Country Settings Switzerland 2025

Excerpt Appendix E of the Industry Recommendation for Grid Connection of Energy Generation Installations to the Low-Voltage Grid (NA/EEA-NE7-CH)

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Gender-fair language.
In the interest of easier readability this document uses the masculine form. However, all roles and personal designations refer to all genders. We thank you for your understanding.

Anhang E Country Settings Switzerland

E.1 Type A units (VSE NA/EEA - CH 2025 Type A)

Valid for Type 2 units (non-synchronous inverters and asynchronous generators)

Grid connection criteria				
Parameters	**Symbol**	**Unit**	**Value**	**Remarks on parameters**
Minimum connection voltage	$U_{ac\ min}$	V	196	85% von U_n
Maximum connection voltage	$U_{ac\ max}$	V	253	110% von U_n
Minimal connection frequency	f_{min}	Hz	47,5	
Maximum connection frequency	f_{max}	Hz	50,1	Must be consistent with U_{ac} NP $_{min}$
Check U/f time before reconnection	t	s	60	Minimum reconnection delay after a fault
Reconnection ramp during start-up	Soft start	-	ON	Standard value: connected
Ramping rate of change	P_{ac} increase	$\%P_{n/Min}$	10	

Table 1: Grid connection criteria Type A

Grid protection criteria					
Parameters	**Symbol**	**Unit**	**Value**	**Time**	**Remarks on parameters**
Over-voltage	U >>	V	276	≤ 100 ms [a)]	120% von U_n
Over-voltage (Sliding 10-minute average value)	U >	V	253	≤ 100 ms [a)]	110% von U_n [b), c)]
Under-voltage	U <	V	184	≤ 1500 ms	80% von U_n [d)]
Under-voltage	U <<	V	104	≤ 300 ms	45% von U_n [d)]
Under-frequency	f >	Hz	47,5	≤ 100 ms [a)]	
Over-frequency	f >	Hz	51,5	≤ 100 ms [a)]	
Frequency-based power reduction	P(f)	-	ON	-	Standard value: connected
Starting value for power reduction	f_{start}	Hz	50,2	-	
Rate of change for power reduction	P(f) red	% $P_{mom/Hz}$	40	-	
Island identification	Anti-islanding	s	5	-	Error clearing time: within 5 seconds, conforming to SNEN 62116:2014

Table 2: Grid protection criteria Type A

Grid operation			
Parameters	**Symbol**	**Value (≤ 250 kVA)**	**Remarks on parameters**
Reactive power control	Q(U)	Yes (active)	Default based on footnote e) or on VNB request
Active power control	P(U)	Yes (active)	Default based on footnote e) or on VNB request
FRT behaviour	FRT	No (inactive)	Dynamic grid support without reactive power feed
k-factor	k-factor	-	Default value 2 or based on VNB request

Table 3: Grid operation Type A

E.2 Type B units (VSE NA/EEA - CH 2025 Type B)

Valid for Type 2 units (non-synchronous inverters and asynchronous generators)

Grid connection criteria				
Parameters	**Symbol**	**Unit**	**Value**	**Remarks on parameters**
Minimum connection voltage	$U_{ac\ min}$	V	196	85% von U_n
Maximum connection voltage	$U_{ac\ max}$	V	253	110% von U_n
Minimal connection frequency	f_{min}	Hz	47,5	
Maximum connection frequency	f_{max}	Hz	50,1	Must be consistent with U_{ac} NP $_{min}$
Check U/f time before reconnection	t	s	600	Minimum reconnection delay after a fault
Reconnection ramp during start-up	Soft start	-	ON	Standard value: connected
Ramping rate of change	P_{ac} increase	$\%P_{n/Min}$	10	

Table 4: Grid connection criteria Type B

Grid protection criteria					
Parameters	**Symbol**	**Unit**	**Value**	**Time**	**Remarks on parameters**
Over-voltage	U >>	V	276	≤ 100 ms [a)]	120% von U_n
Over-voltage (Sliding 10-minute average value)	U >	V	253	≤ 100 ms [a)]	110% von U_n [b), c)]
Under-voltage	U <	V	184	≤ 1500 ms	80% von U_n [d)]
Under-voltage	U <<	V	104	≤ 300 ms	45% von U_n [d)]
Under-frequency	f >	Hz	47,5	≤ 100 ms [a)]	
Over-frequency	f >	Hz	51,5	≤ 100 ms [a)]	
Frequency-based power reduction	P(f)	-	ON	-	Standard value: connected
Starting value for power reduction	f_{start}	Hz	50,2	-	
Rate of change for power reduction	P(f) red	$\%\ P_{mom/Hz}$	40	-	
Island identification	Anti-islanding	s	5	-	Error clearing time: within 5 seconds, conforming to SNEN 62116:2014

Table 5: Grid protection criteria Type B

Grid operation			
Parameters	**Symbol**	**Value (> 250 kVA)**	**Remarks on parameters**
Reactive power control	Q(U)	Yes (active)	Default based on footnote e) or on VNB request
Active power control	P(U)	Yes (active)	Default based on footnote e) or on VNB request
FRT behaviour	FRT	Yes (active)	Dynamic grid support with reactive power feed
k-factor	k-factor	2	Default value 2 or based on VNB request

Table 6: Grid operation Type B

Footnotes and remarks:

a) The time default value "≤ 100 ms" for the protection relay setting also assumes a maximum operating time of 100 ms for the NA protection relay including section switch. This equals a maximum of 200 ms for the total switch-off time.

b) It must be ensured that the (building) connection point does not exceed a voltage of 1.10 U_n. If this requirement is ensured through external NA protection, the over-voltage protection U> at the decentralised EEE/EEA can be set to 1.15 U_n. In this case, the builder should take into account possible impacts on the customer installation. The combination of an external NA protection (U>: 1.1 U_n) and an integrated NA protection (U>: 1,1 U_n to 1.15 U_n) can be applied when the voltage drop in the house wiring is negligible and this does not lead to any inadmissible high voltages. This is typically the case with longer connection lines.

c) If the U> function does not calculate the sliding 10-minute average value, a setting of 1.10 U_n with 60 s delay is recommended (outside the OVRT area). Relay hysteresis in terms of over-function/reconnection must be taken into account.

d) If the EEA medium voltage grid of VNB is operated with an automatic reconnection (AWE-CH), the following protection settings (EEA) are recommended: U<<-function: 0.45 U_n, undelayed (e.g. least possible time delay) and U <-function: 0,8 U_n, 300 milliseconds. The FRT requirements must not be adhered to in this case. The specifications for the protection settings apply to the VNB.

e) Details on Q(U) characteristic curve

In this process, the EEE exchanges reactive power with the distribution grid (Q = f(U)) depending on the actual voltage at the (building) connection point.

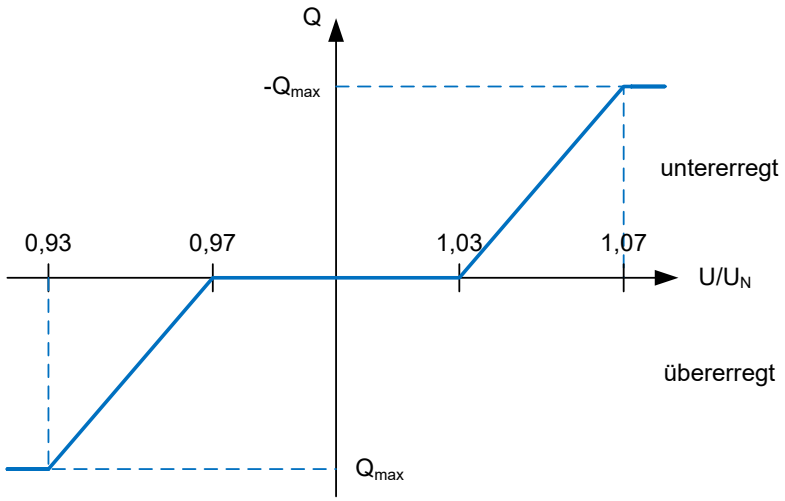

Diagram 1: Standard setting of Q(U) characteristic curve in low voltage (generator metering and flow direction diagram)

The time constant of the Q(U) control must be set at 5 seconds. The time constant indicates how quickly the controller in the inverter must respond to a voltage change. A portion of the occurring voltage change is compensated within the first 5 seconds. Within a maximum of 15 seconds, at least 95% of the reactive power value specified by the predefined Q(U) characteristic curve must be provided.

Note: The Q(U) characteristic curve can be parameterized as specified in VDE-AR-N 4105 (2018-11 edition).

f) Details on active power control - P(U) characteristic curve

To comply with the upper voltage limit according to SNEN 50160, generating plants (EEA) must be capable of implementing voltage-controlled active power reduction.

In the P(U) active power operating range, the maximum permissible active power is limited at a function of voltage, as shown in the following Diagram 2. If the voltage exceeds 1.1 U_n, the maximum permissible active power is linearly reduced from 100% of the rated active power to 0 at 1.12 U_n.

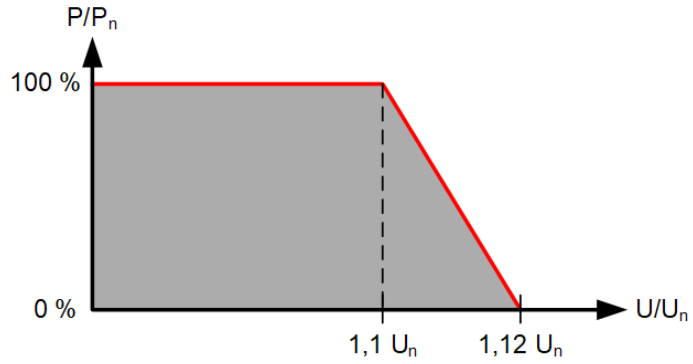

Diagram 2: Standard setting P(U) control

Selecting the threshold point at U = 1.1. U_n, ensures that the generating plant does not operate in the inadmissible voltage range and that the system is not disconnected from the grid by the over-voltage protection (U>).

The P(U) control dynamics should ideally be configured with a time constant of 5 seconds. Within the triple time constant (3 x 5 seconds), 95% of the new nominal value must be reached.

In addition to the characteristic curve, additional parameters must be configurable:

- The control dynamics must correspond to a first-order filter and feature a time constant that can be configured within the range of 3 to 60 seconds.