

# Power System Model for Resonance Studies

## List of revisions

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## 1 Background

This document lists revisions to the research report “Power System Model for Resonance Studies”, available from <http://urn.kb.se/resolve?urn=urn:nbn:se:ltu:diva-70914> (ISBN 978-91-7790-213-3). The latest version of this document is available at <https://i2group.se/phd/>.

Revisions are listed by date.

## 2 Revision 2018-10-05

### 2.1 HVDC transformer data

*Chapter 7 has been updated (changes in red):*

An HVDC link is located at bus G3. The layout of the converter, including filters, is shown in Figure 15 and Figure 16, and the data for the filters is listed in Table 15. The data is based on a typical configuration for a 1000 MW HVDC Classic [1]. The converter impedance (at different operating points) **is considered an open circuit and** has not been included in the model. **The converter transformers are single-phase transformers with data according to Table 16.**

Table 16 - HVDC transformer data

Un (kV)	Sn (MVA) 1-2/2-3/3-1	Uk (%) 1-2/1-3/2-3	PO (kW)	Pk (kW) 1-2/1-3/2-3
410/210/210	340/170/170	18/18/36	140	400/400/800

### 2.2 Transmission transformer data

*Table 11, 12 and 13 in Chapter 5 has been updated (changes in red):*

Table 11 - List of transmission transformers

Bus	No. of transformers	Type	Grounding (Primary/Secondary)
1	2	C	Solid/Solid
2	2	A	T1: Solid/Isolated, T2: Solid/Solid
3	2	A	T1: Solid/Isolated, T2: Solid/Solid
4	2	B	Solid
5	1	C	Solid/Solid
6	1	C	Solid/Solid
8	2	C	Solid/Solid
9	2	A	T1: Solid/Isolated, T2: Solid/Solid
10	2	A	T1: Solid/Isolated, T2: Solid/Solid
11	2	C	Solid/Solid

Table 12 - Main data for the transmission transformer types.

	A (1-2/1-3/2-3)	B	C
Rating [MVA]	500/500/100	750	350
Rated voltages [kV]	410/225/20	410/225	410/145
u <sub>k</sub> [%]*	16/3.5/1.2	12	15
P <sub>0</sub> [kW]	150	200	100
P <sub>k</sub> [kW]	1000/50/50	1400	500
Type	3-winding, 3-limb	2-winding 3-limb	2-winding, 3-limb
Vector group	YNyn0d11	YNauto0	YNyn0

*\*Referred to the lowest MVA of the two windings*

Table 13 - Core saturation characteristics for different transformer types

	A	B	C
Voltage at knee point [p.u.]	1.14	1.14	1.14
Magnetizing current [%]	0.04	0.04	0.04
Air core reactance [p.u.]	0.2	0.2	0.2
Nominal flux density [T]	1.72	1.72	1.72