ENERGY AUDIT REPORT FOR THE YEAR 2022.

PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

PMIST

PERIYAR MANIAMMAI

INSTITUTE OF SCIENCE & TECHNOLOGY

(Deemed to be University)

Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited

think • innovate • transform

Periyar Nagar, Vallam, Thanjavur - 613 403, Tamilnadu, India

Report Prepared By

Dr.M.Vivekanandan M.E.,Ph.D

BEE Certified Energy Auditor (EA-19216)

CEO, TryCAE Industrial Engineering Pvt. Ltd.,

Trichy, Tamil Nadu

TryCAE

ENGINEERING FOR SUSTAINABLE FUTURE

TryCAE
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TO WHOM SO EVER IT MAY CONCERN

This is certify that myself Dr.M.Vivekanandan, Certified Energy Auditor of Bureau of Energy Efficiency, India bearing the registration no. EA-19216, had reviewed the Energy and Green audit at the Periyar Maniammai Institute of Science and Technology, Vallam, Thanjavur during Year 2022 and recommendations to conserve energy is given in the report. I thank the management of Periyar Maniammai Institute of Science and Technology for providing me the opportunity, I also thank the team members of energy audit and green audit for rendering their support to the audit.

TryCAE Industrial Engineering Pvt.Ltd.,
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m.vivekanandan.

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CEO, TryCAE Industrial Engineering Pvt. Ltd.,
Trichy, Tamil Nadu

CONTENTS

Faculty Members Involved in Energy Audit:

1. Dr. V. Hamsadhwani, Associated Professor and Head / EEE

2. Mr. K. Arun Ganesh, Assistant Professor / EEE

3. Mr. B. Balaji, Assistant Professor / EEE

Students Involved in Energy Audit:

28 Students of II year EEE students (Batch: 2021-2025).

1.0: INTRODUCTION

1.1 About TryCAE Industrial Engineering Pvt.Ltd.,

TryCAE is an engineering services company from Tiruchirappalli, Tamil Nadu, India. Majority of the company expertise domain lies in CFD Analysis, FEA Analysis, Design Automation, Equipment Design and Energy Audits. TryCAE is engaged in the projects like L&T Khargone, Rajasthan Atomic Power Plant and L&T Ghatampur. TryCAE also capable in Design Automation where the drawings will be generated based on the input. We are working with ISGEC for design automation. Notable CFD projects are with BrahMOS and AGNI missile components currently working on an underwater torpedo's. They had done physical modelling of ESP for NTPC Farakka 500 MW plant. Currently we are working on CFD analysis of FGD project for NTPC Kudgi and for KC Cottrell.

The company has been mentored by the industry experts like Dr.R. Vasudevan, Dr.V.Gopalakrishnan, Dr.C. Mani and Mr. K. Sakthi.

1.2 About PeriyarManiammaiInstitute of Science and Technology (Deemed to be University)

PeriyarManiammai Institute of Science & Technology(Deemed to be University) is proud to be a unique institution of higher learning and academic excellence. In an endeavour to fulfil the dreams of our Mentor ThanthaiPeriyar and AnnaiManiammaiyar, the University is dedicated to its societal responsibility for transforming students from different parts of India and abroad into stalwarts by igniting their hidden talents. As it is located in a rural area, the students are admitted from a wide range of calibre and by personal attention and modern teaching methodology towards a Product / Process / Demo / Case Study teaching, they are shaped into career oriented professionals with bright future.

The University is making efforts to create new horizons in the arena of technical education and research. Curriculum innovation is given priority by the University to make the courses industry and research oriented. The dedicated and qualified faculty

members routinely preach and practice for outcome based learning which leads towards an excellent academic career for the betterment of the students.

1.3 ABOUT ENERGY AUDIT

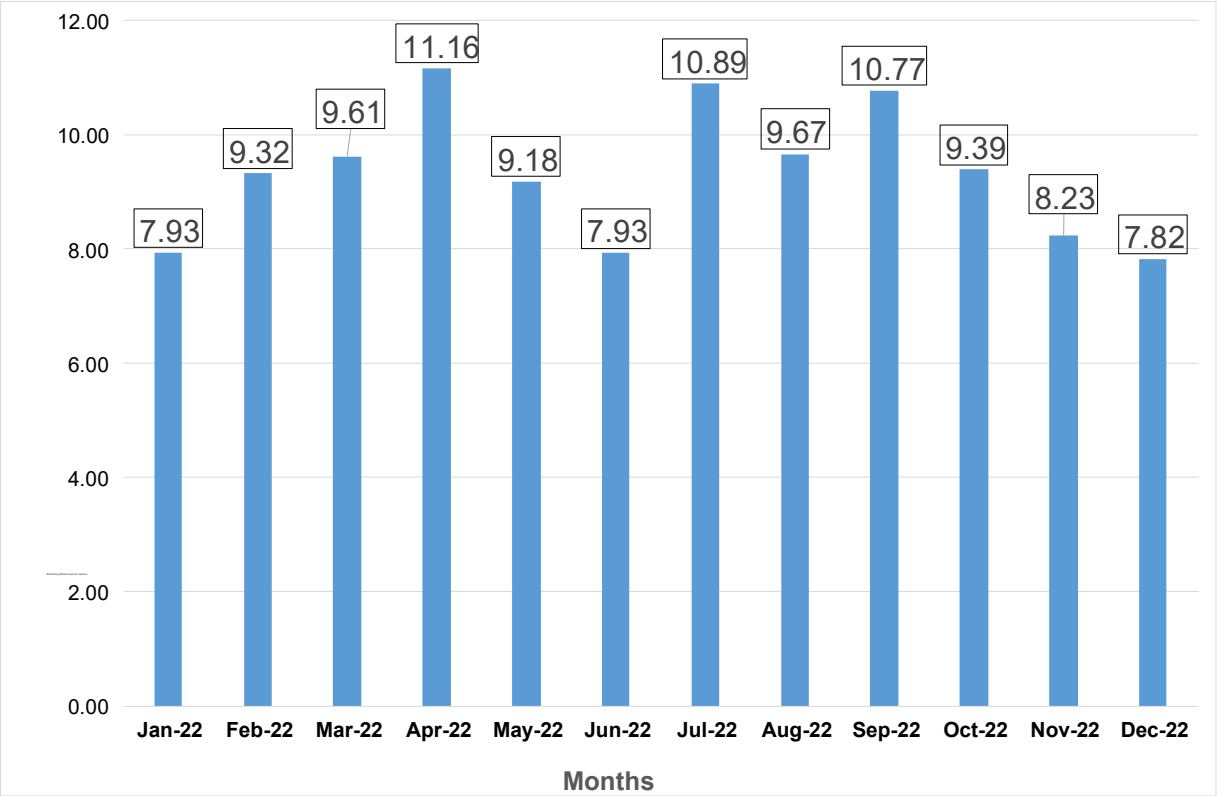
The building sector has gained prominence over the past few decades as the largest consumers of energy. 45% of total global energy is used in heating, cooling and lighting of buildings. Energy consumption patterns could be substantially altered by adopting energy conserving measures, particularly during the phase of building design.
Hence energy requirement to the building is need of the hour for the institutions, this might be the first step in achieving the green audit to the campus

2.0:ENERGY AUDIT

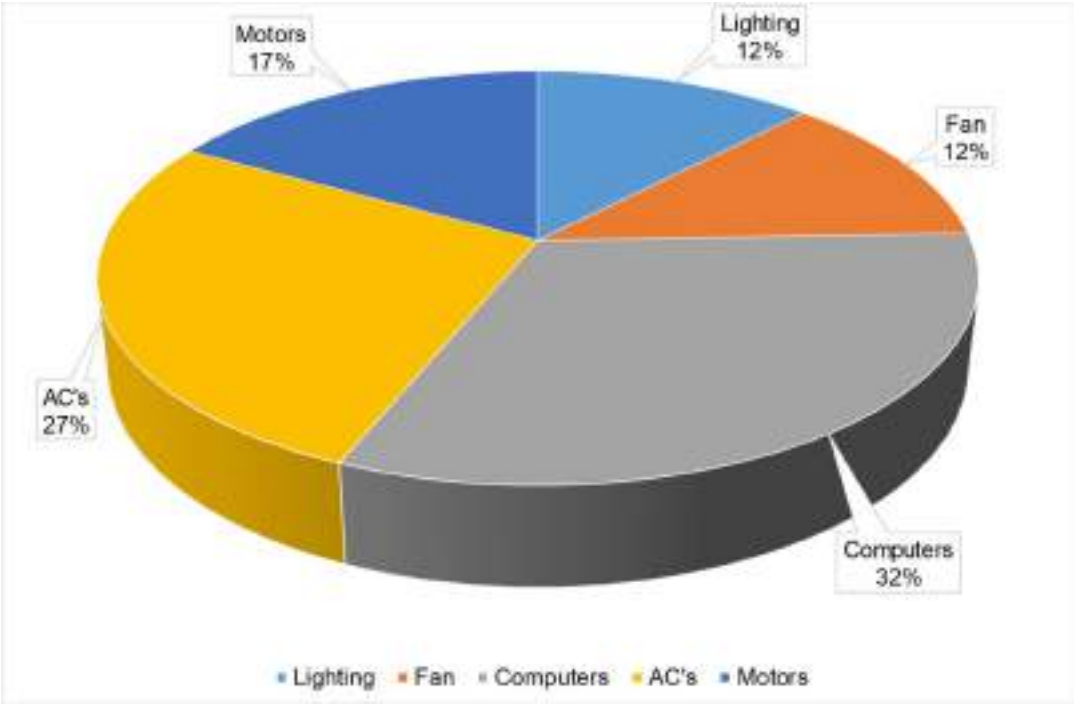
The area of the energy audit includes

- Class Rooms
- Faculty Room
- Laboratories
- Office Rooms
- Seminar Halls
- Hostels
- Canteen
- Post Office
- ATM + Others

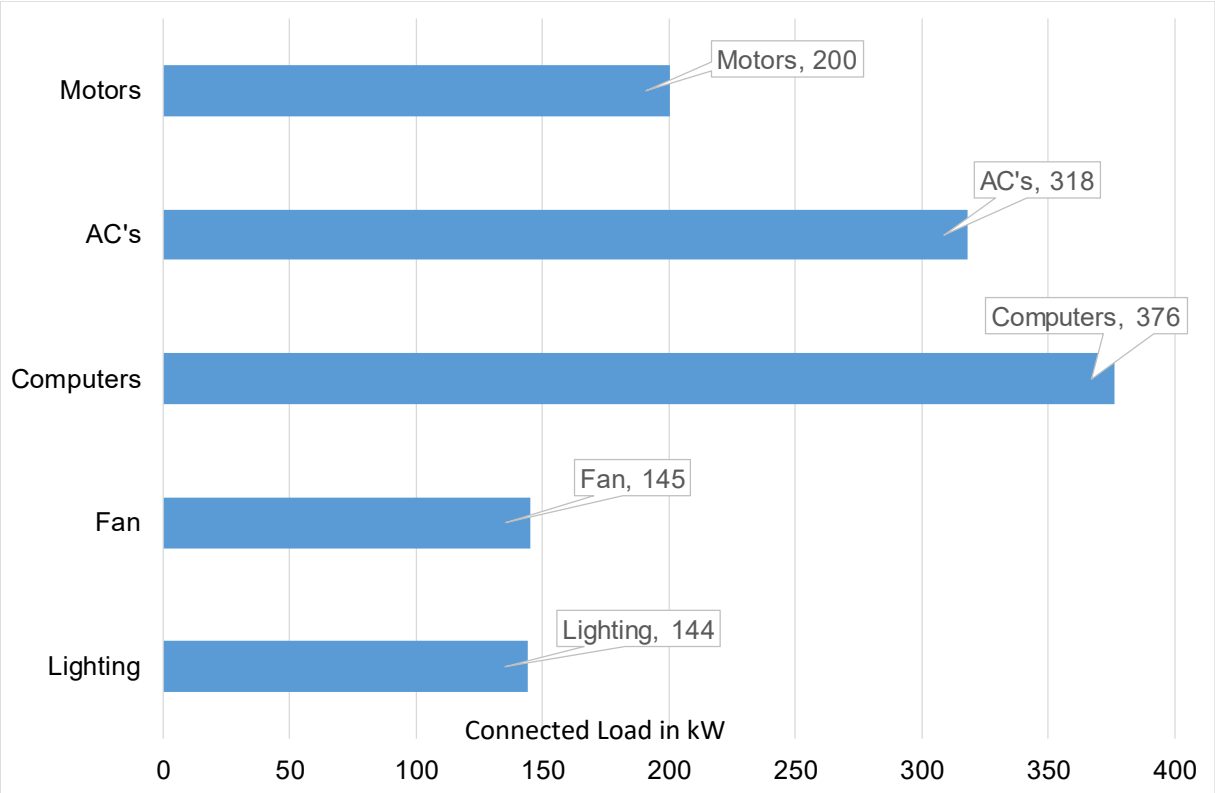
2.1Power Consumption Pattern for the Year 2022



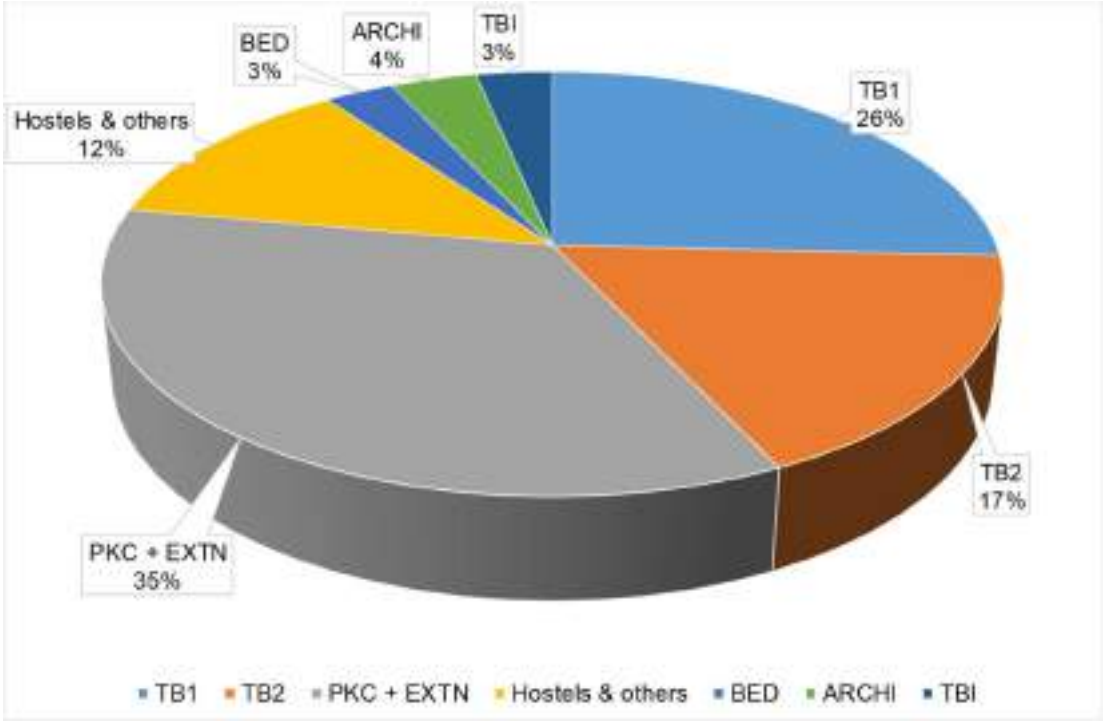
2.2 Connected load distribution of the PMIST



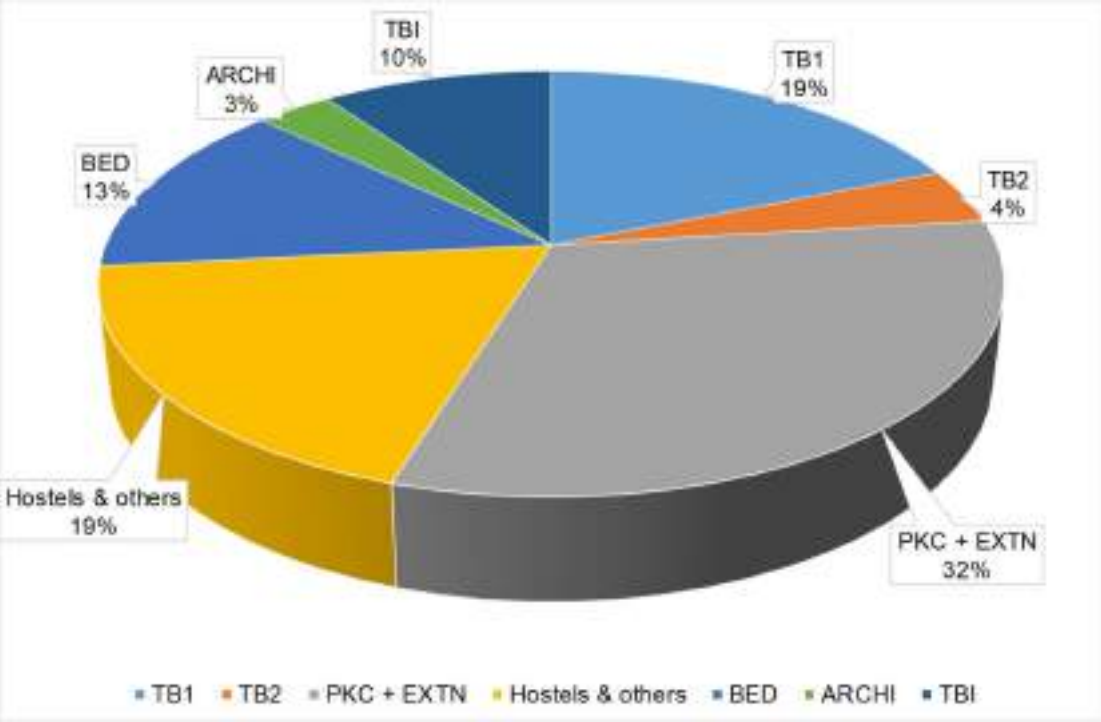
2.3Connected kilowatt for different load distribution



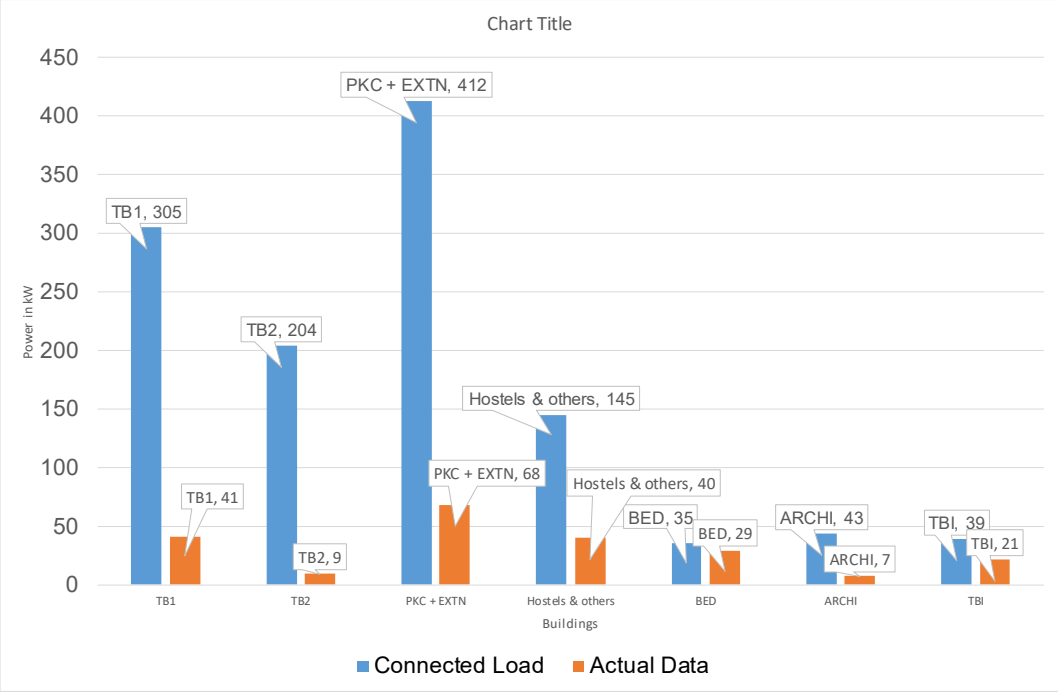
2.4 Percentage distribution for various buildings



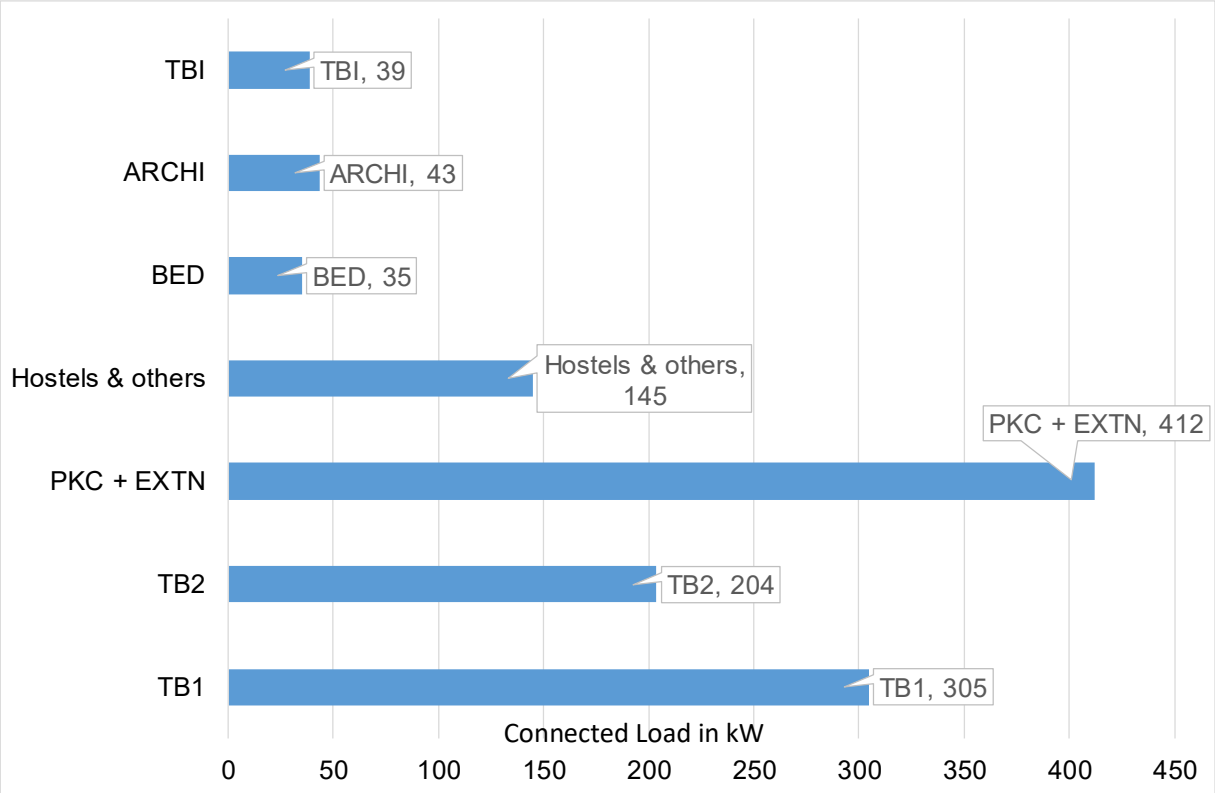
2.5 Percentage distribution for various buildings, recorded data from power quality



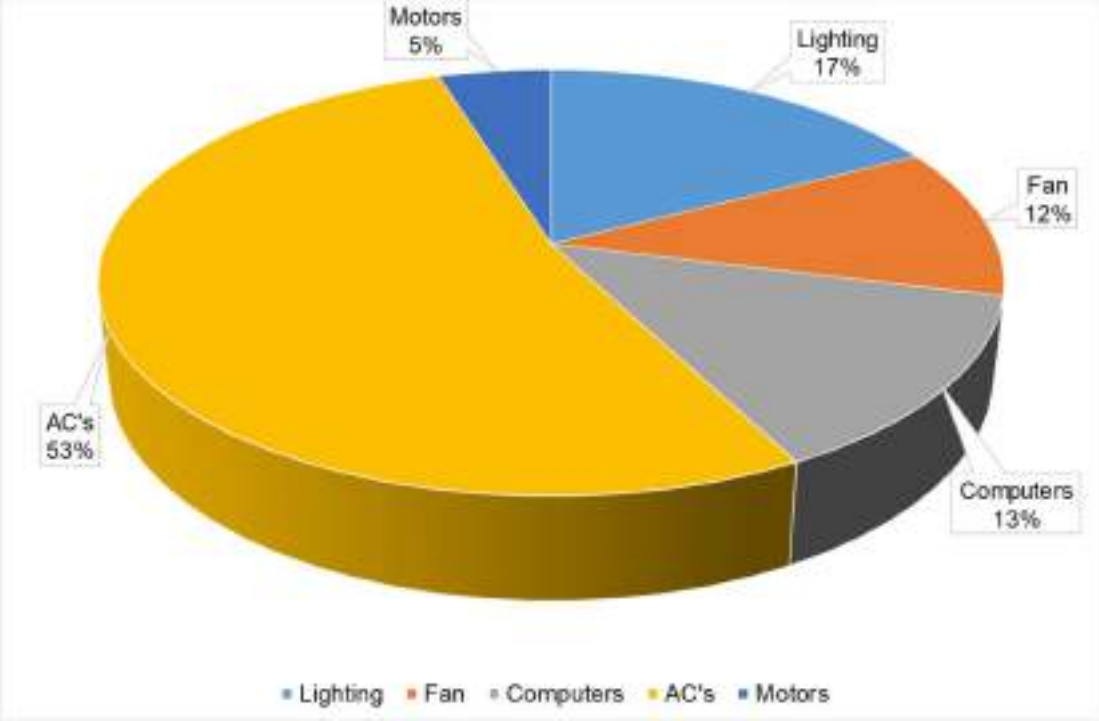
2.6 Comparison between connected load and actual recorded load



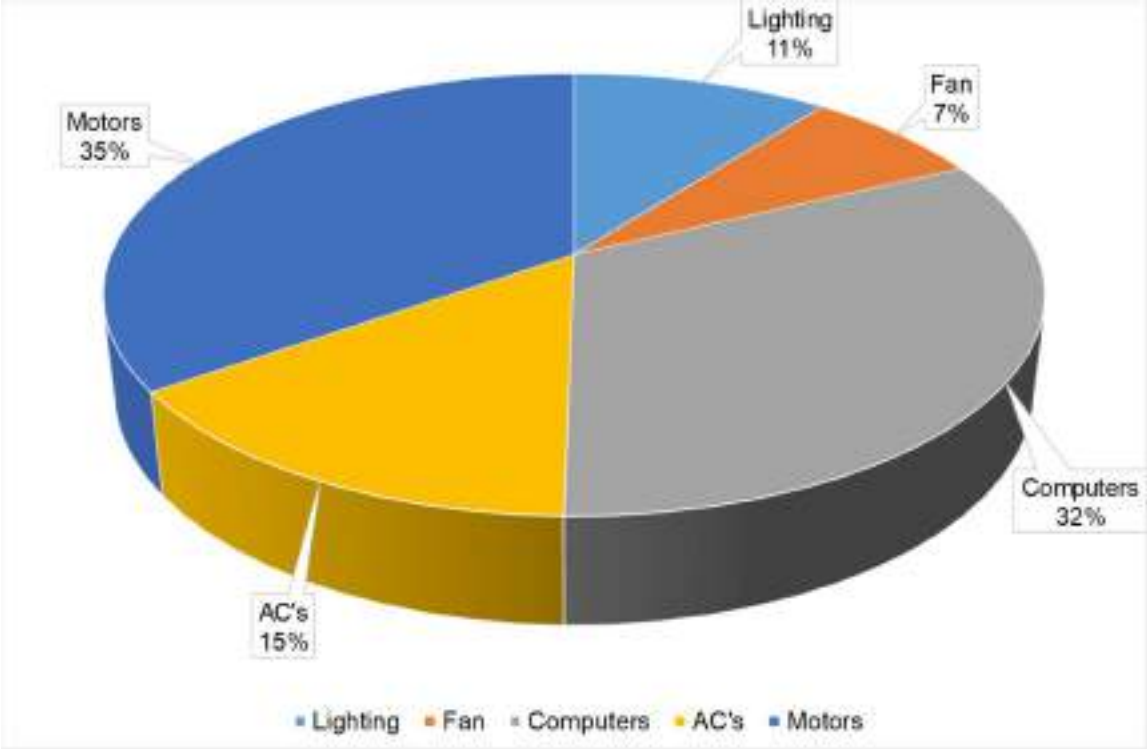
2.7Power consumption based on connected load for various buildings



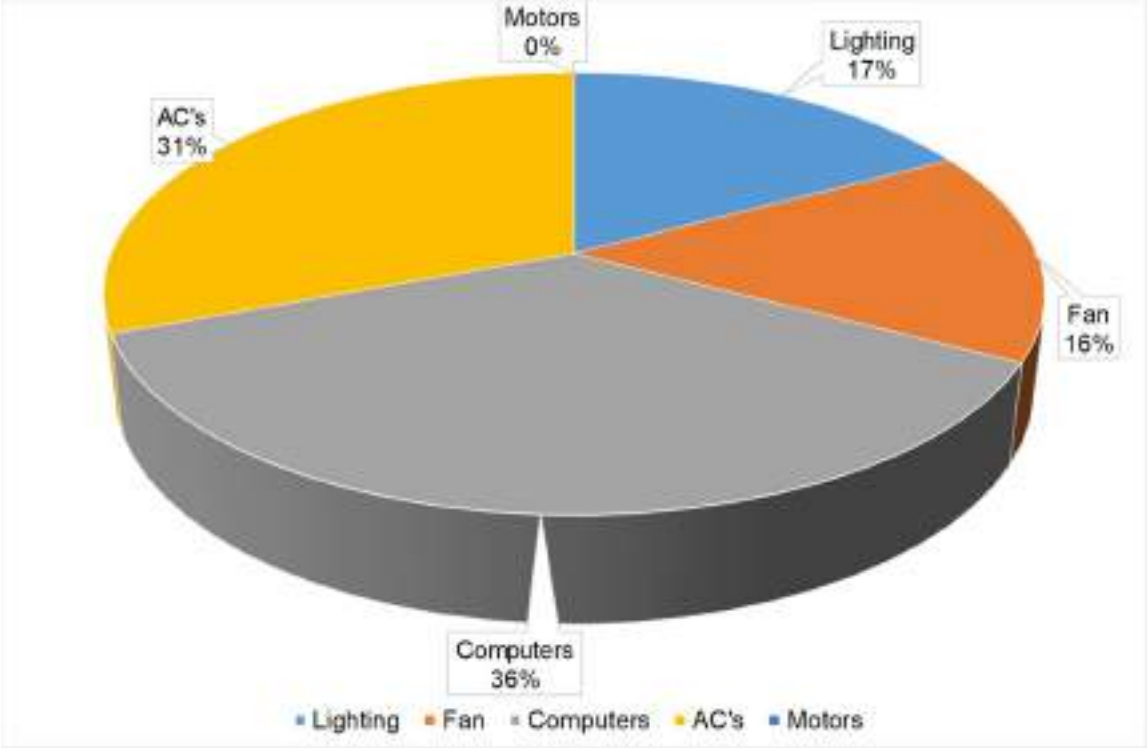
2.8Connected load distribution for TB1 [Main Building]



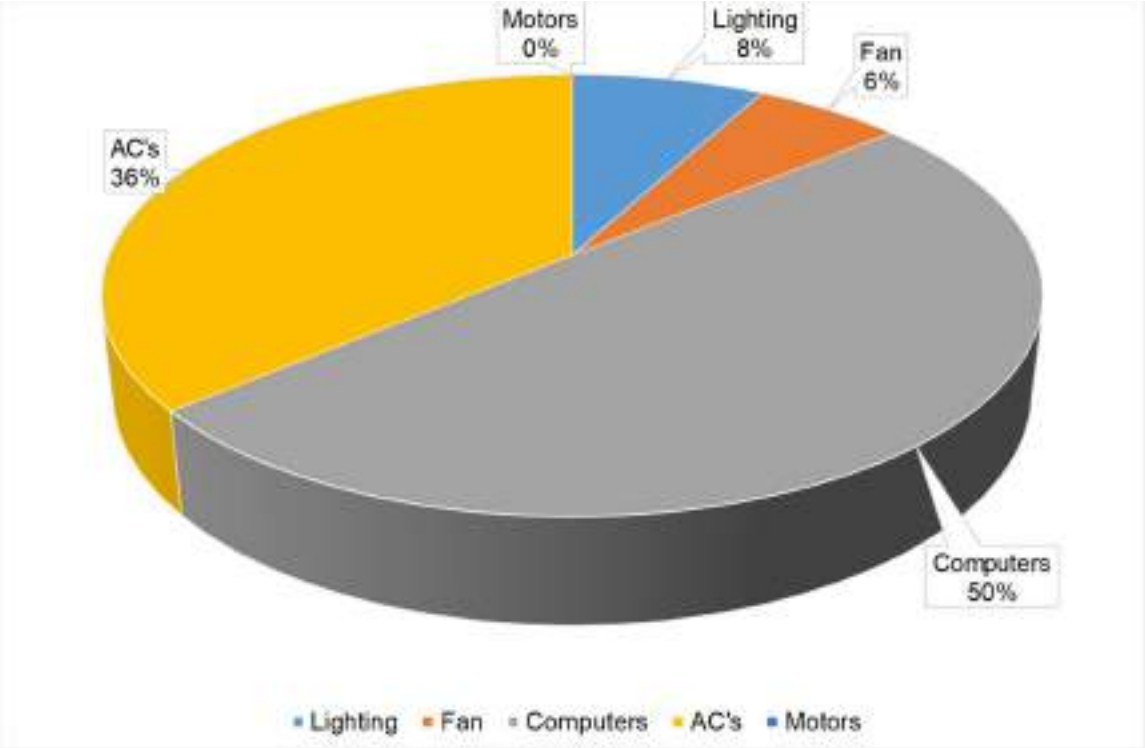
2.9Connected load distribution for TB2 [Mechanical Block]



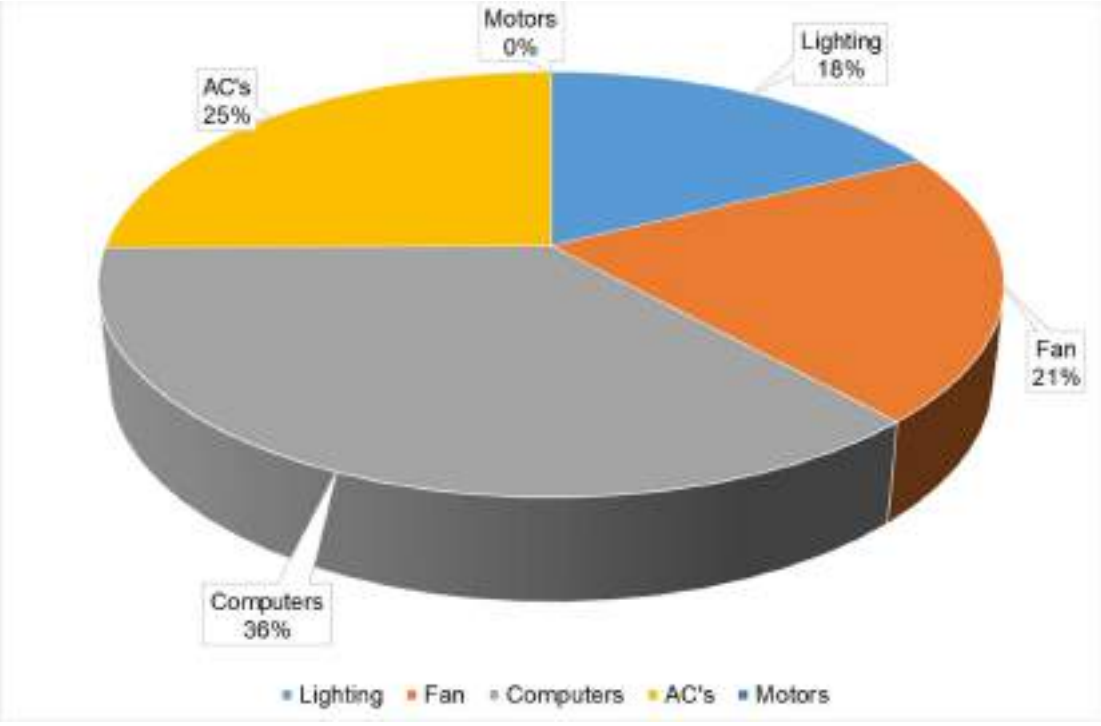
2.10Connected load distribution for Architecture Block



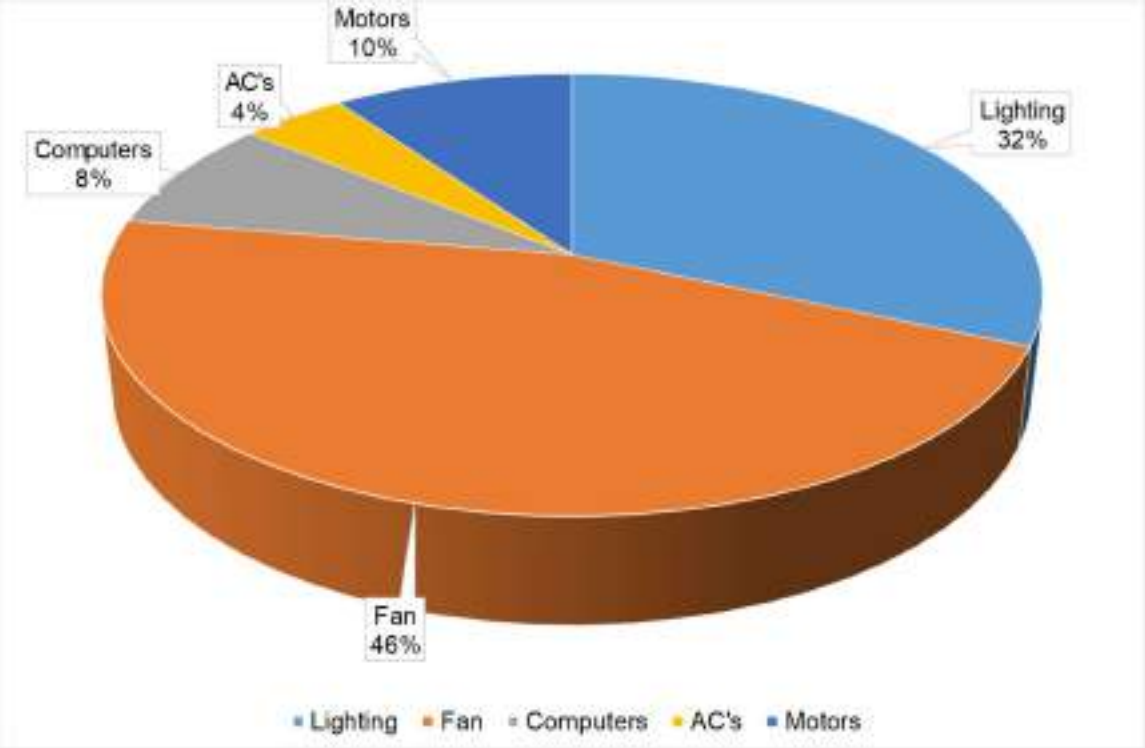
2.11Connected load distribution for PKC& its Extension Block



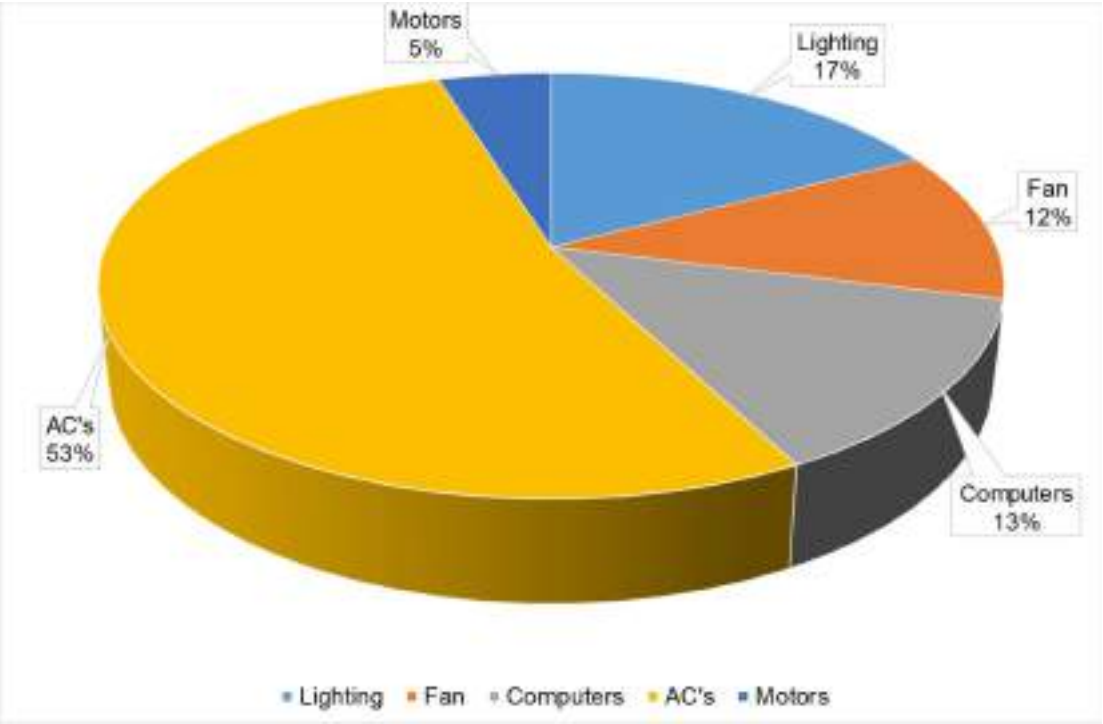
2.12Connected load distribution for B. ED Block



2.13Connected load distribution for Hostels, Canteen, Post Office, ATM and others



2.14Connected load distribution for TBI Block



2.15 CO_2, Temperature and Relative Humidity of various buildings

S.NO.	PLACES	CO_2 PPM	RELATIVE HUMIDITY	TEMPERATURE
1	TB-1 (EEE) LAB.	418	51.6	30.4
2	TRANSPOTATION LAB.	410	50.2	30.5
3	CIVIL HOD CABIN	400	47.9	31.3
4	CONCRET LAB.	433	53	30.4
5	GEO TECHNICAL LAB.	396	48.7	30.9
6	STRENGTH OF MATERIAL LAB.	434	48.3	31.3
7	ELECTRICAL MACHINE LAB.	396	50.8	30.7
8	EDC LAB.	385	49.4	30.8
9	M&I LAB.	380	49.4	31
10	VALLUVAR HALL	506	45.4	34.5
11	OFFICE	387	55.3	28.7
12	VC OFFICE	378	50.1	29.3
13	GIS LAB.	420	51.5	30.7
14	BIO-TECH LAB.	375	49.5	31.3
15	REGISTAR OFFICE	664	39.3	27
16	CONTROL SYSTEM LAB.	413	53.4	28.9
17	BIO-PROCESS LAB.	400	50.9	30.4
18	CHEMICAL ENG. DEPT.	419	49.5	30.4
19	CHEMICAL LAB.	409	48.5	30.7
20	PHYSICS LAB.	409	49.3	30.7
21	TB-1 302	368	43.6	31.7
22	CIVIL DEP. STAFF ROOM	864	44.4	32
23	MATHS DEP. STAFF ROOM	381	45.9	31.8
24	DIRECTOR CSAS ROOM	361	33.6	33.2
25	ADMIN OFFICE	385	34.2	33.2
26	UG LAB.	386	36.3	32.7
27	STUDIO	386	34.1	33.2
28	CANTEEN	421	30.7	35.7
29	ACADMIC AFFAIR OFFICE	380	38.4	31.8
30	LIBRARY	388	34.7	34.1
31	CSE LAB. 208	844	41.7	29.6
32	CSE LAB. 207	803	38.6	28
33	INDOOR STADIUM	897	34.7	33.9
34	SUBSTATION	412	32.2	35.8
35	AEROSPACE LAB.	386	35.2	33.2
36	MECHANICAL LAB.	392	35.6	33.8
37	GENERATE ROOM	382	33.5	34.5

3.0 ENERGY CONSERVATION RECOMMENDATIONS

3.1 Summary of Recommendations

Sl.No.	Topic	Descriptions	Investment (Rs.)	Return on Investment	Page No.
1.	Replacing the Double Frame electrical choke tube lights to a LED tube lights	• Older Double frame tube lights consumes 50% of total light load • LED tube lights are up to 66% more efficient • Replacement of Double Frame Electrical choke tube lights with LED Tube light (Savings= 254 Units per Day)	3 Lakhs	262Days (9 months)	19
2.	Replacing the Single Frame choke tube lights to a LED tube lights	• PHASE 1 : Replacement of Single Electrical Choke tube lights with LED Tube light (Savings= 96 Units per Day) • Older Single frame Electrical Choke tube lights consumes 14% of total light load • LED tube lights are up to 50% more efficient	1.59 Lakhs	524Days (18 months)	20
3.	Replacement of older fans with superfan	There are around 469 fans in the campus in a recoiled conditions, it consumes 25% of the fan total consumption, Super fans are up to 50% more efficient • Replacement of older fans with super fan (Savings=	14 Lakhs	87 Months	22

Sl.No.	Topic	Descriptions	Investment (Rs.)	Return on Investment	Page No.
		96 Units per Day)			
4.	Replacing a multiple split air conditioners in VC room to a single variable refrigerant flow AC	There are Four1.5 Ton 3 Star Split AC in the VC chamber which consumes power individually, it might be replaced with VRF AC with a single outdoor unit and four individual indoor units	2 Lakhs	26 Months	23
5.	High CO_2 in Rooms	In all the computer center CO_2 PPM is higher. so, it is recommended to install an exhaust fan. For Registrar room, it is recommended to install a smaller exhaust fan without compromising the AC cooling.Also, recommends to place few indoor plant inside the room to keep the CO_2 level low.			10
6.	Alternate lighting scheme for Street Light	After 12:00 am to 6:00 am percentage utilization of the street light will be less.Hence it is proposed to install alternate lighting scheme, where ODD numbers (installed) lights will be switched off after 12 am.			25
7.	Proximity sensor for varendas, corridors, porticos	Proximity sensor or alternate lighting scheme can be implemented to save energy			

Sl.No.	Topic	Descriptions	Investment (Rs.)	Return on Investment	Page No.
	and wash rooms				
8.	Translucent shed for library & boys hostel dining hall	Translucent shed can be provided on the top roof of library, this will let in the natural light.			
9.	Window screens for class rooms	Screens in class rooms can be opened during day time to utilities the day light, particularly the class roomsin the first& second floor, screen should be always open.			
10.	Inverter AC for new purchase	All new AC purchases are recommended with Inverter AC.			
11.	Day time savings in hostels	A Common MCB which control all the power input to the flooris to be provided by switching off the MCB.We might save power, if some of the students forget to switch off the fans or lights.			
12.	Power balance for phases for current loading scenario	Power or loading balance to be done for the current loading scenario.It will prevent the overheat of the wires. Kindly refer Thermal Imaging pictures.			
13.	Reduction in Bus bar heat	Power or loading balance to be done for the current			

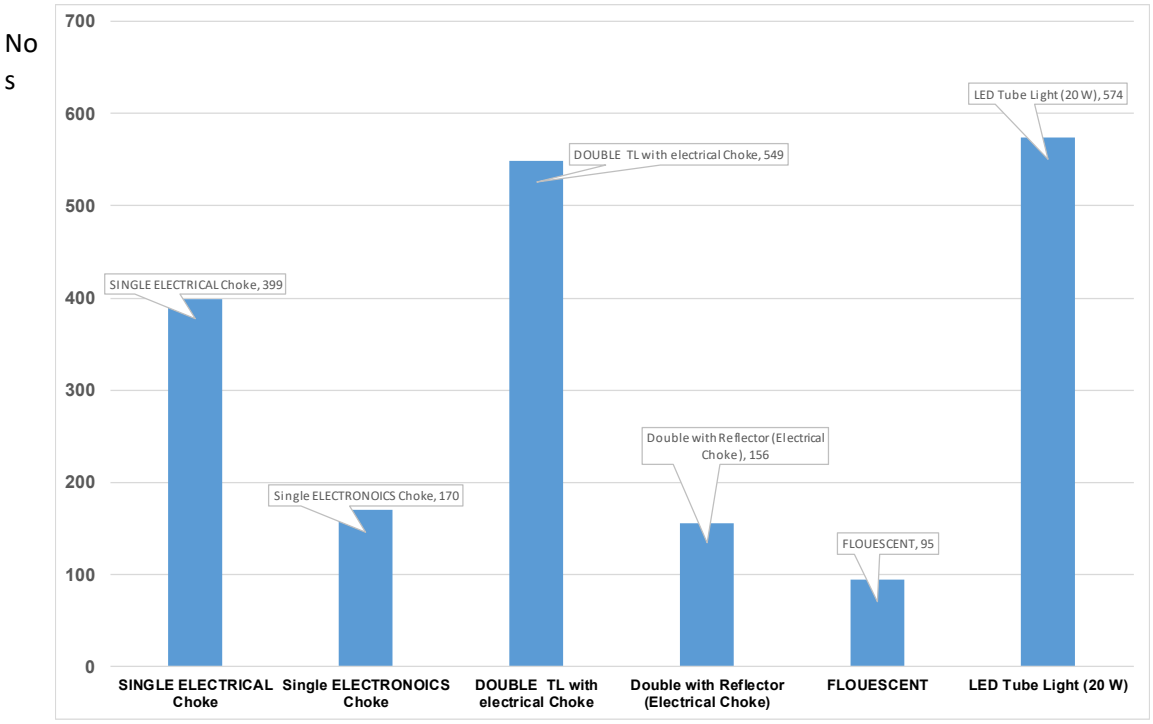
Sl.No.	Topic	Descriptions	Investment (Rs.)	Return on Investment	Page No.
	generation	loading scenario. It will prevent the overheat of the wires. Kindly refer Thermal Imaging pictures.			
14.	Solar Chimney for Computer Center	As the heat and CO_2 generation is more in the computer rooms because of faulty AC's, it is recommended to go to solar chimney for the computer center.Which will substantially decrease the temperature and improve air circulation.			
15.	Replacing smokeless stoves instead of LPG stoves	It would be energy efficient if smoke less stove is used.			
16.	Renewable energy for cooking	As the university is having a renewable energy department, student project with concentrated solar steam generation can be tried as project and can be utilized for cooking.			
17.	Solar roof tops for 100 kw	A solar PV system of 100 kW will be highly energy saving implementation.			
18.	Harmonic filter for neutral	Since we are using LED tube lights in boys and girls			

Sl.No.	Topic	Descriptions	Investment (Rs.)	Return on Investment	Page No.
	wire @ boys and girls hostels	hostels , THD is high in both hostels as well as it affects the overall power quality of PMIST, Hence it is recommended to use harmonic filter at both hostels to avoid the future burning or overheat of neutral cables or coils in the submergible pumps and motors will be affected because of this high THD Refer Power Quality reports			

4.0 ENERGY CONSERVATION PROPOSALS

The following table describes the total number of lights used in the PMIST campus

Descriptions		Wattage	Nos	Power in KW
Tube Lights	Single Electrical Choke	50	399	19.95
	Single Electronics Choke	36	170	6.12
	DOUBLE TL with Electrical Choke	100	549	54.9
	Double with Reflector (Electrical Choke)	100	156	15.6
	FLOUESCENT (1 feet) with Reflector	20	95	1.9
	LED Tube Light(20 W)	20	774	15.48
LED	Square (10W)	10	350	3.5
	Square (9W)	9	175	1.75
	Square (5W)	5	58	0.46
	Round (5W)	5	79	0.395
	Round (8W)	8	126	1.008
	Bulb Type	10	500	5
	Street Light LED (28 W)	18	22	0.396
	Street Light LED (32 W)	35	20	0.7
	Focus Lamp	100	33	3.3



4.1 Number of tube lights in the PMIST

From the above graph, LED tube light and double tube light mounted in the single frame are of approximately same numbers, followed by single electrical choke tube lights.

A single LED tube light will consume only 20 W, where as in a double tube light frame will consume 60 W, a double tube light will consume two times more electricity than the LED tube light.

Hence it is recommended to replace the double frame light with LED tube light in a phased schedule or in a single replacement.

Proposal

1

Replacement of Double frame Tube Light with LED Tube Light

WHY

- Older Double frame tube lights consumes 50% of total light load
- LED tube lights are up to 66% more efficient

.

HOW

- Replacement of Double Frame Electrical choke tube lights with LED Tube light (Savings= 254 Units per Day)

COST

Investment	Payback Period
2.82Lakhs	3 Years

Return On Investment Calculations for Double Frame Tube Light

Total Double Frame Tube Lights	705	Nos.
Per Day Consumption	6	Hours
Watt of Single TL	40	
Per day Unit	169.2	Units
EB Rate Per Unit	6.35	Rs.
Total Amount Spend Per Day	1074.42	Rs.
Per Month	26860.5	Rs.
Cost of New LED TL	400	Rs.
No of TLs	705	Nos.
Investment	282000	Rs.
Savings because of installation per day	537.21	Rs.
Return on Investment	524.93	Days
	17.49781	Months

Proposal 2

Replacement of Single Frame Electrical Tube Light with LED

WHY

- Older Single frame Electrical Choke tube lights consumes 14% of total light load
- LED tube lights are up to 50% more efficient

.

HOW

- Replacement of Single Electrical Choke tube lights with LED Tube light (Savings= 96 Units per Day)

COST

Investment	Payback Period
1.59 lakhs	524 Days

Return On Investment Calculations for Single Frame Choke Tube Light

Total Tube Lights	399	Nos
Per Day Consumption	6	Hours
Watt of Single TL	40	
Per Day Unit	95.76	Units
EB Rate Per Unit	6.35	Rs.
Total Amount Spend Per Day	608.076	Rs.
Per Month	15201.9	Rs.
Cost of New LED TL	400	Rs.
No of TLs	399	Nos.
Investment	159600	Rs.
Savings because of installation per day	304.038	Rs.
Return on Investment	524.93	Days
	17.49781	Months

Proposal 3

Replacement of older Fans with Super Fan

WHY

There are around 469 fans in the campus in a recoiled condition, it consumes 25% of the fan total consumption. Super fans are up to 50% more efficient

HOW

- Replacement of older fans with super fan (Savings= 96 Units per Day)

COST

Investment	Payback Period
14 lakhs	87 Months

Return On Investment Calculations for Super Fan

Total Older Fans	469	Nos.
Per Day Consumption	6	Hours
Watt of Super Fan	60	
Per Day Unit	168.84	Units
EB Rate Per Unit	6.35	Rs.
Total Amount Spend per day	1072.134	Rs.
Per Month	26803.35	Rs.
Cost of New Super Fan	3000	Rs.
No. of Super Fan	469	Nos.
Investment	1407000	Rs.
Savings because of installation per day	536.067	Rs.
Return on Investment	2624.67	Days
	87.48906	Months

Proposal

4

Replacement of Individual ACs to VRF ACs

WHY

There are Four 1.5 Ton 3 Star Split AC in the VC chamber which consumes power individually, it might be replaced with VRF AC with a single outdoor unit and four individual indoor units.

HOW

- Replacement of older split AC with VRF AC
-

COST

Investment	Payback Period
2 lakhs	26 Months

Return On Investment Calculations for VRF AC

Total ACs	5	Nos.
Per Day Consumption	10	Hours
Watt of VRF AC	1600	
Per Day Unit	80	Units
EB Rate Per Unit	6.35	Rs.
Total Amount Spend Per Day	508	Rs.
Per Month	12700	Rs.
Cost of VRF AC	200000	Rs.
No. of AC	1	Nos.
Investment	200000	Rs.
Savings because of installation per day	254	Rs.
Return on Investment	787.40	Days
	26.24672	Months

Proposal

5

Alternate lighting scheme for Street Light

WHY

After 12:00 am to 6:00 am percentage utilization of the street light will be less.

HOW

It is proposed to install alternate lighting scheme, where ODD numbers (installed) lights will be switched off after 12 am, Example in 10 street lights 5 will be in switch off position.

COST

Investment	Payback Period
Wiring	26 Months

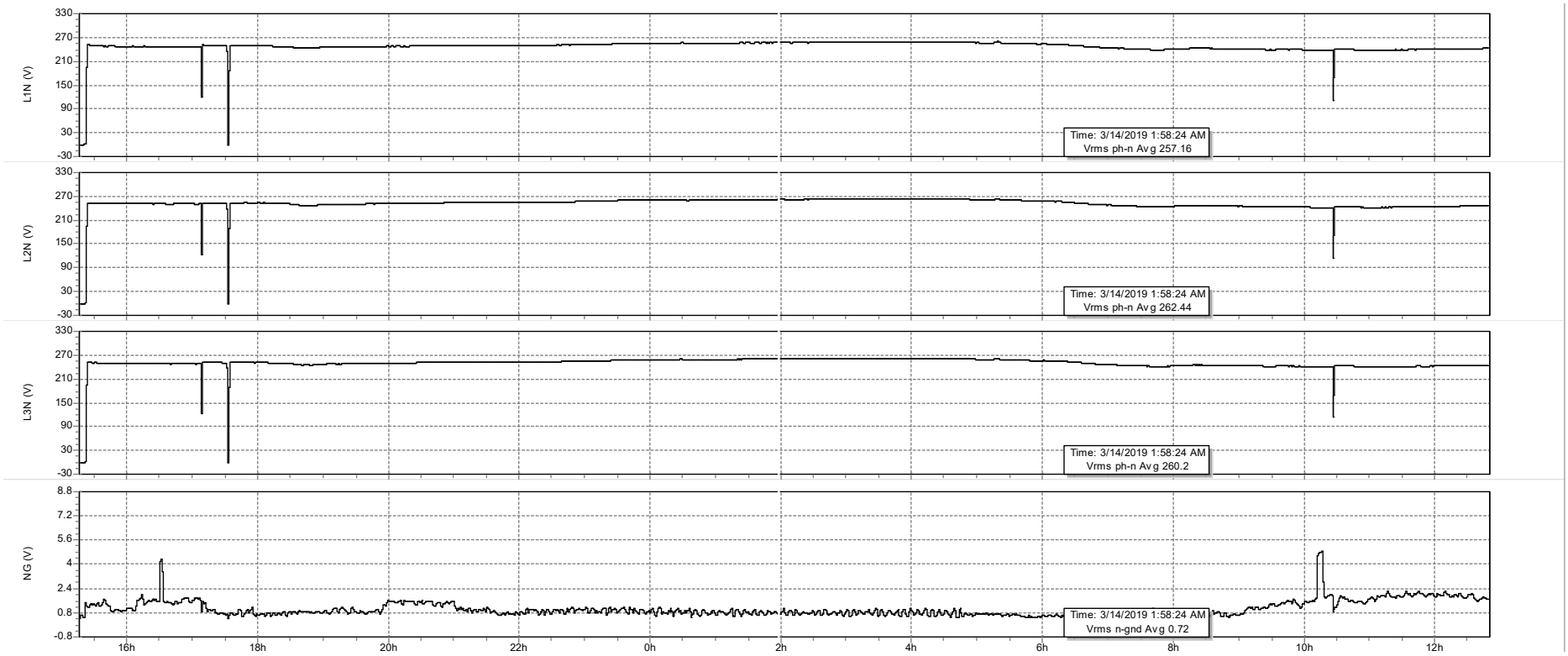


Fig.1 Shows the voltage on three phases and Neutral to ground for 22 hours from 13/03/2022 15:17 pm to 14/03/2022 12:50 pm

Inference :There is no abnormalities found.Also, the neutral to ground voltage is well within the acceptable range of 5 Volt

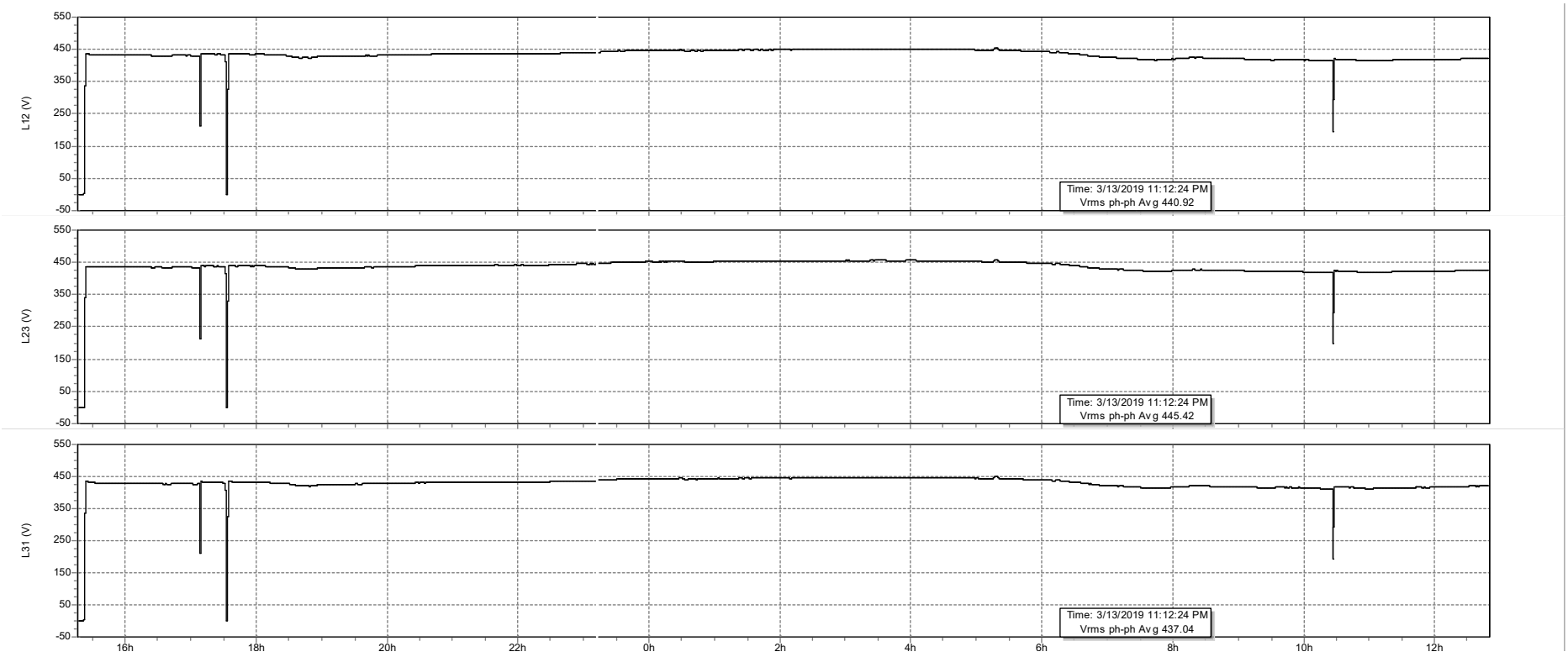


Fig.2 Shows the line to line voltage on three phases for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50 pm

Inference :There is no abnormalities found.

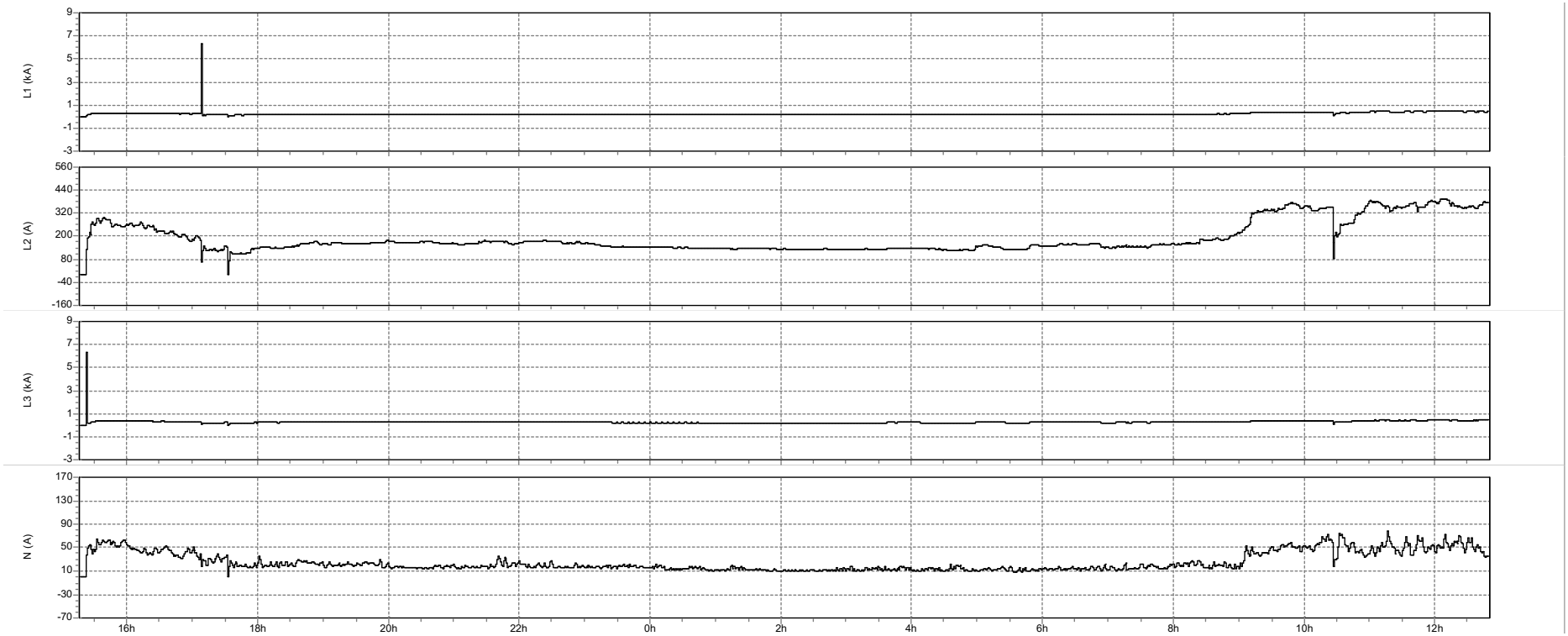


Fig.3Shows the current on three phases for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50 pm

Inference :At line 1, there is a peak current of 6000Afound, and also in L3 a peak current of 6000A found.Which needs to be addressed.

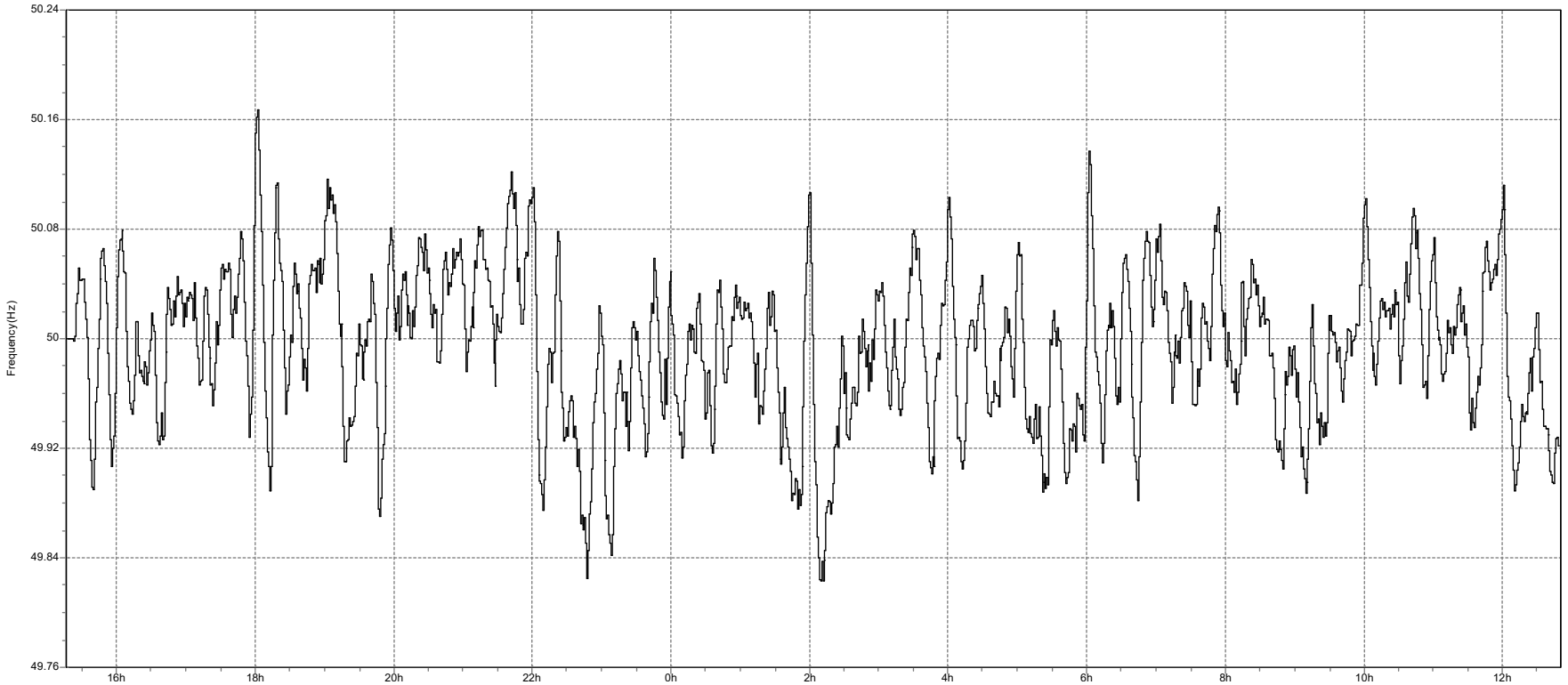


Fig.4Shows the frequency for 22 hours from 13/03/2022 15:17 pm to 14/03/2022 12:50 pm

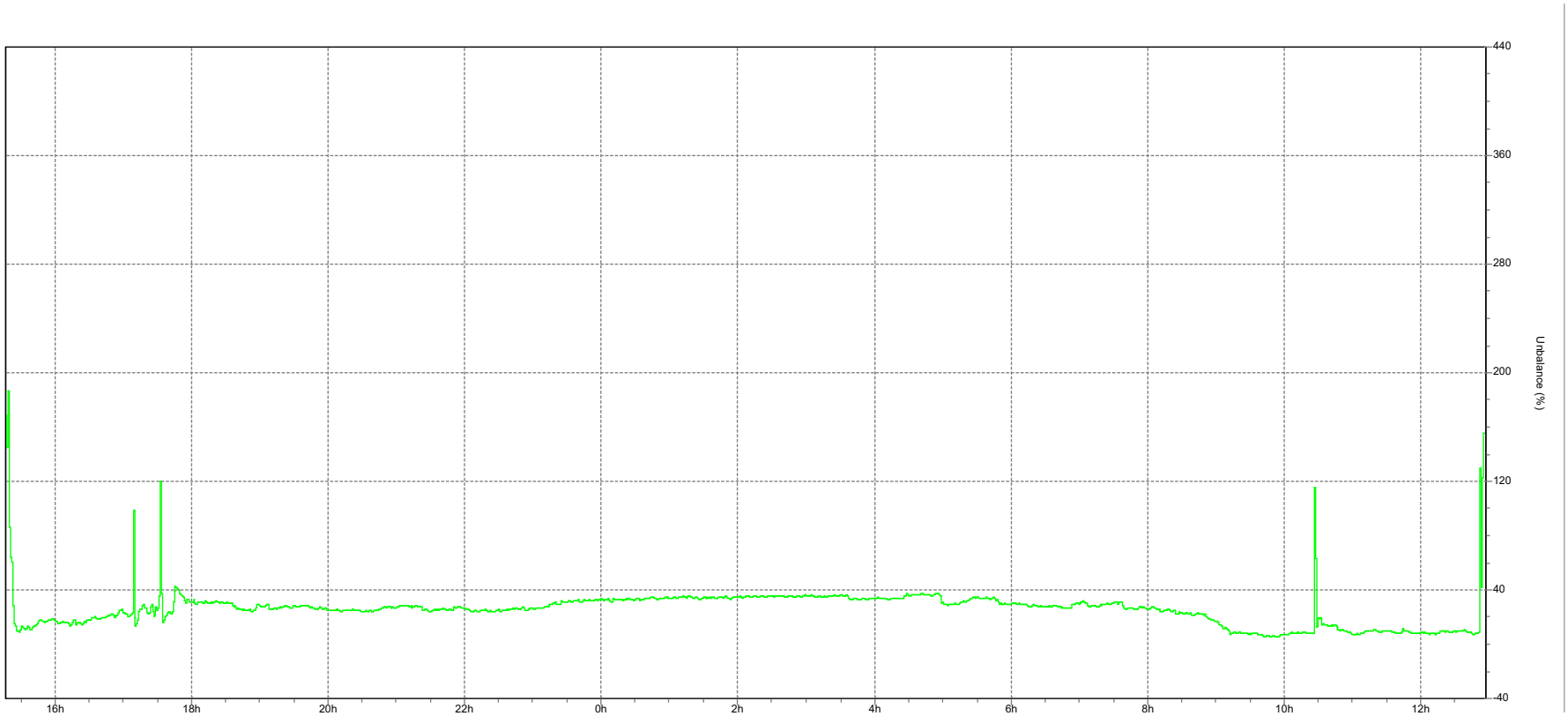


Fig.5 Shows the unbalance on current for 22 hours from 13/03/2019 15:17 pm to 14/03/2019 12:50

Inference: Unbalances are more in the phases which is in the range of 28%, Hence load reschedule is to be done on all the phases.

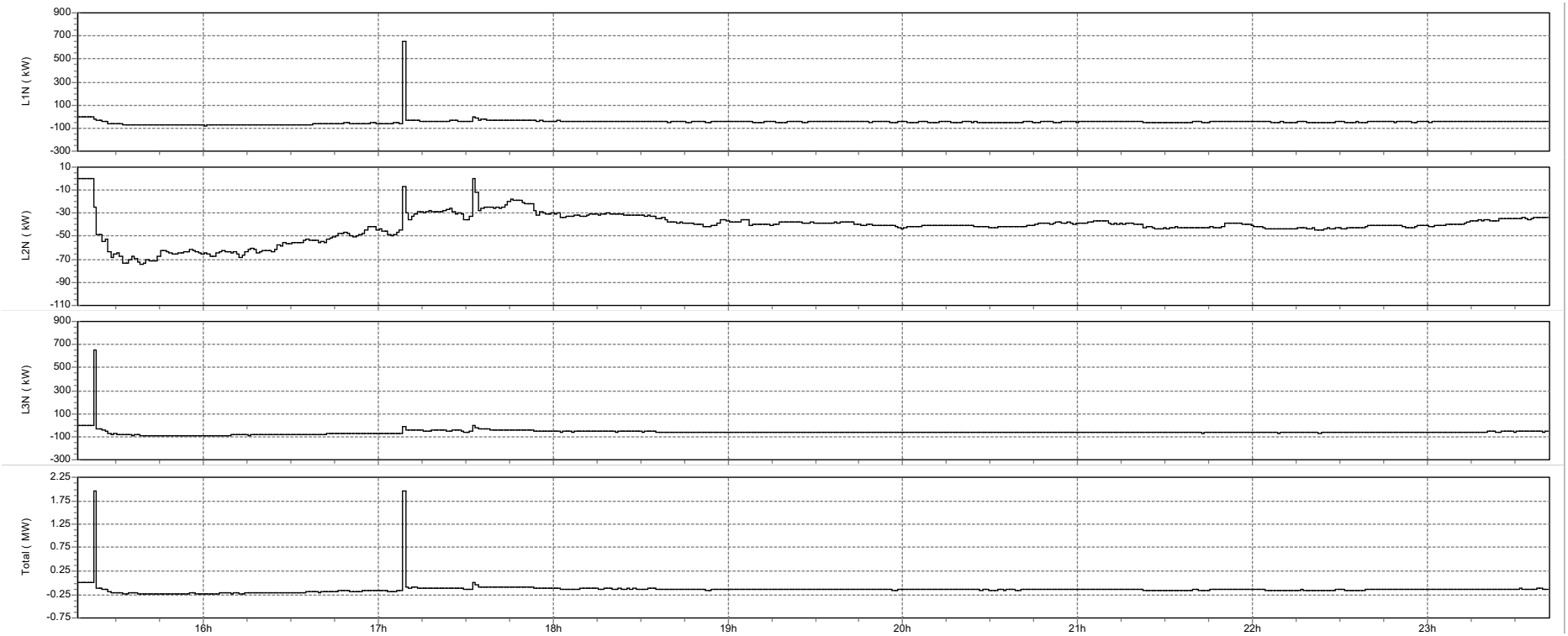


Fig.6Shows the power (KW) for 22 hours from 13/03/2022 15:17 pm to 14/03/2022 12:50

Inference: Average power consumption of 46 kW in L1, 40 kW in L2 and 65 kW in L3 are recorded. Total power consumption average for the day is 150kW.

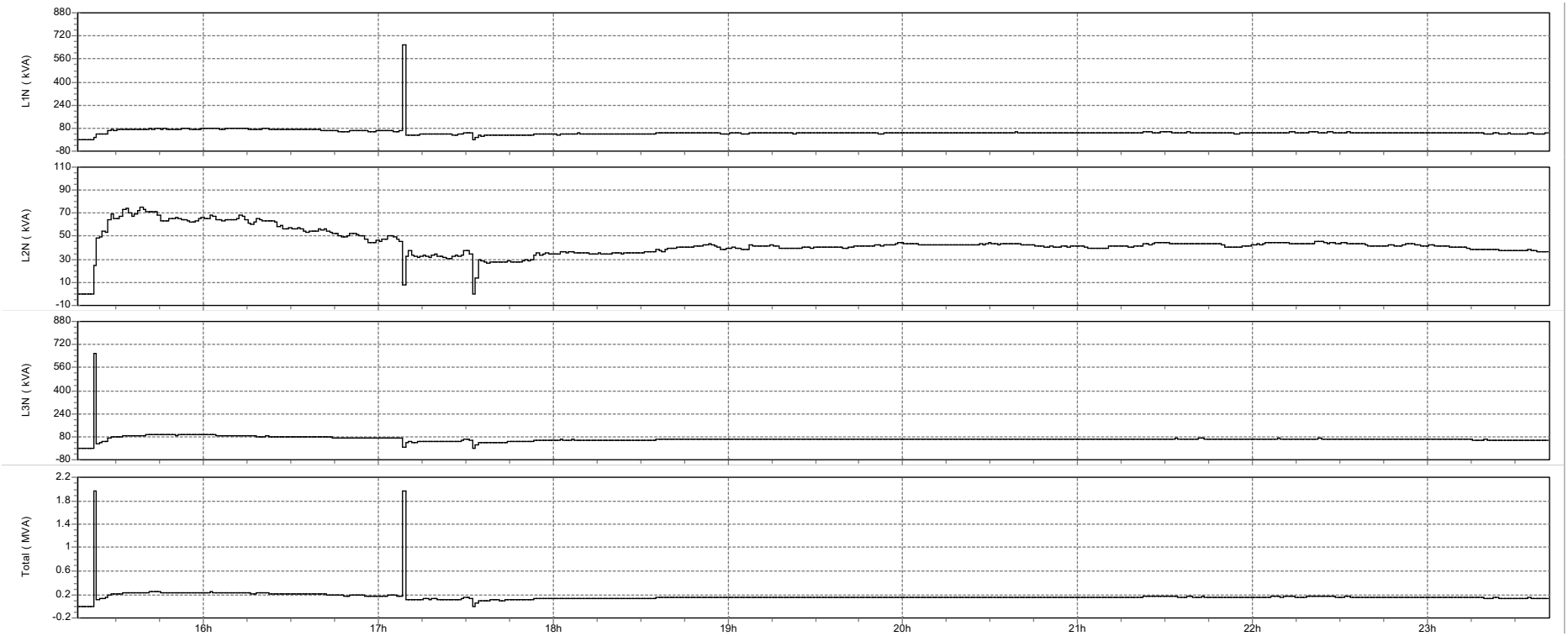


Fig.7 Shows the power (KVA) for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: Average power consumption of 46 kVA in L1, 40 kVA in L2 and 65 kVA in L3 are recorded.

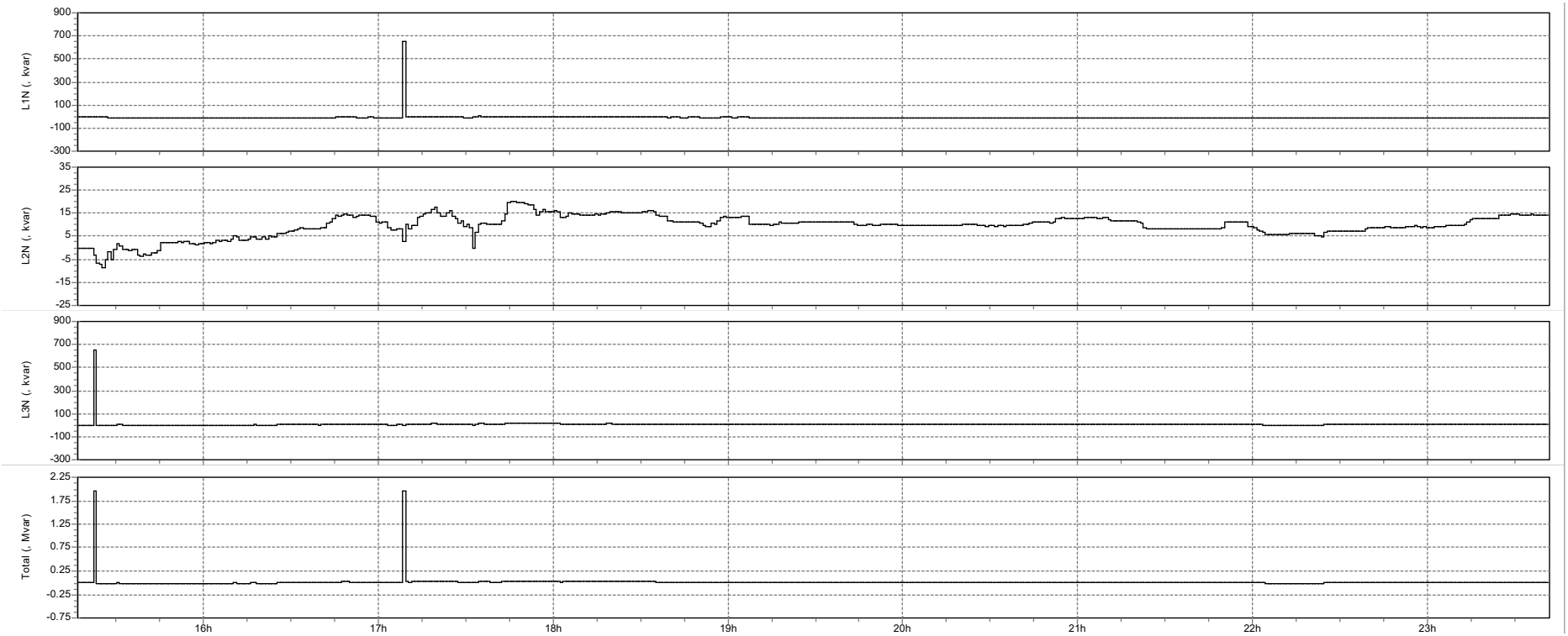


Fig.8 Shows the reactive power (KVAR) for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: Average power consumption of 9 KVAR in L1, 11 KVAR in L2 and 6 KVAR in L3 are recorded.

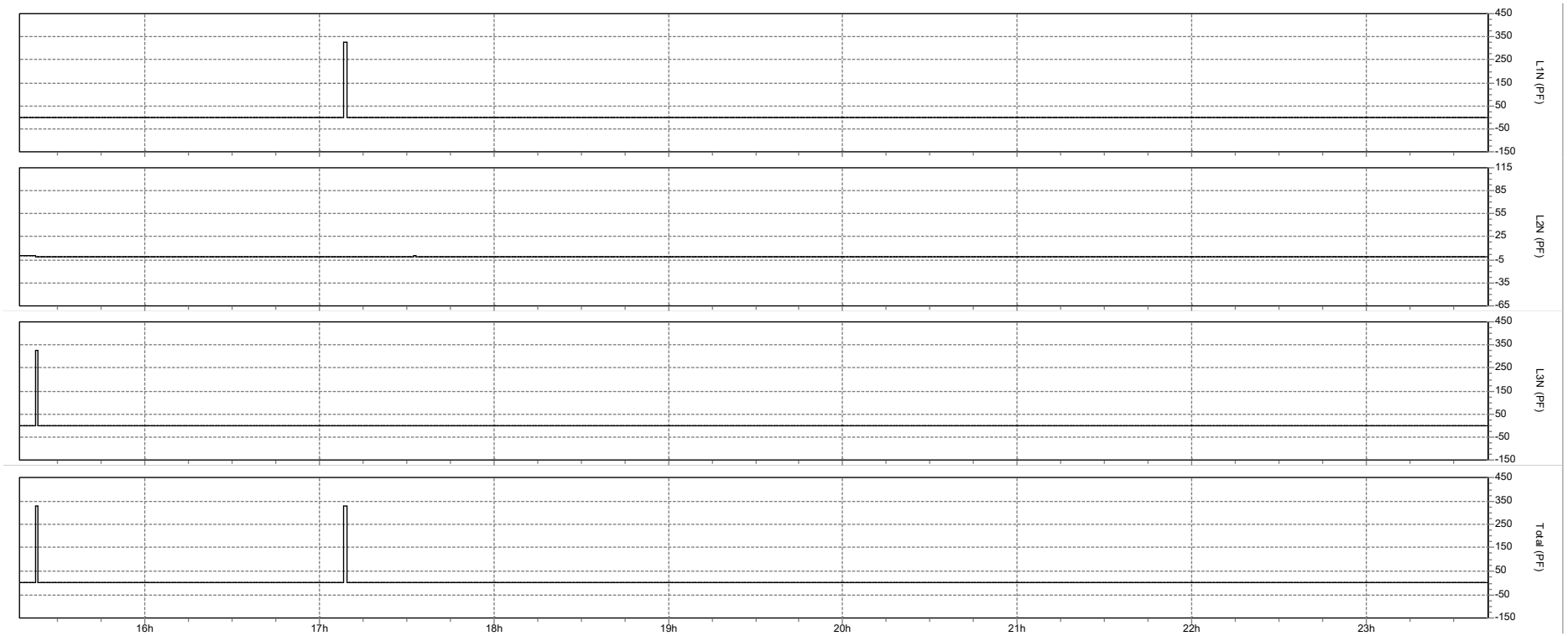


Fig.9 Shows the power factor (PF) for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: No abnormalities found.

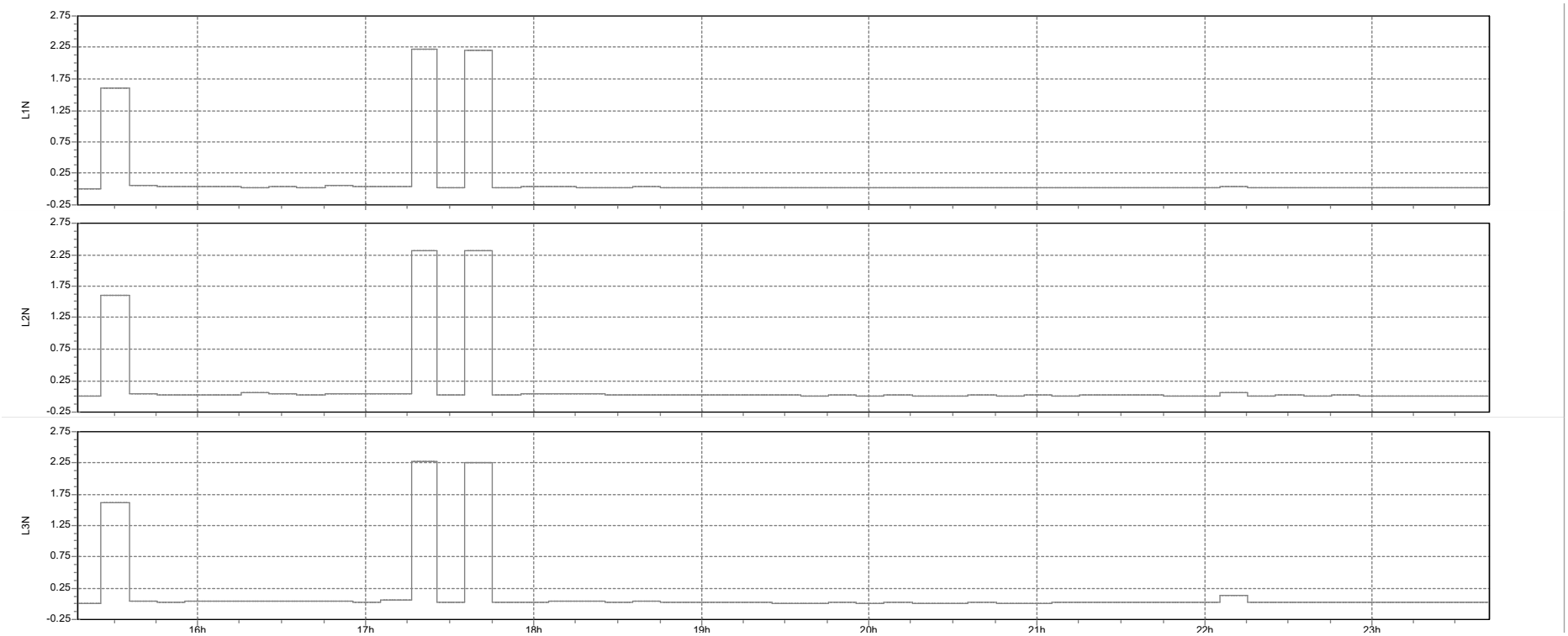


Fig.10 Shows the flicker Pst for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: No abnormalities found.

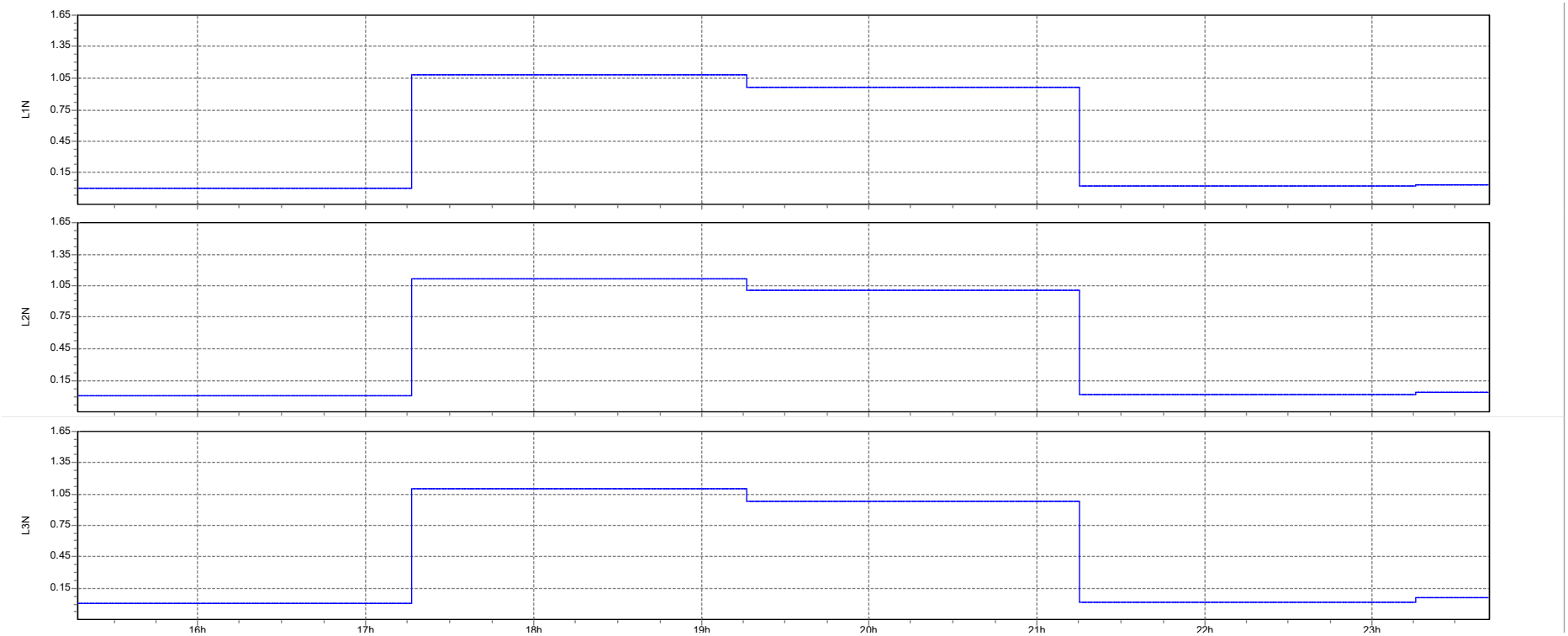


Fig.11 Shows the flicker Plt for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: No abnormalities found.

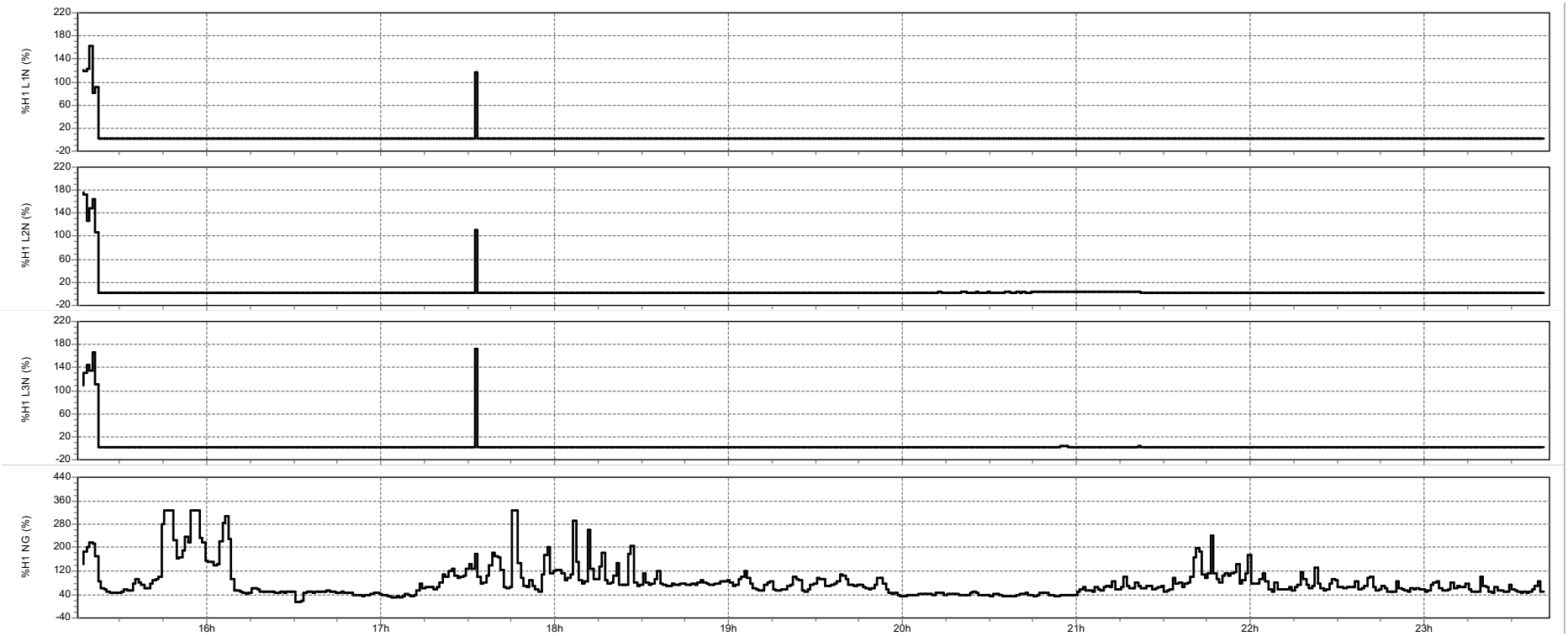


Fig.12 Shows the THD (Voltage Harmonics) for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: High harmonics are found in the neutral line. all the line values are less than 3%.

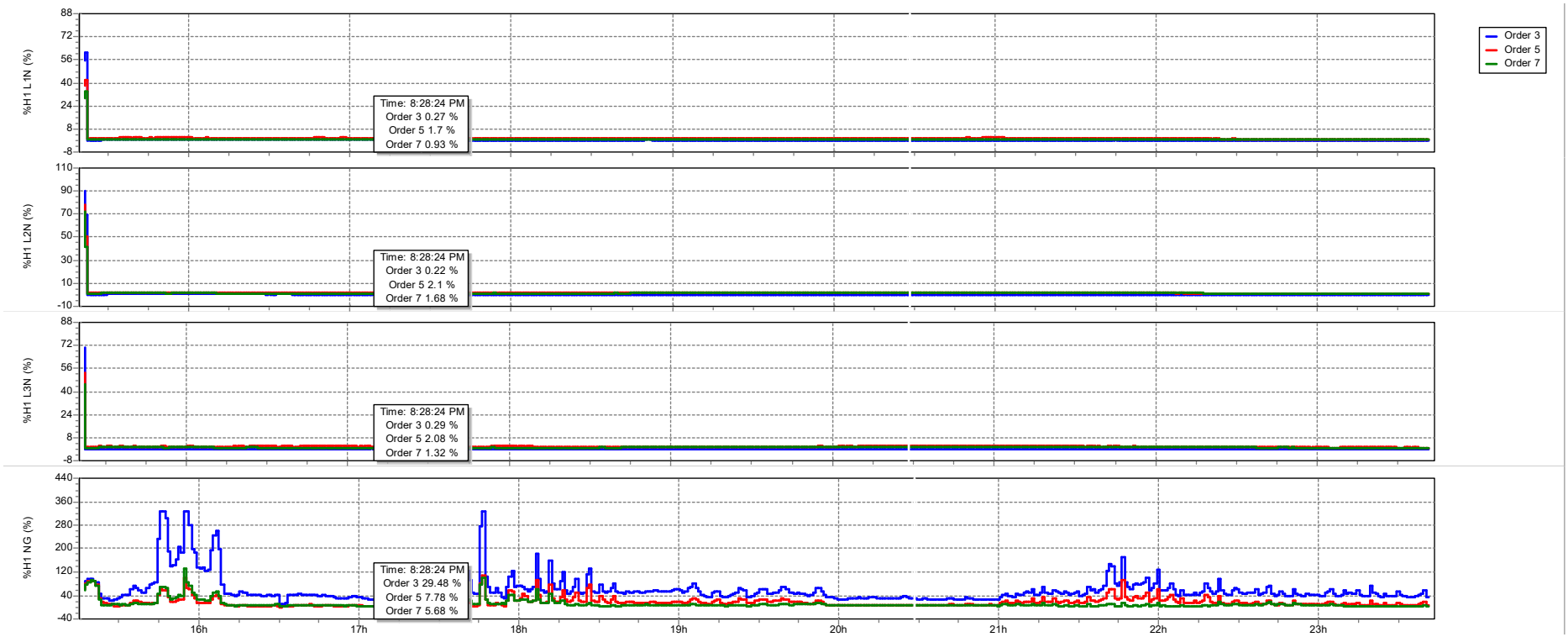


Fig.13 Shows the THD (Voltage Harmonics) for 3rd, 5th and 7th order for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: High harmonics are found on the neutral line. all the line values are less than 3%.

Note :IEEE Std 519, “RECOMMENDED PRACTICES AND REQUIREMENTS FOR HARMONIC CONTROL IN ELECTRICAL POWER SYSTEMS” recommends only 5% of Total Harmonic Distortion (THD).

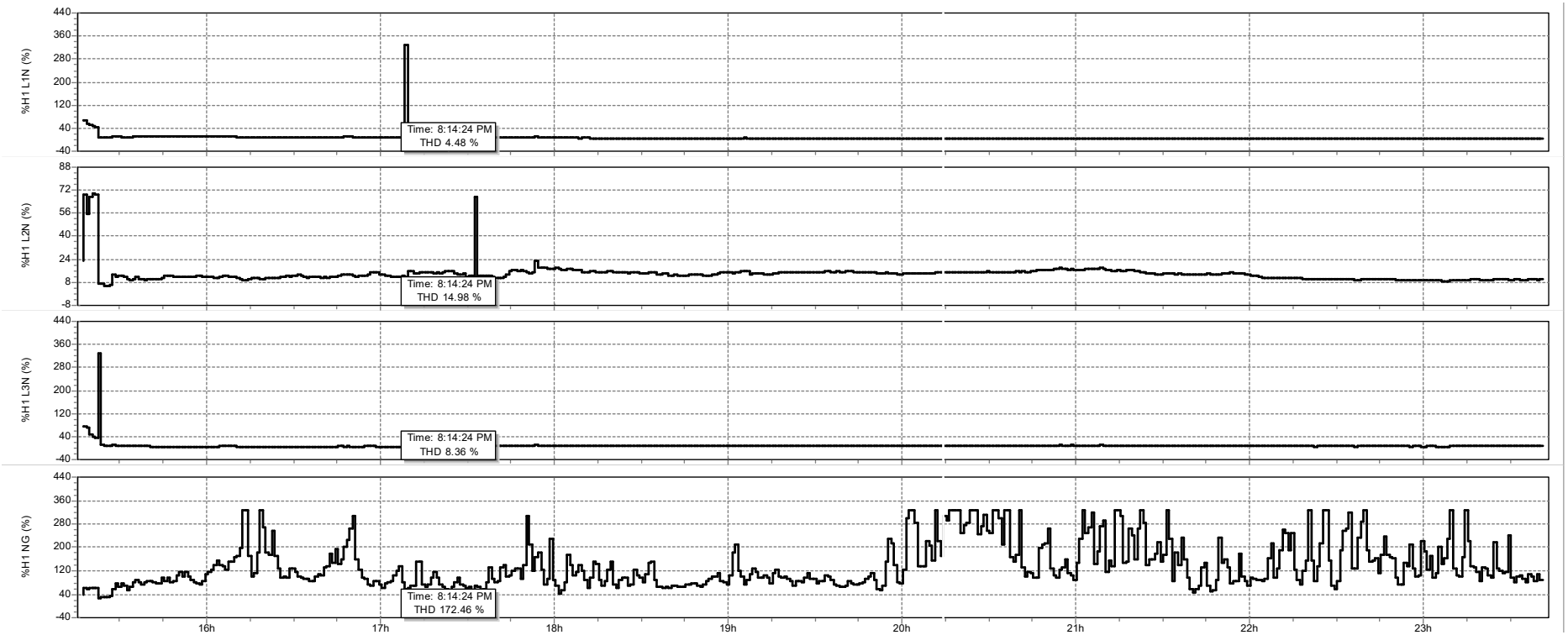


Fig.14 shows the THD (Current Harmonics) for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: High harmonics are found on the neutral line. all the line values except L2 are in normal state. L2 is having harmonics in the range of 15%.

Note :IEEE Std 519, “RECOMMENDED PRACTICES AND REQUIREMENTS FOR HARMONIC CONTROL IN ELECTRICAL POWER SYSTEMS” recommends only 5% of Total Harmonic Distortion (THD).

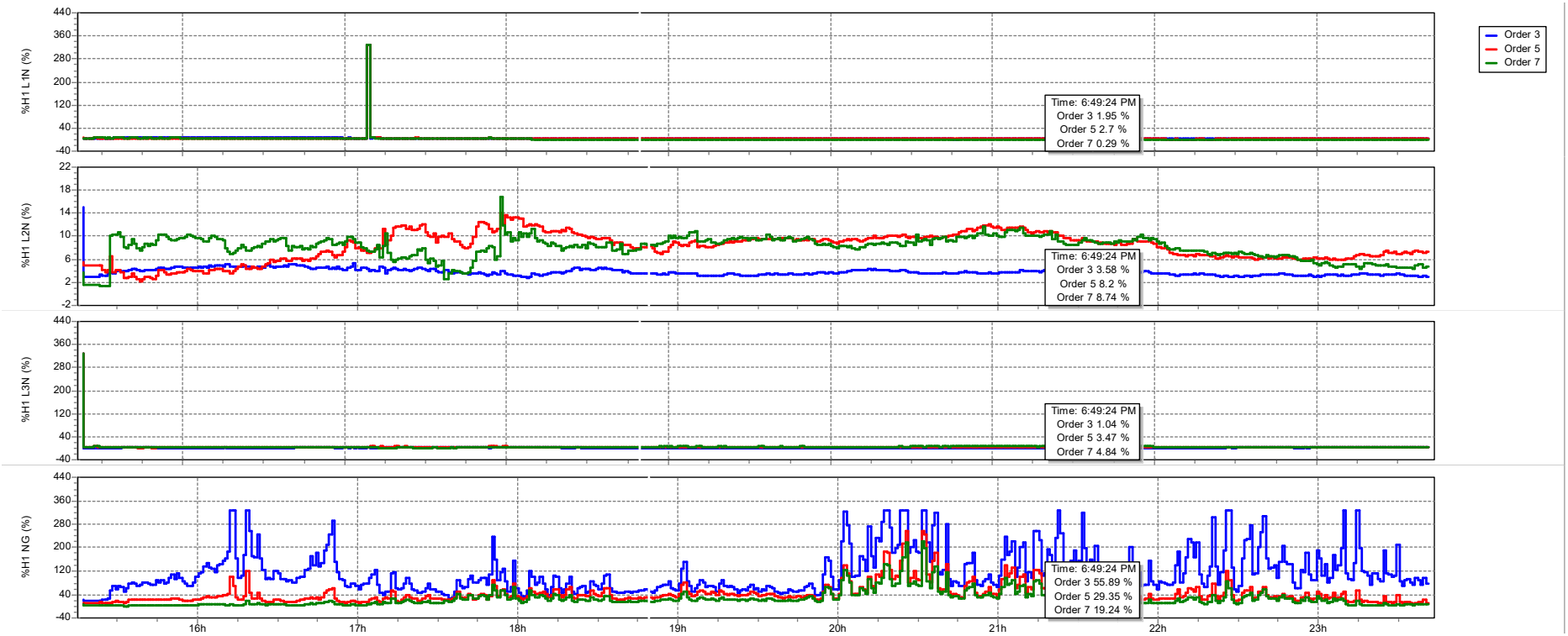


Fig.15 Shows the THD (CurrentHarmonics) for 3rd, 5th and 7th order for 22 hours from 13/09/2022 15:17 pm to 14/09/2022 12:50

Inference: Lower order harmonics are found in L2 and high in neutral

Note :IEEE Std 519, “RECOMMENDED PRACTICES AND REQUIREMENTS FOR HARMONIC CONTROL IN ELECTRICAL POWER SYSTEMS” recommends only 5% of Total Harmonic Distortion (THD).

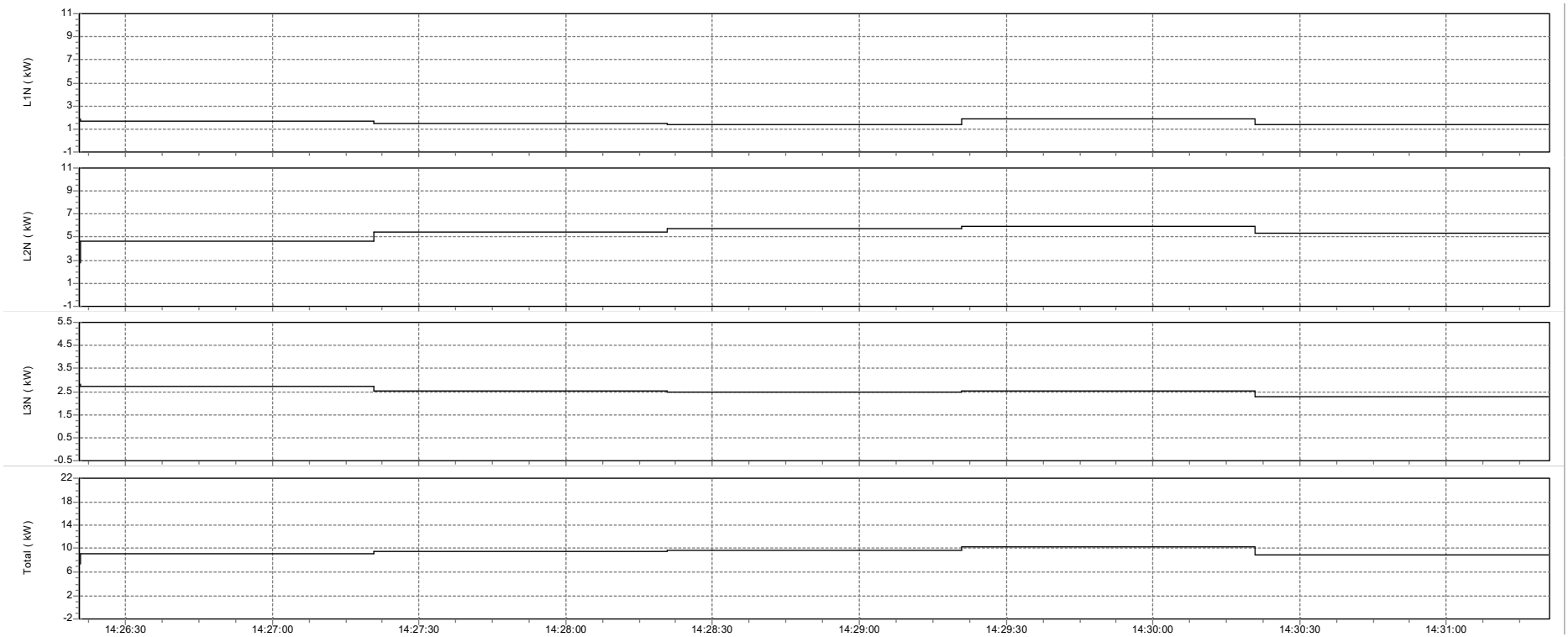


Fig.16 Shows the Power Consumption (kW) for TB1 Block

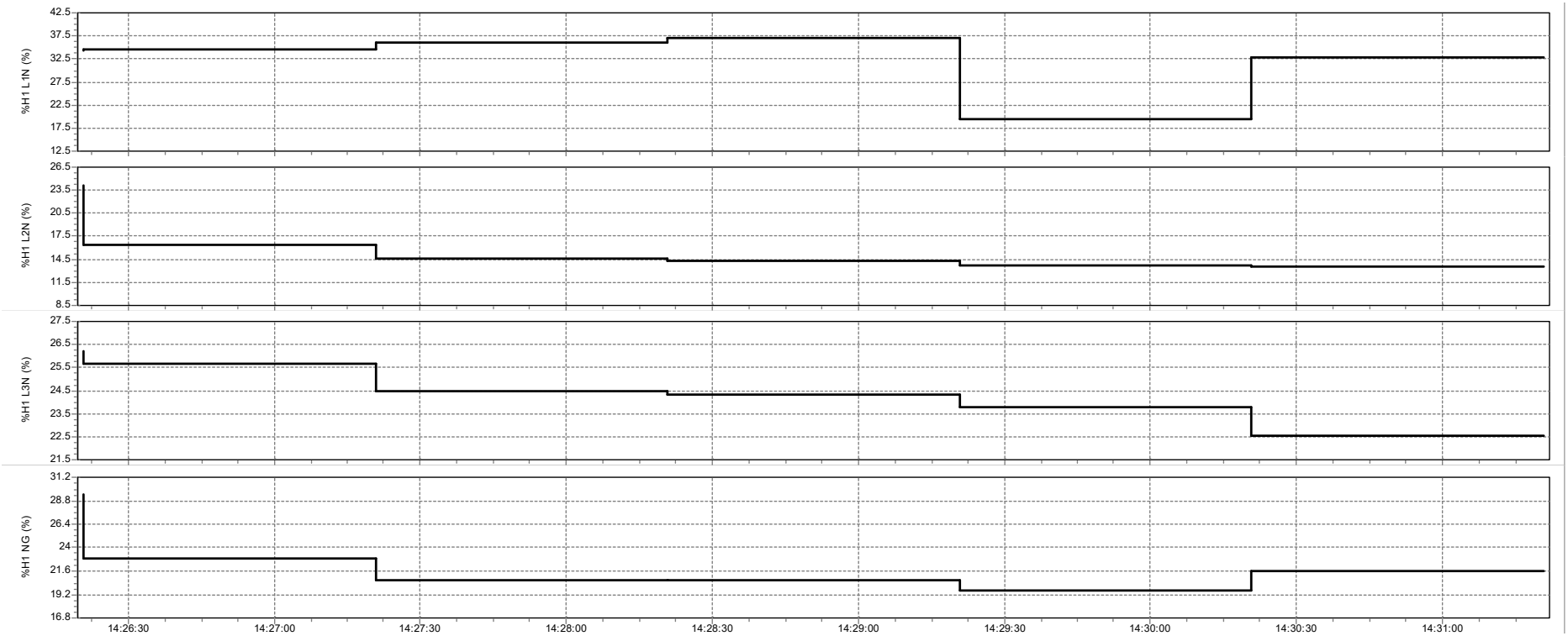


Fig.17 Shows the THD (Current) for TB1 Block

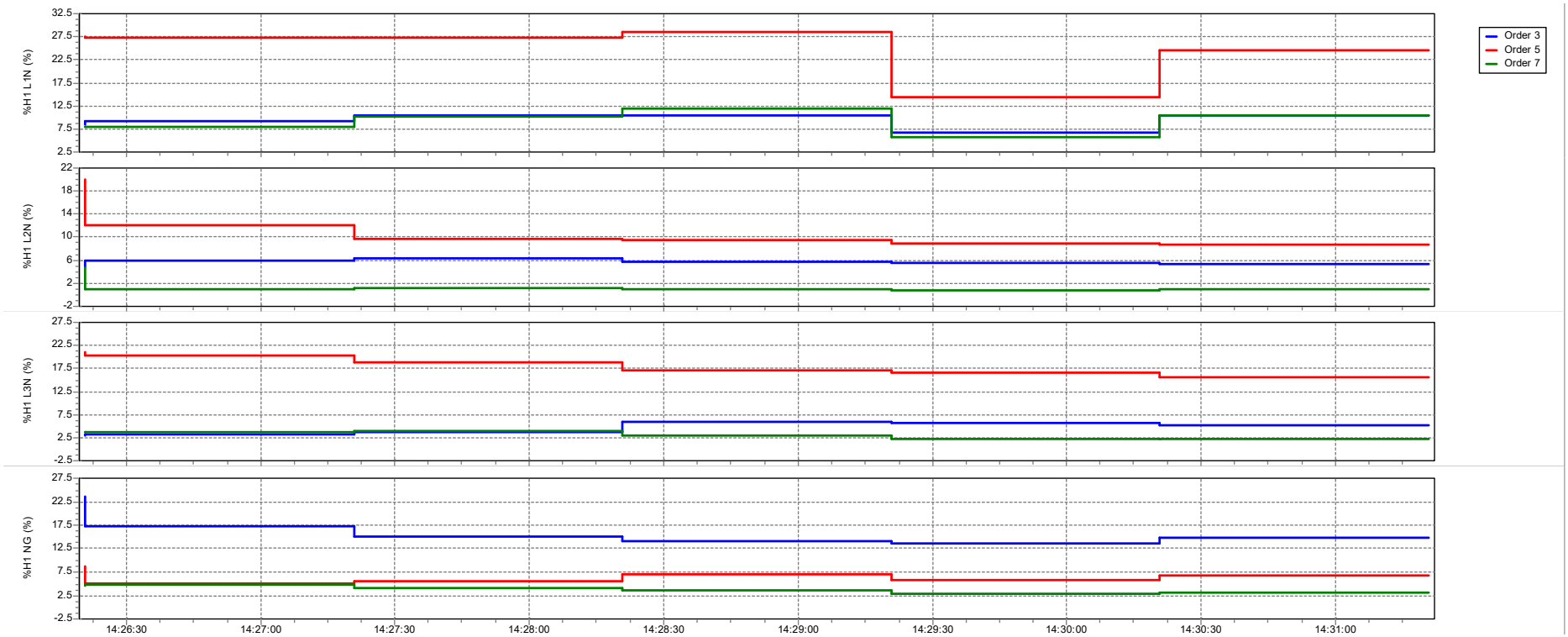


Fig.18Shows the 3rd , 5th and 7th Harmonics for TB1 Block

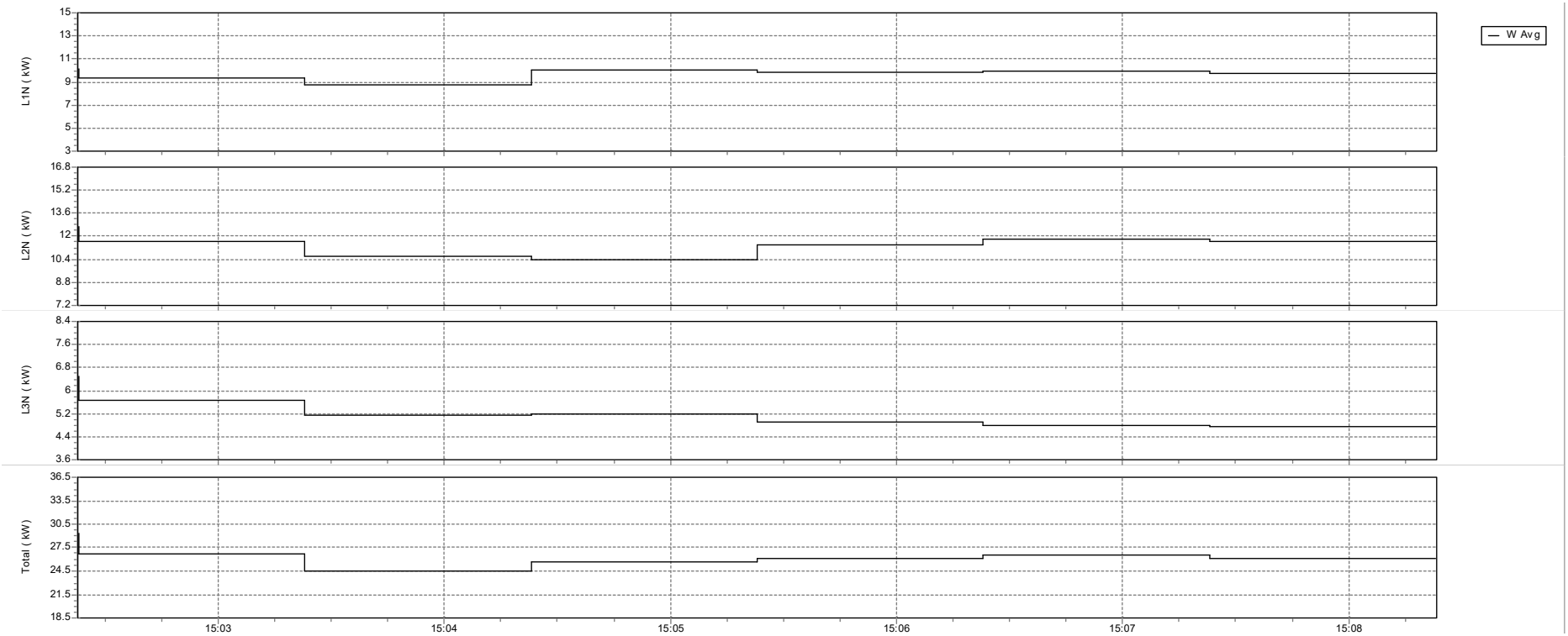


Fig.19Shows the Power Consumption (kW) for TB1 Block

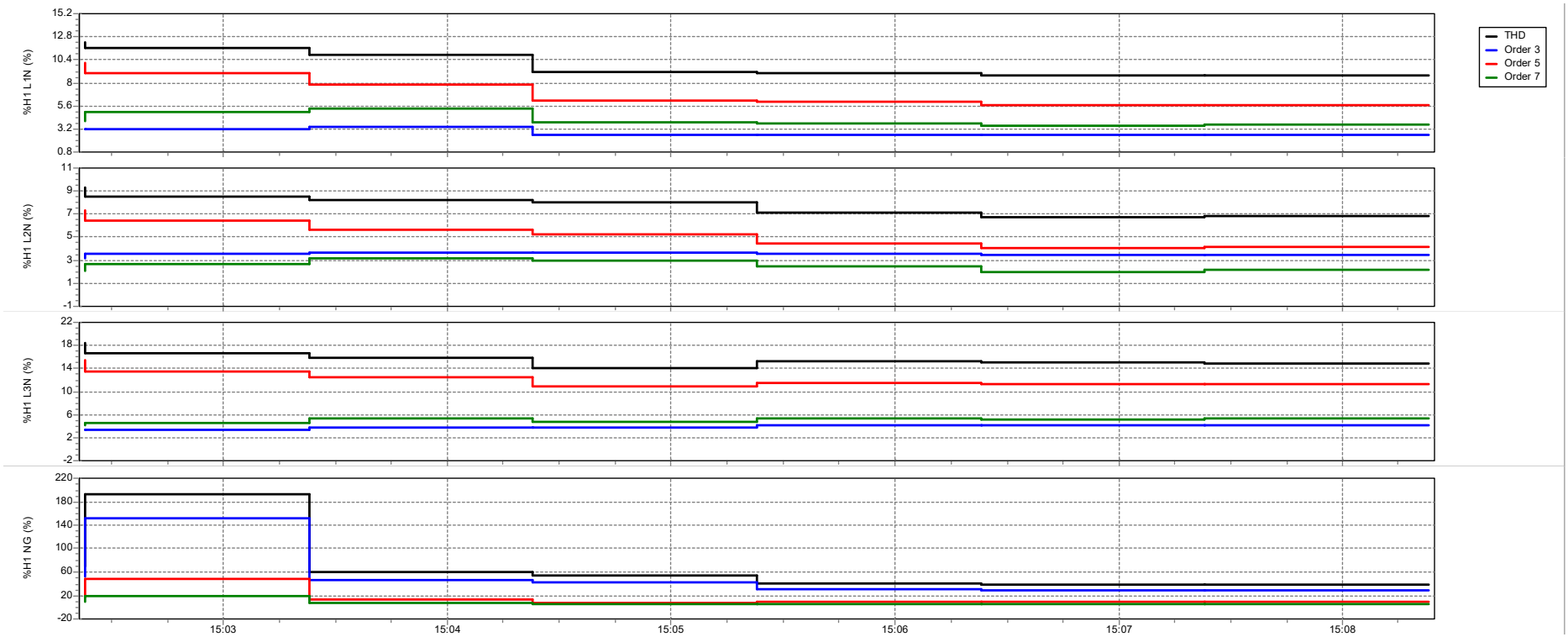


Fig.20 Shows the THD (Current) and 3rd , 5th and 7th Harmonics for TB1 Block

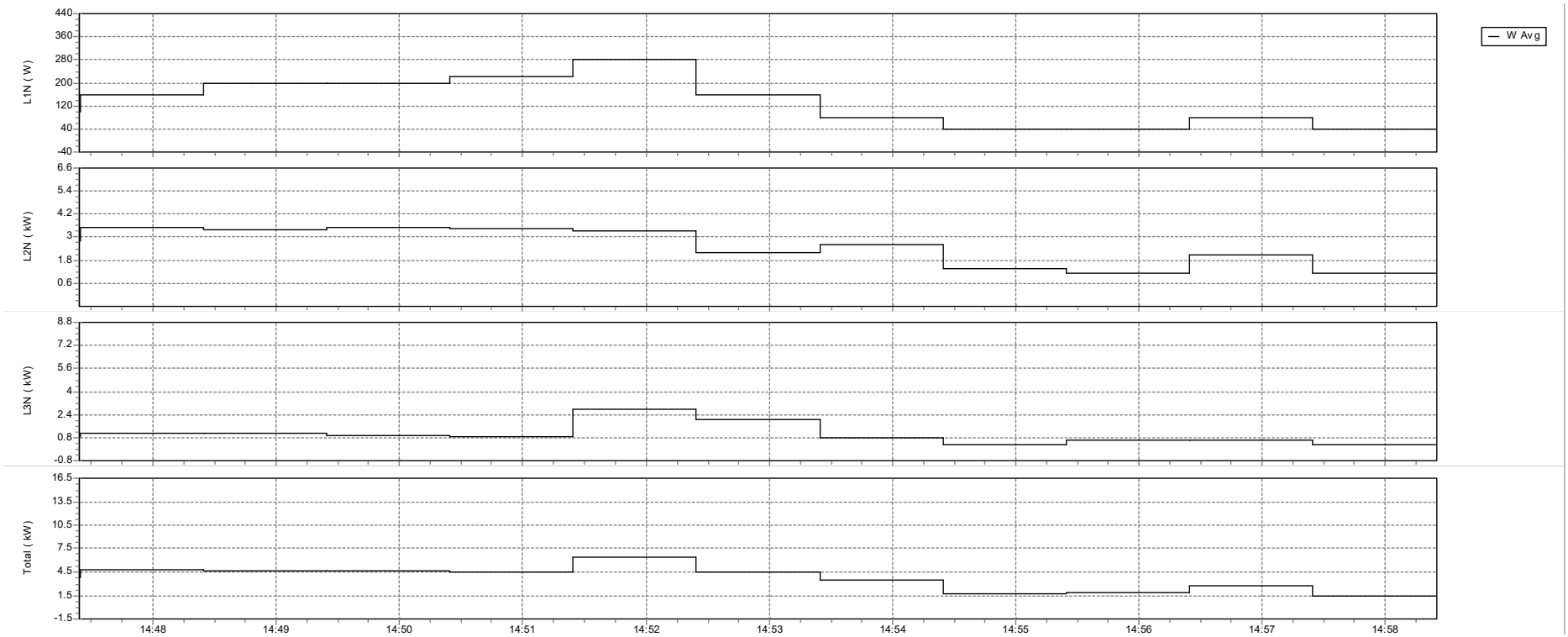


Fig.21Shows the Power Consumption (kW) for VC Chamber

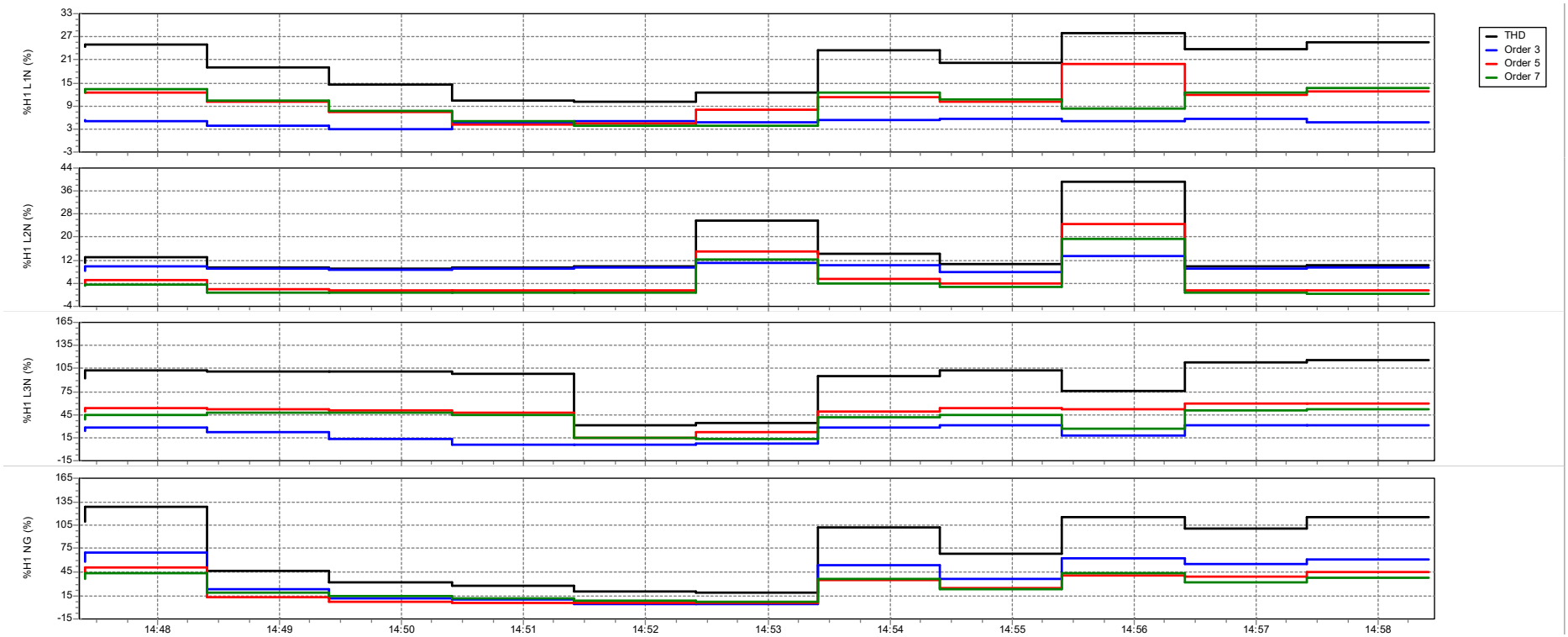


Fig.22Shows the THD (Current) and 3rd , 5th and 7th Harmonics for VC Chamber

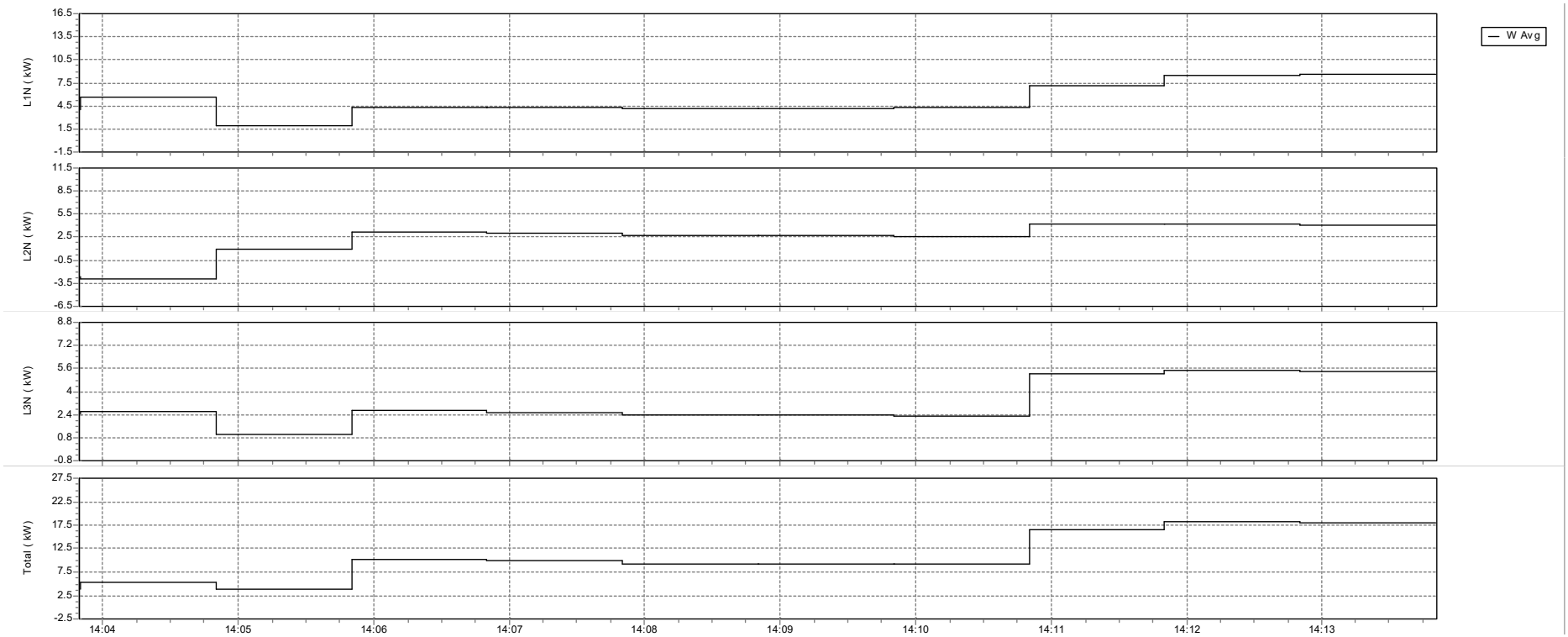


Fig.23Shows the Power Consumption (kW) for TB2 Block

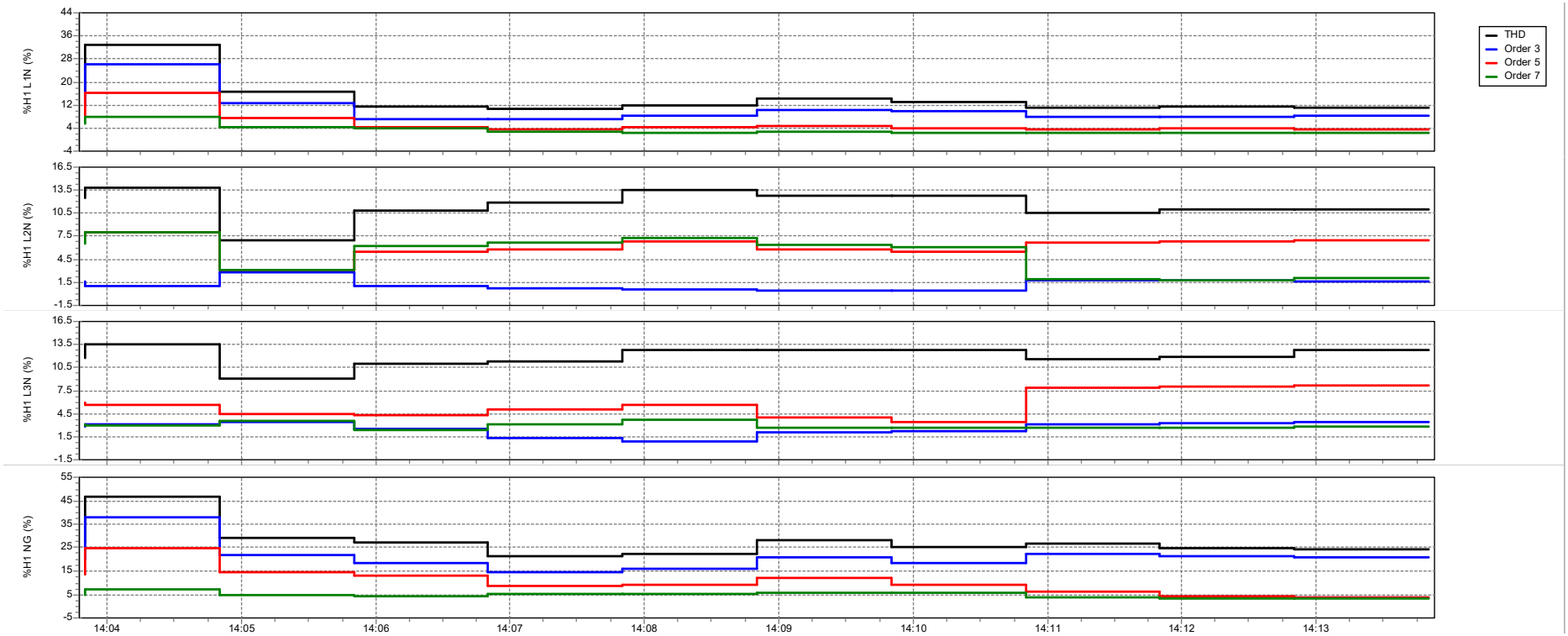


Fig.24 Shows the THD (Current) and 3rd , 5th and 7th Harmonics for TB2 Block

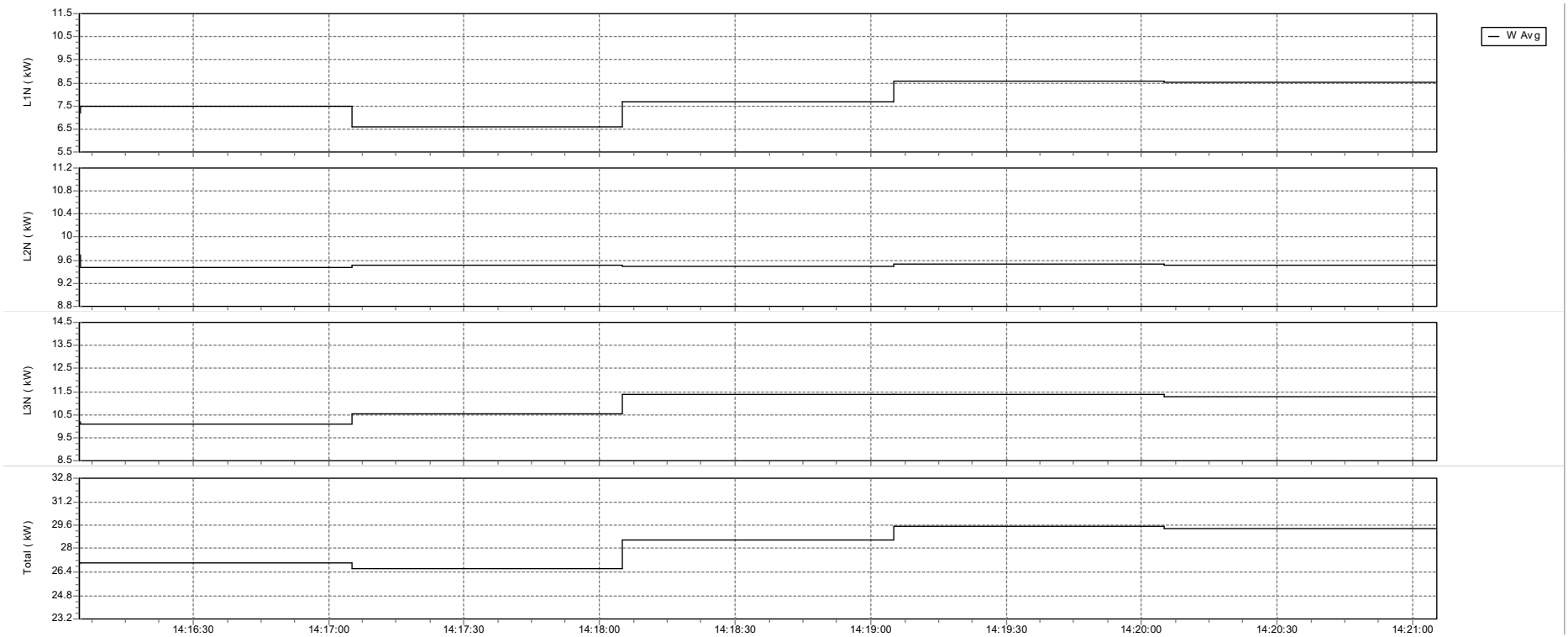


Fig.25Shows the Power Consumption (kW) for B.Ed Block

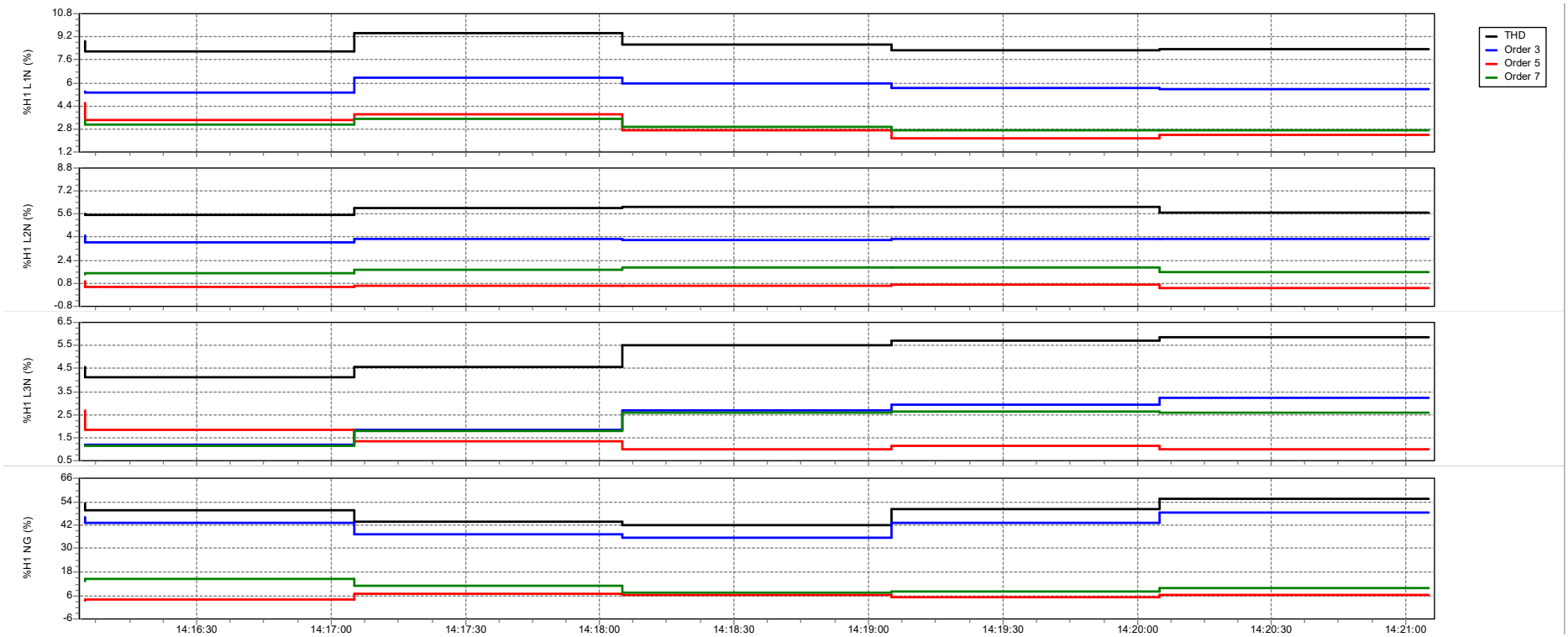


Fig.26 Shows the THD (Current) and 3rd, 5th and 7th Harmonics for B.ED Block

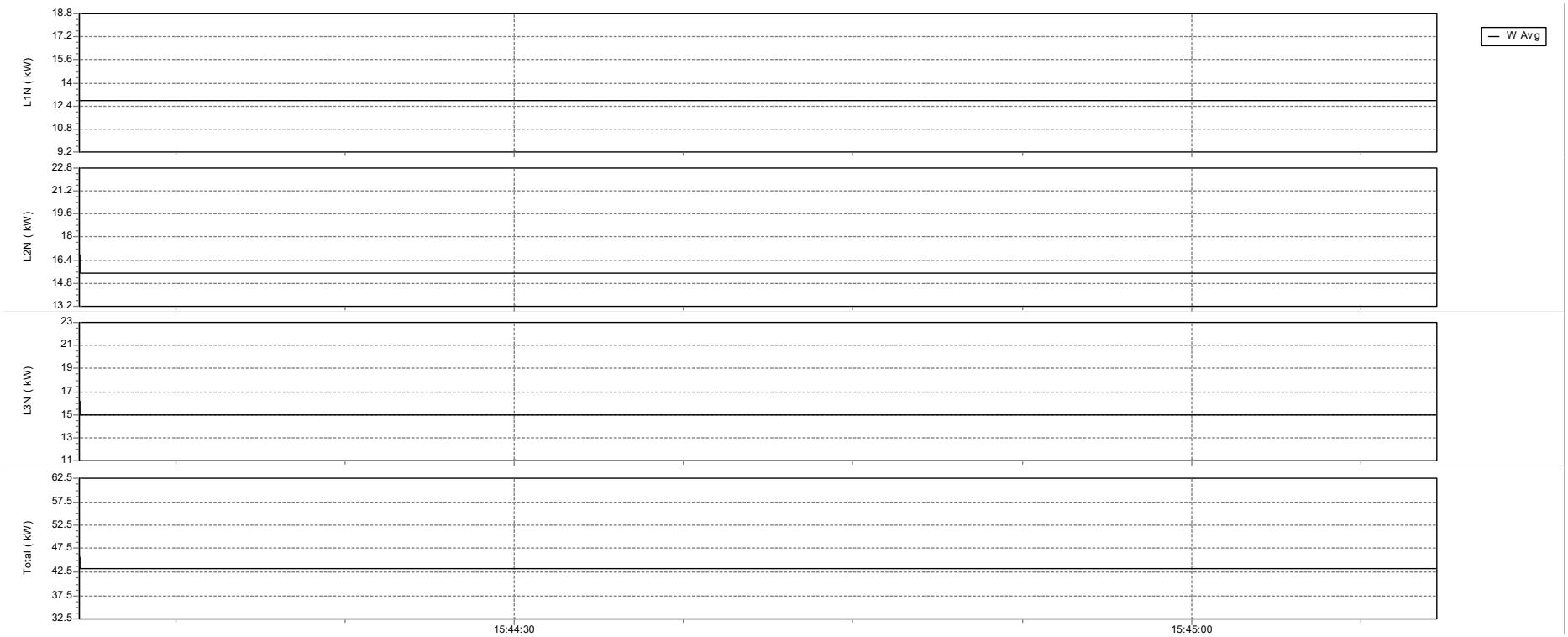


Fig.27Shows the Power Consumption (kW) for PKC + Extn. Block

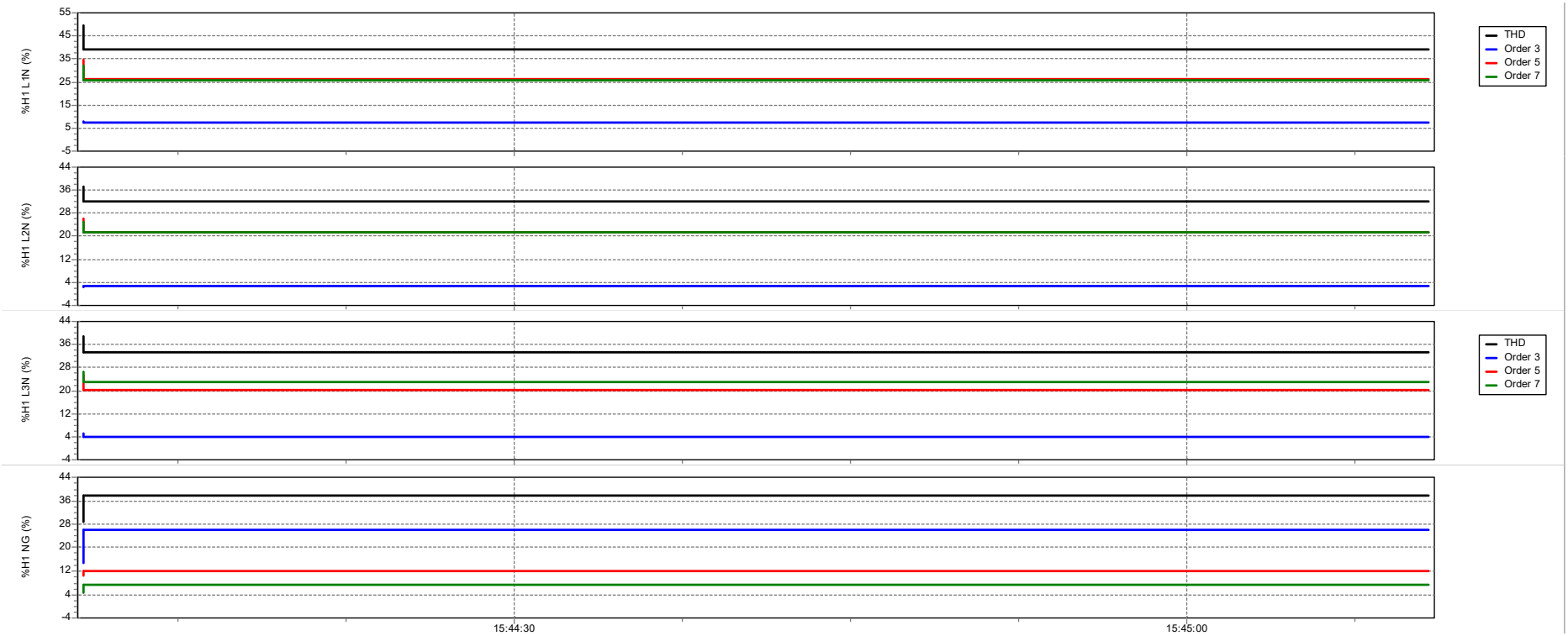


Fig.28Shows the THD (Current) and 3rd, 5th and 7th Harmonics for PKC + Extn. Block

Fig.29Shows the Power Consumption (kW) for Girls Hostel

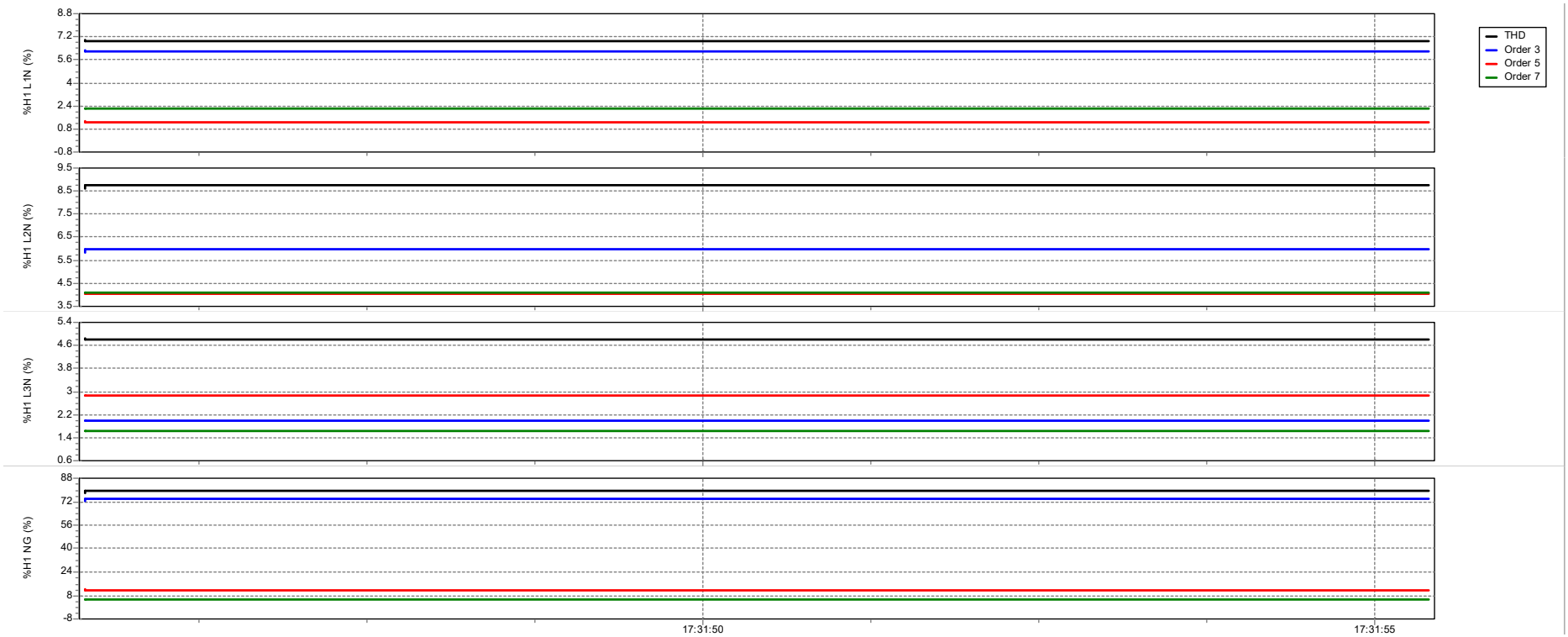


Fig.30Shows the THD (Current) and 3rd, 5th and 7th Harmonics for GirlsHostel

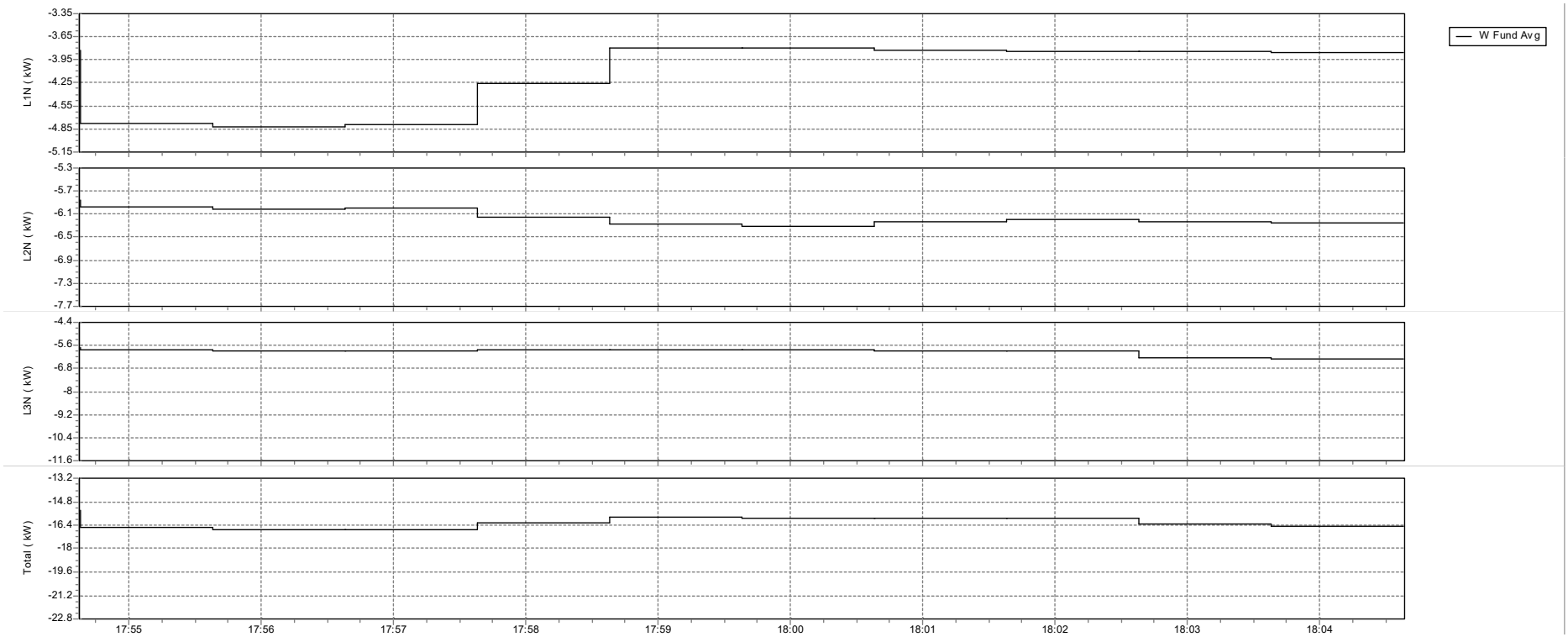


Fig.31Shows the Power Consumption (kW) for Boys Hostel

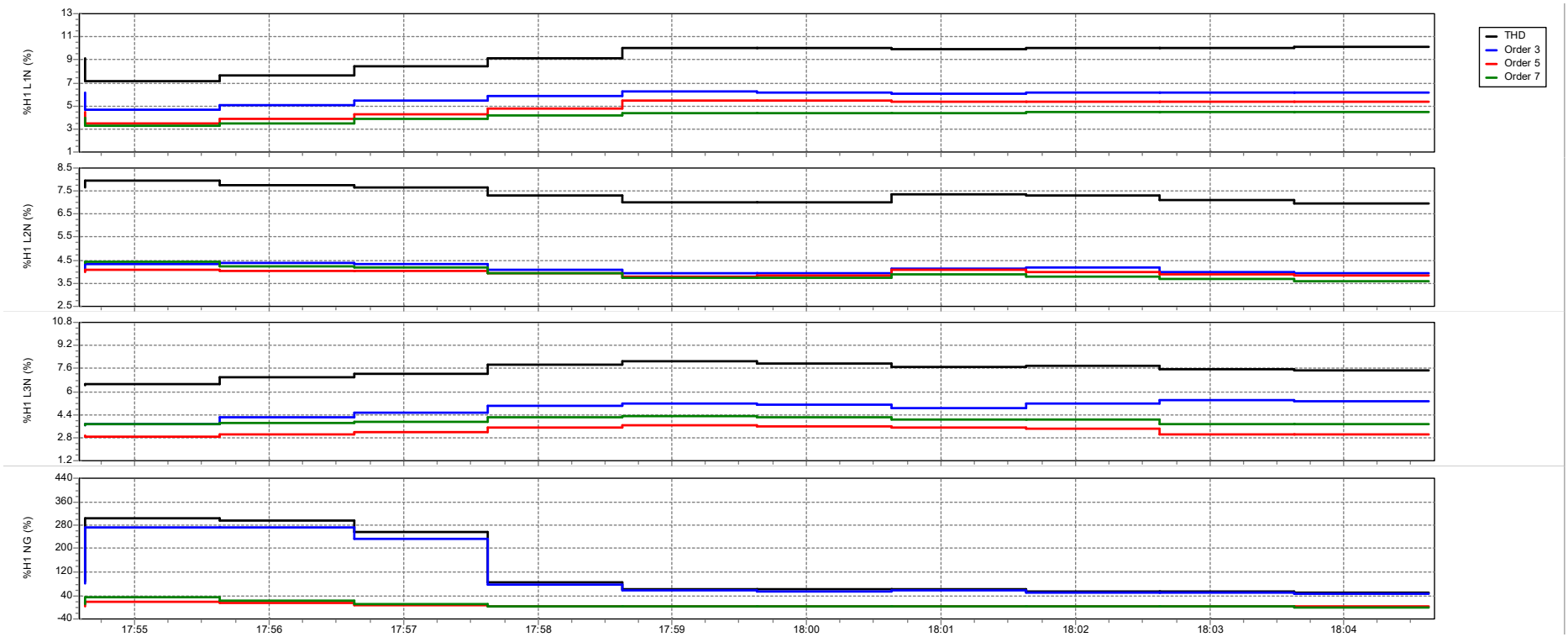


Fig.32 Shows the THD (Current) and 3rd, 5th and 7th Harmonics for Boys Hostel

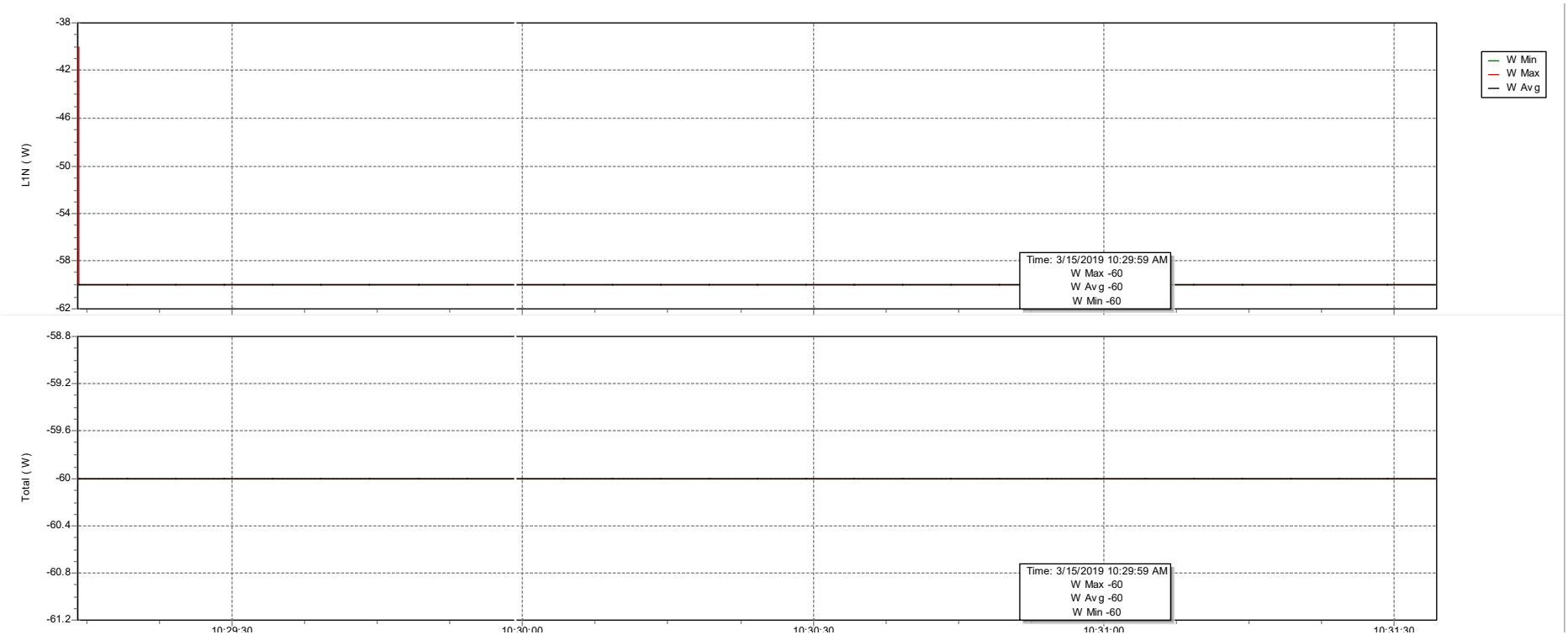


Fig.33Shows the Power Consumption (kW) for Double Frame Tube Light (60 watts)

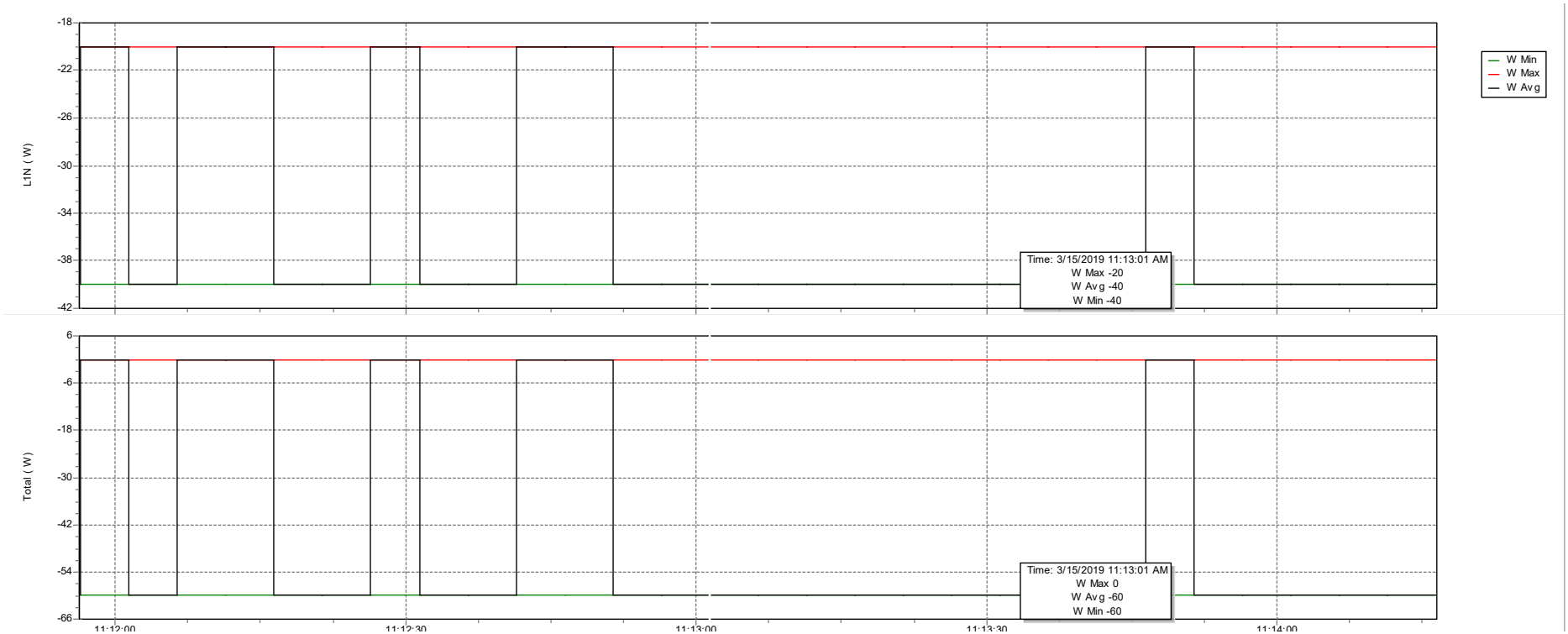


Fig.34Shows the Power Consumption (kW) for Single Frame Tube Light (40 watts)

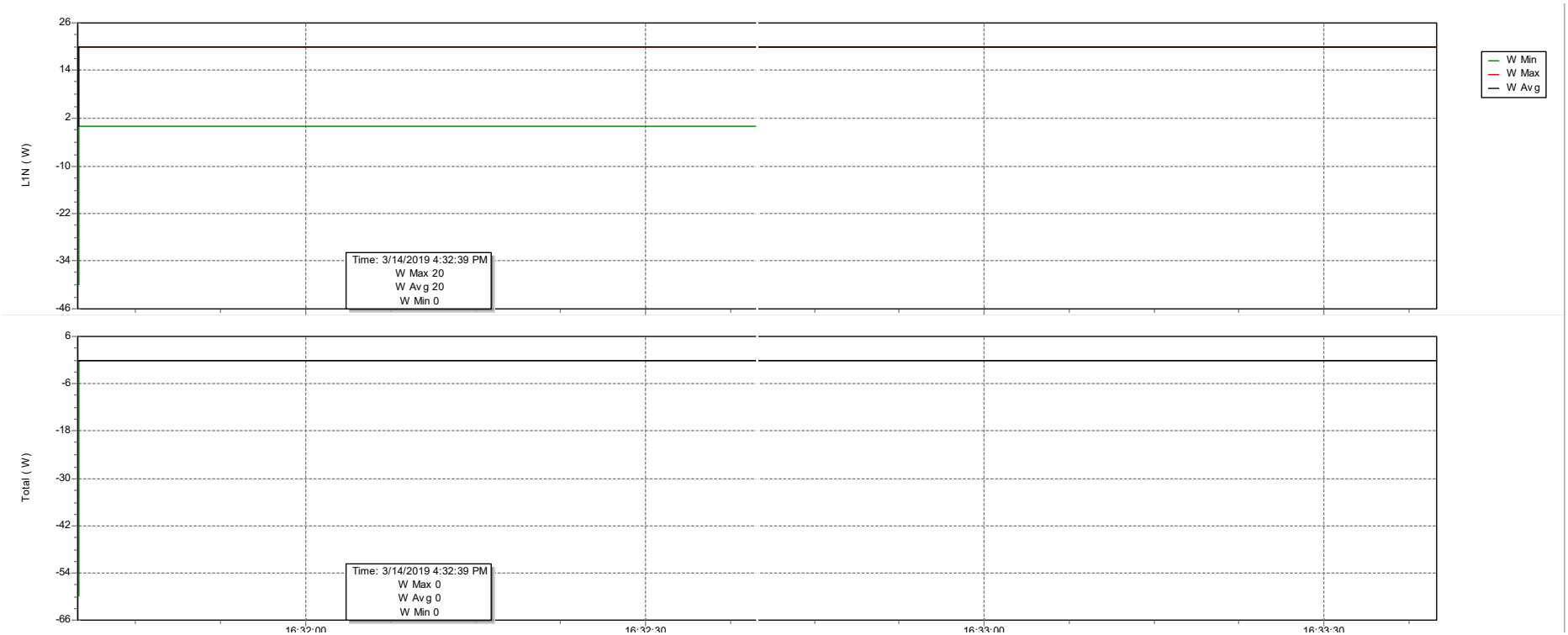


Fig.35Shows the Power Consumption (kW) for LED Tube Light (20 watts)

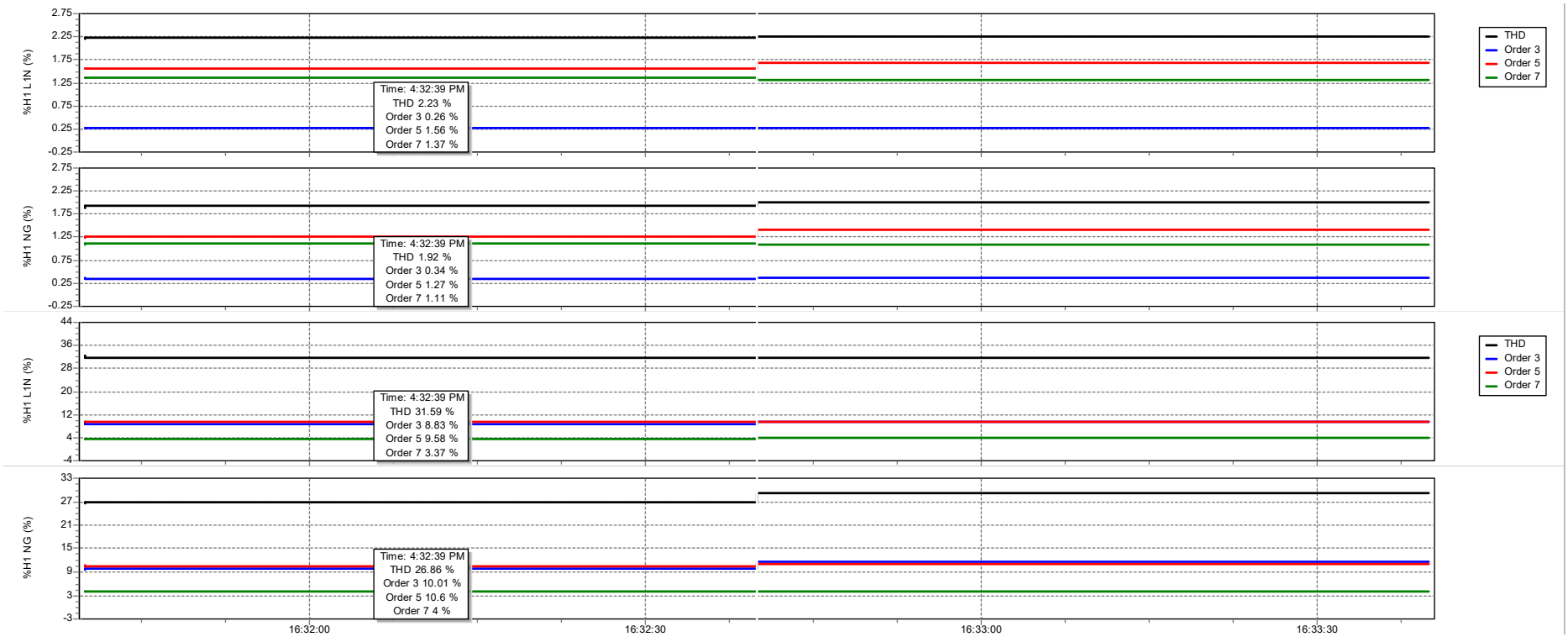


Fig.36Shows the THD (Current) for LED Tube Light

Inference: Lower order harmonics are found in LED tube light and also THD is quite high.

Note :IEEE Std 519, “RECOMMENDED PRACTICES AND REQUIREMENTS FOR HARMONIC CONTROL IN ELECTRICAL POWER SYSTEMS” recommends only 5% of Total Harmonic Distortion (THD).

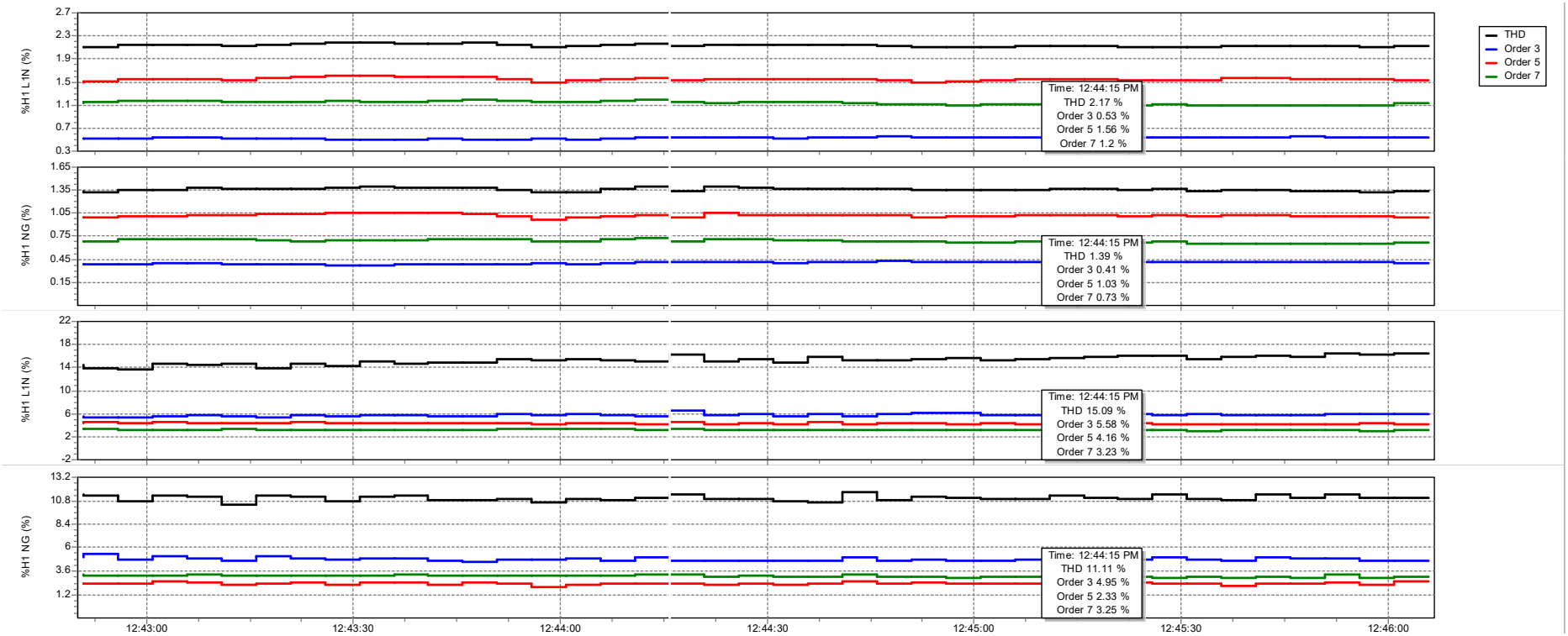


Fig.37 Shows the THD (Current) for Street Light

Inference: Lower order harmonics are found in Street Light and also THD is quite high.

Note : IEEE Std 519, “RECOMMENDED PRACTICES AND REQUIREMENTS FOR HARMONIC CONTROL IN ELECTRICAL POWER SYSTEMS” recommends only 5% of Total Harmonic Distortion (THD).

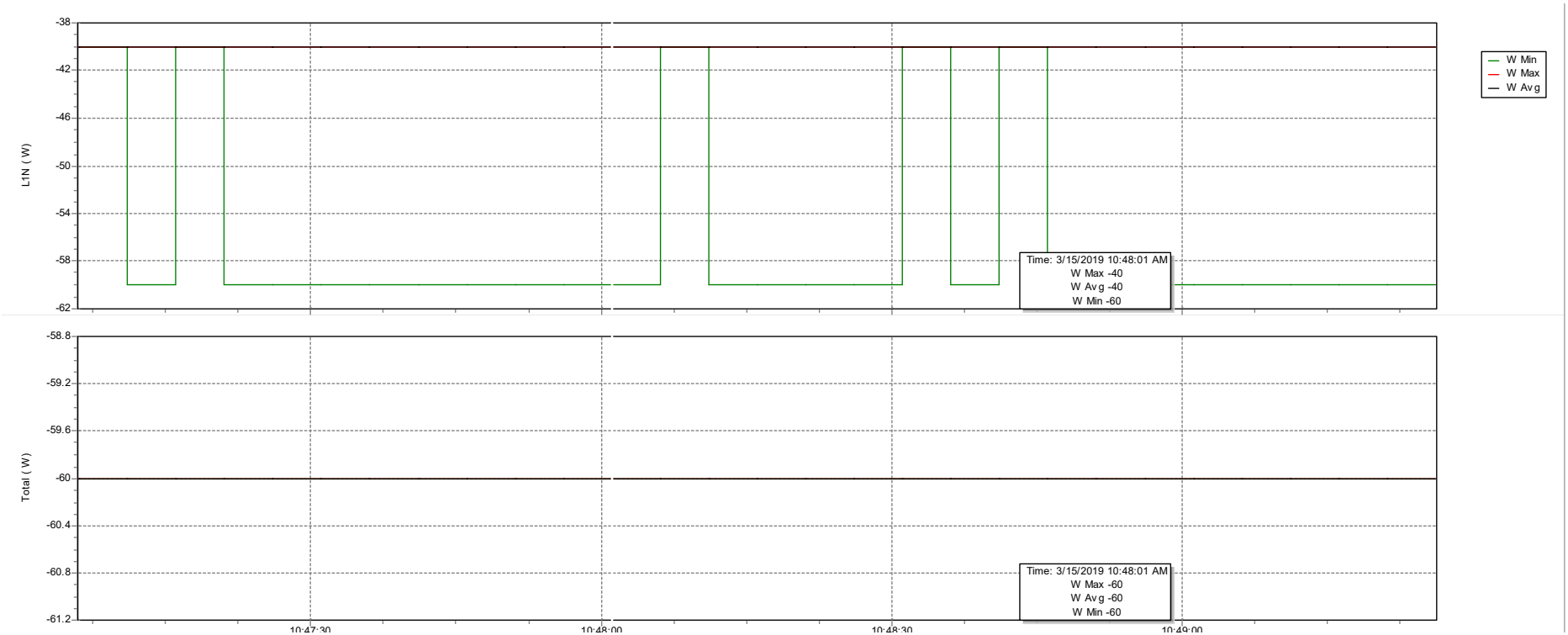


Fig.38 Shows the Power Consumption (kW) for New Fan (60 Watts)

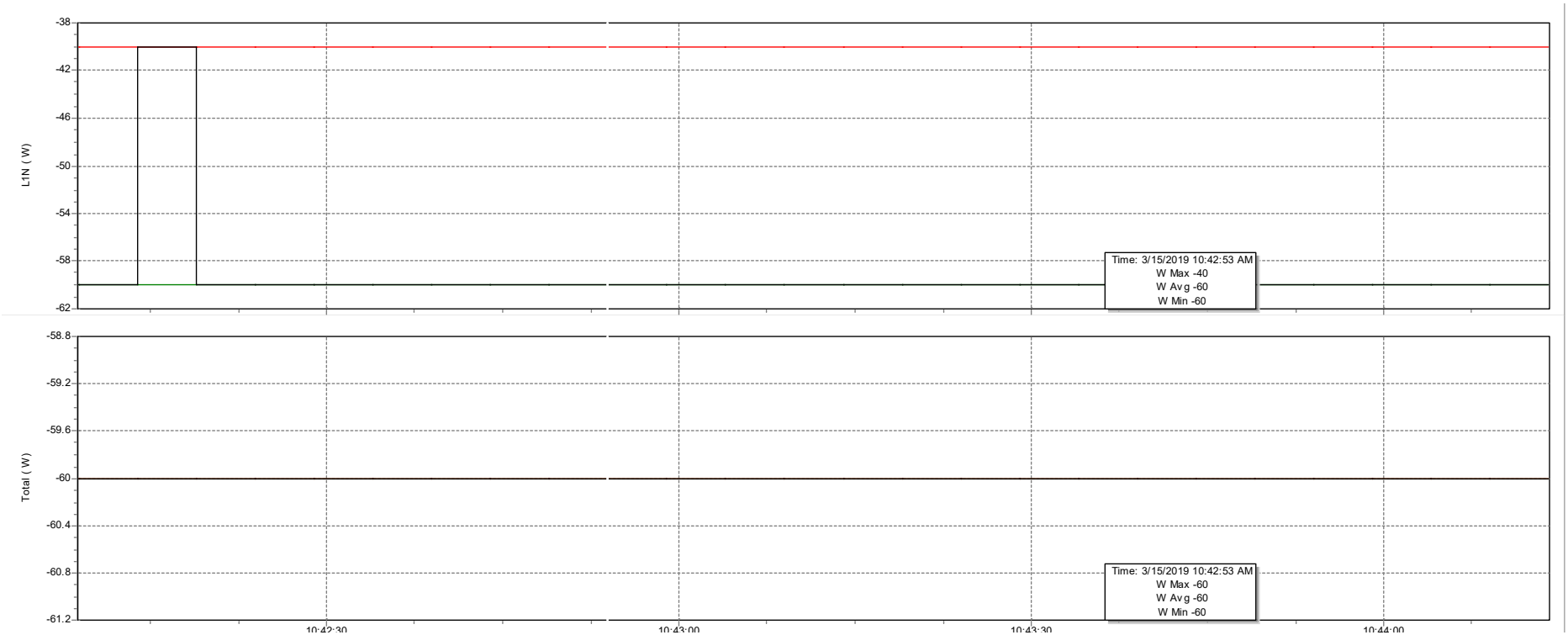


Fig.39 Shows the Power Consumption (kW) for Old Fan (60 Watts)

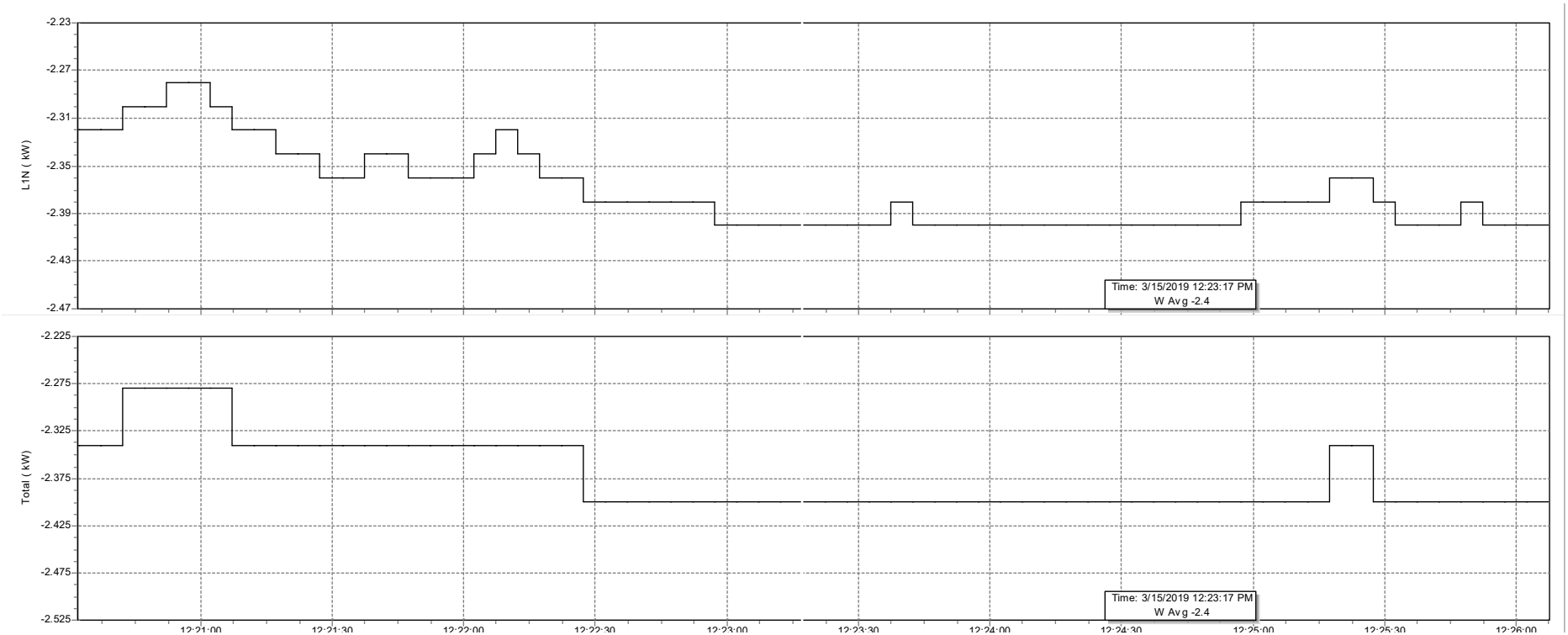
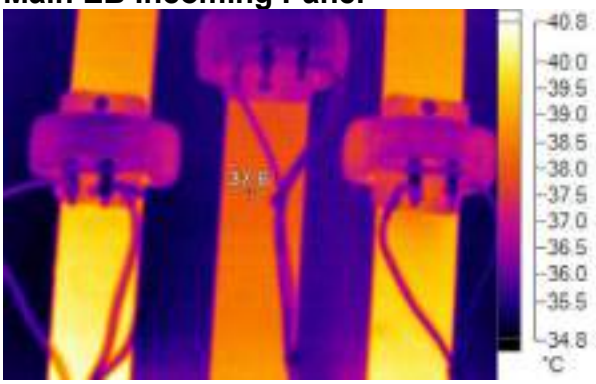


Fig.39 Shows the Power Consumption (kW) for 2 ton Split AC (2400 Watts)

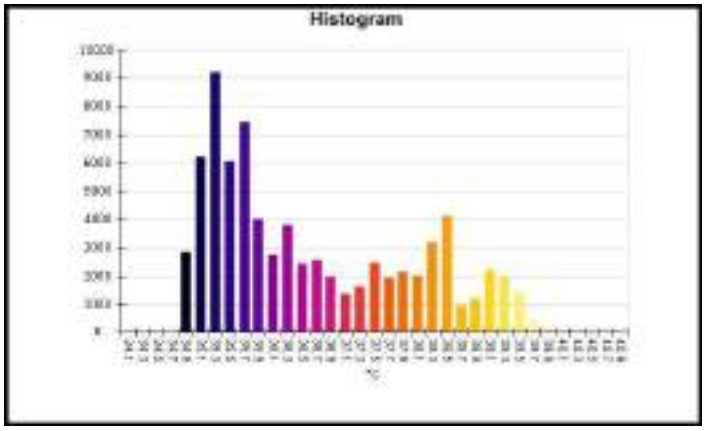
Main EB Incoming Panel



IR000394.IS2

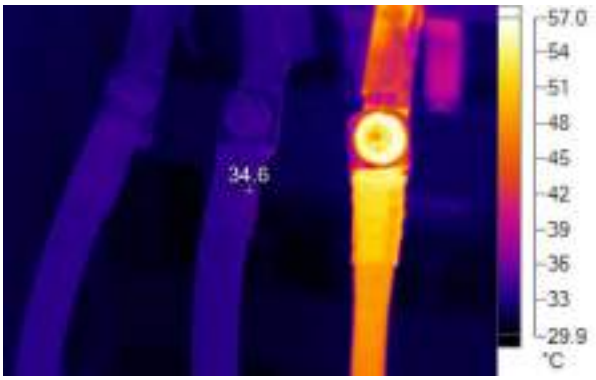
No abnormalities found.

Visible Light Image



Graph

Unbalance of the Load

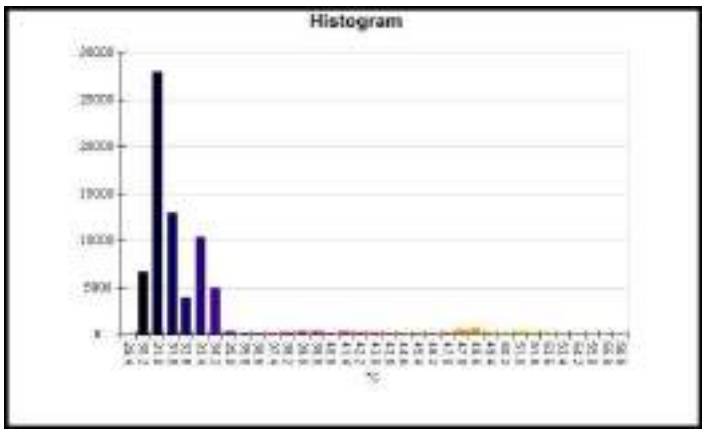


IR000395.IS2

Visible Light Image

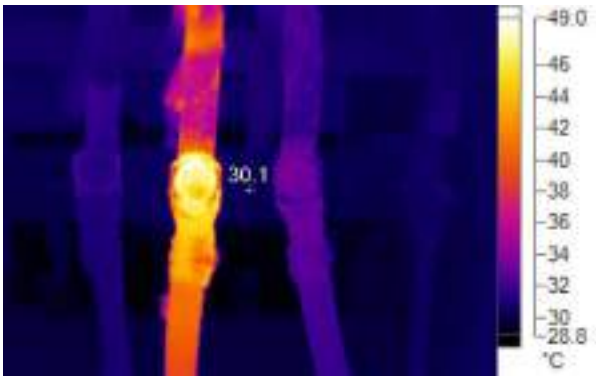
TB1_1, Distribution Box, as the load on the Red phase is higher, it generates more heat in comparison with the other

Temperature is less than 50°C, hence it is not an issue.



Graph

Unbalance of the Load

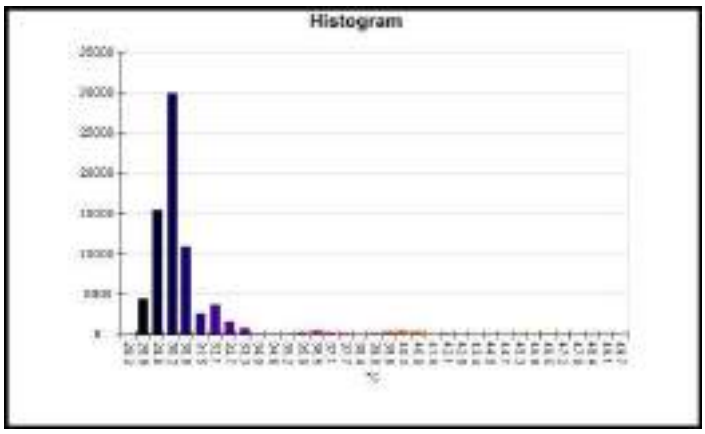


IR000400.IS2

Visible Light Image

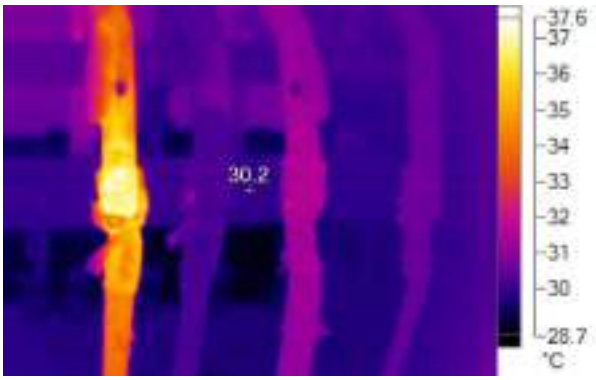
TB1, Distribution Box, as the load on the yellow phase is higher, it generates more heat in comparison with the other

Temperature is less than 50°C, hence it is not an issue.



Graph

Unbalance of the Load

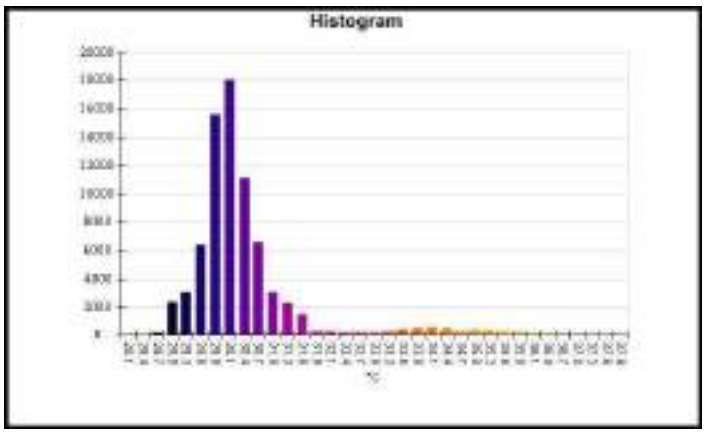


IR000398.IS2

Visible Light Image

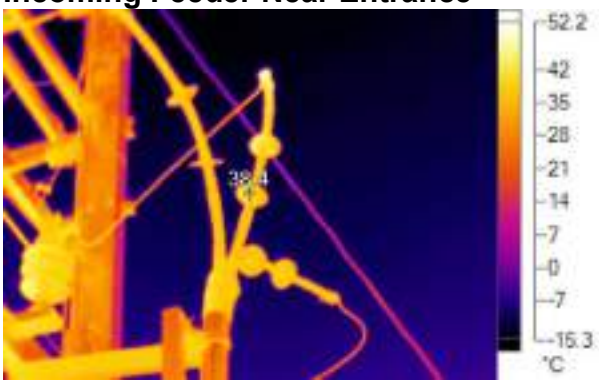
TBI, Distribution Box, as the load on the blue phase is higher, it generates more heat in comparison with the other

Temperature is less than 50°C, hence it is not an issue.



Graph

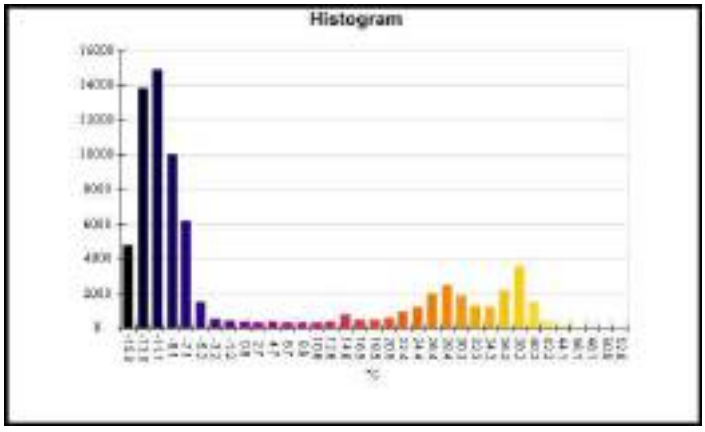
Incoming Feeder Near Entrance



IR000401.IS2

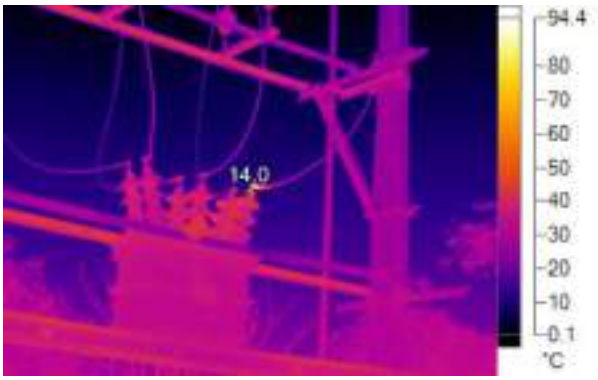
No abnormalities found.

Visible Light Image



Graph

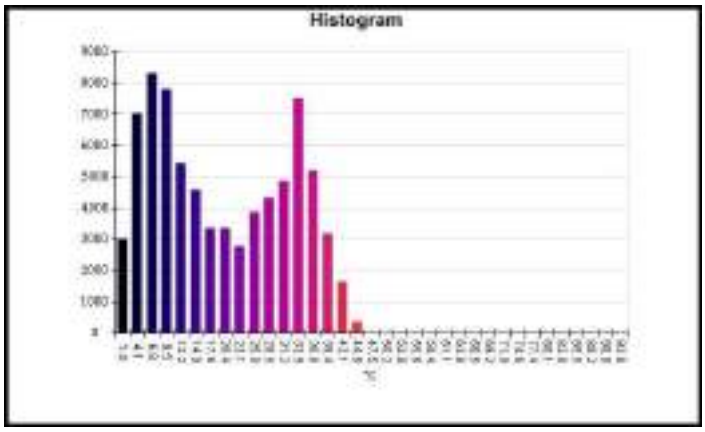
EB Transformer Near Entrance



IR000402.IS2

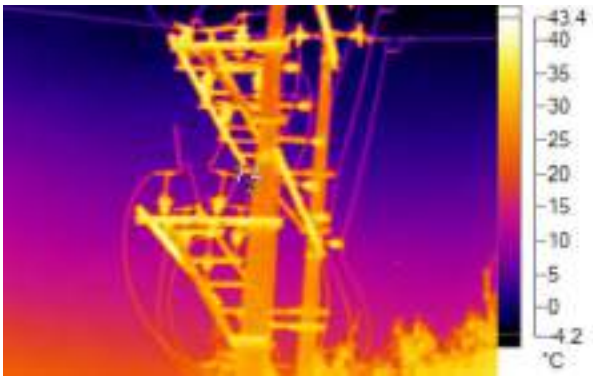
There is a loose connection in the incoming feeder, hence its Generates 90°C

Visible Light Image



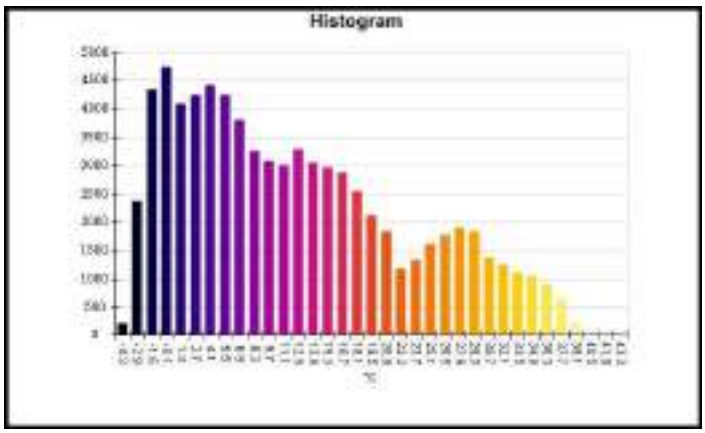
Graph

Feeder Cable in the Sub-Station



IR000406.IS2

Visible Light Image



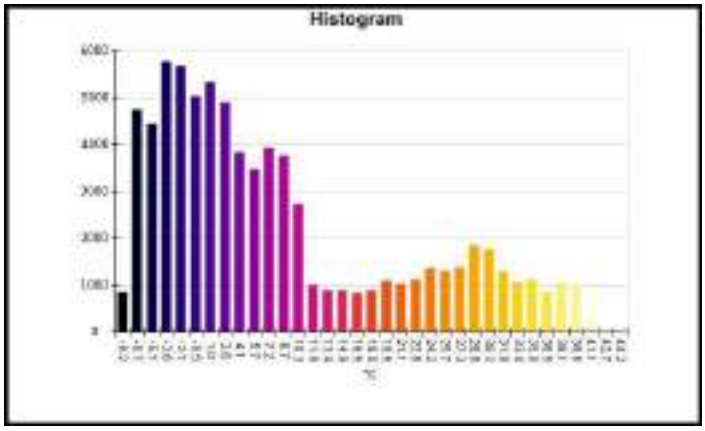
Graph

Feeder Cable in the Sub-Station

IR000407.IS2

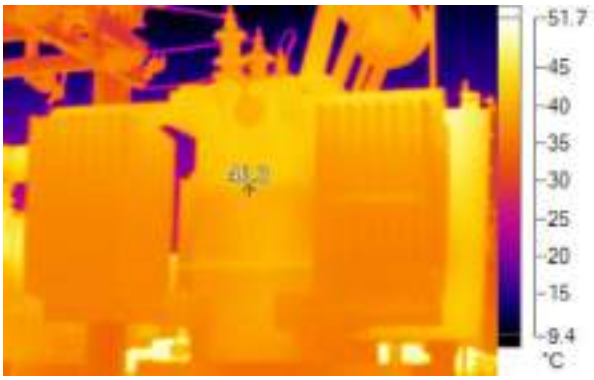
No abnormalities found

Visible Light Image



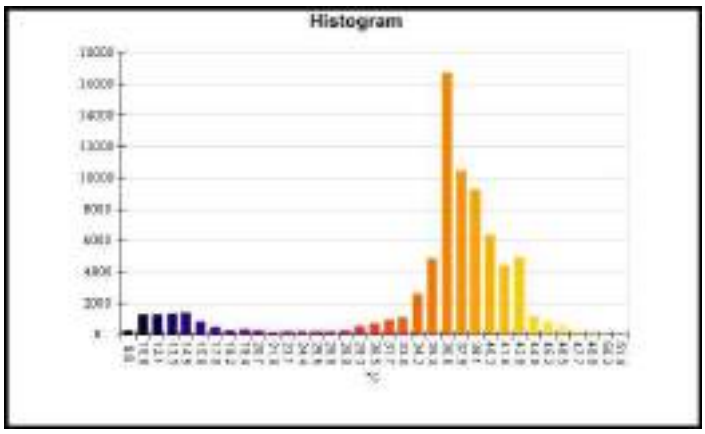
Graph

Transformer in the Sub-Station



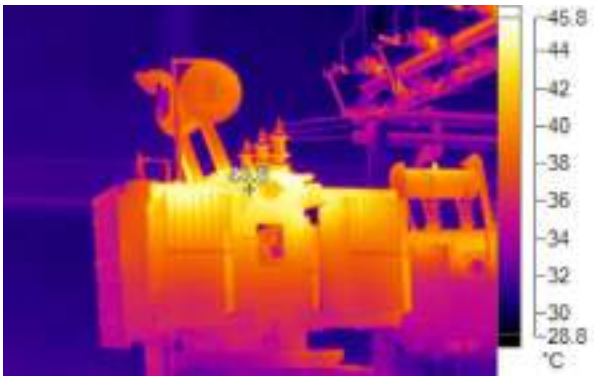
IR000408.IS2

Visible Light Image



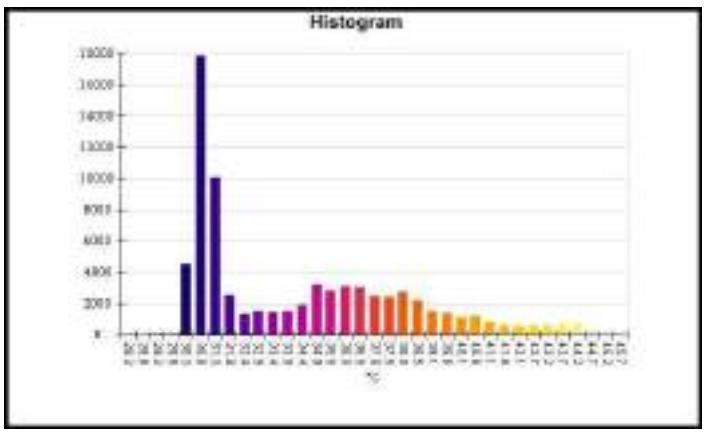
Graph

Transformer in Sub-Station



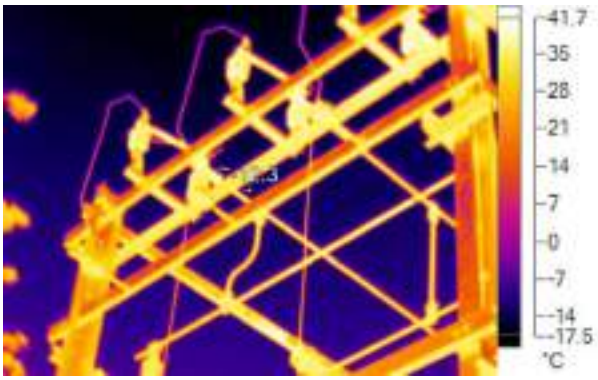
IR000413.IS2

Visible Light Image



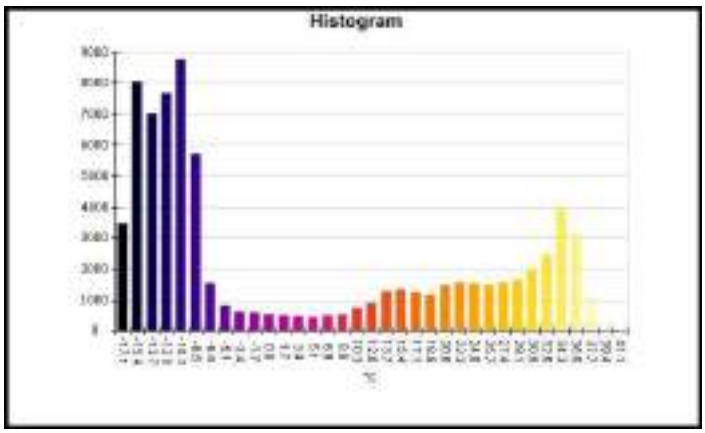
Graph

Feeder Line in Sub-Station



IR000415.IS2

Visible Light Image

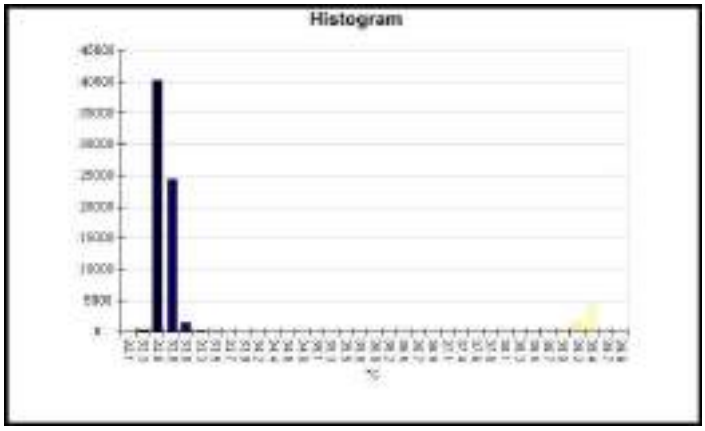


Graph

Heat Generated by the Fan Head

IR000416.IS2
Temperature is around 39°C

Visible Light Image



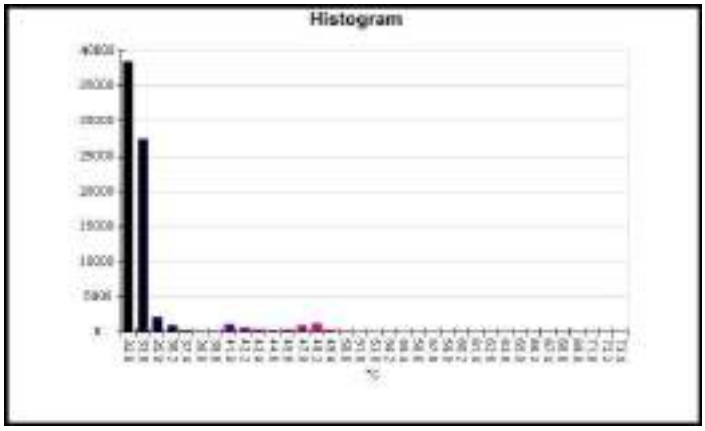
Graph

Heat Generated by Double Frame Tube Light

IR000420.IS2

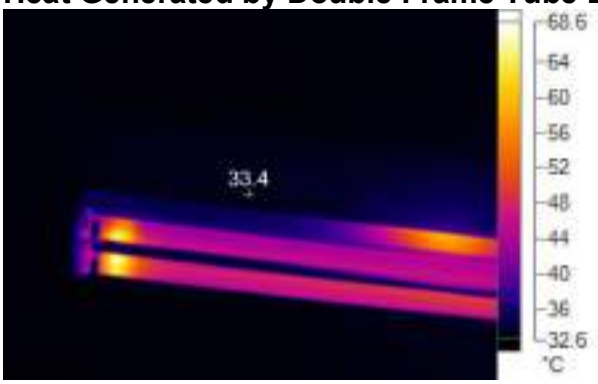
Around 70°C is emitted by the TL

Visible Light Image



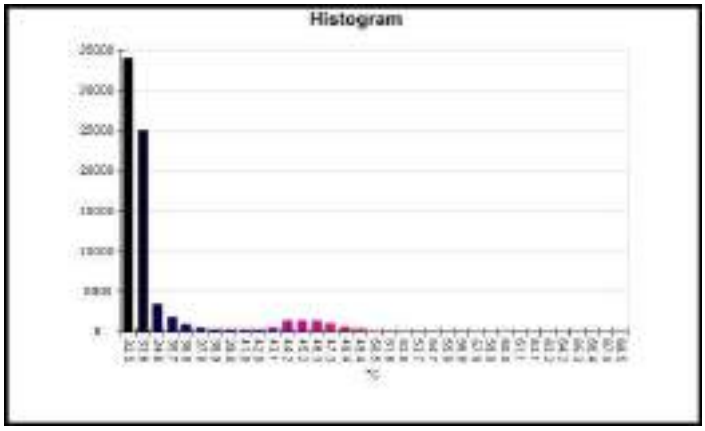
Graph

Heat Generated by Double Frame Tube Light



IR000421.IS2

Visible Light Image



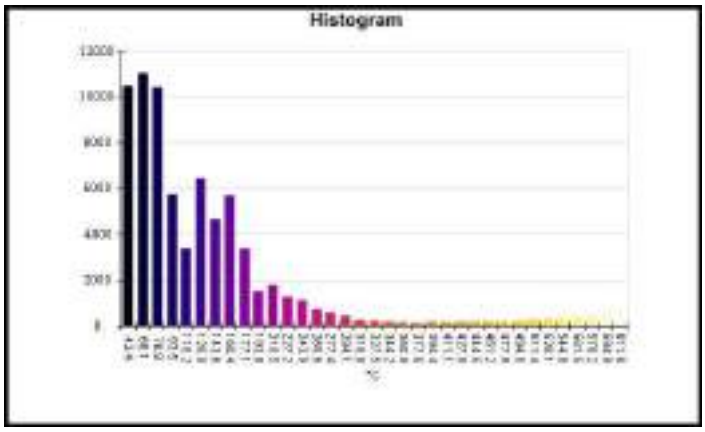
Graph

Heat Emitted through Opened Door.(or) No Door

IR000425.IS2

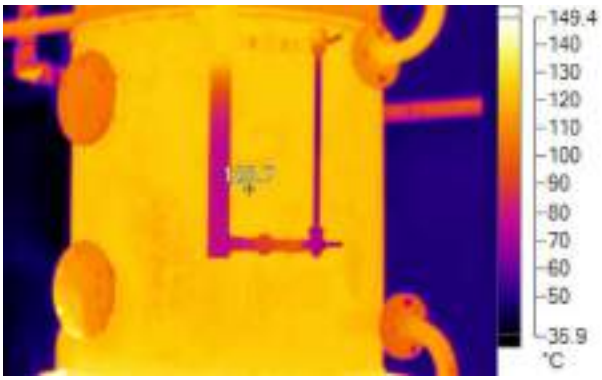
Visible Light Image

Around 620°C is emitted out by the boiler as there is no door to close the combustion chamber. Highly inefficient.



Graph

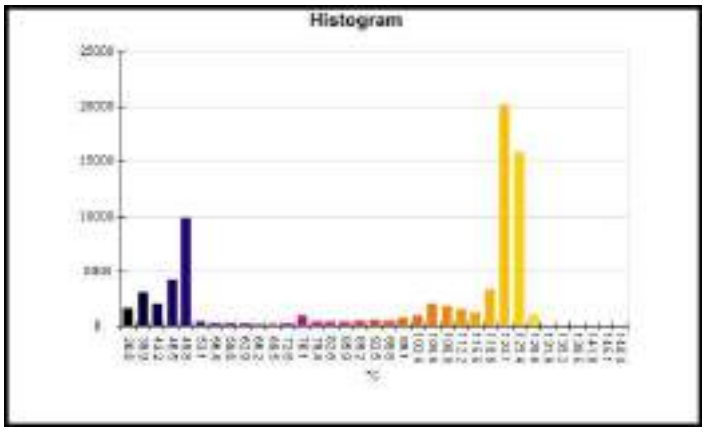
Insulation of the Boiler



IR000428.IS2

Visible Light Image

There is no heat transfer from boiler to the surroundings,

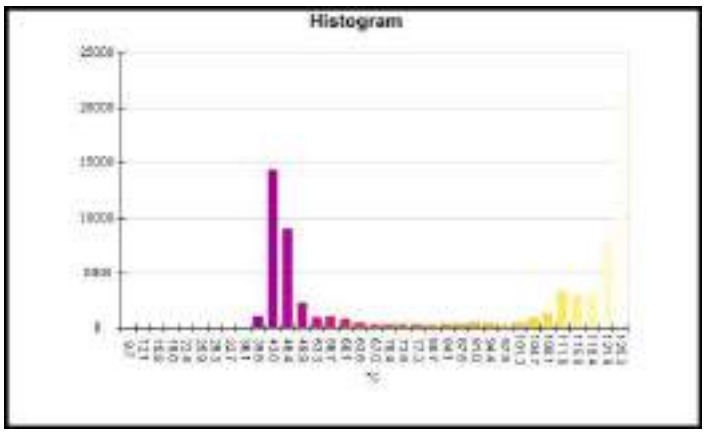


Graph

Insulation of the Boiler

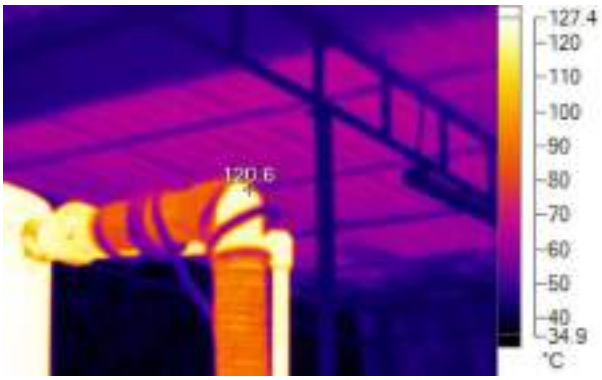
IR000429.IS2

Visible Light Image



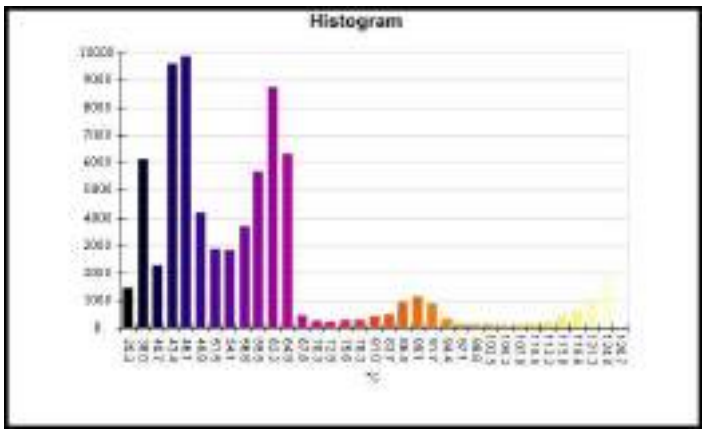
Graph

Worn Out Insulation



IR000432.IS2

Visible Light Image

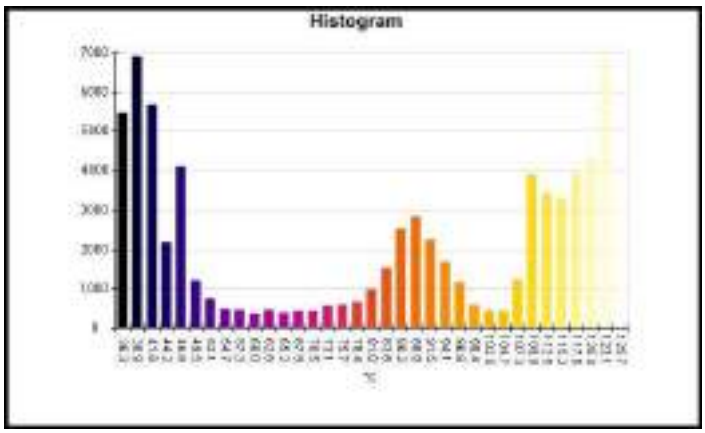


Graph

Need to Insulate Valve

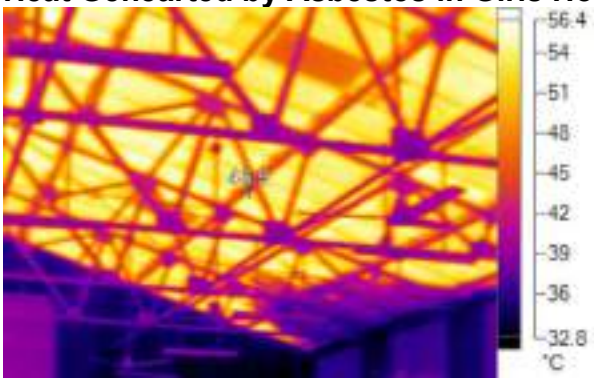
IR000433.IS2

Visible Light Image



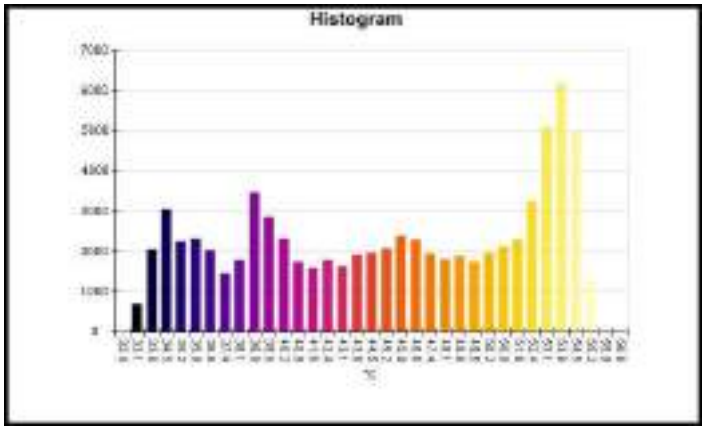
Graph

Heat Genearted by Asbestos in Girls Hostel Mess.



IR000442.IS2
Around 55°C

Visible Light Image



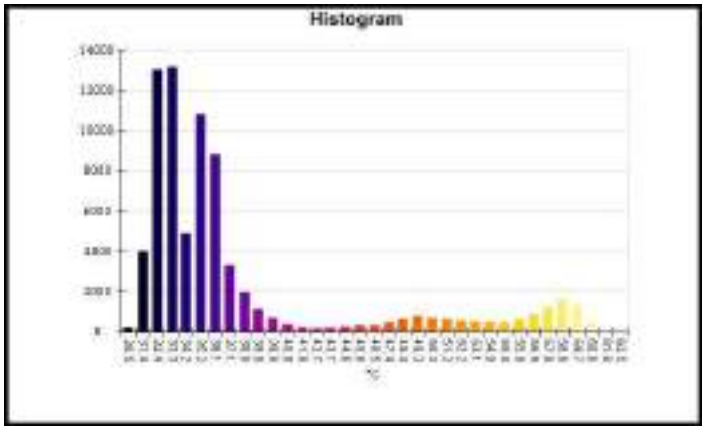
Graph

Heat Emitted by Motor

IR000446.IS2

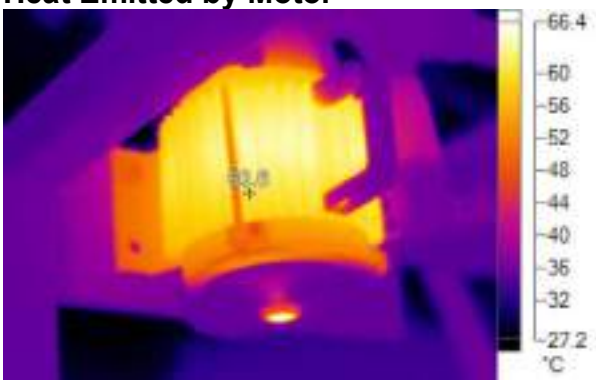
No abnormalities found.

Visible Light Image



Graph

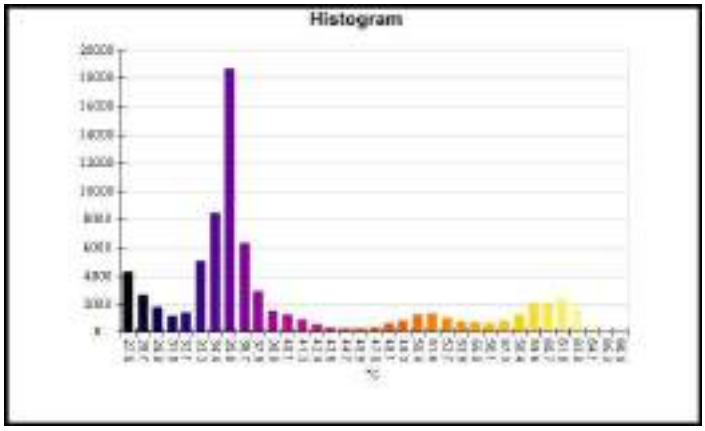
Heat Emitted by Motor



IR000447.IS2

No abnormalities found.

Visible Light Image



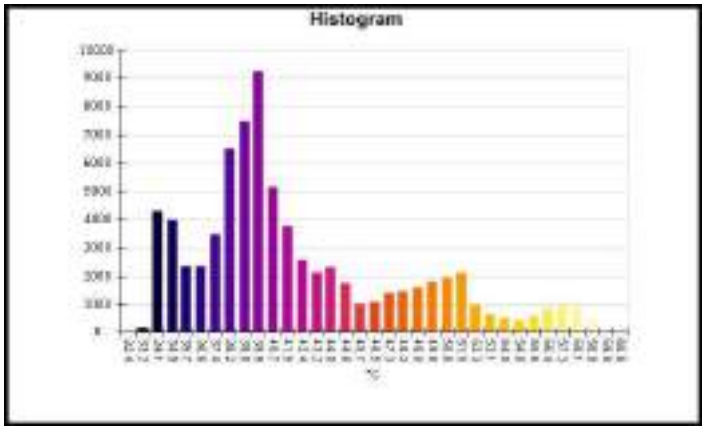
Graph

Heat Emitted by Motor

IR000450.IS2

No abnormalities found.

Visible Light Image

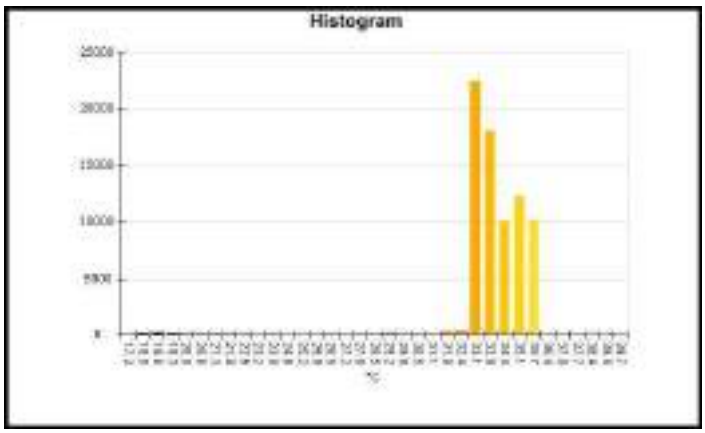


Graph

Working AC in valluvar Hall

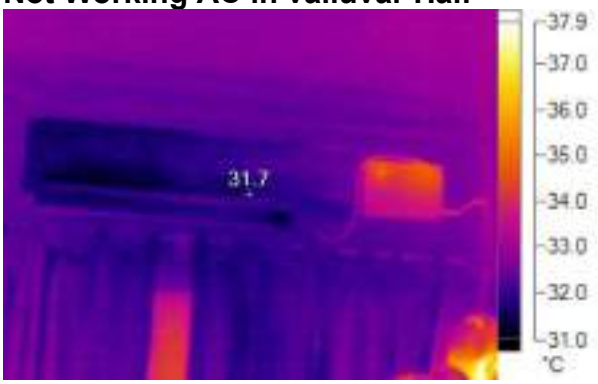
IR000456.IS2

Visible Light Image



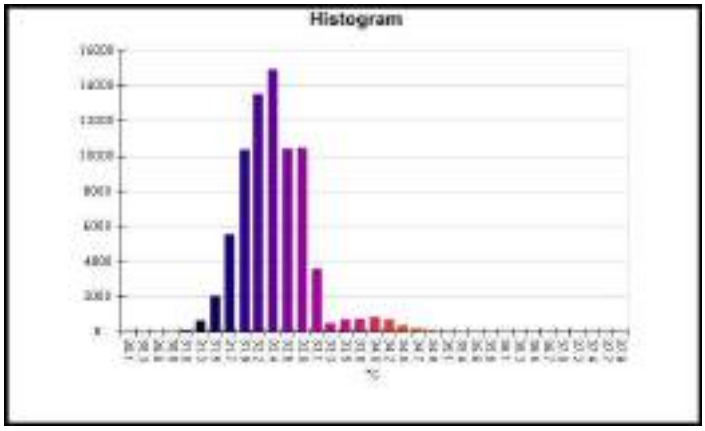
Graph

Not Working AC in valluvar Hall



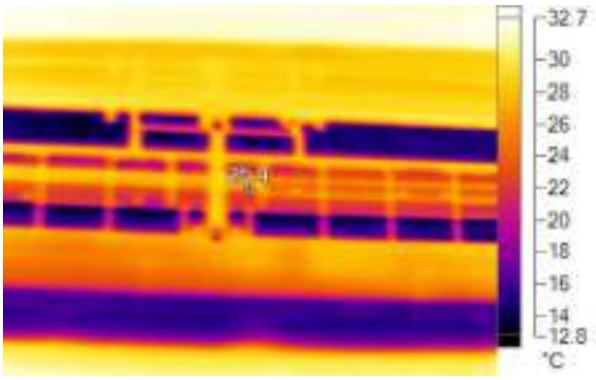
IR000460.IS2

Visible Light Image



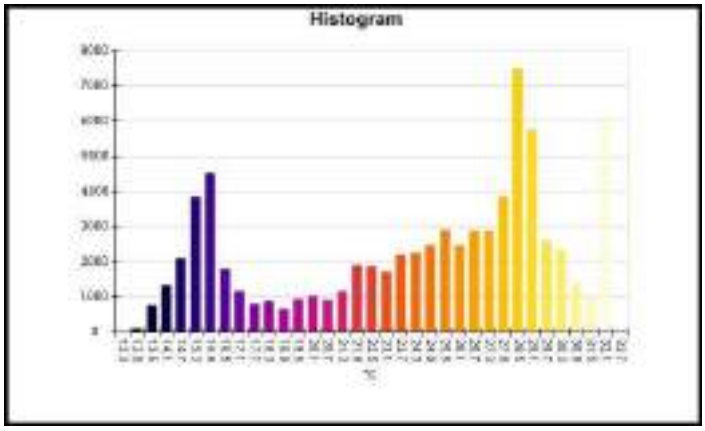
Graph

Inside View of Air Conditioner



IR000464.IS2
No abnormalities found.

Visible Light Image



Graph