

NOTES

1. 115 kV. IVT RATIO  
 $\frac{115,000}{\sqrt{3}} : \frac{115}{\sqrt{3}} // \frac{115}{\sqrt{3}} / \frac{115}{\sqrt{3}} \text{ V}$

2. 115 kV. CT RATIO  
1800/1500/1200/900/600/300 : 1/1/1/1 A. – FOR LINE BAY  
1800/1500/1200/900/600/300 : 1 A. – FOR TRANSFORMER BAY (CORE1)  
400/300/200 : 1/1/1 A. – FOR TRANSFORMER BAY (CORE2-4)

3. 22 kV. VT. RATIO  
 $\frac{22000}{\sqrt{3}} : \frac{110}{\sqrt{3}} // \frac{110}{\sqrt{3}} \text{ V}$

4. 22 kV. CT. RATIO  
1800/1500/900 : 1/1/1/1 A – FOR INCOMING BREAKER  
1800/1500/900 : 1/1 A – FOR TIE BREAKER  
600/300 : 1/1 A – FOR OUTGOING 22 kV.  
1800/900 : 1/1 A – FOR LOW SIDE TRANSFORMER BUSHING CT.  
1800/900 : 1/1 A – FOR NEUTRAL BUSHING CT.  
600/300 : 1/1 A – FOR CAPACITOR BANK
- 50VA/0.2/1.5VF, 50VA/3P/1.5VF  
(SIMULTANEOUS BURDEN = 100 VA.)

20VA/5P20, 20VA/0.5FS5, 20VA/5P20, 20VA/5P20  
20VA/5P20  
20VA/0.5FS5, 30VA/5P20, 30VA/5P20  
\*\*\*PARTICULAR REQUIREMENT FOR ALL 5P20 CLASS CT's  
CURRENT RATIO ERROR AT 100% OF RATED CURRENT < 0.5%  
20VA/5P20

50VA/0.5/1.9VF, 50VA/3P/1.9VF

20VA/5P20, 20VA/0.5FS5, 20VA/5P20, 20VA/5P20  
20VA/0.5FS5, 20VA/5P20  
20VA/0.5FS5, 20VA/5P20  
20VA/5P20, 20VA/5P20  
20VA/0.5FS5, 20VA/5P20  
\*\*\*PARTICULAR REQUIREMENT FOR ALL 5P20 CLASS CT's  
CURRENT RATIO ERROR AT 100% OF RATED CURRENT < 0.5%
5. THE NEUTRAL GROUNDING RESISTORS (NGR) ARE INDICATED FOR FUTURE INSTALLATION.

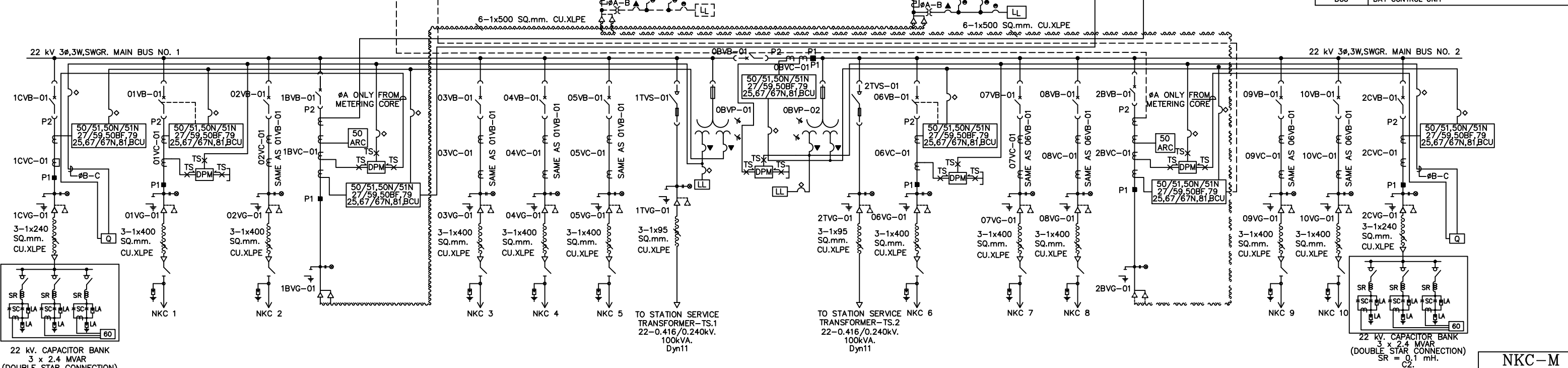
6. SYNCHRONIZING SCHEMATIC  
6.1 0-YP-01 SHOWN THUS, REFER TO INCOMING IVT DESIGNATIONS.  
6.2 0BYP-01 SHOWN THUS REFERS TO RUNNING BUS IVT  
6.3 #B ONLY ✓ SHOWN THUS, REFERS TO THE SECONDARY WINDING OF IVT FOR PHASE "B" AND USING FULL TAP WINDING 115V FOR SYNCHRONIZING SYSTEM WITH ONE END OF THE WINDING CONNECTED WITH COMMON GROUND BUS.  
6.4 MANUAL SYNCHRONIZING BY SYNCHROSCOPE SHALL UTILIZE INCOMING AND RUNNING SECONDARY VOLTAGES OF METERING CORES FROM "PHASE B" FOR BOTH IVT'S.  
6.5 AUTOMATIC SYNCHRONISM VERIFICATION BY SYNCHRO CHECK RELAY (25) SHALL UTILIZE INCOMING AND RUNNING SECONDARY VOLTAGES OF RELAYING CORES FROM "PHASE B" FOR BOTH IVT'S.

7. EACH DIGITAL POWER METER (DPM) SHALL BE COMMUNICATED WITH AUTOMATIC METER READING (AMR) APPLICATION SERVER VIA SWITCH NETWORK.

8. FOR 115KV RELAYS SHALL BE DOUBLE MAIN PROTECTION RELAY(MAIN1&2) AND DIFFERENT PRODUCT/MANUFACTURER.

9. THE DEDICATED PROTECTION RELAY FOR 22 KV SWITCHGEAR SHALL BE STANDARDIZED WHICH CAN BE EITHER USED FOR INCOMING, BUS SECTION, OUTGOING FEEDERS OR CAPACITOR BANK FEEDERS.

10. NETWORK TOPOLOGY OF SUBSTATION CONTROL AND PROTECTION SYSTEM IS TOPOLOGY 1



DEVICES	EXPLANATION
21, 21N	DISTANCE TIME-STEP PHASE AND GROUND DISTANCE RELAY
67	DIRECTIONAL PHASE OVERCURRENT RELAY
67N	DIRECTIONAL GROUND OVERCURRENT RELAY
25	SYNCHROCHECK RELAY
79	AUTOMATIC RECLOSING RELAY
50 BF	BREAKER FAILURE RELAY
50 51	NON-DIRECTIONAL INSTANTANEOUS AND TIME PHASE OVERCURRENT RELAY
50N 51N	NON-DIRECTIONAL INSTANTANEOUS AND TIME GROUND OVERCURRENT RELAY
51GB	NON-DIRECTIONAL GROUND BACKUP OVERCURRENT RELAY
87T	TRANSFORMER DIFFERENTIAL RELAY
87REF	TRANSFORMER RESTRICTED EARTH FAULT RELAY THIS RELAY SHALL BE INCORPORATED IN THE TRANSFORMER DIFFERENTIAL RELAY (87T)
87B	BUS DIFFERENTIAL RELAY, HIGH IMPEDANCE TYPE
95B	BUSBAR SUPERVISION RELAY FOR BUS WIRE SUPERVISION FOR 87B
27,59	UNDER/OVER VOLTAGE RELAY
90	AUTOMATIC VOLTAGE REGULATOR
50 ARC	ARC DETECTOR RELAY FOR ARC PROTECTION SYSTEM
81	UNDER FREQUENCY RELAY
60	CAPACITOR CURRENT UNBALANCE SENSING RELAY
Q	POWER FACTOR CONTROLLER
DPM	DIGITAL POWER METER
DIM	DISTRIBUTED I/O MODULE (PROVIDED IN CSCS)
V METER	DIGITAL VOLTMETER
SS	SYNCHRONIZING SWITCH,3-POSITION,AUTO-OFF-MAN
L	SYNCHRONIZING LAMP
V	VOLTMETER
F	FREQUENCY METER
S	SYNCHROSCOPE
LL	LINE INDICATING LAMP
TS	CURRENT TEST SWITCH
TS	POTENTIAL TEST SWITCH
▲	LOCATED IN THE SWITCHYARD JUNCTION BOX
●	LOCATED IN THE CONTROL AND RELAY BOARD
▼	LOCATED IN THE 22 kV SWITCHGEAR JUNCTION BOX
◇	FOR 22 kV SWITCHGEAR CONTROL & PROTECTIVE CIRCUITS
⏚	WYE CONNECTED CT OF SECONDARY WINDING
⏚	DELTA CONNECTED CT OF SECONDARY WINDING (IF ANY)
⏚	TRANSFORMER BUSHING CT OF SECONDARY WINDING, WYE CONNECTED FOR PHASE OR NEUTRAL
BCU	BAY CONTROL UNIT

22 kV. CAPACITOR BANK  
3 x 2.4 MVAR  
(DOUBLE STAR CONNECTION)  
SR = 0.1 mH.  
C1.

SYNCHRONIZING BUS

TO IVT'S FOR SS AUTO MODE (ABOVE)  
TO IVT'S FOR SS AUTO MODE (ABOVE)

INCOMING BUS FOR LINE IVT-#B ONLY 0-YP-0-  
RUNNING BUS FOR LINE IVT-#B ONLY 0BYP-01  
COMMON GROUND BUS

AUTOMATIC MODE-SYNCHRO-CHECK SCHEMATIC

MTS = MIXED TECHNOLOGY SWITCHGEAR  
---- FUTURE

REFERENCE DRAWING  
SINGLE LINE DIAGRAM.....DWG NO. FA3-011/63015

กองออกแบบสถานีไฟฟ้า ฝ่ายงานสถานีไฟฟ้า	การไฟฟ้าส่วนภูมิภาค	ใช้แบบฉบับ _____ ถูกแทนโดยแบบ _____ เขียนเสร็จวันที่ 2 มิ.ค. 63 แก้ไขแบบวันที่ _____ มีมติเป็น _____ มาตรฐาน _____
ผู้เขียน สุวิกรม ผู้สำรวจ _____ วิศวกร สุวิกรม หัวหน้าแผนก วสุวาท ผู้อำนวยการกอง _____ ผู้อำนวยการฝ่าย (นางนง) รองผู้อำนวยการวิศวกรรม _____	สถานีไฟฟ้าหนองคาย 3 จ.หนองคาย มิเตอร์ และ รีเลย์ไดอะแกรม NONG KHAI 3 SUBSTATION METERING AND RELAYING DIAGRAM	แบบเลขที่ FA4-011/63017 แผ่นที่ 1 ของจำนวน 1 แผ่น