FAQ on FGW TG 3 Rev. 26

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Comments, questions, and corrections to FGW TG 3 Rev. 26

Contents

1 Introduction

This document discusses frequently asked questions about FGW TG 3 (FAQ: frequently asked questions), notes on the interpretation of technical procedures and corrections.

This document refers to FGW TG 3, Rev. 26 /1/:

- Technical guideline for generation units and plants, Part 3: Determination of the Electrical Characteristics of Power Generating Units and Systems, Storage Systems as well as for their Components in Medium, High and Extra-High Voltage Grids, Rev. 26.

The content of this document has been agreed upon in the working group WG TG 3 of the FGW and approved by the Technical Committee Electrical Characteristics (FAEE).

This document is continuously supplemented and revised. The latest version is available on the FGW website.

2 General

2.1 SCOPE OF FGW TG 3, REV. 26

Rev. 26 of FGW TG 3 /1/ is valid with publication of the guideline and can thus be used for measurements on PGUs, PGSs and components. It is noted that measurements can be carried out according to both Rev. 26 and Rev. 25 of TG 3. The companies involved should reach an agreement on this, especially the manufacturer/client and the certification body. It must be considered that TG 3 Rev. 26 contains some additional points which are not included in Rev. 25, but which are required in the VDE application rules VDE AR-N 4110 /5/, 4120 /4/ or 4130 /3/.

The previous revisions of TG 3 do not lose their validity. For certification, however, the application of the latest revisions must be followed according to the specifications of TG 8 /2/.

3 Chapter 4.6 Response during grid faults (FRT)

3.1 CHAPTER 4.6.1.2

3.1.1 FAULT CLEARANCE T2‘

Question: Can the time of fault clearance t2' also be determined by a corresponding switching contact of the test equipment?

Answer: The WG TG 3 considers the use of a signal of a corresponding switching contact of a test device to be sufficient with the described method of determining the time of fault clearance t2' by the instantaneous courses of currents in the short-circuit branch of a test device. Likewise, another method is considered sufficient in which the time t2' is determined from transient changes in the voltages.

3.1.2 FIGURE 4.16 AND 4.17

Question: In figures 4.16 and 4.17, time points for t2' are shown that do not correspond to the method determined from the effective values of all three phase-to-phase voltages as soon as they all leave the level of the error voltage Un ± 5 % for the first time. Should the figures be corrected?

Answer: The figures show the times of the fault declaration t2' resulting from the method when t2' is determined from the instantaneous values of the short-circuit currents or the voltages. The two methods mentioned (instantaneous values or effective values of the three phase-to-phase voltages) result in slightly different times. These minor temporal differences are not considered relevant for the further evaluations.

3.2 CHAPTER 4.6.2.1

3.2.1 TABLE 4-76

Correction: In Table 4-76, the test labelled "110.3_FL_Long" must correctly read: "110.3_PL_Long".

3.2.2 FOOTNOTE 6

In footnote 6 on Table 4-76, the reference to tests 110.2 FL and 110.2 PL must be replaced by 110_3_PL-Long.

Correction: Footnote 6 must read:

[6]According to VDE 4110/20/30 ([3] [4] [5]) Chapter 11.2.5.3: These test points are alternative to verification by a manufacturer's declaration. If the three tests 115.3.FL, 115.3.PL and 115_3_PL_Long are carried out, the corresponding three-phase tests 110.3.FL, 110.3.PL and 110.3_PL_Long can be omitted.

3.3 CHAPTER 4.6.2.3

3.3.1 TABLE 4-77, ACTUAL VALUE OF VOLTAGE DROP

In Table 4-77, lines 16 and 17 determine the actual value of voltage drop / voltage increase for a period up to t2', but according to Chapter 4.6.1.2, this t2' is determined from exactly this actual value of voltage drop / voltage increase, which is not possible.

Correction:

In Table 4-77, the reference time for lines 16 and 17 is changed as follows:

t1+100 ms until the end of the set target error duration (line 6) - 20 ms for error times ≥ 200 ms

t1+60 ms until the end of the set target error duration (line 6) – 20 ms for error times < 200 ms

3.4 CHAPTER 4.6.3.1

3.4.1 TABLE 4-79, FOOTNOTE 8

In footnote 8 to Table 4-79, the reference to tests 110.2 FL and 110.2 PL must be replaced by 110_3_PL-Long.

Correction: Footnote 8 must read:

[8]According to VDE 4110/20/30 ([4] [3] [2]) Chapter 11.2.5.5: These test points are alternative to verification by a manufacturer's declaration. If the three tests 115.3.FL, 115.3.PL and 115_3_PL_Long are performed, the corresponding three-phase tests 110.3.FL, 110.3.PL and 110_3_PL_Long can be omitted.

3.5 CHAPTER 4.6.3.2

3.5.1 TOLERANCE BAND FOR THE REACTIVE CURRENT EVALUATION

Question: The tolerance band for determining the settling time of the reactive current has been reduced in Rev. 26 of TG 3 with ± 10 % of In compared to Rev. 25, which can lead to longer settling times in some cases. Should the tolerance band be changed back to the original value of - 10 % and + 20 %?

Answer: In rev. 26 of TG 3, the determination of the settling time of the reactive current has been changed to the effect that a tolerance band of ± 10 % of In is placed around the stationary final value of the reactive current. In Rev. 25, on the other hand, a tolerance band of - 10 % to +20 % of In was drawn around the setpoint value of the reactive current. The WG TG 3 considers it acceptable that a tolerance band of - 10 % to +20 % of In is also used for Rev. 26 of TG 3, which is placed around the stationary final value of the reactive current, in order to avoid any disadvantages due to the new procedure. The tolerance band used shall be indicated in the test report.

3.6 CHAPTER 4.6.3.3

3.6.1 TABLE 4-82

In Table 4-82, in rows 16 and 17, the actual value of voltage drop / voltage increase is determined for a period up to t2', but this t2' is determined from exactly this actual value of voltage drop / voltage increase according to Chapter 4.6.1.2, which is not possible.

Correction:

In Table 4-82, the reference time for lines 16 and 17 is changed as follows:

t1+100 ms to the end of the set target fault duration (line 6) - 20 ms for fault times ≥ 200 ms

t1+60 ms until the end of the set target error duration (line 6) - 20 ms for error times < 200 ms

3.6.2 TABLE 4-82 FOOTNOTE, 2-POLE VOLTAGE DROPS

Question: Why does it not also apply to 2-pole voltage dips ≤ 5 % that the characteristic values No. 18 and 19 (phase jump), No. 40 to 45 (k-factor (k_{meas}) and rise and fall times reactive current) as well as No. 48 to 51 (phase angle and reactive current) as well as No. 54 and 55 (active power) do not have to be indicated.

Answer: WG TG 3 considers a determination of the phase angle and thus the reactive current for 2-pole voltage drops ≤ 5 % to be sufficiently accurate based on the voltage in the remaining phases. This does not mean that the reactive current should be considered in the certification. The assessment should be carried out in accordance with the measures of FGW TG 8 /2/ as well as TAR-HöS /3/, TAR-HS /4/, TAR-MS /5/.

3.6.3 TABLE 4-82 FOOTNOTE, VOLTAGE DROPS ≤ 5 %

Question: According to TAR-HöS /3/, TAR-HS /4/, TAR-MS /5/, there are no requirements for the feed-in of a current for faults with residual voltages < 15 % Uc. In FGW TR 3 /1/. However, the corresponding characteristic values are not specified for voltage drops ≤ 5 %. Why does this not apply to voltage drops below 15 %?

Answer: WG TG 3 considers a determination of the phase angle and thus the reactive current to be possible with sufficient accuracy even for voltage drops between 5 % and 15 % Uc. This does not mean that the reactive current for voltage drops above 5 % and below 15 % Uc has to be evaluated during certification. The assessment should be carried out according to the specifications of FGW TG 8 /2/ in connection with TAR-HöS /3/, TAR-HS /4/, TAR-MS /5/.

3.6.4 TABLE 4-82 FOOTNOTE, VOLTAGE DROPS ≤ 5 %, ENGLISH VERSION

In the English version, the footnote should not read "48 and 51" but "48 to 51".

Correction:

*For 3-pole voltage drops <= 5 % the parameters no. 18 and 19 (phase step), no. 43 to 48 (k-factor (k_{meas}) and reactive current rise and settling times) as well as no. 48 to 51 (phase angle and reactive current) as well as no. 54 and 55 (active power) do not need to be provided.

4 Annex D

4.1 Chapter D.6.1

4.1.1 CALCULATION OF Z_{LENGTH} AT C. VOLTAGE SPLITTING AUTOTRANSFORMER

In the formula for calculating $\underline{Z}_{length}$, the minus sign in the following formula must be replaced by a plus sign:

Correction:

$\underline{Z}_{length} = \underline{Z}_{Grid} - \underline{Z}_{IO}$

must correctly read:

$\underline{Z}_{length} = \underline{Z}_{Grid} + \underline{Z}_{IO}$

5 Bibliography

[1] Technical Guidelines for Power Generating Units and Systems, Part 3: Determination of the Electrical Characteristics of Power Generating Units and Systems, Storage Systems as well as for their Components in Medium, High and Extra-High Voltage Grids, Rev. 26, 05.04.2022

[2] Technical Guidelines for Power Generating Units, Systems and Storage Systems as well as for their Components, Part 8: Certification of the Electrical Characteristics of Power Generating Units, Systems and Storage Systems as well as for their Components on the Grid, Rev. 09, 01.02.2019.

[3] VDE (FNN), VDE AR-N 4130 Technische Regeln für den Anschluss von Kundenanlagen an das Höchstspannungsnetz und deren Betrieb (TAR-HöS), Berlin, November 2018.

[4] VDE (FNN), VDE AR-N 4120 Technische Regeln für den Anschluss von Kundenanlagen an das Hochspannungsnetz und deren Betrieb (TAR-HS), Berlin, November 2018.

[5] VDE (FNN), VDE AR-N 4110 Technische Regeln für den Anschluss von Kundenanlagen an das Mittelspannungsnetz und deren Betrieb (TAR-MS), Berlin, November 2018.