POWER DIVISION

- EPC Contracting
- Power Transformers
- Distribution Transformers
- Energy Meters
- MV & LV Switchgears
- Control & Protection Equipment

Pak Elektron Ltd.

www.pel.com.pk

Vision & Mission

Vision

To Excel in providing engineering goods & services through continuous improvement

Mission

- To provide quality products & services to the complete satisfaction of our customers and maximize returns for all stakeholders through optimal use of resources
- To focus on personal development of our Human Resources to meet future challenges
- To promote good governance, corporate values and a safe working environment with a strong sense of social responsibility

Commitment based success

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Introduction

PEL was founded in 1956 and has since been serving the Power utilities, industries, individual customers, housing and commercial projects by providing reliable, customized and cost effective solutions. Backed by the innovative genius of Saigol Group, PEL is now technology forerunner and market leader in providing new products and services to meet ever changing and technology intensive needs of its customers. Our EPC contracting division delivers custom designed and built HV and EHV grid stations, electrification of housing projects, industrial parks and optimum solutions for power utilization to all kinds of industries and commercial customers. We aim to maintain this competitive edge and at the same time keep striving to improve it further by continuous R&D, creating new knowledge and adapting to global developments in technology and product design. Ever increasing local market share, growing export orders, numerous successful power projects and greater than ever base of satisfied customers are evidence to these aspirations.

Works of PEL are spread at two facilities in Lahore, the historical city and cultural hub of Pakistan. The two facilities cover an area of 1,033,200 Sq ft and 614,252 Sq ft respectively. Both are equipped with latest technology, state of the art testing facilities and environment friendly production process. At the heart of our operations is our human resource. PEL invests heavily on professional development, skill improvement and well being of its human resource. Our employees are our most valuable asset and we keep them very dear.

Quality Management System

High standards of quality and customer care are hallmark of PEL corporate philosophy. We have a comprehensive Quality Management System that is consistent with ISO 9001-2000. PEL is ISO 9001-2000 certified company. We have been the recipient of the Award for Best Brand in Pakistan and now aim at achieving similar recognition in global market.

The Quality Management System is integrated throughout the enterprise and all departments and areas follow well documented and tested quality control procedures. Complete process quality control is practiced and quality checks are performed at each stage of the manufacturing process and thus making end product reliable and in conformance with needs of the customers and international standards.

SYSTEM CERTIFICATION
ISO 9001:2000
SGS

KEMA
Certified

Corporate Social Responsibilities

In addition to business considerations, PEL is conscious of its responsibility towards the community it operates in and the society at large. Based on numerous initiatives in this area, PEL received Environment Excellence Award for 2008 sponsored by National Forum for Environment and Health (NFEH), United Nations Environment Program (UNEP), Ministry of Environment, Government of Pakistan and the Federation of Pakistan Chambers of Commerce & Industry (FPCCI). The award has become a benchmark for the health, safety and environment standards to be followed in industry and business. The award acknowledges socially responsible and environment friendly organisation, who consciously adopt policies to promote sustainable development and strive to attain balance between profitability and responsibility.

Annual Environment Excellence Award Ceremony

EPC Contracting

With restructuring of power sector in Pakistan and increase in economic, commercial and industrial activity, more and more power utilities and other customers demanded high value packaged solutions for their transmission system and enterprise electrification requirements. To meet this demand PEL established an Engineering Procurement and Construction division. PEL EPC Division consists of human resource with high academic qualifications and experience of local as well as global market. The EPC division delivers custom designed and built solutions in following areas.

- 132kV and 220kV grid stations for power utility companies.
- 132kV and 11kV substations for industrial and commercial customers.
- Integration of private captive power generation plants into utility network for sale of their surplus power to utility companies.
- Electrification of housing projects and industrial parks.

Our services include:

- Engineering
- Project Management
- Project Execution
- Turnkey or customized projects
- Technical support and solution

Our turnkey power supply systems give you unique value added services. In addition to employing its own resources, PEL keeps a well managed supply chain of internationally renowned manufacturers and service providers to complete the project scope. As such, the end product is a reliable, high quality and price-wise most optimum solution.

Projects Completed

1. 132/11kV AIS Satellite Town substation, Rawalpindi Pakistan
2. 132/11kV GIS DHA substation Islamabad-Pakistan
3. 132/11kV AIS Ghuinke substation, Sialkot-Pakistan
4. 132/11kV AIS Kamra substation, Attock-Pakistan
5. External Electrification of Askari Villas Phase-II, Lahore-Pakistan
6. Kohinoor City Faisalabad (Electrification & Networking)
7. Supply, supervision of installation and testing of MV and LV equipment for external electrification of DHA Phase-6 Lahore-Pakistan
8. External Electrification of National University of Science & Technology (NUST) Islamabad-Pakistan
9. External electrification of Iqbal Avenue housing society Lahore-Pakistan

Projects under construction

1. 132/11kV GIS Sheranwala Gate substation, Lahore-Pakistan
2. 220kV Dadu grid station Extension Dadu – Pakistan
3. 132/11kV FIEDMC AIS substation Faisalabad-Pakistan
4. Electrification of 4 small towns (Mangla Dam raising project)
5. Underground external electrification of DHA Ph-8 Lahore-Pakistan
6. External electrification of House Building Finance Corporation Lahore-Pakistan
7. External electrification of DHA Homes Complex Lahore-Pakistan

PEL Unit 2

Transformers

The phenomenal growth and increasing complexity of power systems have put up tremendous responsibilities on the transformer industry to supply reliable transformers. In this competitive era, PEL transformers division, keeping up with the technology boost, is supplying its customers with quality products and services thus asserting its position as vanguard.

We at PEL understand the fact that transformer as a system consists of several components and it is absolutely essential to ensure integrity of all these components individually and as a system. Each phase of the manufacturing process is given equal importance. From material selection to the commissioning of the manufactured Transformer unit, all levels are carefully observed and optimized.

PEL believes in full customer support thus extensive after sales services (installation, commissioning and site testing) are offered. In addition asset management services such as fault diagnosis, life assessment, re-engineering, repair, rehabilitation, refurbishment and capacity enhancement are contracted.

Power Transformers

Extensive experience and success in manufacturing distribution transformers led to the establishment of power transformer division in 2005. Since its birth the division has produced transformers of ratings 31/40MVA, 20/26MVA, and 10/13MVA for ratings up to 132 KV. In order to provide its customers the best of technology and products of international competence, PEL has combined its technical expertise with GANZ, a renowned and experienced Hungarian transformer manufacturer.

PEL is also exporting Power Transformer to International customers for their special requirements and specifications.

PEL power transformers are equipped with best transformer accessories like OLTC from MR (Germany), High Voltage Bushing from PASSONI & VILLA (Italy), Buchholz Relay from EMB (Germany), insulation material from WEIDMANN (Switzerland), silicon steel from THYSSEN (Germany), and cooling fans from SCHORMANN (Germany).

Material of the windings is usually 99.99% pure electrolytic copper. Multiple conductors as well as CTC are used in winding.

The magnetic cores are manufactured from cold rolled grain oriented (CRGO) steel sheets. A robust clamping structure, jointing technique and cutting and mitering of laminations ensure low no load losses. The steel sheets in the core limbs and in the yokes are clamped together by glass-epoxy bands. Tank is constructed with boiler steel plates welded together and a cover plate bolted on top. Strength is ensured by stiffeners. Earthing terminals are attached to both sides of tank. Measuring Instruments are installed on cover plate. Surface protection is done by the process of sand blasting and by applying weather resistant paint.

Tap changers are in accordance with IEC standards. Usually motorized On-Load tap changers are provided for voltage regulation. Off- Load tap changers can be installed on request. The diverter switch is placed in hermetically sealed oil filled chamber in order to avoid contamination of oil in main tank.

Distribution Transformers

PEL made distribution transformers' range includes oil immersed core type transformers, Dry type (VP impregnated) transformers and autotransformers. These transformers are tailor made for various ratings. IEC or national standards are followed. We offer distribution transformers voltage up to 33 kV and ratings up to 30 MVA.

PEL offers transformer tanks with corrugated walls, detachable radiators and tubular arrangement. The corrugated tanks have a better cooling efficiency, since the fins are expandable. Tanks are hermetically sealed where possible.

In order to meet sophisticated requirements of customers PEL has also started manufacturing transformers with foil winding. Foil winding efficiently uses space which results in size reduction. It has better heat dissipation and also increases potential to withstand short circuit current.

PEL transformers are available for various applications:

- Distribution Transformers (Pole /Pad Mounted)
- Auto Transformers
- Furnace Transformers
- Welding Transformers
- Chokes for furnace Transformers
- Any other special requirement

For oil immersed transformers PEL has technical assistance agreement with Pauwels (Belgium), whereas dry type transformers are manufactured under technical collaboration of DUPONT (Singapore).

Our transformers have been tested and certified for impulse voltage and short circuit tests from:

- Short Circuit Laboratory, KEMA (Holland)
- HVSC Lab, RAWAT (Pakistan)

Besides meeting local demand, PEL is exporting transformers to Saudi Arabia, Greece, Kuwait, Kazakhstan, Bangladesh & Yemen. Several repeat orders from these countries are proof of quality products and acceptance in international market.

Energy Meters

PEL Energy meters are specifically designed to address the needs of consumers for low and high voltage networks with load conditions up to 120 A directly. These meters are manufactured on state-of-art assembly lines and are calibrated on automatic calibrating equipment. Meter box is manufactured from ultraviolet stabilized poly carbonate which makes it weather resistant and provides greater security.

PEL started manufacturing energy meters under license from ABB – USA. The Quality of PEL meters has been certified by KEMA laboratories, Holland and conforms to re leva lent IEC standard 521. SGS Yarsley, UK, has certified PEL Energy Meter plant for ISO 9002. Our meters also confirms to relevant WAPDA and KESC Standards.

Single Phase Static Energy Meters

Single phase static energy meter used for measurement of active (kWh) energy for Domestic & commercial consumers. The meter complies with the IEC 62052-11, IEC 62053-21.

Some of the main features include:

- Capable of recording on the basis of current with assumed voltage and power factor in the absence of voltage on its terminals.
- Display of energy (kWh) during power outages.
- High performance Lithium battery with long storage life for display of data during power outages.
- Window based application software for configuration of parameters.
- Anti-tamper indication on meter LCD

Ratings

Rated Voltage (Un) V	230,240
Basic Current (Ib) A	10
Maximum Current (Imax)A	30,40

Single Phase Electromechanical Energy Meters

Single Phase Electromechanical Energy Meters

Single phase active energy meter is used by house hold and small commercial customers. The meter complies with the IEC 62052-11 and IEC 62053-11.

The design and construction features include:

- Calibration on digital benches
- Long term stability and high reliability
- Low self consumption
- High impulse level protection
- Overload and Temperature compensation

Ratings

Rated Voltage (Un) V	230,240
Basic Current (Ib) A	10
Maximum Current (Imax)A	30,40

Poly Phase Static Energy Meters

Three phase multi-rate TOU/TOD meters are used for measurement of active (kWh) & reactive (kvarh) energy in the three phase four wire and three phase three wire network for residential , commercial & industrial consumers.

- Special TOU (Time of Use) feature allows programming of multiple tariffs and multiple seasons.
- High precision voltage and current measurement.
- Meter offers features like event recording, anti tempering and displays the data during power outages.
- Meter displays error and caution codes to indicate any abnormal condition.

Ratings

Description	Whole Current Meter	LT & HT Type Meter
Rated Voltage (Un) V	3x230/400	3x230/400
		3x63.5/110
Basic Current (Ib) A	10 ,20,30	1,5
Maximum Current (Imax) A	60,80,100	6,10

Poly Phase Electromechanical Energy Meters

Poly-Phase Energy Meters are specifically designed to address the needs of consumers for low voltage networks with load conditions up to 120 A. The modern double disc technology together with carefully monitored manufacturing processes put these amongst the best meters available in electromechanical technology.

- These meters have excellent response to temperature variations, positioning (Oblique suspension), voltage, frequency, external magnetic fields, short circuit and load unbalance.

- Accuracy is maintained through out the entire operational life ranging from 5% nominal current up to high value of 600% overload.

Ratings

Description	Whole Current Meter	LT & HT Type Meter
Description	Direct Connected	C.T Operated
Rated Voltage (Un) V	3x230/400	3x230/400
3x63.5/110		
Basic Current (Ib) A	10 ,15,20	1.5,5
Maximum Current (Imax)A	60,90,120	6,10


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Pak Elektron Ltd.

MV & LV Switchgear

MV & LV Switchgear are produced for indoor and outdoor installations. The switchgear and their key components comply with the requirements of all significant international standards and regulations i.e. IEC, BSS or VDE. SGS UK has certified PEL Design & Manufacturing of Switchgears for ISO 9001:2000.

PEL's switchboards are steel sheet fabricated, totally enclosed, floor mounting type and vermin and dust proof. These are supplied with factory fitted components, copper bus bars, internal wiring and terminal blocks etc.

The cubical housing and doors are fabricated from 2-3 mm thick sheet steel, to form a robust and self- supporting structure. Painting procedure includes thorough cleaning, pretreatment and final finishing in standard RAL colors.

Special attention is paid to requirements of safety and protection during maintenance and installation. We keep on improving layout designs so as to optimize space and make it safer to operate and maintain and carry out future expansions easily.

MV Metal Clad Switchgear Cubicles

Features

- Air insulated, single bus bar system
- Protection to IP4X (enhanced degrees as option)
- Maintenance- free VCB/ SF6 breakers
- Interchangeability of similar rated breakers

Safety

- Metal clad and compartmentalized design to IEC 62271-200
- Easily and safely accessible service and test positions
- Prevention of operator errors with interlocks
- Type tested as per IEC 62271-200 and WAPDA Standards

Flexibility

Adaptable to various types of switching devices (vacuum contractor/ disconnect switches etc.)

Technical Data

Rated Voltage	up to 17.5 KV
Rated Current	630 A – 2500A
Rated Short time Current	up to – 40 KA
Protection Class	IP4X
CB type	Vacuum / SF6

MV Pad Mounted Transformers

(Compact Sub-Stations)

Main components of this unit are medium voltage switchgear arranged to function as a Ring Main Unit (2- TP disconnect switches and 1-fused T-off), transformer, LV Switchgear and control gear, corresponding interconnections and auxiliary equipment. Enclosure is made of 2-3 mm sheet steel. These sub-stations are manufactured for outdoor use, suitable for mounting on a concrete pad. Door interlocks and other safety features are inherent part of the design. These compact sub-stations are used in distribution centers and industrial installations having underground cabling

Rated Voltage	up to 17.5 KV
Transformer Rating	up to 1000KVA
Protection Class	IP54

Other MV Equipment

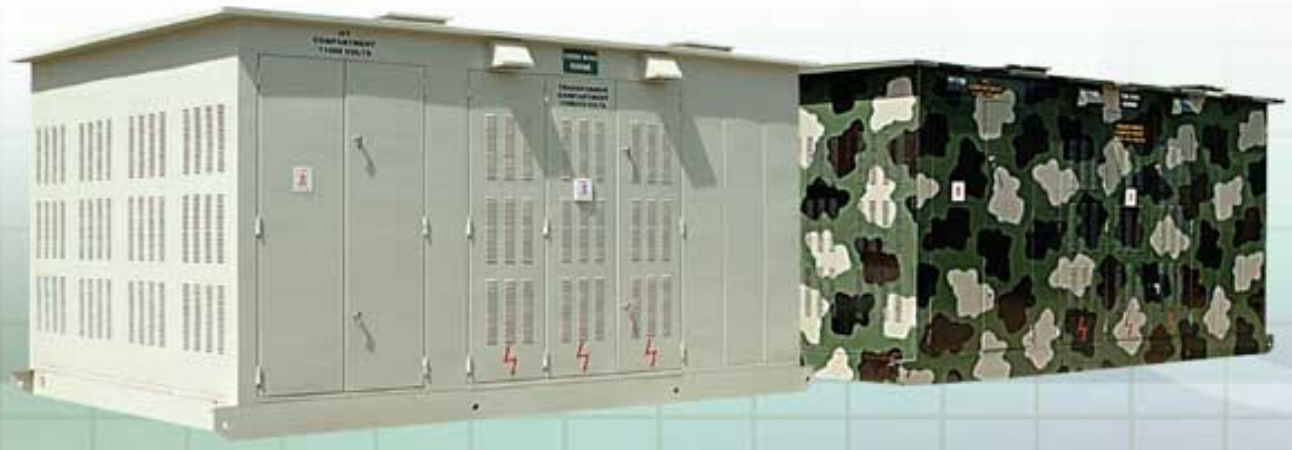
- Shunt Capacitor Banks (Switched and un-Switched)
- 11 kV Bulk Metering Panels
- Other specialized Switchgear and control Centers in fixed and draw-out designs, according to customer requirements

Kiosk Type Compact Sub-Stations

(Walk in type)

These Sub-Stations have almost the same functional features as Pad Mounted Transformers (Compact Sub-Stations), except that these are walk-in-type and the operation of the devices can be performed while standing inside the station. MV switching device is selected in accordance with customer's specification. It could be a compact RMU or isolating switches, as required. The kiosk is self-contained sub-station having its own source of auxiliary supply (battery & battery charger) and is supplied complete with protection and metering devices, internal lights, etc., ready for external cable connections and commissioning.

Rated Voltage	up to 17.5 KV
Transformer Rating	up to 1600KVA
Protection Class	IP54



LV Distribution Panel

Indoor and outdoor type sheet steel fabricated , free standing , front or rear accessibility, cable or bus duct connections are supplied complete with air circuit breakers, molded case circuit breakers, load break switches, necessary meters, relays and instruments etc. Breakers of either fixed or draw-out versions can be supplied as required. Switchgears Panels are extensible on both sides:

Rated Voltage	up to 690/750 V
Rated Current up to	6000A
Rated S.C. Current	up to 100KA

Special design and manufacturing is available on request.

LV Power Factor Improvement Plant

These panels are used for power factor correction and manufactured as indoor units with fixed or automatic capacitor switching. The panel is designed to align and couple with the LT distribution panels. If requested, reactors can be used to eliminate unwanted harmonics. The PFI panel is of self-ventilating design.

The components used are highly robust and reliable.

- Microprocessor based control unit with built in PF meter, user-friendly programmable parameters (sequence, C/K, switching delay etc.).
- Adequately rated air break contractors backed by HRC fuses.
- Self-healing, internally protected, dry type capacitors, having very low losses and rated for 1.1x Un and 1.3 x In.

Motor Control Centre (MCC)

These panels are manufactured at various power levels as indoor units. Draw-out units vary in size and power level. Interlocks, covers, etc. are provided to prevent incorrect or unsafe operation and to prevent access to live parts. The bus bars are at the top of the assembly and are contained within segregated chambers. The riser bars also run within a segregated chamber, down each rack section to feed individual compartment through an automatic shutter system. These units are used at command and control system. Repair and maintenance can be carried out on a withdraw-able unit without interrupting power to the other units.

Bus Tie Duct

We at PEL develop and fabricate made-to measure low voltage Bus Duct systems is air insulated, non-segregated construction. Our Bus Ducts are designed to meet the required voltage, ampere and fault level ratings.

Copper bus bars are sized in accordance with the specified ratings to operate within IEC temperature rise limits. Joints are tin-plated. Provision for the bus expansion is furnished as required by the configuration and length of each system. Flexible connections are provided at the transformer end to absorb the vibrations. Enclosure up to 3000A rating is made of sheet steel while above 3000A (up to 6000A), non-magnetic aluminum enclosures are used to eliminated hysteresis losses. The enclosure is of self-ventilating design.

Other LV Equipment

PEL's other LV Switchgear products include the following

- Relay and control panels for 132/ 220KV Grid Stations
- AC/DC Auxiliary Services Panels
- Piano type control desks
- Distribution boards for power as well as for lighting
- Feeder Pillars
- Any other special requirement

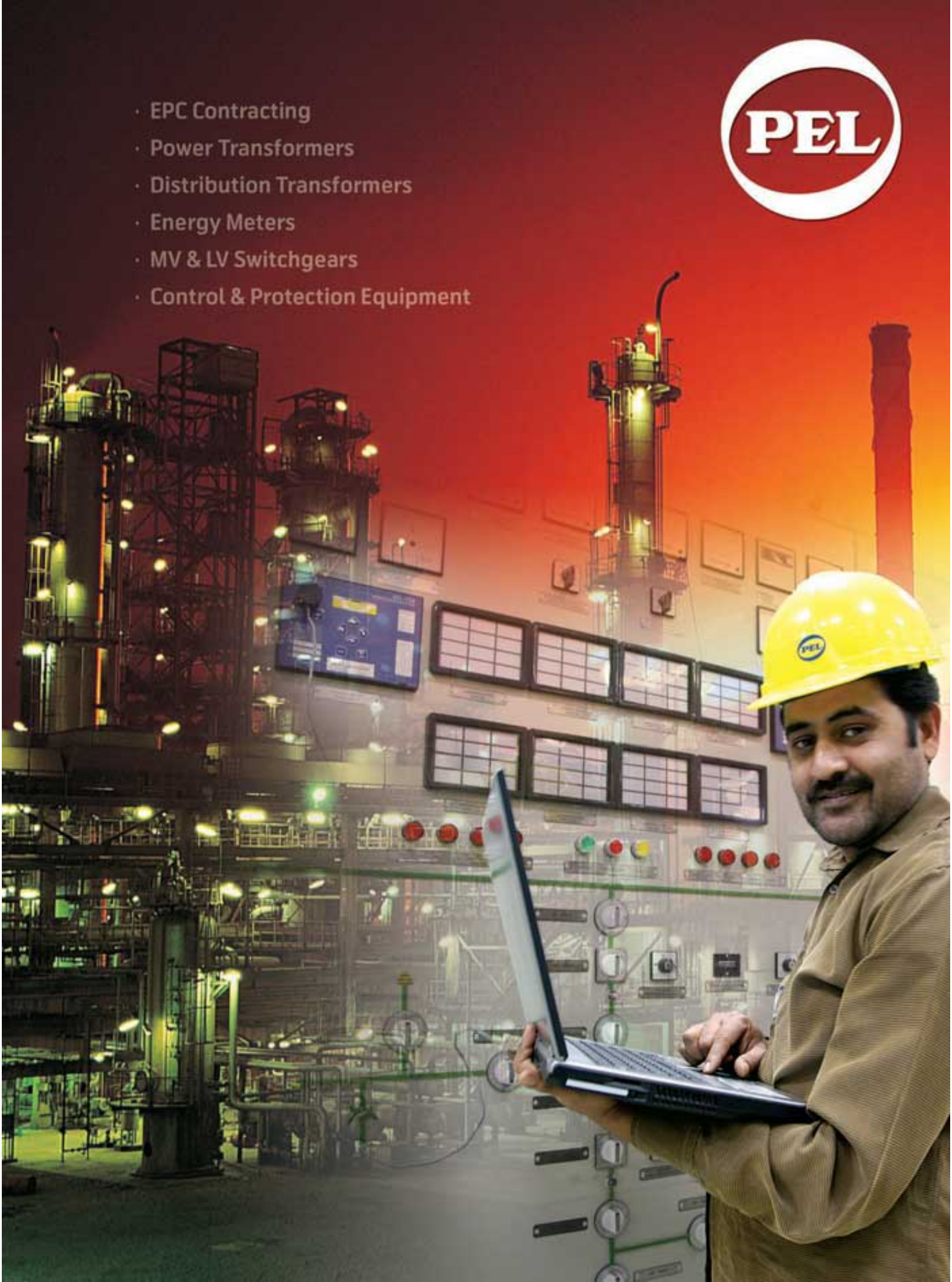
Instrument Transformer

An Instrument Transformer's role is to provide accurate input to protection, control and metering systems including revenue metering. This requirement places stringent demands on the accuracy and reliability of the instrument transformers to ensure the correct functioning of protection systems and precise measurements for metering purposes.

We offer a diverse range of our indigenously developed CTs and PTs for various indoor applications of metering and protection. These transformers are type tested for impulse voltage, short circuit and temperature rise tests as per IEC-60044.

Low voltage CTs are available both in PVC cover or MS cover, in round or square shape, while CTs for MV application up to 12 KV ratings are casted in epoxy resin. These CTs conform to IEC- 60044.

Single Pole epoxy resin PTs for protection and metering conforming to IEC standards are produced for system voltage up to 12 KV.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