

How to select the correct size DS7 Soft Starter for standard duty applications.



Application

The DS7 is a two phase control soft starter utilized to accomplish motor starting using the reduced voltage method. Typically, the motor Horsepower or kW rating is used to determine the required size of the soft starter. This document addresses other factors that require consideration in accomplishing the proper match of soft starter to the load.

Overview

Soft starter sizing is typically determined by the Horsepower or kW rating of the motor, coupled with the mains operating voltage. Using this information, a table or graph is consulted to determine the minimum size of the soft starter for the application. If the application is considered to be severe duty, it is commonplace to select the next size larger soft starter to accommodate the higher load currents.

The graphs and tables published for the DS7 are based on an inrush value of 300% FLA or 400% FLA of the motor. If the actual inrush current approaches a value of 400% FLA, the maximum allowable ramp times are significantly affected. Additionally, the ramp times also must be considered independently, as when the ramp times are increased even though the inrush current does not change, the maximum allowable current capacity is reduced. When selecting the size of the DS7 soft starter, Tables 1 – 4 may be used if the anticipated ramp times are 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 ramp times are expected to be longer, Tables 5 – 11 should be reviewed to ensure that the soft starter is not subjected to excessive current resulting in SCR failure. The size of the soft starter may be required to be increased specifically due to a longer ramp time.

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

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

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

EAT•N

Powering Business Worldwide

Example 1

7.5HP Motor (11A FLA) @ 460V Application, Maximum Current 300% FLA @ 40oC with an estimated start ramp time of 8 seconds and 4 starts per hour.

Consulting Table 1, the DS7-340SX012NO-N soft starter shows an acceptable maximum motor size of 7.5HP. Please note that Tables 1 thru 4 indicate maximum allowable start ramp times of 10 seconds @ 1 start/hr for these selections. Consulting Table 8, the maximum allowable start current is noted as 36A, and the maximum allowable start ramp time is 8 seconds. Under these conditions, a DS7-340SX012NO-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 ramp time must be extended to 12 seconds for the motor to achieve synchronous speed. Consulting Table 8, the maximum allowable start current for 12 seconds (noted in Table 8 as 12.1 seconds) is indicated as 30A, less than the required 33A (3 x 11 amps). Under these conditions, the DS7-340SX012NO-N soft starter would not be an appropriate selection. Table 9 for the next higher size soft starter, lists the maximum allowable start current @ 12 seconds (interpolating between 11.9 and 12.9 seconds) as approximately 37A. Under these new conditions, the next size higher soft starter, DS7-340SX016NO-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 determined that the inrush current requires a 400% Current Limit. This operating condition will also require a larger capacity soft starter (DS7-340SX016NO-N) to accommodate the higher operating current (44 amps) during the start ramp time.

Supporting documentation

| Manuals | Reference Number |
|---------------------------|------------------|
| DS7 Instructional Leaflet | |
| DS7 Catalog | |
| | |
| Program Files | none |
| | |
| Outline Drawings | none |
| | |

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.**

Table 1. 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 | MMP |
|------------------|--------------------|------------------|------|------|--------------------------------|-----------------------------|---------------------------|---------------------------|------------|
| | | 200V | 230V | 480V | | | | | |
| DS7-340SX004NO-N | 3.7 | 0.75 | 0.75 | 2 | HFD3015 | 15A Class RK5 | XTOB040DC1 ¹ | C440A1A005SAX | XTPR004BC1 |
| DS7-342SX004NO-N | | | | | | | | | |
| DS7-340SX007NO-N | 6.9 | 1.5 | 2 | 3 | HFD3015 | 15A Class RK5 | XTOB057DC1 ¹ | C440A1A020SAX | XTPR6P3BC1 |
| DS7-342SX007NO-N | | | | | | | | | |
| DS7-340SX009NO-N | 7.8 | 2 | 2 | 5 | HFD3020 | 20A Class RK5 | XTOB065DC1 ¹ | C440A1A020SAX | XTPR010BC1 |
| DS7-342SX009NO-N | | | | | | | | | |
| DS7-340SX012NO-N | 11 | 3 | 3 | 7.5 | HFD3030 | 20A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR012BC1 |
| DS7-342SX012NO-N | | | | | | | | | |
| DS7-340SX016NO-N | 15.2 | 3 | 5 | 10 | HFD3035 | 25A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR016BC1 |
| DS7-342SX016NO-N | | | | | | | | | |
| DS7-340SX024NO-N | 22 | 5 | 7.5 | 15 | HFD3060 | 40A Class RK5 | XTOB125GC1S ² | C440A1A045SAX | XTPR025BC1 |
| DS7-342SX024NO-N | | | | | | | | | |
| DS7-340SX032NO-N | 32 | 7.5 | 10 | 20 | HFD3070 | 50A Class RK5 | XTOB160GC1S ² | C440A1A045SAX | XTPR032BC1 |
| DS7-342SX032NO-N | | | | | | | | | |

¹ XTOBXDIND Panel Mounting Adapter must be used with this overload.

² XTOBXTLL line and load lugs must be used with this overload.

Table 2. 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 | MMP |
|------------------|--------------------|------------------|------|------|--------------------------------|-----------------------------|---------------------------|---------------------------|------------|
| | | 200V | 230V | 480V | | | | | |
| DS7-340SX004NO-N | 3 | 0.5 | 0.5 | 1.5 | HFD3015 | 15A Class RK5 | XTOB040DC1 ¹ | C440A1A005SAX | XTPR004BC1 |
| DS7-342SX004NO-N | | | | | | | | | |
| DS7-340SX007NO-N | 4.8 | 1 | 1 | 3 | HFD3015 | 15A Class RK5 | XTOB057DC1 ¹ | C440A1A020SAX | XTPR6P3BC1 |
| DS7-342SX007NO-N | | | | | | | | | |
| DS7-340SX009NO-N | 6.9 | 1.5 | 2 | 3 | HFD3020 | 20A Class RK5 | XTOB065DC1 ¹ | C440A1A020SAX | XTPR010BC1 |
| DS7-342SX009NO-N | | | | | | | | | |
| DS7-340SX012NO-N | 9 | 2 | 2 | 5 | HFD3030 | 20A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR012BC1 |
| DS7-342SX012NO-N | | | | | | | | | |
| DS7-340SX016NO-N | 11 | 3 | 3 | 7.5 | HFD3035 | 25A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR016BC1 |
| DS7-342SX016NO-N | | | | | | | | | |
| DS7-340SX024NO-N | 17.5 | 5 | 5 | 10 | HFD3060 | 40A Class RK5 | XTOB125GC1S ² | C440A1A045SAX | XTPR025BC1 |
| DS7-342SX024NO-N | | | | | | | | | |
| DS7-340SX032NO-N | 22 | 5 | 7.5 | 15 | HFD3070 | 50A Class RK5 | XTOB160GC1S ² | C440A1A045SAX | XTPR032BC1 |
| DS7-342SX032NO-N | | | | | | | | | |

¹ XTOBXDIND Panel Mounting Adapter must be used with this overload.

² XTOBXTLL line and load lugs must be used with this overload.

Table 3. 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 | MMP |
|------------------|--------------------|------------------|------|--------------------------------|-----------------------------|---------------------------|---------------------------|------------|
| | | 230V | 400V | | | | | |
| DS7-340SX004NO-N | 3.8 | 0.75 | 1.5 | HFD3015 | 15A Class RK5 | XTOB040DC1 ¹ | C440A1A005SAX | XTPR004BC1 |
| DS7-342SX004NO-N | | | | | | | | |
| DS7-340SX007NO-N | 7 | 1.5 | 3 | HFD3015 | 15A Class RK5 | XTOB057DC1 ¹ | C440A1A020SAX | XTPR6P3BC1 |
| DS7-342SX007NO-N | | | | | | | | |
| DS7-340SX009NO-N | 9 | 2.2 | 4 | HFD3020 | 20A Class RK5 | XTOB065DC1 ¹ | C440A1A020SAX | XTPR010BC1 |
| DS7-342SX009NO-N | | | | | | | | |
| DS7-340SX012NO-N | 12 | 3 | 5.5 | HFD3030 | 20A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR012BC1 |
| DS7-342SX012NO-N | | | | | | | | |
| DS7-340SX016NO-N | 16 | 4 | 7.5 | HFD3035 | 25A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR016BC1 |
| DS7-342SX016NO-N | | | | | | | | |
| DS7-340SX024NO-N | 24 | 5.5 | 11 | HFD3060 | 40A Class RK5 | XTOB125GC1S ² | C440A1A045SAX | XTPR025BC1 |
| DS7-342SX024NO-N | | | | | | | | |
| DS7-340SX032NO-N | 32 | 7.5 | 15 | HFD3070 | 50A Class RK5 | XTOB160GC1S ² | C440A1A045SAX | XTPR032BC1 |
| DS7-342SX032NO-N | | | | | | | | |

¹ XTOBXDIND Panel Mounting Adapter must be used with this overload.

² XTOBXTLL line and load lugs must be used with this overload.

Table 4. 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 | MMP |
|------------------|--------------------|------------------|------|--------------------------------|-----------------------------|---------------------------|---------------------------|------------|
| | | 230V | 400V | | | | | |
| DS7-340SX004NO-N | 2.5 | 0.33 | 1 | HFD3015 | 15A Class RK5 | XTOB040DC1 ¹ | C440A1A005SAX | XTPR004BC1 |
| DS7-342SX004NO-N | | | | | | | | |
| DS7-340SX007NO-N | 3.8 | 0.75 | 1.5 | HFD3015 | 15A Class RK5 | XTOB057DC1 ¹ | C440A1A020SAX | XTPR6P3BC1 |
| DS7-342SX007NO-N | | | | | | | | |
| DS7-340SX009NO-N | 7 | 1.5 | 3 | HFD3020 | 20A Class RK5 | XTOB065DC1 ¹ | C440A1A020SAX | XTPR010BC1 |
| DS7-342SX009NO-N | | | | | | | | |
| DS7-340SX012NO-N | 9 | 2.2 | 4 | HFD3030 | 20A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR012BC1 |
| DS7-342SX012NO-N | | | | | | | | |
| DS7-340SX016NO-N | 12 | 3 | 5.5 | HFD3035 | 25A Class RK5 | XTOB100GC1S ² | C440A1A020SAX | XTPR016BC1 |
| DS7-342SX016NO-N | | | | | | | | |
| DS7-340SX024NO-N | 16 | 4 | 7.5 | HFD3060 | 40A Class RK5 | XTOB125GC1S ² | C440A1A045SAX | XTPR025BC1 |
| DS7-342SX024NO-N | | | | | | | | |
| DS7-340SX032NO-N | 24 | 5.5 | 11 | HFD3070 | 50A Class RK5 | XTOB160GC1S ² | C440A1A045SAX | XTPR032BC1 |
| DS7-342SX032NO-N | | | | | | | | |

¹ XTOBXDIND Panel Mounting Adapter must be used with this overload.

² XTOBXTLL line and load lugs must be used with this overload.

Table 5.

| DS7-340SX004NO-N, DS7342SX004NO-N | | | | | | |
|-----------------------------------|----------|---------------------|----------|----------|----------|----------|
| Start Current | | Start Ramp Time (s) | | | | |
| 4 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 4 | 1 | 135.0 | 112.5 | 90.0 | 75.0 | 27.6 |
| 4 | 1.1 | 110.2 | 91.8 | 73.5 | 60.0 | 22.7 |
| 5 | 1.2 | 91.5 | 76.2 | 61.0 | 48.8 | 19.1 |
| 5 | 1.3 | 77.0 | 64.2 | 51.3 | 40.3 | 16.3 |
| 6 | 1.4 | 65.6 | 54.7 | 43.7 | 33.8 | 14.0 |
| 6 | 1.5 | 56.5 | 47.1 | 37.6 | 28.6 | 12.2 |
| 6 | 1.6 | 49.1 | 40.9 | 32.7 | 24.4 | 10.7 |
| 7 | 1.7 | 43.0 | 35.8 | 28.6 | 21.0 | 9.5 |
| 7 | 1.8 | 37.9 | 31.6 | 25.3 | 18.3 | 8.4 |
| 8 | 1.9 | 33.6 | 28.0 | 22.4 | 16.0 | 7.6 |
| 8 | 2 | 30.0 | 25.0 | 20.0 | 14.1 | 6.8 |
| 8 | 2.1 | 26.9 | 22.4 | 17.9 | 12.4 | 6.2 |
| 9 | 2.2 | 24.3 | 20.2 | 16.2 | 11.1 | 5.6 |
| 9 | 2.3 | 22.0 | 18.3 | 14.6 | 9.9 | 5.1 |
| 10 | 2.4 | 19.9 | 16.6 | 13.3 | 8.9 | 4.7 |
| 10 | 2.5 | 18.2 | 15.2 | 12.1 | 8.0 | 4.3 |
| 10 | 2.6 | 16.6 | 13.9 | 11.1 | 7.2 | 4.0 |
| 11 | 2.7 | 15.3 | 12.7 | 10.2 | 6.6 | 3.7 |
| 11 | 2.8 | 14.1 | 11.7 | 9.4 | 6.0 | 3.5 |
| 12 | 2.9 | 13.0 | 10.8 | 8.6 | 5.5 | 3.2 |
| 12 | 3 | 12.0 | 10.0 | 8.0 | 5.0 | 3.0 |
| 12 | 3.1 | 10.5 | 8.8 | 7.1 | 4.5 | 2.7 |
| 13 | 3.2 | 9.3 | 7.7 | 6.3 | 4.0 | 2.4 |
| 13 | 3.3 | 8.2 | 6.8 | 5.6 | 3.6 | 2.2 |
| 14 | 3.4 | 7.3 | 6.1 | 5.0 | 3.2 | 1.9 |
| 14 | 3.5 | 6.5 | 5.4 | 4.5 | 2.9 | 1.8 |
| 14 | 3.6 | 5.9 | 4.9 | 4.1 | 2.7 | 1.6 |
| 15 | 3.7 | 5.3 | 4.4 | 3.7 | 2.4 | 1.5 |
| 15 | 3.8 | 4.8 | 4.0 | 3.4 | 2.2 | 1.3 |
| 16 | 3.9 | 4.4 | 3.6 | 3.1 | 2.0 | 1.2 |
| 16 | 4 | 4.0 | 3.3 | 2.8 | 1.9 | 1.1 |

Table 6.

| DS7-340SX007NO-N, DS7342SX007NO-N | | | | | | |
|-----------------------------------|----------|---------------------|----------|----------|----------|----------|
| Start Current | | Start Ramp Time (s) | | | | |
| 7 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 7 | 1 | 135.0 | 112.5 | 90.0 | 75.0 | 27.6 |
| 8 | 1.1 | 110.2 | 91.8 | 73.5 | 60.0 | 22.7 |
| 8 | 1.2 | 91.5 | 76.2 | 61.0 | 48.8 | 19.1 |
| 9 | 1.3 | 77.0 | 64.2 | 51.3 | 40.3 | 16.3 |
| 10 | 1.4 | 65.6 | 54.7 | 43.7 | 33.8 | 14.0 |
| 11 | 1.5 | 56.5 | 47.1 | 37.6 | 28.6 | 12.2 |
| 11 | 1.6 | 49.1 | 40.9 | 32.7 | 24.4 | 10.7 |
| 12 | 1.7 | 43.0 | 35.8 | 28.6 | 21.0 | 9.5 |
| 13 | 1.8 | 37.9 | 31.6 | 25.3 | 18.3 | 8.4 |
| 13 | 1.9 | 33.6 | 28.0 | 22.4 | 16.0 | 7.6 |
| 14 | 2 | 30.0 | 25.0 | 20.0 | 14.1 | 6.8 |
| 15 | 2.1 | 26.9 | 22.4 | 17.9 | 12.4 | 6.2 |
| 15 | 2.2 | 24.3 | 20.2 | 16.2 | 11.1 | 5.6 |
| 16 | 2.3 | 22.0 | 18.3 | 14.6 | 9.9 | 5.1 |
| 17 | 2.4 | 19.9 | 16.6 | 13.3 | 8.9 | 4.7 |
| 18 | 2.5 | 18.2 | 15.2 | 12.1 | 8.0 | 4.3 |
| 18 | 2.6 | 16.6 | 13.9 | 11.1 | 7.2 | 4.0 |
| 19 | 2.7 | 15.3 | 12.7 | 10.2 | 6.6 | 3.7 |
| 20 | 2.8 | 14.1 | 11.7 | 9.4 | 6.0 | 3.5 |
| 20 | 2.9 | 13.0 | 10.8 | 8.6 | 5.5 | 3.2 |
| 21 | 3 | 12.0 | 10.0 | 8.0 | 5.0 | 3.0 |
| 22 | 3.1 | 10.5 | 8.8 | 7.1 | 4.5 | 2.7 |
| 22 | 3.2 | 9.3 | 7.7 | 6.3 | 4.0 | 2.4 |
| 23 | 3.3 | 8.2 | 6.8 | 5.6 | 3.6 | 2.2 |
| 24 | 3.4 | 7.3 | 6.1 | 5.0 | 3.2 | 1.9 |
| 25 | 3.5 | 6.5 | 5.4 | 4.5 | 2.9 | 1.8 |
| 25 | 3.6 | 5.9 | 4.9 | 4.1 | 2.7 | 1.6 |
| 26 | 3.7 | 5.3 | 4.4 | 3.7 | 2.4 | 1.5 |
| 27 | 3.8 | 4.8 | 4.0 | 3.4 | 2.2 | 1.3 |
| 27 | 3.9 | 4.4 | 3.6 | 3.1 | 2.0 | 1.2 |
| 28 | 4 | 4.0 | 3.3 | 2.8 | 1.9 | 1.1 |

Table 7.

| DS7-340SX009NO-N, DS7342SX009NO-N | | | | | | |
|-----------------------------------|----------|----------------|----------|----------|----------|----------|
| Start Current | | Start Time (s) | | | | |
| 9 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 9 | 1 | 135.0 | 112.5 | 90.0 | 75.0 | 27.6 |
| 10 | 1.1 | 110.2 | 91.8 | 73.5 | 60.0 | 22.7 |
| 11 | 1.2 | 91.5 | 76.2 | 61.0 | 48.8 | 19.1 |
| 12 | 1.3 | 77.0 | 64.2 | 51.3 | 40.3 | 16.3 |
| 13 | 1.4 | 65.6 | 54.7 | 43.7 | 33.8 | 14.0 |
| 14 | 1.5 | 56.5 | 47.1 | 37.6 | 28.6 | 12.2 |
| 14 | 1.6 | 49.1 | 40.9 | 32.7 | 24.4 | 10.7 |
| 15 | 1.7 | 43.0 | 35.8 | 28.6 | 21.0 | 9.5 |
| 16 | 1.8 | 37.9 | 31.6 | 25.3 | 18.3 | 8.4 |
| 17 | 1.9 | 33.6 | 28.0 | 22.4 | 16.0 | 7.6 |
| 18 | 2 | 30.0 | 25.0 | 20.0 | 14.1 | 6.8 |
| 19 | 2.1 | 26.9 | 22.4 | 17.9 | 12.4 | 6.2 |
| 20 | 2.2 | 24.3 | 20.2 | 16.2 | 11.1 | 5.6 |
| 21 | 2.3 | 22.0 | 18.3 | 14.6 | 9.9 | 5.1 |
| 22 | 2.4 | 19.9 | 16.6 | 13.3 | 8.9 | 4.7 |
| 23 | 2.5 | 18.2 | 15.2 | 12.1 | 8.0 | 4.3 |
| 23 | 2.6 | 16.6 | 13.9 | 11.1 | 7.2 | 4.0 |
| 24 | 2.7 | 15.3 | 12.7 | 10.2 | 6.6 | 3.7 |
| 25 | 2.8 | 14.1 | 11.7 | 9.4 | 6.0 | 3.5 |
| 26 | 2.9 | 13.0 | 10.8 | 8.6 | 5.5 | 3.2 |
| 27 | 3 | 12.0 | 10.0 | 8.0 | 5.0 | 3.0 |
| 28 | 3.1 | 10.5 | 8.8 | 7.1 | 4.5 | 2.7 |
| 29 | 3.2 | 9.3 | 7.7 | 6.3 | 4.0 | 2.4 |
| 30 | 3.3 | 8.2 | 6.8 | 5.6 | 3.6 | 2.2 |
| 31 | 3.4 | 7.3 | 6.1 | 5.0 | 3.2 | 1.9 |
| 32 | 3.5 | 6.5 | 5.4 | 4.5 | 2.9 | 1.8 |
| 32 | 3.6 | 5.9 | 4.9 | 4.1 | 2.7 | 1.6 |
| 33 | 3.7 | 5.3 | 4.4 | 3.7 | 2.4 | 1.5 |
| 34 | 3.8 | 4.8 | 4.0 | 3.4 | 2.2 | 1.3 |
| 35 | 3.9 | 4.4 | 3.6 | 3.1 | 2.0 | 1.2 |
| 36 | 4 | 4.0 | 3.3 | 2.8 | 1.9 | 1.1 |

Table 8.

| DS7-340SX012NO-N, DS7342SX012NO-N | | | | | | |
|-----------------------------------|----------|---------------------|----------|----------|----------|----------|
| Start Current | | Start Ramp Time (s) | | | | |
| 12 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 12 | 1 | 135.0 | 112.5 | 90.0 | 75.0 | 27.6 |
| 13 | 1.1 | 110.2 | 91.8 | 73.5 | 60.0 | 22.7 |
| 14 | 1.2 | 91.5 | 76.2 | 61.0 | 48.8 | 19.1 |
| 16 | 1.3 | 77.0 | 64.2 | 51.3 | 40.3 | 16.3 |
| 17 | 1.4 | 65.6 | 54.7 | 43.7 | 33.8 | 14.0 |
| 18 | 1.5 | 56.5 | 47.1 | 37.6 | 28.6 | 12.2 |
| 19 | 1.6 | 49.1 | 40.9 | 32.7 | 24.4 | 10.7 |
| 20 | 1.7 | 43.0 | 35.8 | 28.6 | 21.0 | 9.5 |
| 22 | 1.8 | 37.9 | 31.6 | 25.3 | 18.3 | 8.4 |
| 23 | 1.9 | 33.6 | 28.0 | 22.4 | 16.0 | 7.6 |
| 24 | 2 | 30.0 | 25.0 | 20.0 | 14.1 | 6.8 |
| 25 | 2.1 | 26.9 | 22.4 | 17.9 | 12.4 | 6.2 |
| 26 | 2.2 | 24.3 | 20.2 | 16.2 | 11.1 | 5.6 |
| 28 | 2.3 | 22.0 | 18.3 | 14.6 | 9.9 | 5.1 |
| 29 | 2.4 | 19.9 | 16.6 | 13.3 | 8.9 | 4.7 |
| 30 | 2.5 | 18.2 | 15.2 | 12.1 | 8.0 | 4.3 |
| 31 | 2.6 | 16.6 | 13.9 | 11.1 | 7.2 | 4.0 |
| 32 | 2.7 | 15.3 | 12.7 | 10.2 | 6.6 | 3.7 |
| 34 | 2.8 | 14.1 | 11.7 | 9.4 | 6.0 | 3.5 |
| 35 | 2.9 | 13.0 | 10.8 | 8.6 | 5.5 | 3.2 |
| 36 | 3 | 12.0 | 10.0 | 8.0 | 5.0 | 3.0 |
| 37 | 3.1 | 10.5 | 8.8 | 7.1 | 4.5 | 2.7 |
| 38 | 3.2 | 9.3 | 7.7 | 6.3 | 4.0 | 2.4 |
| 40 | 3.3 | 8.2 | 6.8 | 5.6 | 3.6 | 2.2 |
| 41 | 3.4 | 7.3 | 6.1 | 5.0 | 3.2 | 1.9 |
| 42 | 3.5 | 6.5 | 5.4 | 4.5 | 2.9 | 1.8 |
| 43 | 3.6 | 5.9 | 4.9 | 4.1 | 2.7 | 1.6 |
| 44 | 3.7 | 5.3 | 4.4 | 3.7 | 2.4 | 1.5 |
| 46 | 3.8 | 4.8 | 4.0 | 3.4 | 2.2 | 1.3 |
| 47 | 3.9 | 4.4 | 3.6 | 3.1 | 2.0 | 1.2 |
| 48 | 4 | 4.0 | 3.3 | 2.8 | 1.9 | 1.1 |

Table 9.

| DS7-340SX016NO-N, DS7342SX016NO-N | | | | | | |
|-----------------------------------|----------|---------------------|----------|----------|----------|----------|
| Start Current | | Start Ramp Time (s) | | | | |
| 16 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 16 | 1 | 110.2 | 101.3 | 56.3 | 28.1 | 23.0 |
| 18 | 1.1 | 91.0 | 82.6 | 46.9 | 23.7 | 19.0 |
| 19 | 1.2 | 76.4 | 68.6 | 39.7 | 20.3 | 15.9 |
| 21 | 1.3 | 65.0 | 57.7 | 34.1 | 17.6 | 13.5 |
| 22 | 1.4 | 56.0 | 49.2 | 29.7 | 15.5 | 11.7 |
| 24 | 1.5 | 48.7 | 42.4 | 26.1 | 13.8 | 10.2 |
| 26 | 1.6 | 42.8 | 36.8 | 23.1 | 12.4 | 8.9 |
| 27 | 1.7 | 37.9 | 32.2 | 20.7 | 11.2 | 7.9 |
| 29 | 1.8 | 33.7 | 28.4 | 18.6 | 10.2 | 7.0 |
| 30 | 1.9 | 30.2 | 25.2 | 16.8 | 9.4 | 6.3 |
| 32 | 2 | 27.3 | 22.5 | 15.3 | 8.7 | 5.7 |
| 34 | 2.1 | 24.7 | 20.2 | 14.0 | 8.0 | 5.1 |
| 35 | 2.2 | 22.5 | 18.2 | 12.9 | 7.5 | 4.7 |
| 37 | 2.3 | 20.6 | 16.5 | 11.9 | 7.0 | 4.3 |
| 38 | 2.4 | 18.9 | 15.0 | 11.1 | 6.6 | 3.9 |
| 40 | 2.5 | 17.4 | 13.6 | 10.3 | 6.3 | 3.6 |
| 42 | 2.6 | 16.0 | 12.5 | 9.6 | 5.9 | 3.3 |
| 43 | 2.7 | 14.9 | 11.5 | 9.0 | 5.7 | 3.1 |
| 45 | 2.8 | 13.8 | 10.5 | 8.4 | 5.4 | 2.9 |
| 46 | 2.9 | 12.9 | 9.7 | 7.9 | 5.2 | 2.7 |
| 48 | 3 | 12.0 | 9.0 | 7.5 | 5.0 | 2.5 |
| 50 | 3.1 | 10.8 | 8.1 | 6.8 | 4.7 | 2.2 |
| 51 | 3.2 | 9.8 | 7.3 | 6.2 | 4.4 | 2.0 |
| 53 | 3.3 | 8.9 | 6.6 | 5.7 | 4.1 | 1.8 |
| 54 | 3.4 | 8.1 | 6.0 | 5.2 | 3.8 | 1.6 |
| 56 | 3.5 | 7.3 | 5.5 | 4.8 | 3.6 | 1.5 |
| 58 | 3.6 | 6.7 | 5.0 | 4.4 | 3.4 | 1.3 |
| 59 | 3.7 | 6.2 | 4.6 | 4.1 | 3.2 | 1.2 |
| 61 | 3.8 | 5.7 | 4.2 | 3.8 | 3.0 | 1.1 |
| 62 | 3.9 | 5.2 | 3.9 | 3.5 | 2.9 | 1.0 |
| 64 | 4 | 4.8 | 3.6 | 3.2 | 2.7 | 0.9 |

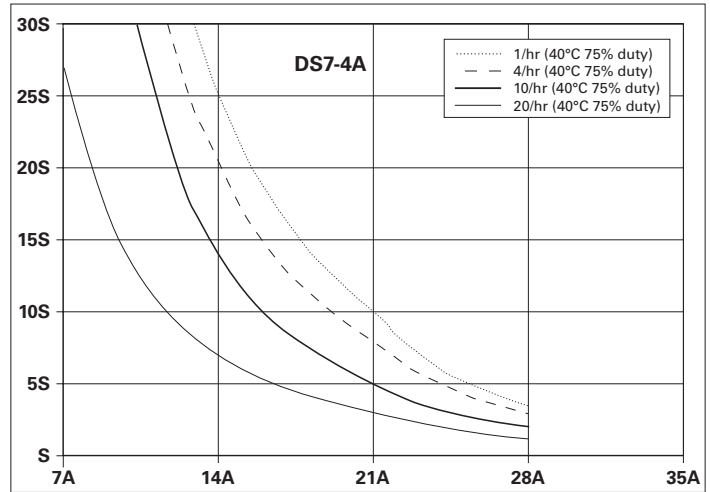
Table 10.

| DS7-340SX024NO-N, DS7342SX024NO-N | | | | | | |
|-----------------------------------|----------|---------------------|----------|----------|----------|----------|
| Start Current | | Start Ramp Time (s) | | | | |
| 24 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 24 | 1 | 110.2 | 101.3 | 56.3 | 28.1 | 23.0 |
| 26 | 1.1 | 91.0 | 82.6 | 46.9 | 23.7 | 19.0 |
| 29 | 1.2 | 76.4 | 68.6 | 39.7 | 20.3 | 15.9 |
| 31 | 1.3 | 65.0 | 57.7 | 34.1 | 17.6 | 13.5 |
| 34 | 1.4 | 56.0 | 49.2 | 29.7 | 15.5 | 11.7 |
| 36 | 1.5 | 48.7 | 42.4 | 26.1 | 13.8 | 10.2 |
| 38 | 1.6 | 42.8 | 36.8 | 23.1 | 12.4 | 8.9 |
| 41 | 1.7 | 37.9 | 32.2 | 20.7 | 11.2 | 7.9 |
| 43 | 1.8 | 33.7 | 28.4 | 18.6 | 10.2 | 7.0 |
| 46 | 1.9 | 30.2 | 25.2 | 16.8 | 9.4 | 6.3 |
| 48 | 2 | 27.3 | 22.5 | 15.3 | 8.7 | 5.7 |
| 50 | 2.1 | 24.7 | 20.2 | 14.0 | 8.0 | 5.1 |
| 53 | 2.2 | 22.5 | 18.2 | 12.9 | 7.5 | 4.7 |
| 55 | 2.3 | 20.6 | 16.5 | 11.9 | 7.0 | 4.3 |
| 58 | 2.4 | 18.9 | 15.0 | 11.1 | 6.6 | 3.9 |
| 60 | 2.5 | 17.4 | 13.6 | 10.3 | 6.3 | 3.6 |
| 62 | 2.6 | 16.0 | 12.5 | 9.6 | 5.9 | 3.3 |
| 65 | 2.7 | 14.9 | 11.5 | 9.0 | 5.7 | 3.1 |
| 67 | 2.8 | 13.8 | 10.5 | 8.4 | 5.4 | 2.9 |
| 70 | 2.9 | 12.9 | 9.7 | 7.9 | 5.2 | 2.7 |
| 72 | 3 | 12.0 | 9.0 | 7.5 | 5.0 | 2.5 |
| 74 | 3.1 | 10.8 | 8.1 | 6.8 | 4.7 | 2.2 |
| 77 | 3.2 | 9.8 | 7.3 | 6.2 | 4.4 | 2.0 |
| 79 | 3.3 | 8.9 | 6.6 | 5.7 | 4.1 | 1.8 |
| 82 | 3.4 | 8.1 | 6.0 | 5.2 | 3.8 | 1.6 |
| 84 | 3.5 | 7.3 | 5.5 | 4.8 | 3.6 | 1.5 |
| 86 | 3.6 | 6.7 | 5.0 | 4.4 | 3.4 | 1.3 |
| 89 | 3.7 | 6.2 | 4.6 | 4.1 | 3.2 | 1.2 |
| 91 | 3.8 | 5.7 | 4.2 | 3.8 | 3.0 | 1.1 |
| 94 | 3.9 | 5.2 | 3.9 | 3.5 | 2.9 | 1.0 |
| 96 | 4 | 4.8 | 3.6 | 3.2 | 2.7 | 0.9 |

Table 11.

| DS7-340SX032NO-N, DS7342SX032NO-N | | | | | | |
|-----------------------------------|----------|---------------------|----------|----------|----------|----------|
| Start Current | | Start Ramp Time (s) | | | | |
| 32 Amps | | 1/hr | 1/hr | 4/hr | 10/hr | 20/hr |
| | Inrush | 25°C | 40°C | 40°C | 40°C | 40°C |
| Amps | Multiple | 75% duty | 75% duty | 75% duty | 75% duty | 75% duty |
| 32 | 1 | 110.2 | 82.7 | 56.3 | 28.1 | 14.1 |
| 35 | 1.1 | 91.0 | 68.2 | 46.9 | 23.7 | 11.8 |
| 38 | 1.2 | 76.4 | 57.3 | 39.7 | 20.3 | 10.1 |
| 42 | 1.3 | 65.0 | 48.8 | 34.1 | 17.6 | 8.8 |
| 45 | 1.4 | 56.0 | 42.0 | 29.7 | 15.5 | 7.8 |
| 48 | 1.5 | 48.7 | 36.5 | 26.1 | 13.8 | 6.9 |
| 51 | 1.6 | 42.8 | 32.1 | 23.1 | 12.4 | 6.2 |
| 54 | 1.7 | 37.9 | 28.4 | 20.7 | 11.2 | 5.6 |
| 58 | 1.8 | 33.7 | 25.3 | 18.6 | 10.2 | 5.1 |
| 61 | 1.9 | 30.2 | 22.7 | 16.8 | 9.4 | 4.7 |
| 64 | 2 | 27.3 | 20.5 | 15.3 | 8.7 | 4.3 |
| 67 | 2.1 | 24.7 | 18.5 | 14.0 | 8.0 | 4.0 |
| 70 | 2.2 | 22.5 | 16.9 | 12.9 | 7.5 | 3.7 |
| 74 | 2.3 | 20.6 | 15.4 | 11.9 | 7.0 | 3.5 |
| 77 | 2.4 | 18.9 | 14.1 | 11.1 | 6.6 | 3.3 |
| 80 | 2.5 | 17.4 | 13.0 | 10.3 | 6.3 | 3.1 |
| 83 | 2.6 | 16.0 | 12.0 | 9.6 | 5.9 | 3.0 |
| 86 | 2.7 | 14.9 | 11.1 | 9.0 | 5.7 | 2.8 |
| 90 | 2.8 | 13.8 | 10.4 | 8.4 | 5.4 | 2.7 |
| 93 | 2.9 | 12.9 | 9.6 | 7.9 | 5.2 | 2.6 |
| 96 | 3 | 12.0 | 9.0 | 7.5 | 5.0 | 2.5 |
| 99 | 3.1 | 10.8 | 8.1 | 6.8 | 4.7 | 2.3 |
| 102 | 3.2 | 9.8 | 7.3 | 6.2 | 4.4 | 2.2 |
| 106 | 3.3 | 8.9 | 6.6 | 5.7 | 4.1 | 2.1 |
| 109 | 3.4 | 8.1 | 6.0 | 5.2 | 3.9 | 1.9 |
| 112 | 3.5 | 7.3 | 5.5 | 4.8 | 3.7 | 1.8 |
| 115 | 3.6 | 6.7 | 5.0 | 4.4 | 3.5 | 1.7 |
| 118 | 3.7 | 6.2 | 4.6 | 4.1 | 3.3 | 1.6 |
| 122 | 3.8 | 5.7 | 4.2 | 3.8 | 3.1 | 1.6 |
| 125 | 3.9 | 5.2 | 3.9 | 3.5 | 2.9 | 1.5 |
| 128 | 4 | 4.8 | 3.6 | 3.2 | 2.8 | 1.4 |

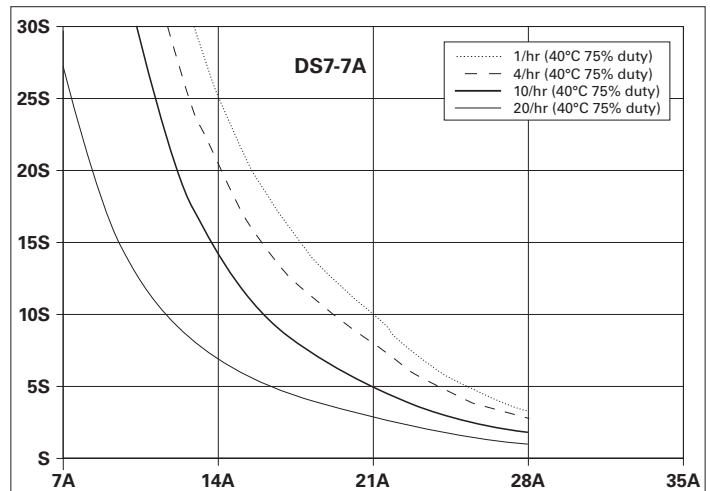
Figure 1: 4 Amp Rated DS7-340SX004NO-N, DS7-342SX004NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 4 = 12 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 10 seconds
- 4 Starts per hour (40°) = 8 seconds

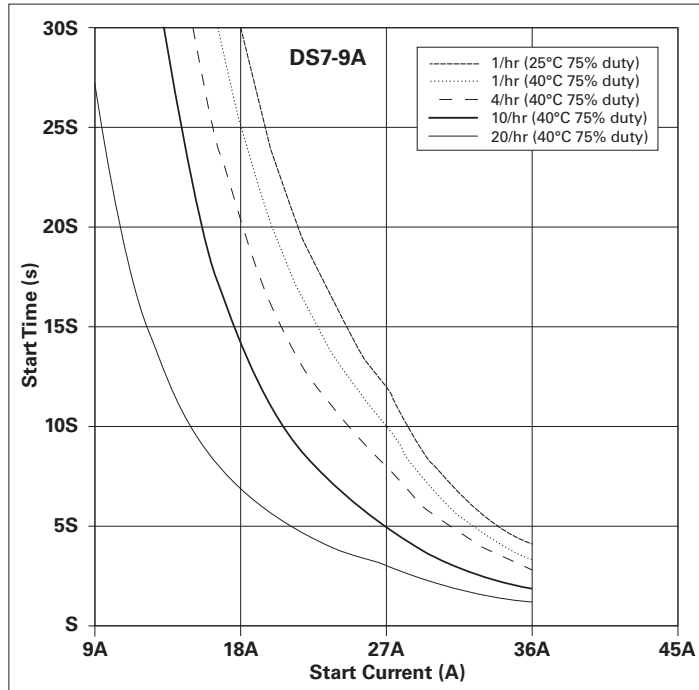
Figure 2: 7 Amp Rated DS7-340SX007NO-N, DS7-342SX007NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 7 = 21 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 10 seconds
- 4 Starts per hour (40°) = 8 seconds

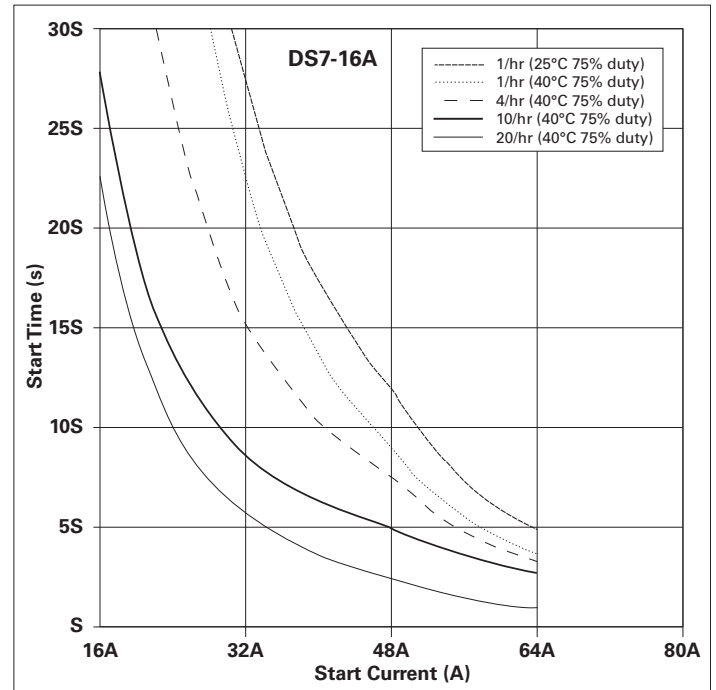
Figure 3: 9 Amp Rated DS7-340SX009NO-N, DS7-342SX009NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 9 = 27 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 10 seconds
- 4 Starts per hour (40°) = 8 seconds

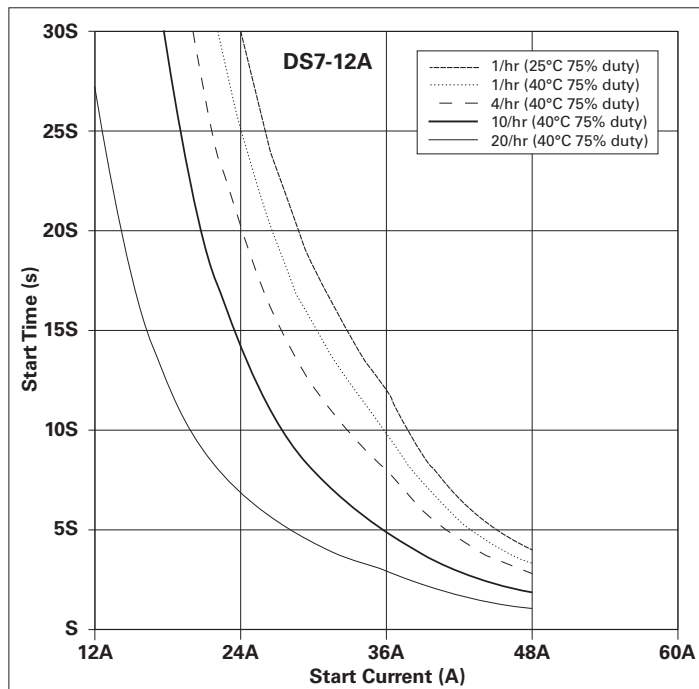
Figure 5: 16 Amp Rated DS7-340SX016NO-N, DS7-342SX016NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 16 = 48 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 9 seconds
- 4 Starts per hour (40°) = 7.5 seconds

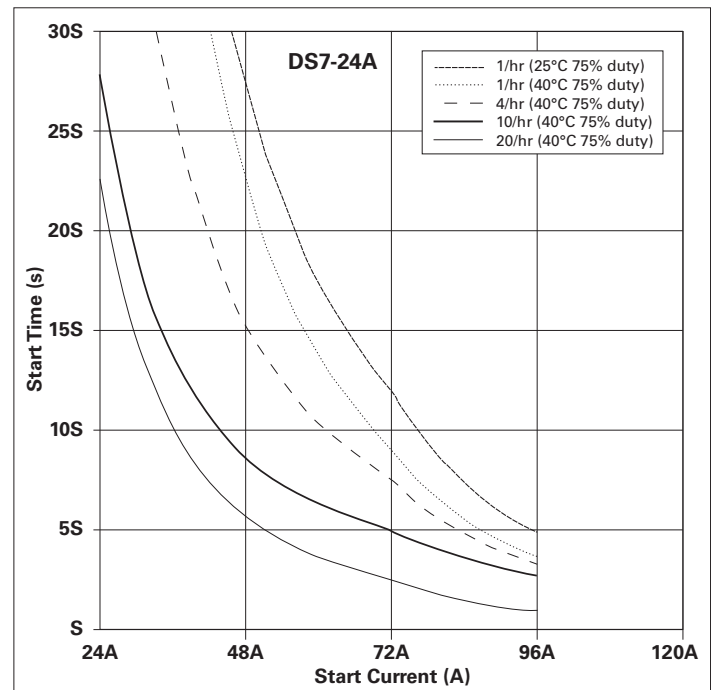
Figure 4: 12 Amp Rated DS7-340SX012NO-N, DS7-342SX012NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 12 = 36 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 10 seconds
- 4 Starts per hour (40°) = 8 seconds

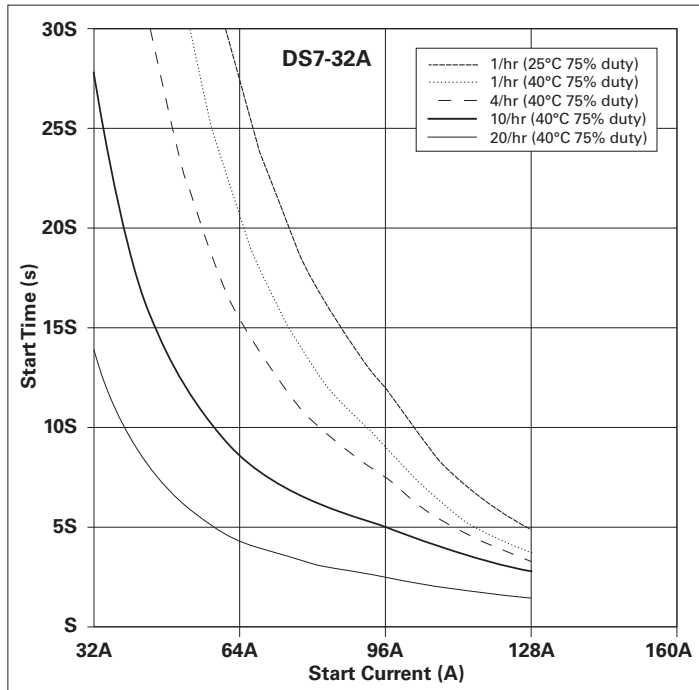
Figure 6: 24 Amp Rated DS7-340SX024NO-N, DS7-342SX024NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 24 = 72 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 9 seconds
- 4 Starts per hour (40°) = 7.5 seconds

Figure 7: 32 Amp Rated DS7-340SX032NO-N, DS7-342SX032NO-N



Maximum Ramp Time @ 300% Frame Size (3 x 32 = 96 Amps)

- 1 Start per hour (25°) = 12 seconds
- 1 Start per hour (40°) = 10 seconds
- 4 Starts per hour (40°) = 8 seconds

Eaton Corporation
 Electrical Sector
 1111 Superior Ave.
 Cleveland, OH 44114
 United States
 877-ETN-CARE (877-386-2273)
 Eaton.com

© 2010 Eaton Corporation
 All Rights Reserved
 Printed in USA
 Publication No. AP03901006E / TN
 December 2010



PowerChain Management®

Eaton and PowerChain Management are registered trademarks of Eaton Corporation.

All other trademarks are property of their respective owners.