

# WECC Approved Dynamic Model Library (DRAFT)

## NOTES:

WECC needs to input the data to the PSLF program, with conversion to the PSS/E program. Therefore, model data must be submitted that can be input to PSLF

\* The PSLF models are converted to these PSS/E models by PTI's conversion program

Acceptable models for the WECC Master Dynamics file (MDF) are highlighted in yellow and indicated in the status column

These models are used in the 06hw3 case and aren't converted, and should be evaluated

## EXCITATION SYSTEM MODELS

GE PSLF	PTI PSS/E*	IEEE Standard	Status	Comments
exac1	EXAC1	AC1A	approved	Brushless AC
[esac1a]		AC1A	future	in next PSLF release
exac1a	EXAC1A		approved	exac1 with altered rate feedback source
exac2	EXAC2		approved	HIR Brushless
esac2a	Not used	AC2A	future	new in GE PSLF
exac3	Not used			
exac3a	ESAC3A		approved	GE Alterrex
esac3a	Not used	AC3A	future	new in GE PSLF
exac4	EXAC4	AC4A	approved	Some differences from IEEE model
[esac4a]		AC4A	future	
[esac5a]		AC5A	future	Brushless exciter
exac6a	Not used	AC6A		Alternator, noncontrolled rectifier, lead-lag
[esac6a]		AC6A	future	
esac7b	Not used	AC7B	future	new in GE PSLF
exac8b	ESAC8B	AC8B	approved	Brushless exciter with PID voltage regulator i.e. ("SEL" digital excitation system of Basler Electric)
[esac8b]		AC8B	future	
exbbc	BBSEX1		approved	Static with ABB regulator
exdc1	IEEEX1	DC1A	approved	Rotating DC
[esdc1a]		DC1A	future	
exdc2	EXDC2		approved	Rotating DC with terminal fed pilot, alternate feedback
exdc2a	EXDC2	DC2A	approved	Rotating DC with terminal fed pilot
[esdc2a]		DC2A	future	
exdc4	IEEET4	DC3A	approved	Rotating, noncontinuous - minor differences between models
[esdc3a]		DC3A	future	
[esdc4b]		DC4B	future	Rotating DC with PID

exeli	EXELI		approved	Static PI transformer fed excitation system
exst1	EXST1	ST1A	approved	Static with double lead/lag
[esst1a]		ST1A	future	
exst2	EXST2	ST2	approved	SCPT - lead/lag block (Tc, Tb) added
exst2a	ESST2A	ST2A	approved	lead/lag block (Tc, Tb) is included to match the WECC FM
[esst2a]		ST2A	future	
exst3	EXST3	ST3	approved	
exst3a	ESST3A	ST3A	approved	Use this model for GE Generex
[esst3a]		ST3A	future	
exst4b	ESST4B	ST4B	approved	GE EX2000 bus fed potential source, static compound and Generex-PPS or -CPS, and SILCOmatic 5 excitation systems, with proportional plus integral (PI) voltage controller
[esst4b]		ST4B	future	
[esst5b]		ST5B	future	Variation of ST1A (New IEEE Model)
[esst6b]		ST6B	future	Variation of ST4B with field current limit (New IEEE model)
[esst7b]		ST7B	future	Static with limiters (Alstom) (New IEEE model)
exwtg1	Not converted (1)			Excitation system model for wound-rotor induction wind-turbine generator
exwtge	Not used			Excitation (converter) control model for GE wind-turbine generators
ieeet1	IEEET1		approved	Old type 1
mexs	Not used			Manual excitation control with field circuit resistance
pfqrg	Not used			Power factor / Reactive power regulator
rexs	REXSYS		approved	General Purpose Rotating Excitation System Model
scrx	SCRX		approved	intended for use where negative field current may be a problem
sexs	Not used			for use where details of the actual excitation system are unknown and/or unspecified
texs	Not converted (9)			Transformer Fed Excitation System Model
oel1	Not converted (277)			Over excitation limiter
[oel]		OEL	future	New IEEE model
[uel1]		UEL1	future	New IEEE model
[uel2]		UEL2	future	New IEEE model

## GENERATOR MODELS

GE PSLF	PTI PSS/E*	IEEE Standard	Status	Comments
gentpf	GENROU/IEEEVC		approved	WECC Model
genrou	GENROU/IEEEVC		approved	Round rotor generator model, use for thermal generator models
gensal	GENSAL/IEEEVC		approved	Salient pole generator model, Use for Hydro generator models
gencce	GENROU/IEEEVC		approved	Cross Compound generator model
genwri	not converted (1)			Vestas Wind turbine generator, 1 instance in 08HS3 base case
gewtg	not used			GE Wind turbine generator
motor1	CIMTR4		approved	Used for wind
gencls	not used			Used to force a signal, or classical generator model

## PSS MODELS

GE PSLF	PTI PSS/E*	IEEE Standard	Status	Comments
wsccest	ST2CUT		approved	Dual input PSS
pss2a	PSS2A	PSS2A, PSS3B	approved	Dual input PSS (2A is delta P-omega, 3A is Accelerating power (Unitrol))
ieeest	IEEEEST	PSS1A	approved	Single input PSS, dual lead lag
psssb	PSS2A	PSS2A, PSS3B	approved	pss2a + transient stabilizer
[pss1a]		PSS1A		
[pss2b]		PSS2B		Extra lead/lag (or rate) block added at end (up to 4 lead/lags total)
[pss3b]		PSS3B		
[pss4b]		PSS4B		ABB multi-band
[psssh]				Siemens H infinity PSS

## LOAD MODELS

GE PSLF	PTI PSS/E*	IEEE Standard	Status	Comments
alwsc	IEELAR		approved	Area load model
blwsc	IEELBL		approved	Bus load model
motorw	CIMWBL		approved	Induction Motor Model

## TURBINE/GOVERNOR MODELS

GE PSLF	PTI PSS/E*	IEEE Standard	Status	Comments
g2wsc	WSHYDD		approved	
gast	URGS3T		approved	
ggov1	GGOV1		approved	
gpwsc	WSHYGP		approved	
hyg3	WSHYGP		approved	
hygov	HYG0V		approved	
hygov4	IEEEG3		approved	
ieeeg1	WSIEG1		approved	
ieeeg3	IEEEG3		approved	
lcfb1	ULCFB1		approved	
pidgov	PIDGOV		approved	
tgov1	TGOV1		approved	
ggov2	new		future	new in GE PSLF

## OTHER MODELS

GE PSLF	PTI PSS/E*	IEEE Standard	Status	Comments
colatr	not converted (1)			Colstrip ATR relay
dc4t	not converted (2)			old PDCI DC model
dcmt	new		approved	new PDCI DC model
epcdc	CDC6		approved	Intermountain DC model
fmeta	not converted (1)			Frequency meter, whole system or bus
gp1	not converted (4)			Generator Protection relay
lsdt1	LDS3BL		approved	Underfrequency relay
lsdt2	LVS3BL		approved	Undervoltage relay
lsdt9	LDS3BL		approved	Underfrequency relay
monit	not converted (1)			solution monitor
ooslen	not converted (11)			3 zone out of step relay
[scmov]				Series capacitor MOV and bypass model
stcon	not converted (2)			Static synchronous condensor
svwsc	CSVGN5, CSVGN6		approved	Static Var Source model
tlin1	not converted (114)			under frequency or under voltage line relay
vmeta	not converted (2)			Voltage meter, whole system or bus
vwscc	CSVGN5		approved	Static Var Source model

SLF.

Modifications/Actions Needed	PTI/GE Comments
	Differs from IEEE AC1A -- does not have OEL/UEL inputs and multiplies output by speed.
New Model	in next PSLF release
	Differs from IEEE AC2A -- no OEL/UEL inputs; different field current limit; speed multiplier
New Model	
	Differs from IEEE AC3A -- no OEL/UEL inputs; different field current limit; speed multiplier
New Model	
	Differs from IEEE AC4A -- no OEL/UEL inputs
New Model	in next PSLF release
New Model	in next PSLF release
	Differs from IEEE AC6A -- no OEL/UEL inputs; speed multiplier
New Model	in next PSLF release
New Model	
	Differs from IEEE AC8B -- no exciter upper limit; added input limits and speed multiplier
New Model	in next PSLF release
	Differs from IEEE DC1A -- no UEL inputs; speed multiplier
New Model	in next PSLF release
	Differs from IEEE DC2A -- no UEL inputs; speed multiplier
New Model	in next PSLF release
	If Kr = 0, should convert to IEEE X4 (IEEE DC3A).
New Model	in next PSLF release
New Model	in next PSLF release

	Differs from IEEE ST1A -- no OEL/UEL inputs; added Xe lfd loading; RFB before field current limiter.
New Model	in next PSLF release
	Differs from IEEE ST2A -- no UEL inputs; added lead/lag.
New Model	in next PSLF release
	Differs from IEEE ST2A -- no UEL inputs; fewer time constants.
New Model	in next PSLF release
	Differs from IEEE ST2A -- no OEL/UEL inputs
New Model	in next PSLF release
New Model	in next PSLF release
New Model	in next PSLF release
New Model	in next PSLF release
replace with new wind models	We need details of this model This is crude Vestas V80 model. This will be obsolete after generic Type 2 model is available.
replace with new wind models	
	PSS/E has a SEXS (simplified excitation system) model (which is similar to the PSLF sexes model but without the PI control block)
replace with esst6b	we don't convert this. Per our notes from previous M&V meetings, this model was not to be used in WECC.
Use new model	Please note that this is not an IEEE standard model. GE developed this model for WECC use. If we have to provide a corresponding PSS/E model, we have to get the block diagram from GE This should be replaced by IEEE model.
New Model	in next PSLF release
New Model	in next PSLF release
New Model	in next PSLF release

Modifications/Actions Needed	PTI/GE Comments
will be replaced with new wind models	We need details of this model This will be replaced by generic Type 2 WTG generator model.
will be replaced with new wind models	We can convert this
	We have a GENCLS model. The PSLF model gencs does get converted to the PSS/E model GENCLS. [Forcing signal (playback) feature not needed in library datasets.]

Modifications/Actions Needed	PTI/GE Comments
extra lead/lag block	
	in next PSLF release
	in next PSLF release
	in next PSLF release
	in next PSLF release
	in next PSLF release

Modifications/Actions Needed	PTI/GE Comments

Modifications/Actions Needed	PTI/GE Comments
Check WSHYGP conversion	
Need new acceptable model in PTI	
	We have the new GGOV2 model in a user written format. We will see if this can be given to users as a user model in the next point release. We hope to make it a standard model for the next major release.

Modifications/Actions Needed	PTI/GE Comments
	was developed for WECC. We don't have a PSS/E model for this, need details
	We have this model, but guess this old model will become obsolete <b>Removed from PSLF.</b>
	We have just developed two new models (north to south and south to north) for the PDCI. <b>GE needs details for data conversion to PSLF.</b>
	not converted for the same reason that vmeta is not converted (please see below)
	We don't have a PSS/E model for this, need details
	not converted for the same reason that vmeta is not converted (please see below)
low priority	<p>We don't convert this. The reason is not because we don't have a model. PSS/E has a double circle or lens out-of step line relay model called 'CIROS1' (please note that like any other relay model, this also is a generic line-relay model not representing any particular manufacturer). The reason that the data is not converted is probably because the data requirements of the PSLF 'ooslen' model do not match the data requirements of the PSS/E 'CIROS1' model. However, this does not prevent the PSS/E users to create a DYR data record and include the CIROS1 model for every occurrence of the PSLF 'ooslen' model.</p> <p><b>in next PSLF release</b></p>
	<p>We don't convert this. This model, per our notes from the previous M&amp;V meetings, was not to be used in WECC. This also is a generic model not representing any particular manufacturer. PSS/E also has two generic static condenser models - the CSTATT (use of this requires a generator model in load flow), and the CSTCNT (use of this requires a FACTS device model in load flow). We can not convert the PSLF STCON to PSS/E CSTATT or the CSTCNT models because the data requirements are different.</p>
Investigate better method for pump (Generator) tripping	<p>We don't convert this, because PSS/E does not have the under frequency or under voltage line relay model. Our consulting group has a user written model and we can include it in PSS/E. We will add this in our list of task to do. As an interim solution we can check if we can make this available as a user written model before it becomes a PSS/E standard model. However, given the fact that this also is a generic model, the data requirements of the PSLF 'tlin1' may not match the data requirements of the PSS/E model, and hence we may not be able to convert from the PSLF to the corresponding PSS/E model. Nonetheless, a model can be made available for WECC PSS/E users.</p>
	<p>We have this model, but don't (and can not convert) it. The reason the conversion is not possible is because the corresponding PSS/E model does not have to be entered into the PSS/E dynamics raw data file (the DYR file). In PSS/E, using the GUI we select CHSBNEW to place the subsystem (which could be on the basis of bus, area, owner or zone) voltages in the output channel.</p>