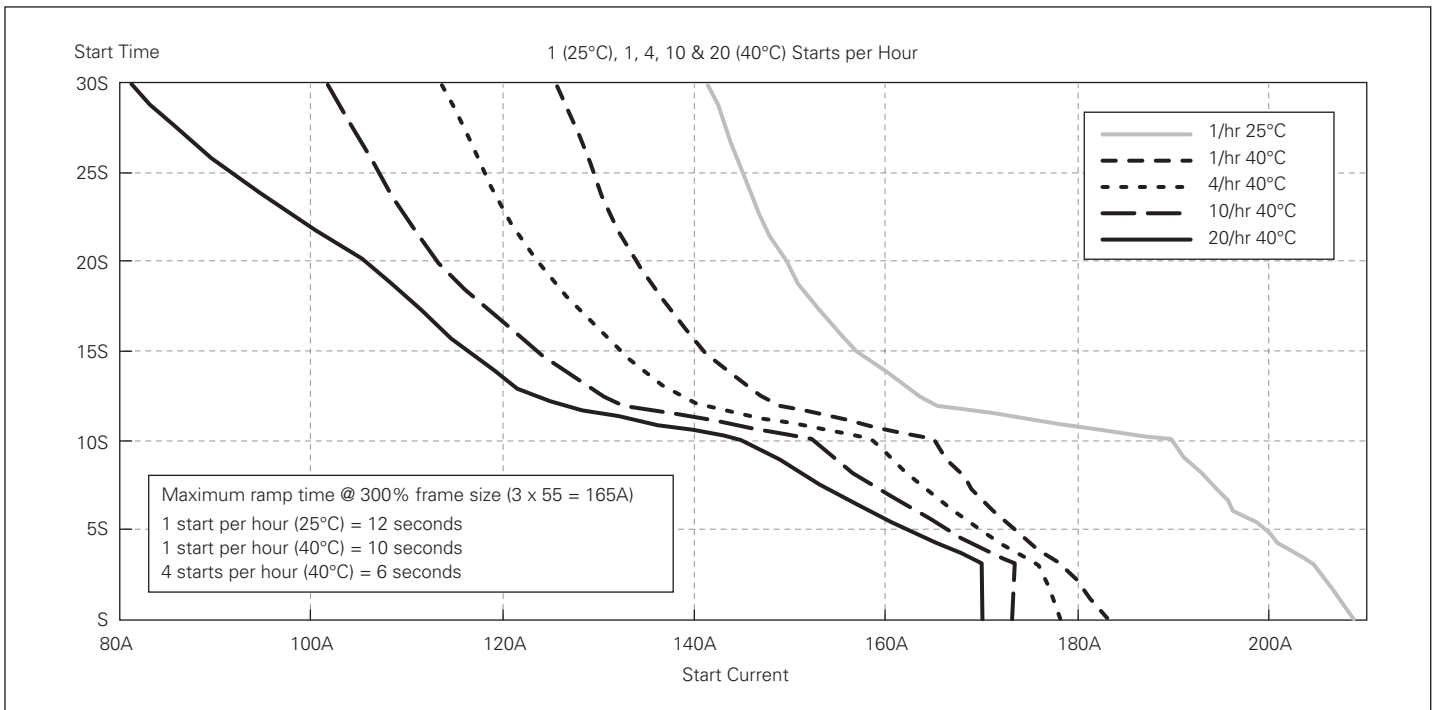


Figure 9. 55A Rated DS7-340SX055N0-N, DS7-342SX055N0-N, DS7-34DSX055N0-D

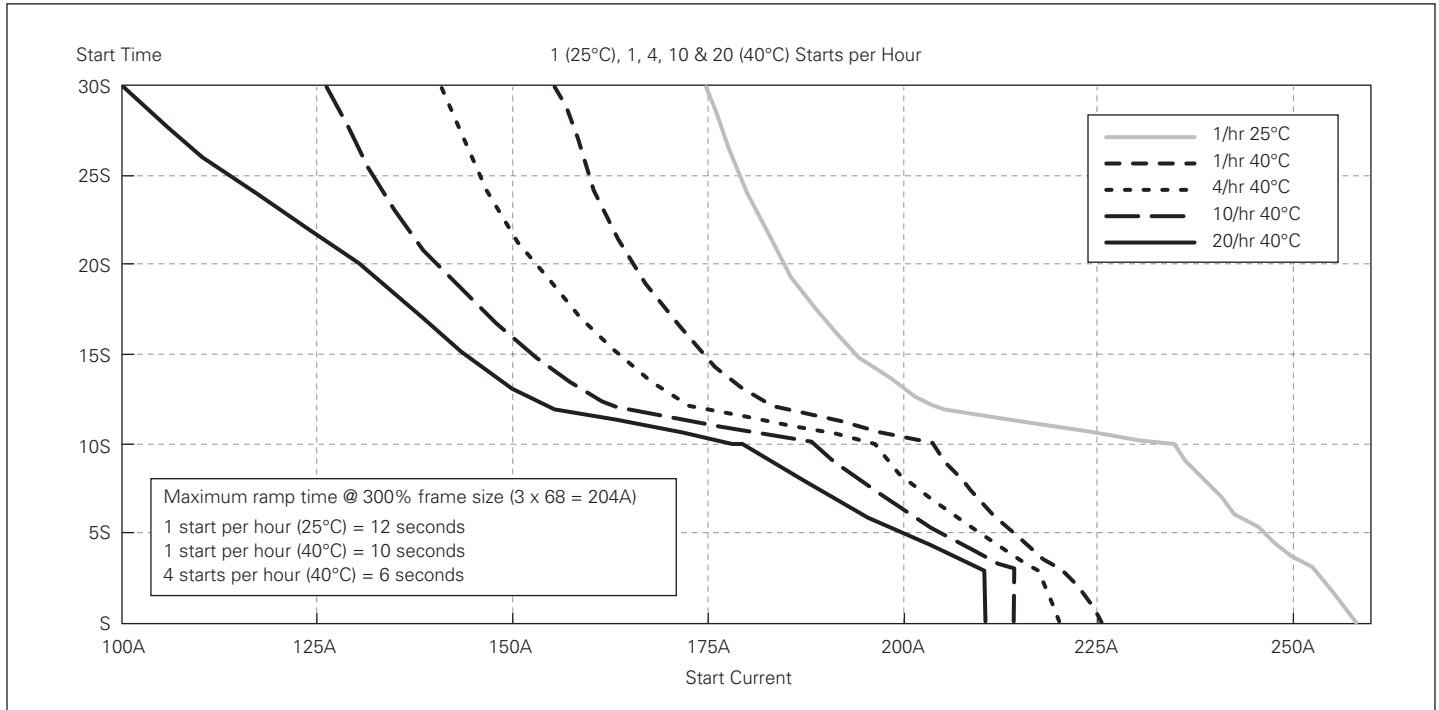


Figure 10. 68A Rated DS7-340SX070N0-N, DS7-342SX070N0-N, DS7-34DSX070N0-D

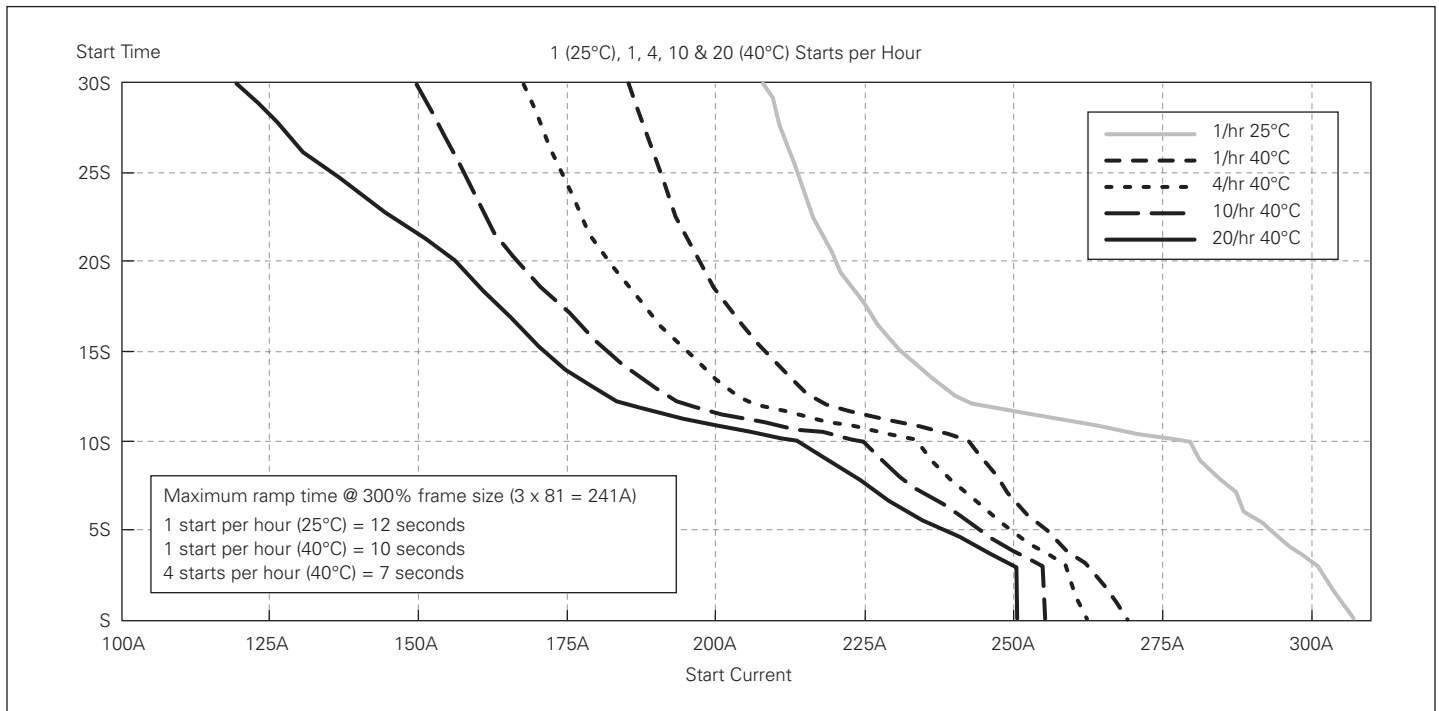


Figure 11. 81A Rated DS7-340SX081N0-N, DS7-342SX081N0-N, DS7-34DSX081N0-D



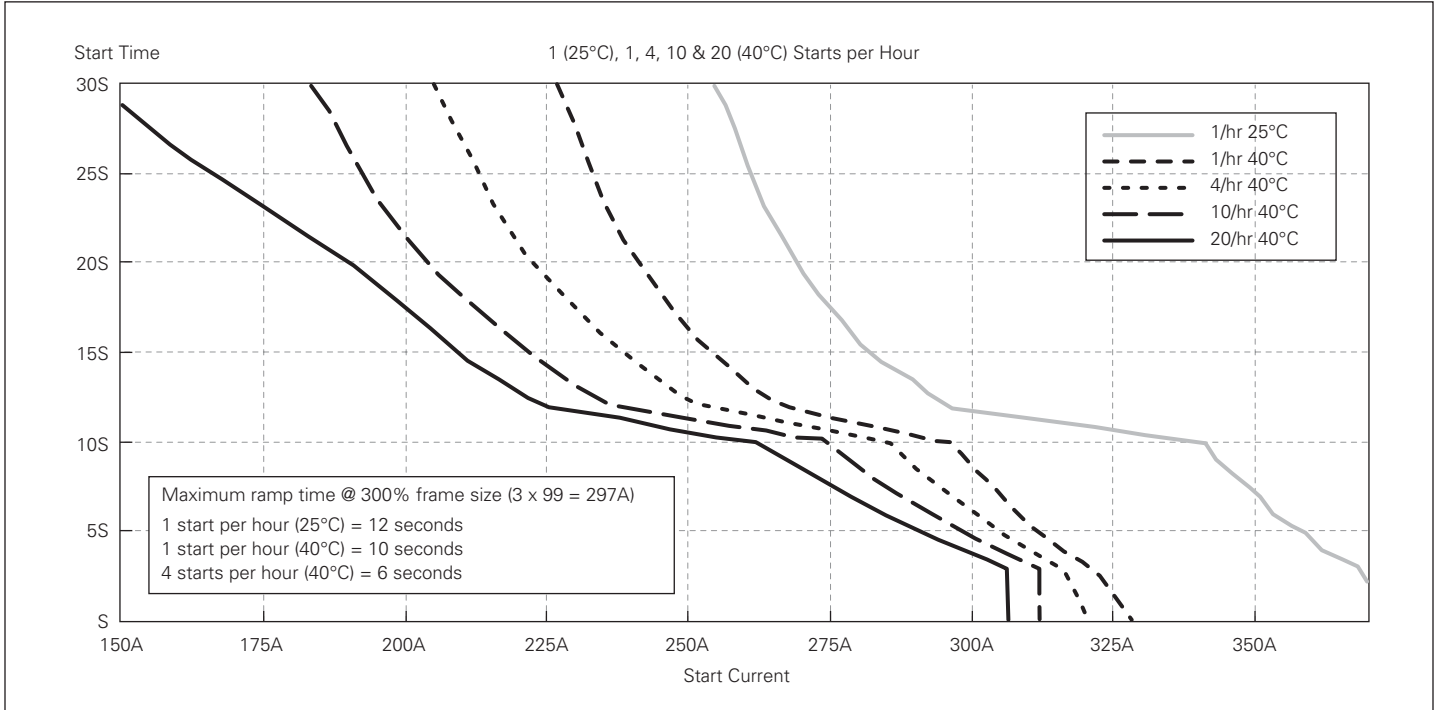


Figure 12. 99A Rated DS7-340SX100N0-N, DS7-342SX100N0-N, DS7-34DSX100N0-D

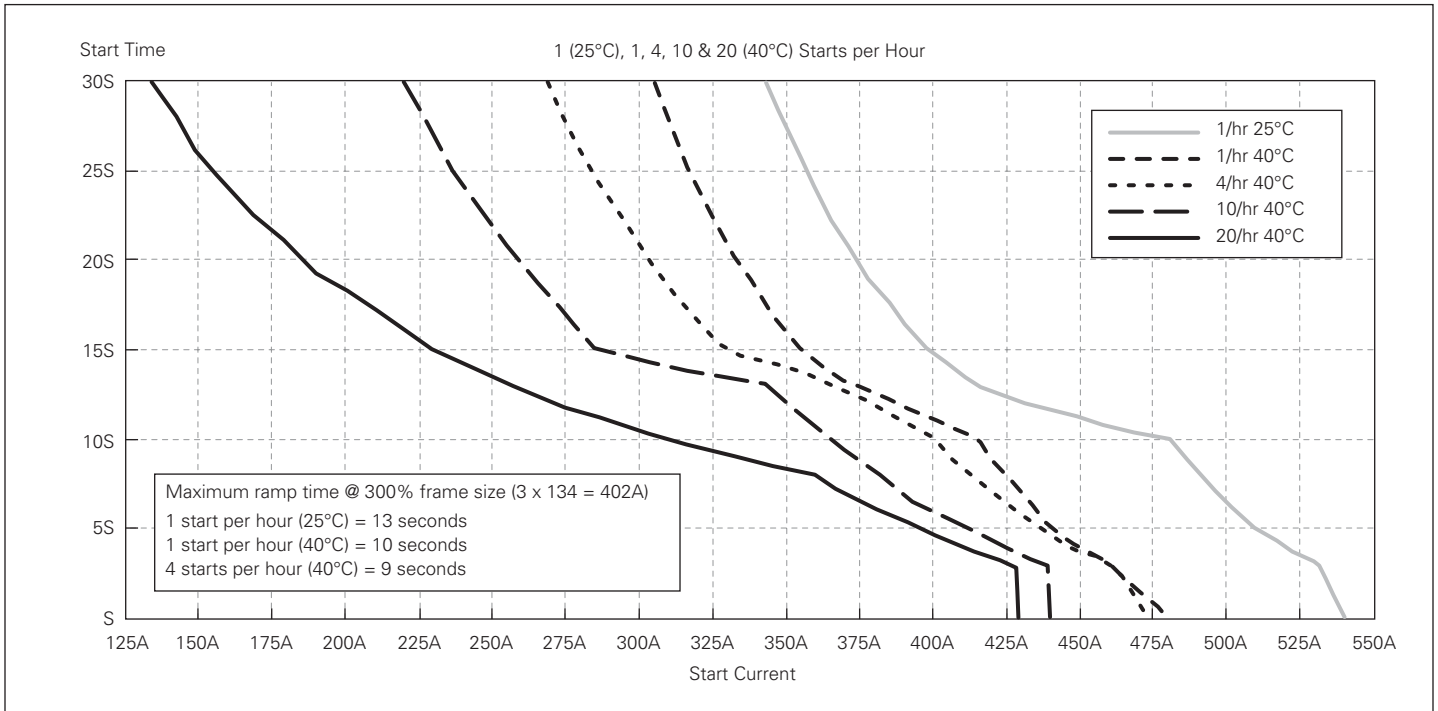


Figure 13. 134A Rated DS7-340SX135N0-N, DS7-342SX135N0-N, DS7-34DSX100N0-D

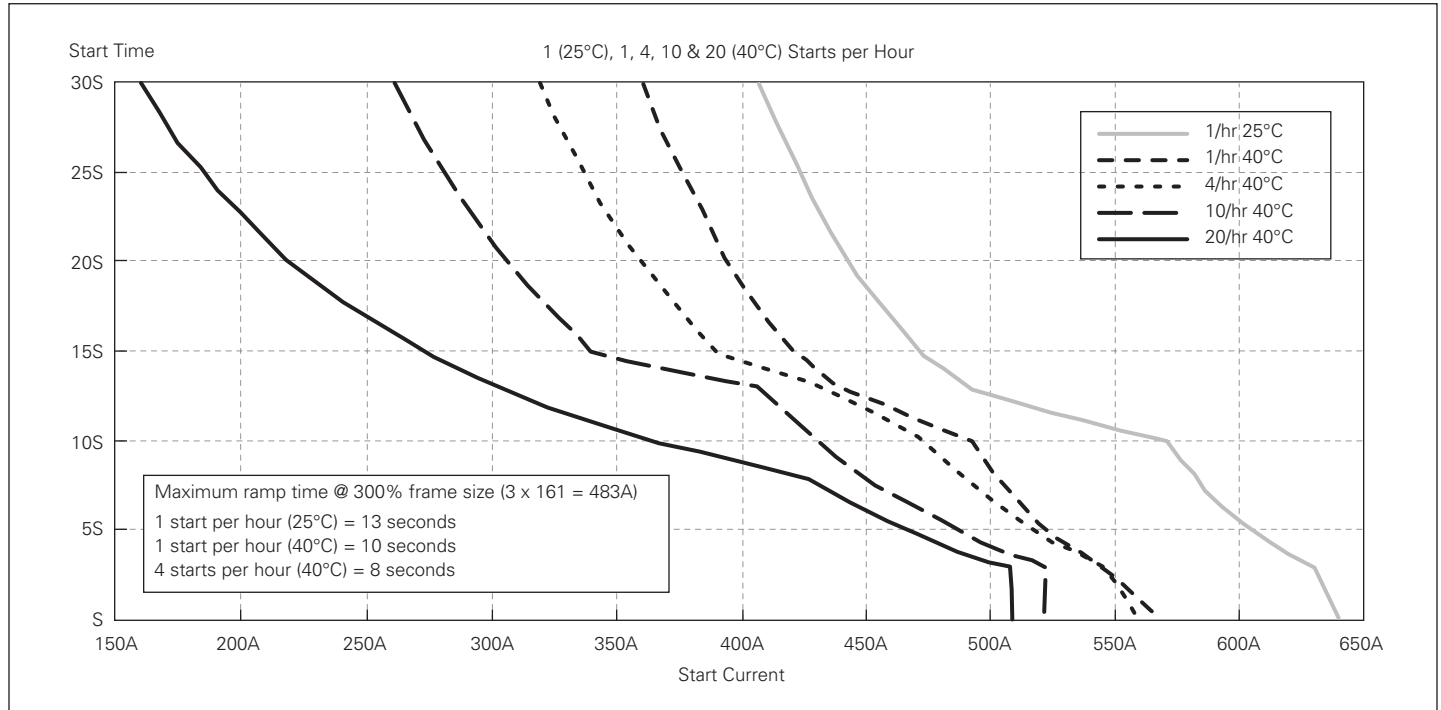


Figure 14. 160A Rated DS7-340SX160N0-N, DS7-342SX160N0-N, DS7-34DSX161N0-D

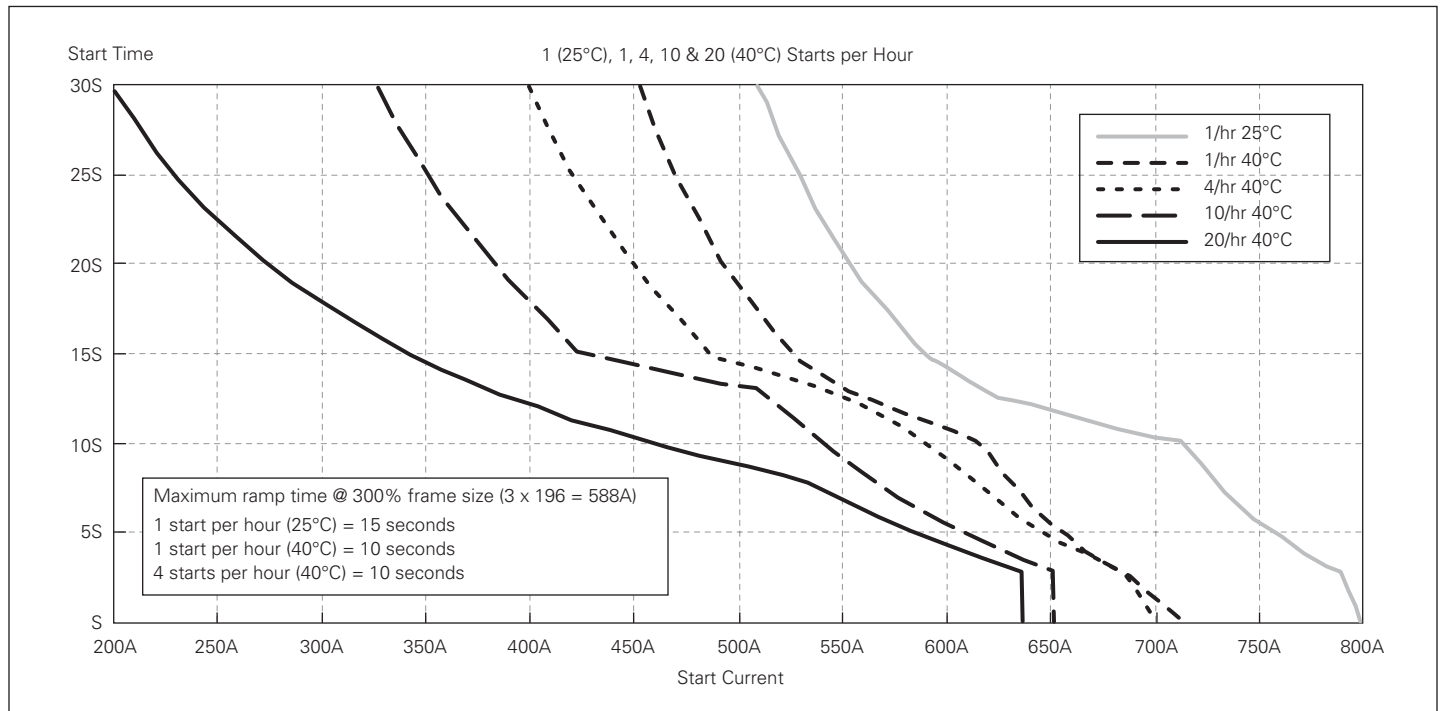


Figure 15. 196A Rated DS7-340SX200N0-N, DS7-342SX200N0-N, DS7-34DSX200N0-D

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