Annexure to IS 15707: 2022

SETTLING FOR THE WHOLE CURRENT METER CURRENT RATING: THE SMART CHOICE

(An Informative Document: May Be Referred To For Guidance)

In line with the developed countries, in the smart meter regime, it would be worthwhile to go for one single long-range current rating for both single phase (5-60A /10-60A) and poly phase (3x 10-100A) smart meters, going ahead, subject to Cost Benefit Analyses by the DISCOMs and provided that the associated operational constraints are suitably taken care of.

Multiple Meter Current Ratings in Electromechanical (EM) Meters: Due to the presence of non-linear magnetic circuit, the basic current (Ib) to the Maximum current (Imax) rating multiplier used to be small (around 2) in EM meters in order to maintain a reasonably flat meter “error v-s load curve”. DISCOMs were offered meter ratings like 5-10A (3x5-10A), 10-20A (3x10-20A) and 30-60A (3x30-60A) for both the single phase and three phase meter segments.

DISCOMs, therefore, needed to procure meters of various meter ratings for various segments of consumers based on the maximum allowable current that the consumer would draw. Consequently, any load up-gradation would call in for a meter replacement, thereby calling for additional operational costs.

Meter Current Ratings in Vanilla Static Meters: In a vanilla static meter, the “error v-s load curve” became almost linear for an extended range of operation and meter current ratings on offer, therefore, changed to 5-30A, 10-60A (3x10-60A), 3x20-100A. Though number of ratings on offer reduced, the same logic of maintaining and operating with multiple ratings of meters continued along with its associated operational pangs.

Traditional Use of Meter Ratings by DISCOMs: DISCOMs have been traditionally using the Imax limits of the meter to keep a tab on the unbridled and unannounced load augmentation by the customer as any overloading would result in meters being burnt. This would in turn ensure that the customers pay for any load enhancement.

IS 13779 Provisions on Meter Ratings:

* Basic Current Choice (Table 2 of IS 13779)
  1. 1 Ph WC Meter: 2.5A, 5A, 10A, 15A and 20A
  2. 3 Ph WC Meter: 5A, 10A, 15A, 20A, 30A, 40A, 50A
* Rated Imax as a percentage of Ib: 200, 300, 400, 500, 600, 800, 1000 (Table 3 of IS 13779)

International Benchmarking: Many developed countries have gone in for “long range” of meters (having a rating of 5-200A) in both the single phase and poly phase segment. This obviates the need for meter replacement possibly / mostly throughout the life cycle of the meter / customer and reduces unnecessary truck rolls.

Smart Meter Advantages:

1. Real time monitoring of customer’s load: DISCOMs can now remotely monitor the load / demand of the customer vis-à-vis their contractual demand in real time and can take call on upgrading their installation capacity against payment / concurrence by the customer.
2. Disconnection on Overload: Smart meters can be configured for a load-drawl limit, beyond which the load switch inside the meter would trip in case of an overload by the customer.
3. Remote Configurability: Overload limit / control in / by the meter can be set and altered from remote. This, in turn, means that one current rating of the meter, with a sufficiently high (technically, commercially and practically sustainable) Imax rating would help both the customer and the DISCOM to have seamless, efficient and effective operations, without having to go through the issues of site interventions.
4. Long life: Since, a smart meter, being a relatively costly product with associated added functionalities of remote monitor-ability / visibility and remote manageability / control-ability, it is expected to last anywhere between 12 to 15 years in circuit, during which the customers’ load growth is inevitable, especially in a developing country like ours, with progressive increase in purchasing power.

A “long range” smart meter shall equip both the customer and the DISCOM with cascading benefits, going ahead, without sacrificing any of the desired control aspects.

Proposed Current Rating for WC Smart Meters

* + 1-ph WC Smart Meter: **10-60A and/or 5-60A** (to cater to low wattage loads)
  + 3-ph WC Smart Meter: **3x10-100A**

**Advantages of using common rating of WC smart meters:**

* Price Implication: Smart meter costs do not vary widely with meter current ratings and owing to the volume of requirement, costs can be brought down and converged to a desired value.
* Type Testing Perspective: Maintaining one single current rating, each for the single phase and the poly phase smart meters would mean that meter manufacturers would not need to carry out and maintain Type Test conformance for various meter current ratings. This would avoid unnecessary costs and would result in a win-win-win situation for the meter manufacturer, the DISCOM and the end customer.
* Reduced site interventions and lesser Operational Costs: Maintaining a single long-range meter rating would mean that DISCOMs would avoid unnecessary replacement of meters on customer load augmentation. This would reduce unnecessary truck rolls, in turn reducing operation and maintenance (O & M) costs, which would ultimately benefit the end-customers.
* Re-use of off-circuit Meters / damage / Testing Issue:Unnecessary meter replacement reduces quantum of off-circuit “good” meters, which in turn reduces O & M costs with respect to handling and managing such meters. It also reduces costs related to testing of such “good” off-circuit meters, which is a time consuming and costly process needing trained and competent human resources.
* Avoidance Of Stock Of Meters With Multiple Current Ratings: Maintaining multiple current ratings of meters in the inventory at Meter Stores or Sub-Division Office Stores and managing the same is not only operationally inconvenient for a DISCOM but also entails additional costs towards withholding larger than required inventory holding costs (for multiple current ratings) for the DISCOM.

Reviewing Load threshold for installing Smart Meters:

Single Phase to Poly Phase:

Existing Policy: Most DISCOMs have a pre-set contractual demand (usually 4kW to 6 kW) beyond which they install a poly phase meter, irrespective of whether at all the customer has a poly phase load connected to his installation or not.

Long range Smart Meter Advantages: If the DISCOMs choose to install a single phase smart meter of rating 5-60A / 10-60A, (considering that there is no requirement of three phase supply of the customer), the single phase smart meter can continue to cater to the customer’s load requirement up to 12kW, conveniently.

Poly Phase to Low Tension Current Transformer (LTCT):

Existing Policy: The current contractual demand threshold beyond which an LTCT meter is used (instead of a polyphase meter) is typically between 25kW-30kW.

Long range Smart Meter Advantages: If the DISCOMs choose to install a polyphase smart meter of rating 3x10-100A, the polyphase smart meter can continue to cater to the customer’s enhanced load requirement up to 62kW (assumed power factor of 0.9), conveniently.

In view of the above, should the DISCOM settle for long range whole meters, the DISCOMs shall in a majority of instances of load enhancement requirements by the customers, save on new meter cost, replacement operational costs, avoid meter damage during handling and testing of off-circuit meters for re-use, cost of competence (for LTCT Meter installation) and save on time.

Customers’ perspective:

Reduced Costs: Reduced operational costs of the DISCOMs ultimately benefits the end customers.

Faster Service: Avoiding meter replacement, on load augmentation, facilitates faster service to the customers. In most such cases, the same can be effected the smart way from remote.

Avoiding additional meter rentals: Meter rentals increase from a single phase to a poly phase to an LTCT meter. Meter rent for smart meter, additionally, would likely to be higher compared to their vanilla counterpart, for each of the respective segments, going forward. Avoiding smart meter replacement on load augmentation, therefore, would mean savings in terms of meter rent paid by the customer.

The Load Balancing Misconception: There is a popular misconception doing rounds that if a polyphase meter is installed in place of a single phase meter, owing to load enhancement requirement by the customer, there is a greater likelihood of balancing in the adjoining LT Distribution system.

However, in most load augmentation cases, the customer hardly changes his internal wiring from a single-phase wiring to a three-phase wiring. Most of the load enhancement requirements are for use of additional single-phase loads and not for any new three phase loads being added by the customer, particularly in the voluminous domestic segment. Therefore, installing a poly phase meter does not improve the unbalancing status of the LT Distribution network.

Conclusion: Unnecessary replacement of smart meters owing to the myopic selection of its current rating and adoption of dated meter-changing trigger-thresholds of DISCOMs and not making the smart choice while handling smart infrastructure may not be wise to continue with, going ahead, in the smart regime.

Also, DISCOMs need to review meter replacement trigger-thresholds smartly and adopt similar progressive practice in the field of selecting the current-carrying-adequacy of “meter-loops”, for holistic benefits of all concerned, given the technological possibilities of Advanced Metering Infrastructure (AMI).

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The normative or informative annexes shall be placed after the main body of the standard and should be referred to somewhere in the standard.