

ESP-001-2A Rev.00		PROJECT ENGINEERING & SYSTEMS DIVISION ELECTRICAL CONTROL PHILOSOPHY		Std. / Doc. Number	
				Annexure-XII to PY55254	
				Rev. No.	00
				Sheet 1 of 15	

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ANNEXURE-XII **SCAP IO LIST**

Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
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**PROJECT ENGINEERING & SYSTEMS DIVISION**
ELECTRICAL CONTROL PHILOSOPHY**1. OBJECTIVE**

The document provides requirement of electrical equipment IOs for SCAP package for monitoring and Control of electrical equipments.

2. REFERENCE DOCUMENTS

1. EIL Job specification, Section 4.7 (A747-400-16-50-SP-7210 rev A)
2. EIL Engineering Design Basis for Steam and Power Generation Plant (A747-000-16-50-DB-1001 rev 0)
3. EIL's Single Line diagram of SS-01 (SPG) (A747-400-16-50-00010 Rev-A)
4. Block diagram of SPG Package (A747-400-16-50-DS-7210)
5. 220kV Switch Yard SLD-Prepared by L&T (633906-E-BE-001, Rev-03)
6. EIL's 33kV SLD (A747-400-1650-00010, Rev-A)
7. Key SLD for GTG power flow (SPG Package) (A747-400-16-50-SK-0006)
8. BHEL's Key Single Line Diagram (PY-DL-1-M095-1101-01)
9. BHEL's Electrical control Philosophy (PY-SE-4-M095-1101-01)

3. GENERAL

The Captive power plant electrical system is designed to meet the electrical power requirements of Petrochemical complex project.

The power plant consists of 1 no. of GTG (GTG-1), having a capacity of 36.36 MW provided with complete electrical system catering to the power requirements of the petrochemical complex and CPP. Evacuation is done through 33kV Switchgear (EIL/RFC Scope) 33kV Generation Switchboard is fed from GTG-1 through 11/34.5 kV Generator transformer (TR-0101).

The CPP 33KV Switchgear (EIL/RFC Scope) is also hooked up with 220KV grid (EIL/RFC Scope) through 220KV/33KV grid transformers (EIL/RFC Scope).

Synchronization of GTG-1 & 220KV grid are envisaged at 33kV Switchboard SCAP & ECS (Customer scope) are envisaged for synchronizing of GTG-1 & 220KV grid incomers. Synchronization of one future GTG also envisaged at 33kV level as per contract.

Further downstream distribution to CPP is done through 6.6kV switchboards (EIL/RFC Scope). 6.6kV Switchboards are hooked up to 33 kV switchboard through 33/6.9kV Station Auxiliary transformers TR-0111 & TR-0112 (SAT-1&2) (EIL/RFC Scope).

Emergency power for safe shutdown & Black Start of CPP is envisaged from 6.6kV DG set. (Emergency DG is not in BHEL scope)



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4. Equipment control brief discretion.

The control and monitoring for 220KV switchyard, 220/33kV Grid Transformers, 33kV Isolating breakers, 11kV Generators, 33kV Switchboard (Only incomers, Bus couplers & Bus ties only) and 11/34.5kV Generator transformers and is envisaged from hard wired mosaic SCAP located in CPP control room.

5. SCAP IO List from Owner's Equipment.

S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
A 220KV SWITCHYARD INCOMER BREAKER (2Nos)						
A.1	AI	A	R-PHASE CURRENT	-	-	FROM LINE CT-METERING CORE
A.2	AI	A	Y-PHASE CURRENT	-	-	FROM LINE CT-METERING CORE
A.3	AI	A	B-PHASE CURRENT	-	-	FROM LINE CT-METERING CORE
A.4	AI	V	RY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
A.5	AI	V	RB-PHASE VOLTAGE			FROM LINE PT-METERING CORE
A.6	AI	V	BR-PHASE VOLTAGE			FROM LINE PT-METERING CORE
A.7	DI	D	LINE PT MCB OPEN	OPEN	CLOSE	
A.8	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
A.9	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
A.10	DO	C	CB OPEN CMD	ACTIVATED	RESET	
A.11	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
A.12	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
A.13	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
A.14	DI	S	ISOLATOR-1 (WITHOUT EARTH SWITCH) OPEN	OPEN	NOT OPEN	
A.15	DI	S	ISOLATOR-1 (WITHOUT EARTH SWITCH) CLOSE	CLOSED	NOT CLOSED	
A.16	DI	S	ISOLATOR-2 (WITH EARTH SWITCH) OPEN	OPEN	NOT OPEN	
A.17	DI	S	ISOLATOR-2 (WITH EARTH SWITCH) CLOSE	CLOSED	NOT CLOSED	
A.18	DI	S	ISOLATOR-2 EARTH SWITCH OPEN	OPEN	NOT OPEN	
A.19	DI	S	ISOLATOR-2 EARTH SWITCH CLOSE	CLOSED	NOT CLOSED	
A.20	DI	S	BREAKER TRIP	ACTIVATED	RESET	



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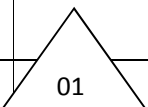
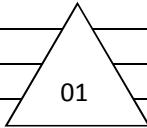
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S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
A.21	DI	S	BREAKER TRIP CIRCUIT UN HEALTHY (95)	UN HEALTHY	HEALTHY	
A.22	AI	V	RY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
A.22	AI	V	RB-PHASE VOLTAGE			FROM LINE PT-METERING CORE
A.23	AI	V	BY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
A.24	DI	D	LINE PT MCB OPEN	OPEN	CLOSE	
B 220KV SWICHYARD BUS PT (2Nos)						
B.1	AI	V	RY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
B.2	AI	V	RB-PHASE VOLTAGE			FROM LINE PT-METERING CORE
B.3	AI	V	BY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
B.4	DI	D	BUS PT MCB OPEN	OPEN	CLOSE	
C 220KV SWICHYARD BUS COUPLER (1No)						
C.1	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
C.2	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
C.3	DO	C	CB OPEN CMD	ACTIVATED	RESET	
C.4	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
C.5	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
C.6	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
C.7	DI	S	ISOLATOR-1 OPEN (205-ISO1)	OPEN	NOT OPEN	
C.8	DI	S	ISOLATOR-1 CLOSE (205-ISO1)	CLOSED	NOT CLOSED	
C.9	DI	S	ISOLATOR-2 OPEN (205-ISO2)	OPEN	NOT OPEN	
C.10	DI	S	ISOLATOR-2 CLOSE (205-ISO2)	CLOSED	NOT CLOSED	
C.11	DI	S	ISOLATOR-1 EARTH SWITCH OPEN (205-ISO1)	OPEN	NOT OPEN	
C.12	DI	S	ISOLATOR-1 EARTH SWITCH CLOSE (205-ISO1)	CLOSED	NOT CLOSED	
C.13	DI	S	ISOLATOR-2 EARTH SWITCH OPEN (205-ISO2)	OPEN	NOT OPEN	



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C.14	DI	S	ISOLATOR-2 EARTH SWITCH-2 CLOSE (205-ISO2)	CLOSED	NOT CLOSED	
C.15	DI	S	DC SUPPLY-1 FAIL	OPERATED	NOT OPERATED	
C.16	DI	S	DC SUPPLY-2 FAIL	OPERATED	NOT OPERATED	
C.17	DI	S	BUS-A PT-SEC MCB OFF	OPERATED	NOT OPERATED	-
C.18	DI	S	BUS-B PT-SEC MCB OFF	OPERATED	NOT OPERATED	-
C.19	AI	A	R-PHASE CURRENT			
C.20	AI	A	Y-PHASE CURRENT			
C.21	AI	A	B-PHASE CURRENT			
C.22	DI	S	BREAKER TRIP CIRCUIT UN HEALTHY	UN HEALTHY	HEALTHY	
D	220KV SWICHYARD OUTGOING BREAKER (2Nos)					
D.1	AI	A	R-PHASE CURRENT	-	-	FROM LINE CT-METERING CORE
D.2	AI	A	Y-PHASE CURRENT	-	-	FROM LINE CT-METERING CORE
D.3	AI	A	B-PHASE CURRENT	-	-	FROM LINE CT-METERING CORE
D.4	AI	V	RY-PHASE VOLTAGE	-	-	FROM LINE PT-METERING CORE
D.5	AI	V	RB-PHASE VOLTAGE	-	-	FROM LINE PT-METERING CORE
D.6	AI	V	BR-PHASE VOLTAGE	-	-	FROM LINE PT-METERING CORE
D.7	DI	D	LINE PT-MCB OPEN	OPEN	CLOSE	-
D.8	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
D.9	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
D.10	DO	C	CB OPEN CMD	ACTIVATED	RESET	
D.11	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
D.12	DI	S	ISOLATOR-1 (WITHOUT EARTH SWITCH) OPEN	OPEN	NOT OPEN	
D.13	DI	S	ISOLATOR-1 (WITHOUT EARTH SWITCH) CLOSE	CLOSED	NOT CLOSED	
D.14	DI	S	ISOLATOR-2 (WITH EARTH SWITCH) OPEN	OPEN	NOT OPEN	
D.15	DI	S	ISOLATOR-2 (WITH EARTH SWITCH) CLOSE	CLOSED	NOT CLOSED	
D.16	DI	S	ISOLATOR-2 EARTH SWITCH OPEN	OPEN	NOT OPEN	
D.17	DI	S	ISOLATOR-2 EARTH SWITCH CLOSE	CLOSED	NOT CLOSED	
D.18	DI	S	BREAKER TRIP	ACTIVATED	RESET	



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S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
D.19	DI	S	BREAKER TRIP CIRCUIT UN HEALTHY	UN HEALTHY	HEALTHY	
D.20	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
D.21	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
E 220/33KV SWICHYARD TRANSFORMERS						
E.1	DI	V	TAP CHANGE MECHANICAL STRUCK	ACTIVATED	RESET	
E.2	DI	V	TAP CHANGE AC SUPPLY FAIL.	ACTIVATED	RESET	
E.3	DI	V	TRANSFORMER TROUBLE	ACTIVATED	RESET	
E.4	DI	D	TRANSFORMER TRIP	ACTIVATED	RESET	
E.5	DO	C	TAP RAISE	OPERATED	NOT OPERATED	
E.6	DO	C	TAP LOWER	OPERATED	NOT OPERATED	
E.7	AI	S	TAP POSITION INDICATION	-	-	4-20mA 01
E.8	DI	S	WINDING TEMPERATURE HIGH ALARM	OPERATED	NOT OPERATED	
E.9	DI	S	WINDING TEMPERATURE HIGH TRIP	OPERATED	NOT OPERATED	
E.10	DI	S	OIL TEMPERATURE HIGH ALARM	OPERATED	NOT OPERATED	
E.11	DI	S	OIL TEMPERATURE HIGH TRIP	OPERATED	NOT OPERATED	
E.12	DI	S	BUCHOLZ ALARM	OPERATED	NOT OPERATED	
E.13	DI	S	BUCHOLZ TRIP	OPERATED	NOT OPERATED	
E.14	DI	S	PRV TRIP	OPERATED	NOT OPERATED	
E.15	DI	S	MOG ALARM	OPERATED	NOT OPERATED	
E.16	DI	S	OLTC TAP IN -15% POSITION	SET	RESET	
E.17	DI	S	OLTC TAP IN -13.75% POSITION	SET	RESET	01
E.18	DI	S	OLTC TAP IN -12.50% POSITION	SET	RESET	
E.19	DI	S	OLTC TAP IN -11.25% POSITION	SET	RESET	
E.20	DI	S	OLTC TAP IN -10.00% POSITION	SET	RESET	
E.21	DI	S	OLTC TAP IN -8.75% POSITION	SET	RESET	
E.22	DI	S	OLTC TAP IN -7.50% POSITION	SET	RESET	



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S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
E.23	DI	S	OLTC TAP IN -6.25% POSITION	SET	RESET	
E.24	DI	S	OLTC TAP IN -5.00% POSITION	SET	RESET	
E.25	DI	S	OLTC TAP IN -3.75% POSITION	SET	RESET	
E.26	DI	S	OLTC TAP IN -2.50% POSITION	SET	RESET	
E.27	DI	S	OLTC TAP IN -1.25% POSITION	SET	RESET	
E.28	DI	S	OLTC TAP IN +0.00% POSITION	SET	RESET	
E.29	DI	S	OLTC TAP IN +1.25% POSITION	SET	RESET	
E.30	DI	S	OLTC TAP IN +2.50% POSITION	SET	RESET	
E.31	DI	S	OLTC TAP IN +3.75% POSITION	SET	RESET	
E.32	DI	S	OLTC TAP IN +5.00% POSITION	SET	RESET	
E.33	DI	S	OLTC TAP IN +6.25% POSITION	SET	RESET	
E.34	DI	S	OLTC TAP IN +7.50% POSITION	SET	RESET	
E.35	DI	S	OLTC TAP IN +8.75% POSITION	SET	RESET	
E.36	DI	S	OLTC TAP IN +10.00% POSITION	SET	RESET	
E.37	DI	S	OLTC TAP IN +11.25% POSITION	SET	RESET	
E.38	DI	S	OLTC TAP IN +12.50% POSITION	SET	RESET	
E.39	DI	S	OLTC TAP IN +13.75% POSITION	SET	RESET	
E.40	DI	S	OLTC TAP IN +15% POSITION	SET	RESET	
F	33KV ISOLATING BREAKER (2Nos)					
F.1	AI	V	RY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
F.2	AI	V	RB-PHASE VOLTAGE			FROM LINE PT-METERING CORE
F.3	AI	V	BR-PHASE VOLTAGE			FROM LINE PT-METERING CORE
F.4	DI	D	LINE PT MCB OPEN	OPEN	CLOSE	



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S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
F.5	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
F.6	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
F.7	DO	C	CB OPEN CMD	ACTIVATED	RESET	
F.8	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
F.9	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
F.10	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
F.11	DI	S	BREAKER TRIP CIRCUIT UN HEALTHY	UN HEALTHY	HEALTHY	
F.12	DI	S	BREAKER TRIP	ACTIVATED	RESET	
G 33KV INCOMER & LINE PT (4Nos)						
G.1	AI	A	R-PHASE CURRENT			FROM LINE CT-METERING CORE
G.2	AI	A	Y-PHASE CURRENT			FROM LINE CT-METERING CORE
G.3	AI	A	B-PHASE CURRENT			FROM LINE CT-METERING CORE
G.4	AI	V	RY-PHASE VOLTAGE			FROM LINE PT-METERING CORE
G.5	AI	V	RB-PHASE VOLTAGE			FROM LINE PT-METERING CORE
G.6	AI	V	BR-PHASE VOLTAGE			FROM LINE PT-METERING CORE
G.7	DI	D	LINE PT MCB OPEN	OPEN	CLOSE	
G.8	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
G.9	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
G.10	DI	S	CB-2 IN SERVICE & OPEN	OPEN	NOT OPEN	-
G.11	DI	S	CB-2 IN SERVICE & CLOSE	CLOSED	NOT CLOSED	-
G.12	DO	C	CB OPEN CMD	ACTIVATED	RESET	
G.13	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
G.14	DO	C	CB-2 OPEN CMD	ACTIVATED	RESET	-
G.15	DO	C	CB-2 CLOSE CMD	ACTIVATED	RESET	-
G.16	DI	D	CB TRIPPED ON FAULT	Activated	Reset	
G.17	DI	D	CB-2 TRIPPED ON FAULT	Activated	Reset	-
G.18	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
G.19	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
G.20	DI	D	BREAKER-2 IN SERVICE	ACTIVATED	NOT ACTIVATED	-
G.21	DI	S	BREAKER-2 RTC	ACTIVATED	NOT ACTIVATED	-
G.22	DI	S	BREAKER TRIP CIRCUIT UN HEALTHY	UN HEALTHY	HEALTHY	



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S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
G.23	DI	S	BREAKER-2 TRIP CIRCUIT UN HEALTHY	UN HEALTHY	HEALTHY	-
G.24	DI	S	BREAKER IN LOCAL/REMOTE	REMOTE	LOCAL	
H	33KV BUS PT (4Nos)					
H.1	AI	V	RY-PHASE VOLTAGE			FROM LINE PT- METERING CORE
H.2	AI	V	RB-PHASE VOLTAGE			FROM LINE PT- METERING CORE
H.3	AI	V	BR-PHASE VOLTAGE			FROM LINE PT- METERING CORE
H.4	DI	D	LINE PT MCB OPEN	OPEN	CLOSE	
I	33KV BUS COUPLER (2Nos)					
I.1	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
I.2	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
I.3	DO	C	CB OPEN CMD	ACTIVATED	RESET	
I.4	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
I.5	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
I.6	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
I.7	DI	S	DC SUPPLY-1 FAIL	ACTIVATED	NOT ACTIVATED	
I.8	DI	S	DC SUPPLY-2 FAIL	ACTIVATED	NOT ACTIVATED	
I.9	AI	A	R-PHASE CURRENT			
I.10	AI	A	Y-PHASE CURRENT			
I.11	AI	A	B-PHASE CURRENT			
I.12	DI	S	Breaker trip circuit un healthy	Un Healthy	Healthy	
I.13	DI	S	Breaker Trip	Activated	Reset	
I.14	DI	S	BREAKER IN LOCAL/REMOTE	REMOTE	LOCAL	
J	33KV BUS TIE BREAKERS (4Nos)					
J.1	DI	S	CB IN SERVICE & OPEN	OPEN	NOT OPEN	
J.2	DI	S	CB IN SERVICE & CLOSE	CLOSED	NOT CLOSED	
J.3	DO	C	CB OPEN CMD	ACTIVATED	RESET	
J.4	DO	C	CB CLOSE CMD	ACTIVATED	RESET	
J.5	DI	D	BREAKER IN SERVICE	ACTIVATED	NOT ACTIVATED	
J.6	DI	S	BREAKER RTC	ACTIVATED	NOT ACTIVATED	
J.7	DI	S	CB-2 IN SERVICE & OPEN	OPEN	NOT-OPEN	
J.8	DI	S	CB-2 IN SERVICE & CLOSE	CLOSED	NOT-CLOSED	
J.9	DO	C	CB-2 OPEN CMD	ACTIVATED	RESET	



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S.No	TYPE	PT TYPE	Signal Description	Set Condition Description	ReSet Condition Description	Remarks
J.10	DO	C	CB-2 CLOSE CMD	ACTIVATED	RESET	
J.11	DI	D	BREAKER-2 IN SERVICE	ACTIVATED	NOT ACTIVATED	
J.12	DI	D	BREAKER-2 RTC	ACTIVATED	NOT ACTIVATED	
J.13	AI	A	R-PHASE CURRENT			
J.14	AI	A	Y-PHASE CURRENT			
J.15	AI	A	B-PHASE CURRENT			
J.16	DI	S	BREAKER TRIP CIRCUIT UN HEALTHY	UN HEALTHY	HEALTHY	
J.17	DI	S	BREAKER TRIP	ACTIVATED	RESET	
J.18	DI	S	BREAKER IN LOCAL/REMOTE	REMOTE	LOCAL	

1. **Analogue Input (AI) Signals:** For all measurements for I, V, MW, MVAR, Hz, PF maximum possible accuracy shall be ensured.

2. **Digital Input (DI) Signals:**

a. **Alarm (D):** Alarm is a signal which requires operator to be alerted such as PT circuit MCB (closed, open), relays 86 & 95 (operated, reset), under-voltage trip etc. This shall be hardwired. For hardwired signal, potential free contacts of rating 0.5 A, 220 V DC or 240 V AC, make to alarm (NO) preferred. Generally a hardwired alarm point is put under "sequence of event" monitoring.

b. **Status (S):** For hardwired signal, potential free contacts of rating 0.5 A, 220 V DC or 240 V AC, make to alarm (NO) required.

3. **Digital Output (DO) Signals:**

a. **Command (C):** Hardwired through potential free changeover type contact of interposing relay, contact rating 5 A, 240 V AC and/or 2 A, 220 V DC.

Notes:

- Above signals have to be arranged and terminate by M/s EIL/RFCAL at SCAP Marshaling panel.
- ~~4-20mA Signal range to be informed by M/s EIL.~~
- CT PT burdens to be considered by M/s EIL/RFC Suitably.

6. I/O LIST OF SCAP (GRP-SCAP)

S.NO	FUNCTION DESCRIPTION	SIGNAL DESCRIPTION
1	ANNUNCION FROM GRP(NON TRIP)	PT 4,5,6 AVR CORE-1 FUSE FAIL
		PT 1,2,3 METERING CORE 1 FUSE FAIL
		PT 7,8,9 AVR 1 CORE FUSE FAIL
		GPR1 RELAY FAULTY
		86A RELAY FAULTY

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S.NO	FUNCTION DESCRIPTION	SIGNAL DESCRIPTION
2	ANNUNCITION FROM GRP(TRIP)	86C RELAY FAULTY
		GEN O/C PROT OPTD STAGE1/2
		GPR2 RELAY FAULTY
		87G RELAT FAULTY
		32 RELAY FAULTY
		87O RELAY FAULTY
		64RT RELAY FAULTY
		PT-1,2,3 FUSE FAIL
		GEN NEG PHASE SEQ STG-1 OPTD
		GEN OVER VOLTAGE STG-1 OPTD
		GEN UNDER FREQ STG-1 OPTD
		PT-4,5,6 FUSE FAIL
		GT OVER FLUXING STG-1 OPTD
		GT BUCHOLTZ ALARM
		OIL TEMP ALARM
		PRD ALARM
		WINDING TEMP ALARM
		33KV GTCB TC-1/2 FAULTY
		ROTOR E/F-1 PROT OPTD
		BACKUP PROTN OPTD
		REF PROT OPTD
		ROTOR E/F-1 RELAY OPTD
		GEN OVER FREQ STG-1
		STATOR FRAME TEMP HIGH 80 DEG
		DC SUPPLY-1 FAIL
		DC SUPPLY-2 FAIL
		GT SEF PROT OPTD
		ROTOR E/F STAGE -2 OPTD
		EMERGENCY TRIP
		GEN DIFF PROT OPTD
		GEN STATOR E/F(0-95%) PROT OPTD
		GEN STATOR E/F(0-100%) PROT OPTD
		DEAD M/C PROT OPTD
		POLE SLIP PROT OPTD
		GEN.VOLTAGE RESTAINT O/C PROT
		GEN. OVER VOLTAGE STG-2 OPTD
		GEN UNDER VOLT PROT OPTD
		STATOR FRAME TEMP HIGH 100 DEG
		LOSS OF EXCITATION WITH U/V OPTD
		LOSS OF EXCITATION WITHOUT W/V OPTD

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S.NO	FUNCTION DESCRIPTION	SIGNAL DESCRIPTION
		GEN OVER FREQ STG-2 OPTD
		GT DIFF PROT OPTD
		GT REF PROT OPTD
		GT OVER FLUXING STG-2 OPTD
		BUCHOLTZZ TRIP OPTD
		OIL TEMP TRIP OPTD
		PRD TRIP OPTD
		WINDING TEMP TRIP OPTD
		86A TRIP RELAY OPTD
		86C TRIP RELAY OPTD
		HOT AIR SET AT 75 DEG
		COLD AIR SET AT 41 DEG
		BEARING TEM SET AT 85 DEG

7. I/O LIST OF SCAP (AVR-SCAP)

S.NO	FUNCTION DESCRIPTION	SIGNAL DESCRIPTION
1	ANNUNCIATION	EMERGENCY PB OPTD
		AVR TRIP DUE TO COMMON ALARM STG-3
		CO2 RELEASED INTO GENERATOR
		STATOR TEMP HIGH 100 DEG
		UEL IN ACTION
		OEL IN ACTION
		V/F LIMITER IN ACTION
		EXCITATION WARNING STG-1
		EXCITATION WARNING STG-2
		EMERGENCY CHANGEOVER FROM AUTO TO MANUAL
		ROTATING DIODE SHORT CIRCUIT
		ROTATING DIODE OPEN CIRCUIT
2	INDICATIONS	CH-1 TO AUTO
		CH-2 TO AUTO
		CH-1 TO MANUAL MODE
		CH-2 TO MANUAL MODE
		AVR IN LOCAL CONTROL
		AVR IN AUTO
		PF ON
		PF/MVAR OFF
		MVAR ON
		REF.VALUE CH-1 MAX



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S.NO	FUNCTION DESCRIPTION	SIGNAL DESCRIPTION
3	COMMANDS	REF VALUE CH-1 MIN
		REF.VALUE CH-2 MAX
		REF VALUE CH-2 MIN
		EXCITER BKR ON
		EXCITER BKR OFF
		CH-1 ON
		CH-2 ON
		CH-1 TO MODE AUTO
		CH-2 TO MODE AUTO
		CH-1 TO MODE MAN
		CH-2 TO MODE MAN
		PF ON
		PF/MVAR OFF
		MVAR ON
		PF/MVAR LOWER
		PF/MVAR RAISE
		AVR REST
		CH REF RAISE
		CH1 REF LOWER
		CH2 REF RAISE
		CH2 REF LOWER
		EXCITER BKR CLOSE
		EXCITER BKR OPEN

8. I/O LIST OF SCAP (SCAP-MK VI)

S.NO	SIGNAL DESCRIPTION	FROM	TO	
1	BUS PT	SCAP	MKVI	
2	LINE PT	SCAP	MKVI	
3	GCB CLOSED STATUS(NO CONTACT)	SCAP	MKVI	
4	GCB CLOSED STATUS(NC CONTACT)	SCAP	MKVI	
5	SPEED RAISE	SCAP	MKVI	
6	SPEED LOWER	SCAP	MKVI	
7	3 Nos MEGA WATT O/P(4-20mA)	SCAP	MKVI	
8	1 No MEGA WATT O/P(4-20mA)	SCAP	MKVI	
9	VOLTAGE RAISE	MKVI	AVR	THRU SCAP
10	VOLTAGE LOWER	MKVI	AVR	THRU SCAP
11	CB CLOSE CMD	MKVI	33KV AIS	THRU SCAP
12	SYNC SELN IN REMOTE	MKVI	SCAP	
13	SYNC SELN IN AUTO	MKVI	SCAP	
14	TRIP CIRCUIT BKR	MKVI	33KV AIS	THRU SCAP

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S.NO	SIGNAL DESCRIPTION	FROM	TO	
1	ECS(Auto)/SCAP(Manual) selector switch in SCAP Position	SCAP	ECS	
2	GTG Voltage Raise contact	ECS	AVR	THRU SCAP
3	GTG Voltage Lower contact	ECS	AVR	THRU SCAP
4	GTG Frequency Raise	ECS	MKVI	THRU SCAP
5	GTG Frequency Lower	ECS	MKVI	THRU SCAP
6	GTG Excitation in Constant PF Mode	SCAP	ECS	
7	GTG Excitation in Constant VAR Mode	SCAP	ECS	
8	GTG Excitation in CONSTANT VAR Control Mode	SCAP	ECS	
9	Set GTG Excitation in Contact PF Mode contact	ECS	AVR	THRU SCAP
10	Set GTG Excitation in Contact VAR Mode contact	ECS	AVR	THRU SCAP
11	GTG Control from Mark VI	SCAP	ECS	
12	GTG Control from Remote	SCAP	ECS	

Note: Above list (s.no 6,7,8) is only indicative. Actual signal exchange list shall be referred during detail engineering in the schematics of SCAP.



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