SHEET NUMBER	TITLE	REVISION	DATE	DESIGN CHANGE DESCRIPTION
00	COVER SHEET	2	29/05/2015	UPDATED DESIGN CHANGE DESCRIPTION
01	PANEL EQUIPMENT LAYOUT	2	29/05/2015	UPDATED BACKPLATE NUMBERS OF TERMINALS
02	LOGIC DIAGRAM	2	29/05/2015	LEVEL 2 & 3 NOTES ADDED
03	SINGLE LINE DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
04	AC KEY DIAGRAM	2	29/05/2015	CORRECTED ALL CT CORES NEUTRAL, R & B DESIGNATIONS
05	VT SUPPLY KEY DIAGRAM	2	29/05/2015	ADDED 4 TERMINALS TO METERING VT SUPPLY
06	MAIN DC KEY DIAGRAM	2	29/05/2015	TEST TERMINALS ADDED, LEVEL 12 & 13 BREAKER DETAILS UPDATED, NOTE 1 ADDED
07	MAIN DC KEY DIAGRAM	2	29/05/2015	IED PSU WIRE NUMBER CORRECTED, LEVEL 12 & 13 BREAKER DETAILS UPDATED
08	TELEPROTECTION DC KEY DIAGRAM	2	29/05/2015	ADDED EXPLANATORY NOTE AND SET THREE TERMINAL DIFFERENTIAL OPTION TO LEVEL 4
09	BACK-UP DC KEY DIAGRAM	2	29/05/2015	TEST TERMINALS ADDED, LEVEL 12 & 13 BREAKER DETAILS UPDATED
10	BACK-UP DC KEY DIAGRAM	2	29/05/2015	LEVEL 12 & 13 BREAKER DETAILS UPDATED
11	BACK-UP DC KEY DIAGRAM	2	29/05/2015	NOTE 2 DETAIL ADDED, LEVEL 12 & 13 BREAKER DETAILS UPDATED
12	CLOSE DC KEY DIAGRAM	2	29/05/2015	CBC-CR AND CBCS-X1 TERMINALS CORRECTED, LEVEL 12 & 13 BREAKER DETAILS UPDATED, NOTE 3 ADDED
13	INDICATION DC KEY DIAGRAM	2	29/05/2015	LEVEL 12 & 13 BREAKER DETAILS UPDATED
14	SPRING REWIND AND AC KEY DIAGRAM	2	29/05/2015	UPDATED DISCHARGE POINT TERMINAL NUMBER, LEVEL 12 & 13 BREAKER DETAILS UPDATED, NOTE 1 ADDED
15	REA AND MEASUREMENTS KEY DIAGRAM	2	29/05/2015	ALTERED RJ45 CONNECTIONS DISPLAY SYMBOL (LEVEL 28)
16	SUPERVISORY STATUS & CONTROL KEY DIAGRAM	2	29/05/2015	DROPPING RESISTORS REMOVED & NOTE 1 ALTERED
17	SUPERVISORY ALARMS KEY DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
18	DISTURBANCE RECORDER KEY DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
19	PROTECTION REFERENCE DIAGRAM	2	29/05/2015	X71 P7 INPUT DESIGNATIONS UPDATED
20	PROTECTION REFERENCE DIAGRAM	2	29/05/2015	FLIP FLOP STATE AND RELAYS RXMB1 & RXMA1 OHMIC VALUES UPDATED, MODULE RCPM,C/T & R2F,1 REFERENCE SHEET NUMBERS UPDATED
21	PROTECTION REFERENCE DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
22	PANEL CABLING DIAGRAM	2	29/05/2015	ADDED 4 TERMINALS TO X2.39-42, LEVEL 12 & 13 BREAKER DETAILS UPDATED
23	PANEL CABLING DIAGRAM	2	29/05/2015	CORRECTED X6.39 TERMINAL TYPE & REMOVED X5 DROPPING RESISTORS; ADDED TEST SOCKET DETAILS, LVL 12 & 13 BREAKER DETAILS UPDATED
24	PANEL CABLING DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
25	CTJB CABLING DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
26	LINE VTJB LAYOUT & KEY DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
27	CABLE BLOCK DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION

LEVEL	DESCRIPTION	LEVEL	DESCRIPTION
1		16	
2	4FZD3920 DISTANCE/ DIFFERENTIAL SCHEME	17	
3	4FZ3920 DISTANCE SCHEME	18	FEEDER PRIMARY OUTBOARD BYPASS (ORDERING OPTION)
4	THREE TERMINAL DIFFERENTIAL OPTION	19	THREE PHASE MEASUREMENTS TRANSDUCER (ORDERING OPTION - ACTOM AREVA 1,5MT FREE ISSUED)
5		20	THREE PHASE MEASUREMENTS TRANSDUCER (ORDERING OPTION - CAMILLE BAUER SINEAX)
6		21	FRONT PLATE V AND I ANALOGUE METERS (ORDERING OPTION)
7		22	SINGLE PHASE V AND I TRANSDUCERS (ORDERING OPTION)
8		23	SUPERVISORY INDICATION AND CONTROL (HARDWIRED) (ORDERING OPTION)
9		24	IDF WIRING (HARDWIRED)
10	STANDARD DESIGN DRAWING	25	SUPERVISORY STATUS INDICATION (DNP3)
11	STANDARD CTJB AC CONNECTION	26	DISTURBANCE RECORDER (ORDERING OPTION)
12	STANDARD OUTDOOR HV ABB 3P CIRCUIT-BREAKER 132kV (AS PER ABB DRAWINGS 1HSB543200-AAF REV G)	27	STANDARD COMMS OPTIONS (FIBRE AND SPA REMOTE ENG. ACCESS)
13	STANDARD OUTDOOR HV ABB 3P CIRCUIT-BREAKER 36-72,5kV (AS PER ABB DRAWINGS 1HYB902173 REV 3)	28	IEC-61850/ETHERNET COMMS (ORDERING OPTION)
14	VOLTAGE SELECTOR RELAY (VSR) DOUBLE BUSBAR (ORDERING OPTION)	29	TIME SYNCHRONISATION EXTERNAL INPUTS RED670
15	LINE VT CONNECTION DIAGRAM	30	TIME SYNCHRONISATION INTERNAL INPUTS RED670 (ORDERING OPTION)

? MUTUALLY EXCLUSIVE LEVELS/SHEETS. SELECT ONE AND ONLY ONE OF EACH PAIR/SET PER APPLICATION.
x MUTUALLY INCLUSIVE LEVELS/SHEETS.

66kV FEEDER 1: BLOUWATER 1 / YSTERVARK TEE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
COVER SHEET

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	00	1

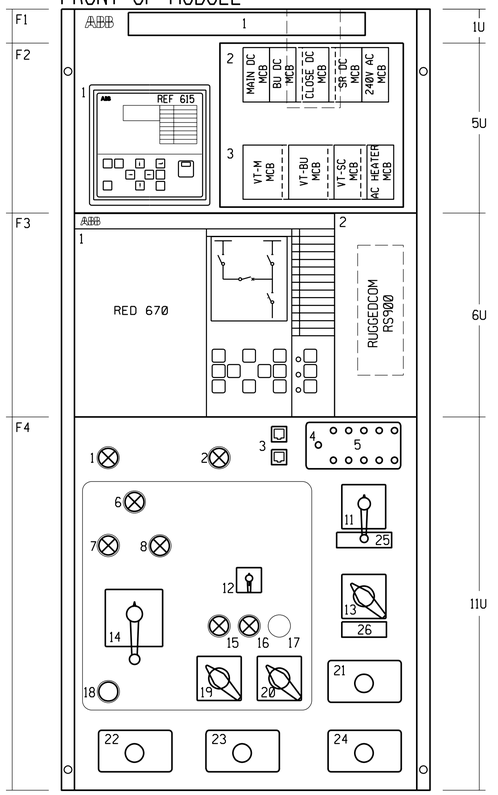
LEVELS 1 5 10

PANEL TYPE DESIGNATION 4FZD-3920

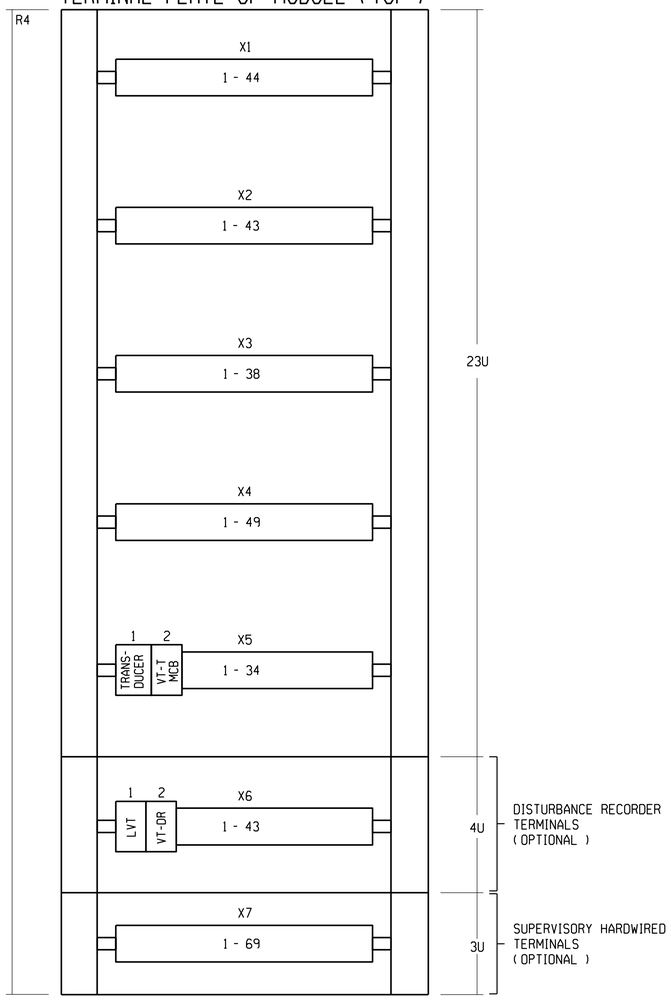
SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 00 OF 28 REVISION 2

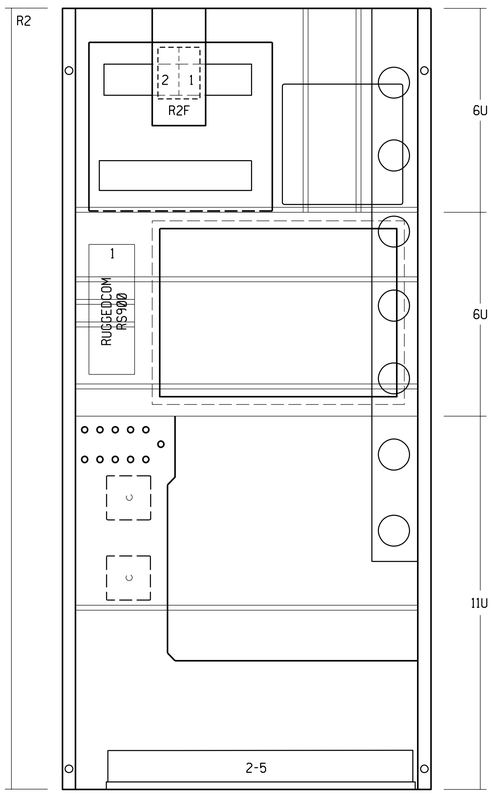
FRONT OF MODULE



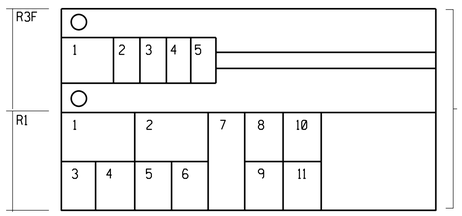
TERMINAL PLATE OF MODULE (TOP)



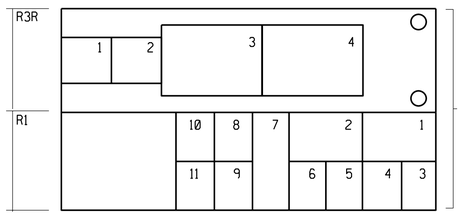
REAR OF MODULE



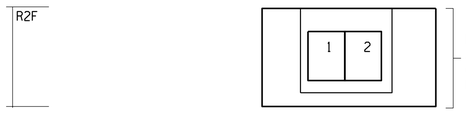
INTERNAL TO MODULE



INTERNAL TO MODULE



INTERNAL TO MODULE



LOCATION			DESIGNATION	DESCRIPTION			TYPE	MANUFACTURER
FRONT OF MODULE								
F1	1		LABEL					
F2	1		BACK-UP IED	DIRECTIONAL BACK-UP PROTECTION			REF615	ABB
	2	1	MCB(M)	MAIN DC SUPPLY MCB	(110V, 220V SCHEME)	(16 AMP)	S282-UC B16	ABB
		2	MCB(BU)	BACK-UP DC SUPPLY MCB	(110V, 220V SCHEME)	(16 AMP)	S282-UC B16	ABB
		3	MCBX(CL)	CLOSE DC SUPPLY MCB AUXILIARY CONTACT			S2-H11 I	ABB
		4	MCB(CL)	CLOSE DC SUPPLY MCB	(110V, 220V SCHEME)	(10 AMP)	S282-UC B10	ABB
		5	MCBX(SR)	SPRING REWIND DC SUPPLY MCB AUXILIARY CONTACT			S2-H11 I	ABB
		6	MCB(SR)	SPRING REWIND DC SUPPLY MCB	(110V, 220V SCHEME)	(20 AMP)	S282-UC B20	ABB
		7	MCB(AC)	MAIN AC SUPPLY MCB		(10 AMP)	S282-UC B10	ABB
	3	1	MCB(VT-M)	VT SUPPLY MAIN PROTECTION MCB	(3 POLE)	(2 AMP)	S203-C 2	ABB
		2	MCBX(VT-M)	VT SUPPLY MAIN PROTECTION MCB AUXILIARY CONTACT			S2C-H6R	ABB
		3	MCB(VT-BU)	VT SUPPLY BACK-UP PROTECTION MCB	(3 POLE)	(2 AMP)	S203-C 2	ABB
		4	MCBX(VT-BU)	VT SUPPLY BACK-UP PROTECTION MCB AUXILIARY CONTACT			S2C-H6R	ABB
		5	MCB(VT-SC)	VT SUPPLY SYNCH CHECK MCB		(2 AMP)	S202-C 2	ABB
		6	MCBX(VT-SC)	VT SUPPLY SYNCH CHECK MCB AUXILIARY CONTACT			S2C-H6R	ABB
		7	MCB(H)	HEATER SUPPLY MCB		(6 AMP)	S282-UC B6	ABB
F3	1		MAIN IED	INTERGRATED DISTANCE/DIFFERENTIAL FEEDER PROTECTION RELAY			RED670	ABB
F4	1		PNH	PROTECTION NOT HEALTHY INDICATION	(AMBER)		CL523Y	ABB
	2		ARC-OFF/LOCKED-OUT	AUTO RECLOSE OFF & CLOSE LOCK-OUT INDICATION	(AMBER)	(CL520 = 240V DC)	CL515Y	ABB
	3		IEC61850 RELAY COM PORTS	IEC61850 RELAY TEST ETHERNET COMMUNICATION PORTS				
	4		ESD	ELECTROSTATIC DISCHARGE POINT			SOCKET (BLUE)	COMMUNICA
	5	1	TP-1	TEST POINT 1 - MAIN PROTECTION TRIP	(RED PHASE)		SOCKET (RED)	COMMUNICA
		2	TP-2	TEST POINT 2 - MAIN PROTECTION TRIP	(WHITE PHASE)		SOCKET (RED)	COMMUNICA
		3	TP-3	TEST POINT 3 - MAIN PROTECTION TRIP	(BLUE PHASE)		SOCKET (RED)	COMMUNICA
		4	TP-4	TEST POINT 4 - BREAKER FAIL BUS STRIP			SOCKET (RED)	COMMUNICA
		5	TP-5	TEST POINT 5 - MAIN DC NEGATIVE SUPPLY			SOCKET (BLACK)	COMMUNICA
		6	TP-6	TEST POINT 6 - BREAKER FAIL RETRIP CROSS TRIP			SOCKET (RED)	COMMUNICA
		7	TP-7	TEST POINT 7 - SUPERVISORY TRIP			SOCKET (RED)	COMMUNICA
		8	TP-8	TEST POINT 8 - BACK-UP PROTECTION TRIP			SOCKET (RED)	COMMUNICA
		9	TP-9	TEST POINT 9 - ARC OR EXTERNAL CLOSE			SOCKET (RED)	COMMUNICA
		10	TP-10	TEST POINT 10 - BACK-UP DC NEGATIVE SUPPLY			SOCKET (BLACK)	COMMUNICA
	6		CBNH	CIRCUIT BREAKER NOT HEALTHY INDICATION	(AMBER)		CL515Y	ABB
	7		CBO	CIRCUIT BREAKER OPEN INDICATION	(GREEN)		CL515G	ABB
	8		CBC	CIRCUIT BREAKER CLOSE INDICATION	(RED)		CL515R	ABB
	11		TNS	TEST NORMAL SWITCH			CR0867	LOP SWITCH
	12		LCS	LAMP CHECK SWITCH			CA4 A321-621	KRAUSE & NAIMER
	13		TPIS	TELEPROTECTION ISOLATOR SWITCH			CR-0866	LOP SWITCH
	14		CBCS	CIRCUIT BREAKER CONTROL SWITCH			CR-0604	LOP SWITCH
	15		ARC OFF	AUTO RECLOSE SELECTION STATE PUSH BUTTON	(AMBER)	(110V DC)	MP3-11Y, MBH-101	ABB
	16		ARC 3 POLE	AUTO RECLOSE SELECTION STATE PUSH BUTTON	(AMBER)	(110V DC)	MP3-11Y, MBH-101	ABB
	17			(BLANK)				
	18		TTPB	TRIP TEST PUSH BUTTON/ PROTECTIVE COVER			CP10-10R-10/ YSF	ABB
	19		BFIS	BREAKER FAIL ISOLATOR SWITCH			CR-0866A	LOP SWITCH
	20		SIS	SUPERVISORY ISOLATOR SWITCH			CR-0316	LOP SWITCH
	21		CTTB-BU	CT TEST BLOCK	(BACK-UP)		PK2 (4 WAY)	IST
	22		CTTB-M	CT TEST BLOCK	(MAIN)		PK2 (4 WAY)	IST
	23		VTTB-M	VT TEST BLOCK	(MAIN)		PK2 (4 WAY)	IST
	24		VTTB-BU	VT TEST BLOCK	(BACK-UP)		PK2 (4 WAY)	IST
	25		M.O.T.- LINK A CLOSED = NO SYNCH CHECK	LABEL INDICATING EMERGENCY CLOSE CONTROL WITHOUT SYNCH CHECK WHEN LINK A IS CLOSED, AND TNS SELECTED TO MAIN ON TEST				
	26		REMOTE DIFF ISOLATION	LABEL INDICATING TPIS BLOCKS REMOTE DIFF UNIT				
INTERNAL TO MODULE								
R1	1		VSR-1	ISOLATOR 1 REPEAT RELAY	(• AN=110V DC, AS=220V DC)	(NOT INSTALLED)	RXMVB 2 RK 251205-•	ABB
	2		VSR-2	ISOLATOR 2 REPEAT RELAY	(• AN=110V DC, AS=220V DC)	(NOT INSTALLED)	RXMVB 2 RK 251205-•	ABB
	3			(BLANK)				
	4			(BLANK)				
	5		RCPM_C/T	SNUBBER CIRCUIT			RCPM1 PR56512029-AA	ABB
	6		CT-X	BACK-UP TO MAIN CROSS TRIP AUXILIARY RELAY			RXMA 1 RK 211072-AN	ABB
	7		PSU	48 VOLT DC POWER SUPPLY UNIT		(NOT INSTALLED)	RXTUG	ABB
	8		TCS-M	TRIP CIRCUIT SUPERVISION MAIN	(MAIN)		BTCS110	ABB
	9			(BLANK)				
	10			(BLANK)				
	11		TCS-BU	TRIP CIRCUIT SUPERVISION BACK-UP	(BACK-UP)		BTCS110	ABB
R3F	1		D1	LAMP CHECK DIODES			PR56592018	WEIDMULLER/ ABB
	2		D2	CROSS TRIP DIODES			PR56512033.BA	WEIDMULLER/ ABB
	3		D3	CROSS TRIP DIODES			PR56512033.BA	WEIDMULLER/ ABB
	4		D4	BLOCKING DIODE (MEASURING POINTS)			PR56592018/4.PNH	WEIDMULLER/ ABB
	5		D5	BLOCKING DIODE (TRIP CIRCUIT SUPERVISION 3 POLE)			PR56512033.BA	WEIDMULLER/ ABB
R3R	1		DCF-M	DC FAIL RELAY (MAIN)	(• 110=110V DC, 220=220V DC)		CR-U110DC3L	ABB
	2		DCF-BU	DC FAIL RELAY (BACKUP)	(• 110=110V DC, 220=220V DC)		CR-U110DC3L	ABB
	3		MCTS	MAIN CT SHORTING RELAY	(• 110=110V DC, 220=220V DC)	(NOT INSTALLED)	BJ8-110V DC	ARTECHE
	4		BCTS	BACK-UP CT SHORTING RELAY	(• 110=110V DC, 220=220V DC)	(NOT INSTALLED)	BJ8-110V DC	ARTECHE
R2F	1		CBC-CR	CIRCUIT BREAKER CLOSE AUXILIARY RELAY	(• AN = 110V DC, AS = 220V DC)		RXMB1 IMRK 000 803-•	ABB
	2			(BLANK)				
REAR OF MODULE								
R2	1		ROUTER	IEC61850 ROUTER			RS900-HI-D-MTMTMT	RUGGEDCOM
	2		CBOS-X1	CIRCUIT BREAKER OPEN SUPERVISORY AUXILIARY 1 RELAY	(48V DC)		CR-U048DC3	ABB
	3		CBCS-X1	CIRCUIT BREAKER CLOSE SUPERVISORY AUXILIARY 1 RELAY	(48V DC)		CR-U048DC3	ABB
	4		PNH-X1	PROTECTION NOT HEALTHY AUXILIARY 1 RELAY	(• 110=110V DC, 220=220V DC)		CR-U110DC3L	ABB
	5		PNH-X2	PROTECTION NOT HEALTHY AUXILIARY 2 RELAY	(• 110=110V DC, 220=220V DC)		CR-U110DC3L	ABB
						(NOT INSTALLED)	SINEAX CAM/1STAT15MT	CAMILLE/ AREVA
R4	X5.1		TRANSDUCER	MEASUREMENTS TRANSDUCER & INTERFACE		(NOT INSTALLED)	SINEAX U543,1543	CAMILLE BAUER
						(NOT INSTALLED)	VA4-LDG6, CA4-LDG6	POWERCON
	X5.2		MCB (VT-T)	TRANSDUCER VT SUPPLY MCB	(3 POLE)	(2 AMP)	S203-C 2	ABB
	X6.1		MCB (LVT)	DISTURBANCE RECORDER LVT SUPPLY MCB	(NOT INSTALLED)	(1 AMP)	S202-C 1	ABB
	X6.2		MCB (VT-DR)	DISTURBANCE RECORDER VT SUPPLY MCB	(3 POLE) (NOT INSTALLED)	(1 AMP)	S203-C 1	ABB

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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10

SCALE

ISCOR SUBSTATION
66kV FEEDER 1
PANEL EQUIPMENT LAYOUT

DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	01	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 01 OF 28 REVISION 2

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

RED670 AND REF615 RELAYS USE PCM600 AS THEIR SOFTWARE TOOL. THE REQUIRED CONNECTIVITY PACKAGES FOR THESE RELAYS IS THE RELION SERIES SOFTWARE.

REDG70: MAIN DISTANCE/DIFFERENTIAL RELAY
NOTE THAT THE INTERNAL TELEPROTECTION/DIFFERENTIAL COMMUNICATION LINK OF THIS RELAY IS ONLY COMPATABLE WITH A MIRRORED RELAY ON THE DISTRIBUTION CONTRACT OR SCHEMES 6FZD3500 AND 6FZD3600 ON THE TRANSMISSION CONTRACT.

EXPLANATION OF THE CONTROLLED SWITCHES USED IN THE RED670 MAIN RELAY
GT SWITCHES, WHICH ARE SETTABLE IN THE PCM600 ENGINEERING PARAMETER SETTING (PS) SOFTWARE, AND MAY BE FOUND WITHIN THE PARAMETER SETTINGS UNDER THE APPLICATION CONFIGURATION SECTIONS THEY ARE CONFIGURED WITHIN, ARE MASKED AS FOLLOWS:

GT-01) INTERNAL COMMUNICATION CARD LINK FAIL FUNCTION SELECTION
SET GT01 TO 'ON' (THE DEFAULT) IF THE SCHEME HAS A COMMUNICATION CARD IN SLOT X34 OR X35 AND IT IS USED.
SET GT01 TO 'OFF' IF THE CARD IS NOT USED OR IF THE SCHEME DOES NOT HAVE A COMMUNICATION CARD IN SLOT X34 OR X35.

TO TAKE ADVANTAGE OF THE TEF CARRIER GUARD FAIL MASKING: SET UNBLOCK = RESTART IN THE PST SOFTWARE AND SET SECURITY = 35ms.

GT-02) TEST OUTPUTS
SET GT02 TO 'ON' TO ENABLE PHASE AND EARTH FAULT IMPEDANCE STARTER TEST OUTPUTS.
SET GT02 TO 'OFF' (THE DEFAULT) TO ENABLE CARRIER RECEIVE AND CARRIER SEND TEST OUTPUTS.

GT-03) INSTANTANEOUS TRIP PARALLEL/SERIES LOGIC FUNCTION SELECTION
SET GT03 TO 'OFF' (THE DEFAULT) FOR PARALLEL OPTION WHICH ALLOWS EITHER FUNCTION, DIFFERENTIAL OR DISTANCE (Z1 OR Z2 AIDED), TO INITIATE THE TRIP (INCREASED DEPENDABILITY).
WITH GT03 SET 'ON', THE SERIES OPTION IS CHOSEN WHICH REQUIRES BOTH FUNCTIONS TO OPERATE TO INITIATE AN INSTANTANEOUS TRIP (INCREASED SECURITY).

GT-04) CARRIER GUARD ZONE ACCELERATION BLOCK
SET GT04 TO 'OFF' (THE DEFAULT) IN 'Application Configuration/Monitoring/Logic/LogicGate' WHEN THE CARRIER GUARD IS NOT USED.
SET GT04 TO 'ON' WHEN USING THE CARRIER GUARD AND USING THE ZONE ACCELERATION FUNCTIONALITY. NOTE THAT ZONE ACCELERATION CAN BE SET ON OR OFF (THE DEFAULT) WITHIN THE SETTINGS AND SHOULD ONLY BE USED FOR SINGLE RADIAL LINES.

GT-05) CARRIER GUARD SELECTION
SET GT05 TO 'ON' FOR CARRIER GUARD USEAGE. SET TO 'OFF' (THE DEFAULT) IF THERE IS NO 50V DC SUPPLY TO THE EXTERNAL TELEPROTECTION (PLC) SCHEME CIRCUIT.

GT-06) PARALLEL FEEDER DISTANCE-TO-FAULT COMPENSATION SELECTION
SET GT06 TO 'OFF' (THE DEFAULT) FOR NO PARALLEL FEEDER DISTANCE TO FAULT COMPENSATION (FAULT LOCATOR ACCURACY).
SET GT06 TO 'ON' FOR DTF FAULT LOCATOR COMPENSATION FOR PARALLEL FEEDERS (DOUBLE CIRCUIT FEEDERS).

GT-07) UNDERVOLTAGE OVERLOAD TRIP OR OVERVOLTAGE TRIP FUNCTION SELECTION
THE U/V OVERLOAD TRIP FUNCTION (THE DEFAULT) MAY BE REPLACED WITH THE 'OVLD' TRIP FUNCTION (SET GT07 TO 'ON' FOR OVLD TRIP) IF THE SOLE CRITERIA IS CURRENT.

A SETTABLE TIMER FUNCTION, TS14, IS USED FOR THE TIMING OF THE OVERLOAD (OVLD) TRIP FUNCTION. TS14 WILL DELAY THE OVERLOAD TRIP OUTPUT AND IS SETTABLE IN THE PST SOFTWARE. TS14 IS IN SERIES WITH THE OVLD FUNCTION TIMER T OUTPUT (i.e. THE TIMERS ARE ADATIVE). IF TS14 IS SET TO 'OFF', THE OVLD TRIP AND THE U/V OVLD ARE BLOCKED BUT THE OVLD ALARM WOULD REMAIN FUNCTIONAL (i.e. THE OVLD ALARM OUTPUT IS TAKEN OFF BEFORE TS14 AND THE OVLD ALARM WOULD OPERATE AFTER OVLD FUNCTION TIME TIMEOUT).
NOTE THAT THE U/V FUNCTION TIMER RUNS CONCURRENTLY WITH THE OVLD TRIP OUTPUT FOR THE U/V TRIP OUTPUT.

GT-08) BROKEN CONDUCTOR TRIP OR ALARM FUNCTION SELECTION
THE BROKEN CONDUCTOR ALARM FUNCTION (THE DEFAULT) MAY BE REPLACED WITH THE BROKEN CONDUCTOR TRIP FUNCTION (SET GT08 TO 'ON' FOR BC TRIP) IF THE CONNECTED POWER PARAMETERS ALLOW IT.

GT-09) FUSE FAIL BREAKER STATUS DUDI FUNCTION SELECTION
SET GT09 TO 'OFF' (THE DEFAULT) FOR EXCLUSION OF THE BREAKER STATUS WITHIN THE DUDI FUNCTION DECISION LOGIC (THEN RELIES SOLELY ON THE CONDITION 'phase Imag > IPh setting' TO BE FULFILLED FOR INITIATION OF DUDI). SET GT09 'ON' FOR INCLUSION OF THE BREAKER STATUS LOGIC (THEN RELIES ON EITHER OF THE CONDITIONS 'phase Imag > IPh setting' OR 'CIRCUIT BREAKER CLOSED' TO BE FULFILLED FOR INITIATION OF THE DUDI FUNCTION).

GT-11) POLE DISAGREEMENT FUNCTION SELECTION
THE POLE DISAGREEMENT FUNCTION (PD) INCLUDES BOTH BREAKER AUXILIARY CONTACT ANALYSIS (TRADITIONAL METHOD) AND A CURRENT BASED FUNCTIONALITY. THEY ARE INDEPENDANT OF EACH OTHER.

THE CURRENT BASED OPTION CAN BE SET FOR CONTINUOUS MONITORING OR FOR A PERIOD OF 200ms AFTER THE BREAKER CHANGES STATE (CurrSel='CB OPEN MONITOR' IS THE SETTING FOR THE 200ms OPTION - INITIATED VIA CLOSE OR 3 POLE TRIP COMMANDS).
IF THE CURRENT BASED OPTION IS USED, THEN IT IS RECOMMENDED TO CHOOSE THE 200ms OPTION, AS OPPOSED TO THE CONTINUOUS OPTION, AS IT IS MORE SECURE.
IF THE CURRENT BASED OPTION IS NOT REQUIRED (RECOMMENDED), SET THE 'Curr Sel' TO 'OFF' (THE DEFAULT).

FUNCTIONALITY HAS BEEN ADDED TO THE TRADITIONAL METHOD OF PD AND THUS THERE IS AN OPTION TO HAVE IT SUPERVISED BY USING THE BROKEN CONDUCTOR 'START' FUNCTIONALITY AND BROKEN CONDUCTOR FUNCTION CURRENT SETTINGS. THIS IS STILL INDEPENDANT OF THE SOLELY CURRENT BASED OPTION IN THE PREVIOUS PARAGRAPH.

SET GT11 TO 'ON' (THE DEFAULT) FOR TRADITIONAL POLE DISAGREEMENT FUNCTIONALITY (i.e. BREAKER AUXILIARY CONTACT ANALYSIS).
SET GT11 TO 'OFF' TO ENABLE A COMBINATION THAT USES BREAKER AUXILIARY CONTACTS AND THE BROKEN CONDUCTOR START FUNCTIONALITY.
THIS EXTRA FUNCTIONALITY HAS BEEN ADDED TO ENHANCE SECURITY OF THE SCHEME (i.e. PD WITH BCondStart WOULD NOT OPERATE FOR A FAULTY BREAKER AUXILIARY CONTACT ONLY) BUT WITH DECREASED DEPENDABILITY (i.e. THE LINE MUST BE ENERGISED, CONNECTED AND POSSIBLY LOADED BEFORE A PD COULD OPERATE).

GT-12) ZONE 2 AUTORECLOSE INITIATE FUNCTION SELECTION
FOR SELECTION OF IMPEDANCE ZONE 2 AUTORECLOSE INITIATION (Z2 ARC INITIATE), SET GT12 TO 'ON'. SET GT12 TO 'OFF' (THE DEFAULT) FOR NO ZONE 2 ARC INITIATE.

GT-13) FAULT AND TRIP COUNTER RESET
GT13 DEFAULT = 'OFF'. SET GATE 'ON' THEN 'OFF' WHEN REPLACING THE HV BREAKER.

GT-14) TEF (EARTH-FAULT RED670) AUTORECLOSE INITIATE FUNCTION SELECTION
FOR SELECTION OF TEF AUTORECLOSE INITIATION, SET GT14 TO 'ON' (THE DEFAULT) IN 'Application Configuration/Closing ARCend Sync/Logic/LogicGate'.
SET GT14 TO 'OFF' FOR NO TEF ARC INITIATE.

GT-15) O/C (RED670) AUTORECLOSE INITIATE FUNCTION SELECTION
FOR SELECTION OF O/C AUTORECLOSE INITIATION, SET GT15 TO 'ON' IN 'Application Configuration/Closing ARCend Sync/Logic/LogicGate'.
SET GT15 TO 'OFF' FOR NO O/C ARC INITIATE (THE DEFAULT).

GT-16) SYNCH CHECK FUNCTION
SET GT16 TO 'OFF' (THE DEFAULT) FOR USAGE OF THE SYNCH CHECK AUTO FUNCTION. SET GT16 TO 'ON' IF THERE IS NO SYNCH CHECK LINE VT.

GT-18) TRIP CIRCUIT SUPERVISION CLOSE BLOCKING
SET GT18 TO 'ON' IN 'PARAMETER SETTING/MONOTORING' FOR ANY TCS FAIL (FROM MAIN OR BACK-UP TRIP COIL CIRCUITS) TO BLOCK A CLOSE.
TCS FAIL WILL NOT BLOCK A CLOSE IF GT18 IS SET 'OFF' UNLESS BOTH MAIN AND BACK-UP TRIP CIRCUITS HAVE FAILED. THE DEFAULT SETTING IS GT18='OFF'.
A PNH AND A CBNH ALARM WILL BE ISSUED FOR A TCS FAIL, IRRESPECTIVE OF THE GT18 STATE.

REF615: BACK-UP RELAY SETTINGS AND LOGIC

CB CLOSE CONTROL LOGIC
THE BACK-UP RELAY HAS BEEN MASKED AND THE SCHEME WIRED TO ENABLE BREAKER CONTROL WHEN THE TNS SWITCH IS SET TO 'MAIN ON TEST' (AND BACK-UP ON TEST).
THE CLOSE PULSE CAN BE ISOLATED IF REQUIRED BY LINK A ON THE TERMINAL STRIP AS THE BACK-UP RELAY DOES NOT OFFER SYNCH-CHECK.
THE DEFAULT LINK A POSITION IS 'OPEN'.

SUPERVISORY BREAKER CONTROL:
THE BACK-UP RELAY IS ALSO MASKED FOR SUPERVISORY DNP3 AND HARDWIRED REMOTE BREAKER CONTROL (VIA MAIN ON TEST AND SIS SELECTION).

BREAKER FAIL LOGIC (51BF)
THE FUNCTION IS ONLY ENABLED WHEN THE TNS SWITCH IS SET TO 'MAIN ON TEST' (AND BACK-UP ON TEST). THERE IS NO TELEPROTECTION LINKED TO THIS OUTPUT AND THE BREAKER FAIL OUTPUT IS ALSO ISOLATED VIA THE BFIS SWITCH. THE BF TRIP PULSE OUTPUT IS SET TO 200ms.

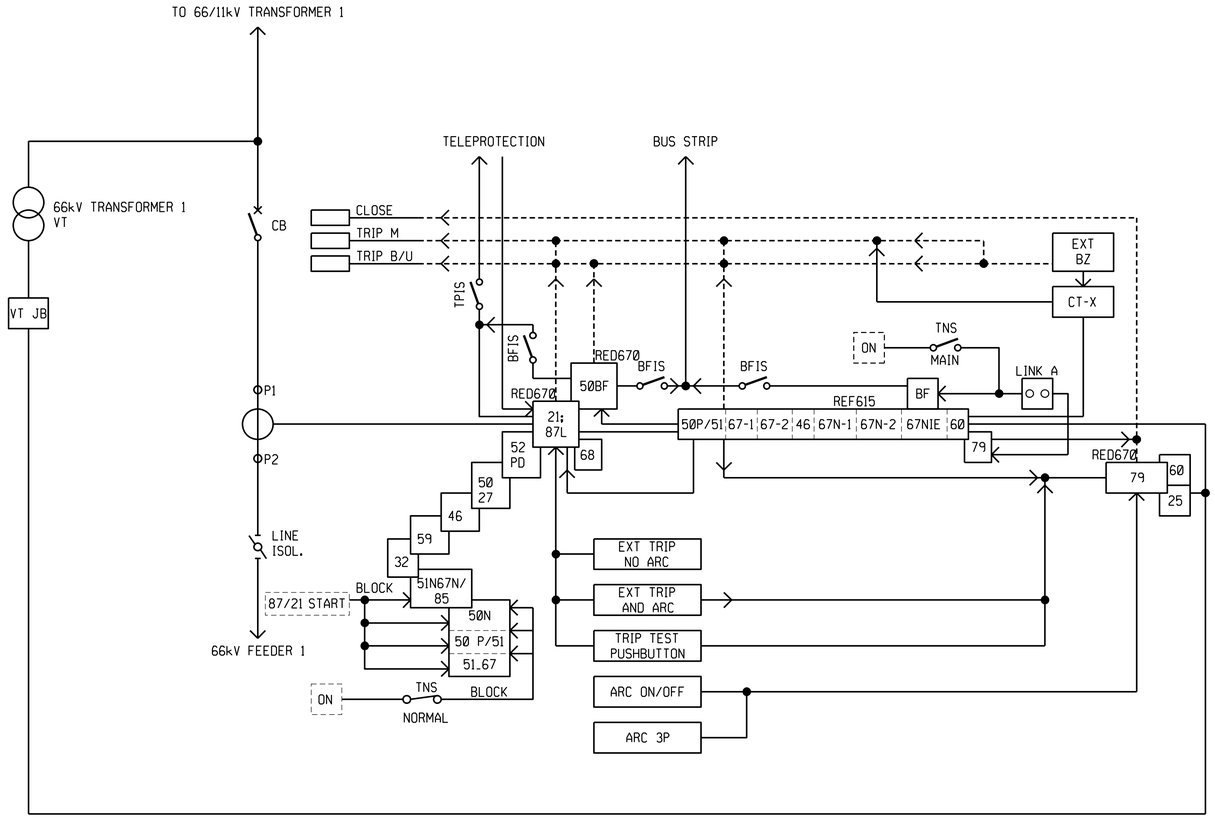
AUTORECLOSE (DARREC1(79))
THE RELAY INCLUDES ARC FUNCTIONALITY. THE FUNCTION IS MASKED SUCH THAT IT IS ENABLED WHEN THE TNS SWITCH IS SET TO 'MAIN ON TEST' (AND BACK-UP ON TEST). HOWEVER, DUE TO LIMITATIONS, BACK-UP RELAY INTERNAL ARC ON/OFF IS NOT SELECTABLE VIA SUPERVISORY OR FROM THE OPERATOR PANEL. THE FUNCTION CAN BE SET ON/OFF VIA EITHER ALTERNATIVE SETTING SELECTION OR MANUALY AND SHOULD ONLY BE USED IN LONG TERM EMERGENCIES.
NOTE THAT THE FUNCTION IS AUTOMATICALLY INHIBITED FOR A MANUAL CLOSE.

2ND HARMONIC INRUSH DETECTION FUNCTIONALITY
THE INRUSH DETECTION FUNCTION, INRPHAR1, IS MASKED TO BLOCK THE FOLLOWING FUNCTIONS WHEN OPERATED:
DIR_OC1 (67-1(1)), DIR HighSetOC (67-2), NonDir InstOC (50P/51), AND IS MASKED TO ENABLE THE DIR_OC2 (67-1(2)) FUNCTION'S MULTIPLIER.

CB CLOSED MULTIPLIER (TPGAPC1 GENERIC TIMER, DEFAULT TIME = 500ms):
TP GAPC1 IS MASKED TO THE FOLLOWING FUNCTIONS TO ENABLE THE MULTIPLIER WHEN THE BREAKER CLOSES IF REQUIRED:
DIR HighSetOC (67-2), NonDIR InstOC (50P/51), SEF DIR EF2 (67N-1), DEF HighSet (67N-2), NonDIR_InstEF (51N-2), NegSeq_OC1/2 (46(1/2)).

THERMAL OVERLOAD (ThermOVLD (49F))
THE FUNCTION HAS BEEN MASKED FOR INDICATION AND NOT TRIP PURPOSES. HOWEVER, THE BLOCK BREAKER CLOSE FOR TEMPERATURE EXCEED HAS BEEN MASKED.
TO CIRCUMVENT THE BLOCK CLOSE FUNCTIONALITY, SET THE RECLOSE TEMPERATURE TO MAXIMUM OR SET THE FUNCTION OFF.

BROKEN CONDUCTOR ((46PD) OVERVOLTAGE 3PH O/V (59)), UNDERVOLTAGE 3PH U/V (27), PosSeq-U/V (47U), NegSeq-O/V (47O)
THESE FUNCTIONS HAVE BEEN MASKED FOR ALARMING PURPOSES ONLY. HOWEVER, THE OPERATION OF THE FUNCTIONS WOULD INHIBIT THE INTERNAL ARC FUNCTION (ENABLED VIA TNS OFF NORMAL).



LEGEND	
21	DISTANCE PROTECTION FUNCTION
25	SYNCHRONISM-CHECK FUNCTION
27	UNDERVOLTAGE FUNCTION
32	DIRECTIONAL OVERPOWER FUNCTION
46	NEGATIVE SEQUENCE OVERCURRENT/ BROKEN COND FUNCTIONS
50BF	BREAKER FAIL FUNCTION
50N	NON-DIR INSTANTANEOUS EARTHFAULT FUNCTION
50/51	INSTANTANEOUS OR TIME DELAY OVERCURRENT FUNCTION
50P/51	NON-DIR INSTANTANEOUS OVERCURRENT FUNCTION
51	AC INVERSE TIME O/C FUNCTION
52PD	POLE DISAGREEMENT PROTECTION FUNCTION
59	OVERVOLTAGE FUNCTION FUNCTION
60	FUSE FAILURE FUNCTION
67-1	DIR OVERCURRENT IDMT OR DT FUNCTION
67-2	DIR HIGHSET OVERCURRENT FUNCTION
67N-1	DIRECT EARTHFAULT IDMT OR DT FUNCTION
67N-2	DIR HIGHSET EARTHFAULT FUNCTION
67NIE	INTERMITANT EARTHFAULT FUNCTION
68	POWERSWING FUNCTION
79	AUTO RECLOSE FUNCTION
85	EARTH FAULT FUNCTION AIDED
87L	LINE DIFFERENTIAL PROTECTION FUNCTION
AUX	AUXILIARY
BCD	BINARY CODED DECIMAL
BZ	BUSZONE

LEGEND	
CT-X	CROSS TRIP AUXILIARY
DIR	DIRECTIONAL
DT	DEFINITE TIME
DTTR	DIRECT TRANSFER TRIP RECIEVE
DTTS	DIRECT TRANSFER TRIP SEND
GPS	GLOBAL POSITIONING SYSTEM
GSM	GPS TIME SYNCHRONISATION MODULE
LDCM	LINE DATA COMMUNICATION MODULE (TELEPROTECTION AND DIFFERENTIAL COMMUNICATION)
LSB/MSB	LEAST SIGNIFICANT BIT /MOST SIGNIFICANT BIT
LSB	LEAST SIGNIFICANT BIT
MSB	MOST SIGNIFICANT BIT
OEM	OPTICAL ETHERNET MODULE
PCM600	CONFIGURATION, PARAMETER SETTING & DISTURBANCE HANDLING ENGINEERING TOOL PACKAGE FOR ABB RELION SERIES
PS	PARAMETER SETTING TOOL WITHIN PCM600
REA	REMOTE ENGINEERING ACCESS
SLM	SERIAL COMMUNICATION MODULE LON AND SPA BUS
SYNCH	CHECK SYNCHRONISM OR SYNCHRONISM-CHECK
TCS	TRIP CIRCUIT SUPERVISION (MONITOR)
TP	TEST POINT
TRIP B/U	TRIP BACKUP CIRCUIT BREAKER COIL
TRIP M	TRIP MAIN CIRCUIT BREAKER COIL
VSR	VOLTAGE SELECTION RELAY

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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10

SCALE

ISCOR SUBSTATION
66kV FEEDER 1
LOGIC DIAGRAM

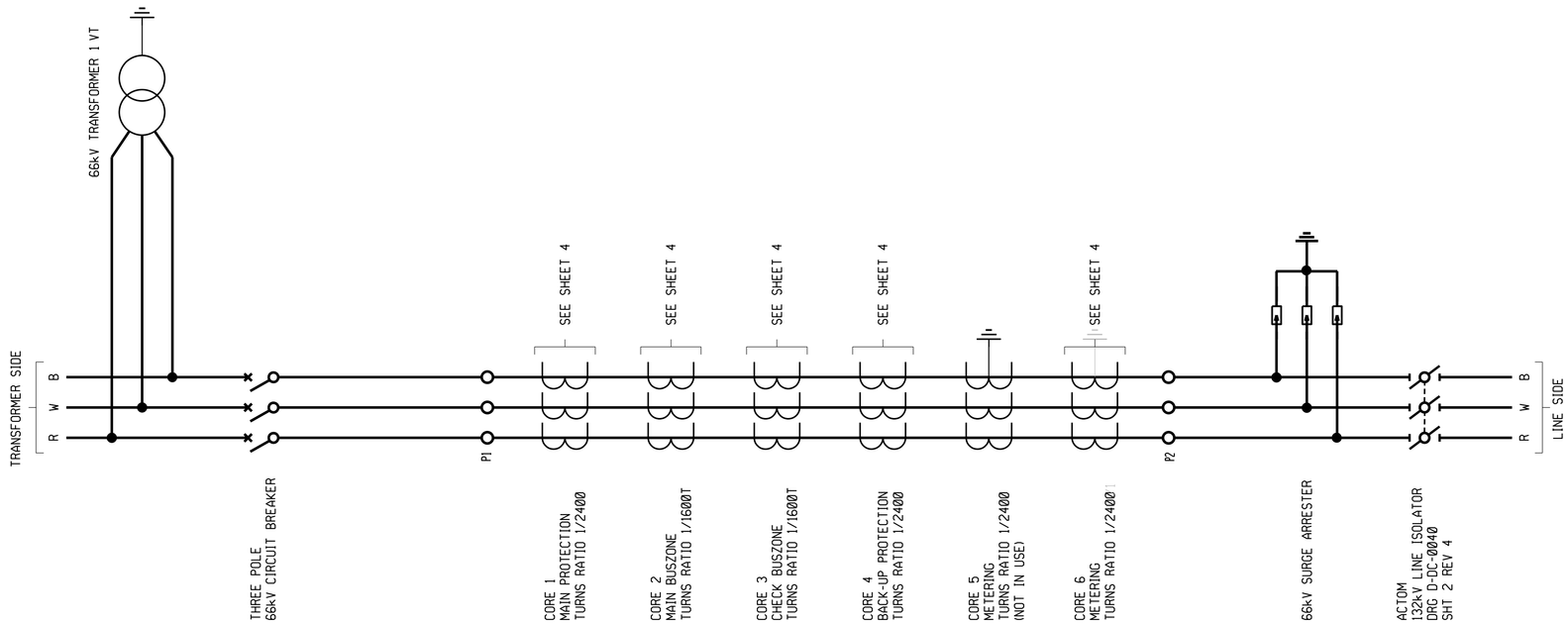
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	02	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 02 OF 28 REVISION 2

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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ISCOR SUBSTATION
66kV FEEDER 1
SINGLE LINE DIAGRAM

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DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

DRG NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	03	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 03 OF 28 REVISION=2

	TERMINAL DESCRIPTION
CT	CURRENT TRANSFORMER
CTJB	CURRENT TRANSFORMER JUNCTION BOX
RP	RELAY PANEL TERMINAL

NOTES:

1. IF THE FEEDER HAS OUTBOARD PRIMARY PLANT BYPASS CAPABILITY THEN SWITCH ON DRAWING LEVEL 18 (I.E. THE CT SHORTING OPTION IS TO THEN BE ORDERED AND USED).
2. AN EXTERNAL DISTURBANCE RECORDER MAY BE CONNECTED HERE IF NO DISTURBANCE RECORDER CT CORE IS AVAILABLE.
3. THE BACK-UP IED FEATURES AN AUTOMATIC CT SHORT-CIRCUIT CONNECTOR WHEN THE PLUG-IN UNIT IS WITHDRAWN.
4. FOR THE CASE OF DOUBLE CIRCUIT LINES WITH REGARD TO THE FAULT LOCATOR ACCURACY, THE INFLUENCE OF THE ZERO-SEQUENCE MUTUAL IMPEDANCE IS COMPENSATED FOR BY CONSIDERING THE RESIDUAL CURRENT ON THE PARALLEL LINE. FOR THIS CASE, USE THESE RELAY CT INPUTS.
5. PULLING CTTB-M WILL ALSO REMOVE THE REF 615 FROM SERVICE. IN THE EVENT THAT THE MAIN IED NEEDS TO BE REMOVED FROM SERVICE, RETURN CTTB-M TO SERVICE AND INSTALL JUMPERS.

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DATE 25/06/21	DATE 13/12/10
DRAWN BY K. STEYNBERG	DRAWN BY C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
AC KEY DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	04	1

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 04 OF 28 REVISION 2

LINE VOLTS
(LINE VT JB)
(NOT USED)

LVT X1.7 — G91 — RP X1.43 — G91
LVT X1.8 — G92 — RP X1.44 — G92

F2.3.5 MCB(VT-SC) 2A
G91: 1 — 2 — G93 (WHITE)
G92: 3 — 4 — G94 (NEUTRAL/BLUE)

F3.1 RED670
X401 19: A110 — SYNCHRONISING CHECK VOLTAGE (NOTE 3) (NOTE 4)
X401 20
X401 21: A111 — DIRECTIONAL EARTH FAULT FUNCTION (INTERNALLY DERIVED)
X401 22

F2.1 REF615
X130 17: U0 — DIRECTIONALITY (ZERO SEQUENCE) VOLTAGE INPUT (INTERNALLY DERIVED)
X130 18

NOTE:

1. ALL OPTIONS ARE WIRED IN, ONLY THE OPTIONAL RELAYS NEED TO BE INSERTED TO SELECT THE SPECIFIC OPTION.
2. RELAY VSR WITH ASSOCIATED WIRING IS ONLY REQUIRED WHEN THE MULTIPLE BUSBAR OPTION IS TAKEN.

   IF THE MULTIPLE BUSBAR OPTION IS NOT TAKEN, THE VT's ARE TO BE CONNECTED AS FOLLOWS :-

   MEASUREMENTS - X1.31, X1.32, X1.33 AND X1.34
   PROTECTION - X1.19, X1.20, X1.21 AND X1.22

   ADD LOOPS FROM X1.19 TO X1.27
   X1.20 TO X1.28
   X1.21 TO X1.29
   } PROTECTION VT CIRCUIT

   AND X1.31 TO X1.39
   X1.32 TO X1.40
   X1.33 TO X1.61
   } MEASUREMENTS VT CIRCUIT
3. SELECT THE PREFERED VOLTAGE FOR THE SYNCHRONISING CHECK OPTION. THE RELAY CAN USE THE FOLLOWING VOLTAGES: R-N, W-N, B-N, R-W, W-B, B-R.
4. THE IMPEDANCE VOLTS ARE DESIGNATED THE "BUS" VOLTS AND THE SYNCH CHECK VOLTS ARE DESIGNATED THE "LINE" VOLTS WITHIN THE ABB RED670 RELAY. THIS IS IDENTICAL TO THE DISTRIBUTION STANDARD OF "BUS" VOLTS AND "LINE" VOLTS, AS DEPICTED ON SHEETS 3 AND 5.

F4.24 VTTB-BU — F2.3.3 MCB(VT-BU) 2A
E11: 8 — 7 — E12 — 1 — 2 — E13 → F2.1 REF615 X130 11: U1 R — 12
E31: 6 — 5 — E32 — 3 — 4 — E33 → F2.1 REF615 X130 13: U2 W — 14 — DIRECTIONALITY WHITE VOLTAGE INPUT
E51: 4 — 3 — E52 — 5 — 6 — E53 → F2.1 REF615 X130 15: U3 B — 16 — DIRECTIONALITY BLUE VOLTAGE INPUT
E70: 2 — 1 — E72 → F2.1 REF615 X130 18
F2.1 REF615 X130 11: U1 R — 12 — DIRECTIONALITY RED VOLTAGE INPUT

F4.23 VTTB-M — F2.3.1 MCB(VT-M) 2A
E11: 8 — 7 — E111 — 1 — 2 — E112 → F3.1 RED670 X401 13: A107 R — 14 — IMPEDANCE VT AND RUNNING VOLTS (NOTE 4)
E31: 6 — 5 — E131 — 3 — 4 — E132 → F3.1 RED670 X401 15: A108 W — 16
E51: 4 — 3 — E151 — 5 — 6 — E152 → F3.1 RED670 X401 17: A109 B — 18
E70: 2 — 1 — E172 → F3.1 RED670 X401 19

FROM 66kV TRANSFORMER 1 VTJB 1 SEE DWC-7104 SET 48 SHT 03

NOT INSTALLED
R1.1 VSR-1

E11AA — RP X1.19 — 113 — 114 — E11 — RP X1.27
E31AA — RP X1.20 — 115 — 116 — E31 — RP X1.28
E51AA — RP X1.21 — 213 — 214 — E51 — RP X1.29
E70AA — RP X1.22 — 223 — 224 — E70 — RP X1.30
E212AA — X1.31 — 227 — 228 — E212
E232AA — X1.32 — 225 — 226 — E232
E252AA — X1.33 — 223 — 224 — E252
E272AA — E372 — X1.34 — 223 — 224 — E372

RP X2.1
RP X2.2
RP X2.3
RP X2.4

NOT INSTALLED
R1.2 VSR-2

(NOT USED)
RP X1.23 — 113 — 114 — E11
RP X1.24 — 115 — 116 — E31
X1.25 — 213 — 214 — E51
X1.26 — 223 — 224 — E70
X1.35 — 227 — 228 — E212
X1.36 — 225 — 226 — E232
X1.37 — 223 — 224 — E252
E372 — X1.38 — 223 — 224 — E372

E212 — RP X2.39
E232 — X2.40
E252 — X2.61
E372 — X2.42
(NOT USED)

R4.X5.2 MCB(VT-T) 2A
E212 — X1.39 — E212A: 1 — 2
E232 — X1.40 — E232A: 3 — 4
E252 — X1.61 — E252A: 5 — 6
(NOT USED)

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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DRAWN BY	DRAWN BY
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ISCOR SUBSTATION
66kV FEEDER 1
VT SUPPLY KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	05	1

PANEL TYPE DESIGNATION 4FZD-3920

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LEVELS 1 2 5 10 11 12 21 25 28

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 05 OF 28 REVISION 2

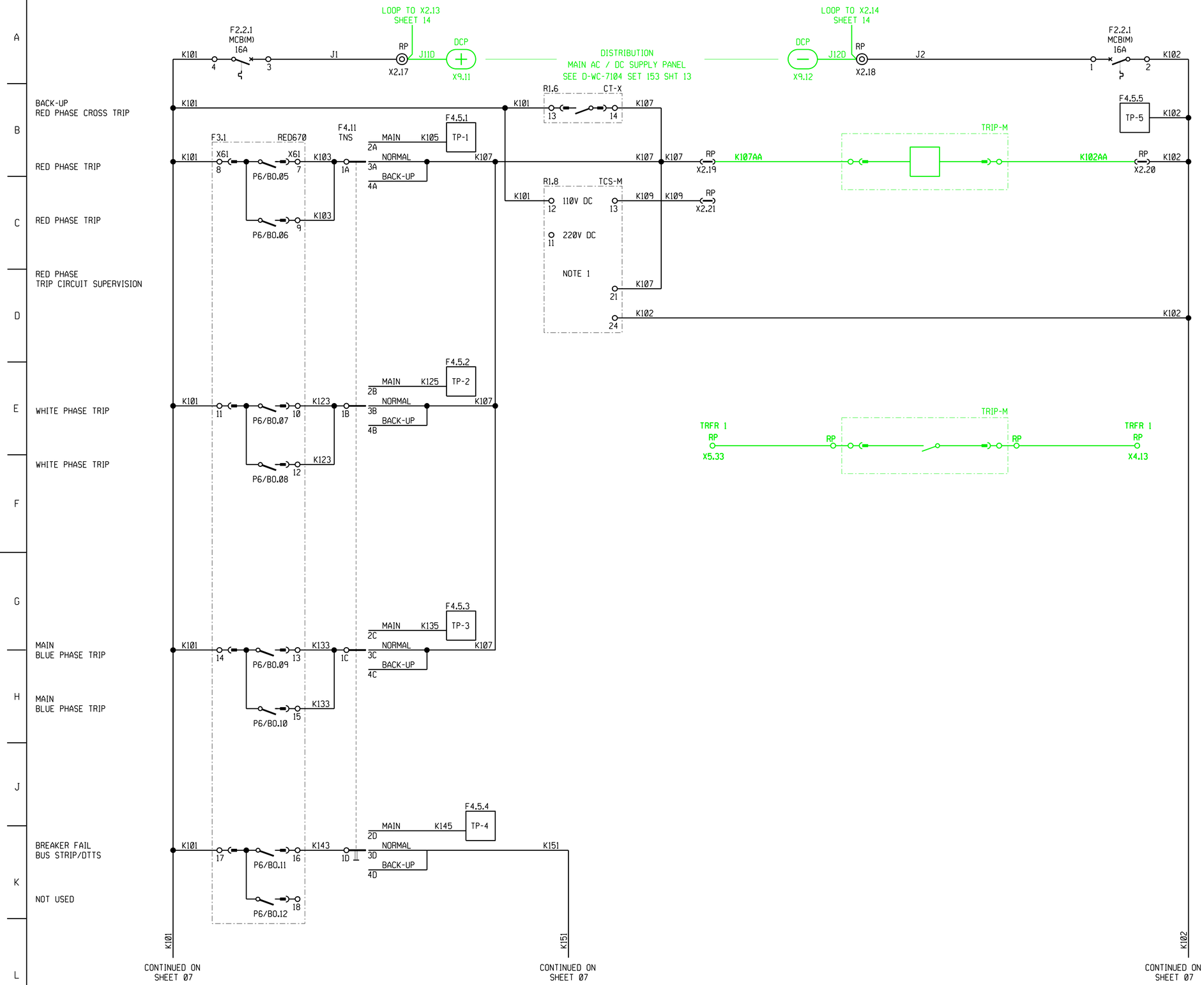

ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

NOTE:

1. REMOVE TCS-M TRIP CIRCUIT SUPERVISION RELAY IN ORDER TO PREVENT TCS FAIL ALARM. CIRCUIT BREAKER HEALTH IS MONITORED BY THE TRANSFORMER PROTECTION.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
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DRG No.	REFERENCE DRAWINGS:

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1	66kV VT & CB ADDED.FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

AECOM
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REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
MAIN DC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	06	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 06 OF 28 REVISION 2

CONTINUED FROM SHEET 06

CIRCUIT BREAKER FAILURE
SEE D-WC-7104-SET 81 SHT 17

CONTINUED FROM SHEET 06

CONTINUED FROM SHEET 06

EXTERNAL DIRECT INTERTRIP SEND

BACK-UP OVERCURRENT AND EARTH FAULT TRIP (HIGH SET) NOTE 3

BACK-UP OVERCURRENT TRIP (IDMT/DT) NOTE 3

BACK-UP EARTH FAULT TRIP (IDMT/DT) NOTE 3

BUSZONE TRIP

CIRCUIT BREAKER CLOSED

CIRCUIT BREAKER OPEN

PROTECTION NOT HEALTHY AUXILIARY 1

SETTING GROUP 2 EXTERNAL CONTROL

SETTING GROUP 3 EXTERNAL CONTROL

BACK-UP PROTECTION FAIL-SELF CHECK

BACK-UP PROTECTION VT FUSE FAIL

DC FAIL BACK-UP

MAIN PROTECTION MAIN IED POWER SUPPLY

• CHECK MANUFACTURER'S DRAWINGS

DIRECT INTERTRIP SEND TO REMOTE END (BLOCKED VIA BFIS OR TPIS SET OFF)

BACK-UP IED THREE PHASE TRIP, BREAKER FAIL INITIATE AND START AUTO RECLOSE NOTE 2

BACK-UP IED THREE PHASE TRIP, BREAKER FAIL INITIATE AND NO AUTO RECLOSE

CROSS TRIP AUXILIARY

EXTERNAL BUSZONE TRIP, BREAKER FAIL INITIATE AND NO CLOSE

EXTERNAL BUSZONE TRIP, BREAKER FAIL INITIATE AND NO CLOSE

CONTINUED ON SHEET 08

CONTINUED ON SHEET 08

NOTE:

1. CONNECT RELAY PANEL TERMINALS AS REQUIRED FOR INITIATION OF AUTO RECLOSE.
2. FOR RED670 IMPEDANCE FUNCTION, ZONE 2 INITIATED AUTO-RECLOSE SET GATE 12 TO 'ON' (DEFAULT = 'OFF').
3. THESE OUTPUTS OF THE BACK-UP IED (REF615) ARE MASKED/ SET TO 'NON-LATCHED'.

ABB 132kV THREE POLE BREAKER LEGEND

ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
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DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
MAIN DC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	07	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 07 OF 28 REVISION 2

CONTINUED FROM SHEET 07

CONTINUED FROM SHEET 07

DC FAIL MAIN

K101 — R3R.1 (DCF-M) 2 — 10 — K102

K101 — R1.7 (NOT INSTALLED) PSU 116 / 118 — K102

NOTE 1

K201 X3.1 — 126 / 128 48V DC / 117 — 90

K202 X3.2

POWER LINE CARRIER OR NSD570 EXTERNAL TELEPROTECTION OR SIMILAR ITEM

X21 INTERNAL COMMUNICATION/TELEPROTECTION (NOT USED)

NOTE 4 F4.13 TPIS — K201 1A — OFF 2A — ON 3A — K205

NOTE 4 F4.13 TPIS — K204 ON 3B — OFF 2B — 1B K202

F3.1 RED670

PERMISSIVE INTERTRIP RECEIVED — K205 — RP X3.3 — RP X3.4 — K209 — X72 9 — PERM INT REC — P7/BI-13 — X72 10 — K204

DIRECT INTERTRIP RECEIVED — K205 — RP X3.5 — RP X3.6 — K211 — X72 11 — DTTR — P7/BI-14 — X72 12 — K204

CARRIER GUARD SIGNAL ON
NOTE 3 — K205 — RP X3.7 — RP X3.8 — K213 — X72 13 — CG SIGNAL — P7/BI-15 — X72 14 — K204

DIRECTIONAL EARTH - FAULT RECEIVED (NOT USED) — K205 — RP X3.9 — RP X3.10 — K215 — X72 15 — DEF RX — P7/BI-16 — X72 16 — K204

F3.1 RED670

PERMISSIVE INTERTRIP SEND — K205 — X62 14 — TX — P6/BO-21 — X62 13 — K217 — RP X3.11

DIRECT INTERTRIP SEND — DTTS — P6/BO-22 — 15 — K219 — RP X3.13

DIRECTIONAL EARTH FAULT SEND (NOT USED) — K205 — X62 17 — DEF_TX — P6/BO-23 — X62 16 — K221 — RP X3.15

NOT USED (DEF_TX TEST OUTPUT) — DEF_TX — P6/BO-24 — 18

RP X3.12 — K204

RP X3.14 — K204

RP X3.16 — K204

FIBRE INTERNAL COMMUNICATION/TELEPROTECTION AND/ OR DIFFERENTIAL

TO TELE-COMMS PANEL — FIBRE RX — FIBRE TX

F3.1 RED670 X312 LDCM1 P31:2 — A FIBRE — B MAIN

F3.1 RED670 X313 LDCM2 P31:3 — A FIBRE — B THREE TERMINAL DIFF OPTION WITH NO TIMING OR WITH EXTERNAL IRIG-B GPS TIMING — NOTE 5

CAUTION:

TREAT FIBRE AS LIVE.
LAZER LIGHT COULD DAMAGE YOUR EYES.
DO NOT LOOK INTO THE END.

NOTE:

1. THE 110/48 VOLT DC/DC CONVERTER IS OPTIONAL. THE SUBSTATION 48 VOLT DC SUPPLY CAN BE USED IF AVAILABLE.
2. NO GROUND - LEAVE CONNECTOR WITHOUT ANY CONNECTION
   DIRECT GROUND - CONNECT PIN 2 DIRECTLY TO EARTH
   SOFT GROUND - CONNECT PIN 1 TO PIN 2
3. SET GATE 1 IN SETTINGS TO 'ON' TO ENABLE INTERNAL COMMUNICATION/ TELEPROTECTION FAIL LOGIC ('ON' IS THE DEFAULT). SET GATE 1 TO 'OFF' IF THE EXTERNAL CARRIER GUARD IS USED OR IF THE INT. COMM/TELEPROTECTION CARD IS NOT USED.
4. REMOTE DIFF ISOLATION:
   SIMULTANEOUSLY SWITCH THE LOCAL & REMOTE TPIS SWITCHES TO 'OFF', ALTERNATIVELY, REMOVE THE TX & RX FIBRES FROM ONE IED.
5. THE INTERNAL GPS TIMING CARD (OPTIONAL) USES SLOT P31:3 X313. THE EXTERNAL GPS TIMING INPUT CARD (OPTIONAL) USES SLOT P30:2 X302. DEPENDANT ON IF ONE OF THE ABOVE CARDS ARE ORDERED, THE THREE TERMINAL DIFF COMMUNICATION CARD (OPTIONAL), WOULD BE PLACED IN THE UNUSED SLOT (i.e. SLOT P31:3 X313 OR P30:2 X302). IF NEITHER TIMING CARD IS ORDERED BUT THE THREE TERMINAL DIFF COMMUNICATION CARD IS ORDERED, IT WILL BE PLACED IN SLOT P31:3 X313.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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SCALE

Eskom

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K. STEYNBERG	C. CONNON
DATE 25/06/21	DATE 26/02/10

ISCOR SUBSTATION
66kV FEEDER 1
TELEPROTECTION DC KEY DIAGRAM

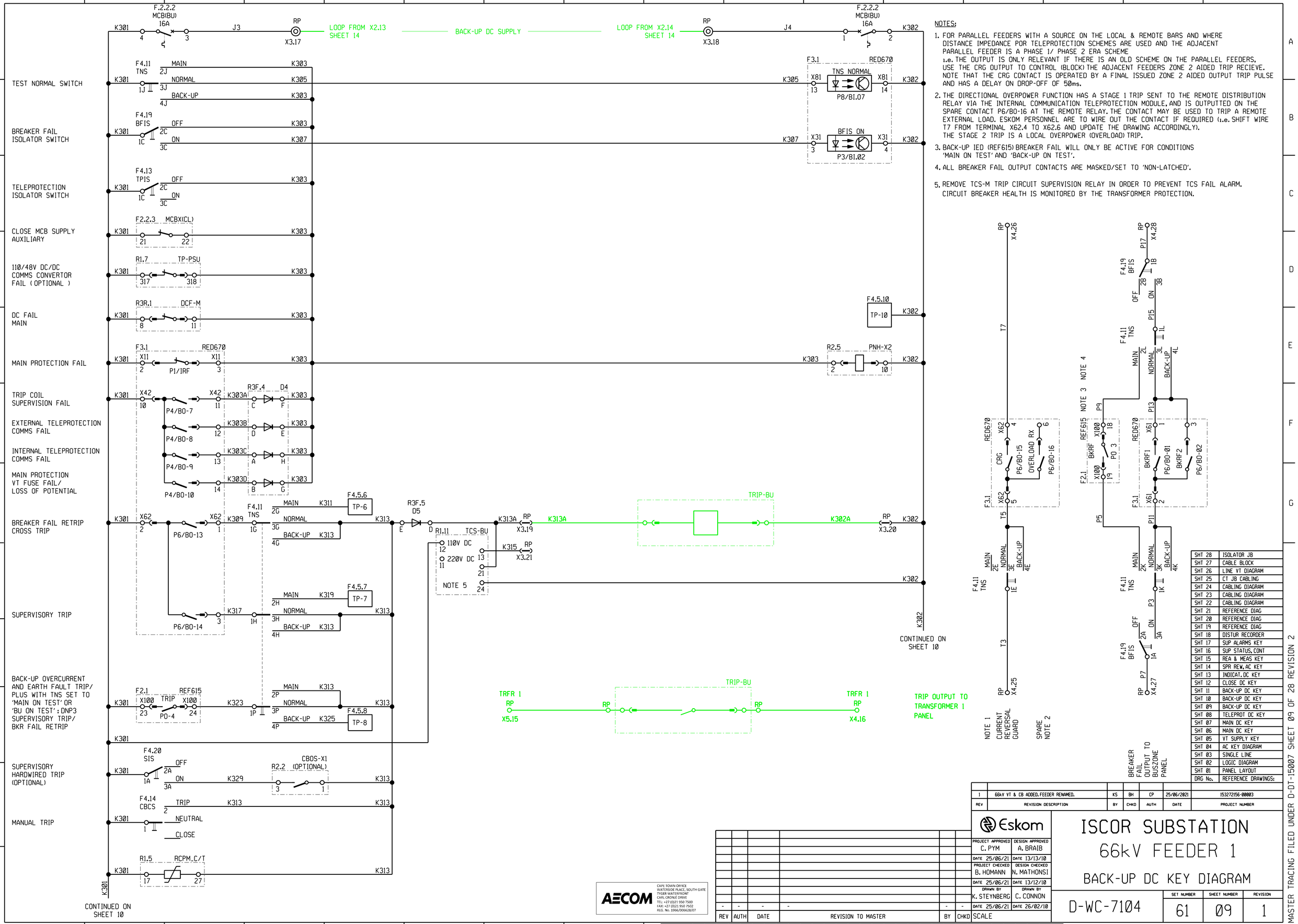
D-WC-7104 | SET NUMBER 61 | SHEET NUMBER 08 | REVISION 0

LEVELS 1 2 4 5 10 11 12 20 21 22 25 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 08 OF 28 REVISION 2



NOTES:

1. FOR PARALLEL FEEDERS WITH A SOURCE ON THE LOCAL & REMOTE BARS AND WHERE DISTANCE IMPEDANCE POR TELEPROTECTION SCHEMES ARE USED AND THE ADJACENT PARALLEL FEEDER IS A PHASE 1/ PHASE 2 ERA SCHEME
   i.e. THE OUTPUT IS ONLY RELEVANT IF THERE IS AN OLD SCHEME ON THE PARALLEL FEEDERS. USE THE CRG OUTPUT TO CONTROL (BLOCK) THE ADJACENT FEEDERS ZONE 2 AIDED TRIP RECIEVE. NOTE THAT THE CRG CONTACT IS OPERATED BY A FINAL ISSUED ZONE 2 AIDED OUTPUT TRIP PULSE AND HAS A DELAY ON DROP-OFF OF 50ms.
2. THE DIRECTIONAL OVERPOWER FUNCTION HAS A STAGE 1 TRIP SENT TO THE REMOTE DISTRIBUTION RELAY VIA THE INTERNAL COMMUNICATION TELEPROTECTION MODULE, AND IS OUTPUTTED ON THE SPARE CONTACT P6/BO-16 AT THE REMOTE RELAY. THE CONTACT MAY BE USED TO TRIP A REMOTE EXTERNAL LOAD. ESKOM PERSONNEL ARE TO WIRE OUT THE CONTACT IF REQUIRED (i.e. SHIFT WIRE T7 FROM TERMINAL X62.4 TO X62.6 AND UPDATE THE DRAWING ACCORDINGLY).
   THE STAGE 2 TRIP IS A LOCAL OVERPOWER (OVERLOAD) TRIP.
3. BACK-UP IED (REF615) BREAKER FAIL WILL ONLY BE ACTIVE FOR CONDITIONS 'MAIN ON TEST' AND 'BACK-UP ON TEST'.
4. ALL BREAKER FAIL OUTPUT CONTACTS ARE MASKED/SET TO 'NON-LATCHED'.
5. REMOVE TCS-M TRIP CIRCUIT SUPERVISION RELAY IN ORDER TO PREVENT TCS FAIL ALARM. CIRCUIT BREAKER HEALTH IS MONITORED BY THE TRANSFORMER PROTECTION.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
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SHT 07	MAIN DC KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
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SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
BACK-UP DC KEY DIAGRAM

DRG NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	09	1

PANEL TYPE DESIGNATION 4FZD-3920

LEVELS 1 5 10 11 12 20 21 22 28

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 09 OF 28 REVISION 2

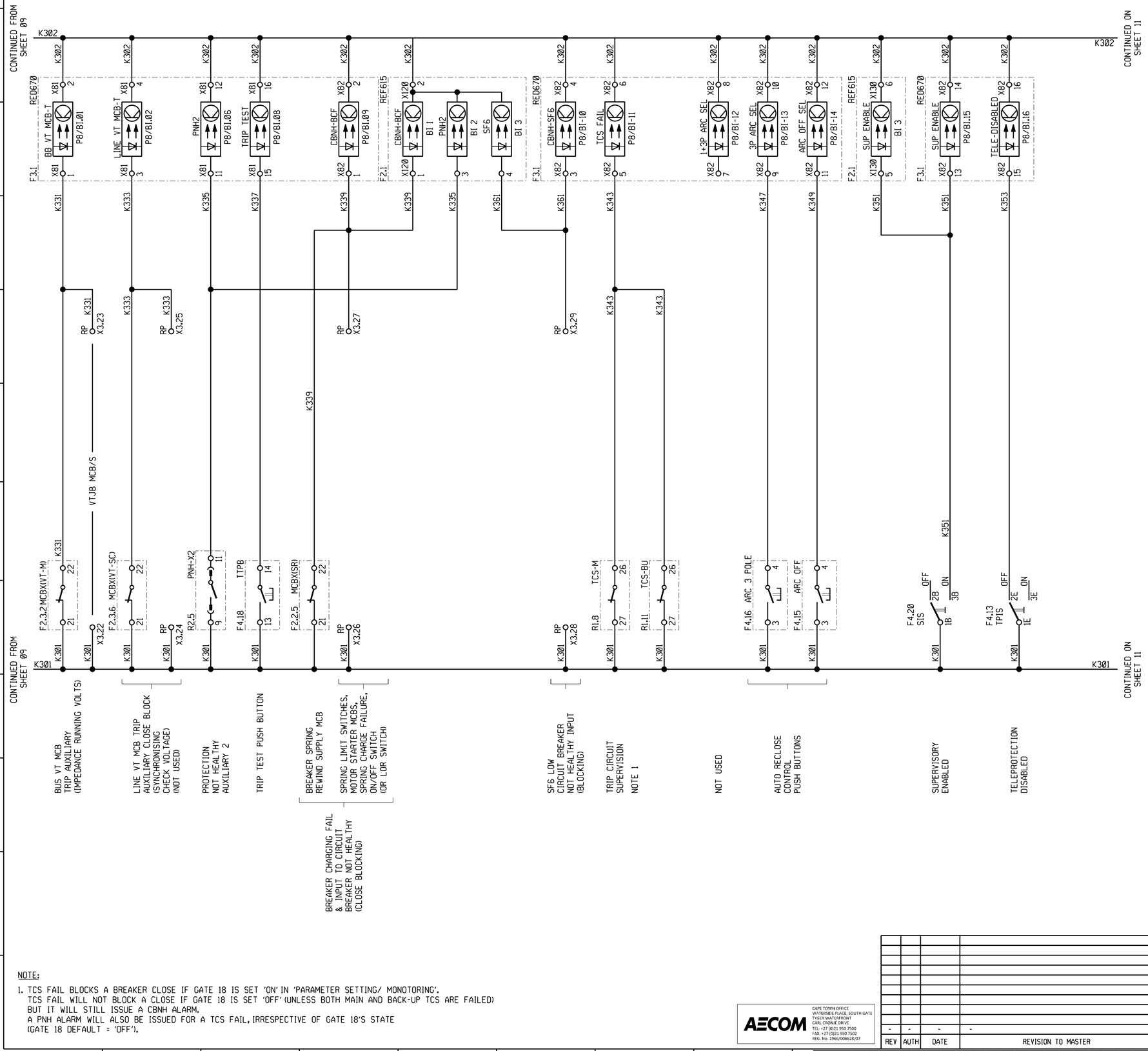

ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

NOTE:

1. TCS FAIL BLOCKS A BREAKER CLOSE IF GATE 18 IS SET 'ON' IN 'PARAMETER SETTING/ MONOTORING'.
   TCS FAIL WILL NOT BLOCK A CLOSE IF GATE 18 IS SET 'OFF' (UNLESS BOTH MAIN AND BACK-UP TCS ARE FAILED) BUT IT WILL STILL ISSUE A CBNH ALARM.
   A PNH ALARM WILL ALSO BE ISSUED FOR A TCS FAIL, IRRESPECTIVE OF GATE 18'S STATE (GATE 18 DEFAULT = 'OFF').

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
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SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
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ISCOR SUBSTATION
66kV FEEDER 1
BACK-UP DC KEY DIAGRAM

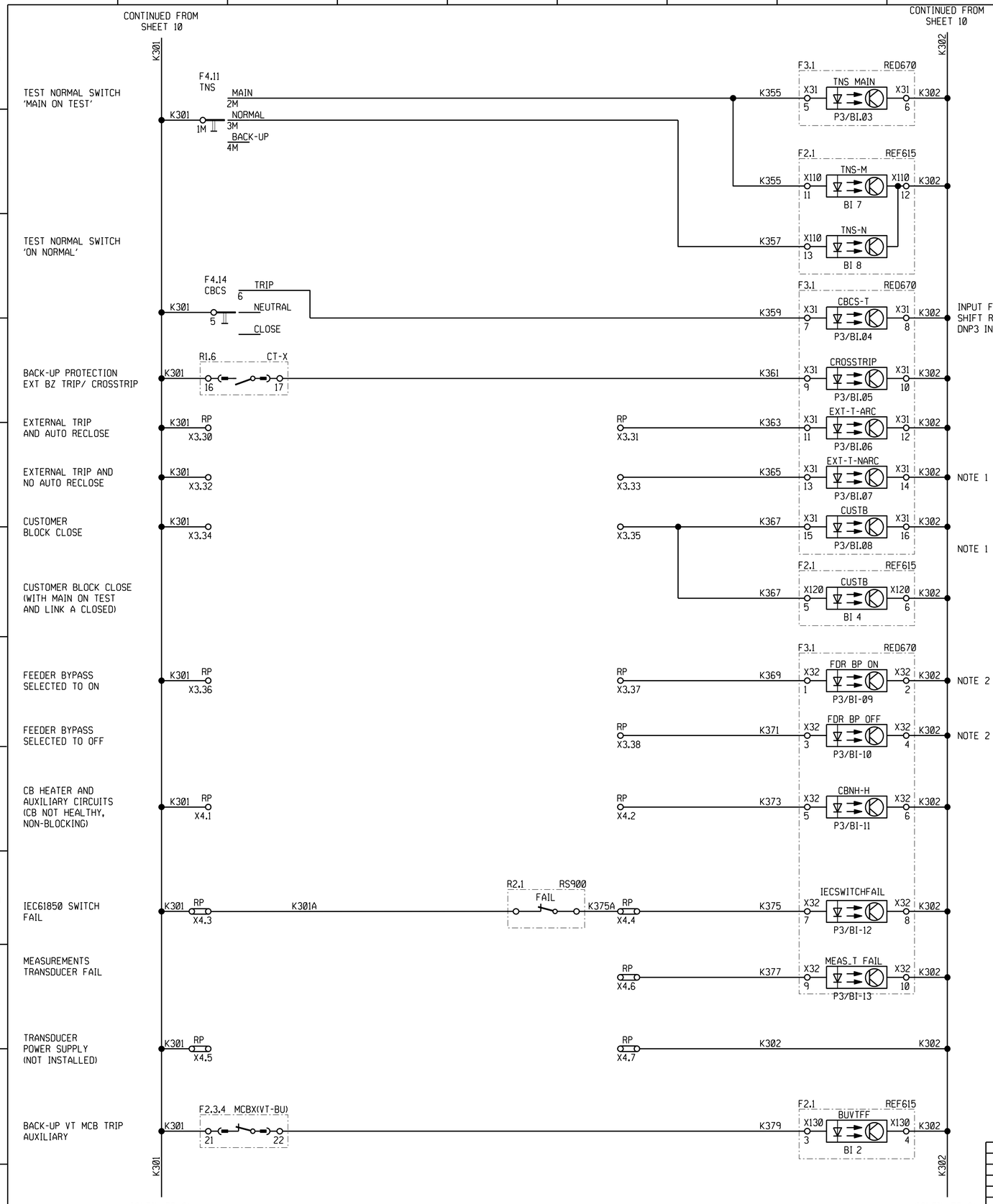
DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	10	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 10 OF 28 REVISION 2



NOTE:

1. A PERMANENT INPUT IS REQUIRED TO BLOCK AN EXTERNAL CLOSE.
2. THIS BYPASS LOGIC IS USED FOR THE SUPERVISORY DNP3 STATUS, THE HMI DISPLAY AND THE AUTOMATED REMOTE ARC BYPASS AND DIFF OUT OF SERVICE SELECTION LOGIC. NOTE THAT A 'G' ISOLATOR CONTACT MUST BE USED FOR THE 'ON' SELECTION AND A 'N' ISOLATOR CONTACT MUST BE USED FOR THE 'OFF' SELECTION.

ABB 132kV THREE POLE BREAKER LEGEND	
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ISCOR SUBSTATION
66kV FEEDER 1
BACK-UP DC KEY DIAGRAM

D-WC-7104

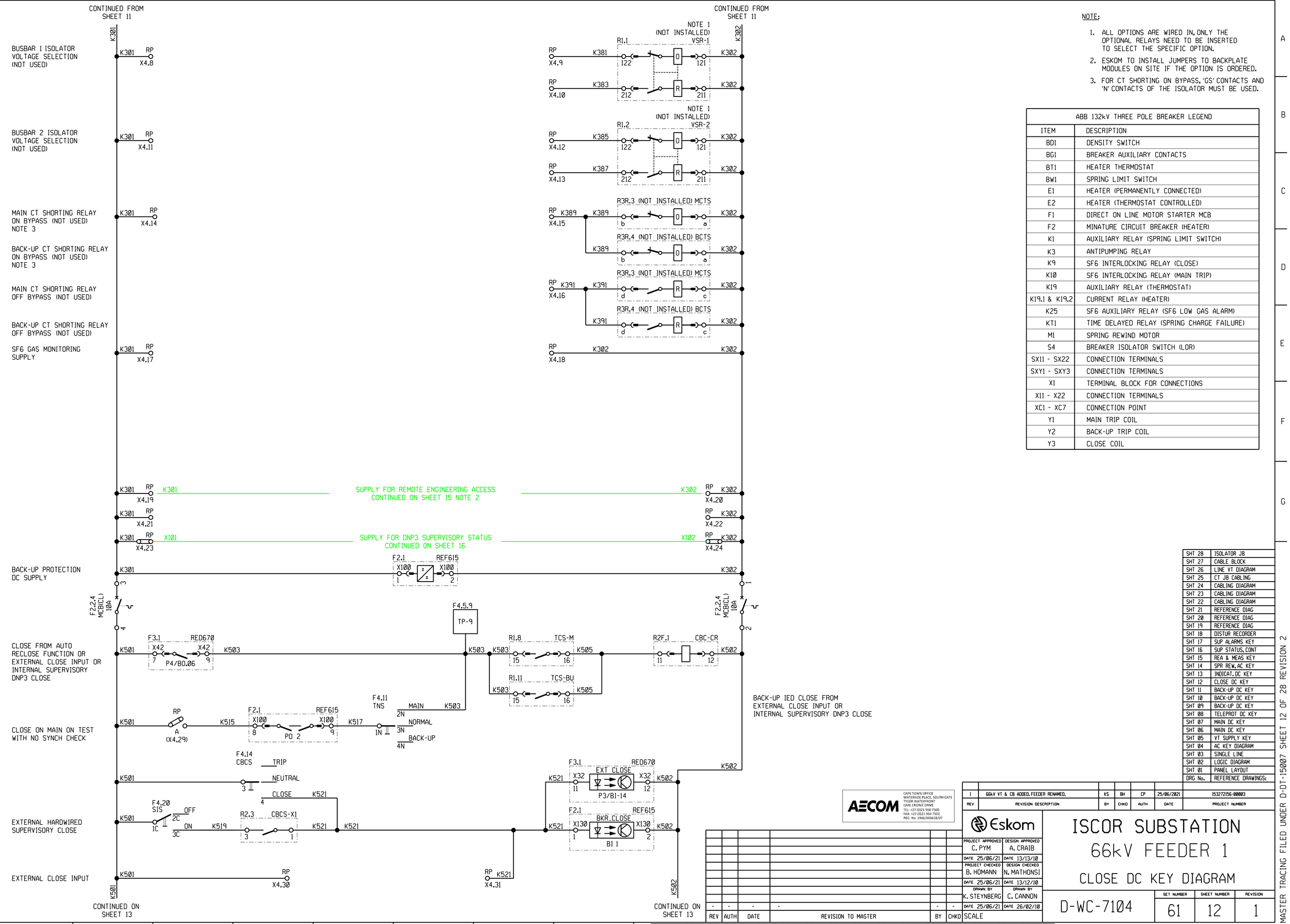
SET NUMBER	SHEET NUMBER	REVISION
61	11	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1

LEVELS 1 2 5 10 11 12 21 22 28

MASTER TRACING FILED UNDER D-DT-15007 SHEET 11 OF 28 REVISION 2



NOTE:

1. ALL OPTIONS ARE WIRED IN, ONLY THE OPTIONAL RELAYS NEED TO BE INSERTED TO SELECT THE SPECIFIC OPTION.
2. ESKOM TO INSTALL JUMPERS TO BACKPLATE MODULES ON SITE IF THE OPTION IS ORDERED.
3. FOR CT SHORTING ON BYPASS, 'GS' CONTACTS AND 'N' CONTACTS OF THE ISOLATOR MUST BE USED.

ABB 132kV THREE POLE BREAKER LEGEND

ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS.CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW.AC KEY
SHT 13	INDICAT.DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED.FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

AECOM
CAPE TOWN OFFICE
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TYGER WATERFRONT
CARL CRONJÉ DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
CLOSE DC KEY DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	12	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 12 OF 28 REVISION 2

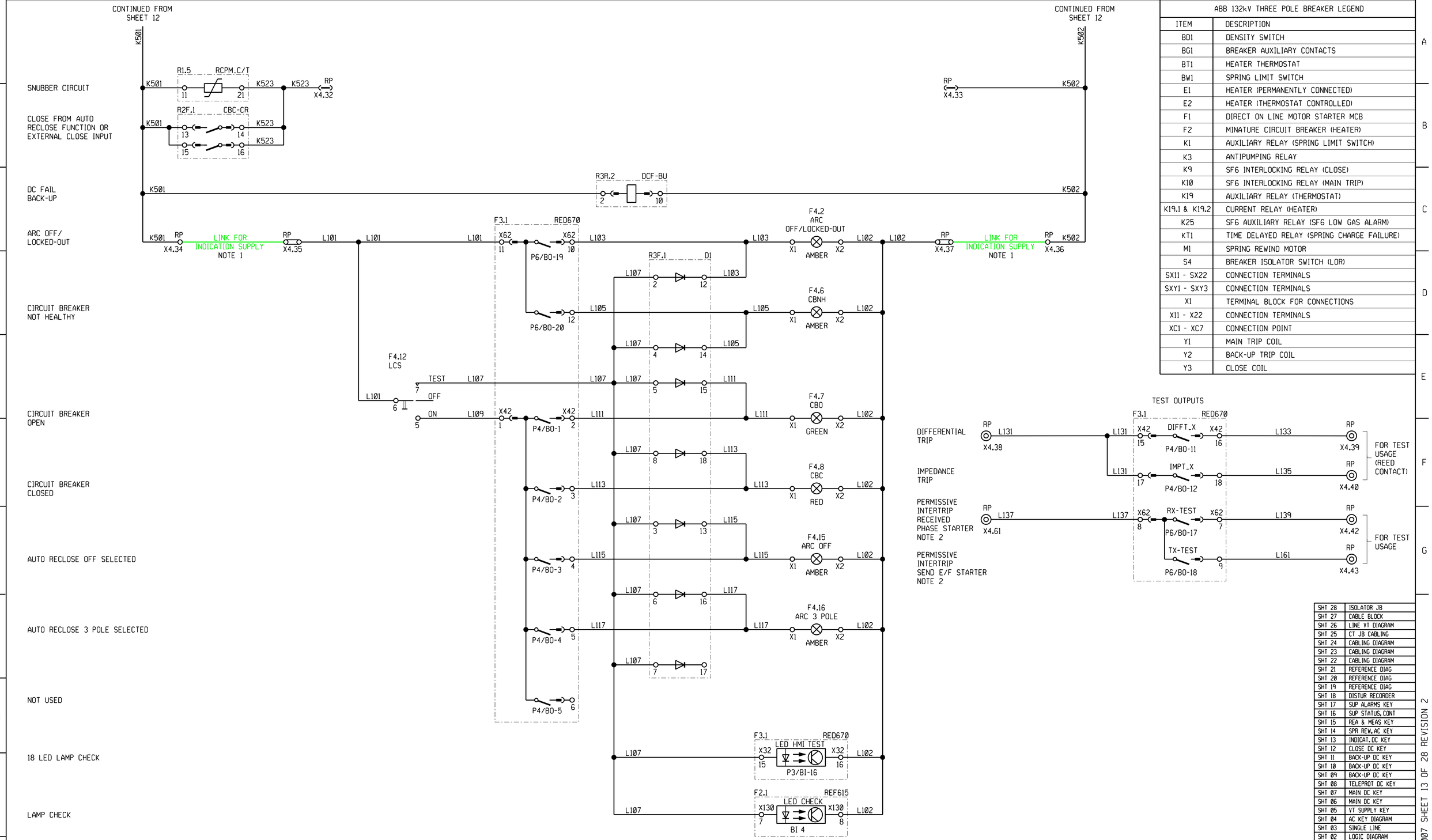

ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

NOTE:

1. JUMPERS TO BE INSTALLED BY ESKOM PERSONNEL OR AN ALTERNATIVE DC SUPPLY TO BE CONNECTED.
2. TO OBTAIN DISTANCE PHASE AND EARTH-FAULT STARTERS DURING TESTING, SET GATE 2 TO 'ON'. TO OBTAIN PERMISSIVE TEST POINTS, SET GATE 2 TO 'OFF' (THE DEFAULT).

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SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
INDICATION DC KEY DIAGRAM

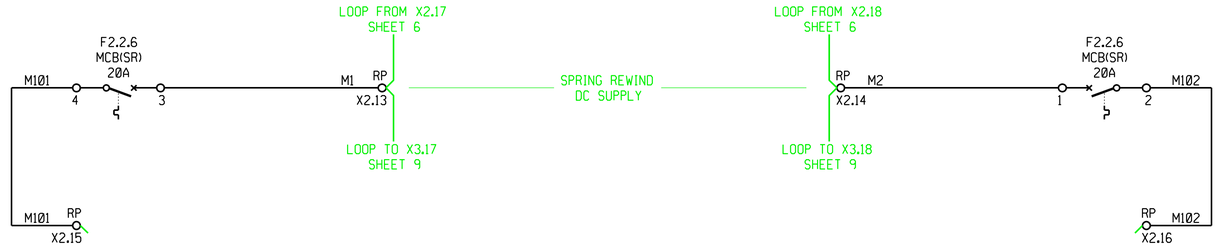
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	13	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GRODTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 13 OF 28 REVISION 2



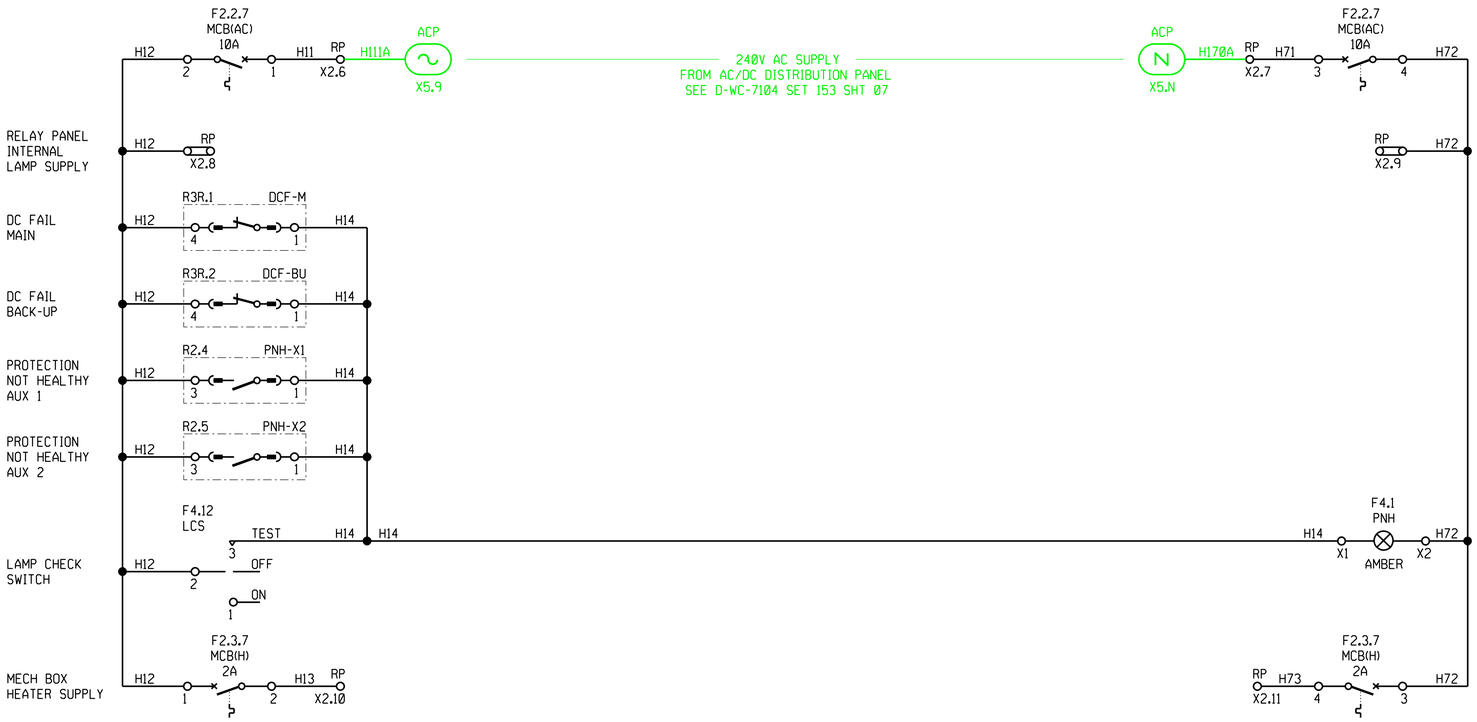


ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
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F1	DIRECT ON LINE MOTOR STARTER MCB
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SHT 22	CABLING DIAGRAM
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SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
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AECOM
CAPE TOWN OFFICE
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REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
SPRING REWIND AND AC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	14	1

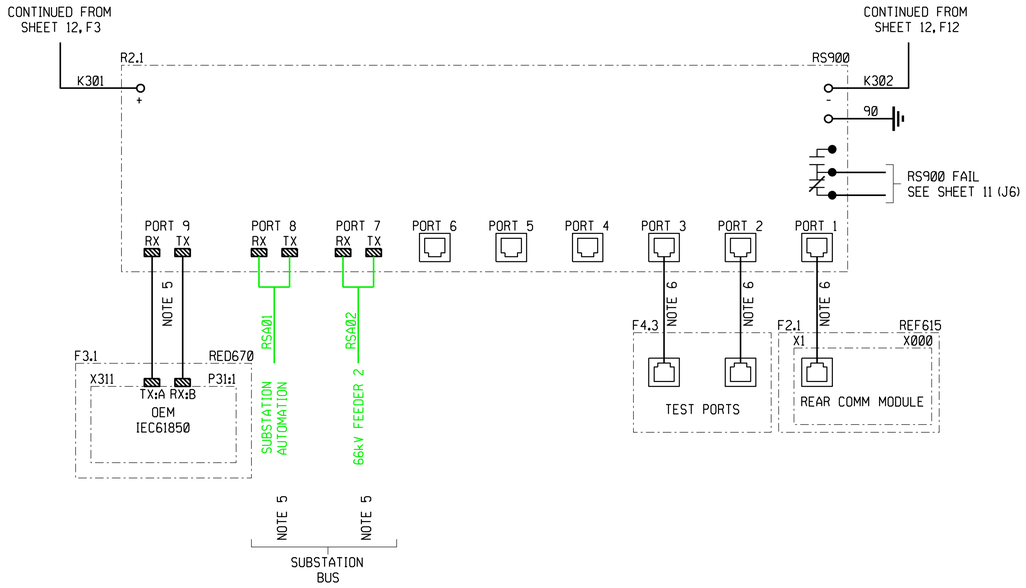
LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

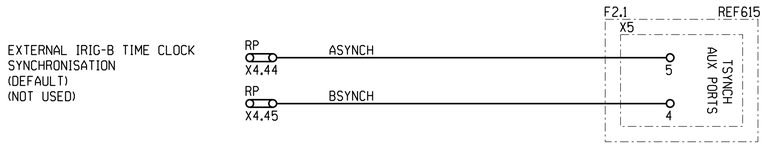
SIZE GRODTTE A1L

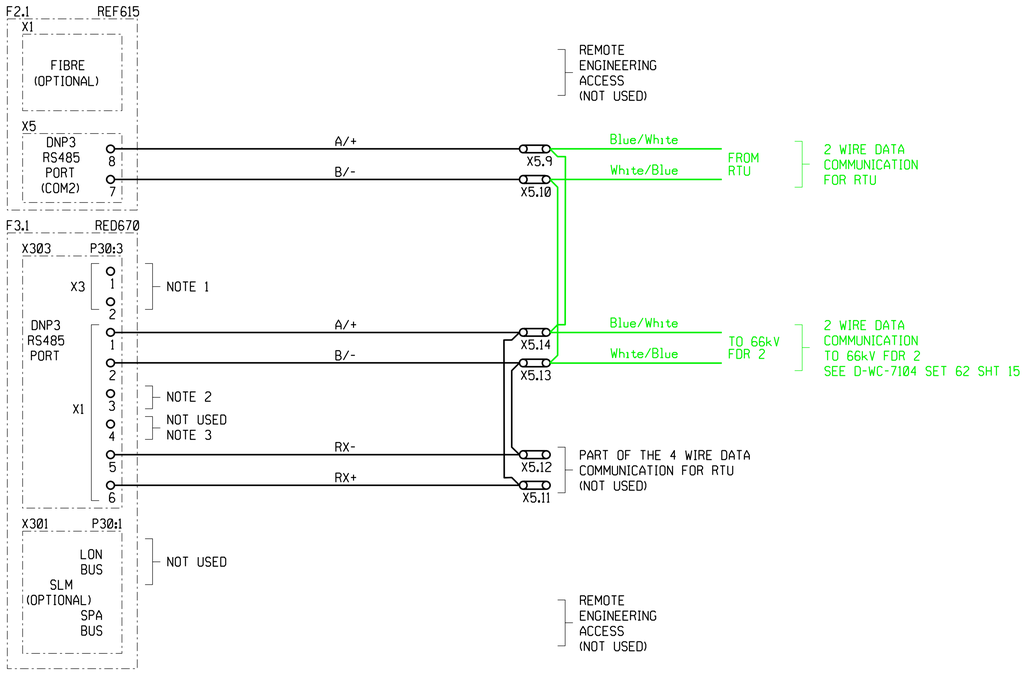
MASTER TRACING FILED UNDER D-DT-15007 SHEET 14 OF 28 REVISION 2

REMOTE ENGINEERING ACCESS IEC61850



TIME SYNCHRONISATION NOTE 4





NOTE:

1. X3 OF THE RED670 IS THE SOFT GROUND CONNECTOR. IT MAY BE UNCONNECTED OR IT CAN BE CONNECTED TO THE GND WITH AN RC NET PARALLEL WITH A MOV.
2. TERMINATION RESISTOR FOR TRANSMITTER AND RECEIVER. ESKOM PERSONNEL TO CONNECT TO A/+ IF USED.
3. TERMINATION RESISTOR FOR RECEIVER IN THE 4 WIRE CASE (CONNECT TO RX+).
4. IF ACCURATE TIMING IS STILL REQUIRED BUT NEITHER OF THE GPS TIMING OPTIONS ARE CHOSEN, THEN USE SNTP TIMING VIA THE IEC61850 OPTIONAL CONNECTION (NOT AS ACCURATE AS GPS TIMING).
5. 100 BASE FX MULTIMODE 1300nm (GLASS), ST CONNECTORS
6. STANDARD RJ45 PORT 100 BASE TX

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REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
REA AND MEASUREMENTS KEY DIAG

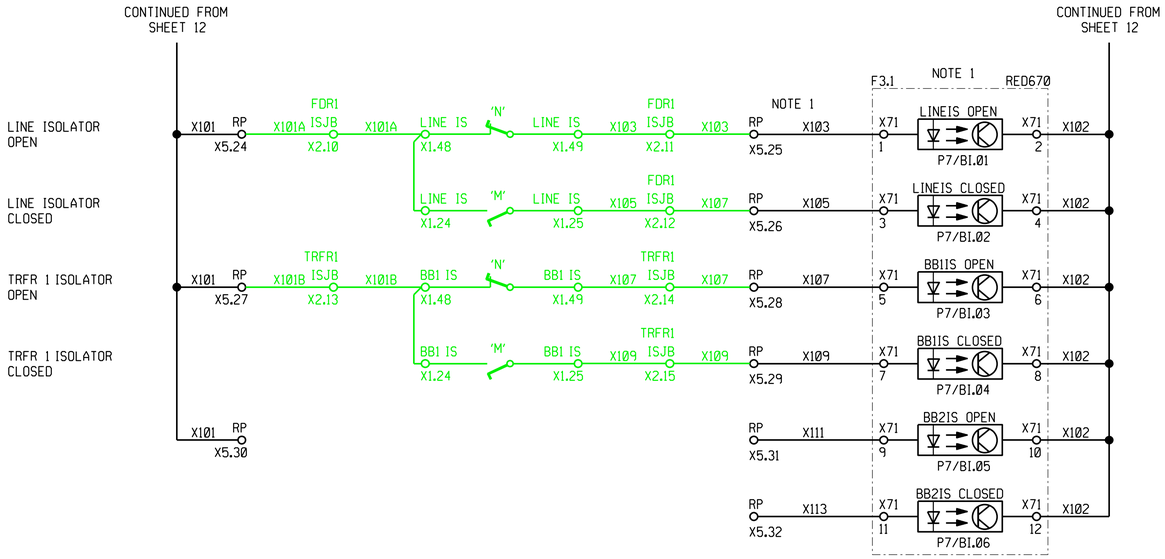
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	15	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 15 OF 28 REVISION 2

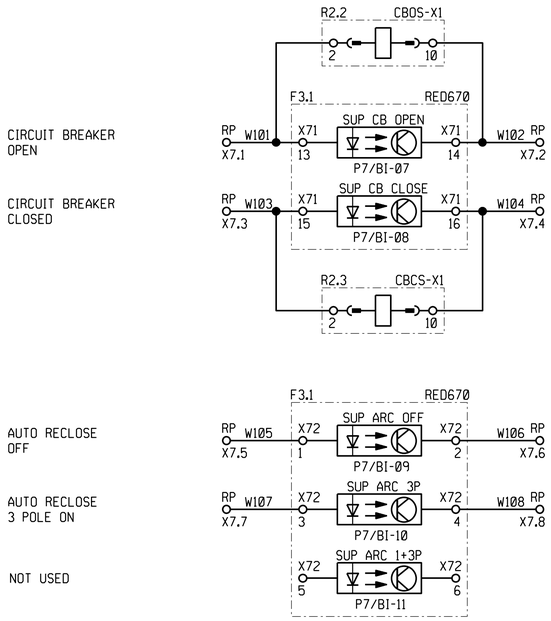
SUPERVISORY STATUS 48V DC (DNP3 OPTIONAL & HMI DISPLAY)



SUPERVISORY STATUS (HARDWIRED OPTIONAL)

RP X7.11
RP X7.12
RP X7.13
RP X7.14
RP X7.15
RP X7.16
RP X7.17
RP X7.18
RP X7.19
RP X7.20
RP X7.21
RP X7.22
RP X7.23
RP X7.24

SUPERVISORY CONTROLS 48V DC (HARDWIRED OPTIONAL)



NOTE:

1. THESE INDICATIONS MUST ALWAYS BE WIRED IN BY ESKOM.
   THE RED670 IED HMI GRAPHICAL DISPLAY EDITOR SINGLE LINE DIAGRAM (SLD) SHOULD BE ALTERED BY ESKOM COMMISSIONING STAFF TO REFLECT THE BUSBAR ARRANGEMENT ON SITE - IN PCM600, GO TO 'GRAPHIC DISPLAY EDITOR'.
   COMMISSIONING STAFF MUST ALSO DEFAULT THE HMI DISPLAY TO THE SLD BY SELECTING ON THE RED670 HMI MAIN MENU, SETTINGS, GENERAL SETTINGS, HMI, SCREEN, DEFAULT SCREEN = SINGLE LINE DIAGRAM.
   NOTE THAT THE BYPASS ISOLATOR STATUS MAY BE FOUND ON THE BACK-UP DC KEY DIAGRAM.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
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SHT 04	AC KEY DIAGRAM
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SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED.FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

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Eskom

PROJECT APPROVED: C.PYM	DESIGN APPROVED: A.CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED: B.HOMANN	DESIGN CHECKED: N.MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY: K.STEYNBERG	DRAWN BY: C.CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
SUPERVIS. STATUS & CONTROL KEY

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	16	1

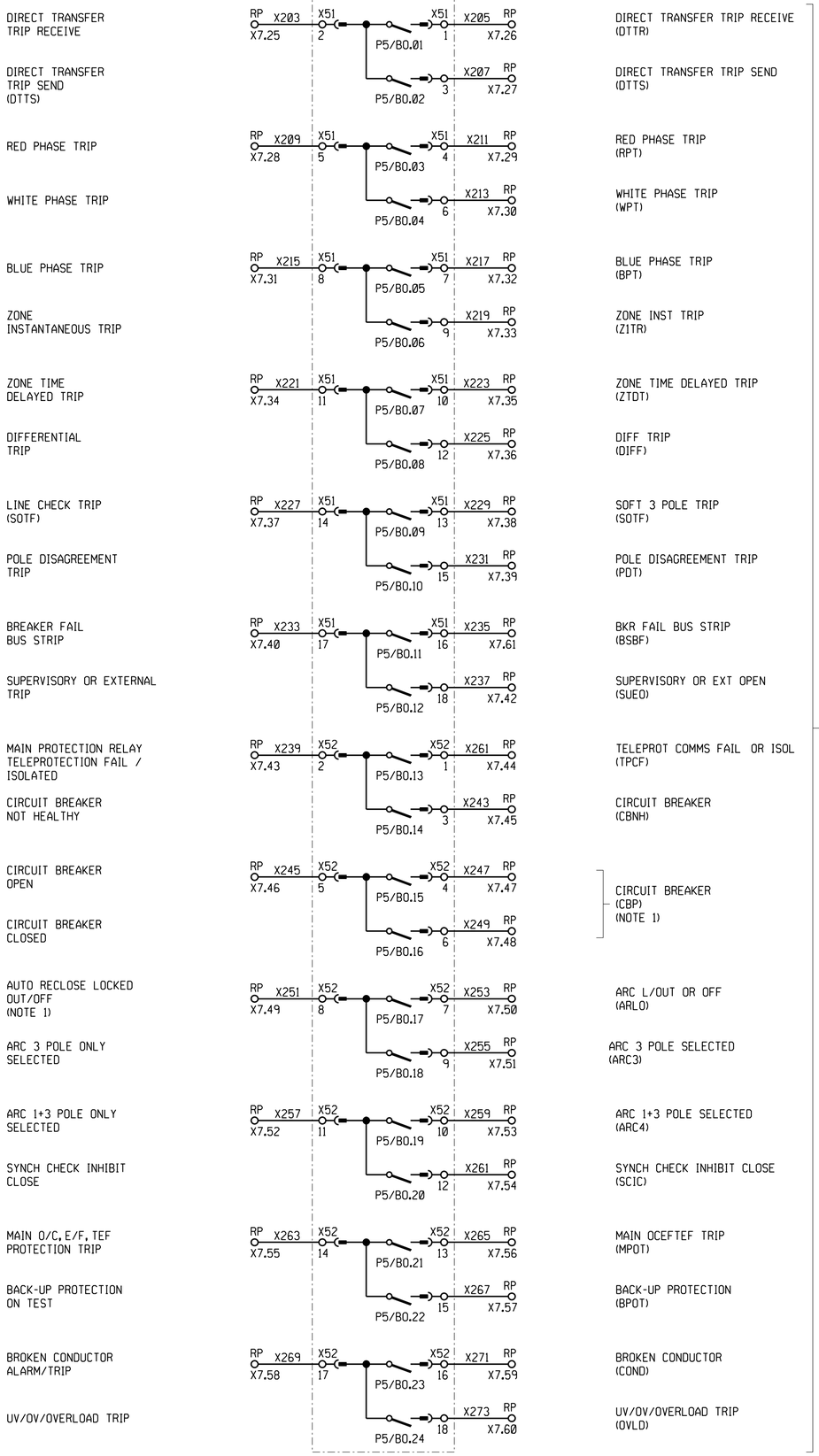
LEVELS 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 25 26 27 28 29 30 31

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 16 OF 28 REVISION 2

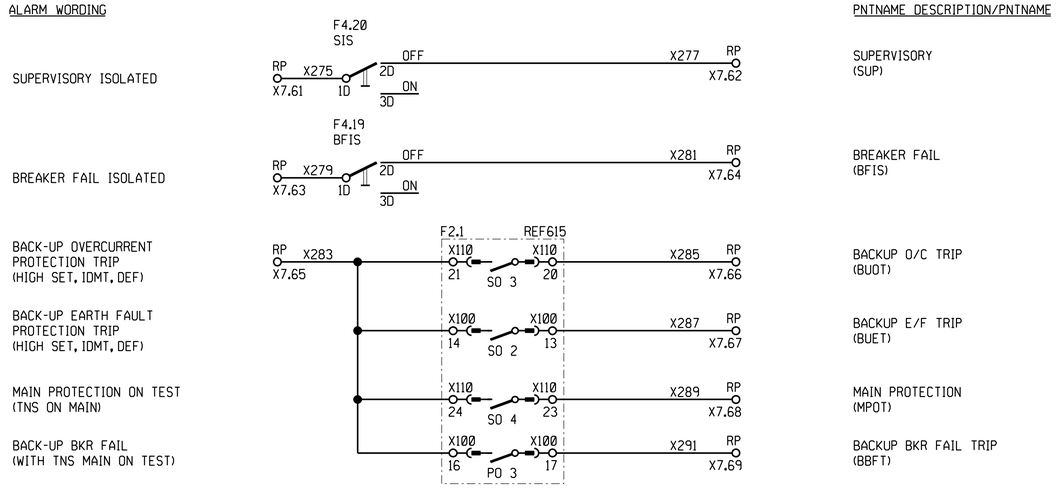
HARDWIRED SUPERVISORY ALARMS (OPTIONAL)



NOTE:

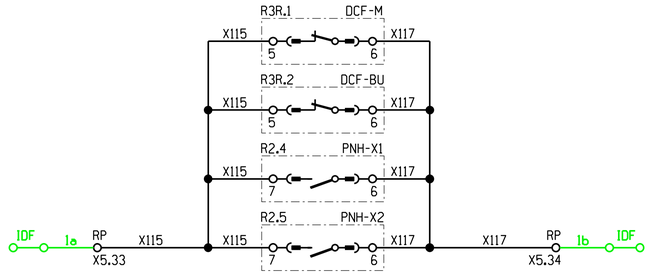
1. DOUBLE BIT INDICATION SHOULD BE USED.

HARDWIRED SUPERVISORY ALARMS (OPTIONAL)



NOTE:

ITEMS INDICATED ABOVE ARE PROVIDED AS AN ORDERING OPTION.
ITEMS INDICATED BELOW ARE PROVIDED AS A DEFAULT.



SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
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SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

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PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
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B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
SUPERVISORY ALARMS KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	17	0

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 17 OF 28 REVISION 2

DISTURBANCE RECORDER/ ADDITIONAL SUPERVISORY ALARMS (OPTIONAL)

(NOT INSTALLED)

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS.CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW.AC KEY
SHT 13	INDICAT.DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
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REG. No. 1966/006628/07

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
DISTURBANCE RECORDER KEY DIAG

DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	18	Ø

LEVELS 1 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 18 OF 28 REVISION 2

X11 P1

POWER SUPPLY	X11 4 — PSU — X11 5	SHT 07
READY	2 — P1/IRF — 1	NOT USED
FAIL	3	SHT 09

X401 P40 — RED670

RED PHASE CURRENT	X401 1 — A101 R — X401 2	SHT 04
WHITE PHASE CURRENT	A102 W 3 — 4	SHT 04
BLUE PHASE CURRENT	A103 B 5 — 6	SHT 04
NEUTRAL CURRENT	A104 N 8 — 7	SHT 04
MUTUAL IMP COMPENSATION	X401 12 — A106 N — X401 11	SHT 04
SYNCH CHECK VOLTAGE (VT)	A110 19 — 20	SHT 05
DIR E/F FUNCTION	A111 21 — 22	SHT 05
RED PHASE VOLTAGE	A107 R 13 — 14	SHT 05
WHITE PHASE VOLTAGE	A108 W 15 — 16	SHT 05
BLUE PHASE VOLTAGE	A109 B 17 — 18	SHT 05

X71 P7 (48V DC) — RED670

LINE ISOLATOR OPEN	X71 1 — LINE1-OPEN — X71 2 (P7/BI-01)	SHT 16
LINE ISOLATOR CLOSED	3 — LINE1-CLOSED — 4 (P7/BI-02)	SHT 16
BB1 ISOLATOR OPEN	5 — BB1I-OPEN — 6 (P7/BI-03)	SHT 16
BB1 ISOLATOR CLOSED	7 — BB1I-CLOSED — 8 (P7/BI-04)	SHT 16
BB2 ISOLATOR OPEN	9 — BB2I-OPEN — 10 (P7/BI-05)	SHT 16
BB2 ISOLATOR CLOSED	11 — BB2I-CLOSED — 12 (P7/BI-06)	SHT 16
SUPERVISORY CIRCUIT BKR OPEN	13 — CB-OPEN — 14 (P7/BI-07)	SHT 16
SUPERVISORY CIRCUIT BKR CLOSED	15 — CB-CLOSE — 16 (P7/BI-08)	SHT 16

X61 P6 — RED670

BUS STRIP OUTPUT EXT	X61 2 — BKRF1 — X61 1 (P6/BO-01)	SHT 09
BUS STRIP OUTPUT EXT	BKRF2 — 3 (P6/BO-02)	SHT 09
FEEDER ON BYPASS TX TELE	TX REMOTE 3P ARC SELECT 5 — 4 (P6/BO-03)	NOT USED
SPARE (TEST OUTPUT)	DEF_RX — 6 (P6/BO-04)	NOT USED
RED PHASE TRIP	8 — REDIT — 7 (P6/BO-05)	SHT 06
RED PHASE TRIP	REDIT — 9 (P6/BO-06)	SHT 06
WHITE PHASE TRIP	11 — WHITEIT — 10 (P6/BO-07)	SHT 06
WHITE PHASE TRIP	WHITEIT — 12 (P6/BO-08)	SHT 06
MAIN BLUE PHASE TRIP	14 — BLUEIT — 13 (P6/BO-09)	SHT 06
BLUE PHASE TRIP	BLUEIT — 15 (P6/BO-10)	SHT 06
BKR FAIL BUS STRIP/ DTTS	17 — BUS STRIP — 16 (P6/BO-11)	SHT 06
BLOCK BU E/F PROTECTION	TRIP — 18 (P6/BO-12)	NOT USED

X61 P4 — RED670

BREAKER POLES CLOSED/PD	X61 1 — CB-CLS — X61 2 (P4/BI.01)	SHT 07
BREAKER POLES OPEN/PD	3 — CB-OPN — 4 (P4/BI.02)	SHT 07
SPARE	5 — 6 (P4/BI.03)	SPARE
SPARE	7 — 8 (P4/BI.04)	SPARE
SETTING G2 EXT CONTROL	9 — SG2 — 10 (P4/BI.05)	SHT 07
SETTING G3 EXT CONTROL	11 — SG3 — 12 (P4/BI.06)	SHT 07
SPARE	13 — 14 (P4/BI.07)	SPARE
PROTECTION NOT HEALTHY AUXILIARY 1	15 — PNH1 — 16 (P4/BI.08)	SHT 07

X31 P3 — RED670

BUSZONE TRIP	X31 1 — EXT BZ TRIP — X31 2 (P3/BI.01)	SHT 07
BKR FAIL ISOLATOR ON	3 — BFIS-ON — 4 (P3/BI.02)	SHT 9
TNS MAIN ON TEST	5 — TNS-M — 6 (P3/BI.03)	SHT 11
EXT TRIP SWITCH/ SUP	7 — CBCS-T — 8 (P3/BI.04)	SHT 11
BACK-UP PROT/ BZ TRIP/ CROSSTRIP	9 — CROSSTRIP — 10 (P3/BI.05)	SHT 11
EXT TRIP AND ARC	11 — EXT-T-ARC — 12 (P3/BI.06)	SHT 11
EXT TRIP AND NO ARC	13 — EXT-T-NARC — 14 (P3/BI.07)	SHT 11
CUSTOMER BLOCK CLOSE	15 — CUSTB — 16 (P3/BI.08)	SHT 11

X81 P8 — RED670

BUS VT MCB TRIP	X81 1 — BB VT MCB-T — X81 2 (P8/BI.01)	SHT 10
LINE VT MCB TRIP	3 — LINE VT MCB-T — 4 (P8/BI.02)	SHT 10
DTTS	5 — EXT-DTTS — 6 (P8/BI.03)	SHT 07
BF INITIATE ARCI, 3PT	7 — 3PT/BFI/ARC — 8 (P8/BI.04)	SHT 07
BF INITIATE 3PT NARC	9 — 3PT/BFI/NARC — 10 (P8/BI.05)	SHT 07
PROTECTION NOT HEALTHY AUXILIARY 2	11 — PNH2 — 12 (P8/BI.06)	SHT 10
TNS NORMAL	13 — TNS-N — 14 (P8/BI.07)	SHT 09
TRIP TEST	15 — TRIP TEST — 16 (P8/BI.08)	SHT 10

X72 P7 (48V DC) — RED670

SUPERVISORY ARC OFF	1 — ARC-OFF — 2 (P7/BI-09)	SHT 16
SUPERVISORY ARC 3P	3 — 3P ARC-ON — 4 (P7/BI-10)	SHT 16
SUPERVISORY ARC 1+3P	5 — 1+3P ARC ON — 6 (P7/BI-11)	NOT USED
REMOTE FEEDER ON BYPASS	7 — RX REMOTE 3P ARC SELECT — 8 (P7/BI-12)	NOT USED
RX	9 — RX — 10 (P7/BI-13)	SHT 08
DTTR	11 — DTTR — 12 (P7/BI-14)	SHT 08
CARRIER GUARD SIGNAL ON	13 — CGS — 14 (P7/BI-15)	SHT 08
DIR E/F RECIEVED	15 — DEF_RX — 16 (P7/BI-16)	SHT 08

X62 P6 — RED670

BKR FAIL RETRIP/ CROSSTRIP	X62 2 — BF 3P RETRIP — X62 1 (P6/BO-13)	SHT 09
SUPERVISORY TRIP	SUP CB OPEN — 3 (P6/BO-14)	SHT 09
CRG	5 — CRG — 4 (P6/BO-15)	SHT 09
(OPTIONAL)	OVERLOAD RX — 6 (P6/BO-16)	SHT 09
PERMISSIVE INTERTRIP RECIEVED	8 — RX-TEST — 7 (P6/BO-17)	SHT 13
PERMISSIVE INTERTRIP SEND	TX-TEST — 9 (P6/BO-18)	SHT 13
ARC OFF/LO	11 — ARC O/L — 10 (P6/BO-19)	SHT 13
CBNH	CBNH — 12 (P6/BO-20)	SHT 13
TX	14 — TX — 13 (P6/BO-21)	SHT 08
DTTS	DTTS — 15 (P6/BO-22)	SHT 08
DIR E/F SEND	17 — DEF_TX — 16 (P6/BO-23)	SHT 08
SPARE (TEST OUTPUT)	DEF_TX — 18 (P6/BO-24)	SHT 08

X42 P4 — RED670

IND CIRCUIT BREAKER OPEN	1 — P4/BO-1 — 2	SHT 13
IND CIRCUIT BREAKER CLOSED	P4/BO-2 — 3	SHT 13
IND ARC OFF	P4/BO-3 — 4	SHT 13
IND ARC 3 POLE	P4/BO-4 — 5	SHT 13
IND ARC 1+3 POLE	P4/BO-5 — 6	NOT USED
BKR CLOSE PULSE	P4/BO-6 — 7 — 8	SHT 12 NOT USED
TCS FAIL	10 — P4/BO-7 — 11	SHT 09
EXTERNAL COMMS FAIL	P4/BO-8 — 12	SHT 09
INTERNAL COMMS FAIL	P4/BO-9 — 13	SHT 09
MAIN PROT VT FUSE FAIL	P4/BO-10 — 14	SHT 09
DIFFERENTIAL TRIP	15 — DIFFT_X — 16 (P4/BO-11)	SHT 13
IMPEDANCE TRIP	17 — IMPT_X — 18 (P4/BO-12)	SHT 13

X32 P3 — RED670

FEEDER BYPASS ON	X32 1 — FDR BP-ON — X32 2 (P3/BI.09)	SHT 11
FEEDER BYPASS OFF	3 — FDR BP-OFF — 4 (P3/BI.10)	SHT 11
CBNH-HEATER FAIL	5 — CBNH-H — 6 (P3/BI.11)	SHT 11
IEC61850 SWITCH FAIL	7 — IEC SWITCH FAIL — 8 (P3/BI.12)	SHT 11
MEAS TRANSDUCER FAIL	9 — MEAS_T FAIL — 10 (P3/BI.13)	SHT 11
EXTERNAL CLOSE	11 — EXTERNAL CLOSE — 12 (P3/BI.14)	SHT 12
SPARE	13 — 14 (P3/BI.15)	SPARE
LED TEST	15 — LED CHECK — 16 (P3/BI.16)	SHT 13

X82 P8 — RED670

BREAKER CHARGING FAIL	X82 1 — CBNH-BCF — X82 2 (P8/BI.09)	SHT 10
TCS FAIL	3 — CBNH-SF6 — 4 (P8/BI.10)	SHT 10
EXTERNAL CLOSE INPUT	5 — TCS-FAIL — 6 (P8/BI.11)	SHT 10
1+3 POLE ARC	7 — 1+3 POLE ARC — 8 (P8/BI.12)	NOT USED
3 POLE ARC	9 — 3 POLE ARC — 10 (P8/BI.13)	SHT 10
ARC OFF	11 — ARC OFF — 12 (P8/BI.14)	SHT 10
SUPERVISORY ENABLED	13 — SUP ENABLE — 14 (P8/BI.15)	SHT 10
TELEPROTECTION DISABLED	15 — TELE-DISABLED — 16 (P8/BI.16)	SHT 10

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

SCALE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						I53272156-00003

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
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K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10

ISCOR SUBSTATION
66kV FEEDER 1
PROTECTION REFERENCE DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	19	0

MASTER TRACING FILED UNDER D-DT-15007 SHEET 19 OF 28 REVISION 2

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

F4.1 PNH
X1 AMBER X2 SHT 14

F4.2 ARC OFF/LOCKED-OUT
X1 AMBER X2 SHT 13

F4.6 CBNH
X1 AMBER X2 SHT 13

F4.7 CBO
X1 GREEN X2 SHT 13

F4.8 CBC
X1 RED X2 SHT 13

R3F.1 D1
1–11 SPARE
2–12 SHT 13
3–13 SHT 13
4–14 SHT 13
5–15 SHT 13
6–16 SHT 13
7–17 SHT 13
8–18 SHT 13

R3F.2 D2
E–D SHT 7
G–B SHT 7

R3F.3 D3
E–D SHT 7
G–B SPARE

R3F.4 D4
C–F SHT 9
D–E SHT 9
A–H SHT 9
B–G SHT 9

R3F.5 D5
E–D SHT 9
G–B SPARE

F2.2.1 MCB(M) 16A
1–2 SHT 6
3–4 SHT 6

F2.2.2 MCB(BU) 16A
1–2 SHT 9
3–4 SHT 9

F2.2.4 MCB(CL)
1–2 SHT 12
3–4 SHT 12
AUX 21–22 SHT 9
13–14 SPARE

F2.2.6 MCB(SR) 20A
1–2 SHT 14
3–4 SHT 14
AUX 21–22 SHT 10
13–14 SPARE

F2.3.1 MCB(VT-M) 2A
RED PHASE VT 1–2 SHT 5
WHITE PHASE VT 3–4 SHT 5
BLUE PHASE VT 5–6 SHT 5
AUX 21–22 SHT 10
13–14 SPARE

F2.3.3 MCB(VT-BU) 2A
RED PHASE VT 1–2 SHT 5
WHITE PHASE VT 3–4 SHT 5
BLUE PHASE VT 5–6 SHT 5
AUX 21–22 SHT 11
13–14 SPARE

F2.3.6 MCB(VT-SC) 2A
1–2 SHT 5
3–4 SHT 5
AUX 21–22 SHT 10
13–14 SPARE

F2.3.7 MCB(H) 6A
1–2 SHT 14
3–4 SHT 14

R4.X5.2 MCB(VT-T) 2A
RED PHASE VT 1–2 SHT 5
WHITE PHASE VT 3–4 SHT 5
BLUE PHASE VT 5–6 SHT 5

R1.5 RCPM_C/T
SNUBBER CIRCUIT 11–21 SHT 13
17–27 SHT 9

F4.11 TNS
1A MAIN 2A SHT 6
NORMAL 3A
BACKUP 4A
1B MAIN 2B SHT 6
NORMAL 3B
BACKUP 4B
1C MAIN 2C SHT 6
NORMAL 3C
BACKUP 4C
12 MAIN 2D
1D NORMAL 3D SHT 6
BACKUP 4D
1E MAIN 2E
NORMAL 3E SHT 9
BACKUP 4E
1F MAIN 2F
NORMAL 3F SHT 7
BACKUP 4F
1G MAIN 2G
NORMAL 3G SHT 9
BACKUP 4G
1H MAIN 2H
NORMAL 3H SHT 9
BACKUP 4H
1J MAIN 2J
NORMAL 3J SHT 9
BACKUP 4J
1P MAIN 2P
NORMAL 3P SHT 9
BACKUP 4P
1K MAIN 2K
NORMAL 3K SHT 9
BACKUP 4K
1L MAIN 2L
NORMAL 3L SHT 9
BACKUP 4L
1M MAIN 2M
NORMAL 3M SHT 11
BACKUP 4M
1N MAIN 2N
NORMAL 3N SHT 12
BACKUP 4N

F2.2.7 MCB(AC) 10A
1–2 SHT 14
3–4 SHT 14

R1.8 TCS-M
220V DC 11 SHT 6 110V DC 12
SHT 6 21–13 SHT 6
15–17 SHT 10
25–27
26
16
FAULT OK
24 SHT 6

R1.11 TCS-BU
220V DC 11 SHT 6 110V DC 12
SHT 6 21–13 SHT 9
15–17 SHT 10
25–27
26
16
FAULT OK
24 SHT 9

F4.16 ARC 3 POLE
3–4 SHT 10
X1 AMBER X2 SHT 13

F4.15 ARC OFF
3–4 SHT 10
X1 AMBER X2 SHT 13

R1.6 CT-X RXMA 1
2000Ω
11–12 SHT 7
13–14 SHT 6
15–16 SPARE
17–18 SPARE
21–22 SPARE
23–24 SPARE
25–26 SHT 11
27–28

R2F.1 CBC-CR RXMB 1
(+) 11–12 (-) SHT 12
13–14 SHT 13
15–16 SHT 13
17–18 SPARE
(+) 21–22 (-) SPARE
23–24 SPARE
25–26 SPARE
27–28 SPARE

F4.12 LCS
TEST 7
OFF 6 SHT 13
ON 5
TEST 3
OFF 2 SHT 14
ON 1

F4.17 ARC 1+3 POLE
3–4 SHT 10
X1 AMBER X2 SHT 13

F4.18 TTPB
13–14 SHT 10

F4.13 TPIS
1A OFF 2A ON 3A SHT 8
1B OFF 2B ON 3B SHT 8
1C OFF 2C ON 3C SHT 9
1D OFF 2D ON 3D SHT 14
1E OFF 2E ON 3E SHT 10

F4.14 CBCS
TRIP 2
1 NORMAL CLOSE SHT 9
TRIP 6
3 NORMAL CLOSE SHT 12
TRIP 4
5 NORMAL CLOSE SHT 11
TRIP 8
7 NORMAL CLOSE SPARE

F4.19 BFIS
1A OFF 2A ON 3A SHT 9
1B OFF 2B ON 3B SHT 9
1C OFF 2C ON 3C SHT 9
1D OFF 2D ON 3D SHT 17

F4.20 SIS
1A OFF 2A ON 3A SHT 9
1B OFF 2B ON 3B SHT 10
1C OFF 2C ON 3C SHT 12
1D OFF 2D ON 3D SHT 17 (OPTIONAL)
1E OFF 2E ON 3E SPARE
1F OFF 2F ON 3F SPARE

R1.1 VSR-1 (OPTIONAL)
+122 -121 SHT 12
113–114 SHT 5
115–116 SHT 5
117–118 SPARE
123–124 SPARE
213–214 SHT 5
227–228 SHT 5
225–226 SHT 5
223–224 SHT 5
+212 -211 SHT 12

R1.2 VSR-2 (OPTIONAL)
+122 -121 SHT 12
113–114 SHT 5
115–116 SHT 5
117–118 SPARE
123–124 SPARE
213–214 SHT 5
227–228 SHT 5
225–226 SHT 5
223–224 SHT 5
+212 -211 SHT 12

R1.7 TP-PSU
110V DC 116–118 SHT 8
48V DC 126–128
117
317–318 SHT 9

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

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-	-	-	-	-	-

SCALE

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ISCOR SUBSTATION
66kV FEEDER 1
PROTECTION REFERENCE DIAGRAM

D-WC-7104 | SET NUMBER 61 | SHEET NUMBER 20 | REVISION 0

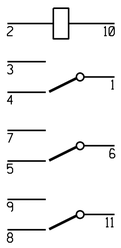
LEVELS 1 5 10

PANEL TYPE DESIGNATION 4FZD-3920

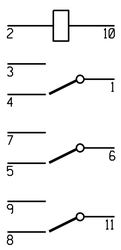
SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 20 OF 28 REVISION 2

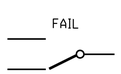
R3R.1 — DCF-M



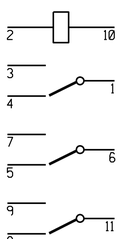
R3R.2 — DCF-BU



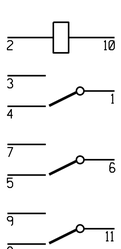
R2.1 — RS900



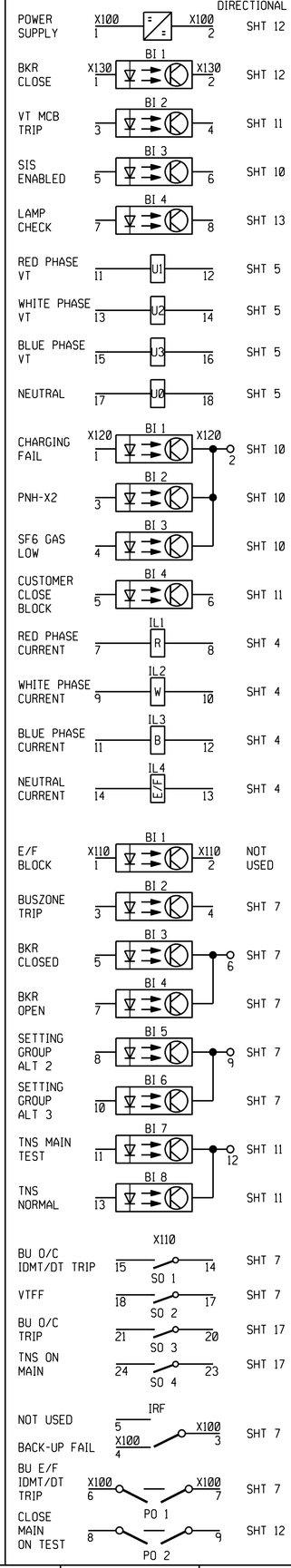
R2.4 — PNH-X1



R2.5 — PNH-X2



F2.1 — REF615 DIRECTIONAL



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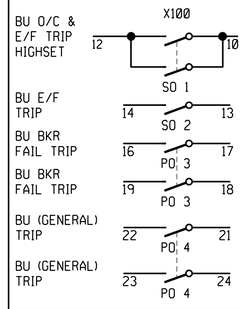
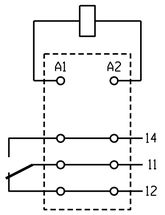
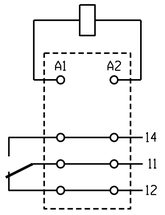


TRIP-M



TRIP-B/U



SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS,CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW,AC KEY
SHT 13	INDICAT,DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
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SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
CARL CRONJÉ DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
PROTECTION REFERENCE DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	21	1

LEVELS 1 2 5 10 11 12 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 21 OF 28 REVISION 2

X1

SYNCHRONISING CHECK VOLTAGE	G92	⊙44							
	G91	⊙43							
MEASUREMENTS VT SUPPLY	E372	⊙42							
	E252	⊙41							
	E232	⊙40							
	E212	⊙39							
	E372	38							
	E252	37							
	E232	36							
	E212	35							
	E372	34							
	E252	33							
	E232	32							
	E212	31							
MAIN PROTECTION VT INPUT	E70	30							
	E51	29							
	E31	28							
	E11	27							
	E70	26							
	E51	25							
	E31	24							
	E11	23							
TRANSFORMER 1 PROTECTION VT INPUTS (VT SELECTION)	E70	22	E71AA		18				
	E51	21	E51AA		17				
	E31	20	E31AA		16				
	E11	19	E11AA		15				
PARALLEL FDR FLD COMPENSATION (IF REQUIRED)		● 18	90						
	A173	⊙17							
	A172	⊙16							
		● 15	90						
DISTURBANCE RECORDER CT CCT	A74	⊙14							
	A54	⊙13							
	A34	⊙12							
	A14	⊙11							
		● 10	90						
BACK-UP PROTECTION CT INPUT	C72	9	C72	58•					
	C52	8	C52	57					
	C32	7	C32	56					
	C12	6	C12	55					
		● 5	90						
MAIN PROTECTION CT INPUT	A72	4	A72	40•					
	A52	3	A52	39					
	A32	2	A32	38					
	A12	1	A12	37					
		D-RAIL							

CABLE NUMBER	AA104	AA112				
CABLE SIZE	12	12				
NUMBER OF SPARES	8	8				
DESTINATION	CT JUNCTION BOX	66kV TRANSFORMER 1 VTJB				

X2

DISCHARGE RESISTOR	ESD		90						
METERING PANEL VT OUTPUT	E372	⊙42	E372AA		1				
	E252	⊙41	E252AA		MCB-3				
	E232	⊙40	E232AA		MCB-2				
	E212	⊙39	E212AA		MCB-1				
SG3	K177	38							
	K101	37							
SG2	K175	36							
	K101	35							
CB OPEN IND	K171	34	K171				X1.40		
	K101	33							
CB CLOSED IND	K169	32	K169				X1.32		
	K101	31	K101A				X1.31		
EXT BUSZONE TRIP	K167	30	P25AA						
	K101	29	P21AA						
BKR FAIL INITIATE BACK-UP PROTECTION AND BZ CROSSTRIP	K163	28							
	K161	27							
	K159	26							
	K157	25	●						
	K155	24							
EXT DTTS	K151	23							
	K101	22							
MAIN TRIP	K109	⊙21	K109A				X1.61		
	K102	⊙20	K102A				X1.6		
	K107	⊙19	K107A				X1.5		
MAIN DC SUPPLY	J2	` 18	J12A	X8.6					
	J1	` 17	J11A	X8.5					
SPRING REWIND SUPPLY	M102	16	M102 (2)					X1.4	
	M101	15	M101 (2)					X1.3	
	M2	14	● TO X3.18						
	M1	13	● TO X3.17						
	SPARE	12							
HEATER SUPPLY	H73	11	H73					X1.2	
	H13	10	H13					X1.1	
LAMP SUPPLY	H72	● 9							
	H12	● 8							
220V AC SCHEME SUPPLY	H71	7	H710	X4.N					
	H11	6	H111A	X4.9					
	SPARE	5							
DISTURBANCE RECORDER VT OUTPUT	E172	⊙ 4							
	E152	⊙ 3							
	E132	⊙ 2							
	E112	⊙ 1							
		D-RAIL							

CABLE NUMBER	AA122	AA107		AA105	AA106	
CABLE SIZE	4	4		19	12	
NUMBER OF SPARES	0	0		1	6	
DESTINATION	AC/DC DISTRIBUTION BOARD	STATS METERING PANEL		HV CIRCUIT-BREAKER	HV CIRCUIT-BREAKER	

X3

FDR BYPASS	K371	38							
	K369	37							
	K301	36							
CUSTOMER BLOCK CLOSE	K367	35							
	K301	34							
EXT TRIP NO ARC	K365	33							
	K301	32							
EXT TRIP AND ARC	K363	31							
	K301	30							
SF6 LOW	K341	29	K341		X1.20				
	K301	28							
BREAKER CHARGING FAIL	K339	27	K339		X1.48•				
	K301	26	K301A		X1.47•				
LINE VT SUPPLY FAIL	K333	25							
	K301	24							
BUS VT SUPPLY FAIL	K331	23							
	K301	22							
BACK-UP TRIP	K315	⊙21	K315A		X1.63				
	K302	⊙20	K302A		X1.8				
	K313A	⊙19	K313AA		X1.7				
BACK-UP DC SUPPLY	J4	` 18	FROM X2.14						
	J3	` 17	FROM X2.13						
DIR E/F SEND	K204	Ø 16							
	K221	Ø 15							
DIRECT INTERTRIP SEND	K204	Ø 14							
	K219	Ø 13							
PERMISSIVE INTERTRIP SEND	K204	Ø 12							
	K217	Ø 11							
DIR E/F RECIEVE	K215	Ø 10							
	K205	Ø 9							
CARRIER GUARD SIGNAL ON	K213	Ø 8							
	K205	Ø 7							
DIRECT INTERTRIP RECIEVE	K211	Ø 6							
	K205	Ø 5							
PERMISSIVE INTERTRIP RECIEVE	K209	Ø 4							
	K205	Ø 3							
TELEPROTECTION POWER SUPPLY (48V DC)	K202	2							
	K201	1							
		D-RAIL							

CABLE NUMBER	AA105						
CABLE SIZE	19						
NUMBER OF SPARES	1						
DESTINATION	HV CIRCUIT-BREAKER						

TERMINAL LOOPS (•)	
RP	X2.13 - X3.17; X2.14 - X3.18
CB MB	X1.18 - X1.48; X1.31 - X1.39;
	X1.17 - X1.19 - X1.47
CTJB	40 - 41 - 42; 46 - 47 - 48; 52 - 53 - 54;
	58 - 59 - 60; 61 - 62 - 63 - 64 - 65 - 66 - E; 70 - 71 - 72 - E

NOTE:

1. (2) INDICATES TWO LEADS IN PARALLEL.
2. SPARE CABLE LEADS TO BE LEFT LONG ENOUGH TO REACH THE FURTHEST TERMINAL.
3. LEAD NUMBERS SHOWN THUS
   K101 [ ] K101 INDICATES NO CHANGE IN LEAD NUMBER.
   K301 [ ] K305 INDICATES CHANGE IN LEAD NUMBER.
4. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.
   STANDARD TERMINALS USED ARE ENTRELEC M10/10.RS
   ● D6/8-ST-RS ENTRELEC SLIDING LINK TEST TERMINAL
   ⊙ D6/8 ST1 RS TEST AND SHORTING LINKS WITH SAFETY CONNECTIONS (YELLOW INSULATED TEST POINTS)
   Ø M4/6 RS SPRING LOADED ENTRELEC
   : M4/6SNTS ENTRELEC SHORTING STRIP (ORANGE) SPRING LOADED TERMINALS
   X D2.5/5 SN ADD ENTRELEC TERMINALS
   □ M4/8 SF ENTRELEC FUSE TERMINALS
   ` ENTRELEC 1SNA168237R0500 TEST SOCKET - AL4 - DIA 4mm (INSTALLED IN CENTRE SPACING OF TERMINAL)
   [R] M4/6 RS SPRING LOADED ENTRELEC WITH RESISTOR INSERTED
5. NOTE THAT D6/8 ST1 RS TERMINALS MAY BE USED IN PLACE OF D6/8-ST-RS TERMINALS. THE YELLOW INSULATED TEST POINTS MAY BE REMOVED FROM THE EARTH LINKS, AT THE COMMISSIONING TECHNICIANS DISCRECTION.
6. FINE TOOTHED HORIZONTAL TRUNKING SHALL BE USED.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
DRG No.	REFERENCE DRAWINGS:

SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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REG. No. 1966/006628/07

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
PANEL CABLING DIAGRAM

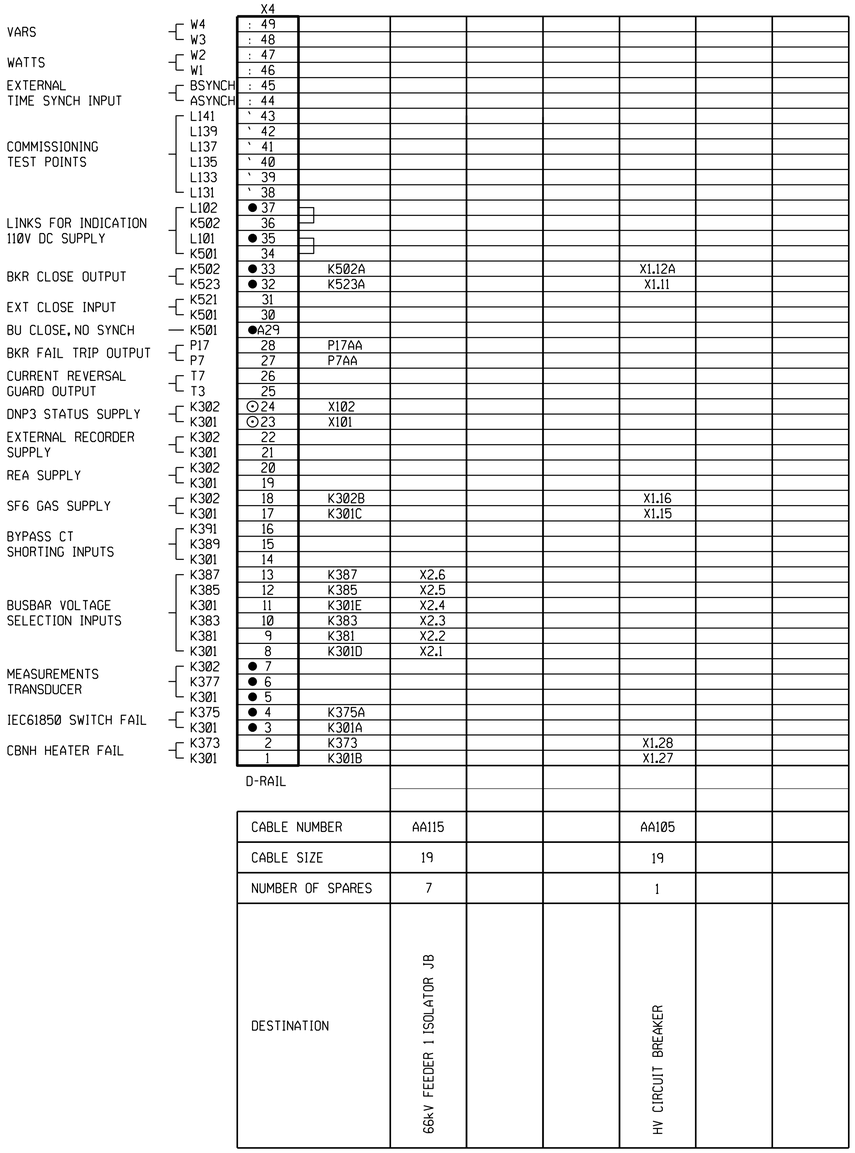
DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	22	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 22 OF 28 REVISION 2



CABLE NUMBER	AA115			AA105		
CABLE SIZE	19			19		
NUMBER OF SPARES	7			1		
DESTINATION	66kV FEEDER 1 ISOLATOR JB			HV CIRCUIT BREAKER		

CABLE NUMBER		AA115			AA124	AA127	AA123
CABLE SIZE		4			4Pr	4Pr	10Pr
NUMBER OF SPARES		1			3Pr	3Pr	9Pr
DESTINATION		66kV FEEDER 1 ISOLATOR JB			RTU	66kV FEEDER 2 RP	IDF

TERMINAL LOOPS (•)	
LINE IS MB	X1.24 - X1.48
BB1 IS MB	X1.24 - X1.48
BB2 IS MB	X1.24 - X1.48

NOTE:

1. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.

STANDARD TERMINALS USED ARE ENTRELEC M10/10.RS
- ● D6/8-ST-RS ENTRELEC SLIDING LINK TEST TERMINAL
- ⊙ D6/8 STI RS TEST AND SHORTING LINKS WITH SAFETY CONNECTIONS (YELLOW INSULATED TEST POINTS)
- Ø M4/6 RS SPRING LOADED ENTRELEC
- : M4/6SNTS ENTRELEC SHORTING STRIP (ORANGE) SPRING LOADED TERMINALS
- X D2.5/5 SN ADD ENTRELEC TERMINALS
- □ M4/8 SF ENTRELEC FUSE TERMINALS
- ` ENTRELEC 1SNA168237R0500 TEST SOCKET - AL4 - DIA 4mm (INSTALLED IN CENTRE SPACING OF TERMINAL)
- [R] M4/6 RS SPRING LOADED ENTRELEC WITH RESISTOR INSERTED

2. NOTE THAT D6/8 STI RS TERMINALS MAY BE USED IN PLACE OF D6/8-ST-RS TERMINALS. THE YELLOW INSULATED TEST POINTS MAY BE REMOVED FROM THE EARTH LINKS, AT THE COMMISSIONING TECHNICIANS DISCRECTION.

3. THE DROPPING RESISTORS HAVE BEEN REMOVED FROM THE X5 RACK AT THE REQUEST OF ABB.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
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SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
PANEL CABLING DIAGRAM

D-WC-7104

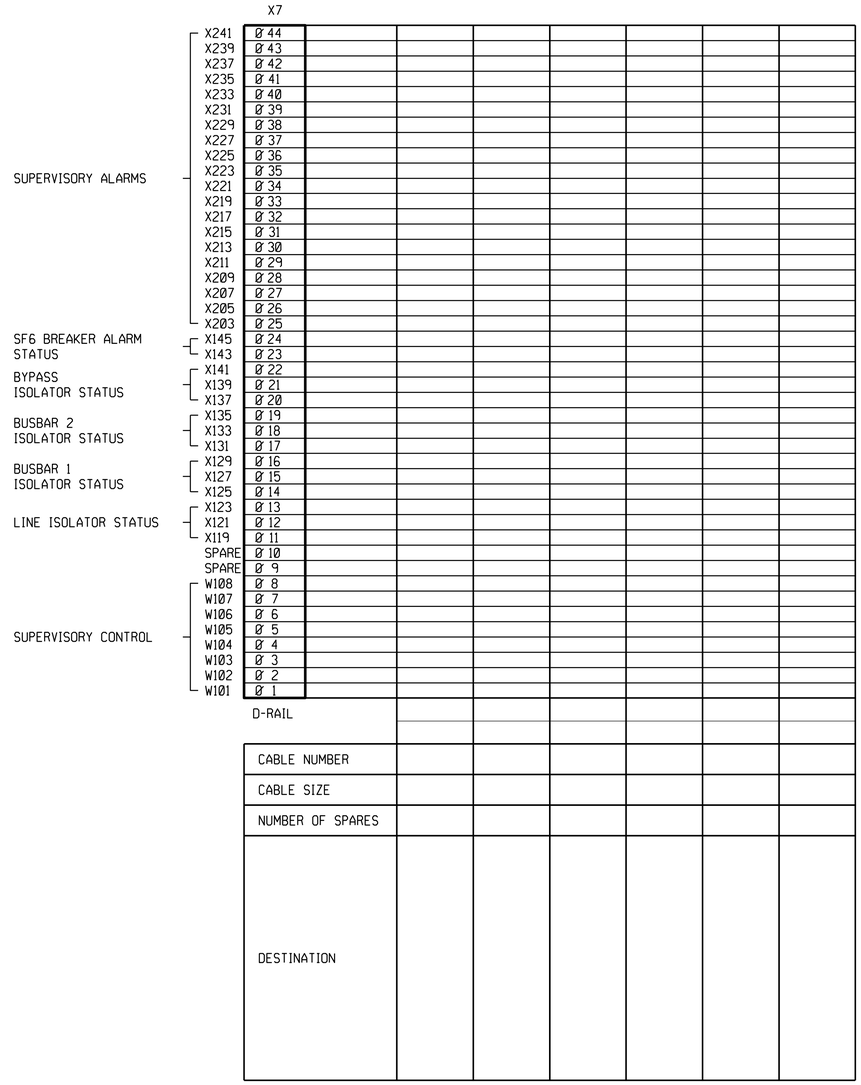
SET NUMBER	SHEET NUMBER	REVISION
61	23	1

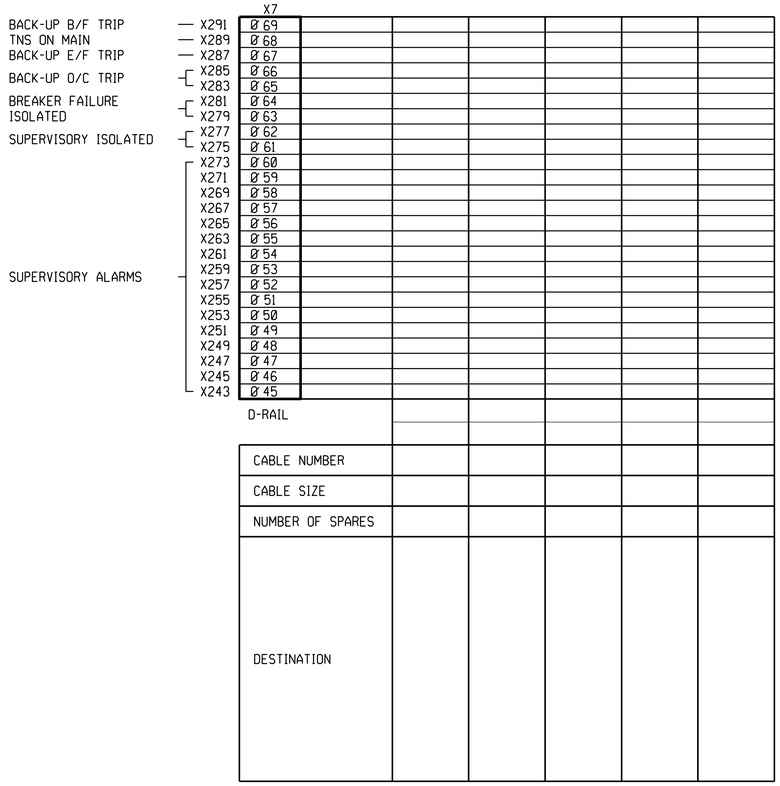
LEVELS 1 2 5 10 11 12 25 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GRODTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 23 OF 28 REVISION 2





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SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

NOTE:

1. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.

STANDARD TERMINALS USED ARE ENTRELEC M10/10.RS
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- ⊙ D6/8 ST1 RS TEST AND SHORTING LINKS WITH SAFETY CONNECTIONS (YELLOW INSULATED TEST POINTS)
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
PANEL CABLING DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	61	24	Ø

LEVELS 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 25 26 27 28 29 30 31

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 24 OF 28 REVISION 2

To CURRENT TRANSFORMERs

TOP OF TERMINAL STRIP

				X1	
		6S5	D171B	36	36
		6S1	D151	35	35
		5S5	D71B	34	34
		5S1	D51	33	33
		4S2	C71B	32	32
		4S1	C51	31	31
		3S5	B71B	30	30
		3S1	B51	29	29
		2S5	B171B	28	28
		2S1	B150	27	27
		1S2	A71B	26	26
		1S1	A51	25	25
	6S5		D171W	24	24
	6S1		D131	23	23
	5S5		D71W	22	22
	5S1		D31	21	21
	4S2		C71W	20	20
	4S1		C31	19	19
	3S5		B71W	18	18
	3S1		B31	17	17
	2S5		B171W	16	16
	2S1		B130	15	15
	1S2		A71W	14	14
	1S1		A31	13	13
6S5			D171R	12	12
6S1			D111	11	11
5S5			D71R	10	10
5S1			D11	9	9
4S2			C71R	8	8
4S1			C11	7	7
3S5			B71R	6	6
3S1			B11	5	5
2S5			B171R	4	4
2S1			B110	3	3
1S2			A71R	2	2
1S1			A11	1	1

To CONTROL ROOM

	X2							
12	72 R	⏚						CORE 6
24	71 W							
36	70 B	D171AA				5		
35	69 B	D151AA				4		
23	68 W	D131AA				3		
11	67 R	D111AA				2		
10	66 R	⏚						CORE 5
22	65 W							
34	64 B							
33	63 B							
21	62 W							
9	61 R							
8	60 R							CORE 4
20	59 W							
32	58 B	C71	X1.9					
31	57 B	C51	X1.8					
19	56 W	C31	X1.7					
7	55 R	C11	X1.6					
6	54 R							CORE 3
18	53 W							
30	52 B	B71AA						
29	51 B	B51AA						
17	50 W	B31AA						
5	49 R	B11AA						
4	48 R							CORE 2
16	47 W							
28	46 B	B171AA					X1.7	
27	45 B	B150AA					X1.5	
15	44 W	B130AA					X1.3	
3	43 R	B110AA					X1.1	
2	42 R							CORE 1
14	41 W							
26	40 B	A71					X1.4	
25	39 B	A51					X1.3	
13	38 W	A31					X1.2	
1	37 R	A11					X1.1	

AA101	AA102	AA103	CABLE NUMBER
12	12	12	CABLE SIZE
0	0	0	NUMBER OF SPARES
66kV FEEDER 1 66kV RED PHASE CT	66kV FEEDER 1 66kV WHITE PHASE CT	66kV FEEDER 1 66kV BLUE PHASE CT	DESTINATION

CABLE NUMBER	AA104		AA118	AA126	EA504
CABLE SIZE	12		4	4	12
NUMBER OF SPARES	8		0	0	8
DESTINATION	66kV FEEDER 1 RELAY PANEL		STATISTICAL METERING PANEL	66kV FEEDER 1 ISOLATOR JB	66/11kV TRANSFORMER 1 RELAY PANEL

TERMINAL LOOPS (•)	
CT JB	40-41-42, 46-47-48, 52-53-54, 58-59-60, 61-62-63-64-65-66-E;
	70-71-72-E.

1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER

-	-	-	-	-	-	-
REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD	SCALE

AECOM
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CARL CRONJE DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

Eskom

ISCOR SUBSTATION

66kV FEEDER 1

CTJB CABLING DIAGRAM

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	25	1

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS.CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW.AC KEY
SHT 13	INDICAT.DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L GRODTTE

MASTER TRACING FILED UNDER D-DT-15007 SHEET 25 OF 28 REVISION 2

(NOT USED)

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS.CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW.AC KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
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TYGER WATERFRONT
CARL CRONJE DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

Eskom

PROJECT APPROVED: C. PYM	DESIGN APPROVED: A. CRAIB
DATE: 25/06/21	DATE: 13/13/10
PROJECT CHECKED: B. HOMANN	DESIGN CHECKED: N. MATHONSI
DATE: 25/06/21	DATE: 13/12/10
DRAWN BY: K. STEYNBERG	DRAWN BY: C. CANNON
DATE: 25/06/21	DATE: 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
LINE VTJB LAYOUT & KEY DIAGRAM

DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	61	26	0

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 26 OF 28 REVISION 2

(NOT USED)

SEE D-WC-7104 SET 159

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS.CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW.AC KEY
SHT 13	INDICAT.DC KEY
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SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

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Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 1
CABLE BLOCK DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	27	0

LEVELS 1 5 10 14 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 27 OF 28 REVISION 2

X2

					K301D	1	K301D	X4.8					
					K381	2	K381	X4.9					
					K383	3	K383	X4.10					
		X1.22			K301E	4	K301E	X4.11					
		X1.23			K385	5	K385	X4.12					
		X1.21			K387	6	K387	X4.13					
						7							
						8							
						9							
		X1.48			K101A	10	K101A	X5.24					
		X1.49			X103	11	X103	X5.25					
		X1.25			X105	12	X105	X5.26					
					X101B	13	X101B	X5.27					
					X107	14	X107	X5.28					
					X109	15	X109	X5.29					
					X101C	16	X101C	X5.30					
					X111	17	X111	X5.31					
					X113	18	X113	X5.32					
						19							
						20							
						21							
						22							
						23							
						24							
						25							
						26							
						27							
						28							
						29							
						30							
						31							
						32							
						33							
		AA110			CABLE NUMBER			AA115					
		12			CABLE SIZE			19					
		6			NUMBER OF SPARES			4					
		66kV LINE ISMB			DESTINATION			66kV FEEDER 1 RP					

X1

					B110AA	1	B110AA	43					
					B111AA	2	B111AA						
					B130AA	3	B130AA	44					
					B131AA	4	B131AA						
					B150AA	5	B150AA	45					
					B151AA	6	B151AA						
				48	B171AA	7	B171AA						
						8	B210AA						
					B211AA	9	B211AA						
						10	B230AA						
					B231AA	11	B231AA						
						12	B250AA						
					B251AA	13	B251AA						
						14	B271AA						
					P3AA	15	P3AA						
					P117AA	16	P117AA						
					P5AA	17	P5AA						
					P217AA	18	P217AA						
						19							
						20							
						21							
						22							
						23							
						24							
						25							
						26							
						27							
						28							
						29							
						30							
				AA126	CABLE NUMBER			AA126					
				4	CABLE SIZE			4					
				-	NUMBER OF SPARES			-					
				66kV FEEDER 1 CTJB	DESTINATION			66kV FEEDR 1 CTJB					

LOOPED TERMINALS	
BP ISMB	
BB1 ISMB	X1.20-X1.22; X1.24-X1.48; X1.32-X1.34; X1.33-X1.35; X1.37-X1.39; X1.41-X1.43; X1.44-X1.46; X1.45-X1.47
BB2 ISMB	X1.20-X1.22; X1.24-X1.48; X1.32-X1.34; X1.33-X1.35; X1.37-X1.39; X1.41-X1.43; X1.44-X1.46; X1.45-X1.47
LINE ISMB	X1.20-X1.22; X1.24-X1.48
ISJB	X1.1-X1.8; X1.3-X1.10; X1.5-X1.12; X1.7-X1.14

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
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SHT 24	CABLING DIAGRAM
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
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TEL: +27 (0)21 950 7500
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REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

LEVELS: 1 10

Eskom

PROJECT APPROVED	DESIGN APPROVED
C.PYM	J.MOSTERT
DATE 25/06/21	DATE 11/12/15
PROJECT CHECKED	DESIGN CHECKED
B.HOMANN	R.BUFFKINS
DATE 25/06/21	DATE 11/12/15
DRAWN BY	DRAWN BY
K.STEYNBERG	N.F.KNOETZEN
DATE 25/06/21	DATE 11/12/15

ISCOR SUBSTATION
66kV FEEDER 1
ISJB CABLING DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
61	28	1

PANEL TYPE DESIGNATION 4FZD-3920

MASTER TRACING FILED UNDER D-DT-15007 SHEET 28 OF 28 REVISION 2

AIL

SHEET NUMBER	TITLE	REVISION	DATE	DESIGN CHANGE DESCRIPTION
00	COVER SHEET	2	29/05/2015	UPDATED DESIGN CHANGE DESCRIPTION
01	PANEL EQUIPMENT LAYOUT	2	29/05/2015	UPDATED BACKPLATE NUMBERS OF TERMINALS
02	LOGIC DIAGRAM	2	29/05/2015	LEVEL 2 & 3 NOTES ADDED
03	SINGLE LINE DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
04	AC KEY DIAGRAM	2	29/05/2015	CORRECTED ALL CT CORES NEUTRAL, R & B DESIGNATIONS
05	VT SUPPLY KEY DIAGRAM	2	29/05/2015	ADDED 4 TERMINALS TO METERING VT SUPPLY
06	MAIN DC KEY DIAGRAM	2	29/05/2015	TEST TERMINALS ADDED, LEVEL 12 & 13 BREAKER DETAILS UPDATED, NOTE 1 ADDED
07	MAIN DC KEY DIAGRAM	2	29/05/2015	IED PSU WIRE NUMBER CORRECTED, LEVEL 12 & 13 BREAKER DETAILS UPDATED
08	TELEPROTECTION DC KEY DIAGRAM	2	29/05/2015	ADDED EXPLANATORY NOTE AND SET THREE TERMINAL DIFFERENTIAL OPTION TO LEVEL 4
09	BACK-UP DC KEY DIAGRAM	2	29/05/2015	TEST TERMINALS ADDED, LEVEL 12 & 13 BREAKER DETAILS UPDATED
10	BACK-UP DC KEY DIAGRAM	2	29/05/2015	LEVEL 12 & 13 BREAKER DETAILS UPDATED
11	BACK-UP DC KEY DIAGRAM	2	29/05/2015	NOTE 2 DETAIL ADDED, LEVEL 12 & 13 BREAKER DETAILS UPDATED
12	CLOSE DC KEY DIAGRAM	2	29/05/2015	CBC-CR AND CBCS-X1 TERMINALS CORRECTED, LEVEL 12 & 13 BREAKER DETAILS UPDATED, NOTE 3 ADDED
13	INDICATION DC KEY DIAGRAM	2	29/05/2015	LEVEL 12 & 13 BREAKER DETAILS UPDATED
14	SPRING REWIND AND AC KEY DIAGRAM	2	29/05/2015	UPDATED DISCHARGE POINT TERMINAL NUMBER, LEVEL 12 & 13 BREAKER DETAILS UPDATED, NOTE 1 ADDED
15	REA AND MEASUREMENTS KEY DIAGRAM	2	29/05/2015	ALTERED RJ45 CONNECTIONS DISPLAY SYMBOL (LEVEL 28)
16	SUPERVISORY STATUS & CONTROL KEY DIAGRAM	2	29/05/2015	DROPPING RESISTORS REMOVED & NOTE 1 ALTERED
17	SUPERVISORY ALARMS KEY DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
18	DISTURBANCE RECORDER KEY DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
19	PROTECTION REFERENCE DIAGRAM	2	29/05/2015	X71 P7 INPUT DESIGNATIONS UPDATED
20	PROTECTION REFERENCE DIAGRAM	2	29/05/2015	FLIP FLOP STATE AND RELAYS RXMB1 & RXMA1 OHMIC VALUES UPDATED, MODULE RCPM,C/T & R2F,1 REFERENCE SHEET NUMBERS UPDATED
21	PROTECTION REFERENCE DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
22	PANEL CABLING DIAGRAM	2	29/05/2015	ADDED 4 TERMINALS TO X2.39-42, LEVEL 12 & 13 BREAKER DETAILS UPDATED
23	PANEL CABLING DIAGRAM	2	29/05/2015	CORRECTED X6.39 TERMINAL TYPE & REMOVED X5 DROPPING RESISTORS; ADDED TEST SOCKET DETAILS, LVL 12 & 13 BREAKER DETAILS UPDATED
24	PANEL CABLING DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
25	CTJB CABLING DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
26	LINE VTJB LAYOUT & KEY DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION
27	CABLE BLOCK DIAGRAM	2	29/05/2015	AS PER PREVIOUS REVISION

LEVEL	DESCRIPTION	LEVEL	DESCRIPTION
1		16	
2	4FZD3920 DISTANCE/ DIFFERENTIAL SCHEME	17	
3	4FZ3920 DISTANCE SCHEME	18	FEEDER PRIMARY OUTBOARD BYPASS (ORDERING OPTION)
4	THREE TERMINAL DIFFERENTIAL OPTION	19	THREE PHASE MEASUREMENTS TRANSDUCER (ORDERING OPTION - ACTOM AREVA 1,5MT FREE ISSUED)
5		20	THREE PHASE MEASUREMENTS TRANSDUCER (ORDERING OPTION - CAMILLE BAUER SINEAX)
6		21	FRONT PLATE V AND I ANALOGUE METERS (ORDERING OPTION)
7		22	SINGLE PHASE V AND I TRANSDUCERS (ORDERING OPTION)
8		23	SUPERVISORY INDICATION AND CONTROL (HARDWIRED) (ORDERING OPTION)
9		24	IDF WIRING (HARDWIRED)
10	STANDARD DESIGN DRAWING	25	SUPERVISORY STATUS INDICATION (DNP3)
11	STANDARD CTJB AC CONNECTION	26	DISTURBANCE RECORDER (ORDERING OPTION)
12	STANDARD OUTDOOR HV ABB 3P CIRCUIT-BREAKER 132kV (AS PER ABB DRAWINGS 1HSB543200-AAF REV G)	27	STANDARD COMMS OPTIONS (FIBRE AND SPA REMOTE ENG. ACCESS)
13	STANDARD OUTDOOR HV ABB 3P CIRCUIT-BREAKER 36-72,5kV (AS PER ABB DRAWINGS 1HYB902173 REV 3)	28	IEC-61850/ETHERNET COMMS (ORDERING OPTION)
14	VOLTAGE SELECTOR RELAY (VSR) DOUBLE BUSBAR (ORDERING OPTION)	29	TIME SYNCHRONISATION EXTERNAL INPUTS RED670
15	LINE VT CONNECTION DIAGRAM	30	TIME SYNCHRONISATION INTERNAL INPUTS RED670 (ORDERING OPTION)

? MUTUALLY EXCLUSIVE LEVELS/SHEETS. SELECT ONE AND ONLY ONE OF EACH PAIR/SET PER APPLICATION.
x MUTUALLY INCLUSIVE LEVELS/SHEETS.

66kV FEEDER 2: BLOUWATER 2 / YSTERVARK TEE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

AECOM
CAPE TOWN OFFICE
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FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
COVER SHEET

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	00	1

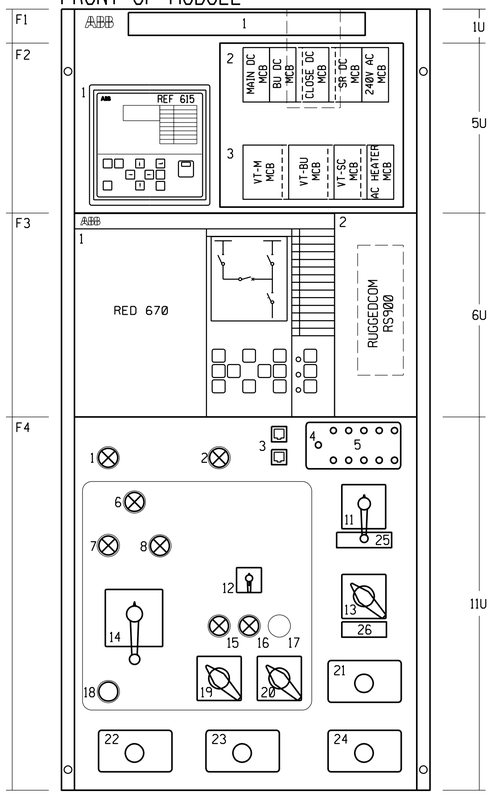
LEVELS 1 5 10

PANEL TYPE DESIGNATION 4FZD-3920

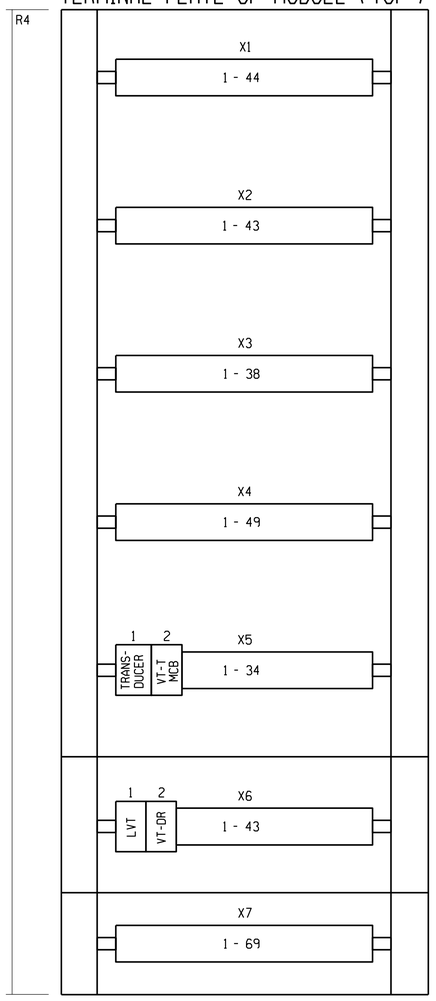
SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 00 OF 28 REVISION 2

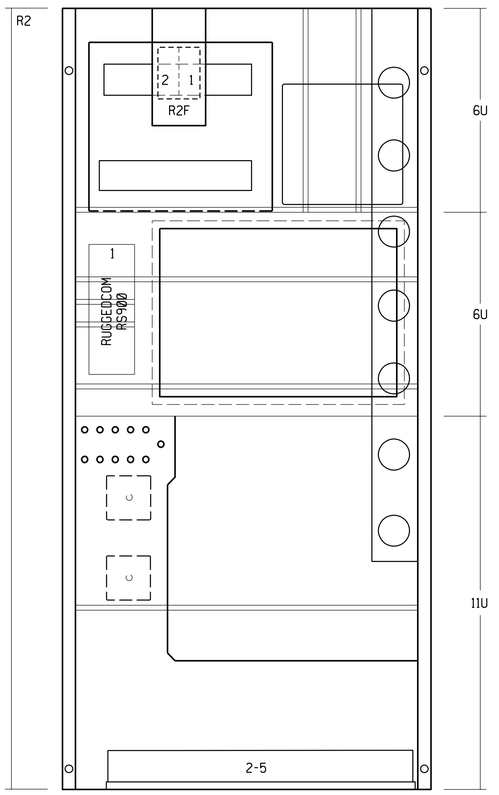
FRONT OF MODULE



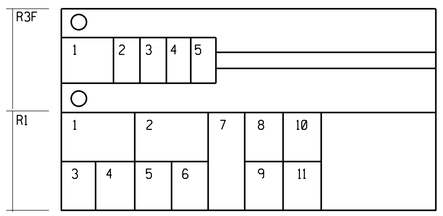
TERMINAL PLATE OF MODULE (TOP)



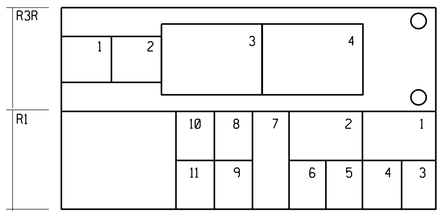
REAR OF MODULE



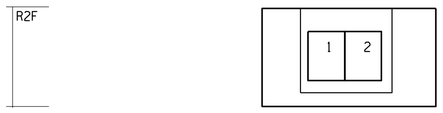
INTERNAL TO MODULE



INTERNAL TO MODULE



INTERNAL TO MODULE



LOCATION			DESIGNATION	DESCRIPTION	TYPE	MANUFACTURER
FRONT OF MODULE						
F1	1		LABEL			
F2	1		BACK-UP IED	DIRECTIONAL BACK-UP PROTECTION	REF615	ABB
	2	1	MCB(M)	MAIN DC SUPPLY MCB (110V, 220V SCHEME) (16 AMP)	S282-UC B16	ABB
		2	MCB(BU)	BACK-UP DC SUPPLY MCB (110V, 220V SCHEME) (16 AMP)	S282-UC B16	ABB
		3	MCBX(CL)	CLOSE DC SUPPLY MCB AUXILIARY CONTACT	S2-H11 I	ABB
		4	MCB(CL)	CLOSE DC SUPPLY MCB (110V, 220V SCHEME) (10 AMP)	S282-UC B10	ABB
		5	MCBX(SR)	SPRING REWIND DC SUPPLY MCB AUXILIARY CONTACT	S2-H11 I	ABB
		6	MCB(SR)	SPRING REWIND DC SUPPLY MCB (110V, 220V SCHEME) (20 AMP)	S282-UC B20	ABB
		7	MCB(AC)	MAIN AC SUPPLY MCB (10 AMP)	S282-UC B10	ABB
	3	1	MCB(VT-M)	VT SUPPLY MAIN PROTECTION MCB (3 POLE) (2 AMP)	S203-C 2	ABB
		2	MCBX(VT-M)	VT SUPPLY MAIN PROTECTION MCB AUXILIARY CONTACT	S2C-H6R	ABB
		3	MCB(VT-BU)	VT SUPPLY BACK-UP PROTECTION MCB (3 POLE) (2 AMP)	S203-C 2	ABB
		4	MCBX(VT-BU)	VT SUPPLY BACK-UP PROTECTION MCB AUXILIARY CONTACT	S2C-H6R	ABB
		5	MCB(VT-SC)	VT SUPPLY SYNCH CHECK MCB (2 AMP)	S202-C 2	ABB
		6	MCBX(VT-SC)	VT SUPPLY SYNCH CHECK MCB AUXILIARY CONTACT	S2C-H6R	ABB
		7	MCB(H)	HEATER SUPPLY MCB (6 AMP)	S282-UC B6	ABB
F3	1		MAIN IED	INTERGRATED DISTANCE/DIFFERENTIAL FEEDER PROTECTION RELAY	RED670	ABB
F4	1		PNH	PROTECTION NOT HEALTHY INDICATION (AMBER)	CL523Y	ABB
	2		ARC-OFF/LOCKED-OUT	AUTO RECLOSE OFF & CLOSE LOCK-OUT INDICATION (AMBER) (CL520 = 240V DC)	CL515Y	ABB
	3		IEC61850 RELAY COM PORTS	IEC61850 RELAY TEST ETHERNET COMMUNICATION PORTS		
	4		ESD	ELECTROSTATIC DISCHARGE POINT	SOCKET (BLUE)	COMMUNICA
	5	1	TP-1	TEST POINT 1 - MAIN PROTECTION TRIP (RED PHASE)	SOCKET (RED)	COMMUNICA
		2	TP-2	TEST POINT 2 - MAIN PROTECTION TRIP (WHITE PHASE)	SOCKET (RED)	COMMUNICA
		3	TP-3	TEST POINT 3 - MAIN PROTECTION TRIP (BLUE PHASE)	SOCKET (RED)	COMMUNICA
		4	TP-4	TEST POINT 4 - BREAKER FAIL BUS STRIP	SOCKET (RED)	COMMUNICA
		5	TP-5	TEST POINT 5 - MAIN DC NEGATIVE SUPPLY	SOCKET (BLACK)	COMMUNICA
		6	TP-6	TEST POINT 6 - BREAKER FAIL RETRIP CROSS TRIP	SOCKET (RED)	COMMUNICA
		7	TP-7	TEST POINT 7 - SUPERVISORY TRIP	SOCKET (RED)	COMMUNICA
		8	TP-8	TEST POINT 8 - BACK-UP PROTECTION TRIP	SOCKET (RED)	COMMUNICA
		9	TP-9	TEST POINT 9 - ARC OR EXTERNAL CLOSE	SOCKET (RED)	COMMUNICA
		10	TP-10	TEST POINT 10 - BACK-UP DC NEGATIVE SUPPLY	SOCKET (BLACK)	COMMUNICA
	6		CBNH	CIRCUIT BREAKER NOT HEALTHY INDICATION (AMBER)	CL515Y	ABB
	7		CBO	CIRCUIT BREAKER OPEN INDICATION (GREEN)	CL515G	ABB
	8		CBC	CIRCUIT BREAKER CLOSE INDICATION (RED)	CL515R	ABB
	11		TNS	TEST NORMAL SWITCH	CR0867	LOP SWITCH
	12		LCS	LAMP CHECK SWITCH	CA4 A321-621	KRAUSE & NAIMER
	13		TPIS	TELEPROTECTION ISOLATOR SWITCH	CR-0866	LOP SWITCH
	14		CBCS	CIRCUIT BREAKER CONTROL SWITCH	CR-0604	LOP SWITCH
	15		ARC OFF	AUTO RECLOSE SELECTION STATE PUSH BUTTON (AMBER) (110V DC)	MP3-11Y, MBH-101	ABB
	16		ARC 3 POLE	AUTO RECLOSE SELECTION STATE PUSH BUTTON (AMBER) (110V DC)	MP3-11Y, MBH-101	ABB
	17			(BLANK)		
	18		TTPB	TRIP TEST PUSH BUTTON/ PROTECTIVE COVER	CP10-10R-10/ YSF	ABB
	19		BFIS	BREAKER FAIL ISOLATOR SWITCH	CR-0866A	LOP SWITCH
	20		SIS	SUPERVISORY ISOLATOR SWITCH	CR-0316	LOP SWITCH
	21		CTTB-BU	CT TEST BLOCK (BACK-UP)	PK2 (4 WAY)	IST
	22		CTTB-M	CT TEST BLOCK (MAIN)	PK2 (4 WAY)	IST
	23		VTTB-M	VT TEST BLOCK (MAIN)	PK2 (4 WAY)	IST
	24		VTTB-BU	VT TEST BLOCK (BACK-UP)	PK2 (4 WAY)	IST
	25		M.O.T.- LINK A CLOSED = NO SYNCH CHECK	LABEL INDICATING EMERGENCY CLOSE CONTROL WITHOUT SYNCH CHECK WHEN LINK A IS CLOSED, AND TNS SELECTED TO MAIN ON TEST		
	26		REMOTE DIFF ISOLATION	LABEL INDICATING TPIS BLOCKS REMOTE DIFF UNIT (OPTIONAL)		
INTERNAL TO MODULE						
R1	1		VSR-1	ISOLATOR 1 REPEAT RELAY (• AN=110V DC, AS=220V DC) (NOT INSTALLED)	RXMVB 2 RK 251205-•	ABB
	2		VSR-2	ISOLATOR 2 REPEAT RELAY (• AN=110V DC, AS=220V DC) (NOT INSTALLED)	RXMVB 2 RK 251205-•	ABB
	3			(BLANK)		
	4			(BLANK)		
	5		RCPM_C/T	SNUBBER CIRCUIT	RCPM1 PR56512029-AA	ABB
	6		CT-X	BACK-UP TO MAIN CROSS TRIP AUXILIARY RELAY	RXMA 1 RK 211072-AN	ABB
	7		PSU	48 VOLT DC POWER SUPPLY UNIT (NOT INSTALLED)	RXTUG	ABB
	8		TCS-M	TRIP CIRCUIT SUPERVISION MAIN (MAIN)	BTCS110	ABB
	9			(BLANK)		
	10			(BLANK)		
	11		TCS-BU	TRIP CIRCUIT SUPERVISION BACK-UP (BACK-UP)	BTCS110	ABB
R3F	1		D1	LAMP CHECK DIODES	PR56592018	WEIDMULLER/ ABB
	2		D2	CROSS TRIP DIODES	PR56512033.BA	WEIDMULLER/ ABB
	3		D3	CROSS TRIP DIODES	PR56512033.BA	WEIDMULLER/ ABB
	4		D4	BLOCKING DIODE (MEASURING POINTS)	PR56592018/4.PNH	WEIDMULLER/ ABB
	5		D5	BLOCKING DIODE (TRIP CIRCUIT SUPERVISION 3 POLE)	PR56512033.BA	WEIDMULLER/ ABB
R3R	1		DCF-M	DC FAIL RELAY (MAIN) (• 110=110V DC, 220=220V DC)	CR-U110DC3L	ABB
	2		DCF-BU	DC FAIL RELAY (BACKUP) (• 110=110V DC, 220=220V DC)	CR-U110DC3L	ABB
	3		MCTS	MAIN CT SHORTING RELAY (• 110=110V DC, 220=220V DC) (NOT INSTALLED)	BJ8-110V DC	ARTECHE
	4		BCTS	BACK-UP CT SHORTING RELAY (• 110=110V DC, 220=220V DC) (NOT INSTALLED)	BJ8-110V DC	ARTECHE
R2F	1		CBC-CR	CIRCUIT BREAKER CLOSE AUXILIARY RELAY (• AN = 110V DC, AS = 220V DC)	RXMB1 IMRK 000 803-•	ABB
	2			(BLANK)		
REAR OF MODULE						
R2	1		ROUTER	IEC61850 ROUTER (OPTIONAL)	RS900-HI-D-MTMTMT	RUGGEDCOM
	2		CBOS-X1	CIRCUIT BREAKER OPEN SUPERVISORY AUXILIARY 1 RELAY (48V DC) (OPTIONAL)	CR-U048DC3	ABB
	3		CBCS-X1	CIRCUIT BREAKER CLOSE SUPERVISORY AUXILIARY 1 RELAY (48V DC) (OPTIONAL)	CR-U048DC3	ABB
	4		PNH-X1	PROTECTION NOT HEALTHY AUXILIARY 1 RELAY (• 110=110V DC, 220=220V DC)	CR-U110DC3L	ABB
	5		PNH-X2	PROTECTION NOT HEALTHY AUXILIARY 2 RELAY (• 110=110V DC, 220=220V DC)	CR-U110DC3L	ABB
				(NOT INSTALLED)	SINEAX CAM/1STAT15MT	CAMILLE/ AREVA
R4	X5.1		TRANSDUCER	MEASUREMENTS TRANSDUCER & INTERFACE (NOT INSTALLED)	SINEAX U543,1543	CAMILLE BAUER
				(NOT INSTALLED)	VA4-LDG6, CA4-LDG6	POWERCON
	X5.2		MCB (VT-T)	TRANSDUCER VT SUPPLY MCB (3 POLE) (2 AMP)	S203-C 2	ABB
	X6.1		MCB (LVT)	DISTURBANCE RECORDER LVT SUPPLY MCB (NOT INSTALLED) (1 AMP)	S202-C 1	ABB
	X6.2		MCB (VT-DR)	DISTURBANCE RECORDER VT SUPPLY MCB (3 POLE) (NOT INSTALLED) (1 AMP)	S203-C 1	ABB

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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10

SCALE

ISCOR SUBSTATION
66kV FEEDER 2
PANEL EQUIPMENT LAYOUT

SET NUMBER	SHEET NUMBER	REVISION
62	01	1

D-WC-7104

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 01 OF 28 REVISION 2

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

RED670 AND REF615 RELAYS USE PCM600 AS THEIR SOFTWARE TOOL. THE REQUIRED CONNECTIVITY PACKAGES FOR THESE RELAYS IS THE RELION SERIES SOFTWARE.

REDG70: MAIN DISTANCE/DIFFERENTIAL RELAY
NOTE THAT THE INTERNAL TELEPROTECTION/DIFFERENTIAL COMMUNICATION LINK OF THIS RELAY IS ONLY COMPATABLE WITH A MIRRORED RELAY ON THE DISTRIBUTION CONTRACT OR SCHEMES 6FZD3500 AND 6FZD3600 ON THE TRANSMISSION CONTRACT.

EXPLANATION OF THE CONTROLLED SWITCHES USED IN THE RED670 MAIN RELAY
GT SWITCHES, WHICH ARE SETTABLE IN THE PCM600 ENGINEERING PARAMETER SETTING (PS) SOFTWARE, AND MAY BE FOUND WITHIN THE PARAMETER SETTINGS UNDER THE APPLICATION CONFIGURATION SECTIONS THEY ARE CONFIGURED WITHIN, ARE MASKED AS FOLLOWS:

GT-01) INTERNAL COMMUNICATION CARD LINK FAIL FUNCTION SELECTION
SET GT01 TO 'ON' (THE DEFAULT) IF THE SCHEME HAS A COMMUNICATION CARD IN SLOT X34 OR X35 AND IT IS USED.
SET GT01 TO 'OFF' IF THE CARD IS NOT USED OR IF THE SCHEME DOES NOT HAVE A COMMUNICATION CARD IN SLOT X34 OR X35.

TO TAKE ADVANTAGE OF THE TEF CARRIER GUARD FAIL MASKING: SET UNBLOCK = RESTART IN THE PST SOFTWARE AND SET SECURITY = 35ms.

GT-02) TEST OUTPUTS
SET GT02 TO 'ON' TO ENABLE PHASE AND EARTH FAULT IMPEDANCE STARTER TEST OUTPUTS.
SET GT02 TO 'OFF' (THE DEFAULT) TO ENABLE CARRIER RECEIVE AND CARRIER SEND TEST OUTPUTS.

GT-03) INSTANTANEOUS TRIP PARALLEL/SERIES LOGIC FUNCTION SELECTION
SET GT03 TO 'OFF' (THE DEFAULT) FOR PARALLEL OPTION WHICH ALLOWS EITHER FUNCTION, DIFFERENTIAL OR DISTANCE (Z1 OR Z2 AIDED), TO INITIATE THE TRIP (INCREASED DEPENDABILITY).
WITH GT03 SET 'ON', THE SERIES OPTION IS CHOSEN WHICH REQUIRES BOTH FUNCTIONS TO OPERATE TO INITIATE AN INSTANTANEOUS TRIP (INCREASED SECURITY).

GT-04) CARRIER GUARD ZONE ACCELERATION BLOCK
SET GT04 TO 'OFF' (THE DEFAULT) IN 'Application Configuration/Monitoring/Logic/LogicGate' WHEN THE CARRIER GUARD IS NOT USED.
SET GT04 TO 'ON' WHEN USING THE CARRIER GUARD AND USING THE ZONE ACCELERATION FUNCTIONALITY. NOTE THAT ZONE ACCELERATION CAN BE SET ON OR OFF (THE DEFAULT) WITHIN THE SETTINGS AND SHOULD ONLY BE USED FOR SINGLE RADIAL LINES.

GT-05) CARRIER GUARD SELECTION
SET GT05 TO 'ON' FOR CARRIER GUARD USEAGE. SET TO 'OFF' (THE DEFAULT) IF THERE IS NO 50V DC SUPPLY TO THE EXTERNAL TELEPROTECTION (PLC) SCHEME CIRCUIT.

GT-06) PARALLEL FEEDER DISTANCE-TO-FAULT COMPENSATION SELECTION
SET GT06 TO 'OFF' (THE DEFAULT) FOR NO PARALLEL FEEDER DISTANCE TO FAULT COMPENSATION (FAULT LOCATOR ACCURACY).
SET GT06 TO 'ON' FOR DTF FAULT LOCATOR COMPENSATION FOR PARALLEL FEEDERS (DOUBLE CIRCUIT FEEDERS).

GT-07) UNDERVOLTAGE OVERLOAD TRIP OR OVERVOLTAGE TRIP FUNCTION SELECTION
THE U/V OVERLOAD TRIP FUNCTION (THE DEFAULT) MAY BE REPLACED WITH THE 'OVLD' TRIP FUNCTION (SET GT07 TO 'ON' FOR OVLD TRIP) IF THE SOLE CRITERIA IS CURRENT.

A SETTABLE TIMER FUNCTION, TS14, IS USED FOR THE TIMING OF THE OVERLOAD (OVLD) TRIP FUNCTION. TS14 WILL DELAY THE OVERLOAD TRIP OUTPUT AND IS SETTABLE IN THE PST SOFTWARE. TS14 IS IN SERIES WITH THE OVLD FUNCTION TIMER T OUTPUT (i.e. THE TIMERS ARE ADATIVE). IF TS14 IS SET TO 'OFF', THE OVLD TRIP AND THE U/V OVLD ARE BLOCKED BUT THE OVLD ALARM WOULD REMAIN FUNCTIONAL (i.e. THE OVLD ALARM OUTPUT IS TAKEN OFF BEFORE TS14 AND THE OVLD ALARM WOULD OPERATE AFTER OVLD FUNCTION TIME TIMEOUT).
NOTE THAT THE U/V FUNCTION TIMER RUNS CONCURRENTLY WITH THE OVLD TRIP OUTPUT FOR THE U/V TRIP OUTPUT.

GT-08) BROKEN CONDUCTOR TRIP OR ALARM FUNCTION SELECTION
THE BROKEN CONDUCTOR ALARM FUNCTION (THE DEFAULT) MAY BE REPLACED WITH THE BROKEN CONDUCTOR TRIP FUNCTION (SET GT08 TO 'ON' FOR BC TRIP) IF THE CONNECTED POWER PARAMETERS ALLOW IT.

GT-09) FUSE FAIL BREAKER STATUS DUDI FUNCTION SELECTION
SET GT09 TO 'OFF' (THE DEFAULT) FOR EXCLUSION OF THE BREAKER STATUS WITHIN THE DUDI FUNCTION DECISION LOGIC (THEN RELIES SOLELY ON THE CONDITION 'phase Imag > IPh setting' TO BE FULFILLED FOR INITIATION OF DUDI). SET GT09 'ON' FOR INCLUSION OF THE BREAKER STATUS LOGIC (THEN RELIES ON EITHER OF THE CONDITIONS 'phase Imag > IPh setting' OR 'CIRCUIT BREAKER CLOSED' TO BE FULFILLED FOR INITIATION OF THE DUDI FUNCTION).

GT-11) POLE DISAGREEMENT FUNCTION SELECTION
THE POLE DISAGREEMENT FUNCTION (PD) INCLUDES BOTH BREAKER AUXILIARY CONTACT ANALYSIS (TRADITIONAL METHOD) AND A CURRENT BASED FUNCTIONALITY. THEY ARE INDEPENDANT OF EACH OTHER.

THE CURRENT BASED OPTION CAN BE SET FOR CONTINUOUS MONITORING OR FOR A PERIOD OF 200ms AFTER THE BREAKER CHANGES STATE (CurrSel='CB OPEN MONITOR' IS THE SETTING FOR THE 200ms OPTION - INITIATED VIA CLOSE OR 3 POLE TRIP COMMANDS).
IF THE CURRENT BASED OPTION IS USED, THEN IT IS RECOMMENDED TO CHOOSE THE 200ms OPTION, AS OPPOSED TO THE CONTINUOUS OPTION, AS IT IS MORE SECURE.
IF THE CURRENT BASED OPTION IS NOT REQUIRED (RECOMMENDED), SET THE 'Curr Sel' TO 'OFF' (THE DEFAULT).

FUNCTIONALITY HAS BEEN ADDED TO THE TRADITIONAL METHOD OF PD AND THUS THERE IS AN OPTION TO HAVE IT SUPERVISED BY USING THE BROKEN CONDUCTOR 'START' FUNCTIONALITY AND BROKEN CONDUCTOR FUNCTION CURRENT SETTINGS. THIS IS STILL INDEPENDANT OF THE SOLELY CURRENT BASED OPTION IN THE PREVIOUS PARAGRAPH.

SET GT11 TO 'ON' (THE DEFAULT) FOR TRADITIONAL POLE DISAGREEMENT FUNCTIONALITY (i.e. BREAKER AUXILIARY CONTACT ANALYSIS).
SET GT11 TO 'OFF' TO ENABLE A COMBINATION THAT USES BREAKER AUXILIARY CONTACTS AND THE BROKEN CONDUCTOR START FUNCTIONALITY.
THIS EXTRA FUNCTIONALITY HAS BEEN ADDED TO ENHANCE SECURITY OF THE SCHEME (i.e. PD WITH BCondStart WOULD NOT OPERATE FOR A FAULTY BREAKER AUXILIARY CONTACT ONLY) BUT WITH DECREASED DEPENDABILITY (i.e. THE LINE MUST BE ENERGISED, CONNECTED AND POSSIBLY LOADED BEFORE A PD COULD OPERATE).

GT-12) ZONE 2 AUTORECLOSE INITIATE FUNCTION SELECTION
FOR SELECTION OF IMPEDANCE ZONE 2 AUTORECLOSE INITIATION (Z2 ARC INITIATE), SET GT12 TO 'ON'. SET GT12 TO 'OFF' (THE DEFAULT) FOR NO ZONE 2 ARC INITIATE.

GT-13) FAULT AND TRIP COUNTER RESET
GT13 DEFAULT = 'OFF'. SET GATE 'ON' THEN 'OFF' WHEN REPLACING THE HV BREAKER.

GT-14) TEF (EARTH-FAULT RED670) AUTORECLOSE INITIATE FUNCTION SELECTION
FOR SELECTION OF TEF AUTORECLOSE INITIATION, SET GT14 TO 'ON' (THE DEFAULT) IN 'Application Configuration/Closing ARCend Sync/Logic/LogicGate'.
SET GT14 TO 'OFF' FOR NO TEF ARC INITIATE.

GT-15) O/C (RED670) AUTORECLOSE INITIATE FUNCTION SELECTION
FOR SELECTION OF O/C AUTORECLOSE INITIATION, SET GT15 TO 'ON' IN 'Application Configuration/Closing ARCend Sync/Logic/LogicGate'.
SET GT15 TO 'OFF' FOR NO O/C ARC INITIATE (THE DEFAULT).

GT-16) SYNCH CHECK FUNCTION
SET GT16 TO 'OFF' (THE DEFAULT) FOR USAGE OF THE SYNCH CHECK AUTO FUNCTION. SET GT16 TO 'ON' IF THERE IS NO SYNCH CHECK LINE VT.

GT-18) TRIP CIRCUIT SUPERVISION CLOSE BLOCKING
SET GT18 TO 'ON' IN 'PARAMETER SETTING/MONOTORING' FOR ANY TCS FAIL (FROM MAIN OR BACK-UP TRIP COIL CIRCUITS) TO BLOCK A CLOSE.
TCS FAIL WILL NOT BLOCK A CLOSE IF GT18 IS SET 'OFF' UNLESS BOTH MAIN AND BACK-UP TRIP CIRCUITS HAVE FAILED. THE DEFAULT SETTING IS GT18='OFF'.
A PNH AND A CBNH ALARM WILL BE ISSUED FOR A TCS FAIL, IRRESPECTIVE OF THE GT18 STATE.

REF615: BACK-UP RELAY SETTINGS AND LOGIC

CB CLOSE CONTROL LOGIC
THE BACK-UP RELAY HAS BEEN MASKED AND THE SCHEME WIRED TO ENABLE BREAKER CONTROL WHEN THE TNS SWITCH IS SET TO 'MAIN ON TEST' (AND BACK-UP ON TEST).
THE CLOSE PULSE CAN BE ISOLATED IF REQUIRED BY LINK A ON THE TERMINAL STRIP AS THE BACK-UP RELAY DOES NOT OFFER SYNCH-CHECK.
THE DEFAULT LINK A POSITION IS 'OPEN'.

SUPERVISORY BREAKER CONTROL:
THE BACK-UP RELAY IS ALSO MASKED FOR SUPERVISORY DNP3 AND HARDWIRED REMOTE BREAKER CONTROL (VIA MAIN ON TEST AND SIS SELECTION).

BREAKER FAIL LOGIC (51BF)
THE FUNCTION IS ONLY ENABLED WHEN THE TNS SWITCH IS SET TO 'MAIN ON TEST' (AND BACK-UP ON TEST). THERE IS NO TELEPROTECTION LINKED TO THIS OUTPUT AND THE BREAKER FAIL OUTPUT IS ALSO ISOLATED VIA THE BFIS SWITCH. THE BF TRIP PULSE OUTPUT IS SET TO 200ms.

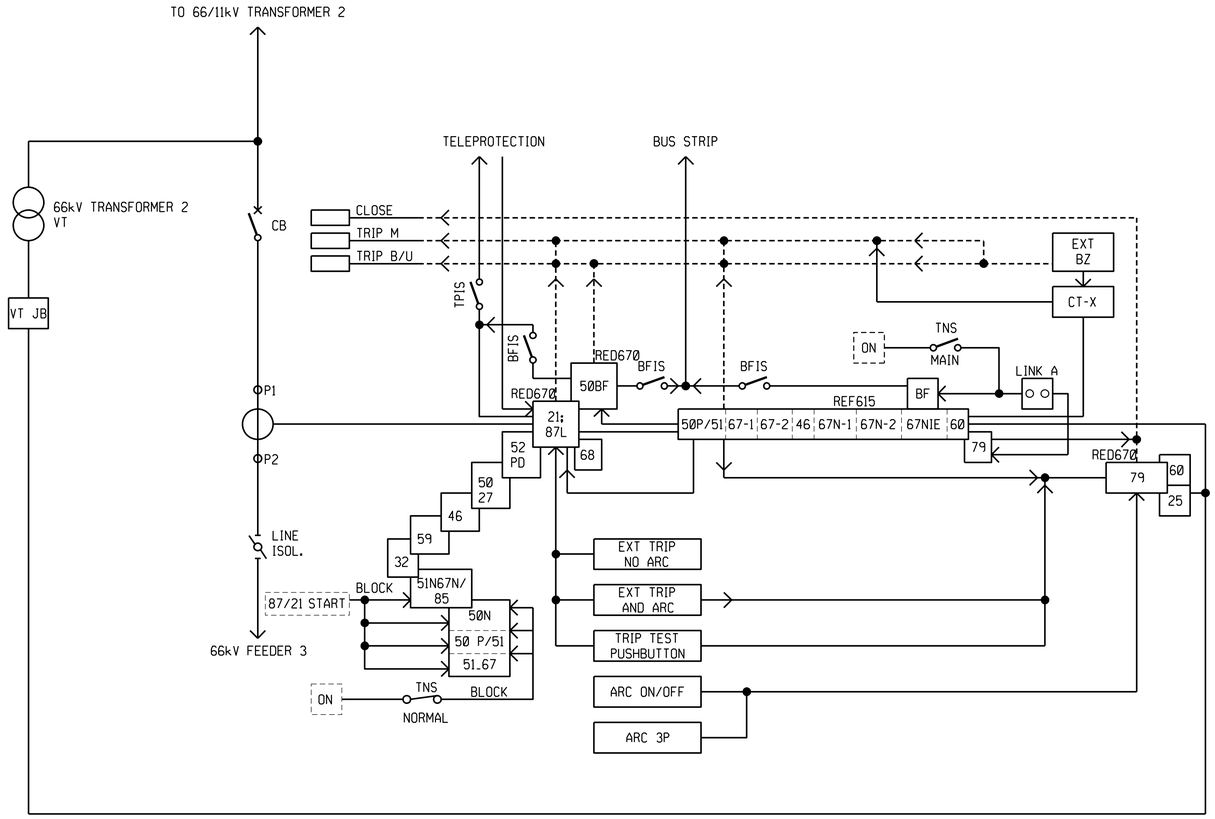
AUTORECLOSE (DARREC1(79))
THE RELAY INCLUDES ARC FUNCTIONALITY. THE FUNCTION IS MASKED SUCH THAT IT IS ENABLED WHEN THE TNS SWITCH IS SET TO 'MAIN ON TEST' (AND BACK-UP ON TEST). HOWEVER, DUE TO LIMITATIONS, BACK-UP RELAY INTERNAL ARC ON/OFF IS NOT SELECTABLE VIA SUPERVISORY OR FROM THE OPERATOR PANEL. THE FUNCTION CAN BE SET ON/OFF VIA EITHER ALTERNATIVE SETTING SELECTION OR MANUALY AND SHOULD ONLY BE USED IN LONG TERM EMERGENCIES.
NOTE THAT THE FUNCTION IS AUTOMATICALLY INHIBITED FOR A MANUAL CLOSE.

2ND HARMONIC INRUSH DETECTION FUNCTIONALITY
THE INRUSH DETECTION FUNCTION, INRPHAR1, IS MASKED TO BLOCK THE FOLLOWING FUNCTIONS WHEN OPERATED:
DIR_OC1 (67-1(1)), DIR HighSetOC (67-2), NonDir InstOC (50P/51), AND IS MASKED TO ENABLE THE DIR_OC2 (67-1(2)) FUNCTION'S MULTIPLIER.

CB CLOSED MULTIPLIER (TPGAPC1 GENERIC TIMER, DEFAULT TIME = 500ms):
TP GAPC1 IS MASKED TO THE FOLLOWING FUNCTIONS TO ENABLE THE MULTIPLIER WHEN THE BREAKER CLOSES IF REQUIRED:
DIR HighSetOC (67-2), NonDIR InstOC (50P/51), SEF DIR EF2 (67N-1), DEF HighSet (67N-2), NonDIR_InstEF (51N-2), NegSeq_OC1/2 (46(1/2)).

THERMAL OVERLOAD (ThermOVLD (49F))
THE FUNCTION HAS BEEN MASKED FOR INDICATION AND NOT TRIP PURPOSES. HOWEVER, THE BLOCK BREAKER CLOSE FOR TEMPERATURE EXCEED HAS BEEN MASKED.
TO CIRCUMVENT THE BLOCK CLOSE FUNCTIONALITY, SET THE RECLOSE TEMPERATURE TO MAXIMUM OR SET THE FUNCTION OFF.

BROKEN CONDUCTOR ((46PD) OVERVOLTAGE 3PH O/V (59)), UNDERVOLTAGE 3PH U/V (27), PosSeq-U/V (47U), NegSeq-O/V (47O)
THESE FUNCTIONS HAVE BEEN MASKED FOR ALARMING PURPOSES ONLY. HOWEVER, THE OPERATION OF THE FUNCTIONS WOULD INHIBIT THE INTERNAL ARC FUNCTION (ENABLED VIA TNS OFF NORMAL).



LEGEND	
21	DISTANCE PROTECTION FUNCTION
25	SYNCHRONISM-CHECK FUNCTION
27	UNDERVOLTAGE FUNCTION
32	DIRECTIONAL OVERPOWER FUNCTION
46	NEGATIVE SEQUENCE OVERCURRENT/ BROKEN COND FUNCTIONS
50BF	BREAKER FAIL FUNCTION
50N	NON-DIR INSTANTANEOUS EARTHFAULT FUNCTION
50/51	INSTANTANEOUS OR TIME DELAY OVERCURRENT FUNCTION
50P/51	NON-DIR INSTANTANEOUS OVERCURRENT FUNCTION
51	AC INVERSE TIME O/C FUNCTION
52PD	POLE DISAGREEMENT PROTECTION FUNCTION
59	OVERVOLTAGE FUNCTION FUNCTION
60	FUSE FAILURE FUNCTION
67-1	DIR OVERCURRENT IDMT OR DT FUNCTION
67-2	DIR HIGHSET OVERCURRENT FUNCTION
67N-1	DIRECT EARTHFAULT IDMT OR DT FUNCTION
67N-2	DIR HIGHSET EARTHFAULT FUNCTION
67NIE	INTERMITANT EARTHFAULT FUNCTION
68	POWERSWING FUNCTION
79	AUTO RECLOSE FUNCTION
85	EARTH FAULT FUNCTION AIDED
87L	LINE DIFFERENTIAL PROTECTION FUNCTION
AUX	AUXILIARY
BCD	BINARY CODED DECIMAL
BZ	BUSZONE

LEGEND	
CT-X	CROSS TRIP AUXILIARY
DIR	DIRECTIONAL
DT	DEFINITE TIME
DTTR	DIRECT TRANSFER TRIP RECIEVE
DTTS	DIRECT TRANSFER TRIP SEND
GPS	GLOBAL POSITIONING SYSTEM
GSM	GPS TIME SYNCHRONISATION MODULE
LDCM	LINE DATA COMMUNICATION MODULE (TELEPROTECTION AND DIFFERENTIAL COMMUNICATION)
LSB/MSB	LEAST SIGNIFICANT BIT /MOST SIGNIFICANT BIT
LSB	LEAST SIGNIFICANT BIT
MSB	MOST SIGNIFICANT BIT
OEM	OPTICAL ETHERNET MODULE
PCM600	CONFIGURATION, PARAMETER SETTING & DISTURBANCE HANDLING ENGINEERING TOOL PACKAGE FOR ABB RELION SERIES
PS	PARAMETER SETTING TOOL WITHIN PCM600
REA	REMOTE ENGINEERING ACCESS
SLM	SERIAL COMMUNICATION MODULE LON AND SPA BUS
SYNCH	CHECK SYNCHRONISM OR SYNCHRONISM-CHECK
TCS	TRIP CIRCUIT SUPERVISION (MONITOR)
TP	TEST POINT
TRIP B/U	TRIP BACKUP CIRCUIT BREAKER COIL
TRIP M	TRIP MAIN CIRCUIT BREAKER COIL
VSR	VOLTAGE SELECTION RELAY

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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
LOGIC DIAGRAM

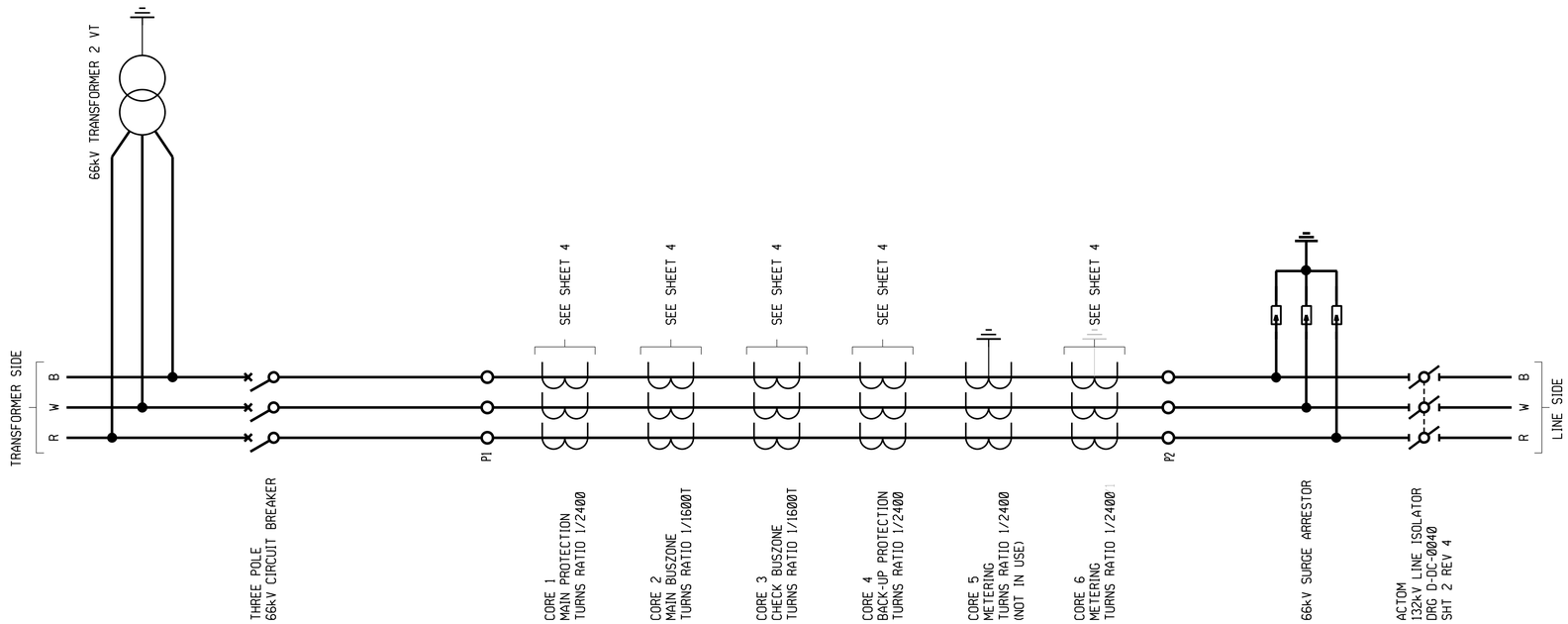
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	02	1

PANEL TYPE DESIGNATION 4FZD-3920

MASTER TRACING FILED UNDER D-DT-15007 SHEET 02 OF 28 REVISION 2

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

SIZE A1L



SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
SINGLE LINE DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	03	1

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FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

LEVELS 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 03 OF 28 REVISION 2

	TERMINAL DESCRIPTION
CT	CURRENT TRANSFORMER
CTJB	CURRENT TRANSFORMER JUNCTION BOX
RP	RELAY PANEL TERMINAL

66/11kV TRANSFORMER 2 SIDE

66kV CIRCUIT BREAKER

66kV LINE ISOLATOR

LINE SIDE

SURGE ARRESTER

TO 66/11kV TRANSFORMER 2 SEE D-WC-7104 SHT 08

F3.1 REDG70 — F4.22 CTTB-M — NOTE 1

F2.1 REF615 — F4.21 CTTB-BU — NOTE 1

• STAR POINTS FOR THIS CORE MUST BE TOWARD LINE

NOT USED

F3.1 REDG70 — NOTE 4

CTJB

CORE 1 MAIN PROTECTION CLASS TPS M.R 2400/1 USE 400/1

CORE 2 BUSZONE (MAIN) CLASS TPS M.R 1600T/1 (NOT USED)

CORE 3 BUSZONE (CHECK) CLASS TPS M.R 1600T/1 (NOT USED)

CORE 4 BACK-UP PROTECTION CLASS TPS M.R 2400/1 USE 600/1

CORE 5 MEASUREMENTS CLASS 0.2 M.R 2400/1 NOT USED

CORE 6 MEASUREMENTS CLASS 0.2 M.R 2400/1 USE 400/1

NOTES:

1. IF THE FEEDER HAS OUTBOARD PRIMARY PLANT BYPASS CAPABILITY THEN SWITCH ON DRAWING LEVEL 18 (I.E. THE CT SHORTING OPTION IS TO THEN BE ORDERED AND USED).
2. AN EXTERNAL DISTURBANCE RECORDER MAY BE CONNECTED HERE IF NO DISTURBANCE RECORDER CT CORE IS AVAILABLE.
3. THE BACK-UP IED FEATURES AN AUTOMATIC CT SHORT-CIRCUIT CONNECTOR WHEN THE PLUG-IN UNIT IS WITHDRAWN.
4. FOR THE CASE OF DOUBLE CIRCUIT LINES WITH REGARD TO THE FAULT LOCATOR ACCURACY, THE INFLUENCE OF THE ZERO-SEQUENCE MUTUAL IMPEDANCE IS COMPENSATED FOR BY CONSIDERING THE RESIDUAL CURRENT ON THE PARALLEL LINE. FOR THIS CASE, USE THESE RELAY CT INPUTS.
5. PULLING CTTB-M WILL ALSO REMOVE THE REF 615 FROM SERVICE. IN THE EVENT THAT THE MAIN IED NEEDS TO BE REMOVED FROM SERVICE, RETURN CTTB-M TO SERVICE AND INSTALL JUMPERS.

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K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
AC KEY DIAGRAM

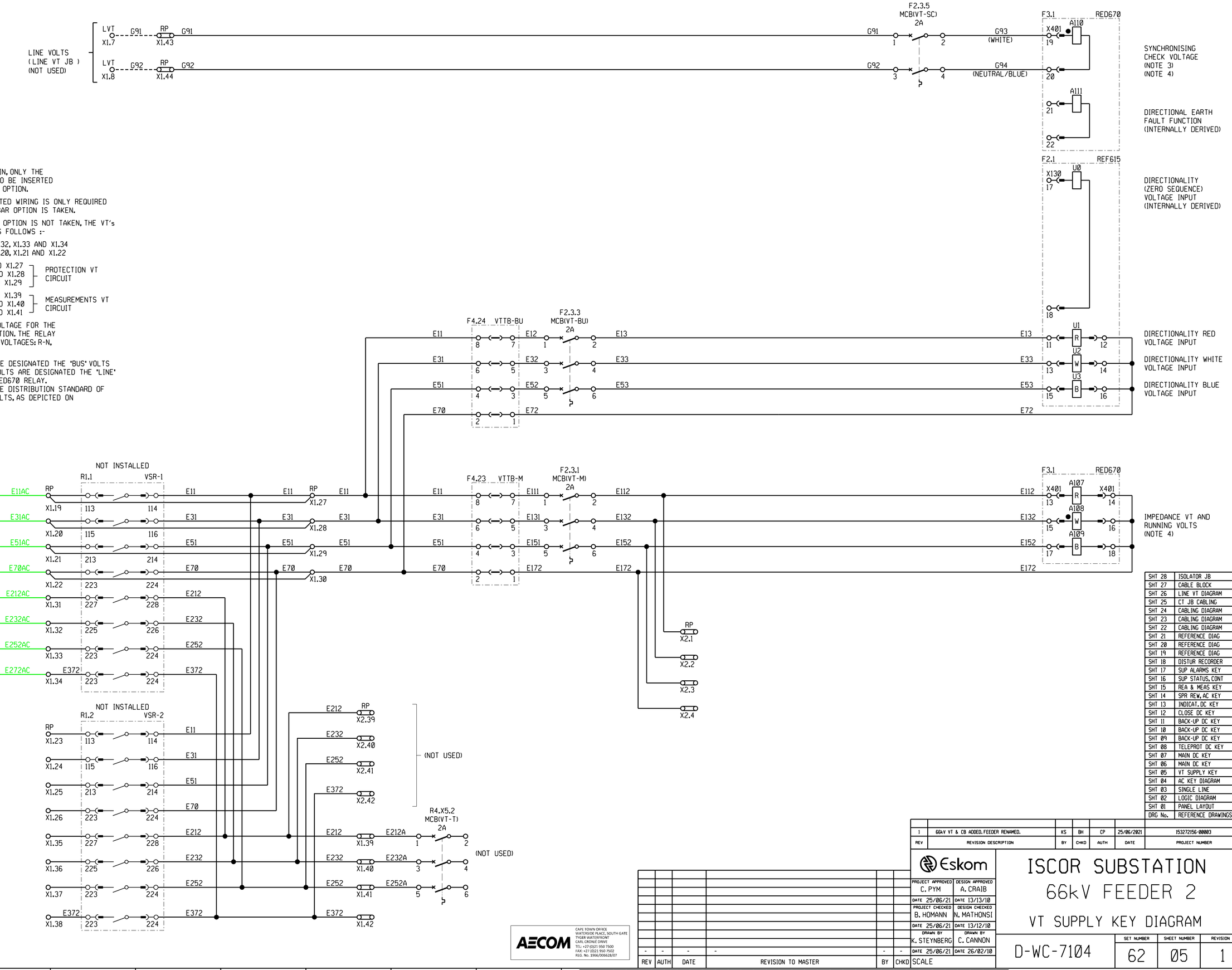
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	04	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 04 OF 28 REVISION 2

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



NOTE:

1. ALL OPTIONS ARE WIRED IN, ONLY THE OPTIONAL RELAYS NEED TO BE INSERTED TO SELECT THE SPECIFIC OPTION.
2. RELAY VSR WITH ASSOCIATED WIRING IS ONLY REQUIRED WHEN THE MULTIPLE BUSBAR OPTION IS TAKEN.

   IF THE MULTIPLE BUSBAR OPTION IS NOT TAKEN, THE VT's ARE TO BE CONNECTED AS FOLLOWS :-

   MEASUREMENTS - X1.31, X1.32, X1.33 AND X1.34
   PROTECTION - X1.19, X1.20, X1.21 AND X1.22

   ADD LOOPS FROM X1.19 TO X1.27
   X1.20 TO X1.28
   X1.21 TO X1.29
   } PROTECTION VT CIRCUIT

   AND X1.31 TO X1.39
   X1.32 TO X1.40
   X1.33 TO X1.41
   } MEASUREMENTS VT CIRCUIT
3. SELECT THE PREFERED VOLTAGE FOR THE SYNCHRONISING CHECK OPTION. THE RELAY CAN USE THE FOLLOWING VOLTAGES: R-N, W-N, B-N, R-W, W-B, B-R.
4. THE IMPEDANCE VOLTS ARE DESIGNATED THE "BUS" VOLTS AND THE SYNCH CHECK VOLTS ARE DESIGNATED THE "LINE" VOLTS WITHIN THE ABB RED670 RELAY. THIS IS IDENTICAL TO THE DISTRIBUTION STANDARD OF "BUS" VOLTS AND "LINE" VOLTS, AS DEPICTED ON SHEETS 3 AND 5.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT, DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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ISCOR SUBSTATION
66kV FEEDER 2
VT SUPPLY KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	05	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 05 OF 28 REVISION 2

LEVELS 1 2 5 10 11 12 21 25 28

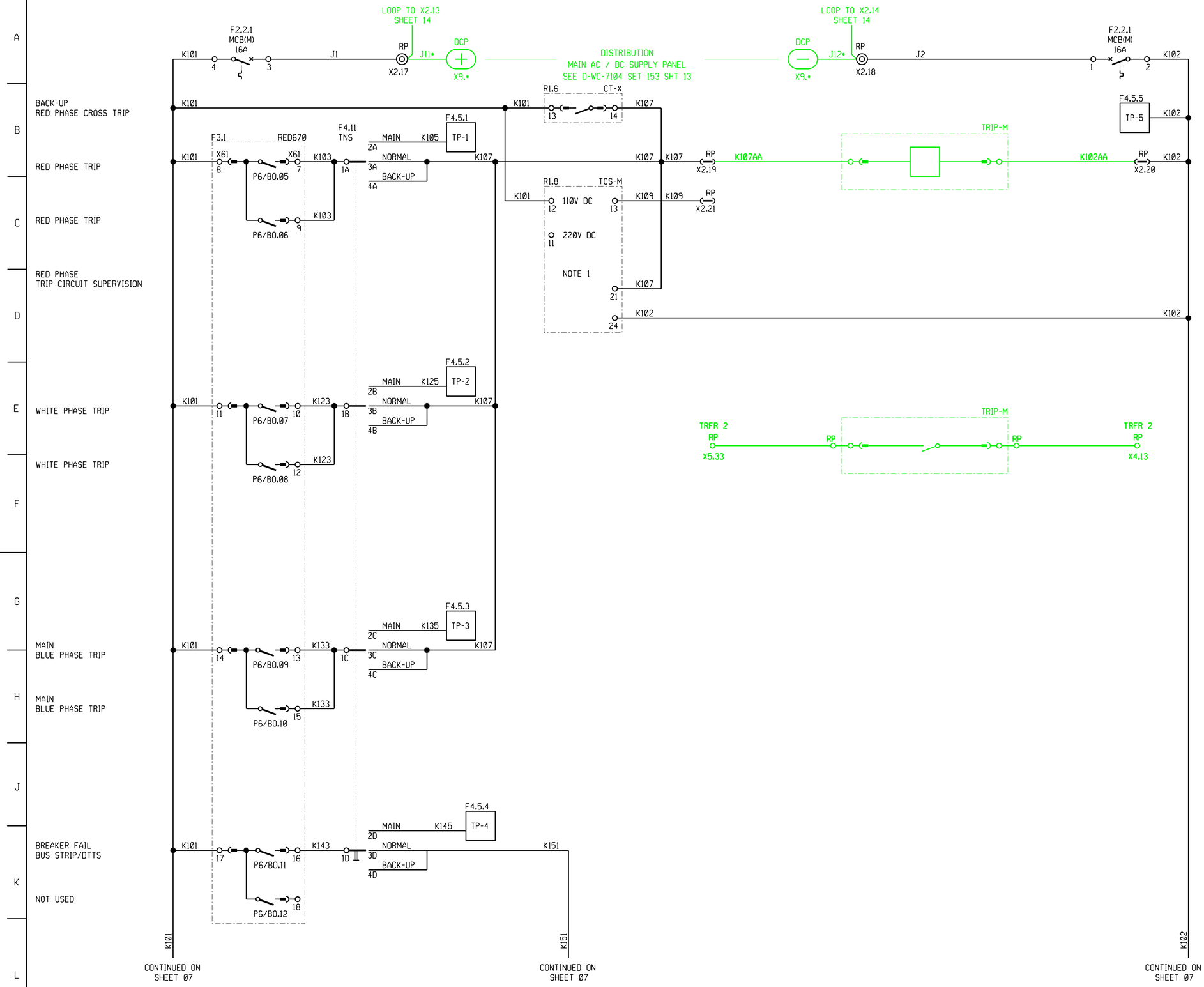

ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

NOTE:

1. REMOVE TCS-M TRIP CIRCUIT SUPERVISION RELAY IN ORDER TO PREVENT TCS FAIL ALARM. CIRCUIT BREAKER HEALTH IS MONITORED BY THE TRANSFORMER PROTECTION.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS,CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW,AC KEY
SHT 13	INDICAT.DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
MAIN DC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	06	1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

LEVELS 1 2 5 10 11 12 20 21 22 25 28

MASTER TRACING FILED UNDER D-DT-15007 SHEET 06 OF 28 REVISION 2

CONTINUED FROM SHEET 06

CIRCUIT BREAKER FAILURE
SEE D-WC-7104-SET 83 SHT 17

CONTINUED FROM SHEET 06

CONTINUED FROM SHEET 06

EXTERNAL DIRECT INTERTRIP SEND

BACK-UP OVERCURRENT AND EARTH FAULT TRIP (HIGH SET) NOTE 3

BACK-UP OVERCURRENT TRIP (IDMT/DT) NOTE 3

BACK-UP EARTH FAULT TRIP (IDMT/DT) NOTE 3

BUSZONE TRIP

CIRCUIT BREAKER CLOSED

CIRCUIT BREAKER OPEN

PROTECTION NOT HEALTHY AUXILIARY 1

SETTING GROUP 2 EXTERNAL CONTROL

SETTING GROUP 3 EXTERNAL CONTROL

BACK-UP PROTECTION FAIL-SELF CHECK

BACK-UP PROTECTION VT FUSE FAIL

DC FAIL BACK-UP

MAIN PROTECTION MAIN IED POWER SUPPLY

• CHECK MANUFACTURER'S DRAWINGS

DIRECT INTERTRIP SEND TO REMOTE END (BLOCKED VIA BFIS OR TPIS SET OFF)

BACK-UP IED THREE PHASE TRIP, BREAKER FAIL INITIATE AND START AUTO RECLOSE NOTE 2

BACK-UP IED THREE PHASE TRIP, BREAKER FAIL INITIATE AND NO AUTO RECLOSE

CROSS TRIP AUXILIARY

EXTERNAL BUSZONE TRIP, BREAKER FAIL INITIATE AND NO CLOSE

EXTERNAL BUSZONE TRIP, BREAKER FAIL INITIATE AND NO CLOSE

CONTINUED ON SHEET 08

CONTINUED ON SHEET 08

NOTE:

1. CONNECT RELAY PANEL TERMINALS AS REQUIRED FOR INITIATION OF AUTO RECLOSE.
2. FOR RED670 IMPEDANCE FUNCTION, ZONE 2 INITIATED AUTO-RECLOSE SET GATE 12 TO 'ON' (DEFAULT = 'OFF').
3. THESE OUTPUTS OF THE BACK-UP IED (REF615) ARE MASKED/ SET TO 'NON-LATCHED'.

ABB 132kV THREE POLE BREAKER LEGEND

ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
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SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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DATE 25/06/21	DATE 26/02/10

ISCOR SUBSTATION
66kV FEEDER 2
MAIN DC KEY DIAGRAM

D-WC-7104 | SET NUMBER 62 | SHEET NUMBER 07 | REVISION 1

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 07 OF 28 REVISION 2

CONTINUED FROM SHEET 07

CONTINUED FROM SHEET 07

DC FAIL MAIN

K101 — R3R.1 (DCF-M) 2 — 10 — K102

K101 — R1.7 (NOT INSTALLED) PSU 116 / 118 — K102

48V DC: 126 / 128; 117 — 90

K201 X3.1

K202 X3.2

POWER LINE CARRIER OR NSD570 EXTERNAL TELEPROTECTION OR SIMILAR ITEM

NOTE 4 F4.13 TPIS

K201 — 1A — OFF 2A — ON 3A — K205

NOTE 4 F4.13 TPIS

K204 — ON 3B — OFF 2B — 1B — K202

F3.1 RED670

PERMISSIVE INTERTRIP RECEIVED — K205 — RP X3.3 — RP X3.4 — K209 — X72 9 — PERM INT REC — P7/BI-13 — X72 10 — K204

DIRECT INTERTRIP RECEIVED — K205 — RP X3.5 — RP X3.6 — K211 — X72 11 — DTTR — P7/BI-14 — X72 12 — K204

CARRIER GUARD SIGNAL ON
NOTE 3 — K205 — RP X3.7 — RP X3.8 — K213 — X72 13 — CG SIGNAL — P7/BI-15 — X72 14 — K204

DIRECTIONAL EARTH - FAULT RECEIVED (NOT USED) — K205 — RP X3.9 — RP X3.10 — K215 — X72 15 — DEF RX — P7/BI-16 — X72 16 — K204

F3.1 RED670

PERMISSIVE INTERTRIP SEND — K205 — X62 14 — TX — P6/BO-21 — X62 13 — K217 — RP X3.11

DIRECT INTERTRIP SEND — DTTS — P6/BO-22 — 15 — K219 — RP X3.13

DIRECTIONAL EARTH FAULT SEND (NOT USED) — K205 — X62 17 — DEF_TX — P6/BO-23 — X62 16 — K221 — RP X3.15

NOT USED (DEF_TX TEST OUTPUT) — DEF_TX — P6/BO-24 — 18

RP X3.12 — K204

RP X3.14 — K204

RP X3.16 — K204

FIBRE INTERNAL COMMUNICATION/TELEPROTECTION AND/ OR DIFFERENTIAL

TO TELE-COMMS PANEL — FIBRE RX / FIBRE TX

F3.1 RED670 — X312 LDCM1 P31:2 — A FIBRE — B MAIN

F3.1 RED670 — X313 LDCM2 P31:3 — A FIBRE — B THREE TERMINAL DIFF OPTION WITH NO TIMING OR WITH EXTERNAL IRIG-B GPS TIMING — NOTE 5

CAUTION:

TREAT FIBRE AS LIVE.
LAZER LIGHT COULD DAMAGE YOUR EYES.
DO NOT LOOK INTO THE END.

NOTE:

1. THE 110/48 VOLT DC/DC CONVERTER IS OPTIONAL. THE SUBSTATION 48 VOLT DC SUPPLY CAN BE USED IF AVAILABLE.
2. NO GROUND - LEAVE CONNECTOR WITHOUT ANY CONNECTION
   DIRECT GROUND - CONNECT PIN 2 DIRECTLY TO EARTH
   SOFT GROUND - CONNECT PIN 1 TO PIN 2
3. SET GATE 1 IN SETTINGS TO 'ON' TO ENABLE INTERNAL COMMUNICATION/ TELEPROTECTION FAIL LOGIC ('ON' IS THE DEFAULT). SET GATE 1 TO 'OFF' IF THE EXTERNAL CARRIER GUARD IS USED OR IF THE INT. COMM/TELEPROTECTION CARD IS NOT USED.
4. REMOTE DIFF ISOLATION:
   SIMULTANEOUSLY SWITCH THE LOCAL & REMOTE TPIS SWITCHES TO 'OFF', ALTERNATIVELY, REMOVE THE TX & RX FIBRES FROM ONE IED.
5. THE INTERNAL GPS TIMING CARD (OPTIONAL) USES SLOT P31:3 X313. THE EXTERNAL GPS TIMING INPUT CARD (OPTIONAL) USES SLOT P30:2 X302. DEPENDANT ON IF ONE OF THE ABOVE CARDS ARE ORDERED, THE THREE TERMINAL DIFF COMMUNICATION CARD (OPTIONAL), WOULD BE PLACED IN THE UNUSED SLOT (i.e. SLOT P31:3 X313 OR P30:2 X302). IF NEITHER TIMING CARD IS ORDERED BUT THE THREE TERMINAL DIFF COMMUNICATION CARD IS ORDERED, IT WILL BE PLACED IN SLOT P31:3 X313.

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ISCOR SUBSTATION
66kV FEEDER 2
TELEPROTECTION DC KEY DIAGRAM

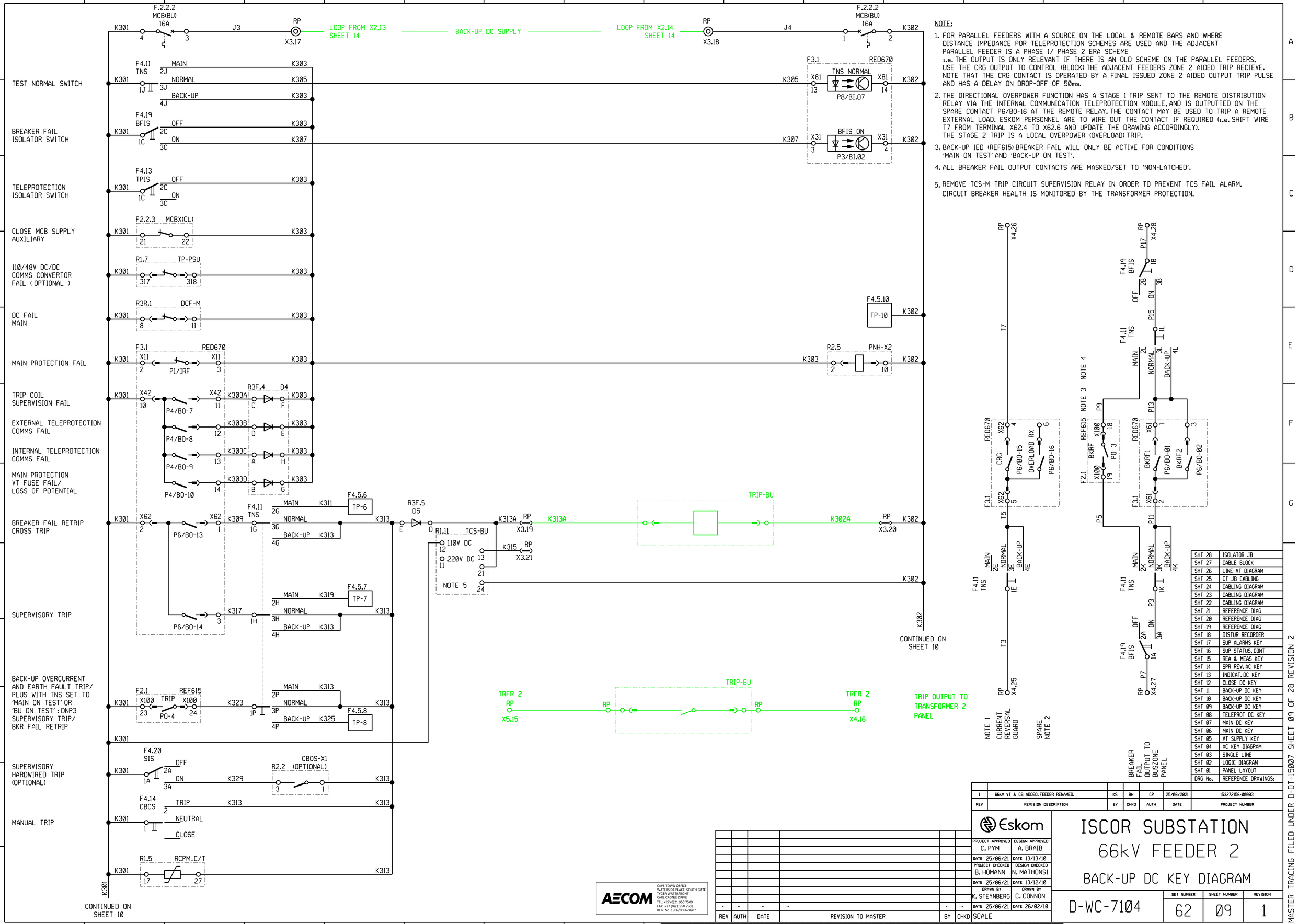
D-WC-7104 | SET NUMBER 62 | SHEET NUMBER 08 | REVISION 0

LEVELS 1 2 4 5 10 11 12 20 21 22 25 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 08 OF 28 REVISION 2



NOTE:

1. FOR PARALLEL FEEDERS WITH A SOURCE ON THE LOCAL & REMOTE BARS AND WHERE DISTANCE IMPEDANCE POR TELEPROTECTION SCHEMES ARE USED AND THE ADJACENT PARALLEL FEEDER IS A PHASE 1/ PHASE 2 ERA SCHEME i.e. THE OUTPUT IS ONLY RELEVANT IF THERE IS AN OLD SCHEME ON THE PARALLEL FEEDERS, USE THE CRG OUTPUT TO CONTROL (BLOCK) THE ADJACENT FEEDERS ZONE 2 AIDED TRIP RECIEVE. NOTE THAT THE CRG CONTACT IS OPERATED BY A FINAL ISSUED ZONE 2 AIDED OUTPUT TRIP PULSE AND HAS A DELAY ON DROP-OFF OF 50ms.
2. THE DIRECTIONAL OVERPOWER FUNCTION HAS A STAGE 1 TRIP SENT TO THE REMOTE DISTRIBUTION RELAY VIA THE INTERNAL COMMUNICATION TELEPROTECTION MODULE, AND IS OUTPUTTED ON THE SPARE CONTACT P6/BO-16 AT THE REMOTE RELAY. THE CONTACT MAY BE USED TO TRIP A REMOTE EXTERNAL LOAD. ESKOM PERSONNEL ARE TO WIRE OUT THE CONTACT IF REQUIRED (i.e. SHIFT WIRE T7 FROM TERMINAL X62.4 TO X62.6 AND UPDATE THE DRAWING ACCORDINGLY). THE STAGE 2 TRIP IS A LOCAL OVERPOWER (OVERLOAD) TRIP.
3. BACK-UP IED (REF615) BREAKER FAIL WILL ONLY BE ACTIVE FOR CONDITIONS 'MAIN ON TEST' AND 'BACK-UP ON TEST'.
4. ALL BREAKER FAIL OUTPUT CONTACTS ARE MASKED/SET TO 'NON-LATCHED'.
5. REMOVE TCS-M TRIP CIRCUIT SUPERVISION RELAY IN ORDER TO PREVENT TCS FAIL ALARM. CIRCUIT BREAKER HEALTH IS MONITORED BY THE TRANSFORMER PROTECTION.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	I53272156-00003

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
CARL CRONJE DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. BRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CONNON
DATE 25/06/21	DATE 26/02/10

SCALE

ISCOR SUBSTATION
66kV FEEDER 2
BACK-UP DC KEY DIAGRAM

DRG NUMBER	SHEET NUMBER	REVISION
D-WC-7104	62	09	1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 09 OF 28 REVISION 2

LEVELS 1 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

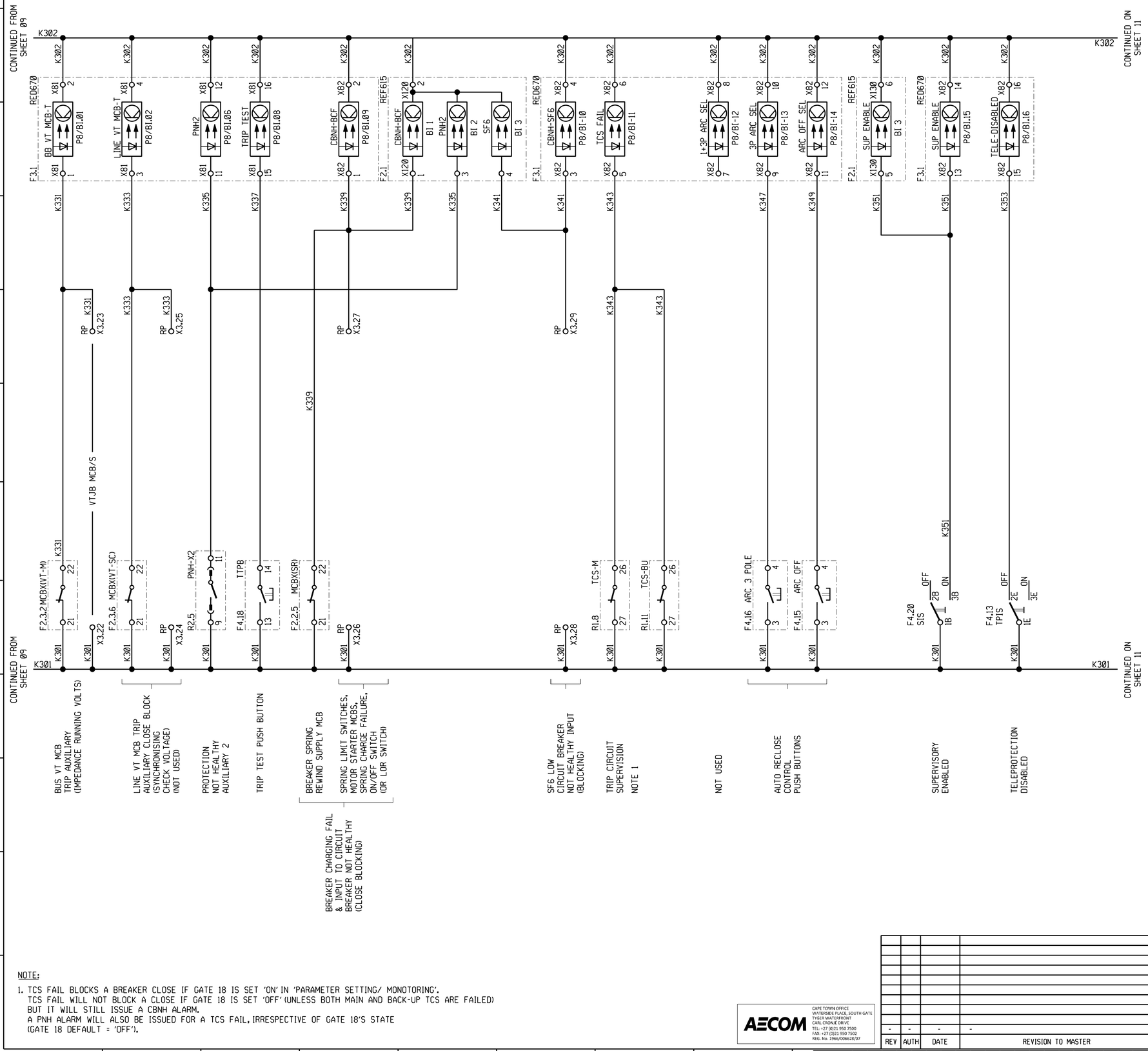


ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

NOTE:

1. TCS FAIL BLOCKS A BREAKER CLOSE IF GATE 18 IS SET 'ON' IN 'PARAMETER SETTING/ MONOTORING'.
   TCS FAIL WILL NOT BLOCK A CLOSE IF GATE 18 IS SET 'OFF' (UNLESS BOTH MAIN AND BACK-UP TCS ARE FAILED)
   BUT IT WILL STILL ISSUE A CBNH ALARM.
   A PNH ALARM WILL ALSO BE ISSUED FOR A TCS FAIL, IRRESPECTIVE OF GATE 18'S STATE
   (GATE 18 DEFAULT = 'OFF').

SHT 28	ISOLATOR JB
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SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
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SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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			DATE 25/06/21		DATE 26/02/10
			SCALE		

Eskom

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C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON

ISCOR SUBSTATION
66kV FEEDER 2
BACK-UP DC KEY DIAGRAM

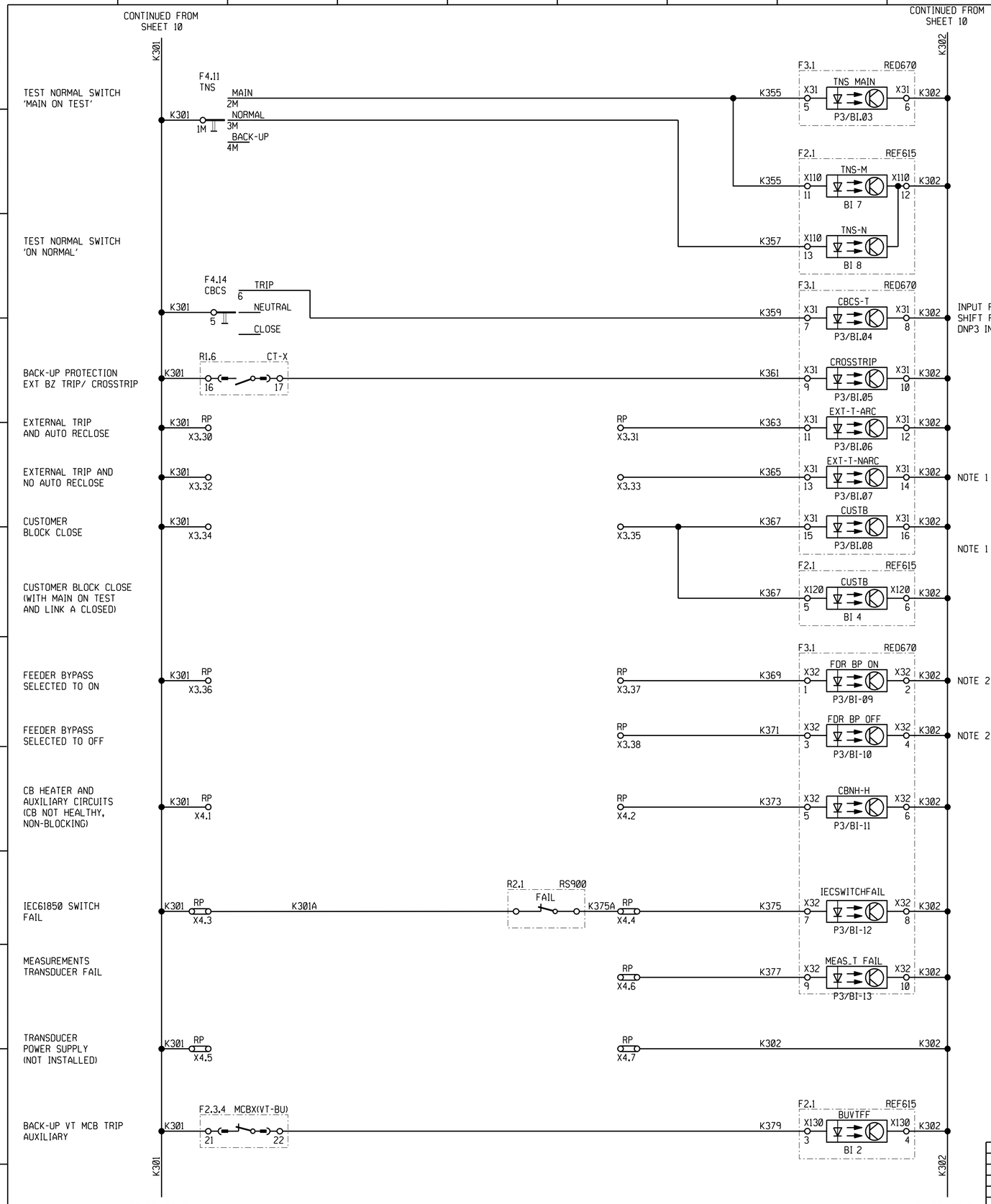
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	10	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 10 OF 28 REVISION 2



NOTE:

1. A PERMANENT INPUT IS REQUIRED TO BLOCK AN EXTERNAL CLOSE.
2. THIS BYPASS LOGIC IS USED FOR THE SUPERVISORY DNP3 STATUS, THE HMI DISPLAY AND THE AUTOMATED REMOTE ARC BYPASS AND DIFF OUT OF SERVICE SELECTION LOGIC. NOTE THAT A 'G' ISOLATOR CONTACT MUST BE USED FOR THE 'ON' SELECTION AND A 'N' ISOLATOR CONTACT MUST BE USED FOR THE 'OFF' SELECTION.

ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
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XC1 - XC7	CONNECTION POINT
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Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
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SHT 24	CABLING DIAGRAM
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SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

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C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
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B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
BACK-UP DC KEY DIAGRAM

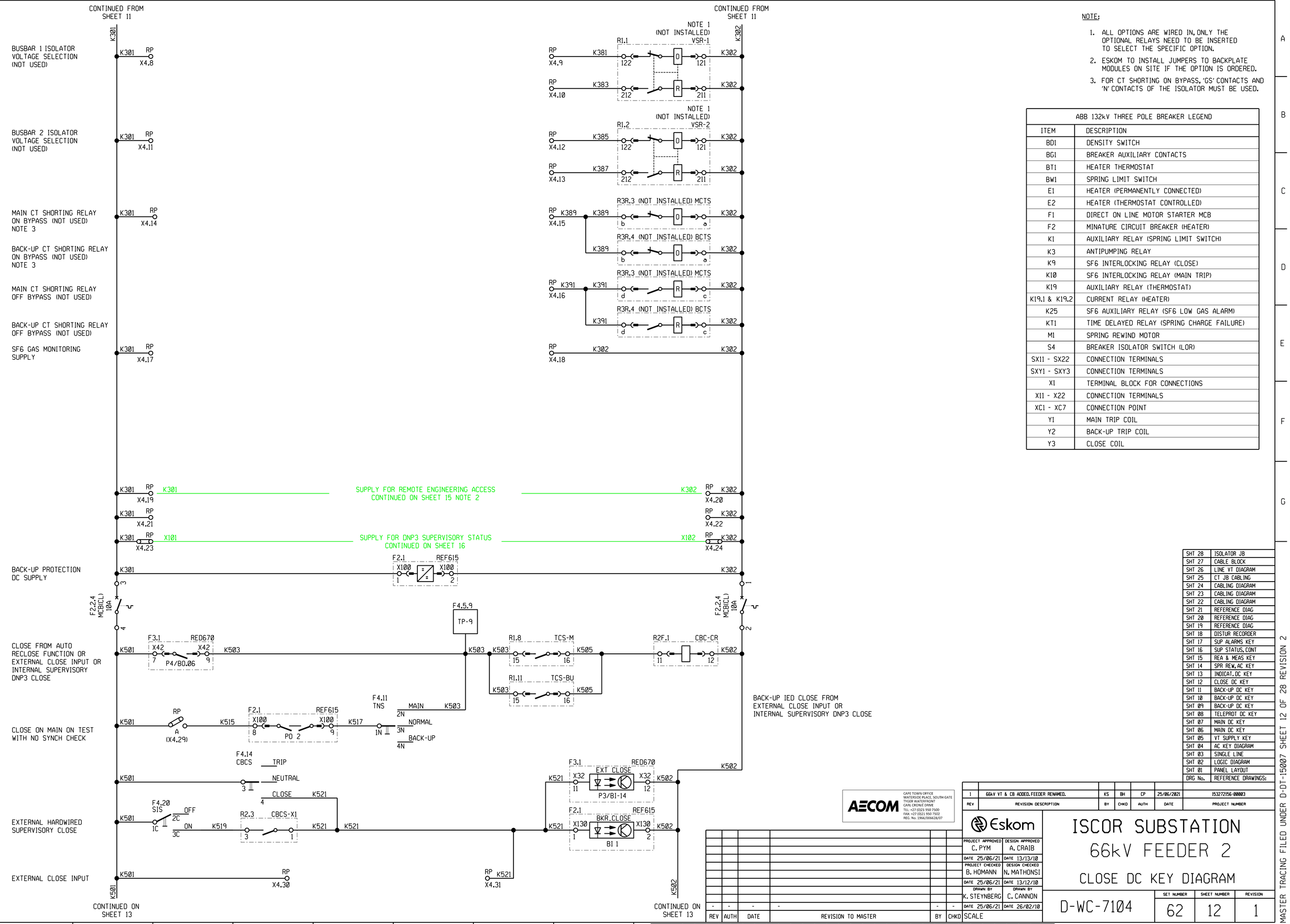
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	11	1

LEVELS 1 2 5 10 11 12 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GRODTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 11 OF 28 REVISION 2


CONTINUED FROM SHEET 11
K301
BUSBAR 1 ISOLATOR VOLTAGE SELECTION (NOT USED)
K301 RP X4.8
BUSBAR 2 ISOLATOR VOLTAGE SELECTION (NOT USED)
K301 RP X4.11
MAIN CT SHORTING RELAY ON BYPASS (NOT USED) NOTE 3
K301 RP X4.14
BACK-UP CT SHORTING RELAY ON BYPASS (NOT USED) NOTE 3
MAIN CT SHORTING RELAY OFF BYPASS (NOT USED)
BACK-UP CT SHORTING RELAY OFF BYPASS (NOT USED)
SF6 GAS MONITORING SUPPLY
K301 RP X4.17
CONTINUED FROM SHEET 11
K302
NOTE 1 (NOT INSTALLED)
R1.1 VSR-1
RP X4.9 K301 122 121 K302
RP X4.10 K303 212 211 K302
NOTE 1 (NOT INSTALLED)
R1.2 VSR-2
RP X4.12 K385 122 121 K302
RP X4.13 K387 212 211 K302
R3R.3 (NOT INSTALLED) MCTS
RP X4.15 K389 b a K302
R3R.4 (NOT INSTALLED) BCTS
K389 b a K302
R3R.3 (NOT INSTALLED) MCTS
RP X4.16 K391 d c K302
R3R.4 (NOT INSTALLED) BCTS
K391 d c K302
RP X4.18 K302 K302
NOTE:
1. ALL OPTIONS ARE WIRED IN, ONLY THE OPTIONAL RELAYS NEED TO BE INSERTED TO SELECT THE SPECIFIC OPTION.
2. ESKOM TO INSTALL JUMPERS TO BACKPLATE MODULES ON SITE IF THE OPTION IS ORDERED.
3. FOR CT SHORTING ON BYPASS, 'GS' CONTACTS AND 'N' CONTACTS OF THE ISOLATOR MUST BE USED.
ABB 132kV THREE POLE BREAKER LEGEND
ITEM | DESCRIPTION
BD1 | DENSITY SWITCH
BG1 | BREAKER AUXILIARY CONTACTS
BT1 | HEATER THERMOSTAT
BW1 | SPRING LIMIT SWITCH
E1 | HEATER (PERMANENTLY CONNECTED)
E2 | HEATER (THERMOSTAT CONTROLLED)
F1 | DIRECT ON LINE MOTOR STARTER MCB
F2 | MINATURE CIRCUIT BREAKER (HEATER)
K1 | AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3 | ANTIPUMPING RELAY
K9 | SF6 INTERLOCKING RELAY (CLOSE)
K10 | SF6 INTERLOCKING RELAY (MAIN TRIP)
K19 | AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2 | CURRENT RELAY (HEATER)
K25 | SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1 | TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1 | SPRING REWIND MOTOR
S4 | BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22 | CONNECTION TERMINALS
SXY1 - SXY3 | CONNECTION TERMINALS
X1 | TERMINAL BLOCK FOR CONNECTIONS
X11 - X22 | CONNECTION TERMINALS
XC1 - XC7 | CONNECTION POINT
Y1 | MAIN TRIP COIL
Y2 | BACK-UP TRIP COIL
Y3 | CLOSE COIL
K301 RP X4.19 K301 SUPPLY FOR REMOTE ENGINEERING ACCESS CONTINUED ON SHEET 15 NOTE 2 K302 RP X4.20 K302
K301 RP X4.21 RP X4.22 K302
K301 RP X4.23 X101 SUPPLY FOR DNP3 SUPERVISORY STATUS CONTINUED ON SHEET 16 X102 RP X4.24 K302
BACK-UP PROTECTION DC SUPPLY
K301 F2.1 REF615 X100 1 X100 2 K302
F2.2.4 MCB(CL) 10A 3 4
F4.5.9 TP-9
F2.2.4 MCB(CL) 10A 1 2
CLOSE FROM AUTO RECLOSE FUNCTION OR EXTERNAL CLOSE INPUT OR INTERNAL SUPERVISORY DNP3 CLOSE
K501 F3.1 RED670 X42 7 P4/BO.06 X42 9 K503
K503 R1.8 TCS-M 15 16 K505
R1.11 TCS-BU 15 16
R2F.1 CBC-CR 11 12 K502
CLOSE ON MAIN ON TEST WITH NO SYNCH CHECK
K501 RP A (X4.29) K515 F2.1 REF615 X100 8 PO 2 X100 9 K517
F4.11 TNS IN MAIN 2N NORMAL 3N BACK-UP 4N K503
BACK-UP IED CLOSE FROM EXTERNAL CLOSE INPUT OR INTERNAL SUPERVISORY DNP3 CLOSE
F4.14 CBCS TRIP NEUTRAL CLOSE K521
K501 3 4
F3.1 RED670 EXT CLOSE X32 11 P3/BI-14 X32 12 K502
K521
EXTERNAL HARDWIRED SUPERVISORY CLOSE
K501 F4.20 SIS 1C 2C OFF ON 3C K519 R2.3 CBCS-X1 3 1 K521 K521
F2.1 REF615 BKR.CLOSE X130 1 BI 1 X130 2 K502
K521
EXTERNAL CLOSE INPUT
K501 RP X4.30
RP K521 X4.31
K502
CONTINUED ON SHEET 13
CONTINUED ON SHEET 13
SHT 28 ISOLATOR JB
SHT 27 CABLE BLOCK
SHT 26 LINE VT DIAGRAM
SHT 25 CT JB CABLING
SHT 24 CABLING DIAGRAM
SHT 23 CABLING DIAGRAM
SHT 22 CABLING DIAGRAM
SHT 21 REFERENCE DIAG
SHT 20 REFERENCE DIAG
SHT 19 REFERENCE DIAG
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SHT 06 MAIN DC KEY
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SHT 04 AC KEY DIAGRAM
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DRG No. REFERENCE DRAWINGS:
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REG. No. 1966/006628/07
REV | REVISION DESCRIPTION | BY | CHKD | AUTH | DATE | PROJECT NUMBER
1 | 66kV VT & CB ADDED.FEEDER RENAMED. | KS | BH | CP | 25/06/2021 | 153272156-00003
REV | AUTH | DATE | REVISION TO MASTER | BY | CHKD | SCALE
- | - | - | - | - | - | DATE 25/06/21 | DATE 26/02/10
Eskom
PROJECT APPROVED C. PYM | DESIGN APPROVED A. CRAIB
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PROJECT CHECKED B. HOMANN | DESIGN CHECKED N. MATHONSI
DATE 25/06/21 | DATE 13/12/10
DRAWN BY K. STEYNBERG | DRAWN BY C. CANNON
ISCOR SUBSTATION
66kV FEEDER 2
CLOSE DC KEY DIAGRAM
D-WC-7104
SET NUMBER 62 | SHEET NUMBER 12 | REVISION 1
LEVELS 1 2 5 10 11 12 20 21 22 28
PANEL TYPE DESIGNATION 4FZD-3920
SIZE A1L
MASTER TRACING FILED UNDER D-DT-15007 SHEET 12 OF 28 REVISION 2

CONTINUED FROM SHEET 12

CONTINUED FROM SHEET 12

SNUBBER CIRCUIT

CLOSE FROM AUTO RECLOSE FUNCTION OR EXTERNAL CLOSE INPUT

DC FAIL BACK-UP

ARC OFF/ LOCKED-OUT

CIRCUIT BREAKER NOT HEALTHY

CIRCUIT BREAKER OPEN

CIRCUIT BREAKER CLOSED

AUTO RECLOSE OFF SELECTED

AUTO RECLOSE 3 POLE SELECTED

NOT USED

18 LED LAMP CHECK

LAMP CHECK

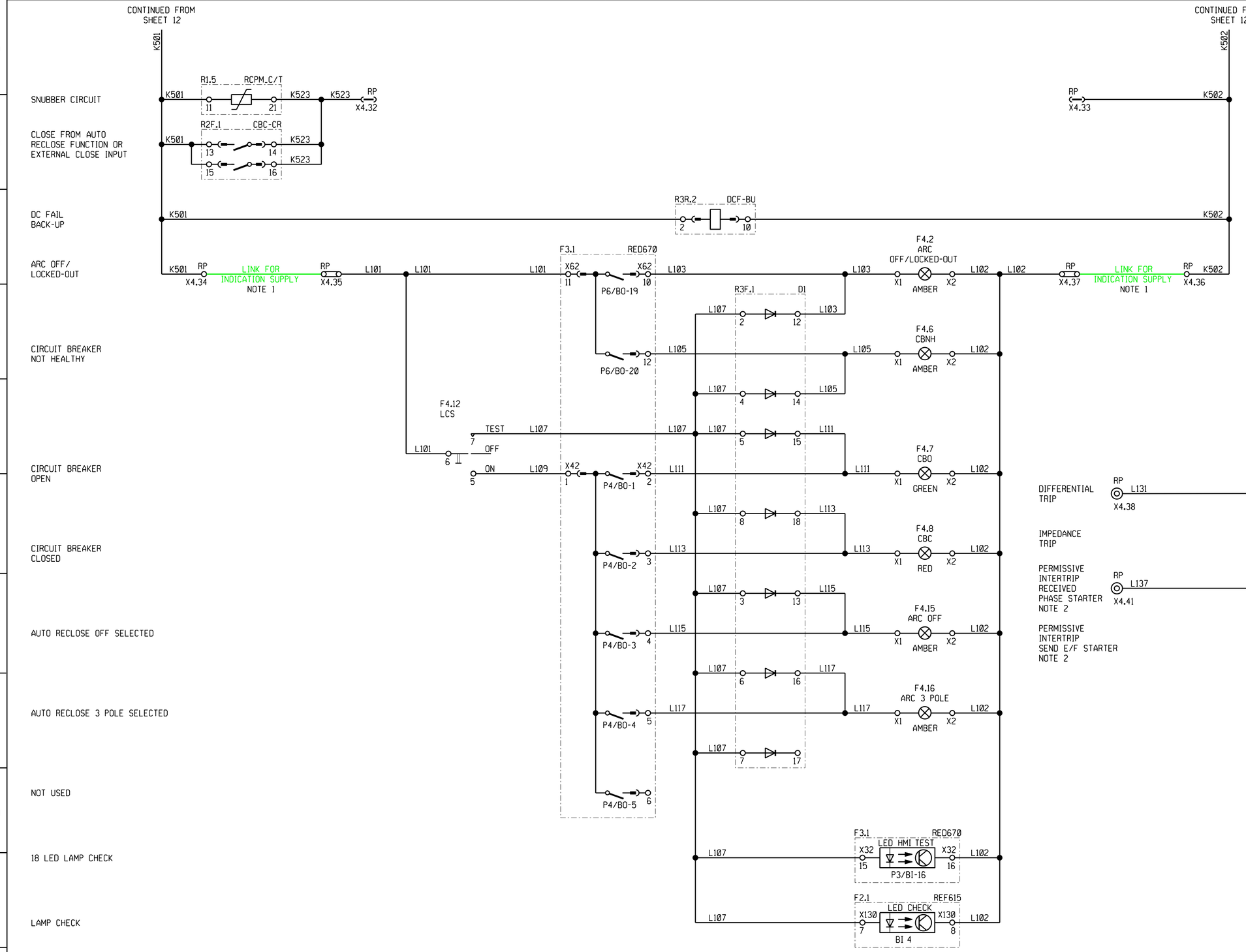

ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
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X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

NOTE:

1. JUMPERS TO BE INSTALLED BY ESKOM PERSONNEL OR AN ALTERNATIVE DC SUPPLY TO BE CONNECTED.
2. TO OBTAIN DISTANCE PHASE AND EARTH-FAULT STARTERS DURING TESTING, SET GATE 2 TO 'ON'. TO OBTAIN PERMISSIVE TEST POINTS, SET GATE 2 TO 'OFF' (THE DEFAULT).

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SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
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DRG No.	REFERENCE DRAWINGS:

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PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
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DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
INDICATION DC KEY DIAGRAM

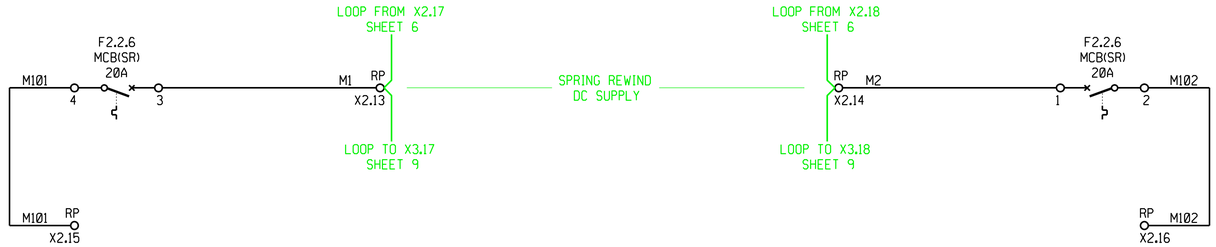
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	13	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 13 OF 28 REVISION 2



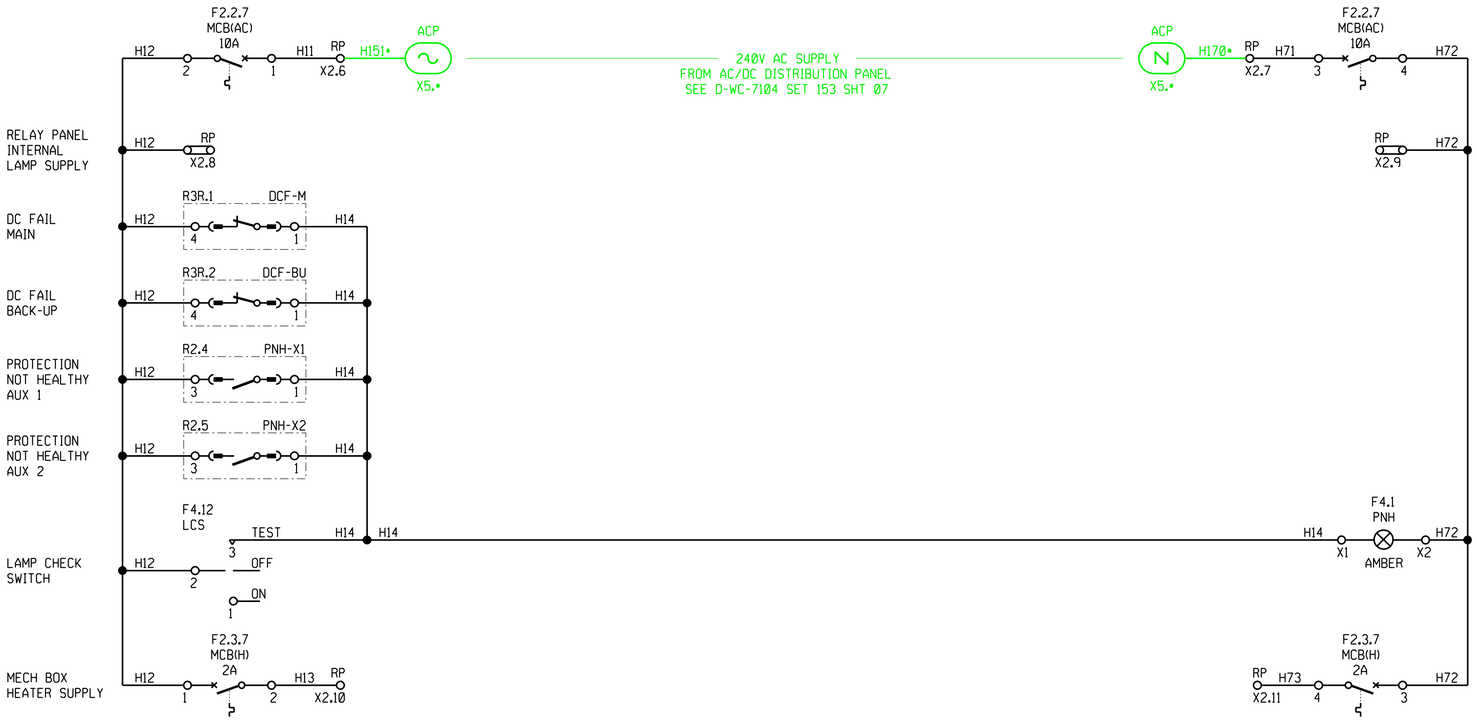


ABB 132kV THREE POLE BREAKER LEGEND	
ITEM	DESCRIPTION
BD1	DENSITY SWITCH
BG1	BREAKER AUXILIARY CONTACTS
BT1	HEATER THERMOSTAT
BW1	SPRING LIMIT SWITCH
E1	HEATER (PERMANENTLY CONNECTED)
E2	HEATER (THERMOSTAT CONTROLLED)
F1	DIRECT ON LINE MOTOR STARTER MCB
F2	MINATURE CIRCUIT BREAKER (HEATER)
K1	AUXILIARY RELAY (SPRING LIMIT SWITCH)
K3	ANTIPUMPING RELAY
K9	SF6 INTERLOCKING RELAY (CLOSE)
K10	SF6 INTERLOCKING RELAY (MAIN TRIP)
K19	AUXILIARY RELAY (THERMOSTAT)
K19.1 & K19.2	CURRENT RELAY (HEATER)
K25	SF6 AUXILIARY RELAY (SF6 LOW GAS ALARM)
KT1	TIME DELAYED RELAY (SPRING CHARGE FAILURE)
M1	SPRING REWIND MOTOR
S4	BREAKER ISOLATOR SWITCH (LOR)
SX11 - SX22	CONNECTION TERMINALS
SXY1 - SXY3	CONNECTION TERMINALS
X1	TERMINAL BLOCK FOR CONNECTIONS
X11 - X22	CONNECTION TERMINALS
XC1 - XC7	CONNECTION POINT
Y1	MAIN TRIP COIL
Y2	BACK-UP TRIP COIL
Y3	CLOSE COIL

DRG No.	REFERENCE DRAWINGS:
SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT, DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE COMMENTS
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

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FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
SPRING REWIND AND AC KEY DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	14	1

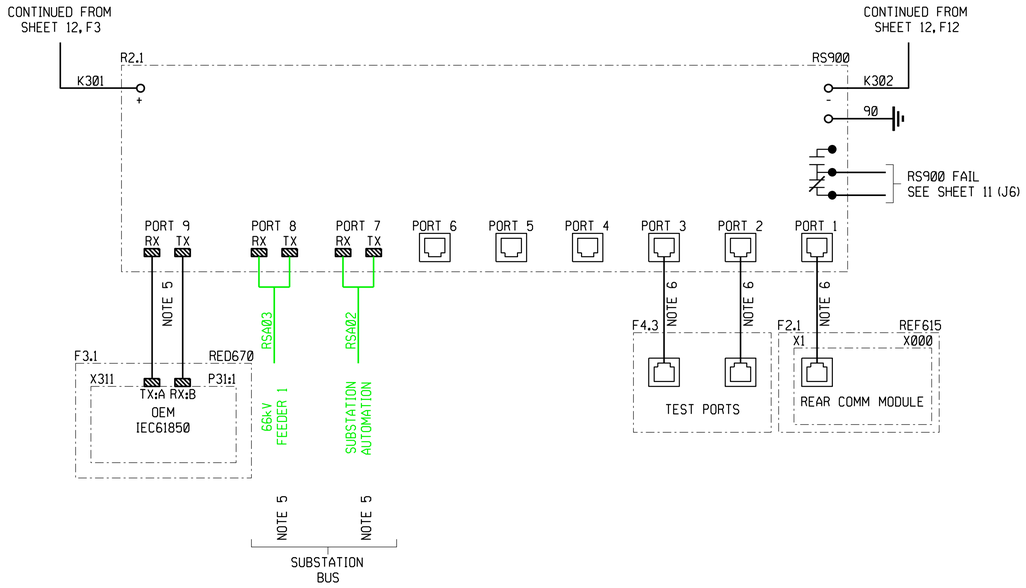
LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

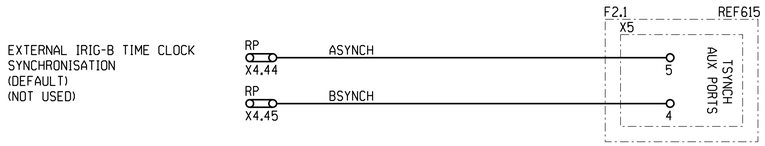
SIZE A1L

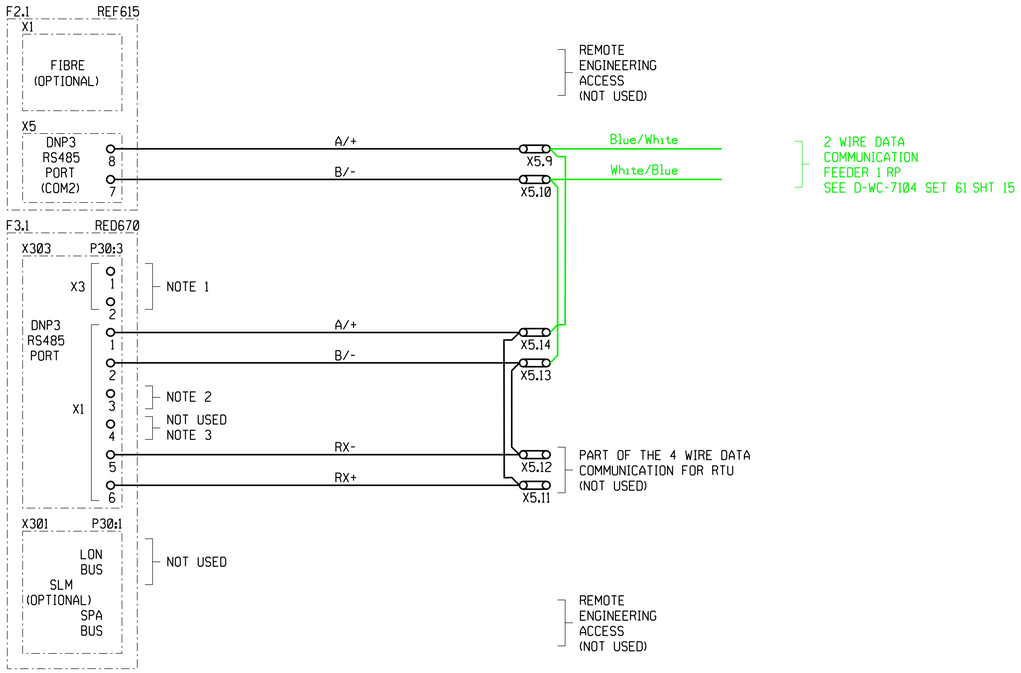
MASTER TRACING FILED UNDER D-DT-15007 SHEET 14 OF 28 REVISION 2

REMOTE ENGINEERING ACCESS IEC61850



TIME SYNCHRONISATION NOTE 4





NOTE:

1. X3 OF THE RED670 IS THE SOFT GROUND CONNECTOR. IT MAY BE UNCONNECTED OR IT CAN BE CONNECTED TO THE GND WITH AN RC NET PARALLEL WITH A MOV.
2. TERMINATION RESISTOR FOR TRANSMITTER AND RECEIVER. ESKOM PERSONNEL TO CONNECT TO A/+ IF USED.
3. TERMINATION RESISTOR FOR RECEIVER IN THE 4 WIRE CASE (CONNECT TO RX+).
4. IF ACCURATE TIMING IS STILL REQUIRED BUT NEITHER OF THE GPS TIMING OPTIONS ARE CHOSEN, THEN USE SNTP TIMING VIA THE IEC61850 OPTIONAL CONNECTION (NOT AS ACCURATE AS GPS TIMING).
5. 100 BASE FX MULTIMODE 1300nm (GLASS), ST CONNECTORS
6. STANDARD RJ45 PORT 100 BASE TX

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

AECOM
CAPE TOWN OFFICE
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TYGER WATERFRONT
CARL CRONJE DRIVE
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REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

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DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
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DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
REA AND MEASUREMENTS KEY DIAG

DRG NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	62	15	1

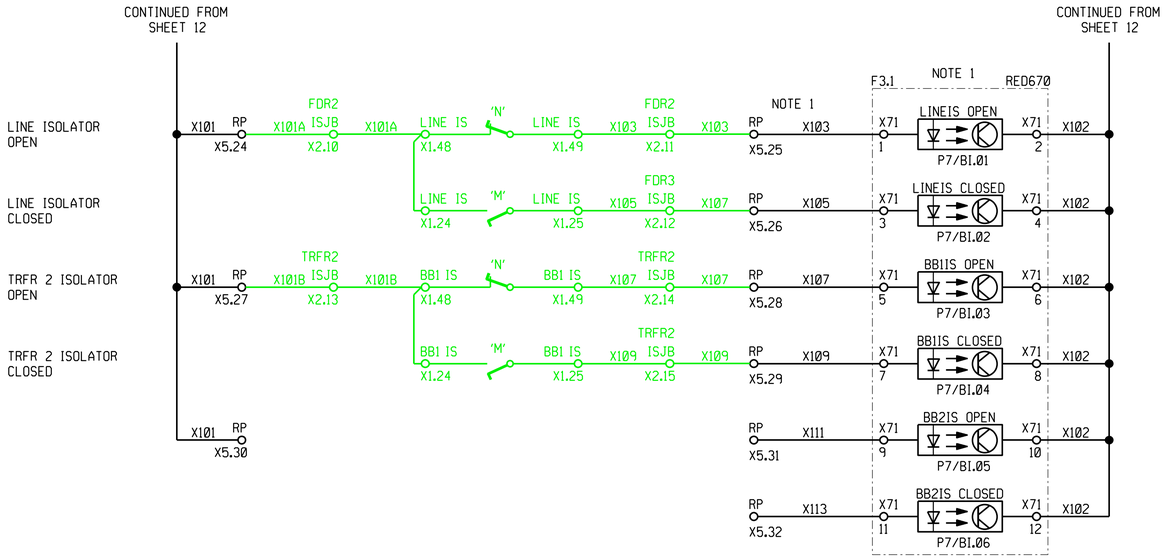
LEVELS 1 2 5 10 23 24 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 15 OF 28 REVISION 2

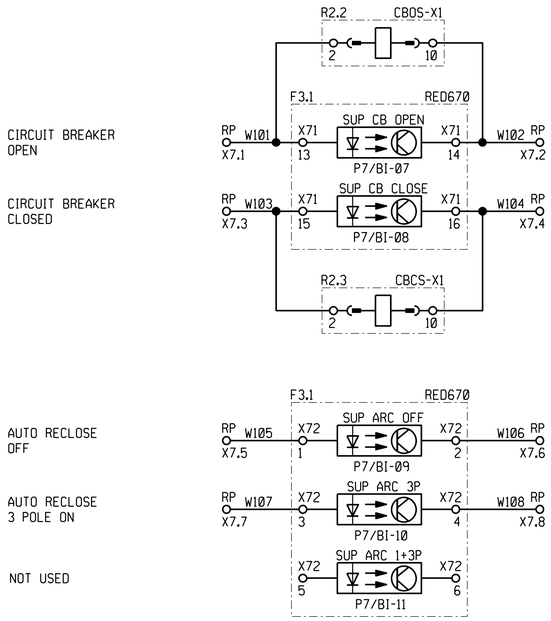
SUPERVISORY STATUS 48V DC (DNP3 OPTIONAL & HMI DISPLAY)



SUPERVISORY STATUS (HARDWIRED OPTIONAL)

RP X7.11
RP X7.12
RP X7.13
RP X7.14
RP X7.15
RP X7.16
RP X7.17
RP X7.18
RP X7.19
RP X7.20
RP X7.21
RP X7.22
RP X7.23
RP X7.24

SUPERVISORY CONTROLS 48V DC (HARDWIRED OPTIONAL)



NOTE:

1. THESE INDICATIONS MUST ALWAYS BE WIRED IN BY ESKOM.
   THE RED670 IED HMI GRAPHICAL DISPLAY EDITOR SINGLE LINE DIAGRAM (SLD) SHOULD BE ALTERED BY ESKOM COMMISSIONING STAFF TO REFLECT THE BUSBAR ARRANGEMENT ON SITE - IN PCM600, GO TO 'GRAPHIC DISPLAY EDITOR'.
   COMMISSIONING STAFF MUST ALSO DEFAULT THE HMI DISPLAY TO THE SLD BY SELECTING ON THE RED670 HMI MAIN MENU, SETTINGS, GENERAL SETTINGS, HMI, SCREEN, DEFAULT SCREEN = SINGLE LINE DIAGRAM.
   NOTE THAT THE BYPASS ISOLATOR STATUS MAY BE FOUND ON THE BACK-UP DC KEY DIAGRAM.

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SHT 27	CABLE BLOCK
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SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED.FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
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Eskom

PROJECT APPROVED: C. PYM	DESIGN APPROVED: A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED: B. HOMANN	DESIGN CHECKED: N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY: K. STEYNBERG	DRAWN BY: C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
SUPERVIS. STATUS & CONTROL KEY

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	16	1

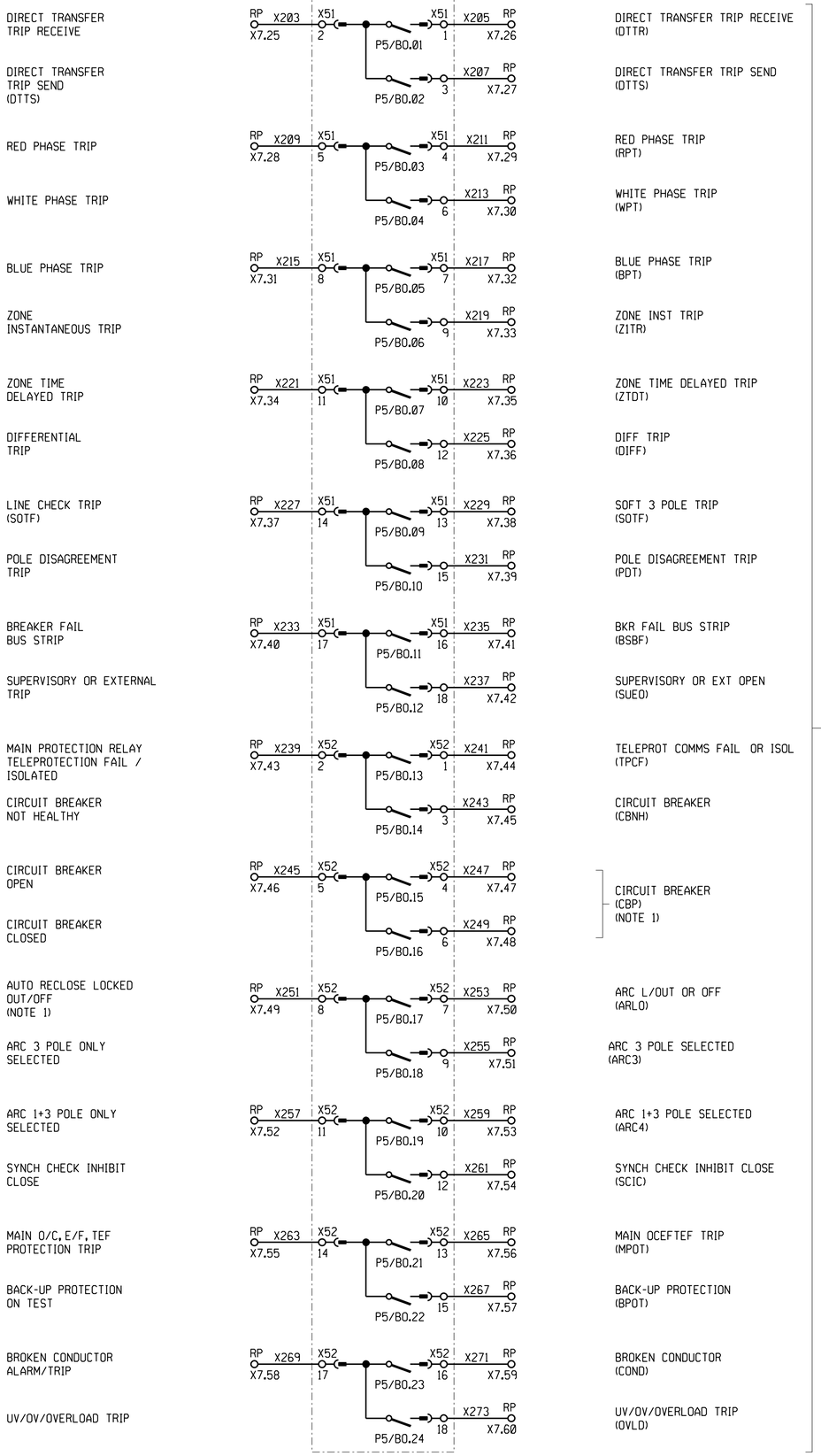
LEVELS 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 25 26 27 28 29 30 31

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 16 OF 28 REVISION 2

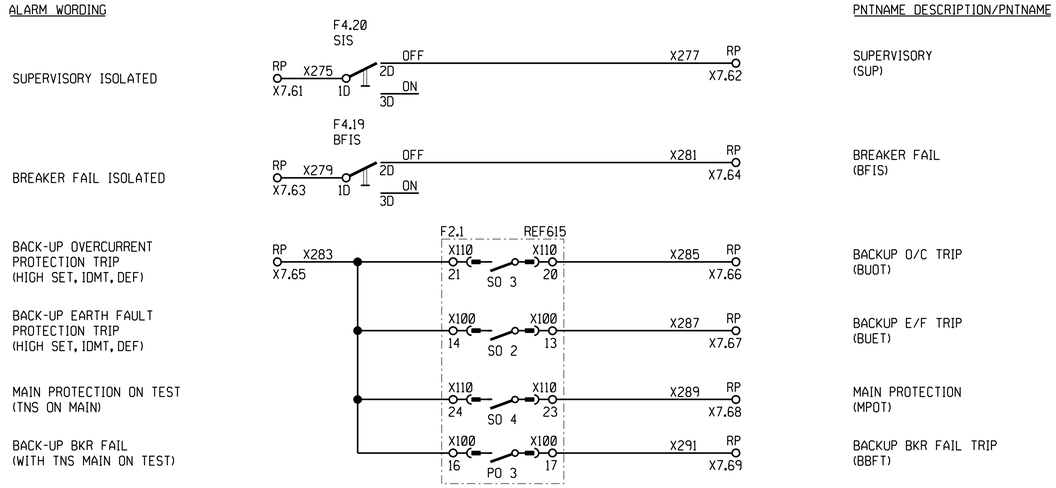
HARDWIRED SUPERVISORY ALARMS (OPTIONAL)



NOTE:

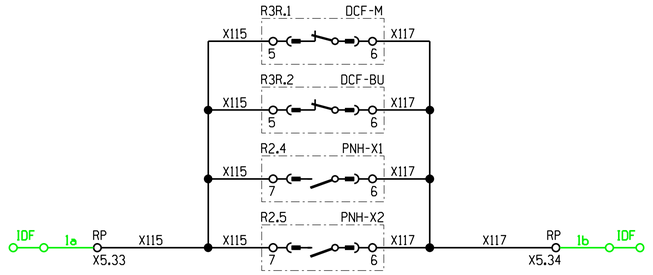
1. DOUBLE BIT INDICATION SHOULD BE USED.

HARDWIRED SUPERVISORY ALARMS (OPTIONAL)



NOTE:

ITEMS INDICATED ABOVE ARE PROVIDED AS AN ORDERING OPTION.
ITEMS INDICATED BELOW ARE PROVIDED AS A DEFAULT.



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SHT 03	SINGLE LINE
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SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						I53272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
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C. PYM	A. CRAIB
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DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
SUPERVISORY ALARMS KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	62	17	0

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 17 OF 28 REVISION 2

DISTURBANCE RECORDER/ ADDITIONAL SUPERVISORY ALARMS (OPTIONAL)

(NOT INSTALLED)

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
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DRG No.	REFERENCE DRAWINGS:

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						153272156-00003

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

Eskom

ISCOR SUBSTATION
66kV FEEDER 2
DISTURBANCE RECORDER KEY DIAG

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	18	0

LEVELS 1 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 18 OF 28 REVISION 2

X11 P1

POWER SUPPLY	X11 4 — PSU — X11 5	SHT 07
READY	P1/IRF 2 — 1	NOT USED
FAIL	P1/IRF 3	SHT 09

X401 P40 — RED670

RED PHASE CURRENT	A101 R: X401 1 — X401 2	SHT 04
WHITE PHASE CURRENT	A102 W: 3 — 4	SHT 04
BLUE PHASE CURRENT	A103 B: 5 — 6	SHT 04
NEUTRAL CURRENT	A104 N: 8 — 7	SHT 04
MUTUAL IMP COMPENSATION	A106 N: X401 12 — X401 11	SHT 04
SYNCH CHECK VOLTAGE (VT)	A110: 19 — 20	SHT 05
DIR E/F FUNCTION	A111: 21 — 22	SHT 05
RED PHASE VOLTAGE	A107 R: 13 — 14	SHT 05
WHITE PHASE VOLTAGE	A108 W: 15 — 16	SHT 05
BLUE PHASE VOLTAGE	A109 B: 17 — 18	SHT 05

X71 P7 (48V DC) — RED670

LINE ISOLATOR OPEN	LINE1-OPEN: X71 1 — X71 2 / P7/BI-01	SHT 16
LINE ISOLATOR CLOSED	LINE1-CLOSED: 3 — 4 / P7/BI-02	SHT 16
BB1 ISOLATOR OPEN	BB1I-OPEN: 5 — 6 / P7/BI-03	SHT 16
BB1 ISOLATOR CLOSED	BB1I-CLOSED: 7 — 8 / P7/BI-04	SHT 16
BB2 ISOLATOR OPEN	BB2I-OPEN: 9 — 10 / P7/BI-05	SHT 16
BB2 ISOLATOR CLOSED	BB2I-CLOSED: 11 — 12 / P7/BI-06	SHT 16
SUPERVISORY CIRCUIT BKR OPEN	CB-OPEN: 13 — 14 / P7/BI-07	SHT 16
SUPERVISORY CIRCUIT BKR CLOSED	CB-CLOSE: 15 — 16 / P7/BI-08	SHT 16

X61 P6 — RED670

BUS STRIP OUTPUT EXT	BKRF1: X61 2 — X61 1 / P6/BO-01	SHT 09
BUS STRIP OUTPUT EXT	BKRF2: 3 / P6/BO-02	SHT 09
FEEDER ON BYPASS TX TELE	TX REMOTE 3P ARC SELECT: 5 — 4 / P6/BO-03	NOT USED
SPARE (TEST OUTPUT)	DEF_RX: 6 / P6/BO-04	NOT USED
RED PHASE TRIP	REDIT: 8 — 7 / P6/BO-05	SHT 06
RED PHASE TRIP	REDIT: 9 / P6/BO-06	SHT 06
WHITE PHASE TRIP	WHITEIT: 11 — 10 / P6/BO-07	SHT 06
WHITE PHASE TRIP	WHITEIT: 12 / P6/BO-08	SHT 06
MAIN BLUE PHASE TRIP	BLUEIT: 14 — 13 / P6/BO-09	SHT 06
BLUE PHASE TRIP	BLUEIT: 15 / P6/BO-10	SHT 06
BKR FAIL BUS STRIP/ DTTS	BUS STRIP: 17 — 16 / P6/BO-11	SHT 06
BLOCK BU E/F PROTECTION	TRIP: 18 / P6/BO-12	NOT USED

X41 P4 — RED670

BREAKER POLES CLOSED/PD	CB-CLS: X41 1 — X41 2 / P4/BI.01	SHT 07
BREAKER POLES OPEN/PD	CB-OPN: 3 — 4 / P4/BI.02	SHT 07
SPARE	5 — 6 / P4/BI.03	SPARE
SPARE	7 — 8 / P4/BI.04	SPARE
SETTING G2 EXT CONTROL	SG2: 9 — 10 / P4/BI.05	SHT 07
SETTING G3 EXT CONTROL	SG3: 11 — 12 / P4/BI.06	SHT 07
SPARE	13 — 14 / P4/BI.07	SPARE
PROTECTION NOT HEALTHY AUXILIARY 1	PNH1: 15 — 16 / P4/BI.08	SHT 07

X31 P3 — RED670

BUSZONE TRIP	EXT BZ TRIP: X31 1 — X31 2 / P3/BI.01	SHT 07
BKR FAIL ISOLATOR ON	BFIS-ON: 3 — 4 / P3/BI.02	SHT 9
TNS MAIN ON TEST	TNS-M: 5 — 6 / P3/BI.03	SHT 11
EXT TRIP SWITCH/ SUP	CBCS-T: 7 — 8 / P3/BI.04	SHT 11
BACK-UP PROT/ BZ TRIP/ CROSSTRIP	CROSSTRIP: 9 — 10 / P3/BI.05	SHT 11
EXT TRIP AND ARC	EXT-T-ARC: 11 — 12 / P3/BI.06	SHT 11
EXT TRIP AND NO ARC	EXT-T-NARC: 13 — 14 / P3/BI.07	SHT 11
CUSTOMER BLOCK CLOSE	CUSTB: 15 — 16 / P3/BI.08	SHT 11

X81 P8 — RED670

BUS VT MCB TRIP	BB VT MCB-T: X81 1 — X81 2 / P8/BI.01	SHT 10
LINE VT MCB TRIP	LINE VT MCB-T: 3 — 4 / P8/BI.02	SHT 10
DTTS	EXT-DTTS: 5 — 6 / P8/BI.03	SHT 07
BF INITIATE ARCI, 3PT	3PT/BFI/ARC: 7 — 8 / P8/BI.04	SHT 07
BF INITIATE 3PT NARC	3PT/BFI/NARC: 9 — 10 / P8/BI.05	SHT 07
PROTECTION NOT HEALTHY AUXILIARY 2	PNH2: 11 — 12 / P8/BI.06	SHT 10
TNS NORMAL	TNS-N: 13 — 14 / P8/BI.07	SHT 09
TRIP TEST	TRIP TEST: 15 — 16 / P8/BI.08	SHT 10

X72 P7 (48V DC) — RED670

SUPERVISORY ARC OFF	ARC-OFF: 1 — 2 / P7/BI-09	SHT 16
SUPERVISORY ARC 3P	3P ARC-ON: 3 — 4 / P7/BI-10	SHT 16
SUPERVISORY ARC 1+3P	1+3P ARC ON: 5 — 6 / P7/BI-11	NOT USED
REMOTE FEEDER ON BYPASS	RX REMOTE 3P ARC SELECT: 7 — 8 / P7/BI-12	NOT USED
RX	RX: 9 — 10 / P7/BI-13	SHT 08
DTTR	DTTR: 11 — 12 / P7/BI-14	SHT 08
CARRIER GUARD SIGNAL ON	CGS: 13 — 14 / P7/BI-15	SHT 08
DIR E/F RECIEVED	DEF_RX: 15 — 16 / P7/BI-16	SHT 08

X62 P6 — RED670

BKR FAIL RETRIP/ CROSSTRIP	BF 3P RETRIP: X62 2 — X62 1 / P6/BO-13	SHT 09
SUPERVISORY TRIP	SUP CB OPEN: 3 / P6/BO-14	SHT 09
CRG	CRG: 5 — 4 / P6/BO-15	SHT 09
(OPTIONAL)	OVERLOAD RX: 6 / P6/BO-16	SHT 09
PERMISSIVE INTERTRIP RECIEVED	RX-TEST: 8 — 7 / P6/BO-17	SHT 13
PERMISSIVE INTERTRIP SEND	TX-TEST: 9 / P6/BO-18	SHT 13
ARC OFF/LO	ARC O/L: 11 — 10 / P6/BO-19	SHT 13
CBNH	CBNH: 12 / P6/BO-20	SHT 13
TX	TX: 14 — 13 / P6/BO-21	SHT 08
DTTS	DTTS: 15 / P6/BO-22	SHT 08
DIR E/F SEND	DEF_TX: 17 — 16 / P6/BO-23	SHT 08
SPARE (TEST OUTPUT)	DEF_TX: 18 / P6/BO-24	SHT 08

X42 P4 — RED670

IND CIRCUIT BREAKER OPEN	P4/BO-1: 1 — 2	SHT 13
IND CIRCUIT BREAKER CLOSED	P4/BO-2: 3	SHT 13
IND ARC OFF	P4/BO-3: 4	SHT 13
IND ARC 3 POLE	P4/BO-4: 5	SHT 13
IND ARC 1+3 POLE	P4/BO-5: 6	NOT USED
BKR CLOSE PULSE	P4/BO-6: 7 — 9	SHT 12
TCS FAIL	P4/BO-7: 10 — 11	SHT 09
EXTERNAL COMMS FAIL	P4/BO-8: 12	SHT 09
INTERNAL COMMS FAIL	P4/BO-9: 13	SHT 09
MAIN PROT VT FUSE FAIL	P4/BO-10: 14	SHT 09
DIFFERENTIAL TRIP	DIFFT_X: 15 — 16 / P4/BO-11	SHT 13
IMPEDANCE TRIP	IMPT_X: 17 — 18 / P4/BO-12	SHT 13

X32 P3 — RED670

FEEDER BYPASS ON	FDR BP-ON: X32 1 — X32 2 / P3/BI.09	SHT 11
FEEDER BYPASS OFF	FDR BP-OFF: 3 — 4 / P3/BI.10	SHT 11
CBNH-HEATER FAIL	CBNH-H: 5 — 6 / P3/BI.11	SHT 11
IEC61850 SWITCH FAIL	IEC SWITCH FAIL: 7 — 8 / P3/BI.12	SHT 11
MEAS TRANSDUCER FAIL	MEAS_T FAIL: 9 — 10 / P3/BI.13	SHT 11
EXTERNAL CLOSE	EXTERNAL CLOSE: 11 — 12 / P3/BI.14	SHT 12
SPARE	13 — 14 / P3/BI.15	SPARE
LED TEST	LED CHECK: 15 — 16 / P3/BI.16	SHT 13

X82 P8 — RED670

BREAKER CHARGING FAIL	CBNH-BCF: X82 1 — X82 2 / P8/BI.09	SHT 10
TCS FAIL	CBNH-SF6: 3 — 4 / P8/BI.10	SHT 10
EXTERNAL CLOSE INPUT	TCS-FAIL: 5 — 6 / P8/BI.11	SHT 10
1+3 POLE ARC	1+3 POLE ARC: 7 — 8 / P8/BI.12	NOT USED
3 POLE ARC	3 POLE ARC: 9 — 10 / P8/BI.13	SHT 10
ARC OFF	ARC OFF: 11 — 12 / P8/BI.14	SHT 10
SUPERVISORY ENABLED	SUP ENABLE: 13 — 14 / P8/BI.15	SHT 10
TELEPROTECTION DISABLED	TELE-DISABLED: 15 — 16 / P8/BI.16	SHT 10

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

SCALE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						I53272156-00003

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10

ISCOR SUBSTATION
66kV FEEDER 2
PROTECTION REFERENCE DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	19	0

MASTER TRACING FILED UNDER D-DT-15007 SHEET 19 OF 28 REVISION 2

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1L

F4.1 PNH
X1 AMBER X2 SHT 14

F4.2 ARC OFF/LOCKED-OUT
X1 AMBER X2 SHT 13

F4.6 CBNH
X1 AMBER X2 SHT 13

F4.7 CBO
X1 GREEN X2 SHT 13

F4.8 CBC
X1 RED X2 SHT 13

R3F.1 D1
1–11 SPARE
2–12 SHT 13
3–13 SHT 13
4–14 SHT 13
5–15 SHT 13
6–16 SHT 13
7–17 SHT 13
8–18 SHT 13

R3F.2 D2
E–D SHT 7
G–B SHT 7

R3F.3 D3
E–D SHT 7
G–B SPARE

R3F.4 D4
C–F SHT 9
D–E SHT 9
A–H SHT 9
B–G SHT 9

R3F.5 D5
E–D SHT 9
G–B SPARE

F2.2.1 MCB(M) 16A
1–2 SHT 6
3–4 SHT 6

F2.2.2 MCB(BU) 16A
1–2 SHT 9
3–4 SHT 9

F2.2.4 MCB(CL)
1–2 SHT 12
3–4 SHT 12
AUX 21–22 SHT 9
13–14 SPARE

F2.2.6 MCB(SR) 20A
1–2 SHT 14
3–4 SHT 14
AUX 21–22 SHT 10
13–14 SPARE

F2.3.1 MCB(VT-M) 2A
RED PHASE VT 1–2 SHT 5
WHITE PHASE VT 3–4 SHT 5
BLUE PHASE VT 5–6 SHT 5
AUX 21–22 SHT 10
13–14 SPARE

F2.3.3 MCB(VT-BU) 2A
RED PHASE VT 1–2 SHT 5
WHITE PHASE VT 3–4 SHT 5
BLUE PHASE VT 5–6 SHT 5
AUX 21–22 SHT 11
13–14 SPARE

F2.3.6 MCB(VT-SC) 2A
1–2 SHT 5
3–4 SHT 5
AUX 21–22 SHT 10
13–14 SPARE

F2.3.7 MCB(H) 6A
1–2 SHT 14
3–4 SHT 14

R4.X5.2 MCB(VT-T) 2A
RED PHASE VT 1–2 SHT 5
WHITE PHASE VT 3–4 SHT 5
BLUE PHASE VT 5–6 SHT 5

R1.5 RCPM_C/T
SNUBBER CIRCUIT 11–21 SHT 13
17–27 SHT 9

F4.11 TNS
1A MAIN 2A SHT 6
NORMAL 3A SHT 6
BACKUP 4A
1B MAIN 2B SHT 6
NORMAL 3B
BACKUP 4B
1C MAIN 2C SHT 6
NORMAL 3C
BACKUP 4C
12 MAIN 2D
1D NORMAL 3D SHT 6
BACKUP 4D
1E MAIN 2E
NORMAL 3E SHT 9
BACKUP 4E
1F MAIN 2F
NORMAL 3F SHT 7
BACKUP 4F
1G MAIN 2G
NORMAL 3G SHT 9
BACKUP 4G
1H MAIN 2H
NORMAL 3H SHT 9
BACKUP 4H
1J MAIN 2J
NORMAL 3J SHT 9
BACKUP 4J
1P MAIN 2P
NORMAL 3P SHT 9
BACKUP 4P
1K MAIN 2K
NORMAL 3K SHT 9
BACKUP 4K
1L MAIN 2L
NORMAL 3L SHT 9
BACKUP 4L
1M MAIN 2M
NORMAL 3M SHT 11
BACKUP 4M
1N MAIN 2N
NORMAL 3N SHT 12
BACKUP 4N

F2.2.7 MCB(AC) 10A
1–2 SHT 14
3–4 SHT 14

R1.8 TCS-M
220V DC SHT 6 110V DC SHT 6
11–12 21–13 SHT 6
15–17 SHT 10
25–27
26–16
FAULT OK
24 SHT 6

R1.11 TCS-BU
220V DC SHT 6 110V DC SHT 6
11–12 21–13 SHT 9
15–17 SHT 10
25–27
26–16
FAULT OK
24 SHT 9

F4.16 ARC 3 POLE
3–4 SHT 10
X1 AMBER X2 SHT 13

F4.15 ARC OFF
3–4 SHT 10
X1 AMBER X2 SHT 13

R1.6 CT-X RXMA 1
2000Ω
11–12 SHT 7
13–14 SHT 6
15–16 SPARE
17–18 SPARE
21–22 SPARE
23–24 SPARE
25–26 SHT 11
27–28

R2F.1 CBC-CR RXMB 1
(+)11 (-)12 SHT 12
13–14 SHT 13
15–16 SHT 13
17–18 SPARE
(+)21 (-)22 SPARE
23–24 SPARE
25–26 SPARE
27–28 SPARE

F4.12 LCS
TEST 7
6 OFF SHT 13
ON 5
TEST 3
2 OFF SHT 14
ON 1

F4.17 ARC 1+3 POLE
3–4 SHT 10
X1 AMBER X2 SHT 13

F4.18 TTPB
13–14 SHT 10

F4.13 TPIS
1A OFF 2A ON 3A SHT 8
1B OFF 2B ON 3B SHT 8
1C OFF 2C ON 3C SHT 9
1D OFF 2D ON 3D SHT 14
1E OFF 2E ON 3E SHT 10

F4.14 CBCS
TRIP 2 NORMAL 1 CLOSE SHT 9
TRIP 3 NORMAL 4 CLOSE SHT 12
TRIP 6 NORMAL 5 CLOSE SHT 11
TRIP 7 NORMAL 8 CLOSE SPARE

F4.19 BFIS
1A OFF 2A ON 3A SHT 9
1B OFF 2B ON 3B SHT 9
1C OFF 2C ON 3C SHT 9
1D OFF 2D ON 3D SHT 17

F4.20 SIS
1A OFF 2A ON 3A SHT 9
1B OFF 2B ON 3B SHT 10
1C OFF 2C ON 3C SHT 12
1D OFF 2D ON 3D SHT 17 (OPTIONAL)
1E OFF 2E ON 3E SPARE
1F OFF 2F ON 3F SPARE

R1.1 VSR-1 (OPTIONAL)
+122 -121 SHT 12
113–114 SHT 5
115–116 SHT 5
117–118 SPARE
123–124 SPARE
213–214 SHT 5
227–228 SHT 5
225–226 SHT 5
223–224 SHT 5
+212 -211 SHT 12

R1.2 VSR-2 (OPTIONAL)
+122 -121 SHT 12
113–114 SHT 5
115–116 SHT 5
117–118 SPARE
123–124 SPARE
213–214 SHT 5
227–228 SHT 5
225–226 SHT 5
223–224 SHT 5
+212 -211 SHT 12

R1.7 TP-PSU
110V DC 116–118 48V DC 126–128 117 SHT 8
317–318 SHT 9

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS,CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW,AC KEY
SHT 13	INDICAT.DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
PROTECTION REFERENCE DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	20	0

LEVELS 1 5 10

PANEL TYPE DESIGNATION 4FZD-3920

SIZE A1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 20 OF 28 REVISION 2

R3R.1 DCF-M
2 10 SHT 8
3 4 1 SHT 14
7 5 6 SHT 17
9 8 11 SHT 9

R3R.2 DCF-BU
2 10 SHT 13
3 4 1 SHT 14
7 5 6 SHT 17
9 8 11 SHT 7

R2.1 FAIL RS900
SHT 11

R2.4 PNH-X1
2 10 SHT 7
3 4 1 SHT 14
7 5 6 SHT 17
9 8 11 SHT 7

R2.5 PNH-X2
2 10 SHT 9
3 4 1 SHT 14
7 5 6 SHT 17
9 8 11 SHT 10

F2.1 REF615 DIRECTIONAL

POWER SUPPLY	X100 1 / X100 2	SHT 12
BKR CLOSE	BI 1 X130 1 / X130 2	SHT 12
VT MCB TRIP	BI 2 3 / 4	SHT 11
SIS ENABLED	BI 3 5 / 6	SHT 10
LAMP CHECK	BI 4 7 / 8	SHT 13
RED PHASE VT	U1 11 / 12	SHT 5
WHITE PHASE VT	U2 13 / 14	SHT 5
BLUE PHASE VT	U3 15 / 16	SHT 5
NEUTRAL	U0 17 / 18	SHT 5
CHARGING FAIL	BI 1 X120 1 / X120 2	SHT 10
PNH-X2	BI 2 3	SHT 10
SF6 GAS LOW	BI 3 4	SHT 10
CUSTOMER CLOSE BLOCK	BI 4 5 / 6	SHT 11
RED PHASE CURRENT	IL1 R 7 / 8	SHT 4
WHITE PHASE CURRENT	IL2 W 9 / 10	SHT 4
BLUE PHASE CURRENT	IL3 B 11 / 12	SHT 4
NEUTRAL CURRENT	IL4 E/F 14 / 13	SHT 4
E/F BLOCK	BI 1 X110 1 / X110 2	NOT USED
BUSZONE TRIP	BI 2 3 / 4	SHT 7
BKR CLOSED	BI 3 5 / 6	SHT 7
BKR OPEN	BI 4 7	SHT 7
SETTING GROUP ALT 2	BI 5 8 / 9	SHT 7
SETTING GROUP ALT 3	BI 6 10	SHT 7
TNS MAIN TEST	BI 7 11 / 12	SHT 11
TNS NORMAL	BI 8 13	SHT 11
BU O/C IDMT/DT TRIP	X110 SO 1 15 / 14	SHT 7
VTFF	SO 2 18 / 17	SHT 7
BU O/C TRIP	SO 3 21 / 20	SHT 17
TNS ON MAIN	SO 4 24 / 23	SHT 17
NOT USED	IRF 5	
BACK-UP FAIL	X100 4 / X100 3	SHT 7
BU E/F IDMT/DT TRIP	X100 6 / PO 1 / X100 7	SHT 7
CLOSE MAIN ON TEST	8 / PO 2 / 9	SHT 12

F2.1 CONTINUED

BU O/C & E/F TRIP HIGHSET	X100 12 / 10	SHT 7
BU E/F TRIP	SO 1 14 / 13	SHT 17
BU BKR FAIL TRIP	SO 2 16 / 17	SHT 17
BU BKR FAIL TRIP	PO 3 19 / 18	SHT 9
BU (GENERAL) TRIP	PO 3 22 / 21	SHT 18
BU (GENERAL) TRIP	PO 4 23 / 24	SHT 9

TRIP-M
A1 A2 14 11 12

TRIP-B/U
A1 A2 14 11 12

SHT	
SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS,CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW,AC KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

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Eskom

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
PROTECTION REFERENCE DIAGRAM

D-WC-7104 | SET NUMBER 62 | SHEET NUMBER 21 | REVISION 1

LEVELS 1 2 5 10 11 12 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 21 OF 28 REVISION 2

X1

SYNCHRONISING CHECK VOLTAGE	G92	⊙44							
	G91	⊙43							
MEASUREMENTS VT SUPPLY	E372	⊙42							
	E252	⊙41							
	E232	⊙40							
	E212	⊙39							
	E372	38							
	E252	37							
	E232	36							
	E212	35							
	E372	34							
	E252	33							
	E232	32							
	E212	31							
MAIN PROTECTION VT INPUT	E70	30							
	E51	29							
	E31	28							
	E11	27							
	E70	26	E70AC						
	E51	25	E61AC						
	E31	24	E41AC						
	E11	23	E21AC						
TRANSFORMER 2 PROTECTION VT INPUTS (VT SELECTION)	E70	22	E71AC		26				
	E51	21	E51AC		25				
	E31	20	E31AC		24				
	E11	19	E11AC		23				
PARALLEL FDR FLD COMPENSATION (IF REQUIRED)		● 18	90						
	A173	⊙17							
	A172	⊙16							
		● 15	90						
DISTURBANCE RECORDER CT CCT	A74	⊙14							
	A54	⊙13							
	A34	⊙12							
	A14	⊙11							
		● 10	90						
BACK-UP PROTECTION CT INPUT	C72	9	C72	58•					
	C52	8	C52	57					
	C32	7	C32	56					
	C12	6	C12	55					
		● 5	90						
MAIN PROTECTION CT INPUT	A72	4	A72	40•					
	A52	3	A52	39					
	A32	2	A32	38					
	A12	1	A12	37					
		D-RAIL							

CABLE NUMBER	AC104	AC112				
CABLE SIZE	12	12				
NUMBER OF SPARES	4	8				
DESTINATION	CT JUNCTION BOX	66kV TRANSFORMER 2 VTJB				

X2

DISCHARGE RESISTOR	ESD		90						
METERING PANEL VT OUTPUT	E372	⊙42	E372AC		13				
	E252	⊙41	E252AC		MCB-6				
	E232	⊙40	E232AC		MCB-5				
	E212	⊙39	E212AC		MCB-4				
SG3	K177	38							
	K101	37							
SG2	K175	36							
	K101	35							
CB OPEN IND	K171	34	K171				X1.40		
	K101	33							
CB CLOSED IND	K169	32	K169				X1.32		
	K101	31	K101A				X1.31		
EXT BUSZONE TRIP	K167	30	P125AC						
	K101	29	P121AC						
BKR FAIL INITIATE BACK-UP PROTECTION AND BZ CROSSTRIP	K163	28							
	K161	27							
	K159	26							
	K157	25	●						
	K155	24							
EXT DTTS	K151	23							
	K101	22							
MAIN TRIP	K109	⊙21	K109A				X1.61		
	K102	⊙20	K102A				X1.6		
	K107	⊙19	K107A				X1.5		
MAIN DC SUPPLY	J2	` 18	J12A	X8.6					
	J1	` 17	J11A	X8.5					
SPRING REWIND SUPPLY	M102	16	M102 (2)					X1.4	
	M101	15	M101 (2)					X1.3	
	M2	14	● TO X3.18						
	M1	13	● TO X3.17						
	SPARE	12							
HEATER SUPPLY	H73	11	H73					X1.2	
	H13	10	H13					X1.1	
LAMP SUPPLY	H72	● 9							
	H12	● 8							
220V AC SCHEME SUPPLY	H71	7	H710	X4.N					
	H11	6	H151C	X4.11					
	SPARE	5							
DISTURBANCE RECORDER VT OUTPUT	E172	⊙ 4							
	E152	⊙ 3							
	E132	⊙ 2							
	E112	⊙ 1							
		D-RAIL							

CABLE NUMBER	AC122	AC107		AC105	AC106	
CABLE SIZE	4	4		19	12	
NUMBER OF SPARES	0	0		1	6	
DESTINATION	AC/DC DISTRIBUTION BOARD	STATISTICAL METERING PANEL		HV CIRCUIT BREAKER	HV CIRCUIT BREAKER	

X3

FDR BYPASS	K371	38							
	K369	37							
	K301	36							
CUSTOMER BLOCK CLOSE	K367	35							
	K301	34							
EXT TRIP NO ARC	K365	33							
	K301	32							
EXT TRIP AND ARC	K363	31							
	K301	30							
SF6 LOW	K341	29	K341	X1.20					
	K301	28							
BREAKER CHARGING FAIL	K339	27	K339	X1.48•					
	K301	26	K301A	X1.47•					
LINE VT SUPPLY FAIL	K333	25							
	K301	24							
BUS VT SUPPLY FAIL	K331	23							
	K301	22							
BACK-UP TRIP	K315	⊙21	K315A	X1.63					
	K302	⊙20	K302A	X1.8					
	K313A	⊙19	K313AC	X1.7					
BACK-UP DC SUPPLY	J4	` 18	FROM X2.14						
	J3	` 17	FROM X2.13						
DIR E/F SEND	K204	Ø 16							
	K221	Ø 15							
DIRECT INTERTRIP SEND	K204	Ø 14							
	K219	Ø 13							
PERMISSIVE INTERTRIP SEND	K204	Ø 12							
	K217	Ø 11							
DIR E/F RECIEVE	K215	Ø 10							
	K205	Ø 9							
CARRIER GUARD SIGNAL ON	K213	Ø 8							
	K205	Ø 7							
DIRECT INTERTRIP RECIEVE	K211	Ø 6							
	K205	Ø 5							
PERMISSIVE INTERTRIP RECIEVE	K209	Ø 4							
	K205	Ø 3							
TELEPROTECTION POWER SUPPLY (48V DC)	K202	2							
	K201	1							
		D-RAIL							

CABLE NUMBER	AC105						
CABLE SIZE	19						
NUMBER OF SPARES	1						
DESTINATION	HV CIRCUIT BREAKER						

NOTE:

1. (2) INDICATES TWO LEADS IN PARALLEL.
2. SPARE CABLE LEADS TO BE LEFT LONG ENOUGH TO REACH THE FURTHEST TERMINAL.
3. LEAD NUMBERS SHOWN THUS
   K101 [ ] K101 INDICATES NO CHANGE IN LEAD NUMBER.
   K301 [ ] K305 INDICATES CHANGE IN LEAD NUMBER.
4. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.
   STANDARD TERMINALS USED ARE ENTRELEC M10/10.RS
   ● D6/8-ST-RS ENTRELEC SLIDING LINK TEST TERMINAL
   ⊙ D6/8 ST1 RS TEST AND SHORTING LINKS WITH SAFETY CONNECTIONS (YELLOW INSULATED TEST POINTS)
   Ø M4/6 RS SPRING LOADED ENTRELEC
   : M4/6SNTS ENTRELEC SHORTING STRIP (ORANGE) SPRING LOADED TERMINALS
   X D2.5/5 SN ADD ENTRELEC TERMINALS
   □ M4/8 SF ENTRELEC FUSE TERMINALS
   ` ENTRELEC 1SNA168237R0500 TEST SOCKET - AL4 - DIA 4mm (INSTALLED IN CENTRE SPACING OF TERMINAL)
   [R] M4/6 RS SPRING LOADED ENTRELEC WITH RESISTOR INSERTED
5. NOTE THAT D6/8 ST1 RS TERMINALS MAY BE USED IN PLACE OF D6/8-ST-RS TERMINALS. THE YELLOW INSULATED TEST POINTS MAY BE REMOVED FROM THE EARTH LINKS, AT THE COMMISSIONING TECHNICIANS DISCRECTION.
6. FINE TOOTHED HORIZONTAL TRUNKING SHALL BE USED.

TERMINAL LOOPS (•)	
RP	X2.13 - X3.17; X2.14 - X3.18
CB MB	X1.18 - X1.48; X1.31 - X1.39;
	X1.17 - X1.19 - X1.47
CTJB	40 - 41 - 42; 46 - 47 - 48; 52 - 53 - 54;
	58 - 59 - 60; 61 - 62 - 63 - 64 - 65 - 66 - E; 70 - 71 - 72 - E

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
DRG No.	REFERENCE DRAWINGS:

SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
SHT 13	INDICAT. DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
CARL CRONJE DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
PANEL CABLING DIAGRAM

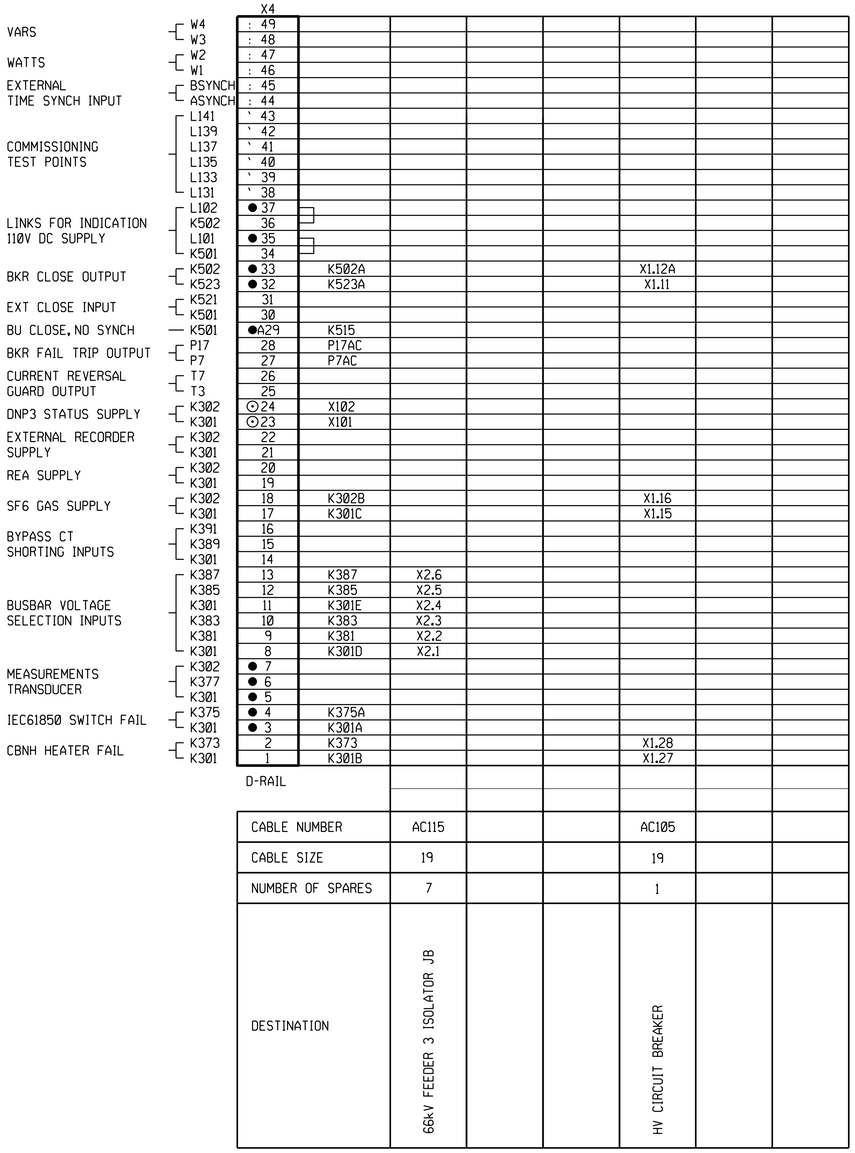
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	22	1

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 22 OF 28 REVISION 2



CABLE NUMBER	AC115			AC105		
CABLE SIZE	19			19		
NUMBER OF SPARES	7			1		
DESTINATION	66kV FEEDER 3 ISOLATOR JB			HV CIRCUIT BREAKER		

CABLE NUMBER		AC115			AA127		AC123
CABLE SIZE		19			4Pr		10Pr
NUMBER OF SPARES		7			3Pr		9Pr
DESTINATION		66kV FEEDER 3 ISOLATOR JB			66kV FEEDER 1 RP		IDF

TERMINAL LOOPS (•)	
LINE IS MB	X1.24 - X1.48
BB1 IS MB	X1.24 - X1.48
BB2 IS MB	X1.24 - X1.48

NOTE:

1. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.

STANDARD TERMINALS USED ARE ENTRELEC M10/10.RS
- ● D6/8-ST-RS ENTRELEC SLIDING LINK TEST TERMINAL
- ⊙ D6/8 STI RS TEST AND SHORTING LINKS WITH SAFETY CONNECTIONS (YELLOW INSULATED TEST POINTS)
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- : M4/6SNTS ENTRELEC SHORTING STRIP (ORANGE) SPRING LOADED TERMINALS
- X D2.5/5 SN ADD ENTRELEC TERMINALS
- □ M4/8 SF ENTRELEC FUSE TERMINALS
- ` ENTRELEC 1SNA168237R0500 TEST SOCKET - AL4 - DIA 4mm (INSTALLED IN CENTRE SPACING OF TERMINAL)
- [R] M4/6 RS SPRING LOADED ENTRELEC WITH RESISTOR INSERTED

2. NOTE THAT D6/8 STI RS TERMINALS MAY BE USED IN PLACE OF D6/8-ST-RS TERMINALS. THE YELLOW INSULATED TEST POINTS MAY BE REMOVED FROM THE EARTH LINKS, AT THE COMMISSIONING TECHNICIANS DISCRECTION.

3. THE DROPPING RESISTORS HAVE BEEN REMOVED FROM THE X5 RACK AT THE REQUEST OF ABB.

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS, CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW, AC KEY
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SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED, FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
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TYGER WATERFRONT
CARL CRONJÉ DRIVE
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REG. No. 1966/006628/07

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
PANEL CABLING DIAGRAM

D-WC-7104

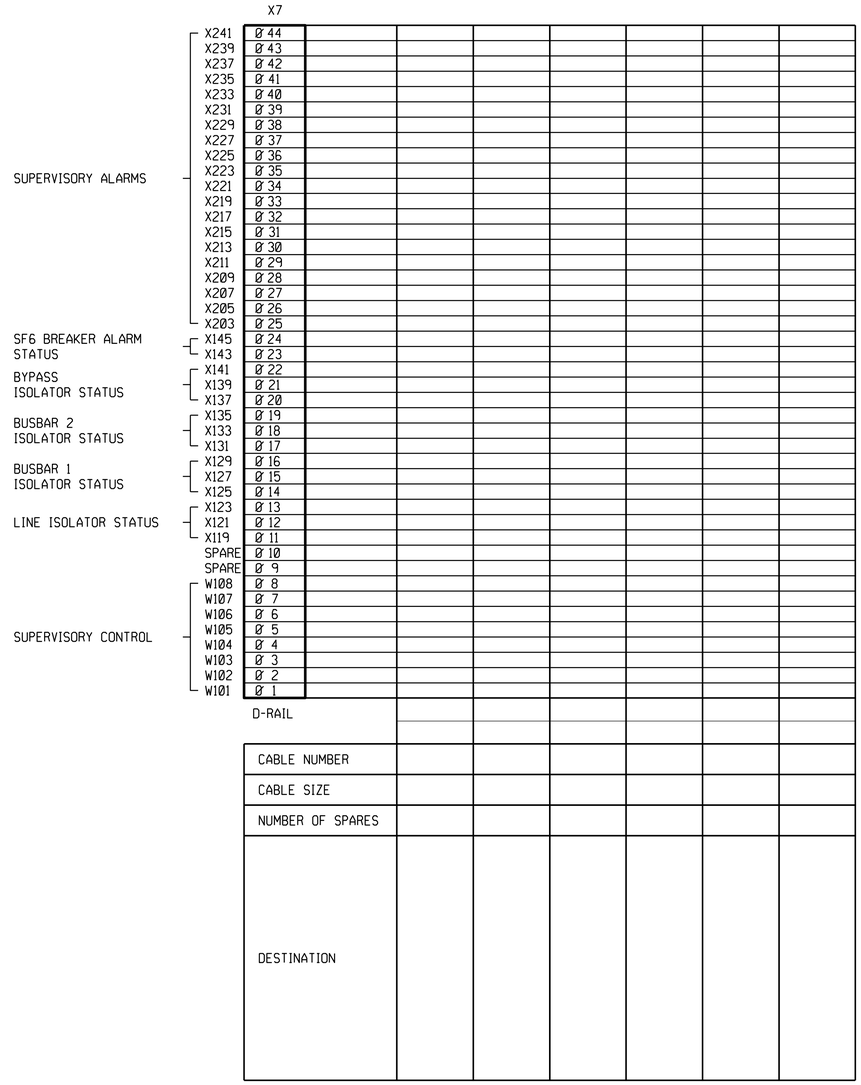
SET NUMBER	SHEET NUMBER	REVISION
62	23	1

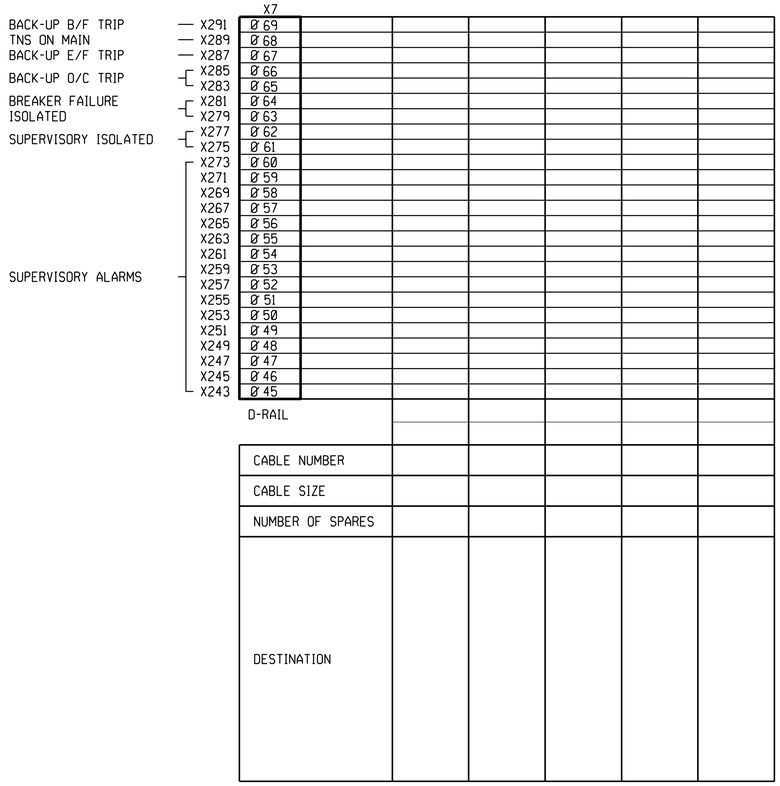
LEVELS 1 2 5 10 11 12 25 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GRODTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 23 OF 28 REVISION 2





SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
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SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

NOTE:

1. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.

STANDARD TERMINALS USED ARE ENTRELEC M10/10.RS
- ● D6/8-ST-RS ENTRELEC SLIDING LINK TEST TERMINAL
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- R M4/6 RS SPRING LOADED ENTRELEC WITH RESISTOR INSERTED

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REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

Eskom

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C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
PANEL CABLING DIAGRAM

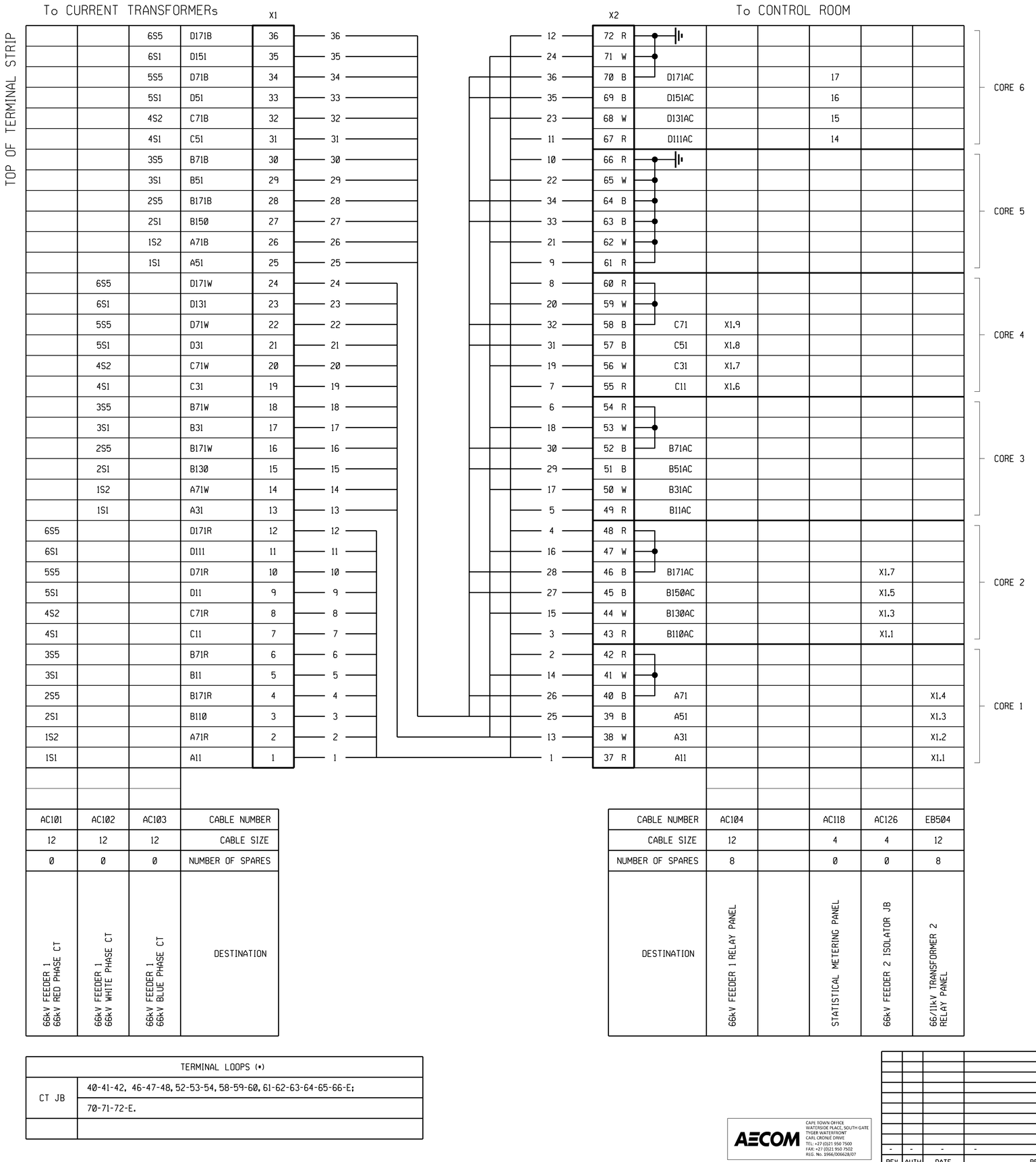
D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	62	24	0

LEVELS 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 25 26 27 28 29 30 31

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 24 OF 28 REVISION 2



To CURRENT TRANSFORMERs

TOP OF TERMINAL STRIP

				X1
		6S5	D171B	36
		6S1	D151	35
		5S5	D71B	34
		5S1	D51	33
		4S2	C71B	32
		4S1	C51	31
		3S5	B71B	30
		3S1	B51	29
		2S5	B171B	28
		2S1	B150	27
		1S2	A71B	26
		1S1	A51	25
	6S5		D171W	24
	6S1		D131	23
	5S5		D71W	22
	5S1		D31	21
	4S2		C71W	20
	4S1		C31	19
	3S5		B71W	18
	3S1		B31	17
	2S5		B171W	16
	2S1		B130	15
	1S2		A71W	14
	1S1		A31	13
6S5			D171R	12
6S1			D111	11
5S5			D71R	10
5S1			D11	9
4S2			C71R	8
4S1			C11	7
3S5			B71R	6
3S1			B11	5
2S5			B171R	4
2S1			B110	3
1S2			A71R	2
1S1			A11	1

AC101	AC102	AC103	CABLE NUMBER
12	12	12	CABLE SIZE
0	0	0	NUMBER OF SPARES
66kV FEEDER 1 66kV RED PHASE CT	66kV FEEDER 1 66kV WHITE PHASE CT	66kV FEEDER 1 66kV BLUE PHASE CT	DESTINATION

To CONTROL ROOM

X2			AC104		AC118	AC126	EB504	
72	R							CORE 6
71	W							
70	B	D171AC			17			
69	B	D151AC			16			
68	W	D131AC			15			
67	R	D111AC			14			
66	R							CORE 5
65	W							
64	B							
63	B							
62	W							
61	R							
60	R							CORE 4
59	W							
58	B	C71	X1.9					
57	B	C51	X1.8					
56	W	C31	X1.7					
55	R	C11	X1.6					
54	R							CORE 3
53	W							
52	B	B71AC						
51	B	B51AC						
50	W	B31AC						
49	R	B11AC						
48	R							CORE 2
47	W							
46	B	B171AC				X1.7		
45	B	B150AC				X1.5		
44	W	B130AC				X1.3		
43	R	B110AC				X1.1		
42	R							CORE 1
41	W							
40	B	A71					X1.4	
39	B	A51					X1.3	
38	W	A31					X1.2	
37	R	A11					X1.1	

CABLE NUMBER	AC104		AC118	AC126	EB504
CABLE SIZE	12		4	4	12
NUMBER OF SPARES	8		0	0	8
DESTINATION	66kV FEEDER 1 RELAY PANEL		STATISTICAL METERING PANEL	66kV FEEDER 2 ISOLATOR JB	66/11kV TRANSFORMER 2 RELAY PANEL

TERMINAL LOOPS (•)	
CT JB	40-41-42, 46-47-48, 52-53-54, 58-59-60, 61-62-63-64-65-66-E; 70-71-72-E.

DRG No.	REFERENCE DRAWINGS:
SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
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SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
CARL CRONJÉ DRIVE
TEL: +27 (0)21 950 7500
FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

Eskom

PROJECT APPROVED C. PYM	DESIGN APPROVED A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED B. HOMANN	DESIGN CHECKED N. MATHONSI
DATE 25/06/21	DATE 13/12/10
DRAWN BY K. STEYNBERG	DRAWN BY C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
CTJB CABLING DIAGRAM

	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	62	25	1

MASTER TRACING FILED UNDER D-DT-15007 SHEET 25 OF 28 REVISION 2

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

(NOT USED)

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
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DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
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Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
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DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
LINE VTJB LAYOUT & KEY DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	26	0

LEVELS 1 2 5 10 11 12 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 26 OF 28 REVISION 2

(NOT USED)

SEE D-WC-7104 SET 159

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
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SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
						153272156-00003

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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PROJECT APPROVED	DESIGN APPROVED
C. PYM	A. CRAIB
DATE 25/06/21	DATE 13/13/10
PROJECT CHECKED	DESIGN CHECKED
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DATE 25/06/21	DATE 13/12/10
DRAWN BY	DRAWN BY
K. STEYNBERG	C. CANNON
DATE 25/06/21	DATE 26/02/10
SCALE	

ISCOR SUBSTATION
66kV FEEDER 2
CABLE BLOCK DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	27	0

LEVELS 1 5 10 14 20 21 22 28

PANEL TYPE DESIGNATION 4FZD-3920

SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15007 SHEET 27 OF 28 REVISION 2

X2

					K301D	1	K301D	X4.8				
					K381	2	K381	X4.9				
					K383	3	K383	X4.10				
		X1.22			K301E	4	K301E	X4.11				
		X1.23			K385	5	K385	X4.12				
		X1.21			K387	6	K387	X4.13				
						7						
						8						
						9						
		X1.48			K101A	10	K101A	X5.24				
		X1.49			X103	11	X103	X5.25				
		X1.25			X105	12	X105	X5.26				
					X101B	13	X101B	X5.27				
					X107	14	X107	X5.28				
					X109	15	X109	X5.29				
					X101C	16	X101C	X5.30				
					X111	17	X111	X5.31				
					X113	18	X113	X5.32				
						19						
						20						
						21						
						22						
						23						
						24						
						25						
						26						
						27						
						28						
						29						
						30						
						31						
						32						
						33						

		AC110			CABLE NUMBER			AC115				
		12			CABLE SIZE			19				
		6			NUMBER OF SPARES			4				
		66kV LINE ISMB			DESTINATION			66kV FEEDER 2 RP				

X1

						B110AC	1	B110AC	43			
						B111AC	2	B111AC				
						B130AC	3	B130AC	44			
						B131AC	4	B131AC				
						B150AC	5	B150AC	45			
						B151AC	6	B151AC				
					48	B171AC	7	B171AC				
							8	B210AC				
						B211AC	9	B211AC				
							10	B230AC				
						B231AC	11	B231AC				
							12	B250AC				
						B251AC	13	B251AC				
							14	B271AC				
						P3AC	15	P3AC				
						P117AC	16	P117AC				
						P5AC	17	P5AC				
						P217AC	18	P217AC				
							19					
							20					
							21					
							22					
							23					
							24					
							25					
							26					
							27					
							28					
							29					
							30					

					AC126			CABLE NUMBER		AC126		
					4			CABLE SIZE		4		
					-			NUMBER OF SPARES		-		
					66kV FEEDER 2 CTJB			DESTINATION		66kV FEEDER 2 CTJB		

LOOPED TERMINALS	
BP ISMB	
BB1 ISMB	X1.20-X1.22; X1.24-X1.48; X1.32-X1.34; X1.33-X1.35; X1.37-X1.39; X1.41-X1.43; X1.44-X1.46; X1.45-X1.47
BB2 ISMB	X1.20-X1.22; X1.24-X1.48; X1.32-X1.34; X1.33-X1.35; X1.37-X1.39; X1.41-X1.43; X1.44-X1.46; X1.45-X1.47
LINE ISMB	X1.20-X1.22; X1.24-X1.48
ISJB	X1.1-X1.8; X1.3-X1.10; X1.5-X1.12; X1.7-X1.14

SHT 28	ISOLATOR JB
SHT 27	CABLE BLOCK
SHT 26	LINE VT DIAGRAM
SHT 25	CT JB CABLING
SHT 24	CABLING DIAGRAM
SHT 23	CABLING DIAGRAM
SHT 22	CABLING DIAGRAM
SHT 21	REFERENCE DIAG
SHT 20	REFERENCE DIAG
SHT 19	REFERENCE DIAG
SHT 18	DISTUR RECORDER
SHT 17	SUP ALARMS KEY
SHT 16	SUP STATUS.CONT
SHT 15	REA & MEAS KEY
SHT 14	SPR REW.AC KEY
SHT 13	INDICAT.DC KEY
SHT 12	CLOSE DC KEY
SHT 11	BACK-UP DC KEY
SHT 10	BACK-UP DC KEY
SHT 09	BACK-UP DC KEY
SHT 08	TELEPROT DC KEY
SHT 07	MAIN DC KEY
SHT 06	MAIN DC KEY
SHT 05	VT SUPPLY KEY
SHT 04	AC KEY DIAGRAM
SHT 03	SINGLE LINE
SHT 02	LOGIC DIAGRAM
SHT 01	PANEL LAYOUT
DRG No.	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV VT & CB ADDED. FEEDER RENAMED.	KS	BH	CP	25/06/2021	153272156-00003

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	J.MOSTERT
DATE 25/06/21	DATE 11/12/15
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	R.BUFFKINS
DATE 25/06/21	DATE 11/12/15
DRAWN BY	DRAWN BY
K. STEYNBERG	N.F.KNOETZEN
DATE 25/06/21	DATE 11/12/15

ISCOR SUBSTATION
66kV FEEDER 2
ISJB CABLING DIAGRAM

D-WC-7104

SET NUMBER	SHEET NUMBER	REVISION
62	28	1

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REG. No: 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
-	-	-	-	-	-

LEVELS: 1 10

PANEL TYPE DESIGNATION 4FZD-3920

MASTER TRACING FILED UNDER D-DT-15007 SHEET 28 OF 28 REVISION 2

AIL

SHEET NUMBER	TITLE	REVISION	DATE	DESIGN CHANGE DESCRIPTION
0	COVER SHEET	1	15/11/2010	REVISION 1 CHANGES INDICATED.
1	PANEL EQUIPMENT LAYOUT	1	15/11/2010	REAR OF MODULE R3: COMPONENT ORDER ALTERED.
2	FRONT PANEL LABELS	1	15/11/2010	SEL-487E LED 10 LABEL UPDATED: "WIND." CHANGED TO "WINDING". BREAKER FAIL ISOLATE SWITCH LABEL WORDING ALTERED.
3	SCHEME LOGIC DIAGRAM	1	15/11/2010	LEVEL 5: HV/MV EARTH FAULT PROTECTION APPLIED FROM PHASE CTs. LEVEL 16: APPLICATION OF MV CUST CABLE PROTECTION ALTERED.
4	RELAY LOGIC DIAGRAM	1	15/11/2010	UPDATED AS PER FINALISED SETTINGS TEMPLATE (REV 0). REPLACES PREVIOUS SHEET 4.
5	RELAY LOGIC DIAGRAM	1	15/11/2010	UPDATED AS PER FINALISED SETTINGS TEMPLATE (REV 0). REPLACES PREVIOUS SHEET 5.
6	RELAY LOGIC DIAGRAM	1	15/11/2010	UPDATED AS PER FINALISED SETTINGS TEMPLATE (REV 0). REPLACES PREVIOUS SHEET 6.
7	RELAY LOGIC DIAGRAM	1	15/11/2010	UPDATED AS PER FINALISED SETTINGS TEMPLATE (REV 0). REPLACES PREVIOUS SHEET 7.
8	AC KEY DIAGRAM	1	15/11/2010	AS PER PREVIOUS ISSUE.
9	AC KEY DIAGRAM: STAR-DELTA POWER TRANSFORMER	1	15/11/2010	VOLTAGE TRFRS PREVIOUSLY ON LEVEL 12 MOVED TO LEVEL 11.
~~9B~~	~~AC KEY DIAGRAM: STAR-STAR POWER TRANSFORMER~~ (NOT USED)	~~1~~	~~15/11/2010~~	~~VOLTAGE TRFRS PREVIOUSLY ON LEVEL 12 MOVED TO LEVEL 11.~~
~~9C~~	~~AC KEY DIAGRAM: AUTO TRANSFORMER~~ (NOT USED)	~~1~~	~~15/11/2010~~	~~VOLTAGE TRFRS PREVIOUSLY ON LEVEL 12 MOVED TO LEVEL 11.~~
10	AC KEY DIAGRAM: ESKOM MV CIRCUIT-BREAKER	1	15/11/2010	AS PER PREVIOUS ISSUE.
~~10B~~	~~AC KEY DIAGRAM: CUSTOMER MV CIRCUIT-BREAKER~~ (NOT USED)	~~1~~	~~15/11/2010~~	PLACEMENT OF TERMINAL T AND U CT INPUTS SWAPPED. ~~CT STAR POINTS REVERSED.~~
~~10C~~	~~AC KEY DIAGRAM: SECONDARY SIDE HV CIRCUIT-BREAKER (FOR AUTO TRANSFORMER APPLICATIONS)~~ (NOT USED)	~~1~~	~~15/11/2010~~	~~AS PER PREVIOUS ISSUE.~~
11	VT SUPPLY KEY DIAGRAM	1	15/11/2010	AS PER PREVIOUS ISSUE.
12	MAIN DC KEY DIAGRAM	1	15/11/2010	AS PER PREVIOUS ISSUE.
13	MAIN DC KEY DIAGRAM	1	15/11/2010	AS PER PREVIOUS ISSUE.
14	BACK-UP DC KEY DIAGRAM	1	15/11/2010	LEVEL 15: FERRULE NUMBERS FOR TERMINAL X2.42 CORRECTED FROM K409 TO K407.
15	BACK-UP DC KEY DIAGRAM	1	15/11/2010	IN313 TERMINAL NO'S CORRECTED FROM A... TO C... LEVEL 16: MV LINE ISOLATOR STATUS ADDED.
16	BACK-UP DC KEY DIAGRAM	1	15/11/2010	LEVELS 3, 4 & 5: MIB CONTACT CONFIGS CORRECTED (N/O vs N/C). NOTE 3 ADDED. FERRULE NO's OF CB CLOSE COIL -VE SUPPLIES CHANGED FROM K385 TO K384. DC SUPPLY MONITORING NO's CHANGED FROM K398 & K399 TO K399 & K400. MODULE TERMINAL (MT) ADDED IN FAULT COUNTER CIRCUIT (K302).
17	SPR REWIND DC KEY, AC KEY DIAGRAM	1	15/11/2010	FERRULE NUMBERS ADDED TO TEST POINT WIRING.
18	SUPERVISORY/COMMS KEY DIAGRAM	1	15/11/2010	LEVEL 26: SEL-2886 DIP SWITCH SETTINGS ADDED.
19	PROTECTION REFERENCE DIAGRAM	1	15/11/2010	AS PER PREVIOUS ISSUE.
20	PANEL CABLING DIAGRAM	1	15/11/2010	LEVEL 9: FERRULE NUMBERS ADDED FOR TERMINALS X1.11 & X1.12 AS PER SHEET 10C.
21	PANEL CABLING DIAGRAM	1	15/11/2010	FERRULE NO's FOR X3.36 & X3.37 CORRECTED FROM K511 & K513 TO K509 & K511. NO's FOR X4.11, X4.12 & X4.20 UPDATED AS PER SHT 16.
22	PANEL CABLING DIAGRAM	1	15/11/2010	FERRULE NO's FOR X5.8 UPDATED AS PER SHEET 16. X7.1-X7.2 DESCRIPTION CHANGED FROM "TCNH ALARM" TO "PNH ALARM". LEVEL 16: MV LINE ISOLATOR STATUS ADDED.
23	HV OR PRIMARY-SIDE CT JB CABLING DIAGRAM	1	15/11/2010	AS PER PREVIOUS ISSUE.
~~24~~	~~MV OR SECONDARY SIDE CT JB CABLING DIAGRAM~~ (NOT USED)	~~1~~	~~15/11/2010~~	~~AS PER PREVIOUS ISSUE.~~
~~25~~	~~MV OR SECONDARY SIDE VT JB CABLING DIAGRAM~~ (NOT USED)	~~1~~	~~15/11/2010~~	~~AS PER PREVIOUS ISSUE.~~
~~26~~	~~CABLE BLOCK DIAGRAM~~ (NOT USED)	~~1~~	~~15/11/2010~~	~~AS PER PREVIOUS ISSUE.~~
24	RED670 RELAY DC, AC & SUPERVISORY KEY DIAGRAM	0	25/11/2011	SHEET ADDED FOR SITE SPECIFIC APPLICATION
25	RED670 RELAY REFERENCE DIAGRAM	0	25/11/2011	SHEET ADDED FOR SITE SPECIFIC APPLICATION

LEVEL	DESCRIPTION	LEVEL	DESCRIPTION
1	SCHEME RATED FOR 110 V DC SUPPLY. (AFFECTS TYPE OF CONTACT PROTECTION (SNUBBER CCTs) SUPPLIED)	16	
2		17	INDOOR SWITCHGEAR AS PER D-DT-5408 SHTs 7 -14 (RT TERMINALS) WITH REMOTE PROTECTION SCHEME
3	STAR-DELTA POWER TRANSFORMER WITH 360 A NEC/R (INCLUDES COOLER FANS: DELETE IF NOT APPLICABLE)	18	
4		19	
5		20	
6		21	
7		22	STANDARD OUTDOOR HV CIRCUIT-BREAKER (AS PER D-DT-5407) WITH POST-TYPE CTs
8	HIGH IMPEDANCE HV & MV REF FOR TWO-WINDING TRFR - TWO RMS 2V73 RELAYS (ORDERING OPTION)	23	
9		24	APPLICATION WITH RED670 DIFF RELAY INTEGRATION
10	STANDARD DESIGN DRAWING	25	NON-STANDARD DESIGN WITH HV POST CTs AND NO HV BREAKER
11	APPLICATION USING TRFR MV / SECONDARY-SIDE VTs (i.e. WITHOUT MV VT SELECTION OPTION)	26	STANDARD COMMS OPTIONS (RS-485/DNP3 SCADA & RS-485 REMOTE ENG. ACCESS)
12		27	IEC-61850/ETHERNET COMMS (ORDERING OPTION)
13		28	
14		29	
15		30	APPLICATION WITH 4TC-5200 TAP CHANGE CONTROL SCHEME

TRANSFORMER SECONDARY-SIDE CIRCUIT-BREAKER OPTIONS (LEVELS 16–21)

TRANSFORMER PRIMARY-SIDE CIRCUIT-BREAKER OPTIONS (LEVELS 22–23)

? MUTUALLY EXCLUSIVE LEVELS/SHEETS. SELECT ONE AND ONLY ONE OF EACH PAIR/SET PER APPLICATION.

IMPORTANT: OWING TO SPACE CONSTRAINTS WITHIN THE MODULE, LEVELS 15 AND 16 CAN NOT BE APPLIED TOGETHER.

PLEASE NOTE!!!!!!!!!!

WHEN USING THIS SCHEME PLEASE MAKE SURE THAT REFERENCE FILE title4TM7100r1 IS ATTACHED ON ALL THE SHEETS AT ALL TIMES.

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET

REFERENCE DRAWINGS:

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
CARL CRONJÉ DRIVE
TEL: +27 (0)21 950 7500
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REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED: C. PYM	DESIGN APPROVED: S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED: B. HOMANN	DESIGN CHECKED: P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY: K. STEYNBERG	DRAWN BY: S.J. van ZYL
DATE 25/06/21	DATE 17/09/09

SCALE

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1

COVER SHEET

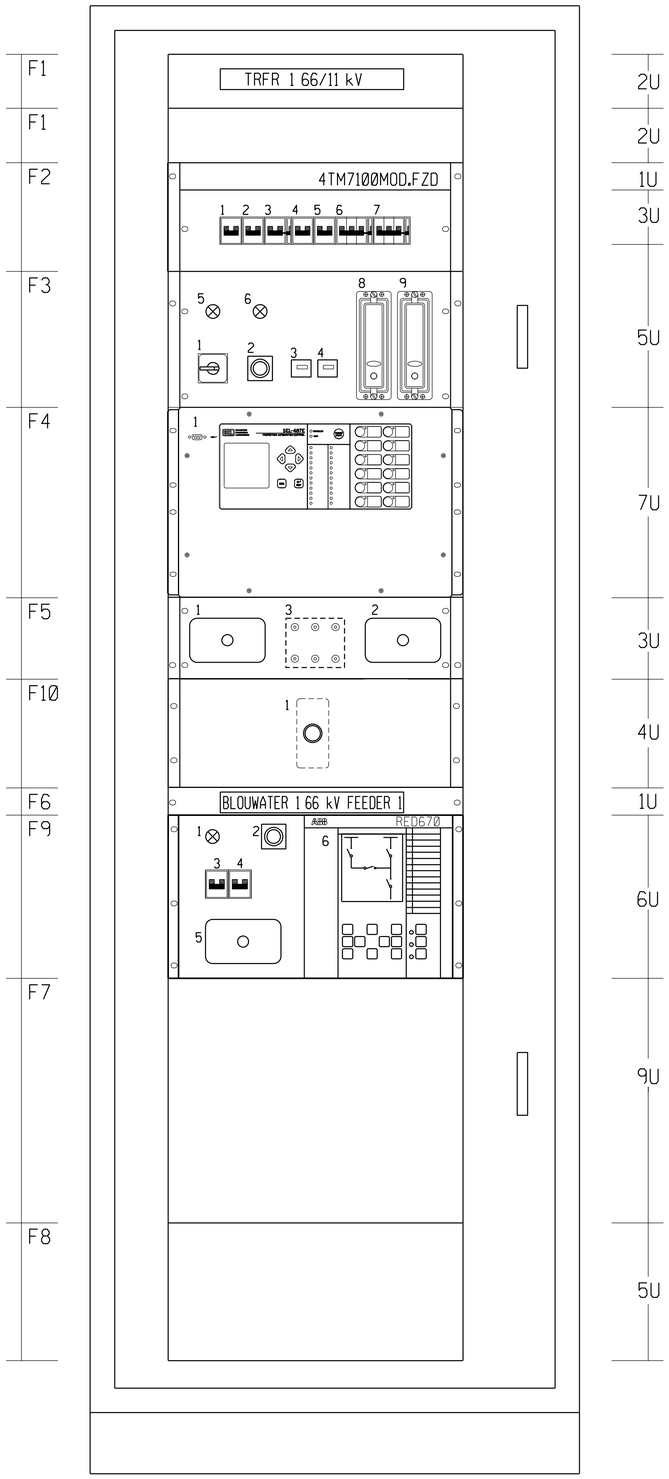
DRAWING	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	00	0

LEVELS 1 3 8 10 11 17 22 24 25 26 27 28 30

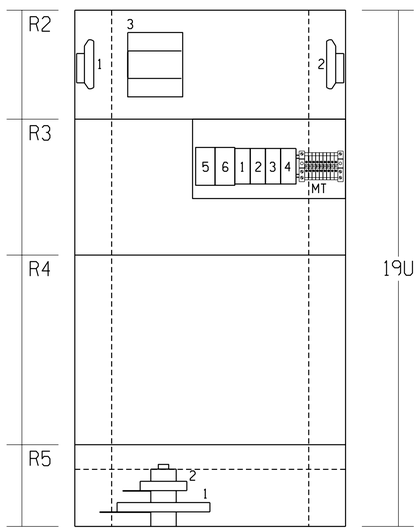
PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 0 OF 26 REVISION 1

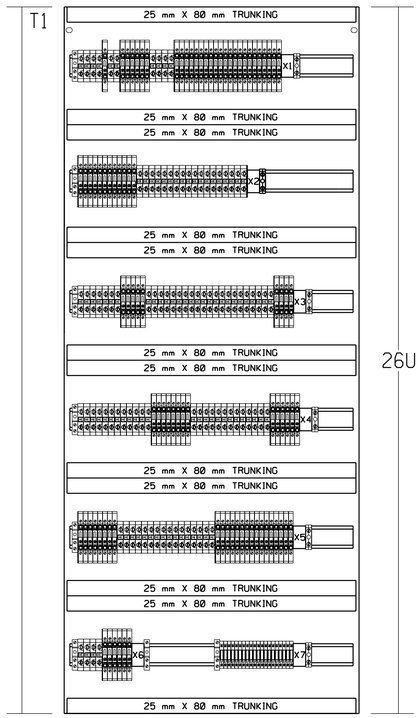
FRONT VIEW



REAR OF MODULE



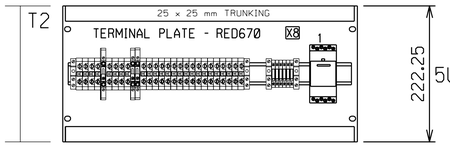
TERMINAL BACK PLATE



LOCATION		DESIGNATION	DESCRIPTION	TYPE	MANUFACTURER
FRONT VIEW					
F1			BLANKING PLATE		
F2	1	DCI MCB (M)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (MAIN CCT) (16A)	EPI02UC(C16)	GE
	2	DCI MCB (BU)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (BACK-UP CCT) (16A)	EPI02UC(C16)	GE
	3	DCI MCB (SR)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (SPRING REWIND) (20A)	EPI02UC(C20)	GE
	4	MCB (AC)	AC ISOLATE MINIATURE CIRCUIT-BREAKER (10A)	G62(C10) & CA H	GE
	5	MCB (H)	HEATER SUPPLY AC MINIATURE CIRCUIT-BREAKER (6A)	G62(C06)	GE
	6	MCB (VT-HV)	HV VOLTAGE TRANSFORMER MINIATURE CIRCUIT-BREAKER (2A)	G63(C02) & CA H	GE
	7	MCB (VT-MV)	HV VOLTAGE TRANSFORMER MINIATURE CIRCUIT-BREAKER (2A)	G63(C02) & CA H	GE
F3	1	BFI	CIRCUIT-BREAKER FAIL ISOLATE SWITCH	CA-10	KRAUS & NIEMAR
	2	ETPB	EMERGENCY TRIP PUSH BUTTON WITH COVER (RED)	MP1-10R / MCBH-20	ABB
	3	FC (HV)	HV CIRCUIT-BREAKER FAULT/TRIP COUNTER (3 DIGIT)	3099	FOX
	4	FC (MV)	MV CIRCUIT-BREAKER FAULT/TRIP COUNTER (3 DIGIT)	3099	FOX
	5	PNH-I	PROTECTION NOT HEALTHY INDICATION (AMBER)	KRE-222-UL (230Vac)	MIMIC CRAFT
	6	MTR-I	MASTER TRIP OPERATED INDICATION (RED)	KRE-222-UN	MIMIC CRAFT
	8	(HI-Z) HV REF	HV HIGH IMPEDANCE RESTRICTED EARTH FAULT PROTECTION RELAY	2V73-AAA	RMS
	9	(HI-Z) MV REF	MV HIGH IMPEDANCE RESTRICTED EARTH FAULT PROTECTION RELAY	2V73-AAA	RMS
F4	1	SEL-487E	TRANSFORMER PROTECTION AND CONTROL RELAY	SEL-487E	SEL
F5	1	CTTB(HV)	HV DIFFERENTIAL CURRENT TRANSFORMER TEST BLOCK	PK2 4-WAY	ALLBRO INDUSTRIES
	2	CTTB(MV)	MV DIFFERENTIAL CURRENT TRANSFORMER TEST BLOCK	PK2 4-WAY	ALLBRO INDUSTRIES
	3	TP1-TP6	BANANA PLUG TEST POINTS (BLACK)	RC11 BK	ELECTRO FUSION
F6			BLANKING PLATE		
F7			BLANKING PLATE		
F8			BLANKING PLATE		
F9	1	PNH-I	PROTECTION NOT HEALTHY INDICATION (RED 670) (AMBER)	KRE-222-UL (230 Vac)	
	2	TTPB	TRIP TEST PUSH BUTTON WITH COVER (RED)	CP10-10R-10/ YSF	ABB
	3	DCI MCB (M)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (RED 670 CCT) (5A)	EPI02UC(C5)	GE
	4	MCB (AC)	AC ISOLATE MINIATURE CIRCUIT-BREAKER (RED 670 CCT) (2A)	G62(C2)	GE
	5	CTTB(HV) - 2	HV DIFFERENTIAL CURRENT TRANSFORMER TEST BLOCK (RED 670)	PK2 4-WAY	ALLBRO INDUSTRIES
	6	RED 670	LINE PROTECTION AND CONTROL RELAY	RED 670	ABB
F10	1	1S20	ARC FAULT RELAY	1S20(CAA)	RMS
REAR OF MODULE					
R2	1	DB1	DIODE BOARD 1 (8 TRIPPING DIODES)	10200	CONCO
	2	DB2	DIODE BOARD 2 (8 TRIPPING DIODES)	10200	CONCO
	3	MTR	MASTER TRIP RELAY	BJ8T ••	ARTECHE
R3		MT	MODULE TERMINALS	M4/6	ENTRELEC
	1	AS-HVM	HV MAIN TRIPPING CIRCUIT ARC SUPPRESSOR	SEL-9501	SEL
	2	AS-HVBU	HV BACK-UP TRIPPING CIRCUIT ARC SUPPRESSOR	SEL-9501	SEL
	3	AS-MVM	MV MAIN TRIPPING CIRCUIT ARC SUPPRESSOR	SEL-9501	SEL
	4	AS-MVBU	MV BACK-UP TRIPPING CIRCUIT ARC SUPPRESSOR	SEL-9501	SEL
	5	SEL-2885	ADDRESSABLE RS-232 TO RS-485 CONVERTER (REMOTE ENG. ACCESS)	SEL-2885	SEL
	6	SEL-2886	RS-232 TO RS-485 CONVERTER (SCADA COMMUNICATION)	SEL-2886	SEL
R4			REAR OF SEL-487E RELAY		
R5	1	HV METROSIL	SINGLE PHASE METROSIL FOR HI-Z HV REF RELAY (6 INCH)	600A/S1/S887	WOODBEAM
	2	MV METROSIL	SINGLE PHASE METROSIL FOR HI-Z MV REF RELAY (3 INCH)	300A/S1/S646	WOODBEAM
TERMINAL BACK PLATE					
T1	X1-X7		TERMINAL RAILS		
			(RAISED FROM BACK PLATE BY 70 mm STAND-OFF POSTS).		
			SCHEME WIRING TERMINATED AT BOTTOM SIDE OF TERMINAL STRIPS.		
			REFER TO SHTs 20 - 22 FOR TERMINAL BLOCK MAKES AND TYPES		
T2	X8		TERMINAL RAILS		
			SCHEME WIRING TERMINATED AT BOTTOM SIDE OF TERMINAL STRIPS.		
			REFER TO SHT 22 FOR TERMINAL BLOCK MAKES AND TYPES		
	1	IRF-X	RED670 PNH AUXILIARY RELAY (110=110V DC)	CR-U110DC3L	ABB

•• SPECIFY 110 Vdc OR 220 Vdc

TERMINAL BACK PLATE



SHEET 8	AC KEY DIAGRAM	SHEET 17	SPR REW DC, AC KEY DIAGRAM		
SHEET 7	RELAY LOGIC DIAGRAM	SHEET 16	BACK-UP DC KEY DIAGRAM	SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM	SHEET 15	BACK-UP DC KEY DIAGRAM	SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM	SHEET 14	BACK-UP DC KEY DIAGRAM	SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM	SHEET 13	MAIN DC KEY DIAGRAM	SHEET 22	PANEL CABLING DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM	SHEET 12	MAIN DC KEY DIAGRAM	SHEET 21	PANEL CABLING DIAGRAM
SHEET 2	FRONT PANEL LABELS	SHEET 11	VT SUPPLY KEY DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM
SHEET 1	PANEL EQUIPMENT LAYOUT	SHEET 10	AC KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM
SHEET 0	COVER SHEET	SHEET 9	AC KEY DIAGRAM	SHEET 18	SUPERVISORY/COMMS KEY DIAG

REFERENCE DRAWINGS:

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TYGER WATERFRONT
CARL CRONJÉ DRIVE
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FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A
1	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG		DATE 25/06/21	DATE 17/09/09
REV	REVISION TO MASTER	BY	CHKD		SCALE 1:5	
					DRAWN BY K. STEYNBERG	DRAWN BY S.J. van ZYL
					PROJECT CHECKED B. HOMANN	DESIGN CHECKED P.A. GERBER
					DATE 25/06/21	DATE 11/06/10
					PROJECT APPROVED C. PYM	DESIGN APPROVED S.J. van ZYL
					DATE 25/06/21	DATE 11/06/10

Eskom

ISCOR SUBSTATION

66/11 kV TRANSFORMER 1

PANEL EQUIPMENT LAYOUT

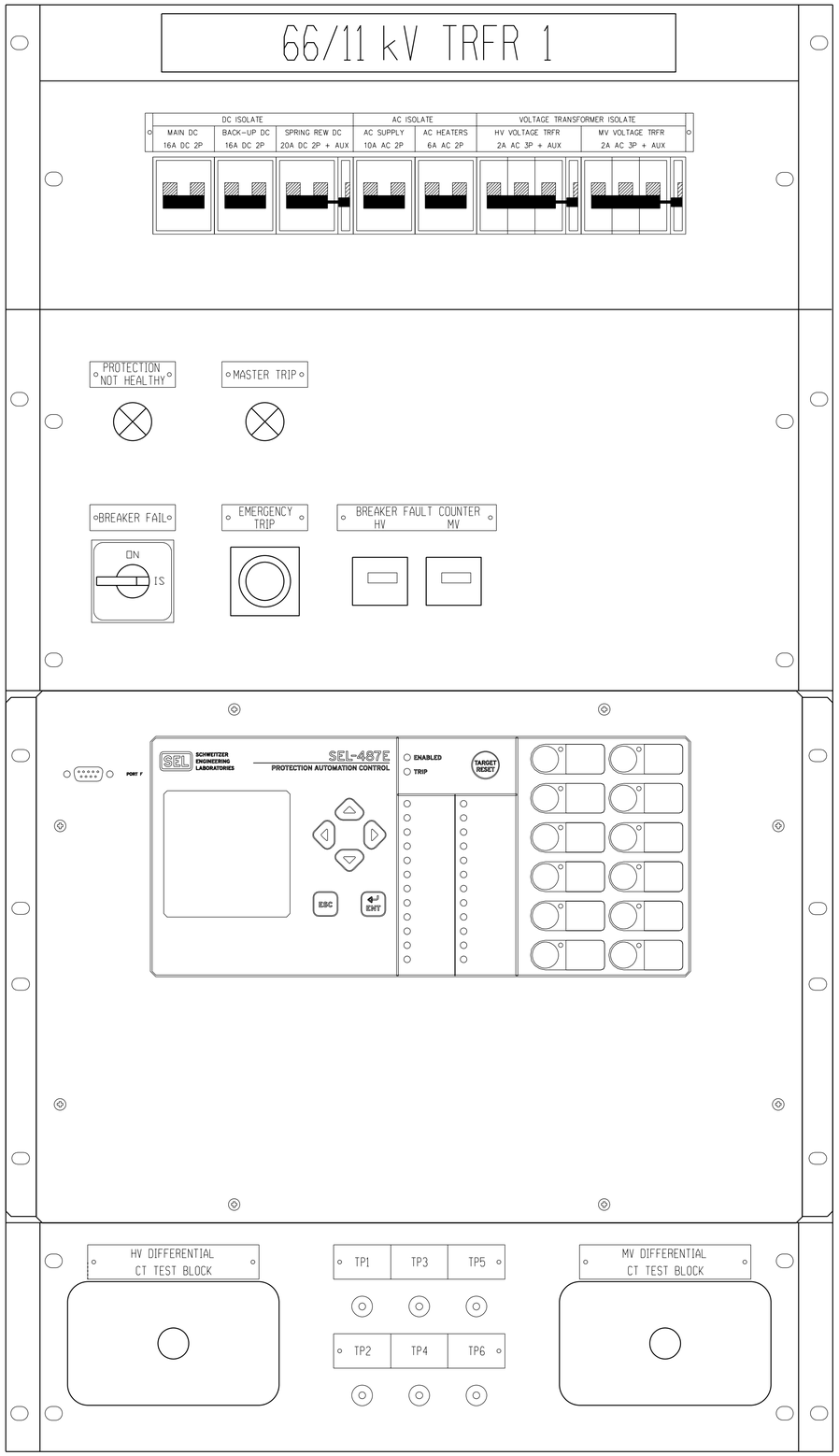
SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	01	0

1. 1U = 44.45mm
THE SCHEME IS DESIGNED FOR MOUNTING A 19 INCH RACK SYSTEM AS PER IEC 60297.
THE MODULE AND BACK PLATE ARE 482.6mm WIDE. THE MODULE IS 300mm DEEP.

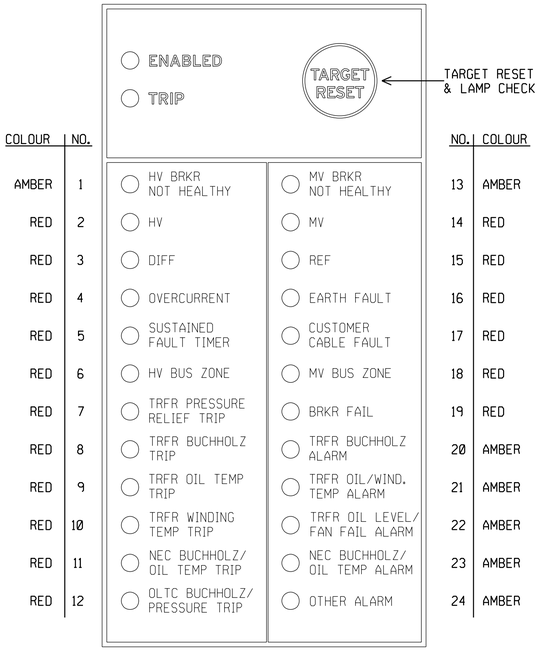
LEVELS 1 3 8 10 11 17 24 25 26 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 1 OF 26 REVISION 1

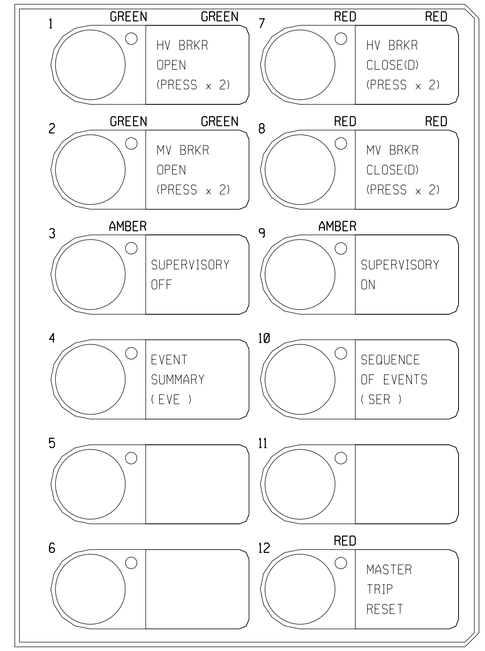


DETAIL OF SEL-487E PROGRAMMABLE LEDs AND PUSH BUTTONS



COLOUR	NO.
AMBER	1
RED	2
RED	3
RED	4
RED	5
RED	6
RED	7
RED	8
RED	9
RED	10
RED	11
RED	12

NO.	COLOUR
13	AMBER
14	RED
15	RED
16	RED
17	RED
18	RED
19	RED
20	AMBER
21	AMBER
22	AMBER
23	AMBER
24	AMBER



NOTES

1. CIRCUIT-BREAKER CONTROLS REQUIRE THE RESPECTIVE BUTTON TO BE PRESSED TWICE WITHIN 3 SECONDS BEFORE ACTIVATION.
2. PRESS PUSH BUTTON 3 FOR 5 SECONDS TO ACTIVATE DNP3 TEST MODE. WHILST IN TEST MODE, PUSH BUTTON 3 MAY BE USED TO SUCCESSIVELY SIMULATE EACH DNP3 ALARM POINT TO THE SUPERVISORY SYSTEM. PRESS PUSH BUTTON 9 TO EXIT DNP3 TEST MODE.

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

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PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL

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66/11 kV TRANSFORMER 1

FRONT PANEL LABELS

	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	02	0

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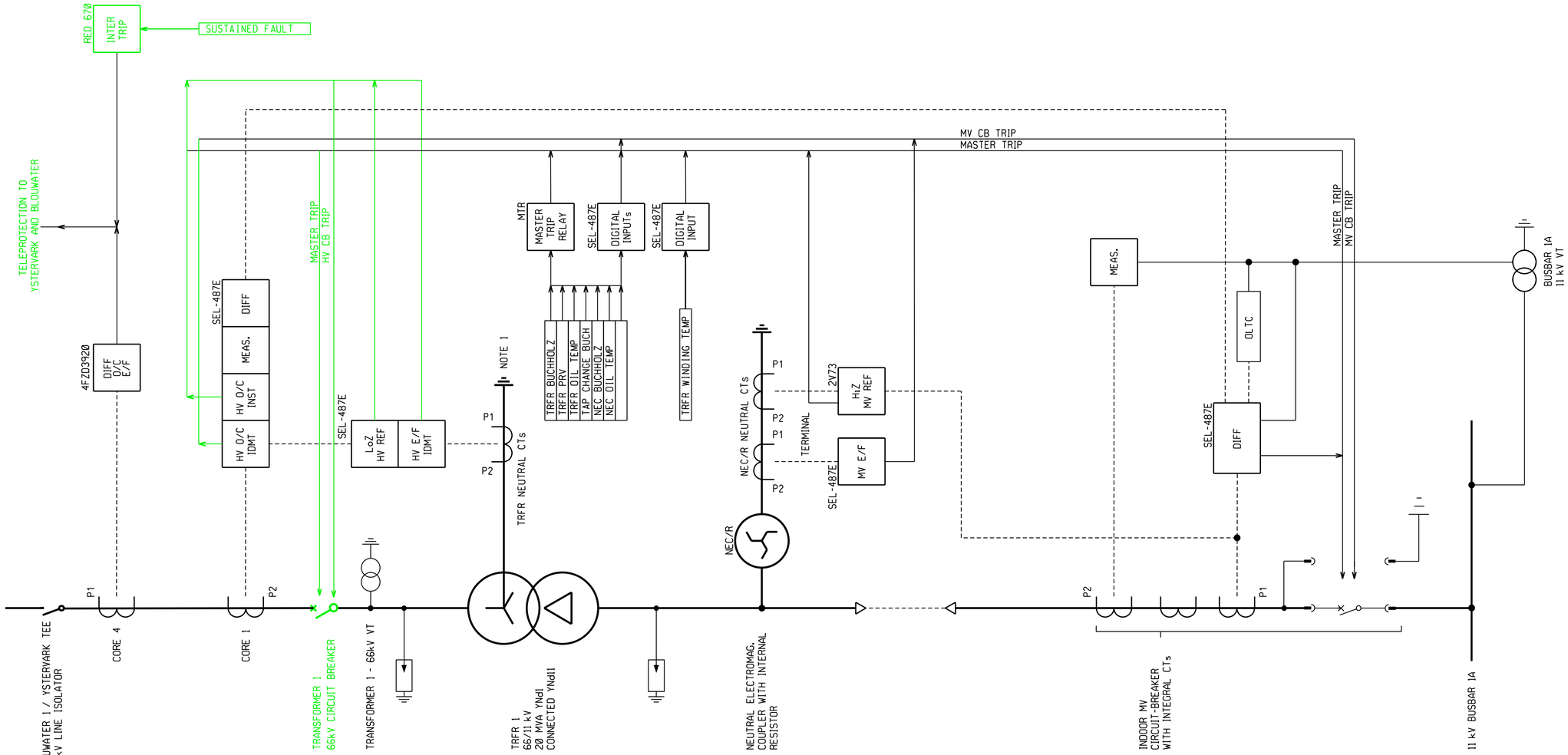
LEVELS 1 3 10 11 17 23 24 25 26 27 30 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L



NOTES

1. THE EARTHING OF TRANSFORMER NEUTRALS SHALL BE IN ACCORDANCE WITH DPL 34-2149.

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
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1	66kV CIRCUIT BREAKER ADDED	JF	BS	LMB	21/01/2011	
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DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

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66/11 kV TRANSFORMER 1

SCHEME LOGIC DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	03	2

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 3 OF 26 REVISION 1

SEL-487E RELAY PROGRAMMABLE LOGIC - TRIPPING LOGIC

MASTER TRIP

TRIP LOGIC

SEL VARIABLE PSV01: HV_REF — HV REF TRIP
SEL VARIABLE PSV02: MV_REF — MV REF TRIP
SEL VARIABLE PSV03: DIFF — DIFF TRIP
FUNCTION OUTPUT 67SP1T: HVOC_DT — HV O/C INST TRIP
TIMER OUTPUT PCT10Q: SFT — SUSTAINED FAULT TIMER
DIGITAL INPUT IN103 (IN) IN103: BUCH_TR — TRFR BUCHHOLZ TRIP
DIGITAL INPUT IN104 (IN) IN104: PRV_TR — TRFR PRESSURE RELIEF TRIP
DIGITAL INPUT IN105 (IN) IN105: OT_TR — TRFR OIL TEMP TRIP
DIGITAL INPUT IN106 (IN) IN106: TC_TR — TRFR TAP CHANGE (BUCH) TRIP
DIGITAL INPUT IN207 (IN) IN207: NEC_TR — NEC BUCH/OIL TEMP TRIP
SEL VARIABLE PSV07: MV_ARCT — MV ARC FAULT TRIP
FUNCTION OUTPUT 67SG1T: HVEF_DT — HV E/F DT/INST TRIP

→ OR → FUNCTION INPUT TRXFMR → FUNCTION OUTPUT TRPXFMR — MASTER TRIP

HV CB TRIP

TRIP LOGIC & WINDING S

FUNCTION OUTPUT REF51T1: HVEF_SI — HV E/F IDMT TRIP
DIGITAL INPUT IN101 (IN) IN101: HV_BZ — HV BUS ZONE
DIGITAL INPUT IN102 (IN) IN102: MV_BZ — MV BUS ZONE
DIGITAL INPUT IN209 (IN) IN209: MTR_TR — MASTER TRIP RELAY OPERATED
FUNCTION OUTPUT 24U1T: FLUX_TR — V/Hz OVER FLUX TRIP

→ OR → OR

FUNCTION INPUT TRS — HV CB CONTROL TRIP
FUNCTION INPUT BFIS — HV CB FAIL INITIATE (CURRENT SUPERVISED)

HV CB CONTROL TRIP

PROTECTION LOGIC 1 - 1

LATCH OUTPUT PLT09: SUP_OFF — SUPERVISORY ISOLATED
FUNCTION INPUT OCS — SUPERVISORY HVCB TRIP
PUSH BUTTON 1 (PB) PB1: HV CB TRIP — (PULSED)

→ & → SEL VARIABLE PSV08: HVSU_TR — HVCB SUPERVISORY TRIP

FALLING EDGE → LATCH (S / R) PLT01 → & → TIMER 3s / 0s PCT01
→ SEL VARIABLE PSV09: HVMA_TR — HVCB MANUAL TRIP
DIGITAL INPUT IN307 (IN) IN307: EMGC_TR — EMERGENCY TRIP

→ OR → TIMER 0s / 0.5s PCT05 → TIMER OUTPUT PCT05Q: OPEN_S — HV CB CONTROL TRIP

THIS LOGIC CREATES THE REQUIREMENT FOR A DOUBLE PRESS OF PUSH BUTTON 1 (WITHIN 3s) BEFORE THE TRIP CONTROL IS ACTIVATED.

FUNCTION OUTPUT TRIPS — HV CB PROTECTION TRIP
TIMER OUTPUT PCT05Q: OPEN_S — HV CB CONTROL TRIP
→ OR → OUTPUT CONTACT OUT201 (OUT) OUT201 — HV CB MAIN TRIP
→ OUTPUT CONTACT OUT202 (OUT) OUT202 — HV CB BACK-UP TRIP

→ OUTPUT CONTACT OUT301 (OUT) OUT301 — MASTER TRIP

MV CB TRIP

TRIP LOGIC & WINDING T

DIGITAL INPUT IN101 (IN) IN101: HV_BZ — HV BUS ZONE
DIGITAL INPUT IN102 (IN) IN102: MV_BZ — MV BUS ZONE
DIGITAL INPUT IN209 (IN) IN209: MTR_TR — MASTER TRIP RELAY OPERATED
FUNCTION OUTPUT 81D1T: UFLS_TR — UNDER FREQUENCY TRIP
FUNCTION OUTPUT 24U1T: FLUX_TR — V/Hz OVER FLUX TRIP
DIGITAL INPUT IN220 (IN) IN220: WT_TR — TRFR WINDING TEMP TRIP
FUNCTION OUTPUT 51T01: HVOC_SI — HV O/C IDMT TRIP
FUNCTION OUTPUT REF51T2: MVEF_SI — MV E/F IDMT TRIP
FUNCTION OUTPUT REF50T2: MV_SEFT — MV SUSTAINED E/F TRIP
TIMER OUTPUT PCT20Q: DCL_TR — DC SUPPLY LOW VOLT TRIP

→ OR → OR

FUNCTION INPUT BFIT — MV CB FAIL INITIATE (CURRENT SUPERVISED)
FUNCTION INPUT TRT — MV CB CONTROL TRIP

MV CB CONTROL TRIP

PROTECTION LOGIC 1 - 2

LATCH OUTPUT PLT09: SUP_OFF — SUPERVISORY ISOLATED
FUNCTION INPUT OCT — SUPERVISORY MVCB TRIP
PUSH BUTTON 2 (PB) PB2: MV CB TRIP — (PULSED)

→ & → SEL VARIABLE PSV10: MVSU_TR — MVCB SUPERVISORY TRIP

FALLING EDGE → LATCH (S / R) PLT02 → & → TIMER 3s / 0s PCT02
→ SEL VARIABLE PSV11: MVMA_TR — HVCB MANUAL TRIP
DIGITAL INPUT IN307 (IN) IN307: EMGC_TR — EMERGENCY TRIP

→ OR → TIMER 0s / 0.5s PCT06 → TIMER OUTPUT PCT06Q: OPEN_T — MV CB CONTROL TRIP

THIS LOGIC CREATES THE REQUIREMENT FOR A DOUBLE PRESS OF PUSH BUTTON 2 (WITHIN 3s) BEFORE THE TRIP CONTROL IS ACTIVATED.

TIMER OUTPUT PCT06Q: OPEN_T — MV CB CONTROL TRIP
FUNCTION OUTPUT TRIPT — MV CB PROTECTION TRIP
→ OR → OUTPUT CONTACT OUT203 (OUT) OUT203 — MV CB MAIN TRIP
→ OUTPUT CONTACT OUT204 (OUT) OUT204 — MV CB BACK-UP TRIP

(UNSUPERVISED) BREAKER FAIL INITIATE

WINDING S & WINDING T

FUNCTION OUTPUT 52CLS — HV CB CLOSED
DIGITAL INPUT IN103 (IN) IN103: BUCH_TR — TRFR BUCHHOLZ TRIP
DIGITAL INPUT IN104 (IN) IN104: PRV_TR — TRFR PRESSURE RELIEF TRIP
DIGITAL INPUT IN106 (IN) IN106: TC_TR — TRFR TAP CHANGE (BUCH) TRIP
DIGITAL INPUT IN207 (IN) IN207: NEC_TR — NEC BUCH/OIL TEMP TRIP
FUNCTION OUTPUT 24U1T: FLUX_TR — V/Hz OVER FLUX TRIP
FUNCTION OUTPUT 52CLT — MV CB CLOSED

→ OR → & → FUNCTION INPUT EXBFS — MV CB FAIL INITIATE (UNSUPERVISED)
→ & → FUNCTION INPUT EXBFT — MV CB FAIL INITIATE (UNSUPERVISED)

SEE CELLS D9 (HV) AND F9 (MV) FOR THE INITIATION OF THE CURRENT SUPERVISED BREAKER FAIL FUNCTIONS: BFIS AND BFIT.

CONTINUED ON SHEET 5

MV CB CABLE CHAMBER ARC FAULT

PROTECTION LOGIC 1 - 3

DIGITAL INPUT IN304 (IN) IN304: MV_ARCS — MV CB CABLE CHAMBER LIGHT (ARC) DETECTED
FUNCTION OUTPUT 51S01: HVOC_SS — HV O/C IDMT START
FUNCTION OUTPUT REF502: MV_SEFS — MV SUSTAINED E/F START

→ OR → & → SEL VARIABLE PSV07: MV_ARCT — MV ARC FAULT TRIP

SHEET 8	AC KEY DIAGRAM	SHEET 17	SPR REW DC, AC KEY DIAGRAM				
SHEET 7	RELAY LOGIC DIAGRAM	SHEET 16	BACK-UP DC KEY DIAGRAM	SHEET 25	RED670 REFERENCE DIAGRAM		
SHEET 6	RELAY LOGIC DIAGRAM	SHEET 15	BACK-UP DC KEY DIAGRAM	SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM		
SHEET 5	RELAY LOGIC DIAGRAM	SHEET 14	BACK-UP DC KEY DIAGRAM	SHEET 23	HV CT JB CABLING DIAGRAM		
SHEET 4	RELAY LOGIC DIAGRAM	SHEET 13	MAIN DC KEY DIAGRAM	SHEET 22	PANEL CABLING DIAGRAM		
SHEET 3	SCHEME LOGIC DIAGRAM	SHEET 12	MAIN DC KEY DIAGRAM	SHEET 21	PANEL CABLING DIAGRAM		
SHEET 2	FRONT PANEL LABELS	SHEET 11	VT SUPPLY KEY DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM		
SHEET 1	PANEL EQUIPMENT LAYOUT	SHEET 10	AC KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM		
SHEET 0	COVER SHEET	SHEET 9	AC KEY DIAGRAM	SHEET 18	SUPERVISORY/COMMS KEY DIAG		

REFERENCE DRAWINGS:

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		/ /				17/09/09

PROJECT APPROVED	C. PYM
DESIGN APPROVED	S.J. van ZYL
DATE	25/06/21
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DRAWN BY	K. STEYNBERG
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SCALE	

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
RELAY LOGIC DIAGRAM

DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	04	0

LEVELS 1 3 8 10 11 17 24 25 26 27 28 30 — PANEL TYPE DESIGNATION 4TM7100MOD.FZD — SIZE GROOTTE A1L

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CONTINUED FROM SHEET 4

SEL-487E RELAY PROGRAMMABLE LOGIC - CLOSING & MISCELLANEOUS LOGIC

SUSTAINED FAULT TIMER

PROTECTION LOGIC 1 - 4

FUNCTION OUTPUT 51T01: HVOC_SI — HV O/C IDMT TRIP
FUNCTION OUTPUT REF51T1: HVEF_SI — HV E/F IDMT TRIP
FUNCTION OUTPUT REF51T2: MVEF_SI — MV E/F IDMT TRIP
FUNCTION OUTPUT REF50T2: MV_SEFT — MV SUSTAINED E/F TRIP
→ OR → SEL VARIABLE PSV26: TIMD_TR — TIME DELAYED TRIP

DIGITAL INPUT IN220 (IN | IN220: WT_TR) — TRFR WINDING TEMP TRIP
FUNCTION OUTPUT 52CLT — MV CB CLOSED
→ & → OR → TIMER 0.25s / 0s — PCT10
→ TIMER OUTPUT PCT100: SFT — SUSTAINED FAULT TIMER

HV CB CLOSE BLOCK/CANCEL

PROTECTION LOGIC 1 - 8

TIMER OUTPUT PCT120: HVM_TCF — HV MAIN TRIP CCT FAIL
TIMER OUTPUT PCT130: HVB_TCF — HV B/U TRIP CCT FAIL
→ & →
FUNCTION OUTPUT TRIPS — HV CB PROTECTION TRIP
TIMER OUTPUT PCT250: MTR_FA — MT RELAY FAILED/WITHDRAWN
SEL VARIABLE PSV20: M_DCF — MAIN DC SUPPLY FAIL
→ OR → OR → SEL VARIABLE PSV16: HVCL_BL — HV CB CLOSE BLOCK
→ FUNCTION INPUT ULCLS

MV CB CLOSE BLOCK/CANCEL

PROTECTION LOGIC 1 - 9

TIMER OUTPUT PCT260: CMTR_FA — CUST MTR FAILED/WITHDRAWN
DIGITAL INPUT IN211 (IN | IN211: CMTR_TR) — CUST MT RELAY OPERATED
FUNCTION OUTPUT TRIPT — MV CB PROTECTION TRIP
TIMER OUTPUT PCT120: MVM_TCF — MV MAIN TRIP CCT FAIL
TIMER OUTPUT PCT130: MVB_TCF — MV B/U TRIP CCT FAIL
→ OR → & → OR → SEL VARIABLE PSV17: MVCL_BL — MV CB CLOSE BLOCK
→ FUNCTION INPUT ULCLT

MISCELLANEOUS TRIPS

PROTECTION LOGIC 1 - 10

FUNCTION OUTPUT 81D1T: UFLS_TR — UNDER FREQUENCY TRIP → LATCH S R PLT05 → LATCH OUTPUT PLT05: UFLS_L — UNDER FREQUENCY TRIP (LATCHED)
FUNCTION OUTPUT 24U1T: FLUX_TR — V/Hz OVER FLUX TRIP → LATCH S R PLT06 → LATCH OUTPUT PLT06: FLUX_L — OVER FLUX TRIP (LATCHED)
TIMER OUTPUT PCT200: DCL_TR — DC SUPPLY LOW VOLT TRIP → LATCH S R PLT07 → LATCH OUTPUT PLT07: DCL_TRL — DC SUP LOW VOLT TRIP (LATCHED)
SEL VARIABLE PSV07: MV_ARCT — MV ARC FAULT TRIP → LATCH S R PLT08 → LATCH OUTPUT PLT08: MV_ARCL — MV ARC FAULT TRIP (LATCHED)
FUNCTION OUTPUT TRGTR — TARGET RESET PUSH BUTTON
→ OR → SEL VARIABLE PSV27: MISCT_L — MISCELLANEOUS TRIPS (LATCHED)

COMBINED PROTECTION LOGICs

PROTECTION LOGIC 1 - 11

DIGITAL INPUT IN305 (IN | IN305: HV_REFH) — Hi Imp HV REF
FUNCTION OUTPUT REFF1: HV_REFL — Low Imp MV REF
→ OR → SEL VARIABLE PSV01: HV_REF — HV REF TRIP

DIGITAL INPUT IN306 (IN | IN306: MV_REFH) — Hi Imp MV REF
FUNCTION OUTPUT REFF2: MV_REFL — Low Imp MV REF
→ OR → SEL VARIABLE PSV02: MV_REF — MV REF TRIP

FUNCTION OUTPUT 87R — RESTRAINED DIFF TRIP
FUNCTION OUTPUT 87U — UNRESTRAINED DIFF TRIP
→ OR → SEL VARIABLE PSV03: DIFF — DIFF TRIP

FUNCTION OUTPUT 87RA — REST. DIFF TRIP - RED PHASE
FUNCTION OUTPUT 87UA — UNREST. DIFF TRIP - RED PHASE
→ OR → SEL VARIABLE PSV04: DIFF_R — DIFF TRIP - RED PHASE

FUNCTION OUTPUT 87RB — REST. DIFF TRIP - WHITE PHASE
FUNCTION OUTPUT 87UB — UNREST. DIFF TRIP - WHITE PHASE
→ OR → SEL VARIABLE PSV05: DIFF_W — DIFF TRIP - WHITE PHASE

FUNCTION OUTPUT 87RC — REST. DIFF TRIP - BLUE PHASE
FUNCTION OUTPUT 87UC — UNREST. DIFF TRIP - BLUE PHASE
→ OR → SEL VARIABLE PSV06: DIFF_B — DIFF TRIP - BLUE PHASE

MT RELAY WITHDRAWN

PROTECTION LOGIC 1 - 12

DIGITAL INPUT IN209 (IN | IN209: MTR_TR) — MASTER TRIP RELAY OPERATED
DIGITAL INPUT IN210 (IN | IN210: MTR_RS) — MASTER TRIP RELAY RESET
SEL VARIABLE PSV20: M_DCF — MAIN DC SUPPLY FAIL
→ & → TIMER 50ms / 0s — PCT25
→ TIMER OUTPUT PCT250: MTR_FA — MT RELAY FAILED/WITHDRAWN

CUST MTR WITHDRAWN

PROTECTION LOGIC 1 - 13

TIMER 50ms / 0s — PCT26
→ TIMER OUTPUT PCT260: CMTR_FA — CUST MTR FAILED/WITHDRAWN

NOTE: PCT260 IS SET TO LOGICAL 0 IN THE EVENT THAT THE CUSTOMER MASTER OPTION IS NOT ORDERED.

HV CB CLOSE

PROTECTION LOGIC 1 - 5

LATCH OUTPUT PLT09: SUP_OFF — SUPERVISORY ISOLATED
FUNCTION INPUT CCS — SUPERVISORY HVCB CLOSE
→ & → SEL VARIABLE PSV12: HVSU_CL — HVCB SUPERVISORY CLOSE

PUSH BUTTON 7 (PB | PB7: HV CB CLOSE) (PULSED)
→ FALLING EDGE → LATCH S R PLT03 → TIMER 3s / 0s — PCT03
→ & → SEL VARIABLE PSV13: HVMA_CL — HVCB MANUAL CLOSE

THIS LOGIC CREATES THE REQUIREMENT FOR A DOUBLE PRESS OF PUSH BUTTON 7 (WITHIN 3s) BEFORE THE CLOSE CONTROL IS ACTIVATED.

SEL VARIABLE PSV12: HVSU_CL — HVCB SUPERVISORY CLOSE
SEL VARIABLE PSV13: HVMA_CL — HVCB MANUAL CLOSE
→ OR → TIMER 0s / 20ms — PCT07 → TIMER OUTPUT PCT070: CLOSE_S — MV CB CONTROL CLOSE → FUNCTION INPUT CLS
FUNCTION OUTPUT CLSS — HV CB CLOSE → OUTPUT CONTACT OUT101 (OUT | OUT101) — HV CB CLOSE

MV CB CLOSE

PROTECTION LOGIC 1 - 6

LATCH OUTPUT PLT09: SUP_OFF — SUPERVISORY ISOLATED
FUNCTION INPUT CCT — SUPERVISORY MVCB CLOSE
→ &
DIGITAL INPUT IN307 (IN | IN215: MVCB_CL) — MV CB STAND-OFF CLOSE
SEL VARIABLE PSV14: MVSU_CL — MVCB SUPERVISORY CLOSE
SEL VARIABLE PSV15: MVMA_CL — MVCB MANUAL CLOSE
→ OR → TIMER 0s / 20ms — PCT08 → TIMER OUTPUT PCT080: CLOSE_T — MV CB CONTROL CLOSE → FUNCTION INPUT CLT

PUSH BUTTON 8 (PB | PB8: MV CB CLOSE) (PULSED)
→ FALLING EDGE → LATCH S R PLT04 → TIMER 3s / 0s — PCT04
→ &

THIS LOGIC CREATES THE REQUIREMENT FOR A DOUBLE PRESS OF PUSH BUTTON 8 (WITHIN 3s) BEFORE THE CLOSE CONTROL IS ACTIVATED.

FUNCTION OUTPUT CLST — MV CB CLOSE → OUTPUT CONTACT OUT102 (OUT | OUT102) — MV CB CLOSE

CB ANTI-PUMP

PROTECTION LOGIC 1 - 7

DIGITAL INPUT IN203 (IN | IN203: HVCB_AP) — HV CB ANTI-PUMP INPUT
OUTPUT CONTACT OUT101 (OUT | OUT101) — HV CB CLOSE
→ &
DIGITAL INPUT IN303 (IN | IN303: MVCB_AP) — MV CB ANTI-PUMP INPUT
OUTPUT CONTACT OUT102 (OUT | OUT102) — MV CB CLOSE
→ & → OR → TIMER 20ms / 0s — PCT11 → TIMER OUTPUT PCT110: APT_OUT — OPERATE ANTI-PUMP CONTACT → OR → OUTPUT CONTACT OUT103 (OUT | OUT103) — APT OUTPUT

CONTINUED ON SHEET 6

REFERENCE DRAWINGS:

SHEET 8	AC KEY DIAGRAM	SHEET 17	SPR REW DC_AC KEY DIAGRAM		
SHEET 7	RELAY LOGIC DIAGRAM	SHEET 16	BACK-UP DC KEY DIAGRAM	SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM	SHEET 15	BACK-UP DC KEY DIAGRAM	SHEET 24	RED670 AC/DC & SUP.KEY DIAGRAM
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SHEET 2	FRONT PANEL LABELS	SHEET 11	VT SUPPLY KEY DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM
SHEET 1	PANEL EQUIPMENT LAYOUT	SHEET 10	AC KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM
SHEET 0	COVER SHEET	SHEET 9	AC KEY DIAGRAM	SHEET 18	SUPERVISORY/COMMS KEY DIAG

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66/11 kV TRANSFORMER 1
RELAY LOGIC DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	05	0

MASTER TRACING FILED UNDER D-DT-15202 SHEET 5 OF 26 REVISION 1

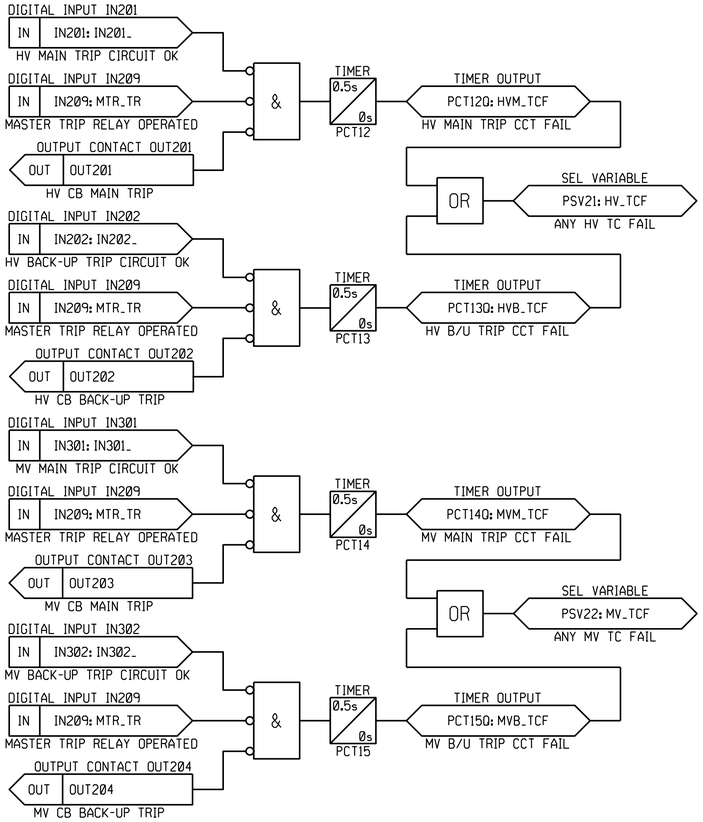
LEVELS 10 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

CONTINUED FROM SHEET 5

SEL-487E RELAY PROGRAMMABLE LOGIC - ALARMs & MISCELLANEOUS LOGIC

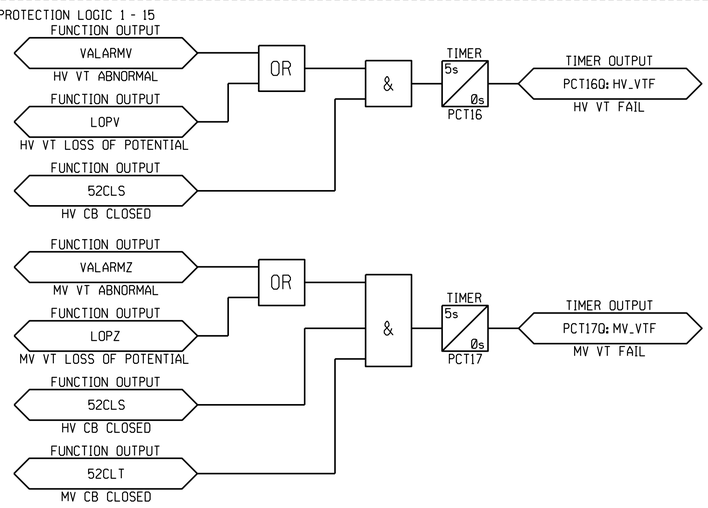
TRIP CIRCUIT SUPERVISION

PROTECTION LOGIC 1 - 14



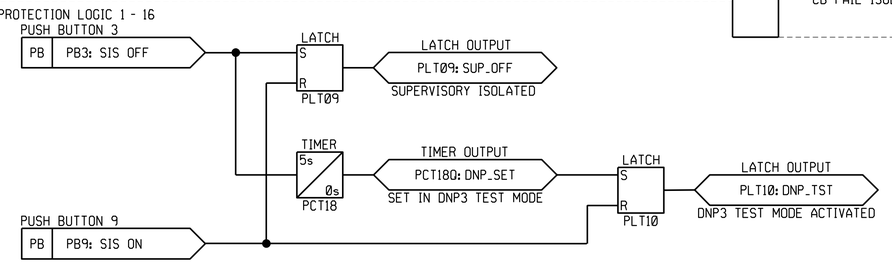
VT SUPERVISION

PROTECTION LOGIC 1 - 15



SUP ISOLATE/DNP3 TEST

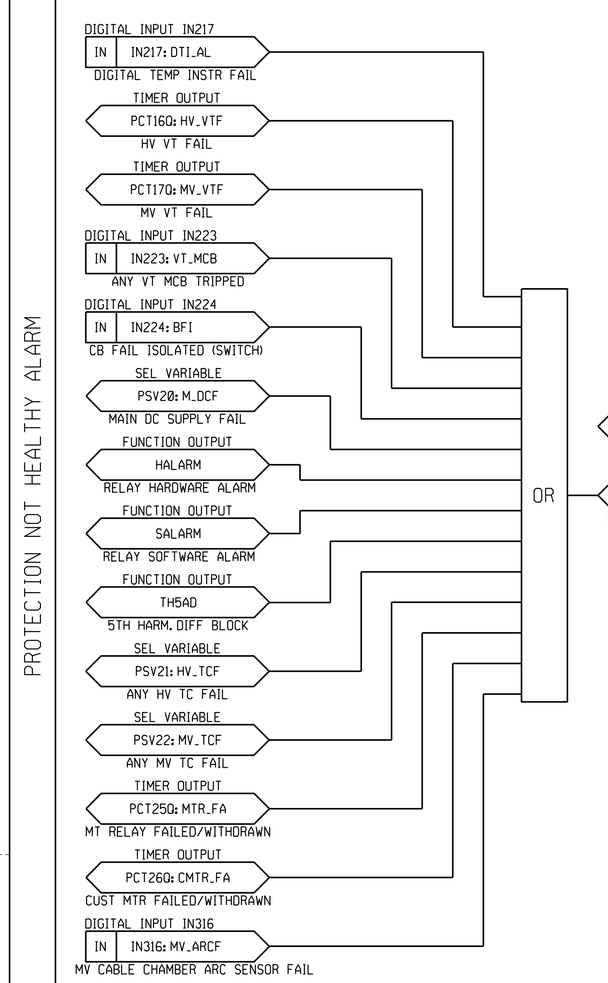
PROTECTION LOGIC 1 - 16



DNP3 TEST MODE LOGIC: PRESS PUSH BUTTON 3 FOR 5 SECONDS TO ACTIVATE DNP3 TEST MODE. WHILST IN TEST MODE, PUSH BUTTON 3 MAY BE USED TO SUCCESSIVELY SIMULATE EACH DNP3 ALARM POINT TO THE SUPERVISORY SYSTEM. PRESS PUSH BUTTON 9 TO EXIT DNP3 TEST MODE.

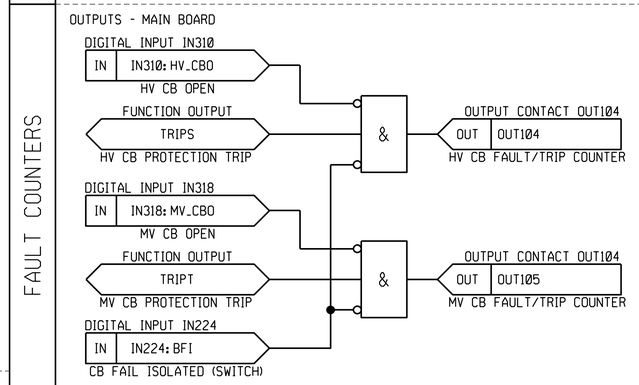
PROTECTION NOT HEALTHY ALARM

PROTECTION LOGIC 1 - 17



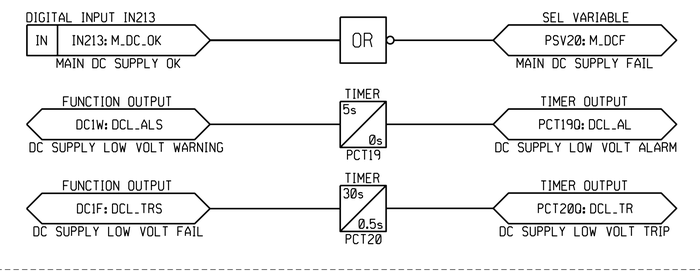
FAULT COUNTERS

OUTPUTS - MAIN BOARD



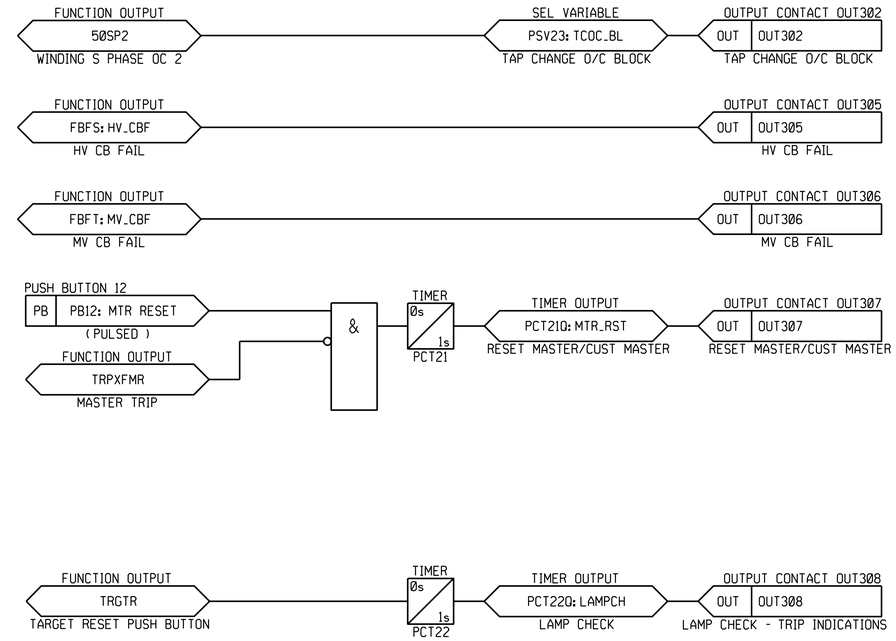
DC SUPPLY ALARM/TRIP

PROTECTION LOGIC 1 - 18



MISCELLANEOUS OUTPUT CONTACT MARSHALLING

PROTECTION LOGIC 1 - 19



SHEET 0	COVER SHEET	SHEET 9	AC KEY DIAGRAM				
SHEET 1	PANEL EQUIPMENT LAYOUT	SHEET 10	AC KEY DIAGRAM	SHEET 17	SPR REW DC, AC KEY DIAGRAM		
SHEET 2	FRONT PANEL LABELS	SHEET 11	VT SUPPLY KEY DIAGRAM	SHEET 18	AC KEY DIAGRAM	SHEET 25	REDB78 REFERENCE DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM	SHEET 12	MAIN DC KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM	SHEET 24	REDB78 AC/DC & SUP.KEY DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM	SHEET 13	MAIN DC KEY DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM	SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM	SHEET 14	BACK-UP DC KEY DIAGRAM	SHEET 21	PANEL CABLING DIAGRAM	SHEET 22	PANEL CABLING DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM	SHEET 15	BACK-UP DC KEY DIAGRAM	SHEET 22	PANEL CABLING DIAGRAM	SHEET 21	PANEL CABLING DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM	SHEET 16	BACK-UP DC KEY DIAGRAM	SHEET 23	HV CT JB CABLING DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM
SHEET 8	AC KEY DIAGRAM			SHEET 24	REDB78 AC/DC & SUP.KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM
				SHEET 25	REDB78 REFERENCE DIAGRAM	SHEET 18	SUPERVISORY/COMMS KEY DIAG
							REFERENCE DRAWINGS:

CONTINUED ON SHEET 7

AECOM
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A
1	SvZ 15/11/2010 CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG		DATE 25/06/21	DATE 17/09/09
REV	AUTH DATE REVISION TO MASTER	BY	CHKD		SCALE	

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1

RELAY LOGIC DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	06	0

MASTER TRACING FILED UNDER D-DT-15202 SHEET 6 OF 26 REVISION 1

LEVELS 1 3 8 10 11 17 24 25 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE A1L

CONTINUED FROM SHEET 6

SEL-487E RELAY PROGRAMMABLE LOGIC - PROGRAMMABLE LEDs

PROGRAMMABLE LED LEDs 1 - 12

PROTECTION LOGIC 1 - 20

DIGITAL INPUT IN322 — IN322: IN322_ — HV CBNH INPUT
TIMER 10s / 0s — PCT23
TIMER OUTPUT PCT230: HV_CBNH — HV CB NOT HEALTHY
LED 1 — AMBER

SEL VARIABLE PSV01: HV_REF — HV REF TRIP
FUNCTION OUTPUT 67SP1T: HVOC_DT — HV O/C INST TRIP
FUNCTION OUTPUT 51T01: HVOC_SI — HV O/C IDMT TRIP
FUNCTION OUTPUT REF51T1: HVEF_SI — HV E/F IDMT TRIP
FUNCTION OUTPUT 67SG1T: HVEF_DT — HV E/F DT/INST TRIP
OR
LATCH S R — PLT11
LATCH OUTPUT PLT11: HV_FLTL — HV FAULT (LATCHED)
LED 2 — RED

SEL VARIABLE PSV03: DIFF — DIFF TRIP
LATCH S R — PLT12
LATCH OUTPUT PLT12: DIFFL — DIFF TRIP (LATCHED)
LED 3 — RED

FUNCTION OUTPUT 67SP1T: HVOC_DT — HV O/C INST
FUNCTION OUTPUT 51T01: HVOC_SI — HV O/C IDMT TRIP
OR
LATCH S R — PLT13
LATCH OUTPUT PLT13: OCL — OVERCURRENT TRIP (LATCHED)
LED 4 — RED

TIMER OUTPUT PCT100: SFT — SUSTAINED FAULT TIMER
LATCH S R — PLT14
LATCH OUTPUT PLT14: SFTL — SFT (LATCHED)
LED 5 — RED

DIGITAL INPUT IN101 — IN101: HV_BZ — HV BUS ZONE
LED 6 — RED

DIGITAL INPUT IN104 — IN104: PRV_TR — TRFR PRESSURE RELIEF TRIP
LATCH S R — PLT15
LATCH OUTPUT PLT15: PRVL — PRV (LATCHED)
LED 7 — RED

DIGITAL INPUT IN103 — IN103: BUCH_TR — TRFR BUCHHOLZ TRIP
LATCH S R — PLT16
LATCH OUTPUT PLT16: BUCHTL — BUCHHOLZ TRIP (LATCHED)
LED 8 — RED

DIGITAL INPUT IN105 — IN105: OT_TR — TRFR OIL TEMP TRIP
LATCH S R — PLT17
LATCH OUTPUT PLT17: OTTL — OTT (LATCHED)
LED 9 — RED

DIGITAL INPUT IN220 — IN220: WT_TR — TRFR WINDING TEMP TRIP
LATCH S R — PLT18
LATCH OUTPUT PLT18: WTTL — WTT (LATCHED)
LED 10 — RED

DIGITAL INPUT IN207 — IN207: NEC_TR — NEC BUCH/OIL TEMP TRIP
LATCH S R — PLT19
LATCH OUTPUT PLT19: NECTL — NEC TRIP (LATCHED)
LED 11 — RED

DIGITAL INPUT IN106 — IN106: TC_TR — TRFR TAP CHANGE (BUCH) TRIP
FUNCTION OUTPUT TRGTR — TARGET RESET PUSH BUTTON
LATCH S R — PLT20
LATCH OUTPUT PLT20: TCTL — TC TRIP (LATCHED)
LED 12 — RED

PROGRAMMABLE LED LEDs 13 - 23

PROTECTION LOGIC 1 - 21

DIGITAL INPUT IN323 — IN322: IN323_ — MV CBNH INPUT
TIMER 10s / 0s — PCT24
TIMER OUTPUT PCT240: MV_CBNH — MV CB NOT HEALTHY
LED 13 — AMBER

SEL VARIABLE PSV02: MV_REF — MV REF TRIP
FUNCTION OUTPUT REF51T2: MVEF_SI — MV E/F IDMT TRIP
FUNCTION OUTPUT REF50T2: MV_SEFT — MV SUSTAINED E/F TRIP
OR
LATCH S R — PLT21
LATCH OUTPUT PLT21: MV_FLTL — MV FAULT (LATCHED)
LED 14 — RED

SEL VARIABLE PSV01: HV_REF — HV REF TRIP
SEL VARIABLE PSV02: MV_REF — MV REF TRIP
OR
LATCH S R — PLT22
LATCH OUTPUT PLT22: REFL — REF TRIP (LATCHED)
LED 15 — RED

FUNCTION OUTPUT 67SG1T: HVEF_DT — HV E/F DT/INST TRIP
FUNCTION OUTPUT REF51T1: HVEF_SI — HV E/F IDMT TRIP
FUNCTION OUTPUT REF51T2: MVEF_SI — MV E/F IDMT TRIP
FUNCTION OUTPUT REF50T2: MV_SEFT — MV SUSTAINED E/F TRIP
OR
LATCH S R — PLT23
LATCH OUTPUT PLT23: EFTL — EARTH FAULT TRIP (LATCHED)
LED 16 — RED

SEL VARIABLE PSV28: CAB_DIF — MV/CUSTOMER CABLE DIFF
LATCH S R — PLT24
LATCH OUTPUT PLT24: CABFL — MV/CUSTOMER CABLE FLT (LATCHED)
LED 17 — RED

DIGITAL INPUT IN102 — IN102: MV_BZ — MV BUS ZONE
LED 18 — RED

FUNCTION OUTPUT FBFS: HV_CBF — HV CB FAIL
FUNCTION OUTPUT FBFT: MV_CBF — MV CB FAIL
OR
LATCH S R — PLT25
LATCH OUTPUT PLT25: CBFL — HV/MV CB FAIL (LATCHED)
LED 21 — AMBER

DIGITAL INPUT IN205 — IN205: BUCH_AL — TRFR BUCHHOLZ ALARM
LATCH S R — PLT26
LATCH OUTPUT PLT26: BUCHALL — BUCHHOLZ ALARM (LATCHED)
LED 20 — AMBER

DIGITAL INPUT IN107 — IN107: OT_AL — TRFR OIL TEMP ALARM
DIGITAL INPUT IN219 — IN219: WT_AL — TRFR WINDING TEMP ALARM
OR
LATCH S R — PLT27
LATCH OUTPUT PLT27: O_WTALL — OIL/WIND TEMP ALARM (LATCHED)
LED 21 — AMBER

DIGITAL INPUT IN204 — IN204: FAN_AL — TRFR FAN FAIL ALARM
DIGITAL INPUT IN206 — IN206: OLI_AL — TRFR/TC OIL LEVEL ALARM
OR
LATCH S R — PLT28
LATCH OUTPUT PLT28: FAN_OAL — FAN/OIL LEVEL ALARM (LATCHED)
LED 22 — AMBER

DIGITAL INPUT IN208 — IN208: NEC_AL — NEC BUCH/OIL TEMP ALARM
LATCH S R — PLT29
LATCH OUTPUT PLT29: NECALL — NEC ALARM (LATCHED)
LED 23 — AMBER

FUNCTION OUTPUT TRGTR — TARGET RESET PUSH BUTTON

PROGRAMMABLE LED 24

PROTECTION LOGIC 1 - 22

DIGITAL INPUT IN218 — IN216: HEAT_AL — CB MECH BOX / MIB HEATER ALARM
DIGITAL INPUT IN218 — IN218: OILSUMP — OIL SUMP (BUND WALL) VALVE OPEN
DIGITAL INPUT IN324 — IN324: SF6_LOW — HV/MV CB SF6 LOW
LATCH OUTPUT PLT07: DNP_TST — DNP3 TEST MODE
SEL VARIABLE PSV16: HVCL_BL — HV CB CLOSE BLOCK
SEL VARIABLE PSV17: MVCL_BL — MV CB CLOSE BLOCK
SEL VARIABLE PSV27: MISCT_L — MISCELLANEOUS TRIPS (LATCHED)
TIMER OUTPUT PCT190: DCL_AL — DC SUPPLY LOW VOLT ALARM
TIMER OUTPUT PCT090: CAB_DAL — MV/CUSTOMER CABLE DIFF ALARM
OR
SEL VARIABLE PSV24: PNH — PROTECTION NOT HEALTHY
SEL VARIABLE PSV25: OTH_AL — OTHER ALARM
OR
LED 24 — AMBER

FAULTED PHASE INDICATION

PROTECTION LOGIC 1 - 23

SEL VARIABLE PSV04: DIFF_R — DIFF TRIP - RED PHASE
LATCH S R — PLT30
LATCH OUTPUT PLT30: DIFF_RL — DIFF TRIP - RED PHASE (LATCHED)
SEL VARIABLE PSV05: DIFF_W — DIFF TRIP - WHITE PHASE
LATCH S R — PLT31
LATCH OUTPUT PLT31: DIFF_WL — DIFF TRIP - WHT PHASE (LATCHED)
SEL VARIABLE PSV06: DIFF_B — DIFF TRIP - BLUE PHASE
LATCH S R — PLT32
LATCH OUTPUT PLT32: DIFF_BL — DIFF TRIP - BLUE PHASE (LATCHED)
FUNCTION OUTPUT TRGTR — TARGET RESET PUSH BUTTON

MV CABLE FAULT

PROTECTION LOGIC 1 - 24

FUNCTION OUTPUT 51S02: CAB_DIS — MV/CUSTOMER CABLE DIFF START
FUNCTION OUTPUT TRPXFMR — MASTER TRIP
TIMER 5s / 0s — PCT09
&
TIMER OUTPUT PCT090: CAB_DAL — MV/CUSTOMER CABLE DIFF ALARM
SEL VARIABLE PSV28: CAB_DIF — MV/CUSTOMER CABLE DIFF

SHEET 8	AC KEY DIAGRAM	SHEET 17	SPR REW DC_AC KEY DIAGRAM		
SHEET 7	RELAY LOGIC DIAGRAM	SHEET 16	BACK-UP DC KEY DIAGRAM	SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM	SHEET 15	BACK-UP DC KEY DIAGRAM	SHEET 24	RED670 AC/DC & SUP.KEY DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM	SHEET 14	BACK-UP DC KEY DIAGRAM	SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM	SHEET 13	MAIN DC KEY DIAGRAM	SHEET 22	PANEL CABLING DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM	SHEET 12	MAIN DC KEY DIAGRAM	SHEET 21	PANEL CABLING DIAGRAM
SHEET 2	FRONT PANEL LABELS	SHEET 11	VT SUPPLY KEY DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM
SHEET 1	PANEL EQUIPMENT LAYOUT	SHEET 10	AC KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM
SHEET 0	COVER SHEET	SHEET 9	AC KEY DIAGRAM	SHEET 18	SUPERVISORY/COMMS KEY DIAG

REFERENCE DRAWINGS:

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
		/ /			
		/ /			
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

SCALE

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REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
RELAY LOGIC DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	07	0

LEVELS 1 3 8 10 11 17 24 25 26 27 30
PANEL TYPE DESIGNATION 4TM7100MOD.FZD
SIZE GROOTTE A1

MASTER TRACING FILED UNDER D-DT-15202 SHEET 7 OF 26 REVISION 1

	TERMINAL DESCRIPTION
CT	CURRENT TRANSFORMER
CTJB	CURRENT TRANSFORMER JUNCTION BOX
MB	HV CIRCUIT-BREAKER MECHANISM BOX
MIB	TRANSFORMER MARSHALLING INTERFACE BOX
MT	MODULE TERMINAL
RP	RELAY PANEL TERMINAL
NEC	NEUTRAL ELECTROMAGNETIC COUPLER
NER	NEUTRAL EARTHING RESISTOR
GB	MV CIRCUIT-BRKR GLAND CHAMBER
GT	MV CIRCUIT-BRKR GLAND CHAMBER CT/VT
RT	MV CIRCUIT-BRKR RELAY CHAMBER CT/VT

CURRENT TRANSFORMER TERMINALS DIFF, L>Z HV REF HV O/C / DMT/INST & HV E/F INST

SEL-487E

NOTE 1

CONTINUED ON SHEET 9

CTTB(HV)

SHORTED AND EARTHED

SHORTED AND EARTHED

TO FEEDER 1 PROTECTION PANEL SEE D-WC-7104 SET 61

SHORTED AND EARTHED

SHORTED AND EARTHED

HV CTJB

66 kV LINE ISOLATOR

CORE 1 MAIN PROTECTION CLASS TPS M.R 1600/1 IN USE: 200/1

CORE 2 BUS ZONE MAIN CLASS TPS M.R 1600/1 (NOT IN USE)

CORE 3 BUS ZONE CHECK CLASS TPS M.R 1600/1 (NOT IN USE)

CORE 4 BACK UP PROTECTION CLASS TPS M.R 1600/1 IN USE: 600/1

CORE 5 MEASUREMENTS CLASS 0.2 M.R 1600/1 (NOT IN USE)

CORE 6 MEASUREMENTS CLASS 0.2 M.R 1600/1 (NOT IN USE)

ALSTOM CTs SEE D-DC-0022 SHT 2

66 kV CIRCUIT BREAKER

CONTINUED ON SHEET 9A

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

NOTE

1. FOR APPLICATION OF HIGH IMPEDANCE HV REF WITH ONLY ONE SET OF HV PHASE CTs, REMOVE LINK X1.6-X1.7 AND BRIDGE X1.6-X1.11 AND X1.7-X1.12.

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
3	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
2	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

	PROJECT APPROVED	DESIGN APPROVED
	C.PYM	S.J. van ZYL
DATE	25/06/21	11/06/10
PROJECT CHECKED	B. HOMANN	P.A. GERBER
DATE	25/06/21	11/06/10
DRAWN BY	K. STEYNBERG	S.J. van ZYL
DATE	25/06/21	17/09/09
SCALE		

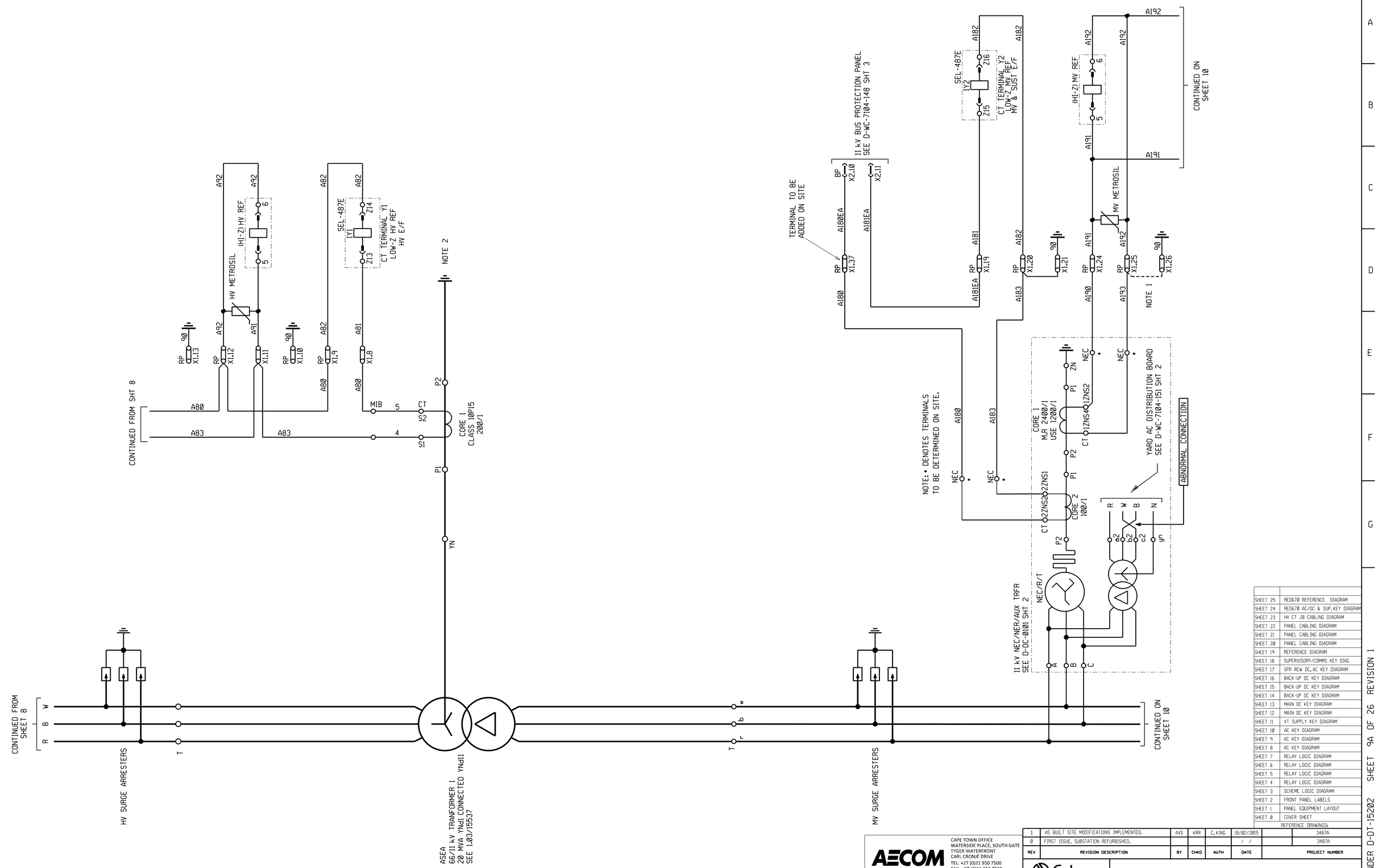
ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
AC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	08	3

LEVELS 1 3 8 10 11 17 24 25 26 27 28 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 8 OF 26 REVISION 1



SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

NOTE

1. ALL CT CIRCUITS ARE TO BE EARTHED AND EARTHED AT ONE POINT ONLY. REMOVE JUMPER X1.12-X1.13 AND/OR X1.25-X1.26 WHERE HV AND/OR MV HIGH IMPEDANCE REF USES LINE CTs (i.e EARTHED VIA X1.5 AND X1.18).
2. THE EARTHING OF TRANSFORMER NEUTRALS SHALL BE IN ACCORDANCE WITH DPL 34-2149.

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG
		/ /			
		/ /			

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	16/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

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Eskom

PROJECT APPROVED	DESIGN APPROVED
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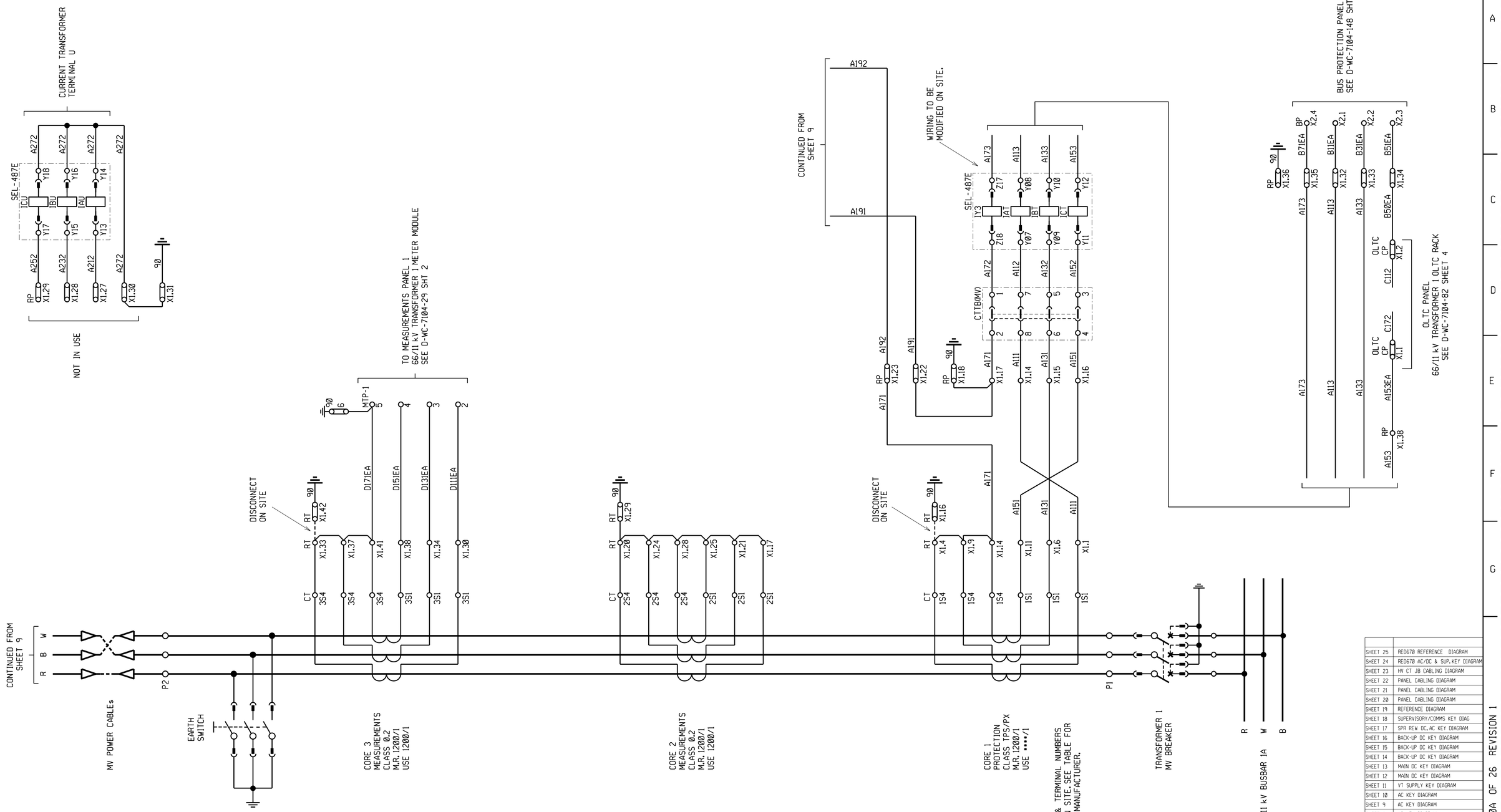
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
AC KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	09	1

MASTER TRACING FILED UNDER D-DT-15202 SHEET 9A OF 26 REVISION 1

LEVELS 1 3 8 10 11 17 24 25 26 27 30 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L



ACTOM BREAKER - METERING CT RATIO SELECTION (CORE 3)					
RATIO	R (	W (	B (	N	BRIDGES
200/1A (S1-S2)	RT X1.30	RT X1.34	RT X1.38	RT X1.39	RT X1.31,X1.35 & X1.39
400/1A (S3-S4)	RT X1.32	RT X1.36	RT X1.40	RT X1.41	RT X1.33,X1.37 & X1.41
600/1A (S2-S3)	RT X1.31	RT X1.35	RT X1.39	RT X1.40	RT X1.32,X1.36 & X1.40
800/1A (S1-S3)	RT X1.30	RT X1.34	RT X1.38	RT X1.40	RT X1.32,X1.36 & X1.40
1000/1A (S2-S4)	RT X1.31	RT X1.35	RT X1.39	RT X1.41	RT X1.33,X1.37 & X1.41
1200/1A (S1-S4)	RT X1.30	RT X1.34	RT X1.38	RT X1.41	RT X1.33,X1.37 & X1.41

ACTOM BREAKER - METERING CT RATIO SELECTION (CORE 2)					
RATIO	R (	W (	B (	N	BRIDGES
200/1A (S1-S2)	RT X1.17	RT X1.21	RT X1.25	RT X1.26	RT X1.18,X1.22 & X1.26
400/1A (S3-S4)	RT X1.19	RT X1.23	RT X1.27	RT X1.28	RT X1.20,X1.24 & X1.28
600/1A (S2-S3)	RT X1.18	RT X1.22	RT X1.26	RT X1.27	RT X1.19,X1.23 & X1.27
800/1A (S1-S3)	RT X1.17	RT X1.21	RT X1.25	RT X1.27	RT X1.19,X1.23 & X1.27
1000/1A (S2-S4)	RT X1.18	RT X1.22	RT X1.26	RT X1.28	RT X1.20,X1.24 & X1.28
1200/1A (S1-S4)	RT X1.17	RT X1.21	RT X1.25	RT X1.28	RT X1.20,X1.24 & X1.28

ACTOM BREAKER - PROTECTION CT RATIO SELECTION (CORE 1)					
RATIO	R (	W (	B (	N	BRIDGES
200/1A (S1-S2)	RT X1.1	RT X1.6	RT X1.11	RT X1.12	RT X1.2,X1.7 & X1.12
400/1A (S3-S4)	RT X1.3	RT X1.8	RT X1.13	RT X1.14	RT X1.4,X1.9 & X1.14
600/1A (S2-S3)	RT X1.2	RT X1.7	RT X1.12	RT X1.13	RT X1.3,X1.8 & X1.13
800/1A (S1-S3)	RT X1.1	RT X1.6	RT X1.11	RT X1.13	RT X1.3,X1.8 & X1.13
1000/1A (S2-S4)	RT X1.2	RT X1.7	RT X1.12	RT X1.13	RT X1.4,X1.9 & X1.14
1200/1A (S1-S4)	RT X1.1	RT X1.6	RT X1.11	RT X1.14	RT X1.4,X1.9 & X1.14

SHEET 25	REDG70 REFERENCE DIAGRAM
SHEET 24	REDG70 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

AECOM
CAPE TOWN OFFICE
WATERSIDE PLACE, SOUTH GATE
TYGER WATERFRONT
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REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

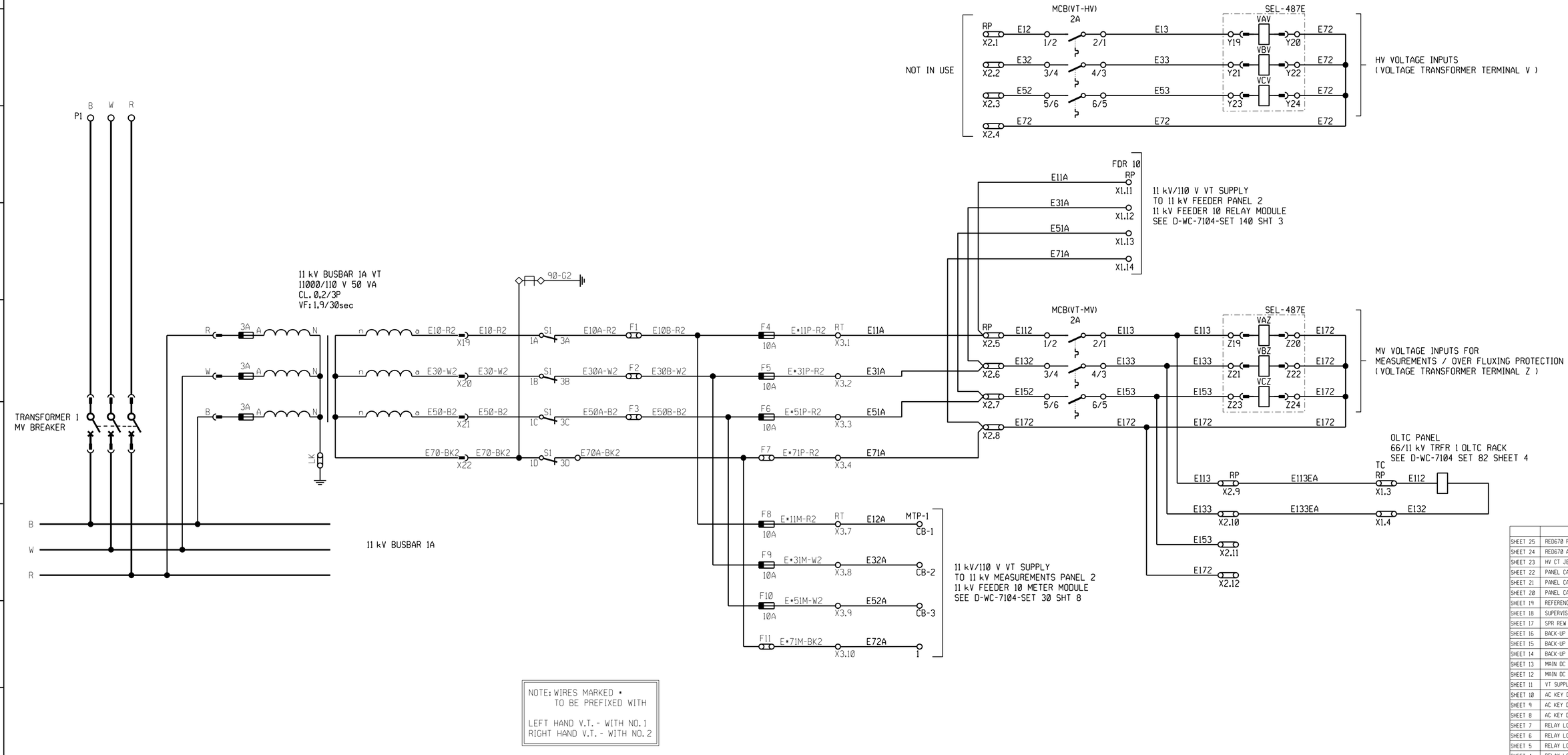
ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
AC KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	10	1

LEVELS 1 3 8 10 11 17 24 25 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 10A OF 26 REVISION 1



NOTE: WIRES MARKED * TO BE PREFIXED WITH

LEFT HAND V.T. - WITH NO. 1
RIGHT HAND V.T. - WITH NO. 2

SHEET 25	REDG70 REFERENCE DIAGRAM
SHEET 24	REDG70 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

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CAPE TOWN OFFICE
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TYGER WATERFRONT
CARL CRONJÉ DRIVE
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REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
		/ /			
		/ /			
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION

66/11 kV TRANSFORMER 1

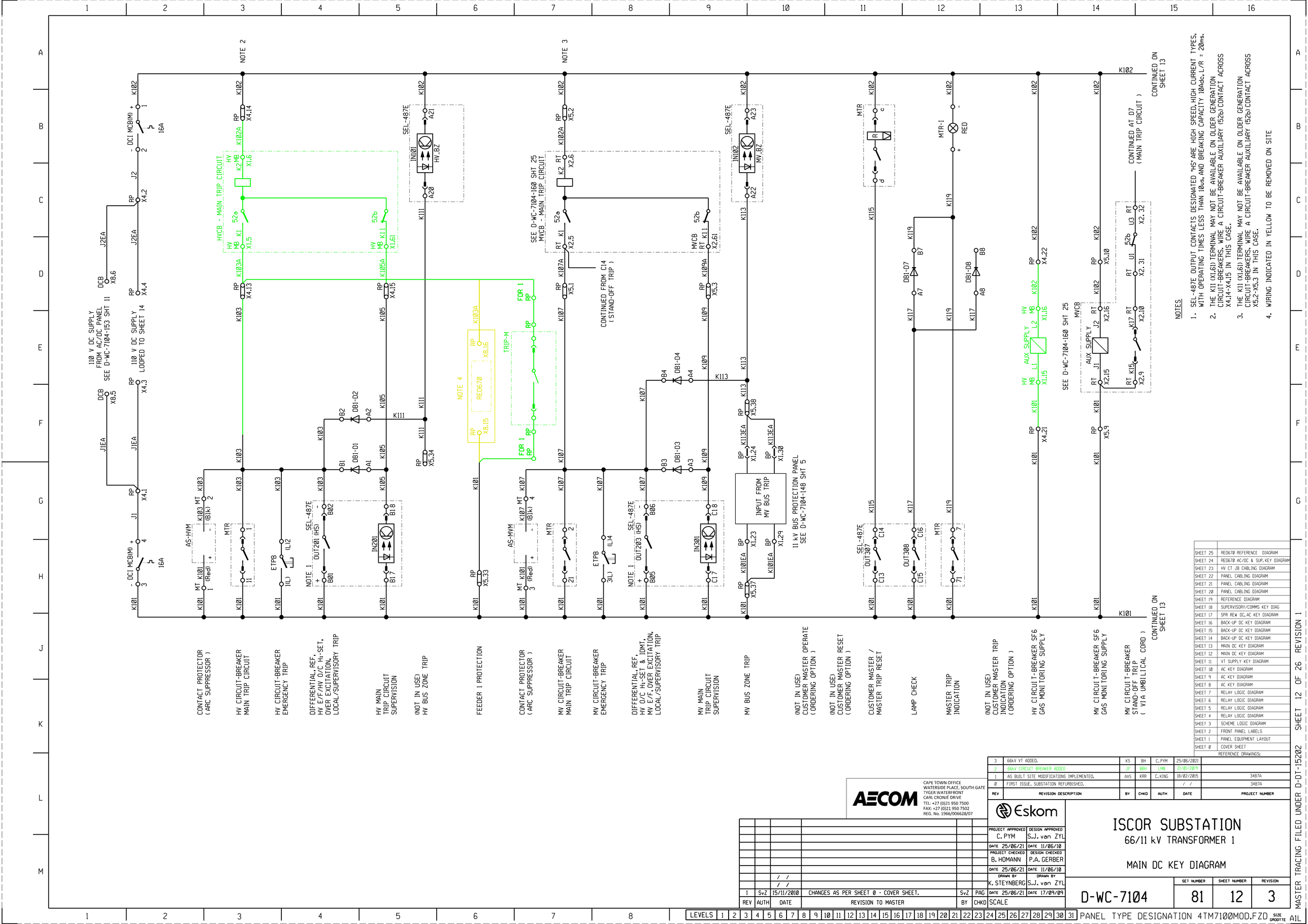
VT SUPPLY KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	11	0

LEVELS 1 3 8 10 11 17 24 25 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 11 OF 26 REVISION 1



NOTES

1. SEL-487E OUTPUT CONTACTS DESIGNATED "HS" ARE HIGH SPEED, HIGH CURRENT TYPES, WITH OPERATING TIMES LESS THAN 10us, AND BREAKING CAPACITY 10Adc, L/R = 20ms.
2. THE K11 (X1.6) TERMINAL MAY NOT BE AVAILABLE ON OLDER GENERATION CIRCUIT-BREAKERS. WIRE A CIRCUIT-BREAKER AUXILIARY (52b) CONTACT ACROSS X4.14-X4.15 IN THIS CASE.
3. THE K11 (X1.6) TERMINAL MAY NOT BE AVAILABLE ON OLDER GENERATION CIRCUIT-BREAKERS. WIRE A CIRCUIT-BREAKER AUXILIARY (52b) CONTACT ACROSS X5.2-X5.3 IN THIS CASE.
4. WIRING INDICATED IN YELLOW TO BE REMOVED ON SITE

SHEET 25	REG670 REFERENCE DIAGRAM
SHEET 24	REG670 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET

REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
3	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
2	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
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REG. No. 1966/006628/07

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG
		/ /			
		/ /			

Eskom

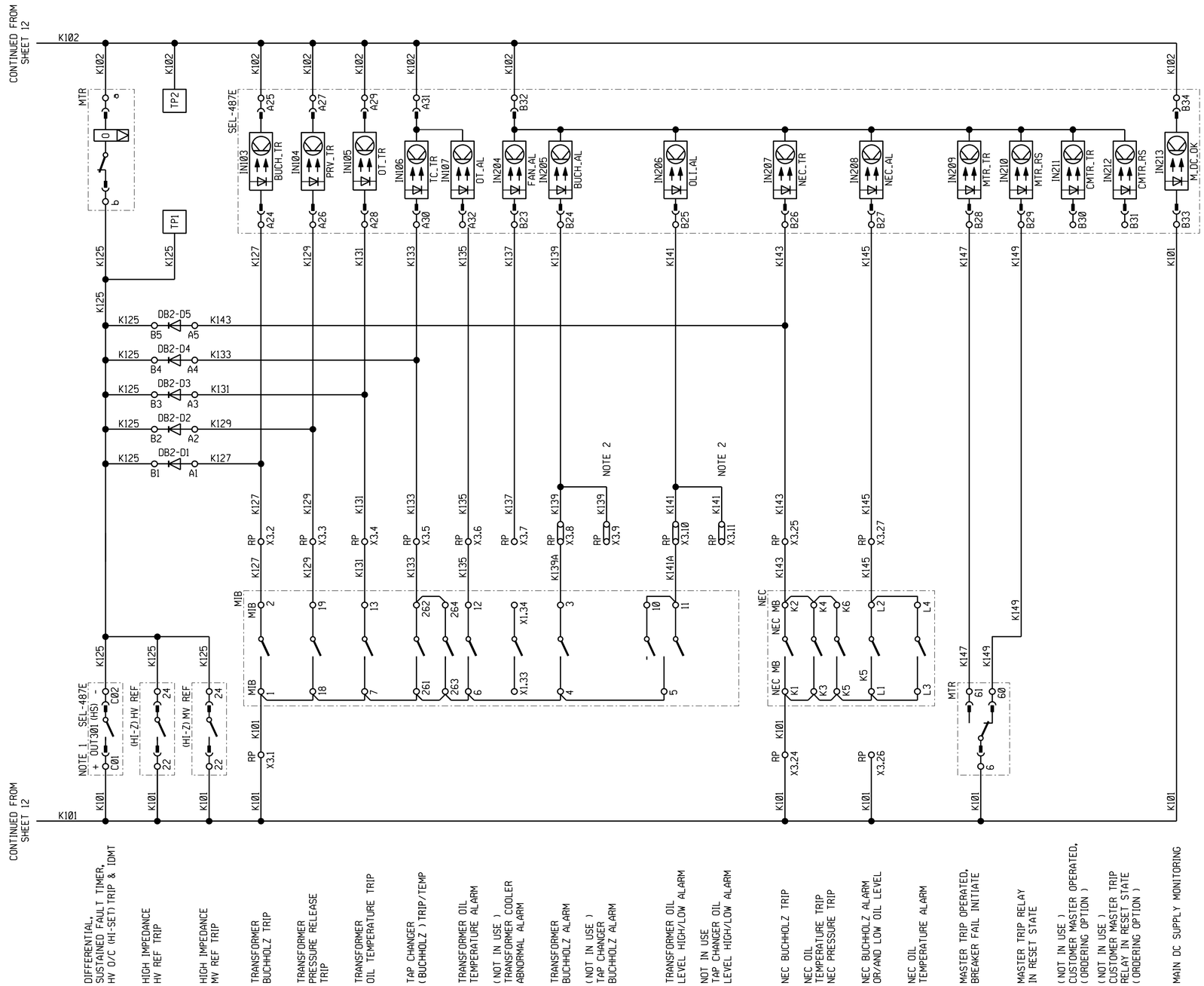
PROJECT APPROVED	DESIGN APPROVED
C.PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
MAIN DC KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	12	3

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 12 OF 26 REVISION 1



NOTE: • DENOTES TERMINAL NUMBER TO BE DETERMINED ON SITE.

NOTES

1. SEL-487E OUTPUT CONTACTS DESIGNATED "HS" ARE HIGH SPEED, HIGH CURRENT TYPES, WITH OPERATING TIMES LESS THAN 10us AND BREAKING CAPACITY 10Adc, L/R = 20ms.
2. MANY ALSTOM/ACTOM POWER TRANSFORMERS FEATURE A TAP CHANGER BUCHHOLZ ALARM WIRED IN PARALLEL WITH THE TAP CHANGER OIL LEVEL ALARM (MIB X1.29-X1.30). THESE ALARMS MUST BE SEPARATED WITH THE TAP CHANGER BUCHHOLZ WIRED IN PARALLED WITH THE MAIN TANK BUCHHOLZ ALARM, OR TO RP TERMINAL X3.9.

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION

66/11 kV TRANSFORMER 1

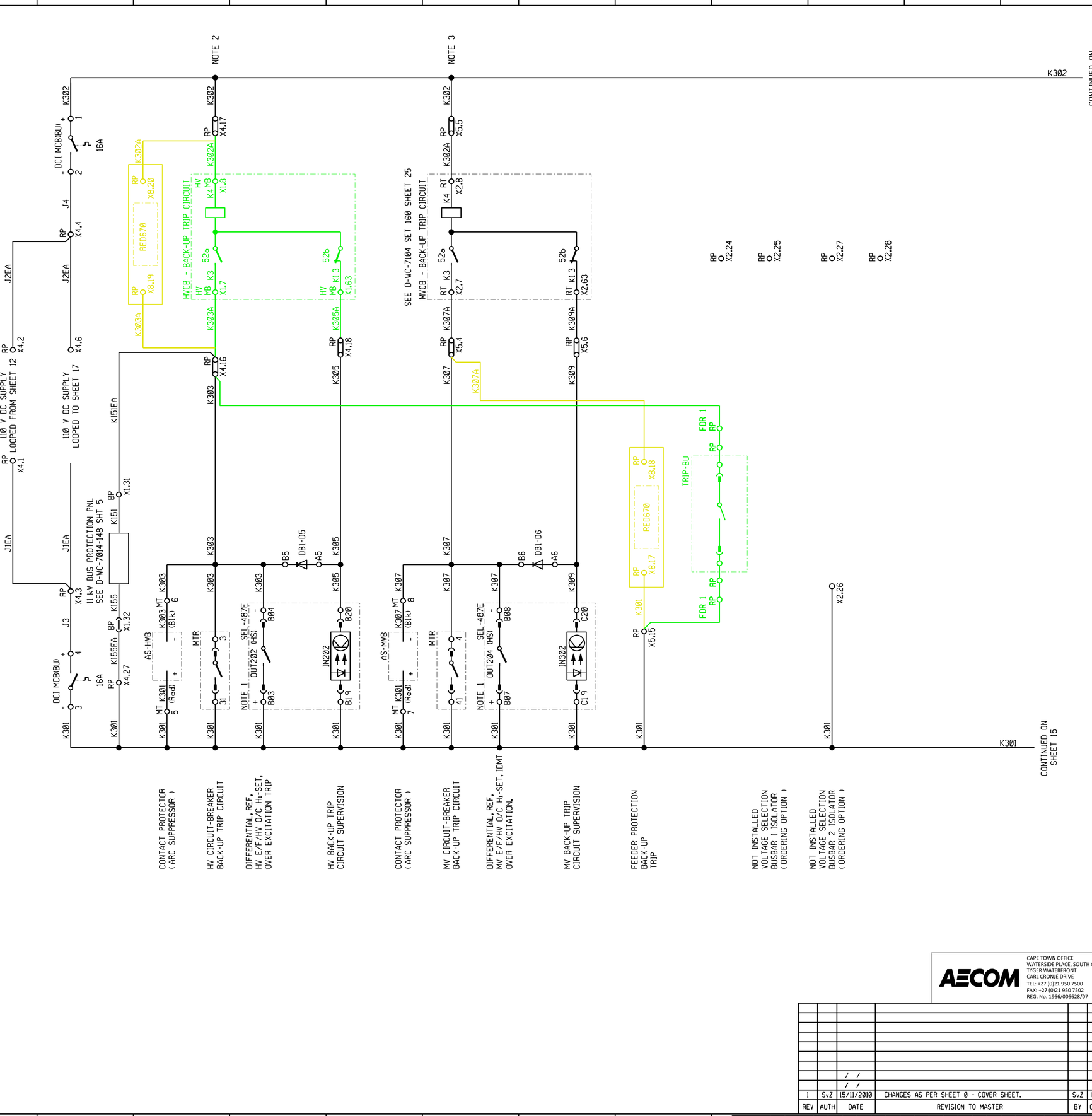
MAIN DC KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	13	1

MASTER TRACING FILED UNDER D-DT-15202 SHEET 13 OF 26 REVISION 1

LEVELS 1 3 8 10 11 17 24 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L



NOTES

1. SEL-487E OUTPUT CONTACTS DESIGNATED 'HS' ARE HIGH SPEED, HIGH CURRENT TYPES, WITH OPERATING TIMES LESS THAN 10us, AND BREAKING CAPACITY 10Adc, L/R = 20ms.
2. THE K13 (X1.63) TERMINAL MAY NOT BE AVAILABLE ON OLDER GENERATION CIRCUIT-BREAKERS. WIRE A CIRCUIT-BREAKER AUXILIARY (52b) CONTACT ACROSS X4.17-X4.18 IN THIS CASE.
3. THE K13 (X1.63) TERMINAL MAY NOT BE AVAILABLE ON OLDER GENERATION CIRCUIT-BREAKERS. WIRE A CIRCUIT-BREAKER AUXILIARY (52b) CONTACT ACROSS X5.5-X5.6 IN THIS CASE.
4. IN THE EVENT THAT ONLY ONE TRIP CIRCUIT IS PROVIDED IN THE CIRCUIT-BREAKER DESIGN, THIS CIRCUIT SHALL BE WIRED INTO THE MAIN TRIPPING CIRCUIT OF THE SCHEME (SEE SHEET 12). IN THIS CASE BRIDGE TERMINALS X4.17-X4.18 (HV) AND/OR X5.5-X5.6 (MV) OF THE CORRESPONDING BACK-UP TRIP CIRCUIT SO AS TO OVERRIDE THE TRIP CIRCUIT SUPERVISION FEATURE.
5. DISCONNECT REB670 BY REMOVING JUMPERS BETWEEN TERMINALS X4.16 AND X8.19; AND X4.17 AND X8.20. WIRE CIRCUIT BREAKER TRIP CIRCUIT IN ITS PLACE. MASK OUT 106 TO SUSTAINED FAULT AND CONNECT TO X8.19.

SHEET 25	REB670 REFERENCE DIAGRAM
SHEET 24	REB670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
3	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
2	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED	DESIGN APPROVED
C.PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
BACK-UP DC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	14	3

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 14 OF 26 REVISION 1

CONTINUED FROM SHEET 14

CONTINUED ON SHEET 16

HV CIRCUIT-BREAKER NOT HEALTHY

MV CIRCUIT-BREAKER NOT HEALTHY

CIRCUIT-BREAKER SF6 GAS LOW COMMOM ALARM

SEL-487E

IN304	MV_ARCS	MV INDOOR CIRCUIT-BRKR CABLE CHAMBER ARC FAULT DETECTED
IN305	HV_REFH	HIGH IMPEDANCE HV REF TRIP
IN306	MV_REFH	HIGH IMPEDANCE MV REF TRIP
IN307	EMGC_TR	EMERGENCY TRIP
IN308		HV LINE ISOLATOR OPEN
IN309		HV LINE ISOLATOR CLOSED
IN310	HV_CBO	HV CIRCUIT-BREAKER OPEN
IN311	HV_CBC	HV CIRCUIT-BREAKER CLOSED
IN312		SPARE STATUS INPUT
IN313		SPARE STATUS INPUT
IN316		MV CIRCUIT-BREAKER CABLE CHAMBER ARC SENSOR FAILED
IN317		MV CIRCUIT-BREAKER RACKED OUT
IN318	MV_CBO	MV CIRCUIT-BREAKER OPEN
IN319	MV_CBC	MV CIRCUIT-BREAKER CLOSED
IN320		MV CIRCUIT-BREAKER INTEGRAL EARTH APPLIED
IN321		(NOT IN USE) MV BUSBAR EARTH APPLIED
IN322		SPRING DISCHARGED CIRCUIT-BREAKER COMMON ALARM SF6 GAS LOW SF6 GAS LOW HV CIRCUIT-BREAKER MB HEATER ALARM
IN323		SPRING REWIND MCB TRIPPED SPRING DISCHARGED CIRCUIT-BREAKER COMMON ALARM SF6 GAS LOW
IN324	SF6_LOW	(NOT IN USE) SF6 GAS LOW MV CIRCUIT-BREAKER MB HEATER ALARM

HV CIRCUIT-BREAKER (NOT INSTALLED) NOT HEALTHY

MV CIRCUIT-BREAKER NOT HEALTHY

NOT INSTALLED

DB2-D7, DB2-D8

CONTINUED ON SHEET 24

CONTINUED ON SHEET 16

SEE D-WC-7104 SET 160 SHEET 26 MVCB

DCI MCB(SP)

ETPB

(HI-Z) HV REF

(HI-Z) MV REF

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC,AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
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SHEET 8	AC KEY DIAGRAM
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SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET

REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
2	66kV CIRCUIT BREAKER ADDED	JF	BRK	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

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REG. No. 1966/006628/07

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

PROJECT APPROVED	C. PYM
DATE	25/06/21
DESIGN APPROVED	S.J. van ZYL
DATE	11/06/10
PROJECT CHECKED	B. HOMANN
DATE	25/06/21
DESIGN CHECKED	P.A. GERBER
DATE	11/06/10
DRAWN BY	K. STEYNBERG
DATE	25/06/21
DRAWN BY	S.J. van ZYL
DATE	17/09/09
SCALE	

ISCOR SUBSTATION

66/11 kV TRANSFORMER 1

BACK-UP DC KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	15	2

MASTER TRACING FILED UNDER D-DT-15202 SHEET 15 OF 26 REVISION 1

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

CONTINUED FROM SHEET 15

CONTINUED FROM SHEET 15

CONTINUED ON SHEET 24

DISCONNECT ON SITE.

SEE D-WC-7104-160 SHT 25 MVCB

SEE D-WC-7104-160 SHT 25 MVCB

SEE D-WC 7104 SET 148 SHT 6 11 kV BUS PROTECTION

SEE D-WC-7104-160 SHT 25 MVCB

CONTINUED FROM SHEET 15

NOTES

1. SEL-487E OUTPUT CONTACTS DESIGNATED "HC" ARE HIGH CURRENT (NORMAL SPEED) TYPES, WITH BREAKING CAPACITY 10Adc, L/R = 20ms.
2. REMOVE LINKS IN THE EVENT THAT THE SEL-487E IS TO BE USED TO MONITOR THE CUSTOMER'S DC SUPPLY. IN THIS CASE, WIRE THE CUSTOMER'S POSITIVE SUPPLY TO X4.11 AND THE NEGATIVE TO X4.12 (MAX 350Vdc).
3. REFERENCE CONDITIONS: DIGITAL TEMPERATURE INSTRUMENT SHOWN IN THE DE-ENERGISED (FAILED) STATE. OIL SUMP DRAIN VALVE SHOWN IN THE OPEN POSITION.

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
3	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
2	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
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		/ /		DATE 25/06/21	DATE 17/09/09
		/ /		SCALE	

PROJECT APPROVED	C.PYM
DESIGN APPROVED	S.J. van ZYL
DATE	25/06/21
DATE	11/06/10
PROJECT CHECKED	B. HOMANN
DESIGN CHECKED	P.A. GERBER
DATE	25/06/21
DATE	11/06/10
DRAWN BY	K. STEYNBERG
DRAWN BY	S.J. van ZYL

ISCOR SUBSTATION

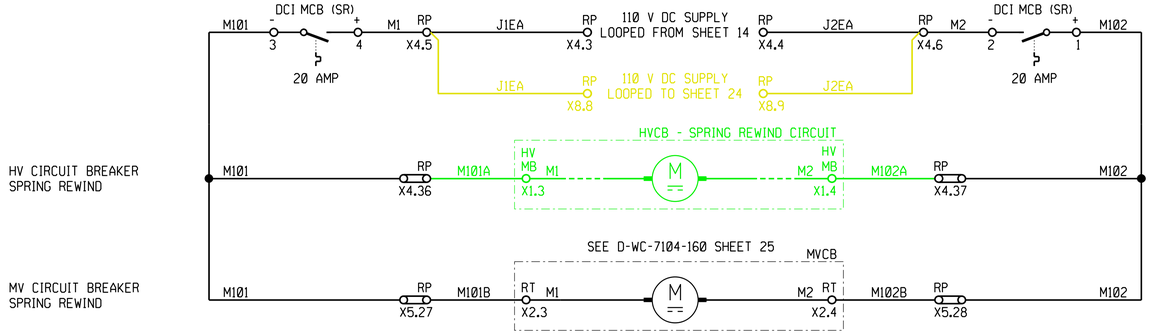
66/11 kV TRANSFORMER 1

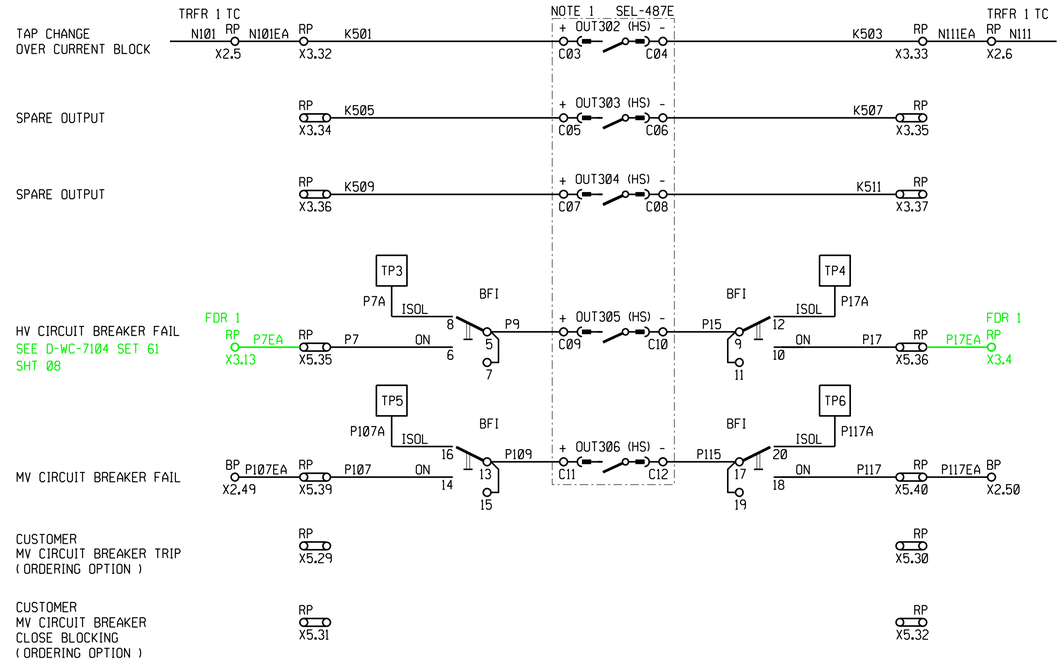
BACK-UP DC KEY DIAGRAM

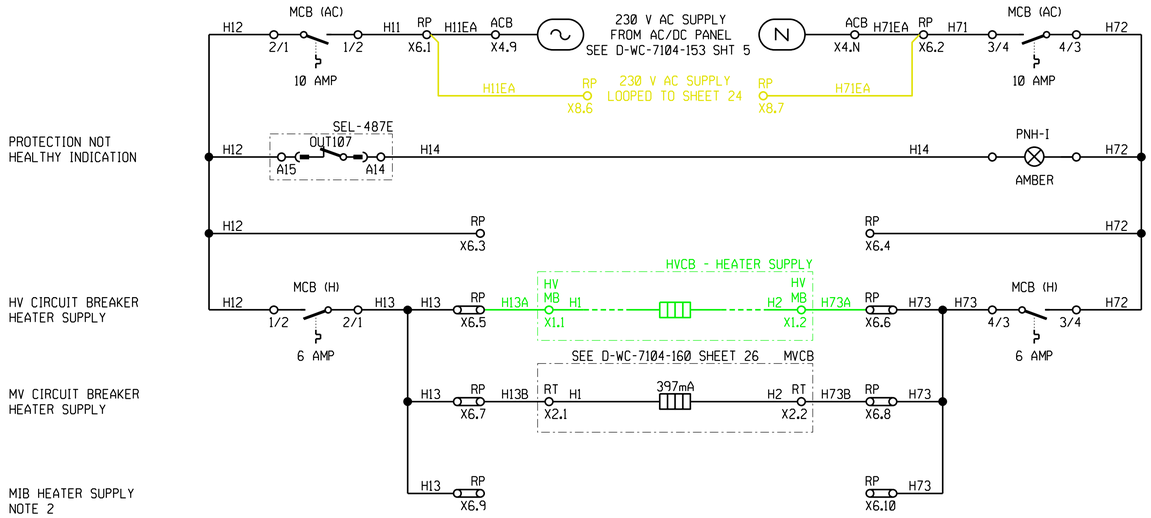
DRAWING NUMBER	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	16	3

LEVELS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 16 OF 26 REVISION 1







NOTES

1. SEL-487E OUTPUT CONTACTS DESIGNATED "HS" ARE HIGH SPEED, HIGH CURRENT TYPES, WITH OPERATING TIMES LESS THAN 10us, AND BREAKING CAPACITY 10Adc, L/R = 20ms.
2. THE TRANSFORMER HEATER SUPPLY IS USUALLY LOOPED FROM THE THREE PHASE AC SUPPLY FOR THE COOLER FANS (WHERE PROVIDED). A SEPARATE SINGLE PHASE AC SUPPLY IS NOT REQUIRED IN THIS CASE.

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
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SHEET 8	AC KEY DIAGRAM
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SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

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		/ /		DRAWN BY	S.J. van ZYL
				DATE	25/06/21
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				SCALE	

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PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
SPR REWIND DC, AC KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	17	3

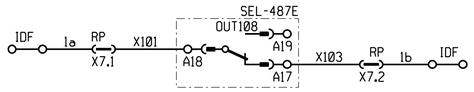
MASTER TRACING FILED UNDER D-DT-15202 SHEET 17 OF 26 REVISION 1

LEVELS 1 3 8 10 11 17 22 24 26 27 30 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

SUPERVISORY ALARM

ALARM WORDING

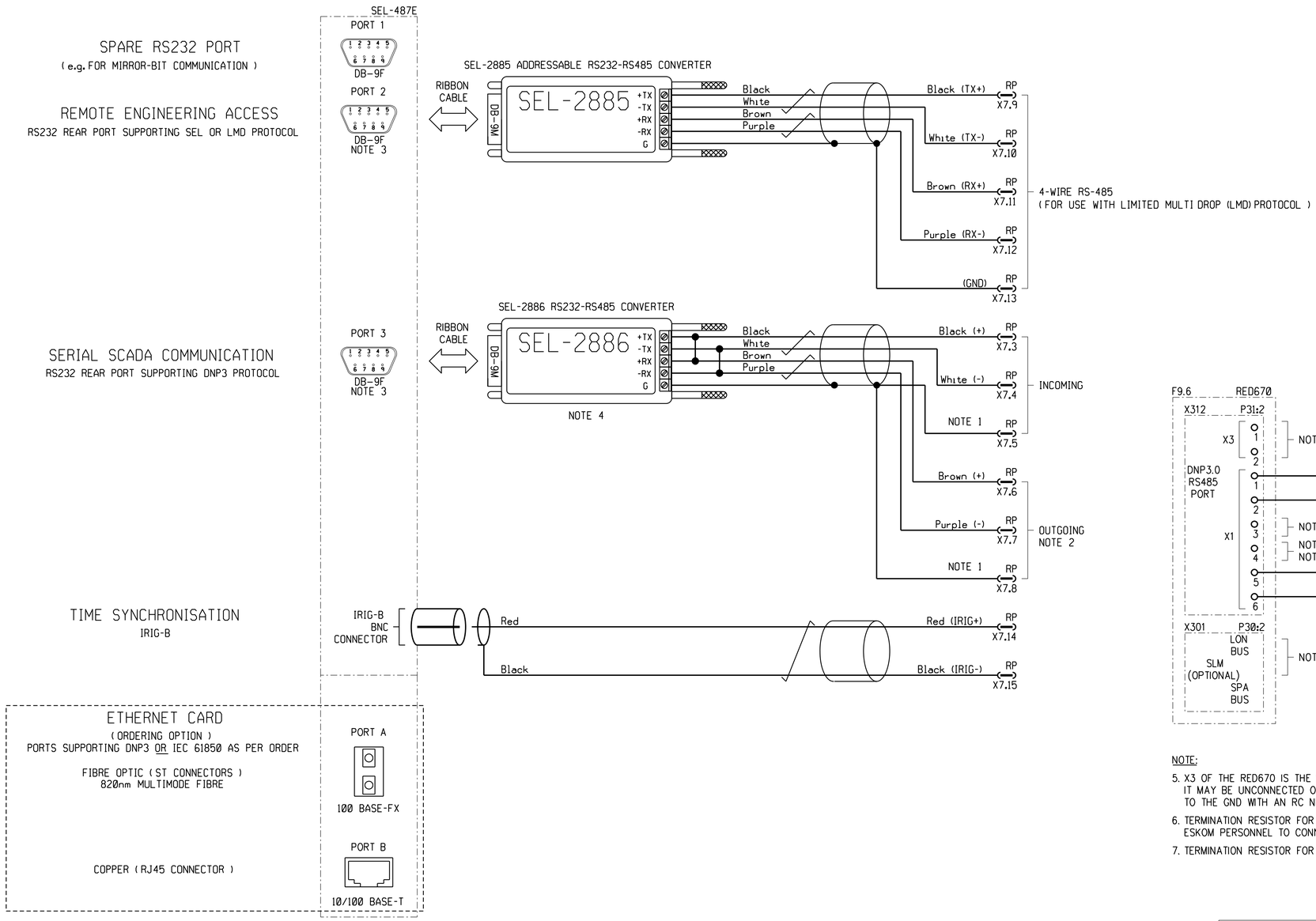
PROTECTION
NOT HEALTHY

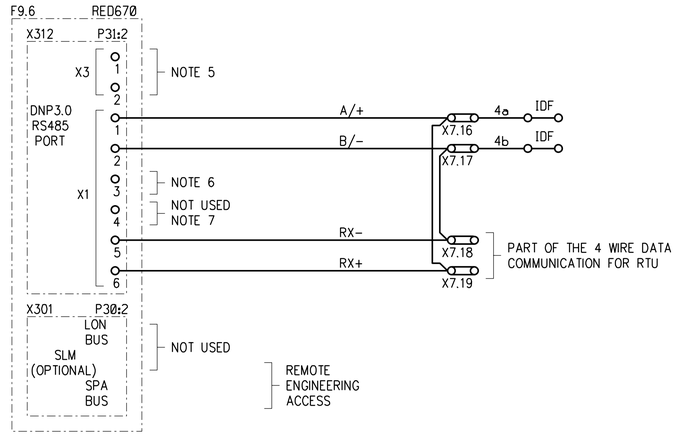


PNT NAME DESCRIPTION/
PNT NAME

PROTECTION
(PNH)

COMMS INTERFACE AND TIME SYNCHRONISATION





SEL-487E MAIN PRINTED CIRCUIT (PC) BOARD JUMPER SETTINGS

THE FOLLOWING MAIN PC BOARD JUMPER SELECTIONS SHALL BE MADE BY CONCO PRIOR TO DELIVERY OF SCHEMES TO ESKOM.

JUMPER NAME	SETTING	FUNCTION
J21-A	N/A	RESERVED FOR USE BY SEL
J21-PASSWORD	OFF	DISABLE PASSWORD PROTECTION
J21-BREAKER	ON	ALLOW ASCII SERIAL COMMANDS "OPEN", "CLOSE" AND "PULSE"
J21-D	N/A	RESERVED FOR USE BY SEL
JMP1	OFF	IRIG-B TERMINATING Z (OFF = 2550 Ohms, ON = 50 Ohms)
JMP2	ON	PORT 3 PIN 1 (ON = +5Vdc, OFF = NO FUNCTION)
JMP3	ON	PORT 2 PIN 1 (ON = +5Vdc, OFF = NO FUNCTION)
JMP4	OFF	PORT 1 PIN 1 (ON = +5Vdc, OFF = NO FUNCTION)

SEL-2886 DIP SWITCH SETTINGS

THE FOLLOWING DIP SWITCH SELECTIONS SHALL BE MADE BY CONCO PRIOR TO DELIVERY OF SCHEMES TO ESKOM.

NO.	1	2	3	4	5	6	7	8
ON-1			▨					
OFF-0	▨	▨		▨	▨	▨	▨	▨

THE SEL-2886 IS SET IN SEND DATA CONTROL (SDC) MODE (DIP SWITCH 4 OFF), CONFIGURED FOR COMPATIBILITY WITH 9600 BAUD (DIP SWITCHES 1 -3) AND WITH ECHO OFF (DIP SWITCH 6).

ALTERNATIVE BAUD RATE SETTINGS ARE AS FOLLOWS:

	DIP SWITCH		
BAUD	1	2	3
1200	1	1	1
2400	0	1	1
4800	1	0	1
9600	0	0	1
19200	1	1	0
38400	0	1	0
57600	1	0	0
115200	0	0	0

NOTES

1. RS485 COMMUNICATION CIRCUITS TO BE EARTHED AT ONE POINT ONLY.
2. THE SEL-2886 PRODUCT MANUAL INDICATES THAT TERMINATING RESISTORS SHOULD SELDOM BE REQUIRED ON THE RS485 CIRCUITS (e.g. COMMUNICATION AT UP TO 115200bps CAN BE ACHIEVED OVER A 230M CABLE RUN WITHOUT THE NEED FOR RESISTORS). WHERE REQUIRED, REFER TO THE PRODUCT MANUAL FOR RESISTOR SIZING AND INSTALLATION PRACTICE NOTES.
3. THE SEL-2885 AND SEL-2886 CONVERTERS REQUIRE A +5Vdc AUXILIARY SUPPLY. THIS IS PROVIDED VIA PIN 1 OF THE SEL-487E COMM PORT. SEE MAIN PC BOARD JUMPER SETTINGS, TOP RIGHT.
4. SEL-2886 CONVERTERS ARE CAPABLE OF 2- OR 4-WIRE RS485 MULTI-DROP CONNECTIONS. THE SEL-2886 IS WIRED FOR 2-WIRE CONNECTION IN THE STANDARD SCHEME APPLICATION.

NOTE:

5. X3 OF THE RED670 IS THE SOFT GROUND CONNECTOR. IT MAY BE UNCONNECTED OR IT CAN BE CONNECTED TO THE GND WITH AN RC NET PARALLEL WITH A MOV.
6. TERMINATION RESISTOR FOR TRANSMITTER AND RECIEVER. ESKOM PERSONNEL TO CONNECT TO A/+ IF USED.
7. TERMINATION RESISTOR FOR RECIEVER IN THE 4 WIRE CASE (CONNECT TO RX+).

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
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	REFERENCE DRAWINGS:

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PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
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DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1

SUPERVISORY/COMMS KEY DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	18	1

LEVELS 1 3 8 10 11 17 24 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 18 OF 26 REVISION 1

SEL-487E

HV CB CLOSE	OUT101(HC) A01 – A02	SHT 16
MV CB CLOSE	OUT102(HC) A03 – A04	SHT 16
HV/MV CB ANTI-PUMP	OUT103(HC) A05 – A06	SHT 16
HVCB FC	OUT104 A07 – A08	SHT 16
MVCB FC	OUT105 A09 – A10	SHT 16
HV SFT	OUT106 A11 – A12 / A13	SHT 14
PNH IND.	OUT107 A14 – A15 / A16	SHT 17
PNH SUP. IND.	OUT108 A17 – A18 / A19	SHT 18
HV BUSZONE TRIP	IN101 A20 – A21	SHT 12
MV BUSZONE TRIP	IN102 A22 – A23	SHT 12
BUCHHOLZ TRIP	IN103 A24 – A25	SHT 13
PRV TRIP	IN104 A26 – A27	SHT 13
OIL TEMP TRIP	IN105 A28 – A29	SHT 13
TC BUCH TRIP	IN106 A30 – A31	SHT 13
OIL TEMP ALARM	IN107 A32	

SPARE RS-232	PORT 1	SHT 18
RS-232 SCADA COMMS	PORT 2	SHT 18
RS-232 ENG. ACCESS	PORT 3	SHT 18
100 BASE-FX ETHERNET (OPTIONAL)	PORT A	SHT 18
10/100 BASE-T ETHERNET (OPTIONAL)	PORT B	SHT 18
IRIG-B INPUT (BNC CONNECTOR)		SHT 18

SEL-487E (CONT)

HV MAIN TRIP	OUT201 (HS) B01 – B02	SHT 12
HV BACK-UP TRIP	OUT202 (HS) B03 – B04	SHT 14
MV MAIN TRIP	OUT203 (HS) B05 – B06	SHT 12
MV BACK-UP TRIP	OUT204 (HS) B07 – B08	SHT 14
SPARE	OUT205 (HS) B09 – B10	NOT USED
SPARE	OUT206 (HS) B11 – B12	NOT USED
SPARE	OUT207 B13 – B14	NOT USED
SPARE	OUT208 B15 – B16	NOT USED
HV MAIN TCS	IN201 B17 – B18	SHT 12
HV BACK-UP TCS	IN202 B19 – B20	SHT 14
HV CB ANTI-PUMP	IN203 B21 – B22	SHT 16
COOLER ALARM	IN204 B23 – B32	SHT 13
BUCHHOLZ ALARM	IN205 B24	
OIL LEVEL ALARM	IN206 B25	
NEC TRIP	IN207 B26	
NEC ALARM	IN208 B27	
MASTER TRIPPED	IN209 B28	
MASTER RESET	IN210 B29	
CUST MTR TRIPPED	IN211 B30	
CUST MTR RESET	IN212 B31	
MAIN DC MONITOR	IN213 B33 – B34	SHT 13
SPARE	IN214 B35 – B36	SHT 16
MVCB EXT CLOSE	IN215 B37 – B38	SHT 16
MIB HEATER ALARM	IN216 B39 – B48	SHT 16
TEMP INST FAIL	IN217 B40	
OIL SUMP OPEN	IN218 B41	
WIND TEMP ALARM	IN219 B42	
WIND TEMP TRIP	IN220 B43	
SPARE INPUT	IN221 B44	
SPARE INPUT	IN222 B45	
VT MCB TRIP	IN223 B46	
BFI	IN224 B47	

SEL-487E (CONT)

MASTER TRIP	OUT301 (HS) C01 – C02	SHT 13
TC O/C BLOCK	OUT302 (HS) C03 – C04	SHT 17
SPARE	OUT303 (HS) C05 – C06	SHT 17
SPARE	OUT304 (HS) C07 – C08	SHT 17
HV CB FAIL	OUT305 (HS) C09 – C10	SHT 17
MV CB FAIL	OUT306 (HS) C11 – C12	SHT 17
MTR RESET	OUT307 C13 – C14	SHT 12
LAMP CHECK	OUT308 C15 – C16	SHT 12
MV MAIN TCS	IN301 C17 – C18	SHT 12
MV BACK-UP TCS	IN302 C19 – C20	SHT 14
MV CB ANTI-PUMP	IN303 C21 – C22	SHT 16
MV CB ARC SENSOR	IN304 C23 – C32	SHT 15
H1Z HV REF TRIP	IN305 C24	
H1Z MV REF TRIP	IN306 C25	
EMERGENCY TRIP	IN307 C26	
HV IS1 OPEN	IN308 C27	
HV IS2 OPEN	IN309 C28	
HV CB OPEN	IN310 C29	
HV CB CLOSED	IN311 C30	
SPARE INPUT	IN312 C31	
SPARE INPUT	IN313 C33 – C34	SHT 15
SPARE	IN314 C35 – C36	NOT USED
SPARE	IN315 C37 – C38	NOT USED
MV IS1 OPEN	IN316 C39 – C48	SHT 15
MV IS2 OPEN	IN317 C40	
MV CB OPEN	IN318 C41	
MV CB CLOSED	IN319 C42	
MVCB INT EARTH	IN320 C43	
MVCB RACK/O	IN321 C44	
HV CBNH	IN322 C45	
MV CBNH	IN323 C46	
SF6 GAS LOW	IN324 C47	

SEL-487E (CONT)

HV CT INPUT RED PHASE	IAS Y01 – Y02	SHT 8
HV CT INPUT WHITE PHASE	IBS Y03 – Y04	SHT 8
HV CT INPUT BLUE PHASE	ICS Y05 – Y06	SHT 8
MV CT INPUT RED PHASE	IAT Y07 – Y08	SHT 10
MV CT INPUT WHITE PHASE	IBT Y09 – Y10	SHT 10
MV CT INPUT BLUE PHASE	ICT Y11 – Y12	SHT 10
MV CT INPUT RED PHASE	IAU Y13 – Y14	SHT 10
MV CT INPUT WHITE PHASE	IBU Y15 – Y16	SHT 10
MV CT INPUT BLUE PHASE	ICU Y17 – Y18	SHT 10
HV VT INPUT RED PHASE	VAV Y19 – Y20	SHT 11
HV VT INPUT WHITE PHASE	VBV Y21 – Y22	SHT 11
HV VT INPUT BLUE PHASE	VCV Y23 – Y24	SHT 11
DC SUPPLY MONITOR	Y25 – Y26	SHT 16
NOT USED	Y27 – Y28	N/A
POWER SUPPLY	PSU Y29 – Y30 / Y31	SHT 16
SPARE CT INPUT	IAW Z01 – Z02	NOT USED
SPARE CT INPUT	IBW Z03 – Z04	NOT USED
SPARE CT INPUT	ICW Z05 – Z06	NOT USED
SPARE CT INPUT	IAX Z07 – Z08	NOT USED
SPARE CT INPUT	IBX Z09 – Z10	NOT USED
SPARE CT INPUT	ICX Z11 – Z12	NOT USED
HV REF CT INPUT	IY1 Z13 – Z14	SHT 9
MV REF CT INPUT	IY2 Z15 – Z16	SHT 9
MV CABLE REF CT INPUT	IY3 Z17 – Z18	SHT 10
MV VT INPUT RED PHASE	VAZ Z19 – Z20	SHT 11
MV VT INPUT WHITE PHASE	VBZ Z21 – Z22	SHT 11
MV VT INPUT BLUE PHASE	VCZ Z23 – Z24	SHT 11

AS-HVBU	+ –	SHT 14
AS-HVM	+ –	SHT 12
AS-MVBU	+ –	SHT 14
AS-MVM	+ –	SHT 12

BFI

	1 – 3 ON 2 – 4 ISOL	SHT 16
	5 – 7 ON 6 – 8 ISOL	SHT 17
	9 – 11 ON 10 – 12 ISOL	SHT 17
	13 – 16 ON 14 – 16 ISOL	SHT 17
	17 – 19 ON 18 – 20 ISOL	SHT 17

CTTB(HV)

8 7 / 6 5 / 4 3 / 2 1 — SHT 8

CTTB(MV)

8 7 / 6 5 / 4 3 / 2 1 — SHT 10

DB1

D1	B1 – A1	SHT 12
D2	B2 – A2	SHT 12
D3	B3 – A3	SHT 12
D4	B4 – A4	SHT 12
D5	B5 – A5	SHT 14
D6	B6 – A6	SHT 14
D7	B7 – A7	SHT 12
D8	B8 – A8	SHT 12

DB2

D1	B1 – A1	SHT 13
D2	B2 – A2	SHT 13
D3	B3 – A3	SHT 13
D4	B4 – A4	SHT 13
D5	B5 – A5	SHT 13
D6	B6 – A6	NOT USED
D7	B7 – A7	SHT 15
D8	B8 – A8	SHT 15

DCI MCB (BU) 16A

2 – 1 / 4 – 3 — SHT 14

DCI MCB (M) 16A

2 – 1 / 4 – 3 — SHT 12

DCI MCB (SR) 20A

2 – 1 / 4 – 3 — SHT 17

11 – 12 / 14 — SHT 15

ETPB

I(L)	(L)2	SHT 12
3(L)	(L)4	SHT 12
I(R)	(R)2	SHT 15
3(R)	(R)4	SPARE

FC (HV)

+ – SHT 16

FC (MV)

+ – SHT 16

HV METROSIL

SHT 9

(H1-Z) HV REF

5 – 6 — SHT 9

22 – 24 — SHT 13

26 – 28 — SHT 15

MCB (AC) 10A

1/2 – 2/1 / 3/4 – 4/3 — SHT 17

MCB (H) 6A

1/2 – 2/1 / 3/4 – 4/3 — SHT 17

NOT IN USE MCB (VT-HV) 2A

1/2 – 2/1 / 3/4 – 4/3 / 5/6 – 6/5 — SHT 11

11 – 12 / 14 — SHT 16

MCB (VT-MV) 2A

1/2 – 2/1 / 3/4 – 4/3 / 5/6 – 6/5 — SHT 11

11 – 12 / 14 — SHT 16

MTR

b – o / d – R – c — SHT 13

1 – 10 / 11 — SHT 11

2 – 20 / 21 — SHT 12

3 – 30 / 31 — SHT 12

4 – 40 / 41 — SHT 14

5 – 50 / 51 — SHT 14

6 – 60 / 61 — SHT 16

7 – 70 / 71 — SHT 13

8 – 80 / 81 — SHT 12

NOT USED

MTR-I

+ – RED — SHT 12

MV METROSIL

SHT 9

(H1-Z) MV REF

5 – 6 — SHT 9

22 – 24 — SHT 13

26 – 28 — SHT 15

PNH-I

AMBER — SHT 17

SHEET 24	ISOLATOR REFERENCE DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REWOC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

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CAPE TOWN OFFICE
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REG. No. 1966/006628/07

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
1	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
		/ /			
		/ /			
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09
SCALE	

ISCOR SUBSTATION

66/11 kV TRANSFORMER 1

REFERENCE DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	19	1

MASTER TRACING FILED UNDER D-DT-15202 SHEET 19 OF 26 REVISION 1

LEVELS 1 3 8 10 11 17 24 26 27 30 — PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

NOTE: • INDICATES TERMINAL NUMBER TO BE DETERMINED ON SITE.

LOOPED TERMINALS	
66 kV CT JB	40-41-42; 43-44-45-46-47-48-EARTH; 49-50-51-52-53-54-EARTH; 58-59-60; 61-62-62-64-65-66-EARTH; 67-68-69-70-71-72-EARTH;
MIB	1-18-7-261-6-4-5-263; 11-10; 262-264-8-9;
NECRT	K1-K3-K5-L1-L3; K2-K4-K6; L2-L4
11 kV BKR MB RT TERMINALS	X1.4-X1.9-X1.14; X1.17-X1.20-X1.21-X1.24-X1.25-X1.28-X1.29-EARTH; X1.33-X1.37-X1.41; X2.15-X2.9; X2.10-X2.31; X2.5-X2.32; X3.9-X2.41-X2.33-X3.13; X2.47-X2.27;
66 kV LINE ISOLATOR	X1.50-X1.24;

NOTES:

1. (2) INDICATES TWO LEADS IN PARALLEL.
2. SPARE CABLE LEADS TO BE LEFT LONG ENOUGH TO REACH THE FURTHEST TERMINAL.
3. LEAD NUMBERS SHOWN THUS
   P7 ▭ INDICATES NO CHANGE IN LEAD NUMBER.
   P7 ▭ P7A INDICATES CHANGE IN LEAD NUMBER.
4. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.
5. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK FALLS/REMAINS CLOSED WHEN THE SECURING SCREW IS LOOSENED.

UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10.RS
⊂⊃ ENTRELEC D6/8-STI-RS SLIDING LINK TEST TERMINAL

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
REFERENCE DRAWINGS:	

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
2	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
		/ /			
		/ /			
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG

Eskom

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL
DATE 25/06/21	DATE 17/09/09

SCALE

ISCOR SUBSTATION

66/11 kV TRANSFORMER 1

PANEL CABLING DIAGRAM

	SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	20	2

LEVELS 1 3 8 10 11 17 24 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 20 OF 26 REVISION 1

TRANSFORMER & NEC/R DC CIRCUITS

TOP OF TERMINAL STRIP

							X3		
							37	K511	SPARE SEL-487E OUTPUTS
							36	K509	
							35	K507	
							34	K505	
			X2.6			N111EA	33	K503	TC O/C BLOCK
			X2.5			N101EA	32	K501	
		X2.14				K379	31	K379	SPARE INPUTS / MV CB EXT CLOSE
		X2.13				K301	30	K301	
							29	K377	
							28	K301	
				L2		K145	27	K145	NECR ALARMS / TRIPS
							26	K101	
				K2		K143	25	K143	
				K1		K101	24	K101	
							23	K371	TRFR ALARMS / TRIPS (BACK-UP)
							22	K301	
	X8.28					K369	21	K369	
	X8.27					K301	20	K301	
					15	K367	19	K367	
					14	K365	18	K365	
							17	K363	
							16	K361	
							15	K357	
							14	K302	
					8	K301	13	K301	
							12	K359	TRFR ALARMS / TRIPS (MAIN)
							11	K141	
					11	K141A	10	K141	
							9	K139	
					3	K139A	8	K139	
							7	K137	
					12	K135	6	K135	
					262	K133	5	K133	
					13	K131	4	K131	
					19	K129	3	K129	
					2	K127	2	K127	
					1	K101	1	K101	

CONTINUED FROM SHT 20

CONTINUED ON SHT 22

	-	EA506	EA522	EA514	EA513	CABLE NUMBER
	-	-	-	-	19	CABLE SIZE
	-	-	-	-	8	NUMBER OF SPARES
	BUS WIRING TO SCHEME TERMINALS	11 kV BREAKER MECH BOX RT TERMINALS	OLTC PANEL 66/11 kV TRFR 1 OLTC RACK	NECRT	TRANSFORMER MIB	DESTINATION

DC SUPPLIES, HV CIRCUIT-BREAKER & ISOLATORS

TOP OF TERMINAL STRIP

								X4		
					X2.20	X1.27		N147EA	39	M102	HV CB SPRING REWIND
					X2.19	X1.26		N101EA	38	M101	
		X1.4						M102A	37	K359	HV CBNH
		X1.3						M101A	36	K355	
X1.28								K359A	35	K349	
X1.22								K355A	34	K301	
X1.48•									33	K335	
X1.47•									32	K333	
									31	K331	HV CB STATUS
									30	K329	
X1.32									29	K301	
X1.40									28	K327	
X1.39•				X1.32				K155EA	27	K301	HV ISOL STATUS
						X1.23		K327	26	K325	
						X1.22		K301	25	K301	
						X1.49		K325	24	K102	
						X1.48		K301	23	K101	HV CB AUX DC SUPPLY
									22	K384	
X1.16									21	K381	HV CB CLOSE CCT
X1.15									20	K305	
X1.12								K384A	19	K302	
X1.11								K381A	18	K303	HV CB TRIP CCTs
X1.63								K305A	17	K105	
X1.8	X8.20							K302A	16	K102	
X1.7	X8.19		(X1.31)					(K151EA) K303A	15	K103	
X1.61								K105A	14	K400	
X1.6								K102A	13	K399	
X1.5								K103A	12	K302	DC SUPPLY MONITORING
									11	K301	
									10	K302	
									9	K301	
									8	M2	
									7	M1	
	X8.9							J2EA	6	J4	DC SUPPLIES
	X8.8							J1EA	5	J3	
									4	J2	
							X8.6	J2EA	3	J1	
							X8.5	J1EA	2		
									1		

CONTINUED FROM SHT 20

CONTINUED ON SHT 22

EB528	-	EB527	EB508	EA522	EA505	EA515	CABLE NUMBER
19	-	4	-	-	12	4	CABLE SIZE
2	-	0	-	-	3	0	NUMBER OF SPARES
HV CIRCUIT-BREAKER MECH BOX	BUS WIRING TO SCHEME TERMINALS	HV CIRCUIT-BREAKER MECH BOX	11 kV BUS PROTECTION PANEL	OLTC PANEL 66/11 kV TRFR 1 OLTC RACK	66 kV LINE ISOLATOR	AC/DC PANEL	DESTINATION

NOTE: • INDICATES TERMINAL NUMBER TO BE DETERMINED ON SITE.

NOTES:

1. (2) INDICATES TWO LEADS IN PARALLEL.
2. SPARE CABLE LEADS TO BE LEFT LONG ENOUGH TO REACH THE FURTHEST TERMINAL.
3. LEAD NUMBERS SHOWN THUS
   P7 [ ] INDICATES NO CHANGE IN LEAD NUMBER.
   P7 [ ] P7A INDICATES CHANGE IN LEAD NUMBER.
4. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.
5. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK FALLS/REMAINS CLOSED WHEN THE SECURING SCREW IS LOOSENED.

UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10.RS
ENTRELEC D6/8-ST1-RS SLIDING LINK TEST TERMINAL

SHEET 25	RED670 REFERENCE DIAGRAM		
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM		
SHEET 23	HV CT JB CABLING DIAGRAM		
SHEET 22	PANEL CABLING DIAGRAM		
SHEET 21	PANEL CABLING DIAGRAM		
SHEET 20	PANEL CABLING DIAGRAM		
SHEET 19	REFERENCE DIAGRAM		
SHEET 18	SUPERVISORY/COMMS KEY DIAG		
SHEET 17	SPR REW DC,AC KEY DIAGRAM		
SHEET 16	BACK-UP DC KEY DIAGRAM		
SHEET 15	BACK-UP DC KEY DIAGRAM		
SHEET 14	BACK-UP DC KEY DIAGRAM		
SHEET 13	MAIN DC KEY DIAGRAM		
SHEET 12	MAIN DC KEY DIAGRAM		
SHEET 11	VT SUPPLY KEY DIAGRAM		
SHEET 10	AC KEY DIAGRAM		
SHEET 9	AC KEY DIAGRAM		
SHEET 8	AC KEY DIAGRAM		
SHEET 7	RELAY LOGIC DIAGRAM		
SHEET 6	RELAY LOGIC DIAGRAM		
SHEET 5	RELAY LOGIC DIAGRAM		
SHEET 4	RELAY LOGIC DIAGRAM		
SHEET 3	SCHEME LOGIC DIAGRAM		
SHEET 2	FRONT PANEL LABELS		
SHEET 1	PANEL EQUIPMENT LAYOUT		
SHEET 0	COVER SHEET		
REFERENCE DRAWINGS:			

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
2	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

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Eskom

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG
		/ /		DRAWN BY	DRAWN BY
		/ /		K. STEYNBERG	S.J. van ZYL
				PROJECT CHECKED	DESIGN CHECKED
				B. HOMANN	P.A. GERBER
				PROJECT APPROVED	DESIGN APPROVED
				C. PYM	S.J. van ZYL
			SCALE	DATE 25/06/21	DATE 11/06/10
				DATE 25/06/21	DATE 11/06/10
				DATE 25/06/21	DATE 17/09/09

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1

PANEL CABLING DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	21	2

LEVELS 1 3 8 10 11 17 22 24 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 21 OF 26 REVISION 1

MV CIRCUIT-BREAKER & ISOLATORS, CUST MTR, BUS ZONE.

TOP OF TERMINAL STRIP

						X5		
						42	SPARE	
		X1.44			X2.11 K7EA	41	K107	
		X2.50			P117EA	40	P117	MV BUS ZONE / BREAKER FAIL
		X2.49			P107EA	39	P107	
		X1.24/X1.30			K113EA	38	K113	
		X1.23/X1.29			K101EA	37	K101	
						36	P17	
						35	P7	HV BUS ZONE / BREAKER FAIL
						34	K111	
X8.15					K101	33	K101	
						32		
						31		
						30		
						29		
				X2.4	M102B	28	M102	MV CB SPRING REWIND
				X2.3	M101B	27	M101	
			X2.28		K359A	26	K359	MV CBNH
						25	K355	
			X2.48		K353	24	K353	
			X2.47		K301	23	K301	
X8.22					K315	22	K315	MV ARC SENSOR
X8.21					K301	21	K301	
			X3.15		K347	20	K347	MV CB STATUS
			X3.14		K345	19	K345	
						18	K301	
			X2.32		K343	17	K343	
			X2.42		K341	16	K341	
X8.17					K301	15	K301	
			X3.10		K339	14	K339	MV ISOL/PLANT STATUS
			X3.9		K301	13	K301	
X8.24					K337	12	K337	
X8.23					K301	11	K301	
				X2.16	K102	10	K102	MV CB AUX DC SUPPLY
				X2.15	K101	9	K101	
				X2.12	K384A	8	K384	MV CB CLOSE CCT
		X1.43			K383EA	7	K383	
				X2.63	K309A	6	K309	MV CB TRIP CCTs
				X2.8	K302A	5	K302	
X8.18				X2.7	K307A	4	K307	
				X2.61	K109A	3	K109	
				X2.6	K102A	2	K102	
X8.16				X2.5	K107A	1	K107	

CONTINUED FROM SHT 21

CONTINUED FROM SHT 20

-		EA508		EA506	EA507	CABLE NUMBER
-		-		-	12	CABLE SIZE
-		-		-	0	NUMBER OF SPARES
BUS WIRING TO SCHEME TERMINALS		11 kV BUS PROTECTION PANEL		11 kV BREAKER MECH BOX RT TERMINALS	11 kV BREAKER MECH BOX RT TERMINALS	DESTINATION

SCADA ALARM & COMMS

TOP OF TERMINAL STRIP

						X7		
						20	SPARE	
						19		RED670 RS-485 SEE SHEET 18
						18		
					4b	17		
					4a	16		
						15	Black	IRIG-B TIME SYNCH INPUT
						14	Red	
						13	GND	RS-485 REMOTE ACCESS
						12	Purple	
						11	Brown	
						10	White	
						9	Black	
			•X7.5			8	GND	RS-485/DNP3 SCADA COMMS
			•X7.4			7	Purple	
			•X7.3			6	Brown	
				•X7.8		5	GND	
				•X7.7		4	White	
				•X7.6		3	Black	
					1b	2	X103	PNH SCADA ALARM
					1a	1	X101	

		EA523			CABLE NUMBER
		10Pr	LOOP	LOOP	CABLE SIZE
		6Pr	-	-	NUMBER OF SPARES
		IDF	RELAY PANEL • (RIGHT)	RELAY PANEL • (LEFT)	DESTINATION

AC SUPPLIES

TOP OF TERMINAL STRIP

						X6		
						10	H73	MIB HEATER
						9	H13	
		X2.2			H73B	8	H73	MV CB HEATER
		X2.1			H13B	7	H13	
						6	H73	HV CB HEATER
						5	H13	
						4	H72	AC SUPPLIES
						3	H12	
X8.7				X4.N	H71EA	2	H71	
X8.6				X4.9	H11EA	1	H11	

CONTINUED FROM SHT 21

-		EA526		EA515	CABLE NUMBER
-		4		-	CABLE SIZE
-		0		-	NUMBER OF SPARES
BUS WIRING TO SCHEME TERMINALS		11 kV BREAKER MECH BOX RT TERMINALS		AC/DC PANEL	DESTINATION

NOTE: • INDICATES TERMINAL NUMBER TO BE DETERMINED ON SITE.

TERMINAL STRIP TO BE MODIFIED BY ESKOM.

TOP OF TERMINAL STRIP

						X8		
						34		
						33		
						32		
						31		
						30		
						29		
						28		
						27		
						26		
						25		
						24		
						23		
						22		
						21		
						20		
						19		
						18		
						17		
						16		
						15		
						14		
						13		
						12		
						11		
						10		
						9		
						8		
						7		
						6		
						5		
						4		
						3		
				X2.20	K102AA	2		
				X2.19	K107AA	1		

				EA505	CABLE NUMBER
				4	CABLE SIZE
				0	NUMBER OF SPARES
			66kV FEEDER 1		DESTINATION

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP.KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
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SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

NOTES:

1. (2) INDICATES TWO LEADS IN PARALLEL.
2. SPARE CABLE LEADS TO BE LEFT LONG ENOUGH TO REACH THE FURTHEST TERMINAL.
3. LEAD NUMBERS SHOWN THUS
   P7 [ ] INDICATES NO CHANGE IN LEAD NUMBER.
   P7 [ ] P7A INDICATES CHANGE IN LEAD NUMBER.
4. SEE CABLE BLOCK DIAGRAM FOR PREFIXING.
5. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK FALLS/REMAINS CLOSED WHEN THE SECURING SCREW IS LOOSENED. TERMINAL DISCONNECTORS ARE TO PIVOT FROM THE BOTTOM SIDE OF THE TERMINAL RAIL.

UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10.RS
⊂⊃ ENTRELEC D6/8-STI-RS SLIDING LINK TEST TERMINAL
⊗ ENTRELEC M4/6.SNTS SPRING LOADED TERMINAL WITH DISCONNECTOR

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
2	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

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FAX: +27 (0)21 950 7502
REG. No. 1966/006628/07

Eskom

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG
		/ /		DATE 25/06/21	DATE 17/09/09
		/ /		SCALE	

PROJECT APPROVED	DESIGN APPROVED
C.PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
PANEL CABLING DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	22	2

LEVELS 1 3 8 10 11 17 24 26 27 30

PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 22 OF 26 REVISION 1

TOP OF TERMINAL STRIP

				X1	
	6S5		D171	36	36
	6S1		D151	35	35
		5S5	D71	34	34
		5S1	D51	33	33
		4S3	C71	32	32
		4S2	C31	31	31
	3S4		B71	30	30
	3S1		B51	29	29
	2S4		B171	28	28
	2S1		B151	27	27
		1S1	A71	26	26
		1S2	A31	25	25
		6S5	D171	24	24
		6S1	D131	23	23
	5S5		D71	22	22
	5S1		D31	21	21
	4S3		C71	20	20
	4S2		C51	19	19
		3S4	B71	18	18
		3S1	B31	17	17
		2S4	B171	16	16
		2S1	B131	15	15
	1S1		A71	14	14
	1S2		A51	13	13
6S5			D171	12	12
6S1			D111	11	11
5S5			D71	10	10
5S1			D11	9	9
4S3			C71	8	8
4S2			C11	7	7
3S4			B71	6	6
3S1			B11	5	5
2S4			B171	4	4
2S1			B111	3	3
1S1			A71	2	2
1S2			A11	1	1

X2				
12	72 R			CORE 6
24	71 W			
36	70 B			
35	69 B			
23	68 W			
11	67 R			
10	66 R			CORE 5
22	65 W			
34	64 B			
33	63 B			
21	62 W			
9	61 R			
8	60 R			CORE 4
20	59 W			
32	58 B	C71	X8.4	
31	57 B	C31	X8.2	
19	56 W	C51	X8.3	
7	55 R	C11	X8.1	
6	54 R			CORE 3
18	53 W			
30	52 B			
29	51 B			
17	50 W			
5	49 R			
4	48 R			CORE 2
16	47 W			
28	46 B			
27	45 B			
15	44 W			
3	43 R			
2	42 R			CORE 1
14	41 W			
26	40 B	A71	X1.4	
25	39 B	A31	X1.2	
13	38 W	A51	X1.3	
1	37 R	A11	X1.1	

EB501	EB502	EB503	CABLE NUMBER
12	12	12	CABLE SIZE
0	0	0	NUMBER OF SPARES
R1 CT	B1 CT	W1 CT	DESTINATION

CABLE NUMBER	EA504
CABLE SIZE	12
NUMBER OF SPARES	4
DESTINATION	RELAY PANEL

NOTE : ALL SPARE CABLE CORES TO BE EARTHED ON ONE END ONLY.

NOTE: USE JUNCTION BOX
VRW 6 CORE CT INSERT
DRG D-DT-5404

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

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REG. No. 1966/006628/07

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1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
0	FIRST ISSUE. SUBSTATION REFURBISHED.				/ /	3487A

Eskom

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD	SCALE
1	SvZ	15/11/2010	CHANGES AS PER SHEET 0 - COVER SHEET.	SvZ	PAG	DATE 25/06/21 DATE 17/09/09

PROJECT APPROVED	DESIGN APPROVED
C. PYM	S.J. van ZYL
DATE 25/06/21	DATE 11/06/10
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	P.A. GERBER
DATE 25/06/21	DATE 11/06/10
DRAWN BY	DRAWN BY
K. STEYNBERG	S.J. van ZYL

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
HV CT JB CABLING DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	23	2

LEVELS 1 3 8 10 11 17 22 24 26 27 30 PANEL TYPE DESIGNATION 4TM7100MOD.FZD SIZE GROOTTE A1L

MASTER TRACING FILED UNDER D-DT-15202 SHEET 23 OF 26 REVISION 1

RED 670
PROTECTION NOT
HEALTHY INDICATION

F9.1
MCB (AC)
H12 — 2/1 — 5A — 1/2 — H11 — RP X8.6 — H11EA — RP X6.1 — 230 V AC SUPPLY LOOPED FROM SHT 17
N — RP X6.2 — H71EA — RP X8.7 — H71 — F9.1 MCB (AC) 3/4 — 5A — 4/3 — H72

IRF-X
H12 — 4 — 1 — H14 — H14 — PNH-I — AMBER — H72

RED 670
POWER SUPPLY

F9.1
MCB(M)
K101 — 4 — 2A — 3 — J1 — RP X8.8 — J1EA — RP X4.5 — 110 V DC SUPPLY LOOPED FROM SHT 17
RP J2EA X4.6 — RP X8.9 — J2 — F9.1 MCB(M) 1 — 2A — 2 — K102

F9.6 RED670
K101 — X11 4 — PSU — X11 5 — K102

1S20
POWER SUPPLY

F9.7 1S20
K101 — 12 — PSU — 11 — K102

T2.1 IRF-X
K101 — 2 — 10 — K102

TTPB
K101 — 13 — 14 — K123

X81 — 15 — TRIP TEST P8/BI.08 — 16 — X81 — K102

K123 — RP X8.11 — K102

RP X8.10

SUPERVISORY STATUS 48 V DC (DNP3 OPTIONAL & HMI DISPLAY)

NOTE:
1. FOR 220 V DC SUPPLY, RESISTOR = 64kΩ

LINE ISOLATOR
OPEN

LINE ISOLATOR
CLOSED

X101 — RP X8.12 — X101 — IS X1.50 — 'N' — IS X1.51 — X103A — RP X8.13 — NOTE 1 R 32kΩ — X103 — F9.6 RED670 X71 1 — LINE IS OPEN P7/BI.01 — X71 2 — X102

'M' — X1.24 — X1.25 — X105A — RP X8.14 — R 32kΩ — X105 — X71 3 — LINE IS CLOSED P7/BI.02 — X71 4 — X102

SUPERVISORY
RED670 PNH

IDF — 2a — RP X8.29 — X107 — IRF-X 5 — PNH — 6 — X109 — RP X8.30 — 2b — IDF — RED670 PNH

SUPERVISORY
ARC FAULT TRIP

IDF — 3a — RP X8.31 — X111 — 1S20 1 — R2 SUP ARC TRIP — 2 — X113 — RP X8.32 — 3b — IDF — ARC TRIP

FIBRE INTERNAL COMMUNICATION/TELEPROTECTION
AND/ OR DIFFERENTIAL (OPTIONAL)

NOTE 1

F9.6 RED670
X312 LDCM1 P31:2
CONNECT TO PATCH PANEL — FIBRE RX — A — FIBRE TX — B — FIBRE MAIN

RED670
X* LDCM* P*
CONNECT TO PATCH PANEL — FIBRE RX — A — FIBRE TX — B — FIBRE MAIN

1. SET GATE 1 IN SETTINGS TO 'ON' TO ENABLE INTERNAL COMMUNICATION/ TELEPROTECTION FAIL LOGIC ('ON' IS THE DEFAULT). SET GATE 1 TO 'OFF' IF THE EXTERNAL CARRIER GUARD IS USED OR IF THE INT. COMM/TELEPROTECTION CARD IS NOT USED.

2. DISCONNECT RED670 BY REMOVING JUMPERS BETWEEN TERMINALS X4.16 AND X8.19; AND X4.17 AND X8.20. CONNECT AS INDICATED ON SHEET 14.

3. INPUT WIRED BETWEEN POS. AND NEG. OF TWO SEPARATED SUPPLIES. REMOVE JUMPER BETWEEN X81.6 AND X81.16 AND CONNECT X81.16 TO K102 NEG. SUPPLY.

SEE ABOVE (A) (B)
F9.6 RED670
X131 3 — X131 4
TNS-N
X81 13 — TNS NORMAL P8/BI.07 — X81 14

DIRECT INTERTRIP
SEND TO REMOTE END
(BLOCKED VIA BFIS OR TPIS SET OFF)

F9.6 RED670

RP X5.33 — K101 — RP X8.15 — K103 — X61 8 — P6/BO.05 — X61 7 — K105 — RP X8.16 — K107A — RP X5.1 — CONTINUED ON SHT 12
RED Ø DIFF TRIP

P6/BO.06 — 9
11 — P6/BO.07 — 10 — WHITE Ø DIFF TRIP
P6/BO.08 — 12
14 — P6/BO.09 — 13 — BLUE Ø DIFF TRIP
P6/BO.10 — 15

RP X5.15 — K301 — RP X8.17 — K107 — X51 11 — P5/BO.08 — X51 12 — K109 — RP X8.18 — K303A — RP X4.16 — CONTINUED ON SHT 14
BACK UP DIFF TRIP

K151EA — BP X1.31 — CONTINUED ON SHT 14 NOTE 2

RP X4.16 — K303A — RP X8.19 — K111 — X81 5 — EXT-DTTS P8/BI.03 — X81 6 — K113 — RP X8.20 — K302A — RP X4.17

K123 — X81 15 — TRIP TEST P8/BI.08 — X81 16 — NOTE 3

RP X3.20 — K301 — RP X8.27 — K125 — X42 15 — DIFFT-X P4/BO-11 — X42 16 — K127 — RP X8.28 — K369 — RP X3.21 — CONTINUED ON SHT 16

ARC FAULT TRIP

1S20
RP X5.21 — K301 — RP X8.21 — K115 — 3 — R1 ARC TRIP — 4 — K117 — RP X8.22 — K315 — RP X5.22 — CONTINUED ON SHT 15

ARC PROTECTION/
SENSOR FAIL

RP X5.11 — K301 — RP X8.23 — K119 — 5 — IRF — 6 — K121 — RP X8.24 — K337 — RP X5.12 — CONTINUED ON SHT 15

FROM CT/CABLE CHAMBER
ARC SENSOR

ARC FAULT PROTECTION 1S20
RT X3.21 — CTS — RP X8.25 — CTS — 10 — ARC 1 — 9 — CTS — RP X8.26 — CTS — RT X3.22
ARC 2 — 8

NOTE: THIS CAN BE USED UP TO DISTANCES OF 50 METERS WITH STP CABLING

SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 22	PANEL CABLING DIAGRAM
SHEET 21	PANEL CABLING DIAGRAM
SHEET 20	PANEL CABLING DIAGRAM
SHEET 19	REFERENCE DIAGRAM
SHEET 18	SUPERVISORY/COMMS KEY DIAG
SHEET 17	SPR REW DC, AC KEY DIAGRAM
SHEET 16	BACK-UP DC KEY DIAGRAM
SHEET 15	BACK-UP DC KEY DIAGRAM
SHEET 14	BACK-UP DC KEY DIAGRAM
SHEET 13	MAIN DC KEY DIAGRAM
SHEET 12	MAIN DC KEY DIAGRAM
SHEET 11	VT SUPPLY KEY DIAGRAM
SHEET 10	AC KEY DIAGRAM
SHEET 9	AC KEY DIAGRAM
SHEET 8	AC KEY DIAGRAM
SHEET 7	RELAY LOGIC DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM
SHEET 2	FRONT PANEL LABELS
SHEET 1	PANEL EQUIPMENT LAYOUT
SHEET 0	COVER SHEET
	REFERENCE DRAWINGS:

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
3	66kV VT ADDED.	KS	BH	C.PYM	25/06/2021	
2	66kV CIRCUIT BREAKER ADDED	JF	BBH	LMB	21/01/2019	
1	AS BUILT SITE MODIFICATIONS IMPLEMENTED.	AVS	KRR	C.KING	18/02/2015	3487A
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REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
		/ /			
		/ /			

PROJECT APPROVED	DESIGN APPROVED
C. PYM	
DATE 25/06/21	DATE
PROJECT CHECKED	DESIGN CHECKED
B. HOMANN	
DATE 25/06/21	DATE
DRAWN BY	DRAWN BY
K. STEYNBERG	
DATE 25/06/21	DATE
SCALE	

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
RED670 AC, DC & SUPERVISORY KEY DIAGRAM

D-WC-7104	SET NUMBER	SHEET NUMBER	REVISION
	81	24	3

LEVELS 10 — PANEL TYPE DESIGNATION 4TM7100MOD.FZD — SIZE GROOTTE A1L

X11 P1

POWER SUPPLY — PSU — X11 4 / 5 — SHT 24

READY — P1/IRF — 2 / 1 — NOT USED

FAIL — 2 / 3 — SHT 24

X401 P40 — RED670

RED PHASE CURRENT — A101 R — X401 1 / 2 — SHT 24

WHITE PHASE CURRENT — A102 W — 3 / 4 — SHT 24

BLUE PHASE CURRENT — A103 B — 5 / 6 — SHT 24

NEUTRAL CURRENT — A104 N — 8 / 7 — SHT 24

MUTUAL IMP COMPENSATION — A106 N — X401 12 / 11

SYNCH CHECK VOLTAGE (VT) — A110 — 19 / 20

DIR E/F FUNCTION — A111 — 21 / 22

RED PHASE VOLTAGE — A107 R — 13 / 14

WHITE PHASE VOLTAGE — A108 W — 15 / 16

BLUE PHASE VOLTAGE — A109 B — 17 / 18

NOT IN USE

X71 P7 (48V DC) — RED670

LINE ISOLATOR OPEN — LINE1-OPEN — X71 1 / 2 — IO1/BI-01 — SHT 24

LINE ISOLATOR CLOSED — LINE1-CLOSED — 3 / 4 — IO1/BI-02 — SHT 24

BB1I-OPEN — 5 / 6 — IO1/BI-03

BB1I-CLOSED — 7 / 8 — IO1/BI-04

BB2I-OPEN — 9 / 10 — IO1/BI-05

BB2I-CLOSED — 11 / 12 — IO1/BI-06

CB-OPEN — 13 / 14 — IO1/BI-07

CB-CLOSE — 15 / 16 — IO1/BI-08

X61 P6 — RED670

BKRF1 — X61 2 / 1 — P6/BO-01

BKRF2 — 3 — P6/BO-02

TX REMOTE 3P ARC SELECT — 5 / 4 — P6/BO-03

SPARE — 6 — P6/BO-04

RED PHASE TRIP — 8 / 7 — P6/BO-05 — SHT 24

RED PHASE TRIP — P6/BO-06 — SHT 24

WHITE PHASE TRIP — 11 / 10 — P6/BO-07 — SHT 24

WHITE PHASE TRIP — P6/BO-08 — SHT 24

MAIN BLUE PHASE TRIP — 14 / 13 — P6/BO-09 — SHT 24

BLUE PHASE TRIP — P6/BO-10 — SHT 24

17 / 16 — P6/BO-11

P6/BO-12

X51 BACK-UP DIFF TRIP — RED670 — X51 11 / 12 — P5/BO-08 — SHT 24

X61 P6

CRG — 5 / 4 — P6/BO-15

P6/BO-16

RX-TEST — 8 / 7 — P6/BO-17

TX-TEST — 9 — P6/BO-18

CRG — 11 / 10 — P6/BO-19

P6/BO-20

TX — 14 / 13 — P6/BO-21

DTTS — P6/BO-22

DEF_TX — 17 / 16 — P6/BO-23

P6/BO-24

F9.1 — PNH

AMBER — X1 / X2 — SHT 24

F9.2 — TTPB

13 / 14 — SHT 24

F9.3 — DC1 MCB (BU) 5A

2 / 1 — SHT 24

4 / 3 — SHT 24

F9.4 — MCB (AC) 2A

1/2 / 2/1 — SHT 24

3/4 / 4/3 — SHT 24

F9.5 — CTTB(HV) - 2

8 7 / 6 5 / 4 3 / 2 1 — SHT 8

F9.7 — IS20

ARC FAULT TRIP — R2 — 1 / 2 — ARC TRIP — SHT 24

ARC FAULT TRIP — R1 — 3 / 4 — SHT 24

ARC SENSOR FAIL — IRF — 5 / 6 — SHT 24

POWER SUPPLY — - / + — 12 / 11 — SHT 24

ARC 1 — 10 / 9 — SHT 24

ARC 2 — 8

T2.1 — IRF-X

2 / 10 — SHT 24

3 / 4 / 1 — SHT 24

7 / 5 / 6 — SHT 24

9 / 8 / 11 — SPARE

X41 P4 NOT IN USE — RED670

CB-CLS — X41 1 / 2 — P4/BI.01

CB-OPN — 3 / 4 — P4/BI.02

5 / 6 — P4/BI.03

7 / 8 — P4/BI.04

SG2 — 9 / 10 — P4/BI.05

SG3 — 11 / 12 — P4/BI.06

13 / 14 — P4/BI.07

PNH1 — 15 / 16 — P4/BI.08

X42 P4 — RED670

P4/BO-1 — 1 / 2

P4/BO-2 — 3

P4/BO-3 — 4

P4/BO-4 — 5

P4/BO-5 — 6

P4/BO-6 — 7 / 9 / 8

P4/BO-7 — 10 / 11

P4/BO-8 — 12

P4/BO-9 — 13

P4/BO-10 — 14

DIFFERENTIAL TRIP — DIFFT_X — 15 / 16 — P4/BO-11

IMPT_X — 17 / 18 — P4/BO-12

X31 P3 NOT IN USE — RED670

EXT BZ TRIP — X31 1 / 2 — P3/BI.01

BFIS-ON — 3 / 4 — P3/BI.02

TNS-M — 5 / 6 — P3/BI.03

CBCS-T — 7 / 8 — P3/BI.04

CROSSTRIP — 9 / 10 — P3/BI.05

EXT-T-ARC — 11 / 12 — P3/BI.06

EXT-T-NARC — 13 / 14 — P3/BI.07

CUSTB — 15 / 16 — P3/BI.08

X32 P3 NOT IN USE — RED670

FDR BP-ON — X32 1 / 2 — P8/BI.09

FDR BP-OFF — 3 / 4 — P8/BI.10

CBNH-H — 5 / 6 — P8/BI.11

IEC SWITCH FAIL — 7 / 8 — P8/BI.12

MEAS.T FAIL — 9 / 10 — P8/BI.13

EXTERNAL CLOSE — 11 / 12 — P8/BI.14

SPARE — 13 / 14 — P8/BI.15

LED CHECK — 15 / 16 — P8/BI.16

X81 P8 — RED670

BB VT MCB-T — X81 1 / 2 — P8/BI.01

LINE VT MCB-T — 3 / 4 — P8/BI.02

EXTERNAL DIRECT INTERTRIP SEND — EXT-DTTS — 5 / 6 — P8/BI.03 — SHT 24

3PT/BFI/ARC — 7 / 8 — P8/BI.04

3PT/BFI/NARC — 9 / 10 — P8/BI.05

PNH2 — 11 / 12 — P8/BI.06

TNS NORMAL — TNS-N — 13 / 14 — P8/BI.07 — SHT 24

TRIP TEST — TRIP TEST — 15 / 16 — P8/BI.08 — SHT 24

X72 P7 (48V DC) NOT IN USE — RED670

ARC-OFF — 1 / 2 — P7/BI-09

3P ARC-ON — 3 / 4 — P7/BI-10

1+3P ARC ON — 5 / 6 — P7/BI-11

RX REMOTE 3P ARC SELECT — 7 / 8 — P7/BI-12

RX — 9 / 10 — P7/BI-13

DTTR — 11 / 12 — P7/BI-14

CGS — 13 / 14 — P7/BI-15

DEF_RX — 15 / 16 — P7/BI-16

X82 P8 NOT IN USE — RED670

CBNH-BCF — X82 1 / 2 — P8/BI.09

CBNH-SF6 — 3 / 4 — P8/BI.10

TCS-FAIL — 5 / 6 — P8/BI.11

1+3 POLE ARC — 7 / 8 — P8/BI.12

3 POLE ARC — 9 / 10 — P8/BI.13

ARC OFF — 11 / 12 — P8/BI.14

SUP ENABLE — 13 / 14 — P8/BI.15

TELE-DISABLED — 15 / 16 — P8/BI.16

SHEET 8	AC KEY DIAGRAM	SHEET 17	SPR REW DC, AC KEY DIAGRAM		
SHEET 7	RELAY LOGIC DIAGRAM	SHEET 16	BACK-UP DC KEY DIAGRAM	SHEET 25	RED670 REFERENCE DIAGRAM
SHEET 6	RELAY LOGIC DIAGRAM	SHEET 15	BACK-UP DC KEY DIAGRAM	SHEET 24	RED670 AC/DC & SUP. KEY DIAGRAM
SHEET 5	RELAY LOGIC DIAGRAM	SHEET 14	BACK-UP DC KEY DIAGRAM	SHEET 23	HV CT JB CABLING DIAGRAM
SHEET 4	RELAY LOGIC DIAGRAM	SHEET 13	MAIN DC KEY DIAGRAM	SHEET 22	PANEL CABLING DIAGRAM
SHEET 3	SCHEME LOGIC DIAGRAM	SHEET 12	MAIN DC KEY DIAGRAM	SHEET 21	PANEL CABLING DIAGRAM
SHEET 2	FRONT PANEL LABELS	SHEET 11	VT SUPPLY KEY DIAGRAM	SHEET 20	PANEL CABLING DIAGRAM
SHEET 1	PANEL EQUIPMENT LAYOUT	SHEET 10	AC KEY DIAGRAM	SHEET 19	REFERENCE DIAGRAM
SHEET 0	COVER SHEET	SHEET 9	AC KEY DIAGRAM	SHEET 18	SUPERVISORY/COMMS KEY DIAG

REFERENCE DRAWINGS:

REV	AUTH	DATE	REVISION TO MASTER	BY	CHKD
		/ /			
		/ /			
		/ /			

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NUMBER
2	DRAWING CANCELLED.	KS	BH	C.PYM	25/06/2021	
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0	FIRST ISSUE. PROTECTION SCHEME UPGRADED.				/ /	3487A

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REG. No. 1966/006628/07

Eskom

PROJECT APPROVED: C.PYM — DESIGN APPROVED — DATE 25/06/21

PROJECT CHECKED: B.HOMANN — DESIGN CHECKED — DATE 25/06/21

DRAWN BY: K.STEYNBERG — DRAWN BY — DATE 25/06/21

SCALE

ISCOR SUBSTATION
66/11 kV TRANSFORMER 1
RED 670 REFERENCE DIAGRAM

SET NUMBER	SHEET NUMBER	REVISION
D-WC-7104	81	25	2

LEVELS 10

PANEL TYPE DESIGNATION 4TM7100MOD.FZD

SIZE GROOTTE A1L