Hypertherm®

HyPrecision D-series Pump Soft Starter

Installation Guide

809460 | Revision 0 | English

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809460
Revision 0

English
Original Instructions

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Use this guide to upgrade the soft starter cable connections and to replace the soft starter in a HyPrecision 100D or HyPrecision150D waterjet pump.

Safety

	Refer to the instruction manual. Read and understand all of the safety guidelines in this manual.
	Dangerous voltage To reduce the risk of serious injuries or death, wear approved protection and follow safety recommendations when working with electricity.
 **DANGER**	People who maintain and repair this equipment can be injured or killed if hazardous energy is not properly controlled. Injuries can include burns, cuts, fractures, or electrocution. Turn off electrical power before starting maintenance or repairs. Disconnect and lock out–tag out the primary power before opening the electrical enclosure or doing maintenance or repair procedures on this equipment.
	This symbol identifies a prohibited action.
	Keep the work area clean and free of fluid spills.

Terminology

AWG

American Wire Gauge (AWG), a standardized wire gauge system used in North America

Line-side lugs

The wires from the incoming power that connect to the top of the soft starter; some pumps may already have these installed

Motor-side lugs

The wires from the bottom of the soft starter that go to the motor

Pump-load lugs

The wires from the top of the soft starter that go to the pump load; some pumps may not have these wires

Required tools, materials, and parts for all models

Cross-tip screwdriver, large
Flat-blade screwdriver, large
Flat-blade screwdriver, small (for terminals)
6 mm hex-bit socket
8 mm hex-bit socket
3/4-inch hex-bit socket
Standard socket set
1/2-inch open-ended wrench
9/16-inch open-ended wrench
Socket wrench
Torque wrench
Torque wrench extension
Cable cutter
ABB TBM4S crimp tool
Cable ties, 4- to 8-inch
Heat gun
Utility knife or scissors (to cut heat shrink and to trim insulation from cables or wires)
Soft starter kit (refer to the repair kit table on page 5)


Other tools may be required. It is recommended that the installer have a mechanic's tool set.

The soft starter repair kit includes lugs, heat shrink tubing, fasteners, and a motor-side fastener kit. Some kits include a replacement soft starter.

Repair kit part number		**428622**	**428623**	**428620**	**428621**
Pump model		14827 100HP 400VAC	14826 100HP 460VAC	14775 150HP 400VAC	14828 150HP 460VAC
Original soft starter ABB model number		PSE170-600-70	PSE142-600-70	PSE210-600-70	PSE210-600-70
Replacement soft starter ABB model number		—	174099 PSE170-600-70	174100 PSE250-600-70	174100 PSE250-600-70
Line-side lugs		174106 Black 45 (2/0 AWG)	174107 Pink 42 (1/0 AWG)	174101 Purple 54 (4/0 AWG)	174102 Orange 50 (3/0 AWG)
Motor-side lugs		174105 Green 37 (#1 AWG)	174105 Green 37 (#1 AWG)	174102 Orange 50 (3/0 AWG)	174102 Orange 50 (3/0 AWG)
Pump-load lugs (not always used; see page 6)		174104 Blue 24 (#6 AWG)	174108 Red 21 (#8 AWG)	174103 Brown 33 (#2 AWG)	174103 Brown 33 (#2 AWG)
Pump-load #2 lugs (not always used; see page 6)		—	174108 Red 21 (#8 AWG)	—	—
1/2-inch heat shrink tubing		046264			
3/4-inch heat shrink tubing		046265			
		1/4 inch		**3/8 inch**	
Line-side fasteners	▪ Flat washer	12257		075892	
	▪ Spring washer	13665		075893	
	▪ Carriage bolt	075896		075894	
	▪ Hex nut	075897		075895	
Motor-side fastener kit	▪ Captive nut terminals	428629		428625	
	▪ Spring washers				
	▪ Cap screws				
Field service bulletin		809410			

The table includes lug sizes based on the cable sizes from the electrical prints. Cable expansion and possible undocumented changes may result in other lug sizes being required.

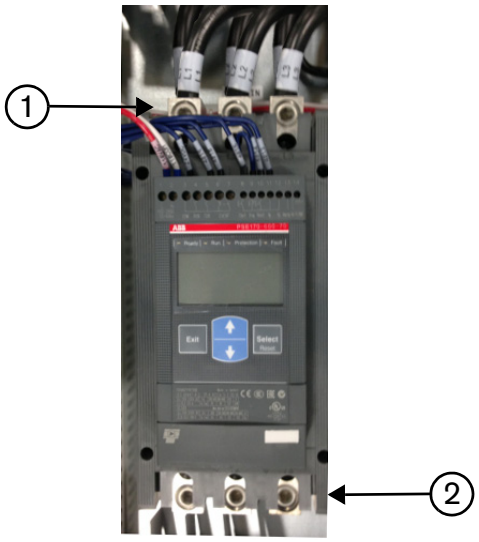
On some pumps, the incoming power is split between the soft starter and the rest of the pump by using multiple cables from a distribution block. In others, the cables split at the soft starter terminal. If the cables split at the terminal, additional lugs are required.

For these reasons, it is recommended that installers carry a set of spare lugs. A full set includes 10 to 12 of each lug size:

- 174108 Red 21 (#8 AWG)
- 174104 Blue 24 (#6 AWG)
- 174103 Brown 33 (#2 AWG)
- 174105 Green 37 (#1 AWG)
- 174107 Pink 42 (1/0 AWG)
- 174106 Black 45 (2/0 AWG)
- 174102 Orange 50 (3/0 AWG)
- 174101 Purple 54 (4/0 AWG)

Upgrade the cable connections and replace the soft starter

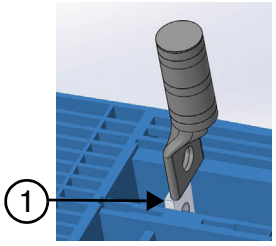
1. Unpack the repair kit. Refer to the table on page 5 to make sure that the correct parts are included.
2. Turn OFF the pump.
3. Make sure that the primary breaker disconnect lever on the electrical enclosure door is in the OFF position. The primary breaker disconnect lever disconnects electricity to the pump motor and controls.
4. Turn OFF power from the primary utility source. Use standard lock out–tag out procedures.
5. Remove the protective covers over the line-side and motor-side connections. Press the tab away from the soft starter with a flat-blade screwdriver.
6. Disconnect the line-side and motor-side cables from the soft starter.



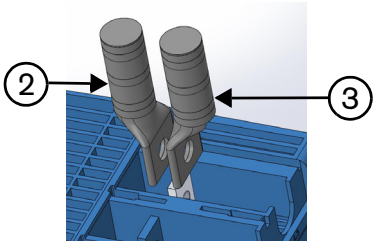
1 Line-side connections

2 Motor-side connections

The line-side connections either have one lug or two lugs for each spade terminal. The second lug is the pump-load lug.



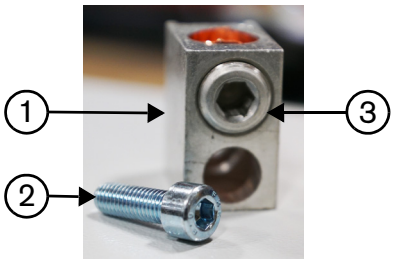
1 Spade terminal



2 Pump-load lug

3 Line-side lug

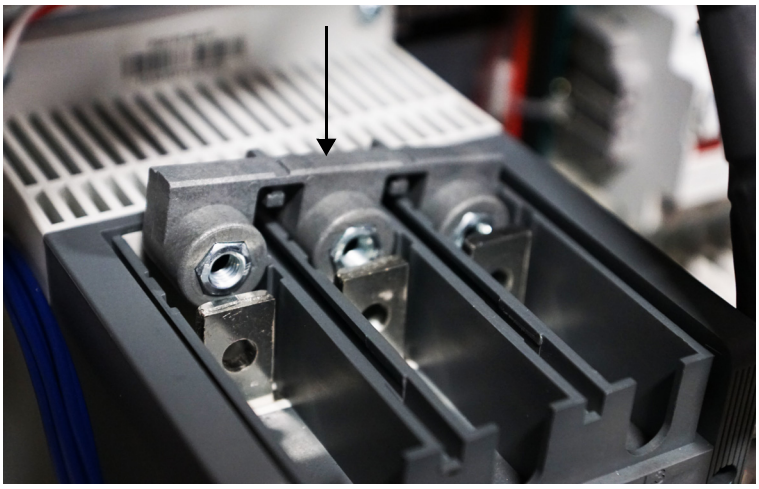
7. Remove and dispose of the line-side and motor-side terminal blocks.



1 Terminal block
2 Cap screw
3 Set screw

On some soft starters, the set screws must be removed to access the cap screws.

8. If the soft starter has one cable for each spade terminal, save the captive nut terminal that is in the slots behind the spade terminals.

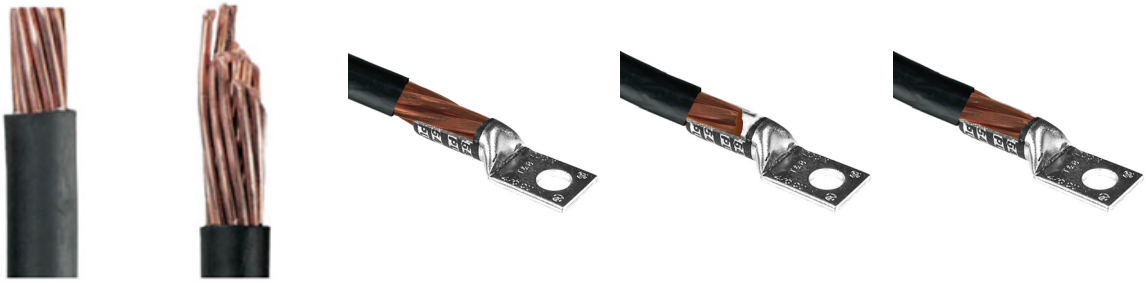


9. Replace the soft starter for pump models 14475, 14828, and 14826.
   a. Document the positions of the control wires so that they can be reconnected correctly later.

   b. Disconnect the control wires from the soft starter.
   c. Remove the mounting screws.
   d. Remove the soft starter and replace it with the new soft starter.
   e. Replace the mounting screws.
   f. Reconnect the control wires to the soft starter.

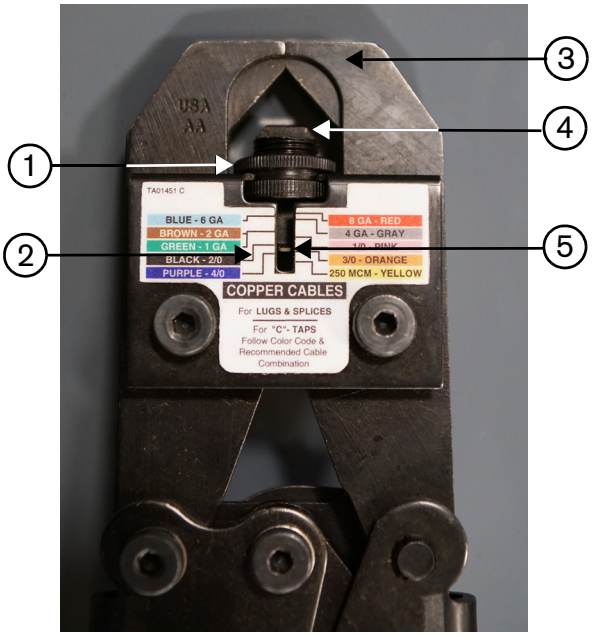
10. Strip the insulation from the line-side and motor-side cables so that each cable fits into the appropriate lug barrel.

	Be careful to avoid cutting the strands unevenly. Do not cut the cables too short.



Good cut | Uneven cut | Too much insulation removed | Not enough insulation removed | Good fit

11. Turn the indenter adjusting wheel on the crimp tool until the pointer slot aligns with the selected cable size line.



1 Indenter adjusting wheel

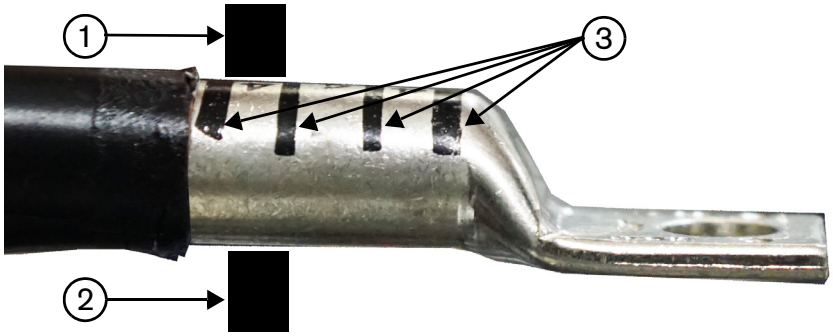
2 Cable size lines

3 Die nest

4 Die indenter

5 Pointer slot

12. Put the lug barrel with the cable in it into the crimp tool between the die nest and the die indenter so that the die is between the color code marks that are closest to the insulation.



1 Die nest

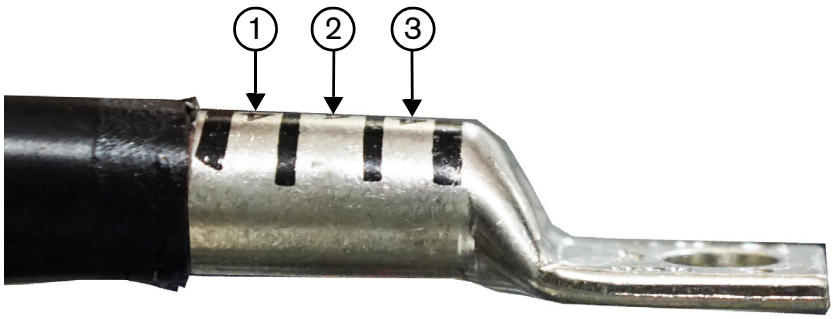
2 Die indenter

3 Color code marks

It may be easier to crimp the lugs onto the cable if the cable is removed from the distribution block first.

13. Close the crimp tool handles to compress the lug barrel onto the cable. Repeat for the required number of compressions, working from the opening of the lug barrel toward the flat end.

Lug color	Red 21 (#8 AWG) Blue 24 (#6 AWG) Brown 33 (#2 AWG) Green 37 (#1 AWG) Pink 42 (1/0 AWG)	Black 45 (2/0 AWG) Orange 50 (3/0 AWG)	Purple 54 (4/0 AWG)
Required number of compressions	2	3	4



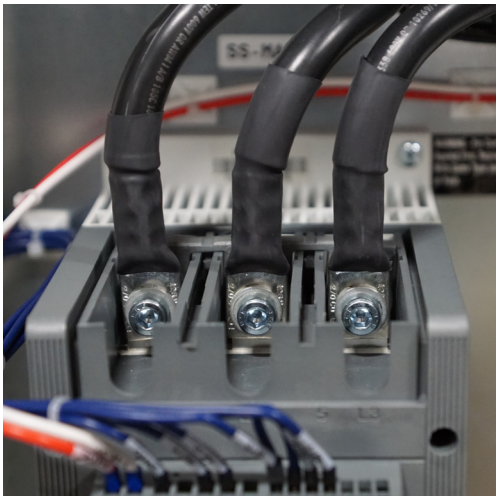
Crimp between the colored lines.

14. Cut a section of heat shrink to fit over each lug barrel. Allow for a minimum of 1/4-inch overlap over the insulation and the lug barrel.

15. Put the heat shrink over the lug barrels and apply heat evenly.

16. Relabel the cables, if necessary.

17. Connect the line-side cables to the spade terminals. For single-cable connections, use the captive nut terminal from step 8. Use the line-side fasteners for two-cable connections.



18. Use the spring washers and the captive nut from the motor-side fastener kit to connect the lugs to the motor-side terminals.

19. Torque the fasteners to 18 Nm (160 in-lb).

20. Replace the protective covers.

21. Turn ON power from the primary utility source.

22. Make sure that the primary breaker disconnect lever on the electrical enclosure door is in the ON position.

23. Update the soft starter settings.

Rated current of motor I_e	Motor current
Start ramp time	5s
Stop ramp time	Off
Initial/end voltage	50%
Current limit	5.5x I_e
Torque control during start ramp	Off
Torque control during stop ramp	Off
Kick start	Off
Electronic motor overload	10, Hand
Underload protection	Off
Locked rotor protection	Off
Fieldbus	Off

Refer to chapters 6 and 7 in the ABB Softstarters Type PSE18...PSE370 Installation and commissioning manual *(document number 1SFC132057M0201, revision E, 01/2011) for instructions regarding how to change the soft starter settings.*

24. Make sure that the LOCAL/REMOTE key switch on the operation panel is in the LOCAL position.

25. Turn ON the pump.

The pump is ready for normal operation.

Recycling and end of product life

At the end of the life of the product or its parts, recycle or dispose of relevant materials and parts using an environmentally satisfactory method and in accordance with local regulations. If the product contains substances that are harmful to the environment, remove and dispose of them in accordance with current local regulations. This includes liquids such as hydraulic fluid.

Make sure that hazardous substances are disposed of safely and that the correct personal protective equipment is used. The safety specifications must be in accordance with the current local regulations at all times.