SCHEDULE - B

GUARANTEED TECHNICAL PARTICULARS FOR 33KV VACUUM CIRCUIT BREAKERS

Sl No.	Description	33KV VCBs (1600A)
1	a)Makers's name and country of manufacture	Crompton Greaves Limited India
	b) Manufacturer's type designation	33KV Outdoor VCB
2	Applicable Technical Standards	IEC-62271-100/ IS:13118
3	a) Rated Voltage (KV)	36
	b) Frequency (HZ)	50
4	Number of poles	3
5	Class (Outdoor /Indoor)	Outdoor
6	Rated normal current : a) Under site conditions (Amps)	1600A
	b) Rated (Amps)	1600A
7	Rated short circuit breaking current	
	a) RMS value of AC component of rated short circuit current (kA)	25
	b) Percentage DC Component	<50% DC component
	c) Asymmetrical breaking current (including DC component	As per IS:13118/1991/ IEC-62271-100
	d) Certificate or report No	2008TC00701,2008TC00798
	e) Oscillogram	As per type test report
8	Rated short circuit making current (kA)	62.5
9	First pole to clear factor	1.5
10	Rated transient recovery voltage for terminal faults	As per IS:13118/1991/IEC-62271-100
11	Rated characteristics for short line faults	Applicable for breakers of rated voltage more than 52KV only as per IEC
12	Rated operating sequence	O - 0.3sec -CO -3min -CO
13	Rated duration of short circuit (Sec)	3sec
14	Rated out of phase breaking current (kA)	6.46kA
15	Opening time (ms)	< 40ms
16	Arcing time (ms)	
	a)at 10% rated breaking current	20ms max
	b) at 25% rated breaking current	20ms max
	c) at 50% rated breaking current	20ms max
	d) at 100% rated breaking current	20ms max
17	Break time (ms)	
	a)at 10% rated breaking current	60ms max
	b) at 25% rated breaking current	60ms max
	c) at 50% rated breaking current	60ms max
	d) at 100% rated breaking current	60ms max
18	Closing time (ms)	100ms max.
19	Maximum pole discrepancy time	
	a) Opening (ms)	Not applicable as breaker offered is of gang operated type

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	b) Closing (ms)	Not applicable as breaker offered is of gang operated type
20	Rated line charging breaking current (kA)	Applicable for breakers of rated voltage more than 52KV only as per IEC
21	Maximum cable charging current	
	a)On supply side	50A
	b) On line side	50A
22	Rated small inductive breaking current (kA)	As per clause no 4.112 of IS:13118/1991/ IEC-62271-100
23	Maximum rise of temperature over ambient temperature for current rating under clause 6	Within limits of IS:13118/1991/ IEC-62271-100
24	Interrupting capacity based on duty cycle As per clause no 11	
	a) AC Component (kA)	25
	B) Percentage DC component	<50% DC component
25	Latching current (kA)	Not Applicable
26	Number of breaks in series per pole	one
27	Length of contact travel (mm)	22 (+2,-2)mm
28	Total length of break per pole (mm)	22 (+2,-2)mm
29	Rate of contact travel	
	a) At tripping (meters/sec)	1.0 to 1.5
	b) At closing (meters/sec)	0.7 to 1.2
30	Type of device ,if any used, to obtain uniform voltage distribution between breaks	Not applicable
31	Recovery voltage distribution between breaks in percentage of rated voltage	Not applicable
	a)single line to ground faults	Not applicable
	b)Interruption of short lines	Not applicable
	c) Switching off unloaded transformers	Not applicable
32	Type of main contacts	BUTT Shaped
33	Type of arcing contacts or arc control device	Not Applicable for VCB
34	Material of contacts	
	a) Main	Copper chromium alloy
	b) Arcing	Not applicable for VCB
	c) Auxiliary	Copper
35	Whether contacts silver plated	Main contacts not silver plated
36	Thickness of silver plating	Adequate
37	Contact pressure	Adequate
38	Insulation level of breaker	
	i)1minute power frequency withstand voltage (kV rms)	70
	ii)Switching surge withstand test voltage (kVpeak)	170
	iii) Impulse withstand test voltage (kpeak)	170
	iv) Maximum dynamic p.f.over voltage withstand (kVpeak)	170
39	Minimum Clearance in air	

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	a)Between phases (mm)	420mm
	b) Between live parts to earth(mm)	380mm
	c) Centre to centre distance between phases	700mm
	d) The safe boundaries during a breaking operation for circuit breakers within external exhaust for ionized gases or flames	Not Applicable
40	Whether circuit breaker is suitable for fixed trip, operation or trip free operation and it is provided with a lock out devices preventing closing of breaker	Trip Free, lock out device not applicable
41	Method of closing	
	a)Normal	Mechanical /electrical
	b) Emergency	Mechanical ON/OFF
42	Type of closing mechanism	Motorised spring closing mechanism
43	a)Normal voltage of closing	220VDC
	b) Pick up range	85% to 110% of 220VDC
44	a) Normal voltage of closing	220VDC
	b) Pick up range	85% TO 110% OF 220VDC
	c) Power at normal voltage of closing mechanism (watts)	600W maximum
	d) Power at 85% of normal voltage (watts)	600W maximum
45	Type of tripping mechanism	Spring
46	Normal voltage of tripping coils(Volts)	220VDC
47	a)Power at normal voltage for tripping coils(watts)	600W maximum
	b) Power at 70% normal voltage for tripping coils (watts)	600W maximum
48	Arc duration at 100% (ms) interrupting capacity:	
	a) Opening arcing time ,no of loops and time including resistor current duration (cycle) Resistor current duration	Not applicable since concealed Vacuum Interrupter
	Resistor current duration (Cycle)	Not applicable since concealed Vacuum Interrupter
	Total length of arc	Not applicable since concealed Vacuum Interrupter
	Total interruption time measured from instant of trip coil energisation to arc extinction resistor current	Not applicable since concealed Vacuum Interrupter
	b) Closing time measured from instant of application of power to closing device up to arcing contacts touching (cycles)	Not applicable since concealed Vacuum Interrupter
49	Critical current (current giving longest arc when break takes place)kA	As per IS/IEC
50	a) Recovery voltage when circuit breaker is tested at 100% rated breaking capacity (kVinst)	As per IS/IEC
	b) Rate of rise of restriking voltage at breaking	
	i)for 30% breaking capacity(kV/micro-sec)	As per IS/IEC
	ii)for00% breaking capacity(kV/micro-sec)	As per IS/IEC

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	c) Maximum over voltage factor of the circuit breaker when switching off	
	i) Unloaded transformer	As per IS/IEC
	ii) Loaded transformers	As per IS/IEC
	iii) Open circuited lines	As per IS/IEC
51	When switching synchronous system a) Maximum current (kA)	Not applicable
	b) Maximum contacts of 1 pole (kV	Not applicable
52	No of opening the circuit breaker is capable of performing without inspection ,replacement of contacts or other main parts	
	a) at 30% rated current	10000
	b) at 100% rated current	10000
	c) at current corresponding to 50% rated breaking capacity	300
	d) at current corresponding to 100% rated breaking capacity	100
53	a)Weight of complete circuit breaker (kg)	700kg approx.
	b) Impact loading for foundation design include dead load, plus impact value on opening at maximum interrupting rating in terms of equivalent static loads	900kg
	c) Overall dimensions Height(mm); Width (mm) ; Length (mm)	As per G.A.Diagram PV1741GB enclosed with list of enclosures
54	Porcelain	
	a) Make	Birla NGK/ Vishal / Jaipur glass/ Ravi Kiron/CJI Porcelain
	b) Type	Hollow
	c) Descriptive pamphlet	-
	d) Weight	26kg approx
	e) Transport dimensions	As per manufacturer's standard
	f) Height above floor required to remove porcelain (mm)	3646mm +/-10%
	g) Insulation class	36KV
	h) One minute dry power frequency withstand kV rms	70
	i) 10sec wet power frequency withstand kV rms	70
	j)flash over voltage (kV)	>70
	k)Full wave impulse withstand voltage kVpeak	170
	l)Switching surge withstand voltage kVpeak	170
	m) Corona discharge voltage (kVrms)	Not Applicable
	n)Nature of dielectric	Air
	o) Creepage distance Total Protected	 900mm minimum Not Applicable
	p) Volume of insulating medium per porcelain (liters)	Not applicable
	q) Permissible safe cantilever loading on installed porcelain(kg-m)	2000kg

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55	Operating mechanism	
	a) Mechanically operated or pneumatically operated or hydraulically operated	Mechanically operated
	b)For stored energy mechanism	
	1. Spring charging motor	
	i) Rating kW	300W maximum
	ii) Voltage	230VAC
	iii)Power Frequency withstand voltage	2KV for one minute
	iv) Time required for the motor to charge the springs fully	less than 15sec
	v) Power required at the normal voltage to charge the springs fully	300W maximum
	vi) Specifications Reference	IS:996
	2 Spring Closing /opening	
	i) Number of springs	2
	ii) Type	Helical
	iii) Number of turns	As per design of manufacturer
	iv) Guage	
	v) External diameter	
	vi) Stiffness	
	vii) Materials	
	viii) Force developed in full charged position	
	ix) Specification ref	
56	Details of Vacuum for 33KV VCB	
	a) Make of vacuum bottle/interrupter	Crompton Greaves Ltd
	b) Pressure maintained in the vacuum interrupter	10^{-6} Torr
	c) Gap between the contacts in vacuum	22(+2,-2)mm
	d) Area of contacts	As per design
	e) Allowable increase in vacuum interrupter	Not applicable
	f)Measure if any to be taken for maintaining normal pressure in the vacuum interrupter	No, vacuum interrupter to be replaced after contact erosion exceeds specified limits of 3mm
	g) Periodically maintenance of the following	
	i) For maintaining vacuum interrupter chamber	No, vacuum interrupter to be replaced after contact erosion exceeds specified limits of 3mm
	ii) For changing contacts	Periodic lubrication of mechanism moving parts required
	iii) Other maintenance sphedule if any	None
	h) Method of checking pressure in the vacuum interrupter and procedure to check up	power frequency high voltage test
57	No of auxiliary contacts provided	
	a) those closed when breaker is closed	12
	b) those open when breaker is closed	12
	c) Those adjustable with respect to position of main	Not adjustable

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	contacts	
	d) Continuous rating of contacts	10A at 220VDC
	e) Breaking capacity of contacts	2.5A
58	Whether equipments covered by this bid have been fully type tested and if so whether the copies of the type test report enclosed with bid offer	Yes

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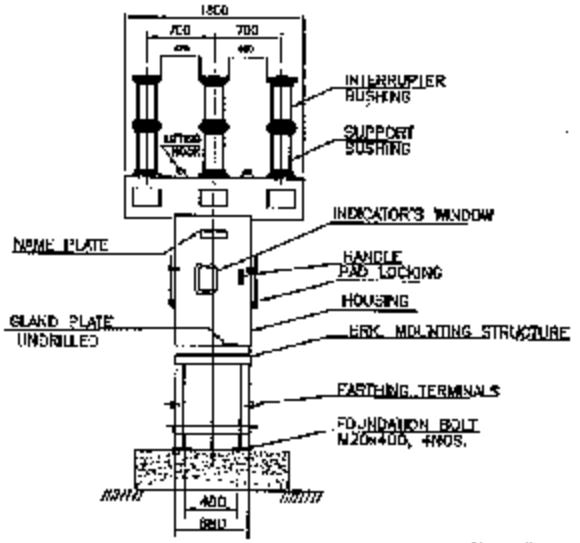
CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD

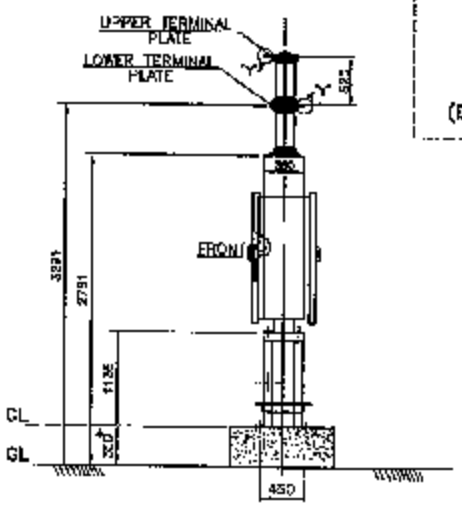
APTRANSCO	Standardised Drawing for 36 kV Vacuum Circuit Breaker (M/s Crompton Greaves Ltd.,)
	STD/GTP-DWG/Approval No. 248-1- 6 sheets Revision No. 0
	Prepared & Approved during November – 2011
Customer ref : APTRANSCO	
Title: GTP for 33 kV VCBs	

Standardised Drawing for 36 kV Vacuum Circuit Breaker
(M/s Crompton Greaves Ltd.,)
STD/GTP-DWG/Approval No. 248-2-1 sheet Revision No. 0
Prepared & Approved during November – 2011
Customer ref : APTRANSCO
Title: GA for 36 kV Outdoor PCVCB

DRG. NO. PV33KVGB



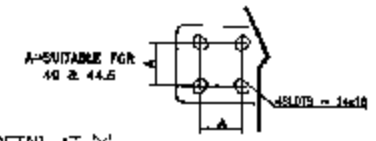
FRONT VIEW.



GL:- GROUND LEVEL
CL:- CONCRETE LEVEL

SIDE VIEW.

LOWER & UPPER TERM. PLATE OF 22mm THICK.



DETAIL AT 'Y'

(DETAILS OF PALM OF LOWER & UPPER TERMINAL PLATES)

NOTES:

1) TOTAL WEIGHT :- 550Kg.(APPROX.)
2) FINISH:- LIGHT GREY PAINT SHADE 631 OF IS-5 IS:5 AND HOT DIP GALVANISING FOR BRK MTG STRUCTURE.
3) TOTAL CREEPAGE DISTANCE : (25mm/kV.)
4) OPERATION COUNTER,MECHANICAL ON-OFF, SP.CHARGE/DISCHARGE INDICATOR,SPRING CHARGING HANDLE AND WIPE GAUGE ARE PROVIDED.
5) 2.5mm Sq. INSULATED BLACK WIRE WILL BE USED FOR WIRING.
6) CABLE GLANDS,TERMINAL CONN. ARE IN SCOPE OF CGL'S SUPPLY.
8) FOR DETAILS OF APPARATUS REFER SHEET P92435
9) MAKE OF VACUUM INTERRUPTER : CGL

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BREAKER SR.NO. :

CHIEF ENGINEER / CONSTRUCTION-I
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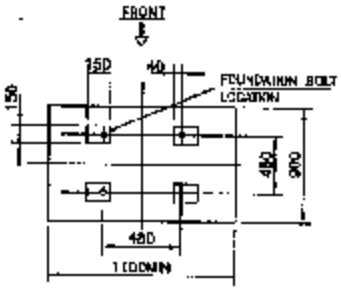
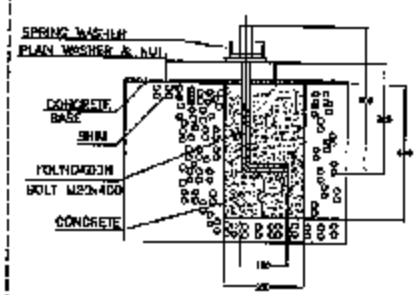
RATING:-

RATED VOLTAGE	:- 36kV
RATED CURRENT	:- 1600Amp
BASIC INSULATION	:- 70kV.rms/170kVpk
BREAKING CAPACITY	:- 25kA rms
SHORT TIME RATING	:- 25kA rms FOR 3 SEC.
SYSTEM	:- 33kV,50Hz.EFFECTIVELY EARTHED

FOUNDATION PLAN DETAILS



DETAILS OF FOUNDATION BOLTS



NO.	REVISION	DATE
2a		

CUSTOMER : APTRANSCO
W.O.No. :

	SIGN	NAME	DATE
DRN.		SPS	30.08.11
APPD.		PVD	30.09.11

TOLERANCE UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS IN mm | SCALE: NTS

THIRD ANGLE PROJECTION

GENERAL ARRANGEMENT FOR 36kV-OUTDOOR PCVCB

CROMPTON GREAVES LTD
52-W SWITCHGEAR BDVN.
SWITCHGEAR COMPLEX,
A-3, MIDC ANDHERI, MUMBAI-93.

DRG. NO. PV33KVGB | REV 0

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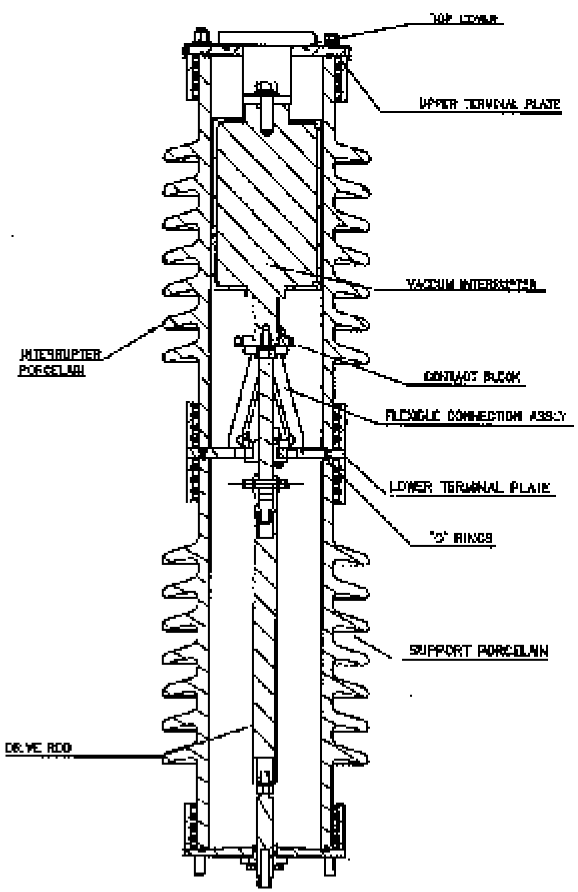
IF IN DOUBT ,ASK.

DRG. NO PV33KVGB1

POLE UNIT ASSLY-CROSS SECTIONAL VIEW



RATING LABLE (STICKER) DETAILS

PORCELAIN CLAD VACUUM CIRCUIT BREAKER

CROMPTON GREAVES LTD.
Medium Voltage Switchgear Divn.
Ambad, Nashik-422010.
MADE IN INDIA

CIRCUIT BREAKER TYPE	36PV25A	RATING TO : IEC62271-100			SR.NO	##	
VOLTAGE	36000 V	BREAKING CAPACITY	25	kA			
CURRENT	1600 AMP	MAKING CAPACITY	62.5	kAp	@	YEAR	
FREQUENCY	50 Hz	SHORT TIME CURRENT	25	kA FOR	1	SEC	
NO OF POLES	3	DC. COMPONENT	50%	BIL	70/170	kVp	
SHUNT TRIP	** VDC			CLOSING COIL	**	VDC	
OPERATING SEQUENCE/DUTY : O-0.3Sec-CO-3Min-CO							

** 220V DC

@ MONTH AND YEAR OF JOB PLANNED e.g. JAN 10

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CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD.

NO.	ZN	REVISION	DATE
3			
2			
1			

CUSTOMER : APTRANSCO			
W.O.No. :			
	SIGN	NAME	DATE
DRN.		TDB	10.09.11
APPD.		PVD	10.09.11
SHEET 2 OF 2			
TOLERANCE ON DIMENSIONS			
ALL DIMENSIONS IN mm	SCALE: NTS		

THIRD ANGLE PROJECTION

G.A.FOR 36kV-OUTDOOR PCVCB CROSS SECT.VIEW OF POLE & RATING PLATE DETAILS

CROMPTON GREAVES LTD.

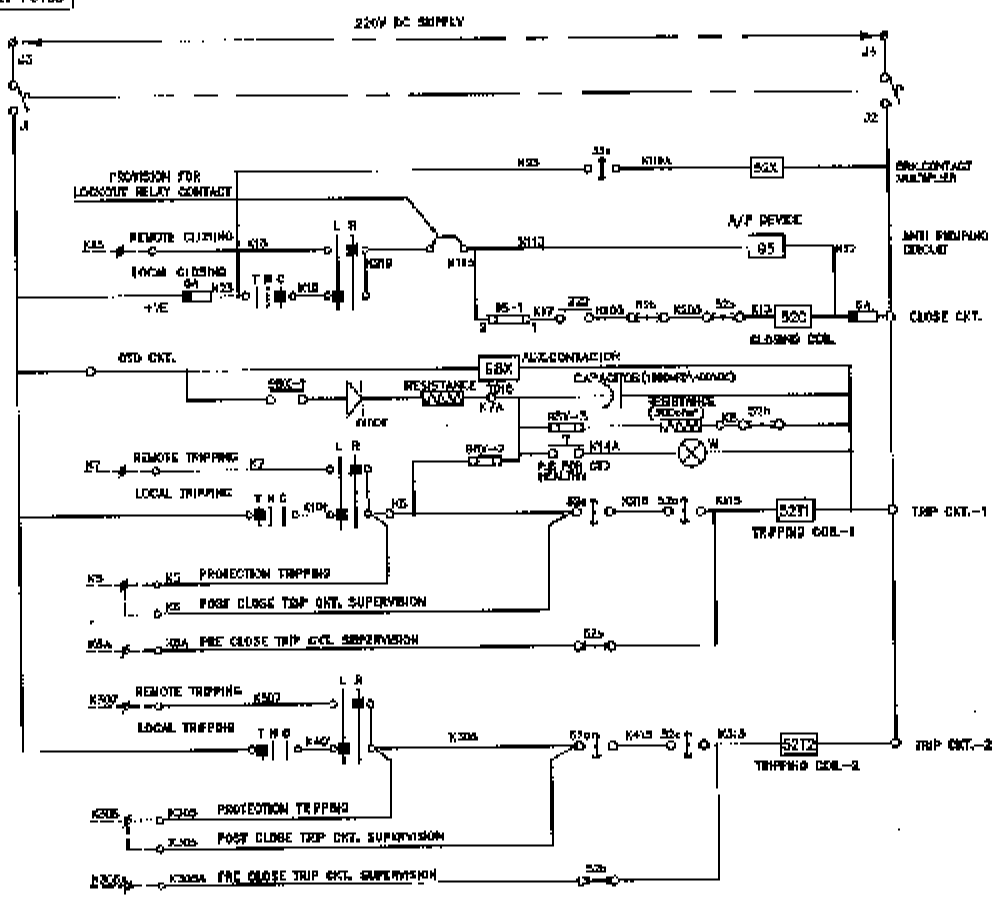
DRG. NO. PV33KVGB2 REV. 0

Standardised Drawing for 36 kV Vacuum Circuit Breaker
(M/s Crompton Greaves Ltd.,)
STD/GTP-DWG/Approval No. 248-3-1 sheet Revision No. 0
Prepared & Approved during November – 2011
Customer ref : APTRANSCO
Title: Cross Sectional View of Pole & Rating Plate details

IF IN DOUBT, ASK

DRG. NO. PV33KVSC REV. 0

USED: 36kV-PCVCB



LEGENDS :

∅	TERM. BLOCKS FOR REMOTE CONNECTION
ZZ2	CLOSES WHEN SPRINGS ARE CHARGED
52a	VCB OPERATED N/O CONTACT
52b	VCB OPERATED N/C CONTACT
LR	LOCAL/REMOTE SWITCH, STAYPUT TYPE
TNC	BRK. CONTROL SWITCH, SPRING RETURN TYPE
95	ANTIPUMPING DEVICE
MCB	2POLE , MCB
52C	CLOSING COIL
52T1/2	TRIPPING COILS
52X	BREAKER AUX.CONTACT MULTIPLIER-CONTACTOR
CTD	CAPACITOR TRIPPING DEVICE

FOR DETAILS OF APPARATUS REFER BILL OF MATERIAL

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CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD.

NOTES : 1) PROTECTION TRIP IS INDEPENDENT OF THE POSITION OF LOCAL/REMOTE SWITCH
2) AUX. VOLTAGE : 220V DC
3) □ : TERML BLOCK AT THE BREAKER PANEL (HOUSING)
4) ∅ : TERML BLOCK AT THE REMOTE CONTROL & RELAY PANEL

NO.	ZN	REVISION	DATE
3			
2			
1			

CUSTOMER : APTRANSCO
W.O.NO. :

	SIGN	NAME	DATE
DRN.		TDB	10.09.11
APPD.		PVD	10.09.11

SHEET 1 OF 2

SCHEMATIC DIAGRAM FOR 36kV-OUTDOOR PCVCB

CROMPTON GREAVES LTD.

DRG. NO. PV33KVSC REV. 0

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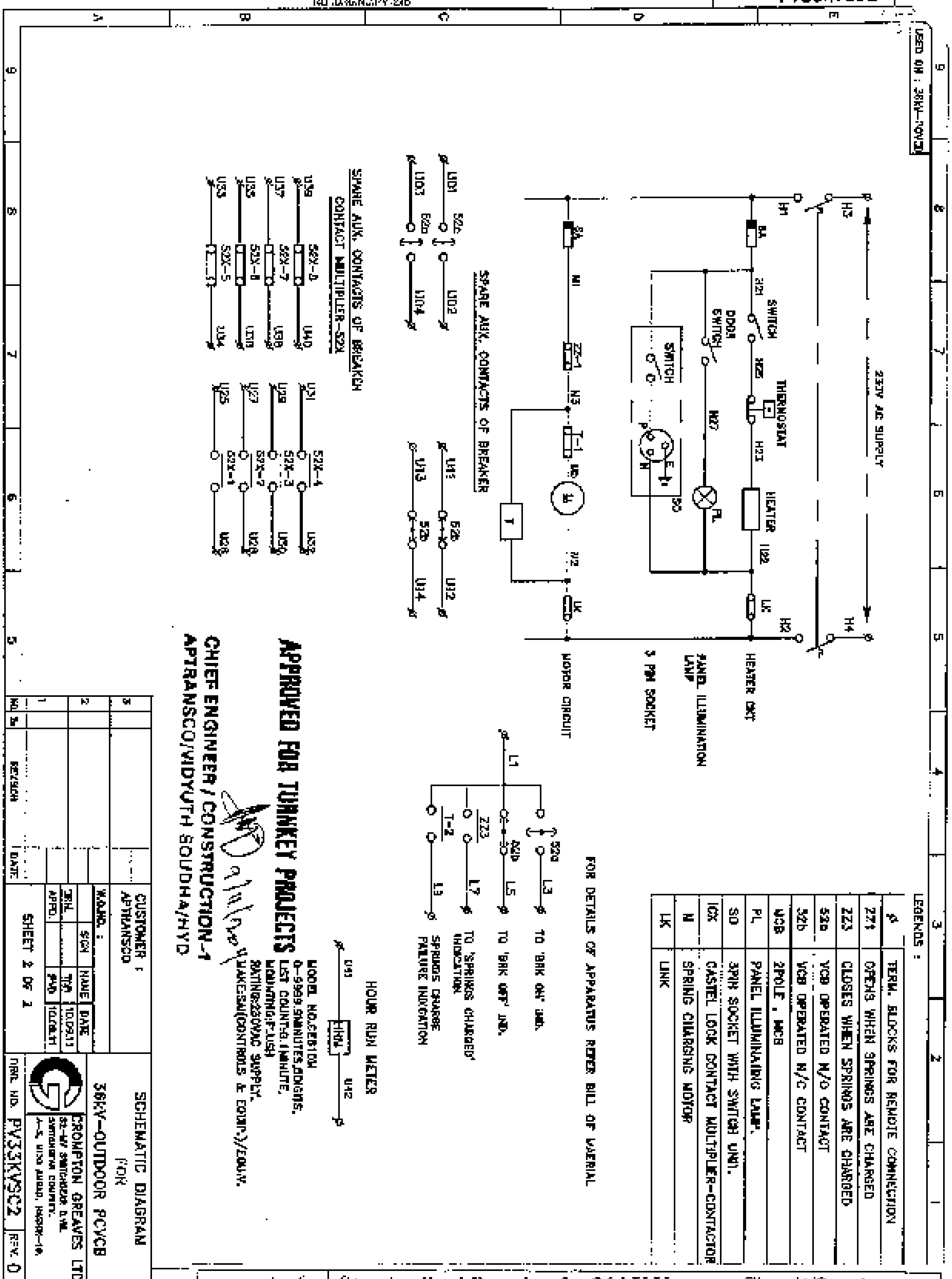
IF IN DOUBT, ASK

DWG NO. PV33KVSC2



SPARE AUX. CONTACTS OF BREAKER
SPARE AUX. CONTACTS OF BREAKER CONTACT MULTIPLIER-52X
230V AC SUPPLY
THERMOSTAT
HEATER
HEATER CKT
PANEL ILLUMINATION LAMP
3 PIN SOCKET
MOTOR CIRCUIT
APPROVED FOR TURNKEY PROJECTS
CHIEF ENGINEER / CONSTRUCTION-I
APTRANSCO/VIDYUTH SOUDHA/HYD
HOUR RUN METER
TO 'BRK ON' IND.
TO 'BRK OFF' IND.
TO 'SPRINGS CHARGED' INDICATION
SPRINGS CHARGE FAILURE INDICATION
FOR DETAILS OF APPARATUS REFER BILL OF MATERIAL
LEGENDS :
TERM. BLOCKS FOR REMOTE CONNECTION
OPENS WHEN SPRINGS ARE CHARGED
CLOSES WHEN SPRINGS ARE CHARGED
VCB OPERATED N/O CONTACT
VCB OPERATED N/C CONTACT
2POLE , MCB
PANEL ILLUMINATING LAMP.
3PIN SOCKET WITH SWITCH UNIT.
CASTEL LOCK CONTACT MULTIPLIER-CONTACTOR
SPRING CHARGING MOTOR
LINK
CUSTOMER : APTRANSCO
SHEET 2 OF 2
SCHEMATIC DIAGRAM FOR 36KV-OUTDOOR PCVCB
CROMPTON GREAVES LTD.
DRG. NO. PV33KVSC2
REV. 0

APTRANSCO	Standardised Drawing for 36 kV Vacuum Circuit Breaker (M/s Crompton Greaves Ltd.,)
	STD/GTP-DWG/Approval No. 248-4- 2 sheets Revision No. 0
	Prepared & Approved during November – 2011

Customer ref : APTRANSCO

Title: Schematic Diagram for 36 kV Outdoor PCVCB

	B-SHEET NO.	PB36KV	REV 0	
	W.O.NO.	PV36KV		
	USER	AP TRANSCO		
	BOARD NO.	33KV O/D PCVCB -		
	PREPARED BY :	TDB		
	APPROVED BY :	PVD		
	DATE :	10.09.11		

IT.	DESCRIPTION	CODE NO.	QTY/VCB	TOTAL
1	BASIC UNIT		1	1
	33KV 1600A 25KA			
	SP.CH.MOTOR 230VAC, AUX. SUPPLY 220V DC			
2	ANTI PUMPING DEVICE	450232177	1	1
	MAKE : SELECTRON/KAPL/EQ			
3	TNC SWITCH W/O BELL ALARM CONTACT	450232132	1	1
	TYPE : NON-LOCKABLE			
	MAKE : KAYCEE/SHPK/EQ			
	CONTACTS: 2NO IN EACH POSITION			
	RATING: 25A (CONT)			
4	LOCAL/REMOTE SELECTOR SWITCH	450232137	1	1
	TYPE : NON-LOCKABLE			
	MAKE : KAYCEE/SHPK/EQ			
	CONTACTS: 2NO IN EACH POSITION			
	RATING: 25A (CONT)			
5	HEATER ON-OFF TOGGLE SWITCH	450232130	2	2
	RATING: 5A 230V AC			
6	DOOR OPERATED SWITCH	180232409	1	1
	RATING : 0.25A 250V AC			
7	SPACE HEATER	180232501	1	1
	RATING : 50W 250VAC			
8	3PIN SOCKET	190232808	1	1
	MAKE : ANCHOR/BCSN/INDER/EQ			
9	PANEL LAMP CFL	450232750	1	1
	RATING : 20W 230VAC			
10	THERMOSTAT-ROD PROBE TYPE	450232450	1	1
	SETTING/RATING : 30-40DEG CENT/230VAC			
11	MCB-2POLE			
	MAKE : SIEMENS/L&T/HAGER/EQ			
	a) 2 POLE - 6A 230VAC - FOR AC SUPPLY	190232006	1	1
	b) 2 POLE - 6A 220 V DC - FOR DC SUPPLY	190232008	1	1
12	CONTACTOR FOR BRK CONTACT MULTIPLIER			
	MAKE : SIEMENS/L&T/EQ			
	AUX SUPPLY : 220V DC	180232861	1	1
	CONTACTOR : 2NO-2NC			
	b) ADD ON BLOCK : 1NO	450232112	2	2
	c) ADD ON BLOCK : 1NC	450232113	2	2
	(FOR BREAKER CONTACT MULTIPLY)			
14	CAPACITOR TRIP DEVICE			
	AUX. VOLTAGE=220V DC	CTD220	1	1
15	MOTOR FOR SPRING CHARGING	180232827	1	1
	RATING 0.1 KW 230V AC			
16	PUSH BUTTON WITH ELEMENT & ACTUATOR	480232186	1	1
	MAKE : SIEMENS/EQ			
	OVERALL SIZE : 22.5 DIA. CONTACT : 1NO			
	PURPOSE : CTD HEALTHY PB			
17	INDICATING LAMPS			
	MAKE : BINAY/VENSON/ALTOS/EQ			
	220V DC - WHITE - CTD CIRCUIT HEALTHY	450232077	1	1
	PURPOSE : CTD HEALTHY IND.			
18	HOUR RUN METER		1	1
	0 - 99999.9 MINUTES, 5 DIGITS			
	LIST COUNT: 0.1 MINUTE			
	MOUNTING: FLUSH			
	RATING: 230V AC SUPPLY			
19	TIMER FOR SP.CH. MOTOR SUPPLY CUT-OFF	450232638	1	1
	MAKE : SELECTRON/KAPL/KAYCEE/EQ			
	RANGE : 0-30 SEC (ON-OFF DELAY)			
	AUX SUPPLY : 230V AC			

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9/11/2011

CHIEF ENGINEER / CONSTRUCTION-1
APTRANSCO/VIDYUTH SOUDHA/HYD

Standardised Drawing for 36 kV Vacuum Circuit Breaker
(M/s Crompton Greaves Ltd.,)
STD/GTP-DWG/Approval No. 248-S-1 sheet Revision No. 0
Prepared & Approved during November – 2011
Customer ref : APTRANSCO
Title: Bill of Material