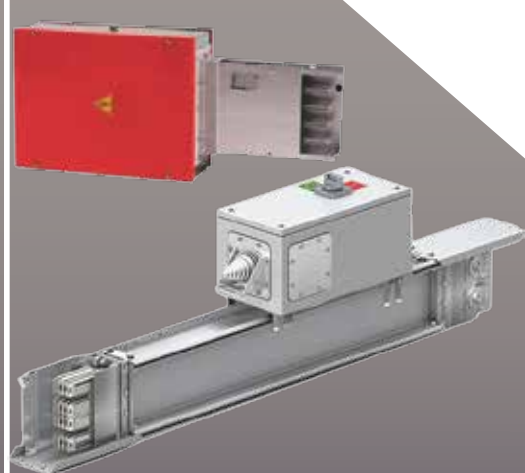


## SWITCHGEAR & ASSOCIATED EQUIPMENT



MV and LV Panels.  
Cable Tray & Trunking Systems.  
Meter & Metering solutions.  
Power Factor Improvement Plant.  
Solar Pump & Solar Street Light.  
Solar Rooftop & Net-metering.  
Harmonic Analysis & Solutions.  
Bus Bar Trunking (BBT).

**Protec Electronics Limited** has long history in improving and updating the engineering know-how in switchgear technology. The switchgear division of the company is itself a complete unit with knowledge, experience, skills as well as machineries, machining facilities and test equipment.

Our fabrication unit is one of the equipped plants with power shearing machine, modern hydraulic and power operated Bus bar bending, Punching & Cutting machines, hydraulic and power operated sheet bending machines, sim welding, mig welding, tig welding with all kind of tooling facilities.

POWERtrac Switchgear Division is a very successful unit because of well equipped Bend Section, Tank Section, Paint Section, Modern Machining Section, In house Die & Mould Section, Automatic Machine for Busbar making, shaping and General Punch.

## General Standards Applicable to POWERtrac Products

Degree of Protection : DIN 40050/IEC-Publ.529 /IP40, IP54

Dimension : DIN 41s488 Sheet 2

Routine Test of Breakers : IEC 60056

Routine Test of Panel along with the Breakers : IEC 60298

Indoor / Outdoor Compartment: IEC 60298

Clearance of Air and skate module Distance : DIN VDE 0660, part 500 (TTA)/IEC- Publ.439-1, DIN VDE 0160, part 100.

Dry Power of Capacitor (Insulating Gas filled) : IEC 70

## Certification

ISO 9001 : 2008, BUET, BSTI, CUET, KUET, CPRI , ISO 14001, and ISO 26000 (under implementation)

## Painting

All the panels of HT switch gear, LT switch gear, PFI plant and Distribution board are powder coated by high quality imported paints from BERGER. Our 9-tank chemical process for curing is one of the best units in the country.

## Product Specialty

- ▶ Panel is equipped with Class, branded equipment
- ▶ High reliability and performance
- ▶ Suitable and Compact Design
- ▶ Easy and smart Operation
- ▶ Easy Cable wiring system
- ▶ Good out look , Safe and Dust Proof Casing.
- ▶ Standard Clearance (Which is ver y important for non TTA Panel)
- Air Ventilation
- Extra cooling system (Exhaust Fan)
- Standard Internal Structure
- Panel is painted by powder coating
- Compliant panels as per ACCORD & ALLIANCE.
- Type Tested panel under the License of BMC and YAMUNA

## Products from Switchgear Division

- ▶ HT Switchgear
- ▶ LT Switchgear
- ▶ PFI Plant
- ▶ Control Panel
- ▶ ATS
- ▶ HT Metering Panel
- ▶ LT Metering Panel
- ▶ PROTEC Box



## HT SWITCHGEAR

The VCB, LBS, SF6 circuit breaker and the Switchboards are of optimized design for Bangladeshi supply condition and ambient. The Breaker and Switchboard is of compact design, sturdy construction and simple in operation with a proven motorized spring operated mechanism. This design ensures ease of operation, low cost maintenance and higher longevity. We are also using very high quality Ring Main Unit (RMU) suitable for highly populated city like Dhaka for multiple feeders in incoming and out going.

HT Panels are equipped with Built-in mechanical interlocks for safety and the breaker compartment is so designed, that it ensures the inter changeability with identical circuit breakers. The panels are fully compartmentalized and extendable on both sides, consisting of bus bar chamber with adequate air clearances, PT compartment, CT and cable termination compartment, Breaker Compartment and Metering Chamber.



33 kV Indoor VCB in Type Tested Assembled (TTA) Panel



33 kV Outdoor VCB



LT Switchgear with TOP-OUT

### Types of HT Switchgear

#### FIXED TYPE

VCB/LBS/SF6 breaker is suitable for use in cubicle switchgear units. Such breaker is fixed to a switchgear or floor by bolting its base with it. If requested, fixed mounting SF6 Breaker/VCB/LBS's may be provided with wheels which will make its movement easier.

Connections between the breaker and incoming as well as outgoing bus bars are made directly and kept fixed.

The terminal arrangement of a fixed mounting breaker is such that connections to various positions are made in the following manner:

<b>Main connection</b>	<b>- by bolts</b>
<b>Control connection</b>	<b>- by screws</b>
<b>Earth connection</b>	<b>- by screws</b>

#### 12 kV 630 LOAD BREAK SWITCH / RING MAIN UNIT TECHNICAL PARTICULARS-

Rated Voltage kV	12
Power frequency withstand voltage Hz	50
1 min each and between poles kV	28
Across the isolating distance kV	32
Impulse Withstand Voltage	
Earth and between poles kV	75
Across the isolating distance kV	85
Rated current A	630
Breaking capacity for active circuits cost. 0.7A	630
For ring circuits A	630
For no-load transformers A	16
For no-loadline and cables A	10
Short time current (3sec) kA	25
Peak withstand current kA	63
Making Capacity kA	630
Overall Dimension mm	L 750X W 950X H 2050



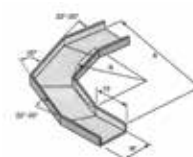
Cable Tray



Ladder Tray



Ladder Type Cable Tray



90° Horizontal Bend



Horizontal Tee



Ladder Tray



Elbow 90°



90° Vertical Inside Bend



90° Vertical Outside Bend

## DRAW-OUT TYPE

VCB/SF6 Breaker is mounted on a cradle. The complete unit may be provided with a shutter of front cover. This SF6 Breaker /VCB along with the cradle can be easily installed inside a switchgear compartment without any need of mechanical adjustment.

**The interlock of the draw out mechanism type and its special features are as follows:**

- The circuit breaker cannot be placed in or withdrawn from its cradle when it is in closed position.
- The circuit breaker cannot be operated at the time of inserting in the cradle.

SPECIFICATION OF H.T. SWITCHGEAR	VCB	LBS	VCB	SF6	SF6
	PNN 10	PNN 20	PNN 21	PNN 30	PNN 31
Rated Voltage	12 kV	12 kV	33 kV	12 kV	33 kV
Rated Current	630 A-1250 A	630 A	630 A-1250 A	630 A	1250 A
Short Time Current Rating for 3 sec.	20 KA	18.1 KA	20 KA	20 KA	20 KA
Basic Impulse Level	75 kV	75 kV	75 kV	75 kV	75 kV
Making Current	50 KA	50 KA	50 KA	50 KA	50 KA

## Equipment Used

SL	Equipment	Brand, Model & Country
01.	LBS	F&G / Hausmann / ABB / SIEMENS, Germany
02.	VCB	ABB, Italy / Hausmann / Schnieder, France / Siemens ,Germany
03.	CT, PT	Siemens, Germany / Hausmann, Germany
04.	IDMT Relay	Omron, Japan / LNT, India / ENTEC, Turkey
05.	Ammeter, Voltmeter	Rishabh / Meco, India

**Note :** We always give client's priority about their brand choice.

## Basic Functions

- ▶ High Voltage (11KV) Controlling or Switching
- ▶ Protection (Over Load, Short circuit, Earth Fault or any Electrical Fault)
- ▶ Status reading (Current, Voltage, Frequency)

## NOTES:

**POWERtrac** engineers are closely related with local and international professional bodies like IEB, IEEE & ASME and are accordingly updating their technologies with the latest developments. Internal and external training is part of our practices. We are improving our design everyday. All data will subject to final confirmation.

## Testing for HT Switchgear

### Test before assembly

### Test after assembly

1. VCB/LBS/SF6/MOCB	1. Wiring Test
2. CT Test	2. Overall Performance Test
3. PT Test	3. Continuity Test
4. IDMT Relay Test	4. Insulation Resistance Test
5. Ammeter Test	5. Final Check up
6. Volt meter Test	6. Relay Test
7. Insulator Test	7. Contact Resistance Test

**Note :** All testing are examined in factory testing lab which is directly monitored by our quality controller and R&D officer.

## LT SWITCHGEAR

### Basic Functions

- ▶ Controlling or Switching
- ▶ Protection (Over Load, Short circuit, or any Electrical Fault)
- ▶ Status reading (current, voltage, frequency)
- ▶ Power distribution



### Cable or BBT Connection

Conductor entry from Top Bottom, Top and Bottom, Single side or both sides.

### Main Features of our LT Switchgear Panel

#### Construction

#### Metal frame

: MS Sheet.

#### Paint

: Powder coating (Siemens Gray) at high temperature

#### Bus bar

: Required rating hard drawn copper bus bar (KA)

#### Cable

: Eastern NYY Cable, 600/1000 Volts (Black) or equivalent



**Specification** : Plain annealed copperconductor, PVC Insulated and PVC Sheathed Single cable. Suitable use for indoors, outdoors, underground and water for continuous permissible service voltage of 720/1200V

## Electrical Specification

Type	Standard
Rated operating Voltage (V)	up to 660V, 50-Hz
Rated Current(A)	up to 7200A

## Electrical Specification

	Single	Double
Main bus bar	up to 176 KA	up to 220 KA
Dropper bars	up to 85 KA	up to 120 KA
Degree of protection to DIN 40050/IEC-publ.529 IP40, IP54		

## Rated current of components:

Components	Standard
Circuit breakers	up to 6300 A
DOL Contactor starters	up to 400 A
Contactor type reversers	up to 400 A
Contactor type star-delta starters	up to 700 A



## Electrical Specification

Dimension	Unit (mm)
Height	2200
Width	1000/900/900/900/900/900=5500
Depth	1000

## Testing For LT Switchgear:

Test Before Assembly	Test After Assembly
1. Circuit breaker	1. Wiring test
2. CT Test	2. Performance test
3. Ammeter performance	3. Continuity test
4. Volt meter performance	4. Insulation Resistance test
5. Insulator	5. Final Check up

# POWER FACTOR IMPROVEMENT (PFI) PLANT



- ▶ Modular Design
- ▶ Compact Arrangement
- ▶ Low Loss Capacitors
- ▶ High Reliability
- ▶ Factory Wired
- ▶ Extendible

Power Factor Correction is the switching on of the Capacitors in parallel with Inductive Loads in the Networks

## Mode of Operation

The control module of PFI plant contains a microprocessor based solid state relay, which continuously measures the reactive power in the incoming feeder. In the event of the actual value different from the preset value, the relay activates contractors to switch capacitors in and out in steps as required. The capacitor rating is chosen so that, on average, the required power is attained.

## Standard Regulations

DIN VDE 0660, Part 500 (TTA) and IEC - Pubi. 439-1  
DIN VDE 0106, Part 100



## Correction/Improvement Principle

**POWERtrac** Power Factor Improvement plants are manufactured in modular design and consist of-

- \* Relay Module
- \* Capacitor Modules

The regulation module consists of-  
solid state reactive power relay with digital indication of power factor circuit breaker for control cable protection

The Capacitor Modules consists of-

- \* air break Contactors to switch capacitors
- \* dry power Capacitors (insulating gas filled) conforming to IEC 70, IEC 831 (latest specification) EN 60831-1 with
- \* metalized Plastic foil
- \* low loss (0.2W / KVAR) polypropylene dielectrics that allows self healing
- \* environment friendly insole device
- \* harmonic load tolerance
- \* high reliability ting gas filled
- \* built-in over pressure relief
- \* high overload capacity (15 X rated current)
- \* high capacitance stability
- \* long life (Approx 100,000 hrs.)
- \* high switching durability
- \* high temperature class
- \* touch proof terminals

### Main feature of our Panel

#### Construction

Metal frame : MS Sheet.  
Paint : Powder coating (siemens gray) at high temperature  
Bus bar : Required rating hard drawn copper  
bus bar (KA) Cable : NYY Cable, 600/1 000Volts (Black) Specification : Plain annealed copper conductor, PVC Insulated and PVC Sheathed Single cable. Suitable use for indoors, outdoors, underground and water for continuous permissible service voltage of 720/1200V.

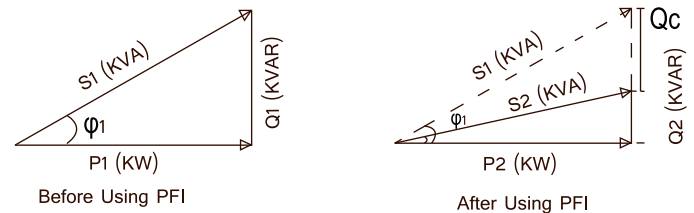
### Other Technical Characteristic

1. High reliability and performance
2. Suitable Design
3. Easy and smart operation
4. Easy cable wiring system
5. Good out looking, Safe and Dust Proof Cashing.
6. Standard Clearance
7. Air Ventilation
8. Extra Cooling system (Exit Fan)
9. Standard Internal Structure

**POWERtrac** fabrication system is now equipped with compliance requirements for export oriented industries.

01. We are making panels that are real dust & virmin proof with CABLE GLAND, DUST FILTER, VENTILATION FAN etc.

02. We also offering LIGHTNING, EARTHING SYSTEMS, LOAD BALANCING, HARMONIC ANALYSIS & SOLUTIONS etc.



### Reactive Power?

We know that reactive loads such as inductors and capacitors dissipate zero power, yet the fact that they drop voltage and draw current gives the deceptive impression that they actually do dissipate power. This "phantom power" is called reactive power, and it is measured in a unit called Volt-Amps-Reactive (VAR), rather than watts.

### Calculation Formula of PFI

Apparent Power  $S = \sqrt{P^2 + Q^2}$  KVA

Reactive Power  $Q = P \left( \sqrt{\frac{1}{\cos^2 \phi_1}} - 1 - \sqrt{\frac{1}{\cos^2 \phi_2}} - 1 \right)$

Q - Reactive Power of the Required correction Capacitor (KVAR)

P - Actual Power of the Load to be Corrected (KW)

$\cos \phi_1$  = Actual Power Factor

$\cos \phi_2$  = Target Power Factor (~ 0.95)

Note: We always give client's priority about their brand choice

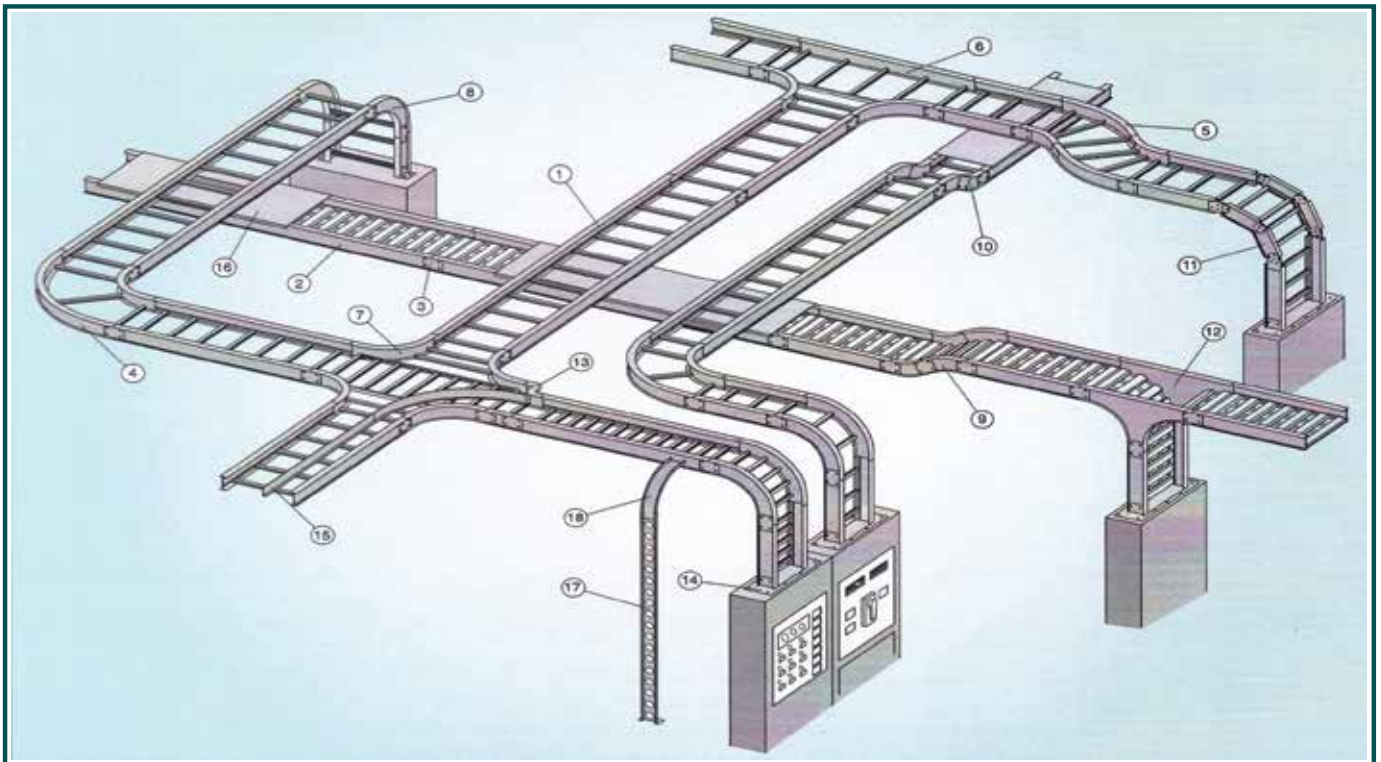
### BUILDING BLOCK COMPENSATION / FILTER MODULE



### Product Introduction:

The emergence of module product is the great change for reactive power compensation and filter devices, as well as the mainstream of the future market and a service concept promotion. LSY module unit is developed and produced by POWERtrac. All the accessories selection is through by precise calculation, design, manufacture and testing. Comparing with the traditional cabinet, modular structure cabinet has some advantages, such as easy to extend, convenient to install, better compact design, concise and nice layout. With the help of the safety guarantee modular structure, it can extend electric equipment lifespan. Protection measures are complete, such as overvoltage, under voltage, overheating, harmonic and other protections; product quality liability is clear only by POWERtrac, avoiding the phenomenon of different accessory manufactures making excuses by each other. Select POWERtrac module product, enjoying the pre-sale, in sale and after-sale service. This is a unified and comprehensive service platform for consultants, complete device factories and end users.

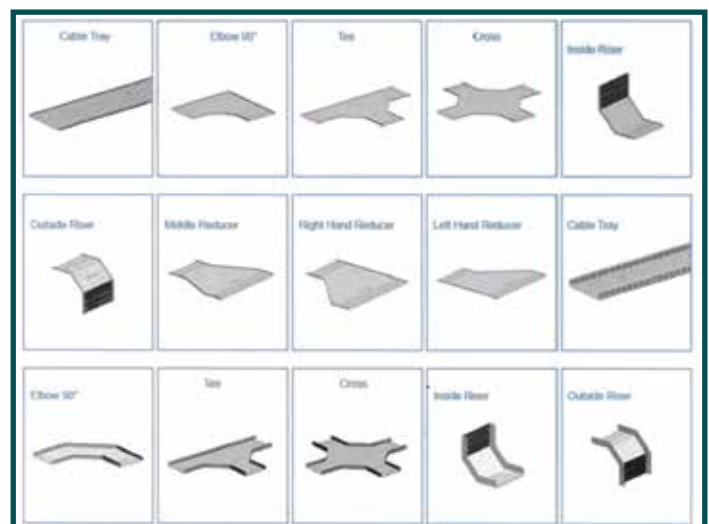
## CABLE TRAY & CABLE MANAGEMENT SYSTEMS



- |  |   |
|--|---|
| 1. Ladder Type Cable Tray                                | 10. Vertical Bend Segment (VBS)                           |
| 2. Ventilated Trough Type Cable Tray                     | 11. Vertical Tree Down, Ventilated Trough Type Cable Tray |
| 3. Straight Splice Plate                                 | 12. Left Hand Reducer, Ladder Type Cable Tray             |
| 4. 45° & 90° Horizontal Bend, Ladder Type Cable Tray     | 13. Left Hand Reducer, Ladder type Cable Tray             |
| 5. Horizontal Tee, Ladder Type Cable Tray                | 14. Frame Type Box Connector                              |
| 6. Horizontal Cross, Ladder Type Cable Tray              | 15. Barrier Strip Straight Section                        |
| 7. 90° Vertical Outside Bend, Ladder Type Cable Tray     | 16. Solid Flanged Tray Cover                              |
| 8. 45° Vertical Outside Bend, Ventilated Type Cable Tray | 17. Ventilated Channel Straight Section                   |
| 9. 30° Vertical Inside Bend, Ladder Type Cable Tray      | 18. Channel Cable Tray, 90° Vertical Outside Bend         |

### Advantages:

1. From light to heavy load
  2. Good lateral stability
  3. No nasty sharp edges
  4. Open profiles provide better corrosion protection
  5. Reduced weight without losing strength
- The average length is 3000mm, which can be adjusted by you.



Note: We can also supply fiber-glass cable tray by out-sourcing.



## CABLE TRAY & CABLE MANAGEMENT SYSTEMS

1. PROTEC perforated cable tray can be used widely.
2. Function: corrosion resistance / simple usage / durability
3. Simple Installation
4. High mechanical strength
5. The average length is 3000 mm, which can be adjusted by you.

Raw material:

G----Galvanized steel.

H----Hot Dip Galvanized

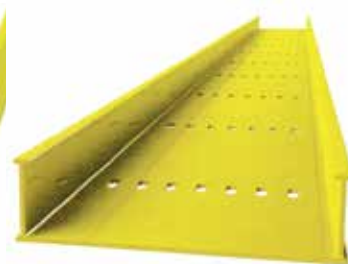
S4----Stainless steel SS304

S6----Stainless steel SS316

A---- Aluminum



Ladder Type Cable Tray



Perforated Cable Tray

### PROTEC-TR-P

Ordering Code	W(mm)	H(mm)	L(mm)
TR-P-50G	50	15	3000
TR-P-100G	100	15	3000
TR-P-150G	150	15	3000
TR-P-200 G	200	15	3000
TR-P-250 G	250	15	3000
TR-P-300 G	300	15	3000
TR-P-450 G	450	15	3000
TR-P-600 G	600	15	3000

### PROTEC-TR-PL

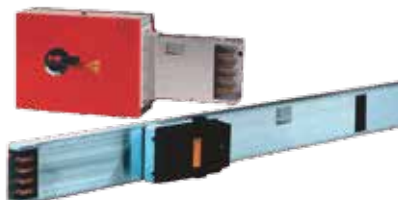
Ordering Goods	W(mm)	H(mm)	L(mm)
TR-PL-150 G	150	50	3000
TR-PL-300 G	300	50	3000
TR-PL-450 G	450	50	3000
TR-PL-600 G	600	50	3000

## BUSBAR TRUNKING SYSTEM



### 30 A-6300 A, 1000 Vol

POWERtrac is also providing comprehensive solution for horizontal and vertical application of BBT suitable for industry and high rise buildings. Starting from design, drawing and best economized BOQ is prepared by skilled Engineers. POWERtrac is supplying Bus Way Systems from world class company Graziadio, Italy. These are of single installation, advanced technology, long lasting, safe and compact and environment friendly.





## DISTRIBUTION BOARDS (DB)



**PORTECbox**  
from **POWERtrac**

01. IP20 for Single Door & IP42 for double door
02. Powder coated and aesthetically good
03. Easy installation and ensure safety
04. SPN : 4/6/8/12/16/24 way
05. TPN: 4/6/8/12 WAY
06. Surface and flush mounting
07. Metal Sheet body and sheet door
08. Metal Sheet body and plastic door



**POWERframe**  
from **INDOASIAN**

01. IP20 for Single Door & IP42 for double door
02. Separate packing, Circuit Identification Label
03. Detachable gland plate
04. Tin plated copper busbar
05. Dust & Vermin proof
06. Surface and flush mounting
07. SPN : 4/6/8/12/16/24 way
08. TPN: 4/6/8/12 WAY
09. Metal Sheet body and door

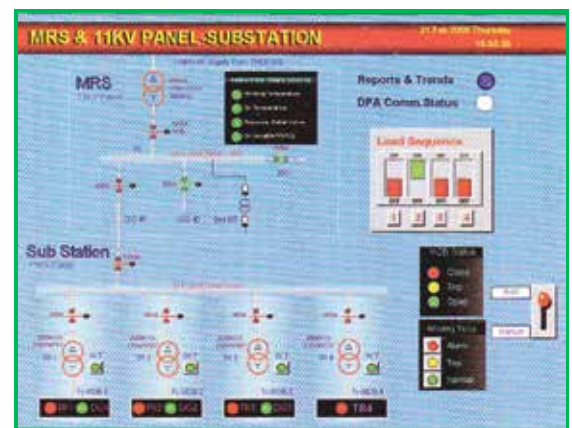
## SUBSTATION AUTOMATION SYSTEM

### FEATURES

- Status Monitoring and Control of HV Switchgear at MRS and Substation.
- Status Monitoring and Control of LV Switchgear at Substation
- Monitoring of Transformers at Substation.
- Status Monitoring and Control of Air circuit breakers and MCCBs.
- Logging of Data from Protection Relays and Control PLCs.
- Performance Monitoring of Power Factor Correction Panels.

### GRAPHICAL PRESENTATION

- Substation single line diagram in mimic form
- Feeders, Breakers and Switches ON/OFF status are displayed in mimic form
- When the cursor is pointed to a particular component data pertaining to the component is displayed.
- Buttons are provided for remote operation of ACB / MCCBs.



## REPORTS

- Voltage, Current, Power, Demand and PF Reports of various feeders
- Energy Report (Hourly, Shift wise, Daily and Monthly)
- Minimum and Maximum Values Recording
- Number of Operations ON/OFF of each breaker
- Recording of Breaker Tripping date and time (Reason to be entered manually)
- Customized Log Sheets and Maintenance Data Recording

## SOLAR SOLUTIONS

POWERtrac is systems integrator & installer of solar solutions, manufacturer of key solar components, and one-stop service provider for all kind of solar solutions

### Our Solutions

#### Grid Connected System:

System connected to grid to supply power directly to the load without battery backup.

#### Capacity Range:

3 KWp - 500 KWp

#### Stand alone System:

Grid Independent Solar PV System with battery back up.



Street Light:



### Total Generation Estimation

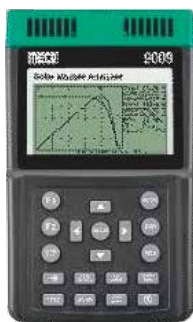
- Site evaluation
- Design for Solar farms
- HV/LV Panels
- Structures (Fixed and Tracking)
- Engineering of Solar farms to international standards
- Third party vetting of design by top international agencies
- Selection of components like modules, inverters, DC cables, switchgears, etc.
- Off-Grid / Rooftop solutions
- O & M

### Features

- Clean energy power generating & utility power system.
- PIR sensor optimizes power consumption and enhances battery backup
- High performance Lithium-ion battery with no maintenance
- Stand alone system not required any other source (grid power) to charge fully solarized.
- Intelligent microcontroller design more efficient and fully automatic control.
- Convenient installation and no need of cables.

## SOLAR ANALYZERS

### SOLAR MODULE ANALYZER



### SOLAR POWER METER



### SOLAR SYSTEM ANALYZER



#### Features

- I-V Curve Test for Solar Panel/Module/Cell
- Max. Solar Panel/Module/Cell Power (Pmax) search by Auto-Scan : 60V. 12A (500W Capability)
- Max. Voltage (Vmaxp) at Pmax
- Max. Current (Imaxp) at Pmax
- Voltage at Open Circuit (Vopen)
- Current at Short Circuit (Ishort)
- Efficiency (%) Calculation of Solar Panel
- Communicate with PC via USB Cable

#### Features

- Solar Power Measurement with Orientation and Tilt Angle
- Solar Power Measurement Range: 2000 W/m<sup>2</sup> or 634 BTU I (ft-h)
- Auto Change for Measuring Range
- Instantaneous, Average. Min / Max Values. Data Hold
- 20 Points Memory, Low Battery Indicator
- Backlight LCD & 4 Digits Triple Display

#### Features

- I-V Curve Test for Solar System
- Power search by Auto-Scan : 1000V. 12A (12KW Capability)
- Measure Voc, Isc, Vpm, Ipm of Solar Panel
- Efficiency (%) Calculation of Solar System
- Temperature Measurement of Solar Panels
- Irradiance Measurement of Sun Light
- Conversion of I-V Curve under OPC to Data under Standard Test Condition (STC) based upon IEC Standard
- Optical USB Cable for PC Communication

## ESSENTIAL ELECTRICAL PRODUCTS

**PROTEC POWER SYSTEMS** offers all kinds of electrical accessories through country wide dealer Network as we as own retail outlets.



AC Drive



Soft Starters



Digital Multi Meter



Solar Analyzer



Battery Tester



Multi Function Meter



Capacitor



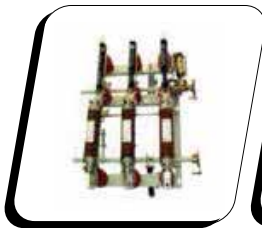
Solar



ACB



VCB



LBS



MCB



MCCB



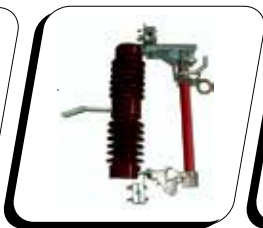
1 Phase Meter



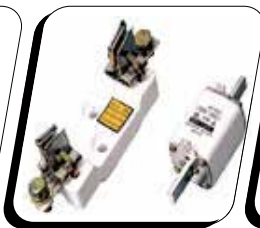
3 Phase Meter



Lightning Arrestor



Drop Out Fuse



HRC Fuse



Digital Clamp Meter



Digital Clamp meters & Accessories



Magnetic Contactor



DB (Distribution Board)



Power Inverter



Mili Ohm Meter



Switch Sockets

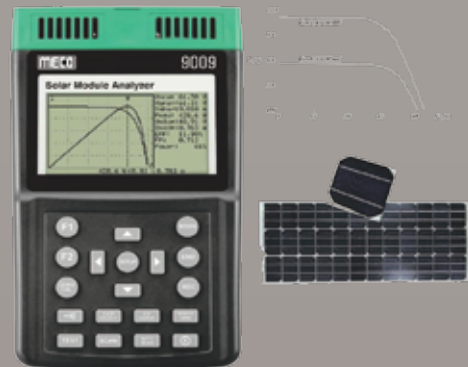


ENJOY PRE-SALE, IN SALE AND AFTER SALE SERVICE

OUR ON-LINE SHOP IS  
knoprotec.com

MAIN SHOW ROOM IS AT PANTHOPATH

LIVE Lively EVERYDAY WITH POWERtrac



#### OUR STRATEGIC PARTNERS:



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Fax # +88 02 9126772  
Email # info@powertrac-bd.com  
Web # www.powertrac-bd.com

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+88 01975655567

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Satmatha, Bogra, Bangladesh.  
Cell # +88 01974655029

### Factory :

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Cell # +88 01975655552

[www.powertrac-bd.com](http://www.powertrac-bd.com)