ELCO SYSTEMS® MV POWER FACTOR CORRECTION BANKS (PFBM)

The planning and design requirements of the **Distribution Code for Peninsular Malaysia, Sabah, F.T. and Labuan Amendments 2017_V5 Clause 7.7.3.9.1** specifies that, **'The Minimum Power Factor at the Connection Point shall be maintained in between values- [depending on voltage levels] of 85% lagging to 90% leading.'** This can be done with the injection of capacitive reactive power into the network using a simple equipment called a capacitor bank or a hybrid capacitor and reactor module.

More often these capacitor bank systems are made up of multiple step configuration and can be switch using AIS, GIS or Vacuum breakers or vacuum contactors. This all depends on the requirements of the industrial plant or the network operator. Furthermore, it is vital that in circumstances that this capacitor bank is applied into the PCC, THD limits are observed fully, as required in **Technical Guidelines for Interconnection of Distributed Generator to Distribution System 2018 subsection 4.1.9 and The Distribution Code section 5.4.6.6. states** 'The Maximum Total Levels of Voltage Distortion at any connection point on the Distribution System from all sources under planned outage and unplanned outage conditions..', shall not exceed:-

Abstract from 4.1.9 THDv limits

Nominal Voltage [kV]	THDv Limits
33	< 6.5%
11	< 6.5%
<0.400	< 5.0%

Breath of Experience in Power Quality

ELCO Systems® - PFBM, accumulated industrial experience with various applications of power factor correction in Large Scale Solar[LSS], Industrial Applications, Bio-Gas, MCC compensation as well as Hydro-Renewable Power Generators and has adapted its experience in making power factor correction banks. Having learnt from successful partnerships with Alstom Nokian, GE & Ergun in this specialized field, **ELCO Systems®** developed the **PFBM** both to rigorous IEC standards and demanding Ingress Protection with applications indoor as well as outdoor.

TECHNICAL SPECIFICATION

Electrical Standards	IEC62271-1, IEC60007-6, IEC62271-1, IEC60007-6, IEC62271-100
Rated Voltage	<40.5kV
Rated Frequency	50Hz/60Hz
Rated Current	630A~2500A
Rated Powers	<30,000kvar
Rated Short Circuit Current	<40kA/1s
Insulation Voltage	3.6kVac~36kVac/1min
Lighting Impulse Voltage	40kV~175kV
Panel Sheet Steel	EG/GI/SS
Ingress Protection	IP23/54/65[indoor/outdoor]
Form of Separation	2
Control Algorithm	PFC
Data capture & Analysis	SD[internal] or RJ45 via Cat5 cables[external]
Remote Power Quality, Fault & Transient Analyzer	Optional –SCADA*
Capacitor Bank Modules	Customizable/step
PFC Module Rated Voltage	3.3/6.6/11/22/33kV
Reactor Peak Saturation Current	145%
Insulation Class	Class F/H
Winding Temperature Rise, 40°C	Class F/<115oC
Winding Losses	<1.5%
Winding Material	Aluminium
Internal Connection	Single/tri-phase Y
*Options are available for full Power Quality Systems , Fault and Transient Analysis including Harmonics and Supraharmonics up to 128th Order or higher	SCADA Option*

ELCO SYSTEMS® MV POWER FACTOR CORRECTION BANKS (PFBM)

33kV Outdoor Bank with Detuned Reactors IP54 RAL7035 Painted Panel

11kv IP42 Indoor Bank with Detuned Reactors

6.6/11kV Outdoor Bank with Inrush Reactors Galvanized Steel