

DOCUMENT No. A951-000-16-50-EDB-001 Rev.1

1.0 Scope

This electrical design basis defines the design requirements agreed by owner/clients in addition to EIL standard design philosophy for electrical facilities specification no: 6-51-0099 Rev-6.

In case of any conflict between statutory requirements, this design basis and standard design philosophy, the most stringent requirement shall govern.

2.0 Abbreviations, Codes & Standards / Publications

2.1 Abbreviations

Code	Description
AC	Alternating Current
ACB	Air Circuit Breaker
ASB	Auxiliary Service Board
CBCT	Core Balance Current Transformer
CEA	Central Electricity Authority
CPWD	Central Public Works Deaprtment
CT	Current Transformer
DC	Direct Current
DCP	Data Concentrator Panel
DG	Diesel Generator
DOL	Direct On Line
ELCB	Earth Leakage Circuit Breaker
EPCC	Emergency Power Control Centre
EPMCC	Emergency Power cum Motor Control Centre
FRLS	Flame Retardant Low Smoke
GI	Galvanised Iron
HMI	Human Machine Interface
HV	High Voltage
IEC	International Electro-Technical Commission
LDB	Lighting Distribution Board
LV	Low Voltage
MCC	Motor Control Centre
MCCB	Moulded Case Circuit Breaker
MOV	Motor Operated Valve
MV	Medium Voltage
NA	Not Applicable
OCTC	Off Circuit Tap Changer
PCC	Power Control Centre
PLC	Programmable Logic Control
PMCC	Power Cum Motor Control Centre
PRP	Parallel Redundancy Protocol
PT	Potential Transformer
PVC	Poly Vinyl chloride
RCC	Reinforced Cement Concrete
RSTP	Rapid Spanning Tree Protocol
SFU	Switch Fuse Unit
SPN	Single Phase & Neutral
TP	Three Phase
TPN	Three Phase & Neutral
UPS	Uninterrupted Power Supply
VFD	Variable Frequency Drive
XLPE	Cross Linked poly Ethylene
	Cross Edition pory Edity ione

\$-data to be provided /confirmed by client.

^{@-}Details to be finalised during detail engineering



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2.2 Codes & Standards / Publications

The main codes and standards, considered as minimum requirements, as applicable, are as follows -

S. No.	Description	Standards / Codes	Edition
1	General requirements for silos for Grain storage, Part-I, Constructional Requirements	IS-5503-I	Latest
2	General requirements for silos for Grain storage, Part-II, : Grain Handling Equipment and Accessories	IS-5503-II	Latest
3	Outdoor Distribution Transformers of ratings up to & including 100KVA, for use on systems with nominal system voltages up to & including 11kV	IS-1180	Latest
4	Code of practice for the fire safety of buildings - Electrical Installations.	IS-1646	Latest
5	Code of practice for selection: installation and maintenance of automatic fire detection and alarm system.	IS-2189	Latest
6	Code for protection against lightning.	IS/IEC- 62305	Latest
7	Code of practice for fire safety of industrial buildings - Electrical generating and distributing stations.	IS-3034	Latest
8	Code of practice for Earthing.	IS-3043	Latest
9.	Code of practice for Interior Illumination.	IS-3646	Latest
10	Application guide for Insulation Coordination.	IS-3716	Latest
11	Guide for safety procedures and practices in electrical work	IS-5216	Latest
12	Code of practice for Industrial Lighting.	IS-6665	Latest
13	Guide for Control of undesirable static electricity.	IS-7689	Latest
14	Guide for improvement of power factor - consumer's installations.	IS-7752	Latest
15	Energy Efficient Induction Motors – Three Phase Squirrel Cage	IS-12615	Latest
16	Reference ambient temperature for electrical equipment	IS-9676	Latest
17	Code of practice for selection, installation and maintenance of transformer.	IS-10028	Latest
18	Code of practice for selection, installation and maintenance for switchgear and control gear.	IS-10018	Latest
19	Application guide for Power Transformer.	IS-10561	Latest
20	Voltage bands for electrical installations including preferred voltages and frequencies.	IS-12360	Latest
21	Guide for short circuit calculations in three phase AC systems.	IS-13234	Latest
22	National Electrical Code (NEC) - BIS Publication.	SP-30	Latest
23	Electrical Apparatus for use in the presence of combustible dust	IS/IEC- 61241	Latest

3.0 General/Design Considerations

1) LV - Low Voltage. The voltage which does not normally exceeds 250 V.

2) MV - Medium Voltage. The voltage which normally exceeds 250 V and does not exceeds 650 V.

3) HV - High Voltage. The voltage which normally exceeds 650 V but does not exceed 33 kV.

4.0 Site conditions

4.1 Equipment design temperature (IS-9676)

:45°C

4.2 Minimum / Maximum Ambient Temperature

:1.0°C/46.1°C

\$-data to be provided /confirmed by client.

@-Details to be finalised during detail engineering

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4.3 Relative Humidity :85% 4.4 Soil Resistivity : As per Soil investigation report or 20 Ohm-m(min) whichever is maximum 4.5 Minimum temperature for battery sizing 4.6 Altitude above mean sea level : Less than 1000m above mean sea level 4.7 Seismic Zone :As per IS-1893 5.0 Power Source Details 5.1 General Independent system or existing system : Independent/Existing system \$ 5.2 **Grid Supply** Name of sub station 5.2.1 \$ 5.2.2 Number of feeders 1 5.2.3 Length of feeder S 5.2.4 Type /size of conductor/ cable size \$ mm^2 5.2.5 Voltage $11 \, kV \pm \%$ 5.2.6 Frequency $50 \text{ Hz} \pm 3 \%$ 5.2.7 Maximum fault level \$ kA for \$ sec 5.2.8 Minimum fault level \$ 5.2.9 Design fault level \$ kA for \$ sec 5.2.10 Basic Insulation Level \$ kV 5.2.11 System neutral Earthing \$ 5.2.12 Minimum load power factor : \$ 5.2.13 Parallel operation of incomers NA : 5.2.14 PLCC requirement Yes/No 5.3 Emergency generator 5.3.1 Number of emergency generators : 1 5.3.2 Type of emergency generators : Diesel 5.3.3 Generator rating/Voltage/Power factor : @ KW/415V / 0.8 5.3.4 Parallel operation with other sources :No, Except Momentary paralleling with grid power supply for transfer of power from emergency to normal 5.3.5 Type of starting : Auto / Manual 5.3.6 Centralised DG set : Yes /No 5.3.7 Location of generator set : 1 No. at Centralised location Note: The rating of emergency DG set shall be finalized during detailed engineering. The emergency DG set shall cater to emergency loads of various utilities, emergency lighting etc. Power Supply Distribution System 6.0 Voltage and frequency variation 6.1 6.1.1 AC System Voltage 11 KV / 415 V ± 10%

\$-data to be provided /confirmed by client.

Frequency

6.1.2

@-Details to be finalised during detail engineering

DC System (at system output terminal)



 $50Hz \pm 3\%$



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Electrical protection and Control system. 110V ±10 %				
DC critical Lighting system		Electrical protection and Control system	. 1	10V +10 %
6.2.1 Primary HV distribution voltage 6.2.2 Secondary MV distribution voltage 6.2.3 Primary HV distribution system neutral Earthing 6.2.4 Secondary MV distribution system neutral Earthing 6.2.5 HV motor voltage (KW more than 160KW) 6.2.6 MV motor voltage (KW more than 160KW) 6.2.7 AC Motors rated below 0.18 KW (except MOVs) 6.2.8 DC Motor 6.2.9 Motor operated valves 6.2.9 Motor operated valves 6.2.10 Battery chargers incoming power supply 6.2.11 UPS System incoming power supply 6.2.12 AC Lighting/Power Panels 6.2.13 Auxiliary Boards incoming power supply 6.2.14 Welding Receptacles 6.2.15 Bulk loads like Process Heaters etc. 6.2.16 Normal Lighting/Emergency Lighting 6.2.17 Convenience outlets 6.2.18 LAN 6.2.19 LAN 6.2.10 Utilisation voltage for critical supplies 6.3.1 Switchgear protection control power supply 6.2.14 Utilisation voltage for critical supplies 6.3.1 Input power supply for Public Address system 6.3.1 Input power supply for Public Address system 6.3.2 Critical lighting power supply input powe				AND THE PERSON AND TH
6.2.1 Primary HV distribution voltage : 11kV 6.2.2 Secondary MV distribution voltage : 415V 6.2.3 Primary HV distribution voltage : 415V 6.2.4 Secondary MV distribution system neutral Earthing : Solidly earthed for 415V 6.2.5 HV motor voltage (KW more than 160KW) : NA 6.2.6 MV motor voltage (0.18≤KW ≤160) : 415 V AC 6.2.7 AC Motors rated below 0.18 KW (except MOVs) : 240V AC 1Ph/415V 3Ph 6.2.8 DC Motor : As per manufacturer standard design 6.2.9 Motor operated valves : 415V AC, 3 Ph 6.2.10 Battery chargers incoming power supply : 415V AC, 3 Ph 6.2.11 UPS System incoming power supply : 415V AC, 3 Ph 6.2.12 AC Lighting/Power Panels : 415V AC, 3 Ph 6.2.13 Auxiliary Boards incoming power supply : 415V AC, 3 Ph 6.2.14 Welding Receptacles : 415V AC, 3 Ph 6.2.15 Bulk loads like Process Heaters etc. : 415V AC, 3 Ph 6.2.16 Normal Lighting/Emergency Lighting : 240V AC, 1 Ph 6.2.17 Convenience outlets : 240V AC, 1 Ph 6.2.18 LAN : 240V AC, 1 Ph 6.3.1 Switchgear protection control power supply : 110V, DC 6.3.2 Critical lighting power supply : 110V, DC 6.3.3 Input power supply for Public Address system : 110VAC UPS 6.3.4 Input power supply for Fire alarm system : 240V AC, SPN, UPS 6.4 Power factor improvement capacitors : At 415V PMCC, Automatic Power Factor Correction : At 15V PMCC, Automatic Power Factor Correction : 11kV Switchboard : Yes /Ne 6.4 Power factor improvement capacitors : At 415V PMCC, Automatic Power Factor Correction : 11kV Switchboard : Yes /Ne 6.4 Hard wired annunciation panel : Yes /Ne 6.5 Hard wired annunciation panel : Yes /Ne 6.7 Hard wired annunciation panel : Yes /Ne				10, 110,0
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\$-data to be provided /confirmed by client.	a	MV Motors	Direct on line/Soft	Starter if required
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7.2 Type of power isolation for transformers

Push button in transformer bay for tripping breaker 7.2.1

: Yes

7.2.2 Local Isolating breaker panel with protection relay

: Yes

and metering

7.3 Relay protection system

Protection devices for power distribution system shall be as indicated below 7.3.1 (Figure inside bracket refers to note below)

RELAY DESCRIPTION	RELAY NUMBER	HV TRANSFORMER FEEDER	OUTGOING BREAKER FEEDER	INC	OMER
		(SECONDARY WINDING VOLTAGE ≤ 0.433 KV)	MV PCC/ PMCC	HV	MV PCC /PMCC
IDMTL over-current relay	51	V	√	√(1)	1
IDMTL earth-fault relay	51N	V	√	√(1)	1
51G backup earth-fault relay (secondary neutral)	51G	V		√	-
Motor protection relay with (50, 50N,46, 49, 50L/R,86,95)	99	-	√(3)	* * .	-
Instantaneous restricted earth- fault relay (secondary side)	64R	-	-	_	-
Instantaneous over-current relay	50	√	-		-
Instantaneous earth-fault relay	50N	V	-	-	-
Differential protection relay	87	-	-	_	-
High speed tripping relay	86	√(15)	√(15)	√(15)	√(15)
Trip circuit supervision relay	95	√ (5)	-	√ (5)	√(5)
Transformer auxiliary relay	63	٧.	-		-
Under-voltage relay with timer	27/2	-	-	7	7
Check synchronisation relay	25		-	√(7)	√ (7)

Notes:

- 1. In case of HV switchboards with continuous parallel operation of incomers, following additional relays shall be provided:
 - One set of 87B (Bus differential) and 95B (Bus wire supervision) for each bus section.
 - 67 and 67N (Directional IDMTL over current and earth fault) relays for the incomers.
- Instantaneous earth fault (50N) shall be provided only for transformer with delta primary. 2.
- 3. For motor feeders rated above 55 kW.
- 4. For critical/long feeders and plant feeders connected to main power generation and distribution bus. A plant feeder implies outgoing feeders from one switchboard to another switchboard of same voltage level.
- 5. Trip circuit supervision relay 95 shall be provided as part of the numerical relay for feeders wherever numerical relays are provided.
- Wherever auto-transfer feature is provided.

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- 7. For switchgears where continuous or momentary paralleling of Incomers is envisaged, check synchronising relay shall be provided.
- 8. 51G and 64R relays shall not be provided for input transformer of VFD system.
- 9. MV capacitor bank feeders shall be provided with 51, 51N, 59 (over voltage) and 86 relays.
- 10. The following feeders shall be provided with timers for delayed tripping on bus under voltage while the under voltage relay shall be common for the bus
 - a. MV capacitor feeders
 - b. HV and MV breaker controlled motor feeders
 - c. Contactor controlled motor feeders with DC control supply.

Numerical relays where ever provided for motor and capacitor feeders shall use in built under voltage relay and timer for delayed tripping on bus under voltage.

- 11. One no. DC supply supervision relay (80) shall be provided for each incoming DC supply to the switchboard.
- 12. One set of bus differential relays (87B) and bus wire supervision relay (95 B) for each bus section shall be provided for HV switchboards connected directly to generation buses
- 13. In case of numerical relays, all relays shall be comprehensive units including all protection, metering and control unless otherwise specified.
- 14. Under voltage and over voltage along with associated timer shall be part of the numerical relays.
- 15. Auto changeover logic between Incomers and bus coupler shall be built in the numerical relay.
- 16. Master Trip relay (86) shall be Electro-Mechanical type
- 17. 2 Nos. of 86 relays shall be considered for MV motor rated more than 55KW.
- 18. Breaker control switch shall be hardwired type.
- 19. Stand by earth fault relay 51G shall be provided in the incomer of switchboard fed from transformers and transformer/switchboard located remotely from HV substation.
- 20. Relay 51V voltage controlled over current relay shall be provided on specific requirement considering the rating of the outgoing feeders with respect to the Incomer rating. Generally this relay shall be provided wherever CT primary current of outgoing feeders is exceeding 40% of the CT primary current of the Incomer.
- 21. DG set shall be provided with protection but not limited to 51V,51G,40,46,86,95,80, 64R etc for generator rated above 500KVA and Generator rated less than 500KVA shall have 51V,51G,40,46,86,95,80 unless otherwise agreed with the owner. The protective relay shall be numerical type.

7.4 Metering

The metering devices in HV and MV switchboards shall be as below:

• • • • • • •

Type of metering

Analogue/As part of the Numerical relay

FEEDER TYPE	A	v	Hz	PF	MW	MWH	HM	MVAR	MVAH	MVA
HV Incomer	1	1	1	1	√(2)	1	-	√(2)	√(2)	√(1,2)
HV Bus Tie	1	-34	-	-	-	-	-	-	-	-
HV Transformer	1	-	-	-	1	\ \	-	-	-	-
HV Bus P.T.		V	-	-		-	-	-	-	-
Capacitor	1	1	677-1	4	n ront to			1		
PCC/PMCC Incomer	1	1	-	√	-	√kWh	-	-	-	-
PCC/PMCC Bus Tie	1	W.	100	9-	90 <u>25</u> 54	all designs of		-	-	-
PCC Bus P.T.	-	1	-	-	-	-	-	-	-	-
ACB Outgoing (Non motor)	1	-	-7	- 1- 1	inger [√kWh	-	-	-	-
MV Motor (>55kW)	1	-	-	-	12,000	Philip- n -	-	-	-	-

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FEEDER TYPE	A	v	Hz	PF	MW	MWH	HM	MVAR	MVAH	MVA
ASB Incomer	1	1	-	-	-	-	-	-	-	-
MCCB/SFU O/G(250A)	1	-	-	-	-	√kWh	-	-	-	-
LDB Incomer	1	1	-	-	-	√kWh	-	-	-	-
DG Set	1	1	1	1	√kW	√kWh	1	1	-	-

Notes:

- 1. MVA meter in HV external power supply Incomers shall include maximum demand indication also.
- 2. MW, MVAR, MVAH meters shall be provided for HV external power supply Incomers only.
- 3. Field Ammeters are to be provided for all motors rated above 5.5kW.
- 4. All metering shall be part of numerical relay in case of electrical system is having numerical relays. Energy meters where provided separately shall be digital type.
- 8.0 Substation Design
- 8.1 Substation feature

	Description	MV	MCC/Electrical Room
8.1.1	Elevated with trays in cable cellar	Yes /No	Yes/No
8.1.2	Raised with internal trenches	Yes/ No	Yes/ No
8.1.3	Pressurisation against ingress of dust	Yes/No	Yes /No
8.1.4	Air-conditioned room for operator	Yes/ No	Yes /No
8.1.5	Roof slab for Distribution transformer	Yes /No	NA

- 8.2 Specific Equipment Locations
- 8.2.1 Batteries in substation and control Rooms :Separate room
- 8.2.2 Battery charger in substation :Air conditioned /non air conditioned room
- 8.2.3 Battery charger in control room :Air conditioned /non air conditioned room
- 8.2.4 Variable speed drive panels :Air-conditioned room
- 8.2.5 Thyristor controlled panels :Air-conditioned room
- 8.2.6 UPS System :Air conditioned room in control room
- 8.2.7 Location of VRLA battery : Air conditioned room

Notes: 1. Battery room shall be preferably located in corner side at switchgear floor of the substation building

- 2. Heat detectors installed in battery room shall be of intrinsically safe type
- 9.0 Equipment Design
- 9.1 HV Switchboard
- 9.1.1 Execution : Draw out for 11kV
- 9.1.2 Type of switchgear : Air insulated for 11kV
- 9.1.3 Circuit breaker type : Vacuum for 11 kV
- 9.2 Current Transformer (CT)/potential Transformer (PT)
- 9.2.1 CT Secondary
 - a General Protection :1A
 - b Special protection (51G etc) :1A
 - c Metering :1A for conventional and remote metering

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9.2.2	PT Secondary		110 V AC		
Note:	CT for metering shall be separate from	the protection (sing CT shall	be provided in the
	protection CT secondary circuit for me	etering purpose			
9.3	Transformers (distribution)				
	Transformer	Voltage ratio	Vector group	Cooling	Tap change
	Dedicated (e.g. for VFD)	As required	As Reqd.	AN	Off-circuit
9.3.2	Distribution transformer (≤ 2000 KVA)	11/.433kV	Dyn 11	ONAN	OLTC +5%, -15
Note: S	Soak pit shall be provided for oil filled to a) Oil qty< 2000 lit b) 2000lit <oil lit<="" qty<9000="" td=""><td>: .</td><td>oer following cond Not Reqd Soak pit</td><td>lition:</td><td></td></oil>	: .	oer following cond Not Reqd Soak pit	lition:	
9.4	MV Switchboard	25			
9.4.1	Execution				
9.4.1.1	PMCC/ EPMCC				
a	Breaker panels	·Dr	aw out, Single fro	nt	
Ъ	Contactor feeders		aw out, single from		ont
9.4.1.2	LDB		w out, single not aw out / Fixed, sin		
9.4.1.3	Motors		in out it mou, bit.	Pro Hour Doa	510 I TOM
	PMCC / EPMCC	:Un	to160 kW		
9.4.1.4	Type of switchboard for small packs (AC system, Pressurisation system, plant etc)	age :Co	mpartmentalised	and Fixed ad Fixed type	type / Non
9.5	Medium voltage Motor Starter Ty	v n e			
9.5.1	Contactor and switch fuse with over relay	load :Up	to 22KW		
9.5.2	Contactor, switch fuse and overload with CBCT for earth fault protection	relay :Abo	ove 22Kw up to 5	5 Kw	
9.5.3	Air circuit breaker with motor protected relay	ction :Abo	ove 55 KW up to	160 KW	
Note:	4 pole ACB for PMCC/EPMCC inco	mers, and DG c	ircuit breaker shal	l be provided.	
9.6	Medium voltage Outgoing feeder	r			
9.6.1	Switch fuse		1004		
9.6.2	Switch fuse with Contactor and CBC earth fault protection	:Up : CT for :Mor	to 100A re than 100A and	up to 250A	
9.6.3	Air Circuit Breaker with protection r	elav • Mo	re than 250 A		
Note:	R-C Circuit across power contactor a command from field shall be provide	and low-burden	auviliary contacto	r for receiving	start/stop
9.7	Motor Controls		per operating ph gn basis-	ilosophy, pro	cess and inst.
	Auto/Manual switch	Desi	PIL DEGIG		



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9.11.1 Public Address System : Yes/No 9.11.2 Telephone System : Yes/No 9.11.3 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated system			
9.7.3 Process interlock :DCS/PLC /switchgear 9.8 Control supply voltage 9.8.1 Breaker control :110V DC 9.8.2 Breaker spring charging :110V DC 9.8.3 Contactor feeder :240V AC 9.8.4 Control supply for earth fault relay in :110V DC 9.8.5 Control supply for earth fault relay in :110V DC 9.8.6 Control supply for earth fault relay in :110V DC 9.8.7 Control supply for earth fault relay in :110V DC 9.8.8 Control supply for earth fault relay in :110V DC 9.8.9 Motors	9.7.2	Local/remote switch	Near mater (Switch many) and wall made (
9.8. Control supply voltage 9.8.1 Breaker control :110V DC 9.8.2 Breaker spring charging :110V DC 9.8.3 Contactor feeder :240V AC 9.8.4 Control supply for earth fault relay in contactor feeder 9.8.5 Control supply for earth fault relay in contactor feeder 9.8.6 Control supply for contactor motor starter :Control transformer 9.9 Motors 415 volts 9.9.1 Enclosure Indoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ±10 % 9.9.6 Design requency variation ±3 % 9.9.7 Combined voltage / frequency ±10 % 1) All MV motors shall be energy efficient IE2 type as per IS-12615-2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy Single UPS with Bypass 9.10.2 Back-up time 30 minutes 9.10.3 Bypass transfer control Starter 30 minutes 9.10.4 Separate fault diagnostic unit Yes/No (Note-2) 9.10.5 Battery type 1. Lead acid (2 x 50% configuration) Notes 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type aneria with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Telephone system and Public Address system Separate/Integrated 9.11.2 Telephone system and Public Address system Separate/Integrated 9.11.3 Telephone system and Data communication LAN system	9.7.3	-	State of the Control
9.8.1 Breaker control 9.8.2 Breaker spring charging 9.8.3 Contactor feeder 9.8.4 Control supply for earth fault relay in contactor feeder 9.8.5 Control supply for earth fault relay in contactor feeder 9.8.6 Control supply for contactor motor starter 9.8.7 Control supply for contactor motor starter 9.9 Motors 9.9.1 Enclosure 1 Indoor 1P65 0 Outdoor 1P65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ±10 % 9.9.6 Design frequency variation ±3 % 9.9.7 Combined voltage / frequency ±10 % 9.9.8 To enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy Single UPS with Bypass 9.10.2 Back-up time 30 minutes 9.10.3 Bypass transfer control 30 minutes 9.10.4 Separate fault diagnostic unit 7:essNo (Note-2) 9.10.5 Battery type 1.2 ada coid (2 x 50% configuration) Note: 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Public Address System 1 Yess/No 9.11.1 Telephone System 2 Yess/No 9.11.2 Telephone system and Public Address system 1.5 Separate/integrated 9.11.3 Telephone system and Data communication LAN 5 Separate/integrated 9.11.4 Telephone system and Data communication LAN 5 Separate/integrated 9.11.4 Telephone system and Data communication LAN 5 Separate/integrated 9.11.4 Telephone system and Data communication LAN 5 Separate/integrated			.DC5/TEC/ SWIttington
9.8.1 Breaker control 9.8.2 Breaker spring charging 9.8.3 Contactor feeder 9.8.4 Control supply for earth fault relay in contactor feeder 9.8.5 Control supply for contactor motor starter 9.8.5 Control supply for contactor motor starter 9.9 Motors 9.9.1 Enclosure Indoor Outdoor Info5 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 9.9.4 Additional canopy (outdoor motors) 9.9.5 Design voltage variation 9.9.6 Design frequency variation 9.9.7 Combined voltage / frequency variation (Design) Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Bypass transfer control 1 Separate fault diagnostic unit 9.10.2 Back-up time 9.10.3 Bypass transfer control 1 Separate fault diagnostic unit 9.10.4 Separate fault diagnostic unit 9.10.5 Separate fault diagnostic unit 9.10.6 Communication system and CFAP of FA system shall be non-redundant single UPS with bypass type ancil with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11 Communication System 9.11.1 Public Address System 9.12 Telephone System 1 Telephone system and Public Address system 9.13 Telephone system and Public Address system 9.14 Telephone system and Public Address system 9.15 Separate/Integrated 9.16 Separate/Integrated 9.11 Telephone system and Public Address system	9.8	Control supply voltage	
9.8.3 Contactor feeder 9.8.4 Control supply for earth fault relay in contactor feeder 9.8.5 Control supply for contactor motor starter 9.8.5 Control supply for contactor motor starter 9.9 Motors 9.9.1 Enclosure Indoor Outdoor IP65 9.9.2 Insulation class F(Temp. Rise limited to B) 9.9.3 Anti-condensation heater 9.9.4 Additional canopy (outdoor motors) 9.9.5 Design voltage variation 9.9.6 Design frequency variation 9.9.7 Combined voltage / frequency variation (Design) Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Back-up time 9.10.2 Back-up time 9.10.3 Bypass transfer control 9.10.4 Separate fault diagnose:ic unit 9.10.5 Battery type 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type aned with VRLA battery. 2. Separate FDU is not: required in case UPS system is serial connected to HMI and fault diagnosis car be done from HMI 9.11 Public Address System 9.11.1 Public Address System 9.11.2 Telephone system and Public Address system 9.11.3 Telephone system and Public Address system 9.11.4 Telephone system and Public Address system 9.11.5 Separate/Integrated 9.11.6 Telephone system and Data communication LAN separate/Integrated 9.11.1 Telephone system and Data communication LAN separate/Integrated 9.11.2 Telephone system and Data communication LAN separate/Integrated	9.8.1		: 110V DC
9.8.4 Control supply for earth fault relay in contactor feeder 9.8.5 Control supply for contactor motor starter : Control transformer 9.9 Motors 415 volts 9.9.1 Enclosure Indoor IP65 Outdoor IP65 Outdoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ±10 % 9.9.6 Design frequency variation ±3 % 9.9.7 Combined voltage / frequency ±10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type aned with VRLA battery. 2. Separate FOU is note required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Public Address System : Yes/Ne 9.11.2 Telephone system and Public Address system :Separate/Integrated 9.11.3 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN system	9.8.2	Breaker spring charging	:110V DC
contactor feeder 9.8.5 Control supply for contactor motor starter : Control transformer 9.9 Motors 415 volts 9.9.1 Enclosure Indoor IP65 Outdoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ± 10 % 9.9.6 Design frequency variation ± 10 % 9.9.7 Combined voltage / frequency ± 10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battry type :Lead acid (2 x 50% configuration) Notes 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type anct with VRLA battery. 2. Separate FUI is not: required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.Th Communication System 9.11.1 Public Address System : Yes/No 9.11.2 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated		50 SEARCH WAS CONTROL STORY (SEARCH STORY	: 240V AC
9.9 Motors 415 volts 9.9.1 Enclosure Indoor IP65 Outdoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ± 10 % 9.9.6 Design frequency variation ± 3 % 9.9.7 Combined voltage / frequency variation ± 3 % 9.9.7 Combined voltage / frequency variation E10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11 Communication System 9.11.1 Public Address System : Yes/No 9.11.2 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	9.8.4	Control supply for earth fault relay in contactor feeder	:110V DC
9.9.1 Enclosure Indoor IP65 Outdoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ±10 % 9.9.6 Design frequency variation ±3 % 9.9.7 Combined voltage / frequency ±10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type aned with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis car be done from HMI 9.11 Communication System :Yes/No 9.11.1 Public Address System :Yes/No 9.11.2 Telephone System and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	9.8.5	Control supply for contactor motor starter	: Control transformer
9.9.1 Enclosure Indoor	9.9	Motors	415 volts
Outdoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ± 10 % 9.9.6 Design frequency variation ± 2 % 9.9.7 Combined voltage / frequency ± 10 % 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy Single UPS with Bypass 9.10.2 Back-up time 30 minutes 9.10.3 Bypass transfer control Auto / Manual 9.10.4 Separate fault diagnostic unit Yes/No (Note-2) 9.10.5 Battery type Lead acid (2 x 50% configuration) Notes 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11. Telephone System Yes/No 9.11.1 Telephone system and Public Address system Separate/Integrated 9.11.2 Telephone system and Data communication LAN Separate/Integrated 9.11.4 Telephone system and Data communication LAN Separate/Integrated 9.11.4 Telephone system and Data communication LAN Separate/Integrated 9.11.4 Telephone system and Data communication LAN Separate/Integrated	9.9.1	Enclosure	413 VOILS
Outdoor IP65 9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes		Indoor	TP65
9.9.2 Insulation class F (Temp. Rise limited to B) 9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ± 10 % 9.9.6 Design frequency variation ± 3 % 9.9.7 Combined voltage / frequency ± 10 % 9.9.7 Combined voltage / frequency ± 10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy Single UPS with Bypass 9.10.2 Back-up time 30 minutes 9.10.3 Bypass transfer control Auto / Manual 9.10.4 Separate fault diagnostic unit Yes/No (Note-2) 9.10.5 Battery type Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not: required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11 Communication System Yes/No 9.11.1 Telephone System Public Address system Separate/Integrated 9.11.2 Telephone system and Public Address system Separate/Integrated 9.11.4 Telephone system and Public Address system Separate/Integrated 9.11.4 Telephone system and Data communication LAN Separate/Integrated		Outdoor	
9.9.3 Anti-condensation heater 30 kW and Above 9.9.4 Additional canopy Yes (outdoor motors) 9.9.5 Design voltage variation ± 10 % 9.9.6 Design frequency variation ± 3 % 9.9.7 Combined voltage / frequency variation (Design) Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnost ic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Public Address System : Yes/No 9.11.2 Telephone System and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	9.9.2	Insulation class	
9.9.4 Additional canopy (outdoor motors) 9.9.5 Design voltage variation	9.9.3	Anti-condensation heater	And the state of t
(outdoor motors) 9.9.5 Design voltage variation	9.9.4		
9.9.6 Design frequency Variation ± 10 % 9.9.7 Combined voltage / frequency ± 10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Public Address System :Yes/Ne 9.11.2 Telephone System and Public Address system :Separate/Integrated 9.11.4 Telephone system and Public Address system :Separate/Integrated 9.11.5 Separate/Integrated 9.11.6 Telephone system and Data communication LAN :Separate/Integrated		(outdoor motors)	a Interest and
9.9.6 Design frequency variation ±3 % 9.9.7 Combined voltage / frequency ±10 % Note: 1) All MV motors shall be energy efficient IE2 type as per IS-12615:2011 2) For enclosure protection for motors located in dust-laden atmospheres refer clause no. 14.8 9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Public Address System : Yes/Ne 9.11.2 Telephone System and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	9.9.5	Design voltage variation	± 10 %
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9.10 UPS System 9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11.1 Public Address System : Yes/No 9.11.2 Telephone System :Yes/No 9.11.3 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	Note:		
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9.10.1 Redundancy 9.10.2 Back-up time 9.10.3 Bypass transfer control 9.10.4 Separate fault diagnostic unit 9.10.5 Battery type 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis car be done from HMI 9.11.1 Public Address System 9.11.2 Telephone System 9.11.3 Telephone system and Public Address system 9.11.4 Telephone system and Public Address system 9.11.4 Telephone system and Data communication LAN Separate/Integrated 9.11.4 Telephone system and Data communication LAN Separate/Integrated 9.11.5 Separate/Integrated 9.11.6 Separate/Integrated 9.11.6 Separate/Integrated 9.11.7 Separate/Integrated 9.11.8 Separate/Integrated 9.11.9 Separate/Integrated 9.11.1 Separate/Integrated 9.11.1 Separate/Integrated		2) For enclosure protection for motors located	d in dust-laden atmospheres refer clause no. 14.8
9.10.1 Redundancy :Single UPS with Bypass 9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis car be done from HMI 9.11. Communication System :Yes/No 9.11.1 Public Address System :Yes/No 9.11.2 Telephone System :Yes/No 9.11.3 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	9.10	UPS System	
9.10.2 Back-up time :30 minutes 9.10.3 Bypass transfer control :Auto / Manual 9.10.4 Separate fault diagnostic unit :Yes/No (Note-2) 9.10.5 Battery type :Lead acid (2 x 50% configuration) Notes- 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis can be done from HMI 9.11 Communication System 9.11.1 Public Address System : Yes/No 9.11.2 Telephone System : Yes/No 9.11.3 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated	9.10.1		Single LIBS with Dyman
9.10.3 Bypass transfer control 9.10.4 Separate fault diagnostic unit 9.10.5 Battery type 1. Lead acid (2 x 50% configuration) Notes 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis car be done from HMI 9.11. Communication System 9.11.1 Public Address System 9.11.2 Telephone System 9.11.3 Telephone system and Public Address system 9.11.4 Telephone system and Data communication LAN :Separate/Integrated system 9.11.4 Separate/Integrated :Separate/Integrated system	9.10.2	Back-up time	
9.10.4 Separate fault diagnostic unit 9.10.5 Battery type 1. Lead acid (2 x 50% configuration) Notes 1. UPS for data communication system and CFAP of FA system shall be non-redundant single UPS with bypass type and with VRLA battery. 2. Separate FDU is not required in case UPS system is serial connected to HMI and fault diagnosis car be done from HMI 9.11. Public Address System 9.11.1 Public Address System 9.11.2 Telephone System 9.11.3 Telephone system and Public Address system 9.11.4 Telephone system and Data communication LAN :Separate/Integrated system	9.10.3	Bypass transfer control	
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9.11.3 Telephone system and Public Address system :Separate/Integrated 9.11.4 Telephone system and Data communication LAN :Separate/Integrated system	9.11.2		
9.11.4 Telephone system and Data communication LAN :Separate/Integrated system	9.11.3		
	9.11.4	Telephone system and Data communication LA	
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0.11.5				
9.11.5	No. of external lines	: \$,@		
9.11.6	No. of Intercom lines	: @		
9.11.7	Interface of Communication system			
a	With fire alarm system	:Yes/ No		
. b	With telephone system	:Yes/ No		
0.10	Time and the second	8		
9.12	Fire Detection and Alarm System	11		
9.12.1	Type	: Analogue addressable		
9.12.2	Name of buildings to be provided with Detectors	: Sub-Stations, Control Rooms, office, canteen, laboratory etc.		
9.12.3	Detection System	:Break Glass, multi sensor detector		
9.12.4	Type of manual call point	:With/Without call back facility		
9.12.5	Qty of Siren and location	: Adequate to cover the entire complex@		
9.12.6	Power supply for Siren	: 415V AC		
9.12.7	Siren range	: 5km (Diametrically)		
9.13	DC System			
9.13.1	Battery type			
a	Switchgear Protection Control and critical lighting	g :Lead acid		
ь	Diesel Engine Starting	:Lead acid		
С	DC Motors	:As per equipment supplier recommendation		
d	Fire alarm system	:VRLA		
e	Telephone system	:VRLA		
f	Data communication LAN system	:VRLA		
9.13.2	Battery backup time			
a	Switchgear Protection and Control	:120 minute		
b	DC Critical lighting	:120 minute		
С	Diesel Engine Starting	:10 starts (FW pumps) & 6 starts (others)		
d	DC Motors	: As per equipment supplier recommendation		
9.13.3	Battery Configuration	: 2 x 50%		
9.14	Variable frequency drive			
9.14.1	By pass feature required	:Yes		
9.15	Cables			
	The power and control cables shall have the follow	wing minimum cross sectional areas:		
9.15.1	Medium voltage power cable	: From 2.5 mm ² up to 16 mm ² -Copper, Above 16 mm ² -Aluminium		
9.15.2	Control cables	:1.5 mm ² (Copper)		
9.15.3	Lighting	:2.5 mm² (Copper)		
9.15.4	Communication system	:0.9 mm dia (Copper)		
9.15.5	Telephone system	:0.9 mm dia (Copper)		
9.15.6	Fire alarm system	5 mm² (Copper)		

^{\$-}data to be provided /confirmed by client.

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Notes:

- 1. For lighting inside the building, minimum 1.5 mm² copper conductor, PVC Insulated wire shall be used in conduit system (for circuit and point wiring), with proper colour coding.
- 2. Communication system, Telephone system and Fire alarm System cable sizes are indicative only and these shall be finalised as per the recommendations of equipment manufacturers. However minimum conductor size shall be as mentioned above.
- 3. Special cable type and size shall be decided on specific requirement.
- 4. Control cable shall be twisted pair overall shielded type.
- 5. All cables shall be with FRLS outer sheath.

10.0 Cabling System

10.1 Cable details

	Design Criteria	High voltage	415 volts
	Loads located beyond 1000 m	Cable	Cable
	Loads beyond 1000A rating and located near the transformer.	NA	Bus duct /cable
1	Recommended limiting size of multi- core cable (mm²)	300 (for 3 core cable)	300 (for 3/3.5 core cable)
	Short-circuit withstand time (seconds)	0.6 sec	Not Applicable
	Insulation voltage grade Type of cable insulation Conductor No. of cores for motor cables	Unearthed for 11 kV XLPE Al NA	Earthed PVC As per cl. No. 9.16.1

404 Miles 1 486 Miles			
102	Cablal		T * T
10.2	Canie ia	avino i	philosophy

10.2.1	Process area	:Above Ground cable tray /RCC trench
10.2.2	Offsite paved area	:Above Ground cable tray/RCC trench
10.2.3	Offsite unpaved area	: Above Ground cable tray/RCC trench.
10.2.4	Type of cable trays	:Galvanized prefabricated
10.2.5	Road Crossings for underground cables	:PVC Pipes /Cable culvert
		- -

Note: Plant communication, fire alarm and telephone cables shall be laid in overhead cable trays / instrumentation trenches as far possible. In case these are not available. Cable shall be laid along berm of the roads.

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11.0	Earthing	C4-
11.0	rarining	System

11.1	Earth electrode	:GI pipe
11.2	Main earth loop material	:GI strip
11.3	Substation earth loop	:GI strip

Note: For Electronic Earthing, copper plates shall be used as earth electrode. Electronic earthing shall not be interconnected with power equipment earthing.

12.0 Lighting System

12.1	Suppl	y S	ystem

	z-pp.j zjace	
12.1.1	Centralised with Lighting distribution board-LDB	:Yes
12.1.2	LDB at substation	:Yes
12.1.3	Normal & Emergen cy Lighting transformer required	:Yes

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12.1.4	Lighting transformer voltage ratio	:415/415V
12.2	Court IN T	
	Control Philosophy	
12.2.1	Outdoor yard	:Auto/Manual/centralised/Local
12.2.2	Street lighting	:Auto/Manual/centralised/Local
12.2.3	Outdoor process area	:Auto /Manual/Centralised /Local
12.2.4	Process building	:Auto/Manual/centralised/Local
12.2.5	Auto control	:Synchronous timer/photocell/
12.2.6	Lamp type for Outdoor General Lighting	:HPSV
12.2.7	Lamp wattage for High Mast Lighting fixture	: 2 x 400W SON-T
12.2.8	Lamp type for DC critical lighting	:LED
12.2.9	Lamp Type for Indoor area and Outdoor area Lighting	:LED
12.2.10	Switch ON/OFF push button at Sub-station Entry	: YES
12.2.11	ELCB for lighting circuits and lighting and Power Panels	:Yes-(in LDB /PMCC Outgoing feeders)
12.3	AC Emergency Lighting	
12.3.1	Name of process areas	:20-25% of normal lighting in all areas
12.3.2	Name of buildings	: 20-25% of normal lighting in all buildings (Control room, Substation, DG room, office, canteen, laboratory etc.)
12.3.3	Power supply source	:Diesel Generator
12.4	DC Critical Lighting for Escape	
12.4.1	Name of process units	: NA
12.4.2	Name of building	: Control room, Administration
		building/office, Substation, laboratory
12.4.3	Power supply	: 110V DC
12.4.4	DC lighting for remote buildings	: Lighting fixture with built in battery
12.5	Wiring Type	
12.5.1	Process area/ Process/Building / Shed	:Armoured cable
12.5.2	Large service building	:Surface conduit/Armoured cable
12.5.3	Buildings with false ceiling	:Surface conduit above false Ceiling, Concealed conduit below false ceiling
12.5.4	Substation (Switchgear Room)	:METSEC channel / Concealed conduit
12.5.6	Other buildings	: Concealed Conduits
12.6	Specific Lighting Requirements	
12.6.1	Aviation lighting	:Yes
12.6.2	Security lighting for peripheral road boundary wall	:Required
12.6.3	Type of control gear for HPMV/HPSV lamps	:Separate/Integral

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12.6.4 Control gear box location

:Accessible level

12.6.5 Type of high mast flood light

:30 meters Telescopic tubular

NOTE:

1) For enclosure protection for Lighting equipment and wiring/cables located in dust-laden atmospheres refer clause no. 14.8

13.0 Statutory Approval

Statutory Authority for Electrical Installation:

State Electrical Inspectorate / CEA

14.0 Specific requirements

- 14.1 Canopy shall be provided for all outdoor equipment except transformers.
- 14.2 No unarmoured cable shall be used.
- 14.3 All power cables in racks/trays shall be laid in single layer only. Further 20% spare space shall be provided in cable trays/trenches for future use.
- 14.4 Heat shrinkable type HV cable end termination kits shall be used.
- 14.5 All MV switchboards (i.e. PMCC, EPMCC, LDB etc.) in substation shall be of one make only.
- 14.6 Spare feeders in PMCC, EPMCC, LDB, UPS ACDB and DCDB shall be 10% for future use with minimum of 1 no. of each rating.
- External hardware of lighting fixtures, CG boxes, junction boxes, welding receptacles, 230V receptacle, LCS, lighting panel, local control panel shall be of stainless steel (SS-304).
- In line with clause no. 4.11.2 of IS-5503: 1969 (Part-II) "All Electrical wirings, fixtures and electric drive motors installed in dust-laden atmosphere, except in the open and in offices and similar locations so occupied and segregated as to be reasonably free from dust, shall be flame-proof."

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Rev. No Date

DATA SHEET HV SWITCHBOARD

Datasheet No. A951-000-16-50-DS-01 Rev: 0

		PURCH	ASER"	SDATA	Mary Hills Inches
A	Site conditions		I viv		
1	Maximum ambient temperature:	46.1 Deg c		0.1.5.11	
2	Minimum ambient temperature:	1Deg C	3	System Breaking capacity	40 kA
3		45 Deg c	3.1		As per IEC
ı	Relative humidity:	45 Deg c 85%	4	, , , , , , , , , , , , , , , , , , , ,	100 kA (peak)
Ĭ		03%	5	Type of Circuit Breaker	VCB/SF ₆
ĺ			100000	Shunt Trip Coil-1:	110/ 220V DC
Š			Reliably:	Shunt Trip Coil-2:	110V UPS AC
			1,000,000		(See Note-1)
	Altitude above MSL:	<1000M	6	Duty Cycle of C.B.	O-3min-CO-3 min-C
	Environment:	Humid & Corrosive	7		Read. for VCB
	Operating conditions	Harria & Corrosive	8	Suitability for Cap. Switching Surge supressor for Motor Feede	
	Voltage	11kV ± 10%	0	& other outgoing feeders	Regd. for VCB
	Frequency	50Hz ± 3%	9	Provision of earthing	Requ. for VCB
	Number of Phases	THREE	200	Earthing truck	Required
	System Fault Level	40 kA	11 ONE	Earthing switch	Not Required
	System Earthing	Resistance Earthed	D	Miscellaneous	Not Required
	Auxiliary Supply	Tresistance Lattried	1	Interface with ECS	Not Dequired
	AC	240V ± 10% SPN	2		Not Required
	DC	110V ± 10% SPN	3		Cable
	Electrical Data	110V ± 10/0	4	Cable Entry	Bottom Boad (Cland plate)
	Busbar current rating (inside	A.A.	4	Separate bolted removable	Reqd.(Gland plate drilled at site)
	panel at design temp.)	*	5	gland palte for cable entry Cable glands and lugs for	onned at site)
	1 sec. Short Circuit withstand	40 kA	5	cable glands and lugs for	Danillo d
	capacity	70 IVA	6		Required
				Painting/Paint shade	RAL 7032
			7	Applicable spec	CPWD
Ŀ		s feeding HV VFDs, sec	ond s	esign Basis/Bid document.	Ferent control
- 47	l) For all HV circuit breakers supply shall be provided		ond s	hunt trip coil operating on dif	ferent control
	1) For all HV circuit breakers	s feeding HV VFDs, sed	ond s	hunt trip coil operating on dif	
100	l) For all HV circuit breakers supply shall be provided Switchboards Make	s feeding HV VFDs, see	ond s	hunt trip coil operating on diff R'S DATA Recommended clearances Front	mm
	I) For all HV circuit breakers supply shall be provided Switchboards Make Type designation	s feeding HV VFDs, sed	ond s	R'S DATA Recommended clearances Front Rear	mm
	I) For all HV circuit breakers supply shall be provided Switchboards Make Type designation Degree of protection	feeding HV VFDs, sec	TUREF	R'S DATA Recommended clearances Front Rear Above	mm
S A T C A	I) For all HV circuit breakers supply shall be provided Switchboards Make Type designation Degree of protection Max. overall weight of C.B. panel	s feeding HV VFDs, see	TUREF 9	R'S DATA Recommended clearances Front Rear Above Shock loading on foundation	mm mm
S A T C A	I) For all HV circuit breakers supply shall be provided Switchboards Make Type designation Degree of protection Max. overall weight of C.B. panel Overall dimensions of C.B. panel	MANUFAC	TUREF	R'S DATA Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be	mm mm mm
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S A T L	by Por all HV circuit breakers supply shall be provided witchboards Make Type designation Degree of protection Max. overall weight of C.B. panel Width	MANUFAC Kg mm mm	TUREF 9 10 11 a.	R'S DATA Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel	mm mm
I I I I I	Type designation Joverall dimensions of C.B. panel Width Depth Height	MANUFAC Kg	TUREF 9 10 11 a. b.	R'S DATA Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel	mm mm
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S N T C N C	Switchboards Make Type designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Verall dimensions of dummy / daptor panel of each type	Kg mm mm mm	9 10 11 a. b. c. 12 a.	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.)	mm mm mm
S N T L N C	Switchboards Make Sype designation Max. overall weight of C.B. panel Width Depth Height Verall dimensions of dummy / daptor panel of each type Width Width Width Weight Width Weight Weight Width Weight Width Weight Weight Width Weight Weight Weight Width Weight Width Weight Width	Kg mm mm mm mm	9 10 11 a. b. c. 12 a. b.	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.)	mm mm mm
T E N C	i) For all HV circuit breakers supply shall be provided Switchboards Jake Jake Jake Jake Jake Jake Jake Jak	Kg mm mm mm mm mm mm	9 10 11 a. b. c. 12 a.	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel size of rear extension panel Size of rear extension panel Clearance in air Phase to Phase (min.) Busbar current rating at design	mm mm
S A T E N O	Switchboards Switchboards Make Type designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Verall dimensions of dummy / Daptor panel of each type Width Depth Height Werall weight and dimensions OF	Kg mm mm mm mm mm mm	10 11 a. b. c. 12 a. b.	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Busbar current rating at design ambient temperature	mm mm
I S N C	i) For all HV circuit breakers supply shall be provided Switchboards Jake Jake Jake Jake Jake Jake Jake Jak	Kg mm mm mm mm mm mm	10 11 a. b. c. 12 a. b. 13	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd)	mm mm
S A T E N O	Switchboards Switchboards Jake Jake Jake Jake Jake Jake Jake Jake	Kg mm mm mm mm mm	10 11 a. b. c. 12 a. b.	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size	mm mm mm
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O aa	Switchboards Switchboards Make Sype designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Werall dimensions of dummy / Daptor panel of each type Width Depth Height Werall weight and dimensions of Weight Width Depth Height Werall weight and dimensions of Weight Width Depth Height Werall weight and dimensions of Weight Width Depth Height Width Depth Height Weight Width Depth Height Weight Width Depth Height Werall dimensions of each swbdd Eduding all dummy/adaptor/rear Gension panels	Kg mm	TUREF 9 10 11 a. b. c. 12 a. b. 13 14 14.1	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size (No. of flats x size of each flat) Horizontal main busbar size as tested at CPRI for full short ckt. withstand as per specification requirement (No. of flats x size of each flat) Vertical dropper size	mm mm
M T C C	Switchboards Switchboards Make Sype designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Werall dimensions of dummy / Daptor panel of each type Width Depth Height Werall weight and dimensions of Weight Width Depth Height Werall weight and dimensions of Weight Width Depth Height Werall weight and dimensions of Weight Width Depth Height Werall dimensions of each swbd Studing all dummy/adaptor/rear Gension panels Width	Kg mm mm mm kg mm mm mm mm mm	TUREF 9 10 11 a. b. c. 12 a. b. 13 14 14.1	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size as tested at CPRI for full short ckt. withstand as per specification requirement (No. of flats x size of each flat) Vertical dropper size (No. of flats x size of each flat)	mm mm
M T T C C C C C C C C C C C C C C C C C	Switchboards Switchboards Jake Sype designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Verall dimensions of dummy / Daptor panel of each type Width Depth Height Verall weight and dimensions of Gest shipping section Weight Width Depth Height Verall dimensions of dummy / Depth Height Verall dimensions of dummy / Depth Height Verall dimensions of each swbd	Kg mm mm mm mm mm mm mm mm	TUREF 9 10 11 a. b. c. 12 a. b. 13 14 14.1 14.2	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size (No. of flats x size of each flat) Horizontal main busbar size as tested at CPRI for full short ckt. withstand as per specification requirement (No. of flats x size of each flat) Vertical dropper size (No. of flats x size of each flat) vertical drop per bus bar size	mm mm mm
S AM TT C C C C C C C C C C C C C C C C C C	Switchboards Switchboards Salake Sype designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Verall dimensions of dummy / Daptor panel of each type Width Depth Height Verall weight and dimensions of Midth Depth Height Verall weight and dimensions of Tegest shipping section Weight Width Depth Height Verall dimensions of each swbcl Udding all dummy/adaptor/rear Rension panels Width Depth Height Verall dimensions of each swbcl Udding all dummy/adaptor/rear Rension panels Width Depth Height Residung All furnish Residung Al	Kg mm mm mm mm mm mm mm mm	TUREF 9 10 11 a. b. c. 12 a. b. 13 14 14.1 14.2	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size (No. of flats x size of each flat) Horizontal main busbar size as tested at CPRI for full short ckt. withstand as per specification requirement (No. of flats x size of each flat) Vertical dropper size (No. of flats x size of each flat) vertical drop per bus bar size	mm mm mm
M M CO add	Switchboards Make Sype designation Max. overall weight of C.B. panel Moverall dimensions of C.B. panel Moverall dimensions of dummy / Maptor panel of each type Width Depth Height Weight and dimensions of Weight Weight Weight and dimensions of Weight Metall dimensions of each swbcl Metall dimension	MANUFAC Kg mm mm mm mm kg mm mm mm mm m	TUREF 9 10 11 a. b. c. 12 a. b. 13 14 14.1 14.2	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel Size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size (No. of flats x size of each flat) Horizontal main busbar size as tested at CPRI for full short ckt. withstand as per specification requirement (No. of flats x size of each flat) Vertical dropper size (No. of flats x size of each flat) vertical dropper bus bar size	mm mm mm
N T C N C	Switchboards Switchboards Jake Sype designation Degree of protection Max. overall weight of C.B. panel Width Depth Height Verall dimensions of dummy / daptor panel of each type Width Depth Height Verall weight and dimensions of Gest shipping section Weight Width Depth Height Verall dimensions of each swbd	Kg mm mm mm mm mm mm mm mm	TUREF 9 10 11 a. b. c. 12 a. b. 13 14 14.1 14.2	Recommended clearances Front Rear Above Shock loading on foundation Max. size/no. of cables that can be terminated inside the panel without rear extension panel with rear extension panel size of rear extension panel Clearance in air Phase to Phase (min.) Phase to Earth (min.) Busbar current rating at design ambient temperature Busbar (separately for each swbd) Horizontal main busbar size (No. of flats x size of each flat) Horizontal main busbar size as tested at CPRI for full short ckt. withstand as per specification requirement (No. of flats x size of each flat) Vertical dropper size (No. of flats x size of each flat) vertical drop per bus bar size	mm mm mm

Prepared by

Checked by

Approved by



DATA SHEET HV SWITCHBOARD

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13	Horizontal main busbar/Vertical	b	Removable FRP shrouds for all	Yes/No
	busbar material Al/Cu		busbar joints and tap-off	
16	Insulating material (Busbar supports)		connections provided	y after a
	Earth busbar size mm ²	c	Arc propagation barrier in busbar	Yes/No
18	Earth busbar material Copp	er	compartment provided	iller i lib
19	1 min. power frequency withstand	d	Breaker service, test and drawn-	- A-
	voltage (rms) kV	195	out position provided	Yes/No
19.1	Over voltage factor for PTs 1.9 for 30 sec.	е	Distinct overall lockable door for	
20	Impuse withsatnd voltage (peak) kV	186	breaker compartment provided	Yes/No
20.1	Wave shape of impulse voiltage	f	Automatic safety shutter provided	Yes/No
	1 sec. short ckt. Withstand capacity kA	g	Independent pressure release	5.0 85.07.55.7
	Peak dynamic withsatnd capacity kA		flaps provided for all HV	
	Windows at the rear side of panels Not Required		compartments	Yes/No
	for thermography	h	Wire mesh for all louvered	To the State of State
	Safety Features	333	openings provided	Yes/No
	Heat shrinkable sleeves, rated to	i	Suitable intrlocks to prevent	
	withstand the system line to line	168	faulty operation as per Cl. 5.1.11	
	voltage for one min., provided Yes/N	lo.	of spec. 6-51-0001 provided	Yes/No
1	on busbar		Операция от применения	- 1 V
В	Circuit Breaker			
1	Type VCB/s	SF ₆ 16	Power required for closing	W/VA
	2nd shunt trip coil for VFD feeders Yes	657		
2	Make	17	Power required for spring	
3	Type Designation	0.00	charging motor	W/VA
4	Circuit Breaker mounting in panel Truck/cassette (@ 18	Breaker is trip free	Yes/No
	No. of poles/phase	19	Closing mechanism	
6	Current rating (in free air) A at	°C 20	Provision of manual spring	
7	Current rating inside the panel at		charging provided	Yes/No.
	specified design tempeature A	21	Mechanical Trip PB provided	Yes/No
	Short time rating (1sec.) kA	22	Mech. On/Off indicator provided	Yes/No
	Symmetrical breaking capapcity kA		Operation counter provided	Yes/No
	% D.C. Component	24		sec
	Peak making current kA	25	1 0 0 0	NO +
	1 min. dry withstand voltage		current ratings	NC ,
	power frequency) kV	26	Interrupter	
107500000	Duty Cycle	a		14 6 7 14
	Total openeing time m sec	100.00		
	Fotal closing time m sec		of SF ₆ gas pressure provided	Yes/No
	Power required for opening W/VA	-		
988	- quild for opening	- BON 1400	LOTO (Lock-Out Tag-Out)	Required
		21	Provision for mechanical	rtequired
				
-		East 17 12 mg	locking arrangement	

@ Lifting truck shall be provided for cassette type circuit breaker.



DATA SHEET HV SWITCHBOARD

Datasheet No. A951-000-16-50-DS-01 Rev : 0

			- July 100 miles
27	Supressor		
a	Type designation		
b	Make		
28	Derating reqd. for Cap. Switching	%	
29	Earthing System	Integral earthing/	
_3		Separate earthing	
		carriage	
30	Copies of following test cerificates		
	enclosed:	Yes/Ne *	
30.1	For each type of offered circuit	100/10	
	breaker panel with breaker		
a.	Short Circuit tests (Peak and 1 sec.		
	withstand)		
b	Heat run test	The second secon	
	Internal arc test		
d	Impulse and power freq. withstand		
0.2	For each type of offered circuit		
	breaker (in panel)		
	Short Circuit test duties	27.0071.0.3	
100			
TY I			

* Switchboard offered shall be of proven design and shill havbe been successfully type tested. Type test certificates for an exactly identical design of offered switchboard shall be furnished by bidders. These test reports shall not be more than 5 years old, as on the final bid opening date. In case these type tests have not been conducted during the last 5 years, bidder shall conduct these type tests on the offered design of switchboard before despatch without any cost and delievery impact.



10 Overall dimensions of each ASB

11 Overall dimensions of each LDB

Max. overall weight

Front*Rear*Above

Length*Depth*Height

14 Recommended clearances for SWBD

21.11.2016

Date

12 Shock loading on foundation

13 Largest shipping section:

Rev. No

Length*Depth*Height

Length*Depth*Height

DATA SHEET FOR

Datasheet No. A951-000-16-50-DS-02

ŞK	(A Govt of endas Undertusing)	MV SWITC	HB	OARD	Rev. 0
握	PROPERTY AND SECURITY	PURCHASER	R'S I	DATA	
A	Site conditions				
1	Maximum ambient temperature:	46.1 Deg c	4	Relative humidity:	85%
2	Minimum ambient temperature:	1 Deg C	5	Altitude above MSL:	<1000M
3	Design ambient temperature:	45Deg c	6	Environment:	Humid & Corrosive
В	Operating Conditions				
1	Voltage	415V ± 10%	6	Auxiliary supply	
2	Frequency	50Hz ± 3%	the state	AC	240V ± 10% SPN
3	No of phases	Three & Neutral	NEWS:	DC	110V ± 10%
4	System fault level	50kA for 1 second	7	Power supply for spring	110V DC ± 10%
5	System earthing	Solidly earthed		charging motor	ROCERY
C	Electrical Data				
1	Short circuit withstand capacity	50kA	7	Incoming power entry	
91.39	for 1 sec.		8	Cable entry (I/C & O/G)	Bottom
2	Busbar current rating inside panel		9	Bus duct entry	Тор
E-RO	panel at specified ambient	*	10	Cable gland/lugs	Included
3	Busbars	Heat shrunk PVC	11	Colour shade Exterior	RAL 7032
19		sleeved	12	Feeder arrangement	Single/Double front
4	System breaking capacity	50 kA	13	Minimum motor starter	240mm
5	System making capacity	105 kA (peak)	1	module size	
6	Circuit breaker	A Market State	14	Minimum MCCB module	200mm
(dg)	Туре	ACB		size	
	Duty cycle	O-3min-CO-3 min-CO	15	Floor fixing	Integral base frame & tack
772%	Rating				welding to the floor channel
010	Note: * To be decided by contractor	or in line with Engineeri MANUFACTUR	ng l	Design Basis/Bid docur	ment.
A	Switchboard	MANUFACIUR		Clearance in air	CASTRELL FOR THE REAL PROPERTY OF THE STATE
1			19	Phase to Phase	mm
2	Tag no. Make		GB/DE	Phase to Friase Phase to Earth	mm
3	Type designation		10		
4			16		
5	Degree of protection CB panel			can be terminated with rear extension	
5				without rear extension	
	Overall weight	1_	47	Size of rear extension pane	
	Incomer			Main horizontal bus bar	51
	Outgoing	кд	18		ı at A
	Overall dimensions			Bus bar current rating	
6	Length*Depth*Height	mm		design ambient	emp.
O	Overall dimensions of MCC/			Main bus bar size	Al / Cu
\$ Inc	contactor controlled feeder panel:		Ships .	Main bus bar material	
7	Length*Depth*Height	mm	_	Main bus bar location	Top/ Bottom
7	Overall dimensions of each PCC		19		ot S
0	Length*Depth*Height	mm		Bus bar current rating	
8	Overall dimensions of each PMCC			design ambient temp.	
0	Length*Depth*Height	mm	75.48	Bus bar size	
9	Overall dimensions of each MCC		Marie C	Bus bar material	
	Length*Depth*Height	mm		Bus bar location	

mm 22

kg

mm

Issued For Tender

Purpose



VK

Prepared by Checked by Approved by

20 Insulating material

Material

1 second

1min power freq voltage

Peak dynamic

between PCC/MCC panel

If Yes, furnish dimensions

GK

mm 24 Whether adaptor panel required

mm 21 Earth bus bar size

23 Short circuit

mm²

kV

kA

Al / Cu

Yes/No

PG



DATA SHEET FOR MV SWITCHBOARD

-	Circuit					2 01 2	
B		ASSEMBLY PRODUCT	- BASS		1 8	Sa Nei Ja	
1	- JFT acoignation		16	Power requirement	1.75%		
2				Opening		di Mish	W/\
3			SEC.	Closing			W/V
4	Title of polocy pridoco	Carlot All Color Michel		Spring charge motor		Service System	W/V
5	Current rating (in air)	A at °C	17		Mary E	Yes	
6	Current rating (inside panel	A	18	Closing mechanism	T'e, a		
119	at design temperature)	TO A PROPERTY OF A COLUMN	19	Provision of manual spring	1,000	Yes	
7	Short time rating (1 sec)		1	charging	86.7	10 To 3	
8	Sym breaking capacity	kA	20			endert d	9 7 E. S
68	% DC component			Mechanical trip PB provided	1,30	Yes	
9	Peak making capacity	kA (peak)	2.00	Mechanical ON/OFF indicator	1,14	Yes	
10	Power frequency withstand	io ((pour)	telesi	provided	- 27	/ W W	10.00
11	Impulse withstand voltage		23	Operation counter provided	- 4.7	Yes/ No	
12	Duty cycle		E-1000000000000000000000000000000000000	Time taken for spring charging	1.00	1001110	sec
13	Total opening time	m sec		No. of auxiliary contacts		NO+	NC
14	Total closing time			Derating required for capacitor	10.0	110	%
15	Time for spring charging	III Sec	20		17. * .		. 70
C	CONTACTOR			switching	10		
1	Type designation		0	1:5-			
2	Make		9	Life	3 35 B		
3	Rated Voltage		CARRY TO	Electrical	1000		
4	Rated current		- 10	Mechanical	4	91.41.41	
	AC-3 Duty		10				
	AC-4 Duty		11				
5	Thermal rating		12	3			
	Making capacity	9 (1 (1) (A) (A) (1) (A) (1) (A) (1)	13		<u> </u>	111111	
-	Breaking capacity		14	The state of the s	3. 7	NO+	NC
	Switching frequency		15	Maxi. permitted back up MCCB rati	ng		
	SWITCH				A 197		14.1.
	Rated voltage			10.59	4 4		
			6	Rated short circuit withstand	76. Yo	Ar Labor	
_	Rated current		W.	current with max. permissible			
	AC 23 rating			rated fuses	4. I	7	r any arrive
	Rated making capacity		7	Mechanical life		4, 5, 15, 5	
5	Rated breaking capacity		8	Maximum permitted back	in the	Er n	
		fill that I see that		up fuse rating	14. 6		
	THERMAL OVERLOAD RELAY		THE R		716.3		
10.00	Make		5	Type of operation	Direc	t/CT ope	erated
_	Гуре		6	Maximum permitted back	21.5		
5	Setting range		0.88	up MCCB rating	12 71 10	, replaced	
	Single phasing preventer	Integral / Separate		place and the second	170	in the	
	MCCB/MCB				· ; · ,	(G. A.) (A)	
_	Make		9	Rated Breaking Capacity at	- 1		
	уре	TOWN STANDARD YOU MAN	100	Service Voltage			
	Rated Voltage	5. 40. 6. 52. 8. 14. 14. 14.	10		C14		
F	Rated Frequency			No of operations at partial fault	200	5.50 000	
R	Rated Current			No of guaranteed mech. operations			1
	lo of Poles		13	1 min dry p.f. withstand voltage	- 581 E		- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
D	Perating factor for operation			Shunt trip feature (for MCCB only)			
	nder site conditions		15	Operating voltage range for MCCB	4 · · ·	in Contract This billing to	* ** ** **
R	ated 10 Sec Short time rating	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10		1		
25	:			shunt trip		4.11.11.11	
	-						

- Notes:
- 1 Vendor shall furnish dimensions of various switchboards, CB Panels and dummy/adaptor panels separately.
- 2 Vendor shall furnish technical particulars of various switchboards separately.
- Switchboard offered shall be of proven design and shall have been successfully type tested. Type test certificates for an exactly identical design of offered switchboard shall be furnished by bidders. These test reports shall be not more than 5 yeas old, as on the final bid due date. In case these type tests have not been conducted during the last 5 years, bidder shall conduct these type tests on the offered design of switchboard before despatch without any extra cost and delivery impact.



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	National Results Service Medical Services		Emily Tollar	No. 25 and		
		PURCHASER	'S DA	ATA III. ET SATE		
	Site conditions		SEE			
1	Maximum ambient temperature:	46.1 Deg c	4	Relative humidity:	85%	
	Minimum ambient temperature:	1 Deg C	5	Altitude above MSL:	<1000M	
	Design ambient temperature:	45 Deg c	6	Environment:	HUMID &	CORROSIVE
В	Technical particulars		Bally.			
1	Tag no.:		27	Explosion protection	PRV	
2	Outy:	Continuous	28	Terminal location:		
3 1	No. of windings:	Two		HV side	Smaller Sig	de
4	Type of cooling:	ONAN		LV w.r.t HV	90°	
5 F	Rated MVA	*	29	Terminal connection		
6 F	Rated voltage		£243	HV side	Cable Box	
	HV winding	11 kV		LV side	Cable/bus	duct
	LV winding	0.433 kV	30	Cable size		The Arthur
7 5	ystem earthing:		20500	HV side	*	
	HV side	*	Seture.	LV side	NA	
	LV side	Solidly Earthed	31	Neutral CT specification:		
3 R	ated frequency:	50 Hz ± 3%	19,438	51G (Standby E/F)		
-	lo. of phases:	Three		64R (REF)		
and the same of	ault level on HV side:	40 kA for 1 Sec.		V _k		1 1 1 1
	onnection	10 IOI IOI I JCC.		I _m at V _k /2	11 15	
	HV side	Delta	50 54 SE	R _{CT}		
	LV side	Star	32		Outdoor	
2 V	ector group:		33		RAL 7031	
-	npedance at max MVA:	Dyn11	1000	AC Auxiliary voltage	415V ± 109	V6
-	isulation class:	^	35		110V ± 109	
	sulation level:	A	-	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Flat	
3 IL			-	Bidirectional roller type	1000 mm	
	P. f withstand	A IC R CT-ID	37	¢ distance of flat rollers		
20	HV winding	As per IS & CBIP	-	Applicable specifications	CPWD	, blo
	LV winding	As per IS & CBIP	39		Not applica	able
5	Impulse withstand		3	Rate for copper loss Rs./kW:	-	
	HV winding	As per IS & CBIP	b	Rate for iron loss Rs./kW:		
	LV winding	As per IS & CBIP				
	il type	Mineral (as per IS 335)	40	Accessories requirement		
	'inding insulation type:	Uniform	а	Sampling valve	Yes	
CI	earance:		b	Conservator drain valve	Yes	
	Ph to Ph	As per IS & CBIP	C	Top oil filter valve	Yes	
	Ph to N	As per IS & CBIP	d	Explosion vent/PRV	Yes	
Ta	p changer		е	Air bag for conservator	Yes	
	Location	HV Side	f	Dial type thermometer	Yes	
	Туре	On Load Tap Changer		& contacts for OTI, WTI		
1	Range	.+5% -15%	g	Drain valve	Yes	1000
	No. of steps	8 (9 positions)	h	Marshalling box	Yes	
-	ormal load:	70-80%	i	Double float Buchholz	Yes	
	mp. rise at extreme tap]	Channels, towing lugs	Yes	
ha	ving max. losses:		k	Rollers	Yes	
	oil	45 ℃	11	Neutral bushing	Yes	
	winding	50 °C		outside terminal box		
Mi	nimum Guaranteed efficiency	see note-3		with connector assembly		
at	0.8 p.f at 80% of ONAN rating:		m	Inspection cover	Yes	
Lo	ad at which max eff. occurs:	KVA	n	Disconnecting chamber	Yes	
	wer flow:	Unidirectional	0	WTI & OTI	Yes	
HV	/LV phase sequence	UVW/To suit switchgear	р	Busduct flange on Sec.	Yes	- 14
100	N. Street Co.	,	q	Lugs and cable glands	Yes	11
* 7	o be decided by contractor in li	ne with Engineering Design			- 10	
THE REAL PROPERTY.	and a contractor in it	no man Engineering Design		, and doodifform.		- 1
1	14.12.16 R	EVISED AND REISSUED FOR TEN	VDFR	GK	VK	PG
0	21.11.16	ISSUED FOR TENDER	,	GK	VK	PG
-	Date	1000ED FOR TEMPER		- OK	AIK	1.0

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_				Charles of the
41	Tests requirements	43	Creepage Distance	31 mm/ kV
9.0	Impulse test:	Not Reqd	Total	As per CBIP & IS
1380	Heat run test:	Not Read.	Protected	As per CBIP & IS
	Vacuum test on tank:	Required		
	Pressure test on tank:	Required		
	Short circuit test:	Not Regd.		
42	ECS Interface	Not Required		

MANUFACTURER'S DATA

A	Make:			С	Constructional Features		
В	Performance:	120		1	Location of terminals		
1	No load loss at				Primary		
200	100% Voltage;		kW		Secondary		
1	110% Voltage:		kW	2	Location of Neutral CT		
2	Full load copper loss at 75°C:	The second	kW	3	Explosion Protection	Explosion Ve	nt/ PRV
3	Auxilliary Losses		kW	Rec.			
4	No load current at			D	Mechanical data		
	100% Voltage:		Α	1	Core & winding weight:	fi fi	Kgs
	110% Voltage:		Α	2	Tank & fitting weight:		Kgs
5	Efficiency at full load at 75°C			3	Radiator without oil weight:		Kgs
	at 0.8 p.f:		%	4	Total weight:		Kgs
	at 1.0 p.f:	1	%	5	Total quantity of oil:		ltrs
6	Eff. at 50% load at 75°C	256	I	6	Quantity of oil in radiators:		ltrs
	at 0.8 p.f;	1	%	7	Overall dimensions:		ltrs
	at 1.0 p.f:		%	1360	Length		mm
7	Maximum efficiency:	7.1	%		Breadth		mm
8	Load at which max eff. Occurs:		MVA		Height		mm
9	Regulation at 75°C		2				
	at 0.8 p.f:	S.	%	TAXA .		1,000,000	
	at 1.0 p.f:	300	%				
10	X1/R1 Ratio	7.4		W.B.			
11	X0/R0 Ratio	i d	8				
12	Zero sequence impedence, ZO	diel					
		1.2		I STATE		grating and	

Note

- 1 Losses shall be inclusive of positive tolerance and shall be at nominal tap.
- 2 Transducers for providing 4–20mA signal for OTI & WTI for owner's interface shall be provided.
- 3 Minimum Guaranteed efficiency for transformers at 0.8 p.f & at 80% of ONAN rating shall be as below:

Transformer rating	Maximum efficiency
<1000kVA	>=99 %
>1 000 kVA upto 1250 kVA	>=99.1 %
>1250 kVA upto 2500 kVA	>=99.3 %



DATASHEET FOR MV BUS DUCT

Datasheet No. A591-000-16-50-DS-04 Rev.No. 0

A	Site conditions		2000		
. 1		46.1 Deg c	4	Relative humidity:	85%
2		1 Deg C	5	Altitude above MSL:	< 1000m
3		45Deg c	6	Environment:	Humid & Corrosive
В			2000		
1	Voltage	415 V ± 6% For MV	4	System fault level	50kA for 1 sec for MV
2	Frequency	50Hz ± 3%	5	System earthing	Solidly Earthed for M
3	No of phases	Three			
C	Busduct Details		6	Auxiliary supply (AC)	240V ± 10% SPN
1	Rated Voltage	415 V ± 6% For MV	7	Wall frame assembly with seal	Required
100		110 12 0701 01 1111		off bushings and bus conductors	
2	Current Rating	*	8	Paint Shade of enclosure	RAL 7032for indoor and
3	Short Circuit rating	50kA for 1 sec for MV			RAL 7031 for outdoor
	3		9	Supporting structure for bus duct	Required
4	Туре	TPN for MV	1000	Space heater and bearther with	Required
				silica gel in bus duct	7.044.04
5	Phase segregation	No for MV		Since goi in pae adol	
			11	Applicable Specification	6-51-0054 Rev 4
6	Location	Outdoor / Indoor	200	присавие оресписатом	0 01 00041101 1
1	Make	MANUFACT	CHARGESTON ALVER 4	and the second s	
2				Flexibles (Size x Quantity)	x mm ² / No
3	Current rating		10000	Earth bus material / size	/ x
The second	Short circuit rating		7.8	Heat shrinkable sleeves rated to	Yes / No
5	Phase segregation	Yes / No	255	withstand the system line to line	www.
	Degree of protection			voltage for 1 min provided	
	Canopy for outdoor busduct	Yes / No	7.9	Removable FRP shrouds for all	Yes / No
1000	Busbar details			busbars joints provided	
	Busbar material	Al / Cu	8	Cross sectional dimensions of	mm x mm
	Busbar size (W x D) Busbar insulator	x mm ²		each busduct	
٥.			-	Space heater provided	Yes / No
	a Type			Overall dimensions(LxBxH)	mm x mm x mm
4	b Tracking index			Weight of each section of busduct	
	Busbar size as tested at CPRI	x mm ²	12	Type test certificates enclosed	Yes / No #
	for full short ckt withstand	NOMES CONTRACTOR OF THE PARTY O		a Short ckt	
	(No. of flats x size of each flat)			(Peak & 1s withstand)	
.o	Clearance		200	b Temperature rise	al e la
200	a Phase to phase	mm		c Voltage withstandability	1 min. power freq.
	b Phase to earth	mm		Enclosure material	Impulse (for HV) Sheet steel / aluminium

Bus duct offered shall be proven design and shall have been successfully type tested. Type test certificates for an exactly identical design of offered bus duct shall be furnished by bidders. Type test reports shall not be more than 5 years old, as on the final bid opening date. In case these type testsbidder shall conduct the type tests have not been conducted during the last 5 years, bidder shall conduct these type tests on the offered design of switchboard before despatch without any cost and delievery impact.

Note

* To be decided by contractor in line with Engineering Design Basis/Bid document.

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0 21.1	1.16	ISSUED FOR TENDER	GK	VK	PG



DATA SHEET BATTERY AND BATTERY CHARGER

Datasheet No. A951-000-16-50-DS-05 Rev.No.0

_										
			Mark - Tary	PL	JRCH	IASE	R'S	DATA	A STATE OF S	
A	Site cond					100				
1			emperature:	46.1 Deg c		1 15	4	Relativ	e humidity:	85%
2	Min. amb	temp for b	attery sizing	1 Deg C	8	18	5		e above MSL:	<1000 m
3	Design an	nbient tem	perature:	45Deg c		- 8	6	Enviro	nment:	Humid & Corrosive
В	Technica	l particula	rs			- 10				
1	Battery			To the second		la la				
а	Туре	Type				b	Plate construction		Tubular Positive	
C	Discharge	Discharge duty requirements		20 N 31 A		- 1	N. I			
		Nominal		Duty cycle				I	No. of cells	End cell voltage
	Item no.	DC voltage	First 1 min.	Next 118 min.	Las	t 1 mir	n.		Lead Acid	Lead Acid
										1.85 V
_										
i	Boost char			10 Hours			h	Access	sories (Per battery set)	
)	Electrolyte liquid in containers Battery stand formation			Required			i	Hydror	meter (syringe type) *	
							ii	Therm	ometer *	
1	Cable deta		n			2	iii	Cell te	sting voltmeter (3V-0-3\	/) 1 no.
	battery & c	harger					ÎV	Rubbe	r gloves	4 pairs
	Item no.			Cable size	N. N.		٧	Spann	er	1 no.
									esistant jugs & funnels *	
					vii Wall mounting teakwood holde		er*			
2	Battery ch	arger		Section 5		734				
	System vol			415 V±10% AC, TPN		i	Earth E	Bus	25X6 mm2 Cu (Min)	
8	System fre	quency		50 Hz ± 3%			i	Separa	ate bolted removable	Required(Gland Plat
	System ner	utral earthi	ng	Solidly earthed		18		undrille	ed gland plate for cable	shall be drilled at site
	System fau	ılt level		50 kA	le te			entry		
	Charger vo				. 18	7.1	k		glands and lugs	
ď,	Float charg	ing voltage	e range/cell	Lead Acid - 2.2	5 V	- Y V	1	Paintin		RAL 7032
	Boost charg	ging voltag	e range/cell	Lead Acid- 2.70 V			m	1		CACAGO AMBIGUAS
	Cable entry	1		Bottom	Section 2	97.18				AND THE RESERVE
	Mounting			Free Standing,	9. N. S.	. * .	215	Item no		Cable size
				Floor Mounted						27 (44X-5VA-75)
N.	Access			Front						
	DC distribu	ution boar	ď			12.11			-	12.24 25 25 2
Ŋ.	Туре			Compartmental	ized	1	-			
	Feeder requ	uirements		Comparanonia			7.00			
	Item no. a per MR/PI	is Fo	eder type			No. of	fee	eders	Max. cable size	Rating of DC contactor
		incom	er							
		Outgo	ing fdr							
									1900-100-100-100-100-100-100-100-100-100	
E	ECS Interfa	ice			a Tib	with.				
	ndication-C	harger fail	uro	not required	25 T S	1500.000	С		ion-Battery discharged	not required

End cell voltage shall confirm to the values specified.

* Asterisk marked items are not applicable for Ni-Cd and VRLA batteries.

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DATA SHEET BATTERY AND CHARGER

THE COURSE OF THE PROPERTY OF THE PARTY OF T	IANUFACTURE	R'S DATA	
A Battery	AUTO AUTORE	KODAIA	
1 Item no. As per MR/PR	10	Short ckt current of battery bank	
2 Tag. No.		Short circuit withstand time	
3 Manufacturer's name			
4 Type & Catalogue no. of cell	1 21	Max. allowable termp.of electrolyte	
5 Ampere hour capacity	1915	the cells can withstand without	
6 No. of cells		injurious effects	
		Continuously	
		Short period	
8 Cell voltage at the end of full		Type of positive plate	
discharge at 10 hrs/ 5 hrs rate		Type of negative plate	1110 1 10 10
9 Specific gravity of electrolyte at the	24	No. of positive plates/cell	
end of full charging at °C	25	No. of negative plates/cell	
10 Specific gravity of electrolyte at the	26	Material & thickness of separators	
end of full discharge at 10 hrs/	27	Ampere hour capacity at min. amb.	WI
5 hrs rate at °C		10 hrs rate to end cell voltage	
11 Quantity of electrolyte per cell		specified at s.no. 8 above	
12 Weight of cell with electrolyte	N. Str	5 hrs rate to end cell voltage	
13 Quick charging current	l and	specified at s.no. 8 above	
Max. safe quick charging rate		2 hrs rate to end cell voltage	
Permissible ripple content		specified at s.no. 8 above	
14 Suggested quick charging rate	1000		
5 Quick charging voltage	100	1 hr rate to end cell voltage	
Max. quick charging voltage/cell	P80	specified at s.no. 8 above	
		30 min. rate to end cell voltage	
Quick charging voltage/cell for		specified at s.no. 8 above	
constant voltage finish charging	28	Dimensions of each battery rack	
6 Float charging voltage/cell		Width	1000
7 Float charging current		Depth	
Float charging current range		Height	
Permissible ripple content	29	No. of battery racks	
8 AH efficiency at 10 hrs/5 hrs rate			
Battery charger			
1 Item no. As per MR/PR	11	Max. RMS ripple voltage at	
2 Tag. No.		rated load	
Manufacturer's name		with battery connected	-1
1 Rating		without battery	
Charger rating	12	Method of volatege control	
Output voltage		Float charging mode	
Output current	2 800	Qulck charging mode	
Nominal voltage	12	Method of current control	
Float charging	10		
Quck charging	[15] (A)	Float charging mode	
Float charging voltage range		Quick charging mode	
Quick charging voltage range	14	Safety factor for component	
		selection	
	15	Charger dimensions	
at light load (40%)		Width	*
at rated load		Depth	10
p.f. at rated voltage & load		Height	1 4 , 36
Degree of protection	16	Max. heat loss in watts	
DCDB	A THE		
Item no. As per MR/PR Tag. No.	5	DCDB dimensions	
Tag. No.		Width	13
Manufacturer's name		Depth	
Degree of protection		Height	
Cell booster			
Item no. As per MR/PR	6	Dimensions	
Tag. No.		Width	14.
Manufacturer's name		Depth	1. 1.
Current rating		Height	
Voltage range		Voltage range	



DATA SHEET HV/MV CABLE

Datasheet No. A951-000-16-50-DS-08 Rev.No. 0

				PURCH	ASER!	SD	AIA	
A	Site condit	ions						
1	Maximum a	mbient temper	ature:	46.1 De	ea c	4	Relative humidity:	85%
2		nbient tempera		1 Deg C		5	Altitude	<1000m
3	Ground tem			45Deg		6	Environment:	Humid & Corrosive
D	Tankaia					384		1.2
B 1	Technical p			<u> </u>		1 45		
1	System voltage Nominal Highest Voltage grade					3	Conductor material	
		Highest	Voltage grade	ja ja		100	HV Power cable	Copper & Al.
	415 V	500 V	650/1100V		V	15.5	MV Power cable	Copper & Al.
	3.3kV(E)	3.6 kV	1.9/3.3kV	- 478 - 12	l		MV control cable	Copper & Al
	3.3kV(UE)	3.6 kV	· 3.3/3.3kV	5.00		B.T.	(See Note-4)	Establish
	6.6kV(E)	7.2 kV	3.8/6.6kV			4	Installation under DGMS jurisdiction	No
	6.6kV(UE)	7.2 kV	6.6/6.6kV	1.11	1	15 6	(See Note-2)	
to be	11kV(E)	12 kV	6.35/11kV		1	5	Applicable spec.	6-51-0051rev 7
	11kV(UE)	12 kV	11/11kV		V	94.5	*	Without I
	22kV(E)	24 kV	12.7/22kV	77	T	14		1 4504 P
1	33kV(E)	36 kV	19/33kV	4.14	Г			a jajantsi 191
	Frequency							1 7 pt. 17 pt.
2	rrequency			50± 3%	Hz			
2	Frequency			50± 3%	Hz			
2	requency			N. P		R'S		
1		nufacturer		50± 3%		Chr Two	DATA	
1	Name of mar			N. P		R'S	DATA Inner sheath	
1 2	Name of man	no.		N. P		Chr Two	DATA Inner sheath Type of compound	
1 2 3	Name of mai MR/PR item Cable type/ o	no. code		N. P		9	DATA Inner sheath Type of compound Thickness	mm
1 2 3 4	Name of mai MR/PR item Cable type/ o	no. code aterial		N. P		9	DATA Inner sheath Type of compound Thickness Nominal dia under armour	mm mm
1 2 3 4	Name of man MR/PR item Cable type/ of Conductor m	no. code aterial emiconducting	screen (HV cables)	N. P		9 10 11	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour	mm
1 2 3 4	Name of mai MR/PR item Cable type/ o Conductor m Conductor se Ma	no. code naterial emiconducting aterial		N. P		9 10 11	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour	mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ o Conductor m Conductor se Ma	no. code aterial emiconducting		N. P		9 10 11	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material	mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Ma Th Insulation	no. code laterial emiconducting aterial ickness	screen (HV cables)	N. P	CTURE	9 10 11	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type	mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation	no. code laterial emiconducting aterial ickness pe of compoun	screen (HV cables)	N. P	CTURE	9 10 11	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size	mm mm mm
1 2 3 4 5	Name of mai MR/PR item Cable type/ of Conductor m Conductor se Ma Th Insulation	no. code laterial emiconducting aterial ickness pe of compoun ickness	screen (HV cables)	N. P	CTURE	9 10 11 12 13	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s	screen (HV cables)	N. P	mm	9 10 11 12 13 14	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation Typ Thi Insulation ser	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s aterial	screen (HV cables)	N. P	mm	9 10 11 12 13 14	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath Outersheath	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation Typ Thi Insulation ser Man Thi	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s	screen (HV cables)	N. P	mm	9 10 11 12 13 14	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath Outersheath Type of compound	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation Typ Thi Insulation ser Man Thi Copper tape	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s aterial ickness	screen (HV cables)	MANUFAC	mm	9 10 11 12 13 14	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath Outersheath Type of compound Thickness	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation Typ Thi Insulation ser Man Thi Copper tape	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s aterial	screen (HV cables)	MANUFAC	mm	9 10 11 12 13 14	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath Outersheath Type of compound	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation Typ Thi Insulation ser Man Thi Copper tape	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s aterial ickness	screen (HV cables)	MANUFAC	mm mm	9 110 111 12 13 14 15	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath Outersheath Type of compound Thickness	mm mm mm
1 2 3 4 5	Name of man MR/PR item Cable type/ of Conductor m Conductor se Man Th Insulation Typ Thi Insulation ser Man Thi Copper tape	no. code laterial emiconducting aterial ickness pe of compoun ickness miconducting s aterial ickness	screen (HV cables)	MANUFAC	mm mm	9 10 11 12 13 14 15 16 17	Inner sheath Type of compound Thickness Nominal dia under armour Calculated dia under armour Armour Material Type Size Nominal dia under outersheath Calculated dia under outersheath Outersheath Type of compound Thickness Nominal outer dia of cable	mm mm mm

Notes

- 1 E- Earthed system UE-Un Earthed system
- 2 Where the installation falls under the jurisdiction of Directorate General of Mines Safety, cables shall comply
- 3 Copper upto 16Sqmm and Aluminium above 16Sqmm.
- 4 Conductor size for control cables shall be 2.5 sq mm.control cable shall be twisted pair overall shielded type.
- 5 Single line to ground fault current (applicable for HV cables) for sizing of insulation screening shall be 300A for 11kV cables.

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				+	· · · · · · · · · · · · · · · · · · ·	
	Melinare Service de		JRCHASER'S DATA	en Sasouri y Chineser - Ini e	PREFERENCES CONTRACTOR	en, etganolistika en had
DDO	CT DATE	✓ TICK FOR SELECTIO	en egypt general weeks a street Harrist and	AMERICAN PARK AN		AND ALL PROPERTY OF THE
	ECT DATA	□ TICK FOR SELECTIO				
<u> </u>	Project details a Project	· DEVELOPMENT OF SHOE		E CONDITIONS		
	b Client	: DEVELOPMENT OF SILOS : CWC	a	Ambient tempeat MIN 1		Design 45 °C
	c Location	: Nabha, Punjab	b		MAX 46.1 °C : >90	Design 45 C
	d Unit	: Common	c d	Humidity Altitude		00 m
	- OIII	: Common				ly corrosive
			e f	Atmospheric con- Installation		or inside pnl
RELAY	SELECTION	TICK FOR SELECTIO	N		- 4 12 17 - 1711	
	RELAY FUNCTION	The second secon		PUT POWER SUPP		
	a Only Protect		4 INF	Site selectable fe		
		and metering	b b	Input supply	: 110V	
	c Protection	and metering and control	D .	input supply	. 1100	20
	d Serial com				2	
	e Password				*	
	a. For w	· · · · · · · · · · · · · · · · · · ·				
		oth read and write				
2	CONSTRUCTION			DT INDUIT TO CO.	AV	
	a Enclosure t			PT INPUT TO REL		~
			а	Current operated		<u>~</u>
	b Terminal size for external			a1 Main CT inp		
				a2 CT for sens		
	 Mounting Drawout feat 	: Flush		or back up I		V
		1 de poi e e i e e e		Voltage operated	relays	Ľ
	e Display type			b1 PT input	:	
		+ LED Indication				V
	CDECIAL DEC	+ Backlit Display		400 CO 100 CO 10	(LEAST-ON	Ľ
		REMENT IF ANY	C	Comprehensive re		
		standards: IEC		c1 Main CT inp		3 CTs, 4wire
		r cable capacitance up to 1000 n	n	c2 PT input		3phase, 4wire
		on where field contacts are		c3 CT for sensi		1 CT, 2 wire input
	directly wire	ed to relay e.g. Motor start/ stop		or back up E		(Yes for IC& TR FDI
			d	CT Secondary cui		5A for Protection CT
DE: AX			1			1A for Differential C
REI AV			TICK FOR SELECTION	A SOUTH TO STORY	F 1 1	
					dr wise protection)	
(where n	o check box is st	hown, the requirement is minimum b	out not limited. Refer			***
(where n	curernt operated a. 3 phase O/C	hown, the requirement is minimum b	out not limited. Refer	SWBD data sht for	<u>/S</u>	(59+2)
(where n	concheck box is slowers of check box is slowers.	hown, the requirement is minimum b I relays C element (50, 51) * I>> * I>>	out not limited. Refer	SWBD data sht for	<u>/S</u>	(59+2)
(where n	Curernt operated 3 phase O/O 1 > Characterist	hown, the requirement is minimum be relays Celement (50, 51)	out not limited. Refer	SWBD data sht for	<u>rs</u> ent with time delay OV>>	*
(where n	Curernt operated 3 phase O/O 1 > Characterist 1 nvers	hown, the requirement is minimum be relays Celement (50, 51)	out not limited. Refer	SWBD data sht for fitage operated relay 3 phase ON elem * OV> * 3 phase UN elem	vs ent with time delay OV>> ent with time delay	*
(where n	conclusion check box is significant operated. 3 phase O/C 1 S Characterist Inversigned and de	hown, the requirement is minimum by I relays C element (50, 51) * I >> * I>>> tics as per IEC te (normal, very, extremely, long) the finite time for I > and I >>	out not limited. Refer 2 <u>Volt</u> a.	SWBD data sht for fi tage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * UV> *	vs. ent with time delay OV>> ent with time delay UV>>	*
(where n	conclusion check box is significant operated. 3 phase O/C 1 S Characterist Inversigned and de	hown, the requirement is minimum be relays Celement (50, 51)	out not limited. Refer 2 <u>Volt</u> a.	SWBD data sht for fitage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as	ent with time delay OV>> ent with time delay UV>> per IEC	(27+2)
(where n	co check box is st Curernt operated 3 phase O/C 1 > Characterist Invers and de Definit	hown, the requirement is minimum by I relays Celement (50, 51) * I >> * I >>> tics as per IEC e (normal, very, extremely, long) efinite time for I >>> te time for I >>>	out not limited. Refer 2 <u>Volt</u> a.	SWBD data sht for fitage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (non	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extreme.	(27+2) ly, long)
(where n	co check box is si Curernt operated 3 phase O/C 1 Characterist Inversion Definit E/F relay (50)	hown, the requirement is minimum by I relays C element (50, 51) * I >> * I >>> tics as per IEC tie (normal, very, extremely, long) te time for I >>> C et time for I >>>> C et ime for I >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	out not limited. Refer : 2 <u>Volt</u> a. b.	SWBD data sht for fitage operated relay 3 phase ON elem * OV> * 3 phase UN elem * UV> * Characteristics as * Inverse (non- and definite	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extrement time for UV > , UV>	(27+2) ly, long)
(where n	co check box is si Curernt operated 3 phase O/C 1 Characterist Inversion and de Definit E/F relay (50 1 Characterist 1 Characterist 1 Characterist 1 Characterist 2 Characterist 3 Characterist 4 Characterist 5 Characterist 6 Characterist 1 Characterist 2 Characterist 1 Characterist 2 Characterist 3 Characterist 4 Characterist 5 Characterist 6 Characterist 7 Characterist 8 Characterist 1 Characterist 1 Characterist 1 Characterist 1 Characterist 1 Characterist 2 Characterist 2 Characterist 3 Characterist 4 Characterist 5 Characterist 6 Characterist 7 Characterist 8 Characterist 1 Characterist 1 Characterist 1 Characterist 1 Characterist 2 Characterist 2 Characterist 3 Characterist 4 Characterist 5 Characterist 6 Characterist 7 Characterist 8 Characterist 9 Characterist 1 Characterist 2 Characterist 2 Characterist 3 Characterist 4 Characterist 4 Characterist 5 Characterist 6 Characterist 7 Characterist 7 Characterist 8 Characterist 9 Characterist 1 Characterist 1 Characterist 1 Characterist 1 Characterist 1 Characterist 1 Characterist 2 Characterist 1 Characterist 2 Characterist 2 Characterist 3 Characterist 4 Characterist 4 Characterist 5 Characterist 6 Characterist 7 Characterist 7 Characterist 8 Characterist 8 Characterist 9 Characterist 1 Chara	hown, the requirement is minimum by I relays C element (50, 51) * I >> * I >> * I >> tics as per IEC the (normal, very, extremely, long) the finite time for I > and I >> time for I >>> C et time for I >>> * I o >> * I o O I O I O I O I O I O I O I O I O I	out not limited. Refer 2 <u>Volt</u> a.	SWBD data sht for fixage operated relay 3 phase ON elem * OV> * 3 phase UN elem * UV> * Characteristics as * Inverse (non- and definite Under/ Over Frequ	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extrement time for UV > , UV>	(27+2) ly, long)
(where n	co check box is silcurernt operated a. 3 phase O/C b. 1 > Characterists number of the control of the contro	thown, the requirement is minimum by the relays C element (50, 51) I >> I >> I >> tics as per IEC If the first time for I > and I >> te time for I >>> C et ime for I >>> In Image: If the first time for I >>> time for I >>>> time for I >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	out not limited. Refer : 2 <u>Volt</u> a. b.	SWBD data sht for five tage operated relay 3 phase ON elem * OV> * 3 phase UN elem * UV> * Characteristics as * Inverse (non and definite Under/ Over Freque (81U/ 81O)	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extrement time for UV > , UV3 uency element with	(27+2) ly, long) >> time delay
(where n	co check box is silcurernt operated a. 3 phase O/C b. 1 > Characterist	hown, the requirement is minimum benefit to the requirement is minimum benefit to the relays. Celement (50, 51) * I >>	out not limited. Refer : 2 <u>Volt</u> a. b.	SWBD data sht for five tage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (non- and definite Under/ Over Freque (81U/ 81O) * Settable und	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extrementime for UV > , UV: Jency element with er voltage restraintime for voltage restraintime.	(27+2) ly, long) >> time delay
(where n	co check box is size the control of	hown, the requirement is minimum by the lays Celement (50, 51) * I >> * I >> * I >> tics as per IEC the (normal, very, extremely, long) the time for I >> * In I >> * I > > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > * I > > > * I > > > * I > > > * I > > > > > * I > > > > > > > > > > > > >	out not limited. Refer : 2 <u>Volt</u> a. b.	SWBD data sht for fi tage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (non- and definite Under/ Over Frequ (81U/ 81O) * Settable und * df/dt elemen	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extrement time for UV > , UV2 uency element with er voltage restraint t	(27+2) ly, long) >> time delay
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1 Car	co check box is size the control of	hown, the requirement is minimum by trelays Celement (50, 51) * I >> * I >> * tics as per IEC te (normal, very, extremely, long) finite time for I >> * DN, 51N, 51G) * I ₀ >> * I ₀ >> * tics as per IEC te (normal, very, extremely, long) te time for I >> * tics as per IEC te (normal, very, extremely, long) te finite time for I ₀ >, I ₀ >> te time for I ₀ >>> te time for I ₀ >>>	but not limited. Refer 2 Volt a. b.	SWBD data sht for fi tage operated relay 3 phase O/V elem * O/V> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (non- and definite Under/ Over Frequ (81U/ 81O) * Settable und * df/dt elemen * Number of si * Number of si	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extremeditime for UV > , UV zuency element with ter voltage restraint tages with uff tages with df/dt	(27+2) ly, long) time delay
1 C	co check box is size the control of	hown, the requirement is minimum by I relays Celement (50, 51) * I >> * I >> * Isolate Celement (50, 51) * I >> * Isolate Celement (50, 51) * I >> * Isolate Celement (50, 51) * I >> * Isolate Celement I Selement I Isolate Celement I Isolate Celement I Selement I Isolate Celemen	b. d.	SWBD data sht for fi tage operated relay 3 phase O/V elem * O/V> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (non, and definite Under/ Over Frequ (81U/ 81O) * Settable und * df/dt elemen * Number of si * Number of si Synchrocheck fund	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extreme, time for UV > , UV > , uency element with ter voltage restraint t tages with uff tages with df/dt ction	(27+2) ly, long) >> time delay
1 Car	co check box is size the control of	hown, the requirement is minimum by relays Celement (50, 51) I >> I >> I >> It is a per IEC I (normal, very, extremely, long) I (normal time for I > and I >> It is a per IEC I (normal, very, extremely, long) I (normal time for I >> It is a per IEC I (normal, very, extremely, long) I (normal, very, extremely, long) I (normal, very, extremely, long) I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> It is a per IEC I (normal time for I o > I o >> I o >> I o >> It is a per IEC I (normal time for I o > I o >> I o o o o	but not limited. Refer 2 Volt a. b.	SWBD data sht for fi tage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (nonand definite Under/ Over Frequ (81U/ 81O) * Settable und * df/dt elemen * Number of si Number of si Synchrocheck fund Metering/ event re	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extreme, time for UV>, UV uency element with ter voltage restraint tages with uff tages with df/dt ction cording	(27+2) ly, long) time delay
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1 Car	co check box is six control of the c	hown, the requirement is minimum by relays Celement (50, 51) I >> I >> Iso its as per IEC The (normal, very, extremely, long) The finite time for I > and I >> Iso its as per IEC The (normal, very, extremely, long) The finite time for I >> Iso its as per IEC The (normal, very, extremely, long) The finite time for I o >, I o >> Iso its as per IEC The (normal, very, extremely, long) The finite time for I o >, I o >> Iso its as per IEC The (normal, very, extremely, long) The finite time for I o >> Iso its as per IEC The finite time for I o > Iso its as per IEC The finite time for I o >> Iso its as per IEC The finite t	b. d.	SWBD data sht for fi tage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (non- and definite Under/ Over Freqt (81U/ 81O) * Settable und * df/dt elemen * Number of s' * Number of s' * Number of s' Synchrocheck fun Metering/ event re * 3 phase/ line * Disturbance	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extreme, time for UV>, UV tency element with ter voltage restraint tages with uff tages with df/dt ction cording Voltages record	(27+2) ly, long) time delay
1 Car	co check box is size to check box is size the control of the contr	thown, the requirement is minimum by trelays C element (50, 51) * >>	b. d.	SWBD data sht for fi tage operated relay 3 phase O/V elem * OV> * 3 phase U/V elem * U/V> * Characteristics as * Inverse (nonand definite Under/ Over Frequ (81U/ 81O) * Settable und * df/dt elemen * Number of si * Number of si * Synchrocheck fund Metering/ event re * 3 phase/ line	ent with time delay OV>> ent with time delay UV>> per IEC mal, very, extreme, time for UV>, UV tency element with ter voltage restraint tages with uff tages with df/dt ction cording Voltages record	(27+2) ly, long) time delay



	(where no check box is shown, the requirement is minimum but a Motor Protection relay	not limited. Refer SWBD data sht for fdr wise protection)
	a. Protection elements	5 Special protection relays
	* Thermal overload (49)	* Part of main relay
	* OC protection (49)	* Separate relay
	* OC protection with doubling feature (50)	a. Differential relays
	* EF protection (50N)	* BUS High/Low Imp, vendor to select
	* Locked Rotor protection	* Feeder High/Low Imp, vendor to select
	* Maximum start time	* Trafo With harmonic restraint
	* Maximum number of starts	
1.1	* Negative phase sequence	* Machine Biased differential
		b. Distance relays (67, 67N)
		c. Restricted EF (64R)
	* Single phasing	d. Generator protection
	b. Metering/ events	e. Distance protection
		f. Reverse power relay
	* 3 phase/ line current * Hour run	
	* 1041 10411	6 Other relay Features
12	KVV, KVVH, pf	a. Analog inputs 4-20mA
	* Disturbance record	* RTD/BTD-MPR AS REQD
	* Plot start characteristic	* WTI/ OTI-Trafo relay AS REQD
	* Trip values	* WTI/ OTI-Trafo relay AS REQD
	* Start time	WTI= Winding temperature indicator
	* Start current	OTI- Oil tomporature indicator
	c. Control	OTI- Oil temperature indicator
	* Breaker close in test mode	b. Out put relays
	Reacceleartion logic	* Number of relays 4NOS
	Breaker trip	,
8	* RTD/BTD input	* Contact rating 2A, 220V DC
		* Reset Hand reset
	4 Comprehensive numerical relay	FUNCTIONS part of numerical relay c. Lock out function (86)
	a. Current op elements	
	(51, 50, 51N, 50N, 51G)	d. Trip circuit supervision(95)
	b. Voltage op elements (59, 27, 2, 81U, 81O)	e. Watch dog f. Time stamp
	c. Control function	
		g. Modular construction
	* Breaker close/ trip from relay	for easy and quick replacement
	* Breaker close/ trip on serial	of faulty PCB/circuit
	* PLC logic function for control scheme * Digital I/P Min4nos for I/C& plant	
	Will thou ball	fdr :
	Min12no.for mtr &trf. Fdr.	
	 Motor Feeder control function 	
-	* Motor Feeder control function	
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION	☐ TICK FOR SELECTION
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration	
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration	3 Redundancy requirement for DC/MMI
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Pales for the control function	3 Redundancy requirement for DC/MMI a Ports at STAR coupler
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol	3 Redundancy requirement for DC/MMI a Ports at STAR coupler
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN	3 Redundancy requirement for DC/MMI a Ports at STAR coupler For each relay
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data Concentrator (DC)	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for Dual Redundant
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for each relay LAN
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integration through DC * Directly to MMI	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for each relay LAN
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integration through DC * Directly to MMI	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for each relay LAN * Communication Processor Dual Redundant
SER	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for each relay LAN * Communication Processor Dual Redundant
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integration through DC * Directly to MMI d Topology NA e Data concentrators NA	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant * For DC Dual Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for Dual Redundant each relay LAN * Communication Processor Dual Redundant 4 Serial Communication from DC to MMI/ ECS RTU
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant * Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) * Non redundancy	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide * Protocol Vendor to decide
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integration through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) * Non redundant (star)	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant communication port for each relay LAN * Communication Processor Dual Redundant communication Processor Dual Redundant a DC to MMI * Topology Vendor to decide b DC to ECS-RTU MODBUS (As per ECS Spec)
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) * Non redundant (star)	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide * Protocol Vendor to decide
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integration through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) * Non redundant b From DC to MMI * Redundant	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant cach relay LAN * Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide b DC to ECS-RTU MODBUS (As per ECS Spec) c Scan time As per 6-51-0055
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) Non redundant * Redundant	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant Communication port for each relay LAN * Communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide b DC to ECS-RTU MODBUS (As per ECS Spec)
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) * Non redundant * Non redundant * Redundant	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant communication port for each relay LAN communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide c Protocol Vendor to decide b DC to ECS-RTU MODBUS (As per ECS Spec) c Scan time As per 6-51-0055
	* Motor Feeder control function RIAL COMMUNICATION AND RELAY INTEGRATION 1 Relay integration a Communication ports at Relay * Relay front : RS 232 * Relay back : RS485 b Protocol : Vendor to decide of relay LAN c Requirment of data concentrator (DC) * Integraton through DC * Directly to MMI d Topology NA e Data concentrators NA 2 Redundancy a Relay LAN /serial * Redundant (serial) Non redundant * Redundant	3 Redundancy requirement for DC/MMI a Ports at STAR coupler * For each relay Non Redundant b Data concentrator (DC) * Power supply card Dual Redundant cach relay LAN communication port for each relay LAN communication Processor Dual Redundant 4 Serial communication from DC to MMI/ ECS RTU a DC to MMI * Topology Vendor to decide b DC to ECS-RTU MODBUS (As per ECS Spec) c Scan time As per 6-51-0055





Datasheet No. A951-000-16-50-DS-09 Rev.No. 0

MANUFACTURER'S DATA

e Minimiz	1 NUMERICAL RELAYS Feeder type	INCOMER	BUS PT	BUSTIE	MOTOR	TRANSFORMER	MOTOR
Relay selection	*Indicate equivalent NEMA no. of element offered inMainRelay * lockout feature 86 * trip ckt sup 95 * relay model & extra element for syn mot Differential relay CT circuit supervision REF relay Direction relay Reverse Power Impedance relay * 86 with all special protection relays			*			
Nos of Serial Port	RS232 RS485 RS422 FO		5				
Analog input	RTD -PT100 BTD- PT100 WTI input OTI input						8
Nos of DI	* DI used by MFR * DI avaialble for customer interlock * DI for auto C/O logic * Main relay						
Protocol	* Special relays * Protocol for relay setting from remote	±1					
Any other data						n van de geween	and the second of
KEMAKKS							
			= = =				



Datasheet No. A951-000-16-50-DS-09 Rev.No. 0

12	а	ATA CONCENTRATOR AND RELAY INTEG	
		Make	
1			* Topology
	b	Input power supply	* Protocol
10	(578)	* Voltage	* Type of Port
		* Power regt	* Cable type
		- oner requ	h Number of Digital Input/ Aanalog Input (4-20mA)
	С	Redundancy	* DI for substation eqpt
		* Power supply	* Spare DI
		* Communication processor	* Al as per project data sht
		* Communication port	* Spare Al
		* Relay LAN /Serial communic	Spare Al
		* ECS-RTU interface	I Maximum Scan Time
		* MMI interface	* Status
	d	Serial interface/ Relay LAN	* events
		* Topology	Data acqusition (analog) Disturbance record download time
		* Protocol	
		Nos (*	
		* Topology	* Spare capacity for
		, openegy	additional devices for
		* Type of port	relay LAN
		* Cable type	* Time synchronization
		Cable type	options * Power walk in time
	f	Serial interface- MMI	* Restoration time of communication of DC with NR & MMI
		* Topology	*After detecting break in serial loop
		* Protocol	*After switchover of supply from normal to reduandant
		* Type of Port	*After failure of normal & reduandant supply&restoration
		* Cable type	of same
		10 J A	*Time required for synchronisation with external
			clock
		dard fortures of 1	

Standard features of relay/ system architecture

Vendor to provide data as applicable for the product offered

OPTIONS

AMB TEMP	MIN	MAX	DESIGN		ATMOSPHERIC CONDTION
	1 °C	46.1 °C	45 °C		
HUMIDITY	MIN	MAX	DESIGN 40		INSTALLATION
*			60 >90		
			100		
ALTITUDE	MIN	MAX	DESIGN		
			100 m 200 m		
			< 1000 m		
			> 1000 m		
DISPLAY TYPE		Section Add	SELECT AlphaNumeric	LCD	INPUT POWER SUPPLY
			Graphic LCD	LCD	
			+ LED Indication	on	
CT-PT INPUT	PT	CTSECOND	,		CONSTRUCTION FEATURES
	13phase, 4wi		´		ENCL TML SIZE MTNG
3 CTs, 4wire 1 CT, 2 wire	ii 3phase, 3 w	rir₁5A			IP5X 2.5 Flush
	1phase	5A-Main, 1A			IP41 4.0 Surface
		1 A /E A nite or	alaatabla		1D22 2.5 for control
		1A/5A site se Refer swbd o			IP23 2.5 for control IP55 4 for CT/ PT
3					
PROTECTION FUNCTIONS					
PROTECTION FUNCTIONS	5		data sht		IP55 4 for CT/ PT
REQUENCY RELAY INDER FREQUENCY		Refer swbd of SELECTION	data sht		IP55 4 for CT/ PT
REQUENCY RELAY INDER FREQUENCY		Refer swbd o	data sht		
REQUENCY RELAY		SELECTION	data sht		IP55 4 for CT/ PT
REQUENCY RELAY INDER FREQUENCY		SELECTION	data sht		IP55 4 for CT/ PT
REQUENCY RELAY INDER FREQUENCY		SELECTION	data sht		IP55 4 for CT/ PT
REQUENCY RELAY INDER FREQUENCY f/dt		SELECTION	data sht		DIGITAL INPUTS FOR INTERLOCKS/ S
REQUENCY RELAY INDER FREQUENCY f/dt		SELECTION SELECTION SELECTION Low Imp with	data sht		IP55 4 for CT/ PT
REQUENCY RELAY INDER FREQUENCY		SELECTION SELECTION SELECTION Low Imp with High Imp with	data sht		DIGITAL INPUTS FOR INTERLOCKS/ S ANALOG INPUT/ OP RELAYS
REQUENCY RELAY INDER FREQUENCY f/dt		SELECTION SELECTION Low Imp with High Imp with High Impeda	check diff		DIGITAL INPUTS FOR INTERLOCKS/ S ANALOG INPUT/ OP RELAYS
REQUENCY RELAY INDER FREQUENCY f/dt		SELECTION SELECTION SELECTION Low Imp with High Imp with	check diff		DIGITAL INPUTS FOR INTERLOCKS/ S ANALOG INPUT/ OP RELAYS
REQUENCY RELAY INDER FREQUENCY f/dt		SELECTION SELECTION SELECTION Low Imp with High Imp with High Impeda Low Impedar Pilot wire Biased low Ir	data sht		DIGITAL INPUTS FOR INTERLOCKS/ S ANALOG INPUT/ OP RELAYS
REQUENCY RELAY NDER FREQUENCY f/dt		SELECTION SELECTION Low Imp with High Imp with High Impeda Low Impedar Pilot wire Biased low Ir With harmon	data sht		DIGITAL INPUTS FOR INTERLOCKS/ S ANALOG INPUT/ OP RELAYS



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FIXTURE TYPE	DESCRIPTION	WATTAGE	MANUFACTURER TYPE DESIGNATION
	LED FIXTURES	5	
LEDIND1	Mounting rail type fixture suitable for 1x18/22 W LED lamp made of stove enamel finish MS sheet steel housing.	1 x 18/22 W	Philips-Master-LED-tube Surya-SLE TL
LEDIND2	Same as INDLED1 but suitable for 2`x18/22 W LED lamp	2 x 18/22 W	Philips-Master-LED-tube Surya-SLE TL
LEDIND3	Industrial type fixture suitable for 1x18/22W fluorescent lamp made of stove enamel finish MS sheet steel housing and vitreous enameled white reflector.	1 x 18/22 W	Philips-Master-LED-tube Surya-SLE TL
LEDIND4	Same as INDLED3 but suitable for 2x18/22 W LED lamp	2 x 18/22 W	Philips-Master-LED-tube Surya-SLE TL
LED 1	Decorative circular (200 mm dia approx.) down lighter, recess mounted type with LED light source having high glossy mirror, matt reflector including suitable integrated independent driver box	28/30W	Philips- BBS498 Crompton-LCDLH- 30CDL
LED 2	Recess type square (600 mm x 600 mm approx) fixture 50 W with LED light source having high efficiency low glare optics with integrated independent driver box	50/55 W	Philips-QUADRA II Crompton-LCTLR-50- FO-CDL
LED3	Recess type square (300 mm x 300 mm approx) fixture 18 W with LED light source having high efficiency low glare optics with integrated independent driver box	18 W	Crompton-LCDRP81
LED4	Under water lighting fixture 7 W with LED light source with all controllers, drivers as required.	7 W	Crompton- AQUA(LUWH2-07-T)
LED5	Similar to LED2, but with 36 W LED Fixture complete with LED Lamp, driver, including other materials as applicable for installation.	36 W	Crompton-LCTLR-36- CDL or equivalent
LED6	Similar to LED2, but SURFACE type with 36 W LED Fixture complete LED Lamp, driver, including other materials as applicable for installation.	36 W	Crompton-LCTLS-36- CDL or equivalent

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FIVELINE		T	T
FIXTURE TYPE	DESCRIPTION	WATTAGE	MANUFACTURER TYPE DESIGNATION
LED7	Bollard type fixture, 10 W with LED light source having high efficiency soft glare free light with LED Lamp, driver, including other materials as applicable for installation.		Philips BR840 Crompton LBLS1-10- CDL, LBLS3-10-T or equivalent
LED8	LED Fixture TUBE Type complete with LED Lamp, driver, including other materials as applicable for installation.	18 W	Crompton IPFC111LT8- 16 or equivalent
LED9	Similar to LED 8 above but Weatherproof (min. IP-65) suitable for conduit / pipe/ surface mounting with LED Lamp, driver, including other materials as applicable for installation.	42W	Philips WT550C LED355 CW PSU S1 PC or equivalent
LED10	Decorative circular down lighter, surface/wall mounted type, Weatherproof (min. IP-65) with LED Lamp, driver, including other materials as applicable for installation.	18W/24W	Philips WL120V Round or equivalent
LED-11	Decorative circular (200 mm dia approx.) dowlighter, surface mounted type with LED Module, aluminium satin finished reflector, polycarbonate lenses including suitable integrated independent driver box.	1x9W	Crompton LCD SLW- 10C or equivalent
LED-12	Decorative circular (200 mm dia approx.) dowlighter, recess mounted type with LED Module, aluminium satin finished reflector, polycarbonate lenses including suitable integrated independent driver box.	1x9W	Crompton LCD RLW- 15C or equivalent
LED13	LED Fixture suitable for DC Voltage complete with LED Lamp, driver, including other materials as applicable for installation.	18 W	Crompton LCDV-18- CDL or equivalent
LED14	LED Chemical resistance Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	Upto 50W	Philips WT461C or equivalent
LED15	LED Low Bay Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	Upto 90W	Philips Crompton LHBV-40- CDL or equivalent
LED16	LED Medium Bay Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	Upto 125W	Philips Crompton LHBB-90- CDL-MB or equivalent
LEDIT	LED High Bay Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	Upto 250W	Philips BY46OP (2-pod version) Crompton LH BBx-150- CDL or equivalent



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FIXTURE TYPE	DESCRIPTION	WATTAGE	MANUFACTURER TYPE DESIGNATION
LED18	LED High Bay Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	Upto 400W	Philips BY461P (4-pod version) Crompton LHBBx-180- CDL or equivalent or equivalent
=	OUTDOOR TYPE FIX	XTURES	
LEDFD1	LED Flood Light Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	90W	Crompton LFBx11-90- CDL or equivalent
LEDFD2	LED Flood Light Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	150W	Crompton LFBxK-150- CDL or equivalent
LEDFD3	LED Flood Light Fixtures complete with LED Lamp, driver, including other materials as applicable for installation.	180W	Crompton LFBxK-180- CDL or equivalent
LEDST1	Street lighting but with LED fixtures with LED Lamp, driver, including other materials as applicable for installation.	30W	Philips BRP320 Crompton LSTO-30- CDL or EQUIVALENT
LEDST2	Street lighting but with LED fixtures with LED Lamp, driver, including other materials as applicable for installation.	45W	Crompton LSTO-45- CDL or EQUIVALENT
LEDST3	Street lighting but with LED fixtures with LED Lamp, driver, including other materials as applicable for installation.	60W	Philips BY200P LED 27S CW PSU SI PC Crompton LSTO-60- 60/CDL or EQUIVALENT
LEDBK1	Weatherproof (min. IP-65) lighting fixture (ceiling mounted and wall mounted) for use in safe areas with LED Lamp, driver, including other materials as applicable for installation.	1x10 W	Philips WT202W LED6S CW PSU S1 PC or equivalent
LEDBK2	Weatherproof (min. IP-65) well glass lighting fixture for use in safe areas with LED Lamp, driver, including other materials as applicable for installation.	60W	SUDHIR WG/182 or equivalent
LEDBK3	Bulk head fitting with cast aluminum alloy body having stove enameled finish (silver grey outside, white inside) and complete with prismatic front glass, wire guard, tropicalised gasket and BC lamp holder suitable for 100W GLS lamp.	1x100 W	Crompton IBH-1110BC Bajaj BJDB-100 Philips FXC 101 or equivalent
LEDBK4	Similar to LEDBK1 but with pressed aluminum body, finished stove enameled grey outside white inside with frosted front glass fitted with tropicalised gasket and without wire guard.	1x100 W	Philips-FXC-101 Crompton IBH-1110BC or equivalent



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FIXTURE TYPE	DESCRIPTION	WATTAGE	MANUFACTURER TYPE DESIGNATION
FD9	Flood lighting fixture suitable for 2x400W SON tubular lamp comprising of anodised aluminum housing and reflector with adjustable lamp holder, heat resistant front glass cover fixed to reflector by aluminum ring and rubber gasket. (IP-54 enclosure).		Philips SNT-001 / 400 Bajaj BJEF- 22CA/BGENF 22 Crompton FHD-1524

	FLAMEPROOF/		
LEDFLP-1	Flameproof well glass/linear LED lighting fixture suitable for use in dust-laden atmosphere complete with LED lamp, LED driver, reflectors, mounting hardwares, clamps & brackets etc. (Light Output i.e. LUMENS of fixture 4000 to 4500 LM and min. 100 LM/Watt.)	Upto 30 W or 40-45 W	BALIGA 22W-FLPW- 1245, 30W-FLPW-1245 KAYSONS KWL-A20, or equivalent
LEDFLP-4	Same as FLP-1 (Light Output i.e. LUMENS equivalent to 125W HPMV lamp)	Upto 65 W or 40-45W	
LEDFLP- 4A- WG	Flameproof well glass LED lighting fixture suitable for use in dust-laden atmosphere complete with LED lamp, LED driver, reflectors, mounting hardwares, clamps & brackets etc. (Light Output i.e. LUMENS of fixture 4000 to 4500 LM and min. 100 LM/Watt.)		BALIGA 36W-FLPW- 1245 FEPL FLP-WF-13 FLEXPRO MFWLED/3001 KAYSONS KWL-A21 or equivalent
LEDFLP- 4A-LNR	Flameproof linear LED lighting fixture suitable for use in dust-laden atmosphere complete with LED lamp, LED driver, reflectors, mounting hardwares, clamps & brackets etc. (Light Output i.e. LUMENS of fixture 4000 to 4500 LM and min. 100 LM/Watt.)	Upto 50 W	
LEDFLP-5a	suitable for use in dust-laden atmosphere complete with LED lamp, LED driver, reflectors, mounting hardwares, clamps & brackets etc. (Light Output i.e. LUMENS of fixture 15000 to 16000 LM and min. 100 LM/Watt.)	120 to 250 W	BALIGA 72W-FLPW- 1095 FLEXPRO MFWLED/3001 KAYSONS KWL-A22 or equivalen t
LEDFLP-5b	Flameproof & WP Well glass lighting	60 W to 150	BALIGA 100W-FLPW-



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	fixture suitable for use in dust-laden atmosphere classified areas with 60W to 150W LED Lamp, driver, including other materials as applicable for installation. (Light Output i.e. LUMENS equivalent to 400W HPMV lamp)		2595L FLEXPRO MFWLED/3001 KAYSONS KWL-A23 or equivalent
LEDFLP-7	Flameproof flood light LED lighting fixture suitable for use in dust-laden atmosphere complete with LED lamp, LED driver, reflectors, mounting hardwares, clamps & brackets etc. (Light Output i.e. LUMENS of fixture 15000 to 16000 LM and min. 100 LM/Watt.)	Upto 160 W	FEPL FLP-RH-IL-01 FLEXPRO MFFLED/4001 or equivalent
LEDFLP-9	Flameproof and weatherproof flood lighting fixture with 120W to 250W LED Lamp, driver, including other materials as applicable for installation (Light Output i.e. LUMENS equivalent to 400W HPMV lamp)	120 W to 250 W	FEPL FLP-RH-IL-02 FLEXPRO MFFLED/4001 or equivalent
FLP-12	Flameproof and weatherproof LED cluster based aviation obstruction light suitable for use in dust-laden atmosphere complete with LEDs (Twin type) with LED Lamp, driver, including other materials as applicable for installation.	Upto 60 W (Medium Intensity)	
LEDExn'R'- 1	Weatherproof well glass non sparking restricted breathing type lighting fixture for use in in dust-laden atmosphere with LED lamp with LED driver. (Light Output i.e. LUMENS equivalent to 100/200W incandescent lamp)	Upto 30 W Or 40-45 W	
LEDExn'R'- 4	Weatherproof well glass non sparking restricted breathing type lighting fixture for use in dust-laden atmosphere but with LED lamp with LED driverand separate control gear. (Light Output i.e. LUMENS equivalent to 125W HPMV lamp)		
LEDExn'R'- 5	Same as Exn'R-1but with separate control gear. (Light Output i.e. LUMENS equivalent to 250W HPMV lamp)	100 W	
LEDExn'R'- 6	Non sparking restricted breathing & WP Well glass lighting fixture for use in dust-laden atmosphere with 60W to 100W LED lamp with LED driver. (Light Output i.e. LUMENS equivalent to 400W HPMV lamp)	60 W to 100W	BALIGA 100W-FLPW- 2595L KAYSONS KWL-A23 or equivalent
LEDExn'R'- 7	Non sparking restricted breathing & WP lighting fixture with LED lamp with LED driver suitable for use in dust-laden	Upto 72 W	BALIGA 72W-FLPW- 1095 KAYSONS KWL-A22



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	Mayorater
atmosphere. (Light Output i.e. LUMENS equivalent to 250W HPMV lamp)	or equivalent

NOTES:

- 1. LED Lamp Efficacy shall be minimum 100 Lumens/ watt.
- 2. All LED fixtures including driver shall be provided with 5 years warranty.
- 3. Color rendering Index (CRI) for LED lamps shall be greater than 80.
- 4. Color temperature for LED lamps shall be 6500K.
- Life of lamps including drivers shall be minimum 35,000 burning hours.
- 6. For LED fixture, integral junction box shall be provided with 2 nos. cable entries for loop-in, loop-out and associated wiring to fixture.
- 7. All fixtures shall be complete with lamps.
- 8. All fixtures shall be high power factor (Min. 0.9) type.
- 9. All mirror optics luminaries should be epoxy powder coated.
- 10. Make of fixtures shall be embossed on the body of the lighting fixtures.
- 11. 2 nos cable entrie shall be provided for loop in & loop out with internal wiring for driver & lamp for all LED FLP/Exn'R' fixtures.
- 12. LED lamps shall be provided with highly translucent diffusers with advance optical system with high internal reflectivity material of excellent and smooth output for glare free light and no visibility of LED to eyes



DATA SHEET UPS SYSTEM

	Name of the Control o						age a work	
-		PURCHASE	R'S D	ATA		号的 音线	ADE STATE	
A	Site conditions							
1	Ambient temperature,		3	Altitude :			<10	000
	- Maximum :	46 °C	4	Atmospheric co			Humid & corr	
	- Minimum :	1 °C	5	Location :	lr	ndoor- in	airconditioned	roc
	- Design :	45 °C	6	Applicable EIL:	specificat	ion	6-51-0017	
2	Design temperature for batt	tery sizing 10 °C	186					
3	Input power supply							
1	Voltage :	415V ±6%	3	Phase :			TPN OS	PN
2	Frequency:	50Hz ±3%	4	System fault lev	/el:			50
;	System requirements							
160	Equipment tag no.:		11	Type of battery	:			Ni-
2	Type of inverter:	IGB'		Battery backup			min	s.
8	Rating :	*		Descript		kVA	Backup time (mir
	Phase :	⊕ TPN ○ SPN		Instrumentation			*	
	Output voltage :	110V±1%		Telecom				74
	Output frequency:	50Hz ±1%		PA system			A . A Fill a light	
	Mode of operation :	Selec	ct				1 1950	
	Load power factor,		-	Battery rack info	ormation	:		
	- Rated :	0.8 (lag)	14	Ingress protecti				Tall a
	- Variation :	0.6 (lag)	15	Cable entry:	01 0110		Program (Program)	
1	Fault diagnostic unit :	Required Not required	-	Colour shade :			631 as pe	er l
_		Required O Not required	10	Joiour Shaue .			55 . 45 pt	
-1	AC distribution board (Ou	troing feeder details)		l			. 16.121 2.6.121	yet L
T	Item no. Incomer r	ating No. of outgoing k	N/A rat	ing of feeders	Swite	h rating	Fuse rating	T
1	as per MR (Amp.	ating No. of outgoing K	VATAL	ing of feeders		_	(Amp.)	
t	Lo po: All Camp.	.) feeders			(A	mp.)	(Allip.)	+
1								
1								
1								1
1						1 80000		1
1								1
L								1
1								
1	Mounting of ACDB:	Floor mounted	d 3	Type of ACDB	C	ompartm	entalised (drav	WC
,	Specific requirements		1	1.77-0				
	Normally Open (NO) p purchaser to ECS inte	Cables between all panels of U	wired				200 . 10	
SELECTION OF COMMISSION OF COM	- Charger Failure - Inverter Failure	rface, for the following condition - Battery Discharged - Battery Isolated	ons:	ирю temmiai s	strip for c	connection	by	THE RESERVE THE PROPERTY OF THE PARTY OF THE
	- Charger Failure - Inverter Failure	 Battery Discharged 	ons:	ирко temminar s	strip for d	connection	h by	STATE OF THE PARTY
Without the Control of the Control o	- Charger Failure - Inverter Failure Note:	- Battery Discharged - Battery Isolated	ons:					THE RESERVE THE PROPERTY OF TH
	- Charger Failure - Inverter Failure Note:	 Battery Discharged 	ons:					CALL THE CASE OF T
	- Charger Failure - Inverter Failure Note:	- Battery Discharged - Battery Isolated	ons:					
	- Charger Failure - Inverter Failure Note: * To be decided by	- Battery Discharged - Battery Isolated Contractor in line with Engi	ineeri			documen	<u>t</u> .	
	Note: * To be decided by	- Battery Discharged - Battery Isolated	ineeri	ng Design Bas			t. PG	



DATA SHEET UPS SYSTEM

Datasheet No. A951-000-16-50-DS-013 Rev.No. 0

	3					Page 2013
13	[1] (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	MANUF	ACTUR	ER'	S DATA	
A						
1	Make :	1 1 1 1 1 1 1 1 1		9	Noise level :	
2	Type designation :			10		of UPS system
3	Rating :	kVA at	0.8 p.f.		except ACDB and battery,	
4	Mode of operation :	e . (8)	海(四)量	13.0	- Length:	mm
5	Output voltage distortion under the following	na condition	s		- Depth:	mm
	- For 50% step load :	V±	%		- Height:	mm
	- For 100% step load :	V±	%	11	Efficiency of each rectifier and in	
	- For 100% step unload :	V±	%		including input and output transf	
	- Power supply interruption and		/0		- At 100% load :	
	restoration:	V±	%			%
	- Load transferred to bypass line :	V±	%		- At 75% load :	%
	When one inverter gets faulty and load		. 70		- At 50% load :	
	transferred to healthy inverter :			-	- At no load :	%
6	Phase angle distortion and anti- fill in	V±	%	12		cluding input
	Phase angle distortion under the following	conditions,			transformer,	
AND AND	(for three phase inverter only)	1 18			- At 100% load :	%
155	- For 50% step load :	120°±	%		- At 75% load :	%
	- For 100% step load :	120°±	%		- At 50% load :	%
16	- For 100% step unload :	120°±	%	THE ST	- At no load :	%
	 Power supply interruption and 	i i i i i i i i i i i i i i i i i i		13	Heat loss for the total system :	kW
	restoration :	120°±	%	14	Overall efficiency of UPS system	(ratio of output
	- Load transferred to bypass line :	120°±	%		load to input power drawn from m	
	 When one inverter gets faulty and loa 	id	SERIE .		charger and inverters are on and	
	transferred to healthy inverter:	120°±	%		with bypass, operating at no load	
7	Maximum recovery time to reach steady st	ate after	Y STUDE		- At 100% load :	%
	above disturbances (clause nos. 5 & 6):	mi	lli sec.	21055	- At 75% load :	%
3	Redundancy of cooling system :	1 188		-014	- At 50% load :	%
	Inverter	- 653			- At no load :	%
	Rating:	kV	'Δ	10	Short circuit capacity & duration :	. /0
-	No. of phase(s):	NV.	^	11		2 abass sabs)
	Steady state output voltage,	1,1 (2)1		61.13	Output voltage/phase angles (for	
	- Nominal :	\/			- For 30% unbalance load :	V/ de
64		V			- For 40% unbalance load :	¥7 GD
	Output voltage adjustment range	· · · V			- For 50% unbalance load :	V/ de
	at rated load :				- For 100% unbalance load :	V/ de
	input DC voltage,	· (4)			Type of control circuit:	. 1.8.1 Jan (1988)
				13	Max. allowable rating of outgoing	
	- Nominal :	V			clearance of feeder fault by UPS	with mains bypass
F	range.	V	- 4.12		supply back up,	
	requency variation limit for inverter				 With fast acting 	
V	when phase locked with mains :				semiconducting fuses :	amps.
1	Allowable unbalance between phases :				- With normal HRC fuses :	amps.
	for 3 phase only)			14	Max. allowable rating of outgoing	feeders for fault
ŀ	larmonic distortion at inverter output at rate	ed load,			clearance of feeder fault by UPS v	
	- For linear load:				bypass supply back up,	
	- For non linear load:		4		- With fast acting	1.
C	Overload capacity & duration:				semiconducting fuses :	amps.
	- For 110% load:	mir	1		- With normal HRC fuses :	amps.
	- For 125% load:	mir		15	Load Crest factor	amps.
	- For 150% load:	sed		Adea	2533 51551 185101	The second secon
S	tatic switches	350				
	o. of static switches in the UPS system :		I	2	Type of static must be	
C	surrent rating at specified ambient,	5 to 10000		3	Type of static switch :	
	- Continuous :			4	Transfer time,	· · · · · · · · · · · · · · · · · · ·
-	- Short time :	Α .			- Synchronised mode :	milli sec.
P	attery charger	Α.	E-100		 Unsynchronised mode : 	milli sec.
	urrent rating :					8
	ype of charger:	A		3	Output voltage range under,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
IT.	And of Cuarder .			TEL VI	- Float charging condition :	V
Ty	, goil				- Boost charging condition :	· · · · · · · · · · · · · · · · · · ·



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Current range:

Format NovEIL 1050-2017-Re

Electronic devices :Electrical devices :

Safety factor used for selecting the components,

Reliability

DATA SHEET UPS SYSTEM

Datasheet No. A951-000-16-50-DS-013 Rev.No. 0

Maximum harmonic content in Output voltage accuracy under specified input input current: 5 Maximum ripple content on DC side with battery, kVA Input transformer rating: - Connected: - Disconnected : Manual transfer devices 3 Rating. 1 Make: Type designation: - Continuous : - Short time : Battery F 11 Overall rack dimension Make: mm 2 Type designation: - Length: - Depth: mm 3 Type: - Height: mm AH rating: 4 12 Battery charging requirements, 5 End cell voltage: V Nominal Voltage : - Nominal voltage/cell: ٧ Boost charging time : - Float voltage/cell: hrs. - Boost charging voltage/cell : V No. of cells in each bank: No. of battery banks: 13 Container type: 14 No. of recommended air changes/hour 10 No. of racks : m^3 for battery room: Stepdown bypass transformer with solid state voltage stabiliser 1 Make: Accuracy of stabiliser: Type designation: Type of control: 3 Rating: kVA 7 Type of cooling: 4 Voltage ratio: V Type of stabiliser: H AC distribution board Overall dimensions, 1 Make: mm Type designation: - Length 2 mm 3 Rating: A - Depth 4 Degree of protection - Height mm (Including max. & min operating Height) 5 No. of outgoing Feeder / rating of each Cell booster 1 Make: Overall dimensions, mm Type designation: - Length - Depth mm 3 Voltage range:

- Height

MTBF/MTTR:

Availability factor:

mm

DATA SHEET FOR DRY TYPE LTG. TRANSFORMER

DOCUMENT NO. A951-000-16-50-DS-014 rev.1

DATA SHEET FOR DRY TYPE TRANSFORMER

PART - I (TO BE FURNISHED BY PURCHASER)

1.0	SITE CONDITIONS

Maximum ambient temp 1.1

46.1 °C

1.2 Minimum ambient temp

1°C

Design Ambient temp. 1.3

45°C

1.4 Relative humidity

Max 89 %

1.5 Altitude

< 1000 m above sea level

1.6 Environment

Tropical, dusty & corrosive as found in Refineries

2.0 **OPERATING CONDITIONS**

2.1 Primary voltage

415V

2.2 Fault level

50 kA

2.3 Earthing system

Primary

Solidly earthed

Secondary

Solidly earthed

3.0 GENERAL DATA

3.1 Service

Lighting

3.2 Duty

Continuous

3.3 Type of cooling

ANAN

3.4 Installation

Within substation

Painting

Ероху

Colour

RAL 7032

ELECTRICAL DATA 4.0

4.1 No. of windings

Two

4.2 Phase 3

4.3 Frequency

50 Hz+3%

4.4

3.5

Insulation class

B (Upto 100kVA)

H (Above 100kVA)

Winding insulation 4.5

Uniform

Rev. Date		Purpose	Prepared	Checked	Approved
0	21.11.16	ISSUED FOR TENDER	GK	VK	PG
7	14.12.16	REVISED AND REISSUED FOR TENDER	GK	VK	PG



DATA SHEET FOR DRY TYPE LTG TRANSFORMER

DOCUMENT NO. A951-000-16-50-DS-014 Rev. 1

4.6	Neutral earthing	:	Solidly earthed
4.7	Prim. phase sequence		
4.8	Sec. phase sequence	:	* (To suit switchgear/As per IS:8623)
×	â.		
5.0	SPECIFIC REQUIREMENT	<u>-s</u>	
5.1	Transformer Tag nos.	: Late	r
5.2	Rated KVA	: *	
5.3	Voltage ratio	: 415/	415V
5.4	Vector group	: Dyn	1
5.5	% Impedance	: 4 %	minimum .
5.6	Off load tap changer	: <u>+</u> 7.5	%,each step of 2.5%
5.7	Neutral C.T.	: N.A.	
5.8	Terminal details		
		Primary : Secondary	*
5.9	Primary	: Cabl	e box
	Cable size/Type	: Late	r
	Secondary	: Cabl	e box
	Cable size/Type	: Late	r
6.0	ACCESSORIES		
6.1	Two temp. Sensing devices	in each limb	: Yes
6.2	Temperature sensing relay		: Yes
6.3	Rollers (Distance between	rollers 1000 mr	n): Yes (Required for Transformer rated above 100 kVA)
6.4	Indicating platinum resistant Thermometer with contacts		: Yes (Required for Transformer rated above 100 kVA)
6.5	Marshalling box (IP-55)		: Yes
6.6	Cross channels with towing	lugs	: Yes
6.7	Separate neutral bushing	outside termina	al :Yes
	box with connector assemb	ly	
6.8	Busduct flange on LV side		: No
6.9	Lugs and cable glands		: Yes
7.0	TESTS REQUIRED		
7.1	Heat Run Test		: Yes (Type test certificates on 1 set of each rating)



DATA SHEET FOR DRY TYPE LTG TRANSFORMER

DOCUMENT NO. A951-000-16-50-DS-014 Rev. 1

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PART-II (TO BE FILLED BY VENDOR)

1.0	Rating of transformer	:
2.0	PERFORMANCE	
	Losses shall be inclusive of positive tolerance at nominal tap	:
2.1	No load loss	
	At 100%V At 110%V	:
2.2	F.L. Copper losses at 75°C	.,
2.3	No load current	
	At 100%V At 110%V	:
2.4	Efficiency at full load at 75°C	:
	At 0.8 p.f.	:
0.5	At 1.0 p.f.	
2.5	Efficiency at 1/2 load at 75°C	
	At 0.8 p.f.	:
	At 1.0 p.f.	:
2.6	Load at which max. efficiency occurs	:
2.7	Maximum efficiency	:
2.8	Percentage regulation at 75°C	
	At 1.0 PF At 0.8 PF	:
3.0	CONSTRUCTIONAL FEATURES	
3.1	Location of terminals	:
3.1.1	Primary	:
3.1.2	Secondary	:
3.2	Location of Neutral CT	:
4.0	MECHANICAL DATA	
4.1	Core & Winding wt.	:
4.2	Total wt.	:
4.3	Overall dimensions LXBXH (mm)	



DATA SHEET FIRE ALARM SYSTEM

A	Site conditions	PURCHASI	EK'S I	DATA	
1	Ambient temperature,				
	- Maximum :		2	- Total Training ty	85 %
	- Minimum :	46.1 °C	3	11000 111 0	bove mean sea level
	- Design :	1 °C	4	Atmosphere Humid &	Corrosive
B	Area classification	45 °C		74	
1	Buildings				
	Plant units	Safe	- 346		
	General data	As per area classifica	tion		. 49 74 89重
	Type of fire alarm papels		k Bo		
2 /	Area to be covered by FA system	Aicroprocessor based			
DF	Power supply	As per block diagra	m		
1 ir	Dut power Welters /				
2 B	nput power (Voltage/Frequency) Battery type	See Note-1	4	Temperature for battery sizing	10 °
3 0	outery type	VRLA	5	Ageing factor	
J /	Ouration for battery sizing			genig ideter	
(r	Refer clause 5.2.3 of spec.6-51-0	076)	- 8000		
F 1	ype of fire alarm system	11 11 188			
	onventional	Not Required			
	icroprocessor based	Required			
ar	nalogue addressable	required			A STATE OF THE STA
		DEATH S			
F Sp	pecific requirements of the fire	alarm system	10700	<u> </u>	
	atdo signais, alamis &	Refer Cl. 9 of	10000		
sh	utdown signal requirements	6-51-0076			
a Au	itomatic signal for clean agent/	Street Control of the			
CC	2 release	Required	g	Fire water pump running indica	
b Se	lector switches for clean agent/	Not Dendard	h	Fire water pump start push butt	
CC	2 SUPPLY	Not Required		Control for sirens	Requir
c Ma	nual push button for discharge		J	Controls & signals to various	Requir
of	clean agent/CO2	Not Required	1111	control rooms	
1 Cle	ean agent/CO ₂ discharge inhibit		k	Repeat alarm signal to mimic pa	anel Not Require
DUIC	sh-buttons	Not Required	1	Repeat alarm signal to repeat	Require
Dal	SI-DULIONS		1000	alarm panel	Link Dr Sala
but	uge valve activation/test push-	Not Required	m	Status of battery condition	Require
Dull	ons and activated status lamps	in the second second	ASSESS.	or battery condition	
Snu	tdown signals (potential free	Required			The Contract
cont	tacts for air handling units)	el 1111 see 113			
	le entries for manual	2 Nos.from bottom	1/63/59		
call	points	i i i i i i i i i i i i i i i i i i i			
			10.000		16. 13.35
9					
Note					
1. Fc	ollowing power supplies shall	he provided by averbase			
			:1.		
	240V AC for each DGFAP, CF	AD - JD			
	Ar, cr	AP and Repeater Panel			
	THE RESERVED				
)	21.11.16				
No.	Date	sued For Tender		GK VK	PG
INU.		Purpose		epared by Checked by	



DATA SHEET FIRE ALARM SYSTEM

	e Politica de Paris de Paris de Caración d		CTURER'S	All and the first of the second secon	为"别"的"多"。
-		PART-2 (to b	e filled by th	ne vendor)	1
A	Make, type and model no. of follo	wing items			
		T PP 1664	Make	Type/Model No. D	imensions
1					- 1: Bakes
a	Safe area	J			
b	Hazardous area	1.1 1.488			
2	Ionisation type smoke detectors	NA			
a		- 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3			
and right	Hazardous area		PR02		
3	Photoelectric type detectors	NA			
а	Safe area	11 11 15			
7.0	Hazardous area	14. 1. 68			
4	Linear beam smoke detectors			<u> </u>	and the second second
a	Safe area	100			11.11.11.11.11.11.11
5	Manual break glass boxes	11:15	No.		
а	Safe area		Bear Bear		(School)
b	Hazardous area				
	Ultra-violet flame detectors	NA S			
7	I/R detectors	NA			10.00
8	Heat sensing cables	NA :			
а	Detector unit for heat sensing cables				
9	Wired telephone handset	NA :			
10	Response indicators	NA			
11	Exit signs	1.11. 198			
12	Hooters	· · · · ·			
а	Hooter acknowledge boxes	- E			
Annual State	Blinking lights	- Fin R			
	Halon/CO2 release/Inhibit switches	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
94. TATE OF	Siren	- 1. 11. 11. 11. 11. 11. 11. 11. 11. 11.			
16	Detectors where radioactive	NA			
	materials are used				
а	Strength of radioactive material		Selection of the Selection	Less than 1 microcurie	[and 10]
	Conventional fire alarm system	NA			"",""
1	Central fire alarm panel	The Hillian			
а	Make & model no.		е	Dimensions (LXDXH)mm	
b	No. of zones	192	Mf.	Mimic	
С	Operating voltage & power		THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAM	LED size	Land State of the Control of the Con
an est	consumption			LEDs arrangement	Tari Mass
d	Ingress protection			LEDs arrangement basis	
-	Siren				
-	Siren				· · · · · · · · · · · · · · · · · · ·
-	Output KW/	db at 1 mete			
-	Voltage	V			11
200	Phase	Phase	1983		i interne
116	Frequency	Hz			. Daniel
	Starter for siren (IP-55)	П2			
3	Mimic panel (if non-integral)		Rate		
a	Make & model no.		c	Mounting	. Barrati
	Operating voltage	11.71	d	Dimensions (LXWXH)mm	Life Sec
4	Zonal fire alarm panel		The same was	Dilleliaiolia (EVAVU)IIIII	
a	Make & model no.		A	Dimensions (LXDXH)mm	· · · · · · · · · · · · · · · · · · ·
a b	Operating voltage & power			Max.& Min.no.of zones	The Market
CHR.	consumption			No. of devices per loop(max.	
	Mounting	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		TWO. Of devices per loop(ITIAX.	



DATA SHEET FIRE ALARM SYSTEM

COLUMN							maga-a
5 Repeat alarm par	nol .			268	(6) (3)		3 (1) F 2 (1)
a Make & model no.	iei	- 1					
b Operating voltage				d		is (LXDXH)mm	
power consumptio				е		nged in a matrix	
c Mounting				f	LEDs arra	nged on graphic	
C Computer sided 6	ina .		·	ALLE			
C Computer aided f	ire alarm syste	m	· 2011		ille and a second		
The second secon	panel (CFAP)			FIX			7111.786
				h	Processor r	edundancy	EFFERENCE TO THE PERSON OF TH
					(Refer claus	se5.3.1.28	11. 1.11
c No.of inputs			SALE		of spec.6-5	1-76)	nim i Spri
d No.of programable ou	itputs			-11	Ingress prof	ection	
e Scanning speed				j	Dimensions	(LXDXH)	
f Operating voltage &							entice the season
power consumption				ALC:	3		
g Software used					ă .		
2 Video display unit (V	/DU)						
a Make & model no.		11.7				9	11 11 1, 1, 1, 1, 1, 1, 1
b Locations		11 41 41		(No.	ğ		
c VDU screen size							
d VDU type/Colour							Til, I die 1994
e Dimensions (LXDXH)r	nm		SWILL.				
3 Printer		411		ent.			
a Make & model no.		100		d	Speed & siz	e	
b Quantity				е		(LXDXH)mm	
c Locations		1,110	· III EXEMP			()	771 1,4854
4 Data gathering cum f	ire alarm panel	(DGFAP)			g .		rita (in a la Maria
a Make & model no.				f	Number of r	rogrammable outp	uts
b Type of panel		is the	March 35	g		ncy for devices	
c Max.and min.number of	of loops					oltage & power	
d Max number of devices	in each				consumption		
analogue loop		a salah	A RELIVERY	1	Communica		
e Event history storage p	rocessina	1,1,11		i	Ingress prot		
5 Repeat alarm panel		** 1 * * * * * * * * * * * * * * * * *			g. 000 prot	554011	F. B. F. 11 12 28
a Make & model no.				С	Display		
b Operating voltage &				d	Ingress prote	ection	1000000
power consumption			G. REELE M	e		(LXDXH)mm	
Battery bank & char	ger details	1 11		935	- Interioris	(LADAI)IIIII	
1 Battery			DGFAP	E PE	CFAP	Zonal panel	and the state of t
a Make			JUI AI		UI AF	Zunai panei	100
Type/modelno.							The second of the second
AH Rating		11 10,74% Till 11 1				,	
No. of cells			AR PERSON				
Voltage per cell							4 1 1 A A A A A A A A A A A A A A A A A
End cell voltage				-			
Dimensions (LXDXH)mr	n			o-HARRY As DESH			
Charger/UPS			Charge			LIDC	
Make		- 100 140	Charger	2 - 1		UPS	4.1 F.1 SEC.
Type/modelno.							The state of
Rating			A			AND THE SECOND	
Dimensions (LXDXH)mn	0	4 1000 75	Amp	15.78			
Power requirements		1 4 1 1 1					The Property of the Control of the C
DGFAP (Watts)							
Zonal fire alarm panel (W	dos.						4. 计数据数
Total fire alarm system ()	cts)						10000000000000000000000000000000000000



certificates of recognised test

Reference no.& date of CCE approval certificate BIS License no. & date

DATA SHEET FIRE ALARM SYSTEM

λ.						tage 4	014
		F		3			
F	Cables	71.		i i		20.89	
1	Recommended cable/wire size	e di					
	& type	2 2	down the last			4 0	Herman
a	Between DGFAP & detectors,	.4.7495				9.3	: Kalenda
	manual call points			0		10	ESECTION.
b	Between Zonal panel & detectors					p. (1)	
	manual call points					7 . :	ices o
2	Recommended cable size & type	11				***	
а	Between CFAP & DGFAP	12 17					
b	Between CFAP & Zonal panel	il ê t				.1111	
С	Between CFAP & repeat alarm panel						No. of the last of
d	Between DGFAP & repeat alarm panel						- Maliantin
е	Between zonal panel &					1	i filmitte
	repeat alarm panel		GENERAL AND				一
	Cable resistance (Max.per loop)					8.8	
4	The superior (Max.pcl 100p)					1	. Ette 88: 441
G	Details of equipment certification	/approva	l for hazardo	us			
	area application	*****		5			
		71.3					
	Equipment	MCP	Multisensor	Linear Beam	Others		
			Detector	Detectors			
	MR item no.						
	Explosion protection class						
	(as applicable)			1			
	Type reference no.						
	Reference no.& date of CMRI/						
11000	_4144		1	1	1	- 1	

FOR TEINDER FOR TEINDER R CLIENT COMMENTS R CLIENT COMMENTS R CLIENT COMMENTS R CLIENT COMMENTS R CLOURCE WITH SPRING REIAT A R CLOURCE WITH SPRING REIAT A R CLOURCE WITH SPRING REIAT BREAKER VOB R CLOURCE WITH SPRING REIAT BREAKER WITH SPRING REIAT BREAKER WITH STABILLISING REST BOWN, CLO-40%) WITH STABILLISING REST BOWN CONTROL SUPPLY SUPERVISION REST BOLIC SUPPLY SUPERVISION REST BOUNDERING RELAY ALSTOW' TYPE VAA 11 OR EQUIVALENT RECOLD TROUBLE) R CONTROL SUPPLY SUPERVISION REST BOWN TROUBLE) R CONTROL SUPPLY SUPERVISION REST BOWN TROUBLE) R CONTROL SUPPLY SUPERVISION REST BOWN TROUBLE TO BE SURGE SUPPREDING RELAY BUTH SWITH	1 1 1 1 1 1 1 1 1 1	PROJECT: DEVELOPMENT OF SILOS FOR REV. DATE	DEVICE	T A	FundosE	B	CHKD	191
REGIONALEM RECUENT RECORD 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	-	TENDE	N AN	KEISSUED FOR	8	¥	S.
AS REGION AS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AS REGIO. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0	ISSUE	FOR	TENDER	충	¥	PG
AS REGD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AS REGD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		ISSUED	FOR CL	JENT COMMENTS	ક્	¥	8
1	AS REGIONALY TEET 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	110 V D.C. CONTROL BUS						
1	AS REGIO. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TER & AUX. CKT.			C FINE COLOR	1		
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AS REGO. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		NO.		E COLUMEN	DESCRIPT	NOL	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0	-	52	1 CIRCUIT BREAK	KER VCB		
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	→		25	1 BKR. CONTROL TRIP (LOCKABL) TO NEUTRAL)	SW. CLO	SPRING F	TRAL- RETURN
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			32	TRIP CKT. SUP TYPE VAX 31 (ERVISION OR EQUIN	RELAY	'ALSTOM'
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			<u> </u>		ΓĂ		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	_		Ž.	1 IDMT. E/F REL (10-40%) WTH	AY 1 STABII	LISING R	ESISTOR
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 AS REGD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1) (ın	1	1 MW & MMH ME	ETER		
3 AS REGD. AS RECD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AS REGD. AS A	J	9	1	1 AMMETER(3 PA	HASE)		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AS REGD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MW (MW)	7	1		CTED 50'	√A, α.–1 Υ	I, P.T.
10 1 1 1 1 1 1	AS AS REGIO. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		60	ı	1 VOLTMETER WI AND OFF	H SELE	CTOR SW	. 3-WAY
AS REQD. REQD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AS REGD. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		00	1	1 4 POLE MCB 1	V 0		
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REGD. REGD. 1 1 1 1SET 1SET 1ECUROMEDAT	REGD. AS RECD. 1 1 1 1SET EQUIPMENT	0.433 kV	=	1		HEATER RMOSTAT	WITH SW	TCH,
REQDIO 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	REQUI	NSFORMER	12			MPS -LE	D TYPE	
1 1SET EQUIPMENT D	1 1 1 SET EQUIPMENT D	100	13			r 031-8	PE (TRA)	NSFORME
1 1SET EQUIPMENT D	1 1SET EQUIPMENT D		4	8	1 CONTROL SUPP 'ALSTOM' TYPE	VAA 11	RVISION OR EQU	RELAY
1SET SQUIPMENT DA	1SET			98		, 'ALSTO	M' TYPE	VAJH 23
ID, IF ANY, SHALL BE CONSIDERED AS PART OF BREAKER MECHANISM. SHOWN ABOVE IS ONLY INDICATIVE, ALL THE ITEMS SPECIFIED UNDER "EQUIPMENT DATA" AND IN GPWO SPECIFICATION SHALL "\$ \$000PE. SHALL BE NUMERICAL TYPE (EXCEPT TRIPPING RELAY, 88 WHICH IS ELECTROMECHANICAL TYPE)	D), IF ANY, SHALL BE CONSIDERED AS PART OF BREAKER MECHANISM. SHOWN ABOVE IS ONLY INDICATIVE, ALL THE ITEMS SPECIFED UNDER TECHPURAT DATA" AND IN GPWO SPECIFICATION SHALL SHALL BE NUMERICAL TYPE (EXCEPT TRIPPING RELAY, 88 WHICH IS ELECTROMECHANICAL TYPE) LL BE DECIDED BY VENDOR					TYPE SUI	RGE SUP	PRESSOR
SHOWN ABOVE IS ONLY INDICATIVE, ALL THE ITDUS SPECIFIED UNDER "EQUIPMENT DATA" AND IN CPWD SPECIFICATION SHALL SHALL BE NUMERICAL TYPE (EXCEPT TRIPPING RELAY, 88 WHICH IS ELECTROMECHANICAL TYPE)	SHOWN ABOVE IS ONLY INDICATIVE, ALL THE ITEMS SPECIFED UNDER "EQUIPMENT DATA" AND IN CPWD SPECIFICATION SHALL SHALL BE NUMERICAL TYPE (EXCEPT TRIPPING RELAY, 86 WHICH IS ELECTROMECHANICAL TYPE) LL BE DECIDED BY VENDOR	D, IF ANY, SHALL BE CONSIDEND AS PART OF BREAKER	MECHANIS	ā				
THE WANT OF THE CEXCEPT TRIPPING RELAY, 88 WHICH IS ELECTROMECHANICAL TYPE)	TY SHALL BE NUMERICAL THPE (EXCEPT TRIPPING RELAY, 86 WHICH IS ELECTROMECHANICAL TYPE) ALL BE DECIDED BY VENDOR	I SHOWN ABOVE IS ONLY INDICATIVE. ALL THE ITEMS SPECIF RYS SYMPF.	BONN CIBL	EQUIP!	AENT DATA" AND IN CPWD	SPECIFICA"	TION SHALL	
	all becoded by vendor	Y SHALL BE NUMERICAL TYPE (EXCEPT TRIPPING RELAY, 86	WHICH IS	E ECTR	DMECHANICAL TYPE)			

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DATA SHEET	A951-000-16-50-DS-0021	
H.V. SW. BD. DATA SHEET	11kV ISOLATION BREAKER PANEL	
(अवस्ता) ENGINEERS INDIA LIMITED	NEW DELH	
	H.V. SW. BD. DATA SHEET	H.V. SW. BD. DATA SHEET 11ky ISOLATION BREAKER PANEL

REV