

Cabling Instructions

NOvA Project

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P#= Part Number

NOTE: Specific crimp tools located at end

FEB/TEC Lower Voltage Cables

Bottom of SB120 to Bottom of 60A Breaker:

1. Cut a 25cm length of yellow 6AWG wire.
2. Using a blade or cable stripper, strip about 1.5cm of insulation off one end of the 25cm wire and around 3cm of insulation off of the other end.
3. Place a 6AWG swivel nut (P#: 0270-0003, Cableco Technologies) over the 1.5cm of exposed wire. Crimp the swivel nut over the exposed wire.
4. Place a 6AWG input connector (P#: 6811G3, APP) over the 3cm of exposed wire. Crimp in place twice, once near the base of the connector (closest to where the insulation of the wire begins again) and again near the other end where the wire has gone farthest inside the connector.

Bottom of SB175 to Bottom of 100A Breaker:

1. Cut a 25cm length of red 2AWG wire.
2. Using a blade or cable stripper, strip about 2cm of insulation off one end of the 25cm wire and 3.5cm of insulation off of the other end.
3. Place a 2AWG swivel nut (P#: 0270-0005, Cableco Technologies) over the 2cm of exposed wire. Crimp the swivel nut in place over the exposed wire.
4. Slide a 2AWG input connector (P#: 6326G5, APP) over the 3.5cm of exposed wire. Crimp in place twice, once at the end of the connector near the insulation and once on the other end where the wire has gone farthest into the connector.

Top of 60A Breaker to Top Source Busbar:

1. Cut a 52cm length of yellow 6AWG wire.
2. Using a blade or cable stripper, strip about 1.5cm of insulation off one end of the 52cm wire and 2cm of insulation of insulation off of the other end.
3. Place a 6AWG swivel nut (P#: 0270-0005, Cableco Technologies) over the 1.5cm of exposed conducting strands. Crimp in place at the center of the swivel nut.

4. Slide a 6AWG ¼” lug nut (P#: 34001, Waytek) over the 2cm of stripped cable on the opposite end. Crimp the lug nut in place over the exposed wire.

Top of 100A Breaker to Bottom Source Busbar:

1. Cut a 52cm length of red 2AWG wire.
2. Using a blade or cable stripper, strip about 2cm of insulation off both ends of the 52cm wire.
3. Place a 2AWG swivel nut (P#: 0270-0005, Cableco Technologies) over one side of exposed conducting strands. Crimp in place at the center of the swivel nut.
4. Slide a 2AWG ¼” lug nut (P#: 35020, Waytek) over the other 2cm of exposed wire. Crimp in place at the center of the lug nut.

Top of SB120 to Top Return Busbar (Left):

1. Cut a 14cm length of black 6AWG wire.
2. Using a blade or cable stripper, strip about 1.5cm of insulation off one end of the 14cm wire and 3cm of insulation off of the other end.
3. Slide a 6AWG ¼” lug nut (P#: 34001, Waytek) over the 1.5cm of exposed wire. Crimp the center of the lug nut over the wire.
4. Slide a 6AWG input connector (P#: 6811G3, APP) over the 3cm of exposed wire. Crimp in place twice, once near the base of the connector nearest the insulation and once where the wire has ended inside the opposite side of the connector.

Top of SB175 to Bottom Return Busbar (Left):

1. Cut a 13cm length of black 2AWG wire.
2. Using a blade or cable stripper, strip about 2cm of insulation off one end of the 13cm wire and 3.5cm off the other end of the cable.
3. Slide a 2AWG ¼” lug nut (P#: 35020, Waytek) over the 2cm of exposed wire. Crimp in place at the center of the lug nut.
4. Place a 2AWG input connector (P#: 947, APP) over the 3.5cm of exposed wire. Crimp in place twice, once near the base of the connector and again where the wire ends inside the opposite end of the connector.

Grounding Cables

Center Return Busbar (Right) to Ground Connector Bar:

1. Cut a 9cm length of black 2AWG wire.
2. Using a blade or cable stripper, strip about 2cm of insulation off both ends of the 9cm wire.
3. Slide a 2AWG ¼” lug nut (P#: 35020, Waytek) over one of the two stripped ends of the cable. Crimp in place at the center of the lug nut.
4. Slide a 2AWG 3/8” lug nut (P#: 35022, Waytek) over the other stripped end of the cable. Crimp in place at the center of the lug nut.

Top/Bottom Return Busbar (Center) to Center Return Busbar (Center):

1. Cut two 12cm lengths of tinned copper braids (P#: 557240, Erico/Eriflex).
2. Place a ground braid lug (P#: 557180, Erico/Eriflex) over each end of the two braids.
3. Flatten the braid lugs over both ends of the two braids.
4. Drill a hole, using a 7/32” sized drill bit, through the center of each (now flattened) lug on the tinned copper braids.

High Voltage Cables

1. Cut a 68cm length of blue and a 38cm length of orange 22AWG cable, as well as 12cm and 16cm lengths of orange 18AWG cable. Strip 0.3cm of insulation off one end of the blue cable and one end of the 16cm length of orange 18AWG cable. After that, strip 0.8cm of insulation off all remaining ends of the cables.
2. Use a flux pen (P#: 7893A23, McMaster-Carr) to place a small amount of flux on both the center and intermediate contacts of the triax connector bulkhead (P#: 5219, Pomona). Slightly bend the intermediate contact, the small golden flap, away from the main body of the triax bulkhead, being careful not to snap it off.
3. Secure the triax connector in a clamp and stick the end of soldering tin into the center contact. Use the soldering iron to melt the tin inside the connector. While maintaining contact between tin and iron so tin remains liquid, quickly insert the 0.3cm stripped end of the orange 22AWG cable. Hold in place for a few seconds while tin solidifies around the wire to hold it in place.
4. Solder more tin (only a small amount is necessary) around the outside of the connection to ensure wire is firmly attached to the center contact.

5. Insert the 0.8cm stripped end of the blue 22AWG cable through the hole in the intermediate contact, making sure to bend the wire as it passes through the hole so that the connection is stable.
6. Apply solder to the intermediate contact to reinforce the connection of the blue cable and the triax connector.
7. Use the Flux-Off (P#: 7655A14, McMaster-Carr) spray and brush to clean the soldering jobs on the two contacts. When satisfied, apply insulating dope (P#: 104702, GC Electronics) over the solder.
8. Cut two 5cm lengths of 1/4" heat shrink and a 5cm length of 3/8" heat shrink. Heat the 1/4" strips at the ends of the 22AWG wires attached to the triax bulkhead's center and intermediate contacts. Place the 3/8" strip over the two wires together and heat it over the same location (nearest the bulkhead).
9. While holding down the ends of the wires near the bulkhead to prevent them from coming detached, twist the blue and orange 22AWG cables together such that there are approximately 1.5-2 turns per inch of wire.
10. At the end of the orange wire, crimp a closed end connector (P#: 7242K111, McMaster-Carr) to bring together the 8cm stripped end of the 22AWG orange wire and one of the ends of the 12cm orange 18AWG wire.
11. Continue twisting the blue 22AWG wire with this orange 18AWG wire.
12. Crimp a larger gold-tipped connector pin (P#: 1-770988-0, Tyco) over one of the stripped ends of the 16cm length of 18AWG orange wire.

DCM and Sense Cables

1. Cut an 8cm length of red, white, green, and black 22AWG wire.
2. Cut a 46cm length of red, a 25cm length of white, a 46cm length of green, and a 28cm length of black 22AWG wire.
3. Cut a 14cm length both of red and black 18 AWG cable.

4. Take the loop of 16AWG red fuse holder wire (P#: Littlefuse, 150274) and cut it twice, once at a distance of 4cm from the end of the fuse on both sides of the wire. This should leave about 13cm total length of wire including the fuse at the center.
5. Strip 0.8cm of insulation off both ends of the fuse holder wire.
6. Repeat steps 4 and 5 three times so that there are now 4 small, stripped fuse holder wires.
7. Strip 0.3cm of insulation off of one end of each of the 8cm length 22AWG AND one end off the two 18AWG wires.
8. Crimp a larger gold-tipped connector pin (P#: 1-770988-0, Tyco) over the stripped end of each of the two 18AWG wires.
9. Crimp a smaller gold connector pin (P#: 66504-9, Tyco) over the stripped end of each of the 8cm length 22AWG wires.
10. Strip 0.8cm of insulation off of the remaining end of the 8cm 22AWG sense cables and the 18AWG DCM cables.
11. Strip 0.8cm of insulation off both ends of the four longer lengths of sense cables.
12. Place the 0.8cm stripped ends of one of the 8cm lengths of 22AWG cable and one stripped end of the fuse holder wire into a crimp-on wire connector (P#: 7242K111, McMaster-Carr) and crimp them together.
13. Place one of the 0.8cm stripped ends of longer length of 22AWG wire of the same color as in the previous step (i.e. if used the 8cm red 22AWG wire in step 12, use the 46cm red 22AWG wire here) and the other end of the same fuse holder wire in another crimp-on wire connector (P#: 7242K111, McMaster-Carr) and crimp them together.
14. Repeat steps 12 and 13 for the remaining three colors of 22AWG wire.
15. On the remaining end of the both the green 46cm and white 25cm 22AWG cables, crimp a M6 conductor lug (P#: 400-0002; Allied Electronics).
16. Place the remaining 0.8cm stripped ends of the 46cm length of red 22AWG sense cable and the 14cm length of red 18AWG DCM cable simultaneously into the same M6 conductor lug (P#: 400-0002; Allied Electronics) and crimp them in place together.

17. Repeat the previous step for the black sense and black DCM cable.

18. Place the gold-plated pin ends of the two DCM cables into a 2 pin rectangular connector (P#: 172165-1, Tyco). The pin on the red DCM cable should be placed in the bottom slot (farthest from the end of the connector with the hook) and the pin on the black DCM cable should be placed in the top slot.

Crimpers by Label:

Sense= Crimps small gold connector pins (P#: 66504-9, Tyco) onto 22AWG sense cables using 22 gauge slot

DCM= Crimps gold-tipped connector pins (P#: 1-770988-0, Tyco) onto 18AWG DCM cables using 18 gauge (red) slot

Multi-Die w/ Die 4300-3129= Crimps wires into the M6 conductor lugs (P#: 400-0002, Allied Electronics) using red slot

Multi-Die w/ Die 4300-3127= Crimps wires into crimp-on wire connector (P#: 7242K111, McMaster-Carr) using 10mm area slot

Pneumatic Crimper Dies and Locators for 2AWG and 6AWG:

For 6 AWG: Used the 414DA-4579 die with the 4579-1 locator

For 2 AWG: Used the 414DA-4580 die with the 4579-1 locator

Quick Reference Table:

Color	Gage	Length	Start	P# at Start	End	P# at End
Yellow	6	25cm	SB120 (Bottom)	947, APP	60A Breaker (Bottom)	0270-0003, Cableco Technologies
Red	2	25cm	SB175 (Bottom)	6811G3, APP	100A Breaker (Bottom)	0270-0005, Cableco Technologies
Yellow	6	52cm	60A Breaker (Top)	0270-0003, Cableco Technologies	Top Source Bar	34001, Waytek
Red	2	52cm	100A Breaker (Top)	0270-0005, Cableco Technologies	Bottom Source Bar	35020, Waytek
Black	6	14cm	SB120 (Top)	947, APP	Top Return Busbar (Left)	34001, Waytek
Black	2	13cm	SB175 (Top)	6811G3, APP	Bottom Return Busbar (Left)	35020, Waytek
Black	2	9cm	Center Return Busbar (Right)	35020, Waytek	Ground Connector Bar	35022, Waytek
Braid	N/A	12cm	Top Return Busbar (Center)	557180, Erico/Eriflex	Center Return Busbar (Center)	557180, Erico/Eriflex

Braid	N/A	12cm	Bottom Return Busbar (Center)	557180, Erico/Eriflex	Center Return Busbar (Center)	557180, Erico/Eriflex
Orange	22	38cm	Triax Connector	(Soldered)	Orange 18AWG Wire	191600148, Molex
Orange	18	12cm	Orange 22AWG Wire	191600148, Molex	HV Power Switch Screw	(Attaches to Screw 4)
Orange	18	16cm	HV Power Switch Screw	(Attaches to Screw 3)	Backplane 3 Pin Connector (top)	172166-1, Tyco
Blue ***	22	68cm	Triax Connector	(Soldered)	Backplane 3 Pin Connector (bottom)	172166-1, Tyco
Red	18	14cm	Backplane 2 Pin Connector (Bottom)	1-770988-0, Tyco	60A Breaker (Bottom)*	400-0002, Allied
Black	18	14cm	Backplane 2 Pin Connector (Top)	1-770988-0, Tyco	Top Return Busbar (Left)**	400-0002, Allied
Red	22	8cm	9 Pin Connector (Slot 4)	66504-9, Tyco	Fuse Holder Wire 1	7242K111, McMaster-Carr
Red	22	46cm	Fuse Holder Wire 1 (Opposite End)	7242K111, McMaster-Carr	60A Breaker (Bottom)*	400-0002, Allied
Black	22	8cm	9 Pin Connector (Slot 9)	66504-9, Tyco	Fuse Holder Wire 2	7242K111, McMaster-Carr
Black	22	28cm	Fuse Holder Wire 2 (Opp. End)	7242K111, McMaster-Carr	Top Return Busbar (Left)**	400-0002, Allied
Green	22	8cm	9 Pin Connector (Slot 2)	66504-9, Tyco	Fuse Holder Wire 3	7242K111, McMaster-Carr
Green	22	46cm	Fuse Holder Wire 3 (Opp. End)	7242K111, McMaster-Carr	100A Breaker (Bottom)	400-0002, Allied
White	22	8cm	9 Pin Connector (Slot 6)	66504-9, Tyco	Fuse Holder Wire 3	7242K111, McMaster-Carr
White	22	25cm	Fuse Holder Wire 4 (Opp. End)	7242K111, McMaster-Carr	Bottom Return Busbar (Left)	400-0002, Allied

*=These two wires are crimped together inside the M6 lug at the 60A breaker

**= These two wires are crimped together inside the M6 lug at the top return busbar

***= Be sure to continue twisting the high voltage blue 22AWG wire with the orange 18AWG wire as it leaves the high voltage switch