



## **SEB Accepted Relay List**

**Acceptable for Use on Systems of  
SARAWAK ENERGY BERHAD**

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**SEB Accepted Relay List**

The items shown in this SEB Accepted Relay List (ARL) includes protection relays, disturbance recorders and ancillary equipment used for transmission and distribution substation. The list stipulated in this document supersedes all preceding issues including revisions.

Any supplier/manufacturer who desire to have their items placed on the list, or any user believing an existing item should be removed from the list, or any communication calling attention to an error or omission in the list, such as an obsolete item, etc, should address to:

**Chief Executive Officer  
Syarikat SESCO Berhad  
A Subsidiary of Sarawak Energy Berhad  
Menara Sarawak Energy  
No. 1, The Isthmus, 93050 Kuching  
Sarawak, MALAYSIA.  
Tel: +6 082-388388  
Fax: +6 082-389983 / 082-344054**

**Attention: SEB Accepted Relay List (ARL)  
[Vice President, Transmission for Chief Executive Officer]  
[Senior Manager, Protection, Control and Instrumentation]**

Every effort has been made to ensure the accuracy of this document. However, in case of any discrepancies, records of Transmission Protection, Control & Instrumentation Division are the authoritative source.

ISSUED BY	Protection, Control & Instrumentation Division, Transmission Department
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## 1 Protection Relays

### 1.1 Current Differential Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Current Differential	Hitachi Energy / Sweden	RED670	RED670*2.2-F00X00- A00000000000001000- B41100000100000000110000000- C01000100100000000010000000- D11000010-T0000- E11000-F0-S0-G010-H00000000000- K01010110-L0000- M0010000-P00000000000000000- B1X0-CF-CB-B-A6X0- C①-PXXXXXXXXXAAXXY ① - BIM / BOM	2.2.5.11 (2.2.2.1)	500kV	
			1MRK002810-AG (Short Ordering Code for RED670)  RED670*2.2-F00X00- A00000000000001000- B41100000100000000110000000- C01000100100000000010000000- D11000010-T0000- E11000-F0-S0-G010-H00000000000- K01010110-L0000- M0010000-P00000000000000000- B1X0-CF-CB-B-A6X0- CD1AAXX-PXXXXXXXXXAAXXY		275kV and 132kV	<b>Ordering code for RED670 V2.2 if the remote end is using RED670 V1.1 :-</b>  RED670*2.2-F00X00- A00000000010000100- B41100000100000000110000000- C01000100100000000010000000- D11000010-T0000- E11000-F0-S0-G010- H00000000000-K01010110-L0000- M0010000-P00000000000000000- B1X0-CF-CB-B-A6X0- CD1AAXX-PXXXXXXXXXAAXX

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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Current Differential	SIEMENS / Berlin, Germany	7SL87	7SL87JAAAAA0008810A ① ② 1111211 ③ ④ ⑤ 000000AC0CH1BA1CJOC E0  ① Function Point Class ② Two-end/ Three-end/ Multi-end protection ③ Integrated Internet Port J ④ Protection interface module Port E ⑤ IEC61850 Communication module Port F	V08.81	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Engineering Tools Digi 5 Premium</li> <li>(b) USB 2.0 Cable</li> </ul>
	GE / Stafford, UK	P545	P545810A0S076AM	76 (Firmware) M (Hardware)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) MiCOM S1 Agile Software Communication Converter 2Mbps (P591602A0M0200B)</li> </ul>
	Schneider Electric / Wuxi, China	P545	P54521EA3M0H99M-SEB (without IEC61850) P54521QA6M0H99M-SEB (with IEC61850)	H9	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Easergy Studio Communication Converter 2Mbps (P-2M-L3A11A011A)</li> </ul>
	NR Electric / Nanjing, China	PCS-931	PCS-931-AACB-BA0XXBBXBBD0XA-EN-R3.40	3.30 (CRC:55A2D7DB)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>PCS Explorer V1.1.6 (Unlimited License)</li> <li>Communication Converter 2Mbps (MUX-2M)</li> </ul>

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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Current Differential	SIEMENS / Berlin, Germany	7SD82	7SD82JAAAAA0009710AC141112111 <b>① ②</b> 000000AB0HB1BD4JZ0  <b>①</b> Protection interface module <b>②</b> IEC61850/ Modbus TCP/ Modbus RTU Communication module	V9.71	33kV and below	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-               <ol style="list-style-type: none"> <li>Engineering Tools Digi 5 Premium (License to Purchase)</li> </ol> </li> </ul>
	NR Electric / Nanjing, China	PCS-9613	PCS-9613-AACB-A0AA0X0A-EN-R3.20	3.00 (CRC: F94D89D1)	33kV and below	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-               <ol style="list-style-type: none"> <li>PCS Explorer V1.1.6 (Unlimited License)</li> </ol> </li> <li>Relay model using communication converter is not acceptable; relay model with direct fiber connection shall be proposed.</li> </ul>

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1.2 Distance Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Distance Protection	SIEMENS / Berlin, Germany	7SA87	7SA87JAAAAA0008810A ① 011112 11 ② ③ ④ 000000AC0CH1BA1CJ0 CEO  ① Function Point Class ② Integrated Internet Port J ③ Protection interface module Port E ④ IEC61850 Communication module Port F	V08.81	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Engineering Tools Digi 5 Premium</li> <li>(b) USB 2.0 Cable</li> </ul>
	Schneider Electric / Wuxi, China	P443	P44321E03M0 H99M-SEB (if more binary inputs are required and without IEC61850)	H9	500kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Easergy Studio</li> <li>(b) Communication Converter 2Mbps (P-2M-L-3A11A011A)</li> </ul>
			P44321QF6M0H99M-SEB (with IEC- 61850)		275kV and 132kV	
			P44321EF3M0H99M-SEB			

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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Distance Protection	GE / Stafford, UK	Agile P443	P443810F0S076AM	76 (Firmware) M (Hardware)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Micom S1 Agile Software Version 1.20 and above</li> <li>(b) Communication Converter G.703 2Mbps (P591602A0M0200B)</li> </ul>
	NR Electric / Nanjing, China	PCS-902	PCS-902-AACB-BA0XXBBXBBD0XA-EN-R3.40	3.30 (CRC:925276E6)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) PCS Explorer V1.1.6 (Unlimited License)</li> <li>Communication Converter 2Mbps (MUX-2M)</li> </ul>



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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Distance Protection	Hitachi Energy / Sweden	REL670	REL670*2.2-F00X00- A0000000000000000000- B000000000000001000120000000- C01000100100000000020000000- D11000020-T0000- E11000-F0-S0-G010- H00000000000-K01010110-L0000- M0010000-P00000000000000000- B1X0-CF-CB-B-A6X0- C ①-PXXXXXXXXXAAXXX  ① - BIM / BOM	2.2.5.11 (2.2.2.1)	500kV	
			1MRK002812-AG (Short Ordering Code for REL670)  REL670*2.2-F00X00- A0000000000000000000- B000000000000001000120000000- C01000100100000000020000000- D11000020-T0000- E11000-F0-S0-G010- H00000000000-K01010110-L0000- M0010000-P00000000000000000- B1X0-CF-CB-B-A6X0- CD1AAXX-PXXXXXXXXXAAXXX		275kV and 132kV	

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1.3 Transformer Bias Differential Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Transformer Bias Differential Protection	GE / Stafford, UK	P643	P643820F0S006AM	06 (Firmware) M (Hardware)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>3 Windings</li> </ul>
	SIEMENS / Berlin, Germany	7UT86/ 7UT85	7UT85JAAAAA0008810A ① 01111211 ② AA ③ 000000AC0CC1BA1CE0 (2 Winding Transformer)  7UT86JAAAAA0008810A ① 01111211 ② AA ③ 000000AC0CC1BA1CH1 (3 Winding Transformer)  ① Function Point Class  ② Integrated Internet Port J  ③ IEC61850 Communication module	V08.81	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-                 (a) Engineering Tools Digi 5 Premium                (b) USB 2.0 Cable</li> </ul>
	NR Electric / Nanjing, China	PCS-978	PCS-978-ACCB-CBBXXAAXAA-EN-R3.42	1.67 (CRC:9D86D08A)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-                 PCS Explorer V1.1.6 (Unlimited License)</li> </ul>

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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Transformer Bias Differential Protection	Schneider Electric / Wuxi, China	P633	P633-8B9910H0-315-430-672-701-921-SEB (500kV without IEC61850)	315-430-672-701	500kV	• 3 Windings
			P633-8B9910H0-315-430-672-701-971-SEB (500kV with IEC61850)		275kV and 132kV	• 3 Windings
		P633-8B9910H0-315-430-672-701-971-SEB (132kV and 275kV without IEC61850)	275kV and 132kV			
	P632	P632-8B9010F0-315-420-672-701-921-SEB		315-420-672-701	275kV and 132kV	• 2 Windings
	Hitachi Energy / Sweden	RET670	RET670*2.2-F00X00-A0000100000000000000-B00000000000000000000000000000000-C010001001000000000100000000-D11010010-T0000-E00000-F0-S0-G000-H000000000000-K00000000-L0000-M0010000-P00000000000000000000-B1X0-CF-CB-B-A3X0-CD1AXXX-PXXXXXXXXXXXXXX	2.2.5.11 (2.2.2.1)	500kV	• 3 Windings

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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Transformer Bias Differential Protection	Hitachi Energy / Sweden	RET670	1MRK002816-AG (Short Ordering Code for RET670)	2.2.5.11 (2.2.2.1)	275kV and 132kV	• 2 Windings
			RET670*2.2-F00X00-A0001000000000000000-B00000000000000000000000000000000-C010001001000000000010000000-D11000010-T0000-E00000-F0-S0-G000-H000000000000-K00000000-L0000-M0010000-P00000000000000000000-B1X0-CF-CB-B-A3X0-CD1AXXX-PXXXXXXXXXXXXXXXXX			• 3 Windings
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR24	7SR2422-2NA11-0BA0	R8e-7e	33kV and below	• 2 Windings
	SIEMENS/ Berlin, Germany	7UT613	7UT6131-ØEB02-1AA0	4.65	33kV and below	

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Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Transformer Bias Differential Protection	Schneider Electric / Wuxi, China	P631	P631-4B900000-316-428-672-701-921-SEB	316-428-672-701 (Software Version)	33kV and below	
	ABB / Finland	RET 615	RET615 HBT DBABA NBA1 ANN 01G	5.0 FP1 (5.1.6)	33kV and below	
	NR Electric / Nanjing, China	PCS-9671	PCS-9671-BBCB-ACA00A-EN-R3.10	3.03 (CRC:98DF470D)	33kV and below	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) PCS Explorer V1.1.6 (Unlimited License)</li> </ul>

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1.4 Restricted Earth Fault Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
High Impedance Restricted Earth Fault Protection	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR1101	7SR1101-30A00-2CA0 *Pos 11 & 12 for IEC 61850	R4K-3d	500kV and below	
	GE / Stafford, UK	P14N-B	P14NB11A1B062BA (No IEC61850 Option) P14NB16A6C062BA (IEC61850 Option)	62	500kV and below	
	Schneider Electric / Wuxi, China	P3U20	P3U20-6AAA2A0CM	30.206	500kV and below	
	ABB / Finland	REB611	REB611HBA ABA 1NN 01G	2.0 (2.0.1)	33kV and below	
Low Impedance Restricted Earth Fault Protection	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	

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1.5 Busbar Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
High Impedance Busbar Protection	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR23	7SR2302-1NA77-0CA0D 7SR2300 = If more BI/BO is required	R8e-1c	500kV, 275kV and 132kV	
	GE /Stafford, UK	P14N-B	P14NB11A1B062BA (No IEC61850 Option) P14NB16A6C062BA (IEC61850 Option)	62	500kV and below	Added MVAJ101RB0800A for bus wire shorting contacts
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR23	7SR2302-1NA12-0CA0D	R8e-1c	33kV and below	
Centralized Low Impedance Busbar Protection	GE / Stafford, UK	P747	P747810B6S003AK	03	500kV and below	<ul style="list-style-type: none"> <li>MiCOM S1 Agile Software</li> <li>P747 per phase</li> <li>Reason S2020 Ethernet Switch</li> </ul>

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### 1.6 Overcurrent and Earth Fault Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Overcurrent and Earth Fault Protection	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR1103	7SR1103-10A00-2CA0 *Pos 11 & 12 for IEC 61850	R4K-3d	500kV and below	
	GE / Stafford, UK	P14N	P14NB10A000640A	64	500kV and below	
	SEL / USA	751A	For 110Vdc, 1A model: 751A11D1D0X0X810610 For 110Vdc, 5A model: 751A11D1D0X0X850610	R419	500kV, 275kV and 132kV	
	SIEMENS/ Berlin, Germany	7SJ612	7SJ6121-4EB91-1FA0+L0R	4.93	500kV, 275kV and 132kV	
	Schneider Electric / Wuxi, China	P3U20	P3U20-6AAA2A0CM	30.206	500kV, 275kV and 132kV	
	ABB / Finland	REF611	REF611 HBB ABA 1NA0 1G	2.0 (2.0.1)	275kV and below	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	



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### 1.7 Directional Overcurrent and Earth Fault Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Directional Overcurrent and Earth Fault Protection	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR1206	7SR1206-2A00-2CA0 *Pos 11 & 12 for IEC 61850	R4K-3d	500kV and below	
	GE / Stafford, UK	P14D	P14DB1A0C0640A	64	500kV and below	
	SIEMENS/ Berlin, Germany	7SJ622	7SJ6221-4EB91-1FC0+LOR	4.93	500kV and below	
	Schneider Electric / Wuxi, China	P3U30	P3U30-6AAA2B0CM	30.206	500kV, 275kV and 132kV	
	ABB / Finland	REF 615	REF615 HBF FAEAG NBA1 ANA0 1G	5.0 FP1 (5.1.6)	275kV and below	

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**1.8 Transformer Standby Earth Fault Protection Relay**

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Transformer Standby Earth Fault protection	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India)	7SR1101	7SR1101-10A00-2CA0 *Pos 11 & 12 for IEC 61850	R4K-3d	500kV and below	
	GE / Stafford, UK	P14N	P14NB10A000640A	64	500kV and below	
	Schneider Electric / Wuxi, China	P3U20	P3U20-6AAA2A0CM	30.206	500kV and below	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	

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1.9 Sensitive Earth Fault Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Sensitive Earth Fault Protection	SIEMENS / Berlin, Germany	7SJ612	7SJ6122-0EB92-1FB0	4.93	33kV and below	
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India)	7SR1101	7SR1101-30A12-2CA0	R4K-3d	33kV and below	

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1.10 Circuit Breaker Fail Protection Relay

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Circuit Breaker Failure Protection	Schneider Electric / Wuxi, China	P3U20	P3U20-6AAA2A0CM	30.206	500kV and below	
	SIEMENS / Berlin, Germany	7VK87	7VK87JAAAAA0008810A①01111211②AA③000000 AC0CH1BA1  ① Function Point Class ② Integrated Internet Port J ③ IEC61850 Communication module	V08.81	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Engineering Tools Digi 5 Premium</li> <li>(b) USB 2.0 Cable</li> </ul>
	Hitachi Energy / Sweden	REQ650	REQ650*1.3-A11X00-X00-B1X0-D-①-S②-E-SA3-AA③-F  ① - Mounting details ② - PSM ③ - BIM /BOM REQ650*1.3-A11X00-X00-B1X0-D-①-S②-E-SA3-AAXX-F  ① - Mounting details ② - PSM	1.3.5.1 (Firmware) 1.3.0.4 (Product Version)	500kV  275kV and 132kV	

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Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Circuit Breaker Failure Protection	GE /Stafford, UK	P841	P84181◇A◇S081AM	81	500kV, 275kV and 132kV	
	SEL /USA	751A	For 110Vdc, 1A model: 751A11D1D0X0X810610  For 110Vdc, 5A model: 751A11D1D0X0X850610	R419	33kV and below	
	SIEMENS / Berlin, Germany or Goa, India	7SR1103	7SR1103-1◇A12-2CA0	R4K-3d	33kV and below	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8 A)	33kV and below	

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**1.11 Over/Under Frequency Protection Relay**

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Over / Under Frequency	SEL /USA	751A	For 110Vdc model: 751A11D1D0X73810610	R419	500kV and below	
	Schneider Electric / Wuxi, China	P3U30	P3U30-6AAA2B0CM	30.206	500kV and below	
	SIEMENS / Berlin, Germany or Goa, India	7RW80	7RW8020-5EB96-1DA0+LOR	4.62	500kV, 275kV and 132kV	
		7RW80	7RW8020-5EB00-1DA0	4.62	33kV and below	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	

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1.12 Over/Under Voltage Protection Relay

Function	Manufacturer /Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Over / Under Voltage	SEL /USA	751A	For 110Vdc model: 751A11D1D0X73810610	R419	500kV and below	
	SIEMENS (REYROLLE) / Goa, India	7SR158	7SR1587 – 5HA12-2DA0/BB	2436H80011R4e-2a	500kV and below	
	Schneider Electric / Wuxi, China	P3U30	P3U30-6AAA2B0CM	30.206	500kV and below	
	SIEMENS / Berlin, Germany or Goa, India	7RW80	7RW8020-5EB96-1DA0+LOR	4.62	500kV, 132kV and 132kV	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	

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**1.13 Shunt Reactor High Impedance Circulating Protection Relay**

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Shunt Reactor High Impedance Circulating Protection	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR23	7SR2302-1NA77-0CA0D (Transmission)  7SR2302-1NA12-0CA0D (Distribution)  7SR230 $\diamond$ = If more BI/BO is required	R8e-1c	500kV and below	
	GE / Stafford, UK	P14N-B	P14NB11A1B062BA (No IEC61850 Option)  P14NB16A6C062BA (IEC61850 Option)	62	500kV and below	



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1.14 Autoreclose + Synchro-Check Relay

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Autoreclose + Synchro- check	SIEMENS/ Berlin, Germany	7VK87	7VK87JAAAAA0008810A ①011 11211 ②AA ③000000AC0CH1 BA1CE0  ① Function Point Class  ② Integrated Internet Port J  ③ IEC61850 Communication module	V08.81	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Engineering Tools Digsy 5 Premium</li> <li>(b) USB 2.0 Cable</li> </ul>
	Hitachi Energy / Sweden	REQ650	REQ650*1.3-A11X00-X00-B1X0- D- ①-S ②-E-SA3-AA ③-F  ① - Mounting details ② - PSM ③ - BIM /BOM	1.3.5.1 (1.3.0.4)	500kV	
			REQ650*1.3-A11X00-X00-B1X0- D- ①-S ②-E-SA3-AAXX-F  ① - Mounting details ② - PSM		275kV and 132kV	

**SEB Accepted Relay List**

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Autoreclose + Synchro- check	GE / Stafford, UK	P841	P841810A0S081AM	81	500kV, 275kV and 132kV	
	SEL /USA	751A	751A600000X00800000	R419	33kV and below	
	SIEMENS / Berlin, Germany or Goa, India)	7SR1103	7SR1103-10A12-2DA0	R4K-3d	33kV and below	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	
	Schneider Electric / Wuxi, China	P3U20	P3U20-6AAA2A0CM	30.206	33kV and below	

SEB Accepted Relay List

1.15 Synchro-Check Relay

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Synchronising Check	Schneider Electric / Wuxi, China	P3U30	P3U30-6AAA2B0CM	30.206	500kV and below	
	SIEMENS/ Berlin, Germany	7VK87	7VK87JAAAAA0008810A ① 0 1111211 ② AA ③ 000000AC 0CH1BA1  ① Function Point Class  ② Integrated Internet Port J  ③ IEC61850 Communication module	V08.81	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:-</li> <li>(a) Engineering Tools Digi 5 Premium</li> <li>(b) USB 2.0 Cable</li> </ul>
	SIEMENS / Berlin, Germany or Goa, India	7RW80	7RW8020-5EB96-1DC0+L0R	4.62	500kV, 275kV and 132kV	
	SIEMENS (REYROLLE) / Goa, India	7SR157	7SR1578-50A12-2CAO/BB	2436H80010R4e-2a	275kV and below	
	SIEMENS / Berlin, Germany or Goa, India	7VK61	7VK6101-0AB02-4YNO	4.71	33kV and below	

**SEB Accepted Relay List**

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Synchronising Check	SIEMENS / Berlin, Germany or Goa, India	7RW80	7RW8020-5EB00-1DC0	4.62	33kV and below	
	SEL /USA	751A	751A500000X72800000	R419	33kV and below	
	NR Electric / Nanjing, China	PCS-9691	PCS-9691-AACA-AAAAAA	1.16 (CRC:61EBFE8A)	33kV and below	

SEB Accepted Relay List

**1.16 Capacitor Bank Protection Relay**

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Capbank Overall Differential Protection	Hitachi Energy / Sweden	RET670	RET670*1.2-A30X00-D03-B1X0- AF-KB-B-A3-①-XXX-XD  ① - BIM / BOM	1.2	500kV	
			1MRK 004 816-AC (Short Ordering Code for Capbank RET670)  RET670*1.2-A30X00-D03-B1X0- AF-KB-B-A3-DIAA-XXX-XD		275kV and 132kV	
	SIEMENS / Berlin, Germany	7UT613	7UT6131-4EB91-1AA0+LOR	4.65	500kV, 275kV and 132kV	
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR23	7SR2303-10A00-0CA0	R8e-1c	500kV, 275kV and 132kV	
1. Capacitor unbalance 2. Thermal overload protection 3. Reactor thermal overload protection 4. Resistor thermal overload 5. Resistor open circuit protection	SIEMENS (REYROLLE) / Goa, India	7SR191	7SR1916-1HA12-2CAO (no IEC 61850)  7SR1916-1HA77-2CAO (with IEC 61850)	R4e-2a	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Function: a) Capacitor Bank Unbalance Protection</li> </ul>

**SEB Accepted Relay List**

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
	SIEMENS (REYROLLE) / Goa, India	7SR1206	7SR1206-2A00-2CA0 *Pos No 11 & 12 option for IEC 61850	R4K-3d	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Function:</li> <li>a) Reactor Thermal Overload Protection</li> </ul>
	SIEMENS (REYROLLE) / Goa, India	7SR1103	7SR1103-1A00-2CA0 *Pos No 11 & 12 option for IEC 61850	R4K-3d	500kV, 275kV, and 132kV	<ul style="list-style-type: none"> <li>Function:</li> <li>a) Resistor Thermal Overload Protection</li> <li>b) Resistor Open Circuit Protection</li> </ul>
1. Capacitor unbalance/ thermal overload protection 2. Reactor thermal overload protection 3. Resistor thermal overload /open circuit protection	TRENCH /Austria	CPR 04	CPR4-00-110	4v81 (Software Version: 5v1)	275kV and 132kV	<ul style="list-style-type: none"> <li>Function:</li> <li>(a) Capacitor Bank Unbalance Protection</li> <li>(b) Capacitor Bank Thermal Overload Protection</li> <li>(c) Reactor Thermal Overload Protection</li> <li>(d) Resistor Thermal Overload Protection</li> <li>(e) Resistor Open Circuit Protection</li> </ul>
	Schneider Electric / Wuxi, China	P3U30	P3U30-6AAA2B0CM	30.206	500kV and below	<ul style="list-style-type: none"> <li>Function:</li> <li>(a) Capacitor Bank Unbalance Protection</li> <li>(b) Capacitor Bank Thermal Overload Protection</li> </ul>

SEB Accepted Relay List

### 1.17 Stub Protection Relay

Function	Manufacturer/ Country	Relay Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Stub Protection	GE / Stafford, UK	P14N	P14NB10A00064AA	64	500kV and 275kV	Added MVAJ101RB0800A for bus wire shorting contacts
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	7SR23	7SR2302-1NA77-0CA0D  7SR2300 = If more BI/BO is required	R8e-1c	500kV and 275kV	

SEB Accepted Relay List

## 2 Disturbance Recorder

Function	Manufacturer/ Country	Model	Ordering Code	Firmware Version	Voltage Limit	Remarks
Disturbance Recorder	QUALITROL / Northern Ireland / UK	BEN 6000	BEN 6000	2.5.25	500kV and below	
	SIEMENS/Berlin, Germany	7KE85	7KE85-JAAA-AA0-0AAAA0- AA8111-13113A-AAA000- 000AC1-CB1BA1-CB1CB1- CB1CB1-BC1CG0-◇◇◇	9.64	500kV and below	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software: -</li> <li>(a) DIGSI 5 software premium</li> <li>(b) SICAM PQ Analyzer (PQA) software Ver 3.21</li> <li>(c) SICAM PQS/PAS (Data Concentrator) Ver 8.21</li> <li>(d) GPS Clock</li> <li>(e) Ethernet Switch</li> </ul>
	NR Electric / China	PCS-996	PCS-996RC-R4.08 PCS-996RA-4.08	4.08 (CRC: B703A1A0)	500kV, 275kV and 132kV	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software: -</li> <li>(a) PCS-PC5 Tools Software</li> <li>(b) DFR Manager Software</li> <li>(c) DFR Helper</li> <li>(d) GPS Clock NR PCS-9785</li> </ul>



SEB Accepted Relay List

### 3 Ancillary Equipment

#### 3.1 Trip Circuit Supervision Relay

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks
Trip Circuit Supervision	GE / Stafford, UK	MVAX31	MVAX31S1DE0754A	500kV and below	
	SIEMENS / Europe	7PA3032	7PA3032-1AA00-1	500kV and below	(a) Single phase
	Schneider Electric / Spain	REL913	REL91323	500kV and below	
	RMS / Australia	ALPHA	XR5-◇◇ -1/4/6◇ (ALPHA XR Series)	500kV and below	
	ARTECHE / Spain	VDF	VDF10	500kV and below	
	ABB / Sweden	SPER IBI	-	33kV and below	

SEB Accepted Relay List

3.2 Lockout Relay

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks	
Lockout	GE / Stafford, UK	MVAJ105	MVAJ105RA0800B	500kV and below	(a) Voltage rating: 110/125V	
	SIEMENS / Europe	7PA2231	7PA2001-1	500kV and below		
	RMS/ Australia	ALPHA/ DELTA/ 6RJ	TR 5/12 - 00 - 1/2/3/4 0 (ALPHA TR Series)		500kV and below	
			AR 5/12 - 00 - 1/2/3/4 0 (ALPHA AR Series- 1 element)			
			AR25 - 00 - 1/2/3/4 0 (ALPHA AR Series- 2 element)			
			TRD-400 (DELTA TRD Series)			
			6RJ25-20-00 (6RJ Series)			
	Schneider Electric / Spain	REL912	REL91263 (4 changeover contacts)		500kV and below	
			REL91283 (8 changeover contacts)			
	ARTECHE / Spain	B00RP	BF4RP (4 changeover contacts)		500kV and below	
			BJ8RP (8 changeover contacts)			
			BJ10RP (10 changeover contacts)			

SEB Accepted Relay List

3.3 Tripping Relay

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks	
Tripping	Hitachi Energy / India	RXMS	RXMS1 RK216 x63-AN	500kV and below		
	SIEMENS/ Europe	7PA2732	7PA2002-0AA00-0	500kV and below		
	SIEMENS/ Berlin, Germany or Goa, India	TR221	7PG1522-1HA40-1AF0	500kV and below		
		AR 011	7PG1101-1EA10-0C00			
	RMS/ Australia	ALPHA/ DELTA	TR 5/12 - 00 - 1/2/3/4 0 (ALPHA TR Series)		500kV and below	
			AR 5/12 - 00 - 1/2/3/4 0 (ALPHA AR Series- 1 element)			
			AR 25 - 00 - 1/2/3/4 0 (ALPHA AR Series-2 element)			
			TRD-400 - (DELTA TRD Series)			
	Schneider Electric / Spain	REL912	REL91203 (4 changeover contacts)		500kV and below	
			REL91223 (Fast trip relay with 4 changeover contacts)			

**SEB Accepted Relay List**

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks
Tripping	GE / Stafford, UK	MVAJ05	MVAJ051RA0800B (5 Contact)	500kV and below	
			MVAJ101RA0800A (10 Contact)		
	ARTECHE / Spain	R00R OP01000	RF4R OP01000 (4 changeover contacts)	500kV and below	
			RJ8R OP01000 (8 changeover contacts)		
			RI16R OP01000 (16 changeover contacts)		

SEB Accepted Relay List

3.4 Test Terminal Block

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks
Test Terminal Block	Hitachi Energy / India	RTXP 18/24	a) Test Socket: i. RTXP 18 RK926-115-00 ii. RTXH 24 RK926 315-00 b) Test Plug: i. RTXH 18 RK926 011-BC ii. RTXH 24 RK926 016-AA	500kV and below	
	GE / Stafford, UK	MMLG01	<ul style="list-style-type: none"> <li>• Test Block: MMLG01R1AB0001E</li> <li>• Test Plug: MMLB01AXAA0011E</li> </ul>	500kV and below	
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	2RMLG07	<ul style="list-style-type: none"> <li>• Test Socket: 7XG2220-3AA00-0AA0</li> <li>• Test Plug: 7XG2240-3AA00-0AA0</li> </ul>	500kV, 275kV and 132kV	
	RMS/ Australia	4M Series	<ul style="list-style-type: none"> <li>• Test Socket: 4M400-00</li> <li>• Test Plug: 4M420-0</li> </ul>	500kV, 275kV and 132kV	
	Schneider Electric / Spain	ETB14	<ul style="list-style-type: none"> <li>• Test Socket: ETB14000000000000000-V</li> <li>• Test Plug: ETB14PV</li> </ul>	500kV and below	
	ARTECHE / Spain	TSB14	<ul style="list-style-type: none"> <li>• Test Block: TSB-14-0000000000000000-V (Ordering Code for Manual CT Shorting: TSB-14-11111111111111-V)</li> <li>• Test Plug: TSB-14-P-V</li> </ul>	500kV and below	Manual CT Shorting is required for 33kV and below

**SEB Accepted Relay List**

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks
Test Terminal Block	ARTECHE / Spain	TSB18	<ul style="list-style-type: none"> <li>Test Block: TSB-18-00000000000000000000-V (Ordering Code for Manual CT Shorting: TSB-18-11111111111111111111-V)</li> <li>Test Plug: TSB-18-P-V</li> </ul>	500kV and below	Manual CT Shorting is required for 33kV and below
	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	2RMLG01	<ul style="list-style-type: none"> <li>Test Socket: 7XG2220-1AA00-0AA0</li> <li>Test Plug: 7XG2240-1AA00-0AA0</li> </ul>	33kV and below	
	RMS / Australia	4M Series	<ul style="list-style-type: none"> <li>Test Block: 4M200-01</li> <li>Test Plug: 4M220-00</li> </ul>	33kV and below	

SEB Accepted Relay List

### 3.5 DC Supervision Relay

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks
DC Supervision	SIEMENS (REYROLLE) / Berlin, Germany or Goa, India	XR152	7PG1741-3BD10-4AA0	500kV and below	
	Schneider Electric / Spain	REL913	REL91344	500kV and below	
	RMS / Australia	Delta XRD Series	XRD-400	500kV and below	
	GE / Stafford, UK	MVAX12	MVAX12R1CB0750A	500kV and below	
	ARTECHE / Spain	RUT4	RUT40P	500kV and below	

SEB Accepted Relay List

#### 4 Substation Interrogation and Monitoring System

Function	Manufacturer/ Country	Model	Ordering Code	Voltage Limit	Remarks
Substation Interrogation and Monitoring system	Malaysia	Advance Remote Access Commander (ARAC)	NA	132kV and above	<ul style="list-style-type: none"> <li>Mandatory Accessories &amp; Software:               <ol style="list-style-type: none"> <li>ARAC Interrogation Software</li> </ol> </li> </ul>

**Important Note:**

1. The recommended relay ordering no. indicated by  $\diamond$  are to be specified based on actual installation requirement / SEB application.
2. The protection relay manufacturer/supplier shall provide 10 years product warranty from the date of supply. Faulty relays shall be collected from and replacement shall be delivered to SEB office without cost to SEB.
3. The Disturbance recorder manufacturer/supplier shall provide 5 years product warranty from the date of supply. Faulty disturbance recorders shall be collected from and replacement shall be delivered to SEB office without cost to SEB.
4. The ancillary equipment manufacturer/supplier shall provide 5 years product warranty from the date of supply. Faulty ancillary equipment shall be collected from and replacement shall be delivered to SEB office without cost to SEB.