

## TECHNICAL SPECIFICATION FOR SMART 1-PHASE AND 3-PHASE METERS

S/No.	ITEM	SPECIFICATIONS
1	Nominal Voltage	1Ø-230V, 1-ph, 2-wire system,
		3Ø- 230/400V, 3-ph, 4-wire system (balanced and unbalanced load conditions)
2	Operating Voltage	-40% to +10% Nominal Voltage
		-40% to +10% Nominal Voltage
3	Current Rating	5(60)A
		3 X5(100)A
4	Frequency	50 ±5%Hz
5	Accuracy Class	Applicable IEC Standards as in Section 7.1.3 of the Nigerian Electricity Smart Metering Regulation 2015
6	Encryption Algorithm for PPM	Standard Transfer Specification (STS)
7	Operating Temp.	from -40°C to 70°C
8	Storage Temp.	Up to 70°C
9	Relative Humidity	95% at 45°C non- condensing
10.	Maximum KWH credit stored	99,999.9 KWh(1Ø), 999,999.9KWh(3Ø)
11.	Credit transfer number	20 Digits encryption
12.	Protection	High resistance to short circuit
13.	Impulse withstand voltage	Preferably greater than 10KV
14.	Insulation withstand voltage	2 KV per minute
15.	Name plate	a) Indelible Meter serial number shall not be more than twelve (12) digits and legibly printed
		b) Size of the digit of the Meter serial number shall be a minimum of 5mm x 3mm.
		c) Bar code shall be printed below the Meter serial number
		d) Manufacturer's name and Trademark.
		e) Place of manufacture.
		f) Year of manufacture.
		g) Reference Voltage, Current and frequency.
		h) Class index.
		i) Meter Constant.
		j) Owner/Utility's Identity.
16.	Front panel Indication/Display	Include but not limited to the following:
		Three level credit LED display
		Green-when energy stored is full Yellow-when remaining credit will last for 3 days.
		The red flashes when the remaining energy will last for 1.5 days.
		Blue-Consumption rate indicator. LCD credit status display.

		Credit transfer number accept/reject Tamper.
17	Special Mode Display for Engineering / Management	Display up to 3 parameters according to programming to be specified:
		a. Normal display – LCD
		i. Duplicate copy of token inserted
		ii. Credit Dispensing Unit identification number and KWh (or voucher serial number) inserted.
		iii. Electricity Dispenser (LED) full of units.
		iv. No power ON LED
		v. No credit on LED
		vi. Credit rejects or accepts.
		vii. Remaining Credit.
		viii. Instantaneous Power
		ix. Total KWh used in the past 24 hrs.
		x. Total KWh used in the past 30 days.
		xi. Total KWh used since the LED was installed.
		b. Display only available with valid codes.
		c. Display only available within chosen programming or engineering mode.
		For the purpose of these specifications, items b) and c) above are treated as one. These shall be accessible only to utility staff.
		a. Over current trip level.
		b. Green-Yellow Light emitting diode (LED) display change over level in KWh (high).
		c. Yellow-Red LED display change over level in KWh (low).
		d. Test on LED for tripping function.
	e. Display of LED number.	
	f. Electronics faulty.	
	g. Power failure counter (Number of times power supply failed or disconnected)-400 cycles and back to Zero.	
	h. Enabling of disabled LED caused by tampering.	
	i. Number of days/hour into the current 30 days when there was power and total KWh used during the period.	
	j. Energy Flow Direction	
	k. Reverse polarity indications	
	l. Customer side Load Management	
	m. Relay states, alarm, 3 voltages and 3 currents	

		n. Auto disconnection & reconnection (Phase break and current reversal)
18.	EMC Compliance	Relevant section of IEC 61036.
19.	Burden	Preferably less than 2 VA per phase.
20.	Terminals	Extended cover type. Hole diameter shall be a minimum of 9mm.
21.	Casing/Cover Material	Transparent fire retardant-bakelite or polycarbonate
22.	Sealing	Provision must be adequate to prevent tampering.
23.	Power Factor Range	-1 to +1
24.	Data Storage	Non-Volatile EPROM (32 MB or higher non-volatile memory )
25.	Switching	Latching contactor.
26.	EMC Susceptibility	According to IEC 61036, 61268. Not adversely affected by external magnetic fields.
27.	Life Span	Minimum 10 years
28	Meter type	1Ø 1-ph with: - Two Internal CTs (one for line and Neutral) for measurement of current - Two Pole internal Breakers to isolate the supply completely - Goes into tamper mode when current in neutral is more than that in Line by 1 amp in a minute.
29	Measurement	1Ø 1-ph, 2-wire system, 3Ø 3- ph, 4 wire system and neutral current measurement.
30	Disconnection relay	Maximum switching voltage: 400V Ac Maximum switching current: 120A Maximum switching power: 48kVA for 3 Phase and 16 kVA for 1-phase.
31	Battery	<ul style="list-style-type: none"> <li>• Internal lithium battery: Easily replaceable battery without breaking seal.</li> <li>• Option for external for backup</li> <li>• Option for additional Supercap (72 hours)</li> <li>• Backup time: 10 years.</li> </ul>
32	Environmental	<ul style="list-style-type: none"> <li>• Specified operating range: -25°C to +65°C</li> <li>• Operating range limit: -40°C to +80°C</li> <li>• Storage range limit: -40°C to +85°C</li> <li>• Relative humidity: Up to 85% mean, 95% non-condensing for 30 days</li> <li>• Ingress protection: Transparent IP54 casing (Outdoor)</li> </ul>

#### Communication Specifications (Smart-features)

##### Meter will record activity in the memory with time and LED glow

1	Communication interface	Optical as per IEC62056-21, supporting DLMS/COSEM protocol capable of transferring data
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2	Remote Communication interface	Meter Shall be able to communicate with Head end system through Gateway/Modem. Two way communication between meter and HES or via DCU through RF, PLC, LoRA and GPRS. DCU shall support TCP/IP, G3 PLC, Radio Frequency, Fibre, 3G or 4G.
3	Midnight Energy Snapshot	Capable of recording and storing midnight snapshot of kWh, for minimum of 30 days and transferring same on demand and at predetermined interval.
4	Interval data recording	15-30 minutes with 3 voltages, current and power factors readings
5	Billing History	Current month + minimum last 6 months billing data
6	Event recording	Meter shall have facility to download using both optical port or via remote communication capability with date and time stamp. Following events to be recorded:
		As per tamper sheet
		a) Terminal Cover open (Tamper Led glow)
		b) Magnet Disturbance (Tamper Led glow)
		c) Phase Miss (R, Y, B)
		d) Current reverse (R, Y, B)
		e) Current Unbalance
		As per Event
		a) Power On/Off
		Status In Anomaly
		a) Over voltage (300.00Volts)
		Identification of neutral current above than line
		Pre-programmed alarms for meter self-check
	Alarms trigger LEDs, enunciators, communications event	
	Alarms are stored in event logs	
7	Remote connection-disconnection	Relay for remote load connection or disconnection with date and time stamp. Visual indication (Relay on/off) to be provided on display unit.
8	Remote load control features	Feature to set threshold values to control load (over load Limit) of customers if demand is exceeded (Set by STS Token)

9	Other remote functions	<ul style="list-style-type: none"> <li>• Remote reading (Read by Modem)</li> <li>• Remote crediting (Set by STS Token with online transfer mechanism)</li> <li>• Acquire Meter profile/configuration data</li> <li>• Remote configuration of meters and DCUs.</li> <li>• Read meters according to pre-defined schedule or on-demand</li> <li>• Automatic re-reading of meters to acquire missed data</li> <li>• Remote disconnection/reconnection of energy supply</li> <li>• Upgrade meter firmware remotely</li> </ul>
10	Tariff Management	TOD billing and remote update to tariffs
11	Measured values	<ul style="list-style-type: none"> <li>• Import/Export/Absolute: Wh, VARh and VAh</li> <li>• Per quadrant Wh, VARh and VAh</li> <li>• Power: W, VAr, VA, Vrms, Irms</li> <li>• 3 Power factors, 3 currents, 3 voltages frequency, phase sequence</li> </ul>