

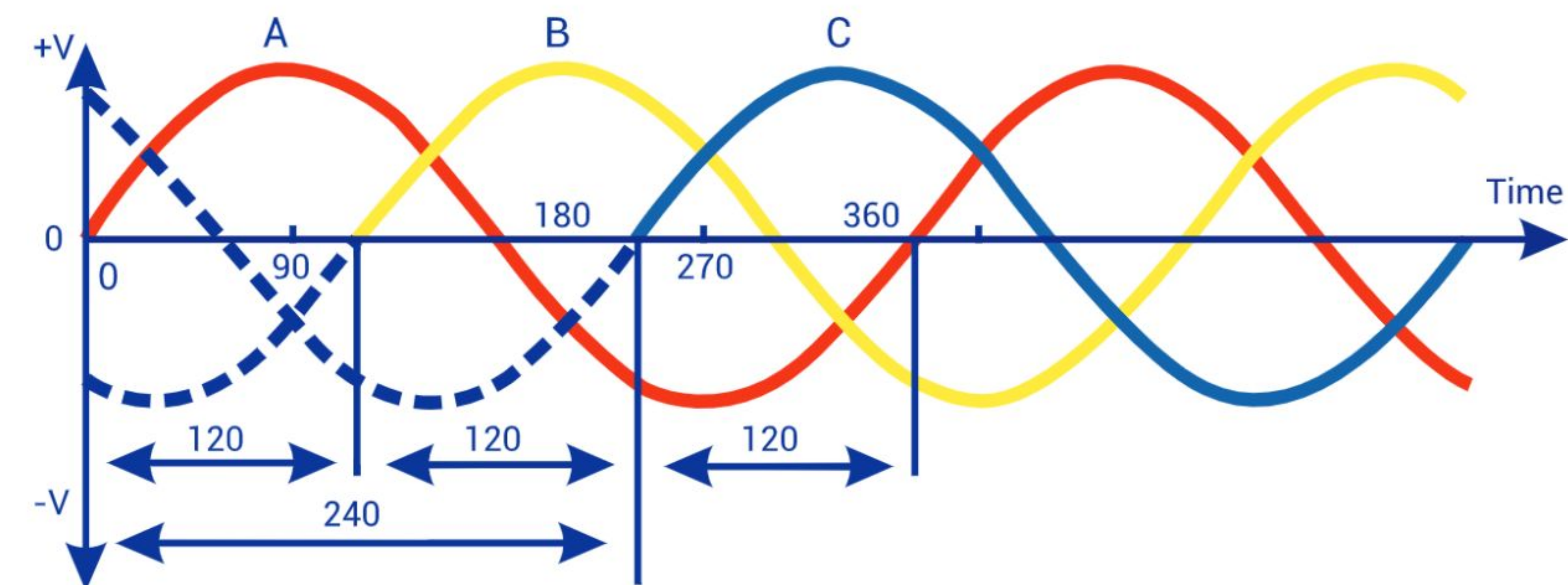
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Electrical Transducer & Meters



POWER PARAMETERS



	AC Voltage - V		Reactive power-KVAR
	AC Current - A		Apparent Power-KVA
	Frequency - Hz		Active Energy -KWh
	Power factor - $\cos \theta$		Reactive Energy- KVARh
	Phase Angle - θ		Apparent Energy- KVAh
	Active power -KW		Maximum Power Demand
 Harmonics & THD			

Demand

- Maximum demand register (kW or kVA). This is the maximum power value, usually the average of 15 minutes, reached during the billing period (this average time may vary depending on the country). Once the value is higher than the contracted power, the customer will pay a penalty on the electricity bill.

Harmonics & THD

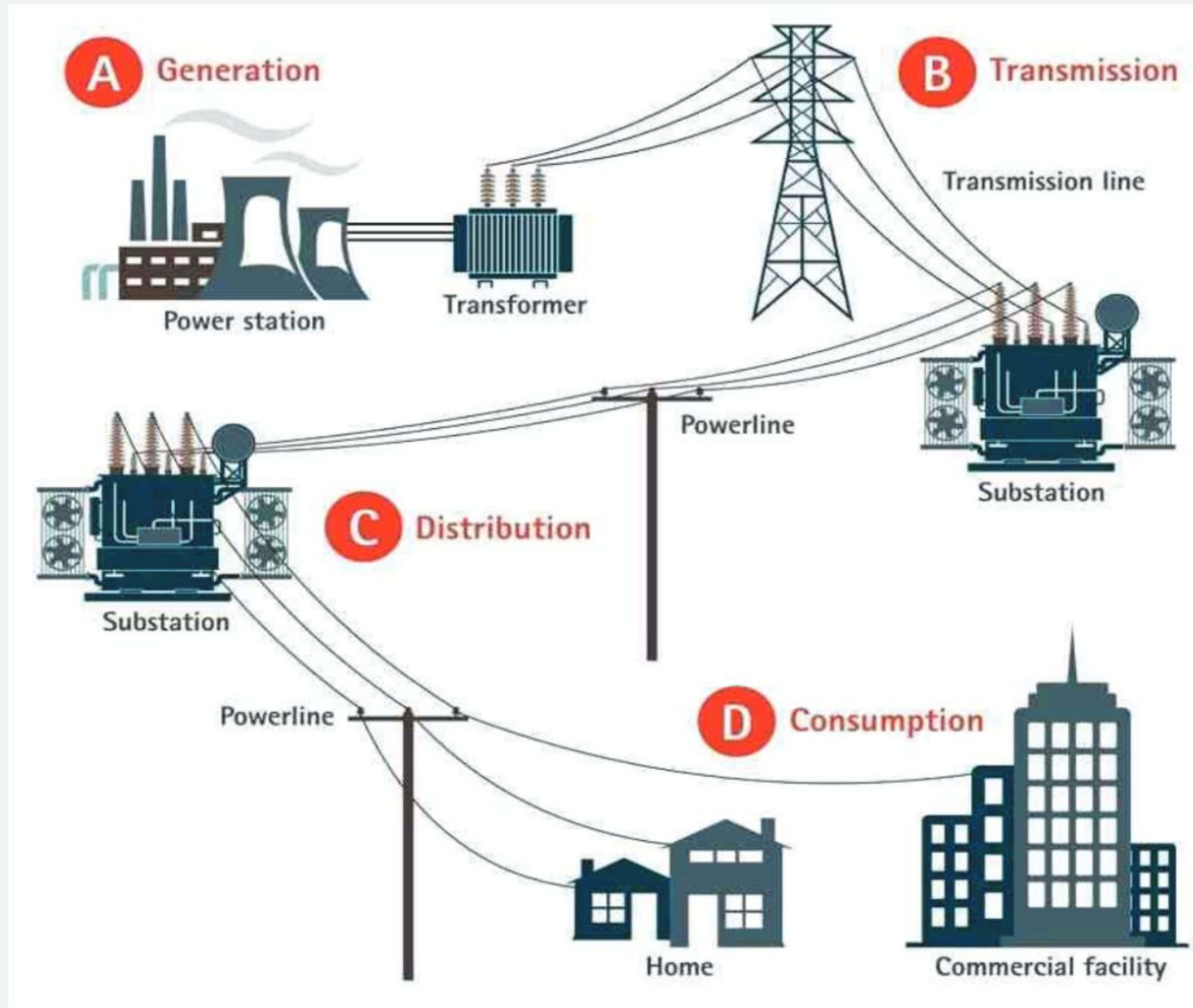
- In an electric power system, a harmonic of a voltage or current waveform is a sinusoidal wave whose frequency is an integer multiple of the fundamental frequency. Harmonic frequencies are produced by the action of non-linear loads such as rectifiers, discharge lighting or saturated electric machines.
- Total harmonic distortion (THD) is the amount of harmonics on a line compared to the line fundamental frequency, eg. 50Hz or 60Hz. The THD considers all of the harmonic frequencies on a line.

Accuracy Class

- Since Accuracy depends on the load of the system, IEC/IS have developed different standards to define accuracy under different load conditions, known as "Accuracy Class"



BENEFITS OF POWER MONITORING



POWER SYSTEM



It identifies the inefficiency in the system



It notifies about the impending maintenance



It will help reduce peak demand



It ensures safety



Environmental benefits



It saves cost



PDA/PDV/PDH - PROGRAMMABLE AC CURRENT / VOLTAGE / FREQUENCY TRANSDUCER



PDA - CURRENT TRANSDUCER

PDV - VOLTAGE TRANSDUCER

PDH - FREQUENCY TRANSDUCER

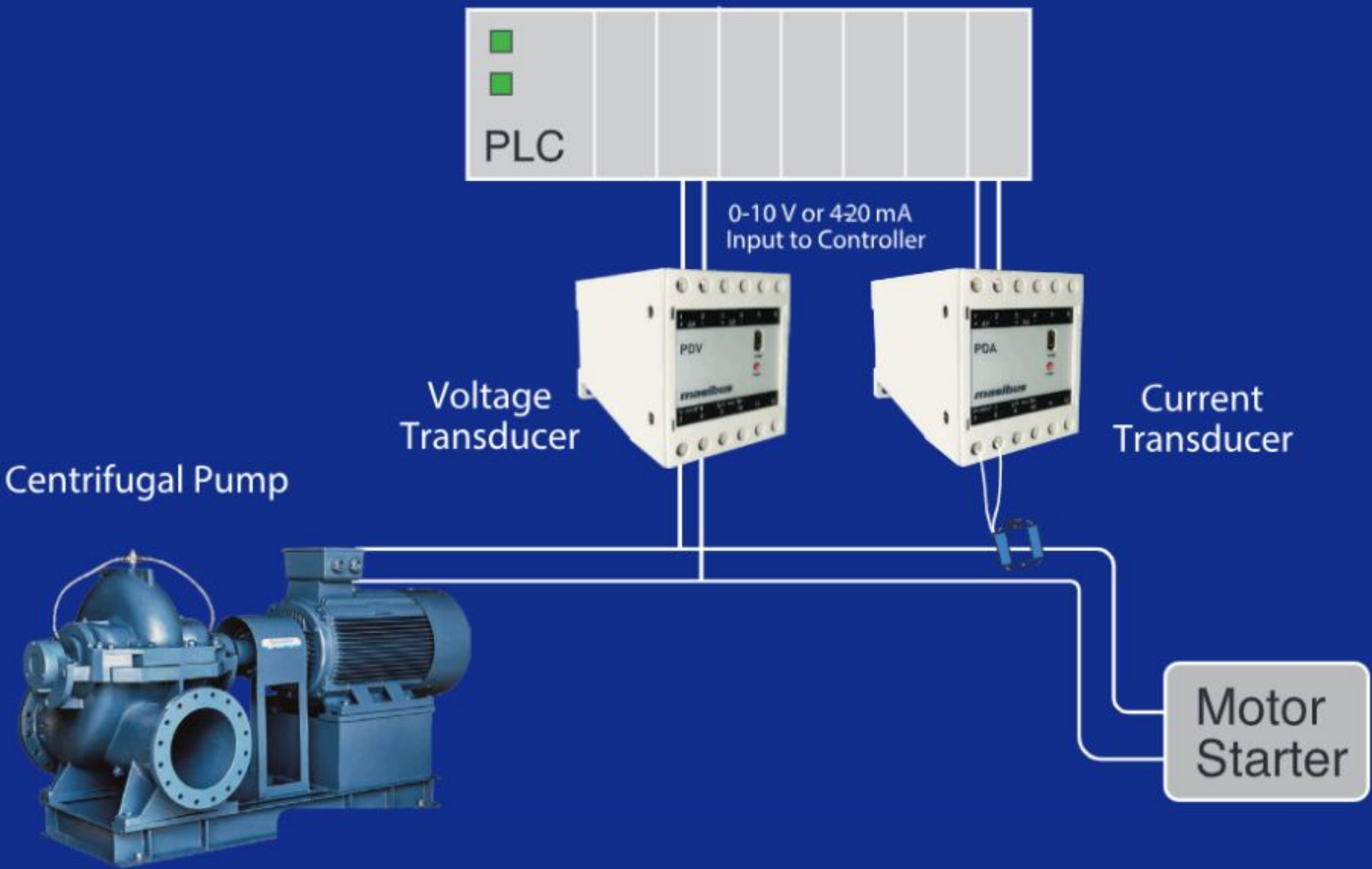
USP

- High accuracy class 0.2 as per IEC60688 standard
- Programmable input rating for PDA, 1A & 5A site selectable
Programmable input rating for PDV, 0 to 415V AC Site Selectable
Programmable input rating for PDH, 40 to 70Hz Site Selectable
- Expanded or Suppressed input & output ranges for inrush current measurement
- Common inventory for input current (1A/5A) or Voltage (57.7V to 415V AC) ranges as well as for
- selectable output types (4-20mA DC, 0-20mA DC, 0-10V DC, 0-5V DC, 1-5V DC)

TECHNICAL SPECIFICATIONS	
AC Current Input	
Nominal Input Current (In)	1A/5A AC
Measuring Current Range	0 to 150 % In
Burden	<0.2VA at In
Maximum Overload Current	2 x In continuously 20 x In for 1 s, with up to 10 repetitions at 100 s intervals
AC Voltage Input	
Nominal Input Voltage(Un)	0 to 415 V AC
Measuring Voltage Range	0 to 130 % Un
Burden	<0.3VA at Un
Maximum Overload Voltage	1.3 x Un continuously 2 x Un for 1 s, with up to 10 repetitions at 10 s intervals
CT/PT Ratio	1 to 9999.999 Programmable
Frequency	45 to 65 Hz
Frequency Input	
Measuring Frequency Range	40 to 70 Hz
Nominal Input Voltage (Un)	57.7 V to 500 VAC

PDA/PDV/PDH - PROGRAMMABLE AC CURRENT / VOLTAGE / FREQUENCY TRANSDUCER

TECHNICAL SPECIFICATIONS	
Power Supply	Universal aux. supply : 85-265VAC, 50/60Hz or 100-300VDC Burden : < 5.5VA (2.2W)
	DC aux. Supply : 20-60VDC Burden : < 2.2W
Analogue Output	
No. of Outputs	2
Output Type	4-20mA, 0-20mA, 0-10V, 0-5V, 1-5V DC
Maximum Load Resistance	≤750 Ω for 20 mA, ≥ 2 k Ω for 10 V (for each output)
Response Time	<500mS
Ripple	<0.4% peak to peak
Isolation	3KV AC for one minute
Impulse voltage tests	5 kV, 1.2/50 uS as per IEC60688
General Specifications	
Operating Temperature	0 to 55 °C
Relative Humidity	25-95% non-condensing
Ingress Protection	Housing : IP40, terminals : IP20
Mounting Type	DIN-Rail
Dimension (in mm)	71H x 61W x 112D
Connector Type	Metal screw
Conductor Size for Terminals	≤ 4 mm ²
Configuration Port	Mini USB type



CURRENT MONITORING FOR SPIN PUMP APPLICATION

MFT20 - MULTIFUNCTION TRANSDUCERS

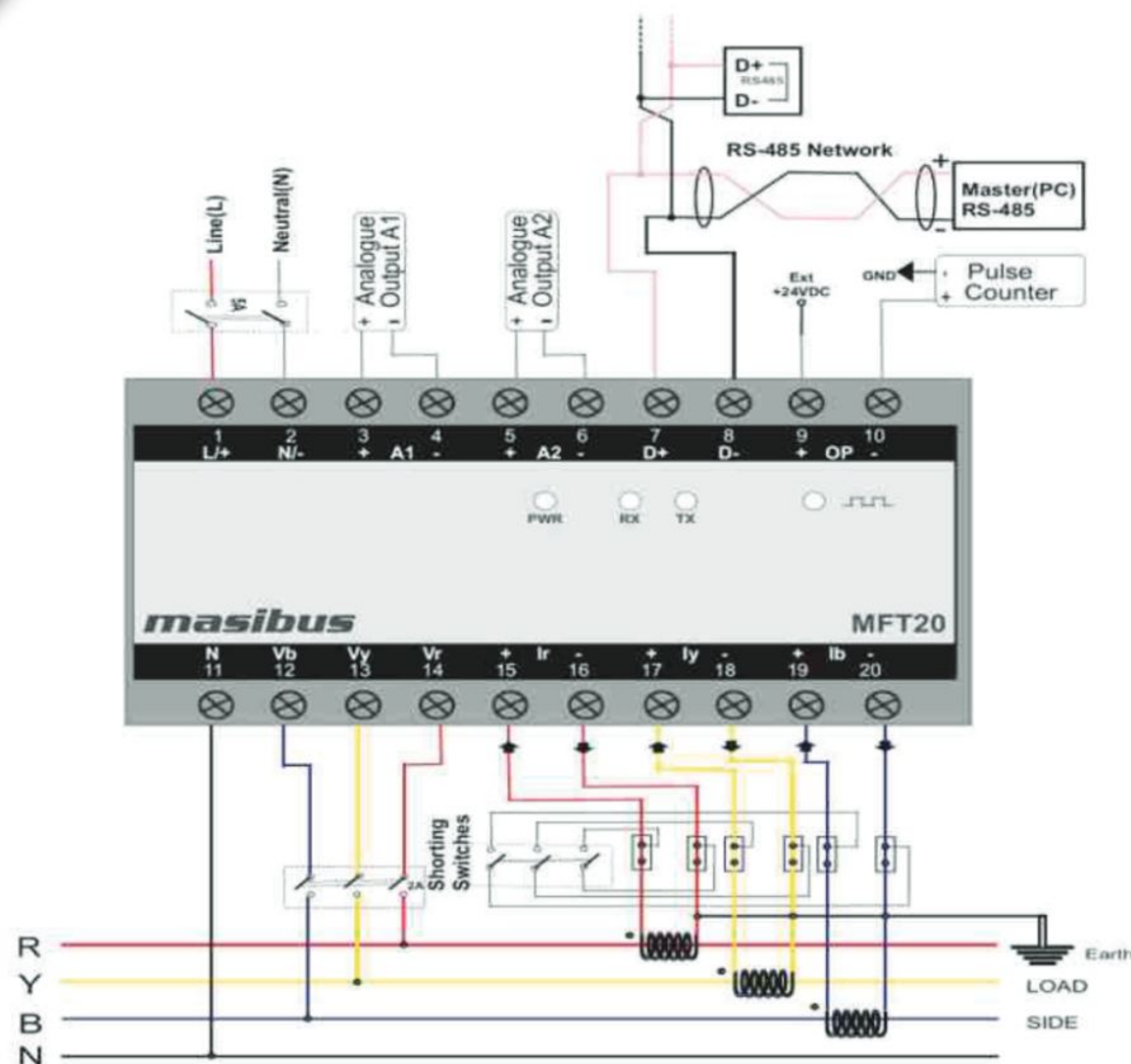


MFT20

USP

- Available in accuracy class 0.5 or 0.2 as per IEC 60688 standard
- EMI/EMC compiled as per IEC 61326-1 standard
- 28 Electrical parameters can be mapped to analogue O/P
- User Assignable Modbus Registers map

CONNECTION DIAGRAM

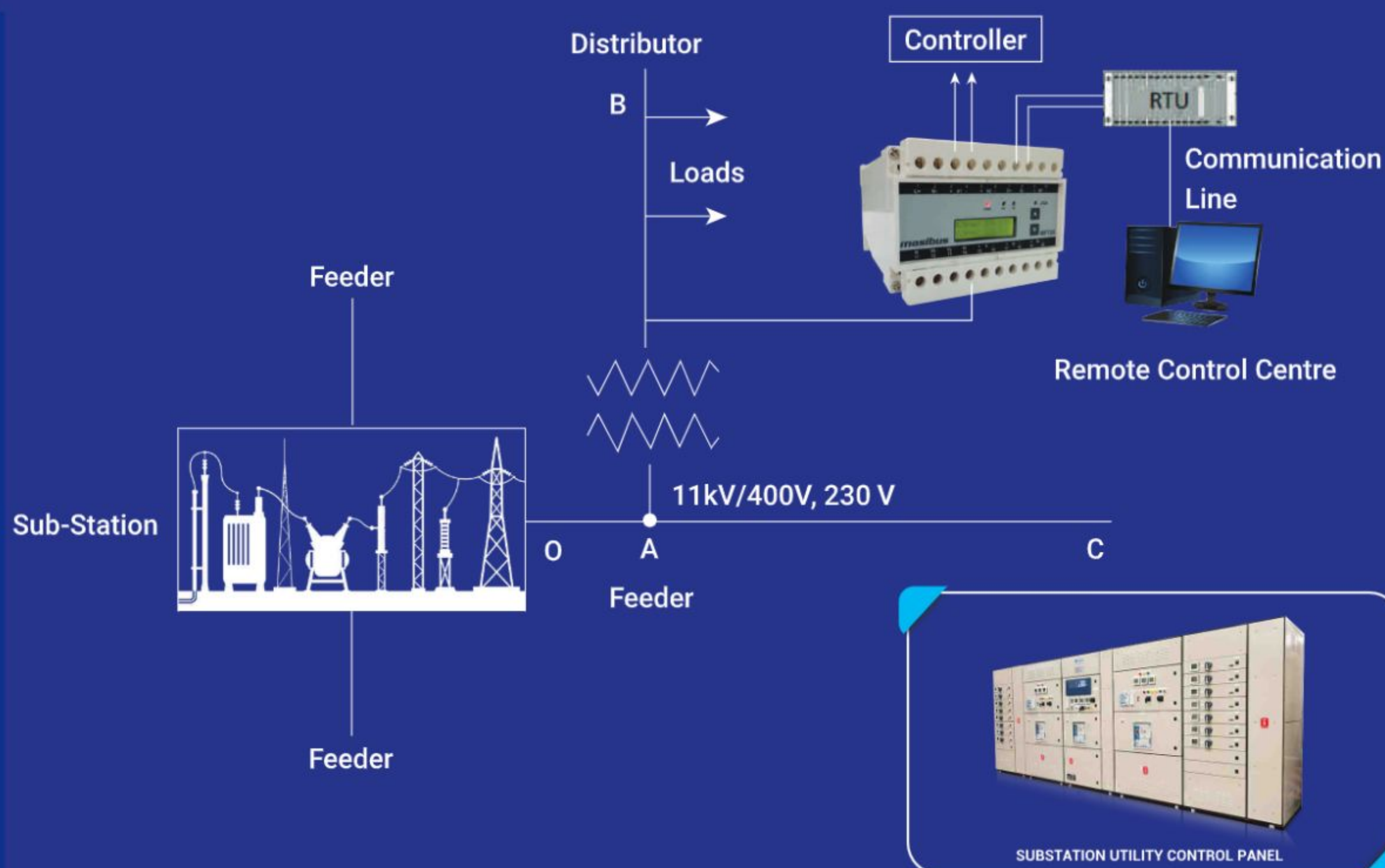




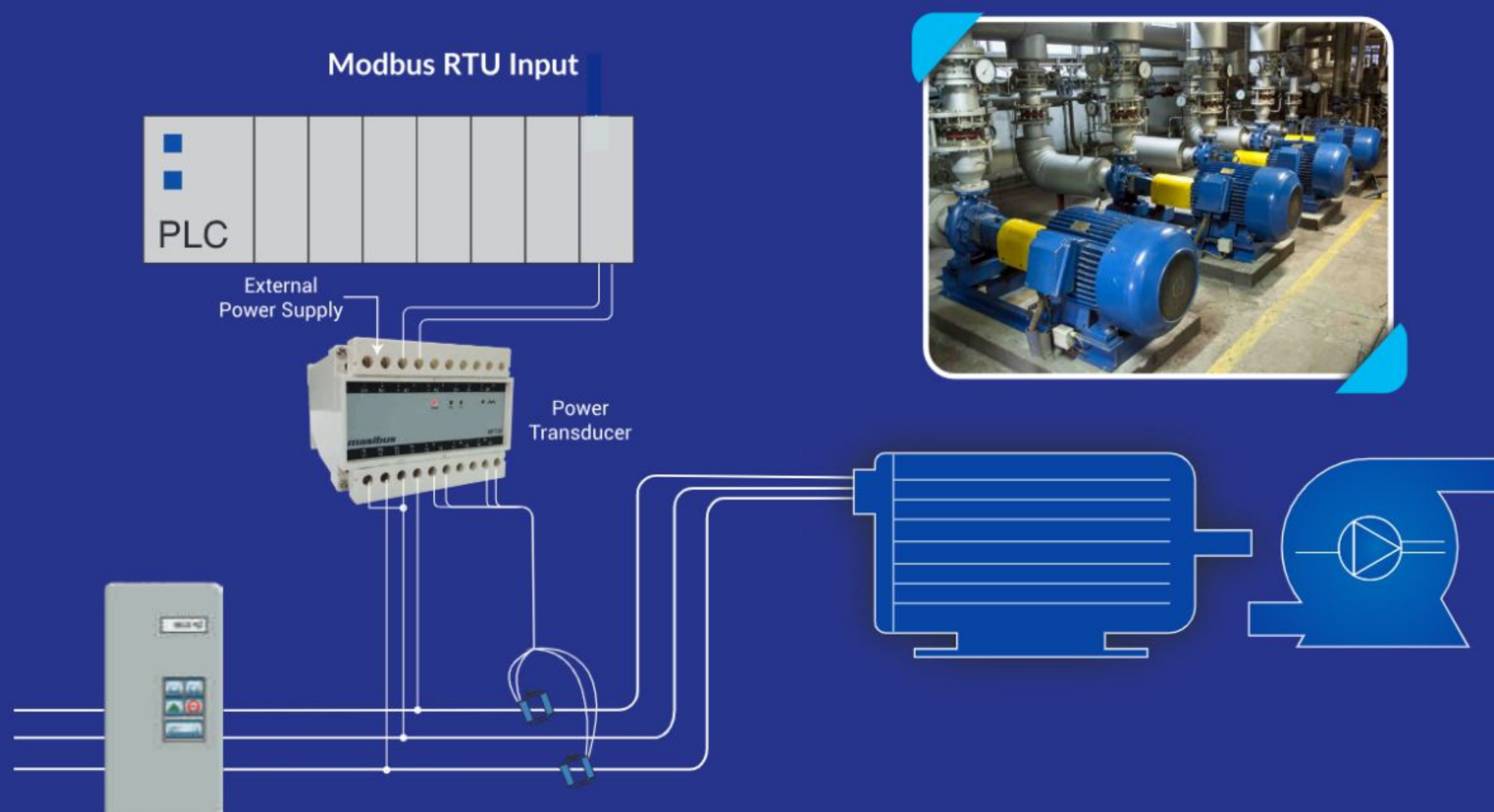
TECHNICAL SPECIFICATIONS

System Type	3Ph4W / 3Ph3W (Site selectable)
AC Current Input	
Nominal Input Current (In)	1A / 5A AC Site selectable
Measuring Current Range	0.01A to 6A
Burden	<0.2VA per phase
AC Voltage Input	
Nominal Input Voltage(Un)	63.5VL-N to 240VL-N
Measuring Voltage Range	20VL-N to 300VL-N (34VL-L to 520VL-L) Self Powered : 63.5VL-N to 240VL-N
Burden	<0.2 VA per phase
CT/PT Ratio	1 to 9999.999 Programmable
Frequency	45 to 65 Hz
Standard Compliance	IEC 60688, IEC 61326-1
Power Supply	Aux. Powered 85-265VAC/ 100-300VDC Burden : < 3VA (Without Analog O/P) < 7VA (With Analog O/P)
Analogue Output	
No. of Outputs	2 (MFT20), 4 (MFT)
Output Type	4-20mA, 0-20mA, 0-10V, 0-5V, 1-5V DC
Maximum Load Resistance	< 550 Ω for mA O/P > 2 k Ω for V O/P
Response Time	< 600mS
Ripple	<0.4% peak to peak
General Specifications	
Operating Temperature	-10 to 60°C
Relative Humidity	Up to 95% non-condensing
Ingress Protection	Housing : IP40, terminals : IP20
Case Material	ABS
Mounting Type	DIN-Rail mounting / Wall mounting
Dimension (in mm)	70H x 100W x 112D
Connector Type	Metal screw
Terminations	Metal screw can accept up to two 2.5 mm ² wire or single 4.0 mm ² wire

MFT20 - FEEDER MONITORING IN UTILITY SUBSTATION



POWER MONITORING OF MOTOR & PUMP



FREE CONFIGURATION SOFTWARE FOR MFT



MFT20 - MAPPING PARAMETERS LIST

SR.NO	AO PARAMETER MAPPING	
	3P4W	3P3W
1	System Frequency	System frequency
2	R Phase PF	-
3	Y Phase PF	-
4	B Phase PF	-
5	System PF	System PF
6	R Phase Voltage	RY Phase Voltage
7	Y Phase Voltage	BR Phase Voltage
8	B Phase Voltage	BY Phase Voltage
9	Average Voltage	Average Voltage
10	R_Y Phase Voltage	-
11	B_R Phase Voltage	-
12	B_Y Phase Voltage	-
13	R Phase Current	R Phase Current
14	Y Phase Current	-
15	B Phase Current	B Phase Current
16	Average Current	Average Current
17	R Phase Active Power	RY Phase Active Power
18	Y Phase Active Power	-
19	B Phase Active Power	BY Phase Active Power
20	Total Active Power	Total Active Power
21	R Phase Reactive Power	RY Phase Reactive Power
22	Y Phase Reactive Power	-
23	B Phase Reactive Power	BY Phase Reactive Power
24	Total Reactive Power	Total Reactive Power
25	R Phase Apparent Power	RY Phase Apparent Power
26	Y Phase Apparent Power	-
27	B Phase Apparent Power	BY Phase Apparent Power
28	Total Apparent Power	Total Apparent Power



MFM2160 - MULTIFUNCTION METER



**MFM2160
LCD DISPLAY**



**MFM2160
LED DISPLAY**

USP

- Accuracy Class 1.0/0.5s as per IEC62053-22/24
- Isolated RS485 Modbus Communication (Modbus-RTU protocol)
- MD & THD
- Data Logging
- User Assignable Modbus registers

TECHNICAL SPECIFICATIONS

Type of Measurement	TRUE RMS
Sampling Rate	82 Samples/Cycle
Input	
Voltage Input	
Measuring Voltage Range	20VL-N to 300VL-N (34VL-L to 520VL-L)
PT(VT) Primary	100 V to 1000 KV AC (L-L) (Programmable)
Nominal Voltage range (Un) (PT/VT Secondary)	57.5VL-N to 240VL-N (100VL-L to 415VL-L)
Current Input	
Measuring Current Range	5mA to 6A
CT Ratings Primary	1A/5A to 15000 A (Programmable)
Nominal Current range (In) (CT Secondary)	1A or 5A
Frequency	45 to 65Hz
Measurement Accuracy	
Voltage	±0.5%
Current	±0.5%
Frequency	±0.05%
Power Factor	±0.01 for Class 1.0 and ± 0.005 for Class 0.5s
Power	±1.0% for Class 1.0 and ± 0.5% for Class 0.5s

Active Energy	Class 1.0 as per IEC 62053-21 and Class 0.5s as per IEC 62053-22
Reactive Energy	Class 1.0 & Class 0.5s as per IEC 62053-24
Apparent Energy	Class 1.0 & Class 0.5s
Auxiliary Power Supply	
Power Supply	Standard: 85-265VAC, 50/60Hz or 100-300VDC Optional: 20-60 VDC
Burden	< 3.5VA / <1.5W
Data Logging - Optional for LCD Display Only	
Method	Periodic Time Based, Load Profile based
Time Interval	1min, 5min,10min,15min, 30min, 45min, 60min, 8h,12h, 24h.
Parameters (Programmable up to 34 Parameters)	Voltage, Current, Power Factor, Frequency, Total Power & Energy (Active, Reactive, Apparent) with Time stamp
No. of Records	524288 / ((No of Parameters + 2) * 8)

Measured Parameters	
Phase-to-neutral voltage (L1, L2, L3)	Active Import Energy
Phase-to-phase voltage (L12, L23, L31)	Active Export Energy
Average voltage	Active Net Energy (Import – Export)
Line current (L1, L2, L3)	Active Total Energy (Import + Export)
Average current	Apparent Import Energy
Neutral current	Apparent Export Energy
System frequency	Apparent Net Energy (Import – Export)
Power factor (L1, L2, L3)	Apparent Total Energy (Import + Export)
Average power factor	Reactive Import Energy
Phase Angle (L1, L2, L3)	Reactive Export Energy
V, A, PF, P phase-wise & Average/Total	Reactive Net Energy (Import – Export)
Active power (L1, L2, L3)	Reactive Total Energy (Import + Export)
Total active power	Reactive Lag Energy
Apparent power (L1, L2, L3)	Reactive Lead Energy
Total apparent power	Reactive Inductive Import Energy – Q1
Reactive power (L1, L2, L3)	Reactive Capacitive Import Energy – Q2
Total Reactive power	Reactive Inductive Export Energy – Q3
Average Current demand (A)	Reactive Capacitive Export Energy – Q4
Total Power demand (KW, KVAR, KVA)	Min. / Max. values (V, A, PF, Hz, KW, KVAR, KVA)
RPM [Pole (2-48) and slip (0.0 to 99.99%)]	Percentage Voltage & Current Unbalance
On hours, Run hours, Power Interruption Count	Real time clock & date
THD Voltage (L1, L2, L3)	Energy Pulse output
THD Current (L1, L2, L3)	Data logging

2160-A MULTIFUNCTION METERS



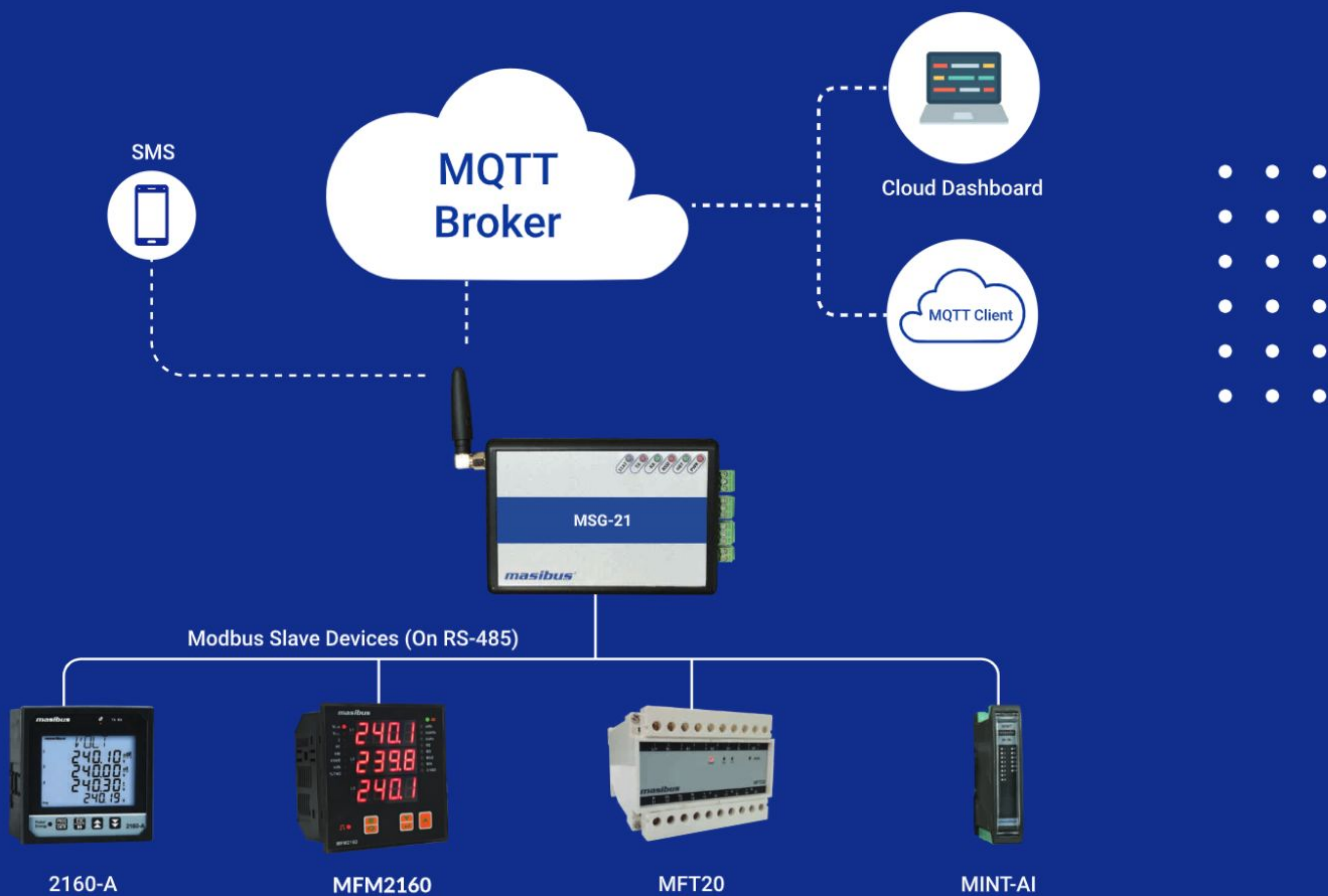
2160 - A
LCD DISPLAY



2160 - A
LED DISPLAY

USP

- Available Accuracy Class 1.0, 0.5s, 0.2s for all Active, Reactive & Apparent Energy
- Four Quadrant measurement
- Digital pulse output and also available front Pulse LED for site calibration for selected type of energy
- Maximum Demand and THD Measurement
- Last day Energy, Min-Max Value measurement



REMOTE MONITORING OF ELECTRICAL SYSTEMS - IIOT APPLICATION

MULTIFUNCTION METER- 2160 A

TECHNICAL SPECIFICATIONS

System Type	3Ph4W / 3Ph3W (Site selectable)
AC Current Input	
Nominal Input Current (In)	1A / 5A AC Site selectable
Measuring Current Range	1mA to 6A
Burden	<0.2VA at per phase
AC Voltage Input	
Nominal Input Voltage(Un)	63.5V L-N, 110V L-N or 240V L-N (Site selectable)
Measuring Voltage Range	20 to 350V (L-N) or 34V to 620V (L-L))
Burden	<0.2 VA per phase
CT/PT Ratio	1 to 9999.999 Programmable
Frequency	45 to 65 Hz
Starting Current	0.1% of Nominal Current
Power Supply	Aux. Powered 85-265VAC/ 100-300VDC Burden : < 4VA for LED Display < 3VA for LCD Panel with Backlight
Communication Output RS485	
Interface	Rs485 Modbus RTU
Baud Rate	9600, 19200, 38400 (Selectable)
Parity bit	None, Odd, Even (Selectable)
Stop bit	1, 2 (Selectable)
Pulse Output (Optional)	
Type	WH/ VARH/ VAH
AC/DC Ratings	24VDC, 20mA
Pulse rate	Programmable from 100 to 60000 pulses per Energy
Pulse duration	20 mSec $\pm$ 10%
Output Type	Open collector [External Excitation Required]

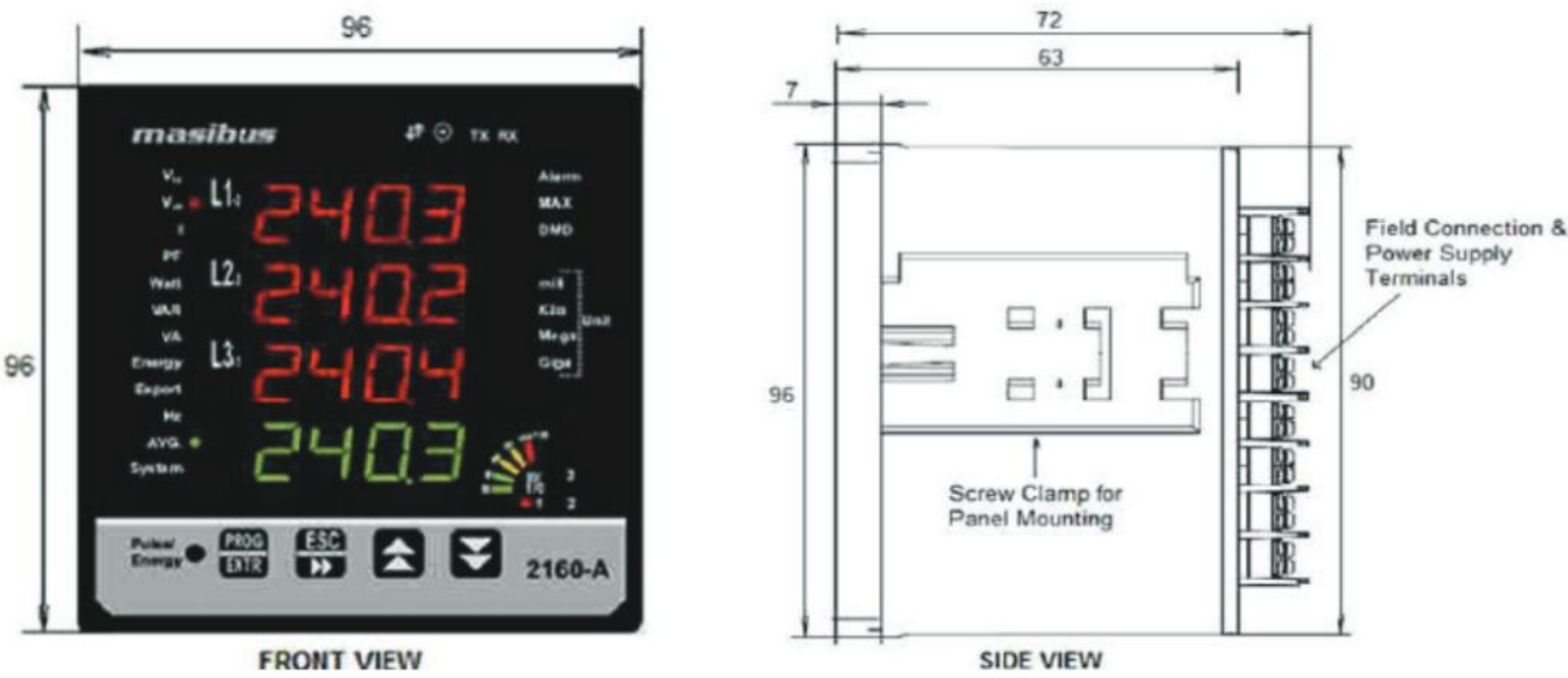


PCC PANEL / SWITCHGEAR PANEL

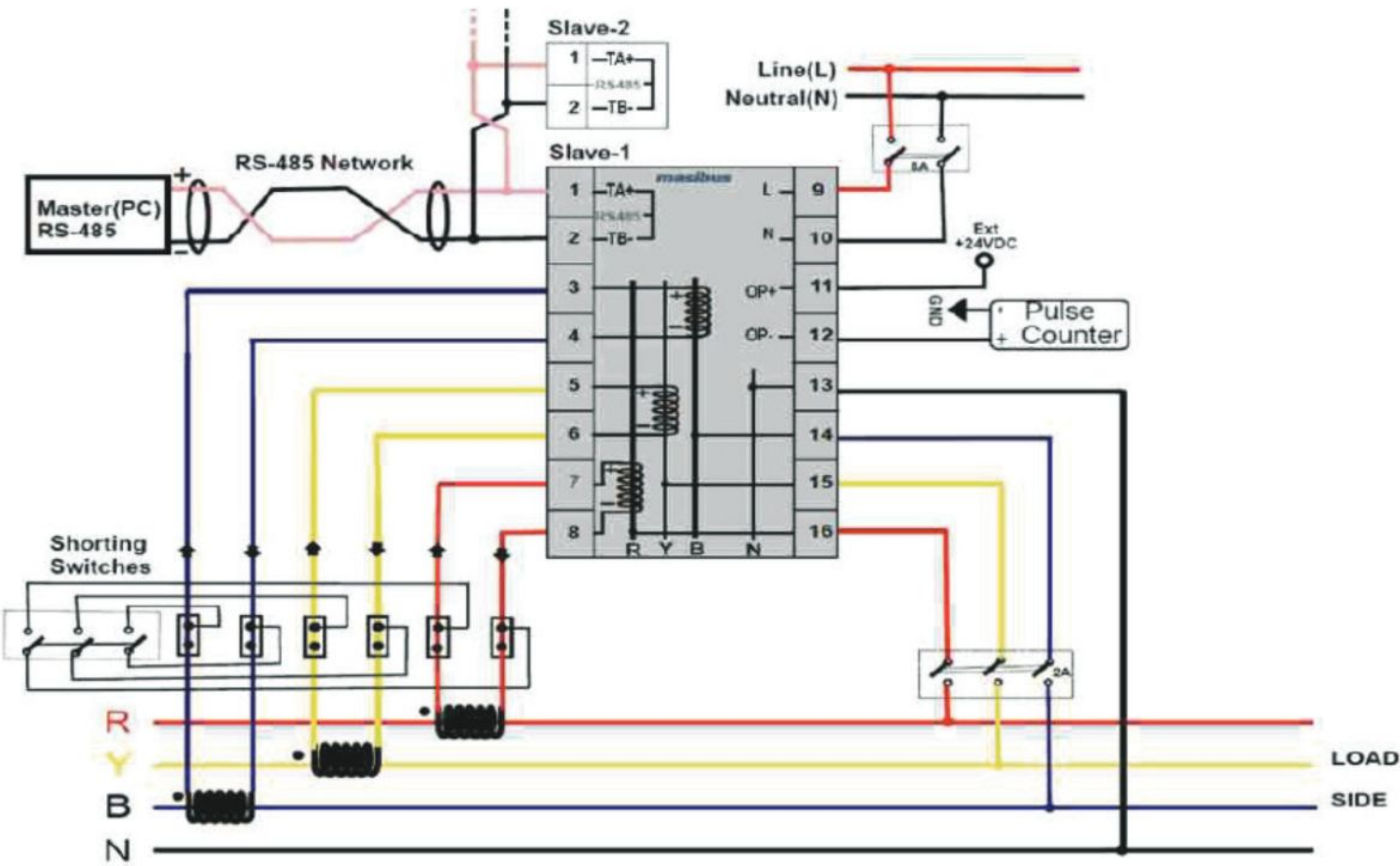
MULTIFUNCTION MTER- 2160 A

Measured Parameters	
Voltage	L1-L2, L2-L3, L1-L3, Avg L1-N, L2-N, L3-N, Avg
Current	I1,I2,I3,Avg & In
Frequency	System Frequency
Power Factor	Phase wise PF & Avg
Phase Angle	Phase wise
Power (Phase wise & Total)	Active, Reactive, Apparent
Energy (Phase wise & Total)	Active Energy for Import & Export Reactive Energy for Import & Export Apparent Energy
Demand	Maximum Demand on KW/KVA (Block/Sliding)
THD	Voltage & Current
Real clock & date	
Percentage Voltage & Current Unbalance	
ON hour, RUN hour, IDLE hour,Power Interruption count	
Last day Energy, Min-Max Value	
Accuracy Class	Class 1.0, 0.5s, 0.2s as per IS13779 / IEC62053-21, IS14697 / IEC62053-22
EMI/EMC Test	
- Electrostatic Discharge IEC 61000-4-2 [As per IEC61326-1 & IEC62052-11] - Fast Transient Burst IEC 61000-4-4 [As per IEC61326-1] - Surge Voltage IEC 61000-4-5 [As per IEC61326-1 & IEC62052-11] - Conducted Susceptibility IEC 61000-4-6 [As per IEC61326-1 & IEC62052-11] - Power Frequency Magnetic Field IEC 61000-4-8 [As per IEC61326-1] - Voltage Dip and Short Interruption IEC 61000-4-11 [As per IEC61326-1] - Conducted Emission CISPR11 [As per IEC61326-1], CISPR22 [As per IEC62052-11] - Radiated Emission CISPR11 [As per IEC61326-1], CISPR22 [As per IEC62052-11] - Impulse Voltage IEC 60060-1	
GENERAL SPECIFICATIONS	
Mounting Type	Panel mount
Size (in mm)	96 (H) x 96(W) x 64 (D)
Material	ABS
Enclosure Protection	IP-51 (Front Fascia), IP-20 Over all
Working temperature	0 to 55 °C
Terminal	Barrier Type terminal

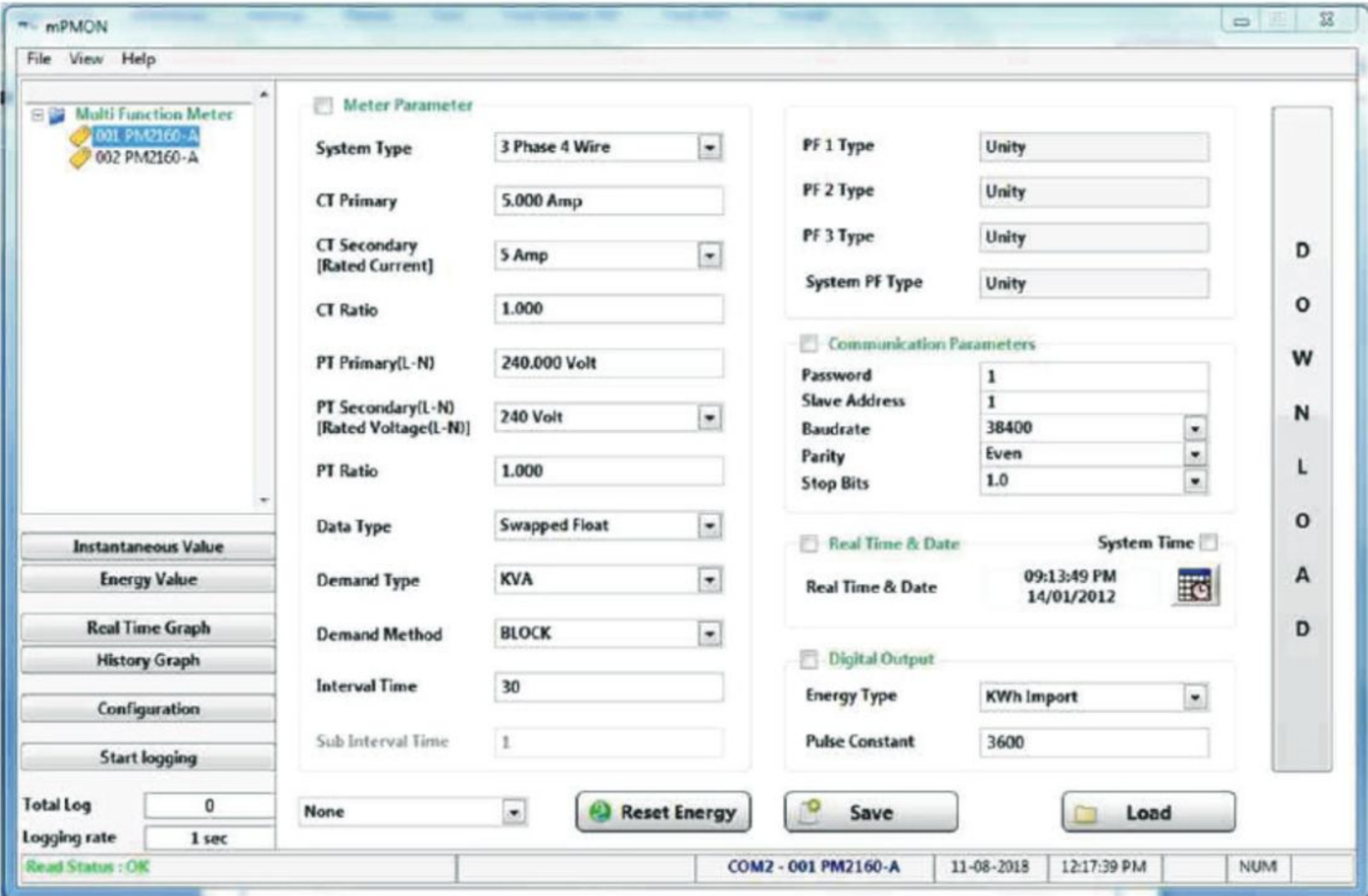
DIMENSIONAL DRAWING



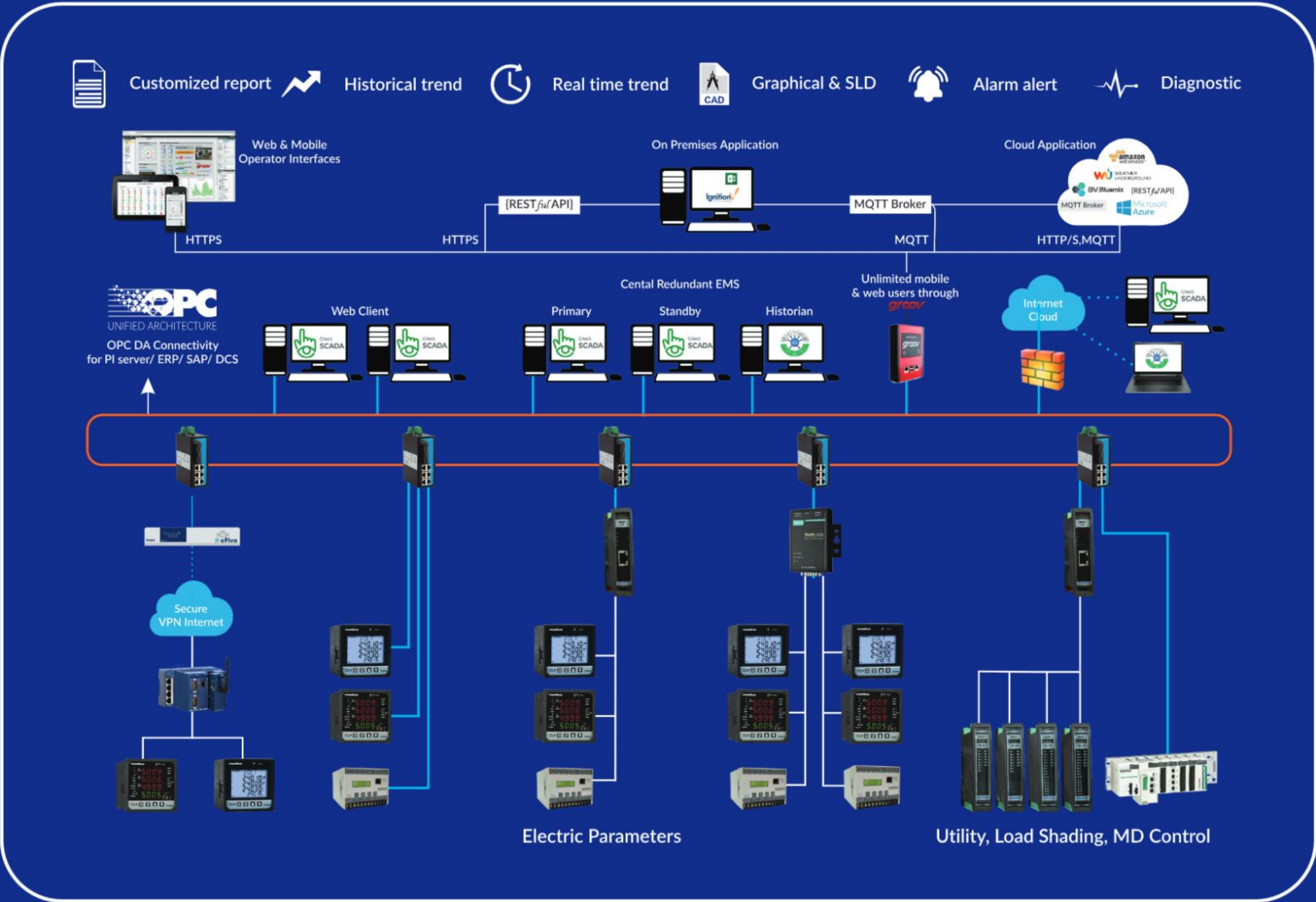
CONNECTION DIAGRAM



FREE CONFIGURATION SOFTWARE FOR MFM



ENERGY MONITORING SYSTEM



Savings from max demand heavy penalty



Minimize production loss



Load balance



Preventive maintenance



Man power & resource planning



Energy cost vs production analysis



Accurate MIS reporting



Monitor equipment efficiency



User Assignable Modbus Register

- The MFT / MFM contains the 60 user assignable registers in the address range of 2001 to 2119, any of which you can map to either register address accessible in the instrument. Registers that reside in different locations may be accessed by a single request by re-mapping them to adjacent addresses in the user assignable registers area.
- Master can read all required data in a single request to reduce the burden of the master device(PLC, DCS SCADA, RTU) as well as data traffic on communication bus.

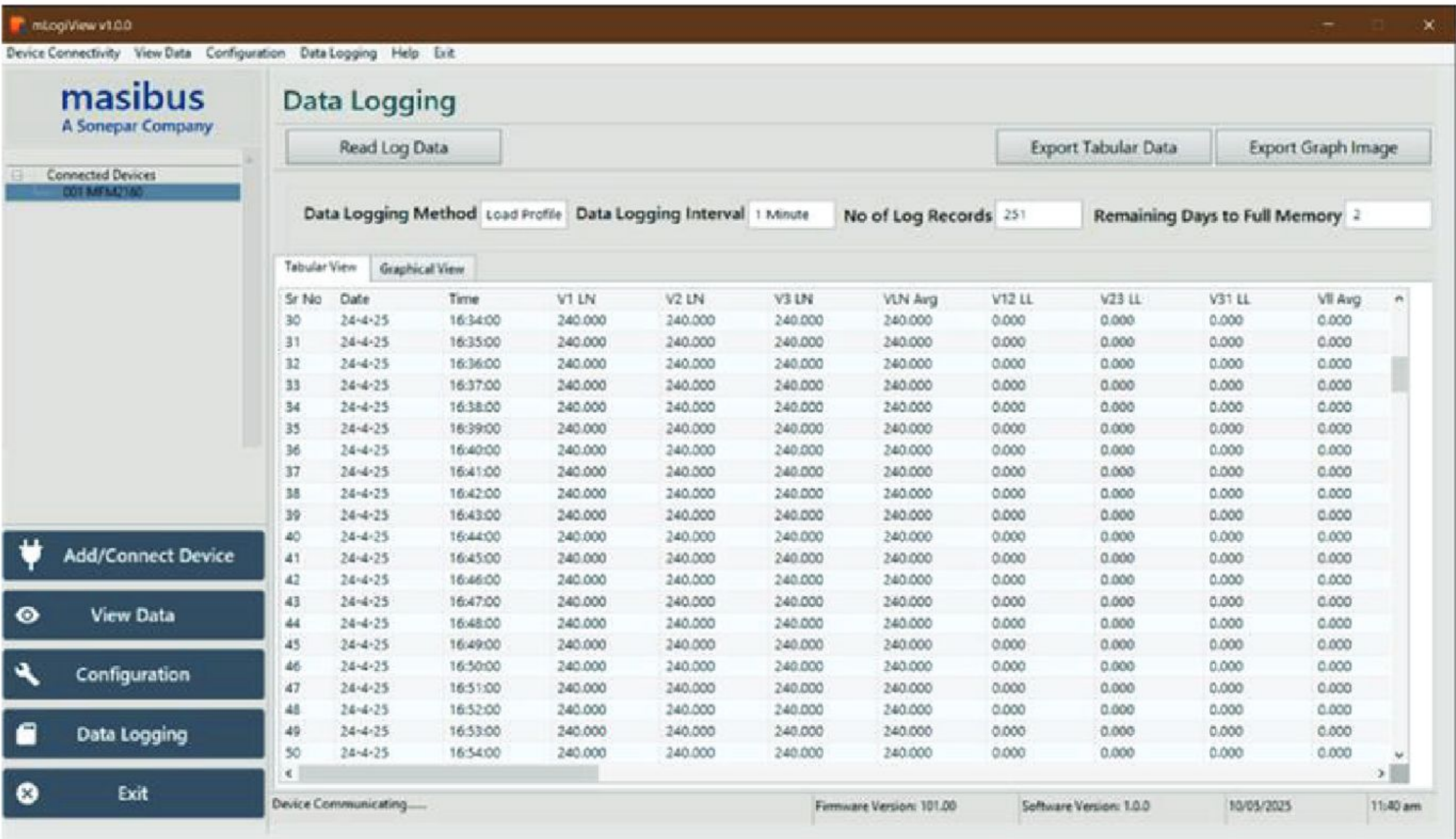
What is Transducer (MFT) ?

- The transducer is suitable for measuring, monitoring and analysing Single / three-phase industrial and supply applications. It is available with up to four analogue outputs and can accurately measure electrical quantities such as current, voltage, active power, reactive power and power factor by converting them into proportional DC current or voltage analogue signals (For e.g. 0-10 V, 0-20mA, 4-20 mA etc.). The output signal that is generated is proportional to the true RMS value of the input signal.

What does the 's' on the MFM Accuracy class 0.2s & 0.5s mean?

- IEC Standard 62053-11 covers Accuracy Class 0.5, 1.0 & 2 for electro mechanical meters for active energy (watt-hours) which means the accuracy as a percentage from reading based on full load conditions and unity power factor. However the accuracy deteriorates under lower load conditions, power factor less than unity along with the presence of harmonics.
- IEC Standard 62053-22 covers a higher Accuracy Standard of 0.2S and 0.5S for static/electronic for active energy (watt-hours) providing a higher "Accuracy Standard" under full load conditions and unity power factor in addition to better accuracy readings at much lower load currents, power factor

Free Configuration/Retrieve logged data software for MFM2160



DCM23 - DC Energy Meter



USP

- 1 voltage and 4 current input channels
- Bi-directional current measurement
- Programmable CT Primary for all channels up to 400A - Through Hall Effect CT
- RS-485 Modbus communication
- Optional Energy Data logging (upto 60 days with time stamp)

DCM23 - DC Energy Meter

TECHNICAL SPECIFICATIONS

Input

Voltage Input Range	5V to 60V DC
Current Input Range	Through Hall Effect CT, Up to 400A
No. of channels	1 voltage channel and 4 current channels

Supply

Aux supply	DC Supply: 18-60VDC
Power Consumption	< 1.5W

Accuracy

Reference Conditions	23 °C ± 2 °C
Voltage, Current, Power	± 0.5 % of FS
Energy	Class 1.0
Temperature Drift	0.05 % / °C

Display

Display & Keys	128 x 64 Graphical LCD with Backlight 3 Front keys for configuration
Displayed Parameters	
Voltage (V)	Common Voltage 1-channel
Current (A), Power (KW), Energy (KWh)	All 4 channels

RTC & Data logging (Optional)

Data logging	Day wise and month wise energy consumption logging for 60 day & 12 month data capacity.
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Utilities vs Electrical Parameters Requirements

Utilities	Watts	VARs	Current	Voltage	Frequency	Phase Angle	Ground Faults	Trans-former Temp.	Ambient Temp.	Watt/ Watt-hour	VAR/ VAR-hour	Billing Allocation	DC Voltage
Generating Station	Per Generator	●	●	●	●	●							
	General Use						●	●	●				●
Transmission Station	Incoming Line	●	●	●									
	Outgoing Line	●	●	●			●	●	●				●
	General												
Transformer Station	Incoming Line			●									
	Station Bus		●	●						●	●		
	Feeder	●	●										
	General						●	●	●				●
Distribution Station	Incoming Line			●									
	Station Bus	●	●	●									
	Feeder		●										
	General						●	●	●				●
Process Users	Motors	●	●	●		●							
	Energy Management												
	Uninterruptible Power Systems	●	●	●	●	●							●



masibus

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Business Park, Newtown, Rajarhat,
Kolkata, West Bengal, 700160, India

Chennai

Address: Plot No. 1, Gokul Garden,
Melnallathur, Thiruvallur, Chennai,
Tamil Nadu, 602002, India

Aurangabad

Address: FP-42, Five Star Industrial Area,
Shendra MIDC, Aurangabad,
Maharashtra, 431201, India

Panchkula

Address: Plot No. 263, Industrial Area,
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134113, India

Bhubaneswar

Address: Plot No. 443, 1st Floor,
Saheed Nagar, Bhubaneswar,
Odisha, 751007, India

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