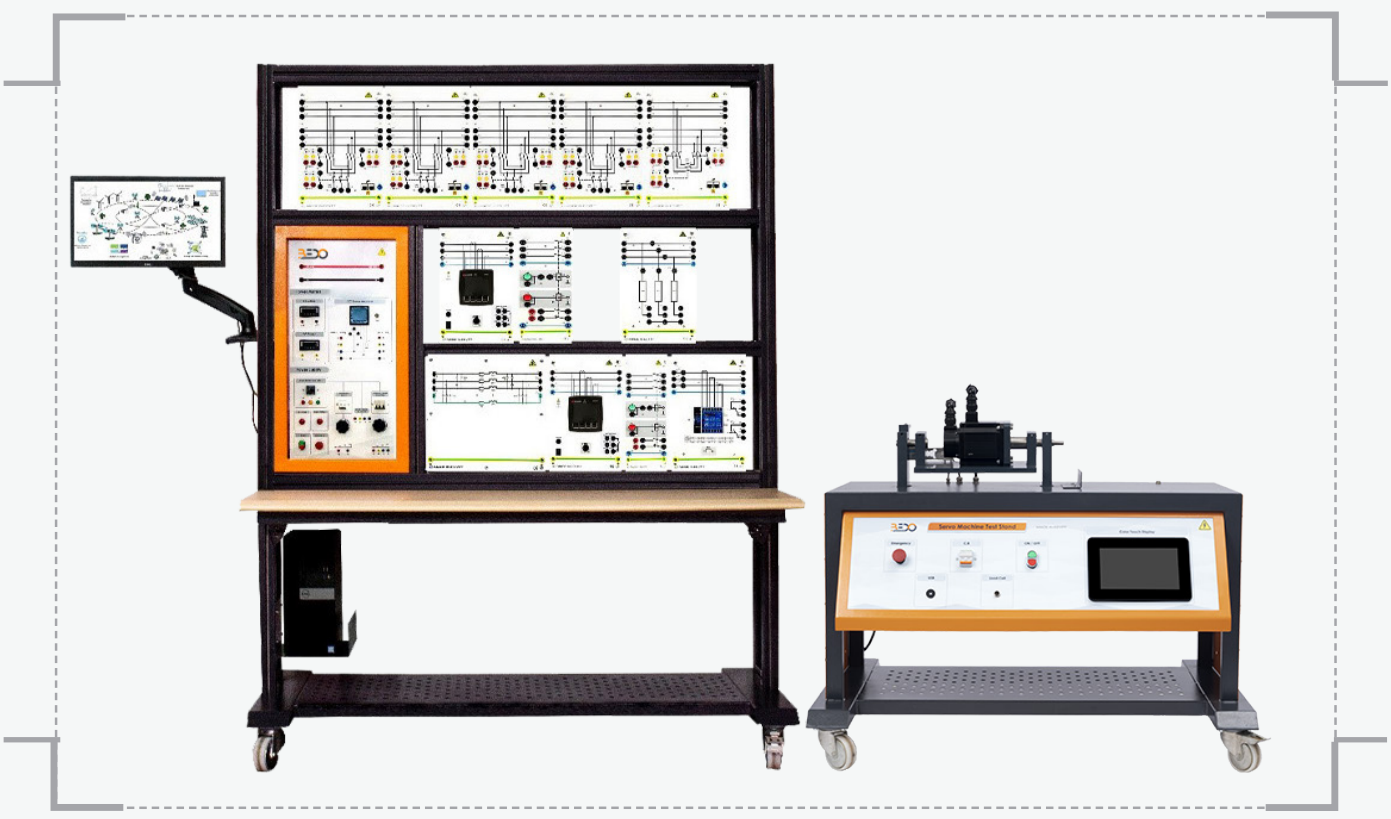
SG103

Dynamic Load Management

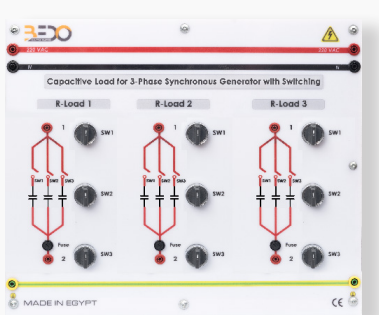
Overview

A three-phase asynchronous motor serves here as a dynamic load. The active and reactive power consumption, the power factor of the motor is load dependent and not constant. Consequently, fixed reactive power compensation can only optimally compensate one definite operating point.



Specifications

Three phase capacitive load module Code: (SG103.1)

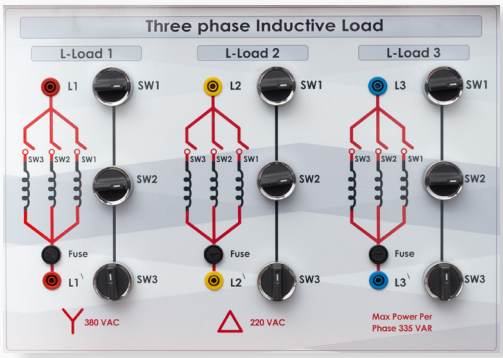


- Three phase capacitive load module can be used as a reactive power compensator. The amount of reactive power compensated per phase is incremented in discrete steps.
- Technical Data:
  - » Rated operating voltage: 400VAC, 50/60Hz
  - » Number of steps per phase: 7
  - » Inductance range:1.5uF to 6.8uF
  - » Minimum loading capability per phase: 75 VAR

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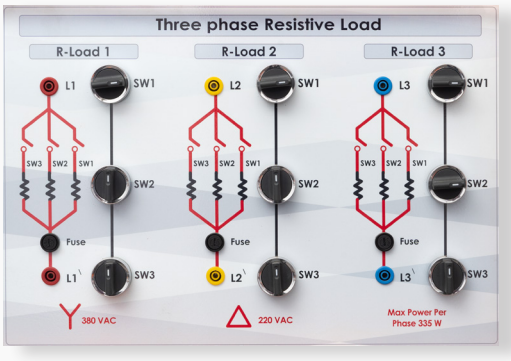
» Maximum loading capability per phase: 335 VAR

Three phase inductive load module
Code: (SG103.02)



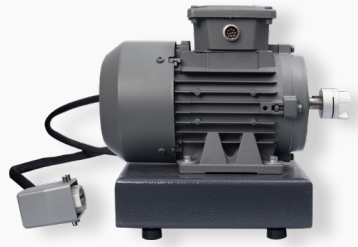
- Three phase inductive load module can be used as a static reactive power load. The inductive power demand per phase is incremented in discrete steps. Rated operating voltage: 400VAC, 50/60 Hz
- Technical Data:
  - » Number of steps per phase: 7
  - » Inductance range:1.5H to 7H
  - » Minimum loading capability per phase: 73 VAR
  - » Maximum loading capability per phase: 335 VAR

Three phase resistive load module
Code: (SG103.03)



- Three phase resistive load module can be used as a static active power load. The resistive power demand per phase is incremented in discrete steps.
- Technical Data:
  - » Rated operating voltage: 400 VAC, 50/60Hz
  - » Number of steps per phase: 7
  - » Minimum loading capability per phase: 72 Watt
  - » Maximum loading capability per phase: 340 Watt
  - » Protected with thermal switches at 165 degree Celsius

Dynamic load module
Code: (SG103.04)



- Dynamic load module comprises a three-phase squirrel cage motor which can be used as an electrical load. The active power demanded from the grid is variable depending on the mechanical load applied to the motor shaft. This machine can be used for injecting active power to the grid by rotating the motor shaft beyond the rated synchronous speed. The reactive power can be supplied from grid only or from compensation capacitors.
- Technical Data:
  - » Nominal shaft speed: 1400 rpm
  - » Rated output power: 300W
  - » Rated input voltage: 220 VAC / 380 VAC (Delta-Star)
  - » Rated operating frequency: 50Hz

Star-Delta power switch
Code:(SG103.05)

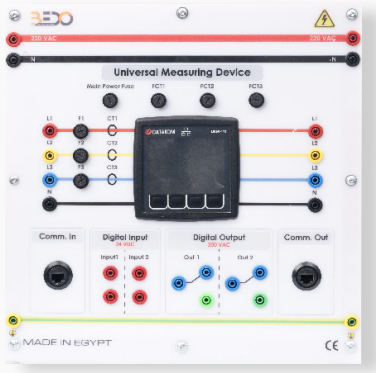


- Star-Delta power switch module is a manual switch which alters the stator winding connections of three phase squirrel cage motor. Due to the high inrush current caused by motor starting for large motors, the motor can be started at low voltage to limit the starting current. When the motor slip reaches a certain limit, the motor can be supplied with its rated voltage. The stator windings of

the motor are fed to this module and which are then internally connected either Delta or in Star configuration depending on the status of an external switch set by the user.

- Technical Data:
  - » Rated input voltage: 400VAC, 50Hz
  - » Rated input current: 10A

Three phase network analyzer
Code: (SG103.06)



- The unit contains a power quality meter that measures the electrical parameters of three phase electricity, as well as able to draw variables versus time and draw vector diagrams. In addition, the unit can be interfaced with a SCADA system through ethernet to monitor all readings.
- Technical Data:
  - » Universal supply input (both AC & DC): 220 V AC, DC
  - » Measurement inputs voltage:
  - » 10 - 300 V AC,
  - » Measuring current: 0.2 – 5.50 A AC
  - » Measuring frequency: DC – 500Hz
  - » True RMS measurements 3.5" TFT LCD, 320x240 pixels
  - » Internal battery backed-up real time clock
  - » Harmonic distortion display (63 harmonics) Oscilloscope
  - » Waveform display
  - » Phasor diagram display
  - » Max demand display
  - » 2x configurable relay outputs
  - » 2x opto-isolated, configurable digital inputs
  - » Dual active-reactive power counters
  - » Both mains & generator energy metering
  - » Voltage transformer ratio for MV applications
  - » Supported wiring topologies:
    - 3 phases, 4 wires (star)
    - 3 phases, 3 wires, 3 CTs
    - 3 phases, 3 wires, 2 CTs (L1-L2)
    - 3 phases, 3 wires, 2 CTs (L1-L3)
    - 3 phases, 4 wires, delta
    - 2 phases, 3 wires, L1-L2
    - 1 phase, 2 wires (L-N)
  - » Measurements:
    - Phase to phase voltages: U12-U23-U31- Uavg
    - Phase to neutral voltages: V1-V2-V3- Vavg
    - Phase currents: I1-I2-I3-Ineutral-Iavg
    - Active power: P1-P2-P3-Psum
    - Reactive power: Q1-Q2-Q3-Qsum
    - Apparent power: S1-S2-S3-Ssum
    - Power factor (cos-phi): cos1-cos2-cos3- ∑cos
    - Active power counters: pc1-pc2
    - Reactive power counters: qc1-qc2
    - Phase to neutral voltages vector angles
    - Phase to phase voltages vector angles

Servo test stand
Code: (SG103.07)



- The servo-machine test bench is a complete testing system for examining electrical machines and drives. It consists of a digital controller, a brake and the software.
- HMI screen technical Data:
  - » Color touch display
  - » Four-quadrant operation monitor

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- » Virtual button for selecting one of the following modes:
- » Speed control mode with developed torque limit
- » Torque control mode with overspeed limit
- » Display preset torque reference and speed reference
- » Monitoring actual torque and speed applied on motor shaft
- » Calculate motor efficiency based on measured electrical input and mechanical horse power
- » Isolated USB interface

- Servo motor technical data:
  - » Maximum shaft speed: 3000 RPM
  - » Rated operating voltage: 3-phase input, 220V AC (L-L)
  - » Maximum operating current: 12.75A
  - » Motor Power Capacity: 2 kW
  - » Feedback incremental encoder resolution: 3000 pulses/ revolution
  - » Braking system for stalling shaft

Experiments

- Recording the characteristic values of the squirrel cage asynchronous machine
- Single Compensation of an Asynchronous Machine
- Squirrel-cage Motor as Asynchronous Generator
- Determining the Reactive Power Demand
- Calculating the required value of capacitor bank for reactive power compensation
- Reactive Power Compensation

Scope of Delivery

- Smart Grid Power Distribution & Energy Management (SG103)
- Hard copy user manual

Required for Operation

- Machine & Drive Lab Supply Unit (ML100)

Options

- Digital content (BI01)

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