ESKOM

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr 5th HARMONIC FILTER BANK

SCHEMATIC DRAWINGS

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

COVER PAGE

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

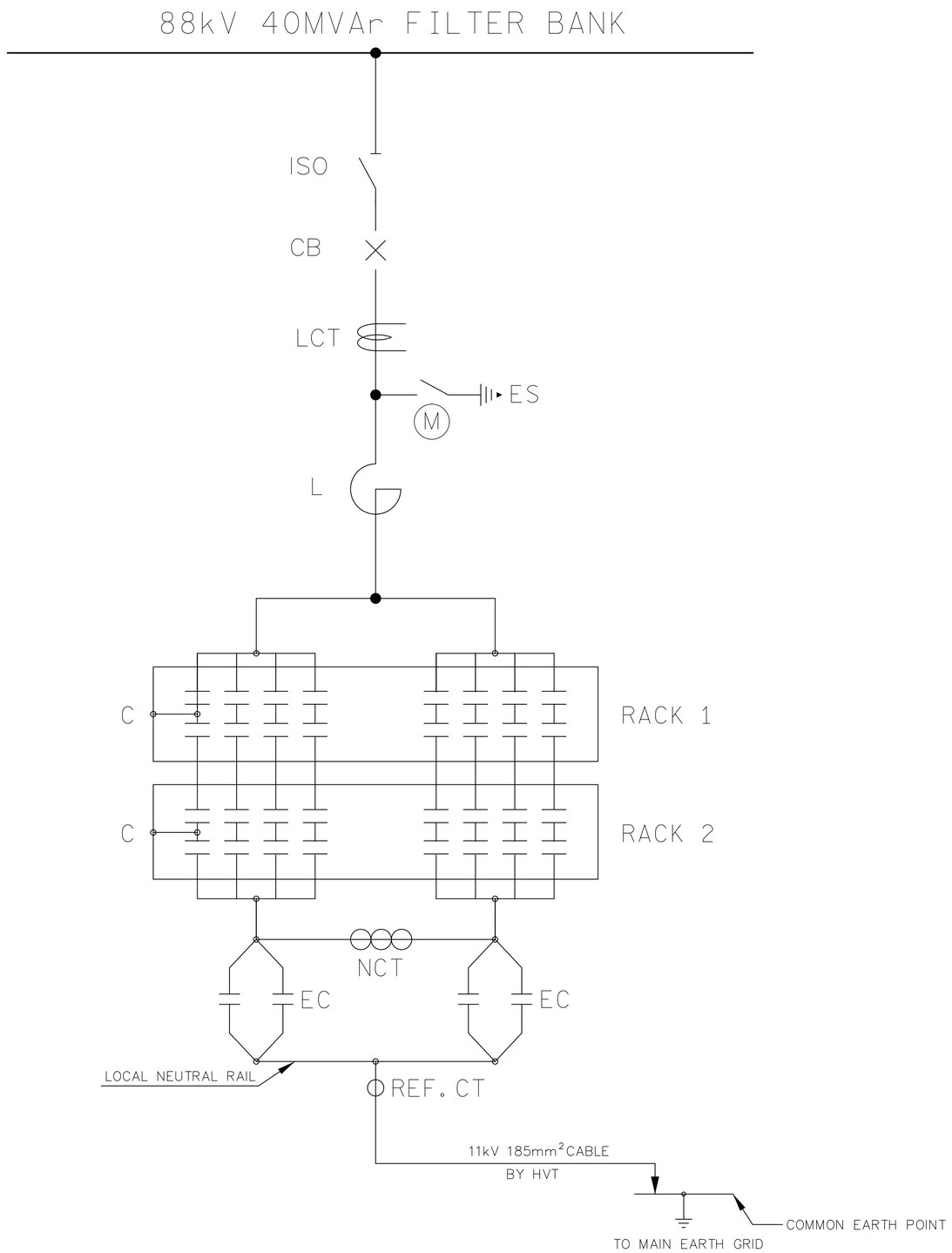
2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	1	2

LEVELS 1 10

SIZE GROOTTE A1L

88kV 40MVAr FILTER BANK 1	
ISO (ISOLATOR)	
Manufacturer	ACTOM
Type	DSB-120/2500
Rating	132kV 2500A 40kA/3sec
Insulation	550 kV Bil
CB (Circuit Breaker)	
Manufacturer	ABB
Type	LTB 170 D1/B-SF6
Rating	170kV 50Hz 40kA
Insulation	31mm/kV
LCT (LINE Current Transformer)	
Manufacturer	ACTOM
Type	OIL FILLED POST TYPE
Core 1+4	400-600-1600-2400/1A CL-PX
Core 2+3	1000-1200-1600/1A CL-PX
Core 5+6	400-1600-2400/1A 10VA CL-0.2
Rating	145kV 2500A
ES (Free Standing Earth Switch)	
Manufacturer	ACTOM
Type	AEB 120 MOTORISED
Rating	40 KA/3sec
Insulation	550 kV BIL
L (Reactor)	
Manufacturer	TRENCH
Type	AIR CORE
Inductance	27.9 mH
Irss	300 A
C (Capacitor)	
Manufacturer	COOPER
External Configuration	s= 4 p= 4 + 4
Total capacitors/Bank	96
Fusing	FUSELESS
Unit Capacitance	7.87 uF
Rated Unit Output	610 kVAr
Rated Unit Voltage	15703 V
Discharge Time	50 V / 5 min
EC (Earthing Capacitor)	
Manufacturer	COOPER
Configuration	s= 1 p= 2 +2
Total capacitors per Bank	4
Unit Capacitance (µF)	781
Unit kVAr	167
Unit Voltage	825 V
NCT (Neutral Current Transformer)	
Manufacturer	SADTEM OCF36-4
Core 1	10/1 A, 10VA , 10P/10
Core 2	10/1 A, 10VA , 10P/10
Core 3	20/1 A, 10VA , 10P/10
Insulation	150kV
REF. CT (Restricted Earth Fault)	
Manufacturer	ITT/CURRENT ELECTRIC
Type	RING TYPE, STAINLESS STEEL
Core specification	400/1 A, PX, 400V, 250mA, 1.6 ohm



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
SINGLE LINE DIAGRAM

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

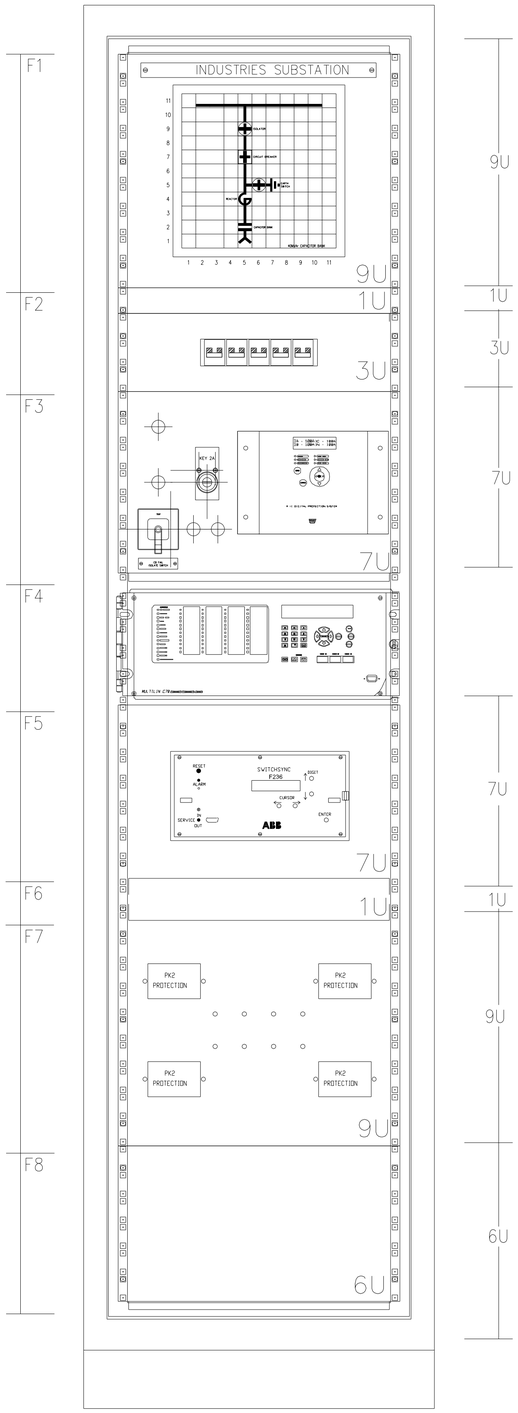
2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	2	2

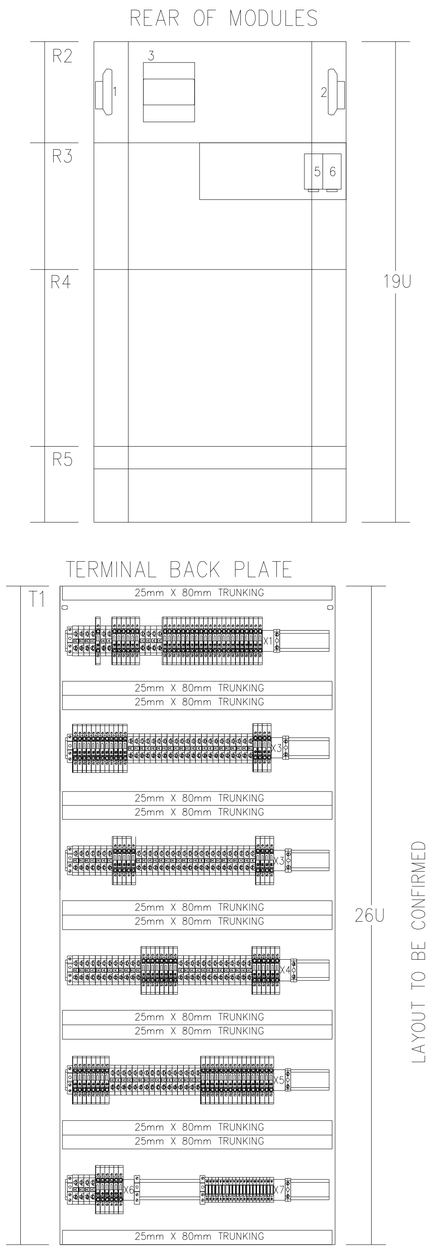
SIZE GROOTTE A1L

LEVELS 1 10

LOCATION		DESIGNATION	DESCRIPTION	TYPE	MANUFACTURER
FRONT VIEW					
F1			BLANKING PLATE		
F2	1	DCI MCB (M)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (MAIN CCT)(16A)	EP102UC(C16)	GE
	2	DCI MCB (BU)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (BACK-UP CCT)(16A)	EP102UC(C16)	GE
	3	DCI MCB (SR)	DC ISOLATE MINIATURE CIRCUIT-BREAKER (SPRING REWIND 20A)	EP102UC(C20)	GE
	4	MCB (AC)	AC ISOLATE MINIATURE CIRCUIT-BREAKER (10A	G62(C10) & CA H	GE
	5	MCB (VT)	HV VOLTAGE TRANSFORMER MINIATURE CIRCUIT-BREAKER (2A)	G63(C02) & CA H	GE
F3	1	PNH-I	PROTECTION NOT HEALTHY INDICATION (AMBER)	KRE-222-UL	MIMIC CRAFT
	2	FC (HV)	HV CIRCUIT-BREAKER OPEN (GREEN)		
	3	FC (MV)	HV CIRCUIT-BREAKER CLOSED (RED)		
	4	BFI	CIRCUIT-BREAKER FAIL ISOLATE SWITCH	CRO 186	ROLOPS
	5	ETPB	EMERGENCY TRIP PUSH BUTTON WITH COVER (RED)	MP1-10R / MCB 230-VAC	ABB
	6	MTR-I	MASTER TRIP OPERATED INDICATION (RED)	KRE-222-UN	MIMIC CRAFT
	7	MIB	RESTRICTED EARTH FAULT PROTECTION RELAY	MIB-II	GE MULTILIN
F4	1	GE C70	CAPACITOR PROTECTION AND CONTROL RELAY	GE MULTILIN C70	GE MULTILIN
F5			SWITCH SYNC RELAY	F236	ABB
F6	1	CTTB (HV)	OVER CURRENT AND EARTH FAULT TEST BLOCK	PK2 4-WAY	IST
	2	CTTB (HV)	RESTRICTED EARTH FAULT TEST BLOCK	PK2 4-WAY	IST
	3	CTTB (HV)	UNBALANCE TEST BLOCK	PK2 4-WAY	IST
	4	CTTB (HV)	VOLTAGE TRANSFORMER BLOCK	PK2-4WAY	IST
	5	TP1-TP8	BANANA PLUG TEST POINTS (BLACK)	RC11 BK	ELECTRO FUSION
F7			BLANKING PLATE		
F8			BLANKING PLATE		
R	REAR OF MODULE				
R2	1	TBC	TBC	TBC	TBC
	2	TBC	TBC	TBC	TBC
	3	TBC	TBC	TBC	TBC
R3					
	1	TBC	TBC		TBC
	2	TBC	TBC		TBC
	3	TBC	TBC		TBC
	4	TBC	TBC		TBC
	5	TBC	TBC	TBC	TBC
	6	TBC	TBC	TBC	TBC
R4			REAR OF C70 RELAY		
R5	1				
	2				
TERMINAL BACK PLATE					
T1	X1-X7		TERMINALS RAILS		
			(RAISED FROM BACK PLATE BY 70 MM STAND-OFF POSTS).		
			SCHEME WIRING TERMINATED AT BOTTOM SIDE OF TERMINAL STRIPS.		
			REFER TO SHEETS 20-22 FOR TERMINAL BLOCK MAKES AND TYPES		

** SPECIFY 110VDC





LAYOUT TO BE CONFIRMED DURING PROTOTYPE BUILDING

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

NOTES

1. FINISH: EXTERIOR - ESKOM GREY G29
   INTERIOR - WHITE BACK PLATES
2. SWING FRAME FRONT AND REAR ENTRY 800mm x 600mm x 2400 (including base)
3. ALL LABELS FORM PART OF THE SILKSCREEN ON THE FRONT
   ALL LABELS AT THE BACK ARE STICK ON LABELS
4. ALL AC WIRING 2.5mm DC AND CONTROL WIRING 1.5mm
5. TERMINALS MOUNTED ON WHITE BACK PLATE FACING THE FRONT OF THE PANEL
6. INTERNAL EQUIPMENT MOUNTED ON WHITE BACK PLATE FACING THE FRONT OF THE PANEL

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

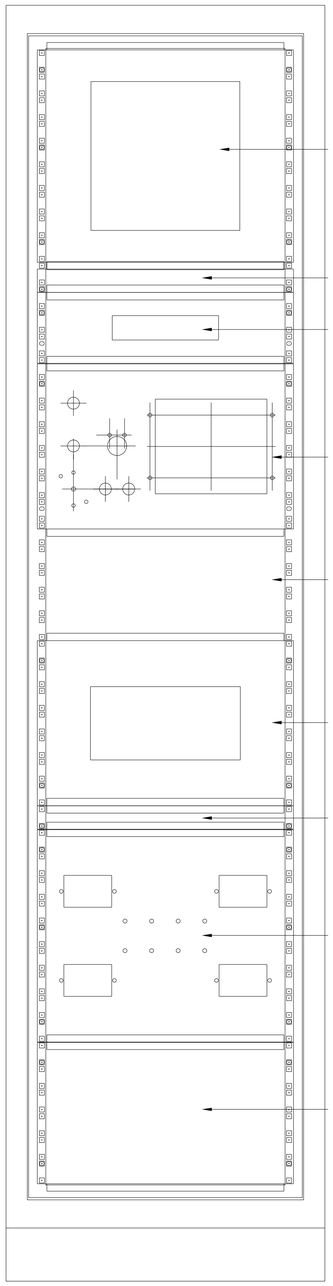
PANEL LAYOUT

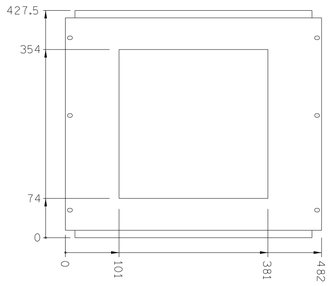
PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

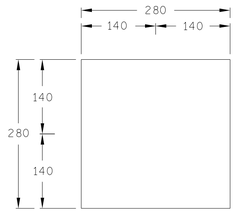
2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	3	2

SIZE GROOTTE A1L

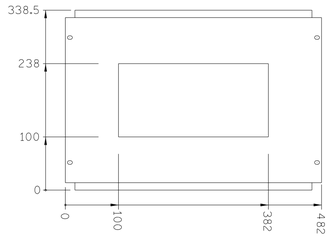




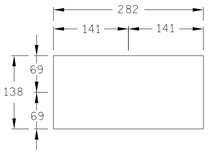
MIMIC CUT-OUT DETAILS
STANDARD 9U BLANKING PLATE



MIMIC PANEL

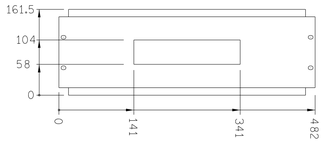


CAPACITOR PROTECTION AND CONTROL RELAY
CUT-OUT DETAILS
STANDARD 7U BLANKING PLATE

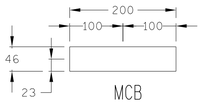


CAPACITOR PROTECTION
AND CONTROL RELAY

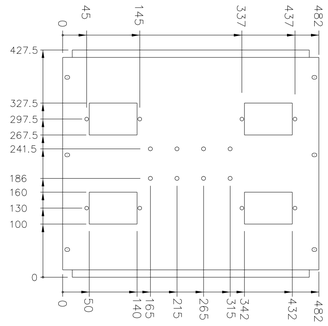
STANDARD 1U BLANKING PLATE



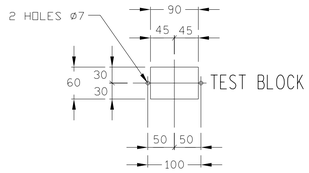
MCB CUT-OUT DETAILS
STANDARD 3U BLANKING PLATE



MCB

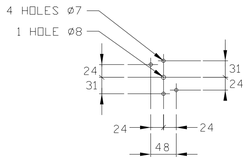


TESTBLOCK & BANANA PLUGS
CUT-OUT DETAILS
STANDARD 9U BLANKING PLATE

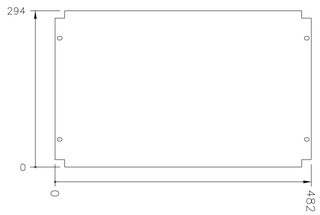


TEST BLOCK

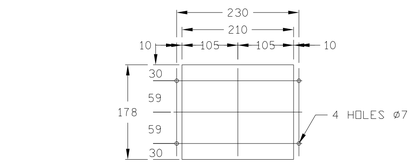
BANANA PLUG



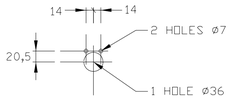
CB FAIL ISOLATE SWITCH



STANDARD 6U BLANKING PLATE



RESTRICTED EARTH
FAULT RELAY



INTERLOCK

INDICATION LAMP
AND PUSH BUTTON

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
PANEL CUTOUTS

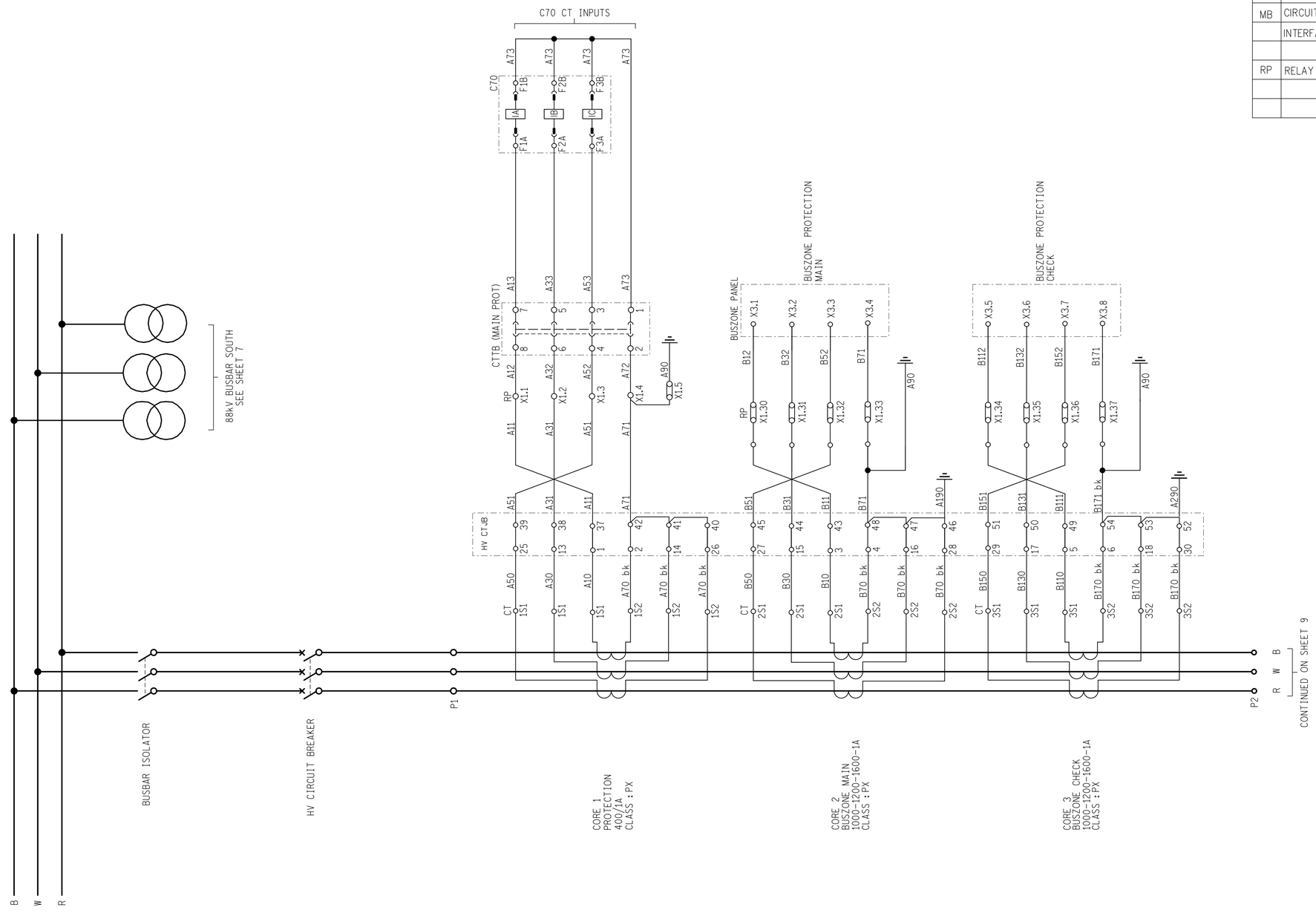
2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	3A	2

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

LEVELS 1 10

SIZE GROOTTE A1L



	TERMINAL DESCRIPTION
CT	CURRENT TRANSFORMER
CTJB	CURRENT TRANSFORMER JUNCTION BOX
MB	CIRCUIT BREAKER MECHANISM BOX
	INTERFACE BOX
RP	RELAY PANEL TERMINAL

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
SINGLE LINE DIAGRAM

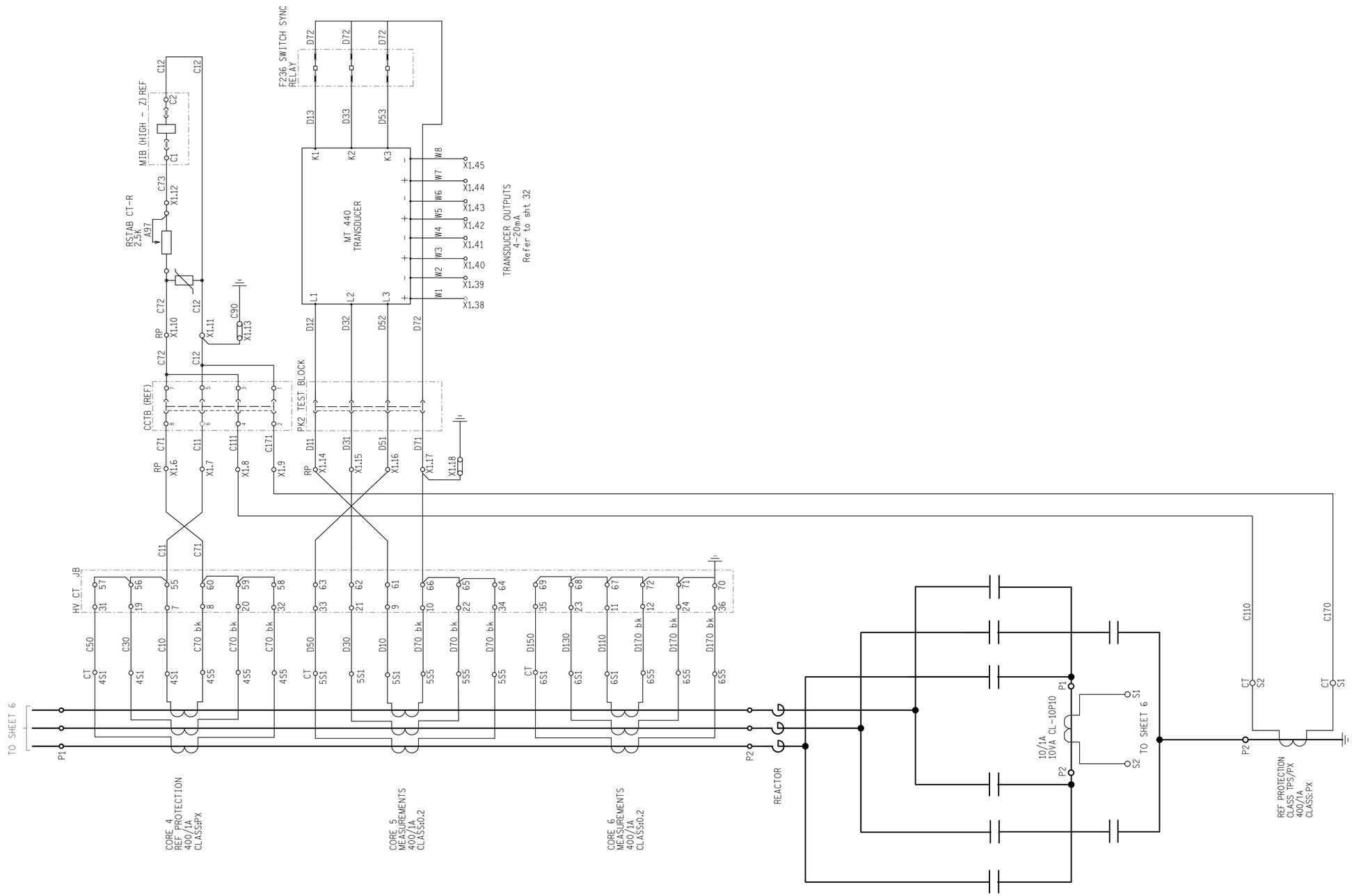
PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
DATE	
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	4	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

CAP STAR POINT AC KEY DIAGRAM

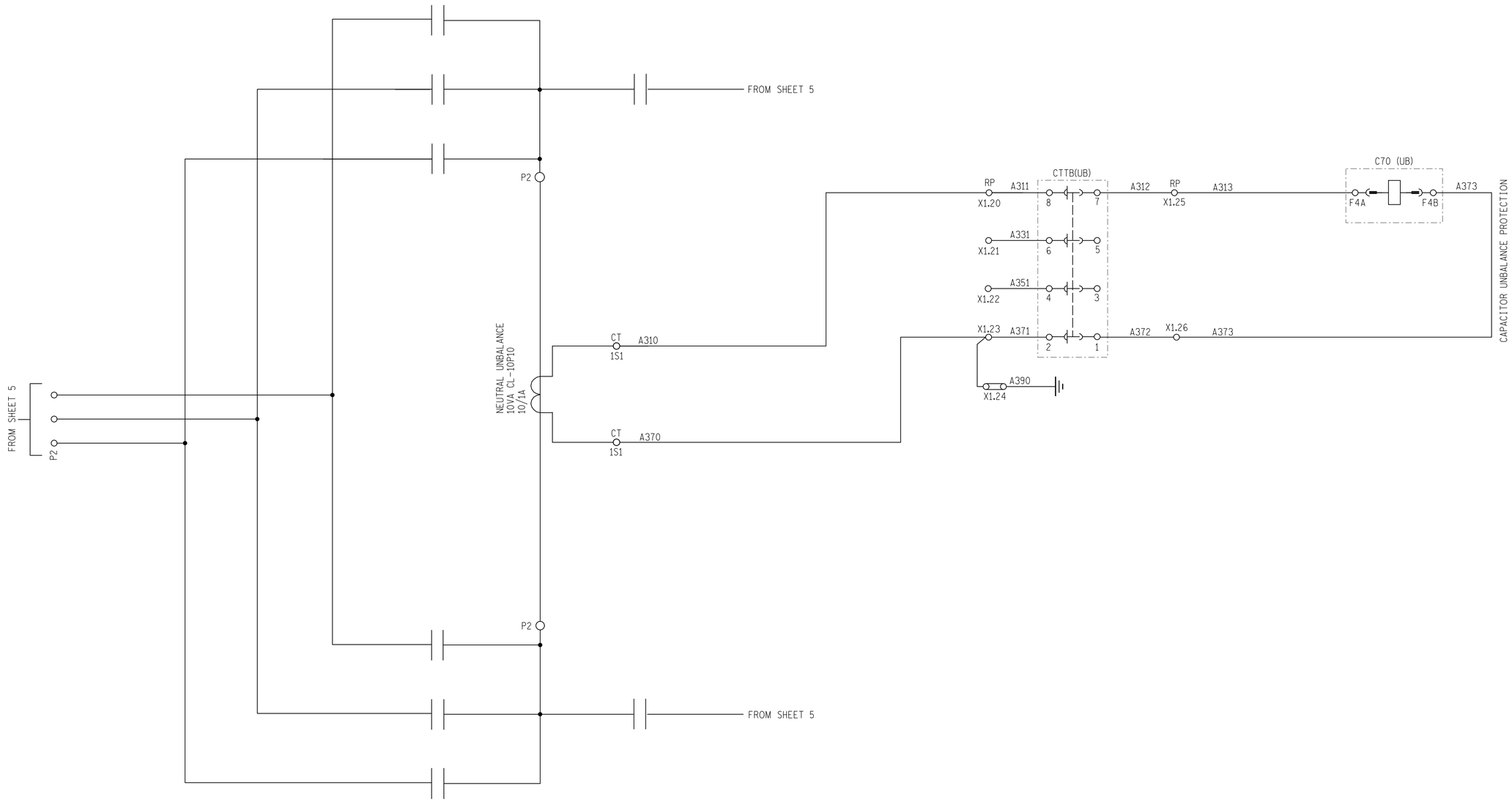
PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	5	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
UNBALANCED CAPACITOR AC KEY DIAGRAM

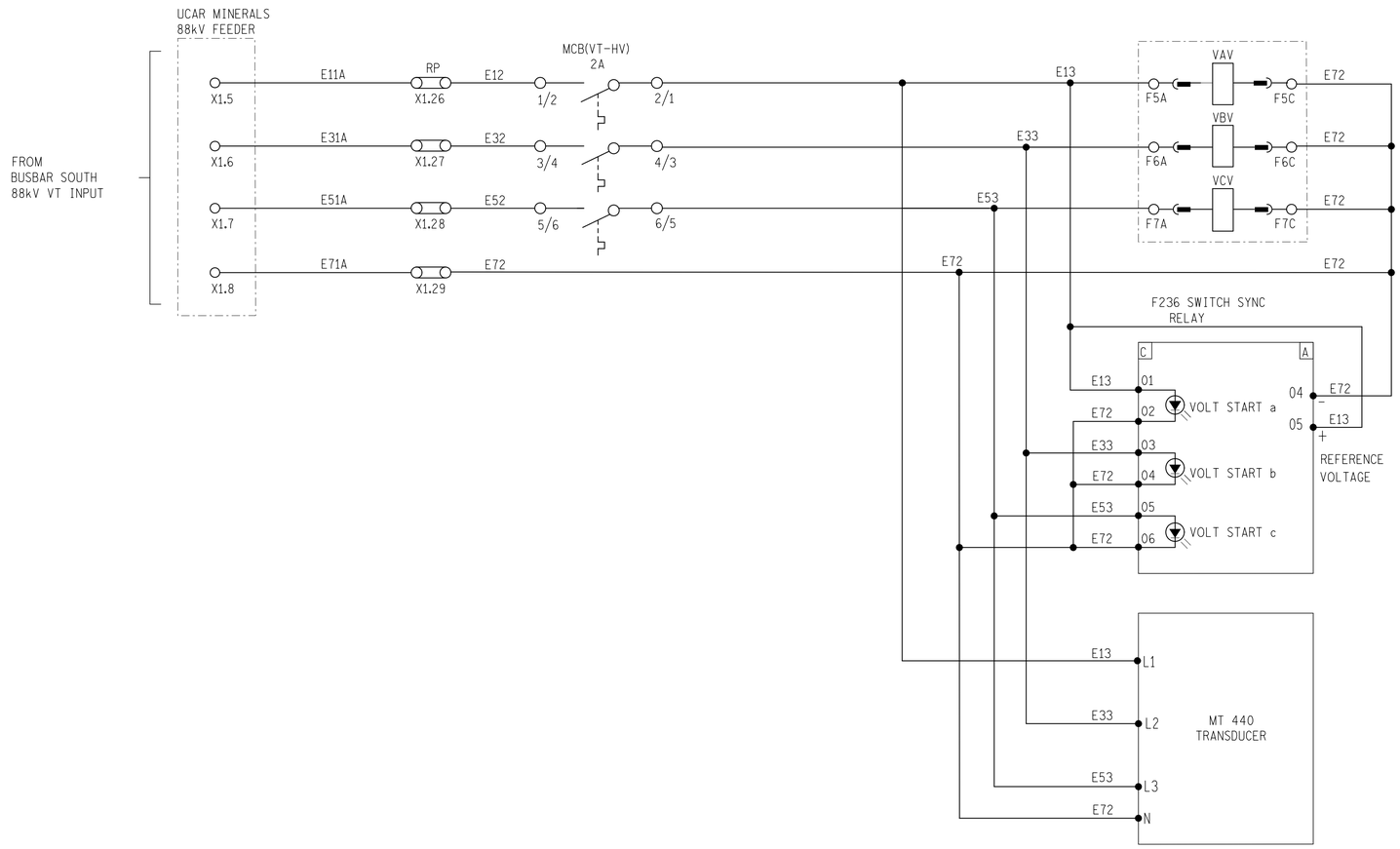
PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
DATE	
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DATE	
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
DATE	
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	6	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
VT SUPPLY KEY DIAGRAM

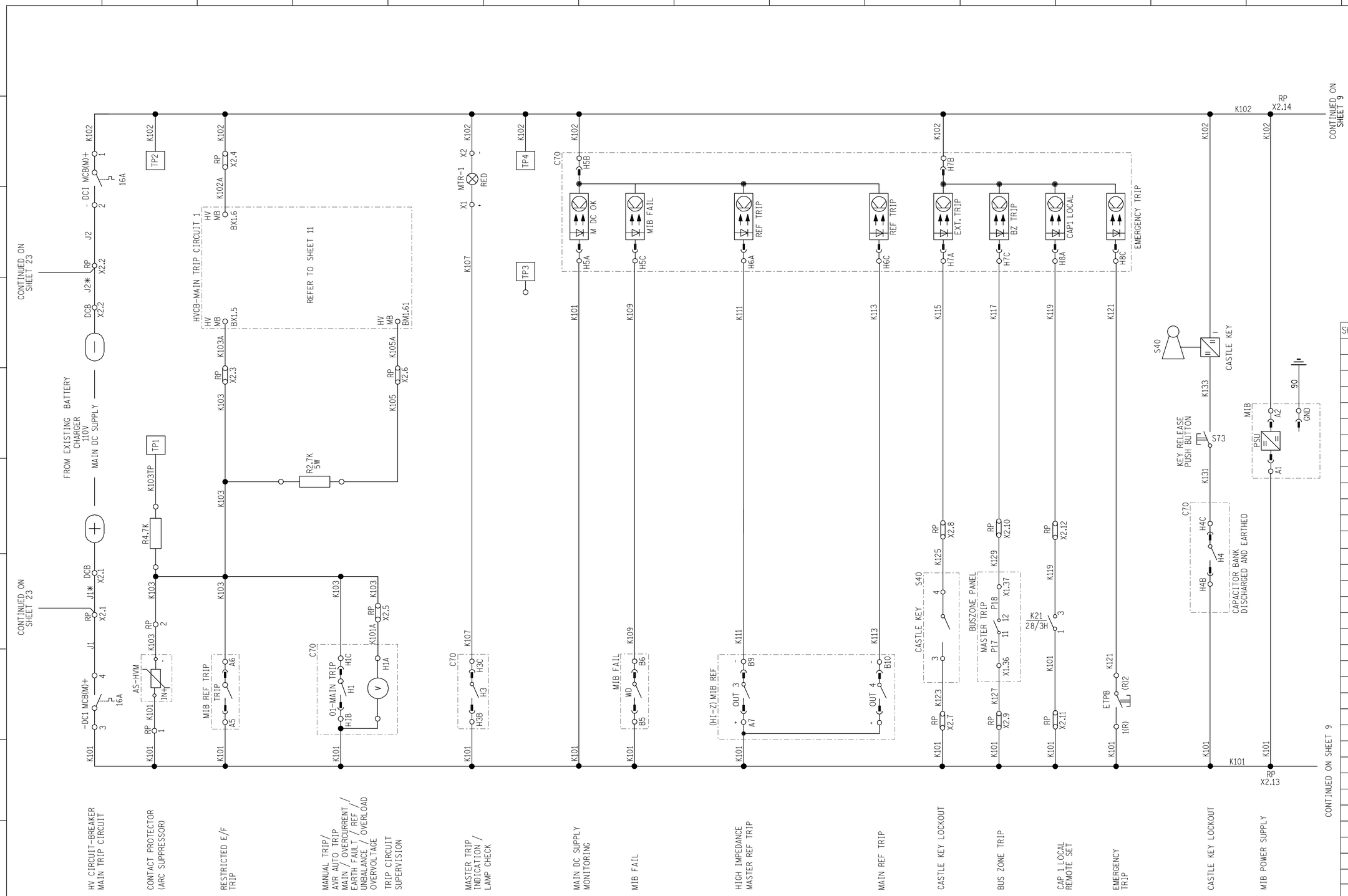
PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
DATE	
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DATE	
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
DATE	
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	7	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

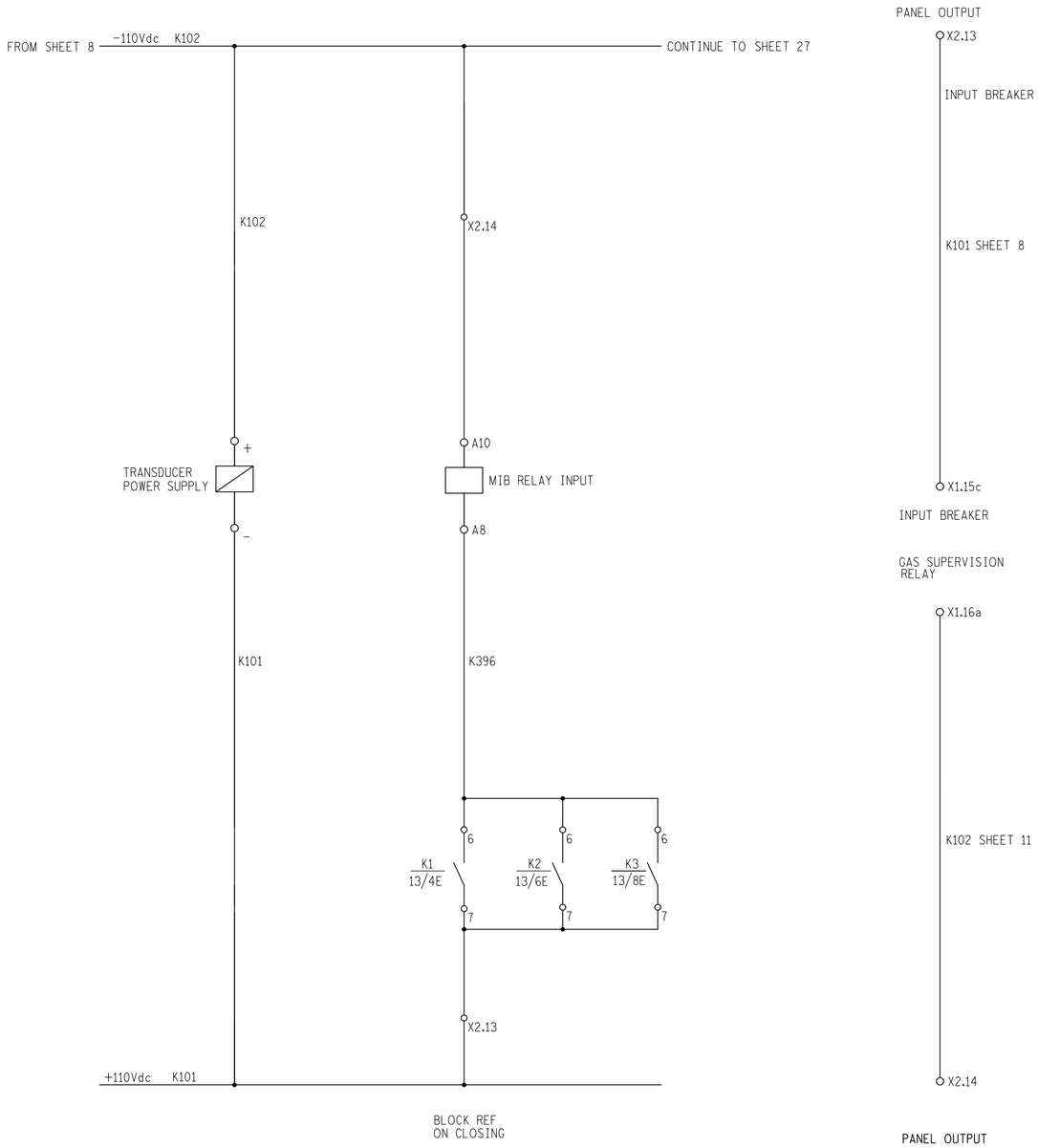
MAIN DC KEY DIAGRAM

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	8	2

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
INPUT & OUTPUT

PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
SCALE:	N.T.S.

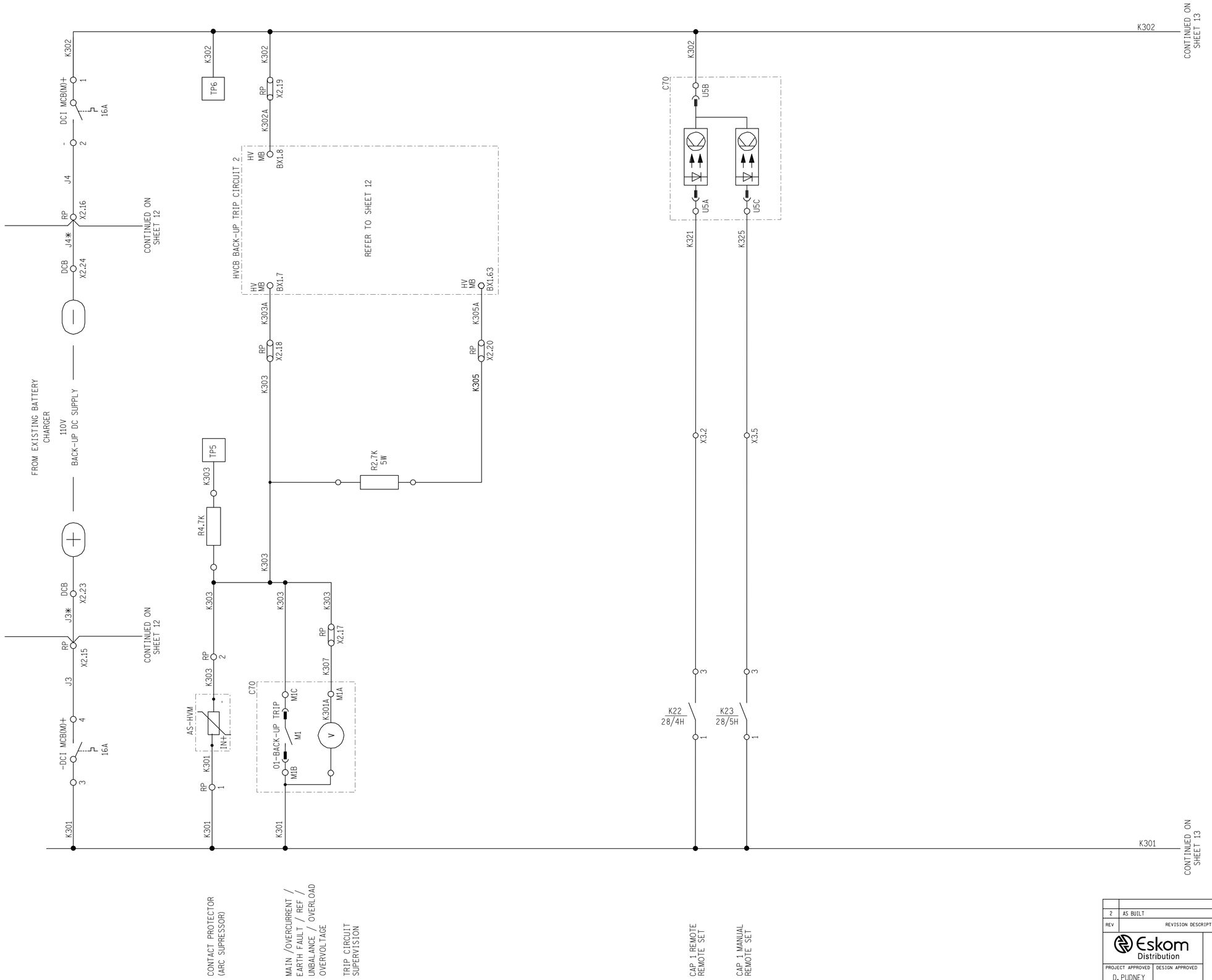
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
1	9	2

2-NR/22000

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
BACKUP DC KEY DIAGRAM

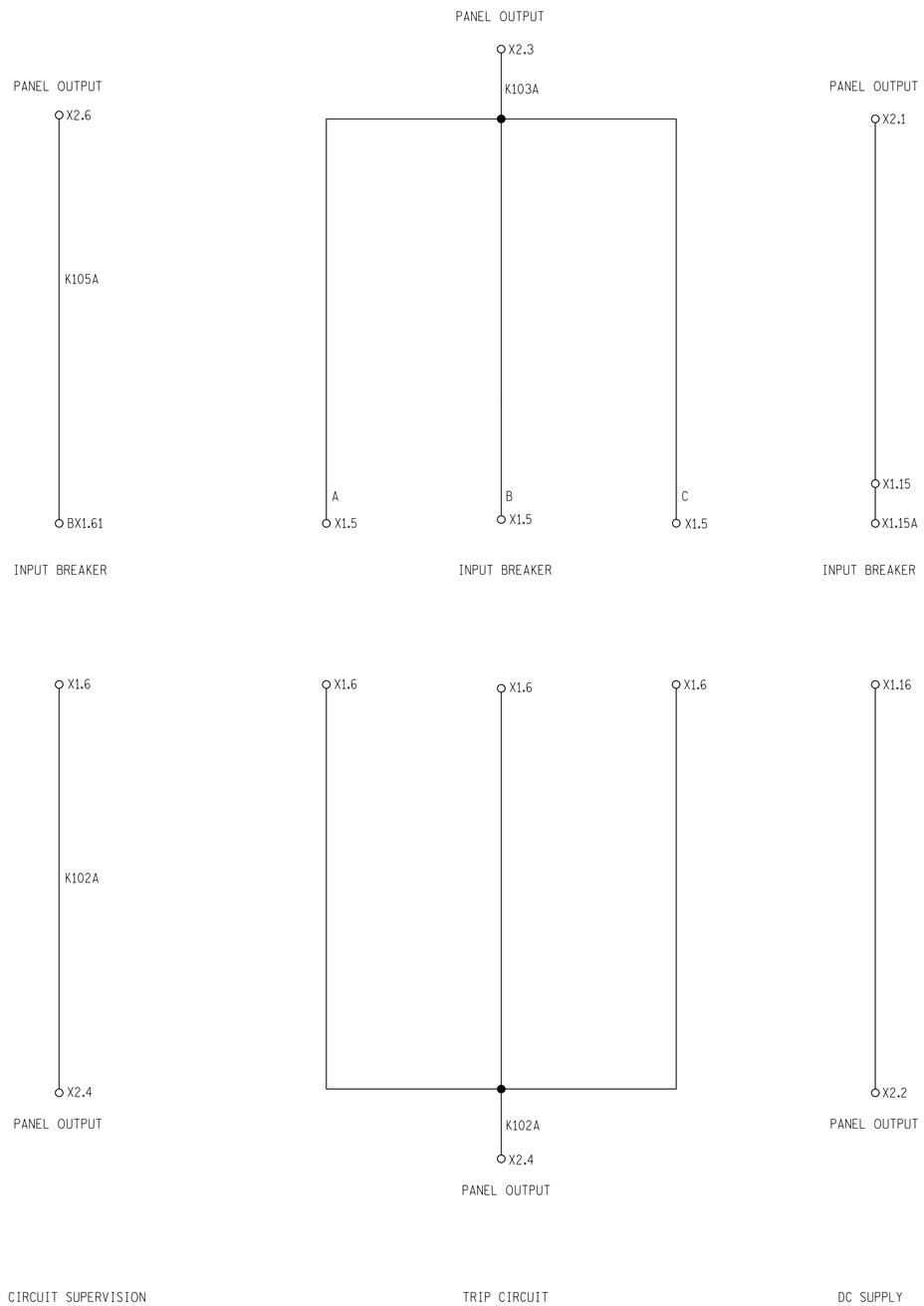
PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	10	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
INPUT & OUTPUT

PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
SCALE:	N.T.S.

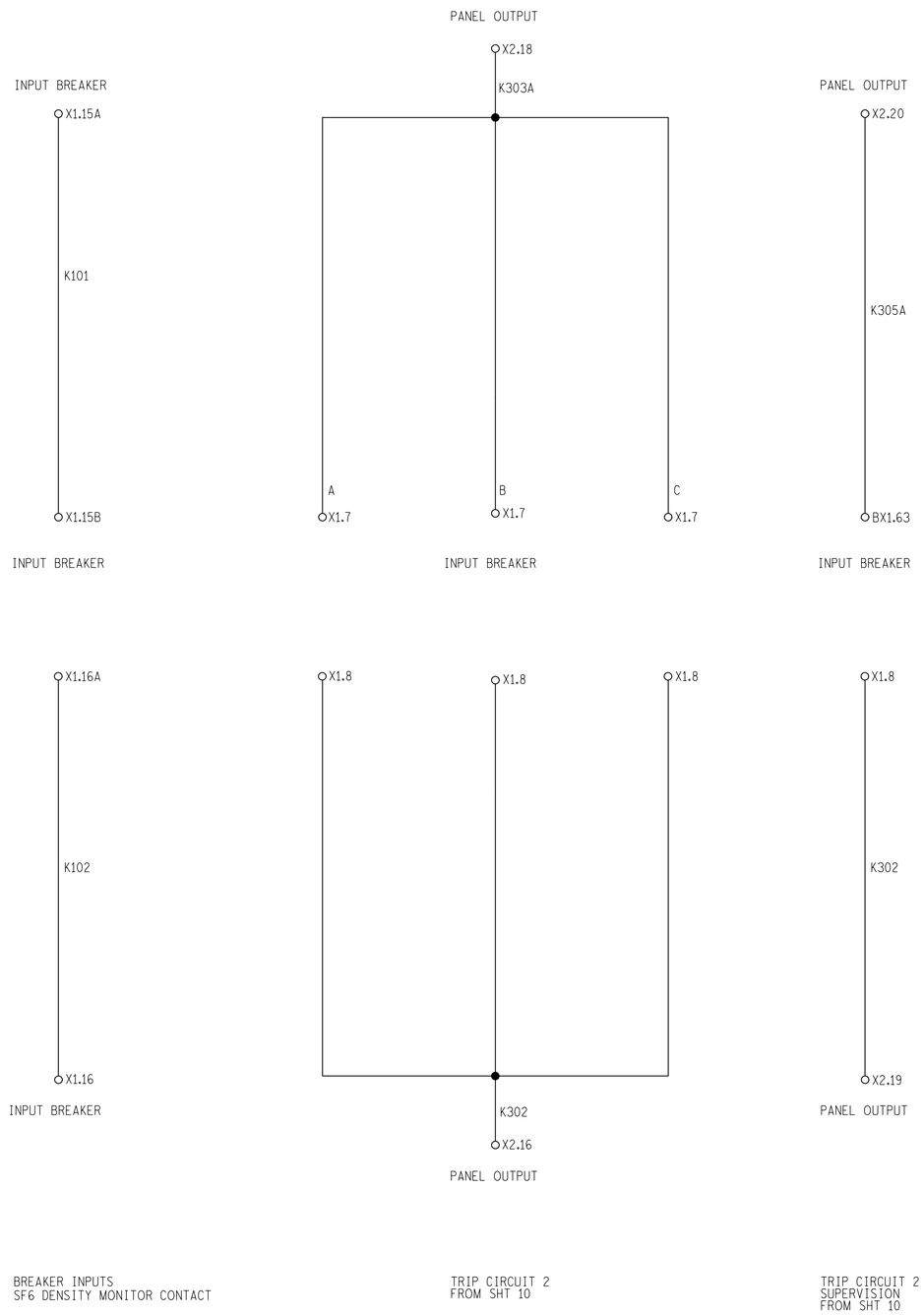
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
1	11	2

2-NR/22000

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
INPUT & OUTPUT

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

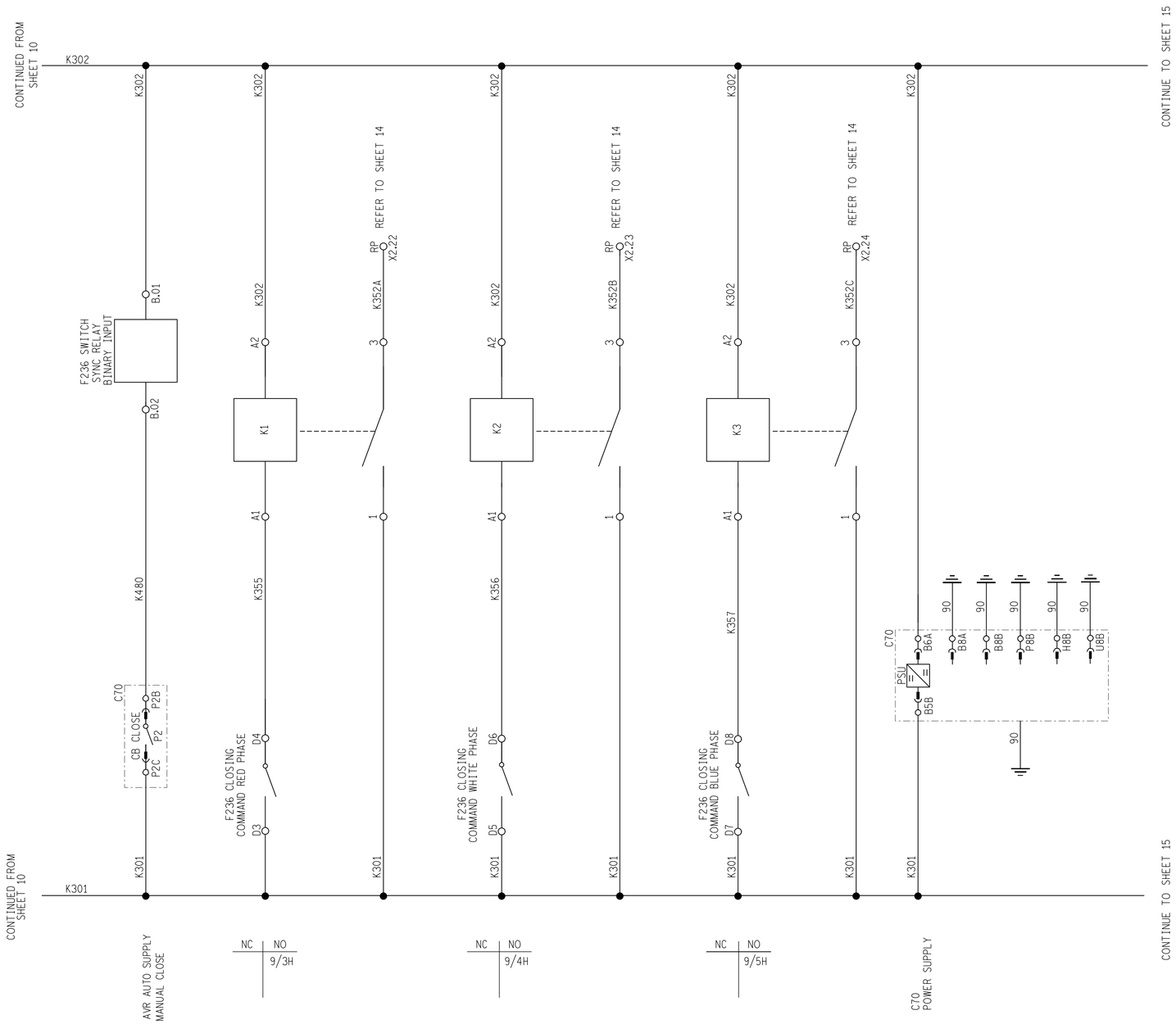
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
1	12	2

2-NR/22000

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

LEGEND

K1 - K3 AUXILIARY RELAYS

C70 - CAPACITOR BANK PROTECTION AND CONTROL

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

BACKUP DC KEY DIAGRAM

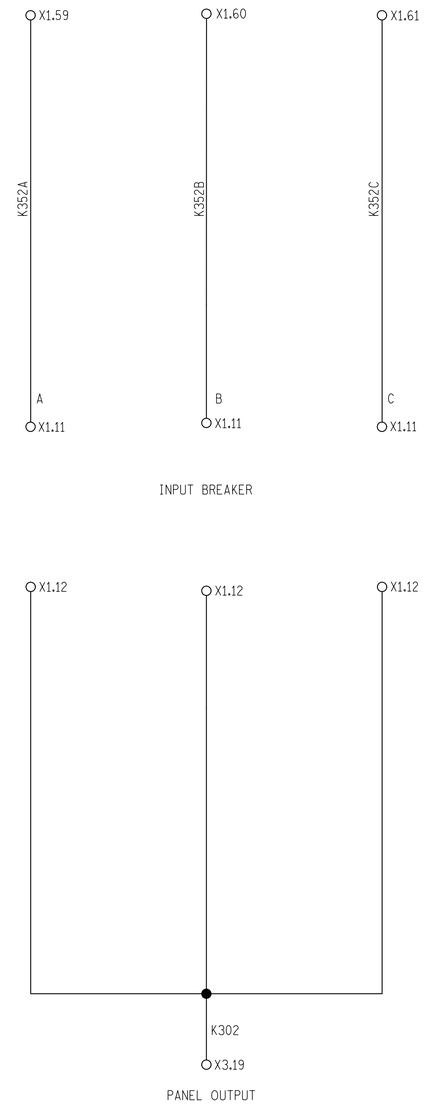
PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	13	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
MECHANISM FSA TRIP CIRCUIT 2

PROJECT APPROVED	D. PUDNEY
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DATE	14/09/2012
SCALE:	N.T.S.

DESIGN APPROVED
DATE
DESIGN CHECKED
DATE
DRAWN BY
DATE

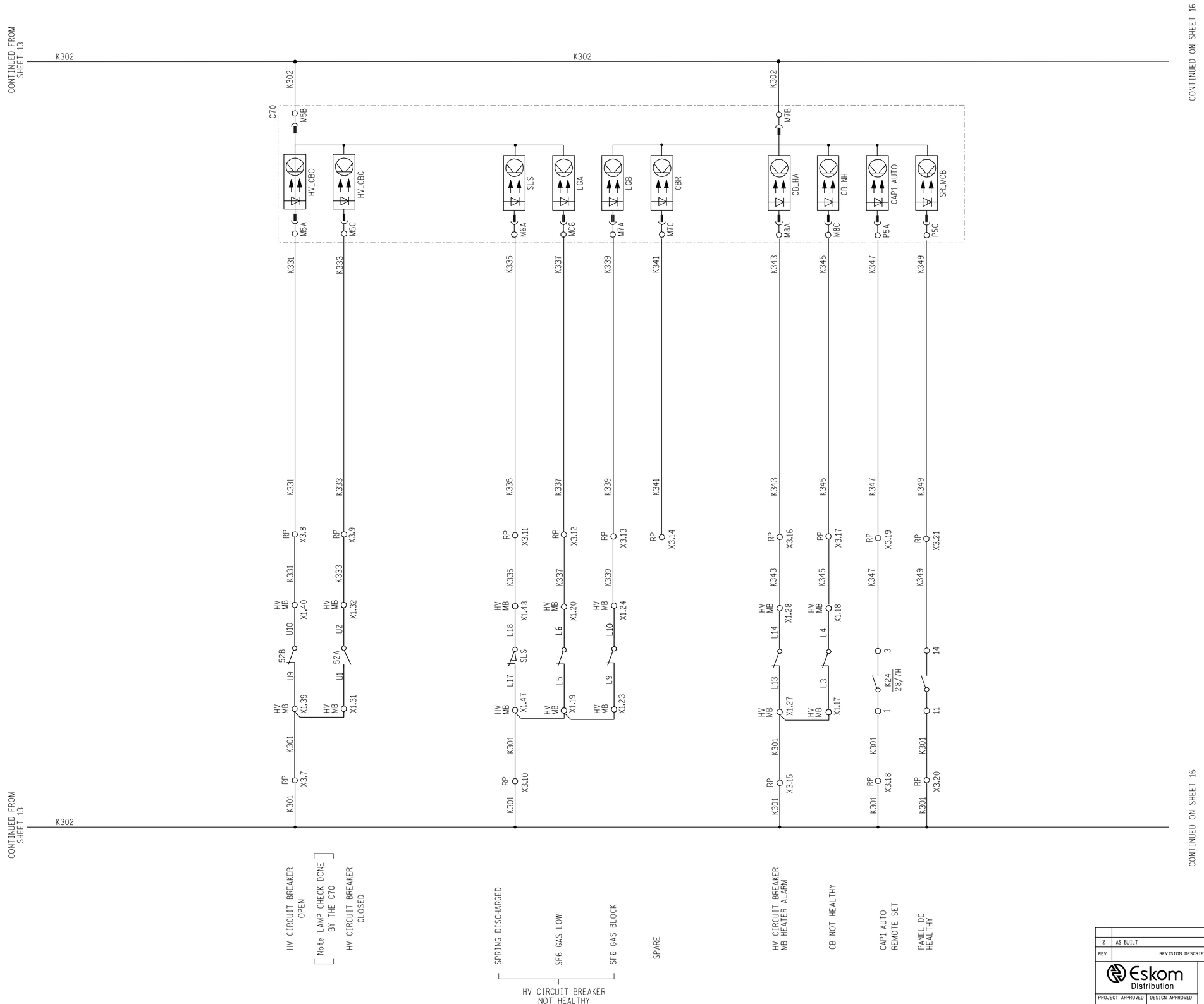
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	14	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
BACKUP DC KEY DIAGRAM

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

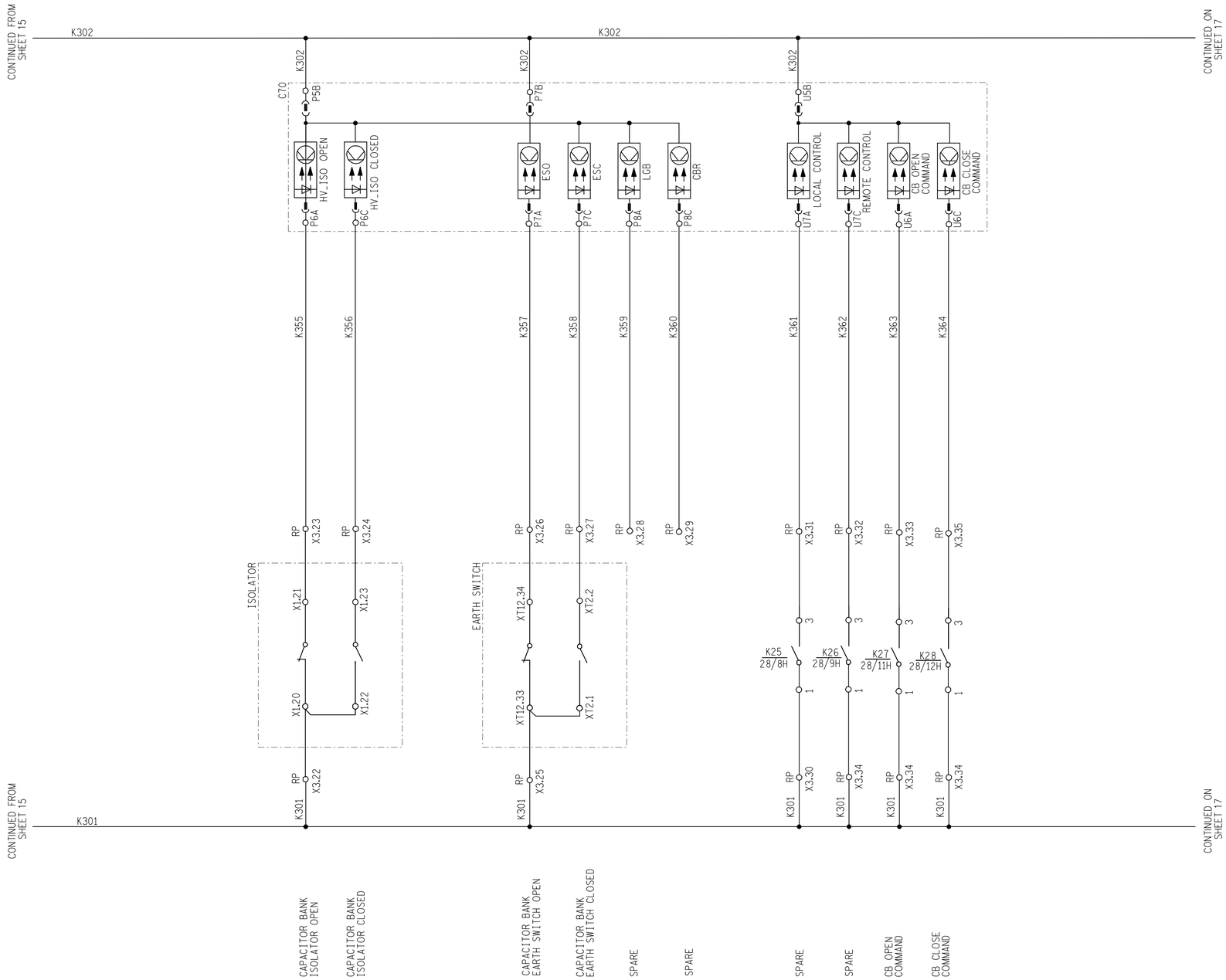
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	15	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

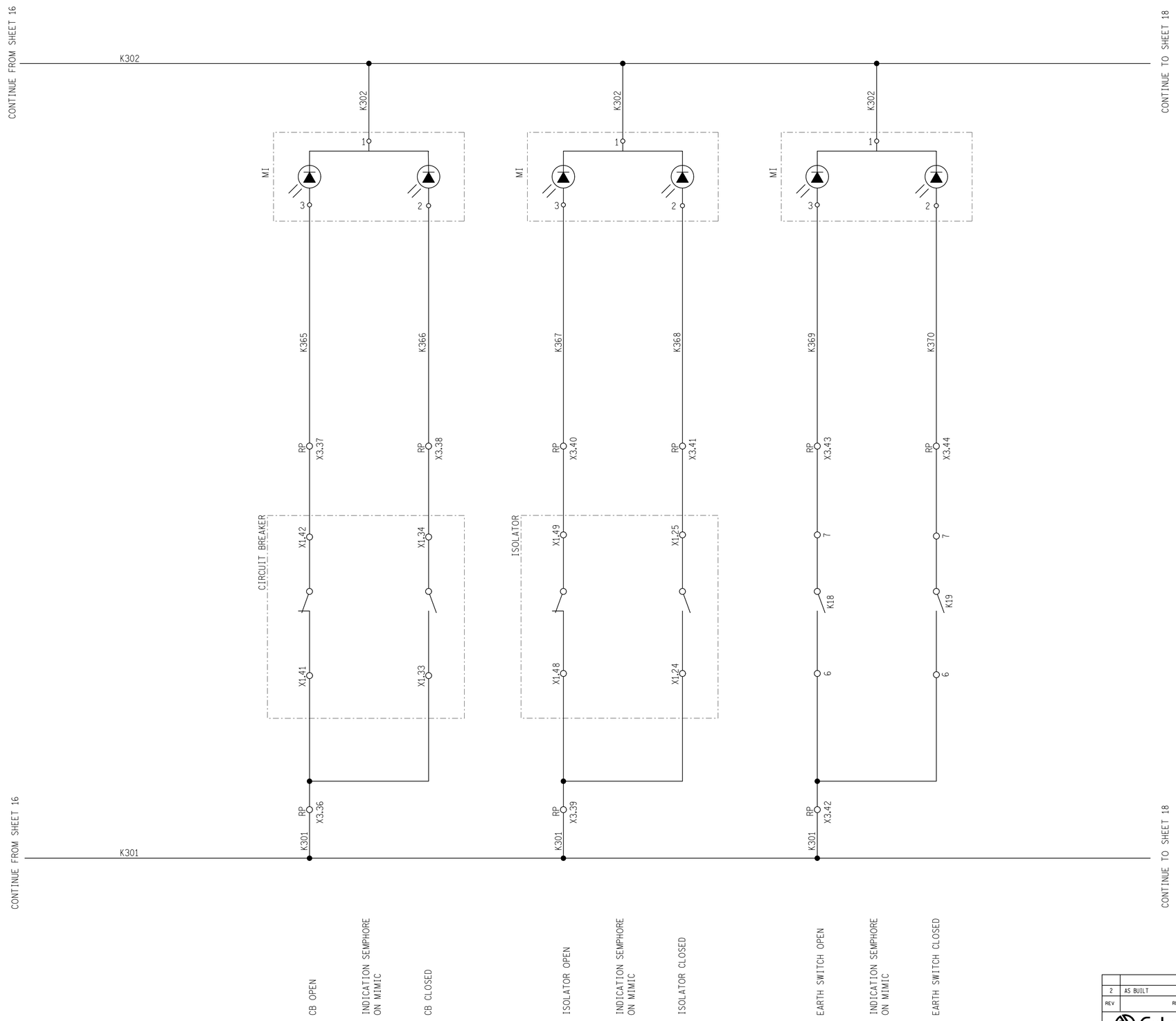
88kV 40MVAr CAPACITOR BANK
BACKUP DC KEY DIAGRAM

PROJECT APPROVED	D. PUDNEY
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DATE	14/09/2012
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	16	2

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

CAPACITOR BANK ALARMS AND INDICATIONS

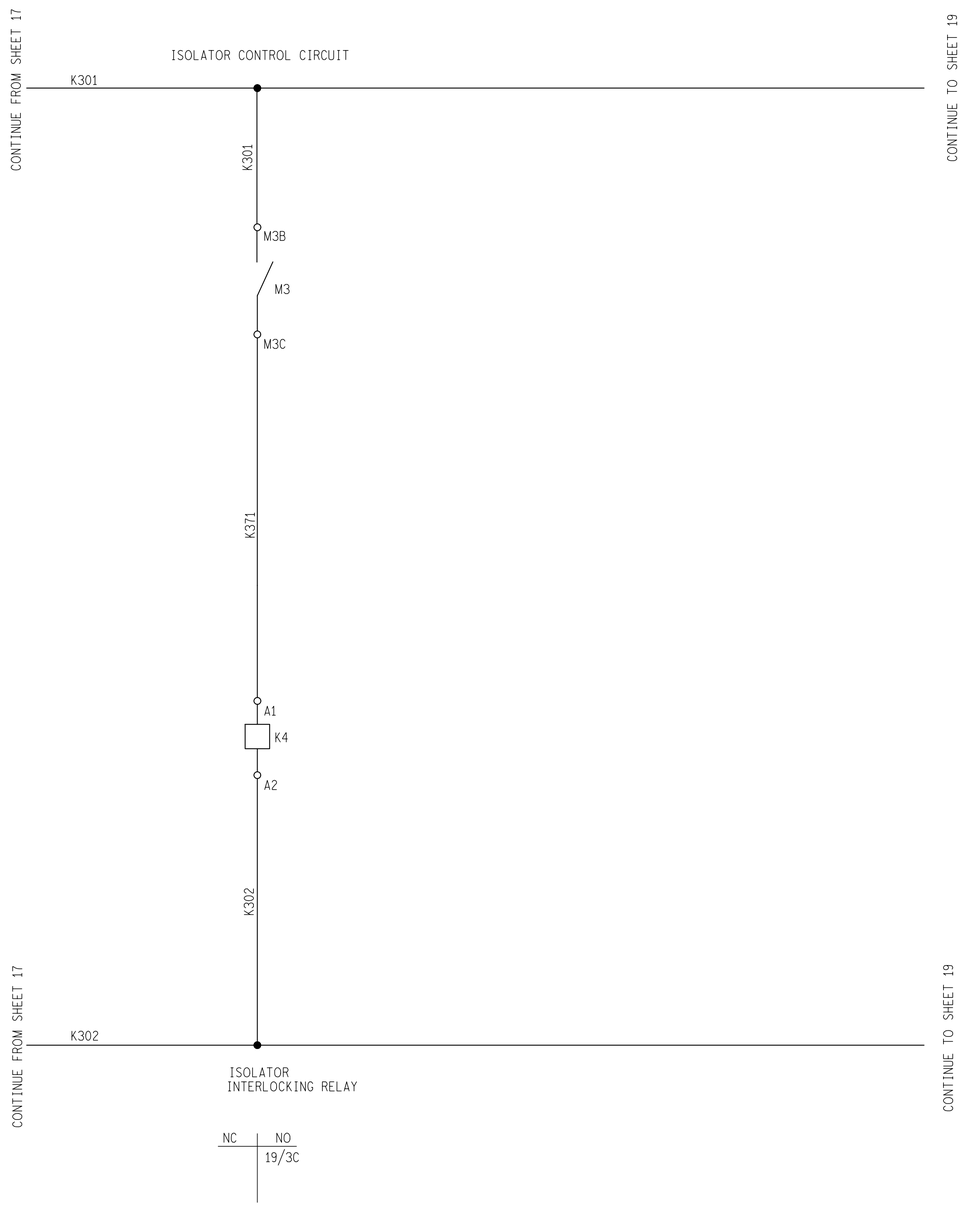
PROJECT APPROVED	D. PUDNEY
DATE	09/07/2012
DESIGN APPROVED	
DATE	
PROJECT CHECKED	N.MOEKETSANE
DATE	09/07/2012
DESIGN CHECKED	
DATE	
DRAWN BY	L.TSHABALALA
DATE	14/09/2012
DRAWN BY	
DATE	
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	17	2

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
SPRING CHARGING MOTOR DC, AC KEY DIAGRAM

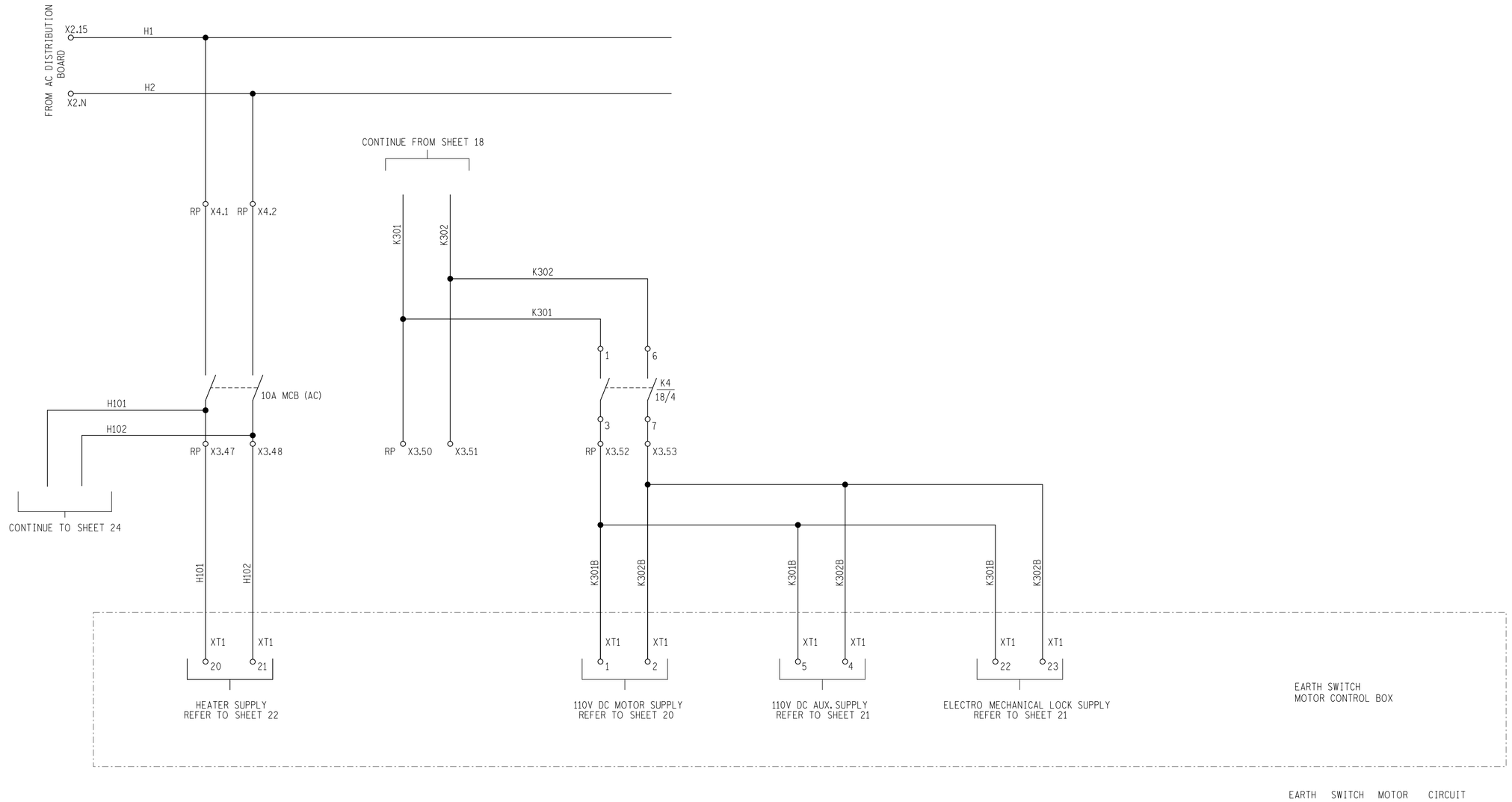
PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	18	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
MOTOR CIRCUIT ISOLATOR

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

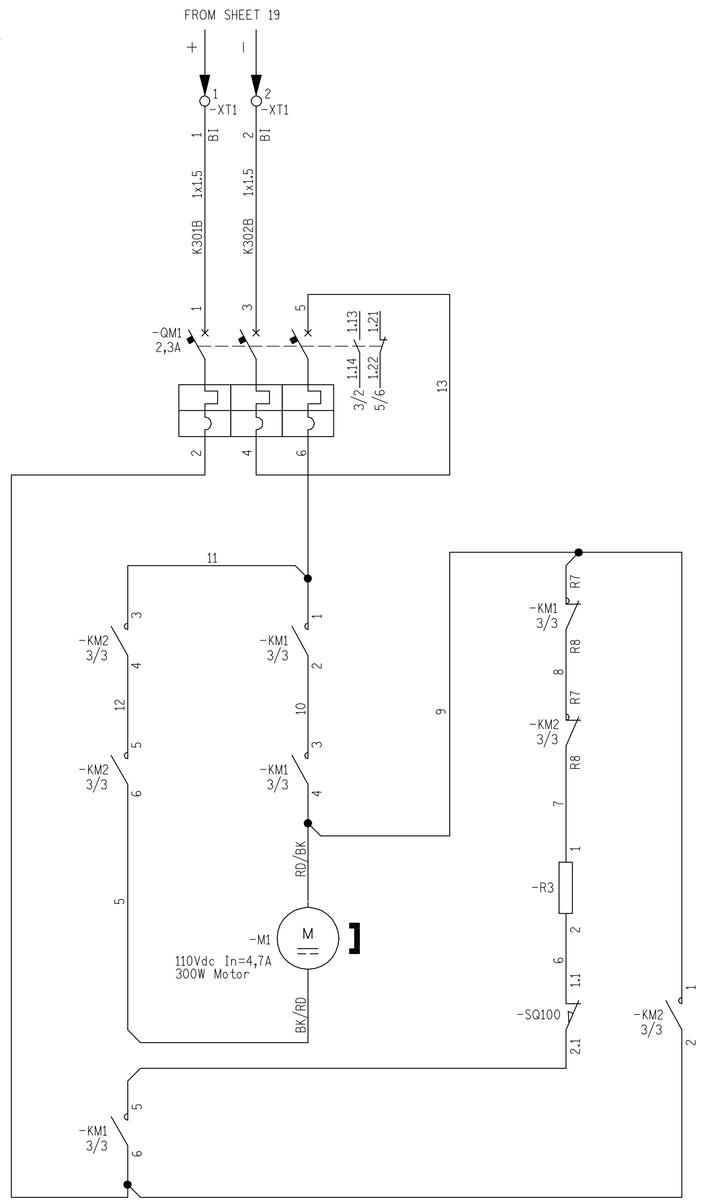
2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	19	2

LEVELS 1 10

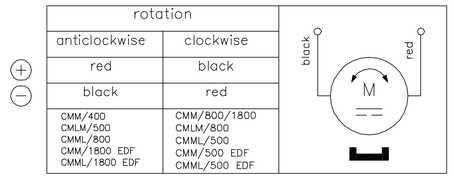
SIZE GROOTTE A1L

(110Vdc) MOTOR CIRCUIT



Item	type	description	Manufactur
-M1	MP80S/2	motor	AMER
-QM1	PKZM0-2,5	circuit breaker for motor pr n	MOELLER
-R3	158-468	braking resistor	RS
-SQ100	see description [NTC-2500]	electromechanical lock	ALSTOM grid
-XT1	WDU 10 SL	terminal blocks [10mm	WEIDMUELLEP

rotation	
anticlockwise	clockwise
red	black
black	red
CMM/400 CMLM/500 CMML/800 CMM/1800 EDF CMML/1800 EDF	CMM/800/1800 CMLM/800 CMML/500 CMM/500 EDF CMML/500 EDF



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

MOTOR CIRCUIT

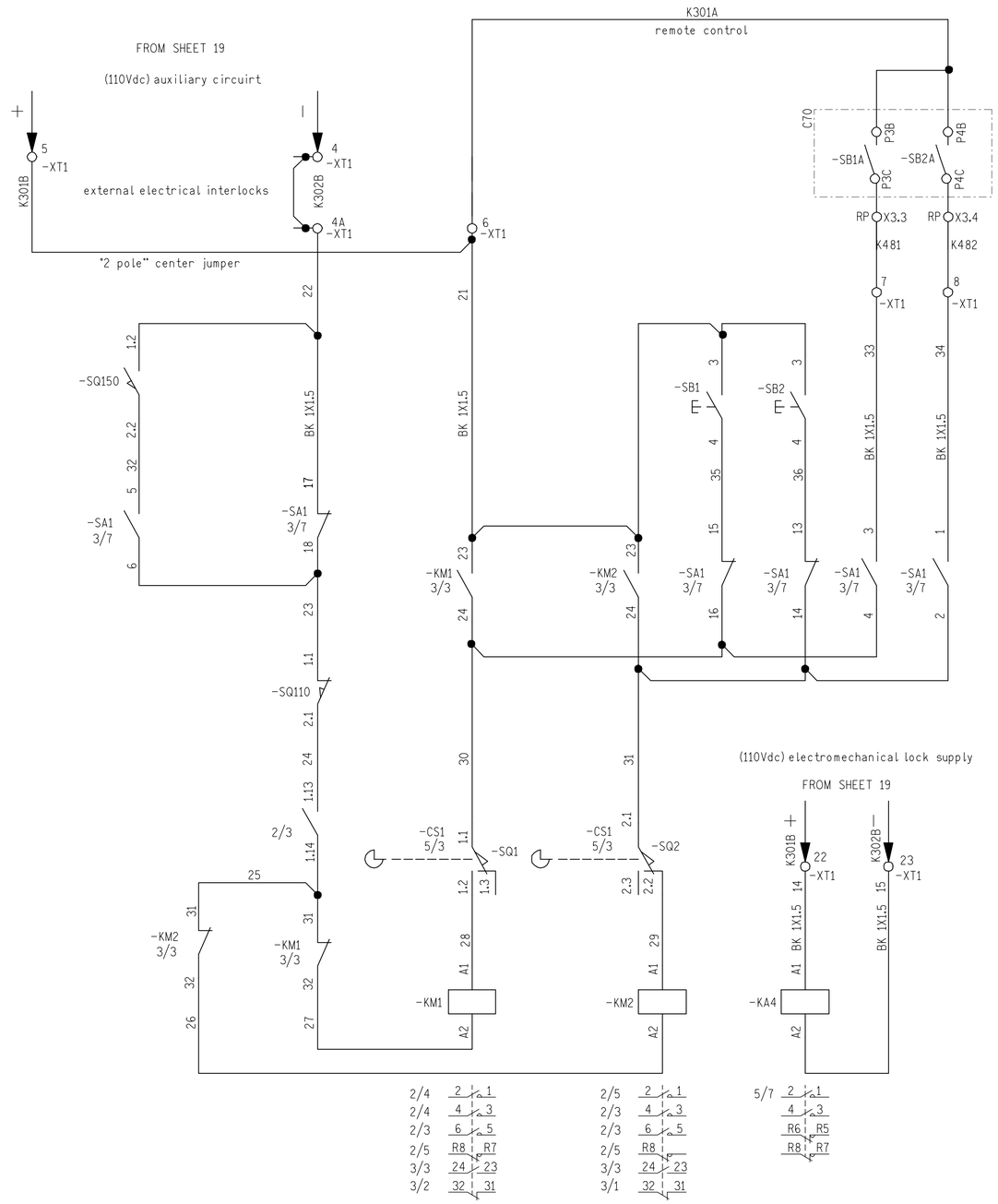
PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	20	2

SIZE GROOTTE A1L

LEVELS 1 10



MOELLER

Item	Type	Description	Manufacture
-KA4	see description [NTC-2500]	electromechanical lock	ALSTOM grid
-KM1	100-K05 300	opening contactor	ALLEN BRADLEY
-KM2	100-K05 300	closing contactor	ALLEN BRADLEY
-SA1	P0120526S	[LOC-OFF-REM] selector switch	GIOVENZANA
-SB1	PPRN8NL/0	opening push button [BLACK/0]	MOELLER
-SB2	PPRN5NL/1	closing push button [WHITE/1]	MOELLER
-SQ1	Z15GW22-B	opening motor limit switch	OMRON
-SQ2	Z15GW22-B	closing motor limit switch	OMRON
-SQ110	see description [NTC-2500]	limit switch to prevent motor operation during manual operation	ALSTOM grid
-SQ150	1117.0101	external door limit switch	MARQUARDT
-XT1	WDU 10 SL	terminal blocks [10mm²]	WEIDMULLER

		1-2	REMOTE	OFF	LOCAL
5	19-20				X
	17/18				X
4	15/16				X
	13/14				X
3	11/12			X	
	9-10			X	
2	7-8			X	
	5/6	X			
1	3-4	X			
	1-2	X			
WATER CONTACT POSITION		1	0	2	

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
AUXILIARY CIRCUIT

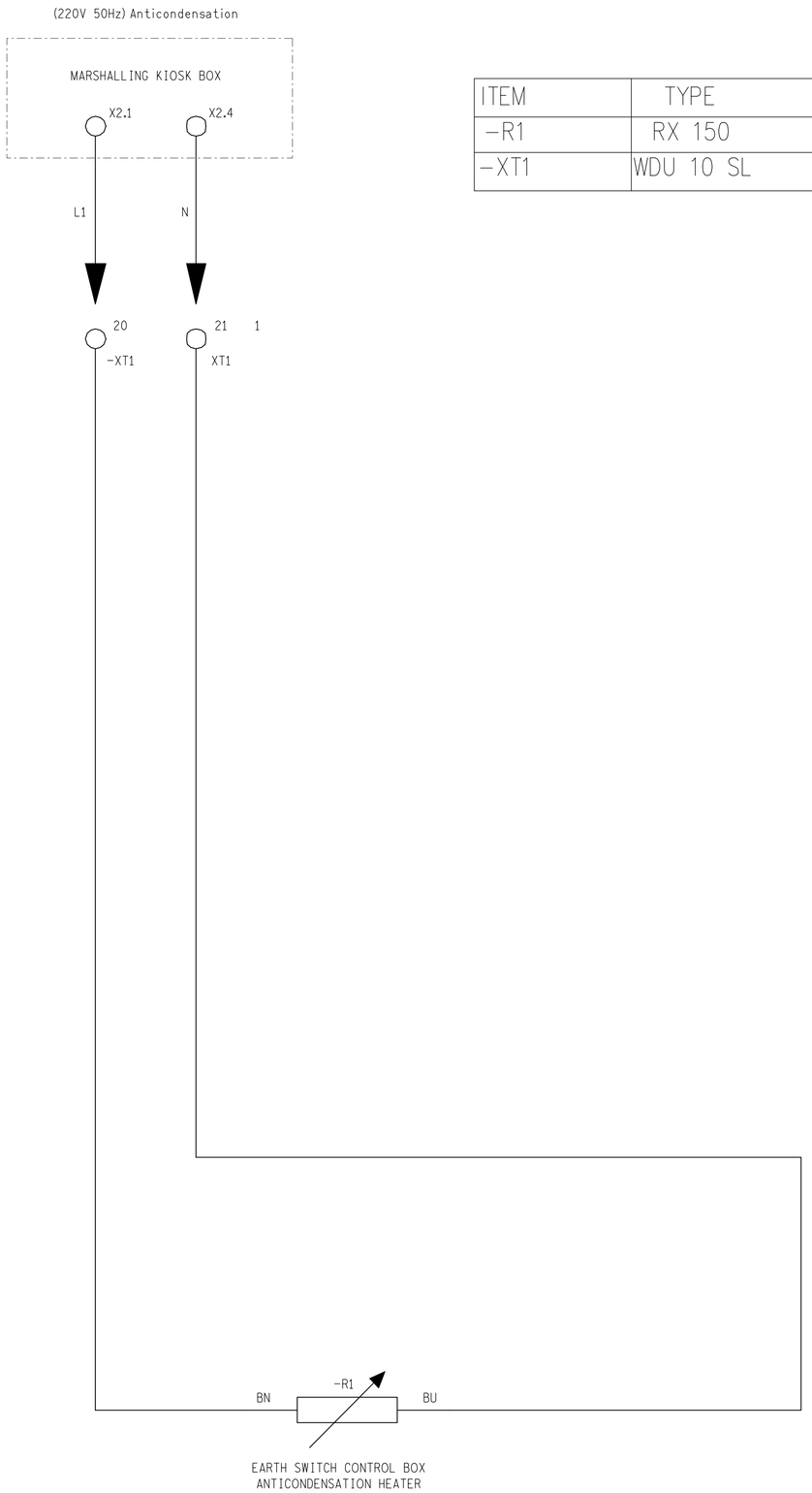
PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	21	2

SIZE GROOTTE A1L



ITEM	TYPE	DESCRIPTION	MANUFACTURER
-R1	RX 150	anticondensation resistor	ALSTOM grid
-XT1	WDU 10 SL	terminal blocks (10mm^2)	WEIDMULLER

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
ANTI-CONDENSATION

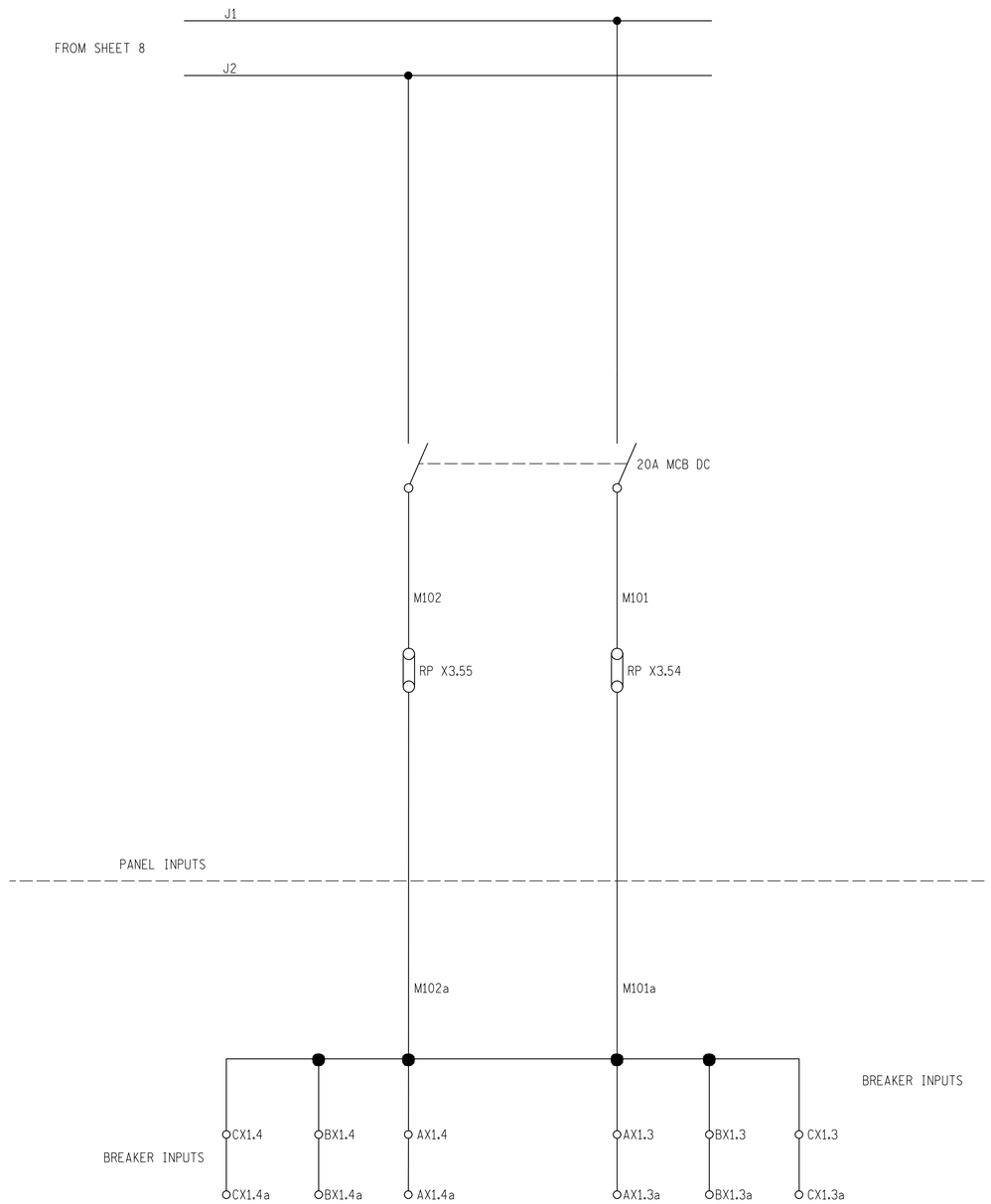
PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	22	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
CB SPRING CHARGE MOTOR CIRCUIT

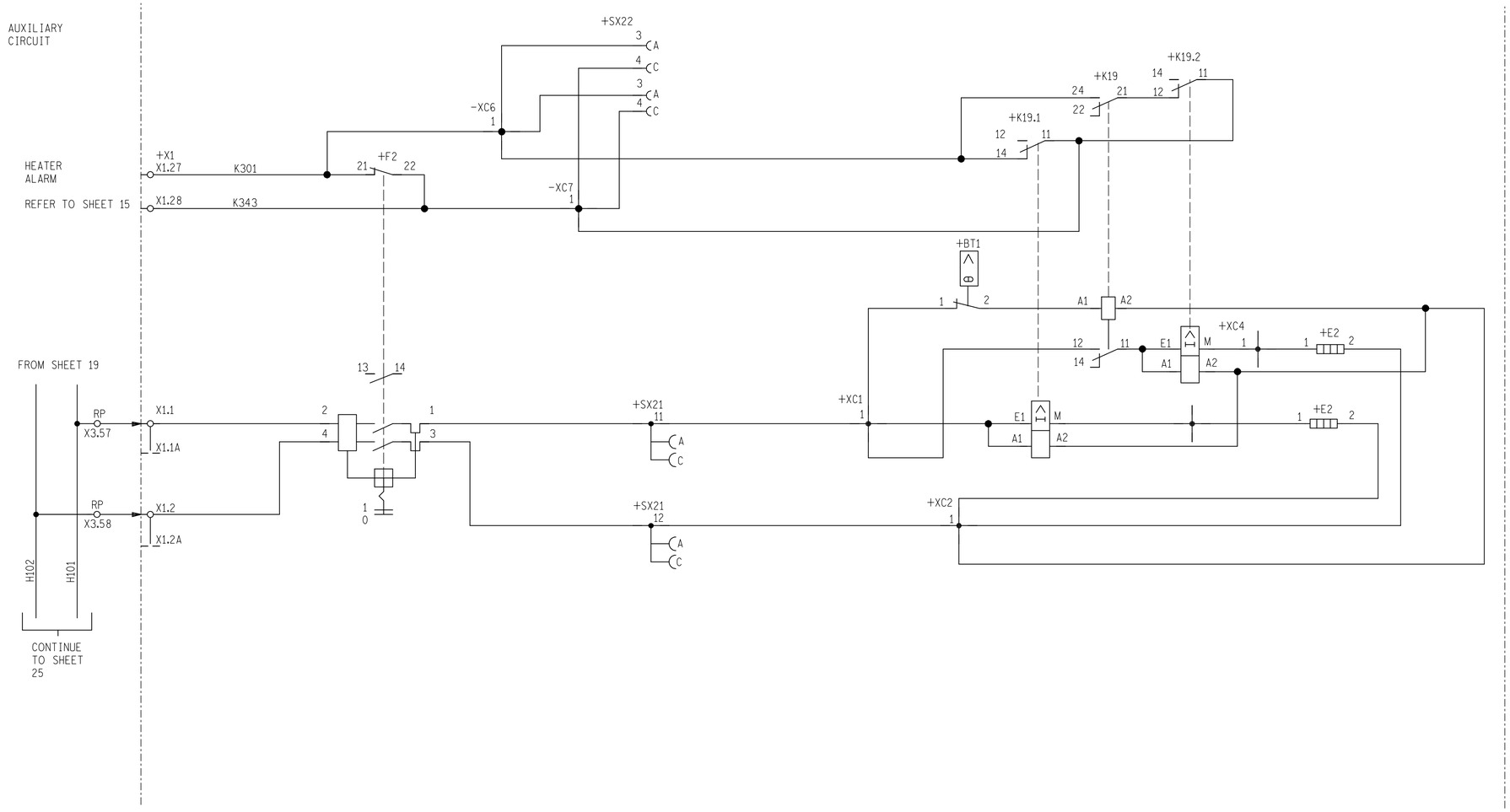
PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	23	2

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

LEVELS 1 10

SIZE GROOTTE A1L



LEGEND

+E2 - HEATER
+BT1 -THERMOSTAT
+K19 -THERMOSTAT AUXILIARY RELAY
+F2 -HEATER SUPPLY MCB

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK

OPERATING MECHANISM FSA HEATER AUXILIARY CIRCUIT

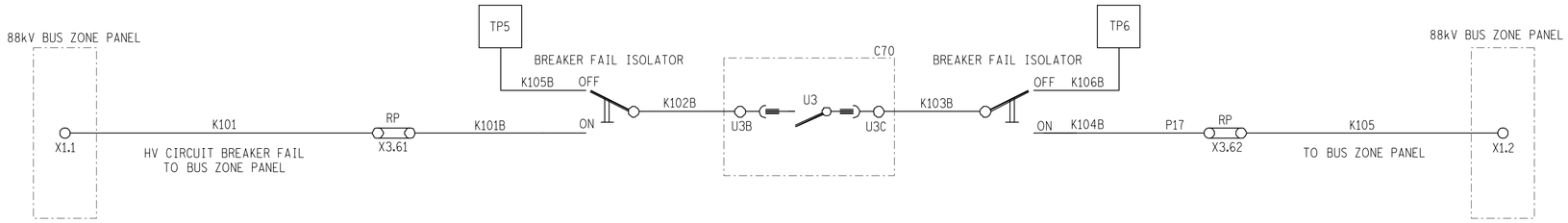
PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	24	2

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
SPRING CHARGING MOTOR DC, AC KEY DIAGRAM

PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

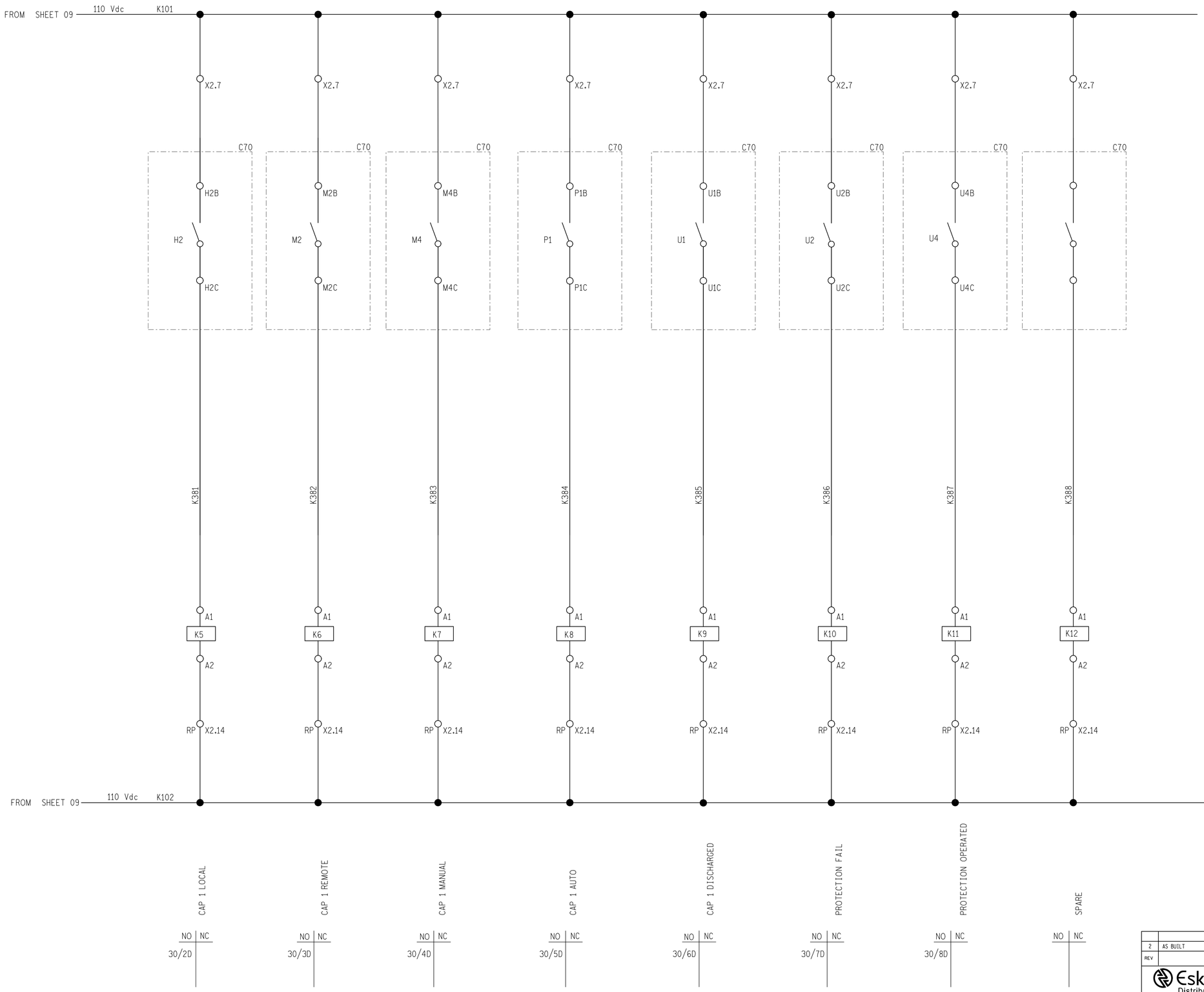
SET NUMBER	SHEET NUMBER	REVISION
1	25	2

2-NR/22000

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
REMOTE TERMINAL UNIT INPUTS

PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
DATE	
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DATE	
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
DATE	
SCALE:	N.T.S.

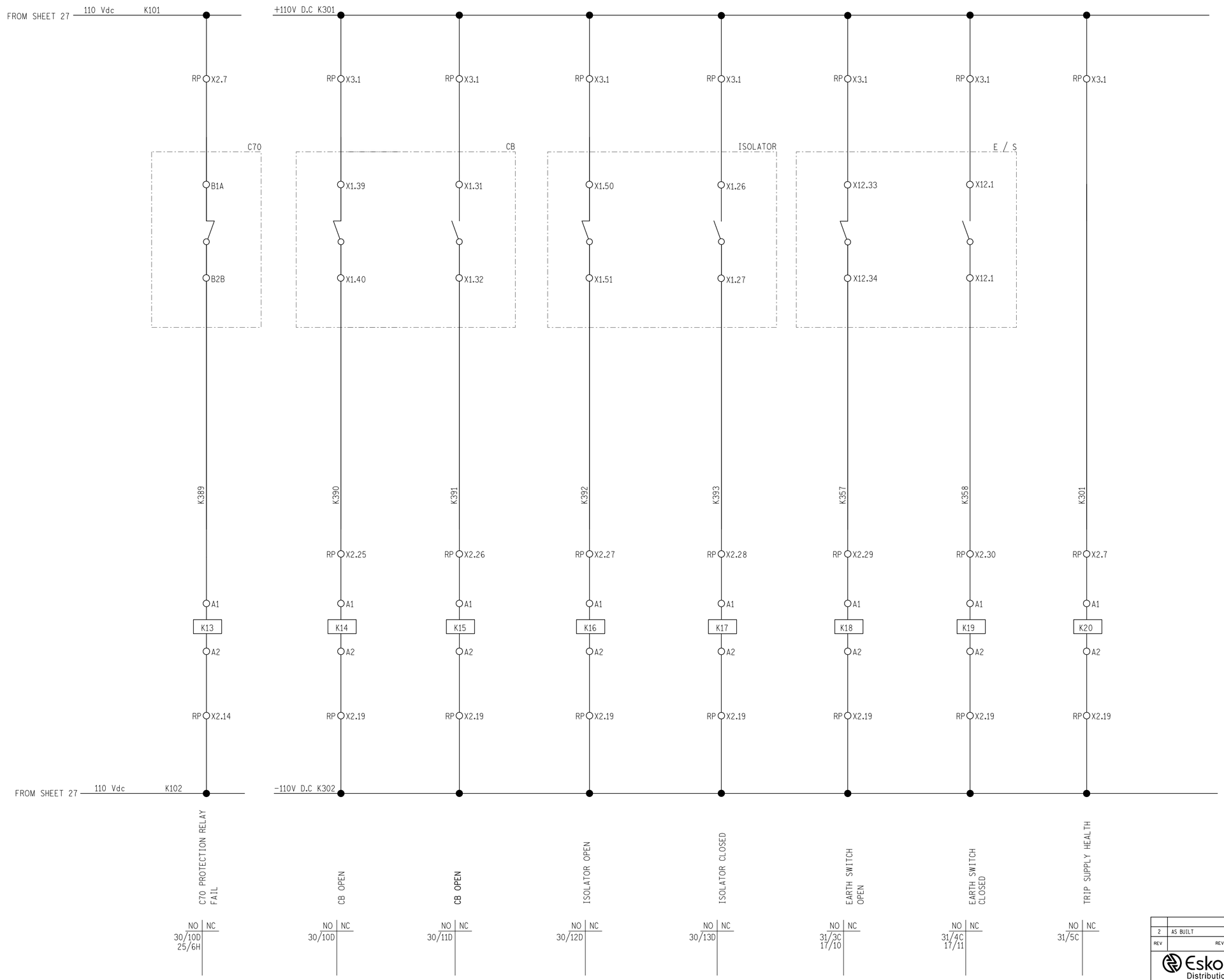
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	26	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
REMOTE TERMINAL UNIT INPUTS

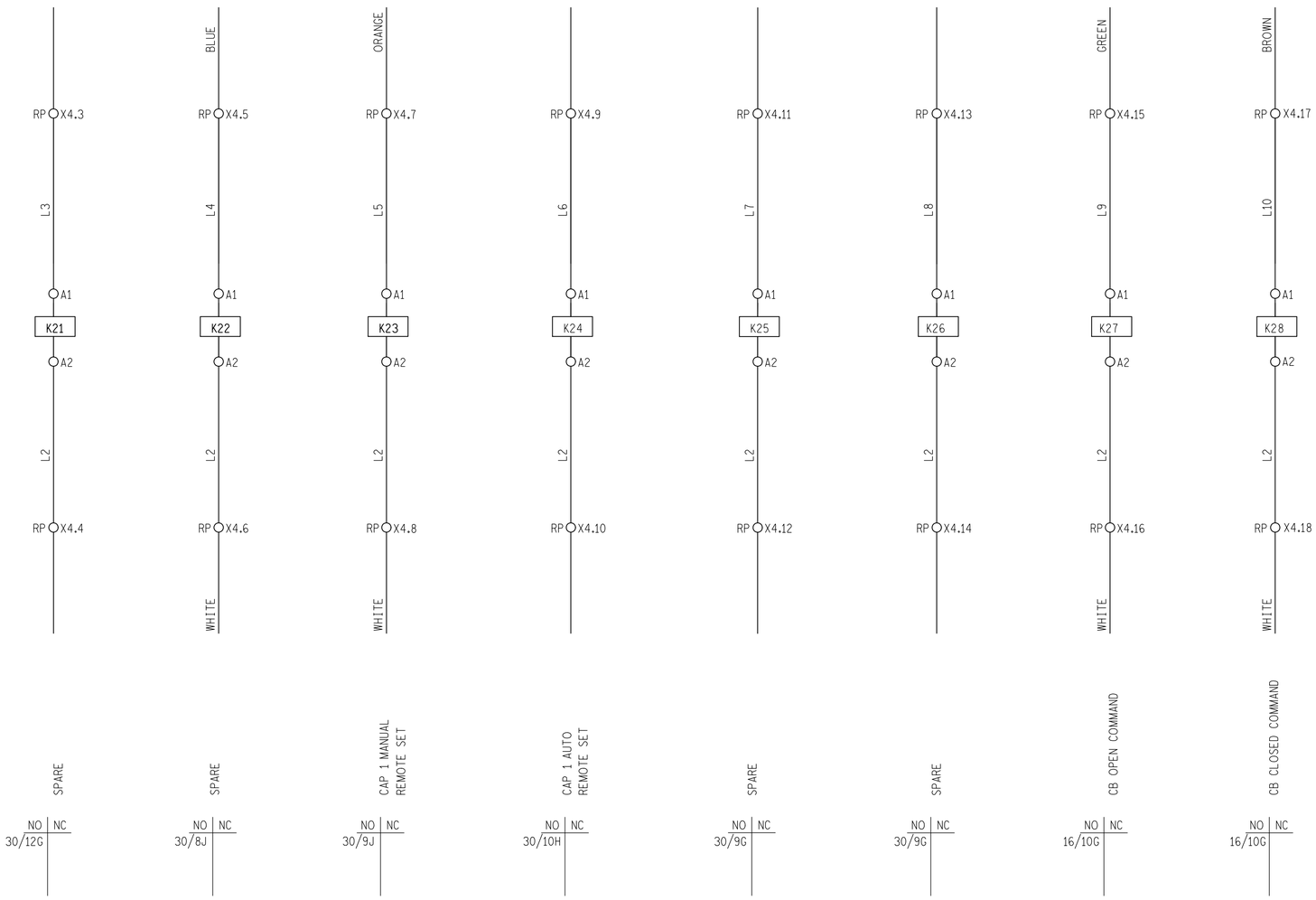
PROJECT APPROVED	D. PUDNEY
DESIGN APPROVED	
DATE	09/07/2012
PROJECT CHECKED	N.MOEKETSANE
DESIGN CHECKED	
DATE	09/07/2012
DRAWN BY	L.TSHABALALA
DRAWN BY	
DATE	14/09/2012
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
2-NR/22000	1	27	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
REMOTE TERMINAL UNIT OUTPUTS

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE

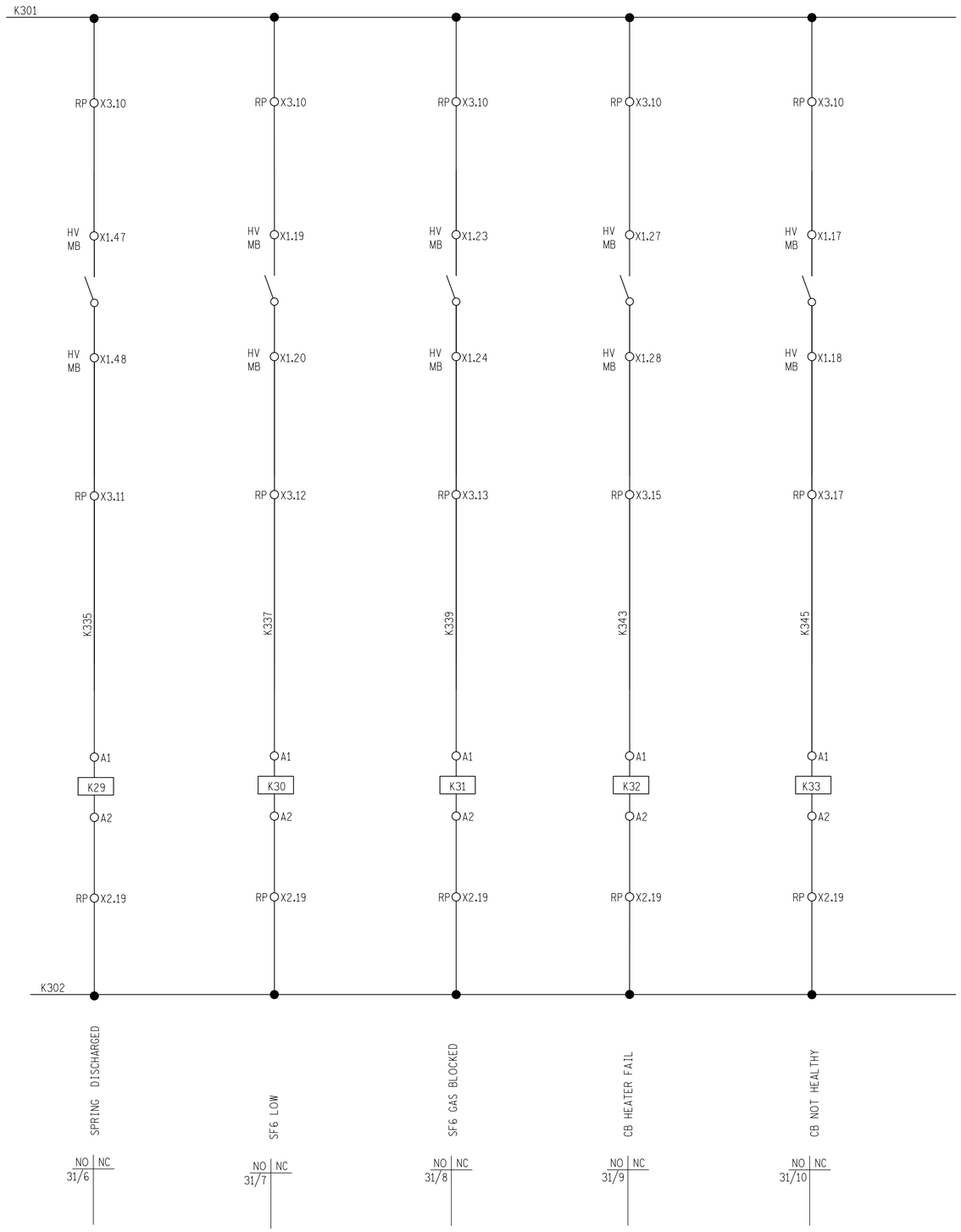
SCALE: N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	28	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
CIRCUIT BREAKER ALARMS

PROJECT APPROVED	D. PUDNEY
DATE	09/07/2012
DESIGN APPROVED	
DATE	
PROJECT CHECKED	N.MOEKETSANE
DATE	09/07/2012
DESIGN CHECKED	
DATE	
DRAWN BY	L.TSHABALALA
DATE	14/09/2012
DRAWN BY	
DATE	
SCALE:	N.T.S.

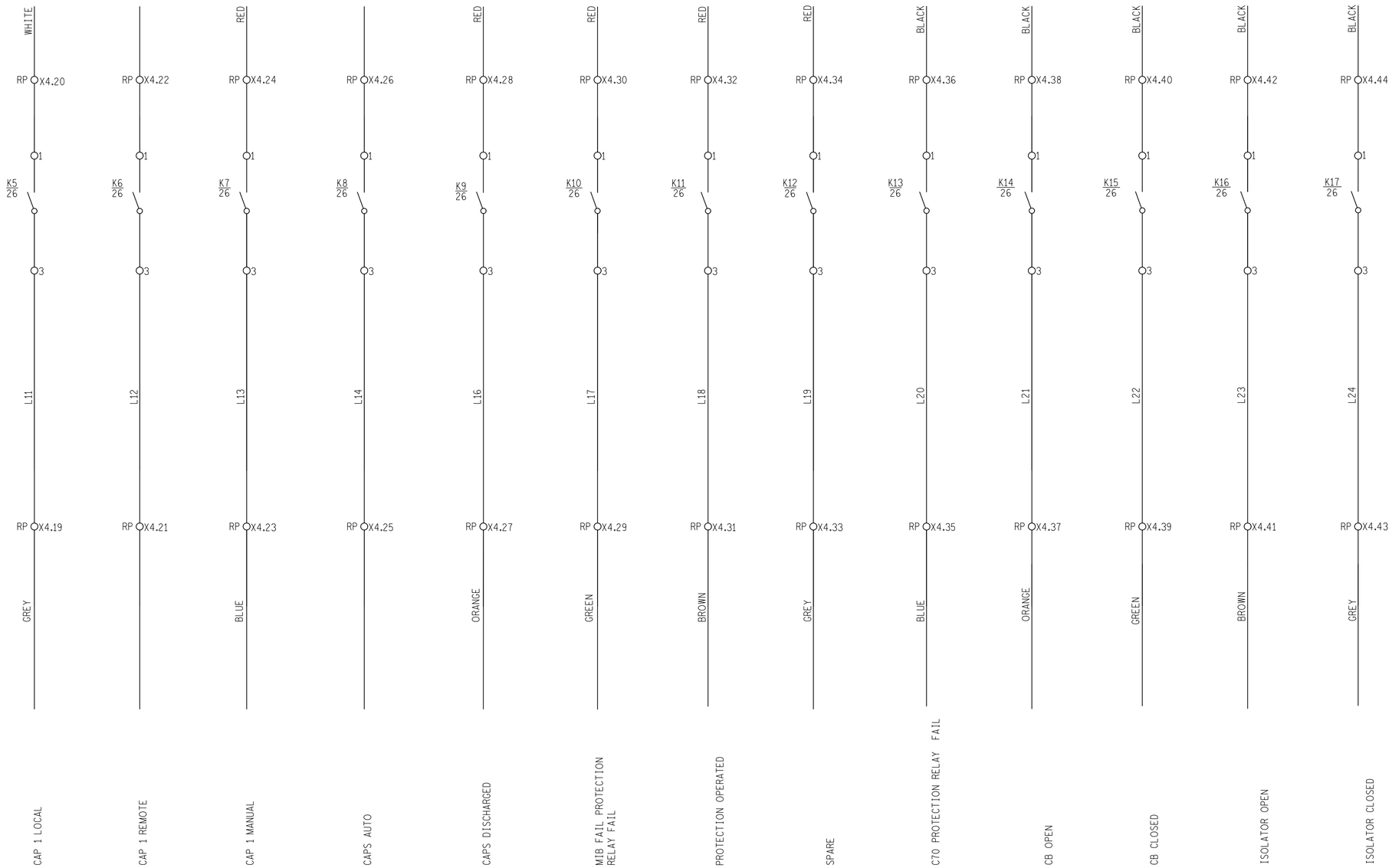
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000

SET NUMBER	SHEET NUMBER	REVISION
1	29	2

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
REMOTE TERMINAL UNIT INPUTS

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE

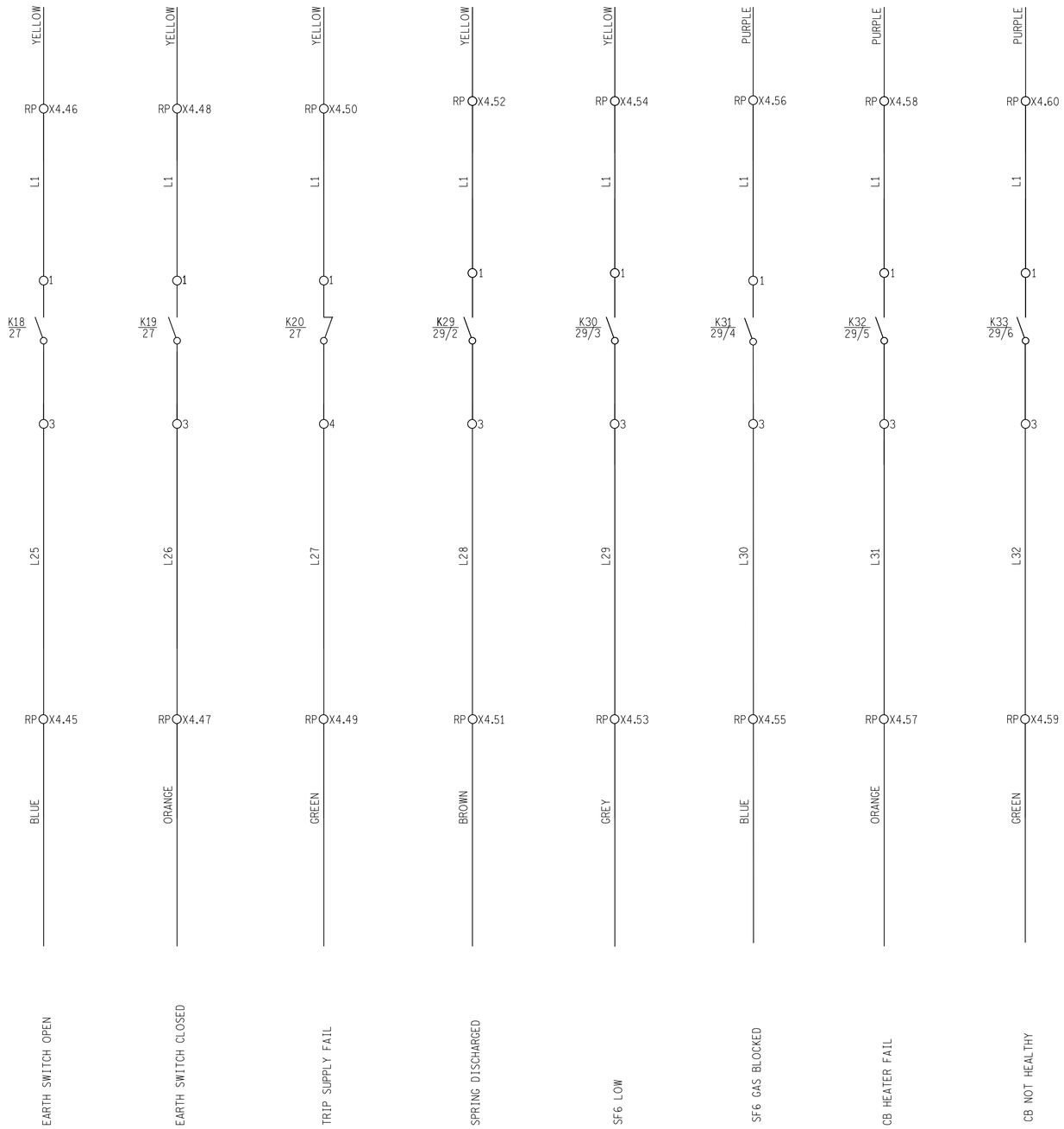
SCALE: N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	30	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
REMOTE TERMINAL UNIT INPUTS

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

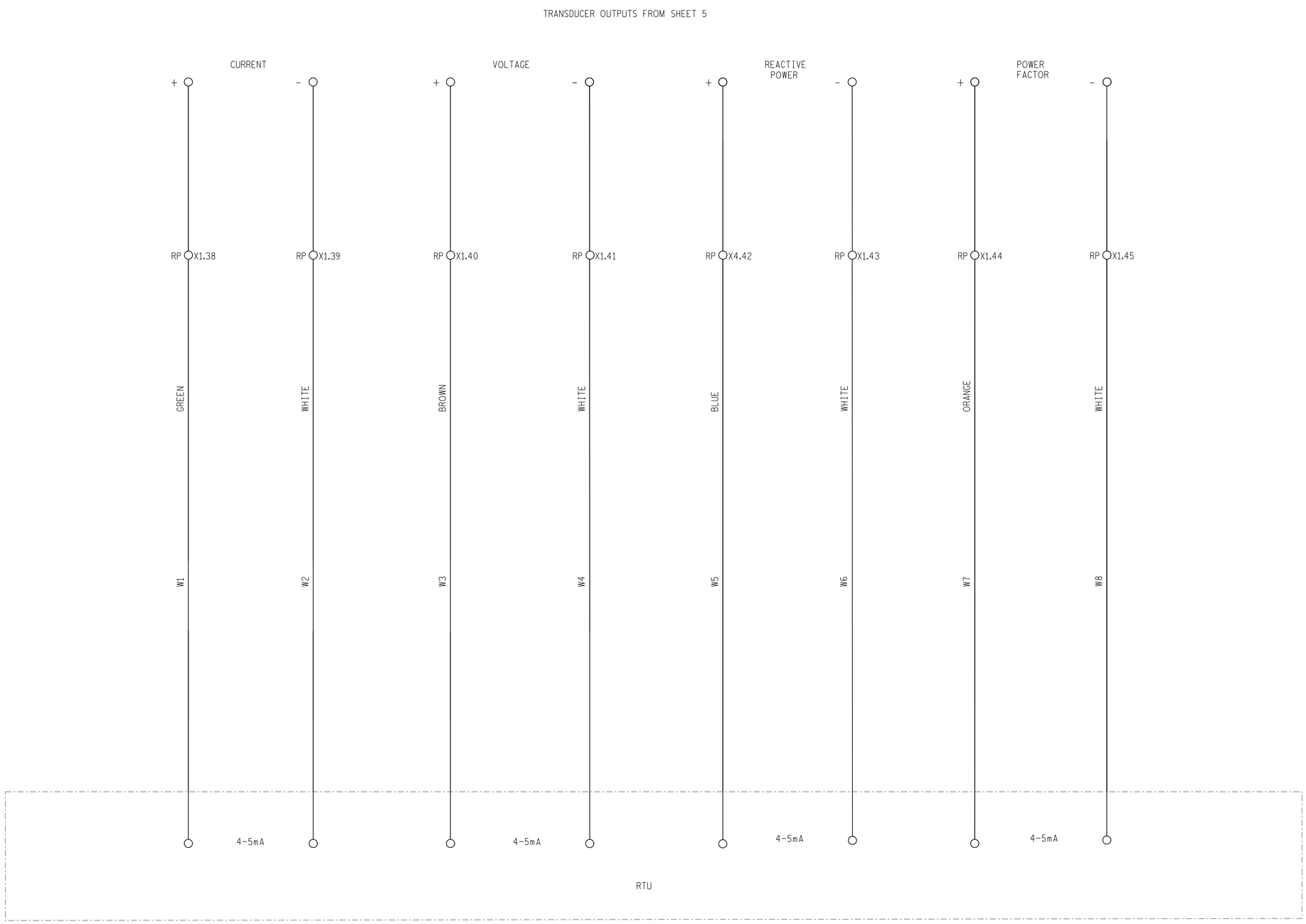
THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
1	31	2

2-NR/22000

SIZE GROOTTE A1L

LEVELS 1 10



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
TRANSDUCER ANALOGUE OUTPUTS

PROJECT APPROVED	DESIGN APPROVED
D. PUDNEY	
DATE 09/07/2012	DATE
PROJECT CHECKED	DESIGN CHECKED
N.MOEKETSANE	
DATE 09/07/2012	DATE
DRAWN BY	DRAWN BY
L.TSHABALALA	
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	32	2

SIZE GROOTTE A1L

LEVELS 1 10

						X1	
	WHITE					45	TRANSDUCER ANALOGUE OUTPUT
	ORANGE					44	
	WHITE					43	
	BLUE					42	
	WHITE					41	
	BROWN					40	
	WHITE					39	
	GREEN					38	
				B171		37	BUSZONE CT CHECK
				B151		36	
				B131		35	
				B111		34	
				B71		33	BUSZONE CT MAIN
				B51		32	
				B31		31	
				B11		30	
		E71A				29	CAPACITOR BANK CONTROL VT INPUT
		E51A				28	
		E31A				27	
		E11A				26	
						25	
						24	
						23	NEUTRAL UNBALANCED CT INPUT
			A370			22	
						21	
						20	
			A310			19	
						18	POINT ON WAVE CT INPUT
				D71		17	
				D51		16	
				D31		15	
				D11		14	
						13	REF CT INPUT
						12	
						11	
						10	
			C170			9	
			C110			8	
				C11		7	
				C71		6	
						5	CAPACITOR BANK PROTECTION CT INPUT
				A71		4	
				A51		3	
				A31		2	
				A11		1	

	C425	C418	C413	C403	CABLE NUMBER
	10	4	12	37	CABLE SIZE
	6	-	8	29	NUMBER OF SPARES
	IDF	88kV UCAR GELUK MINERALS FEEDER	CAPACITOR BANK MARSHALLING BOX	LINE CT JUNCTION BOX	DESTINATION

NOTES:

1. SPARE CABLE LEADS TO BE LONG ENOUGH TO REACH THE FURTHEST
2. LEAD NUMBERS SHOWN THUS
   P7 [ ] INDICATES NO CHANGE IN LEAD NUMBER
   P7 [ ] INDICATES CHANGE IN LEAD NUMBER
3. SEE CABLE BLOCK DIAGRAM FOR PREFIXING
4. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK CLOSED WHEN THE SECURING SCREW IS LOOSENED.
   UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10
   ⊂⊃ ENTRELEC D6/8-ST1-RS SLIDING LINK TEST TERMINAL.

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
PANEL CABLING DIAGRAM

PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	33	2

SIZE GROOTTE A1L

LEVELS 1 10

						X2	
						43	
						42	
						41	
						40	
						39	
						38	
						37	
						36	
						35	
						34	
						33	
						32	
						31	
				K395		30	EARTH SWITCH CLOSED INDICATION
				K394		29	EARTH SWITCH OPEN INDICATION
				K393		28	ISOLATOR CLOSED INDICATION
				K392		27	ISOLATOR OPEN INDICATION
				K391		26	CB CLOSED INDICATION
				K390		25	CB OPEN INDICATION
				K352C		24	BLUE PHASE CLOSING SIGNAL
				K352B		23	WHITE PHASE CLOSING SIGNAL
				K352A		22	RED PHASE CLOSING SIGNAL
						21	
						20	
				K302A		19	BACK UP TRIP
				K303A		18	
						17	
			J4			16	BACK UP DC SUPPLY
			J3			15	
						14	
						13	
				K101		12	110V DC POSITIVE
						11	
						10	
						9	
						8	
						7	
						6	
						5	
				K102A		4	MAIN TRIP
				K103A		3	
			J2			2	MAIN DC SUPPLY
			J1			1	
			C414	C412	CABLE NUMBER		
			4	37	CABLE SIZE		
					NUMBER OF SPARES		
			DC BOARD	CAPACITOR BANK MARSHALLING BOX	DESTINATION		

NOTES:

1. SPARE CABLE LEADS TO BE LONG ENOUGH TO REACH THE FURTHEST
2. LEAD NUMBERS SHOWN THUS
   P7 [ ] INDICATES NO CHANGE IN LEAD NUMBER
   P7 [ ] INDICATES CHANGE IN LEAD NUMBER
3. SEE CABLE BLOCK DIAGRAM FOR PREFIXING
4. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK CLOSED WHEN THE SECURING SCREW IS LOOSENED.
   UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10
   ⊂⊃ ENTRELEC D6/8-ST1-RS SLIDING LINK TEST TERMINAL.

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
PANEL CABLING DIAGRAM

PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
2-NR/22000	1	34	2

SIZE GROOTTE A1L

LEVELS 1 10

X3

			M102			56	SPRING CHARGE MOTOR SUPPLY
			M101			55	
						54	
				K302B		53	EARTH SWITCH MOTOR SUPPLY
				K301B		52	
						51	
						50	
						49	
						48	
						47	
						46	
						45	
				K370		44	EARTH SWITCH CLOSED INDICATION
				K369		43	EARTH SWITCH OPEN INDICATION
						42	
				K368		41	ISOLATOR CLOSED INDICATION
				K367		40	ISOLATOR OPEN INDICATION
						39	
				K366		38	CB CLOSED INDICATION
				K365		37	CB OPEN INDICATION
						36	
						35	
						34	
						33	
						32	
						31	
						30	
						29	
						28	
				K358		27	EARTH SWITCH CLOSED INDICATION
				K357		26	EARTH SWITCH OPEN INDICATION
						25	
				K356		24	ISOLATOR CLOSED INDICATION
				K355		23	ISOLATOR OPEN INDICATION
						22	
						21	
						20	
						19	
						18	
				K345		17	CB NOT HEALTHY
				K343		16	CB HEATER FAIL
						15	
						14	
				K339		13	EARTH SWITCH OPEN COMMAND
				K337		12	EARTH SWITCH CLOSED COMMAND
				K335		11	
						10	
				K333		9	CB CLOSED INDICATION
				K331		8	CB OPEN INDICATION
						7	
						6	
						5	
				K482		4	MAIN TRIP
				K481		3	
						2	ALARM POSITIVE
				K301		1	

			C414	C412	CABLE NUMBER
			4	37	CABLE SIZE
			2	2	NUMBER OF SPARES
			CAPACITOR BANK MARSHALLING KIOSK BOX	CAPACITOR BANK MARSHALLING KIOSK BOX	DESTINATION

NOTES:

1. SPARE CABLE LEADS TO BE LONG ENOUGH TO REACH THE FURTHEST
2. LEAD NUMBERS SHOWN THUS
   P7 [ ] INDICATES NO CHANGE IN LEAD NUMBER
   P7 [ ] INDICATES CHANGE IN LEAD NUMBER
3. SEE CABLE BLOCK DIAGRAM FOR PREFIXING
4. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK CLOSED WHEN THE SECURING SCREW IS LOOSENED.
   UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10
   ⊂⊃ ENTRELEC D6/8-ST1-RS SLIDING LINK TEST TERMINAL.

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
PANEL CABLING DIAGRAM

PROJECT APPROVED	D. PUDNEY
DATE	09/07/2012
DESIGN APPROVED	
DATE	
PROJECT CHECKED	N.MOEKETSANE
DATE	09/07/2012
DESIGN CHECKED	
DATE	
DRAWN BY	L.TSHABALALA
DATE	14/09/2012
DRAWN BY	
DATE	
SCALE:	N.T.S.

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

2-NR/22000	SET NUMBER	SHEET NUMBER	REVISION
	1	35	2

LEVELS 1 10

SIZE GROOTTE A1L

					X4	
				PURPLE	60	CB NOT HEALTHY
				GREEN	59	
				PURPLE	58	CB HEATER FAIL
				ORANGE	57	
				PURPLE	56	SF6 GAS BLOCK
				BLUE	55	
				YELLOW	54	SF6 GAS LOW
				GREY	53	
				YELLOW	52	SPRING DISCHARGED
				BROWN	51	
				YELLOW	50	SPRING SUPPLY FAIL
				GREEN	49	
				YELLOW	48	EARTH SWITCH CLOSED
				ORANGE	47	
				YELLOW	46	EARTH SWITCH OPEN
				BLUE	45	
				BLACK	44	ISOLATOR CLOSED
				GREY	43	
				BLACK	42	ISOLATOR OPEN
				BROWN	41	
				BLACK	40	CB CLOSED
				GREEN	39	
				BLACK	38	CB OPEN
				ORANGE	37	
				BLACK	36	C70 PROTECTION RELAY FAIL
				BLUE	35	
				RED	34	
				GREY	33	
				RED	32	PROTECTION OPERATED
				BROWN	31	
				RED	30	MIB REF PROTECTION RELAY FAIL
				GREEN	29	
				RED	28	CAPACITOR BANK DISCHARGED
				ORANGE	27	
					26	
					25	
				RED	24	CAP 1 MANUAL
				BLUE	23	
					22	
					21	
				WHITE	20	CAP 1 LOCAL
				GREY	19	
				WHITE	18	CB CLOSE COMMAND
				BROWN	17	
				WHITE	16	CB OPEN COMMAND
				GREEN	15	
					14	
					13	
					12	
					11	
				WHITE	10	CAP 1 AUTO COMMAND
				ORANGE	9	
				WHITE	8	CAP 1 MANUAL COMMAND
				BLUE	7	
					6	
					5	
					4	
					3	
			H2		2	PANEL LIGHTING SUPPLY
			H1		1	

			C415	C419		CABLE NUMBER
			4	25		CABLE SIZE
			2	2		NUMBER OF SPARES
			AC BOARD	IDF		DESTINATION

NOTES:

1. SPARE CABLE LEADS TO BE LONG ENOUGH TO REACH THE FURTHEST
2. LEAD NUMBERS SHOWN THUS
   P7 [ ] INDICATES NO CHANGE IN LEAD NUMBER
   P7 [ ] INDICATES CHANGE IN LEAD NUMBER
3. SEE CABLE BLOCK DIAGRAM FOR PREFIXING
4. SLIDING LINK TERMINALS ARE TO BE ORIENTED SUCH THAT THE LINK CLOSED WHEN THE SECURING SCREW IS LOOSENED.
   UNLESS INDICATED OTHERWISE, STANDARD TERMINALS: ENTRELEC M10/10
   ENTRELEC D6/8-ST1-RS SLIDING LINK TEST TERMINAL.

SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
PANEL CABLING DIAGRAM

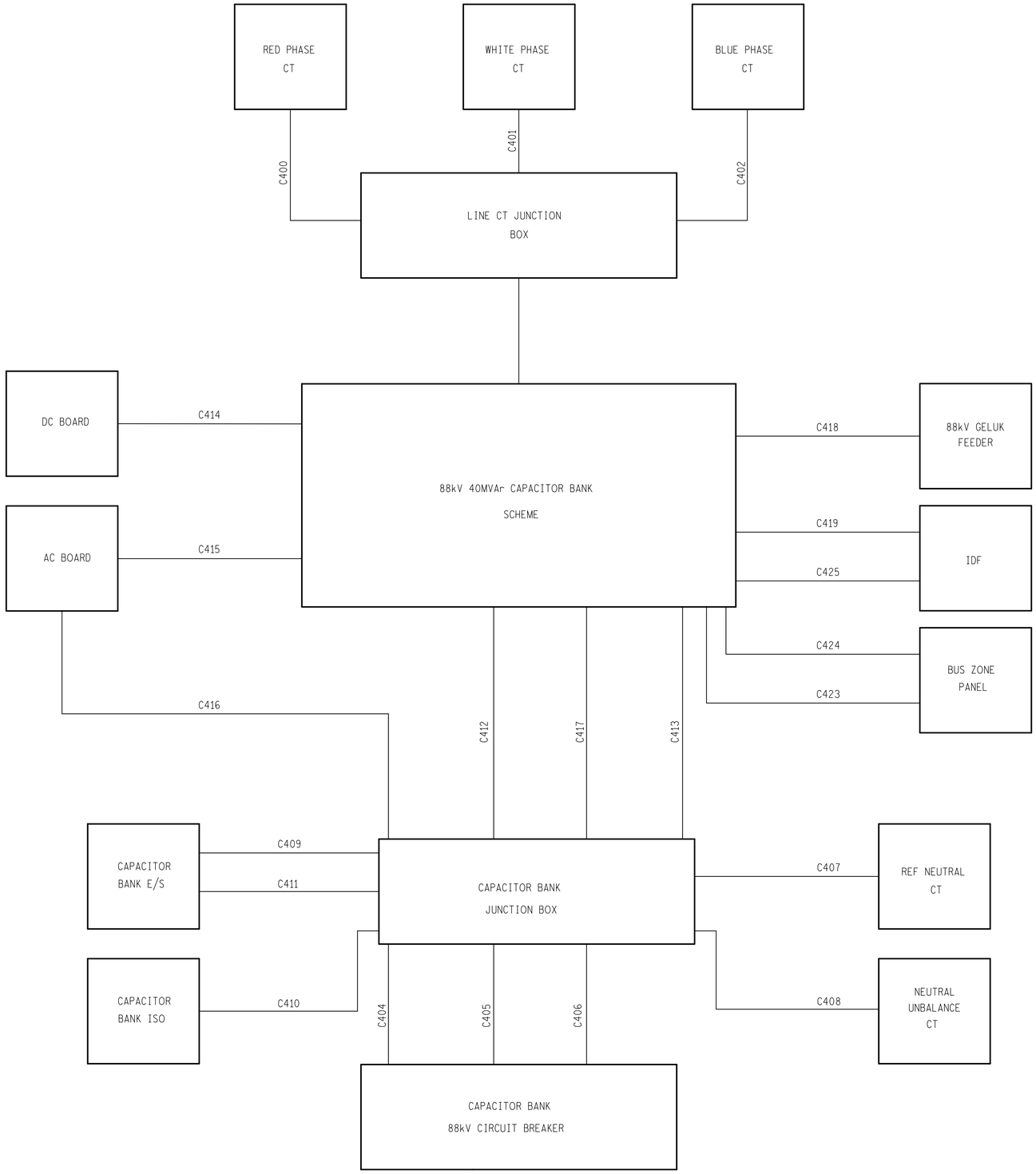
PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
2-NR/22000	1	36	2

LEVELS 1 10

SIZE GROOTTE A1L



SHT NO	ITEM
37	CABLE BLOCK DIAGRAM
36	PANEL CABLING DIAGRAM
35	PANEL CABLING DIAGRAM
34	PANEL CABLING DIAGRAM
33	PANEL CABLING DIAGRAM
32	TRANSDUCER ANALOGUE OUTPUTS
31	REMOTE TERMINAL UNIT INPUTS
30	REMOTE TERMINAL UNIT INPUTS
29	CIRCUIT BREAKER ALARMS
28	REMOTE TERMINAL UNIT OUTPUTS
27	REMOTE TERMINAL UNIT INPUTS
26	REMOTE TERMINAL UNIT INPUTS
25	SPRING CHARGING MOTOR AC,DC
24	OPERATING HEATER AUXILIARY
23	CB SPRING CHARGE MOTOR CIRCUIT
22	ANTICONDENSATION
21	AUXILIARY CIRCUIT
20	MOTOR CIRCUIT
19	MOTOR CIRCUIT ISOLATOR
18	SPRING CHARGING MOTOR AC,DC
17	CAP BANK ALARMS AND INDI.
16	BACK UP DC KEY DIAGRAM
15	BACK UP DC KEY DIAGRAM
14	MECHANISM FSA TRIP CIRCUIT 2
13	BACK UP DC KEY DIAGRAM
12	INPUT & OUTPUT
11	INPUT & OUTPUT
10	BACK UP DC KEY DIAGRAM
9	INPUT & OUTPUT
8	MAIN DC KEY DIAGRAM
7	VT SUPPLY KEY DIAGRAM
6	UNBALANCED CAP AC KEY DIAG.
5	CAP STAR POINT AC KEY DIAG.
4	AC KEY DIAGRAM
3A	PANEL CUTOUTS
3	PANEL LAYOUT
2	SINGLE LINE DIAGRAM
1	COVER PAGE

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	REFERENCE DRAWINGS
2	AS BUILT					

Eskom Distribution

DISTRIBUTION
NORTHERN ENGINEERING DIVISION
PROTECTION & METERING

BRITS INDUSTRIES SUBSTATION

88kV 40MVAr CAPACITOR BANK
CABLE BLOCK DIAGRAM

PROJECT APPROVED: D. PUDNEY	DESIGN APPROVED
DATE 09/07/2012	DATE
PROJECT CHECKED: N.MOEKETSANE	DESIGN CHECKED
DATE 09/07/2012	DATE
DRAWN BY: L.TSHABALALA	DRAWN BY
DATE 14/09/2012	DATE
SCALE: N.T.S.	

THIS DRAWING HAS BEEN CREATED ON A C.A.D. SYSTEM AND ANY AMENDMENT TO THE DRAWING MUST BE EFFECTED ONLY ON THE SAME C.A.D. SYSTEM

SET NUMBER	SHEET NUMBER	REVISION
2-NR/22000	1	37	2

SIZE GROOTTE A1L

LEVELS 1 10