

LCN Fund Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

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Project code:	WPD-T2-04	Question Number	WPD037
Question date	27.09.2012	Answer date	02.10.2012
Submission section question relates to	2		
Topic	Project Description		
Question	Has the factory testing and results analysis confirmed that the Beta technique will accurately measure the fault contribution from all devices (i.e. that have different fault current characteristics), in particular typical DG technologies?		
Notes on question			
Answer	<p>The typical DG technologies are assumed to be synchronous machines, asynchronous machines and power electronic inverter connected devices.</p> <p>WPD's factory acceptance tests of the Fault Level Monitor (FLM) accurately measured fault contribution from synchronous machines. Scottish Power's testing of the FLM has successfully predicted values for Peak and RMS Fault Level on the distribution network, with both synchronous and asynchronous generation connected, close to the values presented in power system analysis software. Power Electronic Inverter connected DG has not been tested, however it unlikely to be an issue as it has a definable and controllable Fault Level contribution. The Fault Level contribution is not sustained as the generation source has no inertia to contribute and the characteristics are well understood.</p> <p>Testing for combinations of DG was outside the scope of the factory testing for a variety of reasons, including non-availability of DG in the laboratory environment, and the practical difficulties of co-ordinating and then dissipating enough DG energy to make any noticeable difference to the magnitude of the currents seen. In practice there were both transient and sub-transient reactances present, all contributing to both predicted and actual fault current. The effective fault level was predicted and compared with the actual fault level seen. These results corroborated previous modelling.</p>		

	<p>The approach adopted for the Fault Level Monitor (FLM) implementation is to assume only that at the measurement point, the network comprises a zero impedance bus followed by linear elements. Its predictions are purely based on what is observed for the responses to disturbances. This means that where multiple complex networks might produce a complex fault characteristic, the FLM does not distinguish the individual network components, nor separate out their individual contributions. Instead the impedance is calculated for its composite effective characteristics, and the prediction for fault level is based on that, giving the composite resultant value.</p> <p>The Factory Acceptance Tests (FAT) were prescribed to test a nominally simple network arrangement, since this is the way the actual network connection is expected to be made, i.e. with the IntelliRupter presenting a passive parallel load to the rest of the network and the current sensing done downstream of the attachment point. Therefore any downstream network fault current appears as upstream at the IntelliRupter.</p>
Attachments	
Verbal Clarifications (Consultants)	