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Ministry of Railways  
भारत सरकार-रेलमंत्रालय  
Research Designs & Standards Organisation  
अनुसंधानअभिकल्पऔरमानकसंगठन  
LUCKNOW – 226011  
लखनऊ-226 011

No: STS/E/TAN/DS-III/Vol-I

Dated 22.08.2016

To,  
Address (Overleaf)

- Sub: Guideline regarding Technical System Application Approval for Electronic Interlocking (EI) Installation.
- Ref : i) Technical advisory note No: STS/E/TAN/3012 ver 1.0 dated 28.08.2014  
ii) CSTE/CON/ECOR's letter no. CSTE/CON/BBS/Signal Policy/171 dt. 04.04.16.  
iii) Failure details due to lightning at Viduraswatha (SWR), Posoita (SER), Boinda (ECOR) & Jagdalpur (ECOR) received vide firm's letter no. MEI633:3840:2016 dated 11.06.2016

Technical Advisory Note No: STS/E/TAN/3012 Ver 1.0 dated 28.08.2014, regarding installation practices was issued in year 2014 by RDSO to ensure better installation at site for improving reliability and availability of Electronic Interlocking systems.

Based upon the experience gained further and observations of site conditions in some of the failures/lightning conditions, this Technical Advisory Note has been revised.

Please find attached herewith amended Technical advisory note No: STS/E/TAN/3012 Ver 2.0 dated 10.08.2016, which supersedes the earlier Technical Advisory Note No. STS/E/TAN/3012 Ver. 1.0 dated 28.08.2014, with immediate effect.

This is issued with the approval of Competent Authority.

DA: As above

*A*  
23/08/16  
(Alok Katiyar)  
Director/Signal-III  
for Executive Director/Signal



1	मुख्य संकेत एवं दूरसंचार अभियन्ता मुख्य संकेत एवं दूरसंचार अभियन्ता/निर्माण मुख्य संकेत एवं दूरसंचार अभियन्ता/प्रोजेक्ट	<b>Chief Signal &amp; Telecom Engineer</b> <b>Chief Signal &amp; Telecom Engineer/Const.</b> <b>Chief Signal &amp; Telecom Engineer/Project</b>
i)	मध्य रेलवे, मुम्बई सी.एस.टी.- 400001	Central Rly, Mumbai CST-400 001
ii)	पश्चिम रेलवे, चर्च गेट, मुम्बई - 400020	Western Rly, Churchgate, Mumbai - 400 020
iii)	पूर्व रेलवे, फेयरली प्लेस, कोलकाता - 001	Eastern Rly, Fairlie Place, Kolkata - 700 001
iv)	दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता -43	South Eastern Rly., Garden Reach, Kolkata - 43
v)	उत्तर रेलवे, बड़ौदा हाउस, नई दिल्ली - 01	Northern Rly., Baroda House, New Delhi- 01
vi)	पूर्वात्तर रेलवे, गोरखपुर - 273012	Northeastern Rly., Gorakhpur -273 012
vii)	पूर्वात्तर सीमान्त रेलवे, मालीगांव, गुवाहाटी 11	North Frontier Rly., Maligaon, Guwahati- 011
viii)	दक्षिण रेलवे, पार्क टाउन, चेन्नई - 600 003	Southern Rly., Park Town, Chennai -600 003
ix)	दक्षिण मध्य रेलवे, सिकन्दराबाद -500 371	South Central Rly, Rail Nilayam, Secunderabad-71
x)	पूर्व मध्य रेलवे, हाजीपुर।	East Central Railway, Hazipur
xi)	उत्तर पश्चिम रेलवे, जयपुर-300206	North Western Railway, Jaipur-300206
xii)	पूर्व तटीय रेलवे, ग्राउन्ड तल, उत्तरी ब्लॉक, समन्त विहार, मुवनेश्वर-17	East Coast Railway, Rail Vihar, Ground floor, North Block, Samant Vihar, Bhubneshwar -17
xiii)	उत्तर मध्य रेलवे, गंगा काम्पलेक्स, सूबेदारगंज, इलाहाबाद।	North Central Railway, Ganga Complex, Subedarganj, Allahabad.
xiv)	दक्षिण पश्चिम रेलवे, क्लब रोड, केशवपुर, हुबली-580023	South Western Railway, Club Road, Keshavpur, Hubli-23
xv)	पश्चिम मध्य रेलवे, जबलपुर	West Central Railway, II floor, DRM Office, Jabalpur.
xvi)	दक्षिण पूर्व मध्य रेलवे, आर.ई. ऑफिस काम्पलेक्स, बिलासपुर- 495004	South East Central Railway, R. E. Office Complex, Bilaspur-495004
2	सी0एस0टी0ई0, मैट्रो रेलवे, 33/1, जवाहर लाल नेहरू रोड, कोलकाता -71	Metro Railway, 33/1, Jawaharlal Nehru Road, Kolkata - 700071
3	सी0एस0टी0ई0, कोर , नवाब युसुफ रोड सिविल लाइन्स इलाहाबाद - 211 001	CORE, Nawab Yusuf Road, Civil Lines, Allahabad- 211 001
4	सी.एस.टी.ई./ कोनकन रेलवे, बेलापुर भवन, सेक्टर-II, सी0बी0डी, बेलापुर, नई मुम्बई-400614	The CSTE, Konkan Railway Corpn. Ltd., Belapur Bhavan, Sector-II, CBD, Belapur, New Mumbai - 400614.
5	सी.ए.ओ./आई.आर.पी.एम.यू./ इरकोट बिल्डिंग/ शंकर मार्केट के पीछे/नई दिल्ली	CAO/IRPMU IRCOT Building, Behind Shanker Market, New Delhi.
6	निदेशक/इरिसेट, तारनाका रोड, लल्लागुडा, पी ओ सिकन्दराबाद-17	Director/IRISET, Tarnaka Road Lallaguda, P.O Secunderabad -17
7	महा प्रबंधक/एसएण्डटी, इरकॉन इंटरनेशनल लि0, सी-4, डिस्ट्रिक्ट सेंटर, साकेत, नई दिल्ली-17	The General Manager/S&T, IRCON Internation Limited, C-4, District Centre, Saket, New Delhi - 110017
8	महा प्रबंधक/रेल विकास निगम लि0/नई दिल्ली	GM/S&T, Rail Vikas Nigam Limited, Plot No. 25, 'B' Block, 1 <sup>st</sup> Floor, August Kranti Bhawan, Bhikaji Kama Place, New Delhi-66
9	प्रिंसिपल/रेलवे स्टाफ कालेज/वडोदरा	The Principal, Railway Staff Colleger, Vadodara
10	मेसर्स सीमेन्स रेल ऑटोमेशन प्रा0 लि0 बंगलोर .560100	M/S Siemens Rail Automation Pvt Ltd, Semicon Park , Plot No 31(P1) , Tower-2 Electronic City Phase -II, Bangalore-560100 Karnataka Fax No-080-30588765
11	मेसर्स अनसाल्डो ट्रांसपोर्ट सिस्टम इंडिया प्रा0 लि0, बंगलोर	M/S Ansaldo Transportation system India Pvt Ltd., SLV complex, AVS Compound No 35, 80 feet road, Kormangal, IV block Bangalore-560034 Fax-080-25525732
12	मेसर्स मेधा सर्वो ड्राइव्स प्रा0 लि0, हैदराबाद	M/S Medha Servo Drives Pvt Ltd., P-4/5B Industrial Park, Nacharam Hyderabad-5600076
13	मेसर्स क्योसन इंडिया प्रा0 लि0, नई दिल्ली	M/s Kyosan India Private Limited (Kyosan Electric Mfg Co. Japan-OEM) Office: 601, 6th Floor, Eros Corporate Tower Nehru Place , New Delhi-110014
14	मेसर्स एलस्टॉम ट्रांसपोर्ट इंडिया लि0, बंगलोर	M/s Alstom Transport India Ltd. Office: 65/2, Level 03 (2nd Floor), Block C, Bagmane Lairel Building, Bagmane Tech Park, CV Raman Nagar, Bangalore-560093, Karnatka

## TECHNICAL ADVISORY NOTE

(This supersedes the earlier Technical Advisory Note No. STS/E/TAN/3012, Ver. 1.0 dated 28.08.2014)

Subject	Guidelines regarding Technical System Application Approval for Electronic Interlocking Installation		
Document No.	STS/E/TAN/3012	Version	2.0
Date	10.08.2016	Pages	08

### Guidelines regarding installation of Electronic Interlocking

#### 1. Scope

These guidelines are issued after analysing the TSAA (technical system application Approval) of Electronic Interlocking installation documents at RDSO during last 3 ½ Years for carrying out installation of Electronic Interlocking in Indian Railway .These guidelines shall be followed by the Railways to ensure speedy clearance of TSAA from RDSO and will help in further improving the reliability of EI installation.

#### 2. Suggestion:

##### 2.1 Power Supply arrangement:

- The 110 volt DC supply from IPS room to EI rack shall be provided with duplicated cable with suitable gauge so as to ensure that voltage drop in cable shall not be more that 1.0 volt from integrated power supply (IPS).

**Reason:** Duplicated cable is provided from IPS to EI to have redundancy of power supply connection to equipment and to prevent failure due to rat cut or any other damage.

Cable voltage drop is restricted to 1 volt to avoid overloading of cable & also ensure correct AWG, quality wires.

- The DC-DC converters provided for Electronic Interlocking system shall be segregated for 'A' & 'B' systems along with segregation of cabling and termination for power supply up to DC-DC converters, for all the converters & shall be in N+1 configuration. It is advised that reliable DC-DC converters as advised by OEMs shall be considered for better reliability. (Tentative Power Supply Sketches are attached as Annexure –A1, A2 & A3).

**Reason:** This is provided for the better supply arrangement with redundancy for main/standby EI system to get high availability and reliability so that in case of failure of one set of DC-DC converter whole EI equipment will not shut down.

- The DC-DC converter shall be installed near to EI rack or in the EI rack itself to avoid the line drop. The line drop shall not be more than 0.5volt.

**Reason:** To avoid high drop in line voltage, so that full operating voltage is available to the system.

- The location of DC-DC converter shall be made in such a way that the 110V DC power supplies wires do not run and cut across other cables in the Electronic Interlocking room and this cable shall be treated as dirty cable and segregated from other clean wiring.



**Reason:** To avoid induced surges from the incoming power supply of 110 VDC, in other indoor wiring, cables of 110 VDC shall be taken in completely segregated way in the Electronic Equipment Room.

- e) Where ever Panel Processor module is installed in the SM room, the 110 volt DC power supply shall be provided from EI or from IPS room with duplicated cable arrangement. The Panel Processor module shall have separate DC-DC converter in N+1 configuration.

**Reason:** It is seen normally that 12V/24V power supply is directly taken from IPS room to Station Master's room which are normally more than 25 meters away. This lead to lot of voltage drop in cables as well as in heating of the cable.

The N+1 configuration of DC-DC converters provide extra redundancy to panel processor.

- f) 24 V or 110 V DC supply for fan shall be fed with separate external (from IPS) supply, which should be completely isolated from Electronic interlocking supply and same shall be provided with fuse.

**Reason:** This is to avoid effect of inductive loading of DC-DC supply of main EI equipment which normally results in resetting of the system and also avoids failure of DC-DC converters in case the fan become short-circuit.

## 2.2 Communication arrangement:

- a) The panel processor shall be preferably housed inside the control cum indication panel (CCIP) and shall be connected with EI on OFC cable in redundant manner in separate duct pipe to avoid failure due to cutting of optical fibre cable.

**Reason:** By accommodating Panel Processor inside the CCIP, space in the station master room can be saved and it also avoid the placing S2 rack for PPM. Communication connection shall be made with OFC to avoid failure due to lightening & increase reliability of system.

- b) It is advised that the EI to VDU, CPU to CPU (in case of distributed system), EI to Object Controller (in case of distributed system) & EI to Panel Processor Module connectivity shall be planned with OFC cable to avoid damage due to surge and lightening. The optical modem shall be of industrial grade with operating temperature range of 0 to 70°C.
- c) The communication line between the CPU's, CPU to PPM, CPU to OC and VDU shall be provided in the ring system (Redundant manner) to avoid failure due to loss of communication. The OFC and other network shall be provided with NMS (network Management System).

**Reason:** To avoid the failure of system due to loss of communication due to single cut, maintain high reliability & availability of system.

### 2.3 Earthing arrangement: (For all EI's except Kyosan make K5BMC EI)

It is advised that the Earthing drawing circulated vide RDSO's TAN STS/E/TAN/3006 dated 02.11.2012 shall be followed for protection from lightening. The following shall also be ensured by authorized Railway Officials before commissioning:

- Class A protection shall be ensured on top of the building.
- Copper tape (Bonding ring conductor) as per drawing mounted on insulated stand-off is provided to cover the maximum area in the Relay room, Power room & Equipment room and the connection to equipment shall be made at the nearest point.
- As far as possible, Railways shall make attempt to provide earthing in such a way that it can cover most part of the building. This is to ensure that earth resistance shall be less than 1ohm at the equipment.
- The buried earth conductor shown as copper can be of GI type to avoid theft.
- The interlinking of all Relay racks, as well as EI racks shall be ensured.
- All the cable trough and ladder shall be earthed properly.
- Provision of the relevant Surge Protection Device (SPD) for the power supplies used for Electronic Interlocking systems shall be ensured. During many cases, it was noticed that the proper earth connections in the SPDs was missing which renders SPD as functionless, hence, the same shall also be ensured.
- It shall be ensured that front and back doors of all cabinets using copper braid with shortest path to earth bus bar in equipment room.

**Reason:** A good earthing arrangement provides better protection of electronic system against lightening and surges. The above drawing has been made considering for provision of good earthing system for Electronic Interlocking.

### 2.4 Data Logger Installation:

- The Data logger shall be commissioned prior to the commissioning of EI system with all the external relay contacts wired into data logger.
- Synchronization of the EI clock and data logger clock through CMU in network condition must be verified and certified at minimum Assistant officers' level.
- The analog monitoring of output of DC-DC converter of EI shall be wired into data-logger for monitoring the healthiness of converter.

**Reason:** For proper health monitoring of DC-DC converter for preventive and predictive maintenance.

## 2.5 Wiring Practice:

- a) The input, output, data and power supply cable shall be routed indifferent cable troughs separated with a gap of minimum 6 to 8 inches.

**Reason:** This is one of the most important items to be taken care of in EI installations. The EI output cables as well as power supply and other dirty cables generated lot of electromagnetic interferences, which if passed to input cable of EI results in repeated resetting and failure of EI system.

- b) The input and output cables (RDSO approved) of EI shall be twisted to minimize EMI & EMC effect.
- c) The fuse terminals are to be fixed with proper fuse rating marking, fuse number and should be of indicative type.
- d) The lightening and surge protection devices shall be installed as per concerned Electronic Interlocking installation document.
- e) It is observed at many installations that wire ends are not properly crimped with correct size of lugs & loose connections are found at the terminals end. It is to be ensured and verified thoroughly at site minimum by Assistant officers' level.
- f) Separation of 110V DC and other external power supply from the internal 12V/24V/50V DC power supply in the relay room by placing them in separate trough/ladder.

**Reason:** The 110V DC/external power supply wires run in outdoor field also and thus are highly susceptible for induction of surges, and if 12V/24V/50V DC input power supply has been placed in the same trough, this will have transmission of surges from external supply wires to the input power supplies resulting in damage to the equipments.

- g) Voltage monitoring cables to the data logger shall also be placed in a different trough which does not have any internal power supplies.

**Reason:** it must be understood that external power supplies particularly 220V AC monitoring wires are highly susceptible to the lightning surges as this is a completely non-protected circuit, hence, all voltage monitoring circuits of data logger shall be considered as dirty and should not be placed with internal power supply or other cables of Electronic Interlocking.

## 2.6 Miscellaneous:

- a) In terms of Railway Board's letter no. 2012/Sig/ASTS dated 03.05.2012, the application for technical system approval shall be forwarded through CSTE/Open line after due scrutiny and verification by Open line.
- b) As per Railway Board's letter no. 2010/Sig/SGF/EI (Ansaldo) dated 26.12.2012, in order to avoid failures due to reset, commissioning shall be planned with hot standby system only.

- c) The input and output details and logic shall be scrutinised and verified at minimum level of JAG officer before commissioning and certificate for the same shall be submitted to RDSO.
- d) The Factory Acceptance Test (FAT) shall be verified by Railway official (Open line/Construction) and Sample verification shall be done by minimum JAG officer during SAT(Site Acceptance Test)
- e) It is advised, for better reliability the guideline specification of embedded VDU as given in "Technical Advisory Note No STS/E/TAN/3007 Ver. 1.0" Date 2.11.2012 may please be seen for guidance.
- f) It is observed that document submitted to RDSO for Technical system application approval are not verified & signed by authorised Railway officer (open line/construction). They are either signed by RVNL official or only by the firm official who are commissioning the Electronic interlocking installation, same shall not be accepted.
- g) The pre-commissioning checklist for concerned EI shall be thoroughly checked at the site at the minimum Assistant officers' level jointly with the executing OEM.
- h) The quality and integrity of the installation remains complete responsibility of the OEM. The firm must provide an OEM certificate regarding this before commissioning of any installation, any deficiency pointed out later, shall be done free of cost by OEM, this shall be confirmed by OEM before commissioning.

*A*  
23/08/16

(Alok Katiyar)

Director/Signal-III

for Director General/Signal

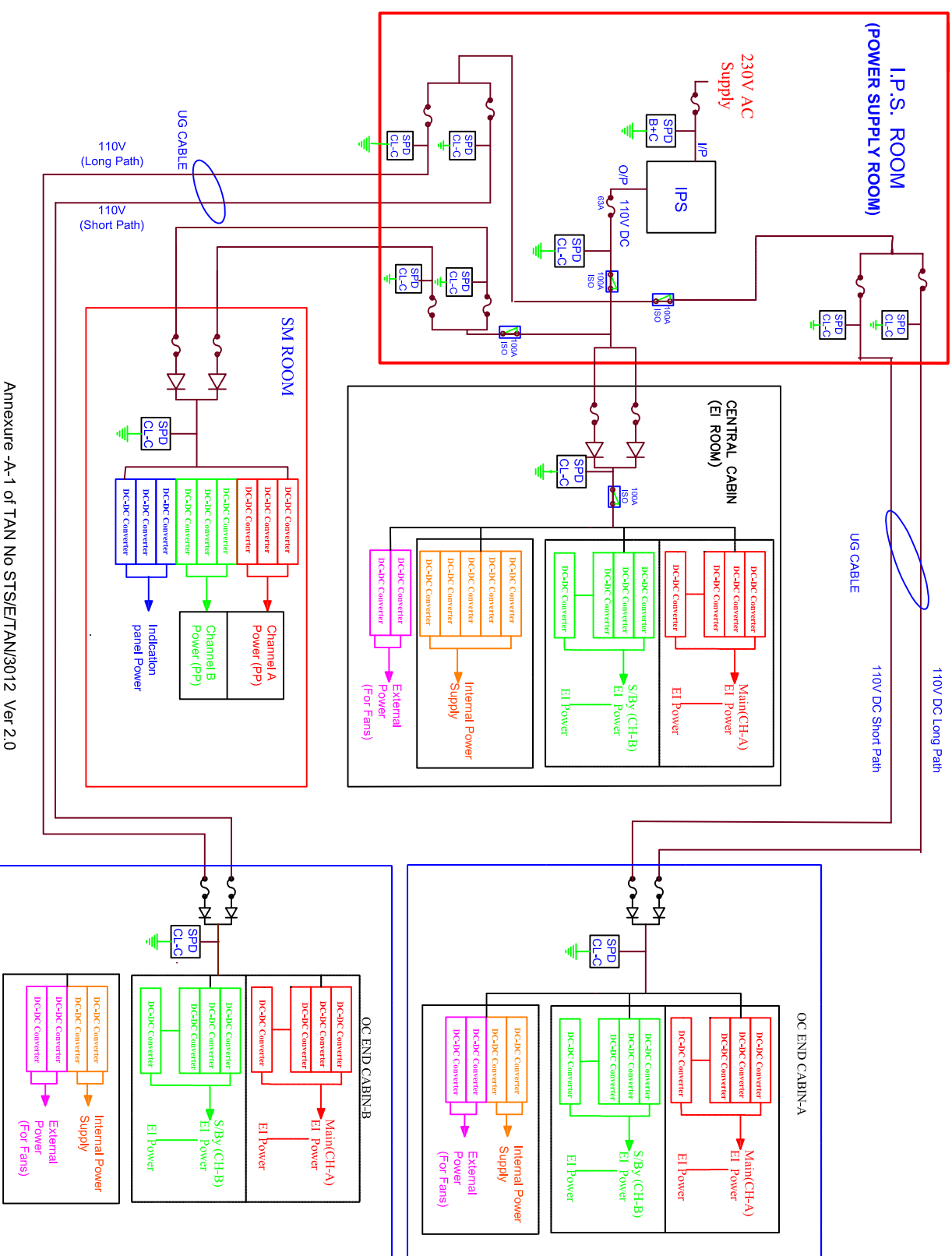
Encl : As above

For any issues related to this TAN (Technical Advisory Note) please contact Director/Signal-III at RDSO, Lucknow (Rly phone- 032-42653, DOT-0522-2465734, Email: [dsig3rdso@gmail.com](mailto:dsig3rdso@gmail.com))



# Power Distribution Scheme ( 110V DC Supply) - Electronic Interlocking System Annexure-A1

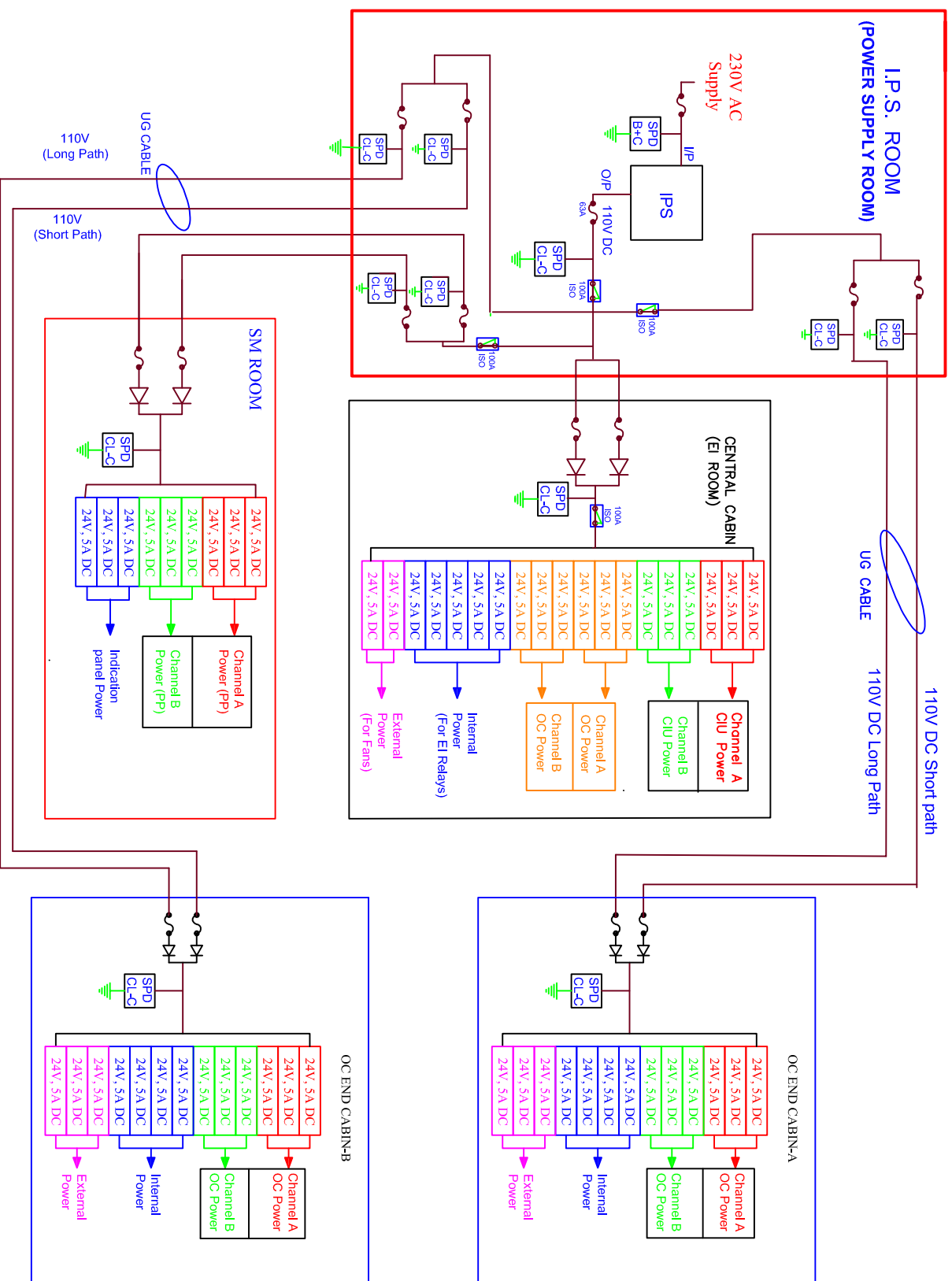
Note: The number of DC-DC converter shown above are tentative and actual number of DC-DC converter should be calculated based upon maximumload current at site depending upon the Electronic Interlocking configuration





# EI Power Distribution ( 110V DC Supply) Medha EI- System Scheme Annexure-A-2

Note: The number of DC-DC converter shown above are tentative and actual number of DC-DC converter should be calculated based upon maximumload current at site depending upon the Electronic Interlocking configuration



## Configuration of Electronic Interlocking in Distributed Installation

