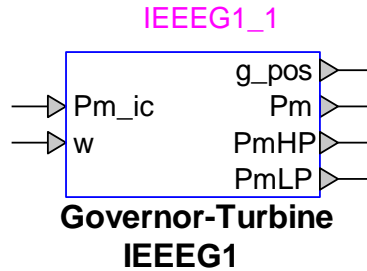


# Exciters and Governors: Governor-Turbine IEEEG1



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## 1 Description

This device is an implementation of a general model for steam turbine and governor IEEEG1. 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 6 pins:

Pin name	Type	Description	Units
Pm_ic	Input	Steady-state mechanical power at t = 0, for initialization	pu
w	Input	Mechanical speed	pu
g_pos	Output	Gate position	pu
Pm	Output	Turbine mechanical power	pu
PmHP	Output	High pressure mechanical power	pu
PmLP	Output	Low pressure mechanical power	pu

### 1.2 Parameters

The default set of parameters are obtained from [2].

#### 1.2.1 Governor tab

The parameters on the Data tab are:

1. **Governor gain K:** Governor gain
2. **Lag time constant  $T_1$ :** governor lag time constant

3. **Lead time constant  $T_2$** : governor lead time constant
4. **Time constant  $T_3$** : valve positioner time constant
5. **Maximum opening velocity  $U_0$** : maximum opening velocity
6. **Minimum closing velocity  $U_c$** : minimum closing velocity
7. **Maximum valve opening  $P_{max}$** : maximum valve opening
8. **Minimum valve opening  $P_{min}$** : minimum valve opening

## 1.2.2 Turbine tab

The turbine tab allows to input:

1. **Time constant  $T_4$** : steam flow time constant
2. **Time constant  $T_5$** : first reheater time constant
3. **Time constant  $T_6$** : second reheater time constant
4. **Time constant  $T_7$** : crossover time constant
5. **HP turbine power fraction  $K_1$** : high pressure turbine power fraction
6. **HP turbine power fraction  $K_3$** : high pressure turbine power fraction
7. **HP turbine power fraction  $K_5$** : high pressure turbine power fraction
8. **HP turbine power fraction  $K_7$** : high pressure turbine power fraction
9. **LP turbine power fraction  $K_2$** : low pressure turbine power fraction
10. **LP turbine power fraction  $K_4$** : low pressure turbine power fraction
11. **LP turbine power fraction  $K_6$** : low pressure turbine power fraction
12. **LP turbine power fraction  $K_8$** : low pressure turbine power fraction

## 2 Initial conditions

The initial output is equal to the generator mechanical power (base for power) at  $t = 0$  s.

## 3 References

- [1] "Dynamic Models for Turbine-Governors in Power System Studies," Technical report PES-TR1. IEEE Power & Energy Society Jan 2013.
- [2] P. Kundur, "Power System Stability and Control", McGraw-Hill 1994