Electricity Distribution

nationalgrid

Company Directive

POLICY DOCUMENT: TP18/0

Application of Connection Control Panels

Summary

This document provides policy on the application of Connection Control Panels. Detailed requirements are included in Standard Techniques within the TP18 series.

Author: **Andy Hood**

Implementation Date: **September 2023**

Approved by

Carl Ketley-Lowe
Engineering Policy Manager

Date: **22nd September 2023**

Target Staff Group	**Staff involved with the analysis, design, construction, maintenance, replacement, operation and control of National Grid Electricity Distribution's (NGED's) network**
Impact of Change	**Amber – This is a new document that describes the high level requirements for the application of Connection Control Panels (CCPs). The document reflects NGED's existing approach**
Planned Assurance checks	**Six months after issue Engineering Policy will check at least one CCP in each license area to confirm compliance with this document.**

IMPLEMENTATION PLAN

Introduction

POL: TP18 specifies the high level requirements associated with the application of Customer Connection Panels

Main Changes

This is a new document that reflects NGED's existing approach to the application of Connection Control Panels.

Impact of Changes

Target Staff Group	**Staff involved with the analysis, design, construction, maintenance, replacement, operation and control of National Grid Electricity Distribution's (NGED's) network**
Impact of Change	**Amber – This is a new document that describes the high level requirements for the application of Connection Control Panels (CCPs). The document reflects NGED's existing approach**

Implementation Actions

Managers shall ensure that target staff group are aware of and follow the requirements of this document.

An explanation video presentation is available from the following link:

POL: TP18_0 presentation.pptx

Implementation Timetable

This document is implemented on issue for new or modified Connection Control Panels.

REVISION HISTORY

DOCUMENT REVISION & REVIEW TABLE		
Date	**Comments**	**Author**
September 2023	• New Document	Andy Hood

CONTENTS

1.0 SCOPE

This document specifies the high level requirements associated with the application of Connection Control Panels (CCPs). These panels may be installed at customer and/or Other Authorised Distributor (OAD) installations, normally at the connection point, and are used to:

- Monitor analogue information including phase current, phase to phase voltage, 3 phase active power and 3 phase reactive power and make this available to NGED's Advanced Distribution Management System (ADMS).
- Send maximum and minimum active power (MW) and reactive power (MVAr) limits to customers or OADs.
- Send stage 1 and stage 2 active power instructions to customers or OADs.
- Receive stage 1 operated and stage 2 operated statuses from the customer or OAD and relay this information to NGED's ADMS.
- Send alarms and additional status information associated with the CCP to ADMS.

Detailed requirements are provided in Standard Techniques within the TP11 series.

2.0 DEFINITIONS

Name/Phase	Definition
Active Network Management (ANM)	A type of Load management that uses a central calculation engine connected to NGED's network via ADMS, to processes network data in real time and, where necessary to satisfy Customer Security, Network Integrity and System Frequency Integrity requirements, to issue active power and/or reactive power instructions/limits to customers/OADs.
Advanced Distribution Management System (ADMS)	A NGED system that provides Supervisory Control and Data Acquisition (SCADA), Distribution Management System (DMS) and Outage Management System (OMS) functionality. *Definition taken from POL:SD11.*
Category B	A category of Load Management Scheme that utilises full pre-event Curtailment and that satisfies the prerequisites specified in ST: SD11B. *Definition derived from ST:SD11B.*
Category C	A category of Load Management Scheme that Curtails Load within the disconnection period following an Operational Secured Next Fault and before healthy sections are back-fed. *Definition taken from ST:SD11C.*

Name/Phase	Definition
Connection Control Panel (CCP)	A combination of equipment and software/logic systems installed at a customer connection or OAD connection used by NGED to instruct the customer to Curtail their Load or instruct the OAD to Curtail their customer's Load.
Controllable Load	Load that shall be Curtailed by a customer in accordance with the terms of the NGED/customer Connection Agreement or the NGED/OAD Bilateral Agreement.
Curtail, Curtailment or Curtailing	Any action taken by NGED to restrict the flow of electricity at the customer's connection point, including a connection point within an IDNO or OAD network. *Definition derived from POL:FD:3.*
Customer Security	The requirement for Demand Security and Generation Security *Definition derived from POL:SD11.* *Note, the term Network Security was historically used instead of Customer Security and may still be found in other directives*
Demand Security	The ability to meet customer demand under Intact Network and outage conditions. *Definition taken from POL:SD11.*
Generation Security	The ability to accept customer export under Intact Network and outage conditions. *Definition taken from POL:SD11.*
Independent Distribution Network Operator (IDNO)	A DNO that does not have a distribution services obligation area in its distribution licence and is not an ex public electricity supplier. *Definition taken from the Distribution Code.*
Intact Network	A network operating with open points in their normal position and without any outages that are material to the condition being considered or studied. *Definition taken from POL:SD11.*
Load	The apparent power (e.g. kVA or MVA) associated with demand, generation and/or electrical energy storage. *Definition taken from POL:SD11*

Name/Phase	Definition
Load Management Scheme (LMS)	Plant, equipment and software systems that together manage network loading and voltages by either controlling demand and/or generation connected to the network, operating switchgear to change the topology of the network and/or controlling the settings of tap-change controllers, reactive compensation equipment and flexible power links. Examples of Load Management Schemes include but are not limited to: • Operational Intertripping • Active Network Management (ANM) • Soft-intertripping • Overload protection • Auto-changeover • Voltage constraint systems • Remote control of switchgear or other plant and equipment. The following are not considered to be Load Management Schemes: • Customer-owned limitation schemes • Conventional independent tap-change control schemes • Network protection for fault clearance • Loss-of-mains protection, including loss-of-mains intertripping • Timed Connections *Definition taken from POL:SD11*
Network Integrity	The ability of a network to operate within thermal, voltage and other technical limits, excluding frequency-related limits, under both Intact Network and outage conditions. *Definition taken from POL:SD11*

Name/Phase	Definition
Operational Secured Next Fault	An electrical network fault outage after which Customer Security, Network Integrity and System Frequency Integrity requirements must be satisfied when operating the network. The following fault conditions starting from the prevailing running arrangement are applicable: • Each Circuit fault • Each busbar fault Outages at all voltage levels in question shall be considered, including outages on the transmission system and other third party networks, where applicable. *Definition taken from POL:SD11*
Other Authorised Distributor (OAD)	A user of NGED's distribution system authorised by licence or exemption to distribute electricity and having a user distribution system connected to the NGED's distribution system. *Definition derived from the Distribution Code* *Note, an IDNO is a type of OAD*
Over-voltage Constraint	A type of Load management that measures the local network voltage and Curtails customer Load or informs an OAD to curtail their customer's Load when the voltage exceeds network limits.
Power Generating Module (PGM)	Either a Synchronous Power Generating Module or a Power Park Module. *Definition taken from EREC G99*
Sequence Scheme	A pre-defined logical set of checks and control actions performed by ADMS. *Definition taken from POL:SD11.*
Soft Intertrip	A type of Load management that utilises binary signals (e.g. normally open or normally closed contacts) to either inform the customer or OAD to Curtail their Controllable Load to a pre-agreed level of active power or to disconnect their Curtailable Load.

3.0 REQUIREMENTS

3.1 When/Where are CCPs Installed?

3.1.1 Customer Connection Points

3.1.1.1 National Grid Electricity Distribution (NGED) owned and operated CCPs are installed at or close to NGED HV[1] customer connection points where:

- A Category B LMS is required, or
- a Category C LMS is required, or
- local over-voltage constraint is required, or
- the customer has an agreed export capacity that exceeds 500kVA

3.1.1.2 CCPs may also be installed at a NGED HV[1] customer connection points to provide telecontrol/SCADA monitoring facilities where required by EREC G99[2]. Alternatively, these monitoring facilities may be provided by installing power transducers (or equivalent), NGED RTUs (Radio Terminal Units) and radio/communication equipment.

3.1.1.3 CCPs are not installed at NGED LV customer connection points.

3.1.1.4 More than one CCP may be installed at a customer connection point to Curtail separate groups of customer Load where these groups of Load occupy different positions within an ANM LIFO stack.

3.1.2 OAD Connection Points

3.1.2.1 NGED owned and operated CCPs are installed at or close to OAD HV[1] connection points where:

- A Category B LMS is required, or
- A Category C LMS is required, or
- overvoltage constraint is required, or
- one or more OAD HV[1] customers have an agreed export capacity (agreed with the OAD) that exceeds 500kVA

3.1.2.2 NGED do not curtail OAD LV customers where their agreed import capacity or agreed export capacity (as agreed with the OAD)' as applicable, is 1MVA or below.[3] This ensures that customers connected to an OAD network are treated the same way as customers connected to NGED's network.

3.1.2.3 More than one CCP may be installed at an OAD connection point to Curtail separate groups of customer Load where these groups of Load occupy different positions within an ANM LIFO stack.

3.1.2.4 Where a CCP is installed at an OAD connection point the OAD is responsible for interfacing with NGED's CCP and providing Curtailment systems between the CCP and the end customer.[4]

Note [1] In this context HV means any voltage above 1000V.

Note [2] Under ERCE G99 it is mandatory to record operational data at customer connection points where G99 Type B, C or D Power Generating Modules are installed but this data may also be provided by means other than CCPs, e.g. by power transducers or protection relays that interface with ADMS.

Note [3] In this context, the import capacity is relevant where NGED are considering curtailing the customer's import and the export capacity is applicable where NGED are considering curtailing the customer's export.

Note [4] NGED may, by agreement, provide Curtailment services on behalf of an OAD within the OAD's network. Where this is the case NGED may install a CCP that satisfies NGED's specification at the OAD/customer connection point and provide the associated communication infrastructure. These facilities will be provided as a recharge service.

3.2 Basic Functionality

CCPs provide the following basic functionality:

- Measurement of 3 phase active power, 3 phase reactive power, phase current (two phases only) and phase to phase voltage (3 phases) in up to 4 circuits.
- Calculation of aggregate 3 phase active power in all circuits, i.e. the sum of circuit 1, 2, 3 and 4.
- Calculation of aggregate 3 phase reactive power in all circuits, i.e. the sum of circuit 1, 2, 3 and 4.
- Provision of CCP alarms and statuses
- Provision of internal logic required for Soft Intertrip, ANM and over-voltage constraint applications.
- Interface/communication with NGED's ADMS system via NGED Telecoms communications systems, e.g. licensed UHF radio.
- Local and remote CCP control facilities
- 48Vdc Battery/charger system powered from a 230Vac supply. The battery shall be sized to support the CCP for at least 72 hours.

3.3 Physical Arrangement

3.3.1 CCP Panels and Equipment

3.3.1.1 In practice the term Connection Control Panel encompasses the following separate panels and items of equipment:

- Main control panel, which includes:
    - a CCP controller which consists of a programmable logic controller and a number of input/output (I/O) modules and analogue cards; and
    - battery/charger system; and
    - auxiliary equipment, e.g. secondary wiring, terminals, switches, lamps/LEDs, auxiliary relays etc.; and
    - NGED's radio terminal unit (RTU) and radio/communication equipment, where applicable. Where the connection is provided using 11kV or 6.6kV secondary switchgear (e.g. a ring main unit) the RTU and radio/communication equipment is normally installed within the main control panel. In other cases this equipment is normally installed in a separate panel.
- A customer interface panel within which the customer or OAD terminates their cables and which includes:
    - auxiliary equipment, e.g. secondary wiring, terminals, analogue units and, where applicable auxiliary relays.
- External NGED owned and operated transducers, where required, to measure secondary current and secondary voltage associated with each monitored circuit and derive the relevant analogue information, e.g. active power and reactive power used by the CCP.
- Separate panels for NGED's RTU and radio equipment, where this equipment is not included within the main control panel (see above).
- External antenna or communication circuit, as applicable.

3.3.2 Instrument Transformers

3.3.2.1 CCPs require access to power system current and voltage data to function correctly. This data is normally derived from current transformers (CTs) and voltage transformers (VTs) that are located within NGED switchgear or NGED metering units, as applicable. The secondary current and voltage is either measured directly by the CCP controller or by external transducers (or equivalent) which send the data to the CCP controller using a digital communication protocol, such as Modbus.

3.3.2.2 In some cases a customer or OAD may install their own transducers (or equivalent) and connect these to their own CTs, VTs and primary plant/equipment. Where this is the case the transducers, CTs and VTs etc. must satisfy NGED specifications/requirements.

3.3.2.3 The relevant Metering Codes of Practice place restrictions on the use of metering CTs and metering VT windings for this purpose. In particular, where the circuit rating exceeds 10MVA, CTs and VT windings that are used for 'main' metering shall be used exclusively for that purpose, i.e. the CCP may not be connected to these CTs and VT windings. Further guidance is included in ST:TP14C.

3.3.2.4 CCPs require connections to 2x phase CTs (i.e. L1 and L3) and 2x phase to phase voltage connections (i.e. L1 to L2 and L2 to L3). This means the voltage connections may be derived from two phase to phase VT windings (often provided for 6.6kV and 11kV metering applications) or from conventional 3 phase VT windings. From these inputs the CCP derives 3 phase active power (MW) and three phase reactive power (MVAr).

3.3.2.5 The CT burden and VT burden of the CCP itself is very low but the secondary wiring adds a significant burden to the CTs (but not to the VTs). The CT burden must be taken into consideration when the arrangement is designed. Further guidance is included in TP11 series standard techniques.

3.3.3 Low voltage (LV) Auxiliary Supply

CCPs require a single phase 230V LV auxiliary supply to power their battery/charger system. This shall be derived from NGED's substation auxiliary supply which is often, in turn, derived from the customer's LV network.

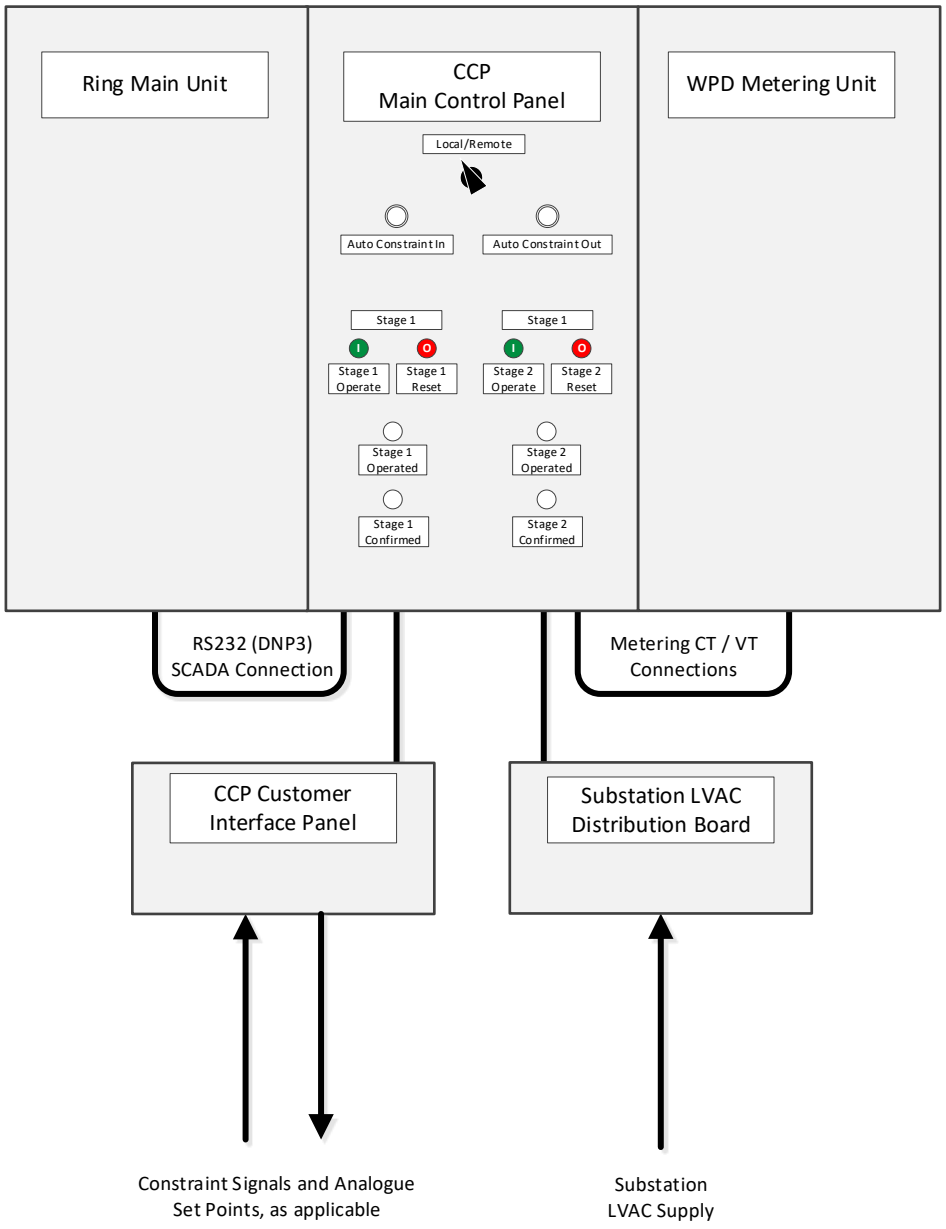
3.3.4 Battery/Charger System

CCPs include their own battery/charger system which is located within the main control panel. The CCP shall not be supplied from any other battery charger systems within the substation (e.g. other substation or NGED Telecoms battery/changer systems) since their earthing and protection arrangements are usually incompatible with the CCP.

3.3.5 Typical Arrangements

Two typical arrangements are shown in Figure 1 and Figure 2.

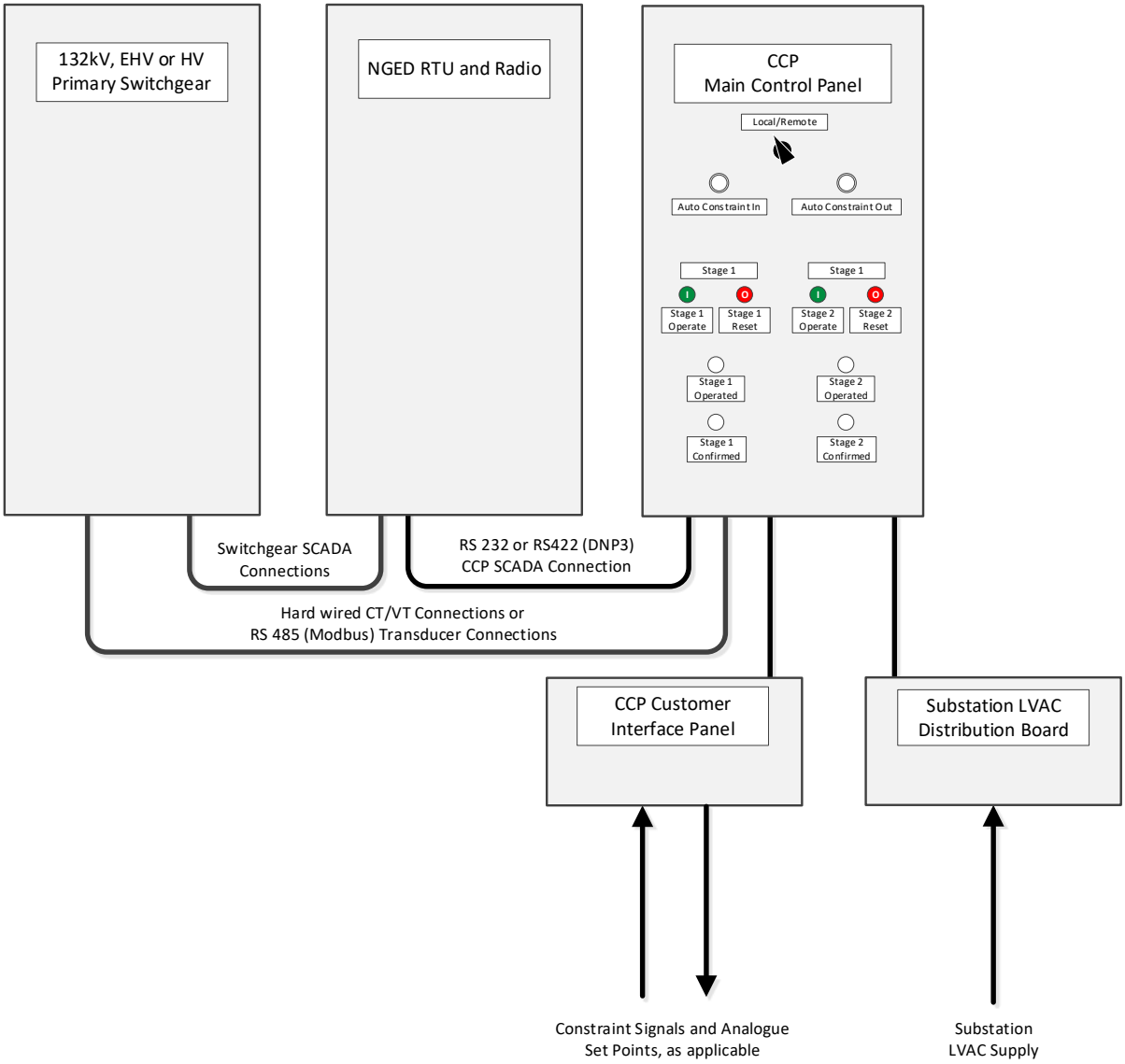
Figure 1: Typical CCP Arrangement for an 11kV or 6.6kV Ring Main Unit



Notes:

- *NGED's RTU and radio/communication equipment is normally installed within the main control panel*
- *NGED's RTU (within the CCP) is normally connected to the RMU controller (e.g. T300 unit) using a RS232 connection. A RS422 interface or fibre interface may be used to cater for longer distances, i.e. >10m*
- *The LVAC supply is also connected to the RMU*

Figure 2: Typical CCP Arrangement for a 132kV, 66kV, 33kV, 11kV or 6.6kV Primary Switchgear Application



Notes:

- *NGED's RTU and radio/communication equipment is installed within a dedicated panel*
- *NGED's RTU is connected to the CCP controller using a RS232, RS422 or fibre connection depending on the distance*
- *LVAC supply is also connected to the mains substation battery/charger system and the RTU/Radio battery/charger system (not shown)*
- *Current and voltage is derived from protection CTs or instrument CTs fitted within the primary switchgear.*

3.4 Soft Intertrip Functionality

All CCPs include soft intertrip functionality irrespective of which additional facilities are used/enabled. Soft intertrip allows Curtailment to be initiated:

- Locally by an operator using the switches on the front of the main control panel
- Remotely via SCADA, for example, manually by a Control Engineer or automatically via an ADMS Sequence Scheme.

CCPs provide 2 distinct constraint stages.

3.4.1 Stage 1 Constraint

3.4.1.1 When stage 1 is initiated the CCP sends a stage 1 signal to the customer typically by closing a normally open contact[1], instructing them to Curtail their Controllable Load (generation or demand, as applicable) in accordance with a pre-agreed export limit and/or import limit.

3.4.1.2 Typically the customer will ramp down their Load in a controlled way over a few seconds but they also have the option of simply tripping off the relevant Load. In addition the customer is required to send a signal to the CCP, typically by closing a normally open contact[1], confirming that stage 1 has been implemented.

3.4.1.3 Following initiation of stage 1 the CCP:

- monitors active power (MW) and checks that this is reduced below the agreed stage 1 limit within a pre-defined time, and;

- checks that's the stage 1 confirmation signal is received within a pre-defined time.

3.4.1.4 If the Stage 1 checks are successful the CCP remains in this state until stage 1 is reset by a local operator or via SCADA.

3.4.1.5 If the checks are not successful the CCP escalates to stage 2.

3.4.2 Stage 2 Constraint

3.4.2.1 Stage 2 is designed to be initiated if stage 1 is unsuccessful for some reason. When stage 2 is initiated the CCP sends a stage 2 signal to the customer, typically by closing a normally open contact[1], instructing them to immediately Curtail their Controllable Load in accordance with the pre-agreed stage 2 export and/or import limit.

3.4.2.2 Stage 2 should be configured to trip off, the customer's Controllable Load, i.e. the load that is expected to be Curtailed under stage 1. The customer is also required to send a signal to the CCP, typically by closing a normally open contact[1], confirming that stage 2 has been implemented.

Note [1]: At the time of writing these signals are provided by hard wiring to binary contacts. This does not preclude other methods being developed in future, e.g. using communication interfaces and protocols.

3.4.2.3 The CCP:

- monitors active power (MW) and checks that this is reduced below the agreed stage 2 limit within an appropriate time, and;
- checks that's the stage 2 confirmation signal is received within a relative short pre-defined time.

3.4.2.4 If the stage 2 checks are successful the CCP remains in this state until stage 2 is reset by a local operator or via SCADA.

3.4.2.5 If the checks are not successful the CCP issues a Failed to Curtail alarm to Control

3.4.3 Customer Implementation of Stage1 and Stage 2

3.4.3.1 Whenever a CCP is installed, irrespective of the reason, both stage 1 and stage 2 must be connected to and implemented by the customer/OAD.

3.4.3.2 If the customer/OAD only has facilities for a single stage of Curtailment then both stage 1 and stage 2 shall trip the customer Load and the customer shall provide both a stage 1 confirmation signal and a stage 2 confirmation when they implement their Curtailment.

3.4.3.3 Where stage 1 or stage 2 are configured to trip a customer circuit breaker that is used to disconnect the relevant Controllable Load, it is acceptable to use their circuit breaker auxiliary contacts to provide stage and/or stage 2 confirmation signal/s, as applicable. In this case, if the customer opens one of these circuit breakers manually (for reasons other than responding to a curtailment signal) it will send an unnecessary confirmation signal to NGED; this is deemed to be acceptable by NGED.

3.4.4 Additional Soft Intertrip Functions

The CCP includes the following additional alarms and functions:

- Auto-constraint in/out status
- Local/remote switch status
- Control isolator status
- AC Supply failed alarm
- Communication lost alarm
- Battery fault alarm
- Maintenance alarm
- Frequent operations alarm
- Modbus communication alarm (associated with communication between the CCP Controller and the analogue unit and/or transducers)
- Import capacity (MW) exceeded alarm
- Export capacity (MW) exceeded alarm
- Automatic stage 1 Curtailment following a communications failure between NGED's RTU and ADMS. Note, this occurs after an additional configurable time delay.

3.5 Over-voltage Constraint

CCPs include built in over-voltage constraint functionality which may be enabled/disabled within the settings.

3.5.1 Initiation

Over-voltage constraint is deigned to initiate stage 1 Constraint when the measured voltage exceeds the CCP's over-voltage setting for a duration that exceeds the associated time delay setting. Once stage 1 is initiated the CCP uses the standard soft intertrip logic to check the stage 1 operation and, where necessary to escalate to stage 2.

3.5.2 Resetting

3.5.2.1 Once stage 1 has been successfully implemented the CCP remains in this state until stage 1 is either:

- Manually reset by a local operator.
- Manually reset via SCADA, i.e. by Control or by an ADMS Sequence Scheme.
- The voltage drops below the reset setting for a duration exceeding the associated reset time delay setting (normally set at 600s).

3.5.2.2 If stage 2 is implemented this may only be reset manually, for example by a local operator or via SCADA (i.e. by Control or via an ADMS Sequence Scheme). This is because the scheme is deemed to have failed to operate correctly and therefore human interaction is required to determine whether the scheme may be reset or not.

3.5.3 When/where should Over-voltage Constraint Enabled?

3.5.3.1 Over-voltage constraint should not be enabled where the CCP is used as part of an ANM scheme (e.g. a Type B Load Management Scheme) that is designed/configured to manage the voltage at the CCP connection point. This prevents the CCP from automatically issuing instructions that are in conflict with the ANM scheme.

3.5.3.2 Where the CCP is not part of an ANM scheme that is designed/configured to manage voltage at the CCP connection point, over-voltage constraint should be enabled where:

- generation with an export capacity of 500kW or more is connected to NGED's network at 132kV, 66kV, 33kV, 11kV or 6.6kV and,
- under Intact Network conditions the voltage at the connection point is expected to be within network limits and,
- under first circuit outage conditions the voltage is expected to be above network limits under worst case conditions (i.e. at times when the network demand is expected to be low and generation is expected to be high).

For the avoidance of doubt, over-voltage constraint may be enabled where the CCP is part of an ANM scheme that does not prevent high voltage at the CCP connection point. For example, where the ANM scheme is designed/configured to address thermal and voltage issues on the 33kV network but the CCP is connected at 11kV.

3.5.3.3 Over-voltage constraint should not be used to manage cases where the voltage is expected to be outside of network limits under intact network conditions. In this case the network should either be reinforced or alternative methods used to address the issue, for example, by providing an alternative type of Load Management Scheme or by using Flexibility Services.

3.6 Active Network Management

CCPs may be configured for ANM functionality in addition to Soft Intertrip and Voltage Constraint. Where ANM functionality is enabled the CCP is capable of sending maximum and minimum active power (MW) and reactive power (MVAr) limits to the customer or OAD. At the time of writing these signals are sent as DC (Direct Current) milliamp (mA) signals but other methods, e.g. using a communication protocol) could also be employed.

When the CCP is operating in ANM Mode these signals are determined by a centralised calculation engine which forms part of the Load Management Scheme, for example a Type B Load Management Scheme, and are communicated to the CCP via the NGED's ADMS system.

3.6.1 Analogue Output Signals

3.6.1.1 The CCP may issue up to four signals that specify limits for:

- Lower[4] limit for active power (MW) – channel 0
- Upper[4] limit for active power (MW) – channel 1
- Lower[4] limit for reactive power (MVAr) – channel 2
- Upper[4] limit for reactive power (MVAr) – channel 3

Note 4: Imported power MWs (and MVArs) are deemed to be positive (+ve) and exported power MWs (and MVArs) are deemed to be negative (-ve) and so exported MWs (and MVArs) have a 'lower' value than 'imported' MWs (and MVArs). Given this, channel 0 is used to provide export MW limits and channel 1 to provide import MW limits.

3.6.1.2 Where the CCP is not designed to limit/control one (or more) of the above parameters there is no requirement for the customer or OAD to connect to the associated analogue output. For example, if it is only necessary to limit the exported active power then the customer only needs to connect to and read channel 0 (associated with lower limit for active power).

3.6.2 Operating Modes

3.6.2.1 CCPs include a number of operating modes which may be selected manually by Control or automatically by ADMS Sequence Schemes, ANM calculation engines and/or the CCP itself. The standard operating Modes are listed below:

- ANM Mode – the ANM calculation engine determines and then issues analogue output values to the CCP via ADMS.
- SCADA Mode – Control determines the import and/or export limits and manually issues the analogue output values to the CCP via ADMS
- Hold mode - the CCP uses the value of active power measured at the connection point when hold mode is applied and issues this as a fixed active power set point.
- Fail-safe mode, the CCP applies predetermined analogue outputs that are designed to prevent Network Integrity issues under all credible conditions.
- ANM online on/off – When selected to "off", ANM Mode, Hold Mode and Failsafe Mode are disabled.

3.6.2.2 Hold mode and fail-safe mode may be used to mitigate equipment failures, communication failures and issues with the ANM calculation engine. Typically hold mode is automatically applied if:

- The ANM calculation engine is unable to determine the required set points, e.g. where the network topology is not catered for or the load flow analysis (where real time load flow analysis is used) is unsuccessful or slow.
- System values remain unchanged after multiple scans
- A transient communications failure is detected

Failsafe mode is automatically applied if:

- Hold mode is automatically activated (see above) and is sustained for pre-determined period of time.

Hold mode and Failsafe mode may also be applied by Control.

3.6.3 Customer/OAD Response to Analogue Signals

Customers are expected to respond to the analogue output signals in a timely manner. If the aggregate active power or reactive power measured by the CCP is outside of the limits issued by the CCP for a duration that exceeds the associated time delay settings the CCP will issue a Stage 1 Constraint. Where this is the case the CCP soft intertrip logic described section 3.4 is initiated.

Where Stage 1 is initiated and the associated checks are successful then Stage 1 may automatically reset again once the measured values of active power and reactive power drop below the active power and reactive power limits issued by the CCP.

If Stage 2 is implemented this may only be manually reset by a local operator or reset via SCADA (i.e. by Control or via an ADMS Sequence Scheme). This is because the scheme is deemed to have failed to operate correctly.

3.6.4 When/where should Active Network Management Functionality be Enabled?

ANM functionality should be enabled where the CCP is installed within an ANM zone and either a Category B LMS or a Category C LMS is required.

3.7 Communication and SCADA Requirements

CPs shall be connected to NGED's ADMS system using communications systems, equipment and links that satisfy the requirements of ST:SD1G, irrespective of whether the site includes parallel generation, or not. The requirements should be based on the larger of:

- the agreed import capacity where the CCP curtails demand, and
- the agreed export capacity where the CCP curtails generation.

NGED's switchgear at the Customer or OAD connection point, including metering circuit breakers, shall include SCADA telecontrol facilities so that Control are able to monitor and re-configure the network should the CCP fail to constrain. The only exception is where the CCP is retrofitted to 11kV or 6.6kV primary type switchgear that does not have existing SCADA functionality and it is not practical to add this functionality without replacing the switchgear.

SCADA facilities shall always be fitted to other types of switchgear including 11kV and 6.6kV secondary switchgear (e.g. ring main units and equivalent).

3.8 CCP Configuration and Settings

CCPs must use standard firmware versions developed and specified by Engineering Policy and NGED Telecoms.

CCP settings are determined by Primary System Design (PSD) or by the relevant HV Planner, as applicable, with any additional guidance provided by Engineering Policy. The agreed settings shall be recorded and issued by PSD in accordance with ST:TP10E.

3.9 Equipment Ordering

Secondary switchgear and CCP equipment is ordered using the forms on the Plant Centre Share Point page.

Communication links and NG Telecoms equipment is ordered using the enquiry form on the NG Telecoms Share Point page.

3.10 Commissioning Requirements

3.10.1 Workshop Testing

CCPs undergo extensive commissioning in NGED's Plant Workshops prior to being shipped to site. Where the CCP is associated with new 11kV or 6.6kV secondary switchgear (e.g. a new ring main unit and metering unit) the CCP, RTU and the switchgear shall be connected and tested together. This requirement still applies where the switchgear is provided by an ICP under Competition in Connections; in this case the ICP shall deliver the switchgear and associated multicore cables, cable glands etc. that are used to connect the CCP to the switchgear etc., so that NGED can connect the equipment together and complete the testing.

3.10.2 On Site Testing

Additional commissioning tests and checks are required on site including:

- Visual inspection of the CCP, CT connections, VT connections and auxiliary supply connections
- Check of final CCP settings
- On load tests to confirm CT and VT connections, magnitude of the voltage and current and the magnitude and polarity (direction of flow) of active power and reactive power. These should check the values in the CCP interrogation software and in Control.
- Local and remote operation of stage 1 and stage 2
- Check the customer Load (demand and/or generation) is Curtailed correctly under stage 1 and stage 2 and provides the required confirmation signals.
- Where ANM functionality is used check that the CCP can be switched between ANM "on" and "off" and that each of the ANM modes can be selected.
- Where analogue outputs are used check that the customer/OAD interprets and responds to these signals correctly, i.e. they read the correct analogue values and curtail accordingly.

3.11 Records

CCP records including asset records, drawings and diagrams, test records and settings shall be produced and recorded in accordance with POL:TP10.

3.12 Competition in Connections

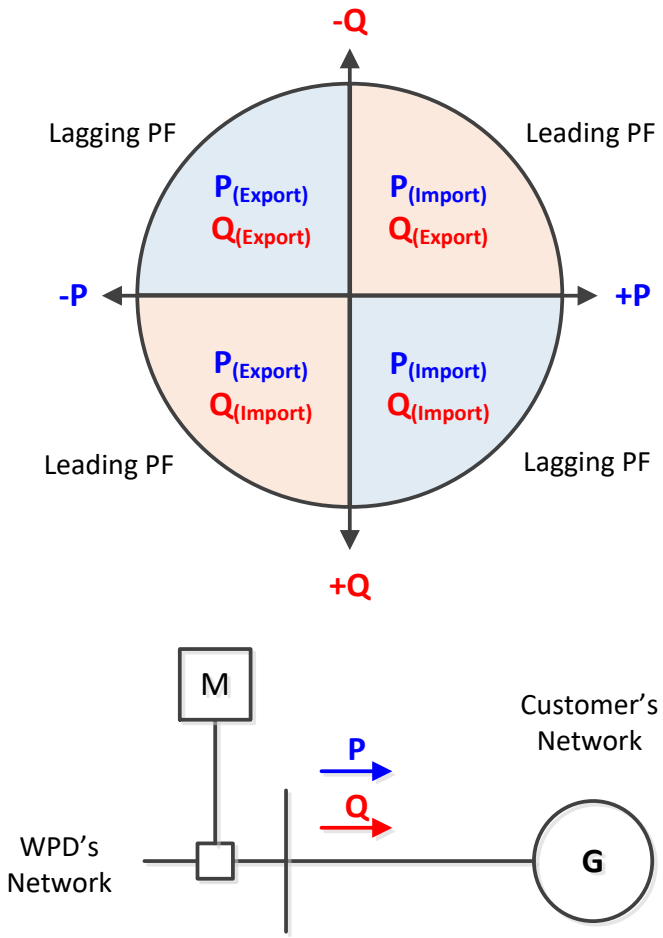
CCPs including main connection panels, customer interface panels, NGED radio equipment is non-contestable whereas the associated switchgear, metering units and cables etc. are contestable.

Where an ICP provides secondary 11kV or 6.6kV switchgear etc. that interfaces with the NGED CCP they must deliver this with all of the relevant multicores, glands etc. to the relevant NGED Plant Workshop for testing. See 3.10.1 above.

POWER FLOW DIRECTION

Power flow direction is deemed to be positive (+ve) where the power is imported into the customer or OAD network from NGED's network and is deemed to be negative (-ve) where it is exported from the customer or OAD network to NGED's network. This is shown Figure A1 below.

Figure A1: Power Flow Direction



P = Active Power (kW)
Q = Reactive Power (kVAr)

APPENDIX B

SUPERSEDED DOCUMENTATION

None

APPENDIX C

RECORD OF COMMENT DURING CONSULTATION

Link to Comments Table:

POL: TP18/0

APPENDIX D

ANCILLARY DOCUMENTATION

POL: SD2 *132kV Network System Design*

POL: SD3 *66kV and 33kV Network System Design*

POL: SD4 *11kV and 6.6kV Network System Design*

POL: TP10 *Protection, Alarm, Control Scheme and Load management Scheme Records*

EE SPEC: 143 *Functional Specification for Western Power distribution's Connection Control Panels (CCPs)*

ST: SD1G *Communication Requirements for Parallel Generation Sites*

ST: SD11B *Requirements for Type B Load Management Schemes that utilise Full Pre - event Curtailment*

ST:SD11C Requirements for Type C Load Management Schemes that utilise disconnection time post event curtailment

ST: SD11Z *Requirements for Type Z Load Management Schemes that do not comply with the prerequisites for other Load Management Scheme categories*

ST: TP10E *Requesting, Issuing and Recording Settings for Connection Control Panels*

APPENDIX E

KEYWORDS

ANM, Category A, Category B, Category D, Category Z, design, intertrip, soft intertrip, Load Management Scheme, network, system, planning, network analysis