



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-20-Apr-19

CORRIGENDUM- 02

PROJECT	:	1x660 MW UPRVUNL PANKI TPS EXT
PACKAGE	:	CONDENSATE POLISHING UNIT
ENQUIRY NO	:	E-6155/2018 Dated. 20.03.2019
SUBJECT	:	TECHNICAL AMENDMENT

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☐

In reference to the above mentioned tender enquiry for **CONDENSATE POLISHING UNIT** package

Please note the following.

1. Amendment to technical specification is attached along with this corrigendum.
2. Reply of pre-bid queries are also attached.
3. Kindly submit your offer after considering amendment to technical specification and reply of pre-bid queries also.

All the other terms and conditions of the tender enquiry remain unchanged. All the bidders are requested to quote accordingly.

Yours faithfully,

For and on behalf of BHEL

Guru Das
Dy. Manager

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.:	
			VOLUME II B	
			SECTION D	
			REV. NO. 00	DATE: 26.02.18
			SHEET 1	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
GENERAL*	* PROJECT	1 x 6600 MW PANKI Thermal Power Project		
	OFFER REFERENCE			
	* TAG NO. SERVICE			
	* DUTY	☐ ON / OFF ☐ INCHING		
	* LINE SIZE (inlet/outlet): MATERIAL			
	* VALVE TYPE	☐ GLOBE ☐ GATE ☐ REG. GLOBE ☐ BUTTERFLY		
	* OPENING / CLOSING TIME			
	* WORKING PRESSURE			
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF -20 to 70 DEG C AND RELATIVE HUMIDITY OF 0-95%		
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY		
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY		
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY		
CONSTRUCTION AND SIZING	CONSTRUCTION	TOTALLY ENCLOSED, WEATHER PROOF, DUST TIGHT SUITABLE FOR OUTDOOR USE WITHOUT CANOPY, NEMA6/IP:68		
	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL		
	BEARINGS	DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.		
	GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION	METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.		
	SIZING	OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 90% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR REGULATING SERVICE - 150 STARTS/HR MINIMUM OR REQUIRED CYCLES WHICHEVER IS HIGHER..		
HANDWHEEL	* REQUIRED	☒ YES ☐ NO		
	* ORIENTATION	☐ TOP MOUNTED ☐ SIDE MOUNTED		
	*TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.			
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY		
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY		
	@ MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT-INCLUSIVE OF I.S. TOLERANCE		
	ACTUATOR APPLICABLE WIRING DIAGRAM	☒ ENCLOSED (BIDDER TO CONFIRM) A: ☐ DRG. NO. 3-V-MISC-24227 R00 B: ☐ DRG. NO. 3-V-MISC-24550 R00 C: ☒ DRG. NO. 3-V-MISC-24283 R00 D: ☐ DRG. NO. 4-V-MISC-90271 R11 E: ☐ For Thyristor based Integral starter, Bidder/Vendor to furnish wiring diagram		
	COLOUR SHADE	☒ RAL 7032		
	PAINT TYPE (## Refer Notes)	☐ ENAMEL ☒ EPOXY ☐		
	SHAFT RPM	BIDDER TO SPECIFY		
	OLR SET VALUE	BIDDER TO SPECIFY		
	@ STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY		
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY		
	@ PWR SUPP TO MTR / STARTER	415V +/- 10%, 3 Phase, 3 Wire 50HZ +/-5%		
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED FROM THE POWER SUPPLY TO THE STARTER ☐ 230 V ☒ 110 V		



SPECIFICATION FOR MOTORISED VALVE ACTUATOR

SPECIFICATION NO.:

VOLUME II B

SECTION D

REV. NO. 00

DATE: 26.02.18

SHEET 2

OF 4

Data Sheet A & B

DATA SHEET-A
(TO BE FILLED BY PURCHASER)

DATA SHEET-B
(TO BE FILLED-UP BY BIDDER)

	@ ENCLOSURE CLASS OF MOTOR	☐ IP 67 ☐ FLAME PROOF		
	@ INSULATION CLASS	CLASS-F TEMP. RISE LIMITED TO CLASS-B		
	@ WINDING TEMP PROTECTION	☒ THERMOSTAT (3 Nos.,1 IN EACH PHASE) ☐ -----		
	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED		
INTEGRAL STARTER	INTEGRAL STARTER	☒ REQUIRED ☐ NOT REQUIRED		
	TYPE OF SWITCHING DEVICE	☒ CONTACTORS(Reversing type) ☐ THYRISTORS		
	TYPE	☒ CONVENTIONAL ☐ SMART (NON-INTRUSIVE)		
	IF SMART			
	a) SERIAL LINK INTERFACE	☐ INTEGRAL ☐ FIELD MOUNTED		
	b) SERIAL LINK PROTOCOL	☐ FOUNDATION FIELD-BUS ☐ PROFI-BUS ☐ DEVICE NET ☐		
	c) SERIAL LINK MEDIA	☐ TWISTED PAIR Cu-CBL ☐ CO-AXIAL Cu-CBL ☐ OFC		
	d) HAND HELD PROGRAMMER	☐ REQUIRED ☐ NOT REQUIRED		
	e) TYPE OF HAND HELD PROGRAMMER	☐ BLUETOOTH ☐ INFRARED ☐		
	f) MASTER STATION	☐ REQUIRED ☐ NOT REQUIRED		
	g) MASTER STN INTRFACE WITH DCS	☐ MODBUS ☐ TCP/IP		
	h) DETAILS OF SPECIAL CABLE	☐ ENCLOSED ☐ NOT REQUIRED		
	STEP DOWN CONT. TRANSFORMER	☒ REQUIRED		
	OPEN-STOP-CLOSE PB(running open/close LED) THREE POSITION SELECTOR SWITCH	☒ REQUIRED ☐ NOT REQUIRED		
	INDICATING LAMPS	☒ REQUIRED ☐ NOT REQUIRED		
	LOCAL-OFF- REMOTE S/S(THREE POSITION SELECTOR SWITCH)	☒ REQUIRED ☐ NOT REQUIRED		
	STATUS CONTACTS FOR MONITORING	☒ REQUIRED ☐ NOT REQUIRED		
	INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (MOTOR THERMOSTAT TRIP/O/L RELAY OPERATED, CONT. /POWER SUPPLY FAILED, S/S IN LOCAL/OFF MODE, TORQUE SWITCH OPEN/CLOSE CUT OFF/STOP PB OPTD.)		
INTERPOSING RELAY/OPTO COUPLER (Applicable for integral Starter)	TYPE OF ISOLATING DEVICE	☐ INTERPOSING RELAY ☒ OPTO COUPLER ☐ EITHER		
	QUANTITY	☒ 2 NOS. ☐ 3 NOS.		
	DRIVING VOLTAGE	☒ 20.5 – 24V DC ☐ _____ V DC		
	DRIVING CURRENT	☒ 125mA MAX ☐ _____ mA MAX		
	LOAD RESISTANCE	☒ > 192 ohms - <25 k ohms ☐ > _____ ohms - < _____ ohms		
TORQUE SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN / CLOSE	☐ 1 No. ☒ 2Nos. / ☐ 1 No. ☒ 2Nos		
	CONTACT TYPE	2 NO + 2 NC		
	RATING	5A 250V AC AND 0.5A 220V DC		
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE		
	ACCURACY	+3% OF SET VALUE		
LIMIT SWITCH (Not Applicable for Smart Actuator) (\$\$ Refer Notes)	MFR & MODEL NO.	BIDDER TO SPECIFY		
	OPEN : INT : CLOSE	☒ 2 Nos. 2 nos(adj) 1 No. ☒ 2Nos.		
	CONTACT TYPE	2 NO + 2 NC		
	RATING (AC / DC)	5A 250V AC AND 0.5A 220V DC		

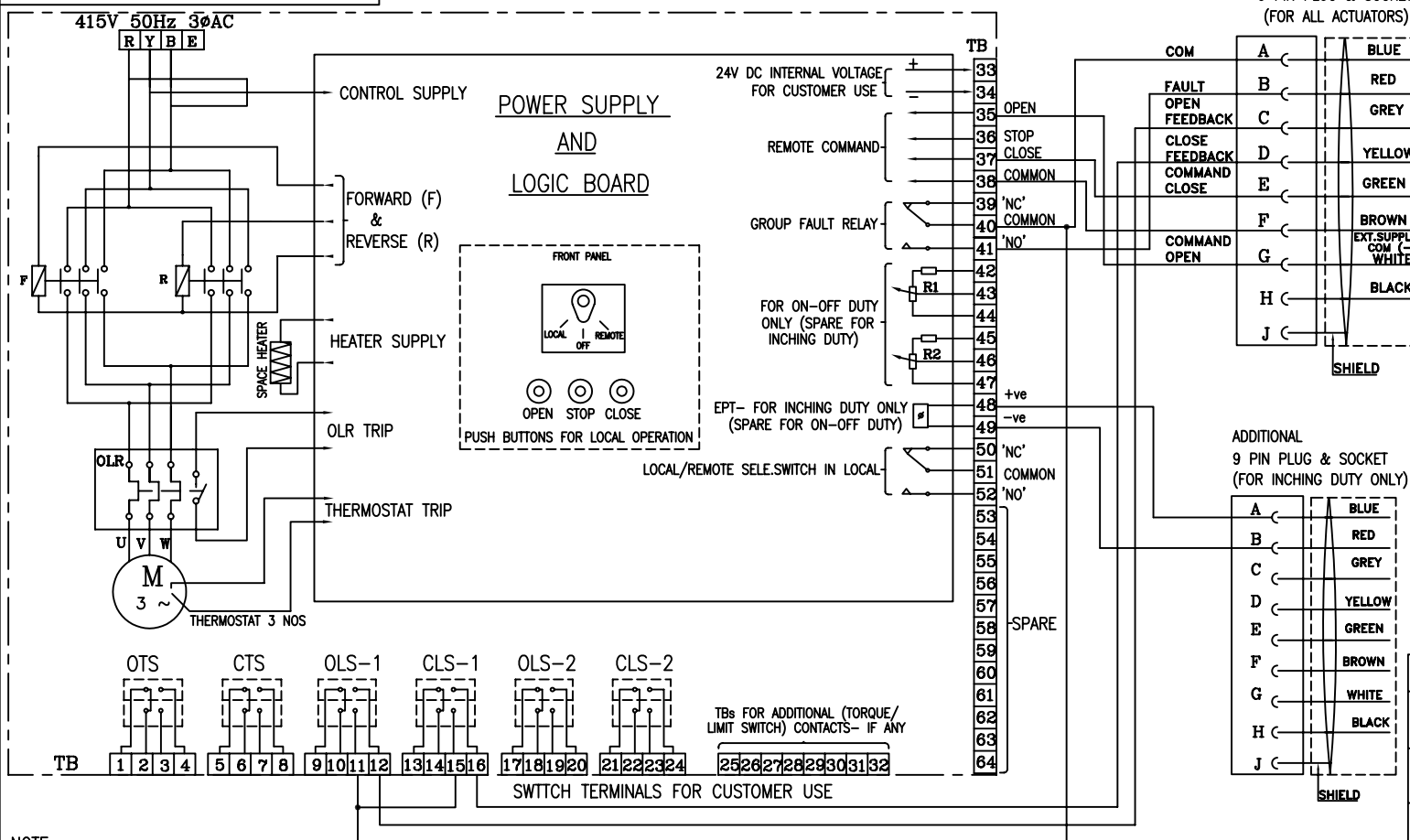
	SPECIFICATION FOR MOTORISED VALVE ACTUATOR	SPECIFICATION NO.:		
		VOLUME	II B	
		SECTION	D	
		REV. NO.	00	DATE: 26.02.18
		SHEET	3	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	

POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty & other specific applications)	REQUIRED for regulating/inching duty only.	
	MFR & MODEL NO.	BIDDER TO SPECIFY	
	TYPE	☐ ELECTRONIC (2 WIRE) R/I CONVERTER ☒ ELECTRONIC (2 WIRE) contactless inductive type	
	SUPPLY	☒ 24V DC ☐	
	OUTPUT	☒ 4-20mA	
	ACCURACY	$\pm 1\%$ FS	
SPACE HEATER	@SPACE HEATER	REQUIRED	
	@ POWER SUPPLY (NON INTEGRAL)	230V AC,1 PH.,50 Hz	
	@ POWER SUPPLY (INTEGRAL)	BIDDER TO SPECIFY	
	@ RATING		
TERMINAL BOX	ACTUATOR/MOTOR TERMINAL BOX	REQUIRED	
	ENCL CLASS ACTUATOR/MOTOR T.B.	@ ☒ IP 68 @ ☐ NEMA6	
	@ EARTHING TERMINAL	REQUIRED	
	PLUG & SOCKET(9 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	☒ REQUIRED ☐ NOT REQUIRED ☒ 2 NOS. ☐	
CABLE GLANDS	@ POWER CABLE GLAND	SIZE:-----	
	@ SPACE HEATER CABLE GLAND	SIZE:-----	
	OTHER CONTROL CABLE GLANDS-1	☐ 1No. for BFV of CW PUMP(Cable size 2Px1.5mm ²)	
	OTHER CONTROL CABLE GLANDS-2	1 no suitable for 8P X 0.5 sq mm Additional 1 no suitable for 2P X 0.5 sq mm(inching duty only)	

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR		SPECIFICATION NO.:	
			VOLUME II B	
			SECTION D	
			REV. NO. 00	DATE: 26.02.18
			SHEET 4	OF 4
Data Sheet A & B				
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY	_____ Kg.	
NOTES: SCOPE: DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY. CODES & STANDARDS: DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH: IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691 AND IS-4722 - TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C. - CABLE GLANDS OF DOUBLE COMPRESSION TYPE, BRASS MATERIAL SHALL BE PROVIDED. - THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE. - THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%. - THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING. \$\$ TORQUE SWITCH & LIMIT SWITCH SHALL ACT INDEPENDENT OF EACH OTHER. TANDEM OPERATION IS NOT ACCEPTABLE. ## EPOXY PAINT IS RECOMMENDED FOR COASTAL AREAS. - IT SHOULD BE POSSIBLE TO OPERATE THE ACTUATOR LOCALLY. LOCKABLE LOCAL/REMOTE SELECTION SHALL BE PROVIDED ON THE ACTUATOR. - POSITION INDICATOR SHALL BE PROVIDED FOR 0 TO 100 % TRAVEL - WIRING SHALL BE SUITABLE VOLTAGE GRADE COPPER WIRE 1.5 SQ. MM. - THE MOTOR SHALL BE CAPABLE OF STARTING AT 85 PERCENT OF RATED VOLTAGE AND RUNNING AT 80 PERCENT OF RATED VOLTAGE AT RATED TORQUE AND 85 PERCENT RATED VOLTAGE AT 33 PERCENT EXCESS RATED TORQUE FOR A PERIOD OF 5 MINUTES EACH. - THE ACTUATORS SHALL BE DESIGNED TO BE SELF-LOCKING UPON LOSS OF POWER. MOTOR SHALL BE DESIGNED TO CLOSE IN 30 SECS. FROM FULL OPEN POSITION AND SHALL HAVE ADEQUATE CAPACITY TO OPEN AND CLOSE UNDER FULL UNBALANCED DESIGN PRESSURE. - ALL SIX (6) LIMIT SWITCHES SHALL BE CHANGEOVER TYPE AND ADJUSTABLE BESIDES HAVING THE SNAP FACILITY. - THE INTEGRAL STARTER WHICH SHALL HAVE SOPHISTICATED ELECTRONIC CONTROLS WITH FIELD PROGRAMMING FEATURE. IT SHALL BE DESIGNED FOR REMOTE CONTROL FROM DCS/RESPECTIVE CONTROL SYSTEM. REQUIRED INTERPOSING RELAYS FOR RECEIVING OPEN/CLOSE/STOP COMMAND FROM DCS/RESPECTIVE CONTROL SYSTEM SHALL BE PROVIDED. POTENTIAL FREE CONTACTS AND TRANSDUCERS SHALL BE PROVIDED TO PROVIDE STATUS INDICATION AT REMOTE DCS/RESPECTIVE CONTROL SYSTEM. - THE REMOTE COMMAND SIGNAL (OPEN-STOP-CLOSE) FROM DCS/RESPECTIVE CONTROL SYSTEM/CONTROL PANEL SHALL BE ISOLATED FROM CONTROL ELECTRONICS THROUGH OPTO-ISOLATOR. - THE FOLLOWING INDIVIDUAL STATUS ANNUNCIATION LED'S (COLOUR-GREEN) SHALL BE PROVIDED LOCALLY (INTEGRAL TO ACTUATOR) TO ANNUNCIATE THE FOLLOWING FOR EASY LOCAL MONITORING. ACTUATOR IN LOCAL MODE ACTUATOR IN REMOTE MODE ACTUATOR RUNNING IN OPEN DIRECTION ACTUATOR RUNNING IN CLOSE DIRECTION ACTUATOR IN INCHING MODE. ACTUATOR IN SELF-RETAINING MODE LIMIT SWITCH OPEN TRIP LIMIT SWITCH CLOSE TRIP CONTROL VOLTAGE AVAILABILITY				
NOTES* = TO BE FILLED BY MPL (LEAD AGENCY). @ = TO BE FILLED BY ELECTRICAL				

3-V-MISC-24283

DRAWING NO.



CONTACT DEVELOPMENT DIAGRAM

OTS	1-2	OPEN AT OVER TORQUE DURING OPENING TRAVEL				
	3-4	CLOSE AT OVER TORQUE DURING OPENING TRAVEL				
CTS	5-6	OPEN AT OVER TORQUE DURING CLOSING TRAVEL				
	7-8	CLOSE AT OVER TORQUE DURING CLOSING TRAVEL				
OLS-1	9-10					
	11-12					
CLS-1	13-14					
	15-16					
OLS-2	17-18					
	19-20					
CLS-2	21-22					
	23-24					
SWITCH	TERMINAL NO.	FULL OPEN	a	INTERMEDIATE	b	FULL CLOSE
		VALVE POSITION				

INDICATES CONTACT CLOSED

INDICATES CONTACT OPEN

CONTACT RATING: 5A AT 250V AC & 0.5A AT 220V DC

INDICATES CONTACT CLOSED

INDICATES CONTACT OPEN

SETTING PROCEDURE OF POSITION LIMIT AND TORQUE SWITCH

VALVES	OPEN		CLOSE	
	MAIN	BACK UP	MAIN	BACK UP
GATE VALVE OF 100 mm AND ABOVE IN 1500 CL AND ABOVE RATINGS	OLS	OTS *	CLS	CTS
ALL OTHER GATE & GLOBE VALVES	OLS	OTS *	CTS	#
# - CLS NOT TO BE CONNECTED IN TRIP CIRCUIT				
* - BYPASS OTS FOR INITIAL 5% OF TRAVEL (FOR GATE VALVES ONLY)				

NOTE:-

- ALL TORQUE AND LIMIT SWITCHES (OTS, CTS, OLS1&2, CLS1&2) ARE WITH 2NO+2NC CONTACTS '1NO+1NC' IS TERMINATED IN TBS 1-24, REMAINING CONTACTS ARE FOR INTERNAL USE.
- ANY SPARE CONTACTS WHICH ARE NOT USED INTERNALLY ARE TO BE TERMINATED IN TBS 25-32
- CTS - TORQUE SWITCHES FOR CW ROTATION (CLOSE)
- OTS - TORQUE SWITCHES FOR CCW ROTATION (OPEN)
- OLS-1, OLS-2 - LIMITSWITCHES FOR POSITION OPEN
- CLS-1, CLS-2 - LIMITSWITCHES FOR POSITION CLOSE
- EPT - ELECTRONIC POSITION TRANSMITTER (CONTACTLESS TYPE, FOR INCHING DUTY)
- R1-R2-POTENTIOMETER 2 x 100 OHMS (FOR ON-OFF DUTY)
- FOR COMMANDS & EPT EITHER INTERNALLY GENERATED 24 VDC OR EXTERNAL SUPPLY OF 24VDC CAN BE USED
- M - MOTOR 3φ 415V 50 Hz AC SUPPLY
- TORQUE SWITCH BYPASS WITH LIMITSWITCH BOTH ON OPEN & CLOSE DIRECTION TO BE DONE INTERNALLY.

REV	DATE	ALTERED
		CHD & APPD

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT			ELECTRICAL VALVE ACTUATORS (AC) WITH INTEGRAL STARTERS FOR NTPC PROJECTS (DRAWN FOR INTERMEDIATE POSITION OF VALVES)						
 BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014. 365-121			DRN	NAME N.P.ESWAR		SIGN N.P		DATE 17.03.05	NO.OF VAR.
			CHD	D.DINAKARAN		D.D		17.03.05	-
			APPD	K.ARUNACHALAM		K.A		17.03.05	-
DEPT	VL		SCALE	WEIGHT (KG).		REFERENCE INFORMATIONS			NO. OF ITEMS
CODE	-		NTS	-					-
TITLE WIRING DIAGRAM (TERMINAL PLAN) FOR ACTUATOR WITH INTEGRAL STARTER WITH PLUG & SOCKET FOR NTPC PROJECTS				CARD CODE U 01	DRAWING NO. 3-V-MISC-24283				REV 0



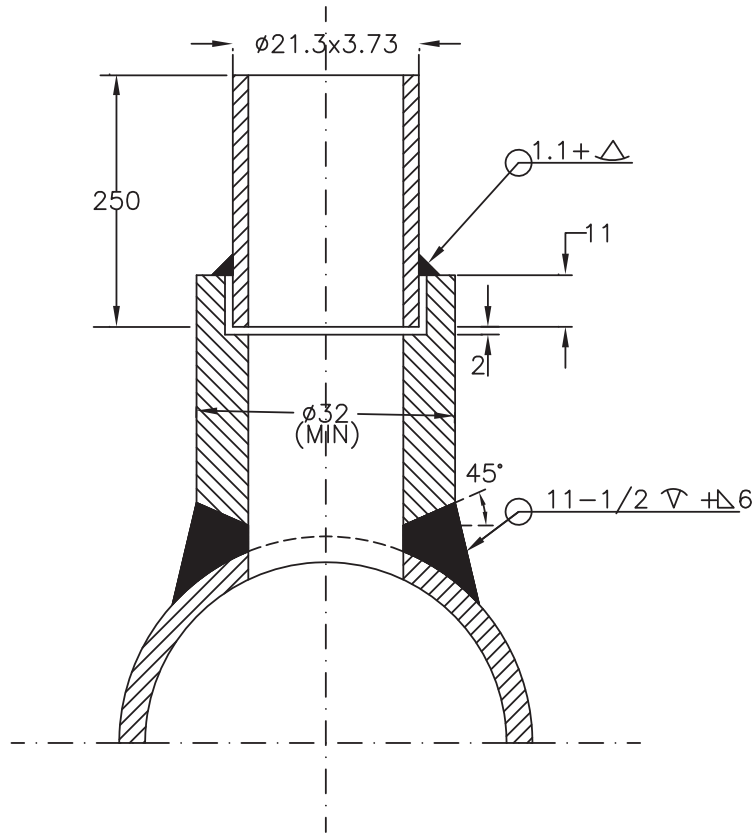
Technical specification for
CONTROL & INSTRUMENTATION
1X660MW PANKI TPS EXTN.

SECTION D

REV. NO. 00

DATE : 13.07.2018

INSTRUMENT STUB DETAILS



NOTE :

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFORM TO ANSI B16.11.
2. THE LENGTH OF NIPPLE SHALL BE 250 MM.
3. THE OTHER END OF THE NIPPLE SHALL BE SOCKET WELDED WITH 1/2" GLOBE VALVE OF MATERIAL AS PER ANSI B 31.1.
4. TWO ISOLATION VALVES ARE TO BE USED FOR PRESSURE EXCEEDING 40 Kg/Cm².
5. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
6. EDGE HOLE MUST BE CLEAN AND SQUARE OR ROUNDED SLIGHTLY (1/64" RADIUS) FREE FROM BURRS, WIRE EDGES OR OTHER IRREGULARITIES.
7. FOR PU COATED PIPE REFER SHT NO.7

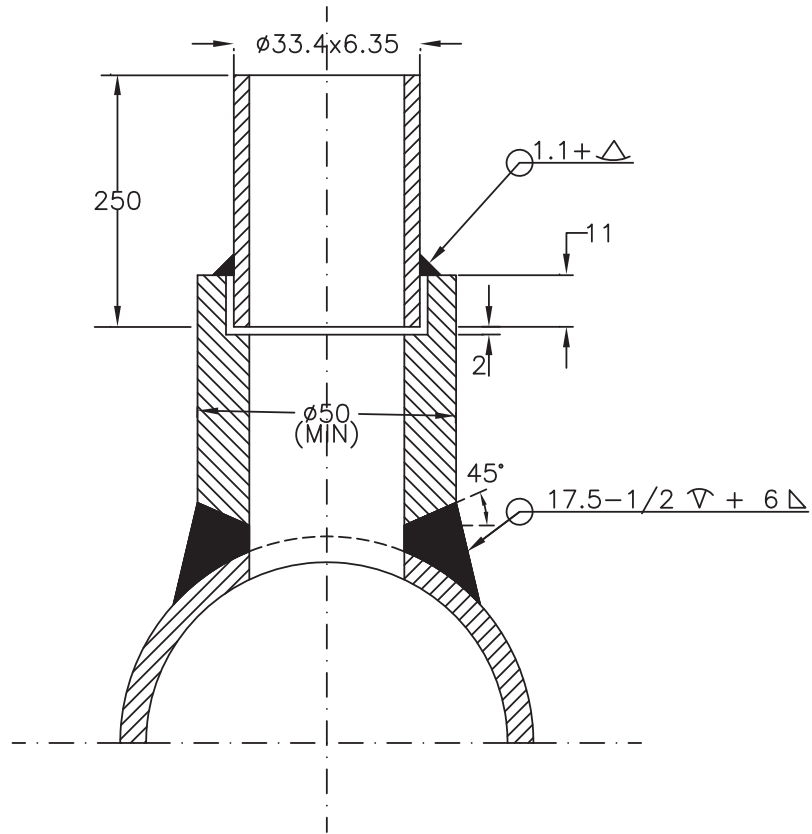


TITLE :

**STD INSTRUMENT STUB
DETAILS**
PRESSURE STUB

SYSTEM PRESS < 60Kg/Cm² & SYSTEM TEMP < 425 Deg C, Nb15 , CL3000

DRG. NO.
PE-DG-426-145-I101
REV. 00
SH. 02 OF 08



NOTE :

1. MATERIAL OF THE BOSS AND NIPPLE SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED AND CONFORM TO ANSI B16.11.
2. THE LENGTH OF NIPPLE SHALL BE 250 MM.
3. THE OTHER END OF THE NIPPLE SHALL BE SOCKET WELDED WITH 1" GLOBE VALVE OF MATERIAL AS PER ANSI B 31.1.
4. TWO ISOLATED VALVES ARE TO BE USED.
5. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
6. EDGE HOLE MUST BE CLEAN AND SQUARE OR ROUNDED SLIGHTLY (1/64" RADIUS) FREE FROM BURRS, WIRE EDGES OR OTHER IRREGULARITIES.

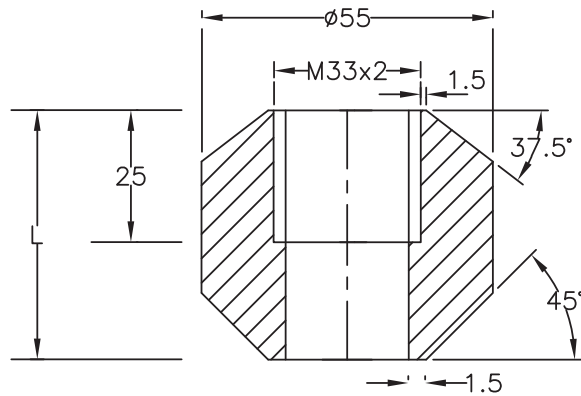


TITLE :

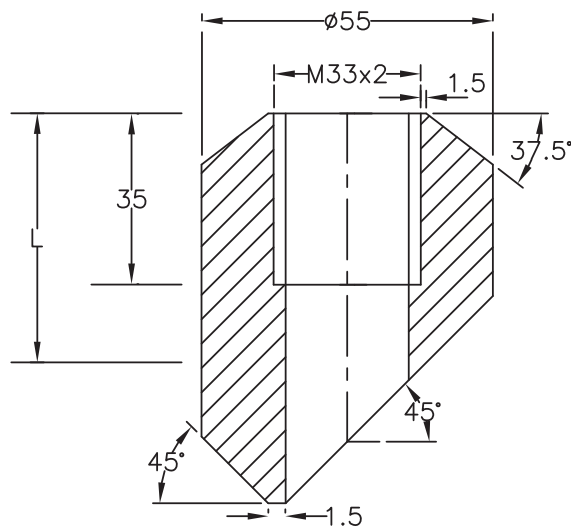
STD INSTRUMENT STUB
DETAILS
PRESSURE STUB

DRG. NO.
PE-DG-426-145-I101
REV. 00
SH. 03 OF 08

SYSTEM PRESS > 60Kg/Cm² & 425 Deg C < SYSTEM TEMP <= 500 Deg C , Nb25 , CL3000/6000



TEMPERATURE STUB FOR STRAIGHT IMMERSION



TEMPERATURE STUB FOR SLANT IMMERSION

NOTE :

1. MATERIAL OF THE BOSS SHALL BE THE SAME AS THE PIPE INTO WHICH IT IS WELDED.
2. LENGTH OF THE STUB (L) SHALL BE 64/45 mm DEPENDING UPON PIPE SIZE, AS PER CORPORATE STD. AA 7326102.(FOR PIPE OD 88.9 mm TO 159 mm STUB HEIGHT SHALL BE=64mm & FOR PIPE OD ≥ 219.1 mm STUB HEIGHT SHALL BE=45mm)
3. STRAIGHT IMMERSION STUBS SHALL BE USED FOR PIPE OD'S 168.3 mm & ABOVE. THE STUB HEIGHT FOR PIPE OD 168.3 mm TO <219.1 mm SHALL BE 64 mm.
4. SLANT IMMERSION STUBS SHALL BE USED FOR PIPE OD'S 88.9 mm TO 159 mm.
5. FOR MAIN PIPE OD'S 88.9 mm & BELOW SUITABLE EXPANDER SHALL BE USED.
6. PLEASE REFER SHEET-6 FOR THERMOWELL INSTALLATION.
7. FOR PU COATED PIPE REFER SHT NO.8

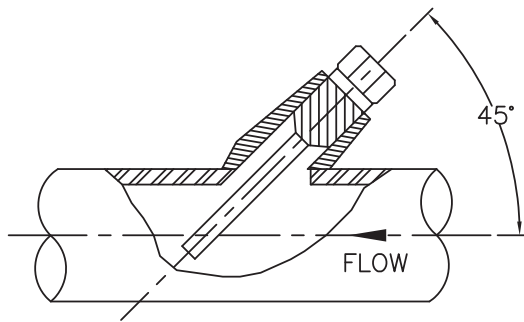
TITLE :



STD INSTRUMENT STUB
DETAILS

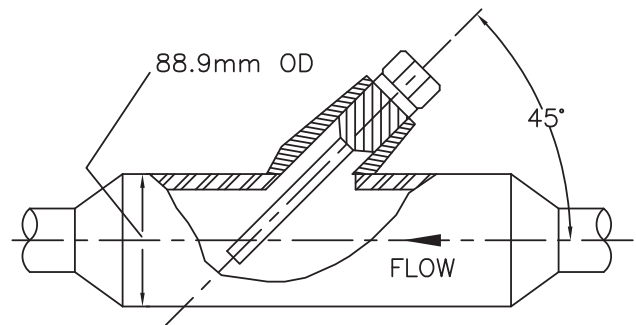
TEMPERATURE STUB

DRG. NO.
PE-DG-426-145-I101
REV. 00
SH. 05 OF 08



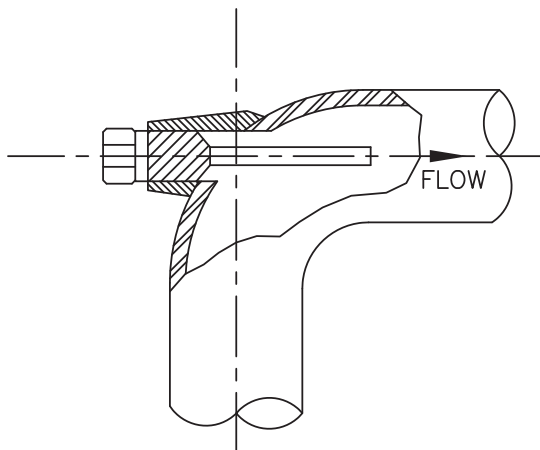
INSTALLATION TYPE-1

FOR MAIN PIPE OD 88.9mm to 159mm



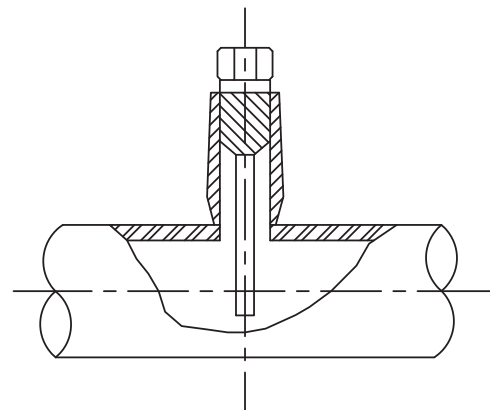
INSTALLATION TYPE-2

FOR MAIN PIPE OD BELOW 88.9mm



INSTALLATION TYPE-3

FOR MAIN PIPE OD 88.9mm & BELOW



INSTALLATION TYPE-4

FOR MAIN PIPE OD 168.3mm & ABOVE



TITLE :

STD INSTRUMENT STUB
DETAILS

THERMOWELL INSTALLATION

DRG. NO.
PE-DG-426-145-I101
REV 00
SH. 06 OF 08

- ~~Interface Units, Surge suppressors, Opto isolators, Interface Converters, Fibre Optic Card Cage, Fibre Optic Line Driver, Repeater / Modem (for Optical Fibre Cables), cable glands, grommets, lugs, termination kits etc. on as required basis.~~
- 9.07.02 Cables, which terminate in cabinets or draw out sections shall have sufficient cable coiled in the bottom of the cabinet to permit full withdrawal of draw out sections without disconnecting the cables. When prefabricated cables with factory connectors on both ends are longer than required, the excess cable shall be coiled in the bottom of one or both termination cabinets.
- 9.07.05 The Bidder shall be responsible for proper grounding of all equipment under this package. Further, proper termination of cable shields shall be verified and the grounding of the same shall be coordinated so as to achieve grounding of all instrumentation cable shields at same potential. This shall be completed prior to system tests.
- 9.07.06 The Bidder shall take full care while laying / installing cables as recommended by cable manufacturers regarding pulling tensions and cable bends. Cables damaged in any way during installation shall be replaced at the expense of the Bidder.

9.08.00 Field Mounted Local Junction Boxes

Type of Enclosure	:	Flame proof/weather proof IP-65 /Explosion Proof as per area classification. Design as per NEC-370 Article 18, 19 & 20.
No. of Ways	:	12/24/36/48/64/72/96/128 with 20% spares terminals.
Material	:	4 mm min. thick FRP (Fiberglass Reinforced Polyester) with protective Coating
		3 mm min. thickness Die cast aluminum for Flame proof/Explosion proof area.
Cable entry	:	Bottom or Side
Cable glands	:	Double compression type – Nickel plated Brass/SS316 with PVC hoods.
Mounting	:	Indoor/Outdoor
No. of terminals	:	As required with standardization with 20% spare of each size & type.
Terminals	:	Phoenix/Wago (screw less rail mounted cage clamp type spring loaded suitable for conductor size up to 2.5 sq. mm)
Grounding	:	Two terminals for body and shield ground
Door	:	Hinged, lockable type.
Accessories	:	Suitable mounting clamps and other accessories shall be in scope of bidder.
		The brackets, bolts, nuts, screws, glands, lugs required for erection shall be of SS304, included in bidder scope of supply. High voltage & insulation resistance test shall also be conducted.

M6 Ni plated Brass earthing stud shall be provided (external 2 nos. internal 1 no.)

Gasket (Normal)- Neoprene/Polyurethane thickness 6.0 mm. Silicon for high Temp. area.

Colour : To be decided during detailed engineering & subject to owner's approval.

9.09.00 Conduits

Conduits shall be generally used for interconnecting cables from field instruments to local JB's. All rigid conduits, couplings and elbows shall be hot dipped galvanised rigid mild steel in accordance with IS:9537 Part-I (1980) and Part-II (1981). The conduit interior and exterior surfaces shall have continuous zinc coating with an overcoat of transparent enamel lacker or zinc chromate. Flexible conduit shall be heat resistant lead coated galvanised steel with, water leak, fire and rust proof protected for the areas of Mills, Drum, Main steam, RH steam Air Heaters and Furnace, BFPDT's.

And for remaining application, water leak, fire and rust proof flexible GI conduits shall be provided. The temperature rating of flexible conduit shall be suitable for actual application.

The Bidder shall install conduits according to the general routing as approved by owner and shall coordinate conduit locations with other works.

All grounding bushings within all enclosures shall be wired together and connected internally to the enclosure grounding lug or grounding bus with 8 AWG bare copper conductors. Conduit runs to individually mounted equipment shall be grounded to the Owner's cable tray grounding conductor with 12 AWG bare copper conductor. All grounding bushing, clamps, and connectors shall be subject to approval of the owner.

All rigid conduit fittings shall conform to the requirements of IS: 2667, 1976. Galvanised steel fittings shall be used with steel conduits. All flexible conduit fittings shall be liquid tight, galvanised steel. The end fittings shall be compatible with flexible conduit supplied.

All individually mounted equipment and devices shall be connected to the supply conduit, using not more than one meter of flexible conduit adjacent to the equipment or device. Flexible conduit shall be installed in all conduit runs, which are supported by both building steel and structures subject to vibration or thermal expansion. This shall include locations where conduit supported by building steel enters or becomes supported by the turbine generator foundation and where conduit supported by building steel or foundation becomes supported by steam generator framing.

Special areas, such as control rooms in which external noise is to be minimized, shall have flexible conduit in conduit runs where the runs cross from the main Building framing to the control room framing.

DRIVE CONTROL PHILOSOPHY

THIS IS TO CERTIFY THAT SUBMITTED DRIVE CONTROL PHILOSOPHY IS INLINE WITH THE DRIVE CONTROL PHILOSOPHY OF 3X800 MW PATRATU (DRG. NO. 9585-001-405-PVI-B-152B, REV05).

NTPC DRG. No. 9962-001-PE-405-PVI-B-152		REV.01	
PROJECT:		1 X 660 MW PANKI THERMAL POWER EXTENSION PROJECT.	
OWNER:		UTTAR PRADESH RAJYA VIDYUT UTPADAN NIGAM LTD.	
REVIEW CONSULTANT:  एन टी सी NTPC		NTPC LTD. (A GOVERNMENT OF INDIA ENTERPRISE)	
CONSULTANT:		DEVELOPMENT CONSULTANTS PVT. LTD. KOLKATA	
BPC CONTRACTOR:  BHEL		BHARAT HEAVY ELECTRICALS LTD.	
JOB NO. 426		BHARAT HEAVY ELECTRICALS LTD	
STATUS CONTRACT		POWER SECTOR	
DISTRIBUTION		PROJECT ENGINEERING MANAGEMENT NOIDA	
REV. DATE		DEPT. NAME SIGN DATE	
01 11.02.19		DRN RINKY --sd-- 03.05.2018	
ALTD. CHD APPD		DESN SS --sd-- 03.05.2018	
RINKY SS/SSB SN		CHD RPR/SSB --sd-- 03.05.2018	
1. DOCUMENT REVISION INLINE WITH NTPC COMMENTS DTD 03.01.19, WIDE LTR REF. 4051096.		APPD DP --sd-- 03.05.2018	
2. DOCUMENT REVISION INLINE WITH DCP. COMMENTS DTD 23.06.18, WIDE LTR REF. 0054.		TITLE	
3. DOCUMENT REVISION INLINE WITH DRIVE CONTROL PHILOSOPHY OF 3X800 MW PATRATU.		DRIVE CONTROL PHILOSOPHY	
		DEPT. SCALE 1:200	
		SIGN	
		DRAWING NO.	
		PE-DG-426-145-I002	
		SHEET 01 OF 34	
		REV. 01	

INDEX SHEET

SHT.NO.	TITLE	REV.NO. 00	REV.NO. 01	REV.NO. 02	REV.NO. 04	REV.NO. 05
01	TITTLE SHEET	X				
02	INDEX SHEET	X				
03	INDEX SHEET	X				
04	DDCMIS INTERFACE WITH HT SWGR (HT)	X				
05	DDCMIS INTERFACE WITH LT MCC (LT)	X				
06	DDCMIS INTERFACE WITH BID	X				
07	DDCMIS INTERFACE WITH BIDI	X				
08	DDCMIS INTERFACE WITH FIRE DAMPERS OF AC&VENT SYS (BID-FD)	X				
09	DDCMIS INTERFACE WITH MOTORISED OPERATED VALVE OF AC&VENT SYS (AC-MOV2)	X				
09A	DDCMIS INTERFACE FOR SCREW CHILLER AND ACCU OF AC&VENT SYS	X				
10	DDCMIS INTERFACE WITH DUAL COIL SOLENOID (DSOV/L)	X				
11	DDCMIS INTERFACE WITH SOV(WITHOUT FEEDBACKS)	X				
12	DDCMIS INTERFACE WITH SOV(WITH FEEDBACKS)	X				
13	DDCMIS INTERFACE WITH VFD OF AC SYSTEM(VFD-AC)	X				
14	DDCMIS INTERFACE WITH MODULATING DRIVES-CLCS	X				
15	DDCMIS INTERFACE WITH MODULATING DRIVES-CLCS-M	X				
16	DDCMIS INTERFACE WITH ERV CONTROL BOX	X				



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DRG.NO. 9962-001-PE-405-PVI-B-152

INDEX SHEET

SHT 02 OF 34

INDEX SHEET

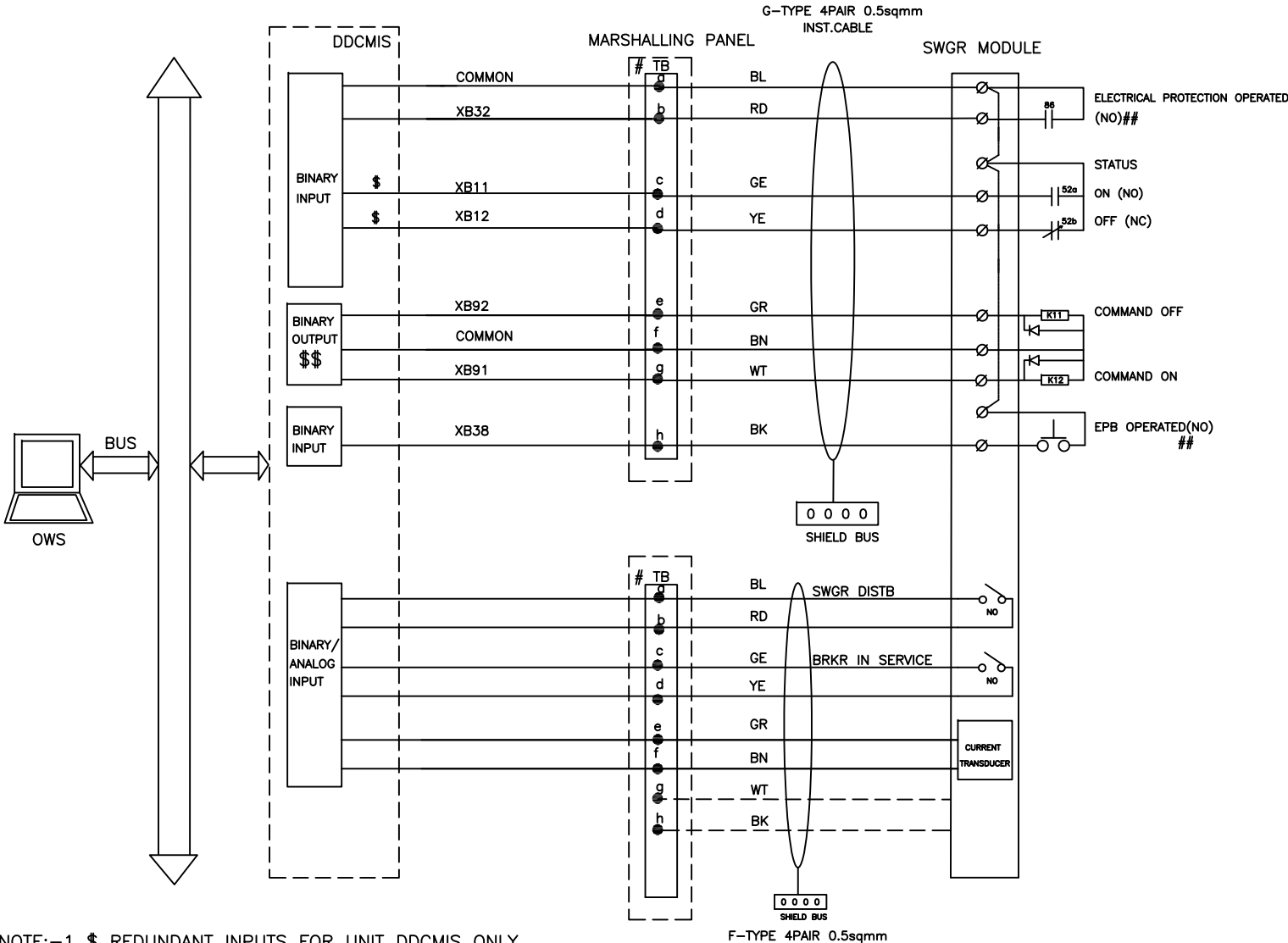
SHT.NO.	TITLE	REV.NO. 00	REV.NO. 01	REV.NO. 02	REV.NO.04
17	DDCMIS INTERFACE WITH EHVCB	X			
18	DDCMIS INTERFACE WITH FIELD BREAKER (FB)	X			
19	DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-HT-SYNC)	X			
20	DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-HT-NONSYNC)	X			
21	DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-LT-SYNC)	X			
22	DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-LT-NONSYNC)	X			
23	DDCMIS INTERFACE WITH DIGITAL INPUT SIGNAL	X			
24	DDCMIS INTERFACE WITH DIGITAL OUTPUT SIGNAL	X			
25	DDCMIS INTERFACE WITH ANALOG INPUT SIGNAL	X			
26	DDCMIS INTERFACE WITH ANALOG OUTPUT SIGNAL	X			
27	DDCMIS INTERFACE WITH LTCHP (DOL)	X			
28	DDCMIS INTERFACE WITH BELT WEIGHER (BW)	X			
29	DDCMIS INTERFACE WITH SUSPENDED MAGNET (SM)	X			
30	DDCMIS INTERFACE WITH METAL DETECTOR (MD)	X			
31	DDCMIS INTERFACE WITH INLINE MAGNETIC SEPARATOR (ILMS)	X			
32	DDCMIS INTERFACE WITH REV (DOL)	X			
33	DDCMIS INTERFACE WITH VVVF	X			
34	DDCMIS INTERFACE WITH HTCHP	X			
34a	FDR TYPE: SP FOR DC JOP, EOP & DC SOC MOTOR	X			
34b	DDCMIS INTERFACE WITH CEP VFD	X			

CABLE COLOR CODING PHILOSOPHY:

SL.NO	DCS END TB	CABLE COLOR
1	a	BLUE (BL)
2	b	RED (RD)
3	c	GREY (GE)
4	d	YELLOW (YE)
5	e	GREEN (GR)
6	f	BROWN (BN)
7	g	WHITE (WT)
8	h	BLACK (BK)

	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS	DRG.NO.	9962-001-PE-405-PVI-B-152
	INDEX SHEET	SHT	03 OF 34

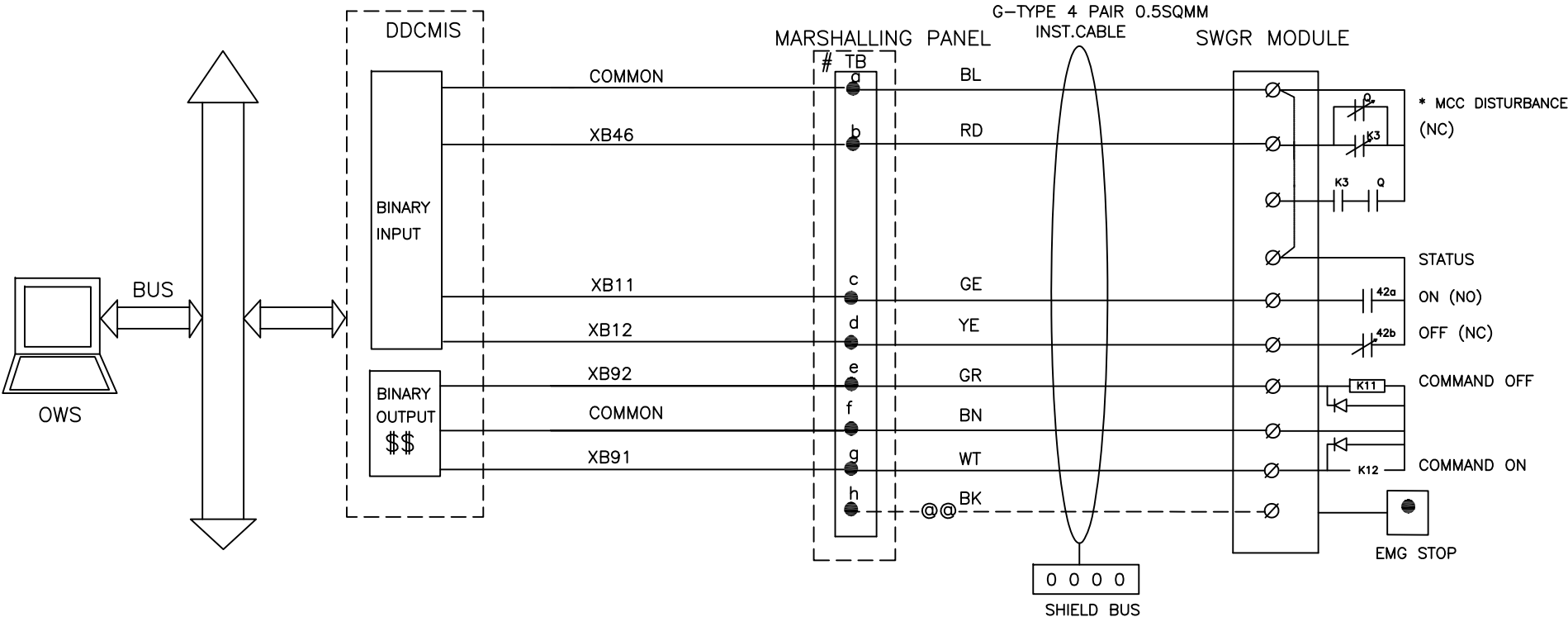
DDCMIS INTERFACE WITH HT SWITCH GEAR (HT)



NOTE:-1 \$ REDUNDANT INPUTS FOR UNIT DDCMIS ONLY
NOTE:-2 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-3 # 8 LEVEL TERMINAL BLOCK
NOTE:-4 ## DI-SOE SIGNALS FOR UNIT DDCMIS ONLY
NOTE:-5 CURRENT SIGNAL IS TO BE CONSIDERED IN DDCMIS FROM HT BREAKER FOR FD,ID,PA,MILL MOTORS, CHP HT CONVEYORS

	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS	DRG.NO.	9962-001-PE-405-PVI-B-152
	DDCMIS INTERFACE WITH HT SWITCH GEAR(HT)	SH	04 OF 34

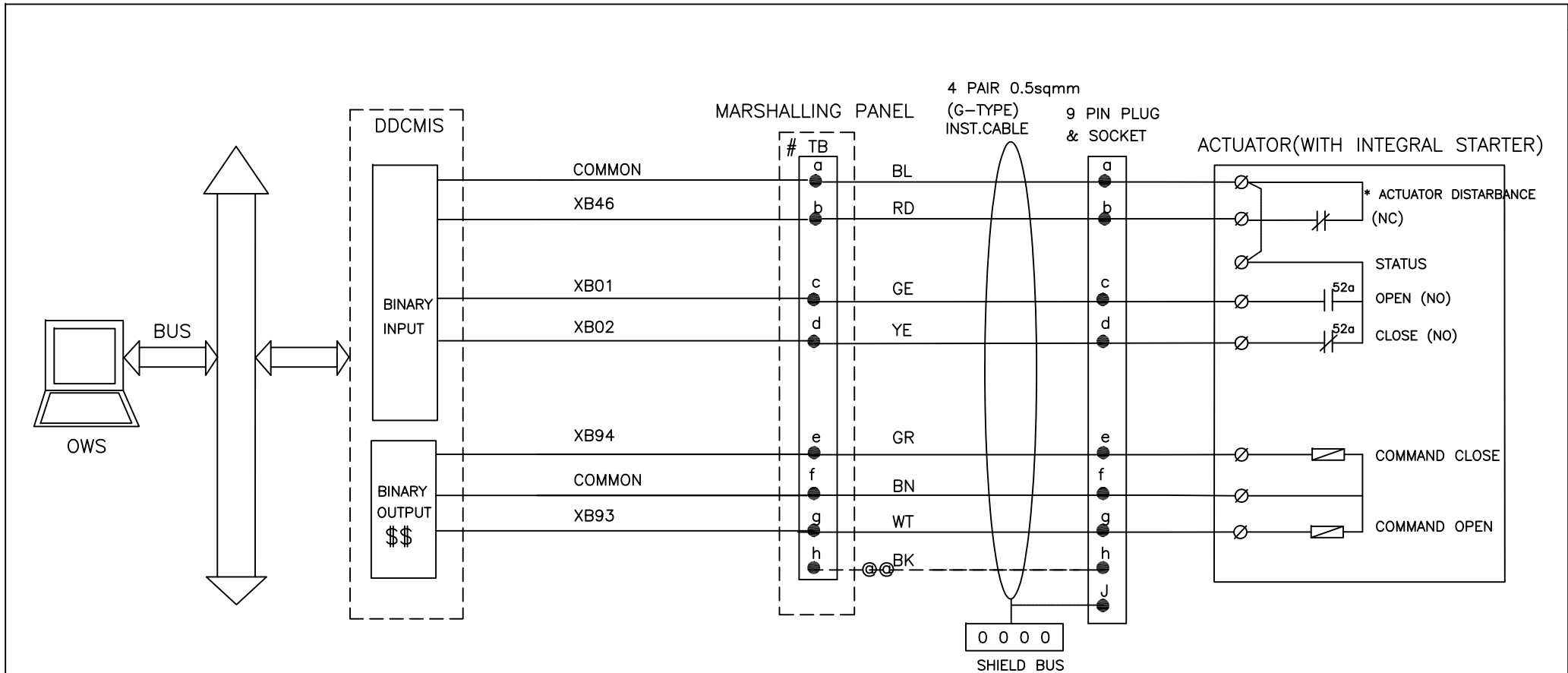
DDCMIS INTERFACE WITH LT MCC (LT)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE
TERMINATION SEQUENTIALLY.
NOTE:-4 * MCC DISTURBED= THERMAL O/L OPT/CONT SUPP FAIL/EPB OPTD
/DRIVE POWER SUPPLY OFF

	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS	DRG.NO.	9962-001-PE-405-PVI-B-152
	DDCMIS INTERFACE WITH LT MCC (LT)	SHT	05 OF 34

DDCMIS INTERFACE WITH BID/MOV/MOD



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 * DISTURBANCE=LOSS OF POWER SUPPLY(1PHASE/3PHASE)/LOSS OF CONTROL SUPPLY/MOTOR THERMOSTAT TRIP/THERMAL OVER LOAD/TORQUE SWITCH OPERATED, LOCAL/OFF/REMOTE SWITCH IN LOCAL/OFF POSITION



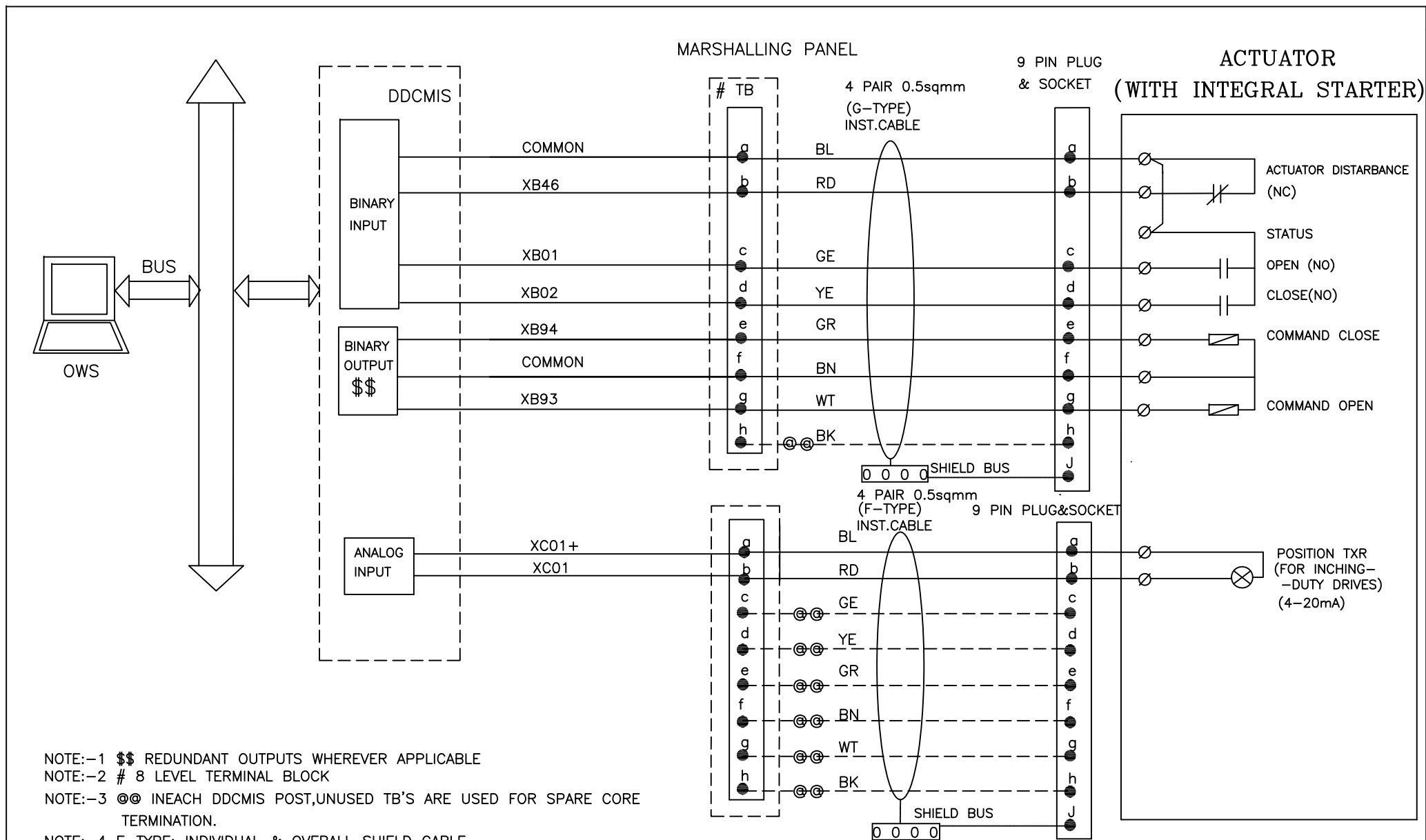
UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH BID

DRG.NO. 9962-001-PE-405-PVI-B-152

SHT 06 OF 26

DDCMIS INTERFACE WITH BIDI/MODI/MOVI



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 F-TYPE: INDIVIDUAL & OVERALL SHIELD CABLE.

NOTE:-5 *DISTURBANCE=LOSS OF POWER SUPPLY/LOSS OF CONTROL SUPPLY/MOTOR THERMOSTAT TRIP/THERMAL OVERLOAD/TORQUE SWITCH OPTD/LOCAL/OFF/REMOTE SWITCH IN LOCAL/OFF POSITION



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

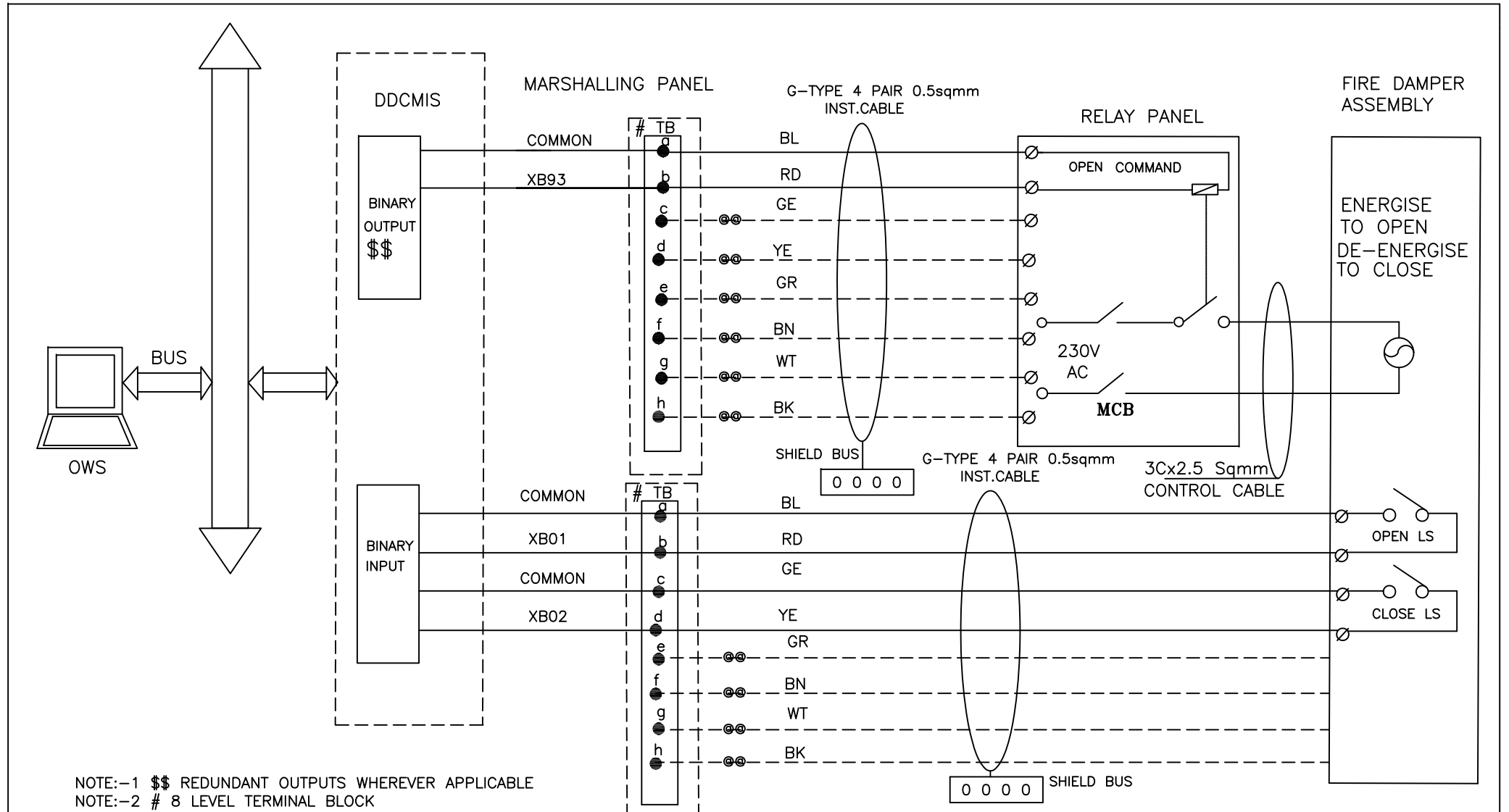
DDCMIS INTERFACE WITH BIDI

DRG.NO. 9962-001-PE-405-PVI-B-152

SHT

07 OF 34

DDCMIS INTERFACE WITH FIRE DAMPERS OF AC & VENT SYS(BID-FD)



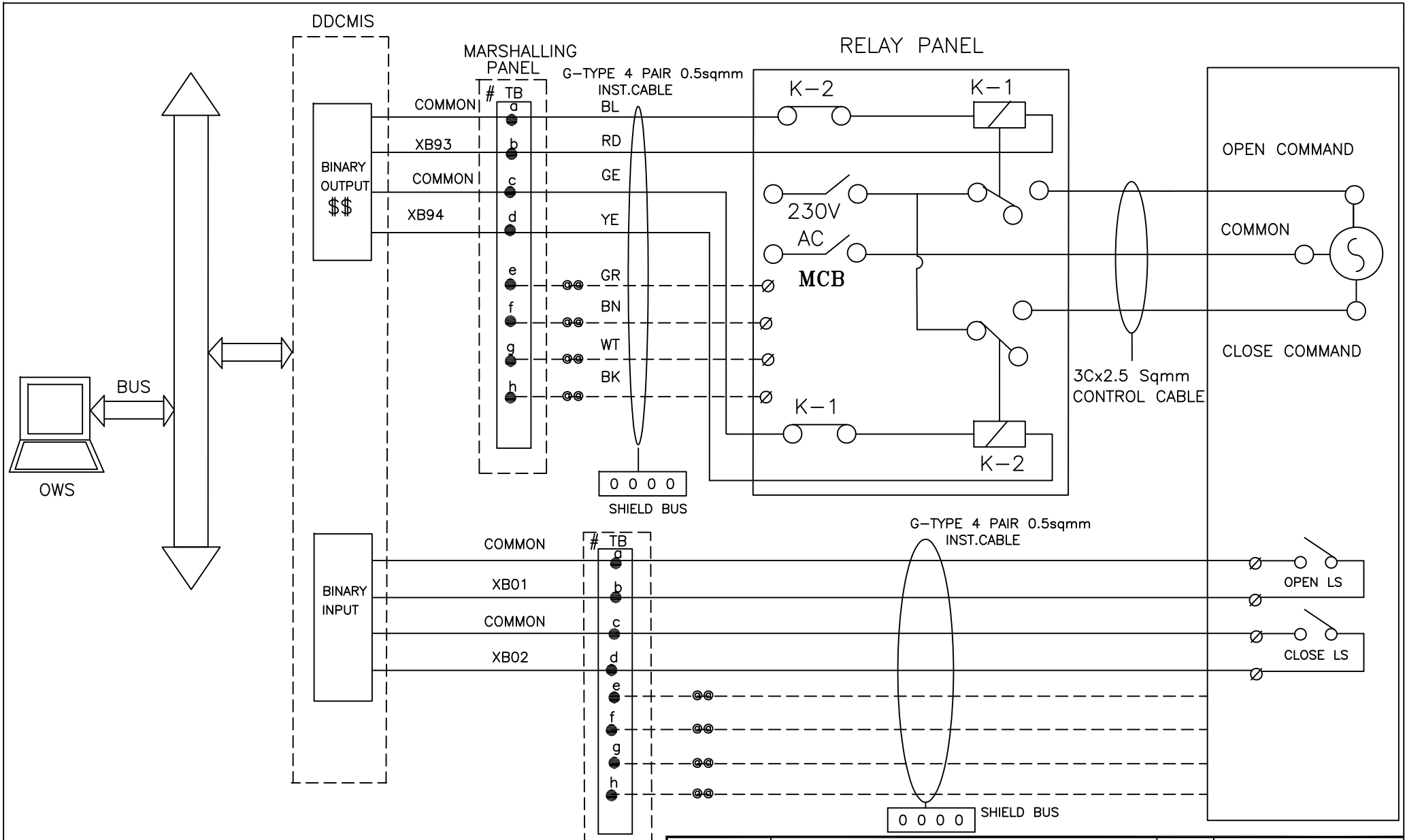
NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS	DRG.NO.	9962-001-PE-405-PVI-B-152
	DDCMIS INTERFACE WITH FIRE DAMPER OF AC&VENT SYS(BID-FD)	SHT	08 OF 34

DDCMIS INTERFACE WITH MOTORISED OPERATED VALVE OF AC & VENT SYS(BID- AC)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

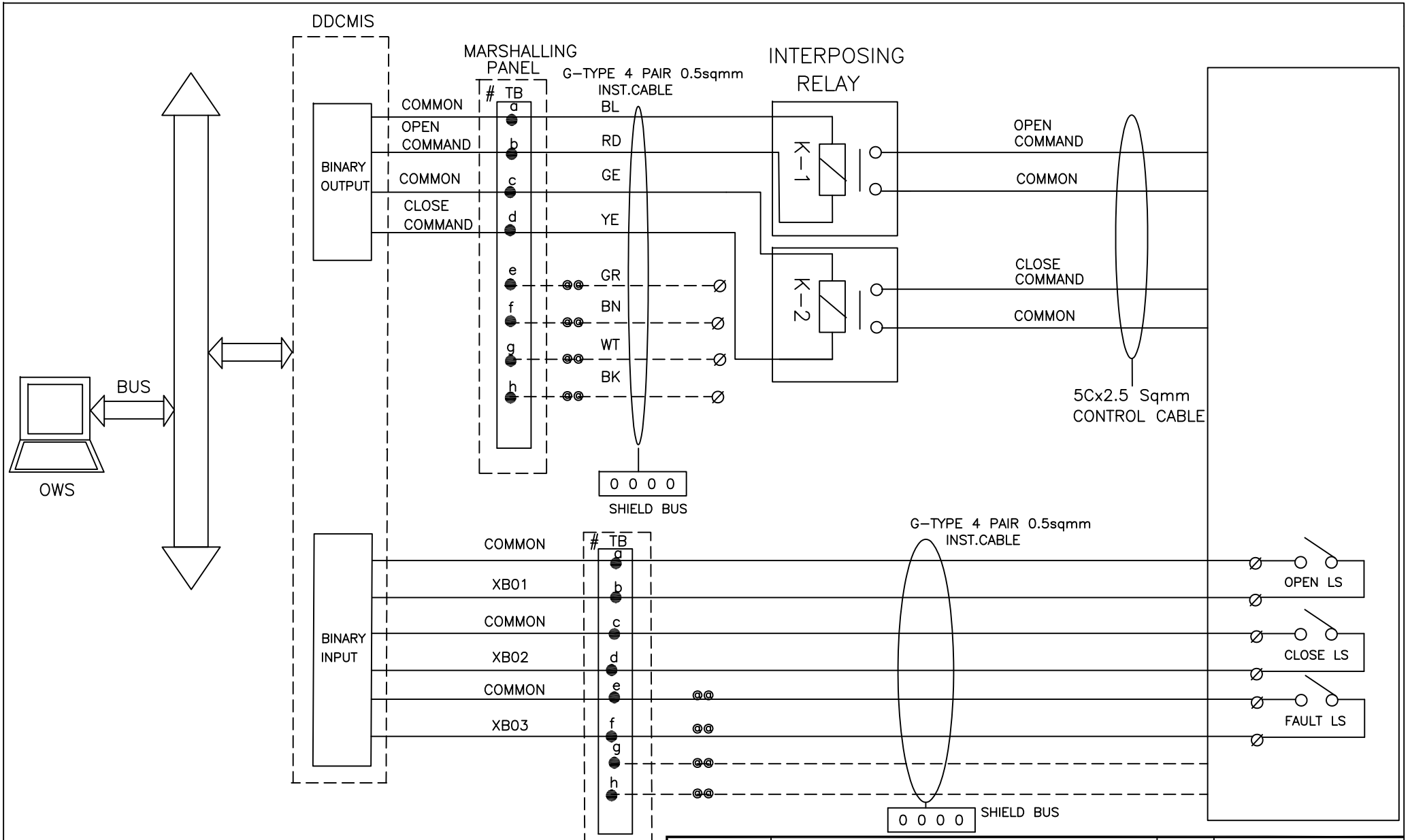
DRG.NO. 9962-001-PE-405-PVI-B-152

DDCMIS INTERFACE WITH FIRE DAMPER OF AC&VENT SYS(BID-AC)

SHT

09 OF 34

DDCMIS INTERFACE OF SCREW CHILLER/ACCU FOR AC AND VENT SYS



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

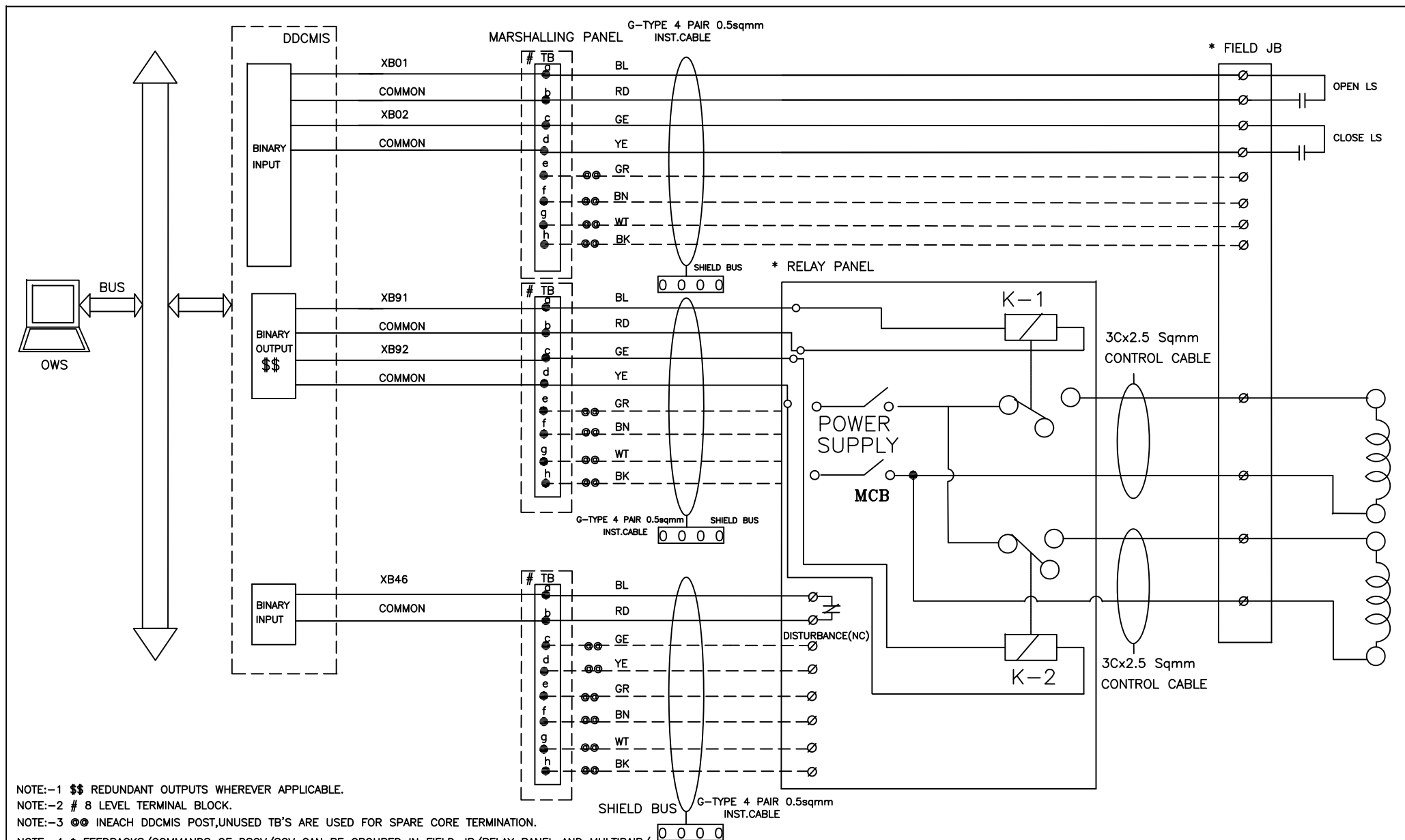
DRG.NO. 9962-001-PE-405-PVI-B-152

DDCMIS INTERFACE OF SCREW CHILLER/ACCU FOR AC & VENT SYS

SHT

09A OF 34

DDCMIS INTERFACE WITH DUAL COIL SOLENOID (DSOV/L)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE.

NOTE:-2 # 8 LEVEL TERMINAL BLOCK.

NOTE:-3 ●● IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 * FEEDBACKS/COMMANDS OF DSOV/SOV CAN BE GROUPED IN FIELD JB/RELAY PANEL AND MULTIPAIR/
MULTICORE CABLE IS TO BE USED FOR GROUPED SIGNALS FROM FIELD JB/RELAYPANEL TO MARSHALLING PANEL.

NOTE:-5 FOR ON/OFF TYPE, SOLENOID ACTUATED CONTROL VALVE.

NOTE:-6 TWO INDEPENDENT OUTPUT FROM CONTROL SYSTEM SHALL BE PROVIDED TO PUSH-PULL TYPE
VALVES, WITH DUAL COIL SOLENOIDS.



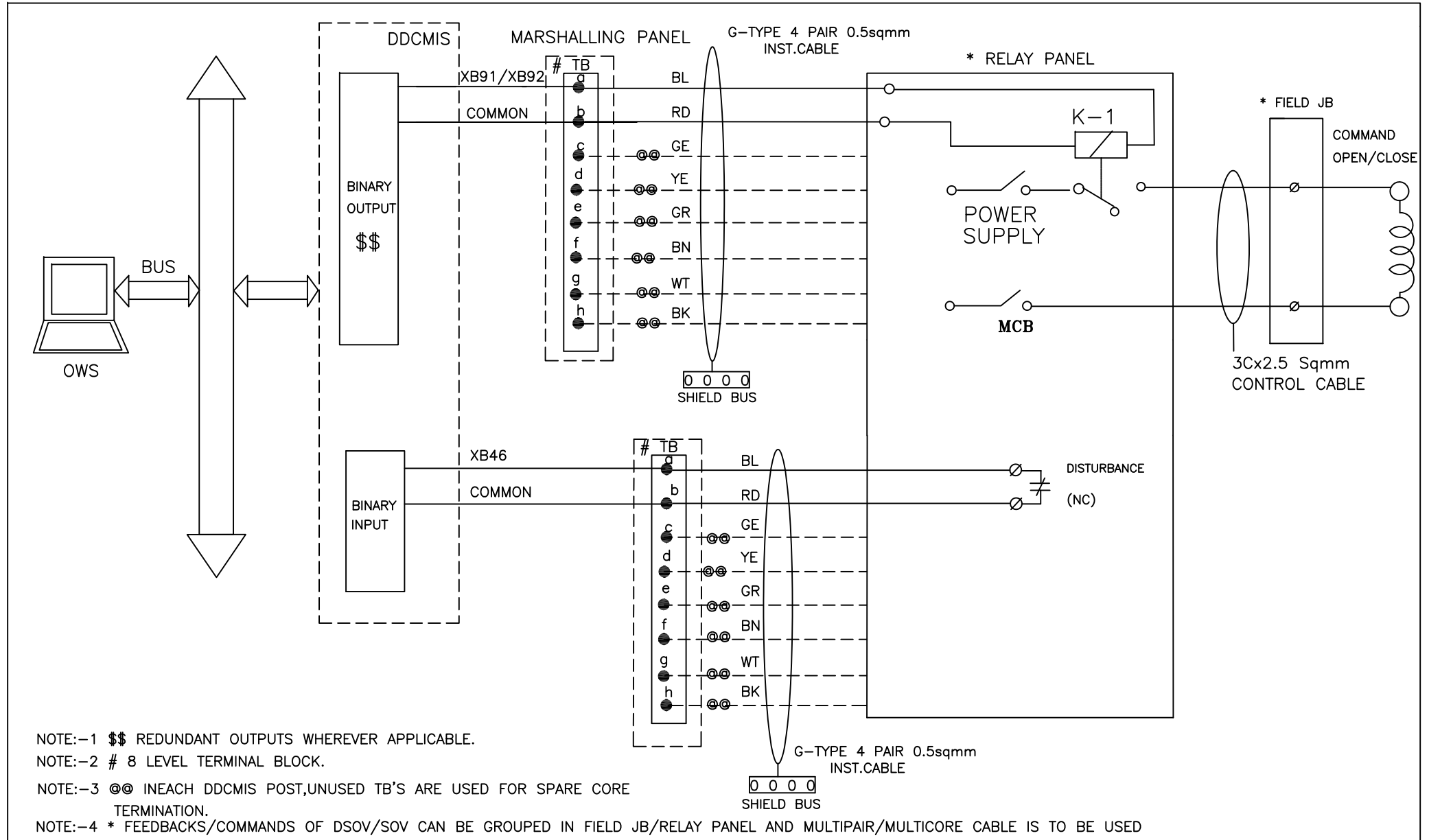
UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH DUAL COIL SOLENOID (DSOV/L)

DRG.NO. 9962-001-PE-405-PVI-B-152

SHT 10 OF 34

DDCMIS INTERFACE WITH SOV/O/SOV/C(WITH OUT FEEDBACKS)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE.

NOTE:-2 # 8 LEVEL TERMINAL BLOCK.

NOTE:-3 @@ IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 * FEEDBACKS/COMMANDS OF DSOV/SOV CAN BE GROUPED IN FIELD JB/RELAY PANEL AND MULTIPAIR/MULTICORE CABLE IS TO BE USED FOR GROUPED SIGNALS FROM FIELD JB/RELAYPANEL TO MARSHELING PANEL.

NOTE:-5 FOR ON/OFF TYPE, SOLENOID ACTUATED CONTROL VALVE.



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH
SOV/O/SOV/C(WITHOUT FEEDBACKS)

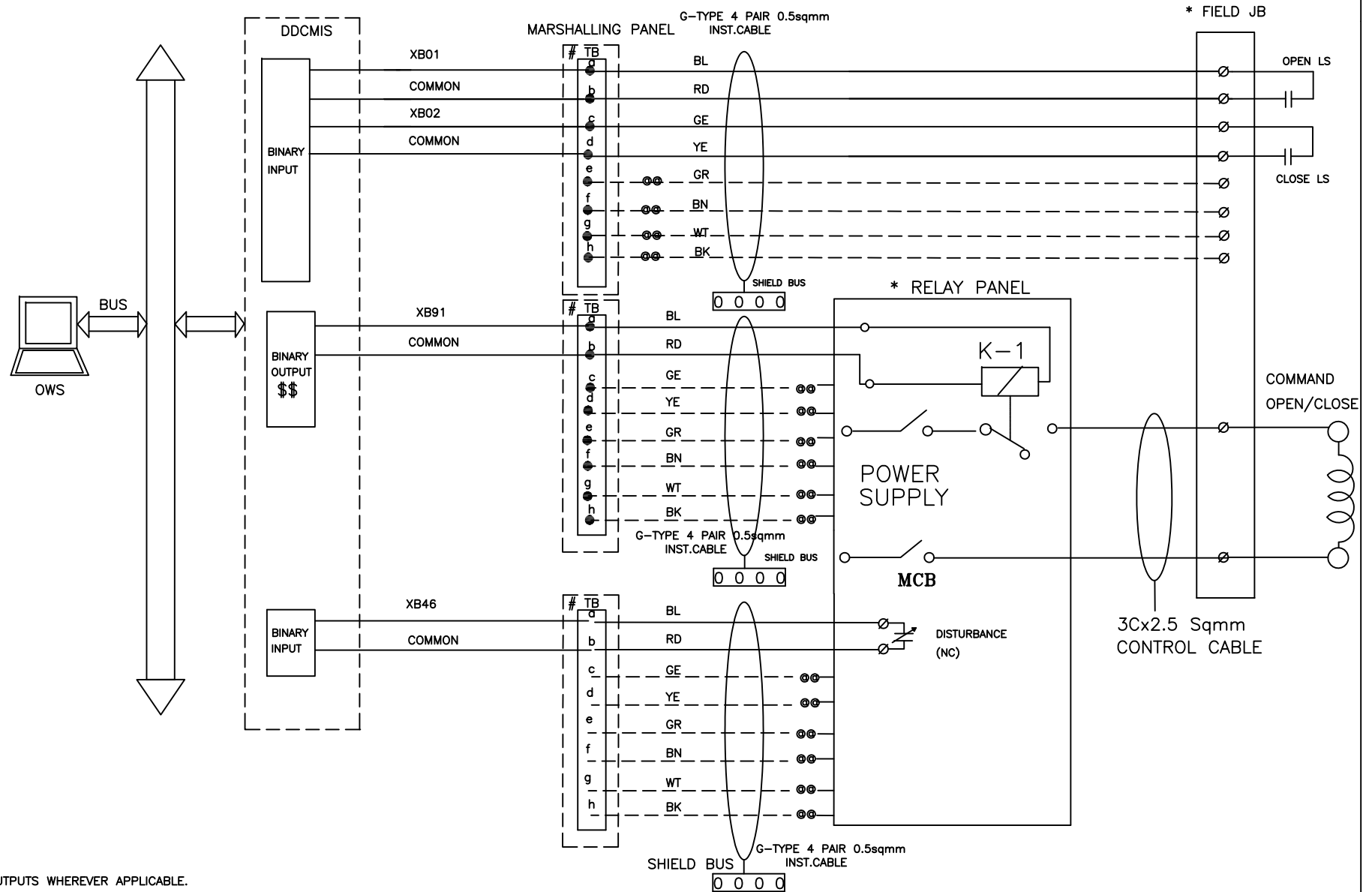
DRG.NO.

9962-001-PE-405-PVI-B-152

SHT

11 OF 34

DDCMIS INTERFACE WITH SOV/O/L(WITH FEED BACKS)



NOTE:-1 \$\$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE.

NOTE:-2 # 8 LEVEL TERMINAL BLOCK.

NOTE:-3 @ @ IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 * FEEDBACKS/COMMANDS OF DSOV/SOV CAN BE GROUPED IN FIELD JB/RELAY PANEL AND MULTIPAIR/ MULTICORE CABLE IS TO BE USED FOR GROUPED SIGNALS FROM FIELD JB/RELAYPANEL TO MARSHALLING PANEL.

NOTE:-5 FOR ON/OFF TYPE, SOLENOID ACTUATED CONTROL VALVE.



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH SOV/O/L(WITH FEEDBACKS)

DRG.NO.

9962-001-PE-405-PVI-B-152

SHT

12 OF 34

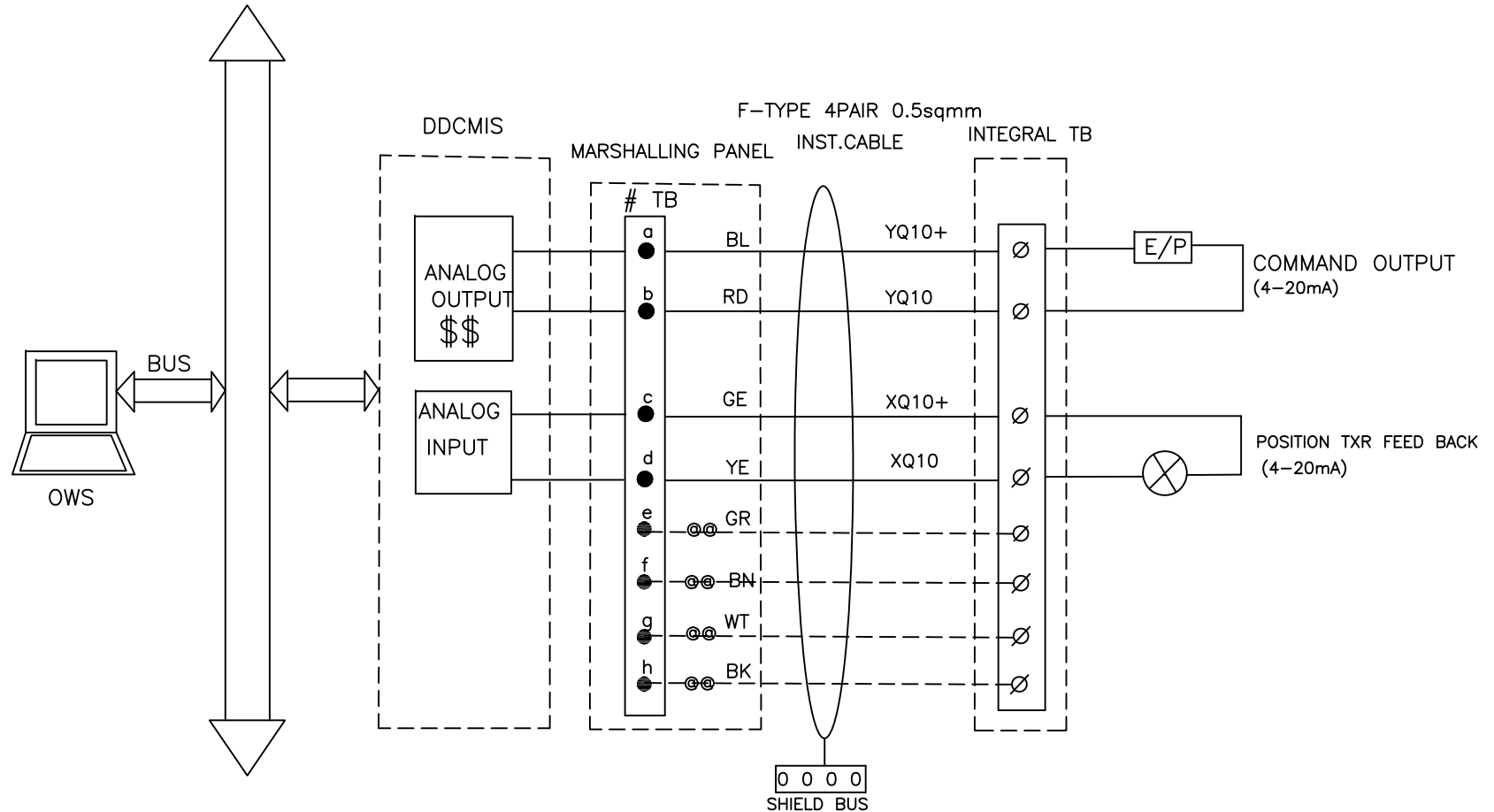
[illegible]

NOTE:-4 OTHER VFD SIGNALS WILL BE CONSIDERED AS PER IO LIST.



SHT 13 OF 34

INTERFACE FOR MODULATING DRIVES – CLCS



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICBLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ IN EACH DDCMIS POST, UNUSED TB's ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 F-TYPE: INDIVIDUAL & OVERALL SHIELD CABLE.



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

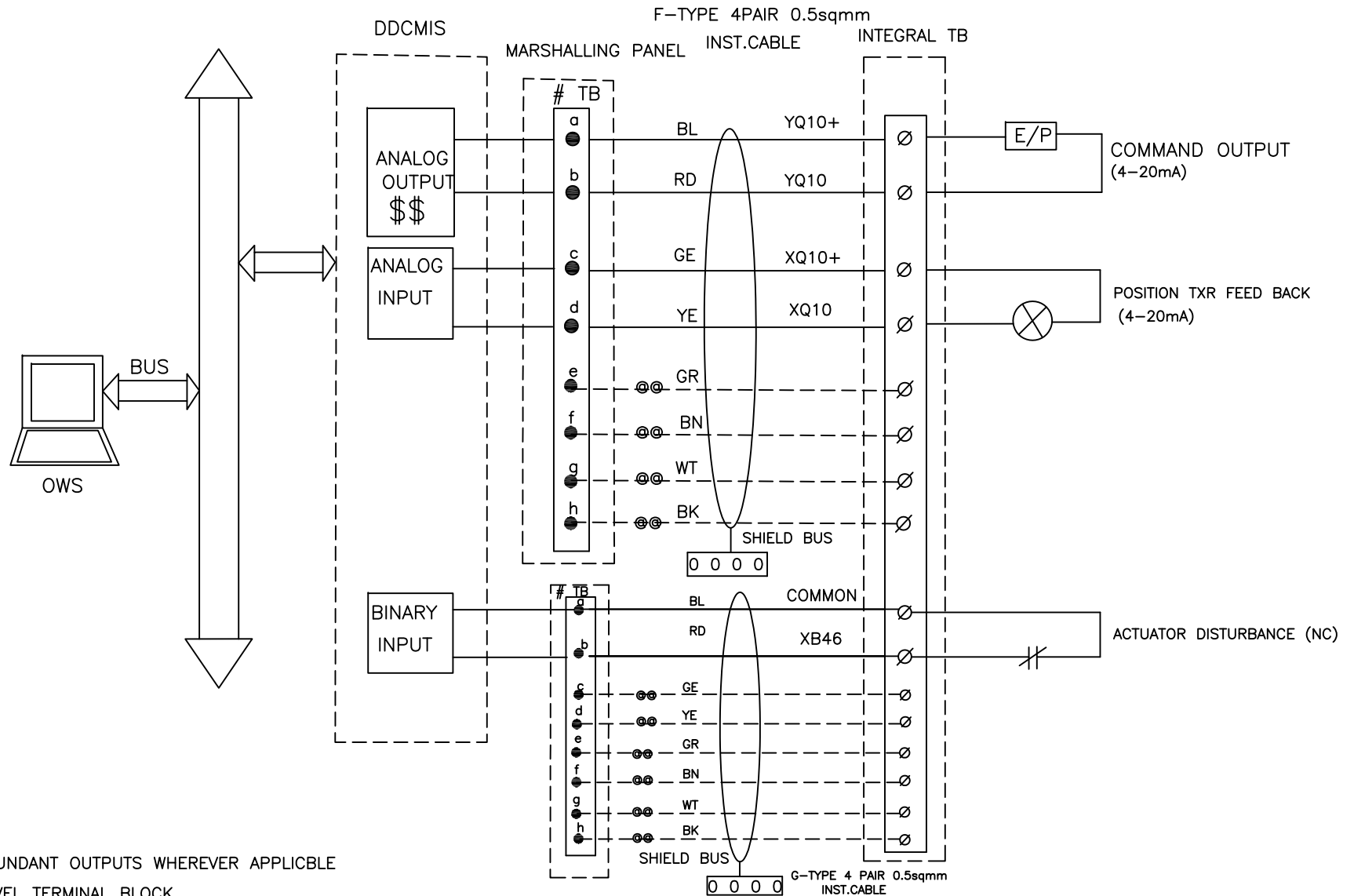
DRG.NO. 9962-001-PE-405-PVI-B-152

INTERFACE FOR MODULATING DRIVES – CLCS

SHT

14 OF 34

INTERFACE FOR MODULATING DRIVES - CLCS-M



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ IN EACH DDCMIS POST, UNUSED TB's ARE USED FOR SPARE CORE TERMINATION.

NOTE:-4 F-TYPE: INDIVIDUAL & OVERALL SHIELD CABLE.



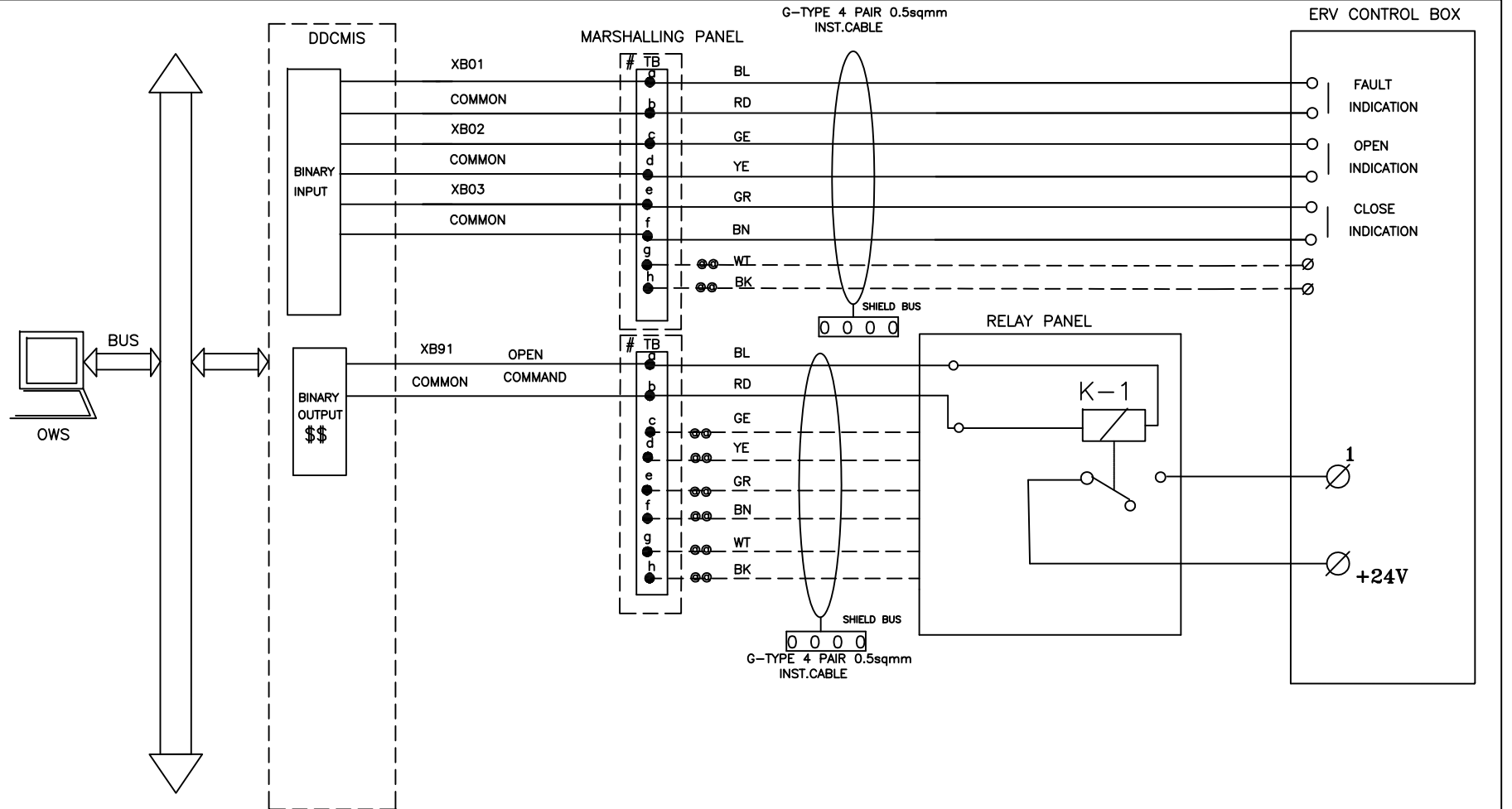
UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

INTERFACE FOR MODULATING DRIVES - CLCS-M

DRG.NO. 9962-001-PE-405-PVI-B-152

SHT 15 OF 34

DDCMIS INTERFACE WITH ERV CONTROL BOX (ERV)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE.

NOTE:-2 # 8 LEVEL TERMINAL BLOCK.

NOTE:-3 @ @ IN EACH DDCMIS POST, UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH ERV CONTROL BOX

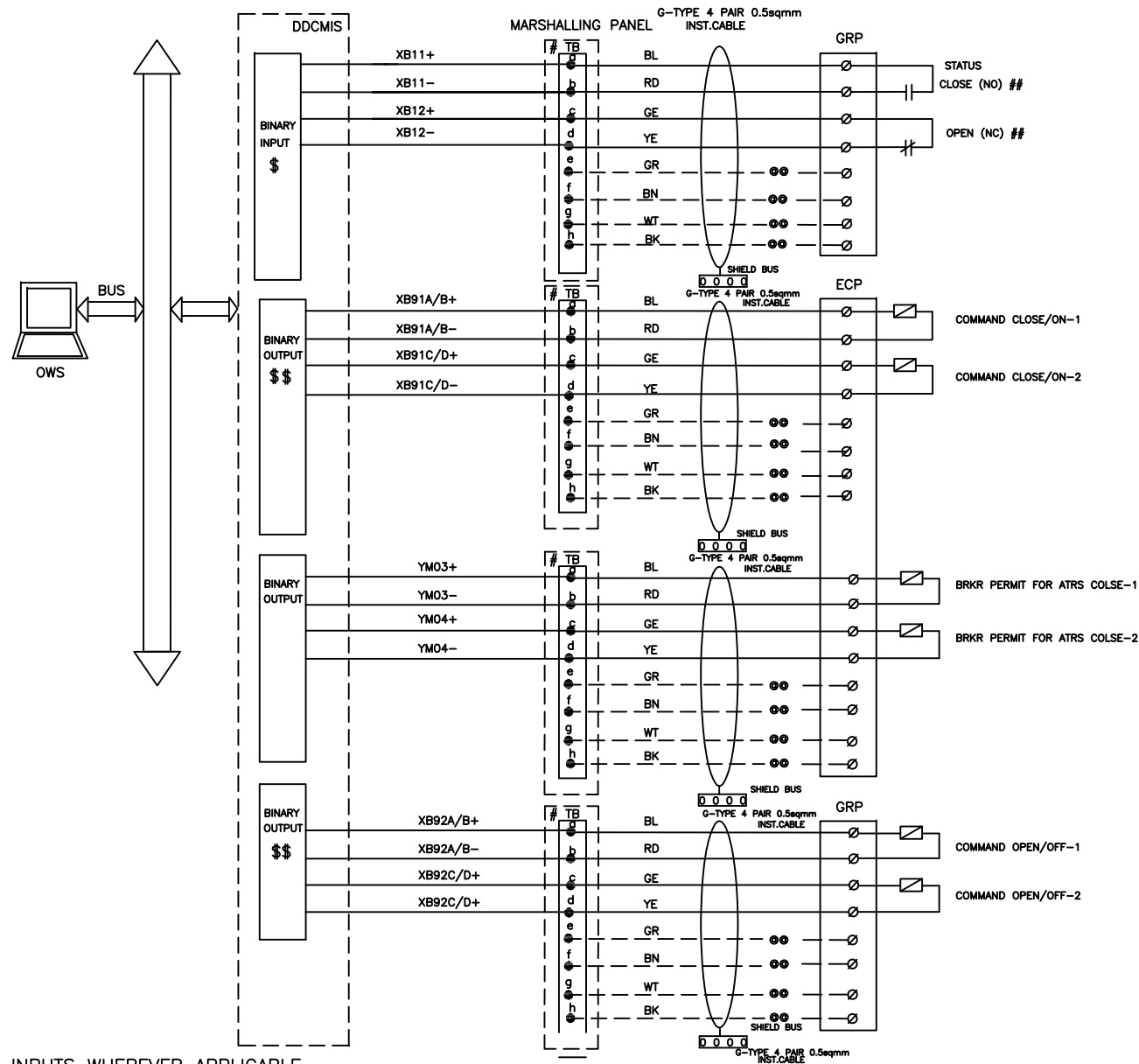
DRG.NO.

9962-001-PE-405-PVI-B-152

SHT

16 OF 34

DDCMIS INTERFACE WITH EHVCB



NOTE:-1 \$ REDUNDANT INPUTS WHEREVER APPLICABLE

NOTE:-2 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

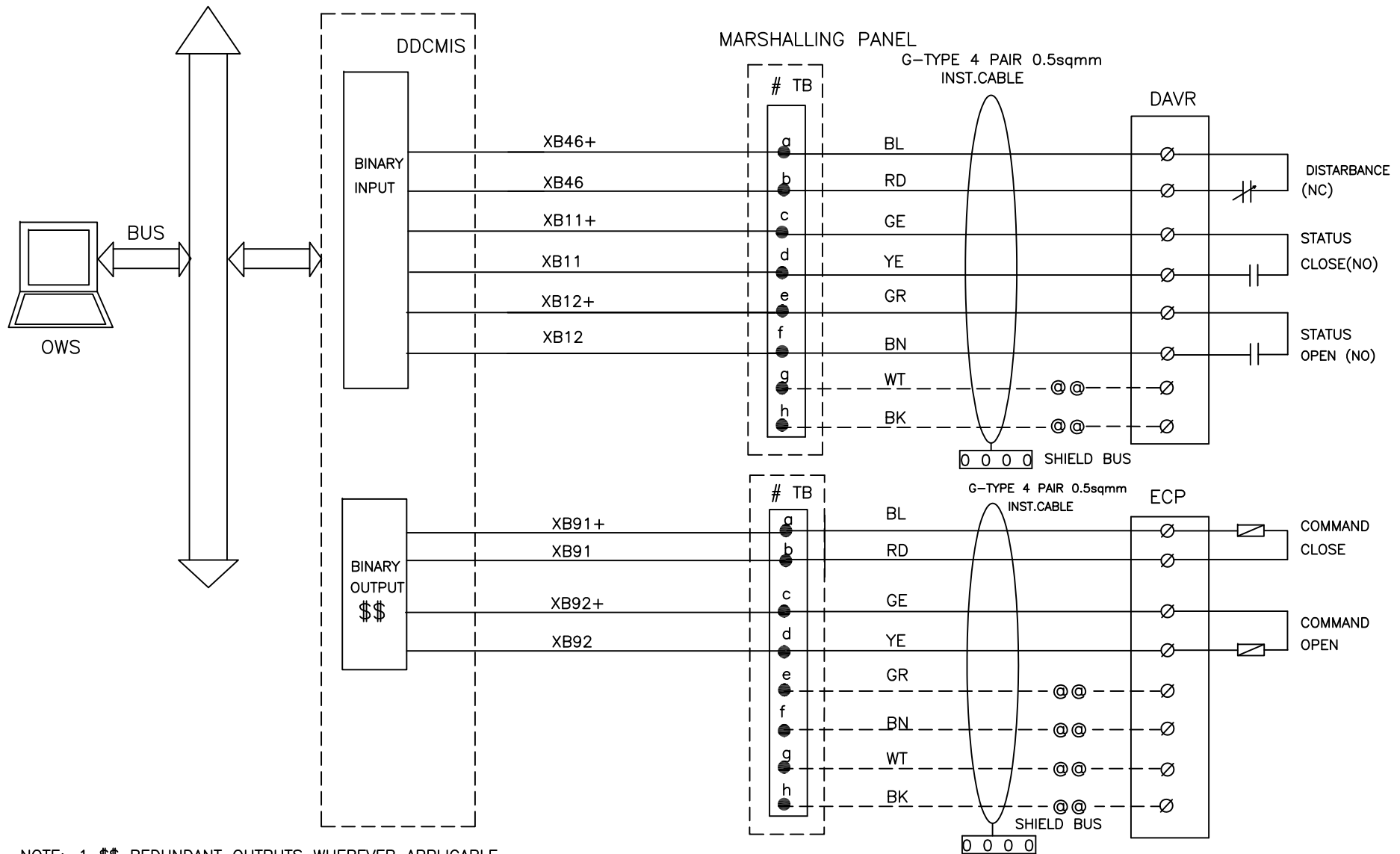
NOTE:-3 # 8 LEVEL TERMINAL BLOCK

NOTE:-4 ## DI-SOE SIGNALS

NOTE:-5 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION

	UP RAJYA VIDYUT UTPADAN NIGAM LTD		DRG.NO.	9962-001-PE-405-PVI-B-152
	1 X 660 MW PANKI TPS		DATE	11.02.2019
	DDCMIS INTERFACE WITH EHVCB		REV.NO.	01
			SHT	17 OF 34

DDCMIS INTERFACE WITH FIELD BREAKER (FB)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

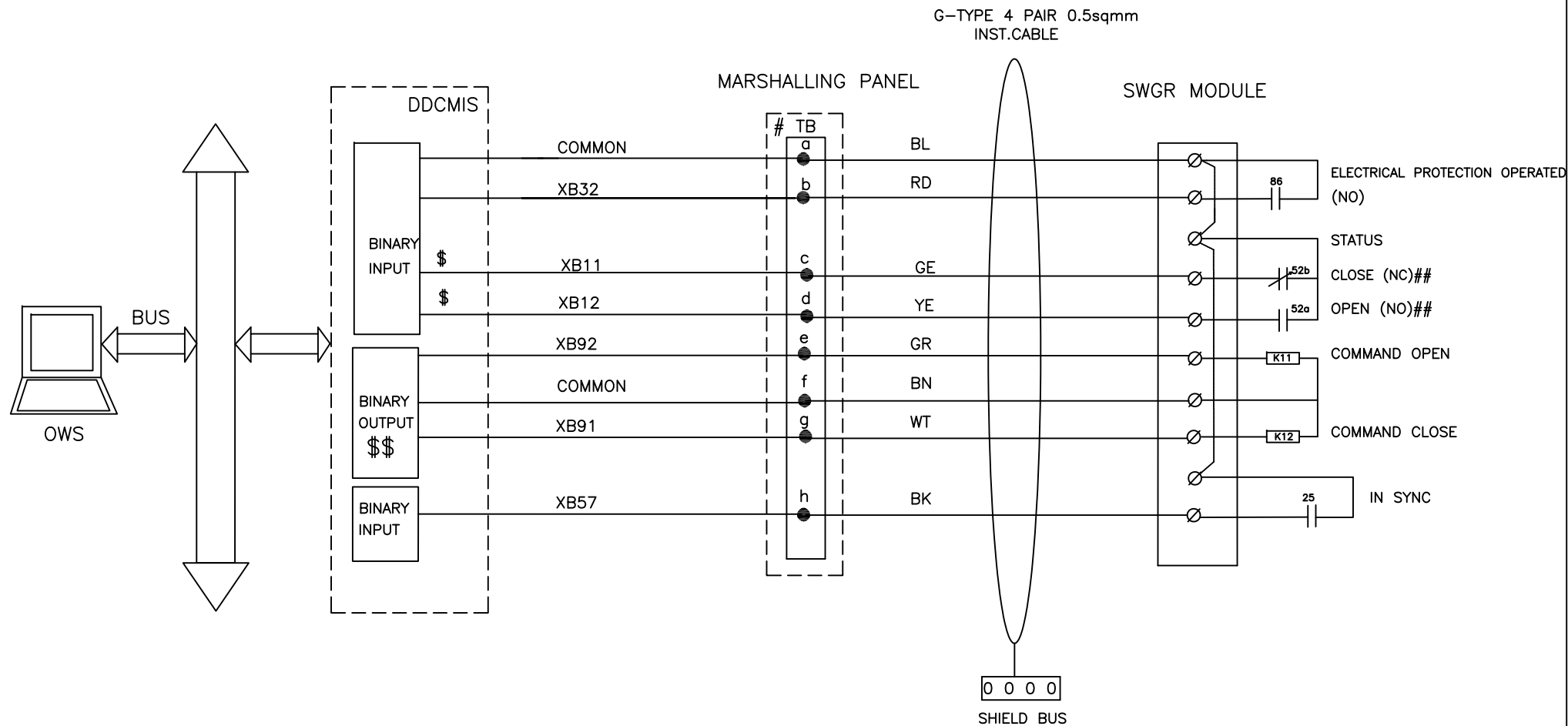


UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH FIELD BREAKER (FB)

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	18 OF 34

DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-HT-SYNC)



NOTE:-1 \$ REDUNDANT INPUTS FOR UNIT DDCMIS ONLY.
 NOTE:-2 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
 NOTE:-3 # 8 LEVEL TERMINAL BLOCK
 NOTE:-4 ## DI-SOE SIGNALS

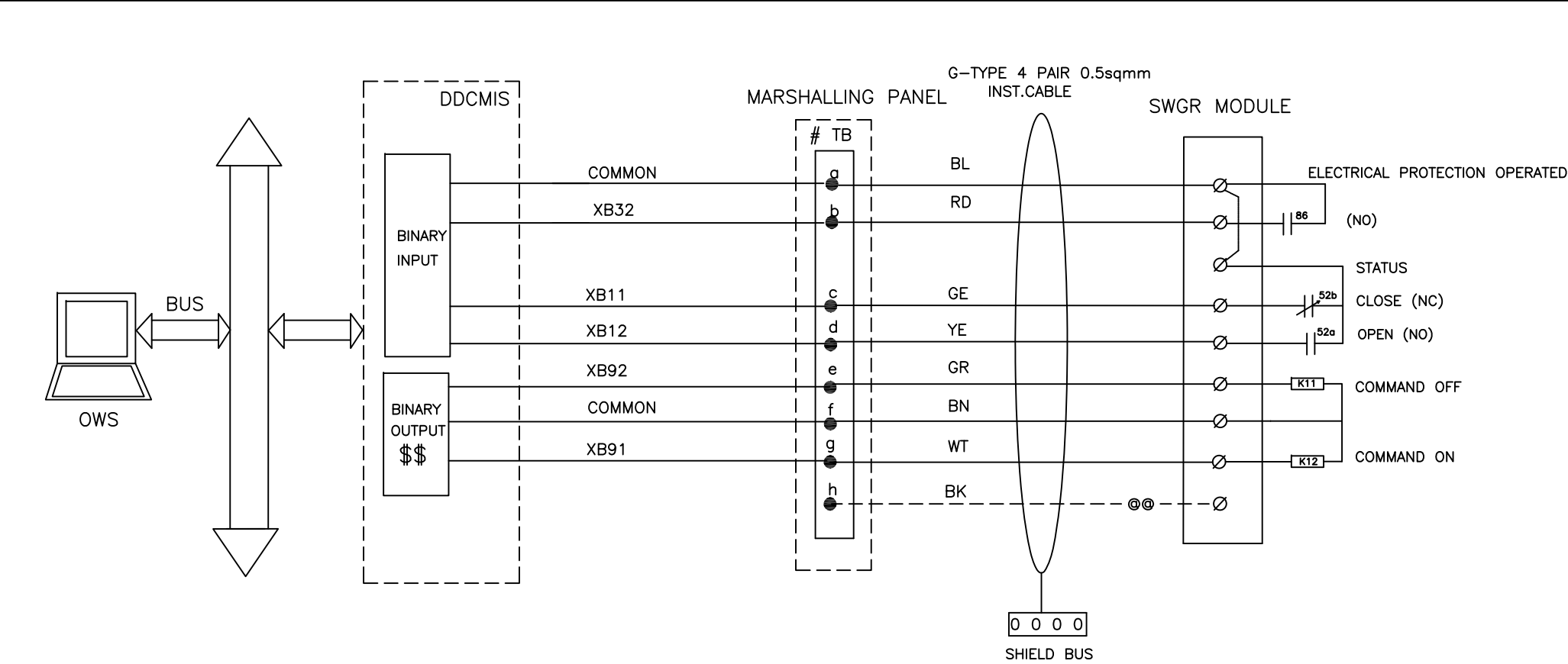


UP RAJYA VIDYUT UTPADAN NIGAM LTD
 1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-HT-SYNC)

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	19 OF 34

DDCMIS INTERFACE WITH ELECTRICAL BREAKER(EB-HT-NONSYNC)



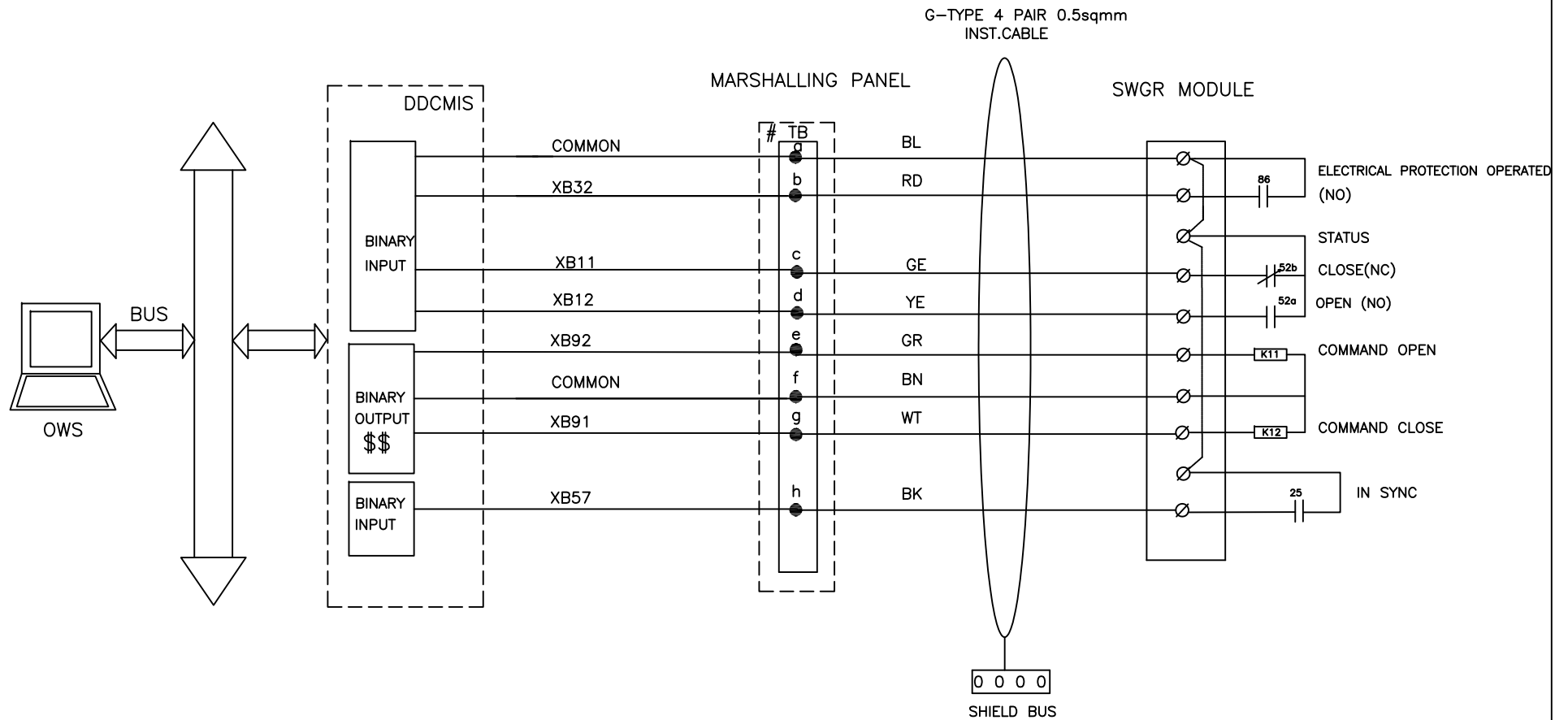
NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE

NOTE:-2 # 8 LEVEL TERMINAL BLOCK

NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD		DRG.NO.	9962-001-PE-405-PVI-B-152
	1 X 660 MW PANKI TPS		DATE	11.02.2019
	DDCMIS INTERFACE WITH ELECTRICAL BREAKER(EB-HT-NONSYNC)		REV.NO.	01
			SHT	20 OF 34

DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-LT-SYNC)



NOTE:-1 \$\$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK

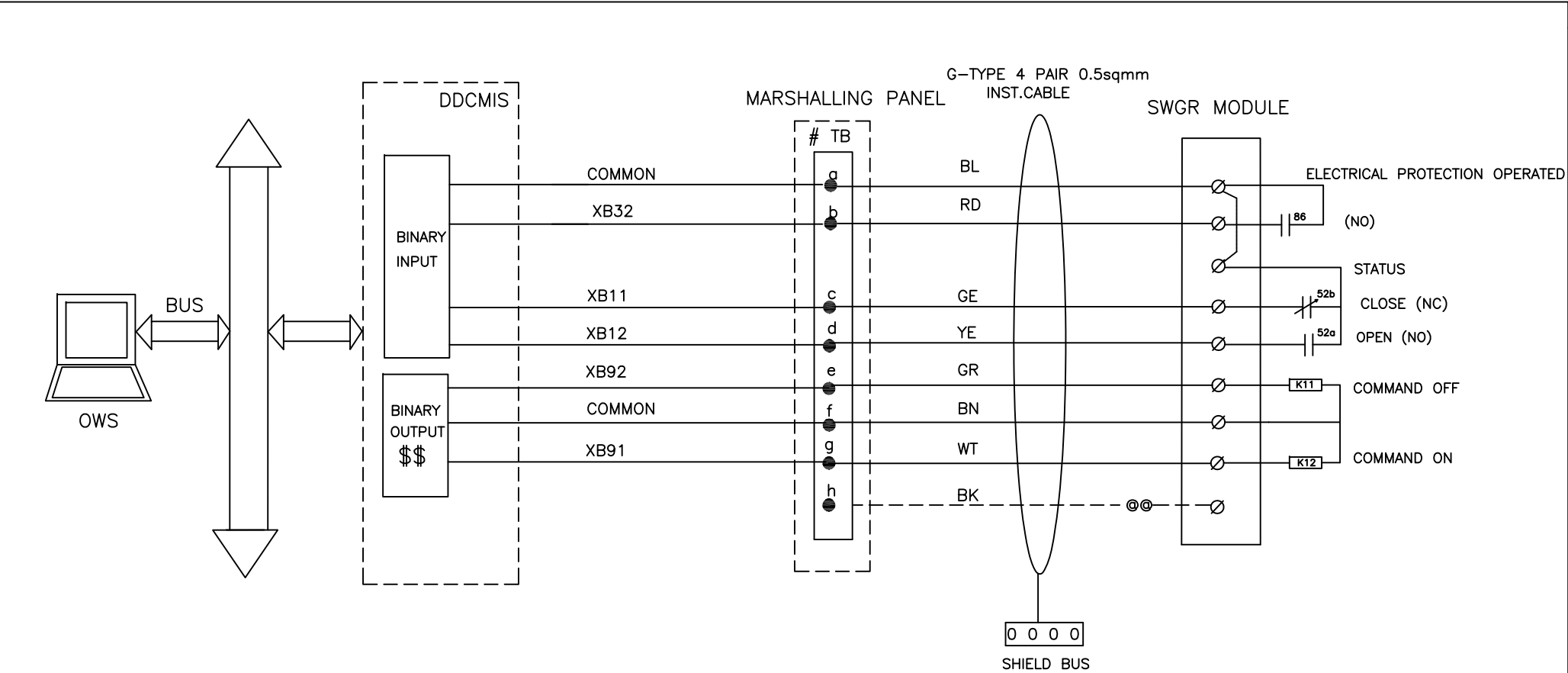


UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH ELECTRICAL BREAKER (EB-LT-SYNC)

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	21 OF 34

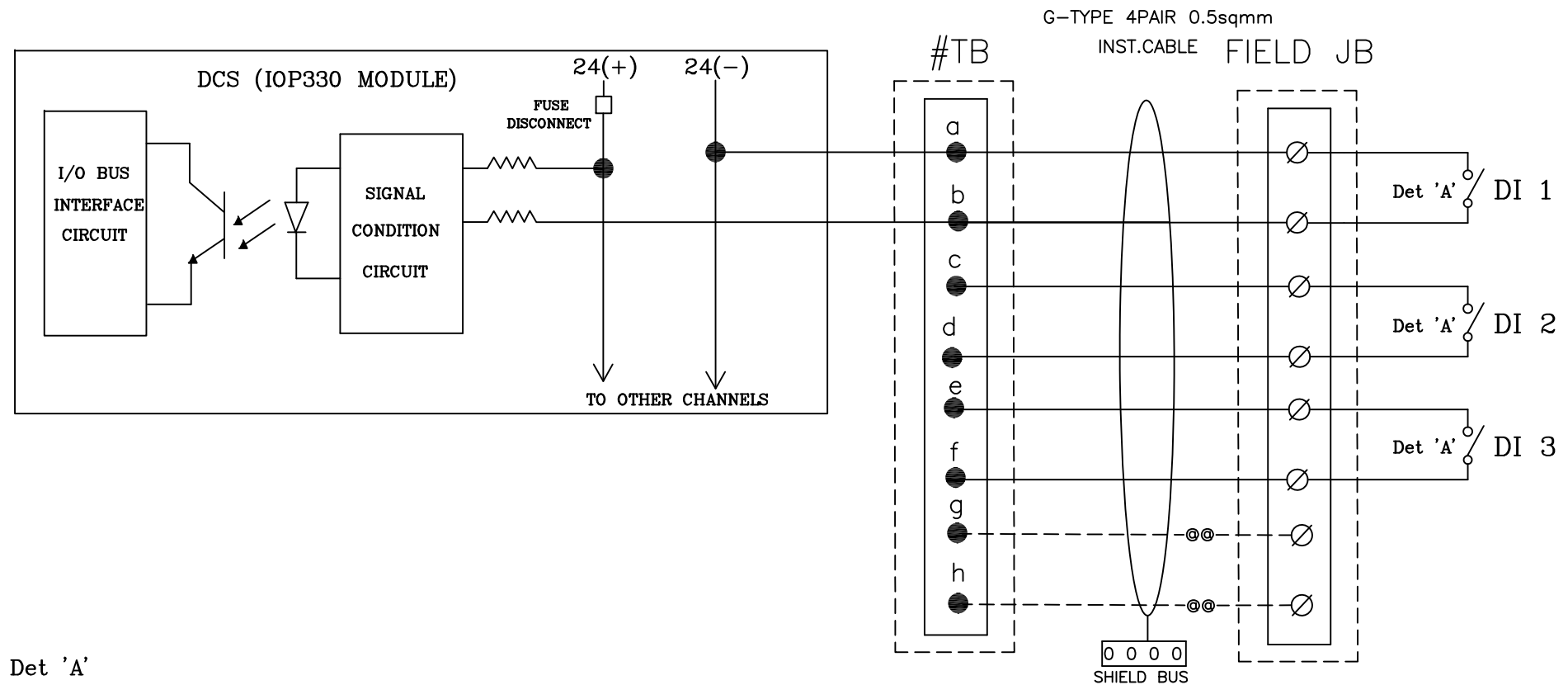
DDCMIS INTERFACE WITH ELECTRICAL BREAKER(EB-LT-NONSYNC)



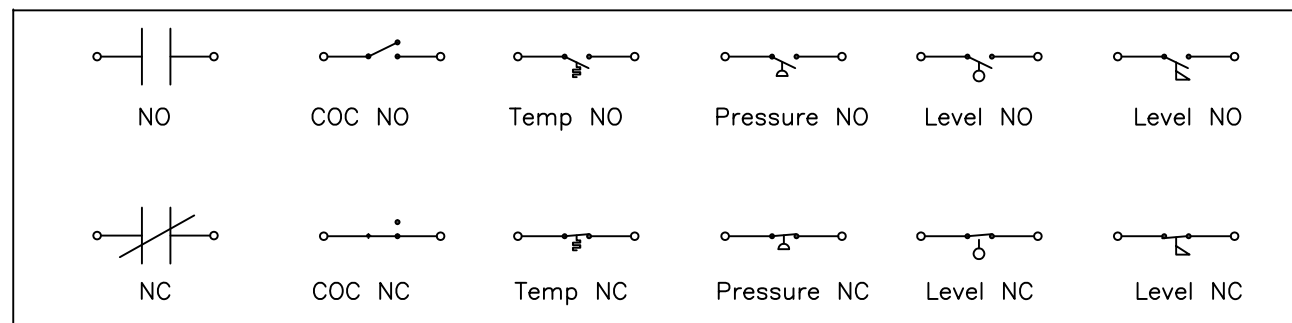
NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE
TERMINATION.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS DDCMIS INTERFACE WITH ELECTRICAL BREAKER(EB-LT-NONSYNC)	DRG.NO.	9962-001-PE-405-PVI-B-152
		DATE	11.02.2019
		REV.NO.	01
		SHT	22 OF 34

DDCMIS INTERFACE WITH DIGITAL INPUT SIGNAL



Det 'A'



NOTE:-1 #8 LEVEL TERMINAL BLOCK.

NOTE:-2 @@ IN EACH DDCMIS POST, UNUSED TB's ARE USED FOR SPARE CORE TERMINATION.

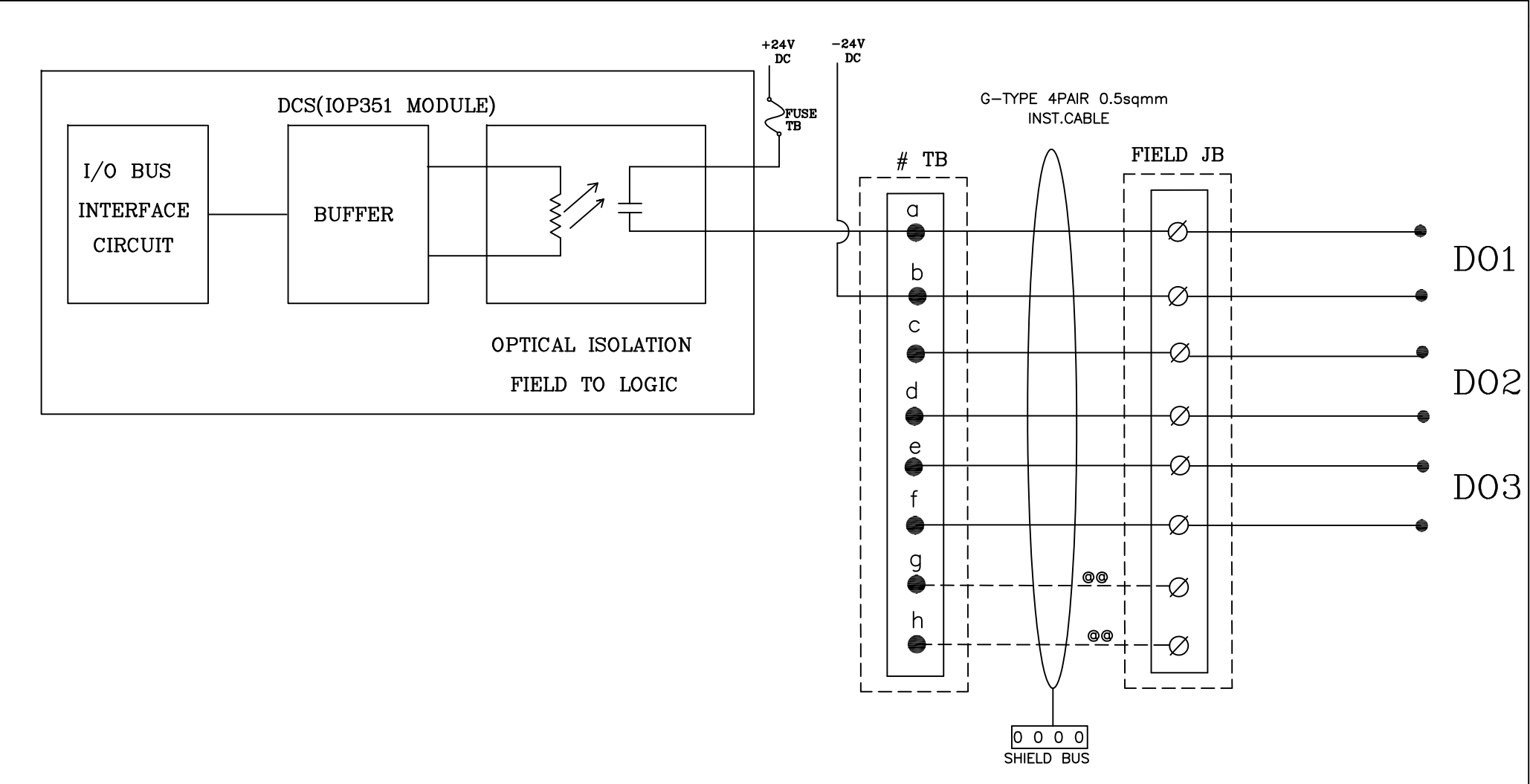


UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH DIGITAL INPUT SIGNAL

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	23 OF 34

DDCMIS INTERFACE WITH DIGITAL OUTPUT SIGNAL

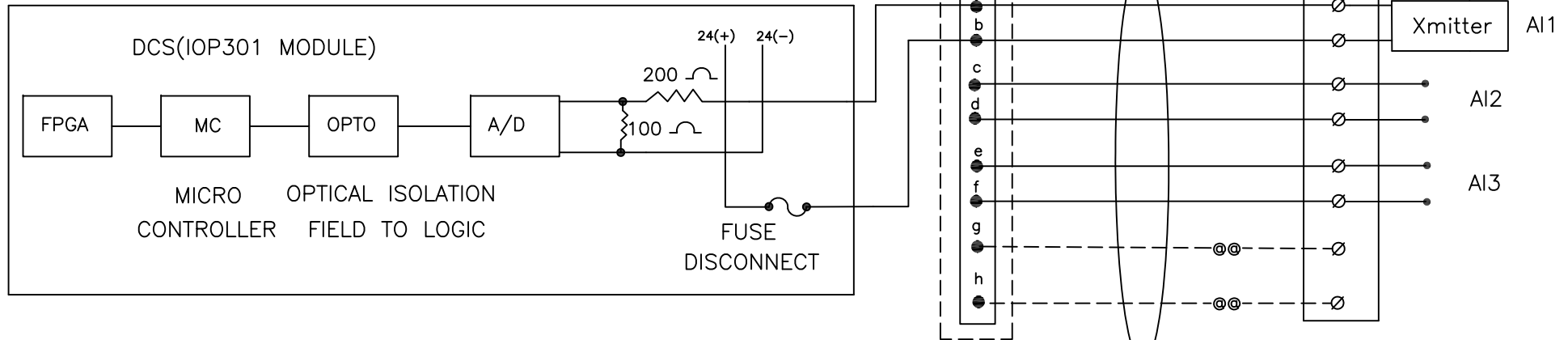


NOTE:-1 #8 LEVEL TERMINAL BLOCK.
NOTE:-2 @@ IN EACH DDCMIS POST, UNUSED TB's ARE USED FOR SPARE CORE TERMINATION.

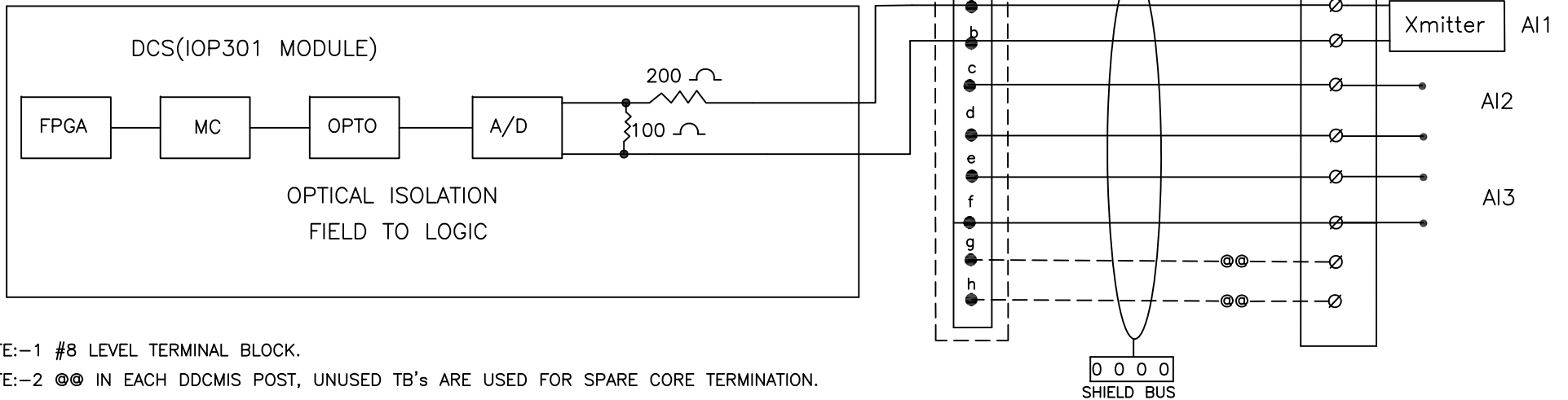
	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS		DRG.NO.	9962-001-PE-405-PVI-B-152
	DDCMIS INTERFACE WITH DIGITAL OUTPUT SIGNAL		DATE	11.02.2019
			REV.NO.	01
			SHT	24 OF 34

DDCMIS INTERFACE WITH ANALOG INPUT SIGNAL

AI INTERFACE(4-20mA POWERED BY SYSTEM)



AI INTERFACE(4-20mA POWERED EXTERNALLY)



NOTE:-1 #8 LEVEL TERMINAL BLOCK.

NOTE:-2 @ @ IN EACH DDCMIS POST, UNUSED TB's ARE USED FOR SPARE CORE TERMINATION.

NOTE:-3 F-TYPE: INDIVIDUAL & OVERALL SHIELD CABLE.



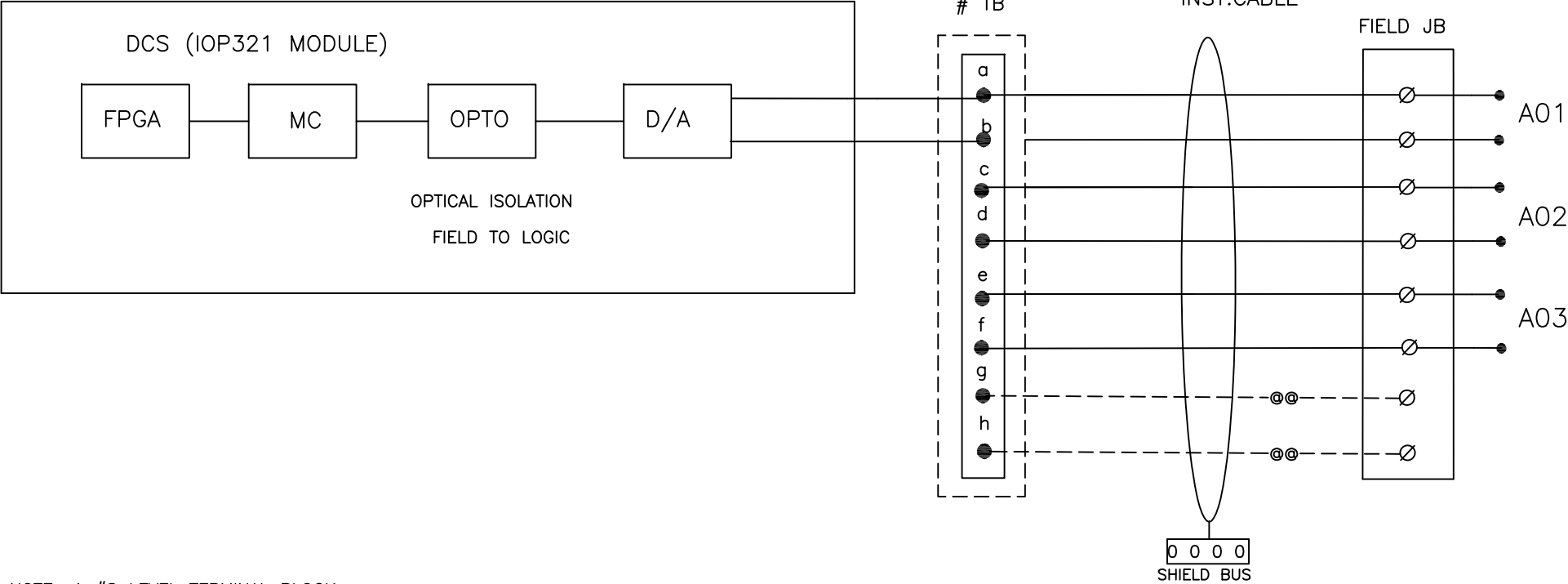
UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH ANALOG INPUT SIGNAL

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	25 OF 34

DDCMIS INTERFACE WITH ANALOG OUTPUT SIGNAL

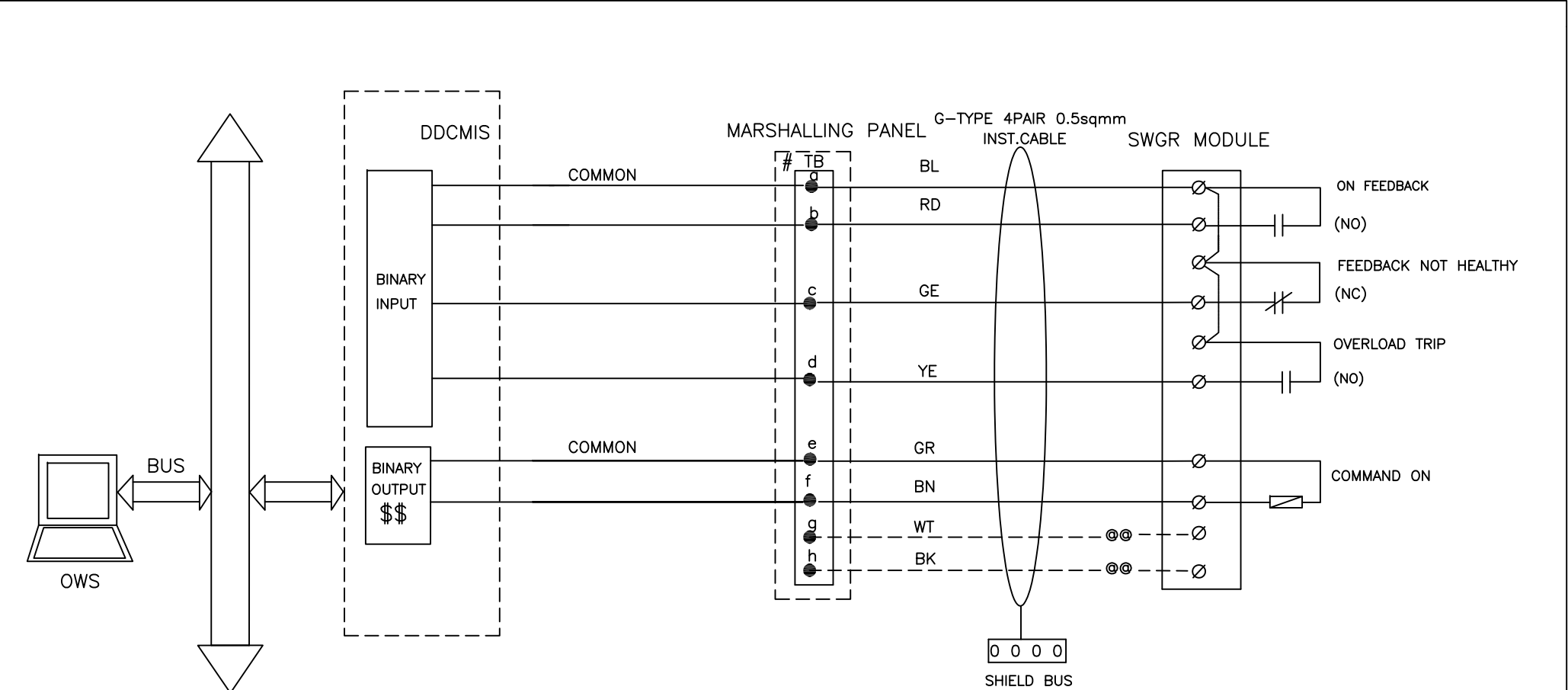
AO INTERFACE



- NOTE:-1 #8 LEVEL TERMINAL BLOCK.
- NOTE:-2 @@ IN EACH DDCMIS POST, UNUSED TB's ARE USED FOR SPARE CORE TERMINATION.
- NOTE:-3 F-TYPE: INDIVIDUAL & OVERALL SHIELD CABLE.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD		DRG.NO.	9962-001-PE-405-PVI-B-152
	1 X 660 MW PANKI TPS		DATE	11.02.2019
	DDCMIS INTERFACE WITH ANALOG OUTPUT SIGNAL		REV.NO.	01
			SHT	26 OF 34

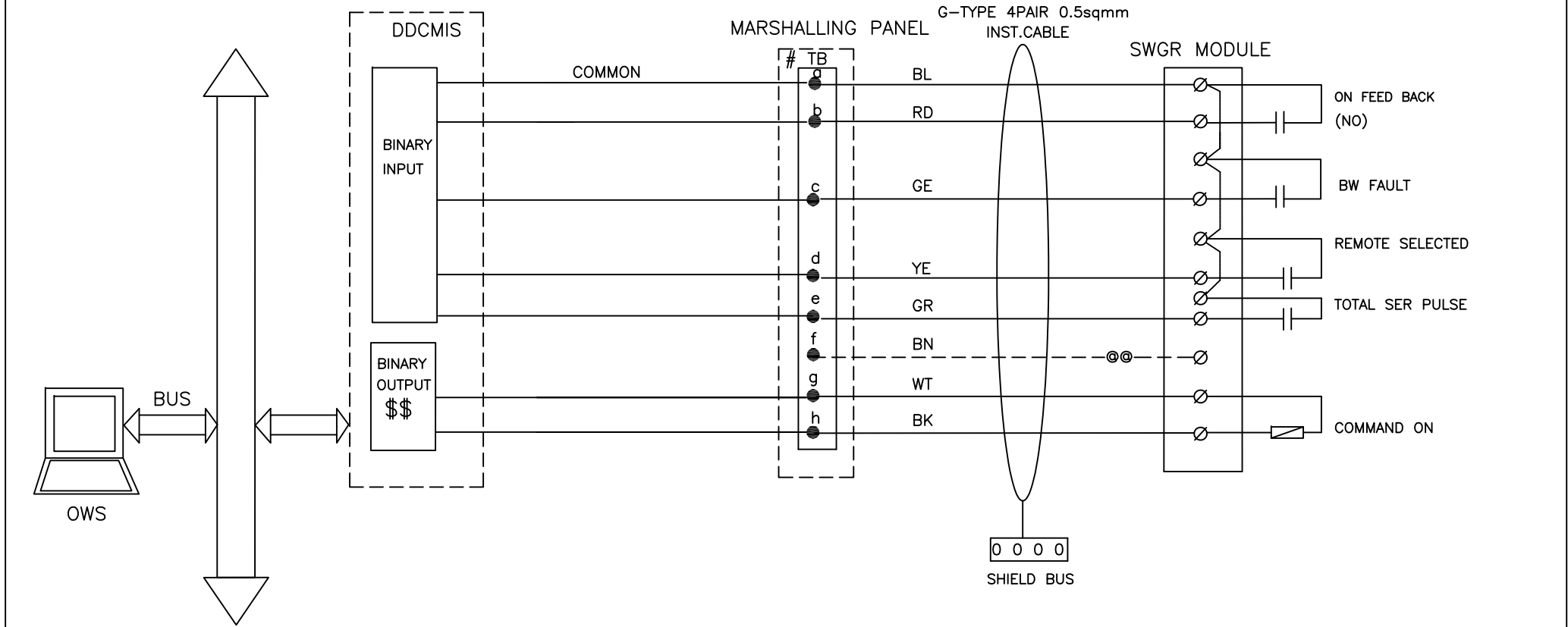
DDCMIS INTERFACE WITH LTCHP (DOL)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD		DRG.NO.	9962-001-PE-405-PVI-B-152
	1 X 660 MW PANKI TPS		DATE	11.02.2019
	DDCMIS INTERFACE WITH LTCHP (DOL)		REV.NO.	01
			SHT	27 OF 34

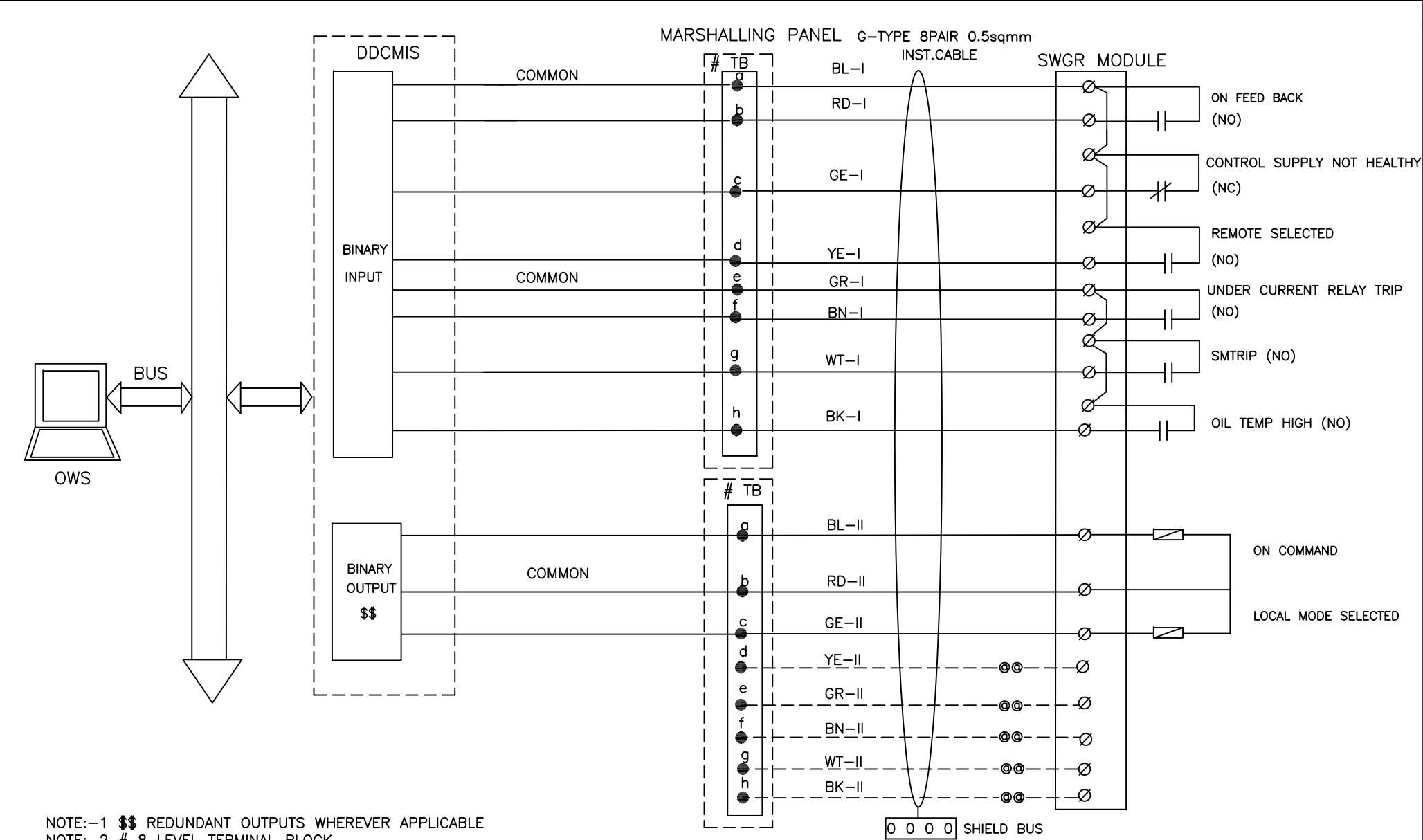
DDCMIS INTERFACE WITH BELT WEIGHER (BW)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE
TERMINATION.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS	DRG.NO.	9962-001-PE-405-PVI-B-152		
		DATE	11.02.2019		
	DDCMIS INTERFACE WITH BELT WEIGHER (BW)	REV.NO.	01		
		SHT	28	OF	34

DDCMIS INTERFACE WITH SUSPENDED MAGNET (SM)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

	UP RAJYA VIDYUT UTPADAN NIGAM LTD		DRG.NO.	9962-001-PE-405-PVI-B-152
	1 X 660 MW PANKI TPS		DATE	11.02.2019
	DDCMIS INTERFACE WITH SUSPENDE MAGNET (SM)		REV.NO.	01
			SHT	29 OF 34

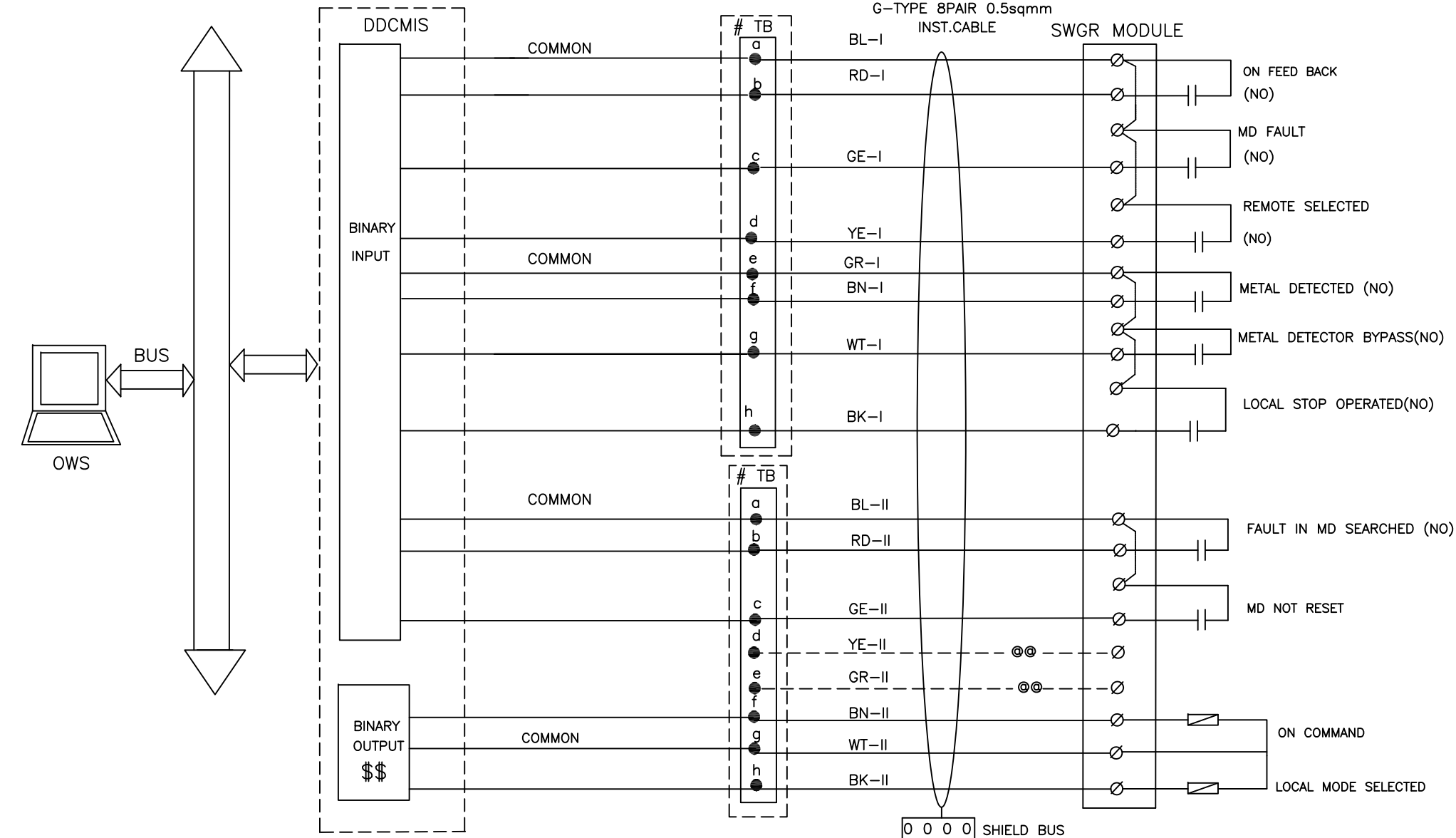
DDCMIS INTERFACE WITH METAL DETECTOR (MD)

MARSHALLING PANEL

G-TYPE 8PAIR 0.5sqmm

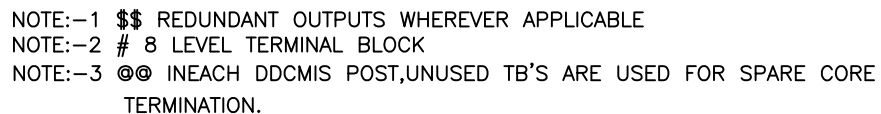
INST.CABLE

SWGR MODULE



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE
TERMINATION.

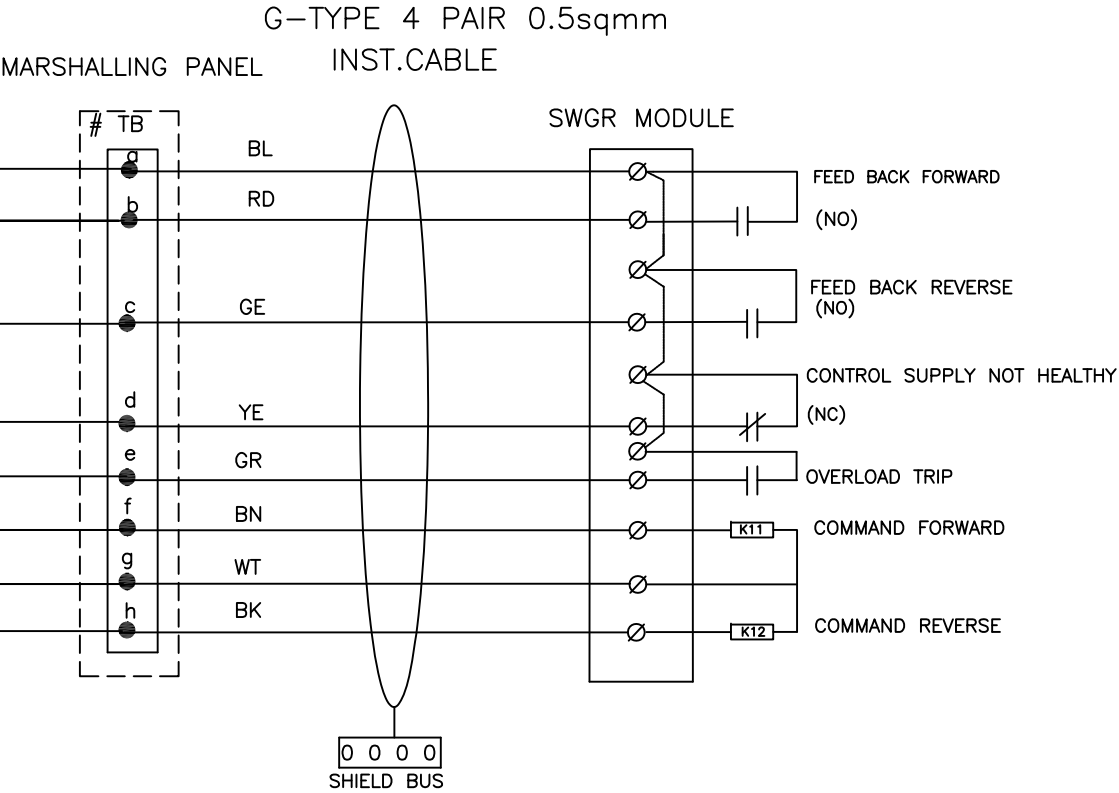
	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS		DRG.NO.	9962-001-PE-405-PVI-B-152
	DDCMIS INTERFACE WITH METAL DETECTOR (MD)		DATE	11.02.2019
			REV.NO.	01
			SHT	30 OF 34

MARSHALLING PANEL G-TYPE 8PAIR 0.5sqmm
INST.CABLE

DDCMIS INTERFACE WITH INLINE MAGNETIC SEPERATOR(ILMS)

DRG.NO.	9962-001-PE-405-PVI-B-152		
DATE	11.02.2019		
REV.NO.	01		
SHT	31	OF	34

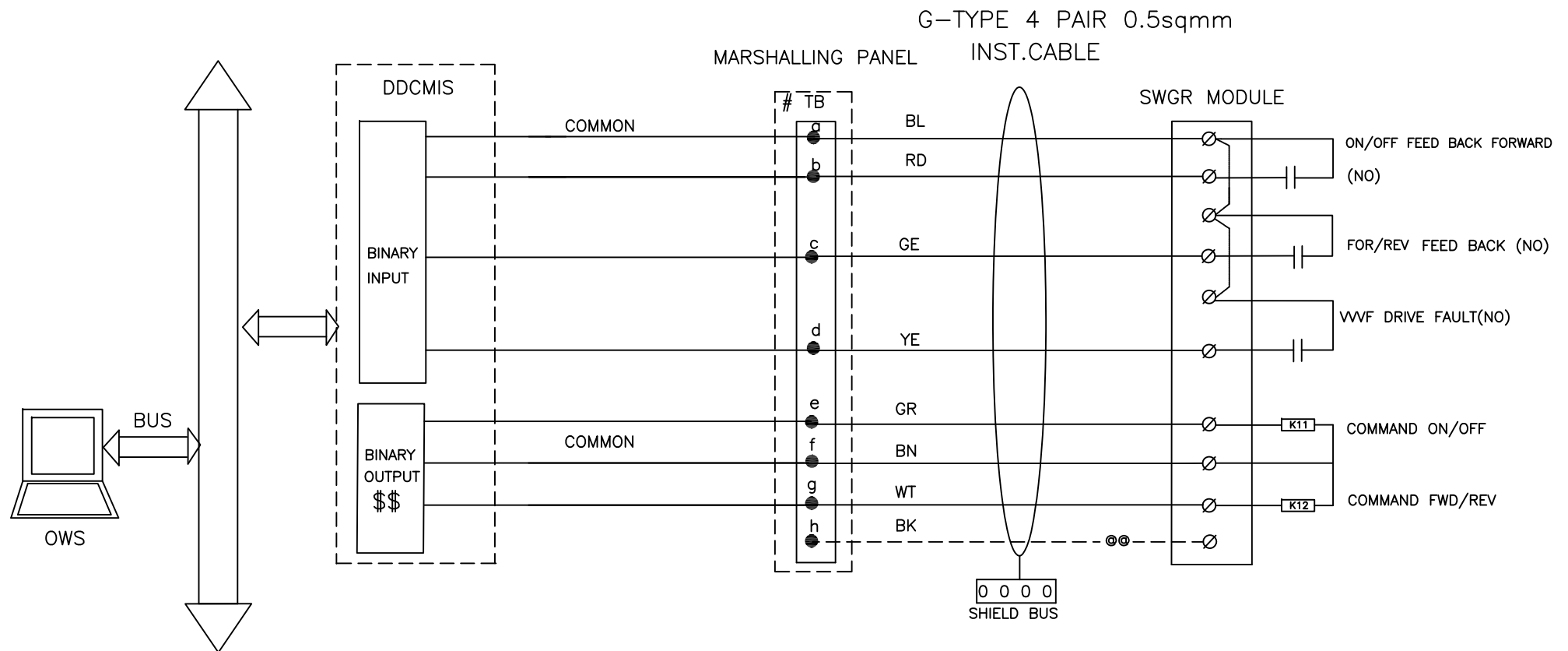
DDCMIS INTERFACE WITH REV (DOL)



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK

	UP RAJYA VIDYUT UTPADAN NIGAM LTD		DRG.NO.	9962-001-PE-405-PVI-B-152
	1 X 660 MW PANKI TPS		DATE	11.02.2019
	DDCMIS INTERFACE WITH REV (DOL)		REV.NO.	01
			SHT	32 OF 34

DDCMIS INTERFACE WITH VVVF



NOTE:-1 \$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE
TERMINATION.

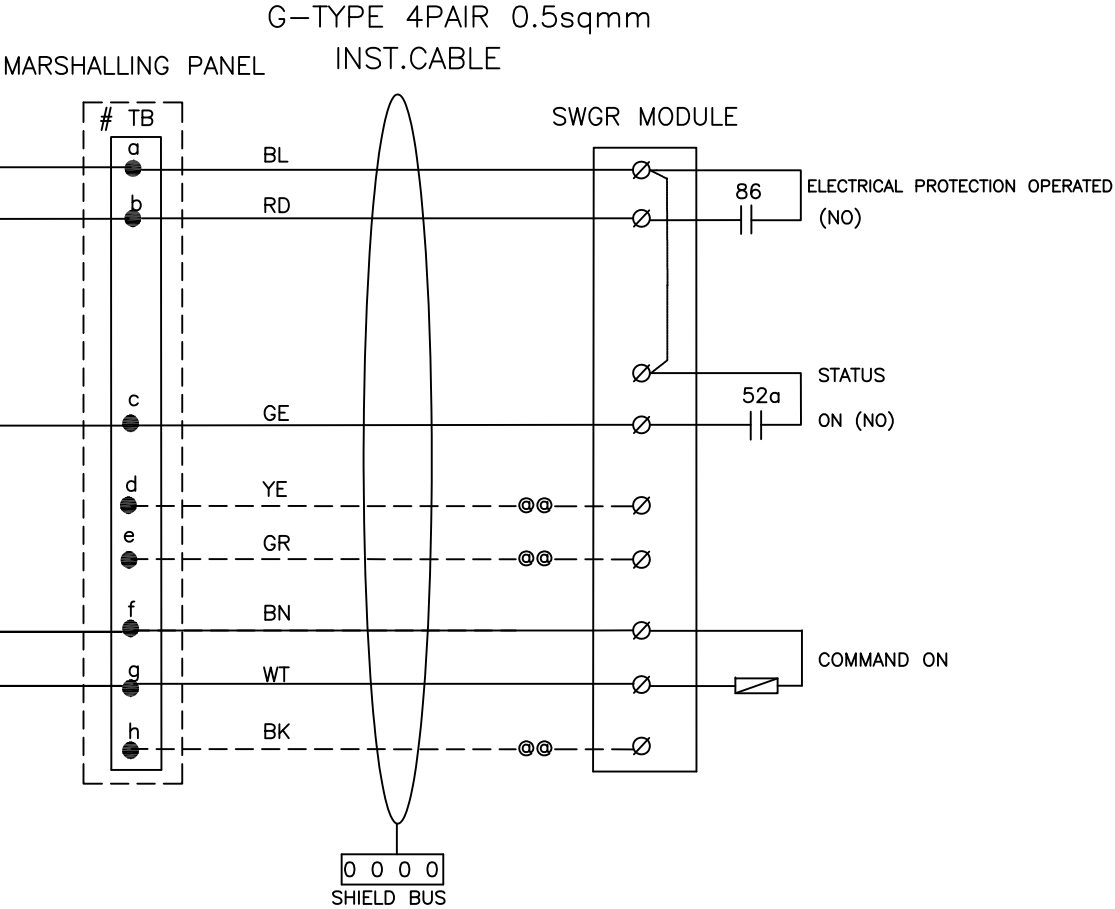


UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE WITH VVVF

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	33 OF 34

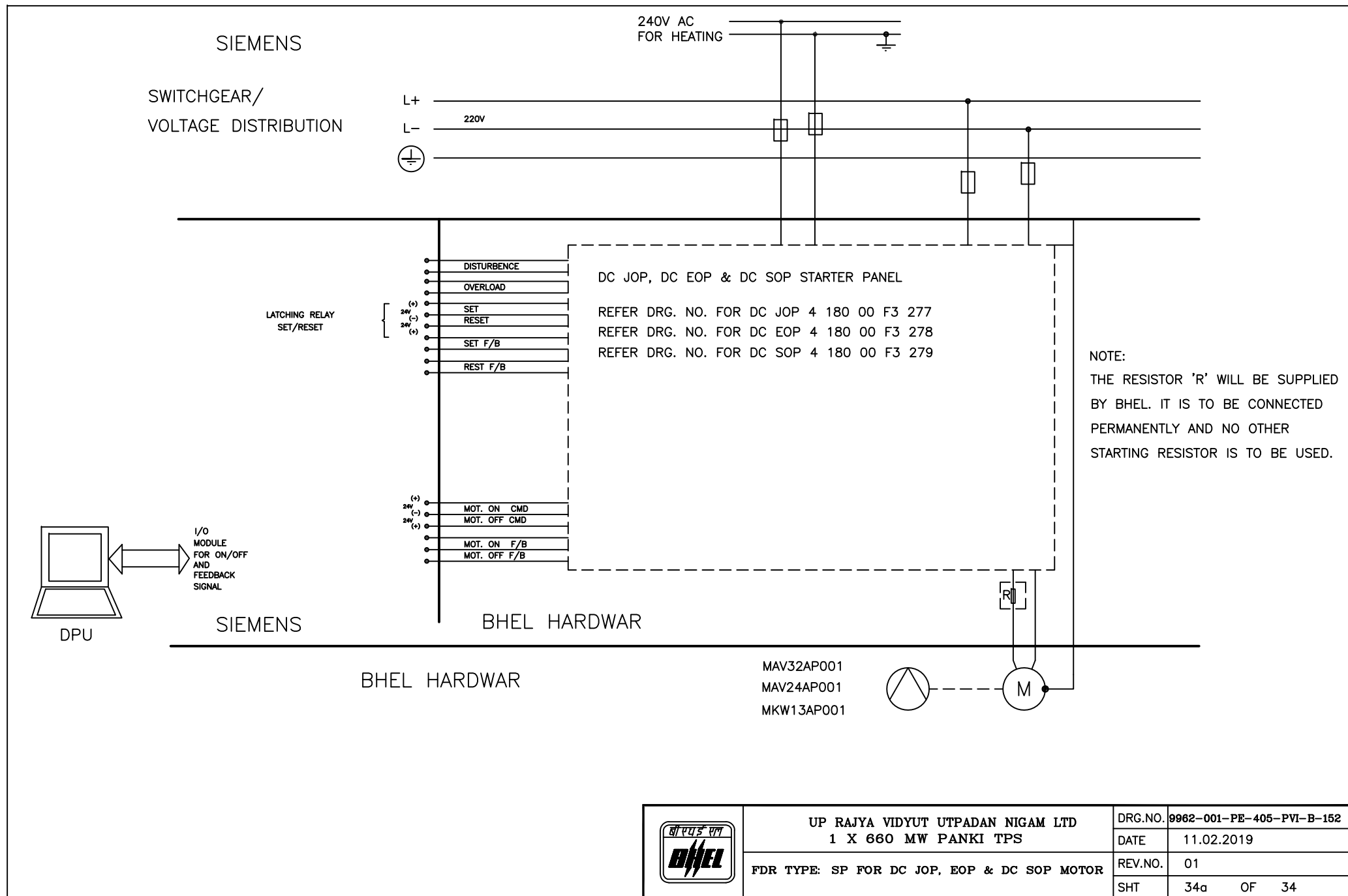
DDCMIS INTERFACE WITH HTCHP



NOTE:-1 \$\$\$ REDUNDANT OUTPUTS WHEREVER APPLICABLE
NOTE:-2 # 8 LEVEL TERMINAL BLOCK
NOTE:-3 @@ INEACH DDCMIS POST,UNUSED TB'S ARE USED FOR SPARE CORE TERMINATION.

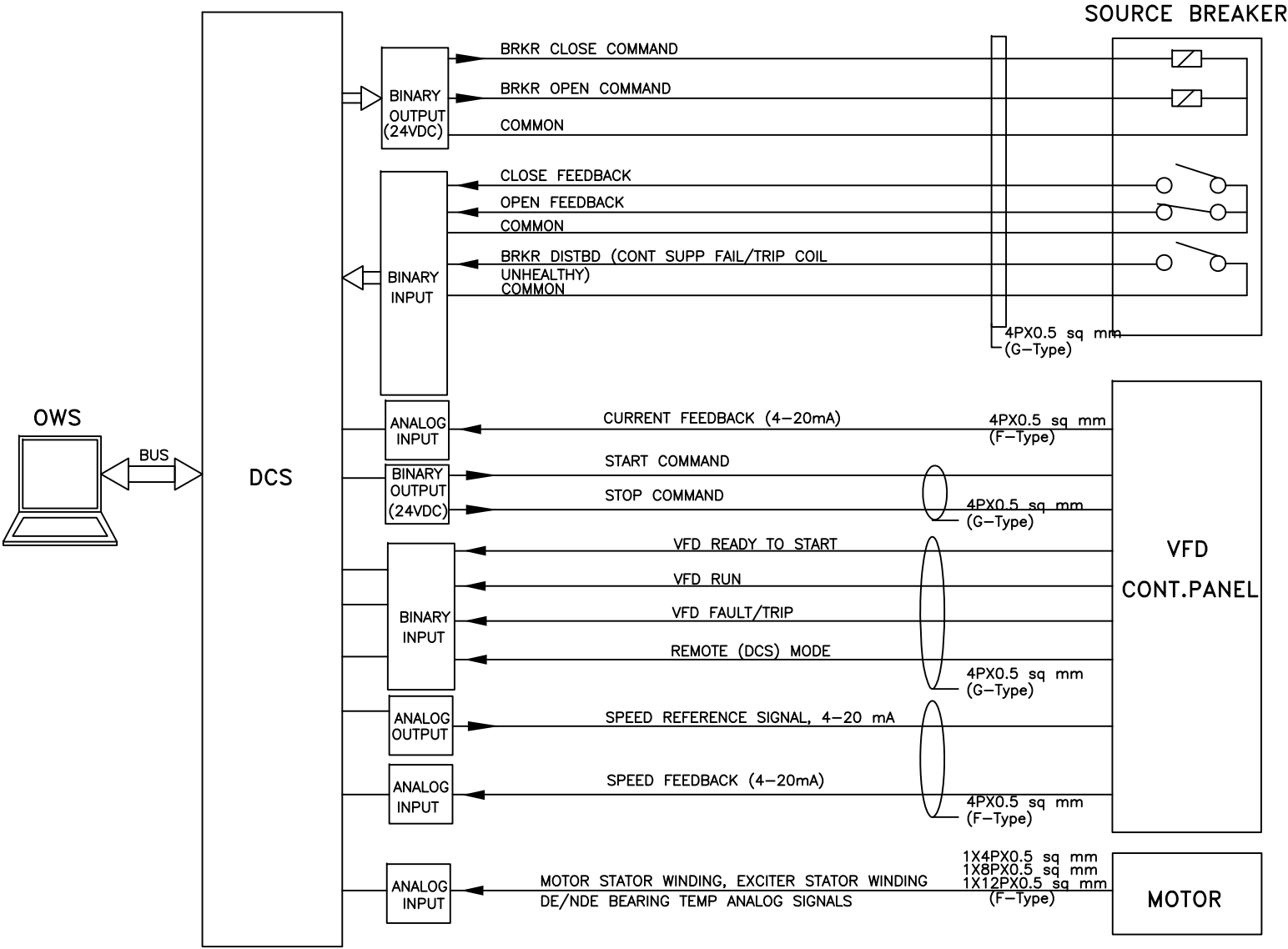
	UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS		DRG.NO.	9962-001-PE-405-PVI-B-152
	DDCMIS INTERFACE WITH HTCHP		DATE	11.02.2019
			REV.NO.	01
			SHT	34 OF 34

INTERFACE SP FOR DC JOP, EOP & DC SOP MOTOR



UP RAJYA VIDYUT UTPADAN NIGAM LTD 1 X 660 MW PANKI TPS		DRG.NO.	9962-001-PE-405-PVI-B-152
FDR TYPE: SP FOR DC JOP, EOP & DC SOP MOTOR		DATE	11.02.2019
		REV.NO.	01
		SHT	34a OF 34

DCS INTERFACE FOR VFD CONTROL DRIVE



UP RAJYA VIDYUT UTPADAN NIGAM LTD
1 X 660 MW PANKI TPS

DDCMIS INTERFACE FOR
CEP VFD

DRG.NO.	9962-001-PE-405-PVI-B-152
DATE	11.02.2019
REV.NO.	01
SHT	34b

	ANNEXURE- WRITE UP FOR DRIVE CONTROL PHILOSOPHY (STATION C&I)	DOCUMENT NUMBER	PE-DM-426-145-I002		
		REVISION NUMBER	01	DATE	11.02.19
	PROJECT: 1 X 660 MW PANKI TPS				

A. DRIVE CONTROL PHILOSOPHY

The control philosophy for different type of Drives is detailed below:

1 Bi-directional drives with Integral Starter(Open/Close duty and inching/regulating duty)

- a) All bi-directional drives shall have integral starter. These drives shall be operable from Remote i.e. from Central Control Room (CCR).
- b) Remote manual operation of all drives shall be done from Operator Works Station (OWS).
- c) Remote control commands i.e. open/close generated from DCS shall be issued to Integral Starter through interposing relays, mounted in Integral Starter. For open/close duty bi-directional drives, DCS output command shall be latched in DCS, except for inching duty bi-directional drives where latching is not required.
- d) Necessary electrical protections shall be realized at Integral Starter, whereas process interlocks and protection shall be realized in DCS.
- e) Following signal exchange shall take place between Integral Starter & DCS.
 - open & close command
 - Integral Starter Disturbed (Loss of power supply/Loss of control supply/ Motor thermostat trip/ Thermal O/L / Torque open/close cut off/ Local/off/Remote S/S in Local or Off mode/Stop PB optd).
 - Valve status feedback by means of limit switches (open/close).
 - Valve position feedback (4-20mA) for inching duty drives.

2 Unidirectional LT Drives (Contactor Operated)

- a. Unidirectional LT drives shall be operable from Remote i.e. from Central Control Room (CCR). Drives shall be provided with Local Emergency Stop Push Button (**EPB**).
- b. Remote manual operation of all drives shall be done from OWS.
- c. Remote control commands i.e. start/stop, shall be generated from DCS and shall be issued to MCC through interposing relays located in respective MCC.DCS output command shall be latched in MCC. EPB (stay put type), in MCC supplier's scope, shall be wired directly to MCC. The EPB shall be provided with press to lock and turn to release type, keyless mechanism.

	ANNEXURE- WRITE UP FOR DRIVE CONTROL PHILOSOPHY (STATION C&I)	DOCUMENT NUMBER	PE-DM-426-145-I002		
		REVISION NUMBER	01	DATE	11.02.19
	PROJECT: 1 X 660 MW PANKI TPS				

- d. Necessary electrical protections for the drives shall be realised at MCC, whereas process interlocks and protections shall be realised in DCS.
- e. Following signal exchange shall take place between MCC & DCS
 - i. Drive Start & Stop commands.
 - ii. Drive ON & OFF feedback.
 - iii. MCC disturbed (Thermal O/L /Control supply fail/ EPB operated/ MCC switched off).
- f. Current transducers, 4-20mA types (in MCC suppliers scope), shall be mounted in the MCC for monitoring the current in DCS for all drives $\geq$ 30 KW and for important drives <30 KW. Auxiliary power supply to these transducers shall be provided from the control power supply of the respective MCC.

3 Solenoid Operated Drives

- a. Solenoid operated drives shall be operable from remote i.e. CCR only.
- b. Remote manual operation of all drives shall be done from OWS.
- c. Remote control commands i.e. open/close shall be generated from DCS and shall be issued to the respective solenoid through interposing relays located in Interposing Relay panels.
- d. Necessary process interlocks shall be realized in DCS.
- e. Following signal exchange shall take place between solenoid operated drive & DCS
 - i. Valve open & close command.
 - ii. Valve status feedback by means of limit switches (open/close), wherever available.

	ANNEXURE- WRITE UP FOR DRIVE CONTROL PHILOSOPHY (STATION C&I)	DOCUMENT NUMBER	PE-DM-426-145-I002		
		REVISION NUMBER	01	DATE	11.02.19
	PROJECT: 1 X 660 MW PANKI TPS				

4 **HT/LT Unidirectional Drives (Breaker operated).**

- a. Remote manual operation of Breaker operated drives shall be normally from remote i.e. Station DCS in main Control Room through OWS.
- b. Remote/Switchgear (SWGR) selection shall be realized from SWGR mounted R/S selector switch.
- c. Following are the operational combinations for breaker operated drives:

-SERVICE POSITION – Drive Operation (Start/Stop) shall be from CCR with R/S (Remote/SWGR) selector switch in Remote position.

-TEST POSITION – SWGR Testing (Start/Stop) from SWGR/CCR.

Switchgear mounted 'Trip/Neutral/Close' switch shall be provided for testing of switchgear when 'R/S' selector switch is selected as 'SWGR'.

- d. Remote control commands i.e. start/stop, pulse type, shall be generated from DCS and shall be issued to Switchgear through interposing relays located in respective Switchgear.
- e. The EPB shall be wired directly to switchgear. The EPB (stay put type), in SWGR supplier's scope, shall be provided with press to lock and turn to release type, keyless mechanism. Under its locked position, the drive operation shall be inhibited.
- f. Necessary electrical protections for the drive shall be realised at Switchgear, whereas process interlocks and protections are realised in DCS.
- g. Following signal exchange shall take place between SWGR and DCS:
 - i. Drive Start & Stop commands.
 - ii. Drive ON & OFF status feedback.
 - iii. Master Trip Relay (86 Relay) operated.
 - iv. Emergency Stop PB operated.
- h. Current transducers (for FD fan, PA fan, ID fan, Mill Motors, MDBFP, CEP & ECW pumps only), 4-20mA types (in SWGR suppliers scope), shall be mounted in the SWGR for monitoring the current in DCS. Auxiliary power supply to these transducers shall be provided from the control power supply of the respective switchgear.
- i. Multifunction relay shall be provided in SWGR which will be connected to DCS through serial link via Data concentrator for transmission of soft signals to DCS including over load alarm, relay fault, motor current, SWGR disturbed(control supply failed or trip coil unhealthy), SWGR available (Selector switch in remote, Breaker spring charged, SWGR is service position).

B. SEQUENCE CONTROL PHILOSOPHY

	ANNEXURE- WRITE UP FOR DRIVE CONTROL PHILOSOPHY (STATION C&I)	DOCUMENT NUMBER	PE-DM-426-145-I002		
		REVISION NUMBER	01	DATE	11.02.19
	PROJECT: 1 X 660 MW PANKI TPS				

1.0 Sequence control is envisaged for startup and shutdown of main drives and their associated drives from OWS. The drives can be operated manually or automatically through group/sub-group control and through process interlocks.

1.1 Sequence Mode Operation

Sequence controls are organized hierarchically in accordance with the operation concept of the plant process. Accordingly following levels of sequence control exists.

- Functional group control
- Sub group control

Functional Group Control logic co-ordinates between functionally cascaded lower level sequence control logics. It performs following functions

- Mode of operation
- Sequential start/stop of sub group.

Sub Group Control performs sequence control strategies on main drive and related drives as required by the process and taking care of the healthiness of each drive e.g. BFP along with its recirculation valve, discharge valve and AOP in a sequence, will form sequence control logic for BFP.

1.2 Sequence Start Up Mode

- 1) **Automatic mode:** - In this mode of operation, once the sequence is initiated, it shall progress without involvement of the operator.
- 2) **Semi-automatic mode:** - In this mode of operation, once the sequence is initialized, the step progressing shall be displayed on the OWS. But the step execution command shall be interlocked and shall be sent by the operator via keyboard. It shall be possible to bypass and/or simulate one or more criteria to enable the program to proceed. This facility shall allow the program to be executed even if some criteria are not fulfilled. It shall be possible to put the system on the auto mode after operating it on semi-auto mode for some steps or vice-versa, without disturbance to the sequence operation.

	ANNEXURE- WRITE UP FOR DRIVE CONTROL PHILOSOPHY (STATION C&I)	DOCUMENT NUMBER	PE-DM-426-145-I002		
		REVISION NUMBER	01	DATE	11.02.19
	PROJECT: 1 X 660 MW PANKI TPS				

- 3) **Operator test mode:** It shall be possible to use the sequential control in operator guide mode / test mode i.e. the complete system runs and receives input from the plant OWS but its command output is blocked. The whole program, in this case shall run in manual mode. This mode shall allow to practice manual operation using step and criteria indications. The actual protection shall remain valid during this mode of operation also.

C. ANALOG CONTROL & MEASUREMENT PHILOSOPHY

1) Analog Drives Control

- 1.1 A drive control function residing in controller is used to position the pneumatically/electrically operated control valves. Interlock and protection Open/Close Commands, originating from field or generated internally in Control Logics (ACS), are interfaced with the drive control function residing in controller.
- 1.2 Control Valve actuator design shall take care of fail safe condition i.e. bringing valve to full open/full close or stay put mode, on signal (pneumatic/electric) failure.
- 1.3 Auto/Manual operator control and display for various control loops shall be provided through OWS, using Analog Displays.
- 1.4 Analog Displays have following functionality:
 - Auto/Manual selection with control device “Raise/Lower Buttons”
 - Set point indication with “Raise/Lower Buttons”
 - Indication for deviation between set point and measured value
 - Measured value indication
 - Final control element portion indicators



**AMENDMENT TO TECHNICAL SPECIFICATION FOR
CONDENSATE POLISING UNIT 1 X 660 MW PANKI TPS
EXTENSION PROJECT**

SPECIFICATION NO.: PE-TS-426-155-A001

AMENDMENT NO # 1

REV. NO. 00

DATE: 19/04/2019

Page 1 of 3

The following modifications with respect to **TECHNICAL SPECIFICATION FOR CONDENSATE POLISING UNIT** BHEL's Technical specification no **PE-TS-426-155-A001** shall apply. Bidder to note that existing clauses/details as appearing in the specification stands deleted / replaced and clauses/details as mentioned in "Modified to or Read as" column shall be applicable and complied by the bidder as listed below in **SCHEDULE A**.

In addition, new clauses and scope are also added as listed below in **SCHEDULE B** and shall be a part of tender specification (**PE-TS-426-155-A001**). Bidder to comply the same.

SCHEDULE- A

MODIFIED CLAUSES/PAGE NUMBERS:

Sl no.	Section	Sub-Section/ Description	Clause no	Page no	Existing clause/details	Modified to or Read as
1.	I	Sub-Section- I-A	4.0,A, Serial No. 24	13 of 611	All butterfly valves MOC used in service vessel area in condensate inlet line shall be (Body & Disc both:CF8M/SS316) and condensate outlet line will be (Body & Disc both: CF8M/SS316).	All butterfly valves MOC used in service vessel area in condensate inlet line shall be (Body- ASTM A 216 Gr. WCB & Disc-CF8M Respectively) and condensate outlet line will be (Body & Disc both: CF8M/SS316).
2.	I	Sub-Section- I-A	4.0,B II, Serial No. 10	15 of 611	DM Plant Bulk acid & alkali storage tanks (not in bidder' scope) shall be used drawing chemicals for regeneration of CPU Resins. These Bulk acid & alkali storage tanks shall be located in DM plant area which is adjacent to CPU regeneration building. The terminal point for acid (30-33% HCL) shall be both bulk acid storage tanks (2 nos.) outlet nozzle. The terminal point for alkali (48% NaOH) shall be both bulk alkali storage tanks (2 nos.) outlet nozzle Further Acid & Alkali pipe lines of size 80 NB each along with isolation valve to meet the CPU regeneration chemical requirement shall be tapped of from the 2 nos. Bulk acid & 2 nos. alkali storage tanks outlet nozzles provided in DM plant area. Further counter flanges, piping, valve, instrumentation and required fitting & accessories required for the same shall be in bidder' scope.	DM Plant Bulk acid & alkali storage tanks (not in bidder' scope) shall be used drawing chemicals for regeneration of CPU Resins. These Bulk acid & alkali storage tanks shall be located in DM plant area which is adjacent to CPU regeneration building. The Distance between Bulk chemicals storage tank of DM plant to proposed CPU regeneration building will be approx. 80 meter. The terminal point for acid (30-33% HCL) shall be both bulk acid storage tanks (2 nos.) outlet nozzle. The terminal point for alkali (48% NaOH) shall be both bulk alkali storage tanks (2 nos.) outlet nozzle Further Acid & Alkali pipe lines of size 80 NB each along with isolation valve to meet the CPU regeneration chemical requirement shall be tapped of from the 2 nos. Bulk acid & 2 nos. alkali storage tanks outlet nozzles provided in DM plant area. Further counter

19/04/2019
(Manoj K. Gupta)



**AMENDMENT TO TECHNICAL SPECIFICATION FOR
CONDENSATE POLISING UNIT 1 X 660 MW PANKI TPS
EXTENSION PROJECT**

SPECIFICATION NO.: PE-TS-426-155-A001

AMENDMENT NO # 1

REV. NO. 00

DATE: 19/04/2019

Page 2 of 3

						flanges, piping, valve, instrumentation and required fitting & accessories required for the same shall be in bidder' scope.
3.	I	Sub-Section- I-A	4.0,C, Serial No. 1	16 of 611	Effluent generated during the regeneration and resin transfer operation from CPU regeneration area shall be transferred through a drain trench to DM plant Neutralization Pit (RCC construction). There will no dedicated Neutralization pit for CPU regeneration area. The details of N-pit will be as mentioned below. One (1) no. Neutralization Pit of RCC construction with two (2) compartments with acid and alkali resistant lining/tiling along with isolation gates for each compartment shall be provided in DM plant. Each section/ compartment shall have capacity to hold (waste generated from single regeneration of one stream of DM Plant + waste generated from single regeneration of one CP Service Vessel + 20% Margin). Effluent generated during the regeneration and resin transfer operation from CPU regeneration area shall be transferred through a drain trench to DM plant Neutralization Pit (RCC construction). Bidder to note that if invert level of DM plant trench is higher than CPU regeneration area trench then suitable arrangement (i.e. mechanical items (Spool pipe, valve, piping & fittings etc.)) required for terminating the drain trench of CPU regeneration area in DM plant drain trench shall be in bidder's scope and shall be provided by bidder without any price and delivery implication to BHEL & Customer.	Effluent generated during the regeneration and resin transfer operation from CPU regeneration area shall be transferred through a drain trench to DM plant Neutralization Pit (RCC construction). There will no dedicated Neutralization pit for CPU regeneration area. The details of N-pit will be as mentioned below. One (1) no. Neutralization Pit of RCC construction with two (2) compartments with acid and alkali resistant lining/tiling along with isolation gates for each compartment shall be provided in DM plant. Each section/ compartment shall have capacity to hold (waste generated from single regeneration of one stream of DM Plant + waste generated from single regeneration of one CP Service Vessel + 20% Margin). Effluent generated during the regeneration and resin transfer operation from CPU regeneration area shall be transferred through a drain trench to DM plant Neutralization Pit (RCC construction).

19/04/2019

(Maneesh kr. Gupta)



**AMENDMENT TO TECHNICAL SPECIFICATION FOR
CONDENSATE POLISHING UNIT 1 X 660 MW PANKI TPS
EXTENSION PROJECT**

SPECIFICATION NO.: PE-TS-426-155-A001

AMENDMENT NO # 1

REV. NO. 00

DATE: 19/04/2019

Page 3 of 3

4.	II	Sub-Section– II-A/volume – III/Ch:9	-	369 of 611	Bidder shall provide all the consumable including chemicals till the Trial Run Operation of the plant and additional chemicals of one (1) month requirement.	Bidder to note that mentioned details "Bidder shall provide all the consumable including chemicals till the Trial Run Operation of the plant and additional chemicals of one (1) month requirement." appearing in the specification stands deleted.
5.	I	Sub-Section– I-A	3.01.00, General Design Data Table,Sr. no.2,3	34 of 611	2. CEP Discharge Pressure (Operating)- 33 kg/cm2 (g) 3. CEP Shut off head- 43 kg/cm2 (g)	2. CEP Discharge Pressure (Operating)- 33.5 kg/cm2 (g) 3. CEP Shut off head- 48 kg/cm2 (g)
6.	I	Sub-Section– I-A, datasheet-A	2.0, (iv)	301 of 611	Operating pressure of each condensate polisher service vessel- 33.0 bar(g) (VWO 1% make up condition)	Operating pressure of each condensate polisher service vessel- 33.5 kg/m2 (g) (VWO 1% make up condition)
7.	II	Sub-Section– II-C/General technical requirements (C&I)	-	590 to 595	General technical requirements (C&I) pages 590 to 595.	General technical requirements (C&I) pages 590 to 595 stands deleted and replaced with 54 pages consisting of Specification for motorised valve actuator, revised instrument stub details, revised Local JB specification and drive control philosophy is attached herewith this amendment for bidder's adherence.

SCHEDULE-B

NEW CLAUSES / SCOPE ADDED:

NIL

Muz
19/04/2019
(Maneesha Br. Gupta)

Pre-Bid clarification for Condensate polishing Unit Package							
Tender.N PE/PG/PK1/E-6155/2018							
Project:	Design, engineering, manufacturing, supply, testing, erection & commissioning, etc of Condensate Polishing Unit system for 2 x 660 MW UPRVUNL PANKI TPS EXT.						
S.No	Volume	Section	Clause	Page No	Specification requirement	Clarification	BHEL Reply dated 19.04.2019
1	Spec.No-PE-TS-426-155-A001, REV 0	Section-I, SUBSECTION: IA	4.0 - A., Service Vessel Facility, Point No-(24)	13 of 611	Service Vessel inlet line Butterfly valve (Body & Disc both): CF8M/SS 316.	Both the clauses are contradictory. Hence, request you to confirm the MOC of valves to be considered in Inlet & outlet of service vessel.	Bidder to follow tender specification clause 5.05.17 point no 8 and datasheet-A for the same. Further Bidder to refer amendment 1, schedule-A. sr. no. 1.
	Spec.No-PE-TS-426-155-A001, REV 0	Section-I, SUBSECTION: IA	5.05.17, Valves, Point No - 8)	42 of 611	MOC of butterfly valve at inlet of service vessel Body - CS, Disc - SS		
2	Spec.No-PE-TS-426-155-A001, REV 0	Section: I, SUB - SECTION: 1	A. Service vessel facility, Point no.20	13 of 611 42 of 611	One no. multi stream (four channel) chloride analyzer to measure process value of each service vessel outlet and process value of common inlet header of TG unit. chloride analyser shall be limited to a maximum of four (4) streams only.	As per the market availability, chloride analyzer for this lower range of ppb measurement is not available. Hence request you to remove the same from our scope of supply to reduce the project cost. Eventhough , if we supply this anlyser , this instrument will not be capable of measuring the chloride ions.	Bidder to follow tender specification.
3	Spec.No-PE-TS-426-155-A001, REV 0	Section: I, SUB-SECTION-IA	B. Regeneration system	14 of 611	1) One no. Resin Separation & Cation Regeneration Vessel. 2) One no. Anion resin regeneration vessel. 3) One no Mixed resin storage vessel 6) The vessels indicated against (sr.no 1 to 3) The same shall depend on the supplier recommendations based on specific regeneration technology to make the systems suitable	We shall provide Two numbers of regeneration vessels as per our process requirement . a .Cation Regeneration Vessel b.Anion Regeneration Vessel cum Mixed Resin storage vessel. However , we shall provide you the system without affecting the performance guarantees.	Bidder to follow tender specification.
4	Spec.No-PE-TS-426-155-A001, REV 0	Section-I, SUB-SECTION: IA	D., Piping, Point No - 7 & 8)	17 of 611	Further Piping from Bulk alkali storage tanks nozzle to CPU regeneration building shall be also in bidders scope. Further Piping from Bulk acid storage tanks nozzle to CPU regeneration building shall be also in bidders scope.	Kindly provide us the distance required between DM Plant Bulk Acid & Alkali Tank to CPU regeneration Area.	Distance between Bulk chemicals storage tank of DM plant to proposed CPU regeneration building will be approx. 80 m. Further Bidder to refer amendment 1, schedule-A. sr. no. 2.

5	Spec.No-PE-TS-426-155-A001, REV 0	Section-I, SUB-SECTION: IA	E. Additional Requirement	19 of 611 & 20 of 611	All handrails shall be of 32 mm nominal bore MS pipes (medium class) as per IS: 1161 galvanized using 750 gm/sq. m of zinc. Hand railing shall be a two-rail system with the top rail 1000 mm above the walkway surface and the intermediate rail 450 mm below the top rail. Handrail post spacing shall be limited to 1500 mm as far as possible but can be proportioned to the length of the opening. In such a case spacing shall not exceed 1850 mm centre to centre of posts. Hand railing shall be shop fabricated for specific locations and field welded or bolted to the erected structural steel. Railings shall be provided with 100 mm wide and 8 mm thick MS strip at bottom as toe guard all along the length of railing in horizontal plane. For RCC stairs, hand railing with 20 mm square MS bar balustrade with suitable MS flat and Aluminium / Teakwood handrail shall be provided, unless specifically mentioned otherwise.	Please confirm whether the same is in BGR Scope.	Handrail required for the equipment supplied by bidder for CPU package shall be in bidders' scope. Specification for the same has been mentioned in the CPU tender specification. Bidder to follow the same.
6	Spec.No-PE-TS-426-155-A001, REV 0	Section-I, SUB-SECTION: IA	3.00.00, Salient Design Data	34 of 611	Sr. No. 4. Design Pressure of CPU is 50 kg/cm ² (g) Sr. No. 10. Condensate Temperature (Mechanical Design)- 60 Deg.C	Based on the Design Pressure & Design Temperature, the valves rating for SS Valves does not fall under 300# .(i.e. Condensate Outlet Line) .Hence, request you to provide a feasible solution / reduce the design pressure to 49 Kg/sq.cm to provide 300# valves which will be economical.	Tender specification is clear in this regard and minimum valve class has been specified in tender specification, however bidder to select the valve class to meet minimum CPU system design requirement . Further Bidder to refer amendment 1, schedule-A. sr. no. 5 and 6.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
Mechanical Clarification								
1.	Section I	IA	4.0, A - II, Serial No. 24	13 of 611	All butterfly valves MOC used in service vessel area in condensate inlet line shall be (Body & Disc both: CF8M/SS316) and condensate outlet line will be (Body & Disc both: CF8M/SS316).	Please confirm the MOC of butterfly valve used in service vessel inlet.	Contradiction in MOC of butterfly valve used in service vessel inlet.	Bidder to follow tender specification clause 5.0 iii) & 6.0 iii) of datasheet –A of CPU for the same. Further Bidder to refer amendment 1, schedule-A. sr. no. 1.
	Section I	IA	iii) of 5.0	308 of 611	Piping-Service Vessel Inlet: BFV – ASTM A 216 Gr. WCB-Body SS-(CF8M) - Disc.			
	Section I	IA	iii) of 6.0	309 of 611	Condensate polishing plant inlet butterfly valves shall be of Carbon Steel construction (Body- ASTM A 216 Gr. WCB & Disc-CF8M Respectively).			

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
2.	Section I	IA	4.0, B - II, Serial No. 10	15 of 611	DM Plant Bulk acid & alkali storage tanks (not in bidder's scope) shall be used drawing chemicals for regeneration of CPU Resins. These Bulk acid & alkali storage tanks shall be located in DM plant area which is adjacent to CPU regeneration building. The terminal point for acid (30-33% HCL) shall be both bulk acid storage tanks (2 nos.) outlet nozzle. The terminal point for alkali (48% NaOH) shall be both bulk alkali storage tanks (2 nos.) outlet nozzle Further Acid & Alkali pipe lines of size 80 NB each along with isolation valve to meet the CPU regeneration chemical requirement shall be tapped off from the 2 nos. Bulk acid & 2 nos. alkali storage tanks outlet nozzles provided in DM plant area.	Please furnish the distance between DM Plant Bulk acid & alkali storage tanks and proposed CPU Regeneration building for calculating the Pipe length.	Distance between Bulk chemicals storage tank of DM plant to proposed CPU regeneration building are not provided.	Distance between Bulk chemicals storage tank of DM plant to proposed CPU regeneration building will be approx. 80 m. Further Bidder to refer amendment 1, schedule-A. sr. no. 2.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
3.	Section I	IA	4.0, C, Serial No. 1	16 of 611	Bidder to note that if invert level of DM plant trench is higher than CPU regeneration area trench then suitable arrangement (i.e. mechanical items (Spool pipe, valve, piping & fittings etc.)) required for terminating the drain trench of CPU regeneration area in DM plant drain trench shall be in bidder's scope and shall be provided by bidder without any price and delivery implication to BHEL & Customer.	Increase in invert of level of DM plant trench cause major scope implication to the bidder. Hence, we request you to confirm whether CPU regeneration area drain will be terminated to the DM plant drain trench through RCC drain trench (Client scope) or pipe.		Bidder to refer amendment 1, schedule-A. sr. no. 3.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
4.	Section I	IA	3.04.00	36 of 611	The bed cross section in the service vessels shall be such that the average velocity of condensate through it shall not exceed 2 meters/min.	Please confirm the velocity for selection of Service vessel diameter.	Both the clauses are contradictory.	Bidder to follow specification clause 3.04.00 page 36 of 611 for the same.
	III	Chapter -9	9.1.5	363 of 611	For vessels of spherical shape, where the bed cross sections vary, the diameter of the vessel shall be selected considering velocity of condensate through it, not exceeding 1.75 meter/min.			
5.				169 of 611 & 171 of 611	Painting Scheme for C2 and C3 Environment and Painting Scheme for C4 and C5 Environment.	As our all Equipment is located inside the Building or covered area hence we follow the Painting Scheme for C2 and C3 Environment. Please confirm.		Bidder to follow the tender specification.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
6.	Section I	IA	6.0, Serial No. iii Vs 27.19.1, Serial No. 1	309 of 611 & 451 of 611	Butterfly valves shall be of double flanged type of low leakage rate confirming to AWWA-C-504 class 300 (min.) or EN593/ BS:5155 PN 10 (min.) The valves shall be suitable for installation in any position (horizontal/vertical etc.) and shall be generally of double-flanged construction. However for sizes 600 NB and below the valves of Wafer construction are also acceptable.	We have considered the lugged wafer type Butterfly valve. Please confirm.		Bidder to consider an automatic bypass for the condensate polisher on the condensate inlet and outlet headers of the unit with a double flanged butterfly type control valve and double flanged butterfly type isolation valves on the upstream and downstream sides of the control valve. However, for other Butterfly valves bidder understanding is correct.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
7.				315 of 611 & 316 of 611	Equipment layout of CPU Regeneration area is attached along with Technical specification sheet no. 315 of 611 & 316 of 611.	The attached tender layout is used only for reference purpose. Equipment shall be suitably placed within the battery limit meeting the system requirement. The same shall be finalized during detailed engineering. Please confirm.		Bidder to follow the tender specification. However, equipment dimension and orientation can be developed by successful bidder during detail engineering as per approved CPU sizing calculation document.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
8.	III	Chapter -9	9.2, Serial No. ii	365 of 611	External resin traps at condensate & rinse outlet of each of the polisher vessels, designed for in-place manual back flushing.	As per Driplex proven system, the rinse line is branched after the resin trap installed on the outlet line of the service vessel hence no separate resin trap is required for rinse outlet. Please confirm.		Tender specification is clear in this regard, further bidder to refer tender P&ID of CPU enclosed with tender specification.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
9.	Section I	IA	4.0, A, Serial No. 13	13 of 611	Emergency bypass between the condensate influent and effluent headers. Each Condensate polisher service unit shall be provided with an automatic bypass for the condensate polisher on the condensate inlet and outlet headers of the unit with a double flanged butterfly type control valve and double flanged butterfly type isolation valves on the upstream and downstream sides of the control valve.	Please confirm the type of Control valve and its isolation valves uses in bypass line of CPU Service vessel area.	Both the clauses are contradictory.	Bidder to follow specification clause 4.0 A Sr. no. 13 page 13 of 611 for the same.
	III	Chapter -9	9.3.1	366 of 611	Each Condensate polisher service unit shall be provided with an automatic bypass for the condensate polisher on the condensate inlet and outlet headers of the unit with a globe type control valve and globe type isolation valves (resilient material seated, to ensure bubble-tight shut off) on the upstream and downstream sides of the control valve.			

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
10.	Section I	IA	11.4	25 of 611	All chemicals except reagents, monitoring gadgets required for pre-commissioning, commissioning, trial run and PG test is given under exclusion.	Please confirm the scope of supply for chemicals as both the clauses are contradictory.		Bidder to follow specification clause 11.4 page 25 of 611 for the same.
	III	Chapter -9	Note:	369 of 611	Bidder shall provide all the consumable including chemicals till the Trial Run Operation of the plant and additional chemicals of one (1) month requirement.			Further Bidder to refer amendment 1, schedule-A. sr. no. 4.

Offer No.: T766/DWE/19-714/1772
 Project: CONDENSATE POLISHING UNIT FOR 1X660 MW UPRVUNL PANKI TPS EXT
 Tender No.: PE/PG/PK1/E-6155/2018 DATED MARCH 20, 2019
 Doc. Title: **PRE-BID QUERIES (TECHNICAL)**

Sr. No.	Volume	Section	Clause No.	Page No.	Specification Requirement	Clarification	Reason for Clarification / Bidder's Assumption	BHEL Replies dated 19/04/2019
11.	III	Chapter -26		464 of 611 to 519 of 611	Chapter no. 26 for Power Cycle Piping, Valves, Fitting & Thermal Insulation Pages 464 of 611 to 519 of 611.	Chapter no. 26 for Power Cycle Piping, Valves, Fitting & Thermal Insulation Pages 464 of 611 to 519 of 611 needs to be deleted from the Technical specification as there is no Such Power Piping is applicable for the System except High pressure Piping for condensate inlet and outlet is applicable in service vessel area.		Bidder to follow tender specification.