Smart IOT Solution
For

Measure - Monitor - Manage - Mitigate

MULTIFUNCTION POWER METER

P 384.0 kVA
330.9 kW
194.4 kVAr
0862 ΣPF
Imp 4323.7 kWh

VOLT/AMP POWER ENERGY PQ

icdipl.net MFM9500

Specialised in
Power Quality Solution

ICD
Innovative Solution for Power Measurement

www.icdipl.net

POWER MATRIX

ACCURATE AND RELIABLE MONITORING OF ELECTRICAL POWER SYSTEMS

Introduction

The ICD Power Matrix APM7500 is an advanced compact powerful power monitoring device suitable for applications where basic to advanced metering functions, Power quality monitoring, Data logging, IO controls and Flexible communication options are required. The ICD Power Matrix can be used as a stand alone meter or as part of an energy management system, Energy billing system, Building automation system and substation automation systems.

FEATURES

- Basic and advanced metering functions
- Energy monitoring for all 4 quadrants with multiple tariff
- Demand storage with date and time stamp
- Power quality monitoring
- Alarm feature for selected parameters
- Set point monitoring

- Minimum and Maximum statistics
- I/O module option for breaker status monitoring and remote control
- Data logging feature
- Multiple choice of communication ports (Modbus, Ethernet, Profibus)
- Modular design and full graphic 160*160 pixel lcd display

RATINGS

Voltage Inputs (Each channel)
Full Scale Voltage	:	300V AC L-N, 520V AC L-L
Frequency Range	:	30 - 70 Hz
Starting Voltage	:	25V AC L-N
Burden	:	0.2VA at 240V AC

Current Inputs (Each channel)
Full Scale Current	:	6A AC
Withstand Capability	:	10A RMS Continuous, 100A RMS for 1 second Non-Recurring
Starting Current	:	0.2% of Full Scale
Burden	:	0.1VA at 5A AC
Accuracy	:	Class 0.5, Class 0.2(Optional)

STANDARDS APPLICABLE

Measurement Standard	:	IEC 62053-22
EMI/EMC Standard	:	IEC 61000-4/-2-3-5, CISPR 22
Safety Standard	:	IEC 61010-1
Environmental Standard	:	IEC 60068-2
Outline Standard	:	DIN 43700

PARAMETERS DETAILS

REAL TIME METERING
- Phase voltage VR,VY,VB, VLNAVG
- Line Voltage VR,VY,VB, VLLAVG
- Current IR,IY,IB,IAVG
- Active Power P1,P2,P3,PSUM
- Reactive power Q1,Q2,Q3,QSUM
- Apparent Power S1,S2,S3, SSUM
- Power Factor PF1,PF2,PF3,PFTOTAL,PFAVG
- Frequency

ENERGY AND DEMAND
- Active Energy kWh_import, kWh_Export
- Reactive Energy kVArh_import Lag, kVArh_import Lead, kVArh_Export Lag, kVArh_Export lead
- Apparent Energy kVAh_import, kVArh_Export
- Demand kVA, kW, kVAr & Avg.Current

POWER QUALITY
- Voltage THD-THD VR, THD VY, THD VB, THD VAVG
- Current THD-THD IR, THD IY, THD IB, THD IAVG
- Harmonics individual 2nd to 31st
- Voltage unbalance factor
- Current unbalance factor
- voltage crest factor
- current k factor
- phase angle between phase voltage
- phase angle between voltage and current
- TIF (THFF)

TIME
- Real time clock-Date, Month, Year, Hour ,Minute, Second

COMMUNICATION
- RS485 port MODBUS-RTU protocol, Baud rate configurable up to 38.4kbps
- Optional Ethernet 10/100 Mbps, self adaptable, RJ45 Jack MODBUS-TCP protocol
- Optional RS485 port Profibus-DPV0 protocol , Slave mode, Baud rate self adaptable up to 12 MbpsStatistics
- Maximum & Minimum with time stamp for VR,VY,VB, VLNAVG,VR,VY,VB, VLLAVG,IR,IY,IB,IAVG,PSUM,SSUM,Demand kVA,Demannd kW, Demannd kVAr, Demand IAVG, Voltage Unbalance, Current Unbalannce, THD VR, THD VY, THD VB, THD IR,THD IY,THD IB

ALARM
- Over/Under limit alarm for VR,VY,VB, VLNAVG,VR,VY,VB, VLLAVG,IR,IY,IB,IAVG,PSUM,SSUM,PFTOTAL,Frequency,Demand kVA,Demand kW, Demand kVAr, Demand IAVG, Voltage Unbalance, Current Unbalannce, THD VLN AVG,THD IAVG

DATA LOGGING
- VR,VY,VB, VLNAVG,VR,VY,VB, VLLAVG, IR ,IY ,IB,IAVG, P1,P2,P3, PSUM,Q1,Q2,Q3,QSUM,PF1,PF2,PF3,PFTOTAL,Frequency, kWh_import, kWh_Export, kVArh_import Lag, kVArh_import Lead,kVArh_Export Lag, kVArh_Export lead, Demand kVA, Demand kW, Demand kVAr, Demand IAVG, Voltage Unbalance, Current Unbalance, Voltage crest factor, THD VR, THD VY, THD VB, THD IR,THD IY,THD IB,THD VLN AVG,THD IR,THD IY,THD IB,THD IAVG, Current k factor ,TIF, Phase angle and digital / Analog input & output

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DISPLAY
- Custom made clear and large graphic LCD screen with white color backlit.
- All the measured values are shown with appropriate units.
- Labeling of function keys for easy navigation.
- Title display for each and every display page.
- Display Bar chart, Load percentage, I/O status and communication status.

USER PROGRAMMABLE FEATURE
- Primary value of PT and CT
- PT secondary 415V/110V
- CT secondary 5A/1A
- Three phase delta or three phase star measurement
- Favorite display page selection
- Communication settings
- Alarm settings

I/O OPTION
- Digital Inpput   : 4 No.s, 24V DC self excited
- Relay Output   : 2 No.s, 5A at 240V AC
- Digital Output   : 2 No.s, Open collector transistor output
- Analog Input   : 2 No.s, 4 - 20 mA / 0 to 10V, 0.2% OFS accuracy
- Analog Output   : 1 No., 4 - 20mA, 0.5% OFS accuracy

APPLICATIONS
- HT, MV and LT incomer Switchgears.
- Power quality analysis and data logging.
- Metering for industries and utilities.
- Energy management systems/Energy billing systems.

MULTI FUNCTION METER
Measure & Manage Power

POWER GENIUS

CE

METERING

■ Voltage V$_R$, V$_Y$, V$_B$, V$_{LN}$ AVG, V$_{RY}$, V$_{YB}$, V$_{BR}$, V$_{LL}$ AVG

■ Current I$_R$, I$_Y$, I$_B$, I$_N$, I$_{AVG}$

■ Active Power P$_1$, P$_2$, P$_3$, P$_{SUM}$

■ Reactive Power Q$_1$, Q$_2$, Q$_3$, Q$_{SUM}$

■ Apparent Power S$_1$, S$_2$, S$_3$, Ssum

■ Power Factor PF$_1$, PF$_2$, PF$_3$, PF$_{TOTAL}$, PF$_{AVG}$

■ Frequency

■ Active Energy kWh_Import, kWh_Export

■ Reactive Energy kVArh_Import Lag, kVArh_Import Lead, kVArh_Export Lag, kVArh_Export Lead

■ Apparent Energy kVAh_Import, kVAh_Export

■ Demand kVA, kW, kVAr and Average Current

MONITORING

■ Voltage Harmonics 2nd to 31st and THD

■ Current Harmonics 2nd to 31st and THD

■ Voltage, Current Unbalance factor

■ Voltage crest factor, Current k factor

■ Maximum and Minimum statistics with time stamp

DISPLAY

■ Custom made clear and large LCD screen with white / orange / blue backlit

■ Supports graphics like Load percentage, 4 quadrant power, Load nature, I/O status and Communication status

COMMUNICATION

■ Isolated RS485 with industry standard MODBUS-RTU Protocol

■ Ethernet module available as option

■ Wi-Fi module available as option

■ GPRS-4G module available as option

■ Profibus-DP module available as option

■ Dual communication ports option

ALARMS

■ Over / under limits can be set for up to 24 indicated parameters along with a specified time delay. If any of the indicated parameter is over or under its setting limit and remains over the specified time interval, the event will trigger an alarm output and also recorded with time stamp. The history of last occurred 10 alarms are retained.

DATA LOGGING:

■ Power genius offers 1 MB of on board data logging memory for the recording of majority of the metering parameters with date and time stamp. The time interval for recording can be selected up to 60 minutes in steps of 5 minutes. The recorded data's can be transferred to a PC and viewed in a Excel format by a user friendly menu driven software supplied by ICD along with the meter.

I/O MODULE OPTIONS

■ Digital Input, Relay Output, Digital Output, Pulse Output, Analog Input and Analog Output are provided as I/O option modules to extend the utility of the Power Genius. The extension module allows easy expansion of the I/O functions. Maximum of 3 modules can be provided in a single meter.

USER PROGRAMMABLE FEATURES

■ Primary Value of PT and CT

■ PT Secondary 415V / 110V AC

■ CT Secondary 5A / 1A

■ Three phase delta or Three Phase Star measurement

■ Favourite display page selection

■ Communication Settings

APPLICATIONS

■ Medium and Low Voltage Systems

■ Panel Metering of distribution feeders, Generators, Transformers and Motors

■ Power Quality Analysis and Data Logging

■ Metering for Industries and utilities

MULTI FUNCTION METER

RATINGS

Voltage Inputs (Each channel)
Full Scale Voltage	:	300V AC L-N, 520V AC L-L
Frequency Range	:	30 - 70 Hz
Starting Voltage	:	25V AC L-N
Burden	:	0.2VA at 240V AC

Current Inputs (Each channel)
Full Scale Current	:	6A AC
Withstand Capability	:	10A RMS Continuous, 100A RMS for 1 second Non-Recurring
Starting Current	:	0.2% of Full Scale
Burden	:	0.1VA at 5A AC
Accuracy	:	Class 0.5, **Class 0.2(Optional)**

COMMUNICATION

Rs485 (Standard)	:	MODBUS-RTU Protocol, 2 Wire Connection up to 38400 Baud rate
Ethernet (Optional)	:	MODBUS-TCP Protocol, RJ45 Jack, 10 / 100 Mbps self adaptable
Profibus (Optional)	:	Profibus-DPV0 Slave protocol, 2 Wire connection, Baud rate adaptable up to 12 Mbps, Profibus standard according to EN50170

AUXILIARY SUPPLY

Operating Range	:	90 - 270V AC, 50 / 60 Hz, 100 - 300V DC
Burden	:	4VA at 240V AC

I/O OPTION

Digital Input	:	4 No's, 24V DC Self Excited
Relay Output	:	2 No's, 5A at 240V AC
Digital Output	:	2 No's Open Collector Transistor Output
Pulse Output	:	1 No, Pulse frequency 25 Hz, 50% duty Cycle
Analog Input	:	2 No's, 4 - 20mA / 0 - 1V, 0.2% OFS Accuracy, 1KV Isolation
Analog Output	:	1 No, 4 - 20mA, 0.5% OFS Accuracy, 1KV Isolation

OPERATING ENVIRONMENT

Operating Temperature	:	-10°C to +55°C
Storage Temperature	:	-25°C to +75°C
Relative Humidity	:	5% to 95% non-condensing

CASE AND DIMENSIONS

Enclosure	:	Polycarbonate
Dimension	:	96 x 96 x 55 mm

STANDARDS APPLICABLE

Measurement Standard	:	IEC 62053-22, IS 14697
EMI / EMC standard	:	IEC 61000-4 / -2 -3 -4 -5 -6 -11, CISPR 22
Safety Standard	:	IEC 61010-1
Environmental Standard	:	IEC 60068-2
Outlines Standard	:	DIN 43700

PRODUCT SELECTION GUIDE

| FUNCTION	PARAMETER	MODELS 9500	MODELS 9502*
REAL TIME METERING	Phase Voltage V_R, V_Y, V_B, V_{LNAVG}	★	★
	Line Voltage V_{RY}, V_{YB}, V_{BR}, V_{LLAVG}	★	★
	Current I_R, I_Y, I_B, I_N, I_{AVG}	★	★
	Active Power P_1, P_2, P_3, P_{SUM}	★	★
	Reactive Power Q_1, Q_2, Q_3, Q_{SUM}	★	★
	Apparent Power S_1, S_2, S_3, S_{SUM}	★	★
	Power Factor PF_1, PF_2, PF_3, PF_{TOTAL}, PF_{AVG}, Frequency	★	★
ENERGY AND DEMAND	Active Energy kWh_Import, kWh_Export	★	★
	Reactive Energy kVArh_Import Lag, kVArh_Import Lead,	★	★
	kVArh_Export Lag, kVArh_Export Lead	★	★
	Apparent Energy kVAh_Import, kVAh_Export	★	★
	Demand kVA, kW, kVAr & Avg. Current	★	★
POWER QUALITY	Voltage THD - THD V_R, THD V_Y, THD V_B, THD V_{AVG}	★	★
	Current THD - THD I_R, THD I_Y, THD I_B, THD I_{AVG}	★	★
	Harmonics Individual 2nd to 31st		★
	Voltage & Current Unbalance Factor		★
	Voltage crest Factor, Current k Factor		★
	Phase Angle between Phase Voltages, Voltage & Current		★
TIME	Real time clock - Date, Month, Year, Hour, Minute, Second	★	★
COMMUNICATION	Rs485 Port MODBUS-RTU Protocol, Baud rate configurable up to 38.4 kbps	★	★
	Ethernet 10 / 100 Mbps, self adaptable, RJ45 Jack MODBUS-TCP Protocol	◉	◉
	Wi-Fi Module, 802.11 b/g/n standard, 2.4 GHz MODBUS-TCP Protocol	◉	◉
	GPRS-2G/3G/4G/LTE, TCP/FTP/HTTP/MQTT Protocol	◉	◉
	Rs485 Port Profibus-DPV0 Protocol, Slave mode, Baud rate self adaptable up to 12 Mbps	◉	◉

* Statistics, Alarm and Data logging functions are available in MFM 9502

★ Available ◉ Optional

MULTI FUNCTION METER

Single Meter suitable for all load conditions LT / HT, 5A / 1A, 4Wire / 3Wire
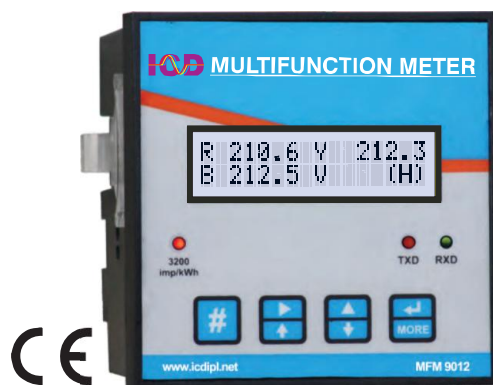
MFM 9012

MFM 9013-NXT

MFM 9015

FEATURES

- True RMS Measurement
- Simultaneous sampling of voltage and current
- Confirms IS14697 for Accuracy Class 1 and Class 0.5
- Direct reading without multiplication factor
- Accurate on Harmonic Conditions
- 10 year back up for integrated energy data
- Available in both LCD and LED Model
- Measures 4 quadrant power and 2 quadrant energy
- Run hour Indication
- Built in phase analyzer for proper connection
- Low PT, CT burden (Less than 0.2 VA)
- Digital Calibration ensures drift free operation for long time
- High reliability and user friendly to configure and operate
- Sealed dust proof Poly Carbonate Enclosure
- Touch safe terminals
- Wide range of Auxiliary supply (90 to 270V AC or DC)

DISPLAY FEATURES

LCD

- 2 Row 16 Character LCD with Backlit
- Character Size 4.35 (H) x 2.95 (W) mm
- LCD Power save mode provided. When no key is pressed for 3 minutes, the LCD Backlit is switched OFF to save power and enhance the life of LCD. The LCD is switched ON when any key is Pressed

LED

- 16 Digit 0.56" Hi bright Red LED Display
- Facility to view 4 parameters at a time

USER PROGRAMMABLE FEATURES

- Primary value of PT and CT
- CT Secondary 5A / 1A
- PT Secondary 415 / 110V AC
- Single phase, 3 phase Delta and 3 phase Star measurement
- Favourite display page selection
- Communication settings like baud rate, parity and stop bit

OPTIONAL FEATURES (Value Line)

- Optically isolated RS485 Communication output with MODBUS - RTU protocol
- Accuracy Class 0.5 (IS14697)

OPTIONAL FEATURES (Power Line)

- Optically isolated RS485 Communication output with MODBUS - RTU protocol
- Optically isolated RS485 Communicaton output with PROFIBUS - DP Slave protocol
- RJ45 Ethernet port with MODBUS - TCP protocol
- Wi-Fi module MODBUS - TCP protocol
- Accuracy Class 0.5 / 0.2 (IS14697)
- Separate energy register for export energy recording
- 2 number digital input for user defined function
- 1 number digital output for user defined function
- Current day and previous day energy and Run hour register

STANDARDS APPROVED

- Type test approved as per IS14697 Class 1 and Class 0.5
- Confirms EMI, EMC Regulations as per IS14697 standards

MONITORING FEATURES (Value Line)

MFM9112, MFM9113

- Voltage, Current, Frequency, kVA or kW, kVAh or kWh, PF, Run hour, Idle hour

MFM9012NXT, MFM9013NXT

- Voltage, Current, Frequency, kVA, kW, kVAr, PF, kVAh or kWh, Run hour, Idle hour, Vthd, Ithd

MONITORING FEATURES (Power Line)

MFM9014NXT, MFM9015NXT

- Voltage, Current, Frequency, kVA, kW, kVAr, PF, kVAh, kWh, Lag kVArh, Lead kVArh, Run hour, Idle hour, Vthd, Ithd, Demand kW, Demand kVA, MD kVA,

DUAL SOURCE METER

EM9024
MFM9022-NXT
MFM9023-NXT

Voltage, Current, Frequency, kW, PF, kWh, Run hour

Separate kWh and run hour, Idle hour, register are provided for EB/DG

EB/DG Indication by LED

240V AC supply or potential free contact for EB/DG Selection

Suitable to generate separate billing for EB/DG Energy

APPLICATIONS

- Energy management systems and Energy billing systems
- Panel metering in sub stations, Distribution panels and Genset Panels
- Pumps, Motors, Compressors and Individual Equipments
- Original equipment manufacturers
- Control panels and Test benches

MULTI FUNCTION METER

TECHNICAL SPECIFICATION

RATINGS

Voltage Inputs (Each channel)
Full Scale Voltage   : 300V AC L-N, 520V AC L-L
Frequency Range   : 30 - 70 Hz
Starting Voltage   : 25V AC L-N

Current Inputs (Each channel)
Full Scale Current   : 6A AC
Withstand Capability   : 10A RMS Continuous, 100A RMS
   for 1 second Non-Recurring
Starting Current   : 0.2% of Full Scale

COMMUNICATION

RS485 (Optional)   : MODBUS-RTU Protocol, 2 Wire
   Connection up to 38400 Baud rate
Ethernet (Optional)   : MODBUS-TCP Protocol, RJ45 Jack,
   10 / 100 Mbps self adaptable
Wi-Fi (Optional)   : Wi-Fi Module, 802.11 b/g/n standard,
   2.4 GHz MODBUS-TCP Protocol
Profibus (Optional)   : Profibus-DPV0 Slave protocol,
   2 Wire connection,
   Baud rate adaptable up to 12 Mbps,
   Profibus standard according to EN50170

AUXILIARY SUPPLY

Operating Range   : 90 - 270V AC, 50 / 60 Hz
   100 - 300V DC
Burden   : 4VA at 240V AC

I/O OPTION

Digital Input   : 2 No's, 24V DC Self Excited
Relay Output   : 2 No's 5A at 240V AC
Pulse Output   : 1 No', Pulse output for energy
   (Open Collector)

OUTPUT

Calibration LED Output   : 3200 lmp/kWh

OPERATING ENVIRONMENT

Operating Temperature   : -10°C to +55°C
Storage Temperature   : -25°C to +75°C
Relative Humidity   : 5% to 95% non-condensing

CASE AND DIMENSIONS

Enclosure   : Polycarbonate
Dimension   : 96 x 96 x 60 mm
Cut out   : 92 x 92 mm

STANDARDS APPLICABLE

Measurement Standard   : IEC 62053-22, IS 14697
EMI / EMC standard   : IEC 61000-4 / -2-3-4-5-6-11, CISPR22
Safety Standard   : IEC 61010-1
Environmental Standard   : IEC 60068-2
Outlines Standard   : DIN 43700

PRODUCT SELECTION GUIDE

PARAMETER	Value Line Series				Power Line Series	
	9112	9113	9012	9013	9014	9015
DISPLAY	LCD	LED	LCD	LED	LCD	LED
Phase Voltage V_R, V_Y, V_B, V_{LNAVG}	★	★	★	★	★	★
Line Voltage V_{RY}, V_{YB}, V_{BR}, V_{LLAVG}	★	★	★	★	★	★
Current I_R, I_Y, I_B, I_{AVG}	★	★	★	★	★	★
Active Power P1, P2, P3, P_{SUM}	■	■	★	★	★	★
Reactive Power Q1, Q2, Q3, Q_{SUM}			★	★	★	★
Apparent Power S1, S2, S3, S_{SUM}	■	■	★	★	★	★
Power Factor PF1, PF2, PF3, PF_{TOTAL}, Frequency	★	★	★	★	★	★
Active Energy kWh	■	■	■	■	★	★
Reactive Energy kVArh Lag, kVArh Lead					★	★
Apparent Energy kVAh	■	■	■	■	★	★
Run Hour, Idle Hour	★	★	★	★	★	★
Number of Power Interuptions	★	★	★	★	★	★
Voltage THD - THD V_R, THD V_Y, THD V_B, THD V_{AVG}	★	★	★	★	★	★
Current THD - THD I_R, THD I_Y, THD I_B, THD I_{AVG}	★	★	★	★	★	★
Demand kVA, kW					★	★
MD kVA, kW					★	★
RTC - Date, Month, Year, Hour, Min., Sec.					★	★
RS485 Port MODBUS-RTU Protocol, Baud rate configurable up to 19.2 kbps	◉	◉	◉	◉	◉	◉
Ethernet / Wi-Fi Communication MODBUS-TCP Protocol	◉	◉	◉	◉	◉	◉
Digital Input Self Excited with 24V DC (2 No's)	◉	◉	◉	◉	◉	◉
Relay Output - 5A at 240V AC (2 No's)	◉	◉	◉	◉	◉	◉
Export Energy Recording					◉	◉

★ Available   ■ User Selectable kVAh / kWh   ◉ Optional

ENERGY MANAGEMENT SYSTEM

CONCEPT

Intelli - Utility 4.0 is an informative energy management system integrating power and process data acquisition from various feeders and sensors through intelligent gateway, data presentation and analysis as per user requirement and cloud service based on internet of things technology.
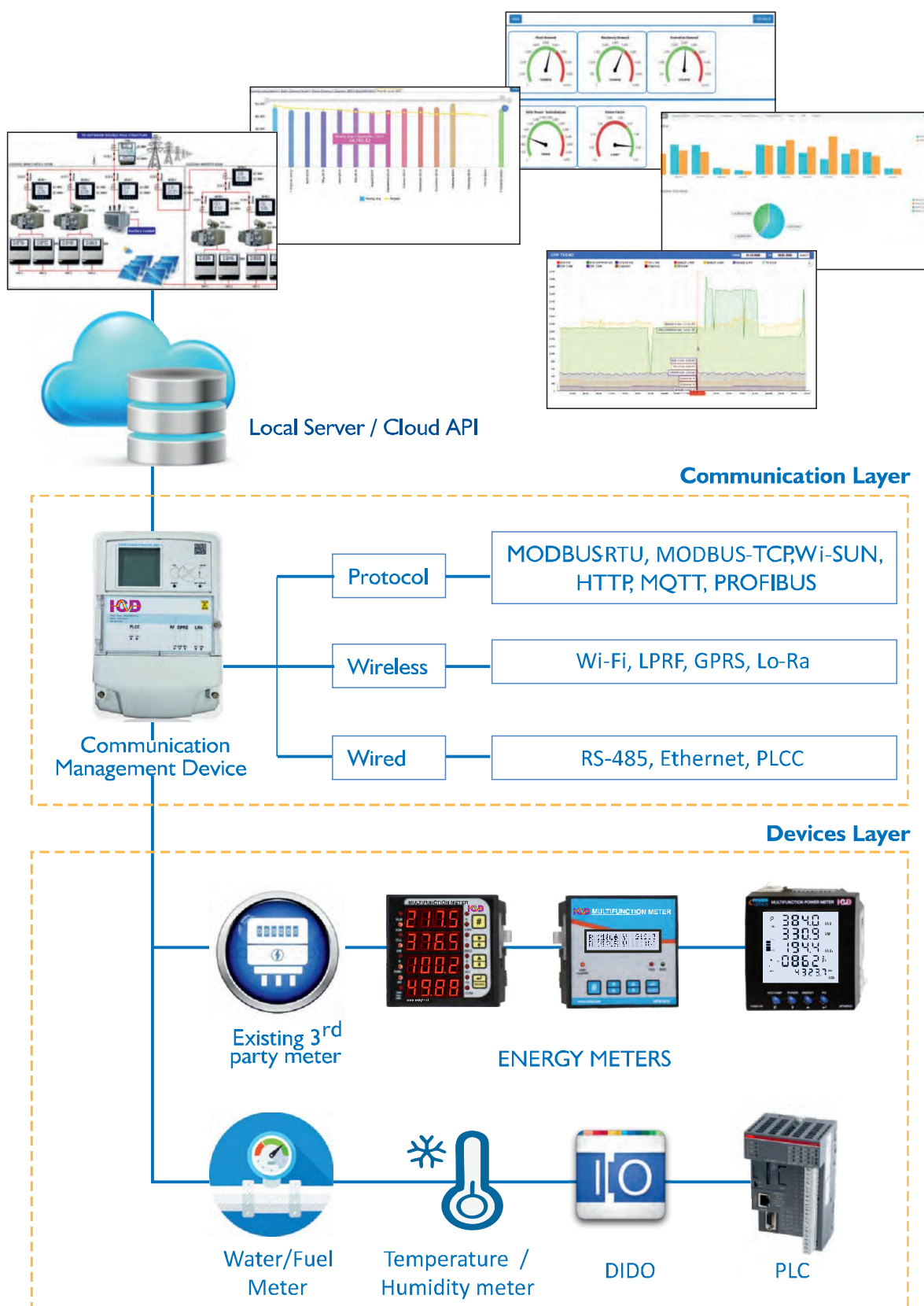
This platform effectively helps the industrial users to effectively use energy, reduce energy consumption, improve operating environment and increase the economic benefit.

INTELLI - UTILITY 4.0
Features and Benefits

Customize:
KPI Dashboard/MIS Report
Interactive screens

After Sales Support:
Anytime remote assistance
Scalability/Update support

Get Alerts:
Ensure uptime/Instant SMs/
E-mail

Integrated Instruments:
Electricity/ Air/ Water/ Logical
outputs Temperature

Asset Optimization:
Increase the asset life and
reduction in maintenance cost

**Connect to
Enterprises/Cloud:**
Configure/ Upgrade / Monitor at
any geo location

Save Energy:
Spend less on energy bills/
Man power/ Maintenance

Data Analysis:
Analytical report/BI/CRM/ERP/ PQ
Violations/ Daily load curve

CONCEPTUAL ARCHITECTURE FOR
SMART ENERGY MANAGEMENT PLATFORM

Local Server / Cloud API

Communication Layer

Communication Management Device

Protocol	MODBUS-RTU, MODBUS-TCP, Wi-SUN, HTTP, MQTT, PROFIBUS
Wireless	Wi-Fi, LPRF, GPRS, Lo-Ra
Wired	RS-485, Ethernet, PLCC

Devices Layer

Existing 3rd party meter

ENERGY METERS

Water/Fuel Meter   Temperature / Humidity meter   DIDO   PLC

INTELLI - UTILITY 4.0

PLATFORM FEATURES

Realtime Monitor

With our interactive dashboard saving the Operation status of important load at all times and places focusing on energy consumption. which helping to improve energy management ability of enterprises
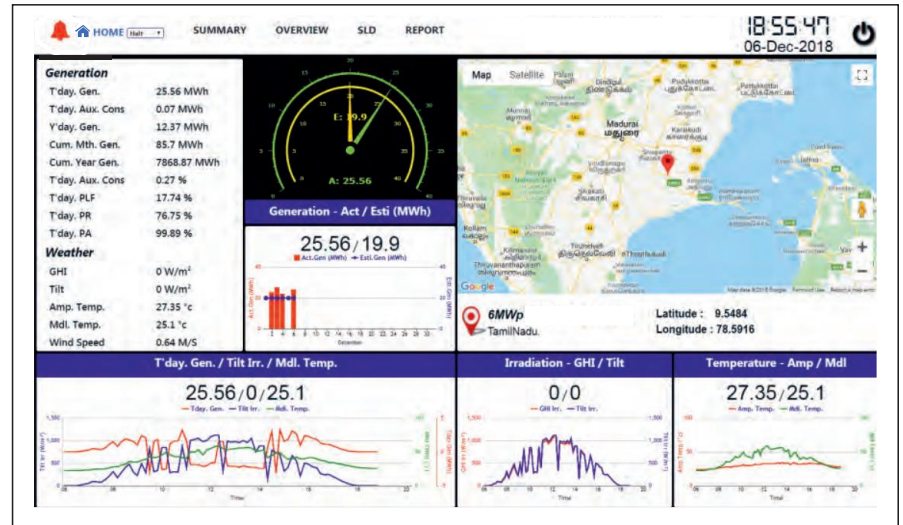
Energy Consumption Management
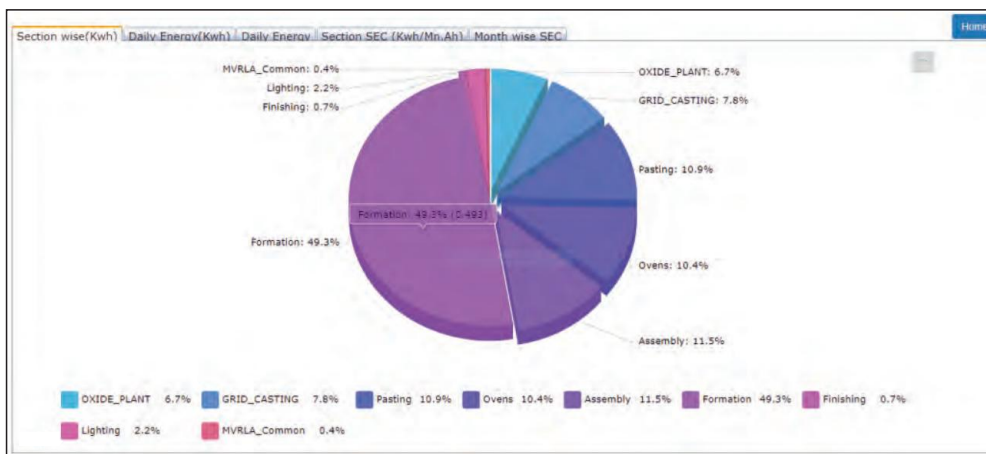
Query Power consumption in a power supply area or during a historical period.

Customised load classification, vertical comparison between classified loads.

Multi dimensional energy consumption report in which distribution circuits, lines can be user defined.

Events and Alarms

Identify and notify events and abnormal conditions:

Shutdown, idle times, excessive energy, low performance, notifications on event logger also users for escalate the scenario

PLATFORM FEATURES

Demand Management

Demand management is a planning methodology user to forecast, plan for and manage the demand for energy requirement.

This can be at macro levels as in economics and at micro levels within individual organisations.
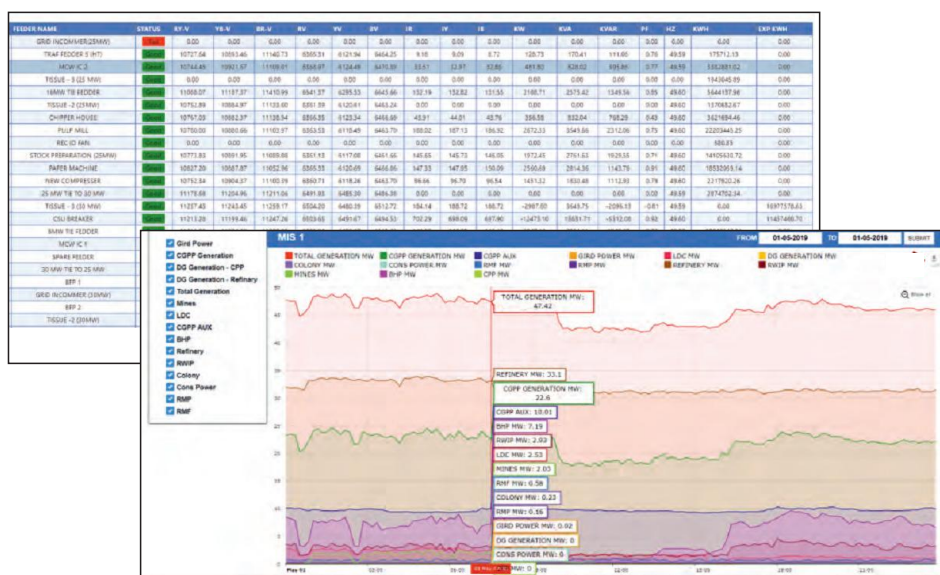

Data Reports & Trend Analysis

Providing realtime data reports and historical data reports such as daily reports, monthly reports, quarterly reports, and annual reports for various historical data such as Voltage, Power, Energy. These datas can be exported to Trend images / excel / csv / pdf formats.

Interactive UI Platform

UI platform provides graphical configuration of the plant to plugin development environment. which meets visual requirement of various realtime datas. Fast realise electrical power system operation monitoring, event alarm, energy flow monitoring of the entire system.
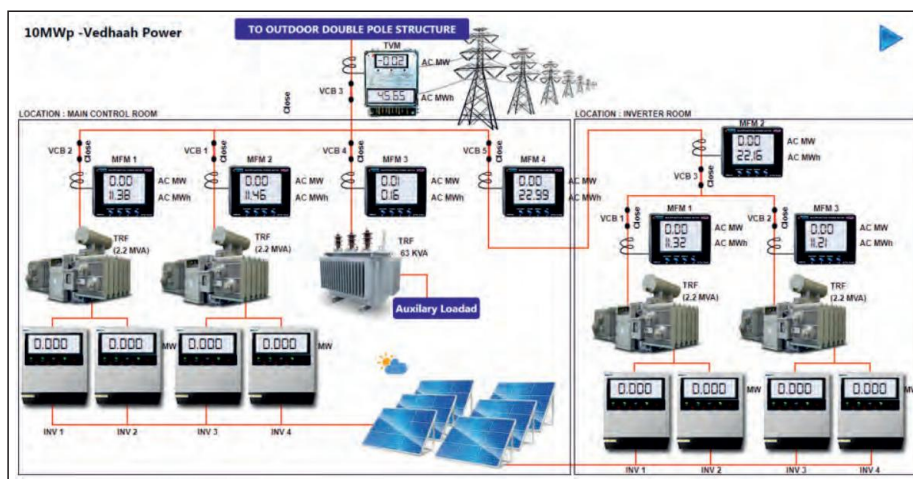
TVM/MD CONTROLLER

TVM / MDC PCM 9505

COMMON FEATURES

- True RMS measurement
- Simultaneous sampling of voltage and current
- Confirms IS14697 for Accuracy Class 0.5
- Confirms EMI/EMC Standards (CISPR 14, IEC 61000-4-1, IEC 61000-4-2, IEC 61000-4-4, IEC 61000-4-5)
- Direct reading without multiplication factor
- Accurate under harmonic conditions
- Measures 4 quadrant power and 2 quadrant energy
- Low PT, CT burden. (Less than 0.2 VA)
- Suitable for all kind of Balanced & Unbalanced Loads
- Energy storage in EERAM with 10 Years backup
- Built in voltage and current phase analyser for proper connection
- Auto scrolling of displayed parameters
- MD Reset through keypad
- Precision RTC with 10 years backup
- 15 / 30 Minutes selectable for Rising Demand
- Total Harmonic Distortion (THD) display of 3 phase voltage and current
- Optically Isolated RS485 communication output with MODBUS RTU protocol
- RJ45 Ethernet port with MODBUS- TCP protocol (optional)
- Export energy recording (optional)
- Sealed dust proof Enclosure (144(H) x 144(W) x 80(D))
- Panel mounting

User Programmable Features
- Primary value of PT and CT
- CT Secondary 5A / 1A
- PT Secondary 415 / 110V AC
- Three phase delta and Three phase star measurement
- Communication settings like baud rate, parity and stop bit

Time Of The Day (TOD) Meter
- Built in Time of the Day (TOD) Function
- 24 hours 8 slots with 8 individual zones
- Facility to register all the energy consumption kVAh, kWh, kVArh and maximum demand for 8 time zones separately

System Input
- Voltage Input : 30 - 520V AC line to line
- Current Input : 0 - 6A
- Over load capability : 10 times Ib for 5 seconds, 1.5 times Ib continuous
- Starting current : 0.1% of basic current
- Frequency range : 40.00 to 60.00Hz
- Operating PF : 0.00Lag to 0.00 Lead
- Auxiliary supply : 90-270V AC/DC

PCM 9505 (TVM/MDC)
- More than 75 parameters displayed
- Custom made clear and large LCD screen with white / orange / blue backlit
- Display page consists of 3 phase Voltages, line voltages, Currents, kVA, kW, kVAr, Power factor, Frequency, Energy and TOD Energy registers, Demand parameters, MD Histories, Clock and Calendar, Demand profile, Predictive demand, Additional load capacity, Power fail Records and Run hour Data
- Lead power factor lock feature (Lead as Lead or Lead as UPF)
- Multi Tariff Function with Programmable TOD
- Zone Wise MD and Previous five MD history
- Power fail and Power Resume records
- Total Run hour & Load on feature
- Higher Meter constant 3200 Imp / kWh and kVArh for faster testing

- MD controller function inbuilt
- Predictive Demand control relay
- Two control set points for demand
- One set point for energy
- Control history recording
- MD Reset through keypad with password protection
- Add / Removal of Load indication

PCM 7505 (TVM/MDC)
- Accuracy class 0.2
- Complies all the features of PCM 9505
- Most suitable for power and energy measurement in the incomers, wind power applications and energy auditing

APPLICATIONS
- Main LT and HT Incoming Feeders
- Sub-Stations, Power Stations and Captive Gensets
- Wind mill application
- Energy data logging using PC
- Electronic billing system
- Energy Audit application

BASIC METERS

VAF 9000 / VLT 9053 / AMM 9043

- Replaces Volt Meter, Ammeter and Frequency Indicator in an electrical panel
- True RMS measurement
- LT / HT Application
- 12 digit 0.39" 7 segment red LED
- Displays 12 parameters in a single instrument
- Parameter displayed includes R, Y, B, RY, YB, BR voltage, R, Y, B current and frequency
- Parameter selection through Front Panel Keypad
- Phase indication and parameter indication through LED
- Accuracy: ±1% on reading for voltage and current ±0.05% on reading for frequency
- Resolution: Voltage 0.1V for LT, 0.01 KV for HT Current 0.1A up to 100A, 1A (more than 100A) Frequency (0.01HZ)
- Voltage Input: 100 - 520V AC line to line for LT 30 - 140V AC line to line for HT
- Current Input: 5A / 1A AC
- PT/CT setting through keypad with password facility
- Auxiliary supply: 90 to 270V AC/DC
- Dimension 96 x 96 x 45 mm
- Poly Carbonate enclosure
- Panel Mounting

ENERGEN

- True RMS Measurement
- LT / HT Application
- 18 Digit .39 inch 7 Segment LED
- Confirms IS14697 for Accuracy Class 1 for energy
- Accurate on Harmonic Conditions
- 10 year back up for integratedenergy data
- Parameter displayed includes R, Y, B, RY, YB, BR voltage, R, Y, B current, frequency, kW or kVA, kWh or kVAh
- Parameter selection through Front Panel Keypad
- Phase indication and parameter indication through LED
- Accuracy : ±1% on reading for voltage, current, kW or kVA ±0.05% on reading for frequency
- Resolution: Voltage 0.1V for LT, Current 0.1A up to 100A, 1A (more than 100A) Frequency (0.01HZ)
- Voltage Input: 100 - 520V AC line to line for LT
- Current Input: 5A / 1A AC
- PT/CT setting through keypad with password facility
- Auxiliary supply: 90 to 270V AC/DC
- Dimension 96 x 96 x 45 mm
- Poly Carbonate enclosure , Panel Mounting

OPTIONAL FEATURES

- Optically isolated RS485 Communication output with MODBUS - RTU protocol

Selection Guide

MODELS	Single Phase			Three Phase			DC Meter	
	V	A	Hz	V	A	VAF	V	A
VLT 9051	✓							
AMM 9041		✓						
CNF 240			✓					
VLT 9053				✓				
AMM 9043					✓			
VAF 9000						✓		
VLT 9059							✓	
AMM 9049								✓

APPLICATIONS

- Panel Metering in Sub Stations
- Power Generation Plants, Genset Panels
- Control Panels
- Test Benches
- Switch Boards
- Power Distribution Panels
- Individual Machines and Equipments (Pumps, Motors and Compressors)
- Data Centres

- All kind of Panel Meters also available in 144(H) x 144(W) x 80(D) mm
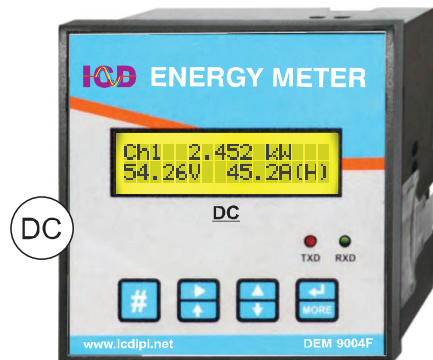
ENERGY METERS
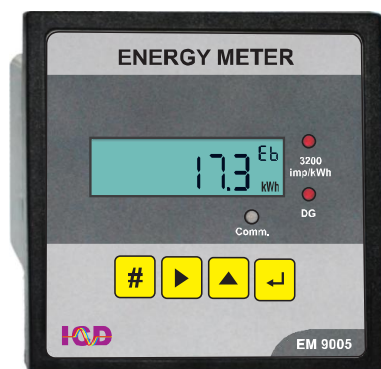
EM 9005

- True RMS measurement
- LT / HT Application
- Suitable for single phase, 3 phase 4 wire, 3 phase 3 wire measurements
- Confirms IS 14697 for accuracy class 1
- Accuracy class 0.5 (Optional)
- Confirms EMI / EMC standards (CISPR 14, IEC 61000 - 4 -1, IEC 61000 - 4 - 3, IEC 61000 - 4 - 4, IEC 61000 - 4 - 5)
- Single row 16 character alpha numeric LCD with backlit
- Displays kW, kWh, Run hour
- kW / kWh selection through front panel key
- Direct reading without multiplication factor
- PT / CT setting through key pad
- Low PT, CT burden (Less than 0.2 VA)
- Energy storage in EERAM with 10 Years backup
- Higher Meter constant 3200 Imp / kWh
- Reverse Indication for proper connection
- Measures 4 quadrant power and records import energy
- Optically isolated open collector transistor pulse output for kWh
- Wide range of Auxiliary supply (90 to 270V AC or DC)
- Sealed dust proof Poly Carbonate Enclosure
- Touch safe terminals
- 96(H) x 96(W) x 45(D) mm
- Panel Mounting

DEM 9004F

- Parameter Shown : DC Voltage, DC Current, kW, kWh, Run hour
- Voltage Range : 24V – 800V DC (One/Four channels 96 x 96) 1000V - 1500V DC (One/Two channels 144 x 144)
- Current Input : 50 mV / 75 mV from shunt (OR) 0 – 4V from Split core Hall effect CT's
- Four DC Current Channels
- Current measurement through Shunt or Hall Sensors
- Power Supply for Hall Sensors Provided in the meter
- Programmable CT primary current individually for 4 channels
- Displays DC Voltage, Current, kW, kWh and Run hour
- Separate energy and run hour register provided for all the four channel
- Digital Calibration by software
- Energy & Run hour storage in EEPROM back up
- kWh range 999999.99 kWh
- Run hour range 9999.59 hours

DEM9024F

- Two isolated DC Voltage Channel
- Four DC Current Channels
- DEM9024F used to monitor two independent BTS Systems with different DC Voltages in a single meter
- Isolation between voltage channels

OPTIONAL FEATURES

- Optically isolated RS485 communication port with MODBUS RTU protocol
- Split core Hall effect CT's suitable for mounting on load cable without disturbing the load

APPLICATIONS
- Suitable for OEM, SPM, ACDB
- Captive Gensets
- Individual Machines & Equipments
- Pumps, Motors & compressors
- Data Centres

APPLICATIONS
- Solar Power System - DCDB Panels
- Battery Management System
- Energy Storage
- Telecom Tower Monitoring systems
- Railway Power systems that uses DC supply

TRANSDUCERS
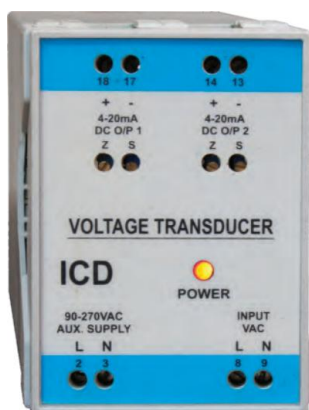
PWT 9060V (Voltage Transducer)
PWT 9060A (Current Transducer)
PWT 9060F (Frequency Transducer)
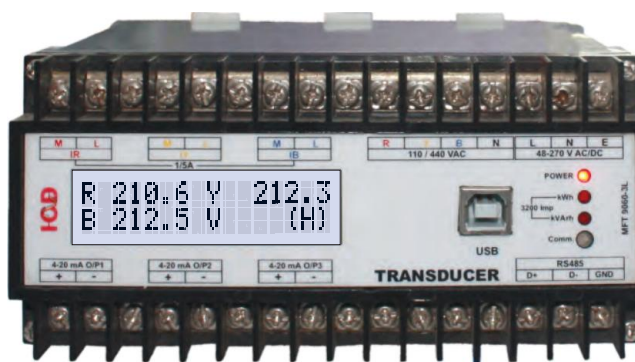
PWT 9060P (Power Transducer)

- Measuring Quantity: AC Voltage/AC Current/ Frequency/Power (kW / kVA / kVAr / PF)
- Nominal Input Voltage: For VT and FT 110V/√3/110V/240V/415V
- Nominal Input Current : For CT 1A / 5A AC
- Measuring Range: (-40% to +20%) For Voltage, 0.2% to 120% of Ib For Current
- 45 to 55 Hz for Frequency
- 0.5 lag - 0.5 Lead for PF
- Single (4-20mA) (0-10V)
- Load Resistance 750Ω max.@ 20mA
- Accuracy class 0.5 as per IEC688
- Ripple less than 1% (P-P)
- Response time less than 500ms
- Galvanic Isolation Provided (4kV)
- Dual output option available
- Self powered / External 48V DC / 110V DC 110V AC / 240V AC auxiliary
- DIN Rail enclosure for easy onsite mounting
- Dimension 70(H) x 55(W) x 110(D)mm for Voltage / Current / Frequency Transducer
- 70(H) x 100(W) x 110(D)mm for Power Transducer

MFT 9060
(Multi Function Transducer)

- 5A / 1A AC Input
- Overload 10 times Ib for 5 Seconds and 2 times Ib Continuous
- Low CT burden. (Less than 0.2 VA)
- Single 4-20 mA / Dual/Triple 4-20 mA output
- Load Resistance 750 ohms maximum
- Response time less than 500 ms
- Galvanic Isolation Provided (4kV)
- External 90 to 270V AC Auxiliary supply
- 75(H) x 150(W) x 110(D)mm
- Din Rail Mounting

Programmable Features

- Single phase, Three phase delta and 3 phase star measurement
- Primary value of CT and PT
- PT Secondary 415 / 110V AC
- CT Secondary 1A / 5A
- Programmable analog outputs (Voltage, Current, Frequency, kW, kVA, kVAr & PF)
- Output can be configured for any of the measured variable

Specifications

- Voltage Input   : 25 - 520V AC L-L
- Current Input   : 5A / 1A AC
- Over load   : 10 times Ib for
  capability   5 seconds, 1.5 times Ib
                         continuous
- Starting current   : 0.2% of basic current
- Frequency range   : 40.00 to 60.00Hz
- Operating PF   : 0.00 Lag to 0.00 Lead
- Auxiliary supply   : 48V DC / 90V - 270V
  AC/DC
- Measured Variables : RMS voltage, RMS
                         current, Active, Reactive,
                         Apparent power
                         (imp/exp) Power factor,
                         frequency and energy
- Communication   : Optically isolated Rs485
                         communication supporting
                         MODBUS RTU Protocol

                         Rs232 Port is available
                         for configuration menu
                         driven windows based
                         software package is given
                         at free of cost for
                         configuration
- Mounting   : Din Rail / Wall Mounting

APPLICATIONS

- Power Generation Plants
- Suitable to measure power system variable in high voltage / high current system
- Remote Power Indicating Systems
- Remote Large Size Display Systems
- Data Logging using PLC / DCS

SMART METERS

SEM 610X

SEM 630X

General

SEM6X0X Meter is a new generation of smart meter. It supports active & reactive energy measurement, instantaneous measurement, relay disconnection and reconnection management. With an optional plug-and-play PLC/RF/GPRS communication module, the meter can be used in sophisticated AMI & vending system.

MAIN FEATURES

- Complying to IS 16444 standards for metering requirement
- Complying IS 15959 part-2 standard for DLMS
- Full smart functionality
- Bidirectional measurement of instantaneous, energy and demand parameters
- Data logging for instantaneous parameters, billing parameters and block load profile
- Tamper events detection, recording and reporting
- Event logging available with active energy, voltage and current snap shots
- Power fail alerts(last gasp) and power resume information(first breath) available
- Load connection/disconnection through latching relays for both phase and neutral
- Communication options including optical, RF, PLC and GPRS
- Bidirectional communication with push feature as well as on demand reading
- Remote firmware upgrade
- Net metering feature available
- Prepaid function as per IS 15959 part-2(optional)

MAIN FUNCTIONALITIES

Measurement
- Unidirectional or Bi-directional Measurement
- Cumulative energy
- Record active & reactive energy (optional) in tariffs

Instantaneous Values
- Power, Voltage, Current
- Power Factor, Frequency

Display
- Large digit LCD display with backlight
- Scrolling display and push button display configurable
- Display readable without main power (RWP)
- Tamper and Relay Status shown as ICON
- Impulse LED available for kWh and kVArh

Tariffs
- Single/TOU
- Upto 4 Registers, configurable profiles and seasons

Daily Profile
- Daily Profile for 35 days
- Energy

SMART METERS

MAIN FUNCTIONALITIES

Billing Profile

- Billing profile for 6 months
- Energy, Average PF, Maximum Demand

Load Profile

- Up to 1 Megabytes of Non-Volatile memory
- Max 35 Days storage (30 minutes)
- Energy, voltage, current.

RTC

- Clock accuracy (daily deviation): ≤ 0.5s (23°C)
- RWP (Read Without Power)
- Replaceable Lithium Batter (10 years support)

Anti- Tamper

- 4 Sealing positions (terminal, body)
- Meter cover and Terminal Cover open detection
- Bypass/Reverse Current
- Neutral Missing/Neutral Disturbance Strong magnetic field detection

SMART FEATURES

Event & Alarms

- Load and Power grid events detection
- Under Voltage, Over voltage, Over Current and Over Load
- Power Failure and Power Resume
- 200 event records with date and time
- Alarm for events and tamper
- Alarms indicator (LED & Buzzer) (Optional)

Load Control

- Load disconnection provided for,
- Over Voltage, Over Current and Over Load
- Selected Tampers (Optional)
- Command from Utility through remote communication

Relay

- Provided in both Phase and Neutral complying to IS15884 UC1/UC2/UC3
- Status of Relay Connect/Disconnect available on display and data downloading
- Connect and Disconnect of relay are logged as events and available for downloading

Demand Monitoring

- Block/ Slide mode (optional)
- Demand interval configurable
- Maximum demand with time stamp
- Historical value (optional)

Security

- Multi-level password for data reading and programming for all available ports
- 2 data access levels (LLS and HLS)
- Encryption of data AES-128 Standard

Communication

- Optical port for Local Communication
- RF/PLC/GPRS plug-and-play communication module
- RF Module with Wi-Sun Sub GHz transceiver
- PLC with G3-PLC band 150kHz - 450kHz
- GPRS support 2G/3G network
- Protocol: DLMS as per IS15959 part1 and part2 standards
- PUSH and Remote Firmware Upgrade available
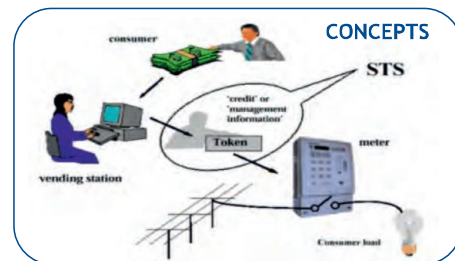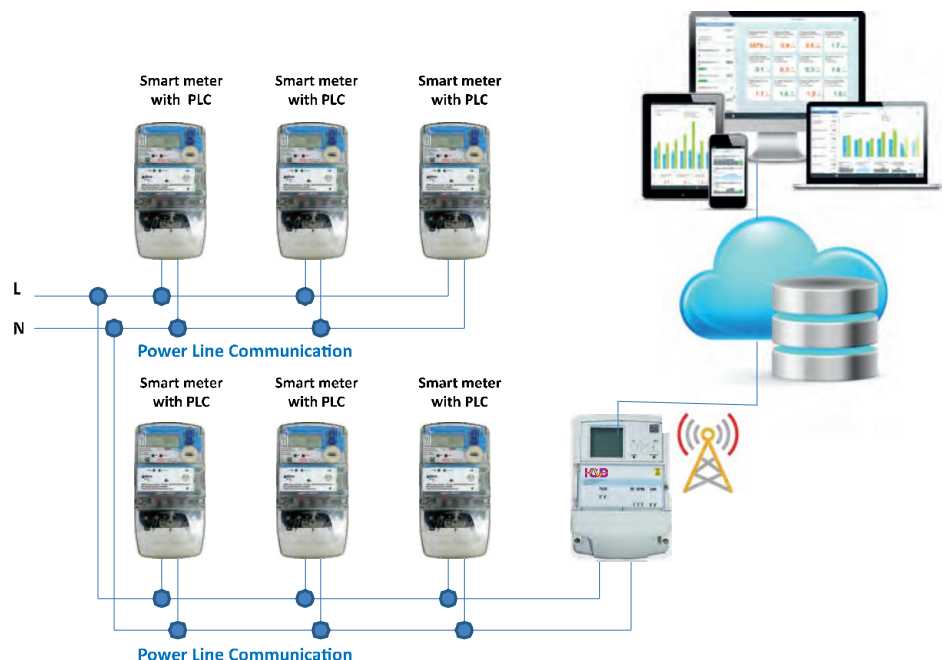
SMART METERS

SPARTAN prepaid

Spartan 3P

Spartan 1P

- Metering system offers flexible and reliable revenue management technique to present bill less, revenue cycle using keypad based prepayment metering.

- The measured information is shown on an 8 digit LCD display with backlit.

- 3x4 matrix keypad is provided on the front panel of the meter to type 20 digits token and 2 digit short codes.

- No-hidden charges

- No recurring expenses on the vending system

- Facilitate flexible tariffs

- Load limit set function to help the demand side Management
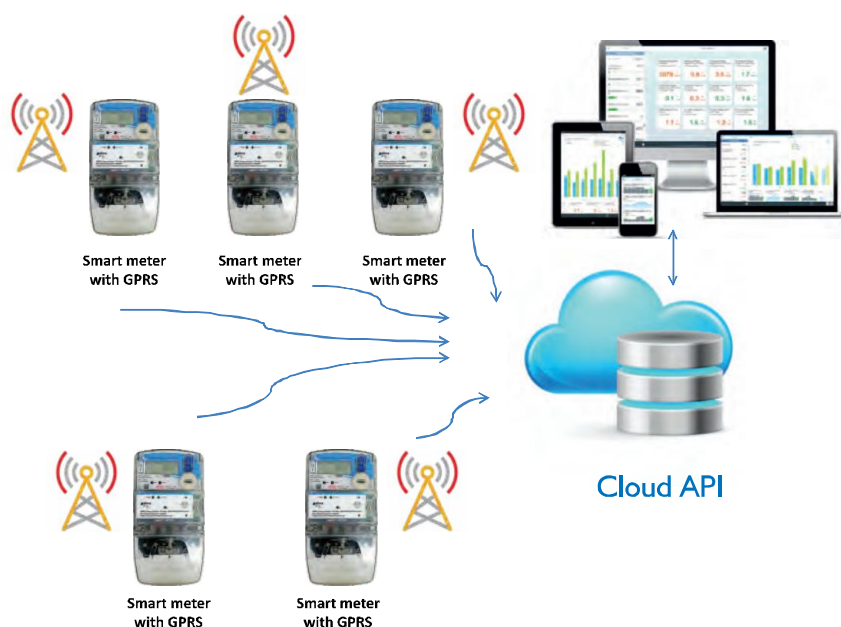

CONCEPTS

- Easy to operate Keypad based technology

- Complete control with the master/aadministrator

- Internet facility not required for the vending system operation

- Prevents token entry at the tampered condition

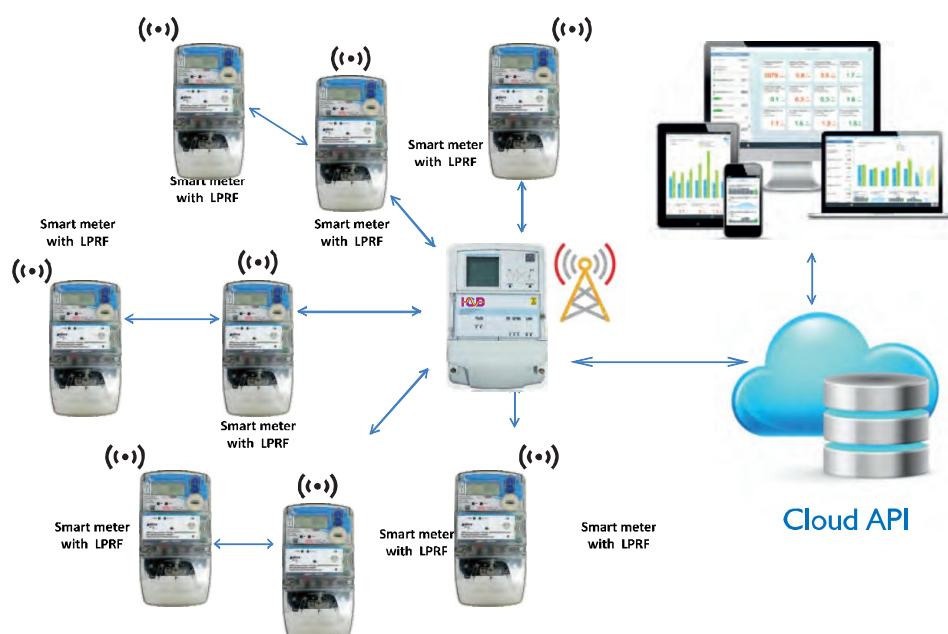## Smart Metering Architecture with PLC Communication

AMI / AMR NETWORK TOPOLOGY

Smart Metering Architecture with GPRS Communication

Smart meter with GPRS

Smart meter with GPRS

Smart meter with GPRS

Smart meter with GPRS

Smart meter with GPRS

Cloud API

Smart Metering Architecture with LPRF Communication

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Smart meter with LPRF

Cloud API

Smart Metering Architecture with RS-485 Communication

Smart meter with RS-485

Smart meter with RS-485

Smart meter with RS-485

Smart meter with RS-485

Smart meter with RS-485

Smart meter with RS-485

Smart meter with RS-485

RS-485 cable connection

Cloud API

POWER FACTOR CONTROLLER
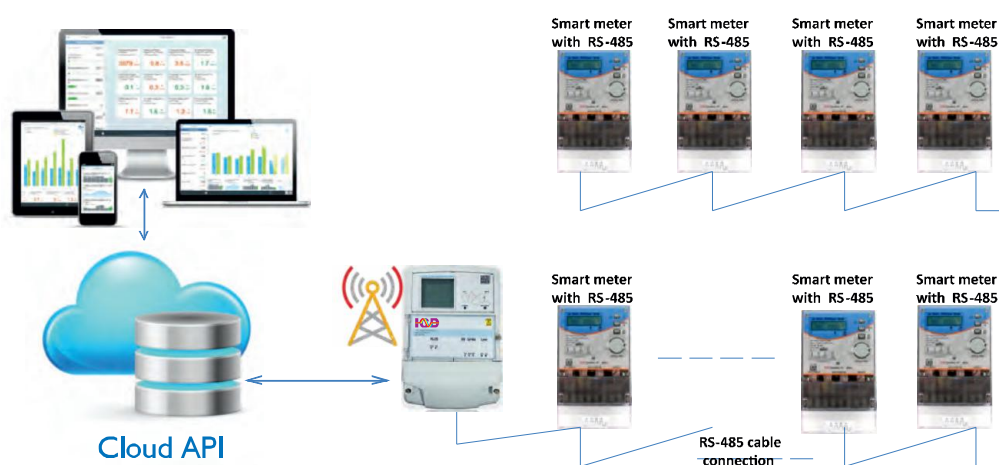
PFC 9059 / PFC 9059R   **PFC 9055 / PFC 9055R**   **PFC 9070 / PFC 9070R**

COMMON FEATURES

- Measurement of PF for all 4 quadrants
- True RMS measurement
- 3 phase 4 wire for LT application
- 3 phase 3 wire for HT application
- Displays power factor, actual KVAr, and required KVAr
- PF setting between 0.8 Lag to 0.90 Lead
- Control of capacitor in both auto and manual mode
- Adjustable connection delay for switching ON the capacitors
- Adjustable Re-connection delay to allow sufficient time for discharge of capacitors
- PF, Capacitor banks operation sequence, Delay setting through keypad

- Alarm output provided for over voltage, over current, over compensation and under compensation

System Input
- Voltage Input   : 100 - 525V AC line to line for LT
                        30 - 140V AC line to line for HT
- Current Input   : 5A / 1A AC
- Frequency range   : 40.00 to 60.00Hz
- Operating PF   : 0.00 Lag to 0.00 Lead (Full 4 quadrants)
- PF Resolution   : 0.01 PF
- Aux. Supply   : Self powered/External 110V AC or 230V AC

PFC 9059 / PFC 9059R

- PFC 9059 - 6 Stage PF Controller with transistor output suitable for switching thyristors
- PFC 9059R- 6 Stage PF Controller with relay output suitable for switching contactors
- 6-digit 0.34" seven segment red LED display
- 96(H) x 96(w) x 80(D) mm

PFC 9055 / PFC 9055R

- PFC 9055 - 12 Stage PF Controller with transistor output suitable for switching thyristors
- PFC 9055R - 12 Stage PF Controller with relay output suitable for switching contactors
- 7 digit 0.5" seven segment LED display
- External potential free digital input provided to select EB/DG setting (optional)
- RS-485 port for communication with MODBUS RTU protocol (optional)

PFC 9070/9070R (Enhanced Version)

- PFC 9070 - 12 Stage PF Controller with transistor output suitable for switching thyristors
- PFC 9070R - 12 Stage PF Controller with relay output suitable for switching contactors
- Monitors both grid and panel parameters
- 4 row 16 character LCD display
- Alarm against Over Voltage, Over Current, Over Compensation, Under Compensation & Step Fault
- THD measurement and alarm (optional)
- Disconnection of capacitor bank for excessive harmonics
- Connection of permanent capacitor value in addition to the measured required power E.g. for compensation of a transformer
- External potential free digital input provided to select EB/DG setting (optional)
- RS-485 port for communication with MODBUS RTU Protocol (optional)

DISPLAY OPTIONS

Grid Parameters
Voltage, Current, kW, kVA, kVAr, PF, Energy, Average Power Factor, Harmonics

Panel Parameters
Capacitor Current, Capacitor kVAr, kVArh Pumped by the panel

Alarm Status
Alr1 – Critical Alarm
Alr2 – Non-critical Alarm

Step History for each Step
Cycle count, Run Hour, Derating Percentage First value and Last value of Capacitor Bank

APPLICATIONS

- Power Factor imporvement in main incomers
- Wind turbine generators
- Hi-tech Soaftware Parks, Buildings and Shopping Malls
- Steel Rolling Mills and Process Industries

HARMONIC INDICATOR HAR 9000

- Display of True RMS voltage and current
- THD in % of voltage
- THD in % of current
- Individual Harmonic Amplitude and in % of voltage spectrum
- Individual Harmonic Amplitude and in % of current spectrum
- Displays upto 31st harmonic
- Total demand distortion (TDD) display
- Continuous harmonic monitoring

- Communication port RS485 with MODBUS-RTU to PC
- Derating of Transformer, cables, breakers can be decided.
- Effects of the mitigating devices / filters can be quantified
- Voltage:100 - 520V AC L-L for LT 30 - 140V AC L-L for HT
- Current   : 5A / 1A AC
- Accuracy : ±1% +1 LSD for magnitude ±2% over full scale for % values (for loads more than 20%)

APPLICATIOINS
- Load distribution centers for PCs, UPS, light loads
- Control panels used in drives rectifiers, power converters.
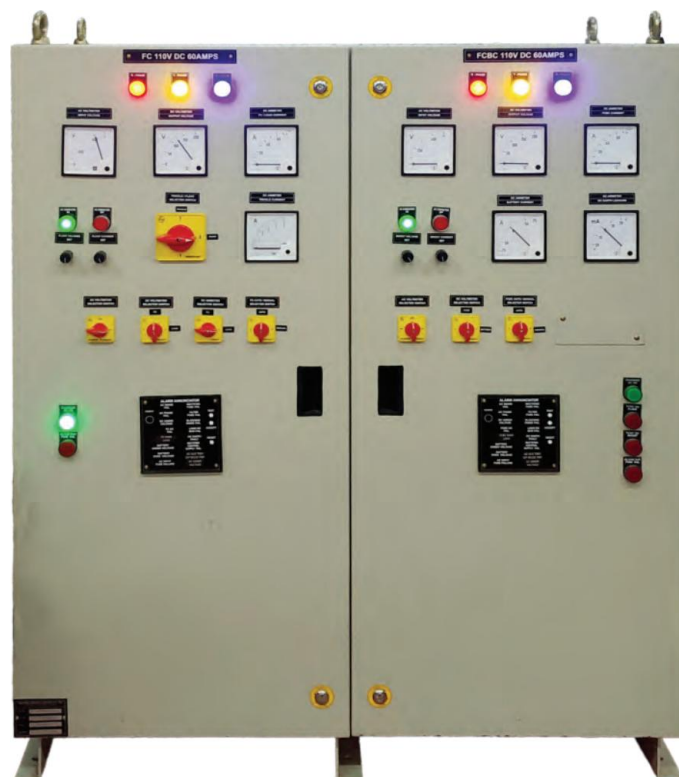- VAR compensation panels

BATTERY CHARGER

The ICD Battery Charger is designed to supply required DC Voltage and Current to the connected load and recharge the Battery on boost charging over it maintains the battery in float mode. The Battery Charger Provide regulated DC output form 1 Phase or 3Phase AC Source with ±10% variation in the input and perform satisfactorily under various load condition. The charger select automatically float and boost mode charging when discharged battery is connected. The Battery Charger ensures complete isolation from power supply by transformer and circuit design with high end micro controller and state of control scheme. ICD Battery charger is suitable for lead Acid Battery VRLA, Non VRLA and Ni-Cd Battery.

SALIENT FEATURES

- Micro controller based design and sophisticated control scheme ensure voltage and current regulation throughout range
- Input Current limit by soft start when charger is ON ■ LC Filter of adequate rating to limit required level of ripple
- Short circuit and over load protected
- Automatic float/Boost changeover depends on charger status
- Auto phase reversal is built in when supply phase is reversed
- Over voltage cutoff ensures load and battery banks are safe and secure
- Sophisticated panel manufacturing with 7 tank painting process.

SCHEMES

- Float cum Boost as combined
- Float Charger and Boost Charger as separate
- Redundant float cum boost charger
- Float charger and float cum boost charger

SPECIFICATION

PROTECTION	■ AC Input circuit breaker ■ AC input fuses ■ Fast acting semiconductor fuses for rectifier protection	■ DC Output circuit breaker ■ DC Output fuses ■ Filter protection fuses ■ Fuses for control circuit protection
SAFETY FEATURES	■ Soft start on DC Side ■ Short circuit protection	■ Battery reverse polarity ■ Output Current limit
TRIP PROTECTION	■ AC Overload ■ DC Earth Fault	■ AC Earth Fault ■ Over Temperature
INDICATIONS/ ANNUNCIATION	■ Input Supply Indication ■ Charger in float mode ■ Charger Over Voltage ■ Charger Fail/Trip	■ Charger ON ■ Charger in Boost Mode ■ Charger Over Load
ROUTINE TEST	■ Dimensional Measurement ■ HV Test ■ Measuring of Ripple ■ Measuring of Efficiency ■ PF and Harmonics ■ Transient response test	■ Insulation Test ■ Function Test ■ Measuring of Regulation ■ Indications & Controls Function Checking ■ Measurement(Optional) ■ Heat Run Test (Optional)
CABINET CONSTRUCTION	■ IP20 or IP42 Enclosures ■ Natural or Forced Cooling	■ Texture / Matt Finish Powder Coated ■ Floor Mounting
ENVIRONMENT CONDITIONS	■ Operating Temperature 0°C to 50°C ■ Humidity Range 0 to 95% RH	■ Storage Temperature -30°C to +70°C

HYBRID POWER FACTOR CORRECTION PANEL

INTRODUCTION

HPFC is another ingenious offering from the stable of ICD products. HAF (Hybrid Active Filter) combines active compensation technology with passive solution to active step-less and smooth reactive compensation. HPFC is available in different models and can be customized to meet Industrial needs. HPFC apart from being used for new setup they can be configured to work with existing APFC making it more attractive and cost effective. HPFC apart from delivering instantaneous power factor correction can manage Harmonics and any Unbalance based on resource availability. The USP of HAF is its capability to monitored online and the ability to work with both existing and new APFC system.

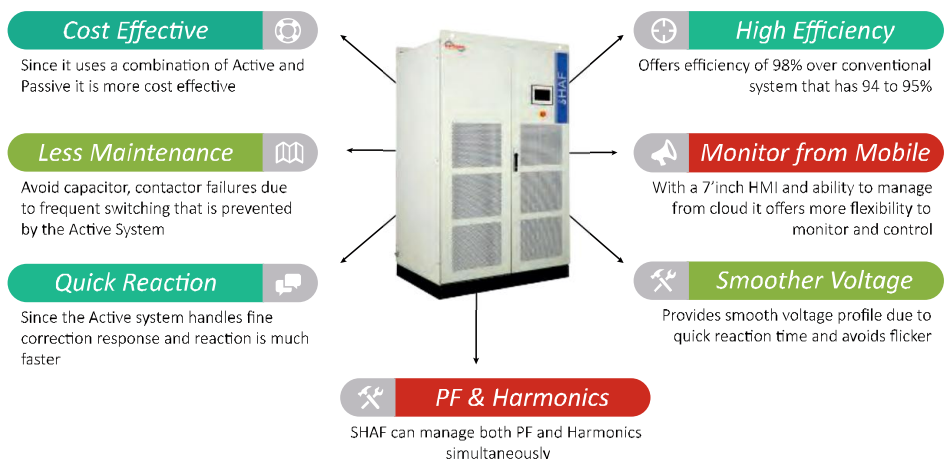| ACTIVE 3LEVEL TOPOLOGY	PASSIVE WITH 7% DHF	TOTAL OUTPUT
150A (100kVAr)	200kVAr (50 x 4)	300 kVAr
315A (225kVAr)	400kVAr (100 x 4 or 50 x 8)	625 kVAr
630A (450kVAr)	600kVAr (100 x 6 or 75 x 8)	1050 kVAr

What is HPFC?

- Combination of Active and Passive compensation technology
- Achieve stepless compensation cost effectively
- Works with detuned APFC/TSC to offer better and smarter reactive power compensation
- Manage harmonics along with Reactive Power

Features of HPFC

Dynamic (Stepless) fast Reactive Power compensation
Capacitor units controlled smartly and no frequent switching
Far cheaper than a 100% Active System of similar Rating
High Efficiency
Both lagging and leading compensation
High speed instant response (milliseconds)
No chances of Over compensation/under compensation
Very compact
Can mange Power factor and Harmonics simultaneously

Go for it...

ADVANTAGES

Cost Effective
Since it uses a combination of Active and Passive it is more cost effective

Less Maintenance
Avoid capacitor, contactor failures due to frequent switching that is prevented by the Active System

Quick Reaction
Since the Active system handles fine correction response and reaction is much faster

High Efficiency
Offers efficiency of 98% over conventional system that has 94 to 95%

Monitor from Mobile
With a 7'inch HMI and ability to manage from cloud it offers more flexibility to monitor and control

Smoother Voltage
Provides smooth voltage profile due to quick reaction time and avoids flicker

PF & Harmonics
SHAF can manage both PF and Harmonics simultaneously

APPLICATIONS

- 1Ø and 3Ø Welding Equipments
- Wind Turbine Generators
- Robotic Machinery
- Steel Rolling Mills
- Elevators, Cranes, Presses
- IT Companies, Hospitals
- Water Treatment Plants
- Air-conditioning etc.

ACTIVE HARMONIC FILTERS

PRODUCT RANGE

Product Name	Voltage	Current	Phase
ASTRA-AHF-415Voltage Range	380V-480V	60A to 630A	3
ASTRA-AHF-690Voltage Range	480V-690V	160A to 320A	3
ASTRA-AHF-690Voltage 1PhaseRange	480V-690V	400A to 800A	1

PRODUCT SPECIFICATIONS

ELECTRICAL CHARACTERISTICS	
Nominal voltage	3P3W 380-480V, 3P3W 480-690V, 1P2W 480-690V
Nominal Frequency	50/60 Hz ± 5%
Number of phases	1-Phase/3-Phase
SYSTEM CHARACTERISTICS	
Topology	Three Level Technology
Losses	<= 2%
Spectrum(Harmonic) cancellation	2nd to 61st Order
Harmonic Attenuation	99%
Voltage flicker control	Available
Power factor correction	0.6 Lag to 0.6 Lead
Mains current balancing	Available
Current transformers (CT) for Sensing	No Separate CT Required (Existing 100~32767/5A)
Quantity of CT	3 for 3-Phase and 1 for 1-Phase
CT VA loading	1 VA For Controller
Control basis	Closed Loop
CT Position	Source Side
Parallel operation	Unlimited Parallel Operation
Parallel redundancy	Fully Redundant
Reaction time	0.1ms
Steady state response time	1ms
Noise level (ISO3746)	Typically 65 db*
Colour	RAL-7035
DISPLAY AND COMMUNICATION	
Display	7" inch Colour Touch Screen
Display parameters	All Power Parameters (Harmonic Spectrum, Wave Form, Vector Diagram, Panel Parameters, Protection, Fault Logger and more)
Communications Capability	CAN/MODBUS Over TCP/IP/RS485/http/SSL
OPERATING CONDITIONS	
Protection (enclosure)	IP-42
Operating Temperature Range	10OC to 55OC
Auto derating of AHF output	2% Per degree after 40OC
Relative humidity	5% to 95%,non condensing

FEATURES

- Available from 380 to 690 Voltage, 30 to 630 Amps 3-Level Topology
- Extremely Efficient
- Low Losses
- Hybrid Compensation
- Handles Floating grid
- Auto Voltage Stabilization
- 98% Efficiency
- Eliminate Grid Resonance
- Dual Quad core DSP Processor 4.4 GHz Inbuilt Cloud
- Connectivity Smart Operation Mode
- Upto 61st order filtering
- 7" Graphical Display

APPLICATIONS

Steel, Cement, Textile, Railways, Process, Automotive and other manufacturing Industries

Services

Harmonic Analysis Study

Objective

The objective of the study is to measure the Total Harmonic Distribution, Order of individual harmonics, Power Factor at the Distribution Transformer and Outgoing Feeders to give solution for Power Factor Improvement and Harmonic Mitigation.

Methodology of the study

■ Phase 1: Site study and Audit Plan

■ Phase 2: Data collection and Field Monitoring Program

■ Phase 3: Data Analysis & Report Preparation

Audit Planning

Based on the information obtained, a comprehensive work method would be developed for carrying out the power quality audit. Provision required for field measurement and depth of review at load centre would also be planned along with the client electrical / energy engineers prior to measurement.

Data Collection

The following information collected from the client resource personnel during the visit for Harmonic Audit.

1. Details of transformers and its connected load
2. List of non - linear loads across the Distribution Transformer
3. Capacity of installed capacitor bank / APFC panel and its location
4. Energy Management procedures
5. Single line Diagram of the Distribution System

Data Analysis and Report Preparation

Based on the audit findings and detailed analysis, the power quality audit report is prepared and verified to be in accordance with IEEE - 519 : 1992 standards. Also the power quality issues if observed is high-lightened and the audit findings is submitted. Based on the final observed data across the measured feeders, the recommendations / proposal for the harmonic filter implementations are derived and submitted.

Installation and Commissioning

ICD caters meter installation & commissioning services for Energy Management System which covers

■ Taking panel cutouts for new meters

■ Net working of meters using RS485 communication cable or RJ45 Ethernet CAT6 cable

■ Laying of Armoured or Unarmored cable

■ PT & CT wiring to meters

■ Laying of Fiber optic cable

■ Development, supply & installation of SCADA software package for Energy Management System

Customized Jobs

■ Apart from the standard Manufacturing products ICD provides solutions to industries for their process needs by doing the customized jobs

■ With our detailed experts in design and development ICD can provide Industries the best optimized solutions

Our Clients

■ Automobiles	■ Aluminium Industries
■ Cement Factories	■ Petro Chemical Industries
■ Steel Industries	■ Paper Mills
■ Power Plants	■ Wind Mills
■ Tyre Industries	■ OEM
■ IT Parks	■ Commercial Complex - Malls
■ Railways	■ Textile Industries
■ Townships	■ Data Centres

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