

848333/2021/O/o PED/TI/RDSO

Reason document for the final draft Specification no TI/SPC/PSI/PROTCT/6072 for Control and Relay Panel For 25 kV AC TSS including Numerical Type Protection Relays for Traction Transformer, OHE Protection, 25 kV Shunt Capacitor Bank and Transmission line for 25 kV AC TSS on Indian Railways

Clause No.	Description	Comments Received from	RDSO's remark																
Page 2	<p>SPECIFICATION No. TI/SPC/PSI/PROTCT/6072</p> <table border="1"> <thead> <tr> <th>Amendment Number</th> <th>Amendment /Revision</th> <th>Total pages including drawings</th> <th>Date of Issue</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Revision 1</td> <td>79</td> <td>--</td> </tr> </tbody> </table>	Amendment Number	Amendment /Revision	Total pages including drawings	Date of Issue	0	Revision 1	79	--	<p><u>M/S ALIND</u></p> <p>SPECIFICATION No. TI/SPC/PSI/PROTCT/6072</p> <table border="1"> <thead> <tr> <th>Amendment Number</th> <th>Amendment /Revision</th> <th>Total pages including drawings</th> <th>Date of Issue</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Revision 1</td> <td>66</td> <td>--</td> </tr> </tbody> </table> <p>Wrongly mentioned</p>	Amendment Number	Amendment /Revision	Total pages including drawings	Date of Issue	0	Revision 1	66	--	Firm comment may be accepted as total pages including drawings is wrongly mentioned.
Amendment Number	Amendment /Revision	Total pages including drawings	Date of Issue																
0	Revision 1	79	--																
Amendment Number	Amendment /Revision	Total pages including drawings	Date of Issue																
0	Revision 1	66	--																
Page 3	8.0 Tests	<p><u>M/S ALIND</u></p> <p>8.0 Testing of C&R Panel and Numerical Relays</p> <p>Typo error</p>	Firm comment may be accepted																
1.2	The latest protocol for communication of protective relays is IEC 61850. Efforts are made to implement the Control & Relay Panel incorporated with protective relays communicating with RTU on IEC 61850. The RTU & communicable relays approved are communicating on IEC 60870-4-103 which is very old protocol and may not support other devices in future in the substation, hence it is the need of hour to implement the IEC 61850 compliant Protective Relays and SCADA interfaced with RTU based on IEC 61850 protocol.	<p><u>M/S ALIND</u></p> <p>IEC 61850 is not recommended for the Railways.</p> <p>IEC 61850 is basically used for within substation communication and interoperability in complex substations. In Indian Railways context, TSS protections are not complex and also well defined. Hence the interoperability within the substation will be redundant. IEC 61850 for external communication for SCADA/SAS depends on IEC 60870-104 protocol only. The Number of devices that current RS 485 based systems can handle is much higher than the number of systems in each substation of Indian Railways thus limiting any advantage of Ethernet based IEC 61850. This will only</p>	<p>Firm comment may not be accepted as,</p> <ol style="list-style-type: none"> 1. IEC 61850 protocol is latest and most of the utilities are using this protocol. DFCCIL is also using this protocol for communication between IEDs & RTU. 2. As per CEA notification August, 2010, all main protection relays provided for transmission lines, transformers and bus-bar shall be numerical type and communication protocol shall be as per IEC 61850/relevant IS. 3. We should encourage for adopting 																

		<p>add a layer of complexity without an actual benefit since for all external communications, the RTU will use 104 Protocol thus losing the added benefits of IEC61850. Only systems internal to the substations can communicate with IEC61850. All protections in the single TSS being much smaller in nature than other complex substations like in power grids and utilities etc., IEC 61850 will only add complexity and redundancy to the existing system. IEC 60870-103 can also be mapped to Ethernet based systems like IEC 61850. Hence until and unless there is any practical need for extensive and critical within substation communication of large number of systems, IEC 61850 will remain redundant only. Diving directly to a newer system may have severe impact in the day to day operations and management</p>	latest protocol.
		<p><u>M/S ASHIDA</u> Not required</p> <p>IEC 61850 protocol mainly offers great deal of flexibility in protection scheme. Using GOOSE, interlocks can be rearranged without physical wiring change. This is a big advantage in a complex & customized protection. However, for Indian Railways sub-stations, which are highly standardized, where all TSS have same protection, this would not offer any advantage. In fact it will only add a layer of complexity, which current staff may not be ready for. This is based on our experience with IEC61850 sub-station automation / SCADA system that we have supplied to various utilities. Further IEC61850 based Sub-station automation Systems can provide a local mimic at sub-station level, which in case of unmanned TSS is of no use. Remote control, even in case of IEC61850 based SAS, uses IEC104 protocol. IEC61850 is not suitable for communication beyond a single sub-station.</p>	<p>Firm comment may not be accepted as,</p> <ol style="list-style-type: none"> 1. IEC 61850 protocol is latest and most of the utilities are using this protocol. DFCCIL is also using this protocol for communication between IEDs & RTU. 2. As per CEA notification August, 2010, all main protection relays provided for transmission lines, transformers and bus-bar shall be numerical type and communication protocol shall be as per IEC 61850/relevant IS. 3. We should encourage for adopting latest protocol.
1.4	New RE work or simultaneously replacement of both, control & relay panels and SCADA system, the communication between RTU and relays shall be on IEC 61850 protocols only.	<p><u>M/S ALIND</u> IEC 61850 is not recommended for the Railways</p> <p>Please refer to comment for point no. 11.3 (1.2)</p>	Refer RDSO's remark on para 1.2 above.
1.5	The vendor is free to develop control & relay	<u>M/S ALIND</u>	Refer RDSO's remark on para 1.2

848333/2021/O/o PED/TI/RDSO

	<p>panel incorporated with numerical relays communicating with SCADA on IEC 60870-5.103 or IEC 61850 or both. The C&R Panel incorporated with numerical relays and associated relays shall be approved according to the IEC protocol adopted by the vendor. The status of approval in the master list of RDSO approved vendor shall be mentioned along with IEC/IECs protocol, which the manufacturer has requested for.</p> <p>The relays are governed by this specification; hence the procurement of loose relays can also be done by the Railways as per requirement from the approved vendor of C&R Panel appearing in the existing RDSO's Vendor Directory.</p>	<p>IEC 61850 is not recommended for the Railways</p> <p>Please refer to comment for point no. 11.3 (1.2)</p>	<p>above.</p>
		<p><u>M/S ASHIDA</u> Not required</p> <p>Like IEC61850 that can be mapped to number of automation protocols, current IEC60870-5- 103 can also be mapped to protocols liked IEC61850-5-104 which is a high speed Ethernet based protocol. Thus IEC 61850 offers no advantage here. In fact current RDSO standard 0130 Rev2 specifies in details mapping between IEC103 & 104 protocols. Same is proved at numerous sub-stations currently Number of devices even in most complicated TSS would not exceed 24 devices. So limit of 32 devices on RS-485 is quite safe. Further it is possible to use fibreoptic cables for communication even for IEC103 protocol.</p>	<p>Refer RDSO's remark on para 1.2 above.</p>
3.0	<p>SERVICE CONDITIONS Max. & Minimum relative humidity: $\geq 97\%$ & 22%</p>	<p><u>M/S APPSIL</u> 3.0 SERVICE CONDITIONS Max. & Minimum relative humidity as per IEC 60068-2-30 : $\geq 97\%$ & 10% . All the destructive tests in the relay shall be as per IEC 60255.</p>	<p>Firm comment may be accepted</p>
4.0	<p>Governing specification: 1. IEC 61850 2. IEC 61850-8-1:2011/AMD1:2020</p>	<p><u>M/S ALIND</u> IEC 61850 is not recommended for the Railways. Include 60255-26: Electromagnetic compatibility requirements in</p>	<p>1. Refer RDSO's remark on para 1.2 above. 2. IEC 60255-26 added in the final</p>

				the governing specification. Please refer to comment for point no. 11.3	draft.			
4.0	3	IEC 61850-8-1:2011/AMD1:2020	Communication networks and systems for power utility automation –Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3	<p><u>M/S ALIND</u></p> <table border="1"> <tr> <td>3</td> <td>IEC 60255-24</td> <td>Measuring relays and protection equipment - Part 24: Common format for transient data exchange (COMTRADE) for power systems</td> </tr> </table> <p>IEC 61850-8-1:2011 does not indicate any structure or format of DR ‘COMTRADE’ file. The same is mentioned in IEC 60255-24 and IEEE C37.111-1999 only.</p>	3	IEC 60255-24	Measuring relays and protection equipment - Part 24: Common format for transient data exchange (COMTRADE) for power systems	Firm comment may not be accepted as IEC 60255-24 is referred in IEC 61850-8-1 for Common format for transient data exchange (COMTRADE). Hence, IEC 61850-8-1 can be mentioned as reference IEC.
3	IEC 60255-24	Measuring relays and protection equipment - Part 24: Common format for transient data exchange (COMTRADE) for power systems						
4.0 (4)	IS 3231			<p><u>M/S ASHIDA</u> IEC 60255-26</p> <p>Obsolete by BIS</p>	Firm comment may be accepted as IS 3231 has been obsolete.			
4.0 (5)	IS 8686			<p><u>M/S ASHIDA</u> IEC 60255-26</p> <p>Obsolete</p>	<ol style="list-style-type: none"> 1. Firm comment may not be accepted as IS 8686 is an active standard. Further following has also corrected: 2. The IS 3156 referred for voltage transformer is not correct, the same has been replaced by 16227-3 3. IS 9224-HRC fuse deleted as it is not active standard. 4. IS 6875 replaced by 4794, as IS6875 is not active. 5. IS 1885 added for control switch. 6. IS 12083 I & II deleted as it is 			

			not active standard. 7. IS 17064 for electromechanical elementary relay-reliability added in addition to IEC 61810-2
4.0 (25)	IEC 60255-27 Product safety requirement	<u>M/S ASHIDA</u> Already mention in point 20, Insulation is part of safety test	Insulation coordination for measuring relays and protection equipment - Requirements and tests is the part of product safety requirement as per IEC 60255-27. This IEC is already appearing in the list. Firm requested may be accepted for deletion.
4.0 (26).	IEC 60255-26 Electromagnetic compatibility requirement	<u>M/S ASHIDA</u> Must be retail. this is active specification	Firm comment may be accepted.
5.1.2	The control and relay panel shall have modular construction to facilitate ease of expansion and replacement. The instruments, control switches, annunciation window, main protection relays, meters, mimic and indicating lamps shall preferably be mounted on front side of the control panels.	<u>M/S APPSIL</u> The control and relay panel shall have modular construction to facilitate ease of expansion and replacement. The instruments, control switches, annunciation window, main protection relays, meters, mimic and indicating lamps shall preferably be mounted on front side of the control panels. Supporting note: Control & Relay Panels with Bay Control Unit offers the advantages of controlling the switchgear from IED improves overall reliability at a reduced space occupancy when compared to conventional system.	Firm comment may not be accepted as Bay control unit generally provides at sub-station where control operation of switchgear carried out locally. In Indian Railway traction system, operation of switchgears are generally carried out through SCADA from centralized location called RCC located at division level.
5.3	MIMIC DIAGRAM 5.3.1 The scheme of connections at the traction sub-station (including feeding post) showing the circuit breakers, transformers, isolators and interrupters shall be represented by a single line mimic diagram on the control panel. The color of the bus bar (mimic) shall be signal red to shade 537 of IS:5 for 220/132/110/66 Kv, golden yellow to shade 356 of IS:5 for 25 Kv and black for 240V. The mimic diagram shall be made of aluminum strip or reflector PVC strip and fixed on the panel. The width of the	<u>M/S APPSIL</u> MIMIC DIAGRAM 5.3.1 The scheme of connections at the traction sub-station (including feeding post) showing the circuit breakers, transformers, isolators and interrupters shall be represented by a single line mimic diagram on the control panel. The color of the bus bar (mimic) shall be signal red to shade 537 of IS:5 for 220/132/110/66 Kv, golden yellow to shade 356 of IS:5 for 25 Kv and black for 240V. The mimic diagram shall be made of aluminum strip or reflector	Firm comment may not be accepted as Bay control unit generally provides at sub-station where control operation of switchgear carried out locally. In Indian Railway traction system, operation of switchgears are generally carried out through SCADA from centralized location called RCC located at division level.

	<p>mimic shall be of 8mm. The successful tenderer will be required to submit his proposal for layout of equipment on the control panel to the purchaser for his approval.</p> <p>5.3.2 Automatic semaphore LED type indication shall be incorporated in the mimic diagram to indicate the ON/OFF position of circuit breakers and interrupters.</p> <p>5.3.3 The position of 220/132/110/66 Kv and 25 Kv isolators shall be represented on the mimic diagram by manually operated semaphore switches.</p>	<p>PVC strip and fixed on the panel. The width of the mimic shall be of 8mm. The successful tenderer will be required to submit his proposal for layout of equipment on the control panel to the purchaser for his approval.</p> <p>5.3.2 Automatic semaphore LED type indication shall be incorporated in the mimic diagram to indicate the ON/OFF position of circuit breakers and interrupters.</p> <p>5.3.3 The position of 220/132/110/66 Kv and 25 Kv isolators shall be represented on the mimic diagram by manually operated semaphore switches.</p> <p>For the Control panel with BCU, only common alarm lamp shall be provided for each Control panel. Each BCU of the control panel shall energize this common alarm lamp on occurrence of alarms/Trips. All alarms shall be available in the BCU mimic/HMI.</p> <p>Supporting note: We request RDSO to consider Control & relay Panel with Bay Control Unit which will have MIMIC using Large HMI in Bay Control IED in line with RDSO requirement. This will avoid any additional panel requirement and reduces space requirement for Control & Relay Panel solution.</p>	
5.1.5	<p>The panel shall be fabricated from sheet steel of thickness not less than 3.0 mm for front, rear, doors and base panels, and not less than 2.0 mm for side, roof and door panels.</p>	<p><u>M/S ALIND</u></p> <p>The panel shall be fabricated from sheet steel of thickness not less than 3mm for front, rear, door panel and base panels, and not less than 2.0 mm for side, roof and doors.</p> <p>Typo error</p>	Firm comment may be accepted.

		<p><u>M/S ASHIDA</u> The panel shall be fabricated from sheet steel of thickness not less than 3.0 mm for front, rear, door Frame and base Frame, and not less than 2.0 mm for side, roof and door panels.</p>	Firm comment may be accepted.
5.1.9	The exterior and base frame of the panel shall be coated with industrially accepted Siemens gray shade and interior surfaces of the panels shall be epoxy powder coated of white color followed by at least 200-degree bake ovening.	<p><u>M/S ASHIDA</u> The exterior and base frame of the panel shall be coated with industrially accepted Siemens gray shade (RAL 7032) and interior surfaces of the panels shall be epoxy powder coated of white color followed by at least 200-degree bake ovening</p>	Firm comment may be accepted.
5.1.9	The sheet steel as well as other steel works shall be properly treated and then an under coat suitable to serve as base and binder for the finishing coat shall be applied. The exterior and base frame of the panel shall be coated with industrially accepted Siemens gray shade and interior surfaces of the panels shall be epoxy powder coated of white color followed by at least 200-degree bake ovening.	<p><u>M/S APPSIL</u> The sheet steel as well as other steel works shall be properly treated and then an under coat suitable to serve as base and binder for the finishing coat shall be applied. The exterior and base frame of the panel shall be coated with industrially accepted Siemens gray shade and interior surfaces of the panels shall be epoxy powder coated of white color followed by at least 180-degree bake ovening.</p>	Firm comment may be accepted
5.4.5	Power factor meter shall have range of lagging 0.5 to leading 0.5 in suitable span, with accuracy +/- 1%.	<p><u>M/S ASHIDA</u> Power factor meter shall have range of lagging 0.5 to leading 0.5 in suitable span, with accuracy $\pm 2^\circ$ (0.1 Lag...1...0.1 Lead)</p>	Comments may be accepted as +/-1 % accuracy of Power factor meter is generally not available easily in the market. Range of power factor meter Lag. 0.1 to Lead 0.1 will useful to display power factor below 0.5 also.

5.4	<p>INDICATING INSTRUMENTS</p> <p>5.4.1 Scalable 4 digits bright red LED display digital Ammeters, Voltmeters and power factor meters shall be provided as indicated in Annexure- D. The instruments shall be of the switchboard type, back connected, suitable for semi- flush or flush panel mounting, provided with dust tight cases of IP 54-52 class.</p>	<p>M/S APPSIL</p> <p>INDICATING INSTRUMENTS</p> <p>5.4.1 Scalable 4 digits bright red LED display digital Ammeters, Voltmeters and power factor meters shall be provided as indicated in Annexure- D. The instruments shall be of the switchboard type, back connected, suitable for semi- flush or flush panel mounting, provided with dust tight cases of IP 54—52 class.</p> <p>For the Control panel with BCU, only common alarm lamp shall be provided for each Control panel. Each BCU of the control panel shall energize this common alarm lamp on occurrence of alarms/Trips. All alarms shall be available in the BCU mimic/HMI.</p> <p>Supporting note: All the required Indication to be provided at BCU front HMI. Hence discrete Indicating LEDs are not required.</p>	<p>Firm comment may not be accepted as Bay control unit generally provides at sub-station where control operation of switchgear carried out locally.</p> <p>In Indian Railway traction system, operation of switchgears are generally carried out through SCADA from centralized location called RCC located at division level.</p>
5.5	<p>ANNUNCIATION</p> <p>5.5.1 Red LEDs and bell, both operating on 110 V d.c. supply, shall be provided on the control panel for giving individual visual and audible alarm whenever any of the protective relays operates. The visual alarm shall be of flasher type, which shall continuously flicker till acknowledged, after which it shall only glow. The annunciation LEDs shall be provided on the control panel at the top in suitable number of rows for concerned transformer/circuit-breaker/PT etc. The alarm accepting, visual resetting and annunciation testing buttons shall be mounted on the control panel at a convenient place & height. The alarm bell shall be mounted inside the control board.</p> <p>5.5.2 The tenderer shall clearly specify in his offer detailed technical description of the annunciation clearly bringing out the type of annunciator being provided by him with detailed technical description of the annunciator.</p>	<p>M/S APPSIL</p> <p>ANNUNCIATION</p> <p>5.5.1 Red LEDs and bell, both operating on 110 V d.c. supply, shall be provided on the control panel for giving individual visual and audible alarm whenever any of the protective relays operates. The visual alarm shall be of flasher type, which shall continuously flicker till acknowledged, after which it shall only glow. The annunciation LEDs shall be provided on the control panel at the top in suitable number of rows for concerned transformer/circuit-breaker/PT etc. The alarm accepting, visual resetting and annunciation testing buttons shall be mounted on the control panel at a convenient place & height. The alarm bell shall be mounted inside the control board.</p> <p>5.5.2 The tenderer shall clearly specify in his offer detailed technical description of the annunciation clearly bringing out the type of annunciator being provided by him with</p>	<p>Firm comment may not be accepted as Bay control unit generally provides at sub-station where control operation of switchgear carried out locally.</p> <p>In Indian Railway traction system, operation of switchgears are generally carried out through SCADA from centralized location called RCC located at division level.</p>

	<p>5.5.3 Annunciation shall be arranged for the following fault conditions as applicable for each circuit. There shall be 20 % spare windows available at the annunciator window to cater for future provisions.</p>	<p>detailed technical description of the annunciator. 5.5.3 Annunciation shall be arranged for the following fault conditions as applicable for each circuit. There shall be 20 % spare windows available at the annunciator window to cater for future provisions.</p> <p>For the Control panel with BCU, only common alarm lamp shall be provided for each Control panel. Each BCU of the control panel shall energize this common alarm lamp on occurrence of alarms/Trips. All alarms shall be available in the BCU mimic/HMI.</p> <p>Supporting Note : In the Proposed Solution for Control & Relay Panel with BCU (Bay Control Unit) and (Protection IED) suitable LED indication will be available for Annunciation purpose for various events. Hence a dedicated / standalone Annunciation System will not be required.</p>	
5.5.3	<p>4) Transformer Buchholz trip. 5) Transformer oil temperature trip. 6) Transformer winding temperature trip. 7) Transformer pressure relief device trip.</p>	<p><u>M/S ASHIDA</u> TRANSFORMER FAULTS - TRIP</p> <p>Nomenclature will be provided on Flag of 4 Element Auxiliary relays.</p>	<p>Firm Comment may be accepted as name on flag for auxiliary relay provides better visualization.</p>
5.5.3	<p>8) Transformer Buchholz alarm. 9) Transformer oil temperature alarm. 10) Transformer winding temperature alarm. 11) Transformer low oil level alarm.</p>	<p><u>M/S ASHIDA</u> TRANSFORMER FAULTS - ALARM</p> <p>Nomenclature will be provided on Relays Display. It will reduce no. of windows and size of Annunciator.</p>	<p>Firm comment may not be accepted as display of transformer trip on annunciation window provides attention to operator regarding tripping of transformer on particular fault.</p>
5.7.9	<p>In addition to above, the relevant general design feature as specified for numerical relays in para shall also be applicable.</p>	<p><u>M/S ALIND</u> In addition to above, the relevant general design feature as specified for numerical relays in para 6.4 shall also be</p>	<p>Firm comment may be accepted.</p>

		applicable. Typo error	
5.8	The numerical relays associated with breakers shall have facility to monitor the continuity and the availability of dc supply to the trip circuit of each circuit breaker, necessary indication and alarm of this shall be made available on the panel by a LED and annunciation.	<u>M/S ASHIDA</u> The numerical relays associated with breakers shall have facility to monitor the continuity and the availability of dc supply to the trip circuit of each circuit breaker, necessary indication and alarm of this shall be made available on the panel by a LED or annunciation.	Firm comment may be accepted as this a typographical error. LED or annunciation serve the purpose for monitoring of trip circuit..
5.9.2	Line potential connected to 25 kV PT type-I (indication type) - Red	<u>M/S ASHIDA</u> Line potential connected to 25 kV PT type-I (indication type) - White RED Lamp provided for CB ON is very close to PT Indication, it is misleading.	Firm comment may be accepted as per justification given by the firm.
5.9.2	HV incoming supply healthy indication (for each phase) - Red	<u>M/S ASHIDA</u> HV incoming supply healthy indication (for each phase) - White	Firm comment may be accepted.
6.3	The protection relays for traction transformer, feeder, 25kV shunt capacitor and transmission line protection are governed by this specification. All relays shall be of numerical type except master trip, inter trip and additional auxiliary relays, which shall be of electromechanical type. Prototype tests on relays shall be carried out separately. The relays used for protection of traction transformer, feeder, 25 kV shunt capacitor bank and transmission line protection shall be of numerical type except master trip, inter trip and additional auxiliary relays, which shall be of electromechanical type.	<u>M/S ALIND</u> The protection relays for traction transformer, feeder, 25kV shunt capacitor and transmission line protection is governed by this specification. All relays shall be of numerical type except master trip, inter trip and additional auxiliary relays, which shall be of electromechanical type. Prototype tests on relays shall be carried out separately for Numerical and electromechanical relays. Typo error	Firm comment may be accepted
6.4.2	The relays shall be of the draw-out or Plug-in, switch board type, back – connected and suitable for semi-flush or flush mounting, with dust-tight covers in dull black enamel finish. Facility shall be provided for automatic shorting CT terminals when the module is draw-out. The enclosure class of module/relays shall be IP 54 52 as per IEC 60529.	<u>M/S ALIND</u> The relays shall be of the draw-out or Plug-in, switch board type, back – connected and suitable for semi-flush or flush mounting, with dust-tight covers. Facility shall be provided for automatic shorting CT terminals when the module is draw-out. The enclosure class of module/relays shall be IP 54 as per IEC 60529. Finish and mechanical design may be finalized on the	<ol style="list-style-type: none"> 1. The removing of words “in dull black enamel finish” may be accepted.. 2. The enclosure class as per IP54 may not be accepted. The panel shall be installed inside masonry room, IP52 may be considered enough for indoor panel.

		prototype approval process. Also in the previous version (6071),relays are confirming to IP54.	
	The relays shall be of the draw-out or Plug-in, switch board type, back - connected and suitable for semi-flush or flush mounting, with dust-tight covers in dull black enamel finish. Facility shall be provided for automatic shorting CT terminals when the module is draw-out. The enclosure class of module/relays shall be IP 54 52 as per IEC 60529.	<p><u>M/S APPSIL</u> The relays shall be of the draw-out or Plug-in, switch board type, back - connected and suitable for semi-flush or flush mounting, with dust-tight covers in dull black enamel finish. Facility shall be provided using test switch for automatic shorting CT terminals when the protection relay module is draw-out taken for testing. The enclosure class of module/relays shall be IP 54 52 as per IEC 60529.</p> <p>Supporting note: Automated CT shorting toward field will ensure the safe & flawless testing environment and remove the human errors.</p>	<ol style="list-style-type: none"> 1. The addition of words “using test switch” may not be accepted as vendor is free to implement any suitable design for automatic shorting CT terminals. 2. The word “module” suggested for replacing by word “protection relay” may be accepted. 3. Further this para is corrected in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items.
6.4.5	The current coils/input module shall be rated for 5A for relays on Type - I panels, 5A & 1A for relays on type-II panels and 1 A for relays on type -III panels. The voltage coil shall be rated for 110 V ac. The current coils/input module shall be capable of withstanding 3 4 In continuously and short time rating shall be 20 40 In for 3 sec where In is rated current. The voltage coil shall be rated for 110V ac. The voltage coil shall be capable to withstand 1.15 times of rated voltage continuously and 1.5 times for 3 seconds.	<p><u>M/S APPSIL</u> The current coils/input module shall be rated for 5A for relays on Type - I panels, 5A & 1A for relays on type-II panels and 1 A for relays on type -III panels. The voltage coil shall be rated for 110 V ac. The current coils/input module shall be capable of withstanding 3-4 In 100 In for 1 sec where In is rated current. The voltage coil shall be rated for 110V ac. The voltage coil shall be capable to withstand 1.15 times of rated voltage continuously and 1.5 times for 3 seconds. For betterment of the specification</p>	Firm comment may be accepted as IEC 60255-27 specified, CT short time withstand current should be 100 In and continuous withstand should be at least 4 In.
6.4.11	The numerical relay should have facility to record actual waveform of current and voltage along with all digital and logical status during fault condition. At a time at least 100- 50 20 faults, such latest waveforms for currents & voltage shall be storable and shall be retrievable through RS-232 serial communication USB port or any other superior type of front end standard communication port with optical interface to limit EMI, accessories and firmware for	<p><u>M/S ALIND</u> The numerical relay should have facility to record actual waveform of current and voltage along with all digital and logical status during fault condition. At a time at least 200 faults. Such waveforms for currents & voltage shall be storable and shall be retrievable through USB port or any other superior type of front end standard communication port with optical interface to limit EMI, accessories and firmware for communication through a Laptop computer and/or suitable external printer and</p>	<p>Firm comments may not be accepted as,</p> <ol style="list-style-type: none"> 1. The storage of 200 numbers of fault records in the relay memory is not much useful as relay will interface generally with SCADA, on occurrence of fault, disturbance data recorded by relay shall be automatically transferred to RCC. 2. IEC 61850 protocol is a latest. This protocol is being used widely by

	<p>communication through a Laptop computer and/or suitable external printer and shall have print/save option in the software/GUI supplied to take records stored in the relay/or suitable external printer. The duration of each disturbance record for current and voltage shall be at least 50 cycles (45 prior to and 5 after trip executed by relay-post fault). The disturbance record shall be triggered from trip operation of relay. Such waveforms shall also be retrievable at RCC through SCADA, suitable software along with compatible protocol for this purpose shall be made available in the relay as well as notebook computer. The transmission of DR data from numerical relay shall be storable in COMTRADE format with suitable software tool. The DR file shall also be retrievable through SCADA on demand or automatically as soon as DR is generated. However, the relay will store latest fault waveforms of 20 events. The DR files shall be according to IEC 61850-8-1:2011/AMD1:2020 or IEC 60870-5-103 or both as IEC standard protocol implemented in the relay..The feeder protection relay shall also have a feature for transferring R-X values to RCC through SCADA, relay manufacturer to match the software and protocol to suit the existing SCADA system of any make/firm.</p>	<p>shall have print/save option in the software/GUI supplied to take records stored in the relay/or suitable external printer. The transmission of DR data from numerical relay shall be storable in COMTRADE format with suitable software tool. The DR file shall also be retrievable through SCADA on demand or automatically as soon as DR is generated. However, the relay will store latest fault waveforms of 200events.</p> <p>For the sites where overloads and tripping are more, 20 no. DRs will be very small as it will overwrite in less period of time. Even though the DRs are saved in SCADA server, for local analysis a minimum number of DRs (at least for a month shall be available in relay memory itself. IEC 61850 is not recommended for the Railways. Please refer to comment for point no.11.3</p>	<p>various utilities. DFCCIL is also using this protocol for communication between IEDs & RTU.</p> <ol style="list-style-type: none"> 3. As per CEA notification August, 2010, all main protection relays provided for transmission lines, transformers and bus-bar shall be numerical type and communication protocol shall be as per IEC 61850/relevant IS. 4. We should encourage to implement latest protocol. 5. Further, number of latest faults data stored in relay is reduced to 8 numbers in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items has been finalised by RDSO.
		<p><u>M/S APPSIL</u> The numerical relay should have facility to record actual waveform of current and voltage along with all digital and logical status during fault condition. At a time at least 100-50-20 faults, such latest waveforms for currents & voltage shall be storable and shall be retrievable through RS 232 serial communication USB port or any other superior type of front end standard communication port with optical interface to limit EMI, accessories and firmware for communication through a Laptop computer and/or suitable external printer and shall have print/save option in the software/GUI</p>	<p>Comment may not be accepted.</p> <ol style="list-style-type: none"> 1. The comments of M/s APPSIL for increasing disturbance record time to 3 sec. in place of 50 cycles may not be accepted, disturbance record of 3 sec. time duration in place of 50 cycles have not much use. Further, longer duration of disturbance record data consume more bandwidth which may result sluggish SCADA response. 2. The storage of 100 numbers fault

		<p>supplied to take records stored in the relay/or suitable external printer. The duration of each disturbance record for current and voltage shall be at least 150 cycles (100 prior to and 50 after trip executed by relay-post fault). The disturbance record shall be triggered from trip operation of relay. Such waveforms shall also be retrievable at RCC through SCADA, suitable software along with compatible protocol for this purpose shall be made available in the relay as well as notebook computer. The transmission of DR data from numerical relay shall be storable in COMTRADE format with suitable software tool. The DR file shall also be retrievable through SCADA on demand or automatically as soon as DR is generated. However, the relay will store latest fault waveforms of 100 events. The DR files shall be according to IEC 61850-8-1:2011/AMD1:2020 or IEC 60870-5-103 or both as IEC standard protocol implemented in the relay..The feeder protection relay shall also have a feature for transferring R-X values to RCC through SCADA, relay manufacturer to match the software and protocol to suit the existing SCADA system of any make/firm.</p> <p>Supporting Note: The recording of disturbance for a longer period provides detailed understanding of the event.</p>	<p>records in the relay memory may not have any use as relay may be interfaced with SCADA and on occurrence of fault, disturbance data will be transferred automatically to RCC.</p>
6.4.11	<p>The DR files shall be according to IEC 61850-8-1:2011/AMD1:2020 or IEC 60870-5-103 or both as IEC standard protocol implemented in the relay..The feeder protection relay</p>	<p><u>M/S ALIND</u> The DR files shall be in COMTRADE formats (.cfg and .dat) according to IEC 60255-24 and shall be available in SCADA as per IEC standard protocol implemented in the relay.</p> <p>IEC 61850-8-1:2011 does not indicate any structure or format of DR ‘COMTRADE’ file. The same is mentioned in IEC 60255- 24 and IEEE C37.111-1999 only</p>	<p>Comment may not be accepted as IEC 60255-24 is referred in IEC 61850-8-1 for Common format for transient data exchange (COMTRADE).</p>

848333/2021/O/o PED/TI/RDSO

6.4.11	The numerical relay should have facility to record actual waveform of current and voltage along with all digital and logical status during fault condition. At a time at least 20 faults	<p><u>M/S ASHIDA</u> The numerical relay should have facility to record actual waveform of current and voltage along with all digital and logical status during fault condition. At a time at least 100 faults</p> <p>Minimum 100 faults are required for segregation of faulty section and testing of relay , 20 events are overlaps and cannot analyse the actual tripping fault wave form.</p>	Comment may not be accepted as, The storage of 100 numbers fault records in the relay memory may not have any use as relay may be interfaced with SCADA and on occurrence of fault, disturbance data will be transferred automatically to RCC. Further, number of latest elents stored in relay is reduced to 800 numbers in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items has been finalised by RDSO.
	The duration of each disturbance record for current and voltage shall be at least 50 cycles (45 prior to and 5 after trip executed by relay-post fault).	<p><u>M/S ASHIDA</u> The duration of each disturbance record for current and voltage shall be at least 200 cycles (195 prior to 5 after trip executed by relay-post fault).</p> <p>For better fault analysis, we recommend DR memory should be increase from 50 cycles to 200 cycles.</p>	Comment may not be accepted as, Disturbance record of 4 sec. time duration in place of 50 cycles has not much use. Further, longer duration of disturbance record data consume more bandwidth which may result sluggish SCADA response.
6.4.12	Suitable software shall be supplied along with the numerical relays to download and interpret the fault waveform and other data stored in the relays. Manufacturer shall furnish the sampling rate at the time of design drawing approval. The software shall be capable of analyzing the peak, RMS and average values of currents & voltage, dc component of currents, harmonic analysis of fault current waveforms and determination of fault clearing time, Resistance, Reactance, Impedance, and Phase angle of waveforms if applicable. The accuracy of measurements shall be 1ms for time, 0.1 2% KV for voltages and 0.1 2% KA for currents. The software shall also be capable of communicating with the relay and viewing and altering of settings though laptop computer and SCADA.	<p><u>M/S ALIND</u> Suitable software shall be supplied along with the numerical relays to download and interpret the fault waveform and other data stored in the relays. Manufacturer shall furnish the sampling rate at the time of design drawing approval. The software shall be capable of analyzing the peak, RMS and average values of currents & voltage, dc component of currents, harmonic analysis of fault current waveforms and determination of fault clearing time, Resistance, Reactance, Impedance, and Phase angle of waveforms if applicable. . The accuracy of measurements shall be 1ms for time, 2% for voltages and 2% for currents at rated condition. The software shall also be capable of communicating with the relay and viewing and altering of settings though laptop computer and SCADA.</p> <p>Made clarity for the mentioned accuracy.</p>	Comment may not be accepted as 2% accuracy of measurement is specified for fault current and voltage, it is not only for rated condition.
6.4.12	Suitable software shall be supplied along with the	<u>M/S APPSIL</u>	Comment may be accepted as per

	numerical relays to download and interpret the fault waveform and other data stored in the relays. Manufacturer shall furnish the sampling rate at the time of design drawing approval.	Suitable software shall be supplied along with the numerical relays to download and interpret the fault waveform and other data stored in the relays. Manufacturer shall furnish the sampling rate at the time of design drawing approval, however the minimum sampling rate shall not be less than 20 samples / cycle. For betterment of the specification and to guarantee the minimum requirement	justification given by firm.
6.4.15	The Protection module shall be capable of storing minimum 5000 1000 latest events serially with date and time stamp of 1ms accuracy. The events should include tripping of different protection elements, relay pickup, relay reset, relay blocked due to harmonics or any other restraints, Auto reclosure acted, Auto reclosure lockout, Auto reclosure bypass, CB trip, CB close, changed of status input, relay setting changed, Relay fail, trip circuit monitoring etc. The events shall be retrievable through an external laptop/PC as well as through SCADA system at RCC.	<u>M/S APPSIL</u> The Protection module shall be capable of storing minimum 2000 1000 latest events serially with date and time stamp of 1ms accuracy. The events should include tripping of different protection elements, relay pickup, relay reset, relay blocked due to harmonics or any other restraints, Auto reclosure acted, Auto reclosure lockout, Auto reclosure bypass, CB trip, CB close, changed of status input, relay setting changed, Relay fail, trip circuit monitoring etc. The events shall be retrievable through an external laptop/PC as well as through SCADA system at RCC. Supporting Note: The recording of higher number of events provides detailed understanding of the incident.	Comment may not be accepted as numerical relays will interface with SCADA. On occurrence of events, it will be transferred to RCC automatically. Storage more number of events in relay memory is no use. Further, number of latest elents stored in relay is reduced to 800 numbers in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items has been finalised by RDSO.
6.4.17	The numerical relays shall be compact in nature and every effort shall be made to minimize the hardwiring within the relays and maximum components shall be on the PCB's. The SMT (surface mounted technology) PCB's shall only be used. Suitable conformal coating to be provided on the PCBs. The contact multiplication shall as far as possible be done through software. For this purpose, only one set of NO/NC auxiliary contact from each switchgear shall be terminated on the C&R panel terminal block.	<u>M/S ALIND</u> The numerical relays shall be compact in nature and every effort shall be made to minimize the hardwiring within the relays and maximum components shall be on the PCB's. Effort shall be made to implement SMT (surface mounted technology) PCB's wherever possible. Suitable conformal coating to be provided on the PCBs. All components are not available in SMT packages as it includes Trip relays also.	Comment may be accepted as, some component like transformers, auxiliary relay etc. is not possible to assemble on PCB through SMT.
6.4.15	The Protection module shall be capable of storing minimum 5000 1000 latest events serially with	<u>M/S ALIND</u> The Protection module shall be capable of storing	Comment may not be accepted as relay may be interfaced with SCADA and on

	<p>date and time stamp of 1ms accuracy. The events should include tripping of different protection elements, relay pickup, relay reset, relay blocked due to harmonics or any other restraints, Auto reclosure acted, Auto reclosure lockout, Auto reclosure bypass, CB trip, CB close, changed of status input, relay setting changed, Relay fail, trip circuit monitoring etc. The events shall be retrievable through an external laptop/PC as well as through SCADA system at RCC.</p>	<p>minimum 5000 latest events serially with date and time stamp of 1ms accuracy. The events should include tripping of different protection elements, relay pickup, relay reset, relay blocked due to harmonics or any other restraints, Auto reclosure acted, Auto reclosure lockout, Auto reclosure bypass, CB trip, CB close, changed of status input, relay setting changed, Relay fail, trip circuit monitoring etc. The events shall be retrievable through an external laptop/PC as well as through SCADA system at RCC.</p> <p>As per the latest SCADA specification/ requirement, number of Tags are much more as many information will be passed to SCADA on every Trip event like PICK UP ACTED/ RELEASED, TRIP ACTED/ RELEASED, MTR OPERATED/RELEASED, BREAKER TRIP ACTED/ RELEASED, BREAKER CLOSE ACTED/ RELEASED etc. For keeping events for at least last one-month data, relay shall store atleast 5000 events as per the previous specifications.</p>	<p>occurrence of fault, disturbance data will be transferred automatically to RCC.</p>
6.4.20	<p>Numerical relays shall have high contrast backlit LCD display of adequate size at least 20x4 LCD characters for display of relay status, settings, on line parameter (current, voltage, Impedance & Phase angle) etc. The parameters of the module shall be settable through a membrane keypad. Manufacturer shall clearly indicate/furnish the sampling rate, accuracy and range of above measurements at the time of design & development to RDSO.</p>	<p><u>M/S APPSIL</u> Numerical relays shall have high contrast graphical monochrome liquid crystal display with facility to adjust number of characters based on size of character for display of relay status, settings, on line parameter current, voltage, resistance & reactance and Graphical display capable of showing a user a defined single-line diagram and providing an interface for controlling switchgear; used for monitoring and controlling one or several bays, or for customized functionality like displaying measurements etc. Minimum 15 no. of multicolour LEDs which can be configured for various signals shall be used for display of power ON conditions and trip/alarm indications of each relay element. The parameters of the module shall be settable through a membrane keypad. For better visualization of various parameters and SLD of the bay.</p>	<p>Firm comments may not be accepted as,</p> <ol style="list-style-type: none"> 1. Size of relay LCD shall be decided by relay manufacturer to meet functional requirement of relay. It seems that comments of M/s APPSIL is for the requirement of bay control unit. 2. Number of LEDs indication depends on number of protection and monitoring functions integrated in a single module. The number of LED indication can not be specified as it varies relays to relays as per protection function integrated in the module.
6.4.26	<p>SCADA system is available for Railway traction</p>	<p><u>M/S APPSIL</u></p>	<p>Comments may not be accepted as it</p>

	<p>application. For its full utilization in controlling/monitoring of protection system, numerical relays shall be capable of communicating with the RTU or other IED's based on standard IEC 60870-5-103 or IEC 61850 or both protocols in same relay for transfer of information stored in relays to the RTU. The relay shall have necessary hardware and firmware interface for this purpose.</p>	<p>SCADA system is available for Railway traction application. For its full utilization in controlling/monitoring of protection system, numerical relays shall be capable of communicating with the RTU or other IED's based on standard IEC 60870-5-103 or IEC 61850 or both protocols in same relay for transfer of information stored in relays to the RTU. The relay shall have necessary hardware and firmware interface for this purpose.</p> <p>The Distance & Transformer Protection IEDs must have suitable provision to add Ethernet Ports on the rear side upto 4 ports to meet current application requirement and future application requirements like process bus without need to replace the Protection IEDs.</p> <p>To safeguard customer investment and support for future upgradation</p>	<p>look likes for the requirement of bay control unit. The number of Ethernet port shall be decided by Particular vendor to meets functional requirements of relays.</p>
6.4.28	<p>Suitable password protection shall be provided on the relays to avoid unauthorized changes in the relay settings.</p>	<p><u>M/S APPSIL</u></p> <p>Suitable password protection shall be provided on the relays to avoid unauthorized changes in the relay settings.The Distance and Transformer Protection IED shall support IEC 62351-8, and provide a full NERC-CIP (Critical Infrastructure Protection) level 5 cybersecurity compliance, including:</p> <p>a. Role based user authority and password management.</p> <p>b. Centralized user authority and password management support</p> <p>c. Cybersecurity-related logged events (user log-in; log-in unsuccessful; password changes, etc.)</p> <p>We request you to include Cyber Security requirements defined in IEC 62351-8 for Control & Relay Panels.</p>	<p>Ccomments may not be accepted as there is no direct link of protection relays with outside network.</p>
6.4.34	<p>Time for LBB protection shall be settable form 50 to 5000 ms. in steps of 1 ms.</p>	<p><u>M/S ASHIDA</u></p> <p>Time for LBB protection shall be settable form 50 to 5000 ms. in steps of 10 ms.</p> <p>10ms, should be sufficient.</p>	<p>Comment may be accepted as LBB time setting in steps of 10 ms meets the functional requirement. Further higher range i.e. 5000ms of LBB setting is not required, it may be reduced to 1000ms.</p>

6.4.36	<p>The relays shall generally conform to following standards</p> <p>a. Current carrying capacity- 5 Amps Continuously at 110 V DC/ 230 V AC</p> <p>b. Making & carry 250 V ac, 50 Hz for 3 seconds: 30 Amps</p> <p>c. Breaking: 220V, 50-60 Hz Cos Ø 0.4: 5A 220 V dc, L/R = 45 milli sec :0.5 A</p>	<p><u>M/S APPSIL</u></p> <p>The relays shall generally conform to following standards</p> <p>a. Current carrying capacity- 5 Amps Continuously at 110 V DC/ 230 V AC</p> <p>b. Making & carry 250 V ac, 50 Hz for 200 milli seconds: 30 Amps</p> <p>c. Breaking: 220V AC, 50-60 Hz Cos Ø 0.4: 8A 110 V dc, L/R = 40 milli sec : 0.4A 220 V dc, L/R = 40 milli sec :0.2 A</p>	<p>Contact rating has been modified in line with IEC 60255-1.</p> <table border="1" data-bbox="1514 199 1992 602"> <tr> <td data-bbox="1514 199 1755 402">Current carrying capacity</td> <td data-bbox="1755 199 1992 402">Continuously ≥ 5 Amps at 110 V DC Short time ≥ 30 Amps for 200 ms at 110 V DC</td> </tr> <tr> <td data-bbox="1514 402 1755 472">Making capacity at 110V DC:</td> <td data-bbox="1755 402 1992 472">≥ 1000 W at L/R = 40 ms</td> </tr> <tr> <td data-bbox="1514 472 1755 602">Breaking capacity at 110 V DC:</td> <td data-bbox="1755 472 1992 602">≥ 30 W at L/R = 40 ms</td> </tr> </table>	Current carrying capacity	Continuously ≥ 5 Amps at 110 V DC Short time ≥ 30 Amps for 200 ms at 110 V DC	Making capacity at 110V DC:	≥ 1000 W at L/R = 40 ms	Breaking capacity at 110 V DC:	≥ 30 W at L/R = 40 ms
Current carrying capacity	Continuously ≥ 5 Amps at 110 V DC Short time ≥ 30 Amps for 200 ms at 110 V DC								
Making capacity at 110V DC:	≥ 1000 W at L/R = 40 ms								
Breaking capacity at 110 V DC:	≥ 30 W at L/R = 40 ms								
	<p>High frequency disturbance IEC 60255- 27, IS: 3231 part-I section-III Longitudinal mode 2.5kV, 1 Mhz across auxiliary dc and current/voltage sensing terminals an earth. Transverse mode 1 kV, 1 Mhz across auxiliary dc and</p>	<p><u>M/S APPSIL</u></p> <p>The relays shall generally conform to following standards</p> <p>High Frequency Disturbance IEC 60255-27 Longitudinal mode 2.5kV, 1 Mhz across auxiliary dc and current/voltage sensing terminals an earth. Transverse mode 1 kV, 1 MHz across auxiliary dc and current/voltage sensing terminals.</p> <p>High Frequency Distrubance Tests as per IEC60255-26 subclause 6.3</p> <p>Damped oscillatory wave test - As per IEC 60255-26 subclause 6.3</p> <p>Voltage oscillation frequency - 1 Mhz</p> <p>Test level</p> <p>Differential mode - 1 kV</p> <p>Common mode-2.5 kV</p>	<p>Comment may be accepted as reference IEC suggested by firm is correct.</p>						
	<p>(iv)(a) Current carrying capacity 5 Amps Continuously at 110 V DC/ 230 V AC</p>	<p><u>M/S APPSIL</u></p> <p>The relays shall generally conform to following standards</p> <p>4.a Current carrying capacity 5 Amps Continuously at 110 V DC/ 230 V AC As per IEC 60255-1 subclause 6.11 Contact current:Continuous ≥ 5 A, Short time ≥ 30 A, 200 ms</p> <p>The duty cycle for the short time rating shall consist of the sequence 200 ms on, 15 s off</p>	<p>Comment may be accepted. Contact rating has been modified in line with IEC 60255-1.</p>						

	(iv) (b) Making & carry 250 V ac, 50 Hz for 3 seconds: 30A	<u>M/S APPSIL</u> The relays shall generally conform to following standards Making & carry 250 V ac, 50Hz for 3 seconds: 30A As per IEC 60255-1 subclause 6.11 Making & carry 250V ac , 50≥1 000 W at L/R = 40 ms	
	(iv) c Breaking: 220V, 50-60 Hz Cos Ø 0.4 ; 5A 220 V dc, L/R = 45 mili sec 0.5 A	<u>M/S APPSIL</u> Breaking: As per IEC 60255-1 subclause 6.11 220V AC, 50-60 Hz Cos Ø 0.4: 8A 110 V dc, L/R = 40 milli sec : 0.4A 220 V dc, L/R = 40 milli sec :0.2 A	
	(iv) d Auxilary power <15 W – De energised consumption at 110V DC <30 W – Energised	<u>M/S APPSIL</u> Auxilary power consumption at 110V DC as per IEC 60255-1 Typically less than 50W	Comment may not be accepted as IEC 60255-1 does not specify auxiliary power consumption of relay.
6.4.26	SCADA system is available for Railway traction application. For its full utilization in controlling/monitoring of protection system, numerical relays shall be capable of communicating with the RTU or other IED's based on standard IEC 60870-5-103 or IEC 61850 or both protocols in same relay for transfer of information stored in relays to the RTU. The relay shall have necessary hardware and firmware interface for this purpose.	<u>M/S ALIND</u> SCADA system is available for Railway traction application. For its full utilization in controlling/monitoring of protection system, numerical relays shall be capable of communicating with the RTU or other IED's based on standard IEC 60870-5-103 protocol for transfer of information stored in relays to the RTU. The relay shall have necessary hardware and firmware interface for this purpose. IEC 61850 is not recommended for the Railways. Please refer to comment for point no. 11.3	Refer RDSO's remark on para 1.2 above.
6.4.30	The module shall also be capable to display I (fault current), V (voltage), R (resistance), X (reactance), Phase angle, fault clearing time and fault date & time (wherever applicable) of latest 100 50 faults at relay LCD, if it is not possible to display these parameters simultaneously on LCD display, then these parameters may accommodate in two or more window and displaying by pressing scroll Key. The CT's & PTs provided at TSS may have different ratio, hence to display the	<u>M/S ALIND</u> The module shall also be capable to display I (fault current), V (voltage), R (resistance), X (reactance), Phase angle, fault clearing time and fault date & time (wherever applicable) of latest 200 faults at relay LCD if it is not possible to display these parameters simultaneously on LCD display, then these parameters may accommodate in two or more window and displaying by pressing scroll Key. The CT's & PTs provided at TSS may have different ratio, hence to display the actual value (line	Comment may not be accepted as numerical relay may be interfaced with SCADA. The disturbance data shall be transferred to RCC through SCADA.

	<p>actual value (line value) of I, V, R, X etc. the CT primary current shall be settable in the range of 100 to 3000A in the steps of 50A and PT primary voltage shall be settable in the range of 20000V to 30000V in steps of 500V. On line current, voltage, Impedance and phase angle shall also be displayed on relay LCD.</p>	<p>value) of I, V, R, X etc. the CT primary current shall be settable in the range of 100 to 3000A in the steps of 50A and PT primary voltage shall be settable in the range of 20000V to 30000V in steps of 500V. On line current, voltage, Impedance and phase angle shall also be displayed on relay LCD.</p> <p>For the sites where overloads and tripping are more, 20 no. DRs will be very small as it will overwrite in less period of time. Even though the DRs are saved in SCADA server, for local analysis a minimum number of DRs (at least for a month shall be available in relay memory itself.</p>	
		<p><u>M/S GE</u> Relay can Store at a time upto 15 Fault Records inside the relay memory .However, these can be extracted to Dedicated Laptop/PC or Remote Workstation/SCADA for further backup and also Logic nodes of Fault records are designed accomadate IEC61850 standard and same can be made availabe to SCADA as and when fault triggered in the relay . From our long experience ,even a backup of 5 Numbers of fault records enough for further analysis and investigation purpose as this is required only during the occurrence of fault and required for the operator to get an information of fault .Otherwise all the information available in Disturbance recorder which we are complying as per the specification. Fault Data like Prefault Voltages/Current ,Post fault Voltages/Current,Start,Trip Signals,Fault time ,Fault location details are available in Fault record. Data like Z,R and X are not available as these data derivatives of primary data Voltage and Current Vectors which is already available in Fault record data.</p> <p><u>The module shall also be capable to display I, V, Phase angle & fault clearing time (wherever applicable) of latest 15 faults at relay LCD of</u></p>	<ol style="list-style-type: none"> 1. If V, I and its angle are available all other values like R, X and Z are derived quantities. It is pertinent to mention that these records can also be easily obtained from the disturbance record (which is planned to be stored in RCC). Therefore, for display on relay the electrical parameters like V, I, phase angles and either R, X, Z or distance or Z and its angle is accepted. 2. Firm comment for reducing fault record inside relay from 20 to 15 may be accepted as relay may be interfaced with SCADA system. On occurrence of fault, the data stored in the relay shall be transferred to RCC.

		<u>adequate size. The CT's & PTs provided at TSS may have different ratio's, hence to display the actual value (line value) of I, the CT primary current shall be settable</u>	
6.4.36 (ii)	Impulse voltage test 5 kV, 1.2/50 micro seconds (IS: 8686/ IS: 3231/IEC-60255-27, IS: 12083 Pt.II)	<u>M/S ASHIDA</u> Impulse voltage test 5 kV, 1.2/50 micro seconds (IEC60255-26/IEC-60255-27, IS: 12083 Pt.II) IS: 8686/ IS: 3231 is Obsolete	Comment may be accepted as IEC 60255-27 is the correct reference for impulse voltage test. The other standard referred i.e. IS: 8686/ IS: 3231/ IS: 12083 Pt.II) deleted.
6.4.36 (iii)	High frequency disturbance IEC 60255- 27, IS: 3231 part-I section-III	<u>M/S ASHIDA</u> High frequency disturbance IS/IEC60255/26	Comment may be accepted as IEC 60255-26 is correct standard for high frequency disturbance test.
7.2	(i) DIFFERENTIAL PROTECTION d.The current setting of the relay shall be adjustable, preferably between the range of 5% and 80% in steps of 5% or less. The minimum current setting shall be as low as possible to obtain better sensitivity. e. Adjustable bias setting shall also be provided. The bias at minimum operating current setting shall be 10 to 50% in steps of 5% to suit the tapping range of the traction transformer and other design considerations.	<u>M/S GE</u> <u>Setting Ranges in PU</u> <u>Is1=0.100 to 2.5 PU in step of 0.010 PU</u> <u>K1=0 to 150% in Step of 1%</u> <u>Is2=0.100 to 10 PU in Step of 0.100 PU</u> <u>K2=15 to 150% in Step of 1%</u>	Comment may not be accepted as comment suggested by the firm seems to be the setting parameters available in GE make relay. This can not be considered as comment.
7.2	(iii) OVER-CURRENT PROTECTION 1. IDMT over current on primary side. 50% to 280% in steps of 1% IDMT curve: 3 sec. at 10 Ir,TMS:0.01 – 1 (In steps of 0.01)	<u>M/S GE</u> <u>TMS:0.025 to 1.2(In Steps of 0.025) [IEC]</u> <u>Time Dial:0.01 to 100 (In Steps of 0.01) [IEEE]</u>	1. Firm comment regarding to increase lower range of TMS setting may be accepted as lower setting of TMS i.e. 0.01 is generally not required in the field. The lower setting is revised to 0.04 in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items has been finalised by RDSO. 2. The steps of TMS setting 0.025 may not be accepted as fine steps 0.01 of TMS setting is essential for time co-ordination of relays.
	2. *Instantaneous over current on primary side.200% to 1600% - * The instantaneous element time shall be within	<u>M/S GE</u> <u>ok</u>	

	20 ms. at the 1.5 times the setting value.		
	3. IDMT over current on secondary side. 50% to 280% in steps of 1% IDMT curve: 3 sec. at 10 Ir,TMS:0.01 –1,(In steps of 0.01)	<u>M/S GE</u> <u>TMS:0.025 to 1.2(In Steps of 0.025) [IEC]</u> <u>Time Dial:0.01 to 100 (In Steps of 0.01) [IEEE]</u>	<ol style="list-style-type: none"> 1. Firm comment pertains to increasing lower range of TMS setting may be accepted as lower setting of TMS i.e. 0.01 is generally not required in the field. The lower setting is revised to 0.04 in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items has been finalised by RDSO. 2. The steps of TMS setting 0.025 may not be accepted as fine steps 0.01 of TMS setting is essential for time co-ordination of relays.
	(iv) OVERLOAD PROTECTION FOR TRANSFORMER Traction transformer is generally designed to handle the over load of 150% for 15 minutes and 200% for 5 minutes provided that two consecutives over loads occur only after an interval of at least 3 hours	<u>M/S GE</u> <u>The thermal overload protection in this device is based on the IEEE Standard C57.91-1995. It provides thermal overload protection for either an individual winding or the transformer as a whole</u>	Comment may not be accepted as kind of changes required in the clause is not understandable.
7.3	SCHEME OF PROTECTION FOR 25 KV OVERHEAD EQUIPMENT		
v	7.3.1.1 Polygonal characteristic distance protection Minimum operating Current shall be settable in the range of 0.1 to 1.0 Amp in the steps of 0.1 Amp.	<u>M/S GE</u> <u>0.250 to 10A in step of 0.025A</u>	Comment may not be accepted as setting of minimum operating current 0.1 may be required in the field. The higher setting range 10A is also not required in the field.
vi	Relay Characteristic Setting Range and steps Forward Resistance (RF) 0.01 – 99.99 Ω in steps of 0.01 Ω Backward Resistance (RB) 0.01 – 99.99 Ω in steps of 0.01 Ω Forward Reactance (XF) 0.01 – 99.99 Ω in steps of 0.01 Ω Backward Reactance (XB) 0.01 – 99.99 Ω in steps of 0.01 Ω Angle (A1) 00 – 70 deg in steps of 1 deg	<u>M/S GE</u> Setting Range and steps Forward Resistance (RF) 0.05 – 500 Ω in steps of 0.01 Ω Backward Resistance (RB) 0.05 – 500 Ω in steps of 0.01 Ω Forward Reach (ZF) 0.05 – 750 Ω in steps of 0.01 Ω Backward Reach (ZB) 0.05 – 750 Ω in steps of 0.01 Ω Load Blinding Angle: 15 – 65 deg in steps of 1 deg Zmin 0.01 – 500 Ω in steps of 0.01 Ω Relay Characteristic Angle 20 to 90 degree in steps of 1 degree	<ol style="list-style-type: none"> 1. Lower setting range 0.05 of XF, SB, RF, RB may be accepted. The lower setting range of TMS between 0.01 to 0.05ohm is generally not required in the field. 2. Setting of Z (impedance) parameters in place of X (reactance) parameters is accepted as Z magnitude and its angle, as this is in terms of polar coordinate and R-X is in Cartesian coordinate system. Both setting can

	<p>Angle (A2) 00 – 70 deg in steps of 1 deg Zmin 0.01 – 99.99 Ω in steps of 0.01 Ω Relay Characteristic Angle 50 to 90 degree in steps of 1 degree</p>	<p>Forward Resistance (RF) 0.05 – 99 Ω in steps of 0.01 Ω Backward Resistance (RB) 0.05 – 99Ω in steps of 0.01 Ω Forward Reach (ZF) 0.05 – 99Ω in steps of 0.01 Ω/ Forward Reactance (XF) 0.05 – 99.99 Ω in steps of 0.01 Ω Backward Reach (ZB) 0.05 – 750 Ω in steps of 0.01 Ω/ Backward Reactance (XB) 0.05 – 99.99 Ω in steps of 0.01 Ω Load Blinding Angle: 15 – 65 deg in steps of 1 deg Zmin 0.01 –99 Ω in steps of 0.01 Ω Relay Characteristic Angle 20 to 90 degree in steps of 1 degree Load Blinder V<:1 to 70V in steps of 500mV</p>	<p>be permitted to attract more vendors</p> <ol style="list-style-type: none"> 3. Load Blinding Angle: 15 – 65 deg in steps of 1 deg in place of 0 – 70 deg in steps of 1 deg may be accepted as this setting range meets functional requirement of distance protection. 4. Relay characteristic angle setting of 20 to 90 deg. is not required, this angle may be set at 70 deg in the field, the existing setting range 50 to 90 is appropriate.
ix	<p>The relay shall be blocked for operation in case 2nd harmonic component in current exceeds more than set value. The percentage of second harmonic for block the operation shall be settable from 5 to 20 % in steps of 1%.</p>	<p><u>M/S GE</u> 10 to 100% in steps of 5%</p>	<p>Comment may be accepted as 2nd harmonic content is generally set at 15%, the lower setting is generally not required. The Fine steps of setting of 2nd harmonics are also not required in the field.</p>
7.2	<p>(i) DIFFERENTIAL PROTECTION e. Adjustable bias setting shall also be provided. The bias at minimum operating current setting shall be 10 to 50% in steps of 5% to suit the tapping range of the traction transformer and other design considerations.</p>	<p><u>M/S APPSIL</u> e. Adjustable bias setting shall also be provided. The bias at minimum operating current setting shall be 10 to 50% in steps of 5% to suit the tapping range of the traction transformer and other design considerations or The restrained area shall contain three sections. The first section shall have the constant operating level independent of the bias current; the remaining two sections shall have settable slopes. The start of first section can be settable from 20% to 130% of the rated current , the start of second section can be settable from 100% to 800% of the rated current, the slope between section 1 & section 2 shall be settable with range of 10% to 50% in step of 1% of bias restraint characteristic. The slope beyond section 2 shall be settable with a range of 30% to 100% in steps of 1% of bias restraint characteristics.</p> <p>f. Differential protection Extended Differential</p>	<ol style="list-style-type: none"> 1. Point-e may be accepted as correction suggested by the firm serve the purpose of transformer differential protection. Hence in addition to existing, suggested modification has added in the final draft. 2. Point-f may not be accepted as REF relay provides protection upto switchyard CT.

		<p>protection covering upto Switchyard CTs of HV & LV to be offered.</p> <p>Supporting Note: e. As per CIGRE Technical Brochure 463 slope characteristics can either be starting from origin or from a fixed value , both methods provide equal protection to the transformer.</p> <p>f. Since it is a un-earthed system, extended differential protection will ensure the protection cover till switchyard CTs. Request you include either as part of the same Differential relay with dedicated CT inputs OR with standalone relay.</p>	
	(i) DIFFERENTIAL PROTECTION d. The current setting of the relay shall be adjustable, preferably between the range of 5% and 80% in steps of 5% or less. The minimum current setting shall be as low as possible to obtain better sensitivity.	<u>M/S APPSIL</u> d. The current setting of the relay shall be adjustable, preferably between the range of 10% and 60% in steps of 1% or less. The minimum current setting shall be as low as possible to obtain better sensitivity.	Comment may be accepted except steps of setting
	(iii) OVER-CURRENT PROTECTION 1. IDMT over current on primary side: Time multiplier setting- 0.01 – 1 (In steps of 0.01)	<u>M/S APPSIL</u> (iii) OVER-CURRENT PROTECTION 1. IDMT over current on primary side: Time multiplier setting- 0.05 – 999 (In steps of 0.01)	Comment may not be accepted. However, TMS setting revised to 0.4 to 1 in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101.
7.3	SCHEME OF PROTECTION FOR 25 KV OVERHEAD EQUIPMENT 1. Numerical integrated feeder protection module comprising: i. Two Zone Polygonal characteristic distance relay.	<u>M/S APPSIL</u> SCHEME OF PROTECTION FOR 25 KV OVERHEAD EQUIPMENT 1. Numerical integrated feeder protection module comprising: i. Five Zone Polygonal characteristic distance relay.	Comment may not be accepted as if firm desire to implement additional protection function, they can do but minimum protection requirement as specified in the specification must be complied.
7.3.1.1 (xii)	The total operating time of the distance protection relay shall be in the range of 30 ± 10 ms. under any circumstances.	<u>M/S ASHIDA</u> The total operating time of the distance protection relay shall be in the range of 2 cycle +/-10ms under any circumstances. 2 cycle +/-10ms (for increase reliability of during rapid	Comment may not be accepted. However, operating time specified in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101. The operating time of distance protection relay at equal to or less than

		fluctuation of impedance condition)	80% of set impedance shall be less than 40ms. The operating time of relay in no case shall be more than 50ms and Zone-2 operating time shall be settable in the range from 50 to 1000ms in steps of 10 ms. Relay shall also be complied operating time characteristics as per IEC 60255-121.
7.3.1.2	The operating time of the relay shall be 30 ± 10 ms.	<u>M/S ASHIDA</u> The operating time of the relay shall be 2 cycle +/-10ms.	Comment may not be accepted as no justification and standard mentioned for increase operating time.
7.3.1.2	7.3.1.2 Wrong phase coupling relay An impedance relay for protection against wrong phase coupling which shall operate on the principle that the relay identifies a wrong phase coupling condition when the impedance lies between 11 ohm to 38 ohm (however the lower limit of impedance shall be settable in the range of 2 to 15 ohm and upper limit shall be settable in the range of 20 to 60 ohm in steps of 1 ohm) and its angle lies in the second quadrants between 100o to 150o (however the lower and upper angle shall be individually settable between 90o to 180o in steps of 10) in the R-X plane. All parameters expressed are in secondary values. The relay shall be immune to the regenerative currents produced by electric loco/EMU's, the regenerative current shall be settable in between 0 to 3 Amp in steps of 0.1 Amp. The operating time of the relay shall be 30 ± 10 ms. The relay manufacturer shall provide the actual logic developed for detecting the wrong phase coupling condition. The operating value error of WPC shall not exceed + 5 %.	<u>M/S GE</u> Setting Range: ZWPC Min:2 to 15 ohms:step 10 mohm ZWPC Max:20 to 60 ohm:step 10 mohm WPC Line angle:90 to 180 Deg .Step:1Deg WPC RH Angle:90 to 175 Deg.Step:1Deg WPC LH Angle:95 to 180 Deg.Step:1Deg	Firm comment may not be accepted as, 1. Fine steps of ZWPC setting is not essential. 2. The setting of WPC line angle is not required. 3. WPC RH & WPC LH is not understandable. 4. Its seems that firm submitted setting available on their make relays.
7.3.1.4	The operating time of instantaneous OCR shall not be more than 25ms	<u>M/S ASHIDA</u> <u>M/S GE</u> The operating time of instantaneous OCR shall not be more than 30ms +/- 10ms.	Firm comment may not be accepted as increasing of relay operating time resulted increase of total fault clearing time and more stress on OHE.

		This will reduce transient tripping substantially)	
7.3.1.4	Over current relay Two stage over current relay (stage 1- instantaneous and stage 2- definite time) shall be provided. The current setting of OCR shall be settable individually in the range of 20% to 1000% in steps of 1%. The operating time of instantaneous OCR shall not be more than 25 ms. The operating time of stage 2 OCR shall be settable in the range of 1 sec to 900 sec in steps of 1 0.1 sec. The operating value error of OCR shall not exceed + 5 %. The over current relay shall have also a feature to block trip command if 2nd harmonic component in current exceeds more than set value. Setting to enable / disable the 2nd harmonic blocking function shall be provided for over current relay.	<p><u>M/S GE</u> Definite Time Range from 0 to 100s instep of 10ms, In case to Thermal Overload .The P44T relay incorporates a current based thermal replica using load current to model heating and cooling of the protected plant. The element can be set with both alarm and trip stages. Thermal Overload Settings: Characteristic : Single/Dual Thermal Trip : 0.08*In to 4*In step 0.01In Thermal Alarm : 50% to 100% step 1% Time Constant: 1 to 200 step 1 Time Constant: 1 to 200 step 1</p> <p>Overcurrent Stage1:20% to1000% in steps of 1%,Time Setting:0 to 100s. Overcurrent Stage2:20% to1000% in steps of 1%,Time Setting:0 to 900s or Thermal overload Protection Characteristic : Single Thermal Trip : 0.08*In to 4*In step 0.01In Thermal Alarm : 50% to 100% step 1% Time Constant: 1 to 200 step 1 Time Constant: 1 to 200 step 1 Setting to enable/ disable the2nd harmonic blocking function shall be provided for over current relay.</p>	<ol style="list-style-type: none"> 1. Operating time range of definite time OCR revised from 1 sec. to 900 sec. in steps of 0.1 sec. to 0 to 100 sec. in steps of 10 ms. 2. Thermal over load protection is not being used in Indian Railway because of single feeder CB feeds supply to multiple lines. However, for future use this protection may be included in the specification.
7.3.1.5	The operating time of PTFF trip element shall not exceed 30±10 ms.	<p><u>M/S ASHIDA</u> The operating time of PTFF trip element shall not exceed 40ms +/- 10ms.</p>	Firm comment may be accepted as increase in PTFF trip time do not affect earth fault clearing time. PTFF trip is not a protection against earth fault, PTFF trip time can be increased.
7.3.1.5	PT fuse failure relay (ii) PTFF trip logic Conditions when PT voltage is less than the set value but the current is more than the set current, then PTFF trip contact shall be closed to trip the feeder CB, the operating time of PTFF trip element shall not exceed 30±10 ms.	<p><u>M/S APPSIL</u> PT fuse failure relay (ii) PTFF trip logic Conditions when PT voltage is less than the set value but the current is more than the set current, then PTFF trip contact shall be closed to trip the feeder CB, the operating time of</p>	Firm comment may not be accepted as it seems that firm submitted setting available on their make relay. Justification has not been given for proposed changes.

848333/2021/O/o PED/TI/RDSO

	The PT voltage shall be settable in the range of 0 to 20 volts in steps of 1 volt and current shall be settable in the range of 0 to 5Amp in the steps of 0.1 Amp.	PTFF trip element shall not exceed 30±10 ms. The PT voltage shall be settable in the range of 10 to 100% of Vbase in steps of 1% and current shall be settable in the range of 10 to 50% of Ibase in steps of 1%.	
7.3.1.6	7.3.1.6 Auto reclosure relay (iv) The auto reclosure shall be bypassed in the event of high current earth faults settable in the range of 10A to 100A in steps of 1A Enable / Disable facility for this feature shall also be provided by the tenderer.	<u>M/S GE</u> Bypass done using Highset over current element Range:0.080A to 32A in steps of 10mA	Firm comment may not be accepted as it seems that firm submitted setting available on their make relay. However, higher setting range of ARB current is reduced to 50A in place of 100 A as more than 50A is not required to set in the field.
7.3.2	7.3.2 Delta-I Relay:	<u>M/S GE</u> Reply: We understand that polygonal characteristic load blinding is an additional supervision for Delta-I Protection. Being Delta I, Protection is used to detect high impedance fault which is of resistive nature, it may restrict the coverage of high impedance fault which falls on the real load region. Hence in our opinion, there is should not any restriction on resistive side ,so that we can get maximum benefit in covering the high resistive fault. Also this Polygonal characteristic with load blinding is part of Distance Impedance Protection which is already available in Traction Catenary relay. In our proposed relay, Delta-I protection is provide as built in function of Traction Catenary relay along with Polygonal Characteristic with load Blinder. Setting Range: Hz Delta I Mag:0.1 to 10A step of 0.01A Hz Delta I Ang:1 to 90A step of 1A Hz Delta I Delay:0 to 10s in step of 0.010s Hz Delta I Sensitive :0.050 to 2A in step of 0.005A Hz Delta V Sensitive :1 to 30V in step of 0.1V Hz3rd Harmonic :5 to 100% in step of 1% Hz5th Harmonic :5 to 100% in step of 1% Delta Time is Fixed to 2 Cycle .	<ol style="list-style-type: none"> 1. Delta-I and polygonal characteristic distance protection are independent characteristic. The polygonal characteristic DPR in Delta-I is included as backup to main DPR. Firm reply about polygonal characteristic load blinding is an additional supervision for Delta-I Protection. It seems that firm submitted settings available on their make relay. Firm has not submitted justification for desired changes. 2. Reactance blinder setting may be included in the Delta-I relay. This setting may useful to minimise falls operation of relay due to load current. 3. Delta-I should not be integrated in feeder protection module. However, if any vendor integrate delta-I relay in feeder protection module, the two number of same relay per feeder CB shall be provided in control and relay panel to provide backup protection in case of main feeder relay fail..

		<p>7.3.2 Delta-I Relay: (i) The relay shall have following characteristics (a) Threshold Detection of Vectoral difference of current from suitable base characteristics (ΔI) It shall be part of Traction Distance Relay</p>	
7.3.2	<p>Delta-I Relay: (b) Polygonal characteristic with load blinding (ii) The module shall also be capable to display I (fault current), V(voltage), R(resistance), X(reactance), Phase angle, Delta-I current, fault clearing time and fault date & time (wherever applicable) of latest 200 20 faults at relay LCD,</p>	<p><u>M/S APPSIL</u> Delta-I Relay: (b) Polygonal characteristic with load blinding (ii) The module shall also be capable to display I (fault current), V(voltage), R(resistance), X(reactance), Phase angle, Delta-I current & shall be possible to calculate fault clearing time (wherever applicable) of latest 200 2000 faults at relay LCD, Supporting Note: Fault clearing time helps in analysing events/ incidents.</p>	<ol style="list-style-type: none"> 1. Fault clearing time to display on relay LCD is already mentioned in draft specification. 2. Parameter display of latest 2000 faults may not be accepted as relay will interface with SCADA system, the fault parameters will be transferred to RCC automatically.
7.3.2 (ii)	<p>The module shall also be capable to display I (fault current), V(voltage), R(resistance), X(reactance), Phase angle, Delta-I current, fault clearing time and fault date & time (wherever applicable) of latest 200 20 faults at relay LCD, if it is not possible to display these parameters simultaneously on LCD display, then these parameters may accommodate in two window and displaying by pressing scroll Key . The CT's & PTs provided at TSS may have different ratios, hence to display the actual value (line value) of I, V, R, X etc. the CT primary current shall be settable in the range of 100 to 3000A in the steps of 50A and PT primary voltage shall be settable in the range of 20000V to 30000V in steps of 500V. On line current, voltage, Reactance & Resistance shall also be displayed on relay LCD.</p>	<p><u>M/S ALIND</u> Delta-I Relay (ii) The module shall also be capable to display I (fault current), V(voltage), R(resistance), X(reactance), Phase angle, Delta-I current, fault clearing time and fault date & time (wherever applicable) of latest 200 faults at relay LCD, For the sites where overloads and tripping are more, 20 no. DRs will be very small as it will overwrite in less period of time. Even though the DRs are saved in SCADA server, for local analysis a minimum number of DRs (at least for a month shall be available in relay memory itself.</p>	<p>Firm comment may not be accepted as there is no need to store large numbers of fault parameters in relay memory. Relay shall be interfaced with SCADA, on occurrence of fault, disturbance data recorded by relay shall be automatically transferred to RCC.</p>
7.3.2.1	<p>(i) The relay monitors vector difference between base load current and fault current. The vector difference shall be calculated in such a manner to ensure detection of high</p>	<p><u>M/S APPSIL</u> (i) The relay monitors vector difference between base load current and fault current. The vector difference shall be calculated in such a manner to ensure detection of</p>	<p>Firm comment may not be accepted as setting range of Delta-I current specified in draft specification is appropriate.</p>

848333/2021/O/o PED/TI/RDSO

	resistance faults even if fault is not detected in current samples the same shall be detected in next sample. The time difference between base load current sample and fault current sample to calculate vector difference shall be settable in the range of 20ms. to 200ms. in steps of 5ms.. The Vector Delta-I current shall be settable in the range of 0.1A to 6A in the steps of 0.1 Amp. Vendor to give details of detection process and how the design assures resilience and improves probability of detection of a fault.	high resistance faults even if fault is not detected in current samples the same shall be detected in next sample. The time difference between base load current sample and fault current sample to calculate vector difference shall be settable in the range of 20ms. to 200ms. in steps of 5ms.. The Vector Delta-I current shall be settable in the range of 5% to 50% of Ibase in the steps of 1%. Vendor to give details of detection process and how the design assures resilience and improves probability of detection of a fault.	
7.3.2.2	Polygonal (on R-X plane) characteristic	<u>M/S ASHIDA</u> Back up DPR Protection	Firm comment may be accepted
		<u>M/S ASHIDA</u> Relay Characteristic Angle 50 to 90 degree in steps of 1 degree should have provision of Characteristic Angle setting	Firm comment may be accepted.
7.3.2.2	Polygonal (on R-X plane) characteristic (v) The operating value error of the relay shall not be more than $\pm 5\%$ including for voltage input to the relay from 125 volts down to 0.5 Volts and current 0.5A to 100A, the frequency variations of 48 to 52 Hz and the temperature variation over the range - 25 Degc to + 70 Degc.	<u>M/S APPSIL</u> Polygonal (on R-X plane) characteristic (v) The operating value error of the relay shall not be more than $\pm 5\%$ including for voltage input to the relay from 121 volts down to 11 Volts and current 1A to 60A, the frequency variations of 48 to 52 Hz and the temperature variation over the range - 25 Degc to + 70 Degc.	The effective range is not standardize in IEC 60255-121. However, the effective range suggested by the firm may be accepted.
	(vi) The relay shall have settable minimum operating current. If current less than set value of minimum operating current then relay should not execute trip command even though impedance measured by relay fall inside set polygonal on R-X plane characteristic. Minimum operating Current shall be settable in the range of 0 to 1Amp in the steps of 0.1 Amp.	<u>M/S APPSIL</u> (vi) The relay shall have settable minimum operating current. If current less than set value of minimum operating current then relay should not execute trip command even though impedance measured by relay fall inside set polygonal on R-X plane characteristic. Minimum operating Current shall be settable in the range of 0 to 1Amp in the steps of 0.1 Amp OR 10% to 80% of the rated	Firm comment may not be accepted as it seems that firm submitted setting available on their make relay and Justification for desired changes are not given. However, in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 minimum operating current corrected as 05 to 1 A in steps of 0.1 A.

		current	
	<p>Polygonal (on R-X plane) characteristic Setting Range and steps</p> <p>Forward Resistance (RF) 0.04 – 99.99 Ω in steps of 0.01 Ω</p> <p>Backward Resistance (RB) 0.04 – 99.99 Ω in steps of 0.01 Ω</p> <p>Forward Reactance (XF) 0.04 – 99.99 Ω in steps of 0.01 Ω</p> <p>Backward Reactance (XB) 0.04 – 99.99 Ω in steps of 0.01 Ω</p> <p>Angle (A1) 00 – 70 deg in steps of 1 deg</p> <p>Angle (A2) 00 – 70 deg in steps of 1 deg</p> <p>Zmin 00 – 99.99 in steps of 0.01 Ω</p>	<p><u>M/S APPSIL</u></p> <p>7.3.2.2 Polygonal (on R-X plane) characteristic Setting Range and steps</p> <p>Forward Resistance (RF) 0.05 – 150 Ω in steps of 0.01 Ω</p> <p>Backward Resistance (RB) 0.05 – 150 Ω in steps of 0.01 Ω</p> <p>Forward Reactance (XF) 0.05 – 150 Ω in steps of 0.01 Ω</p> <p>Backward Reactance (XB) 0.05 – 150 Ω in steps of 0.01 Ω</p> <p>Angle (A1) 05 – 70 deg in steps of 1 deg</p> <p>Angle (A2) -45 to +45 deg in steps of 1 deg</p> <p>Zmin 0.2 – 150 in steps of 0.01 Ω</p>	<p>Firm comment may not be accepted as it seems that firm submitted setting available on their make relay. Justification for desired changes is not given.</p>
7.3.4	<p>MASTER TRIP RELAY</p> <p>All feeder protection relays as explained above shall trip the corresponding feeder circuit breaker in case of fault, through a high-speed self-reset, electromagnetic type master tripping relay. The relay operating time shall not be more than 10 ms. and its resetting time shall not be more than 100ms. The relay shall be capable of handling the current of the CB trip coil.</p>	<p><u>M/S APPSIL</u></p> <p>MASTER TRIP RELAY</p> <p>All feeder protection relays as explained above shall trip the corresponding feeder circuit breaker in case of fault, through a high-speed, latch type with reset facility (manual and electrical reset), electromagnetic type master tripping relay. The relay operating time shall not be more than 10 ms. and its resetting time shall not be more than 100ms. The relay shall be capable of handling the current of the CB trip coil.</p> <p>Supporting Note: Master trip shall be of latch type only, hence it should be bi-stable relay with operate and reset coil.</p>	<p>Firm comment may not be accepted as master trip relay should be self-reset type to avoid unnecessary delay in fault localization.</p>
7.4.1	<p>7.4.1 IDMT OVER CURRENT RELAY</p> <p>Current setting 20% to 200% in steps of 1% IDMT curve: 3 sec. at 10 Ir Time multiplier setting. 0.01 – 1 (In steps of 0.01)</p>	<p><u>M/S GE</u></p> <p>TMS:0.025 to 1.2(In Steps of 0.025) [IEC] Time Dial:0.01 to 100 (In Steps of 0.01) [IEEE]</p>	<ol style="list-style-type: none"> 1. Firm comment pertains to increasing of lower range of TMS setting may be accepted as lower setting of TMS i.e. 0.01 is not required to set in the field. 2. The steps of TMS setting 0.025 may not be accepted as fine steps 0.01 of TMS setting may be required for

848333/2021/O/o PED/TI/RDSO

			time co-ordination of relays.
	<p>IDMT OVER CURRENT RELAY Current setting Time multiplier setting. 20% to 200% in steps of 1% IDMT curve: 3 sec. at 10 Ir 0.01 – 1 (In steps of 0.01)</p>	<p><u>M/S APPSIL</u> IDMT OVER CURRENT RELAY Current setting Time multiplier setting. 20% to 200% in steps of 1% IDMT curve: 3 sec. at 10 Ir 0.05 – 3(In steps of 0.01)</p>	<p>Firm comment may not be accepted. However, lower setting range of TMS increased to 0.04 in place of 0.01 in line to RDSO specification no. TI/SPC/PSI/PROTCT/7101 of similar items has been finalised by RDSO..</p>
7.4.2	<p>7.4.2 OVER VOLTAGE RELAY Over voltage protection shall be provided with inverse time characteristics with voltage settings range 100% to 200 % in steps of 1%, the IDMT operating curve shall be 1.5 N = 7.0 seconds at TMS = 1, the TMS shall be settable 0.01 to 1.0 in the steps of 0.01. The over voltage relay shall be energized from a potential transformer connected to the main bus bar on the incoming side of the circuit breaker controlling the capacitor bank. If required an interposing voltage transformer (IVT) of suitable ratio shall be used for matching the capacitor over- voltage withstand characteristics.</p>	<p><u>M/S GE</u> Setting Range:60 to 185V in steps of 1V TMS:0 to 100 Sec in steps of 10ms</p>	<ol style="list-style-type: none"> 1. Firm comments in regards to voltage setting range may be accepted as suggested setting meets protection requirement. 2. TMS 0 to 100sec seems that it is not in term of TMS setting, this is a definite time setting. Hence, this setting may not be accepted.
7.4.3	<p>7.4.3 UNDER VOLTAGE RELAY The voltage setting range of under voltage relay shall be 20% to 90% in steps of 1%, the IDMT curve shall be of 5.0 at no voltage at TMS= 1.0, the TMS shall be settable from 0.01 to 1.0 in the steps of 0.01. This protection function shall work in conjunction with a timer to enable the capacitors to discharge before reclosure. The relay provided for this purpose shall be connected to the bus potential transformer. Also, a time delay relay shall be included with adjustable setting of 0 to 10 minutes in steps of 1 minute to provide a time lag before the breaker can be reclosed. However, this relay shall not be required if a timer is included in the closing circuit of its associated breaker to prevent its reclosing within 10 minutes</p>	<p><u>M/S GE</u> Setting Range:10 to 120V in steps of 1V TMS:0.5 to 100 in steps of .500</p>	<p>Firm comment may not be accepted as it seems that firm submitted setting available on their make relay. Justification for desired changes is not given.</p>

8.1.6	All type & routine tests relevant to protection module shall be conducted as per the latest version of IEC 60255-16, IEC60255-151, IEC-60255-5, IEC60255-1, IEC-60255-26, IEC60255-27, IEC-60255-21, IEC 61000, IS- 3231 part 1 to 3 and IS: 8686 and as modified or amplified	<u>M/S ASHIDA</u> All type & routine tests relevant to protection module shall be conducted as per the latest version of IEC 60255-16, IEC60255-151, IEC- 60255-5, IEC60255-1, IEC-60255-26, IEC60255-27, IEC-60255-21, IEC 61000, IS-3231 part 1 to 3 and IS: 8686 and as modified or amplified	The IS 3231 is not active, the same may be deleted. IS 8686 is active standard, this can not be deleted.
8.2 (xviii)	Communication standard protocol as per IEC:61850	<u>M/S ALIND</u> IEC 61850 is not recommended for the Railways. IEC 61850 is not recommended for the Railways. Please refer to comment for point no. 11.3	Firm comment may not be accepted as, 1. IEC 61850 protocol is the latest and most of the utilities are using this protocol. DFCCIL is also using this protocol for communication between IEDs & RTU. 2. As per CEA notification August, 2010, all main protection relays provided for transmission lines, transformers and bus-bar shall be numerical type and communication protocol shall be as per IEC 61850/relevant IS. 3. We should encourage to implement latest technology.
8.2	The protection relays shall be type tested as per IS:3231, IS: 12083 IS:8686, IEC 61000 & IEC 60255 as mentioned above	<u>M/S ASHIDA</u> The protection relays shall be type tested as per IS:3231, IS: 12083 IS:8686 , IEC 61000 & IEC 60255 as mentioned above	The IS 3231, IS 12083 is not active, the same may be deleted. IS 8686 is active standard, this can not be deleted.
8.2.3	--	Need to be after cl. No.7.3.3 of Panto Flash-over Relay	Firm comment may be accepted.
		<u>M/S ASHIDA</u> Protection for Sidings/Yard lines to be included in the Specification.	Firm comment may be accepted as protection scheme for siding has been issued to zonal railway by separate RDSO letter.
8.2	(xix) (6) Damp heat test, steady state as per IEC 60068-2-78	<u>M/S APPSIL</u> Damp heat test, steady state as per IEC 60255-1	Firm comment may be accepted
	(xix) (7) Damp heat test, cyclic as per IEC 60068-2-30	<u>M/S APPSIL</u> Damp heat test, cyclic as per IEC 60255-1	Firm comment may be accepted

	(xx) (1) a) 1 MHz burst immunity test as per IEC60255-26 & IEC61000-4-18: Common Mode:2.5kV Differential mode: 1kV Duration: 2 sec	<u>M/S APPSIL</u> (xx) (1) a) 1 MHz burst immunity test as per IEC60255-26 & IEC61000-4-18: Common Mode:2.5kV Differential mode: 1kV Duration: 2 sec see Damped oscillatory wave test - As per IEC 60255-26 subclause 6.3 & IEC61000-4-18 Voltage oscillation frequency - 1Mhz Test level Differential mode - 1kV Common mode-2.5kV	Firm comment may be accepted as name of test as per reference IEC is correct.
	(xx) (9) Power Frequency Immunity Test as per IEC60255-26 & IEC61000-4-8.	<u>M/S APPSIL</u> Power Frequency Immunity Test as per IEC60255-26 & Basic standard IEC61000-4-16	Firm comment may be accepted as suggested IEC reference is correct.
Anx-E-D	1. EQUIPMENT ON THE CONTROL PANEL Switch each for Local/Remote Change over for CB, BM's and tap changer control Automatic semaphore Indicators for CB, BM's Manually operated Semaphores for isolators Indication LEDs for close and open positions of each breaker, interrupters, dc fail supervision, trip circuit fail, PT healthy, dc high/low, tap positions, blower fans etc. A.C. Ammeters on 25 kV side, Scale 750/1500 A with associated range selector switch. A.C. Voltmeters on 25 kV side Scale 0-30 kV. Power factor meter Digital type smart energy meter on HV side Annunciation System as this specification	<u>M/S APPSIL</u> 1. EQUIPMENT ON THE CONTROL PANEL Switch each for Local/Remote Change over for CB, BM's and tap changer control Automatic semaphore Indicators for CB, BM's Manually operated Semaphores for isolators Indication LEDs for close and open positions of each breaker, interrupters, dc fail supervision, trip circuit fail, PT healthy, dc high/low, tap positions, blower fans etc. A.C. Ammeters on 25 kV side, Scale 750/1500 A with associated range selector switch. A.C. Voltmeters on 25 kV side Scale 0-30 kV. Power factor meter Bay control Unit (BCU) Digital type smart energy meter on HV side Annunciation System as this specification Supporting Note: Bay control unit meets the complete control & monitoring requirement of the respective bay. Hence all the conventional operating components can be avoided.	Firm comment may not be accepted as, 1. Bay control unit is not the feature of this specification for monitoring and control of traction equipment. 2. Bay control unit system is generally used for bigger sub-station where all the control operation carried out locally.
	Para 3.0 – service condition, Para 6.2.2, Para 6.2.11-disturbance data for number of events stored in relay reduced to 8, Para 6.2.15-number of events stored in relay reduced to 800, Para 7.2 (iii) – TMS setting start from 0.04 in place of 0.01, Para 7.3.1- operating time of DPR		

	revised, Para 7.3.1.6-PTFF logic changed, (viii)Para 8.2 (xix) -Environmental test is revised according to latest RDSO specification no. TI/SPC/PSI/PROTCT/7101of control and relay panel for 2x25KV ac traction.
--	---