iTeaQ Technical Document

UPS battery configuration instruction

UPS battery configuration list

UPS Ser.	UPS Cap. KVA(module)	UPS Mode	UPS Model	Load (kW)	BAT QTY (Pcs)	End V (V)	INV Eff (η)	BAT CFG (W/cell)	BAT Current (A)	BAT Volt (V)	Note
UR	1	1/1	UR-0010SPL		3	1.67	0.85	0.00	0.00	36	
	2	1/1	UR-0020SPL		6	1.67	0.85	0.00	0.00	72	
	3	1/1	UR-0030SPL		8	1.67	0.85	0.00	0.00	96	
	6	1/1	UR-0060SPL		20	1.67	0.85	0.00	0.00	240	
	10	1/1	UR-0100SPL		20	1.67	0.85	0.00	0.00	240	
	10	3/1	UR-0100NPL		20	1.67	0.85	0.00	0.00	240	
	15	3/1	UR-0150NPL		20	1.67	0.85	0.00	0.00	240	
	20	3/1	UR-0200NPL		20	1.67	0.85	0.00	0.00	240	
	10	3/3	UR-0100TPL		40	1.67	0.90	0.00	0.00	480	
	15	3/3	UR-0150TPL		40	1.67	0.90	0.00	0.00	480	
	20	3/3	UR-0200TPL		40	1.67	0.90	0.00	0.00	480	
	30	3/3	UR-0300TPL		40	1.67	0.90	0.00	0.00	480	
	40	3/3	UR-0400TPL		40	1.67	0.90	0.00	0.00	480	

UPS Ser. = UPS product series: UR, UE, UM.
UPS Cap. KVA (module) = UPS capacity (KVA), single module capacity KVA
UPS Mode = UPS power input and output: 1/1, 3/1, 3/3.
UPS Model = UPS product model with capacity.
Load (kW) = IT load capacity: Input as actual IT load capacity.
BAT QTY (pcs) = battery quantity (pcs): count as 12V on single battery, data limited on each UPS model.
End V (V) = battery ending voltage: count as 2V single battery, default 1.67V.
INV Eff (η) = UPS inverter efficiency: Only for battery configuration calculation.
BAT CFG (W/cell) = Battery W/Cell configuration value: to define battery W/Cell value calculation.
BAT Current (A) = Maximum battery discharge current: to calculate battery breaker configuration.
BAT Volt (V) = Battery bank voltage.

UPS battery configuration list

Ser.	SP	End V	5min	10min	15min	20min	30min	45min	1h	1.5h	2h	3h	5h	10h	20h
Type	SP12-100	1.60	-	375.00	316.00	258.00	196.00	145.00	112.00	84.50	66.80	50.00	33.30	20.50	10.50
Cap.	100AH(C_{10})	1.65	-	364.00	310.00	253.00	193.00	142.00	110.00	83.60	66.40	49.80	33.00	20.30	10.40
Volt	12V	1.67	-	351.70	306.61	251.00	190.88	140.28	109.22	83.32	66.18	49.65	32.97	20.19	10.37
N.W.	27.6kG	1.70	-	338.00	302.00	248.00	188.00	138.00	108.00	82.70	65.70	49.30	32.80	20.00	10.30
W*D*H (mm)		1.75	-	317.00	282.00	240.00	184.00	136.00	106.00	81.70	65.00	48.80	32.60	19.80	10.20
330*174*226		1.80	-	293.00	268.00	230.00	178.00	133.00	104.00	80.20	63.80	48.00	32.30	19.60	10.00

Battery basic information collection:
Battery type, model, capacity, voltage, net weight, dimension.
W/Cell collection table for different End V and backup time.

UPS battery configuration calculate

Step1: W/Cell calculation

UPS Ser.	UPS Cap. KVA(module)	UPS Mode	UPS Model	Load (kW)	BAT QTY (Pcs)	End V (V)	INV Eff (η)	BAT CFG (W/cell)	BAT Current (A)	BAT Volt (V)	Note
UM	90(15)	3/3	UM-0900TFL-xx		40	1.67	0.90	0.00	0.00	480	15kVA single module
	120(20)	3/3	UM-1200TFL-xx		40	1.67	0.90	0.00	0.00	480	20kVA single module
	200(20)	3/3	UM-2000TFL-xx		40	1.67	0.90	0.00	0.00	480	20kVA single module
	125(25)	3/3	UM-1250TFL-xx		40	1.67	0.90	0.00	0.00	480	25kVA single module
	180(30)	3/3	UM-1800TFL-xx		40	1.67	0.90	0.00	0.00	480	30kVA single module
	300(30)	3/3	UM-3000TFL-xx		40	1.67	0.90	0.00	0.00	480	30kVA single module
	200(50)	3/3	UM-2000TFL-xx		40	1.67	0.90	0.00	0.00	480	50kVA single module
	300(50)	3/3	UM-3000TFL-xx		40	1.67	0.90	0.00	0.00	480	50kVA single module
	400(50)	3/3	UM-4000TFL-xx		40	1.67	0.90	0.00	0.00	480	50kVA single module
	500(50)	3/3	UM-5000TFL-xx		40	1.67	0.90	0.00	0.00	480	50kVA single module
	600(50)	3/3	UM-6000TFL-xx		40	1.67	0.90	0.00	0.00	480	50kVA single module
	800(50)	3/3	UM-8000TFL-xx		40	1.67	0.90	0.00	0.00	480	50kVA single module
	600(100)	3/3	UM-6000TFL-xx	500	40	1.67	0.90	2314.81	1386.12	480	100kVA single module

Important parameter calculate: W/Cell
W/Cell = K1 x 1000 / (Q x 6 x η)
K1 = IT heat load (kW)
Q = battery quantity, 12V type
6 = calculate from 2V to 12V
η = UPS inverter efficiency

Example: 500kW IT heat load with 600kVA UPS, backup time 15min, as showed in picture.
Battery quantity: 40 (optional from 30 to 50 even number, data limitation in excel document).
End V: 1.67V
Battery W/Cell = 2314.81 (W/Cell)

UPS battery configuration calculate

Step 2: Battery selection

Ser.	SP	End V	5min	10min	15min	20min	30min	45min	1h	1.5h	2h	3h	5h	10h	20h
Type	SP12-250	1.60	-	828.00	690.00	560.00	450.00	350.00	265.00	207.00	162.00	126.00	80.40	49.50	25.80
Cap.	250AH(C_{10})	1.65	-	804.00	670.00	548.00	440.00	343.00	260.00	205.00	160.00	125.00	79.50	49.40	25.70
Volt	12V	1.67	-	795.59	662.82	542.08	434.37	339.18	258.02	203.91	159.32	124.75	79.26	49.45	25.70
N.W.	71kG	1.70	-	784.00	653.00	534.00	427.00	334.00	255.00	202.00	158.00	124.00	78.70	49.30	25.60
W*D*H (mm)		1.75	-	756.00	630.00	516.00	412.00	320.00	247.00	198.00	157.00	123.00	77.60	49.00	25.60
271*534*233		1.80	-	726.00	605.00	495.00	397.00	308.00	237.00	195.00	155.00	122.00	76.30	48.80	25.40

Since 500kW IT load is big, let's try to select battery with big capacity.

From table: 250AH battery with 1.67V end voltage, 15 minutes backup time could provide 662.82 W/Cell.

Calculated W/Cell requirement: Battery W/Cell = 2314.81 (W/Cell)

Then: 4 pcs 250AH battery banks (40 pcs in each bank) could provide 662.82 x 4 = 2651.28 W/Cell, which is adequate to support 2314.81 W/Cell

Conclusion: we configure 4 pcs 250AH battery banks (40 pcs in each bank) to support 500kW IT load for 15 minutes backup time.