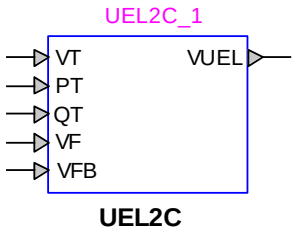
Exciters and Governors: Under Excitation Limiter UEL2C



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1 Description

This device is an implementation of the IEEE type UEL2C under excitation limiter 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 6 pins:

Pin name	Type	Description	Units
VT	Input	Generator terminal voltage magnitude	pu
PT	Input	Generator real power output	pu
QT	Input	Generator reactive power output	pu
VF	Input	Excitation system stabilizer signal	pu
VFB	Input	Exciter ST7B signal	pu
VUEL	Output	Under Excitation Limiter 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. **Reactance X_q**: q-axis synchronous reactance
2. **Time constant T_{UV}**: UEL voltage filter time constant
3. **Time constant T_{UP}**: UEL real power filter time constant
4. **Time constant T_{UQ}**: UEL reactive power filter time constant
5. **Bias V_{bias}**: UEL voltage bias

6. **Exponent K_1**: Voltage exponent for real power input to UEL table
7. **Exponent K_2**: Voltage exponent for reactive power output of UEL table
8. **Gain K_{UF}**: UEL excitation system stabilizer gain
9. **Time constant T_{Qref}**: UEL reactive power reference time constant
10. **Gain K_{fix}**: UEL fixed gain reduction factor
11. **Time delay T_{adj}**: UEL adjustable gain reduction time constant
12. **Gain K_{UL}**: UEL proportional gain
13. **Gain K_{UI}**: UEL integral gain
14. **Gain K_{FB}**: Gain associated with optional integrator feedback input signal to UEL
15. **Time constant T_{UL}**:Time constant associated with optional integrator feedback input signal to UEL
16. **Maximum output V_{ULmax}**: UEL PI control maximum output
17. **Minimum output V_{ULmin}**: UEL PI control minimum output
18. **Time constant T_{U1}**: UEL numerator (lead) time constant (first block)
19. **Time constant T_{U3}**: UEL denominator (lag) time constant (first block)
20. **Time constant T_{U2}**: UEL numerator (lead) time constant (second block)
21. **Time constant T_{U4}**: UEL denominator (lag) time constant (second block)
22. **Maximum output V_{ULmax1}**: UEL maximum output
23. **Minimum output V_{ULmin1}**: UEL minimum output
24. **Maximum output V_{ULmax2}**: UEL maximum output
25. **Minimum output V_{ULmin2}**: UEL minimum output
26. Under Excitation Limiter Gain Control option: see explanations below.

There are two possible selections for the Under Excitation Limiter Gain Control option:
1. Constant gain reduction.
2. Automatic adjustment of the gain reduction

1.2.2 UEL Table tab

The active power versus reactive power characteristic table.

2 Initial conditions

The UEL is supposed to be inactive during the steady-state conditions.

3 References

[1] “IEEE Recommended Practice for Excitation System Models for Power System Models for Power System Stability Studies,” IEEE Standard 421.5-2016.