

Battery Cable Sizing for Freedom Series Inverter/Chargers

The bigger the battery cables, the better. Undersized cables result in additional stress on the inverter, lower efficiency, reduced surge power, and lower peak output voltage. Using cables that are too small in diameter or too long will degrade the Freedom Series' efficiency and may constitute a fire hazard. The following table gives recommended cable sizes for various cable run lengths and inverter voltages.



WARNING: Fire hazard

Use only appropriately sized copper cable. Loose connections or improper connections may constitute a fire hazard, as resistance caused by too long or too small in diameter cable generates sufficient heat to start a fire, potentially causing personal injury or death.

Minimum Recommended Battery Cable Size (In Free Air)

Freedom 458 and Freedom Marine Minimum Recommended Battery Cable Size vs. Cable Length			
Model	Cable Length 1 to 3 Feet	Cable Length 3 to 6 Feet	Cable Length 6 to 10 Feet
Freedom 10	No. 2 AWG (2 gauge)	No. 2 AWG (2 gauge)	No. 2/0 AWG (00)
Freedom 15	No. 1/0 AWG (0)	No. 1/0 AWG (0)	No. 2/0 AWG (00)
Freedom 20	No. 2/0 AWG (00)	No. 2/0 AWG (00)	No 3/0 AWG (000)
Freedom 25	No. 2/0 AWG (00)	No 3/0 AWG (000)	No 3/0 AWG (000)
Freedom 30	No 3/0 AWG (000)	No 3/0 AWG (000)	No 4/0 AWG (0000)

The National Electric Code (NEC) requires that the cables be protected by a fuse or breaker rated to match the cables' ampacity at 90 °C.

Battery Cable to Maximum Breaker/Fuse Size				
Cable Size Required	Rating In Conduit	Maximum Breaker Size	Rating in "Free Air"	Maximum Fuse Size
No. 2 AWG	115 Amps DC	125 Amps DC	170 Amps DC	175 Amps DC
No. 1/0 AWG	150 Amps DC	150 Amps DC	230 Amps DC	250 Amps DC
No. 2/0 AWG	175 Amps DC	175 Amps DC	265 Amps DC	300 Amps DC
No. 3/0 AWG	200 Amps DC	200 Amps DC	310 Amps DC	350 Amps DC
No. 4/0 AWG	230 Amps DC	250 Amps DC	360 Amps DC	400 Amps DC
350 MCM	310 Amps DC	350 Amps DC	505 Amps DC	600 Amps DC

The National Electrical Code (NEC) allows rounding up to the next fuse size from the cable rating. For example, a 150-amp cable size rounds up to a 175-amp fuse size.

This sheet is intended to provide general recommendations for fuse and cable sizing. ALWAYS consult local and national electrical codes for proper fuse and cable size prior to installation.