



ELECTRICAL POWER ENGINEERING



Energy Utilization

Energy consumers, in particular the large ones like the industrial plants, are now obliged, either by contract or for reasons of economy, to provide reactive power compensation for their equipment.

If the consumer refuses to set up a compensating facility, the power supply companies install reactive power meters and the reactive power which is consumed must be paid for.

However, even modern and efficient compensating facilities often create difficulties in generating harmonic currents and generate harmonic-related problems in conjunction with other components of the network.

In fact, the compensating capacitors and the feeding transformers or the supply network form a parallel oscillating circuit that can result in resonances which may cause damage to all the adjoining network installations.

The subjects related to reactive power compensation and reactive power controllers are addressed in this laboratory.

Finally, the laboratory deals also with the problem of the measurement of active and reactive power. Induction meters are usually employed for measuring electrical energy in ac current and in three-phase networks.

These meters firstly provide the basis for calculating the cost of the power to be debited to the consumer and secondly are an important mean for the power supply companies to identify the need for an extension or a modification of the supply network.

These topics are analyzed from the theoretical point of view and also by means of practical examples.

Power factor improvement - GTU104.1

- demonstration of the manual operation on the control of reactive power at various inductive loads
- demonstration of the automatic operation on the control of reactive power at various inductive loads and at different sensitivities

Energy meters and tariffs - GTU104.2

- demonstration of the measurement of active energy consumption
- demonstration of the measurement of reactive energy consumption
- determination of the meters constant
- demonstration of the measurement of the maximum demand
- demonstration of load cut-off operation

		GTU104.1	GTU104.2
Resistive load	DL 1017R		1
Inductive load	DL 1017L		1
Three-phase squirrel cage motor	DL 1021	1	
Magnetic powder brake	DL 1019P	1	
Brake control unit	DL 1054TT	1	
Load cell	DL 2006E	1	
Optical transducer	DL 2031M	1	
Universal base	DL 1013A	1	
Three-phase power supply	DL 2108TAL-SW	1	1
Power circuit breaker	DL 2108T02		1
Reactive power controller	DL 2108T19	1	
Switchable capacitor battery	DL 2108T20	1	
Moving coil ammeter (1.25-2.5A)	DL 2109T2A5	2	1
Moving iron voltmeter (125-250-500V)	DL 2109T3PV		1
Power meter	DL 2109T26	1	2
Power factor meter	DL 2109T27	1	
Three-phase power meter	DL 2109T29		1
Three-phase Active and Reactive Energy Meter	DL 2109T34		1
Electronic stopclock	DL CRON		1
Connecting leads	DL 1155GTU	1	1
Accessories: Table	DL 1001-1	1	1
Accessories: Frame	DL 2100-3M	2	2
Accessories: Storage cabinet	DL 2100TA	1	1
For Countries with 3-phase mains different from 380V :			
Three-phase transformer	DL 2100ATT	1	1