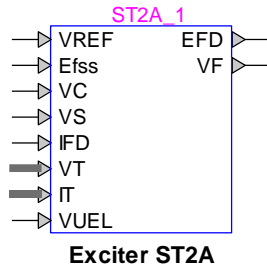


# Exciters and Governors: Exciter ST2A



Exciters and Governors: Exciter ST2A .....	1
1 Description.....	1
1.1 Pins .....	1
1.2 Parameters.....	1
1.2.1 Data tab .....	2
1.2.2 Exciter tab .....	2
2 Initial conditions .....	2
3 References .....	2

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## 1 Description

This device is an implementation of the IEEE type ST2A excitation system model. This device is implemented as described in [1]. Implementation details can be viewed by inspecting the subcircuit of this device.

### 1.1 Pins

This device has 10 pins:

Pin name	Type	Description	Units
VREF	Input	Reference voltage of the stator terminal voltage	pu
Efss	Input	Steady-state field voltage at $t = 0$ , for initialization	pu
VC	Input	Terminal voltage of synchronous machine, transducer output	pu
VS	Input	Power System Stabilizer signal	pu
IFD	Input	Field current	pu
VT	Input, bundle	Terminal voltage of synchronous machine (magnitude and phase)	pu
IT	Input, bundle	Current of synchronous machine (magnitude and phase)	pu
VUEL	Input	Under Excitation Limiter signal	pu
EFD	Output	The field voltage signal	pu
VF	Output	The excitation system stabilizer signal	pu

### 1.2 Parameters

The default set of parameters can be found in [1].

### 1.2.1 Data tab

The parameters on the Data tab are:

1. **Gain  $K_A$** : voltage regulator gain
2. **Time constant  $T_A$** : voltage regulator time constant
3. **Maximum regulator output  $V_{Rmax}$** : maximum regulator voltage output
4. **Minimum regulator output  $V_{Rmin}$** : minimum regulator voltage output
5. **Gain  $K_F$** : excitation control system stabilizer gain
6. **Time constant  $T_F$** : excitation control system stabilizer time constant
7. **Gain  $K_P$** : potential circuit gain coefficient
8. **Gain  $K_I$** : compound circuit gain coefficient
9. Under Excitation Limiter option: see explanations below.

There are two possible selections for the Under Excitation Limiter option:

1. VUEL not available or added to the reference voltage
2. VUEL connected to the high value gate (HV gate)

### 1.2.2 Exciter tab

The exciter tab allows to input:

1. **Gain  $K_E$** : exciter gain
2. **Time constant  $T_E$** : exciter time constant
3. **Synchronous machine reactance  $X_d$** : direct axis synchronous machine reactance
4. **Rectifier loading factor  $K_C$** : rectifier loading factor

## 2 Initial conditions

The reference voltage  $V_{REF}$  can be manually or automatically set by connecting or not connecting the input signal  $V_{REF}$ , respectively. When  $V_{REF}$  is not connected (the signal is zero), the reference voltage is internally found from the steady-state solution. When  $V_{REF}$  is connected, its initial value must match the per unit steady-state voltage of the stator terminal voltage, since otherwise the generator voltage will not start at the actual steady-state.

## 3 References

- [1] "IEEE Recommended Practice for Excitation System Models for Power System Models for Power System Stability Studies," IEEE Standard 421.5-2005.