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Electricity Specification 260

Issue 4 June 2025

Flexible Connections for Demand and Generation

Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 2 **Sept 2021**	Amendments throughout following development of the Connection Control Panel. Detail added, drawing referenced added. Prepared by: Peter Twomey Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director
Issue 3 **July 2023**	Significant revision with the following main changes: • Reduced the ramp down for Controlled Shut Down from 120s to 90s. Controlled Shutdown (CSD) • Deleted the metering burden calculations because metering CTs will no longer be used to derive analogues. Signals will now be derived from an iStat solution. Data Analogues • Commissioning test replaced with current versions. Appendix C • Controlled Shutdown test procedure added Appendix D • RSD Indications added Appendix E • HV connection block diagram updated with metering derived analogues replaced with iStat cables. Appendix B • Communications interface with ANM requirements added. Interface and Communication with Active Network Management Prepared by: Peter Twomey and Steve Davenport Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chairman
Issue 4 **June 2025**	• Reduced the ramp down for Controlled Shut Down / Demand Reduction from 90s to 30s. Controlled Shutdown / Reduction (CSD/CDR), throughout the document • Removed commissioning appendices and held outside of the ES260 document. Appendices held in the same folder location as ES260 • Setpoint failure actions for the customer • Cable block diagram updated for HV connections • Commissioning Appendices referenced and located in ES260 policy folder. Prepared by: Peter Twomey and Steve Davenport Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chair.

Contents

1 Introduction

There has been a large increase in Distributed Energy Resource (DER) connections, and it is expected the connection rate of new Low Carbon Technologies will increase significantly in the next few years. This has driven Distribution Network Operators to offer more flexible connections as an alternative to traditional network reinforcement. Electricity North West Limited has recently introduced a policy that new DG connections are Flexible Connections. A Flexible Connection is a connection with an agreement in the Connection Contract that Electricity North West Limited may curtail or disconnect the connection depending on network conditions.

In order to achieve a Managed Connection there is a requirement to remotely activate a run down or shutdown / reduction of the DER or load / demand. This may be done remotely by automatic sequences within Electricity North West Limited's Network Management System (NMS), by an Electricity North West Limited Control Engineer operating the NMS, or an Electricity North West Limited Field Engineer local to the DG or load.

The system that achieves this function is called a Connection Control Scheme (CCS). The CCS has been developed only for DG connections to date, but this will be extended to control demand connections, and so encompass all DER.

This specification sets out the technical requirements for the design of Flexible Connections for use on Electricity North West distribution network.

2 Scope

This specification covers the overall functional requirements of Connection Control Schemes for use on Electricity North West distribution network for both demand and DG connections. It includes the interfaces between key components within the scheme and details the specific operational requirements. It may be applied to connections at all voltages.

The design of the connection shall be compliant with the relevant planning policy listed in section 13.

3 Definitions

The following definitions are relevant to this Specification:

Customer Connection Panel (CCP)	Panel owned and maintained by Electricity North West Limited on the customer's site that provides CCS functionality
Customer Connection Panel Lite	A variant of the CCP with less functionality
Connection Control Scheme (CCS)	A system that allows Electricity North West Limited to remotely instruction a reduction in output or complete shutdown of Demand and Distributed Generation
Distributed Energy Resource (DER)	A connection that can provide energy services, import or export.
Distributed Generation (DG)	Generation that is designed to operate in parallel with the Network. Embedded Generation is an alternative term. Also known as DER
Flexible Demand (FD)	Demand which can be disconnected as part of a curtailment or flexible contract. Also known as DER
Generation	An installation comprising one or more generating units, where a generating unit is a source of electrical energy and all associated interface equipment.
Generator	A person who generates electricity under licence or exemption from Section 4.1(a) of the Electricity Act 1989.
Network	The electricity distribution network owned by Electricity North West Limited, to which Embedded Generation and Demand is to be connected.
NMS	Network Management System. This is the complete computer system used in the Control Room. It comprises NIMS Servers and workstations to interface to the Control staff, and SCADA Servers to communicate with the RTUs,
Point of Supply	The point of electrical connection between the Network and the apparatus owned by a Generator.
SCADA	Supervisory Control and Data Acquisition

RTU	Remote Terminal Unit – the SCADA onsite equipment.
ANM	Active Network Management
RSD	Rapid Shutdown
CSD	Controlled Shutdown
RDR	Rapid Demand Reduction
CDR	Controlled Demand Reduction

4 Functional Overview and Key Components of the System

4.1 Main Components of the CCS

The main Components of the CCS are shown in Appendix A. The system comprises:

- Standard Electricity North West Limited substation
- Remote Terminal Unit (RTU)
- Customer Connection Panel (CCP).
- Multicore cable link to customer's control equipment.

4.2 Functionality of the CCS

The functionality of the CCS is summarised in the table below.

Flexible Generation Connection

CONTROL	DESCRIPTION	HOW ACHIEVED
Controlled shutdown (CSD)	Controlled Shutdown Initiated by Electricity North West Limited causes DG to shut down in a controlled manner within 30 Seconds	Shutdown initiated by Electricity North West Limited Control Engineer or NMS.
Rapid shutdown (RSD) (remote)	DG disconnected within 500mS	NMS or Control Engineer operating RSD control
Rapid shutdown (RSD) - Local	DG disconnected within 500mS	Electricity North West Limited Engineer operates RSD control via CCP on site
G99 Inhibit function	Inhibit signal prevents DG re-synchronising.	This is achieved when the RSD function is operated and reset when the RSD control is removed
Real Power Set Point (MEC)	Allows Electricity North West Limited to set real power export across the exit point.	4 to 20mA signal from the RTU. 20mA is 100% of Maximum Export Capacity (MEC) kW export. 4mA is zero kW export.
Reactive Power Set Point	Allows Electricity North West Limited to set reactive power export across the exit point.	4 to 20mA signal from the RTU. 20mA is 100% of contracted Flexible Service, 4mA is zero service.

Flexible Demand Connection (Future)

Demand Controls	Allows Electricity North West Limited to instruct change in demand. This may either be a step change or a ramped change.	The control can replicate the Controlled/ Rapid shutdown or use 4 to 20mA signalling. These will be known as Rapid Demand Reduction (RDR) and Controlled Demand Reduction (CDR).
Flexible Services (FS)	Allows Electricity North West Limited to instruct the change between curtailment and flexible service provision power flow across the exit point.	This will be performed via ANM as part of a flexible service contract. This mode can either be a curtailment signal or a flexible service signal

4.3 Signals - Typical "Pure" Generation Connections

4.3.1 Signals from Electricity North West Limited to the Customer

4.3.1.1 Rapid Shutdown (RSD)

- Volt free digital output (contact) from Electricity North West Limited.
- Open Electricity North West contact equals RSD instruction.

4.3.1.2 Controlled Shutdown (CSD)

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Generation is expected to be shutdown / disconnected within 30 seconds is a maximum CSD shutdown time and not a target or preferred setting. A CSD should take no longer than is required in order to shut down the generation in a way which is sympathetic to its operational lifespan and efficiency.

- Volt free digital output (contact) from Electricity North West Limited.
- Open Electricity North West contact equals CSD instruction.

4.3.1.3 Real Power Set Point (PSP)

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Active power change shall be achieved within 30 seconds.

- Analogue 4 to 20 mA current loop output from Electricity North West Limited.
- Where a connection has a MIC & MEC, 2 analogue 4 to 20mA current loop signals will be used (one in each direction).

4.3.1.4 Reactive Power Set Point (QSP)

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Reactive power change shall be achieved within 30 seconds.

- Analogue 4 to 20 mA current loop output from Electricity North West Limited.
- Where a connection has a MIC & MEC, 2 analogue 4 to 20mA current loop signals will be used (one in each direction).

4.3.2 Signals from the Customer

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4.3.2.1 DER Disconnected (COFF) & DER Connected (CON)

An indication to show the state of any resources capable of increasing fault level e.g. generation / storage

- A double bit indication will be used to indicate the state of the generation off or on state. This will generally be the G99 circuit breakers

4.3.2.2 Islanding Indication (ISL)

An indication to show the state of any islanding circuit breaker, where a power island maybe operating beyond.

- A double bit indication will be used to indicate the state of the islanding CB open and closed state.
- These contacts to Electricity North West Limited, indicate if a private network has desynchronised from Electricity North West Limited network and is still operating and has the ability to automatically resynchronised.

  Not related to standby type generation arrangement

4.3.2.3 Shutdown in Progress (SDIP)

Acknowledgement that the Controlled Shutdown signal has been received.

- A digital signal to Electricity North West Limited.
- This would remain whilst the shutdown is in progress and reset once the shutdown is completed.

4.3.2.4 Shutdown Complete (SDC)

Confirmation of the Rapid or Controlled Shutdown / lockout achieved.

- A digital signal to Electricity North West Limited.
- This remains whilst shutdown and the RSD / CSD instruction is active.
- It only resets once the RSD / CSD instruction has been cancelled by Electricity North West Limited.
- This signal shall only be in response to an Electricity North West Limited RSD / CSD instruction. No other generator activity should trigger this signal.

The following provides a list of activities which shall not trigger an SDC signal from the customer to Electricity North West Limited. It should be noted that this list is non-exhaustive and is provided for guidance.

- Customers generation plant stops running (unless following an RSD/ CSD instruction).
- Customer is participating in any commercial arrangements/ markets (unless following an RSD/CSD instruction.
- Customers generation plant starts.
- Customers G99 protection trip operates.
- Customers non-G99 protection trip operates.
- Customers Emergency Trip Button operates.
- Customers maintenance activities take place (see note below).

NOTE: Shutdown Complete (SDC) indication may be sent to Electricity North West Limited during required periodic alarm testing following a mutually agreed notice period.

4.3.2.5 Real Power Generation Availability

This signal indicates how much of the Maximum Export Capacity (MEC) is available to export. This may be either

- A digital signal indicating full or zero output. A digital signal to Electricity North West Limited.
- An analogue indicating the availability 0 to 100% of registered MEC of the connection.
- An analogue 4 to 20 mA current loop to Electricity North West Limited.

4.3.2.6 Reactive Power Generation Availability

This signal indicates how much of the Maximum Export Capacity (MEC) is available to export. This may be either

- A digital signal indicating full or zero output. A digital signal to Electricity North West Limited.
- An analogue indicating the availability 0 to 100% of registered reactive power output of the connection.
- An analogue 4 to 20 mA current loop to Electricity North West Limited.

4.4 Signals - Typical "Pure" Demand Connections

4.4.1 Signals from Electricity North West Limited to the Customer

4.4.3.1 Rapid Demand Reduction (RDR)

Flexible Demand is expected to be disconnected / reduced within 500mS

- Volt free digital output (contact) from Electricity North West Limited.
- Open Electricity North West Limited contact equals RDR instruction.

4.4.3.2 Controlled Demand Reduction (CDR)

Demand is expected to be disconnected / reduced within 30 seconds. This is a maximum CDR shutdown time and not a target or preferred setting.

- Volt free digital output (contact) from Electricity North West Limited.
- Open Electricity North West Limited contact equals CDR instruction.

4.4.3.3 Real Power Set Point (PSP)

Active power change shall be achieved within 30 seconds.

- Analogue 4 to 20 mA current loop output from Electricity North West Limited.

4.4.3.4 Reactive Power Set Point (QSP)

Reactive power change shall be achieved within 30 seconds.

- Analogue 4 to 20 mA current loop output from Electricity North West Limited.

4.4.2 Signals from the Customer

4.4.4.1 Managed Demand – Customer Parallel CB on (PAR) & Customer Off (ISL)

An indication to show the state of any managed demand. This utilises the customers managed demand CB to show any possible islanding situation, where generation is also on site.

When there is no generation, these signals will be used to show the state of the managed demand CB.

- A double bit indication will be used to indicate the state of the managed demand off or on state.

4.4.4.2 Islanding Indication (ISL) – an expansion of the function above

An indication to show the state of any islanding circuit breaker, where a power island maybe operating beyond.

- A double bit indication will be used to indicate the state of the islanding CB open and closed state.
- These contacts to Electricity North West Limited, indicate if a private network has desynchronised from Electricity North West Limited network and is still operating and has the ability to automatically resynchronised.

Not related to standby type generation arrangement.

4.4.2.3 Demand Reduction in Progress (DRIP)

Acknowledgement that the Controlled Demand Reduction signal has been received.

- A digital signal to Electricity North West Limited.
- This would remain whilst the Controlled Demand Reduction is in progress and reset once the reduction is completed.

4.4.2.4 Demand Reduction Complete (DRC)

Confirmation of the Rapid or Controlled Reduction / lockout achieved.

- A digital signal to Electricity North West Limited.
- This remains whilst reduction and the RDR / CDR instruction is active.
- It only resets once the RDR / CDR instruction has been cancelled by Electricity North West Limited.
- This signal shall only be in response to an Electricity North West Limited RDR / CDR instruction. No other demand management activity should trigger this signal.

The following provides a list of activities which shall not trigger an DRC signal from the customer to Electricity North West Limited. It should be noted that this list is non-exhaustive and is provided for guidance.

- Managed Demand plant stops running (unless following an RDR/ CDR instruction)
- Customer is participating in any commercial arrangements/ markets (unless following an RDR/CDR instruction
- Customers generation plant starts
- Customers G99 protection trip operates
- Customers non-G99 protection trip operates
- Customers Emergency Trip Button operates
- Customers maintenance activities take place (see note below)

4.5 Signals - Storage Connections

4.5.1 Signals between Electricity North West Limited and the Customer

The signals to and from a customer will be a combination of the pure generation and demand connections as detailed in section 4.3 & 4.4.

The execution times are the same.

4.5.2 Analogue Signals from the Customer to Electricity North West

4.5.2.1 Real Power Discharge / Generation Availability (State of Charge) SoC

This signal indicates how much of the Maximum Export Capacity (MEC) is available to export. This may be either

- A digital signal indicating full or zero output. A digital signal to Electricity North West Limited.
- An analogue indicating the availability 0 to 100% of registered MEC of the connection.
- An analogue 4 to 20 mA current loop to Electricity North West Limited.

4.5.2.2 Reactive Power Discharge / Generation Availability

This signal indicates how much of the Maximum Export Capacity (MEC) is available to export. This may be either.

- A digital signal indicating full or zero output. A digital signal to Electricity North West Limited.
- An analogue indicating the availability 0 to 100% of registered reactive power output of the connection.
- An analogue 4 to 20 mA current loop to Electricity North West Limited.

4.6 Flexible Services (FS)

If a DER has a flexible service contract with Electricity North West Limited, then a power flow management confirmation signal (Curtailment or Flexible Contract confirmation) will be used. This will ensure the customer acknowledges what the setpoint or discrete CSD signal is referring to either a curtailment instruction or a flexible service (contract) signal

This will be in the form of a double bit indication signal from the DER

- A digital signal to Electricity North West Limited indicating curtailment acknowledgement.
- A digital signal to Electricity North West Limited indicating flexible service acknowledgement.

In normal operation the setpoint will be related to the curtailment mode.

4.7 Demand Signals – Project Specific

Typical pure demand connection, will have similar controls as per a pure generation connection

Project specific but may involve a power flow signal to indicate if the setpoint control analogue signal or discrete digital is referring to a curtailment or a flexible service.

- This will be in the form of a double bit indication signal to the DER (FS).

4.8 Failsafe Controls

As the network becomes increasingly dynamic, it is critical to ensure the control system remain in control, therefore the local RTU will also perform tasks autonomously. These may consist of but not limited to

- Loss of communications with NMS.
- Failure of the DER to respond to an instruction.
- Failure of the 4-20mA current loop to the DER.
- Continued breech of MIC or MEC.

The responses of the RTU could be:

- Setting the setpoint to zero reverse power flow across the exit point.
- Triggering a CSD.
- Triggering a RSD.
- Triggering a CDR
- Triggering a RDR
- Trigging the opening of Electricity North West Limited's incoming circuit breaker.

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Time Frames for failsafe actions

Some or all failsafe's may be utilised. Their use will be network dependant and execution times shall vary depending on conditions.

4.9 RTU Failsafe Execution Examples

These failsafe features may not be enabled in all connections

4.9.1 DER Fails to Respond to a Change in Set Point

Where a DER exit point flow is managed via a set point control, any failures to respond will be acknowledged by ANM and warn the control engineer, who will assess and execute the CSD/CDR or RSD/RDR if required

4.9.2 DER Fails to respond to a Controlled Shutdown/Demand Reduction (CSD/CDR)

Should the DER fail to respond, the RSD could be executed (stage 1), followed by the incoming circuit breaker being opened (stage 2).

4.9.3 DER Fails to Respond to a Rapid Shutdown/ Demand Reduction (RSD/RDR)

Should the DER fail to respond, the incoming circuit breaker being opened (stage 1).

4.9.4 Loss of 4 to 20mA Analogue Signal

Failsafe may constitute one of the following options depending upon network configuration.

- Remain at the last instructed setpoint prior to the loss of the 4-20mA signal
- The DER will reduce to a zero-reverse flow across the exit point.
- The DER will execute a CSD/CDR within the agreed period (30 seconds).

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4.9.5 4-20mA Threshold actions by the customer

4-20mA current loop condition		Action
>20.5mA	Calibration error	No action required unless affecting curtailment.
20mA > 20.5 mA	Assume 100%	As above
20mA – 4 mA	Normal operations	
3.99mA – 3.9mA	Assume zero setpoint	No action required unless affecting curtailment.
3.9 mA – 3.6mA	Calibration error	As above
3.6mA – 0mA	High resistance / Open circuit	DER to freeze at last known setpoint, discuss with Electricity North West in Real Time.

- In the event of setpoint failure to permit and some DER operation - the customer must have a manual method to allow the DER to operate to a setpoint instructed by the Electricity North West control centre.

4.9.6 Loss of RTU Communication with NMS

The same conditions would apply if the communications to the DER had failed– the DER would be unaware of this. June 25

4.9.7 Breech of MIC or MEC

This facility could perform as an export limitation scheme, as a warning to Electricity North West Limited or the customer. The disconnection stages could be enabled if the breech of MIC or MEC continued.

5 Customer Connection Panel (CCP)

The function of the Customer Connection Panel is the interface between Electricity North West Limited's NMS and the Generator's controller or PLC. It will usually be located at Electricity North West Limited's substation, although in exceptional circumstances described in subsection 6 it may be located remotely. Where the panel is located remotely, a second RTU shall be installed at the substation to ensure ability to disconnect the customer should their control systems fail.

The key functions of the Customer Connection panel are:

- Provide local generator trip function.
- Provide local generator status indication.
- Provide and receive demand signals.
- Receive inputs from the RTU and provide relevant output signal into the customer's generator controller / PLC.
- Receive inputs from the customer's generator controller / PLC and provide relevant output signal into the RTU.
- Receive analogue inputs to provide four quadrant power flow data at the point of metering.

The Customer Connection Panel is owned by Electricity North West Limited.

5.1 CCP – Internal Wiring

The wiring associated with the RSD, RDR, CSD, CDR and FS, no-volts contact circuit shall be coloured orange to signify generation or demand will be affected if open- circuited.

- Analogue setpoint cabling shall be coloured purple.
- All other control and indication cabling shall be coloured white as per ES337 Section 5.6.
- Cable identification and ferruling shall be as per engineering drawing 900206-00054.

5.2 CCP Types

The CCP can be adapted for demand control as well and flexible generation with and without set point control. The CCP is available in 2 variants, dependant on complexity of the connection.

The CCP can accommodate all the mentioned features for generation and demand control.

The CCP Lite version can be used when pure demand or generation control is required.

Storage Sites would require the full CCP design.

A most sites may have a MIC that includes site auxiliary demand which will not be part of the flexible connection, this must be considered if this part of the connection is classed as non-firm. ANM will attempt to curtail to 0% / 0 MIC. June 25

Some customers will not require the controlled ramp function, this is customer dependant.

6 Remote Terminal Unit (RTU)

Secondary RTUs complying with ES393 Remote Terminal Units and Control Cabinets shall be used. The RTU provides the communication link between Electricity North West Limited's NMS and the DG controller via the Connection Control panel.

An LV supply shall, where practical, be taken from the Electricity North West Limited network. Alternative arrangements may only be used where this is impractical or uneconomic.

Where the customer provides a LV supply to a HV metered connection and the LV and HV earths are separate, the cable sheath on the LV cable shall be isolated at the Electricity North West Limited substation. The LV equipment at this substation shall be connected to the HV earth. If the LV and HV earths are separated, arrangements shall be made within the design to maintain the separation of two earthing systems in accordance with CP333 Distribution Substation Earthing System Design.

The RTU shall normally be located at the Electricity North West Limited substation. In exceptional circumstances the RTU may be located remotely from the Electricity North West Limited substation. This shall only be permissible if:

The cost to install a cable between the Electricity North West Limited substation and the DG Controller is high due to length or ground conditions

There is confidence in suitable access to the RTU. Indications that access will not be unduly restricted include

- Mature operational relationship with the customer.
- The RTU is located in site where Electricity North West Limited has access, for example a customer owned substation that has an operating and maintenance agreement.
- The RTU is located within a site where documented access arrangements exist, for example defined key holders.

The environment of the proposed location is suitable

It is expected the RTU will only be located remotely where generation or demand is installed at an existing connection. For a new connection it is expected that multicore cables can be installed economically at the same time as power cables.

Where cost of multi core cable is excessive, an option exists for the customer to install a comms cable from the customers control system to a customer PLC located near Electricity North West Limited's CCP, where a shorter multi core could be used.

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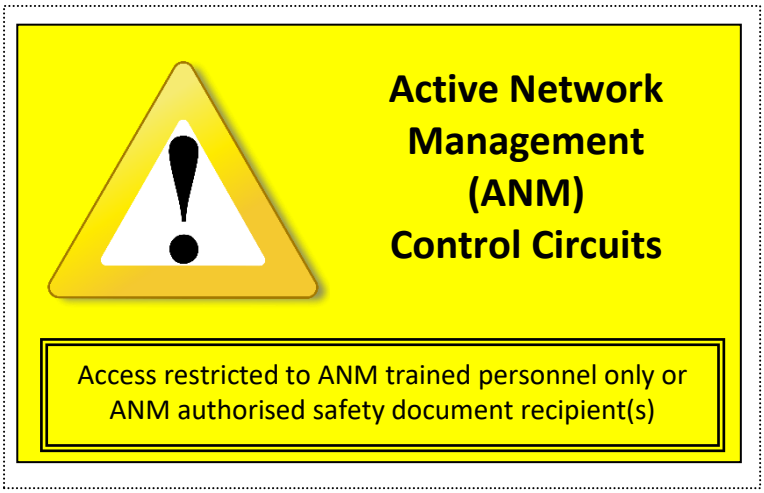
6.1 Warning Labels

All ANM or control panels associated with actively managing the network or provisioning of Flexible Service will be clearly labelled and restricted to trained personnel.



7 Network Management System (NMS)

The NMS provides functionality to instruction controlled and rapid shutdown of the generation or demand. This shall be automated in response to network events or manual in response to planned network switching.

The sequence shall be:

(a) Instruct DG shutdown in NMS – automated or manual, firstly via the CSD function if commissioned, or the RSD if time is critical.

(b) Signal transmitted to the CCP panel via the RTU.

(c) DG controller responds by returning a signal confirming shutdown in progress, via the CCP and RTU.

(d) An alarm is generated on NMS indicating 'Shutdown in progress'.

(e) DG shuts down. Indication of active power change across the exit point will be visible on NMS.

(f) DG controller confirms shutdown complete. This will indicate the generation is locked out and cannot be started by any means until Electricity North West Limited remove the RSD or CSD.

(g) DG circuit breaker opens and status visible in NMS.

7.1 Rapid Shutdown Function

The following events will take place in the order below:

SEQUENCE ORDER	ELECTRICITY NORTH WEST LIMITED	CUSTOMER
1	Instructs RSD	
2		Customer executes a rapid shutdown of the generation.
3		Generation state and Shutdown complete alarm is sent to Electricity North West Limited's RTU. This should be within a G99 protection operation timeframe
		The generation shall be locked out from starting at this stage
4	Receive generation state (OFF) & Shutdown Complete Signal	
5	RSD is cancelled by Electricity North West Limited	
6		Customers control system acknowledges, by resetting the shutdown complete alarm
7	Electricity North West Limited receives the shutdown complete reset state	
8		Customers generation is permitted to restart when required

It is important the shutdown complete alarm is not sent to Electricity North West Limited unless it is in response to a RSD instruction.

Ensure signalling criteria is followed as per Shutdown Complete (DRC)

A similar process is also adopted with Demand Reduction instructions, e.g Shutdown replaced with Reduction | June 25

7.2 Controlled Shutdown Function (CSD) – Customer Option

The following events will take place in the order below

SEQUENCE ORDER	ELECTRICITY NORTH WEST LIMITED	CUSTOMER
1	Instructs CSD	
2		Customer acknowledges the instruction with a shutdown in progress alarm
3	Receive Shutdown In progress signal	
4		A controlled shutdown should be achieved within the agreed time frame.
		Once shutdown has been achieved, the generation state will be sent along with the Shutdown Complete alarm. The In-progress alarm should reset
		The generation shall be locked out from starting at this stage
	Receive generation state (OFF), In progress alarm should reset & Shutdown complete should be received	
5	CSD is cancelled by Electricity North West Limited	
6		Customers control system acknowledges, by resetting the shutdown complete alarm
7	Electricity North West Limited receives the shutdown complete reset state	
8		Customers generation is permitted to restart when required

It is important the shutdown complete alarm is not sent to Electricity North West Limited unless it is in response to a CSD instruction.

Ensure signalling criteria is followed as per Shutdown Complete (SDC)

A similar process is also adopted with Demand Reduction instructions, e.g Shutdown replaced with Reduction. June 25

7.3 Restoration Sequence

Once network conditions permit, DG & Flexible Demand shall be allowed to reconnect by removal of the inhibit signal. This protocol ensures the reconnection of the Generation / Demand is under the control of the Electricity North West Limited.

The NMS shall automatically remove the generation / demand inhibit once the network has been restored to normal configuration after an outage or abnormal running. This will allow the Generator / Demand to reconnect their resource.

7.4 DG Real and Reactive Power Set Point

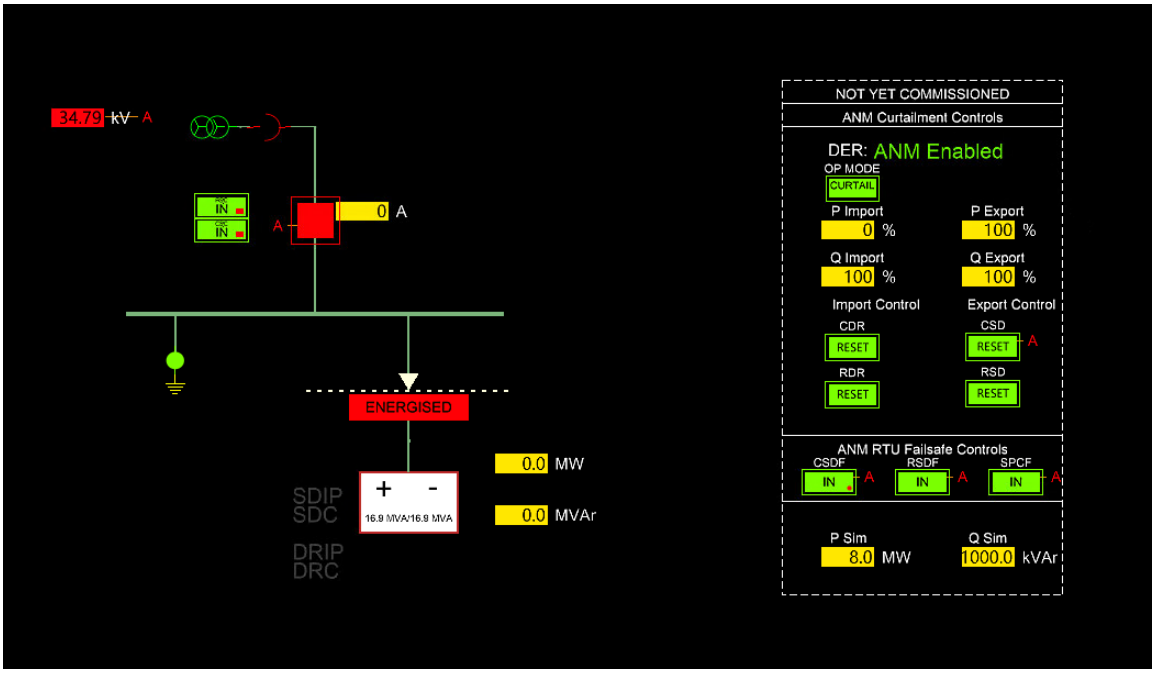
Planned developments of the NMS will provide improved ability to permit limited export following network outages, rather than complete shutdown. This will enable more DG to remain connected and exporting, based on network conditions including voltage and power flows. This will be achieved via a 4-20mA current loop between Electricity North West Limited and the customer

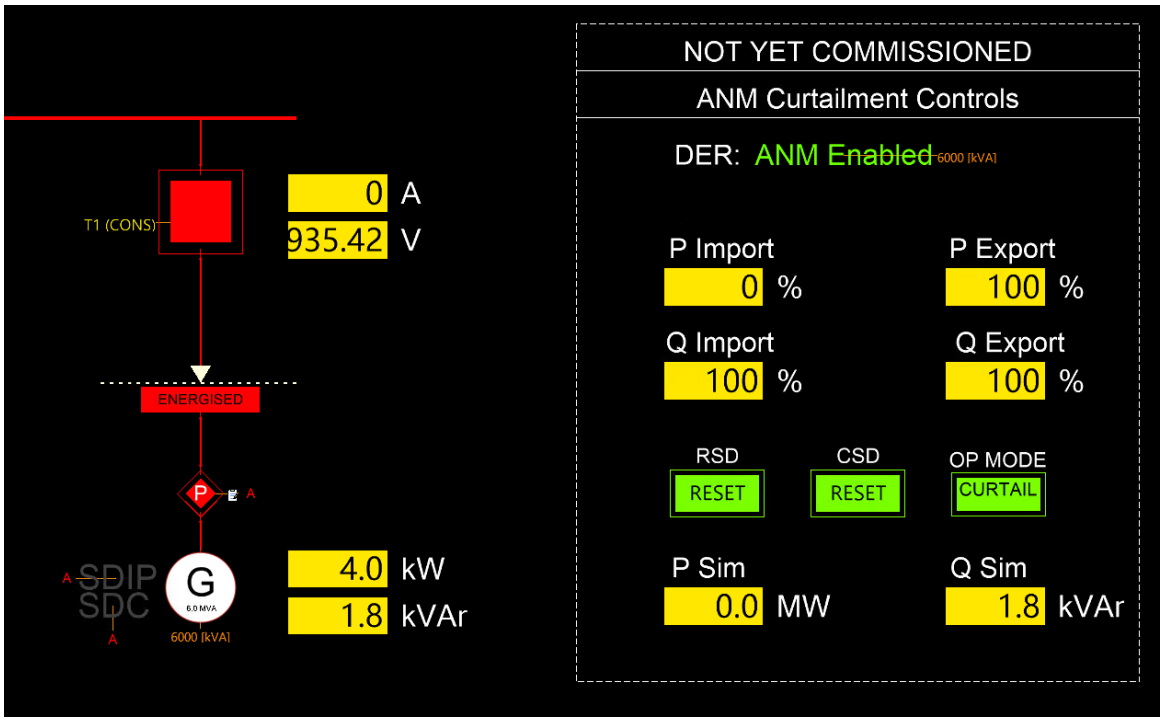
7.5 Demand Control

Demand Control capability enables Electricity North West Limited to instruct customer demand changes. This may be a binary instruction similar to the DG Rapid / Controlled Shutdown for all or some of the customer's demand, or a change in set point which would instruction a demand change to a specific value.

7.6 NMS Graphical User Interface

Typical Representation – for demonstration purposes only.





8 Data Analogues

Analogues shall be derived at the incoming circuit breaker(s) at the site. These analogues shall include voltage, current, real and reactive power, in accordance with ES259 Generation Connected to the Electricity North West Limited Network subsection 7.

Analogues shall be gathered by the local RTU for transmission to the NMS.

Power flow directions shall use conventions described in CP320 SCADA Input / Output Data Standards.

Alternatively, analogues may be derived from interposing CTs.

9 Control and Signal Cable Installations

The customer will provide the 24vDC to be used to power the interposing relays in the CCP.

Customers will provide a minimum of 1.5m wide wall space from floor to ceiling to accommodate the CCP and a RTU. Electricity North West Limited reserve the right to request additional floor / wall space.

Cable construction & core capacity shall be as per engineering diagram 900206-00057.

Steel wire armoured type signalling cable shall be insulated at both ends, 6 metres of cable will be left spare at the substation end.

Each interfacing cable e.g. analogue and indication cable shall be run in separate cables.

A separate multi core will be used to carry the measurements and the power / digital signals.

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The customer may opt to install the additional analogue and digital communications cable for any future setpoint control or digital communications between Electricity North West Limited and the DER.

All armoured cable will be externally identified in accordance to engineering drawing 900206-00057.

All control and signal cabling to comply with ES400-C13.

10 Interface and Communication with Active Network Management

The method of communication with ANM shall be dependent on connection voltage. These methods are summarised in the table below.

VOLTAGE	METHOD	RTU	COMMENT
LV network connection	Fuse down at cut out	None	Short curtailment period expected
LV dedicated way	Weezap set to temp MIC	None	Short curtailment period expected
HV network connection	RTU via cellular	Secondary RTU	
HV direct route to primary	RTU via wired connection	Primary RTU	Enhanced comms security because these are likely to be very large connections relative to the network
33kV	RTU via wired connection	Primary RTU	
132kV	RTU via wired connection	Primary RTU	

11 Commissioning Procedure

The commissioning procedure are detailed in Appendix J - R. These are located in the ES260 policy folder in the SharePoint library.

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Commission Test – File Name	Version
Policy_App_J_CB_Indication_Notes_Commissioning_Procedure_v0.3	0.3
Policy_App_K_RSD_Commissioning_Procedure_v0.7	0.7
Policy_App_L_CSD_Commissioning_Procedure_V0.6	0.6
Policy_App_M_RDR_Commissioning_Procedure_v0.3	0.3
Policy_App_N_CDR_Commissioning_Procedure_V0.2	0.2
Policy_App_Na_Real_Power_Import_Setpoint_Control_Commissioning_Procedure_v0.2	0.2
Policy_App_Nb_Real_Power_Export_Setpoint_Control_Commissioning_Procedure_v0.2	0.2
Policy_App_Nc_Reactive_Power_Import_Setpoint_Control_Commissioning_Procedure_v0.2	0.2
Policy_App_Nd_Reactive_Power_Export_Setpoint_Control_Commissioning_Procedure_v0.2	0.2
Policy_App_O_RSD_I_CB_Commissioning_Procedure_v0.2	0.2
Policy_App_P_CSD_I_CB_Commissioning_Procedure_v0.2	0.2
Policy_App_Q_RDR_I_CB Commissioning_Procedure_v0.2	0.2
Policy_App_R_CDR_I_CB_Commissioning_Procedure_v0.2	0.2

Appendix J - describes the procedure for CB indication.

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Appendix K - describes the procedure for commissioning the Rapid Shutdown which will be required for all generation & storage connections.

Appendix L - describes the procedure for commissioning the Controlled Shutdown where required.

Appendices M & N are the same as K & L but for Demand

Appendix Na – Nd - describes the procedure for commissioning the setpoint controls in the 4 quadrants

Appendix O – R describe the same procedure as Appendices K - N where the resource remains connected to the network following a shutdown or reduction instruction.

Generally, when the shutdown condition is controlled by an inverter not the G99 CB.

12 Associated Policy

New connections shall be designed in accordance with relevant policy documents in the table below.

CP258	Connections of Industrial and Commercial Customers
CP259	Generation Connected to the Electricity North West Limited Distribution Network
EPD259	Private Generation Connected to the Network
EPD280	Distribution System Design – 132kV Network
EPD281	Distribution System Design – 33kV Network
EPD282	Distribution System Design – 11/6.6kV Network
EPD283	Low Voltage Network Design Manual
ES216	11/6.6kV Connections up to 15MVA Capacity
ES217	33kV Connections up to 90MVA Capacity
ES218	Connections up to 240MVA Capacity
ES259	Generation Connected to the Electricity North West Limited Distribution Network
ES400-C13	Multipair & Multicore Auxiliary Cables
ES337	Specification for Protection and Control Relay Panels

13 Documents Referenced

DOCUMENTS REFERENCED	
CP258	Connections of Industrial and Commercial Customers
CP259	Generation Connected to the Electricitv North West Limited Distribution Network
EPD259	Private Generation Connected to the Network
EPD280	Distribution System Design – 132kV Network
EPD281	Distribution System Design – 33kV Network
EPD282	Distribution System Design – 11/6.6kV Network
EPD283	Low Voltage Network Design Manual
ES216	11-6.6kV Connections up to 15MVA Capacity

ES217	33kV Connections up to 90MVA Capacity
ES218	Connections up to 240MVA Capacity
ES259	Generation Connected to the Electricity North West Limited Distribution Network
ES314	12kV and 7.2kV 21.9kA rated Distribution Switchgear

14 Drawing Numbers

900206-00054 Multicore Block Diagrams

900206-00055 Multicore Schedules

900206-00056 Wiring Diagrams

900206-00057 Schematic Diagrams

These drawings are available from the Grid & Primary Design team.

Business Connections drawings:

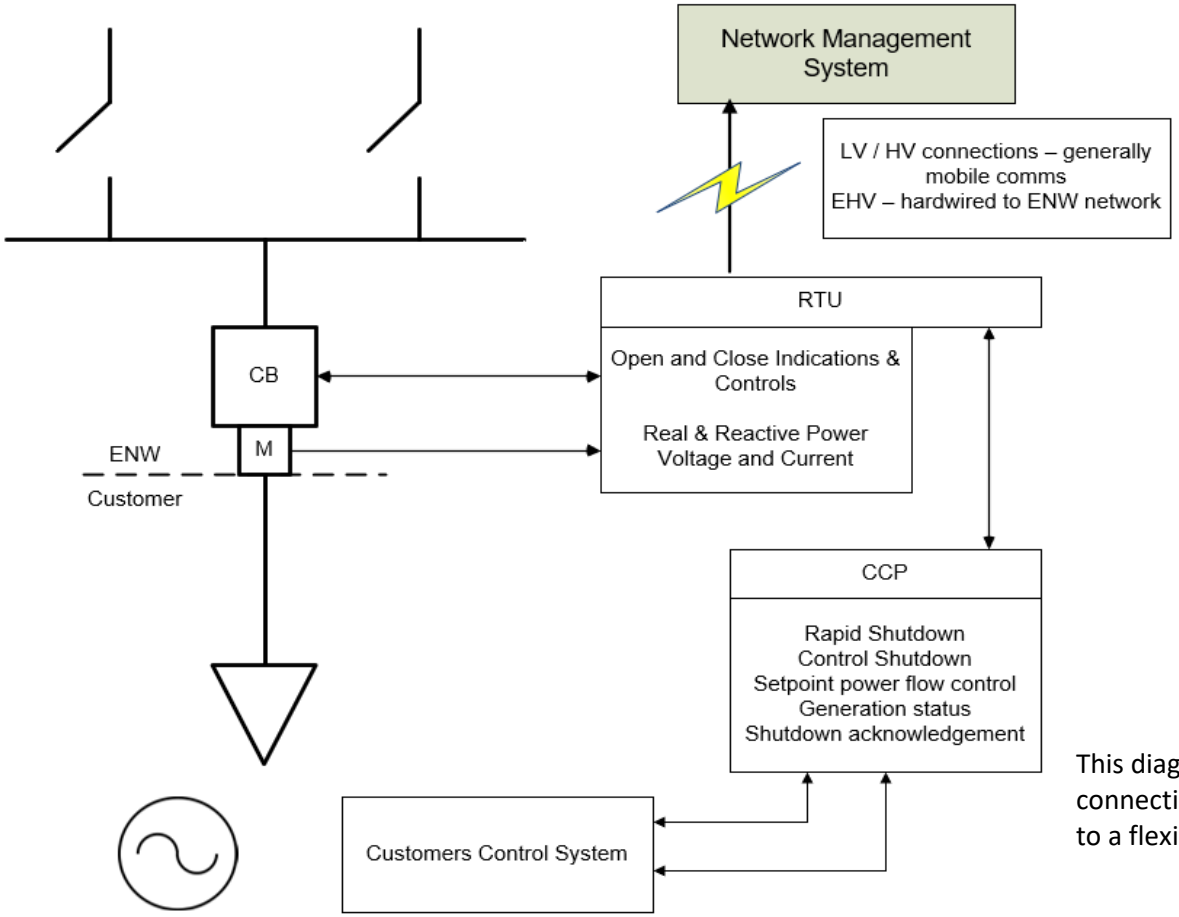
MCBD-001 Multicore Cable Block Diagrams

This diagram is available from the Energy Solutions team.

15 Keywords

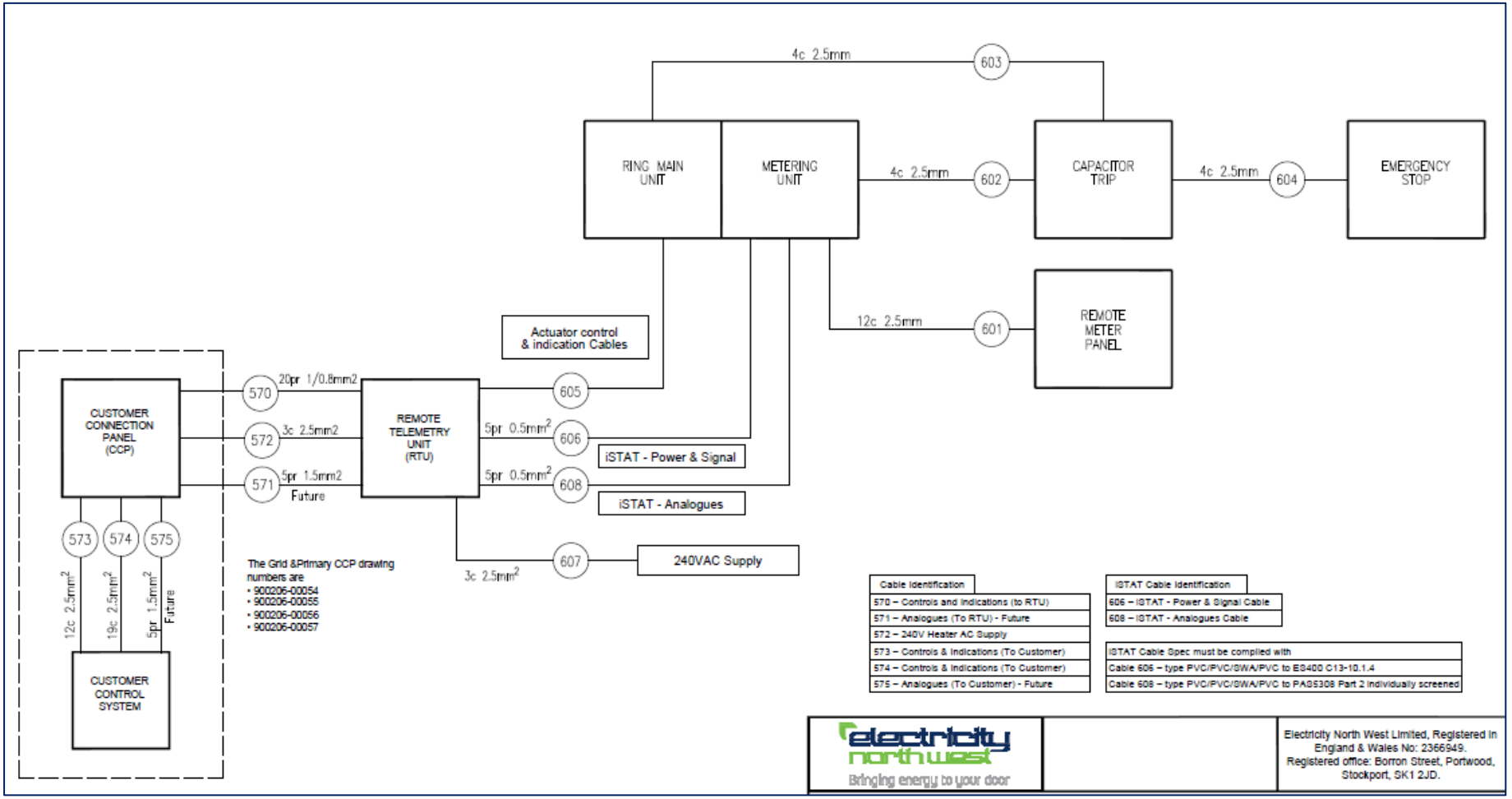
ct, Customer, Generation, Generator, Monitoring, Network, Voltage, vt

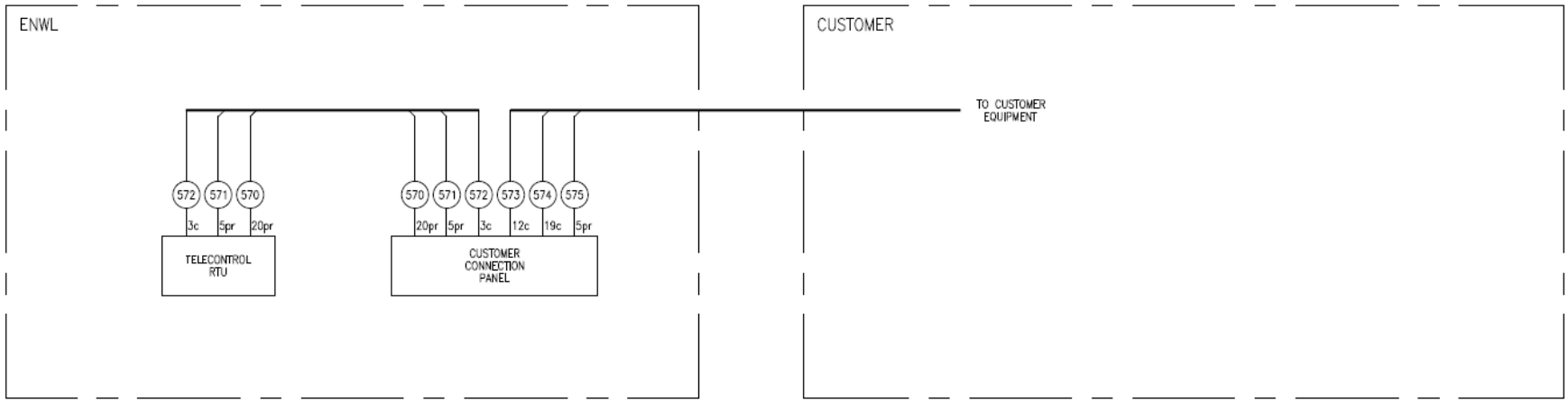
Appendix A – Overview of the Connection Control System



This diagram shows a typical generation connection, but it could also be adapted to a flexible demand connection

Appendix B – Overview of a Typical Connection





Appendix C Overview of CCP Functions and Indications