# Three Phase Transmission Line Testing System

## Nvis 8023

Three Phase Transmission Line Testing System is a key learning concept for Electrical Engineers. Transmission Line Training System is exclusively designed to deliver the learning aspects of the electrical transmission line. Digital display is provided for easy measurement of voltage, current, power, power factor, etc. These parameters help students to learn the characteristics of transmission line and calculations of the ABCD, H, Z parameters, voltage regulation of three phase transmission line, fault analysis and protection, Ferranti effect, etc.

Transmission Line Training System is an ideal platform to enhance education, training, skills & development. It enables demonstrate and test the characteristics and management of high voltage distribution networks, with small scale components.

### Scope of Learning

- Determination of transmission line efficiency and regulation for a given load.
- Analysis of Ferranti effect on transmission lines.
- Determination of ABCD parameters of a given transmission line network.
- Fault analysis of a given transmission line network.
- Sequence impedances of transmission line.
- Analysis of uncompensated lines and their voltage profiles.
- Shunt compensation of transmission lines (using shunt capacitor banks)
- Study of numerical over current O/C & earth fault E/F protection system.
- Study of numerical under voltage U/V & over voltage O/V protection system.

### Transmission line training system consists of:

1) Sending end panel.
2) Transmission line model panel.
3) Receiving end panel.
4) Protection section panel.
5) VAR compensation panel (shunt compensation).
6) Load bank panel.

### Technical Specifications

- Number of Pi Sections: 10 nos.
- Operating Voltage: 3-Phase, 415V, 50Hz Supply.
- Current Rating: 10 Amp.
- Line simulation through air cored inductor (DCC).
- Each Pi-section for every 40Km.
- 3-phase auto transformer 20Amp - 1no.

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### 1. Sending end panel:

- B.T.I 30 terminals for connections
- Digital Voltmeter - 3nos.
- Digital Ammeter - 3nos.
- Multi-function meter - 1no.
- 3 over current earth fault relay - 1no Numerical type.
- Under/Over voltage relay - 1no. Numerical type.
- Under/Over frequency relay - 1no. Numerical type.
- (Frequency Relay operation shown only when input supply is taken from alternator)
- 3 phase power transformer (7KVA) at sending end - 1.
- Push to ON & OFF switches
- Contactor with over current relay, PLA relay to trip the circuit.
- 3 phase preventers for identifying 3 phase failure faults.

### 2. Transmission line model panel:

- B.T.I 30 terminals for connections
- No. of Pi sections: 10 nos.
- Each Pi-section for every 40Km
- Line Inductance (R): 0.2 ohm for each Pi-section (40Km)
- Line Inductance (L): 0.64 mH for each Pi-section (40Km)
- Line Capacitance (C): 2 micro farad for each Pi-section (40Km)
  Note: it is a simulation model (220KV, 400Km - 10 Pi-sections)
- Inductors 10 nos for each phase (3 lines) - 30nos.
- Capacitors 10 nos for each phase (3 lines) - 30nos.
- Digital Voltmeter - 1 no.
- Digital Ammeter - 1 no.

### 3. Receiving end panel:

- B.T.I 30 terminals for connections
- Digital Voltmeter - 3nos.
- Digital Ammeter - 3nos.
- Multi-Function meter - 1no.
- 3 phase preventers for identifying 3 phase failure faults.

**4. Protection section panel:**

- B.T.I 30 terminals for connections
- 3 over Current earth fault relay - 1no Numerical type.
- Under/Over Voltage relay - 1no. Numerical type.
- Under/over frequency relay - 1no. Numerical type.
  (frequency relay operation shown only when Input supply is taken from alternator)
- Push to ON & OFF switches
- Contactor with over current relay
- PLA relay for trip the circuit.
- Neon indications for trip status of relay
- 3 phase preventers for identifying 3 phase failure faults.

**5. VAR compensation panel:**

- Shunt compensation method using capacitor banks (STAR connected)
- Total steps: 8 steps to improve the power factor and Voltage stability.
- Total capacity: 10 Amps each phase.

**6. Load bank panel:**

- B.T.I 30 terminals for connection
- 3 phase induction motor ½ HP - 1no.
- Load bank – 10 Amp
- Type of loads:
  1. R - load
  2. RL- load
  3. RC- load



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