



Training on Various IED (Intelligent Electronic Device) Relay Control Wiring from VCB to Control & Relay Panel.

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I. Code of Practice: Protection

1. Circuitry: -

- The entire wiring of circuitry for indications, alarms, metering and protection should be permanent wiring.
- The leads should be identified by ferrules near terminals.
- Every lead should end at a terminal point and no junctions by twisting is allowed. If two wires are to be terminated at same terminal they may be connected at two different terminals and a loop provided.
- The wiring should be by copper leads for C.T secondaries for all cores (i.e.) metering as well as protection.
- The wiring should be by copper leads for PT secondaries also wherever they are intended for protection.
- The copper lead for CT and PT secondary wiring should be multi-stranded.
- The terminations should be lugged by ring shape 'O' lugs. 'U' shape lugs should be avoided.
- For CT Secondary terminations, two nuts with one spring washer and two flat washers to be compulsorily used.
- The terminal strips should be stud type with nuts and not screw-in-type.
- D.C and A.C supplies should not be taken through different cores of the same cable.
- When CBs have two trip coils, both main protection and backup protection will energize both the trip coils.
- Independent D.C cables should be run to every equipment in the yard and looping of D.C supply either in the yard or in the control room from one equipment to the other is not permitted
- For indications, alarms, annunciations, controls (closing coil, trip coil, etc. negative (-ve) is always given direct and positive (+ve) is supplied only 'on commands' like close, trip, relay trip, etc.
- Where D.C protection supply is at 24 volts, the battery units should be very near the equipment and not in the control rooms.

2. **Standard Ferrule Numbers: -**

J Series	D.C Incoming	J1, J2, etc.
K Series	Control - Closing, Tripping, etc.	K1, K2, K3 etc.
L Series	Alarms, indications and annunciations	L1, L2, L3, etc.
E Series	Potential transformer secondaries	E1, E2, E3, etc.
H Series	LT A.C Supply	H1, H2, H3, etc.
A Series	C.T secondary for special protection	A1, A2, A3, etc.
B Series	Bus bar protection	B1, B2, B3, etc.
C Series	Protection Circuits	C1, C2, C3, etc.
D Series	Metering Circuits	D1, D2, D3, etc.

- Wherever CT cores are not used “SHORTING LOOPS” should be provided near CT secondary terminals and not in marshalling boxes or at panels.
- The Cable entries near equipment, marshalling boxes and panels should be by use of appropriate size glands.
- The Wiring inside the panels should be clear and neatly fastened avoiding loose wires.
- All wires not in use should not only be disconnected but removed from panels.

3. **STANDARD LEAD NUMBERS: -**

Certain lead numbers are standardised as follows and should be compulsorily adopted with ferrules at terminations.

J1 – DC Positive

J2 - DC Negative

K1- DC Positive Outgoing

K2- DC Negative Outgoing

Local Close – K5

Local Trip - K3

CB ON Indication – L3

CB OFF Indication -L5

CB Spring Charge – L7

CB Trip circuit Healthy – K3A

II. ANSI standard device numbers: -

SL. NO	ANSI STANDARD ABBREVIATION	ANSI STANDARD DEVICE NUMBER
1	Master Element	1
2	Time-delay Starting / Closing relay	2
3	Checking / Interlocking Relay	3
4	Master Protection	4
5	Undervoltage Relay	27
6	Phase Undervoltage	27P
7	DC undervoltage Relay	27S
8	Annunciator Relay	30
9	Directional Power Relay	32
10	Reverse Power	32R
11	End Fault Protection	50EF
12	Ground Instantaneous Overcurrent	50G
13	Neutral Instantaneous Overcurrent	50N
14	Phase Instantaneous Overcurrent	50P
15	Sensitive Ground Instantaneous Overcurrent	50SG
16	Negative Sequence Instantaneous Overcurrent	50Q
17	Instantaneous / Time-delay Overcurrent Relay	50/51
18	Phase Time Overcurrent	51P
19	AC circuit breaker	52
20	AC circuit breaker position (contact open when circuit breaker open)	52a
21	AC circuit breaker position (contact closed when circuit breaker open)	52b
22	Power Factor Relay	55
23	Phase Overvoltage	59P
24	Neutral Overvoltage	59N
25	Neutral Voltage Unbalance	59NU
26	Negative Sequence Overvoltage	59Q
27	Rheostat	70
28	DC Circuit Breaker	72
29	Alarm Relay	74
30	DC Overcurrent Relay	76
31	Frequency Relay	81
32	Over Frequency	81O
33	Lock-Out Relay; Master Trip Relay	86
34	Differential Protective Relay	87
35	Transformer Differential	87T
36	Anti pumping Relay	94

III. Existing IED Relays Make wise in APEPDCL: -

1. Make: Schneider Type: **Vamp 255**



Main features: -

- Fully digital signal handling with a powerful 16-bit microprocessor, and high measuring accuracy on all the setting ranges due to an accurate 16-bit A/D conversion technique.
- Freely configurable display with six measurement values.
- Freely configurable interlocking schemes with basic logic functions.
- Recording of events and fault values into an event register from which the data can be read via a keypad and a local HMI or by means of a PC based VAMPSET user interface.
- Built-in, self-regulating ac/dc converter for auxiliary power supply from any source within the range from 40 to 265 Vdc or Vac. The alternative power supply is for 18 to 36 Vdc.
- Built-in disturbance recorder for evaluating all the analogue and digital signals.
- Eight (8) programmable stages for alarming or protection purposes

2. Make: Schneider Type: **Easergy P3U30**



Main features: -

- A complete set of protection functions, related to the application
- Arc detection (Easergy P3 Advanced)
Dedicated circuit breaker control with single-line diagram, push buttons, programmable function key and LEDs, and a customizable alarm
- Multilingual HMI for customized messaging
Settings tool relay management software for setting parameters, configuring, and network fault simulation
Both serial and Ethernet communication, including redundancy
- IEC 61850 standard Ed.1 & Ed.2

3. Make: ABB Type: **REF 615**



Main features: -

- Directional and non-directional overcurrent and earth-fault protection, voltage, frequency and power-based protection and measurement functionality

- Optional advanced and fast fault location of short circuits and earth faults, arc protection and high-speed outputs
- Supports IEC 61850 Editions 1 and 2, including HSR and PRP, GOOSE messaging and IEC 61850-9-2 LE for less wiring and supervised communication

4. Make: Schneider Type: **P3T32**



Main features: -

- The relay is a transformer protection relay
- The relay has an optional interface for connecting four arc flash point sensors.
- The relay has optional arc flash communications and high-speed outputs to allow for simple arc flash system configuration.
- 128 x 128 LCD matrix Display
- IEC61850

IV. 1. Block Diagram of VAMP-255

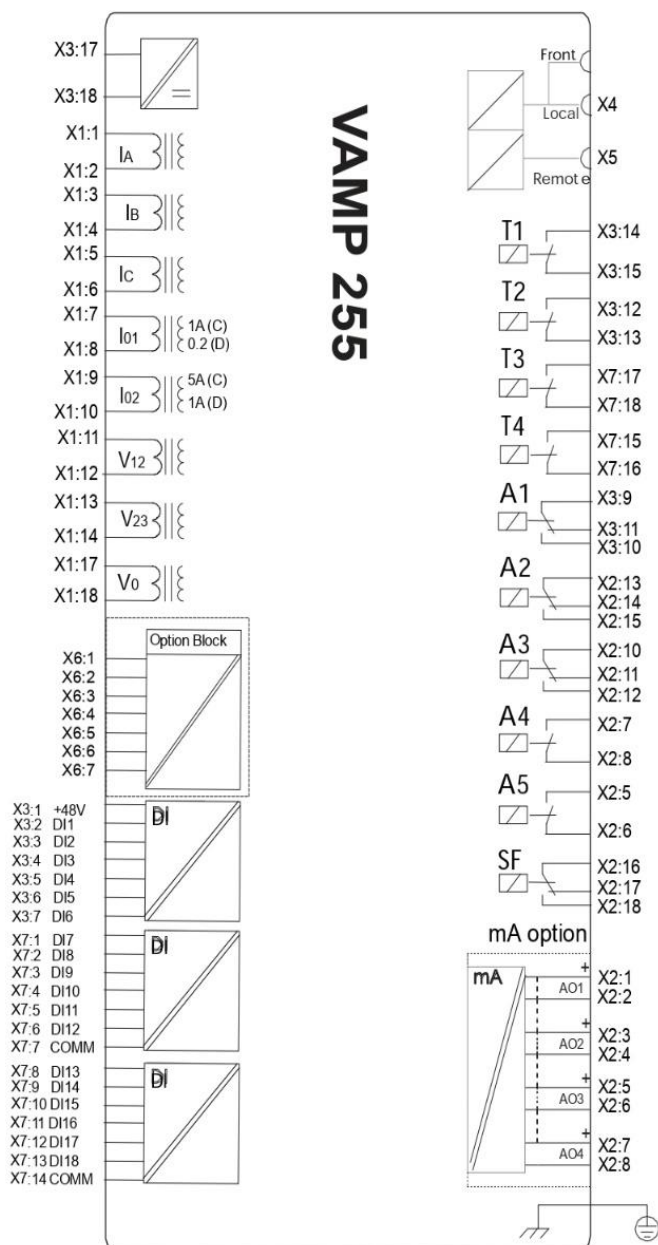
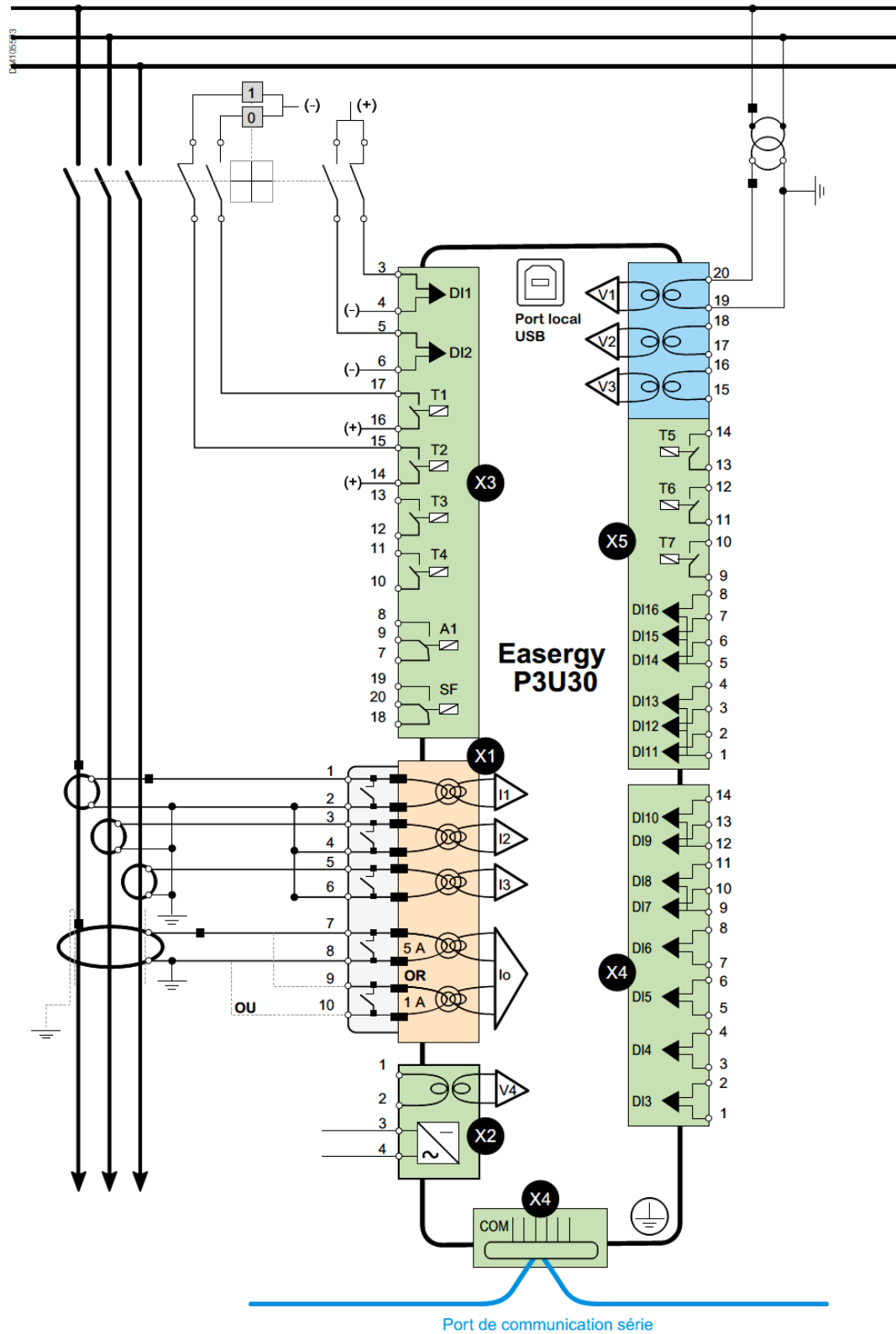
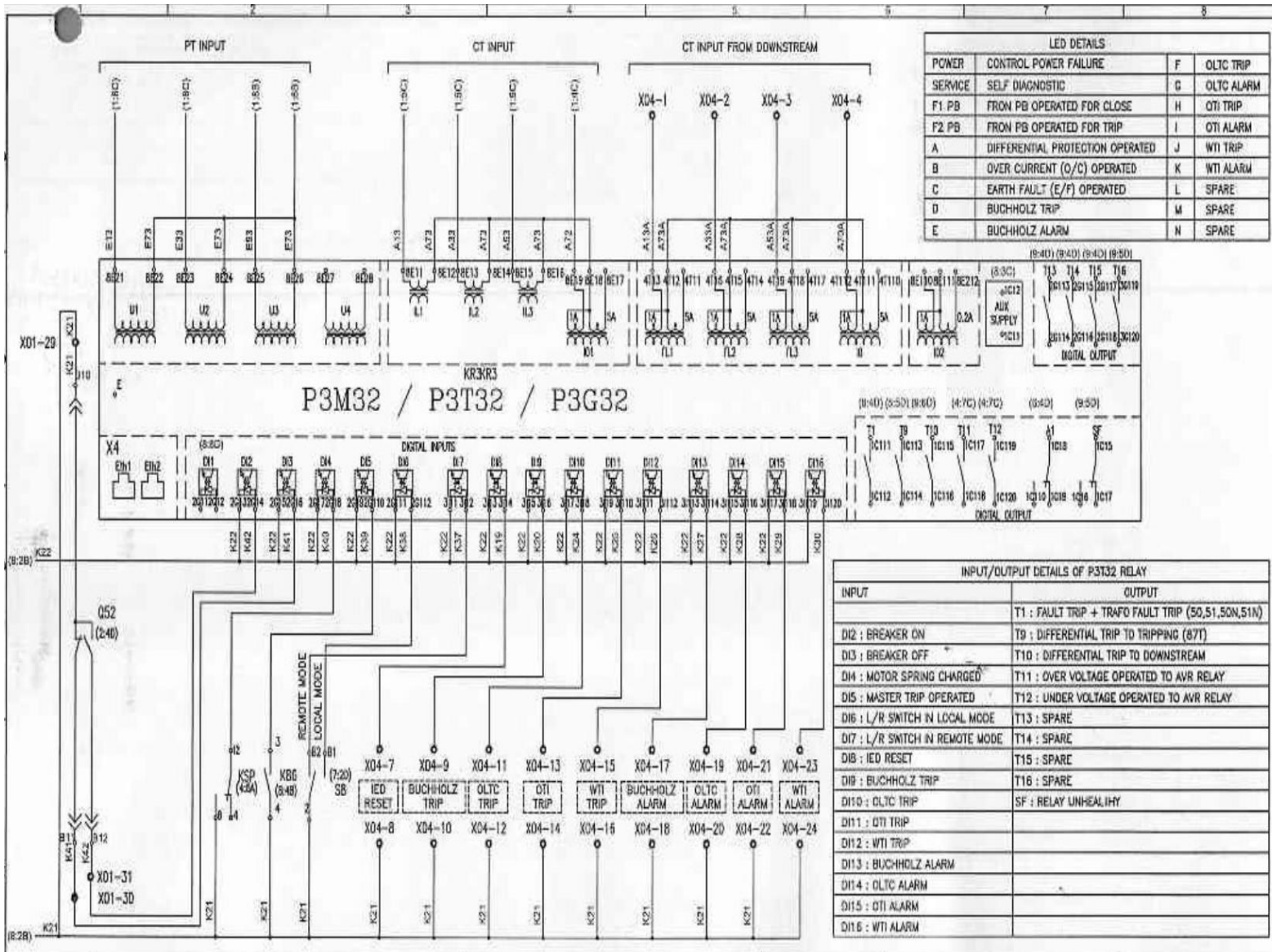


Figure 11.12: Block diagram of VAMP 255, with the mA-option included.

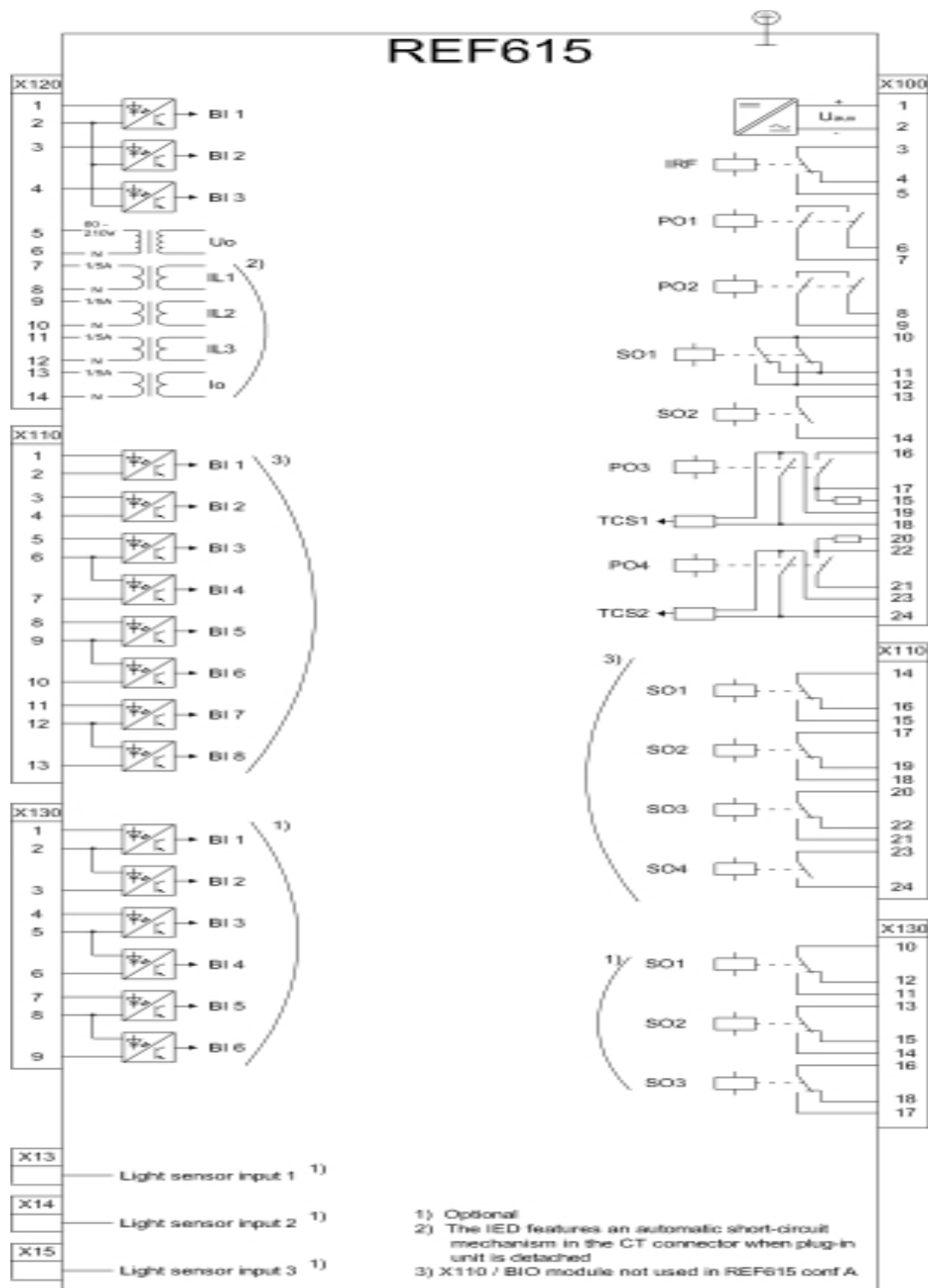
V. Block Diagram of Easergy P3U30



VI. Block Diagram of Easergy P3T32: -

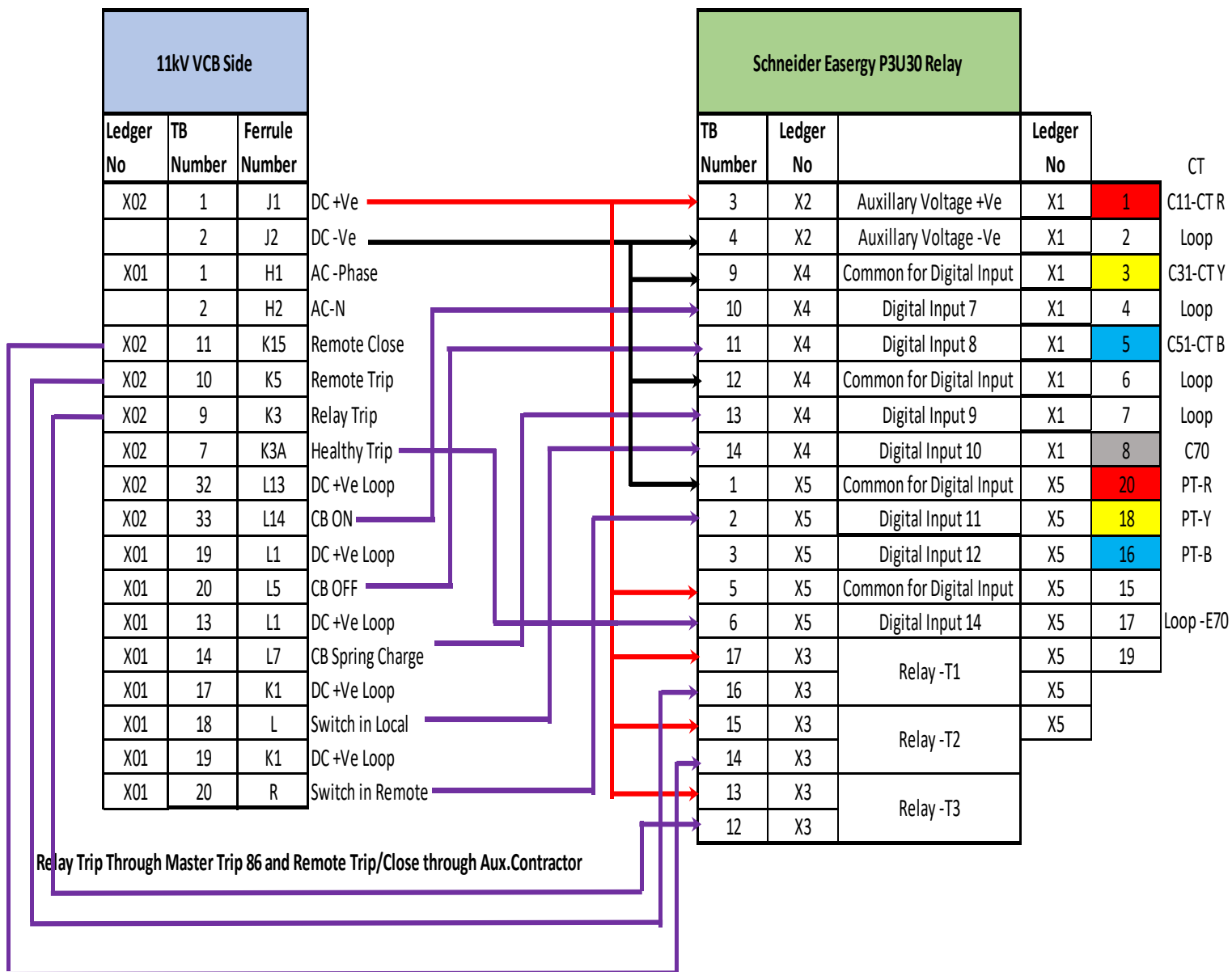


VII. Block diagram of ABB REF 615: -



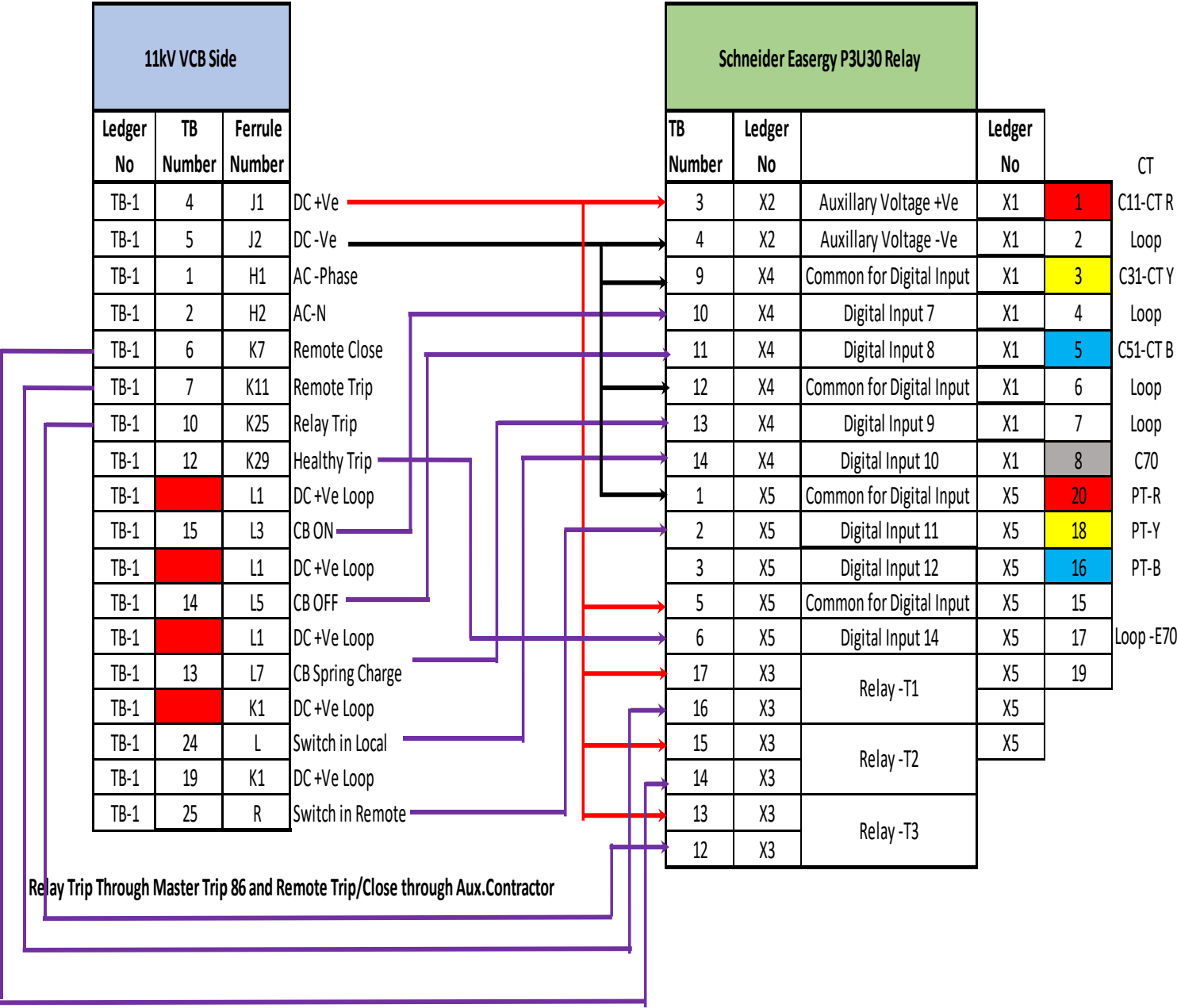
VIII. 11kV BHEL Make VCB to Easegy P3U30 Connection Diagram

11kV BHEL Make VCB to Easegy P3U30 Connection diagram



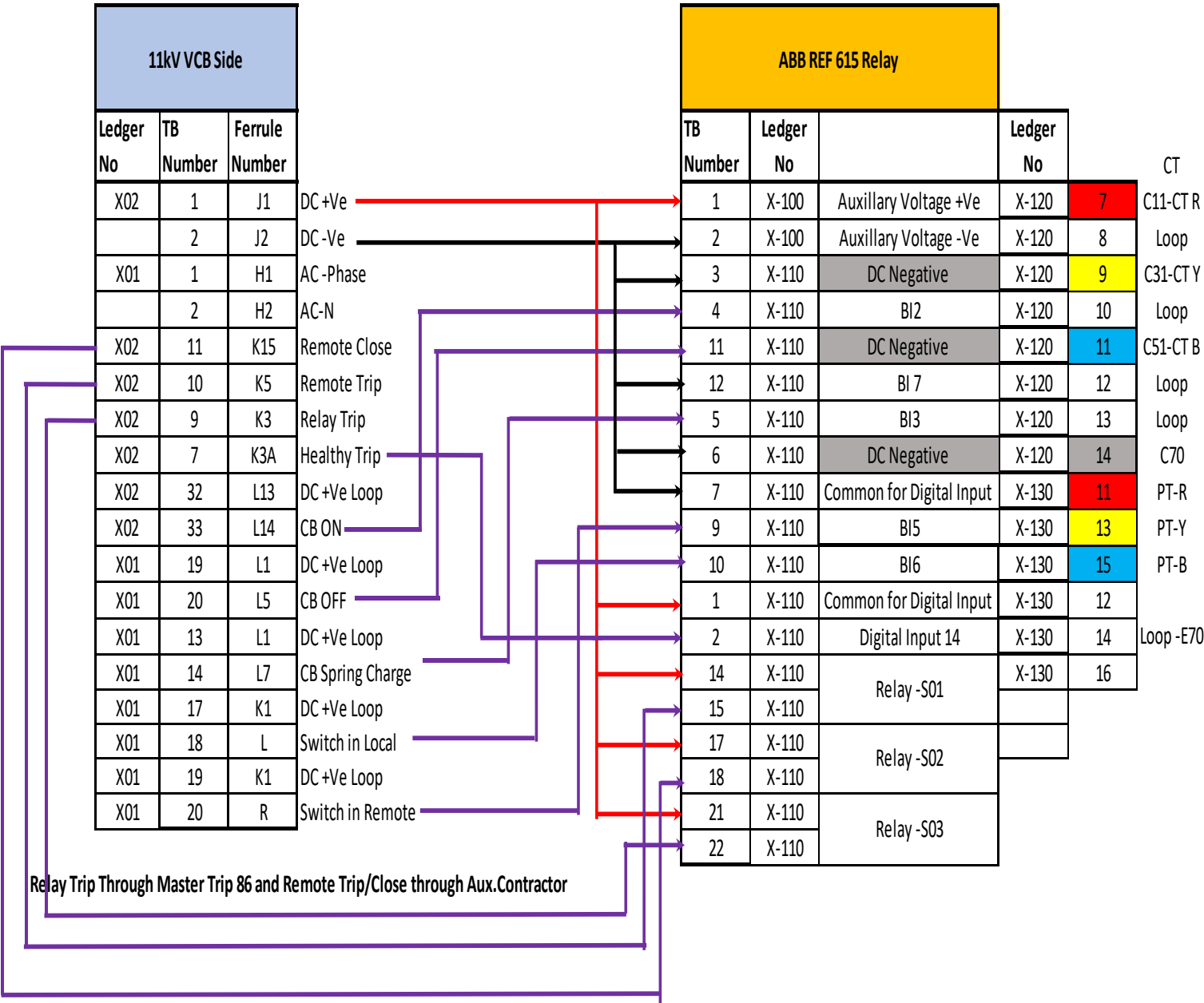
IX. 11KV Stelmac Make VCB to Easegy P3U30 Connection Diagram

11kV STELMEC Make VCB to Easergy P3U30 Connection diagram



X. 11KV BHEL Make VCB to ABB REF 615 Connection Diagram

11kV BHEL Make VCB to ABB REF 615 Connection diagram



Drawings

INVENTORY NO.

SIGN & DATE

REF. DRG. NO.

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2

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35620061774

DRAWING NO.

A

B

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E

REV.

DATE

ALTERED

CHECKED

APPROVED

REV.

DATE

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APPROVED

REV.

DATE

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APPROVED

ZONE

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ZONE

DEPT.

SWE

CODE

409



DRN.

NAME

N.M.

SIGN

DATE

24/02/18

NO. OF

VAR

TITLE

CKD.

M.H.N.

24/02/18

APPD.

M.A.K.

24/02/18

BHARAT HEAVY ELECTRICALS LTD.

BHOPAL

OUTDOOR CRP FOR 11KV VCB
APEPDCL VISHAKHAPATNAM

OUTDOOR CONTROL & RELAY PANEL
TITLE SHEET

DRAWING NO.

35620061774

REV

00

SHT. NO.

01

NO OF SHEETS

15

WO_NO : REFER TABLE-1

SCHEME OF
OUTDOOR CONTROL AND RELAY PANELS
FOR 11KV PTR LV OUTDOOR CIRCUIT BREAKER OF
APEPDCL VISHAKHAPATNAM

TABLE-1

WO	CUSTOMER PO.NO.	VCB Unit sl. Nos.	QTY	CT DETAILS	GOVT. SCHEME
97050A47601	CGM/P&MM/EPDCL/P4/VSP/CEMPT/-50/17-18/PM-4970/17, DT: 23.12.2017	9146812 to 9146839	28	11 kV O/D LV CT RATIO 600-300/1-1A CORE-I:15VA,5P10,CORE-II:5VA, 0.2S	-
97056A47601	CGM/P&MM/EPDCL/P4/VSP/CEMPT/-50/17-18/EXTN.PM(1)-4970/17, DT: 22.01.2018	8217382 to 8217385	4	11 kV O/D LV CT RATIO 600-300/1-1A CORE-I:15VA,5P10,CORE-II:5VA, 0.2S	IPDS
97056A47601	CGM/P&MM/EPDCL/P4/VSP/CEMPT/-50/17-18/EXTN.PM(1)-4970/17, DT: 22.01.2018	8217386 to 8217389	4	11 kV O/D LV CT RATIO 600-300/1-1A CORE-I:15VA,5P10,CORE-II:5VA, 0.2S	DDUGJY

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35620061774

DRAWING NO.

23

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INVENTORY NO.

REV.

DATE

ALTERED

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APPROVED

ZONE

REV.

DATE

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DATE

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SWE

CODE

409

DRN.

NAME

N.M.

CKD.

M.H.N.

APPD.

M.A.K.

SIGN

DATE

24/02/18

NO. OF

VAR

TITLE

OUTDOOR CONTROL & RELAY PANEL

CONTENTS

DRAWING NO.

35620061774

SHT. NO.

02

NO OF SHEETS

15

REV

00

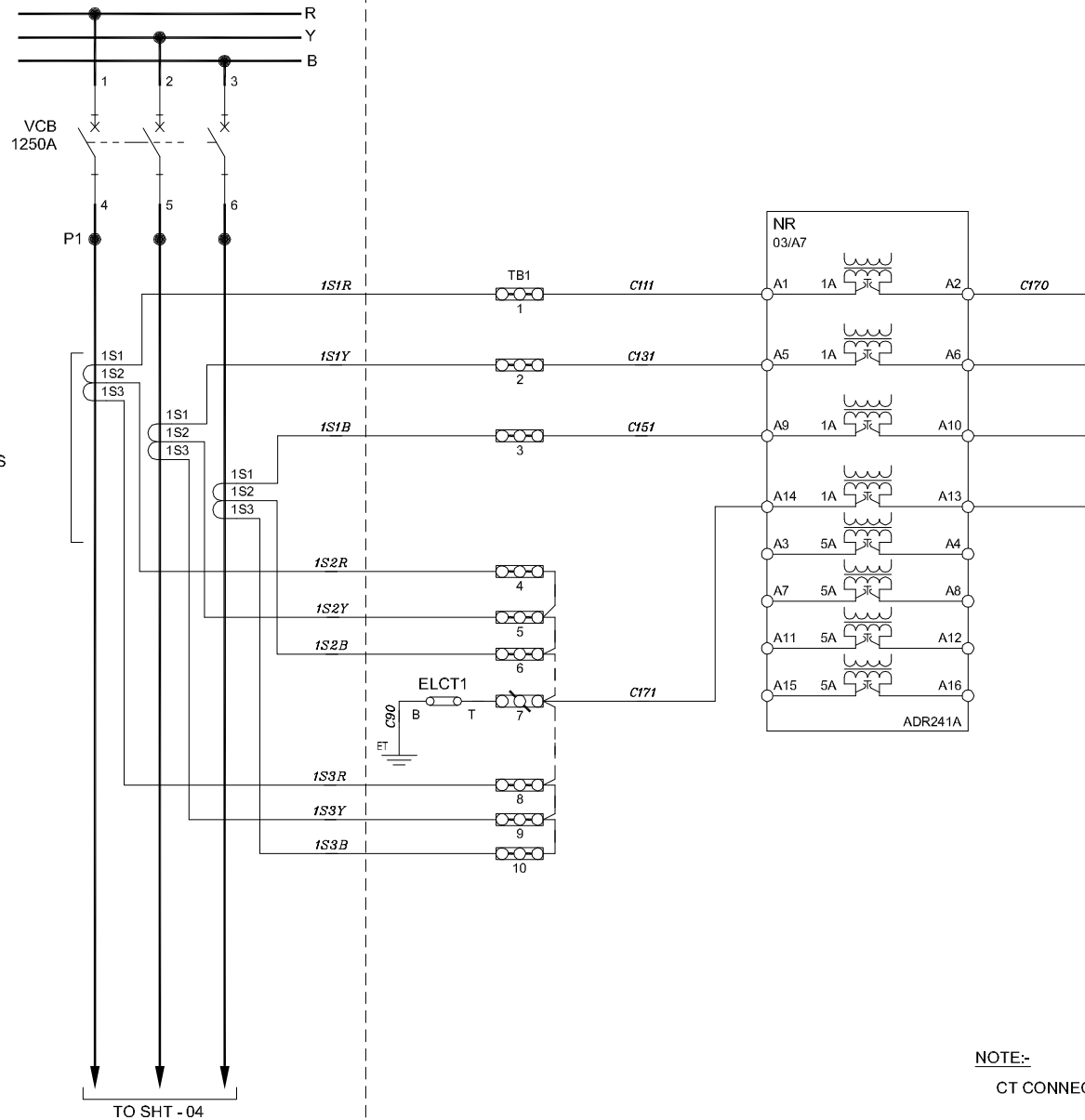
SHEET NO.	TITLE
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2	CONTENTS
3	3-LINE DIAGRAM-CT CONNECTIONS & AC SCHEME-NR RELAY
4	3-LINE DIAGRAM-CT CONNECTIONS
5	METERING CIRCUIT
6	240V AC SUPPLY DISTRIBUTION
7	24V DC SUPPLY DISTRIBUTION
8	TRIP CONDITIONS (86) & DC SCHEME-NR
9	PROTECTION CIRCUIT
10	LED INDICATIONS
11	CB CONTROL-CLOSE & TRIP COIL
12	CB CONTROL-CLOSE & TRIP COIL
13	ALARM CANCELLATION SCHEME
14	ALARM ANNUNCIATOR
15	CONTACT DISTRIBUTION & SWITCH DETAIL












NOTE : 1. CONTACTS OF MAIN NUMERICAL RELAY & TRIP RELAY IS REPRESENTATIVE ONLY , AVAILABLE CONTACTS FROM THE RESPECTIVE MANUFACTURER WILL BE UPDATED IN THE AS BUILT DRAWINGS.
2. TERMINAL NOS. MAY CHANGE AFTER FINALIZING OF MAKE OF EACH ITEM AND WILL BE REFLECTED IN AS BUILT DAWINGS.

OUTDOOR CRP FOR 11KV VCB
APEPDCL VISHAKHAPATNAM


DRAWING NO.

REMOTE SIDE




NR			
	CT		03/B4
C1		C3	08/C1
B2		B4	11/B3
B3		B5	12/B3
B6		B8	SPARE
B7		B9	SPARE
	2CRDC		SPARE
	2CRDC		SPARE
C6		C8	13/A2
C9		C11	08/B2
C10		C12	15/A3 TO SPARE
C13		C15	15/A3 TO SPARE
C14		C16	15/A4 TO SPARE
B10		B11	15/A5 TO SPARE

CT CONNECTIONS ARE SHOWN FOR HIGHER TAB

REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	SWE		BHARAT HEAVY ELECTRICALS LTD.	BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM			
		CHECKED				CHECKED				CHECKED								CODE		
		APPROVED				APPROVED				APPROVED								409		
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL 3-LINE DIAGRAM-CT CONNECTIONS & AC SCHEME-NR RELAY	DRAWING NO. 35620061774		REV 00
											CKD.	M.H.N.		24/02/18				SHT. NO. 03	NO OF SHEETS	15
												APPD.	M.A.K.		24/02/18					

CT CONNECTIONS ARE SHOWN FOR HIGHER TAB

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		CHECKED				CHECKED				CHECKED		SWE							
		APPROVED				APPROVED				APPROVED		CODE 409							
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL 3-LINE DIAGRAM-CT CONNECTIONS	DRAWING NO. 35620061774	REV 00
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												APPD.	M.A.K.		24/02/18				

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SIGN & DATE

INVENTORY NO.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35620061774

DRAWING NO.

FROM CT-1 METERING CORE

PRIMARY: - 110V
SECONDARY: $\sqrt{3}$
REMOTE PT

FROM PT SEC
METERING CORE

ELPT
ET

IL11
RED
PT R-PH
HEALTHY
X1
X2
IL12
YELLOW
PT Y-PH
HEALTHY
X1
X2
IL13
BLUE
PT B-PH
HEALTHY
X1
X2

TBTVM

TVM
ER300P

AS

A

PH

AMMETER

VS

V

VOLTMETER

TBTVM

TVM

RS485 COMM. PORT
TX+
TX-
GND

NOTE: SUPPLY OF TVM IS IN CUSTOMER SCOPE.

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT.	SWE	NAME	SIGN	DATE	NO. OF	TITLE	DRAWING NO.	REV
		CHECKED			CHECKED			CHECKED	409		M.H.N.		24/02/18	VAR	OUTDOOR CONTROL & RELAY PANEL METERING CIRCUIT	35620061774	00
		APPROVED			APPROVED			APPROVED			M.A.K.		24/02/18			SHT. NO. 05	NO OF SHEETS 15

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INVENTORY NO.

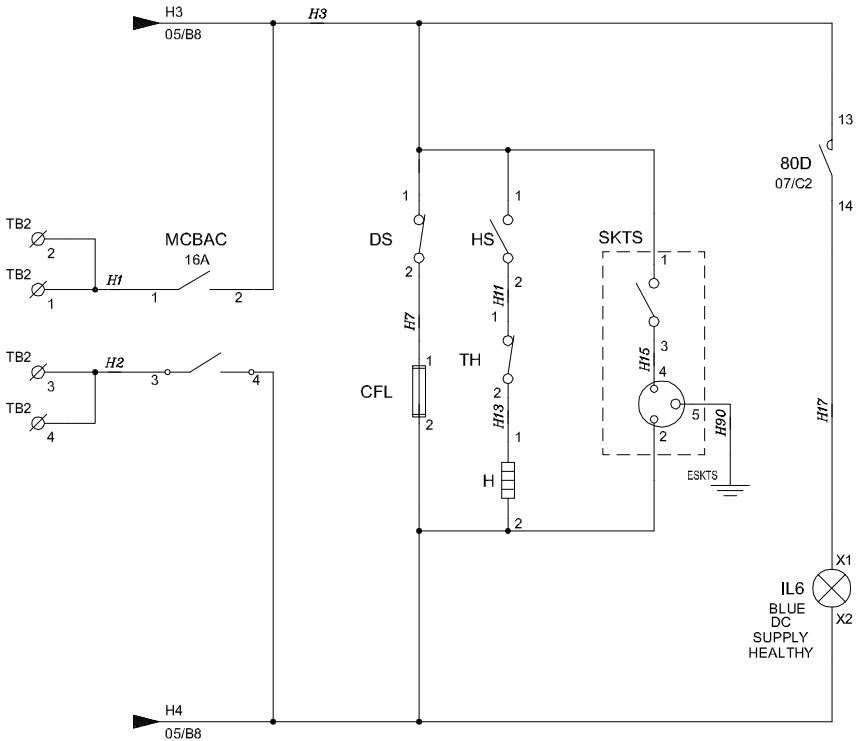
FIRST ANGLE PROJECTION


(ALL DIMENSIONS ARE IN mm)

35620061774

DRAWING NO.

SINGLE PH.
240V AC
SUPPLY
FROM ACDB



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT. SWE	को. एच. ई. एल. 	BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM					
		CHECKED				CHECKED				CODE 409										
		APPROVED				APPROVED														
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL 240V AC SUPPLY DISTRIBUTION	DRAWING NO. 35620061774		REV 00
												CKD.	M.H.N.		24/02/18			SHT. NO. 06	NO OF SHEETS	15
												APPD.	M.A.K.		24/02/18					



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

OUTDOOR CRP FOR 11KV VCB
APEPDCL VISHAKHAPATNAM

DRAWING NO.
35620061774
REV
00

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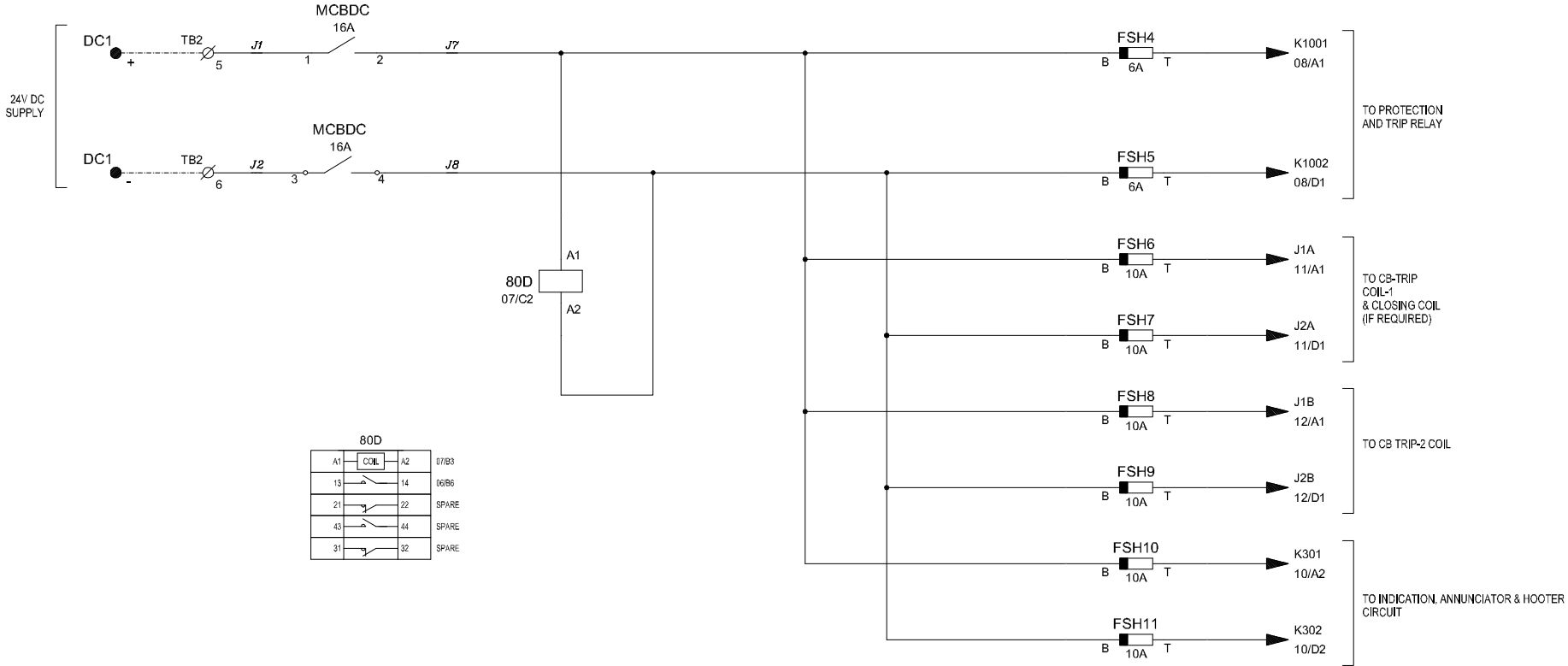
INVENTORY NO.

FIRST ANGLE PROJECTION

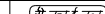
(ALL DIMENSIONS ARE IN mm)

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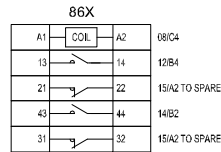



80D			
A1	COIL	A2	07/B3
13		14	06/B6
21		22	SPARE
43		44	SPARE
31		32	SPARE

REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT. SWE	409		BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM				
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		APPROVED				APPROVED				APPROVED										
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL 24V DC SUPPLY DISTRIBUTION	DRAWING NO. 35620061774		REV 00
												CKD.	M.H.N.		DATE 24/02/18			SHT. NO. 07	NO OF SHEETS	15
														APPD.	M.A.K.				DATE 24/02/18	

(ALL DIMENSIONS ARE IN mm)

DRAWING NO.



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	 BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM							
		CHECKED				CHECKED				CHECKED		SWE									
		APPROVED				APPROVED				APPROVED		CODE 409									
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL TRIP CONDITIONS (86) & DC SCHEME-NR	DRAWING NO. 35620061774		REV 00	
											CKD.	M.H.N.		24/02/18					SHT. NO. 08	NO OF SHEETS	15
											APPD.	M.A.K.		24/02/18							

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SIGN & DATE

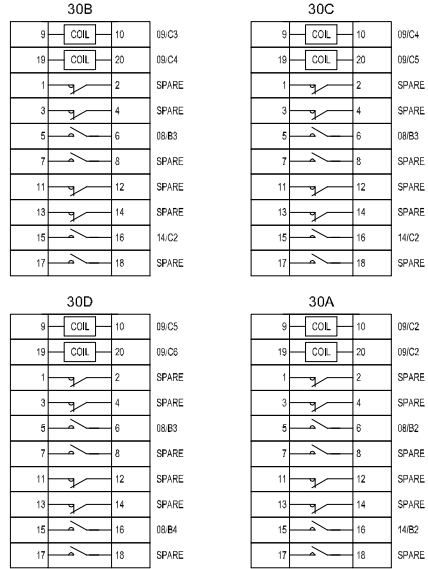
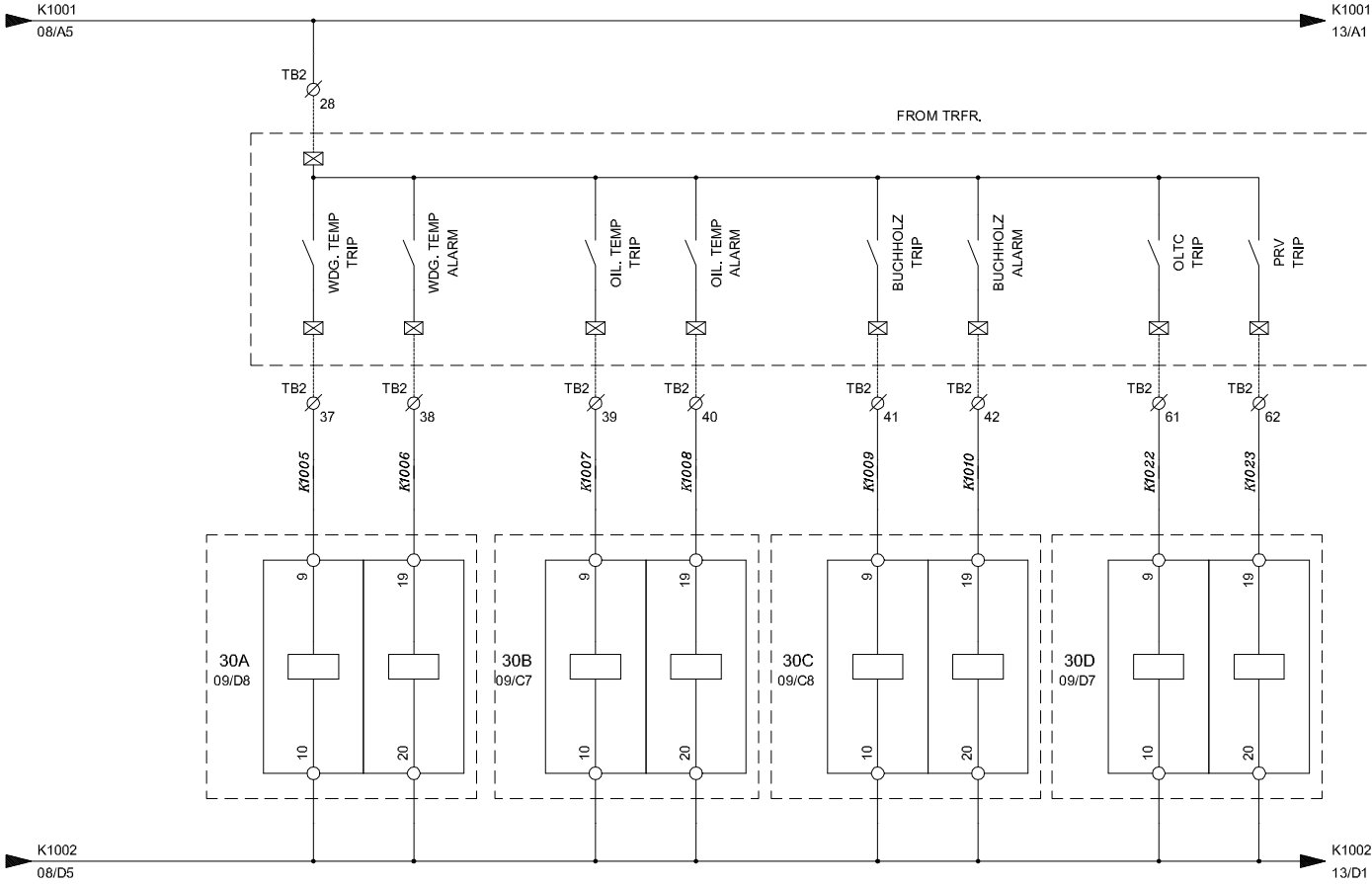
INVENTORY NO.


FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35620061774

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REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	SWE		BHARAT HEAVY ELECTRICALS LTD.	OUTDOOR CRP FOR 11KV VCB APEPDCI VISHAKHAPATNAM			
		CHECKED				CHECKED				CHECKED			CODE						
		APPROVED				APPROVED				APPROVED			409						
ZONE				ZONE				ZONE				DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE	DRAWING NO. 35620061774	REV 00
											CKD.	M.H.N.		24/02/18					
											APPD.	M.A.K.		24/02/18	OUTDOOR CONTROL & RELAY PANEL PROTECTION CIRCUIT				



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

OUTDOOR CRP FOR 11KV VCB
APEPDCI VISHAKHAPATNAM

OUTDOOR CONTROL & RELAY PANEL
PROTECTION CIRCUIT

35620061774

00

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IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF. DRG. NO.

SIGN & DATE

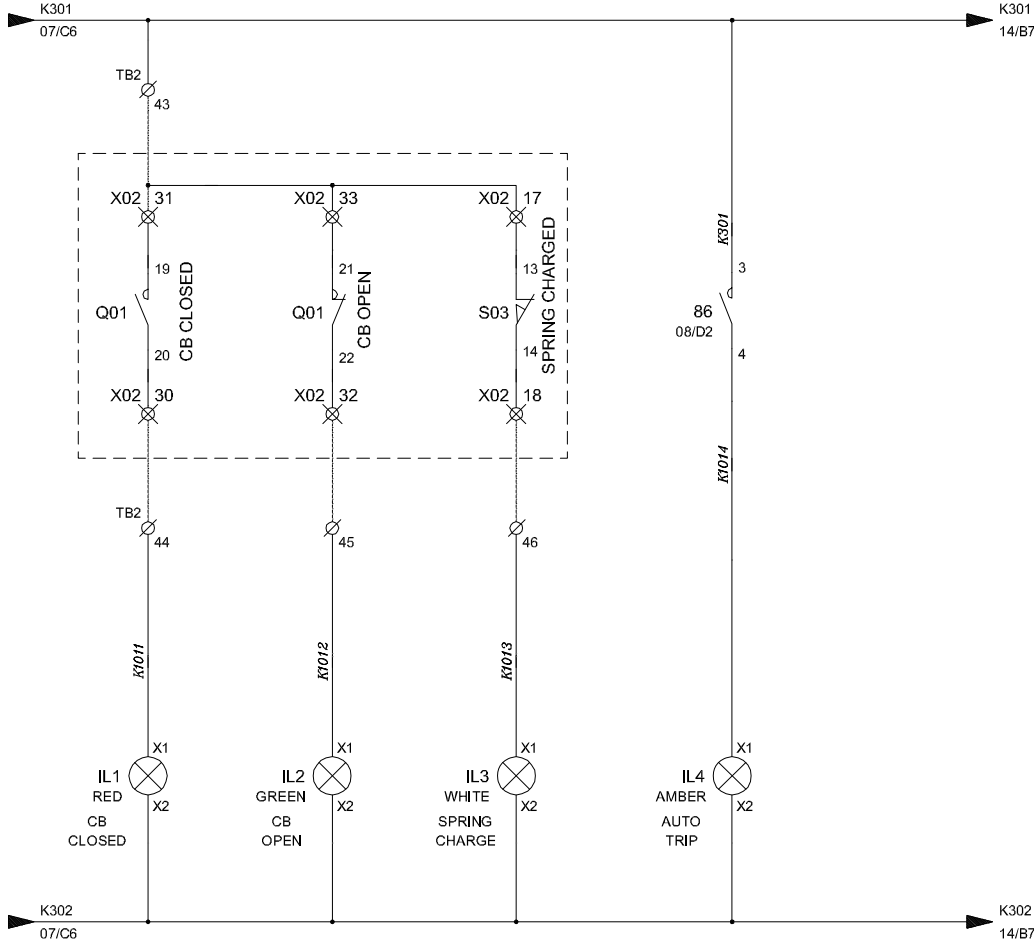
INVENTORY NO.


FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35620061774

DRAWING NO.



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT. SWE		BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM					
		CHECKED			CHECKED			CHECKED									
		APPROVED			APPROVED			APPROVED									
ZONE			ZONE			ZONE			409								
									DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL LED INDICATIONS	DRAWING NO. 35620061774		REV 00
									CKD.	M.H.N.		24/02/18			SHT. NO. 10	NO OF SHEETS	15
									APPD.	M.A.K.		24/02/18					



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

DRAWING NO.
35620061774

SHT. NO. 10 NO OF SHEETS 15

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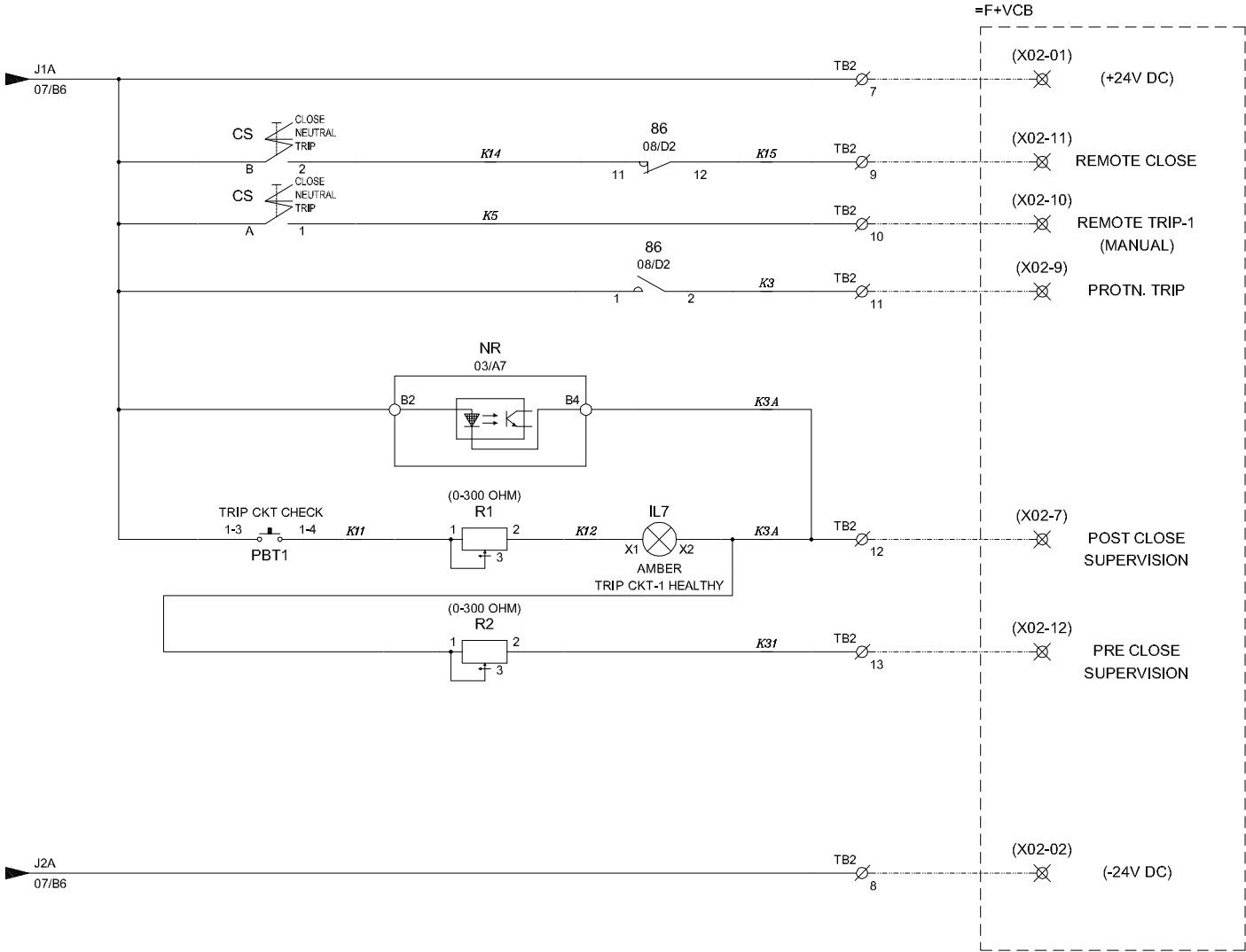
REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

35620061774

DRAWING NO.



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	SWE	BHPCL	BHARAT HEAVY ELECTRICALS LTD.	BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM			
		CHECKED				CHECKED				CHECKED										
		APPROVED				APPROVED				APPROVED										
ZONE				ZONE				ZONE				409								
												DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL CB CONTROL-CLOSE & TRIP COIL	DRAWING NO. 35620061774		REV 00
												CKD.	M.H.N.	DATE 24/02/18	SHT. NO. 11			NO OF SHEETS 15		
														APPD.	M.A.K.				DATE 24/02/18	

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REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35620061774

DRAWING NO.

J1B
07/B6

CS
11/B2
CLOSE
NEUTRAL
TRIP
C 3

NR
03/A7

TRIP CKT CHECK
1-3 1-4
PBT2

(0-300 OHM)
R3
1 2 3

IL8
X1 X2
AMBER
TRIP CKT-2 HEALTHY

(0-300 OHM)
R4
1 2 3

J2B
07/C6

J2B

=F+VCB

(X02-19)

(+24V DC)

(X02-21)

REMOTE TRIP-1
(MANUAL)

(X02-22)

PROTN. TRIP

(X02-24)

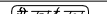
POST CLOSE
SUPERVISION

(X02-25)

PRE CLOSE
SUPERVISION

(X02-20)

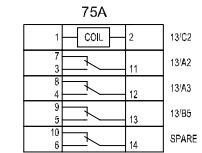
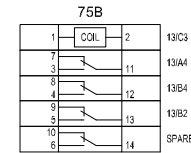
(-24V DC)


REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT. SWE		BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM									
		CHECKED			CHECKED			CHECKED													
		APPROVED			APPROVED			APPROVED													
ZONE													DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL CB CONTROL-CLOSE & TRIP COIL	DRAWING NO. 35620061774		REV 00
													CKD.	M.H.N.		24/02/18			SHT. NO. 12	NO OF SHEETS	15
													APPD.	M.A.K.		24/02/18					

INVENTORY NO.

SIGN & DATE

DRAWING NO.



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.		BHARAT HEAVY ELECTRICALS LTD. BOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM					
		CHECKED				CHECKED				SWE										
		APPROVED				APPROVED				CODE 409										
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL ALARM CANCELLATION SCHEME	DRAWING NO. 35620061774		REV 00
												CKD.	M.H.N.	24/02/18					SHT. NO. 13	NO OF SHEETS 15
												APPD.	M.A.K.	24/02/18						

INVENTORY NO.

SIGN & DATE

REF. DRG. NO.

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A

B

C

D

35620061774

DRAWING NO.

2

3

4

5

6

7

8

86X
08/D4

30A
09/D8

30B
09/C7

30C
09/C8

43

44

15

15

15

L101

L111

L103

L105

L107

TB1

45

46

BREAKER TRIPPED ON FAULT

WDG TEMP ALARM

OIL TEMP ALARM

BUCHOLZ ALARM

S

T

A

R

C

F1

F2

F3

F4

F5

F6

F7

6W
ANNUNCIATOR

+

-

TP

TP

NT

NT

K303

K302

BZ-2

1

2

K301
10/A5

K302
10/D5

DC SUPPLY

ANNUNCIATOR WINDOW DETAILS

F1 BREAKER TRIPPED ON FAULT	T	F5 SPARE
F2 WDG TEMP ALARM	NT	F6 SPARE
F3 OIL TEMP ALARM	NT	F7 SPARE
F4 BUCHOLZ ALARM	NT	

REV.

DATE

ALTERED

REV.

DATE

ALTERED

REV.

DATE

ALTERED

DEPT.
SWE

CODE
409

DRN.

NAME
N.M.

DATE
24/02/18

CKD.

M.H.N.

24/02/18

APPD.

M.A.K.

24/02/18

NO. OF
VAR

TITLE
OUTDOOR CONTROL & RELAY PANEL
ALARM ANNUNCIATOR

DRAWING NO.
35620061774

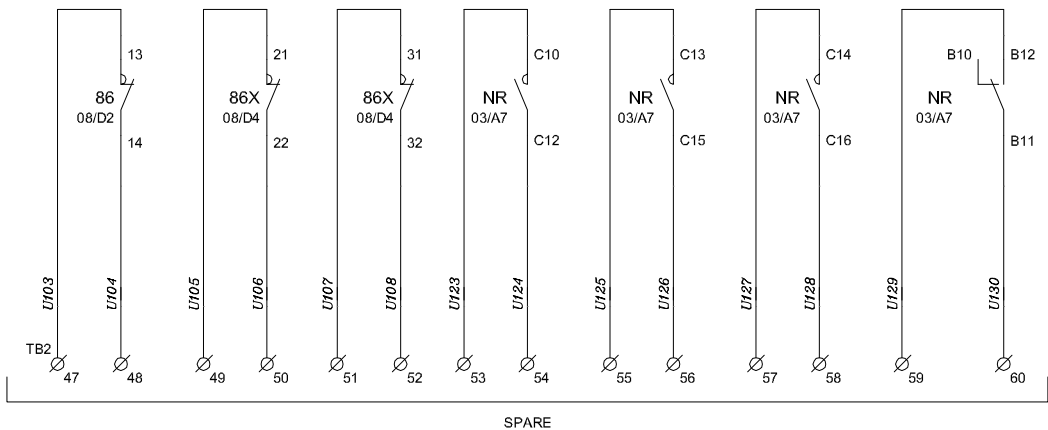
REV
00


OUTDOOR CRP FOR 11KV VCB
APEPDCL VISHAKHAPATNAM

(ALL DIMENSIONS ARE IN mm)

INVENTORY NO.

DRAWING NO.



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	<div>श्री. लक्ष्मी. ई. लक्ष्मी.</div> <div></div>	BHARAT HEAVY ELECTRICALS LTD.	BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCI VISHAKHAPATNAM				
		CHECKED				CHECKED				SWE										
		APPROVED				APPROVED				CODE 409										
ZONE				ZONE				ZONE				DRN.	NAME N.M.	SIGN	DATE 24/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL CONTACT DISTRIBUTION & SWITCH DETAIL	DRAWING NO. 35620061774		REV 00
												CKD.	M.H.N.		24/02/18				SHT. NO. 15	NO OF SHEETS 15
												APPD.	M.A.K.		24/02/18					

INVENTORY NO.

SIGN & DATE

REF. DRG. NO.

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35620061775

DRAWING NO.

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E

REV.

DATE

ALTERED

REV.

DATE

ALTERED

REV.

DATE

ALTERED

DEPT.

SWE

CODE

409

DRN.

CKD.

APPD.

NAME

NM

MHN

MAK

SIGN

DATE

16/02/18

16/02/18

16/02/18

NO. OF

VAR

OUTDOOR CONTROL & RELAY PANEL

TITLE SHEET

DRAWING NO.

35620061775

REV

00

SHT. NO.

01

NO OF SHEETS

16

WO_NO : REFER TABLE-1

OUTDOOR CRP FOR 11KV VCB
APEPDCL VISHAKHAPATNAM

WO

CUSTOMER PO.NO.

VCB Unit sl. Nos.

QTY

CT DETAILS

GOVT. SCHEME

97050A47601

CGM/P&MM/EPDCL/P4/VSP/CEMPT/-50/17-18/PM-4970/17, DT: 23.12.2017

8217228 to 8217276

49

11 kV O/D LV CT RATIO 600-300/1-1-0.5775 A ,CORE-I:15VA,5P10,CORE-II:5VA, 0.2S
CORE-III: CL-PS,VK>=40I(RCT+RL), IM<=30MA at Vk/4

-

97056A47601

CGM/P&MM/EPDCL/P4/VSP/CEMPT/-50/17-18/EXTN.PM(1)-4970/17, DT: 22.01.2018

8217390 to 8217394

5

11 kV O/D LV CT RATIO 600-300/1-1-0.5775 A ,CORE-I:15VA,5P10,CORE-II:5VA, 0.2S
CORE-III: CL-PS,VK>=40I(RCT+RL), IM<=30MA at Vk/4

IPDS

SCHEME OF

OUTDOOR CONTROL AND RELAY PANELS

FOR 11KV LV VCB WITH DIFFERENTIAL PROTECTION

OF APEPDCL VISHAKHAPATNAM

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REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

35620061775

DRAWING NO.

2

3

4

5

6

7

8

A

B


C

D

E

SHEET NO.	TITLE
1	TITLE SHEET
2	CONTENTS
3	3-LINE DIAGRAM-CT CONNECTIONS & AC SCHEME-NR RELAY
4	3-LINE DIAGRAM-CT CONNECTIONS
5	3-LINE DIAGRAM-CT CONNECTIONS
6	METERING CIRCUIT
7	240V AC SUPPLY DISTRIBUTION
8	24V DC SUPPLY DISTRIBUTION
9	TRIP CONDITIONS (86) & DC SCHEME-NR
10	PROTECTION CIRCUIT
11	LED INDICATIONS
12	CB CONTROL-CLOSE & TRIP COIL
13	CB CONTROL-CLOSE & TRIP COIL
14	ALARM CANCELLATION SCHEME
15	ALARM ANNUNCIATOR
16	CONTACT DISTRIBUTION & SWITCH DETAIL

NOTE : 1. CONTACTS OF MAIN NUMERICAL RELAY & TRIP RELAY IS REPRESENTATIVE ONLY , AVAILABLE CONTACTS FROM THE RESPECTIVE MANUFACTURER WILL BE UPDATED IN THE AS BUILT DRAWINGS.
2. TERMINAL NOS. MAY CHANGE AFTER FINALIZING OF MAKE OF EACH ITEM AND WILL BE REFLECTED IN AS BUILT DAWINGS.

REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.		BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM				
		CHECKED				CHECKED				CHECKED		SWE							
		APPROVED				APPROVED				APPROVED		CODE 409							
ZONE				ZONE				ZONE				DRN.	NAME NM	SIGN	DATE 16/02/18	NO. OF VAR	TITLES OUTDOOR CONTROL & RELAY PANEL CONTENTS	DRAWING NO.	REV
											CKD.	MHN		16/02/18	35620061775			00	
											APPD.	MAK		16/02/18	SHT. NO. 02			NO OF SHEETS 16	

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REF. DRG. NO.

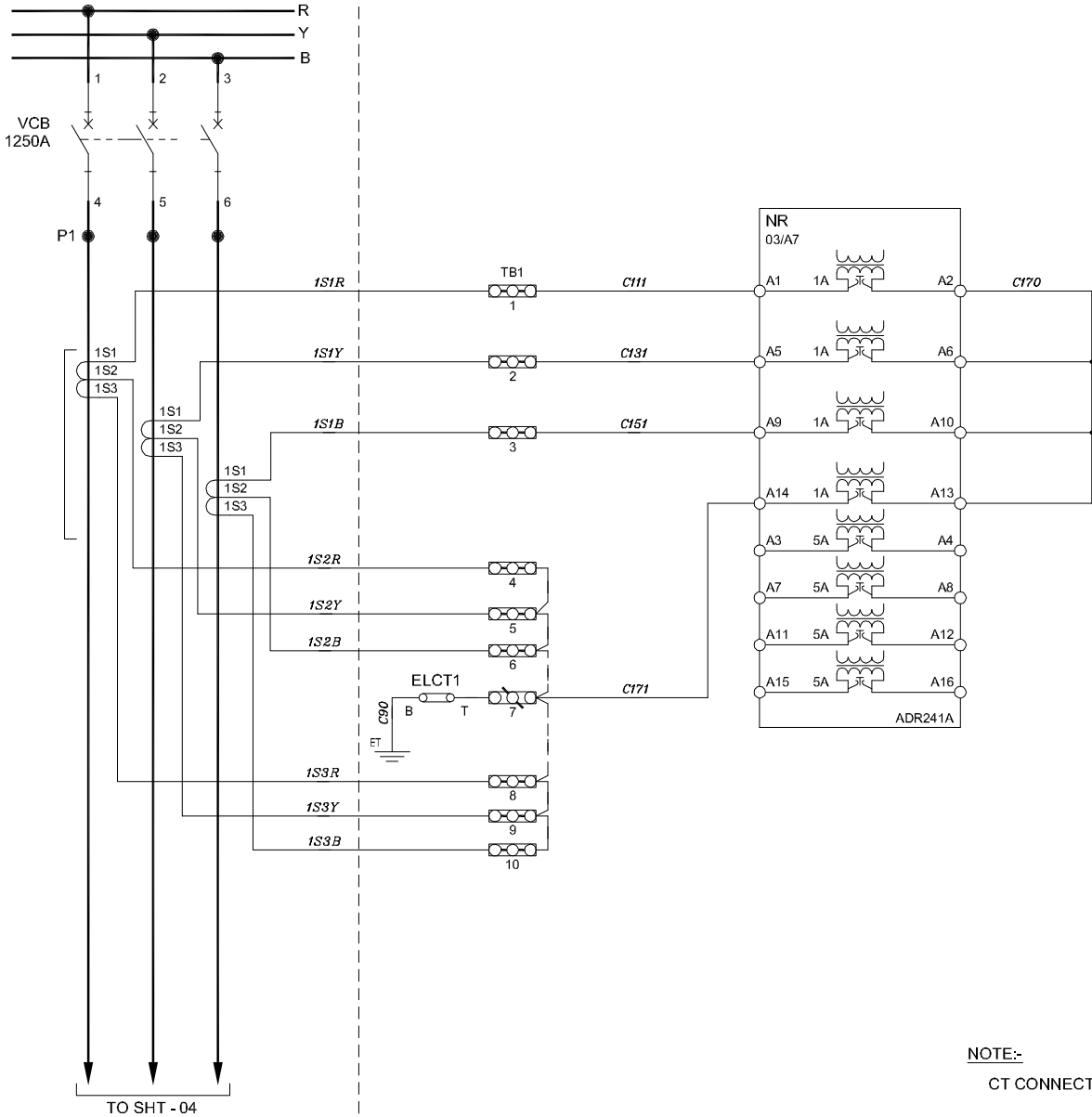
SIGN & DATE

INVENTORY NO.

35620061775

DRAWING NO.


REMOTE SIDE

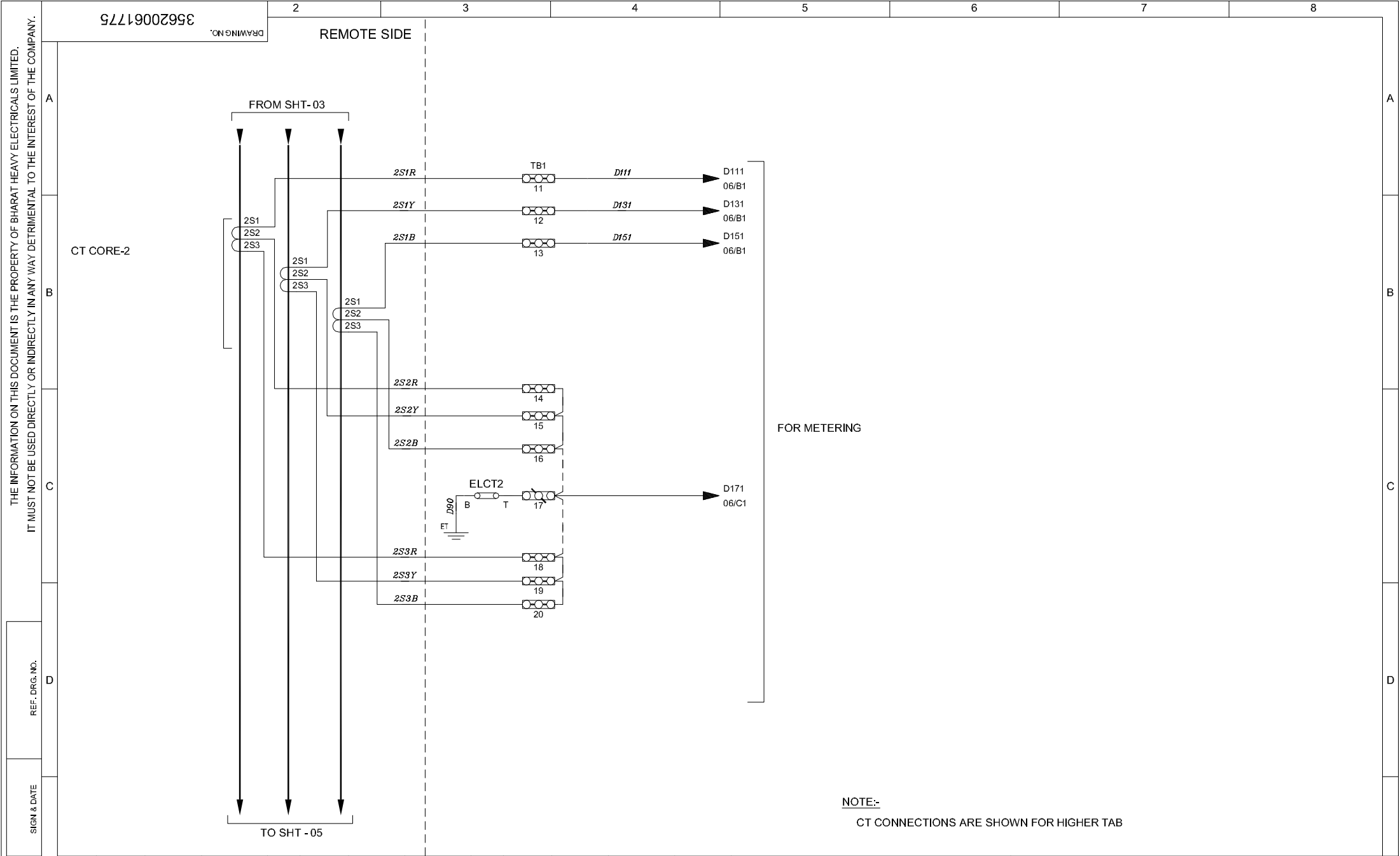


NR		
CT	03/B4	
C1	PSU	C3
B2		B4
B3		B5
B6		B8
B7		B9
2CRDC		SPARE
2CRDC		SPARE
C6		C8
C8		C11
C10		C12
C13		C15
C14		C16
B10		B11
B12		B11


NOTE:-

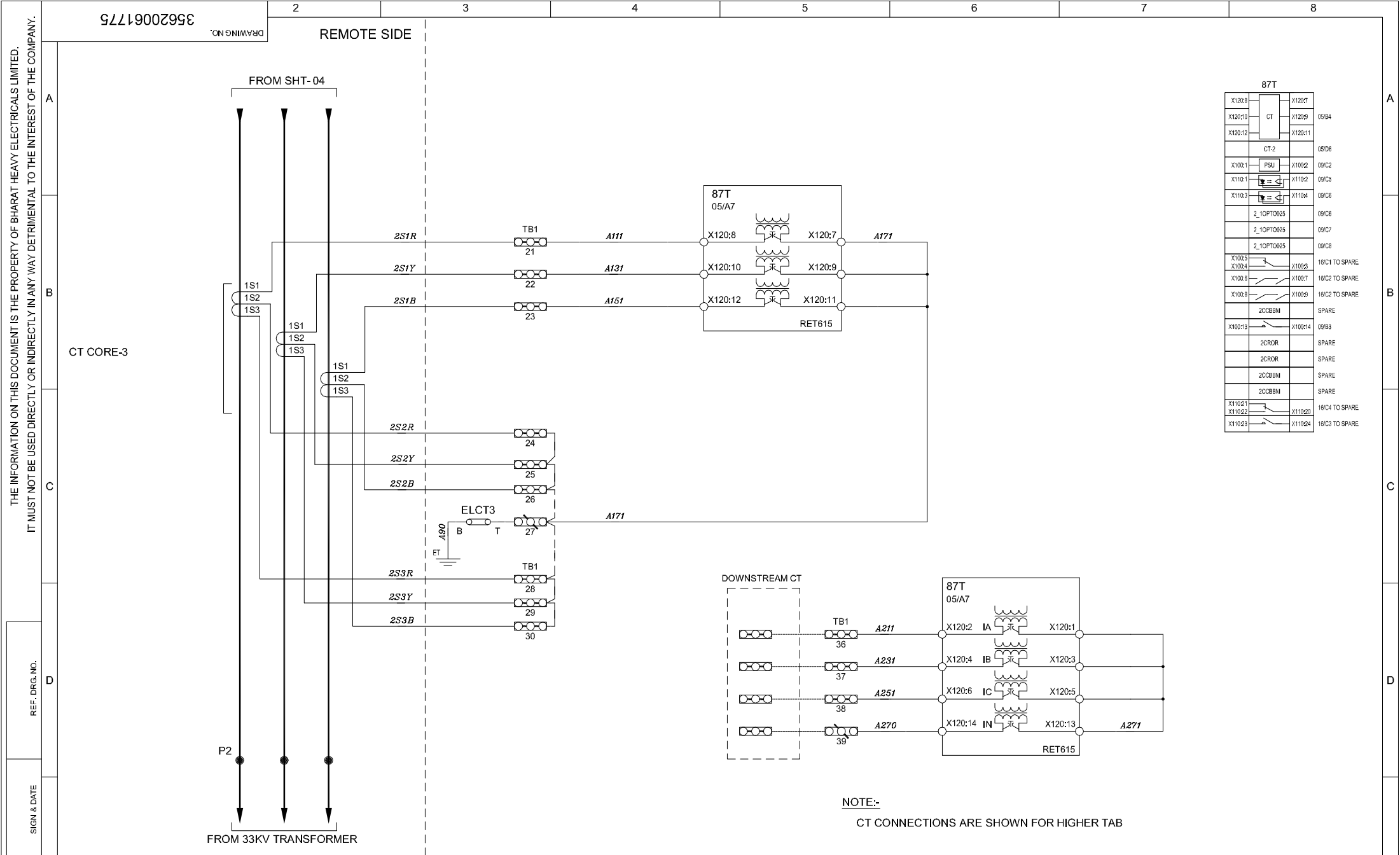
CT CONNECTIONS ARE SHOWN FOR HIGHER TAB

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT.	<div>श्री. एच. ई. लो.</div> <div></div>	BHARAT HEAVY ELECTRICALS LTD.	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM				
		CHECKED			CHECKED			CHECKED								
		APPROVED			APPROVED			APPROVED								
409																
ZONE			ZONE			ZONE		DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE	DRAWING NO. 35620061775		REV 00
								CKD.	MHN		16/02/18					
								APPD.	MAK		16/02/18					
BHOPAL																
												SHT. NO. 03		NO OF SHEETS 16		



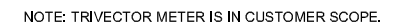
NOTE:-
CT CONNECTIONS ARE SHOWN FOR HIGHER TAB

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				CHECKED				CHECKED				CODE												
				APPROVED				APPROVED				409												
		ZONE					ZONE					ZONE							DRN.	NAME	SIGN	DATE		NO. OF VAR
															CKD.	MHN		16/02/18	35620061775		00			
															APPD.	MAK		16/02/18	OUTDOOR CONTROL & RELAY PANEL 3-LINE DIAGRAM-CT CONNECTIONS		SHT. NO. 04	NO OF SHEETS	16	



INVENTORY NO.	E	REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	SWE		BHARAT HEAVY ELECTRICALS LTD.	BHO PAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM				
				CHECKED				CHECKED				CODE											
				APPROVED				APPROVED				409											
	ZONE				ZONE				ZONE					DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE	DRAWING NO.	REV		
													CKD.	MHN		16/02/18	OUTDOOR CONTROL & RELAY PANEL 3-LINE DIAGRAM-CT CONNECTIONS					35620061775	00
													APPD.	MAK		16/02/18							

DRAWING NO.



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT.	<div>श्री. लक्ष्मी ई. लक्ष्मी</div> <div>BHEL</div>	BHARAT HEAVY ELECTRICALS LTD.	OUTDOOR CRP FOR 11KV VCB				
		CHECKED			CHECKED			CHECKED					SWE	BHOPAL	APEPDCL VISHAKHAPATNAM	
		APPROVED			APPROVED			APPROVED					CODE			
									409							
ZONE			ZONE			ZONE		DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE	OUTDOOR CONTROL & RELAY PANEL METERING CIRCUIT	DRAWING NO. 35620061775	REV 00
								AKD.	MHN		16/02/18					
								APPD.	MAK		16/02/18					
		SHT. NO. 06		NO OF SHEETS		16										

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REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

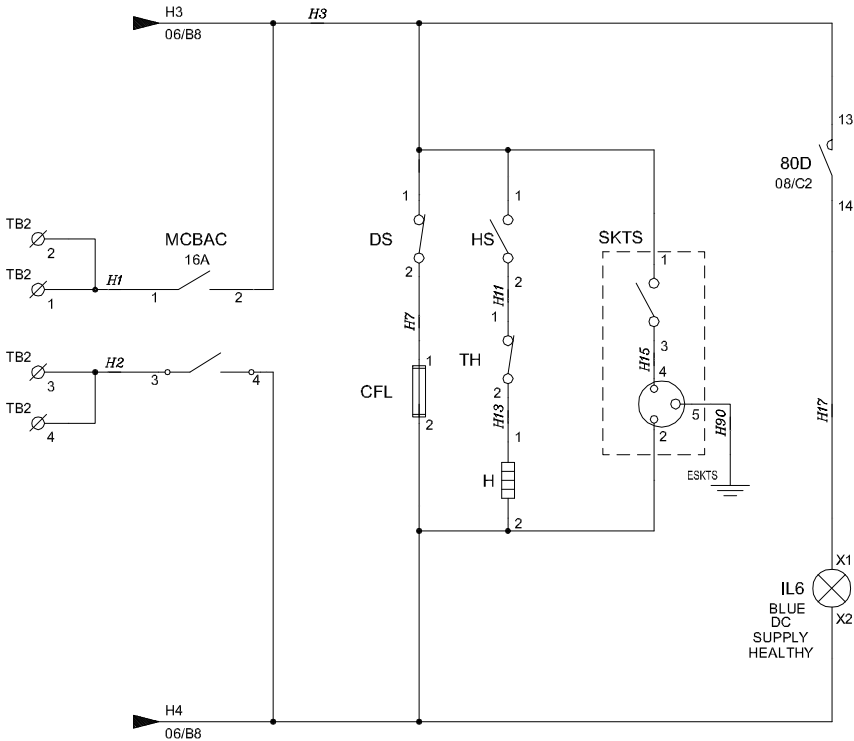
FIRST ANGLE PROJECTION


(ALL DIMENSIONS ARE IN mm)

35620061775

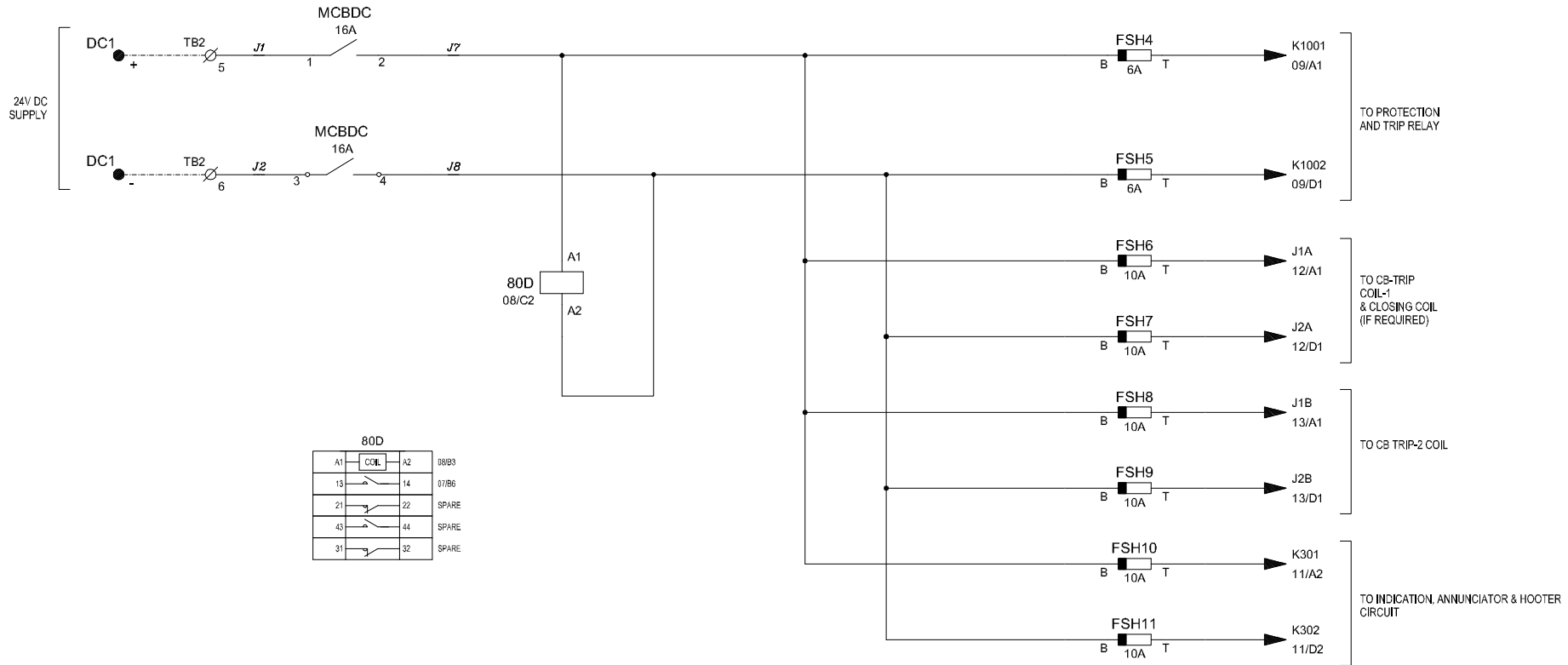
DRAWING NO.





SINGLE PH.
240V AC
SUPPLY
FROM ACDB



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT. SWE		BHARAT HEAVY ELECTRICALS LTD. BHOPAL	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM					
		CHECKED			CHECKED			CHECKED									
		APPROVED			APPROVED			APPROVED									
ZONE			ZONE			ZONE			DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL 240V AC SUPPLY DISTRIBUTION	DRAWING NO. 35620061775		REV 00
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									APPD.	MAK		16/02/18					

DRAWING NO.




80D			
A1	COIL	A2	08/B3
13		14	07/B6
21		22	SPARE
43		44	SPARE
31		32	SPARE

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REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT.		BHARAT HEAVY ELECTRICALS LTD. Bhopal	OUTDOOR CRP FOR 11KV VCB APEPDCL VISHAKHAPATNAM					
		CHECKED			CHECKED			SWE									
		APPROVED			APPROVED			CODE 409									
ZONE			ZONE			ZONE			DRN.	NAME NM	SIGN	DATE 16/02/18	NO. OF VAR	TITLE OUTDOOR CONTROL & RELAY PANEL 24V DC SUPPLY DISTRIBUTION	DRAWING NO. 35620061775		REV 00
								AKD.	MHN		16/02/18						
								APPD.	MAK		16/02/18	SHT. NO. 08			NO OF SHEETS	16	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

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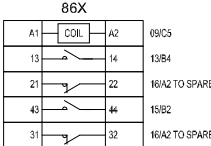
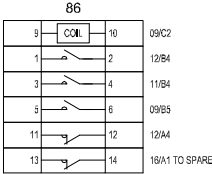
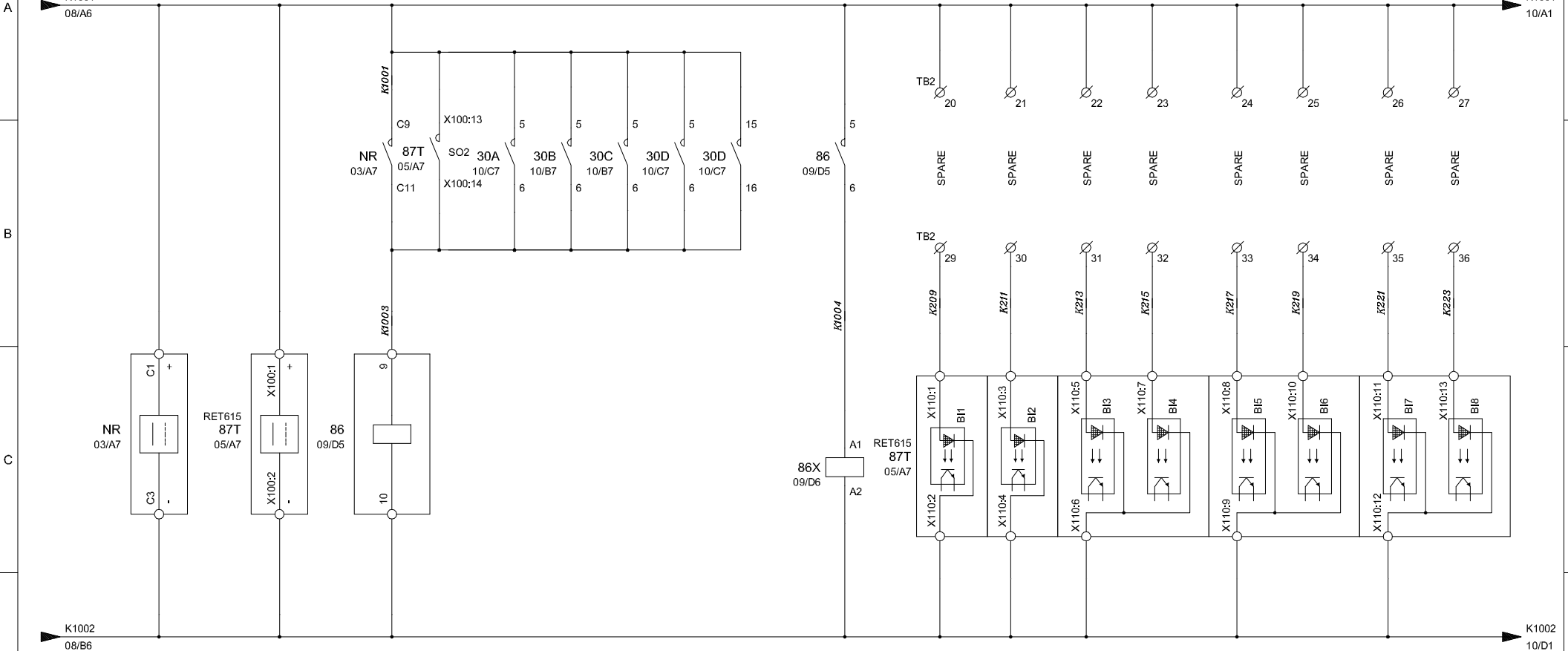
REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

35620061775

DRAWING NO.



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	SWE	CODE	409	NAME	SIGN	DATE	NO. OF	TITLE	DRAWING NO.	REV
ZONE				ZONE				ZONE				DRN.	NM	MAH	16/02/18	NO. OF	VAR	OUTDOOR CONTROL & RELAY PANEL			35620061775	00
												CKD.	MAH	16/02/18				OUTDOOR CONTROL & RELAY PANEL				
												APPD.	MAH	16/02/18				TRIP CONDITIONS (86) &				
																		DC SCHEME-NR				
																				SHT. NO. 09	NO OF SHEETS	16



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

OUTDOOR CRP FOR 11KV VCB
APEPDCL VISHAKHAPATNAM

OUTDOOR CONTROL & RELAY PANEL
TRIP CONDITIONS (86) &
DC SCHEME-NR

DRAWING NO.
35620061775
SHT. NO. 09
NO OF SHEETS
16

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REF. DRG. NO.

SIGN & DATE

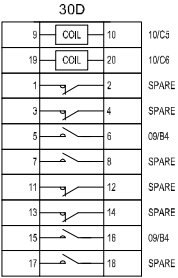
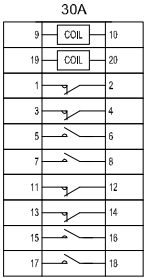
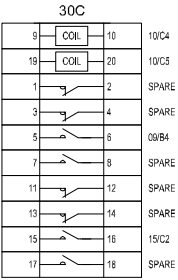
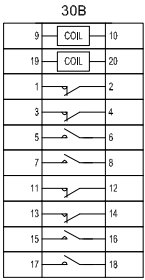
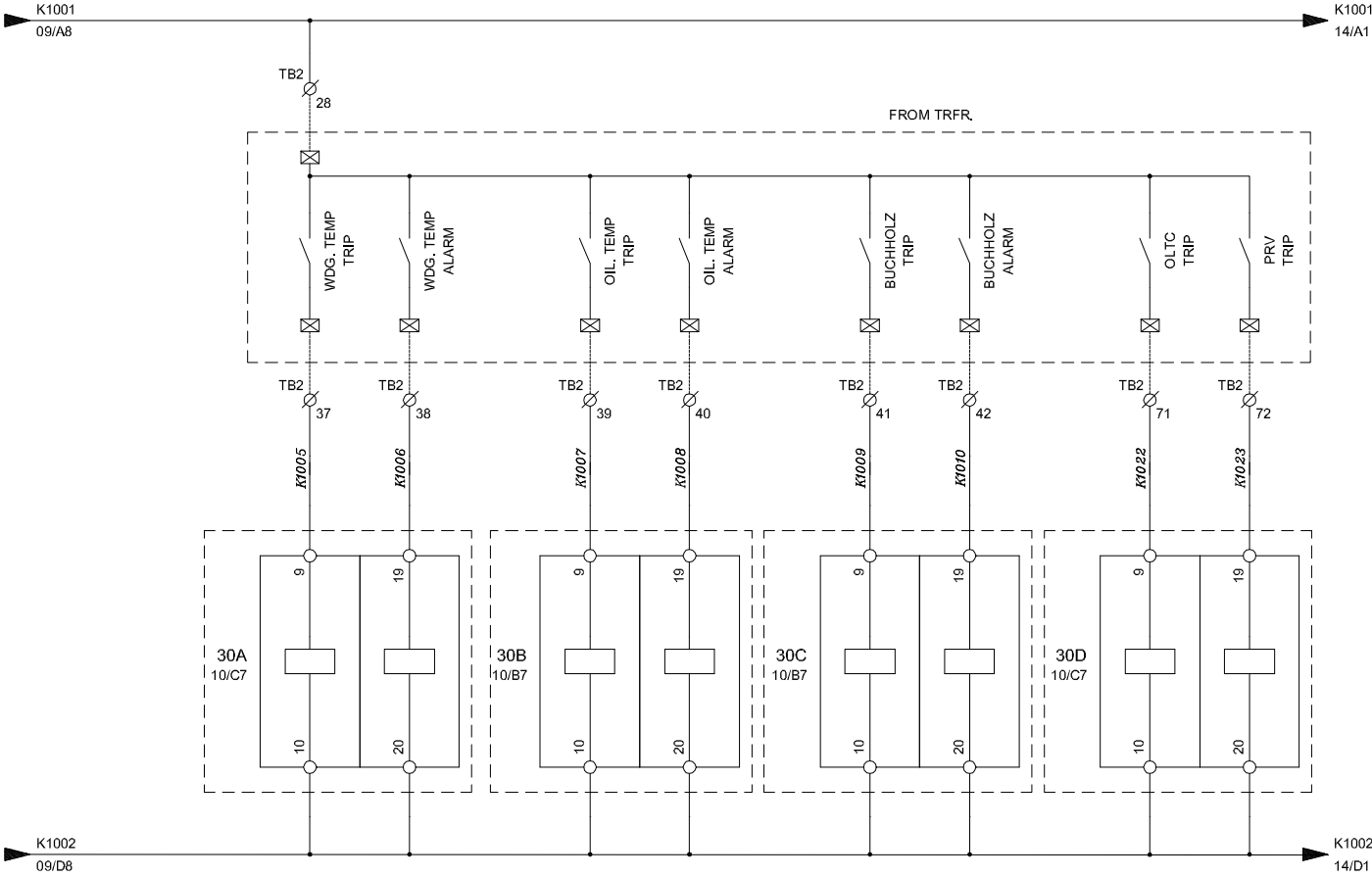
INVENTORY NO.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35620061775

DRAWING NO.



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DEPT.	SWE	BPHARAT HEAVY ELECTRICALS LTD.	OUTDOOR CRP FOR 11KV VCB APEPDCD VISHAKHAPATNAM										
		CHECKED			CHECKED			CHECKED														
		APPROVED			APPROVED			APPROVED														
										409												
ZONE				ZONE				ZONE				DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE	DRAWING NO.		REV		
												CKD.	MHN		16/02/18			OUTDOOR CONTROL & RELAY PANEL PROTECTION CIRCUIT	35620061775		00	
												APPD.	MAK		16/02/18				SHT. NO. 10			NO OF SHEETS



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

OUTDOOR CRP FOR 11KV VCB
APEPDCD VISHAKHAPATNAM

OUTDOOR CONTROL & RELAY PANEL
PROTECTION CIRCUIT

SHT. NO. 10 NO OF SHEETS 16

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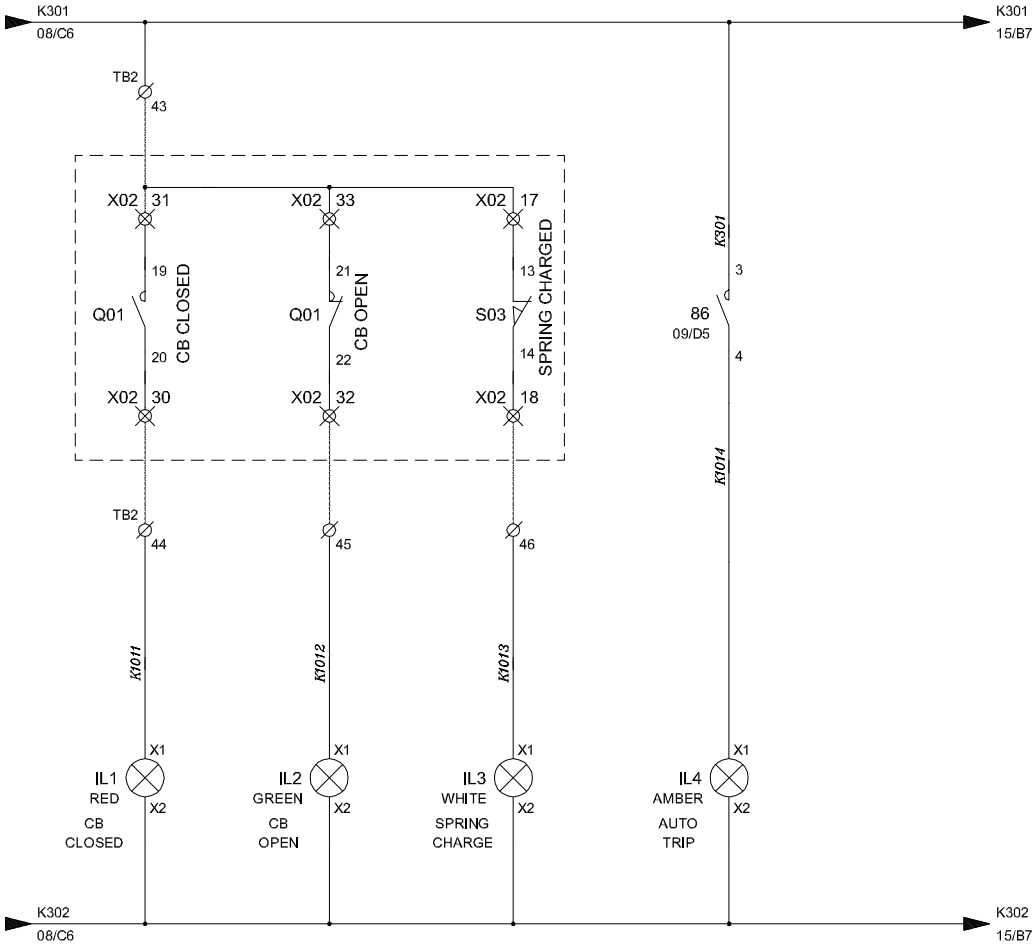
REF. DRG. NO.


SIGN & DATE

INVENTORY NO.

35620061775

DRAWING NO.



REV.	DATE	ALTERED		REV.	DATE	ALTERED		REV.	DATE	ALTERED		DEPT.	SWE	BHARAT HEAVY ELECTRICALS LTD.	OUTDOOR CRP FOR 11KV VCB						
		CHECKED				CHECKED				CHECKED						APPEPCL VISHAKHAPATNAM					
		APPROVED				APPROVED				APPROVED											
ZONE				ZONE				ZONE				409		BHOPAL							
												DRN.	NAME	SIGN	DATE	NO. OF VAR	TITLE	DRAWING NO.		REV	
												CKD.	MHN		16/02/18			35620061775			00
												APPD.	MAK		16/02/18			SHT. NO. 11			NO OF SHEETS