

FEEDBACK ON „PROPOSAL FOR STORAGE CONNECTION REQUIREMENTS”

In chapter 4.1.3 „SPM Type A – Frequency stability & active power management – Limited Frequency Sensitive Mode (LFSM-O and LFSM-U)”, it is defined in Table 1 that the droop value for s_1 and s_2 should be selectable in a range of 0.1 to 12 %.

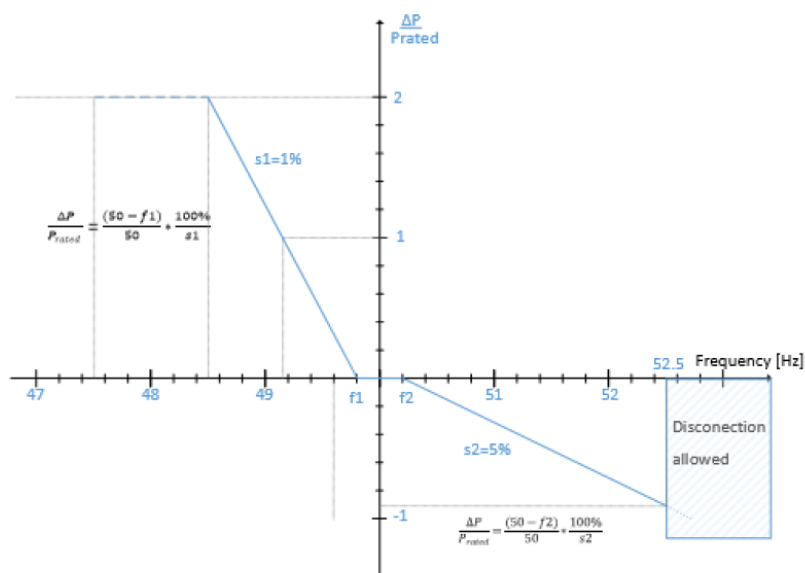


Figure 2 Limited Frequency Sensitive response capabilities for a SPM

Table 1 Limited Frequency Sensitive response parameters for a SPM

Parameters	Default value
f1	49.8 Hz
f2	50.2 Hz
s1	1% Selectable within a range of 0.1 and 12%
s2	5 % Selectable within a range of 0.1 and 12%
Settling time	As fast as possible maximum 30 seconds
First reaction	By default as fast as technically possible (no intentional delay), specific provisions could be applicable by the DSOs in agreement with Elia.

Mathematically, the droop s is defined as follows:

$$s = \frac{\frac{\Delta f}{f_n}}{\frac{\Delta P}{P_{ref}}}$$

In Europe, $f_n = 50 \text{ Hz}$. If P_{ref} is 100 %, the following gradients $\frac{\Delta P}{\Delta f}$ result out of the maximum and minimum selectable droop:

$$\frac{\Delta P}{\Delta f} = \frac{P_{ref}}{s * f_n}$$

For $s = 12 \%$, this results in a gradient of $16.67 \frac{\% P_{ref}}{\text{Hz}}$.

For $s = 0,1 \%$, this would result in a gradient of $2000 \frac{\% P_{ref}}{\text{Hz}}$, which is not applicable at all.

Generally, both EN 50549-1 and EN 50549-2 define a minimum droop of 2 %, which would result in a gradient of $100 \frac{\% P_{ref}}{\text{Hz}}$. The scope of EN 50549-1 and 50549-2 both include storage systems. That is why Fronius International highly recommends to adapt the selectable range for s_1 and s_2 to 2 – 12 %.

If a faster reaction is required by the DSO's, it could be possible to lower the droop down to 1 %, but less is not beneficial for the grid.