

# TECHNICAL SPECIFICATIONS FOR DIGITAL SUMMATION UNIT SUITABLE FOR BULK CONSUMER MULTI-FEEDER STANDARD SUMMATION METERING

**Detail specification of Standard Summation is as mentioned below:**

## **1.0 SCOPE**

- 1.1 This specification covers the design, engineering, manufacture, assembly, inspection and testing before supply and delivery at site/ FOR destination of digital summation unit, along with other associated equipments as per details given in this specification. The digital summation unit shall be used for commercial/ tariff metering for multi-feeder standard summation application at bulk consumer premises, in conjunction with compatible 0.2Saccuracy class AC static trivector feeder meters.
- 1.2 The summation unit and feeder meter module shall be an integrated part of standard 19" rack and this rack shall also have facility to accommodate either one summation unit and one feeder meter or two feeder modules and shall have capable to add feeder meters up to 7 feeder meters module.
- 1.3 These four 19" racks are accommodates in one summation metering panel with all hardware as details in panel specification. Number of feeder meters which vary two to seven as per site requirements. Purchaser will confirm about number of feeders summation as required.
- 1.4 It is not the intent to specify completely herein all the details of the design and construction of material. The material shall, however, conform in all respects to the best industry standards of engineering, design and workmanship and shall be capable of performing for continuous commercial operation in a manner acceptable to the purchaser. The offered equipment shall be complete in all respects including all components/ accessories for effective and trouble free operation according to the specifications. Such components shall be deemed to be within the scope of this specification irrespective of whether those are specifically brought out or not.
- 1.5 A dedicated digital summation unit shall be provided that shall be capable to collect the required energy parameters from the feeder meter modules and calculate concurrent apparent demand & summated energy parameters as per principle specified below. It shall have the provision to summate the readings of up to seven individual feeder meters in a typical installation.

## **2.0 GENERAL CONSTRUCTIONAL REQUIREMENTS**

The equipment shall be designed and constructed in such a way so as to avoid causing any danger during use and under normal conditions. However the following should be ensured:

- i) Personnel safety against electric shock
- ii) Personnel safety against effects of excessive temperature
- iii) Protection against spread of fire
- iv) Protection against penetration of solid objects, dust and water in normal working condition

All the materials and electronic power components used in the manufacture of the summation unit shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.

The summation unit shall be designed with application specific integrated circuits. The electronic components shall be mounted on the printed circuit board using latest Surface Mount Technology (SMT).

All insulating materials used in the construction of meters shall be non-hygroscopic, non-aging and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating.

### **3.0 SEALING**

One number sealing screw shall be provided on the front cover of summation module. The sealing arrangement should be suitable for application.

### **4.0 MARKING OF SUMMATION UNIT**

The basic marking on the name plate of summation unit shall be as follows:

- i) Manufacturer's name and trade mark
- ii) Serial Number
- iii) Year of manufacture

5.0 This summation unit shall process the data of feeder meters to provide the summated energy parameters as specified below:

- i) Summated active energy import total
- ii) Summated active energy export total
- iii) Summated active energy import fundamental
- iv) Summated active energy export fundamental
- v) Summated reactive energy lag while active import
- vi) Summated reactive energy lead while active import
- vii) Summated reactive energy lag while active export
- viii) Summated reactive energy lead while active export
- ix) Summated apparent energy (while active import)
- x) Summated apparent energy (while active export)

### **6.0 CONCURRENT APPARENT DEMAND/ ENERGY CALCULATION**

The Summation unit shall calculate the concurrent apparent demand from the incremental active and reactive energy readings of feeder meters. The apparent energy/ demand shall be calculated by vector (Pythagoras) addition of active energy and reactive energy readings of feeder metering modules.

The Concurrent demand shall be computed on the fixed time block principle. The block interval shall be set as 30 minutes that shall be capable to change to other integration period (5/15/ 60 minutes), if required, through suitable high level software as an authenticated transaction.

Summation unit shall provide the following apparent demand and energy parameters:

- i) Summated active import total
- ii) Summated active export total
- iii) Summated apparent energy (while active import)
- iv) Summated apparent energy (while active export)

7.0 The summation unit shall act as the master for all its feeder meters. It shall be possible to have a common MD reset operation, which shall be performed in the summation unit. During this common MD reset operation, MD of all the feeder meters and summation unit shall get reset concurrently. This shall ensure that all feeder meters and summation unit remain synchronized to each other. Further, it shall not be possible to perform individual MD reset operation in feeder meters.

8.0 Maximum Demand Reset: Following provisions shall be available for MD reset in summation unit –

- i) Auto billing at predefined date and time
- ii) Manual via MD reset button (optional)
- iii) Authenticated transaction through suitable high level software/ MRI (optional)

9.0 The summation unit shall also draw its operating power from the auxiliary power supply, in the same manner as feeder meters. There shall be two auxiliary supplies (60-240 V AC/DC) so that the summation system remains alive even if one or more feeder(s) is off. The system shall continue to work even if any one of the above auxiliary supply (AC/ DC) is present.

10.0 Summation module shall have a built-in calendar and clock, having an accuracy of one minute per month or better. The calendar and clock shall be correctly set at the manufacturer's works.

An automatic backup for continued operation of the calendar-clock shall be provided through a long life battery, which shall be capable of supplying the required power for at least two years under meter un-powered conditions. The summation module shall be supplied duly fitted with the batteries, which shall not require to be changed for at least ten years, as long as total supply interruption does not exceed two years.

- iv) The real time clock of the summation unit shall be used as the master clock for its feeder metering modules so that all the feeder meters remain time synchronized with summation unit. For time set, summation unit shall accept authenticated command through suitable high level software/ MRI (optional). Feeder meter time shall synchronize with summation unit and it shall not accept time set command through suitable high level software/ MRI (optional).

11.0 TOD (Time of day registers): The summation unit shall have TOD registers for active energy import and export, apparent energy import and export and apparent MD import and export. Maximum eight time of day registers can be defined. It shall be possible to program number of TOD registers and TOD timings through suitable high level software/ MRI as an authenticated transaction.

12.0 Individual display shall be used for viewing the display parameters of summation unit and feeder meters. Necessary means shall be provided for moving forward/ backward from one display to the other via soft key pad.

The display shall indicate direct values (i.e. without having to apply any multiplying factor) of computed parameters. It should be possible to easily identify the single or multiple displayed parameters through legends on the metering system display.

13.0 The summation unit shall display on demand the following parameters:

- i) Date
- ii) Time
- iii) Summated active energy import total
- iv) Summated active energy export total
- v) Summated active energy import fundamental
- vi) Summated active energy export fundamental
- vii) Summated reactive energy lag while active import
- viii) Summated reactive energy lead while active import
- ix) Summated reactive energy lag while active export
- x) Summated reactive energy lead while active export
- xi) Summated apparent energy (while active import)
- xii) Summated apparent energy (while active export)
- xiii) Summated maximum apparent demand (while active import)

- xiv) Summated maximum apparent demand (while active export)
- xv) MD reset count
- xvi) Date of Billing Action
- xvii) Cause of Billing
- xviii) History1- Summated active energy import energy total
- xix) History1- Summated active energy export energy total
- xx) History1- Summated apparent energy (while active import)
- xxi) History1- Summated apparent energy (while active export)
- xxii) History1- Concurrent Maximum demand for apparent energy (while active import) for current month (0-24 hrs)
- xxiii) History1- Concurrent Maximum demand for apparent energy (while active export) for current month (0-24 hrs)

14.0 Load Survey: Summation unit shall have a non-volatile memory in which the following shall be automatically stored for each successive 30 minute integration period block:

- i) Summated active import total
- ii) Summated active export total
- iii) Summated active import fundamental
- iv) Summated active export fundamental
- v) Summated apparent (while active import)
- vi) Summated apparent (while active export)

30 minute average of above parameters shall be available for last thirty five (35) days. It shall be possible to select either energy or demand view at Base Computer Software (BCS) end. The load survey data should be available in the form of bar charts as well as in spreadsheets. The BCS shall have the facility to give complete time synchronized load survey data both in numeric and graphic form.

15.0 Billing parameters: The predefined date and time for registering the billing parameters of shall be 00.00 hours of the first day of each calendar (billing) month. The summation unit shall store following parameters corresponding to defined bill dates for up to last 12 months:

- i) Summated active energy import total
- ii) Summated active energy export total
- iii) Summated active energy import fundamental
- iv) Summated active energy export fundamental
- v) Summated apparent energy (while active import)
- vi) Summated apparent energy (while active export)
- vii) Concurrent Maximum Demand Apparent (while active import)
- viii) Concurrent Maximum Demand Apparent (while active export)

16.0 Daily midnight parameters: The summation unit shall store following end day parameters for last thirty five (35) days:

- i) Summated active energy import total
- ii) Summated active energy export total
- iii) Summated active energy import fundamental
- iv) Summated active energy export fundamental

## 17.0 DATA COMMUNICATION CAPABILITY

The summation unit and feeder meter system should have a suitable communication ports following communication ports for local/remote reading. Simultaneous communication over all ports shall be available.

- i) IEC 1107 optical port
- ii) RS232 port (for remote communication or dedicated to Modem)
- iii) TCP/IP Ethernet (should be configurable on DLMS TCP/MODBUS TCP)
- iv) USB port

Meter reading instrument (MRI) shall be used for the purpose of local meter reading via this optical communication port and Pen drive for USB port. MRI shall serve as the interface between meters and PC loaded with Base Computer Software. It shall also be possible to download meter data via this port by connecting laptop computer directly. The overall intention is to have the local ports is to tap the data stored in meter once in a week/month and transmit the same to PC with BCS for view.

Easy integration with third party software over Ethernet, meter shall have support of **two clients** to access meter data over DLMS as well as MODBUS simultaneously.

18.0 The summation unit shall have a unique identification code i.e. serial number, which shall be marked on name plate as well as in its memory.

19.0 Each summation unit shall have a non volatile memory in which the parameters as mentioned in this specification shall be stored. The non volatile memory shall retain the data for a period not less than 10 years under un-powered condition; battery back up memory shall not be treated as NVM.

## 20.0 TRANSACTIONS

The summation unit shall record critical events (as performed in authenticated manner) of Time set, MD reset operation, Communication status with feeder meter and tariff change. These events shall be logged in roll over mode.

## **GURANTEED TECHNICAL PARTICULARS – STANDARD SUMMATIONUNIT**

S. No.	Technical Specification Requirements	Bidder's Offer
1.	Manufacturer's name & Country	
2.	Name and model no. of offered product	
3.	MD Reset provisions a. Auto b. Manual	
4.	Demand integration period	
5.	Method of concurrent apparent demand/ energy calculation	
6.	Load survey parameters recorded in summation unit	
7.	Billing parameters recorded in summation unit	
8.	Daily Midnight parameters recorded in summation unit	
9.	Communication Capability for a. Local reading b. On demand Remote reading	a.
10.	Communication ports	

**GURANTEED TECHNICAL PARTICULARS FOR SUMMATION METERING APPLICATION METER**

S. No.	Technical Specification Requirements	Bidder's Offer
1.	Manufacturer's name & Country	
2.	Type of Meter (3P4W or 3P3W)	
3.	Standards to which meter complies	
4.	Accuracy class	
5.	Summation parameters measured	
6.	P.F. range	
7.	Overload capacity	
8.	Variation of voltage at which system functions normally	I.
9.	Minimum starting current	
10.	MD Reset provisions	
11.	Reset count	
12.	No. of digit of display	
13.	Particular of readouts by MRI	
14.	Non Volatile memory retention time in absence of power	
15.	Memory capacity of metering module	
16.	Demand integration period.	
17.	Metrology indicator for each meter	
18.	Communication Capability on I. Local port II. Remote port	I.
19.	modem for reading over GSM/GPRS, its max speed and Transmission protocol	
20.	Transformer loss compensation	
21.	Rack auxiliary supplies	
22.	Load survey parameters	
23.	Power consumption per phase Voltage circuit Current circuit	
24.	Self-diagnostics features	
25.	Testing Facility with meter test terminal block	
26.	Type of port used for data download in meter	
27.	Sealing arrangement for meters,& test terminal blocks	1.
28.	Method use to display import & export data	
29.	Capacity on non-volatile memory of the meter	
30.	Immunity to external magnetic field	
31.	EMI/RFI generated by metering system	
32.	Tamper & Anomaly detection features	

**\* Due to continuous endeavor to improve the design the specifications are subject to change**