

Q and A session on the following consultation:

“DCRP17/05 GC0079 Frequency Changes during Large Disturbances and their Impact on the Total System”

Please note that this is not an official statement by workgroup GC0079, it is the understanding of the AMPS representative on the Workgroup and is written to help other AMPS members respond to the consultation.

Q1. What changes are we being asked to make?

A. Stop using Vector Shift (VS) protection on new installations and instead use RoCoF protection at the much less sensitive setting of 1.0Hz/s with a definite time delay of 0.5s.

Q2. Why are we being asked to make these changes?

A. Because recent major events on the grid have shown VS to be a serious risk to stability, research has also shown it to be very ineffective at detecting islands.

The current sensitive RoCoF setting is also a serious risk to stability and is causing National Grid to spend tens of millions of pounds a year on stabilising the grid to mitigate the risk.

Q3. Is there any risk from these changes?

A. The research shows that when switching from VS to the new RoCoF settings there is a small improvement in the chances of detecting an island. However, if switching from the current sensitive RoCoF settings to the new ones there is a substantial reduction in the chance of detection, but the risks are still well within those deemed acceptable to the HSE. You may want to perform your own risk assessment.

Q4. Why are there two sets of some documents?

A. The Workgroup had some concerns that type-tested inverter manufacturers may struggle to comply with the new immunity requirements so has proposed two alternatives:

Option 1 does not include type-tested equipment so does not modify G83.

Option 2 does include type-tested equipment.

The Workgroup wants this mod to comprehensively cover the whole market so it fully achieves its goal of improving grid reliability, but if including type-tested inverters is problematic then the alternative can be considered. Therefore, it was agreed to consult on this issue and get feedback from manufacturers rather than prejudging that some will have a major problem.

Q5. Why are there two dates proposed?

A. The Workgroup recognises that if option 2 is chosen then manufacturers of type tested equipment will need more time to repeat their type-tests and re-submit their certificates to the Energy Network Association's (ENA's) register. If option 1 is chosen it can be implemented more quickly as the only requirement is for new installations to have different protection settings. The threat from VS to the grid is urgent so the sooner we stop using it the better.

Q6. Why are severe VS immunity tests being imposed?

A. Because the recent events on the grid, and extensive research triggered by them, shown that huge VS events occur when there are routine transmission faults which would otherwise have no consequences. We need to make sure that protections are not going to trip in these situations and destabilise the grid.

Q7. Do the immunity tests for RoCoF and VS apply to a genset itself?

A. No, they only apply to the protection relay, though it is recognised that for a typical type-tested inverter it is impossible to separate the protections from the inverter.

Q8. Does my existing relay comply with the new requirements?

A. It should do, but check with the manufacturer. In particular, check that it has the definite time delay function on the RoCoF protection, as it is not permissible to simply increase the number of measurement cycles, since that would make it more vulnerable to nuisance tripping. The requirement for a definite time delay was introduced in a revision of G59 in August 2014 and applied retrospectively to sets greater than 5MW. The intention to use this on smaller sets in the future was also clearly flagged at the time, so this feature should be in all relays by now.

Q9. What are the implications for type-tested inverters?

A. These do not use either RoCoF or VS but a proprietary method of island detection, so there are no setting changes. However, they do need to be tested against the new immunity requirements to ensure that their protections do not trip, and their type test certificates re-issued.

Q10. Can we expect further changes to G59?

A. Yes, it is the intention to raise another mod in the near future to apply these changes retrospectively to all embedded generation as the VS threat can only be solved by completely removing it and the RoCoF mitigation costs can only be avoided if most relays are changed. However, this consultation is not about retrospective changes only the requirements for new installations.

Q11. Are there any circumstances where these proposals act retrospectively?

A. Yes, the codes have always had the concept that if a “material alteration” is made to an installation then the latest version of G59 will have to be applied. Unfortunately, there is no clear definition so it comes down to the view of the DO, if they are aware of an alteration of course.

Q12. What if I have a set with a protection setting of greater than 1.0Hz/s, do I have to reset it to 1.0Hz/s?

A. This should not exist under current regulations so is a grey area.

Q13. What does “Registered Capacity” mean and why has it appeared?

A. It is a standard term in the Distribution Code, but the definition should have been copied into the G59 when it was used there, this has already been fed back as a correction.

Q14. Section 10.5.7.1 note 3 talks about “condition detection” which is a step in the internal operation of the relay, how does this affect relay testing?

A. This is a mistake and has been fed back as a correction. All relay testing is measured from the time the test set injects a step in voltage, frequency, phase or RoCoF to the time the relay’s contact operates, as indicated by the timer in the test set. The time indicated on the test set needs to be within the limits stated in Annex 13.3 to pass the tests. The delay between condition initiation and detection is an internal matter for the relay manufacturer and not specified in any way in G59 which treats relays as ‘black boxes’. What this note is supposed to be clarifying is that the circuit breaker operation time is not to be included in the relay testing and typically adds 100 mms to the disconnection time, though absolute requirements for the circuit breaker are not specified in G59.

Q15 Why has Annex 13.3 replaced “time delay” with “relay operating time”?

A. This is to further dispel the misunderstanding about the last point, it is the relay that is tested, not the relay and breaker combination. This issue has been dealt with repeatedly over the last few years but when it was found that the column heading was being cited it was felt prudent to take this opportunity to clarify it.

Q16. Why does G59 still contain references to VS requirements?

A. Because VS is only being banned for new installations and there are places where it has to talk about existing ones. The next mod will hopefully clean this up as it will ban VS retrospectively.

Q17. Why does Annex 13.3 now require the relay details to be recorded?

A. It has always been a requirement that the relay can be unambiguously identified to prevent tampering, but this has not been happening consistently so these details have been explicitly added to the test report which is filed by the DNO.

Q18. Are synchronous sets really being subjected to 50-degree VS events?

A. We know from recording instruments that such large VS events are happening on the transmission network, they have also been recorded at the connection points of solar farms on the distribution networks and are tripping them in the hundreds of MW. We do not know if these are also seen at synchronous sites on the distribution network, it seems likely that the generator is limiting the size of the event locally but there is a lack of evidence.

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