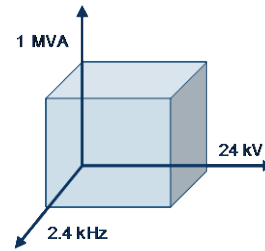


# FLEX POWER GRID LAB

## SUMMARY OF TECHNICAL POSSIBILITIES

### Overview of electrical capability

- Voltage level up to **24 kV<sub>AC</sub>**
- **DC to 75 Hz** frequency range
- Continuous power up to **1 MVA**
- Up to **25<sup>th</sup>** harmonics
- Synchronization with external sources
- Controllable **bi-directional power flow**
- Adjustable passive loads (0.5MW, 1MVA<sub>r</sub>):
  - Voltage range up to 4 kV, in a multitude of possible combinations



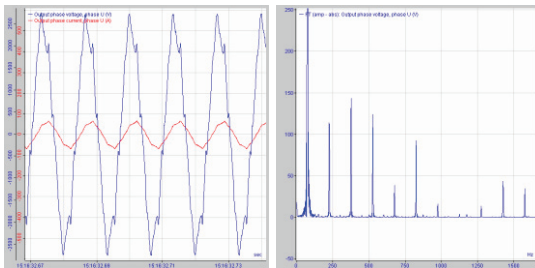
	Resistors	Inductors	Capacitors
Power	500kW	1MVA <sub>r</sub>	1MVA <sub>r</sub>

Stationary voltage phenomena

### Available network phenomena

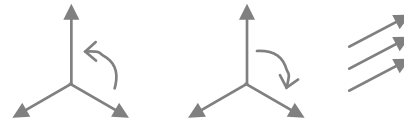
#### Harmonic voltage distortion

- 6 closed loop (resonant) controllers
- >6 open loop controllers



#### Voltage unbalance

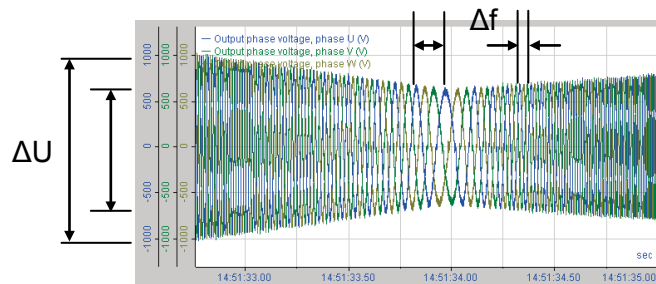
Negative sequence voltage  
10 % of positive sequence voltage



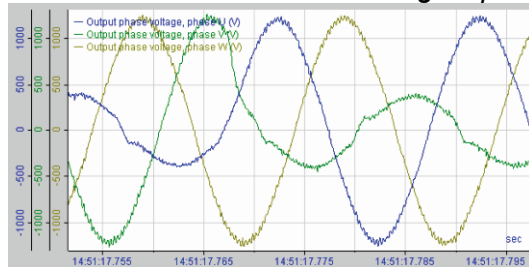
Zero sequence freely adjustable

Dynamic voltage phenomena

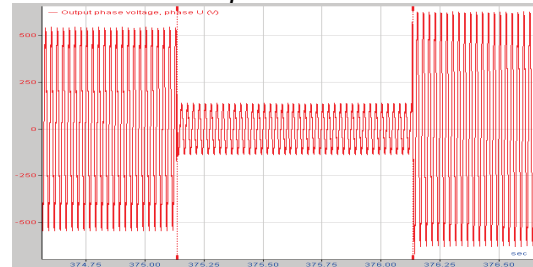
### Dynamic system voltage variations, both amplitude and power frequency variations

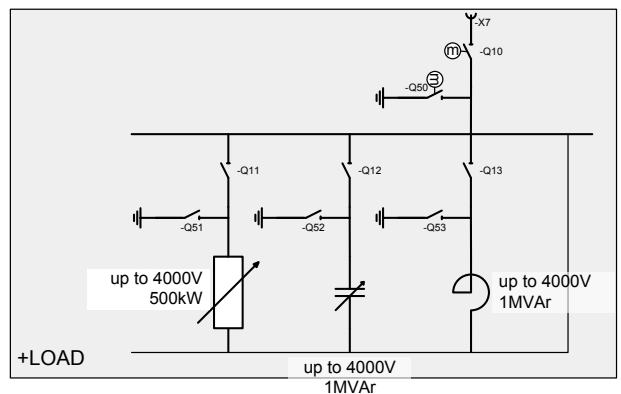
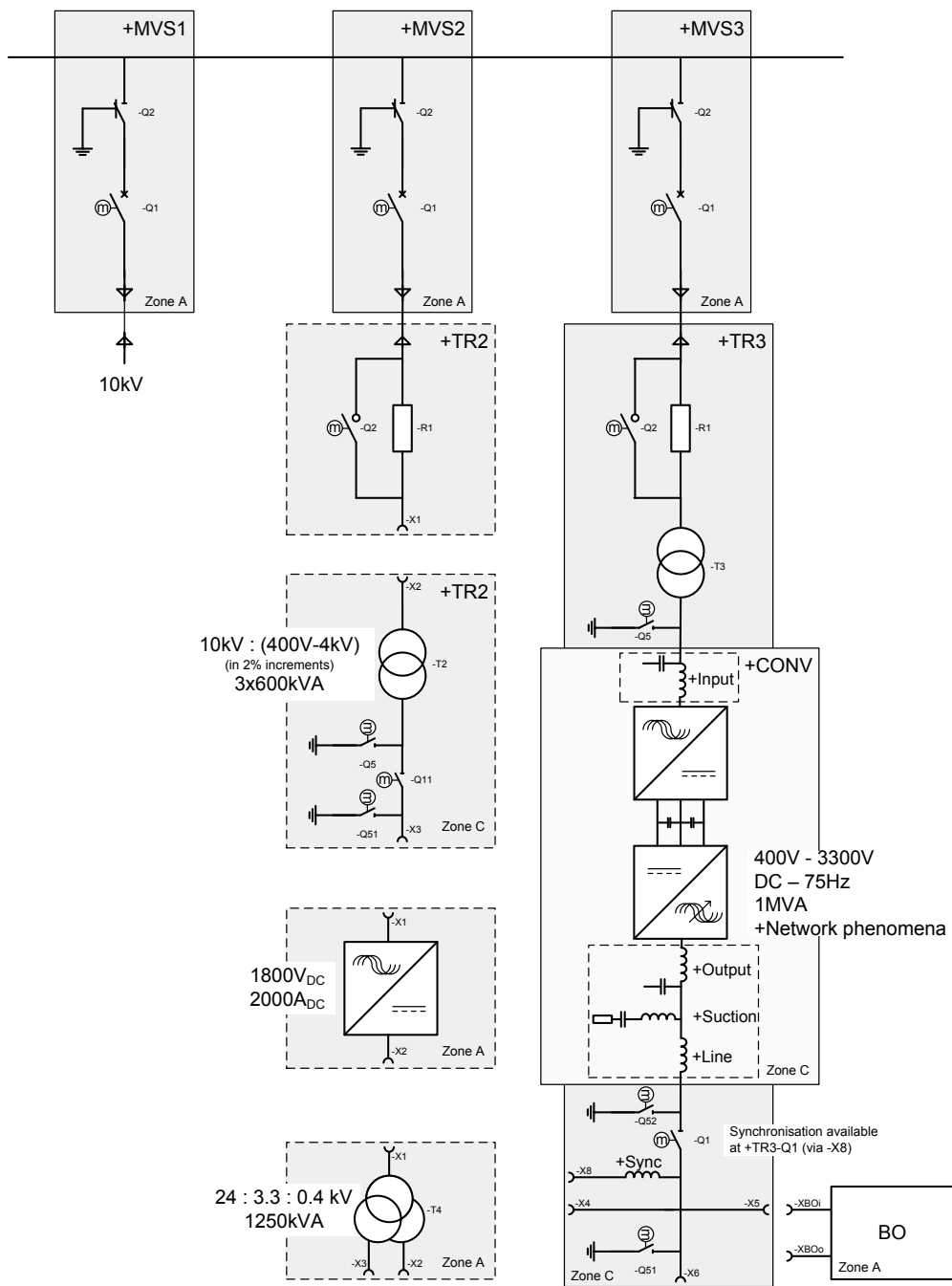


#### Balanced and unbalanced voltage dips



#### Short interruptions





Single-line diagram of facility

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