

Aluminum Power Cables

Installation Guidelines

There has been some confusion on whether it is acceptable to use aluminum conductors when installing ABB drives. This document addresses some of the concerns and gives some guidance on best practices. While in some cases it may be acceptable to use aluminum conductors, the use of copper conductors would be greatly preferred.

The main concern when using aluminum conductors is for the ease of oxidation on the contact surfaces. Without proper installation procedures and maintenance this can lead to poor conductivity at connection points that results in high resistance causing unwanted heating and poor current flow.

The drive installation manual may give instructions on using aluminum cables for IEC installations for some of drive ratings, but aluminum cables are not allowed for UL NEC installations in the U.S. See the example below from the ACS580 Hardware Manual. Page 338 [EN / ACS580-01 hardware manual \(abb.com\)](#)

■ Typical power cables, IEC

The table below gives copper cable types with concentric copper shield for the drives with nominal current. The value separated by the plus sign means the diameter of the PE conductor.

See page 330 for the cable entry sizes allowed for the selected drive frame size.

ACS580-01-...	Frame size	Cu cable type ¹⁾	Al cable type ^{1), 2)}
		mm ²	mm ²
3-phase $U_n = 230$ V			
04A7-2	R1	3×1.5 + 1.5	-
06A7-2	R1	3×1.5 + 1.5	-
07A6-2	R1	3×1.5 + 1.5	-
012A-2	R1	3×1.5 + 1.5	-
018A-2	R1	3×2.5 + 2.5	-
025A-2	R2	3×4.0 + 4.0	-
032A-2	R2	3×6.0 + 6.0	-
047A-2	R3	3×10 + 10	-
060A-2	R3	3×16 + 16	-
089A-2	R5	3×35 + 16	3×50 + 25
091A-2	R4 v2	3×50 + 25	3×70 + 35
115A-2	R5	3×50 + 25	3×70 + 35
144A-2	R6	3×70 + 35	3×120 + 70
171A-2	R7	3×95 + 50	3×150 + 70
213A-2	R7	3×120 + 70	3×240 + 120
276A-2	R8	2×(3×70 + 35)	2×(3×95 + 50)

This table is for IEC installations only. Notice also that aluminum conductors are not allowed for ratings that do not list the cable size in the table. Aluminum cables can be used with $U_n = 230\text{ V}$ frames R5...R8 only for the ACS580 drives shown.

It may also be acceptable to use aluminum for control cable connections but be aware the copper is greatly preferred for over aluminum conductors. Be sure to follow any applicable local or national codes and if the choice is made to use aluminum, here are some recommended practices:

- If conductors are not stripped and used immediately, protect the end from oxidation with a cap.
- Strip the cable just before terminating it.
- Remove the oxide layer with the proper tool:
Scrape the stripped surface of the conductor, then immediately apply a neutral grease or Vaseline without acid or alkaline on the stripped end and brush with stainless steel strands to eliminate the oxide layer.
- Tighten the connection to the recommended torque with a torque-controlled tool.
- The working area must be clean, (no oxide particles, no grease...) and must be free of humidity and aggressive products.

Note that maintenance is required to sustain proper installation conditions over time to be assured that all connections remain clean and lubricated.