

**QUALITY  
SWITCH  
INC**

**P.O. Box 250  
715 Arlington Blvd  
Newton Falls, Ohio 44444**

**Phone: (330)872-5707**

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## **General Assembly Instructions Type QS-DGR Ring Type DETC (up to 750kV BIL)**

Locate the following items from the shipping container (loose parts bagged will be marked with a yellow packing sticker labeled "Parts Enclosed"):



**Figure 1  
Main Switch Body**



**Figure 2  
Dielectric Washers**



**Figure 3  
Socket Head Cap Screws**



Figure 4  
Crimp Connectors  
(Styles may vary—plain copper or silver plated available)

The above items will be needed in the areas where the switch will be attached to the transformer core and coil and where the cables will be attached to the switch.

Next Locate the following items:



Figure 5  
Handle (external spring pin  
taped to handle)



Figure 6  
Shaft (cotter pin taped to shaft)



Figure 7  
Index Plate



Figure 8  
Gland, Gland Nut, o-rings, and brass spacer.

The gland will be welded into the tank. The gland nut, o-rings, brass spacer, and index plate will be needed at final tanking. See Packing Gland Instructions for details o-ring installation.

### **Connecting Leads to Switch Crimp Connectors**

Make sure approximately 1" of cable is bare. Remove all insulation. Insert bare cable into non-threaded end of crimp connector. Crimp or braze cable into connector.



Figure 9  
Cable stripped of insulation and  
inserted into crimp connector.

Note that this step would not apply to connectors that have threaded contact post. If using a threaded connector, cable would be inserted in a ring terminal. The ring terminal would be used to attach the cable to the switch terminals (threaded contact post is shipped attached to tap deck).

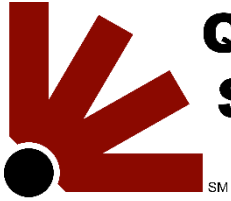
### **Connecting Crimp Terminals to Switch.**

Insert Hex Head Cap Screw (supplied by Quality Switch) into deck.



Figure 10  
Hex Head Cap Screw  
being inserted into a  
non-molded deck.





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Locate one of the dielectric washers. The washer goes on as shown:



Figure 11  
Dielectric washer being  
installed.

Note that larger  
diameter of washer  
goes against tap deck.

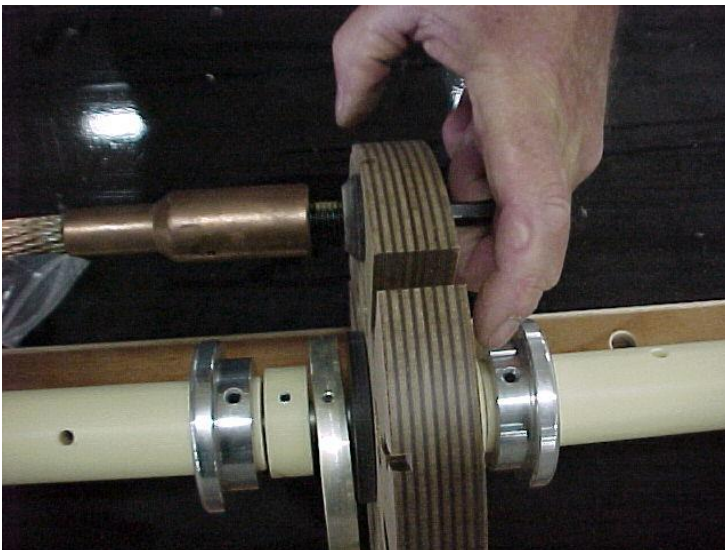


Figure 12  
Crimp connector with  
cable being installed on  
top of dielectric washer.

Hold crimp connector in place and tighten socket head cap screw. Maximum tightening torque is 40 foot-lbs (480 inch-lbs). Crimps should be tight against washer and washer should be tight against deck board when fully tightened. If crimp wiggles or space can be seen between deck, washer, and crimp, the function of the switch may be impaired. However, properly installed contacts MAY rotate in the deck after tightening.

The socket head cap screw includes a special patch material that prevents it from loosening up in operation. The cap screw can be removed and reinstalled a maximum of 2 times (total installation of 3 times). After a maximum of 3 installations, a new cap screw must be used.

Also note that the patch will generate some copper particles when being inserted into the connector. Removing the cap screw should be a careful process. Switch should be thoroughly cleaned to ensure that no copper particles remain on deck or surrounding items (leads, lead structure, windings).

### **Final Assembly**

Switch body and index plate must be coordinated. Typically switch should be assembled in the NOMINAL tap position.

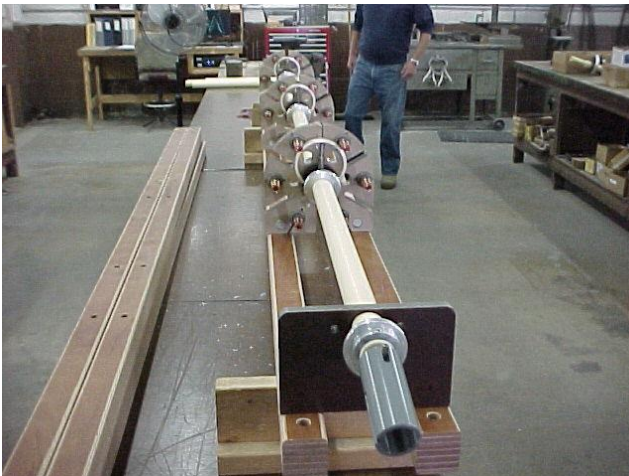


Figure 13  
5 position switch shown in the typical NOMINAL tap position (position C or 3).

Prior to inserting the core and coil into the tank, the brass shaft must be inserted into the gland. (See Figure 6). The knuckle and pin stay inside the tank. The shaft with holes is external to the tank.

After switch is mounted to core and coil assembly and core and coil assembly is inside the tank, care must be taken to assure proper alignment of switch and index plate. With the switch in the "C" or NOMINAL position (see Figure 13) slide the knuckle into the coupler.



Figure 15  
Knuckle going into coupler

The coupler assembly is properly assembled if both pins are approximately centered in each slot.



Figure 16  
Pins located approximately  
center of slot.

Finally, external to the tank, shaft should go through index plate. Handle is attached to shaft using predrilled holes and roll pin (spring pin). Cotter pin is inserted through small hole in shaft behind index plate to prevent handle and shaft assembly from being pulled out of coupler internal to the tank.



Figure 17  
Switch in NOMINAL position,  
handle in NOMINAL position  
according to Index plate  
(position C or 3 on a 5-  
position switch).

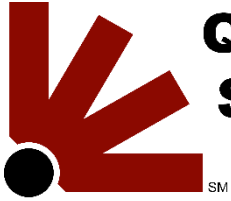




Figure 18  
Shaft w/cotter pin taped

Note 1 “knuckle” end with spring pin will be internal to the tank.

Note 2 holes in shaft. Larger hole will receive roll pin inserted through handle. Smaller hole (second from left) will receive cotter pin.



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Figure 19  
Handle with external spring pin  
taped to it.

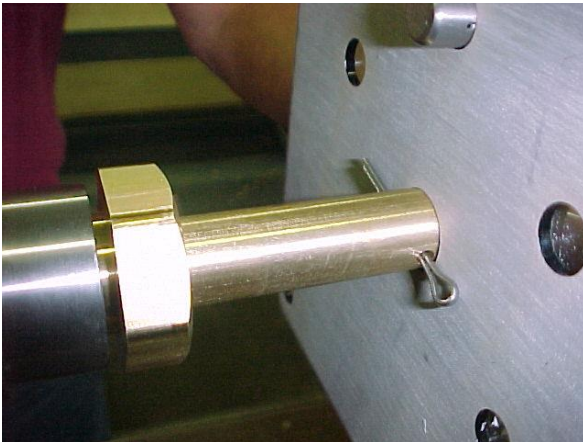


Figure 20  
Cotter Pin inserted into small  
hole in shaft. Hole must be  
behind index plate to prevent  
accidental removal of  
handle/shaft assembly from  
coupler inside the tank.  
Spread legs of cotter pin to  
prevent cotter pin from falling  
out.

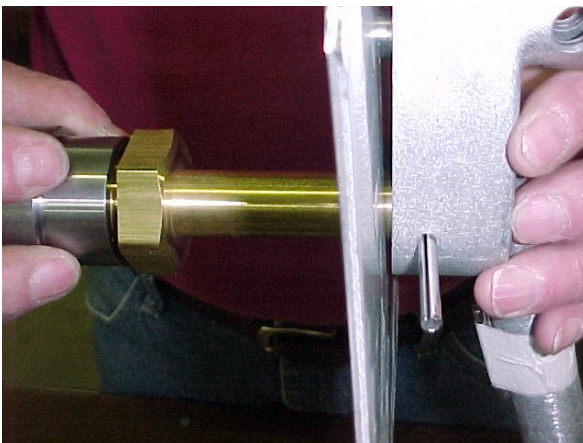
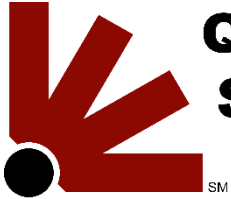


Figure 21  
Roll pin being inserted into  
predrilled hole in handle. Hole  
in handle must line up with hole  
in shaft. Puck in handle (upper)  
must seat into index hole  
located on index plate below  
NOMINAL position.



Figure 22  
Support must be provided as  
spring pin is inserted into  
shaft. In this picture a  
hammer is used on right side  
of handle to support the shaft  
as pin is driven in with  
hammer from left side of  
handle.



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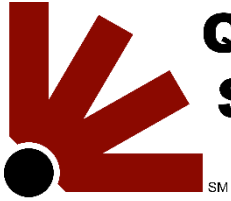
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Assembly steps summarized:

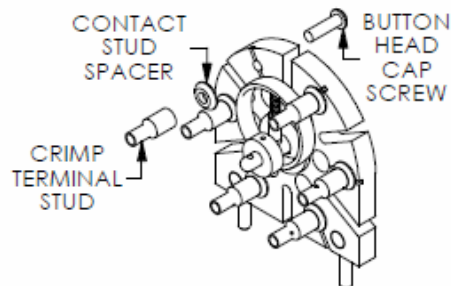
- 1) The switch assembly will attach to the transformer structure via mounting holes provided in the DETC mounting rails (see outline drawing for pattern arrangement).
- 2) Install the switch assembly by attaching the mounting rails to the transformer structure using non-metallic hardware (not supplied by QS unless specified before shipment). The size of the mounting holes in the mounting rails are specified on the outline drawing of the DETC.
- 3) The switch mounting rails shall be secured to the structure in a manner that prevents the operating shaft from binding by fitting the DETC to keep the two mounting rails square.
- 4) To confirm that the installation has been done properly, after tightening all of the mounting hardware, turn the operating shaft and observe the movement of the contact rings on all three tap deck assemblies. All three phases should move together from one end of the tap range to the other in a synchronized fashion and if restriction on the rotations of the shaft is felt prior to installing the crimp connections, re-fitting may be required until smooth rotation is achieved.
- 5) Connecting tap leads to the tap deck assembly is done by crimping or brazing the tap lead into the connector provided with the tap decks. These connectors are supplied by QS to the size specified on the order to match the appropriate cable size. The tap leads should be pre-formed and arranged in a manner to avoid any mechanical stresses to the tap deck mounting board when attached.





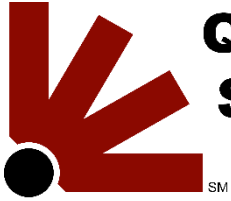
- 6) Once the lead is attached to the crimp connector and the leads are formed to the tap deck, the crimp connector is then secured to the tap deck using  $\frac{1}{2}$ "-13 button head cap screws (supplied by QS). The crimp is attached to the deck on top of a non-metallic terminal spacer washer (also supplied by QS). The bolt is to be tightened to a maximum of 40 ft-lbs. The button head cap screws are supplied with a lock patch to prevent loosening due to vibration after installed but need verified after dry-out process to torque value. (see below).

Partial Exploded View of connector assembly



PARTIAL EXPLODED VIEW

- 7) It is recommended these connections to then be wrapped in some form of insulation (crepe paper or aluminum backed crepe paper) to aide in eliminating sharp edges. Each customer may have a preferred method they use within their transformer on wrapped connections that are appropriate to the voltage class.
- 8) After the drying out process all non-metallic hardware will need to be re-tightened. Snug up finger tight (5-8 ft-lbs) similar to all other non-metallic hardware on the transformer structure. Then apply electrical epoxy (i.e. Glyptal™ or equivalent) to prevent them from vibrating loose.
- 9) The insulating shaft between the first tap deck and handle operating mechanism external to the tank are coupled together after the core and coil assembly have been installed into the tank. A bearing support plate shall be provided near the end of the insulating tube on the front of the DETC to prevent deflection and keep alignment proper (see outline drawing for details). A slotted steel coupling is able to compensate for minor variations in expansion and contraction.



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