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# CNN/004/004 – Commissioning of Current Transformer Metering Equipment

## 1. Purpose

The purpose of this document is to outline the requirements and responsibility for the commissioning of Current Transformer (CT) Metering Equipment for which the Company is responsible. It ensures compliance with the Balancing and Settlement Code (BSC) Code of Practice 4 (CoP4) – Code of Practice for the calibration, testing and commissioning requirements of metering equipment for settlement purposes.

This document supersedes the following documents, all copies of which should be destroyed;

Document Reference	Document Title	Version	Published Date
CNN/004/004	Commissioning of Current Transformer Metering Equipment	1.0	Jan 2020

## 2. Scope

This document applies to all new and modified installations of CT Metering Equipment (typically a combination of CTs, Voltage Transformers (VTs), wiring loom, meter panel and test terminal block) for LV, HV and EHV demand projects where the CT Metering Equipment is installed by the Company’s direct staff, sub-contractor or by an independent connections provider (ICP) and subsequently adopted by the Company. See Appendix 1 for Metering Equipment ownership and installation responsibility.

Note: Within the BSC, Metering Equipment also includes the meter itself. However, for the purpose of this code of practice, the meter is out of scope of this document as it is not owned by, or the responsibility of, the Company.

Within this document the term “Company” refers to the Northern Powergrid Holdings Company and all subsidiaries within it except Northern Powergrid Gas Limited.

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### 3. Requirements and Responsibility

Under the BSC the ultimate responsibility for compliance with CoP4, and the overall performance of the metering system as a whole, is with the registrant (usually the electricity supplier). However, where elements of the CT Metering Equipment e.g. CTs, VTs and test facilities, are under the ownership of another BSC party (e.g. Distributor), the responsibility for commissioning, calibration certification and record keeping for their equipment sits with that party. Therefore, the Company is responsible for the commissioning, calibration certification and record keeping of CT Metering Equipment which it owns.

#### 3.1. Commissioning Requirements

The purpose of commissioning is to ensure that power flowing across a Defined Metering Point (DMP) is accurately recorded by the associated metering system.

Commissioning shall be performed on all new CT Metering Equipment which is to provide metering data for settlement. Where individual items of CT Metering Equipment are replaced on a like-for-like basis then only those items are required to be commissioned – rather than the whole metering system.

The headline requirements for commissioning of a metering system are to prove that:

1. the CTs and VTs are of the correct ratio and polarity and are correctly located to record the required power flow;
2. the relationship between associated voltage and current are correct and that phase rotation is standard at the meter terminals;
3. the burden on the CTs and VTs are within the correct limits;
4. the meter(s) is(are) set to the same ratio as the installed CTs and VTs;
5. the meter(s) has(have) the correct compensation for errors in the CTs and VTs, connections and losses in power transformers where appropriate;
6. the Metering Equipment detects phase failure and operates the required alarms; and
7. the output of the metering system correctly records the energy in the primary system at the DMP.

The Company is responsible for items 1, 2, and 3\*. The registrant (via the appointed Meter Operator Agent (MOA)) is responsible for items 3\*, 4, 5, 6 and 7.

\*Note: the overall burden includes the meter in circuit so checks are required by both the Company (up to the test terminal block) and MOA.

Commission information and outcome results are communicated between industry parties via data flow. Therefore, there are a number of data items that are mandatory to populate within the commission data flow (D0383) for it to be sent. These are detailed within Appendix 2. All of the mandatory data items are included in the appropriate Company commissioning pro forma in Appendix 3, 4 and 5.

#### 3.2. Commissioning Process

CT Metering Equipment installation requests and tracking of the job is documented in the process document CNN/004/004/001.

##### 3.2.1. CT Metering Equipment Tests – for ISUM / HDCOM Pre-commissioned Unit

ISUM and HDCOM units are purchased almost completely factory pre-commissioned. A typical commissioning pro forma for these units is in Appendix 3. Only data items in red text are required to be completed on site by the installer/Work Initiator.

The unit specifications are documented in NPS/002/029 - Technical Specification for Industrial Service Units with Integral Current Transformers and NPS/002/030 - Technical Specification for Heavy Duty Cut-Outs with Integral Current Transformers.

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### 3.2.2. CT Metering Equipment Tests – for EHV/HV Installations

These installations utilise a remote metering base/panel unit and a multicore cable between the CT/VT marshalling box of the metering circuit breaker and the metering base/panel unit. The specification of these units will depend on the capacity of the circuit being metered:

CoP3 - Circuit capacity greater than 1MVA but not exceeding 10MVA (NPS/002/032);

CoP2 - Circuit capacity greater than 10MVA but not exceeding 100MVA (NPS/002/034); or

CoP1 - Circuit capacity exceeding 100MVA (NPS/002/035)

The commissioning pro forma to use for these installations is SCTS 71 – HV Metering Equipment Tests (Appendix 4)

### 3.2.3. CT Metering Equipment Tests – for LV Installations

These installations utilise a remote metering base/panel unit and a multicore cable between the CT marshalling box of the metering circuit breaker and the metering base/panel unit. The commissioning pro forma to use for these installations is SCTS 81 – LV Metering Equipment Tests (Appendix 5).

This category also includes traditional LV installations using an Industrial Service Unit (ISU) with separate CTs and wiring to the metering base/panel. The commissioning pro forma to use for these installations is in Appendix 3. These units are not pre-commissioned so will require all data items completing on site.

The specification of the metering base/panel unit is in NPS/002/031.

### 3.3. Calibration Certificates

When CTs and VTs are manufactured they are tested/calibrated under specific conditions to verify their accuracy. The results are documented to create a calibration certificate. As the registrant is responsible for the overall accuracy of the metering system, on occasions the MOA may need to use the information on the calibration certificates in order to verify that the accuracy of the metering system is within prescribed limits. In addition, the BSC auditor may also require the calibration certificates when carrying out an audit for a particular site. Therefore, it is a requirement under CoP4 that the owner of the CTs and VTs retains, and provides upon request, the calibration certificates.

The calibration certificates are either contained within the ISUM / HDCOM / metering circuit breaker switchgear following delivery from manufacturer or will be delivered separately. On occasions it may be necessary to request copies from the manufacturer.

### 3.4. Records

In accordance with process CNN/004/004/001 the completed commissioning pro forma and calibration certificates must be collected by the Work Initiator who will scan them and send the electronic version to the Registration Services email box CTCommissioning@northernpowergrid.com. The original documents must be stored in the project file for the job.

It is essential that all the data items required on the data flow (in Appendix 2) are inputted on to the commissioning pro forma in order for Registration Services to extract the required data to complete and send the data flow. Any missing mandatory data items will prevent the data flow from being sent. Therefore, if this is the case, the documents will be returned to the Work Initiator to complete and re-send.

### 3.5. Independent Connections Provider (ICP) installations

As the ownership of ICP installed CT Metering Equipment only transfers to the Company following adoption, the ICP is responsible for the Metering Equipment commissioning and completion of the appropriate documentation. Within the 'Electricity Asset Adoption Agreement' section 7 (Title and Adoption) and section 13 (Connection) - extracts in Appendix 6 - the ICP is required to provide commissioning test results compliant with CoP4 prior to adoption and connection. Therefore, the commissioning documents and calibration certificates must be included within the 'hand over pack' to the Work Initiator.

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### 3.6. Provision of Information

The outcome of the CT Metering Equipment commission must be provided to the MOA. This is done via data flow (D0383). It is a requirement within the BSC procedures (BSCP 514 and 515) to send the data flow to the appointed MOA via an electronic or other agreed method within 5 working days of energisation. The process for the data flow and timelines is set out in CNN/004/004/001 and the process referenced within the Registration Services LWP.

### 3.7. Responsibilities

#### 3.7.1. Major Projects

During the installation of new or replacement/upgrade of existing CT Metering Equipment the Project Delivery Engineer is responsible for:

- Coordinating the installation of the CT Metering Equipment;
- Liaison with MOA;
- Requesting Engineer/Fitter resource for commissioning;
- Witness the ICP Metering Equipment commission (where appropriate); and
- Following request from supplier, close (energise) LV MCCB, HV or EHV metering circuit breaker as appropriate.

The Project Manager (Work Initiator) is responsible for:

- Collecting, ensuring completion, forwarding on and filing of all CT Metering Equipment commissioning and calibration certificate documentation within required timelines.

#### 3.7.2. Regional Operations Engineer

During the installation of new or replacement/upgrade of existing CT Metering Equipment the Regional Operations Engineer (Work Initiator) is responsible for:

- Coordinating the installation of the CT Metering Equipment;
- Liaison with MOA;
- Updating Connections Database Application (CDA);
- Requesting Engineer/Fitter resource for commissioning;
- Witness the ICP Metering Equipment commission (where appropriate);
- Collecting, ensuring completion, forwarding on and filing of all CT Metering Equipment commissioning and calibration certificate documentation within required timelines; and
- Following request from supplier, close (energise) LV MCCB, HV or EHV metering circuit breaker as appropriate.

#### 3.7.3. Commissioning Engineer/Fitter

- Following a request from the Work Initiator the Commissioning Engineer/Fitter is responsible for:
- Commissioning the CT Meeting Equipment using the appropriate SCTS 71/81 commissioning pro forma; and
- Handing completed commission document to Work Initiator.

#### 3.7.4. ICP

Prior to adoption of CT Metering Equipment by the Company the ICP is responsible for:

- Installation and commissioning of CT Metering Equipment; and
- Handing commission documents and calibration certificates to Work Initiator via a hand over pack.

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### 3.7.5. Meter Operator Agent

- Following the installation of Company CT metering Equipment the MOA is responsible for:
- Installation of meter(s) to meter panel and connection of meter to test terminal block;
- Commissioning the meter and the overall performance of the metering system (on behalf of the supplier); and
- Insertion of main fuses to energise the ISU, ISUM or HDCOM.

### 3.7.6. Registration Services

- Following receipt of documentation from the Work Initiator Registration Services is responsible for:
- Quality assurance checking of the commission documentation;
- Completing and sending the D0383 data flow; and
- Electronically filing the commission and calibration certificate documents.

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## 4. References

### 4.1. External Documentation

Reference	Title
BSC CoP4	Code of Practice for the calibration, testing and commissioning requirements of metering equipment for settlement purposes
BSCP 514	SVA Meter Operations for Metering Systems Registered in SMRS
BSCP 515	Licensed Distribution.

### 4.2. Internal Documentation

Reference	Title
CNN/004/004/001	CT Metering Equipment Installations
NPS/002/029	Technical Specification for Industrial Service Units with Integral Current Transformers
NPS/002/030	Technical Specification for Heavy Duty Cut-outs with Integral Current Transformers
NPS/002/031	Technical Specification for Metering Base/Panel Unit for Connection to Heavy Duty Cut-outs from 100-500 Amps with Integral Current Transformers and LV Air Circuit Breakers in accordance with CoP5 up to 1 MW
NPS/002/032	Technical Specification for Metering Base/Panel Unit for Connection to High Voltage Metering Circuit Breakers in accordance with CoP3 up to a circuit capacity not exceeding 10 MVA
NPS/002/034	Technical Specification for Metering Base/Panel Unit for Connection to Extra High Voltage Metering Circuit Breakers in accordance with CoP2 up to a circuit capacity not exceeding 100 MVA
NPS/002/035	Technical Specification for Metering Base/Panel Unit for Connection to 132kV Metering Circuit Breakers in accordance with CoP1 up to a circuit capacity exceeding 100 MVA

### 4.3. Amendments from Previous Version

Reference	Description
Appendix 1	Amended the drawing in Appendix 1 to reflect our change of specification of the CT meter panel to split out the ownership and responsibility of CT secondary wiring either side of the test terminal block (the supplier is responsible from the test terminal block to meter).
Appendix 3	Appendix 3 is only a title change of the commission pro-forma to reflect that of the NPS specification document.
Section 3.2.3	Section 3.2.3 was a typo where it referenced the wrong appendix number.

## 5. Definitions

Term	Definition
CT Metering Equipment	typically all or a combination of CTs, VTs, wiring loom, meter panel and test terminal block
DMP	Defined Metering Point (BSC definition)
HDCOM	Heavy Duty Cut Out with integrated metering equipment (CTs)
ICP	Independent Connections Provider
ISUM	Industrial Service Unit with integrated metering equipment (CTs)
MOA	Meter Operator Agent
Work Initiator	Typically the Regional Operations Engineer/Major Projects Manager

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## 6. Authority for Issue

### 6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Date
Liz Beat	Governance Administrator	11/06/2020

### 6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

**Review Period** - This document should be reviewed within the following time period;

Standard CDS review of 3 years?	Non Standard Review Period & Reason	
Yes	Period: n/a	Reason: n/a
<b>Should this document be displayed on the Northern Powergrid external website?</b>		Yes
		Date
Warren Lacey	Technical Metering Specialist	11/06/2020

### 6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Date
Michael Crowe	Technical Services Manager	11/06/2020
Andrew Scott	Technical Services Manager	30/07/2020
Neil Metcalfe	Project Engineering Manager	19/06/2020
Drew Johnstone	Connections Input Service Operations Manager	12/06/2020
Leanne Yates	Registration Services Manager	11/06/2020

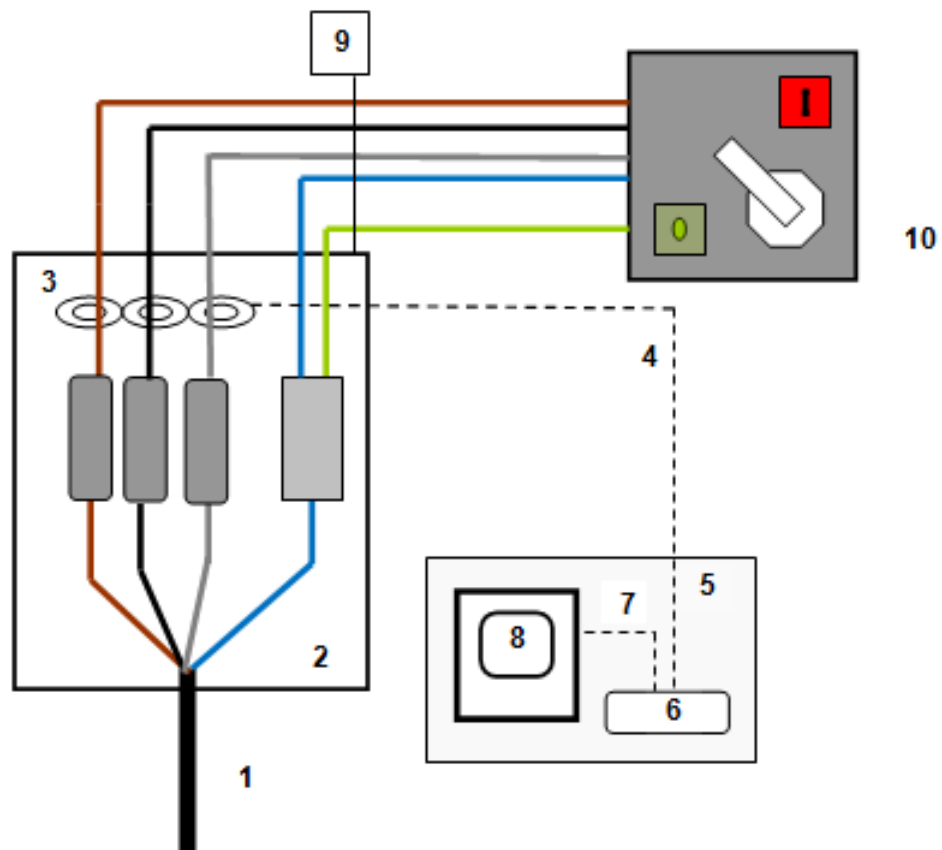
### 6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Glen Hodges	Head of Field Services	11/06/2020

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## Appendix 1 – Typical LV CT Metering Equipment Installation and Responsibility\*



	Description	Ownership	Installation responsibility
1	Incoming supply cable	NPg <sup>1</sup>	NPg <sup>2</sup>
2	Cable termination (ISU)	NPg <sup>1</sup>	NPg <sup>2</sup>
3	Metering CTs	NPg <sup>1</sup>	NPg <sup>2</sup>
4	Metering multi-core – CTs to TTB	NPg <sup>1</sup>	NPg <sup>2</sup>
5	Meter panel	NPg <sup>1</sup>	NPg <sup>2</sup>
6	Test terminal block (TTB)	NPg <sup>1</sup>	NPg <sup>2</sup>
7	Metering multi-core – TTB to meter	Supplier	MOA (on behalf of supplier)
8	Meter	Supplier	MOA (on behalf of supplier)
9	Customer tails	Customer	NPg <sup>2</sup> - only final connection to ISU(M)/HDCO(M)
10	Customer main switch	Customer	Customer

\*The illustration is of a typical LV ISU installation but the same ownership and installation responsibility requirements apply to all levels of CT metering equipment installations where the Company ultimately owns the CT Metering Equipment.

<sup>1</sup> Only following adoption for ICP installations

<sup>2</sup> ICP for ICP installations



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## Appendix 2 – Mandatory Dataflow D0383 Data Items

For all CT Metering Equipment installations

MPAN	Referenced on all commission documents and required for import (and export where applicable)
Number of feeders	Not referenced on ISUM/HDCOM commission document as default to “1” but referenced on SCTS 71/81 documents for input
Feeder ID	Not referenced on ISUM/HDCOM commission document as default to “Feeder 1” but referenced on SCTS 71/81 documents for input
Feeder status	Not referenced on ISUM/HDCOM commission document as default to “Inactive” as this is at meter level so will not be live at installation. Referenced on the SCTS 71/81 documents for input
Measurement transformers at defined meter point (DMP)	Location of CT/VTs and referenced on all commission documents
Number of phases	Referenced on all commission documents
Phase ID	L1, L2, L3 referenced on all commission documents
CT commission date	Referenced on all commission documents
CT serial number	Referenced on all commission documents and must be completed for each phase
CT class	
CT rating (in VA)	
CT ratio (full load ratio)	
Burden on CT (full load in VA)	

Additional only for EHV/HV CT Metering Equipment installations

VT commission date	Referenced on SCTS 71 commission document
VT serial number	Referenced on SCTS 71 commission document and must be completed for each phase
VT class	
VT rating (in VA)	
VT ratio (full voltage)	
Burden on VT (full load in VA)	



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## **Appendix 4 – SCTS 71 – HV Metering Equipment Tests**

[SCTS 71 - HV Metering Equipment Tests](#)

## **Appendix 5 – SCTS 81 – LV Metering Equipment Tests**

[SCTS 81 - LV Metering Equipment Tests](#)

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## Appendix 6 – Extract from Adoption Framework Agreement

### 7. TITLE AND ADOPTION

- 7.1 The Electricity Asset Adoption Agreement is an agreement between the Owner, the ICP and the Distributor whereby the Distributor Adopts the Assets set out in Appendix 1 to the Electricity Asset Adoption Agreement subject to the terms and conditions set out in this Agreement.
- 7.2 The ICP shall prior to Adoption by the Distributor of any Assets:
- 7.2.1 Procure the completion, signature and return to the Distributor of the Electricity Asset Adoption Agreement set out in Schedule 1.
  - 7.2.2 Provide As Laid Drawings which shall be appended to the Completion, Handover and Adoption Certificate;
  - 7.2.3 Provide documentary evidence, satisfactory to the Distributor, that the person or persons undertaking the Works are and continue to be properly Authorised and otherwise possess the appropriate skills and experience to carry out the Works and construct the Asset(s) and, where applicable, performed the Works and any Connection in accordance with the Network Access Agreement;
  - 7.2.4 Provide plot numbers and full postal address of any Customer’s Installation and answer promptly any queries the Distributor may have regarding such plot numbers and postal addresses;
  - 7.2.5 Provide the name of any landowner of land over, on or under which the relevant Asset(s) are situated;
  - 7.2.6 Provide in respect of high voltage plant comprising the relevant Asset(s), the complete set of the Plant Test Results in accordance with the Specifications and the Commissioning Test Results; and
  - 7.2.7 Ensure that any defects in the Works found by the Distributor upon inspection or otherwise are rectified.

### 13. CONNECTION

- 13.1 Assets will be Connected to the Distribution System by the Distributor only if:
- 13.1.1 The Distributor has received a Completion, Handover and Adoption Certificate;
  - 13.1.2 The Distributor has received the acceptance of its terms for the provision of non-contestable work;
  - 13.1.3 The Distributor has obtained any required Consents;
  - 13.1.4 The Distributor has received the As Laid Drawings;
  - 13.1.5 The Distributor has received any required Plant Test Results and the Commissioning Test Results; and
  - 13.1.6 The Owner has entered into an Electricity Asset Adoption Agreement in the form set out in Schedule 1 on or prior to the Adoption Date.

A new defined term was also added to define Commissioning Test Results;

“Commissioning Test Results” means the results of a test which comply with the requirements set out in Section 5.5 of the “Code Of Practice For The Calibration, Testing And Commissioning Requirements Of Metering Equipment For Settlement Purposes” published by Elexon pursuant to the Balancing and Settlement Code;