# IMO Solar Isolators

## Why use an IMO Solar Isolator?

### DC Switching

IMO “SI” products are true DC switching isolators, not an AC type de-rated or re-wired for DC operation. What you have to consider is that any AC isolator is predominantly designed with materials chosen such that the load will be AC, this means that the load supply will be a 50/60Hz sine wave, whether it be 230Vacor 400Vac, etc. When switching AC it should be remembered that the nature of the load supply will always pass through 0Vacand therefore although loads can be arduous in type the supply is self extinguishing – by that I mean that even if the isolator switches at peak load and an arc between contacts is formed the action of the supply reducing to 0V means that the load will tend to zero and the arc be extinguished.

DC load, on the other hand, is always there and unless the load becomes zero the power being pulled through the contacts will always be the same, so if the load is 500Vdc 25A it will be 500V 25A now, in 1s , in 1min, in 1hour – that is constant. If this is the case unlike the AC above if you switch “OFF” on load you will also be switching “ON” on load; DC does not go through a 0V level unless there is system supply failure (or some other fault).

### Switching Speed

IMO “SI” products have a switching speed that is independent of the operator, that is the IMO mechanism is such that there is no direct linkage between the operator handle and the switch contacts. As the IMO handle is moved it interacts with a spring mechanism which upon reaching a set point causes all the contacts to “SNAP” over thereby causing a very fast break/make action which means that the arcs produced by the constant DC load are normally extinguished within 5ms. In an AC Isolator, there is a direct link between the operator turning the handle and the contacts switching, therefore if the operator turns the handle slowly then the contacts will break slowly leading to arcing times of up to 100ms or more.

As the AC isolators have direct action the operator could always stop the making/breaking of the contacts thereby oscillating them about a point that could make/break the arcing causing significant contact wear. With the IMO “SI” range it is impossible to stop the make/break once it has started movement and therefore the operation must go to completion before any secondary movement can occur.

A number of AC isolators do have DC ratings but these are normally covered by a caveat “Quick Switching Only” in small print and therefore the question of “What is ‘Quick Switching’ ?” especially where, as said before, these isolators rely on operator action.

### Arcing

IMO “SI” products operate with a “knife switch” mechanism meaning that when the unit is operated the operation gives a double break but the arcing effect occurs on the corners of the switch only and so the main contact ismade on an area where no arcing has occurred. With the rotary nature of our contact mechanism this

also means that when the “SI” is operated a self-cleaning action occurs on the arcing points thereby producing good contact integrity over the life of the product. A secondary advantage of this type of operation, in a photovoltaic design, where high currents are available, is that in the event of the supply to earth failure the high short circuit current pulls the contacts together thereby giving an extremely high short circuit withstand up to 1700A (product dependant).

If you now consider the AC Isolator type of product, this as a norm uses a double break but on a contact bridge, similar to that in contactor; therefore, although this also offers a double break like the IMO mechanism, the arcing occurs at the switching/contact point and any subsequent operation leads to continuity being made (or trying to be made) at the same point. Should contact welding occur where these contacts touch then the isolation of the unit drops and therefore its effectiveness for switching the higher powers. If we then consider, as above, a short circuit situation then the capability of an AC isolator is of the order of up to 400A only (product dependant).

Because of the nature of AC switching, the AC supply goes through a 0V point so there is very limited commercial consideration to designing arc suppression mechanisms into AC isolators. However, when switching DC the arc will be there and so the IMO “SI” does include arc extinguishing plates within the contact area of the design in order to reduce the heating effect generated by this arc and therefore significantly increase the operational life of the product – this is not the case in AC isolators.

## Losses & Failures

IMO “SI” knife type mechanism gives you a set of contacts per pole as each pole face will incur losses due to contact resistance (oxidation, etc) this means that self heating will occur within the device. So if you consider an installation where, to obtain the isolation, a four pole AC Isolator is wired with each pole set in series, this will actually give the customer 8 contact sets, leading to 8 losses per pole, and 8 heating effects per pole; which at high current levels could produce significant product heating as well as system losses. Also if we consider the above as an installation then if an AC isolator has 4 pole sets in series to perform the same operation as the IMO “SI” units where you may have to place 2 poles in series, because of the mechanism differences there will be potentially a 6x higher amount of contact failures.