

**CODE OF PRACTICE 10**

**CODE OF PRACTICE FOR METERING OF ENERGY VIA LOW  
VOLTAGE CIRCUITS FOR SETTLEMENT PURPOSES**

**Issue 2**

**Version 6.0**

**DATE: 25 February 2010**

## Code of Practice 10

### **CODE OF PRACTICE FOR METERING OF ENERGY VIA LOW VOLTAGE CIRCUITS FOR SETTLEMENT PURPOSES**

1. Reference is made to the Balancing and Settlement Code for the Electricity Industry in Great Britain and, in particular, to the definition of "Code of Practice" in Annex X-1 thereof.
2. This is Code of Practice Ten, Issue 2, Version 6.0.
3. This Code of Practice shall apply to Metering Systems comprising Metering Equipment that is subject to the requirements of Section L of the Balancing and Settlement Code.
4. This Code of Practice is effective from 25 February 2010.
5. This Code of Practice has been approved by the Panel.

SUPERSEDED

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**AMENDMENT RECORD**

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SUPERSEDED

## CODE OF PRACTICE FOR METERING OF ENERGY VIA LOW VOLTAGE CIRCUITS FOR SETTLEMENT PURPOSES

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## FOREWORD

This Code of Practice defines the minimum requirements for the metering of energy via low voltage circuits for Settlement purposes.

BSCCo shall retain copies of, inter alia, the Code of Practice together with copies of all documents referred to in them, in accordance with the provisions of the Balancing and Settlement Code (the Code).

### 1. SCOPE

This Code of Practice states the practices that shall be employed, and the facilities that shall be provided for the measurement and recording of the quantities required for Settlement purposes.

Additional features may be incorporated within or associated with the Metering Equipment provided but these must not interfere with or put at risk the operation of the Settlement process.

This Code of Practice specifically applies to metering of energy via low voltage circuits for Settlement purposes. Metering Equipment compliant with this Code of Practice can be traded either elective Half Hourly (Measurement Class E) or Non-Half Hourly.

It derives force from the Code, and in particular the metering provisions (Section L), to which reference should be made. It should also be read in conjunction with the relevant BSC Procedures.

Metering Equipment that meets the requirements of this Code of Practice is also applicable where the Registrant is required by its Supply Licence (and as referenced in Section L 3.2.6) to install Metering Equipment that is capable of providing measured electricity consumption data for multiple periods (at least half hourly) and providing the Registrant with remote access to such data.

Outstations shall, as a minimum, be capable of interrogation by the Settlement instation. In addition, Outstations may deliver metering data to the Settlement instation providing that the requirements of this Code of Practice are met.

This Code of Practice does not contain the calibration, testing and commissioning requirements for Metering Equipment used for Settlement purposes. These requirements are detailed in Code of Practice Four - "Code of Practice for Calibration, Testing and Commissioning Requirements for Metering Equipment for Settlement Purposes".

Meters and Outstations referred to in this Code of Practice shall only achieve successful compliance in respect of any testing detailed in this Code of Practice if the requirements set out in accordance with BSCP601 are also observed and successfully completed or the Registrant has been granted a valid Metering Dispensation covering any departure from the requirements as detailed in this Code of Practice.

Dispensations from the requirements of this Code of Practice may be sought in accordance with the Code and BSCP32 'Metering Dispensations'.

Generic Metering Dispensations applicable to this Code of Practice are located on the BSC website ([ELEXON Website](#)).

In the event of an inconsistency between the provisions of this Code of Practice and the Code, the provisions of the Code shall prevail.

SUPERSEDED

## 2. REFERENCES

The following documents are referred to in the text:-

Balancing and Settlement Code	Section X; Annex X-1 and Section L and BSC Procedures
Code of Practice Four	Code of Practice for Calibration, Testing and Commissioning Requirements for Metering Equipment for Settlement Purposes
Electricity Act 1989	Schedule 7, as amended
IEC 62053-23	Electricity metering equipment (a.c.). Particular requirements. Static meters for reactive energy (classes 2 and 3)
IEC62056-21	Data Exchange for Meter Reading, Tariff and Load Control. Direct Local Exchange.
Meter Operation Code of Practice Agreement	Agreement between Meter Operators and Distribution Businesses governing arrangements for safety and technical competence ( <a href="http://www.mocopa.org.uk">www.mocopa.org.uk</a> )
IEC Standard 185	Current Transformers
Statutory Instruments 2006 No. 1679	The Measuring Instruments (Active Electrical Energy Meters) Regulations 2006
Standard Frequency and Time Signal Emission	International Telecommunication Union - RTF.460 (ISBN92-61-05311-4)



### 3. DEFINITIONS AND INTERPRETATIONS

Save as otherwise expressly provided herein, words and expressions used in this Code of Practice shall have the meanings attributed to them in the Code and are included for the purpose of clarification.

Note: \* indicates definitions in the Code.

Note: † indicates definitions which supplement or complement those in the Code.

Note: ‡ indicates definitions specific to this Code of Practice

#### 3.1 Active Energy \*

Active Energy means the electrical energy produced, flowing or supplied by an electric circuit during a time interval, being the integral with respect to time of the instantaneous Active Power, measured in units of watt-hours or standard multiples thereof.

#### 3.2 Active Power \*

Active Power means the product of voltage and the in-phase component of alternating current measured in units of watts and standard multiples thereof, that is:-

$$1,000 \text{ Watts} = 1 \text{ kW}$$

$$1,000 \text{ kW} = 1 \text{ MW}$$

#### 3.3 Apparent Energy ‡

Apparent Energy means the integral with respect to time of the Apparent Power.

#### 3.4 Apparent Power ‡

Apparent Power means the product of voltage and current measured in units of volt-amperes and standard multiples thereof, that is:-

$$1,000 \text{ VA} = 1 \text{ kVA}$$

$$1,000 \text{ kVA} = 1 \text{ MVA}$$

#### 3.5 Defined Metering Point ‡

Defined Metering Point means the physical location at which the overall accuracy requirements as stated in this Code of Practice are to be met. The Defined Metering Points are identified in Appendix A.

#### 3.6 Demand Period ‡

Demand Period means the period over which Active Energy, Reactive Energy or Apparent Energy are integrated to produce stored energy values. For Settlement purposes, unless the context requires otherwise, each Demand Period shall be of 30 minutes duration, one of which shall finish at 24:00 hours.

**3.7 Demand Values ‡**

Demand Values means, expressed in kW, kVAr or kVA, twice the value of kWh, kVArh or kVAh recorded during any Demand Period. The Demand Values are half hour demands and these are identified by the time of the end of the Demand Period.

**3.8 "electricity" \***

electricity means Active Energy and Reactive Energy.

**3.9 Export \***

Export means, in relation to a Party, a flow of electricity at any instant in time from any Plant or Apparatus (not comprising part of the Total System) of that Party to the Plant or Apparatus (comprising part of the Total System) of a Party.

**3.10 Import \***

Import means, in relation to a Party, a flow of electricity at any instant in time to any Plant or Apparatus (not comprising part of the Total System) of that Party from the Plant or Apparatus (comprising part of the Total System) of a Party.

**3.11 Interrogation Unit ‡**

Interrogation Unit means a Hand Held Unit "HHU" (also known as Local Interrogation Unit LIU") or portable computer which can enter Metering Equipment parameters and extract information from the Metering Equipment and store this for later retrieval.

**3.12 Maximum Demand †**

Maximum Demand expressed in kW or kVA means twice the greatest number of kWh or kVAh recorded during any Demand Period.

**3.13 Meter \***

Meter means a device for measuring Active Energy and/or Reactive Energy.

**3.14 Metering Equipment \***

Metering Equipment means Meters, measurement transformers (voltage, current or combination units), metering protection equipment including alarms, circuitry, associated Communications Equipment and Outstation and wiring.

**3.15 Meter Register ‡**

Meter Register means a device, normally associated with a Meter, from which it is possible to obtain a reading of the amount of Active Energy, or the amount of Reactive Energy that has been supplied by a circuit.

**3.16 Outstation \***

Outstation means equipment which receives and stores data from a Meter(s) for the purpose, inter-alia, of transfer of that metering data to the Central Data Collector Agent (CDCA) or Data Collector as the case may be and which may perform some processing before such transfer and may be in one or more separate units or may be integral with the Meter.

**3.17 Offshore Platform**

Has the meaning given to that term in the Grid Code.

**3.18 Offshore Power Park Module**

Has the meaning given to that term in the Grid Code.

**3.19 Outstation System ‡**

Outstation System means one or more Outstations linked to a single communication line. For clarification, where there is no physical communication line (i.e. SMS) the point of connection to the communication system shall be deemed as the communications line.

**3.20 Reactive Energy \***

Reactive Energy means the integral with respect to time of the Reactive Power.

**3.21 Reactive Power \***

Reactive Power means the product of voltage and current and the sine of the phase angle between them measured in units of volt-amperes reactive and standard multiples thereof.

**3.22 Registrant \***

Registrant means in relation to a Metering System, the person for the time being registered in CMRS or (as the case may be) SMRS in respect of that Metering System pursuant to Section K of the Balancing and Settlement Code.

**3.23 Settlement Instation ‡**

Settlement Instation means a computer based system which collects or receives data on a routine basis from selected Outstation Systems by a Data Collector.

**3.24 SVA Customer \***

Means a person to whom electrical power is provided, whether or not that person is the provider of that electrical power; and where that electrical power is measured by a SVA Metering System.

**3.25 UTC \***

UTC means Co-ordinated Universal Time which bears the same meaning as in the document Standard Frequency and Time Signal Emission, International Telecommunication Union - RTF.460(ISBN92-61-05311-4) (colloquially referred to as Rugby Time).

## 4. MEASUREMENT CRITERIA

### 4.1 Measured Quantities and Demand Values

#### 4.1.1 Measured Quantities

For each separate circuit the following energy measurements shall be provided:-

- (i) Import kWh\*
- (ii) Export kWh\*
- (iii) Import kvarh\*
- (iv) Export kvarh\*

While Active Energy values are a Settlement requirement the Reactive Energy values are not but are likely to be required by Licensed Distribution System Operators (LDSO).

#### 4.1.2 Demand Values

For each Demand Period for each circuit the following Demand Values shall be provided:-

- (i) Import kW\*
- (ii) Export kW\*
- (iii) Import kvar
- (iv) Export kvar

\* Import and/or Export metering need only be installed where a Party requires this measurement to meet system or plant conditions.

Where Import and Export metering is installed gross Import and gross Export Active Energy shall be recorded separately for Settlements.

While Active Energy values are a Settlement requirement the Reactive Energy values are not but are likely to be required by LDSO.

## 4.2 Accuracy Requirements

### 4.2.1 Overall Accuracy

The overall accuracy of the energy measurements at, or referred to, the Defined Metering Point shall at all times be within the limits of error of the Electricity Act 1989. These limits of error shall apply at the Reference Conditions defined in the appropriate Meter specification.

Evidence to substantiate that these overall accuracy requirements are met shall be available for inspection to either the Panel or the Technical Assurance Agent.

## 5. METERING EQUIPMENT CRITERIA

Although for clarity this Code of Practice identifies separate items of equipment, nothing in it prevents such items being combined to perform the same task provided the requirements of this Code of Practice are met.

### 5.1 Current Transformers

Where required, one set of current transformers (CT) to IEC Standard 185 with a minimum standard of accuracy to class 0.5, shall be provided per circuit. Preferably, the CTs shall be dedicated for Settlement purposes, but the CTs may be used for other purposes provided the overall accuracy requirements in clause 4.2.1 are met and evidence of the value of the additional burden is available for inspection by the Panel or the Technical Assurance Agent.

The additional burden shall not be modified without prior notification to the Panel, and evidence of the value of the modified additional burden shall be available for inspection by either the Panel or the Technical Assurance Agent.

CT test certificates showing errors at the overall working burden or at burdens which enable the working burden errors to be calculated shall be available for inspection by either the Panel or the Technical Assurance Agent. Where CT test certificates are not available and the CTs can be verified as class 0.5 or better and are installed on a Low Voltage installation, the extreme errors for the accuracy class shall be assumed.

The total burden on each CT shall not exceed the rated burden of such CT.

### 5.2 Fusing and Test Facilities

Where CTs are used, testing facilities shall be provided close by the Meters of each circuit, which enable such Meters to be routinely tested and /or changed safely with the circuit energised. Separate fusing shall be provided locally for:-

- (i) the Meter;
- (ii) any other Settlement Metering Equipment burden; and
- (iii) any other equipment burden e.g. non-Settlement meters, protection, etc.

Local fusing shall discriminate with the source fusing.

The voltage supply to the Metering Equipment shall be fused as close as practicable to the point of that supply with a set of isolating links provided locally, suitably identified, to the Metering Equipment. If that point of supply is close to the Metering Equipment, then the isolating links may be omitted.

### 5.3 Meters

For each circuit, Active Energy Meters shall be supplied which shall meet the requirements of Schedule 7 of the Electricity Act 1989.

All Meters supplied via CTs shall be set to the actual primary and secondary ratings of the CTs. The CT ratio shall be displayed and downloaded during the interrogation process.

All Meters shall be labelled or otherwise be readily identifiable with respect to their associated circuit(s), and as defined in IEC 62053-23.

## 5.4 Displays and Facilities for Registrant Information

### 5.4.1 Displays

#### (a) Mandatory Displays

The Metering Equipment shall display the following primary information (not necessarily simultaneously):-

- (i) measured quantities as per clause 4.1.1;
- (ii) current time and date; and
- (iii) the CT ratio that the Meter has been programmed to (where appropriate).

#### (b) Display Capabilities

The Metering Equipment shall be capable of enabling the display of the following information, as specified by the Registrant:-

- (i) Maximum Demand (MD) for kW per programmable charging period, i.e. monthly or statistical review period;
- (ii) (MD) for kVA per programmable charging period, i.e. monthly or statistical review period;
- (iii) cumulative MD;
- (iv) number of MD resets;
- (v) multi-rate display sequence as specified by the Registrant, with a minimum of 8 rates selectable over the calendar year; and
- (vi) indication of reverse running for Active Energy, where appropriate.

MD shall be resettable at midnight of last day of charging period. Also resettable for part chargeable period demands. If a manual reset button is used then this shall be sealable.

MD is not a Settlement requirement but may be required for Distribution Use of System (DUoS) purposes.

## 5.5 Outstation

Any device that is not covered by SI1679 shall not be involved in deriving the kWh value for Settlement purposes. To clarify, an integral Outstation may be used but a remote Outstation that derives a kWh value (e.g. via pulsed outputs) shall not be used. An integral Outstation that transfers the kWh value of the primary register in accordance with the manufacturers protocol may be used.

An Outstation System shall be provided which transfers data to and receives data from a Settlement Instation.

The Outstation data shall be to a format and protocol approved by the Panel in accordance with BSCP601 'Metering Protocol Approval and Compliance Testing'.

The Outstation shall facilitate the metering data to be read by instations other than the Settlement Instation provided the requirements of clause 6 of this Code of Practice are satisfied.

For the purpose of transferring stored metering data from the Outstation to the Settlement Instation, a unique Outstation identification code shall be provided.

Repeat collections of metering data shall be possible throughout the Outstation data storage period.

Where metering data is transferred to the Settlement instation automatically, the Outstation shall be capable of providing this data on a daily basis as a minimum. Where the Meter is being used on a Half Hourly site, time synchronisation of the Outstation shall be performed by the Half Hourly Data Collector communicating directly with the Outstation in accordance with BSCP502 'Half Hourly Data Collection for SVA Metering Systems Registered in SMRS'.

If not integral with the Meter, a separately fused supply shall be provided for each Outstation.

Where a separate modem (or equivalent) associated with the Outstation System is used, then it shall be provided with a separately fused supply. Alternatively, line or battery powered modem types may be used.

### 5.5.1 Data Storage

Data storage facilities shall be provided as follows:-

- (i) Each Demand Value shall be identifiable to its respective date and time;
- (ii) a storage capacity of 48 periods per day for a minimum of 20 days for all Demand Values as defined in clause 4.1.2;
- (iii) the resolution of the Active Energy transferred into the demand registers shall be within  $\pm 0.1\%$  (at full load) of the amount of Active Energy measured by the associated Meter;

- (iv) the value of energy measured in a Demand Period but not stored in that Demand Period shall be carried forward to the next Demand Period;
- (v) in the event of a supply failure, the Outstation shall protect all data stored up to the time of the failure.
- (vi) to cater for continuous supply failures, the clock and calendar shall be supported for a minimum period of 20 days without an external supply connected and maintain time accuracy in accordance with clause 5.5.2;
- (vii) any "read" operation shall not delete or alter any stored metered data; and
- (viii) an Outstation shall provide all the metered data stored from the commencement of any specified date upon request by the Settlement Instation.

#### 5.5.2 Time Keeping

- (i) The Outstation time shall be set to Co-ordinated Universal Time (UTC). No switching between UTC and British Summer Time (BST) shall occur for Settlement data storage requirements.
- (ii) Time synchronisation of the Outstation may be performed remotely by the Settlement Instation as part of the normal interrogation process or locally by an Interrogation Unit.
- (iii) When time synchronisation occurs the relevant period(s) shall be marked with an alarm indication, as outlined in clause 5.5.3.
- (iv) The overall limits of error for the time keeping allowing for a failure to communicate with the Outstation for a period of 20 days shall be:-
  - a) the completion of each Demand Period shall be at a time which is within  $\pm 20$  seconds of UTC; and
  - b) the duration of each Demand Period shall be within  $\pm 0.1\%$ , except where time synchronisation has occurred in a Demand Period.

#### 5.5.3 Monitoring Facilities

Monitoring facilities shall be provided for each of the following conditions and shall be reported, as separate alarm indications, tagged to the relevant Demand Period(s), via remote communications and the local Interrogation Unit:-

- (i) phase failure of any one or combination of phases;
- (ii) Metering Equipment resets caused by other than a supply failure (where fitted);
- (iii) battery monitoring (where battery fitted);
- (iv) interrogation port access which changes time and/or date;
- (v) where different from (iv), Demand Period(s) which have been truncated or extended by a time synchronisation;



- (vi) interrogation port access which changes data other than time and/or date; and
- (vii) reverse running (if fitted).

In addition to (ii), detected errors in Metering Equipment functionality should be recorded as an event alarm with date and time.

Any alarm indications shall not be cancelled or deleted by the interrogation process and shall be retained with the data until overwritten. The alarm shall reset automatically when the abnormal condition has been cleared.

## 5.6 Security Regime

Unauthorised access to the data in the Metering Equipment shall be prevented. It should be possible, where reasonably practicable, to identify when unauthorised access has been attempted. A security regime allowing for at least the levels of access as defined below:-

- (i) Level 1 for:-

Read only of the following metering data, which shall be transferable on request during the interrogation process:-

- a) Outstation ID;
- b) Demand Values as defined in clause 4.1.2;
- c) cumulative measured quantities as defined in clause 4.1.1;
- d) Maximum Demand (MD) for kW or kVA per programmable charging period i.e. monthly, statistical review period;
- e) multi-rate cumulative Active Energy as specified by the Registrant;
- f) the CT ratio, where appropriate;
- g) alarm indications; and
- h) Outstation time and date.

- (ii) Level 2 for:-

- a) corrections to the time and/or date; and
- b) resetting of the MD.

- (iii) Level 3 for:-

Programming of :-

- a) the Displays and Facilities as defined in clause 5.4;
- b) the CT ratio, as appropriate;

- c) the access for levels 1 and 2; and
- d) programming of the schedule for automated transfer of Level 1 metering data.

In addition, it shall be possible to read additional information within the Metering Equipment to enable the programmed information to be confirmed.

In addition to the functions specified for each level it shall be feasible to undertake the functions at the preceding level(s). e.g. at level 3 it shall also be possible to carry out the functions specified at levels 1 and 2.

## **5.7 Communications**

Outstation(s) shall provide both local and remote interrogation facilities, from separate ports.

### **5.7.1 Local Interrogation**

An interrogation port shall be provided for each Outstation.

### **5.7.2 Remote Interrogation**

Remote interrogation facilities shall be provided with error checking of the communications between the Outstation System and the Settlement Instation.

It shall not be possible to disconnect the remote communications connection to/from the Outstation without the breaking of an appropriate seal (see clause 5.8).

Interrogation of an Outstation shall be possible using media agreed by the Panel.

The actual media employed shall be in accordance with the requirements of the Registrant for SVA Metering Systems.

The data shall be to a format and protocol approved by the Panel in accordance with BSCP601 'Metering Protocol Approval and Compliance Testing'.

## **5.8 Appropriate Seals**

All SVA Metering Equipment shall be sealed in accordance with Appendix 8 and 9 of the Meter Operation Code of Practice Agreement.

## **6. ACCESS TO DATA**

Access to metering data shall be in accordance with the provisions of the Code and the BSC Procedures referred to therein.

## APPENDIX A DEFINED METERING POINTS

For transfers of electricity between the following parties the Defined Metering Point (DMP) shall be at one of the following locations:-

1. For transfers between a Transmission System operator and a single Distribution System operated by a Licensed Distribution System Operator where no other Party(s) are connected to the busbar, the DMP shall be at the lower voltage side of the supergrid connected transformer.
2. For transfers between a Transmission System operator and a single Distribution System operated by a Licensed Distribution System Operator where other Party(s) are connected to the busbar, the DMP shall be at the circuit connections to that Distribution System operated by a Licensed Distribution System Operator.
3. For transfers between a Transmission System operator and more than one Distribution System operated by a Licensed Distribution System Operator connected to the same busbar, the DMP shall be at the circuit connections of each Distribution System operated by a Licensed Distribution System Operator to such busbar.
4. For transfers between Distribution Systems operated by Licensed Distribution System Operators not including a connection to the Transmission System, the DMP shall be at the point of connection of the two Distribution Systems operated by Licensed Distribution System Operators.
5. For transfers between a Transmission System operator and:-
  - (i) Generating Plant, the DMP shall be at the high voltage side of the generator transformers and station transformer(s).
  - (ii) An Offshore Power Park Module(s) comprising a single BM Unit, the DMP shall be at the point(s) of connection of the Offshore Power Park Module to the Transmission System. A Party may install Metering Equipment at either:
    - the DMP; or
    - a point or points on the Offshore Platform, other than the DMP. Such point or points shall be the Actual Metering Point for the purposes of this Code of Practice.
6. For transfers between a Distribution System operated by a Licensed Distribution System Operator and Generating Plant, the DMP shall be at the point(s) of connection of the generating station to the Distribution System operated by the Licensed Distribution System Operator.
7. For transfers between the Distribution System of a Licensed Distribution System Operator and a Customer, the DMP shall be at the point of connection to the Distribution System of the Licensed Distribution System Operator.
8. For transfers between a Transmission System operator and a Customer, the DMP shall be at the point of connection to the Transmission System.

9. For transfers between a Transmission System operator and an External System the DMP shall be as follows:-
- (i) For the EdF link the busbar side of the busbar disconnectors at the Sellindge 400 kV Substation.
  - (ii) For the Moyle Interconnector, the Converter Station side of the L15 circuit breaker on the Coylton feeder at Auchencrosh Substation.

SUPERSEDED