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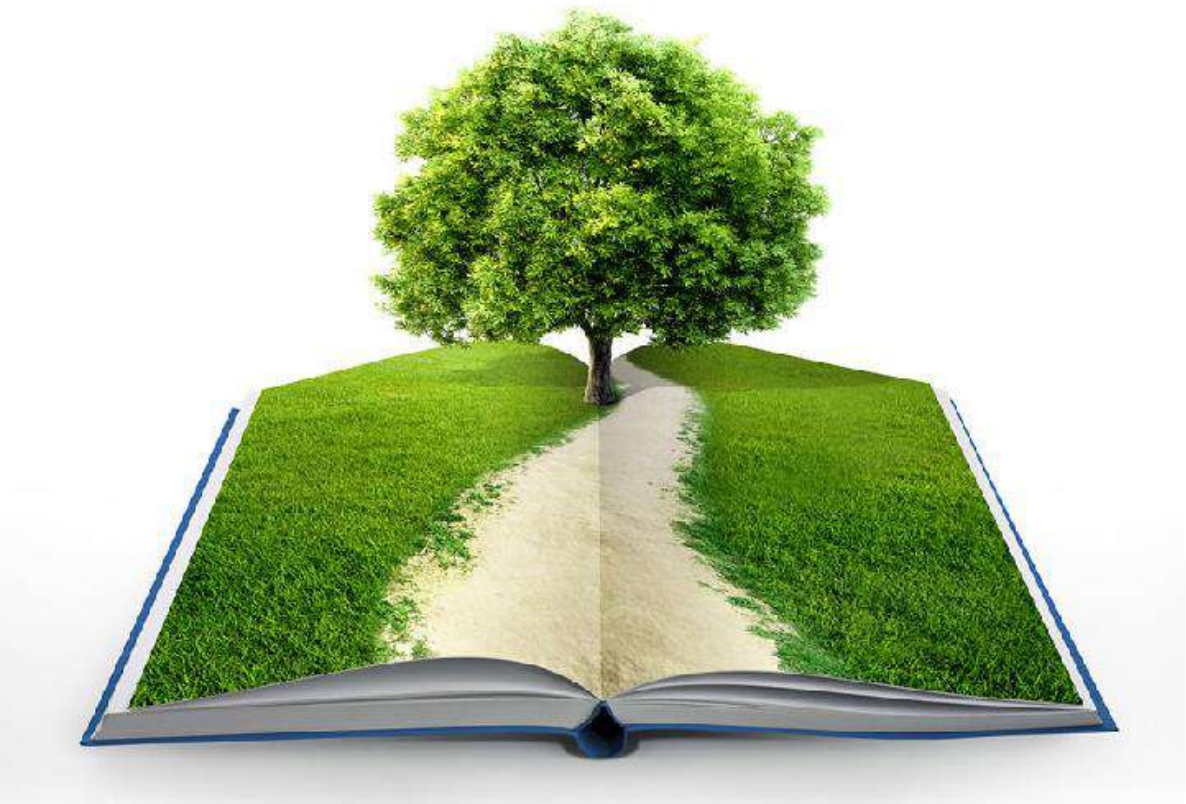

[GREEN AUDIT REPORT]

GREEN AUDIT REPORT
2021-22

Prepared By,

(Environment Division)

KOGNITIVE STREET CONSULTING SOLUTIONS PVT LTD

CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT

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MESSAGE BY VICE CHANCELLOR

India, the oldest civilization and the oldest nation of the world, inherits a rich tradition of intellectual exploration. The Rigveda prayer:' आ नो भद्रा क्रतवो यन्तु विश्वतः' (Let the noble ideas come to us from the entire world.) underlines the openness in Indian thinking since ancient times. Even in the ancient period, India led the higher education system of the world, attracting the student population from a number of countries to its famous seats of learning at Takshila and Nalanda.

Established in 1965, the Chaudhary Charan Singh University, Meerut (formerly known as Meerut University, Meerut) has been continuously engaged in the creation and dissemination of world-class knowledge by involving all the stakeholders, i.e., students, teachers, supporting staff, and the people from different walks of the society. Over the years, it has steadily evolved itself as one of the leading centers of comprehensive learning with its exposure to and linkages with its peers at national and international levels. With its state-of-the-art infrastructure, well-equipped laboratories, and highly qualified and dedicated faculty, the University is committed to the task of harnessing and cultivating the capabilities of young students to enable them to carve suitable space for themselves in the modern economic world.

Conscious of its social responsibility and accountability, the University since its inception has been striving hard to inculcate the right values among students to develop them as socially sensitive citizens. Sustainable development

and inclusiveness being our main mottos, the university encourages teaching and research programs addressing the issues of concern to contemporary society. Thus, the system encourages not only curricular activities but also promotes co-curricular, extracurricular, and extension activities through its outreach to and interaction with the local community.

While we have come a long way and our academic journey is marked by a number of path-breaking milestones, we have to keep pace with the fast-changing needs and expectations of society. The process of creating new knowledge and producing capable human beings dedicated to the upliftment of the nation and the world has to continue with renewed vigor in an unabated manner.

I extend my best wishes to all the students, teachers, and members of the administrative staff who are part of the University and to those also who intend to join us in our endeavor to liberate humanity with the help of the powerful tool of knowledge.

Prof. Narendra Kumar Taneja
Vice Chancellor
Chaudhary Charan Singh University

MESSAGE BY PRO VICE CHANCELLOR

Like the phrase “every square is a rectangle, but not every rectangle is a square;” action is awareness, but awareness is not action. You can have awareness without action, but you cannot have action without awareness. The important message to take out of this environment awareness in order to make our campus green & sustainable.

By conducting the green audit University has taken great steps for energy conservation, water conservation & environmental sustainability.

Prof. Y. Vimala
(Pro Vice Chancellor)

MESSAGE BY PROF. BINDU SHARMA

Over the past few years university has adopted various new and advanced technologies which are eco-friendly; such as solar electricity projects, rooftop rainwater harvesting, solid waste management system, and water purification system for the Plantation of local plant species on the campus. The university has installed solar electrical panels, electrical vehicles for garbage collection on the campus to reduce its carbon emissions. With the National agenda, the university has taken the Clean and Green Campus mission as well minimize the use of Plastic on the campus. The university has taken lead in Tree plantation and planted huge quantities of trees on campus which will support the reduction of carbon footprints of the university.

I am very happy to forward this Green Audit Report 2020-21 of Chaudhary Charan Singh University, Meerut, I would like to give my special thanks to Taneja Sir for the initiative taken for Conducting Green Audit. I hope the report will be helpful to all concerned in the university and will motivate all to put green steps ahead in the future.

Prof. Bindu Sharma
Dept. of Zoology

MESSAGE BY PROF. A. K. CHAUBEY

In this climate-changing scenario, we as the University recognize the severe stain that has been put on mother Earth. In the face of the crisis that the world is now racing, excuses no longer stand and we must change policy and practice at every level in order to avert ecological catastrophe on a global scale.

Chaudhary Charan Singh University has often been at the forefront of environmental campaigning, social change, and international development. Chaudhary Charan Singh University's history is evidence of that, providing leadership, support, and arena of debate for its members to become engaged and able to constantly question and challenge the existing status while pushing for progressive change. The green audit is an ethical and environmental stance has always been a shining example of this.

University has already taken some steps to conserve the energy as well as to avoid loss of energy through various programs Solar Panels, Garbage Electrical Vehicle and to aware students about No use of plastic, conservation of energy, and biodiversity of the campus.

The staff of the University, students, and members are committed to undertaking this GREEN AUDIT as a means to continually improve its environmental performance and standards in recognition of the immediate and serious threat that climate change poses to the Earth and its population, however, undertaking this audit is the first step towards the green approach and needs to

be pushed for continuous improvement. The university should run a campaign and aim to change not just ourselves, but all those around us, from our students, faculty staff of the university, academic institutions, society, and ultimately the world. It is the bottom-up approach combined with a real and progressive governmental policy that we stand a chance to prevent runaway climate change.

I am very happy and congratulate Chaudhary Charan Singh University for efforts taken for Green Audit 2020-21. Now, it becomes the responsibility of all the stakeholders of the university to follow the proposed management plan suggested in the report to reduce our carbon footprints.

Prof. A K Chaubey
Dept. of Zoology

CERTIFICATE

This is to certify that Chaudhary Charan Singh University has conducted a detailed “Green Audit” for its campus during the academic year 2020-2021. The green audit was conducted in accordance with the applicable standards prescribed by the Central Pollution Control Board, New Delhi, and the Ministry of Environment, Forest and Climate Change, New Delhi. The audit involves water, wastewater, energy, air, green inventory, solid waste, etc., and gives an 'Environmental Management Plan', which the university can follow to minimize the impact on the institutional working framework. In an opinion and to the best of our information and according to the information given to us, said green audit gives a true and fair view in conformity with environmental auditing principles' accepted in India.

EXECUTIVE SUMMARY

Green auditing is the process of identifying and determining whether institutions' practices are eco-friendly and sustainable. The main objective to carry out a green audit is to check green practices followed by the university and to conduct a well-formulated audit report to understand where we stand on a scale of environmental soundness.

The initiative taken by **Chaudhary Charan Singh University** to conduct a **Green Audit** of the university campus is a commendable sustainable goal. The strategies followed were the preparation of questionnaires and subsequent action plans to implement the project. Questionnaires prepared to conduct the green audit were based on the guidelines, rules, acts, and formats set by the Government of India, Ministry of Environment and Forest, New Delhi, and Central Pollution Control Board, New Delhi. Questionnaires were prepared for solid waste, energy, water, hazardous waste, and e-waste. For audit purposes and suitability analysis of data, the study area is grouped into various Blocks and Departments. The audit was carried for solid waste, electricity and energy, water and wastewater, hazardous waste, air quality, and green inventory including and carbon footprints. It also indicates the green initiatives taken by the university to save environmental resources. The “Green Audit‟ also presents the “Environmental Management Plan‟.

CHAPTER 1 - INTRODUCTION

1.1 Green Audit - *An Effective Efforts towards Environment Sustainability & Energy Conservation*

Modernization and industrialization are the two important outputs of the twentieth century that have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources, and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar with global issues like global warming, greenhouse effect, ozone depletion, and climate change, etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for a sustainable environment.

Considering the present environmental problems of pollution and excessive use of natural resources, Hon. Prime Minister, Shri. Narendra Modiji has declared the Mission of Swachch Bharat Abhiyan. Also, University Grants Commission has mentioned the "Green Campus, Clean Campus" mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important

components in a specified area. Through this process, the regular environmental activities are monitored within and outside of the concerned sites which have a direct and indirect impact on surroundings. Green audit can be one of the initiatives for such institutes to account their energy, water resource use as well as wastewater, solid waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit, one can get direction about how to improve the condition of environment.

1.2 Why Green Audit:

Green auditing is the process of identifying and determining whether institution's practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period excess use of resources like energy, water, chemicals have become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than the required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion, it is necessary to verify the processes and convert them into green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.3 Goals of Green audit:

University has conducted a green audit with specific goals as:

- Assess facility of different types of waste management.
- Increase environmental awareness throughout campus.

- Identification and documentation of green practices followed by university.
- Identify strength and weakness in green practices.
- Conduct a survey to know the ground reality about green practices.
- Analyze and suggest solution for problems identified from survey.
- Identify and assess environmental risk.
- The long term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issues before get complex.
- To motivate staff for optimized sustainable use of available resources.

1.4 Objectives of Green audit:

To examine the current practices which can impact on environment such as of resource utilization, waste management etc.

- To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.
- Setup goal, vision and mission for Green practices in campus.
- To identify and analyze significant environmental issues.
- Establish and implement Environmental Management Plan in various departments.
- Continuous assessment for better performance in green practices and its evaluation.

1.5 About Criteria 7 of NAAC

Universities are playing a key role in the development of human resources worldwide. Higher education institutes campus run various activities to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solutions for issues related to t h e environment. Different types of evolutionary methods are used to assess the problem concerning the environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment(SIA), Carbon Footprint Mapping, Green audit, etc.

National Assessment and Accreditation Council (NAAC) is a self-governing organization that declares the institutions as Grade according to the scores assigned at thetime of accreditation of the institution. Green Audit has become a mandatory procedure for educational institutes under Criterion VII of NAAC. Green audit intends to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring, etc. for making the institution more eco-friendly.

Students are the major strength of any academic institution. Practicing green action in any educational institution will inculcate the good habit of caring for natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

1.6 Benefits of Green Audit to an Educational Institute:

There are many advantages of green audit to an Educational Institute:

- It would help to protect the environment in and around the campus.
- Recognize the cost saving methods through waste minimization and energy conservation.
- Find out the prevailing and forthcoming complications.
- Empower the organization to frame a better environmental performance.
- It portrays good image of institution through its clean and green campus.
- More efficient resource management
- To create a green campus
- To enable waste management through reduction of waste generation, solid and - waste
- To create plastic free campus and evolve health consciousness among the stakeholder
- Recognize the cost saving methods through waste minimizing and managing
- Point out the prevailing and forthcoming complications
- Authenticate conformity with the implemented laws
- Empower the organizations to frame a better environmental performance
- Enhance the alertness for environmental guidelines and duties
- Impart environmental education through systematic environmental management approach and Improving environmental standards
- Benchmarking for environmental protection initiatives
- Financial savings through a reduction in resource use
- Development of ownership, personal and social responsibility for the

University and its environment

- Enhancement of University profile
- Developing an environmental ethic and value systems in youngsters.
- Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the University.
- Finally, it will help to built positive impression for through green initiatives the upcoming NAAC visit.

1.7 ABOUT CHAUDHARY CHARAN SINGH UNIVERSITY

Chaudhary Charan Singh University (formerly, Meerut University) was established in 1965, to cater to the needs of higher education in western Uttar Pradesh. The University celebrated its silver jubilee in 1991. Presently, it is one of the premier educational institutions of the country encompassing a vast, beautiful and pollution-free campus which sprawls over 222 acres of land having vast playgrounds and experimental fields, botanical garden, rose garden with life-size statue of the late Prime Minister Ch. Charan Singh, Gymnasium, Indoor Stadium, well equipped Library, Hostels for both girls and boys, Administrative Block, Spacious Auditorium, Guest House, Community Center, Medical Center, Residential Quarters for faculty members and employees, Canteen, Bank and Post office.

The teaching department belonging to different faculties, are housed in spacious buildings and have well-equipped laboratories and advanced facilities. The University also has a separate engineering University, which is currently

offering courses leading to B.Tech. Degree in several different branches of engineering.

Location:

Chaudhary Charan Singh University is located at the center of Meerut City which is just 2.6 Km from Meerut Garh Bus Station so getting to the University is easy-going travel.

It is 10 Km from Meerut Railway Station connected by various Public Transports, Cabs, Auto Rickshaws, etc.

Total Campus Area & University Building Spread Area:

The University campus is spread over a total area of 221 acres. Out of this, 37.4 acre is the built-up area of all Buildings –

1. Administrative Buildings,
2. Departments Buildings,
3. Hostel Buildings,
4. Residential Buildings

17.68 acres area is ground coverage.

Details of all departments and faculties are mentioned in the below table of Buildings:-

Administrative Buildings	Adam Block, Administrative Block SCRIET, Answer Book Building-1, Answer Book Building -2, Badminton Court (Indoor), Bank, Bhraspati Bhawan, Canteen, Central Evaluation Building, Community Centre, Computer Centre, Computer Centre (Ext.), Electrical Section & Post Office, Engineering Section, Examination & Confidential, Kushti Stadium, Library SCRIET, Metrological Station, Netaji Subhash Chandra Boss Auditorioum, Raja Mahendra Pratap Library, SCRIET Canteen, Student Grievance Cell, Swami Kalyandev Swasthya Kendra, VC Secretariat
Department Buildings	Applied Science, MCA, Food Science & technology and Plant Protection, Bio-technology, Home Science & Commerce, Chemistry (Block-1 & Block -2), History & Legal Studies, History & Legal Studies, Horticulture, Sanskrit & Yoga, Microbiology, Physical Education, Psychology, Fine Arts & Statistics, Russian, Dean Student Welfare Office & Chief Proctor Office, Sociology, MSW English and Seed Science Technology, Animal House, Botany, Dept. of IBS, MBA(HA) and Mass Communication, Education, Economics & Political Science, Hindi, Hounarable Kanshiram Jee Sodh Peeth, Library & Information Science, Madan Mohan Vidya Mandir School, Mathematics, genetics & Plant Breeding, New Journalism & Mass Communication, Physics & Geography, SCRIET

	Block (EC & EI Engg.), SCRIET (CS & IT Engg.), SCRIET Block C(Agriculture Engg.), SCRIET Block (Mechanical & Chemical Engg.), SCRIET Workshop, URDU, Zoology, Toxicology
Hostel Buildings	Durga Bhabhi Girls Hostel, Kailash Prakash Boys Hostel, Late Rajesh Pilot Sports Hostel, Maharana Pratap Boys Hostel, Pandit Deendayal Upadhyay Boys Hostel, R K Singh Boys Hostel, Rani Laxmi Bai Girls Hostel
Residential Buildings	Guest House (21 Rooms, Kitchen, Dining Area), Residence – Vice Chancellor, Residence (A1-A6), Residence (AB1-AB5), Residence (B1 – B11), Residence (S1-S8 & S37-S52), Residence (S9-S36 & S53-S56), Residence (C1-C24), Residence (D1-D8), Residence (D25-D28), Residence (D9-D24), Residence (H1-H16)

There is separate campus named SCRIET Engineering University.

The University has also adopted the 'Green Campus' system for environmental conservation and sustainability.

The 'Green Campus' has been active since last 7 years both as an assembly group of sub committees that actively promote the various projects. The University administration works on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management and Paperless Work.

1.1 Campus Infrastructure

The University Campus from the outside looks great and is unique

keeping the architecture of the University. Chaudhary Charan Singh University has a very good and systematic building infrastructure. All classrooms are fully ventilated, they are fully comfortable. The University from the outside looks good and is unique keeping the architecture of other universities in mind. And the University has an interesting historical legacy that is interesting to learn about.

The University Campus is itself is a combination of all standards and amenities required as far as great educational infrastructure is concerned; however residential areas including hostels are full of amenities link Bank, School, Health Centre, etc.

Badminton Court, Computer Centres are center of attraction. The library is very vast and there are enough books available to issue or read in the library itself. There is ample seating space also available. Students can get Internet access at the library, power back up, University has provided a Wi-Fi facility available for all students. The University Campus also has a book bank facility that enables students to use the books, for the entire academic session. There is a separate library for SCRIET Engg. University and the computer laboratories have access to advance web activity with its subscription to E-resources through a digital Network that links students and faculty researchers to the databases needed for research. There are separate girl's & boy's Hostels. The campus also has sports facilities which include a well-maintained Cricket ground, football ground, and a basketball court, and carom for indoor sports. Students also use this platform for their cultural competitions etc. University has a medical building with all the necessary first aid. University has facilities for both outdoor and indoor games.

Existing facilities are continuously upgrading and improving.

Department of Botany

Ecology & Research Lab

Physiology & Tissue Culture Lab

Biochemistry Lab

AG Botany Lab

Plant Taxonomy & Pathology Lab

Department of Zoology

Department of Nematology

Chronology Lab

Laboratory of Molecular Parasitology

Department of Toxicology

Molecular Biology & Plant Virology Lab

Department of Mathematics

Department of Microbiology

Fermenter Room

Pathogenic Microorganism Lab

Department of Horticulture

Department of Chemistry, Department of Biotechnology, Department of Commerce & Department of Foreign Languages

CHAPTER 2 – GREEN AUDIT METHODOLOGY

1.1 The Audit Team

SI No.	Name	Department
1	Prof. Y Vimla	Dept. of Botany
2	Prof. A K Chaubey	Dept. of Zoology
3	Prof. Jitendra Dhaka	Dept. of Horti culture
4	Prof. Bindu Sharma	Dept. of Zoology
5	Prof. Vijay Malik	Dept. of Botany
6	Er. Maneesh Mishra	University Engineer section

2. Pre Audit Stage

A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit and discussions were held on the practicalities associated with the audit. This meeting is an important prerequisite for the green audit because it is the first opportunity to meet the auditee and deal with any concerns. It was held with the Vice-Chancellor regarding initiatives taken by the University and regarding the last NAAC Green Audit conducted by the University. The meeting was an opportunity to gather the information that the audit team can study before arriving on the site.

The audit protocol and audit plan was handed over at this meeting and discussed in advance of the audit itself. The pre-audit meeting was conducted successfully and necessary documents were collected directly from the University

before the initiation of the audit processes. Actual planning of audit processes was discussed in the pre-audit meeting. Audit team was also selected in this meeting with the help of staff and the University management. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself.

2.1 Management Commitment

The Management of the University has shown a commitment towards green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus, etc., after the green auditing. The management of the University was willing to formulate policies based on green auditing report.

2.2 Objectives of the study

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues.

Green Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care that is the responsibility of each individual who is the part of economic, financial, social, environmental factors. It is necessary to conduct green audit on a University campus because students become aware of the green audit, its advantages to save the planet and they become a good citizen of our country. Thus Green audit becomes necessary at the University level.

The broad objectives are: –

- Diagnosing the environmental problems to eliminate them.
- Environmental education through a systematic environmental management approach.
- Improving environmental standards.
- Benchmarking for environmental protection initiatives.
- Efficient utilization of resources.
- Financial savings through a reduction in resource use.
- Curriculum enrichment through practical experience.
- Development of ownership, personal and social responsibility for the University and its environment.
- Enhancement of the University's profile.
- Developing an environmental ethics and value systems in young people.
- Providing certain recommendations based on environmental audit report.
- Ensuring compliance, not only with laws, regulations, and standards but also with company policies and the requirements of an Environmental Management System (EMS) standard.
- Enabling environmental problems and risks to be anticipated.
- To demonstrate that University is aware of its impact upon the environment.

3. Audit Stage

Green Audit was done with the help of co-associates involving different student groups, teaching, and non-teaching staff. The green audit began with the teams walking through all the different facilities at the University, determining the different types of appliances and utilities as well as measuring the usage per item

(Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency, or general characteristics of certain appliances. Data collection was done in the sectors such as Energy, Waste, Green Area, Carbon footprint, and Water use. Universities' records and documents were verified several times to clarify the data received through survey and discussions.

3.1 Methodology

The Management of the University has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus etc., after the green auditing. The management of the University was willing to formulate policies based on green auditing report.

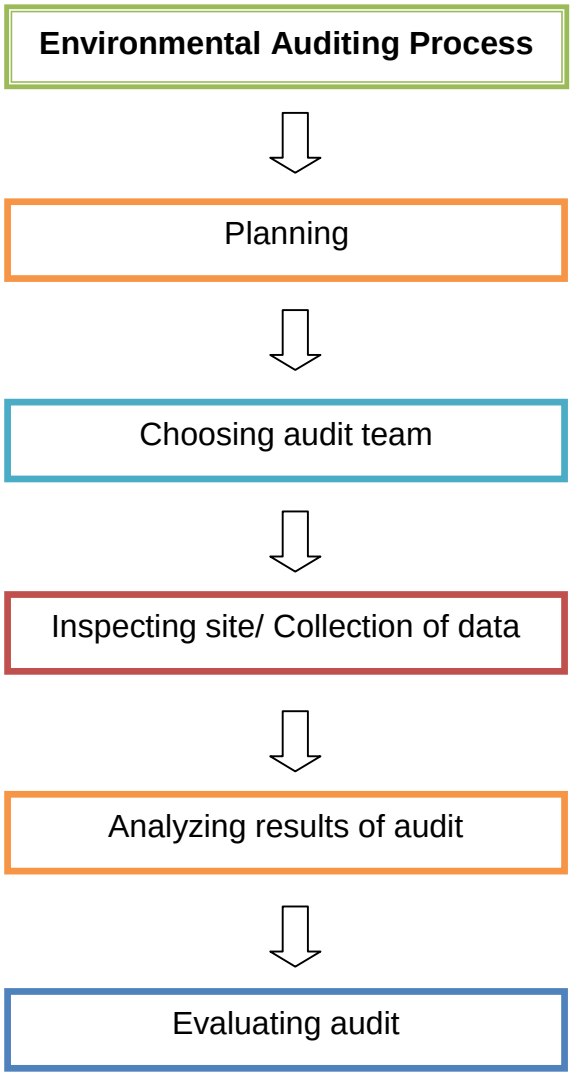
In order to perform green audit, the methodology included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summarize the present status of environment management in the campus:

- Energy Management
- Water Management
- Waste Management
- Environment Management

Methodology – Step By Step

The audit process was carried out in three phases. At first, all the secondary data required for the study was collected from various sources, like concerned departments as engineering, garden etc. A broad reference work was carried out to clear the idea of green auditing. Different case studies and methodologies were studied and the following methodology was adopted for present audit.

The methodology of present study is based on onsite visits, the personal observations and questionnaires survey tool. Initially, based on data requirement, sets of questionnaires were prepared. The surveyors then visited all the departments of the university and the questionnaires were filled. The generated data is subsequently gathered and used for further analysis. From the outcome of the overall study, a final report is prepared.



Survey by Questionnaire:

Baseline data for green audit report preparation was collected by questionnaire survey method. Questionnaires prepared to conduct the green audit in the university campus is based on the guidelines, rules, acts and formats prepared by Ministry of Environment, Forest and Climate Change, New Delhi, Central Pollution Control Board and other statutory organizations. Most of the guidelines and formats are based on broad aspects and some of the issues or formats were not applicable for University campus. Therefore, using these guidelines and formats, combinations,

modifications and restructuring was done and sets of questionnaires were prepared as solid waste, energy, water, hazardous waste, and e-waste.

All the questionnaires comprises of group of modules. The first module is related to the general information of the concerned department, which broadly includes name of the department, month and year, total number of students and employees, visitors of the department, average working days and office timings etc. The next module is related to the present consumption of resources like water, energy, or the handling of solid and hazardous waste. Maintaining records of the handling of solid and hazardous waste is much important in green audit.

There are possibilities of loss of resources like water, energy due to improper maintenances and assessment of this kind of probability is necessary in green audit. One separate module is based on the questions related to this aspect. Another module is related to maintaining records, like records of disposal of solid waste, records of solid waste recovery etc. For better convenience of the surveyor, some statistics like, basic energy consumption characteristics for electrical equipment etc. was provided with the questionnaires itself.

Onsite visit and observations:

The Chaudhary Charan Singh University has vast built up area comprising of various departments, administrative building, teachers and staff quarters, student hostels, guest house, sports complex and health center. All these amenities have different kind of infrastructure as per their requirement. All these buildings were visited by the surveyors and the present condition is checked with the help of the questionnaires. Personal observations were made during the onsite visit. All the amenities were clubbed in as per their similarities and differences, which makes the

survey and further analysis easier.

For the data compilation purpose the University Departments and support services were clubbed into Four Types of Buildings and given names as Administrative Building, Departments Buildings, Hostel Buildings and Residential Buildings. The details of the Buildings are as follows:

Details of each building including the various departments

Sr. No.	Name of the Buildings
1.	Administrative Buildings
2.	Department Buildings
3.	Hostel Buildings
4.	Residential Buildings

After collection of secondary data, the reviews related to each environmental factor were taken by the green audit team. The data was tabulated, analyzed and graphs were prepared. Depending upon the observations and data collected, interpretations were made. The lacunas and good practices were documented. The Environmental Management Plan (EMP) was prepared for the next academic year in order to have better environmental sensitization. Finally, all the information was compiled in the form of Green Audit Report.

3.2 Data analysis and final report preparation:

A proper analysis and presentation of data produced from work is a vital element. In case of green audit, the filled questionnaires of the survey from each group, were tabulated as per their modules, in Excel spreadsheets. The tabulated data is then used for further analysis. For better understanding of the results and to avoid complications, averages and percentages of the tables were calculated. Graphical representation of these results was made to give a quick idea of the status. Interpretation of the overall outcomes were made which incorporates all the primary and secondary data, references and interrelations within. Final report preparation was done using this interpretation.

Categorization of University Departments & Support Services at Chaudhary Charan Singh University Campus

Administrative Buildings	Adam Block, Administrative Block SCRIET, Answer Book Building-1, Answer Book Building -2, Badminton Court (Inddor), Bank, Bhraspati Bhawan, Canteen, Central Evaluation Building, Community Centre, Computer Centre, Computer Centre (Ext.), Electrical Section & Post Office, Engineering Section, Examination & Confidential, Kushti Stadium, Library SCRIET, Metrological Station, Netaji Subhash Chandra Boss Auditorioum, Raja Mahendra Pratap Library, SCRIET Canteen, Student Grievance Cell, Swami Kalyandev Swasthya Kendra, VC Secretariat

Department Buildings	Applied Science, MCA, Food Science & technology and Plant Protection, Bio-technology, Home Science & Commerce, Chemistry (Block-1 & Block -2), History & Legal Studies, History & Legal Studies, Horticulture, Sanskrit & Yoga, Microbiology, Physical Education, Psychology, Fine Arts & Statistics, Russian, Dean Student Welfare Office & Chief Proctor Office, Sociology, MSW English and Seed Science Technology, Animal House, Botany, Dept. of IBS, MBA(HA) and Mass Communication, Education, Economics & Political Science, Hindi, Hounarable Kanshiram Jee Sodh Peeth, Library & Information Science, Madan Mohan Vidya Mandir School, Mathematics, genetics & Plant Breeding, New Journalism & Mass Communication, Physics & Geography, SCRIET Block (EC & EI Engg.), SCRIET (CS & IT Engg.), SCRIET Block C(Agriculture Engg.), SCRIET Block (Mechanical & Chemical Engg.), SCRIET Workshop, URDU, Zoology, Toxicology
Hostel Buildings	Durga Bhabhi Girls Hostel, Kailash Prakash Boys Hostel, Late Rajesh Pilot Sports Hostel, Maharana Pratap Boys Hostel, Pandit Deendayal Upadhyaya Boys Hostel, R K Singh Boys Hostel, Rani Laxmi Bai Girls Hostel
Residential Buildings	Guest House (21 Rooms, Kitchen, Dining Area), Residence – Vice Chancellor, Residence (A1-A6), Residence (AB1-AB5), Residence (B1 – B11), Residence (S1-S8 & S37-S52), Residence (S9-S36 & S53-S56), Residence (C1-C24), Residence (D1-D8), Residence (D25-D28), Residence (D9-D24), Residence (H1-H16)

CHAPTER 3 – WATER & WASTE WATER AUDIT

Water which is precious natural national resource available with fixed quantum. The availability of water is decreasing due to increasing population of nation, as per capita availability of utilized water is going down. Due to ever rising standard of living of people, industrialization, urbanization, demand of fresh water is increasing day by day. The unabated discharge of industrial effluent in the available water bodies is reducing the quality of these ample sources of water continuously. Hence, the national mission on water conservation was declared by the then Hon. Prime Minister Narendra Modi as 'Jal Shakti Abhiyan' and appealed to all citizens to collectively address the problem of water shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use.

Water audit can be defined as a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. Water Audit is nothing but an effective measure for minimizing losses, optimizing various uses and thus, enabling considerable conservation of water in irrigation sector, domestic, power and industrial as well. A water audit is a technique or method which makes possible to identify ways of conserving water by determining any inefficiencies in the system of water distribution. The measurement of water losses due to different uses in the system or any utility is essential to implement water conservation measures in such an establishment.

Importance of Water Audit:

- Systematic process
- May yield some surprising results

- Easier to work on solutions when the problems are identified.
- A tracking mechanism can be put into place.audit team

It is observed that a number of factors like climate, culture, food habits, work and working conditions, level and type of development, and physiology to determine the requirement of water. The community which has a population between 20,000 to 1,00,000 requires 100 to 150 liters per person (capita) per day. The communities with a population over 1,00,000 requires 150 to 200 liters person (capita) per day. As per thestandards provided by WHO Regional office for South East Asia Schools require 2 liters per student; 10-15 liters per student if water-flushed toilets, Administration requires (Staff accommodation not included) 50 liters per person per day, Staff accommodation requires 30liters per person per day and for sanitation purposes it depends on technology.

3.1 Water Audit:

Water usage can be defined as water used for all activities which are carried out on campus from different water sources. This includes usage in all residential halls, academic buildings, on campus and on grounds. Wastewater is referred as the water which is transported off the campus. The wastewater includes sewerage, residence, hall water used in cooking, showering, clothes washing as well as wastewater from chemical and biological laboratories which ultimately going down in sink or drainage system.

University water resources

The major resource for the Water in the university is self-reliant water boring system installed in the campus in mass scale. Water storage tanks with capacity (2X 250 Kilo Litres and 2X 400 Kilo Litres) installed in the University Campus which covers the daily consumption of water in the Campus including Drinking, Bathroom, Toilet, Kitchen, Garden, Urinals, Wash Basin, Laboratory etc. In the total population of 3800 of the University campus, the daily water need of the university is 266 Kilo Litres/ Day.

3.1.1 Water Consumption in the University:

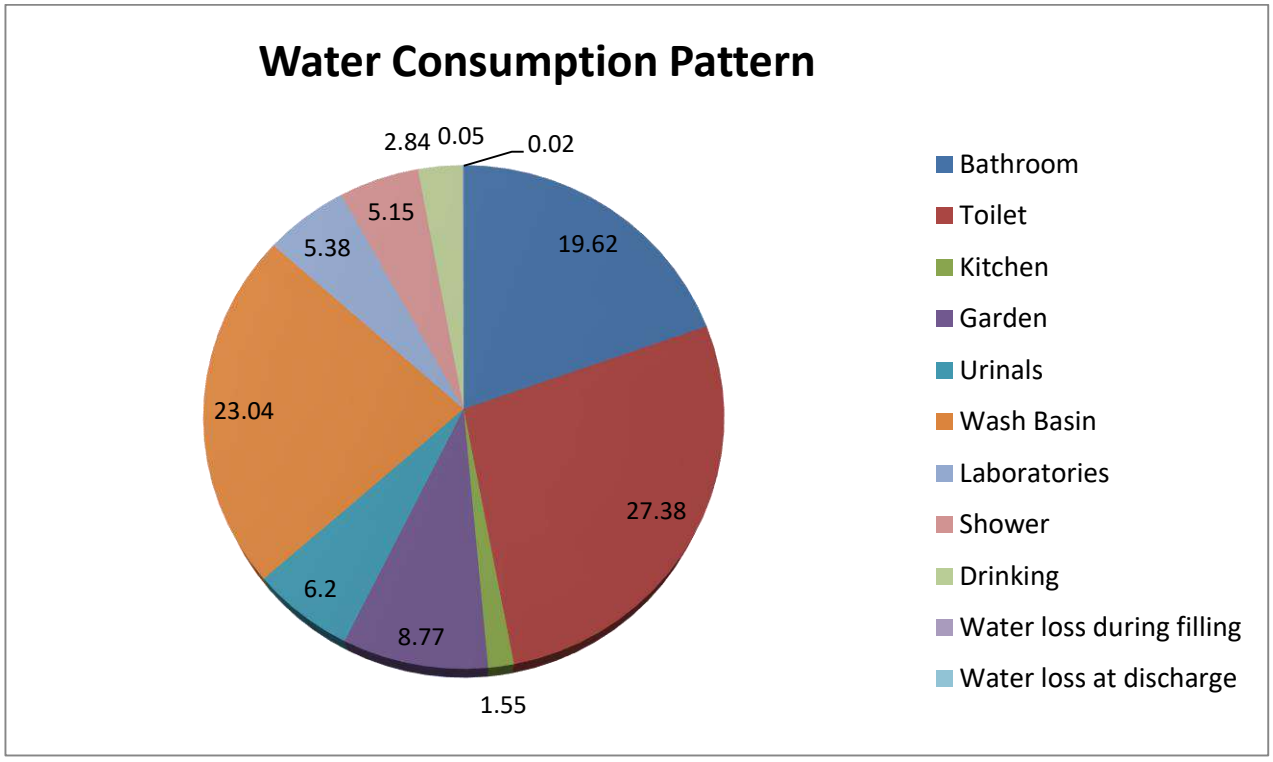
From the data collected for water audit of Chaudhary Charan Singh University, Meerut, the water distribution and water consumption pattern is noticed as follows.

Table: Yearly Average Water Consumption at Chaudhary Charan Singh University

Sr. No.	Sector	Total Daily Use (liter)	Total Monthly use (kl)	Total yearly use (kl)	Percentage %
1	Bathroom	52,189.20	1,565,676.00	18,788,112.00	19.62
2	Toilet	72,830.80	2,184,924.00	26,219,088.00	27.38
3	Kitchen	4,123.00	123,690.00	1,484,280.00	1.55
4	Garden	23,328.20	699,846.00	8,398,152.00	8.77
5	Urinals	16,492.00	494,760.00	5,937,120.00	6.2
6	Wash Basin	61,286.40	1,838,592.00	22,063,104.00	23.04
7	Laboratories	14,310.80	429,324.00	5,151,888.00	5.38
8	Shower	13,699.00	410,970.00	4,931,640.00	5.15
9	Drinking	7,554.40	226,632.00	2,719,584.00	2.84
10	Water loss during filling	133.00	3,990.00	47,880.00	0.05

11	Water loss at discharge	53.20	1,596.00	19,152.00	0.02
Total		**266,000.00**	**7,980,000.00**	**95,760,000.00**	**100**

Graph: Yearly Average Water Consumption at Chaudhary Charan Singh University



Graph shows the total percent of water consumed by all the Building Blocks of Chaudhary Charan Singh University, Meerut. The graph shows toilets, wash basin and bathrooms as the major sources of water utilization comprising 27.38 %, 23.04 %, and 19.62 % respectively. The other uses namely garden, urinals, laboratory and shower consume water with yearly water requirement of 8.77 %, 6.20 %, 5.38 % and 5.45 % respectively. Further also includes water required for drinking purpose, water

required for kitchen activity and loss of water during filling and during discharge which is 2.84%, 1.55%, 0.05% and 0.02%. It was observed that the water required for drinkingpurpose is 2.84 % while for kitchen it is 1.55 %. In case of filling loss of water observed 0.05 and % while during discharging water loss is about 0.02 % respectively.

3.1.2 Sustainable Water Practices (SWP):

Watershed Management Practices at Chaudhary Charan Singh University campus.

Chaudhary Charan Singh University, Meerut has taken many initiatives in water conservation and management of water available on the campus. Now, university is self-reliant through decentralized water conservation and management practices.

3.1.3 Water Filtration Unit:

The university has huge campus with its administrative setup and there is lot of waste collected and disposed to the Garbage Unit. University has constructed Mini Water Filtration Unit on the campus. This filter house used to filter the wastewater from Garbage Unit into potable water stored in Tank constructed near Garbage Unit. This water is utilized for further trees and plants in the university campus as self-filtered water throughout the year.

3.1.4 Rain Water Harvesting Units:

The underground water table is decreasing day by day & minute by minute. The reason is that no attempt is made to replenish the ground water table with rainwater during the monsoon & other rainy days. The Rainwater harvesting is the simple collection or storing of water through scientific techniques from the areas where the rain falls. It involves utilization of rain water for the domestic or the agricultural purpose. The method of rain water harvesting has been into practice since ancient times.

It is as far the best possible way to conserve water and awaken the society towards the importance of water. The method is simple and cost effective too. It is especially beneficial in the areas, which faces the scarcity of water. We can see that the People usually make complaints about the lack of water. During the monsoons lots of water goes waste into the gutters. And this is when Rain water Harvesting proves to be the most effective way to conserve water. We can collect the rain water into the tanks and

prevent it from flowing into drains and being wasted. It is practiced on the large scale in the metropolitan cities. Rain water harvesting comprises of storage of water and water recharging through the technical process.

The university program of rain water harvesting is spreaded in mass scale which covers the total 46 units including roof top RWH available at Different Buildings. These units are also functional for storing and reuse.

List of Rain Water Harvesting Units			
SI No.	**Name of the Building**	**Type of RWH**	**No. of Units**
1	Applied Science		2
2	Hon. Kashi Ram Sodh Peeth		2
3	History & Law Dept.		2
4	Physics Dept.		2
5	Dr. R K Singh Hostel		2
6	K P Hostel		1
7	Security - Home Guard Office		2
8	Near Statue of Swami Vivekanand		2
9	In Front of Rsidance A6		1
10	New Answer book hall building (In Park)	Roof Top RWH	1
11	Botany Dept.		2
12	AG Botany Dept.		1
13	Answer Book Hall		1
14	Art Block		1
15	MBA/ IBS Dept.		2
16	Mass Communication Dept.	Roof Top RWH	1
17	VSMP Hostel		2
18	Pt. DDU Hostel		1

19	Phycology Dept.		1
20	Sports Field		2
21	Physical Education Dept.		2
22	Chemistry Dept.		1
23	Biotechnology Dept.		1
24	Sociology Dept.		1
25	Dean Student Welfare Office		1
26	Computer Cente Building	Roof Top RWH	1
27	Horticulture Dept.		1
28	Fine Art Dept.		1
29	Statistics Dept.	Roof Top RWH	1
30	B.Com Honours	Roof Top RWH	1
31	Hindi Dept.	Roof Top RWH	1
32	Library & Information Science	Roof Top RWH	1
33	Engg. Section (Civil)	Roof Top RWH	1
34	Legal studies Building Extension	Roof Top RWH	1
	TOTAL		**46**

Recommendations:

University should consider following recommendations for improving campus environment:-

- Non-teaching staff or peons in the concerned section should take responsibility of monitoring the overflow of water tanks.
- Large amount of water is wasted during the practical process in Science laboratories. Designs of small water recycle system helps to reuse of water.
- Producing distilled water in the laboratories required large amount of water to distillate. To produce 1 liter of distilled water required more than 33 liters of

water. To avoid more wastage university should design common distillation plant for Science Department.

- Reduce chemical waste formation in Chemistry laboratory; adopt the principles of green chemistry to reduce chemical waste.
- Pipes, overhead tanks and plumbing system should be maintained properly to reduce leakages and wastages of water.
- University should install its own Sewage Treatment Plant (STP). By doing so there will be a great reduction in water usage, as the water after treatment can be used for various purposes in the University.

CHAPTER 4 – ENERGY AUDIT

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also it can be said as "the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems". The energy audit is key to a systematic approach for decision making in the area of energy management. It attempt to balance the total energy inputs with its use, and serve to identify all the energy streams in a facility.

4.1 Energy audit:

Energy resources utilized by all the departments, support services and the administrative buildings of Chaudhary Charan Singh University, Meerut campus include Electricity, Solar Roof Top systems and Diesel Generators installed in the campus.

Grid Electricity **Source** is from PVVNL (*PASHCMINCHAL VIDYUT VITRAN NIGAM LIMITED)* with two source connections having load 700KW each. And third major source is through Solar Roof Top System with total capacity of 1260 KW which covers 90% of the total university requirement. The other source includes various DG systems installed at areas named as Substation A, Substation B, Substation C, Substation D, Residential and Auditorium. The capacity of DG sets installed at Substation A is 180 KVA, 250 KVA and 320 KVA, while at Substation B is 380 KVA and 180 KVA. On the other hand capacity at Substation C & Substation D is 380 KVA & 250 KVA respectively.

The capacity of GS sets at Residential and Auditorium set is 250 KVA and 500 KVA respectively.

The majoruse of the energy is at office area, canteen, hostel, residential area and laboratories, for lightings, fans, water coolers, air conditioners, and laboratory & workshop instruments.

Electricity consumption in the University Campus

Total electricity consumption is 44,56,980 Kwh per year and average monthly consumption is 3,71,415 Kwh which is combination of 88,600 Kwh through Grid Source 1, 166,005 Kwh through Grid Source 2 and approx.. 116,810 are from Solar Roof Top System.

Lighting systems are mostly linear fluorescent, with compact florescent used in corridors and foyers. All the departments and common facility centers are equipped with LED lamps. Quantities is distributed from Fan, Exhaust Fan and tube lights are 458, 180 and 667 numbers respectively, whereas the quantities of number of water coolers are slightly less as 144. Four to Five star air-conditioners are 524 numbers and other various depts. includes 3484 no.s Fans, 2695 no's Exhaust Fans, 4412 no's Tubelight and 1127 no's LED lamps. Besides this, equipment like Computers are used with power saving mode.

Also, campus administration runs switch–off drill on regular basis. In science department like Physics, Chemistry, Mathematics, Botany and Zoology electricity was shut downed after occupancy time is one of green practices for energy conservation.

A billing analysis has been used to create an energy usage profile of the University to document each building of the campus. Department Buildings and Residential Buildings are major electricity users because of maximum no. of lights, computers & fans. Moreover, other Buildings have been observed with slight lesser energy consumptions.

All of the machines have an energy saver facility which sets the machine to energy save mode after a programmable time period of inactivity. The time period is currently set at the maximum of hours and is centrally programmed for those machines connected to the network.

University Campus currently has a policy of enabling the Energy star facility on all computers where appropriate and phasing in lower energy consuming liquid crystal monitors as leases expire. Most of the time runs on standby modes.

Recommendations:

- University has many areas where lighting is not required at all times. Installing sensor based lighting in such areas can generate massive rewards. This is one of the easiest waysto save energy at university.
- If most systems in computer laboratory and instrumentation laboratory are based on old technology, they might be consuming more power than new technology.
- Replacing old computers and instruments with ones having energy efficiency certifications is the easiest way to conserve energy at university.
- By installing more solar energy panels generate more electricity and minimize their electricity bill. In the hostels increases use of solar water heater is needed.
- Investment in solar lights for outdoor lighting can generate long term benefits.

- A huge amount of energy is wasted because no one really cares about switching off the fans and lights when not required. Hence, planning workshops on energy conservation to educate students, faculty and staff can generate huge results.
- Unplug overhead projectors, computers, and smart boards when not in use. This simple way to conserve energy can help save large amount of power and money in the long run.

CHAPTER 5 – SOLID WASTE AUDIT

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. A number of processes are involved in efficiently managing waste for a organisation. It is necessary to manage the solid waste properly to reduce the load on waste management system.

Solid waste generation and its management is a burning issue in current days. The rate of generation of solid waste is very high and yet we do not have adequate technology to manage thegenerated waste. Unscientific handling of solid waste can create threats to public health and environmental safety issues. Thus, it is necessary to manage the solid waste properly to reduce the load on waste management system. The purpose of this audit is to find out the quantity, volume, type and current management practice of solid waste generation in the Chaudhary Charan Singh University campus. This report will help for further solid waste management and to go for green campus development.

4.1 Generation of solid waste in Chaudhary Charan Singh University, Meerut:

Chaudhary Charan Singh University campus solid waste data is collected from all the Building areas. There are different types of waste are recorded such as paper waste, plastic waste, biodegradable waste, construction waste and glass waste etc.

Table: Status of solid waste generation in Chaudhary Charan Singh University Campus:

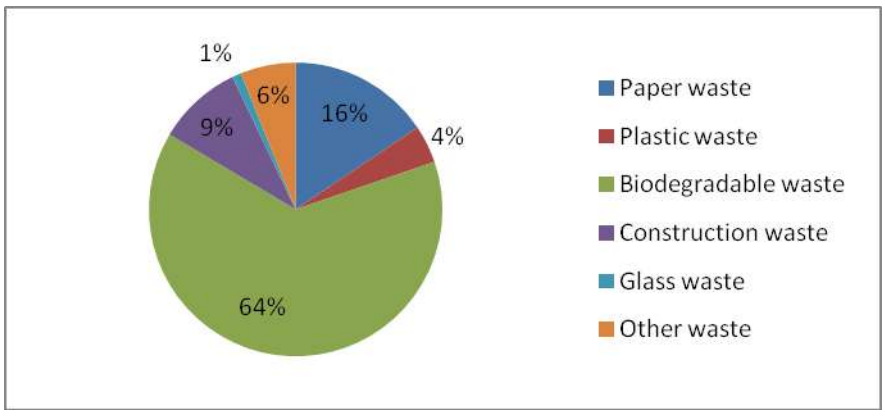
SI No.	Month	Total Waste Kg/ Month
1	Oct-20	3551
2	Nov-20	3558
3	Dec-20	4186

4	Jan-21	3976
5	Feb-21	4051
6	Mar-21	4184
7	Apr-21	4674
8	May-21	4704
9	Jun-21	4733
10	Jul-21	4897
11	Aug-21	4305
12	Sep-21	4439

Table: Solid Waste Generation at University Campus (kg / month)

Category of waste	Paper waste	Plastic waste	Biodegradable waste	Construction waste	Glass waste	Other waste	Total waste kg/month	Total waste kg/year
Quantity	**683.44**	**170.86**	**2733.76**	**384.43**	**42.71**	**170.86**	**4271.5**	**51258**
Percentage	**16**	**4**	**64**	**9**	**1**	**4**	**100**	

Graph: Solid waste Generation at University Campus



During the study period total 4271.5 kg/month of solid waste is generated. Among this highest quantity of solid waste is biodegradable waste and it is 2733.76 kg/month, which is 64 % of total solid waste. Paper waste is at second place amounting 683.44 kg/month and is 16%. Glass waste is lowest and is 42.75 kg/month and is 1%. The total waste generated on university campus is 51257.8 kg/year and 51.25 tones /year.

4.2 Waste Management

Further University has taken initiative for waste management to compost using processes like Dry & Wet Waste Management.

Under the waste management scheme, segregation is done for total waste into Dry Waste & Wet Waste. Micro level segregation techniques is used for Dry Waste management where in it is segregated into 25-30 layers, dry material recovered is sent to recyclers. On the other hand wet waste is further processed to compost bin for 15-20 days in summer and 25-30 days at winters.

Table: Detailed data on Waste Management

Sl No.	Month	Total Garbage Received (In kg)	Total Inert Quantity (In Kg)	Wet Garbage Process (In Kg)	Dry Material Recovered (In Kg)	Harvested Compost Bin (In Kg)	Compost Consumed as Absorbent (In Kg)
1	Oct-20	3551	1081	2470	460.9	1073	261
2	Nov-20	3558	1028	2330	510.5	562	194
3	Dec-20	4186	1580	2606	373	511	206
4	Jan-21	3976	1532	2444	259	528	201
5	Feb-21	4051	1777	2274	285	351	196
6	Mar-21	4184	1843	2341	314	546	216
7	Apr-21	4674	2043	2631	333	850	230
8	May-21	4704	2104	2600	229	1203	233
9	Jun-21	4733	2057	2676	361	597	227
10	Jul-21	4897	2207	2690	288	529	233
11	Aug-21	4305	2068	2237	283	663	218
12	Sep-21	4439	2156	2283	463	419	224

Below graph shows total harvested compost at bin out of total Garbage received. Approx. 20% of waste is harvested compost during the process.

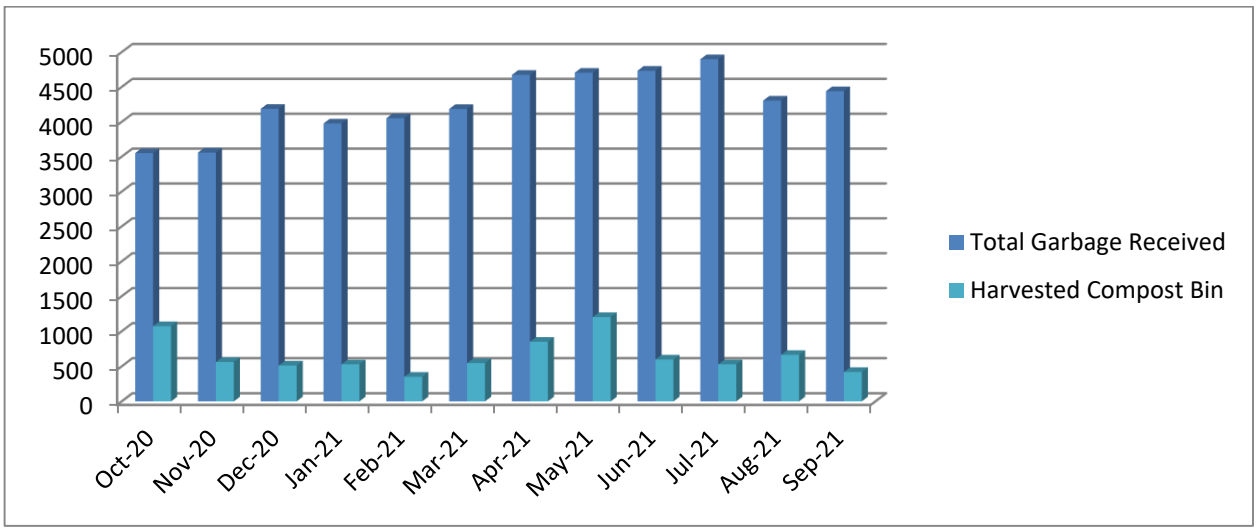


Table: Departments generating highest and lowest quantity of solid waste.

Waste	Quantity	Quantity kg/month	Quantity kg/year
Paper waste	Max.	683.44	8,201.3
	Min	22.8	273.4
Plastic waste	Max.	170.86	2,050.3
	Min	5.7	68.3
Biodegradable waste	Max.	2733.76	32,805.1
	Min	91.1	1,093.5
Construction waste	Max.	384.43	4,613.2
	Min	12.8	153.8
Glass waste	Max.	42.75	513.0
	Min	1.425	17.1

Initiatives taken by the University for Waste Management:

- Biodegradable waste is a major solid waste generated in campus is mostly from canteen, hostels and guest house kitchens. Canteen waste is collected and some biodegradable waste is treated by composting process.
- Glass waste is generated from laboratory mainly in the form of bottles; Many times bottles are reused for storing of other chemicals.
- Maximum e waste due to Computer laboratory, MCA and other courses. E-waste generated at Chaudhary Charan Singh University is sent for recycling and reuse.
- Hazardous waste generated in solid and liquid state during experiments in laboratory is disposed properly.

Recommendations:

- Metal scrap should be segregated separately by respective departments and should send for recycling.
- Provision for the E-waste management should be introduced in the University Campus.
- Paper waste like answer sheets, old bills and confidential reports should be sent for shredding, pulping and recycling after completion of their preservation period.
- University has signaled less use of plastic for any administrative as well as other purpose andscheme like no use of plastic should be implemented in the University.
- Chaudhary Charan Singh University saves maximum paper sheet per year through .less paper convocation application. It saves number of trees per year and reduces Carbon foot print of 5.6168 ton CO_2.
- Reduce the absolute amount of waste that it produced from University staff

offices.

- Make full use of all recycling facilities provided by City Municipality and private suppliers, including glass, cans, white, colored and brown paper, plastic bottles, batteries, print cartridges, cardboard and furniture.
- Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated.
- Single sided papers to be used for writing and photocopy
- Important and confidential papers after their validity to be sent for pulping.

CHAPTER 6 – ENVIRONMENT QUALITY AUDIT

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards. This also helps in ensuring that the Environmental Policy is enacted, enforced and reviewed using various environmental awareness programmes.

6.1 Environment Quality Audit

To keep the greeneries in the campus, the University regularly maintains the gardens which are looked after by concerned staff under the guidance of higher authorities of the University.

Activities organized to create greenery and its conservation at University campus is as follows-

1) Plantation of diversified species, Vegetative propagation, Uses of medicinal plants, Identification of plants species, Plantation of diversified species:
2) Waste management plan and disposal facility
3) Awareness of carbon consumption and carbon foot print programme

To create- green cover, Eco-friendly atmosphere, pure oxygen at the University campus, plantation program is organized every year with involving all students, principal, and all departments faculty members. In this session program was organized and about more than 100 ornamental, avenue, medicinal plant with rare and exotic beautiful trees were planted in the green areas and other parts of University campus. To keep the greeneries in the University, campus regularly maintains the gardens which are looked after by paid staff under the guidance of garden committee members. Moreover, every year campus try to plant new trees.

Campus is located in the vicinity of approximately more than 200 types (species) trees. Various tree plantation programs are being organized during the year at University campus and surrounding villages. This program helps in encouraging eco-friendly environment which provides pure oxygen within the institute and awareness among villagers. The plantation program includes various types of indigenous species of ornamental and medicinal wild plant species. The plants have medicinal value, which faculty members of botany department help students to identify with scientific name and give information about medicinal uses of the plants.

Campus Involvement

For sustainable use of resources and for the mission of "GO-GREEN" it is necessary that the students, faculty and administration welcome it. Chaudhary Charan Singh University is an environment that invites opportunities to better its community through campus organizations. The green initiative started in the campus many years ago. The University students are actively participating and solely concerned with environment. These students under the guidance of faculties strive to create an environmentally friendly campus. Their purpose is to create awareness and eventually act on that awareness. University is also actively conducting environmental awareness programs in campus regularly.

Efforts for Carbon Neutrality

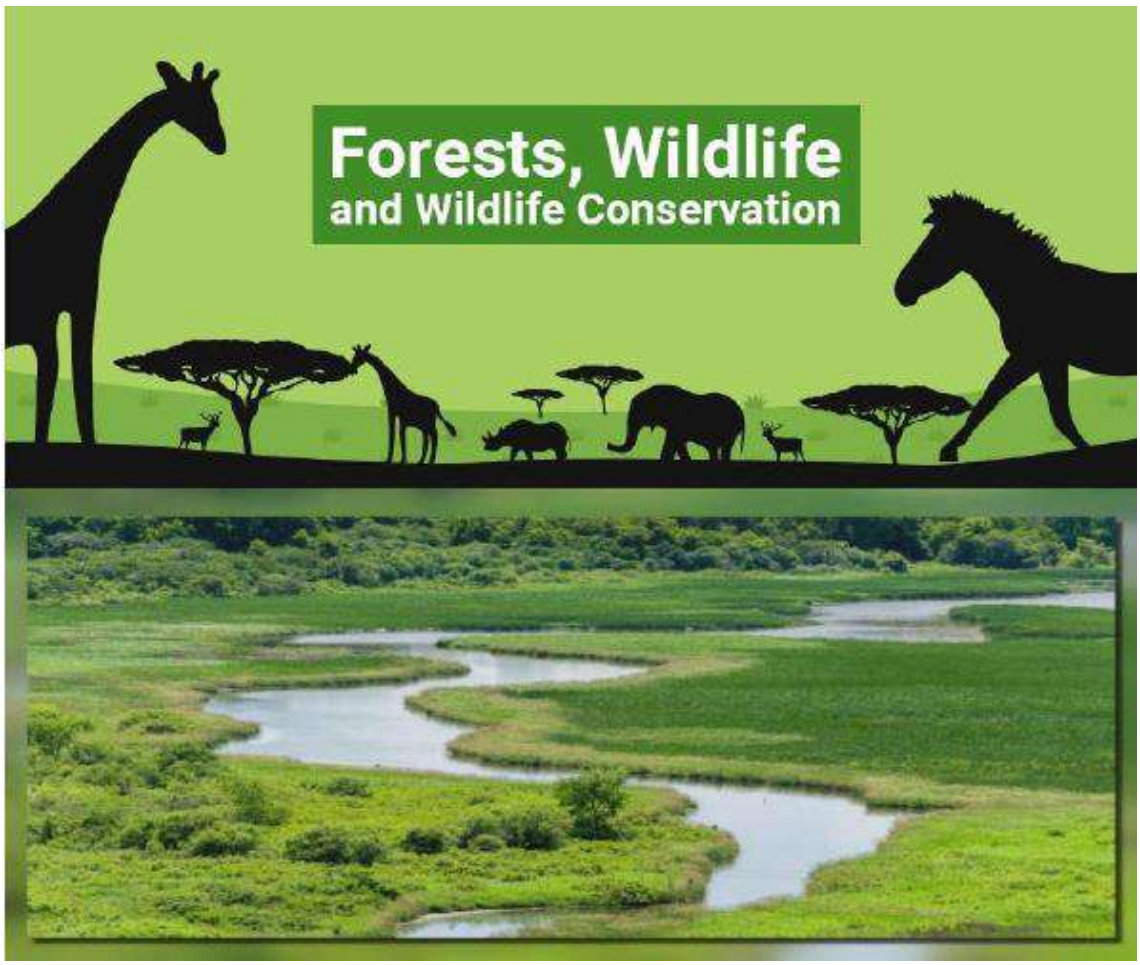
Air pollution is a matter of serious concern in the campus owing to its urban location. Government Science University as a responsible institution understands the importance of its carbon footprint and developed a plan to reduce greenhouse gas emissions in all its activities. Strictly ban on burning of dried leaves and waste paper in University.

Environmental Conservation Programme

University is very active in practical education of the students with regard to the environmental conservation.

The University has arranged visits to their faculties to the Wildlife Institute of India (WII), Botanical Garden, Sanctuaries, Zoological park Sacred grooves in order to educate their students.

The University also took their students to different National Park in order to educate the students about in situ Conservation of Wildlife.



4.1.National Ambient Air Quality Program (NAAQM)

Central Pollution Control Board, New Delhi initiated National Ambient Air Quality Monitoring (NAAQM) programme in the year 1984 to get spatial and temporal variation of ambient air concentrations for a wide range of pollutants that are considered relevant for evolving strategic management plan. The program was subsequently renamed as NAMP (National Air Quality Monitoring Program). Under NAMP, three air pollutants viz., Sulphur dioxide (SO_2), Nitrogen dioxides (NO_2) and Respirable Suspended Particulate Matter (RSPM/PM_{10}) have been identified for regular monitoring at three locations. Monitoring of pollutants has carried out for 24 hours (4-hourly sampling for gaseous pollutants and 8-hourly sampling for particulate matter) as per CPCB monitoring protocol. One Respirable Dust Sampler (RDS) machine

is installed at the Main Gate of the University Campus which monitored thechanges in ambient air quality during 24- Hrs.

Chaudhary Charan Singh University, Meerut monitors air pollution regularly under National Ambient Air Quality Monitoring Program, Central Pollution Control Board, New Delhi.

Ambient air quality in the Chaudhary Charan Singh University is given in the below Table: -

Ambient Air Quality status in Chaudhary Charan Singh University

S.No	Parameters	Unit	Result	Requirement permissible limits as per	Test Method
1	Particulate Matter, PM10	µg/m3	91.2	100	IS:5182 (P-23) : 2006
2	Particulate Matter, PM 2.5	µg/m3	50.4	60	SOP1/Ambient Air/01/010416
3	Sulphur Dioxide (as SO2)	µg/m3	6.0	80	IS:5182 (P-2) : 2006
4	Carbon Monoxide (as CO)	mg/m3	0.860	04	IS:5182 (P-10) : 1999
5	Oxide of Nitrogen (as NO2)	µg/m3	16.2	80	IS:5182 (P-6) : 2006

Central Pollution Control Board, New Delhi has set guidelines to monitor and analyze theair pollution quality parameters. The trees cover in campus are the leading sources to absorb CO_2 and releasing enough fresh O_2 across the University Campus. Result shows that Chaudhary Charan Singh University Campus air quality status is good as compared to other locations.

It is identified that Chaudhary Charan Singh University's campus is a green campus. University campus observed minimum air pollution as compared to other Ambient Air Pollution Centers located in different part of the city.

Precautionary measures:

- Use of bicycles for transportation in the campus.
- Avoid using diesel generators.

4.2 Ambient noise monitoring status:

Chaudhary Charan Singh University is located in the center of the city. The major source of noise on university is automobile noise. At the main gate of the Campus, the human communication and transportation are producing high level sound. A variety of sound come from Trucks, Buses, Bikes and other work processes going on at the Main Gate of the Campus.

Ambient noise monitoring was carried out in different areas of Chaudhary Charan Singh University campuslike at University campus entry, Departments, Mechanical working places, Canteens, Boys and Girls hostels. The sampling was carried out using calibrated Sound Level Meter (AZ 8921) by logarithmic scale in Decibels (dB). The noise readings were collected in the University campus and calculated. The details of noise status in University campus are given in below table.

Ambient Noise levels in Chaudhary Charan Singh University

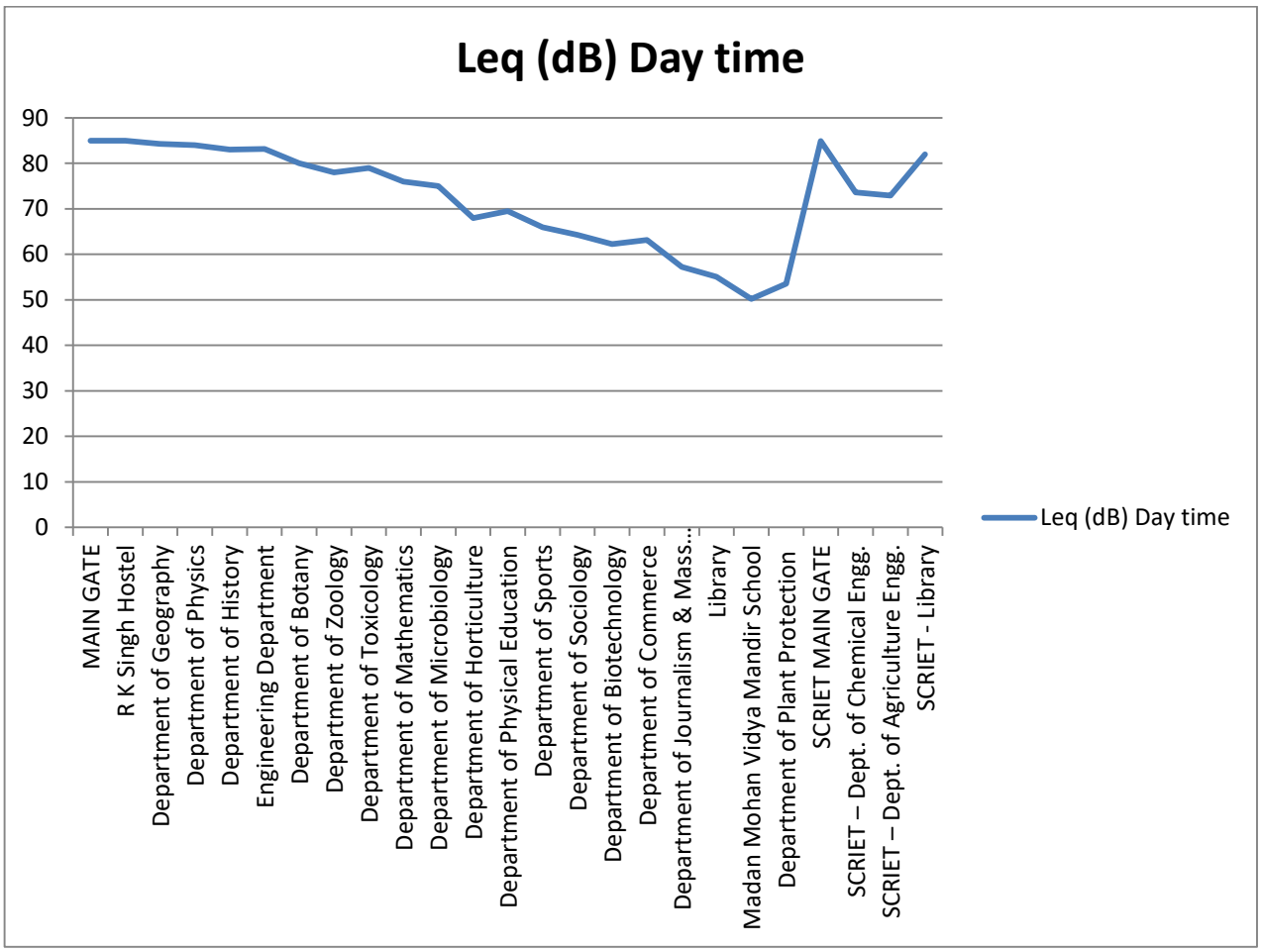
Sr.No	Department Name	Leq (dB) Day time
1	MAIN GATE	85.00
2	R K Singh Hostel	84.40
3	Department of Geography	84.30
4	Department of Physics	84.00
5	Department of History	83.00
6	Engineering Department	83.20
7	Department of Botany	80.00

8	Department of Zoology	78.00
9	Department of Toxicology	79.00
10	Department of Mathematics	76.00
11	Department of Microbiology	75.00
12	Department of Horticulture	68.00
13	Department of Physical Education	69.50
14	Department of Sports	65.98
15	Department of Sociology	64.30
16	Department of Biotechnology	62.24
17	Department of Commerce	63.20
18	Department of Journalism & Mass Communication	57.25
19	Library	55.06
20	Madan Mohan Vidya Mandir School	50.20
21	Department of Plant Protection	53.55
22	SCRIET MAIN GATE	84.90
23	SCRIET – Dept. of Chemical Engg.	73.65
24	SCRIET – Dept. of Agriculture Engg.	72.90
25	SCRIET – Library	81.98

Note: - 1. All parameters expressed in dB (A) Leq.

Monitoring is carried during day time.

Graph: Ambient Noise levels in Chaudhary Charan Singh University, Meerut



The graph shows that the University MAIN GATE Campus and SCRIET MAIN Gate found major noise levels as compared to other University areas.

Recommendations

- University Campus should follow the Environmental aware laws for different aspect of Environmental management.
- Campus should make the rule & poster the slogan in campus for protecting the environment

List of Trees – BIO DIVERSITIES in CCS University

SI NO.	BOTANICAL NAME	SYNONYMS	COMMON NAME	FAMILY	HABIT
1	*Abrus precarious L.*	*Glycine abrus L.; minor Desv.*	Ratti	*Fabaceae*	Climber
2	*Acacia auriculiformis Benth.*	*Acacia moniliformis Griseb.; Racosperma auriculiforme (Benth.) Pedley*	Earleaf acacia	*Fabaceae*	Tree
3	*Acacia catechu (L.f.) wild.*	*Mimosa catechu L.f.; Acacia wallichiana DC.*	Black cutch tree	*Fabaceae*	Tree
4	*Acalypha wilkesiana Mull.Arg.*	*Acalypha trocolor Seem.; Acalypha mosaics Auct.*	Copperleaf	*Euphorbiaceae*	Shrub
5	*Adansonia digital L.*	*Adansonia intergrifolia Raf.; Adansonia sculata Steud.*	Baobab	*Malvaceae*	Tree
6	*Adenanthera pavonina L.*	*Adenanthera polite Miq.; Corallaria parvifolia Rumph.*	Peacock flower fence	*Fabaceae*	Tree
7	*Eagle marmelos (L.) Correa*	*Creteva marmelos L.; Feronia pellucida Roth.*	Indian Bael	*Rutaceae*	Tree
8	*Agathis robusta (C.Moore ex F.Muell.) F.M.Bailey*	*Dammara bidwillti Guilfoyle; Dammara palamerstonii F. Muell*	Queensland kauri pine	*Araucaeiaceae*	Tree
9	*Albizia lebbeck (L.) Beth*	*Mimosa lebbeck L.; Albizia latifolia B.Boivin*	Woman's tongue tree	*Fabaceae*	Tree
10	*Albizia procera (Roxb.) Benth.*	*Mimosa procera Roxb.; Mimosa elata Roxb.*	White siris	*Fabaceae*	Tree
11	*Albizia saman (Jacq.) Merr.*	*Mimosa saman Jack.; Inga saman (Jacq.)*	Monkey pod	*Fabaceae*	Tree

12	*Allamonda cathartic L.*	*Allamonda latifolia C.Presl; Orelia grandiflora Aubl.*	Golden trumpet	*Apocynaceae*	Tree
13	*Alstonia scholars (L.) R.Br.*	*Echites scholaris L.; pala scholaris (L.) Roberty*	Devil tree	*Apocynaceae*	Tree
14	*Amoora rohituka Walp.*	*Aphanamixis polystachya (Wall.) R.Parker; Andersonia rohituka Roxb.*	Pithraj tree	*Rubiaceae*	Tree and shrub
15	*Annona squamosa L.*	*Annona asiatica Vahl; Annona forsakalii DC*	Sugar apple	*Annonaceae*	Tree and shrub
16	*Antigonon leptopus Hook.& Arn.*	*Antigonon platypus Hook. & Arn.; Antigonon amabie K. Koch*	Mexican creeper	*Polygonaceae*	Vine
17	*Araucaria heterophylla (Saliva.) Franco*	*Eurasia heterophylla Salisb.; Eutacta excelsa Carriere*	Christmas tree	*Araucariaceae*	Tree
18	*Artabotrys hexapetalus (L.f.) Bhandari*	*Artabotrys odorantissimus R.Br.; Unona uncata (Lour.) Dunal*	Green champa	*Annonaceae*	Shrub
19	*Artocarpus heterophyllus Lam.*	*Artocarpus brasiliensis Ortega: Artocarpus maximus Blanco*	Jack tree	*Moraceae*	Tree
20	*Artocarpus lacucha Buch.-Ham.*	*Artocarpus ficifolius W.T. Wang: Artocarpus lakoocha Roxb.*	Monkey jack	*Moraceae*	Tree
21	*Averrhoa carambola L.*	*Sarcotheca philippica (Villar) Happier f.:*	Star fruit	*Oxalidaceae*	Tree

		Averrhoa acutangula stokes			
22	*Azadirochta indica A. Juss.*	*Melia azadirachta L.; Melia indica (A.Juss)Brandis*	Neem	*Meliaceae*	Tree
23	*Barleria lupulina Lindl.*	*Barleria macrostachya Bojer: Dicliptera spinosa Lodd.Ex Ness*	Snake bush	*Acanthaceae*	Shrub
24	*Barleria prionitis L.*	*Barleria spicata Roxb.; Prionitis hystrix Miq.*	Porcupine flower	*Acanthaceae*	Shrub
25	*Beaucarnea recurvata Lem.*	*Nolina recurvata (Lem.) Hemsl.; Dasylirion inermis S.Watson*	Elephant's foot palm	*Asparagaceae*	Tree
26	*Bauhinia purpurea L.*	*Bauhinia triandra Roxb; Bauhinia violates Corner*	Kachnar	*Fabaceae*	Tree
27	*Bombaunguris-y ceibs L.*	*Melaleuca grandifolia Blanco; Bombax aculeatum L.*	Silk- cotton tree	*Malvaceae*	Tree
28	*Bougainvillea spectabilis Willd.*	*Bougainvillea virescens Choisy; Bougainvillea specious Schnizl.*	Bougainvillia	*Nyctagunaceae*	Climber
29	*Brunfelsia pauciflora (Cham.& Schltdl.) Benth*	*Besleria inodora Vell.; franciscea augusta Regel*	Brazil raintree	*Solanaceae*	Shrub
30	*Butea monosperma (Lam.) Taub.*	*Butea frondosa Wills.; Butea braamania DC.*	Dhak	*Fabaceae*	Tree
31	*Caesalpinia bonduc (L.) Roxb.*	*Guilandina bonduc L.; Bonduc minus Medik.*	Fever nut	*Fabaceae*	Climber

32	*Cajanus cajan (L.) Millsp.*	*Cajanus flavus DC.; Cajanus bicolor DC.*	Pigeon pea	*Fabaceae*	Shrub
33	*Calliandra haematocephala Hassk.*	*Calliandra novaesii Hoehne; Calliandra inaewuilatera Rusby*	Red powder puff	*Fabaceae*	Tree and shrub
34	*Callicarpa macrophylla Vahl*	*Callicarpa cana Gamble; Callicarpa dunniana H.Lev.*	Large-leaf beauty berry	*Lamiaceae*	Tree and shrub
35	*Callistemon viminalis (Sol.ex Gaetn.) G.Don*	*Melaleuca viminalis (Sol. ex.Gaertn.) Byrnes; Melaleuca viminalis minor Byrnes*	Weeping bottlebrush	*Myrtaceae*	Small tree
36	*Calotropis gigantea (L.) Dryand*	*Asclepias gigantea L.; Calotropis gigantea (L.) R. Be.Ex.Schult.*	Crown flower	*Apocynaceae*	Shrub
37	*Calotropis procera (Aiton) Dryand*	*Calotropis heterophylla Wall.; Asclepias patula Decene*	Apple of sodom	*Apocynaceae*	Shrub
38	*Campsis radicals (L.) Seem.*	*Bignonia radicans L.; Camprsis curtisii Seem.*	Humming Bird vine	*Bognoniaceae*	Vine
39	*Carica papaya L.*	*Papaya Africa Gaertn.; Carica carandus (L.) Baill.*	Papaya	*Caricaceae*	Tree and Shrub
40	*Carissa carandus L.*	*Carissa salicina Lam.; Arduina carandas (L.) Baill.*	Christ thorn	*Apocynaceae*	Shrub
41	*Caryota urens L.*		Solitary fishtail palm	*Arecaceae*	Tree
42	*Cascabela thevetia (L.) Lippold*	*Thevetia peruviana (Pers) K. Schum.; Thevetia linearis A. DC.*	Yellow oleander	*Apocynaceae*	Shrub

43	*Cassia fistula L.*	*Cassia fistuloides Collar.; Cassia excelsa kunth.*	Golden shower tree	*Fabaceae*	Tree
44	*Casuarina equisetifolia L.*	*Casuarina africana Lour.;Casuarina brunoniana Miq*	Australian pine tree	*Casuarinaceae*	Tree
45	*Ceiba speciosa (A.St. - Hil.) Ravenna*	*Chorisia speciosa A.St.-Hil; Chorisia speciosa var. Minor Chodat.*	Silk floss tree	*Malvaceae*	Tree
46	*Cestrum nocturnum L.*	*Cestrum graciliflorum Dunal; Chiococca nocturna Jacq.*	Night - blooming jasmine	*Solanaceae*	Shrub
47	*chukrasia tabularis A. Juss*	*chukrasia velutina M.Roem. ; Chickrassia nimmonii J. Graham ex Wight*	Chittagong	*Meliaceae*	Tree
48	*cinnamomum camphora (L.) J.Presl.*	*Camphora officinarum Nees; Camphora vera Raf.*	Camphor tree	*Lauraceae*	Tree
49	*Cinnamomum tamala (Buch-Ham) T. Nees & Eberm.*	*Laurus albiflora Wall.; Laurus tamala Buch-Ham.*	Indian bark	*Lauraceae*	Tree
50	*Citrus aurantifolia (christm.) swingle*	*Citrus × acida pers.; Citrus lima lunan*	West indian lime	*Rutaceae*	Tree and shrub
51	*Citrus limon L. Osbeck*	*Citrus limonia osbeck; Citrus × bergamota Raf.*	Mandarin lime	*Rutaceae*	Tree
52	*Citrus medica L.*	*Citrus pyriformis Hassk.; Citrus cedra Link*	Pita- sara	*Ruraceae*	Tree and shrub
53	*Clerodendrum infortunately L.*	*Clerodendrum calycinum Turez.*	Hill glory bower	*Lamiaceae*	Tree and shrub

54	*Clerodendrum splendens G.Don*	*Siphonanthus splendens (G.Don) Hiern; Oxydectes aurantium G.Don*	Flaming glorybower	*Lamiaceae*	Tree and shrub
55	*Codiaeum variegatum (L.) Rumph. Ex A. Juss*	*Croton variegatus L. Oxydectes variegata (L.) Kuntze*	Garden croton	*Euphorbiaceae*	Tree and shrub
56	*Combretum indium (L.) DeFilipps*	*Quisqualis indica L.; Quisqualis sinensis Lindl.*	Chinese honey suckle	*Combretaceae*	Shrub
57	*Commiphora muskil (Hook.Ex Stocks) Engl.*	*Balsamea mukul Baill.; Balsamodendrum wightii Arn.*	Guggul	*Burserceae*	Tree
58	*Cordyline fruticosa L. A.Chev.*	*Convallaria fruticosa L.; Dracaena sepiara Seem.*	Palm lily	*Asparagaceae*	Shrub
59	*Cordia myxa L.*	*Cordia officinalis Lam.; Cordia paniculata Roth*	Assyrian	*Boraginaceae*	Tree
60	*Crateva religiosa G. Forst*	*Crateva brownii korth. Ex Miq.; Crateva speciosa Volkens*	Devil- pepper	*Capparaceae*	Tree
61	*Crotalaria verrucosa L.*	*Phaseolus bulai Blanco ; Quirosia anceps Blanco*	Blue rattlepod	*Leguminosae*	Shrub
62	*Cupressus sp.*		Chinese weeping cypress	*Cupressaceae*	Tree
63	*Cycas circinalis L.*	*Palma polypodiifolia Mill.; Cycas wallichi Miq.*	Sago palm	*Cycadaceae*	Tree and shrub
64	*Cycas revoluta Thunb.*	*Cycas miquelii Warb.; Epicycas miquelii (Warn.) de Laub.*	Sago palm	*Cycadaceae*	Tree and shrub
65	*Dalbergia sissoo DC.*	*Amerimnom sissoo (Roxb.)Kuntze*	Sheesham	*Fabaceae*	Tree

66	*Delonix regia (Hook.) Raf.*	*Poinciana regia Hook.*	Gulmohar	*Fabaceae*	Tree
67	*Diospyrous malabarica (Desr.) Kostel.*	*Diospyrous biflora Blanco Embryopteris glutinifolia Link*	Indian persimmon	*Ebenaceae*	Tree
68	*Dolichandra unguis- cati (L.) L.G.Lohmann*	*Bignonia gracilis Lodd.; Bignonia unguis L.*	Claw creeper	*Bignoniaceae*	Tree
69	*Dracaena fragrans (L.) Ker Gawl*	*Aletris fragrans L. ; dracaena deremensis Engl.*	Corn plant	*Asparagaceae*	Shrub
70	*Dracaena reflexa Lam*	*Draco reflexa (Lam.) Kuntze ; Pleamele reflexa (Lam.) N.E.Br.*	Song of india	*Asparagaceae*	Shrub
71	*Durante erecta L.*	*Durante repens L. ; Duaranta inermis L.*	Golden dewdrop	*Verbenaceae*	Tree and shrub
72	*Dypsis intescens (H. Wendl.) Beentje & J. Dransf.*	*Areca flavescens Voss ;Chrysalidocarpus lutescens H.Wendl.*	Areca palm	*Asparagaceae*	Tree
73	*Elaeocarpus serratus L.*	*Elaeocarpus ganitrus Roxb. Ex G.Don ;Monocera serrata Turez.*	Rudraksh	*Elaeocarpaceae*	Tree
74	*Enteralohium contortisiliquum (Vell.) Morong*	*Enterolobium glaucescens Mart. ; Mimosa contortisiliqua Vell.*	Eardrop tree	*Fabaceae*	Tree
75	*Ephedra foliata Boiss.ex. C.A. Mey.*	*Ephedra alte Brandis ;Ephedra kokanica Regel*	Shrubby horsetail	*Ephedraceae*	Shrub

76	*Erythrina variegata L.*	*Erythrina indica Lam. ; Erythrina lobulata Miq.*	Indian coral tree	*Fabaceae*	Tree
77	*Euphorbia cotinifolia L.*	*Aklema continifolia (L.) Millsp. ;Tithymalus continifolius (L.) Haw.*	Smoke tree	*Euphorbiaceae*	Tree and shrub
78	*Euphorbia leucocephala Lotsy*		Japanese poinsettia	*Euphorbiaceae*	Tree and shrub
79	*Euphorbia milii Des Moul.*	*Euphorbia bojeri Hook. ; Tumalis bojeri (Hook.) Raf.*	Christ plant	*Euphorbiaceae*	Shrub
80	*Euphorbia tithymaloides L.*	*Pedilanthus tithymaloides (L.) Poit. ; tithymalus tithymaloides (L.) Croizat*	Devil's backbone	*Euphorbiaceae*	Tree,shrub and climber
81	*Euphorbia umbellata (Pax) Bruyns*	*Synadenium umbellatum Pax ;Synadenium grantii Hook.f.*	African milk bush	*Euphorbiaceae*	Shrub
82	*Fernandoa adenophylla (Wall.ex G.Don) Steenis*	*Haplophragma adenophyllum (Wall.Ex G.Don) Dop; spathodea adenophylla A.DC.*	Marod phalli	*Bignoniaceae*	Tree
83	*Ficus benghalensis L.*	*Ficus krishnae C.DC.; Ficus banayana Oken*	Banyan fig	*Moraceae*	Tree
84	*Ficus benjamina L.*	*Ficus pendula Link ;Ficus comosa Roxb.*	Weeping fig	*Moraceae*	Tree and shrub
85	*Ficus elastica Roxb.*	*Urostigma karet Miq, ; Urgastigma odoratum Miq,*	Rubber tree	*Moraceae*	Tree
86	*Ficus krishnae C.DC.*	*Ficus benghalenesis L.*	Krishna badh	*Moraceae*	Tree

87	*Ficus hyrata Warb.*		Leaf fig	*Moraceae*	Tree
88	*Ficus racemosa L.*	*Ficus glamerata Roxb. : Ficus acidula King*	Fig tree	*Moraceae*	Tree
89	*Ficus religiosa L.*	*Ficus peepul Griff. ; Ficus caudata Stockes*	Peepal tree	*Moraceae*	Tree
90	*Ficus retusa L.*	*Urastigma nitidum Miq. ; Perula retusa Raf.*	Indian laurel fig	*Moraceae*	Tree and shrub
91	*Ficus vitrens Aiton*	*Ficus infectoria Willd. ; Ficus pilhasi Sm.*	White fig	*Moraceae*	tree
92	*Furcraea foetida (L.) Haw*	*Aloe foetida (L.) Crantz ; Agave bulbosa K.Koch*	mauritius hemp	*Asparagaceae*	Shrub
93	*Gimgko biloba L.*	*Ginko marcophylla Reyn. ; Salisburia macrophylla Reyn.*	Maidenhair tree	*Ginkgoaceae*	Tree
94	*Grevillea robusta A.Cunn.ex R.Br.*	*Grevillea umbratica A.Cunn.ex Meisn. ; Stylurus robustus (A.Cunn.) O.Deg.*	Southern silky oak	*Proteaceae*	Tree
95	*Grewia asiatica L.*	*Grewia hainesiana Hole ; Grewia subinaequalis DC.*	Phalsa	*Malvaceae*	Tree and shrub
96	*Hamelia patens Jacq.*	*Hamelia intermedia Urb. & Ekman ;Hamelia erecta Jacq.*	Humming bird bush	*Rubiaceae*	Tree and shrub
97	*Hibiscus rosa-sinensis L.*	*Hibuscus boryanus DC. ;Hibiscus cooperi auct.*	China rose	*Malvaceae*	Shrub
98	*Hibiscus schizopetlus (Dyer) Hook.f.*	*Hibuscus rosa-sinensis Dyer*	China rose	*Malvaceae*	Shrub
99	*Hibiscus tiliaceus L.*	*Hibiscus tiliifolius Salisb. ; Pariti tiliaceum (L.) A.Juss.*	Cotten tree	*Malvaceae*	Tree and shrub

100	*Holarrhena pubescens Wall.ex G.Don*	*Nerium sinense Hunter ex Ridl. ; Holarrhena macrocarpa (Hassk.) Fern.-Vill.*	Kuchi	*Apocynaceae*	Tree and shrub
101	*Holoptelea integrifolia Planch.*	*Ulmus integrifolia Roxb.*	Indian elm	*Ulmaceae*	Tree and Shrub
102	*Ipomea nil (L.) Roth*	*Convolvulus nil L.: Pharbitis nil (L.) Choisy*	Japanese morning glory	*Convolvulaceae*	Vine
103	*Ipomea quamoclit L.*	*Convolvulus pennatus Desr.: Quamoclit vulgaris Choisy*	Humming bird vine	*Convolvulaceae*	Shrub
104	*Ixora chinensis Lam.*	*Ixora stricta Roxb.: Ixora dubia Schult.*	Jungle flame	*Rubiaceae*	Tree and shrub
105	*Ixora coccinea L.*	*Pavetta coccinea (L.) Blume*	Flame of the woods	*Rubiaceae*	Tree
106	*Ixora finlaysoniana Wall. Ex. G.don*	*Ixora findlayana B.S. Williams: Ixora merguensis F.N. Williams*	Siamese white ixora	*Rubiaceae*	Tree
107	*Jacaranda mimosifolia D. Don*	*Jacaranda chelonia Griseb. Jacaranda ovalifolia R.Br.*	Blue jacaranda	*Bignoniaceae*	Tree and Shrub
108	*Jacaranda ruscifolia Spreng.*		Bracelet wood	*Theophrastaceae*	Shrub
109	*Jasminum multiflorum (Burm.f.) Andrew*	*Nyctanthes pubescens Retz. Nyctanthus multiflora Burm.f.*	Winter Jasmine	*Oleaceae*	Shrub and vine
110	*BOTANIC NAME*	*Nyctanthes goa Steud.: Mogorium gimea Zuccagni*	Arabian jasmine	*Oleaceae*	Shrub and tree
111	*Ipomea nil (L.) Roth*	*Curcas indica A.Rich.: Ricinus jarak Thunb.*	Psyic nut	*Euphorbiaceae*	Tree and Shrub

112	*Ipomea quamoclit L.*	*Jatropha elegans Kl.: Jatropha jacquinii Baill.*	Bellayache bush	*Euphorbiaceae*	Tree and Shrub
113	*Ixora chinensis Lam.*	*Jatropha hastata Jacq.: Jatropha acuminata Desr.*	spicy katropha	*Euphorbiaceae*	Tree
114	*Ixora coccinea L.*		Buddha belly plant	*Euphorbiaceae*	Shrub
115	*Ixora finlaysoniana Wall. Ex. G.don*	*Adhatoda vasica Nees: Gendarussa adhatoda Steud.*	Malabar nut	*Acanthaceae*	Shrub
116	*Jacaranda mimosifolia D. Don*	*Dianthera subserrata Blanco: Ecbolium subserratum Kuntze*	Willow-leaved justicia	*Acanthaceae*	Tree and Shrub
117	*Jacaranda ruscifolia Spreng.*	*Kigelia pinnata (Jacq.)DC.; Kigelia trists A. Chev.*	Sausage tree	*Bignoniaceae*	Tree
118	*Jasminum multiflorum (Burm.f.) Andrew*	*Lagerstroemia minor Retz.; Lagerstroemia pulchra Salisb.*	Crape myrtle	*Lythraceae*	
119	*Lagerstroenia speciosa (L.Pers)*	*Lagerstroenia major Retz; Adambea globra Lam.*	Pride of india	*Lythraceae*	Tree
120	*Lawsonia inermis L.*	*Alcanna spinosa (L.) Gaertn. Lawsonia alba Lam. nom*	henna tree	*Lythraceae*	Tree
121	*Leucaena leucocephala (Lam.) de Wit*	*Acacia frondosa Willd.; Mimosa leucocephala Lam.*	lead tree	*Fabaceae*	Tree
122	*Limonia acidissima L.*	*Schinus limonia L.; Murraya odorata Blanco*	elephant-apple.	*Rutaceae*	Tree

123	*Litchi chinensis Sonn. (Jacq.) R.Br. ex Mart*		Litchi	*Sapindaceae*	Tree
124	*Livistona chinensis*	*Saribus subglobosus Hassk.*	palm tree	*Arecaceae*	Tree
125	*Loranthus longiflorus Desr*		Loranthus	*Loranthaceae*	Plant
126	*Madhuca longifoli (J.Konig) J.F.Macbr.*	*Madhuca indica J.f.Gmel*	mahua, mahwa	*Sapotaceae*	Tree
127	*Mangifera indica*	*Mangifera austroyunnanensis Hu*	Mango	*Anacardiaceae*	Tree
128	*Magnolia × alba (DC.) Figlar*	*Michelia longifolia Blume Michelia × alba DC.*	white champaca,	*Magnoliaceae*	Tree
129	*Magnolia grandiflora L.*	*Magnolia angustifolia Millais*	southern magnolia	*Magnoliaceae*	Tree
130	*Malus domestica Borkh*	*M. sylvestris Mil. Pyrus malus L.*	apple tree	*Rosaceae*	Tree
131	*Manilkara zapota (L.) P.Royen*	*Achras sapota L.*	zapota	*Sapotaceae*	Tree
132	*Mansoa alliacea (Lam.) A.H.Gentry*	*Bignonia alliacea (basionym)*	garlic vine	*Bignoniaceae*	Tree
133	*Melaleuca bracteata F.Muell*		black tea-tree,	*Myrtaceae*	Tree
134	*Melia azedarach L.*	*Melia japonica G.Don; Azedara speciosa Raf.*	chinaberry tree,	*Meliaceae*	Tree
135	*Ocimum gratissimum*	*Geniosporum discolor*	clove basil	*Lamiaceae*	Shrub
136	*Oroxylum indicum L.*	*Spathodea indica*	Garlic pear	*Bignoniaceae*	Tree

137	*Passiflora vitifolia*	*Tacsonia sanguinea*	perfumed passionflower	*Passifloraceae*	Vine
138	*Petrea volubilis*	*Petrea retusa*	queen's wreath	*Verbenaceae*	Climber
139	*Phoenix dactylifera L*	*Palm dactylifera*	Date palm	*Arecaceae*	Tree
140	*phyllanthus emblica*	*Emblica officinalis*	Indian gooseberry	*Phyllanthaceae*	Tree and shrub
141	*Pinus roxburghii*		Chir pine	*Pinaceae*	Tree
142	*Pithecellobium dulce*	*Albizia dulcis*	monkeypod	*Fabaceae*	Tree and shrub
143	*platanus orientalis*	*platanus palmata*	Chinar	*Platanaceae*	Tree
144	*Plumeria robusta*	*Plumeria apiculata*	singapore and raveyard flower	*Apocynaceae*	Tree
145	*plumeria rubra L.*	*Plumeria aurantia*	red jasmine	*Apocynaceae*	Tree
146	*Podranea ricasoliana*	*Tecoma ricasoliana*	pink trumpet vine	*Bignoniaceae*	Climber
147	*polyalthia longifolia*	*Uvaria longifolia*	False ashoka	*Annonaceae*	Tree
148	*pongamia pinnata*	*Millettia pinnata*	Indian beech	*Fabaceae*	Tree and shrub
149	*Populus deltoides*	*Populus anglusa*	European aspen	*Salicaceae*	Tree
150	*Prunus persica*	*Persica vulgaris*	peach	*Rosaceae*	Tree
151	*Psidium guajava*	*Psidium pomiferum*	guava	*Myrtaceae*	Tree and shrub
152	*Pterocarpus santalinus*	*Lingoum santalinum*	red sandalwood	*Fabaceae*	Tree
153	*pterospermum acerifolium*	*Pentapetes acerifolia*	Kanak Champa	*Malvaceae*	Tree and shrub
154	*Punica granatum*	*Punica nana L*	Pomegranate	*Lythraceae*	shrub

155	*Putranjiva roxburghii*	*putranjiva sphaerocarpa*	Lucky Bean Tree	*Putranjivaceae*	Tree
156	*pyrostegia venusta*	*Jacaranda echinata*	orange trumpetvine	*Bignoniaceae*	Vine
157	*pyrus communis*	*pyrus sativa*	common pear	*Apocynaceae*	Tree
158	*Rauvolfia serpentina*	*Rauvolfia trifoluta*	Indian snakeroot	*Apocynaceae*	shrub
159	*Rauvolfia tetraphylla*	*Rauvolfia heterophylla*	Devil Pepper	*Apocynaceae*	Tree
160	*Ravenala madagascariensis*	*Urnia speciosa*	traveler's palm	*Strelitziaceae*	Tree
161	*Ricinus communis*	*Croton spinosus*	castor of oil	*Fabaceae*	Tree and shrub
162	*Rosa indica*		Rose	*Rosaceae*	shrub
163	*Roystonea regia*	*Roystonea floridina*	Bottle Palm	*Arecaceae*	Tree
164	*Sanchezia speciosa*			*Acanthaceae*	shrub
165	*Santalum lanceolatum*		sandalwood	*Santalaceae*	Tree and shrub
166	*Saraca asoca*	*Jonasia confusa*	Ashoka tree	*Fabaceae*	Tree
167	*Schefflera arboricola*	*Heptopleurum arboricola*	Umbrella tree	*aryliaceae*	shrub
168	*Schleichera oleosa*	*Pistacia oleosa*	Kusum Tree	*Sapindaceae*	Tree
169	*Senna alata*	*cassia alata*	ring worm brush	*Fabaceae*	Shrub
170	*Senna occidentalis*	*cassia occidentalis*	ant brush	*Fabaceae*	Shrub
171	*Senna polyphylla*	*Cassia polyphylla*	desert cassia	*Fabaceae*	Tree and shrub
172	*Senna siamea*	*cassia sumatrana*	cassia tree	*Fabaceae*	Tree
173	*Senna sophera*	*cassia sophera*	kasunda	*Fabaceae*	shrub
174	*Senna tora*	*Cassia toras*	sickle pod	*Fabaceae*	Shrub

175	*Spathodea campanulata*	*Spathodea nilotica*	African tulip tree	*Bignoniaceae*	shrub
176	*Sterculia foetida*	*Sterculia ornata*	wild almond tree	*fabaceae*	Tree
177	*Streblus asper*		sand paper tree	*Moraceae*	Tree
178	*Syzygium cumini*	*Myrtas cumini*	Java plum	*Myrtaceae*	Tree
179	*Tabebuia heterophylla*	*Bignonia leucoxylon*	white cedar	*Bignoniaceae*	Tree
180	*Tabernaemontana divaricata*	*Tabernaemontana recuva*	crape jasmine	*Apocynaceae*	Shrub
181	*Tamarindus indica*	*Tamarindus occidentalis*	imli	*Fabaceae*	Tree
182	*Tecoma stans*	*Bignonia fruteceans*	Burmese brush	*Bignoniaceae*	Shrub
183	*Tectona grandis*	*Tectona theca*	Teak	*Lamiaceae*	Tree
184	*Terminalia arjuna*	*Pentaptera angustifolia*	Arjun tree	*Combretaceae*	Tree
185	*Terminalia bellirica*	*Terminalia punctata*	bahera	*Combretaceae*	Tree
186	*Terminalia catappa*	*Terminalia procera,Terminalia latifolia*	Sea almond	*Combretaceae*	Tree
187	*Terminalia muelleri*	*Myrobalanus muelleri*	Australian almond	*Combretaceae*	Tree
188	*Thuja orientalis L*	*Thuja revuculata*	northern white cedar	*Cupressaceae*	Tree
189	*Thunbergia alata*	*Thunbergia grandiflora*	Black-eyed Susan Vine	*Acanthaceae*	Vine
190	*Thunbergia erecta*	*Meyenia Erecta*	bush clockvine	*Acanthaceae*	Climber
191	*Tinospora cordifolia*	*Menispermum cordifolium*	Giloy	*Menispermaceae*	Climber
192	*Toona ciliata*	*Cedrela microspora*	Burma Cedar.	*Meliaceae*	Tree

193	*Vitis vinifera L.*	*Cissus vinifera*	common grape vine	*Vitaceae*	Climber
194	*Washingtonia filifera*	*Livistona filamentosa*	desert fan palm	*Arecaceae*	Tree
195	*Withania somnifera*	*Physalis flexuosa*	Indian ginseng	*Solanaceae*	Shrub
196	*Yucca gloriosa*	*Yucca acuminata*	Spanish Dagger	*Asparagaceae*	shrub
197	*Zamia furfuracea*	*Zamia vestila*	cardboard palm	*Zamiaceae*	Tree
198	*Ziziphus jujuba Mill*	*Ziphus sativus*	Indian plum	*Rhamnaceae*	Tree and shrub

CHAPTER 7 – CARBON FOOTPRINTS

Carbon is the basis of life on mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, present in the form of carbon dioxide (CO2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO2 . The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet.

The starting of the 21st century, we brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO2 is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO2. On this background it is a need of time to cover the research areas interrelated with climate change.

7.1 Carbon footprints

In today's world one of the biggest issues faced by all of us is global warming. Global warming refers to an increase in average global temperature of mother Earth. The main cause ofglobal warming is increase in the concentration of greenhouse gases (GHGs) in the atmosphere due to anthropogenic activities and their level is determined with the help of global warming potential (GWP) and expressed as Carbon Footprint (CF). Carbon Footprint is another phenomenon used for GHGs or carbon dioxide emission in terms of CO_2 equivalents. There are various definitions of carbon footprint are in literature. But the most recognized definition givenby Wiedmann "the Carbon footprint is the measure of carbon dioxide emissions directly or indirectly caused by an activity or accumulated over the life stages of a product." In otherwords, "A carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product."

As the Chaudhary Charan Singh University considered as institutional organization, the various energy resources like electricity, solar roof top systems are used. It is necessary to calculate the carbon footprint of the University to upgrading the Clean Developmental Mechanism (CDM) in various processes. All the data from the various sources were collected from all the sectors where energy resources are used. The collected data is calculated by using standard emission factors.

7.1.1 Electricity carbon footprint:

In the university, electricity is used for various purposes like residential, office use and in the laboratories. The total electricity used in the University liberates mass kg of CO_2 per year. The laboratory equipments consume highest electricity which emits the large amount of carbon CO_2 per year.

The solar panels are installed on the roof of various buildings produces electricity from solar panels which further saves ample mass of CO_2 per year.

7.1.2 Paper footprint:

The papers are used in the institution for various purposes like exam answer sheets, circulars, notices, office work etc. The papers are responsible for the emission of CO_2. The University used total used 1,765.17 reams of papers which emits the 3.67 tons of CO_2. In the University campus various departments follows paperless methods of communication to reduce the footprint by use of papers. The various sections on the campus save 13, 48,914 papers per years i.e. 2,697 reams. The paperless work reduces approximately 5.61 tons of CO_2 approximately. The total 2.80 tons of biomass is saved by paperless communication i.e. green computing.

Total footprint of the University:

The total footprint is the addition of all the footprints and it is expressed as tons of CO_2 per year. The total footprint of Chaudhary Charan Singh University is approx. more than 10,000 tons of CO_2 per year approximately.

As the university is following the Clean Developmental Mechanism to reduce the emission of CO_2 and greenhouse emission by using solar panels for electricity generation and minimize the paper work at the university reduces of 18.10 tons of CO_2 per year approximately.

Conclusion:

India's CO2 emission is increased by an estimated 4.6 % in 2017, despite a turbulent year for its economy. The carbon footprint of nation is measured per person; India‟s

emissions are still very low – at only 1.8 tons of CO2 per capita which is much lower than the world average of 4.2 tons. But those emissions have been increasing steadily, with an average growth rate over the past decade of 6 %. The universities are the organizations which are having large areas which consume the high quantities of electricity and LPGs for many purposes. The Chaudhary Charan Singh University Campus emits 30,355 tons of CO2 per year approximately. The present Clean Development Mechanism (CDM) practices to reduce the 18.10 tons CO2 per year approximately.

Recommendations

- Installation of solar panels or solar energy generation devices should be enhanced to reduce the electricity footprint of the campus. Terrace of each building can be utilized to produce electricity from tiltable solar modules.
- The food waste generated from university hostel mess, guest house, canteens and staff quarters should be converted into the biogas which can be further utilized for hostel kitchens.
- The solar battery operated vehicles should be used on the campus to overcome the vehicle footprint.
- The Green computing or E- work is helping the organization to reduce footprint very effectively.
- The solar energy based street lamps on campus will reduce carbon footprint.
- The awareness should be made among the faculty, students and other employees regarding Clean Development Mechanism (CDM) to reduce the consumption of electricity and natural resources.
- "Carbon Sequestration" survey should be conducted in the campus. Carbon sequestration is a process of converting atmospheric carbon i.e. CO2 in to other sinks of carbon such as vegetation, soil, ocean etc. in various forms to mitigate global warming audit is one of the important clauses of Kyoto Protocol.

About Carbon Sequestration

While transforming ourselves from regional university to global university it is a responsibility of such universities to face the global future challenges and try to find out possible solutions for them. It is a social and environmental responsibility of Government Institutes, Universities, National and International Organizations to respond positively for various global issues at local level and should percolate the generated knowledge in to the society. Globalwarming and climate change are current environmental issues need to be addressed scientifically and efficiently. As Universities are provided with skilful human resource supported by analytical infrastructure, it is our duty to bring such ideas in practice.

Objectives & Benefits:

- To study woody green cover of University campus.
- To study species diversity of woody vegetation in the University campus.
- To understand biomass and carbon stock accumulated by woody vegetation in the University Campus
- To explore carbon sequestration potential of woody vegetation in the University campus.
- To explore potential of woody vegetation of the University campus as an oxygen source.
- To measure canopy cover of the trees on the University campus

CHAPTER 8 – GREEN INITIATIVES

University is located at the area which is one of the important wilderness areas of Meerut city with its precious biodiversity. It covers an area of about 221 acres The major portion is covered with vegetation. The university aims to protect and conserve its biodiversity, fresh and clean ambience through many initiatives.

The university has taken following green initiatives to protect and conserve the nature.

1. Plantation and Nurturing Programme

Many plantation drives are taken by the University on its campus. Every year on 5th June i.e. World Environment Day, the University takes Plantation activity. Under 33 Crore tree plantation scheme of Govt., University has taken many plantation drives. The garden department looks after tree plantation activities. The trees are watered by students of various Departments. They nurture these trees throughout the year. Students of various departments and students make the plantation and nurturing programmes successful.

2. Green computing practice:

Being an academic institution, papers are used for various purposes like exam answer sheets, circulars, notices, office work , for document printing and Xeroxing. Since the trees are cut for paper manufacturing, the sequestration of carbon is reduced increasing carbon foot print. To cut down the carbon footprint, the university administration and various departments follows paperless methods of communication by using emails, online forms submission etc. The paperless work was helpful in reducing tons of CO2. The tons of biomass is saved by this green computing practices.

3. Solar Electricity Generation:

The University has installed solar panels system for electricity generation which produces 1600 kilowatt of electricity and send to the grid of PVVNL (Pashchimaanchal Vidyut Vitran Nigam Limited) which is helpful for electricity bill reduction. Most of the buildings are constructed considering the need of Light and ventilation which reduces the use of electricity. The air conditioners are used only in essential conditions in the laboratories and offices to reduceelectricity consumption.

4. Conferences and workshops on Environmental Sustainability:

Chaudhary Charan Singh University organizes Conferences and Workshops based on the theme of environmental sustainability.

CHAPTER 9 – SUMMARY & CONCLUSION

Summary

Green Audit is one of the important tool to check the balance of natural resources and its judicial use. Green auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area.

The Department of Environmental Science, Chaudhary Charan Singh University, Meerut has conducted a"Green Audit" of Chaudhary Charan Singh University, Meerut in the academic year 2020-21. The main objective to carry out green audit is to check the green practices followed by university and to conduct a well defined audit report to understand whether the university is on the track of sustainable development. After completing the audit procedure of university for green practices, there are following conclusions, recommendations and Environmental Management Plan (EMP) which can be followed by university in future for keeping campus environment friendly.

Conclusion:

From the green audit following are some of the conclusions which can be taken forimprovement in the campus.

- University takes efforts to dispose majority waste by proper methods. The Green computing i.e. Online payment system, online circulars and examination procedures(SRPD) are helpful for reducing the use of papers and ultimately reducing carbon footprint.
- Reducing the use of one time use plastic bottles, cups, folders, pens, bouquets, decorativeitems will be useful to solve the problem of plastic pollution to some

extent.

- Biodegradable waste is used efficiently for composting and vermicomposting. There is a scope to utilize the organic matter for biogas generation or manure production. Use of LED lamps and Tube Lights is less and is to be encouraged.
- Toilets and bathrooms are consuming more water in the departments. The replacement of old taps can be beneficial for solving this issue
- The use of electrical cars in the campus are good initiatives to save fuel.
- The overall ambient air quality on the campus is good while some air quality issues may arise due to developmental activities on the campus should be addressed.

- The sound levels on the campus is good except due to some transportation activities.
- Science departments are following the principles of Green Chemistry to reduce chemical wastes.

Key Recommendations & Environment Management Plan (EMP)

Following are some of the key recommendation for improving campus environment and to be considered as **Environment Management Plan (EMP).**

- An environmental policy document has to be prepared with all the recommendations and current practice carried by university.
- A frequent visit should be conducted to ensure that the generated waste is measured, monitored and recorded regularly and information should be made available to administration.
- The university should develop internal procedures to ensure its compliances with environmental legislation and responsibility should be fixed to carry out it in practice.
- The solid waste should be reused or recycled at maximum possible places. The

biodegradablewaste is generated in more amounts in hostels which should be properly utilized for manure preparation or biogas generation.

- Reuse of glass bottles for storage of chemicals should be encouraged or the bottles should be sent to again suppliers for reuse.
- Electrification of street lights by solar power should be encouraged.
- Installation of sensor based electrification items like fans, lights, etc. can save electricity.
- Installation of solar panels and rain water harvesting system to every terrace of building will be useful in conserving the natural resources.
- Regular checkups and maintenance of pipes, overhead tanks and plumbing system should be done by engineering section to reduce overflow, leakages and corrosions.
- Science laboratories large amount of water goes waste during the process of making distilled water; the system should developed to reuse this water for other purposes. The solar distillation unit be installed at the earliest.
- No such processes or activities were observed at Chaudhary Charan Singh University which can deteriorate the environmental quality.
- The said University is in continuous efforts to spread the environmental awareness programmes among staff and students.
- It was also observed that the said University is keeping the environmental quality at priority in every developmental stage.

WE ARE GLAD TO DECLARE CHAUDHARY CHARAN SINGH UNIVERSITY AS AN ENVIRONMENT FRIENDLY UNIVERSITY ALONG WITH MANY DEVELOPMENT PROCESSES IS FAIRLY PRACTICING ENVIORNMNETAL IMPORTANCE AT ANY STAGE OF ITS DEVELOPMENT.

CHAPTER 10 – ACKNOWLEDGEMENT

I would like to **express my special thanks of gratitude** to staff of Chaudhary Charan Singh University who gave me the golden opportunity to do this wonderful project **(GREEN AUDIT)**, which also helped me to be the part of ESG (Environment Sustainability Goals) of University.

I am really thankful to all.

END OF THE REPORT

DETAILED ENERGY AUDIT OF ELECTRICAL SYSTEMS & UTILITY EQUIPMENT

BY

WIRE CONSULTANCY
ENGINEERING, RISK AND SUSTAINABILITY

FOR

CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT, UTTAR PRADESH

2805	Energy audit	Negi, S	Vaidyanathan. R.	28.05.2022	0
Project No.	**Project Title**	**Made By**	**Reviewed By**	**Date**	**Rev**

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Study	**Detailed Energy Audit of Electrical Systems & Utility Equipment**
Date of Site Visit	**17th,18th, 19th & 20th May 2022**
Date of Submission	**28th May 2022**
Co-coordinating person at site	**Mr. VikasTyagi (Electrical Engineer- CCSU)** **Mr. Sharad Giri**
Site Visit Conducted by	**Mr. Shishpal Singh Negi** **Mr. Pawan Kumar** **Mr. Sandeep Salve** **Mr. Arun Kumar**
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We feel highly privileged to be working for CCS University, Meerut and express our sincere thanks to **Mr. Vikas Tyagi and Mr. Sharad Giri** who pursued this essential measure for energy conservation. We also gratefully acknowledge their advice and direction provided to us from time to time.

We gratefully acknowledge the suggestion and cooperation provided to us by other supporting staff in obtaining required data from different sources.

Last but definitely not the least, we at WIRE CONSULTANCY, expresses our profound thanks to the electrical maintenance staff of CCS University, Meerut for their efforts & assistance extended to the auditing team.

For Wire Consultancy

2. INTRODUCTION

With the advent of energy crisis and exponential hikes in the costs of different forms of energy, Energy Audit is manifesting its due importance in every establishment. Energy Audit helps to understand more about the way energy is used in any Establishment and helps in identifying areas where waste may occur and scope for improvement exists.

It was with this objective that Wire consultancy was entrusted with the job of conducting Energy Audit of CCS University, Meerut, Uttar Pradesh

3. SCOPE OF WORK

- Review of Electricity Bills, Contract Demand and Power Factor: For the last one year, to explore the possibility of reducing the contract demand and improvement of Power Factor. Study of load, Loading Pattern etc.
- Review of present AC system like central AC, window AC, split AC, package AC, Water Coolers, and Air heaters etc.
- Power Quality study which includes harmonic analysis, power factor, load unbalancing, nominal voltage and current range etc.
- Illumination System: Study of the illumination system, lux level in various areas, area lighting and suggest measures for improvements and energy conservation opportunity wherever feasible.
- DG Set: Measurement of Specific Fuel Consumption in DG Sets and suggesting various measures for improvements.
- Transformer & distribution network: evaluation and loss calculations at transformer and distribution network.
- Review of lighting and fans provided in the lifts and use of lights in standby conditions.
- Study of auxiliary system including drives and air compressors.

The entire recommendations have been backed up with techno-economic calculations including the estimated investments required for implementation of the suggested measures and payback period. Measurements have been made using appropriate instrumentation support for time lapse and continuous recording of the operational parameters.

4. METHODOLOGY

Methodology adopted for achieving the desired objectives viz: Assessment of the Current operational status and Energy savings include the following:

- Discussions with the concerned officials for identification of major areas of focus and other related systems.
- A team of engineers visited the Site and had discussions with the concerned officials/ supervisors to collect data/ information on the operations and Load Distribution within the Plant. The data was analyzed to arrive at a base line energy consumption pattern.
- Measurements and monitoring with the help of appropriate instruments including continuous and/ or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- Computation and in-depth analysis of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/ reduction in specific energy consumption.

INSTRUMENTATION SUPPORT

Some of the instruments used for undertaking the audit include the following:

Name of the Instrument (Make/ Model)	Primary Measured Parameters	Measuring Range	Accuracy	Resolution
Load Manager with appropriate CT's and Voltage Probes for HT & LT measurements (Krykard/ALM 31)	Active Power	0 – 9999 KW	± 1%	4-digit
	Reactive Power	0 – 9999 KVAR	± 1%	4-digit
	Power Factor	0.14 – 1	± 1.5%	0.001
Anemometer (Extech/ 45118)	Air Velocity	0.5 – 89 miles/hr.	± 3%	3½ digit LCD with multifunction indicators
Lux Meter (TES 1332)	Lux	0 to 200000 lux	± 3%	3½ digit LCD

Name of the Instrument (Make/ Model)	Primary Measured Parameters	Measuring Range	Accuracy	Resolution
Surface Temperature Indicator with appropriate Probe (CHY 501 K)	Temperature	-50°C to 450°C	± 0.3%	0.5°C
Water Flow Meter (TUF-2000H)	50MM – 750MM DIA.	14000M^3/HRS.	± 1%	_30^0 to 160^0 C Temp.

5. SUMMARY OF ENERGY CONSERVATION OPPORTUNITIES (ECOS) SUGGESTED

- The Power Supply to the **Chaudhary Charan Singh University, Meerut** (CCS University, hereafter) is sourced from the PVVNL at 11 KV and stepped down through transformers 11/0.433KV subsequently.
- There are two energy meters installed in the university campus at 11 KV on behalf of UPPCL. **Meter No. XE498276** feeds to Sub-station A, and **Meter No. XE498270** feeds to Sub-station B, C and D. We have reviewed the power consumption of entire campus month wise. The campus is being billed on KVAH and maintains the Power factor the effect of power factor is inbuilt in electricity bills tariff. There are no capacitor panels installed at both the feeder; at LT distribution side after transformers. It is recommended install APFC panel of 450 KVAR with small units of 2 KVAr, 3 KVAR, 5 KVAR, 7.5 KVAr and 10 KVAr to maintain the power factor 0.999-1.00 at every load condition, so that the overall system power factor is maintained from the current recorded range 0.646-0.960 at meter number XE498276 and recorded from 0.274 to 0.840 at meter number XE498270. it is recommended that maintain the Power factor 0.99 and above at every load condition and above. For this purpose, it is suggested to install a new APFC panel in auto mode so that every time it can maintain the power factor automatically as per the requirement of the system. The estimated investment for new APFC panel of 450 KVAR for meter number: XE498276, is approx. Rs.8,00,000/- and cumalitive savings is Rs.4,64,680/- per year with the payback period of 1.75 years. For meter number: XE498270, the estimated investment for new APFC capacitor panel of 450 KVAR is approx. Rs. 8,00,000/- and cumalitive savings is Rs.78,07,765/- per year with the payback period of 2 months.

- **Study of D.G. Sets: -** CCS University has installed ten (10) number of D.G. sets of different capacity such as, 180 KVA, 250 KVA, 320 KVA, and 380 KVA at different location of the campus for power cut and self-generation. During the study team was check the fuel efficiency. Overall efficiency of the D.G. sets according to the running load was found satisfactory. For details, refer the chapter of study of D.G. sets.

- **Study of Water Pumps:** CCS University has installed ten (10) number of tube wells for drinking water and irrigation purpose at different location of the campus. The measurements and efficiency were calculated for tube wells and submersible and calculated the efficiency. On behalf of study, it is suggested replace old motor, which are burnt more than 4 times with energy efficient motors with the help of government bodies such as EESL.

- Voltage level also found very low at **Tapovan** tube wells. It is suggested to install small capacitors in direct mode just after contactor, to increase the voltage existing level **335 Volt. to 415 Volt**. It will also help to reduce the existing current level and will improve the power factor. Cost for installing capacitors for four (4) numbers of tube wells at **Tapovan** will be approx. Rs. 20,000/-

- **Study of fans and exhaust fans: -** Approx. 5266 number of ceiling fans of 50 W are installed in the entire university campus and approx. 3081 number of exhaust fans of 80 W were installed. It is suggested replace all existing fans and exhaust fans with the energy efficient 26-Watt BLDC fans. The approximate saving by replacing 5266 nos. of ceiling fans will be Rs.19,96,867/- per year with the investment of Rs.1,63,24,600/- and the payback period of this investment will be approx. 8.5 years. Savings by replacing 3081 number of 80-watt existing exhaust fans with 20-watt BLDC exhaust fans is approx. Rs. 29,20,788/- per year with the investment of Rs.83,18,700/- with the simple payback period of 3 years.

- **Lighting system: -** University campus has installed 70 sodium lights of 125-watt and approx. 8693 STL lights of 40-watt lights which could be replaced by 20-watt energy efficient LED lights**.** Savings by replacing existing 8693 number of 40-wall STL lights will be approx. 49,44,578/- per year. The replacement costs of those lights will be approx. Rs.17,38,600/- with the payback period of 3 months. Also, sodium lights could be replaced with 70-watt LED lights and savings by replacing these sodium lights will be approx. Rs.1,93,770/- with the investment of Rs.1,75,000/- with a simple payback period of within 2 months.

- Although there is no simpler way to reduce the amount of energy consumed by lighting system than to manually turn OFF whenever not needed, this is not done as often as it could be. In response, automatic lighting control strategies like installation of occupancy sensors can be considered to control light in response to the presence or absence of people in the space. Quantification of energy savings on this account is not possible. The management was already replaced most of the conventional with energy efficient LED light and is also keen to replace the pending conventional lights.
- Cumulative energy saving opportunities in KVAH & corresponding monitory benefits with simple payback period is tabulated below.

ECO's	Saving Quantum (KVAH)	Annual Energy Savings (Rs Lacs)	Estimated Investments (Rs Lacs)	Simple Payback Period (Months)
Improvement in the Overall System Power Factor Meter NO. XE498276	48525	4.646	8.0	21
Improvement in the Overall System Power Factor Meter NO. XE498270	815341	78.077	8.0	2
Saving by using 26W BLDC Ceiling fans (5266 numbers)	252768	19.968	163.246	102
Saving by using 20W BLDC Exhaust fans (3081 numbers)	369720	29.07	83.187	36
Saving by replacing 40 W STL with 20 W LED lights	625896	49.445	17.386	3
Saving by replacing 125 W sodium lights with 70 W LED lights	24528	1.937	1.75	2
Grand Total	**2136778**	**183.143**	**281.569**	**102 (max)**

- The summary of the power quality study at various feeders is tabulated below.

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Sub-station -A																
Transformer 1000KVA, Output (SS-A)	405.63	412.88	407.83	567.1	393.33	545.4	49.98	326.81	355.26	0.91	1.2	1.3	1.2	3.2	2.4	2.7
Admin Block (SS-A)	414.45	415.65	408.55	112.71	89.79	103.35	49.92	71.49	72.9	0.98	1.3	1.4	1.2	3.8	4.8	3.7
Rani Laxmi Bai Hostel, Guest House, Dhan Singh Gujjar Hall and Railway counter (SS-A)	414.06	413.75	407.14	16.81	2.67	36.62	49.95	13.09	13.29	0.98	1.2	1.5	1.3	9.1	29.6	3.7
D G Set 250	414.94	414.51	415.89	210.62	205.09	196.98	50.3	142.2	146.9	0.83	3.4	2.7	3.5	12.1	13.9	9

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
KVA (SS-A)							5	2	7							
D.G. Set 180 KVA (SS-A)	424.65	417.57	413.62	87.5	133.74	181.55	51.26	94.94	97.22	0.91	1.6	1.9	1.9	76.1	16.6	15.1
Durga Bhabhi Hostel UG (SS-A)	406.43	408.78	409.53	5.63	17.82	7.51	49.92	6.94	7.29	0.94	1.3	1.4	1.2	5.4	5.1	7.2
Library Information Science (SS-A)	408.75	411.04	411.68	8.33	18.48	11.36	49.91	8.99	9.04	0.99	1.2	1.3	1.2	5.3	2.6	3.3
Old Over Head, Urdu and Hindi Dept. (SS-A)	412.39	412.21	409.69	21.7	18.05	6.37	50	8.28	10.96	0.57	1.4	1.3	1.3	17.9	25.6	293.4

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Rani Laxmi Bai Hostel (SS-A)	408.71	411.58	410.87	16.52	8.93	43.08	50.01	15.76	16.27	0.96	1.3	1.3	1.3	11.1	9.8	7.4
New Girls Hostel (SS-A)	409.6	412.28	411.64	14.18	22.02	31.36	50.01	15.68	16.06	0.98	1.3	1.3	1.2	3.9	3.4	1.8
Durga Bhabhi Hostel Overhead (SS-A)	408.52	411.39	409.9	16.1	22.73	23.01	49.99	14.25	14.64	0.97	1.24	1.29	1.17	4.4	4.13	2.54
New Park	409	407.83	409.89	21.38	34.75	34.79	49.93	19.93	21.46	0.93	1.2	1.3	1.3	3.5	3.6	3.2
Zoology Dept. and Old Tube well (SS-A)	408.91	412.45	411.35	45.67	60.57	86.32	49.98	41.63	45.74	0.89	1.3	1.4	1.3	5.1	6.5	9.7

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
VC Office (SS-A)	412.11	409.4	412.59	25.5	53.55	7.43	49.99	19.91	20.54	0.97	1.2	1.3	1.4	16.6	6.2	29.3
Secrecy Exam. Dept. (SS-A)	411.79	411	418.67	22.37	15.33	13.74	50.01	8.43	12.3	0.68	2.4	2.6	1.3	7	14.9	18.3
Rani Laxmi Bai Hostel (SS-A)	419.79	422.02	419.46	3.79	31.19	26.97	50.02	14.82	15.07	0.98	1.3	1.3	1.3	7.7	13.8	4.3
Dara Singh Kushti Hall, MBA (SS-A)	418.12	422.73	417.98	47.1	46.57	52.83	49.99	23.5	35.5	0.65	1.3	1.3	1.4	4	5.1	4.5
Computer Centre and New Answer Book Hall (SS-	419.27	412.62	418.3	25.1	28.04	20.44	50	16.9	17.71	0.89	1.4	1.3	1.3	14.3	40.5	12

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
A)																
Auditorium, Main Gate and Security Office (SS-A)	417.95	410.61	416.76	7.65	1.65	9.18	49.94	4.35	4.43	0.98	1.3	1.2	1.3	8.1	22.6	11.4
M. Phill (SS-A)	414.76	414.73	408.13	25.34	15.43	18.77	49.92	11.55	14.17	0.77	1.2	1.4	1.3	20.2	69.3	23.2
D G Set 320 KVA (SS-A)	445.73	443.51	446.85	150.59	173.89	133.02	50.44	110.4	117.68	0.91	1.3	1	0.9	8.8	6.2	6.3
Sub-station -B																
Transformer 630 KVA, Output (SS-B)	414.16	410.07	413.91	267.74	452.14	350.39	50	231.94	254.96	0.87	1.4	1.4	1.4	3.8	2.1	3.9

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
D.G. Set 380 KVA, (SS-B)	425.5	419.79	419.63	236.66	342.38	336.72	50.15	211.75	222.89	0.91	1.7	1.6	1.6	5.4	5.5	4.7
Transformer 630 KVA, Kendriya Mulyankan Bhawan (SS-B)	422.76	426.87	424.38	192.08	203.23	216.14	49.84	145.18	149.98	0.96	3.4	3.5	3.5	33	29.4	28.4
D.G. set 400 KVA, Kendriya Mulyankan Bhawan (SS-B)	413.68	412.63	412.25	104.96	131.65	132.73	50.07	86.51	88.04	0.94	3.8	3.5	3.5	24.7	16.5	20.5
History Law Substation-B,	415.59	415.81	417.01	30.87	23.94	21.08	50	17.35	18.25	0.97	2.8	2.8	3	10.2	14.2	20

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Civil (SS-B)																
Examination Centre (SS-B)	408.52	400.18	399.44	16.83	46.65	47.36	49.98	22.11	25.72	0.83	2.8	2.8	2.8	28.4	10.5	11
KP Hostel, RK Hostel Panel 2nd (SS-B)	407.56	397.75	397.68	4.06	5.67	22.15	50.01	6.93	7.32	0.95	3	3.1	3.1	18.1	7.6	11.9
Farm House UG (SS-B)	396.75	398.45	410.42	36.94	5.71	10.85	49.99	12.39	12.5	0.99	3	3	2.9	5.2	10.2	8.3
Physics Dept. AC (SS-B)	396.53	409.71	394.67	18.27	6	25.59	50	11.06	11.5	0.9	3	2.9	3.1	21.4	19.1	15.8
Campus Farm OH, (SS-B)	401.41	412.54	401.49	27.07	8.15	3.78	50.03	8.81	9.04	0.95	3	2.8	2.9	5.3	8.3	8.2

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Brahaspati Bhawan, Horticulture Dept. (SS-B)	422.15	414.84	425.14	36.5	28.57	25.06	50	20.41	21.93	0.91	1.6	1.6	1.5	5.6	7.5	10.3
Canteen Library, Internet (SS-B)	415.23	424.37	420.13	51.72	22.47	70.04	49.98	33.24	35.02	0.91	1.5	1.3	1.5	17.4	20.3	10.4
KP Hostel, RK Hostel Panel 1st (SS-B)	419.97	414.2	423.39	32.38	52.99	36.34	50	28.01	29.41	0.95	1.4	1.3	1.3	4.8	3.1	3.4
SS-C, Farm Tank (SS-B)	422.89	415.74	425.49	46.95	34.64	50.97	50.03	27.22	32.28	0.84	1.5	1.4	1.4	3.1	7.4	3.9
Sociology, English,	420.02	412.51	423.12	124.38	117.45	80.98	50.05	73.26	77.94	0.46	1.7	1.5	1.5	9.2	24.6	46.6

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Sewer Pumping Station, Physical Education (SS-B)																
DSW, Sports and Sanskrit (SS-B)	418.1	410.02	421.88	123.79	99.54	108.13	50.01	75.28	79.86	0.94	1.6	1.5	1.5	2.2	2.2	2.8
Physics, Chemistry, Microbiology Dept. (SS-B)	421.58	413	425.16	53.48	45.59	23.83	50.01	26.75	29.86	0.83	1.5	1.3	1.3	11.8	8	14.2
D.G. Set 180 KVA, (SS-B)	407.05	402.79	399.73	25.92	53.99	74.51	53.59	35.57	35.92	0.98	1.5	1.2	1.7	35.6	8.3	9.4

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Lighting 1st Floor Kendriya Mulyankan Bhawan (SS-B)	417.8	421.89	419.5	5.97	7.2	5.38	49.66	4.42	4.5	0.98	3.3	3.3	3.4	12.3	4.4	9.5
Lighting 3rd Floor Kendriya Mulyankan Bhawan (SS-B)	419.59	423.84	421.49	4.11	9.77	5.38	49.79	4.35	4.7	0.12	3.5	3.3	3.4	25	92.2	78.5
Lighting 2nd Floor Kendriya Mulyankan Bhawan (SS-B)	423.09	427.05	424.83	9.01	7.03	16.94	49.91	7.96	8.1	0.98	3.3	3.2	3.4	10.3	6.8	9.2

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
AC Feeder Kendriya Mulyankan Bhawan (SS-B)	419.94	424.06	422.03	119.51	119.64	120.47	49.87	78.85	87.67	0.89	3.2	3.3	3.3	49	50	49.7
Sub-station -C																
Transformer Output -630 KVA (SS-C)	424.88	425.03	427.28	67.26	105.4	87.22	49.99	56.69	63.67	0.31	1.5	1.2	1.4	52	30.4	35.1
D G Set 380 KVA (SS-C)	412.91	409.57	410.26	81.06	139.91	148.91	51.02	85.66	87.73	0.9	1.6	2.2	2	14.5	16	40.4
Library, Workshop and New Hostel (SS-C)	394.01	396.87	393.66	55.17	43.13	28.93	49.98	28.61	28.99	0.99	1.6	2	2.1	4.5	4.2	7.6

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
Block Mechanical (SS-C)	399.59	400.26	393.1	51.62	43.93	40.15	50.01	31.03	31.16	0.99	1.5	2	2.1	5.4	6.8	8.8
Block-A, B and Admin Block (SS-C)	401.02	400.86	394	30.69	22.19	45.69	50	21.52	22.64	0.93	1.4	1.9	2	14.5	20.6	39.9
Water Tank and Sewer pumping station (SS-C)	401.45	401.28	394.67	20.97	29.87	20.54	50.01	14	16.47	0.85	1.4	1.9	2	3.5	6.2	4.4
Applied Science (SS-C)	399.9	393.32	400.01	16.58	27.24	13.04	49.98	6.88	13.05	0.52	1.9	2	1.4	18.1	11.3	39.3
Block-C and Horticulture	400.23	394.17	400.53	23.66	25.7	28.13	50.01	10.72	17.82	0.6	1.9	2.1	1.5	9.3	8.9	11.4

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
(SS-C)																
APJ Abdul Kalam Hostel (SS-C)	401.43	395.61	400.89	25.88	17.14	14.58	50.04	13.09	13.32	0.98	2	2.1	1.5	3.6	7.9	6.4
Sub-Station D																
Outgoing transformer 630 KVA (SS-D)	412.47	414.48	415.27	127.75	181.16	115.8	49.99	99.46	101.51	0.96	1.1	1.2	1.2	3.9	5.2	4.4
D G Set 250 KVA (SS-D)	406.45	413.04	410.86	144.14	94.81	99.88	50.31	79.18	80.18	0.98	3	2.5	2.2	10.2	9.8	9.1
New Mass Communication Dept (SS-D)	414.16	413.99	412.18	12.47	12.68	7.81	50.01	7.76	7.87	0.97	1	1.1	1.1	14.8	10.4	12.3

	Voltage -V1	Voltage -V2	Voltage -V3	Current -I1	Current -I2	Current -I3	Hz	Power	Power	PF	%THD -V1	%THD -V2	%THD -V3	%THD -I1	%THD -I2	%THD -I3
Permissible Limits	**415±6%**	**415±6%**	**415±6%**				**50**			**>0.95**	**<5%**	**<5%**	**<5%**	**<20%**	**<20%**	**<20%**
	V	**V**	**V**	**A**	**A**	**A**	**Hz**	**kVA**			**%**	**%**	**%**	**%**	**%**	**%**
New Hindi Dept (SS-D)	407.51	411.05	406.51	7.94	1.07	2.3	49.96	2.61	2.66	0.91	1	1.2	1	15.6	4.4	6.7
Zoology Dept. ground floor (SS-D)	408.3	411.81	407.63	80.94	18.05	48.66	49.94	34.25	34.82	0.98	1	1.1	1	4.5	10.8	4.9
Psychology dept. (SS-D)	412.65	415.74	411.54	36	43.61	34.93	50.04	27.21	27.35	0.99	0.9	0.8	0.8	10.1	7.1	5
VSMP Hostel (SS-D)	414.73	416.07	413.31	25.28	11.12	16.98	49.99	12.63	12.77	0.99	0.9	0.9	0.8	4.4	4.8	4.2
Pt. Deendayal Upadhyay Hostel (SS-D)	410.77	412.46	409.34	13.72	17.74	12.63	50.01	10.03	10.47	0.96	1.3	1.2	1.2	8.5	2.5	5.2

**Red mark areas are troublesome areas.*

Power factor is low at various feeders and current harmonics at various feeders is also exceeding the limits. It is suggested to use active harmonics filter for the rectification of the same. The details are provided in the upcoming sections of the report.

6. GENERAL DETAILS OF FACILITY

CONTACT DETAILS

Brief description of Assignment	Detailed Energy Audit of Electrical Systems & Utility Equipment.
Name & Address of the facility.	Chaudhary Charan Singh University, Ramgarhi, Meerut, Uttar Pradesh
Operational Days	365 days
Name of Contact Officer	Mr. Vikas Tyagi (Electrical Engineer)
Contact Number of the Officer	+91-9897239187
Small write up about the facility.	Chaudhary Charan Singh University (formerly, Meerut University) was established in 1965, to cater to the needs of higher education in western Uttar Pradesh. The University celebrated its silver jubilee in 1991. Presently, it is one of the premier educational institutions of the country encompassing a vast, beautiful and pollution-free campus which sprawls over 222 acres of land having vast playgrounds and experimental fields, botanical garden, rose garden with life-size statue of the late Prime Minister Ch. Charan Singh, Gymnasium, Indoor Stadium, well equipped Library, Hostels for both girls and boys, Administrative Block, Spacious Auditorium, Guest House, Community Center, Medical Center, Residential Quarters for faculty members and employees, Canteen, Bank and Post office. The teaching department belonging to different faculties, are housed in spacious buildings and have well-equipped laboratories and advanced facilities. The University also has a separate engineering college, which is currently offering courses leading to B.Tech. degree in several different branches of engineering.

RATED SPECIFICATIONS OF TRANSFORMERS

Particulars	TR≠1, S/S-A	TR≠2, S/S-C	TR≠3, S/S-B	TR≠4, S/S-B (New)	TR≠5, S/S-D
Make	Universal Power	Powertech Electric	Powertech Electric	ABB	Powertech Electric
Rating	1000 KVA	630 KVA	630 KVA	630 KVA	630 KVA
Voltage Ratio	11/0.433 KV	11/0.433 KV	11/0.433 KV	11/0.433 KV	11/0 .433 KV
Current Ratio	52.6/1333 A	33.30/480 A	33.30/480 A	33.3/480 A	33.30/480 A
% Impedance	5.5%	4.78%	4.78%	4.78%	4.78
Year of Manufacturing	2004	2004	2004	2021	2004

RATED SPECIFICATIONS OF D.G. SETS

At Substation A

Particulars	D.G≠1	D.G≠2	D.G≠3
Make	CUMMINS	CUMMINS/Kirloskar	CUMMINS
Rating	320KVA	180KVA	250KVA
Voltage	415	415	415
Current	445	250	347.5
KW	256	200	200
KVA	320	180	250
PF	0.80	0.80	0.80
RPM	1500	1500	1500

At Substation B

Particulars	D.G≠1	D.G≠2	D.G≠3
Make	CUMMINS	CUMMINS/Kirloskar	CUMMINS
Rating	380KVA	180KVA	400KVA
Voltage	415	415	415
Current	529	250	556
KW	304	200	320
KVA	380	180	400
PF	0.80	0.80	0.80
RPM	1500	1500	1500

At Substation C

Particulars	D.G≠1
Make	CUMMINS
Rating	380KVA
Voltage	415
Current	529
KW	304
KVA	380
PF	0.80
RPM	1500

At Substation D

Particulars	D.G≠1

Particulars	D.G≠1
Make	Kirloskar Greens
Rating	250KVA
Voltage	415
Current	347.5
KW	200
KVA	250
PF	0.80
RPM	1500

7. REVIEW OF ELECTRICITY BILLS CONTRACT, DEMAND AND POWER FACTOR

PURCHASED POWER

The power supply to the Chaudhary Charan Singh University is sourced from PVVNL (Pashchimanchal Vidyut Vitran Nigam Limited at 11KV and stepped down through transformer of 11/0.433KV. Subsequently the voltage is directly feeded to the servo stabilizer and controlled through the same and further fed to the bus bar through the changeover between purchased power and generated captive power.

POWER CONSUMPTION

Chaudhary Charan Singh University is sourced from PVVNL (Pashchimanchal Vidyut Vitran Nigam Limited) at 11KV and there are two energy meters installed at the university campus at 11 KV on behalf of UPPCL. Meter number: XE498276 feeds to the Sub-station A and Meter number: XE498270 feeds to the Sub-station B, C and D. We have analyzed and reviewed the power consumption of entire campus month wise. The campus is being billed on KVAH and maintains the power factor; the effect of power factor is inbuilt in electricity bills tariff.

SELF-GENERATED POWER (DG SETS & SOLAR)

The campus has installed app ten DG Sets of different capacity 500 KVA, 180 KVA, 250 KVA, 320 KVA, 380 KVA at different locations of the campus according to the connected/running load for power generation during the power cut & testing only.

The campus has also installed 1250 KW solar system through net metering with UPPCL. The billing for solar system on KVAH bases. The effect of Solar system is inbuilt in the UPPCL billing.

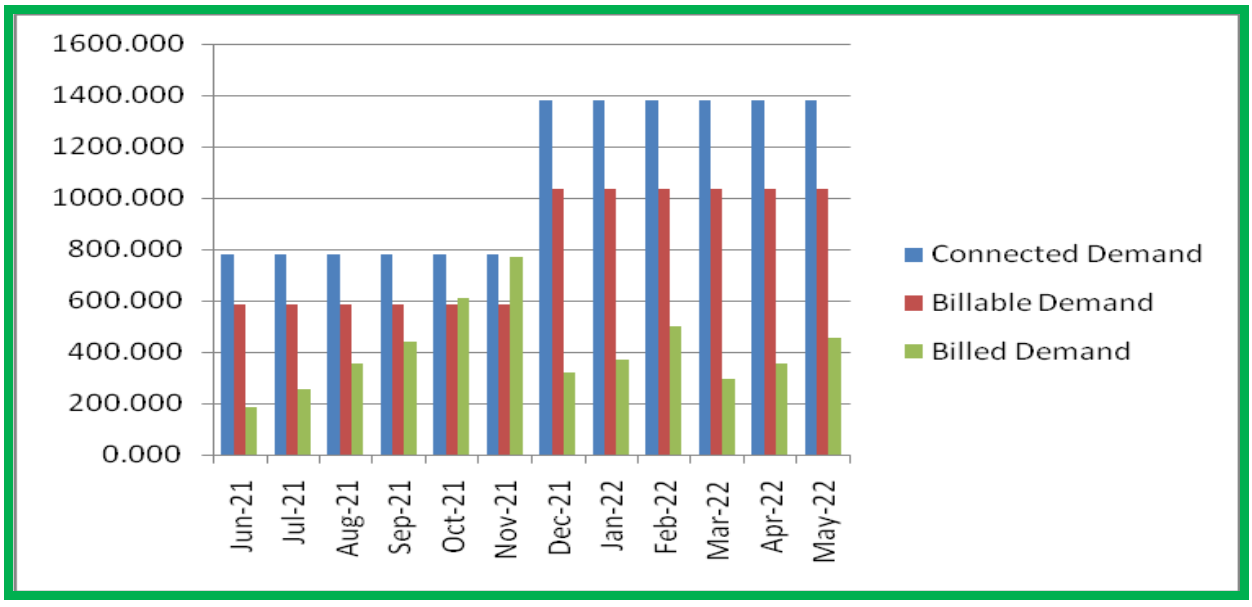
ENERGY BILL ANALYSIS FOR METER NO. XE498276 (SS-A)

JUNE 2021 to MAY 2022

Contract Demand, Billable & Billed Demand:

Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand
1	Jun-21	777.773	583.330	185.2
2	Jul-21	777.773	583.330	253.8
3	Aug-21	777.773	583.330	355

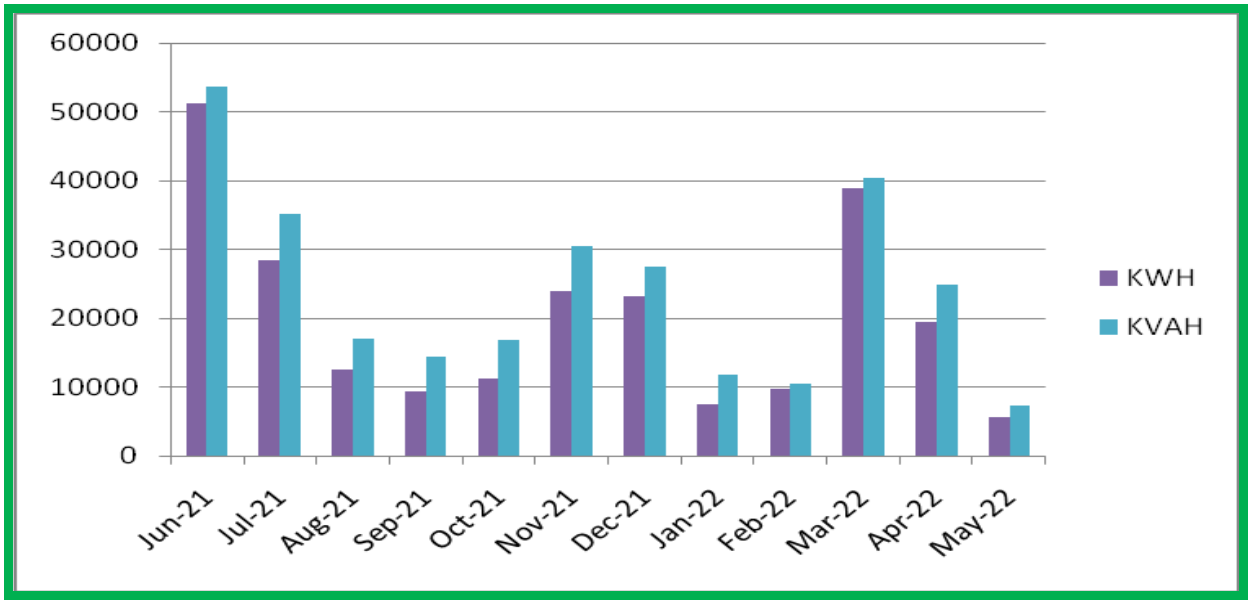
Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand
4	Sep-21	777.773	583.330	439
5	Oct-21	777.773	583.330	611.4
6	Nov-21	777.773	583.330	768.3
7	Dec-21	1378.000	1033.500	322.2
8	Jan-22	1378.000	1033.500	369
9	Feb-22	1378.000	1033.500	501.9
10	Mar-22	1378.000	1033.500	296.1
11	Apr-22	1378.000	1033.500	353.1
12	May-22	1378.000	1033.500	457.5



KWH & KVAH Variation:

Sr. No.	Month	KWH	KVAH
1	Jun-21	51245	53730

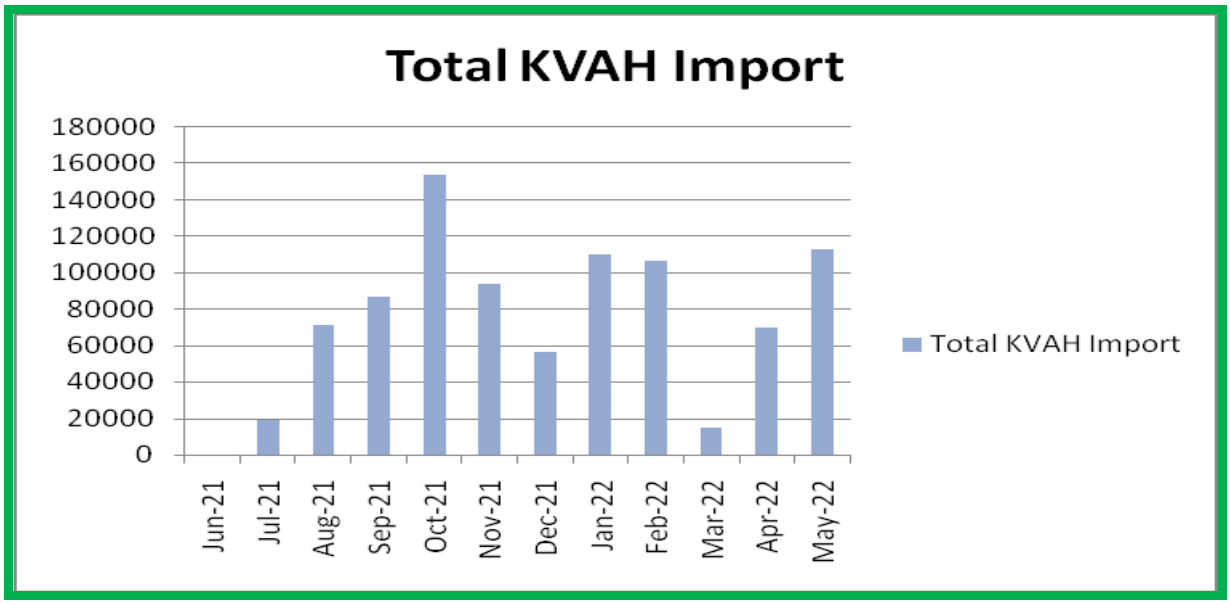
Sr. No.	Month	KWH	KVAH
2	Jul-21	28450	35140
3	Aug-21	12590	16980
4	Sep-21	9270	14340
5	Oct-21	11242.5	16777.5
6	Nov-21	24000	30450
7	Dec-21	23100	27525
8	Jan-22	7402.5	11685
9	Feb-22	9637.5	10530
10	Mar-22	38812.5	40417.5
11	Apr-22	19410	24795
12	May-22	5692.5	7297.5
13	Total	240853	289668
14	AVG.	20071	24139



Total KVAH Import

Sr. No.	Month	Total KVAH Import
1	Jun-21	
2	Jul-21	19260
3	Aug-21	71620
4	Sep-21	86600
5	Oct-21	154200
6	Nov-21	93900
7	Dec-21	56580
8	Jan-22	110377.5
9	Feb-22	106867.5
10	Mar-22	14767.5
11	Apr-22	69750
12	May-22	112957.5

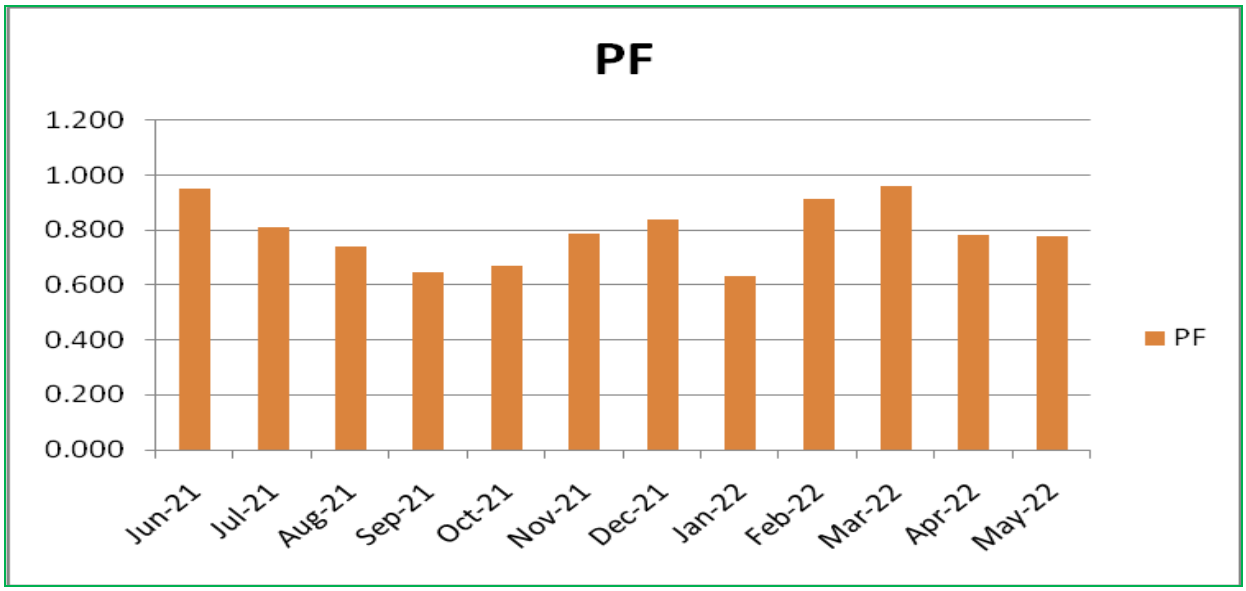
Sr. No.	Month	Total KVAH Import
13	Total	896880
14	AVG.	81534.545



Power Factor Variation:

Sr. No.	Month	PF
1	Jun-21	0.954
2	Jul-21	0.810
3	Aug-21	0.741
4	Sep-21	0.646
5	Oct-21	0.670
6	Nov-21	0.788
7	Dec-21	0.839
8	Jan-22	0.634

Sr. No.	Month	PF
9	Feb-22	0.915
10	Mar-22	0.960
11	Apr-22	0.783
12	May-22	0.780
	AVG.	0.793



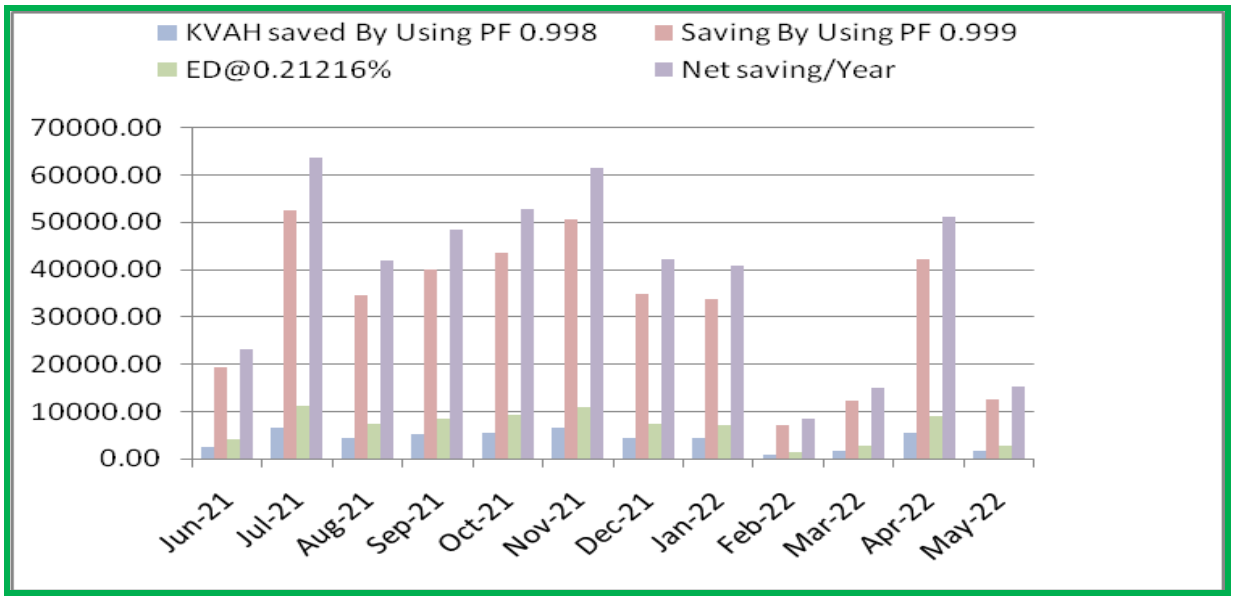
OVERALL ENERGY BILL FOR METER NO. XE498276 (SS-A)

Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand	KWH	KVAH	PF	Total KVAH Import	Rs. For 2500/KVAH	Rs. For /KVAH	Total Amount Paid for KVAH	Demand Charge	Total Bill Paid
1	Jun-21	777.773	583.330	185.2	51245	53730	0.954					221665.36	238290.31
2	Jul-21	777.773	583.330	253.8	28450	35140	0.810	19260	19250	132404	151654	221665.36	429771.25
3	Aug-21	777.773	583.330	355	12590	16980	0.741	71620	19250	546048	565298	221665.36	847961.49
4	Sep-21	777.773	583.330	439	9270	14340	0.646	86600	19250	664390	683640	221665.36	973541.00
5	Oct-21	777.773	583.330	611.4	11242.5	16777.5	0.670	154200	19250	1198430	1217680	232332.00	1558763.00
6	Nov-21	777.773	583.330	768.3	24000	30450	0.788	93900	19250	722060	741310	291954.00	1110822.00
7	Dec-21	1378.000	1033.500	322.2	23100	27525	0.839	56580	19250	427232	446482	392730.00	904025.00
8	Jan-22	1378.000	1033.500	369	7402.5	11685	0.634	110377.5	19250	852232.25	871482.25	392730.00	1367534.00
9	Feb-22	1378.000	1033.500	501.9	9637.5	10530	0.915	106867.5	19250	824503.25	843753.25	392730.00	1339339.00
10	Mar-22	1378.000	1033.500	296.1	38812.5	40417.5	0.960	14767.5	19250	96913.25	116163.25	392730.00	547116.00
11	Apr-22	1378.000	1033.500	353.1	19410	24795	0.783	69750	19250	531275	550525	392730.00	1013999.00

Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand	KWH	KVAH	PF	Total KVAH Import	Rs. For 2500/KVAH	Rs. For /KVAH	Total Amount Paid for KVAH	Demand Charge	Total Bill Paid
12	May-22	1378.000	1033.500	457.5	5692.5	7297.5	0.780	112957.5	19250	872614.25	891864.25	392730.00	2405620.00
13	Total				240853	289668		896880	211750	6868102	7079852	3767327.45	12736782.05
14	AVG.				20071	24139	0.793	81534.545	19250.000	624372.91	7.9		14.20

Overall saving by using power factor 0.999 and above No. XE498276

Sr. No.	Month	KVAH saved By Using PF 0.998	Saving By Using PF 0.999	ED@0.21216%	Net saving/Year
1	Jun-21	2431.27	19207.03	4074.96	23282.00
2	Jul-21	6654.86	52573.39	11153.97	63727.37
3	Aug-21	4373.02	34546.86	7329.46	41876.32
4	Sep-21	5055.66	39939.71	8473.61	48413.32
5	Oct-21	5518.22	43593.96	9248.89	52842.85
6	Nov-21	6419.55	50714.45	10759.58	61474.02
7	Dec-21	4397.48	34740.05	7370.45	42110.50
8	Jan-22	4270.82	33739.44	7158.16	40897.60
9	Feb-22	881.97	6967.56	1478.24	8445.80
10	Mar-22	1564.58	12360.20	2622.34	14982.54
11	Apr-22	5360.21	42345.62	8984.05	51329.67
12	May-22	1597.70	12621.85	2677.85	15299.70
13	Total	48525.33	383350.13	81331.56	464681.69
14	AVG.		31945.84	6777.63	38723.47

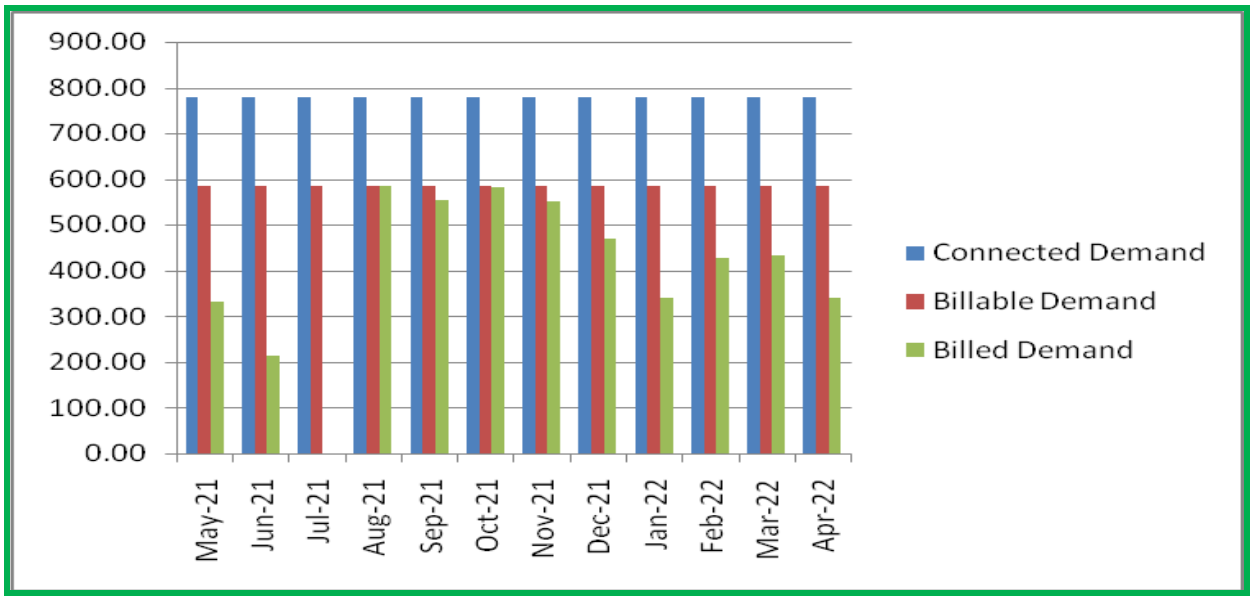

KVAH saved By Using PF 0.998
Saving By Using PF 0.999
ED@0.21216%
Net saving/Year
70000.00
60000.00
50000.00
40000.00
30000.00
20000.00
10000.00
0.00
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22

ENERGY BILL ANALYSIS FOR METER NO. XE498270 (S/S-B, C and D)

JUNE 2021 TO MAY 2022

Connected, Billable & Billed Demand:

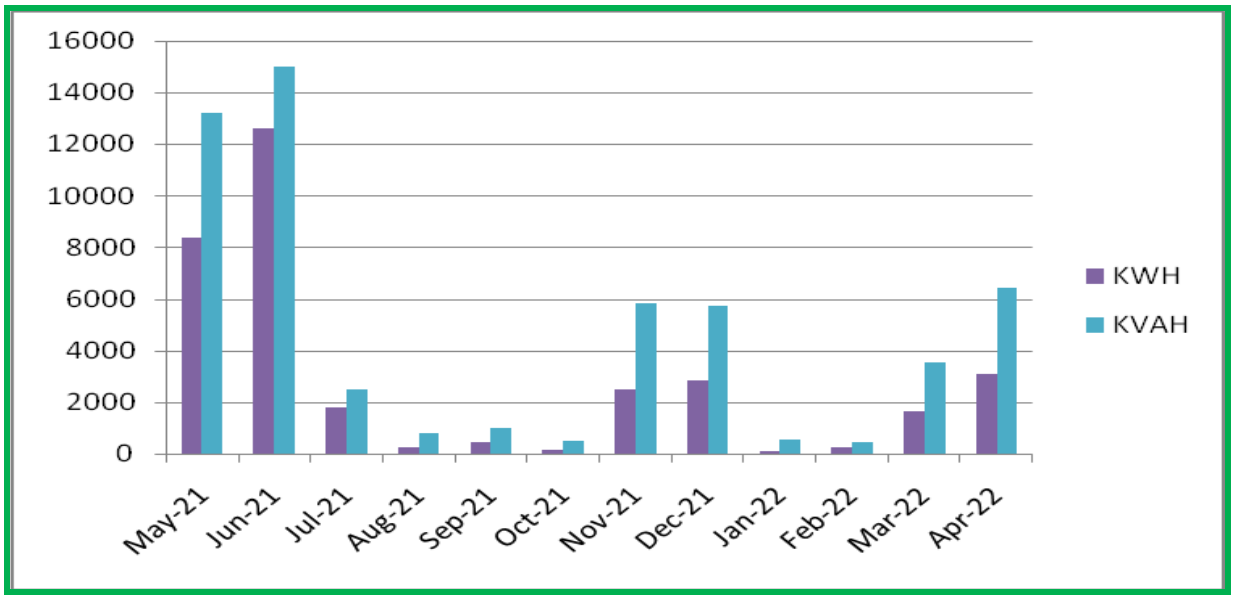
Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand
1	May-21	778.89	584.170	330.6
2	Jun-21	778.89	584.170	212.6
3	Jul-21	778.89	584.170	
4	Aug-21	778.89	584.170	584.170
5	Sep-21	778.89	584.170	553.6
6	Oct-21	778.89	584.170	580.8
7	Nov-21	778.89	584.170	550.8
8	Dec-21	778.89	584.170	468.6
9	Jan-22	778.89	584.170	341
10	Feb-22	778.89	584.170	427.8
11	Mar-22	778.89	584.170	432.6
12	Apr-22	778.89	584.170	339.8



KWH & KVAH Variation:

Sr. No.	Month	KWH	KVAH
1	May-21	8375	13220
2	Jun-21	12625	15025
3	Jul-21	1770	2470
4	Aug-21	225	800
5	Sep-21	425	995
6	Oct-21	130	475
7	Nov-21	2510	5830
8	Dec-21	2820	5745
9	Jan-22	110	530
10	Feb-22	230	460
11	Mar-22	1630	3545
12	Apr-22	3090	6410

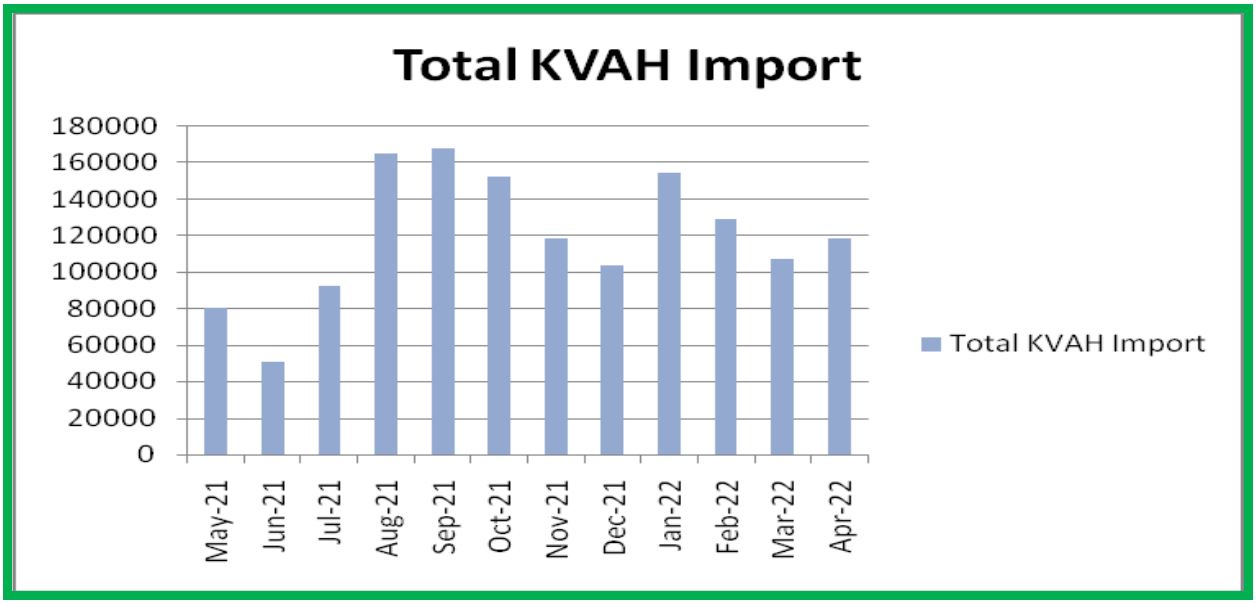
Sr. No.	Month	KWH	KVAH
13	Total	33940	55505
14	AVG.	2828.333	4625.417



TOTAL KVAH IMPORT

Sr. No.	Month	Total KVAH Import
1	May-21	80410
2	Jun-21	50810
3	Jul-21	92350
4	Aug-21	165205
5	Sep-21	167835
6	Oct-21	152705
7	Nov-21	118650
8	Dec-21	104035

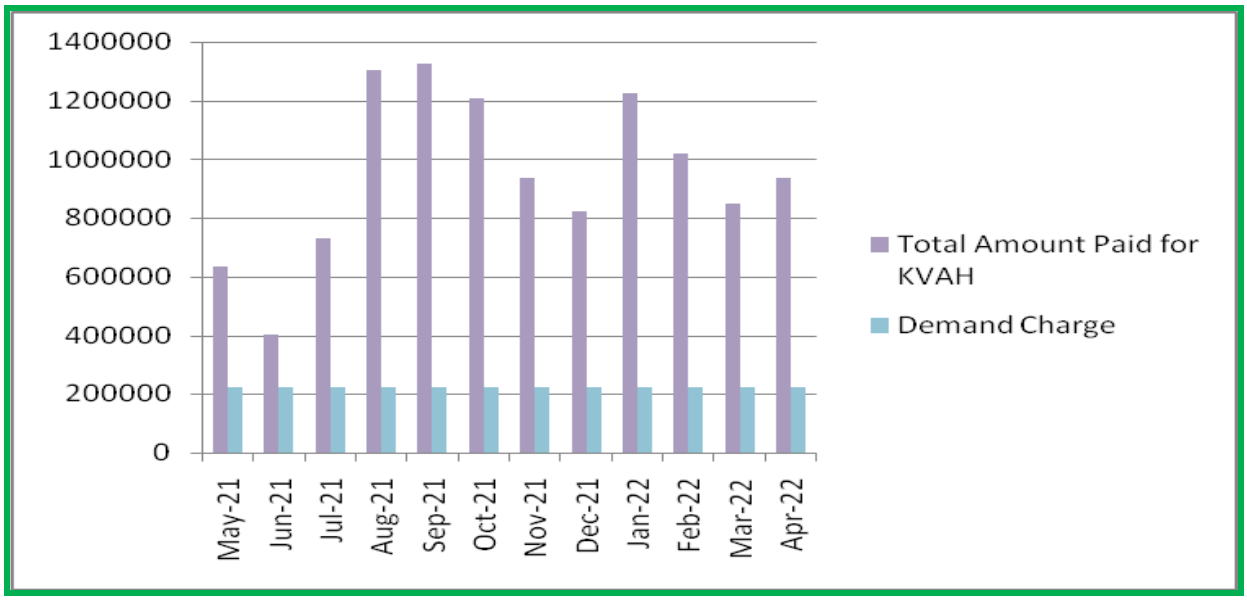
Sr. No.	Month	Total KVAH Import
9	Jan-22	154900
10	Feb-22	128985
11	Mar-22	107615
12	Apr-22	118380
13	Total	1441880
14	AVG.	120156.667



Charges Paid for the bill

Sr. No.	Month	Total Amount Paid for KVAH	Demand Charge
1	May-21	634739	221984.6
2	Jun-21	400899	221984.6
3	Jul-21	729065	221984.6
4	Aug-21	1304619.5	221984.6

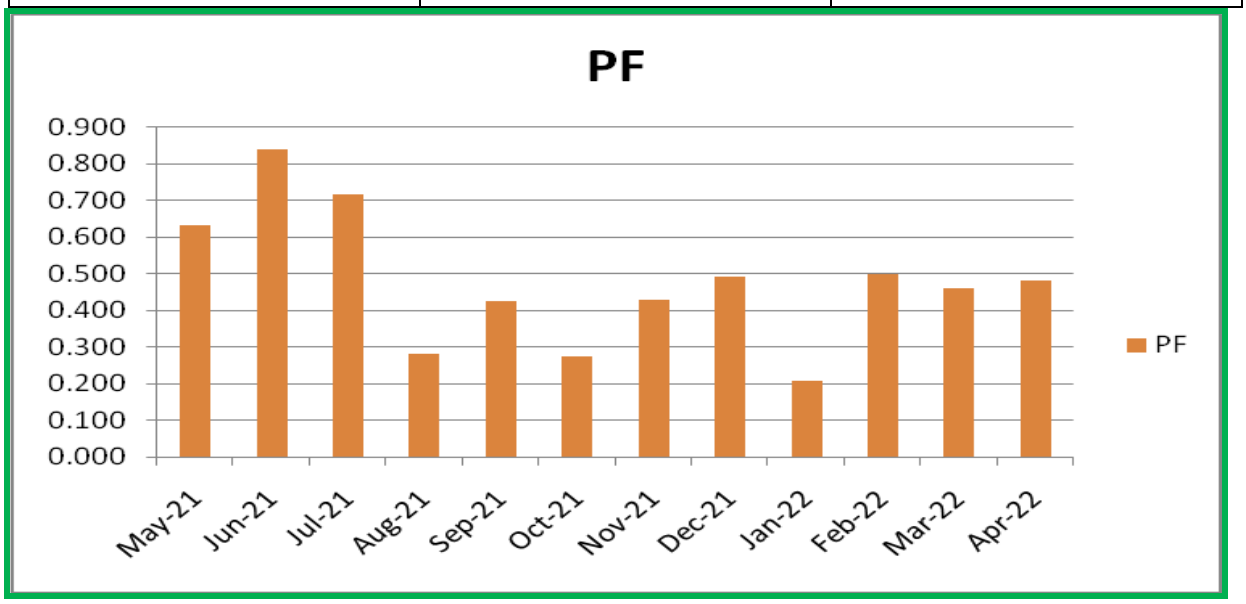
Sr. No.	Month	Total Amount Paid for KVAH	Demand Charge
5	Sep-21	1325396.5	221984.6
6	Oct-21	1205869.5	221984.6
7	Nov-21	936835	221984.6
8	Dec-21	821376.5	221984.6
9	Jan-22	1223210	221984.6
10	Feb-22	1018481.5	221984.6
11	Mar-22	849658.5	221984.6
12	Apr-22	934702	221984.6
13	Total	11384852	2663815.09



Power Factor Variation

Sr. No.	Month	PF
1	May-21	0.634

Sr. No.	Month	PF
2	Jun-21	0.840
3	Jul-21	0.717
4	Aug-21	0.281
5	Sep-21	0.427
6	Oct-21	0.274
7	Nov-21	0.431
8	Dec-21	0.491
9	Jan-22	0.208
10	Feb-22	0.500
11	Mar-22	0.460
12	Apr-22	0.482
13	AVG.	0.479



OVERALL ENERGY BILL FOR METER NO. XE498270 (SS-B, C AND D)

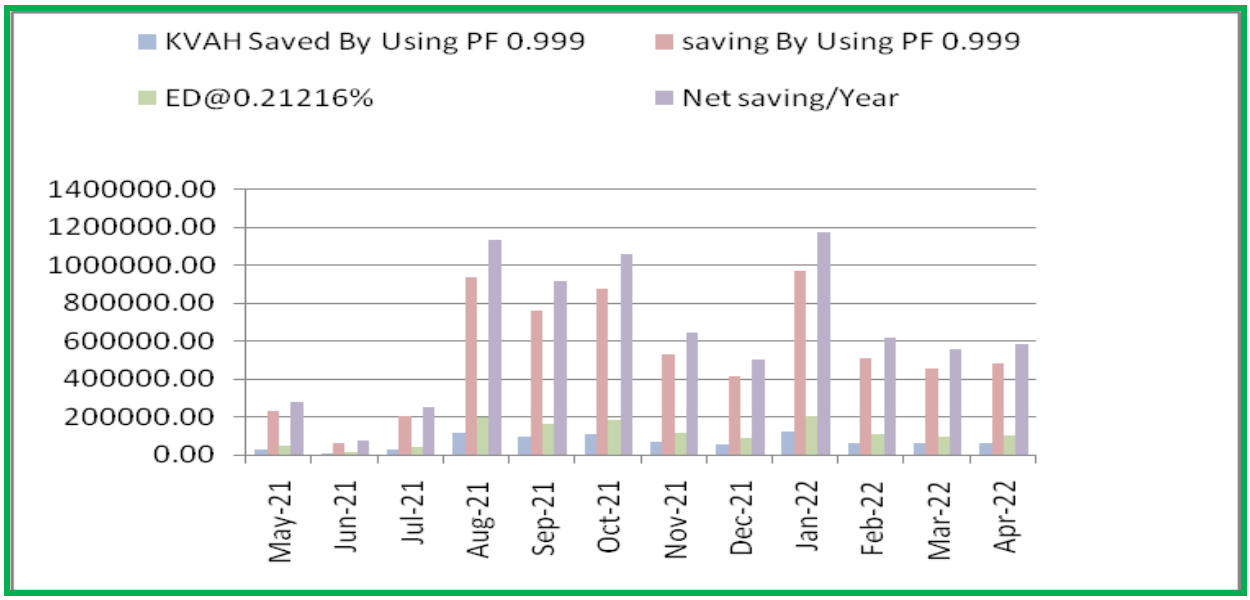
JUNE 2021 TO MAY 2022

Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand	KWH	KVAH	PF	Total KVAH Import	Rs. For 2500/KVAH	Rs. For /KVAH	Total Amount Paid for KVAH	Demand Charge	Total Bill Paid
1	May-21	778.89	584.170	330.6	8375	13220	0.634	80410	19250	615489	634739	221984.6	921243.2
2	Jun-21	778.89	584.170	212.6	12625	15025	0.840	50810	19250	381649	400899	221984.6	669752
3	Jul-21	778.89	584.170		1770	2470	0.717	92350	19250	709815	729065	221984.6	1055147
4	Aug-21	778.89	584.170	584.170	225	800	0.281	165205	19250	1285369.5	1304619.5	221984.6	1631588.91
5	Sep-21	778.89	584.170	553.6	425	995	0.427	167835	19250	1306146.5	1325396.5	221984.6	1663459
6	Oct-21	778.89	584.170	580.8	130	475	0.274	152705	19250	1186619.5	1205869.5	221984.6	1534988.95
7	Nov-21	778.89	584.170	550.8	2510	5830	0.431	118650	19250	917585	936835	221984.6	1245839
8	Dec-21	778.89	584.170	468.6	2820	5745	0.491	104035	19250	802126.5	821376.5	221984.6	1121685
9	Jan-22	778.89	584.170	341	110	530	0.208	154900	19250	1203960	1223210	221984.6	1553625
10	Feb-22	778.89	584.170	427.8	230	460	0.500	128985	19250	999231.5	1018481.5	221984.6	1333532

Sr. No.	Month	Connected Demand	Billable Demand	Billed Demand	KWH	KVAH	PF	Total KVAH Import	Rs. For 2500/KVAH	Rs. For /KVAH	Total Amount Paid for KVAH	Demand Charge	Total Bill Paid
11	Mar-22	778.89	584.170	432.6	1630	3545	0.460	107615	19250	830408.5	849658.5	221984.6	1152096
12	Apr-22	778.89	584.170	339.8	3090	6410	0.482	118380	19250	915452	934702	221984.6	1243525
13	Total				33940	55505		1441880	231000	11153852	11384852	2663815.09	15126481.06
14	AVG.				2828.333	4625.417	0.479	120156.667	19250.000	929487.67	7.9		10.49

OVERALL SAVING BY USING POWER FACTOR 0.999 FOR METER NO. XE498270 (SS-B, C AND D)

Sr. No.	Month	KVAH Saved by Using PF 0.999	saving By Using PF 0.999	ED@0.21216%	Net saving/Year
1	May-21	29389.06	232173.61	49257.95	281431.56
2	Jun-21	8065.26	63715.58	13517.90	77233.48
3	Jul-21	26079.71	206029.75	43711.27	249741.02
4	Aug-21	118575.89	936749.52	198740.78	1135490.30
5	Sep-21	95978.85	758232.90	160866.69	919099.60
6	Oct-21	110759.35	874998.85	185639.76	1060638.60
7	Nov-21	67448.76	532845.20	113048.44	645893.64
8	Dec-21	52864.18	417626.99	88603.74	506230.74
9	Jan-22	122596.04	968508.74	205478.81	1173987.56
10	Feb-22	64363.52	508471.77	107877.37	616349.14
11	Mar-22	58025.73	458403.30	97254.85	555658.15
12	Apr-22	61195.44	483443.99	102567.48	586011.47
13	Total	815341.80	6441200.21	1366565.04	7807765.25
14	AVG.	67945.15	536766.68	113880.42	650647.10



Observations and Suggestions:

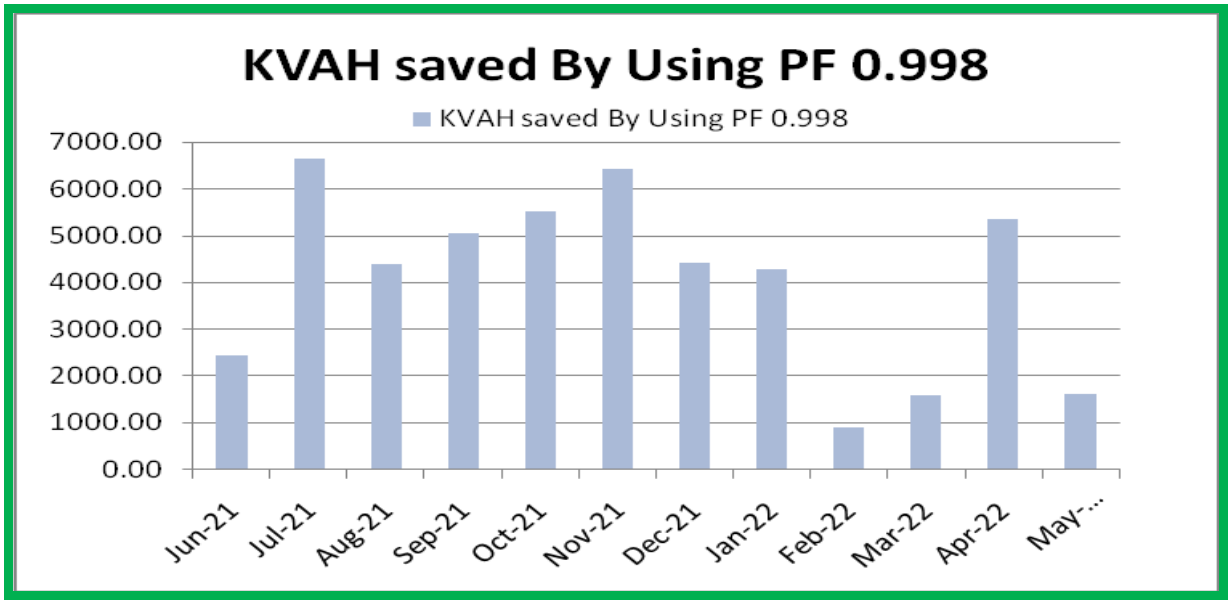
- During the study of electricity bills from June 2021 to May 2022 of Meter NO. XE498276 (SS-A) it was found that the power factor level was running very lower side i.e. 0.646 to 960. It was also found the power factor level for Meter NO. XE498270 (SS-B,C and D) it was also running very low i.e. 0.274 to 0.840 which is very low. It shoul be 0.999 and 1.00 at every load condition.
- To maintain the power factor ehixesting level to 0.999 or 1.00 at every load condition it is suggested install a power factor correction panel at both connections, so that it will able to maintain the power factr 0.999 and above.
- The investment to improve the power factor for of Meter NO. XE498276 (SS-A) are Rs.675000/- and for Meter NO. XE498270 (SS-B,C and D) are Rs.675000/-
- The billing is on KVAH basis, so there huge sving by using power factor 0.999.

8. STUDY OF CAPACITOR PANEL

The campus has not installed any capacitor panel at both feeders. If we look at the overall average monthly electricity bills in last 12 months by campus for financial year 2021-22 power factor was mentioned in electricity bills billet on KVAH basis was given. The actual KVAR required to maintain the power factor from existing level to 0.999 and above for both two connections are 450 KVAR for each feeder. Details are given below.

KVAH saved by installation of Capacitor Bank for Meter NO. XE498276

Sr. No.	Month	KVAH saved By Using PF 0.998
1	Jun-21	2431.27
2	Jul-21	6654.86
3	Aug-21	4373.02
4	Sep-21	5055.66
5	Oct-21	5518.22
6	Nov-21	6419.55
7	Dec-21	4397.48
8	Jan-22	4270.82
9	Feb-22	881.97
10	Mar-22	1564.58
11	Apr-22	5360.21
12	May-22	1597.70
13	Total	48525.33



- Total KVAH saved by installing capacitor panel is =48525 KVAH
- Capacitor panel is required to save above is =450 KVAR
- Cost for 450 KVAR APFC Capacitor panel is app. =Rs.675000/
- Erection, commissioning, testing and cable charges =Rs.125000/-
- Total Charges are = Rs.800000/-
- Payback within =1.75 Years.

KVAH saved by installation of Capacitor Bank for Meter NO. XE498270

Sr. No.	Month	KVAH Saved by Using PF 0.999
1	May-21	29389.06
2	Jun-21	8065.26
3	Jul-21	26079.71
4	Aug-21	118575.89
5	Sep-21	95978.85
6	Oct-21	110759.35
7	Nov-21	67448.76

Sr. No.	Month	KVAH Saved by Using PF 0.999
8	Dec-21	52864.18
9	Jan-22	122596.04
10	Feb-22	64363.52
11	Mar-22	58025.73
12	Apr-22	61195.44
13	Total	815341.80
14	AVG.	67945.15

- Total KVAH saved by installing capacitor panel is app. =815340 KVAH
- Capacitor panel is required to save above is =450 KVAR
- Cost for 450 KVAR APFC Capacitor panel is app. =Rs.675000/
- Erection, commissioning, testing and cable charges =Rs.125000/-
- Total Charges are =Rs.800000/-
- Payback within =2Months

9. LOAD PROFILE OF THE FACILITY

Load profile at different feeders:

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
Sub-station -A																
A1-For- Transformer 1000KVA, Output (SS-A)																
MIN	400.30	406.90	402.10	464.80	324.30	451.00	49.85	284.92	309.00	0.91	1.10	1.10	1.10	2.20	1.40	1.70
MAX	416.50	423.40	418.80	609.00	441.00	611.20	50.06	350.68	380.48	0.93	1.20	1.30	1.20	3.20	2.40	2.70
AVG	405.63	412.88	407.83	567.10	393.33	545.40	49.98	326.81	355.26	0.92	1.19	1.22	1.12	2.58	1.73	2.10
A2-For- Admin Block (SS-A)																
MIN	412.40	414.60	407.40	103.80	84.80	98.60	49.89	67.57	69.13	0.98	1.20	1.30	1.10	2.90	3.60	2.80
MAX	415.60	416.60	409.40	115.60	96.00	110.00	49.96	73.77	75.14	0.98	1.30	1.40	1.20	3.80	4.80	3.70
AVG	414.45	415.65	408.55	112.71	89.79	103.35	49.92	71.49	72.90	0.98	1.20	1.31	1.15	3.35	4.27	3.28
A3-For-Rani Laxmi Bai Hostel, Guest House, Dhan Singh Gujjar Hall and Railway counter (SS-A)																
MIN	411.70	411.90	405.20	16.71	2.62	36.16	49.90	12.97	13.17	0.98	1.20	1.30	1.10	7.70	27.60	2.40

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MAX	416.00	415.40	408.30	16.91	2.80	50.85	49.98	16.44	16.71	0.99	1.20	1.50	1.30	9.10	29.60	3.70
AVG	414.06	413.75	407.14	16.81	2.67	36.62	49.95	13.09	13.29	0.98	1.20	1.34	1.20	8.46	28.19	2.99
A13-For-D. G Set 250 KVA (SS-A)																
MIN	400.50	410.00	404.10	75.20	46.80	64.10	47.42	45.93	49.44	0.83	1.40	1.30	1.10	3.10	3.70	2.70
MAX	422.40	417.00	422.70	251.70	276.20	234.70	51.11	161.98	167.10	0.97	3.40	2.70	3.50	12.10	13.90	9.00
AVG	414.94	414.51	415.89	210.62	205.09	196.98	50.35	142.22	146.97	0.97	2.37	1.76	2.45	3.70	4.78	4.40
B47-For-D.G. Set 180 KVA (SS-A)																
MIN	419.50	414.10	411.50	4.70	39.20	61.10	50.85	24.59	26.90	0.91	0.90	1.40	1.10	5.10	4.90	5.10
MAX	428.70	420.30	414.40	103.60	159.60	217.70	52.88	109.86	112.27	0.99	1.60	1.90	1.90	76.10	16.60	15.10
AVG	424.65	417.57	413.62	87.50	133.74	181.55	51.26	94.94	97.22	0.98	1.35	1.53	1.33	8.53	6.16	5.94
B1-For-Durga Bhabhi Hostel UG (SS-A)																
MIN	405.50	407.30	408.70	5.60	17.67	7.38	49.86	6.87	7.21	0.94	1.20	1.20	1.10	4.80	4.60	6.40
MAX	407.80	410.30	411.00	5.67	18.15	8.22	49.95	7.07	7.49	0.95	1.30	1.40	1.20	5.40	5.10	7.20

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
AVG	406.43	408.78	409.53	5.63	17.82	7.51	49.92	6.94	7.29	0.95	1.20	1.29	1.18	5.22	4.86	6.62
B2-For-Library Information Science (SS-A)																
MIN	407.00	409.10	410.10	8.30	18.43	11.34	49.85	8.95	8.99	0.99	1.20	1.20	1.10	5.00	2.40	3.20
MAX	410.40	412.90	413.20	8.35	18.62	11.37	49.99	9.04	9.09	1.00	1.20	1.30	1.20	5.30	2.60	3.30
AVG	408.75	411.04	411.68	8.33	18.48	11.36	49.91	8.99	9.04	0.99	1.20	1.29	1.14	5.17	2.51	3.23
B3-For-Old Over Head, Urdu and Hindi Dept. (SS-A)																
MIN	411.10	409.30	407.40	14.38	14.97	2.43	49.92	5.39	8.56	0.57	1.20	1.10	1.20	9.20	14.50	13.50
MAX	413.20	413.80	411.30	27.69	22.55	17.99	50.04	12.32	15.67	0.86	1.40	1.30	1.30	17.90	25.60	293.40
AVG	412.39	412.21	409.69	21.70	18.05	6.37	50.00	8.28	10.96	0.75	1.29	1.15	1.25	12.25	19.44	55.98
B4-For-Rani Laxmi Bai Hostel (SS-A)																
MIN	407.60	411.00	410.10	16.22	8.84	38.28	49.98	14.68	15.19	0.96	1.20	1.20	1.10	9.10	7.60	4.90
MAX	409.70	412.40	411.90	16.91	8.99	45.89	50.03	16.39	16.90	0.97	1.30	1.30	1.30	11.10	9.80	7.40
AVG	408.71	411.58	410.87	16.52	8.93	43.08	50.01	15.76	16.27	0.97	1.24	1.29	1.18	10.24	9.14	6.12

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
B5-For-New Girls Hostel (SS-A)																
MIN	408.00	411.20	410.00	13.25	20.86	31.15	49.96	15.44	15.84	0.98	1.20	1.20	1.10	3.00	2.80	1.30
MAX	410.50	413.00	412.60	14.57	23.15	31.74	50.06	15.96	16.35	0.98	1.30	1.30	1.20	3.90	3.40	1.80
AVG	409.60	412.28	411.64	14.18	22.02	31.36	50.01	15.68	16.06	0.98	1.27	1.28	1.16	3.35	3.10	1.57
B6-For-Durga Bhabhi Hostel Overhead (SS-A)																
MIN	407.70	410.50	409.10	15.76	18.68	22.70	49.95	13.23	13.69	0.97	1.20	1.20	1.10	4.30	3.50	2.40
MAX	409.60	412.20	410.60	16.44	24.40	23.20	50.04	14.69	15.07	0.98	1.30	1.30	1.30	4.50	5.60	2.70
AVG	408.52	411.39	409.90	16.10	22.73	23.01	49.99	14.25	14.64	0.97	1.24	1.29	1.17	4.40	4.13	2.54
B7-For-New Park																
MIN	407.80	406.70	408.00	21.23	34.59	34.55	49.91	19.88	21.42	0.93	1.10	1.20	1.20	3.30	3.40	3.10
MAX	410.50	408.90	411.20	21.50	35.01	35.02	49.99	20.01	21.53	0.93	1.20	1.30	1.30	3.50	3.60	3.20
AVG	409.00	407.83	409.89	21.38	34.75	34.79	49.93	19.93	21.46	0.93	1.20	1.23	1.27	3.41	3.50	3.12
B8-For-zoology Dept. and Old Tube well (SS-A)																

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MIN	408.00	411.00	409.80	44.10	59.05	80.98	49.92	40.17	44.13	0.89	1.20	1.20	1.10	3.00	5.40	6.90
MAX	410.90	414.30	413.40	47.09	62.28	99.79	50.02	43.85	48.62	0.92	1.30	1.40	1.30	5.10	6.50	9.70
AVG	408.91	412.45	411.35	45.67	60.57	86.32	49.98	41.63	45.74	0.91	1.26	1.29	1.20	3.84	6.01	8.47
B9-For-VC Office (SS-A)																
MIN	411.00	408.20	411.80	24.37	52.18	7.05	49.96	19.29	19.93	0.97	1.10	1.20	1.20	10.80	3.30	20.20
MAX	413.30	411.70	413.60	29.93	56.94	7.77	50.02	21.50	22.12	0.97	1.20	1.30	1.40	16.60	6.20	29.30
AVG	412.11	409.40	412.59	25.50	53.55	7.43	49.99	19.91	20.54	0.97	1.19	1.23	1.29	13.79	4.49	24.13
B10-For-Secrecy Exam. Dept. (SS-A)																
MIN	399.80	398.40	417.30	20.77	14.96	11.27	49.98	8.19	11.82	0.68	1.20	1.20	1.20	5.70	11.50	12.70
MAX	417.30	417.50	420.30	22.62	15.78	14.47	50.04	8.65	12.65	0.70	2.40	2.60	1.30	7.00	14.90	18.30
AVG	411.79	411.00	418.67	22.37	15.33	13.74	50.01	8.43	12.30	0.69	1.57	1.53	1.28	6.17	13.37	13.81
B11-For-Rani Laxmi Bai Hostel (SS-A)																
MIN	417.70	419.80	416.90	3.76	29.63	25.92	49.96	14.40	14.65	0.98	1.10	1.20	1.20	6.90	9.80	3.70

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MAX	422.20	423.90	421.80	4.03	37.29	27.30	50.07	16.40	16.57	0.99	1.30	1.30	1.30	7.70	13.80	4.30
AVG	419.79	422.02	419.46	3.79	31.19	26.97	50.02	14.82	15.07	0.98	1.20	1.26	1.24	7.45	12.48	3.94
B12-For-Dara Singh Kushti Hall, MBA (SS-A)																
MIN	416.80	422.00	416.40	46.73	46.06	52.49	49.96	23.18	35.37	0.65	1.20	1.20	1.20	3.70	4.70	4.30
MAX	419.60	423.70	419.00	47.45	47.14	53.13	50.03	23.69	35.64	0.67	1.30	1.30	1.40	4.00	5.10	4.50
AVG	418.12	422.73	417.98	47.10	46.57	52.83	49.99	23.50	35.50	0.66	1.28	1.29	1.30	3.84	4.90	4.40
B13-For-Computer Center and New Answer Book Hall (SS-A)																
MIN	418.00	411.10	416.80	16.77	17.40	5.78	49.89	8.73	9.66	0.89	1.20	1.10	1.20	7.60	17.70	5.00
MAX	420.60	413.90	420.00	33.25	36.79	34.03	50.07	21.98	22.74	0.97	1.40	1.30	1.30	14.30	40.50	12.00
AVG	419.27	412.62	418.30	25.10	28.04	20.44	50.00	16.90	17.71	0.95	1.30	1.16	1.24	9.89	25.65	7.23
B14-For-Auditorium, Main Gate and Security Office (SS-A)																
MIN	416.90	409.70	414.30	7.63	1.49	9.11	49.90	4.29	4.39	0.98	1.20	1.10	1.20	6.10	17.90	10.20
MAX	419.00	411.90	417.90	7.67	1.72	9.23	49.98	4.38	4.46	0.98	1.30	1.20	1.30	8.10	22.60	11.40

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
AVG	417.95	410.61	416.76	7.65	1.65	9.18	49.94	4.35	4.43	0.98	1.29	1.17	1.21	7.23	19.50	10.88
B15-For-M-Phill (SS-A)																
MIN	412.80	412.40	405.50	23.70	14.37	16.41	49.86	10.11	13.21	0.77	1.20	1.30	1.20	13.10	42.60	16.20
MAX	416.80	416.20	410.10	34.91	20.24	20.83	49.98	14.66	16.52	0.88	1.20	1.40	1.30	20.20	69.30	23.20
AVG	414.76	414.73	408.13	25.34	15.43	18.77	49.92	11.55	14.17	0.81	1.20	1.31	1.20	17.43	62.23	19.01
A12-For-D. G Set 320 KVA (SS-A)																
MIN	443.60	442.70	442.60	67.30	83.60	82.40	50.26	55.80	60.45	0.91	0.50	0.40	0.40	3.50	3.00	2.70
MAX	448.20	444.60	450.10	190.90	207.60	175.40	50.84	135.61	142.26	0.96	1.30	1.00	0.90	8.80	6.20	6.30
AVG	445.73	443.51	446.85	150.59	173.89	133.02	50.44	110.40	117.68	0.94	0.63	0.53	0.57	4.53	3.63	4.73
Sub-station -B																
A5-For-Transformer 630 KVA, Output (SS-B)																
MIN	409.80	405.40	409.90	165.40	303.60	203.60	49.92	141.15	162.25	0.87	1.20	1.20	1.10	1.30	0.80	1.40
MAX	419.20	415.50	419.20	409.90	637.20	489.20	50.06	338.81	362.68	0.94	1.40	1.40	1.40	3.80	2.10	3.90

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
AVG	414.16	410.07	413.91	267.74	452.14	350.39	50.00	231.94	254.96	0.91	1.28	1.28	1.28	2.29	1.28	2.06
A6-For-D.G. Set 380 KVA, (SS-B)																
MIN	422.40	417.70	418.80	127.60	182.30	184.00	49.95	109.67	119.95	0.91	0.70	1.00	0.60	3.20	2.90	2.30
MAX	431.30	422.30	420.30	320.50	437.80	484.80	50.53	281.16	295.93	0.96	1.70	1.60	1.60	5.40	5.50	4.70
AVG	425.50	419.79	419.63	236.66	342.38	336.72	50.15	211.75	222.89	0.95	1.34	1.33	1.10	3.94	3.48	2.85
A7-For-Transformer 630 KVA, Kendriya Mulyankan Bhawan (SS-B)																
MIN	417.40	421.20	419.00	157.70	184.30	195.10	49.63	132.53	137.98	0.96	2.90	2.90	2.90	23.30	18.50	18.30
MAX	428.60	432.80	430.10	219.20	224.10	243.90	50.03	157.86	162.86	0.98	3.40	3.50	3.50	33.00	29.40	28.40
AVG	422.76	426.87	424.38	192.08	203.23	216.14	49.84	145.18	149.98	0.97	3.17	3.20	3.26	27.64	26.06	25.03
A8-For-D.G. set 400 KVA, Kendriya Mulyankan Bhawan (SS-B)																
MIN	412.60	411.40	410.00	34.40	51.90	50.90	50.06	31.93	33.97	0.94	1.00	0.90	1.00	11.60	6.80	10.40
MAX	415.30	415.60	414.70	146.30	168.30	182.50	50.07	116.45	118.09	0.99	3.80	3.50	3.50	24.70	16.50	20.50
AVG	413.68	412.63	412.25	104.96	131.65	132.73	50.07	86.51	88.04	0.98	2.53	2.39	2.41	17.35	13.14	13.96

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
B23-For-History Law Substation-B, Civil (SS-B)																
MIN	413.10	412.80	413.30	30.26	23.02	17.20	49.94	16.05	17.21	0.93	2.70	2.60	2.80	9.80	10.90	14.50
MAX	417.90	419.00	419.40	31.48	27.87	22.50	50.04	18.75	19.32	0.97	2.80	2.80	3.00	10.20	14.20	20.00
AVG	415.59	415.81	417.01	30.87	23.94	21.08	50.00	17.35	18.25	0.95	2.72	2.73	2.89	9.99	13.28	16.04
B24-For- Examination Centre (SS-B)																
MIN	407.40	397.00	396.20	13.42	39.65	38.79	49.95	18.57	22.41	0.83	2.50	2.50	2.50	18.60	6.90	7.90
MAX	409.90	402.10	401.50	17.75	56.34	58.01	50.04	26.04	29.51	0.88	2.80	2.80	2.80	28.40	10.50	11.00
AVG	408.52	400.18	399.44	16.83	46.65	47.36	49.98	22.11	25.72	0.86	2.59	2.60	2.64	20.69	8.67	9.25
B25-For-KP Hostel, RK Hostel Panel 2nd (SS-B)																
MIN	407.00	394.70	394.40	3.61	5.50	20.97	49.99	6.69	7.12	0.93	2.70	2.70	2.70	10.10	6.40	9.50
MAX	408.30	399.60	399.80	6.12	5.94	23.73	50.04	7.34	7.75	0.95	3.00	3.10	3.10	18.10	7.60	11.90
AVG	407.56	397.75	397.68	4.06	5.67	22.15	50.01	6.93	7.32	0.95	2.87	2.89	2.92	15.74	7.10	10.50
B26-For-Farm House UG (SS-B)																

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MIN	391.10	393.60	407.30	29.66	5.28	10.12	49.95	10.87	10.99	0.99	2.60	2.70	2.60	3.40	6.50	7.00
MAX	399.10	401.20	412.40	44.53	6.40	11.37	50.03	13.94	14.03	0.99	3.00	3.00	2.90	5.20	10.20	8.30
AVG	396.75	398.45	410.42	36.94	5.71	10.85	49.99	12.39	12.50	0.99	2.72	2.80	2.75	4.28	8.30	7.67
B27-For-Physics Dept. AC (SS-B)																
MIN	391.80	408.60	391.10	18.13	1.43	18.70	49.95	8.42	8.80	0.90	2.60	2.50	2.60	12.80	4.60	9.70
MAX	398.90	410.80	398.10	18.45	15.24	26.77	50.04	13.40	13.98	0.97	3.00	2.90	3.10	21.40	19.10	15.80
AVG	396.53	409.71	394.67	18.27	6.00	25.59	50.00	11.06	11.50	0.96	2.77	2.62	2.72	16.98	12.53	11.49
B28-For-Campus Farm OH, (SS-B)																
MIN	394.60	410.50	394.40	20.58	6.67	3.25	49.96	7.09	7.36	0.95	2.30	2.20	2.20	3.40	3.90	3.70
MAX	403.70	414.00	404.00	36.99	9.51	5.25	50.08	11.30	11.47	0.99	3.00	2.80	2.90	5.30	8.30	8.20
AVG	401.41	412.54	401.49	27.07	8.15	3.78	50.03	8.81	9.04	0.97	2.68	2.52	2.55	4.16	6.09	6.91
B29-For-Brahaspati Bhawan, Horticulture Dept. (SS-B)																
MIN	417.70	412.10	423.20	24.53	22.77	13.66	49.97	14.32	15.48	0.91	1.40	1.40	1.30	2.40	2.80	4.70

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MAX	424.50	418.00	426.60	58.06	34.78	38.29	50.04	29.60	31.34	0.95	1.60	1.60	1.50	5.60	7.50	10.30
AVG	422.15	414.84	425.14	36.50	28.57	25.06	50.00	20.41	21.93	0.93	1.49	1.45	1.39	4.41	4.86	7.60
B30-For-Canteen Library, Internet (SS-B)																
MIN	413.70	422.30	417.90	41.10	13.30	59.38	49.94	25.10	27.64	0.91	1.20	1.10	1.30	12.90	9.70	7.50
MAX	419.50	429.30	423.90	55.73	26.47	74.55	50.02	36.61	38.29	0.96	1.50	1.30	1.50	17.40	20.30	10.40
AVG	415.23	424.37	420.13	51.72	22.47	70.04	49.98	33.24	35.02	0.95	1.37	1.27	1.36	14.07	12.38	8.43
B31-For-KP Hostel, RK Hostel Panel 1st (SS-B)																
MIN	418.30	412.30	420.80	31.82	47.17	34.64	49.94	26.31	27.73	0.95	1.30	1.20	1.10	4.30	2.10	2.50
MAX	421.60	416.70	425.80	32.91	59.70	43.73	50.07	30.57	31.91	0.96	1.40	1.30	1.30	4.80	3.10	3.40
AVG	419.97	414.20	423.39	32.38	52.99	36.34	50.00	28.01	29.41	0.95	1.31	1.24	1.25	4.54	2.51	3.07
B32-For-SS-C, Farm Tank (SS-B)																
MIN	417.60	410.00	424.30	45.92	32.67	50.07	49.98	27.13	32.07	0.84	1.20	1.20	1.10	2.70	5.60	3.30
MAX	425.40	418.30	427.10	49.18	35.68	52.90	50.07	27.35	32.43	0.85	1.50	1.40	1.40	3.10	7.40	3.90

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
AVG	422.89	415.74	425.49	46.95	34.64	50.97	50.03	27.22	32.28	0.84	1.37	1.28	1.30	2.82	6.18	3.48
B33-For-Sociology, English, Sewer Pumping Station, Physical Education (SS-B)																
MIN	414.90	407.60	419.60	45.90	17.60	22.20	50.02	20.15	22.32	0.46	1.30	1.20	1.20	1.10	1.600	1.40
MAX	424.10	416.20	425.90	286.90	249.30	123.60	50.07	124.68	132.56	0.99	1.70	1.50	1.50	9.20	24.60	46.60
AVG	420.02	412.51	423.12	124.38	117.45	80.98	50.05	73.26	77.94	0.93	1.44	1.38	1.32	4.07	5.52	5.18
B34-For-DSW, Sports and Sanskrit (SS-B)																
MIN	415.70	407.70	420.10	117.00	98.50	103.00	49.97	72.37	77.03	0.94	1.40	1.30	1.20	1.60	1.90	2.00
MAX	423.00	414.30	424.60	141.10	101.50	111.30	50.04	80.04	84.86	0.95	1.60	1.50	1.50	2.20	2.20	2.80
AVG	418.10	410.02	421.88	123.79	99.54	108.13	50.01	75.28	79.86	0.94	1.50	1.39	1.37	2.03	2.09	2.37
B35-For-Physics, Chemistry, Microbiology Dept. (SS-B)																
MIN	420.70	412.10	424.50	41.85	40.27	19.72	49.96	20.72	24.84	0.83	1.40	1.20	1.20	7.40	5.60	6.90
MAX	422.40	413.70	426.00	61.80	52.08	29.20	50.04	30.97	33.66	0.92	1.50	1.30	1.30	11.80	8.00	14.20
AVG	421.58	413.00	425.16	53.48	45.59	23.83	50.01	26.75	29.86	0.89	1.40	1.27	1.23	8.89	6.81	10.18

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
B36-For-D.G. Set 180 KVA, (SS-B)																
MIN	404.60	400.90	397.70	7.90	37.30	56.90	53.45	28.57	29.22	0.98	1.30	1.00	1.50	12.10	4.10	6.80
MAX	409.50	404.50	402.20	31.40	77.40	91.10	53.76	41.82	42.16	0.99	1.50	1.20	1.70	35.60	8.30	9.40
AVG	407.05	402.79	399.73	25.92	53.99	74.51	53.59	35.57	35.92	0.99	1.41	1.09	1.59	14.43	6.00	7.82
B37-For-Lighting 1st Floor Kendriya Mulyankan Bhawan (SS-B)																
MIN	417.00	421.00	418.80	5.70	6.80	4.80	49.62	4.12	4.19	0.98	3.10	3.20	3.20	10.10	3.60	8.50
MAX	419.50	423.50	421.30	6.88	8.55	6.73	49.71	5.28	5.36	0.99	3.30	3.30	3.40	12.30	4.40	9.50
AVG	417.80	421.89	419.50	5.97	7.20	5.38	49.66	4.42	4.50	0.98	3.23	3.28	3.31	11.69	4.16	8.90
B38-For-Lighting 3rd Floor Kendriya Mulyankan Bhawan (SS-B)																
MIN	417.60	421.80	419.40	3.08	3.28	3.01	49.65	0.76	3.97	0.12	3.20	3.10	3.20	5.60	6.60	7.00
MAX	423.10	427.10	424.60	19.51	14.02	18.73	49.92	7.88	10.15	0.98	3.50	3.30	3.40	25.00	92.20	78.50
AVG	419.59	423.84	421.49	4.11	9.77	5.38	49.79	4.35	4.70	0.94	3.25	3.23	3.32	8.38	11.64	25.11
B39-For-Lighting 2nd Floor Kendriya Mulyankan Bhawan (SS-B)																

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MIN	421.70	425.30	422.60	8.97	7.01	14.66	49.89	7.39	7.53	0.98	3.20	3.20	3.20	10.10	6.60	7.00
MAX	423.80	427.60	425.30	9.05	7.04	21.58	49.94	9.11	9.24	0.99	3.30	3.20	3.40	10.30	6.80	9.20
AVG	423.09	427.05	424.83	9.01	7.03	16.94	49.91	7.96	8.10	0.98	3.21	3.20	3.29	10.17	6.68	7.55
B40-For-AC Feeder Kendriya Mulyankan Bhawan (SS-B)																
MIN	417.60	422.40	420.20	112.30	112.50	113.30	49.81	73.23	82.30	0.89	3.00	2.90	3.00	43.30	44.30	43.80
MAX	422.50	426.60	424.30	133.10	133.30	134.10	49.93	89.35	97.85	0.91	3.20	3.30	3.30	49.00	50.00	49.70
AVG	419.94	424.06	422.03	119.51	119.64	120.47	49.87	78.85	87.67	0.90	3.06	3.04	3.13	46.83	47.78	47.45
Sub-station -C																
A4-For- Transformer Output -630 KVA (SS-C)																
MIN	419.40	418.70	421.70	37.00	38.30	30.30	49.91	9.57	28.23	0.31	1.30	1.00	1.30	12.00	6.40	5.60
MAX	432.40	433.10	435.50	139.00	177.80	182.20	50.08	119.65	120.52	0.99	1.50	1.20	1.40	52.00	30.40	35.10
AVG	424.88	425.03	427.28	67.26	105.40	87.22	49.99	56.69	63.67	0.82	1.38	1.09	1.35	32.55	12.60	16.10
A11-For-D G Set 380 KVA (SS-C)																

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MIN	412.30	408.30	409.20	46.20	65.40	66.30	50.93	39.47	43.60	0.90	0.90	1.40	1.20	5.50	5.20	8.50
MAX	413.40	411.80	413.70	101.10	170.20	167.40	51.32	99.10	100.87	0.98	1.60	2.20	2.00	14.50	16.00	40.40
AVG	412.91	409.57	410.26	81.06	139.91	148.91	51.02	85.66	87.73	0.97	1.01	1.56	1.44	7.14	6.87	11.51
B16-For-Library, Workshop and New Hostel (SS-C)																
MIN	391.70	394.50	391.80	53.91	42.22	25.59	49.90	27.78	28.16	0.99	1.40	1.80	1.90	3.90	3.60	6.20
MAX	398.40	400.10	394.90	56.64	43.53	29.85	50.04	29.00	29.37	0.99	1.60	2.00	2.10	4.50	4.20	7.60
AVG	394.01	396.87	393.66	55.17	43.13	28.93	49.98	28.61	28.99	0.99	1.50	1.92	1.97	4.21	3.86	6.67
B17-For-D-Block Mechanical (SS-C)																
MIN	398.50	399.50	392.40	49.86	41.53	38.36	49.94	29.66	29.79	0.99	1.30	1.70	1.90	4.90	5.80	7.30
MAX	400.70	401.90	394.60	53.22	47.07	43.21	50.07	32.76	32.88	1.00	1.50	2.00	2.10	5.40	6.80	8.80
AVG	399.59	400.26	393.10	51.62	43.93	40.15	50.01	31.03	31.16	1.00	1.43	1.86	1.98	5.14	6.32	8.10
B18-For-Block-A, B and Admin Block (SS-C)																
MIN	399.80	399.90	392.60	27.13	16.18	41.19	49.93	18.63	19.91	0.93	1.30	1.80	1.90	9.70	10.40	31.10

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
MAX	402.20	401.90	395.50	36.34	29.10	48.59	50.04	24.90	25.91	0.96	1.40	1.90	2.00	14.50	20.60	39.90
AVG	401.02	400.86	394.00	30.69	22.19	45.69	50.00	21.52	22.64	0.95	1.39	1.81	1.95	12.20	14.92	34.34
B19-For-Water Tank and Sewer pumping station (SS-C)																
MIN	400.80	400.60	393.80	20.87	29.72	20.37	49.93	13.91	16.39	0.85	1.30	1.80	1.90	3.40	5.80	4.30
MAX	402.10	402.00	395.70	21.04	29.96	20.64	50.05	14.06	16.54	0.85	1.40	1.90	2.00	3.50	6.20	4.40
AVG	401.45	401.28	394.67	20.97	29.87	20.54	50.01	14.00	16.47	0.85	1.40	1.84	1.98	3.46	5.96	4.39
B20-For-Applied Science (SS-C)																
MIN	398.80	392.30	398.90	14.51	26.12	9.29	49.95	6.33	12.18	0.52	1.80	1.90	1.30	12.60	9.90	23.50
MAX	400.90	394.40	401.50	17.90	28.73	14.65	50.02	7.52	14.01	0.54	1.90	2.00	1.40	18.10	11.30	39.30
AVG	399.90	393.32	400.01	16.58	27.24	13.04	49.98	6.88	13.05	0.53	1.81	1.93	1.38	15.28	10.64	27.51
B21-For-Block-C and Horticulture (SS-C)																
MIN	399.30	393.20	399.90	23.15	25.01	27.41	49.99	10.58	17.53	0.60	1.70	1.80	1.30	8.20	7.80	10.10
MAX	401.00	395.00	401.20	24.09	26.26	28.68	50.03	10.89	18.13	0.60	1.90	2.10	1.50	9.30	8.90	11.40

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
AVG	400.23	394.17	400.53	23.66	25.70	28.13	50.01	10.72	17.82	0.60	1.83	1.93	1.37	8.70	8.26	10.75
B22-For-APJ Abdul Kalam Hostel (SS-C)																
MIN	398.80	393.60	398.20	25.52	17.06	14.40	49.97	12.98	13.19	0.98	1.80	1.90	1.40	3.30	7.00	5.00
MAX	403.90	397.90	403.50	26.24	17.51	14.70	50.09	13.30	13.54	0.99	2.00	2.10	1.50	3.60	7.90	6.40
AVG	401.43	395.61	400.89	25.88	17.14	14.58	50.04	13.09	13.32	0.98	1.93	1.99	1.41	3.43	7.36	5.52
Sub-Station D																
A9-For-Outgoing transformer 630 KVA (SS-D)																
MIN	408.00	409.60	410.90	40.70	61.30	48.10	49.91	35.03	36.27	0.96	0.70	0.70	0.70	1.50	2.60	2.40
MAX	417.40	419.50	419.60	181.10	256.80	159.90	50.07	135.75	138.21	0.98	1.10	1.20	1.20	3.90	5.20	4.40
AVG	412.47	414.48	415.27	127.75	181.16	115.80	49.99	99.46	101.51	0.98	0.93	0.91	0.97	2.23	3.57	3.12
A10-For-D G Set 250 KVA (SS-D)																
MIN	402.80	411.90	409.00	49.50	54.30	47.40	50.27	35.63	36.05	0.98	2.20	2.00	1.40	3.10	4.20	3.40
MAX	412.30	414.00	414.30	187.10	114.80	115.70	50.37	90.46	91.78	0.99	3.00	2.50	2.20	10.20	9.80	9.10

	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
AVG	406.45	413.04	410.86	144.14	94.81	99.88	50.31	79.18	80.18	0.99	2.30	2.19	1.56	4.20	5.43	4.55
B41-For-New Mass Communication Dept (SS-D)																
MIN	401.80	401.90	409.00	10.98	11.73	4.35	49.96	6.84	6.93	0.97	0.90	1.00	0.90	11.90	8.60	6.50
MAX	418.10	418.10	416.30	14.25	15.31	15.55	50.07	9.92	10.08	0.99	1.00	1.10	1.10	14.80	10.40	12.30
AVG	414.16	413.99	412.18	12.47	12.68	7.81	50.01	7.76	7.87	0.99	0.92	1.04	0.97	13.87	9.36	9.64
B42-For-New Hindi Dept (SS-D)																
MIN	405.70	409.50	404.80	2.28	1.07	2.15	49.91	1.27	1.30	0.91	0.80	1.00	0.90	3.50	3.80	5.60
MAX	410.50	413.80	408.90	12.22	1.08	2.64	50.02	3.69	3.75	0.99	1.00	1.20	1.00	15.60	4.40	6.70
AVG	407.51	411.05	406.51	7.94	1.07	2.30	49.96	2.61	2.66	0.98	0.98	1.08	0.98	9.59	4.11	6.29
B43-For- Zoology Dept. ground floor (SS-D)																
MIN	406.60	410.30	406.10	72.79	16.82	47.22	49.91	32.28	32.77	0.98	0.80	0.80	0.70	2.70	8.00	3.70
MAX	411.70	415.10	410.80	93.54	22.93	53.92	49.98	37.45	38.11	0.99	1.00	1.10	1.00	4.50	10.80	4.90
AVG	408.30	411.81	407.63	80.94	18.05	48.66	49.94	34.25	34.82	0.98	0.92	1.00	0.96	3.48	10.01	4.34

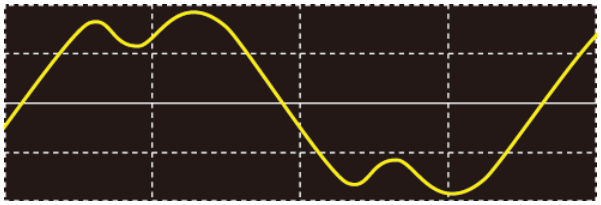
	Voltage-V1	Voltage-V2	Voltage-V3	Current-I1	Current-I2	Current-I3	Hz	Power KW	Power KVA	PF	%THD-V1	%THD-V2	%THD-V3	%THD-I1	%THD-I2	%THD-I3
B44-For-Psychology dept. (SS-D)																
MIN	412.00	414.80	411.00	34.96	41.64	31.07	49.98	26.06	26.20	0.99	0.70	0.70	0.60	7.70	5.50	2.20
MAX	413.30	416.40	412.30	41.80	44.14	37.79	50.08	29.14	29.30	1.00	0.90	0.80	0.80	10.10	7.10	5.00
AVG	412.65	415.74	411.54	36.00	43.61	34.93	50.04	27.21	27.35	0.99	0.75	0.78	0.73	9.41	6.32	3.65
B45-For-VSMP Hostel (SS-D)																
MIN	414.10	415.40	412.60	25.12	11.04	16.55	49.94	12.52	12.67	0.99	0.70	0.70	0.70	3.70	4.30	3.00
MAX	415.30	416.60	413.70	25.40	11.26	18.02	50.04	12.88	13.04	0.99	0.90	0.90	0.80	4.40	4.80	4.20
AVG	414.73	416.07	413.31	25.28	11.12	16.98	49.99	12.63	12.77	0.99	0.80	0.81	0.78	4.03	4.62	3.53
B46-For-Pt. Deendayal Upadhyay Hostel (SS-D)																
MIN	407.20	409.30	405.60	13.03	17.39	12.38	49.94	9.80	10.22	0.96	0.70	0.80	0.70	6.60	1.60	4.60
MAX	413.70	415.40	412.40	15.57	17.85	13.09	50.07	10.41	10.84	0.96	1.30	1.20	1.20	8.50	2.50	5.20
AVG	410.77	412.46	409.34	13.72	17.74	12.63	50.01	10.03	10.47	0.96	0.96	1.00	0.96	7.25	1.97	4.93

10. STUDY OF POWER QUALITY

Recently, electricity consumers have shown increasing concern for power quality. Indeed, power quality standards have become higher than before due to sensitivity of electronic gadgets and automation devices. Power Quality is the key to successful delivery of quality service of an IT industry. It is now even more critical to the industry because of increasing application of electronic loads and electronic controllers which are sensitive to the quality of power supplied.

In this study, the consumers are provided with the basic knowledge of power quality, while on the other hand, the existent regulations are evaluated in terms of consumers' rights so that poor power quality costs and loss are identified and amended. There are so many regulations in relation to the rights of electrical power consumers in legislation that regulates the relations between distribution companies and the consumers, whereas, in this study, only the issue of power quality is dealt with.

Power quality indices viz total voltage & current harmonics distortion (THD), Power Factor (pf), Transformer De-rating Factor "K", dielectric stress Crest Factor (CF), unbalancing in voltage & in current and Flicker Factor etc. If their values remain within the limits and that allows utilities to function in their intended manner without any interruption. Similarly, Power quality also helped to ensure that Unit remain operational at all times.



Harmonics are generated by semi-conductor control devices in the power supply of equipment as a result of distorted voltage and current waveforms. When the harmonic component is big, it may cause serious accidents such as overheating or noise in motors or transformers, burn out reactors in phase compensation capacitors, etc.,

Harmonic Current causes overheating of conductors and their insulation, overheating of transformers with increased losses, overloaded Neutral conductors, Neutral to Earth potential, overheating of capacitors and ultimately premature ageing or failure of equipment.

Harmonic Voltage – causes linear loads to draw non-linear current resulting in current distortion effects, torque pulsation in motors, capacitor dielectric failure, insulation breakdown, server and network equipment power supply failure, electronic lighting failure, malfunction of sensitive electronic equipment and, again, excessive distortion in distribution supply networks.

The Institute of Electrical & Electronic Engineers (IEEE), various government agencies and other organizations have been studying these problems and effects for several years. As a result, they have issued design guidelines and recommended practices

The Institute of Electrical and Electronics Engineers (IEEE) & International Electro technical Commission (IEC) has published different slanders time to time in this regard to improve the quality of power. IEEE 1159 describes recommended practices for monitoring of power quality. Comparison of different standards given below in table,

PARAMETER	IEEE 519	IEC 61000-2-2 (FOR EQUIPMENT)	EN 50160 (ONLY UP TO 35 KV)
Harmonics	a) THD voltage1.5 -5.0% THD current 5 -20% at PCC	THD<8%	Individual harmonics limit 0.5-6.0%
Voltage Unbalance	NA	2%	2-3%

Power Quality Term

Voltage Variation Compliance

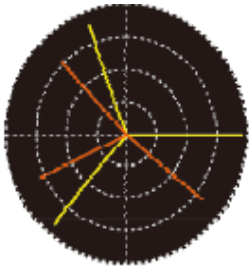
Voltage is relatively small deviations of voltage characteristics around their nominal or ideal values. The two basic examples are voltage magnitude and frequency

As per the Electricity (supply) Act 1948 & 1956, Electricity Act 2003, Electricity Code 2005, Voltages must be maintained within prescribed limited for various level of supply Voltage as depicted below,

- In case of LT supply, voltage variation should be within the limit of +/- 6%
- ii. In case of HT supply, voltage variation should be within the limit of +/- 6% + 6% & - 9%
- iii. In case of EHT supply, voltage variation should be within the limit of +/- 6%+ 10% & -12.5%

However, if the voltage at the point of commencement of supply varies beyond the above-specified limits, the Licensee (Power supply Company) shall ensure to get it rectified within following time limits, after receiving a complaint.

Voltage Unbalance Compliance



Power is distributed to customers by way of 3 phase electricity, in which each phase is initially transmitted at 120o before and after the proceeding and preceding phase and this is known as a balanced supply. However, differing loads on each of the phases causes imbalances between phases and amplitudes and can cause problems that may risk damage to

connected equipment and in extreme cases could pose electric shock risks.

Where such unbalances are identified, appropriate work is done either within the customer's installation or by balancing of the customer connections on the LV or the High Voltage (HV) distribution networks.

The Technical Rules outline the limit for the negative phase sequence component of the voltage (in percent of the positive sequence component) to be less than 2%.

But as per UPERC Electricity Code 2005, this limit is slightly higher and Power Supply (Licensee) shall ensure that the voltage unbalance does not exceed 3% at the point of commencement of supply.

PF, DPF & Tan

Power factor is the ratio between the KW and the KVA drawn by an electrical load where the KW is the actual load power and the KVA is the apparent load power. It is a measure of how effectively the current is being converted into useful work output and more particularly is a good indicator of the effect of the load current on the efficiency of the supply system.

There are two types of power factor, displacement power factor and distortion power factor caused by harmonics distortion. Only displacement power factor can be corrected by the addition of capacitors. Tangent is the phase angle in arc tan

The power factor of the distribution system and bulk consumer shall not be less than 0.95.

Harmonics Compliance

Harmonics are certain characteristics of voltage and current on a power system that arise from particular types of equipment that are connected to the system. Harmonics can result in extra strain on the network and devices connected to the network.

Various National and International organization has set up limit for Voltage and Current harmonics.

- As per central Electricity Authority: Paper 2007(technical paper)

  (1) The total harmonic distortion for voltage at the connection point shall not exceed 5% with no individual harmonic higher than 3%.

  (2) The total harmonic distortion for current drawn from the transmission system at the connection point shall not exceed 8%.

- As per the ELECTRICITY SUPPLY CODE, 2005 issued by UP Electricity Regulatory Commission, the total harmonic voltage distortion shall not exceed the limits mentioned below:

EHT = 4% HT = 5% LT = 20%

Crest factor (Ucf, Acf, Vcf)

The crest factor or peak-to-average ratio (PAR) or peak-to-average power ratio (PAPR) is a measurement of a waveform, calculated from the peak amplitude of the waveform divided by the RMS value of the waveform.

$$C = \frac{|x|_{\text{peak}}}{x_{\text{rms}}}$$

The minimum crest Factor is 1.0

Flicker (PST)

The power supply network voltage varies over time due to perturbations that occur in the processes of electricity generation, transmission and distribution. Interaction of electrical loads with the network causes further deterioration of the electrical power quality.

High power loads that draw fluctuating current, such as large motor drives and arc furnaces, cause low frequency cyclic voltage variations that result in:

Flickering of light sources can cause significant physiological discomfort, physical and psychological tiredness, and even pathological effects for human beings, Problems with the stability of electrical devices and electronic circuits.

Recurrent small changes of network voltage amplitude cause flickering of light sources. The effect is popularly referred to as ‘flicker’ and is a significant power quality parameter.

The value flicker severity index VPST=< 1.0 (for 10 minutes)

K-Factor

K-factor is a weighting of the harmonic load currents according to their effects on transformer heating, as derived from ANSI/IEEE C57.110. A K-factor of 1.0 indicates a linear load (no harmonics). The higher the K-factor will be the greater the harmonic heating effects (IEEE Standard 1100-1992).

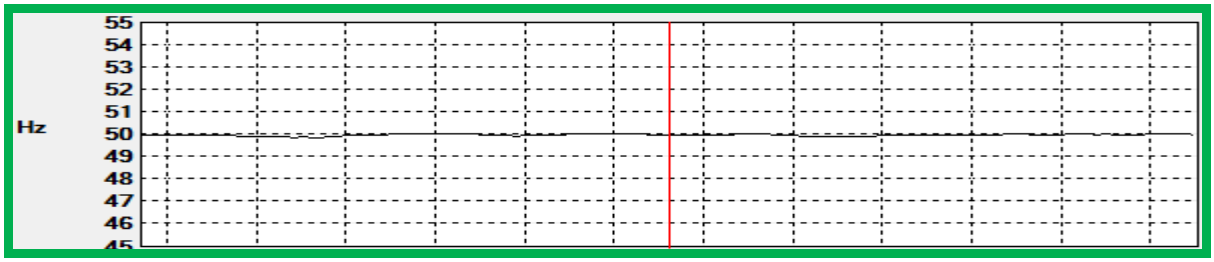
4.2. Instrumentation Support

Three Phase Power Manager with CTs and PTs. Power Quality has been measured at various locations through portable power manager; the recorded data are as follows: -

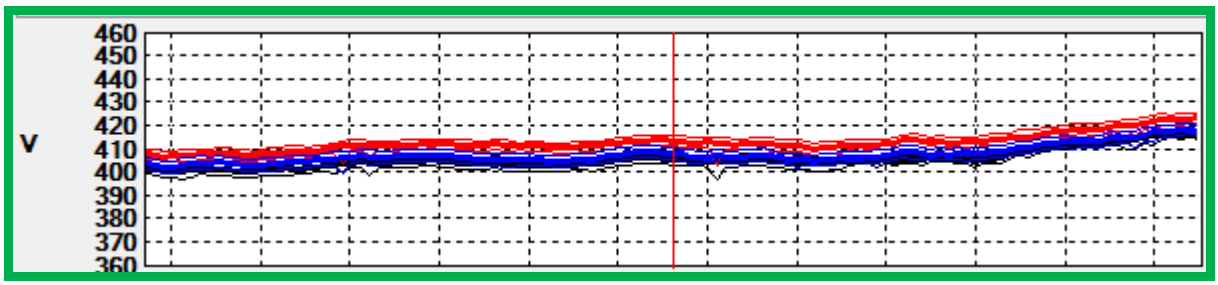
- **METER NO. XE498276 (SUB-STATION –A):**

A1-For- Transformer 1000KVA, OUTPUT (SS-A)

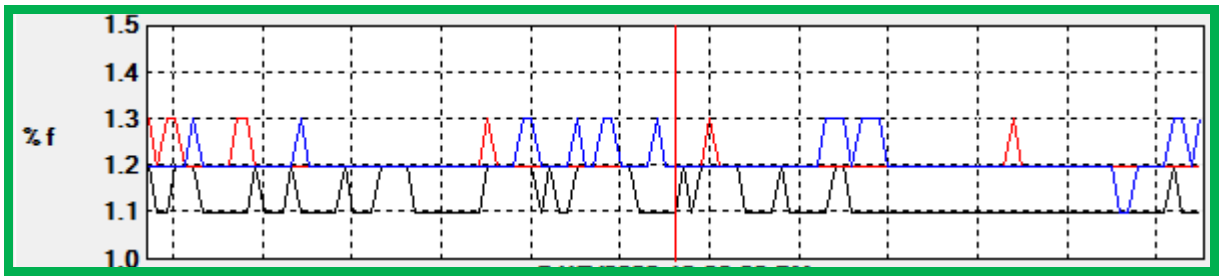
Frequency



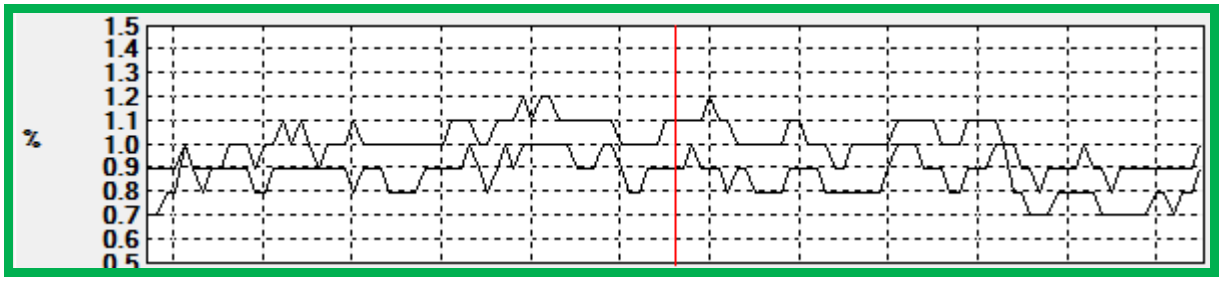
Voltage



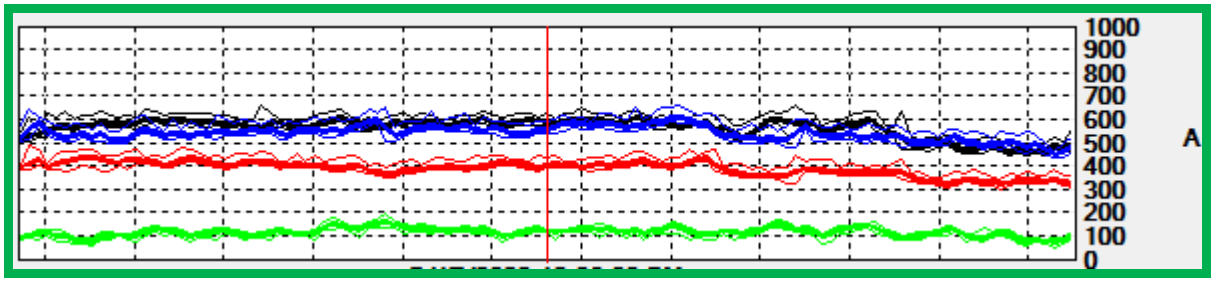
Voltage Harmonics



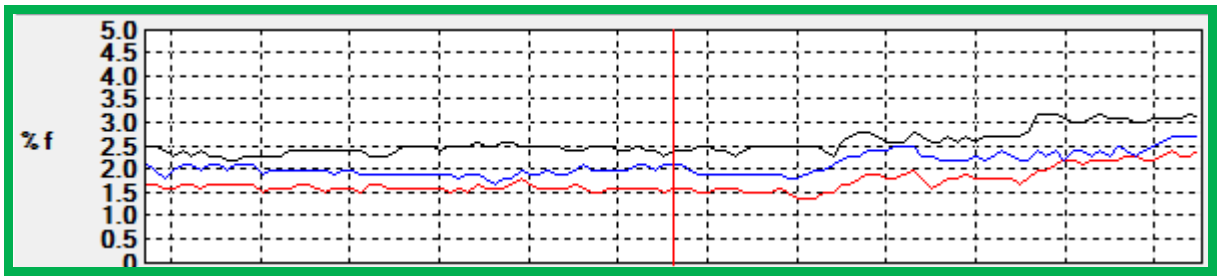
Voltage Un-balance



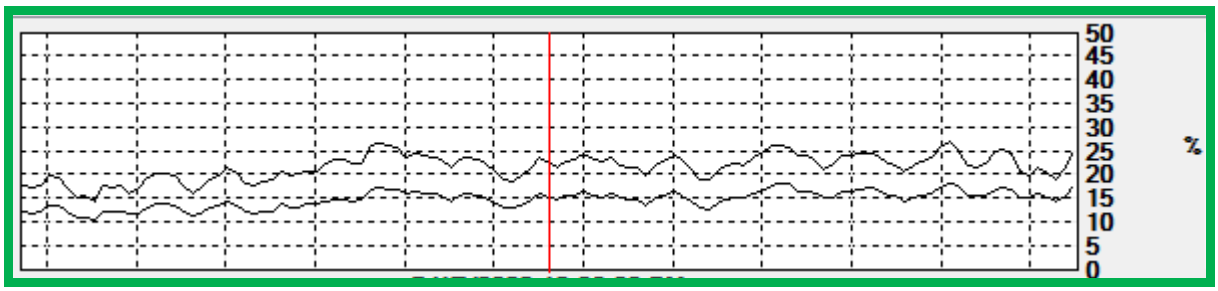
Current



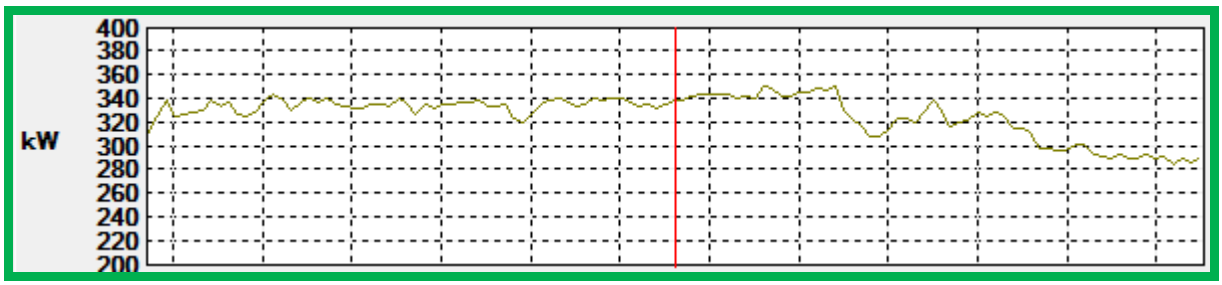
Current Harmonics



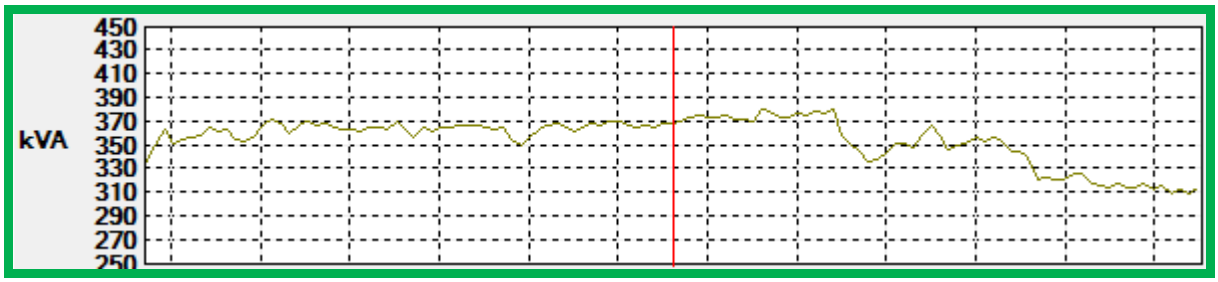
Current Un-balance



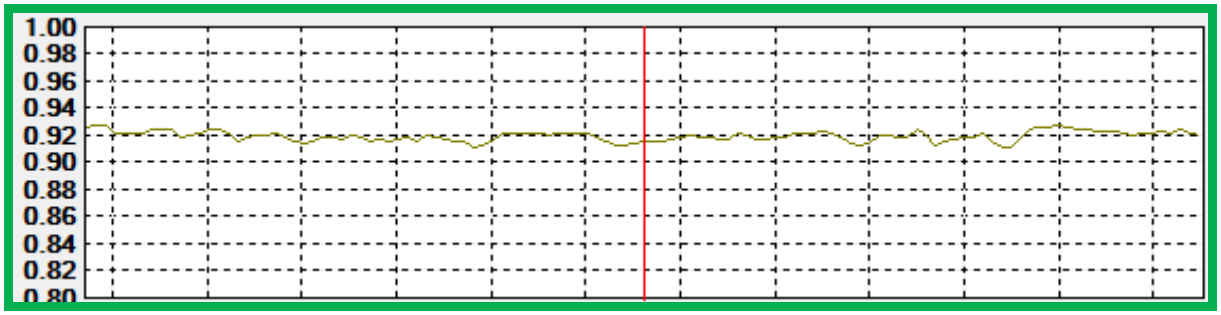
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	400.30	406.90	402.10	464.80	324.30	451.00	0.90	0.87	0.94	49.85	0.80	14.40
MAX	416.50	423.40	418.80	609.00	441.00	611.20	0.92	0.91	0.96	50.06	1.20	27.10
AVG	405.63	412.88	407.83	567.10	393.33	545.40	0.91	0.89	0.95	49.98	1.01	21.67

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THD	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.20	0.18	0.21	1.00	1.00	1.00	1.10	1.10	1.10	2.20	1.40	1.70
MAX	1.42	1.66	2.00	1.00	1.00	1.00	1.20	1.30	1.20	3.20	2.40	2.70
AVG	0.44	0.51	0.44	1.00	1.00	1.00	1.19	1.22	1.12	2.58	1.73	2.10

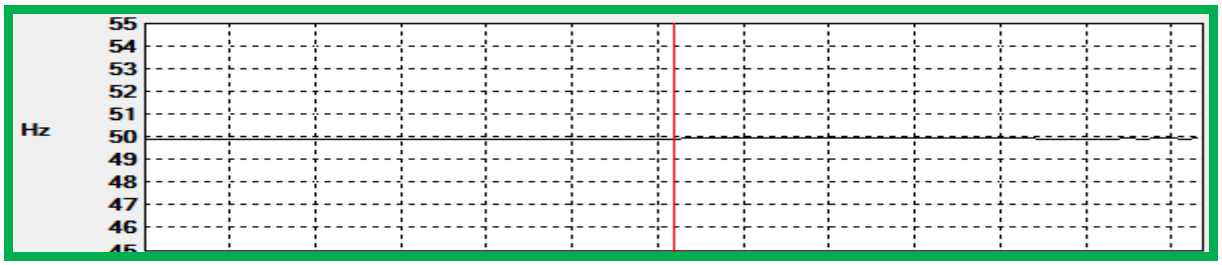
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.46	1.44	1.44

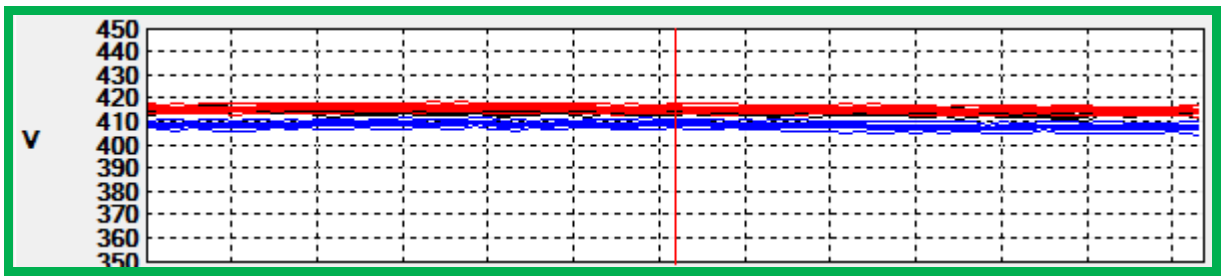
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.48	1.47	1.47
AVG	1.43	1.43	1.43	1.46	1.45	1.45

A2-For- Admin BLOCK (SS-A)

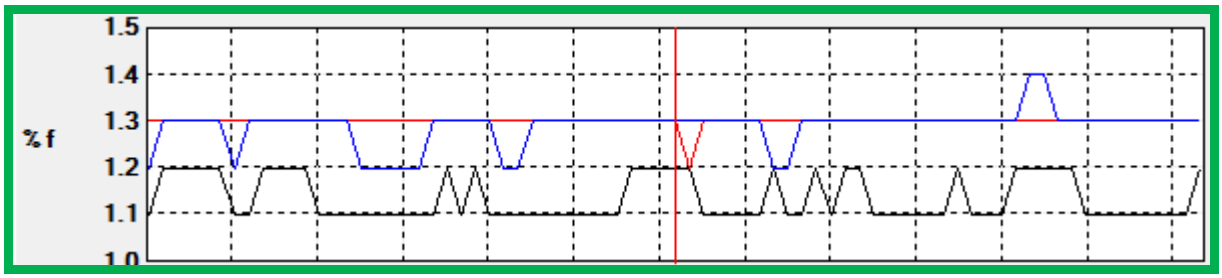
Frequency



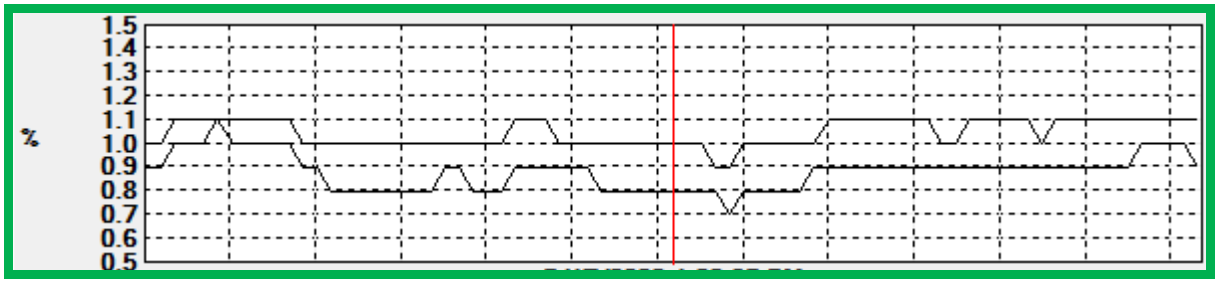
Voltage



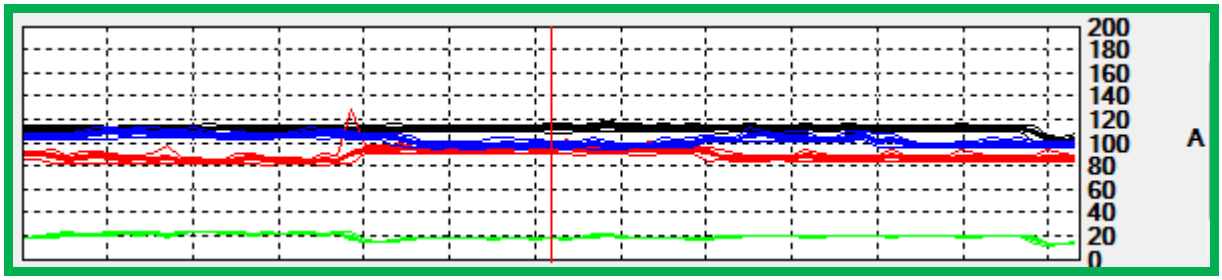
Voltage Harmonics



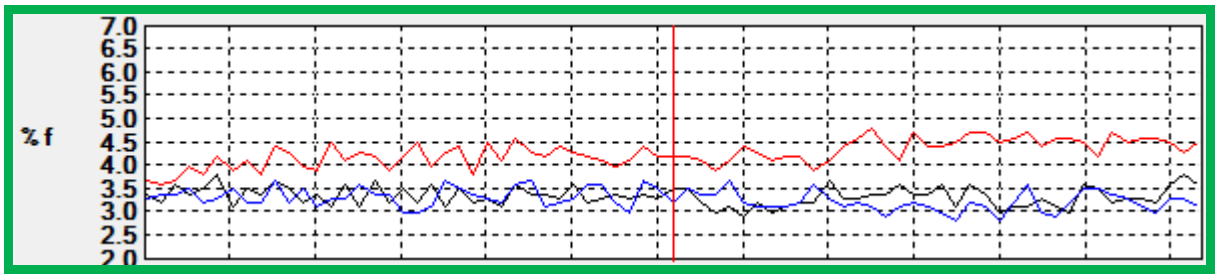
Voltage Un-balance



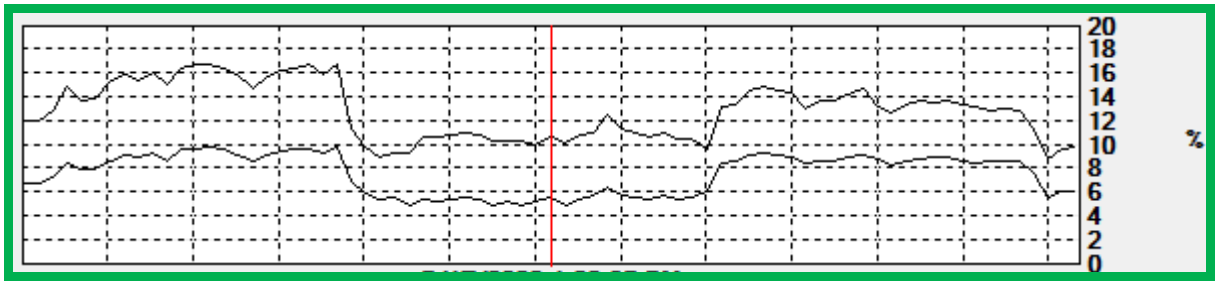
Current



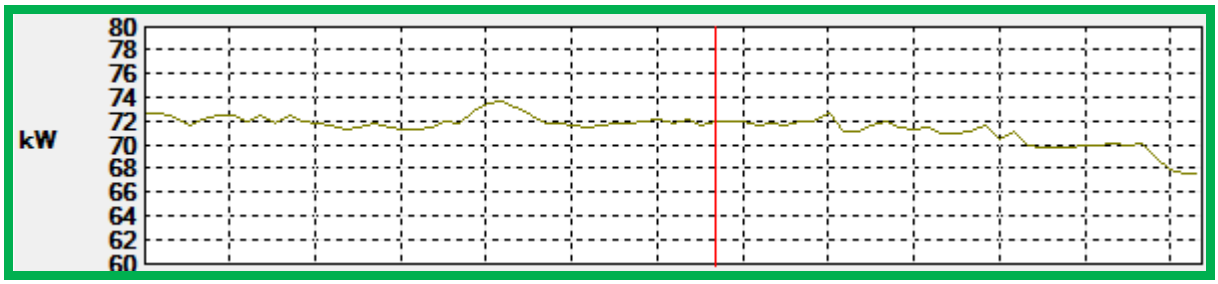
Current Harmonics



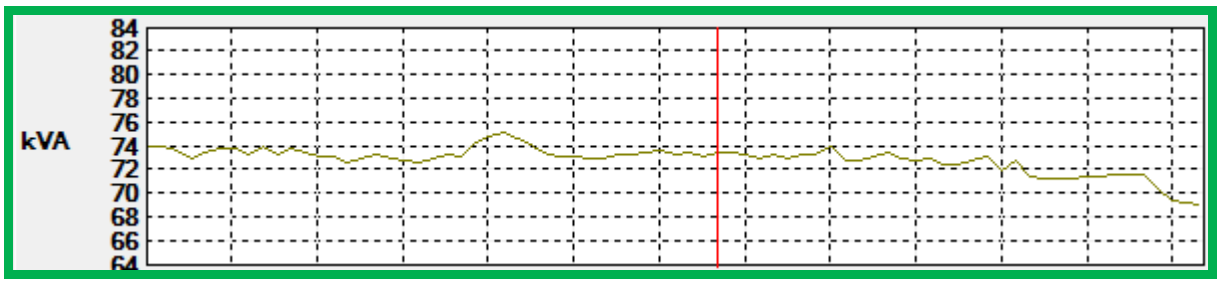
Current Un-balance



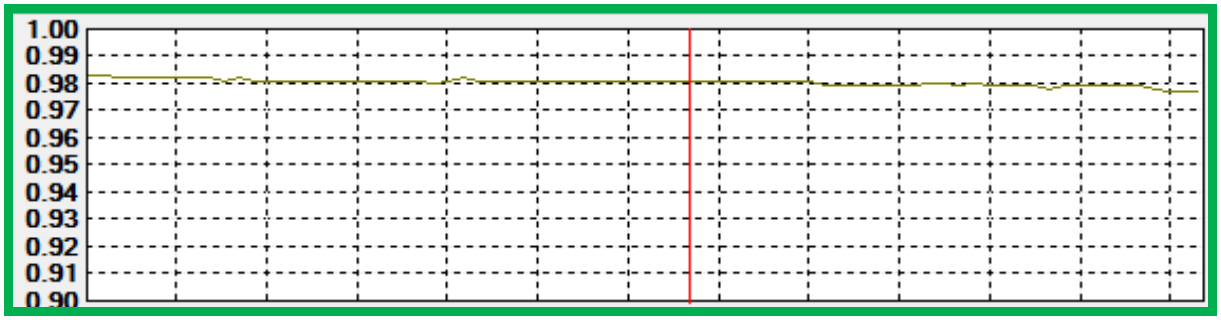
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	412.40	414.60	407.40	103.80	84.80	98.60	0.97	0.97	0.98	49.89	0.90	8.80
MAX	415.60	416.60	409.40	115.60	96.00	110.00	0.98	0.99	0.99	49.96	1.20	16.80
AVG	414.45	415.65	408.55	112.71	89.79	103.35	0.98	0.98	0.99	49.92	1.05	12.88

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THD	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.30	1.10	2.90	3.60	2.80
MAX	- - -	- - -	- - -	1.00	1.00	1.00	1.30	1.40	1.20	3.80	4.80	3.70
AVG	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.31	1.15	3.35	4.27	3.28

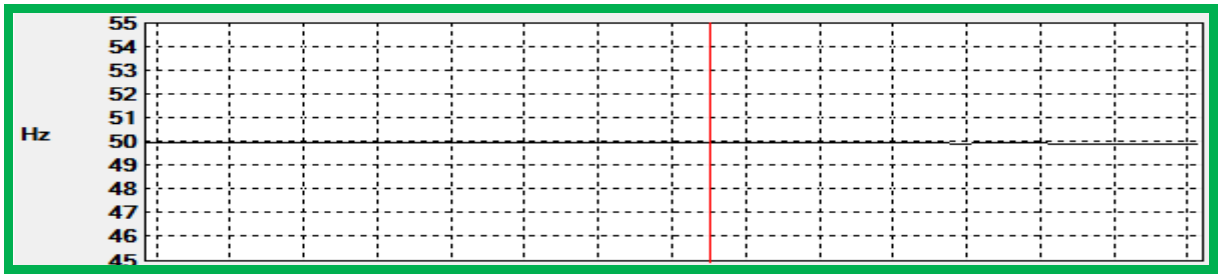
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.46	1.48	1.46

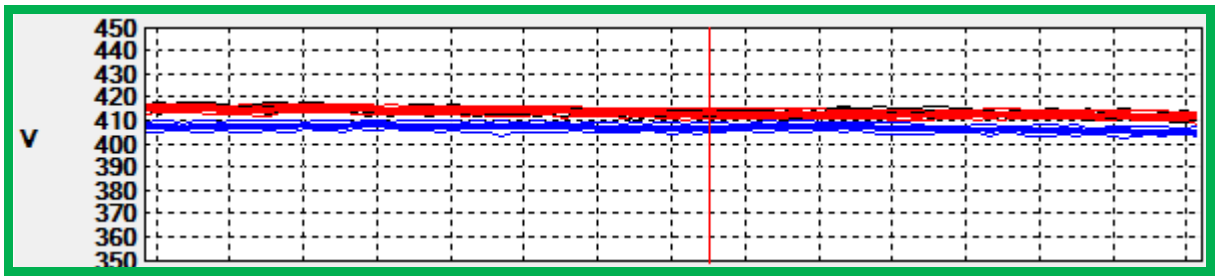
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.49	1.58	1.51
AVG	1.43	1.43	1.43	1.47	1.50	1.48

A3-For-Rani Laxmi Bai Hostel, Guest House, Dhan Singh Gujjar Hall and Railway COUNTER (SS-A)

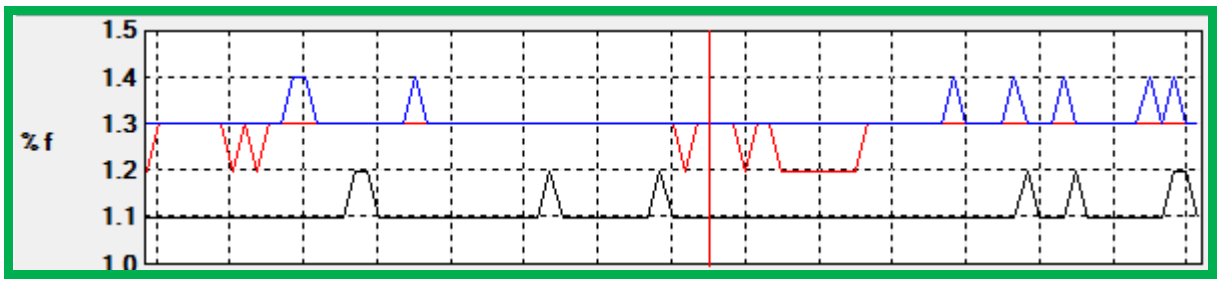
Frequency



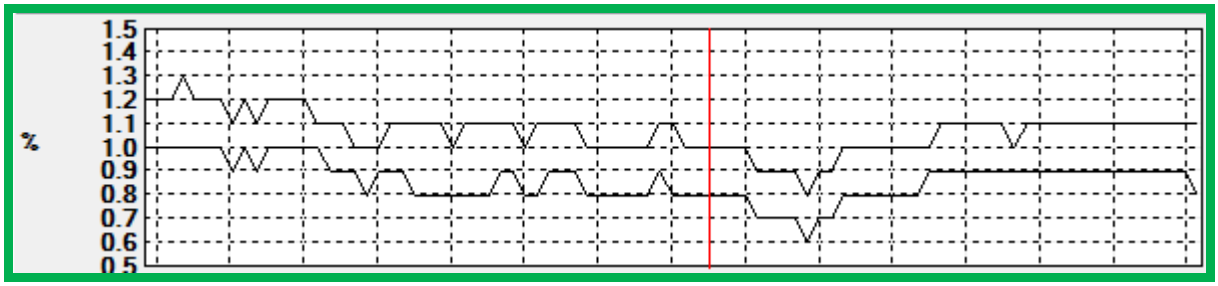
Voltage



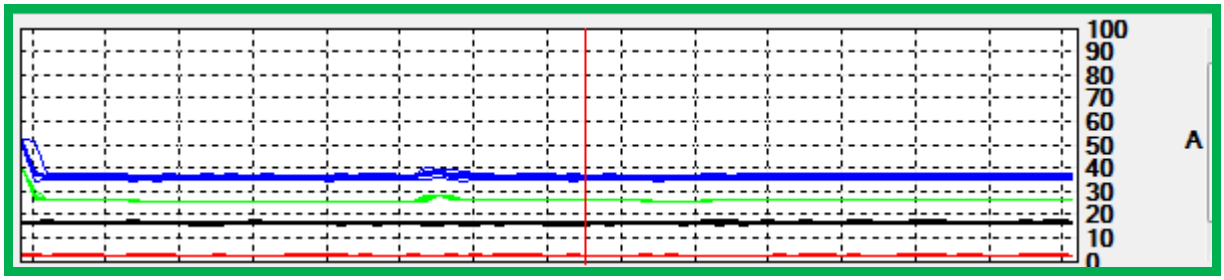
Voltage Harmonics



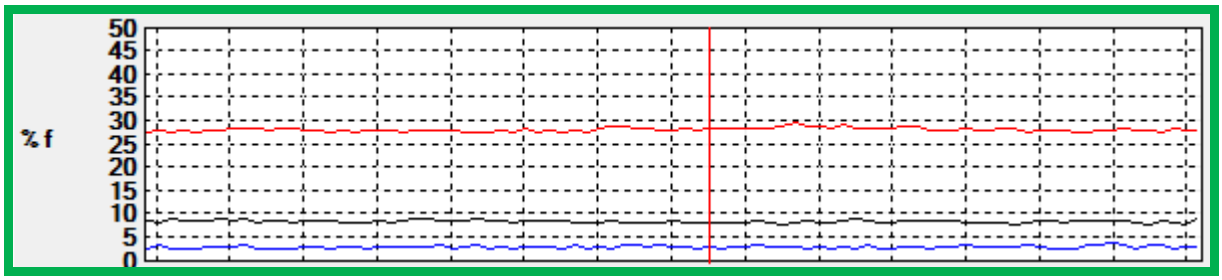
Voltage Un-balance



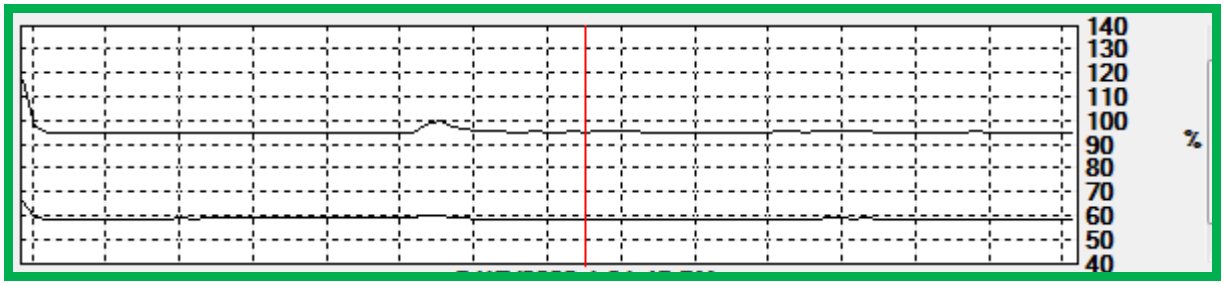
Current



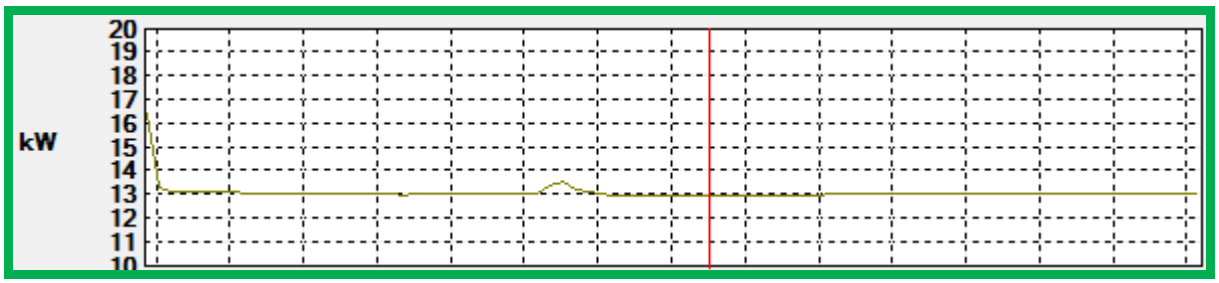
Current Harmonics



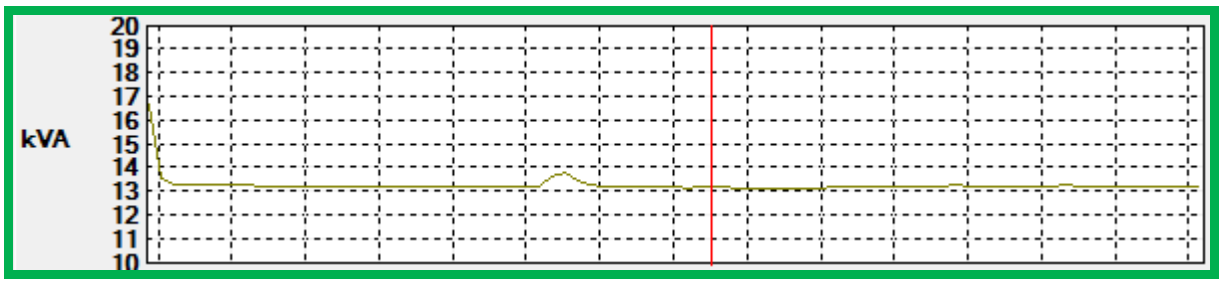
Current Un-balance



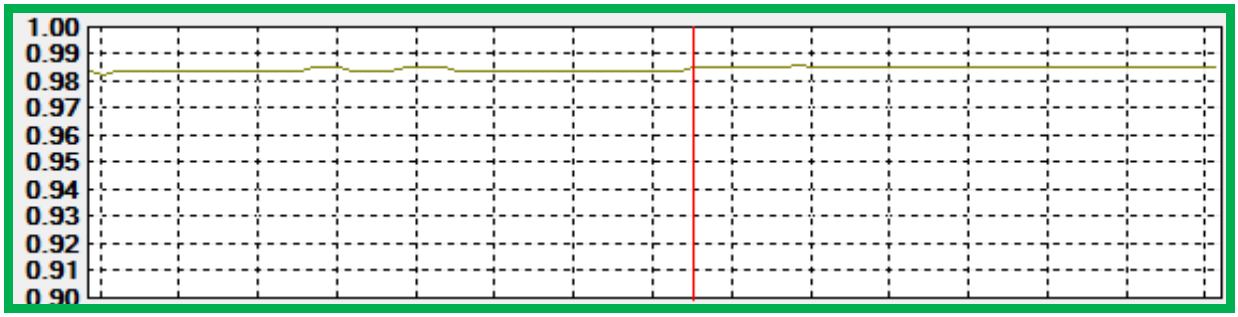
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	411.70	411.90	405.20	16.71	2.62	36.16	0.96	0.94	0.99	49.90	0.90	94.80
MAX	416.00	415.40	408.30	16.91	2.80	50.85	0.97	0.95	1.00	49.98	1.30	116.70
AVG	414.06	413.75	407.14	16.81	2.67	36.62	0.96	0.95	1.00	49.95	1.10	95.78

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.05	1.00	1.20	1.30	1.10	7.70	27.60	2.40
MAX	- - -	- - -	- - -	1.00	1.06	1.00	1.20	1.50	1.30	9.10	29.60	3.70
AVG	- - -	- - -	- - -	1.00	1.06	1.00	1.20	1.34	1.20	8.46	28.19	2.99

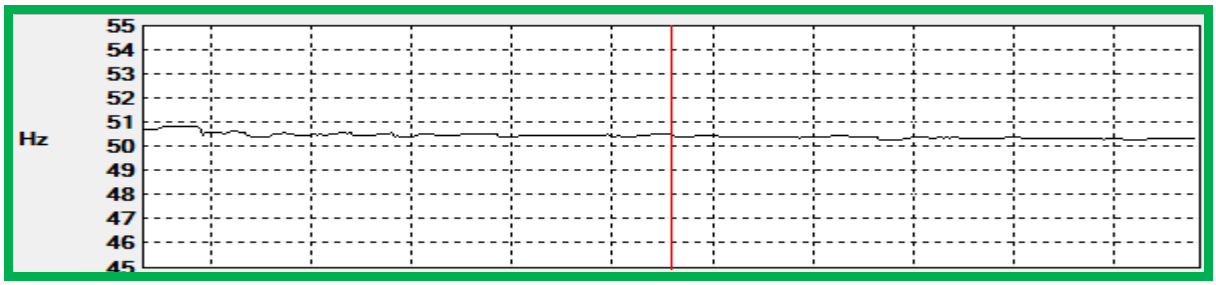
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.55	2.24	1.48

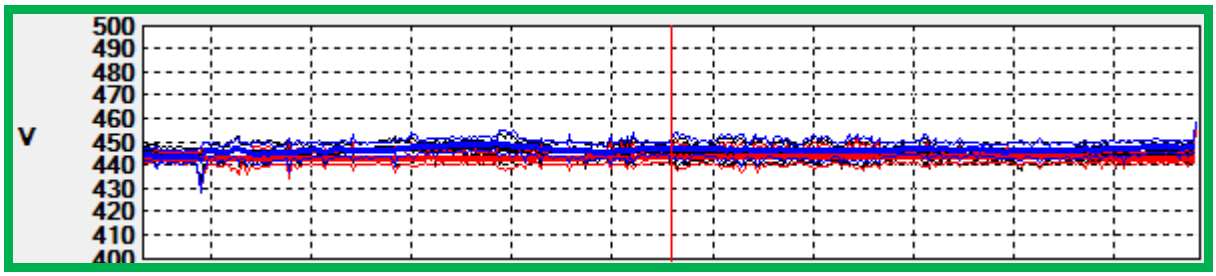
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.44	1.59	2.39	1.56
AVG	1.43	1.43	1.44	1.57	2.31	1.48

A12-For-D. G Set 320 KVA (SS-A)

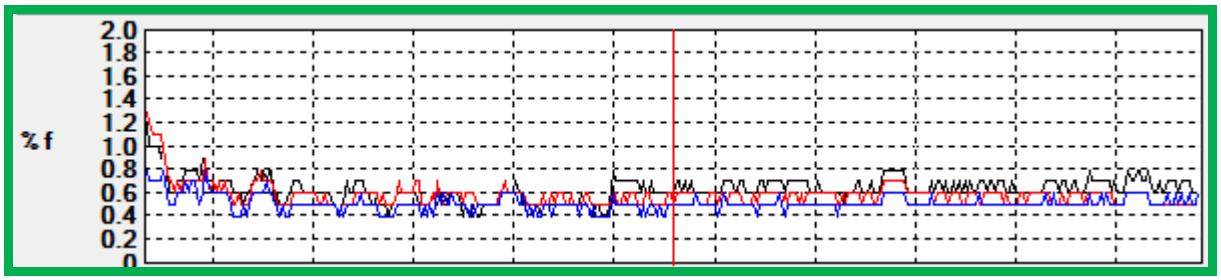
Frequency



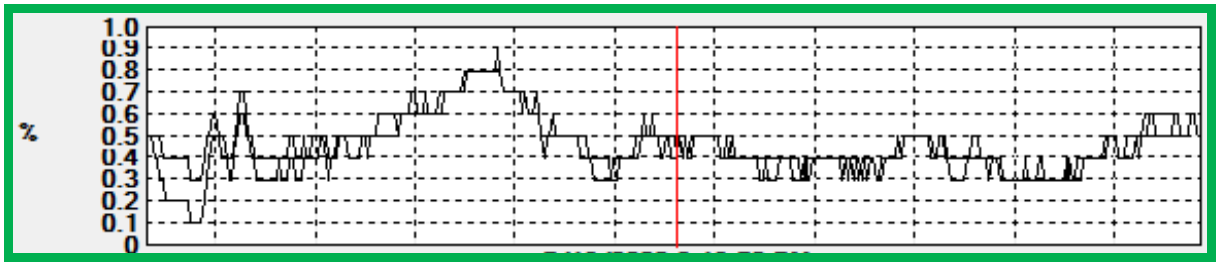
Voltage



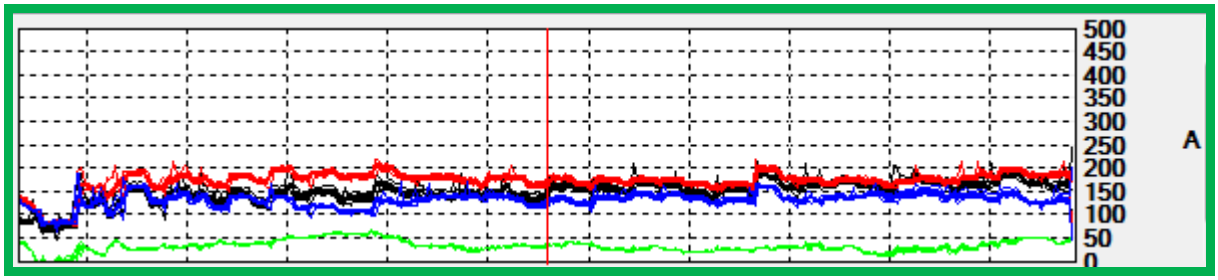
Voltage Harmonics



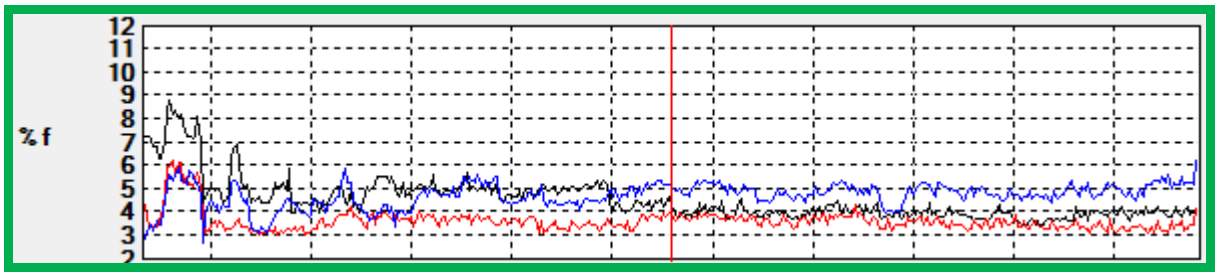
Voltage Un-balance



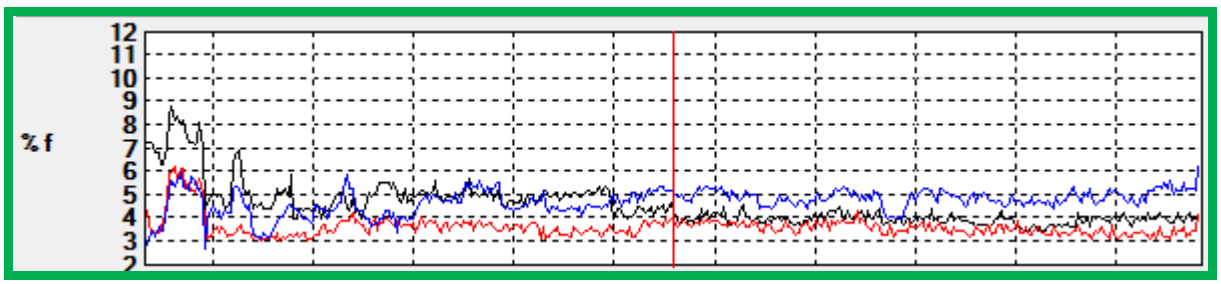
Current



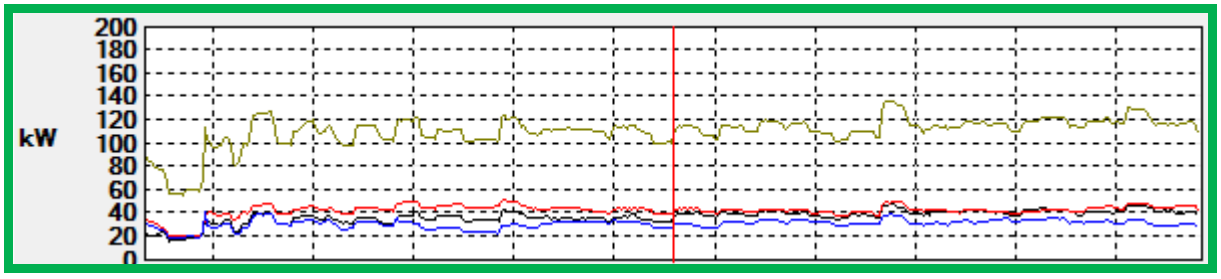
Current Harmonics



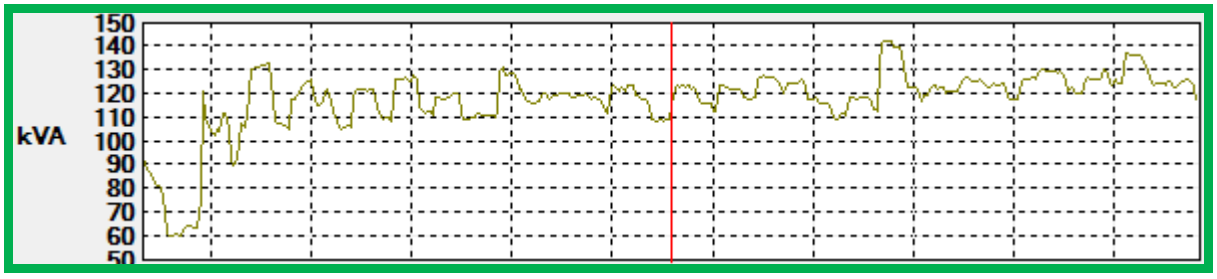
Current Un-balance



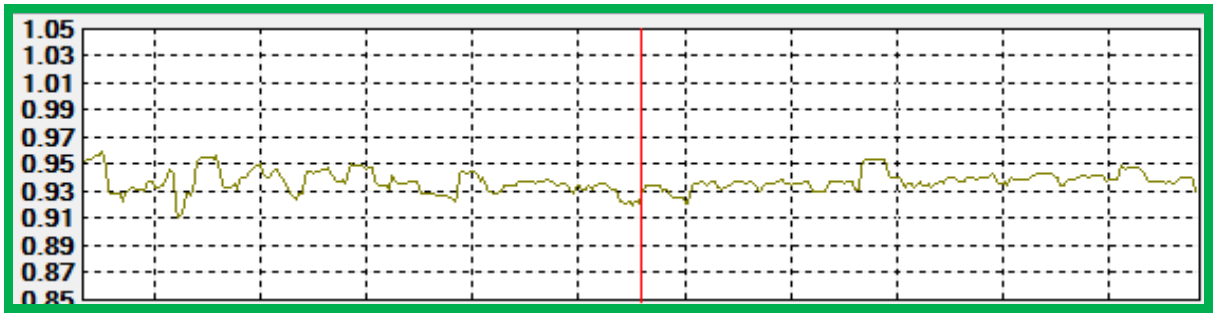
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	443.60	442.70	442.60	67.30	83.60	82.40	0.93	0.93	0.83	50.26	0.10	5.00
MAX	448.20	444.60	450.10	190.90	207.60	175.40	0.97	0.98	0.94	50.84	0.80	32.00
AVG	445.73	443.51	446.85	150.59	173.89	133.02	0.95	0.95	0.90	50.44	0.44	15.83

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.23	1.23	1.42	1.00	1.00	1.00	0.50	0.40	0.40	3.50	3.00	2.70
MAX	1.58	1.50	1.58	1.00	1.00	1.00	1.30	1.00	0.90	8.80	6.20	6.30
AVG	1.35	1.32	1.53	1.00	1.00	1.00	0.63	0.53	0.57	4.53	3.63	4.73

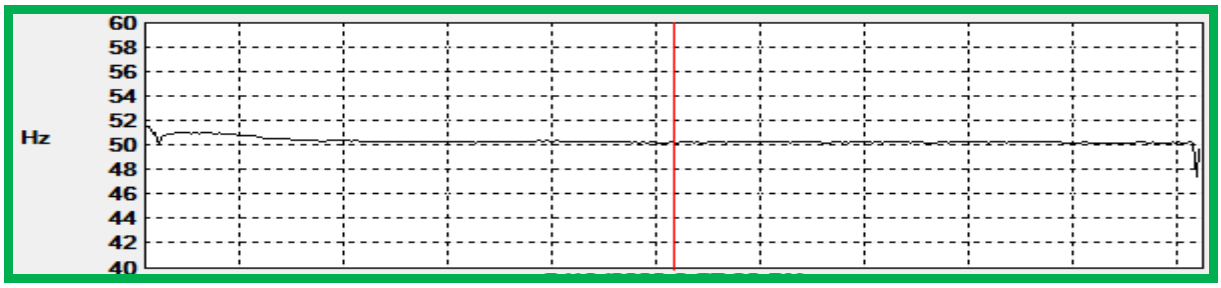
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.41	1.41	1.41	1.55	1.47	1.48

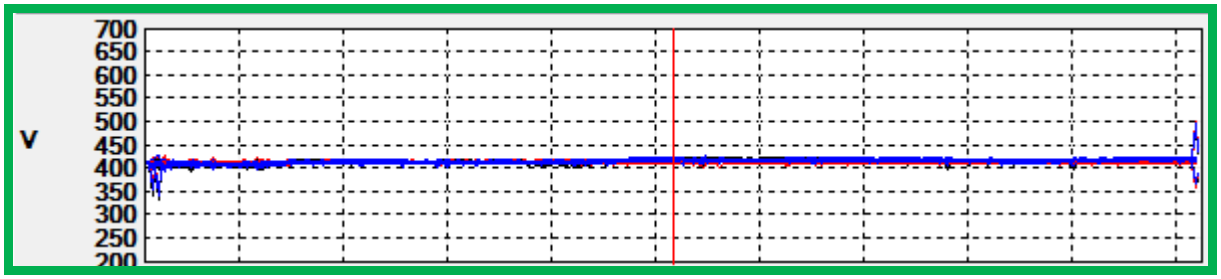
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.90	1.71	1.87
AVG	1.42	1.42	1.42	1.59	1.52	1.53

A13-For-D. G Set 250 KVA (SS-A)

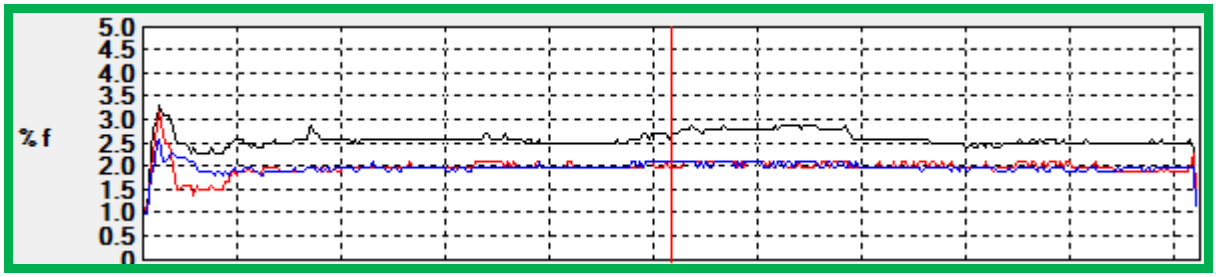
Frequency



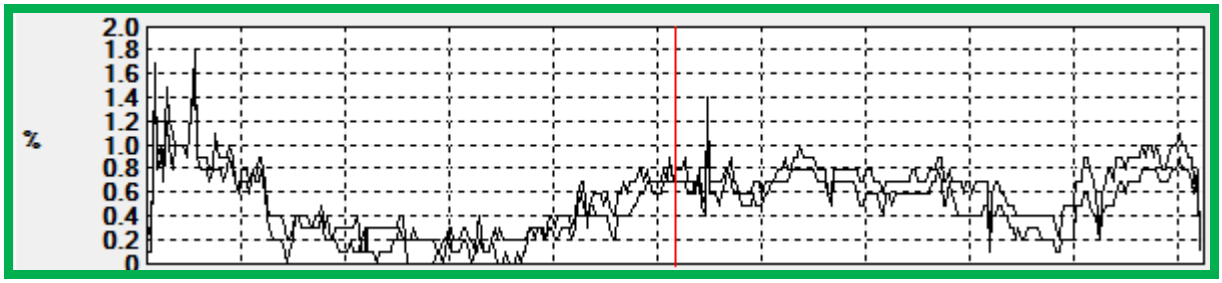
Voltage



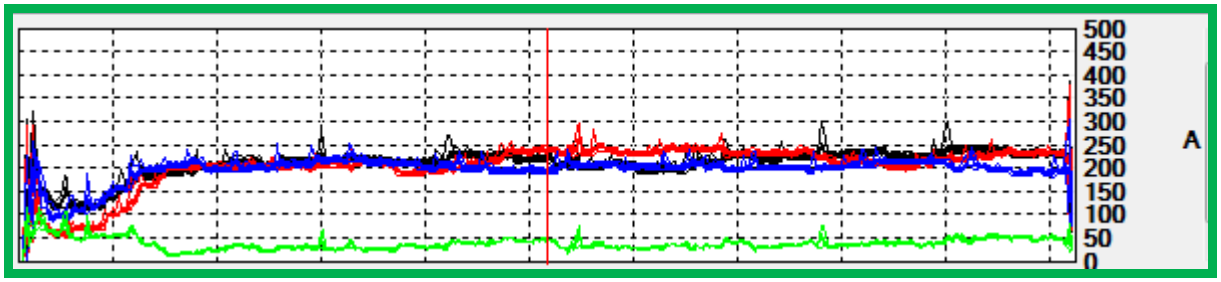
Voltage Harmonics



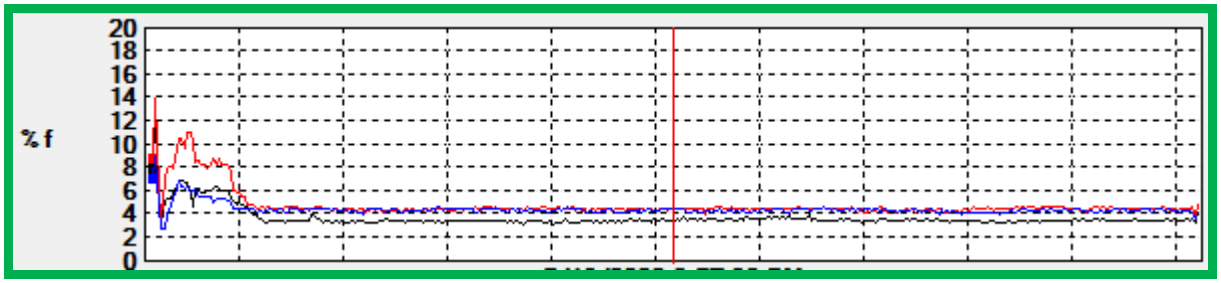
Voltage Un-balance



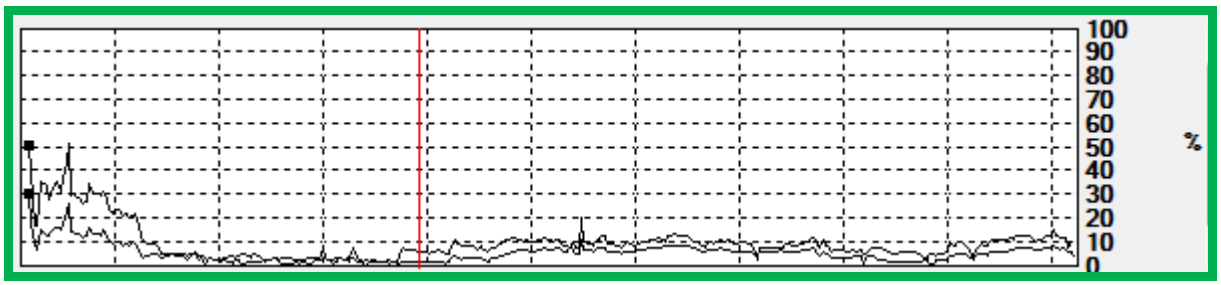
Current



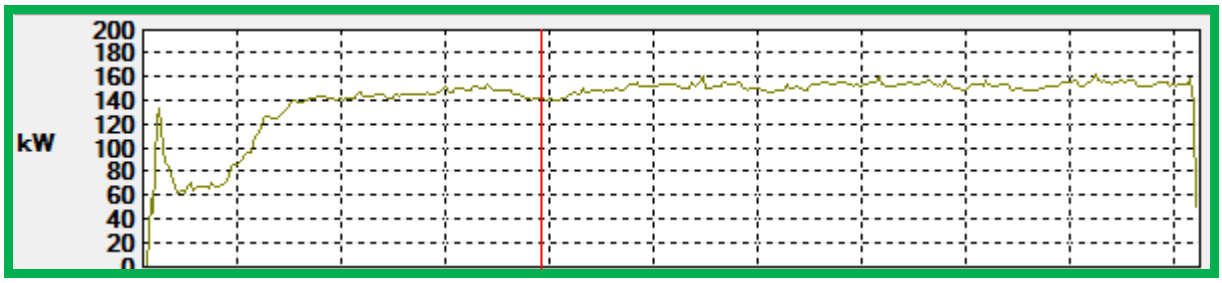
Current Harmonics



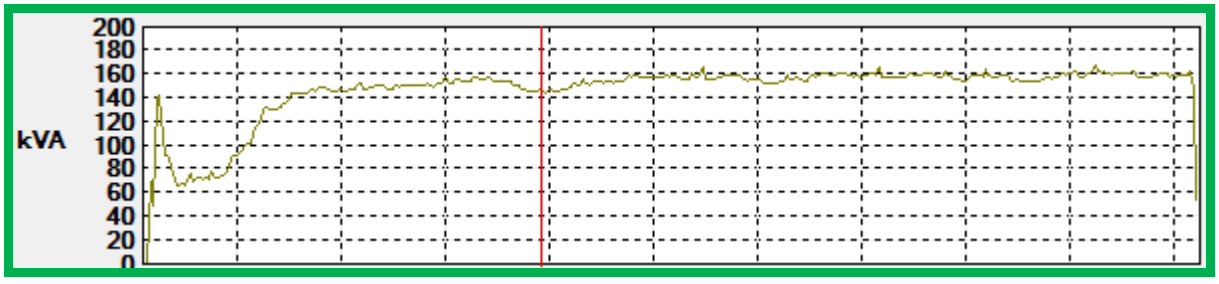
Current Un-balance



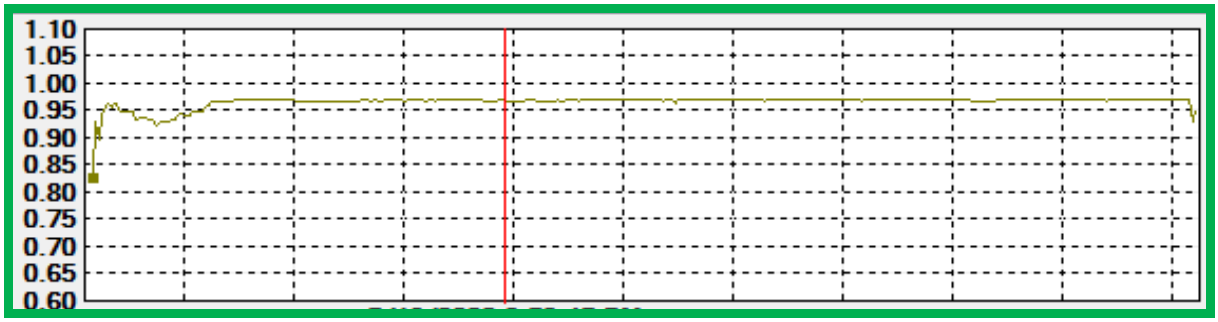
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	400.50	410.00	404.10	75.20	46.80	64.10	0.82	0.83	0.83	47.42	0.00	0.20
MAX	422.40	417.00	422.70	251.70	276.20	234.70	0.98	0.98	0.96	51.11	1.70	51.80
AVG	414.94	414.51	415.89	210.62	205.09	196.98	0.97	0.97	0.95	50.35	0.49	9.83

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THD	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.54	0.50	1.00	1.00	1.00	1.00	1.40	1.30	1.10	3.10	3.70	2.70
MAX	1.54	1.18	1.50	1.01	1.04	1.01	3.40	2.70	3.50	12.10	13.90	9.00
AVG	1.54	1.05	1.09	1.00	1.00	1.00	2.37	1.76	2.45	3.70	4.78	4.40

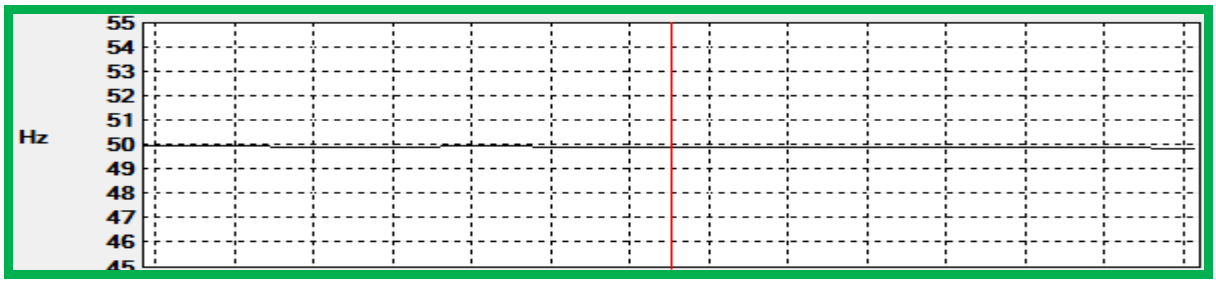
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.42	1.49	1.51	1.50

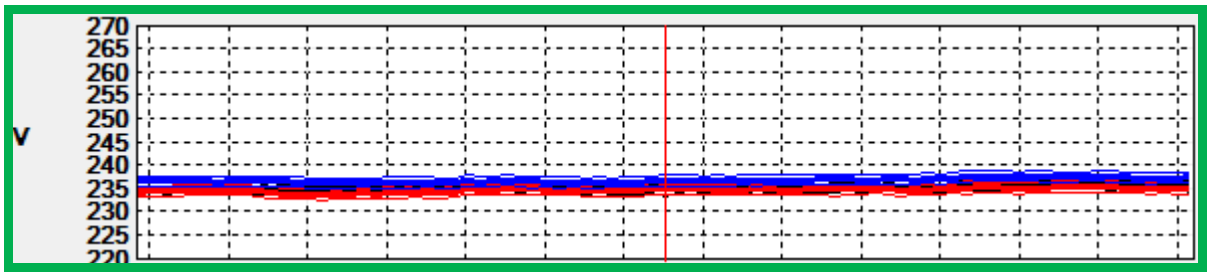
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.51	1.53	1.52	1.99	3.56	2.09
AVG	1.43	1.43	1.43	1.53	1.54	1.55

B1-For-Durga Bhabhi Hostel UG (SS-A)

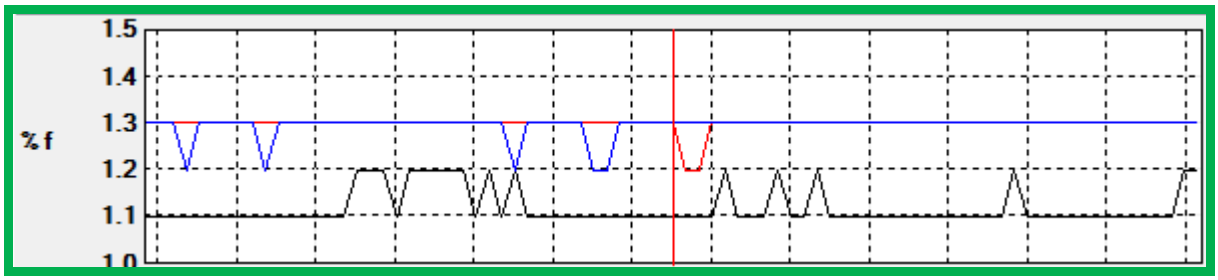
Frequency



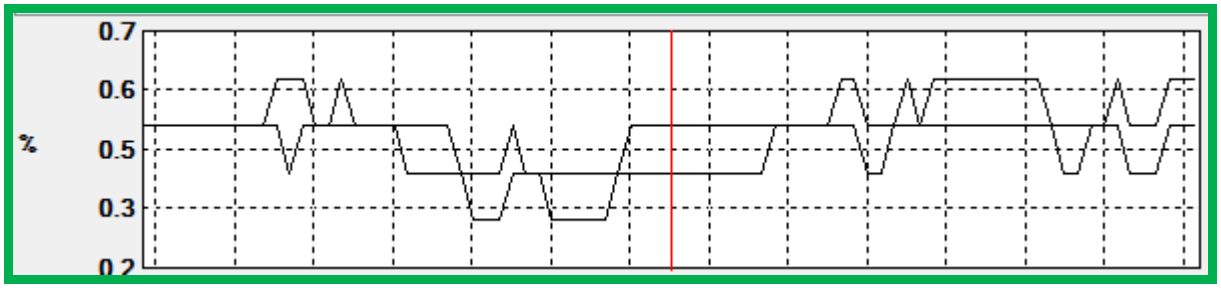
Voltage



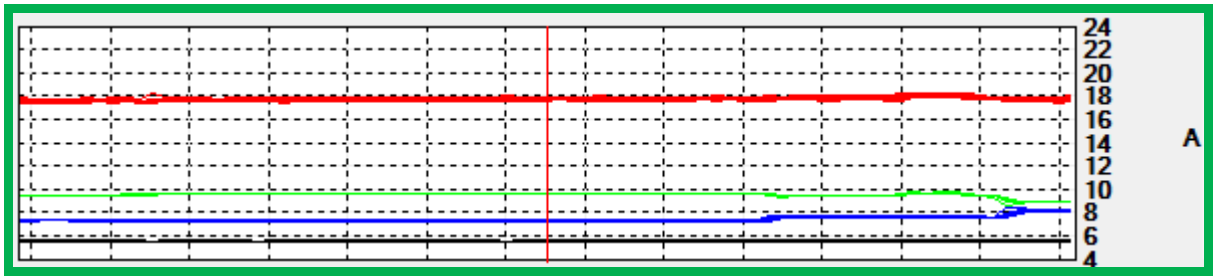
Voltage Harmonics



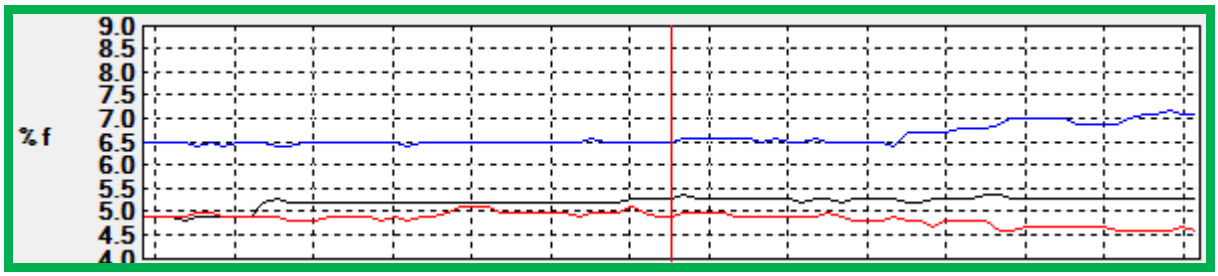
Voltage Un-balance



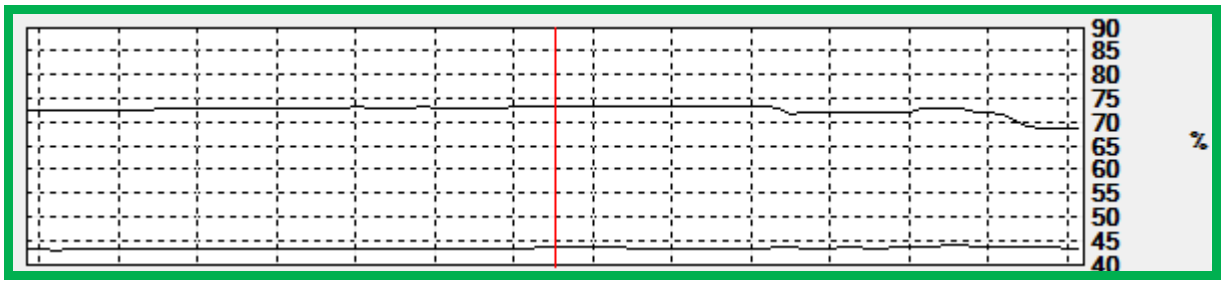
Current



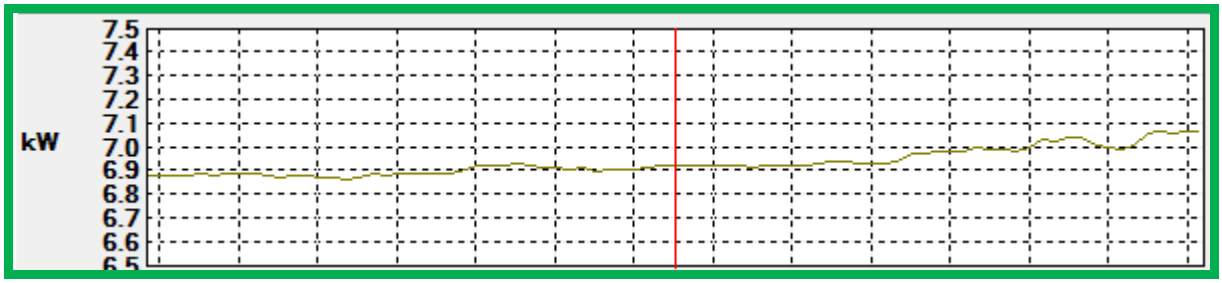
Current Harmonics



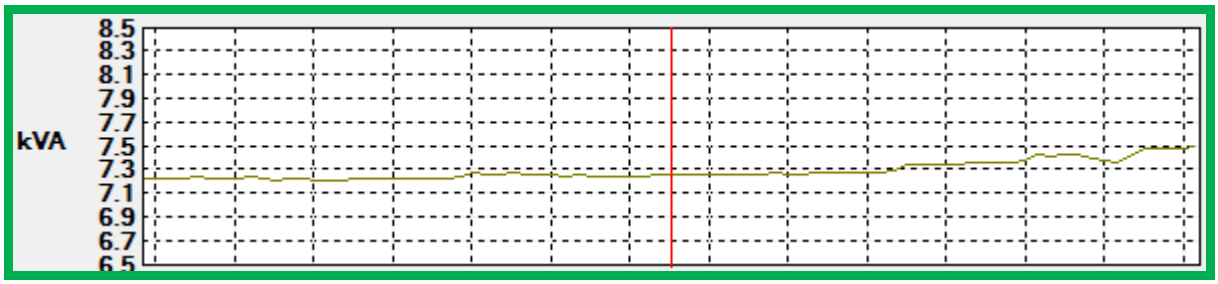
Current Un-balance



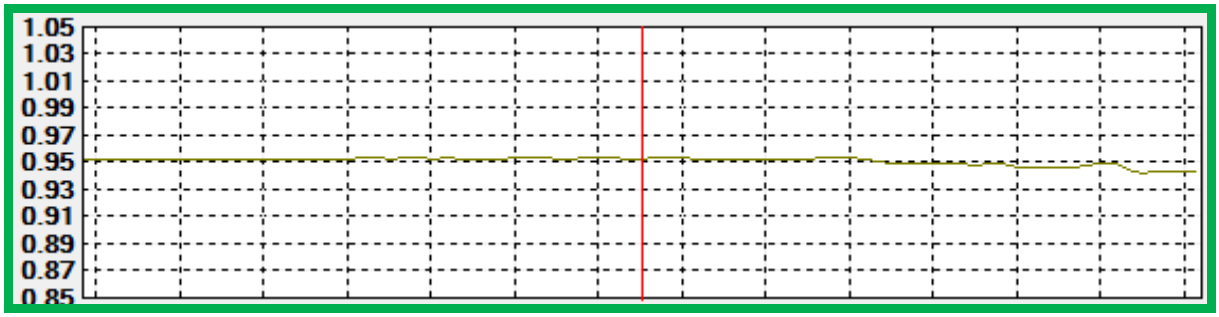
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	405.50	407.30	408.70	5.60	17.67	7.38	0.99	0.96	0.87	49.86	0.30	68.90
MAX	407.80	410.30	411.00	5.67	18.15	8.22	0.99	0.96	0.90	49.95	0.60	73.60
AVG	406.43	408.78	409.53	5.63	17.82	7.51	0.99	0.96	0.90	49.92	0.44	72.68

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.20	1.10	4.80	4.60	6.40
MAX	- - -	- - -	- - -	1.00	1.00	1.00	1.30	1.40	1.20	5.40	5.10	7.20
AVG	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.29	1.18	5.22	4.86	6.62

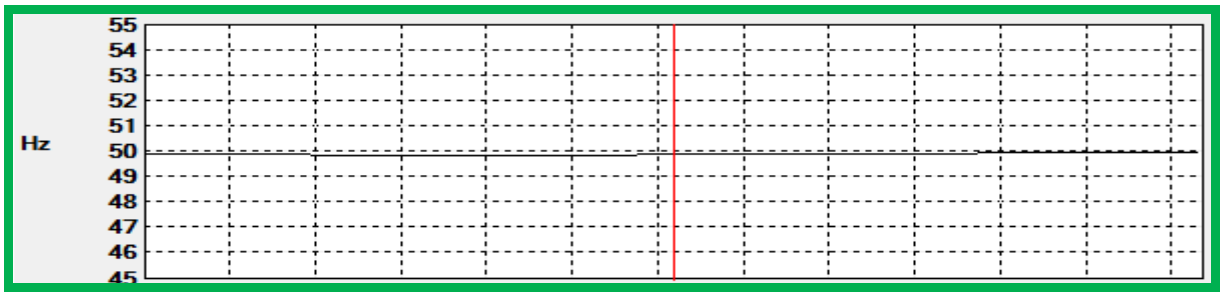
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.35	1.45	1.35

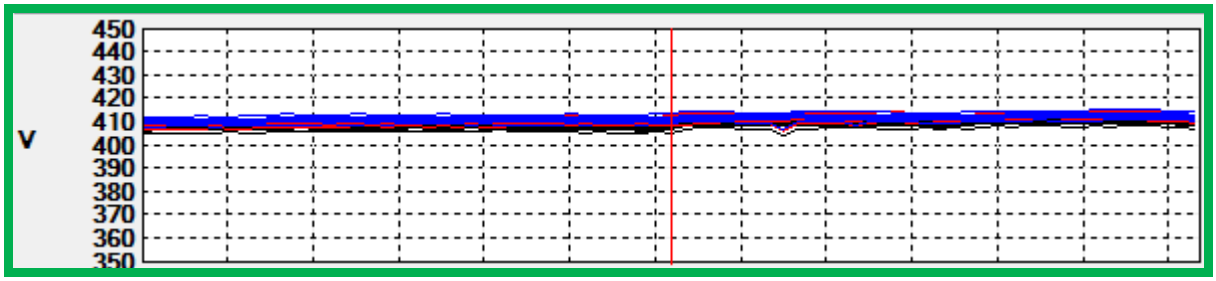
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.44	1.43	1.36	1.48	1.39
AVG	1.43	1.43	1.43	1.36	1.47	1.36

B2-For-Library Information Science (SS-A)

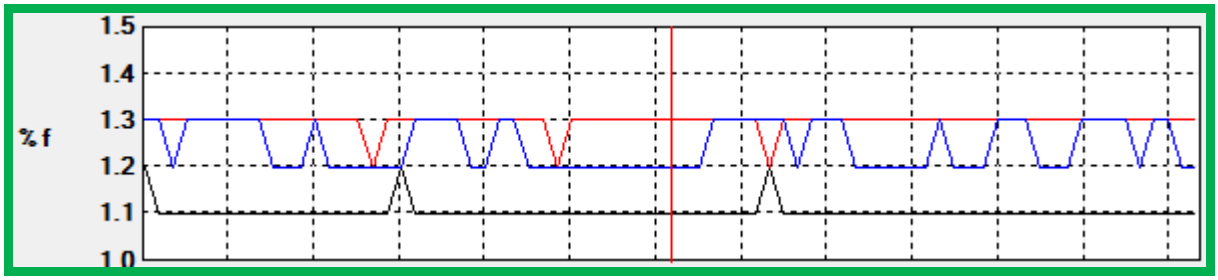
Frequency



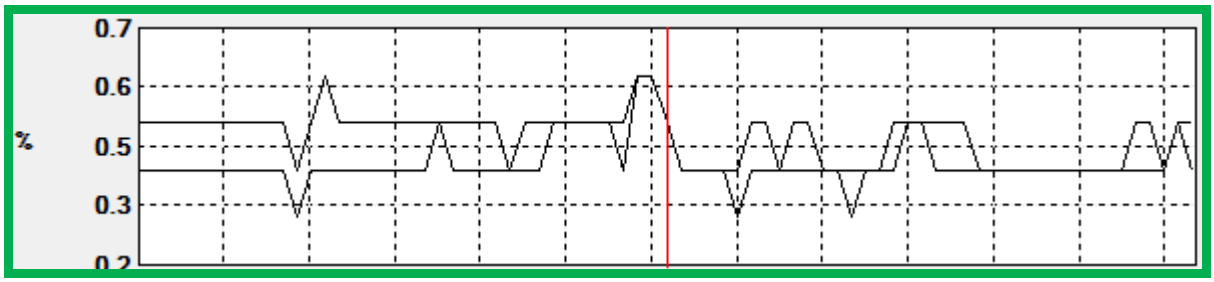
Voltage



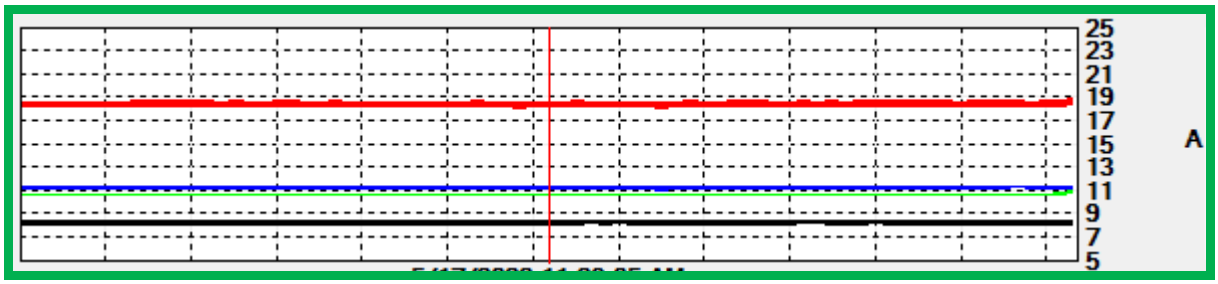
Voltage Harmonics



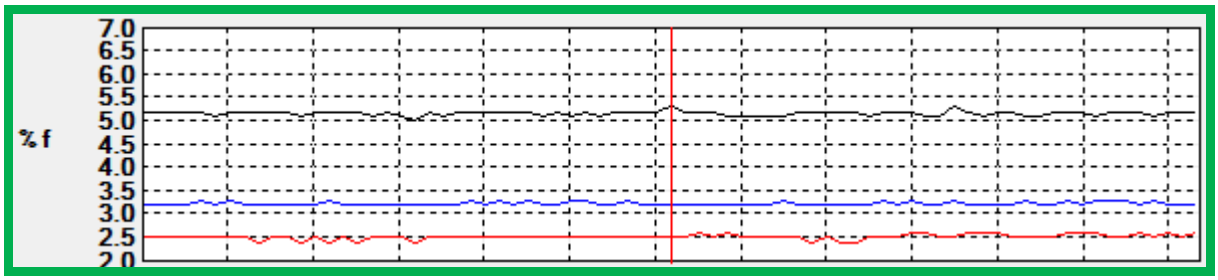
Voltage Un-balance



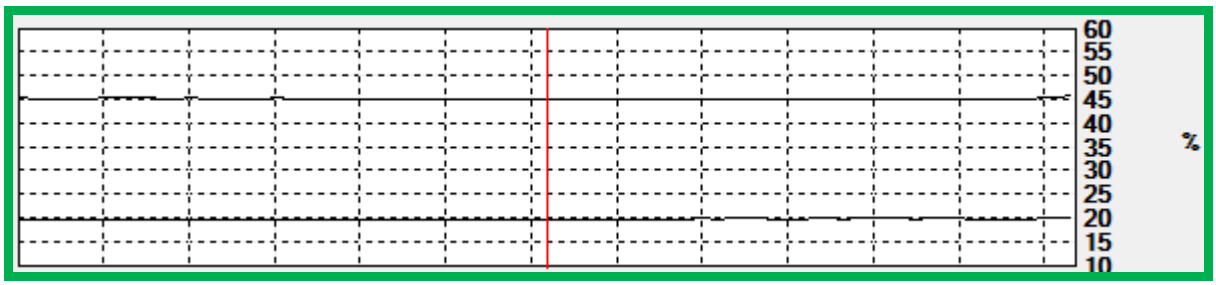
Current



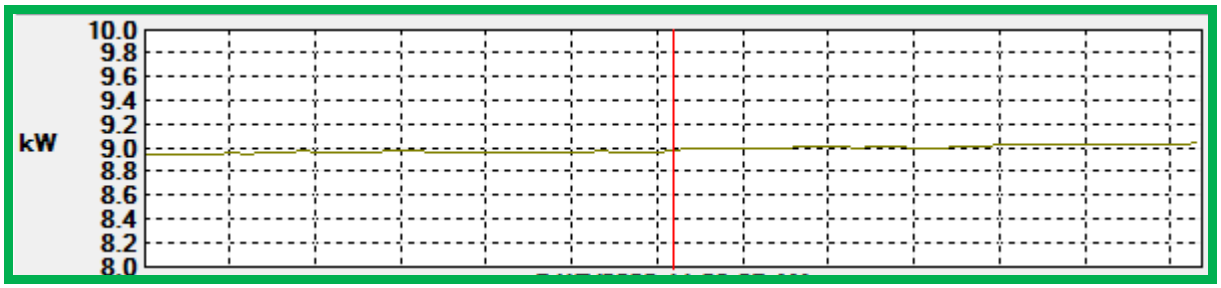
Current Harmonics



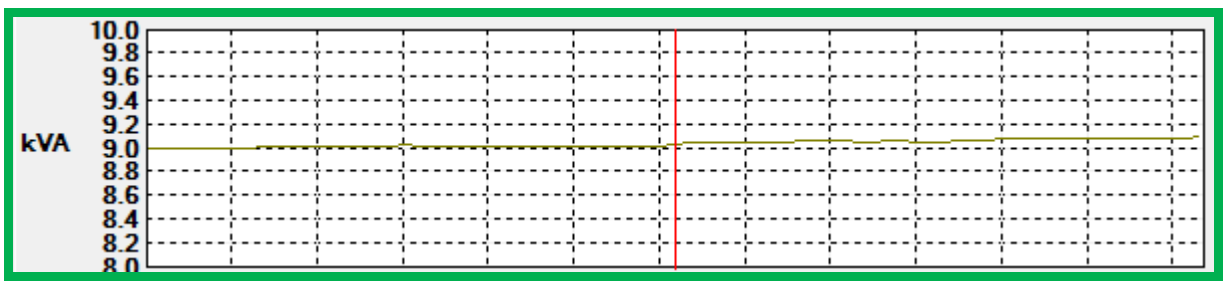
Current Un-balance



Power in KW



Power in KVA



Power Factor

Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.00	409.10	410.10	8.30	18.43	11.34	0.98	1.00	1.00	49.85	0.30	45.10
MAX	410.40	412.90	413.20	8.35	18.62	11.37	0.98	1.00	1.00	49.99	0.60	45.90
AVG	408.75	411.04	411.68	8.33	18.48	11.36	0.98	1.00	1.00	49.91	0.42	45.25

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.20	1.10	5.00	2.40	3.20
MAX	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.30	1.20	5.30	2.60	3.30
AVG	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.29	1.14	5.17	2.51	3.23

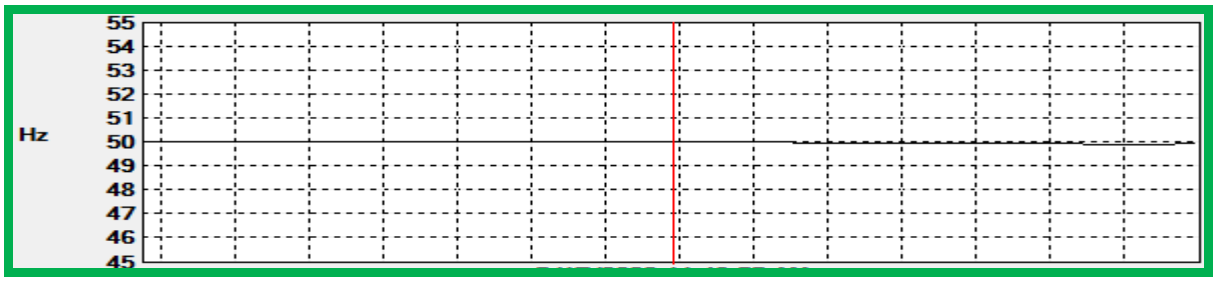
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.50	1.40	1.46

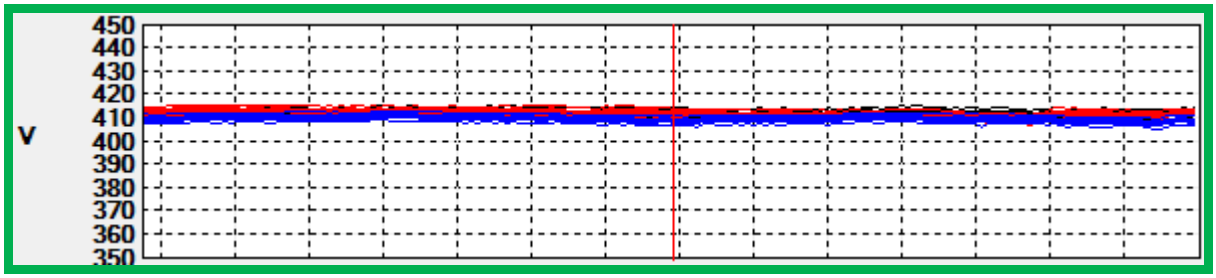
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.51	1.41	1.47
AVG	1.43	1.43	1.43	1.50	1.41	1.47

B3-For-Botany Over Head, Urdu and Hindi Dept. (SS-A)

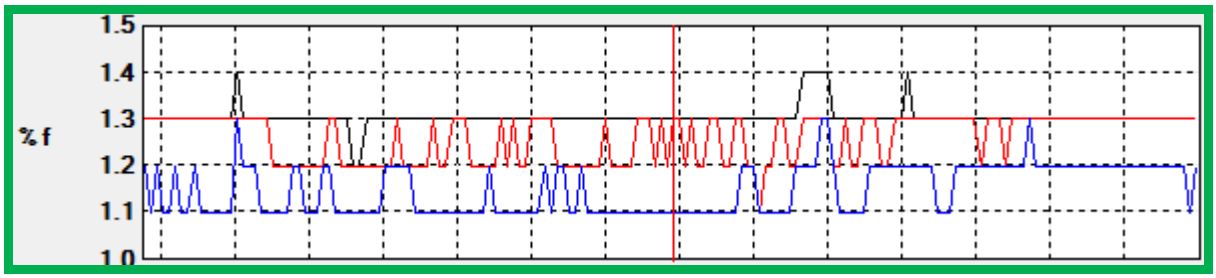
Frequency



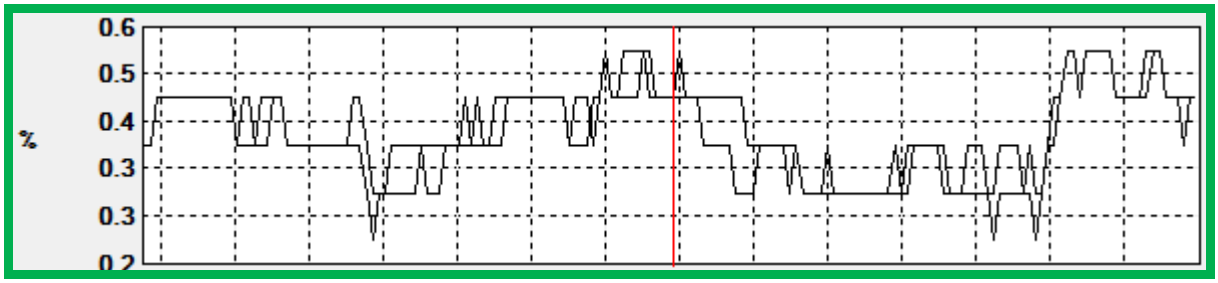
Voltage



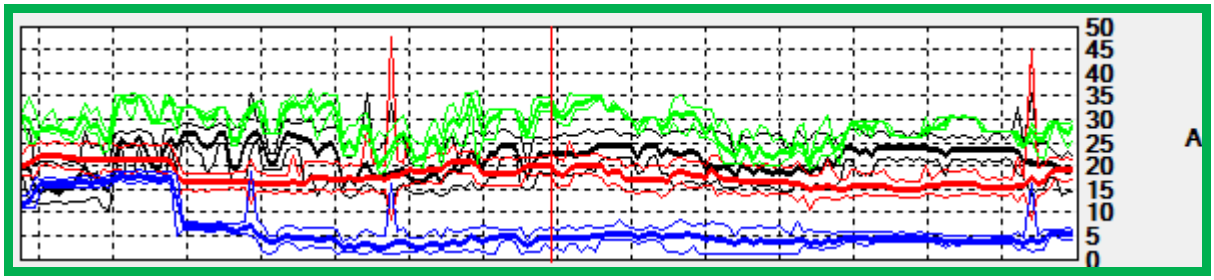
Voltage Harmonics



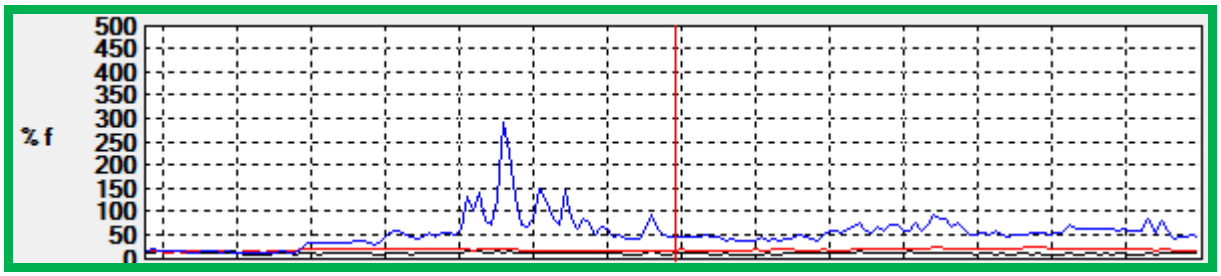
Voltage Un-balance



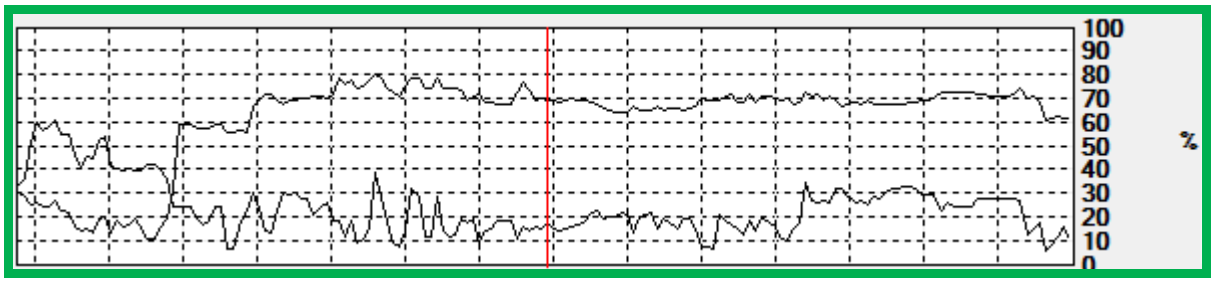
Current



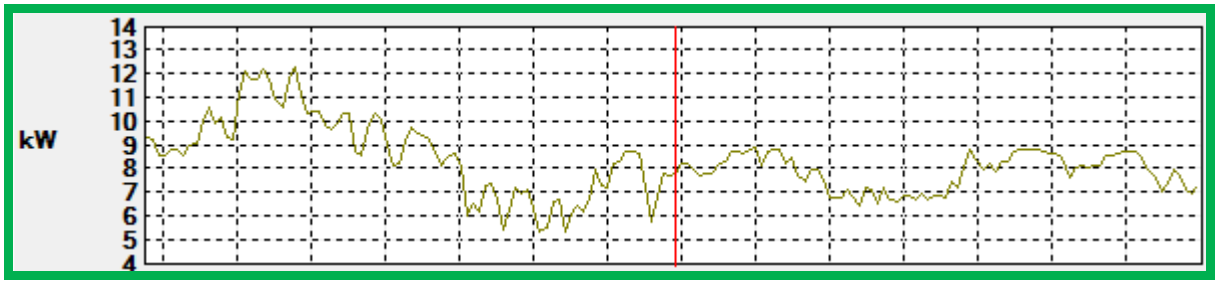
Current Harmonics



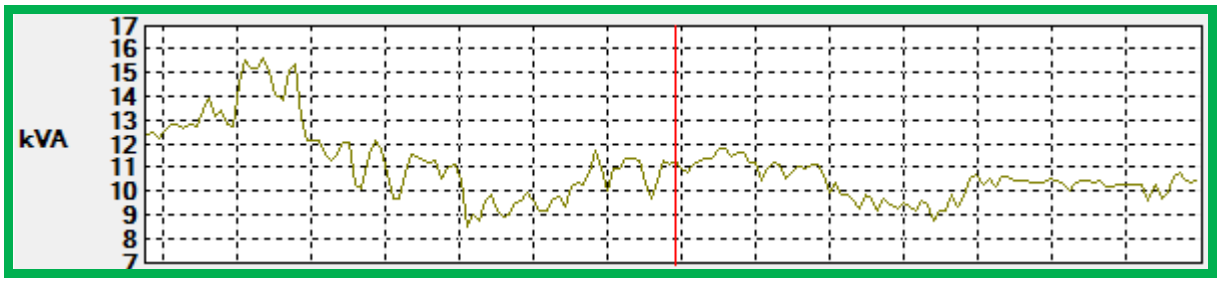
Current Un-balance



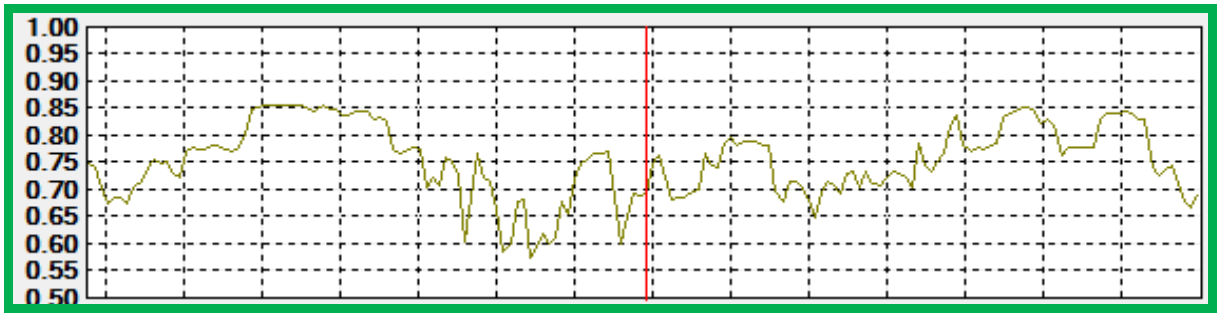
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	411.10	409.30	407.40	14.38	14.97	2.43	0.70	0.31	0.05	49.92	0.30	10.70
MAX	413.20	413.80	411.30	27.69	22.55	17.99	0.99	0.78	0.94	50.04	0.60	80.60
AVG	412.39	412.21	409.69	21.70	18.05	6.37	0.95	0.53	0.67	50.00	0.43	61.81

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.03	1.03	0.61	1.00	1.02	1.02	1.20	1.10	1.20	9.20	14.50	13.50
MAX	1.03	1.03	0.61	1.03	1.06	1.64	1.40	1.30	1.30	17.90	25.60	293.40
AVG	1.03	1.03	0.61	1.01	1.04	1.20	1.29	1.15	1.25	12.25	19.44	55.98

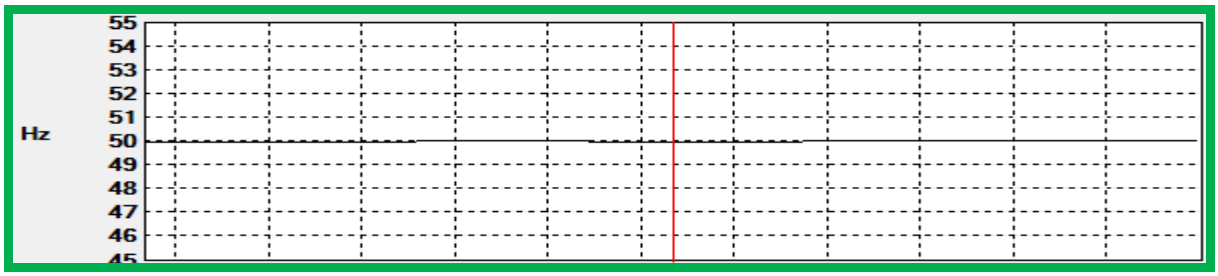
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.54	1.77	1.49

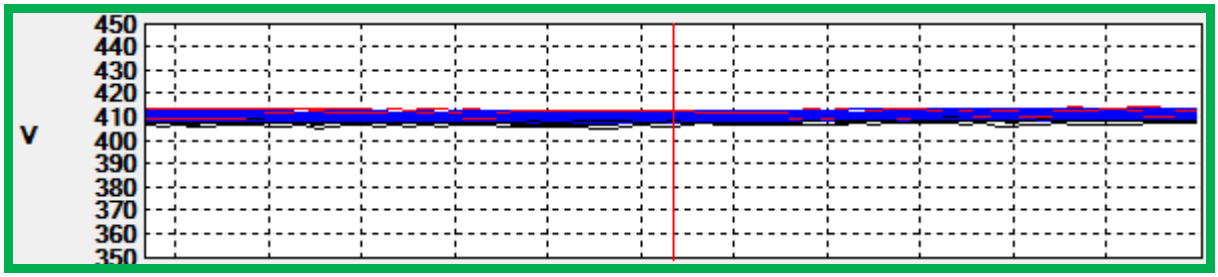
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.44	1.44	1.43	2.03	2.62	4.23
AVG	1.43	1.43	1.43	1.72	1.98	2.37

B4-For-RANI LAXMI BAI HOSTEL (SS-A)

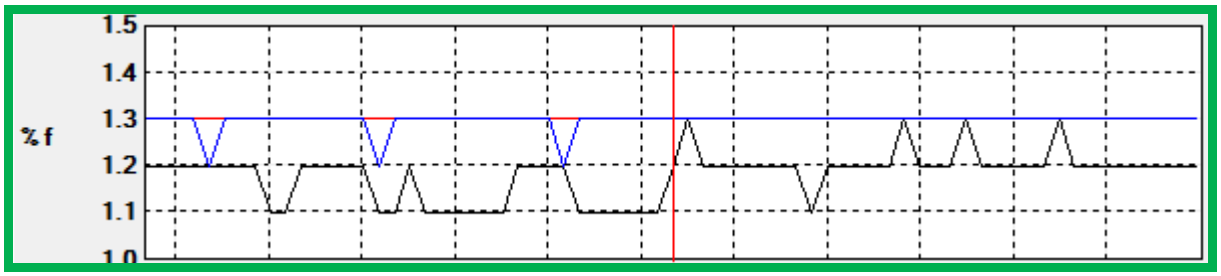
Frequency



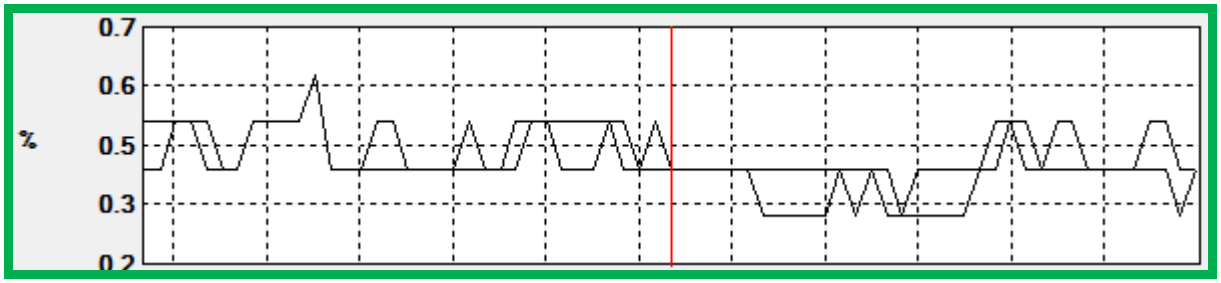
Voltage



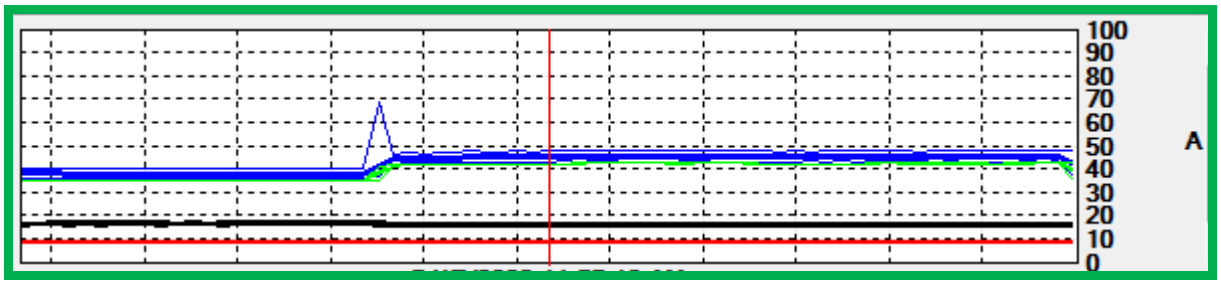
Voltage Harmonics



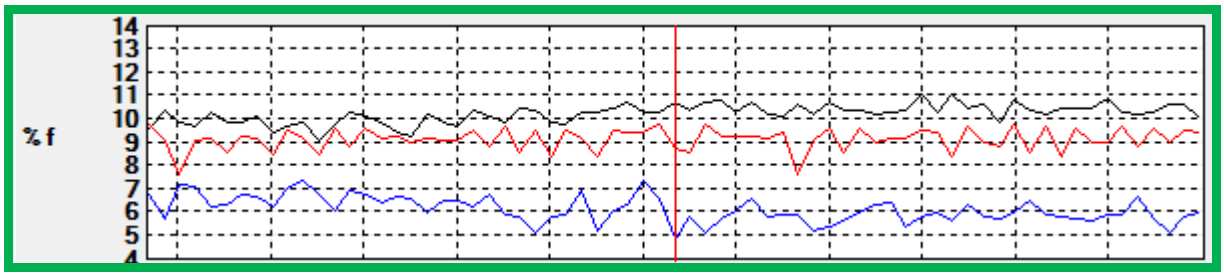
Voltage Un-balance



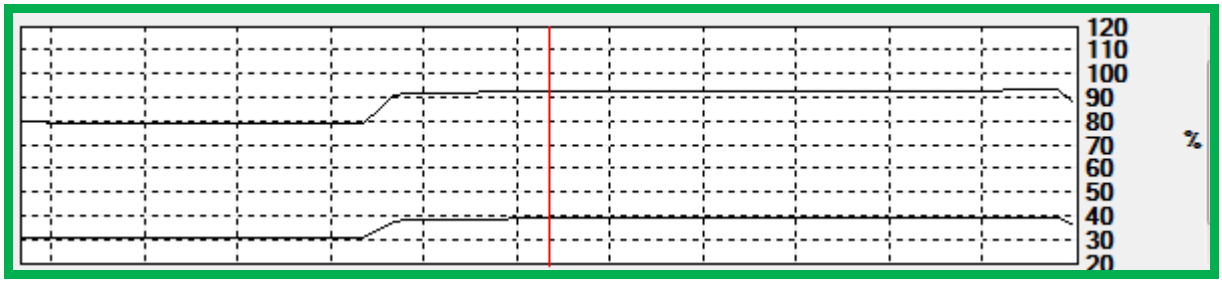
Current



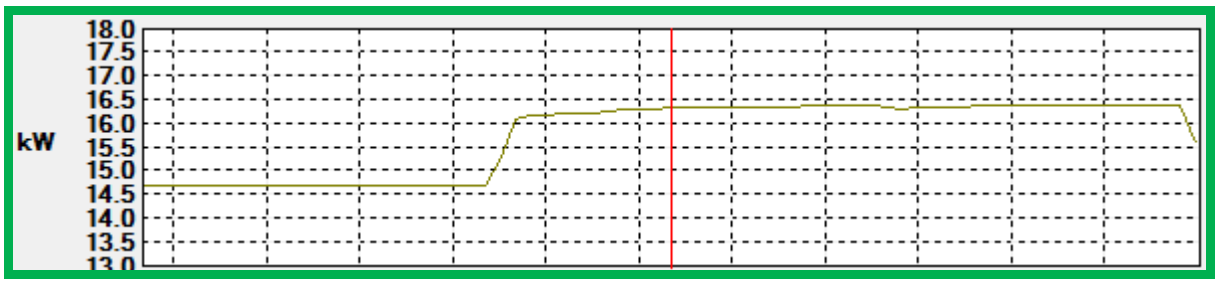
Current Harmonics



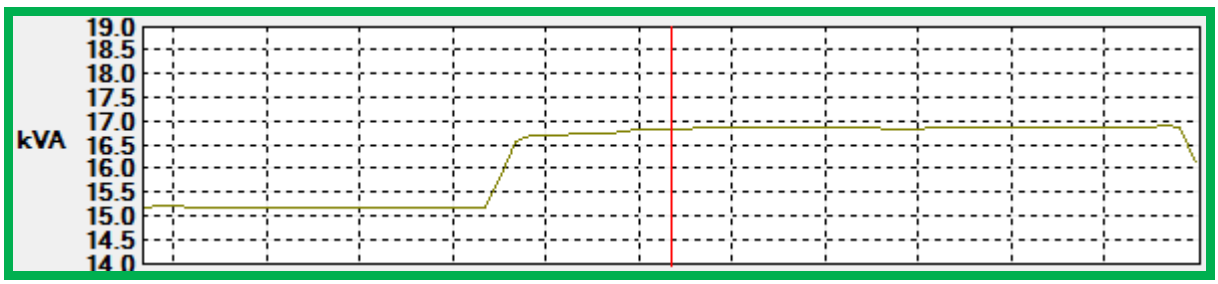
Current Un-balance



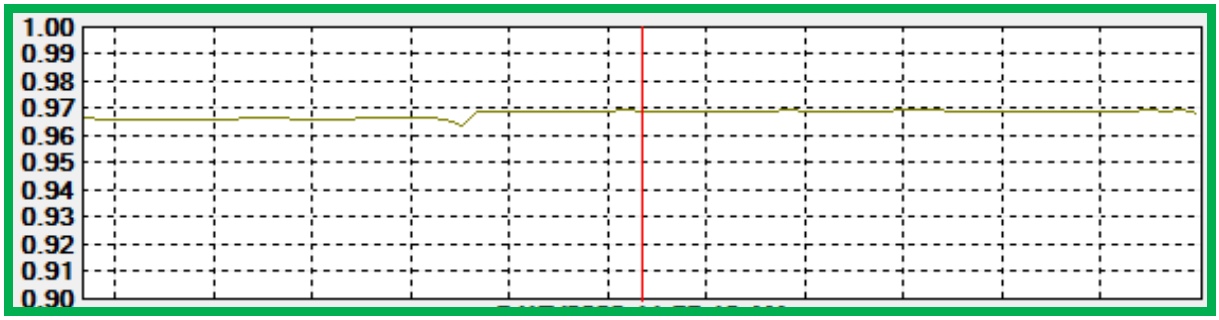
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.60	411.00	410.10	16.22	8.84	38.28	0.91	0.98	0.98	49.98	0.30	79.30
MAX	409.70	412.40	411.90	16.91	8.99	45.89	0.92	0.99	0.99	50.03	0.60	93.70
AVG	408.71	411.58	410.87	16.52	8.93	43.08	0.92	0.99	0.98	50.01	0.41	88.30

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.03	1.03	0.61	1.00	1.01	1.00	1.20	1.20	1.10	9.10	7.60	4.90
MAX	3.91	3.41	3.57	1.00	1.01	1.00	1.30	1.30	1.30	11.10	9.80	7.40
AVG	1.35	1.29	0.94	1.00	1.01	1.00	1.24	1.29	1.18	10.24	9.14	6.12

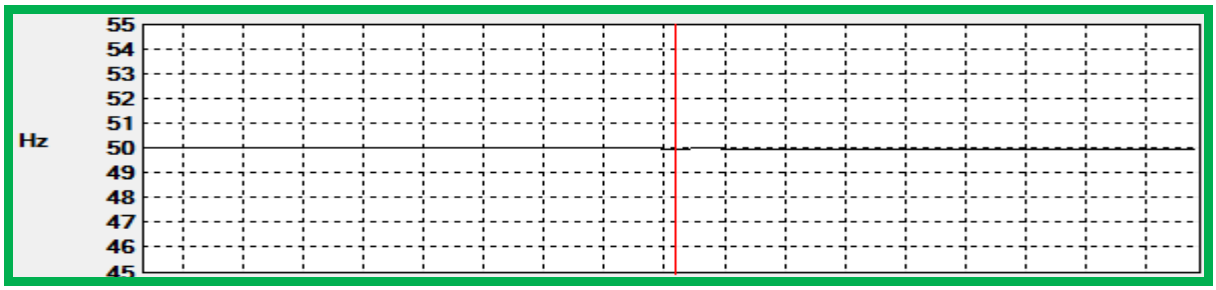
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.51	1.53	1.50

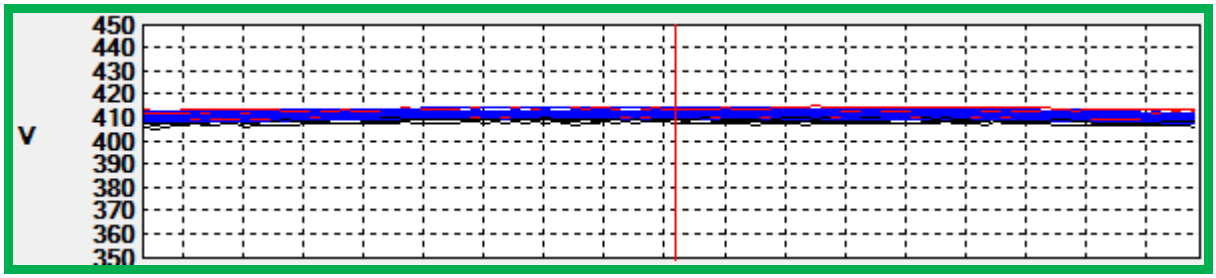
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.44	1.43	1.53	1.57	1.68
AVG	1.43	1.43	1.43	1.52	1.54	1.52

B5-For-New Girls Hostel (SS-A)

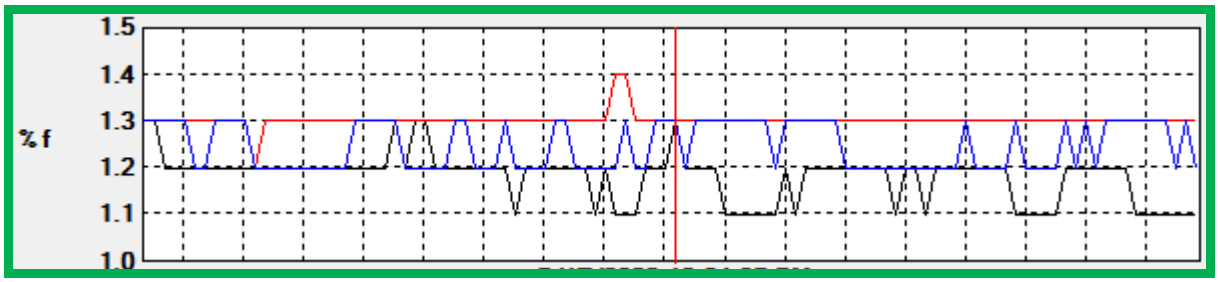
Frequency



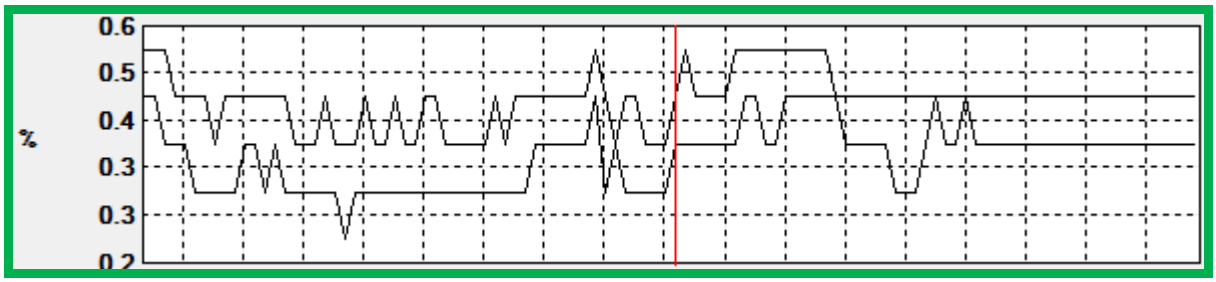
Voltage



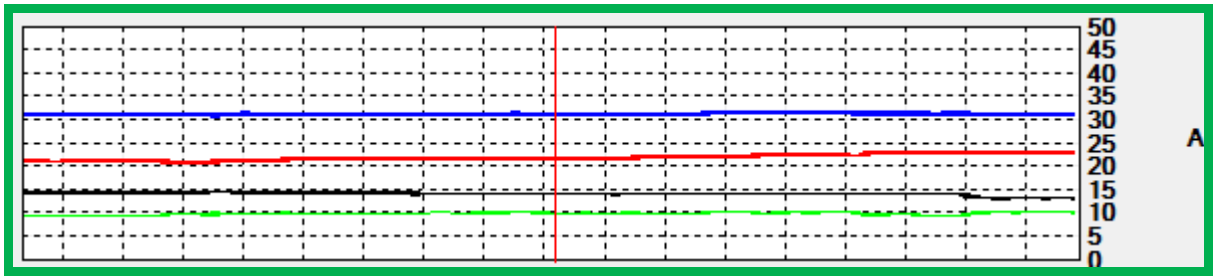
Voltage Harmonics



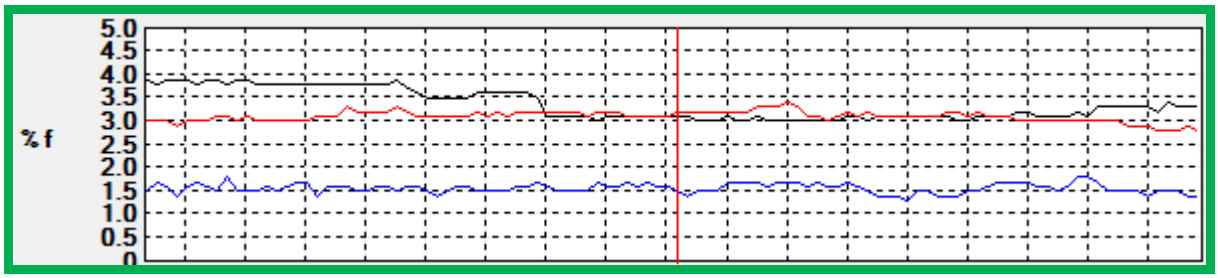
Voltage Un-balance



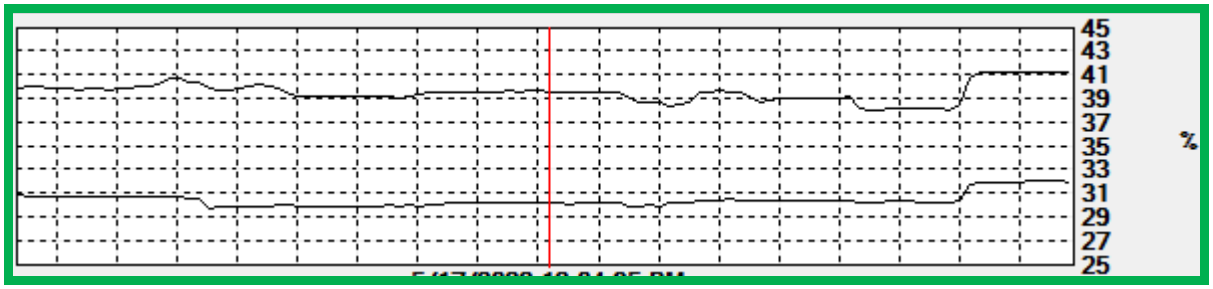
Current



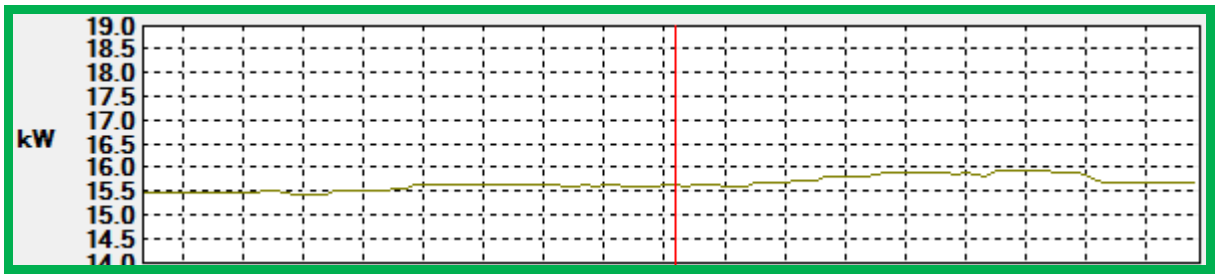
Current Harmonics



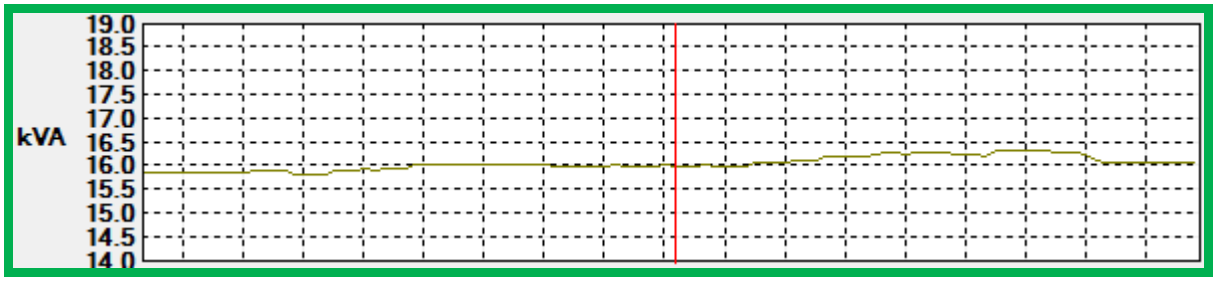
Current Un-balance



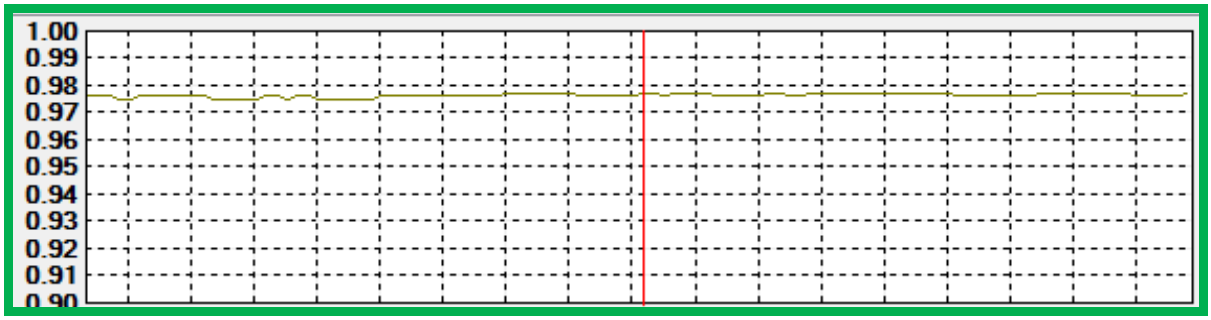
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	408.00	411.20	410.00	13.25	20.86	31.15	0.98	1.00	0.96	49.96	0.20	38.10
MAX	410.50	413.00	412.60	14.57	23.15	31.74	0.98	1.00	0.96	50.06	0.50	41.30
AVG	409.60	412.28	411.64	14.18	22.02	31.36	0.98	1.00	0.96	50.01	0.38	39.57

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	3.91	3.41	3.57	1.00	1.00	1.00	1.20	1.20	1.10	3.00	2.80	1.30
MAX	3.91	3.41	3.57	1.00	1.00	1.00	1.30	1.30	1.20	3.90	3.40	1.80
AVG	3.91	3.41	3.57	1.00	1.00	1.00	1.27	1.28	1.16	3.35	3.10	1.57

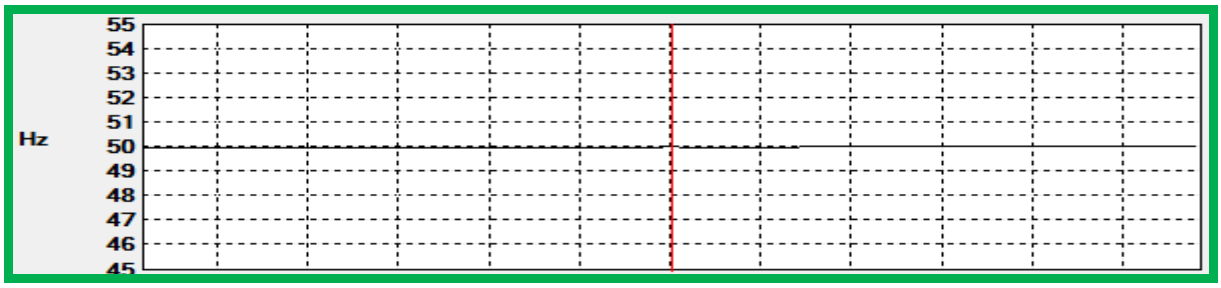
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.42	1.39	1.42

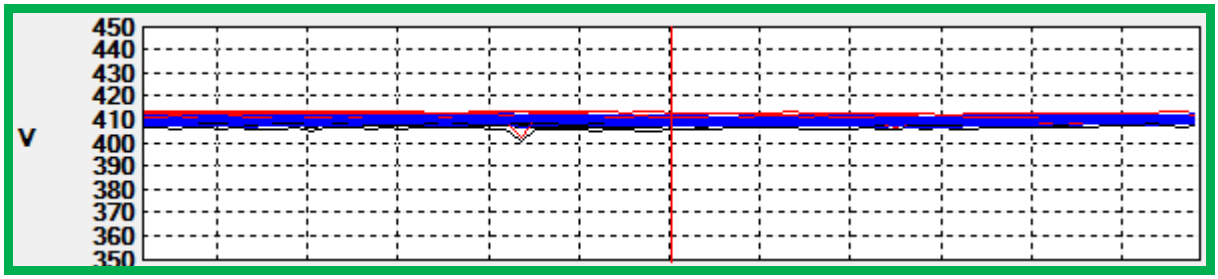
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.44	1.44	1.43	1.45	1.41	1.46
AVG	1.43	1.44	1.43	1.43	1.39	1.43

B6-For-Durga Bhabhi Hostel OVERHEAD (SS-A)

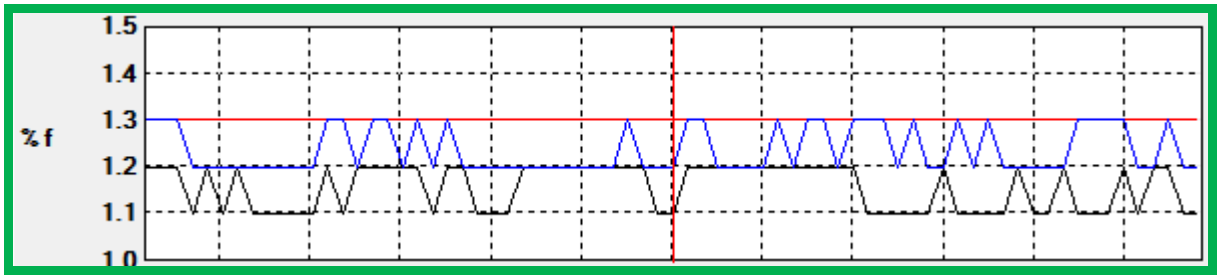
Frequency



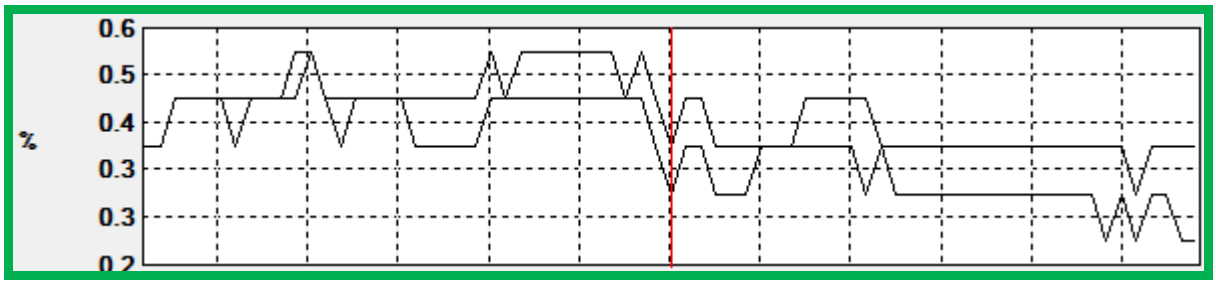
Voltage



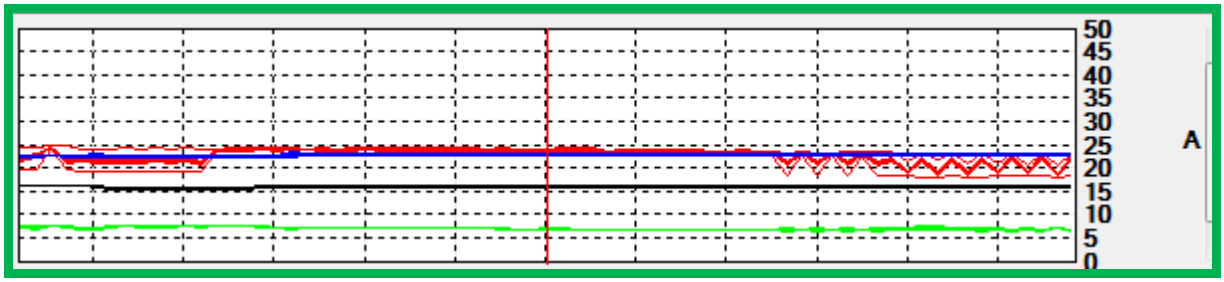
Voltage Harmonics



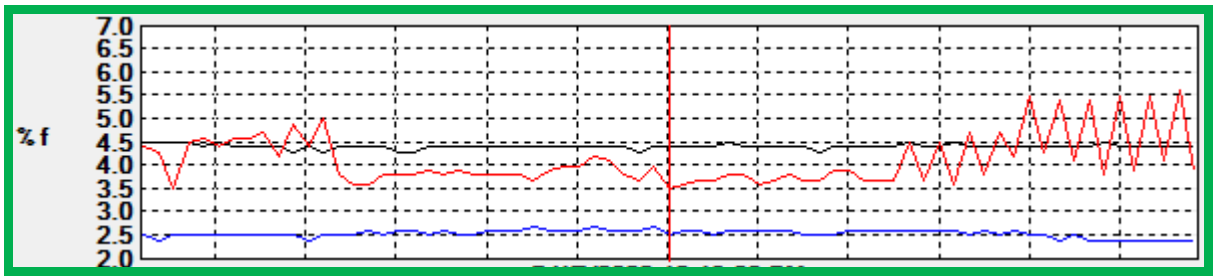
Voltage Un-balance



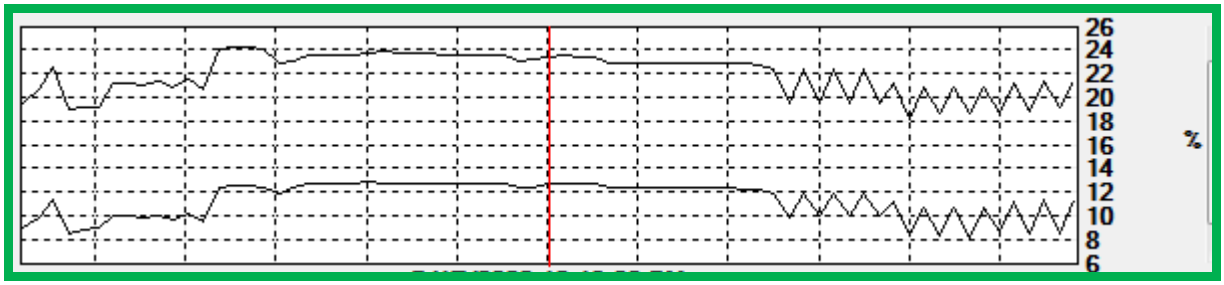
Current



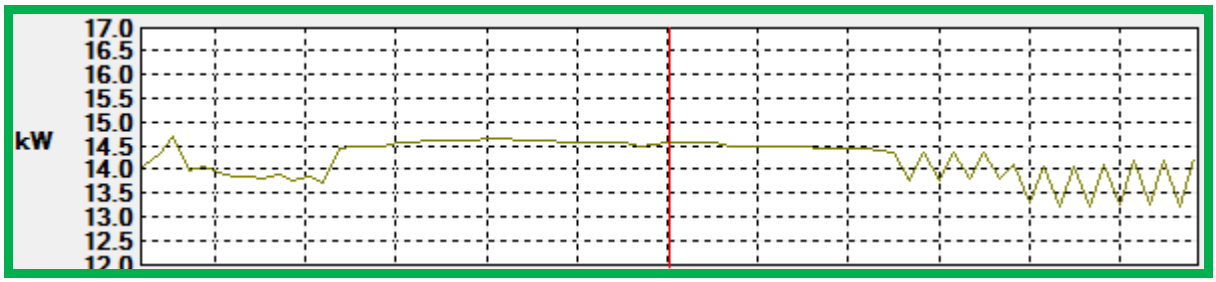
Current Harmonics



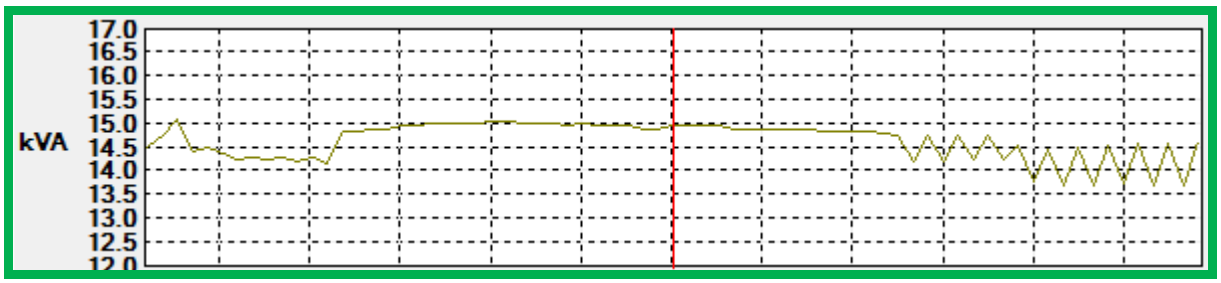
Current Un-balance



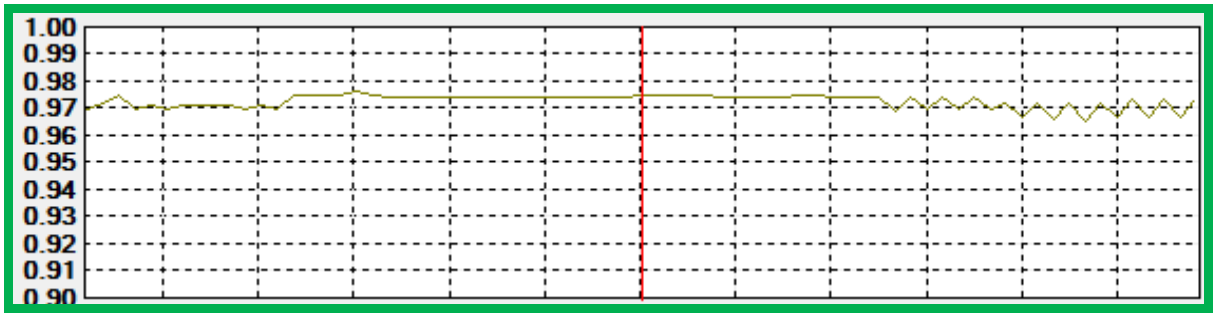
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.70	410.50	409.10	15.76	18.68	22.70	0.97	0.95	0.97	49.95	0.20	18.20
MAX	409.60	412.20	410.60	16.44	24.40	23.20	0.97	0.98	0.98	50.04	0.60	24.30
AVG	408.52	411.39	409.90	16.10	22.73	23.01	0.97	0.97	0.98	49.99	0.36	22.05

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.20	1.10	4.30	3.50	2.40
MAX	- - -	- - -	- - -	1.00	1.00	1.00	1.30	1.30	1.30	4.50	5.60	2.70
AVG	- - -	- - -	- - -	1.00	1.00	1.00	1.24	1.29	1.17	4.40	4.13	2.54

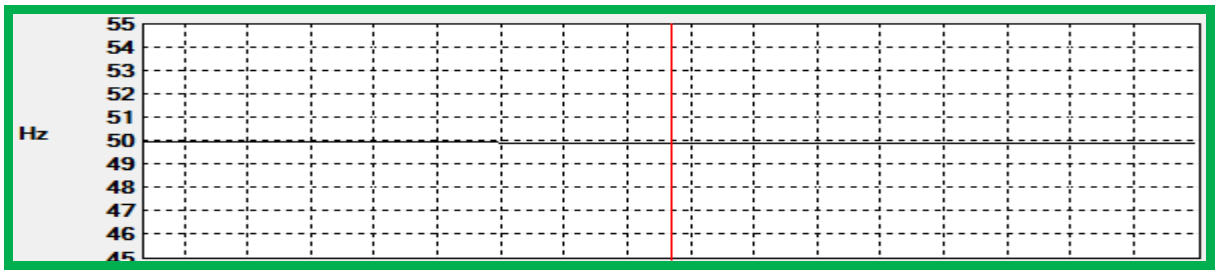
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.43	1.38	1.43

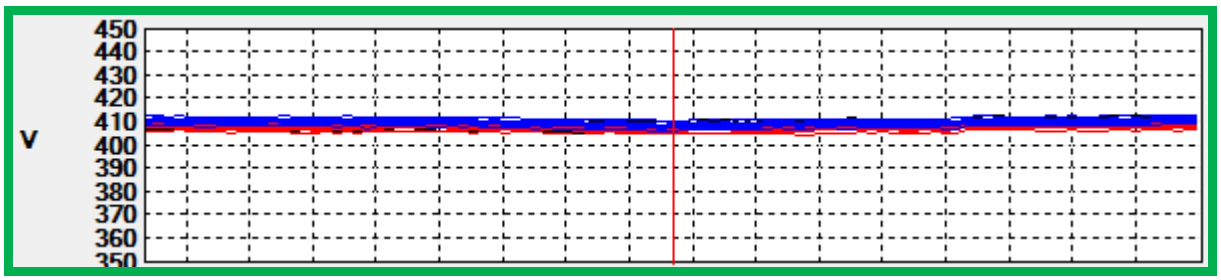
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.44	1.44	1.43	1.45	1.46	1.49
AVG	1.43	1.43	1.43	1.44	1.41	1.47

B7-For-New Park

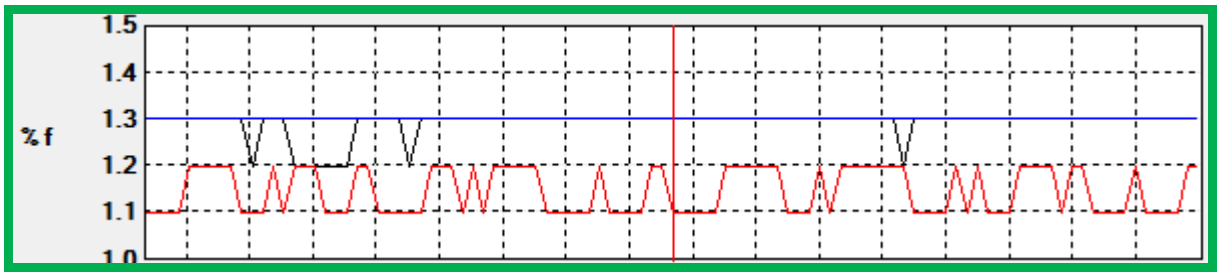
Frequency



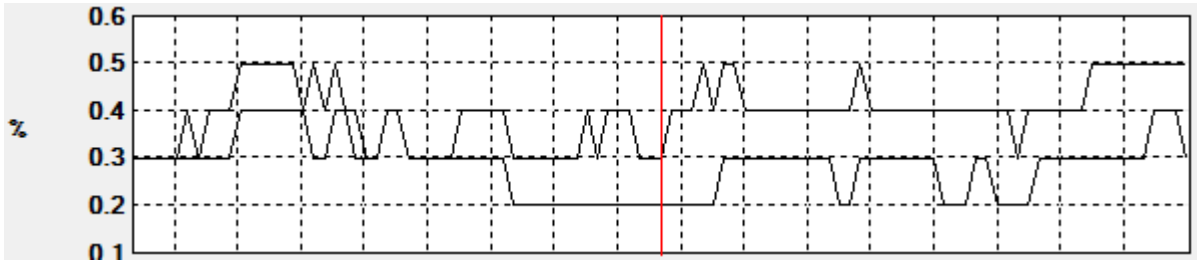
Voltage



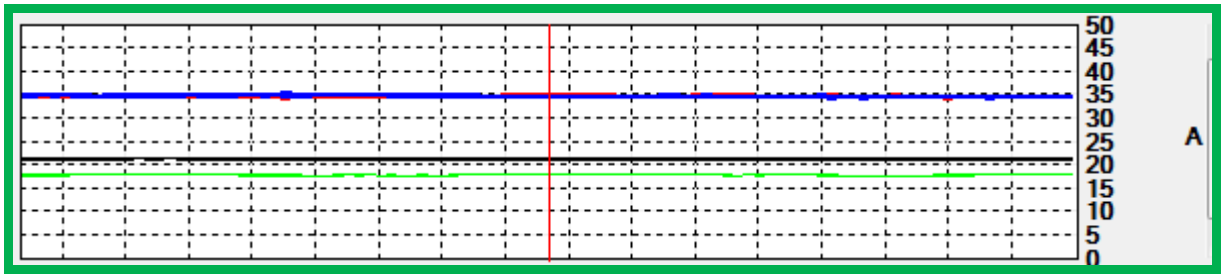
Voltage Harmonics



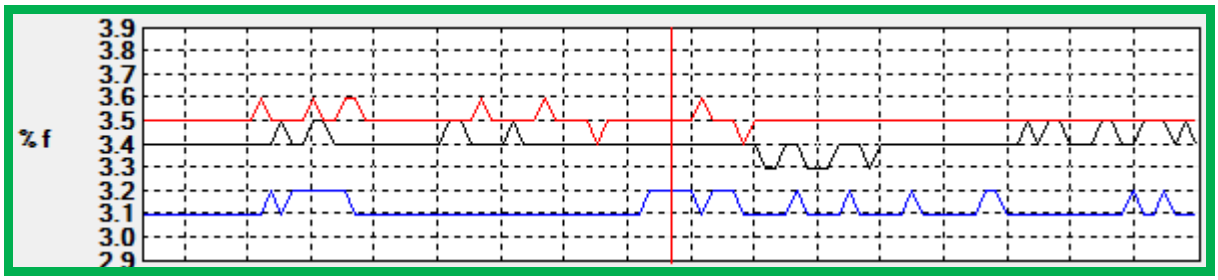
Voltage Un-balance



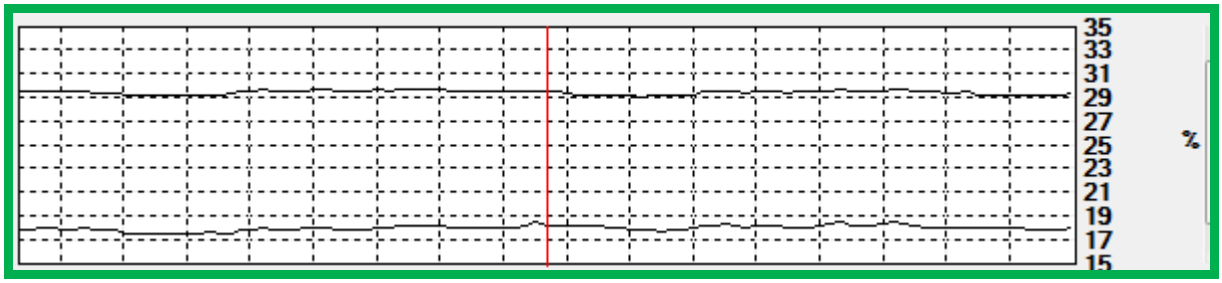
Current



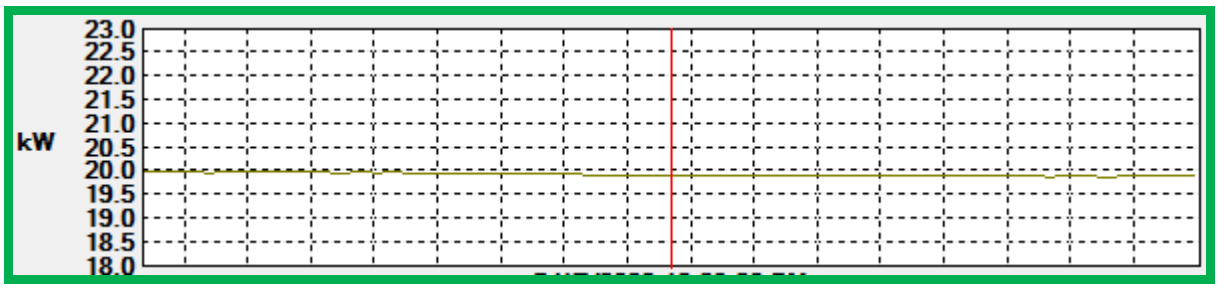
Current Harmonics



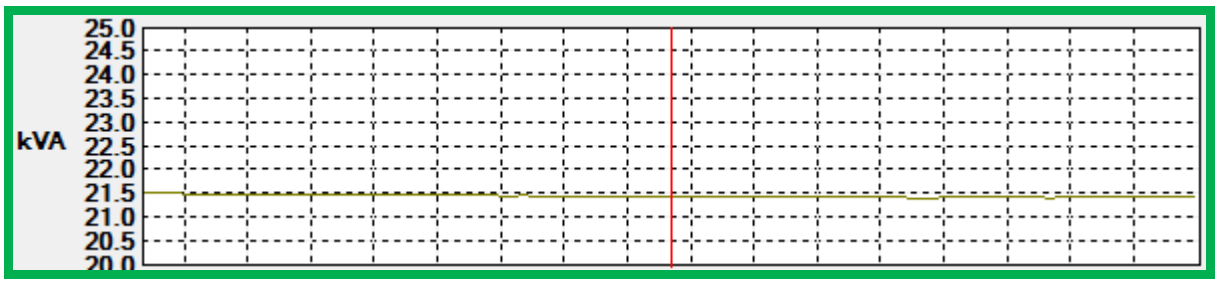
Current Un-balance



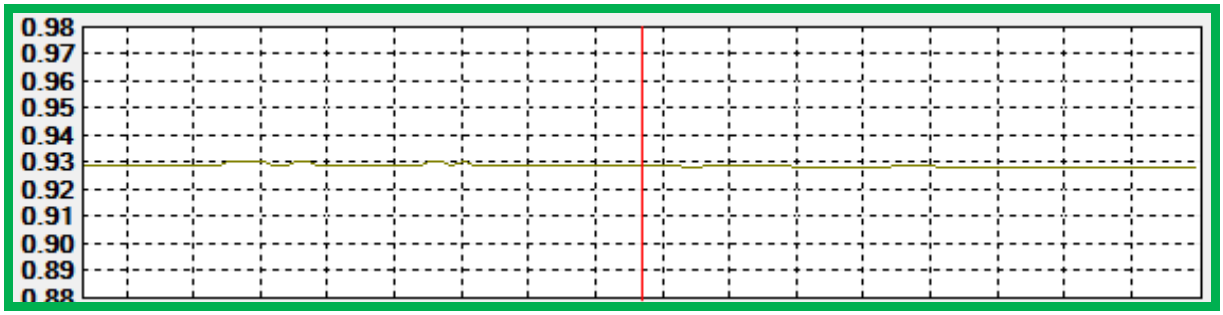
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.80	406.70	408.00	21.23	34.59	34.55	1.00	0.90	0.91	49.91	0.20	29.10
MAX	410.50	408.90	411.20	21.50	35.01	35.02	1.00	0.90	0.92	49.99	0.40	29.80
AVG	409.00	407.83	409.89	21.38	34.75	34.79	1.00	0.90	0.91	49.93	0.29	29.46

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.12	1.74	1.23	1.00	1.00	1.00	1.10	1.20	1.20	3.30	3.40	3.10
MAX	1.12	1.74	1.23	1.00	1.00	1.00	1.20	1.30	1.30	3.50	3.60	3.20
AVG	1.12	1.74	1.23	1.00	1.00	1.00	1.20	1.23	1.27	3.41	3.50	3.12

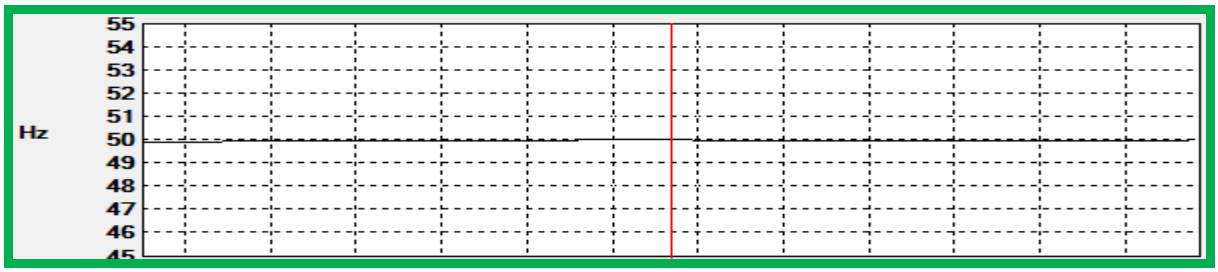
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.44	1.45	1.46

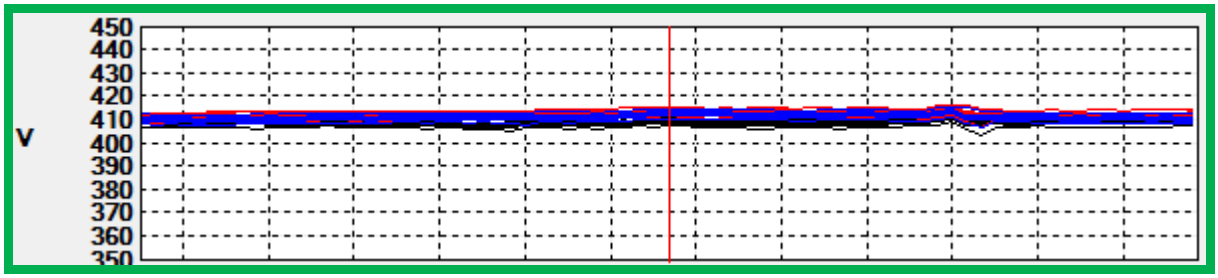
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.44	1.44	1.45	1.46	1.47
AVG	1.43	1.43	1.43	1.45	1.46	1.46

B8-For- Zoology Dept. and Old Tube well (SS-A)

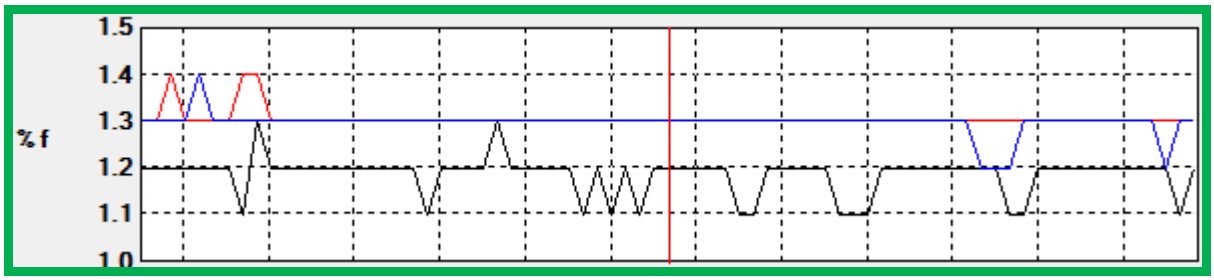
Frequency



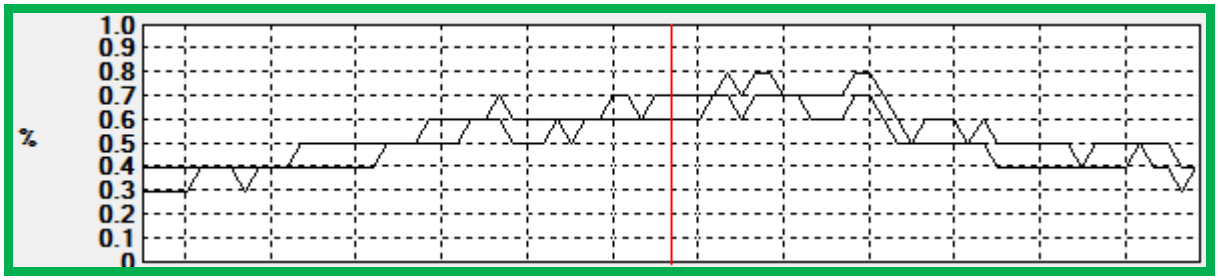
Voltage



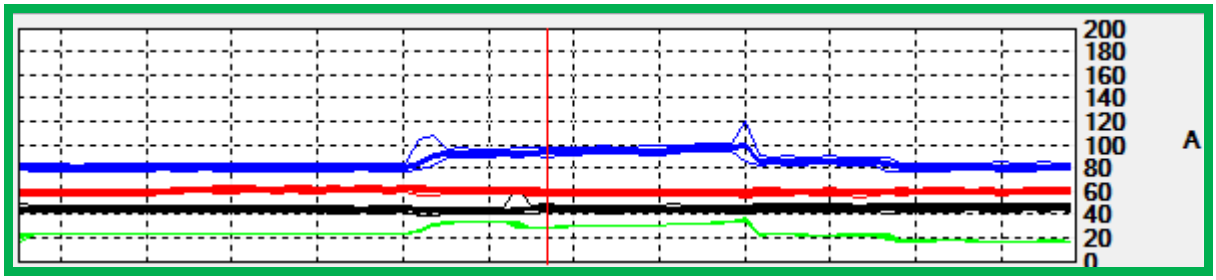
Voltage Harmonics



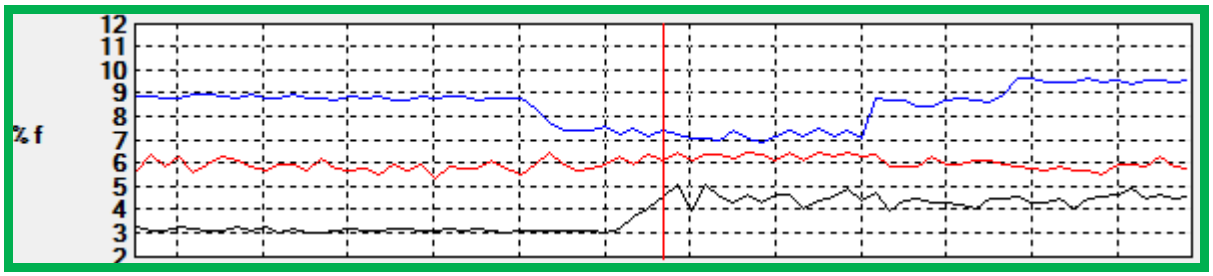
Voltage Un-balance



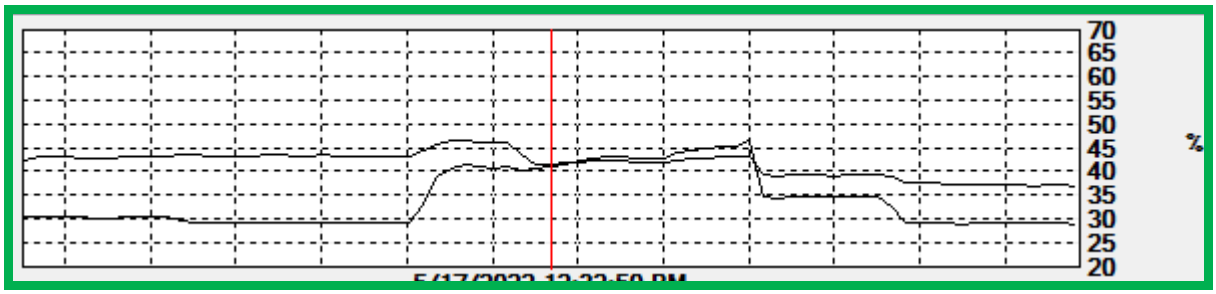
Current



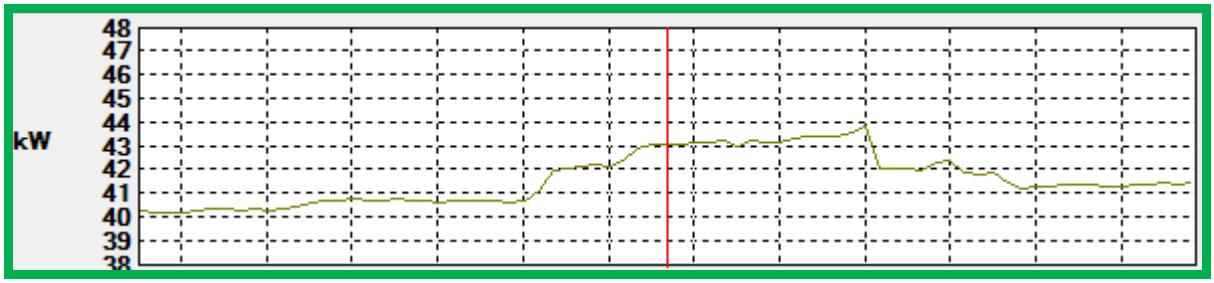
Current Harmonics



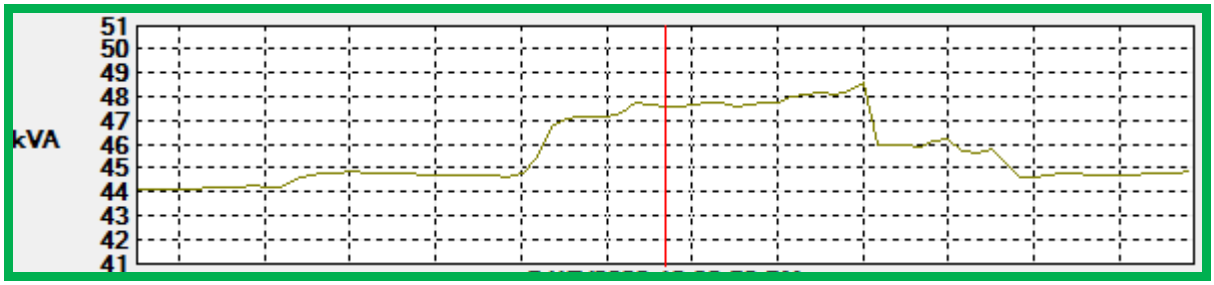
Current Un-balance



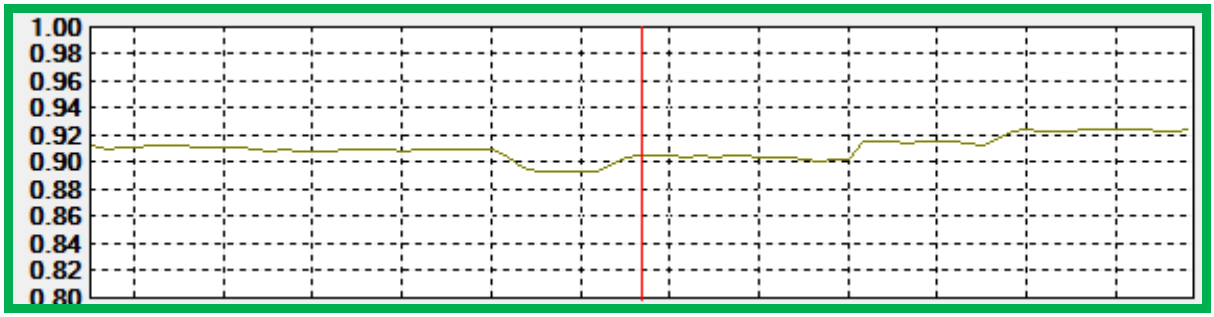
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	408.00	411.00	409.80	44.10	59.05	80.98	0.93	0.82	0.91	49.92	0.30	29.10
MAX	410.90	414.30	413.40	47.09	62.28	99.79	0.98	0.84	0.96	50.02	0.70	46.60
AVG	408.91	412.45	411.35	45.67	60.57	86.32	0.95	0.83	0.94	49.98	0.49	34.31

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	1.20	1.20	1.10	3.00	5.40	6.90
MAX	- - -	- - -	- - -	1.00	1.00	1.00	1.30	1.40	1.30	5.10	6.50	9.70
AVG	- - -	- - -	- - -	1.00	1.00	1.00	1.26	1.29	1.20	3.84	6.01	8.47

Crest Factor

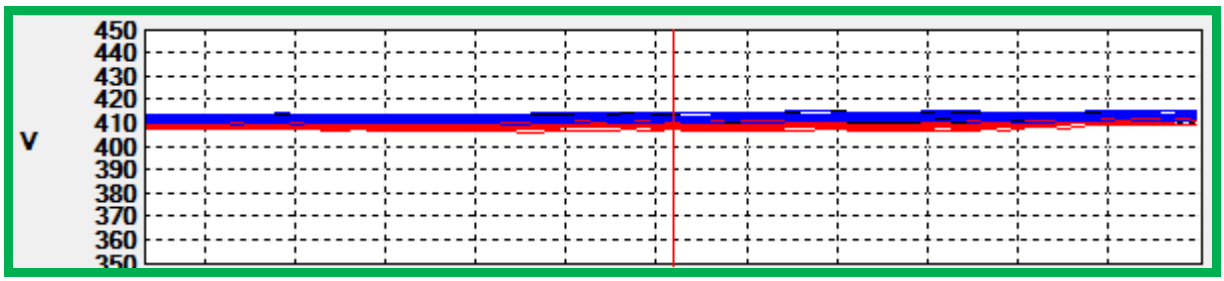
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.42	1.46	1.52	1.58

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.44	1.43	1.57	1.57	1.70
AVG	1.43	1.43	1.43	1.48	1.54	1.62

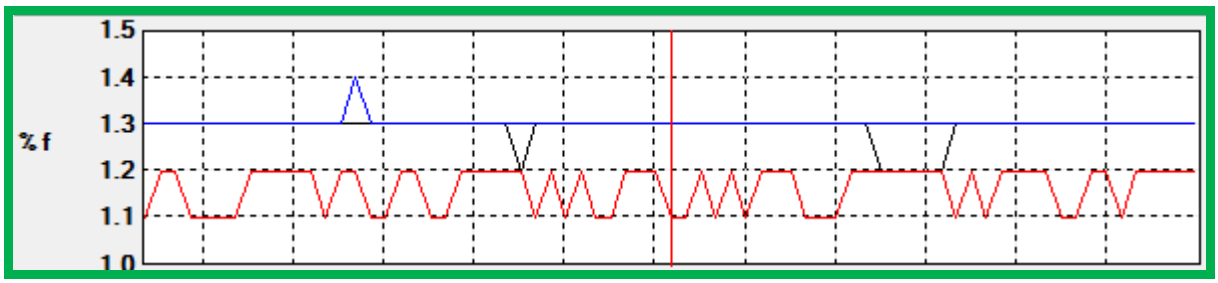
B9-For-VC OFFICE (SS-A)

Frequency

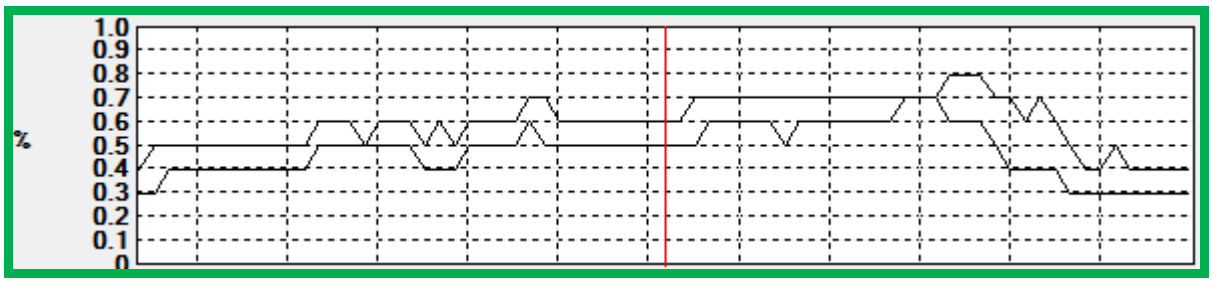
Voltage



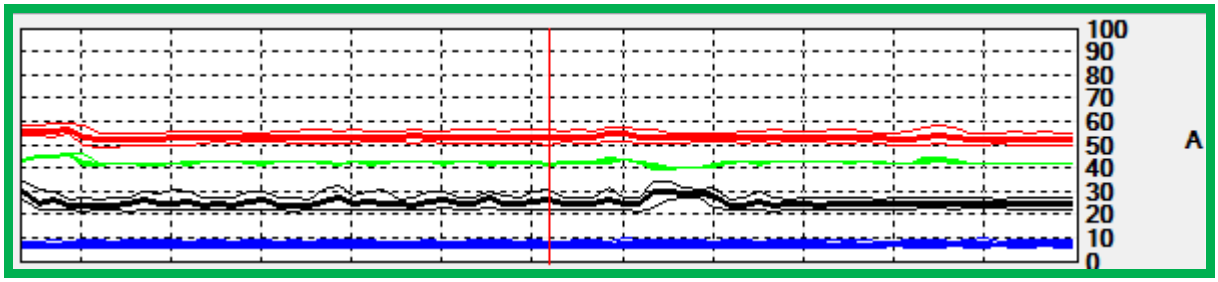
Voltage Harmonics



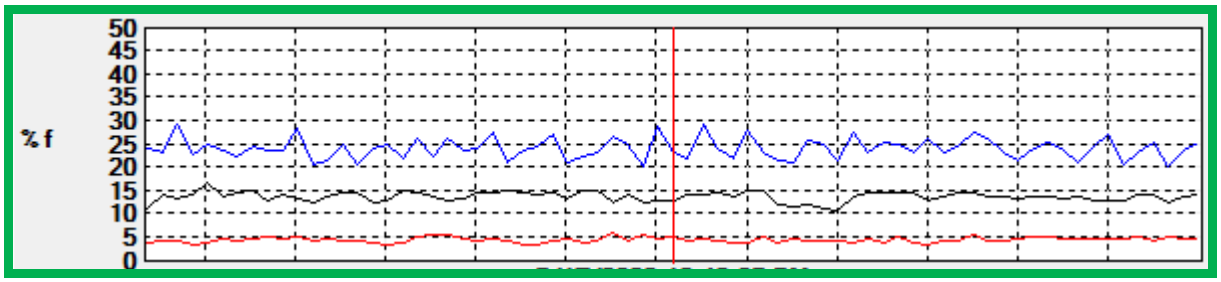
Voltage Un-balance



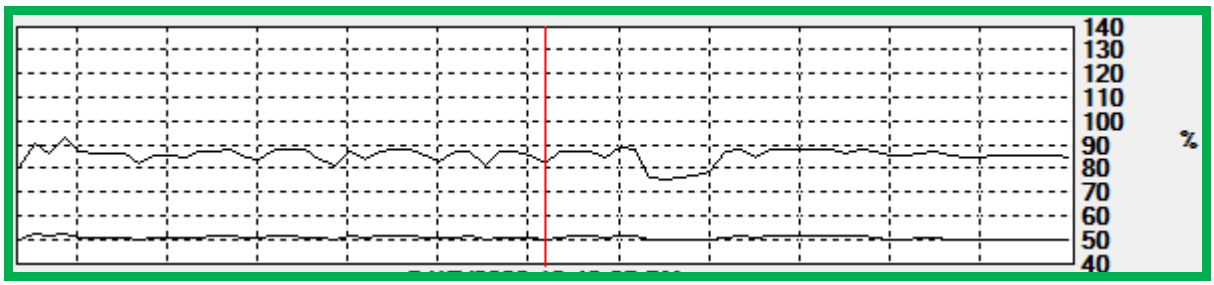
Current



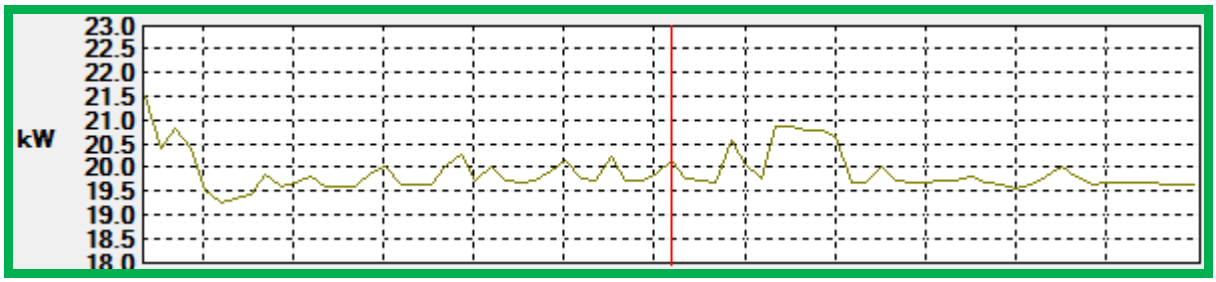
Current Harmonics



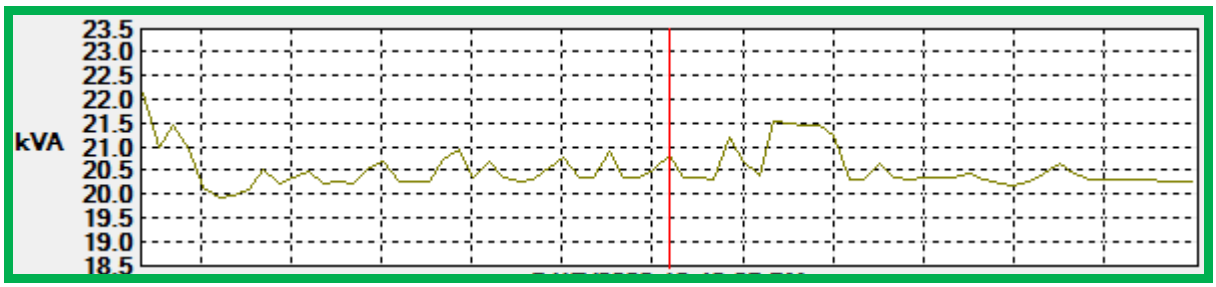
Current Un-balance



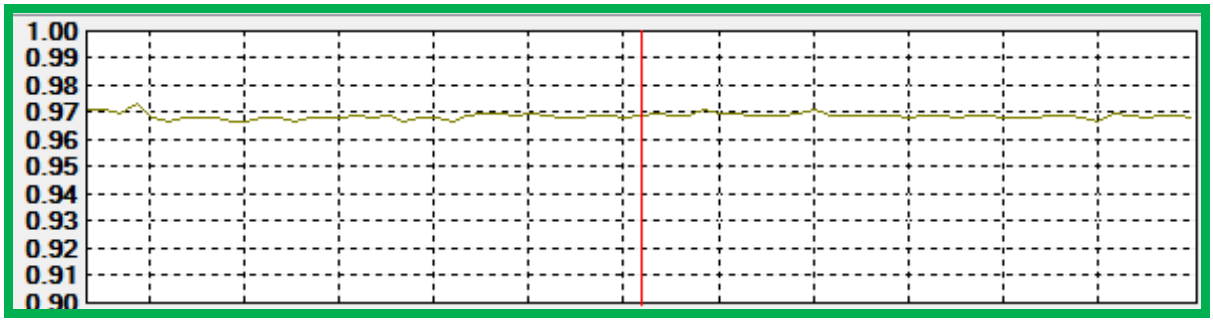
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	411.00	408.20	411.80	24.37	52.18	7.05	0.99	0.99	0.69	49.96	0.30	75.90
MAX	413.30	411.70	413.60	29.93	56.94	7.77	0.99	1.00	0.73	50.02	0.70	93.30
AVG	412.11	409.40	412.59	25.50	53.55	7.43	0.99	1.00	0.71	49.99	0.48	85.79

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.04	1.10	1.20	1.20	10.80	3.30	20.20
MAX	- - -	- - -	- - -	1.01	1.00	1.05	1.20	1.30	1.40	16.60	6.20	29.30
AVG	- - -	- - -	- - -	1.01	1.00	1.04	1.19	1.23	1.29	13.79	4.49	24.13

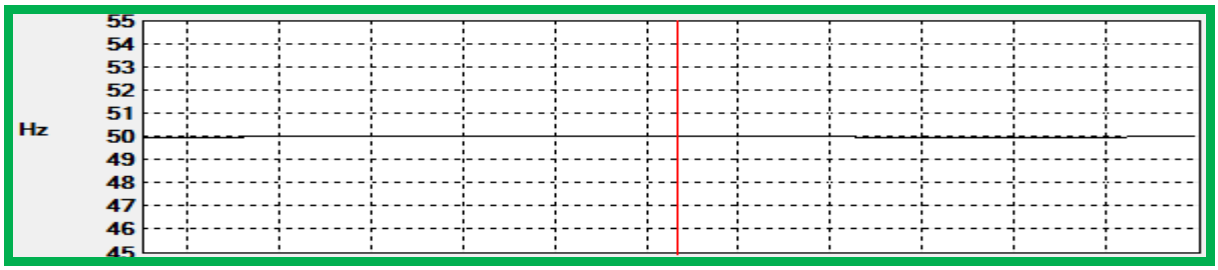
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.65	1.46	2.01

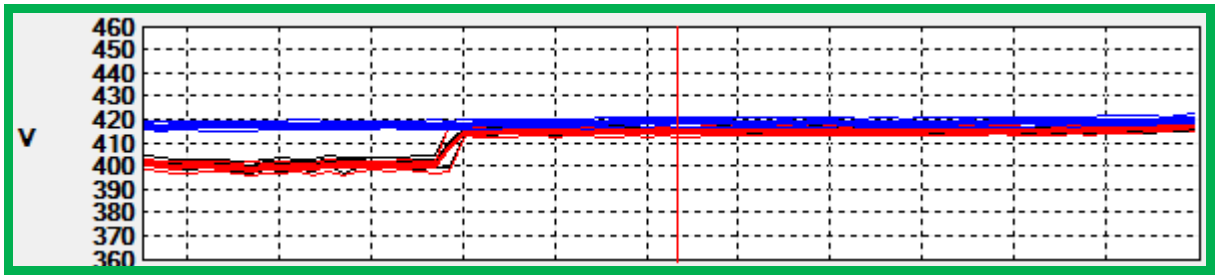
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.44	1.44	1.82	1.50	2.21
AVG	1.43	1.43	1.43	1.72	1.48	2.10

B10-For-Secrecy Exam. Dept. (SS-A)

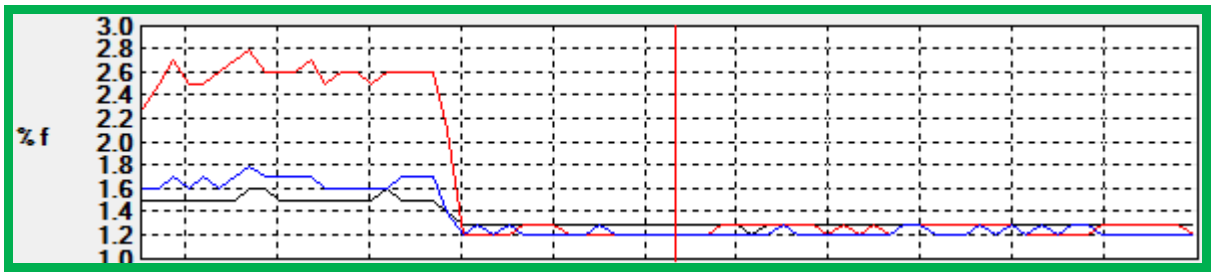
Frequency



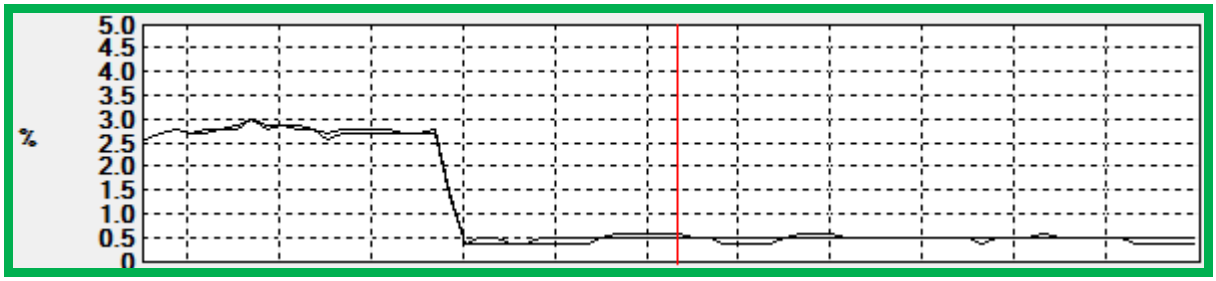
Voltage



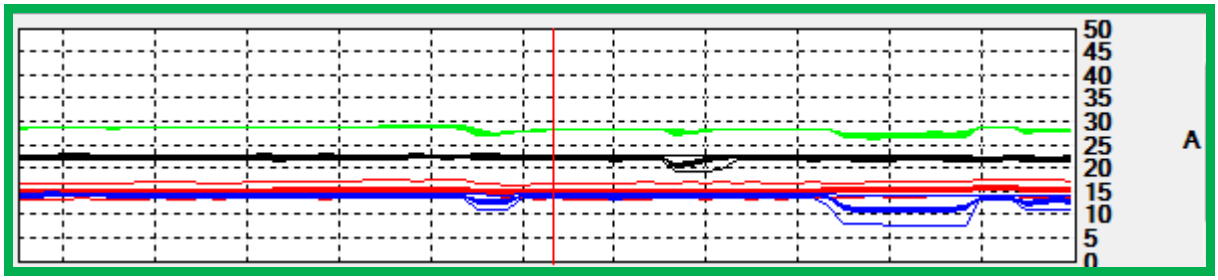
Voltage Harmonics



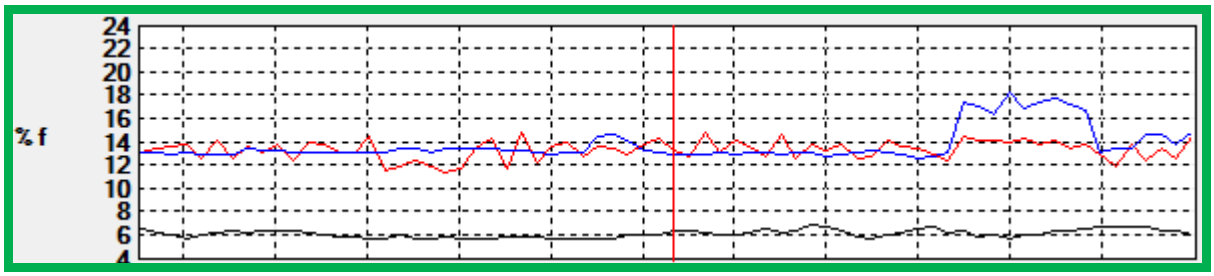
Voltage Un-balance



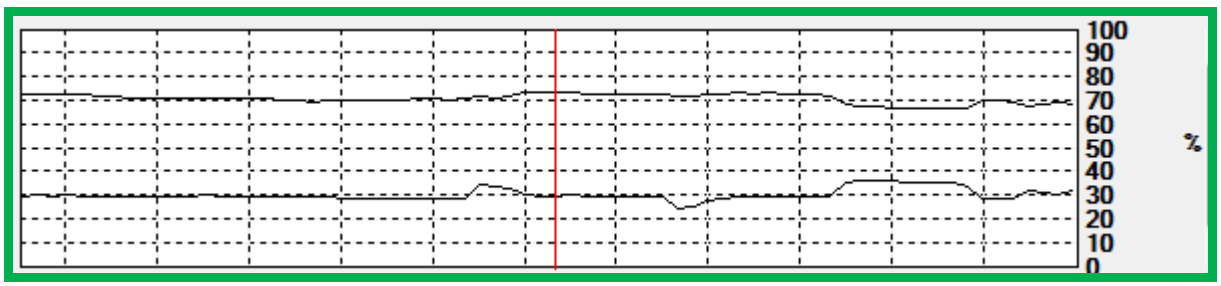
Current



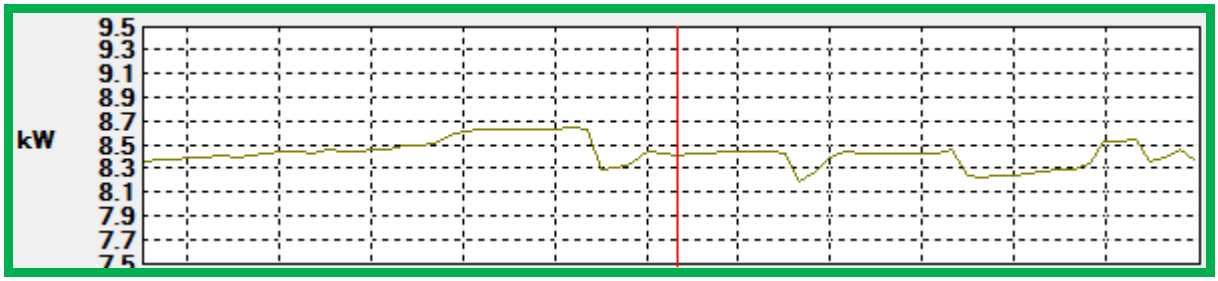
Current Harmonics



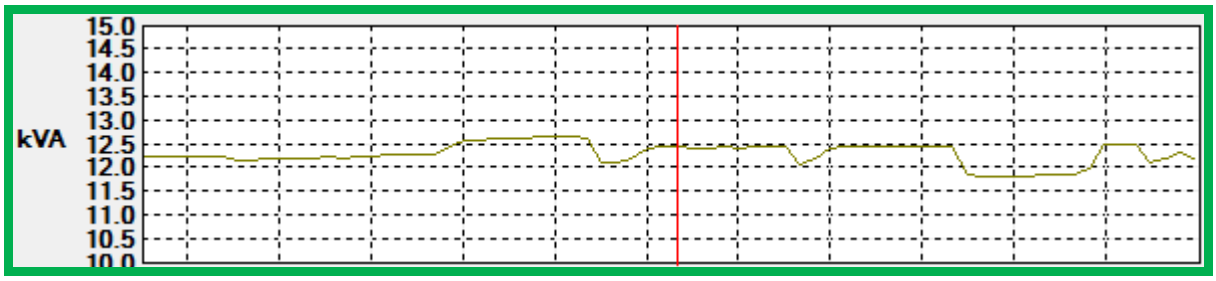
Current Un-balance



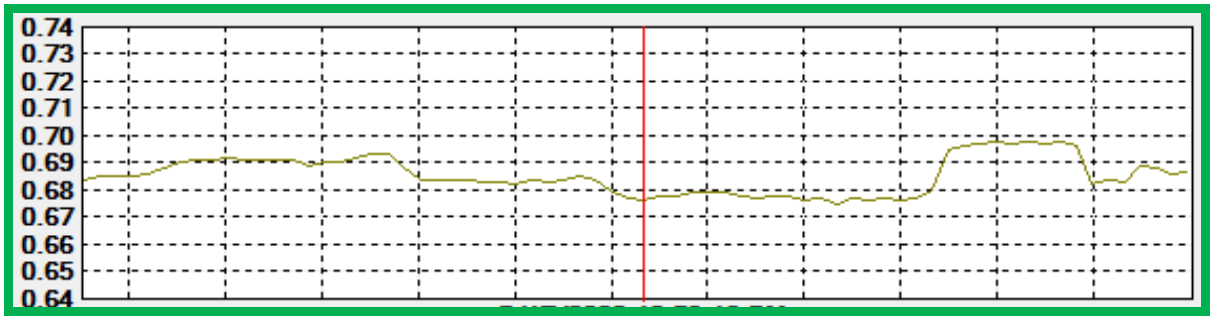
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	399.80	398.40	417.30	20.77	14.96	11.27	0.73	0.91	0.30	49.98	0.40	24.20
MAX	417.30	417.50	420.30	22.62	15.78	14.47	0.76	0.93	0.37	50.04	3.00	36.20
AVG	411.79	411.00	418.67	22.37	15.33	13.74	0.74	0.92	0.33	50.01	1.19	30.49

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.01	1.01	1.20	1.20	1.20	5.70	11.50	12.70
MAX	- - -	- - -	- - -	1.01	1.01	1.03	2.40	2.60	1.30	7.00	14.90	18.30
AVG	- - -	- - -	- - -	1.01	1.01	1.02	1.57	1.53	1.28	6.17	13.37	13.81

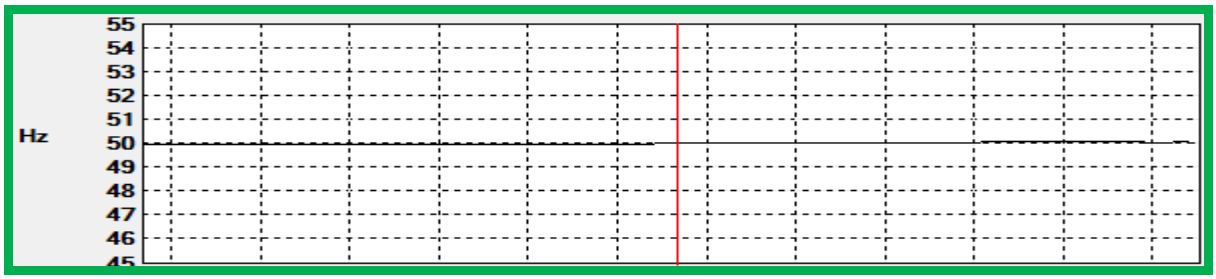
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.58	1.67	1.53

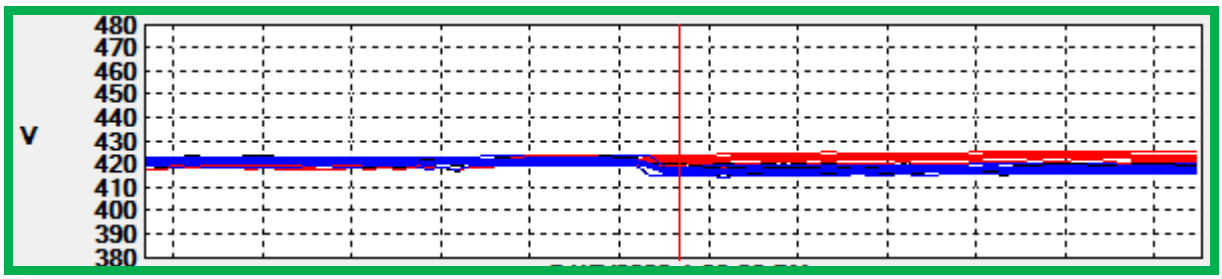
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.44	1.44	1.43	1.66	1.72	1.87
AVG	1.43	1.43	1.43	1.60	1.70	1.59

B11-For-Rani Laxmi Bai Hostel (SS-A)

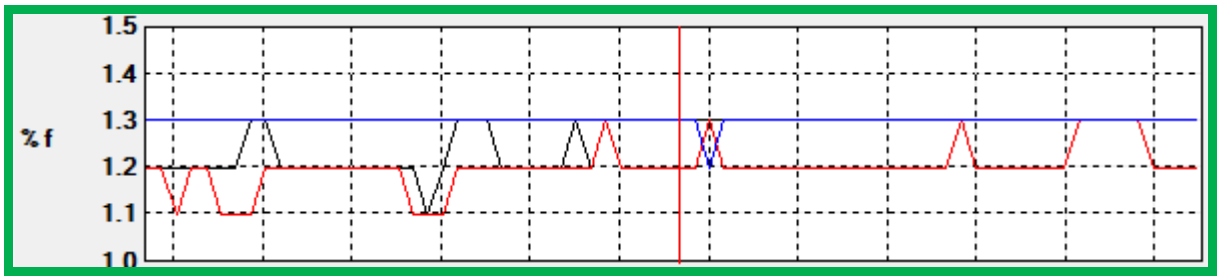
Frequency



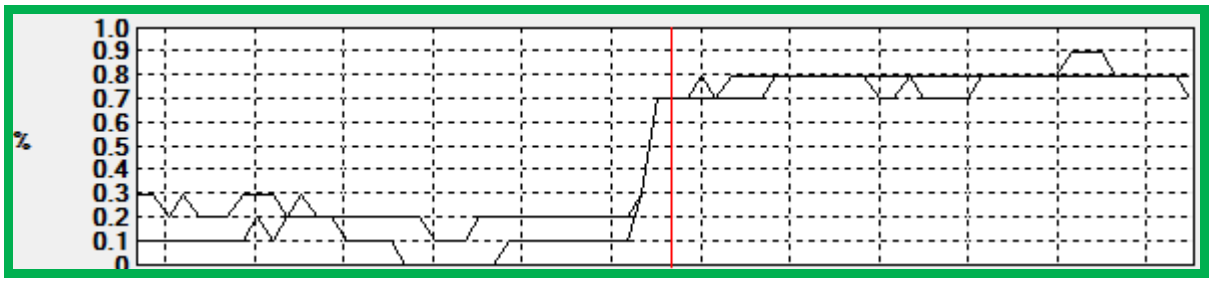
Voltage



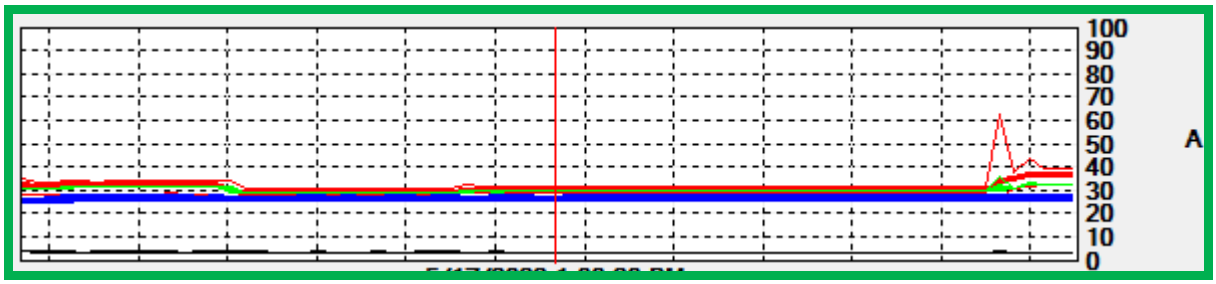
Voltage Harmonics



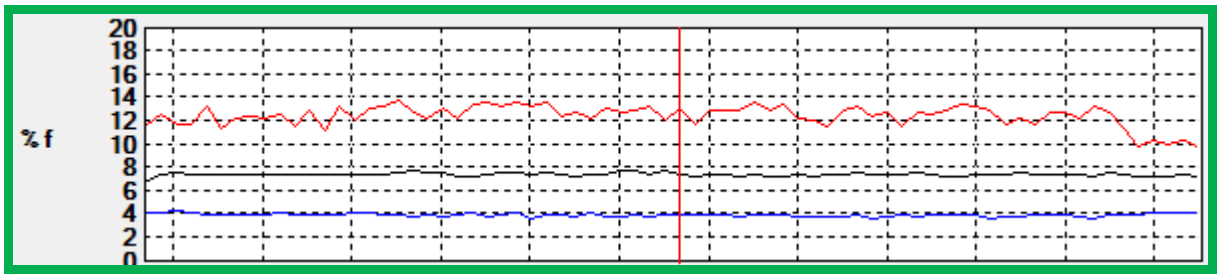
Voltage Un-balance



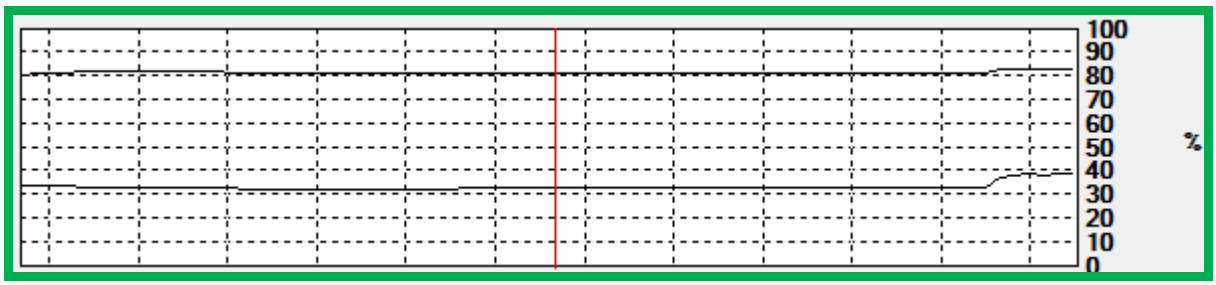
Current



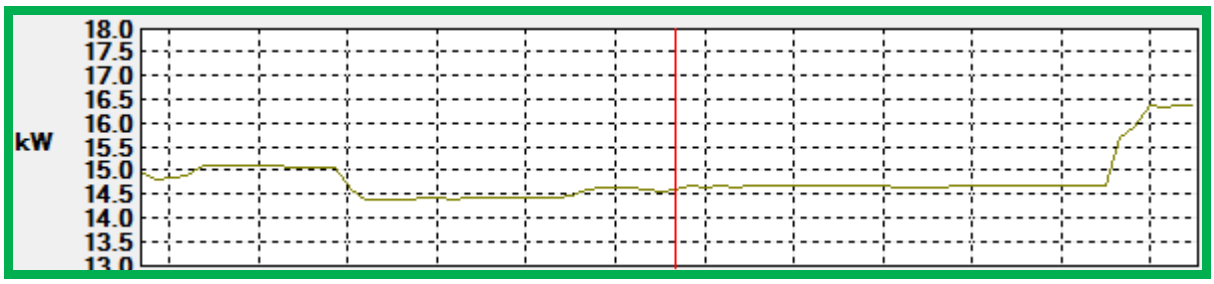
Current Harmonics



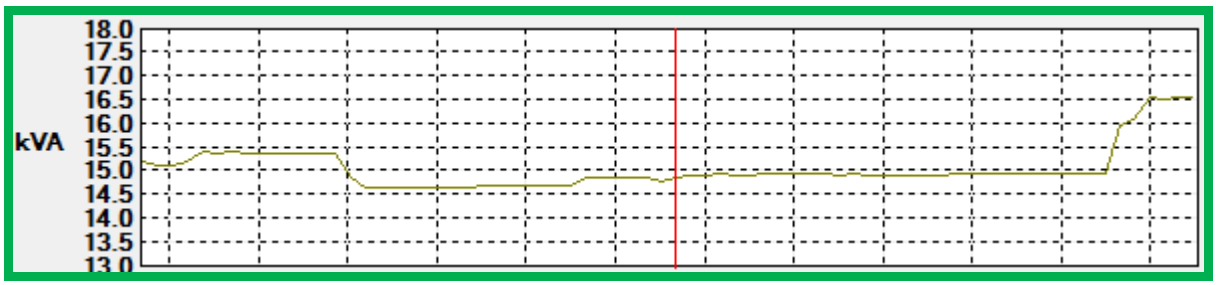
Current Un-balance



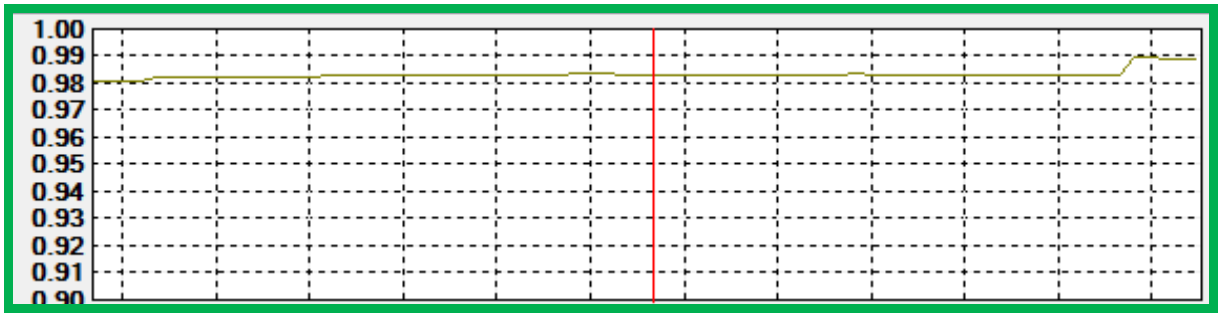
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.70	419.80	416.90	3.76	29.63	25.92	0.99	0.97	1.00	49.96	0.00	80.70
MAX	422.20	423.90	421.80	4.03	37.29	27.30	1.00	0.98	1.00	50.07	0.90	83.30
AVG	419.79	422.02	419.46	3.79	31.19	26.97	0.99	0.97	1.00	50.02	0.47	81.61

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.02	1.00	1.00	1.10	1.20	1.20	6.90	9.80	3.70
MAX	- - -	- - -	- - -	1.03	1.01	1.00	1.30	1.30	1.30	7.70	13.80	4.30
AVG	- - -	- - -	- - -	1.03	1.01	1.00	1.20	1.26	1.24	7.45	12.48	3.94

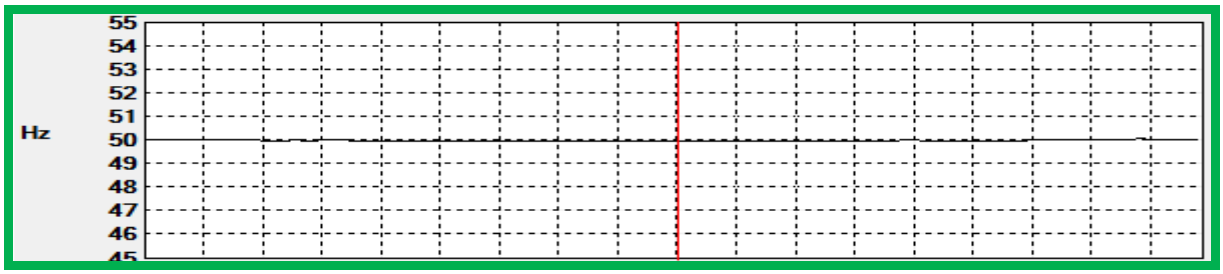
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.52	1.67	1.45

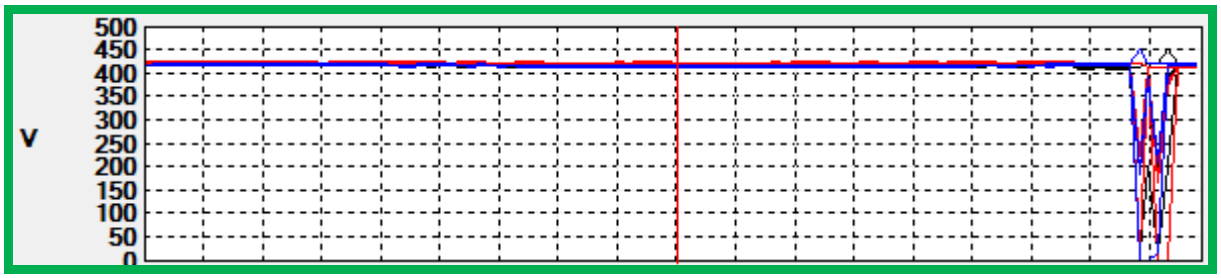
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.56	1.84	1.46
AVG	1.43	1.43	1.43	1.54	1.70	1.45

B12-For-Dara Singh Kushti Hall, MBA (SS-A)

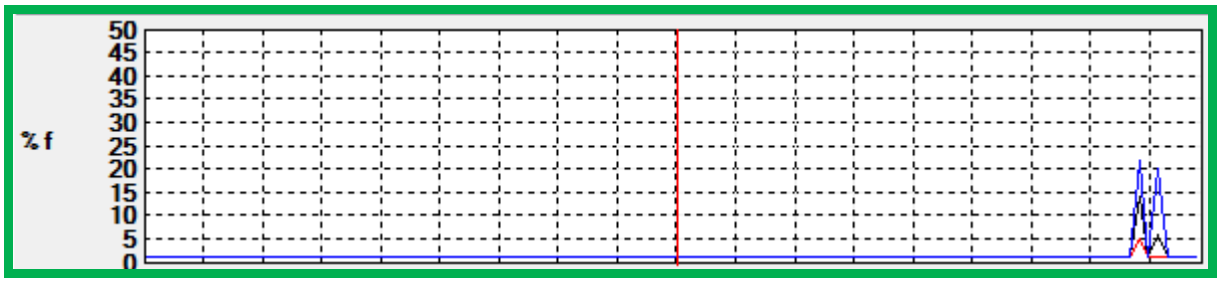
Frequency



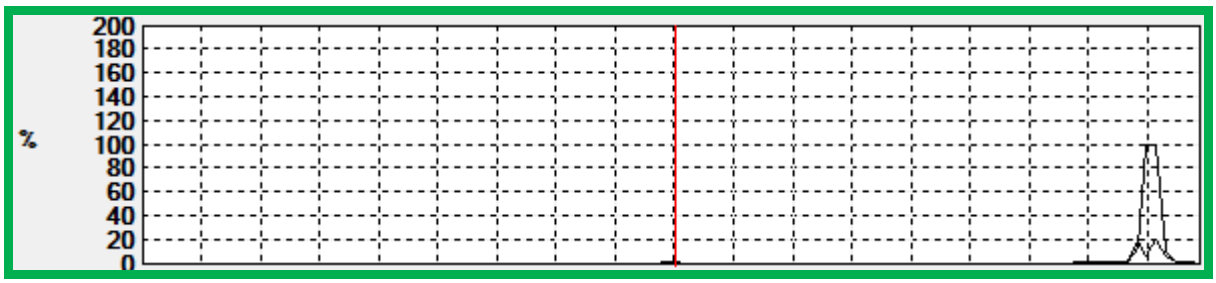
Voltage



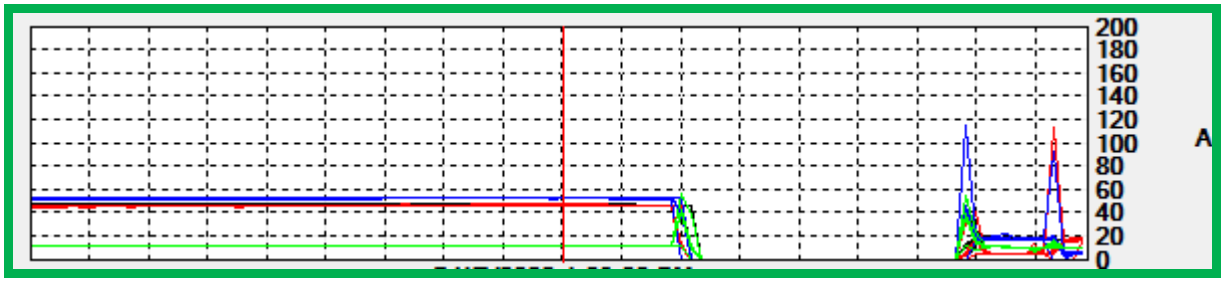
Voltage Harmonics



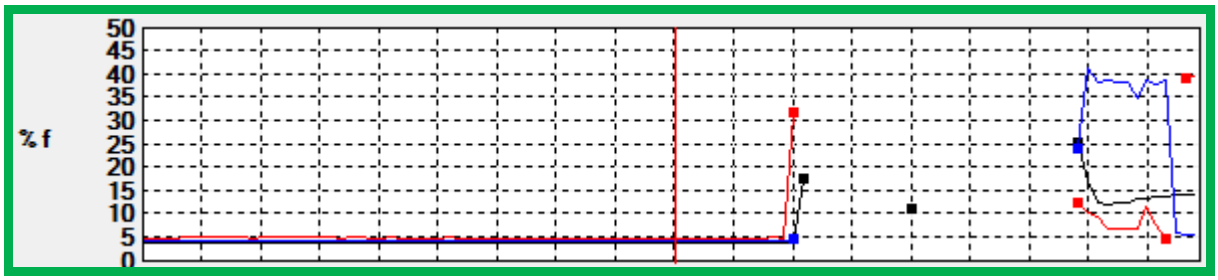
Voltage Un-balance



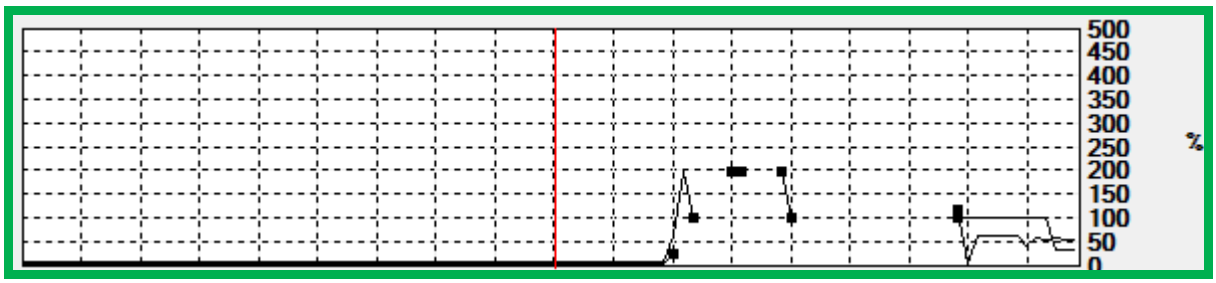
Current



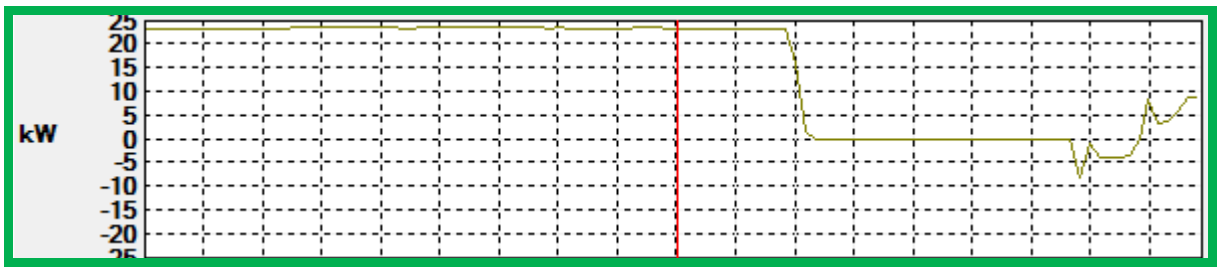
Current Harmonics



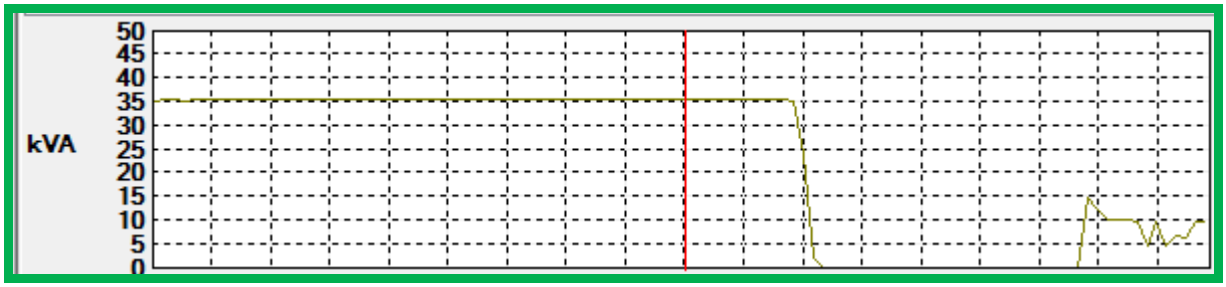
Current Un-balance



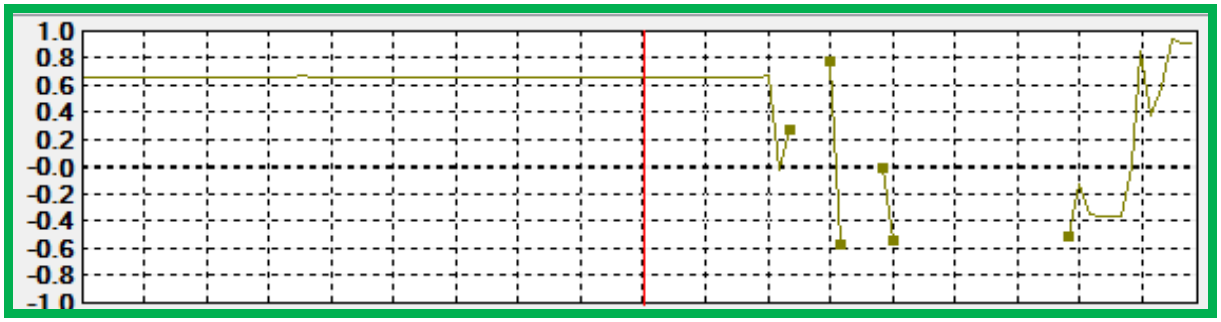
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	416.80	422.00	416.40	46.73	46.06	52.49	0.73	0.63	0.61	49.96	0.60	8.10
MAX	419.60	423.70	419.00	47.45	47.14	53.13	0.74	0.64	0.62	50.03	0.90	8.60
AVG	418.12	422.73	417.98	47.10	46.57	52.83	0.74	0.64	0.62	49.99	0.75	8.18

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	3.84	3.91	4.16	1.00	1.00	1.00	1.20	1.20	1.20	3.70	4.70	4.30
MAX	3.84	3.91	4.16	1.00	1.00	1.00	1.30	1.30	1.40	4.00	5.10	4.50
AVG	3.84	3.91	4.16	1.00	1.00	1.00	1.28	1.29	1.30	3.84	4.90	4.40

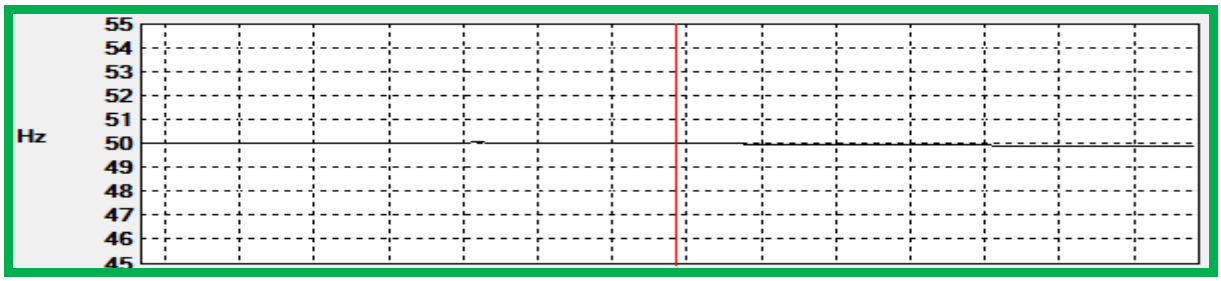
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.47	1.48	1.50

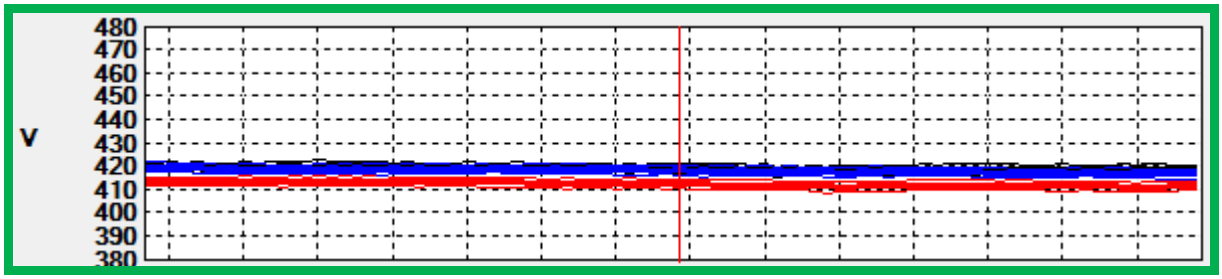
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.48	1.50	1.52
AVG	1.43	1.43	1.43	1.47	1.49	1.52

B13-For-Computer Center and New Answer Book Hall (SS-A)

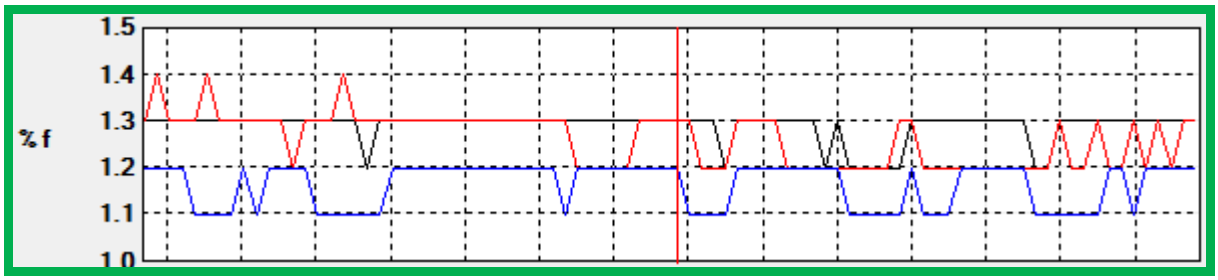
Frequency



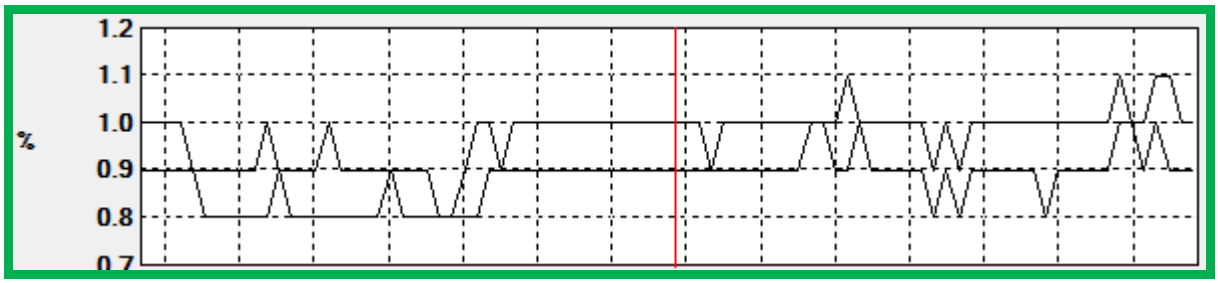
Voltage



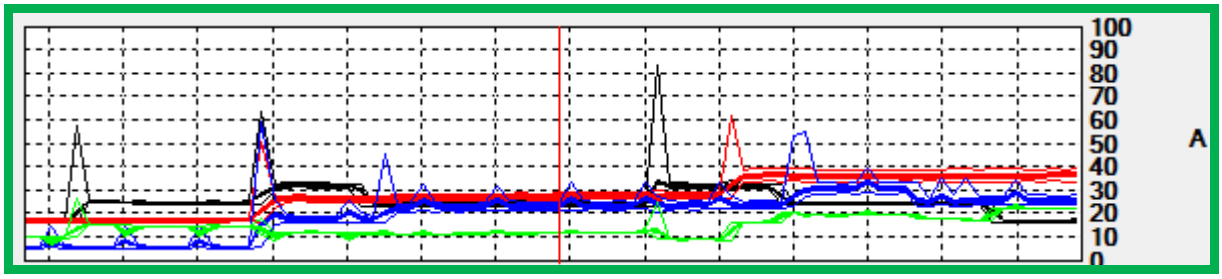
Voltage Harmonics



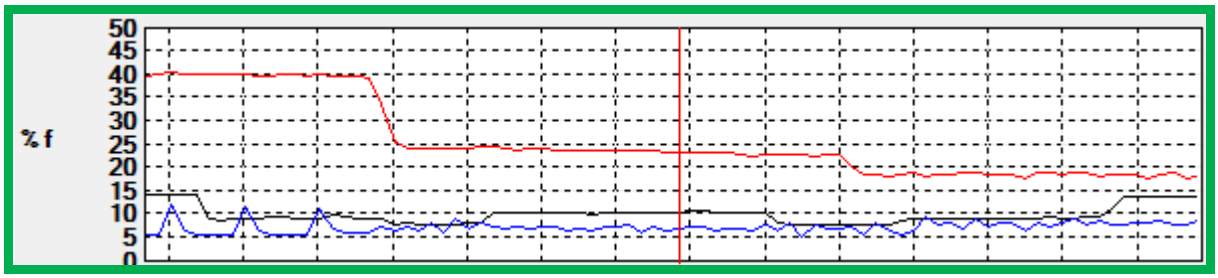
Voltage Un-balance



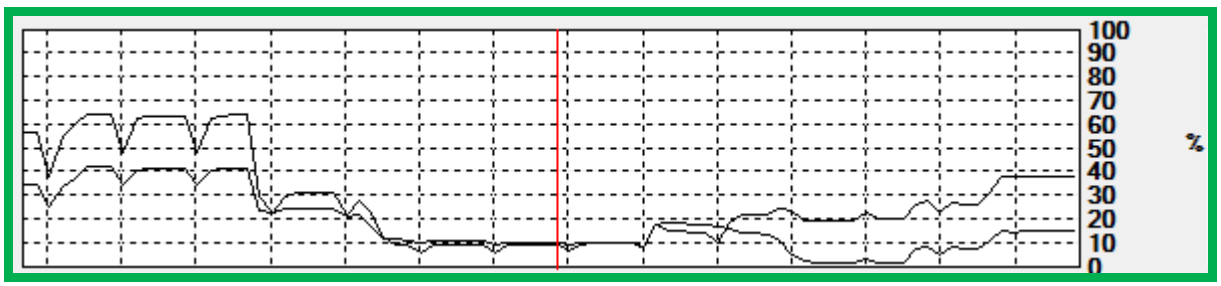
Current



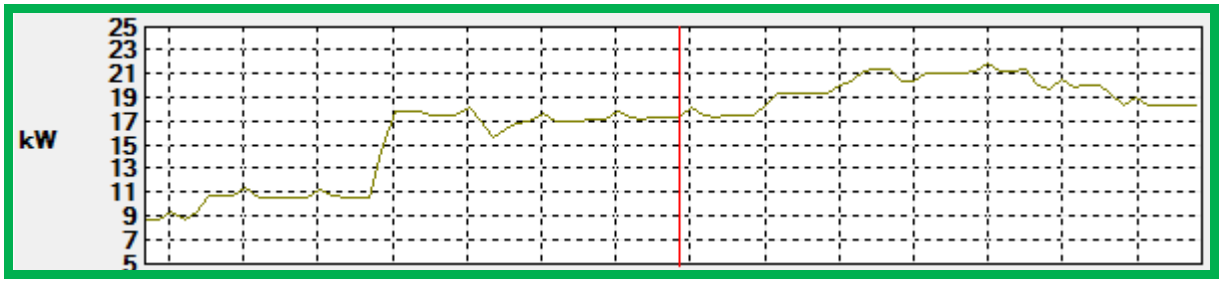
Current Harmonics



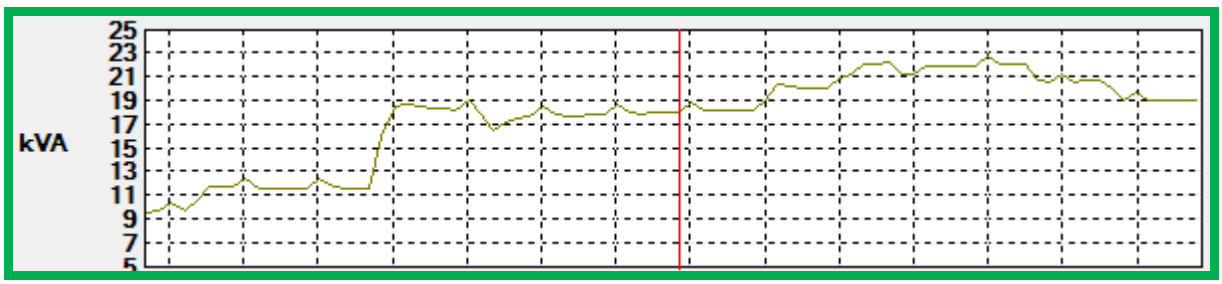
Current Un-balance



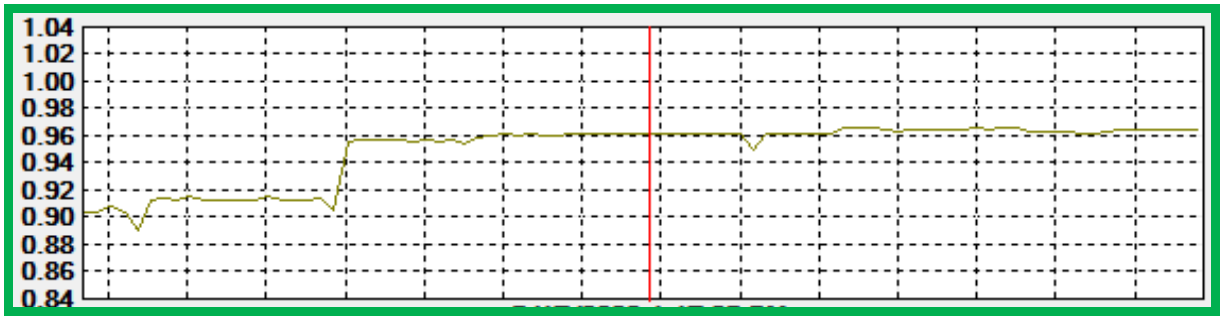
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	418.0	411.1	416.8	16.8	17.4	5.8	0.9	0.8	0.9	49.9	0.9	5.6
MAX	420.6	413.9	420.0	33.3	36.8	34.0	1.0	1.0	1.0	50.1	1.1	64.5
AVG	419.3	412.6	418.3	25.1	28.0	20.4	1.0	0.9	1.0	50.0	1.0	28.7

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	3.7	3.4	3.4	1.0	1.0	1.0	1.2	1.1	1.2	7.6	17.7	5.0
MAX	3.8	3.9	4.2	1.0	1.1	1.0	1.4	1.3	1.3	14.3	40.5	12.0
AVG	3.8	3.6	3.7	1.0	1.0	1.0	1.3	1.2	1.2	9.9	25.7	7.2

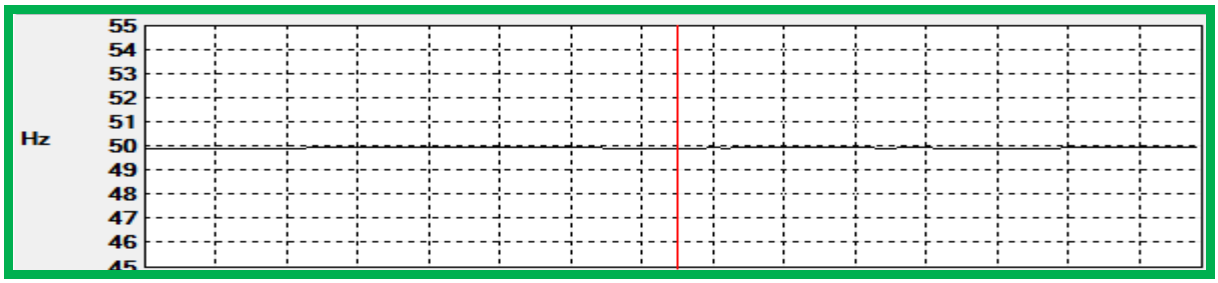
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.4	1.4	1.4	1.5	1.8	1.5

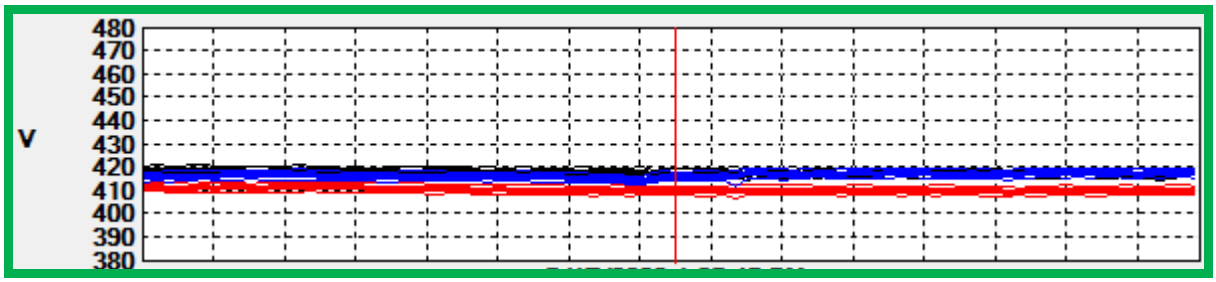
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.4	1.4	1.4	1.8	2.8	2.0
AVG	1.4	1.4	1.4	1.6	1.9	1.6

B14-For-Auditorium, Main Gate and Security Office (SS-A)

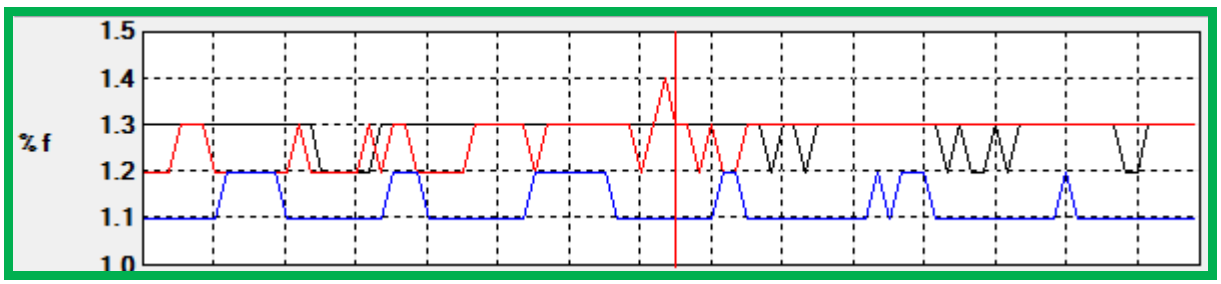
Frequency



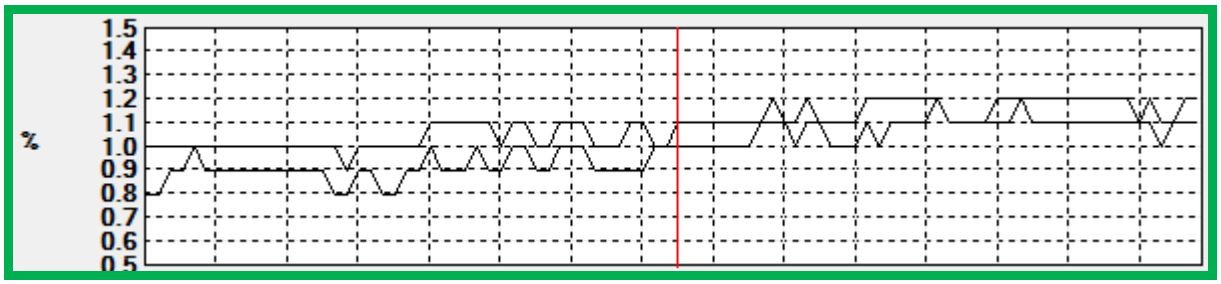
Voltage



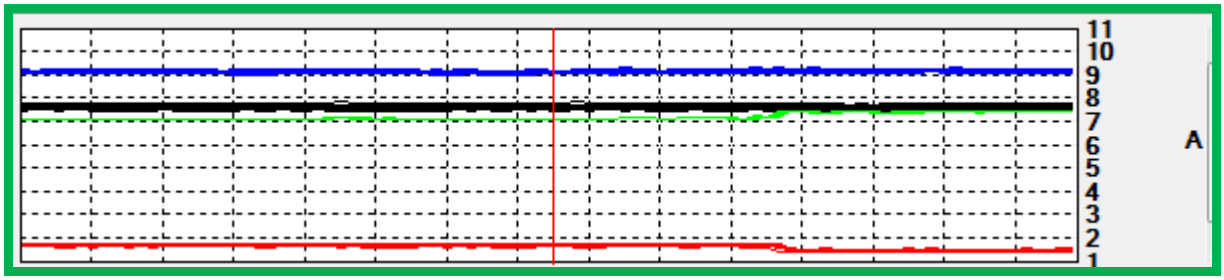
Voltage Harmonics



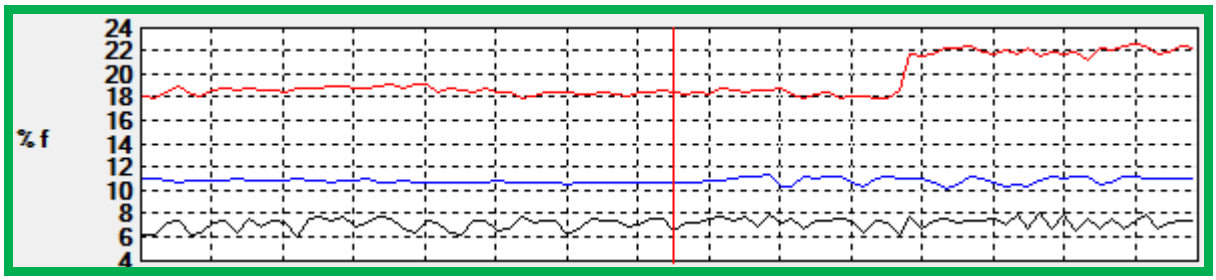
Voltage Un-balance



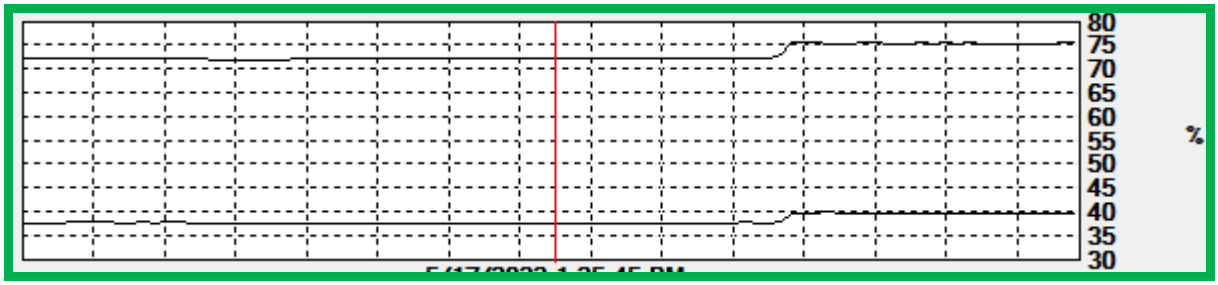
Current



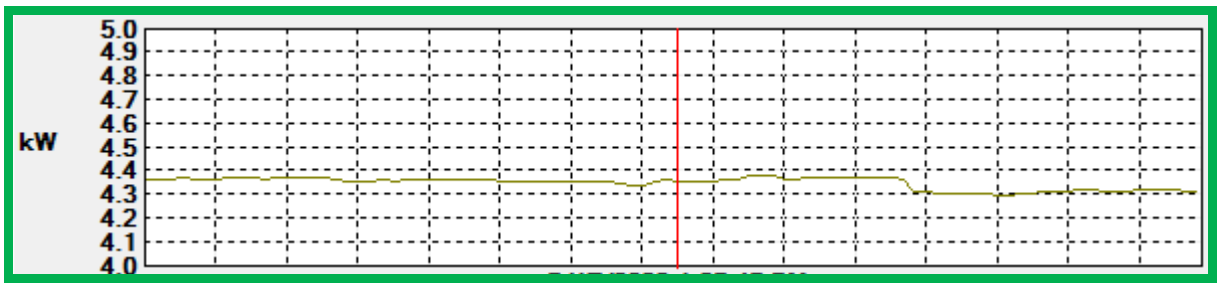
Current Harmonics



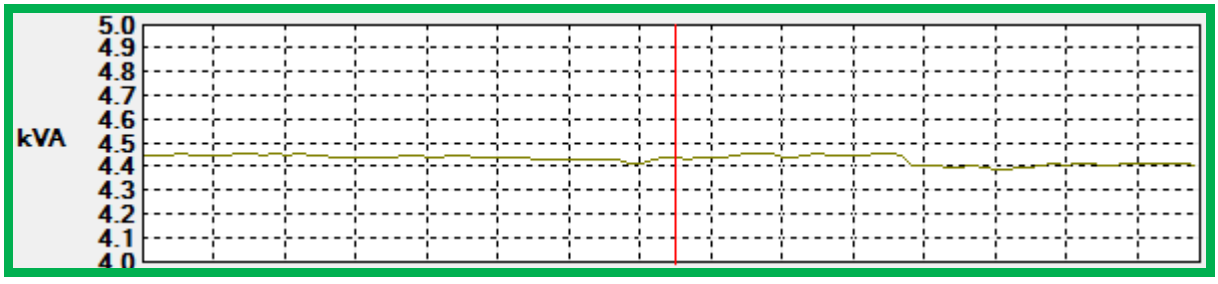
Current Un-balance



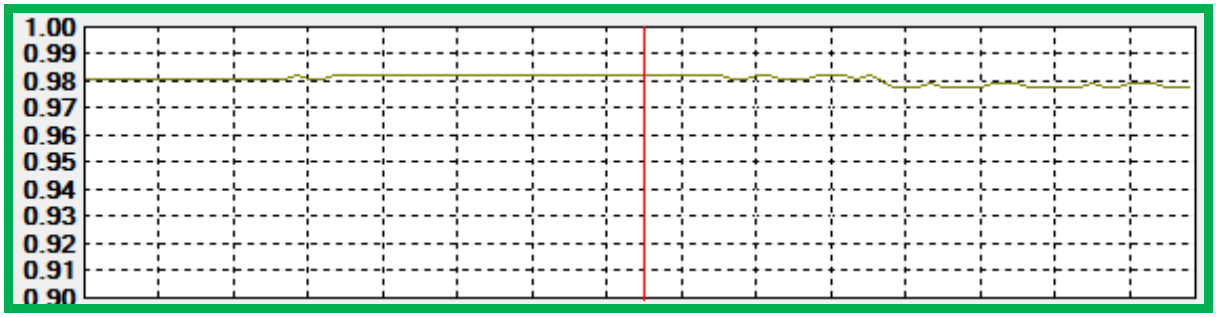
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	416.9	409.7	414.3	7.6	1.5	9.1	1.0	0.8	1.0	49.9	0.9	72.1
MAX	419.0	411.9	417.9	7.7	1.7	9.2	1.0	0.9	1.0	50.0	1.2	75.7
AVG	418.0	410.6	416.8	7.6	1.7	9.2	1.0	0.9	1.0	49.9	1.1	73.2

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.3	0.3	0.3	1.0	1.1	1.0	1.2	1.1	1.2	6.1	17.9	10.2
MAX	3.7	3.4	3.4	1.0	1.1	1.0	1.3	1.2	1.3	8.1	22.6	11.4
AVG	2.6	2.4	2.4	1.0	1.1	1.0	1.3	1.2	1.2	7.2	19.5	10.9

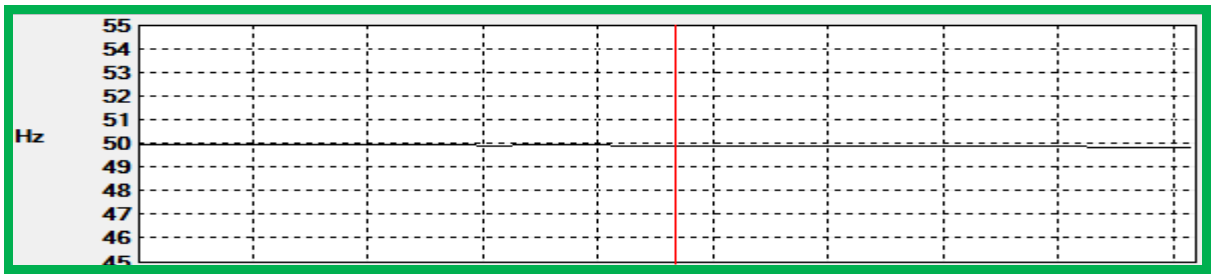
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.4	1.4	1.4	1.5	1.9	1.4

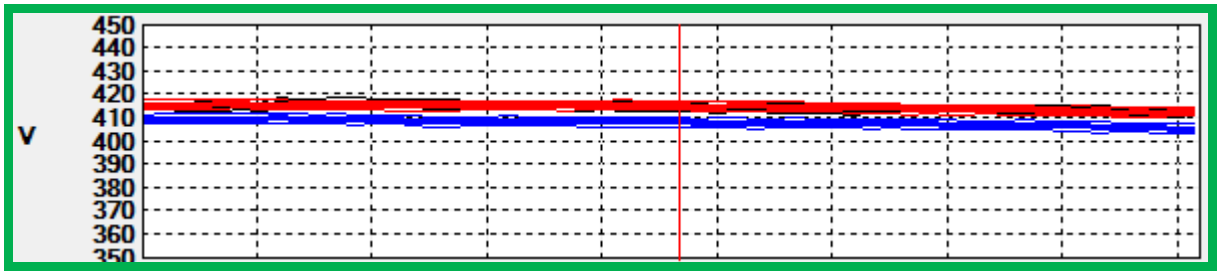
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.4	1.4	1.4	1.5	2.0	1.5
AVG	1.4	1.4	1.4	1.5	1.9	1.4

B15-For-M-Phill (SS-A)

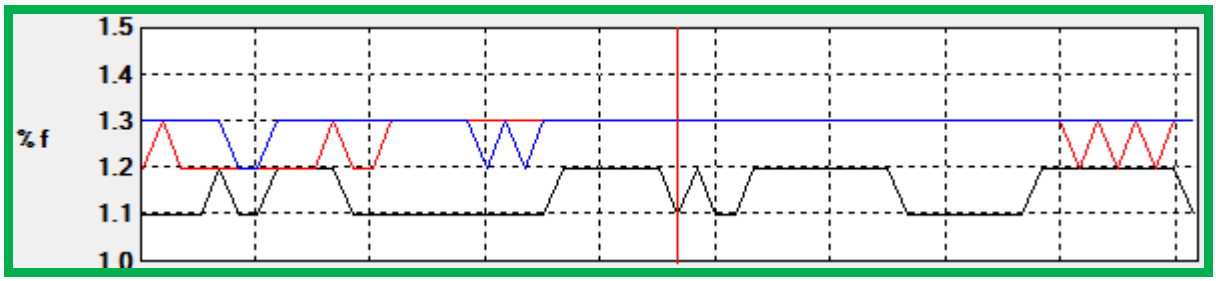
Frequency



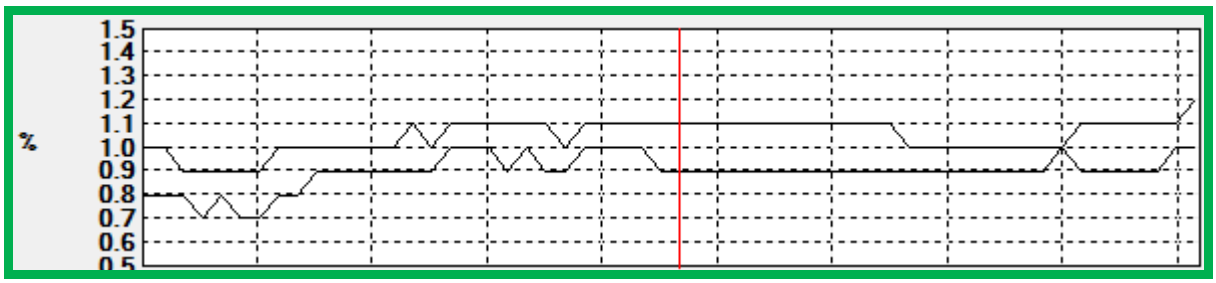
Voltage



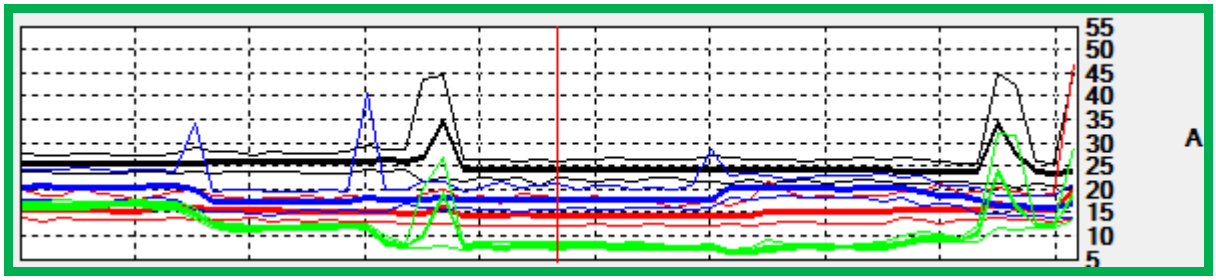
Voltage Harmonics



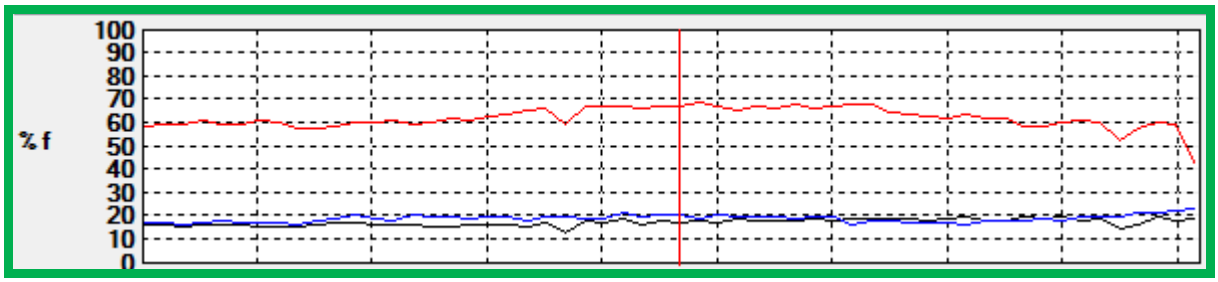
Voltage Un-balance



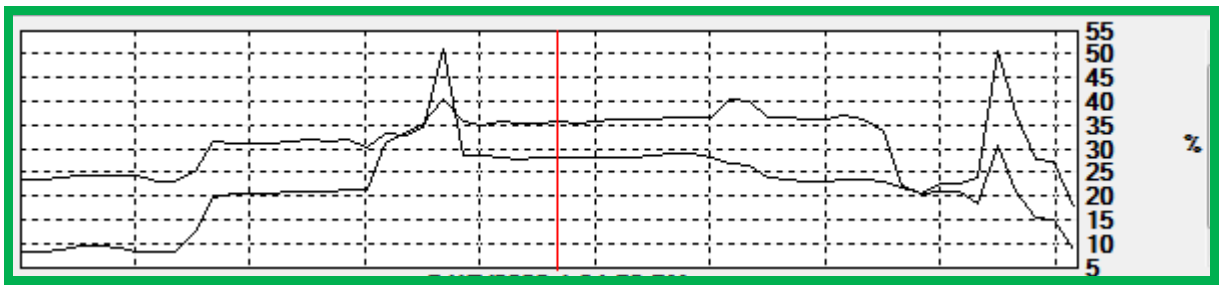
Current



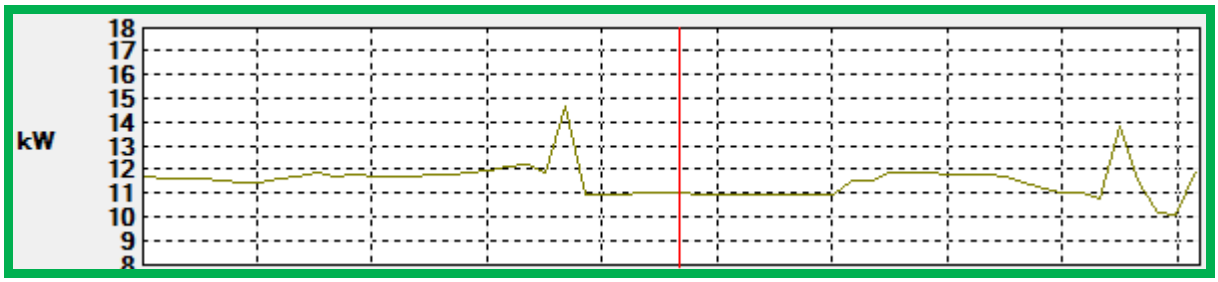
Current Harmonics



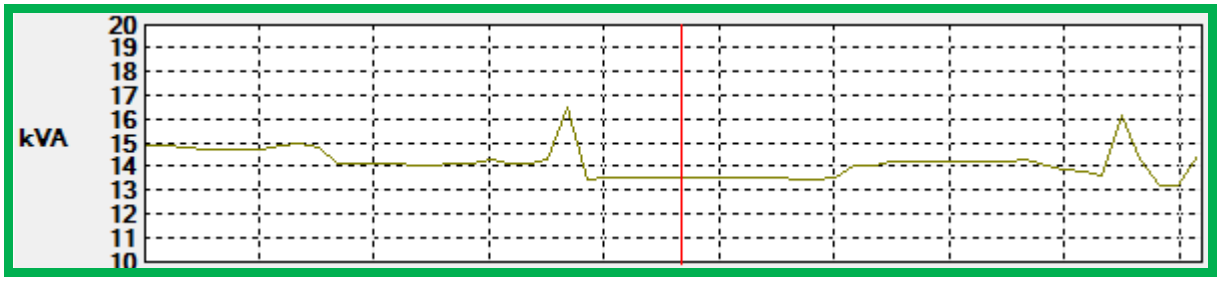
Current Un-balance



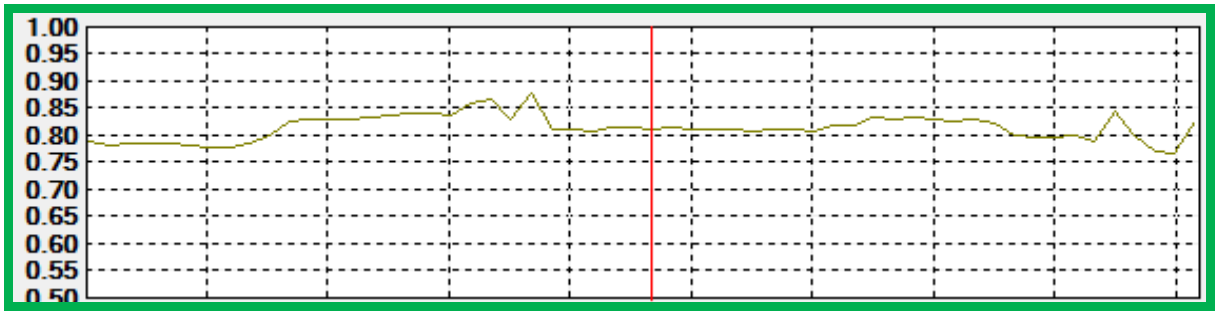
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	412.80	412.40	405.50	23.70	14.37	16.41	0.75	0.69	0.71	49.86	0.90	17.80
MAX	416.80	416.20	410.10	34.91	20.24	20.83	0.90	0.86	0.98	49.98	1.20	51.00
AVG	414.76	414.73	408.13	25.34	15.43	18.77	0.81	0.73	0.89	49.92	1.07	27.99

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.34	0.27	0.30	1.02	1.16	1.07	1.20	1.30	1.20	13.10	42.60	16.20
MAX	5.68	5.11	5.63	1.05	1.32	1.11	1.20	1.40	1.30	20.20	69.30	23.20
AVG	0.53	0.44	0.49	1.04	1.29	1.09	1.20	1.31	1.20	17.43	62.23	19.01

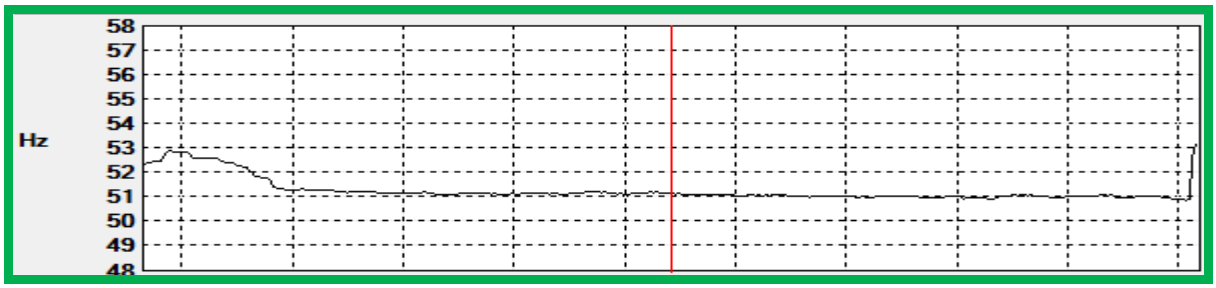
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.65	2.77	1.74

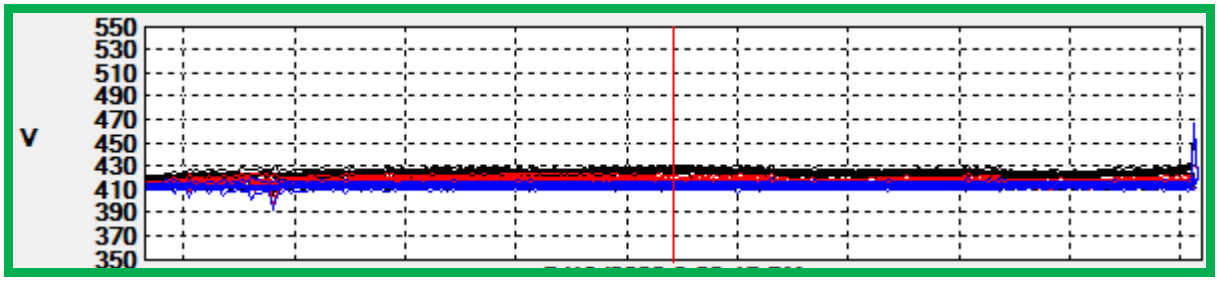
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.44	2.01	3.12	2.22
AVG	1.43	1.43	1.43	1.74	2.98	2.00

B47-For-D.G. Set 180 KVA (SS-A)

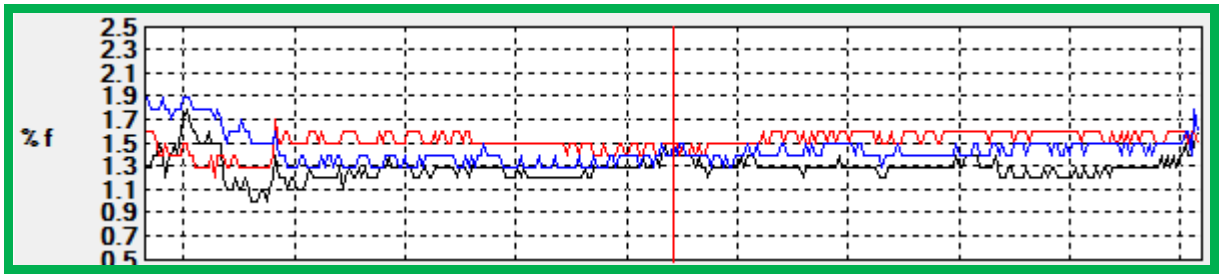
Frequency



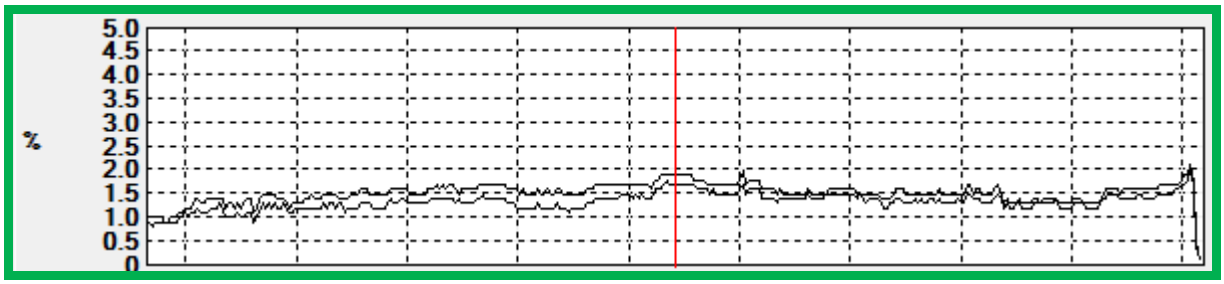
Voltage



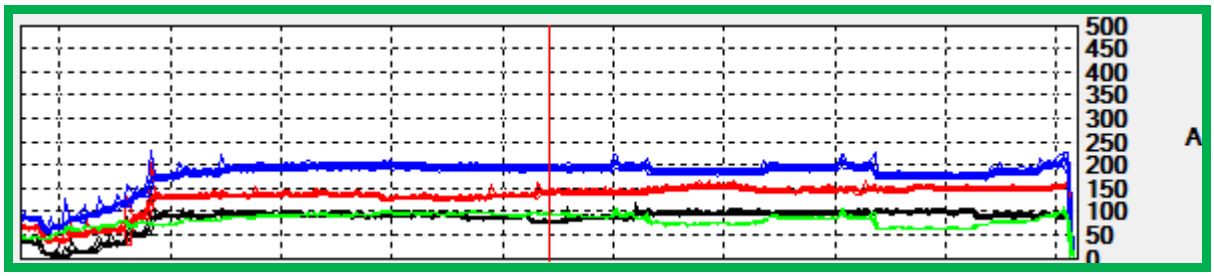
Voltage Harmonics



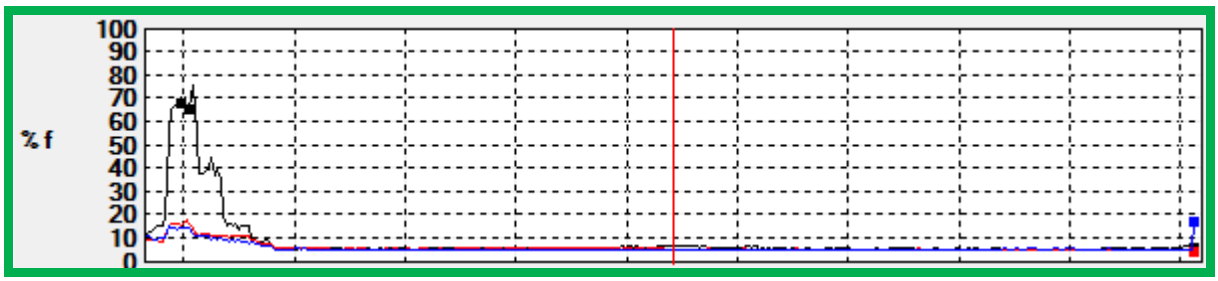
Voltage Un-balance



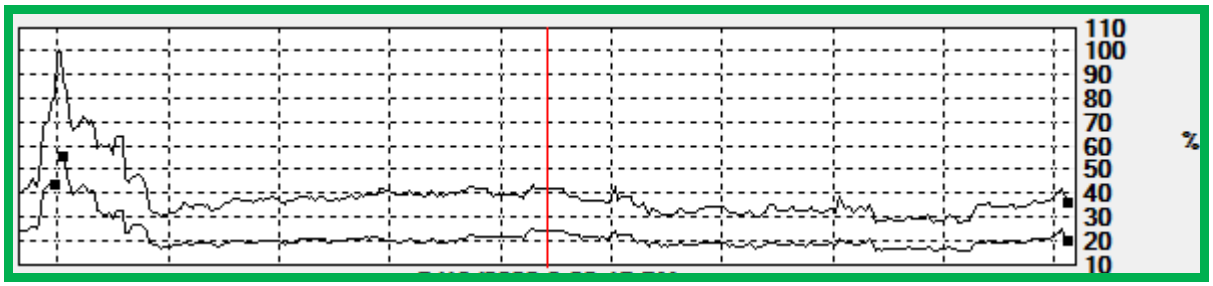
Current



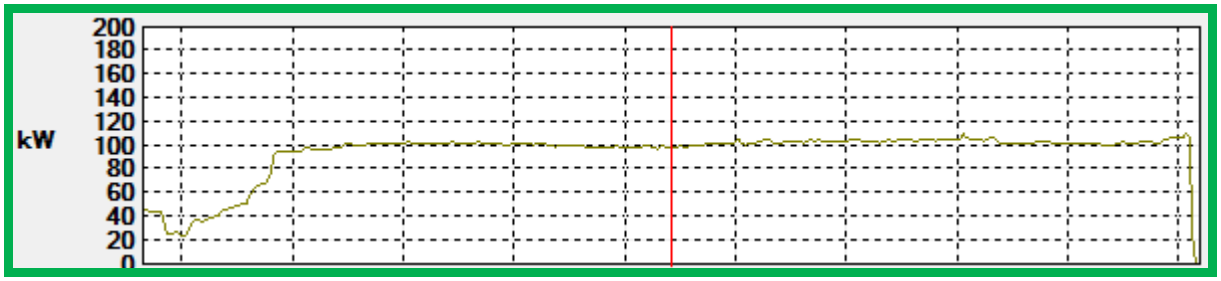
Current Harmonics



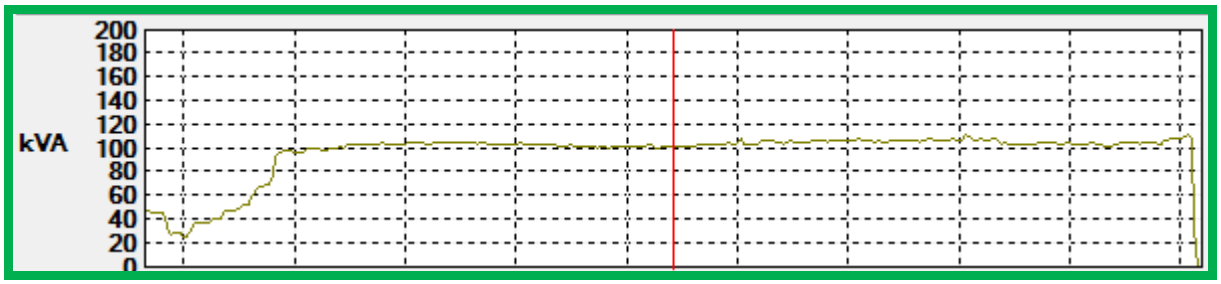
Current Un-balance



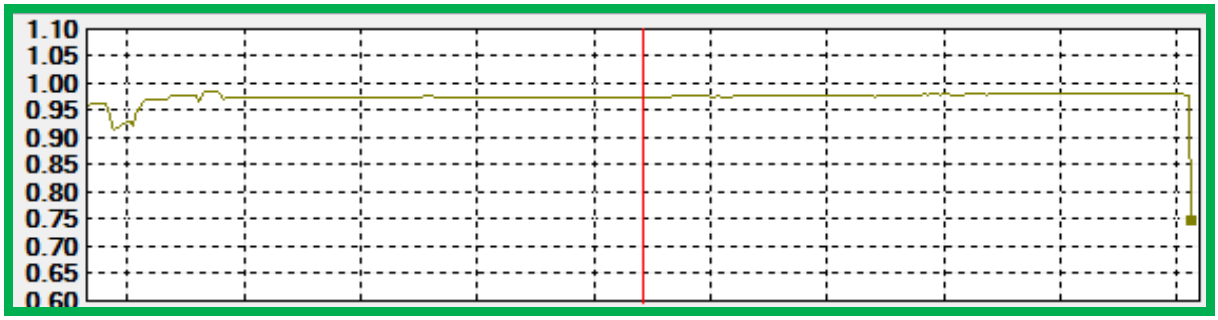
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	419.50	414.10	411.50	4.70	39.20	56.80	0.61	0.76	0.74	50.85	0.40	28.00
MAX	428.70	420.30	418.50	103.60	159.60	217.70	0.99	0.99	0.98	52.88	2.00	88.10
AVG	424.64	417.57	413.64	87.33	133.50	181.18	0.98	0.98	0.97	51.26	1.44	38.54

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.84	0.85	0.83	1.00	1.00	1.00	0.90	1.40	1.10	5.10	4.70	5.10
MAX	0.99	0.87	1.05	1.38	1.02	1.03	1.70	2.30	1.90	76.10	16.60	17.30
AVG	0.98	0.85	1.04	1.01	1.00	1.00	1.35	1.53	1.33	8.52	6.16	5.98

Crest Factor

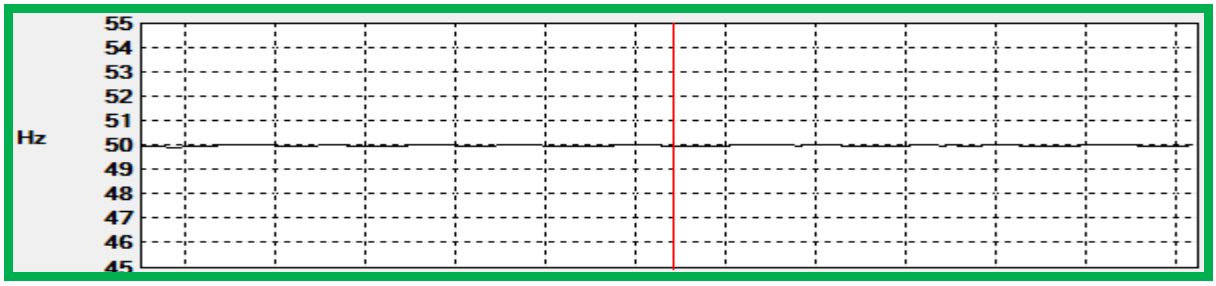
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.39	1.41	1.47	1.51	1.46

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.44	1.43	1.42	3.14	2.12	2.06
AVG	1.43	1.42	1.42	1.56	1.57	1.48

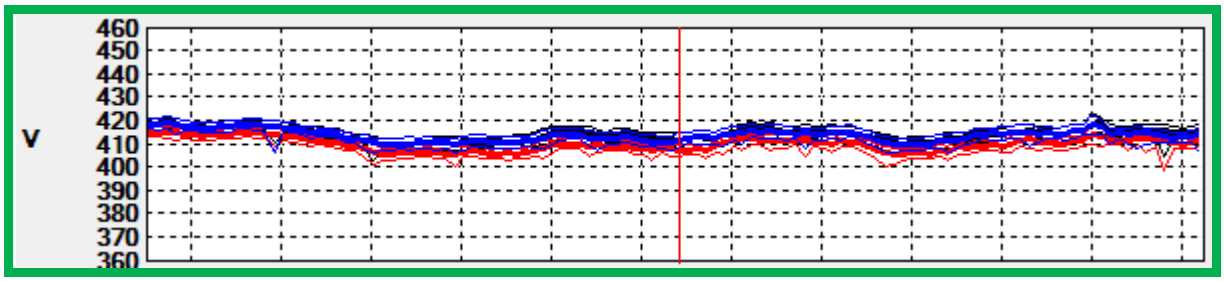
- **SUB-STATION B, C AND D AT METER NO. XE498270**

A5-For-Transformer 630 KVA, Output (SS-B)

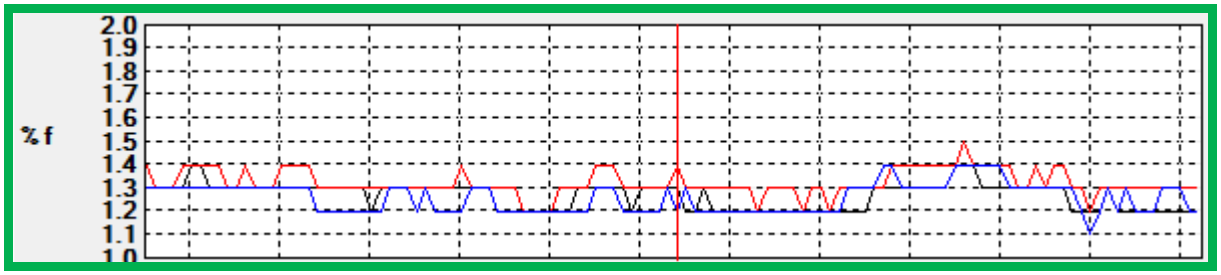
Frequency



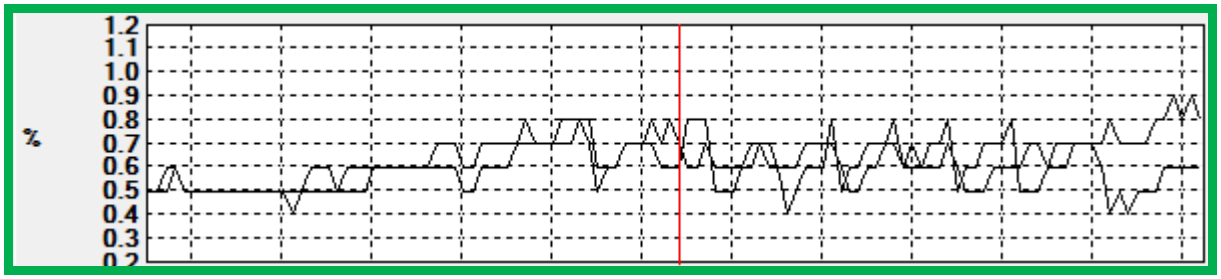
Voltage



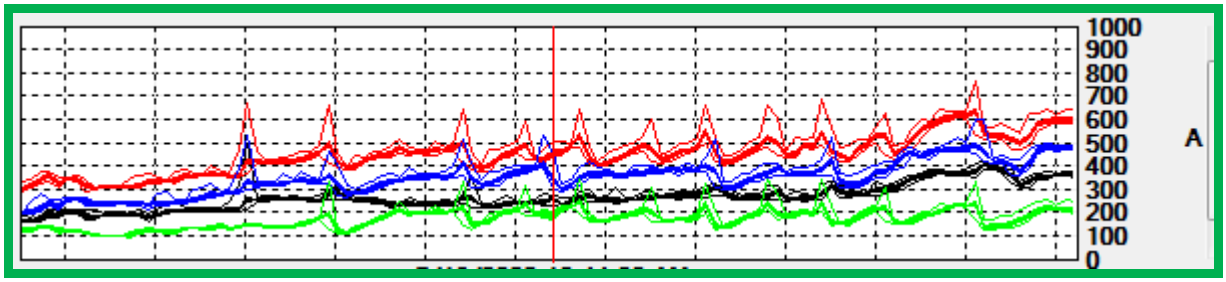
Voltage Harmonics



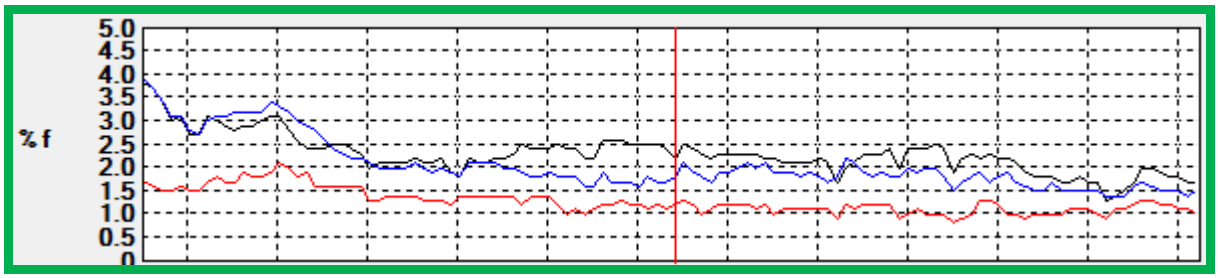
Voltage Un-balance



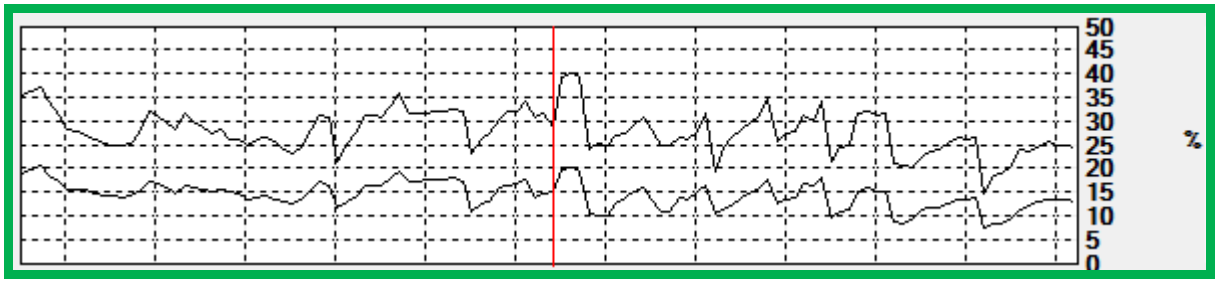
Current



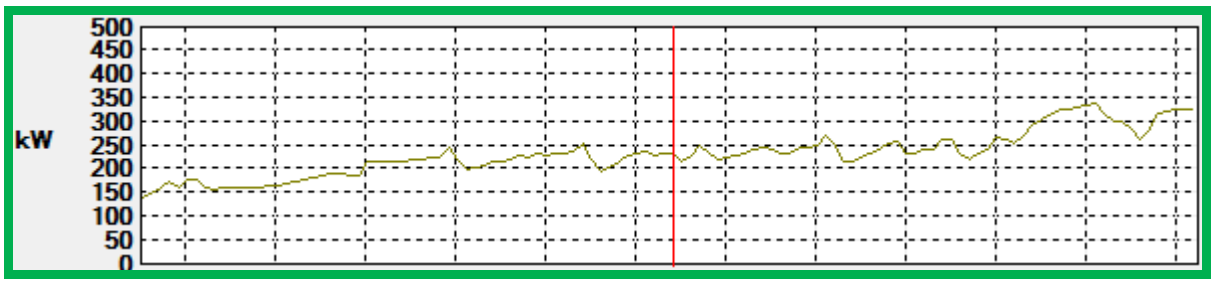
Current Harmonics



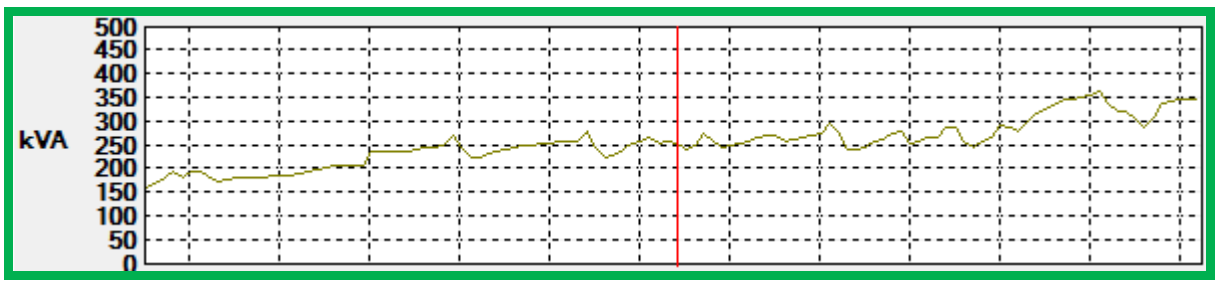
Current Un-balance



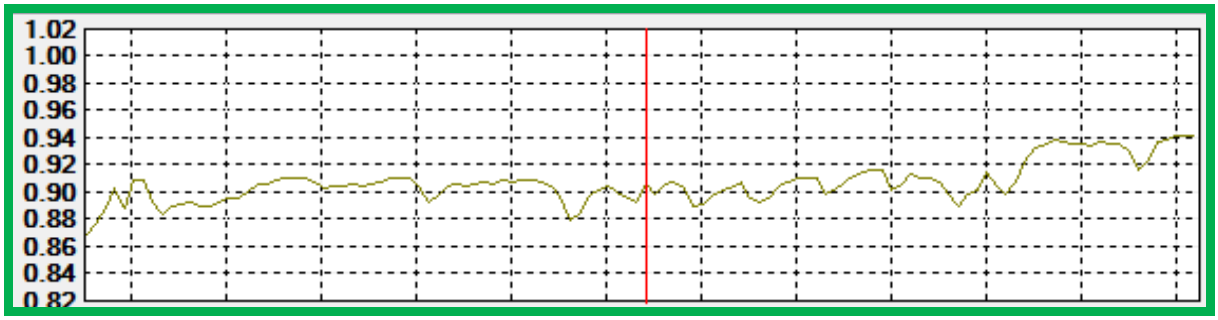
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	409.80	405.40	409.90	165.40	303.60	203.60	0.84	0.88	0.85	49.92	0.40	14.90
MAX	419.20	415.50	419.20	409.90	637.20	489.20	0.94	0.94	0.95	50.06	0.90	40.20
AVG	414.16	410.07	413.91	267.74	452.14	350.39	0.89	0.91	0.91	50.00	0.64	28.10

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.21	0.22	0.23	1.00	1.00	1.00	1.20	1.20	1.10	1.30	0.80	1.40
MAX	0.49	0.57	0.52	1.00	1.00	1.00	1.40	1.40	1.40	3.80	2.10	3.90
AVG	0.31	0.30	0.34	1.00	1.00	1.00	1.28	1.28	1.28	2.29	1.28	2.06

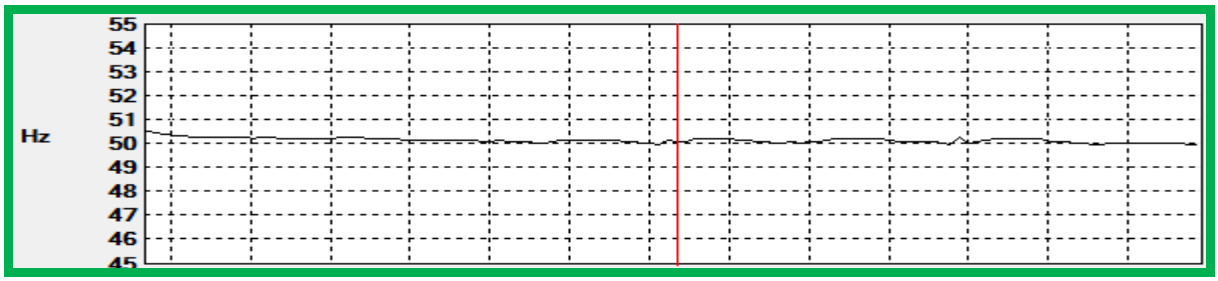
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.42	1.43	1.42

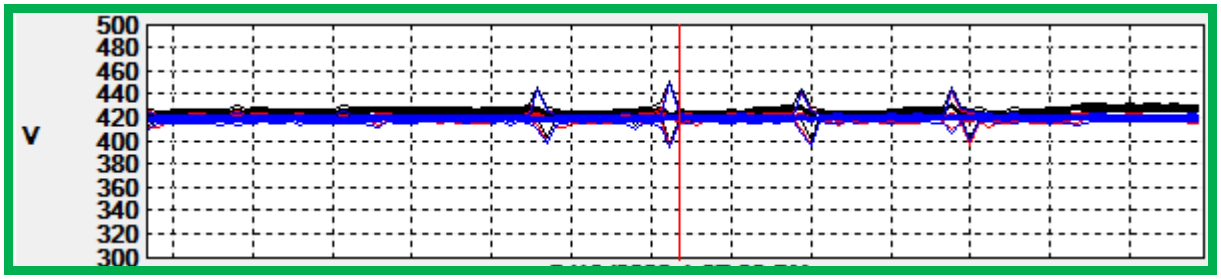
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.44	1.44	1.44	1.46	1.46	1.44
AVG	1.44	1.43	1.44	1.44	1.44	1.43

A6-For-D.G. Set 380 KVA, (SS-B)

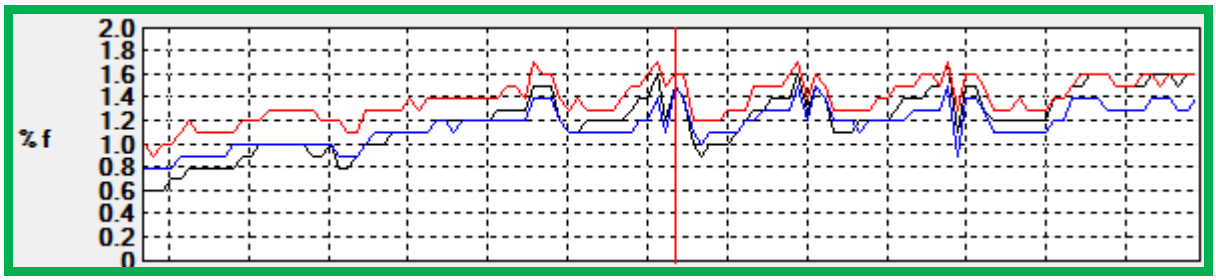
Frequency



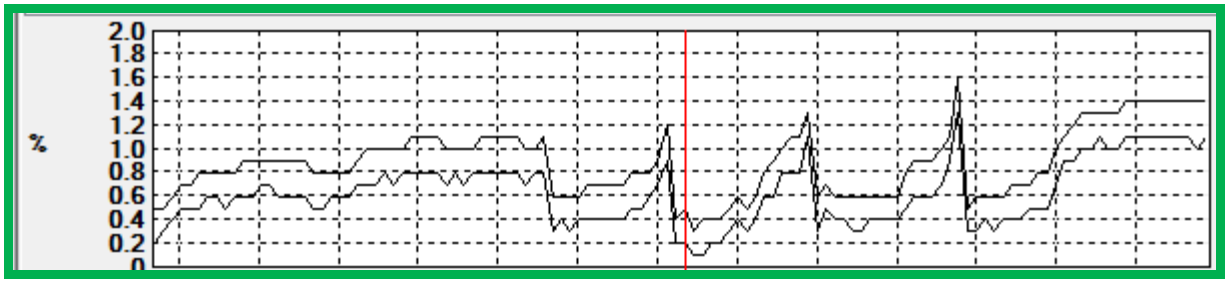
Voltage



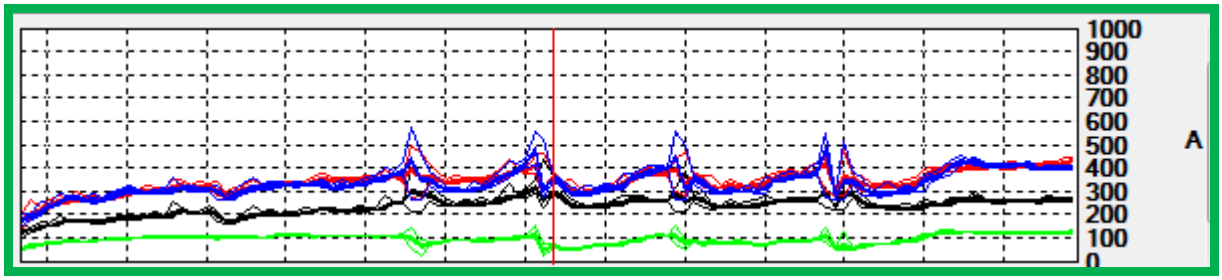
Voltage Harmonics



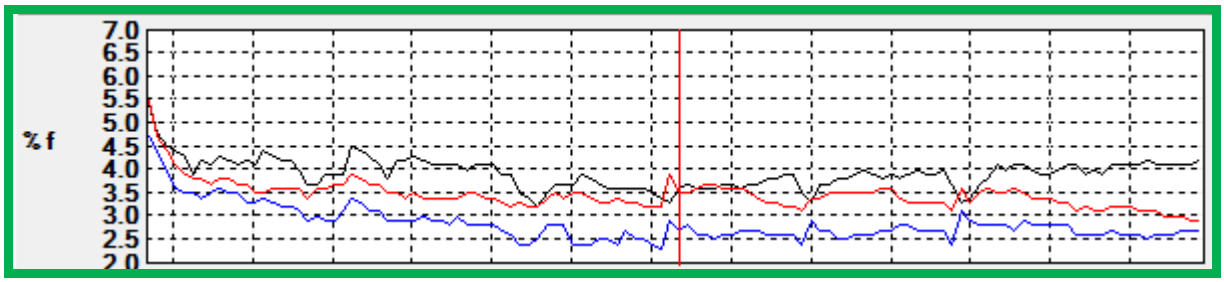
Voltage Un-balance



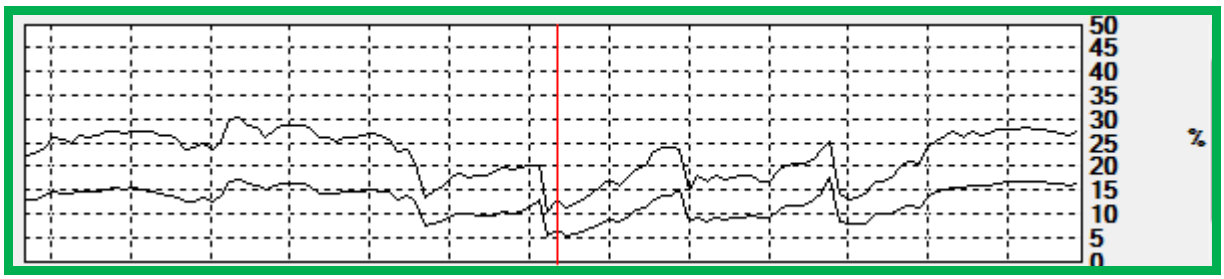
Current



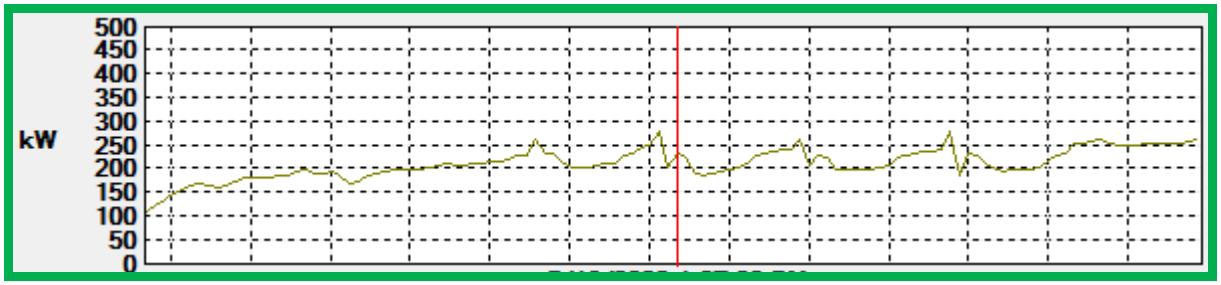
Current Harmonics



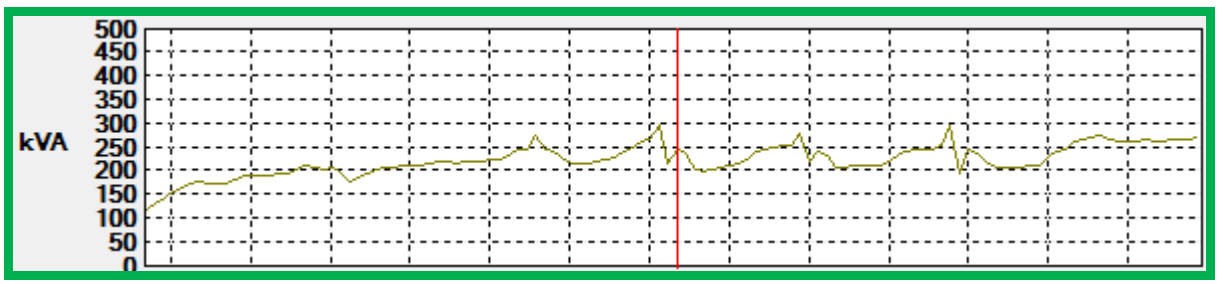
Current Un-balance



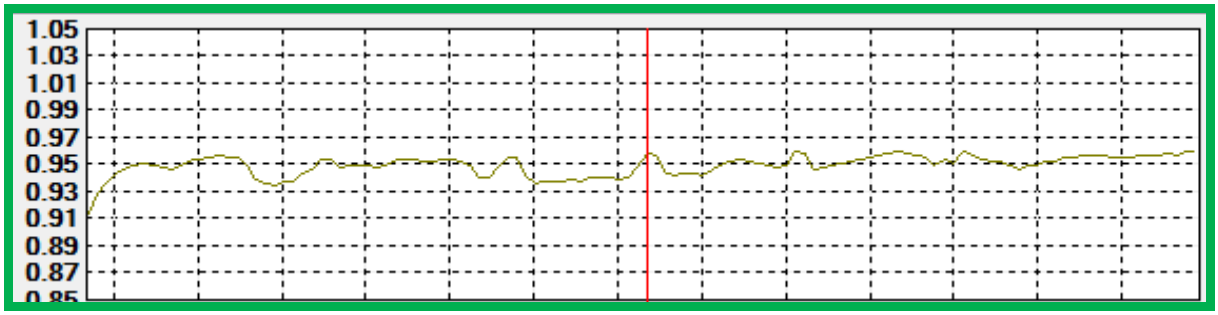
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	422.40	417.70	418.80	127.60	182.30	184.00	0.86	0.94	0.93	49.95	0.40	10.80
MAX	431.30	422.30	420.30	320.50	437.80	484.80	0.95	0.98	0.96	50.53	1.60	30.60
AVG	425.48	419.79	419.63	236.87	342.92	336.76	0.93	0.96	0.95	50.15	0.92	22.50

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.87	0.90	1.05	1.00	1.00	1.00	0.70	1.00	0.60	3.20	2.90	2.30
MAX	1.50	1.74	1.74	1.00	1.00	1.00	1.70	1.60	1.60	5.40	5.50	4.70
AVG	1.32	1.51	1.45	1.00	1.00	1.00	1.34	1.33	1.10	3.93	3.47	2.84

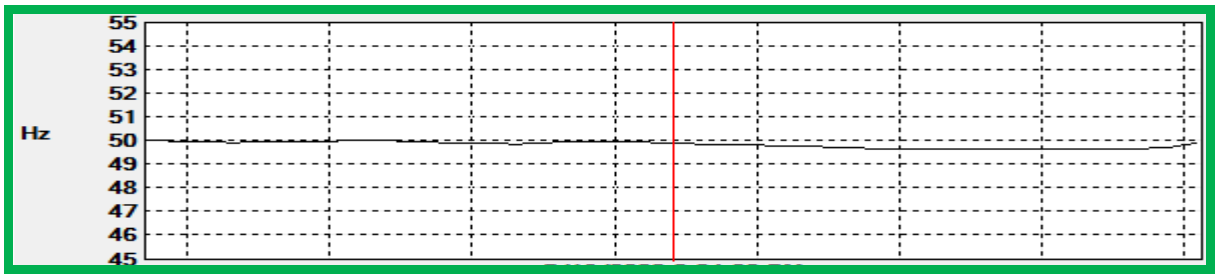
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.41	1.44	1.44	1.44

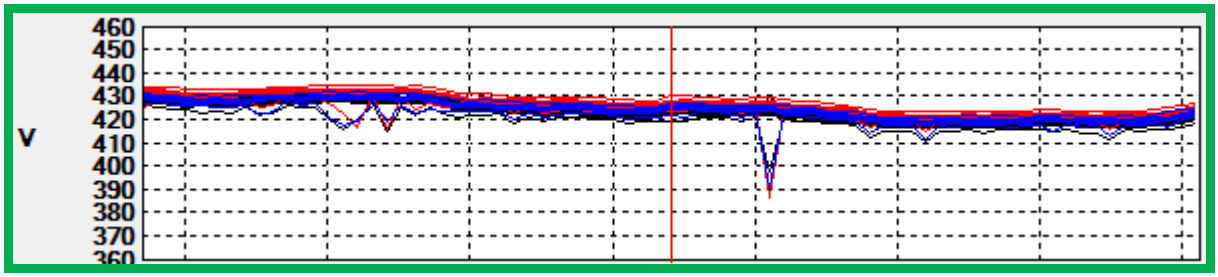
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.43	1.43	1.43	1.53	1.53	1.51
AVG	1.42	1.43	1.42	1.47	1.47	1.47

A7-For-Transformer 630 KVA, Kendriya Mulyankan Bhawan (SS-B)

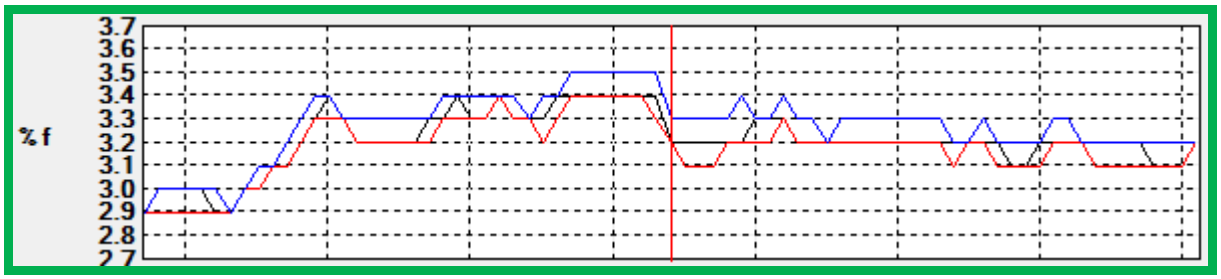
Frequency



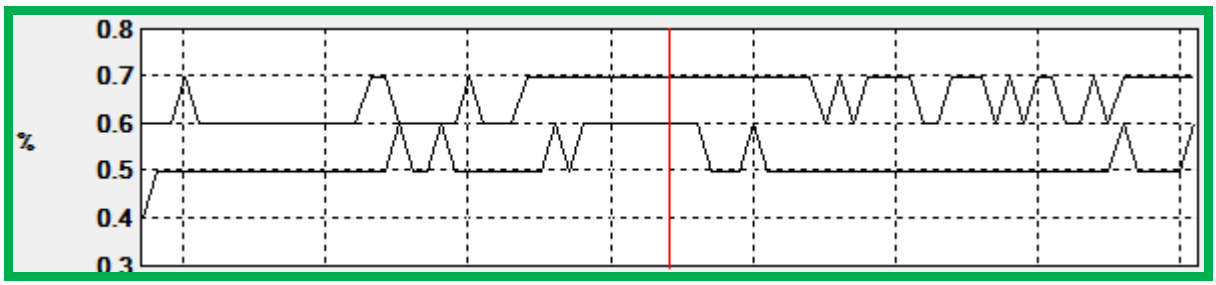
Voltage



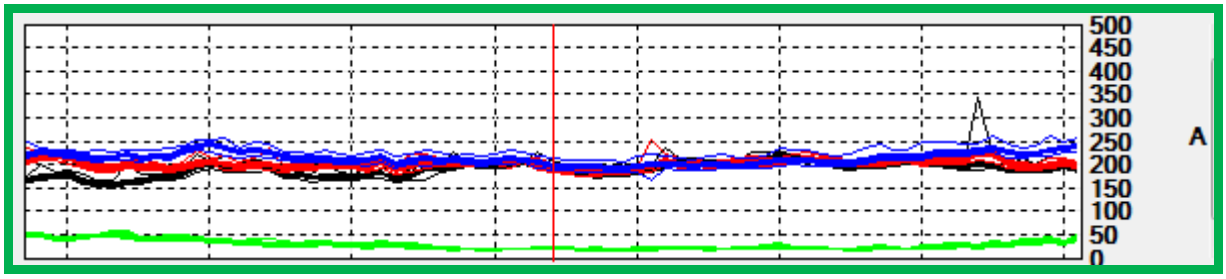
Voltage Harmonics



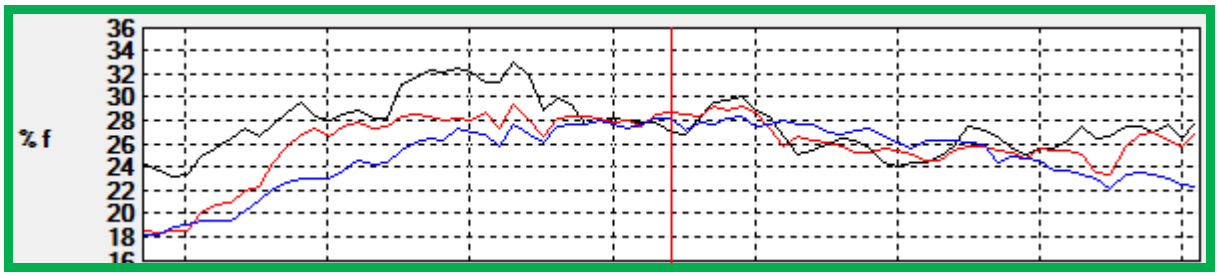
Voltage Un-balance



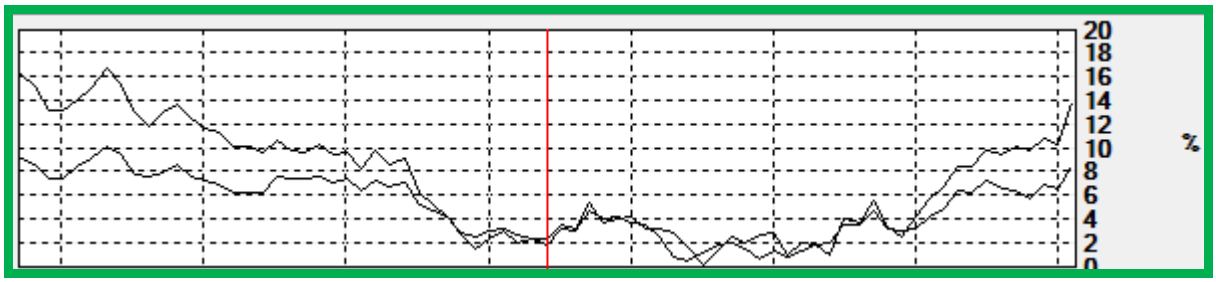
Current



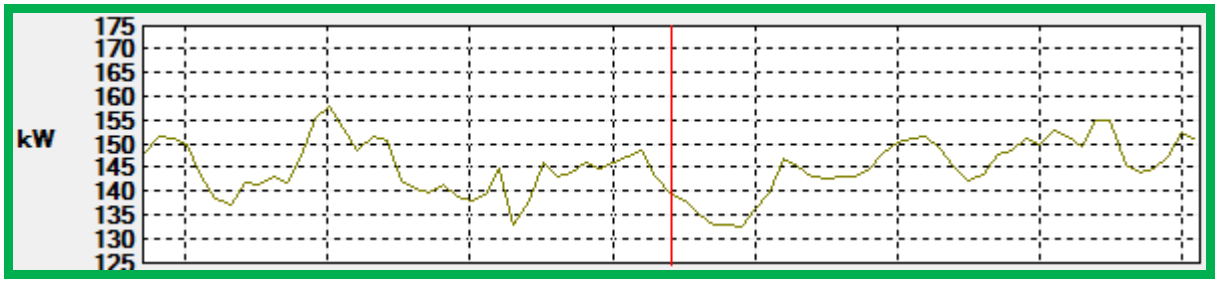
Current Harmonics



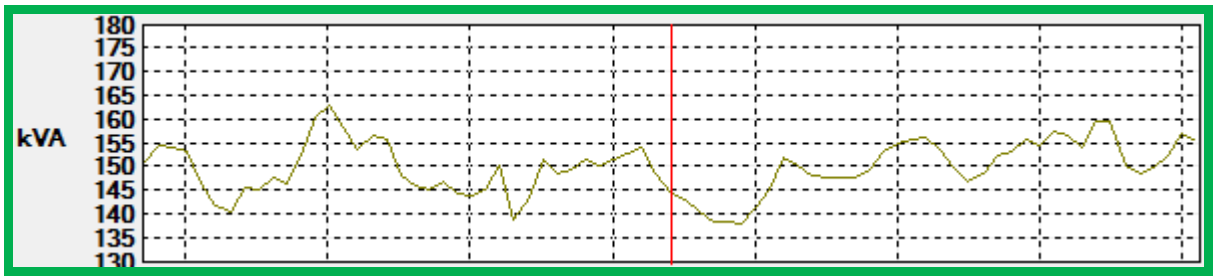
Current Un-balance



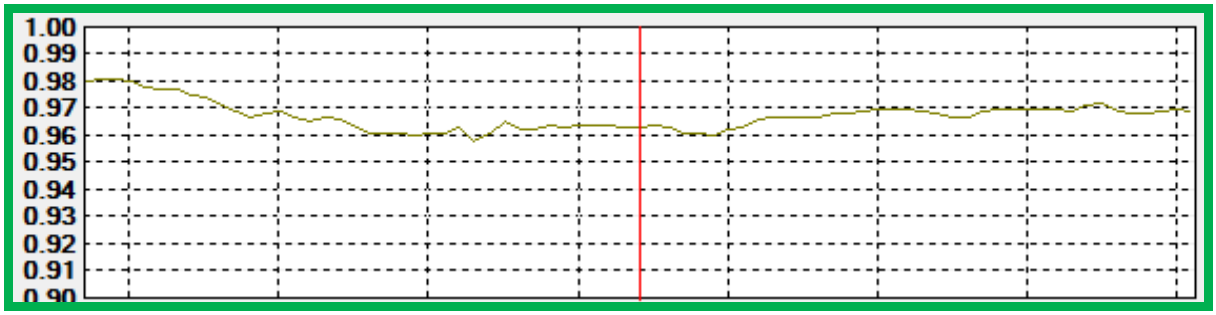
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.40	421.20	419.00	157.70	184.30	195.10	0.95	0.96	0.96	49.63	0.50	0.20
MAX	428.60	432.80	430.10	219.20	224.10	243.90	0.97	0.98	0.98	50.03	0.60	16.70
AVG	422.76	426.87	424.38	192.08	203.23	216.14	0.96	0.97	0.97	49.84	0.51	7.26

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.29	0.29	0.28	1.08	1.06	1.05	2.90	2.90	2.90	23.30	18.50	18.30
MAX	0.60	0.70	0.90	1.13	1.11	1.10	3.40	3.50	3.50	33.00	29.40	28.40
AVG	0.47	0.53	0.54	1.10	1.09	1.08	3.17	3.20	3.26	27.64	26.06	25.03

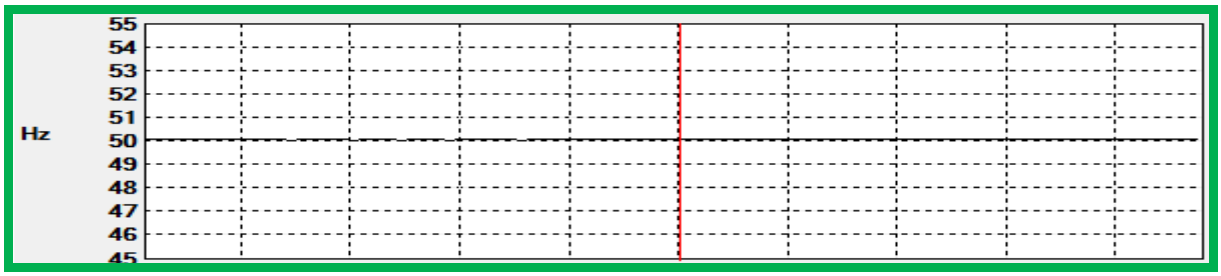
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.46	1.45	1.46	1.65	1.60	1.62

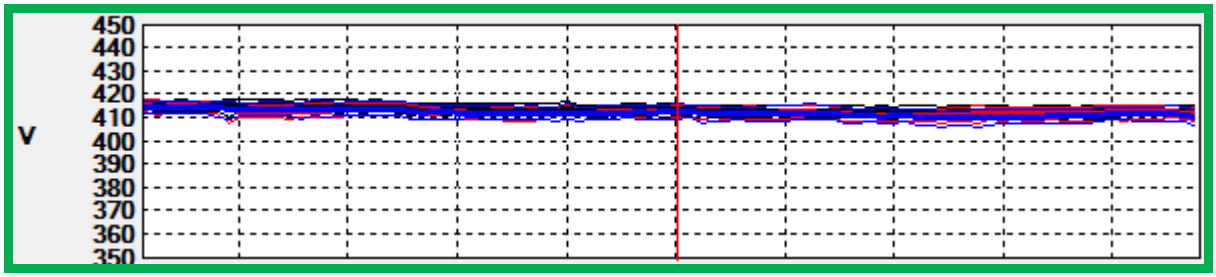
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.47	1.47	1.48	1.80	1.76	1.80
AVG	1.47	1.47	1.47	1.75	1.71	1.74

A8-For-D.G. set 400 KVA, Kendriya Mulyankan Bhawan (SS-B)

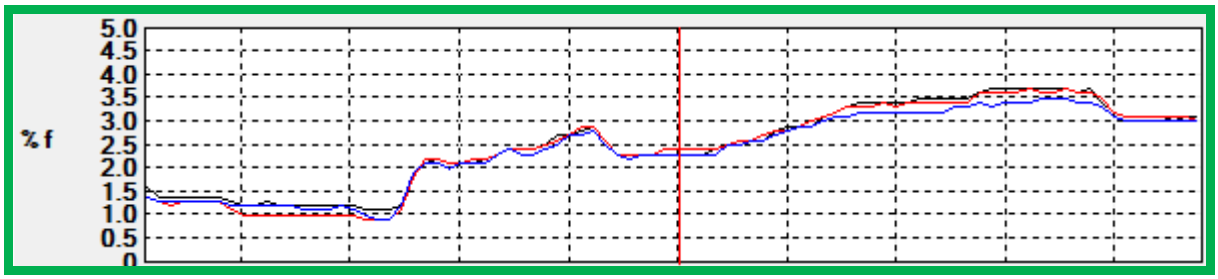
Frequency



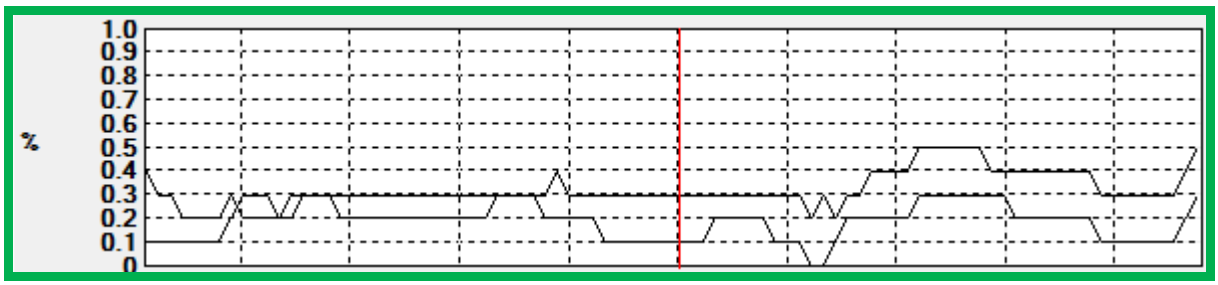
Voltage



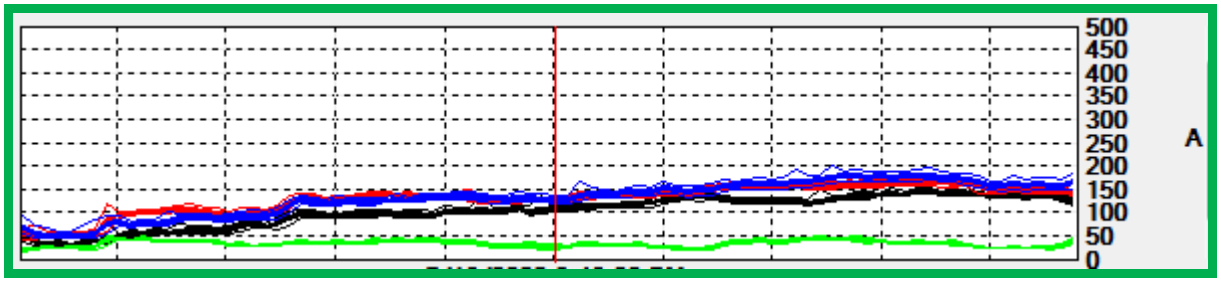
Voltage Harmonics



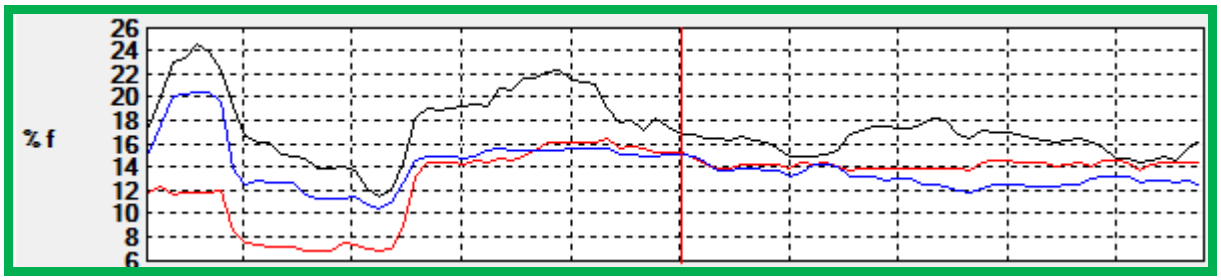
Voltage Un-balance



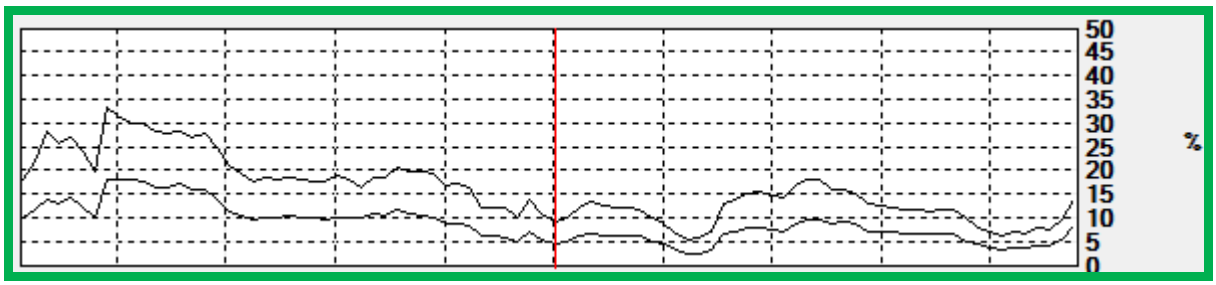
Current



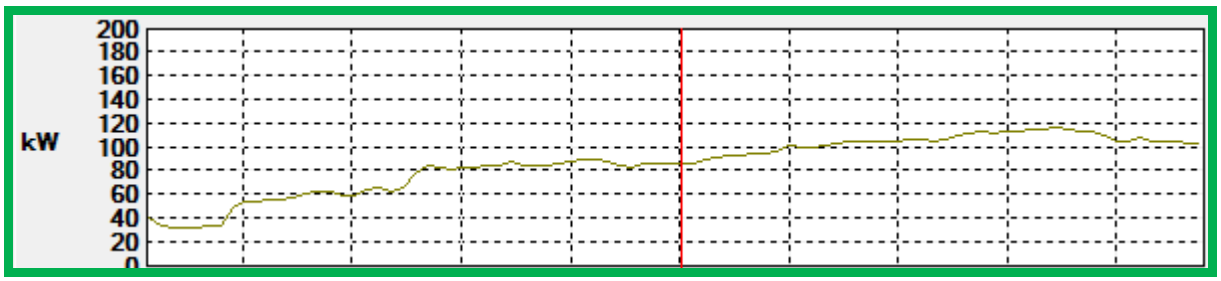
Current Harmonics



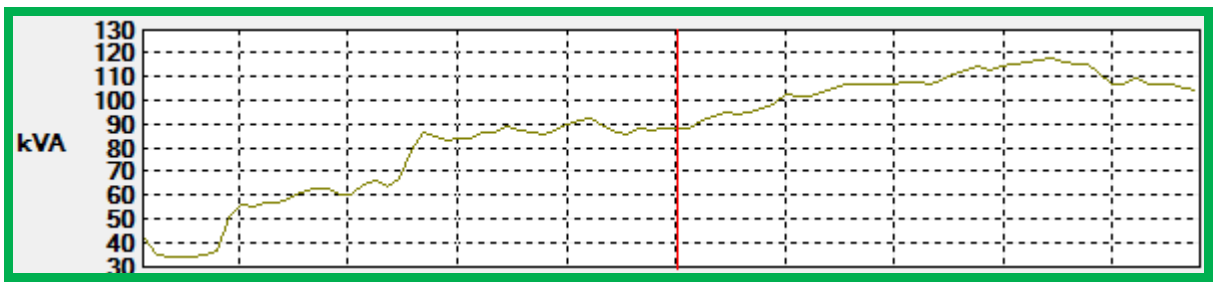
Current Un-balance



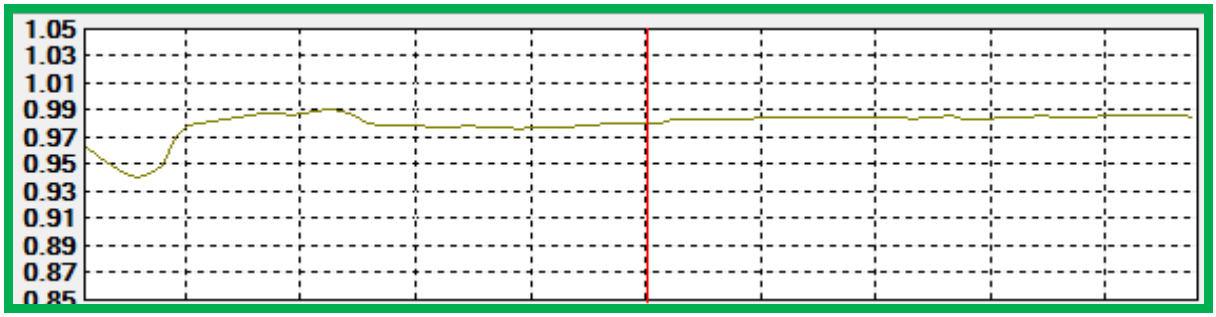
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	412.60	411.40	410.00	34.40	51.90	50.90	0.89	0.97	0.94	50.06	0.10	5.70
MAX	415.30	415.60	414.70	146.30	168.30	182.50	0.99	0.99	0.99	50.07	0.30	33.60
AVG	413.68	412.63	412.25	104.96	131.65	132.73	0.97	0.99	0.98	50.07	0.22	16.21

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.42	0.43	0.43	1.01	1.00	1.01	1.00	0.90	1.00	11.60	6.80	10.40
MAX	0.55	0.59	0.57	1.07	1.02	1.04	3.80	3.50	3.50	24.70	16.50	20.50
AVG	0.54	0.58	0.56	1.03	1.02	1.02	2.53	2.39	2.41	17.35	13.14	13.96

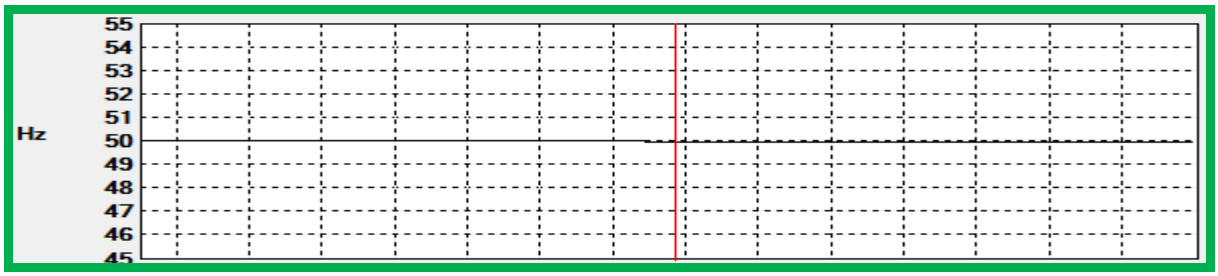
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.40	1.41	1.41	1.46	1.45	1.48

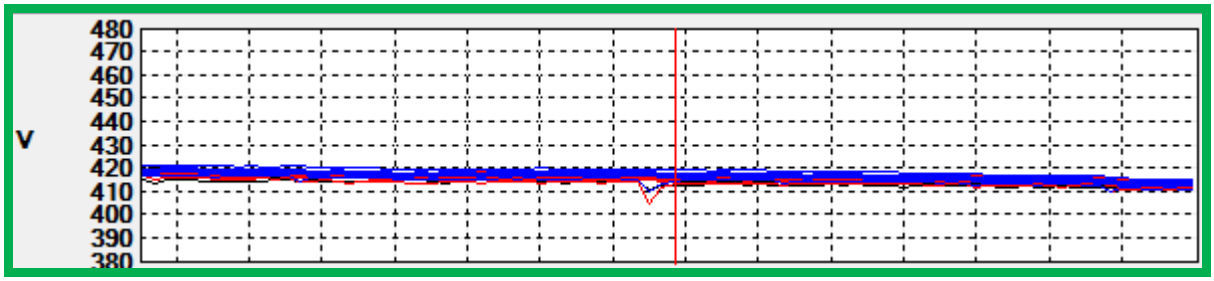
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.45	1.46	1.45	1.97	1.76	1.89
AVG	1.44	1.44	1.44	1.62	1.55	1.61

B23-For-History Law Substation-B, Civil (SS-B)

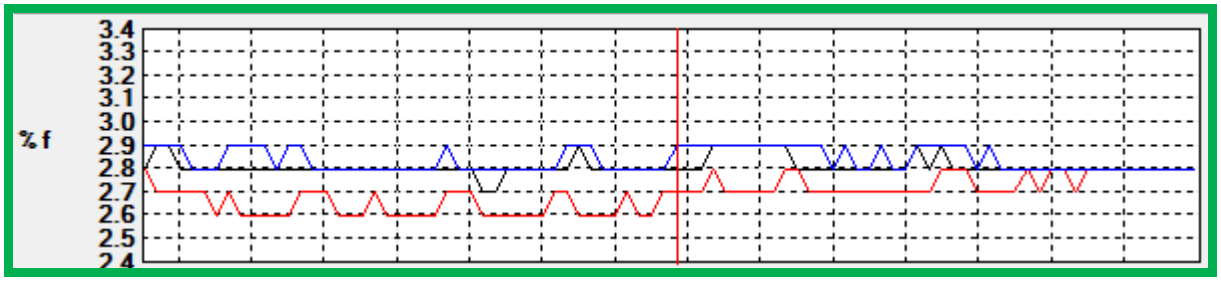
Frequency



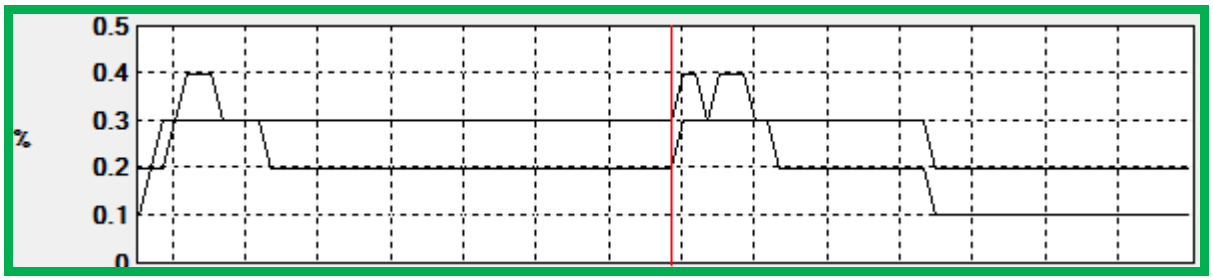
Voltage



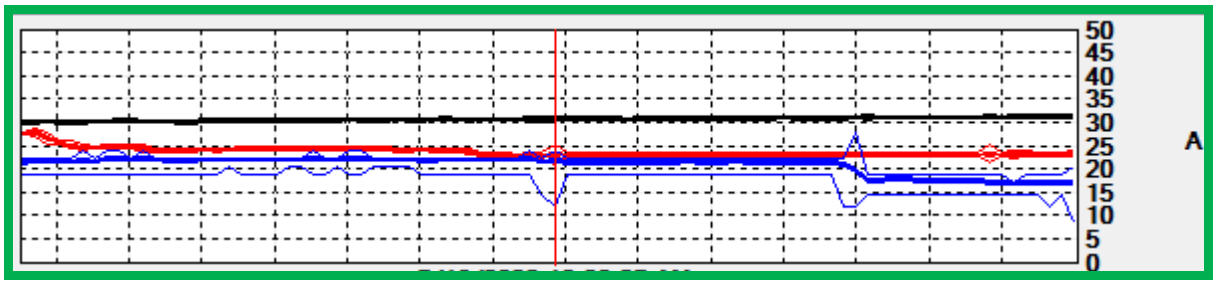
Voltage Harmonics



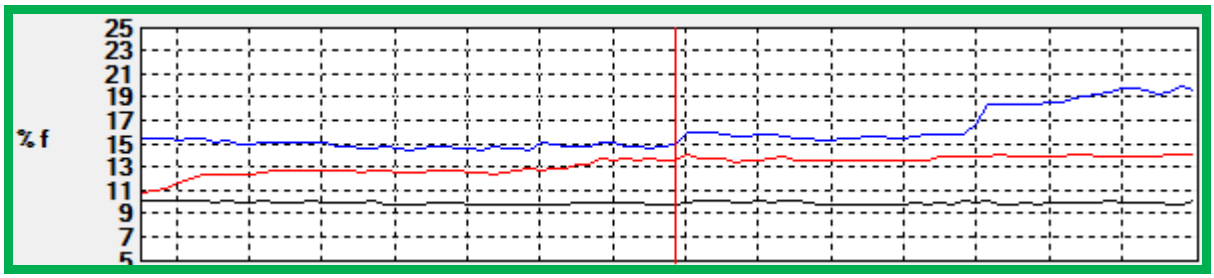
Voltage Un-balance



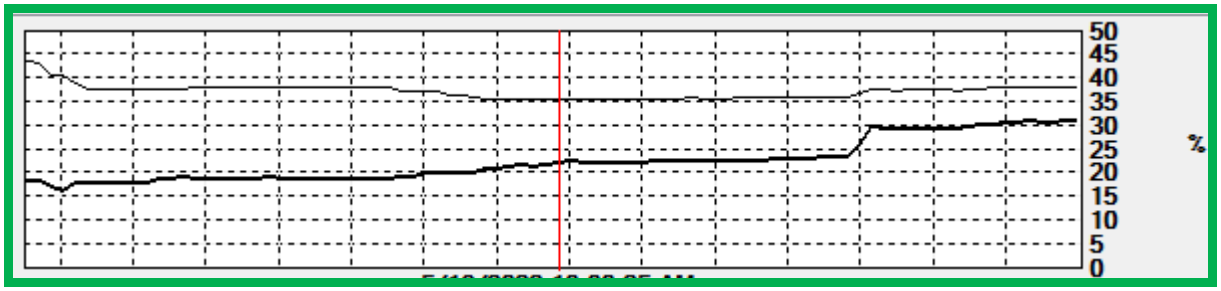
Current



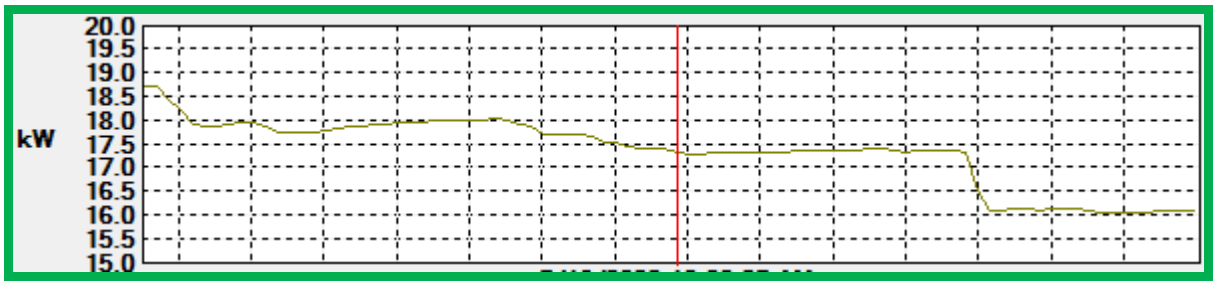
Current Harmonics



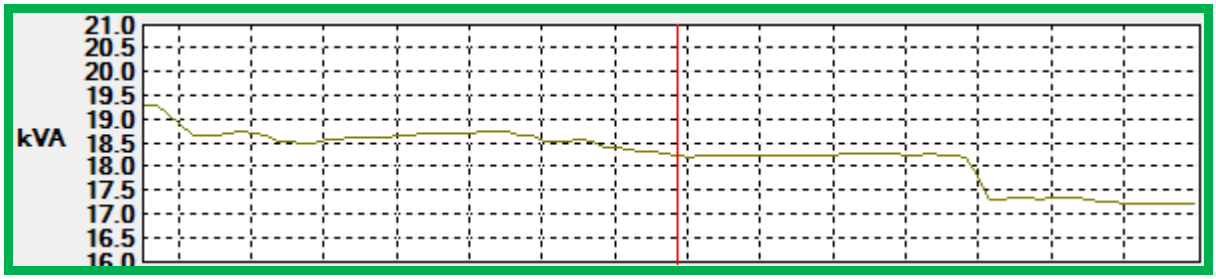
Current Un-balance



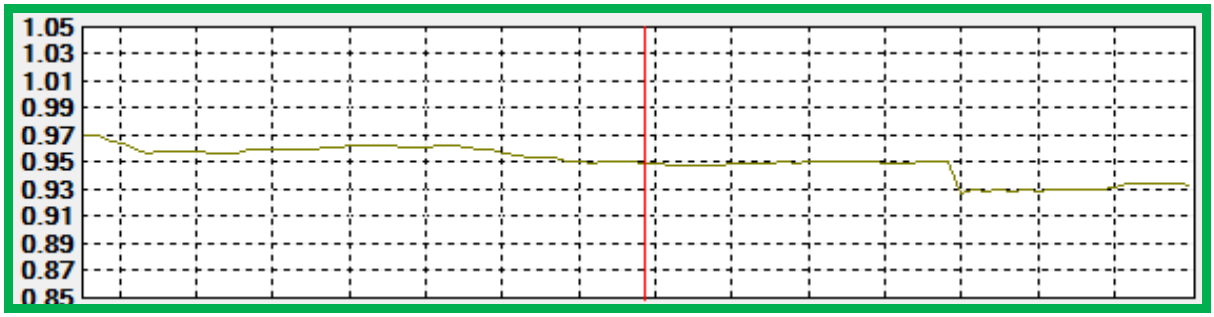
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	413.10	412.80	413.30	30.26	23.02	17.20	0.99	0.93	0.81	49.94	0.10	0.20
MAX	417.90	419.00	419.40	31.48	27.87	22.50	0.99	0.99	0.93	50.04	0.30	0.40
AVG	415.59	415.81	417.01	30.87	23.94	21.08	0.99	0.95	0.89	50.00	0.20	0.28

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.03	1.03	1.06	2.70	2.60	2.80	9.80	10.90	14.50
MAX	- - -	- - -	- - -	1.03	1.05	1.10	2.80	2.80	3.00	10.20	14.20	20.00
AVG	- - -	- - -	- - -	1.03	1.04	1.07	2.72	2.73	2.89	9.99	13.28	16.04

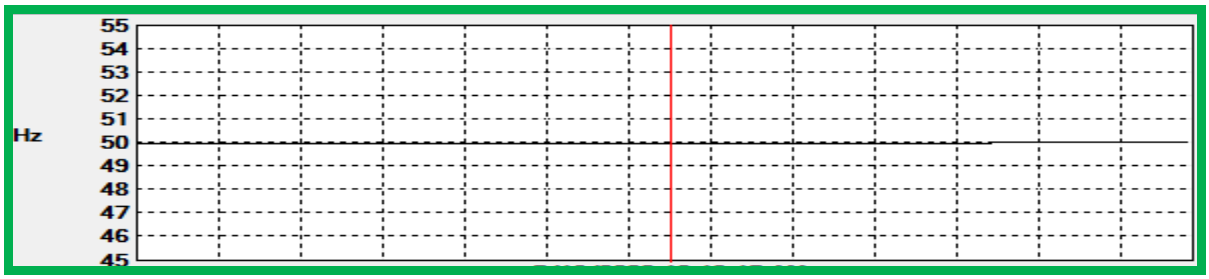
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.46	1.46	1.47	1.52	1.52	1.67

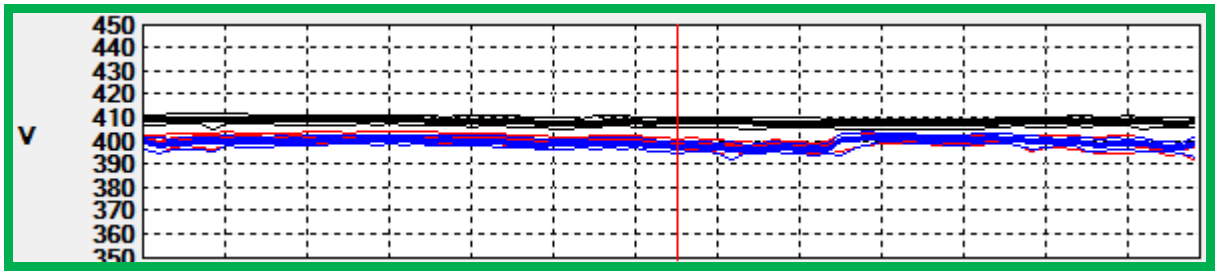
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.46	1.47	1.47	1.54	1.63	1.98
AVG	1.46	1.46	1.47	1.53	1.60	1.74

B24-For- Examination Centre (SS-B)

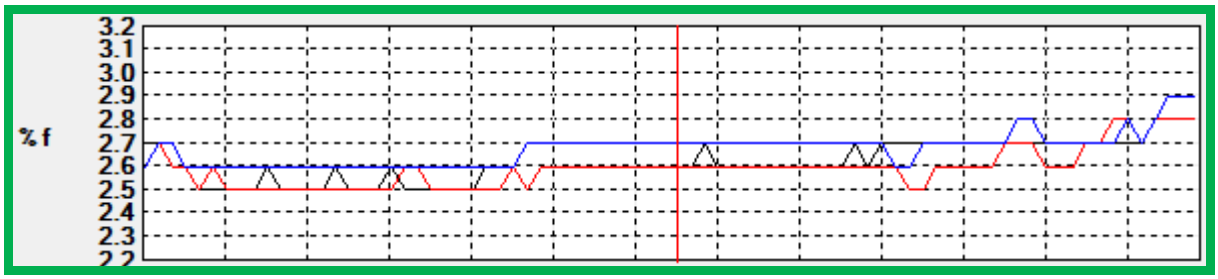
Frequency



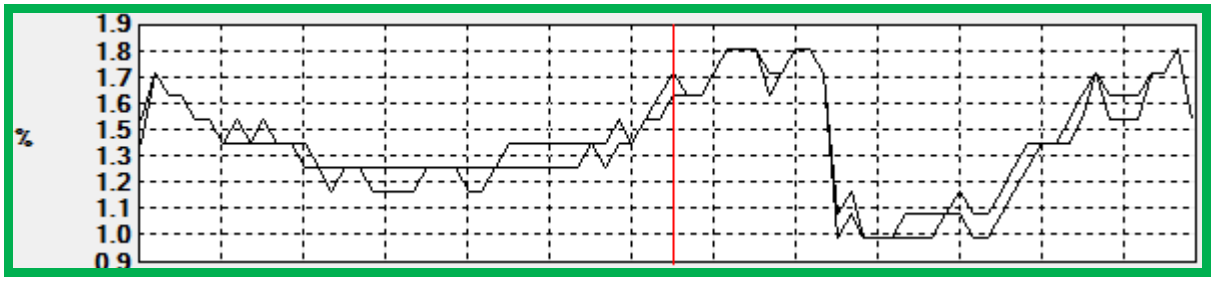
Voltage



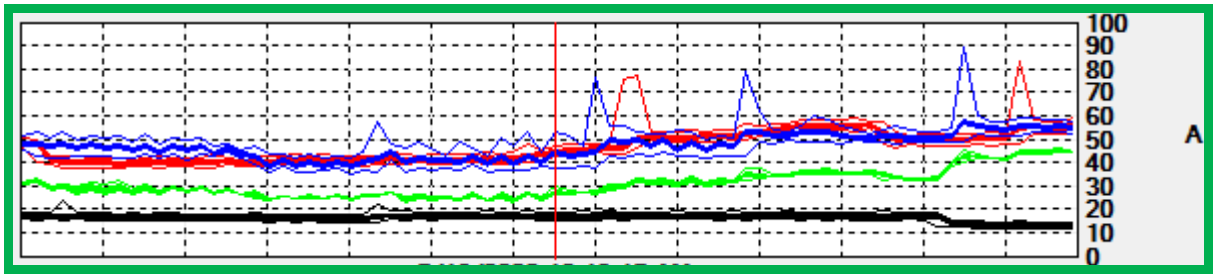
Voltage Harmonics



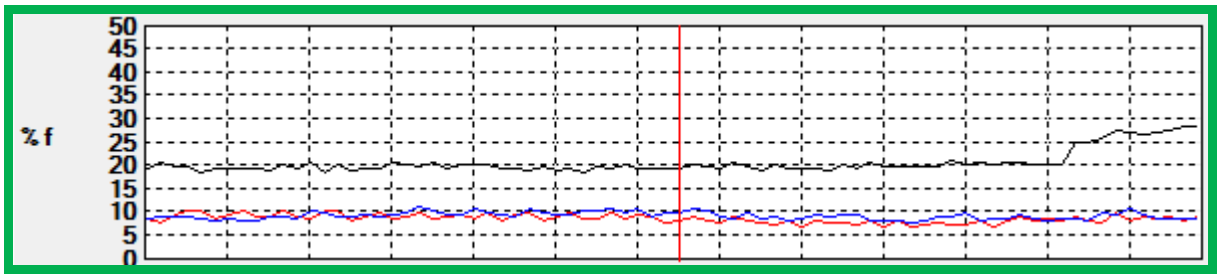
Voltage Un-balance



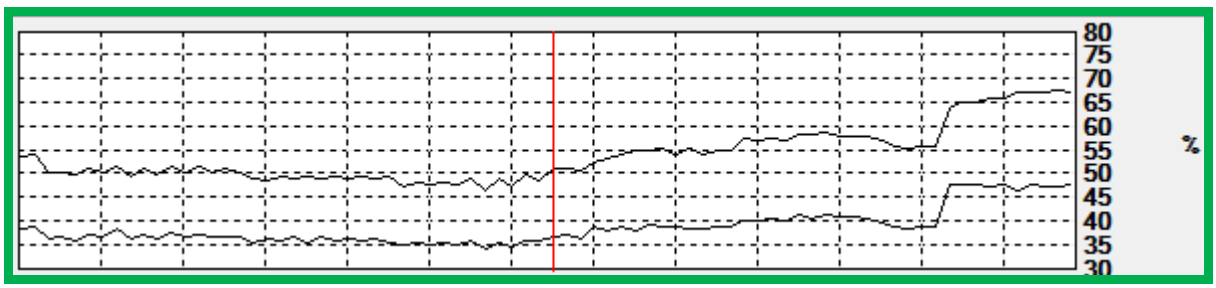
Current



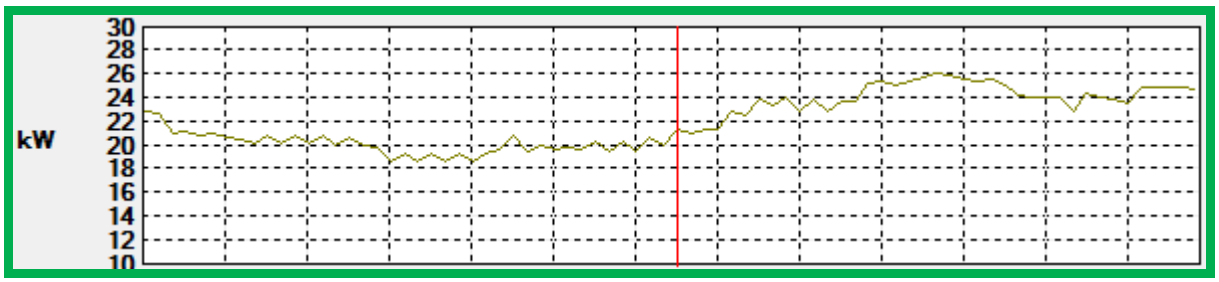
Current Harmonics



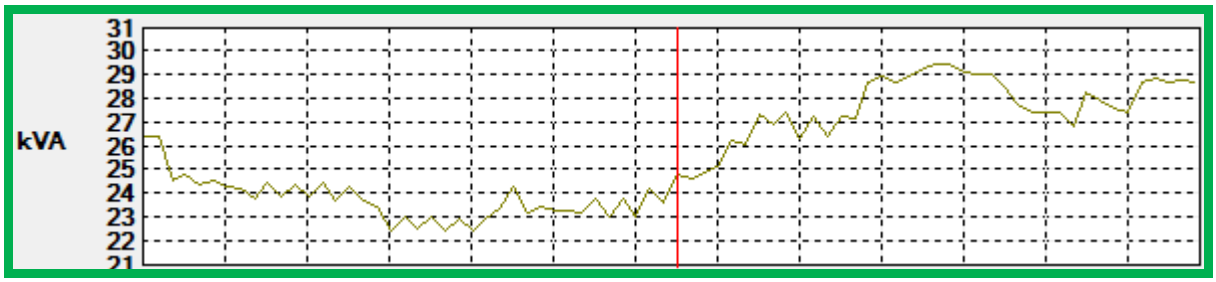
Current Un-balance



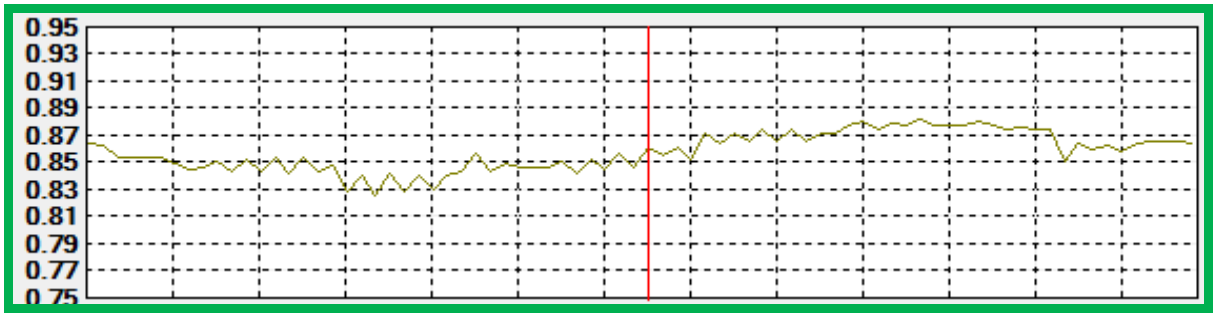
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.40	397.00	396.20	13.42	39.65	38.79	0.16	0.94	0.87	49.95	1.00	46.70
MAX	409.90	402.10	401.50	17.75	56.34	58.01	0.52	0.97	0.94	50.04	1.90	67.60
AVG	408.52	400.18	399.44	16.83	46.65	47.36	0.44	0.96	0.91	49.98	1.44	54.02

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.83	1.00	1.39	1.09	1.01	1.01	2.50	2.50	2.50	18.60	6.90	7.90
MAX	0.83	1.00	1.39	1.21	1.02	1.02	2.80	2.80	2.80	28.40	10.50	11.00
AVG	0.83	1.00	1.39	1.11	1.02	1.02	2.59	2.60	2.64	20.69	8.67	9.25

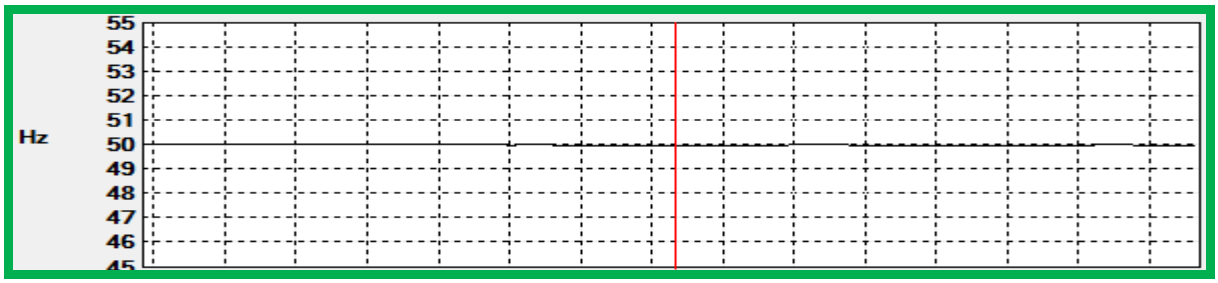
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.46	1.46	1.46	1.93	1.53	1.58

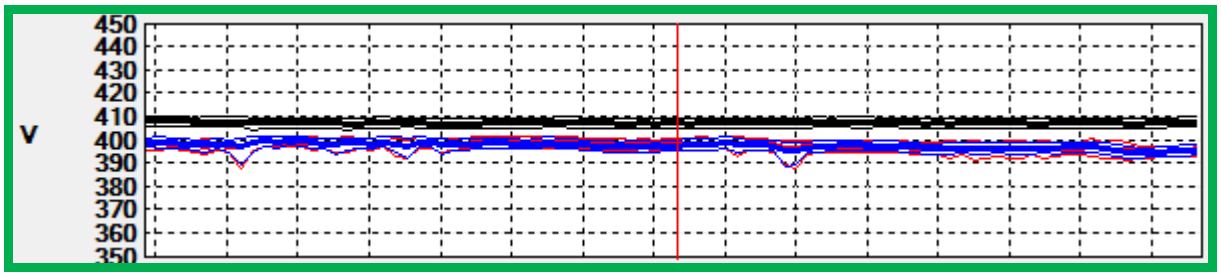
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.46	1.46	1.47	2.24	1.73	1.81
AVG	1.46	1.46	1.47	2.01	1.60	1.65

B25-For-KP HOSTEL, RK Hostel Panel 2nd (SS-B)

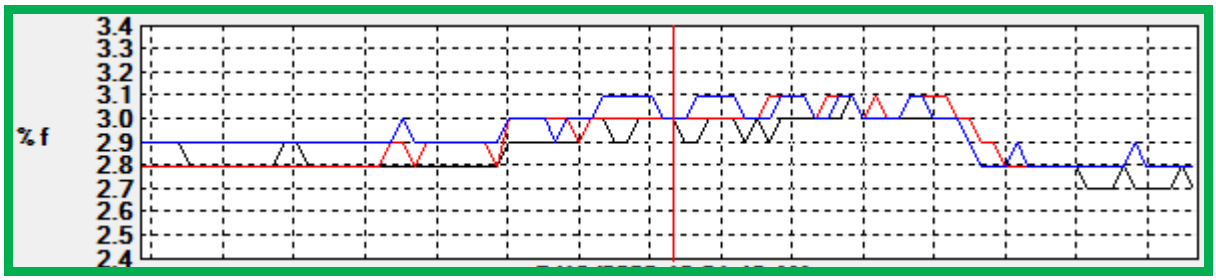
Frequency



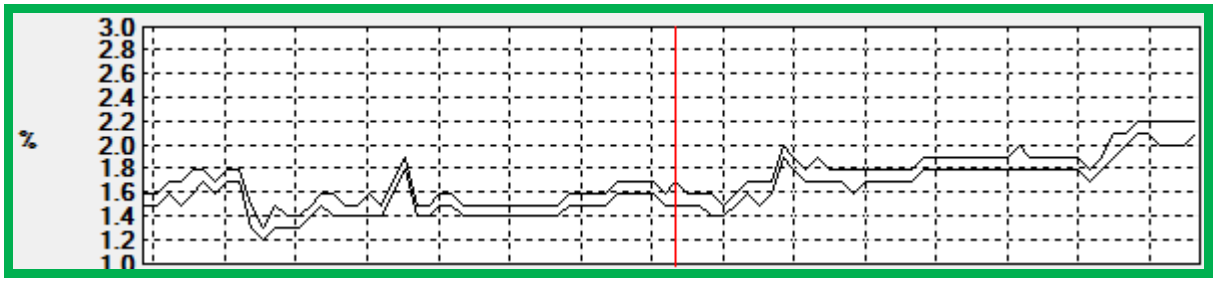
Voltage



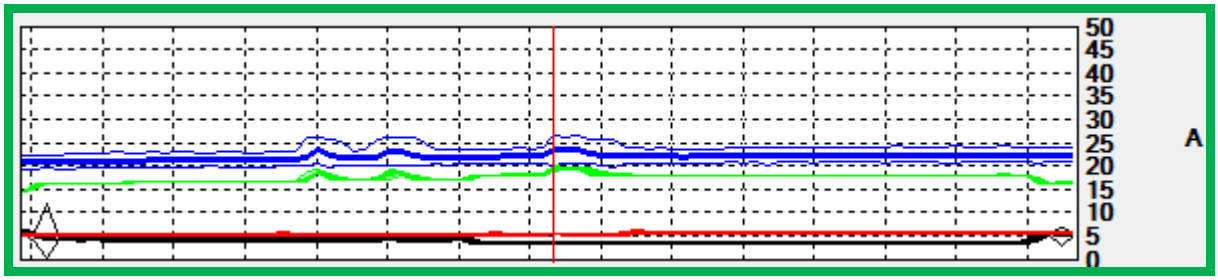
Voltage Harmonics



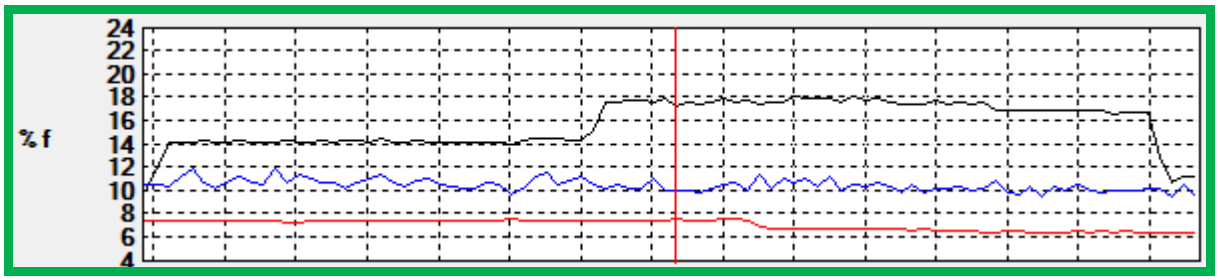
Voltage Un-balance



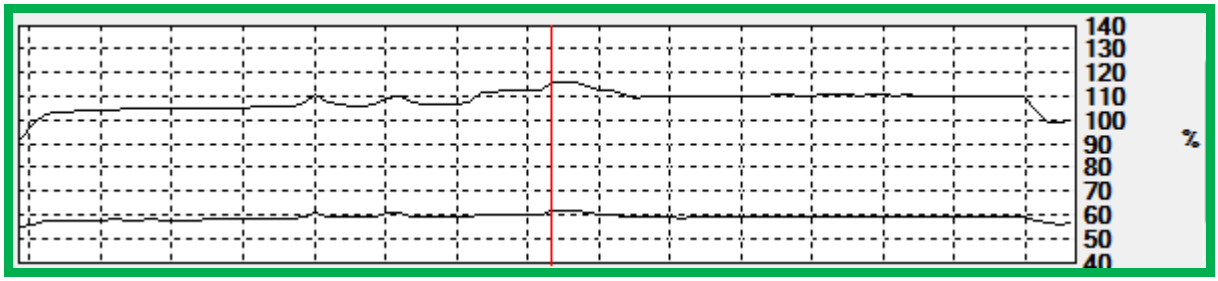
Current



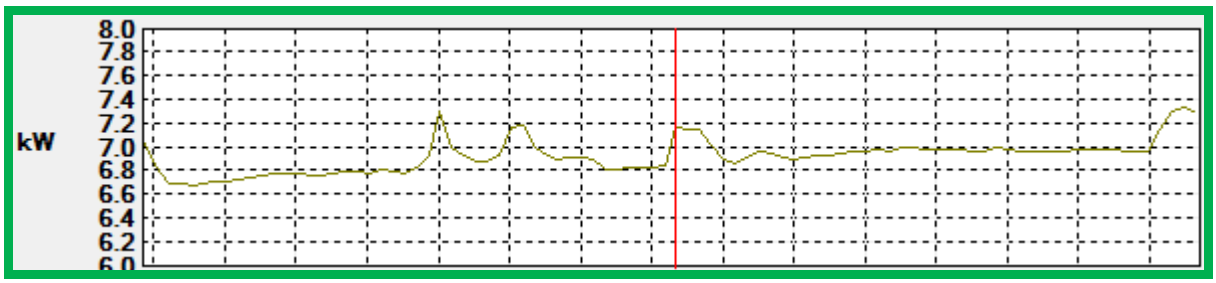
Current Harmonics



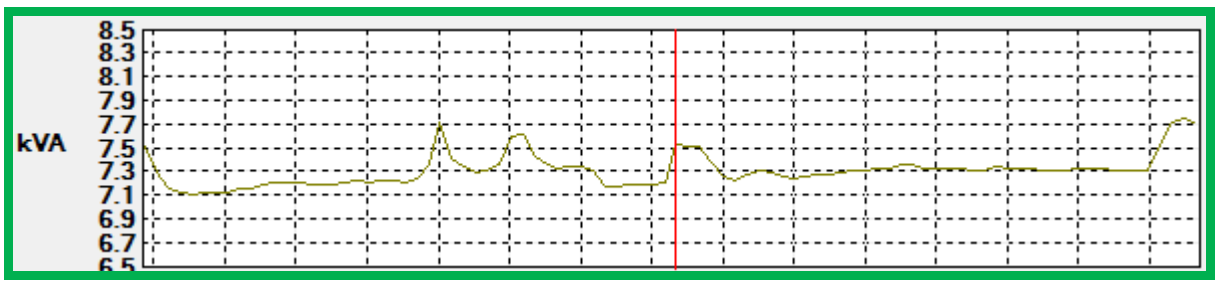
Current Un-balance



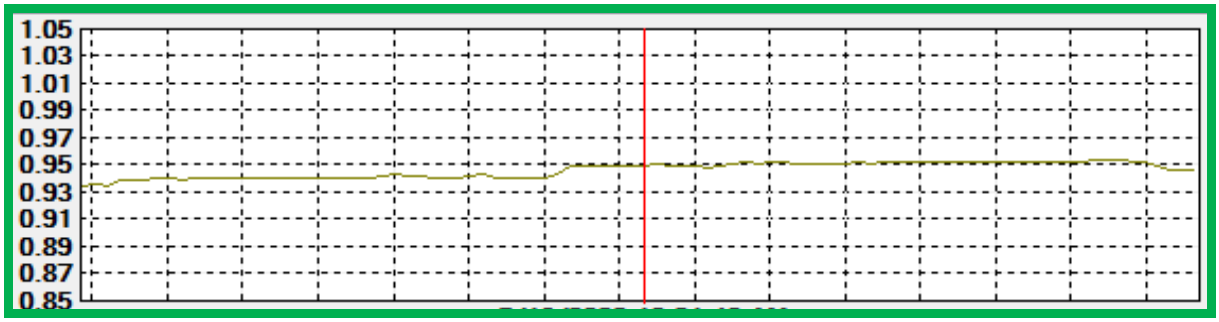
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.00	394.70	394.40	3.61	5.50	20.97	0.71	0.92	0.99	49.99	1.30	92.90
MAX	408.30	399.60	399.80	6.12	5.94	23.73	0.77	0.95	0.99	50.04	2.10	116.30
AVG	407.56	397.75	397.68	4.06	5.67	22.15	0.74	0.93	0.99	50.01	1.64	108.38

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.61	0.66	0.55	1.04	1.01	1.01	2.70	2.70	2.70	10.10	6.40	9.50
MAX	0.83	1.00	1.39	1.14	1.02	1.01	3.00	3.10	3.10	18.10	7.60	11.90
AVG	0.76	0.89	1.12	1.10	1.02	1.01	2.87	2.89	2.92	15.74	7.10	10.50

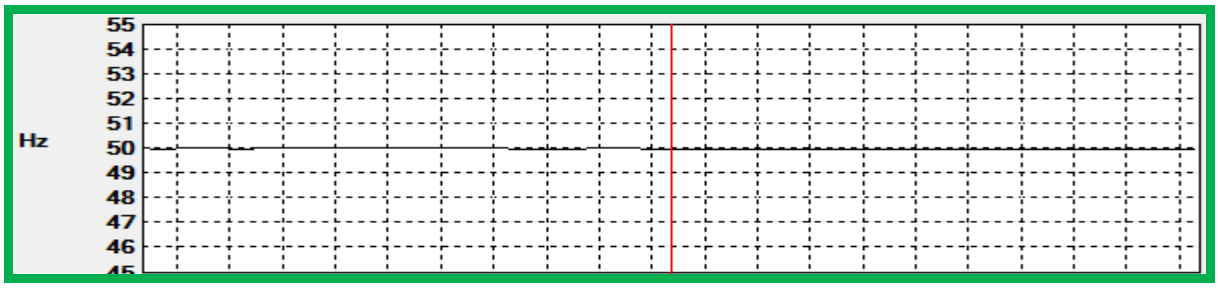
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.46	1.46	1.46	1.52	1.45	1.52

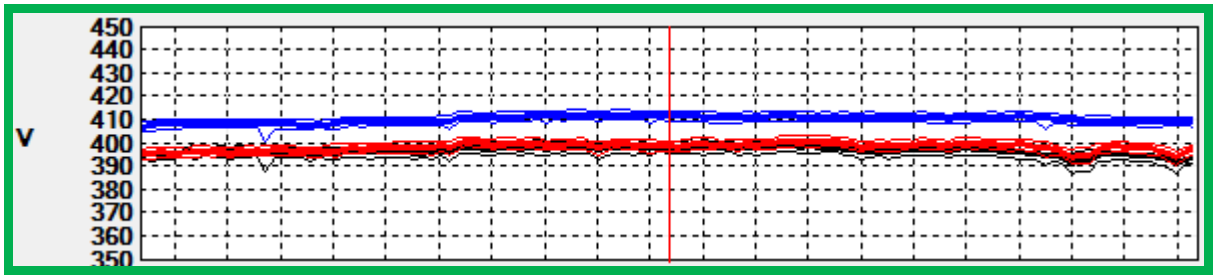
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.47	1.47	1.48	1.81	1.48	1.65
AVG	1.46	1.46	1.47	1.55	1.47	1.55

B26-For-Farm House UG (SS-B)

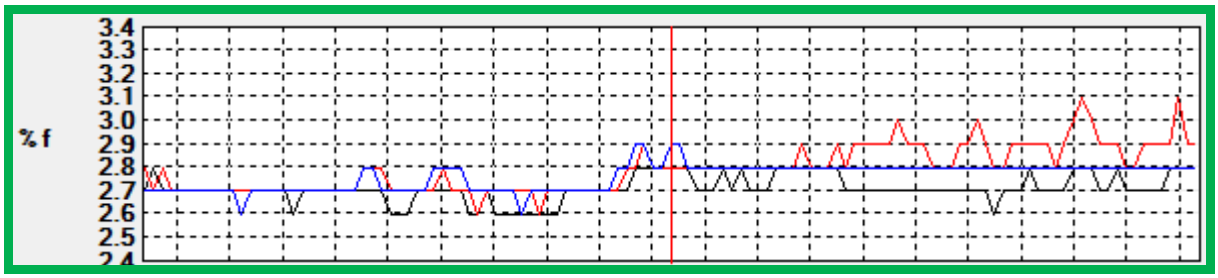
Frequency



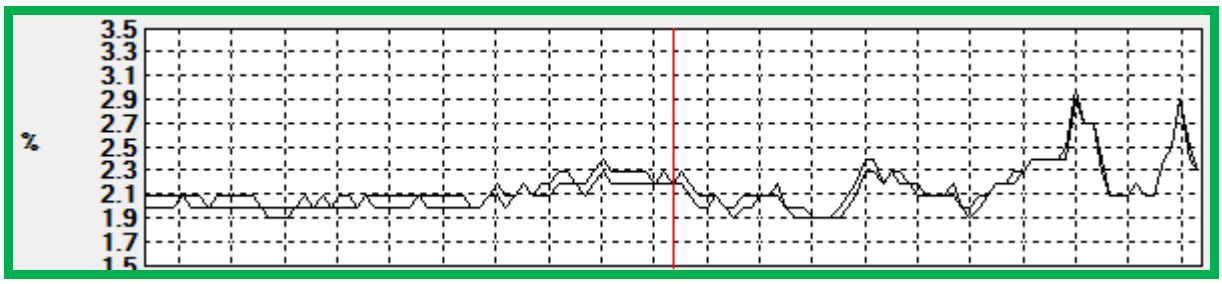
Voltage



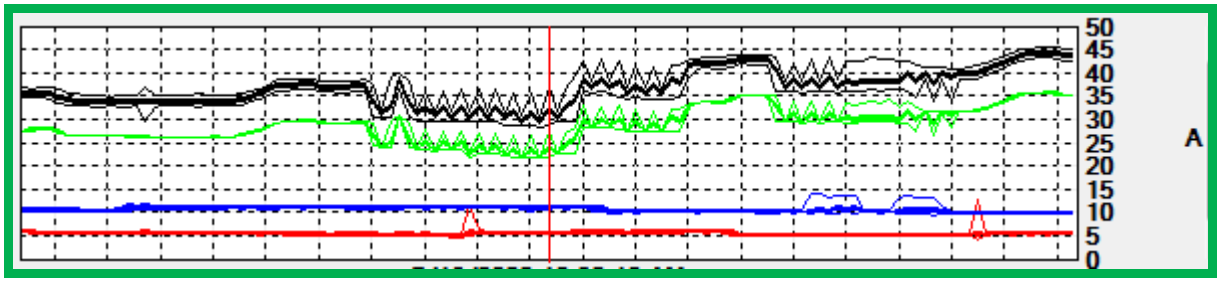
Voltage Harmonics



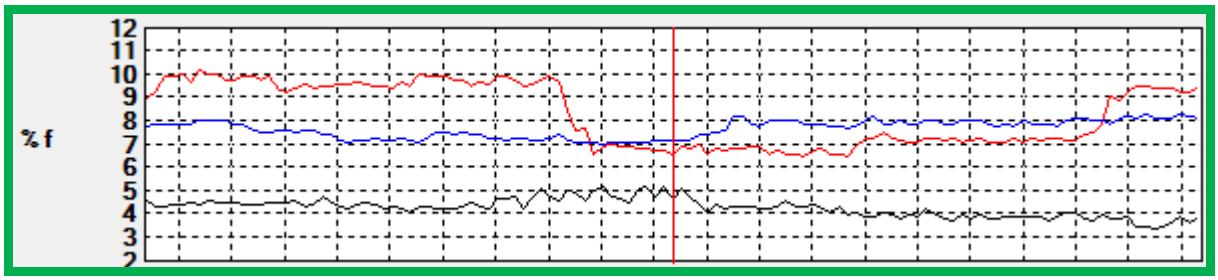
Voltage Un-balance



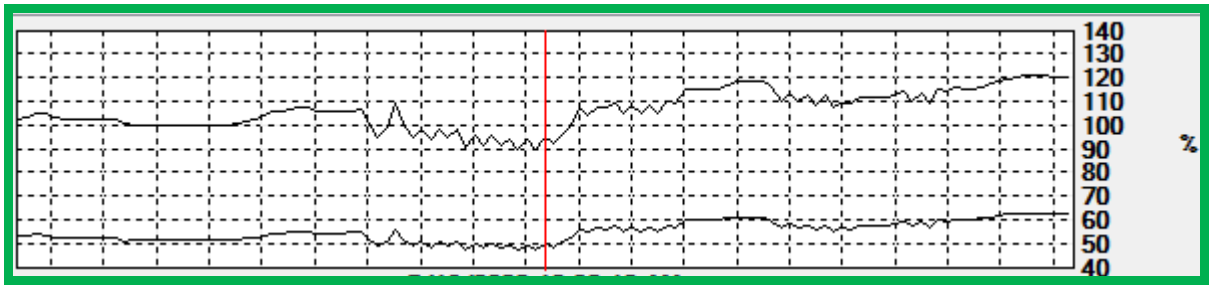
Current



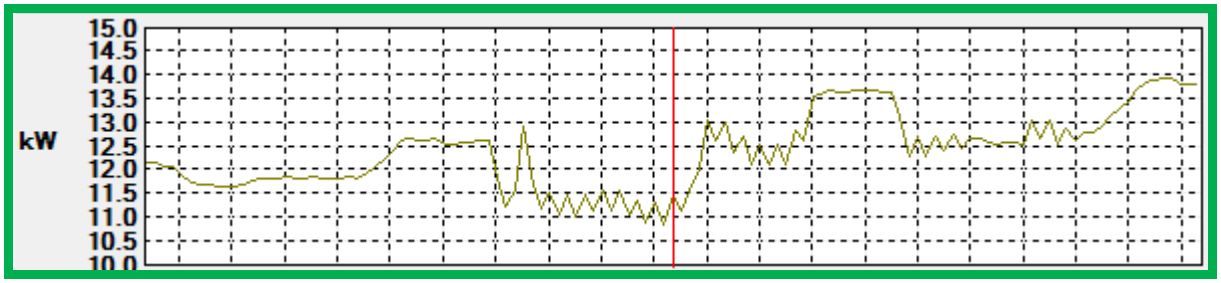
Current Harmonics



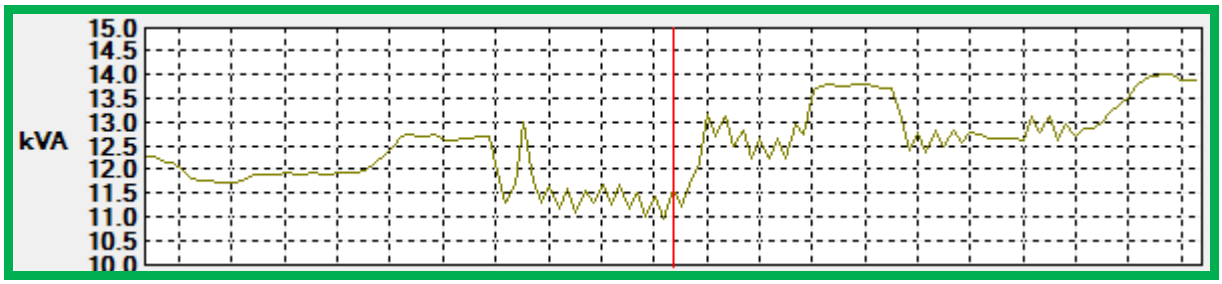
Current Un-balance



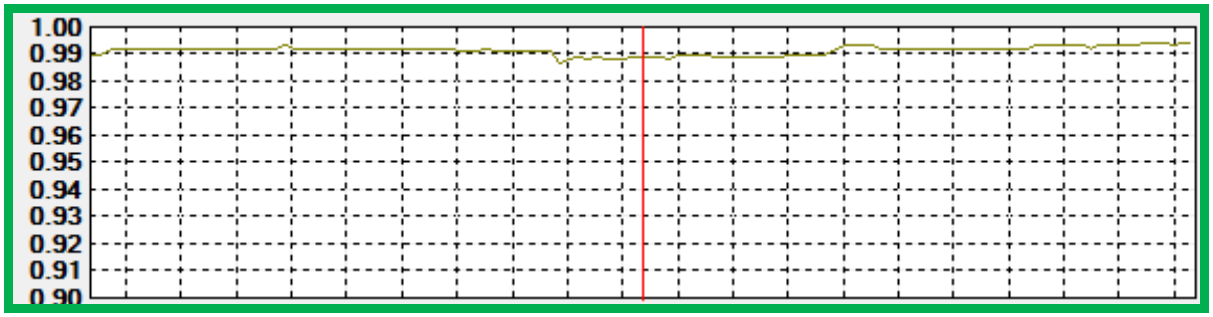
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	391.1	393.6	407.3	29.7	5.3	10.1	1.0	0.9	1.0	50.0	1.9	89.8
MAX	399.1	401.2	412.4	44.5	6.4	11.4	1.0	1.0	1.0	50.0	2.9	121.2
AVG	396.7	398.5	410.4	36.9	5.7	10.9	1.0	1.0	1.0	50.0	2.1	106.6

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

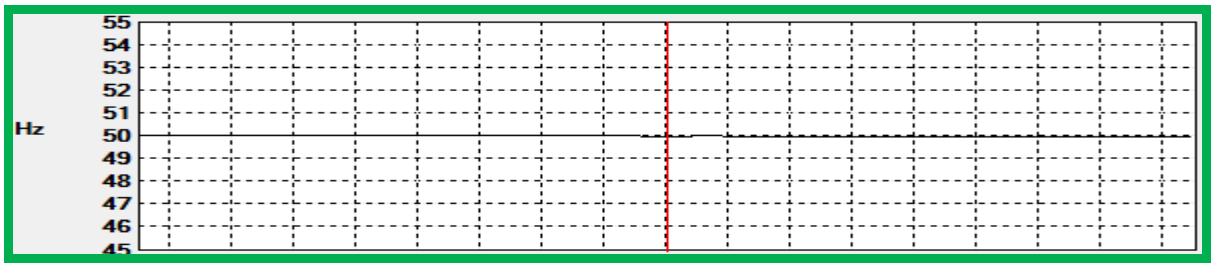
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.6	0.7	0.6	1.0	1.0	1.0	2.6	2.7	2.6	3.4	6.5	7.0
MAX	0.6	0.7	0.6	1.0	1.0	1.0	3.0	3.0	2.9	5.2	10.2	8.3
AVG	0.6	0.7	0.6	1.0	1.0	1.0	2.7	2.8	2.7	4.3	8.3	7.7

Crest Factor

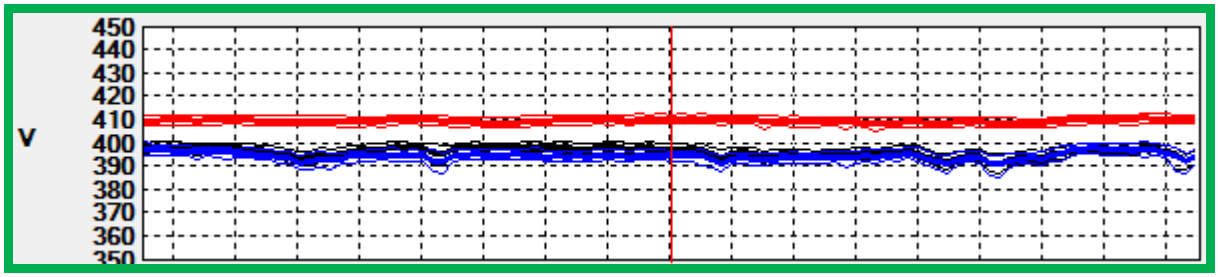
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.5	1.5	1.5	1.5	1.6	1.6
MAX	1.5	1.5	1.5	1.6	2.2	1.9
AVG	1.5	1.5	1.5	1.5	1.7	1.7

B27-For-Physics Dept. AC (SS-B)

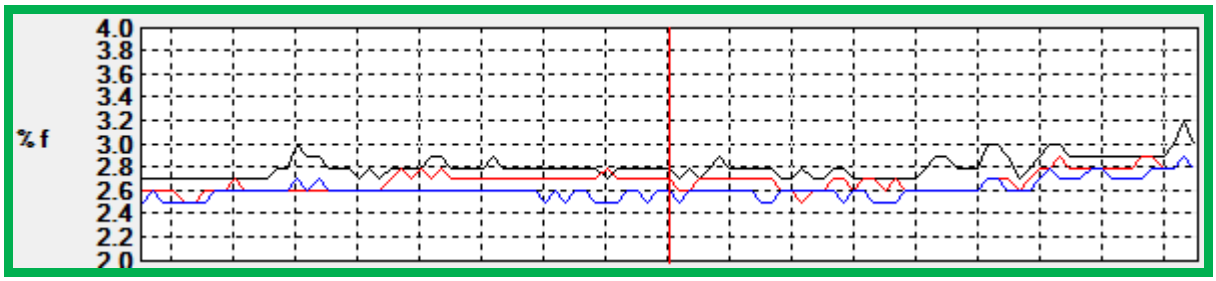
Frequency



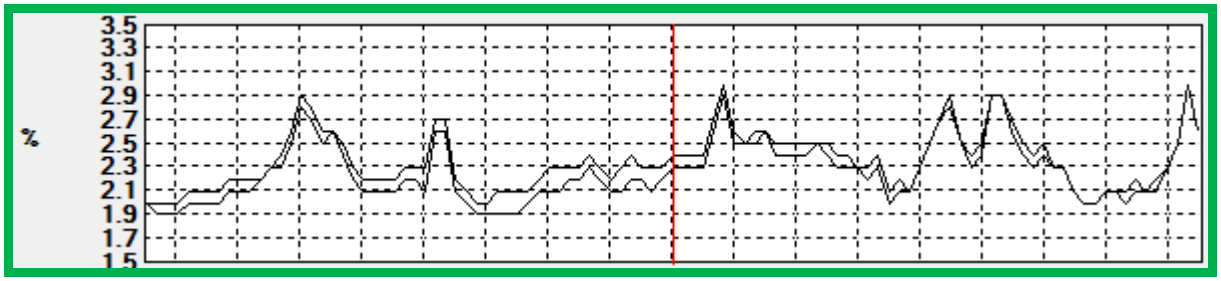
Voltage



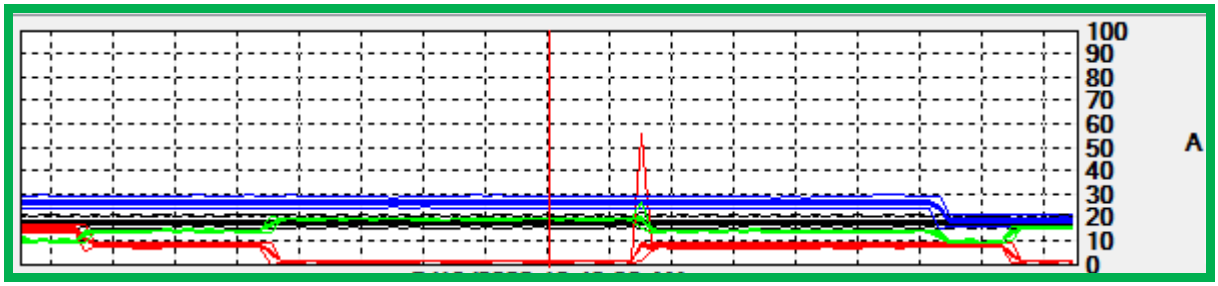
Voltage Harmonics



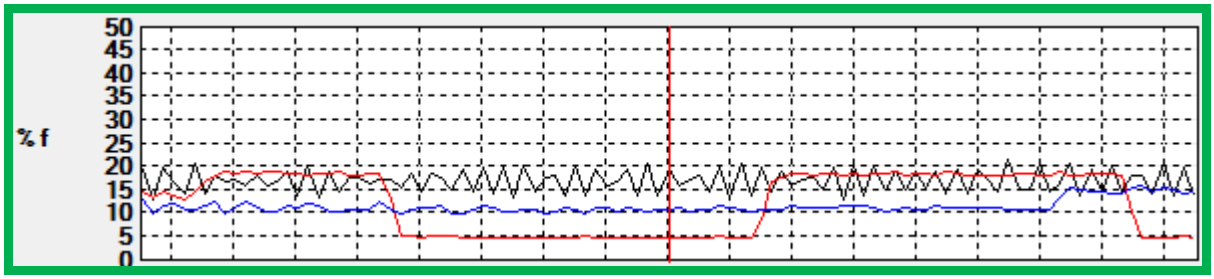
Voltage Un-balance



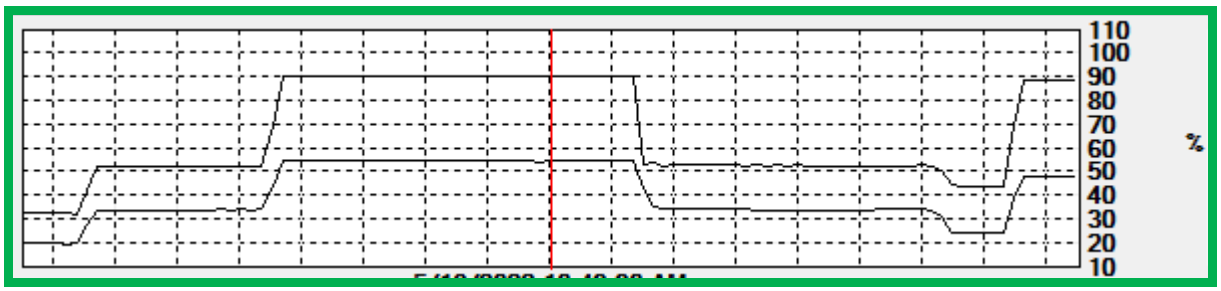
Current



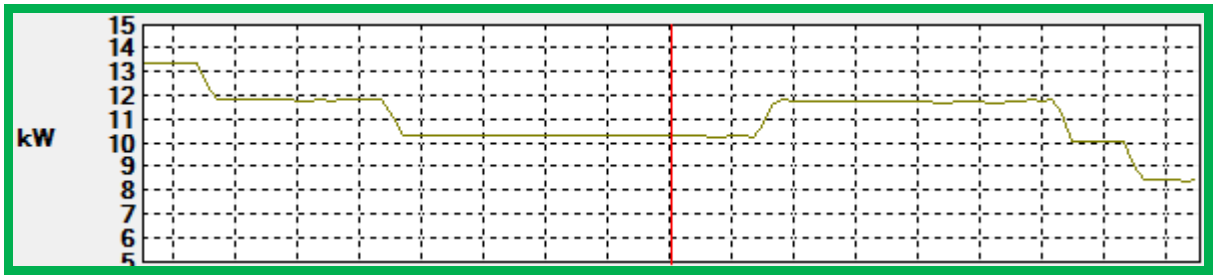
Current Harmonics



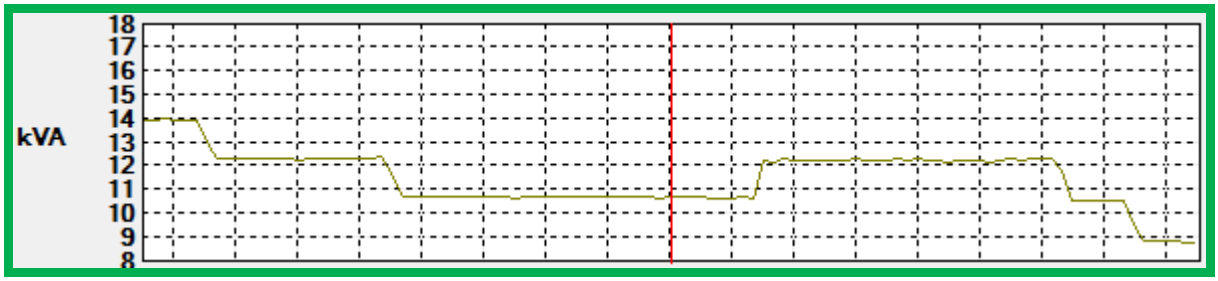
Current Un-balance



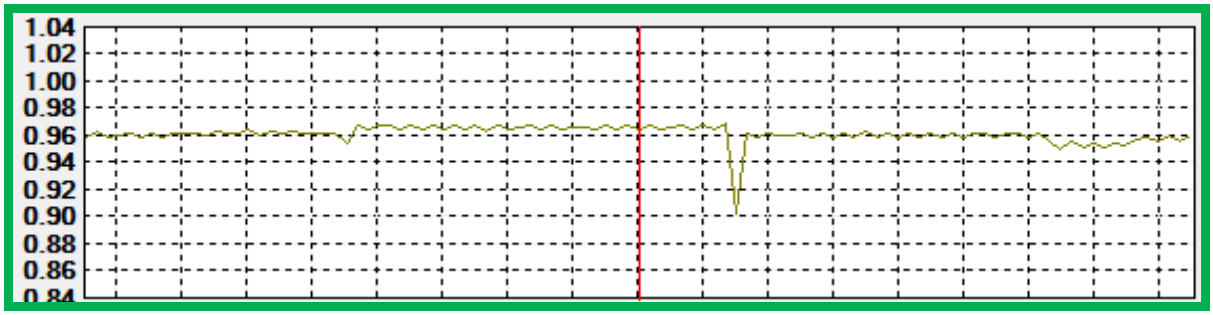
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	391.80	408.60	391.10	18.13	1.43	18.70	0.93	0.74	0.97	49.95	2.00	32.20
MAX	398.90	410.80	398.10	18.45	15.24	26.77	0.95	1.00	0.99	50.04	3.00	90.80
AVG	396.53	409.71	394.67	18.27	6.00	25.59	0.94	0.96	0.98	50.00	2.35	66.13

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	4.17	4.29	4.34	1.01	1.00	1.00	2.60	2.50	2.60	12.80	4.60	9.70
MAX	4.17	4.29	4.34	1.01	1.01	1.01	3.00	2.90	3.10	21.40	19.10	15.80
AVG	4.17	4.29	4.34	1.01	1.01	1.00	2.77	2.62	2.72	16.98	12.53	11.49

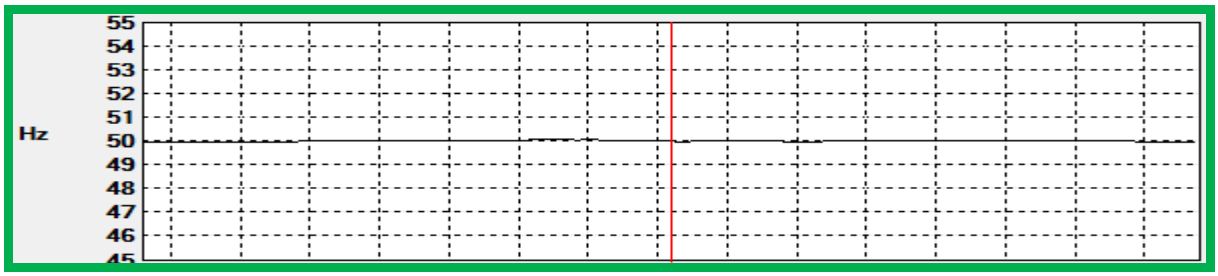
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.46	1.46	1.45	1.70	1.53	1.54

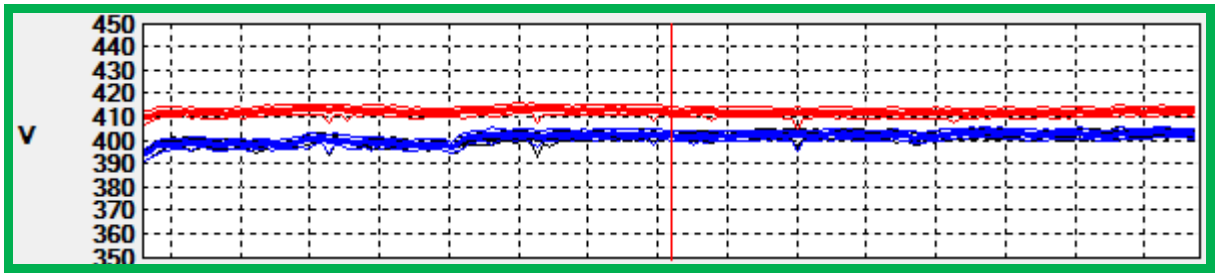
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MAX	1.48	1.47	1.47	1.81	2.41	1.66
AVG	1.47	1.46	1.46	1.76	1.66	1.57

B28-For-Campus Farm OH, (SS-B)

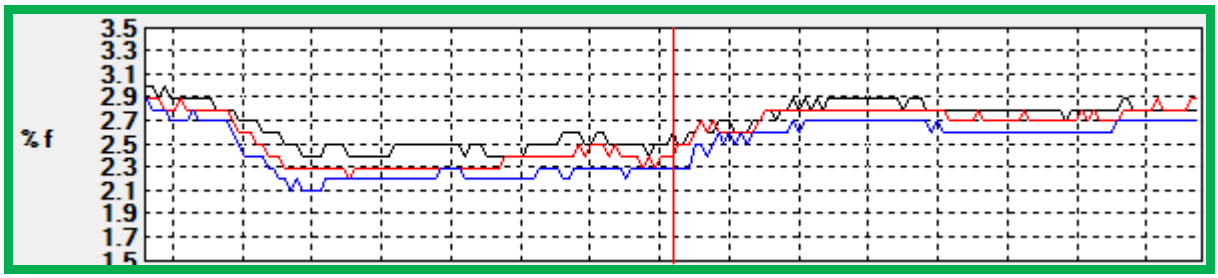
Frequency



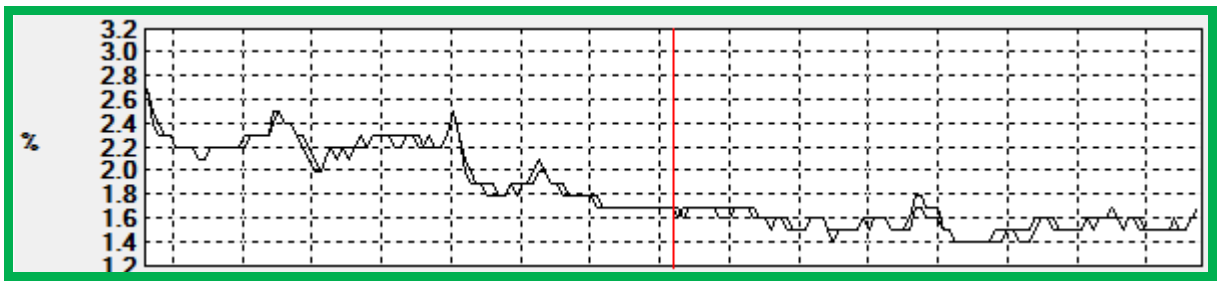
Voltage



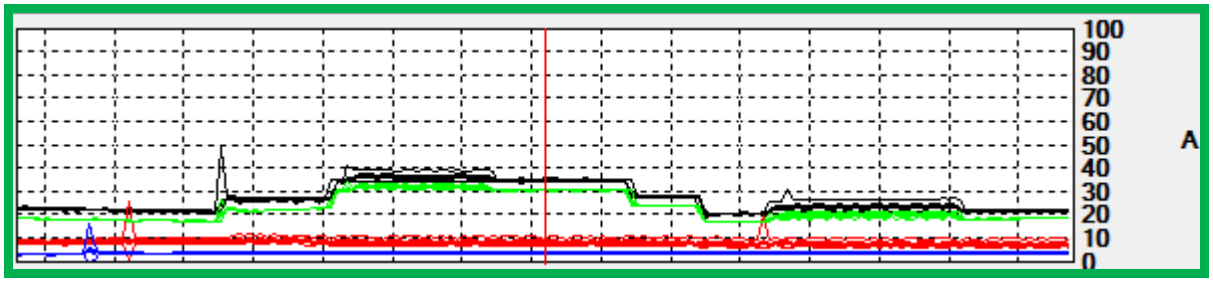
Voltage Harmonics



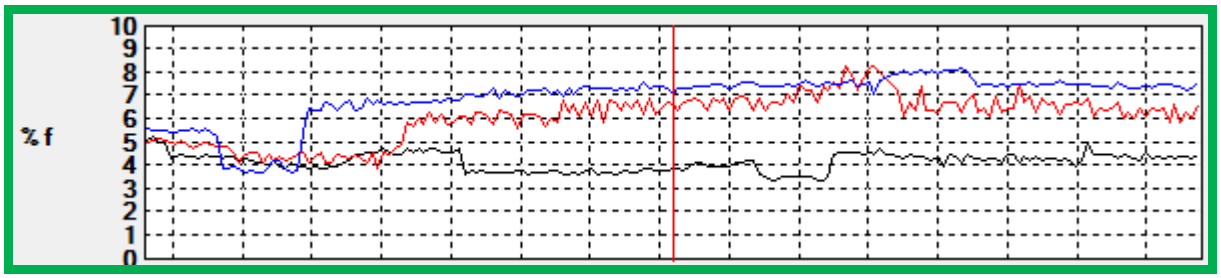
Voltage Un-balance



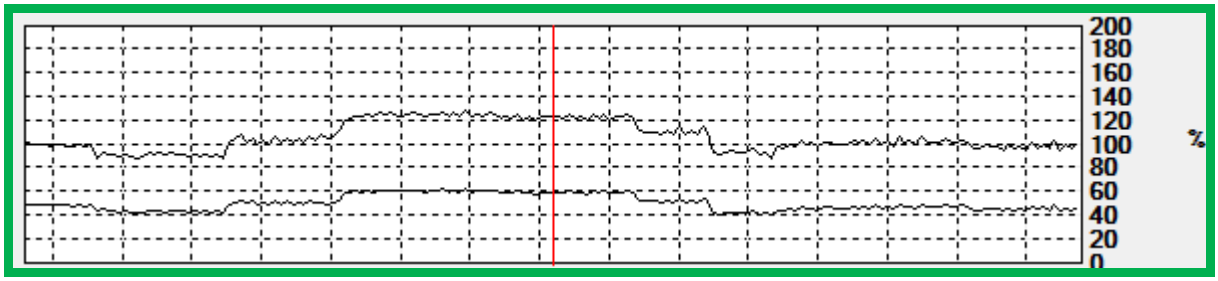
Current



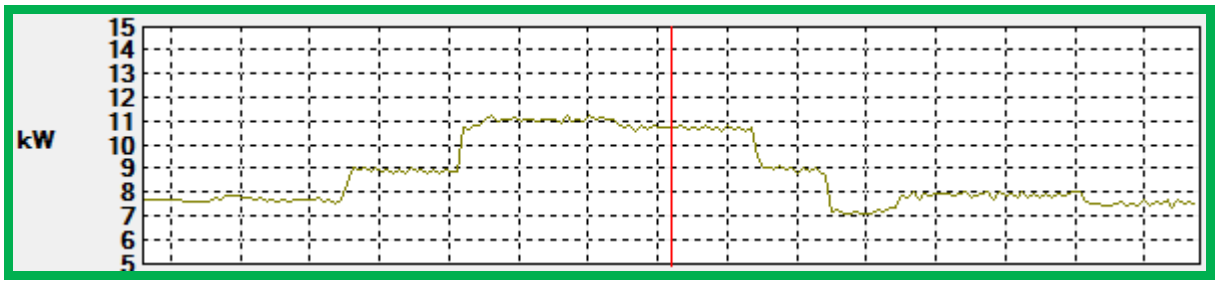
Current Harmonics



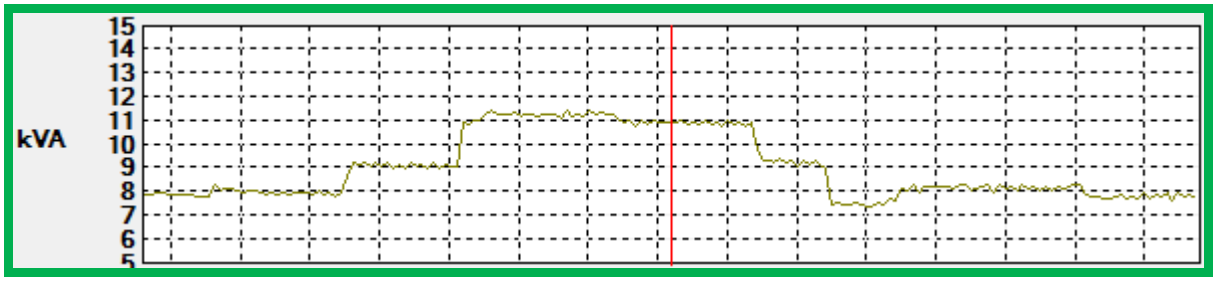
Current Un-balance



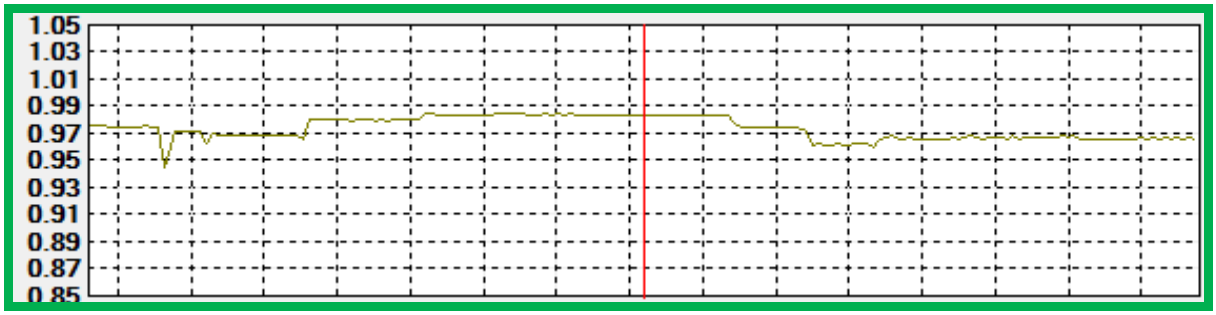
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	394.60	410.50	394.40	20.58	6.67	3.25	0.96	0.96	0.83	49.96	1.40	87.30
MAX	403.70	414.00	404.00	36.99	9.51	5.25	0.99	1.00	0.97	50.08	2.70	128.20
AVG	401.41	412.54	401.49	27.07	8.15	3.78	0.97	0.99	0.93	50.03	1.83	106.49

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.41	0.51	0.34	1.00	1.00	1.00	2.30	2.20	2.20	3.40	3.90	3.70
MAX	4.17	4.29	4.34	1.01	1.01	1.01	3.00	2.80	2.90	5.30	8.30	8.20
AVG	1.33	1.53	1.24	1.00	1.01	1.01	2.68	2.52	2.55	4.16	6.09	6.91

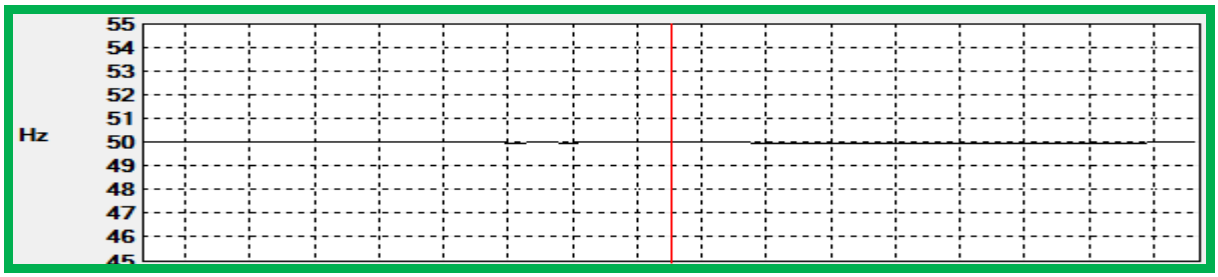
Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF

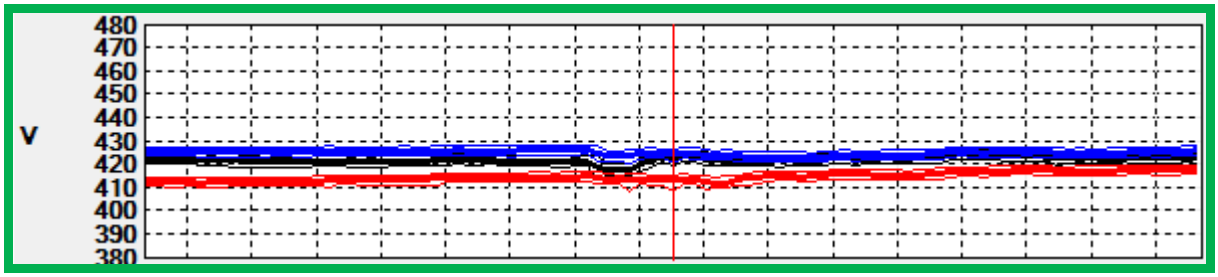
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.46	1.46	1.45	1.47	1.50	1.40
MAX	1.48	1.47	1.46	1.71	1.99	1.91
AVG	1.47	1.46	1.46	1.53	1.69	1.43

B29-For-Brahaspati Bhawan, Horticulture Dept. (SS-B)

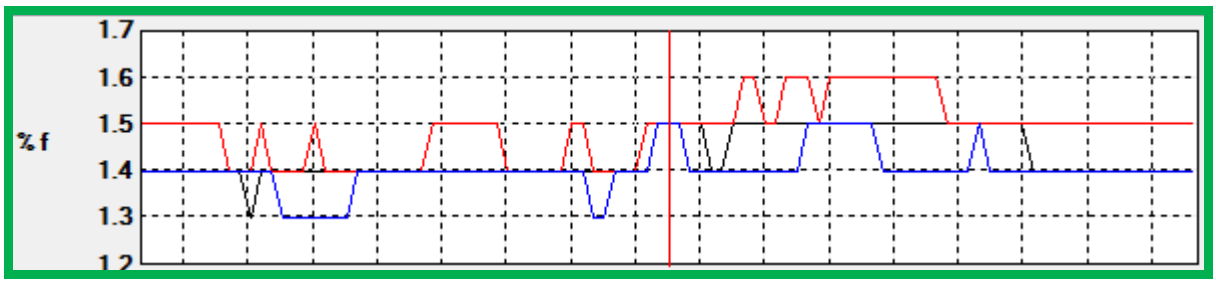
Frequency



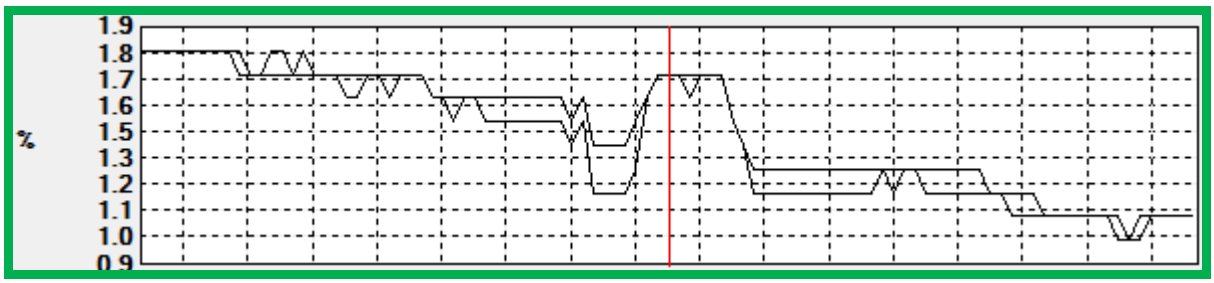
Voltage



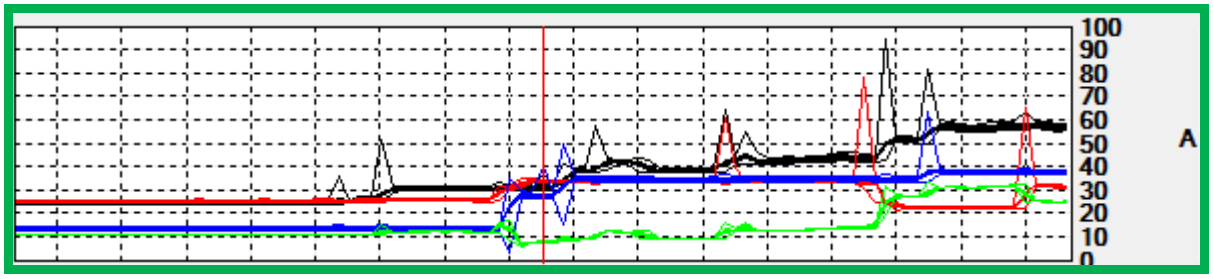
Voltage Harmonics



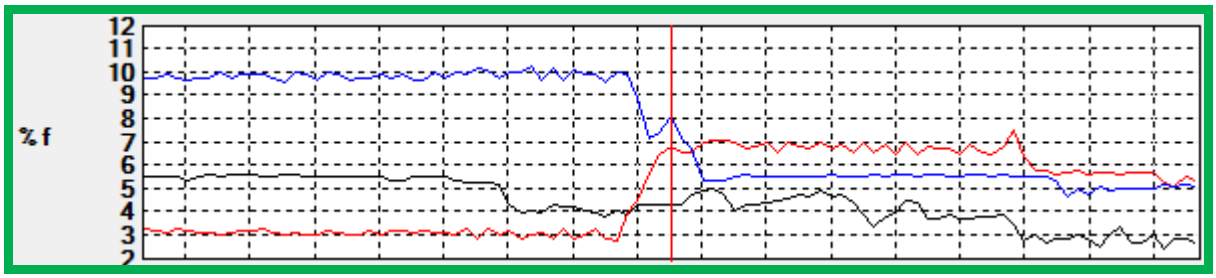
Voltage Un-balance



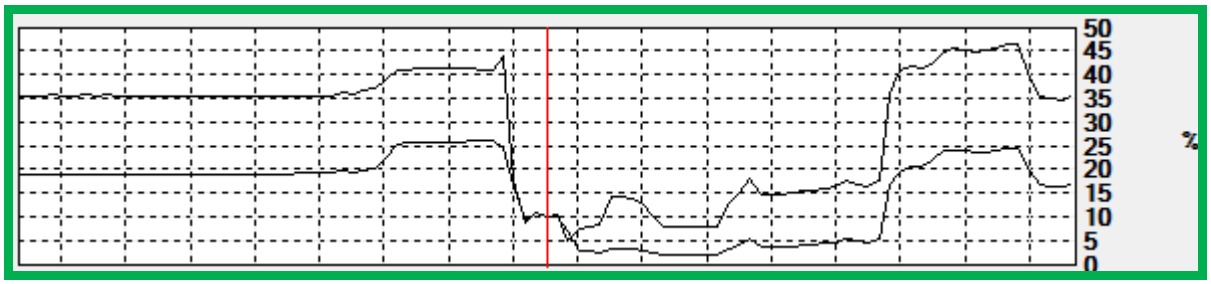
Current



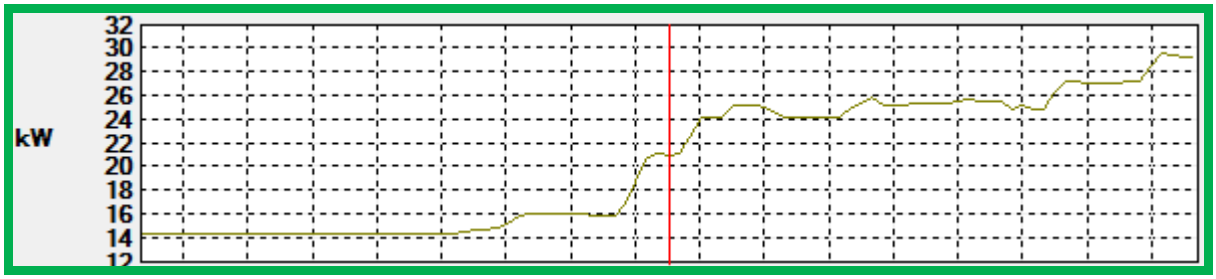
Current Harmonics



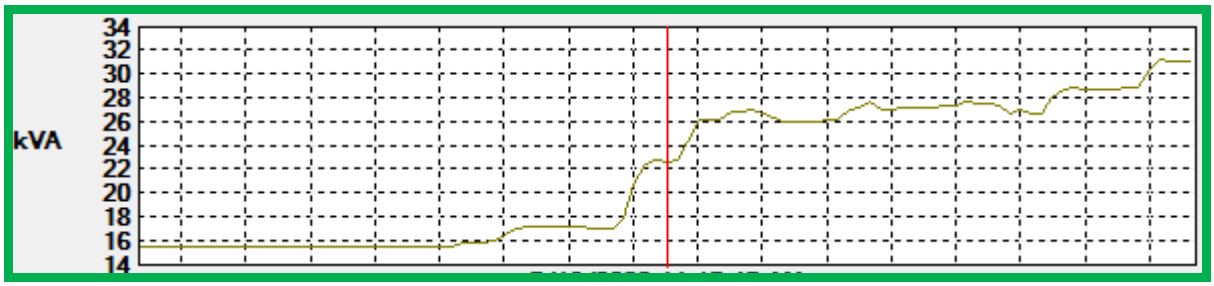
Current Un-balance



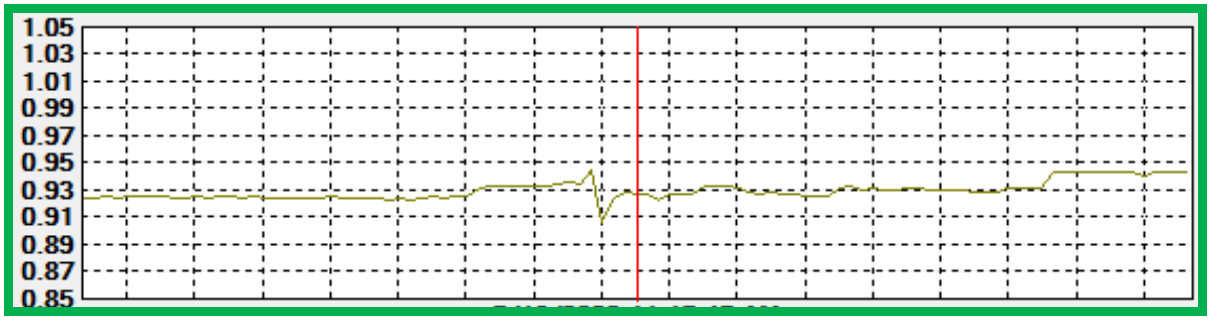
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.70	412.10	423.20	24.53	22.77	13.66	0.92	0.91	0.81	49.97	1.00	5.20
MAX	424.50	418.00	426.60	58.06	34.78	38.29	0.96	0.96	0.95	50.04	1.80	46.60
AVG	422.15	414.84	425.14	36.50	28.57	25.06	0.93	0.93	0.92	50.00	1.40	29.35

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

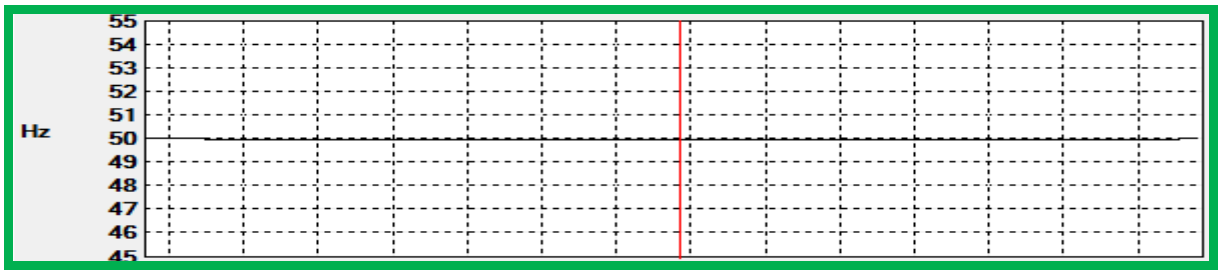
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.41	0.51	0.35	1.00	1.00	1.00	1.40	1.40	1.30	2.40	2.80	4.70
MAX	0.41	0.51	0.35	1.00	1.01	1.00	1.60	1.60	1.50	5.60	7.50	10.30
AVG	0.41	0.51	0.35	1.00	1.00	1.00	1.49	1.45	1.39	4.41	4.86	7.60

Crest Factor

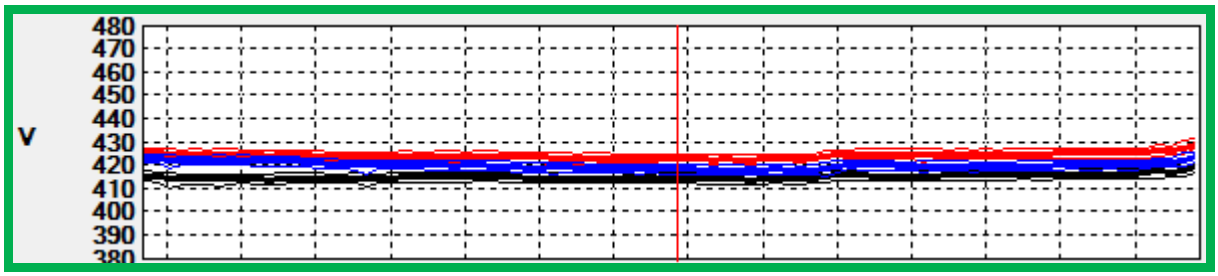
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.44	1.43	1.42	1.47	1.43
MAX	1.44	1.44	1.44	1.66	1.94	2.21
AVG	1.44	1.44	1.44	1.46	1.52	1.52

B30-For-Canteen Library, Internet (SS-B)

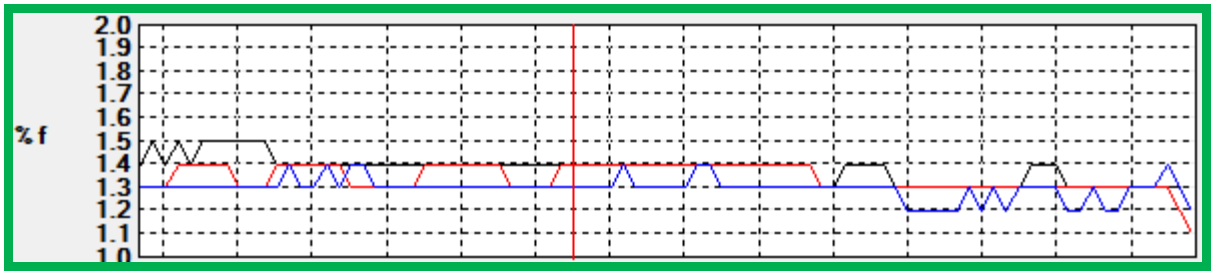
Frequency



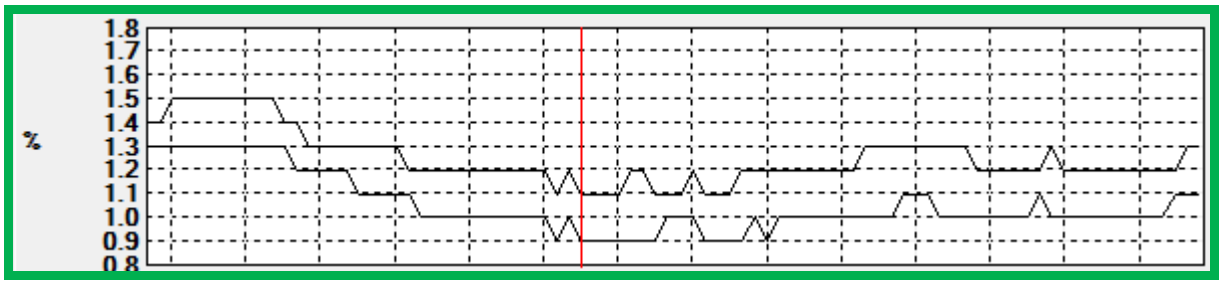
Voltage



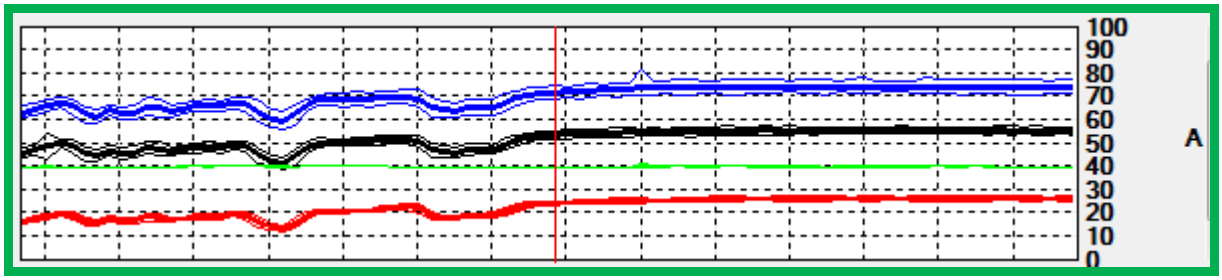
Voltage Harmonics



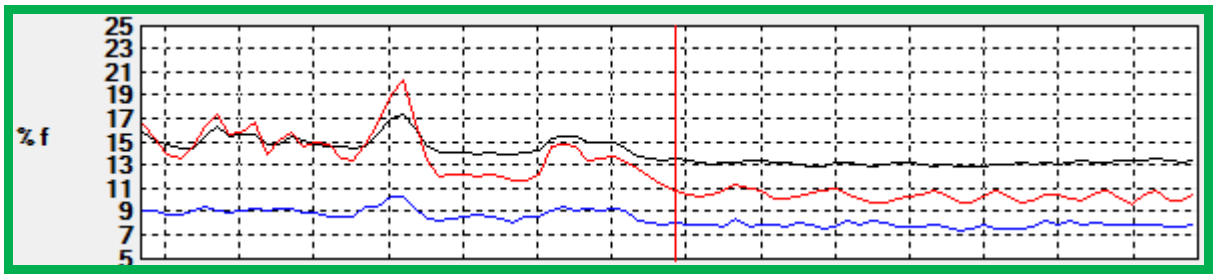
Voltage Un-balance



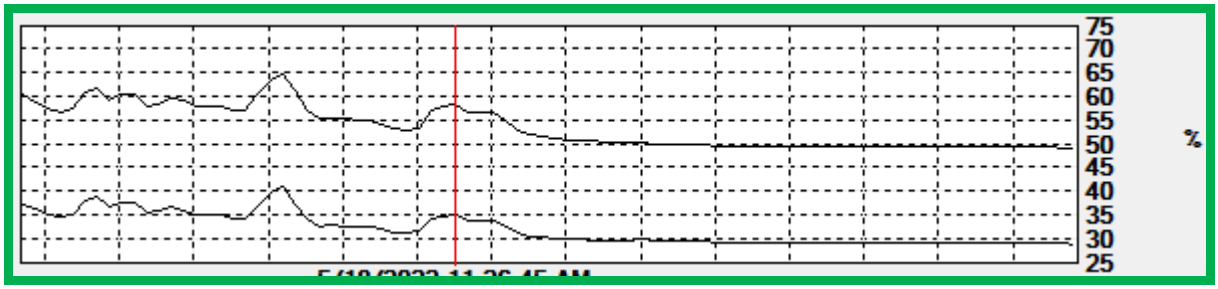
Current



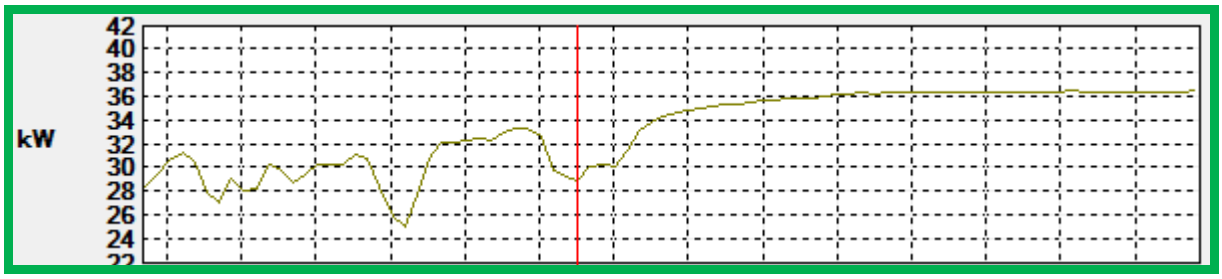
Current Harmonics



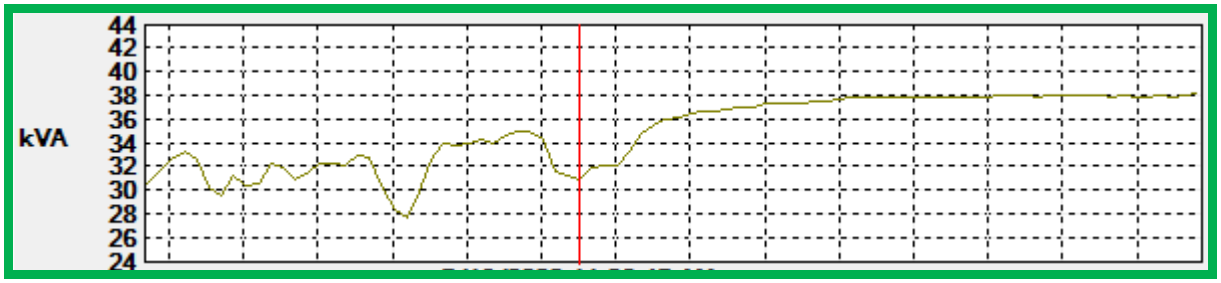
Current Un-balance



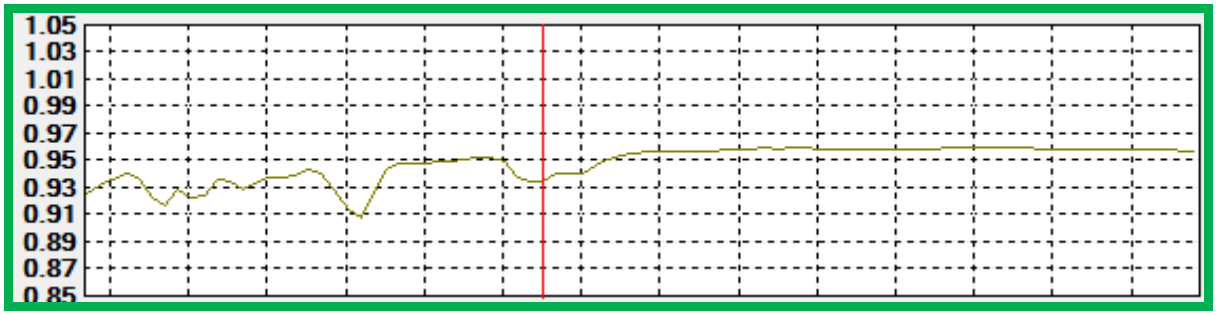
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	413.70	422.30	417.90	41.10	13.30	59.38	0.91	0.66	0.96	49.94	1.00	49.10
MAX	419.50	429.30	423.90	55.73	26.47	74.55	0.95	0.92	0.98	50.02	1.50	64.90
AVG	415.23	424.37	420.13	51.72	22.47	70.04	0.94	0.87	0.97	49.98	1.15	53.64

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

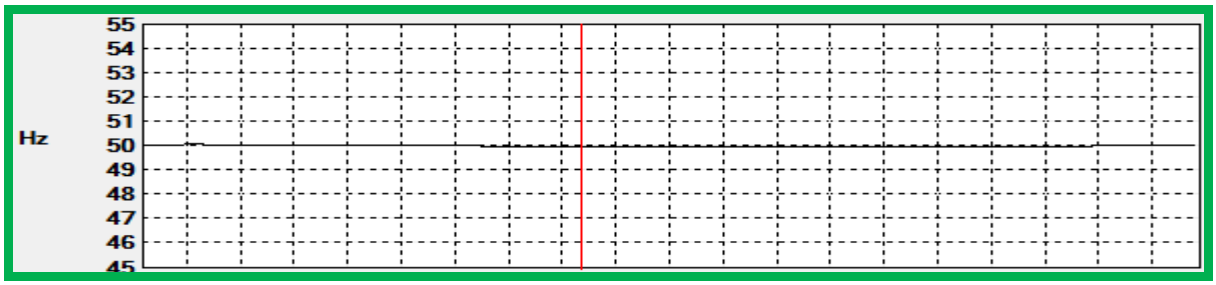
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.02	1.01	1.00	1.20	1.10	1.30	12.90	9.70	7.50
MAX	- - -	- - -	- - -	1.03	1.03	1.01	1.50	1.30	1.50	17.40	20.30	10.40
AVG	- - -	- - -	- - -	1.02	1.01	1.00	1.37	1.27	1.36	14.07	12.38	8.43

Crest Factor

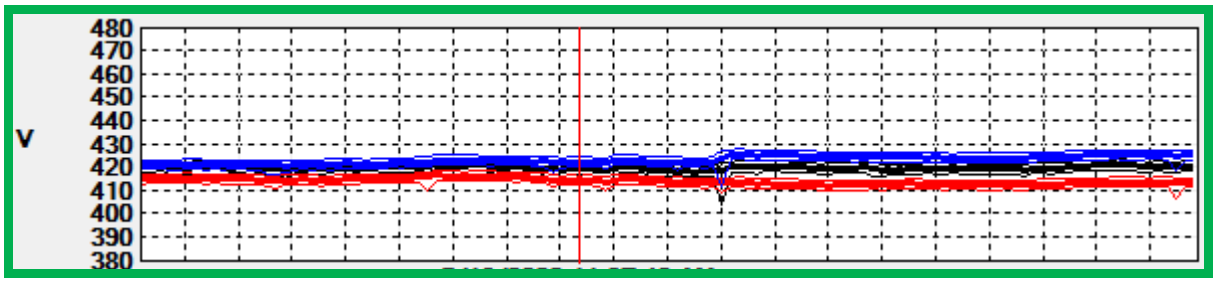
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.59	1.48	1.49
MAX	1.44	1.44	1.44	1.81	1.60	1.60
AVG	1.44	1.44	1.43	1.64	1.52	1.53

B31-For-KP Hostel, RK Hostel Panel 1st (SS-B)

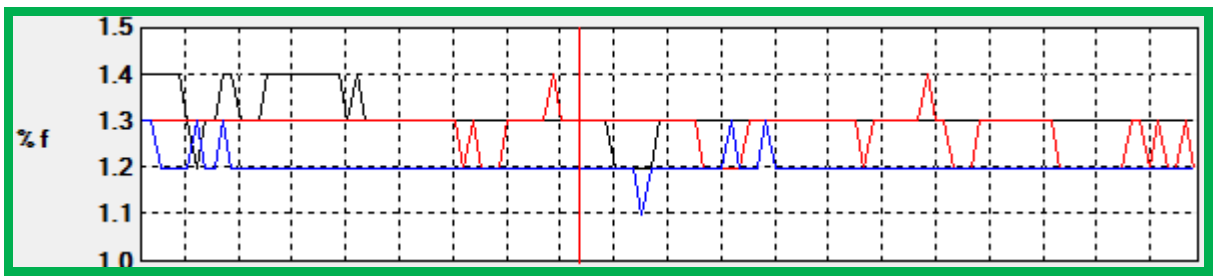
Frequency



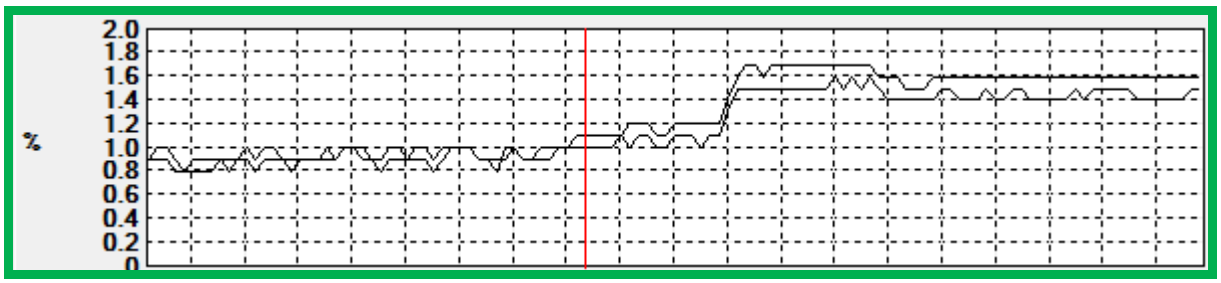
Voltage



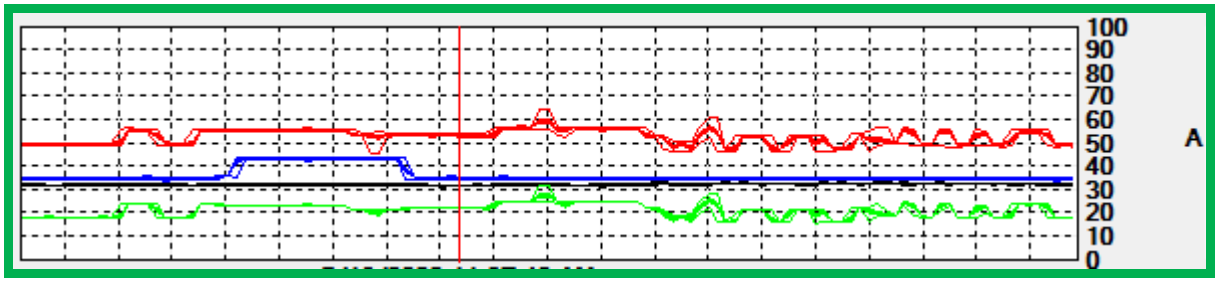
Voltage Harmonics



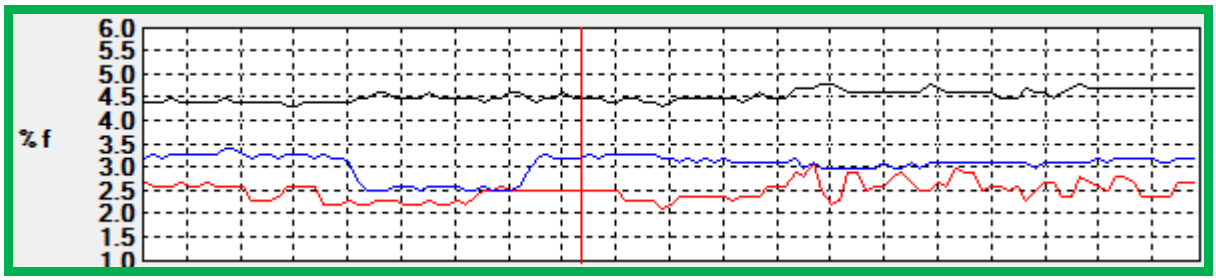
Voltage Un-balance



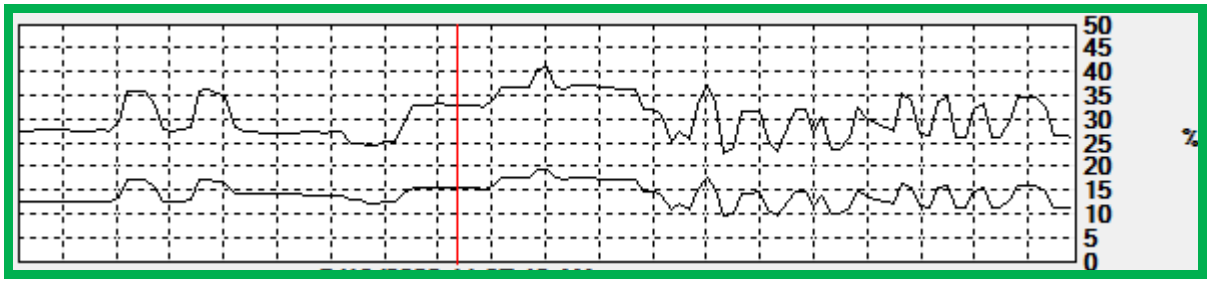
Current



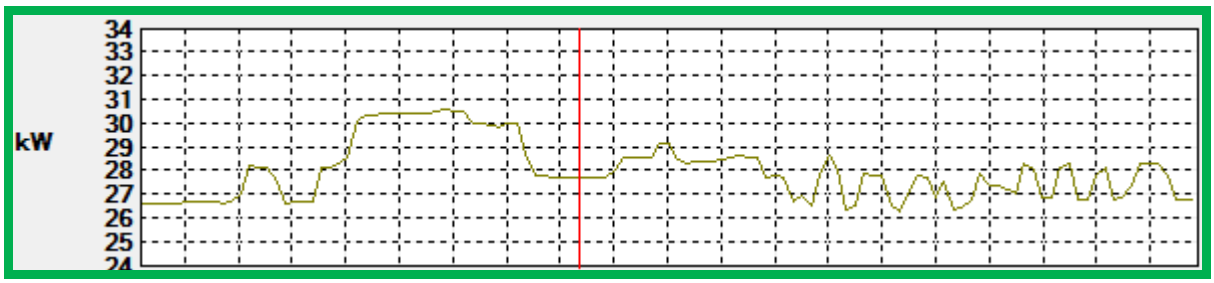
Current Harmonics



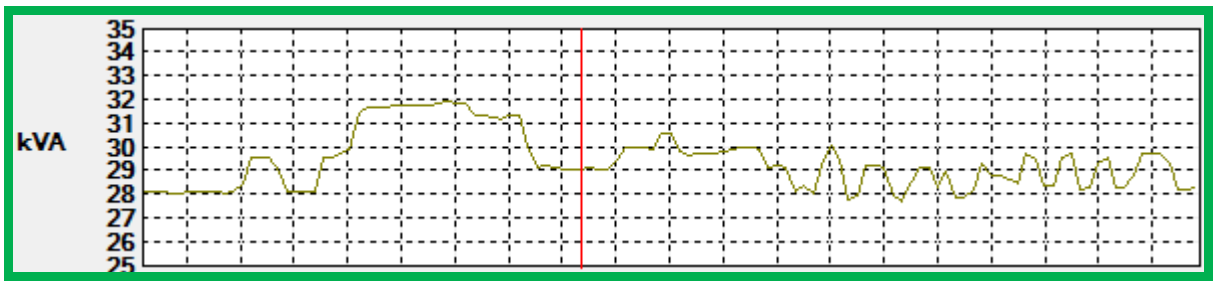
Current Un-balance



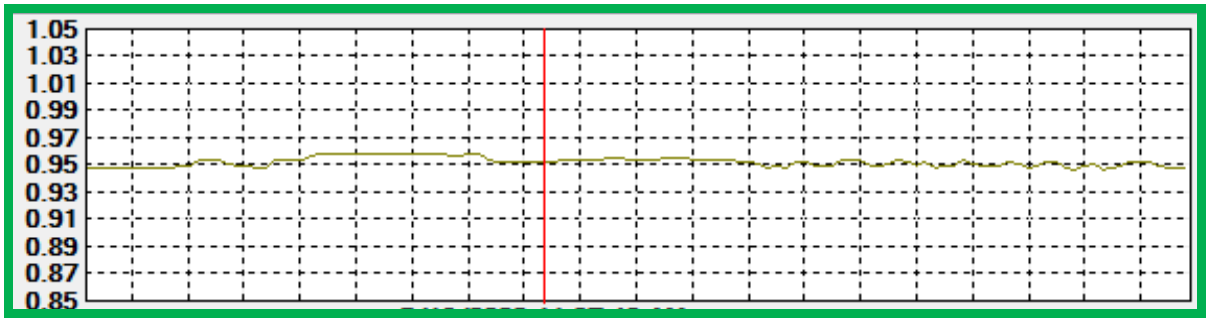
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	418.30	412.30	420.80	31.82	47.17	34.64	0.93	0.96	0.95	49.94	0.80	23.00
MAX	421.60	416.70	425.80	32.91	59.70	43.73	0.93	0.97	0.97	50.07	1.60	41.10
AVG	419.97	414.20	423.39	32.38	52.99	36.34	0.93	0.96	0.95	50.00	1.19	30.63

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

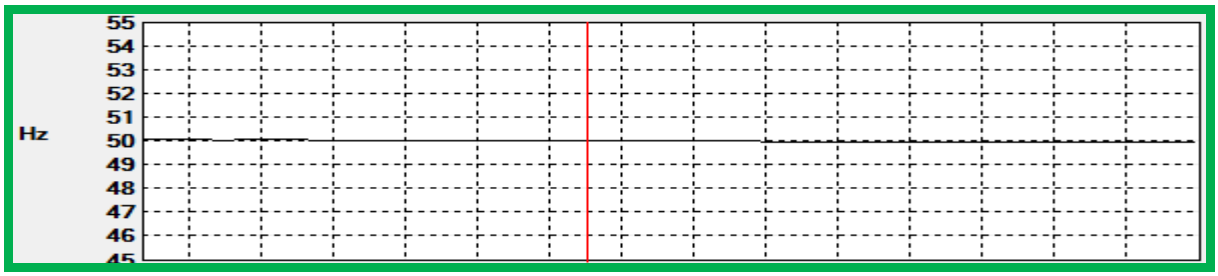
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.75	2.46	2.46	1.00	1.00	1.00	1.30	1.20	1.10	4.30	2.10	2.50
MAX	3.77	3.55	3.01	1.00	1.00	1.00	1.40	1.30	1.30	4.80	3.10	3.40
AVG	3.65	3.50	2.49	1.00	1.00	1.00	1.31	1.24	1.25	4.54	2.51	3.07

Crest Factor

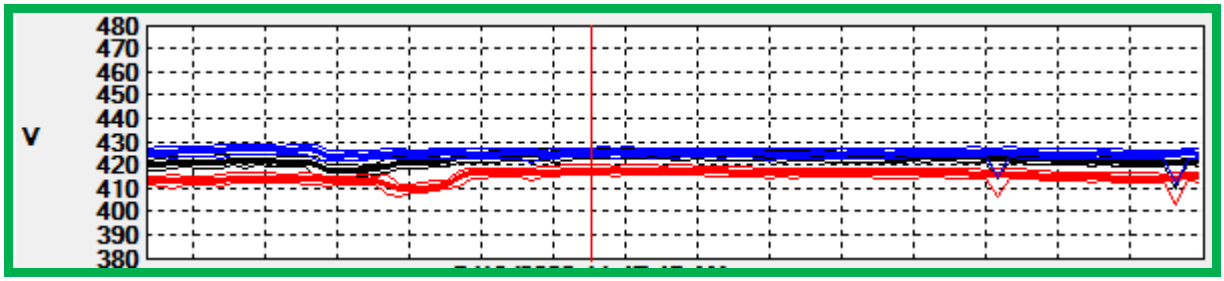
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.44	1.43	1.40	1.45	1.48
MAX	1.44	1.44	1.44	1.45	1.51	1.70
AVG	1.44	1.44	1.44	1.40	1.46	1.50

B32-For-SS-C, Farm Tank (SS-B)

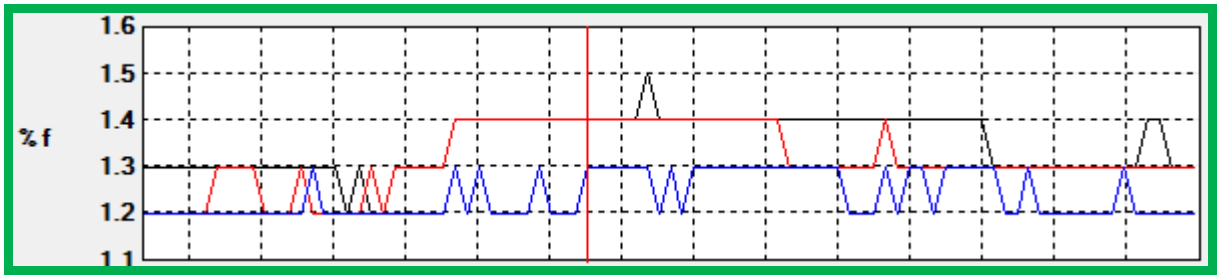
Frequency



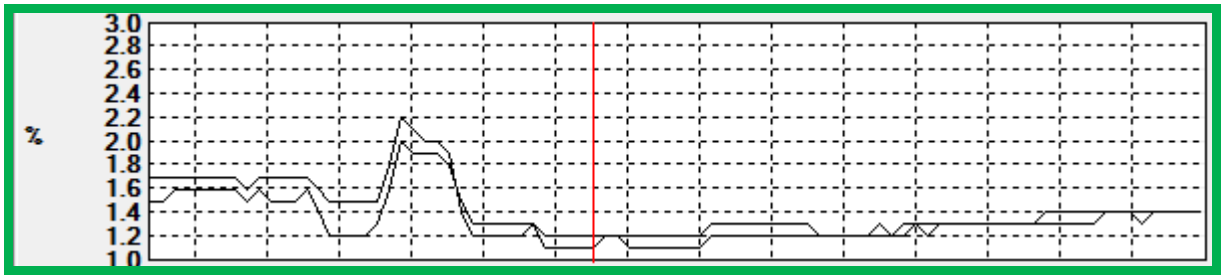
Voltage



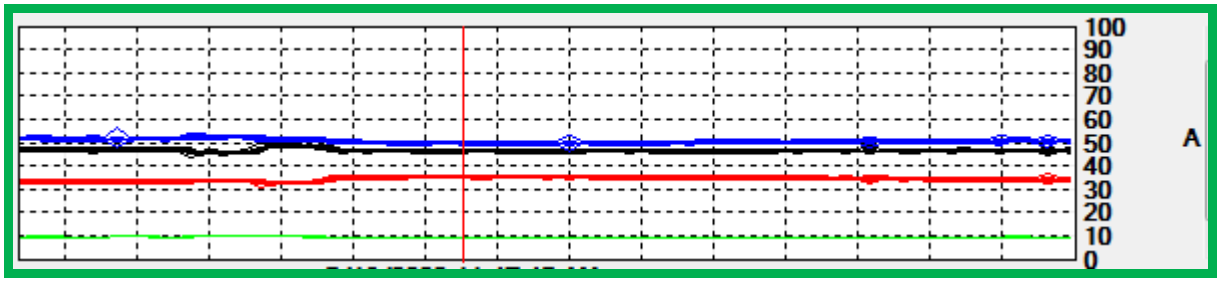
Voltage Harmonics



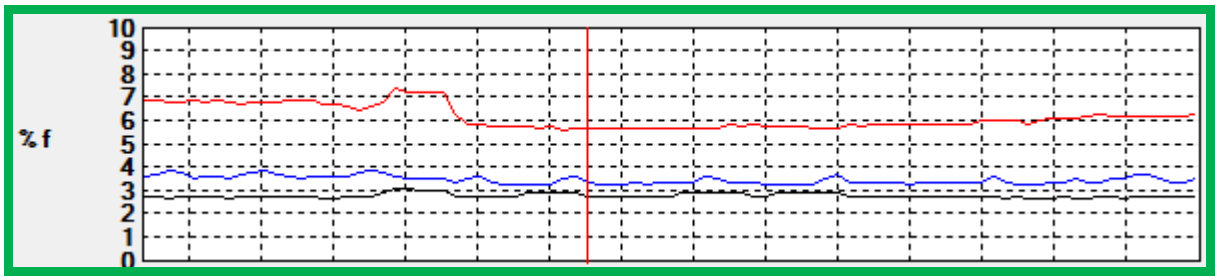
Voltage Un-balance



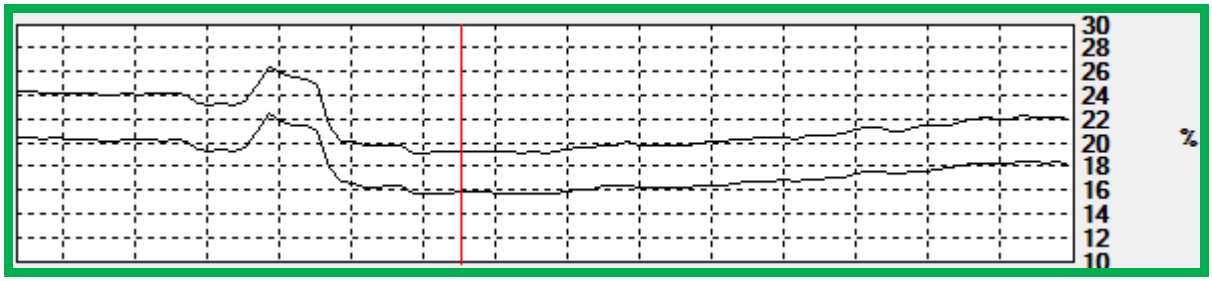
Current



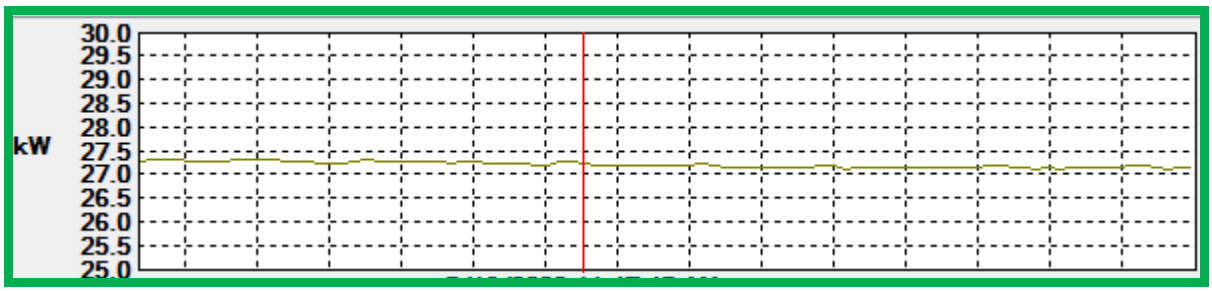
Current Harmonics



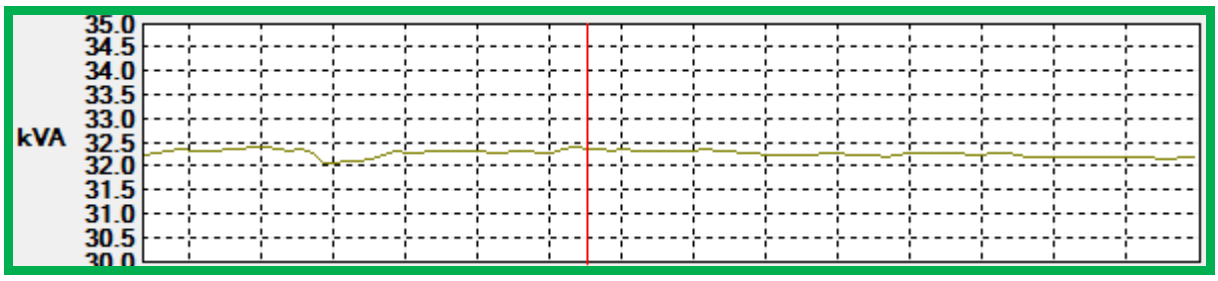
Current Un-balance



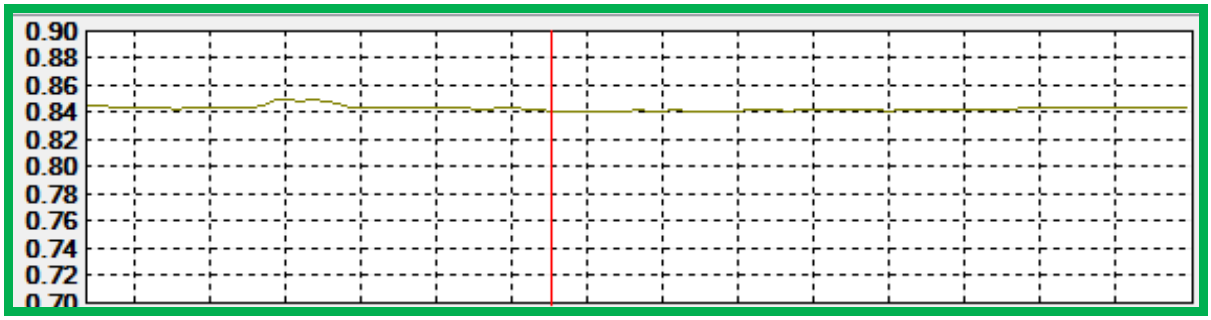
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.60	410.00	424.30	45.92	32.67	50.07	0.80	0.78	0.90	49.98	1.10	19.20
MAX	425.40	418.30	427.10	49.18	35.68	52.90	0.82	0.82	0.92	50.07	2.10	26.50
AVG	422.89	415.74	425.49	46.95	34.64	50.97	0.81	0.80	0.91	50.03	1.35	21.61

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

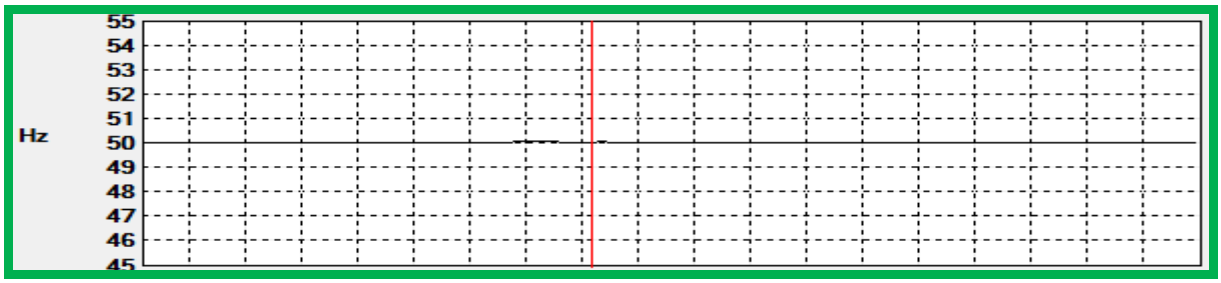
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.75	2.46	3.01	1.00	1.00	1.00	1.20	1.20	1.10	2.70	5.60	3.30
MAX	0.75	2.46	3.01	1.00	1.00	1.00	1.50	1.40	1.40	3.10	7.40	3.90
AVG	0.75	2.46	3.01	1.00	1.00	1.00	1.37	1.28	1.30	2.82	6.18	3.48

Crest Factor

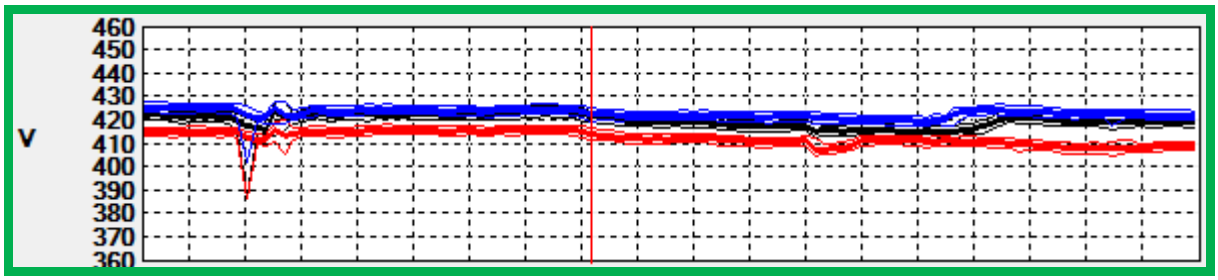
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.44	1.44	1.50	1.49	1.45
MAX	1.44	1.44	1.44	1.52	1.52	1.53
AVG	1.44	1.44	1.44	1.51	1.50	1.47

B33-For-Sociology, English, Sewer Pumping Station, Physical Education (SS-B)

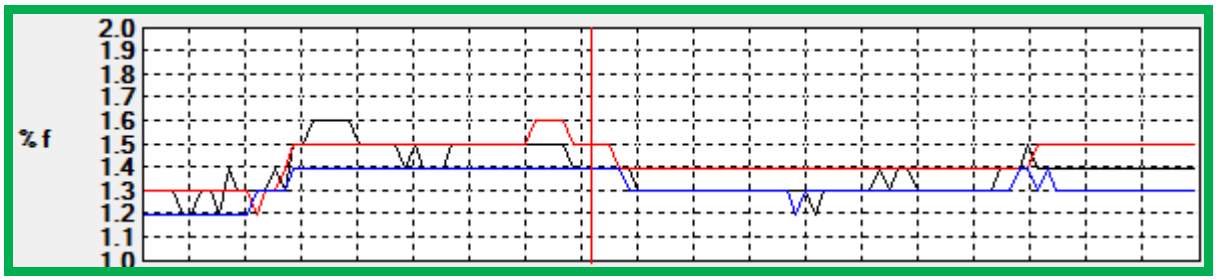
Frequency



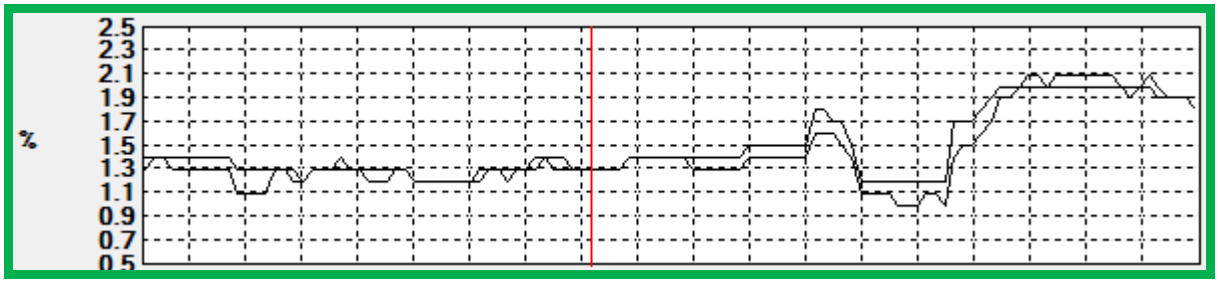
Voltage



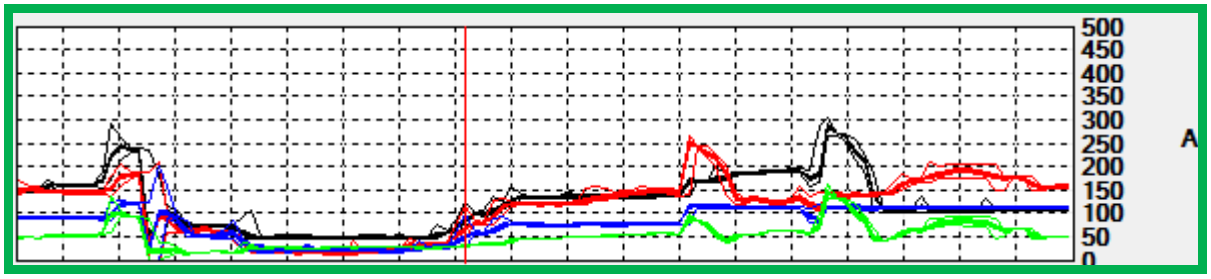
Voltage Harmonics



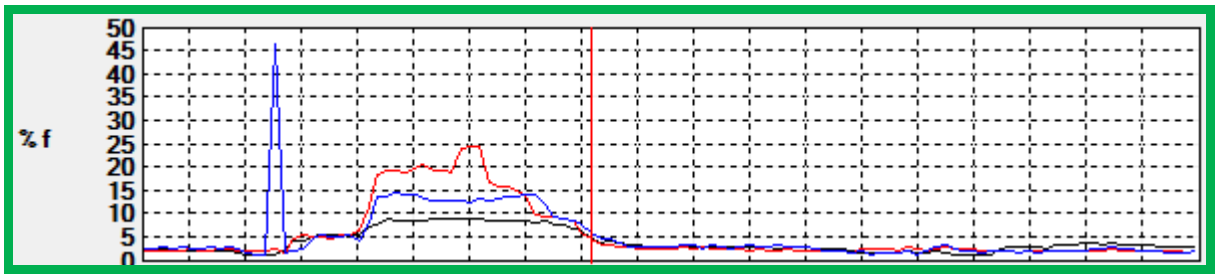
Voltage Un-balance



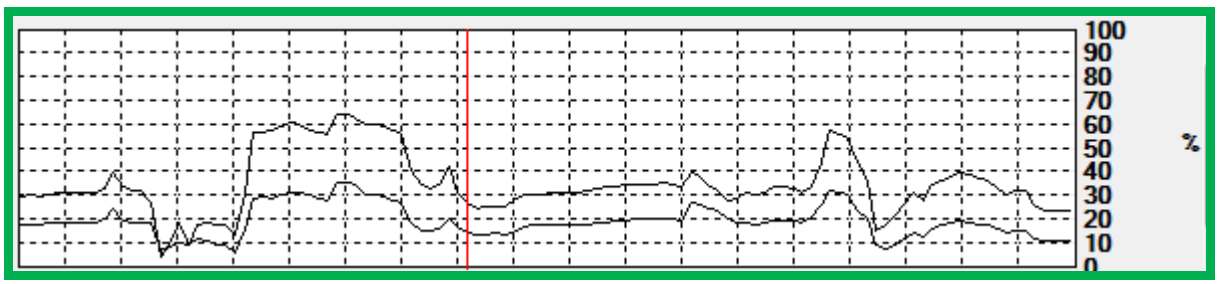
Current



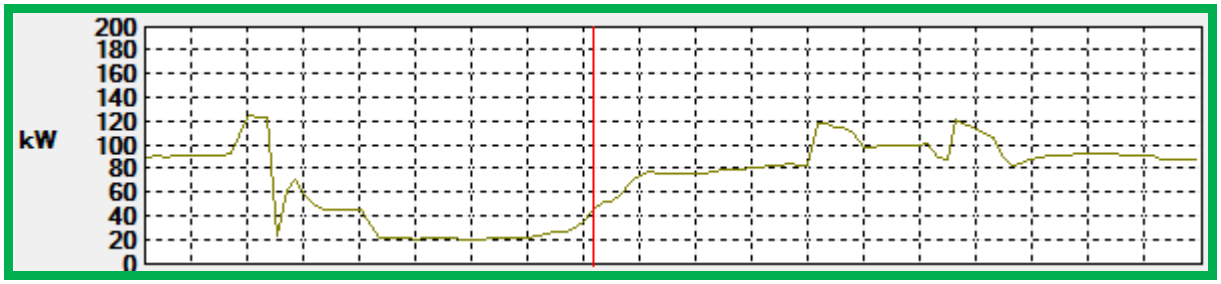
Current Harmonics



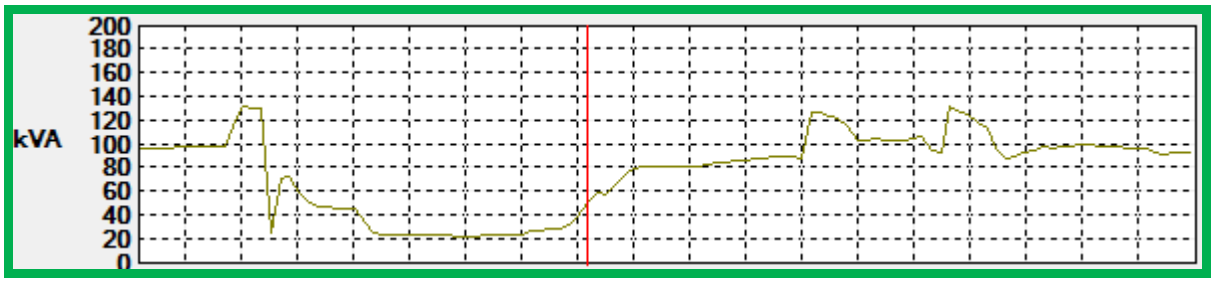
Current Un-balance



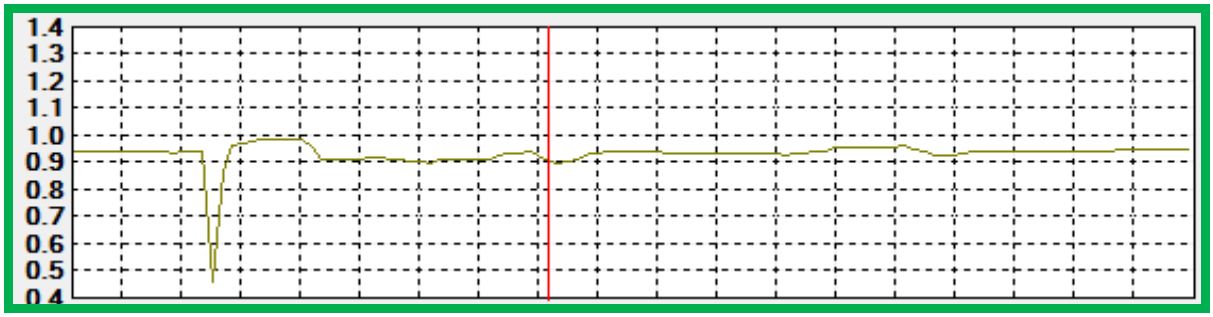
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	414.90	407.60	419.60	45.90	17.60	22.20	0.87	0.83	0.46	50.02	1.00	4.50
MAX	424.10	416.20	425.90	286.90	249.30	123.60	0.99	0.99	0.98	50.07	2.10	64.40
AVG	420.02	412.51	423.12	124.38	117.45	80.98	0.94	0.93	0.92	50.05	1.45	35.19

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

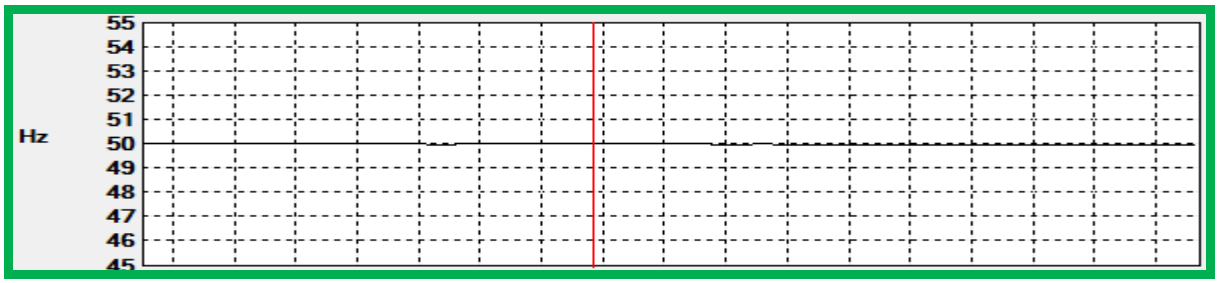
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.56	0.69	0.51	1.00	1.00	1.00	1.30	1.20	1.20	1.10	1.60	1.40
MAX	0.61	0.71	0.63	1.00	1.07	1.23	1.70	1.50	1.50	9.20	24.60	46.60
AVG	0.61	0.69	0.62	1.00	1.01	1.00	1.44	1.38	1.32	4.07	5.52	5.18

Crest Factor

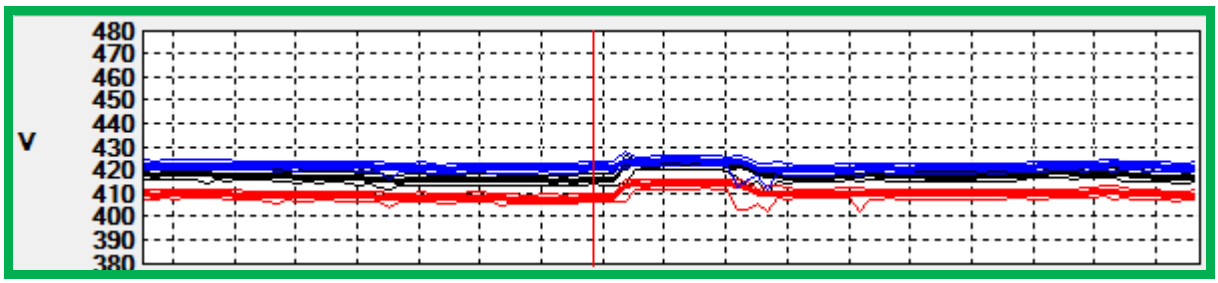
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.44	1.44	1.44	1.43	1.44	1.43
MAX	1.44	1.44	1.45	2.02	1.96	1.88
AVG	1.44	1.44	1.44	1.52	1.54	1.52

B34-For-DSW, Sports and Sanskrit (SS-B)

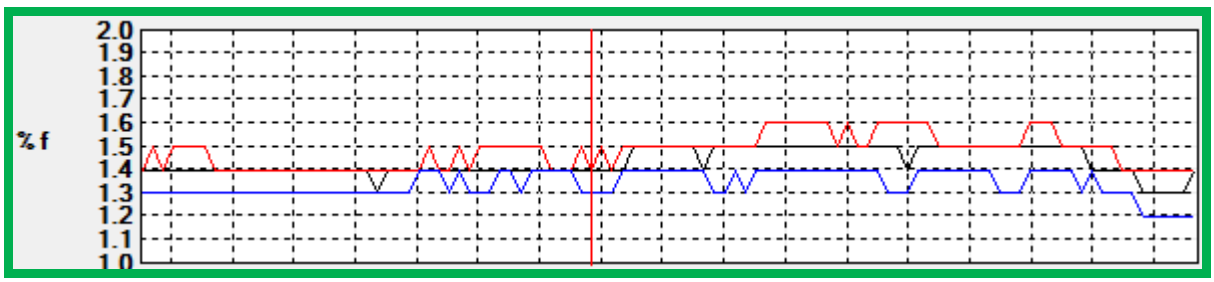
Frequency



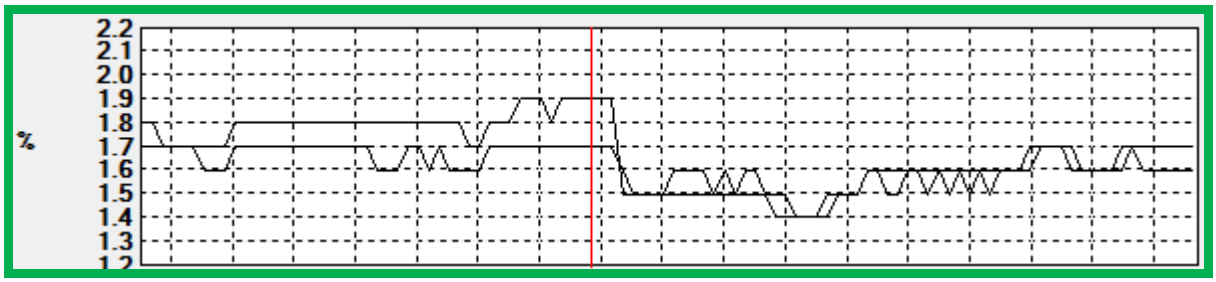
Voltage



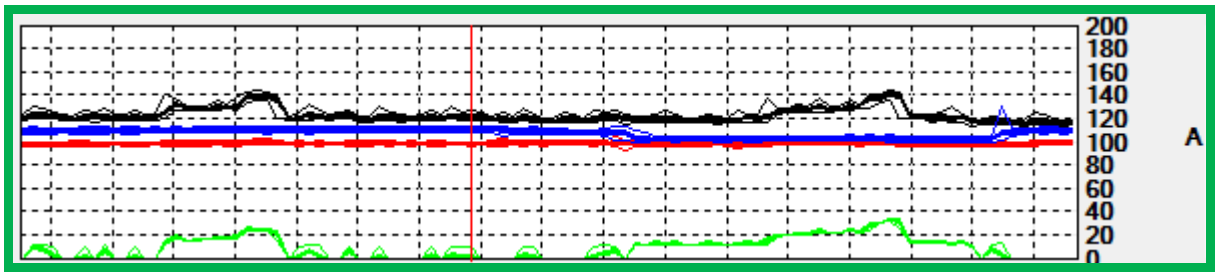
Voltage Harmonics



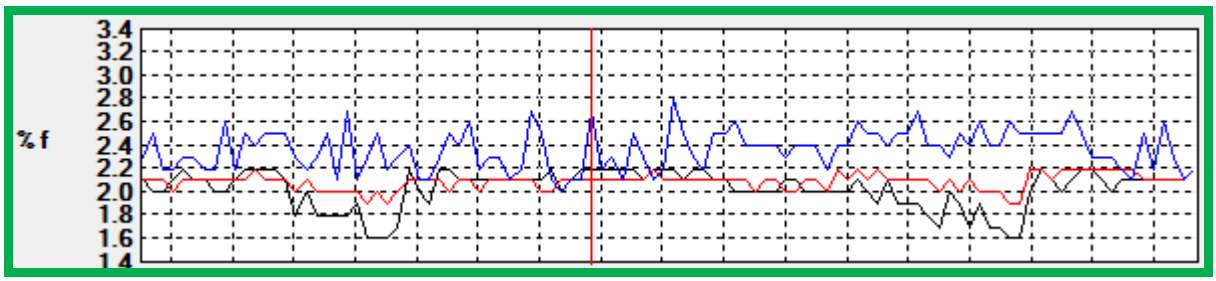
Voltage Un-balance



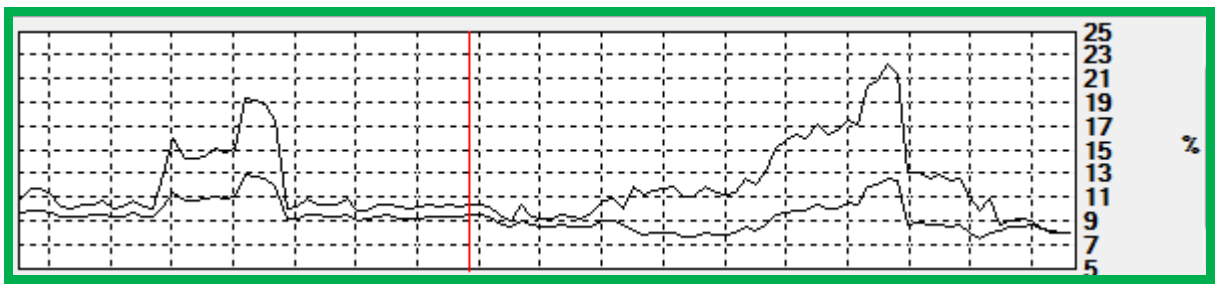
Current



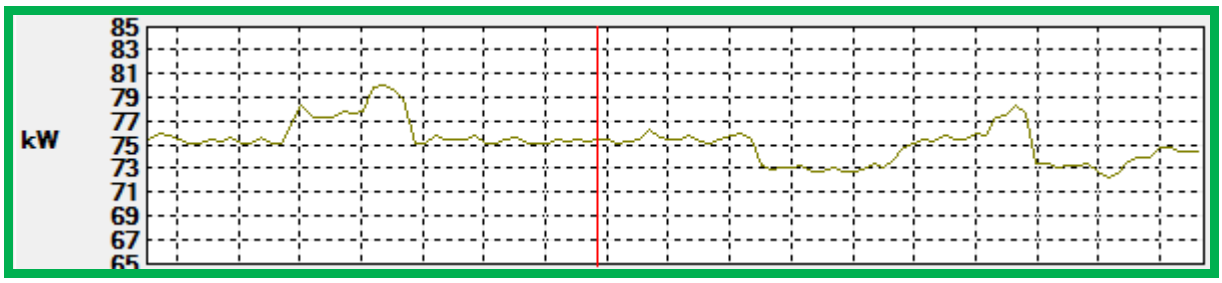
Current Harmonics



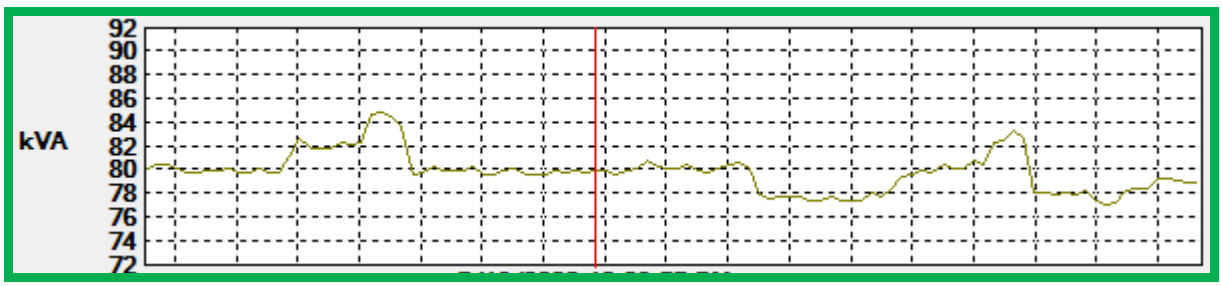
Current Un-balance



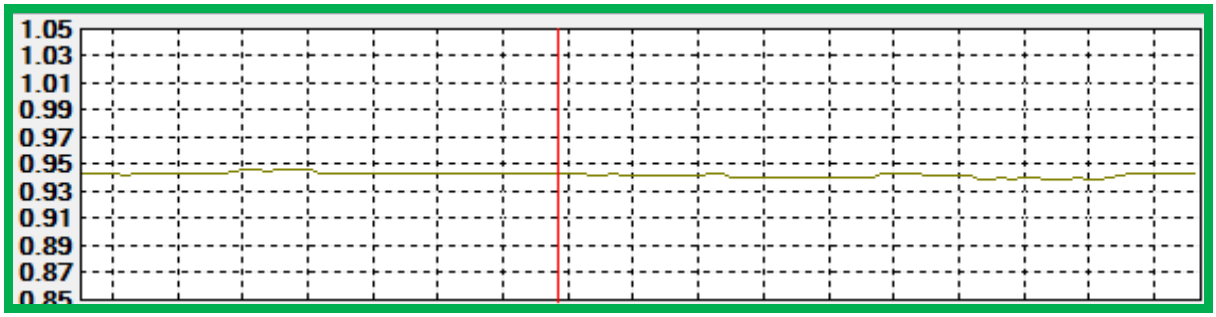
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	415.70	407.70	420.10	117.00	98.50	103.00	0.93	0.93	0.95	49.97	1.40	8.10
MAX	423.00	414.30	424.60	141.10	101.50	111.30	0.94	0.94	0.96	50.04	1.80	22.30
AVG	418.10	410.02	421.88	123.79	99.54	108.13	0.94	0.93	0.96	50.01	1.59	12.13

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

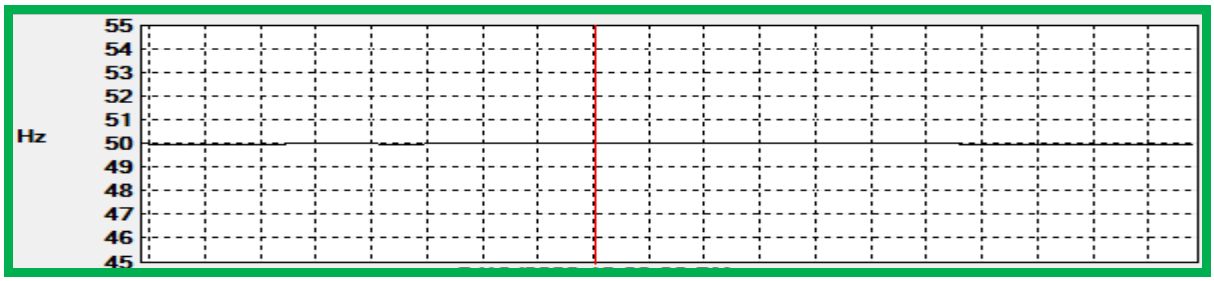
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.53	0.55	0.51	1.00	1.00	1.00	1.40	1.30	1.20	1.60	1.90	2.00
MAX	0.56	0.71	0.60	1.00	1.00	1.00	1.60	1.50	1.50	2.20	2.20	2.80
AVG	0.55	0.68	0.53	1.00	1.00	1.00	1.50	1.39	1.37	2.03	2.09	2.37

Crest Factor

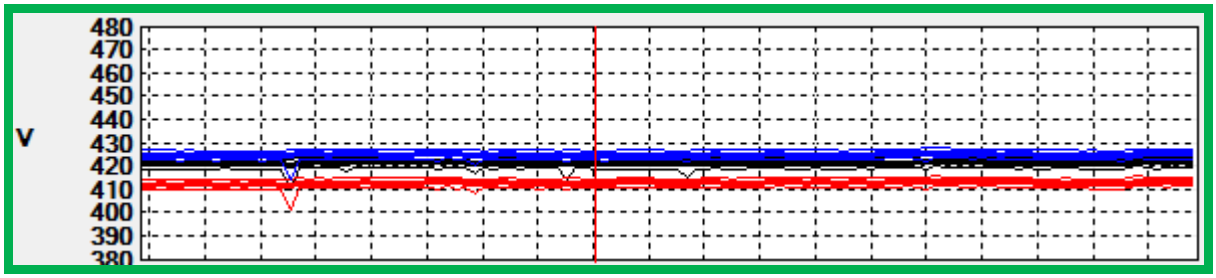
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.44	1.44	1.44	1.44	1.44	1.45
MAX	1.44	1.45	1.45	1.52	1.46	1.50
AVG	1.44	1.44	1.44	1.46	1.45	1.46

B35-For-Physics, Chemistry, Microbiology Dept. (SS-B)

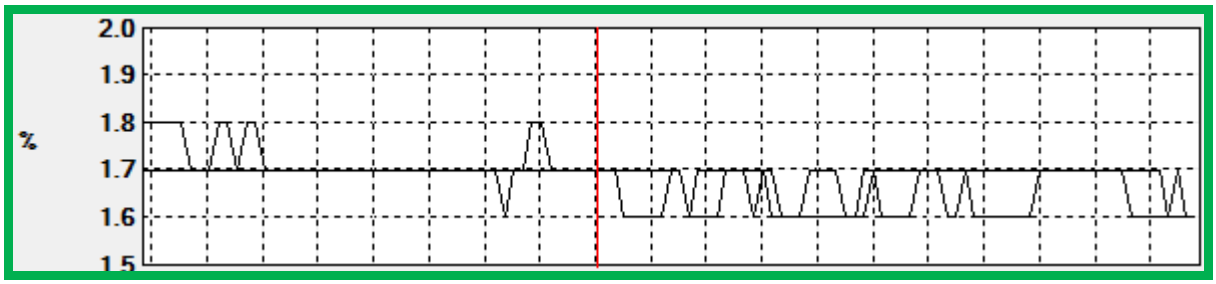
Frequency



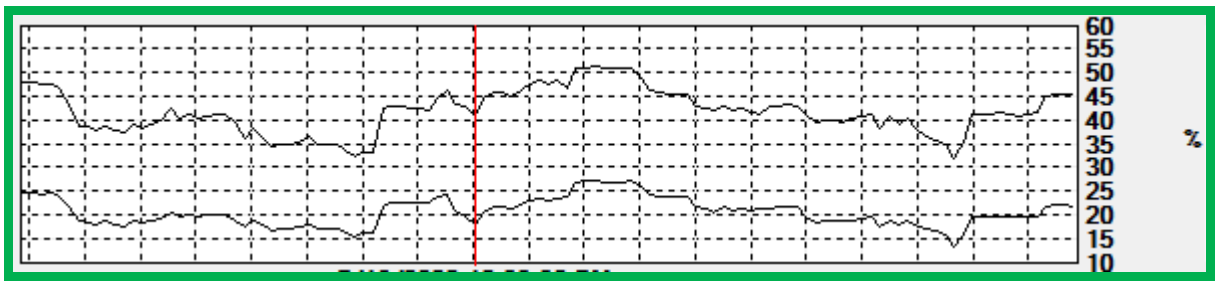
Voltage



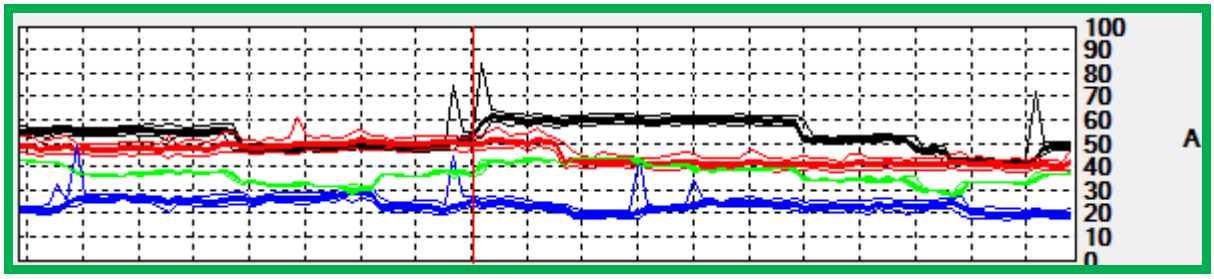
Voltage Harmonics



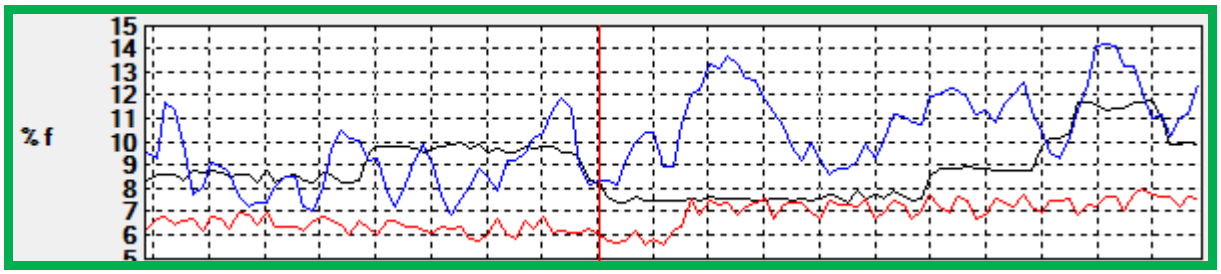
Voltage Un-balance



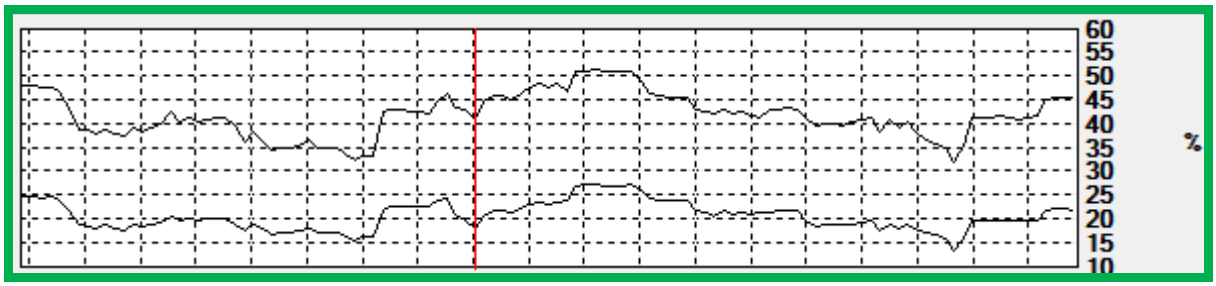
Current



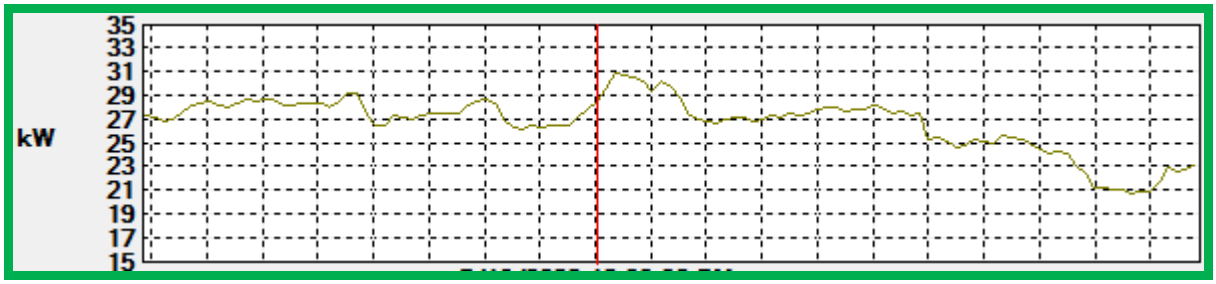
Current Harmonics



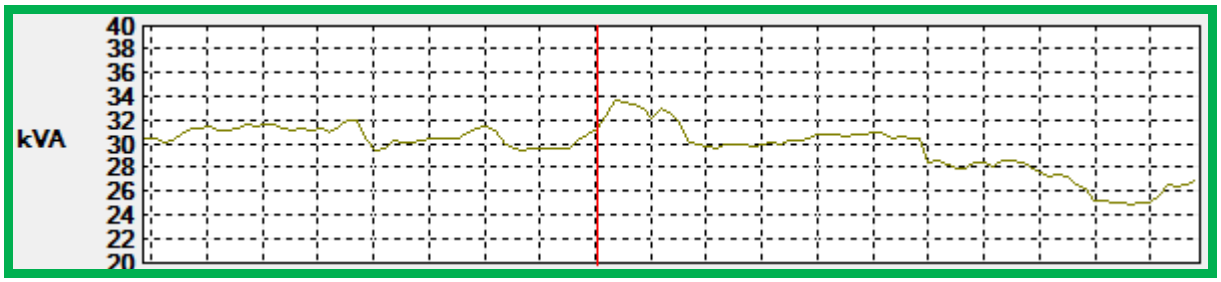
Current Un-balance



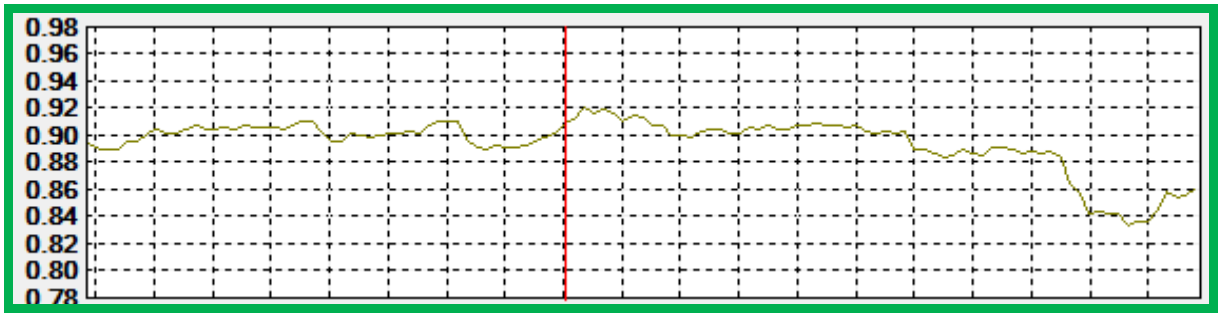
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	420.70	412.10	424.50	41.85	40.27	19.72	0.87	0.95	0.53	49.96	1.60	31.90
MAX	422.40	413.70	426.00	61.80	52.08	29.20	0.95	0.97	0.78	50.04	1.70	51.40
AVG	421.58	413.00	425.16	53.48	45.59	23.83	0.93	0.96	0.69	50.01	1.65	41.93

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

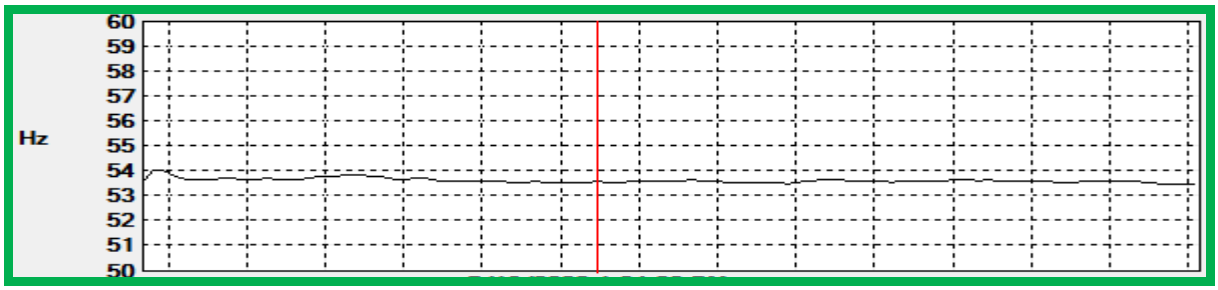
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	4.36	4.60	4.53	1.01	1.00	1.00	1.40	1.20	1.20	7.40	5.60	6.90
MAX	4.36	4.60	4.53	1.02	1.01	1.02	1.50	1.30	1.30	11.80	8.00	14.20
AVG	4.36	4.60	4.53	1.01	1.00	1.01	1.40	1.27	1.23	8.89	6.81	10.18

Crest Factor

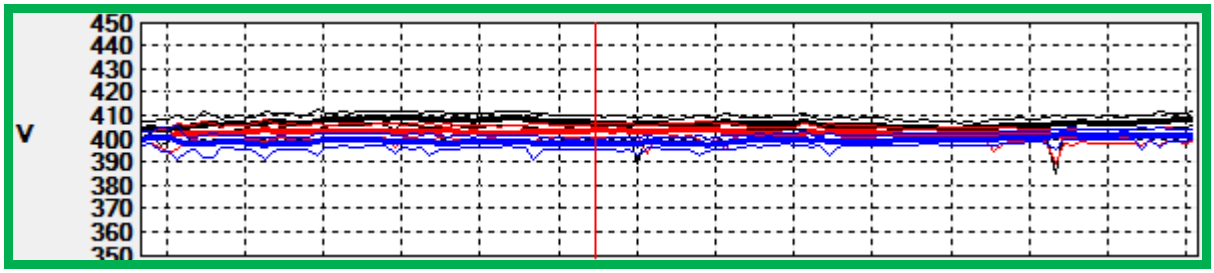
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.44	1.44	1.44	1.46	1.51	1.42
MAX	1.44	1.44	1.44	1.69	1.63	1.85
AVG	1.44	1.44	1.44	1.50	1.55	1.53

B36-For-D.G. Set 180 KVA, (SS-B)

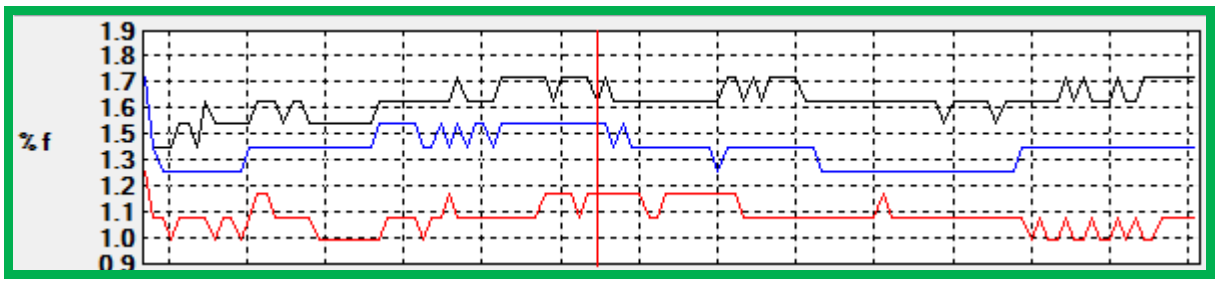
Frequency



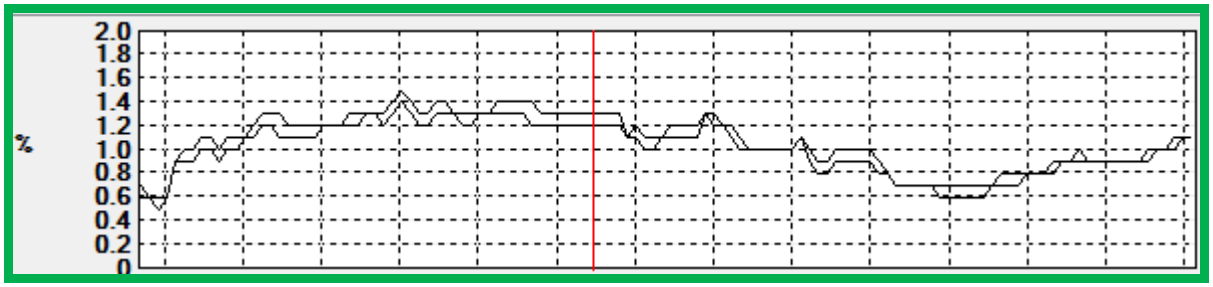
Voltage



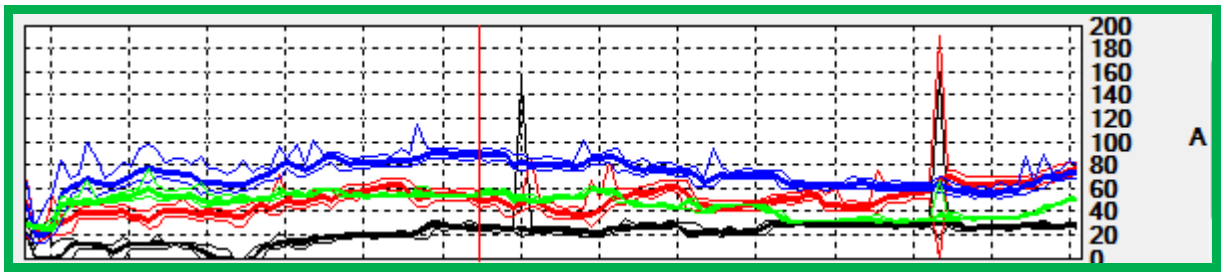
Voltage Harmonics



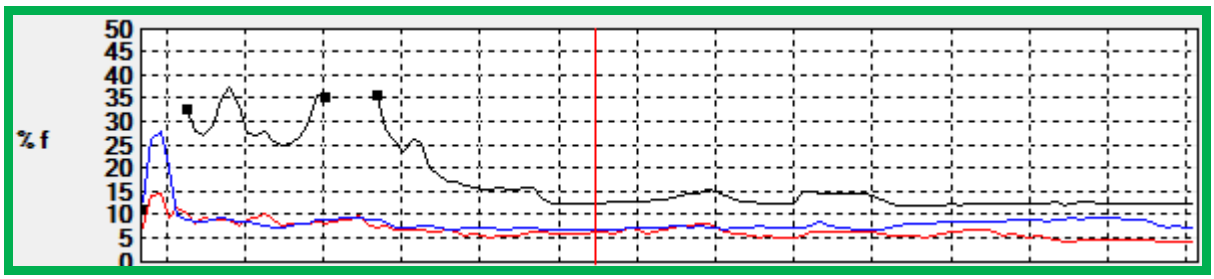
Voltage Un-balance



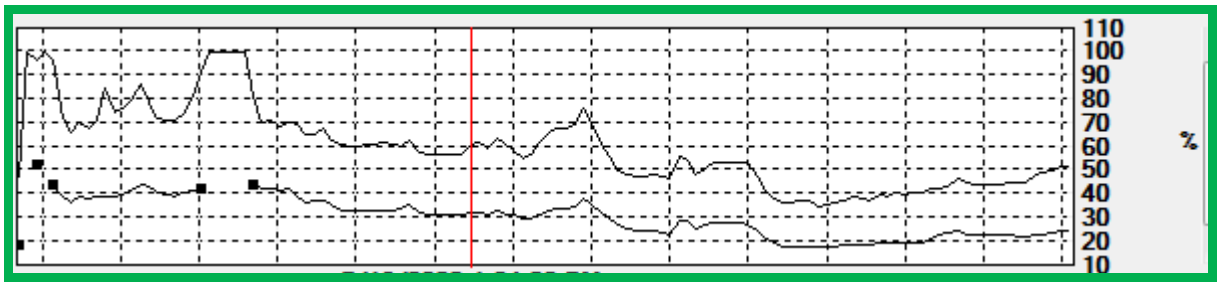
Current



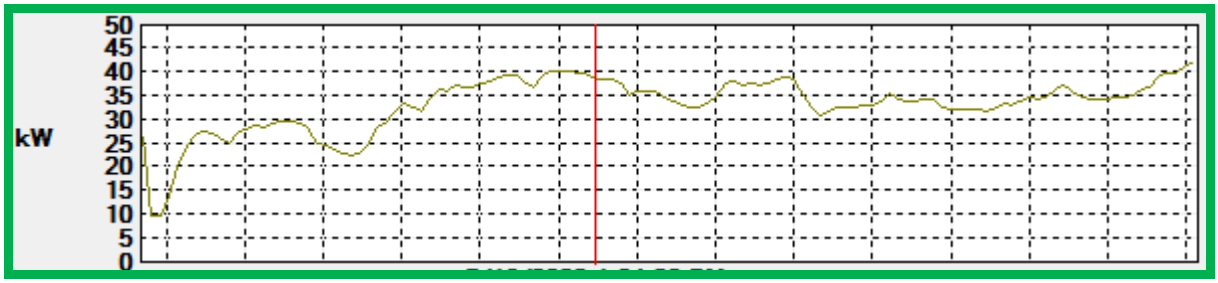
Current Harmonics



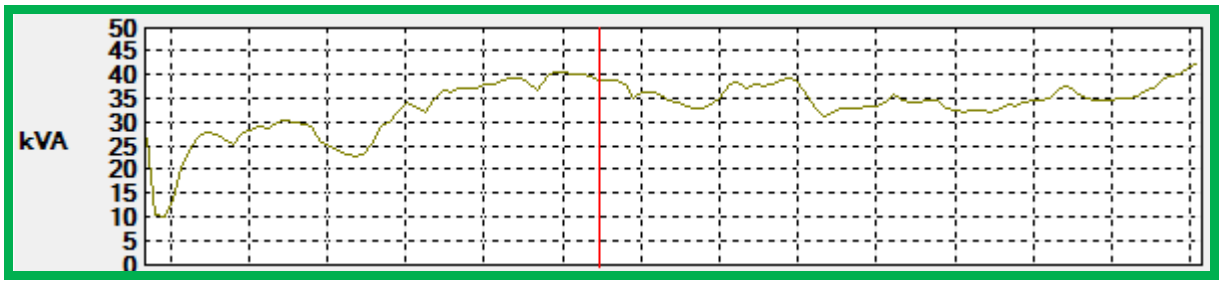
Current Un-balance



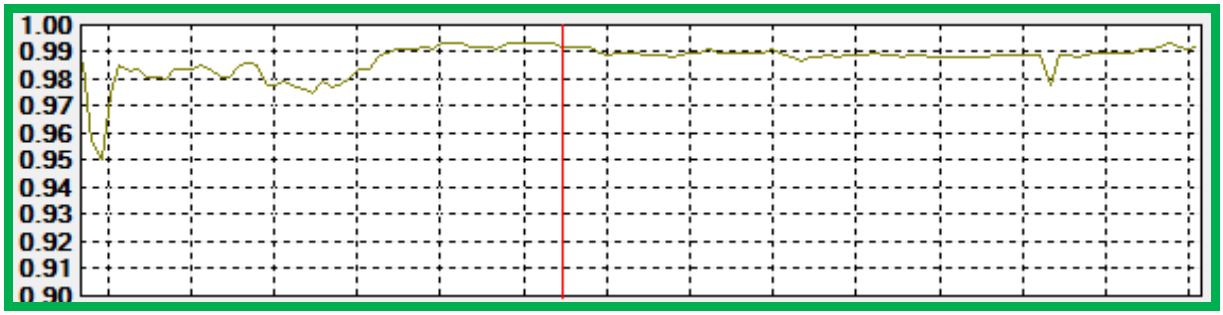
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	404.60	400.90	397.70	7.90	37.30	56.90	0.93	0.97	0.98	53.45	0.60	34.40
MAX	409.50	404.50	402.20	31.40	77.40	91.10	0.99	1.00	0.99	53.76	1.30	81.10
AVG	407.03	402.77	399.71	25.73	53.82	74.33	0.98	0.99	0.99	53.59	1.00	52.52

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

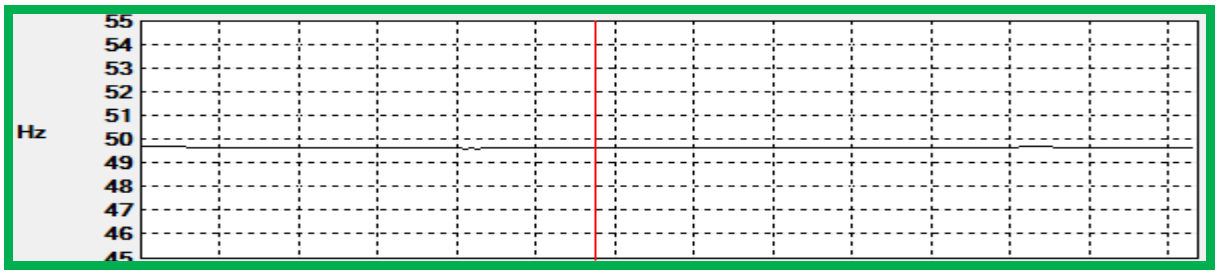
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.38	0.45	0.44	1.02	1.00	1.00	1.30	1.00	1.50	12.10	4.10	6.80
MAX	2.00	2.24	2.00	1.13	1.01	1.01	1.50	1.20	1.70	35.60	8.30	9.40
AVG	1.20	1.45	1.25	1.03	1.00	1.00	1.41	1.08	1.59	14.41	5.98	7.81

Crest Factor

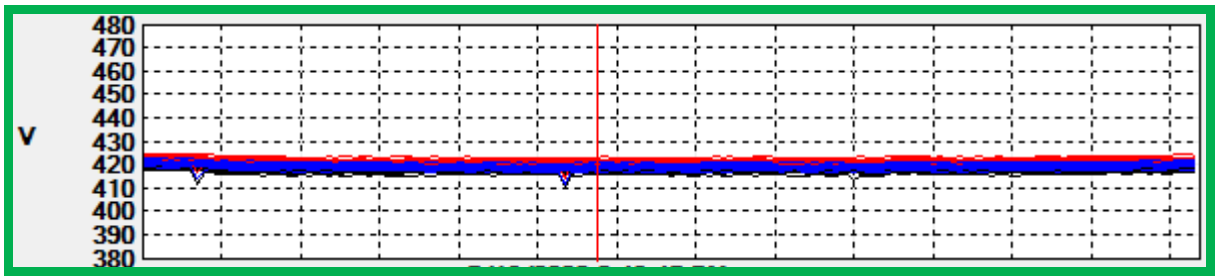
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.41	1.41	1.41	1.81	1.55	1.65
MAX	1.42	1.42	1.42	2.41	1.81	1.78
AVG	1.41	1.42	1.41	1.90	1.64	1.70

B37-For-Lighting 1st Floor Kendriya Mulyankan Bhawan (SS-B)

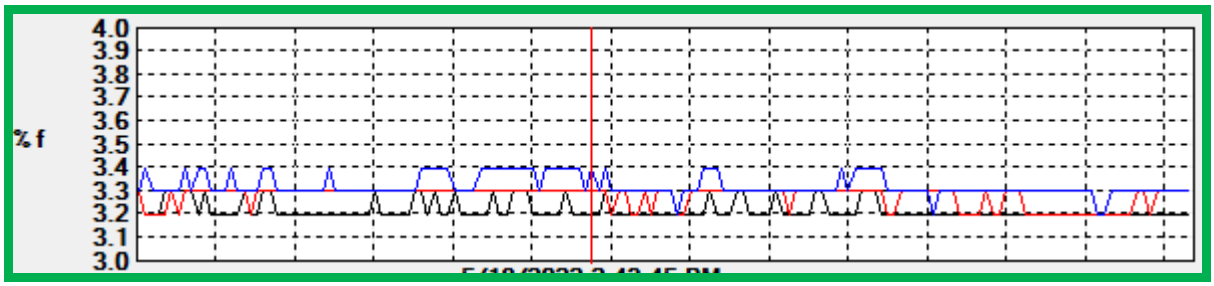
Frequency



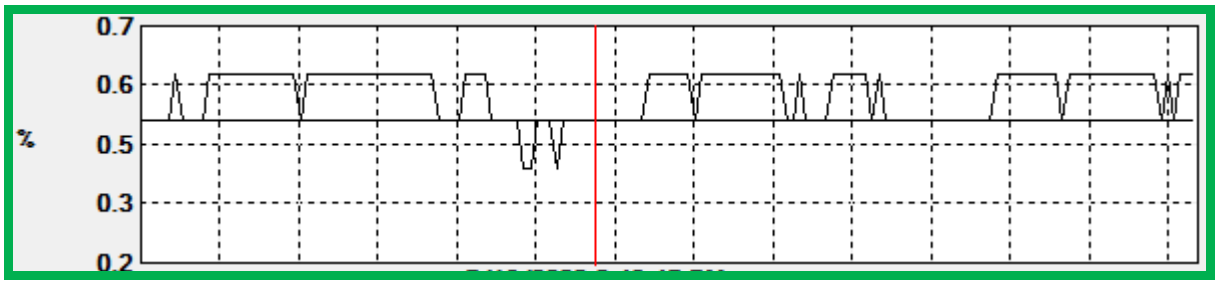
Voltage



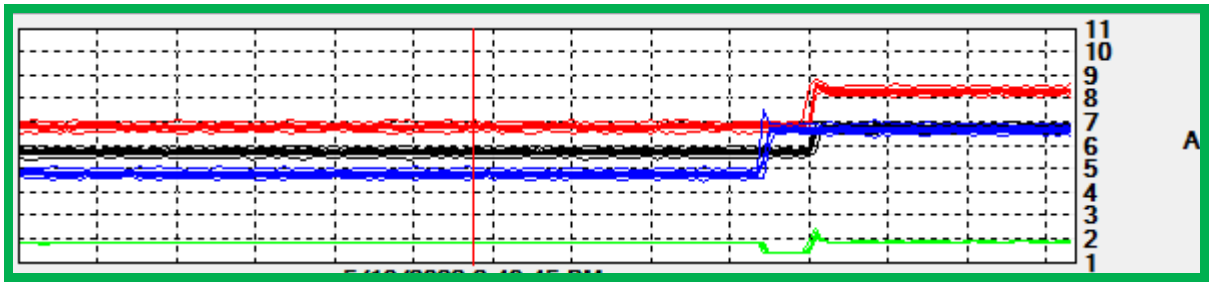
Voltage Harmonics



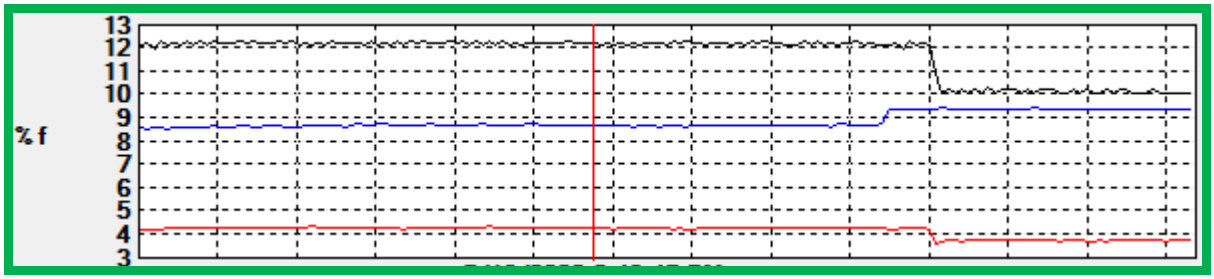
Voltage Un-balance



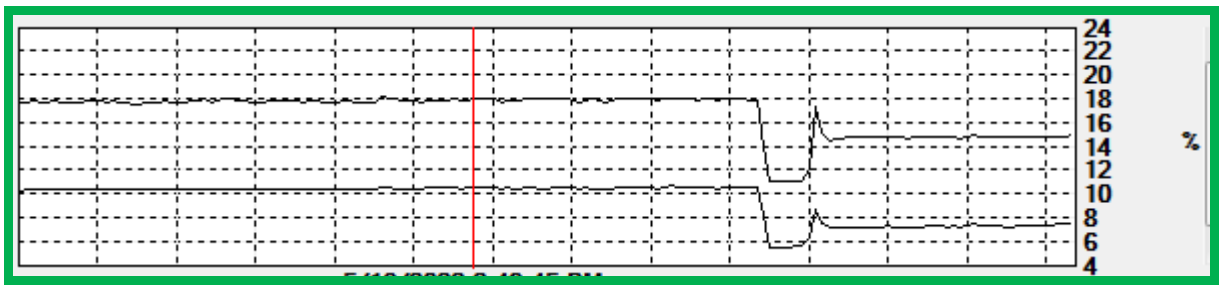
Current



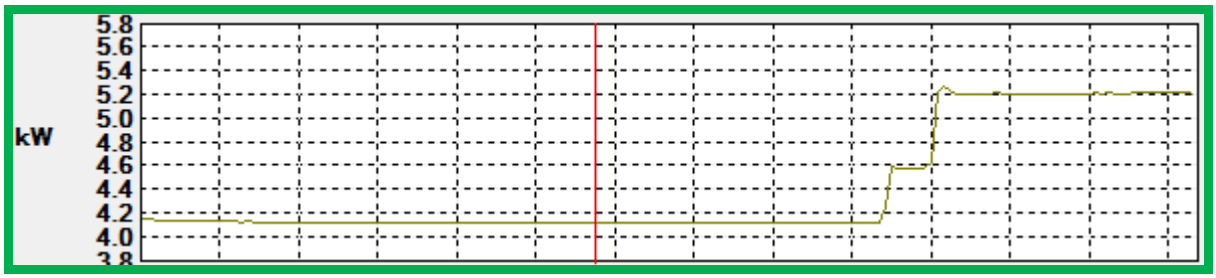
Current Harmonics



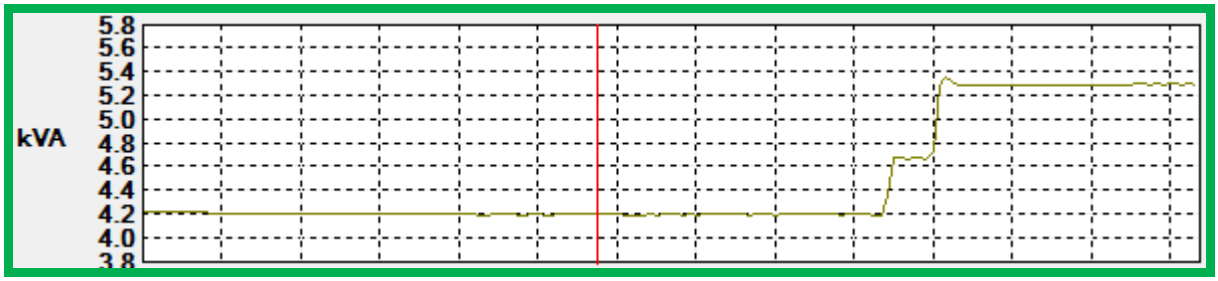
Current Un-balance



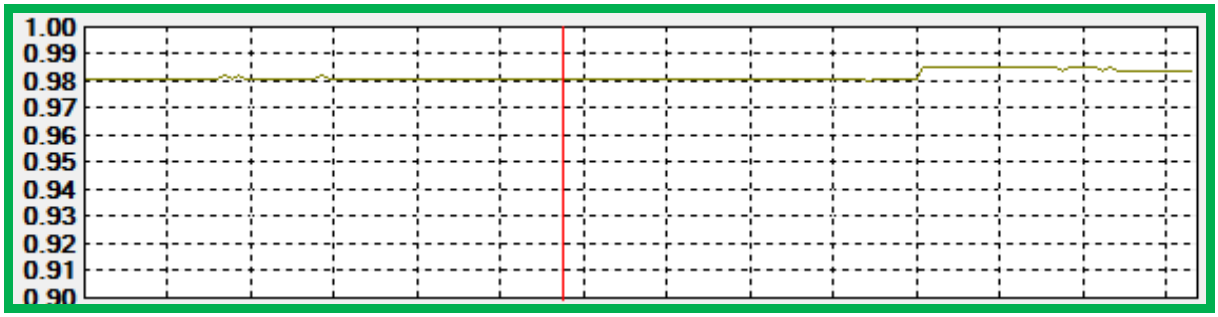
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.00	421.00	418.80	5.70	6.80	4.80	0.97	0.99	0.98	49.62	0.50	11.10
MAX	419.50	423.50	421.30	6.88	8.55	6.73	0.98	0.99	0.98	49.71	0.50	18.20
AVG	417.80	421.89	419.50	5.97	7.20	5.38	0.98	0.99	0.98	49.66	0.50	16.84

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

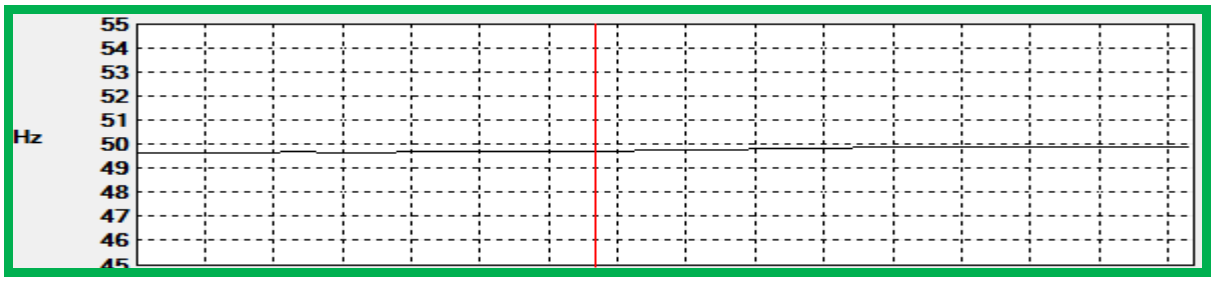
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.02	1.01	1.03	3.10	3.20	3.20	10.10	3.60	8.50
MAX	- - -	- - -	- - -	1.03	1.01	1.04	3.30	3.30	3.40	12.30	4.40	9.50
AVG	- - -	- - -	- - -	1.03	1.01	1.03	3.23	3.28	3.31	11.69	4.16	8.90

Crest Factor

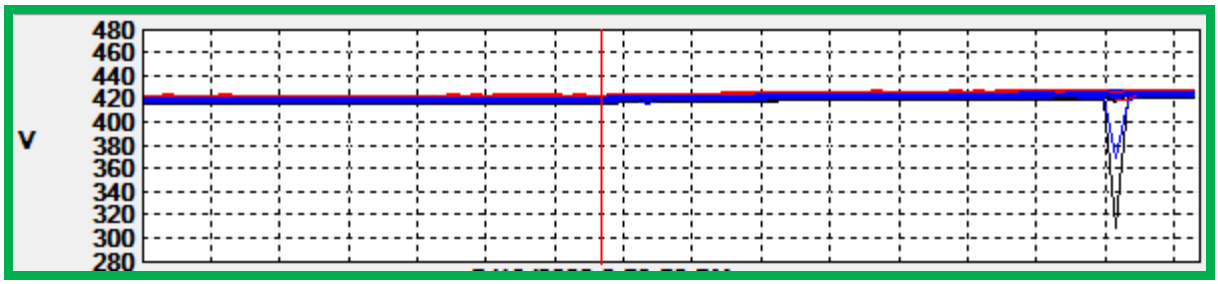
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.47	1.47	1.47	1.72	1.41	1.43
MAX	1.47	1.47	1.47	1.81	1.57	1.77
AVG	1.47	1.47	1.47	1.77	1.43	1.45

B38-For-Lighting 3rd Floor Kendriya Mulyakan Bhawan (SS-B)

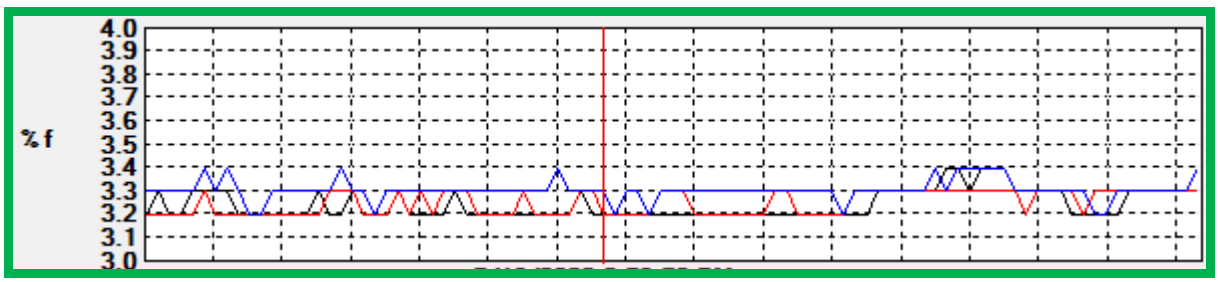
Frequency



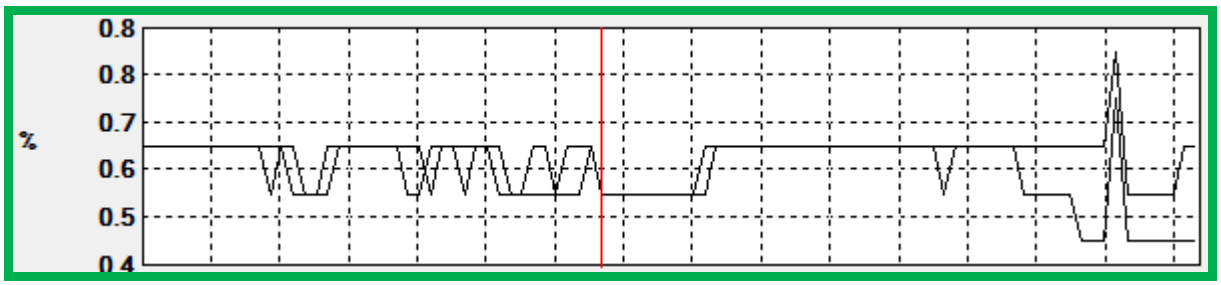
Voltage



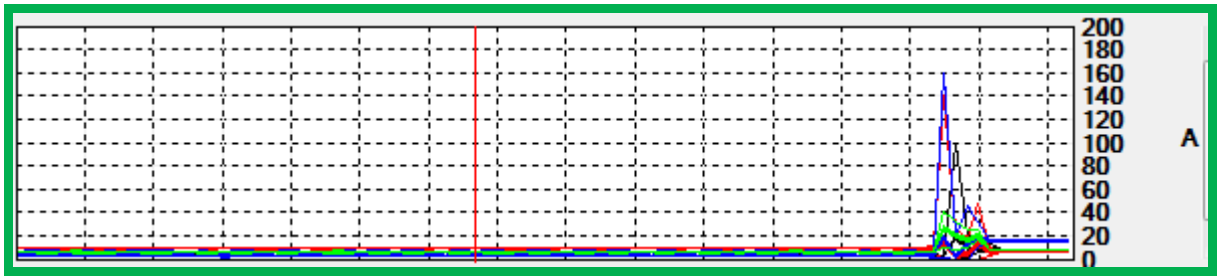
Voltage Harmonics



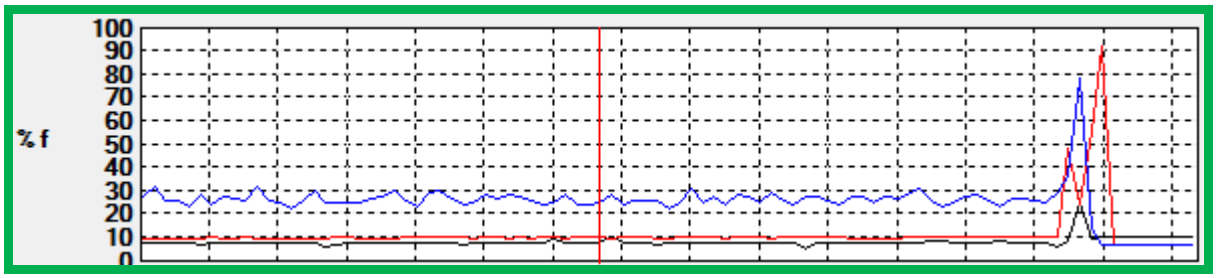
Voltage Un-balance



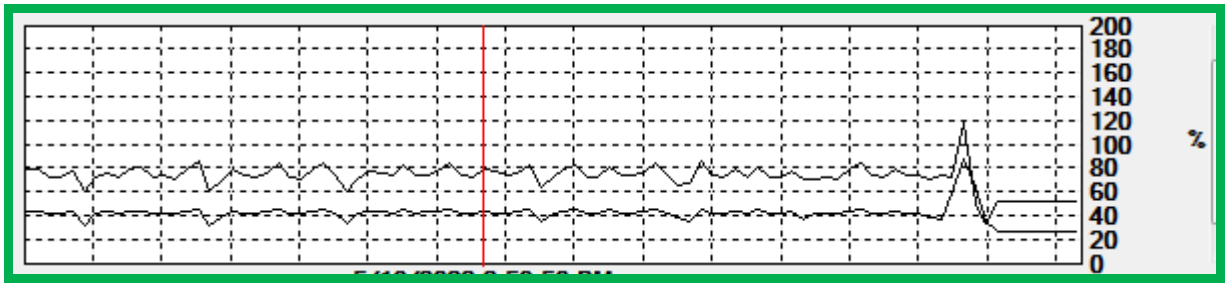
Current



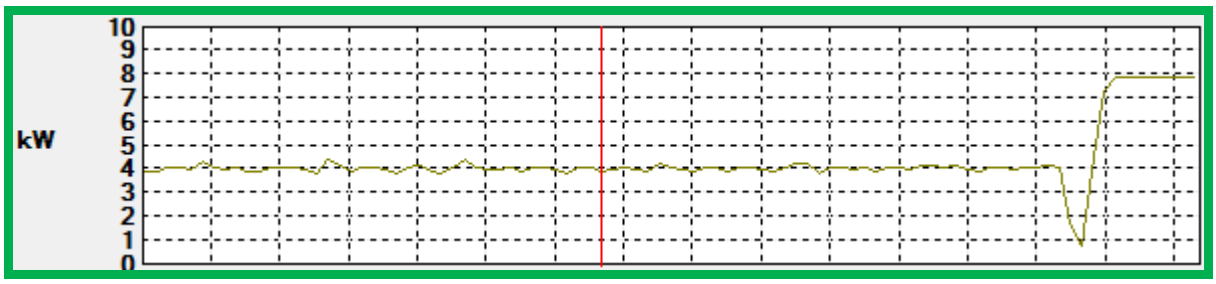
Current Harmonics



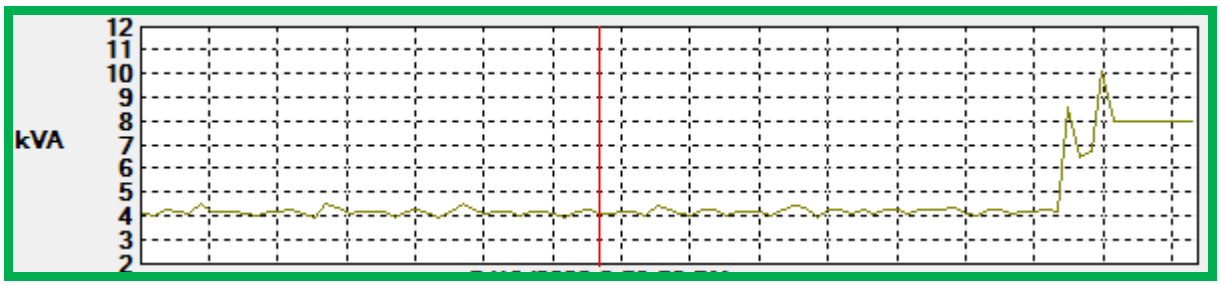
Current Un-balance



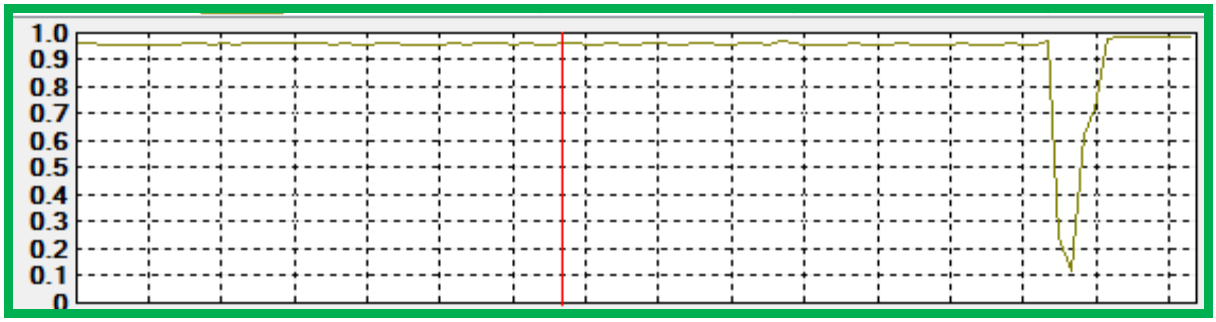
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.60	421.80	419.40	3.08	3.28	3.01	0.22	0.04	0.09	49.65	0.50	34.10
MAX	423.10	427.10	424.60	19.51	14.02	18.73	0.99	0.99	0.98	49.92	0.80	119.20
AVG	419.59	423.84	421.49	4.11	9.77	5.38	0.94	0.95	0.90	49.79	0.51	73.25

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

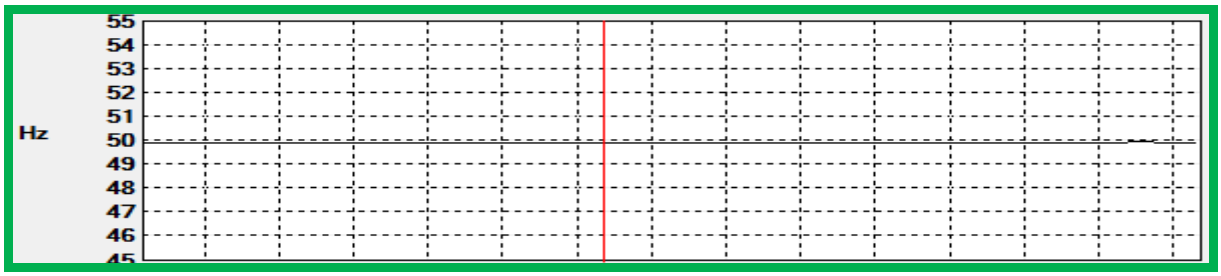
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.02	1.01	1.02	3.20	3.10	3.20	5.60	6.60	7.00
MAX	- - -	- - -	- - -	1.10	1.39	1.39	3.50	3.30	3.40	25.00	92.20	78.50
AVG	- - -	- - -	- - -	1.03	1.02	1.13	3.25	3.23	3.32	8.38	11.64	25.11

Crest Factor

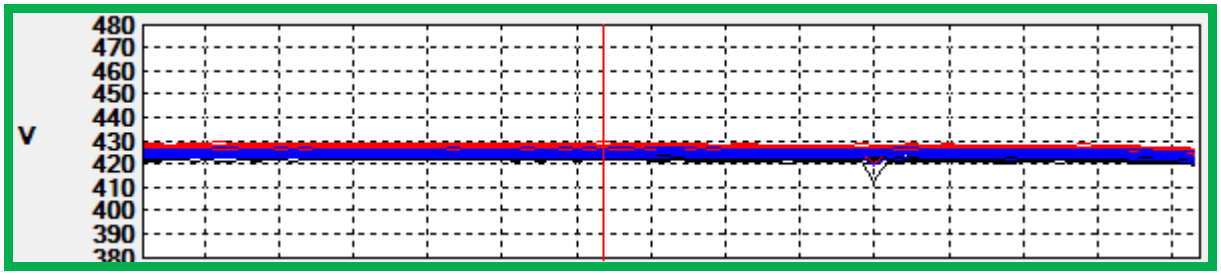
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.47	1.47	1.47	1.50	1.56	1.46
MAX	1.47	1.47	1.48	2.70	3.03	3.65
AVG	1.47	1.47	1.47	1.62	1.75	2.76

B39-For-Lighting 2nd Floor Kendriya Mulyakan Bhawan (SS-B)

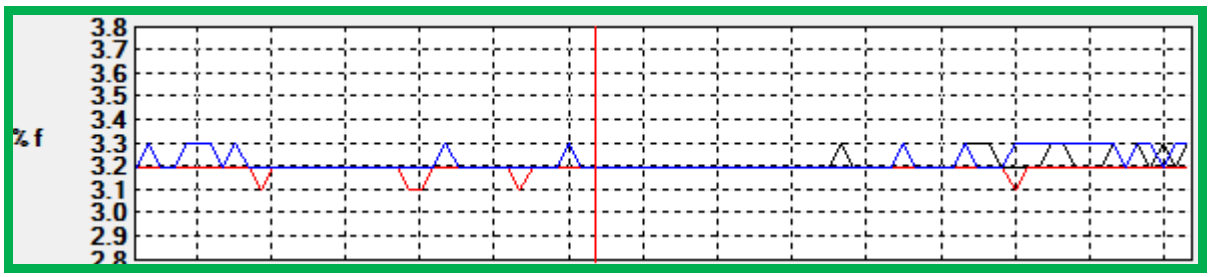
Frequency



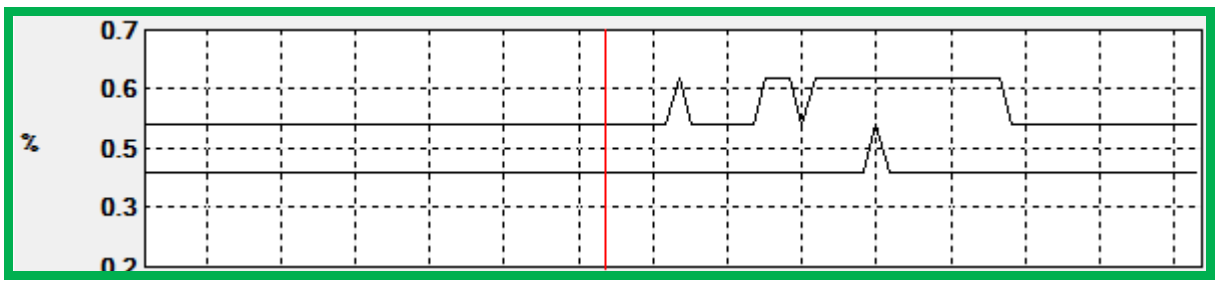
Voltage



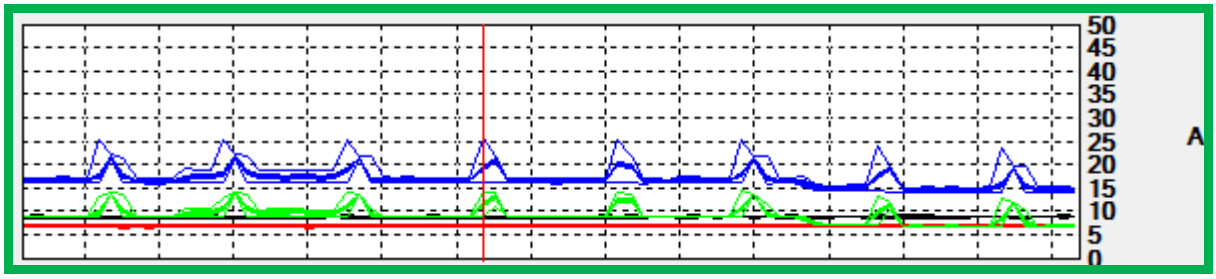
Voltage Harmonics



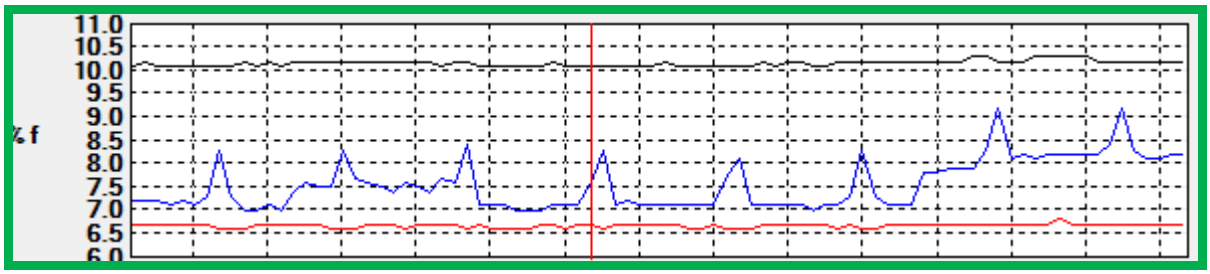
Voltage Un-balance



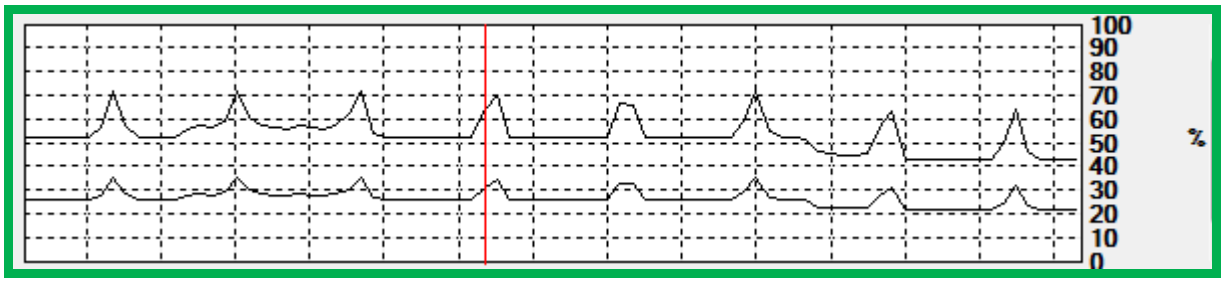
Current



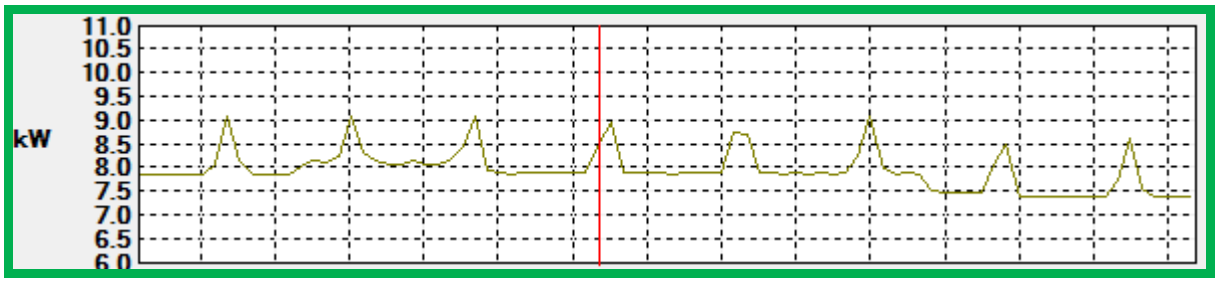
Current Harmonics



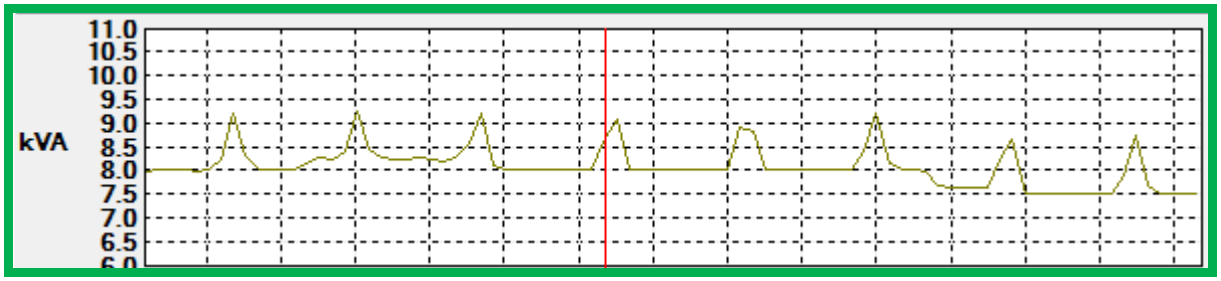
Current Un-balance



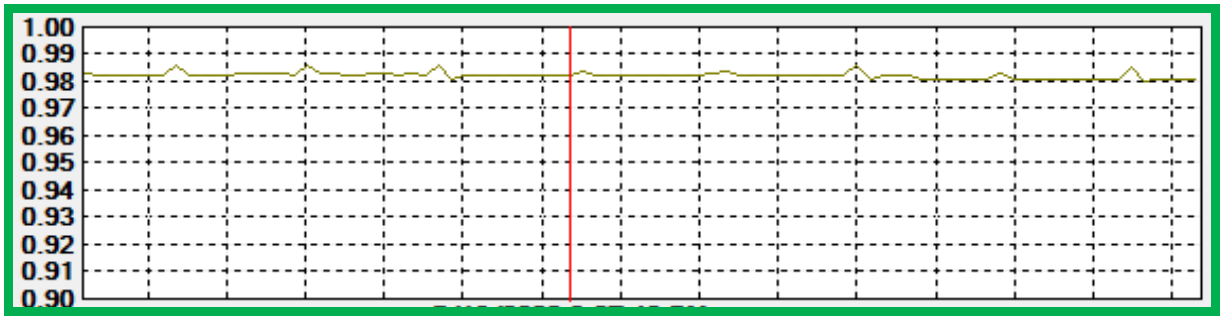
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	421.70	425.30	422.60	8.97	7.01	14.66	0.98	0.99	0.98	49.89	0.40	43.20
MAX	423.80	427.60	425.30	9.05	7.04	21.58	0.98	0.99	0.99	49.94	0.50	72.20
AVG	423.09	427.05	424.83	9.01	7.03	16.94	0.98	0.99	0.98	49.91	0.49	53.75

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

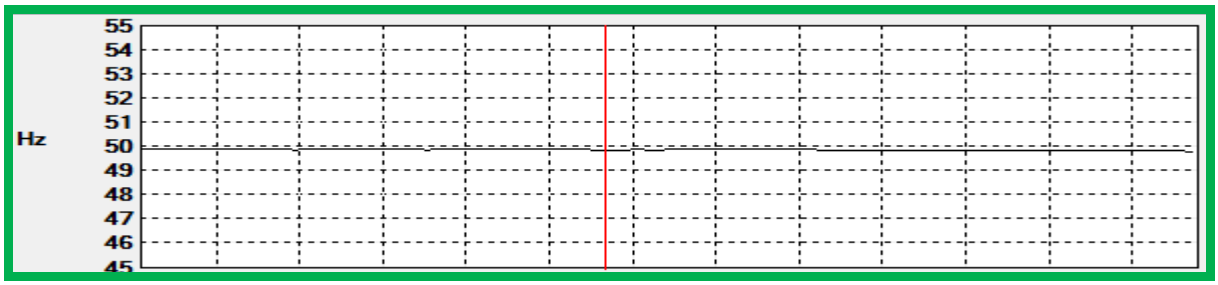
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.04	1.02	1.02	3.20	3.20	3.20	10.10	6.60	7.00
MAX	- - -	- - -	- - -	1.05	1.03	1.04	3.30	3.20	3.40	10.30	6.80	9.20
AVG	- - -	- - -	- - -	1.05	1.03	1.03	3.21	3.20	3.29	10.17	6.68	7.55

Crest Factor

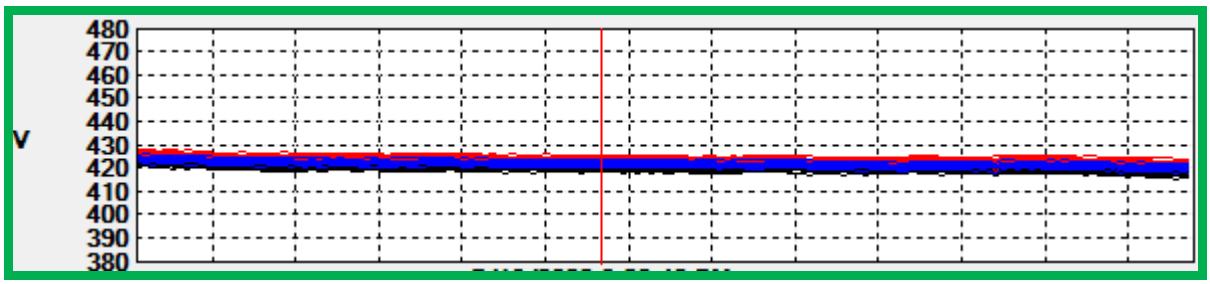
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.47	1.47	1.47	1.65	1.55	1.46
MAX	1.47	1.47	1.47	1.67	1.57	1.62
AVG	1.47	1.47	1.47	1.66	1.56	1.50

B40-For-AC Feeder Kendriya Mulyakan Bhawan (SS-B)

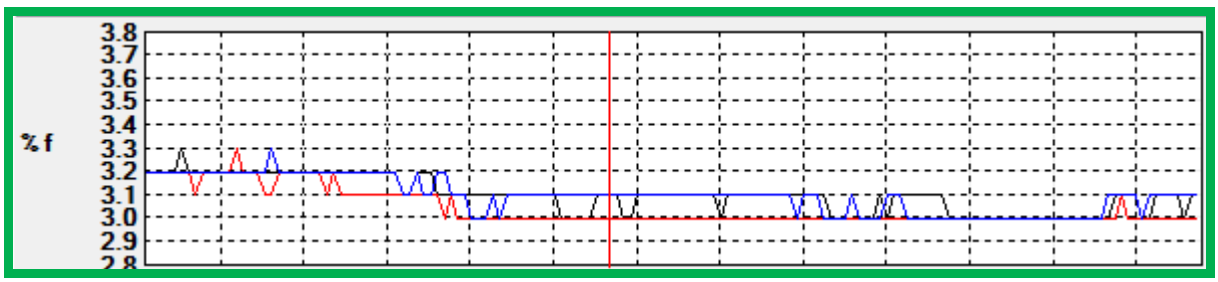
Frequency



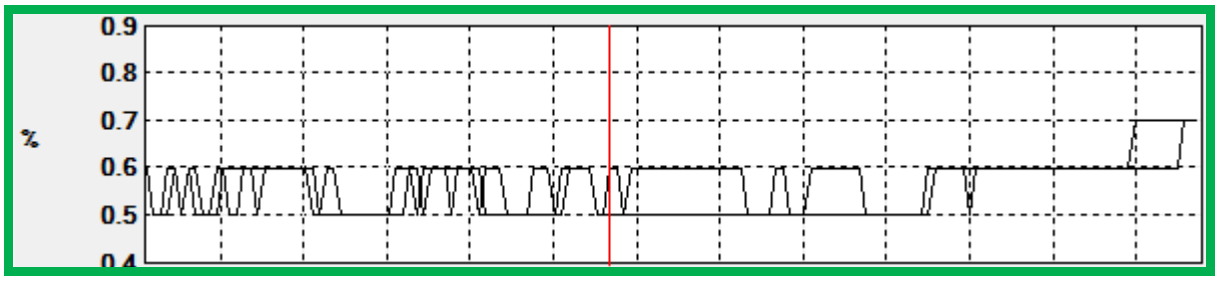
Voltage



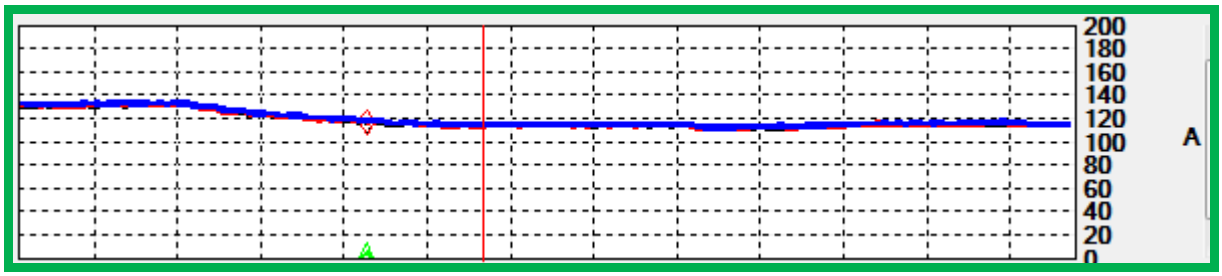
Voltage Harmonics



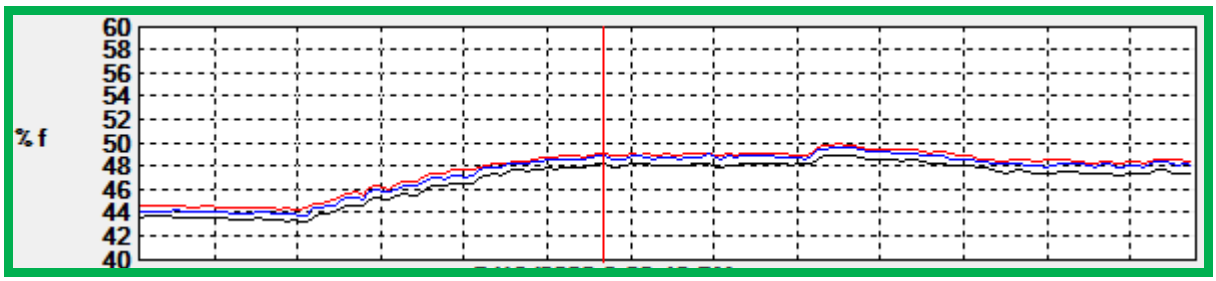
Voltage Un-balance



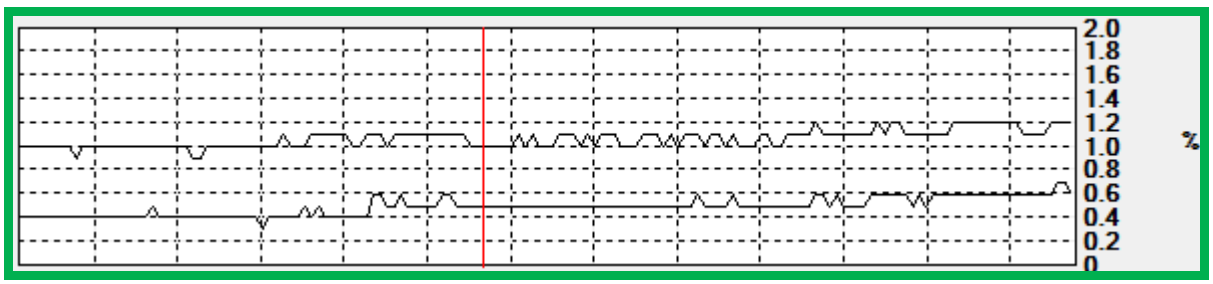
Current



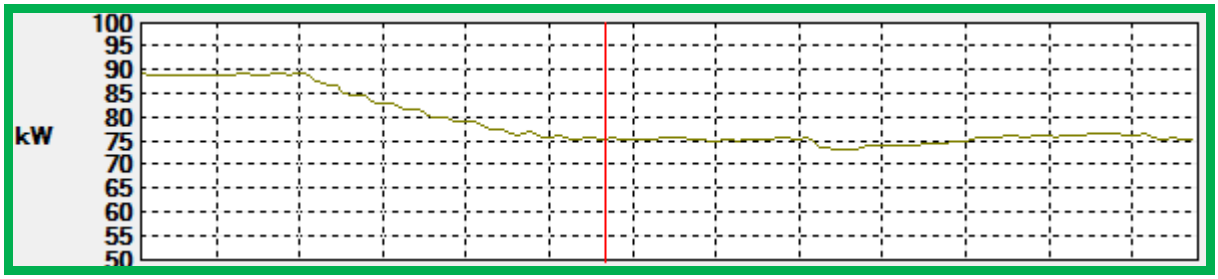
Current Harmonics



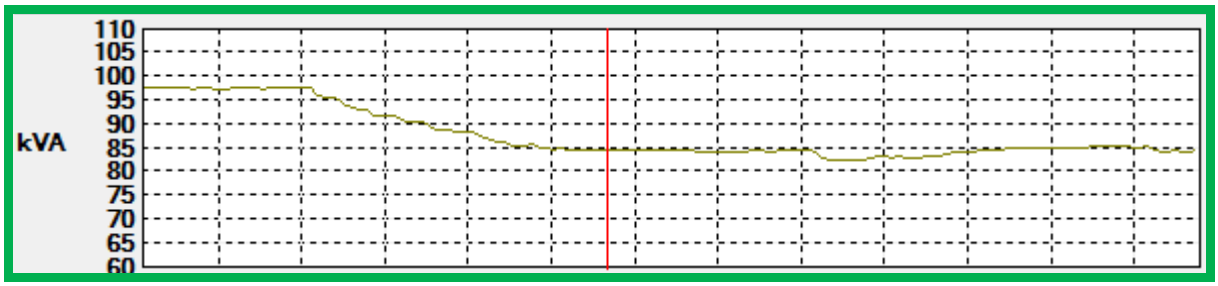
Current Un-balance



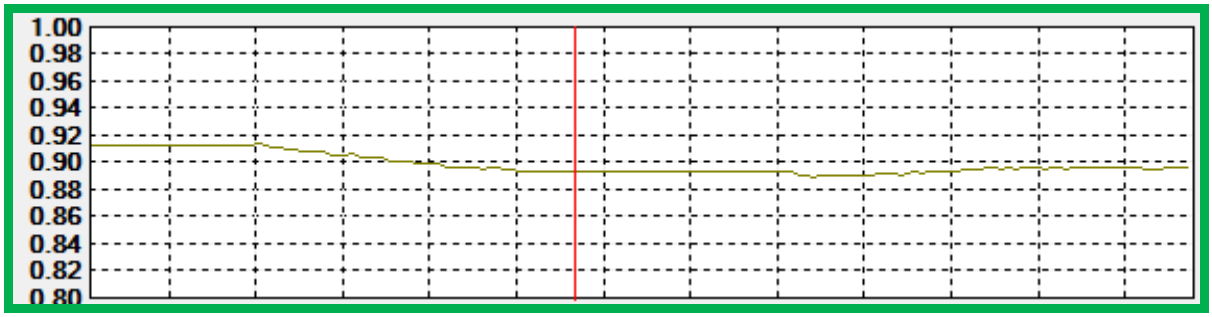
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	417.60	422.40	420.20	112.30	112.50	113.30	0.89	0.89	0.89	49.81	0.40	0.30
MAX	422.50	426.60	424.30	133.10	133.30	134.10	0.92	0.91	0.91	49.93	0.60	0.70
AVG	419.96	424.07	422.04	119.56	119.68	120.52	0.90	0.90	0.90	49.87	0.50	0.49

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

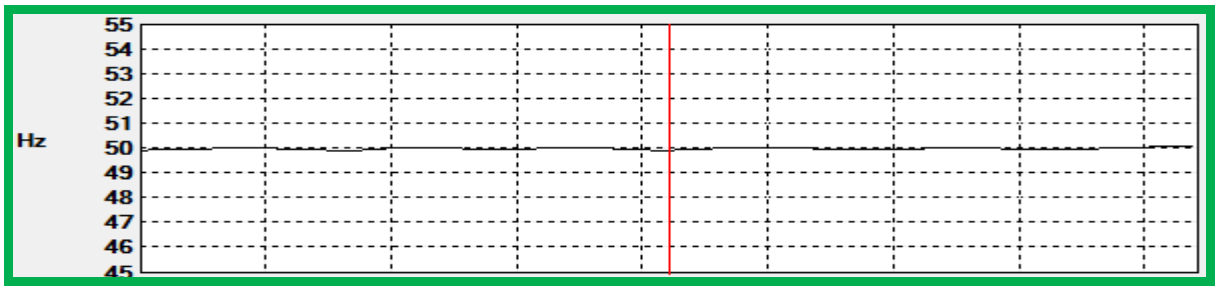
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.50	1.23	1.00	1.21	1.21	1.21	3.00	2.90	3.00	43.30	44.30	43.80
MAX	1.74	1.74	1.50	1.24	1.25	1.24	3.20	3.30	3.30	49.00	50.00	49.70
AVG	1.68	1.36	1.13	1.23	1.24	1.23	3.06	3.04	3.13	46.85	47.80	47.48

Crest Factor

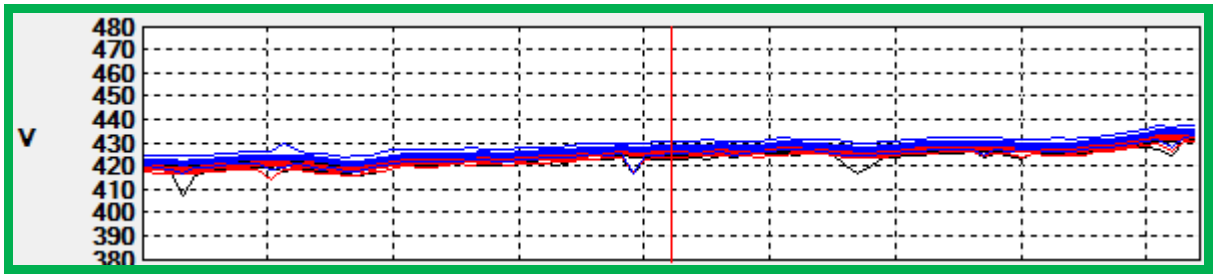
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.47	1.47	1.47	1.95	1.97	1.97
MAX	1.47	1.47	1.47	2.06	2.07	2.11
AVG	1.47	1.47	1.47	2.02	2.04	2.06

A4-For- Transformer Output -630 KVA (SS-C)

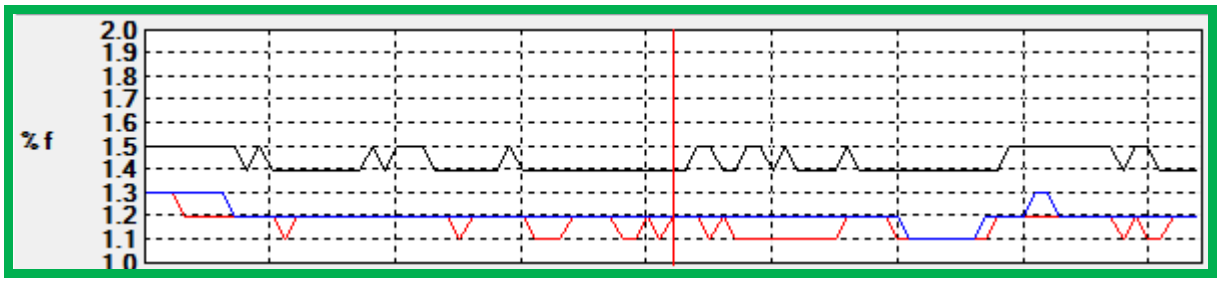
Frequency



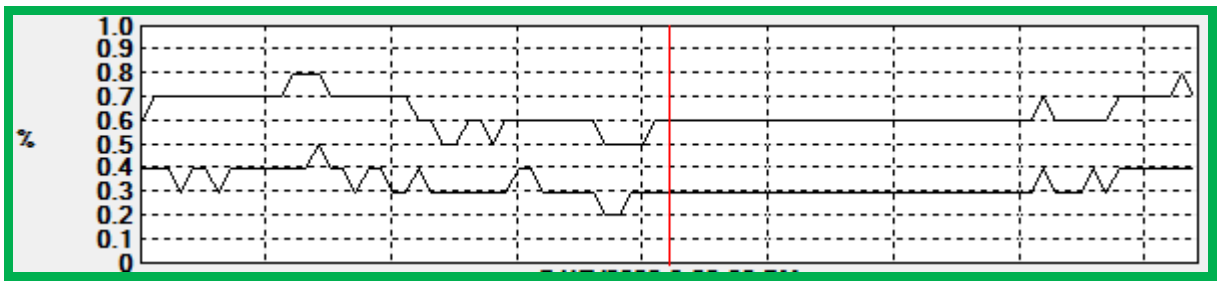
Voltage



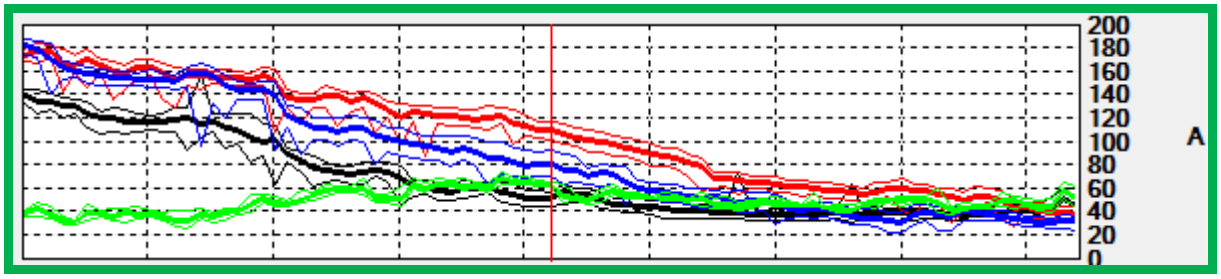
Voltage Harmonics



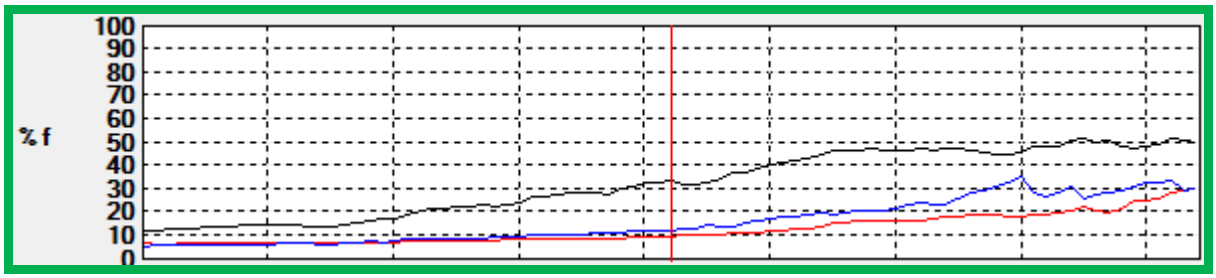
Voltage Un-balance



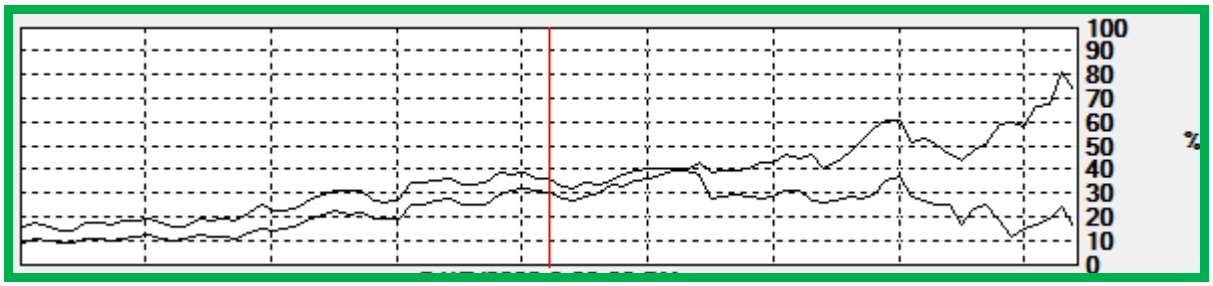
Current



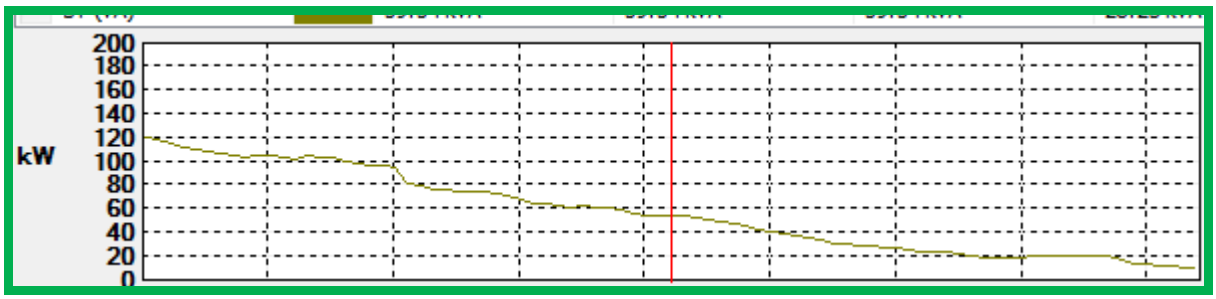
Current Harmonics



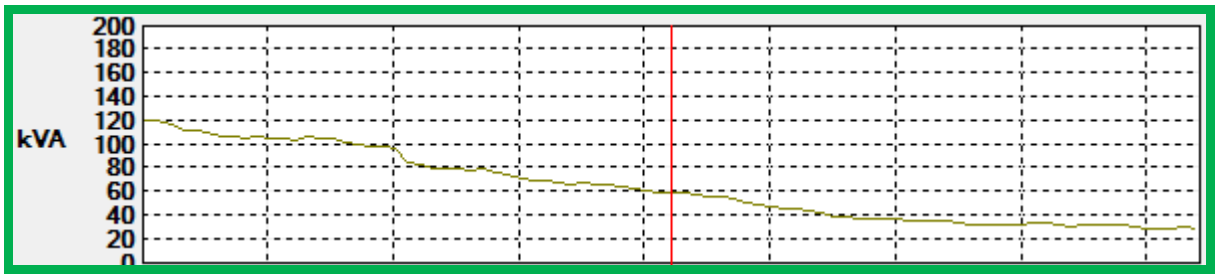
Current Un-balance



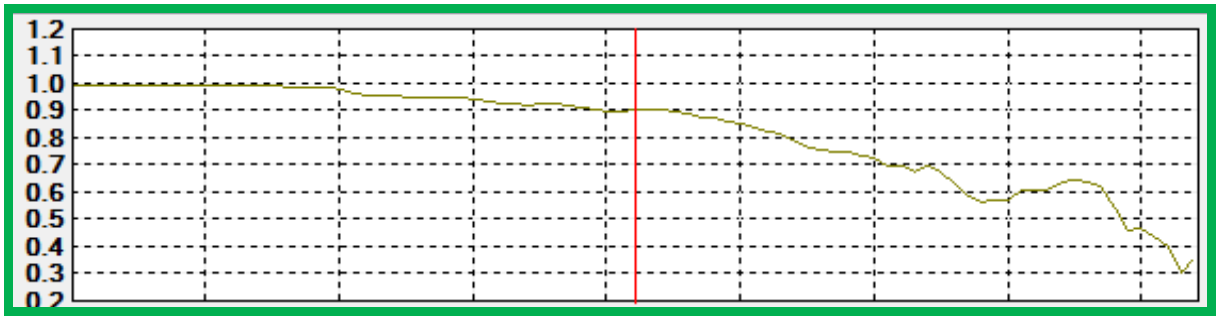
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	419.40	418.70	421.70	37.00	38.30	30.30	0.46	0.84	0.72	49.91	0.30	12.10
MAX	432.40	433.10	435.50	139.00	177.80	182.20	0.99	0.99	1.00	50.08	0.50	40.90
AVG	424.88	425.03	427.28	67.26	105.40	87.22	0.51	0.96	0.93	49.99	0.37	27.28

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

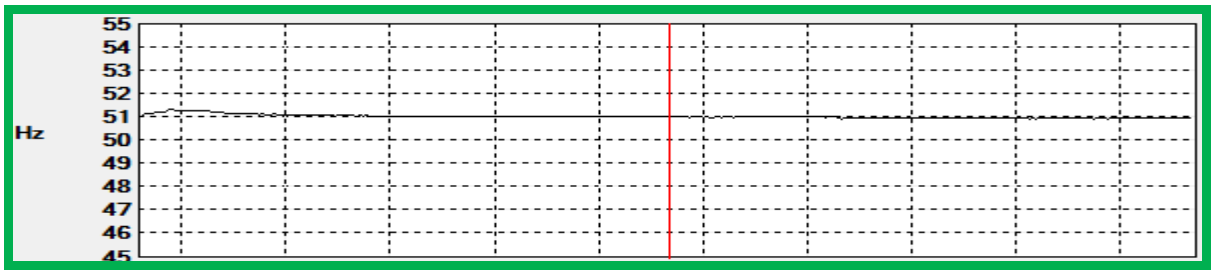
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.20	0.19	0.18	1.01	1.00	1.00	1.30	1.00	1.30	12.00	6.40	5.60
MAX	1.58	1.66	1.66	1.15	1.10	1.12	1.50	1.20	1.40	52.00	30.40	35.10
AVG	0.48	0.59	0.63	1.08	1.02	1.04	1.38	1.09	1.35	32.55	12.60	16.10

Crest Factor

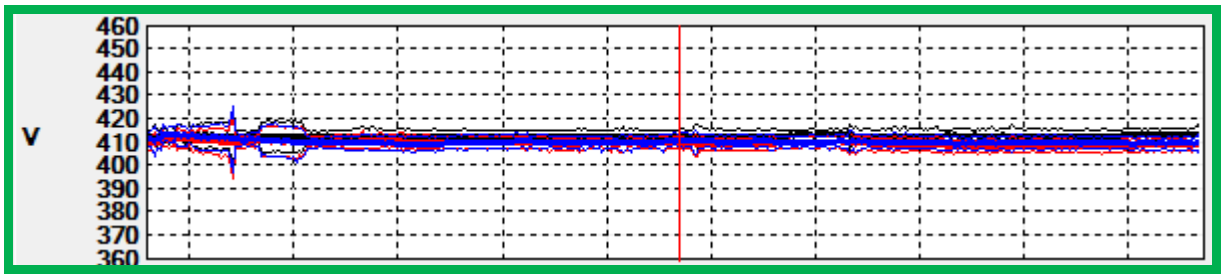
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.57	1.52	1.46
MAX	1.44	1.43	1.43	2.45	1.81	1.88
AVG	1.43	1.43	1.43	1.86	1.61	1.63

A11-For-D. G Set 380 KVA (SS-C)

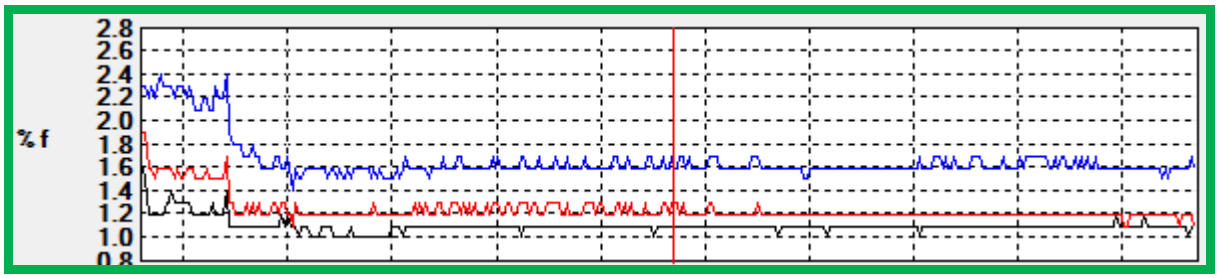
Frequency



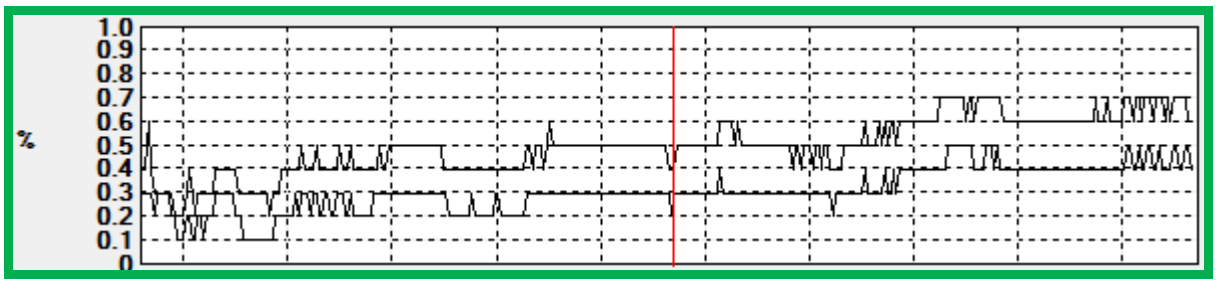
Voltage



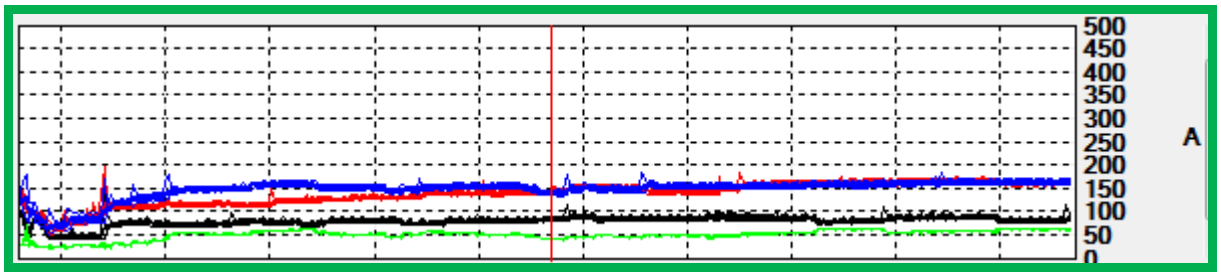
Voltage Harmonics



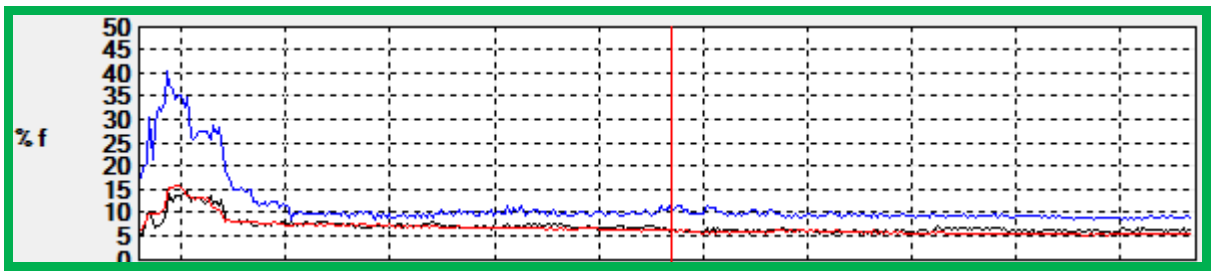
Voltage Un-balance



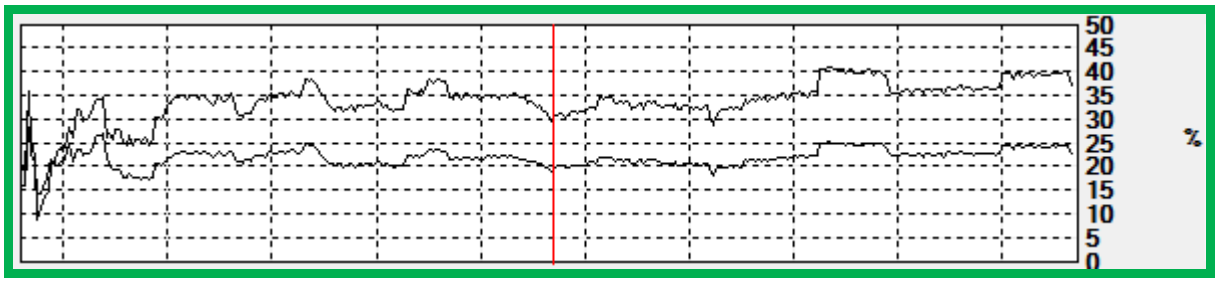
Current



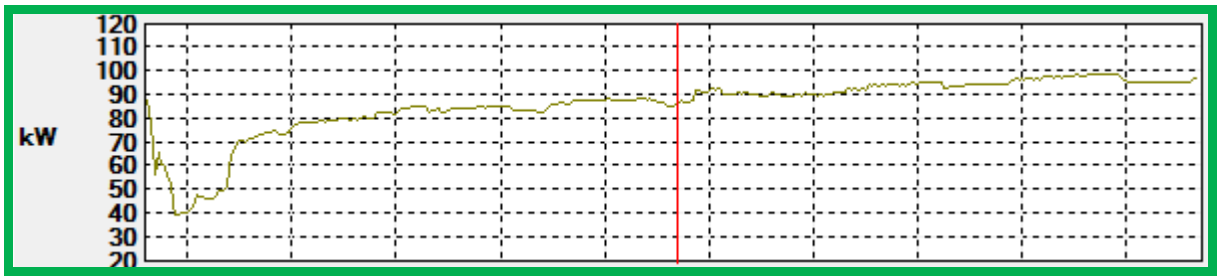
Current Harmonics



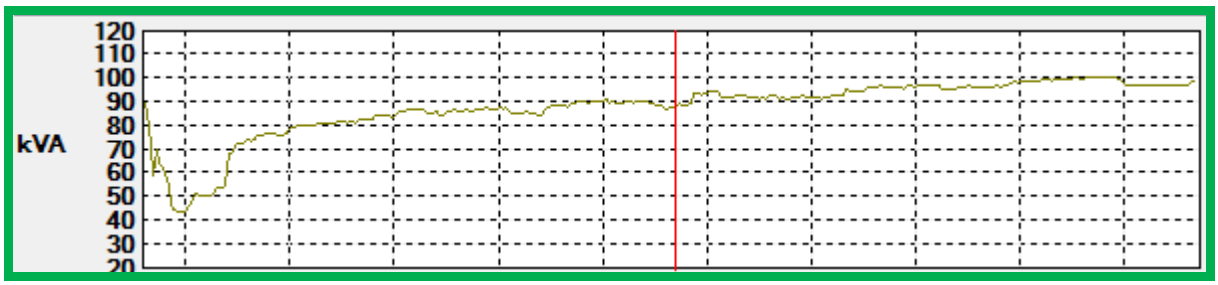
Current Un-balance



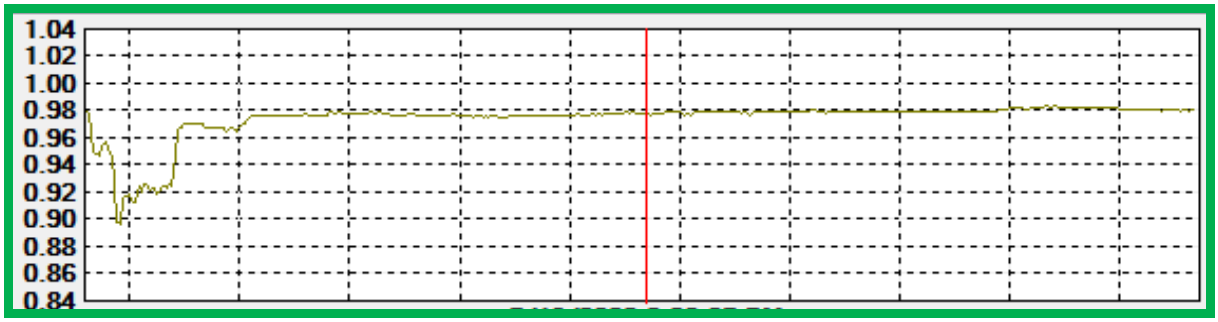
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	412.30	408.30	409.20	46.20	65.40	66.30	0.95	0.95	0.79	50.93	0.20	9.00
MAX	413.40	411.80	413.70	101.10	170.20	167.40	1.00	1.00	0.97	51.32	0.70	41.10
AVG	412.91	409.57	410.26	81.06	139.91	148.91	0.98	0.99	0.96	51.02	0.49	33.89

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

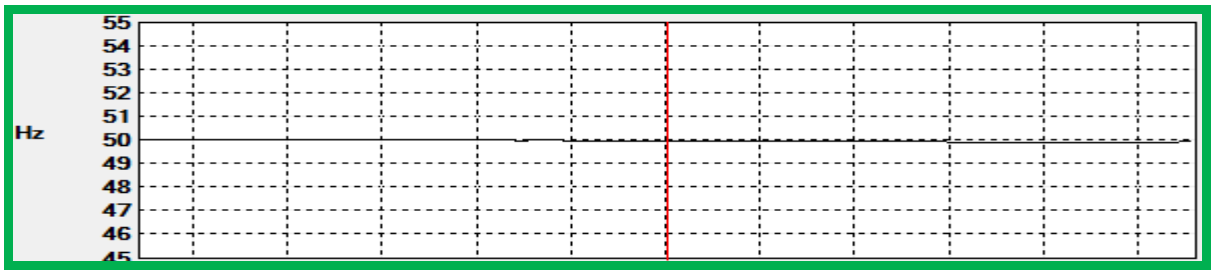
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.52	0.53	0.58	1.00	1.00	1.01	0.90	1.40	1.20	5.50	5.20	8.50
MAX	0.58	0.59	0.61	1.03	1.03	1.11	1.60	2.20	2.00	14.50	16.00	40.40
AVG	0.57	0.58	0.60	1.01	1.01	1.01	1.01	1.56	1.44	7.14	6.87	11.51

Crest Factor

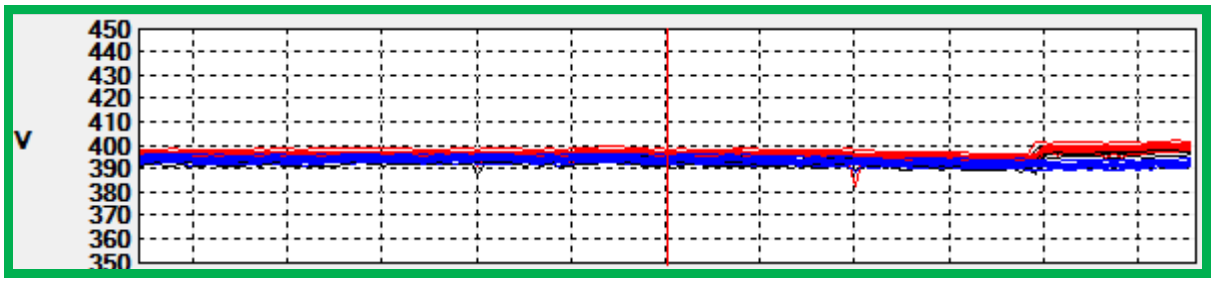
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.41	1.40	1.41	1.59	1.56	1.47
MAX	1.43	1.43	1.43	1.94	1.78	2.70
AVG	1.41	1.41	1.41	1.66	1.60	1.56

B16-For-Library, Workshop and New Hostel (SS-C)

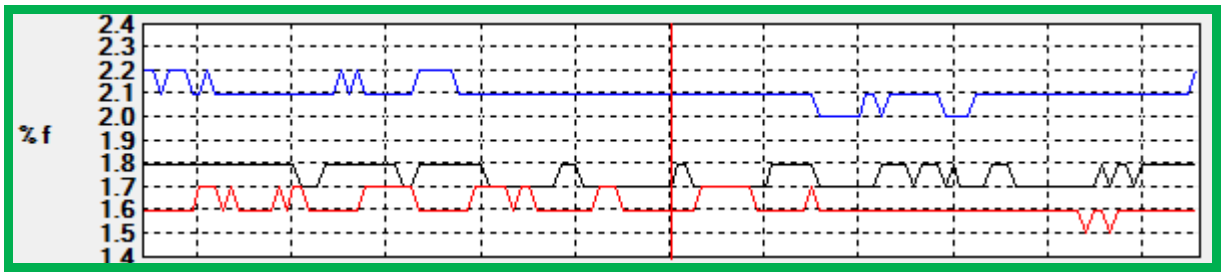
Frequency



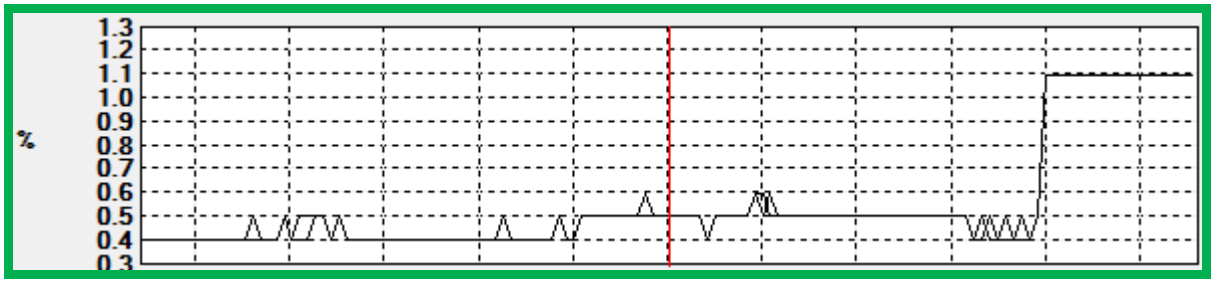
Voltage



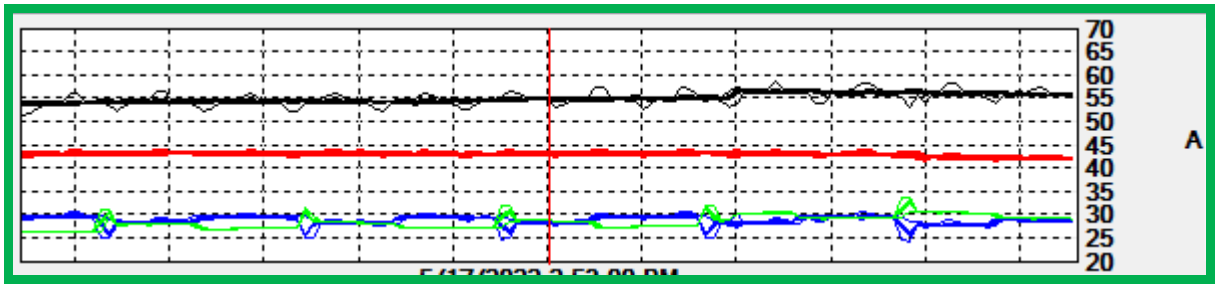
Voltage Harmonics



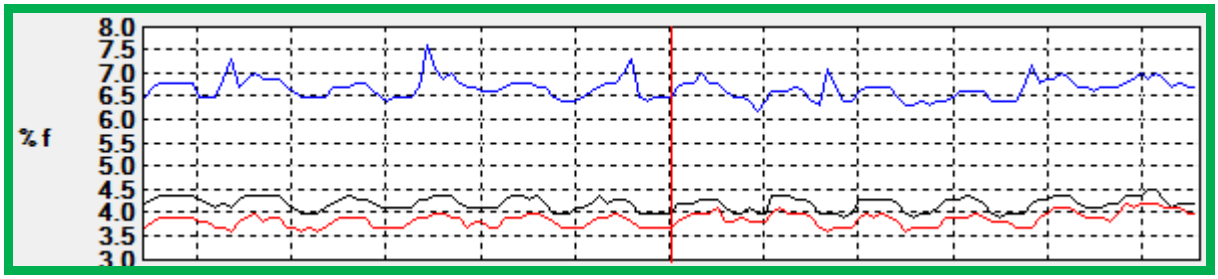
Voltage Un-balance



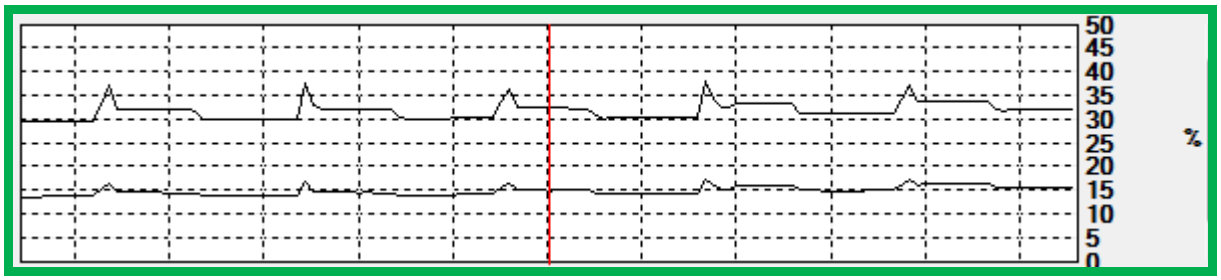
Current



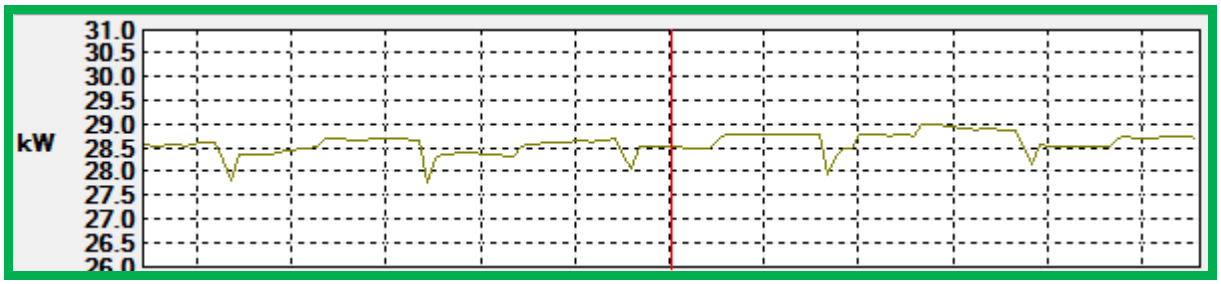
Current Harmonics



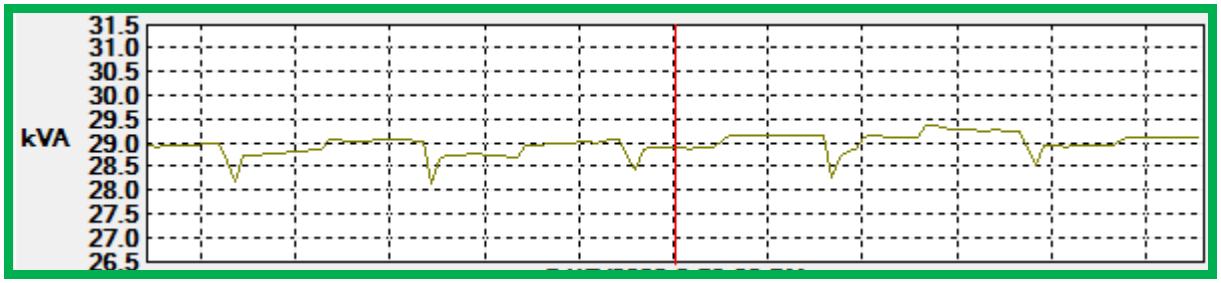
Current Un-balance



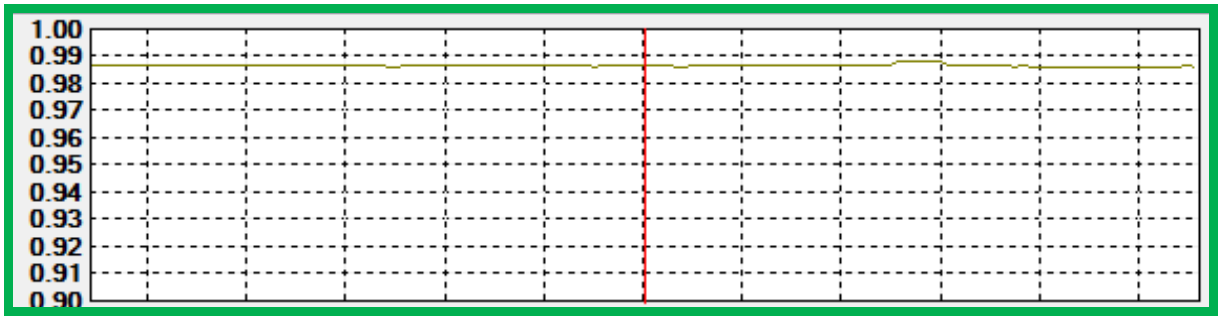
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	391.70	394.50	391.80	53.91	42.22	25.59	1.00	0.98	0.97	49.90	0.40	29.60
MAX	398.40	400.10	394.90	56.64	43.53	29.85	1.00	0.98	0.98	50.04	1.10	38.30
AVG	394.01	396.87	393.66	55.17	43.13	28.93	1.00	0.98	0.97	49.98	0.55	31.82

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

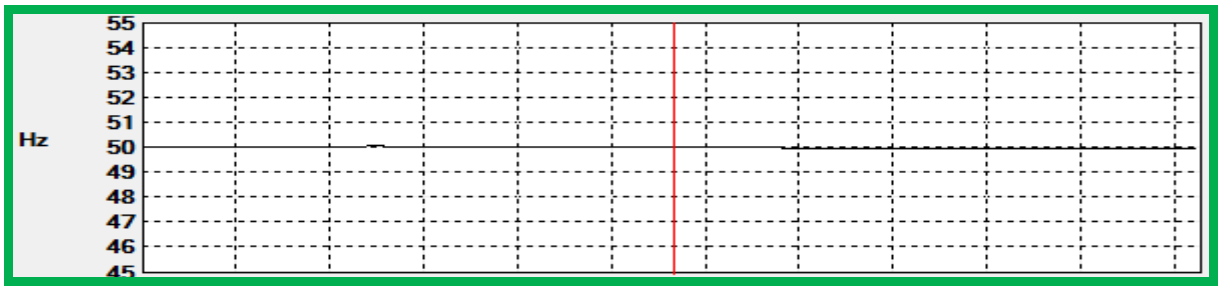
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	1.40	1.80	1.90	3.90	3.60	6.20
MAX	- - -	- - -	- - -	1.00	1.00	1.01	1.60	2.00	2.10	4.50	4.20	7.60
AVG	- - -	- - -	- - -	1.00	1.00	1.01	1.50	1.92	1.97	4.21	3.86	6.67

Crest Factor

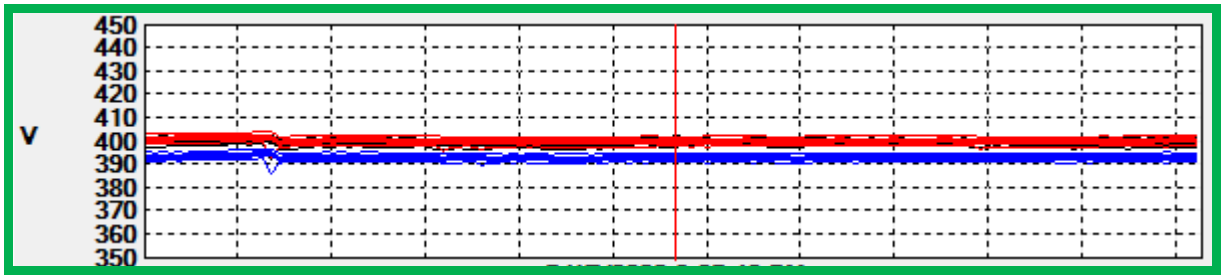
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.43	1.49	1.46	1.51
MAX	1.43	1.43	1.44	1.52	1.53	1.55
AVG	1.43	1.43	1.44	1.50	1.48	1.51

B17-For-D-Block Mechanical (SS-C)

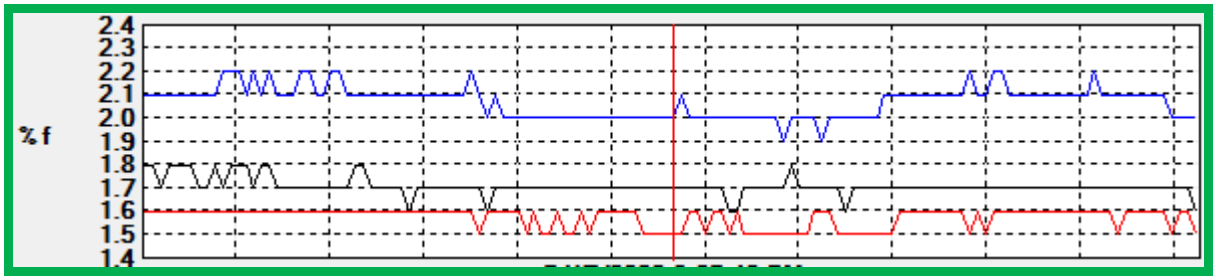
Frequency



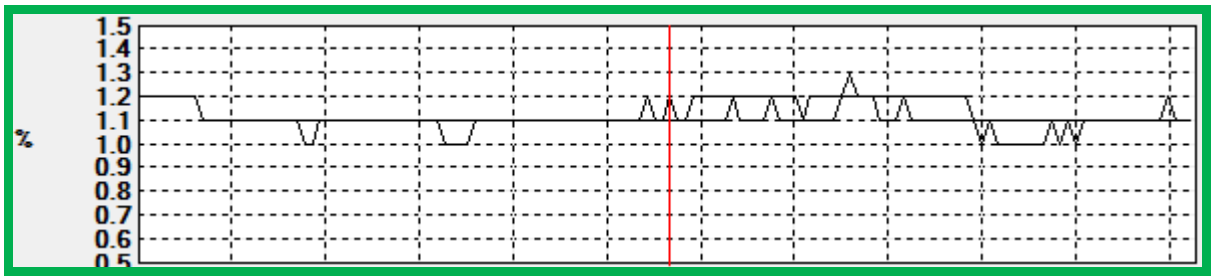
Voltage



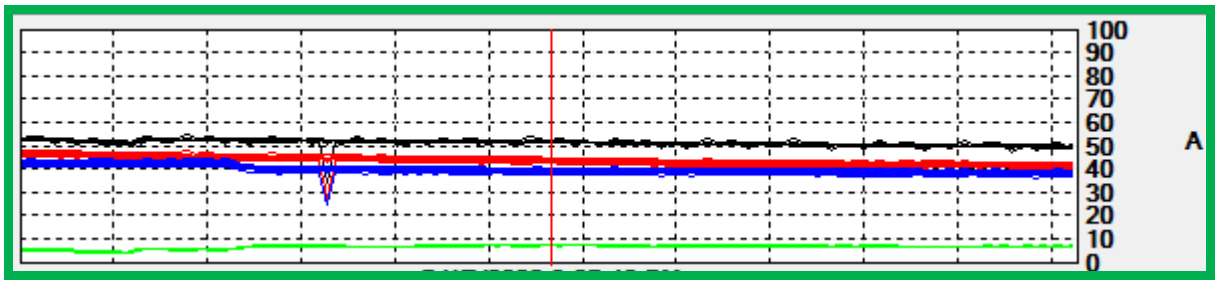
Voltage Harmonics



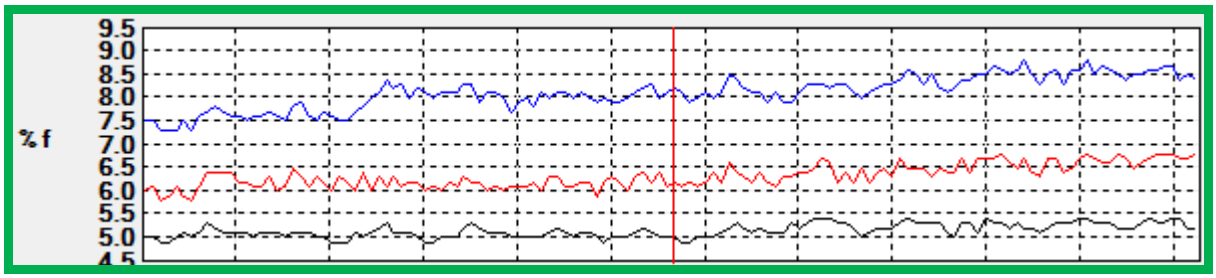
Voltage Un-balance



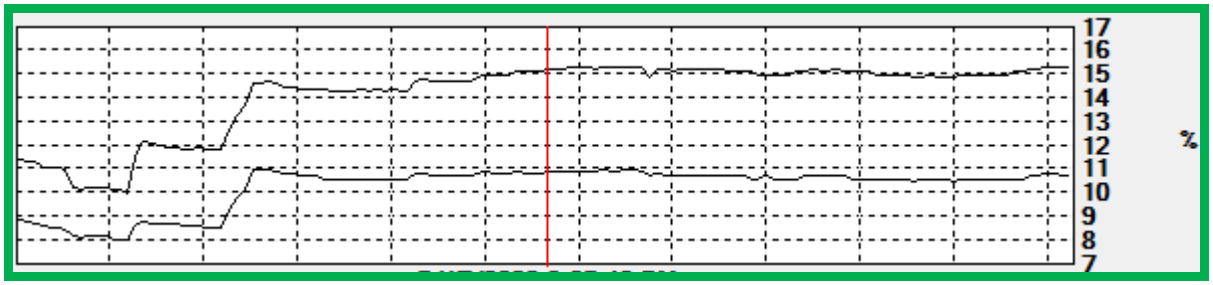
Current



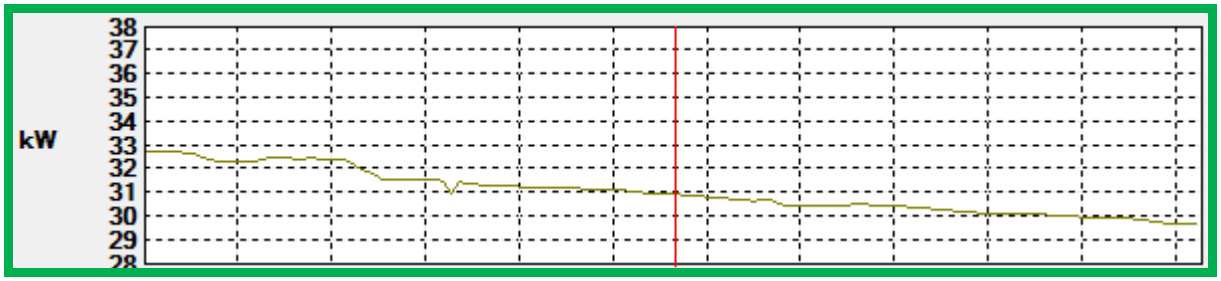
Current Harmonics



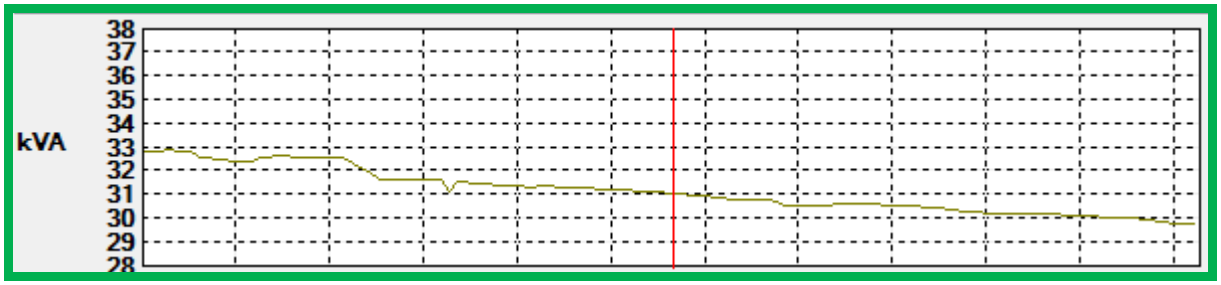
Current Un-balance



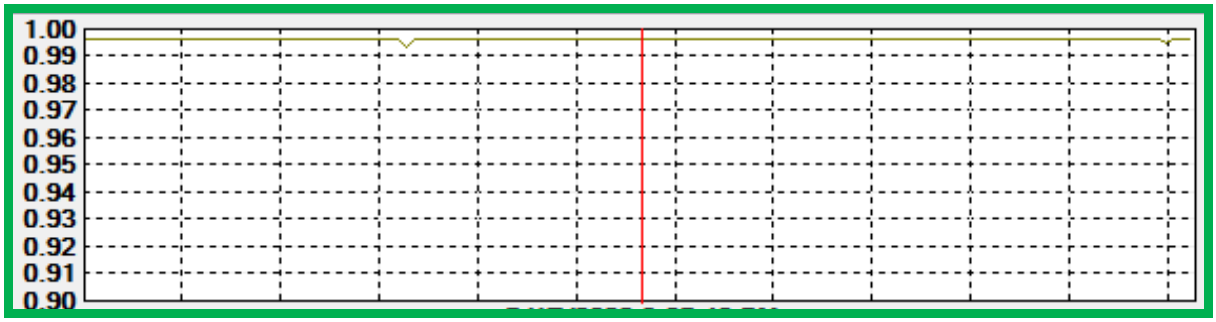
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	398.50	399.50	392.40	49.86	41.53	38.36	1.00	0.99	0.99	49.94	1.10	10.00
MAX	400.70	401.90	394.60	53.22	47.07	43.21	1.00	1.00	1.00	50.07	1.30	15.30
AVG	399.59	400.26	393.10	51.62	43.93	40.15	1.00	0.99	1.00	50.01	1.14	14.16

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

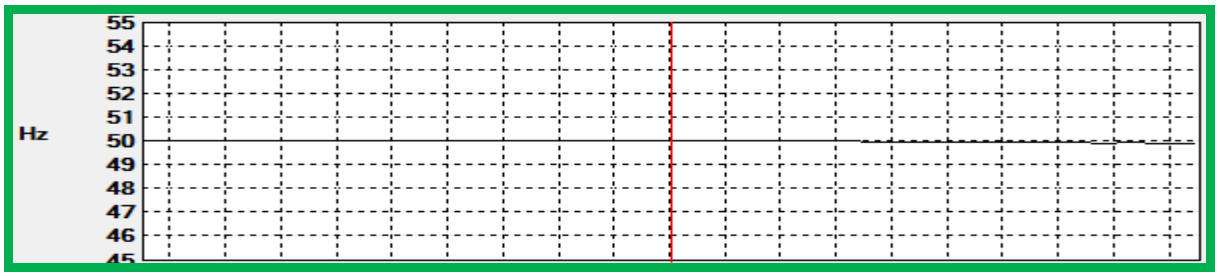
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.23	1.33	1.33	1.00	1.00	1.01	1.30	1.70	1.90	4.90	5.80	7.30
MAX	1.23	1.33	1.33	1.00	1.01	1.01	1.50	2.00	2.10	5.40	6.80	8.80
AVG	1.23	1.33	1.33	1.00	1.00	1.01	1.43	1.86	1.98	5.14	6.32	8.10

Crest Factor

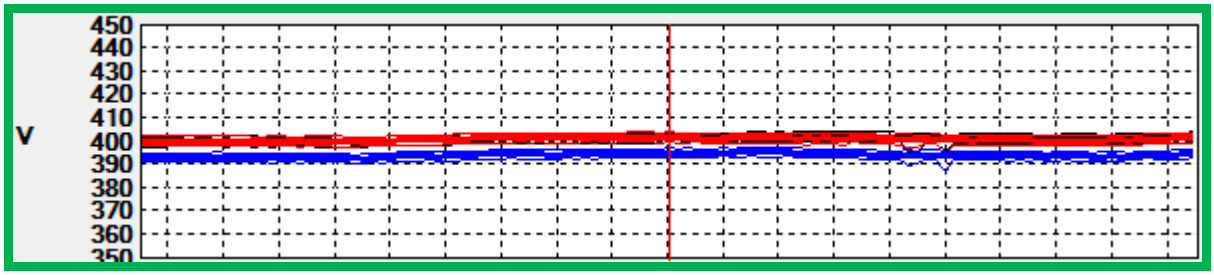
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.44	1.50	1.52	1.52
MAX	1.43	1.43	1.44	1.53	1.56	1.57
AVG	1.43	1.43	1.44	1.51	1.53	1.54

B18-For-Block-A, B and Admin Block (SS-C)

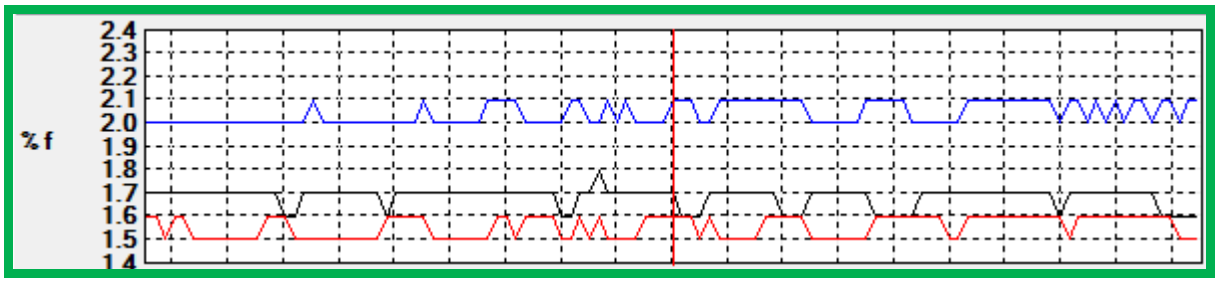
Frequency



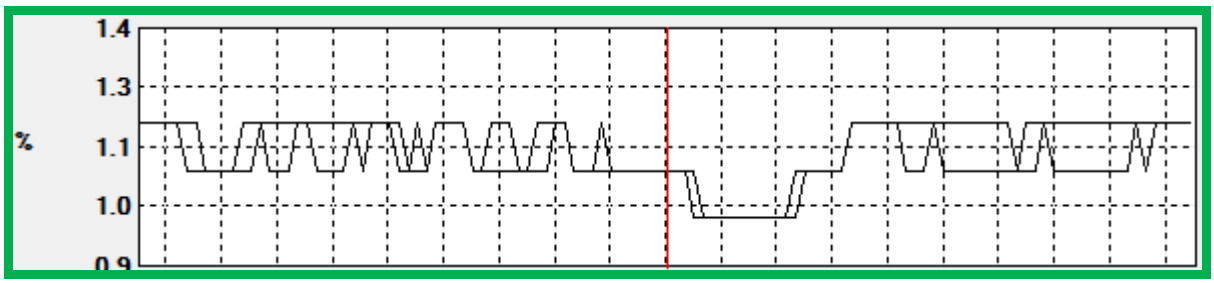
Voltage



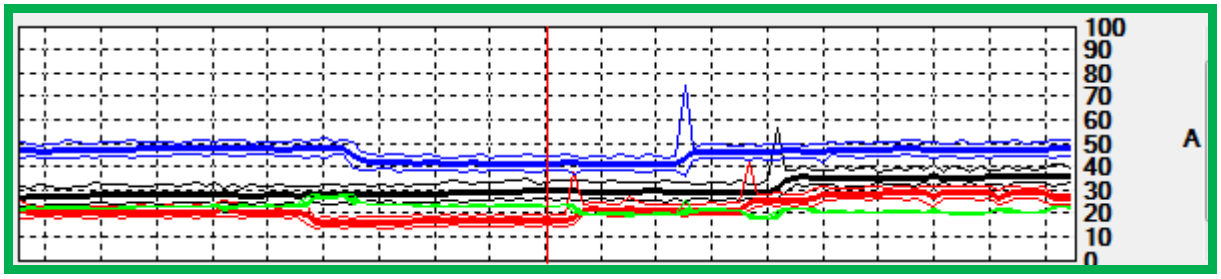
Voltage Harmonics



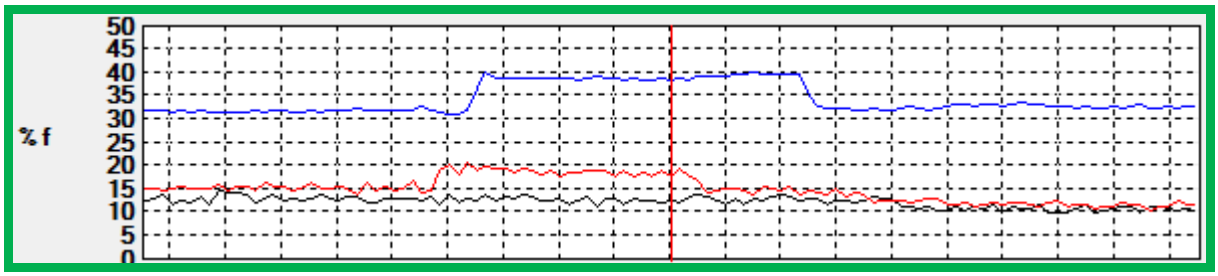
Voltage Un-balance



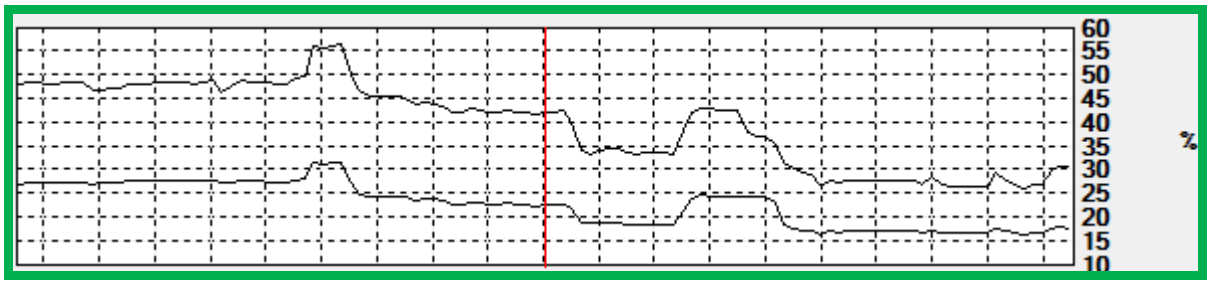
Current



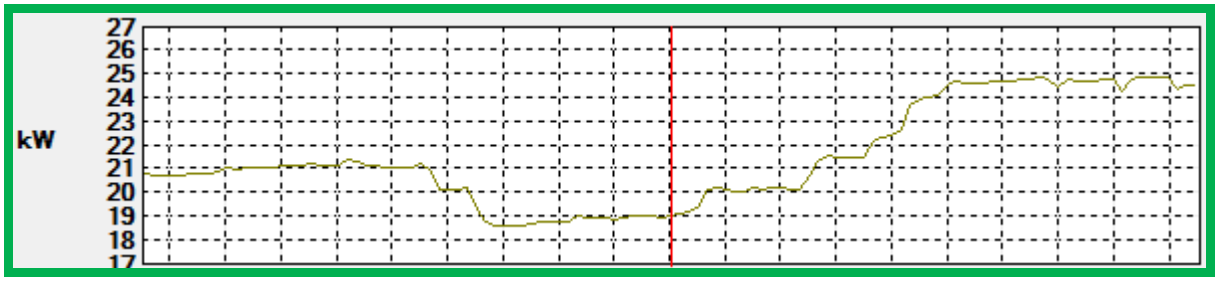
Current Harmonics



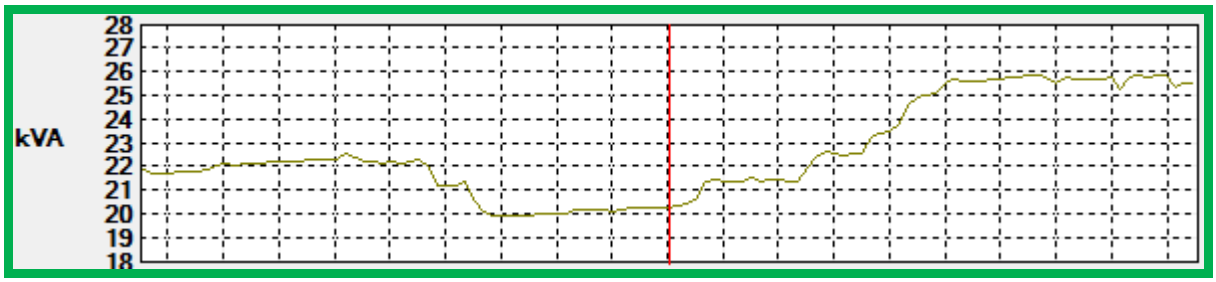
Current Un-balance



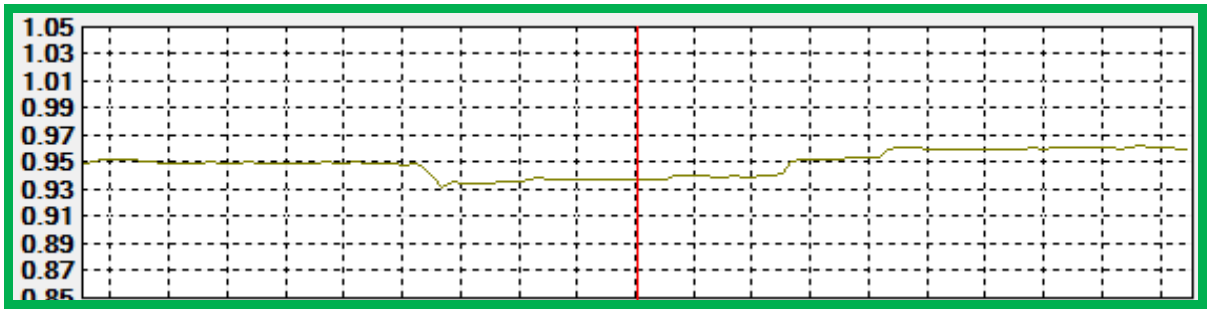
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	399.80	399.90	392.60	27.13	16.18	41.19	0.96	0.98	0.89	49.93	1.00	26.00
MAX	402.20	401.90	395.50	36.34	29.10	48.59	0.99	0.99	0.93	50.04	1.20	56.50
AVG	401.02	400.86	394.00	30.69	22.19	45.69	0.97	0.98	0.92	50.00	1.17	39.72

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

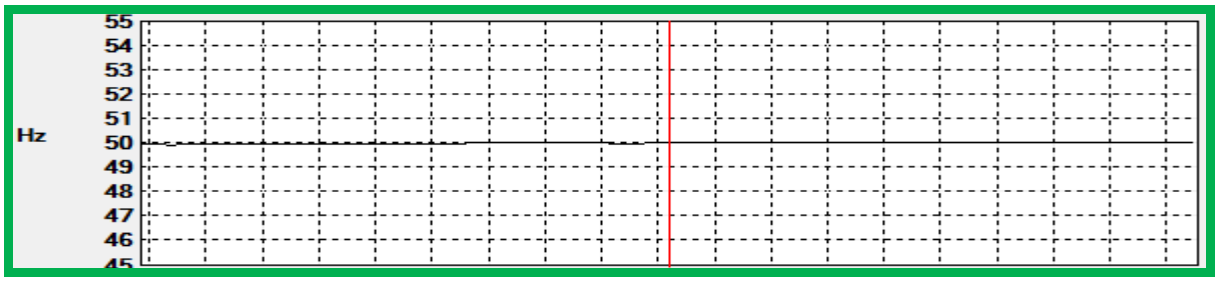
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.83	1.03	0.90	1.01	1.01	1.06	1.30	1.80	1.90	9.70	10.40	31.10
MAX	1.23	1.33	1.33	1.02	1.03	1.10	1.40	1.90	2.00	14.50	20.60	39.90
AVG	0.96	1.13	1.04	1.01	1.02	1.08	1.39	1.81	1.95	12.20	14.92	34.34

Crest Factor

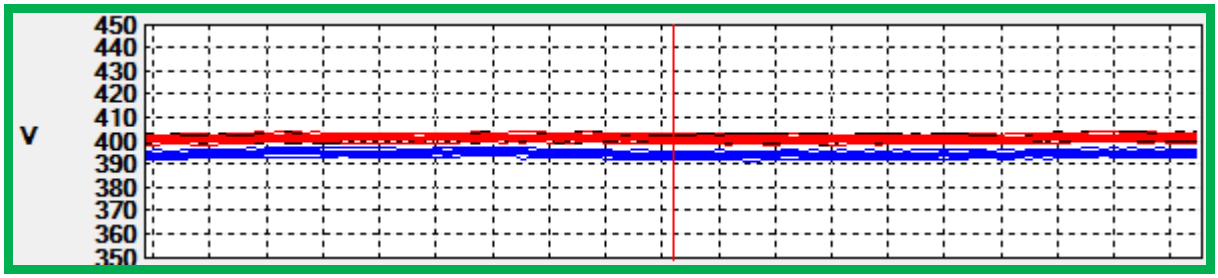
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.44	1.47	1.75	1.99
MAX	1.43	1.44	1.44	1.81	2.09	2.31
AVG	1.43	1.43	1.44	1.51	1.88	2.08

B19-For-Water Tank and Sewer pumping station (SS-C)

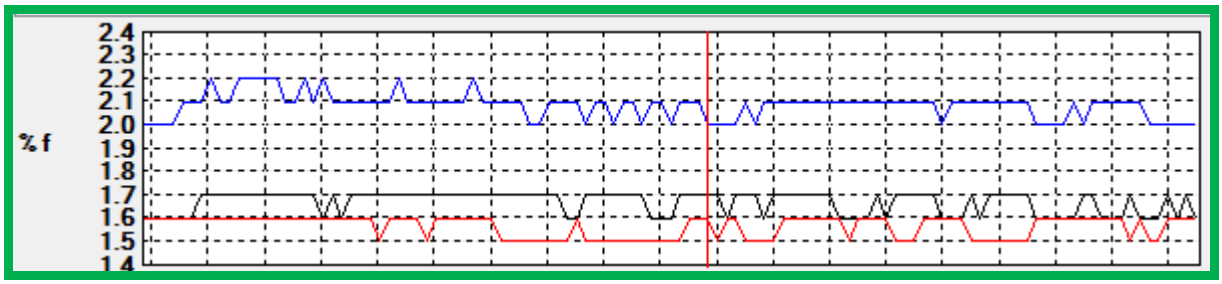
Frequency



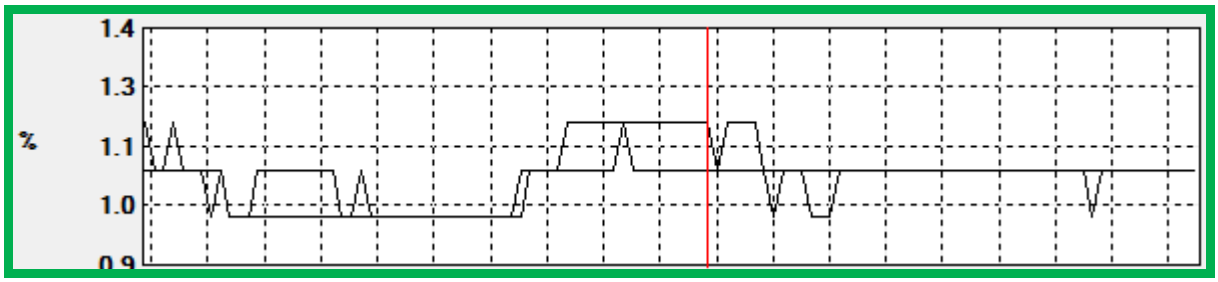
Voltage



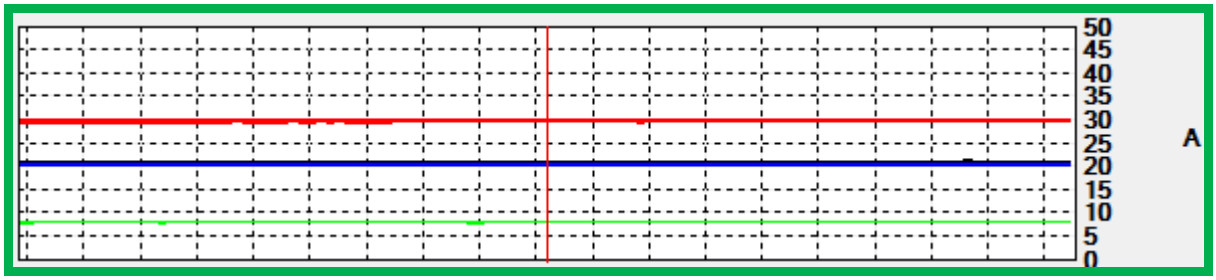
Voltage Harmonics



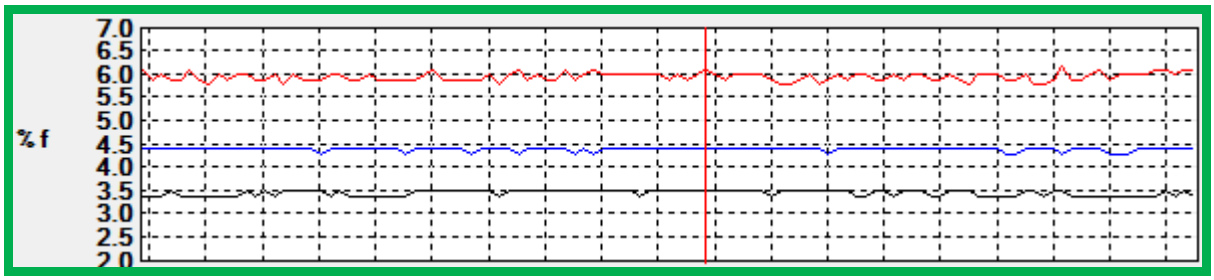
Voltage Un-balance



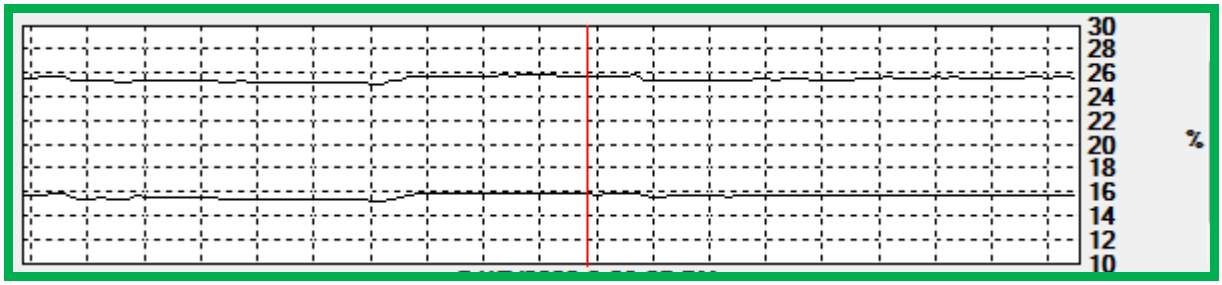
Current



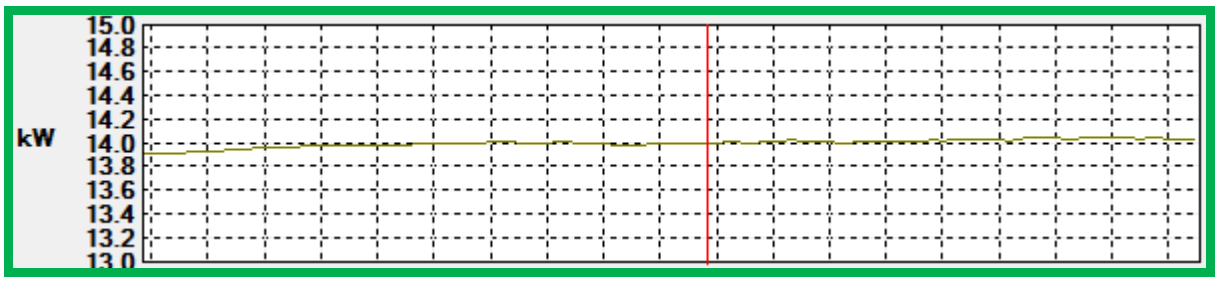
Current Harmonics



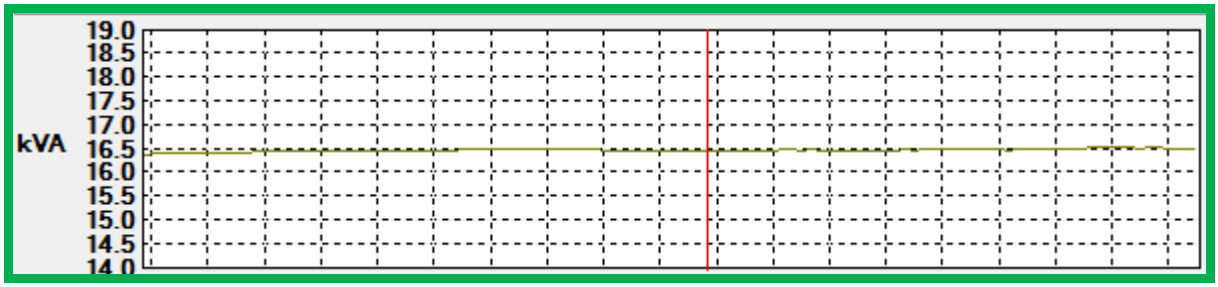
Current Un-balance



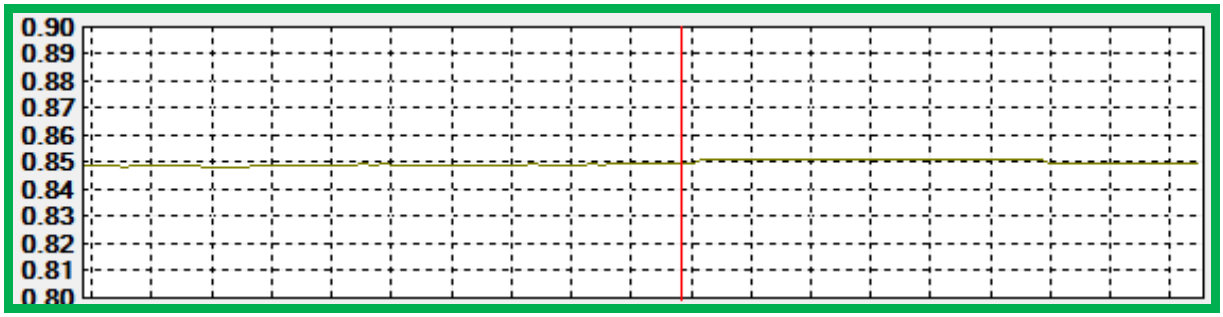
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	400.80	400.60	393.80	20.87	29.72	20.37	0.85	0.88	0.80	49.93	1.00	25.10
MAX	402.10	402.00	395.70	21.04	29.96	20.64	0.85	0.88	0.80	50.05	1.20	25.90
AVG	401.45	401.28	394.67	20.97	29.87	20.54	0.85	0.88	0.80	50.01	1.12	25.55

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

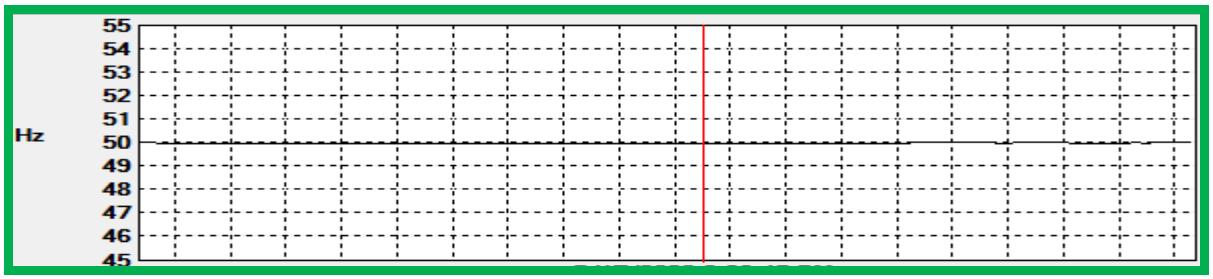
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.32	0.25	0.28	1.00	1.00	1.00	1.30	1.80	1.90	3.40	5.80	4.30
MAX	0.83	1.03	0.90	1.00	1.00	1.00	1.40	1.90	2.00	3.50	6.20	4.40
AVG	0.46	0.46	0.45	1.00	1.00	1.00	1.40	1.84	1.98	3.46	5.96	4.39

Crest Factor

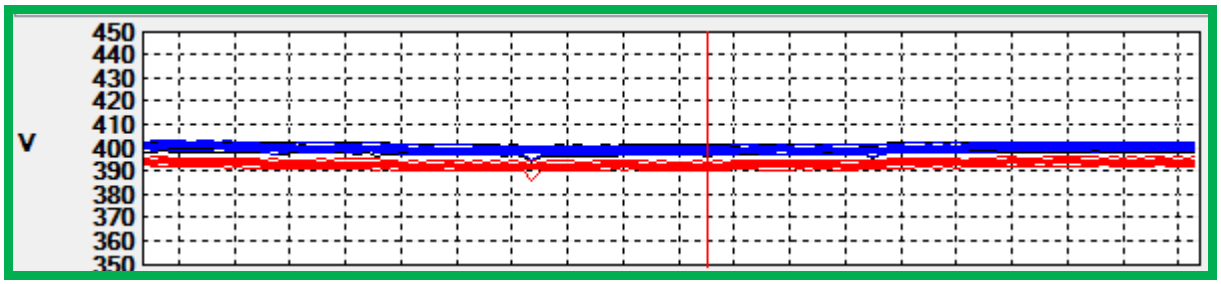
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.43	1.44	1.47	1.53	1.45
MAX	1.43	1.44	1.44	1.47	1.53	1.45
AVG	1.43	1.43	1.44	1.47	1.53	1.45

B20-For-Applied Science (SS-C)

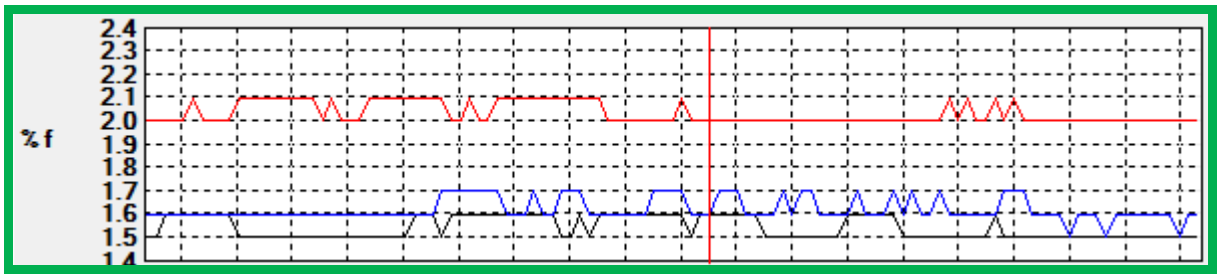
Frequency



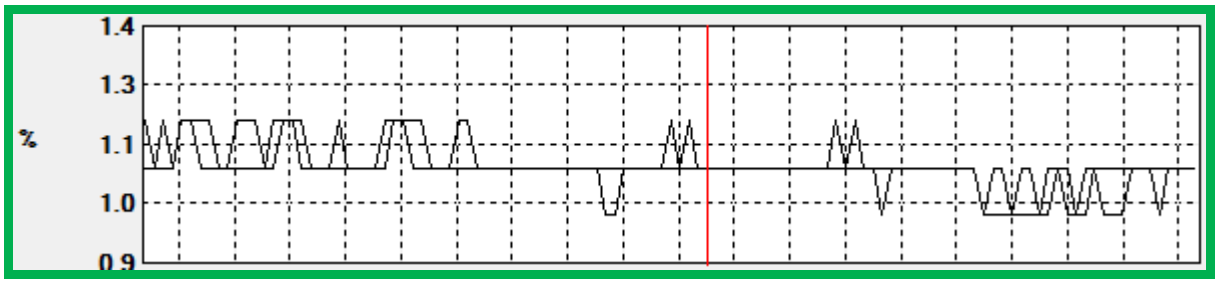
Voltage



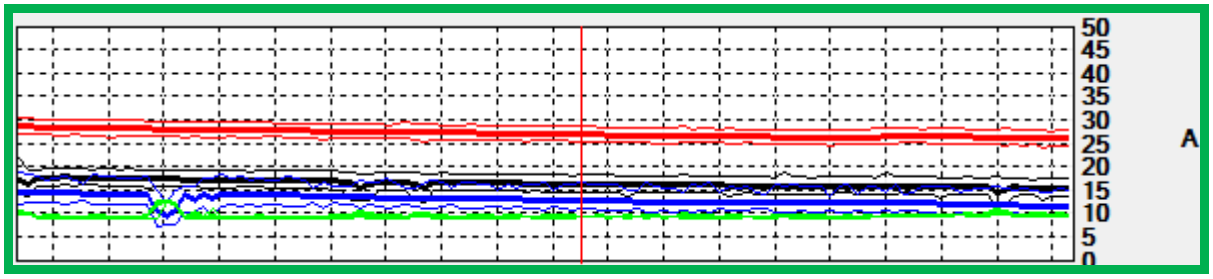
Voltage Harmonics



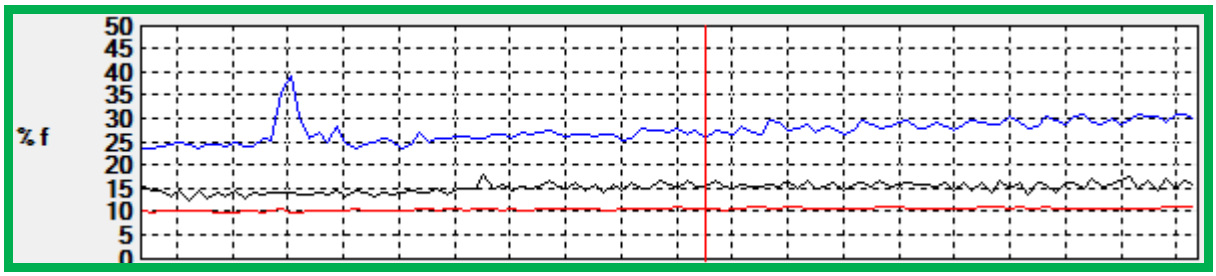
Voltage Un-balance



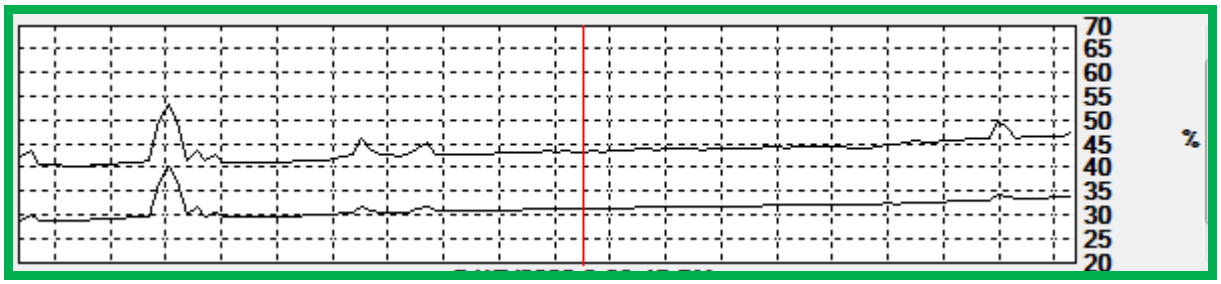
Current



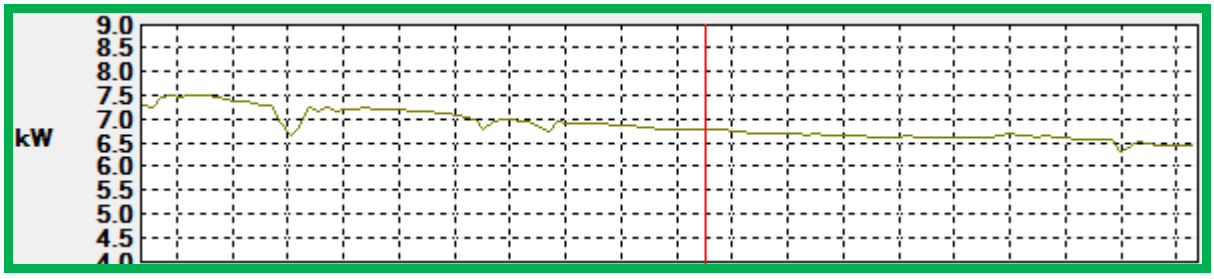
Current Harmonics



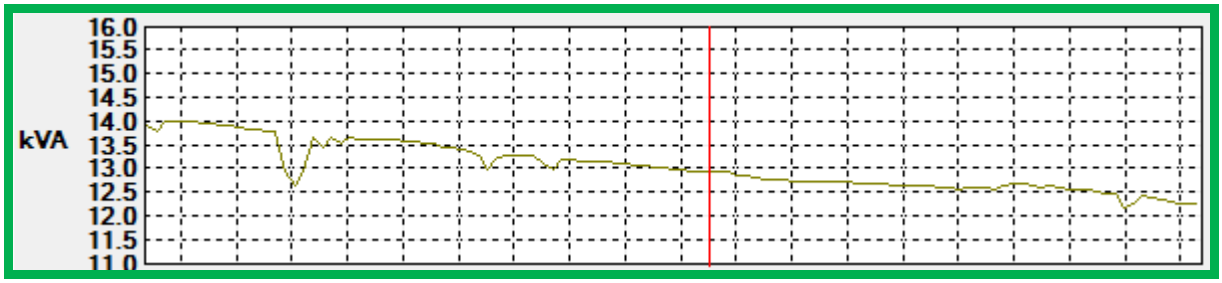
Current Un-balance



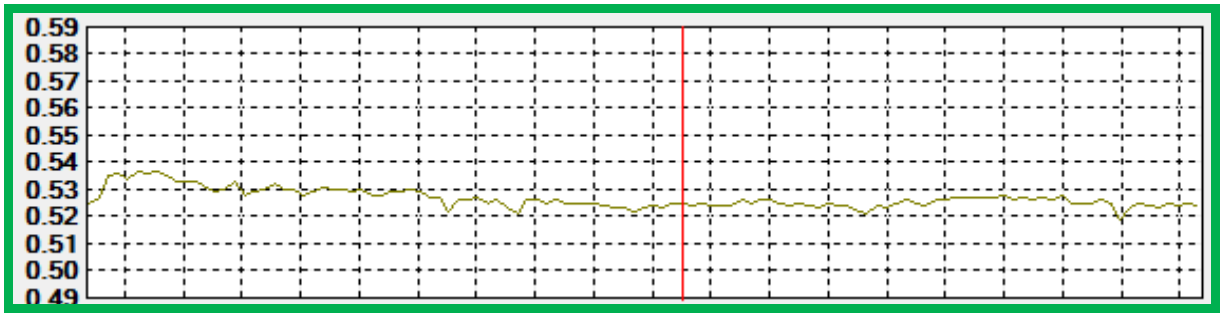
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	398.80	392.30	398.90	14.51	26.12	9.29	0.65	0.50	0.33	49.95	1.00	40.30
MAX	400.90	394.40	401.50	17.90	28.73	14.65	0.68	0.51	0.42	50.02	1.20	53.60
AVG	399.90	393.32	400.01	16.58	27.24	13.04	0.67	0.50	0.39	49.98	1.11	43.79

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

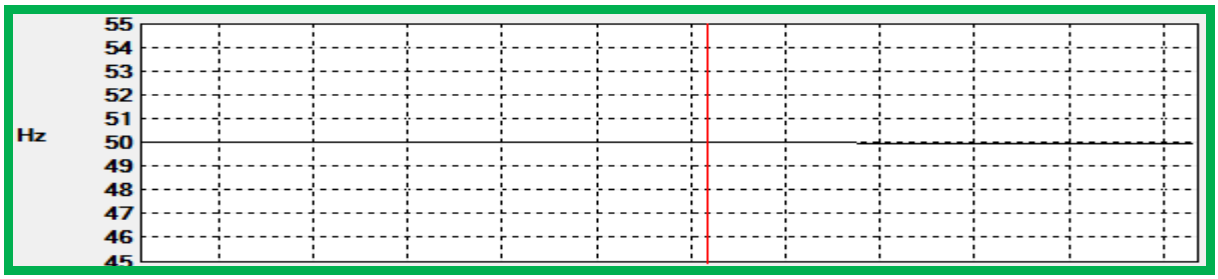
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.32	0.25	0.28	1.02	1.01	1.06	1.80	1.90	1.30	12.60	9.90	23.50
MAX	3.71	3.97	3.90	1.02	1.01	1.15	1.90	2.00	1.40	18.10	11.30	39.30
AVG	3.26	3.47	3.42	1.02	1.01	1.07	1.81	1.93	1.38	15.28	10.64	27.51

Crest Factor

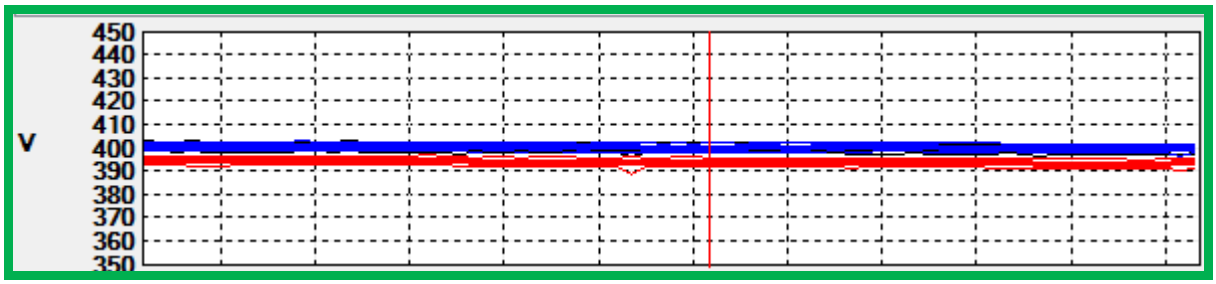
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.44	1.43	1.53	1.62	1.78
MAX	1.44	1.44	1.43	1.67	1.66	2.22
AVG	1.43	1.44	1.43	1.57	1.63	1.84

B21-For-Block-C and Horticulture (SS-C)

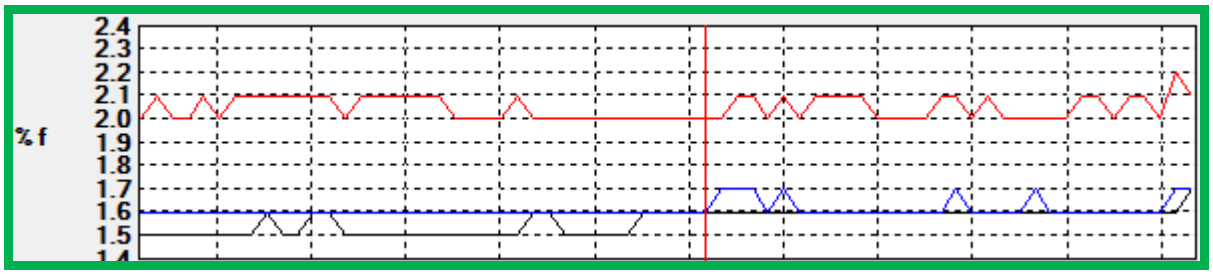
Frequency



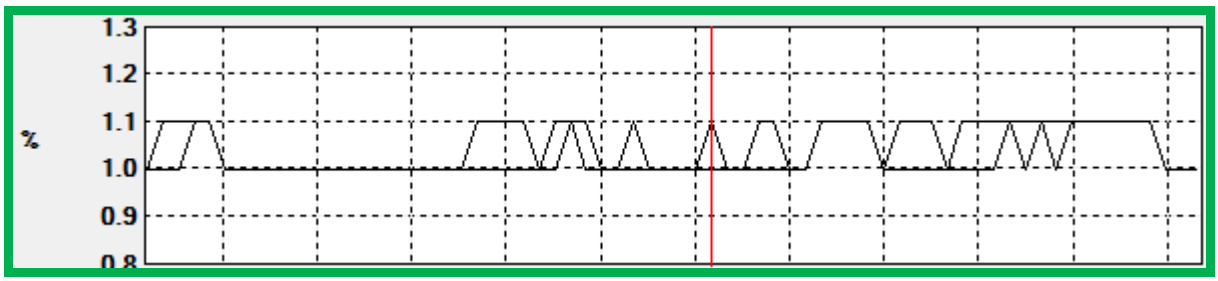
Voltage



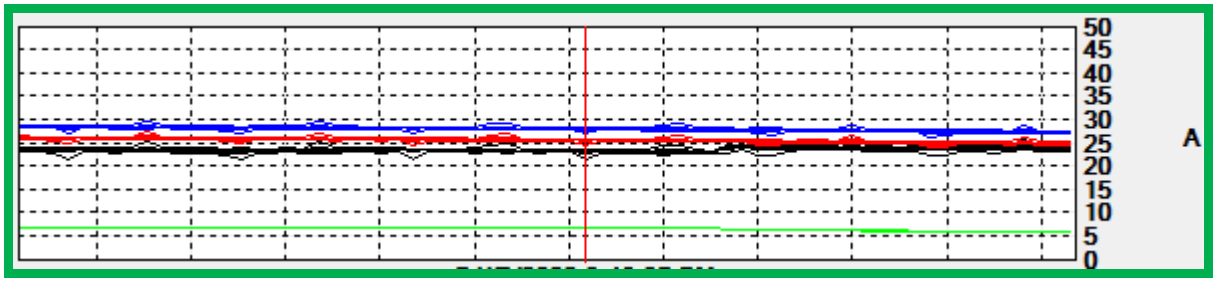
Voltage Harmonics



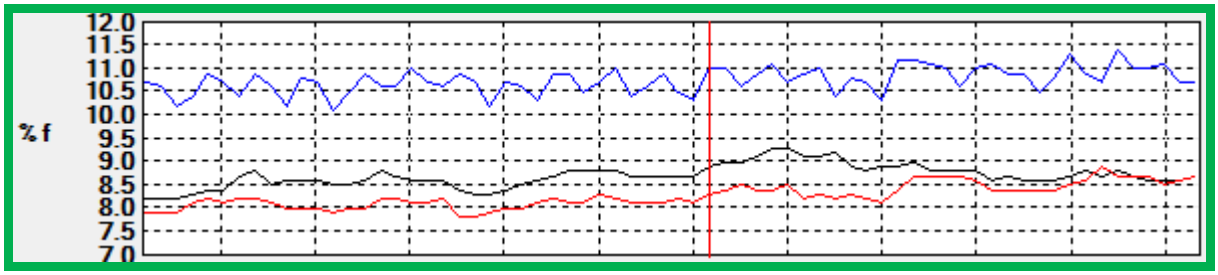
Voltage Un-balance



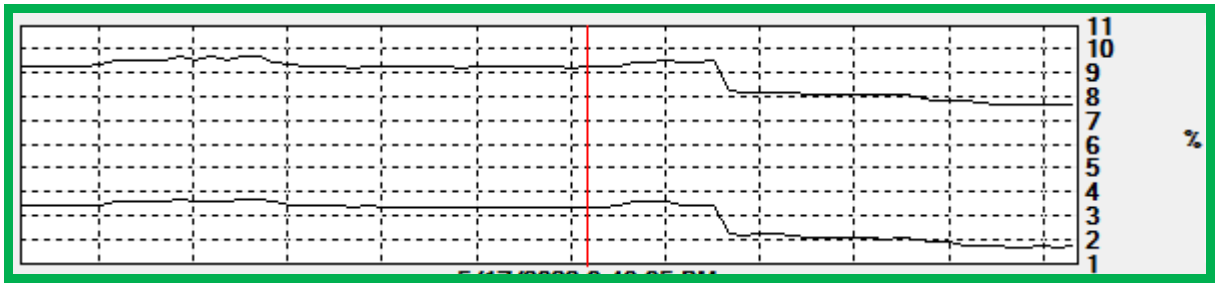
Current



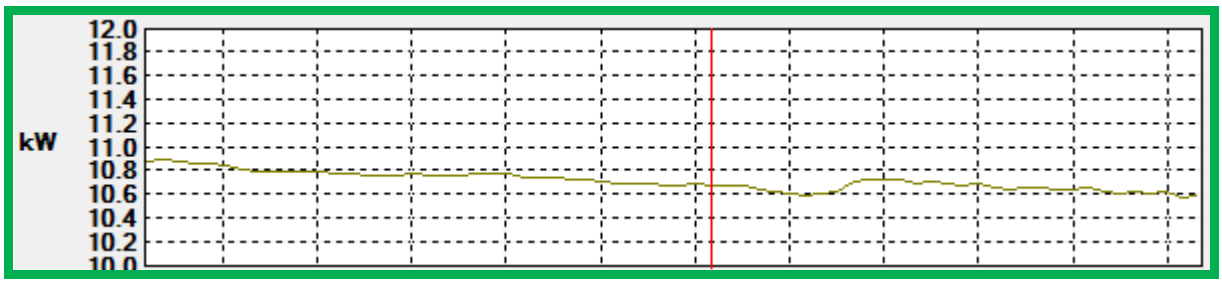
Current Harmonics



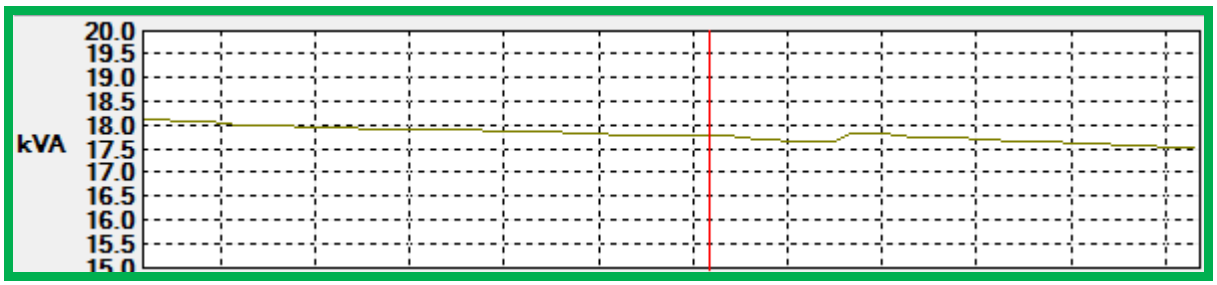
Current Un-balance



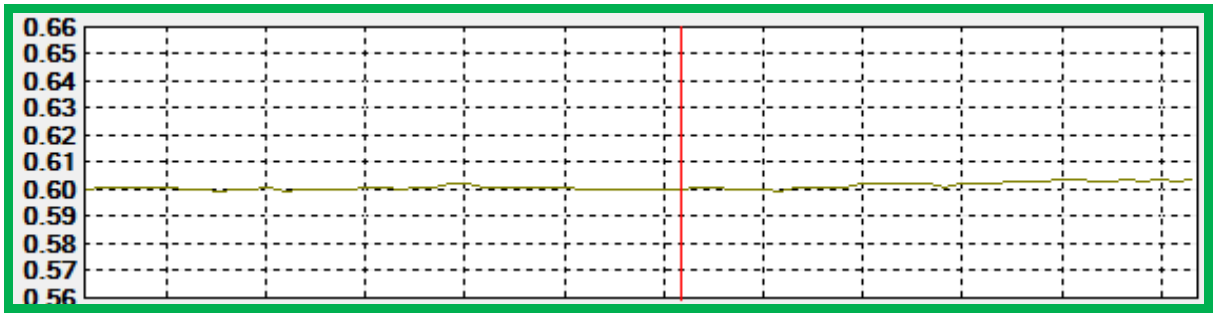
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	399.30	393.20	399.90	23.15	25.01	27.41	0.66	0.56	0.58	49.99	1.00	7.70
MAX	401.00	395.00	401.20	24.09	26.26	28.68	0.67	0.57	0.59	50.03	1.10	9.70
AVG	400.23	394.17	400.53	23.66	25.70	28.13	0.66	0.56	0.58	50.01	1.04	8.93

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

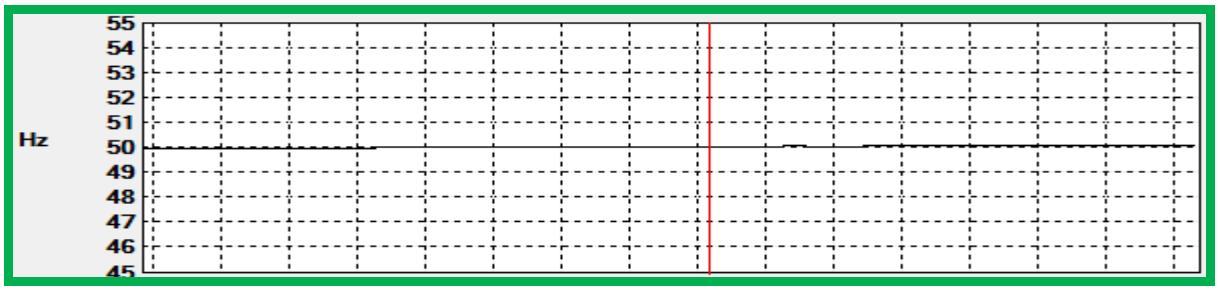
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.50	0.38	0.41	1.01	1.01	1.01	1.70	1.80	1.30	8.20	7.80	10.10
MAX	3.71	3.97	3.90	1.01	1.01	1.02	1.90	2.10	1.50	9.30	8.90	11.40
AVG	0.72	0.62	0.65	1.01	1.01	1.01	1.83	1.93	1.37	8.70	8.26	10.75

Crest Factor

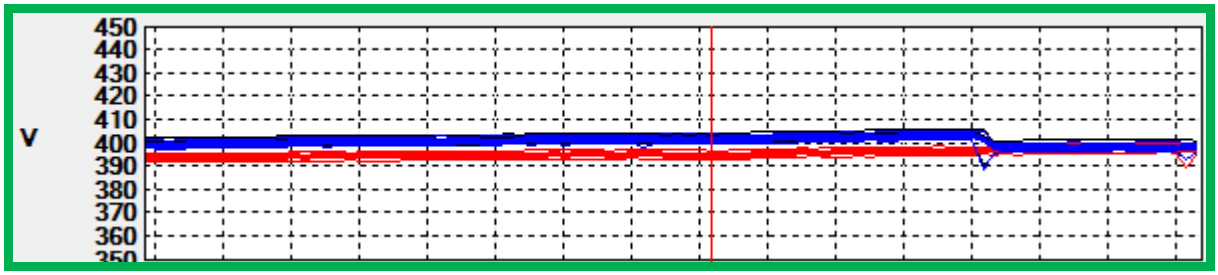
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.44	1.43	1.59	1.56	1.56
MAX	1.44	1.44	1.43	1.65	1.59	1.58
AVG	1.43	1.44	1.43	1.61	1.58	1.57

B22-For-APJ Abdul Kalam Hostel (SS-C)

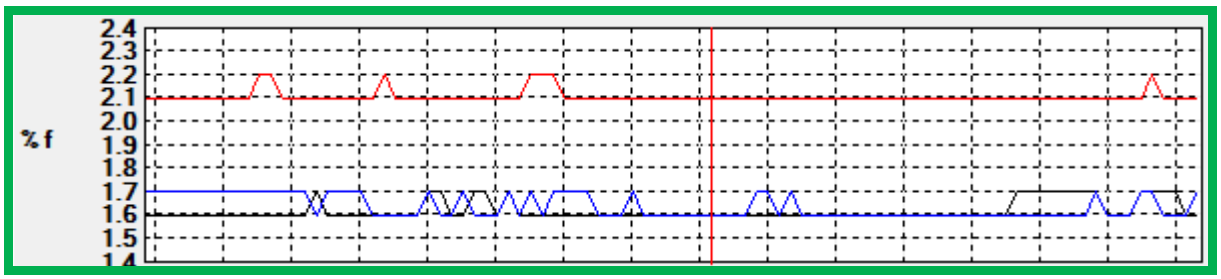
Frequency



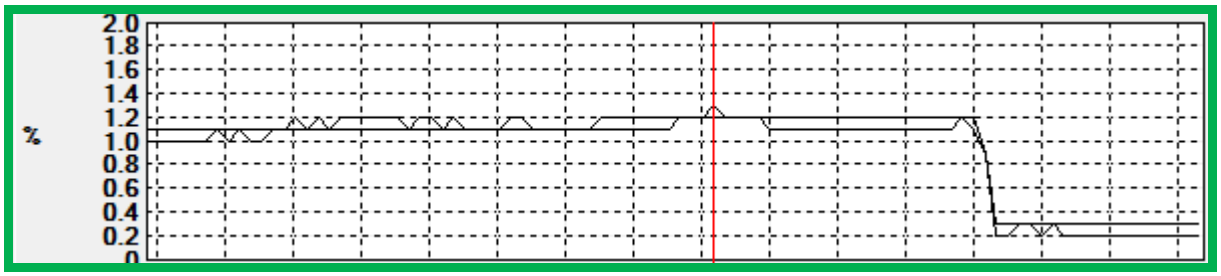
Voltage



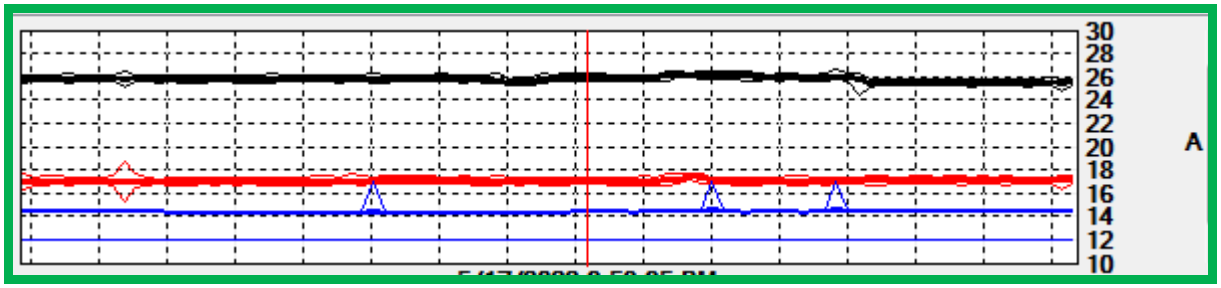
Voltage Harmonics



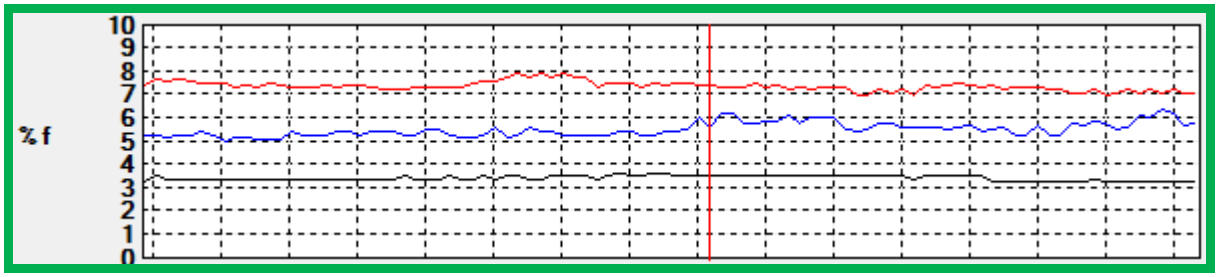
Voltage Un-balance



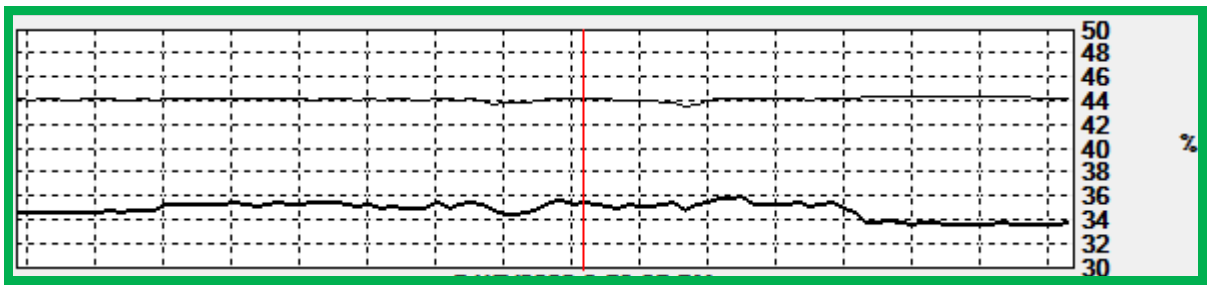
Current



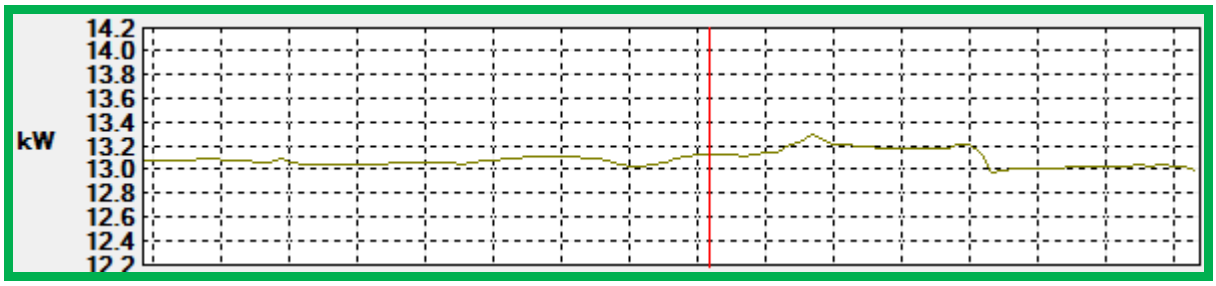
Current Harmonics



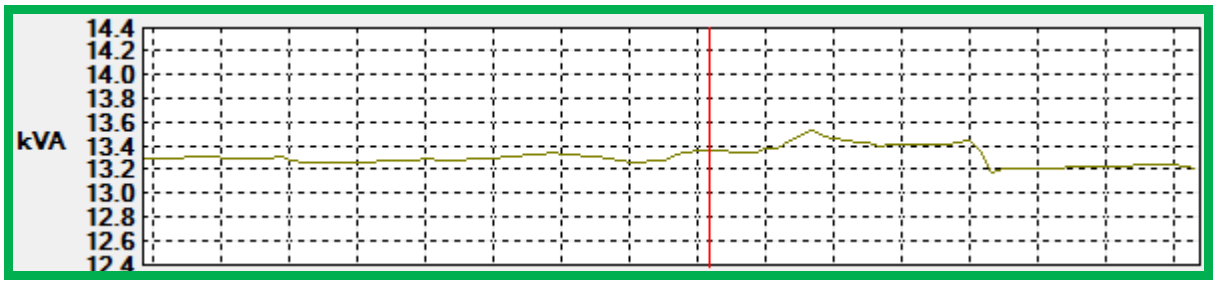
Current Un-balance



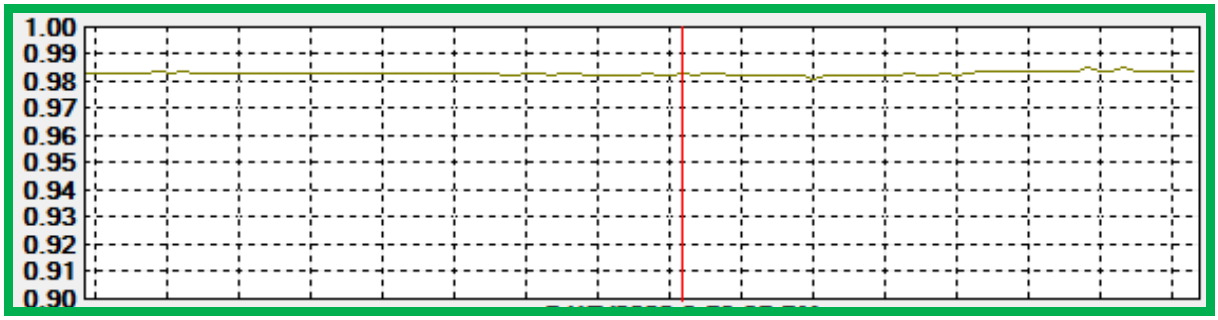
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	398.80	393.60	398.20	25.52	17.06	14.40	0.97	0.99	0.98	49.97	0.20	90.00
MAX	403.90	397.90	403.50	26.24	17.51	14.70	0.98	0.99	0.99	50.09	1.20	90.30
AVG	401.43	395.61	400.89	25.88	17.14	14.58	0.98	0.99	0.99	50.04	0.92	90.17

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

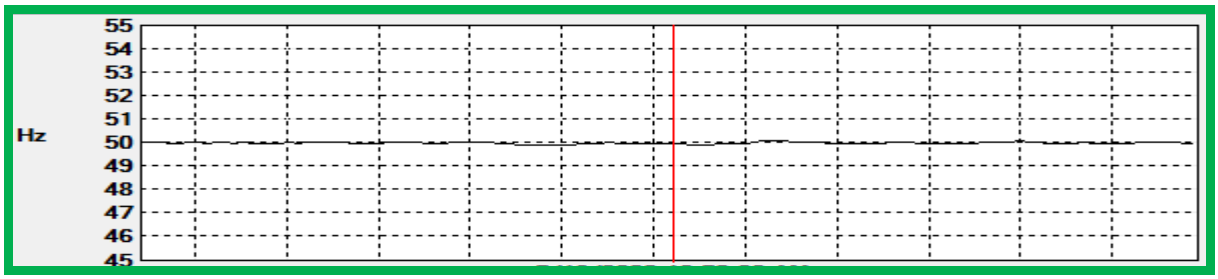
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.50	0.38	0.41	1.00	1.00	1.00	1.80	1.90	1.40	3.30	7.00	5.00
MAX	3.41	4.04	3.77	1.00	1.01	1.01	2.00	2.10	1.50	3.60	7.90	6.40
AVG	3.21	3.78	3.53	1.00	1.00	1.00	1.93	1.99	1.41	3.43	7.36	5.52

Crest Factor

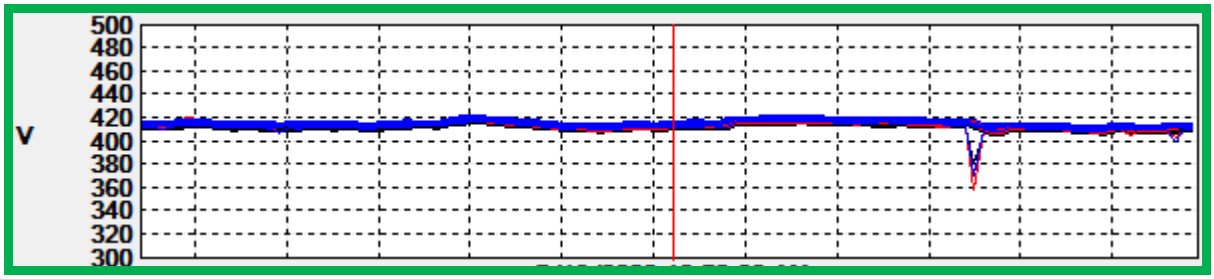
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.43	1.44	1.43	1.43	1.62	1.54
MAX	1.44	1.44	1.43	1.48	1.69	1.71
AVG	1.43	1.44	1.43	1.44	1.63	1.60

A9-For-Outgoing transformer 630 KVA (SS-D)

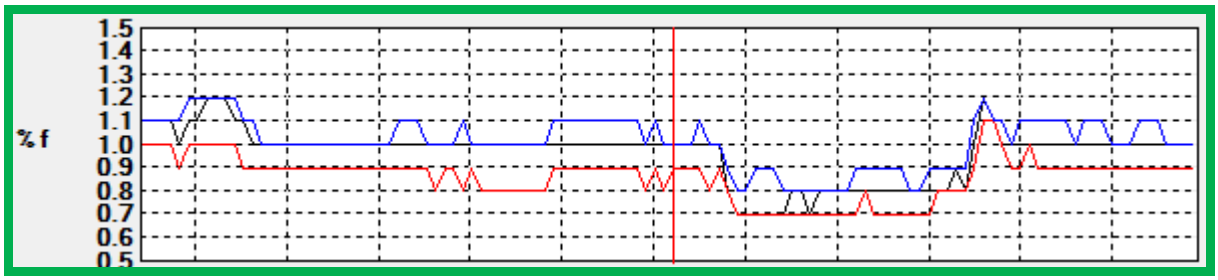
Frequency



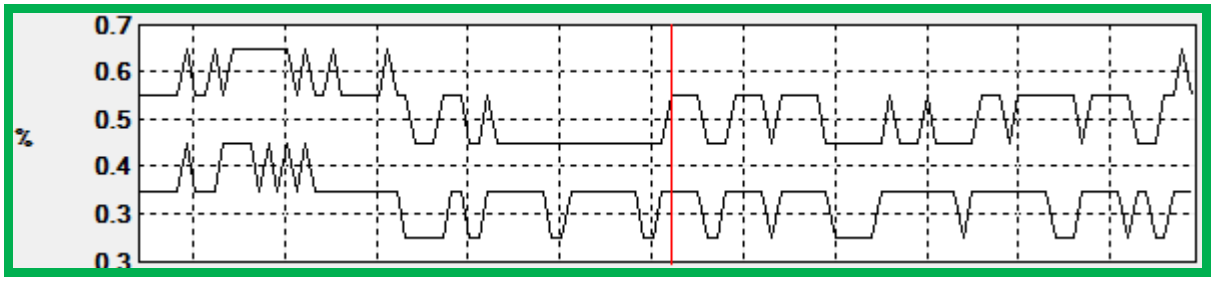
Voltage



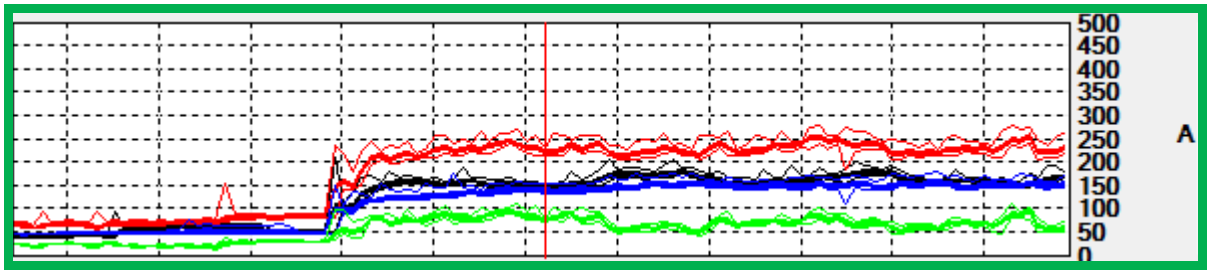
Voltage Harmonics



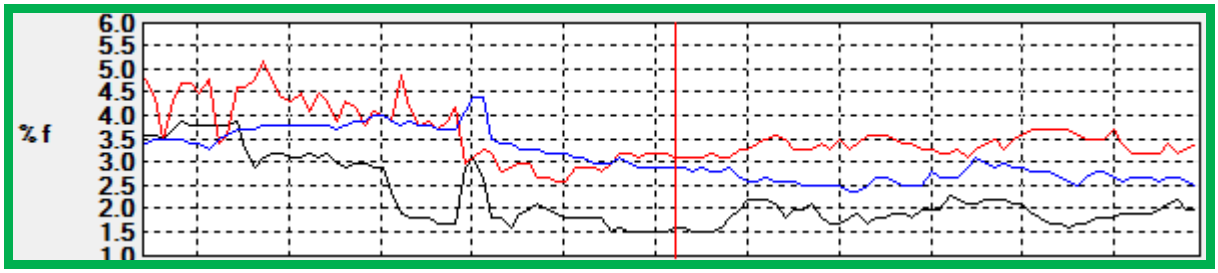
Voltage Un-balance



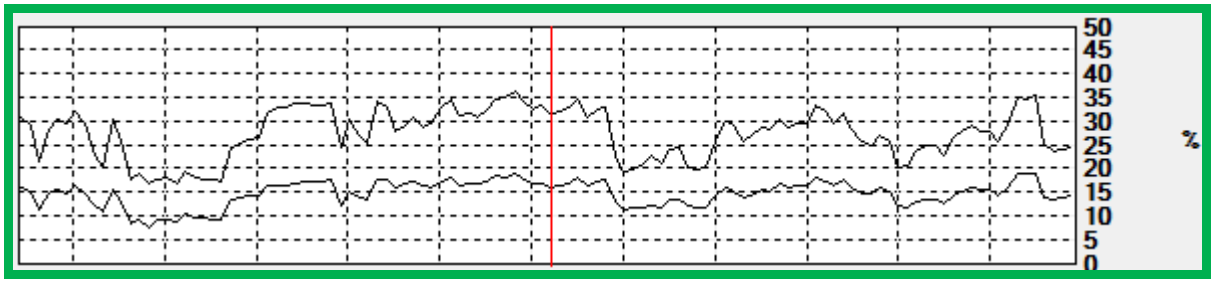
Current



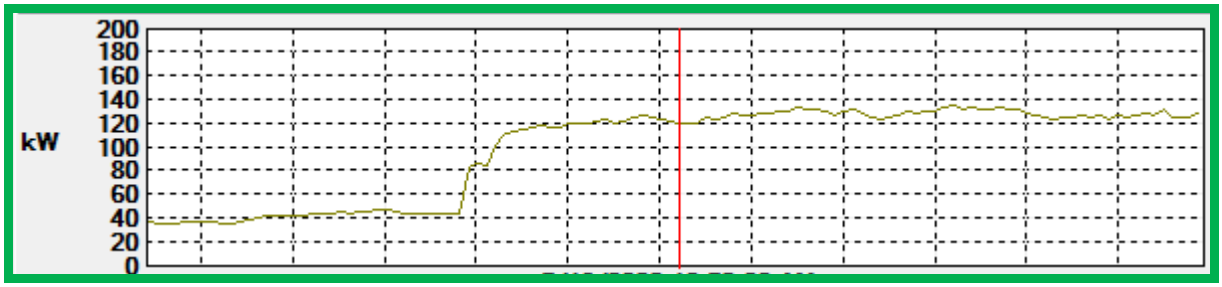
Current Harmonics



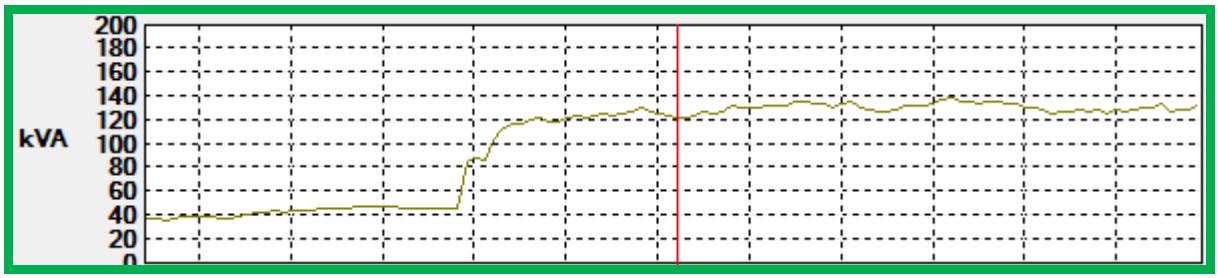
Current Un-balance



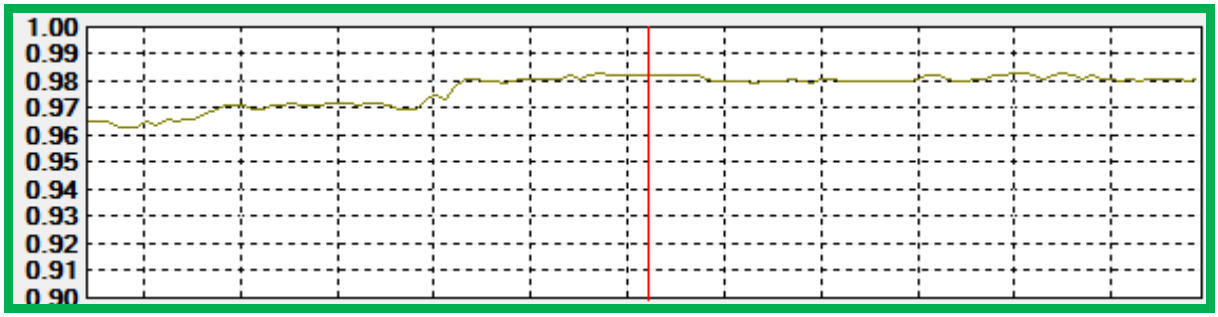
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	408.00	409.60	410.90	40.70	61.30	48.10	0.94	0.98	0.96	49.91	0.30	16.80
MAX	417.40	419.50	419.60	181.10	256.80	159.90	0.99	0.99	0.98	50.07	0.50	36.60
AVG	412.47	414.48	415.27	127.75	181.16	115.80	0.98	0.98	0.97	49.99	0.39	27.54

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

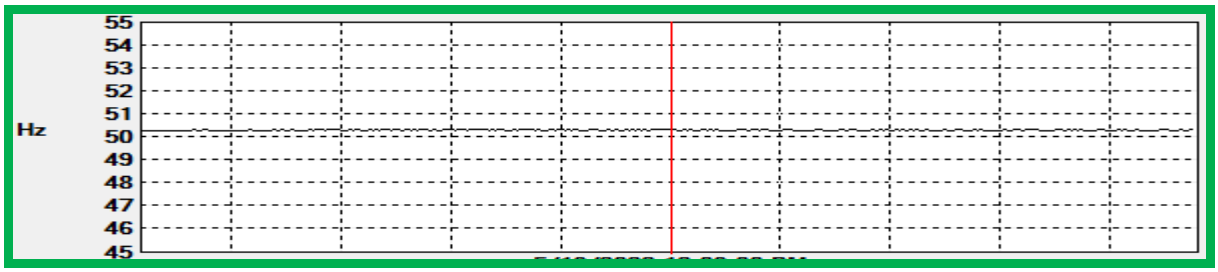
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.20	0.20	0.18	1.00	1.00	1.00	0.70	0.70	0.70	1.50	2.60	2.40
MAX	1.74	1.42	1.74	1.00	1.00	1.00	1.10	1.20	1.20	3.90	5.20	4.40
AVG	0.48	0.49	0.58	1.00	1.00	1.00	0.93	0.91	0.97	2.23	3.57	3.12

Crest Factor

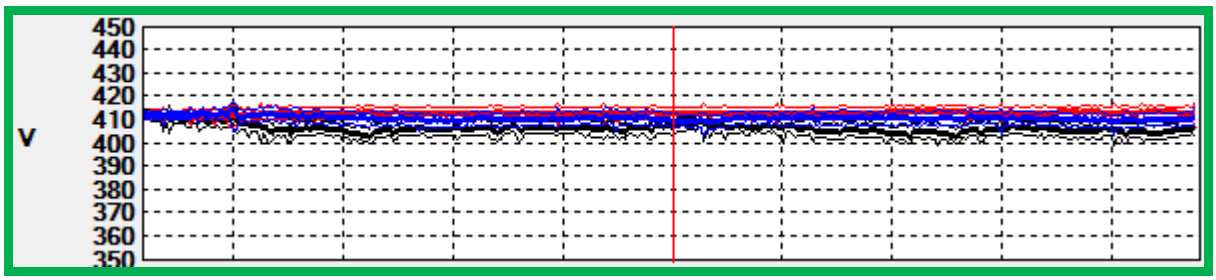
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.42	1.39	1.48	1.46
MAX	1.43	1.43	1.43	1.51	1.56	1.55
AVG	1.42	1.42	1.43	1.46	1.51	1.50

A10-For-D. G Set 250 KVA (SS-D)

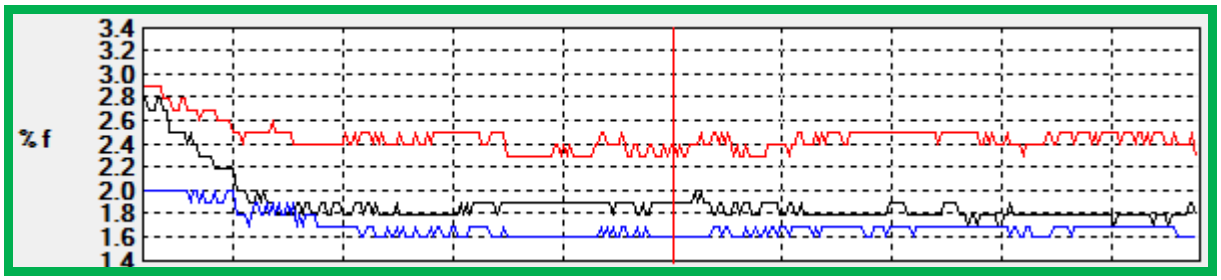
Frequency



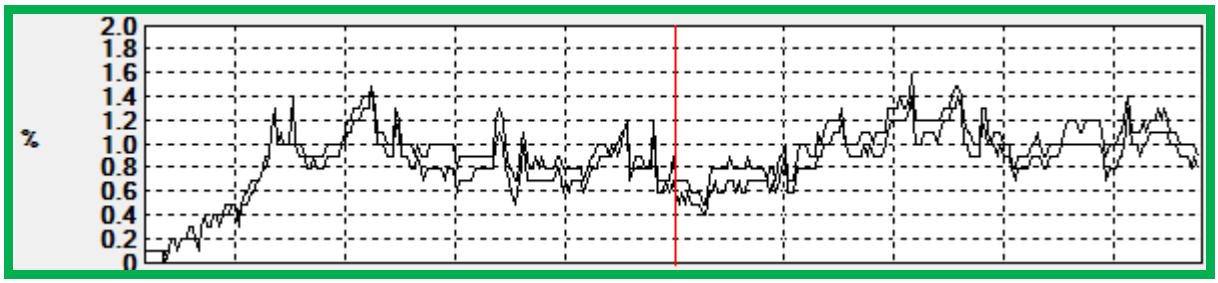
Voltage



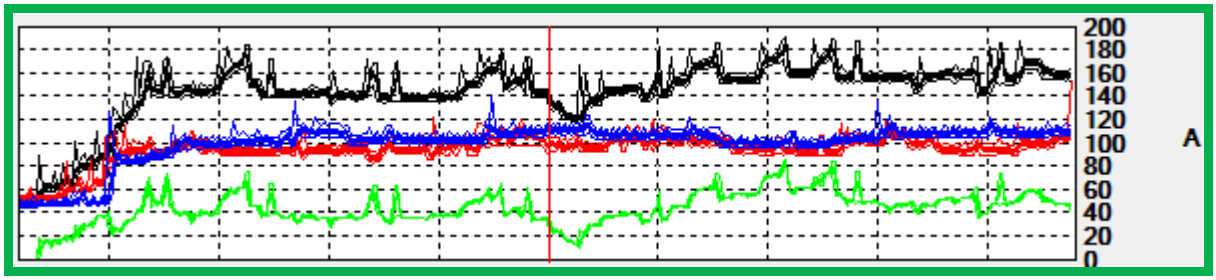
Voltage Harmonics



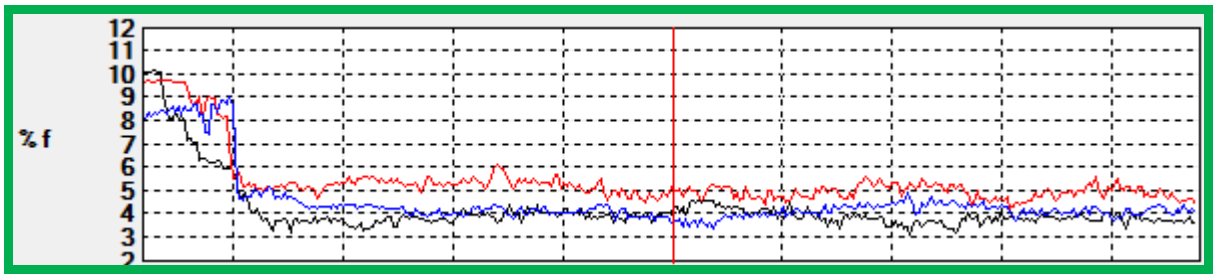
Voltage Un-balance



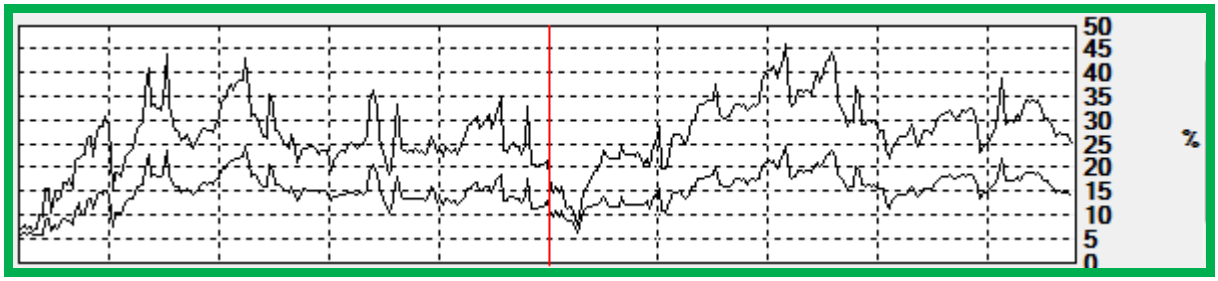
Current



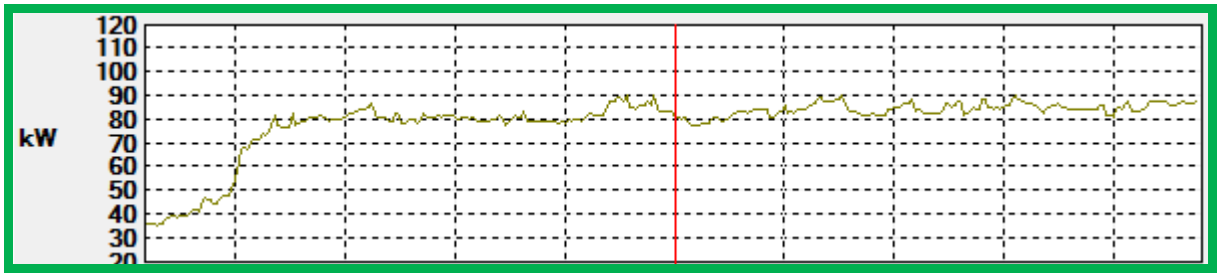
Current Harmonics



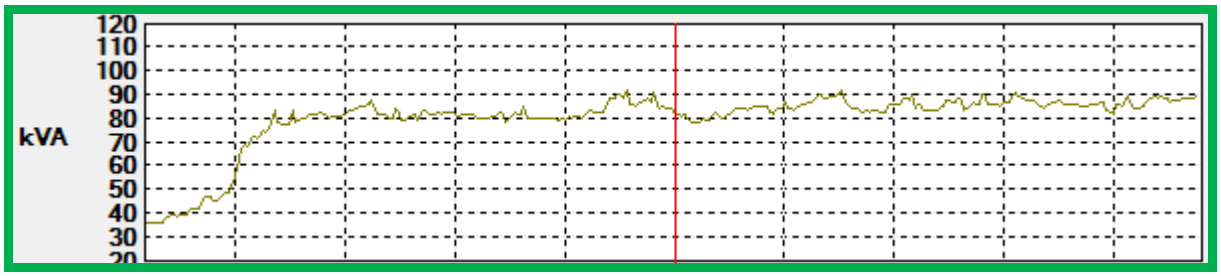
Current Un-balance



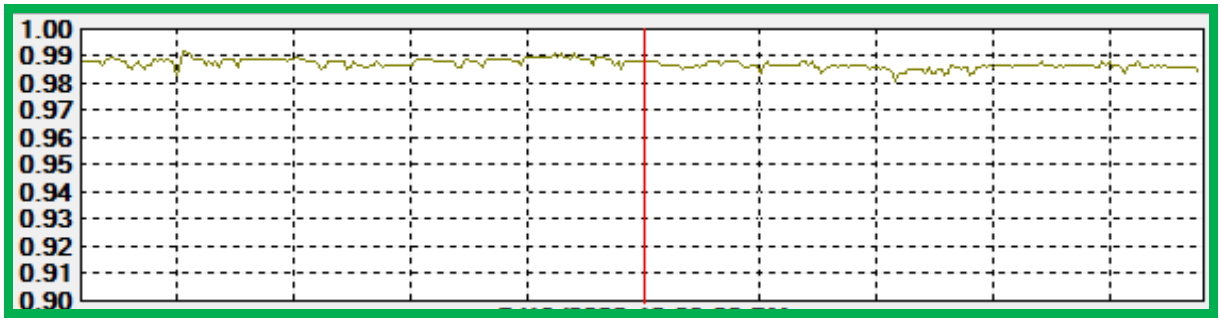
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	402.80	411.90	409.00	49.50	54.30	47.40	0.98	0.98	0.97	50.27	0.00	6.80
MAX	412.30	414.00	414.30	187.10	114.80	115.70	1.00	0.99	1.00	50.37	1.50	46.30
AVG	406.45	413.04	410.86	144.14	94.81	99.88	0.99	0.98	0.99	50.31	0.90	27.15

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

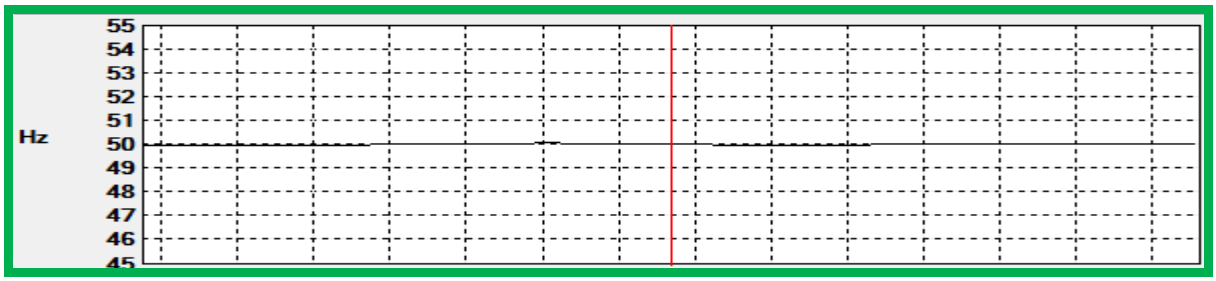
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	0.30	0.27	0.52	1.00	1.00	1.00	2.20	2.00	1.40	3.10	4.20	3.40
MAX	1.58	1.66	1.42	1.03	1.04	1.03	3.00	2.50	2.20	10.20	9.80	9.10
AVG	1.13	1.13	1.03	1.00	1.01	1.01	2.30	2.19	1.56	4.20	5.43	4.55

Crest Factor

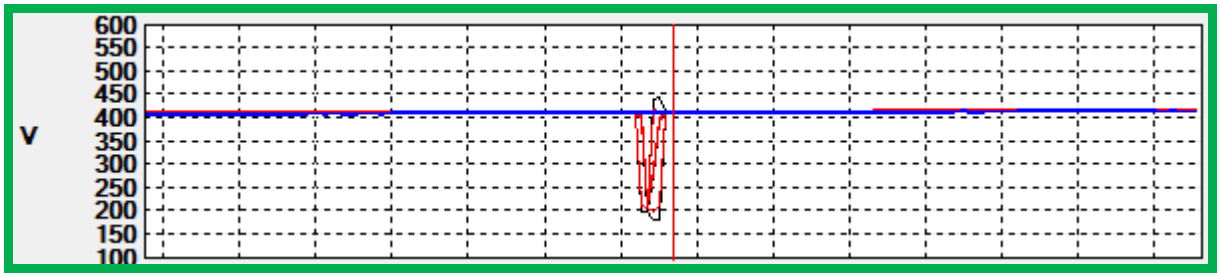
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.41	1.44	1.51	1.54	1.53
MAX	1.44	1.46	1.46	1.84	1.78	2.12
AVG	1.44	1.45	1.45	1.56	1.59	1.56

B41-For-New Mass Communication Dept (SS-D)

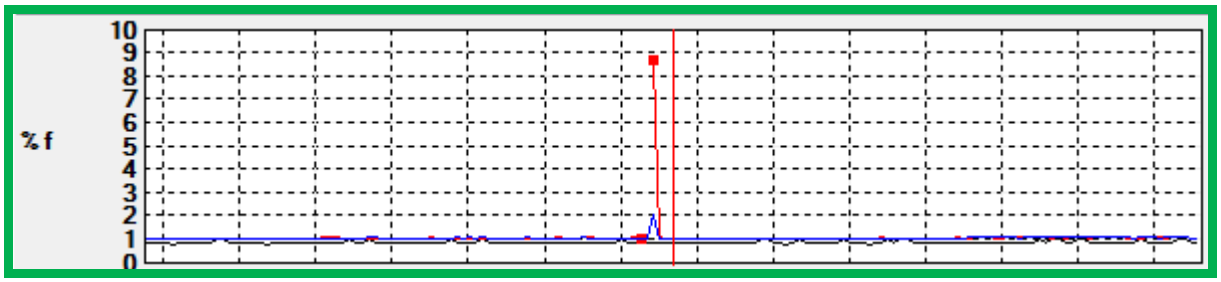
Frequency



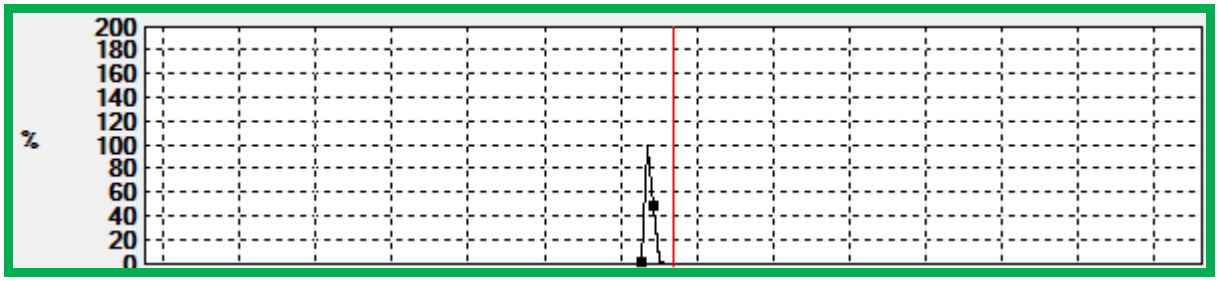
Voltage



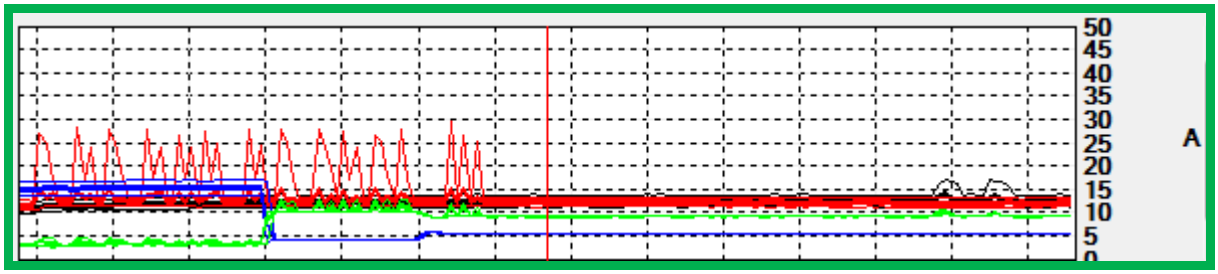
Voltage Harmonics



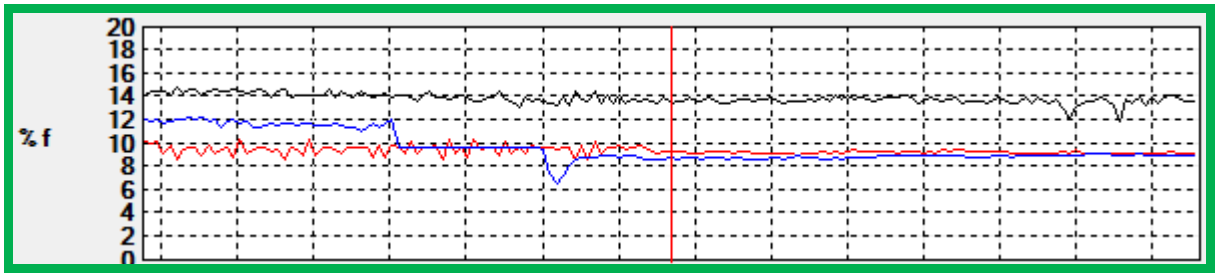
Voltage Un-balance



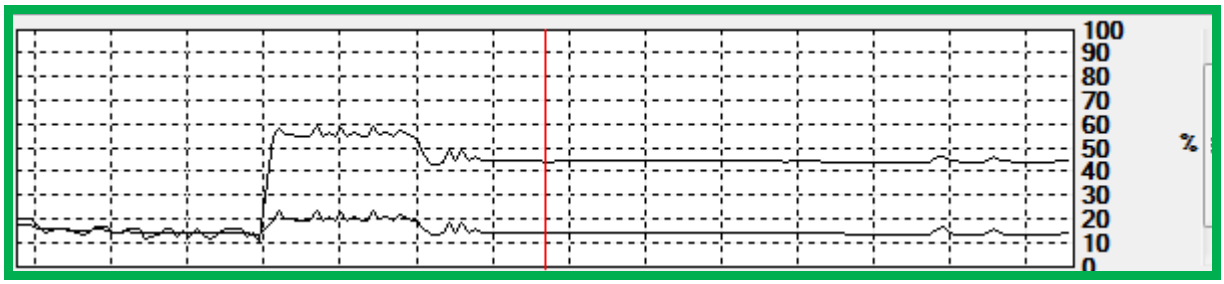
Current



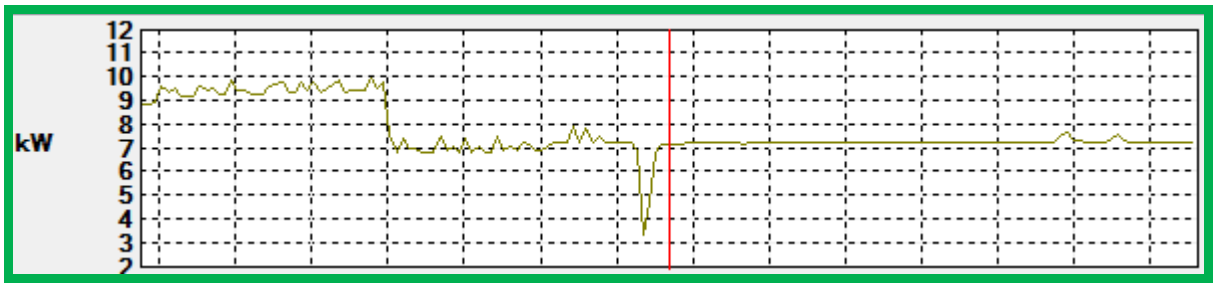
Current Harmonics



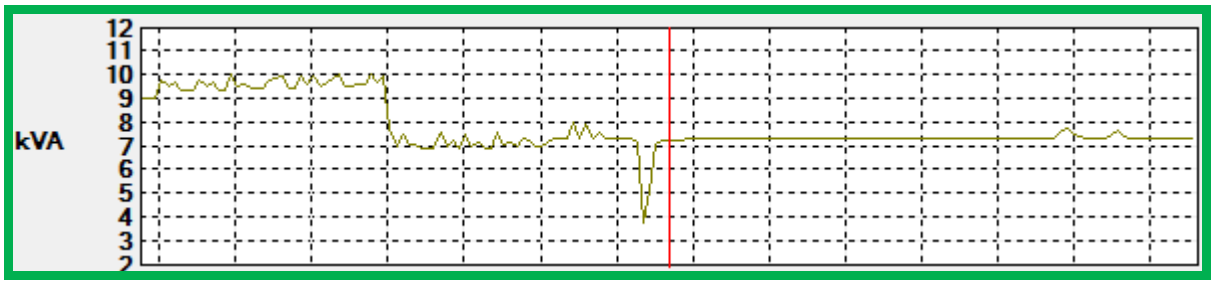
Current Un-balance



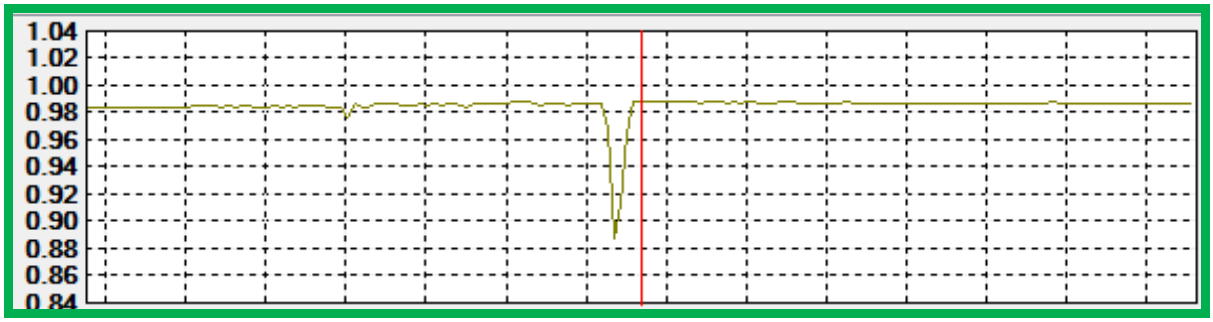
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	401.8	401.9	409.0	11.0	11.7	4.4	1.0	1.0	1.0	50.0	0.2	11.1
MAX	418.1	418.1	416.3	14.3	15.3	15.6	1.0	1.0	1.0	50.1	1.6	59.1
AVG	414.2	414.0	412.2	12.5	12.7	7.8	1.0	1.0	1.0	50.0	0.3	39.3

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

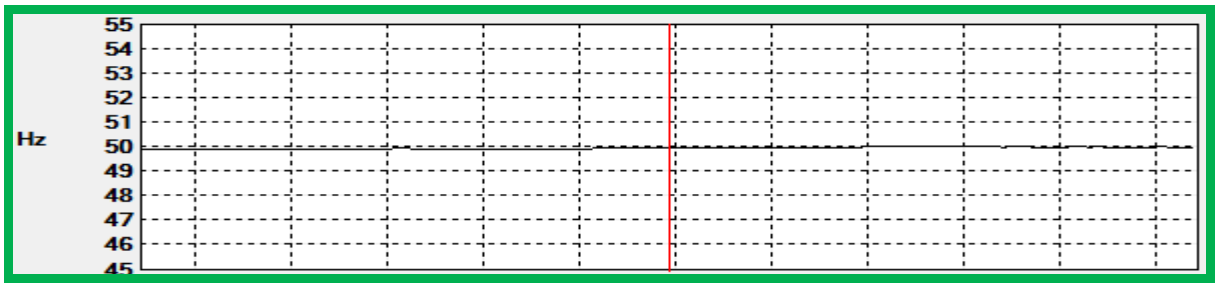
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.0	1.0	1.0	0.9	1.0	0.9	11.9	8.6	6.5
MAX	- - -	- - -	- - -	1.0	1.0	1.0	1.0	1.1	1.1	14.8	10.4	12.3
AVG	- - -	- - -	- - -	1.0	1.0	1.0	0.9	1.0	1.0	13.9	9.4	9.6

Crest Factor

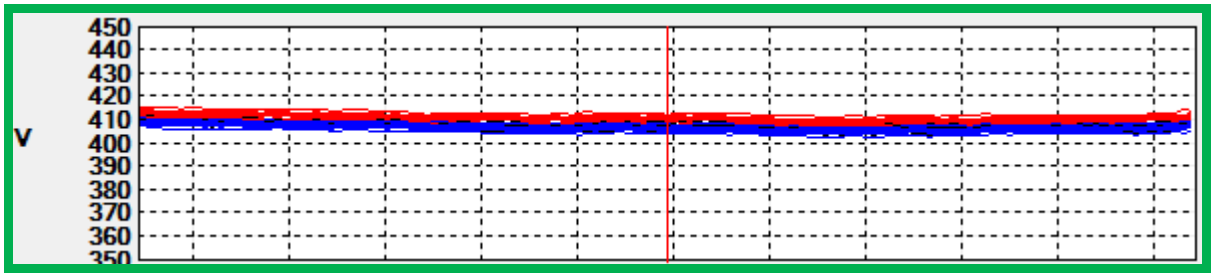
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.4	1.4	1.4	1.6	1.6	1.4
MAX	1.5	1.5	1.4	1.8	2.1	1.7
AVG	1.4	1.4	1.4	1.6	1.7	1.5

B42-For-New Hindi Dept (SS-D)

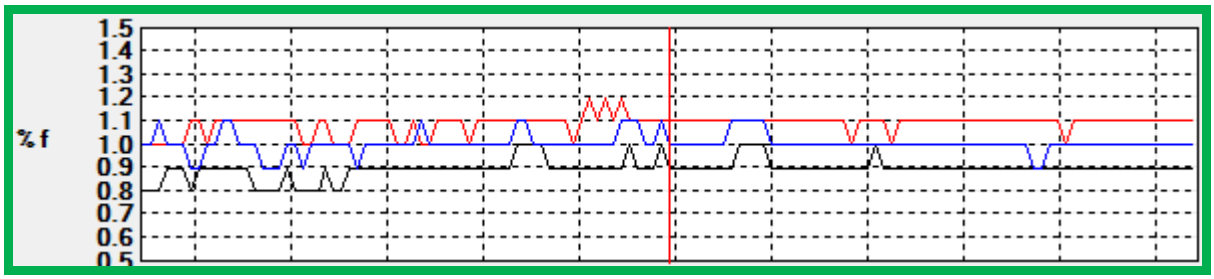
Frequency



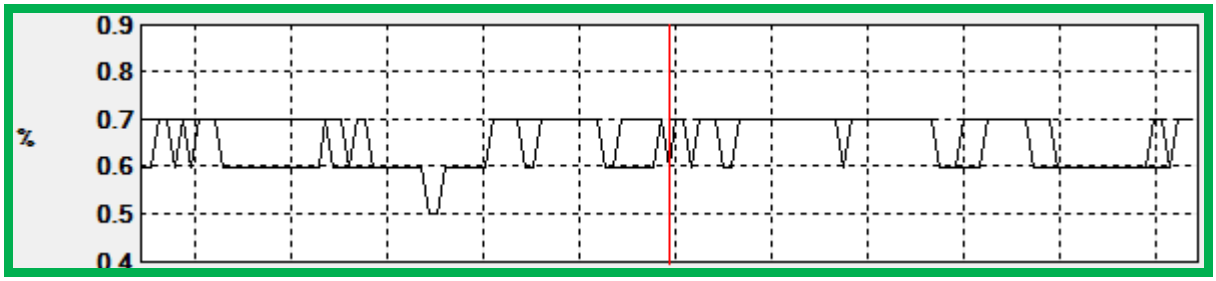
Voltage



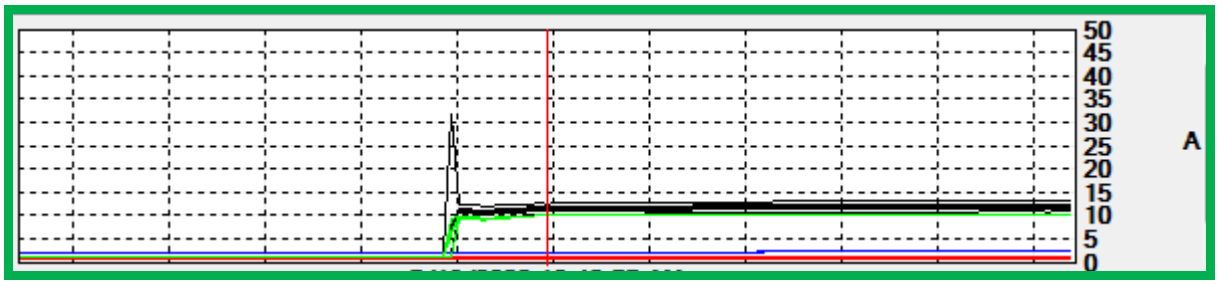
Voltage Harmonics



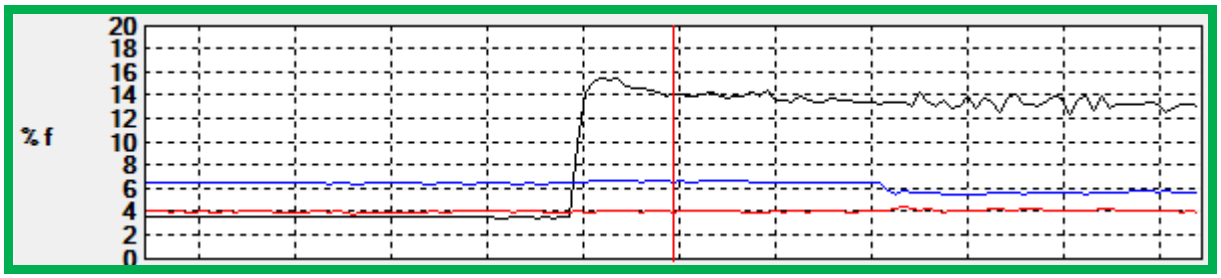
Voltage Un-balance



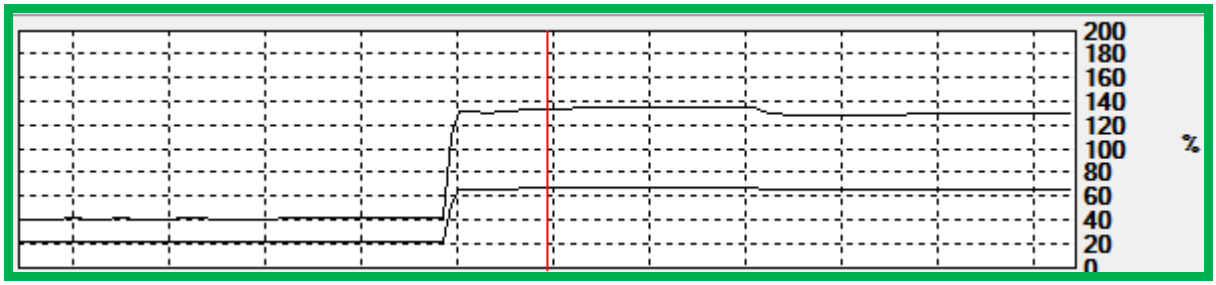
Current



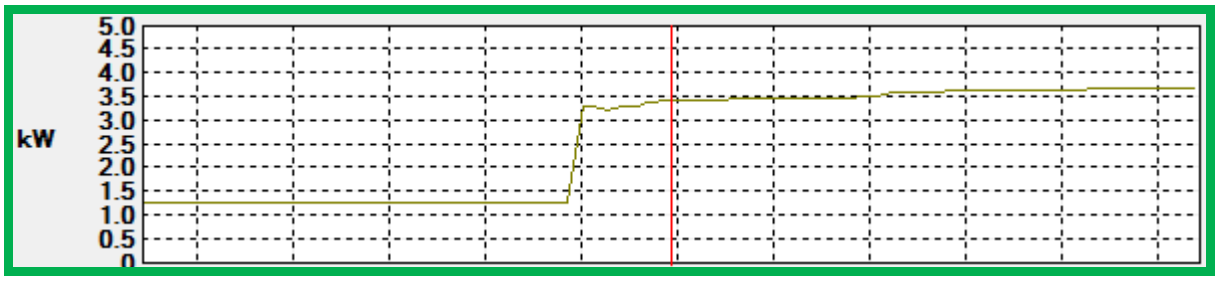
Current Harmonics



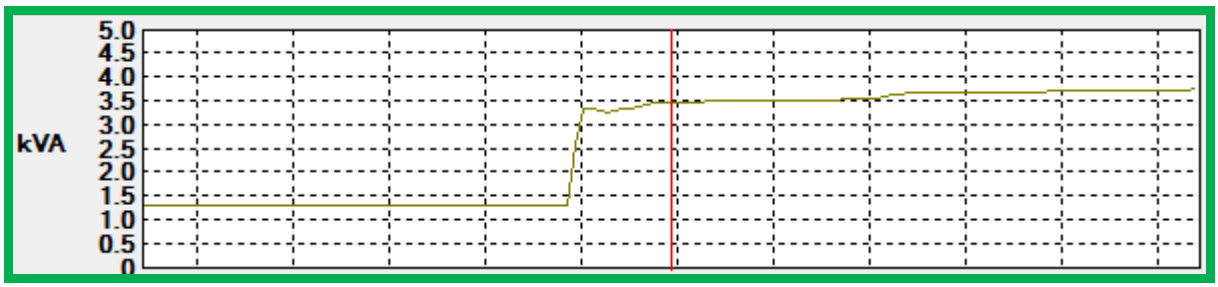
Current Un-balance



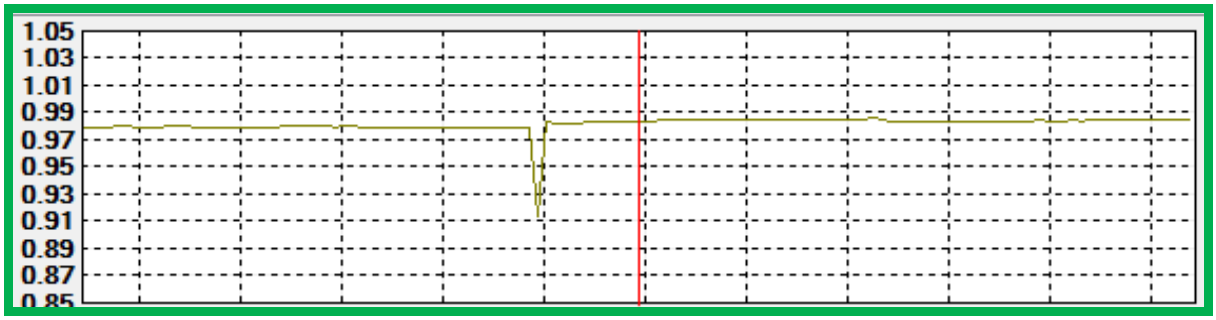
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	405.70	409.50	404.80	2.28	1.07	2.15	0.90	0.92	0.99	49.91	0.50	41.40
MAX	410.50	413.80	408.90	12.22	1.08	2.64	0.99	0.93	0.99	50.02	0.80	136.10
AVG	407.51	411.05	406.51	7.94	1.07	2.30	0.99	0.92	0.99	49.96	0.66	95.20

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

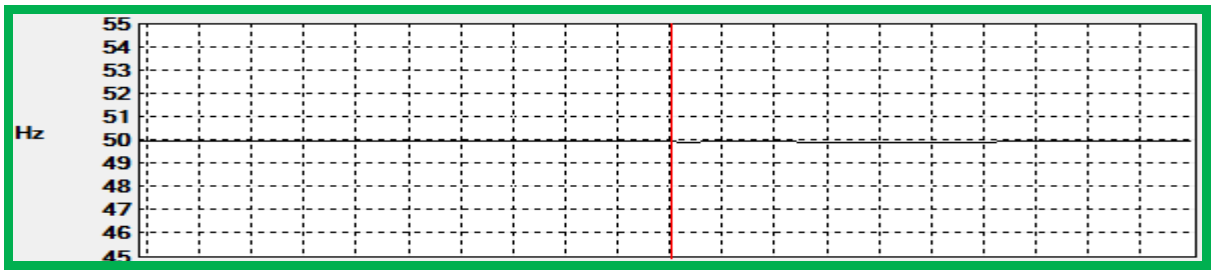
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	- - -	- - -	- - -	1.00	1.00	1.00	0.80	1.00	0.90	3.50	3.80	5.60
MAX	- - -	- - -	- - -	1.00	1.00	1.00	1.00	1.20	1.00	15.60	4.40	6.70
AVG	- - -	- - -	- - -	1.00	1.00	1.00	0.98	1.08	0.98	9.59	4.11	6.29

Crest Factor

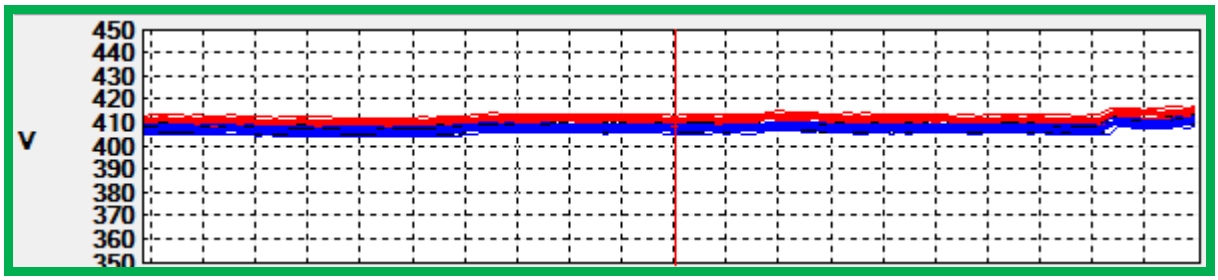
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.43	1.42	1.40	1.48	1.38
MAX	1.43	1.43	1.43	2.30	1.50	1.46
AVG	1.42	1.43	1.42	1.51	1.50	1.40

B43-For-Zoology Dept. ground FLOOR (SS-D)

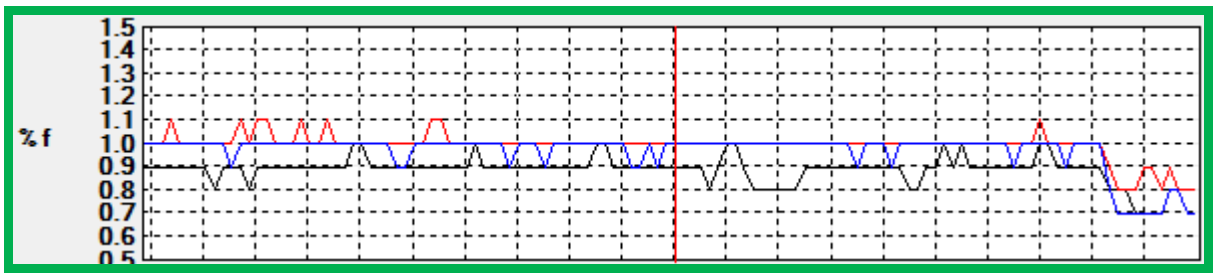
Frequency



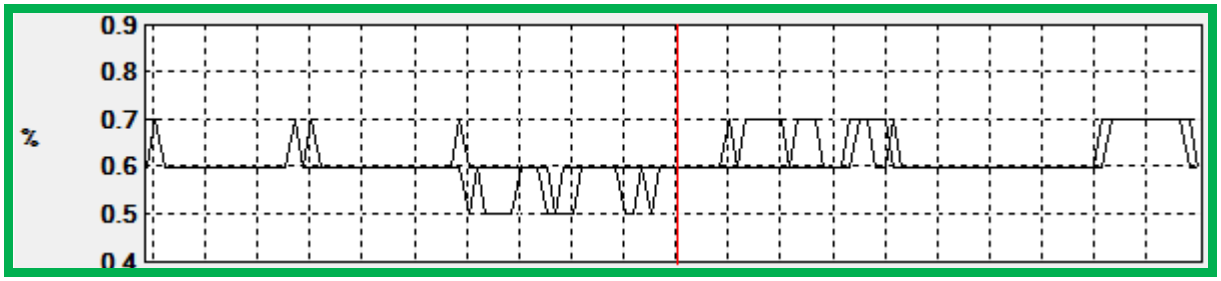
Voltage



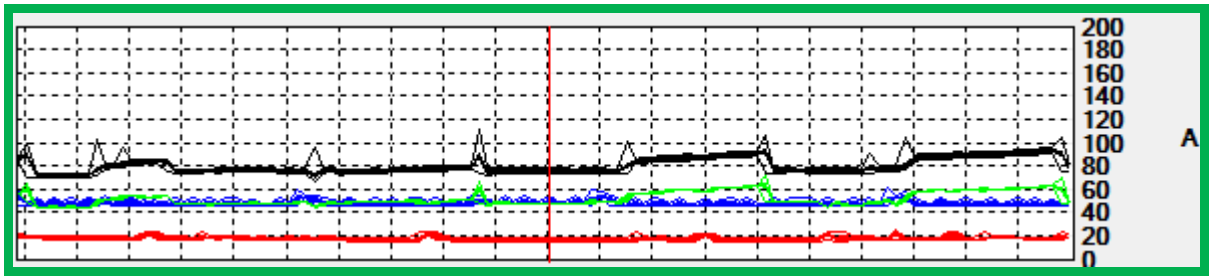
Voltage Harmonics



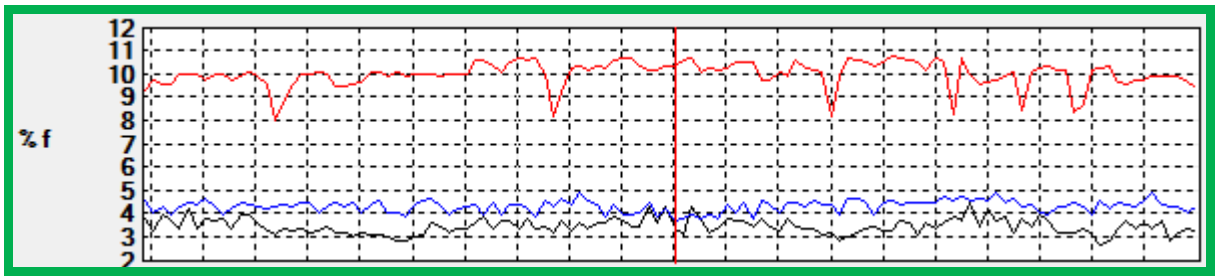
Voltage Un-balance



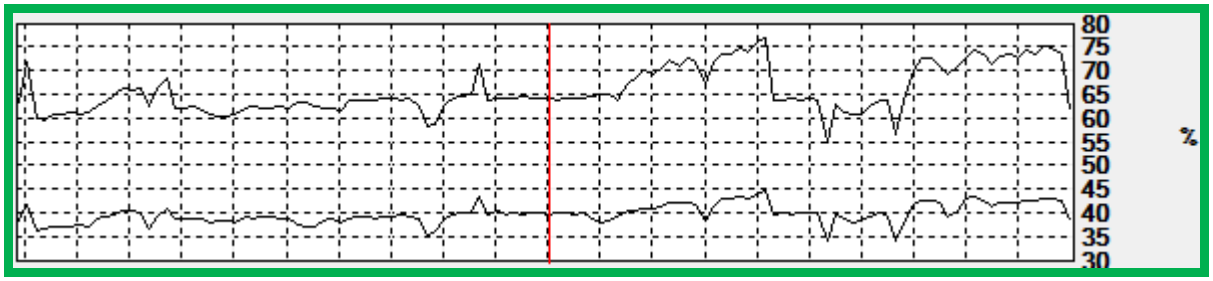
Current



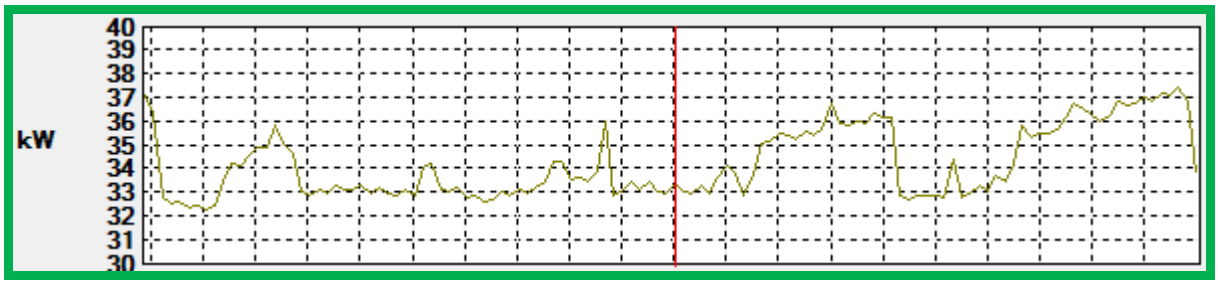
Current Harmonics



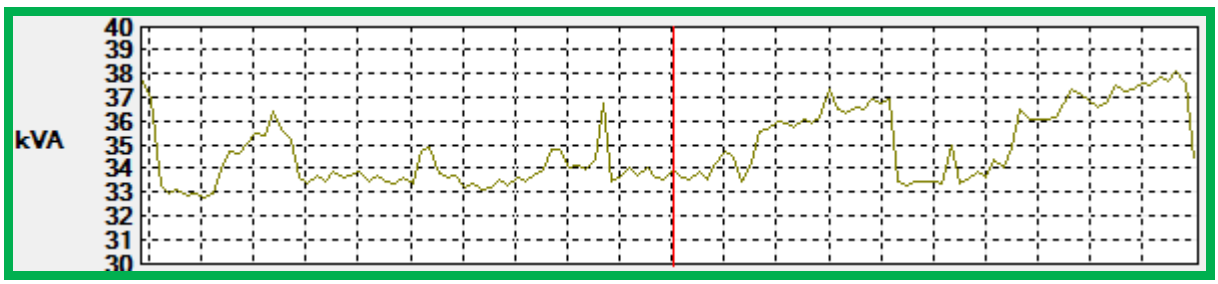
Current Un-balance



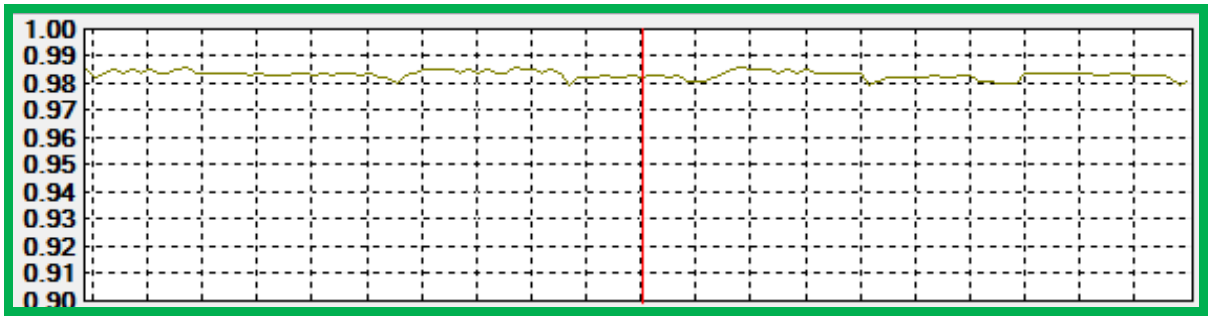
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	406.60	410.30	406.10	72.79	16.82	47.22	0.97	0.99	0.99	49.91	0.60	54.80
MAX	411.70	415.10	410.80	93.54	22.93	53.92	0.98	1.00	1.00	49.98	0.70	77.20
AVG	408.30	411.81	407.63	80.94	18.05	48.66	0.97	0.99	0.99	49.94	0.63	65.87

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

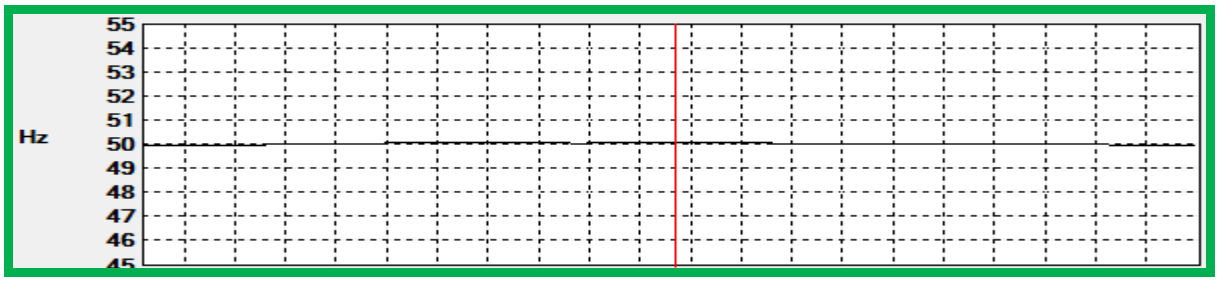
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.74	1.42	1.42	1.00	1.01	1.00	0.80	0.80	0.70	2.70	8.00	3.70
MAX	1.74	1.42	1.42	1.00	1.02	1.00	1.00	1.10	1.00	4.50	10.80	4.90
AVG	1.74	1.42	1.42	1.00	1.02	1.00	0.92	1.00	0.96	3.48	10.01	4.34

Crest Factor

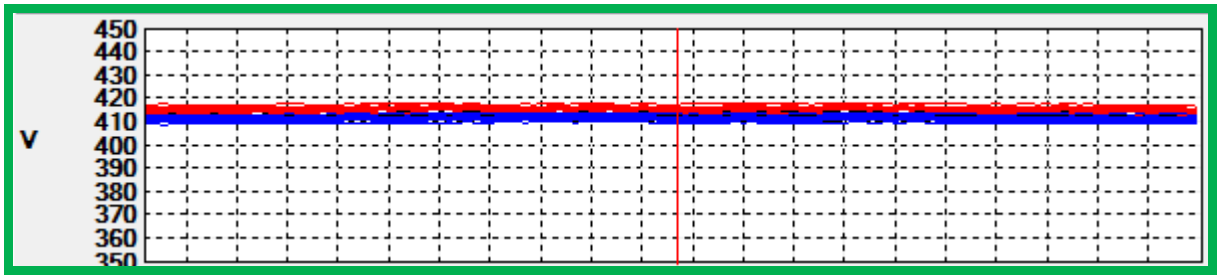
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.42	1.48	1.57	1.49
MAX	1.43	1.43	1.43	1.68	1.79	1.58
AVG	1.42	1.43	1.42	1.50	1.63	1.52

B44-For-Sycology dept. (SS-D)

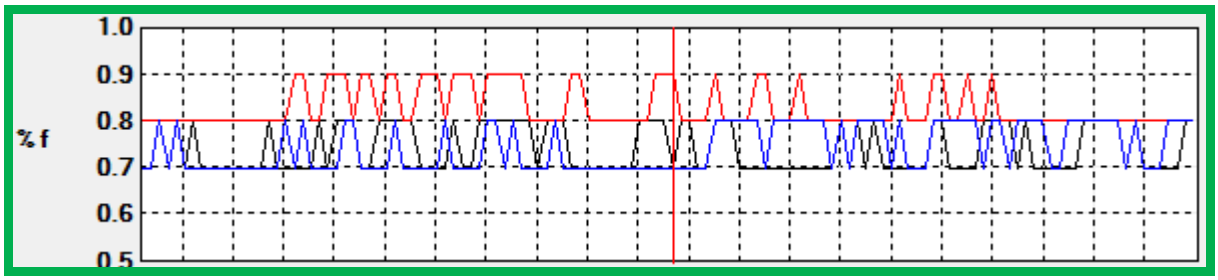
Frequency



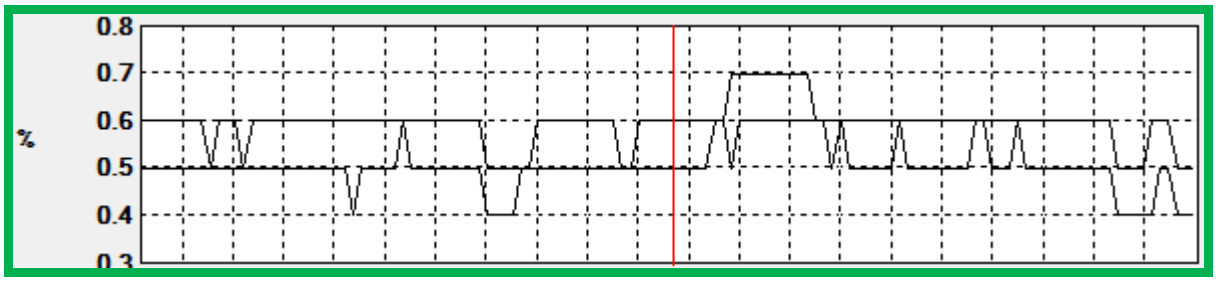
Voltage



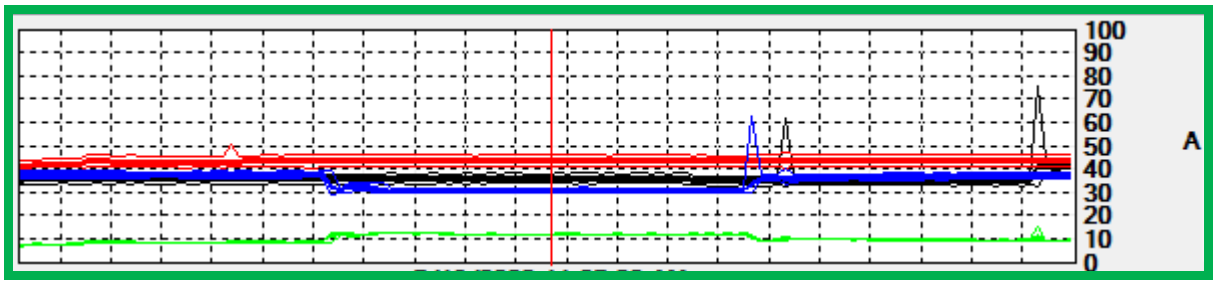
Voltage Harmonics



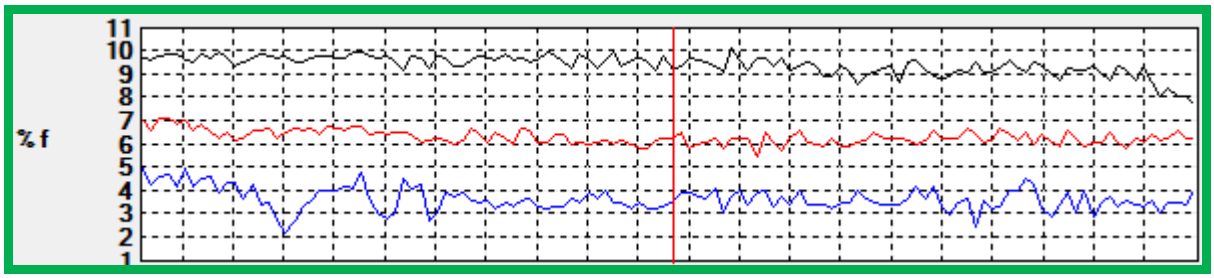
Voltage Un-balance



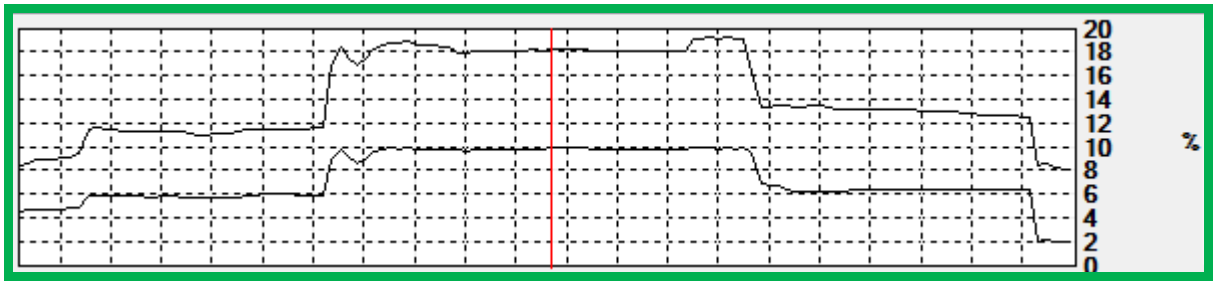
Current



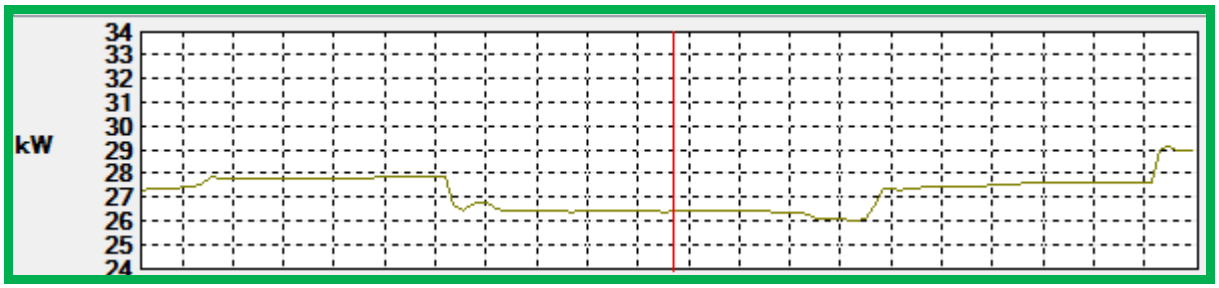
Current Harmonics



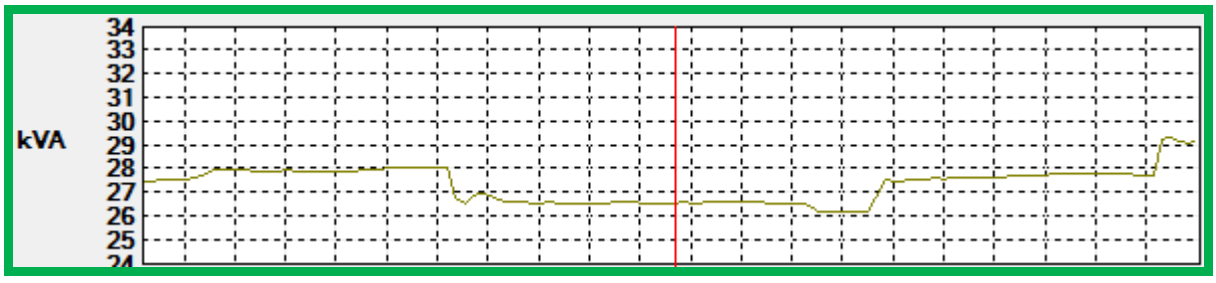
Current Un-balance



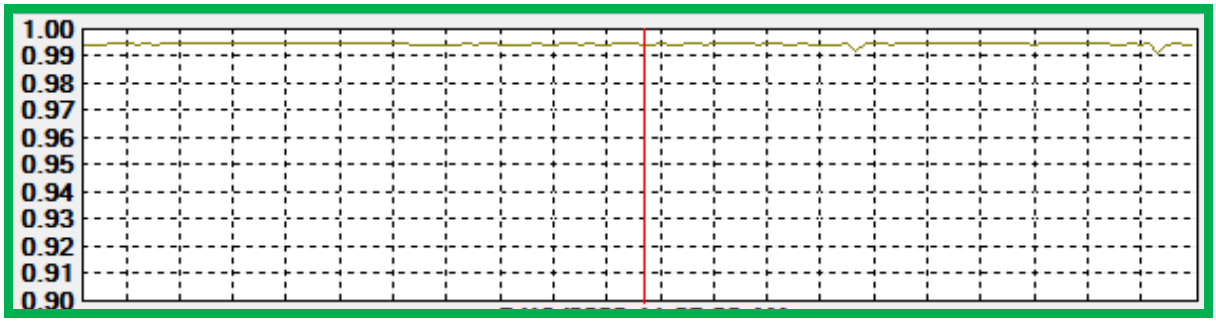
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	412.00	414.80	411.00	34.96	41.64	31.07	0.98	1.00	0.99	49.98	0.50	8.20
MAX	413.30	416.40	412.30	41.80	44.14	37.79	0.99	1.00	1.00	50.08	0.70	19.30
AVG	412.65	415.74	411.54	36.00	43.61	34.93	0.99	1.00	1.00	50.04	0.59	14.37

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

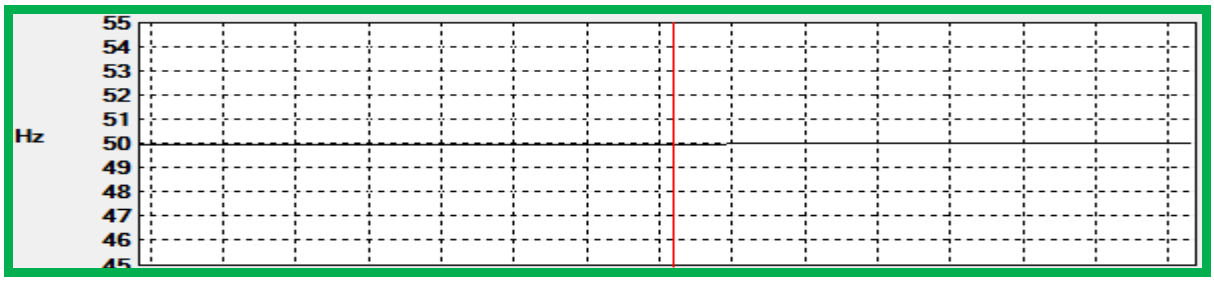
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.58	0.71	0.71	1.00	1.00	1.00	0.70	0.70	0.60	7.70	5.50	2.20
MAX	1.74	1.42	1.42	1.00	1.00	1.00	0.90	0.80	0.80	10.10	7.10	5.00
AVG	1.64	0.98	0.98	1.00	1.00	1.00	0.75	0.78	0.73	9.41	6.32	3.65

Crest Factor

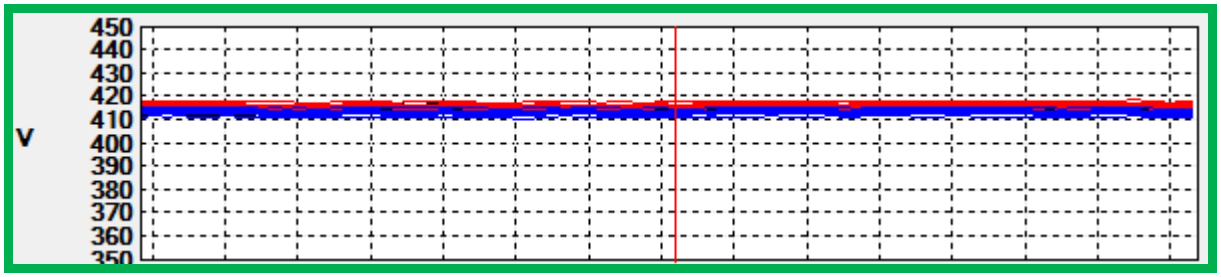
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.42	1.55	1.52	1.45
MAX	1.42	1.43	1.42	1.89	1.78	1.63
AVG	1.42	1.42	1.42	1.59	1.53	1.47

B45-For-VSMP Hostel (SS-D)

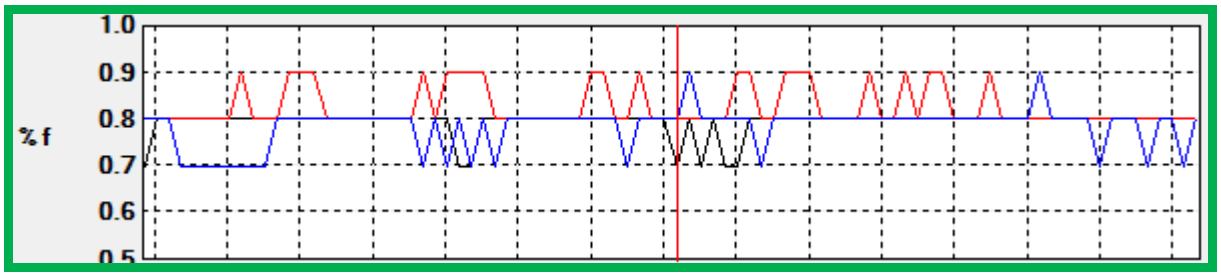
Frequency



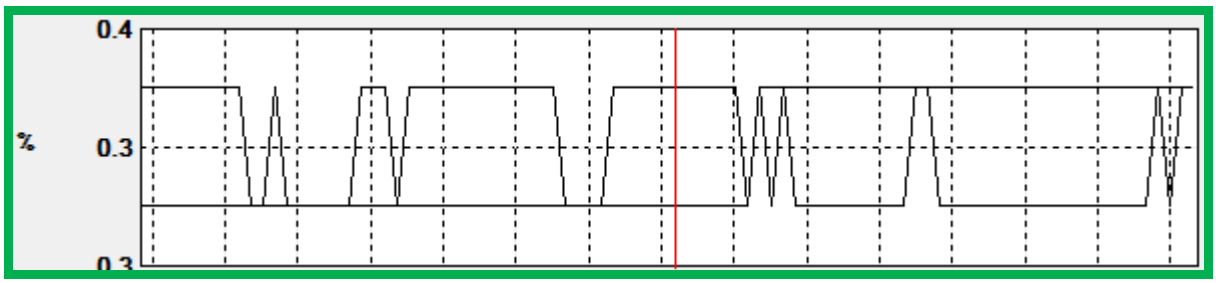
Voltage



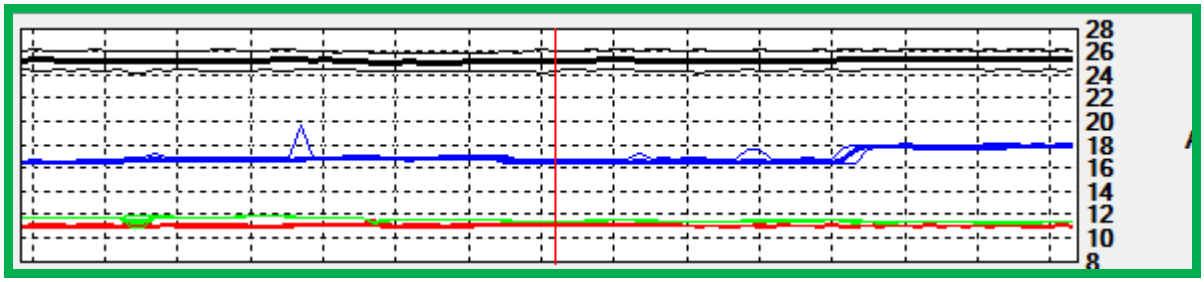
Voltage Harmonics



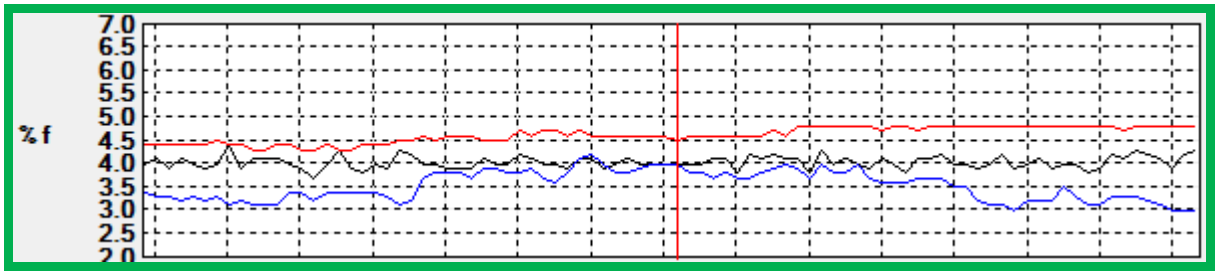
Voltage Un-balance



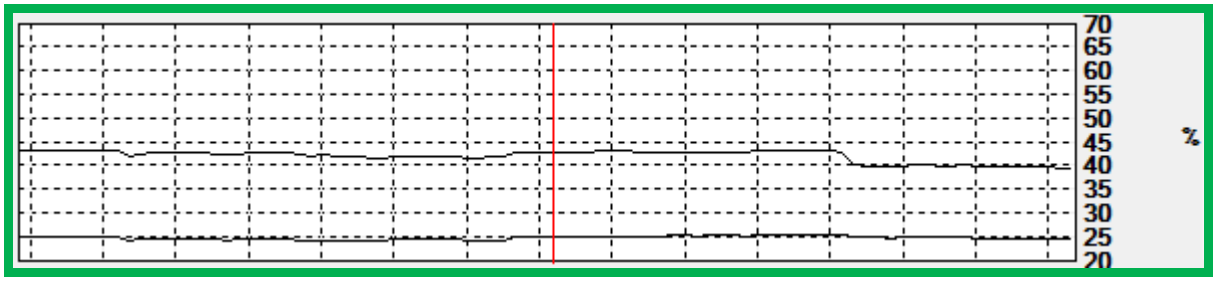
Current



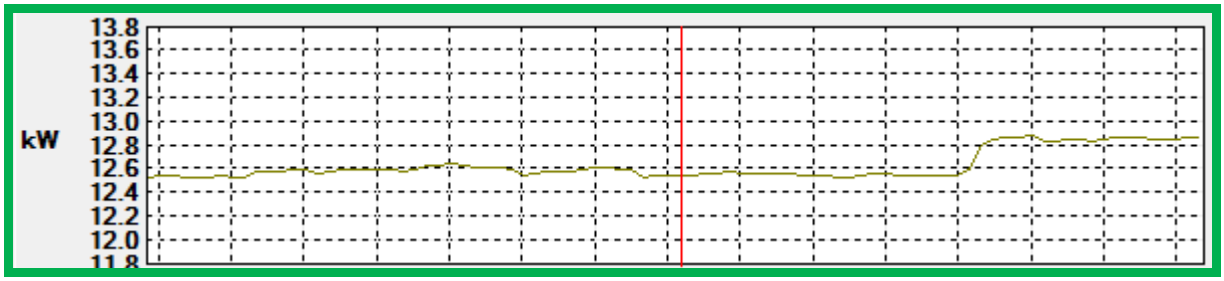
Current Harmonics



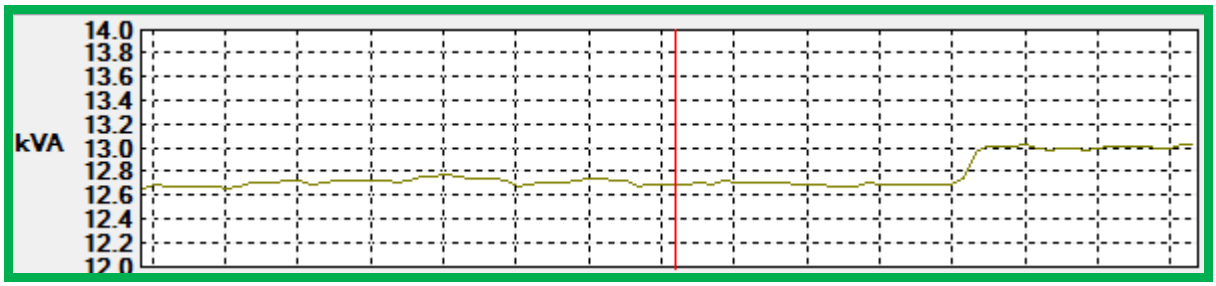
Current Un-balance



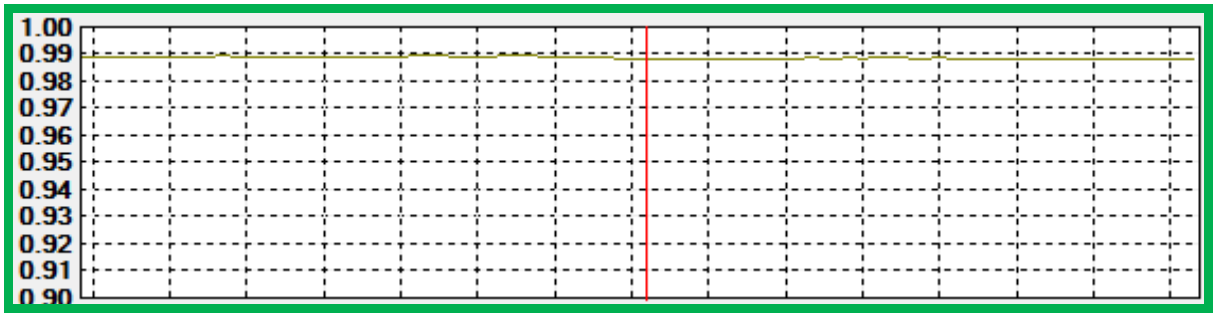
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb (IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	414.10	415.40	412.60	25.12	11.04	16.55	0.99	1.00	0.98	49.94	0.30	39.60
MAX	415.30	416.60	413.70	25.40	11.26	18.02	0.99	1.00	0.99	50.04	0.40	43.40
AVG	414.73	416.07	413.31	25.28	11.12	16.98	0.99	1.00	0.98	49.99	0.36	42.13

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

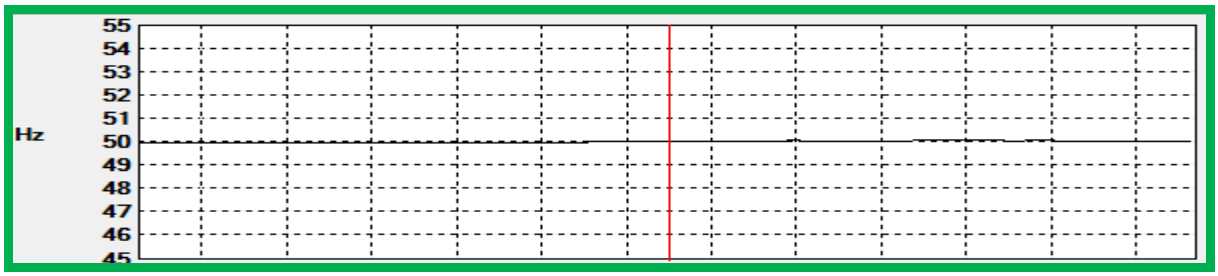
Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	1.58	0.71	0.71	1.00	1.00	1.00	0.70	0.70	0.70	3.70	4.30	3.00
MAX	1.58	0.71	0.71	1.00	1.00	1.00	0.90	0.90	0.80	4.40	4.80	4.20
AVG	1.58	0.71	0.71	1.00	1.00	1.00	0.80	0.81	0.78	4.03	4.62	3.53

Crest Factor

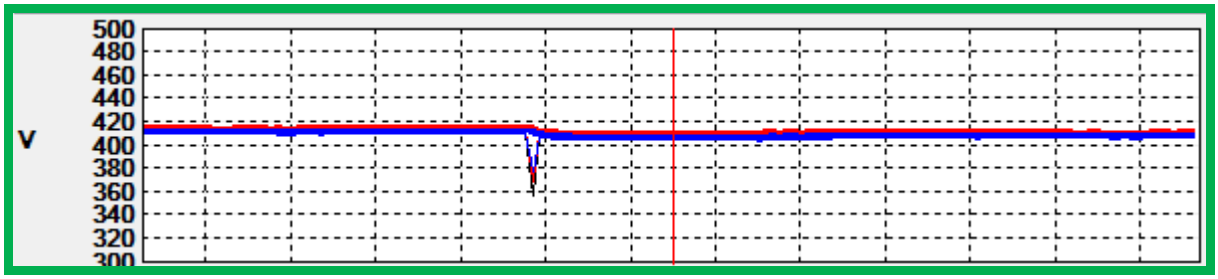
Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.42	1.49	1.40	1.49
MAX	1.42	1.43	1.42	1.50	1.45	1.85
AVG	1.42	1.43	1.42	1.49	1.42	1.52

B46-For-Pt. Deendayal Upadhyay Hostel (SS-D)

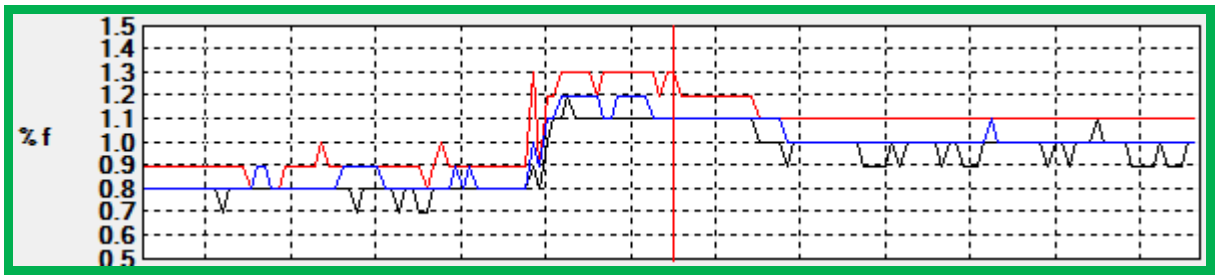
Frequency



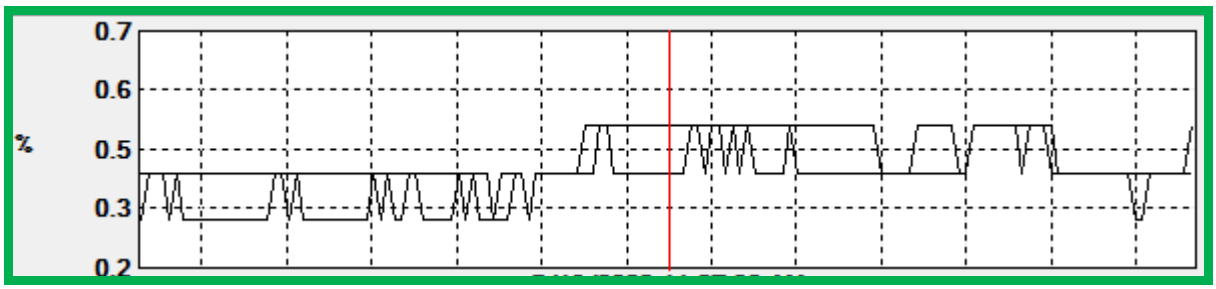
Voltage



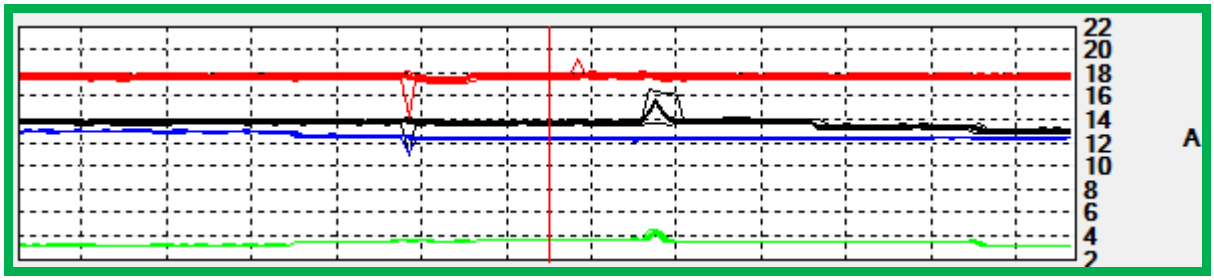
Voltage Harmonics



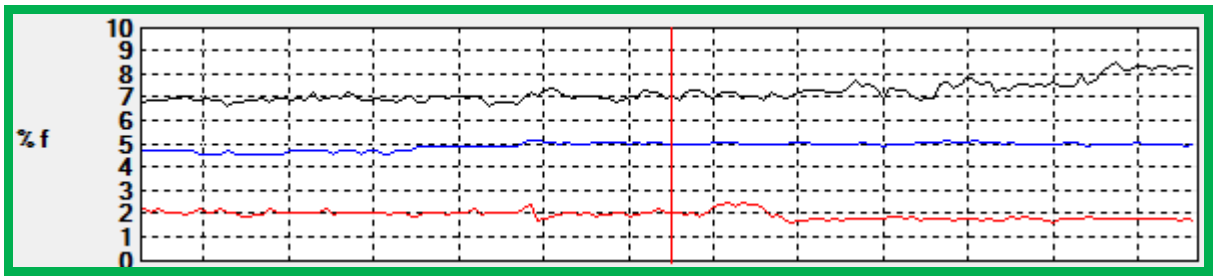
Voltage Un-balance



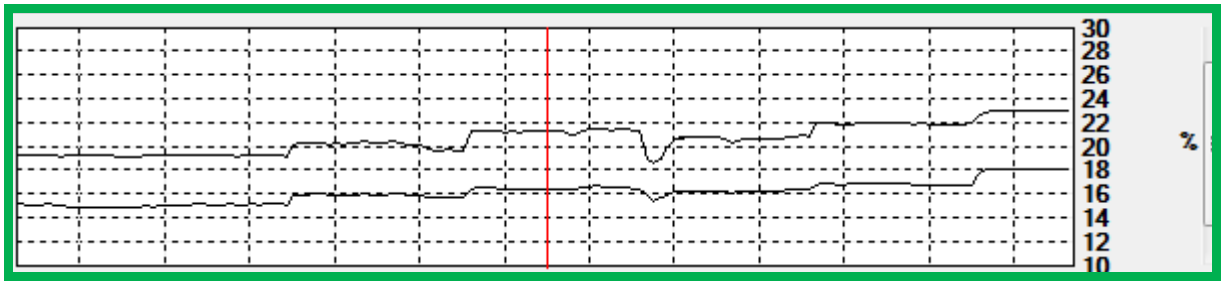
Current



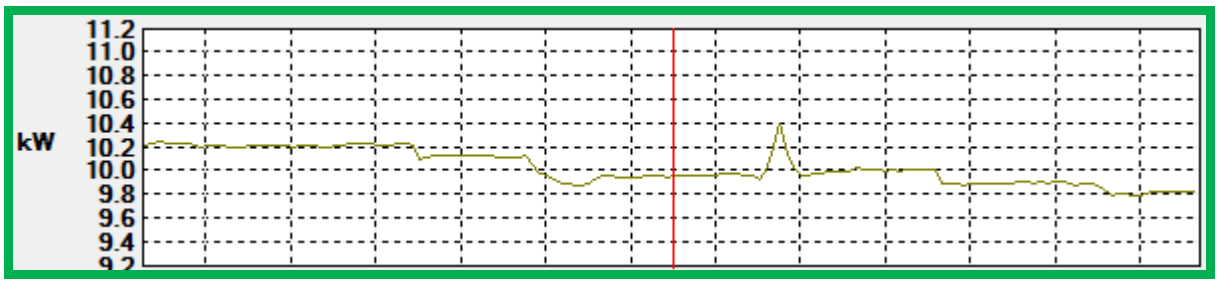
Current Harmonics



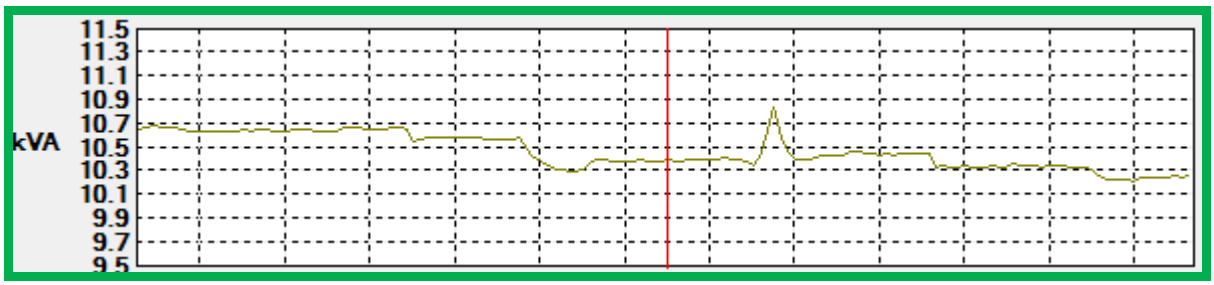
Current Un-balance



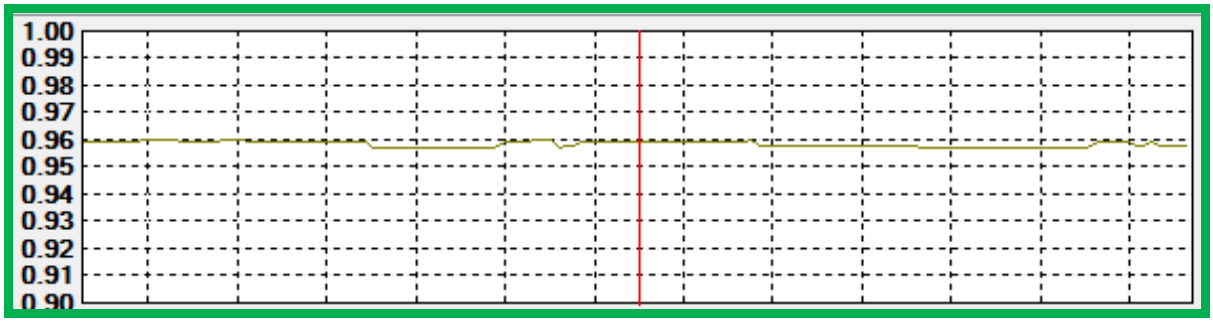
Power in KW



Power in KVA



Power Factor



Min, Average & Max Rang of Voltage, Current, Frequency & Un-balance

Value:	U12 rms	U23 rms	U31 rms	A1 rms	A2 rms	A3 rms	PF1	PF2	PF3	F	Uunb (IEEE 112)	Aunb(IEEE 112)
	V	V	V	A	A	A				Hz	%	%
MIN	407.20	409.30	405.60	13.03	17.39	12.38	0.98	0.97	0.91	49.94	0.30	18.60
MAX	413.70	415.40	412.40	15.57	17.85	13.09	0.98	0.98	0.92	50.07	0.50	23.10
AVG	410.77	412.46	409.34	13.72	17.74	12.63	0.98	0.98	0.91	50.01	0.40	20.73

Min, Average & Max Rang of Flickering, "K" Factor & Harmonics

Value:	Pst1	Pst2	Pst3	FK1	FK2	FK3	U12THDf	U23THDf	U31THDf	A1THDf	A2THDf	A3THDf
							% f	% f	% f	% f	% f	% f
MIN	4.43	3.05	2.75	1.00	1.00	1.00	0.70	0.80	0.70	6.60	1.60	4.60
MAX	4.43	3.05	2.75	1.01	1.00	1.00	1.30	1.20	1.20	8.50	2.50	5.20
AVG	4.43	3.05	2.75	1.01	1.00	1.00	0.96	1.00	0.96	7.25	1.97	4.93

Crest Factor

Value:	U12 CF	U23 CF	U31 CF	A1 CF	A2 CF	A3 CF
MIN	1.42	1.42	1.42	1.62	1.45	1.36
MAX	1.43	1.43	1.42	1.84	1.58	1.38
AVG	1.42	1.42	1.42	1.65	1.46	1.37

Many problems can arise from harmonic currents in a power system. Some problems are easy to detect; others exist and persist because harmonics are not suspected. Higher RMS current and voltage in the system are caused by harmonic currents, which can result in any of the problems listed below:

Cause	Effect
Blinking of Incandescent Lights	Transformer Saturation
Capacitor Failure	Harmonic Resonance
Circuit Breakers Tripping	Inductive Heating and Overload
Conductor Failure	Inductive Heating
Electronic Equipment Shutting down	Voltage Distortion
Flickering of Fluorescent Lights	Transformer Saturation
Fuses Blowing for No Apparent Reason	Inductive Heating and Overload
Motor Failures (overheating)	Voltage Drop
Neutral Conductor and Terminal Failures	Additive Triplen Currents
Electromagnetic Load Failures	Inductive Heating
Overheating of Metal Enclosures	Inductive Heating
Power Interference on Voice Communication	Harmonic Noise
Transformer Failures	Inductive Heating

11. STUDY OF D.G. SETS

Brief description of existing system and its operation

The CCS University Meerut has installed 10 nos. of D.G. sets of different capacity like, 180 KVA, 250 KVA, 320 KVA, and 380 KVA at different location of the campus for power cut and self-generation.

During the study team was check the fuel efficiency each D.G. sets and tabulated below.

Rated Specification:

At Substation A

Particulars	D.G≠1	D.G≠2	D.G≠3
Make	CUMMINS	CUMMINS/Kirloskar	CUMMINS
Rating	320KVA	180KVA	250KVA
Voltage	415	415	415
Current	445	250	347.5
KW	256	200	200
KVA	320	180	250
PF	0.80	0.80	0.80
RPM	1500	1500	1500

At Substation B

Particulars	D.G≠1	D.G≠2	D.G≠3
Make	CUMMINS	CUMMINS/Kirloskar	CUMMINS
Rating	380KVA	180KVA	400KVA
Voltage	415	415	415
Current	529	250	556

Particulars	D.G≠1	D.G≠2	D.G≠3
KW	304	200	320
KVA	380	180	400
PF	0.80	0.80	0.80
RPM	1500	1500	1500

At Substation C

Particulars	D.G≠1
Make	CUMMINS
Rating	380KVA
Voltage	415
Current	529
KW	304
KVA	380
PF	0.80
RPM	1500

At Substation D

Particulars	D.G≠1
Make	Kirloskar Greens
Rating	250KVA
Voltage	415
Current	347.5

Particulars	D.G≠1
KW	200
KVA	250
PF	0.80
RPM	1500

Measurement & Observation:

- **DG set at S/S- B**

380 KVA, DG 1	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other Details	380 KVA, Cummins / Stamford
	415 V, I: -529, PF: -0.80, KW: -304
Fuel Used	HSD
Trial Duration	0.66 HR.
Units Generated By (Our Calibrated Meter)	141.35 KWh
Fuel Consumed	36 LTRs
% Loading (As Per KW.)	69.74%
Power Quality	%THDV :1.10% THDI :4.00 %
Frequency	50 HZ
Specific Fuel Consumption	3.92 UNITS/Ltr
Electrical Parameters	Refer Graphs

Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.24.23 / UNIT

180 KVA, DG 2	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other Details	180 KVA, Cummins/Kirloskar
	415 V, I: -250, PF: -0.80, KW: -144
Fuel Used	HSD
Trial Duration	0.66 HR.
Units Generated By (Our Calibrated Meter)	22.45 KWh
Fuel Consumed	12 LTRs
% Loading (As Per Kw.)	23.37%
Power Quality	%THDV :1.00% THDI :8.30 %
Frequency	50 HZ
Specific Fuel Consumption	1.87 UNITS/Ltr
Electrical Parameters	Refer Graphs
Cost Of Hsd	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.50.80/- UNIT

400 KVA, DG 3, Kendriya Mulyankan Bhawan	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other	400 KVA, Cummins/Stamford

Details	415 V, I:-556, PF:-0.80, KW:-320
Fuel Used	HSD
Trial Duration	1/2 HR.
Units Generated By (Our Calibrated Meter)	42.30 KWh
Fuel Consumed	16.92 LTRs
% Loading (As Per KW.)	26.44%
Power Quality	%THDV :1.50% THDI :15 %
Frequency	50 HZ
Specific Fuel Consumption	2.5 UNITS/Ltr
Electrical Parameters	Refer Graphs
Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.38/- UNIT

- **DG sets at SS-C**

380 KVA, DG 1	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other Details	380 KVA, Cummins / Stamford
	415 V, I: - 529, PF: - 0.80, KW: - 304
Fuel Used	HSD
Trial Duration	1/2 HR.
Units Generated By	44 KWh

(Our Calibrated Meter)	
Fuel Consumed	12 LTRs
% Loading (As Per KW.)	28.94%
Power Quality	%THDV :1.60 % THDI :13 %
Frequency	50 HZ
Specific Fuel Consumption	3.00 UNITS/Ltr
Electrical Parameters	Refer Graphs
Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.31.66 /- UNIT

- **DG sets Data SS-A**

320 KVA, DG 1	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make And Other Details	320 KVA, Cummins / Stamford
	415 V, I:-445, PF:-0.80, KW:-256
Fuel Used	HSD
Trial Duration	1/2 HR.
Units Generated By	58.29 KWh
(Our Calibrated Meter)	
Fuel Consumed	20 LTRs
% Loading (As Per KW.)	45.53%

Power Quality	%THDV :2.00% THDI :7.5%
Frequency	50 HZ
Specific Fuel Consumption	2.91 UNITS/Ltr
Electrical Parameters	Refer Graphs
Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.32.64/- UNIT

180 KVA, No.2	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other Details	180 KVA, Cummins/Kirloskar
	415 V, I:-250, PF:-0.80, KW:-144
Fuel Used	HSD
Trial Duration	1/2 HR.
Units Generated By	44.93 KWh
(Our Calibrated Meter)	
Fuel Consumed	15 LTRs
% Loading (As Per KW.)	62.40%
Power Quality	%THDV :1.50% THDI :12 %
Frequency	50 HZ
Specific Fuel Consumption	2.99 UNITS/Ltr

Electrical Parameters	Refer Graphs
Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.31.77/- UNIT

250 KVA, DG 3, Kendriya Mulyankan Bhawan	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other Details	250 KVA, Cummins/stamford
	415 V, I:-347.5, PF:-0.80, KW:-200
Fuel Used	HSD
Trial Duration	1/2 HR.
Units Generated By (Our Calibrated Meter)	71.26 KWh
Fuel Consumed	20 LTRs
% Loading (As Per KW.)	71.26%
Power Quality	%THDV :2.00% THDI :8.00 %
Frequency	50 HZ
Specific Fuel Consumption	3.56 UNITS/Ltr
Electrical Parameters	Refer Graphs
Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.26.68/- UNIT

- **DG sets Data SS-D**

250 KVA DG set 1	
PARAMETERS	**OBSERVATIONS**
Capacity Of Generator Set, Make and Other Details	250 KVA, Kirloskar Green
	415 V, I:-347.5, PF:-0.80, KW:-200
Fuel Used	HSD
Trial Duration	1/2 HR.
Units Generated By (Our Calibrated Meter)	38.30 KWh
Fuel Consumed	16 LTRs
% Loading (As Per KW.)	38.39%
Power Quality	%THDV :2.00% THDI :5 %
Frequency	50 HZ
Specific Fuel Consumption	2.4 UNITS/Ltr
Electrical Parameters	Refer Graphs
Cost Of HSD	Rs.95 /UNIT (APPROX.)
Cost Per Unit	Rs.39.58/- UNIT

Remarks

- On behalf of above study, it was observed that the voltage level of D.G. set No.1, 320 KVA was running on higher side i.e., 443 Voltage to 448 Voltage. It is suggested take corrective action to control the voltage level from existing level to 420 Voltage.
- It is suggested that proper log sheets (sample enclosed as Annexure-1) may be maintained for each DG Sets. This would help to evaluate the performance of each DG Sets on a periodic basis.

12. STUDY OF WATER PUMPS

With the installed pumps data, the actual efficiency of the pump has been calculated. In order to assess the performance of pumps, the operating efficiencies were evaluated. In order to evaluate the pumps operating efficiency, online flow was measured with the help of ultrasonic flow meter, pump head was measured with the help of pressure gauges at suction and discharge lines, and pumps motor power were measured using calibrated power analyzer.

The performance of the pumps evaluated during the energy audit is given below:

Old Overhead tank				New Overhead (Rajesh Pilot)		
Voltage (Volts)				Voltage (Volts)		
	"R" Phase	230.0			"R" Phase	222.8
	"Y" Phase	226.0			"Y" Phase	222.8
	"B" Phase	235.0			"B" Phase	221.7
Current (Amps)				Current (Amps)		
	"R" Phase	46			"R" Phase	43
	"Y" Phase	56			"Y" Phase	37
	"B" Phase	46			"B" Phase	41
Power Factor				Power Factor		
	"R" Phase	0.67			"R" Phase	0.84
	"Y" Phase	0.77			"Y" Phase	0.91
	"B" Phase	0.83			"B" Phase	0.91
Power Drawn (KW)				Power Drawn (KW)		
	"R" Phase	7.09			"R" Phase	8.05
	"Y" Phase	9.75			"Y" Phase	7.50

Old Overhead tank				New Overhead (Rajesh Pilot)		
	"B" Phase	8.97			"B" Phase	8.27
	Total	**25.81**			**Total**	**23.82**
Power Drawn (KVA)				Power Drawn (KVA)		
	"R" Phase	10.58			"R" Phase	9.58
	"Y" Phase	12.66			"Y" Phase	8.24
	"B" Phase	10.81			"B" Phase	9.09
	Total	**34.05**			**Total**	**26.91**

Tube well Farm House				B-Tech Block C		
Voltage (Volts)				Voltage (Volts)		
	"R" Phase	241.3			"R" Phase	225.1
	"Y" Phase	241.9			"Y" Phase	226.3
	"B" Phase	234.4			"B" Phase	225.1
Current (Amps)				Current (Amps)		
	"R" Phase	36.7			"R" Phase	46
	"Y" Phase	39.7			"Y" Phase	42
	"B" Phase	38.6			"B" Phase	51
Power Factor				Power Factor		
	"R" Phase	0.81			"R" Phase	0.71
	"Y" Phase	0.86			"Y" Phase	0.67

Tube well Farm House				B-Tech Block C		
	"B" Phase	0.86			"B" Phase	0.59
Power Drawn (KW)				Power Drawn (KW)		
	"R" Phase	7.17			"R" Phase	7.35
	"Y" Phase	8.26			"Y" Phase	6.37
	"B" Phase	7.78			"B" Phase	6.77
	Total	**23.21**			**Total**	**20.49**
Power Drawn (KVA)				Power Drawn (KVA)		
	"R" Phase	8.86			"R" Phase	10.36
	"Y" Phase	9.60			"Y" Phase	9.50
	"B" Phase	9.05			"B" Phase	11.48
	Total	**27.50**			**Total**	**31.34**

Tube well no.1, Tapovan				Tube well no.2, Tapovan		
Voltage (Volts)				Voltage (Volts)		
	"R" Phase	211.3			"R" Phase	194.5
	"Y" Phase	210.7			"Y" Phase	194.0
	"B" Phase	211.3			"B" Phase	195.1
Current (Amps)				Current (Amps)		
	"R" Phase	11			"R" Phase	17

Tube well no.1, Tapovan				Tube well no.2, Tapovan		
	"Y" Phase	10			"Y" Phase	17
	"B" Phase	11			"B" Phase	17.5
Power Factor				Power Factor		
	"R" Phase	0.58			"R" Phase	0.83
	"Y" Phase	0.7			"Y" Phase	0.87
	"B" Phase	0.67			"B" Phase	0.81
Power Drawn (KW)				Power Drawn (KW)		
	"R" Phase	1.35			"R" Phase	2.74
	"Y" Phase	1.47			"Y" Phase	2.87
	"B" Phase	1.56			"B" Phase	2.77
	Total	**4.38**			**Total**	**8.38**
Power Drawn (KVA)				Power Drawn (KVA)		
	"R" Phase	2.32			"R" Phase	3.31
	"Y" Phase	2.11			"Y" Phase	3.30
	"B" Phase	2.32			"B" Phase	3.41
	Total	**6.75**			**Total**	**10.02**

Tube well no.3, Tapovan				Tube well no.4, Tapovan		
Voltage (Volts)				Voltage (Volts)		
	"R" Phase	204.9			"R" Phase	204.9

Tube well no.3, Tapovan				Tube well no.4, Tapovan		
	"Y" Phase	202.0			"Y" Phase	202.6
	"B" Phase	204.3			"B" Phase	199.7
Current (Amps)				Current (Amps)		
	"R" Phase	28.61			"R" Phase	17.81
	"Y" Phase	27.3			"Y" Phase	18.57
	"B" Phase	27.75			"B" Phase	19.1
Power Factor				Power Factor		
	"R" Phase	0.91			"R" Phase	0.88
	"Y" Phase	0.95			"Y" Phase	0.85
	"B" Phase	0.91			"B" Phase	0.91
Power Drawn (KW)				Power Drawn (KW)		
	"R" Phase	5.34			"R" Phase	3.21
	"Y" Phase	5.24			"Y" Phase	3.20
	"B" Phase	5.16			"B" Phase	3.47
	Total	**15.73**			**Total**	**9.88**
Power Drawn (KVA)				Power Drawn (KVA)		
	"R" Phase	5.86			"R" Phase	3.65
	"Y" Phase	5.52			"Y" Phase	3.76
	"B" Phase	5.67			"B" Phase	3.81
	Total	**17.05**			**Total**	**11.23**

Water flow measurement:

Measured Parameters for Old Overhead tank:

Sr. No.	Description	Unit	Measured
1	Input Power of Pump	KW	25.81
2	Motor Eff.	%	80
3	Shaft power	KW	20.65
4	Total Head	m	38
5	Density of Fluid	Kg/m3	1000
6	Water Flow	m3/h	98.9
7	Hydraulic Power	KW	10.24
8	**Pump Calculated Eff.**	**%**	**49.58**
9	**Overall Efficiency of Pump**	**%**	**39.66**

Tube well Farm House

Sr. No.	Description	Unit	Measured
1	Input Power of Pump (Motor through Analyzer)	KW	23.21
2	Motor Eff.	%	80
3	Shaft power	KW	18.57
4	Total Head	m	35
5	Density of Fluid	Kg/m3	1000

Sr. No.	Description	Unit	Measured
6	Water Flow	m3/h	92.5
7	Hydraulic Power	KW	8.82
8	**Pump Calculated Eff.**	**%**	**47.51**
9	**Overall Efficiency of Pump**	**%**	**38.01**

B-Tech Block C

Sr. No.	Description	Unit	Measured
1	Input Power of Pump (Motor through Analyzer)	KW	20.49
2	Motor Eff.	%	80
3	Shaft power	KW	16.39
4	Total Head	m	35
5	Density of Fluid	Kg/m3	1000
6	Water Flow	m3/h	79.5
7	Hydraulic Power	KW	7.58
8	**Pump Calculated Eff.**	**%**	**46.26**
9	**Overall Efficiency of Pump**	**%**	**37.00**

Tube well at Tapovan:

			Measured Parameters			
Sr.	Description	Unit	Tube well	Tube well	Tube well	Tube well

No.			No.1	No.2	No.3	No.4
1	Input Power of Pump (Motor through Analyzer)	KW	4.38	8.38	15.73	9.88
2	Motor Eff.	%	80	80	80	80
3	Shaft power	KW	3.50	6.70	12.58	7.90
4	Total Head	m	18	18	18	18
5	Density of Fluid	Kg/m3	1000	1000	1000	1000
6	Water Flow	m3/h	5.2	28.4	93.3	50.5
7	Hydraulic Power	KW	0.26	1.39	4.58	2.48
8	**Pump Calculated Eff.**	**%**	**7.32**	**20.81**	**36.37**	**31.35**
9	**Overall Efficiency of Pump**	**%**	**5.86**	**16.65**	**29.09**	**25.08**

OBSERVATIONS

- During the study of above pumps some points were identified like submersible pumps are rewind more time due to this running current are more unbalance.
- Voltage level was found very low 335 volts. to 355 volts. This is very harmful for three phase motors.
- Power factor was also very low due to cable length and voltage drop.
- Overall efficiency of the pumps is very low due to more time rewinding of motors.

SUGGESTIONS

- It is suggested do not use rewind motors more than 3 times.
- Increase the existing voltage level i.e., 335 volts to 415 volts.
- Install LT capacitors at motor end just after starter and improve the existing power factor to 0.90 and above.

- Replace the existing old motor with new energy efficient motors with the help of govt. body EESL (Ministry of Power)

Cost for installing LT capacitors at 4 nos. Tapovan tube wells are given below.

Capacitor 5 KVAR for each tube well	=Rs.1000*5
	=Rs.5000/-
Capacitor Cost for 4 tube wells	=5*4
	= 20 KVAR
	=20*Rs.1000
	=Rs.20000/-

13. STUDY OF CEILING, WALL & EXHAUST FANS:

During the study the team was collected the install capacities of ceiling fans and exhaust fans along with wattage and tabulated the same below

Sr. No	Department	FAN	Exhaust	Power Consumption for Exhaust Fans (80 W)
1	Department of Hindi	94	23	1840
2	Department of Urdu	34	9	720
3	Dara Singh Stadium	38	10	800
4	Sports	21	5	400
5	Department of Physical Education	104	26	2080
6	Department of Sociology	46	12	960
7	Department of English	26	6	480
8	Department of Seed Science	24	6	480
9	Department of Biotechnology	46	12	960
10	Department of Commerce	91	23	1840
11	Department of Home Science	20	5	400
12	M.B.A. Department	76	25	2000
13	Department of Mass Communication	77	19	1520
14	D.S.W	20	5	400
15	Pt. Deen Dayal Boys Hostel	201	50	4000
16	Dr. B.R. Ambedkar Hostel	62	15	1200
17	Answer Book Hall	111	28	2240

Sr. No	Department	FAN	Exhaust	Power Consumption for Exhaust Fans (80 W)
18	Veer Shiromani Maharana Pratap Hostel	142	35	2800
19	Result Cell	32	8	640
20	Computer Center	46	11	880
21	Department of Political Science	59	15	1200
22	Department of Economics	70	18	1440
23	B. Tech Library	216	70	5600
24	B. Tech Hostel	150	0	0
25	B. Tech Elec. Office (Electricity Power House)	4	3	240
26	B. Tech Canteen	31	11	880
27	Administration Building (Adm. Block)	141	60	4800
28	Allahabad Bank (Indian Bank)	9	0	0
29	B. Tech Research Center	231	58	4640
30	A Block - Electronics Communication Engineering.	276	496	39680
31	B Block - Computer Science	276	496	39680
32	C Block - Agricultural Engineering.	274	493	39440
33	D Block - Mechanical Engineering /Chemical Engineering	272	492	39360
34	B. Tech Workshop	120	150	12000
35	B. Tech New Hostel	33	0	0

Sr. No	Department	FAN	Exhaust	Power Consumption for Exhaust Fans (80 W)
36	Weather Department	3	0	0
37	B. Tech Tunkey	4	0	0
38	O. C. B	2		0
39	Sir Chotu Ram Main Gate	2		0
40	Kailash Prakash Hostel	130	12	960
41	Department of Microbiology	101	32	2560
42	R. K. Singh Hostel	116	38	3040
43	Police Chowki	4	1	80
44	Canteen	8	4	320
45	Electrical Section "B"	5	4	320
46	Engineering Section (Civil)	10	3	240
47	Department of Chemistry (New)	53	28	2240
48	Department of Chemistry (Old)	170	15	1200
49	Brahaspati Bhawan	26	6	480
50	Department of History	73	14	1120
51	Department of Law (Old)	178	39	3120
52	Department of Horticulture	48	19	1520
53	Department of Sanskrit	65	22	1760
54	Madan Mohan Vidhya Mandir School	60	5	400

Sr. No	Department	FAN	Exhaust	Power Consumption for Exhaust Fans (80 W)
55	Department of Physics Science	206	22	1760
56	Department of Geography	93	7	560
57	Hon. Kashiram Shodh Peth	282	52	4160
58	Farm House	154	63	5040
Total		5266	3081	246

Observations:

On behalf of above data, it is suggested replace existing ordinary ceiling fans and exhaust fans with energy efficient BLDC fans. The calculations of energy consumptions and saving are calculated below.

- **Calculation of savings for 5266 number of 50-Watt Ceiling fans.**

Power consumption for 5266 nos. ceiling fans =5266*nos.*50 W *8 hours*250 days
=526600 KWH/year

Energy Cost for 5266 nos. 50 W fans =526600KWH*Rs.7.90/KWH
=Rs.4160140/-year

Power consumption for 5266 nos. BLDC ceiling fans =5266*nos.*26 W *8 hours*250 days
=273832 KWH/year

Energy Cost for 5266 nos. 26 W BLDC fans =273832 KWH*Rs.7.90/KWH
=Rs.2163270/-year

KWH saved by 26 W BLDC 5266 Nos. Fans =KWH 526600 - KWH 273832
=252768KWH

Energy cost saved by 5266 BLDC 26 W Ceiling Fans =KWH 252768*Rs.7.9/KWH
=Rs.1996867/-year

Cost for new 26 W BLDC 5266 nos. fans =5266 nos.*Rs.3000/-fan
=Rs.15798000/-

Cost for new fans installation and old fan removing =5266*100

=Rs.52660/-

Total investment for new BLDC fans =Rs.16324600/-

Simply payback in 8.5 years

- **Calculation of savings for 80-watt exhaust fans (3081 Numbers)**

Power consumption for 3081 nos. Exhaust fans =3081*nos.*80 W *8 hours*250 days

=492960 KWH/year

Energy Cost for 3081 nos. 80 W fans =492960KWH*Rs.7.90/KWH

=Rs.3894384/-year

Power consumption for 3081 nos. BLDC Exhaust fans =3081*nos.*20 W *8 hours*250 days

= 123240 KWH/year

Energy Cost for 3081 nos. 20 W BLDC Exhaust fans =123240 KWH*Rs.7.90/KWH

=Rs.973596/-year

KWH saved by 20 W BLDC 3081 Nos. Exhaust Fans =KWH 492960 - KWH 123240

=369720 KWH

Energy cost saved by 3081 BLDC 20 W exhaust Fans =KWH 369720*Rs.7.9/KWH

=Rs.2920788/-year

Cost for new 20 W BLDC 3081 nos. exhaust fans =3081 nos.*Rs.2600/-fan

=Rs.8010600/-

Cost for new fans installation and old fan removing =3081*100

=Rs.308100/-

Total investment for new BLDC Exhaust fans =Rs.8318700/-

Simply payback in approx. 3 years

14. STUDY OF CENTRALIZED ENERGY MONITORING SYSTEM STUDY OF ILLUMINATION

MDI Controlling System

Observations & suggestions

- M.D. recoded of the plant was found running at neck-to-neck condition if problem occurs in APFC at any time; it may be cross the limit and fall in three times penalty range so a MDI controller may be required in this case.
- Centralized **"Energy Monitoring and Data Acquisition System"** for the entire plant will help to acquire the energy consumption trends and other electrical parameters data online on single point PC for the entire plant as well as for different sections of the plant.
- The system will always limit the demand within the contracted value by generating a relay output to trip any non-critical load for small duration in case the demand tends to shoot the contracted value.
- With the help of this system overall load profile can be regularly monitored and the important electrical parameters like kW load and Power Factor can be optimized.
- Benchmark can be established in terms of overall production & overall electrical power consumption. Apart from above section wise performance can also be regularly monitored in terms of efficient utilization of electrical power.
- Most importantly the above system will help to earmark the areas of the loss of electrical power in to any system deficiency. The details of the system are as follows:

Details of Energy Monitoring/Data Acquisition System:

System Overview:

- The Data Acquisition System is designed for monitoring of Power Distribution System of the complete building.
- Every area will have power analyzers in distributed area. All the parameters will be sensed by power analyzers. One analyzer will be used for every load / source location. The analyzer will have high speed communication port for communication to personal Computer software. The analyzer will have inbuilt RS485 communication port. The communication network is of 2-wire communication with multi-drop facility.
- Every area will have its own dedicated communication network via 2-core shielded cable.
- The entire communication network coming from areas will be fed to PC through protocol converters.

Parameters to be measured:

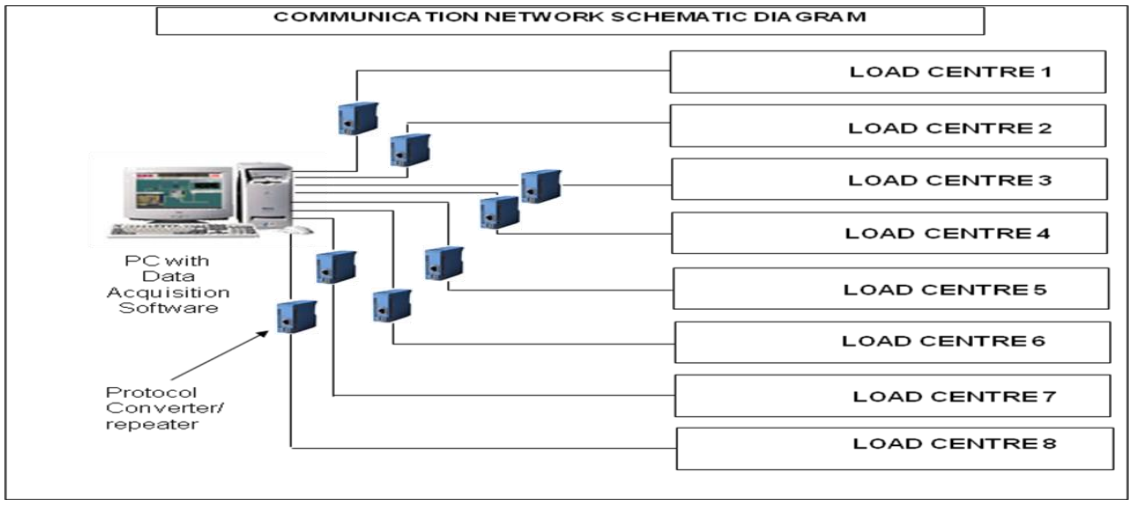
- Average Values: Amps, Volts, Frequency
- Amps & Volt Demand Parameters
- Average Power values
- Energy per Phase
- Power Demand Parameters
- Total Energy
- Min/Max Log
- Real-time Amps, Volts, Frequency
- Real-time Power Values
- Harmonic Distortion in Voltage & Current

Benefits of Energy Monitoring System:

- Regular monitoring of energy parameters
- Helpful in establishing the bench marks of performance for different utilities
- Effective tool to find out the reasons of the higher energy consumption.
- Suggest probable remedial actions.

SOFTWARE FEATURES

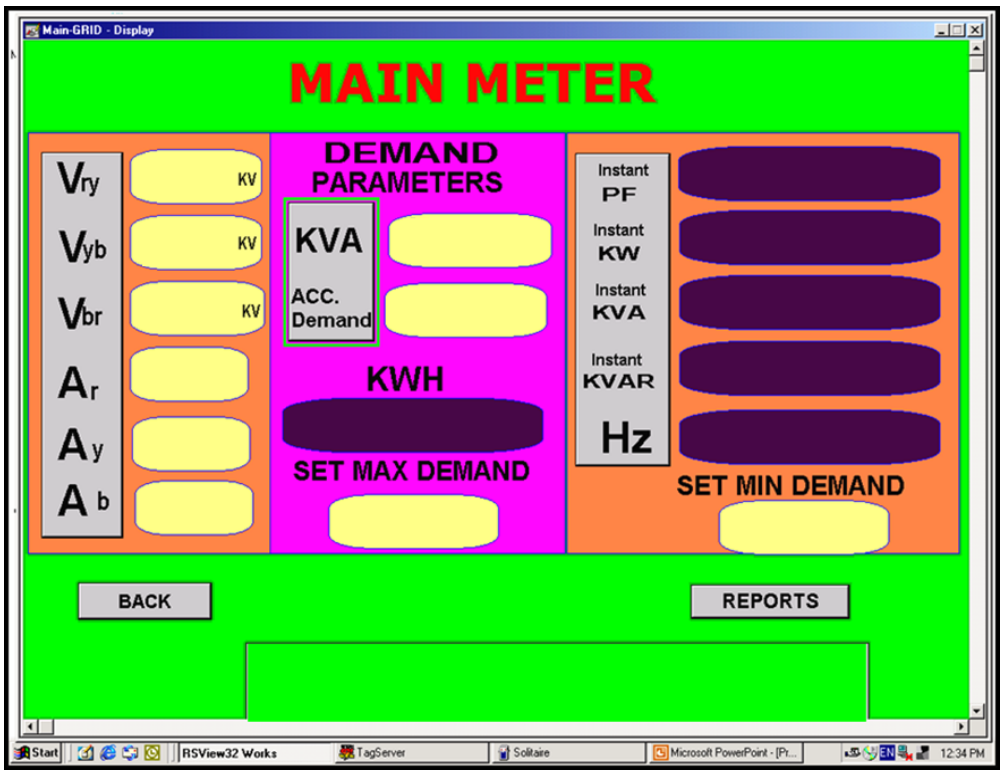
- The data acquisition software will collect data from all the power analyzers and will display data in following formats.



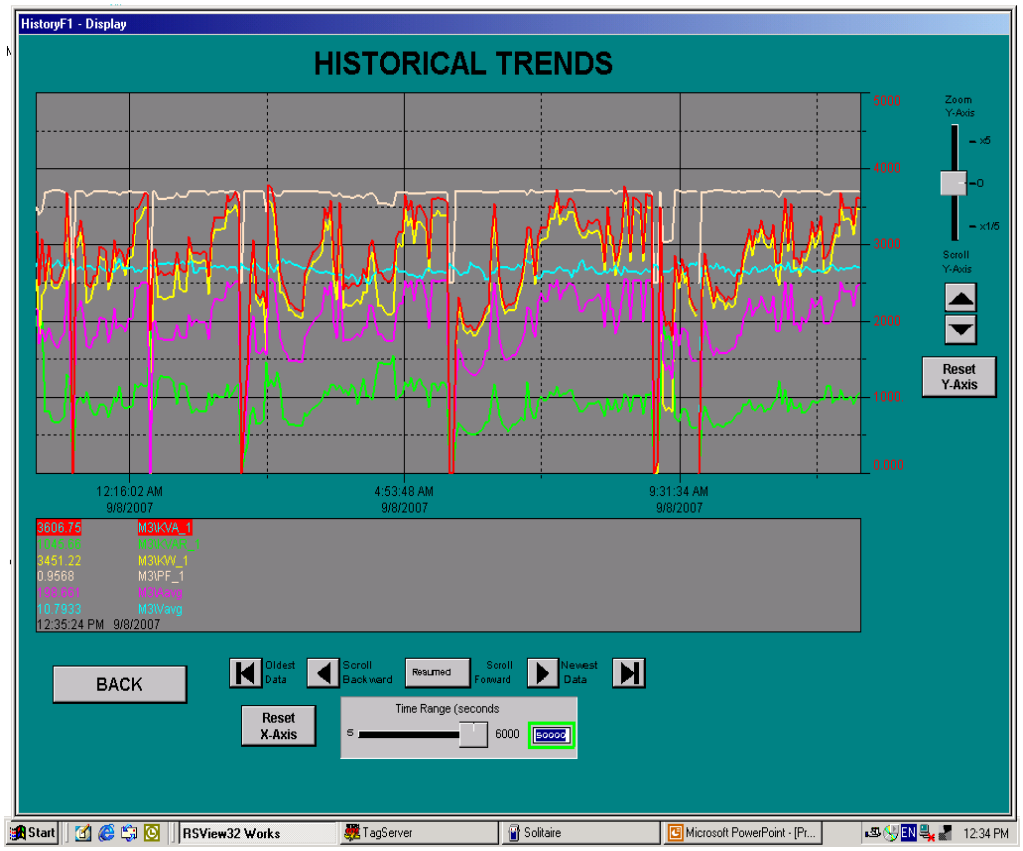
Rear View Of The Power Analyzer

Front View Of Power Analyzer

REAL TIME VALUES OF ALL PARAMETERS



HISTORICAL DATA RECORDING AND DATA RETRIEVAL IN GRAPHICAL FORM


HistoryF1 - Display
HISTORICAL TRENDS
Zoom Y-Axis
x5
0
x1/5
Scroll Y-Axis
Reset Y-Axis
12:16:02 AM 9/8/2007
4:53:48 AM 9/8/2007
9:31:34 AM 9/8/2007
3606.75 M3\KVA_1
3451.22 M3\KW_1
0.9568 M3\PF_1
10.7933 M3\Vavg
12:35:24 PM 9/8/2007
BACK
Oldest Data
Scroll Backward
Resumed
Scroll Forward
Newest Data
Reset X-Axis
Time Range (seconds
5
6000
50000
Start
RSView32 Works
TagServer
Solitaire
Microsoft PowerPoint - [Pr...
12:34 PM

15. STUDY OF LIGHTNING AND ILLUMINATION

TL 40 W, bulb & CFL have been used at most of location in the building. However, there are also around several Conventional Tube Lights, which could be replaced by energy efficient lights. Energy Efficient Fluorescent Lamps are based on the highly sophisticated tri – phosphor fluorescent powder technology offer reduction in the power consumption besides excellent color rendering properties and high luminous efficacy.

Lightning inventory department wise:

Sr. No	Department	Tube light	LED	TL 40W
1	Department of Hindi	129	106	5160
2	Department of Urdu	66	12	2640
3	Dara Singh Stadium	38	29	1520
4	Sports	57	5	2280
5	Department of Physical Education	152	28	6080
6	Department of Sociology	50	56	2000
7	Department of English	48	12	1920
8	Department of Seed Science	45	8	1800
9	Department of Biotechnology	44	47	1760
10	Department of Commerce	122	120	4880
11	Department of Home Science	50	10	2000
12	M.B.A. Department	164	115	6560
13	Department of Mass Communication	124	47	4960
14	D. S. W	12	26	480
15	Pt. Deen Dayal Boys Hostel	392	20	15680

Sr. No	Department	Tube light	LED	TL 40W
16	Dr. B.R. Ambedkar Hostel	190	45	7600
17	Answer Book Hall	224	17	8960
18	Veer Shiromani Maharana Pratap Hostel	351	56	14040
19	Result Cell	82	0	3280
20	Computer Center	142	10	5680
21	Department of Political Science	98	36	3920
22	Department of Economics	69	146	2760
23	B. Tech Library	490	0	19600
24	B. Tech Hostel	374	0	14960
25	B. Tech Elec. Office (Electricity Power House)	12	0	480
26	B. Tech Canteen	77	0	3080
27	Administration Building (Adm. Block)	230	59	9200
28	Allahabad Bank (Indian Bank)	10	0	400
29	B. Tech Research Center	475	50	19000
30	A Block - Electronics' Communication Engineering	20	0	800
31	B Block - Computer Science	25	0 0	1000
32	C Block - Agricultural Engineering	10	0	400
33	D Block - Mechanical Engineering /Chemical Engineering	10	0	400

Sr. No	Department	Tube light	LED	TL 40W
34	B. Tech Workshop	20	0	800
35	B. Tech New Hostel	0	56	0
36	Weather Department	8	0	320
37	B. Tech Tunkey	0	7	0
38	O. C. B		4	0
39	Sir Chotu Ram Main Gate	2		80
40	Kailash Prakash Hostel	302	20	12080
41	Department of Microbiology	161	81	6440
42	R. K. Singh Hostel	306	6	12240
43	Police Chowki	8	0	320
44	Canteen	12	0	480
45	Electrical Section "B"	13	0	520
46	Engineering Section (Civil)	24	2	960
47	Department of Chemistry (New)	176	98	7040
48	Department of Chemistry (Old)	296	56	11840
49	Brahaspati Bhawan	150	14	6000
50	Department of History	212	24	8480
51	Department of Law (Old)	240	26	9600
52	Department of Horticulture	89	16	3560
53	Department of Sanskrit	93	17	3720

Sr. No	Department	Tube light	LED	TL 40W
54	Madan Mohan Vidhya Mandir School	72	8	2880
55	Department of Physics Science	287	178	11480
56	Department of Geography	135	2	5400
57	Hon. Kashiram Shodh Peth	463	65	18520
58	Farm House	108	98	4320
Total		7559	1838	302

Lighting Inventory Residence wise:

Sr. No	Residence	Tube light	LED	TL 40W
1	AB-1 Campus	11	7	440
2	AB-2	3	10	120
3	AB-3	7	8	280
4	AB-4	14	6	560
5	AB-5	10	15	400
6	A-1 Campus	12	10	480
7	A-2	13	5	520
8	A-3	12	7	480
9	A-4	4	10	160
10	A-5	6	4	240
11	A-6	4	8	160
12	B-1 Campus	7	7	280

Sr. No	Residence	Tube light	LED	TL 40W
13	B-2	7	3	280
14	B-3	6	4	240
15	B-4	4	7	160
16	B-5	4	6	160
17	B-6	5	5	200
18	B-7	5	4	200
19	B-8	3	7	120
20	B-9	3	10	120
21	B-10	2	9	80
22	B-11	0	8	0
23	C-1 Campus	3	7	120
24	C-2	3	5	120
25	C-3	3	6	120
26	C-4	2	5	80
27	C-5	2	7	80
28	C-6	5	4	200
29	C-7	0	10	0
30	C-8	4	4	160
31	C-9	7	3	280
32	C-10	2	7	80

Sr. No	Residence	Tube light	LED	TL 40W
33	C-11	2	6	80
34	C-12	4	5	160
35	C-13	1	4	40
36	C-14	2	6	80
37	C-15	2	10	80
38	C-16	8		320
39	C-17	6		240
40	C-18	3	3	120
41	C-19	3	6	120
42	C-20	6	3	240
43	C-21	2	10	80
44	C-22	0	8	0
45	C-23	6	5	240
46	C-24	3	5	120
47	D-1 Campus	1	8	40
48	D-2	1	5	40
49	D-3	1	5	40
50	D-4	2	4	80
51	D-5	1	6	40
52	D-6	3	3	120

Sr. No	Residence	Tube light	LED	TL 40W
53	D-7	1	6	40
54	D-8	3	4	120
55	D-9	4	5	160
56	D-10	3	3	120
57	D-11	1	6	40
58	D-12	3	2	120
59	D-13	0	6	0
60	D-14	2	3	80
61	D-15	2	5	80
62	D-16	1	2	40
63	D-17	0	3	0
64	D-18	1	3	40
65	D-19	0	4	0
66	D-20	2	2	80
67	D-21	1	4	40
68	D-22	2	2	80
69	D-23	2	2	80
70	D-24	2	2	80
71	D-25	2	3	80
72	D-26	3	4	120

Sr. No	Residence	Tube light	LED	TL 40W
73	D-27	2	5	80
74	D-28	3	3	120
75	H-1 Campus	6	3	240
76	H-2	5	2	200
77	H-3	3	2	120
78	H-4	4	3	160
79	H-5	5	2	200
80	H-6	2	2	80
81	H-7	4	6	160
82	H-8	5	3	200
83	H-9	2	2	80
84	H-10	3	5	120
85	H-11	3	7	120
86	H-12	3	3	120
87	H-13	3	5	120
88	H-14	4	4	160
89	H-15	2	3	80
90	H-16	4	3	160
91	S-1 Campus	8	3	320
92	S-2	6	2	240

Sr. No	Residence	Tube light	LED	TL 40W
93	S-3	4	5	160
94	S-4	8	3	320
95	S-5	12	2	480
96	S-6	7	6	280
97	S-7	5	2	200
98	S-8	6	3	240
99	S-9	5	0	200
100	S-10	2	0	80
101	S-11	3	0	120
102	S-12	4	0	160
103	S-13	6	0	240
104	S-14	3	0	120
105	S-15	4	0	160
106	S-16	9	0	360
107	S-17	5	0	200
108	S-18	6	0	240
109	S-19	7	0	280
110	S-20		7	0
111	S-21	5	0	200
112	S-22	6	0	240

Sr. No	Residence	Tube light	LED	TL 40W
113	S-23	4	0	160
114	S-24	4	3	160
115	S-25	3	0	120
116	S-26	6	2	240
117	S-27	4	0	160
118	S-28	5	2	200
119	S-29	4	2	160
120	S-30	4	0	160
121	S-31	2	0	80
122	S-32	4	0	160
123	S-33	5	3	200
124	S-34	4	2	160
125	S-35	4	3	160
126	S-36	4	0	160
127	S-37	4	4	160
128	S-38	0	3	0
129	S-39	6	5	240
130	S-40	5	3	200
131	S-41	0	3	0
132	S-42	5	3	200

Sr. No	Residence	Tube light	LED	TL 40W
133	S-43	6	2	240
134	S-44	6	3	240
135	S-45	6	4	240
136	S-46	4	3	160
137	S-47	6	3	240
138	S-48	8	3	320
139	S-49	8	3	320
140	S-50	7	2	280
141	S-51	2	11	80
142	S-52	8	3	320
143	S-53	3	0	120
144	S-54	4	0	160
145	S-55	3	0	120
146	S-56	4	0	160
				0
Total		**601**	**562**	24.04

Lighting inventory residence teen shade wise:

Sr. No	Residence (Teen Shade)	Tube light	LED	TL 40 W
1	Bindra Prasad	8	8	320
2	Swami Charan	5	3	200

Sr. No	Residence (Teen Shade)	Tube light	LED	TL 40 W
3	Pappu Chaudhary	3	2	120
4	Sanjeev Kumar	9	0	360
5	Ranglal	2	0	80
6	Rinku Chaudhary	3	2	120
7	Ganga Ram	1	1	40
8	Anil Shukla	6	2	240
9	Mahadev	3	2	120
10	Satish Chaudhary	4	2	160
11	Arun Panday	5	4	200
12	Vidhya Dhar Dubey	4	3	160
13	Ravindra Panday	7	7	280
14	Dabal Singh	3	2	120
15	Anjani Panday	6	5	240
Total		**69**	**43**	2.76

Lighting inventory girls Hostel wise

Sr. No	Hostel (Durga Bhabhi Girls Hostel)		Tube light	LED	TL 40 W
	Block	Rooms			
1	A - Block	30	67	10	2680
2	B - Block	24	44	15	1760
3	C - Block	30	66	12	2640
4	D - Block	36	70	20	2800
5	E - Block	24	48	8	1920
6	F - Block	30	52	7	2080
7	G - Block	06	17	0	680
8	H- Block	06	18	0	720
9	Study Room		0	16	0
10	T.V Room		6	0	240
11	Bathroom Near T.V Room		6	0	240
12	Hostel Gallary		10	5	400
13	Maton office + Warden Residence		8	3	320
14	Clerk Office		4	0	160
15	Pol Life		11	0	440
16	1st Guard Room		6	0	240
17	2nd Guard Room		3	0	120
18	Mess		23	10	920

Sr. No	Hostel (Durga Bhabhi Girls Hostel)		Tube light	LED	TL 40 W
	Block	Rooms			
19	Visitor Lobby		5	0	200
					0
Total			464	106	18.56

LIGHTING INVENTERY Boys Hostel wise

Sr. No	Hostel (Rani Laxmi Boys Hostel)		Tube light	LED	TL 40 W
	Block	Rooms			
1	A - Block	33	66	0	2640
2	B - Block	39	78	0	3120
3	C - Block	39	78	0	3120
4	Healt Club		0	30	0
5	Mess		26	0	1040
6	Clerk Office		5	10	200
7	A - Block Gallary		14	20	560
8	B - Block Gallary		28	10	1120
9	C - Block Gallary		24	14	960
10	A - Block Bathroom		11	15	440
11	B - Block Bathroom		6	10	240
12	C - Block Bathroom		23	6	920
13	Study Room		0	20	0

Sr. No	Hostel (Rani Laxmi Boys Hostel)		Tube light	LED	TL 40 W
	Block	Rooms			
14	A - Block Porch		0	0	0
15	B - Block Porch		0	0	0
16	C - Block Porch		0	0	0
Total			359	135	14.36

Lighting Inventory - street lights

S. No	Department/Place	Street Light		Sodium Light 125 W+ Choke
		Sodium	LED	
1	Department of Microbiology - Chemistry	11	4	1650
2	Canteen - Guard Room	10	17	1500
3	Department of Microbiology - Peer Baba	29	36	4350
4	Auditorium - Peer Baba	16	84	2400
5	O.B.C		2	0
6	Sir Chotu Ram Main Gate	4	1	600
Total		70	144	10.5

Total number of lights replace with energy efficient LED lights

Sr. No	Department	light 125 W+ Choke	Total nos. of 40 W TL	Total load in KW	125 W light load in KW
1	Department wise		7559	302.36	
2	Residence wise		601	24.04	
3	Residence teen shade wise		69	2.76	
4	Girls Hostel wise		464	18.56	
5	Street lights	70			10.5
6	Total	70	8693	347.72	10.5

Installation of Energy Efficient LED Lights

CCS university management were very aware about energy conservation and they have already replaced most of the conventional with energy efficient LED light. However, there are also around 8693 No's STL lights of 40 W with and around 70 nos. of 125 W with Choke conventional sodium lights are installed in the building, which could be replaced by energy efficient Fluorescent lights.

Energy Efficient LED offer reduction in the power consumption besides excellent color rendering properties and high luminous efficacy.

The resultant benefit in terms of Energy Savings has been worked out as follows:

A. Replacement of conventional 40 W STL lights

• Power drawn by conventional 40 W	= 40W
• Power Drawn by one LED Light (20 Watts)	= 20 W
• No of Lights to be replaced	= 8693 nos.
• Power drawn by 8693 nos. 40 W lights	= 347.72 KW

• Power drawn by 8693 nos.20W, LED	= 173.86 KW
• Energy saved by Using 20 W LED 8693 nos.	= 173.86 KW
• KWH saved by using LED light of 8693 nos.(173.86 KW*12hours*300 Days)	= 625896 KWH/year
• Annual Saving in Rs.7.9 KWH	= Rs.4944578/-year
• Investments for 8693 nos. LED lights @Rs.200/LED	= Rs.1738600/-
• Payback	= Within 3 Months

B. Replacement of conventional Sodium (125Watts Light +Choke) lights

• Power drawn by conventional Sodium (125Watts Light+ 25 W Chock)	= 150 W
• Power Drawn by one Led Light (70 Watts)	= 70 W
• No of Lights to be replaced	= 70 nos.
• Power drawn by 70 nos. 125 W Sodium lights	10.5 KW
• Power drawn by 70 nos.70 W, LED	= 4.9 KW
• Energy saved by Using 70 w LED 70 nos.	= 5.6 KW
• KWH saved by using LED light of 70 nos.(5.6KW*12 hours*365 Days)	= 24528 KWH/year
• Annual Saving in Rs.7.9/KWH/year	= Rs.193770/-year
• Investments for 70 nos. LED lights @Rs.2500/LED	= Rs.175000/-
• Payback	= Within 2 Months

Lighting Control

Although there is no simpler way to reduce the amount of energy consumed by lighting system than to manually turn OFF whenever not needed, this is not done as often as it could be. In response, automatic lighting control strategies can be adopted:

- Scheduling Control: Use a time scheduling device to control lighting systems according to predetermined schedules

A central processor with relays is usually capable of controlling several output channels, each of which may be assigned to one or more lighting circuits. Overrides can be provided to accommodate individuals who use the space during scheduled off hours.

- Day lighting: Control lights in response to the presence of daylight illumination in the space
- Lumen Maintenance: gradually adjust the electric light levels over time to correspond with the depreciation of light output from ageing lamps.
- Occupancy Sensing: Control light in response to the presence or absence of people in the space

These are automatic scheduling devices that detect motion and turn ON / OFF the lights accordingly. Most of these devices can be calibrated for sensitivity and for the length of time delay between the last detected occupancy and extinguishing of light. Occupancy sensors typically consist of a motion detector, a control unit and a relay. Quantification of energy savings on this account is not possible.

Illumination Level (Lux level)

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
M- Phil Building-1st Floor	Lobby	47	47	34	37	41.25
	Main Office	61	30	45	47	45.75
	Classroom	89	75	96	110	92.5
	BIF Lab	59	64	34	69	56.5
	Dean Office	204	240	170	247	215.25

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
	Nano Science Lab	115	120	150	125	127.5
	Agrigenome Lab	248	249	215	270	245.5
	Gallery	69	70	70	65	68.5
M- Phil Building-2nd Floor	Classroom Mathematics	65	40	39	42	46.5
	Main Office	70	40	55	45	52.5
	Lobby	38	40	35	39	38
	Prof. Gupta Office	100	109	100	105	103.5
	M.K. Gupta office	170	169	165	160	166
	Shivraj Singh Office	228	324	229	247	257
	Computer Lab	77	104	80	96	89.25
	Shivraj Singh Office-2	403	412	399	405	404.75
	Saru Kumari	143	140	130	139	138

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
	office					
	Sandip Kumar office	161	164	162	159	161.5
M-Phil Building- 3rd floor	Seminar Hall	60	64	62	58	61
	Mr.Pratap office	140	149	147	143	144.75
	Prof. And Head Office	103	104	101	100	102
	Dark Room	197	200	195	198	197.5
	H.S. Baloyan office	204	230	211	221	216.5
Admin Building Main	Lobby	182	189	185	181	184.25
	Richa Bhatt Office	231	230	225	227	228.25
	Lekha Vibhag	170	126	139	145	145
	Account Section Office	128	130	125	127	127.5
	Check Righter	235	239	231	237	235.5

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
	office					
	Office-1	139	142	137	140	139.5
	Office-2	148	188	170	169	168.75
	Office-3	162	161	159	158	160
	Office-4	229	220	205	225	219.75
	Pariksha Niyantran vibhag	75	103	99	101	94.5
	Exam Section	97	99	95	93	96
	Exam Section office	146	145	132	139	140.5
	Affilation Office-1	145	146	142	147	145
	Affilation Office-2	87	89	85	90	87.75
	Affilation Office-3	96	98	95	93	95.5
	Affilation Office-4	67	64	63	66	65
	Affilation Office-5	72	73	71	74	72.5

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
	B.ed Department	147	149	146	148	147.5
	Committee Cell Office	95	97	98	92	95.5
VC Office	Lobby	376	379	348	355	364.5
	Office-1	377	247	249	265	284.5
	Office-2	349	384	376	380	372.25
	Kulpati Office	135	139	134	132	135
	Prati Kulpati Office	413	433	425	420	422.75
	Committee Meeting Cell	403	401	413	402	404.75
	Resistar Office	107	109	111	108	108.75
	Dc Office	229	229	224	226	227
Auditorium-1	At Right Side Row	247	240	239	232	239.5
	At Left Side Row	261	234	234	239	242
	Middle	39	27	28	27	30.2

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
	Row					5
	At Stage	249	311	208	207	243.75
Engineering Department	Manish Mishra Office (Electrical)	180	182	184	183	182.25
	Manoj Kumar(Civil Engineer)	103	104	101	102	102.5
	Main Office	72	73	64	69	69.5
Admin Building -2 Near Substaion C-2nd floor	Office	273	170	169	204	204
	Lobby	103	168	159	134	141
	Ved Vyas Office	117	119	123	164	130.75
	Committee Room	250	253	289	284	269
	Account Section	139	135	142	140	139
	Account Office	103	104	118	99	106
	Admin Office	150	153	145	147	148.75
Admin Building -2 Near	Exam Cell	134	150	139	138	140.25

Location		Sample-1	Sample-2	Sample-3	Sample-4	Average
Substaion C-3rd floor	CCTV Camera Room	210	150	160	175	173.75
	Class Room	40	45	49	47	45.25
	1st Room	104	120	133	125	120.5
	Placement Cell	93	69	63	74	74.75
Auditorium New	At stage	333	340	337	345	338.75
	At Left Side Row	100	80	99	95	93.5
	Middle	168	160	129	145	150.5
	At Right Side Row	90	98	95	93	94

16. OTHER CONNECTED LOAD

Sr. No	Department	No. of Computers	Load in W
1	Russian Department	12	840
2	Proctor office	2	140
3	Computer Centre Department	25	1750
4	Chemistry Department	49	3430
5	Horticulture Department	2	140
6	Brahaspati Bhawan		0
7	Microbiology Department	60	4200
8	Geography Department	4	280
9	Physics Department	21	1470
10	History Department	8	560
11	Legal Studies Department	11	770
12	Political Science Department	15	1050
13	Hon. Kanshiram Shodh Peeth Sansthan	3	210
14	Applied Science Department	5	350
15	B.tech ADM Block	373	26110
16	B.tech A-Block		0
17	B.tech C-Block		0
18	B.tech B-Block		0
19	B.tech D-Block		0

Sr. No	Department	No. of Computers	Load in W
20	B.tach Library		0
21	V.C Lodge	1	70
22	V.C Office	4	280
23	Committee Hall		0
24	Committee Cell	2	140
25	Account Section	24	1680
26	Exam Section	4	280
27	Registrar Office	4	280
28	F.C Office	4	280
29	Affiliation	6	420
30	IQAC6	6	420
31	Secrecy	4	280
32	Auditorium		0
33	First Appeal Officer	1	70
34	R.T.I Department		0
35	AG botany	31	2170
36	Botany Department	40	2800
37	Zoology Department	33	2310
38	Hindi Department	15	1050

Sr. No	Department	No. of Computers	Load in W
39	Urdu Department	15	1050
40	Mathematics Department	35	2450
41	Computer center new bill		0
42	M B A	27	1890
43	Mass Communication	39	2730
44	Answer book	2	140
45	Dispensary	2	140
46	Guest House	1	70
47	Community Centre	3	210
48	Sports	3	210
49	Sociology	16	1120
50	Centre of Excellence	0	0
51	Physical Education	10	700
52	Library	76	5320
53	Electrical Section	3	210
54	Economics Department	36	2520
55	Education Department	26	1820
56	Psychology Department	8	560
57	Statistics Department	22	1540

Sr. No	Department	No. of Computers	Load in W
58	Biotechnology Department	13	910
59	English Department	26	1820
60	Seed Science Department	8	560
61	General Section	1	70
62	B.ed Cell	2	140
63	Exam Controller Office	4	280
64	Pro V.C Office	2	140
65	Fine Art Department	1	70
66	Toxicology Department	3	210
67	M.C.A. Department	34	2380
68	Rajesh Pilot Hostel	0	0
69	Adm. Block (308)	1	70
70	Confidential Section	6	420
71	Yoga	0	0
72	Sanskrit Department	3	210
73	Engineering Section (Civil)	2	140
74	Library Science		0
75	Plant Protection	3	210
76	Food science	3	210

Sr. No	Department	No. of Computers	Load in W
77	Result Cell	1	70
78	D.S.W	2	140
79	Chief Warden Office	2	140
80	B.com	34	2380
81	Home Science	8	560
82	Dara Singh Khusti Stadium	1	70
83	MBHA	7	490
84	Madan Mohan School	7	490
85	309	2	140
86	301	1	70
87	NSS	1	70
88	Development Cell	1	70
89	Campus Cell	1	70
90	Vigilance Office	1	70
91	Legal Cell	2	140
92	Pro Registrar	2	140
93	Shodh Mulyankan	1	70
94	Puchatch Kendra	6	420
95	Shodh Panjiyan	2	140

Sr. No	Department	No. of Computers	Load in W
96	Chatra Sahayta Kendra	4	280
97	Central Evaluation Centre	10	700
Total		1301	91.07

Inventory of air conditioner

Sr. No	Department	No. Of Air Conditioner
1	V.C. Office	9
2	Comity Cell Department	3
3	P.V.C. Office	2
4	Registrar Office	5
5	F.O. Office	3
6	R.T.I. Cell	2
7	General Section	2
8	First Appellate Officer	2
9	Affiliation	1
10	Account Section	12
11	Exam Controller Office	2
12	Comity Cell Department)	3
13	Room No. 210	1
14	Room No. 308	1

Sr. No	Department	No. Of Air Conditioner
15	Exam Department	2
16	Confidential Department	3
17	Community Center	6
18	Auditorium	1
19	Late Rajesh Pilot Hostel	4
20	Sports	2
21	Department of Physical Education	3
22	Department of English	6
23	Department of Seed Science	2
24	Department of Yoga	1
25	Department of Sociology	7
26	Department of Biotechnology	6
27	S.B.S	6
28	Department of Mass Communication	5
29	Center of Excellence	2
30	Department of Statistics	10
31	Department of Psychology	7
32	Department of Fine Art	1
33	New Computer Center Building	1
34	Department of Russian Language	6

Sr. No	Department	No. Of Air Conditioner
35	D.S.W	2
36	Department of Horticulture	3
37	Department of Sanskrit	2
38	Brhaspati Bhawan	12
39	Department of Microbiology	14
40	Student Help Center	2
41	Department of Zoology	39
42	Animal House	14
43	Plant Protection	7
44	AG Botany	38
45	Hon. Kashi Ram Sodeh Peeth Sasthan	12
46	Department of History	8
47	Department of Law	1
48	New Mass Communication	2
49	B.tech ADM Block	21
50	B.tech A - Block	5
51	B.tech B -Block	14
52	B.tech C -Block	1
53	B.Tech D - Block	6
54	B.tech Library	4

Sr. No	Department	No. Of Air Conditioner
55	Dispensary	2
56	Department of Hindi	9
57	Department of Urdu	3
58	Department of Physics	31
59	Exam Section	5
60	Department of Economics	17
61	Department of Political Science	18
62	Answer Book Hall	2
63	Library	9
64	Civil Section	3
65	Electrical Section	3
66	Department of Mathematics	17
67	Guest House	22
68	Computer Center	16
69	V.C Lodge	12
70	IQAC	6
71	M.C.A Hall	4
72	Secrecy	3
73	Library Science	6
Total		**524**

Inventory of water coolers:

Sr. No	Department	No. of Cooler
1	Confidential	1
2	Confidential Out Side	1
3	Exam Section	2
4	Adam Block	6
5	Library	5
6	Auditorium	1
7	Guest House	1
8	D.B.G Hostel	7
9	Rani Laxmi Bai New Girls Hostel	6
10	Department of Urdu	1
11	Department of Hindi	1
12	Department of Zoology	2
13	Department of AG Botany	3
14	Department of Botany	2
15	K.P Hostel	5
16	R.K Hostel	7
17	Department of Geography	1
18	Department of Physics	2
19	Department of History	2

Sr. No	Department	No. of Cooler
20	Department of Legal Studies	1
21	Madan Mohan Vidya Mandir	1
22	Engineering Section (Civil)	1
23	Department of Microbiology	1
24	Department of Chemistry	2
25	New Building Chemistry	2
26	Department of Russian Language	1
27	D.S.W	1
28	Department of Sanskrit	1
29	Department of Physiology	1
30	Department of Fine Art	1
31	Department of Statics	1
32	S.B.S	2
33	Department of English	1
34	Department of Sociology	2
35	Department of Seed Science	1
36	Department of Biotechnology	1
37	Sports	1
38	Department of Political Science	2
39	Department of Economics	1

Sr. No	Department	No. of Cooler
40	Department of Education	0
41	Computer Center	1
42	Canteen	1
43	Engineering Section (Electrical)	0
44	Hon. Kashi Ram Sodeh Peeth Sasthan	3
45	Department Of Applied Science	6
46	Reading Room	1
47	Late.Rajesh Pilot Hostel	2
48	Veer Siromani Mahrana Pratap Hostel	3
49	Dr. Ambedkar Hostel	2
50	B.tech Hostel	4
51	B.tech ADM Block	3
52	B.Tech A - Block	3
53	B.Tech. B. Rlock	3
54	B.Tech. C. Block	2
55	B.Tech D - Block	2
56	R.Tech. Library	3
57	B.Tech. Work Shop	1
58	B.Tech. Canteen	1
59	V.C.Lodge	1

Sr. No	Department	No. of Cooler
60	Community Centre	1
61	Answer Book Hall	1
62	Department of Physical Education	2
63	Department of Yoga	1
64	Department of Environment	2
65	Dara Singh Stadium	1
66	Pt. Deen Dayal Boys Hostel	5
67	Main Gate C.C.S.U	1
68	Department of M.C.A	1
69	Main Gate B-Tech	1
70	IQAC	1
71	V.C. Office	1
72	Centre of Excellence	1
73	Department of Library Science	1
74	Department of Horticulture	1
Total		**144**

17. ANNEXURE 1 RECOMMENDED LUX LEVELS

Recommended Lux Levels for different locations

Entrance	
Entrance halls, lobbies, waiting rooms	200
Enquiry Desks	500
Gate Houses	200
Circulation Areas	
Lifts	100
Corridors, passageways, stairs	100
Escalators, revelators	150
Medicine & First Aid Centers	
Consulting Rooms, Treatment Rooms	500
Rest Rooms	150
Medical Stores	150
Staff Rooms	
Offices	300
Changing, locker and cleaners room, Cloak rooms, lavatories	100
Rest Rooms	150
Staff Restaurants	
Canteens, Cafeterias, dining rooms, mess rooms	200
Survey, vegetable preparation, washing up area	300

Food preparation & cooking	500
Food stores, cellars	150
Communication	
Switch board rooms	300
Telephone, apparatus rooms	150
Telex room, post rooms	500
Reprographic room	300

18. ANNEXURE 2 KVAR SELECTION CHART

Original Power Factor	Desired Power Factor																				
	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00
	KVAR Required per KW of Load																				
0.50	0.982	1.008	1.034	1.060	1.086	1.112	1.139	1.165	1.192	1.220	1.248	1.276	1.306	1.337	1.369	1.403	1.440	1.481	1.529	1.590	1.732
0.51	0.937	0.963	0.989	1.015	1.041	1.067	1.093	1.120	1.147	1.174	1.202	1.231	1.261	1.291	1.324	1.358	1.395	1.436	1.484	1.544	1.687
0.52	0.893	0.919	0.945	0.971	0.997	1.023	1.049	1.076	1.103	1.130	1.158	1.187	1.217	1.247	1.280	1.314	1.351	1.392	1.440	1.500	1.643
0.53	0.850	0.876	0.902	0.928	0.954	0.980	1.007	1.033	1.060	1.088	1.116	1.144	1.174	1.205	1.237	1.271	1.308	1.349	1.397	1.458	1.600
0.54	0.809	0.835	0.861	0.887	0.913	0.939	0.965	0.992	1.019	1.046	1.074	1.103	1.133	1.163	1.196	1.230	1.267	1.308	1.356	1.416	1.559
0.55	0.768	0.794	0.820	0.846	0.873	0.899	0.925	0.952	0.979	1.006	1.034	1.063	1.092	1.123	1.156	1.190	1.227	1.268	1.315	1.376	1.518
0.56	0.729	0.755	0.781	0.807	0.834	0.860	0.886	0.913	0.940	0.967	0.995	1.024	1.053	1.084	1.116	1.151	1.188	1.229	1.276	1.337	1.479
0.57	0.691	0.717	0.743	0.769	0.796	0.822	0.848	0.875	0.902	0.929	0.957	0.986	1.015	1.046	1.079	1.113	1.150	1.191	1.238	1.299	1.441
0.58	0.655	0.681	0.707	0.733	0.759	0.785	0.811	0.838	0.865	0.892	0.920	0.949	0.979	1.009	1.042	1.076	1.113	1.154	1.201	1.262	1.405
0.59	0.618	0.644	0.670	0.696	0.723	0.749	0.775	0.802	0.829	0.856	0.884	0.913	0.942	0.973	1.006	1.040	1.077	1.118	1.165	1.226	1.368
0.60	0.583	0.609	0.635	0.661	0.687	0.714	0.740	0.767	0.794	0.821	0.849	0.878	0.907	0.938	0.970	1.005	1.042	1.083	1.130	1.191	1.333
0.61	0.549	0.575	0.601	0.627	0.653	0.679	0.706	0.732	0.759	0.787	0.815	0.843	0.873	0.904	0.936	0.970	1.007	1.048	1.096	1.157	1.299
0.62	0.515	0.541	0.567	0.593	0.620	0.646	0.672	0.699	0.726	0.753	0.781	0.810	0.839	0.870	0.903	0.937	0.974	1.015	1.062	1.123	1.265
0.63	0.483	0.509	0.535	0.561	0.587	0.613	0.639	0.666	0.693	0.720	0.748	0.777	0.807	0.837	0.870	0.904	0.941	0.982	1.030	1.090	1.233
0.64	0.451	0.477	0.503	0.529	0.555	0.581	0.607	0.634	0.661	0.688	0.716	0.745	0.775	0.805	0.838	0.872	0.909	0.950	0.998	1.058	1.201
0.65	0.419	0.445	0.471	0.497	0.523	0.549	0.576	0.602	0.629	0.657	0.685	0.714	0.743	0.774	0.806	0.840	0.877	0.919	0.966	1.027	1.169
0.66	0.388	0.414	0.440	0.466	0.492	0.519	0.545	0.572	0.599	0.626	0.654	0.683	0.712	0.743	0.775	0.810	0.847	0.888	0.935	0.996	1.138

*****END OF THIS REPORT******