

PQ survey highlights

by VIT Team

SMPT Sholingur

Max Dem: 2000 kVA,
PFC: 800 kVAR, 300 kVAR-APFC

HF: No

Sr. No	Application	Motor details			AC/DC	Details of Power control if speed is changed	No. of hours of operation per day
		kVA		RPM/Range			
1	Spinning &Acce	Upto 5	- 241 Nos.	90 % - 1440	AC	30 % VFD 70 % without VFD	23.5 hrs/day
2	"	5.1 to 25	- 145 Nos.	rmp			
3	"	25.1 to 50	- 18 Nos.	10 % - 2885			
4	"	50.1 to 100	- 7 Nos.	rpm			

Summary of the measurement Data at HT side					
Voltage	kV	<1% (9 kV)	2.0%(<10.5 kV)	32%(10.5- 11 kV)	64%(11-11.7 kV)
V_{UB}	%	53% (≤ 1.0 %)	47%(1- 1.5 %	One Instant 23%	
Current	A	2.36 %(<70 A)	16.21 %(70-80A)	75% (80-90A)	6.75 % (90-95A)
I_{UB}	%	58% (<5%)	28.2%(5-8%)	12.83% (8- 9.33 %)	
Power,P	kW	8%(< 1500kW))	92% (1500- 1696 kW)		
App Power	kVA	5.4% (<1500 kVA)		94.6%(1500-1731 kVA)	
Reactive P	kVAR	< 1% (lead)	2.7% (< 100kVAR)	60% (100-200kVAR)	32%(200-271kVAR)
Power factor	-	1 Inst. 0.82 lead	1.6% (0.93 lead - 0.98 lead)	90%(0.98 lag)	7.1%(0.99lag)
V_{THD}	%	3%(<1.5%)	33%(<2.0%)	64%(2-2.71%)	
I_{THD}	%	96.6% (9 % - 15%)		2.7% (15 % - 18.65 %)	

From the measurement, with the pf capacitors disconnected, shows considerable reduction in the I_{THD} with minor the deterioration of the total pf from 0.99 to 0.95 lag. The operation of the plant with pf of 0.95 , if it is acceptable, customer may plan to operate the plant at the most optimum power factor and achieve the resultant reduced I_{THD} without any harmonic filter

These information enable the design of the filter used for harmonic mitigation ; e.g. a 15.64 % I_{THD} (typical from the data) at 79.38 A RMS current and 78.4 A fundamental current at HT side means 1992 A fundamental at LT side. This fundamental current involves total harmonic RMS current of 311.55 A , 3rd harmonic current of 5.33 A, 5th harmonic current of 296 A, 7th harmonic current of 93.82 A , 11th harmonic current of 11.55 A, 13th harmonic current of 3.98 A and 17th harmonic current of 1.8 A etc.

Summary of the measurement Data at LT side with & WO capacitors

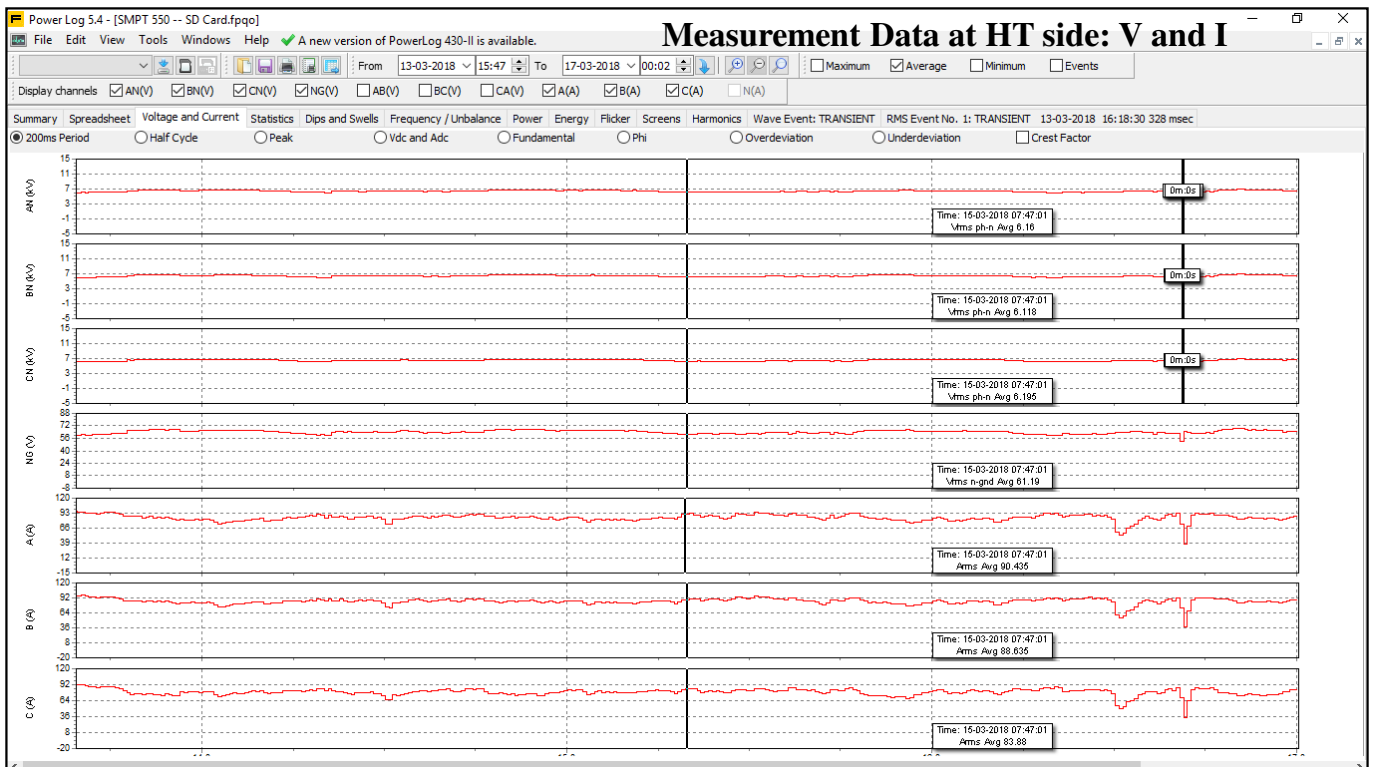
Voltage	V	Range is 233 V to 242 V
V_{UB}	%	Range is 0.01 % to 0.1 %
Current	A	Range is 2147 A to 2304 A
I_{UB}	%	Range is 1.51 % to 2.73 %
Power,P	kW	Range is 1485 kW to 1585 kW
App Power	kVA	Range is 1538 kVA to 1643 kVAR
Reactive P	kVAR	Range is 439- 591kVAr (w/o Cap) and 141 kVar- 200 kVar (with cap)
Power factor	-	Range is 0.93 to 0.96 % (w/o Cap) to 0.98 to 0.99 (with cap)
V_{THD}	%	Range is 2.69 % to 3.29 % (w/o Cap) and 4.56% to 5.19 % . (with cap)
I_{THD}	%	Range is 7.78 % to 9.10 % (w/o cap) and 12.85 to 14.4 % (with cap)

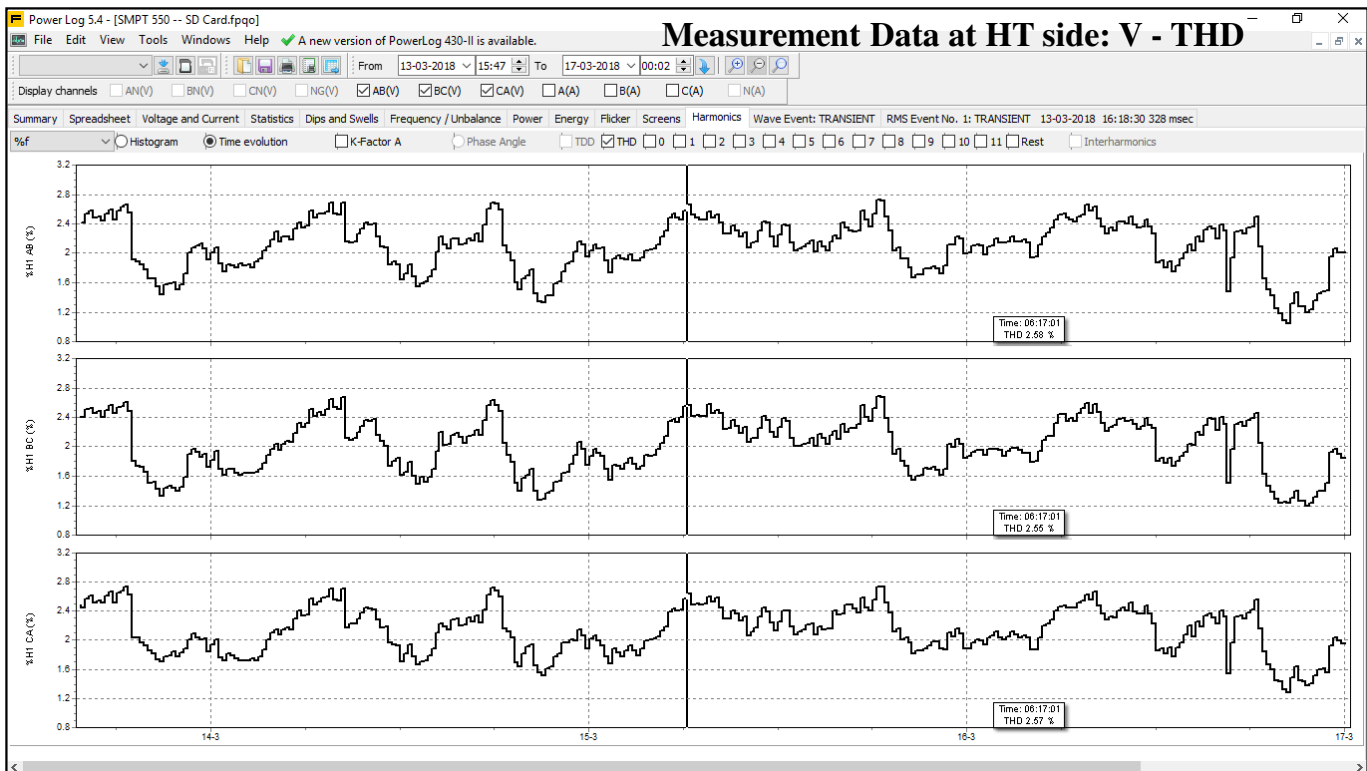
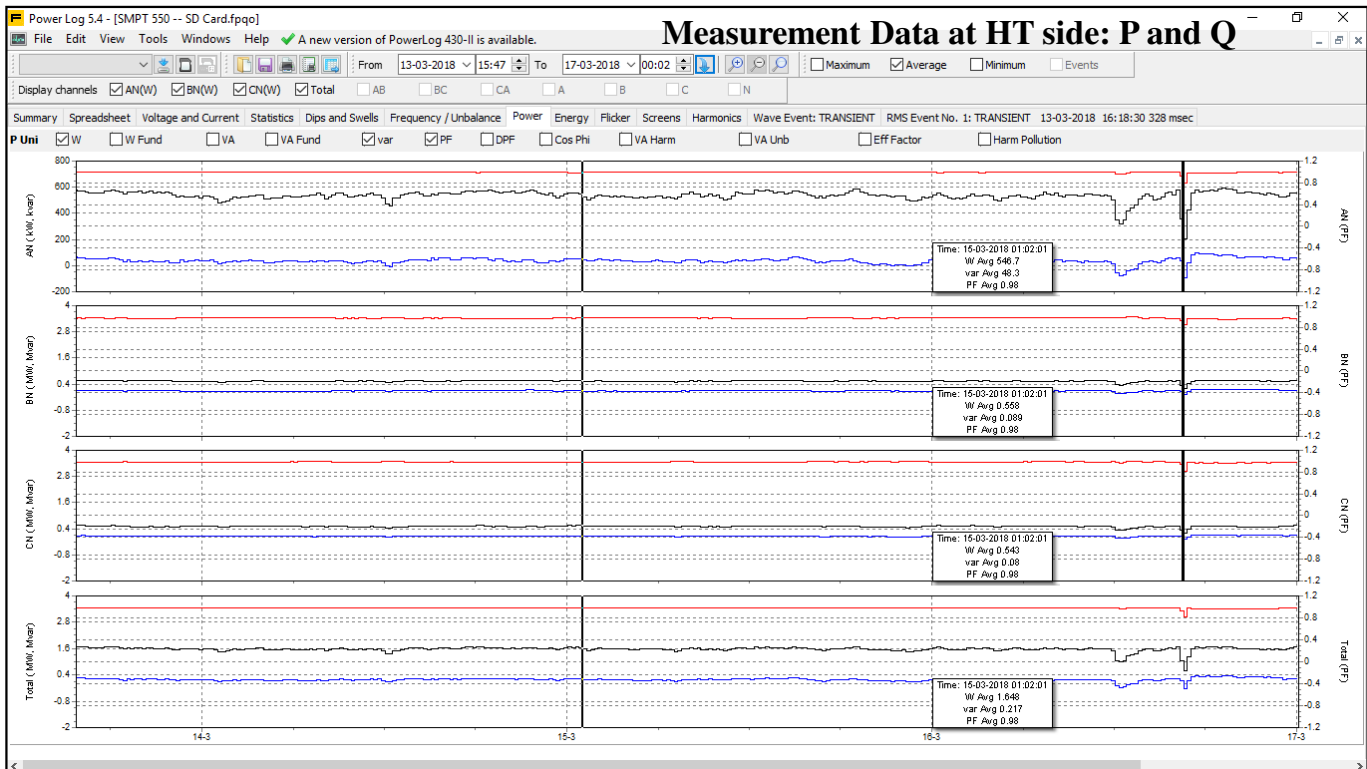
The summary of the relevant parameters

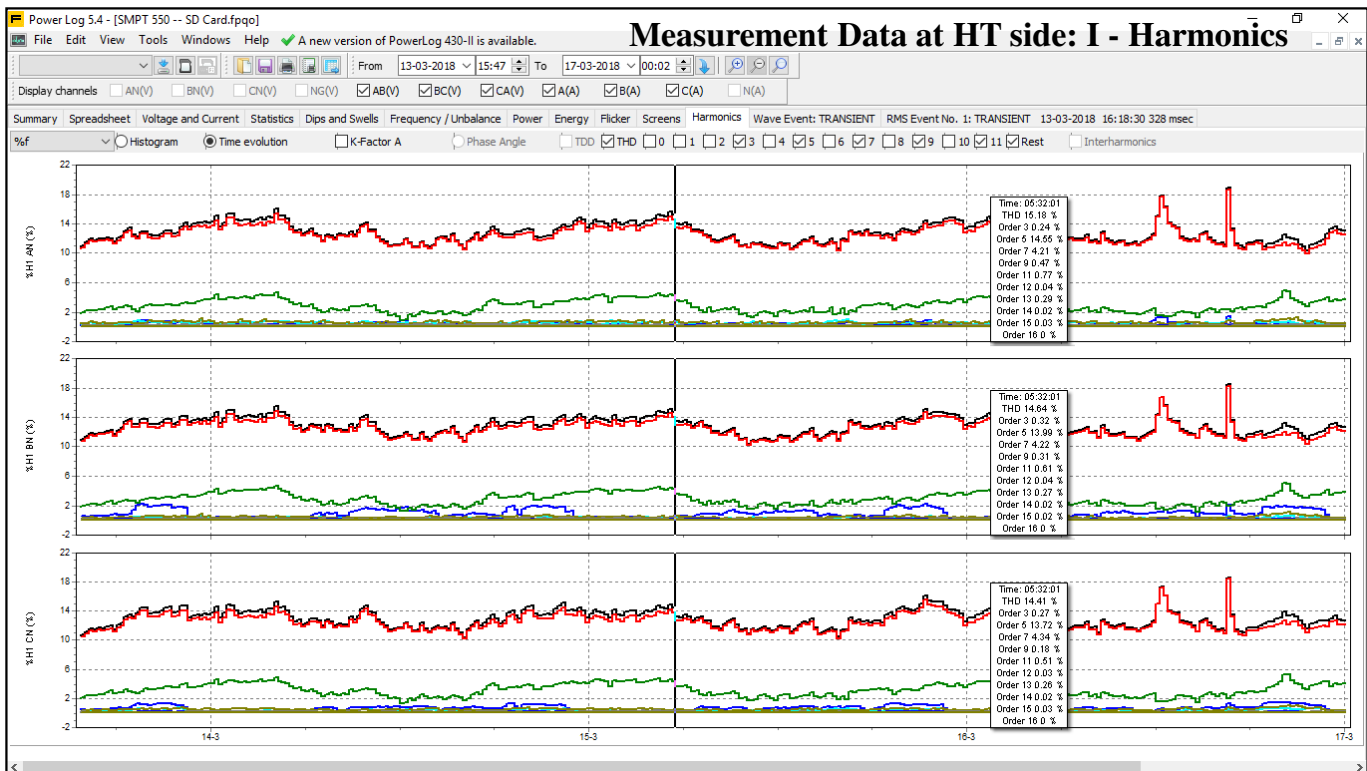
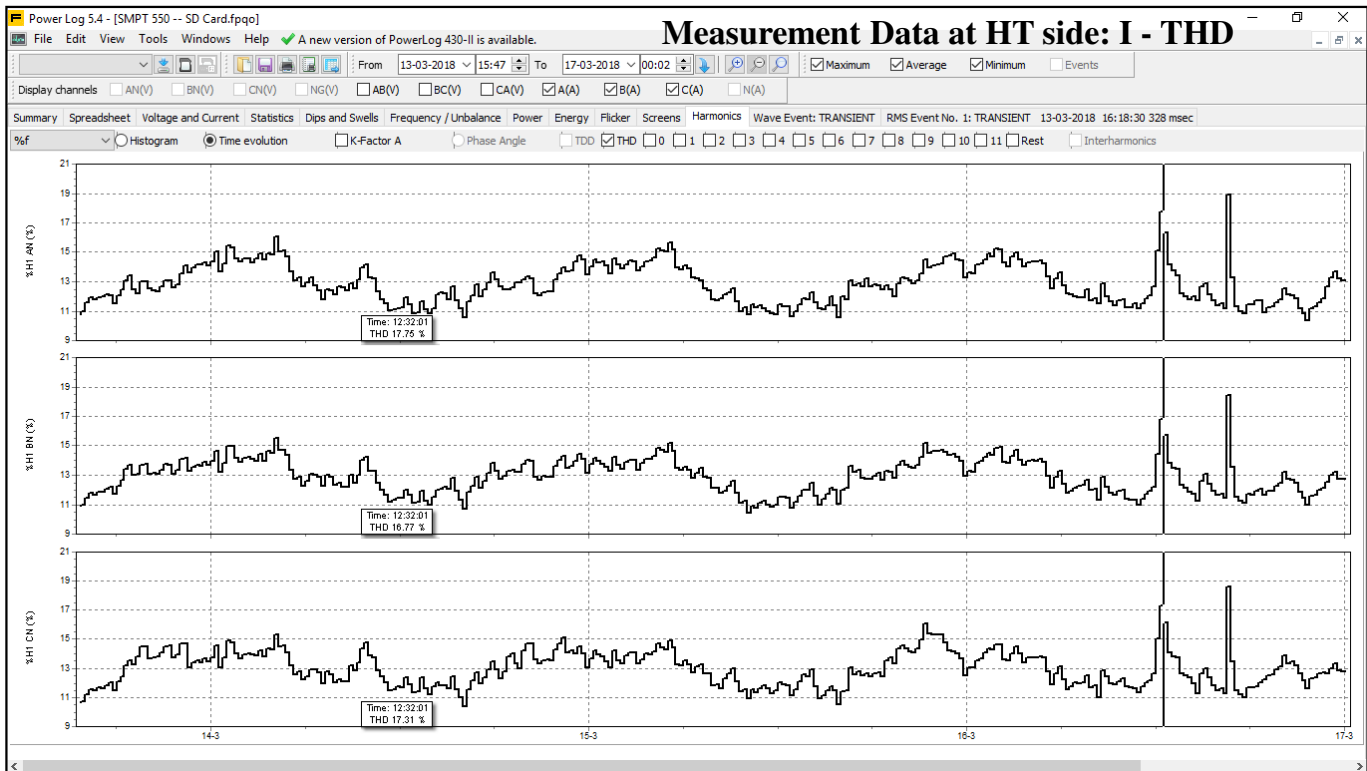
LOCATION	Capacitor	I _{RMS(AMP)}	kW	kVAR	T _{PF}	V _{THD} %	I _{THD} %
PCC LT	With Cap	2191	1543	164	0.99	4.93	13.65
PCC LT	Without cap	2230	1514	522	0.95	2.94	8.30
PCC HT	With capacitors	83	1571	178	0.99	1.47	12.92

Individual loads with one minute sample time for a short period

LOCATION	$I_{RMS(AMP)}$	kW	kVAR	T_{PF}	I THD%
SSB3	152.68	109.76	-37.33	0.9	40.86
SSB11	308.51	203.58	86.65	0.92	4.96
SSB18	163.28	107.43	28.15	0.91	30.78
PDB 9	160.6	94.5	68.47	0.81	5.51

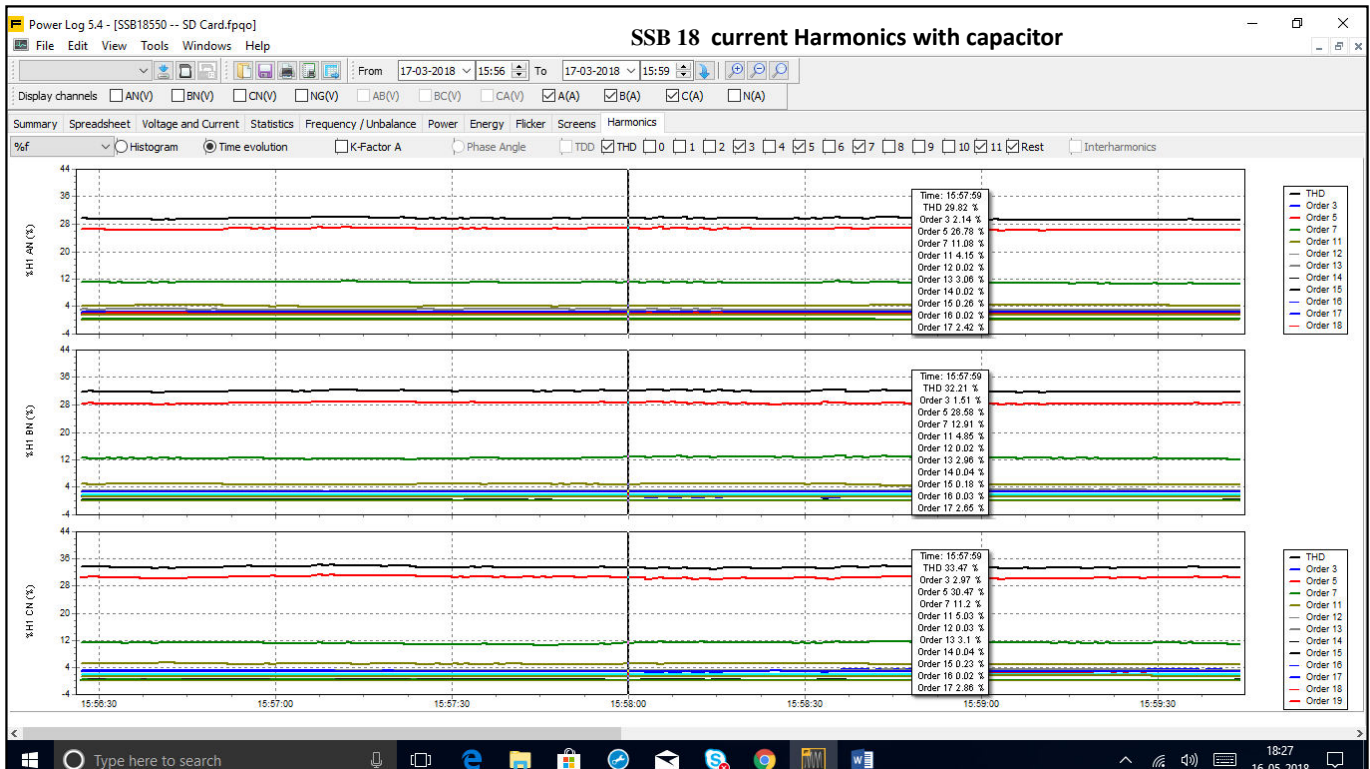






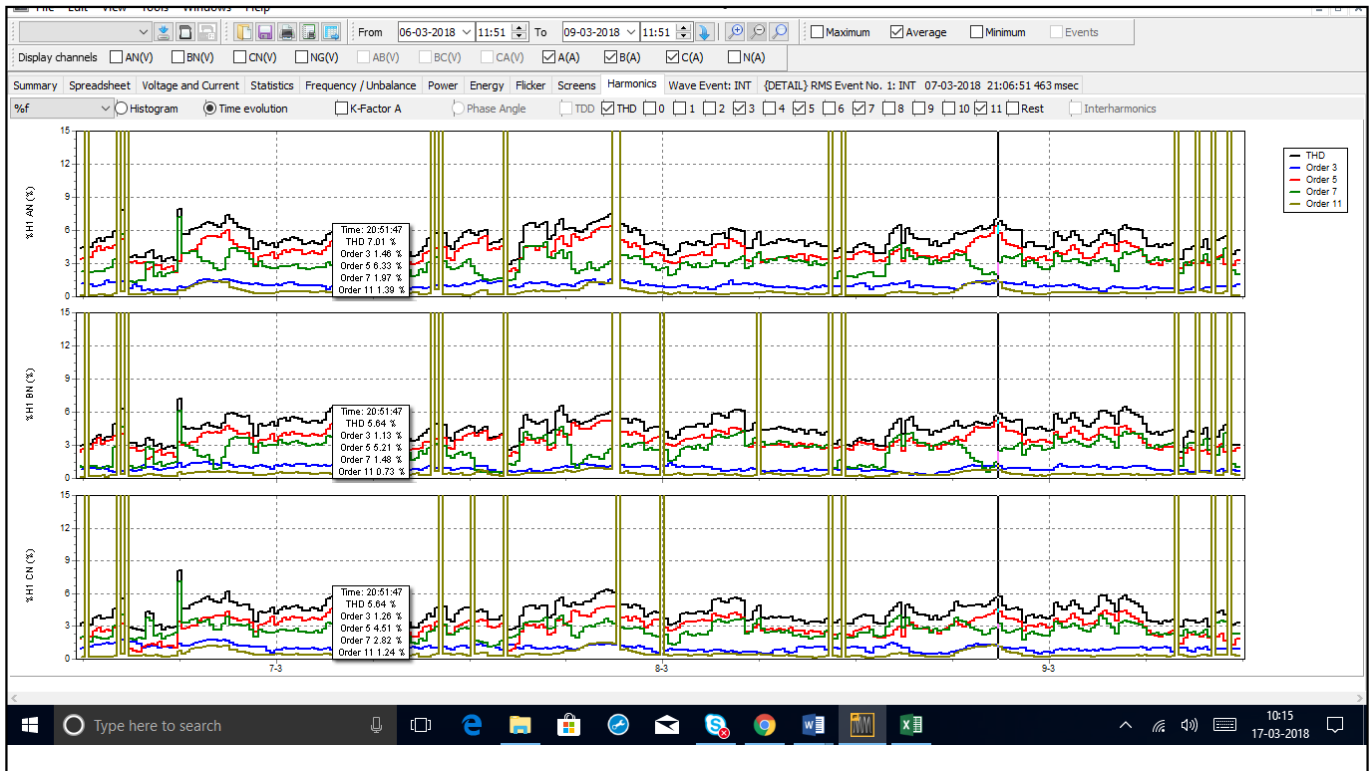
Summary sheet for SSB 18 (SPINNING FRAMES AND AUTO CONERS)With Capacitor (Basic Electrical parameters)

Date	Time	Phase Voltage (L1,L2,L3) Avg V	Line Current (L1,L2,L3) Avg A	Phase Voltage (L1,L2,L3) Fundamental Avg V	Line Current (L1,L2,L3) Fundamental Avg A	%-age Voltage Unbalance	%-age Current Unbalance	Frequency In Hz	Active Power Total Avg in kW	Reactive Power Total Avg in kVAR	Apparent Power Total Avg in kVA	Neutral to Ground Voltage	DPF	TPF	THD V Avg % age	THD A Avg % age
17-03-2018	15:56:56	241.19	162.63	240.85	155.11	0.10	1.50	49.96	1072.70	285.00	1176.90	1.80	0.97	0.91	5.26	31.60
17-03-2018	15:57:26	242.10	162.36	241.77	154.64	0.10	1.39	49.95	1073.30	287.00	1178.90	1.79	0.97	0.91	5.21	31.93
17-03-2018	15:57:56	242.50	162.27	242.18	154.42	0.11	1.40	49.94	1075.80	287.30	1180.80	1.79	0.97	0.91	5.15	31.70
17-03-2018	15:58:26	243.00	161.76	242.66	154.13	0.16	1.51	49.94	1073.90	286.80	1179.20	1.87	0.97	0.91	5.29	31.69
17-03-2018	15:58:56	243.75	161.46	243.39	153.87	0.17	1.66	49.95	1074.90	288.50	1181.10	1.89	0.97	0.91	5.42	31.76
17-03-2018	15:59:26	239.30	164.14	238.93	156.24	0.20	1.59	49.97	1074.90	282.00	1178.60	1.92	0.97	0.91	5.58	31.42
17-03-2018	15:59:56	239.54	163.78	239.19	156.27	0.18	1.57	49.98	1073.80	281.30	1176.90	1.82	0.97	0.91	5.44	31.36
17-03-2018	16:00:26	239.63	163.70	239.26	156.27	0.15	1.55	50.00	1074.70	281.00	1176.50	1.82	0.97	0.91	5.51	31.00
17-03-2018	16:00:56	237.42	163.79	237.13	156.82	0.18	1.68	50.02	1071.70	278.10	1166.90	1.81	0.97	0.92	4.93	30.23



SMPT Chittoor

summary of the measurements				
Voltage	V	64.5% (232.53 to 240 V)	35.5%(>240 V)	Min Voltage: 232.53 V Max Voltage: 248.72 V
V _{UB}	%	91.4% (≤ 0.5 %)	8.6%(0.5 to 0.61 %	One Instant 11%
Current	A	33.33 %(<800 A)	49.6 % (800-870A)	16.8 % (870-948.5A) 17 are erroneous data (>2000A)
I _{UB}	%	88.9% (<5%)	11.1%(5-6.51%)	One instant 35.72
Power,P	kW	61.4%(< 600 kW))	38.6% (600-663 kW), 17 are erroneous data. Min kW: 501 kW, Max : 663 kW	
App Power	kVA	60% (<600 kVA)		40%(600-668.5 kVA) Min: 502.8 kVA, Max: 668.5 kVA
Reactive P	kVAR	13.7% (lead -30.45 to 0)	86.3% (0 to 87.45 kVAR)	
Power factor	-	13.7 % lead 0.99		Unity PF 96.3 %
V _{THD}	%	65.5%(<1.5%)	22.4%(<2.0%)	11.7%(2-3.11%)
I _{THD}	%	61.4% (<5 %)		38.6% (5 % - 7.74 % 17 are erroneous data



Thank you for the opportunity!