

## Converting SilverMax

This document describes how to convert an existing SilverMax servo to either a SilverNugget or SilverDust system. Follow diagrams and tables for replacement parts. Some older SilverMax part numbers are special and unique in which case; please refer to device type and motor stack when looking for replacements.

### SilverDust and SilverNugget Vs SilverMax

Whenever possible, we recommend converting to the SilverDust instead of the SilverNugget as the SilverDust is a newer design with additional features and programming capabilities. The SilverDust system is also less expensive.

The SilverNugget uses the same Digital Signal Processor (DSP) as the SilverMax and is therefore 100% compatible.

The SilverDust uses a more advanced Digital Signal Processor (DSP), which allows QuickSilver to add more features. Every effort was made to make the SilverDust backwards Compatible with the SilverNugget/SilverMax, but there are some minor differences.

The new motors typically have a higher resolution than the SilverMax units. If this additional resolution is not required or desired, the old programs may be used without (or with only minor) changes by ordering the SilverNugget units preconfigured with a 2x or 4x encoder resolution. The divisor is designated by F2 or F4 in the part number (See below). The SilverDust units provide this capability as a software configured option under Tools=>Initialization Wizard=>Options (Button) "Encoder Resolution Reduction". In each case, the processor divides down the actual encoder resolution to make all of the user functions logically appear as if the encoder resolution were lower to the degree indicated. For more details, please refer to chapter 1 of the user manual.

The SilverDust controller SMI port has the ability to accept TTL logic inputs (0-3.3V). The SilverDust controller accepts 24V inputs with the use of a breakout (BO-B52) or with the QCI-D2-IGB or QCI-D2-IG8 controller with built-in 24V isolated I/O's.

For detailed documentation on the differences between the SilverNugget and SilverDust, see Technical Document QCI-TD020 "Differences Between SilverNugget™ and SilverDust™".

**17 or 23 Frame SilverMax to I-Grade SilverDust with 24V I/O**  
 (nn = Length in Feet)

*Left Diagram: Typical 17 & 23 Frame SilverMax*

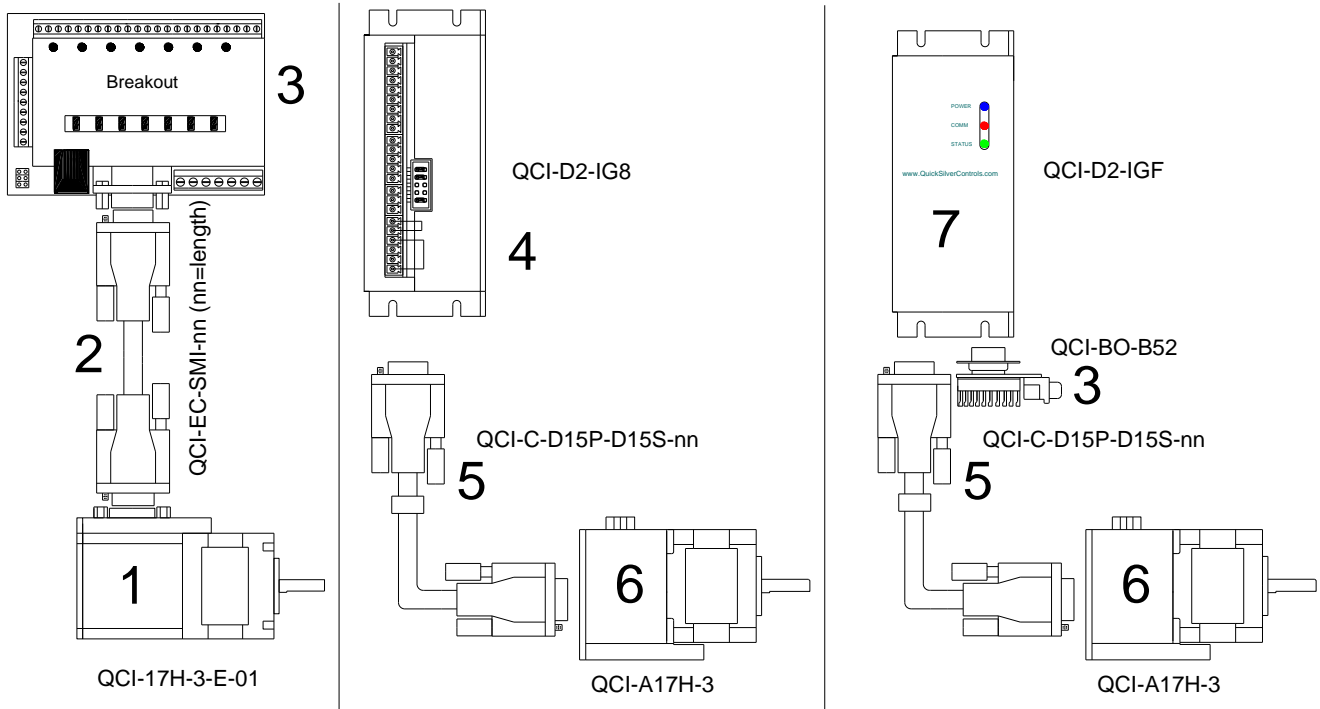
- Item1: QCI-17H-3-E3-01 (SilverMax ... Motor + Encoder + Controller + Driver)
- Item2: QCI-EC-SMI-nn (DB15HD SilverLode Multifunction Interface Cable)
- Item3: Breakout Module (several types available)

*Center Diagram: I-Grade SilverDust IG8 system to replace 17 or 23 Frame SilverMax*

- Item4: QCI-D2-IG8 (SilverDust IG8 Controller/Driver...Extended Breakout)
- Item5: QCI-C-D15P-D15S-nn (Motor Interface Cable...Encoder Feedback, Motor Pwr)
- Item6: QCI-17H-3 (I-Grade Motor/Encoder... Motor + Encoder)

*Right Diagram: I-Grade SilverDust IGF system to replace 17 or 23 Frame SilverMax*

- Item7: QCI-D2-IGF (SilverDust IGF Controller/Drive With QCI-BO-B52)



### SilverDust D2 Replacement Table

For All 17 & 23 Frame SilverMax (series E, E3 & E4) and (options 01 & 6T).

Example: QCI-17H-1-E-01

Type: 17H	Stack Size: 1	Series: E	Options: 01
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\*Special Case: Match type and stack size if there are no matching part numbers.

SilverMax 17 or 23 Frame Servo	SilverDust I-Grade Replacements		
	*All Three Parts Required		
SilverMax	SilverDust D2 Controller/ Driver <sup>1</sup>	Motor Interface Cable nn = cable length in feet <sup>2</sup>	I-Grade Motor/Encoder
QCI-17-1-E3-01	QCI-D2-IGF with	QCI-C-D15P-D15S-nn	QCI-A17-1
QCI-17-3-E3-01	QCI-B0-B52	QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-17H-1-E3-01	or	QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-17H-3-E3-01	QCI-D2-IG8	QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-23-3-E3-01	QCI-D2-IGF with	QCI-C-D15P-D15S-nn	QCI-A23K-3
QCI-23-5-E3-01	QCI-B0-B52	QCI-C-D15P-D15S-nn	QCI-A23H-5
QCI-23H-1-E3-01	or	QCI-C-D15P-D15S-nn	QCI-A23L-1
QCI-23H-3-E3-01	QCI-D2-IG8	QCI-C-D15P-D15S-nn	QCI-A23H-5
QCI-23H-5-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5
S-17-1-E3-01	QCI-D2-IGF with	QCI-C-D15P-D15S-nn	QCI-A17-1
S-17-3-E3-01	QCI-B0-B52	QCI-C-D15P-D15S-nn	QCI-A17H-3
S-17H-1-E3-01	or	QCI-C-D15P-D15S-nn	QCI-A17H-3
S-17H-3-E3-01	QCI-D2-IG8	QCI-C-D15P-D15S-nn	QCI-A17H-3
S-23-3-E3-01	QCI-D2-IGF with	QCI-C-D15P-D15S-nn	QCI-A23K-3
S-23-5-E3-01	QCI-B0-B52	QCI-C-D15P-D15S-nn	QCI-A23H-5
S-23H-1-E3-01	or	QCI-C-D15P-D15S-nn	QCI-A23L-1
S-23H-3-E3-01	QCI-D2-IG8	QCI-C-D15P-D15S-nn	QCI-A23H-5
S-23H-5-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5

Note 1: All 17 & 23 SilverMax series (E3) and I-Grade Motor/Encoder come with 8000 counts/rev. No scaling is required for straight replacements.

For 17 & 23 SilverMax series (E & E4) with 4000 counts/rev, scaling ( Encoder divided by 2) is accomplished with QuickControl during the Initialization Wizard (only for SilverDust controller/drivers).

All 17 & 23 Frame SilverMax motors can use the SilverNugget N2 controller/driver as well as the listed SilverDust controller/driver. See SilverNugget N2 Replacement Table above.

## 17 or 23 Frame SilverMax to I-Grade SilverDust with TTL I/O

(nn = Length in Feet)

*Left Diagram: Typical 17 & 23 Frame SilverMax*

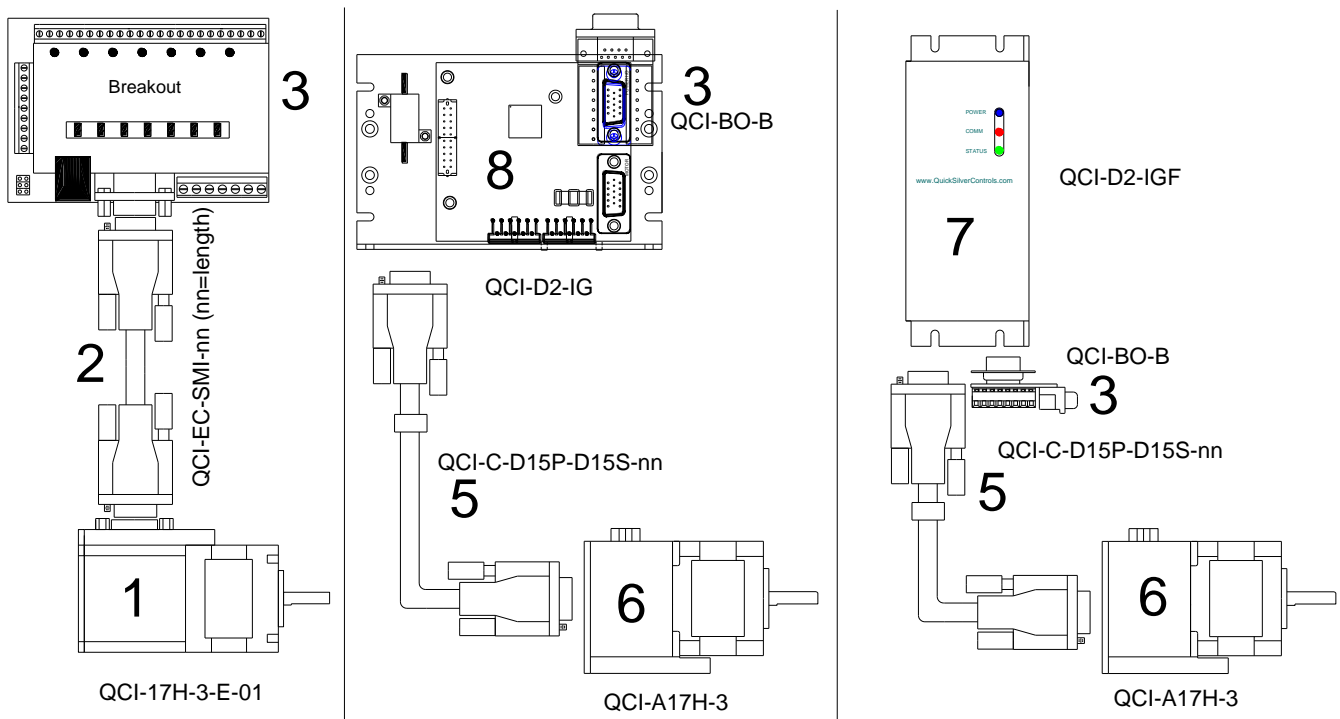
- Item1: QCI-17H-3-E3-01 (SilverMax ... Motor + Encoder + Controller + Driver)
- Item2: QCI-EC-SMI-nn (DB15HD SilverLode Multifunction Interface Cable)
- Item3: Breakout Module (several types available)

*Center Diagram: I-Grade SilverDust IG system to replace 17 or 23 Frame SilverMax*

- Item8: QCI-D2-IG (Open Frame SilverDust IG Controller/Driver)
- Item5: QCI-C-D15P-D15S-nn (Motor Interface Cable...Encoder Feedback, Motor Pwr)
- Item6: QCI-17H-3 (I-Grade Motor/Encoder... Motor + Encoder)

*Right Diagram: I-Grade SilverDust IGF system to replace 17 or 23 Frame SilverMax*

- Item7: QCI-D2-IGF (SilverDust IGF Controller/Driver With QCI-BO-B)



## SilverDust D2 Replacement Table

For All 17 & 23 Frame SilverMax (series E, E3 & E4) and (options 01 & 6T).

Example: QCI-17H-1-E-01

Type: 17H	Stack Size: 1	Series: E	Options: 01
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\*Special Case: Match type and stack size if there are no matching part numbers.

SilverMax 17 or 23 Frame Servo	SilverDust I-Grade Replacements		
	*All Three Parts Required		
SilverMax	SilverDust D2 Controller/ Driver <sup>1</sup>	Motor Interface Cable nn = cable length in feet <sup>2</sup>	I-Grade Motor/Encoder
QCI-17-1-E3-01	QCI-D2-IGF with QCI-BO-B or QCI-D2-IG	QCI-C-D15P-D15S-nn	QCI-A17-1
QCI-17-3-E3-01		QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-17H-1-E3-01		QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-17H-3-E3-01		QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-23-3-E3-01	QCI-D2-IGF with QCI-BO-B or QCI-D2-IG	QCI-C-D15P-D15S-nn	QCI-A23K-3
QCI-23-5-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5
QCI-23H-1-E3-01		QCI-C-D15P-D15S-nn	QCI-A23L-1
QCI-23H-3-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5
QCI-23H-5-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5
S-17-1-E3-01	QCI-D2-IGF with QCI-BO-B or QCI-D2-IG	QCI-C-D15P-D15S-nn	QCI-A17-1
S-17-3-E3-01		QCI-C-D15P-D15S-nn	QCI-A17H-3
S-17H-1-E3-01		QCI-C-D15P-D15S-nn	QCI-A17H-3
S-17H-3-E3-01		QCI-C-D15P-D15S-nn	QCI-A17H-3
S-23-3-E3-01	QCI-D2-IGF with QCI-BO-B or QCI-D2-IG	QCI-C-D15P-D15S-nn	QCI-A23K-3
S-23-5-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5
S-23H-1-E3-01		QCI-C-D15P-D15S-nn	QCI-A23L-1
S-23H-3-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5
S-23H-5-E3-01		QCI-C-D15P-D15S-nn	QCI-A23H-5

## SilverMax 17 or 23 Frame to I-Grade SilverNugget N2

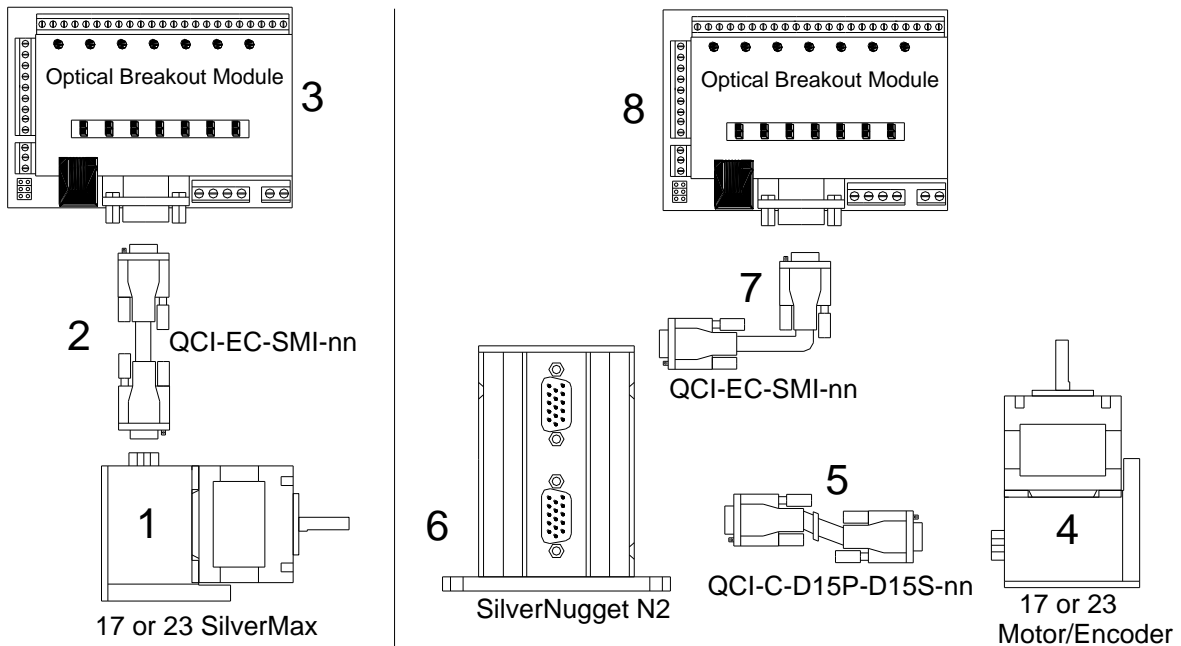
(nn = Length in Feet)

*Left Diagram: Typical SilverMax 17 & 23 Frame Motor*

- Item1: QCI-17H-3-E-01    (SilverMax ... Motor + Encoder + Controller + Driver)
- Item2: QCI-EC-SMI-nn    (DB15HD SilverLode Multifunction Interface Cable)
- Item3: Breakout Module    (several types available)

*Right Diagram: I-Grade SilverNugget N2 system that will replace the 17 or 23 Frame SilverMax*

- Item4: QCI-A17H-3            (I-Grade Motor/Encoder ... Motor + Encoder)
- Item5: QCI-C-D15P-D15S-nn    (Motor Interface Cable... Encoder Feedback, Motor Winding)
- Item6: QCI-N2-F2-04-EE    (SilverNugget N2 Controller/Driver)
- Item7: QCI-EC-SMI-nn    (DB15HD SilverLode Multifunction Interface Cable)
- Item8: Breakout Module    (several types available)



## SilverNugget N2 Replacement Table

For All 17 & 23 Frame SilverMax (series E, E3 & E4) and (options 01 & 6T).

Example: QCI-17H-1-E-01

Type: 17H	Stack Size: 1	Series: E	Options: 01
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\*Special Case: Match type and stack size if there are no matching part numbers.

SilverMax 17 or 23 Frame Servo	SilverNugget N2 I-Grade Replacements		
	*All Three Parts Required		
SilverMax	SilverNugget N2 Controller/Driver <sup>1</sup>	Motor Interface Cable nn = cable length in feet <sup>2</sup>	I-Grade Motor/Encoder
QCI-17-1-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17-1
QCI-17-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-17H-1-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-17H-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17H-3
QCI-23-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23K-3
QCI-23-5-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23H-5
QCI-23H-1-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23L-1
QCI-23H-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23H-5
QCI-23H-5-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23H-5
S-17-1-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17-1
S-17-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17H-3
S-17H-1-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17H-3
S-17H-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A17H-3
S-23-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23K-3
S-23-5-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23H-5
S-23H-1-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23L-1
S-23H-3-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23H-5
S-23H-5-E-01	QCI-N2-F2-04-EE	QCI-C-D15P-D15S-nn	QCI-A23H-5

Note 1: The encoder resolutions will differ for some series of 17 & 23 Frame SilverMax. The SilverMax series (E) has an encoder resolution of 4000 counts/rev while the SilverMax series (E3) has an encoder resolution of 8000 counts/rev.

All I-Grade NEMA 17 & 23 Motors come standard with 8000 counts/rev (2000 lines Encoder); therefore, SilverNugget series QCI-N2-F2-04-EE provides scaling (divides encoder counts by 2) for compatibility with SilverMax series (E) 4000 counts/rev.

Users who wish to use the full resolution (8000 counts/rev) may do so by ordering the SilverNugget QCI-N2-E3-04-EE series.

All 17 & 23 Frame SilverMax can use the SilverDust D2 controller/driver as well as the listed SilverNugget controller/driver. See SilverDust D2 Replacement Table above.

## SilverMax 34 Frame to I-Grade SilverNugget N3 with TTL I/O

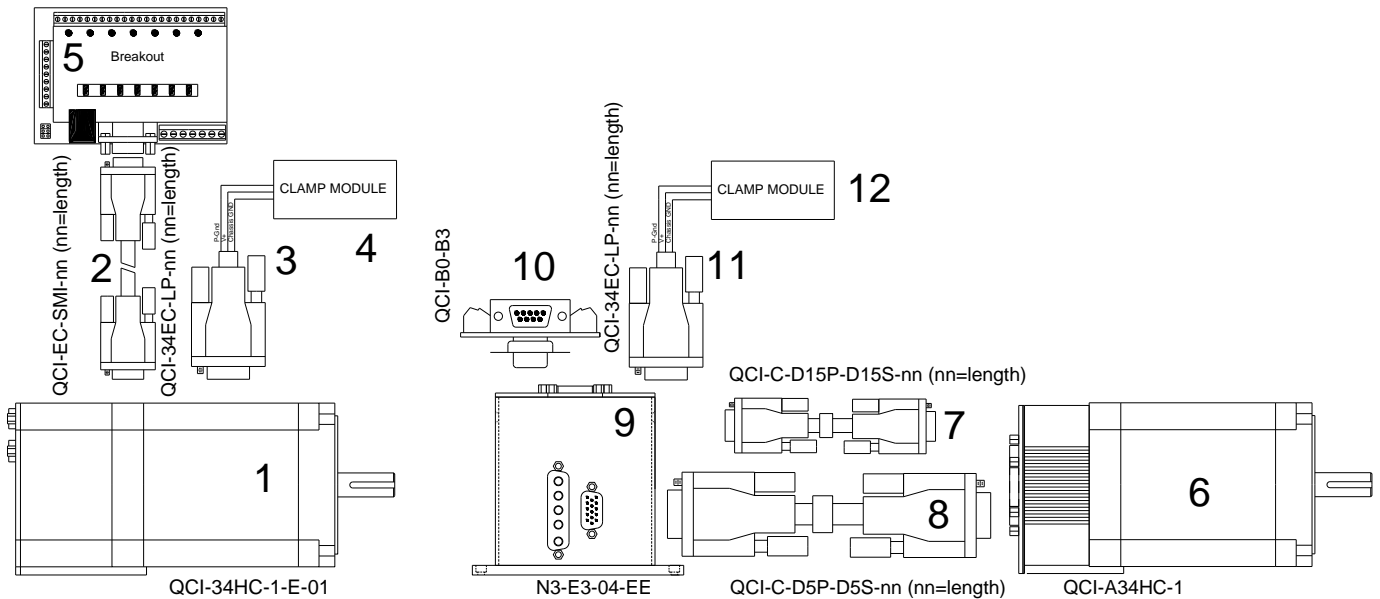
(nn = Length in Feet)

*Left Diagram: Typical 34 Frame SilverMax*

- Item1: QCI-34HC-1-E-01 (SilverMax ... Motor + Encoder + Controller + Driver)
- Item2: QCI-EC-SMI-nn (DB15HD SilverLode Multifunction Interface Cable)
- Item3: QCI-34EC-LP-nn (Driver Line Power Cable)
- Item4: QCI-CLCF-04 (High Current Clamp Module is required for 34HC)
- Item5: Breakout Module (several types available)

*Right Diagram: I-Grade SilverNugget N3 system that will replace the 34 Frame SilverMax*

- Item6: QCI-A34HC-1 (I-Grade 34 Frame Motor/Encoder...Motor + Encoder)
- Item7: QCI-C-D15P-D15S-nn (Motor Interface Cable...Encoder Feedback)
- Item8: QCI-C-D5P-D5S-nn (Motor Interface Cable...Motor Pwr)
- Item9: QCI-N3-E3-04-EE (SilverNugget N3 Controller/Driver)
- Item10: QCI-BO-B3 (Breakout Module)
- Item11: QCI-34EC-LP-nn (Driver Line Power Cable)
- Item12: QCI-CLCF-04-R2 (High Current Clamp Module is required for 34HC)





## SilverNugget N3 Replacement Table

For All 34 Frame SilverMax(series E, E1 & E3) and (options 01 & 6T).

Example: QCI-34N-1-E-01

Type: 34N	Stack Size: 1	Series: E	Options: 01
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\*Special Case: Match type and stack size if there are no matching part numbers.

SilverMax 34 Frame Servo	SilverNugget I-Grade Replacements			
	*All Four Parts Required			
SilverMax	SilverNugget N3 Controller/ Driver <sup>1</sup>	Motor Interface Cables nn = cable length in feet <sup>2</sup>		I-Grade Motor/Encoder
QCI-34H-1-E-01	QCI-N3-F4-04-EE with QCI-BO-B3	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34H-1
QCI-34N-1-E-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34N-1
QCI-34HC-1-E3-01	QCI-N3-E3-04-EE with QCI-BO-B3	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-1
QCI-34HC-2-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-2
QCI-34HC-3-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-3
QCI-34HC-4-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-4
S-34H-1-E-01	QCI-N3-F4-04-EE with QCI-BO-B3	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34H-1
S-34N-1-E-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34N-1
S-34HC-1-E3-01	QCI-N3-E3-04-EE with QCI-BO-B3	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-1
S-34HC-2-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-2
S-34HC-3-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-3
S-34HC-4-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-4

Note 1: There are different encoder resolutions for 34 Frame SilverMax. SilverMax (N & H) have 4000 counts/rev while SilverMax (HC) have 16000 counts/rev.

All I-Grade NEMA 34 Frame Motors come standard with 16000 counts/rev (4000 lines Encoder); therefore, SilverNugget series QCI-N3-F4-04-EE provides scaling (divides encoder counts by 4) for compatibility with SilverMax (N & H) 4000 counts/rev.

Users who wish to use the full resolution (16000 counts/rev) may do so by ordering the SilverNugget QCI-N3-E3-04-EE series.

## SilverMax 34 Frame to I-Grade SilverNugget N3 with 24V I/O

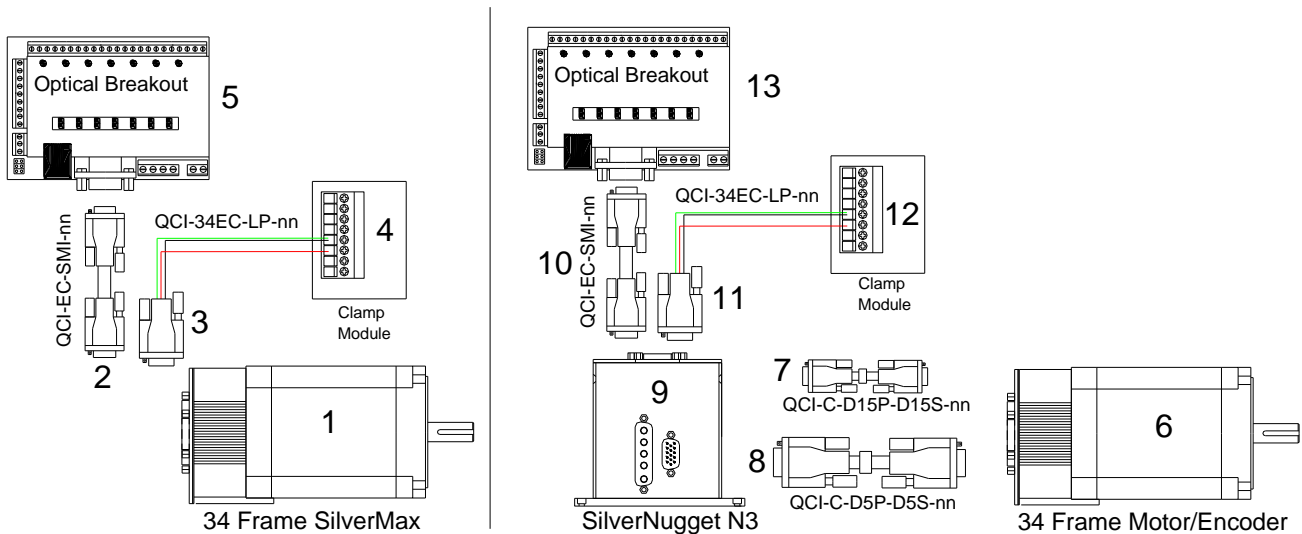
(nn = Length in Feet)

*Left Diagram: Typical 34 Frame SilverMax*

- Item1: QCI-34HC-1-E-01 (SilverMax ... Motor + Encoder + Controller + Driver)
- Item2: QCI-EC-SMI-nn (DB15HD SilverLode Multifunction Interface Cable)
- Item3: QCI-34EC-LP-nn (Driver Line Power Cable)
- Item4: QCI-CLCF-04 (High Current Clamp Module is required for 34HC)
- Item5: Breakout Module (several types available)

*Right Diagram: I-Grade SilverNugget N3 system that will replace the 34 Frame SilverMax*

- Item6: QCI-A34HC-1 (I-Grade 34 Frame Motor/Encoder...Motor + Encoder)
- Item7: QCI-C-D15P-D15S-nn (Motor Interface Cable...Encoder Feedback)
- Item8: QCI-C-D5P-D5S-nn (Motor Interface Cable...Motor Pwr)
- Item9: QCI-N3-E3-04-EE (SilverNugget N3 Controller/Driver)
- Item10: QCI-EC-SMI-nn (DB15HD SilverLode Multifunction Interface Cable)
- Item11: QCI-34EC-LP-nn (Driver Line Power Cable)
- Item12: QCI-CLCF-04-R2 (High Current Clamp Module is required for 34HC)
- Item13: QCI-OPTMC-24 (Breakout Module)



## SilverNugget N3 Replacement Table

For All 34 Frame SilverMax (series E, E1 & E3) and (options 01 & 6T).

Example: QCI-34N-1-E-01

Type: 34N	Stack Size: 1	Series: E	Options: 01
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\*Special Case: Match type and stack size if there are no matching part numbers.

SilverMax 34 Frame Servo	SilverNugget I-Grade Replacements			
	*All Four Parts Required			
SilverMax	SilverNugget N3 Controller/ Driver <sup>1</sup>	Motor Interface Cables nn = cable length in feet <sup>2</sup>	I-Grade Motor/Encoder	
QCI-34H-1-E-01	QCI-N3-F4-04-EE with QCI-OPTMC-24	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34H-1
QCI-34N-1-E-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34N-1
QCI-34HC-1-E3-01	QCI-N3-E3-04-EE with QCI-OPTMC-24	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-1
QCI-34HC-2-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-2
QCI-34HC-3-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-3
QCI-34HC-4-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-4
S-34H-1-E-01	QCI-N3-F4-04-EE with QCI-OPTMC-24	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34H-1
S-34N-1-E-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34N-1
S-34HC-1-E3-01	QCI-N3-E3-04-EE with QCI-OPTMC-24	QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-1
S-34HC-2-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-2
S-34HC-3-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-3
S-34HC-4-E3-01		QCI-C-D5P-D5S-nn	QCI-C-D15P-D15S-nn	QCI-A34HC-4

Note 1: There are different encoder resolutions for 34 Frame SilverMax. SilverMax (N & H) have 4000 counts/rev while SilverMax (HC) have 16000 counts/rev.

All I-Grade NEMA 34 Frame Motors come standard with 16000 counts/rev (4000 lines Encoder); therefore, SilverNugget series QCI-N3-F4-04-EE provides scaling (divides encoder counts by 4) for compatibility with SilverMax (N & H) 4000 counts/rev.

Users who wish to use the full resolution (16000 counts/rev) may do so by ordering the SilverNugget QCI-N3-E3-04-EE series.