

पावर सेक्टर- पश्चिमी क्षेत्र Power Sector-Western Region
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BHEL PAN: AAACB4146P

Ref.: PW/NGP/PUR/1906070/Corrigendum-09

DT: 07-09-2019

To,

ALL BIDDERS

Sub: Corrigendum-09 for issuance of clarification.

Job: Design, manufacture and supply of 01 No. Prefabricated container at 2 X 800 MW NTPC Ramagundam Site on F.O.R. destination basis

Ref:- Tender Enquiry Number: 1906070

Bidders to kindly take note of the following: -

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AA: Clarifications to bidder's queries has been issued as per **ANNEXURE-I**

BB: In addition to the drawings, sketch and documents provided in NIT, following documents shall become part of the tender documents:

1. NTPC Technical Requirements
2. Data Sheets for Mini UPS doc ref: 9591-102-405-PVI-Y-014 Rev:00

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All other Terms and conditions of the Tender Specification shall remain unaltered unless expressly amended by BHEL in writing.

Bidders are requested to submit as a part of their offer, a copy of this corrigendum duly Digitally countersigned by the authorized signatory as a token of Bidder's unqualified acceptance of this corrigendum.

BIDDERS MAY PLEASE NOTE THAT SUBJECT TENDER IS E-TENDER AND THE OFFER IS TO BE SUBMITTED ONLY IN E-PROCUREMENT PORTAL <https://bhel.abcpurchase.com>

BIDDERS WHO HAVE ALREADY SUBMITTED THEIR OFFERS PRIOR TO ISSUANCE OF THIS CORRIGENDUM IN E-TENDER PORTAL ARE REQUIRED TO RE-SUBMIT THEIR OFFER AFTER TAKING COGNIZANCE OF THIS CORRIGENDUM.

Thanking you,
Yours faithfully,

AGM/Purchase

BHEL-PSWR, Nagpur

ANNEXURE – I

Ref: PW/NGP/PUR/1906070/Corrigendum-09 dtd 07-09-2019

Query (1). Confirm the Dimensions of Container –

- a) Length-14900mm x Depth-4600mm x Height-4500mm (Aux.Boiler PMCC room),
- b) Length-5500mm x Depth-9300mm x Height-4500mm (Aux.Boiler Control room, Battery room), Toilet room
(Length-3000mm x Depth-3000mm x Height - 4500mm)

Clarification (1). All dimensions should be as per attached layout with 4500mm clear Height for switchgear room.

Query (2). Transformer area and any kind of Civil works, Cable trench below container etc. and Supply & Installation of cable trays, Rubber mats inside container is in BHEL scope.

Clarification (2). Earthworks, RCC works for transformer area, container area and cable trench below container is in BHEL scope.

Supply of Cable trays and installation of tray: BHEL's Scope

Supply and Installation of Rubber mat is in BHEL's scope.

Query (3). Confirm whether any fire rating is required for E-House-walls, roof and doors. Refer Clause no.6 & 8 in page no.22 of 28 in document: VOL_IA Technical bid. It is mentioned as " Doors shall be of 4 hours fire rated".

Clarification (3). In the specification for container 4 hours fire rating for door mentioned.

For Roof & walls: Fire rating is required as per industrial practice.

Query (4). Confirm the Door width for Battery room.

Clarification (4). Door shall be 1.2M W X 2.5M H

Query (5). Confirm the Size of GI flat required for Container internal earthing:

Clarification (5). 65X8MM

Query (6). Confirm Table-1,Table-2,Table-3,Printer table, Gravity dampers and all required items, piping and accessories for Toilet room is in BHEL scope.

Clarification (6). Piping and accessories for Toilet room is in scope of vendor.

For HMI items supplied by EDN: Dimension of Computer table & Printer table is 1500x750x750 mm & 900x650 x740 mm respectively.

HVAC items like Gravity damper, ventilation fans, intake louvers shall be provided by BHEL. Opening Sizes required for installation of these HVAC items are already shown in the Electrical drg (**PE-DG-424-100-E019_Rev 05**).

Dimension of Aux Boiler DCS panels supplied by BHEL 2400x800x2067 mm (WxDxH)

ANNEXURE – I

Ref: PW/NGP/PUR/1906070/Corrigendum-09 dtd 07-09-2019

Query (7). Confirm the Interior paint shade colour for Container whether white (or) RAL 5012 (light blue). Refer Clause no.9 in page no.22 of 28 "Standard interior finish shall be white" & Clause no. 9A in page no.23 of 28 in document: VOL_IA Technical bid.It is mentioned as " Both Interior and exterior panels, roof and base frame will be painted in colour shade of RAL 5012".

Clarification (7). Shade for painting shall be as approved by NTPC/BHEL.

Query (8). Inform the internal free issue equipment weight details.

Clarification (8). Total Switchgear Weight shall be 9000KG approx..

Weight of Aux Boiler DCS panels supplied by BHEL 1200 kg approx.

For HMI items supplied : Items being supplied for HMI :

i.) 3 KVA mini-UPS and Battery - 1 Set -- refer attached datasheet for dimension and weight.

ii.) 1 KVA mini-UPS & Battery - 3 Sets -- refer attached datasheet for dimension and weight.

iii.) Engg. Station- 1 No. & Storian Station - 2 Nos.

Dimensions (H x W x D)	43.26 x 20 x 62cm (17.03 x 7.87 x 24.41in)
Weight (Approximate)	Minimum:14.51 kg (32 lb)

iv.) A4 Colour Laser Printer - 1 No. --- Size (in. - H x W x D) / Weight (lb.)-- 11.5 x 17.4 x 16.0 in. / 44.8 lb.

Query (9). Details and quantities of light fittings, fire detection & alarm system and Air Conditioners & Ventilation system is needed to consider provision inside container.

Clarification (9). Light Fitting quantities is not in the scope of bidder.

Air conditioning and Ventilation system equipment like Axial exhaust fans and intake louvers for battery room, axial supply fan and gravity damper for MCC room, propeller fans and intake louver for toilet, split AC for control room shall be provided by BHEL.

Fire detection & Alarm system is not in bidder Scope

Query (10). Inform the degree of protection (IP) to be considered for E-House.

Clarification (10). Min IP-65 Degree of Protection is required.

Please refer enclosed specification for applicable wind and seismic loadings for container structure etc.

CLAUSE NO.	TECHNICAL REQUIREMENTS			एनटीपीसी NTPC								
	Annexure- (d) CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT All structures shall be designed for wind forces in accordance with IS:875 (Part-3) and as specified in this document. Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard. Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method. Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than “5” and/or if the fundamental frequency of the structure is less than 1 Hz. Susceptibility of structures to across-wind forces, galloping, flutter, ovaling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875(Part-3) and other relevant Indian standards. It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects. Damping in Structures The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for: <table><tr><td>a) Welded steel structures</td><td>: 1.0%</td></tr><tr><td>b) Bolted steel structures</td><td>: 2.0%</td></tr><tr><td>c) Reinforced concrete structures</td><td>: 1.6%</td></tr><tr><td>d) Steel stacks</td><td>: As per IS:6533 & CICIND Model Code whichever is more critical.</td></tr></table>				a) Welded steel structures	: 1.0%	b) Bolted steel structures	: 2.0%	c) Reinforced concrete structures	: 1.6%	d) Steel stacks	: As per IS:6533 & CICIND Model Code whichever is more critical.
a) Welded steel structures	: 1.0%											
b) Bolted steel structures	: 2.0%											
c) Reinforced concrete structures	: 1.6%											
d) Steel stacks	: As per IS:6533 & CICIND Model Code whichever is more critical.											
TELANGANA SUPER THERMAL POWER PROJECT PHASE-I (2X800MW) STEAM GENERATOR ISLAND PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO.:CS-9591-101-2	SUB-SECTION- CIVIL WORKS	PAGE 280 OF 294									

CLAUSE NO.	TECHNICAL REQUIREMENTS		एनटीपीसी NTPC									
	Annexure (d) Site Specific Design Parameters The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows: <table><tr><td>a.</td><td>The basic wind speed “V_b” at ten meters above the mean ground level</td><td>44 m/s</td></tr><tr><td>b.</td><td>The risk coefficient “K₁”</td><td>1.07</td></tr><tr><td>c.</td><td>Category of terrain</td><td>Category-2</td></tr></table> Note: Notwithstanding the values of the above mentioned parameters, 1) The design wind pressure "p_z" at any point (computed using Peak Wind Speed method) shall not be taken less than 1500 N/Sq. metre for all classes of structures, i.e. A, B & C, as defined in IS:875(Part-3). 2) The design wind pressure " $\bar{p}_z$ " at any point (computed using Gust Factor method) multiplied by the gust factor "G" shall not be taken less than 1500 N/Sq.metre.			a.	The basic wind speed “V _b ” at ten meters above the mean ground level	44 m/s	b.	The risk coefficient “K ₁ ”	1.07	c.	Category of terrain	Category-2
a.	The basic wind speed “V _b ” at ten meters above the mean ground level	44 m/s										
b.	The risk coefficient “K ₁ ”	1.07										
c.	Category of terrain	Category-2										
TELANGANA SUPER THERMAL POWER PROJECT PHASE-I (2X800MW) STEAM GENERATOR ISLAND PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO.:CS-9591-101-2	SUB-SECTION- CIVIL WORKS PAGE 281 OF 294									

CLAUSE NO.	TECHNICAL REQUIREMENTS			एनटीपीसी NTPC																
	Annexure-(e) CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS:1893 (Part 1):2002 and IS:1893 (Part 4):2005. Pending finalization of Parts 2, 3 and 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for structures other than the buildings and industrial structures including stack-like structures. A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration 'g') in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at Annexure-I. Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values. The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS:1893 (Part 1) and Annex B of IS:1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in Annexure-I includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS:1893 (Part 1 and Part 4). Damping in Structures The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for: <table><tr><td>a)</td><td>Steel structures</td><td>:</td><td>2%</td></tr><tr><td>b)</td><td>Reinforced Concrete structures</td><td>:</td><td>5%</td></tr><tr><td>c)</td><td>Reinforced Concrete Stacks</td><td>:</td><td>3%</td></tr><tr><td>d)</td><td>Steel stacks</td><td>:</td><td>2%</td></tr></table>				a)	Steel structures	:	2%	b)	Reinforced Concrete structures	:	5%	c)	Reinforced Concrete Stacks	:	3%	d)	Steel stacks	:	2%
a)	Steel structures	:	2%																	
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d)	Steel stacks	:	2%																	
TELANGANA SUPER THERMAL POWER PROJECT PHASE-I (2X800MW) STEAM GENERATOR ISLAND PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO.:CS-9591-101-2	SUB-SECTION- CIVIL WORKS	PAGE 282 OF 294																

CLAUSE NO.	TECHNICAL REQUIREMENTS 		
	Method of Analysis Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS:1893 (Part 1). Modal combination of the peak response quantities shall be performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS:1893 (Part 1). In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893 (Part 1). For buildings, if the design base shear (V_B) obtained from modal combination is less than the base shear ($\bar{V}_B$) computed using the approximate fundamental period (T_a) given in IS:1893:Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of $\bar{V}_B / V_B$. However, no reduction is permitted if $\bar{V}_B$ is less than V_B. For regular buildings less than 12m in height, design seismic base shear and its distribution to different floor levels along the height of the building may be carried out as specified under clause 7.5, 7.6 & 7.7 of IS:1893 (Part 1) and using site specific design acceleration spectra. The design horizontal acceleration spectrum value (A_h) shall be computed for the fundamental natural period as per clause 7.6 of IS:1893 (Part 1) using site specific spectral acceleration coefficients with appropriate multiplying factor given in Annexure-I. Further, the spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the building falls to the left of the peak in the spectral acceleration curve. Design/Detailing for Ductility for Structures The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.		
TELANGANA SUPER THERMAL POWER PROJECT PHASE-I (2X800MW) STEAM GENERATOR ISLAND PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO.:CS-9591-101-2	SUB-SECTION- CIVIL WORKS	PAGE 283 OF 294

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	ANNEXURE – I			
	SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT			
	The various site specific seismic parameters for the project site shall be as follows:			
	1)	Peak ground horizontal acceleration (MCE)	:	0.28 g
	2)	Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration ‘g’) to obtain the design acceleration spectra		
	a)	for ordinary moment resisting steel frames designed and detailed as per IS:800	:	0.082
	b)	for braced steel frames designed and detailed as per IS:800	:	0.061
	c)	For special moment resisting RC frames designed and detailed as per IS:456 and IS:13920	:	0.049
	d)	for steel chimney	:	0.123
	e)	for design of structures not covered under 2 (a) to 2 (d) above and under 3 below	:	0.082
	3)	Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration ‘g’) for design of equipment and structures where inelastic action is not relevant or not permitted	:	0.16
	Note: g = Acceleration due to gravity			
	The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.			
TELANGANA SUPER THERMAL POWER PROJECT PHASE-I (2X800MW) STEAM GENERATOR ISLAND PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC. NO.:CS-9591-101-2		SUB-SECTION- CIVIL WORKS
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ANNEXURE – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0	1.000	1.000	1.000
0.03	1.000	1.842	1.450
0.04	1.355	2.032	1.600
0.05	1.716	2.223	1.750
0.06	2.081	2.413	1.900
0.07	2.449	2.604	2.050
0.08	2.820	2.794	2.200
0.09	3.194	2.985	2.350
0.10	3.570	3.175	2.500
0.105	3.759	3.175	2.500
0.106	3.760	3.175	2.500
0.11	3.760	3.175	2.500
0.115	3.760	3.175	2.500
0.12	3.760	3.175	2.500
0.125	3.760	3.175	2.500
0.13	3.760	3.175	2.500
0.135	3.760	3.175	2.500
0.14	3.760	3.175	2.500
0.145	3.760	3.175	2.500
0.15	3.760	3.175	2.500
0.20	3.760	3.175	2.500
0.25	3.760	3.175	2.500
0.27	3.760	3.175	2.500
0.30	3.760	3.175	2.500
0.32	3.760	3.175	2.500
0.35	3.760	3.175	2.500
0.372	3.760	3.175	2.500
0.40	3.500	3.175	2.500
0.402	3.483	3.159	2.488
0.405	3.457	3.136	2.469
0.41	3.415	3.098	2.439
0.425	3.294	2.988	2.353
0.45	3.111	2.822	2.222
0.50	2.800	2.540	2.000
0.55	2.545	2.309	1.818
0.60	2.333	2.117	1.667

ANNEXURE – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.65	2.154	1.954	1.538
0.70	2.000	1.814	1.429
0.75	1.867	1.693	1.333
0.80	1.750	1.588	1.250
0.85	1.647	1.494	1.176
0.9	1.556	1.411	1.111
0.95	1.474	1.337	1.053
1.0	1.400	1.270	1.000
1.05	1.333	1.210	0.952
1.10	1.273	1.155	0.909
1.15	1.217	1.104	0.870
1.20	1.167	1.058	0.833
1.25	1.120	1.016	0.800
1.30	1.077	0.977	0.769
1.35	1.037	0.941	0.741
1.40	1.000	0.907	0.714
1.45	0.966	0.876	0.690
1.50	0.933	0.847	0.667
1.55	0.903	0.819	0.645
1.60	0.875	0.794	0.625
1.65	0.848	0.770	0.606
1.70	0.824	0.747	0.588
1.75	0.800	0.726	0.571
1.80	0.778	0.706	0.556
1.85	0.757	0.686	0.541
1.90	0.737	0.668	0.526
1.95	0.718	0.651	0.513
2.0	0.700	0.635	0.500
2.05	0.683	0.620	0.488
2.10	0.667	0.605	0.476
2.15	0.651	0.591	0.465
2.20	0.636	0.577	0.455
2.25	0.622	0.564	0.444
2.30	0.609	0.552	0.435
2.35	0.596	0.540	0.426
2.40	0.583	0.529	0.417

ANNEXURE – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
2.45	0.571	0.518	0.408
2.50	0.560	0.508	0.400
2.55	0.549	0.498	0.392
2.60	0.538	0.488	0.385
2.65	0.528	0.479	0.377
2.70	0.519	0.470	0.370
2.74	0.511	0.464	0.365
2.80	0.500	0.454	0.357
2.85	0.491	0.446	0.351
2.88	0.486	0.441	0.347
2.90	0.483	0.438	0.345
2.95	0.475	0.431	0.339
3.0	0.467	0.423	0.333
3.05	0.459	0.416	0.328
3.10	0.452	0.410	0.323
3.15	0.444	0.403	0.317
3.20	0.438	0.397	0.313
3.25	0.431	0.391	0.308
3.30	0.424	0.385	0.303
3.35	0.418	0.379	0.299
3.40	0.412	0.374	0.294
3.45	0.406	0.368	0.290
3.50	0.400	0.363	0.286



DATA SHEETS for MINI UPS for SG Island Package

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REV No. : 00

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PROJECT : TELANGANA (2 X 800 MW)

CUSTOMER : NATIONAL THERMAL POWER CORPORATION LTD.,

PACKAGE NAME : maxDNA BASED HMI SYSTEM

DOCUMENT NO. : 9591-102-405-PVI-Y-014

Note:

- i.) This document includes the BOM and Datasheet for Mini-UPS.
- ii.) Datasheet for PC/Work-Station/Server/Laptop/Printer is part of document "BOM FOR HMIPIS" of respective Systems as below :-

BOM FOR HMIPIS-UNIT 01/02 - 9591-102-405-PVI-H-049

BOM FOR HMIPIS-SAC

- 9591-102-405-PVI-H-049

BOM FOR HMIPIS-AHP

- 9591-102-405-PVI-H-049

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by deepak jindal
Date: 2018.03.12
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ISSUED BY: CE – ENGG / HMI

REV No.	DATE	NATURE OF CHANGE	REASON	PREPARED	CHECKED	APPROVED
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**DATA SHEETS for MINI UPS
STN C&I Package**

9591-102-405-PVI-Y-014

REV No. : 00

Page 2 of 4

Bill of Materials for Mini-UPS– Main Supply

A.) Tally of quantities for 1 KVA and 3 KVA Intelligent online UPS as per Table-I & Table-II :-

SL.No.	Mini UPS & Battery	Quantity		Grand Total (Nos.)
		Table-I	Table-II	
1(a)	1 KVA Online UPS	2	31	33
1(b)	2 x 42AH Battery	2	31	33
2(a)	3 KVA Online UPS	3	2	5
2(b)	6 x 42AH Battery	3	2	5

Table-I.) Scope as per Technical Specifications Section-VI,Part-A Appendix-I to Part-A

SL.No.	UPS Reference	Employer's load	UPS Location	KVA Rating of Mini-UPS	LOADS
1	UPS-SA-01	NA	CWPH	3	i.) SAC-OWS @SWPH ii.) SAC CLR LASER PRINTER
2	UPS-SA-02	NA	CT CONTROL ROOM U-1	1	i.) SAC-OWS
3	UPS-SA-03	NA	CT RIO ROOM U-2	1	CT RIO ROOM (GIU)
4	UPS-FOPH-01	NA	FOPH	3	i.) 2 FOPH-OWS ii.) FOPH CLR LASER PRINTER iii.) FOPH EWS IV.) FOPH STOR1/2
5	UPS-AUX-B-01	NA		3	i.) AUX BLR LASER PRINTR ii.) AUX BLR EWS iii.) AUX BLR STOR1/2

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**DATA SHEETS for MINI UPS
STN C&I Package**

9591-102-405-PVI-Y-014

REV No. : 00

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Table II.) Scope as per Design for Server grade Machines, Station LAN Panels, PC Stations etc.

SL. No.	STN C&I System	Services	Qty of 1 KVA Mini-UPS	Remarks for 1 KVA Loads	Qty of 3 KVA Mini-UPS	Remarks for 3 KVA Loads
1	unit-1	EWS	1	SECONDARY POWER SUPPLY		
2		STOR1/2	2	SECONDARY POWER SUPPLY		
3		PCSTN	3			
4	unit-2	EWS	1	SECONDARY POWER SUPPLY		
5		STOR1/2	2	SECONDARY POWER SUPPLY		
6		PCSTN	3			
7	AHP	EWS	1	SECONDARY POWER SUPPLY		
8		STOR1/2	2	SECONDARY POWER SUPPLY		
9	FOPH	EWS	1	SECONDARY POWER SUPPLY		
10		STOR1/2	2	SECONDARY POWER SUPPLY		
11	AUX BLR	EWS	1	SECONDARY POWER SUPPLY		
12		STOR1/2	2	SECONDARY POWER SUPPLY		
14	SAC	EWS	1	SECONDARY POWER SUPPLY		
15		STOR1/2	2	SECONDARY POWER SUPPLY		
18	SLAN	GW PC	1		2	FOR STATION LAN PANELS (NWPS01/02)
19		NMS SRV	1	SECONDARY POWER SUPPLY		
20		SLAN SRV	2	SECONDARY POWER SUPPLY		
21		PC STN	3			
		Total	31		2	

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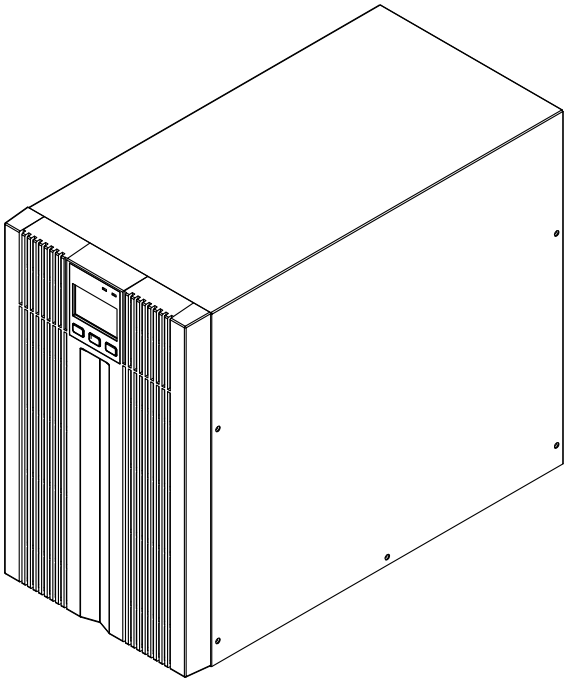
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This must not be used directly or indirectly, in any manner detrimental to the interest of the company

			DATA SHEETS for MINI UPS STN C&I Package	9591-102-405-PVI-Y-014 REV No. : 00 Page 4 of 4
COPYRIGHT AND CONFIDENTIAL The information contained in this document is the property of BHARAT HEAVY ELECTRICALS LIMITED This must not be used directly or indirectly, in any manner detrimental to the interest of the company		<u>Make and Model of Mini-UPS</u> • 1 KVA -- DELTA N-1K , <i>refer datasheet in Page-2&3 for details.</i> • 3 KVA -- DELTA N-3K , <i>refer datasheet in Page-2&3 for details.</i> Enclosures: 1. BHEL 1& 3 KVA UPS GA & battery calculations		

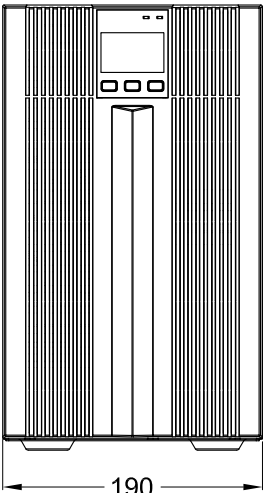
GENERAL ARRANGEMENT DRAWING - 3kVA UPS



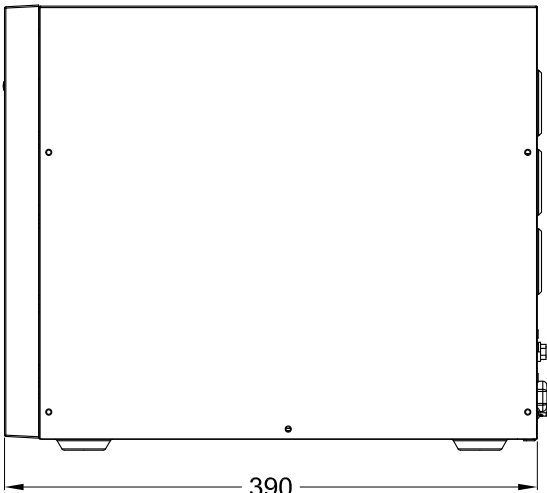
TOP VIEW



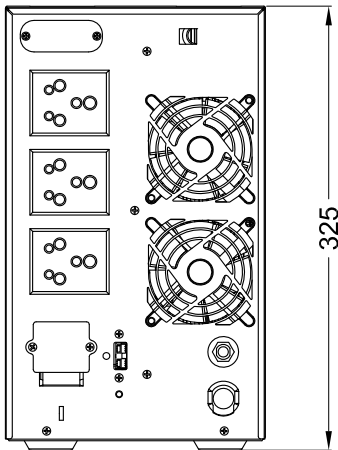
ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW



REAR VIEW

DETAILS FOR 3kVA N(NEW):-

WEIGHT : 8.5 KG
FLOOR LOADING : 115 KG/M2
CABLE ENTRY : MAIN LEAD WITH PLUG TOP

CLEARANCE REQUIREMENT :
FRONT : 600mm
REAR : 300mm
SIDE : 300mm

General tolerance chart (in mm)								Rev	Amendment	Sign/Date	All dimensions are in mm			Title:- 3 kVA UPS NEW N Series GAD		Scale: NTS	 THIRD ANGLE PROJECTION	
Length or Dia	0-6	6-30	30-120	120-315	315-1000	1000-2000	2000-2300				Material:			 Delta Power Solution [India] Pvt. Ltd. Plot No. 43, Sector-35. HSIIDC, Gurgaon Haryana-122001, India		Drg. No: -		
											Finish:							
Tolerance	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.5					Signature	Date					
Copyright and Confidential The information on the document is the property of Delta Energy Sytems (I) Pvt Ltd. It may not be used In any way, detrimental to the interest of the company.											Drawn	Narendra	06.09.17			Sheet:- 1 to 1		Rev. 00
											Checked	Chandan	06.09.17					
											Approved	Chandan	06.09.17					

The power behind competitiveness

Delta UPS - Amplon Family

N Series, Single Phase

1/2/3 kVA

High-performance power protection with greater energy savings

The Amplon N series is a true online double-conversion UPS that can provide your critical equipment with reliable, stable sine wave power. It features significant advantages, including an output power factor of 0.9 and up to 93% AC-AC efficiency for greater energy savings. The Amplon N series provides a safe power supply guaranteed for mission critical applications such as work stations, POS, ATMs, medical equipment, and more.

Availability

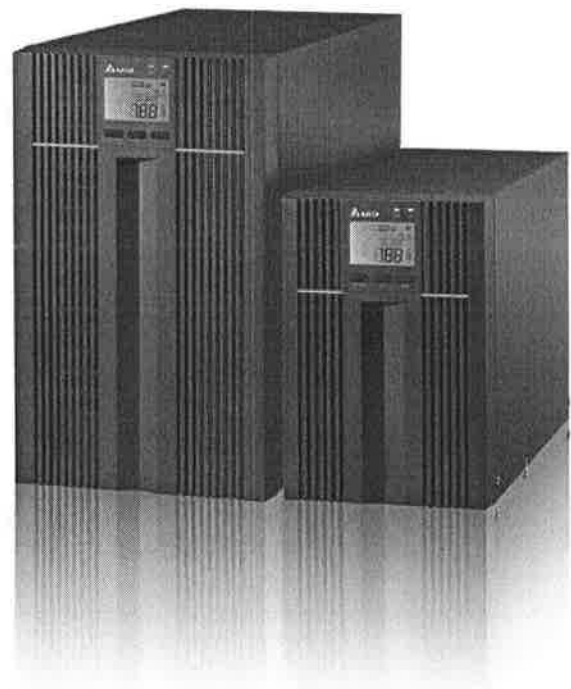
- True online double-conversion topology and zero transfer time to battery ensure high reliability.
- Advanced DSP (Digital Signal Processor) controller for fast computation capability and a simplified control circuit for enhanced stability.
- Wide input voltage range allows the UPS to work in harsh electrical environments.
- Generator compatibility ensures continuous and reliable power.

Green with Low TCO

- High input power factor (> 0.99) and low input harmonic distortion (iTHD $< 3\%$) save upstream investment.
- Output power factor up to 0.9 presents a stronger load capacity.
- AC-AC efficiency up to 93% and high efficiency of 91% at 50% load results in marked energy cost savings.
- Compact design saves more space for critical equipment.

Intelligent Management

- Excellent local communications through LCD display
- Intelligent battery management maximizes battery performance and sustains battery life
- Mini slot and USB port enhance monitoring and manageability



Server



Network



Security



Medical



POS



Banking

 **DELTA**
Smarter. Greener. Together.

Delta UPS – Amplon Family

N Series, Single Phase
1/2/3 kVA

Technical Specifications

Model		N-1K	N-2K	N-3K
Power Rating		1kVA/0.9KW	2kVA/1.8KW	3kVA/2.7KW
Input	Nominal Voltage	220/230/240 Vac		
	Voltage range	175 ~ 280 Vac (full load)		
	Frequency	50/60 Hz ± 10 Hz		
	Power Factor	> 0.99 (full load)		
Output	Current Harmonic Distortion	<3%		
	Power Factor	0.9*		
	Voltage	220/230/240 Vac		
	Frequency	50/60 Hz ± 0.05 Hz		
	Current Harmonic Distortion	< 3% (linear load)		
	Overload Capability	< 105%: continuous; < 105% ~ 125% : 1 minutes : 125% ~ 150% : 30 seconds		
	Crest Factor	3:1		
	Receptacle	India socket x 3	India socket x 4	India socket x4, Terminal block x1
Efficiency	AC-AC	91%	Up to 93%	
Battery	Nominal Voltage	24 Vdc	48 Vdc	72 Vdc
	Typical Backup Time	Up to 7 Min.**		
	Recharge Time	3hrs to 90% (Long backup model: depends on the capacity of external batt.)		
	Charge Current	Standard model: 1A; Long backup model: 4A (increased to 8A via optional 4A charge board)		
Audible Noise		< 43 dBA	< 48 dBA	
Display		LCD panel		
Interface		MINI Slot x 1 · USB Port x 1		
Physical	Dimensions (Wx Dx H)	145 x 320 x225 mm	190 x 390 x325 mm	
	Weight (Standard model)	9.7 Kg	19.1 Kg	24.9 Kg
	Weight (Long backup model)	4.4 Kg	8.2 Kg	8.5 Kg
Environment	Operating Temperature	0 ~ 40° C		
	Relative Humidity	5% ~ 95% (no condensing)		

* Long backup model is 0.8

** When the total load reaches 75%.

All specifications are subject to change without prior notice.



LCD Panel



Advanced UPS Management
Software - UPSEntry



Delta offers a full range of UPS solutions from 600 VA to 4000 kVA to fulfill your power security needs.



2007~2008 Forbes Asia's
Fabulous 50



2009 Frost & Sullivan
Green Excellence Award for
Corporate Leadership



ISO 9001:2008



ISO 18001:2007



ISO 14001:2004

+91 9999992084

upsinfo@delta.co.in

www.deltapowersolutions.com

DELTA
Smarter. Greener. Together.

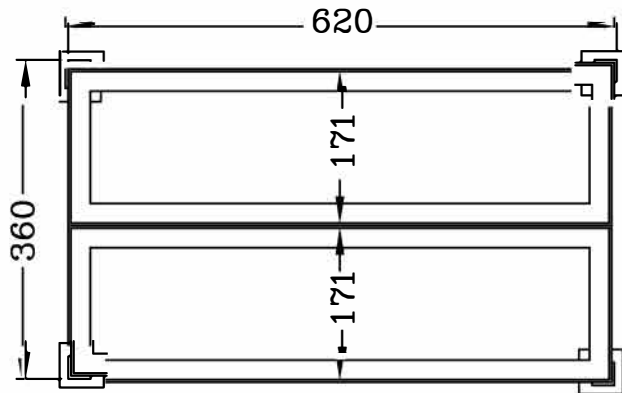
Rev.	Description:-	Drawn	Checked	Approved
00	FRAME BATTERY STEEL 620*360*130*3	Sant Singh/21.02.14	Vikas Panwar	Vikas Panwar
01	a. BASE PLATE REVISED b. EARTHING HARDWARE ADD	Sant Singh/10.12.14	Jitender Kumar	Vikas Panwar

 DELTA DELTA POWER SOLUTION (INDIA) PVT. LTD. The information on the document is the property of Delta Power Solution (I) Pvt Ltd. It may not be used in any way, detrimental to the interest of the company.	Description:-		
	FRAME BATTERY STEEL 620*360*130*3		
	Part No:-		Rev.
3921436000		01	
SHEET	1	OF	2

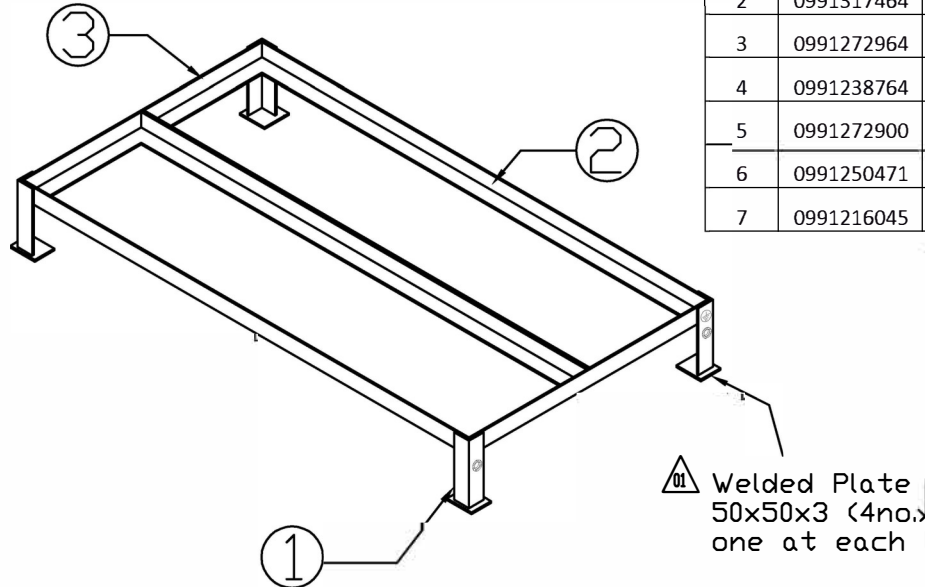
OFFERED BATTERY IS
SEALED MAINTENANCE
FREE BATTERY.
THERE IS NO ACID SPILL OUT

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	VERTICAL L ANGLE	MS Angle 25*25*3	4
2	HORIZONTAL L ANGLE	MS Angle 25*25*3	4
3	HORIZONTAL L ANGLE	MS Angle 25*25*3	2

STANDARD RACK - BATTERY PART NO. LIST					
Sr. no.	Delta P/N	Volt	AH	Supplier	Qty.
1	0991216001	12	42	Rocket PS	6
2	0991317464	12	30	Exide XHD	6
3	0991272964	12	42	Exide NXT	6
4	0991238764	12	42	Exide PS	6
5	0991272900	12	42	Relicell	6
6	0991250471	12	45	OKAYA	6
7	0991216045	12	42	Amara Raja	6

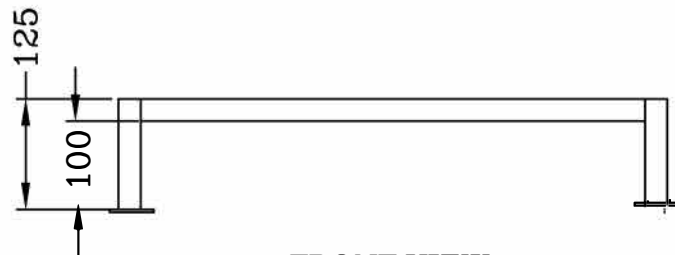
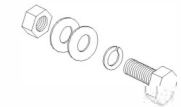


TOP VIEW

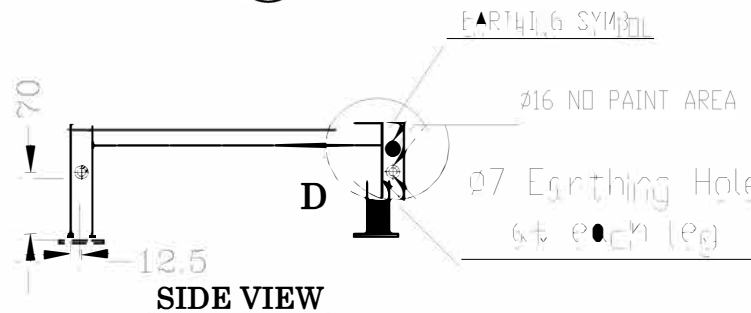


Welded Plate
50x50x3 (4no.)
one at each leg

REQUIRED EARTHING
HARWARE ARE IN
VENDOR SCOPE M6*25
QTY. 1SET



FRONT VIEW

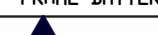


SIDE VIEW

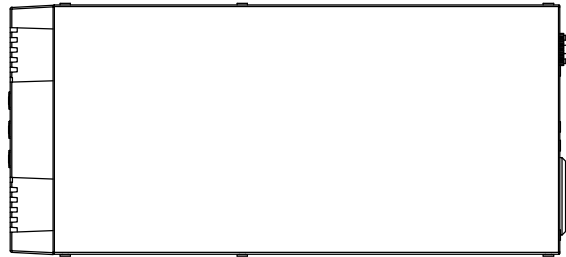
Approx Weight = 4kg

NOTE:

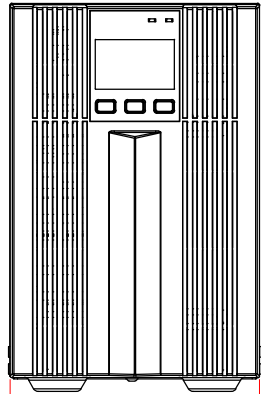
1. MATERIAL : MS ANGLE 25x25, T=3MM
2. FINISH : POWDER COATED COLOR-DELTA-BLACK
3. THE PART MUST MEET DELTA GENERAL SPEC.: 10000-0002, 10000-0094 & 10000-0162. DIM. TOLERANCE MUST MEET TOLERANCE TABLE UNLESS SPECIFIED.
4. THE MARK ** ARE CRITICAL DIMENSIONS. IN THIS PART, MUST BE INSPECTED BY SUPPLIER IN EVERY SHIPMENT.
5. ABOVE PART ARE MADE BY NCT, TOOLING.
6. BURR HEIGHT CAN'T EXCEEDED 5% OF METAL THICKNESS AND BURR SIDE TO BE INSIDE; OXIDATION ON SHEARED EDGE IS PERMITTED BUT IT CAN'T EXCEED OVER SURFACE.
7. USE MINIMUM BEND RELIEF UNLESS OTHERWISE SPECIFIED.
8. THE TOLERANCE OF HOLE IS ± 0.05 MM UNLESS OTHERWISE SPECIFIED.
9. ANY TOOLING MODIFY IN PRODUCT MUST BE APPROVED BY DELTA ENGINEERING DEPARTMENT.
10. IF ANY ISSUE DISCUSS WITH DELTA ENGINEERING DEPARTMENT.

General tolerance chart (in mm)								Rev	Signature		Stamp/Date	All dimensions are in mm		FRAME BATTERY STEEL 620*360*130*3		SCALE-NTS					
Length or Dia	0-6	6-30	30-120	120-315	315-1000	1000-2000	2000-2300					Material	See Note								
												Finish	See Note								
Tolerance	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±1.2					Signature	See Note								
Copyright and Confidential												Drawn	Signature	210214		Delt Power Solution (India) Pvt Ltd Plot No 38, Phase-1, Sector-14 Pantnagar, Rudrapur-263531					
The information on the document is the property of Delta Power Solution (I) Pvt Ltd. It may not be used in any way detrimental to the interest of the company.												Checked	Signature	210214							
														Approved						Signature	210214

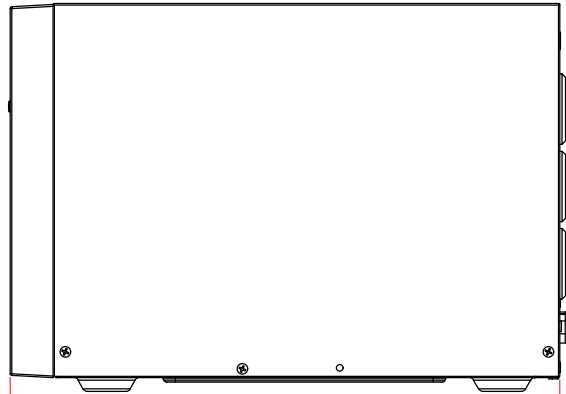
GENERAL ARRANGEMENT DRAWING - 1kVA UPS



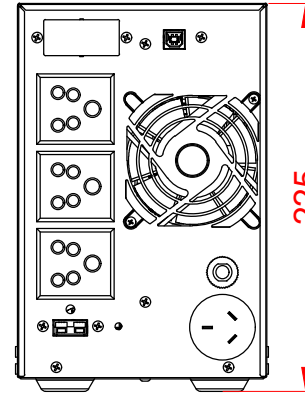
TOP VIEW



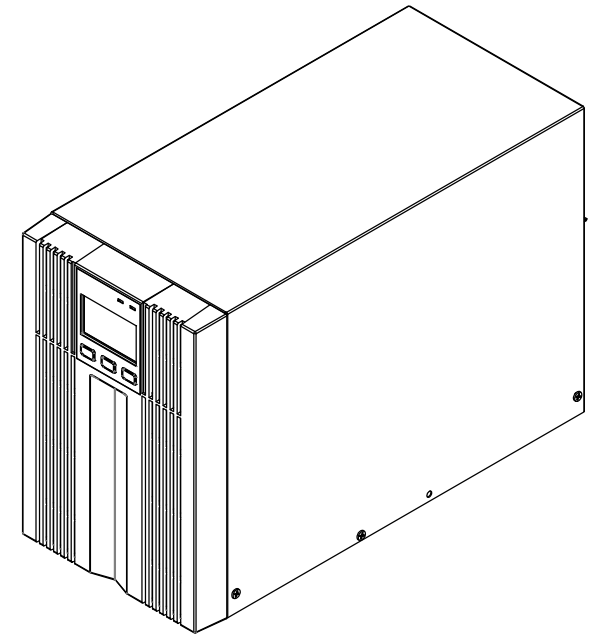
FRONT VIEW



SIDE VIEW



REAR VIEW



ISOMETRIC VIEW

DETAILS FOR 1kVA N(NEW):-	
WEIGHT	: 4.4 KG
FLOOR LOADING	: 95 KG/M2
CABLE ENTRY	: MAIN LEAD WITH PLUG TOP
CLEARANCE REQUIREMENT :	
FRONT	: 600mm
REAR	: 300mm
SIDE	: 300mm

General tolerance chart (in mm)

Length or Dia	0-6	6-30	30-120	120-315	315-1000	1000-2000	2000-2300
Tolerance	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.5

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All dimensions are in mm

Material:

Finish:

	Signature	Date
Drawn	Narendra	21.02.2018
Checked	Chandan	21.02.2018
Approved	Chandan	21.02.2018

Title:-

1kVA UPS NEW N Series - GAD



Delta Power Solution [India] Pvt. Ltd.
Plot No. 43, Sector-35.
HSIIDC, Gurgaon
Haryana-122001, India

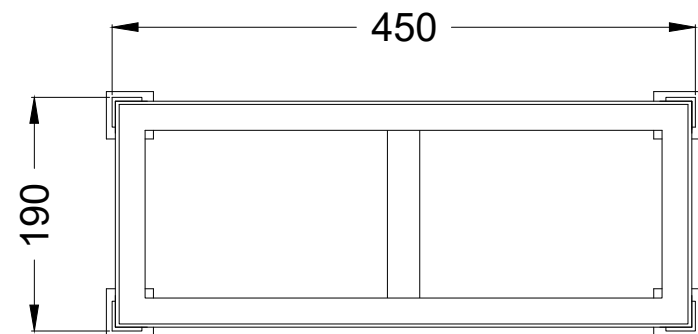
Scale: NTS



Drg. No: UPS102N2002N0B0

Sheet:- 1 OF 1

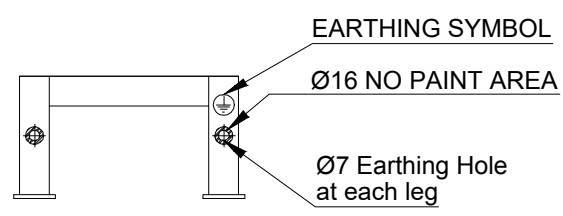
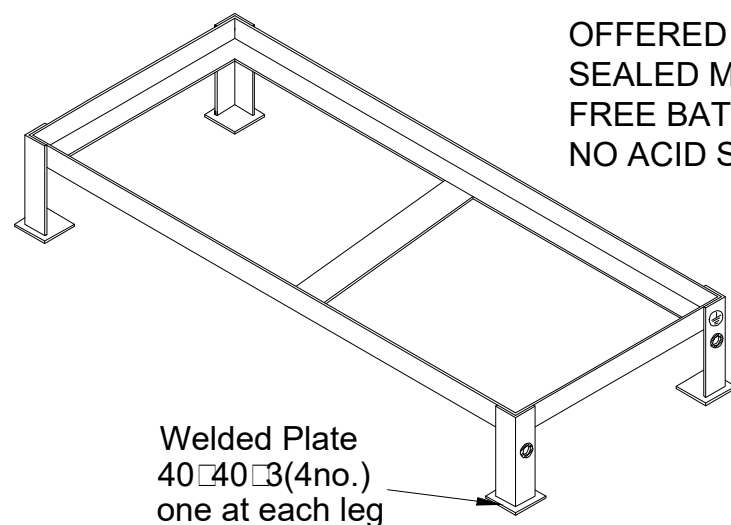
Rev.
00



TOP VIEW



FRONT VIEW



SIDE VIEW

- NOTE:-
1. MATERIAL : MS ANGLE 32x32 , T=3MM
 2. FINISH : POWDER COATED COLOR-DELTA-BLACK
 3. THE PART MUST MEET DELTA GENERAL SPEC. :10000-0002, 10000-0094 & 10000-0162 ;DIM. TOLERANCE MUST MEET TOLERANCE TABLE UNLESS SPECIFIED .
 4. THE MARK *** ARE CRITICAL DIMENSIONS. IN THIS PART, MUST BE INSPECTED BY SUPPLIER IN EVERY SHIPMENT.
 5. ABOVE PART ARE MADE BY NCT , TOOLING.
 6. BURR HEIGHT CAN'T EXCEEDED 5 % OF MATTELTHICKNESS AND BURR SIDE TO BE INSIDE ; OXIDATION ON SHEARED EDGE IS PERMITTED BUT IT CAN'T EXCEED OVER SURFACE.
 7. USE MINIMUM BEND RELIF UNLESS OTHERWISE SPECIFIED.
 8. THE TOLERANCE OF HOLE IS ±1.0MM UNLESS OTHERWISE SPECIFIED.
 9. ANY TOOLING MODIFY IN PRODUCT MUST BE APPROVED BY DELTA ENGINEERING DEPARTMENT.
 10. IF ANY ISSUE DISCUSS WITH DELTA ENGINEERING DEPARTMENT.

Approx Weight -2kg

Battery Frame for 42Ahx2Nos. (Amara Raja)

FRAME (STRUCTURE STEEL) DIMENSIONAL TOLERANCES (✓)			
<30	±1		
>30~100	±1.5	>300~1000	±3
>100~300	±2	ABOVE 1000	±4

DIMENSIONAL TOLERANCES									
()	()	()	()	()	()	()	()	()	()
<30	±0.25	DECIMALS	UP-100	±0.2	250-300	±0.4	UP-600	±1.5	
>30~100	±0.35	X	±0.3	100-150	±0.25	300-350	±0.45	600-900	±2.4
>100~300	±0.5	X.X	±0.2	150-200	±0.3	350-400	±0.5	900-OVER	±3.1
ABOVE 300	±0.6	X.XX	±0.1	200-250	±0.35				
(HOLES : ±0.05 ANGLES : ±0.5 DEG)									

Rev	Amendment	Sign/Date	All dimensions are in mm		
			Material: As per Note		
			Finish : As per Note		
			Signature	Date	
			Drawn	SANJAY	22.02.2018
			Checked	NARENDRA	22.02.2018

DELTA POWER SOLUTIONS
(INDIA) PRIVATE LIMITED.

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SCALE: NTS	 THIRD ANGLE PROJECTION
DESCRIPTION: Battery Frame 450x190x100x3	
USED ON:	REV
SHEET : 1 OF 1	00



AMARA RAJA



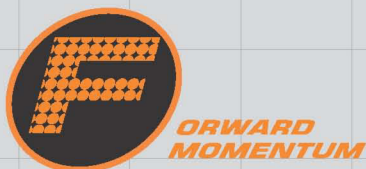
AMARON®

SEALED MAINTENANCE FREE

QUANTA

LIFE UNINTERRUPTED

THE LONG LIFE
UPS BATTERY



Presenting Amaron Quanta™, the industrial segment SMF battery for UPS applications, built to perform 'forever'. In short, the lifeline to your UPS applications.

Amaron Quanta™ is a product of fail-safe, fool-proof battery technology, produced and tested in our premier manufacturing facility. Built to the highest technical competence in its class, the Amaron Quanta™ is an example of Amara Raja's commitment to bringing the best of technology to your table. It features several firsts for the battery industry like the unique Radgrid™ profile.

As a company that is known for its legendary obsession with technology, Amara Raja has been behind some of the best innovations in technology that India has seen. Our VRLA - Valve Regulated Lead Acid batteries for example, were India's first major advancement in battery technology. This paved way for our literally no-maintenance and far reliable automotive battery, Amaron®. Amaron® has grown rapidly to become the preferred battery of leading auto manufacturers. Today Amaron® sets the benchmark for quality and technology in the hitherto dormant automotive battery market.

Our every product comes with the double promise of Amara Raja's expertise and support of our alliance partner, Johnson Controls Inc., undisputed world leader in the storage battery business.

The Amaron Quanta™ comes to you with the same promise of advanced technology and unmatched customer service standards followed at Amara Raja.

An UPS battery is meant to provide back-up. So what's the back-up to the back-up? Shall we say, technology?

Amaron Quanta™ is the product of fail-safe, fool-proof battery technology, produced and tested in our premier manufacturing facility. It features several firsts for the battery industry, like the unique Radgrid™ profile.

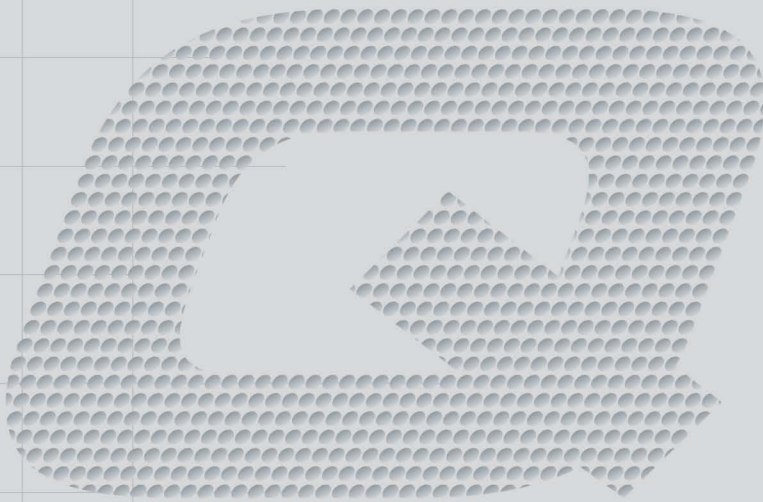


Applications

- ♦ Data Centres
- ♦ Banks & Financial Markets
- ♦ Network Operations Centers
- ♦ Industrial Process Control Facilities
- ♦ Internet Housing Sites
- ♦ Semiconductor Manufacturing
- ♦ Power Generation Plants
- ♦ Hospital & Testing Laboratories



QUANTA™
— WHEN ALL
ELSE FAILS



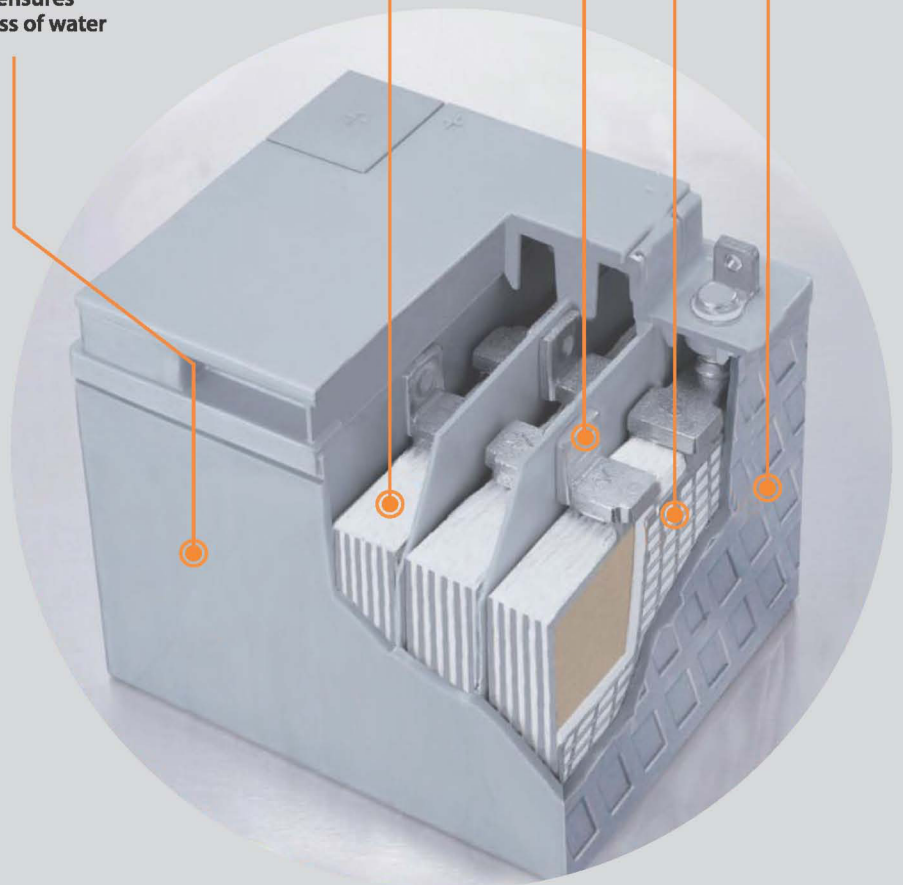
Thicker grids and highest separator compression that prolong life expectancy

Reinforced end walls improve impact resistance

Inter-cell weld between cells, provide a high reliable, low resistance current path

Proven AGM technology that ensures maintenance-free characteristics

PPCP containers with low permeability that ensures no loss of water



**DESIGN
FEATURES**

Uninterrupted life

A clutch of design features ensures that Amaron Quanta™ batteries perform predictably and reliably every time.

- ◆ A unique heavy-duty corrosion-resistant alloy for positive grids, to increase cyclic life in tropical environments.
- ◆ Radgrid™ profile provides lower internal resistance and superior high-discharge performance.
- ◆ Instacharge™ a patented paste recipe for excellent charge acceptance.
- ◆ Low self-discharge rates for extended storage periods.
- ◆ Conforms to International Standards - JIS 8702C.
- ◆ Design float life of 10 years
- ◆ Clean and sleek looks.

Designed to make life easier

Since Amaron Quanta™ has a broad range of SMF batteries specifically designed for UPS application, it offers you the right choice, no matter what your particular standby power need is.

It is aesthetically designed, with an L shaped terminal block that comes with a rugged Flappon™ terminal protector that prevents shorts.

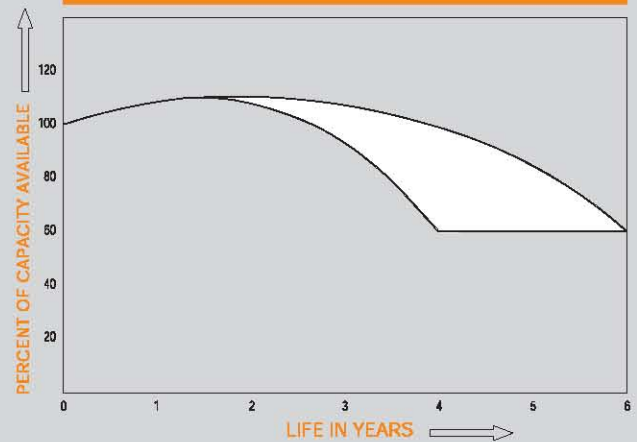
The metallic silver finish gives it a business-like look and feel that blends into the plush office environment.

And every other angle is covered too: Amaron Quanta™ is compact, lightweight, factory-charged, explosion-resistant and environment-friendly.

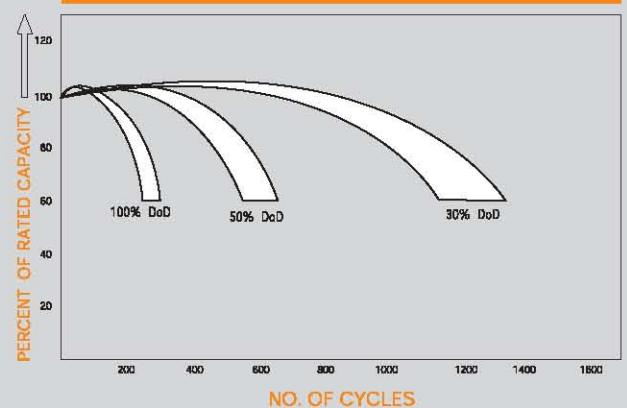
Uninterrupted back-up

Apart from the technology itself, it's our stringent quality norms. Helping us meet them is our QS 9000 accredited manufacturing plant. This is one of the newest and most extensive facilities in the Johnson Controls Alliance. Our Battery Excellence Centre ensures that we set industry benchmarks.

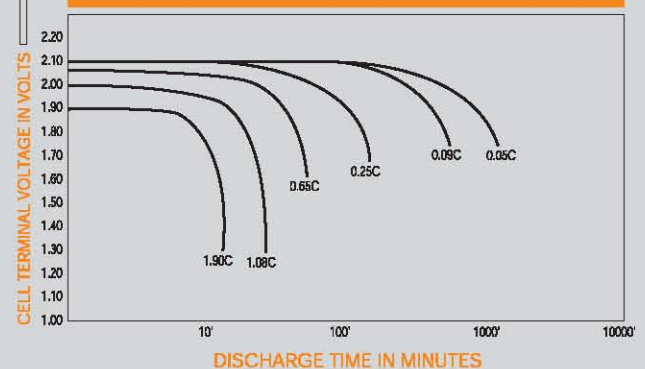
SERVICE FLOAT LIFE EXPECTANCY OF AMARON QUANTA™ BATTERIES



CYCLIC LIFE EXPECTANCY OF AMARON QUANTA™ BATTERIES



DISCHARGE CHARACTERISTICS OF AMARON QUANTA™ BATTERIES



Technical data

Battery Rating	Capacity Ah @ 20 Hrs	Dimensions (±2mm)			Approx Weight (in Kgs) ±5%	CONSTANT CURRENT DISCHARGE RATINGS-AMPERES AT 27°C (10.5 EMV)									Terminal Type	Plastic
		Length	Width	Total Height		10 Min	15 Min	30 Min	60 Min	2 Hrs	3 Hrs	5 Hrs	10 Hrs	20 Hrs		
12V26Ah	26	167	126	175	9.00	53.06	41.94	25.74	16.25	9.29	6.57	4.44	2.42	1.30	L terminal (B5)	PPCP
12V42Ah	42	199	167	175	14.00	85.71	67.74	41.58	26.25	15.00	10.61	7.18	3.91	2.10	L terminal (B6)	PPCP
12V65Ah	65	351	167	175	20.00	114.29	90.32	55.45	35.00	20.00	14.14	10.26	5.59	3.25	L terminal (B6)	PPCP
12V84Ah	84	351	167	203	27.00	171.43	135.48	83.17	52.50	30.00	21.21	14.36	7.82	4.20	L terminal (B6)	PPCP
12V100 Ah	100	393	173	221	32.50	200.00	158.70	98.00	61.00	35.71	25.25	17.09	9.31	5.00	M8 X 25 mm Copper	PPCP
12V120 Ah	120	393	173	240	36.60	240.00	190.48	117.65	73.17	42.86	30.30	20.51	11.17	6.00	M8 X 25 mm Copper	PPCP
12V130Ah	130	445	168	247	42.00	265.31	209.68	128.71	81.25	46.43	32.83	22.22	12.10	6.50	L terminal (B6)	PPCP
12V150 Ah	150	453	173	251	45.00	300.00	238.10	147.06	91.46	53.57	37.88	25.64	13.97	7.50	M8 X 25 mm Copper	PPCP
12V160Ah	160	445	168	283	52.00	326.53	258.06	158.42	100.00	57.14	40.40	27.35	14.90	8.00	L terminal (B6)	PPCP
12V200Ah	200	556	186	263	62.00	400.00	317.50	196.10	122.00	71.40	50.50	34.20	18.60	10.00	M8 X 25 mm Copper	PPCP

EMV: End Module Voltage

Also available in 28Ah, 110Ah

Recharge characteristics

Charge Setting @ 27°C	Charging Voltage per 12 V Module
Float	13.50 V
Boost	13.80 V

The maximum current limit in either charge provision will be 25% of the rated capacity (AH) at a 20-hour rate.

Company-owned service network

An expanding sales and service network spread across the country backs the Amaron Quanta™ range of batteries. The network consists of a qualified team of engineers who provide pre and post-sales service and support.

Back-up your UPS battery decision with solid, proven technology. **Choose Amaron Quanta™.**





AMARA RAJA BATTERIES LIMITED

(An Amara Raja Johnson Controls Company)

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Authorized Quanta Alliance (AQuAs):



Quality Systems Certified to
EN ISO 9001 : 2000
ISO/TS 16949 : 2002
EN ISO 14001 : 2004



**ARBL**

TITLE

SIZING CALCULATION SHEET**SIZING AS PER IEEE 485**

Document Ref:CTRL S

Pg. : 1 of : 1

Pg . Rev. : 00

Date : 8-Feb-11

Load in KVA	3 KVA
End Cell Voltage	1.75 V
Design Factor	1
Aging Factor	1
Inverter Efficiency	0.93
Power Factor	0.7
Backup time	30 min
DC Voltage	72 V
Temperature	50 °C
Temp corr. Factor*	1
K-factor*	1.01
No of cells	36 No's

$$\text{Load Current} = \frac{\text{Load in KVA} \times 1000 \times \text{Power Factor}}{\text{No.of cells} \times \text{ECV} \times \text{Invertor Efficiency}} = 35.84 \text{ Amps}$$

$$\text{Ah Capacity considering Various factors} = \text{Load current} \times \text{K-Factor} \times \text{Aging factor} \times \text{Temperature Factor} \times \text{Design Factor} = 36.20 \text{ Ah}$$

Recommended Ah is 42 Ah

From the manufacturers catalogue,model 12AL 042 is recommended with 42 Ah at 1.75 ECV

*Temperature Factor and K-Factors considered as per manufacturer's catalogue

APPROVED BY:**PREPARED BY :** Rajat

**ARBL**

TITLE

SIZING CALCULATION SHEET**SIZING AS PER IEEE 485**

Document Ref:CTRL S

Pg. : 1 of : 1

Pg . Rev. : 00

Date : 8-Feb-11

Load in KVA	1 KVA
End Cell Voltage	1.75 V
Design Factor	1
Aging Factor	1
Inverter Efficiency	0.93
Power Factor	0.8
Backup time	30 min
DC Voltage	24 V
Temperature	27 °C
Temp corr. Factor*	1
K-factor*	1.01
No of cells	12 No's

$$\text{Load Current} = \frac{\text{Load in KVA} \times 1000 \times \text{Power Factor}}{\text{No.of cells} \times \text{ECV} \times \text{Invertor Efficiency}} = 40.96 \text{ Amps}$$

$$\text{Ah Capacity considering Various factors} = \text{Load current} \times \text{K-Factor} \times \text{Aging factor} \times \text{Temperature Factor} \times \text{Design Factor} = 41.37 \text{ Ah}$$

Recommended Ah is 42 Ah

From the manufacturers catalogue,model 12AL 042 is recommended with 42 Ah at 1.75 ECV

*Temperature Factor and K-Factors considered as per manufacturer's catalogue

APPROVED BY:**PREPARED BY :** Rajat