SONI Signal List For Transmission Connected Battery ESPS

#	Signals sent from SONI to Site	Analogue /Digital	Scale	Description
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13	MP100 CB Open Command	Digital		CB Open Command from SONI. SONI must be able to open customer CB for system security reason.
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19	Active Power Dispatch Set Point Command (MW)	Analogue	TBC	The ESPS shall be able to change Active Power Export or Active Power Import in response to a MW set point received from SONI. The set point may be any value between #103 Active Power Export Availability and #104 Active Power Import Availability (MW). Signal #19 sends the set point to ESPS. Feedback via signal #119 will confirm the existing set-point back to SONI. The change in Active Power Output should follow a specified ramp rate MW/min specified via signal #30. Active Power will begin to ramp to the desired value only when #29 Active Power Control (Emergency Action) signal has been turned ON. Normal Mode of Active Power Dispatch will be via Electronic Dispatch Instruction Logger (EDIL). Positive = Active Power Export to Grid (Discharging). Negative = Active Power Import from Grid (Charging).
20	Reactive Power Disp. Set Point Command(MVAR)	Analogue	TBC	The ESPS shall be able to change Reactive Power Export or Reactive Power Import in response to a MVAr set point received from SONI. The set point may be any value between #105 Reactive Power Export Availability and #106 Reactive Power Import Availability (MW). Signal #20 sends the set point to ESPS. Feedback via signal #120 will confirm the existing set-point back to SONI. Reactive Power will adjust to the desired #20 Reactive Power Disp. Set Point value only when #24 Reactive Power Control Mode signal has been turned ON. Positive = Reactive Power Export to Grid. Negative = Reactive Power Import from Grid.
21	Voltage Dispatch Set Point Command (kV)	Analogue	99-132	Whilst the PPM is operating in #25 Voltage Control mode, the ESPS will adjust Reactive Power Export or Reactive Power Import in order to achieve the #21 Voltage Dispatch Set Point if it has the reactive capability to do so. PPM setting schedule provides more information.
22	Power Factor Dispatch Set Point Command (decimal)	Analogue	-0.85 to 1 to +0.85	Whilst the PPM is operating in #26 Power Factor Cont. Mode, the ESPS will adjust Reactive Power Export or Reactive Power Import in order to achieve the #22 Power Factor Dispatch Set point. PPM setting schedule provides more information.
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24	Reactive Power Cont. Mode select Command(ON/OFF)	Digital		Command to turn ON Reactive Power Control Mode and turn OFF #25 Voltage Control Mode or #26 Power Factor Control Mode
25	Voltage Control Mode Select	Digital		Command to turn ON Voltage Control Mode and turn OFF #24 Reactive Power Control Mode or #26 Power Factor Control Mode

	Command (ON/OFF)			
26	Power Factor Cont. Mode Select Command (ON/OFF)	Digital		Command to turn ON Power Factor Control Mode and turn OFF #24 Reactive Power Control Mode or #25 Voltage Control Mode
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29	Active Power Control (ON/OFF) (also called emergency action)	Digital		Active Power will begin to ramp to the desired #19 Active Power Dispatch Set Point value when the #29 Active Power Control signal (Emergency Action) has been turned ON.
30	Ramp Rate to reach Set Point Command (% Registered Capacity/min)	Analogue	0 to 100	Signal to set Active Power Dispatch ramp rate. Confirmed via feedback signal 130.
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40	Frequency Response Command (ON/OFF)	Digital		Command to turn ON frequency response and enable the unit to respond to variations in system frequency
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63	Reserve Response Mode 1 Command (ON/OFF)	Digital		Signal to Instruct System Service Response Mode 1 On. All other System Service Response Modes will turn OFF.
64	Reserve Response Mode 2 Command (ON/OFF)	Digital		Signal to Instruct System Service Response Mode 2 On. All other System Service Response Modes will turn OFF.
65	Reserve Response Mode 3 Command (ON/OFF)	Digital		Signal to Instruct System Service Response Mode 3 On. All other System Service Response Modes will turn OFF.
66	Reserve Response Mode 4 Command (ON/OFF)	Digital		Signal to Instruct System Service Response Mode 4 On. All other System Service Response Modes will turn OFF.
67	Reserve Response Mode 5 Command (ON/OFF)	Digital		Signal to Instruct System Service Response Mode 5 On. All other System Service Response Modes will turn OFF.
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#	Signals From Site to SONI	Analogue/ Digital	Scale	Description
101	ESPS (Useable) Energy Remaining (MWh)	Analogue	TBC	Real-time quantity of energy that can be completely extracted from the ESPS. During Discharge the value of this quantity will decrease and reach zero when no further energy is available. During Charging the value of this quantity will increase up to the maximum at which point no further energy can be stored. Planned (or Forced) outages of any relevant ESPS module will also be captured by this signal.
102	ESPS Total (Usable) Storage Capacity (MWh)	Analogue	TBC	Represents the total energy that can be contained in the ESPS based on the real-time plant status. This quantity may reduce from name-plate value due to planned (or forced) outages or other factors. If all plant storage modules are unavailable this signal must equal zero. E.g. An ESPS has an initial ESPS Total (Useable) Storage Capacity of 100 MWh, and is comprised of 10 x 10 MWh modules. If one module becomes unavailable due to forced outage then the ESPS Total (Useable) Storage Capacity will be reduced to 90 MWh.
103	ESPS Active Power Export Availability (MW)	Analogue	TBC	Real-time signal indicating capability to export active power onto the grid. This figure will reduce depending on the plant status, such as planned or forced outages or other factors. The figure is relevant to total capability. E.g.(1) an ESPS has an initial Active Power Export Availability of 50 MW. The ESPS is dispatched to 20 MW Export -the Active Power Export Availability will remain at 50 MW. E.g. (2) an ESPS has an initial Active Power Export Availability of 50 MW. A frequency transient occurs resulting in a 50 MW Active Power Export. The Active Power Export Availability will remain at 50 MW. E.g. (3) an ESPS has an initial Active Power Export Availability of 50 MW. A forced outage/fault removes 50% of export capability. The Active Power Export Availability will reduce to 25 MW
104	ESPS Active Power Import Availability (MW)	Analogue	TBC	Real-time signal indicating capability to import active power from the grid. This figure will reduce depending on the plant status, such as planned or forced outages or other factors. The figure is relevant to total capability. E.g.(1) an ESPS has an initial Active Power Import Availability of 50 MW. The ESPS is dispatched to 20 MW Import -the Active Power Import Availability will remain at 50 MW. E.g. (2) an ESPS has an initial Active Power Import Availability of 50 MW. A frequency transient occurs resulting in a 50 MW Active Power Import. The Active Power Import Availability will remain at 50 MW. E.g. (3) an ESPS has an initial Active Power Import Availability of 50 MW. A forced outage/fault removes 50% of import capability. The Active Power Import Availability will reduce to 25 MW
105	ESPS Reactive Power Export Availability (MVAr)	Analogue	TBC	Real-time signal indicating capability to export Reactive power onto the grid. This figure will reduce depending on the plant status, such as planned or forced outages or other factors. The figure is relevant to total capability. E.g.(1) an ESPS has an initial Reactive Power Export Availability of 15 MVAr. The ESPS is dispatched to 15 MVAr Export -the Reactive Power Export Availability will remain at 15 MVAr. E.g. (2) an ESPS has an initial Reactive Power Export Availability of 15 MVAR. A forced outage/fault removes 50% of export capability. The Reactive Power Export Availability will reduce to 7.5 MVAR
106	ESPS Reactive Power Import Availability (MVAr)	Analogue	TBC	Real-time signal indicating capability to Import Reactive power from the grid. This figure will reduce depending on the plant status, such as planned or forced outages or other factors. The figure is relevant to total capability. E.g.(1) an ESPS has an initial Reactive Power Import Availability of 15 MVAr. The ESPS is dispatched to 15 MVAr Import -the Reactive Power Import Availability will remain at 15 MVAr. E.g. (2) an ESPS has an initial Reactive Power Import Availability of 15 MVAr. A forced outage/fault removes 50% of Import capability. The Reactive Power Import Availability will reduce to 7.5 MVAr
107	ESPS Active Power Export/Import	Analogue	TBC	Real-time signal indicating active power flow to/from the Grid at Point of Connection. Export = ESPS Discharging. Import = ESPS Charging.

	(MW)			
108	ESPS Reactive Power Export/Import (MVAr)	Analogue	TBC	Real-time signal indicating Reactive power flow to/from the Grid at Point of Connection. Export = ESPS providing Reactive Power to 110kV Grid. Import = ESPS consuming Reactive Power from 110 kV Grid
109	ESPS 110 kV Voltage magnitude (kV)	Analogue	90 to 132	Real-time signal indicating Customer Voltage at Point of Connection to the Grid.
110		Analogue		
111	ESPS 110 kV Power factor (decimal)	Analogue	-1 to +1	Real-time signal indicating Customer measured Power Factor at Point of Connection to the Grid. Range = -1 to 0 to 1. Negative indicates Lagging Positive indicates Leading
112	MP100 CB Low SF6 (Operated/reset)	Digital		Customer 110 kV Circuit Breaker – SF6 Low alarm
113	MP100 CB Switch Status (Open/closed)	Digital		Customer 110 kV Circuit Breaker Position
114		Digital		
115	EM370 Earth Switch Status (Open/closed)	Digital		Customer 110 kV Earth Switch Position
116	MP100 CB Fail (operated /reset)	Digital		Customer 110 kV CB Fail Indication
117		Digital		
118	MP100 CB Lockout (Operated/reset)	Digital		Customer 110 kV CB Lockout Indication
119	Active Power Set Point feedback (MW)	Analogue	TBC	Feed back to confirm received value of #19 Active Power Dispatch Set Point Command (MW)
120	Reactive Power Set Point feedback (MVAr)	Analogue	TBC	Feed back to confirm received value of #20 Reactive Power Dispatch Set Point Command (MVAr)
121	Voltage Set Point Feedback (kV)	Analogue	99 to 132	Feed back to confirm received value of #21 Voltage Dispatch Set Point Command (kV)
122	Power Factor Set Point Feedback (decimal)	Analogue	-0.85 to +0.85	Feed back to confirm received value of #22 Power Factor Dispatch Set Point Command (decimal)
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124	Reactive Power Mode Feedback (ON/OFF)	Digital		Feed back to confirm #24 Reactive Power Cont. Mode ON or OFF. If Reactive Power Mode is On, then Voltage Control Mode and Power Factor mode must be Off.
125	Voltage Mode Feedback (ON/OFF)	Digital		Feed back to confirm #25 Voltage Control Mode Selected ON or OFF. If Voltage Control Mode is On, then Reactive Power Mode and Power Factor mode must be Off.
126	Power Factor Mode Feedback (ON/OFF)	Digital		Feed back to confirm #26 Power Factor Cont. Mode Selected ON or OFF. If Power Factor mode is On, then Reactive Power Mode and Voltage Control Mode must be Off.
127	Voltage Control Auto Change Over (ON/OFF)	Digital		If 110 kV voltage at Point of Connection exceeds the specified band of +/- 10% from nominal 110 kV then the voltage control should change to voltage control mode #125. I.e. if in Reactive Power control mode or Power factor mode it should switch to #125 voltage control mode. This is defined in the Power Park Module Setting Schedule.
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129	Active Power Control Feedback (ON/OFF)	Digital		Feedback to confirm #29 Active Power Control Mode (referred to as Emergency Action in PPM Setting schedule) is ON or OFF.
130	Ramp Rate to reach set point feedback (% Registered Capacity/min)	Analogue	0 to 100	Feedback to confirm received value of #30 Ramp Rate to reach Set Point Command (% Registered Capacity/min)

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136	Grid Control Selected (On/OFF)	Digital		As per the PPM Setting Schedule: SONI must have full control of PPM when the PPM controller is operating in 'Grid Control' mode i.e. the normal running mode of the PPM controller. This signal indicates Grid Control ON or OFF, i.e. the site is controllable via SCADA.
137	Local Control Selected (On/OFF)	Digital		As per the PPM Setting Schedule: In the event of PPM controller being put into 'Local Control' that SONI receives an alarm. When the PPM controller enters 'Local Control', SONI must receive an alarm to alert that the site is no longer remotely controllable via SCADA.
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140	Frequency Response Command (ON/OFF)	Digital		Feedback to confirm #40 Frequency Response Command ON or OFF.
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144	ESPS Charging Active (ON/OFF)	Digital		A signal from the PPM Controller to indicate the system is charging. This may be used as a check signal for the metering and discrete indication to the control room of ESPS operation.
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146	ESPS Generating Active (ON/OFF)	Digital		A signal from the PPM Controller to indicate the system is Discharging. This may be used as a check signal for the metering and discrete indication to the control room of ESPS operation.
147		Digital		
148				
149	ESPS Capacity Limited Ramp (ON/OFF)	Digital		This is a new signal designed to alert SONI that the output of the ESPS is ramping towards zero (i.e. it cannot maintain the current MW dispatch) e.g.: 1) ESPS is discharging, but ESPS (Useable) Energy Remaining (MWh) is approaching zero (setting to be specified in the PPM setting schedule), therefore the ESPS will provide an alarm "ESPS Resource Limited Ramp On" and Active Power Output will ramp towards zero at a defined ramp rate (specified in the PPM Setting schedule). 2) ESPS is charging and approaching full charge (setting to be specified in the PPM setting schedule), therefore the ESPS will provide an alarm "ESPS Resource Limited Ramp On" and Active Power Output will ramp towards zero at a defined ramp rate (specified in the PPM Setting schedule).
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151	System Frequency (Hz)	Analogue	45 to 65	Real-time signal indicating System frequency as measured by ESPS
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157	Active Low Frequency Trigger Setting (Hz)	Analogue	49-50	DS3 System Services Contracts Define 5 Modes of Operation, each with different frequency response mode settings, see Table 1 below. E.g. if Mode 1 is selected, then from Table 1 (column A) the Active Low Frequency Trigger Setting equals 49.8 Hz and is confirmed to SONI via analogue signal

158	Active High Frequency Trigger Setting (Hz)	Analogue	50-51	DS3 System Services Contracts Define 5 Modes of Operation, each with different frequency response mode settings, see Table 1 below. E.g. if Mode 1 is selected, then from Table 1 (column D) the Active High Frequency Trigger Setting equals 50.2 Hz and is confirmed to SONI via analogue signal
159	Active Low Frequency Trajectory Setting (Hz)	Analogue	0-10	DS3 System Services Contracts Define 5 Modes of Operation, each with different frequency response mode settings, see Table 1 below. E.g. if Mode 1 is selected, then from Table 1 (column B) the Active Low Frequency Trajectory Setting equals 0.3 Hz and is confirmed to SONI via analogue signal
160	Active High Frequency Trajectory Setting (Hz)	Analogue	0-10	DS3 System Services Contracts Define 5 Modes of Operation, each with different frequency response mode settings, see Table 1 below. E.g. if Mode 1 is selected, then from Table 1 (column E) the Active High Frequency Trajectory Setting equals 0.3 Hz and is confirmed to SONI via analogue signal
161	Active Maximum underfrequency response setting (MW)	Analogue	TBC	DS3 System Services Contracts Define 5 Modes of Operation, each with different frequency response mode settings, see Table 1 below. E.g. if Mode 1 is selected, then from Table 1 (column C) the Active Maximum underfrequency response Setting equals Operating Range and is confirmed to SONI via analogue signal
162	Active Maximum overfrequency response setting (MW)	Analogue	TBC	DS3 System Services Contracts Define 5 Modes of Operation, each with different frequency response mode settings, see Table 1 below. E.g. if Mode 1 is selected, then from Table 1 (column F) the Active Maximum overfrequency response Setting equals Operating Range and is confirmed to SONI via analogue signal
163	Reserve Response Mode 1 FEEDBACK (ON/OFF)	Digital		Feedback to confirm #63 System Service Response Mode 1 On or Off. This feedback signal will confirm that the Providing Unit is operating in Reserve Response Mode 1, and no other Reserve Response Modes can be active at the same time.
164	Reserve Response Mode 2 FEEDBACK (ON/OFF)	Digital		Feedback to confirm #64 System Service Response Mode 2 On or Off. This feedback signal will confirm that the Providing Unit is operating in Reserve Response Mode 2, and no other Reserve Response Mode can be active at the same time.
165	Reserve Response Mode 3 FEEDBACK (ON/OFF)	Digital		Feedback to confirm #65 System Service Response Mode 3 On or Off. This feedback signal will confirm that the Providing Unit is operating in Reserve Response Mode 3, and no other Reserve Response Mode can be active at the same time.
166	Reserve Response Mode 4 FEEDBACK (ON/OFF)	Digital		Feedback to confirm #66 System Service Response Mode 4 On or Off. This feedback signal will confirm that the Providing Unit is operating in Reserve Response Mode 4, and no other Reserve Response Mode can be active at the same time.
167	Reserve Response Mode 5 FEEDBACK (ON/OFF)	Digital		Feedback to confirm #67 System Service Response Mode 5 On or Off. This feedback signal will confirm that the Providing Unit is operating in Reserve Response Mode 5, and no other Reserve Response Mode can be active at the same time.
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171	FFR Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of FFR which is available. E.g. A unit has a maximum export capacity of 50 MW and a contracted FFR capability of 50 MW. 1) At 0 MW active power output – FFR Signal Indicates 50 MW (assuming sufficient remain energy) 2) At 50 MW active power export - FFR signal indicates 0 MW
172	POR Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of POR which is available. E.g. A unit has a maximum export capacity of 50 MW and a contracted POR capability of 50 MW. 1) At 0 MW active power output – POR Signal Indicates 50 MW (assuming sufficient remain energy) 2) At 50 MW active power export - POR signal indicates 0 MW
173	SOR Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of SOR which is available. E.g. A unit has a maximum export capacity of 50 MW and a contracted SOR capability of 50 MW. 1) At 0 MW active power output – SOR Signal Indicates 50 MW (assuming sufficient remain energy) 2) At 50 MW active power export - SOR signal indicates 0 MW
174	TOR1 Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of TOR1 which is available. E.g. A unit has a maximum export capacity of 50 MW and a contracted TOR1 capability of 50 MW. 1) At 0 MW active power output – TOR1 Signal Indicates 50 MW (assuming sufficient remain energy) 2) At 50 MW active power export - TOR1signal indicates 0 MW

175	TOR2 Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of TOR2 which is available. E.g. A unit has a maximum export capacity of 50 MW and a contracted TOR2 capability of 50 MW. 1) At 0 MW active power output – TOR2 Signal Indicates 50 MW (assuming sufficient remain energy) 2) At 50 MW active power export - TOR2 signal indicates 0 MW
176	FFR-o Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of POR-o which is available. E.g. A unit has a maximum import capacity of 50 MW and a contracted FFR-o capability of 50 MW. 1) At 0 MW active power output – FFR-o Signal Indicates 50 MW (assuming sufficient headroom to charge) 2) At 50 MW active power import - FFR-o signal indicates 0 MW
177	POR-o Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of POR-o which is available. E.g. A unit has a maximum import capacity of 50 MW and a contracted POR-o capability of 50 MW. 1) At 0 MW active power output – POR-o Signal Indicates 50 MW (assuming sufficient headroom to charge) 2) At 50 MW active power import - POR-o signal indicates 0 MW
178	SOR-o Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of SOR-o which is available. E.g. A unit has a maximum import capacity of 50 MW and a contracted SOR-o capability of 50 MW. 1) At 0 MW active power output – SOR-o Signal Indicates 50 MW (assuming sufficient headroom to charge) 2) At 50 MW active power import - SOR-o signal indicates 0 MW
179	TOR1-o Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of TOR1-o which is available. E.g. A unit has a maximum import capacity of 50 MW and a contracted TOR1-o capability of 50 MW. 1) At 0 MW active power output – TOR1-o Signal Indicates 50 MW (assuming sufficient headroom to charge) 2) At 50 MW active power import - TOR1-o signal indicate 0 MW
180	TOR2-o Availability (MW)	Analogue	TBC	DS3 System Service Signal Requirement - This signal identifies in real-time the remaining quantity of TOR2-o which is available. E.g. A unit has a maximum import capacity of 50 MW and a contracted TOR2-o capability of 50 MW. 1) At 0 MW active power output – TOR2-o Signal Indicates 50 MW (assuming sufficient headroom to charge) 2) At 50 MW active power import - TOR2-o signal indicate 0 MW
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182	Ambient Temperature on Site (°C)	Analogue	-20 to 0 to +50	Temperature on Site
183	Fire Alarm Operated (ON/OFF)	Digital		Fire Alarm Signal
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185	Average Temperature of all battery racks (°C)	Analogue	-40 to 120	Average Temperature of battery racks
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194	Island Detected Trip (RoCoF) (ON/OFF)	Digital		Alarm that the G59/G99 protection has operated
195	Customer Emergency Push Button	Digital		Indication that the Customer Emergency Push Button has operated and CB MP100 should have opened.

	Trip (ON/OFF)			
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