NPS/003/017 – Technical Specification for a Ground Mounted Distribution Switchgear Remote Control System

1. Purpose

This document is the technical specification for ground mounted distribution switchgear remote control systems for use on the networks of Northern Powergrid (the Company).

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

Document Reference	Document Title	Version	Published Date
NPS/003/017	Technical Specification for a Ground Mounted Distribution Switchgear Remote Control System	2.0	July 2015

2. Scope

This specification includes the functionality of the units and operational safety requirements but does not include requirements for the site to base communications.

There is a requirement for suppliers to provide periodic inspection and maintenance information.

The following appendices form part of this technical specification:

- Appendix 1: DNP3 protocol mapping
- Appendix 2: Self-Certification Conformance Declaration NPS/003/017
- Appendix 3: Self-Certification Conformance Declaration ENATS 50-18
- Appendix 4: Schedule of Equipment types to be interfaced.
- Appendix 5: Pre-Commission Testing, Routine Inspection and Periodic Maintenance Requirements
- Appendix 6: Technical Information Check List
- Appendix 7: Asset Data Reporting

2.1 Table of Contents

3. Technical Requirements

3.1 Summary

The Company requires the ability to remotely control and monitor the following plant combinations at ground mounted distribution substations:

- SINGLE POINT SWITCH: One bay Switch operation OPEN / CLOSE with position indication and associated Fault Passage Indication

For the above SINGLE POINT SWITCH device the associated communication and logic systems shall be incorporated into a single composite package containing RTU, motor-drive actuator and at least two modes of comms.

- NON-EXTENDED RMU DUAL POINT SWITCH or CIRCUIT BREAKER: two bays of Switches and/or Circuit Breakers OPEN / CLOSE / TRIP-RESET and associated Fault Passage Indicators
- EXTENDED RMU MULTI-POINT SWITCH or CIRCUIT BREAKER: Up to three bays of Switches and/or Circuit Breakers OPEN / CLOSE / TRIP-RESET and associated Fault Passage Indicators
- ENHANCED EXTENDED RMU MULTI-POINT SWITCH or CIRCUIT BREAKER: Up to six bays of Switches and/or Circuit Breakers OPEN / CLOSE / TRIP-RESET and associated Fault Passage Indicators

The associated communication and logic systems shall also be capable of controlling and monitoring two, three, four or six switchgear devices, respectively, at any site.

3.2 Operating Characteristics

The system and all software shall comply with applicable parts of BS EN 61508 – Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems, with the supplier providing a declaration of the minimum tested Safety integrity level (SIL) and within which operating mode (low or high demand) this occurs.

The system shall comply fully with BS EN IEC 61439 Part 1 - Low Voltage Switchgear and Controlgear Assemblies, BS EN 60870-2-1, BS EN 60870-2-2 and where relevant and not varied by this document, BS EN 60870 or ENA Technical Specification 50-18 Application of Ancillary Electrical Equipment.

Where a conflict arises between standards and specifications then this document, followed by BS EN 60870, shall take precedence.

The system shall be designed to be failsafe and not present risk to any persons, or to any plant and equipment.

The system must provide the same feature as an anti-reflex handle does for HV switchgear; i.e. must incorporate an anti-reflex (nominal 3 second delay) between subsequent switching operations on the same item of switchgear to prevent an operator closing a device, realising that there was fault current flowing and (as a reflex action) opening a non-rated device to attempt to break fault current on a switching device that does not have full fault break capability/rating.

The time taken from the actuator receiving an operational signal to the point that the switchgear operates and the RTU detects the switchgear change of state, shall preferably be achieved within 5 seconds, but in any case, shall not exceed 10 seconds.

Following a successful command/action/report sequence, the system shall be ready and able to begin another command/action/report sequence within 3 seconds of completing the first sequence.

Where latching relays are to be used to control plant and/or equipment, provision shall be made to ensure that no relay shall remain latched for more than 7½ seconds.

The design and installation of the remote-control scheme shall ensure that any differences in touch or step potential, particularly due to the passage of fault current, will not endanger any persons or affect the switchgear or the remote-control scheme and its components.

The system shall detect outputs from the Low gas alarm contacts in the local HV switchgear where these are available and shall provide an alarm to SCADA including a COMMON ALARM condition that is visible locally. The detection of the low gas alarm shall not inhibit remote operation of the switchgear.

3.3 Fault Passage Indicators (FPIs)

Where the option of a Fault Passage Indicator module or feature is available as an integrated function, then the supplier shall provide details of this in terms of conformity to the main functional characteristics of such a device as specified in Northern Powergrid technical specification NPS/003/013 – Specification for Fault Passage Indicators and their associated current and voltage sensing Instruments for use with Ground Mounted 11 & 20kV Switchgear.

Northern PowerGrid's current, arrangement is for a single circuit, independent FPI device installed to monitor on at least one (Left) Ring Switch feeder, but often on both (Left and Right) Ring switch circuits. Regardless of which situation, the remote-control system shall:

a) Supply the switchgear mounted FPI(s) with 24VDC from the self-monitoring RTU battery (for use by the FPI(s) as a power supply)

b) detect the overcurrent and/or earth fault output signals from the volt free contacts or other local comms on the FPI(s) and relay these to the Control Centre via the SCADA communications link.

The LV reset supplies to the FPI(s) shall (in preference order) be sourced from:

- 230V supply from the local LV fuseboard busbar
- 55V/110V supply from the local HV metering VT
- Local 230V supply to the RTU, if supplied from a Northern Powergrid network fed transformer in the substation where the remote-control scheme is installed.

The LV reset supply to the FPI shall NOT be taken from a customer's LV network.

The remote control system shall also be capable of providing a remote SCADA command reset signal of between 18 and 30V DC (+24V DC nominal) for 0.25 to 1.0 second duration.

3.4 Operating Environment

To align with the rated environmental ranges of the switchgear to be controlled, the equipment that forms part of an on-site remote-control system shall be designed and proven to work under the following conditions:

Operating ambient temperature range: -20°C to +40°C

Relative humidity: Up to 95 %, at 40°C non-condensing (tropicalized).

Where distinct outdoor and indoor versions of equipment is offered, they shall be clearly labelled to indicate which environment they are designed and manufactured for.

Where the equipment requires, and is designed to incorporate a heater, this shall be clearly stated in the tender return and/or technical data sheet and the operating characteristics and power consumption of these items shall be stated.

Forced ventilation is not an acceptable feature.

All of the equipment that forms part of an on-site remote-control system shall be designed and proven to comply with the following:

European Community (EC) Low Voltage (LVD) directive No. 2014/35/EU -

BS EN IEC 62368-1, Audio /video, information and communication technology equipment Part 1: Safety requirements

European Community (EC) Electro Magnetic Compatibility directive (EMC) directive No. 2014/30/EU

BS EN IEC 60870-2-1, Level 4. Telecontrol equipment and systems. Operating conditions. Power supply and electromagnetic compatibility

3.5 Remote Control Cubicle

3.5.1. The Cubicle

SINGLE POINT SWITCH remote-control device cubicles shall be designed to accommodate, as a minimum: A communications system (dual mode minimum), RTU, motor-drive actuator and 24V Battery & Charger. This type shall be designed to mount directly onto the switchgear in place of the manual operating handle utilising existing fixing points on the switchgear.

NON-EXTENDED RMU DUAL-POINT device cubicles shall be designed to accommodate, as a minimum: A communications system / Radio, RTU, Local Control Panel and 24V Battery & Charger. This type shall be designed so that it can be fitted in all of the following three positions:

1. On the switchgear and arranged such that access to the switchgear for normal operation, maintenance and testing of the switchgear is maintained.
2. Mounted on a freestanding support.
3. Wall mounted.

EXTENDED RMU MULTI-POINT device cubicles shall be designed to accommodate, as a minimum: A communications system / Radio, RTU, Local Control Panel and 24V Battery & Charger. This type shall be designed so that it can be fitted in both of the following positions:

1. Mounted on a freestanding support.
2. Wall mounted.

Cubicles shall adhere to the following dimensional limitations:

Type	No. of Bays	Max Height (mm)	Max Width (mm)	Max Depth (mm)
SINGLE-POINT COMPOSITE SYSTEM	1	275	130	105
NON-EXTENDED DUAL-POINT SYSTEM	2	600	400	230
EXTENDED MULTI-POINT SYSTEM	3	1000	375	125
ENHANCED MULTI-POINT SYSTEM	6	1000	700	150

where the depth from front to back - i.e. from the plane of the mounting wall / switchgear to the plane of the cubicle front / door.

For indoor use, the installed Remote-Control system shall provide a minimum IP rating of IP32 (2.5mm maximum gap and water dripping at 15°) to BS EN IEC 60529, and the RTU installation shall be intruder resistant, preferably, proven to meet level 1 of the UK Building Research Establishment Loss Prevention Standard BRE-LPS1175 or equivalent.

For the avoidance of doubt, any part or component that is installed onto an operating fascia on switchgear that is enclosed by a hood or door when not being manually operated is classed as being 'indoor'.

For outdoor use where parts or components are directly exposed to the elements of weather, these installed Remote Control parts or components shall provide a minimum IP rating of IP44 (1mm maximum gap and splashing water) to BS EN 60529, and the RTU installation shall be intruder resistant proven to meet level 2 of the UK Building Research Establishment Loss Prevention Standard BRE-LPS1175 or equivalent

The cubicle and its contents shall comply with Part 1 and Part 5 of BS EN IEC 61439 – Low Voltage Switchgear and Controlgear Assemblies.

BS EN IEC 61439 7.2 - Special service conditions that exist are:

BS EN IEC 61439 7.2 a) – Exposure to solar radiation is likely, and this shall be assumed to be 1,000W/m2. The temperature rise inside the battery chamber shall be taken account of when calculating battery life.

BS EN IEC 61439 7.2 b) – Exposure to variations in climatic conditions likely to result in exceptional condensation inside the assembly.

BS EN IEC 61439 7.2 c) – Heavy pollution of the air by salt is likely to occur in coastal regions.

BS EN IEC 61439 7.2 d) – Exposure to strong electric and magnetic field is likely.

BS EN IEC 61439 7.2 f) – Attack by fungus and by small creatures is likely.

The cubicle shall be fitted with ventilation compatible with the environment in which it is to be used and the equipment it is to contain.

All components of the remote-control installation (including the actuators and their housings/shielding, the remote-control cubicle, supports and fastenings, associated cables, trunking and ducting) shall be designed and manufactured to not require maintenance, including painting, for at least 20 years in a polluted/coastal environment according to BS EN ISO 12944 2 Category C4.

Manufactures shall provide details of how this is achieved and provide supporting evidence of tests to ISO standards (ISO 9227, 7253, 4628, 10289, etc. as appropriate to the surface finishes) including test certificates or reports.

The colour of the exterior surfaces shall be by agreement between manufacturer and purchaser.

The following shall specifically apply to DUAL and MULTI-POINT SWITCH products:

- An option shall be provided for a local control operation panel mounted external to and remote from the RTU
- The cubicle shall be equipped with a removable, retractable pin hinged front opening door with padlocking facilities that will accept the Company's padlocks. The front opening door shall have the facility to change for Left or Right hand opening on all cubicles. Company padlocks have a body up to 63mm square with up to 10mm diameter shackle having clear inside width of 35 mm and a shackle inside length of between 25mm and 45mm. The hole provided for the shackle shall be not less than 11mm diameter.
- To restrict access and prevent inadvertent contact with RTU components; the cubicle shall be equipped with a colourless, transparent, robust barrier that limits normal access to the operational controls only. To allow specialist access to all of the RTU this barrier shall be hinged or removable without the use of tools.
- To allow for potential flooding of the substation; the remote-control cubicle arrangement shall be designed so that the height to the bottom of the cabinet is at least 1.2m above floor level.
- A suitably rated earthing point shall be provided on the outside of the cubicle.
- The cubicle shall be installed equipped with durable labels, each with the substation name and number permanently fixed to the outside and to the inside, of its door.

- Provision should be made for multicore cable termination for plant cables and the LV auxiliary supply via industry standard plugs and sockets.
- Separate sockets/termination arrangements shall be provided for each RTU to HV switchgear circuit. These shall be clearly labelled and identified.
- An encapsulated schematic and physical layout diagrams shall be provided in every cabinet. These diagrams shall detail the location, type and rating of fuses, links, terminal blocks, indicators (including lamps and lights) and all external connections/interfaces.
- A double-ended bulkhead "TNC" type socket shall be provided for radio aerial feeder connection.

3.5.2. Local Control Operation Panel

Facilities for local control of the switchgear shall be provided as a feature of the Remote Control System.

On a SINGLE-POINT SWITCH system, controls may be provided either as:

- Electro-mechanical pushbuttons, or
- Software pushbuttons via a purpose made App suitable for use on Apple iPhone iOS16 or later.

On DUAL and MULTI-POINT systems, separate controls shall be provided for 'OPEN' and for 'CLOSE' operations for each switch. These controls shall be individually, and independently, lockable. This may be achieved by:

- Electro-mechanical pushbuttons with physical transparent covers, securable with the Company's safety padlocks or split rings, or
- Software pushbuttons via a purpose made Graphic User Interface (GUI), or
- Software pushbuttons via a purpose made App suitable for use on Apple iPhone iOS16 or later, where secure software "locking" is demonstrated and proven to achieve the same "independent locking function" function as mechanical covers to the satisfaction of the Company.

Each pair of controls shall be presented labelled with the circuit name and its associated switchgear it operates.

The layout of the controls shall mimic the position of the switchgear as far as is reasonably practicable from the viewpoint of an operator stood in front of the switchboard (i.e. the left-hand switch is controlled by the left hand set of control buttons).

All controls that do not have any associated switchgear, or function, shall have blank circuit name labels. These spare controls shall be obscured from the operator's normal operating position. The arrangement shall be easily modified if required in the future for use.

To cater for situations where there are space restrictions in the distribution substation; an option shall be provided for the local controls to be mounted on an umbilical connected satellite panel to allow it to be situated remotely from the RTU cabinet on site. This control panel shall provide:- actuator control buttons, Local/Remote switch, actuator/switch status indication, and power and common alarm indications.

Drive command of the motor-drive actuators and therefore connected switchgear will be via the RTU remote control interface. To ensure that only local OR remote control is possible at any one time, then either of the following shall be provided:

- A single padlockable control isolation rotary switch shall be fitted at the local control panel. This switch shall have at least two positions labelled 'Remote' and 'Local'. An optional third "Off" position may be included.

- A secure software access screen with “Remote” and “Local” software pushbuttons. Selection of either mode shall return a confirmation message and the requirement to confirm the selection by a further screen interaction before the selection is activated. This current mode selection shall remain visible and unambiguous during subsequent control screens.

This Control Isolation switch shall operate as follows:

The "Local" position shall disable and prevent any plant control being actioned remotely via the RTU but shall not disable any remote indication or alarm facilities.

The "Local" position shall enable local control facilities, which shall be independent of the RTU.

A ‘local selected’ status signal shall be presented to the RTU for inclusion into the SCADA host reporting database.

The "Remote" position shall enable controls being actioned remotely via SCADA.

The "Remote" position shall disable and prevent all local control facilities, but shall not disable any local indication or alarm facilities.

A ‘remote selected’ status signal shall be presented to the RTU for inclusion into the SCADA host reporting database.

Where provided, the ‘Off’ position shall disable both local and remote control facilities but shall not disable any local indication or alarm facilities.

A ‘Control Off’ status signal shall be presented to the RTU for inclusion into the SCADA host reporting database when the ‘Off’ position is selected.

The system DC Power Supply shall be protected either as an integrated feature of self-protection / self-limiting in the event of overload or short-circuit conditions. Where no integrated self-protection feature is utilised, then an MCB shall be fitted to protect the integrity of the 24V DC switching supply to the control functions. Whichever protection method is employed, shall provide remote indication, raising a remote common alarm when tripped / off.

Point(s) Of Isolation shall be provided to enable isolation of the 24V DC supply to the actuator(s).

Indication shall be provided in the control cubicle (and any remote operation panel connected to the RTU), to replicate the remote common alarm condition. This indication shall be so positioned that it is clearly visible to a local operator when the cubicle or panel door is open.

3.5.3. Remote Terminal Unit (RTU)

The RTU shall be a versatile, high performance device with sufficient programming capability to enable communication with the Control System located at any Company Control Centre.

The RTU, and its software, shall comply fully with BS EN 61508 – Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems.

Mean Time between Fail (MTBF) calculations in years shall be provided for all major RTU modules including Communications Modem / Radio, RTU, Local Control Panel and 24V Battery Charger, using the latest IEC 62380 Standard

Loss of power supply (AC or DC) shall not cause or result in any loss of data within the RTU.

DUAL or MULTI-POINT system RTUs shall support monitored/controlled equipment (Switches, Circuit Breakers and Fault Passage Indicators) installed in any combination of available up to six bays.

DUAL or MULTI-POINT system RTU logic shall detect and distinguish between a protection driven Circuit Breaker operation versus a SCADA driven operation either remotely or locally by push-button. It shall have the ability to reverse the actuator position and indication in readiness for a remote close either automatically or in response to a SCADA command.

This sequence and each Status will be reported back as alarms and events as they occur to the Company Control Centre.

3.5.3.1. RTU Programming Capability

The RTU shall be programmable on-site for the implementation of specific, locally derived, control sequences on DUAL or MULTI-POINT systems.

The RTU shall be supplied ready to accept downloaded generic configurations that are prepared utilising an external workbench utility.

The RTU supplier shall free-issue The Company with a configuration tool that is capable of reading the stored configuration in the RTU back so that its integrity can be checked.

The RTU shall maintain a non-volatile time stamped event log with a minimum capacity to cater for 50 events or 1 year; whichever occurs first. The RTU shall, if these limits are reached, continue to log events by overwriting the earliest one first. The supplier shall state the capabilities of the event log to include details of the extent and limitations of what can (and is supplied set up to) be recorded and for how long a time period these will be stored.

3.5.3.2. RTU Configuration and Supporting Utilities

The configuration utility shall be capable of running on at least one of the following devices:

- A standard IBM compatible laptop PC.
- A tablet device running Apple iPadOS version 15 or later
- A tablet device running Android 12 or later

With exception to SINGLE-POINT systems, a Microsoft Windows based RTU configuration software utility, which allows modifications to the RTU database configuration, shall be provided to The Company. This software utility shall be compatible with Microsoft Windows from version 10 onwards.

Regardless of system, any configuration utility or separate monitoring utility shall enable connection to the RTU to provide monitoring of the status of the plant I/O.

The RTU Date/Time shall be a settable option within the configuration software.

The software shall provide direct access to the RTU database and allow real time confirmation of the current status of all I/O points within the RTU.

These utilities shall be capable of saving and/or loading the configuration and/or data files to on-board memory locations i.e. disc or RAM.

These utilities shall be capable of saving in a format that supports a plain text file version of the RTU settings.

If additional RTU ports other than those specified are available, the purpose and advantages of these shall be stated.

3.5.3.3. RTU Status Inputs/Outputs

The RTU shall include I/O for local conditions that include support of the LOCAL/REMOTE switch, battery monitoring and actuator supply off.

The number of inputs to be reported via DNP3 is shown in Appendix 1.

Plant Functionality

Function	Control	Indication	Alarm	Analogue	Comment
Open/Close CB/Switch	Yes	Yes			
FPI Operated E/F			Yes		Where available
FPI Operated O/C			Yes		Where available
Dummy Circuit Breaker / Switch (DCB / DSW) Open/Close	Yes	Yes			
Local/Remote operation		Yes			Common for all bays
230V Supply Fail (delayed by 120 seconds)			Yes		
Common Alarm (to indicative the failure of any sub system such as: Battery fail, Local communications fail or RTU problem or Low Gas alarm)			Yes		
Low gas alarm (where available on the switchgear)			Yes		Single, Two or Three bays – common Four or Six bays – individual indication per bay

All inputs shall be electrically isolated from the processor electronics

Secure Control Outputs. Each channel will employ 2-bit control (Open and Close per channel) isolated from all other Plant I/O. All outputs shall be capable of High security Select-Checkback-Execute sequence operation. Visual representation of each control function in progress without the use of PC software would be desirable.

Analogue values that are generated within the RTU shall be sent to the DNP master; with a configurable period between unsolicited messages.

A software tool for the purposes of setting up the configurable dead band values shall be supplied.

Analogue values shall be scaled where possible.

Indication of Binary output Control status and which control operation is in progress without the use of a PC is desirable.

Control Outputs for switchgear control will match the capacity of the system device (1, 2, 3 or 6)

1 Control output for range taking radio power management

1 Control per Fault Passage Indicator (FPI) reset

1 dummy control internal to the RTU.

3.5.3.4. RTU Serial Interfaces – Not applicable to Single-Point Switch systems

At least one configurable serial interface shall be provided on all systems with and as a minimum be capable of:

RS232 or RS485 serial interface for host communications or master port interface to slave RTU or IEDs to be equipped with Modem control signals.

RS232 or RS485 serial interface for slave port interface to RTUs or IEDs

DUAL or MULTI-POINT systems shall include oneRS232 or 10/100 Tx Ethernet port for configuration/diagnostic tool

RS485 serial ports shall provide Input/output isolation of 1.5 kV rms / 2.1 kV DC between the input supply and all other card circuits.

3.5.3.5. DNP3

All RTUs shall have, at least, DNP3 2002 L2 approval.

All binary outputs shall be Direct Operate.

All DNP3 internal indication bits shall be supported.

All controls shall use the Control Relay Output Block (object 12) and be confirmed by a Binary Input Change object.

Control Operations shall be selectable as:

Select Before Operate

Direct Operate

All points shall be capable of supporting the following controls:

Pulse On

Pulse Off

Latch On

Latch Off

In addition all plant controls shall support Trip/Close

Minimum Message Set

Communications to remote distribution equipment shall support the following identified message types:

Data Type	Object	Variation	Unsolicited	Function Codes		Plant Function	Comment
				To RTU	From RTU		
Binary IP	1	1		1, 22	129	All points	Without Status Flags
		2					Include status flags
Binary IP Change with Time	2	1	Yes	*1*	129, 130	Plant operations, protection operations, alarms	All events to need to include time stamps. See comment below. Without status flags.
		2					All events to need to include time stamps. See comment below. Include status flags.
Binary OP Status	10	2		1	N/A	All controls	Required for Class 0 polling to indicate control status

Data Type	Object	Variation	Unsolicited	Function Codes		Plant Function	Comment
				To RTU	From RTU		
Control Relay OP block	12	1		3,4,5	129	All controls	
16 bit Analogue IP	30	2		1, 22	129	Phase voltage, line current	Include status flags
		4					Without status flags
16 bit Analogue IP Change with Time	32	2	Yes	1	129, 130	Phase voltage, line current	Without status flags
		4					Include status flags
Time and date	50	1		2	129	Time synchronisation	Comms check if application confirm can be generated
Time delay fine	52	2		N/A	N/A	Used to measure Comms latency	
Class data 0	60	1		1, 20, 21	N/A	Class requests	
Class data 1	60	2		1, 20, 21	N/A	Class requests	
Class data 2	60	3		1, 20, 21	N/A	Class requests	
Class data 3	60	4		1, 20, 21	N/A	Class requests	
Internal indications	80	1		2	N/A	RTU and event buffer status	

The following function codes shall be supported:

From the Control System:

Function Code	Description	Comment
1	Read	
2	Write	
3	Select	
4	Operate	
5	Direct Operate	With Acknowledgement
20	Enable Unsolicited Messages	
21	Disable Unsolicited Messages	
22	Assign Class	
23	Delay Measurement	

From the RTU:

Function Code	Description	Comment
129	Response	
130	Unsolicited Message	

All messages require an application confirm from the control system. Data Links confirms shall support disabled and sometimes.

All controls shall be performed with the Control Relay Output Block, object 12 variation 1.

All controls shall be Direct Operate.

Confirmation of controls shall be via an unsolicited change in the relevant binary IP.

All analogues shall be 16 bit.

Time and date synchronisation shall support both immediate and delay measurement.

The reporting of all plant statuses shall be single bit.

Binary and Analogue Objects With and Without Status Flags

All status changes assigned to class 1 shall be reported immediately.

All unsolicited events shall be date and time stamped in the RTU when the event occurs.

Upon start-up and reset; RTUs shall not send unsolicited messages (apart from those used to indicate to the control system the availability of the RTU) until the control system enables them.

DNP3 Mapping

Appendix 1 details the required DNP3 maps for the following plant arrangements:

Single Bay Map – Switch only

Dual Bay Map – Switches only

Dual Bay Map – One switch and one Circuit Breaker

Three Bay Map – Switches only

Three Bay Map – A combination of Switches and Circuit Breakers

Six Bay Map – Switches Only

Six Bay Map – A combination of Switches and Circuit Breakers

3.5.3.6. Circuit Breaker Logic

For control of Circuit Breakers additional logic is required to automatically operate the actuator in the event of an unmonitored trip. This logic shall be enabled on each bay controlling a Circuit Breaker. The use of the logic shall be disabled on bays not equipped with a Circuit Breaker.

If a controlled Circuit Breaker is independently tripped (via a local push button or protection) the RTU shall automatically send a single open control to the respective actuator only if the following conditions are met:

The Local /Remote switch is in Remote

And

The Circuit Breaker and actuator indication both show closed before the Circuit Breaker opens

And

The Circuit Breaker indication shows open and the actuator indication shows closed after the Circuit Breaker is open

And

Common Alarm has remained clear throughout the sequence

The logic shall be independently configurable per bay and shall only be enabled for each bay controlling a Circuit Breaker.

3.5.3.7. Supply Monitoring and Control

The RTU shall continually monitor the LVAC auxiliary power supply. If the supply fails for longer than a user configurable time delay then a Supply Fail DNP3 event shall be raised. The time delay shall be configurable from 1 second to a minimum of 3 hours in 1 second steps.

Upon the failure of the auxiliary supply a timer shall be initiated and, after a configurable time (up to 24 hours settable in 1 minute intervals), the power to the radio shall be automatically disconnected.

The Delayed Supply Fail Indication shall be reset after the auxiliary LV supply has been reset for 20 seconds.

Upon restoration of the auxiliary LV supply, the power to the radio shall be automatically and immediately reinstated.

3.6 Connecting Cables

3.6.1. Volt Drop

The power supply connection from the control cabinet to the actuator shall be designed to minimise volt drop and shall, in any case, limit this drop to 2.0V.

3.6.2. Physical Protection

Any external connections between the RTU, actuator, HV switchgear, FPI, etc. shall be provided by suitably armoured cables, or protected in suitable, flexible conduits.

All cabling between the RTU, actuators and switchgear shall be secured and protected. All cables shall be routed or contained so as not to present a tripping hazard or interfere with the normal operational and maintenance requirements of the switchgear.

3.6.3. Terminations

Where external connecting preformed cables are supplied, they shall have a plug/socket arrangement at each end. The plug and socket shall be of standard design such that an RTU can be connected to any actuator with the same preformed cable. I.e. if core 1 and 2 is assigned for the actuator close command for one design of actuator they shall have the same function for all actuators.

Where more than one cable is required to connect between RTU and switchgear and/or the actuator, the cables, plugs and sockets shall be clearly labelled to ensure they can be readily identified and installed in the correct orientation.

Signals

The cables shall provide signals for:

1 Open control per Switch/Circuit Breaker

1 Close control per Switch/Circuit Breaker

1 Fault Passage indicator Reset control per switch

1 Open/Close double bit indication per Switch or 1 Open/Close double bit indication Circuit Breaker actuator and 1 Open/Close double bit indication per Circuit Breaker derived from the switchgear auxiliary contacts

1 single bit Earth Fault indication per Fault Passage indicator

1 single bit Over Current indication per Fault Passage indicator

24V positive supply

24V negative supply

1 gas pressure low alarm

2 spare connections

Common

3.7 Communication

SINGLE-POINT SWITCH RTUs shall include an ethernet port for communications use.

DUAL and MULTI-POINT RTUs shall include a minimum of five serial ports: at least two shall be suitable for host communication and at least 3 shall be suitable for slave communications.

The following applies to all types of RTU

The communication protocols shall be configurable by means of a software configuration program.

The RTU shall support DNP3 Level 2, Modbus, BS EN IEC 61850 and BS EN IEC 60870 part 5 communications protocols to host or slave.

The protocol used to communicate between the Control centre OR Primary Substation based Master DNP device and all remote site equipment RTUs, shall be a minimum of DNP3 L2.

All supplied RTUs shall hold a minimum of a DNP3 L2 compliance certificate.

3.7.1. Communication Bearers

A wide range of communications bearers shall be supported. Suppliers shall state which of the following are / can be supported:

PMR radio (MPT1327)

UHF/VHF low power radio

Cellular networks (see section below)

De-regulated low power (MPT1329 including repeaters if required)

Regulated radio (MPT1411)

Packet Digital Radio (PDR)

Meshed Network Radio

3.7.2. Cellular Connection

Where cellular connectivity is provided it shall meet the following requirements:

Shall be configurable to use a private APN endpoint

Shall be compatible with all UK public networks

Shall be compliant with 2G and 4G/LTE (CAT-1) standards

Shall optionally be capable of utilising LTE (CAT-M1) networks (it is recognised this may require alternative modem hardware)

Shall be capable of accepting GSMA SIM Specification EUICC SIM cards

Shall be capable of remote re-provisioning GSMA Sim Specification EUICC SIM cards onto alternative cellular providers in the event of a change of contracted cellular provider (it is understood this will require the presence of SIM Toolkit and/or other software to support the process)

Shall be capable of accepting SIM cards and/or EUICC profiles supplied under Northern Powergrid contracts

3.7.3. Communication Details

At the present time, SCADA communications are achieved via a private Communications radio network whereby each site will have communications radio provided by Northern Powergrid Telecoms. This radio will require 'housing' either within an existing cubicle or within a suitable protective enclosure depending on the site which may be outdoor or indoor.

SINGLE-POINT Control Cubicles shall be capable of interfacing with suitable radio sets, modems, or equivalent terminal equipment, for use with any one of the above and the added capability of an alternative connection to an associated communications radio. Where a communications radio cannot be contained within the main RTU cubicle then an alternative suitable housing shall be provided.

On DUAL and MULTI-POINT systems the associated communications radio shall be accommodated within the control cubicle. The radio aerial connection shall be mounted, and connected, via a bulkhead fitting ,typically either a TNC-TNC on both sides or an N type-TNC, through the Control Cubicle, to the radio inside (having typically a BNC, or N type, flying lead as an integral part of the radio).

A suitably protected DC power supply within the range of 12 – 24V, switched via a secure RTU control signal, shall connect the internal RTU power system to the radio.

A data cable with suitable terminations shall connect the radio and the RTU host communications port. This will typically be via a Serial RJ45/DB9, RS485 Modbus or screw terminals.

The radio network may at times be busy performing internal functions and not be ready to accept a DNP transaction for transmission across the network. To cater for these situations a method of communications flow control between the RTU and the radio shall be in place.

The RTU shall hold off communication until the Clear To Send (CTS) signal from the radio is active.

The serial port hardware handshaking shall work using levels rather than edges in the detection of the CTS state.

The RTU shall have a user configurable delay before a message is sent after the RTS is raised and CTS is high. This delay resolution shall not be greater than 10mSec.

3.8 Power Supplies

The incoming power supply unit will be 230V AC (+10% / -6%) 50Hz. The remote control system shall be capable of functioning fully and normally across this input range.

The remote control system shall be connected via a suitably rated isolatable protection device, using suitably rated and mechanically protected cable and/or conduit to provide sufficient power to the Battery charger and battery for normal reliable operation of the RTU, communications, fault passage indicator(s) and the actuator(s).

Connected devices requiring a 24VDC supply from the system include the communication radio and Fault passage Indicator(s). Details of these are included in Appendix 4. A negative ground, 24V 4.5A DC supply shall be available to power a communications radio. This supply to the radio shall be protected from overloads above 4.5 A and shall be controllable from the RTU.

3.8.1. The Battery

The battery and the overall remote-control system shall be designed to be sufficiently robust to prevent spurious low volt alarms resulting from normal operation of the remote-control system.

Where the battery technology chosen is Lead-Acid, the batteries shall be valve-regulated or sealed monobloc type and shall have a minimum capacity of 24Ah

Where an alternative cell technology is chosen, then the package shall be of a sealed / vented monobloc or compact package that does not require chemical replenishment or additives at any point within the lifetime of the cell(s). The capacity shall be chosen and proven to conform to the following requirements:

The batteries shall have an actual 10-year operational life, fully taking into account the predicted site conditions.

At the end of an 18 hour period following loss of mains supply during which time the ambient temperature is minus 20˚C, the battery shall be capable of powering the communications, RTU and actuator to carry out six consecutive Open/Close operations (i.e. 3 Open + 3 Close) of the switchgear; at an ambient temperature of minus 20°C.

3.8.2. Battery Charger

The battery charger shall have an expected life of 20 years, fully taking into account the predicted site conditions.

The battery charger shall be temperature compensated.

The battery charger shall recharge the batteries, from discharged to fully charged, in a maximum of 6 hours. This requirement assumes that the RTU, communications and FPI are connected and functioning during this charging time, but that no actuator operation is required.

3.8.3. Battery Protection, Monitoring and Testing

The battery shall be protected against overload and against short circuit. In addition, the battery system shall have a level of monitoring and control that can be configured to either:

- perform a pre-operation battery check to ensure that the intended operation will in fact complete successfully under what is regarded as normal operating conditions and limits without 'stalling' due to insufficient battery power; or
- have a pre-programmed battery check function as outlined below.

The system shall load test the battery every 24 hours and shall initiate an alarm if a problem is found. In addition and to simulate real site load conditions, an automated battery test sequence function shall simulate an actuator operation every 7 Days, this being:

- Draw 6A @ 24Vdc for 30-seconds on Lead-Acid powered systems
- Draw a supplier defined current load for a supplier defined time period to provide an appropriate and reliable test on alternative battery technology powered systems.

The voltage at the battery terminals shall be monitored continuously, including during tests.

A battery not connected alarm shall be initiated, via the RTU, if no battery is connected to the system.

A battery volts low alarm shall be initiated, via the RTU, if the battery terminal volts drop below:

- 22V for more than 10 seconds on Lead-Acid powered systems
- A (stated) voltage determined by the supplier for more than 10 seconds that will continue to support normal operation and the 18 hr 'loss of mains' scenario without reaching the 'deep discharge' point beyond which the battery would not recover to at least 80% capacity from on-site normal recharge.

The battery shall be protected against deep discharge. Lead-Acid technology batteries shall be disconnected immediately if the terminal volts drop below 20V, for more than 60 seconds. Alternative battery technologies shall disconnect after the same time period of over 60 seconds at a voltage level determined by the supplier where normal on-site recharging will recover the battery to an operating state of 80% full capacity.

3.9 Actuators

Actuators shall operate the switchgear in a safe and effective manner.

There shall be provision for manual operation of the switchgear. The supplier shall state how this is achieved.

The actuator must not interfere with visual confirmation of the position of the switch that it is controlling by allowing an unobstructed view of the switchgear's original On/Off indication.

Where auxiliary contacts within the switchgear are available, it is preferable that position indication of the of the switch is derived from the switchgear mechanism contacts and not from the actuator. However, this is not mandatory where an acceptable case for an alternative, equally reliable position determination method is offered and proven to match reliability.

The actuator shall be designed so as to allow compliance with the principles of the Company's operational policies. The method of accommodating application of a Company operational, or safety padlock to prevent any operation (Remotely, Locally or Manually) of the associated switchgear shall be stated by the supplier. This method shall achieve the locked-off state within 60 seconds.

The actuator shall have been type tested over a minimum of 1000 full cycle operations and have a life expectancy of 10 years without maintenance, considering the predicted site conditions.

The operations shall be carried on a single sample and shall be carried out in the following sequence:

200 cycles at -20°C during which the actuator shall be removed and re-fitted to the switchgear every 60 cycles.

200 cycles at +40°C during which the actuator shall be removed and re-fitted to the switchgear every 60 cycles.

600 cycles at room temperature (18 to 22°C), during which the actuator shall be removed and re-fitted to the switchgear every 80 cycles.

A simulation of the HV switchgear may be used if it can be proven that the equivalent forces, loads, acceleration, speed and travel are applied to the actuator and its mountings and fastenings.

During the 1000 operations records shall be made of any adjustments required to the actuator arrangement (e.g. realignment during disconnection and reattachment) and these shall be detailed in the test reports. During the 1000 operations; any sensors associated with the actuator shall be monitored to ensure that they detect and output the switchgear status.

The arrangement will be deemed to have failed the tests if the sensor outputs do not represent the HV switchgear status at any time(s) during the test cycle.

The actuator shall preferably complete its operation within 5, but not exceed 10 seconds of receiving an initiation signal. Expected operation times shall be provided for all applicable switchgear operations.

If the actuator fails, or loses power, partway through an operation, it shall be capable of dissipating any stored energy, or there shall be a safe, documented procedure in place to allow the manual dissipation of the stored energy and the removal of the actuator.

All actuators shall be individually, permanently marked with the manufacturer's name, make and model, and a unique serial number.

A full set of instructions detailing the procedure for the mounting and removal of the actuator shall be available on site as stated further in this document.

3.9.1. Actuator Mounting

The actuator shall be of a non-intrusive design that can be mounted to the switchgear with the equipment live and in service position.

The mounting of the actuator shall not compromise the integrity of the switchgear that it is to operate.

The actuator arrangement shall provide protection against operator contact with moving parts to a minimum of IP 32 in accordance with BS EN IEC 60529. The IP tests shall be carried out with the actuator in operation to prove the IP rating is not compromised by the stresses placed on the components during actuator operation.

The remote-control arrangement shall not impede access to the HV cable boxes, HV test orifices, the switch position indication or any associated Fault Passage Indicator.

The actuator shall be able to be mounted to a switch in the middle, or at either end of a switchboard in a substation. The actuator shall not interfere with the use or operation of any adjacent switchgear.

3.9.2. Actuator Removal

The actuator shall be designed in such a manner that it can be removed easily from the switchgear. The removal shall not require any special tools and shall be a single person operation. Where common fixings (i.e. hex head) are used to secure the actuator for normal operations which would then have to be removed to facilitate switchgear Earth application, then the required tool necessary for removal / re-mounting of the actuator shall be provided and secured with the actuator in such a way that it remains available and is not easily detached or lost.

3.9.3. Actuator Re-Mounting After Removal

The system shall be designed in such a manner that, following the temporary removal of the actuator as part of the normal switching sequence; the actuator can only be mounted so that the actuator state and the RTU state correspond to the switchgear state.

The re-mounting shall not require any special tools and shall be a single person operation. Any common tool required to secure the actuator in place shall be provided and secured with the actuator in such a way that it remains available and is not easily detached or lost.

On all systems, the RTU shall present indication to confirm the position of the actuator, as interpreted by the RTU for the benefit of operator awareness. This indication shall be presented so as to be unambiguous and easily understood and so positioned that it is clearly visible to a local operator.

On DUAL and MULTI-POINT systems, it is acceptable for this indication to require the cubicle door to be open.

Where this indication is provided in the form of LED's, then they shall be 4mm in size as a minimum.

3.10 Fault Passage Indicator

The outputs from the FPI volt free contacts shall be connected to the remote-control system.

Where an FPI has two volt-free contacts (one for overcurrent and one for earth fault) these outputs shall be interpreted separately by the RTU..

A 24 Volt power supply to the FPI shall be provided from the Remote-Control System battery. To allow for future changes of FPI; this 24V power supply shall be available regardless of whether the installed FPI can accept the supply. Where it cannot, no connection shall be made, and the supply point terminals shall be screened or shrouded and not exposed.

Where an FPI has other connection options such as RS-485 Modbus or similar, then these may be used as an alternative.

3.11 System Documentation and asset replacement

For each and every new installation or replacement works at a site, a file containing the system information documents will be prepared in an electronic format upon the completion of the works. One paper copy shall be printed and left on-site, and the electronic copy provided to the Northern Powergrid contract Engineer / co-ordinator with responsibility for the project.

This information shall include:

- An updated Substation diagram (NPg Northeast sites)
- Updated system schematics
- An asset list for the remote control system and associated switchgear including:
    - Make, model, type and serial number of RTU, radio, battery and actuator(s),
    - Firmware and Software versions, revisions and customisations applied,
    - Radio Test and commissioning information, IO and Radio mapping

For each RTU control circuit number (if an RTU control circuit is unused state “Unused”):

- make, model, type, serial number and HV circuit name of HV switchgear controlled
- make, model, type, serial number, HV circuit name, details of associated CTs and details of power and/or reset supplies for the Fault Passage Indicator on that circuit.
- Wiring diagram of umbilical/multicore connections to and from the RTU, including cable type and details of unused cores/pairs.

The full name of the install and commissioning engineer(s) and date(s) of installation and commissioning (with all dates included where these have occurred separately)

The following shall be encapsulated and also included:

- A diagram detailing the function, location, rating, characteristics and type of all fuses, links and terminations
- A basic cubicle lay-out diagram
- A diagram/picture labelling all indications
- Operation instructions for the associated actuators
- Basic instructions that can be used by a non-specialist network operator using the local RTU. These shall include: local/remote selection, actuator operation, isolation, locking, labelling and simple checks, diagnostics and rectifications.

On DUAL and MULTI-POINT systems, a document holder shall be fitted inside the cubicle which shall be populated with the system information hard copies specified above.

SINGLE-POINT systems shall satisfy the above requirements by the provision of a folder containing the necessary information being left in a document holder mounted either to an inside wall on an indoor substation or in the inside of the Switchgear enclosure IP rated door at outdoor substations.

Where sub-modules or component items such as actuators, RTU, System Batteries, Communication radios etc are replaced as warranty replacement due to premature failure, the information file shall be updated both on-site and electronic copy to reflect this.

4. References

4.1 External Documentation

Reference	Title
BS EN 60529	Degrees of protection provided by enclosures (IP Code)
BS EN IEC 61439	Low Voltage Switchgear and Controlgear Assemblies
BS EN IEC 61508	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems
BS EN 62368-1	Audio / video, information, and communication technology equipment. Safety requirements
BS EN 60870-2-1	Telecontrol Equipment and Systems Part 2: Operating Conditions Section 1: Power Supply and Electromagnetic Compatibility
BS EN 60870-2-2	Telecontrol Equipment and Systems Part 2:Operating Conditions Section 2: Environmental conditions (climatic, mechanical and other non-electrical influences)
ENATS 50-18	Design and application of ancillary equipment
European Community (EC) directive No. 2014/30/EU	Electro Magnetic Compatibility (EMC) Directive.
European Community (EC) directive No. 2014/35/EU	Low Voltage (LVD) Directive
IEC TR 62380	Reliability data handbook – Universal model for reliability prediction of electronics components, PCBs and equipment
The UK Building Research Establishment Loss Prevention Standard BRE-LPS1175	Requirements and Testing Procedures for the LPCB Approval and Listing of Burglary Resistant Building Components, Strongpoints and Security Enclosures.

4.2 Internal Documentation

Reference	Title
NPS/003/013	Technical Specification for Fault Passage Indicators and their associated Current and Voltage Sensing Instruments for use with Ground Mounted 11 & 20kV Switchgear

4.3 Amendments from Previous Version

Reference	Description
Appendix 1	Updated to include new addition types
Appendix 2	Updated in line with new additions and clauses
Appendix 3	Updated to reflect changes in BS EN standards and ENA TS 50-18
Appendix 4	Added to include Equipment types that will be interfaced
Appendix 7	Revised and updated to accommodate new additions
Technical Requirements	Addition of types of system to include Single Switch and Dual Bay systems with reference thereafter throughout
Throughout	Update to various BS EN standards
Throughout	Full review and expansion of clauses for new added types. Removal of out-dated and defunct clauses.

5. Definitions

Term	Definition
DNP3	Distributed Network Protocol - A multi-layered communications protocol used in SCADA Communications systems.
Labels / labelled	A label, for the purpose of this technical specification, shall mean an inscription on switchgear and controlgear, either integral therewith or on a separately made piece of material which is affixed thereto. Labels shall be durable non-fading and, apart from circuit labels, permanently attached to the equipment (pressure sensitive labels to BS 4781 Parts 1 and 2 are considered permanent).
Local Operation	Whereby an operator on site operates the switchgear, via on-site controls that are an extension of the remote control scheme.
Manual Operation	Whereby an operator on site manually operates the switchgear via hand operating handles.
Remote Control Cubicle	The cubicle housing items including: the radio, the RTU, the battery & charger, the Local Control Panel, etc.
Remote Operation	Whereby a command signal is sent, usually from a Control Centre to site and the switchgear is operated by the remote control scheme.
RTU	A Remote Terminal Unit. - An item of equipment typically used as an interface between a remote device requiring both analogue and digital I/O and a communications device.
SCADA	Supervisory Control and Data Acquisition
The Company	Northern Powergrid

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	11/03/2024

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	
No	**Period: 5 Years**	**Reason: Update will be dictated by contract renewal date or any significant changes in the specification or documents referenced**
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Alan MacDonald	Policy & Standards Engineer	12/03/2024

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
Mark Callum	Smart Grid Development Manager	19/03/2024
Mark Elliot	Operations Assurance Manager	18/03/2024
Michael Crowe	Technical Services Manager (Northeast)	20/03/2024
Andrew Scott	Technical Services Manager (Yorkshire)	25/03/2024
Gary Bartholomew	Programme Manager	21/03/2024
Paul Nicholson	Control Operations Manager (Northeast)	08/04/2024
Gordon Burrows	Control Operations Manager (Yorkshire)	28/03/2024
Simon McGeary	Technical Services Engineer	25/03/2024

6.4 Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	Head of System Engineering	05/04/2024

Appendix 1 – DNP3 Protocol Mapping

The RTU shall be able to support the following DNP3 mappings. Where the individual Common Alarms Flags are described as bitwise analogue values NPG reserve the right for these points to be sent as individual Digital Inputs. If required, these points will be appended to the Digital Inputs tables shown.

Single Bay – Switch

Dual Bay - Switches Only

Dual Bay – One Switch and one Circuit Breaker

Three Bay – Switches Only

Three Bay – A combination of Switches and Circuit Breakers Six Bay – Switches Only

Six Bay – A combination of Switches and Circuit

Single Point Composite Device Map – Switch Only

Index	Name	Class	Comment
0	Bay 1 Switchgear Open	1	
1	Bay 1 Switchgear Closed	1	
6	Bay 1 FPI operated O/C	1	
9	Mode (Local/Remote)	1	
10	Bay 1 FPI operated E/F	1	
13	Common Alarm	1	To indicative the failure of any sub system such as: Battery fail Local communications fail RTU problem Low Gas Alarm
14	Low gas alarm	1	Common for all bays
16	Dummy Circuit Breaker Closed	1	
17	Auxiliary Supply Fail (delayed)	0	The class should be configurable in the RTU configuration tool

Analogue Inputs

Index	Name	Class	Comment
3	Voltage (i)	0	Scaling option for 11kV or 20kV
4	Common Alarm Flags	1	Common Alarm description, NPg Northeast only

(i) Auxiliary supply referred to 11 kV or 20kV. Scaling factor 1:1 at 11,000V or 20,000V

Dual and Three Bay Map – Switches Only

Index	Name	Class	Comment
0	Bay 1 Switchgear Tripped	1	
1	Bay 1 Switchgear Closed	1	
2	Bay 2 Switchgear Tripped	1	
3	Bay 2 Switchgear Closed	1	
4	Bay 3 Switchgear Tripped	1	Three Bay RTU only
5	Bay 3 Switchgear Closed	1	Three Bay RTU only
6	Bay 1 Protection/FPI operated O/C	1	
7	Bay 2 Protection/FPI operated O/C	1	
8	Bay 3 Protection/FPI operated O/C	1	
9	Mode (Local/Remote)	1	

Index	Name	Class	Comment
10	Bay 1 Protection/FPI operated E/F	1	
11	Bay 2 Protection/FPI operated E/F	1	
12	Bay 3 Protection/FPI operated E/F	1	Three Bay RTU only
13	Common Alarm	1	To indicative the failure of any sub system such as: Battery fail Local communications fail RTU problem Low Gas Alarm
14	Low gas alarm	1	Common for all bays
16	Dummy Circuit Breaker Closed	1	
17	Auxiliary Supply Fail (delayed)	0	The class should be configurable in the RTU configuration tool

Analogue Inputs

Index	Name	Class	Comment
3	Voltage (i)	0	
4	Common Alarm Flags	1	Common Alarm description, NPg Northeast only

(ii) Auxiliary supply referred to 11 kV. Scaling factor 1:1 at 11,000V

Binary Outputs

Index	Name	Comment
0	Bay 1 Open/Close CB/Switch	
1	Bay 2 Open/Close CB/Switch	
2	Bay 3 Open/Close CB/Switch	Three Bay RTU only
3	Reset fault flags/FPI	Where available, dependent on relays/FPI.
6	Dummy CB Open/Close	

Dual and Three Bay Map – A combination of Switches and Circuit Breakers

Digital Inputs

Index	Name	Class	Comment
0	Bay 1 Actuator Tripped	1	
1	Bay 1 Actuator Closed	1	
2	Bay 2 Actuator Tripped	1	
3	Bay 2 Actuator Closed	1	
4	Bay 3 Actuator Tripped	1	Three Bay RTU only
5	Bay 3 Actuator Closed	1	Three Bay RTU only
6	Bay 1 Protection/FPI operated O/C	1	
7	Bay 2 Protection/FPI operated O/C	1	
8	Bay 3 Protection/FPI operated O/C	1	Three Bay RTU only
9	Mode (Local/Remote)	1	
10	Bay 1 Protection/FPI operated E/F	1	
11	Bay 2 Protection/FPI operated E/F	1	
12	Bay 3 Protection/FPI operated E/F	1	Three Bay RTU only
13	Common Alarm	1	To indicative the failure of any sub system such as: Battery fail Local communications fail RTU problem Low Gas Alarm
14	Low gas alarm	1	Common for all bays
16	Dummy Circuit Breaker Closed	1	
17	Auxiliary Supply Fail (delayed)	0	The class should be configurable in the RTU configuration tool
18	Bay 1 CB Tripped	1	
19	Bay 1 CB Closed	1	
20	Bay 2 CB Tripped	1	
21	Bay 2 CB Closed	1	
22	Bay 3 CB Tripped	1	Three Bay RTU only
23	Bay 3 CB Closed	1	Three Bay RTU only

Analogue Inputs

Index	Name	Class	Comment
3	Voltage	0	
4	Common Alarm Flags	1	Common Alarm description, NPg Northeast only

Binary Outputs

Index	Name	Comment
0	Bay 1 Open/Close CB/Switch	
1	Bay 2 Open/Close CB/Switch	
2	Bay 3 Open/Close CB/Switch	Three Bay RTU only
3	Reset fault flags/FPI	Where available, dependent on relays/FPI.
6	DCB Open/Close	

Six Bay Map – Switches only

Index	Name	Class	Comment
0	Bay 1 Switchgear Tripped	1	
1	Bay 1 Switchgear Closed	1	
2	Bay 2 Switchgear Tripped	1	
3	Bay 2 Switchgear Closed	1	
4	Bay 3 Switchgear Tripped	1	
5	Bay 3 Switchgear Closed	1	
6	Bay 4 Switchgear Tripped	1	
7	Bay 4 Switchgear Closed	1	
8	Bay 5 Switchgear Tripped	1	
9	Bay 5 Switchgear Closed	1	
10	Bay 6 Switchgear Tripped	1	
11	Bay 6 Switchgear Closed	1	
12	Bay 1 Protection/FPI operated O/C	1	
13	Bay 1 Protection/FPI operated E/F	1	
14	Bay 2 Protection/FPI operated O/C	1	
15	Bay 2 Protection/FPI operated E/F	1	
16	Bay 3 Protection/FPI operated O/C	1	
17	Bay 3 Protection/FPI operated E/F	1	
18	Bay 4 Protection/FPI operated O/C	1	
19	Bay 4 Protection/FPI operated E/F	1	
20	Bay 5 Protection/FPI operated O/C	1	
21	Bay 5 Protection/FPI operated E/F	1	
22	Bay 6 Protection/FPI operated O/C	1	
23	Bay 6 Protection/FPI operated E/F	1	
24	Mode (Local/Remote)	1	
25	Common Alarm	1	To indicative the failure of any sub system such as: Battery fail Local communications fail RTU problem Low Gas Alarm
26	Bay 1 Low gas alarm	1	
27	Bay 2 Low gas alarm	1	
28	Bay 3 Low gas alarm	1	
29	Bay 4 Low gas alarm	1	
30	Bay 5 Low gas alarm	1	
31	Bay 6 Low gas alarm	1	
32	Dummy Circuit Breaker Closed	1	
33	Auxiliary Supply Fail (delayed)	0	The class should be configurable in the RTU configuration tool

Analogue Inputs

Index	Name	Class	Comment
3	Voltage (i)	0	
4	Common Alarm Flags	1	Common Alarm description, NPg Northeast only

(i) Auxiliary supply referred to 11 kV. Scaling factor 1:1 at 11,000V

Binary Outputs

Index	Name	Comment
0	Bay 1 Open/Close Switch	
1	Bay 2 Open/Close Switch	
2	Bay 3 Open/Close Switch	
3	Bay 4 Open/Close Switch	
4	Bay 5 Open/Close Switch	
5	Bay 6 Open/Close Switch	
6	Reset fault flags/FPI	Where available, dependent on relays/FPI.
7	Dummy CB Open/Close	

Six Bay Map – A combination of Switches and Circuit Breakers

Digital Inputs

Index	Name	Class	Comment
0	Bay 1 Actuator Tripped	1	
1	Bay 1 Actuator Closed	1	
2	Bay 2 Actuator Tripped	1	
3	Bay 2 Actuator Closed	1	
4	Bay 3 Actuator Tripped	1	
5	Bay 3 Actuator Closed	1	
6	Bay 4 Actuator Tripped	1	
7	Bay 4 Actuator Closed	1	
8	Bay 5 Actuator Tripped	1	
9	Bay 5 Actuator Closed	1	
10	Bay 6 Actuator Tripped	1	
11	Bay 6 Actuator Closed	1	
12	Bay 1 Protection/FPI operated O/C	1	
13	Bay 1 Protection/FPI operated E/F	1	
14	Bay 2 Protection/FPI operated O/C	1	
15	Bay 2 Protection/FPI operated E/F	1	
16	Bay 3 Protection/FPI operated O/C	1	
17	Bay 3 Protection/FPI operated E/F	1	
18	Bay 4 Protection/FPI operated O/C	1	
19	Bay 4 Protection/FPI operated E/F	1	
20	Bay 5 Protection/FPI operated O/C	1	
21	Bay 5 Protection/FPI operated E/F	1	
22	Bay 6 Protection/FPI operated O/C	1	
23	Bay 6 Protection/FPI operated E/F	1	
24	Mode (Local/Remote)	1	
25	Common Alarm	1	To indicative the failure of any sub system such as: Battery fail Local communications fail RTU problem Low Gas Alarm
26	Bay 1 Low gas alarm	1	
27	Bay 2 Low gas alarm	1	
28	Bay 3 Low gas alarm	1	
29	Bay 4 Low gas alarm	1	
30	Bay 5 Low gas alarm	1	
31	Bay 6 Low gas alarm	1	
32	Dummy Circuit Breaker Closed	1	
33	Auxiliary Supply Fail (delayed)	0	The class should be configurable in the RTU configuration tool
34	Bay 1 CB Tripped	1	
35	Bay 1 CB Closed	1	
36	Bay 2 CB Tripped	1	
37	Bay 2 CB Closed	1	
38	Bay 3 CB Tripped	1	
39	Bay 3 CB Closed	1	
40	Bay 4 CB Tripped	1	
41	Bay 4 CB Closed	1	
42	Bay 5 CB Tripped	1	

Index	Name	Class	Comment
43	Bay 5 CB Closed	1	
44	Bay 6 CB Tripped	1	
45	Bay 6 CB Closed	1	

Analogue Inputs

Index	Name	Class	Comment
3	Voltage	0	
4	Common Alarm Flags	1	Common Alarm description, NPg Northeast only

Binary Outputs

Index	Name	Comment
0	Bay 1 Open/Close CB/Switch	
1	Bay 2 Open/Close CB/Switch	
2	Bay 3 Open/Close CB/Switch	
3	Bay 4 Open/Close CB/Switch	
4	Bay 5 Open/Close CB/Switch	
5	Bay 6 Open/Close CB/Switch	
6	Reset fault flags/FPI	Where available, dependent on relays/FPI.
7	DCB Open/Close	

Common Alarm description flags (NPg Northeast only)

The following bits in the Common Alarm description 16 bit analogue shall be set for the relevant conditions;

Bit	Value	Condition
0	1	Spare
1	2	Spare
2	4	Spare
3	8	Spare
4	16	Spare
5	32	Spare
6	64	Spare
7	128	Spare
8	256	24V battery test Fail
9	512	24V battery low (mains failed)
10	1024	24V battery low (mains healthy)
11	2048	Hardware fault
12	4096	Mal-operation detected
13	8192	No 24V Battery detected
14	16384	No actuator supply
15	32768	Low Gas Alarm

Multiple bits shall be able to be set in any one message.

Appendix 2 – SELF CERTIFICATION CONFORMANCE DECLARATION AGAINST NPS/003/017

Ground Mounted Distribution Switchgear Remote Control Systems required to be supplied against this specification shall comply with the latest issues of the relevant ENATS, British and International Standards specified. The following tables are intended to amplify and/or clarify the requirements of elements of these Standards but do not preclude meeting all requirements of the standards.

The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes
N/A = Clause is not applicable/ appropriate to the product
Cs1 = The product conforms fully with the requirements of this clause
Cs2 = The product conforms partially with the requirements of this clause
Cs3 = The product does not conform to the requirements of this clause
Cs4 = The product does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Instructions for Completion

- **When Cs1 code is declared, a remark IS still necessary; Provide details of how/why compliance is achieved, include references to type tests, etc.**
- **When any other code is entered; details of the reason for non-conformance shall be entered.**
- **Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate.**

Manufacturer:

Product Reference:

Details of the product (State system type as categorised in 3.1)

Name:

Signature:

Date:

NOTE:

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks / Declaration**
3.1 Summary	SINGLE POINT SWITCH: One bay switch operation		
	NON-EXTENDED RMU DUAL-POINT SWITCH OR CIRCUIT BREAKER: Two bay switch or CB operation		
	EXTENDED RMU MULTI-POINT SWITCH OR CIRCUIT BREAKER: Up to three bays of operation		
	ENHANCED EXTENDED RMU MULTI-POINT SWITCH OR CIRCUIT BREAKER: Up to six bays of operation		
3.2 Operating Characteristics	Compliance with: BS EN 61508 • Declare Safety Integrity level (SIL) and, • within which operating mode (Low or High demand)		
	Compliance with: • BS EN IEC 60439-Part 1 • BS EN 60870-2-1 • BS EN 60870-2-2 • ENA TS 50-18		
	Failsafe design		
	Anti-Reflex (3 sec delay) design between subsequent operations *(provide details)*		
	Actuator Operation Completed and detected within maximum of 10 seconds, preferably 5 seconds.		
	System READY to begin another sequence within 3 seconds of the preceding one		
	Maximum latch time of 7.5 seconds on any latching relay		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.2 Operating Characteristics (continued)	System shall not expose persons or equipment to harmful levels of touch or step potential particularly during fault conditions.		
	Low Gas alarm from local HV switchgear is detected, initiates COMMON ALARM and is relayed, but does NOT inhibit remote operation.		
3.3 Fault Passage Indicators (FPIs)	Fault Passage Indicators (FPI's) on switchgear shall: a) Be supplied 24V DC Power from system battery b) Detect overcurrent and/or earth fault volt free outputs and relay via SCADA comms		
	LV reset supplies to FPI's sourced from (order preference) • 230V AC from LOCAL LV Fuseboard busbar • 55V/110V AC from LOCAL HV metering VT • 230V AC local RTU supply IF this is fed from the NPg Network Local Transformer on the same controlled site. LV reset AC supplies SHALL NOT be taken from a customer's LV network.		
3.4 Operating Environment	Operating ambient temp range: -20°C to +40°C		
	Relative humidity: Up to 95 %, at 40°C non-condensing (tropicalized).		
	Clarify if system is environment specific (indoor / outdoor)		
	Declare if a heater is a design function critical feature		

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks**
3.4 Operating Environment (continued)	Forced ventilation is NOT acceptable		
	All Equipment is designed and proven to comply with: • Low Voltage (LVD) directive No. 2014/35/EU • BS EN IEC 62368-1 • (EMC) directive No. 2014/30/EU • BS EN 60870-2-1, Level 4.		
3.5.1 Remote Control Cubicle	SINGLE POINT SWITCH Cubicle shall contain: • Communications System (dual mode) • RTU • Motor drive actuator • 24V Battery and Charger		
	SINGLE POINT SWITCH system mounts directly onto the switchgear in place of the manual operating handle using existing fixings.		
	NON-EXTENDED RMU DUAL POINT and MULTI-POINT systems shall contain: • Communications System / Radio • RTU • 24 Battery and Charger		
	NON-EXTENDED RMU DUAL POINT cubicle mounts: • On the switchgear without operation or testing hinderance • On a free-standing support • On to a wall		

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.1 Remote Control Cubicle (continued)	EXTENDED AND ENHANCED MULTI-POINT cubicle mounts: • On a free-standing support • On to a wall		
	Cubicles shall adhere to the following dimensional limitations (HxWxD) mm: • SINGLE-POINT – 275 x 130 x 105 • NON-EXTENDED DUAL-POINT – 600 x 400 x 230 • EXTENDED MULTI-POINT – 1000 x 375 x 125 • ENHANCED MULTI-POINT – 1000 x 700 x 150		
	Cubicle Environmental and Intruder resistance shall meet: • IP32 (minimum) AND *preferably* LPS BRE-LPS1175 Level 1 for INDOOR USE • IP44 (minimum) AND LPS BRE-LPS1175 Level 2 for OUTDOOR USE.		
	The cubicle and its contents shall comply with Part 1 and Part 5 of BS EN IEC 61439		
	BS EN IEC 61439 7.2 – compliance (*enter code for each)* • 7.2 a) Solar radiation 1,000W/m² • 7.2 b) Climatic variation condensation • 7.2 c) Heavy Pollution of sea salt • 7.2 d) Strong electric and magnetic field • 7.2 f) Attack by fungus and small creatures		
	Cubicle ventilation shall be compatible with the installed environment and for the equipment within		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.1 Remote Control Cubicle (continued)	All components shall not require maintenance, including painting, for at least 20 years in a polluted/coastal environment according to EN ISO 12944 2 Category C4. (*Provide details and evidence)*		
	NON EXTENDED DUAL and MULTIPOINT cubicles shall: (*enter code for each)* • Have an option for a separate Local Control Operation panel mounted external to and away from the RTU. • Provide a hinged front opening door with padlocking facilities that will accept the Company's padlocks, AND is Interchangeable between RIGHT and LEFT hand opening. • Be equipped with colourless, transparent barrier limiting contact access unless removed. • Be designed so that the height to the bottom of the cabinet from the floor is at least 1.2m. • Be equipped with a suitably rated earthing point on the outside of the cabinet. • Be equipped with durable labels, as and where prescribed. • Make use of multicore cable terminations that are industry standard plugs and sockets and are agreed by Northern Powergrid • Be equipped with a double-ended bulkhead "TNC" type socket radio aerial connection. • Include encapsulated schematic and physical layout diagrams in every cabinet.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.2 Local control operation panel (continued)	SINGLE-POINT SWITCH system local controls are either: (*enter code for all that apply)* • Electro-mechanical pushbuttons • Software touchscreen pushbuttons via IOS app for iPhone		
	NON EXTENDED DUAL and MULTIPOINT cubicles shall provide separate controls for 'OPEN' and for 'CLOSE' operations for each switch that are individually and independently lockable as prescribed in the form of:. (*enter code for each)* • Electro-mechanical pushbuttons • Software pushbuttons via a purpose made Graphic User Interface (GUI), or • Software touchscreen pushbuttons via IOS app for iPhone.		
	Each pair of controls labelled with the circuit name of the associated switchgear it operates.		
	The control layout mimics the position of the switchgear as far as is reasonably practicable		
	Controls with no associated switchgear or function have blank circuit name labels and are obscured from the operator's normal position. These shall be easily modified if needed for use in the future		
	Option provided for the local controls mounted on an umbilical connected satellite panel for remote situation from the RTU cabinet on site.		

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.2 Local control operation panel (continued)	Satellite Local Control Panel shall provide: actuator control buttons, Local/Remote switch, actuator/switch status indication, and power and common alarm indications.		
	LOCAL OR REMOTE drive control to the actuators shall only be possible to one or the other modes which is selectable by either: (*enter code for all that apply)* • A single, padlockable electro-mechanical, control isolation, two position rotary switch labelled 'Local' and 'Remote' with optional third 'Off' position disabling both modes, or • A secure software access screen with 'Local' and 'Remote' selection buttons which requires subsequent confirmation of mode selection that remains visible on subsequent screens.		
	Control Isolation switch in LOCAL operates as follows: • Disables and prevents any plant control being actioned remotely via the RTU, but not any remote indication or alarm facilities. • Enables local control facilities, independent of the RTU. • A 'local selected' status signal is presented to the RTU for inclusion into the SCADA host reporting database.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.2 Local control operation panel (continued)	Control Isolation switch in REMOTE operates as follows: • Enable controls being actioned remotely via SCADA. • Disables and prevents all local control facilities, but not any local indication or alarm facilities. • A 'remote selected' status signal is presented to the RTU for inclusion into the SCADA host reporting database.		
	Where available, the Control Isolation 'Off' position shall: • Isolate both 'Local' and 'Remote' drive facilities, but NOT any local or remote indication or alarm facilities. • Present a 'Control Off' status signal to the RTU SCADA host reporting database.		
	Self-Protection or an MCB is fitted to protect the integrity of the 24V DC switching supply to the control functions. The protection provides remote indication, raising a remote common alarm when open / activated.		
	Point(s) Of Isolation provided to enable isolation of the 24V DC supply to the actuator(s).		
	Indication provided in the control cubicle (and any remote panel connected) to replicate the remote common alarm condition. Indication positioned to be clearly visible to a local operator, when the cubicle or panel door is open.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3 RTU	The RTU shall be a versatile, high-performance remote-control interface device with intelligent programming capability to enable communication with the Control System located at any Company Control Centre.		
	The RTU, and its software shall comply fully with BS EN IEC 61508		
	IEC 62380 MTBF calculations in years provided for all major RTU modules including: • Communications Modem / Radio, • RTU • Local Control Panel • 24V Battery Charger,		
	Loss of power supply shall not cause or result in any loss of data within the RTU.		
	The RTU supports monitored/controlled equipment (Switches, Circuit Breakers and Fault Passage Indicators) installed in any combination available on combination of specified bays.		
	The RTU logic detects and distinguishes between a protection driven CB TRIP operation versus a SCADA or local drive operation by push-button, and can: • Reverse the actuator position and indication in readiness for a remote close either automatically or in response to a SCADA command. • Report back this sequence, status, alarms and events to the Control centre.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.1 RTU Programming Capability	DUAL or MULTI-POINT RTUs shall be programmable on-site for the implementation of specific, locally derived, control sequences.		
	The RTU is supplied ready to accept downloaded generic configurations that are prepared utilising an external workbench utility.		
	Configuration tool (free issued) is supplied for reading back the stored configuration in the RTU.		
	The RTU maintains a non-volatile time stamped event log which: • Has a minimum capacity to cater for 50 events or 1 year; whichever occurs first. • Upon reaching limit, shall overwrite the earliest entry first.		
	State the event log capabilities as prescribed.		
3.5.3.2 RTU Configuration and Supporting Utilities	RTU Configuration and supporting utility Is capable of running on At least one off: (*enter code for all that apply)* • A standard IBM compatible laptop PC. • A tablet device running Apple iPadOS version 15 or later. • A tablet device running Android 12 or later		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.2 RTU Configuration and Supporting Utilities (continued)	A Windows based RTU configuration software utility is provided that: •Allows modifications to the RTU database configuration •Is compatible with Microsoft Windows from version 10 onwards **Not Applicable to SINGLE-POINT SWITCH systems**		
	The configuration and/or monitoring utility enables connection to the RTU to provide status monitoring of the plant I/O		
	The RTU Date/Time is set with the configuration software.		
	The software directly accesses the RTU database and allows real time confirmation of the current status of all I/O points within the RTU.		
	Configuration / Monitoring utilities are capable of saving and/or loading the system configuration and/or data files to on-board memory locations.		
	Configuration / Monitoring utilities are capable of saving a plain text file formatted version of the RTU settings.		
	Additional RTU ports other than those specified - State if available and they're purpose and advantages. (*Where applicable*)		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.3 RTU Status Inputs / Outputs	Plant Functionality table (*enter code for all that apply):* • Open/Close CB/Switch • FPI Operated E/F • FPI operated O/C • Dummy CB/Sw Open/Close • Local/Remote operation • 230VAC Supply Fail (120s delay) • Common Alarm • Low Gas Alarm		
	Reported DNP3 inputs (Appendix 1) for: • Single Bay – Switch • Dual Bay – Switches only • Dual Bay – One Switch and one CB • Three Bay – Switches only • Three Bay – A combination of Switches and Circuit Breakers • Six Bay – Switches only • Six Bay – A combination of Switches and Circuit Breakers State conformance code for each that apply		
	All inputs electrically isolated from the processor electronics		
	Secure Control Outputs - 2-bit control (Open and Close per channel) isolated from all other Plant I/O. All outputs capable of High security Select-Checkback-Execute sequence operation		
	Internally generated Analogue values sent to the DNP master; with a configurable period between unsolicited messages.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.3 RTU Status Inputs / Outputs (continued)	A software tool for the purposes of setting up the configurable dead band values included.		
	Analogue values scaled where possible.		
	Binary output Control status Indication and control operation in progress - without the use of a PC is desirable.		
	Control Outputs for switchgear control: 1 Control output for range taking radio power management		
	1 Control per Fault Passage Indicator (FPI) reset 1 dummy control internal to the RTU.		
3.5.3.4 RTU Serial Interfaces	Configurable serial interfaces provided to include (as a minimum): • One RS232 or RS485 serial interface for host communications or master port interface to slave RTU or IEDs to be equipped with Modem control signals • One RS232 or RS485 serial interface for slave port interface to RTUs or IEDs • One RS232 or 10/100 Tx Ethernet port for configuration/diagnostic tool • RS485 serial ports provide Input/output isolation of 1.5 kV rms / 2.1 kV DC between the input supply and all other card circuits.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.5 DNP3	All RTUs have DNP3 2002 L2 approval as a minimum.		
	All binary outputs are Direct Operate.		
	All controls use the Control Relay Output Block (object 12) and are confirmed by a Binary Input Change object. DNP3 Control Operations shall be selectable as: • Select Before Operate • Direct Operate		
	All points capable of supporting the following controls: • Pulse On • Pulse Off • Latch On Latch Off		
	All plant controls support Trip/Close		
	Minimum message set - Communications to remote distribution equipment supports the identified message types. *(State any and all Non-conformances)*		
	Function codes supported as detailed in tables: • From the Control System • From the RTU *(State any and all Non-conformances)*		
	All messages require an application confirm from the control system. Data Links confirms shall support disabled and sometimes		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.5 DNP3 (continued)	All controls performed with the Control Relay Output Block, object 12 variation 1.		
	All controls are Direct Operate		
	Confirmation of controls via an unsolicited change in the relevant binary IP.		
	All analogues 16 bit		
	Time and date synchronisation supports both immediate and delay measurement.		
	The reporting of all plant statuses is single bit.		
	Binary and Analogue objects with and without status flags. • All status changes assigned to class 1 are reported immediately. • All unsolicited events are date and time stamped in the RTU when the event occurs. Upon start-up and reset; RTUs do not send unsolicited messages (apart from those used to indicate to the control system the availability of the RTU) until the control system enables them.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.5 DNP3 (continued)	Required DNP3 maps as detailed (Appendix 1) for: • Single Bay Switch • Dual Bay – Switches only • Dual Bay – One switch and one Circuit Breaker • Three Bay – Switches Only • Three Bay – A combination of Switches and Circuit Breakers • Six Bay – Switches Only • Six Bay – A combination of Switches and Circuit Breakers *State conformance code for each.*		
3.5.3.6 Circuit Breaker Logic	Circuit Breaker Logic operates only if the following conditions are met: The Local /Remote switch is in Remote, AND The CB and actuator indication both show closed before the CB opens, AND The CB indication shows open and the actuator indication shows closed after the CB is open, AND Common Alarm has remained clear throughout the sequence		
3.5.3.7 Energy Monitoring and control	LV auxiliary supply monitoring by RTU. Upon Supply fail, a user configurable time delay will be followed by • Supply Fail DNP3 event shall be raised. Event time delay configurable from 1 second to a minimum of 3 hours in 1 second steps		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.5.3.7 Energy Monitoring and control (continued)	LV auxiliary supply failure timer is configurable (up to 24 hours settable in 1-minute intervals. Thereafter • The power to the radio shall be automatically disconnected. • The Delayed Supply Fail Indication resets after the auxiliary LV supply has been restored for 20 seconds. • Power to the radio is automatically and immediately reinstated upon restoration of the auxiliary LV supply		
3.6.1 Connecting Cables – Volt Drop	Power Supply Volt drop does not exceed 2 volts under any circumstances between control cabinet and Actuator.		
3.6.2 Connecting Cables – Physical Protection	Any external connecting cables between RTU, Actuator, Switchgear being controlled and FPI shall be suitably protected by either: • Armoured cables, or • Enclosure in flexible conduits And routed, secured or contained so as not to present a tripping hazard or interfere with the normal operation and maintenance of the switchgear		
3.6.3 Connecting Cables - Terminations	Cables provide signal lines as specified		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.6.3 Connecting Cables – Terminations (continued)	Preformed cable terminations have a plug/socket arrangement at each end. The plug and socket is a standard design and pin/core/signal allocation such that RTU can be connected to any actuator Multiple interface connections are clearly labelled and readily identified and installed in the correct orientation.		
3.7 Communications	SINGLE-POINT SWITCH RTU includes an ethernet port suitable for communications use.		
	DUAL and MUKTI-POINT RTUs include a minimum of five serial ports with at least two suitable for host communications and three suitable for slave communications.		
	The communication protocols are configurable by software configuration program.		
	RTU supports DNP3 Level 2, Modbus, BS EN IEC 61850 and BS EN IEC 60870 part 5 communications protocols to host or slave. Communication protocol between the Control centre OR Primary Substation based Master DNP device, and all remote site equipment RTUs, is a minimum of DNP3 L2. All RTUs hold a minimum of a DNP3 L2 compliance certificate.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.7.1 Communication Bearers	Communications bearers supported is compatible with any/all of the following: (*Enter conformance code for all that apply)* • PMR Radio (MPT1327) • UHV/VHF low power radio • Cellular networks (detailed in 3.7.2) • De-regulated power • Regulated radio (MPT1411) • Packet Digital Radio (PDR) • Meshed Network Radio		
3.7.2 Cellular Connection	• Configurable to use a private APN endpoint • Compatible with all UK public networks • Compliant with 2G and 4G/LTE (CAT-1) standards • Optionally capable of utilising LTE (CAT-M1) networks • Capable of accepting GSMA SIM Specification EUICC SIM cards • Capable of remote re-provisioning GSMA Sim Specification EUICC SIM cards onto alternative cellular providers in the event of a change of contracted cellular provider • Capable of accepting SIM cards and/or EUICC profiles supplied under Northern Powergrid contracts		
3.7.3 Communication Detail	'Housing ' of provided communication radio is required at both INDOOR and OUTDOOR sites		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.7.3 Communication Detail (continued)	SINGLE-POINT SWITCH systems capable of at least one of the communication bearers in 3.7.1 and an alternative connection to an associated communications radio		
	DUAL and MULTI-POINT systems shall accommodate an associated Communications radio within the control cubicle and is provided with: • Radio aerial connection as specified • A suitably protected DC power supply as specified • A suitable radio data cable • Data Comms flow control • RTU holds off communication until the Clear To Send (CTS) signal from the radio is active • Serial port hardware handshaking as specified • User configurable delay with ≤ 10msec resolution		
3.8 Power Supplies	System operates fully and normally from an incoming power supply of 230V AC +10% / -6%, 50Hz The system is connected via a suitably rated isolatable supply protection device, using suitably rated and mechanically protected cable and/or conduit. (*State how this is achieved)* Connected devices operating at 24VDC are specified in Appendix 4. Communications Radio requires a -ve earth 24V, 4.5A fused supply, RTU controlled.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.8.1 The Battery	The battery and system are designed to prevent spurious low volt alarms during normal operation. Lead-Acid is SLA / VRLA monobloc with minimum capacity of 24Ah is required Alternative technology is compact sealed-for-life type with capacity. Both types proven to be capable of: • Actual 10-year life • 18-hour loss of mains low temperature operations (3 open + 3 close) @ -20°C		
3.8.2 Battery Charger	The system Battery Charger shall: • Have an expected life of 20 years. • Be temperature compensated. • Recharge batteries from a discharged (low volts disconnect) state to fully charged within 6 hours whilst operating normally without actuator operation.		
3.8.3 Battery Protection, Monitoring and Testing	The battery is protected against overload and short circuit.		
	Includes configurable monitoring and control that either: • Includes a pre-operation battery check, OR • Is pre-programmed to conduct a simulated load test as below if no 'pre-operation check function'		
	Simulated real site load condition test sequence shall: • Draw 6A @ 24Vdc for 30-seconds every 7 Days on Lead-Acid systems, OR • Draw a supplier defined load for a supplier defined time period on batteries other than Lead-Acid.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.8.3 Battery Protection, Monitoring and Testing (continued)	The voltage at the battery terminals is monitored continuously, including during tests and an alarm is initiated upon any of the above tests failing.		
	A battery volts low alarm is initiated, via the RTU, if the battery terminal volts drop below: • 22V for > 10s on Lead-Acid systems, or • A (stated) voltage level for >10s determined by the supplier whereby the battery will operate and support the 18hr scenario and still recover to ≥ 80% via normal charge.		
	A battery not connected alarm shall be initiated, via the RTU, if no battery is connected to the system.		
	Battery deep discharge protection shall be disconnected immediately in the event: • The terminal volts drop below 20V, for >60 seconds on Lead-Acid technology systems, or • After the same time period > 60 seconds at a voltage level determined by the supplier where normal on-site recharging will recover the battery to an operating state of 80% full capacity. (*State the voltage level)*		
3.9 Actuators	Actuators operate in a safe and efficient manner and there is provision for method of manual operation of the switchgear, details of which shall be stated.		
	The actuator does not interfere with visual confirmation of the position of the switch that it is controlling, allowing an unobstructed view of the switchgear's original On/Off indication		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.9 Actuators (continued)	Use of available internal switchgear auxiliary position contacts is preferable unless an alternative reliable method is offered and proven to be equally reliable.		
	Method of Compliance with operational policies and practices in locking off switchgear when remote control is installed on an asset. State how this achieved within 60 seconds.		
	The drive actuator has been type tested over a minimum of 1000 full cycle operations and has a minimum life expectancy of 15 years without maintenance, considering the predicted site conditions.		
	The type test operations are performed on a single sample and are carried out in the following sequence: • 200 cycles at -20°C during which the actuator is disconnected and reconnected to the switchgear every 60 cycles. • 200 cycles at +40°C during which the actuator is disconnected and reconnected to the switchgear every 60 cycles. • 600 cycles at room temperature (18 to 22°C), during which the actuator is disconnected and reconnected to the switchgear every 80 cycles.		
	State if a simulation of the HV switchgear is used and provide full details.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.9 Actuators (continued)	Provide details of 1000 operation test results, including any required adjustments or interventions due to mal-operation or failures to correctly represent the switchgear status.		
	The actuator completes its operation preferably within 5, or up to a maximum of 10 seconds of receiving an initiation signal. Provide actual expected times for all operations on all applicable switchgear.		
	Actuator safely dissipates stored energy in the event of losing power partway through an operation. OR There is a safe, documented procedure for the manual dissipation of the stored energy and the removal of the actuator.		
	Actuators are individually, permanently marked with the manufacturer's name, make and model, and a unique serial number.		
	Instructions for the mounting and removal of the actuator will be located on site within the control cubical.		
3.9.1 Actuator mounting	The actuator is a non-intrusive design that can be mounted to the switchgear with the equipment live and in service.		
	The mounting of the actuator does not compromise the integrity of the switchgear that it is to operate.		

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Clause	**Requirement**	**Conformance Code**	**Remarks**
3.9.1 Actuator mounting (continued)	Protection against operator contact with moving parts to IP 32 minimum is proven.		
	Access to switchgear cable boxes, test orifices, position indication and FPI(s) is not impeded.		
3.9.2 Actuator Removal	The actuator is designed to be removed easily from the switchgear by a single person operation. Any common tools required shall be provided and secured with the actuator to remain available and not easily lost.		
3.9.3 Actuator re-mounting after removal	The actuator is designed so that it can only be re-mounted when the actuator position and the RTU state correspond to the switchgear state. The re-mounting does not require any special tools and is a single person operation. Any common tools required are readily available fixed to the actuator.		
	The RTU presents indication to confirm the status of the switchgear/actuator, as interpreted by RTU in an unambiguous way for the benefit of operator awareness. Indication is positioned so as to be clearly visible to a local operator, with the cubicle door open if necessary on DUAL and MULTI-POINT systems. Where indication is in the form of LEDs, then they shall be 4mm in size as a minimum		

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks**
3.9.3 Actuator re-mounting after removal (continued)	Where two volt-free contacts are available (one over-current, one earth fault) these are interpreted as separate inputs by the RTU.		
	24VDC Power supply is available to FPI(s) from Remote-control system battery. Where not required, connection points are screened or shrouded and not exposed.		
3.11 System Documentation	System Information file document created for every new installation or site full system replacement with an electronic copy and an on-site hard copy being provided.		

	The System Information file includes:
	• An updated Substation diagram (NPg Northeast sites)
	• Updated system schematics
	• An asset list for the remote control system and associated switchgear including:
	  ○ Make, model, type and serial number of RTU, radio, battery and actuator(s),
	  ○ Firmware and Software versions, revisions and customisations applied,
	  ○ Radio Test and commissioning information, IO and Radio mapping		

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks**
3.11 System Documentation (continued)	For each RTU control circuit number (if an RTU control circuit is unused state "Unused"): • make, model, type, serial number and HV circuit name of HV switchgear controlled, • make, model, type, serial number, HV circuit name, details of associated CTs and details of power and/or reset supplies for the Fault Passage Indicator on that circuit. • Wiring diagram of umbilical/multicore connections to and from the RTU, including cable type and details of unused cores/pairs.		
3.11 System Documentation (continued)	The full name of the install and commissioning engineer(s) and date(s) of installation and commissioning (with all dates included where these have occurred separately)		
	The following shall be encapsulated and also included: • A diagram detailing all fuses, links, and terminations. • A basic cubicle lay-out diagram. • A diagram/picture labelling all indications. • Operation instructions for the associated actuators • Basic instructions that can be used by a non-specialist network operator using the local RTU.		
	On DUAL and MULTI-POINT systems, a document holder shall be fitted inside the cubicle which shall be populated with the		

	system information hard copies specified above.		

NPS/003/017 - TECHNICAL SPECIFICATION FOR A GROUND MOUNTED DISTRIBUTION SWITCHGEAR REMOTE CONTROL SYSTEM			
Clause	**Requirement**	**Conformance Code**	**Remarks**
3.11 System Documentation (continued)	SINGLE-POINT systems shall satisfy the above requirements by the provision of a folder containing the necessary information being left in a document holder mounted either to an inside wall on an indoor substation or in the inside of the Switchgear enclosure IP rated door at outdoor substations.		
	Where sub-modules or component items such as actuators, RTU, System Batteries, Communication radios etc are replaced as warranty replacement due to premature failure, the information file shall be updated both on-site and electronic copy to reflect this		

Appendix 3a – SELF CERTIFICATION CONFORMANCE DECLARATION AGAINST ENATS 50-18

Ground Mounted Distribution Switchgear Remote Control Systems required to be supplied against this specification shall comply with the latest issues of the relevant ENATS, British and International Standards specified. The following tables are intended to amplify and/or clarify the requirements of elements of these Standards but do not preclude meeting all requirements of the standards.

The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes
N/A = Clause is not applicable/ appropriate to the product
Cs1 = The product conforms fully with the requirements of this clause
Cs2 = The product conforms partially with the requirements of this clause
Cs3 = The product does not conform to the requirements of this clause
Cs4 = The product does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Instructions for Completion

- **When Cs1 code used is a remark IS still necessary;**

  Provide details of how/why compliance is achieved, include references to test tests etc.

- **When any other code is entered; details of the reason for non-conformance shall be entered.**
- **Prefix each remark with the relevant 'NPS', BS EN' 'IEC' or 'ENATS' as appropriate.**

Manufacturer:

Product Reference:

Details of the product

Name:

Signature:

Date:

NOTE:

BS EN				ENA TS 50-18			
Clause/Subclause		Requirement	Conformance code	ENA TS 50-18 Clause/ Subclause	Requirement	Conformance code	Remarks
BS EN 62271-1	BS EN 62271-200						
4	4	Service conditions		4	Service conditions		
7.9				5.2	Electromagnetic compatibility		
				5.3	Type tests (See separate conformance declaration)		
				5.4	Voltage and frequency limits		
				Table 1	Correct operation at d.c. voltage limits at apparatus terminals		
6.4	6.4			6.1	General		
				6.1 c)	DIN rail used		
				6.1 f)	Materials – Non-ignitable		
				6.1 g)	Materials – Dimensionally stable		
				6.1 j)	Dust protected contacts and mechanisms		
				6.1 l)	Minimum height of terminal block arrangement (100 mm)		
6.14				6.2	Provision of padlocking on doors		
6.4.3.1					Selection of components		
6.4.3.2				6.2.1 a)	Access to apparatus and components		
6.4.3.2				6.2.1 b)	Maximum/minimum heights of components		

BS EN				ENA TS 50-18			
Clause/Subclause		Requirement	Conformance code	ENA TS 50-18 Clause/ Subclause	Requirement	Conformance code	Remarks
BS EN 62271-1	BS EN 62271-200						
6.14				6.2.2	Degree of protection		
				6.2.3	Padlocking		
6.3	6.3			6.3	Earthing of enclosures		
				6.4	Earthing of small apparatus and equipment		
				6.5	Circuit earthing		
6.4.2.1				6.6.1	Segregation of circuits		
				6.6.2	Access to connection interface terminals and apparatus		
6.18				6.7	Fire hazard		
6.11	–			6.8	Marking and labelling		
6.4.3.4.2				7.1	Small wiring		
				7.2	Connections		
6.4.3.4.3				7.2.1	Terminals and terminations		
				7.2.2	Terminal blocks		
				7.2.3	Termination crimps		
				7.2.4	Insulation displacement connections		
				7.3	Plug and socket connectors		
				8.1	Fuses and links		
				8.4	Miniature circuit breakers		

BS EN				ENA TS 50-18			
Clause/Subclause		Requirement	Conformance code	ENA TS 50-18 Clause/ Subclause	Requirement	Conformance code	Remarks
BS EN 62271-1	BS EN 62271-200						
				8.5	Supply isolation		
				9	Control and selector switches		
				9.2.1	Classification		
				9.2.2	Rating		
				9.3	Design		
				10.1	Instruments		
				10.2	Electrical measurement transducers		
				10.3	Control and interposing relays		
				10.4	Small contactors		
				10.5	Indicating lamps and fittings		

Appendix 3b – TYPE TEST CONFORMANCE DECLARATION AGAINST ENATS 50-18

Ground Mounted Distribution Switchgear Remote Control Systems required to be supplied against this specification shall comply with the latest issues of the relevant ENATS, British and International Standards specified. The following tables are intended to amplify and/or clarify the requirements of elements of these Standards but do not preclude meeting all requirements of the standards.

The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes
Ct1 = Independent witness tests
Ct2 = Not fully independent witnessed tests
Ct3 = Self verified tests
Ct4 = Alternative tests/evidence offered
Ct5 = Manufacturer has underwritten that the product meets the functional and performance requirements without further testing.
Ct6 = Not tested

Witness codes**
I = Independent
M = Manufacturer
E = ENA

Manufacturer:

Product Reference:

Details of the product

Name:

Signature:

Date:

NOTE:

Instructions for Completion

- **When Ct1 code used is a remark IS still necessary;**

  Provide details of how/why compliance is achieved, include references to test evidence etc.

- **When any other code is entered; details of the reason for non-conformance shall be entered.**
- **Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate.**

	1	2	3	4	5	6	7	8	9	10
	Test requirement	**Specification/ standard**	**Rated value**	**Test req'd? (Y or N)**	**Tested value**	**Conformance code ***	**Date of test**	**Test station report/cert no.**	**Witness I, M or E****	**Remarks**
1	Emission tests from the auxiliary and control circuits.	BS EN 62271-1 Clause 7.9.1.2		Y						
2	Immunity tests on auxiliary and control circuits: Electrical fast transient/burst test Oscillatory wave immunity test	 BS EN 62271-1 Clause 7.9.2.2 BS EN 62271-1 Clause 7.9.2.3		 Y Y						
3	Additional EMC tests on auxiliary and control circuits: Ripple on d.c. input power port immunity test Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	 BS EN 62271-1 Clause 7.9.3.2 BS EN 62271-1 Clause 7.9.3.3		 Y Y						

	1	2	3	4	5	6	7	8	9	10
	Test requirement	**Specification/ standard**	**Rated value**	**Test req'd? (Y or N)**	**Tested value**	**Conformance code ***	**Date of test**	**Test station report/cert no.**	**Witness I, M or E****	**Remarks**
4	Additional tests on auxiliary and control circuits:									
	Functional tests	BS EN 62271-1 Clause 7.10.2		Y						
	Electrical continuity of earthed metallic parts test	BS EN 62271-1 Clause 7.4.3		Y						
	Verification of the operational characteristics of auxiliary contacts:									
	Auxiliary contact rated continuous current	BS EN 62271-1 Clause 7.10.3.2		Y						
	Auxiliary contact rated short time withstand current	BS EN 62271-1 Clause 7.10.3.3		Y						
	Auxiliary contact breaking capacity	BS EN 62271-1 Clause 7.10.3.4		Y						

	1	2	3	4	5	6	7	8	9	10
	Test requirement	**Specification/ standard**	**Rated value**	**Test req'd? (Y or N)**	**Tested value**	**Conformance code ***	**Date of test**	**Test station report/cert no.**	**Witness I, M or E****	**Remarks**
5	Environmental tests:									
	Cold test	BS EN 62271-1 Clause 7.10.4.2		Y						
	Dry heat test	BS EN 62271-1 Clause 7.10.4.3		Y						
	Cyclic humidity test	BS EN 62271-1 Clause 7.10.4.4		Y						
	Vibration response and seismic tests	BS EN 62271-1 Clause 7.10.4.6		Y						
	Final condition check	BS EN 62271-1 Clause 7.10.4.6		Y						
6	Dielectric test	BS EN 62271-1 Clause 7.10.5		Y						

Appendix 4 - Schedule of Equipment types to be interfaced.

Equipment Type	Manufacturer / Make	Models / Variants	VOLTAGE	LICENCE REGION
Distribution Switchgear	ABB	SafeRing & SafePlus	20kV	Northeast
Distribution Switchgear	Long & Crawford	J3, J4, T3GF3 & T4GF3	11kV	Northeast
Distribution Switchgear	Lucy Switchgear / Electric	FRMU MK2, FRMU MK24, Sabre VRN2a, VRN6a, VRN24	11kV & 20kV	Northeast & Yorkshire
Distribution Switchgear	Merlin Gerin	RN2, RN2c, RN6c, RE2c	11kV	Northeast & Yorkshire
Distribution Switchgear	Reyrolle	IMS, LMI	11kV	Northeast
Distribution Switchgear	Schneider Electric	RN2c, RN6c, RE2c, RN2d, RN6d, RE2d	11kV	Northeast & Yorkshire
Distribution Switchgear	Yorkshire Switchgear	FMS MK2, Tyke, Tyke 24	11kV & 20kV	Northeast & Yorkshire
Communications Radio	GE	Orbit MDR	11 – 55VDC	Northeast & Yorkshire
Fault Passage Indicator	Nortroll	Cabletroll 2350NPg	12 – 36VDC (Supply) 55-230VAC (reset)	Northeast & Yorkshire
Fault Passage Indicator	Nortech	F20	12 – 24VDC (Supply) 90 – 240VAC (reset)	Northeast & Yorkshire

Appendix 5 - Pre-commission testing, Maintenance and Routine Inspection requirements

Tenderers shall provide details of the recommended pre-commission testing and inspection required.
Details of the Test Voltage Levels, duration, pass/fail criteria, etc. shall be provided.
Tenderers shall state any maximum voltage that may be applied or any other limitations that may apply.

Tenderers shall provide information regarding detailed and periodic inspection and maintenance requirements to be undertaken during the lifetime of their product.

Appendix 6 – Technical Information Check List

Provided (Y/N)	Requirement
	Full product descriptions and part number/reference
	Complete set of drawings for each variant
	Appendix 2 – completed self-certification conformance declaration against NPS/003/017
	Appendix 3 – completed self-certification conformance declaration against ENATS 50-18
	Appendix 5 - Pre-commission testing, Maintenance and Routine Inspection requirements
	Appendix 6 – This table

Appendix 7 – Asset Data Reporting

The asset data from the installed, or replaced, assets shall be reported to Northern Powergrid and shall include all relevant data fields used in the following ***examples***:

Ground Mounted Remote Control Asset Data Report Pro-Forma - NPS/003/017 Version 3 Pg. 1 of 2							
NPg licence area	*Northern Powergrid (Northeast)*			**Substation Name:**	*Castle View*		
Substation Address:	*20m west of 52 Castle View Drive, Tynemouth NE29 1XP*						
Substation Number:	*N/A*			**Date of Install:**	*04/05/2023*		
Engineer Name:	*Graham Williams*			**Engineer Company:**	*IUS*		
Sub Environment: (Indoor / Outdoor)	*Indoor*			**System Type: (SINGLE / DUAL / MULTI-POINT)**			*Multi-point (3)*
RTU	**Make**	**Model**	**S/N**	**F/W Vers.**	**S/W Vers.**	**Config. File**	**Satellite Local Controls (Y/N)**
	Lucy	*Gemini 3*	*040556-1*	*XX-X.1*	*YYY-1*	*NPgconfig_06-2*	*No*
	Location		**Mounting**		**AC Supply source**		**Battery Make / Model / SN**
	RHS access door in front of RMU		*Wall mounted*		*SS LV Power & Lighting via fused spur*		*Exide Marathon L12V24 x2 (XXX-2 & ZZFF-3)*
Comms Radio	**Make**	**Model**	**S/N**	**Fw / Sw Vers.**	**Install Date**	**Config. File**	**Antenna Type / Location**
	GE	*Orbit MDR*	*6657-1*	*XPD-2.2*	*25/05/2023*	*NPGXp_Nedl.v1*	*2M Bi-pole / Indoor, above RTU.*

Ground Mounted Remote Control Asset Data Report Pro-Forma - NPS/003/017 Version 3 Pg 2 of 2						
NPg licence area	**Northern Powergrid (Northeast)**			**Substation Name:**	*Castle View*	
Substation Address:	*20m west of 52 Castle View Drive, Tynemouth NE29 1XP*			**Engineer Name:**	*Graham Williams*	
Substation Number:	*n/a*	**Date of Work:**	*04/05/2023*	**Engineer Company:**	*IUS*	
HV Distibution Cct # (RTU Local Controls L-R)	*1*	*2*	*3*	*4*	*5*	*SPARE*
HV Distibution Cct # (Looking at Swgr L-R)	*1*	*2*	*3*	*2*	*1*	*3*
HV Distibution Circuit Name	*HUMBERSTON GRANGE*	*RED TO GREEN B/C*	*BLACKLEDGE PRIMARY ENGINEERING COMPANY*	*THISTLE AVENUE*	*GREEN TO RED B/C*	*TRANSFORMER*
Switchgear Make	*Schneider Electric*	*Schneider Electric*	*Schneider Electric*	*Schneider Electric*	*Schneider Electric*	*Schneider Electric*
Switchgear Model	*RN6c*	*RN6c*	*RN6c*	*RN2D*	*RN2D*	*RN2D*
Switchgear Serial Number	*147-201505*	*147-201505*	*147-201505*	*10456789*	*10456789*	*10456789*
Switchgear Descriptors	*LHS Ring Sw (RED)*	*RHS Ring Sw (RED)*	*TEE CB (RED)*	*RHS Ring Sw (GREEN)*	*LHS Ring Sw (GREEN)*	*TEE CB (GREEN)*
	630A Sw	*630A Sw*	*630A CB*	*630A Sw*	*630A Sw*	*200A CB*
Switchgear Location	*Indoor*	*Indoor*	*Indoor*	*Indoor*	*Indoor*	*Indoor*
Actuator make	*Merlin Gerin*	*Merlin Gerin*	*Schneider*	*Schneider*	*Schneider*	*N/A*
Actuator Model & Version	*Mk1*	*Mk1*	*Mk 2*	*Mk 2*	*Mk 2*	*N/A*
Actuator Serial Number	*369-201505*	*370-201505*	*56789*	*58881*	*65212*	*N/A*
Actuator Descriptor	*Rotary*	*Rotary*	*Rotary*	*Rotary*	*Rotary*	*N/A*
FPI make	*Nortech*	*Nortech*	*Nortech*	*Nortroll*	*Nortroll*	*N/A*
FPI Model & Version	*F20-NPG*	*F20-NPG*	*F20-NPG*	*2350-NPG*	*2350-NPG*	*N/A*
FPI Serial Number	*654-201505*	*654-201554*	*654-201658*	*85756*	*85996*	*N/A*
Location of FPI CTs	*Integral to S/Gear*	*Split CT, outside cable box*	*Split CT, outside cable box*	*Integral to S/Gear*	*Integral to S/Gear*	*N/A*
Ratio of FPI CTs	*3 x 500:1*	*1 x 60:1*	*1 x 60:1*	*3 x 500:1*	*3 x 500:1*	*N/A*
FPI detecting E/F or O/C or O/C+E/F	*OCEF*	*OCEF*	*OCEF*	*OCEF*	*OCEF*	*N/A*
FPI contacts wired back to RTU	*OC and EF*	*EF Only*	*EF Only*	*OC and EF*	*OC and EF*	*N/A*
FPI reset Supply Source	*Local LV Board*	*Local LV Board*	*Local LV Board*	*Local LV Board*	*Local LV Board*	*N/A*
FPI Internal Battery - Date Manufactured	*No Battery*	*No Battery*	*No Battery*	*Mar-22*	*Mar-22*	*N/A*
FPI supplied with 24V from RTU battery	*No*	*No*	*No*	*YES*	*YES*	*N/A*