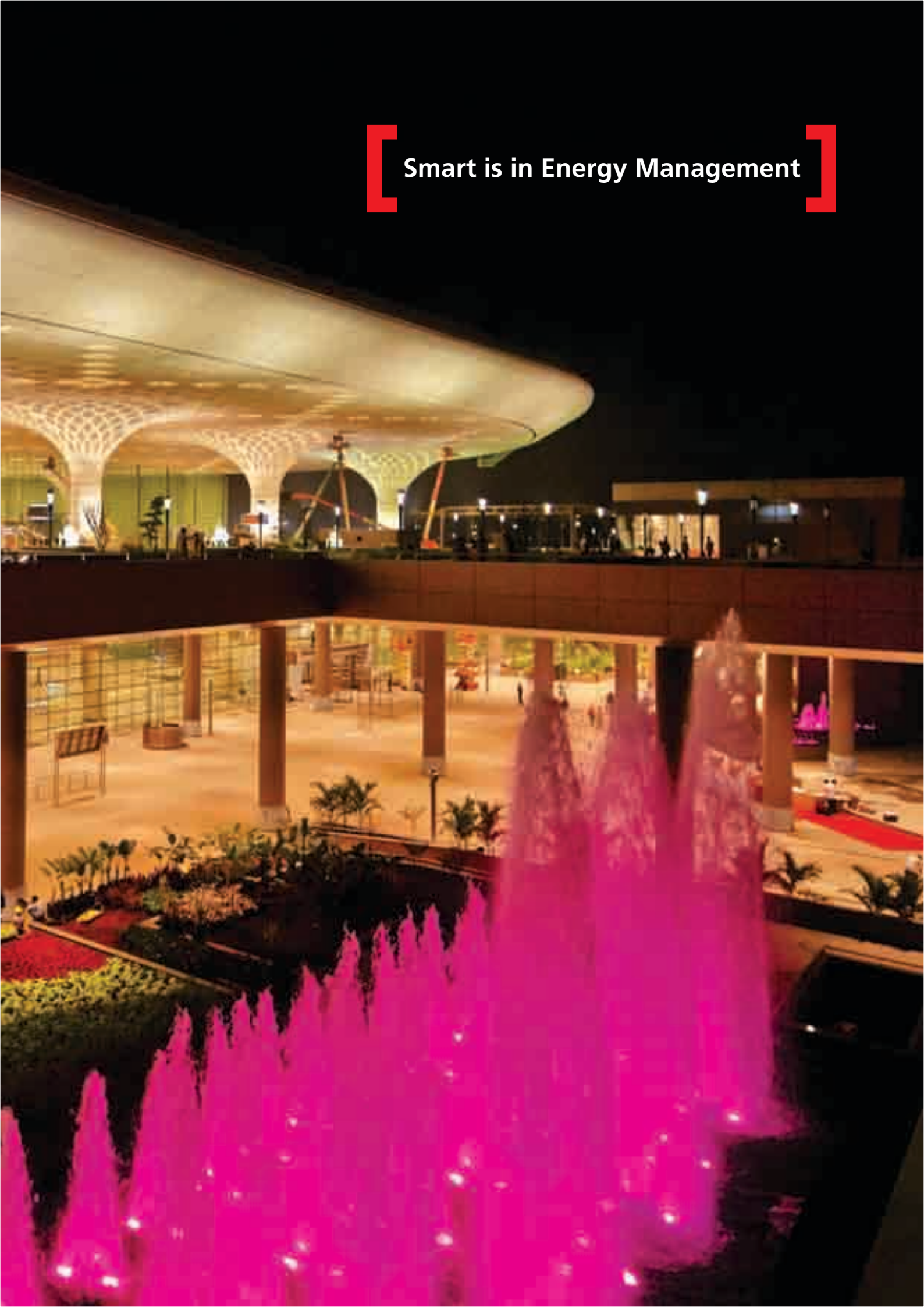
LARSEN & TOUBRO

# Energy Management Solutions


L&T SWITCHGEAR
SAFE & SURE


Smart is in Energy Management

# About Us

L&T Electrical & Automation business, part of technology, engineering, construction, manufacturing and financial services conglomerate Larsen & Toubro, offers products and solutions in low and medium voltage categories. Committed to sustainable business growth through energy efficient processes and the optimized use of resources, L&T charts and pursues its business goals and environmental responsibilities in the same spirit.

Our Green Factory at Vadodara and 17 Green Buildings stand testimony to this commitment. We have 2.3 million sq. ft. of certified green space. We are passionate about safe, reliable and efficient use of electrical energy. Our factory at Mahape has been declared a 4-star energy efficient facility by the Bureau of Energy Efficiency. All our switchgear factories are compliant to ISO 50001 standard. These facilities inspire us to translate our knowledge into products like meters, power factor improvement capacitors, drives and solutions in energy management and plant automation that help improve productivity and reduce energy consumption in buildings and industry.

We believe in thought leadership and through our Switchgear Training Centres, we have trained a number of budding electrical professionals, promoting good electrical practices in the country.

## Energy Management

The world is seeking smarter solutions with optimized utilization of resources to reduce cost and thereby achieve savings.

L&T Electrical & Automation offers a range of ecofriendly products, systems, services and software for industrial, commercial and residential applications. We offer products and solutions that saves energy like AC drives, Power factor improvement capacitors, Detuned and Active Harmonic filters, Industrial and Building management systems. We also offer products that assists energy savings like Lighting controls, Metering systems. Our Green product portfolio helps our customers to meet energy efficiency.

At L&T, we have been constantly integrating more sustainable ways of working across our business - from design to production to logistics. While offering the best in class products we are limiting our ecological footprints.

**Renewable Energy**

18.2 million units (kWh) of renewable energy used in campuses, contributing to more than 5% of our electrical energy mix

**Energy Conservation**

More than 76 million units (kWh) of energy saved avoiding over 60,916 tons of $CO_2$ emissions at our establishments, cumulatively in last eight years.

**GHG Emissions**

25.13% decrease in Scope 1 Specific Green House Gas (GHG) emission intensity as compared to 2011-12

**Material Management**

22,317 Tons of steel and 470 Tons of zinc recycled during last five years; 6 tons of Aluminum has also been recycled by our Shipbuilding business, this year

**Water Efficiency**

8 campuses are water positive and 28 campuses continue to maintain 'Zero waste-water discharge' status

**Green Building**

L&T now has 17 Green Buildings including 1 Green Factory within its campuses, amounting to 2.3 million sq.ft of certified green building space at campuses.

Manufacturers, corporations, utilities, energy service companies, and other organizations are using ISO 50001 to reduce costs and carbon emissions.

The purpose of ISO 50001 is to enable organizations to establish the systems and process necessary to improve energy performance including energy efficiency, use and consumption. Implementation of this standard is intended to lead in reductions in greenhouse gas emissions and other related environmental impact and energy cost through systematic management of energy. This standard is applicable to all types and sizes of organizations, irrespective of geographical, cultural or social conditions. Successful implementation depends on commitment from all level and functions of the organization and especially from top management.

## Larsen & Toubro LEED Rated Green Buildings

*Technology Block, Hazira*

*Administrative Building, Kattupalli*

*Office Complex, Talegaon*

*SBU Block (2nd floor), Hazira*

*Administrative Building, LTSSHF, Hazira*

*Office building, Coimbatore*

*Office Complex, Ahmednagar*

*Unnati building at C&A Mahape (Navi Mumbai)*

*Knowledge City, Vadodara*

*North Block II, Mumbai*

*Learning Centre - LDA, Lonavala*

*Infotech TC 1, Mumbai*

*Green Factory, Vadodara*

*EDRC, Chennai*

*L&T TC III, Chennai*

*Administrative Building, Vadodara*

*L&T TC II, Chennai*

This standard specifies energy management system requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. An energy management system performance demonstrates the conformity of the system to the requirements of this standards. This standard applies to the activities under the control of the organization and can be customized to fit the specific requirements of the organizations, including the complexity of the system, degree of documentation, and resources.

This standard is based on the Plan–Do-Check-act (PDCA) continual improvement framework and incorporates energy management into everyday organizational practices, as illustrated in figure 1.

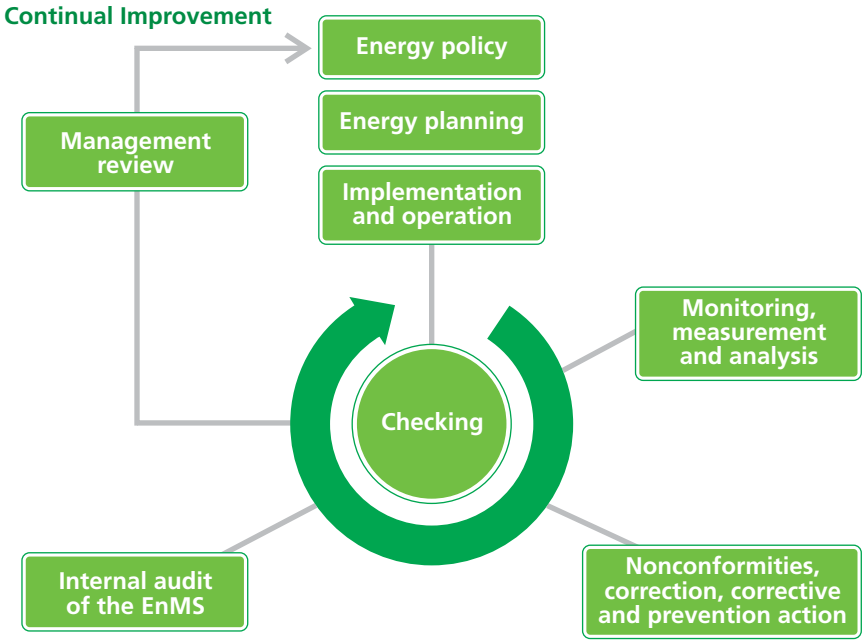



Figure1 - Energy management system model for this international standard

The PDCA approach can be outlined as follows:

PLAN: Conduct energy review and establish the baseline, energy performance indicators, objectives, targets and action plans necessary to deliver results that will improve energy performance in accordance with the organizations energy policy.

DO: Implement the energy management action plans

CHECK: Monitor and measure processes and the key characteristics of operations that determine energy performance against the energy policy and objectives, and report the results

ACT: Take actions to continually improve energy performance and the energy management system.

The implementation of an energy management system is intended to result in improved energy performance. This standard is based on the premise that the organization will periodically review and evaluate its energy management system in order to identify opportunities for improvement and their implementation.

Measurement and monitoring always provides the insight you need to start and sustain an effective energy management program.

**SmartComm EMS** software that enables the user and the organization to identify areas of energy wastage and improve the operations of its system, processes or equipment. Analysis of the electrical system for energy usage can be done with the help of this software.

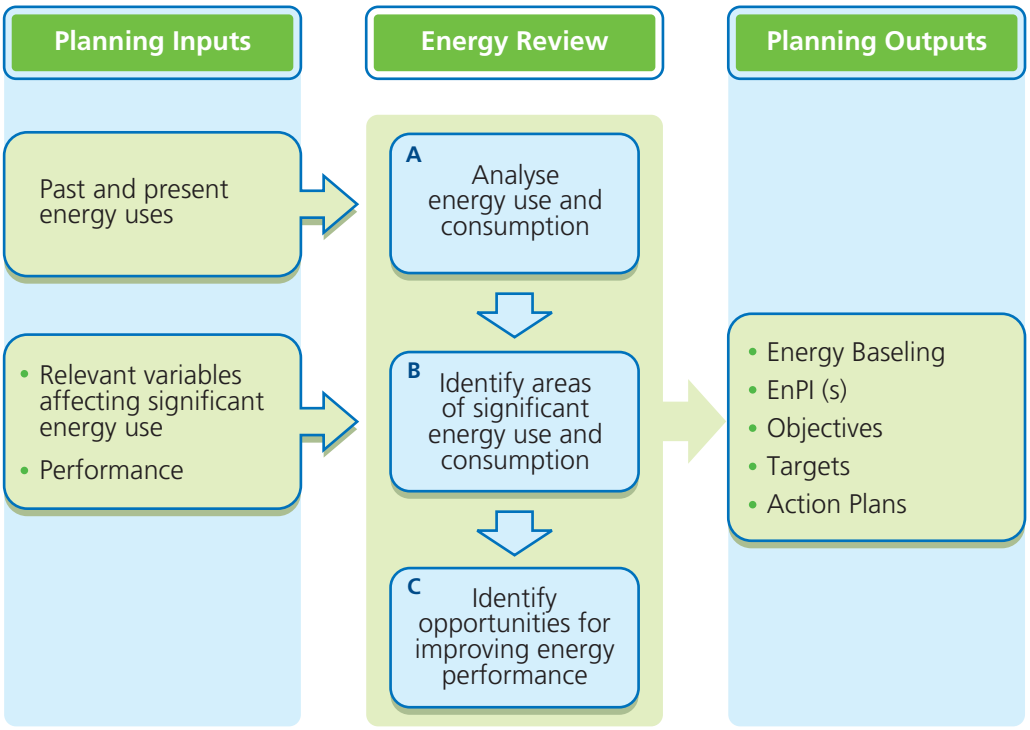
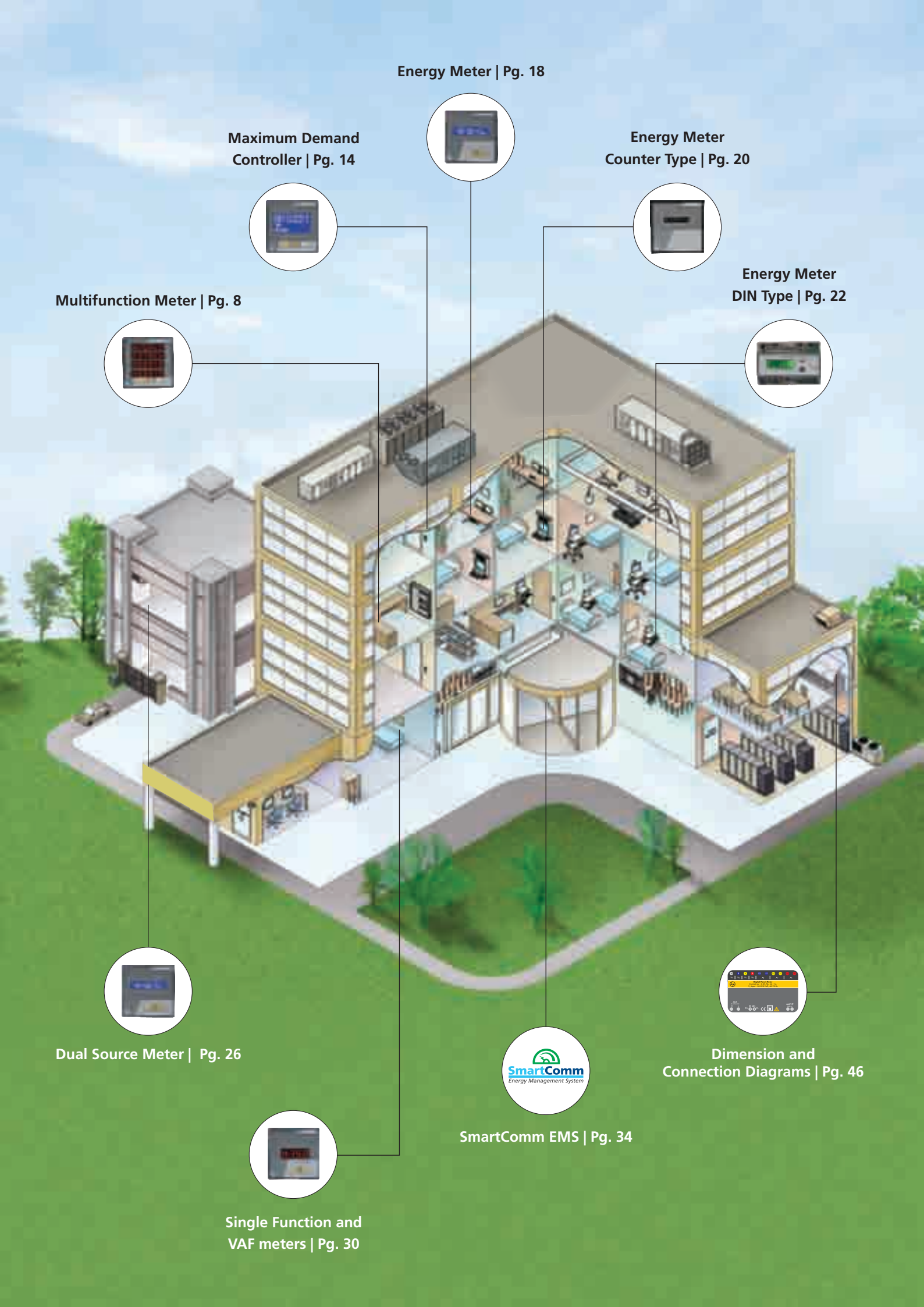



Figure 2 - Energy planning process concept diagram

The implementation of an energy management system is intended to result in improved energy performance this standard is based on the premise that the organization will periodically review and evaluate its energy management system in order to identify opportunities for improvement and their implementation

Measurement and monitoring always provides the insight you need to start and sustain an effective energy management program.

**Analysis of the electrical system for energy usage can be done with the help of SmartComm EMS software which enables the user and the organization to identify areas of energy wastage and improve the operations of its system, processes or equipment.**


Energy Meter | Pg. 18
Maximum Demand Controller | Pg. 14
Energy Meter Counter Type | Pg. 20
Multifunction Meter | Pg. 8
Energy Meter DIN Type | Pg. 22
Dual Source Meter | Pg. 26
SmartComm
Energy Management System
Dimension and Connection Diagrams | Pg. 46
SmartComm EMS | Pg. 34
Single Function and VAF meters | Pg. 30

# Multifunction Meter

- Accuracy Class 1 as per IEC 62053-21 and Class 0.5, 0.5S, 0.2, 0.2S as per IEC 62053-22
- True RMS measurement
- Expert in Load monitoring
- Password protection provision for security
- THD for Voltage and Current (31st Individual harmonics in 5000 series)
- Phase wise Voltage & Current wave forms in LCD meter
- Site selectable for 3 Phase 4 wire, 3 Phase 3 wire, 1 Phase
- Maximum Demand measurement with real time clock in 4440 & 5000 series
- Analog output can be independently programmed for 0-20 / 4-20 mA configurable for VLL, A, F, W, PF, VA.
- Data logging provision is available in 5000 series
- Auto scrolling and freeze mode for constant single page viewing available
- Terminals with sealing provision (optional)
- Direct access key for Basic parameters, Power and Energy parameters
- My Favourite screen option for user selectable parameters in LCD series

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire, 3 Phase 3 Wire, 1 Phase<br>True RMS, 128 samples per cycle except 4400 (64 samples)<br>1 sec update time, 4 Quadrant Power & Energy in select models |
| Measurement Accuracy | | Class 1 as per IEC 62053-21<br>Class 0.5, 0.2 as per IEC 62053-22<br>Class 0.5S, 0.2S as per IEC 62053-22 |
| Display type and resolution | LED | 4 digit for instantaneous and 6 digits for cummulative |
| Measuring circuit | Input voltage | 50 - 550 VLL<br>PT Primary and Secondary user programmable for LT and HT applications<br>Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable<br>Current range from 10% to 120% of In (50mA-6A),<br>Starting current: 0.4% of full scale<br>CT Primary and Secondary user programmable for LT and HT applications |
| | Frequency | 40-70 Hz |
| Auxilliary circuit | Aux voltage | 80 - 300VAC/DC |
| | Aux burden | <5VA |
| | Freq range | 40-70 Hz |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62053-21 |
| | Short time over current protection | 10A max continuous, 20 times of In for 3 sec |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V/m as per IEC 61000-4-6 |
| | Surge immunity test | ±6 kV as per IEC 61000-4-5 |
| | Rated power frequency magnetic fields | 1 A/m as per IEC 61000-4-8 |
| | Emission | Class B as per CISPR 22 |
| Insulation Properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| Operating Conditions | Operating temperature | -10°C to +55°C |
| | Storage temperature | -25°C to +70°C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical Conditions | Shock | As per standard IEC 60068-2 |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Safety | Measurement category | CAT III |
| | Pollution degree | 2 |
| | Protection | IP20 at terminals, IP 51 when mounted on panel |
| Weight and Dimensions | Product weight | 300 gms |
| | Bezel dimension (W X H X D) | 96 X 96 X 58 mm |
| | Panel cutout | 92 X 92 mm |
| Outputs | | Meter constant for LED 4400 series: 1250/ (external CT ratio X PT ratio)<br>Meter constant for LCD 4400 series: 2500/ (external CT ratio X PT ratio)<br>Meter constant for 44xx & 50xx series :10000/ (external CT ratio X PT ratio) |
| Communication | Type | RS485 port Modbus RTU, Ethernet (optional) |
| | Baud rate | 2400, 4800, 9600, 19200 bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## Parameter List

| | Parameters | 4400 | 4410 | 4420 | 4430 | 4400 | 5000 | 5010 |
|---|---|---|---|---|---|---|---|---|
| Instantaneous Parameters | V1, V2, V3, V12, V23, V31, Avg (VLN, VLL) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | A1, A2, A3, Aavg | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | An (Computed) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | % A Unbal, % V Unbal (Avg and Phase wise) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | PF-1, PF-2, PF-3, PF (Avg) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | RPM (Rotations per minute) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase Angle A°1, A°2, A°3, V°1, V°2, V°3 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | W1, W2, W3, W(total) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VA1, VA2, VA3, VA(total) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VAR1, VAR2, VAR3, VAR(total) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cumulative Parameters | Import Wh | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Import VAh | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Import VArh (Lead & Lag) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Import load hours | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Export Wh | | | | ✓ | | | ✓ |
| | Export Vah | | | | ✓ | | | ✓ |
| | Export Varh (Lead & Lag) | | | | ✓ | | | ✓ |
| | Export run hours | | | | ✓ | | | ✓ |
| | No of Interrupts | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Reset (old) Cumulative parameters | Import Wh | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Import Vah | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Import Varh (Lead & Lag) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Import load hours | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Export Wh | | | | ✓ | | | ✓ |
| | Export Vah | | | | ✓ | | | ✓ |
| | Export Varh (Lead & Lag) | | | | ✓ | | | ✓ |
| | Export run hours | | | | ✓ | | | ✓ |
| Harmonic | V THD%, V1, V2, V3 - harmonic | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | A THD%, A1, A2, A3, - harmonic | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Individual harmonics upto 31st (V,A) | | | | | | ✓ | ✓ |
| Demand / Load parameters | Maximum demand MD W, MD VA, MD VAr - max avg A (without RTC) | | | ✓ | ✓ | | | |
| | Maximum demand MD W, MD VA, MD VAr - max avg A (with RTC) | | | | | ✓ | ✓ | ✓ |
| | Max MD & occurence time | | | | | | ✓ | ✓ |
| | Time of Day (TOD) | | | | | | Optional | |
| Min / max value | VLL, VLN, A, F, W, VA, VAr, PF | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Others | Datalog (8MB) | | | | | | ✓ | |
| Communication | RS485 Modus RTU | Optional | Optional | Optional | Optional | Optional | Optional | Optional |
| | Ethernet | | | | | | Optional | |
| Input and Output | Digital and Analog (input and output ) | | | | | | Optional | |

## Ordering Information

| Description | CAT No. |
|---|---|
| **4400 Series** | |
| MFM 4400 LED meter Cl 1 | WL440010OOOO |
| MFM 4400 LED meter Cl 1 with RS485 | WL440011OOOO |
| MFM 4400 LED meter Cl 0.5 with RS485 | WL440021OOOO |
| MFM 4400 LED meter Cl 0.5S with RS485 | WL440031OOOO |
| MFM 4400 LCD meter Cl 1 | WC440010OOOO |
| MFM 4400 LCD meter Cl 1 with RS485 | WC440011OOOO |
| **4410 Series** | |
| MFM 4410 LED meter Cl 1 | WL441010OOOO |
| MFM 4410 LED meter Cl 1 with RS485 | WL441011OOOO |
| MFM 4410 LED meter Cl 0.5 with RS485 | WL441021OOOO |
| MFM 4410 LED meter Cl 0.5S with RS485 | WL441031OOOO |
| MFM 4410 LED meter Cl 0.2 with RS485 | WL441041OOOO |
| MFM 4410 LED meter Cl 0.2S with RS485 | WL441051OOOO |
| MFM 4410 LCD meter Cl 1 | WC441010OOOO |
| MFM 4410 LCD meter Cl 1 with RS485 | WC441011OOOO |
| MFM 4410 LCD meter Cl 0.5 with RS485 | WC441021OOOO |
| MFM 4410 LCD meter Cl 0.5S with RS485 | WC441031OOOO |
| MFM 4410 LCD meter Cl 0.2 with RS485 | WC441041OOOO |
| MFM 4410 LCD meter Cl 0.2S with RS485 | WC441051OOOO |
| **4420 Series** | |
| MFM 4420 LED meter Cl 1 | WL442010OOOO |
| MFM 4420 LED meter Cl 1 with RS485 | WL442011OOOO |
| MFM 4420 LED meter Cl 0.5 with RS485 | WL442021OOOO |
| MFM 4420 LED meter Cl 0.5S with RS485 | WL442031OOOO |
| MFM 4420 LED meter Cl 0.2 with RS485 | WL442041OOOO |
| MFM 4420 LED meter Cl 0.2S with RS485 | WL442051OOOO |
| MFM 4420 LCD meter Cl 1 | WC442010OOOO |
| MFM 4420 LCD meter Cl 1 with RS485 | WC442011OOOO |
| MFM 4420 LCD meter Cl 0.5 with RS485 | WC442021OOOO |
| MFM 4420 LCD meter Cl 0.5S with RS485 | WC442031OOOO |
| MFM 4420 LCD meter Cl 0.2 with RS485 | WC442041OOOO |
| MFM 4420 LCD meter Cl 0.2S with RS485 | WC442051OOOO |

| Description | CAT No. |
|---|---|
| **4430 Series** | |
| MFM 4430 LED meter Cl 1 | WL443010OOOO |
| MFM 4430 LED meter Cl 1 with RS485 | WL443011OOOO |
| MFM 4430 LED meter Cl 0.5 with RS485 | WL443021OOOO |
| MFM 4430 LED meter Cl 0.5S with RS485 | WL443031OOOO |
| MFM 4430 LED meter Cl 0.2 with RS485 | WL443041OOOO |
| MFM 4430 LED meter Cl 0.2S with RS485 | WL443051OOOO |
| MFM 4430 LCD meter Cl 1 | WC443010OOOO |
| MFM 4430 LCD meter Cl 1 with RS485 | WC443011OOOO |
| MFM 4430 LCD meter Cl 0.5 with RS485 | WC443021OOOO |
| MFM 4430 LCD meter Cl 0.5S with RS485 | WC443031OOOO |
| MFM 4430 LCD meter Cl 0.2 with RS485 | WC443041OOOO |
| MFM 4430 LCD meter Cl 0.2S with RS485 | WC443051OOOO |
| **4440 Series** | |
| MFM 4440 LED meter Cl 1 with RS485 | WL444011OOOO |
| MFM 4440 LED meter Cl 0.5 with RS485 | WL444021OOOO |
| MFM 4440 LED meter Cl 0.2 with RS485 | WL444041OOOO |
| MFM 4440 LCD meter Cl 1 with RS485 | WC444011OOOO |
| MFM 4440 LCD meter Cl 0.5 with RS485 | WC444021OOOO |
| MFM 4440 LCD meter Cl 0.2 with RS485 | WC444041OOOO |
| **5000 Series** | |
| MFM 5000 LED meter Cl 1 with RS485 | WL500011OOOO |
| MFM 5000 LED meter Cl 1 with Ethernet | WL500012OOOO |
| MFM 5000 LED meter Cl 0.5 with Ethernet | WL500022OOOO |
| MFM 5000 LED meter Cl 0.5S with Ethernet | WL500032OOOO |
| MFM 5000 LCD meter Cl 1 with RS485 | WC500011OOOO |
| MFM 5000 LCD meter Cl 1 with Ethernet | WC500012OOOO |
| MFM 5000 LCD meter Cl 0.5 with RS485 | WC500021OOOO |
| MFM 5000 LCD meter Cl 0.5S with RS485 | WC500031OOOO |
| MFM 5000 LCD meter Cl 0.5 with Ethernet | WC500022OOOO |
| MFM 5000 LCD meter Cl 0.5S with Ethernet | WC500032OOOO |
| MFM 5000 LCD meter Cl 0.2 with RS485 | WC500041OOOO |
| MFM 5000 LCD meter Cl 0.2S with RS485 | WC500051OOOO |
| **5010 Series** | |
| MFM 5010 LED meter Cl 1 | WL501010OOOO |
| MFM 5010 LED meter Cl 1 with RS485 | WL501011OOOO |
| MFM 5010 LED meter Cl 0.5S | WL501030OOOO |
| MFM 5010 LED meter Cl 0.5S with RS485 | WL501031OOOO |
| MFM 5010 LED meter Cl 0.2 with RS485 | WL501041OOOO |

- ## Maximum Demand Charges

  MD registered during month / billing period. This is the maximum load placed on the utility's system by your facility's equipment ad recorded over a specific interval of time.

- ## Time Of Day (TOD)

  Utility charges different rates for different time of the day for energy consumption.

- ## Energy Charges

  Total amount of energy consume during the billing period, often levied in slabs of use rates. Some utilities now charge on the basis of apparent energy (kVAh), which is a vector sum of KWh and KVArh.

- ## PF Penalty / Incentive

  Penalty or bonus rate are levied by most utilities for maintaining power factor and load factor as per tariff structure provisions.

# Maximum Demand Controller

- Accuracy Class 1 as per IEC 62053-21
- True RMS measurement
- Password Protection provision for security
- Phase wise Voltage & Current Wave Forms in LCD meter
- Site selectable for 3 Phase 4 wire, 3 Phase 3 wire, 1 phase
- Maximum demand measurement with Real time clock
- Time of Day (TOD) provision is available
- 6 Demand and 6 Energy option with MD occurance captured for each TOD
- 4 relay outputs available for proper load control
- Data logging provision is available
- Auto scrolling and freeze mode for constant single page viewing available
- Terminals with sealing provision (optional)
- Direct access key for Basic parameters, Power and Energy parameters

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire, 3 Phase 3 Wire, 1 Phase<br>True RMS, 128 samples per cycle<br>1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21 |
| Display type and resolution | LED | 4 digit for instantaneous and 6 digits for cummulative |
| | LCD | 4 digit for instantaneous and 7 digits for cummulative |
| Measuring circuit | Input voltage | 50 - 550 VLL<br>PT Primary and Secondary user programmable for LT and HT applications<br>Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable<br>Current range from 10% to 120% of In (50mA-5A),<br>Starting current: 0.4% of full scale<br>CT Primary and Secondary user programmable for LT and HT applications |
| | Frequency | 40-70 Hz |
| Auxilliary circuit | Aux voltage | 80 - 300VAC/DC |
| | Aux burden | <5VA |
| | Freq range | 40-70 Hz |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62053-21 |
| | Short time over current protection | 10A max continuous, 20 times of In for 3 sec |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V/m as per IEC 61000-4-6 |
| | Surge immunity test | ±6 kV as per IEC 61000-4-5 |
| | Rated power frequency magnetic fields | 1 A/m as per IEC 61000-4-8 |
| | Emission | Class B as per CISPR 22 |
| Insulation Properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| Operating Conditions | Operating temperature | -10°C to +55°C |
| | Storage temperature | -25°C to +70°C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical Conditions | Shock | As per standard IEC 60068-2 |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Safety | Measurement category | CAT III |
| | Pollution degree | 2 |
| | Protection | IP20 at terminals, IP 51 when mounted on panel |
| Weight and Dimensions | Product weight | 300 gms |
| | Bezel dimension (W X H X D) | 96 X 96 X 58 mm |
| | Panel cutout | 92 X 92 mm |
| Outputs | | 4 Relay outputs 240VAC , 30VDC, 2A resistive<br>Meter constant for 4400 series: 10000/ (external CT ratio X PT ratio) |
| Communication | Type | RS485 port Modbus RTU |
| | Baud rate | 2400, 4800, 9600, 19200 bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## Parameter List

| | Parameters | 6000 |
|---|---|---|
| Instantaneous parameters | V1, V2, V3, V12, V23, V31, Avg (VLN, VLL) | ✓ |
| | A1, A2, A3, Aavg | ✓ |
| | An (Computed) | ✓ |
| | F | ✓ |
| | % A Unbal, % V Unbal (Avg and Phase wise) | ✓ |
| | PF-1, PF-2, PF-3, PF (Avg) | ✓ |
| | RPM (Rotations per minute) | ✓ |
| | Phase Angle A°1, A°2, A°3, V°1, V°2, V°3 | ✓ |
| | W1, W2, W3, W(total) | ✓ |
| | VA1, VA2, VA3, VA(total) | ✓ |
| | VAR1, VAR2, VAR3, VAR(total) | ✓ |
| Cumulative Parameters | Import Wh | ✓ |
| | Import VAh | ✓ |
| | Import VArh (Lead & Lag) | ✓ |
| | Import load hours | ✓ |
| | No of Interrupts | ✓ |
| Reset (old) Cumulative parameters | Import Wh | ✓ |
| | Import Vah | ✓ |
| | Import Varh (Lead & Lag) | ✓ |
| | Import load hours | ✓ |
| Harmonic | V THD%, V1, V2, V3 - harmonic | ✓ |
| | A THD%, A1, A2, A3, - harmonic | ✓ |
| Demand / Load parameters | Maximum demand MD W, MD VA, MD VAr, Max Avg A (with RTC) | ✓ |
| | Max MD & occurence time | ✓ |
| Min / max value | VLL, VLN, A, F, W, VA, VAr, PF | ✓ |
| Others | Datalog (8MB) | ✓ |
| Communication | RS485 Modus RTU | Optional |
| Output | | 4 Relay outputs |

## Ordering Information

| Description | CAT No. |
|---|---|
| **6000 Series** | |
| MDC 6000 LED meter Cl 1 with RS485 | WL600011OOOO |
| MFM 6000 LCD meter Cl 1 with RS485 | WC600011OOOO |
| MDC 6000 LED meter Cl 0.5S with RS485 | WL600031OOOO |

# Energy Meter

- Accuracy Class 1 as per IEC 62053-21 and Class 0.5 as per IEC 62053-22
- True RMS measurement
- Simultaneous sampling of Volts & Amps
- Positive energy accumulation even with CT polarity reversal, reverse lock programmable
- User programmable password protection
- Auto scrolling
- Auto-scaling of Kilo, Mega, Giga values
- Low PT, CT burden
- Programmable PT, CT ratio
- Site selectable for 3 Phase 4 wire, 3 Phase 3 wire, 1 phase
- Old register to store the previously cleared energy value
- Wide operating range of 80 to 300 V AC/DC auxiliary supply
- Site selectable 1A/5A CT secondary

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire, 3 Phase 3 Wire, 1 Phase<br>True RMS, 64 samples per cycle<br>1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21<br>Class 0.5 as per IEC 62053-22<br>Class 0.2 as per IEC 62053-22 |
| Display type and resolution | LED | 4 digit for instantaneous and 6 digits for cummulative |
| | LCD | 4 digit for instantaneous and 7 digits for cummulative |
| Measuring circuit | Input voltage | 50 - 550 VLL<br>PT Primary and Secondary user programmable for LT and HT applications<br>Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable<br>Current range from 10% to 120% of In (50mA-5A),<br>Starting current: 0.4% of full scale<br>CT Primary and Secondary user programmable for LT and HT applications |
| | Frequency | 40-70 Hz |
| Auxilliary circuit | Aux voltage<br>Aux burden<br>Freq range | 80 - 300VAC/DC<br><5VA<br>40-70 Hz |
| Electrical requirements | Test of power consumption<br>Voltage dips and interrupts<br>Short time over current protection | as per IEC 62053-21<br>as per IEC 62053-21<br>10A max continuous, 20 times of In for 3 sec |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test<br>Immunity to electrostatic discharge<br>Radiated, radio-frequency, electromagnetic field immunity test<br>Immunity to electromagnetic HF fields through conducted lines<br>Surge immunity test<br>Rated power frequency magnetic fields<br>Emission | ±4 kV as per IEC 61000-4-4<br>±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2<br>10 V/m as per 61000-4-3<br>10 V/m as per IEC 61000-4-6<br>±6 kV as per IEC 61000-4-5<br>1 A/m as per IEC 61000-4-8<br>Class B as per CISPR 22 |
| Insulation Properties | Impulse voltage test<br>AC voltage test | ±6 kV as per IEC 62052-11<br>4 kV double insulation as per IEC 62053-21 |
| Operating Conditions | Operating temperature<br>Storage temperature<br>Humidity<br>Recommended wire | -10°C to +55°C<br>-25°C to +70°C<br>5% to 95% relative humidity non-condensing<br>2.5 sq mm |
| Mechanical Conditions | Shock<br>Vibration<br>Casing | As per standard IEC 60068-2<br>10 to 55 Hz, 0.15 mm amplitude<br>Plastic mould protected to IP51 from front side |
| Safety | Measurement category<br>Pollution degree<br>Protection | CAT III<br>2<br>IP20 at terminals, IP 51 when mounted on panel |
| Weight and Dimensions | Product weight<br>Bezel dimension (W X H X D)<br>Panel cutout | 300 gms<br>96 X 96 X 58 mm<br>92 X 92 mm |
| Outputs | | Meter constant for LED: 1250/ (external CT ratio X PT ratio)<br>Meter constant for LCD: 2500/ (external CT ratio X PT ratio) |
| Communication | Type<br>Baud rate<br>Parity<br>Slave id<br>Isolation | RS485 port Modbus RTU (Optional)<br>2400, 4800, 9600, 19200 bps (site selectable)<br>Odd, Even, None<br>1 to 247 (programmable)<br>2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## Ordering Information

| Description | CAT No. |
|---|---|
| Dualsource LED meter Cl1 | WL404010OOOO |
| Dualsource LED meter Cl1 with RS485 | WL404011OOOO |
| Dualsource LED meter Cl0.5 | WL404020OOOO |
| Dualsource LED meter Cl0.5 with RS485 | WL404021OOOO |

| Description | CAT No. |
|---|---|
| Dualsource LCD meter Cl1 | WC404010OOOO |
| Dualsource LCD meter Cl1 with RS485 | WC404011OOOO |
| Dualsource LCDmeter Cl0.5 | WC404020OOOO |
| Dualsource LCDmeter Cl0.5 with RS485 | WC404021OOOO |

# Energy Meter Counter Type

- Class 1 accuracy as per IS13779
- Active energy measurement
- Rugged product for control panels to measure active energy
- 3 phase 4 wire configuration
- Stepper motor counter display
- Energy pulse LED output
- Terminal covers with sealing provision
- Meter records correct energy irrespective of current direction
- Meter records correct energy under balance & unbalance condition with any phase sequence
- Ideal product for DG set panels.

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire |
| Measurement Accuracy | | Class 1 as per IS 13779 |
| Display type and resolution | Counter | 6 Digit stepper counter with sealing arrangement |
| Measuring circuit | Input voltage | 240 V<br>Burden: 0.2VA max per phase<br>Voltage range for accuracy as per IS 13779 |
| | Input current | -/5A fixed<br>Current range from 0.4% of Ib (20mA-6A)<br>Max current - 200% of Ib<br>Current range for class of accuracy as per IS 13779 |
| | Frequency | 50 Hz + 5% |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 61326-1 |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Surge immunity test | ±4 kV as per IEC 61000-4-5 |
| | Emission | Class B as per CISPR 22 |
| Operating Conditions | Operating temperature | -10°C to +55°C |
| | Storage temperature | -25°C to +70°C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical Conditions | Shock | 40 g in 3 planes (Double insulation) |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Weight and Dimensions | Product weight | 600 gms |
| | Bezel dimension (W X H X D) | 96 X 96 X 97 mm |
| | Panel cutout | 92 X 92 |
| Outputs | | Meter constant: 1280 |

## Ordering Information

| Description | CAT No. |
|---|---|
| **4030 Series** | |
| kWh Counter type meter Cl 1 | WL403010OOOO |

# Energy Meter DIN Type

- Accuracy Class 1 as per IEC 62053-21
- LCD display for clear display of parameter values
- Whole current operated. 5-40A for Single Phase and 10-60A for Three Phase
- Displays Push-to-Push consumption, Daily, Weekly, Monthly consumption
- Push button for parameter scrolling
- Terminal covers to avoid direct contact of the supply terminals along with sealing provision
- Energy recording at low currents
- Pulse output LED available
- Reverse current indication for three phase
- Compact size and easy mounting
- Additional RS485 module for communication over RS485 modbus RTU protocol
- Additional Wi-Fi module for communication over IEEE 802.11b standard
- These can be mounted inside distribution boxes to monitor electric consumption of identified loads, circuits and areas.

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire, 1 Phase<br>1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21 |
| Display type and resolution | LCD | 6 digit LCD |
| Measuring circuit | Input voltage | Rated voltage: 240 V<br>-30% to +20% of rated voltage<br>Burden: <8VA max per phase<br>Voltage range for accuracy: -30% to +20% of rated voltage |
| | Input current | Whole current operated 1P: 5-40A, 3P: 10-60A<br>Starting current: 1 Phase: 20 mA, 3 Phase: 40 mA<br>Current range for class of accuracy: 5% I to Ib max |
| | Frequency | 50 Hz ±5% |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62052-11 |
| | Short time over current protection | 20 times of I for half a second |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V as per IEC 61000-4-6 |
| | Surge immunity test | ±4 kV as per IEC 61000-4-5 |
| | Emission | Class B as per CISPR 22 |
| Insulation Properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| | Insulation resistance | 500 V DC as per IS 13779 |
| Operating Conditions | Operating temperature | -10°C to +55°C |
| | Storage temperature | -20°C to +70°C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical Conditions | Shock | 40 g in 3 planes (Double insulation) |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Weight and Dimensions | Product weight | 1 Phase, Wi-Fi,RS 485 module:132 gms<br>3 Phase: 460 gms |
| | Bezel dimension (W X H X D) | 1 Phase: 36 mm x 83 mm x 67 mm<br>3 phase: 125 mm x 83 mm x 64 mm (approx.)<br>RS485 module: 36 mm x 83 mm x 67 mm<br>Wi-Fi module: 36 mm x 83 mm x 67 mm |
| Outputs | | Meter constant 3 Ph : 450, 1 Ph : 3200 |
| Communication | Type | RS485 port Modbus RTU (separate module) |
| | Baud rate | 2400, 4800, 9600, bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC, double insulated |

## Ordering Information

| Description | CAT No. |
|---|---|
| **4000 Series** | |
| Energy meter 1P 5-40A Cl 1 DIN | WD4000101OOO |
| Energy meter 3P 10-60A Cl 1 DIN | WD4000103OOO |
| Energy meter RS485 module | WD400010RSOO |
| Energy meter Wi-Fi module | WD400010WFOO |

## The Energy Monitor

DIN energy meter is a small energy monitoring device that helps in increasing awareness of energy consumption at the point of installation. It helps in monitoring of energy guzzling devices to take corrective actions. It shows the amount of money spent in consuming energy.

Ideal applications include residential buildings, shopping malls, factories, etc.

An energy monitor alone can't save any energy - but it makes one aware of level of energy consumption. Therefore it's a great tool to help bring a change in user behavior and cut electricity bills.

It is good to remember that in most cases one is likely to get a return on investment if one reduce their energy usage as a result of buying these meters.

The device has a LCD screen to display the readings. Also when used along with Wi-Fi module, the entire data can be viewed on laptop, tablet or smart phones in real time.

Some of the most convenient features and benefits of DIN meters include:

- A display that shows current energy use
- Wireless connectivity so that it can be viewed anywhere in the hotspot range
- Ease of historical data availability including daily, weekly and monthly usage

**Push to Push consumption:** The push button is used for measuring kWh consumption from one push of the button to next time push i.e from one period to another period.

To achieve this scroll through the parameters until kWh is displayed. Press and hold the push button, it shall reset to zero.

Energy recording starts in display. To stop the push to push consumption press and hold the push button in kWh display. Check kWh display to get the energy consumed value between the start and stop operations.

| Parameters | | 3-Phase Meter | 1-Phase Meter |
|---|---|---|---|
| **Instantaneous Parameters** | Phase voltage | ✓ | ✓ |
| | Phase current | ✓ | ✓ |
| | Power factor | ✓ | |
| | Active power | ✓ | ✓ |
| | Reactive power | ✓ | |
| | Apparent power | ✓ | |
| | Frequency | ✓ | |
| **Maximum Demand** | Present month | ✓ | |
| | Previous month | ✓ | |
| **kWh Consumption** | Total | ✓ | ✓ |
| | Present day | ✓ | ✓ |
| | Present week | ✓ | ✓ |
| | Present month | ✓ | ✓ |
| | Push-to-push | ✓ | ✓ |
| | Previous day | ✓ | ✓ |
| | Previous week | ✓ | ✓ |
| | Previous month | ✓ | ✓ |

# Dual Source Meter

- Accuracy class 1 as per IEC 62053-21 & class 0.5 as per 62053-22
- True RMS measurement
- Separate registers for EB and DG energy
- Automatic switching of display based on input source as EB or DG through DG sensing input
- Positive energy accumulation / reverse lock programmable
- Old registers to store the previously cleared energy values
- User programmable password protection
- Auto-scaling of Kilo, Mega, Giga values
- Energy pulse LED available
- Site selectable for 3 Phase 4 wire, 3 Phase 3 wire, 1 Phase
- Optional RS485 port communication

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire, 3 Phase 3 Wire, 1 Phase<br>True RMS, 64 samples per cycle<br>1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21<br>Class 0.5 as per IEC 62053-22 |
| Display type and resolution | LED | 4 digit for instantaneous and 6 digits for cummulative |
| | LCD | 4 digit for instantaneous and 7 digits for cummulative |
| Measuring circuit | Input voltage | UL: 50 - 550 VLL<br>PT Primary and Secondary user programmable for LT and HT applications<br>Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable<br>Current range from 10% to 120% of In (50mA-5A),<br>Starting current: 0.4% of full scale<br>CT Primary and Secondary user programmable for LT and HT applications<br>DG sensing input: 230VAC |
| | Frequency | 40-70 Hz |
| Auxilliary circuit | Aux voltage | 80 - 300VAC/DC |
| | Aux burden | <5VA |
| | Freq range | 40-70 Hz |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62053-21 |
| | Short time over current protection | 10A max continuous, 20 times of In for 3 sec |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V/m as per IEC 61000-4-6 |
| | Surge immunity test | ±6 kV as per IEC 61000-4-5 |
| | Rated power frequency magnetic fields | 1 A/m as per IEC 61000-4-8 |
| | Emission | Class B as per CISPR 22 |
| Insulation Properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| Operating Conditions | Operating temperature | -10°C to +55°C |
| | Storage temperature | -25°C to +70°C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical Conditions | Shock | As per standard IEC 60068-2 |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Safety | Measurement category | CAT III |
| | Pollution degree | 2 |
| | Protection | IP20 at terminals, IP51 when mounted on panel |
| Weight and Dimensions | Product weight | 300 gms |
| | Bezel dimension (W X H X D) | 96 X 96 X 58 mm |
| | Panel cutout | 92 X 92 mm |
| Outputs | | Meter constant for LED: 1250 / (external CT ratio X PT ratio)<br>Meter constant for LCD: 2500 / (external CT ratio X PT ratio) |
| Communication | Type | RS485 port Modbus RTU |
| | Baud rate | 2400, 4800, 9600, 19200 bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## Dual Energy Registers:

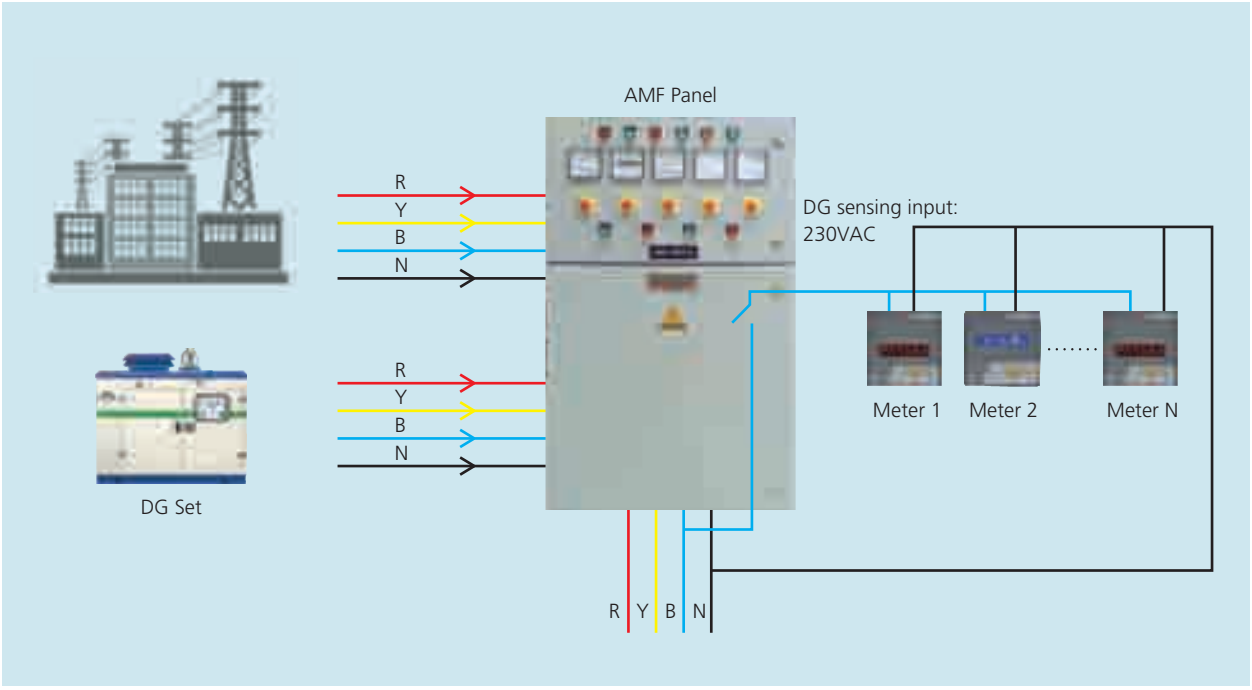
Two separate energy registers are provided, one for EB (Electricity Board supply) and another for DG (Generator Supply). Normally meter accumulates energy in EB register. Whenever the DG sensing signal (230 V AC) is present, meter accumulates energy in DG register.

Separate LED indication is provided on the LED meter front panel, which glows when DG sensing signal is present. LCD meter indicates automatically the source of energy.

## Ordering Information

| Description | CAT No. |
|---|---|
| 4040 Series | |
| Dualsource LED meter Cl1 | WL404010OOOO |
| Dualsource LED meter Cl1 with RS485 | WL404011OOOO |
| Dualsource LED meter Cl0.5 | WL404020OOOO |
| Dualsource LED meter Cl0.5 with RS485 | WL404021OOOO |
| Dualsource LCD meter Cl1 | WC404010OOOO |
| Dualsource LCD meter Cl1 with RS485 | WC404011OOOO |
| Dualsource LCDmeter Cl0.5 | WC404020OOOO |
| Dualsource LCDmeter Cl0.5 with RS485 | WC404021OOOO |

## Typical Connection Diagram of Dual Energy Measurement



# Single Function and VAF Meters

- Accuracy Class 1 as per IEC 62053-21 and Class 0.5 as per IEC 62053-22
- True RMS measurement
- Password protection site selectable
- Auto and manual scrolling.
- Field programmable CT, PT ratio
- Site selectable 1A/5A
- Phase wise and average display of voltage and current as per applicable meter
- Inbuilt selector switch for 3 phase models
- Site selectable for 3 Phase 4 wire, 3 Phase 3 wire, 1 phase
- Wide operating range of 80 to 300 V AC/DC auxiliary supply in 4110 series
- Suitable for 50/60 Hz

## Technical Chart

| | | |
|---|---|---|
| Type of measurement | Type | 3 Phase 4 Wire, 3 Phase 3 Wire, 1 Phase<br>True RMS, 64 samples per cycle<br>1 sec update time |
| Measurement Accuracy | | Class 1 as per IEC 62053-21<br>Class 0.5 as per IEC 62053-22<br>Class 0.2 for frequency meter |
| Display type and resolution | LED | 4 digit |
| Measuring circuit | Input voltage | 50 - 550 VLL<br>PT Primary and Secondary user programmable for LT and HT applications<br>Burden: 0.2VA max per phase |
| | Input current | -/5A and -/1A site selectable<br>Current range from 10% to 120% of In (50mA-6A),<br>starting current: 0.4%<br>CT Primary and Secondary user programmable for LT and HT applications |
| | Frequency | 40-70 Hz |
| Auxilliary circuit | Aux voltage | Ammeter, Voltmeter, Freq meter: 80 - 300VAC<br>VAF + PF meter; 80 -300VAC/DC |
| | Aux burden | <5VA |
| | Freq range | 40-70 Hz |
| Electrical requirements | Test of power consumption | as per IEC 62053-21 |
| | Voltage dips and interrupts | as per IEC 62053-21 |
| | Short time over current protection | 10A max continuous, 20 times of In for 3 sec |
| Electro-Magnetic Compatibility (EMC) | Fast transients burst test | ±4 kV as per IEC 61000-4-4 |
| | Immunity to electrostatic discharge | ±8 kV air discharge, ±6 kV contact discharge as per IEC 61000-4-2 |
| | Radiated, radio-frequency, electromagnetic field immunity test | 10 V/m as per 61000-4-3 |
| | Immunity to electromagnetic HF fields through conducted lines | 10 V/m as per IEC 61000-4-6 |
| | Surge immunity test | ±6 kV as per IEC 61000-4-5 |
| | Rated power frequency magnetic fields | 1 A/m as per IEC 61000-4-8 |
| | Emission | Class B as per CISPR 22 |
| Insulation Properties | Impulse voltage test | ±6 kV as per IEC 62052-11 |
| | AC voltage test | 4 kV double insulation as per IEC 62053-21 |
| Operating Conditions | Operating temperature | -10°C to +55°C |
| | Storage temperature | -25°C to +70°C |
| | Humidity | 5% to 95% relative humidity non-condensing |
| | Recommended wire | 2.5 sq mm |
| Mechanical Conditions | Shock | As per standard IEC 60068-2 |
| | Vibration | 10 to 55 Hz, 0.15 mm amplitude |
| | Casing | Plastic mould protected to IP51 from front side |
| Safety | Measurement category | CAT III |
| | Pollution degree | 2 |
| | Protection | IP20 at terminals, IP 51 when mounted on panel |
| Weight and Dimensions | Product weight | 300 gms |
| | Bezel dimension (W X H X D) | 96 X 96 X 58 mm |
| | Panel cutout | 92 X 92 mm |
| Communication | Type | RS485 port Modbus RTU |
| | Baud rate | 2400, 4800, 9600, 19200 bps (site selectable) |
| | Parity | Odd, Even, None |
| | Slave id | 1 to 247 (programmable) |
| | Isolation | 2 kVAC isolation for 1 minute between communication and other circuits |
| Certifications | | CE, RoHS |

## Ordering Information

| Description | CAT No. |
|---|---|
| **1XXX Series** | |
| 1Ph Ammeter Cl 1 | WL111010OOOO |
| 1Ph Voltmeter Cl 1 | WL112010OOOO |
| 3P Ammeter Cl 1 | WL131010OOOO |
| 3P Voltmeter Cl 1 | WL132010OOOO |
| Freq meter Cl 0.2 | WL113040OOOO |
| 1Ph Ammeter Cl 0.5 | WL111020OOOO |
| 1Ph Voltmeter Cl 0.5 | WL112020OOOO |
| 3P Ammeter Cl 0.5 | WL131020OOOO |
| 3P Voltmeter Cl 0.5 | WL132020OOOO |

| Description | CAT No. |
|---|---|
| **4110 Series** | |
| VAF + PF meter, Cl 1 | WL411010OOOO |
| VAF + PF meter with RS485, Cl 1 | WL411011OOOO |
| VAF + PF meter, Cl 0.5 | WL411020OOOO |
| VAF + PF meter with RS485, Cl 0.5 | WL411021OOOO |

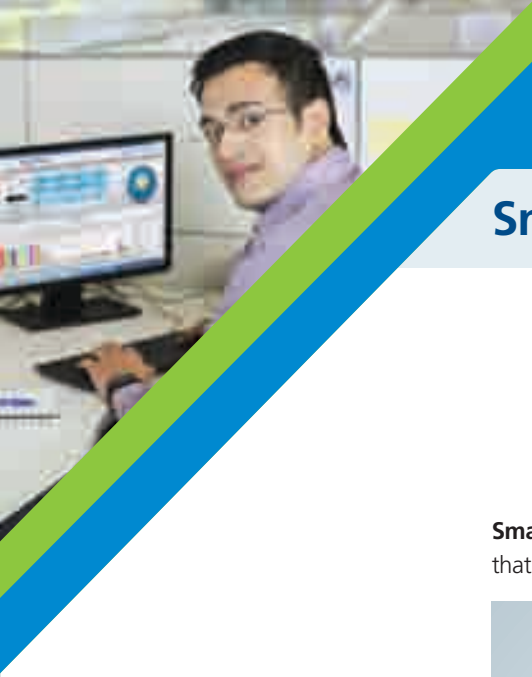
| Display parameter list | | 1 Phase Voltmeter | 3 Phase Voltmeter | 1 Phase Ammeter | 3 Phase Ammeter | Frequency Meter | VAF Meter |
|---|---|---|---|---|---|---|---|
| **Voltage** | R Phase | ✓ | ✓ | | | | ✓ |
| | Y Phase | | ✓ | | | | ✓ |
| | B Phase | | ✓ | | | | ✓ |
| | Line Voltage | | ✓ | | | | ✓ |
| | Average | | ✓ | | | | ✓ |
| **Current** | R Phase | | | ✓ | ✓ | | ✓ |
| | Y Phase | | | | ✓ | | ✓ |
| | B Phase | | | | ✓ | | ✓ |
| | Average | | | | ✓ | | ✓ |
| | A Peak | | | | | | ✓ |
| **Frequency** | | ✓ | | | | ✓ | ✓ |
| **RPM (Rotations per minute)** | | | | | | | ✓ |
| **Power factor** | | | | | | | ✓ |
| **On Hours** | | | | | | | ✓ |

## 4110 Series

In a single screen following parameters can be seen in a page. This enables for quick decision making at a single glance. With Auto scrolling disabled mode, it can be freezed at any page.

| Parameter | | | | | | | |
|---|---|---|---|---|---|---|---|
| Row 1 | VLL(avg) | VLn(avg) | VLL(avg) | Vry | Vr | Ar | PF - R |
| Row 2 | A(avg) | A(avg) | A(avg) | Vyb | Vy | Ay | PF - Y |
| Row 3 | F | F | PF (total) | Vbr | Vb | Ab | PF - B |

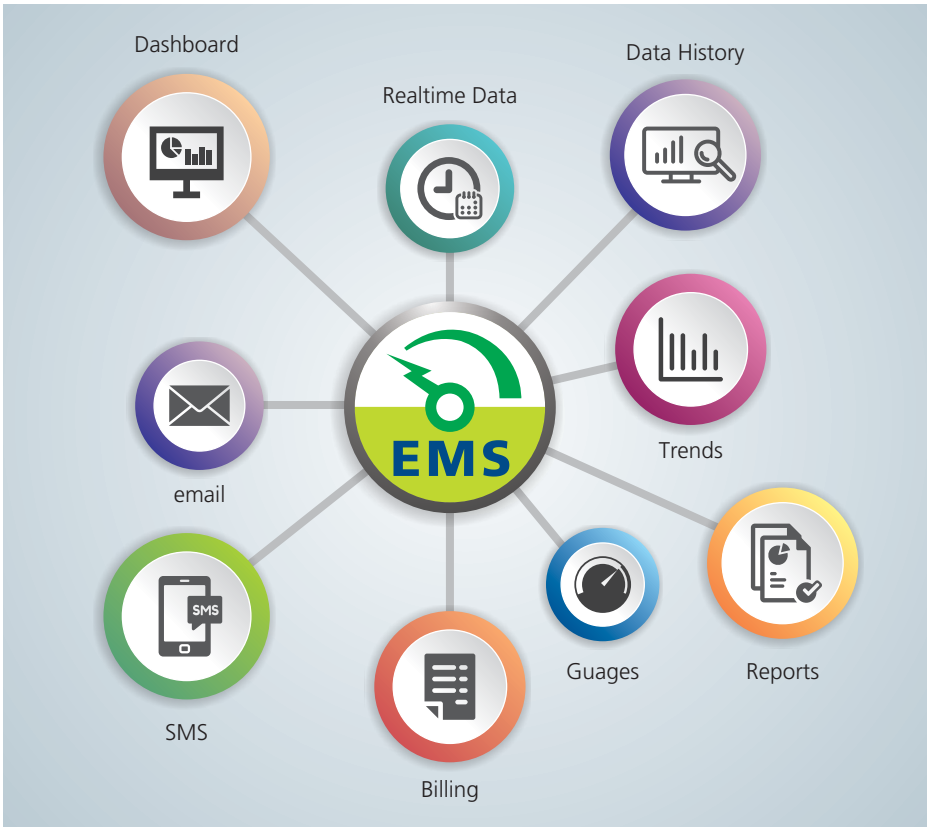

Real Time

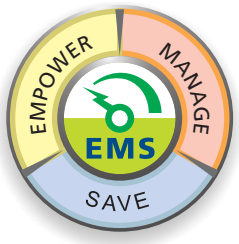


# SmartComm EMS

SmartComm
*Energy Management System*

**SmartComm EMS,** a simple and powerful energy monitoring software with multiple benefits that empowers the customer to save money.




**Empowers** the user to take corrective actions in areas of energy wastage

**Manage**ment of energy for optimal utilization

**Save** money by identifying energy guzzlers for corrective actions to conserve energy.

## Features:

- Glimpse of all entire energy consumption in the plant through dashboard
- Quick understanding of energy consumption of today compared to yesterday, this month consumption compared to last month as well as yoy energy comparison through dashboard.
- Easy navigation through the modules
- Excel reports with charts
- All parameters in the device can be monitored from the software
- Multiple combination of devices and parameters for analysis
- Provision to generate multiple report types
- Specific Energy Consumption (SEC) report
- Access to features defined by user levels
- L&T meters preconfigured in the software


## Realtime Monitoring

- Dashboard has graphical gauge representation of multiple parameters that can be selected by user at site.
- Bar graph energy consumption representation on hourly basis, monthly basis, yearly basis, TOD basis as well as yoy comparison.
- Matrix data showing data of all feeders with all parameters
- Real time view of all parameters for devices.
- 10 Analog gauges configurable for any device any parameter
- Realtime trends of multiple parameter values
- Real time Alarms based on user set threshold levels for parameters with acknowledgement feature
- Communication diagnostics depicting status of activation

## Reports

- Provision to generate 26 reports for analysis that meets user requirements
- Multiple energy reports can be generated including daily, weekly, monthly and yearly basis.
- Provision to set 5 reports as favorites that are frequently used by the user thereby making it easier for quick access
- Provision to generate energy report with Specific Energy Consumption
- Average PF report
- Reports for alarms
- Groupwise energy reports
- Shift reports with user defined timings
- Time of Day report
- Daily logbook report for parameters

## Data History

- Trend analysis of historic data from between two dates
- Multiple views of charts with device and parameters
- Provision to save and print the charts
- Zoom in and out feature in charts for detailed analysis
- Generation of historic data as per user for parameters and devices with facility for excel export and printing.
- Device wise alarm history can be generated and analysed
- Device Min-max value analysis

## Billing

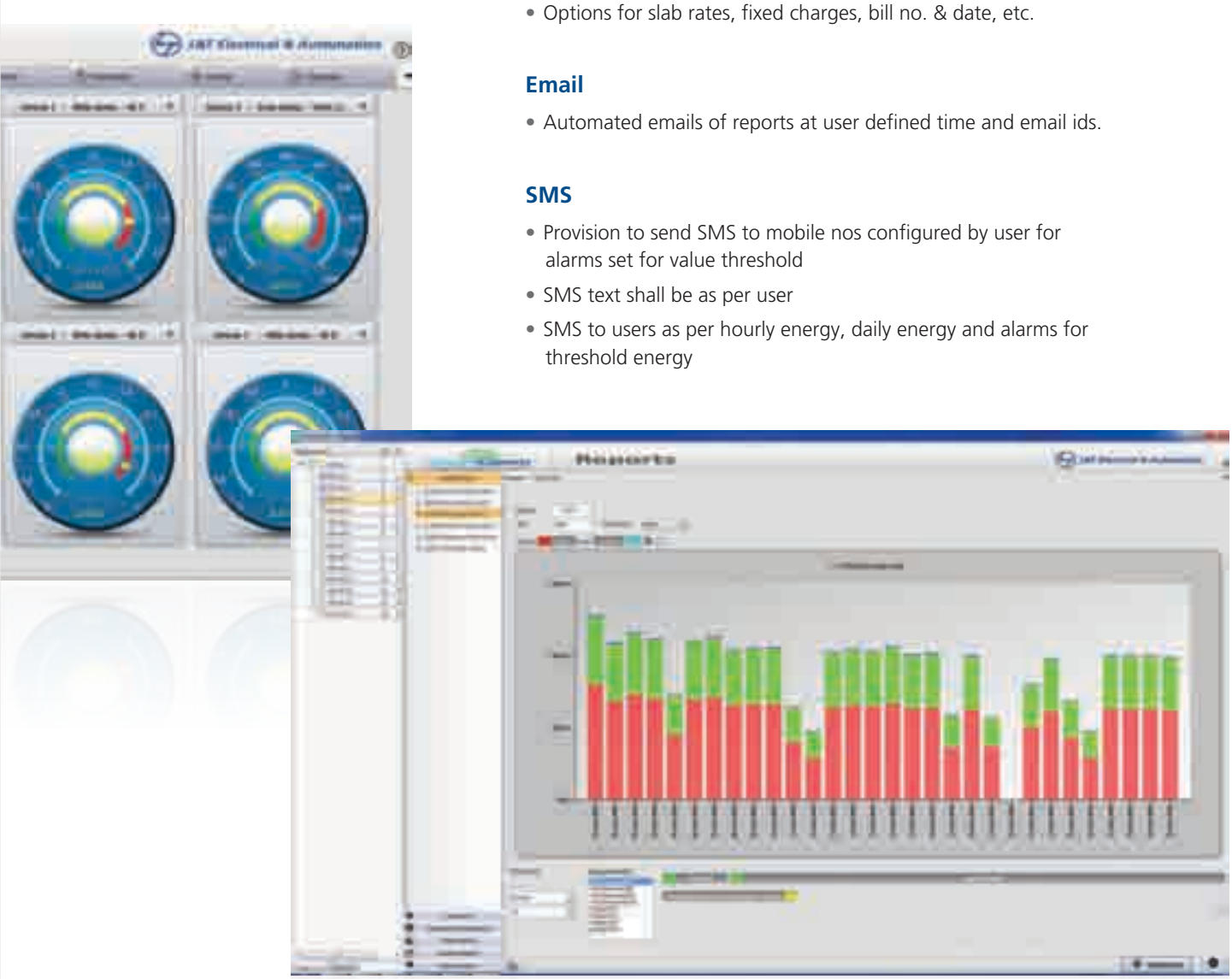
- Provision to generate bills for commercial complexes
- Options for slab rates, fixed charges, bill no. & date, etc.

## Email

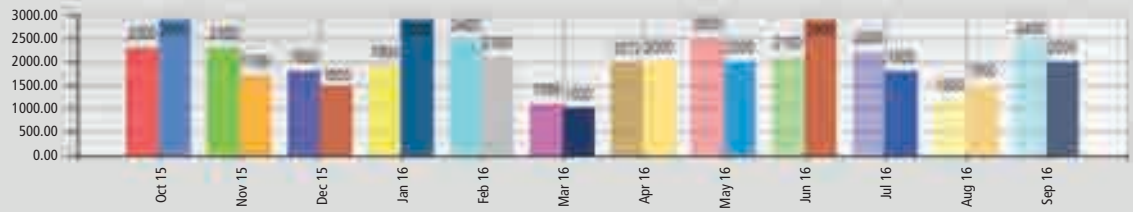
- Automated emails of reports at user defined time and email ids.

## SMS

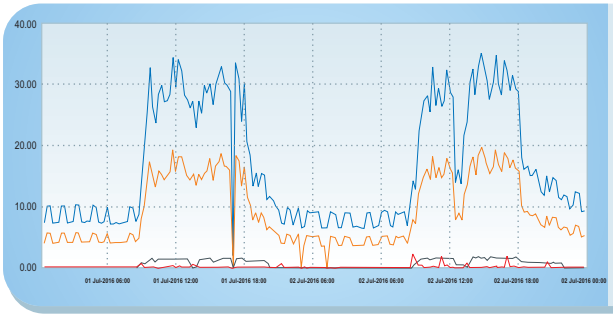
- Provision to send SMS to mobile nos configured by user for alarms set for value threshold
- SMS text shall be as per user
- SMS to users as per hourly energy, daily energy and alarms for threshold energy



## SmartComm EMS




- Year on Year energy consumption at facility / individual feeder level at click of a button




- Trend plot for users analytic requirement

- Quick insights into today and monthly consumption compared to previous period

Today
From 7AM till now

29.52

kWh

82 %

compared to yesterday

This month
Till now

1596.54

kWh

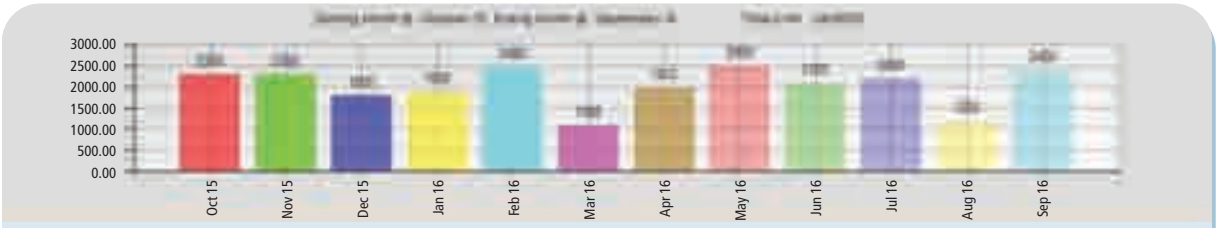
12.5 %

compared to same

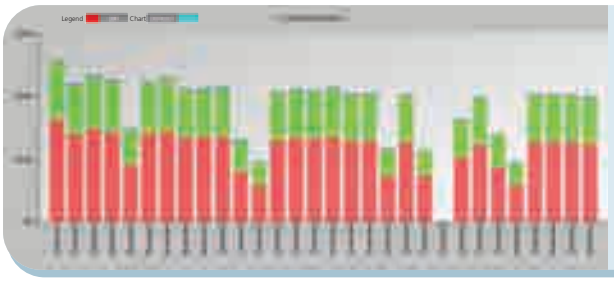

- Messages at your fingertips based on alarms / events immediately

- User management at different access levels for security

## SmartComm EMS

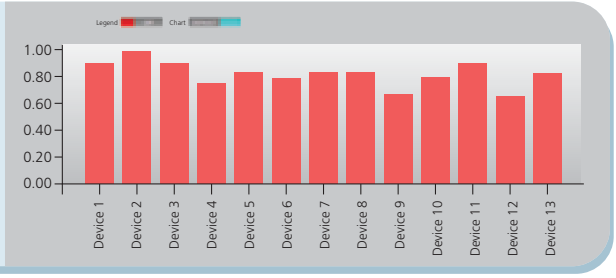



- Monthly energy consumption of last 12 months



- Daily energy consumption report

- Average PF report




- My Favourite report section to bookmark 5 most frequently used reports

- Time stamped alarms / events


- Lower your carbon footprint, save money and help the environment

## SmartComm EMS

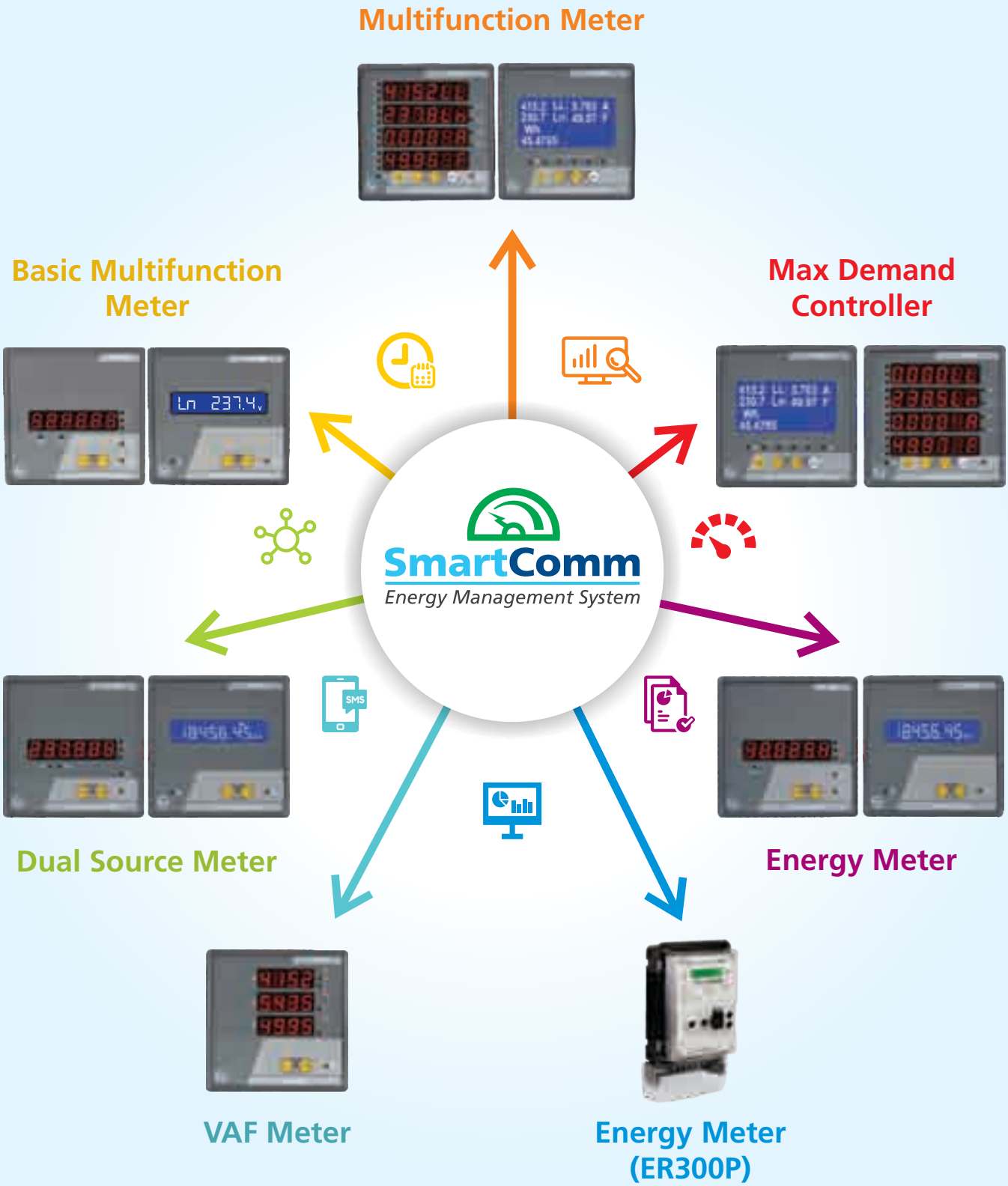
- Area wise report generation facility

| | |
|---|---|
| HVAC | Utility |
| Lighting | Emergency Lighting |
| DG | Compressor |

## Typical Application Areas


**Steps to be followed while implementing Energy Monitoring System**

- List down meters that needs to be brought under the ambit of Energy Management system.
- Check whether these devices are communication compatible. If not plan for replacement with communication capable meters.
- Whether communication cables are laid for meters. If no scope of work to be finalized.
- Identify persons who will monitor SmartComm EMS.
- Plan for the administrative rights to be given to respective users.
- Plan for a dedicated computer for EMS.
- Decide the reports required and frequency of reports.
- Decide whether SMS alert is required, if yes for which alerts.
- Decide whether email facility is required. If yes list of email ids.
- Enquiry for SmartComm EMS to be sent to nearest L&T branch office.


Multifunction Meter
Basic Multifunction Meter
Max Demand Controller
SmartComm
Energy Management System
SMS
Dual Source Meter
Energy Meter
VAF Meter
Energy Meter (ER300P)

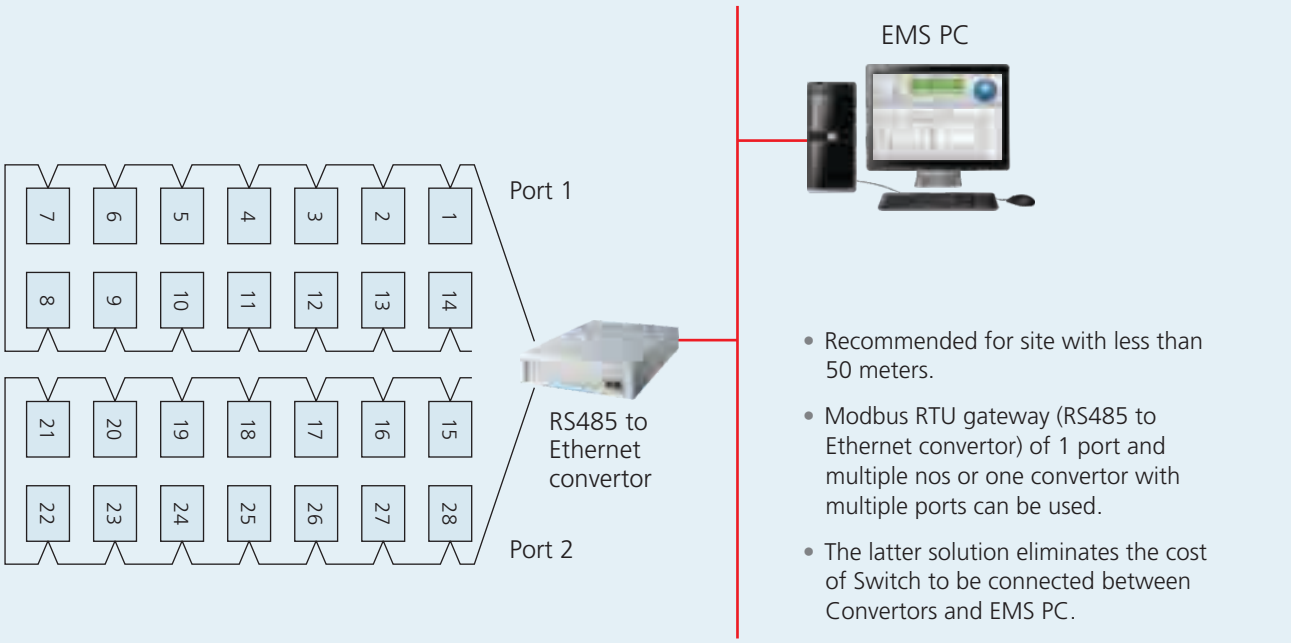
# Architecture

The default slave ID of meter is 1. When multiple meters are connected in a network, the slave IDs should be unique to network. RS485 modbus protocol allows up to 247 meters to be connected in a network. But the signal strength of RS485 allows only 32 meters to be connected in a daisy chain. Hence to enable connection up to 247 meters, multiple convertors should be used. Repeaters are used when distance between meter and convertor increases more than 800m. These are used to improve the signal strength.

Termination resistor is used to reduce the reflection of signals at the ends. The value of the termination resistor should be equal to the cable impedance. The cable impedance can be obtained from the cable manufacturer. In case value of cable impedance is not known, usually 120, 5W resistor can be used. Termination resistor has to be connected at the convertor end as well as at the last meter end.

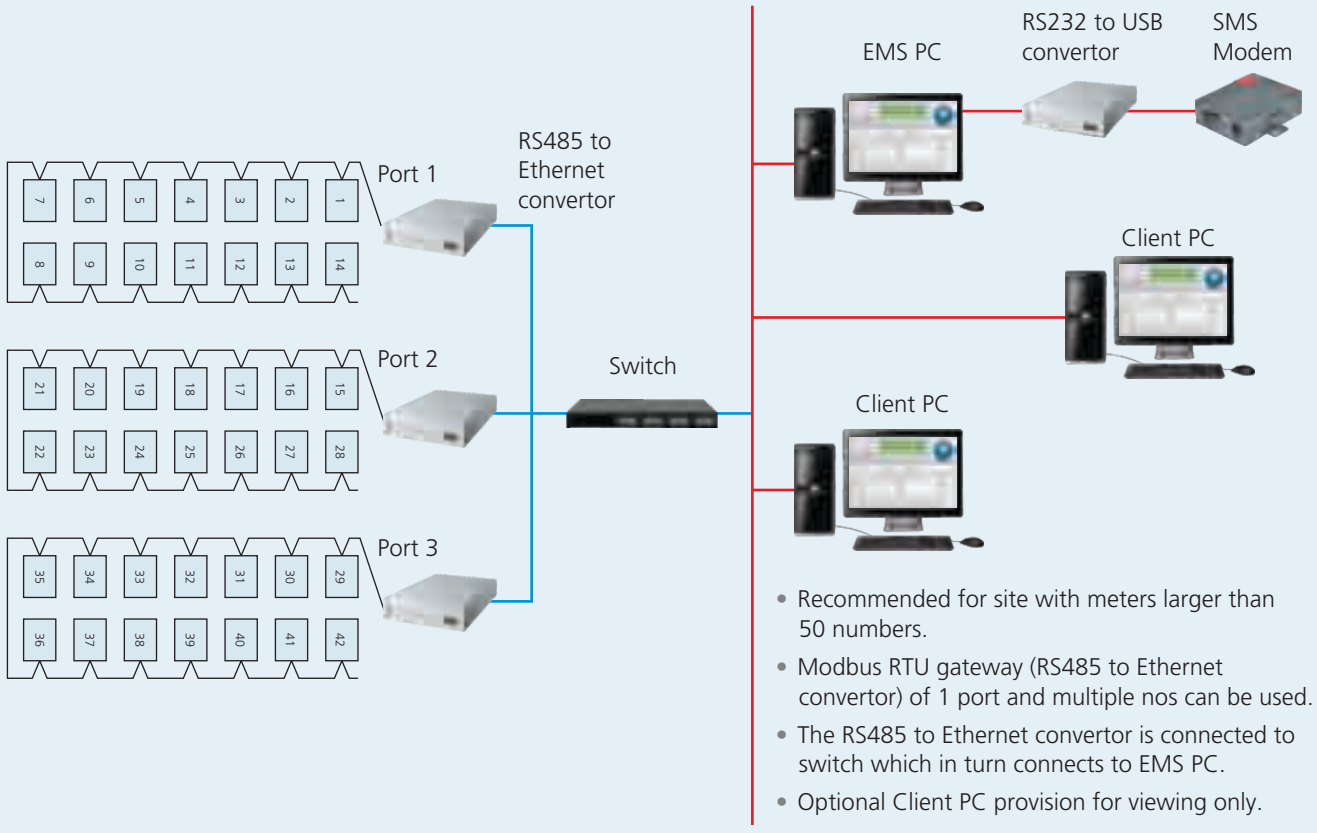
Typical Architecture are as follows:

## Method 1 - Architecture for basic requirement



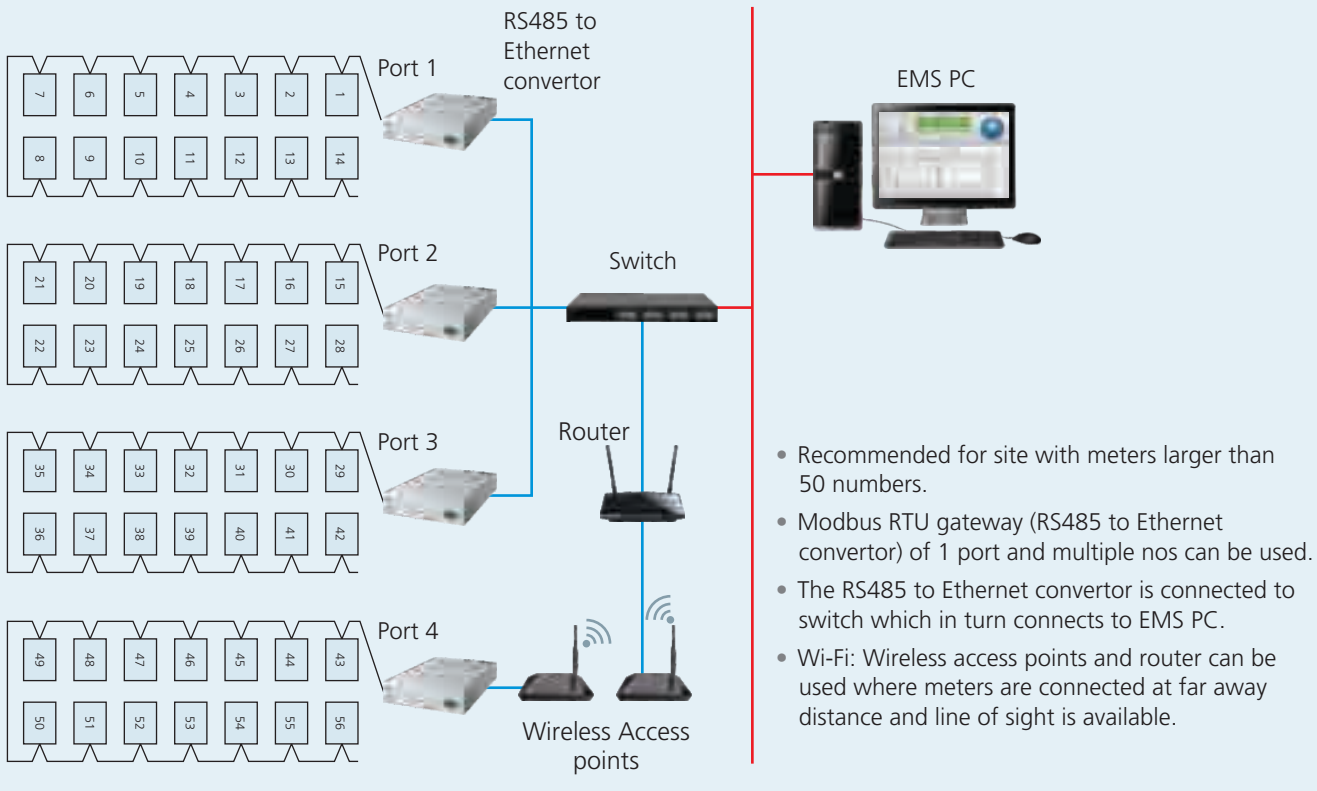

- Recommended for site with less than 50 meters.
- Modbus RTU gateway (RS485 to Ethernet convertor) of 1 port and multiple nos or one convertor with multiple ports can be used.
- The latter solution eliminates the cost of Switch to be connected between Convertors and EMS PC.

## Method 2 - Architecture with client PC



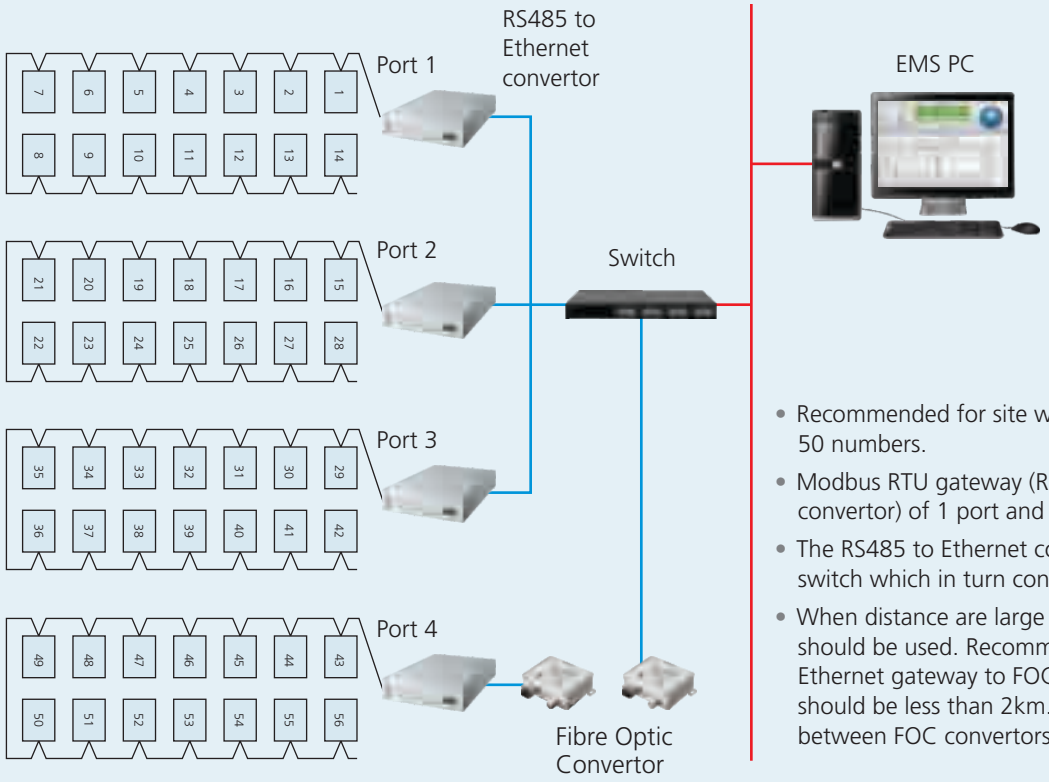

- Recommended for site with meters larger than 50 numbers.
- Modbus RTU gateway (RS485 to Ethernet convertor) of 1 port and multiple nos can be used.
- The RS485 to Ethernet convertor is connected to switch which in turn connects to EMS PC.
- Optional Client PC provision for viewing only.

## Method 3 - Architecture with wireless connectivity



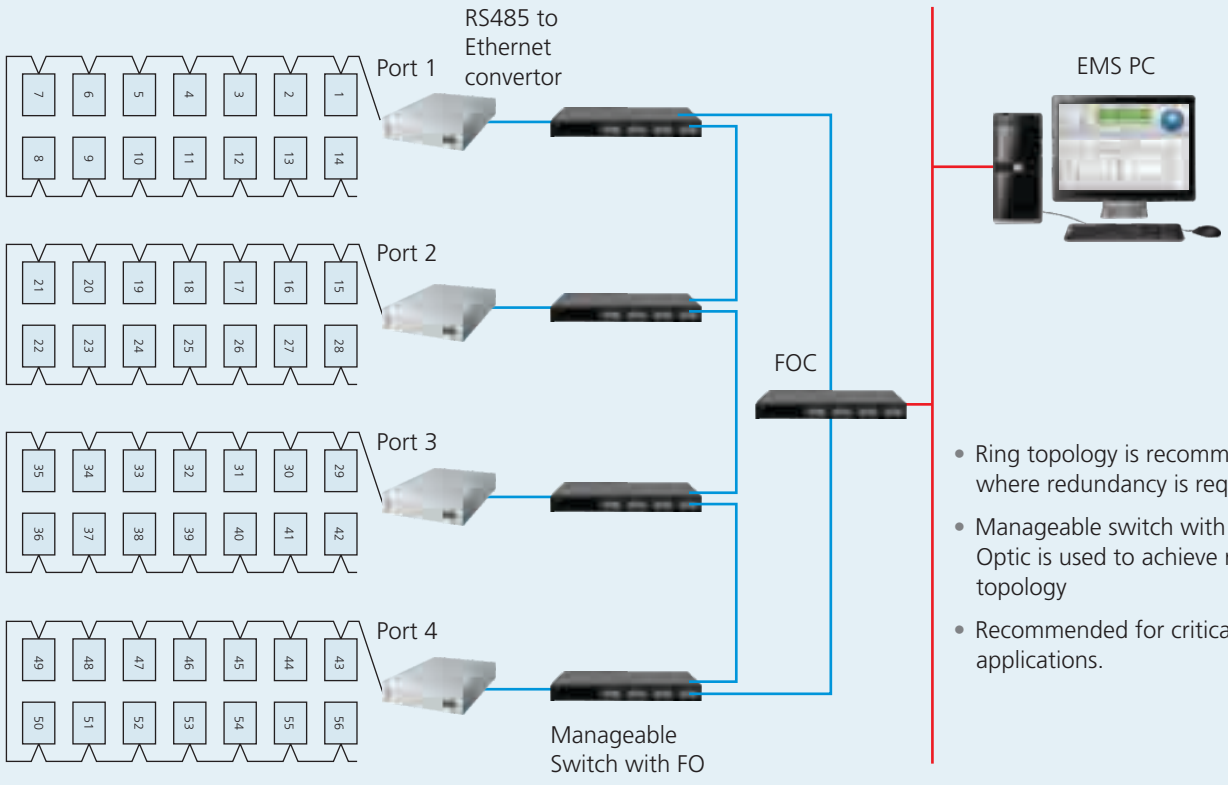

- Recommended for site with meters larger than 50 numbers.
- Modbus RTU gateway (RS485 to Ethernet convertor) of 1 port and multiple nos can be used.
- The RS485 to Ethernet convertor is connected to switch which in turn connects to EMS PC.
- Wi-Fi: Wireless access points and router can be used where meters are connected at far away distance and line of sight is available.

## Method 4 - Architecture with Fiber Optic connectivity

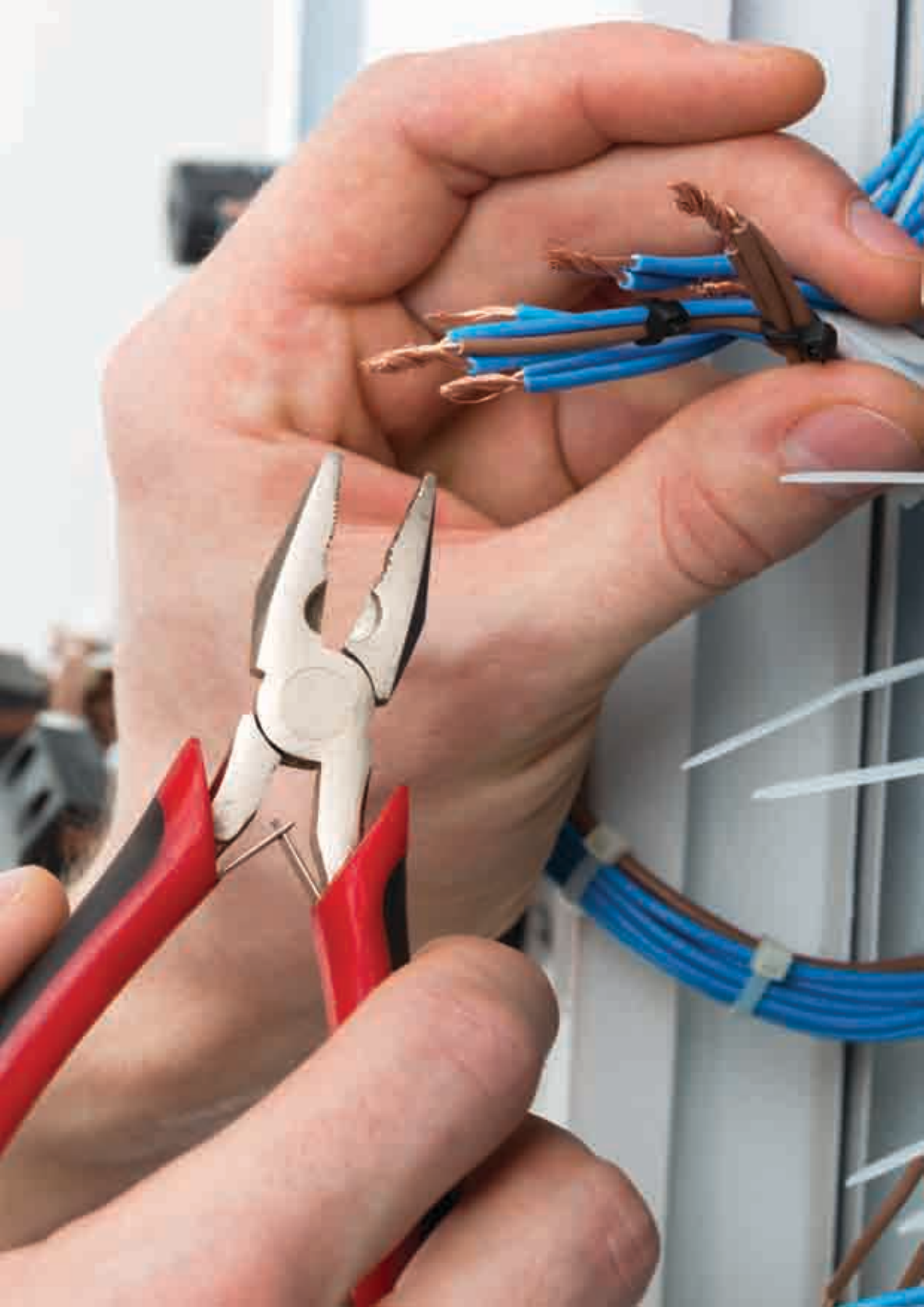



- Recommended for site with meters larger than 50 numbers.
- Modbus RTU gateway (RS485 to Ethernet convertor) of 1 port and multiple nos can be used.
- The RS485 to Ethernet convertor is connected to switch which in turn connects to EMS PC.
- When distance are large (in kms) Optical fibre should be used. Recommended distance between Ethernet gateway to FOC (Fibre Optic Convertor) should be less than 2km. Recommended distance between FOC convertors can be approx. 10km.

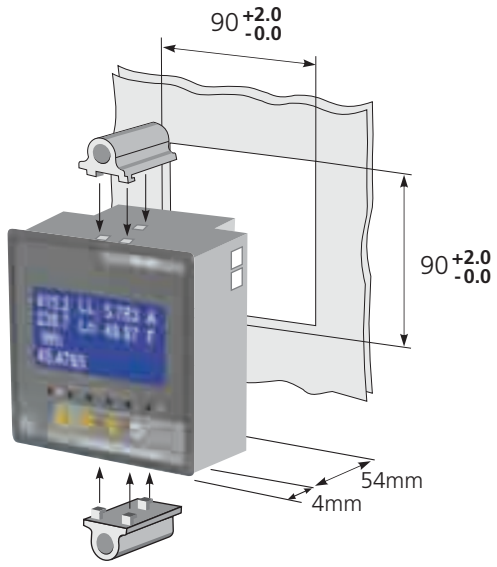
## Method 5 - Architecture with redundant network topology



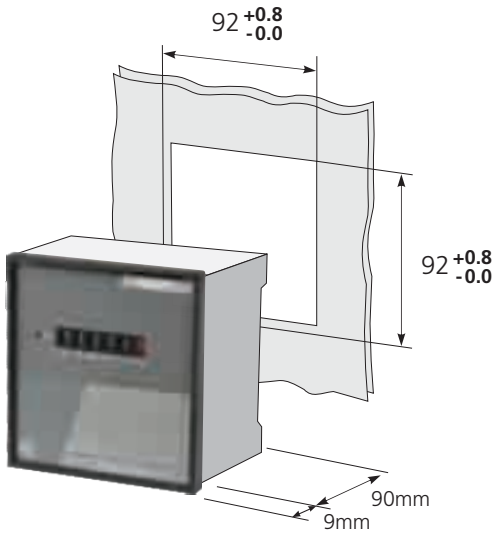

- Ring topology is recommended where redundancy is required.
- Manageable switch with Fibre Optic is used to achieve ring topology
- Recommended for critical applications.



# Dimension and Connection Diagrams



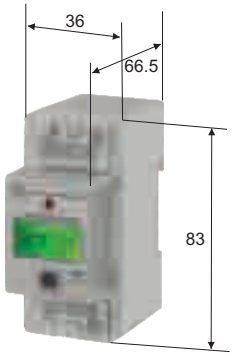

96 X 96: 11XX,13XX, 4000, 4040,
41XX, 44XX, 50XX, 60XX
(in case of meters with ethernet module the depth is 86mm)



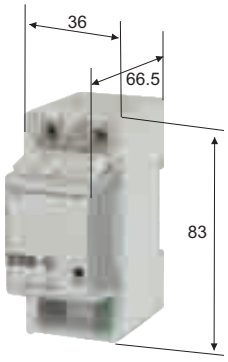

96 X 96: 4030

## DIN Meter: 4000

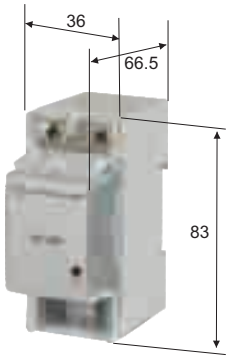

**3-Phase**




**1-Phase**



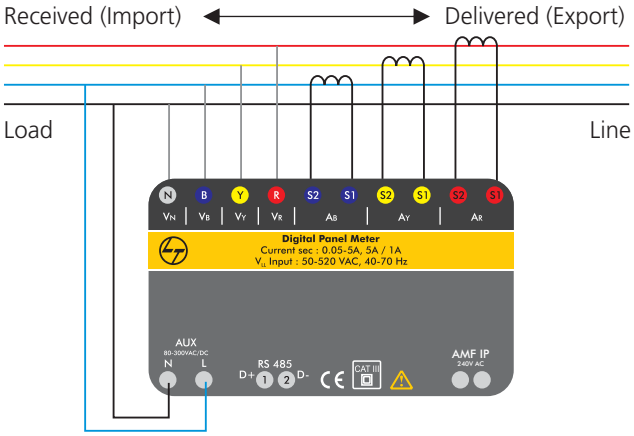

**Wi-Fi Module**



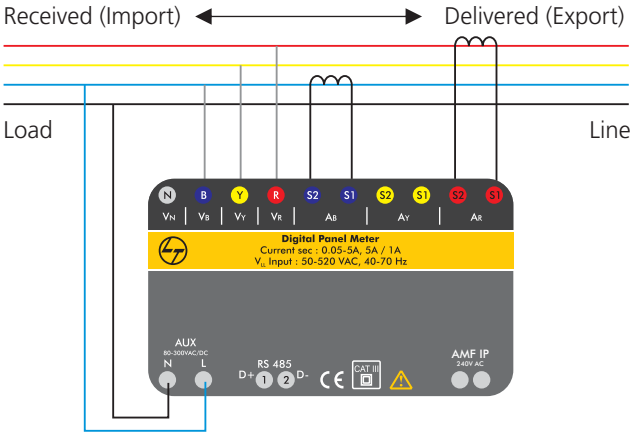

**RS485 Module**

All Dimensions in mm

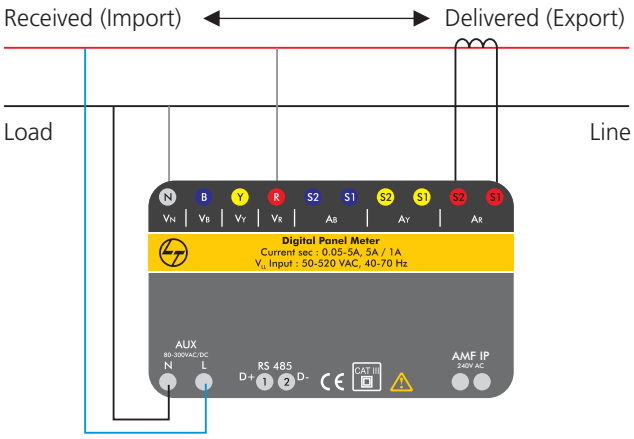
# Connection Diagrams



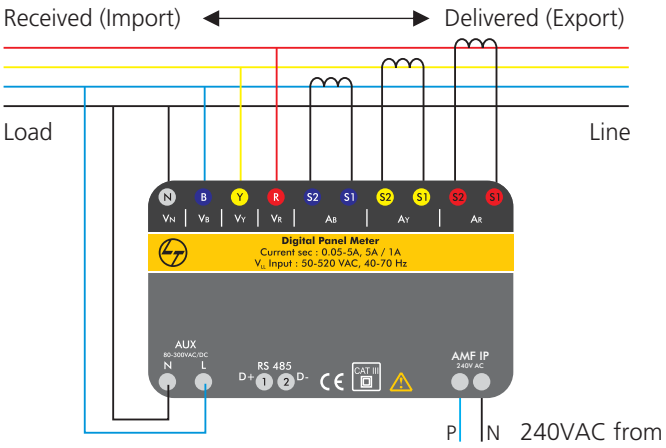

**3 Phase 4 Wire System**



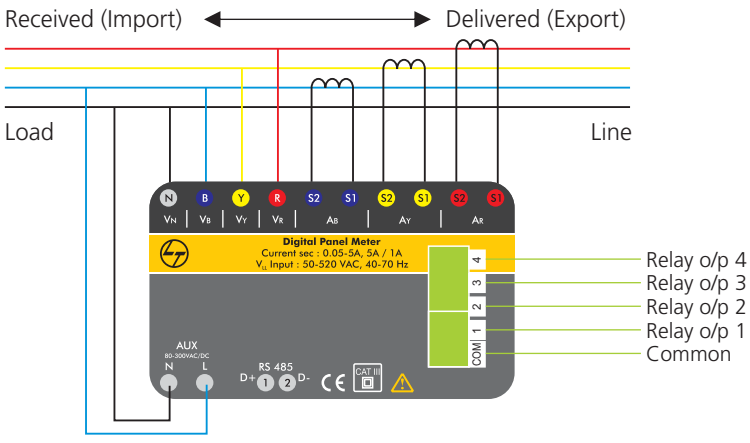

**3 Phase 3 Wire System**




**Single Phase System**

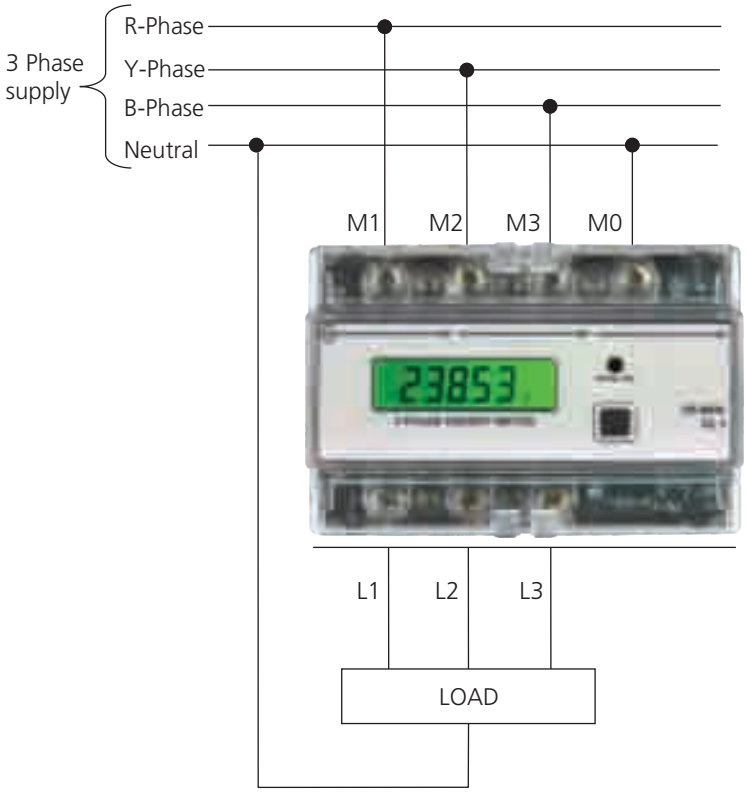



**Dual Source Meter Wiring**

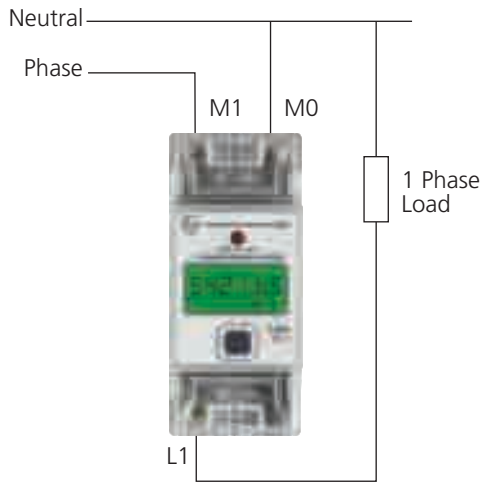



**MD Controller**

## 3-Phase

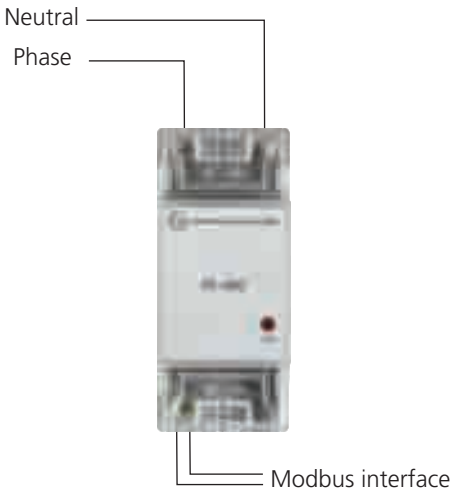



## 1-Phase




## Wi-Fi Module


## RS 485 Module




RS 485 & Wi-Fi Module should be mounted on the left side of 1Ph, 3Ph DIN Energy Meter.

# Communication Register Map

| Sl. No. | Parameter | Data Type | Address | WC6000/ WL6000 | WC5010/ WL5010 | WC5000/ WL5000 | WC4440/ WL4440 | WC4430/ WL4430 | WC4420/ WL4420 | WC4410/ WL4410 | WC4000/ WL4000 | WC4400/ WL4400 | WC4040/ WL4040 | WL4110 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Watts Total | float | 40101 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 2 | Watts R phase | float | 40103 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 3 | Watts Y phase | float | 40105 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 4 | Watts B phase | float | 40107 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 5 | VAR Total | float | 40109 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 6 | VAR R phase | float | 40111 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 7 | VAR Y phase | float | 40113 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 8 | VAR B phase | float | 40115 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 9 | PF Avg(inst) | float | 40117 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 10 | PF R phase | float | 40119 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 11 | PF Y phase | float | 40121 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 12 | PF B phase | float | 40123 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 13 | VA Total | float | 40125 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 14 | VA R phase | float | 40127 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 15 | VA Y phase | float | 40129 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 16 | VA B phase | float | 40131 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 17 | VLL average | float | 40133 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 18 | Vry phase | float | 40135 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 19 | Vyb phase | float | 40137 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 20 | Vbr phase | float | 40139 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 21 | VLN average | float | 40141 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 22 | V R phase | float | 40143 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 23 | V Y phase | float | 40145 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24 | V B phase | float | 40147 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 25 | Current Total | float | 40149 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 26 | Current R phase | float | 40151 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 27 | Current Y phase | float | 40153 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 28 | Current B phase | float | 40155 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 29 | Frequency | float | 40157 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 30 | Wh received | float | 40159 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ Prog | ✓ Prog | ✓ Prog | |
| 31 | VAh received | float | 40161 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ Prog | ✓ Prog | ✓ Prog | |
| 32 | VARh Ind. Received | float | 40163 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 33 | VARh Cap. Received | float | 40165 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 34 | Wh Delivered | float | 40167 | | ✓ | | | ✓ | | | | | ✓ | |
| 35 | VAh Delivered | float | 40169 | | ✓ | | | ✓ | | | | | ✓ | |
| 36 | VARh Ind. Delivered | float | 40171 | | ✓ | | | ✓ | | | | | | |
| 37 | VARh Cap. Delivered | float | 40173 | | ✓ | | | ✓ | | | | | | |
| 38 | PF Average Received | float | 40175 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 39 | Amps hours Received | float | 40177 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 40 | PF Average Delivered | float | 40179 | | ✓ | | | ✓ | | | | | | |
| 41 | Amps hours Delivered | float | 40181 | | ✓ | | | ✓ | | | | | | |
| 42 | Neutral Current | float | 40183 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓Apeak |
| 43 | Voltage R Harmonics | float | 40185 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 44 | Voltage Y Harmonics | float | 40187 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 45 | Voltage B Harmonics | float | 40189 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 46 | Current R Harmonics | float | 40191 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 47 | Current Y Harmonics | float | 40193 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 48 | Current B Harmonics | float | 40195 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 49 | Rising Demand | float | 40197 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | |
| 50 | Forecast Demand | float | 40199 | ✓ | | | | | | | | | | |
| 51 | Maximum Demand | float | 40201 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | |
| 52 | Reserved | float | 40203 | | | | | | | | | | | |
| 53 | Reserved | float | 40205 | | | | | | | | | | | |
| 54 | Reserved | float | 40207 | | | | | | | | | | | |
| 55 | RPM | float | 40215 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ |
| 56 | Load Hours Received | Unsigned long | 40217 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| 57 | Load Hours Delivered | Unsigned long | 40219 | | ✓ | | | ✓ | | | | | ✓ | |
| 58 | No of interruptions | Unsigned long | 40221 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 59 | MD Occurrence time | Unsigned long | 40223 | ✓ | ✓ | ✓ | ✓ | | | | | | | |
| 60 | ON hours ( in seconds) | Unsigned long | 40231 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 61 | Voltage R phase angle | float | 40233 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 62 | Voltage Y phase angle | float | 40235 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 63 | Voltage B phase angle | float | 40237 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |

Note: Prog means user can access any one parameter (Wh or Vah) through communication as per the programming done in meter setup.

# Communication Register Map

| Sl. No. | Parameter | Data Type | Address | WC6000/ WL6000 | WC5010/ WL5010 | WC5000/ WL5000 | WC4440/ WL4440 | WC4430/ WL4430 | WC4420/ WL4420 | WC4410/ WL4410 | WC4000/ WL4000 | WC4400/ WL4400 | WC4040/ WL4040 | WL4110 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64 | Current R phase angle | float | 40239 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 65 | Current Y phase angle | float | 40241 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 66 | Current B phase angle | float | 40243 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 67 | Energy TOD Slot-1 | float | 40245 | ✓ | | | | | | | | | | |
| 68 | Energy TOD Slot-2 | float | 40247 | ✓ | | | | | | | | | | |
| 69 | Energy TOD Slot-3 | float | 40249 | ✓ | | | | | | | | | | |
| 70 | Energy TOD Slot-4 | float | 40251 | ✓ | | | | | | | | | | |
| 71 | Energy TOD Slot-5 | float | 40253 | ✓ | | | | | | | | | | |
| 72 | Energy TOD Slot-6 | float | 40255 | ✓ | | | | | | | | | | |
| 73 | Reserved | float | 40257 | | | | | | | | | | | |
| 74 | Voltage Unbal R Phase | float | 40259 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 75 | Voltage Unbal Y Phase | float | 40261 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 76 | Voltage Unbal B Phase | float | 40263 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 77 | Current Unbal R Phase | float | 40265 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 78 | Current Unbal Y Phase | float | 40267 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 79 | Current Unbal B Phase | float | 40269 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 80 | Additional Load | float | 40271 | ✓ | | | | | | | | | | |
| 81 | Analog input 1 | float | 40273 | | | | | | | ✓# | | | | |
| 82 | Analog input 2 | float | 40275 | | | | | | | ✓# | | | | |
| 83 | Digital input 1 | Unsigned long | 40277 | | | ✓# | | | | | | | | |
| 84 | Digital input 2 | Unsigned long | 40279 | | | ✓# | | | | | | | | |
| 85 | Digital input 3 | Unsigned long | 40281 | | | | | | | | | | | |
| 86 | Digital input 4 | Unsigned long | 40283 | | | | | | | | | | | |
| 87 | VLL Max | float | 40285 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 88 | VLL Min | float | 40287 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 89 | VLN max | float | 40289 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 90 | VLN min | float | 40291 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 91 | Amps max | float | 40293 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 92 | Amps Min | float | 40295 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 93 | Frequency Max | float | 40297 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 94 | Frequency Min | float | 40299 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 95 | Watts Max | float | 40301 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 96 | Watts Min | float | 40303 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 97 | VAR max (absolute max) | float | 40305 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 98 | VAR min (absolute min) | float | 40307 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 99 | VA max | float | 40309 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 100 | VA min | float | 40311 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 101 | PF max (absolute max) | float | 40313 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 102 | PF min (absolute min) | float | 40315 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 103 | Analog input 1 max | float | 40317 | | | | | | | ✓# | | | | |
| 104 | Analog input 1 Min | float | 40319 | | | | | | | ✓# | | | | |
| 105 | Analog input 2 Max | float | 40321 | | | | | | | ✓# | | | | |
| 106 | Analog input 2 min | float | 40323 | | | | | | | ✓# | | | | |
| 107 | Maximum demand TOD slot 1 | float | 40325 | ✓ | | | | | | | | | | |
| 108 | Maximum demand TOD slot 2 | float | 40327 | ✓ | | | | | | | | | | |
| 109 | Maximum demand TOD slot 3 | float | 40329 | ✓ | | | | | | | | | | |
| 110 | Maximum demand TOD slot 4 | float | 40331 | ✓ | | | | | | | | | | |
| 111 | Maximum demand TOD slot 5 | float | 40333 | ✓ | | | | | | | | | | |
| 112 | Maximum demand TOD slot 6 | float | 40335 | ✓ | | | | | | | | | | |
| 113 | Maximum demand TOD slot 1 occ Time | Unsigned long | 40337 | ✓ | | | | | | | | | | |
| 114 | Maximum demand TOD slot 1 occ Date | Unsigned long | 40339 | ✓ | | | | | | | | | | |
| 115 | Maximum demand TOD slot 2 occ Time | Unsigned long | 40341 | ✓ | | | | | | | | | | |
| 116 | Maximum demand TOD slot 2 occ Date | Unsigned long | 40343 | ✓ | | | | | | | | | | |
| 117 | Maximum demand TOD slot 3 occ Time | Unsigned long | 40345 | ✓ | | | | | | | | | | |
| 118 | Maximum demand TOD slot 3 occ Date | Unsigned long | 40347 | ✓ | | | | | | | | | | |
| 119 | Maximum demand TOD slot 4 occ Time | Unsigned long | 40349 | ✓ | | | | | | | | | | |
| 120 | Maximum demand TOD slot 4 occ Date | Unsigned long | 40351 | ✓ | | | | | | | | | | |
| 121 | Maximum demand TOD slot 5 occ Time | Unsigned long | 40353 | ✓ | | | | | | | | | | |
| 122 | Maximum demand TOD slot 5 occ Date | Unsigned long | 40355 | ✓ | | | | | | | | | | |
| 123 | Maximum demand TOD slot 6 occ Time | Unsigned long | 40357 | ✓ | | | | | | | | | | |
| 124 | Maximum demand TOD slot 6 occ Date | Unsigned long | 40359 | ✓ | | | | | | | | | | |
| 125 | Voltage R Harmonics | float | 40479 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 126 | Voltage Y Harmonics | float | 40481 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |

# Available in select models

# Communication Register Map

| Sl. No. | Parameter | Data Type | Address | WC6000/ WL6000 | WC5010/ WL5010 | WC5000/ WL5000 | WC4440/ WL4440 | WC4430/ WL4430 | WC4420/ WL4420 | WC4410/ WL4410 | WC4000/ WL4000 | WC4400/ WL4400 | WC4040/ WL4040 | WL4110 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 127 | Voltage B Harmonics | float | 40483 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 128 | Current R Harmonics | float | 40485 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 129 | Current Y Harmonics | float | 40487 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 130 | Current B Harmonics | float | 40489 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 131 | K factor Voltage R phase | float | 40491 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 132 | K factor Voltage Y phase | float | 40493 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 133 | K factor Voltage B phase | float | 40495 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 134 | K factor Current R phase | float | 40497 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 135 | K factor Current Y phase | float | 40499 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 136 | K factor Current B phase | float | 40501 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 137 | 3rd harmonics Voltage R phase | float | 40503 | | ✓ | ✓ | | | | | | | | |
| 138 | 3rd harmonics Voltage Y phase | float | 40505 | | ✓ | ✓ | | | | | | | | |
| 139 | 3rd harmonics Voltage B phase | float | 40507 | | ✓ | ✓ | | | | | | | | |
| 140 | 3rd harmonics Current R phase | float | 40509 | | ✓ | ✓ | | | | | | | | |
| 141 | 3rd harmonics Current Y phase | float | 40511 | | ✓ | ✓ | | | | | | | | |
| 142 | 3rd harmonics Current B phase | float | 40513 | | ✓ | ✓ | | | | | | | | |
| 143 | 5th harmonics Voltage R phase | float | 40515 | | ✓ | ✓ | | | | | | | | |
| 144 | 5th harmonics Voltage Y phase | float | 40517 | | ✓ | ✓ | | | | | | | | |
| 145 | 5th harmonics Voltage B phase | float | 40519 | | ✓ | ✓ | | | | | | | | |
| 146 | 5th harmonics Current R phase | float | 40521 | | ✓ | ✓ | | | | | | | | |
| 147 | 5th harmonics Current Y phase | float | 40523 | | ✓ | ✓ | | | | | | | | |
| 148 | 5th harmonics Current B phase | float | 40525 | | ✓ | ✓ | | | | | | | | |
| 149 | 7th harmonics Voltage R phase | float | 40527 | | ✓ | ✓ | | | | | | | | |
| 150 | 7th harmonics Voltage Y phase | float | 40529 | | ✓ | ✓ | | | | | | | | |
| 151 | 7th harmonics Voltage B phase | float | 40531 | | ✓ | ✓ | | | | | | | | |
| 152 | 7th harmonics Current R phase | float | 40533 | | ✓ | ✓ | | | | | | | | |
| 153 | 7th harmonics Current Y phase | float | 40535 | | ✓ | ✓ | | | | | | | | |
| 154 | 7th harmonics Current B phase | float | 40537 | | ✓ | ✓ | | | | | | | | |
| 155 | 9th harmonics Voltage R phase | float | 40539 | | ✓ | ✓ | | | | | | | | |
| 156 | 9th harmonics Voltage Y phase | float | 40541 | | ✓ | ✓ | | | | | | | | |
| 157 | 9th harmonics Voltage B phase | float | 40543 | | ✓ | ✓ | | | | | | | | |
| 158 | 9th harmonics Current R phase | float | 40545 | | ✓ | ✓ | | | | | | | | |
| 159 | 9th harmonics Current Y phase | float | 40547 | | ✓ | ✓ | | | | | | | | |
| 160 | 9th harmonics Current B phase | float | 40549 | | ✓ | ✓ | | | | | | | | |
| 161 | 11th harmonics Voltage R phase | float | 40551 | | ✓ | ✓ | | | | | | | | |
| 162 | 11th harmonics Voltage Y phase | float | 40553 | | ✓ | ✓ | | | | | | | | |
| 163 | 11th harmonics Voltage B phase | float | 40555 | | ✓ | ✓ | | | | | | | | |
| 164 | 11th harmonics Current R phase | float | 40557 | | ✓ | ✓ | | | | | | | | |
| 165 | 11th harmonics Current Y phase | float | 40559 | | ✓ | ✓ | | | | | | | | |
| 166 | 11th harmonics Current B phase | float | 40561 | | ✓ | ✓ | | | | | | | | |
| 167 | 13th harmonics Voltage R phase | float | 40563 | | ✓ | ✓ | | | | | | | | |
| 168 | 13th harmonics Voltage Y phase | float | 40565 | | ✓ | ✓ | | | | | | | | |
| 169 | 13th harmonics Voltage B phase | float | 40567 | | ✓ | ✓ | | | | | | | | |
| 170 | 13th harmonics Current R phase | float | 40569 | | ✓ | ✓ | | | | | | | | |
| 171 | 13th harmonics Current Y phase | float | 40571 | | ✓ | ✓ | | | | | | | | |
| 172 | 13th harmonics Current B phase | float | 40573 | | ✓ | ✓ | | | | | | | | |
| 173 | 15th harmonics Voltage R phase | float | 40575 | | ✓ | ✓ | | | | | | | | |
| 174 | 15th harmonics Voltage Y phase | float | 40577 | | ✓ | ✓ | | | | | | | | |
| 175 | 15th harmonics Voltage B phase | float | 40579 | | ✓ | ✓ | | | | | | | | |
| 176 | 15th harmonics Current R phase | float | 40581 | | ✓ | ✓ | | | | | | | | |
| 177 | 15th harmonics Current Y phase | float | 40583 | | ✓ | ✓ | | | | | | | | |
| 178 | 15th harmonics Current B phase | float | 40585 | | ✓ | ✓ | | | | | | | | |
| 179 | 17th harmonics Voltage R phase | float | 40587 | | ✓ | ✓ | | | | | | | | |
| 180 | 17th harmonics Voltage Y phase | float | 40589 | | ✓ | ✓ | | | | | | | | |
| 181 | 17th harmonics Voltage B phase | float | 40591 | | ✓ | ✓ | | | | | | | | |
| 182 | 17th harmonics Current R phase | float | 40593 | | ✓ | ✓ | | | | | | | | |
| 183 | 17th harmonics Current Y phase | float | 40595 | | ✓ | ✓ | | | | | | | | |
| 184 | 17th harmonics Current B phase | float | 40597 | | ✓ | ✓ | | | | | | | | |
| 185 | 19th harmonics Voltage R phase | float | 40599 | | ✓ | ✓ | | | | | | | | |
| 186 | 19th harmonics Voltage Y phase | float | 40601 | | ✓ | ✓ | | | | | | | | |
| 187 | 19th harmonics Voltage B phase | float | 40603 | | ✓ | ✓ | | | | | | | | |
| 188 | 19th harmonics Current R phase | float | 40605 | | ✓ | ✓ | | | | | | | | |
| 189 | 19th harmonics Current Y phase | float | 40607 | | ✓ | ✓ | | | | | | | | |

# Communication Register Map

| Sl. No. | Parameter | Data Type | Address | WC6000/ WL6000 | WC5010/ WL5010 | WC5000/ WL5000 |
|---|---|---|---|---|---|---|
| 190 | 19th harmonics Current B phase | float | 40609 | | ✓ | ✓ |
| 191 | 21st harmonics Voltage R phase | float | 40611 | | ✓ | ✓ |
| 192 | 21st harmonics Voltage Y phase | float | 40613 | | ✓ | ✓ |
| 193 | 21st harmonics Voltage B phase | float | 40615 | | ✓ | ✓ |
| 194 | 21st harmonics Current R phase | float | 40617 | | ✓ | ✓ |
| 195 | 21st harmonics Current Y phase | float | 40619 | | ✓ | ✓ |
| 196 | 21st harmonics Current B phase | float | 40621 | | ✓ | ✓ |
| 197 | 23rd harmonics Voltage R phase | float | 40623 | | ✓ | ✓ |
| 198 | 23rd harmonics Voltage Y phase | float | 40625 | | ✓ | ✓ |
| 199 | 23rd harmonics Voltage B phase | float | 40627 | | ✓ | ✓ |
| 200 | 23rd harmonics Current R phase | float | 40629 | | ✓ | ✓ |
| 201 | 23rd harmonics Current Y phase | float | 40631 | | ✓ | ✓ |
| 202 | 23rd harmonics Current B phase | float | 40633 | | ✓ | ✓ |
| 203 | 25th harmonics Voltage R phase | float | 40635 | | ✓ | ✓ |
| 204 | 25th harmonics Voltage Y phase | float | 40637 | | ✓ | ✓ |
| 205 | 25th harmonics Voltage B phase | float | 40639 | | ✓ | ✓ |
| 206 | 25th harmonics Current R phase | float | 40641 | | ✓ | ✓ |
| 207 | 25th harmonics Current Y phase | float | 40643 | | ✓ | ✓ |
| 208 | 25th harmonics Current B phase | float | 40645 | | ✓ | ✓ |
| 209 | 27th harmonics Voltage R phase | float | 40647 | | ✓ | ✓ |
| 210 | 27th harmonics Voltage Y phase | float | 40649 | | ✓ | ✓ |
| 211 | 27th harmonics Voltage B phase | float | 40651 | | ✓ | ✓ |
| 212 | 27th harmonics Current R phase | float | 40653 | | ✓ | ✓ |
| 213 | 27th harmonics Current Y phase | float | 40655 | | ✓ | ✓ |
| 214 | 27th harmonics Current B phase | float | 40657 | | ✓ | ✓ |
| 215 | 29th harmonics Voltage R phase | float | 40659 | | ✓ | ✓ |
| 216 | 29th harmonics Voltage Y phase | float | 40661 | | ✓ | ✓ |
| 217 | 29th harmonics Voltage B phase | float | 40663 | | ✓ | ✓ |
| 218 | 29th harmonics Current R phase | float | 40665 | | ✓ | ✓ |
| 219 | 29th harmonics Current Y phase | float | 40667 | | ✓ | ✓ |
| 220 | 29th harmonics Current B phase | float | 40669 | | ✓ | ✓ |
| 221 | 31st harmonics Voltage R phase | float | 40671 | | ✓ | ✓ |
| 222 | 31st harmonics Voltage Y phase | float | 40673 | | ✓ | ✓ |
| 223 | 31st harmonics Voltage B phase | float | 40675 | | ✓ | ✓ |
| 224 | 31st harmonics Current R phase | float | 40677 | | ✓ | ✓ |
| 225 | 31st harmonics Current Y phase | float | 40679 | | ✓ | ✓ |
| 226 | 31st harmonics Current B phase | float | 40681 | | ✓ | ✓ |
| 227 | 2nd harmonics Voltage R phase | float | 40683 | | ✓ | ✓ |
| 228 | 2nd harmonics Voltage Y phase | float | 40685 | | ✓ | ✓ |
| 229 | 2nd harmonics Voltage B phase | float | 40687 | | ✓ | ✓ |
| 230 | 2nd harmonics Current R phase | float | 40689 | | ✓ | ✓ |
| 231 | 2nd harmonics Current Y phase | float | 40691 | | ✓ | ✓ |
| 232 | 2nd harmonics Current B phase | float | 40693 | | ✓ | ✓ |
| 233 | 4th harmonics Voltage R phase | float | 40695 | | ✓ | ✓ |
| 234 | 4th harmonics Voltage Y phase | float | 40697 | | ✓ | ✓ |
| 235 | 4th harmonics Voltage B phase | float | 40699 | | ✓ | ✓ |
| 236 | 4th harmonics Current R phase | float | 40701 | | ✓ | ✓ |
| 237 | 4th harmonics Current Y phase | float | 40703 | | ✓ | ✓ |
| 238 | 4th harmonics Current B phase | float | 40705 | | ✓ | ✓ |
| 239 | 6th harmonics Voltage R phase | float | 40707 | | ✓ | ✓ |
| 240 | 6th harmonics Voltage Y phase | float | 40709 | | ✓ | ✓ |
| 241 | 6th harmonics Voltage B phase | float | 40711 | | ✓ | ✓ |
| 242 | 6th harmonics Current R phase | float | 40713 | | ✓ | ✓ |
| 243 | 6th harmonics Current Y phase | float | 40715 | | ✓ | ✓ |
| 244 | 6th harmonics Current B phase | float | 40717 | | ✓ | ✓ |
| 245 | 8th harmonics Voltage R phase | float | 40719 | | ✓ | ✓ |
| 246 | 8th harmonics Voltage Y phase | float | 40721 | | ✓ | ✓ |
| 247 | 8th harmonics Voltage B phase | float | 40723 | | ✓ | ✓ |
| 248 | 8th harmonics Current R phase | float | 40725 | | ✓ | ✓ |
| 249 | 8th harmonics Current Y phase | float | 40727 | | ✓ | ✓ |
| 250 | 8th harmonics Current B phase | float | 40729 | | ✓ | ✓ |
| 251 | 10th harmonics Voltage R phase | float | 40731 | | ✓ | ✓ |
| 252 | 10th harmonics Voltage Y phase | float | 40733 | | ✓ | ✓ |

| Sl. No. | Parameter | Data Type | Address | WC6000/ WL6000 | WC5010/ WL5010 | WC5000/ WL5000 |
|---|---|---|---|---|---|---|
| 253 | 10th harmonics Voltage B phase | float | 40735 | | ✓ | ✓ |
| 254 | 10th harmonics Current R phase | float | 40737 | | ✓ | ✓ |
| 255 | 10th harmonics Current Y phase | float | 40739 | | ✓ | ✓ |
| 256 | 10th harmonics Current B phase | float | 40741 | | ✓ | ✓ |
| 257 | 12th harmonics Voltage R phase | float | 40743 | | ✓ | ✓ |
| 258 | 12th harmonics Voltage Y phase | float | 40745 | | ✓ | ✓ |
| 259 | 12th harmonics Voltage B phase | float | 40747 | | ✓ | ✓ |
| 260 | 12th harmonics Current R phase | float | 40749 | | ✓ | ✓ |
| 261 | 12th harmonics Current Y phase | float | 40751 | | ✓ | ✓ |
| 262 | 12th harmonics Current B phase | float | 40753 | | ✓ | ✓ |
| 263 | 14th harmonics Voltage R phase | float | 40755 | | ✓ | ✓ |
| 264 | 14th harmonics Voltage Y phase | float | 40757 | | ✓ | ✓ |
| 265 | 14th harmonics Voltage B phase | float | 40759 | | ✓ | ✓ |
| 266 | 14th harmonics Current R phase | float | 40761 | | ✓ | ✓ |
| 267 | 14th harmonics Current Y phase | float | 40763 | | ✓ | ✓ |
| 268 | 14th harmonics Current B phase | float | 40765 | | ✓ | ✓ |
| 269 | 16th harmonics Voltage R phase | float | 40767 | | ✓ | ✓ |
| 270 | 16th harmonics Voltage Y phase | float | 40769 | | ✓ | ✓ |
| 271 | 16th harmonics Voltage B phase | float | 40771 | | ✓ | ✓ |
| 272 | 16th harmonics Current R phase | float | 40773 | | ✓ | ✓ |
| 273 | 16th harmonics Current Y phase | float | 40775 | | ✓ | ✓ |
| 274 | 16th harmonics Current B phase | float | 40777 | | ✓ | ✓ |
| 275 | 18th harmonics Voltage R phase | float | 40779 | | ✓ | ✓ |
| 276 | 18th harmonics Voltage Y phase | float | 40781 | | ✓ | ✓ |
| 277 | 18th harmonics Voltage B phase | float | 40783 | | ✓ | ✓ |
| 278 | 18th harmonics Current R phase | float | 40785 | | ✓ | ✓ |
| 279 | 18th harmonics Current Y phase | float | 40787 | | ✓ | ✓ |
| 280 | 18th harmonics Current B phase | float | 40789 | | ✓ | ✓ |
| 281 | 20th harmonics Voltage R phase | float | 40791 | | ✓ | ✓ |
| 282 | 20th harmonics Voltage Y phase | float | 40793 | | ✓ | ✓ |
| 283 | 20th harmonics Voltage B phase | float | 40795 | | ✓ | ✓ |
| 284 | 20th harmonics Current R phase | float | 40797 | | ✓ | ✓ |
| 285 | 20th harmonics Current Y phase | float | 40799 | | ✓ | ✓ |
| 286 | 20th harmonics Current B phase | float | 40801 | | ✓ | ✓ |
| 287 | 22th harmonics Voltage R phase | float | 40803 | | ✓ | ✓ |
| 288 | 22th harmonics Voltage Y phase | float | 40805 | | ✓ | ✓ |
| 289 | 22th harmonics Voltage B phase | float | 40807 | | ✓ | ✓ |
| 290 | 22th harmonics Current R phase | float | 40809 | | ✓ | ✓ |
| 291 | 22th harmonics Current Y phase | float | 40811 | | ✓ | ✓ |
| 292 | 22th harmonics Current B phase | float | 40813 | | ✓ | ✓ |
| 293 | 24th harmonics Voltage R phase | float | 40815 | | ✓ | ✓ |
| 294 | 24th harmonics Voltage Y phase | float | 40817 | | ✓ | ✓ |
| 295 | 24th harmonics Voltage B phase | float | 40819 | | ✓ | ✓ |
| 296 | 24th harmonics Current R phase | float | 40821 | | ✓ | ✓ |
| 297 | 24th harmonics Current Y phase | float | 40823 | | ✓ | ✓ |
| 298 | 24th harmonics Current B phase | float | 40825 | | ✓ | ✓ |
| 299 | 26th harmonics Voltage R phase | float | 40827 | | ✓ | ✓ |
| 300 | 26th harmonics Voltage Y phase | float | 40829 | | ✓ | ✓ |
| 301 | 26th harmonics Voltage B phase | float | 40831 | | ✓ | ✓ |
| 302 | 26th harmonics Current R phase | float | 40833 | | ✓ | ✓ |
| 303 | 26th harmonics Current Y phase | float | 40835 | | ✓ | ✓ |
| 304 | 26th harmonics Current B phase | float | 40837 | | ✓ | ✓ |
| 305 | 28th harmonics Voltage R phase | float | 40839 | | ✓ | ✓ |
| 306 | 28th harmonics Voltage Y phase | float | 40841 | | ✓ | ✓ |
| 307 | 28th harmonics Voltage B phase | float | 40843 | | ✓ | ✓ |
| 308 | 28th harmonics Current R phase | float | 40845 | | ✓ | ✓ |
| 309 | 28th harmonics Current Y phase | float | 40847 | | ✓ | ✓ |
| 310 | 28th harmonics Current B phase | float | 40849 | | ✓ | ✓ |
| 311 | 30th harmonics Voltage R phase | float | 40851 | | ✓ | ✓ |
| 312 | 30th harmonics Voltage Y phase | float | 40853 | | ✓ | ✓ |
| 313 | 30th harmonics Voltage B phase | float | 40855 | | ✓ | ✓ |
| 314 | 30th harmonics Current R phase | float | 40857 | | ✓ | ✓ |
| 315 | 30th harmonics Current Y phase | float | 40859 | | ✓ | ✓ |
| 316 | 30th harmonics Current B phase | float | 40861 | | ✓ | ✓ |

## Electrical Standard Products (ESP) Offices:

**HEAD OFFICE**
L&T Business Park,
Tower 'B' / 3rd Floor
Saki Vihar Road, Powai
**Mumbai 400 072**
Tel: 022-67053229
Fax: 022-67051112
e-mail: cic@LNTEBG.com

**BRANCH OFFICES**
501, Sakar Complex I
Opp. Gandhigram Rly. Station
Ashram Road
**Ahmedabad 380 009**
Tel: 079-66304006-11
Fax: 079-66304025
e-mail: esp-ahm@LNTEBG.com

38, Cubbon Road, P. O. Box 5098
**Bengaluru 560 001**
Tel: 080-25020100 / 25020324
Fax: 080-25580525
e-mail: esp-blr@LNTEBG.com

131/1, Zone II
Maharana Pratap Nagar
**Bhopal 462 011**
Tel: 0755-3080511 / 05 / 08 / 13 / 17 / 19
Fax: 0755-3080502
e-mail: esp-bho@LNTEBG.com

Plot No. 559, Annapurna Complex
Lewis Road
**Bhubaneswar 751 014**
Tel: 0674-6451342 / 2436690 / 2436696
Fax: 0674-2537309
e-mail: esp-bsr@LNTEBG.com

Aspire Towers, 4th Floor
Plot No. 55, Phase-I
Industrial & Business Park
**Chandigarh-160 002**
Tel: 0172-4646840 / 41 / 42 / 46 / 53
Fax: 0172-4646802
Email: esp-chd@Lntebg.com

L&T Construction Campus
TC-1 Building, II Floor
Mount-Poonamallee Road
Manapakkam
**Chennai 600 089**
Tel: 044-2270 6800
Fax: 044-22706940
e-mail: esp-maa1@LNTEBG.com

67, Appuswamy Road
Post Bag 7156
Opp. Nirmala College
**Coimbatore 641 045**
Tel: 0422-2588120 / 1 / 5
Fax: 0422-2588148
e-mail: esp-cbe@LNTEBG.com

Khairasol, Degaul Avenue
**Durgapur 713 212**
Tel: 0343-2540448 / 2540449 / 2540443
Fax: 0343-2540442
e-mail: esp-dgp@LNTEBG.com

5, Milanpur Road, Bamuni Maidan
**Guwahati 781 021**
Tel: +91 8876554410 / 8876554417
Fax: 361-2551308
e-mail: esp-ghy@LNTEBG.com

II Floor, Vasantha Chambers
5-10-173, Fateh Maidan Road
**Hyderabad 500 004**
Tel: 040-67015052
Fax: 040-23296468
e-mail: esp-hyd@LNTEBG.com

Monarch Building, 1st Floor
D-236 & 237, Amrapali Marg
Vaishali Nagar
**Jaipur 302 021**
Tel: 0141-4385914 to 18
Fax: 0141-4385925
e-mail: esp-jai@LNTEBG.com

Akashdeep Plaza, 2nd Floor
P. O. Golmuri
**Jamshedpur 831 003**
Jharkhand
Tel: 0657-2312205 / 38
Fax: 0657-2341250
e-mail: esp-jam@LNTEBG.com

Skybright Bldg; M. G. Road
Ravipuram Junction, Ernakulam
**Kochi 682 016**
Tel: 0484-4409420 / 4 / 5 / 7
Fax: 0484-4409426
e-mail: esp-cok@LNTEBG.com

3-B, Shakespeare Sarani
**Kolkata 700 071**
Tel: 033-42005982
Fax: 033-22821025 / 7587
e-mail: esp-ccu@LNTEBG.com

A28, Indira Nagar, Faizabad Road
**Lucknow 226 016**
Tel: 0522-4929905 / 04
Fax: 0522-2311671
e-mail: esp-Lko@LNTEBG.com

No: 73, Karpaga Nagar, 8th Street
K. Pudur
**Madurai 625 007**
Tel: 0452-2567405 / 2561068 / 2561657
Fax: 0452-2567552
e-mail: esp-mdu@LNTEBG.com

L&T Business Park,
Tower 'B' / 5th Floor
Saki Vihar Road, Powai
**Mumbai 400 072**
Tel: 022-67052874 / 2737 / 1156
Fax: 022-67051112
e-mail: esp-bom@LNTEBG.com

12, Shivaji Nagar
North Ambajhari Road
**Nagpur 440 010**
Tel: 0712-2260012 / 6606421
Fax: 2260030 / 6606434
e-mail: esp-nag@LNTEBG.com

32, Shivaji Marg
P. O. Box 6223
**New Delhi 110 015**
Tel: 011-41419514 / 5 / 6
Fax: 011-41419600
e-mail: esp-del@LNTEBG.com

L&T House
P. O. Box 119
191/1, Dhole Patil Road
**Pune 411 001**
Tel: 020-66033395 / 66033279
Fax: 020-26164048 / 26164910
e-mail: esp-pnq@LNTEBG.com

Crystal Tower,
4th Floor, G. E. Road
Telibandha
**Raipur - 492 006**
Tel: 0771-4283214
e-mail: esp-raipur@LNTEBG.com

3rd Floor
Vishwakarma Chambers
Majura Gate, Ring Road
**Surat 395 002**
Tel: 0261-2473726
Fax: 0261-2477078
e-mail: esp-sur@LNTEBG.com

Radhadaya Complex
Old Padra Road
Near Charotar Society
**Vadodara 390 007**
Tel: 0265-6613610 / 1 / 2
Fax: 0265-2336184
e-mail: esp-bar@LNTEBG.com

Door No. 49-38-14/3/2, 1st floor,
NGGO's Colony, Akkayyapalem,
**Visakhapatnam - 530 016**
Tel: 0891-2791126 / 2711125
Fax: 0891-2791100
Email: esp-viz@LNTEBG.com

*Product improvement is a continuous process. For the latest information and special applications, please contact any of our offices listed here.*

L&T SWITCHGEAR
SAFE & SURE

LARSEN & TOUBRO

***Larsen & Toubro Limited, Electrical Standard Products***
*Powai Campus, Mumbai 400 072*

***Customer Interaction Center (CIC)***
*BSNL / MTNL (toll free) : 1800 233 5858  Reliance (toll free) : 1800 200 5858*
*Tel : 022 6774 5858,  Fax : 022 6774 5859*
*E-mail : cic@Lntebg.com / Website  www.Lntebg.com*

***Registered Office:*** *L&T House, N. M. Marg, Ballard Estate, Mumbai 400 001, INDIA* ***CIN:*** *L99999MH1946PLC004768*

SP 50884