

## Disconnectors & Earthing Switches

General Information, Recommended Spares, Services & Maintenance brochure

For rated voltage up to 420kV



**Siemens Ltd  
Gas and Power**

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(\*charges depend on provider)

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- Read these operating instructions carefully before starting erection work erection work must only be carried out by personnel familiar with the operating instructions.
- Images, drawings & line diagrams shown in this manual are for your reference, original design may vary as per GA drawings
- Failure to comply with warnings and other alerts can cause serious bodily injury and extensive damage to property and the environment can even cause death.



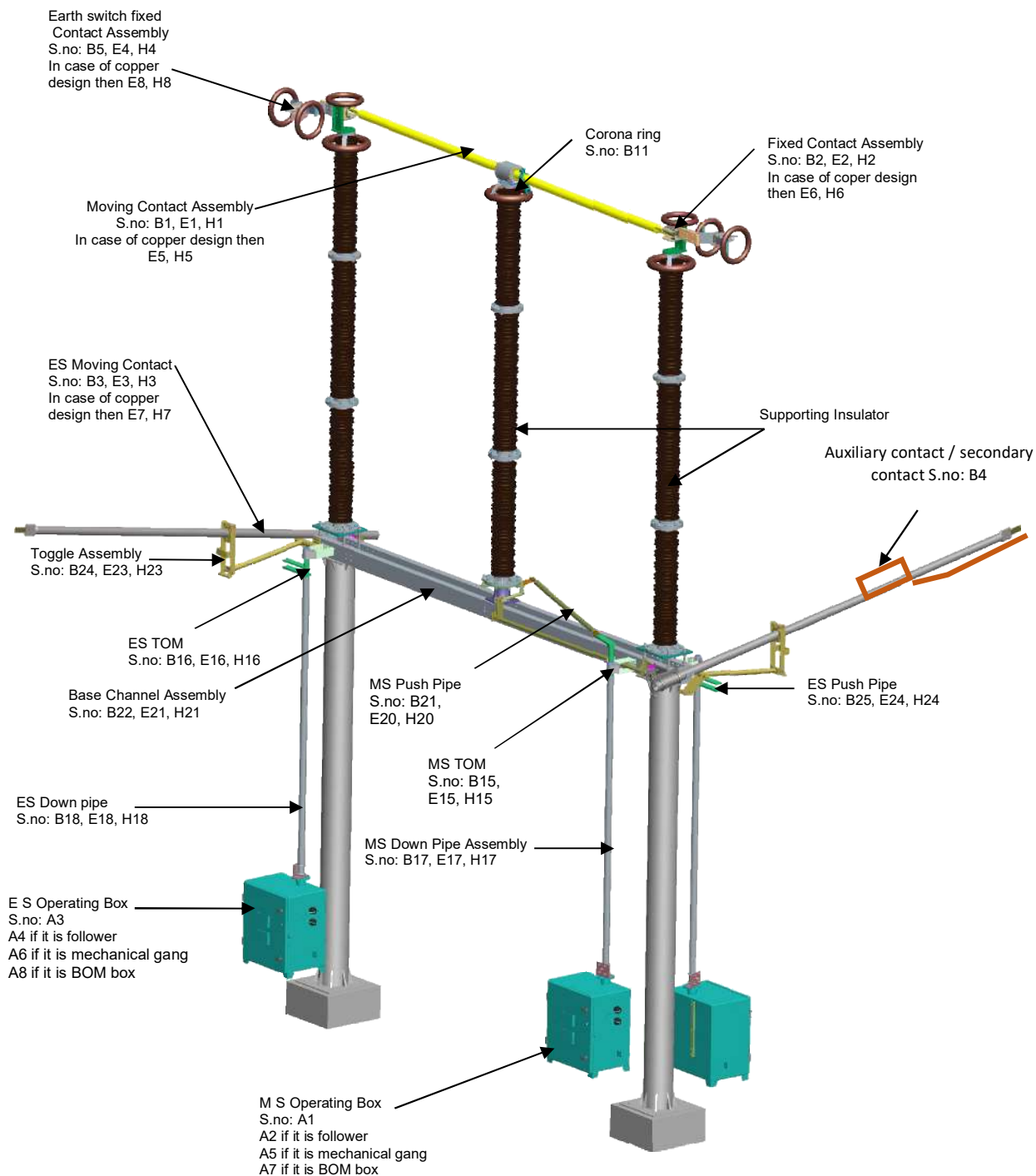
## ❖ Details required from customers at the time of enquiry for spares and services

- ✓ Name plate photographs of Isolator
- ✓ GA drawings in case of Insulators and Terminal Connectors
- ✓ Item Photographs in case of electrical components inside control panel
- ✓ Complete Isolator photographs in case of service
- ✓ Sample Video in case of operational issues and hot spots
- ✓ Old PO copies in case of repeat spare orders

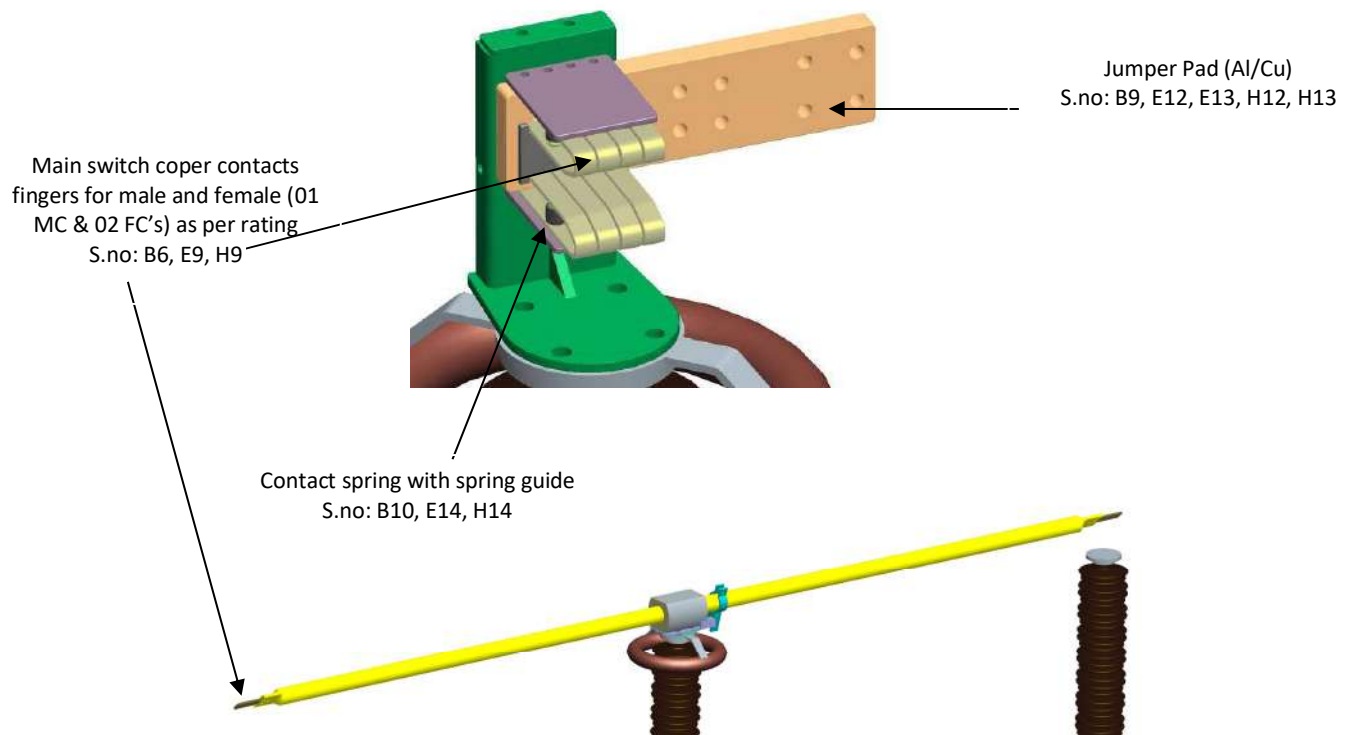
## 1. General

### 1.1 GA Drawing – Double Break

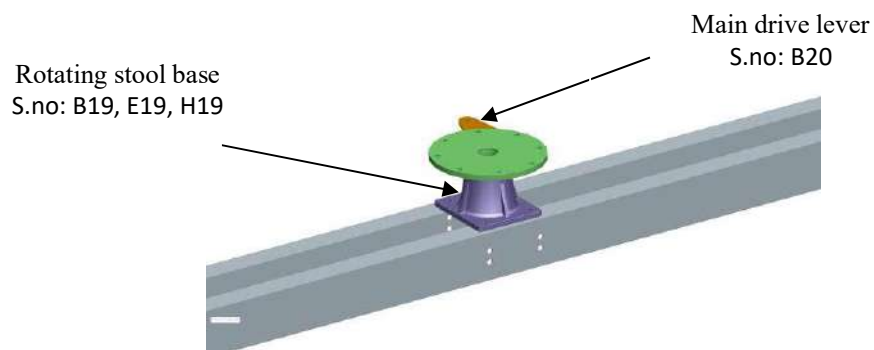
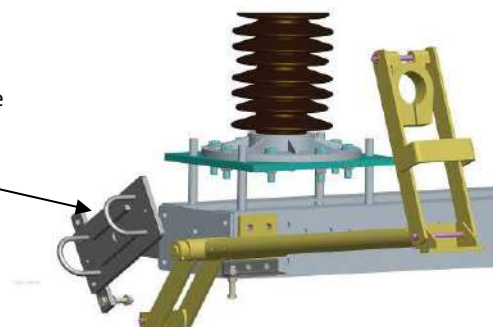
#### Double Break Isolator



DBR (400kV, 245kV & 145kV)



Contact spring with spring guide  
S.no: B23, E22, H22







Main Switch Moving Contact assembly – Sliding Design (Single layer -2000A & Double layer 3150A)  
S.no: B.1a

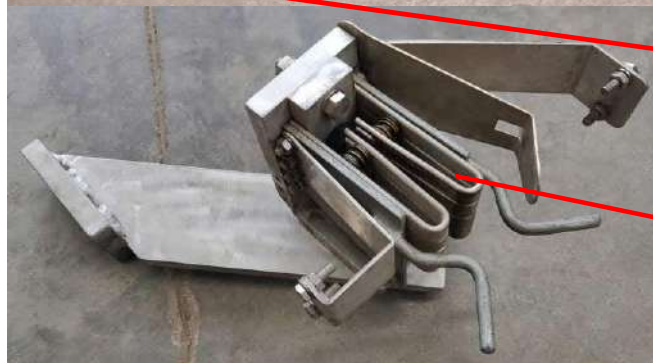


Main Switch Fixed Contact assembly – Sliding Design  
S.no: B.2b

Copper Contact Fingers – Sliding Design  
S.no: B.6a



Blade / Tip for Earth Switch Moving Contact  
S.no: B07, E10, H10



Copper Contact Fingers for Earth Switch Fixed Contact  
S.no: B08, E11, H11

ESMC Cu Flexibles  
S.no: A38

## 1.2 Parts & Identification of Isolator – Double Break

A. General Components			
S.no	Description	Qty	UOM
A.1	Main Master Switch MOM Box Assembly	1	No's
A.2	Main Follower Switch MOM Box Assembly	1	No's
A.3	Earth Master Switch MOM Box Assembly	1	No's
A.4	Earth Follower Switch MOM Box Assembly	1	No's
A.5	Main Switch MOM Box Assembly - Mechanical Ganged	1	No's
A.6	Earth Switch MOM Box Assembly - Mechanical Ganged	1	No's
A.7	Main Switch BOM Box Assembly	1	No's
A.8	Earth Switch BOM Box Assembly	1	No's
A.9	0.5 HP Gear Box Assembly with Motor (Side Mounted)	1	No's
A.10	0.5 HP Gear Box Assembly with Motor (Top Mounted)	1	No's
A.11	0.5 HP Motor without Pinion	1	No's
A.12	1 HP Motor without Pinion	1	No's
A.13	Overload Relay	1	No's
A.14	Relay Fixing Bracket	1	No's
A.15	Contactor (Close / Open)	1	No's
A.16	Auxiliary Block	1	No's
A.17	Interlocking Contactor	1	No's
A.18	3P AC MCB 10A	1	No's
A.19	16A SPN, 10KA MCB	1	No's
A.20	16A SP, 10KA MCB	1	No's
A.21	6A SP, 10KA MCB	1	No's
A.22	Limit Switch – Right	1	No's
A.23	Limit Switch – Left	1	No's
A.24	Auxiliary Switch (Till 14NO+14NC)	1	No's
A.25	Timer Range: 0-180 Secs	1	No's
A.26	Push Button - No Element - Color Green	1	No's
A.27	Push Button - No Element - Color Blue	1	No's
A.28	Push Button - NC Element - Color Red	1	No's
A.29	Push Button - No Element - Color Black	1	No's
A.30	Castle Key - 4 Lock + 1 Key Set	1	No's
A.31	Castle Key - 2 Lock + 1 Key Set	1	No's
A.32	Heater	1	No's
A.33	Lamp Holder	1	No's
A.34	Solenoid Coil with Plunger for MOM Box	1	No's
A.35	Solenoid Coil with Plunger for BOM Box	1	No's
A.36	Master - Individual Selector Switch	1	No's
A.37	Local - Remote - Manual Switch	1	No's
A.38	ESMC Flexible (CU Braid)	1	No's
A.39	PG Flexible (CU Braid)	1	No's
A.40	HCB Flexible (CU Braid)	1	No's

A.41	ESMC Counter balancing Spring	1	No's
A.42	PG Compound Spring	1	No's
B. 420kV DBR 2000A & 3150A			
S.no	Description	Qty	UOM
B.1	Main Switch Moving Contact Assembly	1	No's
B.2	Main Switch Fixed Contact Assembly	1	No's
B.1a	Main Switch Moving Contact Assembly - Sliding Design	1	No's
B.2b	Main Switch Fixed Contact Assembly - Sliding Design	1	No's
B.3	Earth Switch Moving Contact Assembly	1	No's
B.4	Auxiliary Contact Assembly	1	No's
B.5	Earth Switch Fixed Contact Assembly	1	No's
B.6	Copper Contact Fingers for One Pole of DBR Isolator	1	Pole
B.6a	Copper Contact Finger - Sliding Design	1	No's
B.7	Blade / Tip for Earth Switch Moving Contact	1	Pole
B.8	Copper Contact Fingers for Earth Switch Fixed Contact	1	Pole
B.9	Jumper Pad - Aluminum Design	1	No's
B.10	Contact Spring with Spring Guide	1	No's
B.11	Corona Rings for One Pole of Isolator	1	Pole
B.15	Main Switch TOM Assembly	1	No's
B.16	Earth Switch TOM Assembly	1	No's
B.17	Main Switch Down Pipe Assembly	1	No's
B.18	Earth Switch Down Pipe Assembly	1	No's
B.19	Rotating Stool Base Assembly	1	No's
B.20	Main Drive Lever	1	No's
B.21	M/S Push pipe Assembly	1	No's
B.22	Base Channel Assembly	1	No's
B.23	Earth Base Assembly	1	No's
B.24	Toggle Assembly for Earth Switch	1	No's
B.25	Earth Switch Push Pipe Assembly	1	No's
B.26	Mechanical Interlock Assembly	1	No's

E. 245kV DBR 1600A & 2000A/2500A			
S.no	Description	Qty	UOM
E.1	Main Switch Moving Contact Assembly	1	No's
E.2	Main Switch Fixed Contact Assembly	1	No's
E.3	Earth Switch Moving Contact Assembly	1	No's
E.4	Earth Switch Fixed Contact Assembly	1	No's
E.5	Main Switch Moving Contact Assembly – CU	1	No's
E.6	Main Switch Fixed Contact Assembly – CU	1	No's
E.7	Earth Switch Moving Contact Assembly – CU	1	No's
E.8	Earth Switch Fixed Contact Assembly – CU	1	No's
E.9	Copper Contact Fingers for One Pole of Isolator	1	Pole
E.10	Blade / Tip for Earth Switch Moving Contact	1	No's
E.11	Copper Contact Fingers for Earth Switch Fixed Contact	1	Pole
E.12	Jumper Pad - Aluminum Design	1	No's
E.13	Jumper Pad - Copper Design	1	No's

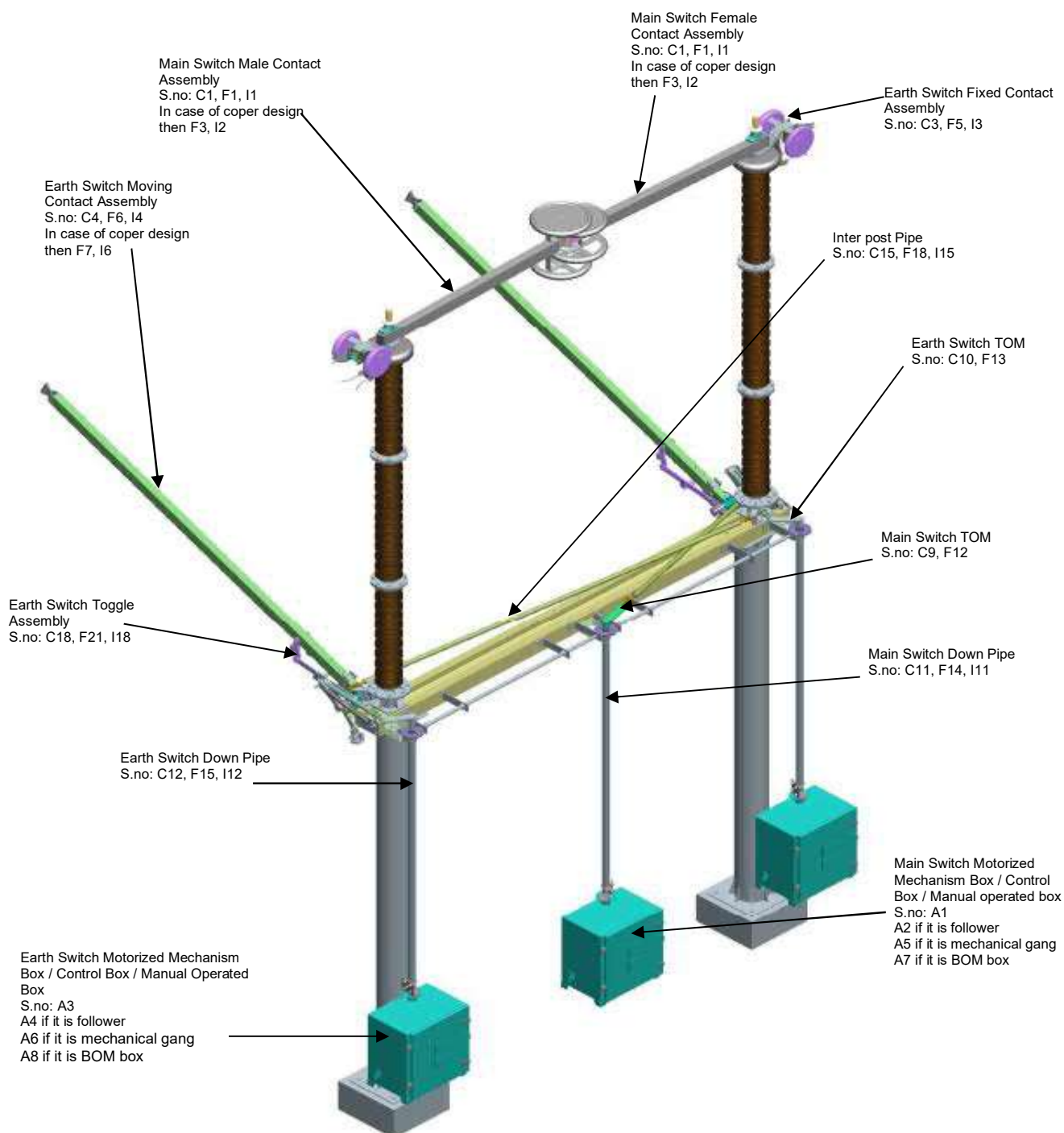


E.14	Contact Spring with Spring Guide	1	No's
E.15	Main Switch TOM Assembly	1	No's
E.16	Earth Switch TOM Assembly	1	No's
E.17	Main Switch Down Pipe Assembly	1	No's
E.18	Earth Switch Down Pipe Assembly	1	No's
E.19	Rotating Stool Base Assembly	1	No's
E.20	M/S Push pipe assembly	1	No's
E.21	Base Channel Assembly	1	No's
E.22	Earth Base Assembly	1	No's
E.23	Toggle Assembly for Earth Switch	1	No's
E.24	E/S PUSH PIPE ASSY	1	No's
E.25	Mechanical Interlock Assembly	1	Pole

H. 145kV DBR 1250A\1600A & 2000A\2500A			
S.no	Description	Qty	UOM
H.1	Main Switch Moving Contact Assembly	1	No's
H.2	Main Switch Fixed Contact Assembly	1	No's
H.3	Earth Switch Moving Contact Assembly	1	No's
H.4	Earth Switch Fixed Contact Assembly	1	No's
H.5	Main Switch Moving Contact Assembly – CU	1	No's
H.6	Main Switch Fixed Contact Assembly	1	No's
H.7	Earth Switch Moving Contact Assembly – CU	1	No's
H.8	Earth Switch Fixed Contact Assembly	1	No's
H.9	Copper Contact Fingers for One Pole of Isolator	1	Pole
H.10	Blade / Tip for Earth Switch Moving Contact	1	No's
H.11	Copper Contact Fingers for Earth Switch Fixed Contact	1	Pole
H.12	Jumper Pad - Aluminum Design	1	No's
H.13	Jumper Pad - Copper Design	1	No's
H.14	Contact Spring with Spring Guide	1	No's
H.15	Main Switch TOM Assembly	1	No's
H.16	Earth Switch TOM Assembly	1	No's
H.17	Main Switch Down Pipe Assembly	1	No's
H.18	Earth Switch Down Pipe Assembly	1	No's
H.19	Rotating Stool Base Assembly	1	No's
H.20	M/S Push pipe assembly	1	No's
H.21	Base Channel Assembly	1	No's
H.22	Earth Base Assembly	1	No's
H.23	Toggle Assembly for Earth Switch	1	No's
H.24	E/S PUSH PIPE ASSY	1	No's
H.25	Mechanical Interlock Assembly	1	No's

## 1.3GA Drawing – Horizontal Center Break

### Horizontal Center Break



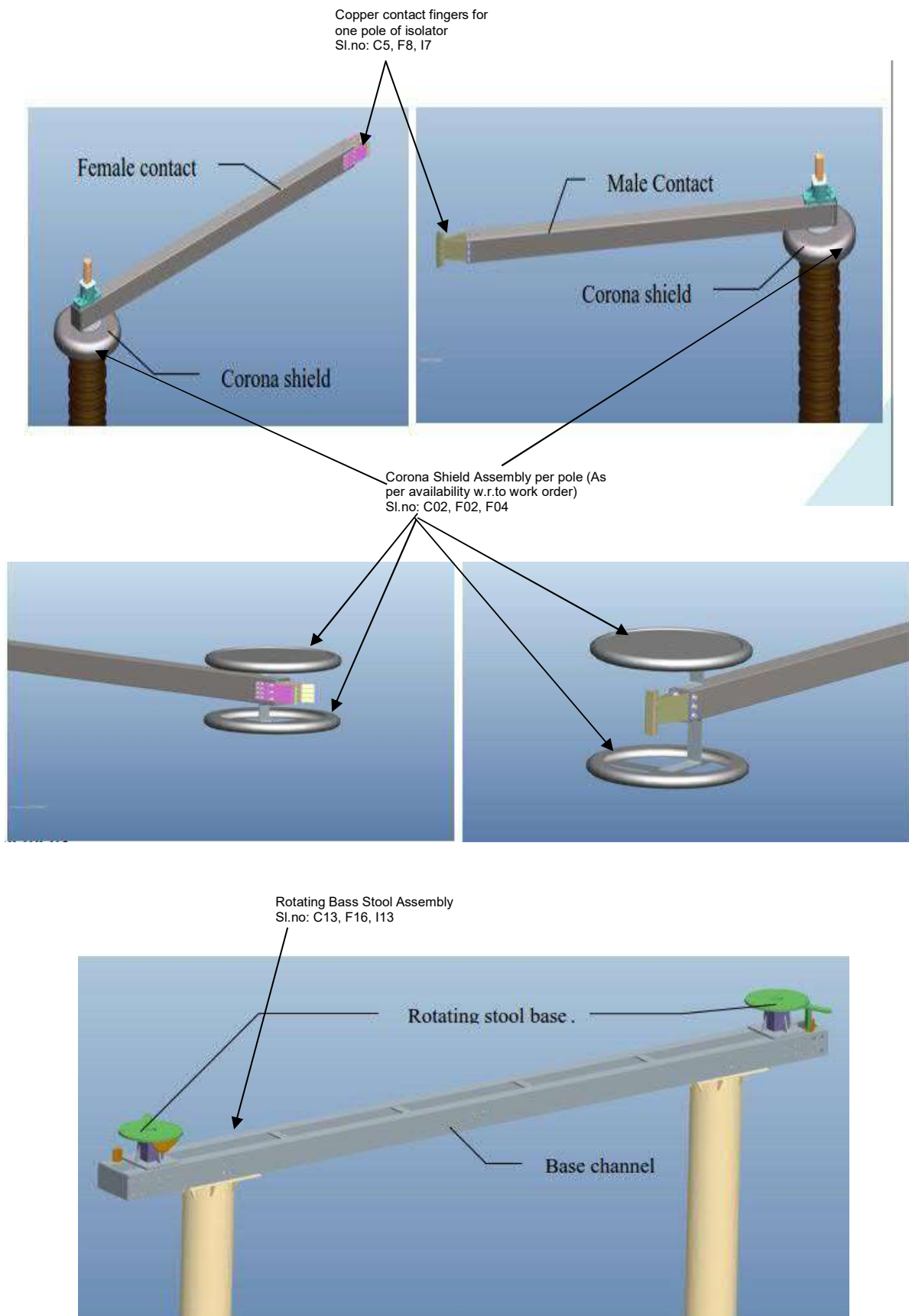


Fig. 03 Rotating Stool base mounting

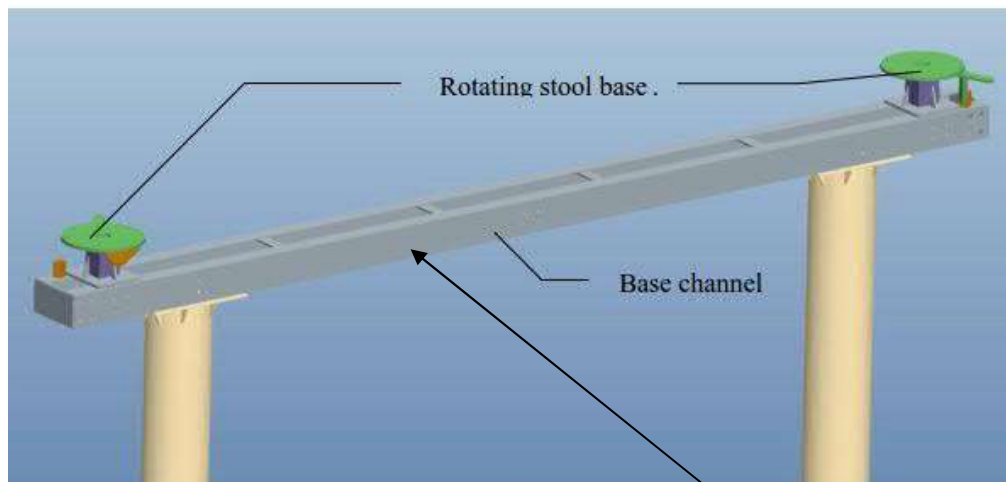


Fig. 03 Rotating Stool base mounting

Interpost Pipe Assembly  
Sl.no: C15, F18, I15

Base Channel Assembly  
Sl.no: C16, F19, I16

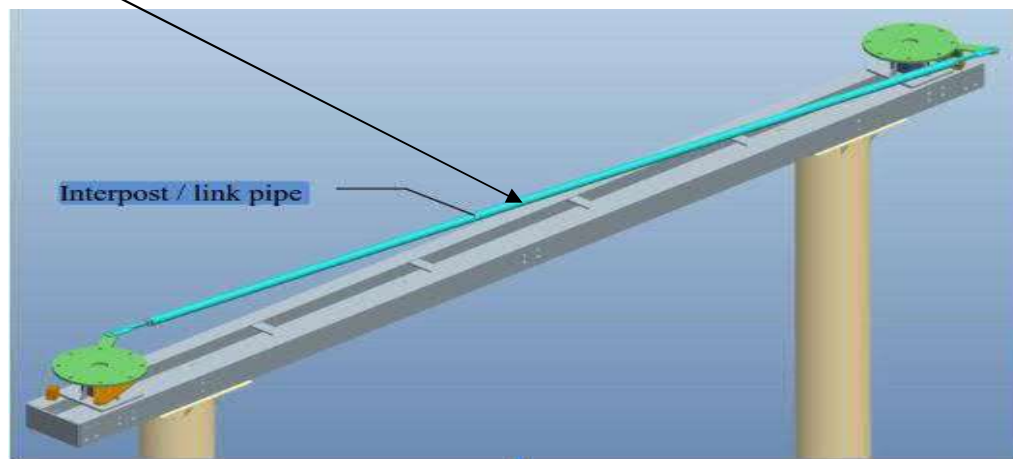


Fig. 04 Interpost pipe

MS Push Pipe Assembly  
Sl.no: C14, F17, I14

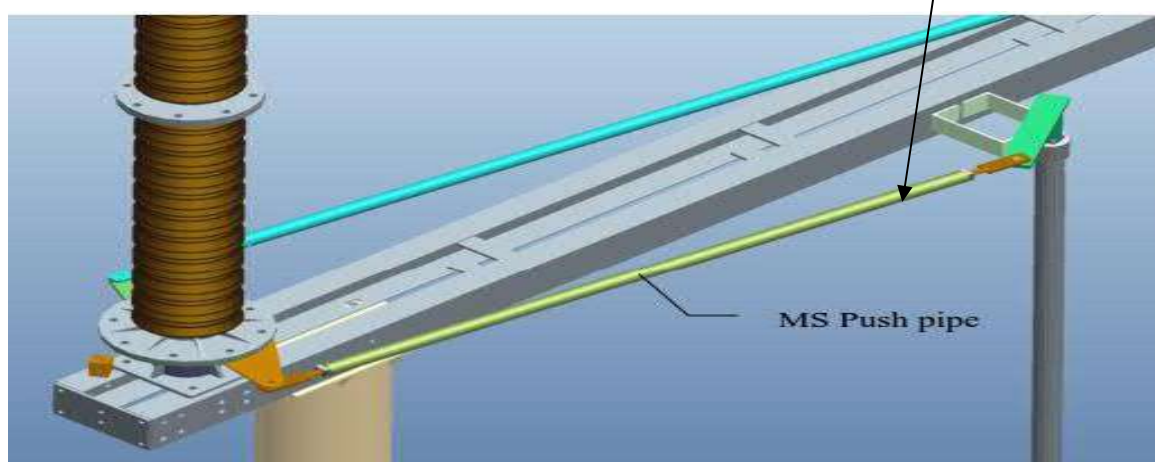


Fig. 12 Push pipe assembly

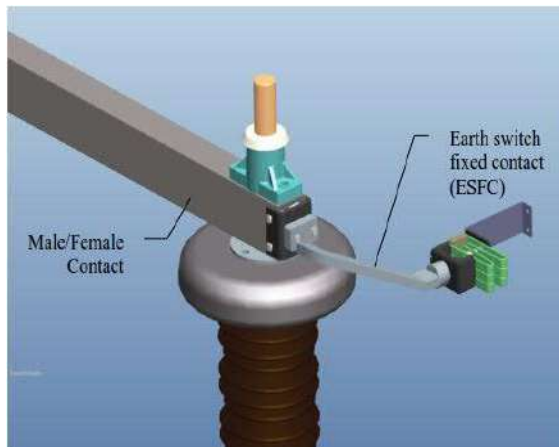


Fig. 15 Earth switch fixed contact (Type – "A" Design)

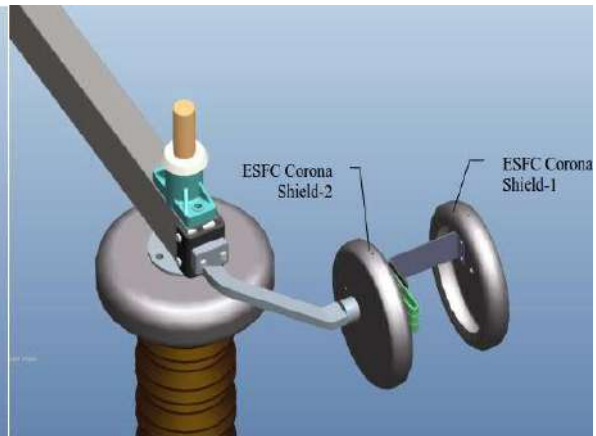


Fig. 16 Fixed contacts corona ring mounting (Type – "A" Design)

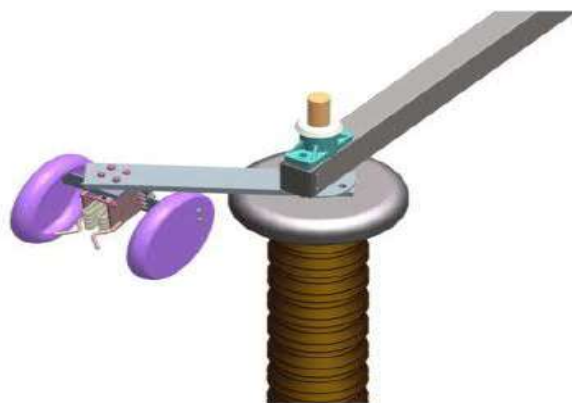
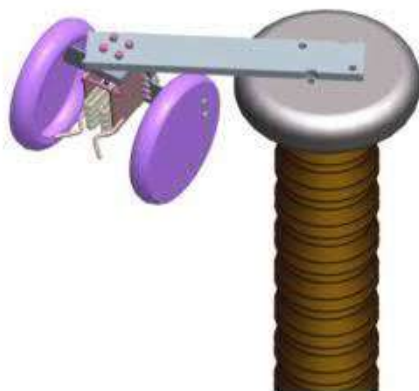
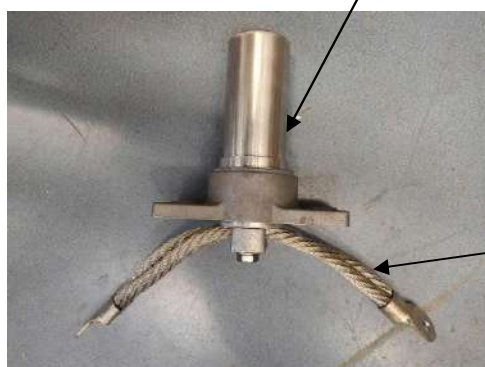
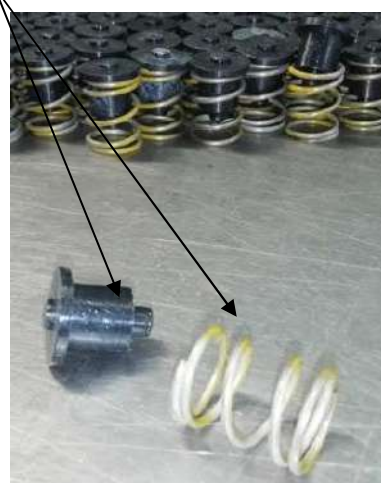


Fig. 17 Earth switch fixed contact (Type – "B" Design)



Terminal Assembly  
SI.no: C06, F09, I08



Contact Spring with Spring Guide  
SI.no: C08, F11, I10

HCB Flexible  
SI.no: A40



Earth Base Assembly  
Sl.no: C17, F20, I17

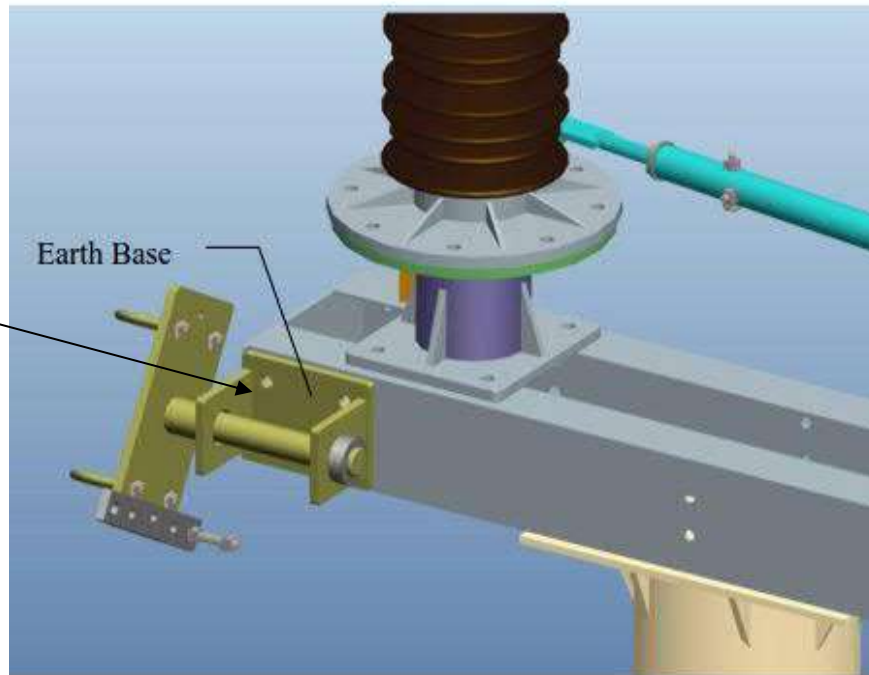
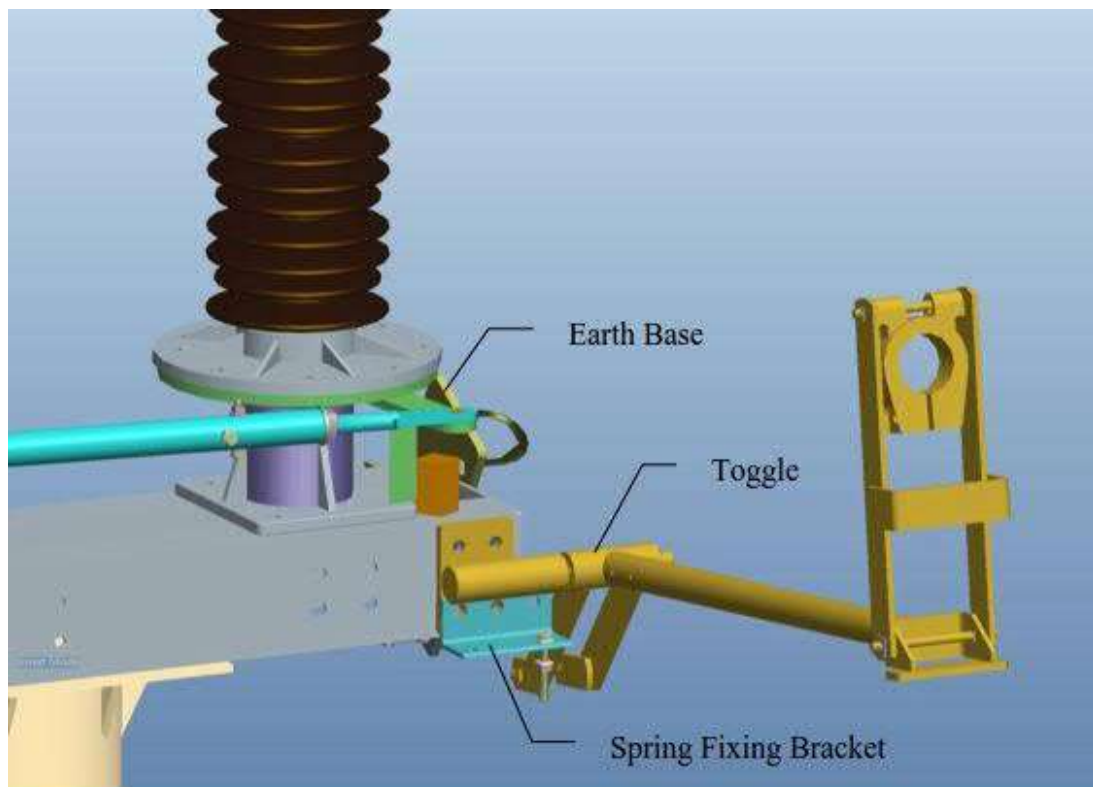


Fig. 18 Earth base assembly mounting (Right Hand Side)



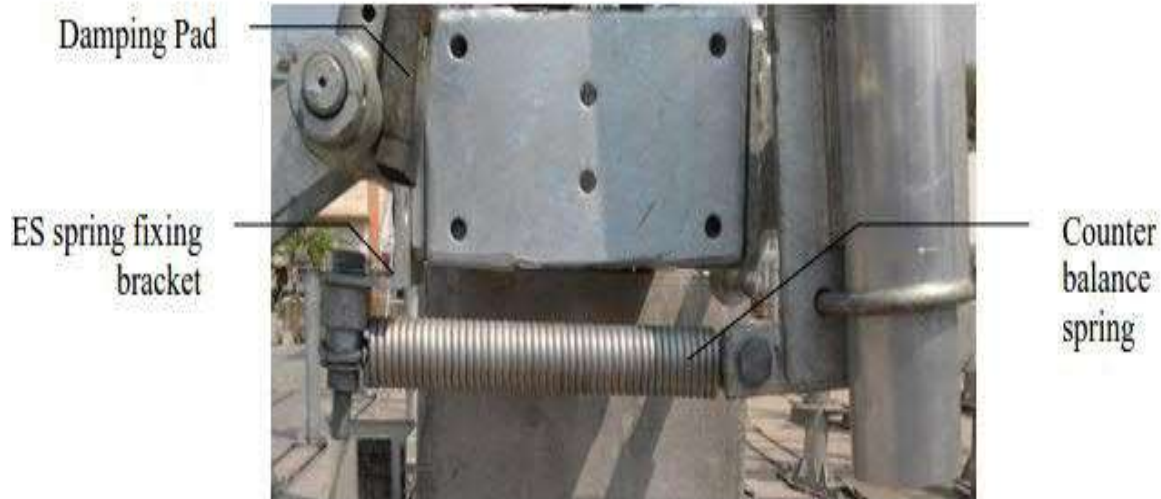


Fig. 24 Counter balance springs assembly

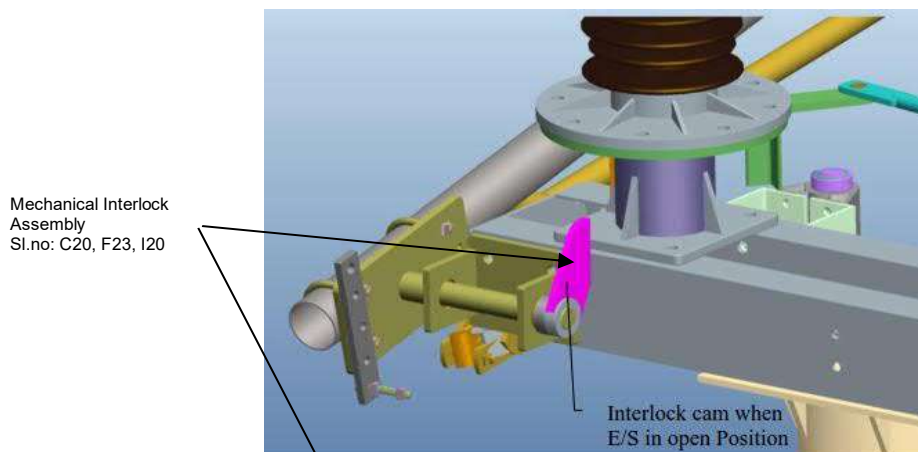


Fig. 26 Interlock cam (Right Hand Side)

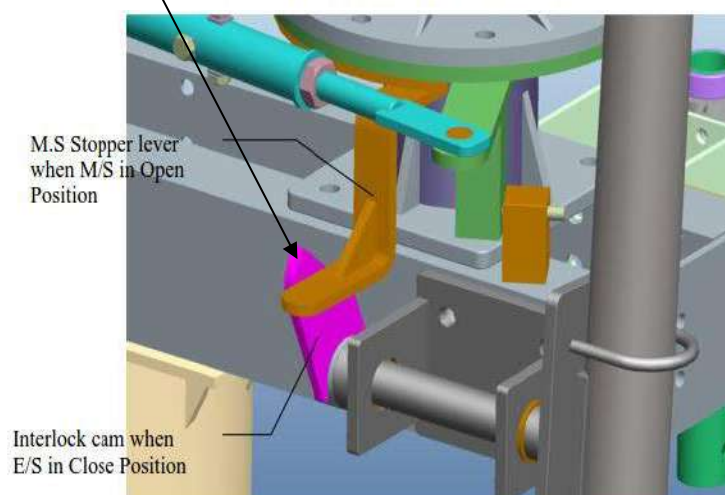


Fig. 29 Interlock Adjustment (Left Hand Side)

## 1.4 Parts & Identification of Isolator – Horizontal Center Break

C. 420kV HCB 2000A & 3150A			
S.no	Description	Qty	UOM
C.1	Main Switch Male & Female Contact Assembly	1	Pole
C.2	Corona Shield Assembly	1	Pole
C.3	Earth Switch Fixed Contact Assembly	1	No's
C.4	Earth Switch Moving Contact Assembly	1	No's
C.5	Copper Contact Fingers for One Pole of Isolator	1	Pole
C.6	Terminal Assembly	1	No's
C.7	Terminal Bush	1	No's
C.8	Contact Spring with Spring Guide for Female Contact Jaw	1	No's
C.9	Main Switch TOM Assembly	1	No's
C.10	Earth Switch TOM Assembly	1	No's
C.11	Main Switch Down Pipe Assembly	1	No's
C.12	Earth Switch Down Pipe Assembly	1	No's
C.13	Rotating Stool Base Assembly	1	No's
C.14	M/S Push pipe assembly	1	No's
C.15	Inter Post Pipe Assembly	1	No's
C.16	Base Channel Assembly	1	No's
C.17	Earth Base Assembly	1	No's
C.18	Toggle Assembly for Earth Switch	1	No's
C.19	Earth Switch Push Pipe Assembly	1	No's
C.20	Mechanical Interlock Assembly	1	Pole

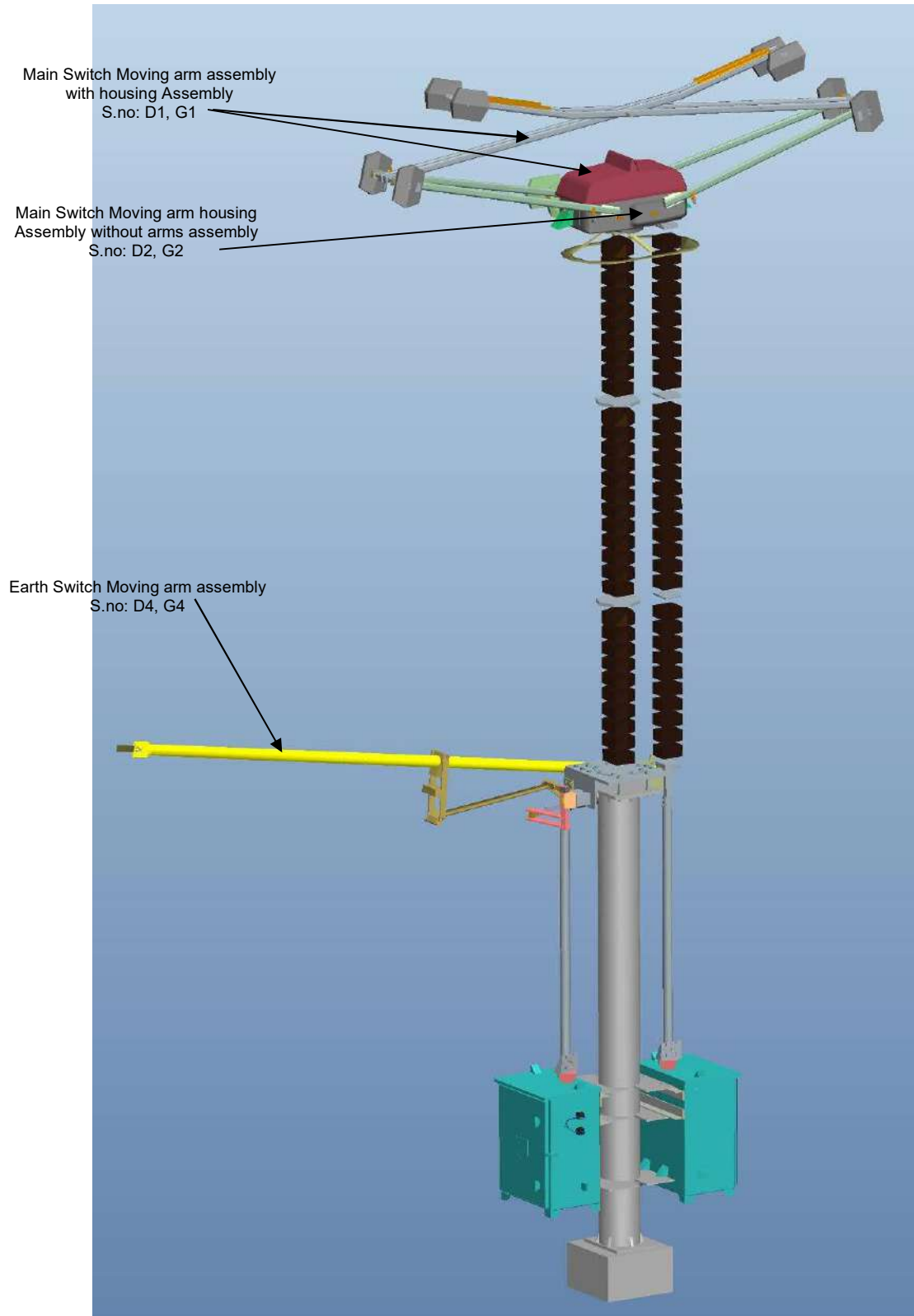
F. 245kV HCB 1600A & 2000A/2500A			
S.no	Description	Qty	UOM
F.1	Main Switch Male & Female Contact Assembly	1	Pole
F.2	Corona Shield Assembly	1	Pole
F.3	Main Switch Male & Female Contact Assembly - CU	1	Pole
F.4	Corona Shield Assembly	1	Pole
F.5	Earth Switch Fixed Contact Assembly	1	No's
F.6	Earth Switch Moving Contact Assembly	1	No's
F.7	Earth Switch Moving Contact Assembly - CU	1	No's
F.8	Copper Contact Fingers for One Pole of Isolator	1	Pole
F.9	Terminal Stem Assembly	1	No's
F.10	Terminal Bush	1	No's
F.11	Contact Spring with Spring Guide for Female Contact Jaw	1	No's
F.12	Main Switch TOM Assembly	1	No's
F.13	Earth Switch TOM Assembly	1	No's
F.14	Main Switch Down Pipe Assembly	1	No's
F.15	Earth Switch Down Pipe Assembly	1	No's
F.16	Rotating Stool Base Assembly	1	No's
F.17	M/S Push pipe assembly	1	No's
F.18	INTER POST PIPE ASSY	1	No's
F.19	Base Channel Assembly	1	No's
F.20	Earth Base Assembly	1	No's

F.21	Toggle Assembly for Earth Switch	1	No's
F.22	E/S PUSH PIPE ASSY	1	No's
F.23	Mechanical Interlock Assembly	1	Pole

I. 145kV HCB 1250A\1600A & 2000A\2500A			
S.no	Description	Qty	UOM
I.1	Main Switch Male & Female Contact Assembly	1	Pole
I.2	Main Switch Male & Female Contact Assembly - CU	1	Pole
I.3	Earth Switch Fixed Contact Assembly	1	No's
I.4	Earth Switch Moving Contact Assembly	1	No's
I.5	Earth Switch Fixed Contact Assembly	1	No's
I.6	Earth Switch Moving Contact Assembly - CU	1	No's
I.7	Copper Contact Fingers for One Pole of Isolator	1	Pole
I.8	Terminal Assembly	1	No's
I.9	Terminal Bush	1	No's
I.10	Contact Spring with Spring Guide for Female Contact Jaw	1	No's
I.11	Main Switch Down Pipe Assembly	1	No's
I.12	Earth Switch Down Pipe Assembly	1	No's
I.13	Rotating Stool Base Assembly	1	No's
I.14	M/S Push pipe assembly	1	No's
I.15	INTER POST PIPE ASSY	1	No's
I.16	Base Channel Assembly	1	No's
I.17	Earth Base Assembly	1	No's
I.18	Toggle Assembly for Earth Switch	1	No's
I.19	E/S PUSH PIPE ASSY	1	No's
I.20	Mechanical Interlock Assembly	1	No's

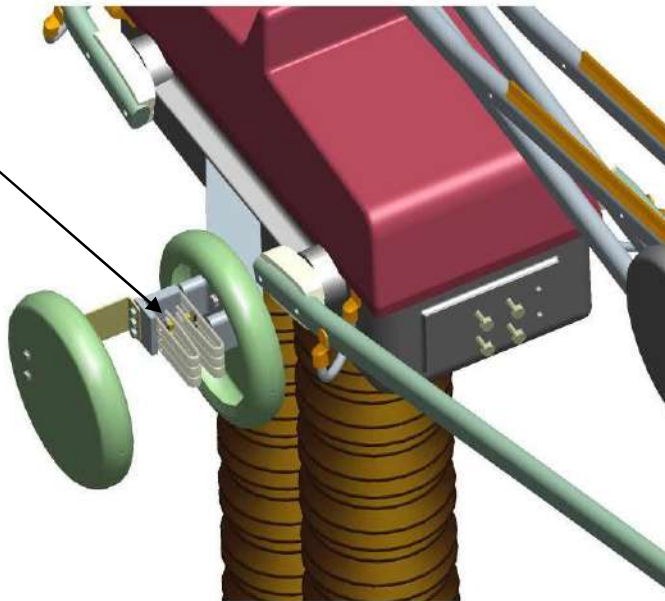
## 1.5GA Drawing – Pantograph

### Pentagraph





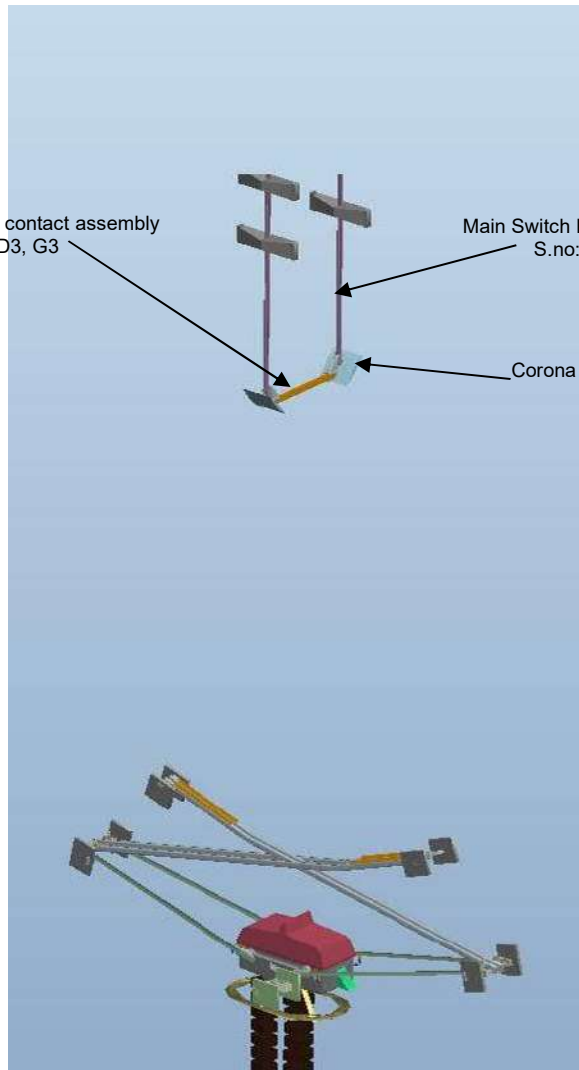
Earth Switch fixed contact  
assembly  
S.no: D5, G5

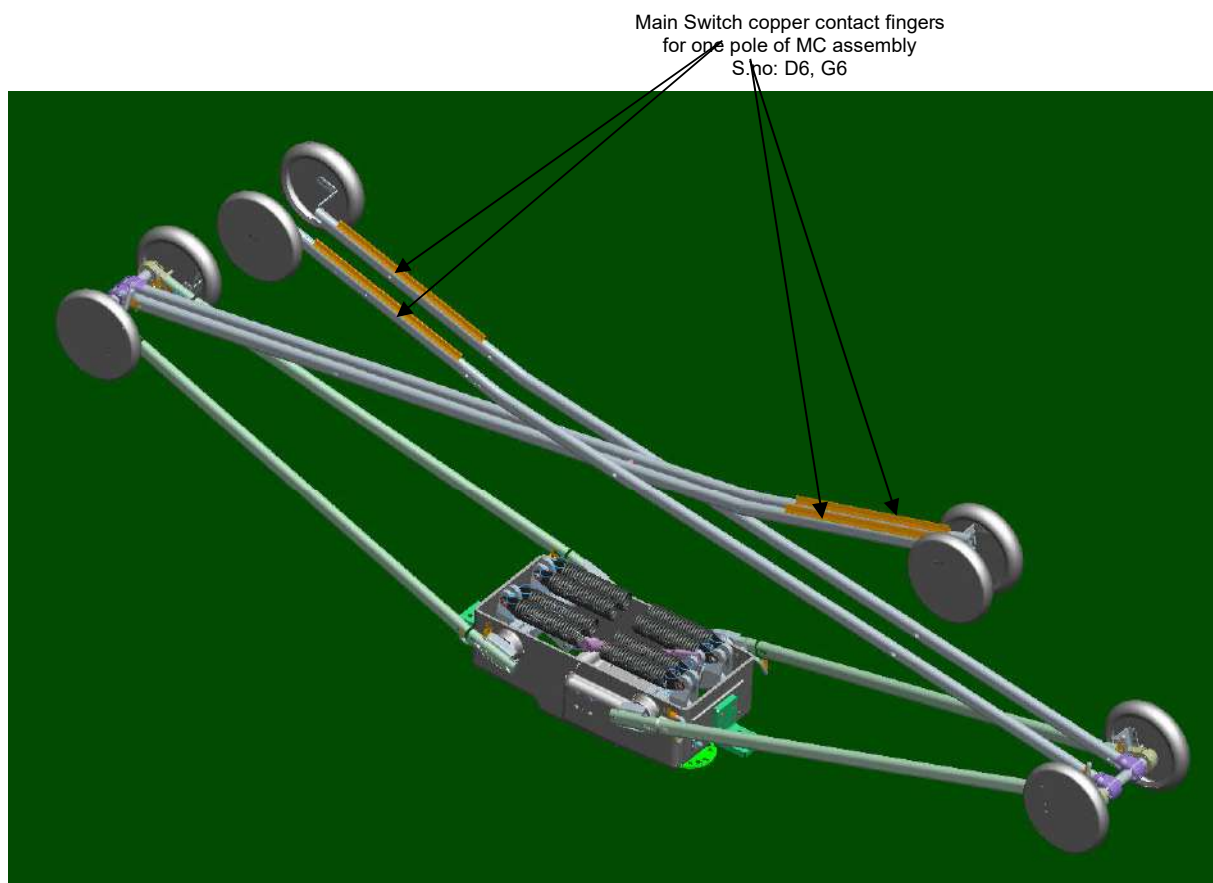


Main Switch fixed contact assembly  
S.no: D3, G3

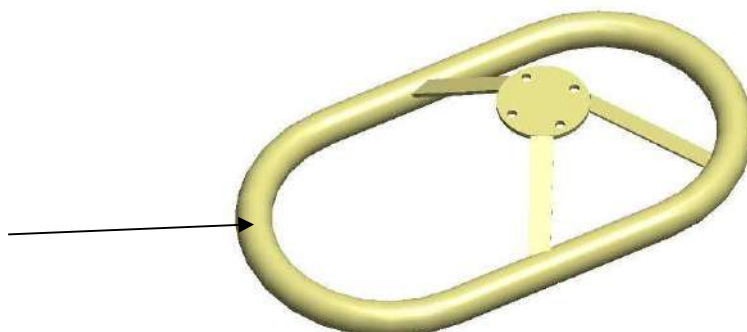
Main Switch FC dropper pipe  
S.no: D7, G7

Corona rings for dropper pipe  
S.no: D8

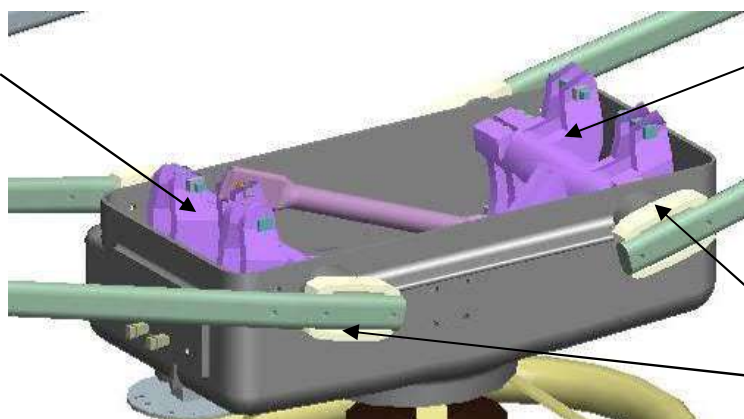




Elliptical Corona Ring  
S.no: D9

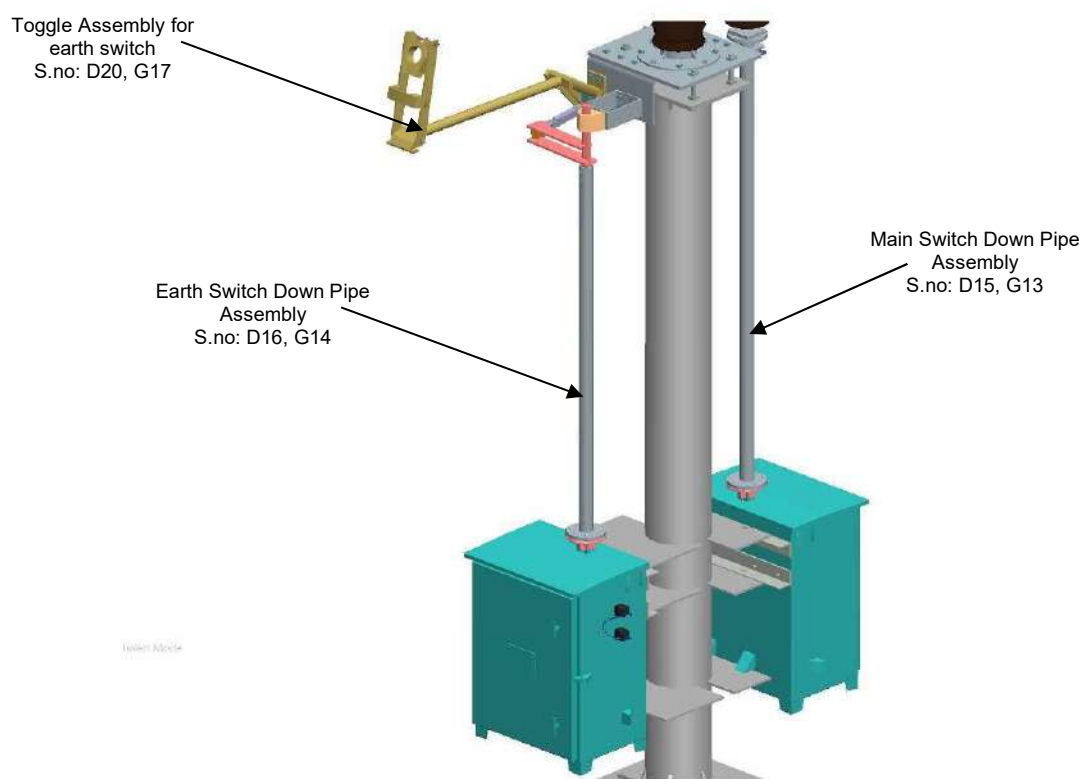
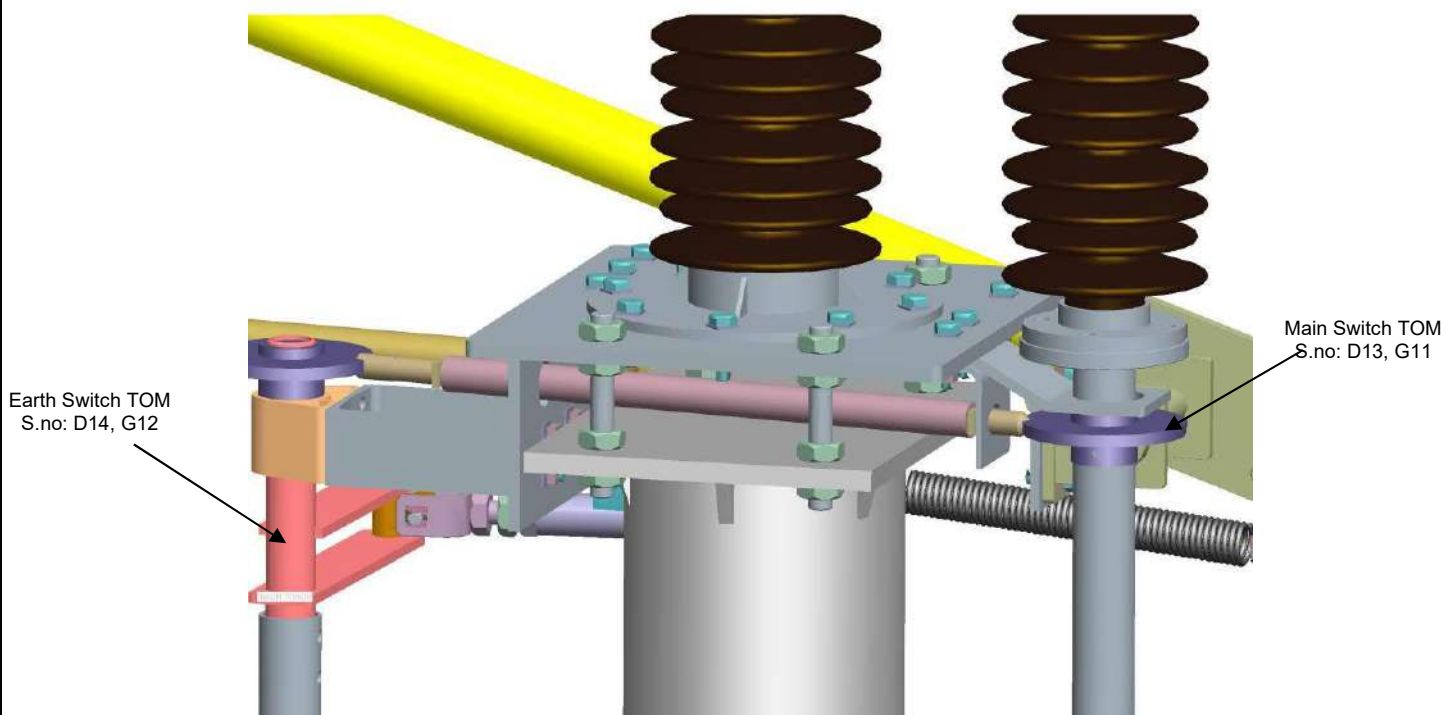


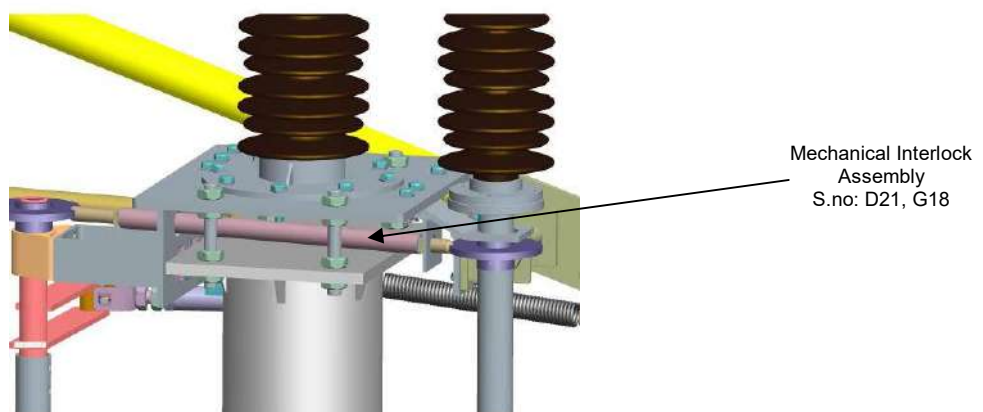
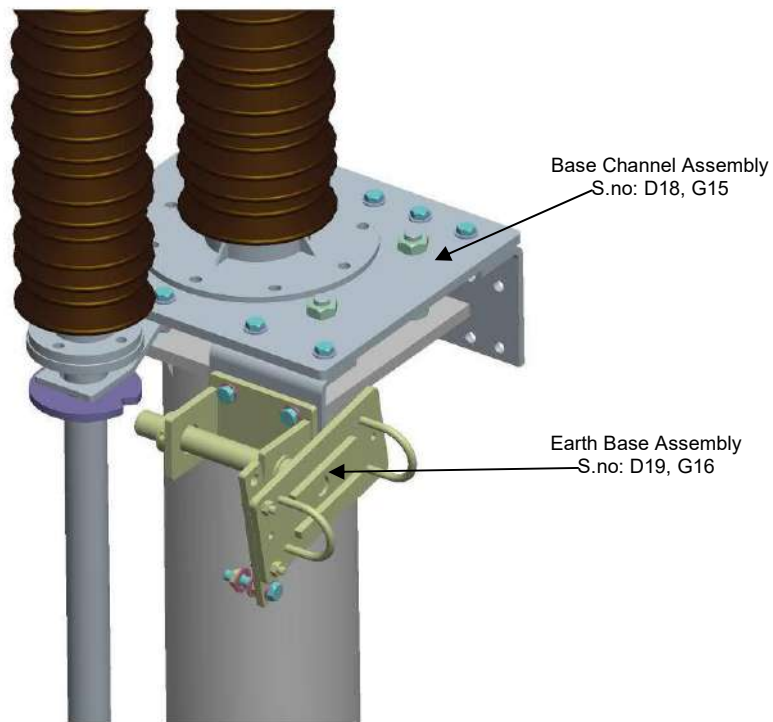
3 Lever Casting  
S.no: D10, G08



4 Lever Casting  
S.no: D11, G09

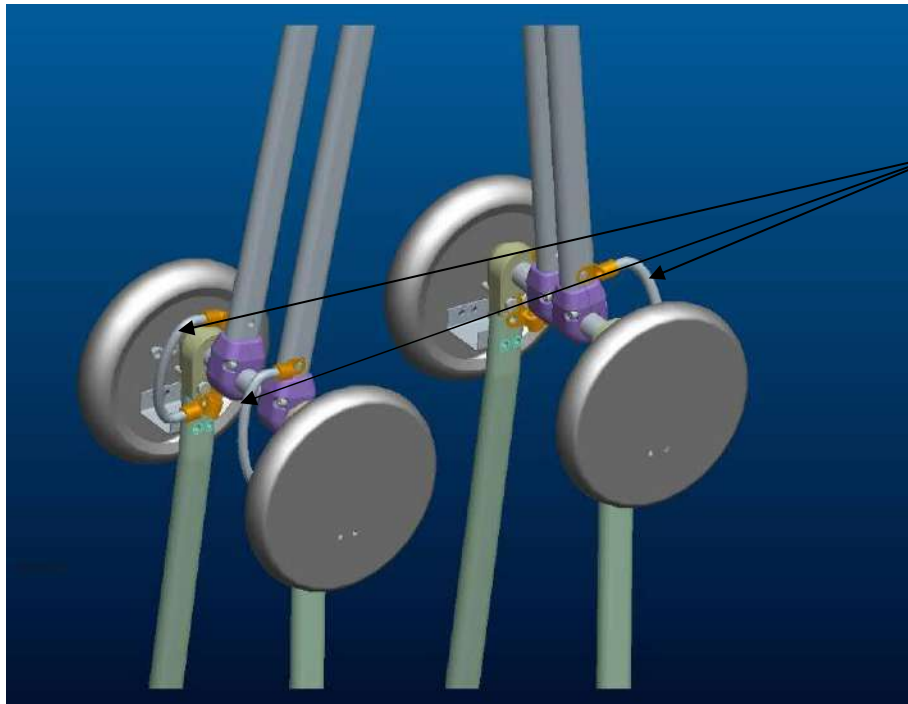
Contact Holders (02 scissor)  
S.no: D12, G10







**TENSION SPRING ASSLY**  
(Compound type)  
Ø7/Ø5x362) with fixing  
fasteners  
S.no:



**Flexibles Cu/ Tin Plated**  
S.no:



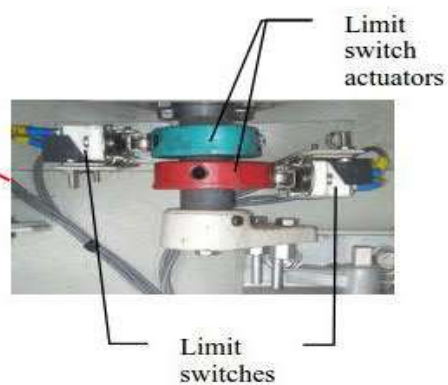
## 1.6 Parts & Identification of Isolator – Pantograph

D. 420kV PG 2000A & 3150A			
S.no	Description	Qty	UOM
D.1	Main Switch Moving Contact Assembly (i.e., Housing & Arm Assemblies)	1	No's
D.2	Main Switch Housing Assembly without Arm Assembly	1	No's
D.3	Main Switch Fixed Contact Assembly	1	No's
D.4	Earth Switch Moving Contact Assembly	1	No's
D.5	Earth Switch Fixed Contact Assembly	1	No's
D.6	Copper Contact Fingers for One Pole of Moving Contact Assembly	1	Pole
D.7	Dropper Pipe	1	No's
D.8	Corona Ring for Dropper Pipe	1	No's
D.9	Elliptical Corona Ring	1	No's
D.10	3 Lever Casting	1	No's
D.11	4 Lever Casting	1	No's
D.12	Contact Holder	1	No's
D.13	Main Switch TOM Assembly	1	No's
D.14	Earth Switch TOM Assembly	1	No's
D.15	Main Switch Down Pipe Assembly	1	No's
D.16	Earth Switch Down Pipe Assembly	1	No's
D.17	Rotating Stool Base Assembly	1	No's
D.18	Base Channel Assembly	1	No's
D.19	Earth Base Assembly	1	No's
D.20	Toggle Assembly for Earth Switch	1	No's
D.21	Mechanical Interlock Rod Assembly	1	No's

G. 245kV PG 1600A / 2000A			
S.no	Description	Qty	UOM
G.1	Main Switch Moving Contact Assembly (i.e., Housing & Arm Assemblies)	1	No's
G.2	Main Switch Housing Assembly without Arm Assembly	1	No's
G.3	Main Switch Fixed Contact Assembly	1	No's
G.4	Earth Switch Moving Contact Assembly	1	No's
G.5	Earth Switch Fixed Contact Assembly	1	No's
G.6	Copper Contact Fingers for One Pole of Moving Contact Assembly	1	Pole
G.7	Dropper Pipe	1	No's
G.8	3 Lever Casting	1	No's
G.9	4 Lever Casting	1	No's
G.10	Contact Holder	1	No's
G.11	Main Switch TOM Assembly	1	No's
G.12	Earth Switch TOM Assembly	1	No's
G.13	Main Switch Down Pipe Assembly	1	No's
G.14	Earth Switch Down Pipe Assembly	1	No's
G.15	Base Channel Assembly	1	No's
G.16	Earth Base Assembly	1	No's
G.17	Toggle Assembly for Earth Switch	1	No's
G.18	Mechanical Interlock Rod Assembly	1	No's

## Motor Operated Mechanism Control Box

Schematic and wiring diagram



## Manual Operated Control Box



## 2. Recommended Spares of Double Break Isolator

### 2.1 Turn Twist Tip Design with Full Jaws (Elpro & Siemens)

S.no	Description	Qty	UOM
1	Main Switch Moving Contact Assembly (01 Pole consists of 01 PCs of MC assembly)	1	Pole
2	Copper contact tips of main switch moving contact assembly (01 MC consists of 04 PCs of male Cu tips with fixing accessories)	1	Pole
3	Main Switch Fixed Contact Assembly (01 Pole consists of 02 PCs of FC assembly's)	1	Pole
	Copper contact fingers / jaws (Full / big Jaws) of main switch fixed contact assembly (01 FC consists of 20x5mm and 32x5mm size Cu jaws with spring and spring guide) Quantity and size of jaws for 01 FC is depending on current rating	1	Pole
5	Earth Switch Moving Contact Assembly	1	PCs
6	Copper contact tips of earth switch moving contact assembly (01 ESMC consists of 01 PCs of male Cu tip with fixing accessories)	1	PCs
7	Earth Switch Fixed Contact Assembly	1	PCs
8	Copper contact fingers / jaws of earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
9	Contact Spring with Spring Guide	1	No's
10	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 02 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 03 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

### 2.2 Turn Twist Blade Design with Semi Jaws (Siemens)

S.no	Description	Qty	UOM
1	Main Switch Moving Contact Assembly (01 Pole consists of 01 PCs of MC assembly)	1	Pole
2	Copper contact tips of main switch moving contact assembly (01 MC consists of 02 PCs of male Cu tips with fixing accessories)	1	Pole
3	Main Switch Fixed Contact Assembly (01 Pole consists of 02 PCs of FC assembly's)	1	Pole
4	Copper contact fingers / jaws (Small Jaws) of main switch fixed contact assembly (01 FC consists of 20x5mm size Cu jaws with spring and spring guide) Quantity of jaws for 01 FC is depending on current rating	1	Pole
5	Earth Switch Moving Contact Assembly	1	PCs
6	Copper contact tips of earth switch moving contact assembly (01 ESMC consists of 01 PCs of male Cu tip with fixing accessories)	1	PCs
7	Earth Switch Fixed Contact Assembly	1	PCs
8	Copper contact fingers / jaws of earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
9	Contact Spring with Spring Guide	1	No's
10	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 02 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 03 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

## 2.3 Sliding Design (Elpro & Siemens)

S.no	Description	Qty	UOM
1	Main Switch Moving Contact Assembly (01 Pole consists of 01 PCs of MC assembly)	1	Pole
2	Copper contact tips of main switch moving contact assembly (01 MC consists of 04 PCs of double contact tips (or) 08 Pcs single contact tips with fixing accessories depending on current rating)	1	Pole
3	Main Switch Fixed Contact Assembly (01 Pole consists of 02 PCs of FC assembly's)	1	Pole
4	Earth Switch Moving Contact Assembly	1	PCs
5	Copper contact tips of earth switch moving contact assembly (01 ESMC consists of 01 PCs of male Cu tip with fixing accessories)	1	PCs
6	Earth Switch Fixed Contact Assembly	1	PCs
7	Copper contact fingers / jaws of earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
8	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 02 PCs for ESFC and 03 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

## 3. Recommended Spares of Horizontal Center Break

### 3.1 Flat Spring Design (Elpro & Siemens)

S.no	Description	Qty	UOM
1	Main switch moving contact arm assembly (01 Pole consists of 01 PCs of male moving arm and female moving arm assembly including mounting hardware)	1	Pole
2	Male copper contact tips for main switch male moving arm assembly (01 Pole of Male arm consists 02 PCs of male Cu tips with fixing accessories)	1	Pole
3	Female copper contact jaws / fingers for main switch female moving arm assembly (01 Pole of Female arm consists of 20x5mm size jaws with spring and spring guide) Quantity of jaws for 01 Female arm is depends on current rating	1	Pole
4	Terminal stems for main switch moving contact arm assembly (01 Pole consists of 02 PCs of Cu stems with Circlips)	1	Pole
5	Terminal jaws for main switch stem assembly (01 Pole consists of 04 PCs of flat jaws with flat spring and supporting plates and accessories)	1	Pole
6	Earth Switch Moving Contact Assembly	1	PCs
7	Copper contact tips for earth switch moving contact assembly (01 ESMC consists of 01 male Cu tip with fixing accessories)	1	PCs
8	Earth Switch Fixed Contact Assembly	1	PCs
9	Copper contact fingers / jaws for earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
10	Contact Spring with Spring Guide	1	No's
11	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 02 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 02 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

### 3.2 Tulip Design (Siemens)

S.no	Description	Qty	UOM
1	Main switch moving contact arm assembly (01 Pole consists of 01 PCs of male moving arm and female moving arm assembly including mounting hardware)	1	Pole
2	Male copper contact tips for main switch male moving arm assembly (01 Pole of Male arm consists 02 PCs of male Cu tips with fixing accessories)	1	Pole
3	Female copper contact jaws / fingers for main switch female moving arm assembly (01 Pole of Female arm consists of 20x5mm size jaws with spring and spring guide) Quantity of jaws for 01 Female arm is depends on current rating	1	Pole
4	Terminal stem housing assembly for main switch moving contact arms (01 Pole consists of 02 PCs of Al terminal stem housing with mounting hardware)	1	Pole
5	Earth Switch Moving Contact Assembly	1	PCs
6	Copper contact tips for earth switch moving contact assembly (01 ESMC consists of 01 male Cu tip with fixing accessories)	1	PCs
7	Earth Switch Fixed Contact Assembly	1	PCs
8	Copper contact fingers / jaws for earth switch fixed contact assembly	1	PCs



	(01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating		
9	Contact Spring with Spring Guide	1	No's
10	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 02 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 02 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

### 3.3 Flexible Design (Siemens)

S.no	Description	Qty	UOM
1	Main switch moving contact arm assembly (01 Pole consists of 01 PCs of male moving arm and female moving arm assembly including mounting hardware)	1	Pole
2	Male copper contact tips for main switch male moving arm assembly (01 Pole of Male arm consists 02 PCs of male Cu tips with fixing accessories)	1	Pole
3	Female copper contact jaws / fingers for main switch female moving arm assembly (01 Pole of Female arm consists of 20x5mm size jaws with spring and spring guide) Quantity of jaws for 01 Female arm is depends on current rating	1	Pole
4	Terminal stem housing assembly with flexibles for main switch moving contact arms (01 Pole consists of 02 PCs of Al terminal stem housing with mounting hardware)	1	Pole
5	Earth Switch Moving Contact Assembly	1	PCs
6	Copper contact tips for earth switch moving contact assembly (01 ESMC consists of 01 male Cu tip with fixing accessories)	1	PCs
7	Earth Switch Fixed Contact Assembly	1	PCs
8	Copper contact fingers / jaws for earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
9	Contact Spring with Spring Guide	1	No's
10	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 02 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 02 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

## 4. Recommended Spares of Pantograph Isolator

### 4.1 Old Design - Double Scissor (Elpro & Siemens)

S.no	Description	Qty	UOM
1	Old Design moving contact assembly is obsolete, and the only option is to retrofit the old double scissor MC assembly with new single scissor MC assembly (01 Pole consists of 01 PCs of MC assembly)	1	Pole
2	Male copper contact tips for main switch male moving arm assembly (01 Pole of Male arm consists 04 PCs of male Cu tips with fixing accessories)	1	Pole
3	Main switch fixed contact assembly including Cu rod, downpipes and connecting pads	1	Pole
4	Copper contact rod for fixed contact assembly	1	PCs
5	Earth Switch Moving Contact Assembly	1	PCs
6	Copper contact tips for earth switch moving contact assembly (01 ESMC consists of 01 male Cu tip with fixing accessories)	1	PCs
7	Earth Switch Fixed Contact Assembly	1	PCs
8	Copper contact fingers / jaws for earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
9	Copper Flexibles with Tin plated (01 Pole consists of 24 PCs)	1	Pole
10	Compound Springs	1	PCs
11	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 08 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 01 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

### 4.2 New Design - Single Scissor (Elpro & Siemens)

S.no	Description	Qty	UOM
1	Main switch moving contact complete assembly (01 Pole consists of 01 PCs of MC assembly)	1	Pole
2	Male copper contact tips for main switch male moving arm assembly (01 Pole of Male arm consists 04 PCs of male Cu tips with fixing accessories)	1	Pole
3	Main switch housing assembly	1	PCs
4	Main switch fixed contact assembly including Cu rod, downpipes and connecting pads	1	Pole
5	Copper contact rod for fixed contact assembly	1	PCs
6	Earth Switch Moving Contact Assembly	1	PCs
7	Copper contact tips for earth switch moving contact assembly (01 ESMC consists of 01 male Cu tip with fixing accessories)	1	PCs
8	Earth Switch Fixed Contact Assembly	1	PCs
9	Copper contact fingers / jaws for earth switch fixed contact assembly (01 ESFC consists of 20x5mm size Cu jaws (Small Jaws) with spring and spring guide) Quantity of jaws for 01 ESFC is depending on current rating	1	PCs
10	Copper Flexibles with Tin Plated (01 Pole consists of 16 PCs)	1	Pole
11	Compound Springs	1	PCs
12	Corona Rings / shields for One Pole of Isolator (01 Pole consists of 08 PCs for MC, 02 PCs for FC, 02 PCs for ESFC and 01 PCs for Insulators – Depending upon the approved drawings and ratings)	1	Pole

## 5. Recommended Spares of Control Box / Panel

### 5.1 Main & Earth Switch Motor & Manual Box (Elpro & Siemens)

S.no	Description	Qty	UOM
1	Main switch operating mechanism box (Motor (or) Manual) / Mechanical gang (or) Electrical gang	1	No's
2	Earth switch operating mechanism box (Motor (or) Manual) / Mechanical gang (or) Electrical gang		
3	1 HP Gear Box Assembly with Motor (Side Mounted) is obsolete, the only option is to replace complete control box with latest design	1	No's
4	0.5 HP Gear Box Assembly with Motor (Side Mounted)	1	No's
5	0.5 HP Gear Box Assembly with Motor (Top Mounted)	1	No's
6	0.5 HP Motor without Pinion	1	No's
7	1 HP Motor without Pinion	1	No's
8	Overload Relay	1	No's
9	Contactor (Close / Open)	1	No's
10	Interlocking Contactor	1	No's
11	Limit Switch - Right	1	No's
12	Limit Switch - Left	1	No's
13	Auxiliary Switch (Till 14NO+14NC)	1	No's
14	Timer Range: 0-180 Secs	1	No's
15	Heater	1	No's
16	Solenoid Coil with Plunger for MOM Box	1	No's
17	Solenoid Coil with Plunger for BOM Box	1	No's
18	Master - Individual Selector Switch	1	No's
19	Local - Remote - Manual Switch	1	No's

## 6. Maintenance Instructions

### 6.1 Double Break Isolators

Tightening torques in Nm for threaded connections <sup>3</sup> (Applies to nut side if nut is used)						
			Bolts and nuts Of Cu2,Cu3 And hexagon socket set Screws. e.g. DIN 913,DIN 914 DIN 915,DIN 916 Hexagon socket counter sunk head cap screws eg DIN 7991 studs <sup>7</sup> Eg DIN 835,DIN 938 And DIN 939	For general use And for pressure vessels (flanged connection) Nuts <sup>8,16)</sup> e.g. DIN 934 and DIN 936 <b>Bolts 8.8</b> e.g.DIN 931,DIN 933 and DIN 6912 <b>Bolts 10.9<sup>9)</sup></b> Screwed into non- ferrous Metals e.g.DIN 933,DIN 912 and DIN 931	<b>Bolts 10.9</b> of Steel e.g.DIN 912,DIN 931 and DIN 933	A2/A4 Cu 5
Thread Gauges	Strength grades					
	4.6	4.8	5.6	8.8	10.9	70 <sup>8</sup>
M 3	0.5±0.1	0.7±0.1	0.6±0.1	1.4±0.1		1.4±0.1
M 3,5	0.8±0.1	1±0.1	1±0.1	2±0.2		2±0.2
M 4	1±0.1	1.4±0.1	1.4±0.1	3±0.3		3±0.3
M 5	2.2±0.2	3±0.2	3±0.3	6±0.5		6±0.5
M 6	4±0.4	5.1±0.4	6±0.5	8±1	12±2	8±1
M 8			12±2	20±2	30±3	20±2
M 10			25±3	40±4	60±6	40±4
M 12			40±4	70±7	100±10	70±7
M 16			100±10	170±20	250±25	170±20
M 20				340±30	500±50	340±30
M 24				600±60	800±80	
Refer to drawing information for thread gauges> M 24						

### Assembly Preparation

The following documents must be available to perform the assembly according to this instruction

- GA drawings of Disconnecter with Earth.
- Disconnecter & Earth switch contact assembly drawings.
- Assembly part List for Disconnecter & Earth switch.
- Check sheet for Erection.
- Instruction for Tightening torques for all hardware.

Check the foundation plan with respect to the GA drawing  
The sub- structure should meet the following requirements:

- Flatness of support plates for pole frame of disconnecter ± 1 mm
- Height of support plates ± 3mm
- Drilling plan dimensions for the attachment of pole frame according layout drawing ± 1 mm
- Drilling plan dimensions for the attachment of drives according GA drawings ± 1mm
- The support plates must be rectangular ± 15' to the fixing support of drives

Ensure tightening for screws according to instruction as per the instructions enclosed.

## **The Right Tool for the Right Job:**

- Chose the right tool for a specific job.
- Keep your tools clean and in good condition (grease, wear & tear free).
- Never use a tool not designed for the job you are doing. Never carry tools in your pockets.
- Never leave hand tools in areas where they may be kicked off onto lower levels or where they may be a tripping hazard.
- Never remove an electrical cord by jerking it; pull it away from power by the plug.  
Always be sure that power tools are electrically safe.

**TABLE:1**

<b>TYPES OF GREASE TO BE USED</b>	<b>APPLICATION</b>
Rivolta or SKD 3602 (or) Centoplex 24DL (or) Graphite Oil	For parts on contact system.
Rivolta SKD 3602 (or) Molycote long-term 2 plus	For threads of hot dip galvanized parts.
Rivolta SKD 3602 (or) Isoflex Topaz L32	For all lubrication points on Operating mechanism, gears.



## 6.2 Horizontal Center Break Isolators

Tightening torques in Nm for threaded connections <sup>3)</sup> (applies to nut side if nut is used)						
			Bolts and nuts of Cu 2, Cu 3 and hexagon socket set screws e.g. DIN 913, DIN 914, DIN 915 and DIN 916 hexagon socket countersunk head cap screws e.g. DIN 7991 studs <sup>7)</sup> e.g. DIN 835, DIN 938 and DIN 939	For general use <sup>1)</sup> and for pressure vessels <sup>2)</sup> (flanged connections) Nuts <sup>8)</sup> e.g. DIN 934 and DIN 936 Bolts 8.8 e.g. DIN 931, DIN 933 and DIN 6912 Bolts 10.9 <sup>6)</sup> screwed into non-ferrous metals e.g. DIN 933, DIN 912 and DIN 931	Bolts 10.9 of steel e.g. DIN 912, DIN 931 and DIN 933	A2 / A4 Cu 5
Thread gauges	Strength grades					
	4.6	4.8	5.6	8.8	10.9	70 <sup>8)</sup>
M 3	0,5 ± 0,1	0,7 ± 0,1	0,6 ± 0,1	1,4 ± 0,1		1,4 ± 0,1
M 3,5	0,8 ± 0,1	1 ± 0,1	1 ± 0,1	2 ± 0,2		2 ± 0,2
M 4	1 ± 0,1	1,4 ± 0,1	1,4 ± 0,1	3 ± 0,3		3 ± 0,3
M 5	2,2 ± 0,2	3 ± 0,2	3 ± 0,3	6 ± 0,5		6 ± 0,5
M 6	4 ± 0,4	5,1 ± 0,4	6 ± 0,5	8 ± 1	12 ± 2	8 ± 1
M 8			12 ± 2	20 ± 2	30 ± 3	20 ± 2
M 10			25 ± 3	40 ± 4	60 ± 6	40 ± 4
M 12			40 ± 4	70 ± 7	100 ± 10	70 ± 7
M 16			100 ± 10	170 ± 20	250 ± 25	170 ± 20
M 20				340 ± 30	500 ± 50	340 ± 30
M 24				600 ± 60	800 ± 80	

Refer to drawing information for thread gauges >M 24

- 1) In accordance with VDI 2230  $\mu_{ges} = 0.1$
- 2) Agreed with TÜV (Technical Inspectorate) Berlin, applies to hot-dip galvanized pressure vessel bolts lubricated with a grease containing added MoS<sub>2</sub> (e.g. Molykote Longterm 2).
- 3) Strength grade as per DIN 267/ DIN ISO 898.
- 4) Including locking nuts of strength grade 8 to DIN 267 / DIN ISO 898.
- 5) For other strength grades, different tightening torques must be specified for locking nuts, e.g. Cleveloc nuts, and indicated in the drawing.
- 6) Where bolts of strength grade 10.9 and higher are screwed into aluminium, use only the tightening torques specified for bolts of strength grade 8.8 (cf. FQV report 22171/78 dated 7.3.1978).
- 7) If using a nut, the bolt must protrude by at least one thread turn.
- 8) Applies to insertion. Nut to be tightened according to the applicable values.

### Assembly Preparation

The following documents must be available to perform the assembly according to this instruction

- GA drawings of Disconnecter with Earth.
- Disconnecter & Earth switch contact assembly drawings.
- Assembly part List for Disconnecter & Earth switch.
- Check sheet for Erection.
- Instruction for Tightening torques for all hardware.

Check the foundation plan with respect to the GA drawing  
The sub- structure should meet the following requirements:

- Flatness of support plates for pole frame of disconnecter ± 1 mm
- Height of support plates ± 3mm
- Drilling plan dimensions for the attachment of pole frame according layout drawing ± 1 mm
- Drilling plan dimensions for the attachment of drives according GA drawings ± 1mm

- The support plates must be rectangular  $\pm 15'$  to the fixing support of drives

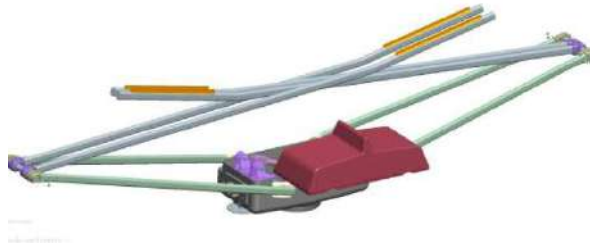
Ensure tightening for screws according to instruction as per the instructions enclosed.

## **The Right Tool for the Right Job:**

- Chose the right tool for a specific job.
- Keep your tools clean and in good condition (grease, wear & tear free).
- Never use a tool not designed for the job you are doing. Never carry tools in your pockets.
- Never leave hand tools in areas where they may be kicked off onto lower levels or where they may be a tripping hazard.
- Never remove an electrical cord by jerking it; pull it away from power by the plug.  
Always be sure that power tools are electrically safe.

## 6. Maintenance Instructions

### 6.3 Pantograph Isolators



#### **Warning!**

**Do not take off / Remove the Binding wire tie to the moving contact until the moving contact is installed.**



#### **Note:**

**Ensure while Mounting the PG Moving contact the Top view of Insulators should be the collinear holes are to be perpendicular to each other.**

#### **Warning!**

**Support Insulator should be 2mm high & it must be elevated than Operating Rod Insulator. Deviation in flatness of Insulators must be leveled by placing Shim washers.**

## Tightening torques in Nm for threaded connections

(Applies to nut side if nut is used)

			Bolts and nuts Of Cu2,Cu3 And hexagon socket set Screws. e.g. DIN 913,DIN 914 DIN 915,DIN 916 Hexagon socket counter sunk head cap screws eg DIN 7991 studs <sup>7</sup> Eg DIN 835,DIN 938 And DIN 939	For general use And for pressure vessels (flanged connection) Nuts <sup>8 4)6)</sup> e.g. DIN 934 and DIN 936 <b>Bolts 8.8</b> e.g. DIN 931,DIN 933 and DIN 6912 <b>Bolts 10.9<sup>9)</sup></b> Screwed into non- ferrous Metals e.g. DIN 933,DIN 912 and DIN 931	<b>Bolts 10.9 of            Steel</b> e.g. DIN 912,DIN 931 and DIN 933	A2/A4 Cu 5
Thread Gauges	Strength grades					
	4.6	4.8	5.6	8.8	10.9	70 <sup>8</sup>
M 3	0.5±0.1	0.7±0.1	0.6±0.1	1.4±0.1		1.4±0.1
M 3,5	0.8±0.1	1±0.1	1±0.1	2±0.2		2±0.2
M4	1±0.1	1.4±0.1	1.4±0.1	3±0.3		3±0.3
M 5	2.2±0.2	3±0.2	3±0.3	6±0.5		6±0.5
M 6	4±0.4	5.1±0.4	6±0.5	8±1	12±2	8±1
M 8			12±2	20±2	30±3	20±2
M 10			25±3	40±4	60±6	40±4
M 12			40±4	70±7	100±10	70±7
M 16			100±10	170±20	250±25	170±20
M 20				340±30	500±50	340±30
M 24				600±60	800±80	
Refer to drawing information for thread gauges> M 24						



## 7. Tools Kit List for Isolator Maintenance

- a. Torque Wrench & Spanners
- b. Allenkey Set
- c. Normal Scrubber / Scorch Brush
- d. Rubber Hammer
- e. CRC Electro Cleaner
- f. Conductive Grease (As per above table)
- g. Multimeter
- h. CRM Kit
- i. Discharge Rods
- j. Scaffolding / FRP Ladders

## 8. Overhauling Kit for Isolator Maintenance

- a. Copper contact tips and fingers of main switch – 03 Poles
- b. Copper contact tips and fingers of earth switch – 03 Poles
- c. 24DL Conductive Grease – 02 KGs
- d. Cu Flexibles (For PG) – 48 PCs
- e. Springs and Spring guides – 100 PCs
- f. Bearings for RSB – 12 PCs
- g. Motor with gear box – 02 PCs
- h. Overload relay, Contactors (open / close), Interlocking Contactor – 01 set
- i. Limit switches (Right / Left), Auxiliary switches (Main / Earth) – 01 set
- j. Timer, Heater, Solenoid coil (Main / Earth) – 01 set
- k. Master Individual selector switch, Local Remote & Manual switch – 01 set



## 9. Recommended Inspection and Maintenance after Testing & Commissioning

The following indications are related to places of installation with moderate up to heavy pollution and a maximum number of 500 operating cycles for the disconnecter per year.

For other than the above described conditions, extent and frequency of maintenance must be adapted accordingly.

### Inspection

Step	Description of Activities	Requirement
	<p>During a normal operation cycle, the transmission parts of the disconnecter and if applicable of the earthing switch, shall be checked as follows:</p> <ul style="list-style-type: none"> <li>• Proper course of motion</li> <li>• Possible damage of parts</li> <li>• Possible loose joining elements (Screws, pins, etc....)</li> </ul>	<p>No unusual noise None None</p>

### Current carrying parts:

Step	Description of Activities	Requirement
	<p>During a normal operation cycle, the current carrying parts of the disconnecter, shall be checked as follows:</p> <ul style="list-style-type: none"> <li>• Proper course of motion</li> <li>• Condition of Main contacts.</li> </ul>	<p>The main contacts shall close properly</p> <p>No unusual noise No damages of heavy dirt Accumulation</p>
	<p>During a normal operation cycle of the Earth Switch, the following shall be checked as follows:</p> <ul style="list-style-type: none"> <li>• Proper course of motion</li> <li>• Condition of earthing blade</li> <li>• Condition of Flexible connectors</li> </ul>	<p>Proper movement of earthing blade into the contact carrier</p> <p>No damage or heavy dirt accumulation No damage good movability</p>

If inspection shows deviation to the requirement, appropriate corrective action must be taken, i.e.,

- Perform maintenance work (Cleaning, greasing)
- Tighten the screws.
- Adjust disconnecter or earthing switch.
- Replace damaged parts.
- Pay attention to the information given in the appropriate assembly instructions.
- Depending on the service conditions, an inspection should be made after every 12 to 18 months.

- At very high switching frequency, latest however after 1000 switching operations.
- After several loads near the short time withstand current.
- In severe service environments.
- The following activities are required in addition to those in section 6:
- Inspect the contact system and replace the current path if necessary due to wear.
- Check the rotating stool mechanisms for free movement.

## Maintenance

Maintenance of the transmission:

Lubricate all bearings and joints  
Perform the inspection per par. 11.1.1

### Maintenance of current carrying parts:

Perform the inspection per par. 11.2.1  
Clean the main contacts  
Lubricate the main contacts  
Lubricate the bearings of current carrying parts

### Maintenance of earthing switch:

Step	Description of Activities	Requirement
	Perform the inspection per par.11.2.2	Lubricant: Graphite oil or petroleum jelly to be used.
	Clean the earthing blades and contact springs	
	Lubricate the earthing blades and contact springs	
Note: While using lubricants the respective MSDS (Material Safety data Sheets) should be referred.		

Commissioning Checks:

After fixing the conductors, the following checks must be performed:

- Adjustment of disconnect and earthing switch and ensure all the conditions are in line with manual
- All bearing should be greased
- CRM need to check at the joints where current is transferring from one part to other.
- All contacts should be lubricated  
Perform few operating cycles

## 10. Siemens Contact Details

### Isolator Replacement of parts / Spare Parts:

For queries, replacement parts orders or faults, please, contact our service department giving details of all nameplate data:

Mr. Ravi Veer. K  
M/s Siemens Ltd  
Email: [ravi.kondapalli@siemens.com](mailto:ravi.kondapalli@siemens.com)  
Mail: [energysupport.in@siemens.com](mailto:energysupport.in@siemens.com)

### Isolator Service:

Mr. Bhaskar Reddy. K  
M/s Siemens Ltd  
Email: [bhaskar.kreddy@siemens.com](mailto:bhaskar.kreddy@siemens.com)  
Mail: [energysupport.in@siemens.com](mailto:energysupport.in@siemens.com)

Other Product spares managed by the same team.

### For Circuit Breaker:

Mr. Manoj Kumar Sharma  
M/s Siemens Ltd  
Email: [manojkumar.sharma@siemens.com](mailto:manojkumar.sharma@siemens.com)

### For GIS:

Mr. Ashfaq Shaikh  
M/s Siemens Ltd  
Email: [ashfaq.shaikh@siemens.com](mailto:ashfaq.shaikh@siemens.com)