In the framework of SESEI

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26th April, 2018 – New Delhi

IS 16444

AC DIRECT CONNECTED SMART METER SPECIFICATIONS

DEVELOPMENT AND PRESENT STATUS OF THE STANDARD

B A Sawale

IS 16444

AC DIRECT CONNECTED SMART METER- SPECIFICATIONS

DEVELOPMENT AND PRESENT STATUS OF THE STANDARD

B A Sawale

IS 16444- Aug 2015

-**Standard is based on**

- **Functional Specifications framed by CEA**
- **Specifications of ac static direct connected Wh meter IS 13779**
- **Data exchange -companion specifications -IS 15959**
- **Specifications of prepayment meter - IS 15884**

Development of IS 16444

- IS 15959 renumbered as IS 15959 part 1.
- IS 15959 part 2 was developed for specific requirement of smart meters- Data exchange.
- IS 16444 was renumbered as IS 16444 part 1
- IS 16444 part 2 was developed for Transformer operated smart meters.
- IS 15959 part 3 was developed for transformer operated smart meters Data exchange

IS 16444, Part1

ac Static Direct Connected watt-hour Smart Meter class 1 and 2 Specifications . (up to 100 A I max)

Direct connected Smart meter defined as-

Static meter with TOD registers, internal connect -disconnect switches ,with two way communication capability. Remotely accessible for collecting data/ event, programming for select parameters.

IS 16444, Part2

Transformer Operated ac Static watt-hour and VArhr Smart Meter class 0.2s, 0.5s and 1.0s- Specifications .

Transformer operated Smart meter defined as-

Static meter with TOD registers, with two way communication capability. Remotely accessible for collecting data/ event, programming for select parameters.

IS 16444 part 1 and 2 : Structure

- **The standard defines Smart meter Architecture, Test requirement, data exchange protocol and communication.**
- **IS 16444- Part 1 refers to : IS 13779 , IS 15884 and IS 15959 part 1 and part2**
- **IS 16444- Part 2 refers to : IS 14697 and IS 15959 part 1 and part 3**

IS 16444 part 1 - Structure

It applies to

- **Direct connected meters consisting of measuring element, TOD register, display, load switch & built-in type/ plug-in bidirectional communication module.**
- **Suitable for Indoor/ outdoor type**
- **Forward (import) ; and Forward (Import) & reverse (Export)**

It does not apply to

- **Where voltage exceeds 600 V**
- **Meters with external CT**
- **Portable meters**
- **Meters without internal load switch**

IS 16444 part 2 - Structure

It applies to

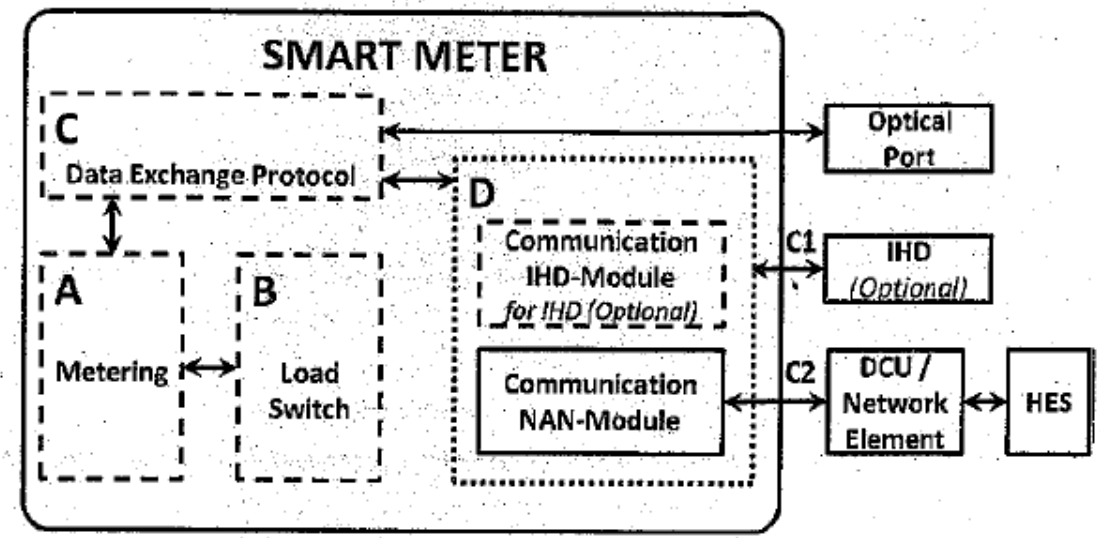
- **Transformer operated meters consisting of measuring element, TOD register, display & built-in type/ plug-in bidirectional communication module.**
- **Suitable for Indoor**
- **Forward (import) ; and Forward (Import) & reverse (Export)**

It does not apply to

- **Where voltage exceeds 600 V**
- **Portable meters , outdoor metes**

Direct connected Smart Meter – Architecture

Variant 1



LEGEND

A – Metrology
B – Load switch for control
C – Metering protocol
D – Communication

Optical port — As per IS 15959 (Part 2)
C1 – IHD Connectivity SM ↔ IHD (optional)
C2 – NAN Connectivity SM ↔ DCU

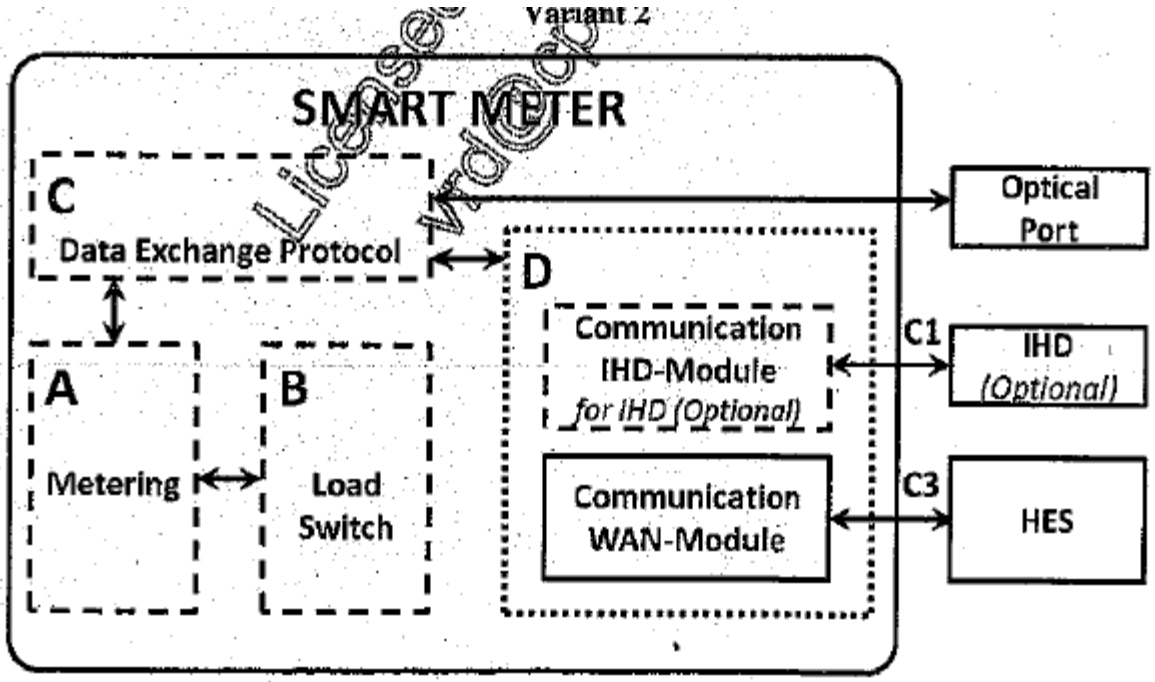
NOTES

1 The Smart Meter variant based on Fig. 1 shall provide connectivity C2 for two way communication with DCU using a NAN module.

2 If IHD is chosen this Smart Meter shall provide connectivity C1 for two way communication with IHD using the same NAN module or a suitable additional module as per buyer-seller agreement.

FIG. 1 SMART METER ARCHITECTURE

Direct connected Smart Meter – Architecture



LEGEND
A – Metrology
B – Load switch for control
C – Metering protocol
D – Communication

Optical port — As per IS 15959 (Part 2)
C1 – IHD Connectivity SM ↔ IHD (Optional)
C3 – WAN Connectivity SM ↔ HES

NOTES

1 The Smart Meter variant based on Fig. 2 shall provide connectivity C3 for two way communication with HES using a WAN module.

2 If IHD is chosen this Smart Meter shall provide connectivity C1 for two way communication with IHD using a suitable additional module as per buyer-seller agreement.

FIG. 2 SMART METER ARCHITECTURE

IS 16444 part 1- Structure

General Requirement ,
Metering and Metrology requirements,
Mechanical,
Climatic requirement

→ IS 13779

Electrical Requirement
EMI/ EMC
Load Switch

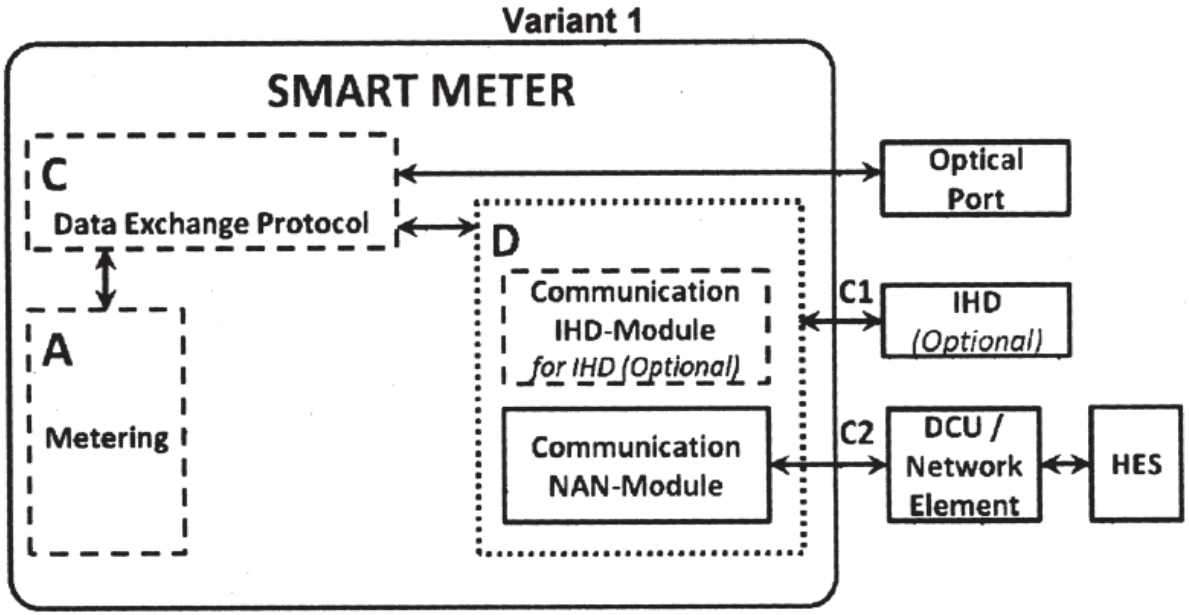
→ IS 15884

Power consumption of voltage circuit 5 W, 15 VA in idle condition
6w, 18 VA with IHD, additional 7 W during communication.

Data Exchange Protocol → IS 15959 part 1 & IS 15959 part 2

Communication – wire or wireless complying to IPV6,
comply with WPC requirements. Equipment type approval as per DOT

Transformer Operated Smart Meter – Architecture



LEGEND

A – Metrology
C – Data Exchange and Metering Protocol
D – Communication

Optical port — As per IS 15959 (Part 2)
C1 – IHD Connectivity SM →IHD (optional)
C2 – NAN Connectivity SM→DCU

NOTES

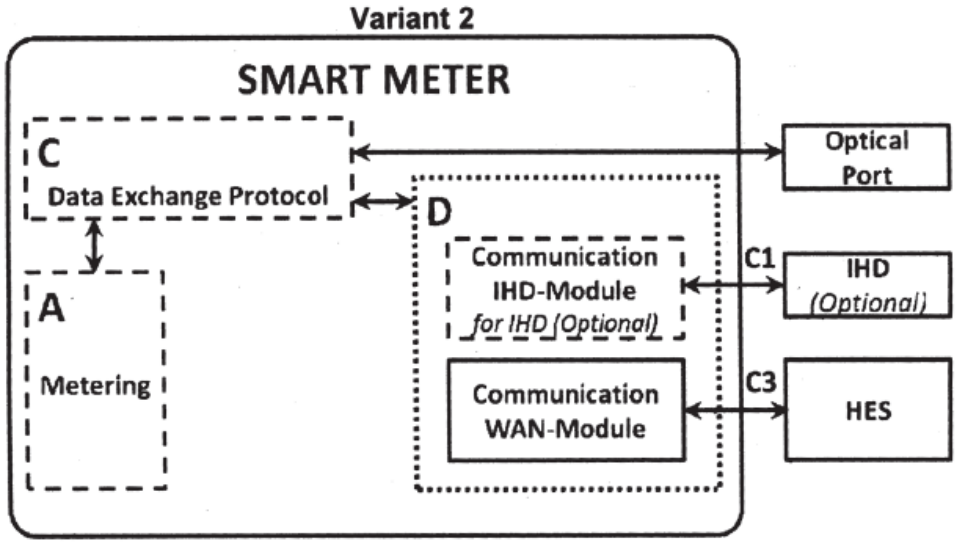
1 The smart meter variant based on Fig. 1 shall provide connectivity C2 for two way communication with DCU using a NAN module.

2 If IHD is chosen this smart meter shall provide connectivity C1 for two way communication with IHD using the same NAN module or a suitable additional module as per buyer-seller agreement.

FIG. 1 SMART METER ARCHITECTURE (FOR TRANSFORMER OPERATED METERS)

Transformer Operated Smart Meter – Architecture

IS 16444 (Part 2) : 2017



LEGEND

A – Metrology
C – Metering protocol
D – Communication

Optical port — As per IS 15959 (Part 2)
C1 – IHD Connectivity SMIHD (Optional)
C3 – WAN Connectivity SMàHES

NOTES

1 The smart meter variant based on Fig. 2 shall provide connectivity C3 for two way communication with HES using a WAN module.

2 If IHD is chosen this smart meter shall provide connectivity C1 for two way communication with IHD using a suitable additional module as per buyer-seller agreement.

FIG. 2 SMART METER ARCHITECTURE (FOR TRANSFORMER OPERATED METERS)

IS 16444 part 2- Structure

General Requirement ,
Metering and Metrology requirements,
Mechanical,
Climatic requirement

→ IS 14697

Electrical Requirement
EMI/ EMC

→ IS 14697

Data Exchange Protocol

→ IS 15959 part 1 & IS 15959 part 3

Communication – wire or wireless complying to IPV6,
comply with WPC requirements. Equipment type approval as per DOT

IS 16444 part 1

Smart meter functionality –

Disconnection Mechanism- over current, load control, events, prepayment
Reconnection Mechanism - local- over current, load control
remote/ HES - events, repeated O/L

Reconnection for prepayment meter

Standards- Present status - *Indian Standards*

- Single Phase and three phase conventional whole current meters
  - IS 13779 up to amendment 5 (Standard under Revision)
- Single phase/ three phase Prepaid whole current meters
  - IS 15884 (under Revision)
- Three phase transformer operated Meters - IS 14697, up to am 4
- Whole current Single phase and three phase Smart Meters
  - IS 16444 part1, 2015, am 1 & IS 15959 part 2, 2015, am 1 and 2
- Transformer operated Smart Meters - IS 16444 part 2, 2017 & IS 15959 part 3, 2017
- Data Exchange Protocol – IS 15959 part 1 Am. 1 to Am. 4

Standards and their status -*IEC Standards*

- **IEC 62052-11 General Requirement – Metering equipment, Am 1, 2016**
- **IEC 62053-21 Static Meters for Active Energy class 1 and 2**
  – Specific requirement , Am 1, 2016
- **IEC 62053-22 Static Meters for Active Energy class 0.2s and 0.5s**
  – Specific requirement , Am 1, 2016
- **IEC 62053-24 Static Meters for Reactive Energy at fundamental**
  frequency class 0.5s, 1s and 1, am 1, 2016
  – Specific requirement
- **IEC 62055-31 , Static prepayment meters class 1 and 2 Specific requirement**
- **IEC 62052-31, 2015 Electricity metering Equipment (ac)**
  General requirement, test and test condition Product Safety requirement and tests.

IEC Standards under preparation –

- **IEC 62052 Part 11: Metering equipment (CD2)**
- **IEC62053 Part 21: Static meters for a.c. active energy (classes 1 and 2) : (CD2)**
- **IEC 62053 Part 22: Static meters for a.c. active energy (classes 0,1 S, 0,2 S and 0,5 S): (CD2)**
- **IEC62053 Part 23: Static meters for a.c. (classes 2 reactive energy and 3): (CD2)**
- **IEC62053Part 24: Static meters for fundamental component a.c. reactive energy (classes 0,5 S, 1 S and 1) (CD2)**

IEC 62052part 31: Product safety requirements and tests : (amendment under preparation)

Proposed activities of standardization –BIS ET13

- IS 13779 under revision
- Harmonization of IS and IEC
- Standard for DC meters
- Standard for panel meters
- Revision of IS 15884
- Standard for reliability

Thank you

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