

LEGEND

SYMBOL	DESCRIPTION
	MOTOR
	GENERATOR
	POTENTIAL TRANSFORMER
	CURRENT TRANSFORMER
	RING
	ISOLATOR
	CIRCUIT BREAKER
	CONTACTOR COIL
	WITHDRAWABLE DEVICE
	EARTH
	MECHANICAL INTERLOCK
	ELECTRICAL INTERLOCK
	MECHANICAL & ELECTRICAL INTERLOCK
	INDICATION LIGHT
	TRIP COIL
	CIRCUIT BREAKER
	CONTACTOR
	ON–LOAD ISOLATING SWITCH
	MANUAL/AUTO SWITCH
	AMMETER SELECTOR SWITCH
	VOLTMETER SELECTOR SWITCH
	VARIABLE FREQUENCY DRIVE (VFD)
	SOFT STARTER
	MOTORIZED VACUUM CIRCUIT BREAKER
	TIME RELAY / CABLE SEALING END
	POWER OUTLET / JUNCTION BOX
	GROUND PROTECTION RELAY / STATOR EARTH FAULT PROTECTION
	DIRECTIONAL POWER RELAY
	SYNCHRONIZING VOLTAGE TRANSFORMER
	TRANSFORMER GAS PRESSURE BUCHOLZ PROTECTION
	TRANSFORMER LIQUID LEVEL BUCHOLZ PROTECTION
	DIESEL GENERATOR
	GROUNDING CONNECTION
	NORMALY OPEN
	NORMALLY CLOSE
	POWER CABLE
	FUSE FOR VOLTAGE INPUT
	BREAKER FAILURE
	SYNCHRONIZATION
	DIGITAL ENERGY METER WITH ANALYZER (kWh)
	AMMETER
	VOLTMETER
	AMMETER SELECTOR SWITCH
	VOLTMETER SELECTOR SWITCH
	WATT HOUR METER
	COMBINED ELECTRIC METER
	ACTIVE POWER TRANSDUCER
	VOLTAGE–CONTROLLED/VOLTAGE–RESTRAINED OVER CURRENT PROTECTION
	SYNCHRONIZING/SYNCHRONISM–CHECK DEVICE
	REVERSE POWER

LEGEND

SYMBOL	DESCRIPTION
	UNDERVOLTAGE RELAY
	ANNUNCIATOR RELAY
	UNDERCURRENT UNIT
	BEARING PROTECTIVE DEVICE
	FIELD RELAY
	UNBALANCED CURRENT RELAY
	THERMAL OVERLOAD RELAY
	INSTANTANEOUS OVERCURRENT RELAY
	INSTANTANEOUS/ TIMED OVERCURRENT RELAY
	EARTH FAULT RELAY
	LOCKED ROTOR RELAY
	DELAYED ZERO SEQUENCE RELAY
	OVERVOLTAGE RELAY
	PRESSURE ALARM/TRIP
	TOO LONG STARTING RELAY
	OVER/UNDER FREQUENCY RELAY
	LOCKOUT RELAY
	DIFFERENTIAL RELAY
	POWER FACTOR INDICATOR
	WATTMETER
	FREQUENCY METER
	AMMETER
	VOLTMETER
	THEMARAL OVER LOAD
	PHASE SEQUENCE RELAY
	CIRCUIT BREAKER
	NORMALY OPEN
	PHOTO–VOLTAIC CELL OPERATED SWITCH
	NORMALLY CLOSE
	MINIATURE CIRCUIT BREAKER
	PLUG AND SOCKET
	M.M.U.
	F.M.U.
	SHUNT TRIP
	LOAD BREAK EARTH DISCONNECT SWITCH
	NEUTRAL EARTH RESISTOR (SEPARATE PANEL) / FUSE
	SURGE ARRESTOR
	CURRENT TRANSFORMER / POTENTIAL TRANSFORMER
	MAXIMUM DEMAND INDICATOR
	AMMETER / VOLTMETER
	FREQUENCY METER / POWER FACTOR METER
	KILOWATT METER / KILOWATT HOUR METER
	TRANSFORMER GAS PROTECTION / LIQUID LEVEL BUCHOLZ PROTECTION
	KILO VOLT AMPERE REACTIVE HOUR METER
	BUCHOLZ ALARM INDICATION
	ENERGY METER
	REMOTE MOTOR CONTROL STATION WITH SELECTOR SWITCH OR WITHOUT SELECTOR SWITCH

NOTES:-

1– DEVELOPED SINGLE LINE DIAGRAM IS BASED ON FEED ENGINEERING & DETAILSILLUSTRATED HEREIN ARE MINIMUM REQUIRED. EPCC CONTRACTOR SHALL ENHANCE ALL OF THESE REQUIREMENTS AND SHALL DEVELOP THEIR OWN SINGLE LINE DIAGRAM CONSIDERING ALL THE REQUIREMENTS OF DETAIL ENGINEERING EVEN NOT EXPLICITLY MENTIONED HEREIN BUT REQUIRED FOR THE INTENDED OBJECTIVE OF THE SUBJECT PROJECT SHALL BE INCLUDED AND PART OF EPCC SCOPE OF WORK.

2– VENDOR/MANUFACTURER SHALL DEVELOP/PROVIDE DETAIL DOCUMENTS OF RESPECTIVE SWITCHGEAR/MCC .I.E. COMPONENT LIST, SCHEMATICS, SINGLE DIAGRAM, MAIN AND INTERNAL CABLE TERMINATION DRAWINGS TO BE SUBMITTED FOR M/S OGDCL REVIEW AND APPROVAL.

3– AS THE INTEND OF THIS SINGLE LINE DIAGRAM IS BASED ON FEED ENGINEERING AND DETAIL ENGINEERING OF ALL PACKAGES/EQUIPMENT IS YET TO BE FINALIZED, THEREFORE, ANY COMPONENT, MODIFICATION WORK OR ADDITIONAL FEEDERS/STARTERS/COMPONENTS OR ELSE THAT WOULD BE NEEDED FOR THE PROJECT, HOWEVER, NOT EXPLICITLY MENTIONED IN THIS SINGLE LINE BUT REQUIRED FOR THE INTENDED OBJECTIVE OF THE SUBJECT PROJECT, SHALL BE PROVIDED BY EPCC CONTRACTOR WITHOUT ANY ADDITIONAL COST AND TIME.

4– PLANT MAX. PEAK DEMAND REQUIREMENT SYSTEM SHALL BE ENSURED THROUGH SELF–POWER GENERATION COMPRISING OF 02 NOS. OF ENGINE DRIVEN GAS GENERATORS (HEREIN AFTER REFERRED TO GAS GENSET) AND 01 NOS. DIESEL GENERATOR (HEREIN AFTER REFERRED TO DG SET). IN NORMAL OPERATION, ONE (01) GAS GENSET SHALL BE IN CONTINUOUS OPERATION WHILE OTHER GAS GENSET TO BE OFF LINE IN ORDER TO MEET PLANT OPERATING & MAINTENANCE CONTINGENCIES.

01 NO. OF DG SET SHALL ALSO BE PROVIDED FOR PLANT BLACK START PURPOSE OR TO DEAL WITH PLANT OPERATION AND MAINTENANCE CONTINGENCIES WHEN INDIGENOUS GAS SUPPLY IS NOT AVAILABLE.

PROVISION OF PARALLEL OPERATION (ACTIVE AND REACTIVE POWER SHARING) OF BOTH GAS GENSETS SHALL ALSO BE PROVIDED TO DEAL WITH ANY FUTURE OR OPERATING CONTINGENCIES. AND, DG SET SHALL ALSO BE INTERLOCKED WITH GAS GENSETS IN SUCH A MANNER THAT FAILURE IN NORMAL POWER GENERATION OR DUE TO NON–AVAILABILITY OF INDIGENOUS GAS RENDER THE DG SET START AUTOMATICALLY AND CATER THE PLANT ESSENTIAL DEMAND ACCORDINGLY.

CONDITION OF NORMAL POWER GENERATION FAILURE MAY NORMALLY OCCUR WHEN 01 NOS. OF GENERATOR IS OUT OF SERVICE OR PARKED FOR SCHEDULED MAINTENANCE AND OTHER/SECOND OPERATING GENERATOR IS COINCIDENTALLY SHUT DOWN DUE TO UNFORESEEN CIRCUMSTANCES.

5– BUS BAR OF NEW LV SWITCHGEAR/MCC SHALL BE DIVIDED INTO TWO SECTIONS A & B AND TO BE COUPLED THROUGH TIE BREAKER THAT ARE NORMALLY CLOSED AS ILLUSTRATED IN THIS SINGLE LINE DIAGRAM.

VARIOUS CONFIGURATIONS POSSIBLE FOR THE SWITCHGEAR THAT SHALL BE EITHER ONE OF THE THREE FOLLOWING CONFIGURATIONS:

CONFIGURATION	INCOMING–1 (GAS GENSET–1)	INCOMING–2 (GAS GENSET–1)	BUS COUPLER	INCOMING–3 (EDG–DG SET)
1	CLOSED	OPEN	CLOSED	OPEN
2	OPEN	CLOSED	CLOSED	OPEN
3	OPEN	OPEN	CLOSED	CLOSED
4	OPEN	OPEN	OPEN	CLOSED

CONFIGURATION 1 &2: REPRESENTS THE NORMAL OPERATING CONDITION WHEN ANYONE INCOMING GAS GENSET IN OPERATION AND OTHER ARE OFFLINE.

CONFIGURATION 3: MAY BE USED DURING NON–AVAILABILITY OF INDIGENOUS GAS SOURCE AND/OR SIMULTANEOUS FAILURE OF 01 NOS. OF GAS GENSET WHEN OTHER OTHER/2ND GAS GENSET ARE ALREADY PARKED FOR MAINTENANCE AS STATED ABOVE.

CONFIGURATION 4: DURING FAULT OR MAINTENANCE AT BUS–A OR PART OF THE SWITCHGEAR IN WHICH SHUTDOWN OF BUS–A IS INEVITABLE.

6– NEW SWITCHGEAR/MCC SHALL BE TYPE TESTED AS PER IEC–61439–1&2 AND IP RATING SHALL BE 42 AND FORM OF SEPARATION 4B.

7– ALL THE NEW LV MOTORS SHALL HAVE THE PROVISION TO START AND STOP FROM MCC AS WELL AS FROM FIELD THROUGH THE SELECTION OF SELECTOR SWITCH AVAILABLE AT THE FRONT OF EACH MCC STARTER. EACH FIELD MOUNTED CONTROL STATION SHALL BE PROVIDED WITH ON, OFF PUSH BUTTON AND EMERGENCY STAY PUT TYPE PUSH BUTTON. MCC–OFF–FIELD SELECTOR SWITCH (MCC MEANS THROUGH PUSH BUTTONS AVAILABLE AT THE FRONT OF EACH STARTER AND FIELD MEANS THROUGH PUSH BUTTON AVAILABLE AT LCS LOCATED CLOSE TO RESPECTIVE MOTOR.

FURTHER, EACH MOTOR STARTER SHALL HAVE THE PROVISION TO EXCHANGE OF FOLLOWING INFORMATION .I.E. START, STOP AND TRIP WITH PLANT CONTROL SYSTEM/DCS. ALL THE NECESSARY INTERPOSING RELAYS AS REQUIRED TO INTERFACE WITH PLANT CONTROL SYSTEM SHALL ALSO BE PROVIDED.

8– EACH MOTOR STARTER SHALL BE COMBINATION TYPE AND BE FITTED WITH:

- SHORT CIRCUIT PROTECTION BY MEANS OF INSTANTANEOUS THROUGH A 3 POLE MOTOR PROTECTION CIRCUIT BREAKER WITH ADJUSTABLE TRIP SETTINGS (IN MULTIPLES OF THE CONTINUOUS CURRENT RATING) ALLOWS FOR CUSTOMIZED MOTOR PROTECTION.
- THREE POLE AIR BREAK CONTRACTOR (S), AC–3 UTILIZATION CATEGORY.
- OVERLOAD PROTECTION RELAYS SHALL BE INSTALLED IN ALL PHASES AND SHALL ALSO INCLUDE PROTECTION AGAINST SINGLE PHASING (AT LEAST 10% FASTER) AND SHALL BE AT LEAST OF TRIP CLASS SUITABLE FOR RESPECTIVE MOTOR/PUMP APPLICATION IN ACCORDANCE WITH IEC 60947-4-1. THE RELAYS SHALL BE OF THE TEMPERATURE COMPENSATED TYPE AND SHALL BE EQUIPPED WITH MANUALLY RESET FACILITIES ON THE FRONT OF THE COMPARTMENT (RESETTABLE WITHOUT OPENING THE ASSEMBLY). AN INADVERTENT RESET ACTION SHALL NOT TRIP A CIRCUIT. OVERLOAD RELAY IS SOLELY RESPONSIBLE FOR BOTH LOCKED-ROTOR PROTECTION AND STARTING/REACCELERATING CAPABILITY.
- SPACE HEATER PROVISION FOR MOTORS RATED 22 KW OR ABOVE. SPACE HEATER SHALL HAVE CONTROL CIRCUIT IN THE RESPECTIVE STARTER THAT WHEN MOTOR IS IN OPERATION, THE SPACE HEATER IS CUTOFF AND WHEN MOTOR IS OFF, THE SPACE HEATER CIRCUIT ON/ENERGIZED.
- EARTH FAULT RELAY WITH ASSOCIATED TOROIDAL CT.
- AUXILIARY POWER SUPPLY FOR MOTOR STARTERS SHALL BE FETCHED INTERNALLY FROM MAIN BUS AND ACCORDINGLY DISTRIBUTED TO INDIVIDUAL MOTOR STARTERS. SINCE THE BUSES ARE DIVIDED INTO TWO (02) SECTIONS, THEREFORE, AUXILIARY POWER SUPPLY FROM TWO (02) BUSES SHALL BE INTERLOCKED WITH EACH OTHER IN SUCH A MANNER THAT TRIPPING IN ANYONE SUPPLY MAY CAUSE THE LOAD TO BE TRANSFERRED TO HEALTHY CIRCUIT AUTOMATICALLY. HOWEVER, MANUAL PROVISION SHALL ALSO BE PROVIDED.

9– ALL FEEDER CIRCUITS SHALL BE PROVIDED WITH LOAD SHEDDING CONTACT.

10– EACH AIR COMPRESSOR MOTOR SHALL BE PROVIDED WITH FIELD MOUNTED DISTRIBUTION BOARD ALONG WITH SUITABLE PROTECTION FOR CONNECTED LOADS. MAIN COMPRESSOR MOTOR AND COMPRESSOR AUXILIARIES/ HEATERS LOADS SHALL DRIVE THEIR POWER FROM RESPECTIVE DISTRIBUTION BOARDS AS STATED ABOVE. FURTHER, EACH COMPRESSOR/COMPRESSOR MOTOR SHALL HAVE FACILITIES FOR MANUAL AND AUTOMATIC STARTING IN CASE OF FAILURE OF THE ONE COMPRESSOR/COMPRESSOR MOTOR.

11– ELECTRICAL CONTROLS TO BE SUPPLIED AS AN INTEGRAL PART OF THE COMPRESSOR SHALL BE INTERLOCKED WITH THE START/STOP CONTROLS AND BE SUITABLE FOR THE ENVIRONMENT WHERE THEY INSTALLED.

12– ALL FEEDER MCCB’S SHALL BE FITTED WITH MINIMUM OF THERMAL & MAGNETIC PROTECTION.

13– THE RATINGS OF CT’S, VT’S, MCCB’S/MPCB’S, MAGNETIC CONTRACTOR, ELECTRONIC OVERLOAD/OVER CURRENT RELAYS ETC. SHALL BE SELECTED BY VENDOR AS PER CONNECTED LOAD CURRENT, FAULT CURRENT AND DEVICE CO–COORDINATION REQUIREMENT AND COMPLETE CALCULATION SHALL BE SUBMITTED TO CLIENT FOR REVIEW & APPROVAL.

14– LOAD SHEDDING CONTACT SHALL BE PROVIDED IN ALL LV OUTGOING CIRCUITS.

15–LOAD FLOW, SHORT CIRCUIT, VOLTAGE DROP, HARMONIC, ARC FLASH, TRANSIENT STABILITY, MOTOR STARTING STUDY AND RELAY CO–ORDINATION STUDY SHALL BE CARRIED OUT BY EPCC ON LICENSES SOFTWARE .I.E. ETAP OR EQUIVALENT. VALID LICENSE OF SOFTWARE SHALL ALSO BE SHARED WITH M/S OGDCL AT THE TIME OF BIDDING OR WHENEVER REQUIRED BY OGDCL.

RE-ISSUED FOR TENDER

1	25-02-2022	RE-ISSUED FOR TENDER	MAA	AIB	MAS
6	07-01-2022	ISSUED FOR TENDER	MAA	AIB	MAS
REV.	DATE	DESCRIPTION OF REVISION	DRAWN	CHECKED	APPR.
CLIENT: OIL & GAS DEVELOPMENT COMPANY LTD. OGDCL HOUSE TOWER, FIRST FLOOR, PAF, BLUE AREA, JINNAH AVENUE ISLAMABAD PAFISTAN PAF- 46001 ISLAMABAD, PAFISTAN					
ENAR PETROTECH SERVICES (PRIVATE) LIMITED 7–B, Sector 7–A Korangi Industrial Area, Korangi Pakistan TEL: (92211) 50627591 E-mail: info@enar.com.pk PAC-10001 ISLAMABAD, PAFISTAN			DWG. NO. 0258-ELB-6600 8-1 OF 2 REV. 1		
PROJECT : KPD-TAY COMPRESSION PROJECT			JOB NO. 14-0258		
TITLE : 0.4KV SINGLE LINE DIAGRAM FOR THORA DEEP-03 GGS			SIZE A3	SCALE NTS	SHEET 1 OF 1