

23% Saving  
at Chiller  
Consumption

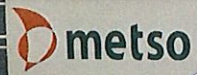


**HAYAT KİMYA AŞ**

Hydromx® Performance Test



Building Technologies & Solutions  
After Sales, Turkey



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## I. EXECUTIVE SUMMARY

This report aims to share the scope, measurement, and calculation details of the energy efficiency of Hydromx® technology in a Chiller system that only cools a room where the electrical panels of the MCC Machinery Park are located at the Hayat Kimya Paper Factory. The study was carried out by the collaboration of Hayat Kimya AS - Global Energy Group, Johnson Control International (JCI) Turkey - After Market Division, and Hydromx Inc Eurasia Office.

In this study, baseline data with Water and post data with Hydromx® – Efficient Heat Transfer Fluid periods were compared according to the International Performance Monitoring and Verification Protocol (IPMVP) by the World Energy Valuation Organization.

The data was recorded for 15 days for the water period and 25 days for the Hydromx® period. All the data was collected by the data analyzers owned by the Hayat Kimya AŞ with minimum human involvement as required by the IPMVP. All the data, together with the approval signatures of all the parties, is shared in the APPX section at the end of the report.

The comparison was made between two periods and the results were adjusted particularly for the weather conditions as required by the IPMVP. It was calculated that an average saving of 19% was achieved in overall "System" Energy consumption and 23% in the "Chiller" consumption.

Hayat Kimya, Hydromx Inc, and Johnson Controls International (JCI) all accepted the methodologies used and the analysis results. Through this performance, a maximum 3-year ROI period was verified over the list price of Hydromx®.

The impact of other external conditions, that could not be quantified, was also emphasized in the calculation and conclusion sections. Based upon the system's energy consumption trends, unquantifiable external conditions, which were examined in detail later in the report, were predicted to have a positive impact of a minimum 5% to 7% addition to the chiller efficiency. However, the conclusion section did not encapsulate the unquantifiable conditions' predicted saving.

In the Hydromx® period, although the outdoor weather conditions were significantly warmer and humid, the room temperature continuously remained lower than the target temperature of 25°C. It can also be observed from the data graphs that the target room temperature had been steadily satisfied during the Hydromx® period versus the Water period. In the Water Period the Room Temperature fluctuated erratically in certain periods.

Considering all the results, the increase in the effectiveness of the overall heat transfer process that Hydromx® technology brings to the system has been shown unmistakably.

## II. INTRODUCTION

### a. HYDROMX®

#### "Heat Transfer Nano-Fluid"

Hydromx® is the world's first and currently only "commercial" Nano-Technology heat transfer fluid. It has been proven after many years of studies that Hydromx technology has no

negative toxic effects on the environment and organisms by the most stringent international standards. Hydromx® is the only Nanofluid in the World that has cleared Toxicology through NSF International according to the strict standards recognized and set by the Food and Drug Administration (FDA).

Hydromx® is certified and registered for both:

HT1 – Incidental Food Contact

HT2 – Nonfood Contact Heat Transfer

by NSF International and authorized to bear the NSF Registration Mark. NSF International protects and improves global human health. Manufacturers, regulators, and consumers look to NSF to develop public health standards and certifications that help protect food, water, consumer products, and the environment. NSF International recognized Hydromx Inc. and published Hydromx® name.

A nano-fluid is a liquid containing nanometer-sized particles, called nanoparticles. Such fluids are engineered colloidal suspensions of nanoparticles in a base fluid. Nano-fluids leverage the nanoparticles to increase the speed of the heat transfer process. As a result, the required target temperature is satisfied in a shorter amount of time, thereby requiring significantly less energy versus the conventional heat transfer mediums.

#### **First "Efficient Heat Transfer Fluid"**

Hydromx® was recognized as the first "Efficient Heat Transfer Fluid" (EHTF) that fulfills the requirements in the EHTF category by the USGBC and the Environment Product Declaration (EPD) System. Furthermore, Hydromx® is the only nano-fluid that possesses NSF International verified & certified the Comparable LCA and EPD documents. With an official verdict, the USGBC approved ASHRAE 90.1 "the Exceptional Calculation Methodology" in the LEED® Green Building Certification Assessment for the EHTF product category rule.

Hydromx® has been used in different types of closed-circuit heating/cooling applications in various geographies of the world and achieved successful results reported by independent 3<sup>rd</sup> Parties. Hydromx® has also been recognized in academia and has certificates from internationally accredited institutions such as NSF, ASTM, Build-Cert, NACE. F

For this performance test, Hydromx®-EG product was supplied by the Hydromx Inc Eurasia Office. The product is NSF International HT2 certified. This certificate means that the product will not cause any toxic damage to the environment in case of an accidental spill, contamination, or leakage. For more details, please visit [www.hydromx.com](http://www.hydromx.com)

#### **b. HAYAT KİMYA AŞ**

Hayat Kimya, as the world's 5th largest branded diaper manufacturer and the largest cleaning paper manufacturer in the Middle East, Eastern Europe, and Africa, is an important global player in the fast-moving consumer industry. It reaches millions of homes in more than 100 countries with 14 strong brands such as Bingo, Test, Has, Molfix, Bebem, Molped, Joly, Evony, Papia, Familia, Teno, and Focus in-home care, hygiene, and cleaning paper categories.



There are 46 different Turkish brands produced with advanced technologies in 36 production facilities under the umbrella of Hayat Holding, which meet millions of consumers in 13 countries.

Hayat Kimya, with its affiliates in 10 countries, 18 production facilities, and close to 8.000 employees, in the fast-moving consumer industry, home care, hygiene and sanitary paper categories, Bingo, Test, Has, Molfix, Bebem, Molped, It offers its brands Joly, Evony, Papia, Familia, Focus and Teno to millions of consumers.

Following the facilities in Turkey, Hayat Kimya established Algeria, Iran, Egypt, Russia, Nigeria, and Pakistan production facilities along with the distribution companies in Morocco, Bulgaria, and Kenya. With the production, sales, and distribution operations globally; Hayat Kimya has proven that it is a fast-growing company and a key player in its sector in the World.

As a global company, Hayat Kimya AŞ is aware of its environmental responsibilities. Therefore, following thorough research, it considered this performance test with Hydromx as an innovative and sustainable opportunity towards leaving a lesser carbon footprint.

This pilot project was applied to the cooling system of the Paper milling machine's electrical board room, at the plant located at Başiskele, Kocaeli, Turkey.

Under the leadership of Mr. Sabri Çakmak (Global Energy Group Manager) and supervision of Safa Kumral ( Sen. Elect. Eng.), the field team has played the key role in adopting the Hydromx® for CO2 emission reduction and energy saving.

### c. JOHNSON CONTROLS INTERNATIONAL (JCI)

JCI, as the Exclusive Partner of Hydromx® in the Middle East and Africa, had been actively part of the project since the inception. Mr. Mustafa Özçam (Director of After Sales Dept. with JCI) witnessed and verified the performance increase of the system. Furthermore, Mr. Özçam's contribution to the Project regarding the chiller behavior was extremely valuable.

## III. PROJECT DEFINITION

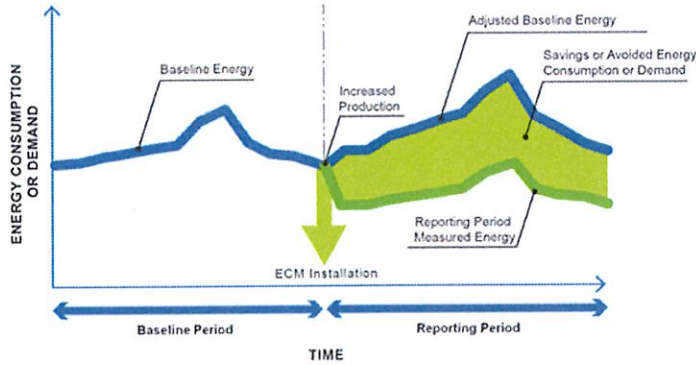
### a. SCOPE OF THE PROJECT

More than one type of production activity is carried out under the Hayat Holding at various production facilities. The energy consumption of these facilities is being managed by the Energy Management Unit within the Holding. This particular Unit is responsible for electricity production, heating/cooling (2G, 3G) energies with natural gas conversion plants along with diesel generators, and also manages the efficiency of energy used. It provides uninterrupted service in terms of quality and source reliability as a result of continuous analyses carried out 24x7. Such services include Turkey, Egypt, Bangladesh, and Nigeria.

An improvement in Thermal Energy transfer is definitely among the goals of the Energy Management Unit. A minimum of 20% energy efficiency committed by Hydromx® was taken into consideration by the Unit. With this project, it is aimed to firsthand witness the behavior and observe the capabilities of the Hydromx technology in their facilities, under their complete control.

## b. CALCULATION METHODOLOGY

For the energy efficiency calculation, the latest updated protocol (IPMVP) of the “Energy Valuation Organization” ([www.evo-world.org](http://www.evo-world.org)), which controls and updates the standards globally, has been applied. The protocol can be briefly expressed by the formula below.



$$\text{Savings} = (\text{Baseline Period Energy} - \text{Reporting Period Energy}) \pm \text{Adjustments}$$

<https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp>

The methods of Option-C specified in the last updated IPMVP were used. (APPX C- IPMVP)

The chiller unit that was measured supplies chilled water only to an isolated room and nowhere else. Since the system was controlled 100% by automation and all active parameters were recorded separately, the IPMVP Option C was the most appropriate methodology to apply.

To increase the accuracy of the analysis result, IPMVP Option-C deems it necessary to review the data and make appropriate exclusions. Furthermore, adjustments on time-limited data are crucial especially in this system as the target temperature and average outside temperatures variances have a major impact on the consumption of the chiller.

In this detailed analysis, to accurately show the efficacy of the product, following analytical methodologies had been applied to both dataset:

**Simple Comparison:** Comparison of active parameters which consists of

- a. Raw Data Analysis
- b. Refined Data Analysis
- c. Adjusted Ambient Temperature Analysis
- d. Same Temperature Comparison Analysis

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### c. SYSTEM DEFINITION

Hayat Kimya Energy unit wanted to test Hydromx®'s capability primarily in chilled water systems operating at low temperatures as the coolants generally have more stringent conditions to meet than the heating fluids.

The cooling requirement of the electrical panels of the MCC Production Line is sustained by a single chiller unit. The Chiller, with 735KW cooling capacity, consists of 2 compressors with 4 stages. The operational capacity of the compressors is controlled according to the chilled water temperature, which is set to 10°C.



All electrical panels that are associated with the MCC Production line are located in one room and the airflow of the room is air-conditioned by 2 AHUs.

The room is completely isolated from outdoor conditions. It is not exposed to direct sunlight. Seasonal changes affect the overall temperature of the building, and consequently, the temperature of the room is slightly impacted.

The heat generation of the room is due to the electricity drawn by the MCC Machinery's panels. This is the only heat load of the room.

The room is free from personnel and is kept locked throughout the day. Only authorized personnel are allowed if maintenance is required.

All these conditions increase the reliability of the project.

The temperature of the room is targeted to be continuously maintained at 25°C. Chiller and AHU units are managed by the automation system of the factory to maintain this condition. The chiller is designed to supply chilled water of 10°C to AHUs at a constant flow rate.



While one of the AHU units is working continuously, the second is driven by the VFD. The operational capacities of AHUs are completely geared towards to maintain the room temperature. As the temperature of the room rises, the fans speed up and cool down the room to bring the room to setpoint. When the room temperature drops to 25°C and below, the second fan stops completely, while the first fan continues to work.

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#### IV. DATA & ANALYSIS

##### a. DATA DEFINITION

All of the factors affecting the cooling energy of the system were recorded and downloaded to Hayat Kimya's corporate cloud infrastructure. Below listed factors are logged.

DATA	Unit	Frequency	Logged by
Chiller Electricity Consumption	Watt	10sec	Fluke
AHU Electricity Consumption	Watt	1 min	Fluke
MCC unit (VFD) Electricity Consumption	Kw	1 hr	Fluke
Room Temperature	°C	1 min	SCADA
Ambient Temperature	°C	1 hr	SCADA

Table 1- Logged Factors Table

MCC consumption and outdoor temperature data were recorded hourly, other data was recorded at frequencies of 5 and 10 seconds. All of the data logged and recorded by Hayat Kimya Energy Unit and provided to Hydromx Eurasia Office.

The working principle of the Fluke 430 Series II Three-Phase Power Quality and Energy Analyzers is to take 200,000 records per second and report them at the desired frequencies.

Tables were created by calculating hourly subtotals of energy consumption data and the hourly average of temperature data to fit all parameters at the same timetable. The sample data table is presented in APPX-A.

All the data used in this report was approved and signed by the Hayat Kimya Energy Unit team and presented in APPX-A (data tables).

##### b. DATA RELIABILITY

According to the IPMV protocol, all data to be calculated should be recorded independently of human intervention. All data recordings were carried out by this rule.

All data was recorded by the automation team in the factory. There are two types of data in total:

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1. Electricity consumption (kW/hr)
2. Temperature data (°C)

Electricity consumption is logged by the portable Fluke 430 Series II Three-Phase Power Quality and Energy Analyzers. (see APPX E-Analyzer Technical Brochure)

Temperature data are logged by the central automation system of the factory.

All data are shared by the Energy management department in MS Excel format.



### c. DATA ANALYSIS

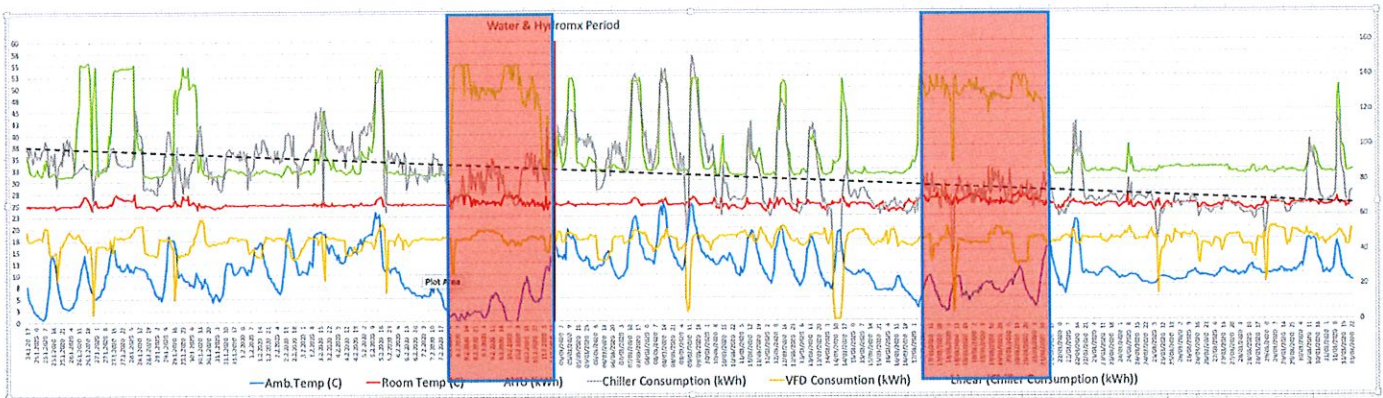
The goal of the entire cooling system is to keep the room temperature constant at 25°C. This condition was not met during certain periods for both before and after data. The IPMVP Option C dictates to have above 0.80 R-squared (R2) statistical value to obtain reliable results. Therefore, during periods when the system ran extremely contrary to the predetermined working principle were excluded from both data.

As can be seen from the graph below, in the red colored sections.

- a. Although outside temperatures were lower than the general average,
- b. Although the MCC load was stable,
- c. AHU and Chiller were running at high performance,

the room temperature could not be maintained at 25°C. Such periods openly violated the predetermined working principle of the system.

After consulting with the Hayat Kimya team regarding the periods in violation, it was mutually agreed upon that such periods were to be removed from both data. Hence, the comparison calculations were made with the "Refined Data". As a result, a significantly more dependable and accurate "apples-to-apples" analysis reporting was achieved.



Chiller and AHU energy consumptions are significantly affected by 2 parameters.

1. Outdoor temperatures (Affects consumption of chiller and room temperature.)
2. MCC consumption (The main factor affecting the room temperature)

As can be verified from the above chart, Chiller and AHU consumptions were extremely affected by Outdoor temps and MCC consumptions. For reliable calculations to be made, such differences ought to be adjusted as defined by the IPMVP. In this analysis, the required adjustments were only made to the Outside Temperatures. Overall averages reflected very closely matched MCC consumptions, therefore had not been adjusted.

## V. CALCULATION & RESULTS

**Simple Comparison:** Comparison of the active parameters.

### a. Raw Data Analysis:

The below table represents the simple averages of the dataset enclosed to this report that was provided by Hayat Kimya without any adjustments.

Raw data	Ambient Temp. (°C)	Room Temp. (°C)	Chiller Consumption (kWh)/hr	MCC (kWh)/hr	AHU (kWh)/hr	System Power (kWh)/hr
Water	9,09	25,25	90,31	4.524	38,5	149,8
Hydromx	10,99	24,95	81,96	4.535	37,3	140,2
Difference	+1,9°C (3.5°F)	-0,30°C (0.5°F)	-9,3%	0%	-3%	-6,4%

As it can be clearly observed from the "Difference" row that Hydromx® had significantly improved the overall efficiency of the System whilst operating almost 2 Celsius or 3.5 Fahrenheit degrees higher on average outside temperature conditions. Not only that the chiller consumption had dropped 9,3% but also the target room temperature was steadily kept under 25°C and even maintained 0,3°C or 0.5°F degrees lower temperature than the Water period.

### b. Refined Data Analysis:

When the general averages of the recorded parameters were compared with the "Refined Data", as explained in the "Data Analysis" section, the results are as follows:

Refined Data	Ambient Temp. (°C)	Room Temp. (°C)	Chiller Consumption (kWh)/hr	MCC (kWh)/hr	AHU (kWh)/hr	System Power (kWh)/hr
Water	10,09	25,2	92,26	4.474	36,4	149,7
Hydromx	11,70	24,75	81,68	4.555	34,37	137,05
Difference	+1,6°C (2.9°F)	-0,45°C (0.81°F)	-12%	+2%	-5%	-9%

Table 2 Performance Comparison Table with Refined Data

The outdoor temperature and relative humidity were higher by 1,6°C and 15% on average respectively during the Hydromx® period. Despite these disadvantages, a gain of 12% on the chiller consumption and a gain of 6% on the AHU consumption were recorded, and more importantly, the room temperature was 0,45°C or 0.81°F cooler on average.

Both Raw and Refined Data are true testaments to the effectiveness of Hydromx®'s technology.

### c. Adjusted Data Analysis:

To be able to accurately compare both periods "adjustments" had to be made to data based upon the behavior of the system for such differences.

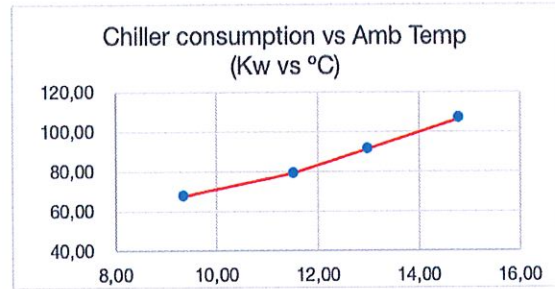
Between the two periods, there was a difference of 1,6°C in "average outdoor temperatures". Adjustments on the chiller consumption due to this difference had to be applied according to the IPMVP.

The difference in chiller consumption during the Hydromx® period according to the average outside temperature variance was calculated and summarized in the table below.

1,5°C to 2°C outside temperature change affected chiller and system power consumption by a minimum of 11kW and 13kW respectively.

Amb. Temp (°C)	Amb Temp increment (°C)	Chiller Consumption (kW/hr)	Chiller Power difference (KW)	AHU (kW)/hr	System Power Consumption (kW/hr)	System Power Increment	Room Temp (°C)	MCC Consumption (kWh)
14,81	1,81	106,36	15,09	37,11	165,02	16,60	25,10	4.437,69
13,00	1,50	91,27	11,92	36,10	148,28	13,71	24,86	4.500,12
11,50	2,13	79,35	11,42	34,22	134,57	13,29	24,67	4.530,18
9,38		67,93		32,35	121,28		24,52	4.544,66

If Hydromx® had been operating at 1,6°C colder average outdoor temperature conditions as it was in the water period, the chiller consumption in the Hydromx® period would have been 11kW less, and the System Energy Consumption would have been lower by 13KW. This adjustment ought to be made for a reliable comparison per the IPMVP.



Hence, the "Adjusted Data Table" would be as below:

Refined Data	Ambient Temp. (°C)	Room Temp (°C)	Chiller Consumption (kWh)/hr	MCC (kWh)/hr	AHU (kWh)/hr	System Power (kWh)/hr
Water	10,09	25,2	92,26	4.474	36,4	149,7
Hydromx	11,59	24,75	70,68	4.555	34,39	124,53
Adjusted Diff.	Adjusted	-0,45 (0.81°F)	-23%	+2%	-5%	-17%

Considering the extra energy spent to reduce the room temperature by 0,45°C or 0.81°F and the extra loads caused by the differences in relative humidity & the MCC increase, it would be very accurate to assume that the rate of savings improvement of Hydromx® would have been over 20% with ease.

Objectively, Hydromx® achieved better quality room comfort under more difficult conditions by providing significant energy efficiency.

#### d. Same Ambient Temperature Analysis:

To check the accuracy of the adjustments applied above; the periods when the room target temperature (25°C) were steadily achieved and the periods with equal outdoor temperatures & equal MCC loads were compared in the tables below.

The results confirmed the validity of “adjustments” applied according to the IPMVP. The chiller efficiency increased by 23,55% and 27,49% along with the System performance increase of 17,56% and 21,61% respectively.

When outside temperatures were at 10°C on average:

Comparison at 10°C	Amb. Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU kW/hr	System Power (kW/hr)
HX 27Mar- 29Mar -- 10:00 - 04:00	10,2	24,4	65,4	4.410,9	32,0	118,3
Water 31Jan – 01Feb -- 17:00 - 08:00	10,6	25,0	90,2	4.481,9	33,2	144,3
Water 02Feb - 03Feb -- 21:00 - 05:00	10,5	25,0	89,0	4.124,2	32,0	142,0
Water 05Feb - 06Feb -- 19:00 - 08:00	11,0	25,0	91,4	4.577,8	32,0	144,3
Water Average	10,7	25,0	90,2	4.394,66	32,4	143,6
Difference	-0,5	-0,59°C	27,49%	-0,37%	1,27%	17,56%

When outside temperatures were at 9°C on average:

Comparison at 9°C	Amb. Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU kWh/hr	System Power
HX 23Mar - 27Mar -- 20:00 - 10:00	8,93	24,57	69,16	4.558,86	32,43	122,59
Water 29Jan - 30Jan-- 19:00 - 19:00	8,93	25,43	90,46	4.533,28	44,91	156,38
Difference	0,00	-0,86°C	23,55%	-0,56%	27,80%	21,61%

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## VI. CONCLUSION

The Hydromx® performance test was performed by comparing the total cooling energy consumption of the “Before (Water) and After (Hydromx®)” periods.

According to the automation scenario, the room temperature was set to 25°C. The AHUs & Chiller were configured to keep the temperature steady at 25°C. The periods that significantly violated this rule were excluded from both before and after data by applying the same criterion, as openly indicated in the Data Analysis section and agreed by Hayat Kimya Team.

Hydromx® dropped the target room temperature further down in all conditions versus water. The extra consumption of the chiller due to 0,50°C or 0.90°F excessive cooling would have been recovered via proper optimization made to the automation & control systems. It would be safe to assume that such optimization would have added at least an additional 5%-7% savings on energy consumption. This evaluation was made based on the consumption behavior of the system derived from the data.

*The explicit outcome of this study is that Hydromx® had succeeded to maintain the target room temperature, on average, 0,50°C (0.90°F) lower than the water by consuming less energy under worse ambient conditions.*

This Chiller is an air-cooled type chiller. Air-cooled chillers are significantly affected by the relative humidity of the outdoor environment. This effect was completely ignored in this analysis. The relative humidity recorded by the weather station was 15% higher during the Hydromx® period. If the chiller manufacturer’s technical data sheet was available such an impact on the chiller consumption would have been quantified and included in this analysis accordingly.

Based on the result of “the Simple Comparison Method”, an hourly average of 26 kW was saved from the energy consumption of the system. With an average consumption of 300 days x 24 hours, it would mean an energy saving of 187.200,00 kW/year. This would equate to a yearly savings of \$14,976.00 with a unit price of \$ 0.08/kWh. Considering the retail list price of Hydromx®, ROI (Return of Investment) would be a maximum of 3 years.

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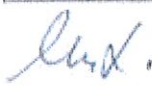
APPX A. Data Tables (Water Period)

WATER PERIOD HOURLY DATA							
Date	Hour	Ambi Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
24.01.2020	17:00	8,6	25,1	112,37	5.194	38,7	172,0
24.01.2020	18:00	7,7	24,9	97,47	4.706	35,6	154,0
24.01.2020	19:00	5,4	24,8	99,32	4.838	34,5	154,8
24.01.2020	20:00	4,4	25,0	98,73	4.661	32,9	147,6
24.01.2020	21:00	4,6	24,7	98,27	4.613	32,1	151,4
24.01.2020	22:00	3,7	25,0	97,45	4.661	33,9	150,4
24.01.2020	23:00	2,5	25,0	89,88	4.690	31,5	147,4
25.01.2020	00:00	2,4	24,7	90,80	4.748	33,7	143,5
25.01.2020	01:00	1,9	24,9	97,46	4.759	33,5	150,0
25.01.2020	02:00	1,8	24,8	93,97	4.736	32,4	147,4
25.01.2020	03:00	1,6	24,6	92,49	4.838	32,8	146,1
25.01.2020	04:00	1,1	24,8	93,56	4.823	31,5	146,5
25.01.2020	05:00	1,0	24,9	93,00	4.795	31,6	145,6
25.01.2020	06:00	0,7	24,8	93,30	4.727	31,1	145,3
25.01.2020	07:00	0,5	24,7	97,56	5.250	31,4	150,0
25.01.2020	08:00	1,0	24,8	98,01	5.443	34,0	153,0
25.01.2020	09:00	1,8	25,0	102,59	5.342	32,7	156,3
25.01.2020	10:00	3,4	24,8	103,08	5.327	34,8	158,9
25.01.2020	11:00	5,6	24,8	90,21	4.308	33,4	153,6
25.01.2020	12:00	7,9	24,8	83,16	3.862	31,3	135,5
25.01.2020	13:00	12,4	24,9	89,11	3.812	31,3	141,4
25.01.2020	14:00	14,5	25,0	95,21	3.824	31,6	147,8
25.01.2020	15:00	14,2	24,9	93,19	3.861	32,0	146,2
25.01.2020	16:00	13,6	24,9	89,51	3.962	31,9	141,4
25.01.2020	17:00	12,4	25,0	95,81	3.984	31,9	148,7
25.01.2020	18:00	9,8	24,3	78,37	2.373	31,1	130,5
25.01.2020	19:00	8,3	24,1	76,64	3.212	31,4	129,3
25.01.2020	20:00	6,3	24,6	88,38	4.082	31,1	140,5
25.01.2020	21:00	4,3	24,8	90,09	4.395	31,1	142,1
25.01.2020	22:00	4,0	24,8	91,64	4.287	31,1	143,7
25.01.2020	23:00	3,4	24,9	88,94	4.609	30,9	140,8
26.01.2020	00:00	3,2	24,9	102,34	4.704	30,8	154,1
26.01.2020	01:00	3,1	25,0	95,04	4.890	31,0	147,0
26.01.2020	02:00	3,0	24,9	101,33	5.032	31,2	153,5
26.01.2020	03:00	2,8	25,0	104,07	5.101	31,3	156,1
26.01.2020	04:00	2,8	24,9	95,05	5.173	31,3	147,3
26.01.2020	05:00	3,2	25,0	103,11	5.042	31,4	155,5
26.01.2020	06:00	3,3	24,8	100,05	4.912	31,2	152,3
26.01.2020	07:00	3,4	25,0	98,28	4.921	31,1	150,5
26.01.2020	08:00	4,2	25,0	94,23	4.900	31,2	146,5
26.01.2020	09:00	4,8	25,1	84,11	4.831	32,2	137,4
26.01.2020	10:00	5,4	24,9	84,44	4.960	32,2	142,7
26.01.2020	11:00	7,1	24,9	85,10	5.037	31,4	147,5
26.01.2020	12:00	8,1	25,0	85,87	4.953	31,3	151,7
26.01.2020	13:00	9,8	25,0	86,99	4.744	31,9	154,9
26.01.2020	14:00	10,9	25,2	87,77	4.658	31,1	163,9
26.01.2020	15:00	12,2	25,7	87,76	4.543	31,2	164,0
26.01.2020	16:00	13,4	26,3	88,56	4.550	31,9	164,6
26.01.2020	17:00	14,3	26,9	89,91	4.451	34,8	165,8
26.01.2020	18:00	12,3	27,0	87,98	4.188	35,0	164,0
26.01.2020	19:00	10,5	26,7	87,71	4.094	35,4	164,1
26.01.2020	20:00	9,0	26,3	87,96	4.291	35,6	164,5
26.01.2020	21:00	8,1	25,9	87,51	4.355	35,5	164,0
26.01.2020	22:00	6,8	25,3	87,00	3.145	32,2	160,2
26.01.2020	23:00	6,5	24,1	80,73	4.77	31,7	133,4
27.01.2020	00:00	5,9	25,2	62,87	1.877	26,5	130,4
27.01.2020	01:00	5,4	25,4	80,40	3.535	30,7	152,1
27.01.2020	02:00	5,0	26,2	82,05	4.266	34,6	157,6
27.01.2020	03:00	4,9	26,0	86,35	4.371	35,1	152,5
27.01.2020	04:00	5,7	24,9	86,17	4.250	31,2	138,3
27.01.2020	05:00	5,7	24,8	86,45	4.352	31,8	139,2
27.01.2020	06:00	6,2	24,8	86,72	4.367	33,1	139,9
27.01.2020	07:00	7,3	25,1	86,83	4.326	32,4	140,7
27.01.2020	08:00	7,2	24,8	86,54	4.307	32,3	139,8
27.01.2020	09:00	8,3	24,6	87,57	4.349	32,7	141,3
27.01.2020	10:00	10,2	24,9	87,81	4.212	32,5	143,3
27.01.2020	11:00	10,9	25,1	88,35	4.223	33,2	142,5
27.01.2020	12:00	11,1	24,8	88,72	4.187	33,6	143,3
27.01.2020	13:00	13,7	25,2	88,78	4.768	40,1	149,9
27.01.2020	14:00	15,2	25,6	94,93	4.531	38,4	154,3
27.01.2020	15:00	16,9	25,0	98,87	3.939	40,5	160,4
27.01.2020	16:00	15,6	25,6	98,90	4.839	48,7	168,6
27.01.2020	17:00	15,6	26,5	98,93	4.902	54,0	173,9
27.01.2020	18:00	14,3	27,1	98,46	4.849	54,1	173,5
27.01.2020	19:00	12,3	27,1	94,32	4.806	54,2	169,5

Sabri CAŞMAK  
 Enerji Yönetim ve Teknoloji  
 Grup Müdürü



WATER PERIOD HOURLY DATA							
Date	Hour	Amb Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
27.01.2020	20:00	12,0	27,0	89,64	4.806	54,1	164,7
27.01.2020	21:00	12,3	26,7	90,04	4.867	54,1	165,3
27.01.2020	22:00	11,2	26,8	90,36	4.855	54,3	165,7
27.01.2020	23:00	11,3	26,7	88,70	4.771	54,4	164,1
28.01.2020	00:00	11,1	26,4	88,71	4.741	54,4	164,1
28.01.2020	01:00	11,0	26,1	89,50	4.819	54,6	164,1
28.01.2020	02:00	11,8	26,2	89,27	4.854	54,5	164,8
28.01.2020	03:00	12,5	26,1	88,44	4.837	54,5	164,0
28.01.2020	04:00	12,0	26,1	89,01	4.910	54,4	164,4
28.01.2020	05:00	10,9	26,1	88,46	4.936	54,5	163,9
28.01.2020	06:00	11,5	26,1	88,73	4.950	54,6	164,3
28.01.2020	07:00	11,1	26,0	88,75	5.141	54,5	164,2
28.01.2020	08:00	10,7	26,0	88,70	5.209	54,6	164,3
28.01.2020	09:00	11,7	26,6	103,12	5.291	55,1	173,2
28.01.2020	10:00	12,0	27,4	106,88	5.468	55,2	183,1
28.01.2020	11:00	12,0	24,8	120,39	5.485	43,1	184,5
28.01.2020	12:00	11,7	24,8	113,87	5.488	38,4	171,1
28.01.2020	13:00	11,7	25,0	108,06	5.491	37,2	166,3
28.01.2020	14:00	11,7	24,9	105,87	5.506	37,0	163,9
28.01.2020	15:00	11,3	25,0	105,65	5.519	37,4	164,0
28.01.2020	16:00	11,6	24,6	101,11	4.870	35,8	157,9
28.01.2020	17:00	11,4	24,5	73,43	3.946	31,9	128,3
28.01.2020	18:00	11,0	24,6	74,91	3.986	31,1	127,1
28.01.2020	19:00	10,6	25,0	76,43	3.892	31,4	128,8
28.01.2020	20:00	9,4	25,0	75,39	3.865	31,2	128,0
28.01.2020	21:00	9,5	24,9	75,35	3.815	31,2	127,4
28.01.2020	22:00	9,1	24,9	74,57	3.885	31,0	126,6
28.01.2020	23:00	8,5	25,0	75,55	3.877	30,9	127,4
29.01.2020	00:00	7,7	24,9	75,10	3.814	31,1	127,7
29.01.2020	01:00	6,7	24,8	74,84	3.828	31,2	127,0
29.01.2020	02:00	6,2	24,6	73,15	3.780	31,1	125,1
29.01.2020	03:00	5,7	24,4	72,53	3.801	31,2	124,7
29.01.2020	04:00	5,7	24,1	72,00	3.935	31,3	124,1
29.01.2020	05:00	5,1	24,8	83,36	4.734	31,2	135,6
29.01.2020	06:00	5,5	24,5	76,60	4.766	31,3	128,9
29.01.2020	07:00	4,5	24,8	78,10	4.750	31,4	130,5
29.01.2020	08:00	4,8	24,9	78,18	4.697	31,4	130,6
29.01.2020	09:00	6,7	25,0	81,50	4.702	31,4	133,9
29.01.2020	10:00	9,5	25,1	94,90	4.726	31,6	147,5
29.01.2020	11:00	12,5	25,1	94,15	4.784	31,8	147,0
29.01.2020	12:00	15,5	25,1	102,94	4.764	32,0	156,0
29.01.2020	13:00	18,5	25,2	108,57	4.769	32,5	161,0
29.01.2020	14:00	17,5	25,2	107,76	4.454	31,5	162,1
29.01.2020	15:00	17,5	24,8	102,88	4.227	31,1	156,9
29.01.2020	16:00	17,7	25,0	95,92	4.266	31,3	149,2
29.01.2020	17:00	17,4	25,0	70,24	3.309	32,6	123,8
29.01.2020	18:00	17,3	26,2	68,80	2.196	49,0	138,6
29.01.2020	19:00	15,2	26,0	90,04	3.654	49,5	160,9
29.01.2020	20:00	11,0	24,9	99,08	3.853	44,7	164,8
29.01.2020	21:00	9,5	25,5	84,37	3.690	48,5	153,8
29.01.2020	22:00	10,1	25,0	89,89	3.857	50,0	160,9
29.01.2020	23:00	10,4	24,9	80,36	3.844	50,3	151,7
30.01.2020	00:00	9,9	25,7	78,82	3.824	50,5	150,1
30.01.2020	01:00	9,2	27,1	71,34	3.830	54,6	149,0
30.01.2020	02:00	8,8	26,1	87,54	3.945	52,4	161,0
30.01.2020	03:00	9,0	26,1	78,74	3.915	52,7	150,4
30.01.2020	04:00	8,9	28,1	82,47	3.925	52,5	155,9
30.01.2020	05:00	8,6	27,1	76,19	3.893	54,6	151,8
30.01.2020	06:00	7,9	25,2	84,23	4.393	50,1	155,1
30.01.2020	07:00	8,0	25,3	84,44	4.402	50,3	155,8
30.01.2020	08:00	7,8	25,6	90,32	4.402	50,7	162,0
30.01.2020	09:00	7,5	25,7	90,71	4.803	51,2	162,9
30.01.2020	10:00	8,4	25,5	92,61	4.918	50,8	164,5
30.01.2020	11:00	10,6	25,3	92,51	5.155	51,0	164,5
30.01.2020	12:00	9,8	24,8	105,00	5.405	46,8	172,8
30.01.2020	13:00	9,4	24,2	98,38	5.627	32,2	151,5
30.01.2020	14:00	8,7	25,6	108,09	5.811	33,1	162,1
30.01.2020	15:00	8,7	25,1	111,42	5.729	35,9	168,4
30.01.2020	16:00	7,2	24,7	105,54	5.834	32,9	159,4
30.01.2020	17:00	7,9	24,9	96,50	5.479	31,2	148,7
30.01.2020	18:00	9,3	24,7	85,85	4.714	31,5	138,4
30.01.2020	19:00	8,6	25,1	90,57	4.460	31,7	143,3
30.01.2020	20:00	8,1	25,0	93,69	4.435	31,6	146,3
30.01.2020	21:00	7,0	24,9	85,43	4.429	31,9	137,7
30.01.2020	22:00	6,7	24,9	81,17	4.371	31,0	133,4


**Sabri ÇAKMAK**  
 Enerji Üretim ve Teknoloji  
 Sorumlusu Grup Müdürü

WATER PERIOD-HOURLY DATA							
Date	Hour	Amb.Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
10.01.2020	23:00	6,1	24,7	85,27	4,465	31,0	137,9
11.01.2020	00:00	5,0	24,6	85,19	4,467	31,0	137,2
11.01.2020	01:00	4,2	24,7	78,28	4,441	31,2	130,5
11.01.2020	02:00	5,4	24,5	81,80	4,413	31,2	134,0
11.01.2020	03:00	6,0	24,2	80,50	4,458	31,1	132,8
11.01.2020	04:00	5,6	24,4	79,99	4,488	31,2	132,2
11.01.2020	05:00	5,3	24,5	82,30	4,549	31,2	134,5
11.01.2020	06:00	4,6	24,5	75,51	4,556	31,5	128,0
11.01.2020	07:00	5,0	24,4	75,02	4,492	31,3	127,1
11.01.2020	08:00	5,0	24,4	73,81	4,522	31,2	126,0
11.01.2020	09:00	5,9	24,6	74,41	4,643	31,2	126,6
11.01.2020	10:00	8,6	24,9	84,31	4,670	31,2	136,5
11.01.2020	11:00	10,8	25,2	81,26	4,563	31,4	133,7
11.01.2020	12:00	12,2	25,2	94,51	4,525	32,2	147,7
11.01.2020	13:00	12,8	24,9	95,94	4,699	32,6	149,5
11.01.2020	14:00	12,7	25,1	97,35	4,828	32,8	151,2
11.01.2020	15:00	12,4	25,0	98,26	4,879	32,8	152,0
11.01.2020	16:00	12,6	25,0	96,51	4,822	32,7	150,2
11.01.2020	17:00	11,9	24,9	94,95	4,791	32,5	148,5
11.01.2020	18:00	10,3	25,2	95,97	4,823	32,5	149,3
11.01.2020	19:00	10,1	24,9	94,82	4,804	32,6	148,4
11.01.2020	20:00	10,3	25,0	94,11	4,780	32,4	147,7
11.01.2020	21:00	10,5	24,9	93,07	4,675	32,1	146,2
11.01.2020	22:00	10,9	25,0	94,64	4,741	32,1	148,8
11.01.2020	23:00	11,4	25,0	91,35	4,775	32,1	144,5
1.02.2020	00:00	11,8	25,1	96,97	4,743	32,2	150,1
1.02.2020	01:00	11,8	24,9	91,75	4,738	32,2	144,9
1.02.2020	02:00	11,8	25,0	94,11	4,710	32,1	147,2
1.02.2020	03:00	11,7	25,0	92,21	4,729	32,2	150,8
1.02.2020	04:00	10,8	25,1	91,01	4,714	31,6	143,6
1.02.2020	05:00	10,2	24,8	95,32	4,397	31,5	147,9
1.02.2020	06:00	11,2	24,9	75,85	3,895	31,5	128,2
1.02.2020	07:00	11,1	25,1	87,65	3,943	31,5	140,2
1.02.2020	08:00	10,2	25,0	79,85	3,983	31,4	132,3
1.02.2020	09:00	11,7	25,0	85,50	4,151	31,2	137,7
1.02.2020	10:00	13,0	25,0	85,81	4,163	31,4	138,2
1.02.2020	11:00	15,4	25,0	88,11	3,852	31,6	140,8
1.02.2020	12:00	16,0	25,1	96,03	3,688	31,7	148,7
1.02.2020	13:00	15,7	25,1	100,98	3,730	32,2	154,1
1.02.2020	14:00	16,1	24,9	96,71	3,771	32,1	149,8
1.02.2020	15:00	16,6	25,0	94,25	3,676	31,9	147,1
1.02.2020	16:00	17,0	25,1	95,36	3,713	31,9	148,2
1.02.2020	17:00	16,7	25,1	96,62	4,123	32,2	149,8
1.02.2020	18:00	15,3	25,1	103,06	4,447	32,3	156,4
1.02.2020	19:00	13,4	25,0	103,77	4,660	32,6	157,3
1.02.2020	20:00	12,0	25,1	101,51	4,896	32,5	155,0
1.02.2020	21:00	13,6	24,9	96,66	4,776	32,3	150,9
1.02.2020	22:00	10,4	25,0	98,38	4,797	32,1	151,5
1.02.2020	23:00	9,3	25,0	92,87	4,791	32,0	145,8
2.02.2020	00:00	9,4	25,0	92,41	4,792	32,0	145,4
2.02.2020	01:00	8,7	25,0	93,69	4,704	31,9	146,6
2.02.2020	02:00	8,3	24,9	92,74	4,638	31,9	145,4
2.02.2020	03:00	7,8	25,0	90,33	4,678	31,6	142,9
2.02.2020	04:00	7,1	25,1	96,73	4,781	31,8	149,5
2.02.2020	05:00	7,0	24,9	91,66	4,788	31,7	144,4
2.02.2020	06:00	6,4	25,0	96,74	4,789	31,7	149,4
2.02.2020	07:00	6,3	24,9	93,04	4,815	31,6	145,6
2.02.2020	08:00	6,0	25,0	89,87	4,792	31,4	142,3
2.02.2020	09:00	7,0	24,9	92,96	4,719	31,0	145,0
2.02.2020	10:00	8,9	25,2	90,87	4,800	31,2	143,1
2.02.2020	11:00	11,4	25,0	96,24	4,743	31,8	149,1
2.02.2020	12:00	14,2	25,1	97,30	4,452	32,5	150,8
2.02.2020	13:00	16,9	25,2	106,76	4,453	33,0	159,8
2.02.2020	14:00	18,0	25,1	106,27	4,292	33,4	160,7
2.02.2020	15:00	20,0	25,0	106,92	4,225	33,1	161,0
2.02.2020	16:00	18,9	24,9	105,36	3,777	33,1	159,5
2.02.2020	17:00	17,6	24,8	100,75	3,624	32,3	154,1
2.02.2020	18:00	16,1	24,9	93,76	3,549	31,9	146,7
2.02.2020	19:00	13,7	25,0	105,64	3,630	32,2	158,8
2.02.2020	20:00	13,6	25,0	90,92	3,630	32,4	144,3
2.02.2020	21:00	12,7	24,9	90,06	3,601	32,2	143,1
2.02.2020	22:00	11,1	24,9	89,18	3,610	32,2	142,4
2.02.2020	23:00	10,1	25,0	75,71	3,846	32,0	128,7
3.02.2020	00:00	10,2	25,0	89,05	4,059	31,7	141,8
3.02.2020	01:00	10,1	25,1	85,33	4,217	31,8	138,1

Sabit ÇAKMAK  
Enerji İstetim ve Teknoloji  
Grup Müdürü



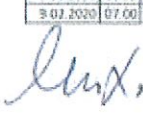


WATER PERIOD HOURLY DATA							
Date	Hour	Amb. Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
3.02.2020	02:00	10,9	25,0	87,80	4.194	31,8	140,1
3.02.2020	03:00	10,6	25,1	90,29	4.391	32,0	143,1
3.02.2020	04:00	10,6	25,0	93,49	4.506	32,0	146,5
3.02.2020	05:00	10,8	25,0	93,74	4.654	32,1	146,8
3.02.2020	06:00	10,2	25,0	95,73	4.696	32,1	148,9
3.02.2020	07:00	12,0	25,1	96,86	4.844	32,1	150,1
3.02.2020	08:00	12,9	24,9	97,94	4.768	32,0	151,0
3.02.2020	09:00	12,7	25,1	96,61	4.785	31,5	149,1
3.02.2020	10:00	11,6	25,1	100,54	4.744	32,0	151,6
3.02.2020	11:00	18,2	24,9	99,22	4.711	32,1	152,3
3.02.2020	12:00	18,6	25,4	107,52	4.810	32,0	161,4
3.02.2020	13:00	19,0	25,2	118,92	4.810	32,0	170,9
3.02.2020	14:00	18,9	24,8	114,42	4.409	35,0	170,4
3.02.2020	15:00	19,0	25,1	109,54	4.641	33,9	164,5
3.02.2020	16:00	19,3	25,1	112,13	4.878	35,4	168,5
3.02.2020	17:00	19,2	25,2	121,65	4.996	37,4	180,1
3.02.2020	18:00	18,7	24,6	106,33	3.168	38,5	165,8
3.02.2020	19:00	18,8	26,2	67,29	2.352	45,1	131,4
3.02.2020	20:00	18,8	24,7	119,89	4.781	42,9	183,8
3.02.2020	21:00	17,2	25,2	117,04	4.861	35,6	171,6
3.02.2020	22:00	15,9	24,9	109,88	4.757	35,0	165,9
3.02.2020	23:00	14,7	24,8	106,80	4.722	34,1	161,1
4.02.2020	00:00	15,8	25,0	103,08	4.745	34,0	158,1
4.02.2020	01:00	16,4	24,8	101,66	4.776	32,7	157,4
4.02.2020	02:00	16,2	25,4	104,53	4.738	33,0	158,5
4.02.2020	03:00	15,3	25,0	109,04	4.736	34,7	164,8
4.02.2020	04:00	14,4	24,8	100,83	4.746	33,0	154,9
4.02.2020	05:00	14,3	25,0	100,96	4.692	32,1	154,3
4.02.2020	06:00	13,2	25,0	97,94	4.625	32,2	151,1
4.02.2020	07:00	14,3	25,0	100,31	4.727	32,4	153,6
4.02.2020	08:00	12,5	25,1	95,00	4.652	32,5	149,5
4.02.2020	09:00	12,9	25,0	100,32	4.711	32,4	153,6
4.02.2020	10:00	12,4	25,0	96,95	4.658	32,2	150,2
4.02.2020	11:00	12,6	25,0	99,85	4.641	32,1	152,9
4.02.2020	12:00	12,9	24,8	94,60	3.929	31,9	147,5
4.02.2020	13:00	14,1	25,0	87,38	3.750	31,6	139,9
4.02.2020	14:00	14,2	25,1	88,34	3.849	31,5	150,9
4.02.2020	15:00	15,6	25,1	96,33	3.845	32,0	152,1
4.02.2020	16:00	15,9	25,0	97,52	3.797	31,9	150,4
4.02.2020	17:00	16,0	25,1	97,04	3.829	32,0	150,0
4.02.2020	18:00	15,4	25,2	101,23	4.103	32,8	157,0
4.02.2020	19:00	14,7	25,0	107,38	4.298	33,5	161,9
4.02.2020	20:00	15,0	24,6	91,40	4.062	32,2	144,6
4.02.2020	21:00	15,0	25,0	94,07	4.015	31,8	146,8
4.02.2020	22:00	14,5	25,0	91,74	3.964	31,7	144,4
4.02.2020	23:00	16,7	25,0	93,41	4.604	31,8	146,1
5.02.2020	00:00	16,7	25,0	91,57	4.021	31,6	144,2
5.02.2020	01:00	17,6	25,2	104,87	4.090	31,1	158,0
5.02.2020	02:00	16,5	25,4	108,70	4.398	35,5	166,2
5.02.2020	03:00	17,0	24,9	106,28	4.580	35,8	168,1
5.02.2020	04:00	18,0	25,0	110,53	4.545	35,2	166,7
5.02.2020	05:00	18,1	25,0	111,16	4.576	35,2	167,3
5.02.2020	06:00	18,1	25,1	109,80	4.525	35,2	162,0
5.02.2020	07:00	18,5	25,0	106,43	4.580	34,8	162,1
5.02.2020	08:00	18,3	25,1	110,42	4.517	37,4	168,8
5.02.2020	09:00	18,9	25,0	113,02	4.486	36,8	170,8
5.02.2020	10:00	18,6	25,0	108,20	4.396	36,2	165,4
5.02.2020	11:00	19,6	25,0	110,42	4.184	37,1	168,8
5.02.2020	12:00	21,6	25,2	120,16	4.479	39,5	180,7
5.02.2020	13:00	23,4	25,1	125,38	4.872	45,8	192,8
5.02.2020	14:00	22,0	25,7	135,64	5.015	53,9	210,5
5.02.2020	15:00	22,1	26,2	135,75	5.170	54,7	211,0
5.02.2020	16:00	22,9	26,4	136,36	5.332	53,9	211,1
5.02.2020	17:00	22,1	26,4	141,00	5.481	53,9	215,9
5.02.2020	18:00	16,4	25,7	142,01	5.576	53,8	216,8
5.02.2020	19:00	11,9	26,1	126,92	5.366	53,9	201,8
5.02.2020	20:00	11,1	24,7	111,86	5.301	50,2	185,1
5.02.2020	21:00	10,7	24,6	65,96	1.638	35,3	122,1
5.02.2020	22:00	11,7	25,5	61,54	1.343	31,7	114,3
5.02.2020	23:00	11,6	25,0	91,40	4.612	31,9	144,3
6.02.2020	00:00	11,3	25,1	96,91	4.634	32,0	149,9
6.02.2020	01:00	10,5	25,1	91,85	4.619	32,0	144,8
6.02.2020	02:00	11,1	24,9	92,36	4.624	31,9	145,1
6.02.2020	03:00	11,0	25,0	95,52	4.592	31,8	148,1
6.02.2020	04:00	11,4	24,9	89,61	4.347	31,7	142,1

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**Sabri ÇAKMAK**  
Enerji Sistem ve Teknoloji  
Genel Müdürü

WATER PERIOD HOURLY DATA							
Date	Hour	Amb.Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kW)
6.02.2020	05:00	11,5	25,0	93,56	4.610	33,7	145,3
6.02.2020	06:00	10,8	25,1	91,19	4.885	33,8	144,0
6.02.2020	07:00	10,5	25,1	95,47	5.004	32,2	148,6
6.02.2020	08:00	10,6	24,8	94,16	4.847	32,0	147,1
6.02.2020	09:00	10,1	25,2	87,49	4.692	33,3	139,8
6.02.2020	10:00	8,4	25,1	92,08	4.667	31,6	144,7
6.02.2020	11:00	8,0	24,8	87,71	4.141	31,6	140,3
6.02.2020	12:00	7,5	23,2	83,55	4.680	31,5	136,0
6.02.2020	13:00	6,9	23,0	86,74	4.684	31,6	140,3
6.02.2020	14:00	7,1	25,0	92,02	4.677	31,8	144,8
6.02.2020	15:00	7,1	24,7	74,11	4.277	31,2	126,3
6.02.2020	16:00	7,0	25,0	77,70	4.336	31,3	130,0
6.02.2020	17:00	6,8	25,0	83,43	4.402	31,1	135,6
6.02.2020	18:00	6,4	24,9	88,28	4.540	31,4	140,7
6.02.2020	19:00	6,1	25,0	84,52	4.567	31,4	136,9
6.02.2020	20:00	6,2	25,0	84,96	4.675	31,4	137,3
6.02.2020	21:00	5,9	25,0	81,02	4.675	31,6	135,6
6.02.2020	22:00	5,5	24,9	85,78	4.657	31,3	139,1
6.02.2020	23:00	5,5	25,0	80,76	4.634	31,5	133,3
7.02.2020	00:00	5,5	25,0	77,44	4.634	31,5	129,9
7.02.2020	01:00	5,5	25,0	82,23	4.716	31,4	134,7
7.02.2020	02:00	5,5	24,9	83,09	4.754	31,5	135,6
7.02.2020	03:00	5,1	25,1	81,87	4.761	31,4	135,3
7.02.2020	04:00	5,5	24,9	81,31	4.744	31,3	135,6
7.02.2020	05:00	5,7	25,0	80,99	4.733	31,2	133,2
7.02.2020	06:00	5,3	25,0	79,97	4.732	31,2	132,7
7.02.2020	07:00	5,2	25,0	82,74	4.651	31,2	135,0
7.02.2020	08:00	5,3	25,1	78,59	4.722	31,2	130,8
7.02.2020	09:00	5,4	24,9	87,40	4.665	31,0	139,4
7.02.2020	10:00	5,8	25,0	80,27	4.697	30,9	132,3
7.02.2020	11:00	7,6	24,9	89,16	4.691	31,3	141,5
7.02.2020	12:00	6,2	25,1	82,83	4.730	31,3	135,1
7.02.2020	13:00	6,7	25,1	95,39	4.705	31,2	147,5
7.02.2020	14:00	7,6	25,1	92,50	4.693	30,9	144,0
7.02.2020	15:00	7,4	24,9	92,30	4.721	31,8	145,0
7.02.2020	16:00	6,5	25,0	81,57	4.645	31,5	144,1
7.02.2020	17:00	6,4	24,9	90,29	4.646	31,4	142,7
7.02.2020	18:00	6,0	25,0	82,19	4.721	31,4	134,6
7.02.2020	19:00	5,1	24,9	80,13	4.717	31,5	141,7
7.02.2020	20:00	4,4	23,1	84,16	4.797	31,5	136,6
7.02.2020	21:00	3,8	24,9	84,75	4.770	31,4	137,2
7.02.2020	22:00	2,6	24,9	85,09	4.757	31,4	137,5
7.02.2020	23:00	2,8	24,8	78,12	4.776	31,2	130,3
8.02.2020	00:00	1,8	24,9	76,26	4.718	31,1	128,4
8.02.2020	01:00	1,6	24,7	74,06	4.708	31,3	126,3
8.02.2020	02:00	1,0	24,8	78,85	4.780	31,2	131,3
8.02.2020	03:00	1,1	24,8	63,88	3.328	31,1	116,0
8.02.2020	04:00	1,6	25,9	63,38	2.157	45,9	130,3
8.02.2020	05:00	1,4	25,3	68,18	3.947	49,4	138,6
8.02.2020	06:00	1,5	26,2	71,30	4.715	54,6	146,9
8.02.2020	07:00	0,9	26,7	70,50	4.666	54,7	146,3
8.02.2020	08:00	1,0	26,7	71,21	4.659	55,0	147,2
8.02.2020	09:00	0,4	26,6	67,56	4.601	54,9	143,5
8.02.2020	10:00	0,8	26,6	71,42	4.615	54,9	147,3
8.02.2020	11:00	1,6	26,9	70,53	4.701	55,2	146,7
8.02.2020	12:00	1,8	27,1	72,31	4.707	55,3	148,6
8.02.2020	13:00	0,7	27,2	82,20	4.717	54,7	157,8
8.02.2020	14:00	0,4	25,1	73,98	4.728	48,3	143,2
8.02.2020	15:00	0,8	26,8	70,99	4.734	55,0	147,0
8.02.2020	16:00	1,8	26,9	71,77	4.675	55,1	147,8
8.02.2020	17:00	1,9	27,0	71,43	4.610	55,1	147,5
8.02.2020	18:00	1,3	27,0	74,26	4.640	54,9	150,2
8.02.2020	19:00	1,4	26,5	89,12	4.888	51,7	161,8
8.02.2020	20:00	1,7	24,6	74,33	4.925	48,1	143,4
8.02.2020	21:00	1,8	25,4	82,67	4.908	49,4	153,1
8.02.2020	22:00	2,2	26,2	79,61	4.680	51,1	151,7
8.02.2020	23:00	2,1	25,0	74,06	5.041	48,4	143,5
9.02.2020	00:00	2,0	25,9	81,10	5.174	50,4	152,5
9.02.2020	01:00	2,0	25,9	84,01	5.092	48,4	151,4
9.02.2020	02:00	2,1	25,0	80,84	5.197	48,0	149,0
9.02.2020	03:00	2,1	24,9	74,60	5.120	47,7	143,3
9.02.2020	04:00	1,3	25,2	84,77	5.193	50,0	155,8
9.02.2020	05:00	0,8	25,8	71,11	5.098	49,6	141,7
9.02.2020	06:00	0,7	25,6	78,95	5.144	50,2	150,2
9.02.2020	07:00	0,8	27,86	72,86	5.201	48,8	147,6


  
**Sabri ÇAKMAK**  
 Enerji Üretim ve Teknoloji  
 İşletme Grup Müdürü



WATER PERIOD HOURLY DATA							
Date	Hour	Amb. Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
9.02.2020	08:00	1,4	25,0	79,38	5.206	48,4	148,6
9.02.2020	09:00	2,2	25,6	85,36	5.165	49,7	160,0
9.02.2020	10:00	3,2	25,2	86,38	5.091	50,1	157,4
9.02.2020	11:00	4,8	25,8	82,46	5.139	49,2	152,7
9.02.2020	12:00	5,5	25,4	80,60	5.211	49,8	151,4
9.02.2020	13:00	4,9	25,3	92,30	5.125	48,4	161,7
9.02.2020	14:00	5,8	25,8	89,83	4.997	49,6	160,4
9.02.2020	15:00	6,1	24,7	82,50	5.001	47,6	151,1
9.02.2020	16:00	6,1	25,4	82,68	5.053	49,0	152,7
9.02.2020	17:00	5,4	25,4	85,11	4.889	49,2	155,1
9.02.2020	18:00	4,2	25,6	72,96	5.028	49,4	141,8
9.02.2020	19:00	4,1	24,9	87,46	4.922	48,9	157,4
9.02.2020	20:00	4,0	24,3	81,81	4.748	49,5	152,4
9.02.2020	21:00	3,2	26,0	78,27	4.522	51,3	150,6
9.02.2020	22:00	2,6	26,0	82,54	4.587	51,9	155,4
9.02.2020	23:00	1,5	22,1	73,55	4.323	54,7	149,1
10.02.2020	00:00	0,3	26,9	70,53	4.378	54,6	146,2
10.02.2020	01:00	0,0	26,5	69,38	4.308	54,9	145,3
10.02.2020	02:00	0,0	26,9	69,68	4.489	54,8	145,5
10.02.2020	03:00	-0,1	27,1	73,46	4.643	54,8	149,1
10.02.2020	04:00	-0,5	26,4	69,49	4.543	51,9	142,4
10.02.2020	05:00	-0,9	26,9	70,06	4.585	54,6	145,7
10.02.2020	06:00	-0,9	26,2	68,00	4.470	51,3	140,5
10.02.2020	07:00	-0,9	26,4	64,94	4.273	55,0	141,0
10.02.2020	08:00	-0,7	26,7	64,39	4.477	55,7	140,5
10.02.2020	09:00	0,4	26,8	65,93	4.529	55,1	142,1
10.02.2020	10:00	2,0	26,8	65,86	4.367	54,9	141,7
10.02.2020	11:00	3,1	25,8	66,49	4.289	50,4	137,9
10.02.2020	12:00	4,1	26,2	78,25	4.571	52,6	151,8
10.02.2020	13:00	6,1	25,5	84,85	4.647	48,7	154,6
10.02.2020	14:00	7,1	24,7	86,63	4.636	46,6	154,2
10.02.2020	15:00	8,2	25,5	85,52	4.598	47,2	153,7
10.02.2020	16:00	8,3	24,6	85,22	4.622	45,9	152,2
10.02.2020	17:00	9,7	25,1	93,90	4.775	46,3	161,2
10.02.2020	18:00	8,4	25,4	95,19	4.777	49,2	165,4
10.02.2020	19:00	6,3	24,6	91,53	4.822	47,4	159,9
10.02.2020	20:00	3,6	25,2	87,21	4.871	49,1	157,3
10.02.2020	21:00	5,3	25,3	95,26	4.859	50,6	166,9
10.02.2020	22:00	4,4	26,1	87,53	4.763	52,5	161,0
10.02.2020	23:00	4,2	25,3	82,67	4.827	50,0	153,7
11.02.2020	00:00	4,0	24,5	93,60	4.753	45,4	160,0
11.02.2020	01:00	4,2	25,0	85,21	4.669	49,0	155,2
11.02.2020	02:00	4,1	26,4	78,59	4.732	48,7	148,3
11.02.2020	03:00	4,6	24,6	90,08	4.784	46,2	157,3
11.02.2020	04:00	4,9	25,7	92,07	4.860	45,6	158,7
11.02.2020	05:00	6,6	24,6	88,78	4.812	36,4	146,2
11.02.2020	06:00	8,0	25,4	85,31	4.726	34,1	140,2
11.02.2020	07:00	9,8	23,9	82,39	4.008	32,5	135,9
11.02.2020	08:00	11,2	24,9	74,73	3.951	31,9	127,6
11.02.2020	09:00	11,8	26,7	72,40	3.898	35,6	129,0
11.02.2020	10:00	14,5	23,9	110,07	3.936	43,9	179,0
11.02.2020	11:00	10,8	25,1	79,58	4.585	31,9	132,4
11.02.2020	12:00	12,7	25,4	96,76	4.959	31,9	148,6
11.02.2020	13:00	13,9	25,0	95,49	5.031	32,6	149,1
11.02.2020	14:00	14,6	25,1	100,38	4.947	33,0	154,4
11.02.2020	15:00	15,4	22,2	89,09	4.806	37,0	147,1
11.02.2020	16:00	16,4	25,7	106,89	4.559	34,7	162,1

*Safa KUMRAL*

*Sabri ÇAKMAK*  
Enerji Üretim ve Teknoloji  
Geliştirme Grup Müdürü

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PX B. Data Tables (Hydromx Period)

HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb.Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
4.03.2020	11:00	25,4	24,8	123,08	4.523	45,1	189,2
4.03.2020	12:00	22,2	25,9	135,58	4.746	51,9	208,5
4.03.2020	13:00	20,4	26,3	129,56	5.124	53,6	204,1
4.03.2020	14:00	19,5	26,1	128,47	5.063	53,6	203,1
4.03.2020	15:00	19,5	25,9	127,69	5.006	54,0	202,7
4.03.2020	16:00	20,8	25,8	127,80	5.008	53,9	202,7
4.03.2020	17:00	19,3	25,9	130,66	5.043	53,8	205,5
4.03.2020	18:00	18,4	26,1	131,05	5.280	53,6	205,6
4.03.2020	19:00	17,0	25,9	131,82	5.314	53,5	206,3
4.03.2020	20:00	16,2	25,7	132,78	5.339	54,1	207,8
4.03.2020	21:00	15,3	25,4	131,21	5.272	54,0	206,2
4.03.2020	22:00	14,4	25,1	128,28	5.205	53,6	202,9
4.03.2020	23:00	13,1	24,7	119,85	5.119	46,5	187,3
5.03.2020	00:00	13,0	25,3	110,32	5.069	39,3	170,6
5.03.2020	01:00	13,6	25,1	114,92	5.124	38,4	174,3
5.03.2020	02:00	14,1	25,0	111,45	5.140	40,5	173,0
5.03.2020	03:00	13,7	24,8	108,63	4.850	37,4	167,0
5.03.2020	04:00	13,7	24,8	108,62	4.485	34,6	164,2
5.03.2020	05:00	13,3	25,0	102,89	4.492	33,2	157,1
5.03.2020	06:00	14,1	25,0	108,67	4.533	33,8	163,4
5.03.2020	07:00	13,1	25,1	104,70	5.001	35,0	160,7
5.03.2020	08:00	16,9	25,1	113,27	5.053	37,1	171,4
5.03.2020	09:00	19,7	25,2	118,53	5.028	38,6	178,2
5.03.2020	10:00	18,1	25,5	122,97	5.079	50,7	194,6
5.03.2020	11:00	18,0	25,3	122,41	5.003	53,9	197,3
5.03.2020	12:00	17,6	25,0	123,28	4.974	53,8	198,0
5.03.2020	13:00	18,3	25,1	122,57	4.992	53,9	197,5
5.03.2020	14:00	17,9	25,0	123,08	4.914	53,3	197,4
5.03.2020	15:00	17,1	24,8	122,88	4.892	51,2	195,1
5.03.2020	16:00	14,9	24,6	117,49	4.661	37,7	176,2
5.03.2020	17:00	14,6	25,0	111,88	4.650	34,4	167,3
5.03.2020	18:00	13,8	25,0	105,01	4.610	34,1	160,1
5.03.2020	19:00	13,5	25,0	107,40	4.653	34,0	162,4
5.03.2020	20:00	13,2	25,0	106,20	4.635	34,1	161,3
5.03.2020	21:00	12,7	25,0	106,92	4.664	33,7	161,6
5.03.2020	22:00	12,9	24,9	105,30	4.681	33,2	160,5
5.03.2020	23:00	13,0	25,0	102,99	4.687	32,7	156,7
6.03.2020	00:00	13,7	24,9	107,44	4.699	33,4	161,8
6.03.2020	01:00	13,3	24,9	102,35	4.658	33,4	156,7
6.03.2020	02:00	13,2	25,2	110,08	4.843	35,1	166,1
6.03.2020	03:00	11,6	25,0	103,88	4.905	35,4	160,3
6.03.2020	04:00	11,3	24,9	108,45	4.822	35,0	164,5
6.03.2020	05:00	11,5	25,0	101,51	4.812	34,7	157,2
6.03.2020	06:00	11,0	25,0	105,60	4.809	34,3	160,9
6.03.2020	07:00	10,8	25,0	100,71	4.876	34,4	156,1
6.03.2020	08:00	11,2	24,7	97,61	4.381	34,0	152,6
6.03.2020	09:00	11,4	24,9	77,80	3.484	32,0	130,8
6.03.2020	10:00	11,9	25,0	77,87	3.490	32,4	131,2
6.03.2020	11:00	12,0	25,0	78,03	3.483	32,6	131,6
6.03.2020	12:00	11,6	25,0	78,79	3.482	32,6	132,4
6.03.2020	13:00	11,9	25,0	79,13	3.445	32,3	132,4
6.03.2020	14:00	12,3	25,0	81,21	3.470	32,5	134,7
6.03.2020	15:00	13,5	25,0	82,95	3.439	32,7	136,6
6.03.2020	16:00	14,1	25,0	85,45	3.493	32,5	139,0
6.03.2020	17:00	14,6	25,0	95,58	3.572	32,7	149,2
6.03.2020	18:00	14,8	25,2	94,84	3.821	33,0	148,9
6.03.2020	19:00	14,3	24,8	101,48	3.973	33,4	155,8
6.03.2020	20:00	12,7	25,1	85,37	3.965	33,3	139,6
6.03.2020	21:00	11,4	25,1	98,87	4.652	32,9	152,8
6.03.2020	22:00	11,1	25,0	104,17	4.737	33,5	158,7
6.03.2020	23:00	10,4	25,0	100,93	4.783	33,6	155,5
7.03.2020	00:00	9,6	25,0	105,26	4.763	33,4	159,6
7.03.2020	01:00	9,8	24,9	97,96	4.771	32,8	151,8
7.03.2020	02:00	9,0	25,0	103,99	4.786	33,0	158,0
7.03.2020	03:00	8,9	25,0	97,79	4.848	32,6	151,4
7.03.2020	04:00	9,2	25,0	104,47	4.844	32,7	158,2
7.03.2020	05:00	9,6	25,0	97,70	4.844	32,6	151,3
7.03.2020	06:00	9,5	24,9	92,66	4.509	32,3	145,9
7.03.2020	07:00	10,1	25,1	97,21	4.417	31,9	150,1
7.03.2020	08:00	10,5	25,1	88,73	4.475	31,8	141,5
7.03.2020	09:00	11,2	25,0	95,14	4.460	32,2	148,3
7.03.2020	10:00	14,1	25,1	104,56	4.556	32,6	158,1
7.03.2020	11:00	16,3	25,2	106,49	4.654	33,5	161,0
7.03.2020	12:00	18,7	25,2	118,66	4.668	37,4	177,1
7.03.2020	13:00	19,8	25,4	124,95	4.817	44,6	190,6

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Sabri ÇAKMAK  
Enerji Üretim ve Teknoloji  
Geliştirme Grup Müdürü

HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
7.03.2020	14:00	21,2	23,9	129,03	5,160	53,5	203,6
7.03.2020	15:00	22,1	26,3	143,52	5,187	53,3	235,9
7.03.2020	16:00	22,3	26,3	141,85	5,154	53,2	230,0
7.03.2020	17:00	21,9	26,4	142,33	5,139	53,0	236,4
7.03.2020	18:00	20,9	26,0	141,55	5,074	53,1	235,8
7.03.2020	19:00	20,5	25,7	136,57	5,024	53,3	230,9
7.03.2020	20:00	20,5	25,2	128,41	5,066	54,0	203,8
7.03.2020	21:00	20,9	24,8	126,83	5,033	51,9	199,8
7.03.2020	22:00	20,2	24,7	117,92	4,944	39,1	178,0
7.03.2020	23:00	14,2	25,0	114,29	5,049	36,5	171,8
8.03.2020	00:00	13,2	25,0	107,91	4,896	34,7	163,6
8.03.2020	01:00	13,1	25,0	111,60	4,911	33,2	165,8
8.03.2020	02:00	13,2	24,8	101,84	4,465	32,6	155,4
8.03.2020	03:00	13,1	25,1	99,62	4,351	32,7	152,9
8.03.2020	04:00	13,0	24,9	92,48	4,349	32,3	145,8
8.03.2020	05:00	13,8	25,1	100,86	4,230	33,3	154,2
8.03.2020	06:00	12,7	25,0	94,31	3,918	32,3	147,6
8.03.2020	07:00	12,1	25,0	89,00	4,320	32,5	142,5
8.03.2020	08:00	12,9	25,0	88,97	4,084	32,4	142,3
8.03.2020	09:00	15,2	25,1	97,20	4,214	32,7	150,9
8.03.2020	10:00	17,2	25,0	102,33	4,153	33,6	156,9
8.03.2020	11:00	20,9	25,1	109,64	4,177	34,0	164,6
8.03.2020	12:00	23,1	25,6	120,59	4,553	41,2	182,8
8.03.2020	13:00	24,5	26,5	146,70	4,872	53,2	210,9
8.03.2020	14:00	22,6	25,9	146,98	4,760	53,7	221,7
8.03.2020	15:00	20,2	25,2	138,82	4,701	53,9	213,7
8.03.2020	16:00	24,5	25,8	145,55	5,146	53,7	220,3
8.03.2020	17:00	22,3	26,1	146,89	5,198	53,6	221,5
8.03.2020	18:00	20,1	25,5	140,73	4,797	53,7	215,5
8.03.2020	19:00	18,1	24,9	132,08	4,811	52,2	205,3
8.03.2020	20:00	17,1	24,8	120,04	4,841	42,5	183,5
8.03.2020	21:00	15,9	24,9	116,89	4,760	38,7	176,6
8.03.2020	22:00	14,7	24,8	116,32	4,766	35,7	173,0
8.03.2020	23:00	14,4	24,9	107,47	4,743	34,2	162,6
9.03.2020	00:00	13,5	24,8	109,81	4,651	33,1	163,9
9.03.2020	01:00	13,4	25,0	102,85	4,699	32,7	156,6
9.03.2020	02:00	12,6	25,0	93,17	4,153	32,4	152,6
9.03.2020	03:00	11,8	25,0	91,38	4,010	31,9	146,3
9.03.2020	04:00	11,7	25,0	86,91	4,180	31,9	139,8
9.03.2020	05:00	11,1	24,9	99,07	4,089	32,7	152,1
9.03.2020	06:00	10,7	25,1	89,69	4,144	32,1	142,8
9.03.2020	07:00	11,1	24,9	94,41	4,275	32,3	147,7
9.03.2020	08:00	11,9	25,1	97,13	4,410	32,3	150,4
9.03.2020	09:00	13,9	24,4	73,12	1,274	32,4	126,5
9.03.2020	10:00	16,7	24,9	54,22	522	32,1	107,4
9.03.2020	11:00	19,1	25,4	61,44	578	32,2	114,7
9.03.2020	12:00	21,8	24,1	74,84	1,970	31,5	127,3
9.03.2020	13:00	23,9	26,8	103,03	3,495	33,1	157,2
9.03.2020	14:00	25,0	25,9	140,99	4,611	49,8	213,6
9.03.2020	15:00	24,4	26,2	154,64	4,780	53,9	229,5
9.03.2020	16:00	22,6	26,5	152,75	4,896	53,7	227,4
9.03.2020	17:00	20,3	26,1	147,19	4,892	53,8	222,0
9.03.2020	18:00	19,8	25,9	141,47	4,919	53,9	216,4
9.03.2020	19:00	18,5	25,6	139,61	4,913	51,6	214,3
9.03.2020	20:00	16,8	25,0	129,63	4,671	51,8	204,4
9.03.2020	21:00	16,2	24,7	117,16	4,677	44,3	182,5
9.03.2020	22:00	15,3	24,9	118,41	4,897	38,1	177,5
9.03.2020	23:00	14,5	24,8	113,57	4,810	35,7	170,3
10.03.2020	00:00	14,4	25,0	108,76	4,676	32,9	162,7
10.03.2020	01:00	13,8	24,9	109,34	4,513	32,4	162,6
10.03.2020	02:00	13,4	25,0	102,91	4,510	32,3	156,2
10.03.2020	03:00	13,8	25,0	99,16	4,459	32,5	152,7
10.03.2020	04:00	13,3	25,0	92,74	4,419	32,4	146,6
10.03.2020	05:00	13,1	25,0	94,43	3,987	32,3	147,7
10.03.2020	06:00	12,8	25,2	100,88	4,370	32,8	154,7
10.03.2020	07:00	13,1	24,9	100,03	4,540	33,5	154,6
10.03.2020	08:00	12,4	25,0	103,27	4,529	33,4	157,6
10.03.2020	09:00	12,3	26,2	85,43	4,052	35,3	141,7
10.03.2020	10:00	11,9	25,3	75,80	4,663	31,7	128,5
10.03.2020	11:00	11,7	24,2	68,69	4,718	31,0	130,7
10.03.2020	12:00	11,2	24,2	69,09	4,852	31,3	121,5
10.03.2020	13:00	12,8	24,0	68,41	4,835	31,7	130,6
10.03.2020	14:00	13,0	24,0	69,95	4,858	31,1	122,0
10.03.2020	15:00	13,1	26,2	63,77	4,888	37,0	121,8
10.03.2020	16:00	13,7	24,3	92,84	4,808	40,2	151,9

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Sabri ÇAKMAK  
Enerji Sistemleri ve Teknoloji  
Geliştirme Grup Müdürü

HYDROMAX PERIOD HOURLY DATA							
Date	Hour	Amb. Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
10.03.2020	17:00	13,9	25,0	80,82	4.793	14,0	135,8
10.03.2020	18:00	13,1	25,0	81,56	4.847	14,2	136,7
10.03.2020	19:00	12,9	24,8	80,76	4.875	13,8	135,5
10.03.2020	20:00	13,3	24,8	78,41	4.883	12,9	132,3
10.03.2020	21:00	14,3	23,8	72,45	4.894	11,6	125,0
10.03.2020	22:00	13,7	24,4	71,33	4.893	11,6	123,9
10.03.2020	23:00	13,1	24,6	72,39	4.869	11,2	124,6
11.03.2020	00:00	12,2	24,9	71,38	4.876	11,7	125,6
11.03.2020	01:00	12,0	24,7	71,77	4.856	11,2	126,0
11.03.2020	02:00	10,1	24,4	72,81	4.756	11,1	124,9
11.03.2020	03:00	10,3	24,2	72,68	4.923	11,3	125,0
11.03.2020	04:00	9,7	24,1	72,02	4.956	11,3	124,8
11.03.2020	05:00	9,4	24,0	71,96	4.975	11,1	124,0
11.03.2020	06:00	11,1	24,2	72,74	5.031	11,0	124,3
11.03.2020	07:00	10,0	23,9	71,36	5.009	11,1	123,4
11.03.2020	08:00	10,8	23,8	72,11	5.036	11,1	124,2
11.03.2020	09:00	11,1	24,1	73,65	5.136	11,1	125,8
11.03.2020	10:00	11,9	24,4	71,52	4.935	11,4	125,9
11.03.2020	11:00	15,7	25,2	79,12	4.862	11,2	131,4
11.03.2020	12:00	17,6	26,1	101,89	4.725	14,9	157,6
11.03.2020	13:00	18,0	24,7	111,90	4.758	42,0	174,9
11.03.2020	14:00	18,8	25,0	94,21	4.759	37,7	152,9
11.03.2020	15:00	19,3	25,0	116,36	4.949	40,8	178,4
11.03.2020	16:00	19,0	24,9	100,11	4.786	45,7	156,9
11.03.2020	17:00	17,9	25,0	92,88	4.446	35,3	154,2
11.03.2020	18:00	17,1	25,0	96,60	4.491	34,9	152,5
11.03.2020	19:00	15,5	25,1	92,52	4.534	34,3	147,8
11.03.2020	20:00	14,3	25,1	92,63	4.365	36,2	149,8
11.03.2020	21:00	13,0	25,0	90,30	5.198	37,2	148,5
11.03.2020	22:00	12,0	24,9	87,84	5.257	17,3	146,1
11.03.2020	23:00	11,7	24,8	82,87	4.964	34,5	138,4
12.03.2020	00:00	10,8	24,8	78,35	4.973	12,4	131,7
12.03.2020	01:00	10,5	24,1	68,80	4.881	11,4	121,2
12.03.2020	02:00	9,8	23,6	70,16	4.776	11,1	122,4
12.03.2020	03:00	9,8	23,4	67,87	4.447	11,0	119,9
12.03.2020	04:00	9,0	24,5	66,78	4.437	11,3	119,1
12.03.2020	05:00	8,5	23,9	64,50	4.370	10,9	116,4
12.03.2020	06:00	8,4	25,0	62,55	4.178	11,1	114,6
12.03.2020	07:00	7,9	25,2	63,94	4.124	11,3	116,2
12.03.2020	08:00	9,4	24,9	67,07	4.309	11,4	119,5
12.03.2020	09:00	10,7	25,2	70,08	4.762	11,8	122,8
12.03.2020	10:00	15,3	24,0	72,78	4.837	11,0	134,8
12.03.2020	11:00	15,8	25,2	79,82	5.234	11,2	132,0
12.03.2020	12:00	17,5	26,2	108,64	5.237	41,5	171,2
12.03.2020	13:00	18,5	24,6	119,02	5.041	45,6	185,6
12.03.2020	14:00	19,4	25,3	123,44	5.319	41,6	186,1
12.03.2020	15:00	20,0	25,7	127,74	5.394	52,1	200,8
12.03.2020	16:00	18,7	26,1	129,74	5.434	52,9	203,6
12.03.2020	17:00	17,3	26,1	127,59	5.345	53,2	201,8
12.03.2020	18:00	15,7	25,7	125,97	5.266	53,2	200,1
12.03.2020	19:00	15,0	24,8	122,22	5.110	52,0	196,2
12.03.2020	20:00	13,9	24,7	103,56	4.919	39,4	164,0
12.03.2020	21:00	13,0	25,0	98,72	4.797	37,1	156,9
12.03.2020	22:00	12,4	24,9	86,77	4.680	36,2	144,0
12.03.2020	23:00	11,3	24,5	79,36	4.524	33,1	133,5
13.03.2020	00:00	10,6	24,7	68,92	4.494	11,6	121,5
13.03.2020	01:00	10,7	23,6	68,86	4.518	11,3	121,3
13.03.2020	02:00	9,3	23,6	68,83	4.564	11,2	121,0
13.03.2020	03:00	8,9	23,5	68,72	4.625	11,0	120,7
13.03.2020	04:00	8,3	23,3	66,76	4.571	11,2	119,0
13.03.2020	05:00	8,1	25,9	64,88	4.364	11,2	116,9
13.03.2020	06:00	7,2	25,0	64,05	4.290	10,9	116,0
13.03.2020	07:00	7,8	25,1	65,56	4.316	11,4	118,0
13.03.2020	08:00	7,8	24,9	67,21	4.231	12,1	120,3
13.03.2020	09:00	8,8	25,1	70,32	4.305	12,3	123,9
13.03.2020	10:00	10,5	24,8	68,41	4.370	12,3	121,7
13.03.2020	11:00	13,0	24,8	69,65	4.604	11,7	122,3
13.03.2020	12:00	15,2	24,9	74,76	4.468	11,6	122,4
13.03.2020	13:00	15,8	25,7	88,11	4.686	12,5	143,6
13.03.2020	14:00	16,9	25,2	107,99	4.909	41,3	170,3
13.03.2020	15:00	17,8	25,0	112,92	4.836	39,6	173,5
13.03.2020	16:00	17,7	25,1	111,98	4.904	39,3	172,3
13.03.2020	17:00	16,7	25,0	115,19	4.926	40,5	176,2
13.03.2020	18:00	16,1	24,9	110,82	4.955	39,6	171,2
13.03.2020	19:00	15,0	24,9	111,03	4.968	37,7	169,8

*Sabri CAKMAK*  
 Enerji Üretim ve Teknoloji  
 Geliştirme Grup Müdürü



HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb.Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AMP Consumption (kWh)	System Power (kW)
13.03.2020	20:00	13,8	25,0	97,13	4.920	37,4	155,6
13.03.2020	21:00	12,0	25,0	93,66	4.898	36,3	151,0
13.03.2020	22:00	10,8	24,9	86,08	4.937	35,7	142,7
13.03.2020	23:00	9,9	25,0	83,28	4.887	34,2	137,5
14.03.2020	00:00	8,9	23,9	78,54	4.887	32,8	132,4
14.03.2020	01:00	8,7	23,8	70,08	5.018	31,3	122,3
14.03.2020	02:00	8,1	24,3	72,37	5.231	31,2	124,5
14.03.2020	03:00	7,1	23,9	71,20	4.855	31,1	121,3
14.03.2020	04:00	8,1	23,5	68,94	4.477	31,1	119,1
14.03.2020	05:00	7,9	24,7	82,50	4.379	31,3	114,8
14.03.2020	06:00	7,7	24,6	68,34	4.490	31,5	120,8
14.03.2020	07:00	7,0	24,6	66,63	5.041	31,4	119,0
14.03.2020	08:00	6,6	24,6	66,42	5.020	31,4	118,9
14.03.2020	09:00	7,9	25,4	44,02	1.090	32,2	97,2
14.03.2020	10:00	9,5	24,7	36,36	77	34,4	91,8
14.03.2020	11:00	12,6	25,0	41,34	72	33,6	96,0
14.03.2020	12:00	16,6	25,0	43,95	71	34,0	99,0
14.03.2020	13:00	18,8	25,0	43,80	73	34,2	97,0
14.03.2020	14:00	19,0	25,0	41,52	74	34,4	97,0
14.03.2020	15:00	19,3	25,1	42,06	377	35,0	98,1
14.03.2020	16:00	17,0	25,7	48,18	1.280	37,2	106,8
14.03.2020	17:00	14,3	25,9	72,58	2.966	53,7	147,3
14.03.2020	18:00	11,5	26,2	80,57	3.681	50,5	152,1
14.03.2020	19:00	11,1	25,3	85,09	4.386	48,1	154,2
14.03.2020	20:00	10,7	25,1	85,34	4.711	47,2	153,5
14.03.2020	21:00	10,6	24,3	94,16	4.896	43,8	159,0
14.03.2020	22:00	10,5	24,8	82,00	4.975	33,7	136,7
14.03.2020	23:00	10,2	24,1	74,57	4.998	31,6	127,2
15.03.2020	00:00	10,2	24,4	72,66	4.992	31,3	124,9
15.03.2020	01:00	9,6	25,1	74,17	5.042	31,3	126,5
15.03.2020	02:00	9,5	25,1	75,08	5.151	31,5	127,6
15.03.2020	03:00	9,6	25,0	76,86	5.195	31,7	129,6
15.03.2020	04:00	9,8	25,0	76,33	5.154	31,8	129,1
15.03.2020	05:00	9,9	24,8	72,75	5.139	31,6	125,4
15.03.2020	06:00	10,4	24,7	71,84	5.195	31,4	124,3
15.03.2020	07:00	10,0	25,3	75,29	5.222	31,5	127,8
15.03.2020	08:00	10,2	25,0	77,75	5.171	31,2	130,0
15.03.2020	09:00	10,4	25,0	78,33	5.109	31,3	130,7
15.03.2020	10:00	10,7	25,1	78,16	5.156	31,7	130,9
15.03.2020	11:00	10,2	24,8	78,21	4.844	32,8	132,0
15.03.2020	12:00	9,9	25,0	76,22	4.923	32,1	129,3
15.03.2020	13:00	9,7	24,9	75,76	4.796	31,5	128,2
15.03.2020	14:00	9,9	24,9	72,81	4.550	31,4	123,2
15.03.2020	15:00	9,3	24,8	72,56	4.513	31,4	123,0
15.03.2020	16:00	8,8	24,6	71,84	4.391	31,4	124,0
15.03.2020	17:00	8,4	24,4	70,61	4.298	31,3	122,9
15.03.2020	18:00	8,1	24,0	69,22	4.261	31,2	121,5
15.03.2020	19:00	7,3	23,7	68,19	4.313	31,2	120,4
15.03.2020	20:00	6,5	22,6	67,81	4.363	31,4	120,2
15.03.2020	21:00	6,3	24,1	65,50	4.446	31,5	118,4
15.03.2020	22:00	6,3	24,4	63,78	4.470	31,6	119,1
15.03.2020	23:00	6,4	24,2	67,63	4.469	31,5	120,1
16.03.2020	00:00	6,4	24,9	63,33	4.411	31,5	115,8
16.03.2020	01:00	6,3	24,4	66,29	4.613	31,7	119,0
16.03.2020	02:00	6,5	25,2	65,66	4.488	31,7	118,1
16.03.2020	03:00	6,5	23,8	69,04	4.900	31,6	121,7
16.03.2020	04:00	6,4	23,5	69,96	5.035	31,4	122,3
16.03.2020	05:00	6,4	24,3	65,98	4.346	31,7	118,6
16.03.2020	06:00	6,2	23,7	66,42	4.432	31,6	119,0
16.03.2020	07:00	6,6	23,1	68,17	4.879	31,4	120,6
16.03.2020	08:00	6,3	23,6	68,57	5.186	31,1	111,6
16.03.2020	09:00	6,1	23,8	70,88	5.114	31,1	123,0
16.03.2020	10:00	6,8	23,7	70,21	5.157	31,4	122,6
16.03.2020	11:00	7,0	23,9	71,50	5.179	31,5	124,0
16.03.2020	12:00	7,9	24,1	72,50	4.769	31,7	125,2
16.03.2020	13:00	9,2	23,3	67,27	4.150	31,4	119,6
16.03.2020	14:00	9,3	23,7	67,56	4.182	31,3	120,1
16.03.2020	15:00	9,0	23,9	69,19	4.391	31,6	121,8
16.03.2020	16:00	7,9	24,0	70,34	4.653	31,3	122,6
16.03.2020	17:00	6,9	23,8	69,34	4.427	31,2	121,6
16.03.2020	18:00	6,8	23,3	67,90	4.368	31,2	120,1
16.03.2020	19:00	6,3	23,8	65,10	4.192	31,7	117,8
16.03.2020	20:00	5,9	25,0	64,65	4.307	31,7	117,4
16.03.2020	21:00	5,8	25,0	63,06	4.310	32,1	116,1
16.03.2020	22:00	5,8		64,87	4.293	32,2	118,0

*Mud*

**Sabri ÇAKMAK**  
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Geliştirme Grup Müdürü

HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
16.03.2020	23:00	5,1	25,7	64,56	4.256	32,1	117,9
17.03.2020	00:00	4,8	24,8	65,20	4.215	32,8	119,0
17.03.2020	01:00	4,5	25,2	66,02	4.268	33,7	120,7
17.03.2020	02:00	4,3	25,1	67,87	4.340	34,4	123,2
17.03.2020	03:00	4,0	24,7	69,65	4.359	33,9	121,6
17.03.2020	04:00	4,0	25,2	64,09	4.431	34,3	119,4
17.03.2020	05:00	3,0	25,7	72,36	4.476	35,5	128,8
17.03.2020	06:00	2,7	25,2	64,75	4.523	38,0	123,7
17.03.2020	07:00	3,8	25,7	70,58	4.692	47,6	139,1
17.03.2020	08:00	4,7	25,8	74,40	4.734	54,5	149,9
17.03.2020	09:00	5,4	26,2	75,06	4.633	64,7	150,7
17.03.2020	10:00	6,0	26,6	77,32	4.660	74,8	153,2
17.03.2020	11:00	6,4	26,5	85,47	4.663	87,1	158,6
17.03.2020	12:00	7,7	26,5	79,92	4.894	91,9	162,8
17.03.2020	13:00	8,4	25,7	76,85	4.763	83,2	167,1
17.03.2020	14:00	8,9	25,4	86,12	4.873	90,0	167,1
17.03.2020	15:00	9,4	25,3	77,89	4.899	89,6	168,5
17.03.2020	16:00	9,7	26,0	72,48	3.599	90,6	144,1
17.03.2020	17:00	9,0	25,1	72,93	3.432	94,1	148,0
17.03.2020	18:00	8,1	26,2	86,64	4.208	92,1	159,8
17.03.2020	19:00	7,2	26,4	78,06	4.280	91,8	148,0
17.03.2020	20:00	6,3	26,2	78,14	4.282	91,1	148,3
17.03.2020	21:00	5,9	26,2	78,08	4.246	91,7	150,7
17.03.2020	22:00	5,8	27,0	77,28	4.316	94,5	152,8
17.03.2020	23:00	4,4	25,1	77,37	4.535	91,8	150,1
18.03.2020	00:00	3,7	25,1	68,03	4.517	91,7	140,7
18.03.2020	01:00	2,7	25,1	66,09	4.745	91,7	139,3
18.03.2020	02:00	2,7	26,2	80,10	4.667	91,1	152,2
18.03.2020	03:00	2,6	27,1	73,22	4.640	94,0	148,2
18.03.2020	04:00	2,3	26,5	73,43	4.931	92,0	146,5
18.03.2020	05:00	1,7	25,6	82,14	5.402	89,6	152,8
18.03.2020	06:00	2,2	26,8	69,49	4.954	92,2	142,6
18.03.2020	07:00	2,0	25,0	71,32	4.754	90,7	142,9
18.03.2020	08:00	4,3	25,5	68,12	4.655	90,6	139,7
18.03.2020	09:00	5,7	25,9	74,52	3.359	88,5	144,0
18.03.2020	10:00	6,8	24,4	49,38	436	84,0	95,4
18.03.2020	11:00	8,7	25,4	42,92	1.133	84,3	98,2
18.03.2020	12:00	8,7	26,1	67,48	3.348	93,2	141,6
18.03.2020	13:00	9,1	26,6	73,86	3.768	94,4	149,3
18.03.2020	14:00	9,1	25,1	79,13	4.483	90,1	150,2
18.03.2020	15:00	9,3	24,8	75,17	4.604	90,2	146,4
18.03.2020	16:00	9,1	25,6	85,07	4.573	89,4	155,5
18.03.2020	17:00	6,6	25,5	81,91	4.516	89,9	152,8
18.03.2020	18:00	4,9	25,5	75,73	4.893	89,8	146,5
18.03.2020	19:00	5,4	25,6	78,78	4.485	90,8	150,6
18.03.2020	20:00	5,1	25,9	73,35	4.368	93,2	143,4
18.03.2020	21:00	5,9	26,3	72,52	4.463	91,9	145,5
18.03.2020	22:00	5,3	25,9	71,94	4.450	93,5	144,5
18.03.2020	23:00	4,8	26,3	81,30	4.433	93,4	153,5
19.03.2020	00:00	4,0	26,0	79,41	4.347	93,6	148,0
19.03.2020	01:00	5,0	27,0	80,07	4.429	93,1	154,2
19.03.2020	02:00	5,0	26,4	69,49	4.397	93,3	141,8
19.03.2020	03:00	5,5	26,4	74,92	4.397	91,9	147,8
19.03.2020	04:00	5,7	26,8	69,59	4.398	92,3	142,9
19.03.2020	05:00	6,0	26,0	77,11	4.411	90,7	148,8
19.03.2020	06:00	5,9	27,0	73,77	4.401	93,6	148,4
19.03.2020	07:00	5,4	26,3	73,92	4.384	91,0	149,9
19.03.2020	08:00	6,8	26,4	77,72	4.396	91,1	149,8
19.03.2020	09:00	6,2	25,9	71,91	4.419	91,2	144,1
19.03.2020	10:00	7,1	25,2	77,22	4.489	89,9	148,1
19.03.2020	11:00	7,5	25,6	79,53	4.427	90,8	143,3
19.03.2020	12:00	7,7	25,7	83,76	4.396	91,3	154,1
19.03.2020	13:00	7,9	26,2	71,11	4.373	89,9	142,0
19.03.2020	14:00	8,1	25,1	76,32	4.375	89,5	146,8
19.03.2020	15:00	7,9	25,3	76,70	4.856	88,6	146,3
19.03.2020	16:00	7,5	24,4	90,60	4.986	89,8	157,4
19.03.2020	17:00	8,0	25,9	75,36	4.828	89,0	145,2
19.03.2020	18:00	8,1	24,9	76,28	4.881	90,3	147,5
19.03.2020	19:00	7,0	25,3	88,94	4.847	88,6	158,5
19.03.2020	20:00	6,5	25,4	81,82	5.200	90,7	153,5
19.03.2020	21:00	6,5	24,9	86,88	5.152	89,8	157,7
19.03.2020	22:00	6,3	25,4	86,08	5.287	89,4	156,5
19.03.2020	23:00	6,3	25,3	81,92	5.239	89,8	152,8
20.03.2020	00:00	6,5	26,5	87,92	5.276	89,6	158,6
20.03.2020	01:00	5,7	24,8	76,07	5.169	89,4	146,5

*S. Kaya*

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HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb.Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
20.03.2020	02:00	5,7	26,0	76,74	4.899	49,8	147,5
20.03.2020	03:00	5,7	25,0	84,86	4.857	48,8	154,7
20.03.2020	04:00	6,1	24,9	78,74	4.902	49,2	148,9
20.03.2020	05:00	6,6	25,4	76,31	4.900	48,9	145,2
20.03.2020	06:00	6,8	25,3	71,64	4.957	49,0	141,7
20.03.2020	07:00	7,3	25,3	70,03	4.884	48,7	139,8
20.03.2020	08:00	7,8	25,2	74,92	4.974	48,8	144,7
20.03.2020	09:00	8,2	25,0	88,82	4.802	48,7	158,6
20.03.2020	10:00	8,5	24,8	75,48	4.834	49,1	145,6
20.03.2020	11:00	7,3	25,8	71,19	3.875	50,3	142,5
20.03.2020	12:00	8,5	26,7	68,18	3.303	54,4	143,6
20.03.2020	13:00	9,4	26,4	70,17	3.195	51,9	145,0
20.03.2020	14:00	9,8	26,6	69,58	3.323	54,3	144,9
20.03.2020	15:00	10,0	26,9	69,70	3.238	54,7	145,4
20.03.2020	16:00	10,8	27,1	70,85	3.272	54,3	146,2
20.03.2020	17:00	11,2	27,1	72,30	3.331	54,2	147,5
20.03.2020	18:00	10,7	26,1	75,69	3.267	52,3	152,8
20.03.2020	19:00	9,9	26,2	80,05	3.253	51,8	152,4
20.03.2020	20:00	8,4	27,0	73,20	3.294	54,1	148,3
20.03.2020	21:00	7,3	26,7	73,55	3.174	54,3	148,8
20.03.2020	22:00	6,2	26,6	72,80	3.226	54,1	147,9
20.03.2020	23:00	5,7	26,4	81,20	4.143	52,8	155,5
21.03.2020	00:00	5,1	25,2	73,36	4.696	49,0	143,3
21.03.2020	01:00	4,6	25,6	74,66	4.627	50,4	146,0
21.03.2020	02:00	4,1	25,6	79,86	4.731	49,2	150,1
21.03.2020	03:00	4,6	26,1	78,49	4.809	49,5	149,0
21.03.2020	04:00	3,8	25,4	67,23	4.685	48,4	136,6
21.03.2020	05:00	3,2	25,6	74,98	4.760	47,9	143,9
21.03.2020	06:00	2,9	25,9	73,19	4.750	50,4	144,6
21.03.2020	07:00	3,7	25,6	75,68	4.798	49,6	146,3
21.03.2020	08:00	5,1	25,8	72,91	4.759	49,0	142,9
21.03.2020	09:00	6,2	25,5	69,42	4.763	49,3	139,7
21.03.2020	10:00	9,0	25,2	72,93	4.714	48,9	142,8
21.03.2020	11:00	10,5	25,2	71,19	4.856	48,3	146,5
21.03.2020	12:00	12,5	25,3	78,14	4.478	48,4	147,5
21.03.2020	13:00	13,4	24,3	86,70	4.503	48,7	151,4
21.03.2020	14:00	14,7	24,4	79,18	4.489	47,9	133,1
21.03.2020	15:00	15,5	25,2	78,86	4.273	47,7	132,6
21.03.2020	16:00	15,8	25,0	81,78	4.154	47,9	135,7
21.03.2020	17:00	17,1	25,0	81,94	4.340	47,7	136,2
21.03.2020	18:00	15,3	25,0	84,85	4.430	47,4	138,2
21.03.2020	19:00	13,6	24,8	78,63	4.458	47,1	132,7
21.03.2020	20:00	11,9	24,9	72,10	4.481	47,3	125,2
21.03.2020	21:00	10,8	24,8	69,38	4.398	47,4	121,8
21.03.2020	22:00	10,2	24,4	68,14	4.474	47,3	120,2
21.03.2020	23:00	9,3	23,8	67,38	4.492	47,1	119,5
22.03.2020	00:00	8,5	23,8	66,17	4.533	47,1	118,4
22.03.2020	01:00	7,1	24,4	61,15	4.463	47,1	114,1
22.03.2020	02:00	7,1	23,8	62,57	4.581	47,1	114,5
22.03.2020	03:00	7,2	23,6	65,56	4.716	47,1	117,8
22.03.2020	04:00	7,2	24,5	65,05	4.725	47,1	117,7
22.03.2020	05:00	6,4	24,0	63,33	4.745	47,1	115,3
22.03.2020	06:00	5,5	25,1	65,10	4.786	47,1	116,9
22.03.2020	07:00	6,3	25,1	62,72	4.785	47,1	114,9
22.03.2020	08:00	8,2	25,3	67,60	4.745	47,1	120,0
22.03.2020	09:00	9,7	25,9	66,42	4.609	47,1	120,0
22.03.2020	10:00	11,7	24,8	74,15	4.856	47,1	127,1
22.03.2020	11:00	16,1	24,9	71,67	5.087	47,1	133,7
22.03.2020	12:00	18,8	25,5	87,65	5.037	47,1	141,1
22.03.2020	13:00	20,5	25,5	115,36	4.998	47,1	176,9
22.03.2020	14:00	21,5	24,9	97,87	4.353	47,1	154,7
22.03.2020	15:00	21,5	25,0	116,44	4.342	47,1	174,0
22.03.2020	16:00	20,8	24,9	96,22	4.304	47,1	153,5
22.03.2020	17:00	17,8	25,0	101,20	4.370	47,1	158,7
22.03.2020	18:00	15,0	25,0	97,82	4.369	47,1	154,9
22.03.2020	19:00	15,4	25,0	110,01	4.729	47,1	167,3
22.03.2020	20:00	10,0	24,8	90,34	4.720	47,1	147,0
22.03.2020	21:00	9,8	24,6	85,79	4.689	47,1	136,8
22.03.2020	22:00	10,1	24,4	72,19	4.714	47,1	125,2
22.03.2020	23:00	10,4	25,0	72,85	4.717	47,1	125,4
23.03.2020	00:00	10,1	23,4	70,67	4.640	47,1	123,3
23.03.2020	01:00	9,8	24,6	71,54	4.654	47,1	124,2
23.03.2020	02:00	9,7	24,8	73,04	4.641	47,1	125,5
23.03.2020	03:00	9,8	24,6	73,00	4.633	47,1	126,0
23.03.2020	04:00	9,8	24,9	73,02	4.668	47,1	126,0

*[Signature]*  
**Sabri CAKMAK**  
 Enerji Uzmanı ve Teknoloji  
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HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb.Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
23.03.2020	05:00	9,7	24,9	72,45	4.660	32,1	125,5
23.03.2020	06:00	9,5	24,4	70,67	4.650	32,1	123,8
23.03.2020	07:00	9,1	24,1	70,35	4.673	32,4	123,7
23.03.2020	08:00	9,1	24,1	70,55	4.645	31,8	123,1
23.03.2020	09:00	9,3	24,5	71,01	4.668	31,8	123,8
23.03.2020	10:00	9,9	24,7	71,96	4.790	32,0	125,0
23.03.2020	11:00	10,9	24,5	70,32	4.485	32,0	123,3
23.03.2020	12:00	10,5	24,3	70,64	4.501	32,2	123,8
23.03.2020	13:00	10,8	24,6	71,05	4.476	31,9	123,9
23.03.2020	14:00	10,8	24,8	71,47	4.420	31,9	124,3
23.03.2020	15:00	11,1	24,8	71,90	4.396	31,8	124,7
23.03.2020	16:00	11,0	25,0	72,65	4.469	31,8	125,5
23.03.2020	17:00	10,8	25,0	72,50	4.556	31,7	125,2
23.03.2020	18:00	10,6	25,0	73,29	4.639	31,6	125,9
23.03.2020	19:00	10,4	25,0	74,85	4.743	31,8	127,6
23.03.2020	20:00	10,1	25,0	73,78	4.707	32,2	126,9
23.03.2020	21:00	10,0	25,0	73,96	4.624	32,1	127,3
23.03.2020	22:00	9,9	25,0	73,35	4.673	32,2	126,6
23.03.2020	23:00	9,4	25,0	74,13	4.719	32,4	127,4
24.03.2020	00:00	9,3	24,7	73,22	4.678	32,1	126,3
24.03.2020	01:00	9,0	24,4	71,23	4.662	32,2	124,4
24.03.2020	02:00	8,8	24,0	69,31	4.587	32,0	122,3
24.03.2020	03:00	8,9	24,0	69,34	4.700	31,9	122,2
24.03.2020	04:00	9,1	24,3	71,01	4.811	31,7	123,7
24.03.2020	05:00	9,0	24,7	72,06	4.873	31,7	124,8
24.03.2020	06:00	8,9	24,9	73,54	5.008	31,5	126,1
24.03.2020	07:00	9,0	24,8	71,36	4.901	31,5	125,7
24.03.2020	08:00	9,1	24,9	72,33	5.112	31,3	124,6
24.03.2020	09:00	9,2	27,1	78,97	5.353	37,0	137,0
24.03.2020	10:00	9,5	24,3	83,25	5.242	38,0	142,3
24.03.2020	11:00	9,5	24,4	71,46	4.881	33,1	125,6
24.03.2020	12:00	9,5	25,5	80,78	4.901	34,9	136,7
24.03.2020	13:00	9,4	24,1	70,50	4.873	33,4	124,9
24.03.2020	14:00	9,5	23,8	70,47	4.541	31,5	123,0
24.03.2020	15:00	9,5	24,1	71,88	4.534	31,2	124,5
24.03.2020	16:00	9,3	24,5	72,98	4.581	31,6	125,3
24.03.2020	17:00	9,1	24,6	73,67	4.554	31,5	126,2
24.03.2020	18:00	8,7	24,7	73,81	4.644	31,5	126,3
24.03.2020	19:00	8,5	24,7	73,35	4.639	31,3	126,8
24.03.2020	20:00	8,0	24,5	73,50	4.612	31,8	126,1
24.03.2020	21:00	7,9	24,4	72,74	4.609	32,0	125,7
24.03.2020	22:00	8,0	24,2	72,53	4.635	31,9	125,4
24.03.2020	23:00	7,9	24,1	72,30	4.664	32,0	125,1
25.03.2020	00:00	7,9	24,9	71,48	4.534	31,8	124,3
25.03.2020	01:00	7,9	24,3	72,33	4.728	31,6	124,9
25.03.2020	02:00	7,6	24,6	73,58	4.962	31,8	126,4
25.03.2020	03:00	7,5	24,8	74,82	5.008	31,9	127,8
25.03.2020	04:00	7,4	25,0	75,23	5.193	31,7	127,9
25.03.2020	05:00	7,4	24,6	73,11	4.814	31,6	125,7
25.03.2020	06:00	7,5	23,7	69,80	4.637	31,8	122,6
25.03.2020	07:00	7,6	23,3	69,37	4.806	31,9	122,3
25.03.2020	08:00	7,6	23,4	69,72	4.562	31,5	122,2
25.03.2020	09:00	8,0	25,3	47,50	1.510	31,4	99,9
25.03.2020	10:00	8,6	24,7	53,58	2.675	32,3	106,9
25.03.2020	11:00	9,1	25,8	55,78	3.768	32,8	109,6
25.03.2020	12:00	9,1	23,7	66,81	4.081	32,1	119,9
25.03.2020	13:00	9,1	23,6	62,50	3.981	32,5	115,9
25.03.2020	14:00	9,0	23,7	62,84	4.132	32,3	116,2
25.03.2020	15:00	9,1	24,2	65,42	4.482	32,7	119,1
25.03.2020	16:00	9,0	24,6	67,34	4.744	32,2	121,0
25.03.2020	17:00	8,9	24,9	68,34	4.706	32,7	122,0
25.03.2020	18:00	8,8	25,0	68,41	4.693	32,6	122,0
25.03.2020	19:00	8,8	24,6	66,38	4.386	32,7	120,1
25.03.2020	20:00	8,6	24,5	66,02	4.345	32,8	119,8
25.03.2020	21:00	8,5	24,4	66,18	4.415	32,9	120,1
25.03.2020	22:00	8,2	25,0	69,26	5.005	32,6	122,9
25.03.2020	23:00	8,2	25,1	72,92	5.093	32,9	126,8
26.03.2020	00:00	8,3	24,1	69,46	4.876	33,8	123,1
26.03.2020	01:00	8,5	25,0	69,63	4.891	32,9	123,5
26.03.2020	02:00	8,3	25,1	70,58	4.940	33,1	124,7
26.03.2020	03:00	8,4	24,9	69,99	4.827	33,0	123,9
26.03.2020	04:00	8,3	24,8	67,20	4.606	32,8	123,0
26.03.2020	05:00	8,4	24,9	67,94	4.839	32,7	123,6
26.03.2020	06:00	8,5	25,0	69,84	4.903	32,7	123,5
26.03.2020	07:00	8,6	24,9	69,64	4.864	32,7	123,4

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Sabri ÇAKMAK  
Enerji Üretim ve Teknoloji  
Geliştirme Grup Müdürü

HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb Temp (°C)	Recon Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
26.03.2020	08:00	8,7	25,0	68,07	4.793	32,7	122,5
26.03.2020	09:00	9,0	25,0	69,55	4.777	32,7	123,2
26.03.2020	10:00	9,7	25,0	69,42	4.793	32,7	123,1
26.03.2020	11:00	9,8	24,9	68,82	4.749	32,7	122,5
26.03.2020	12:00	9,8	25,0	69,26	4.808	32,9	123,1
26.03.2020	13:00	10,1	25,1	72,22	4.929	33,0	126,2
26.03.2020	14:00	10,1	25,0	73,98	4.861	33,1	128,0
26.03.2020	15:00	10,3	25,0	70,99	4.799	32,6	124,6
26.03.2020	16:00	10,6	25,1	73,26	4.774	32,9	127,2
26.03.2020	17:00	9,8	24,9	70,13	4.398	32,9	124,0
26.03.2020	18:00	9,8	24,4	65,02	3.362	32,7	118,7
26.03.2020	19:00	9,5	23,8	61,62	3.240	32,9	115,5
26.03.2020	20:00	9,3	23,8	63,54	4.106	32,8	117,4
26.03.2020	21:00	9,6	24,3	65,90	4.374	32,9	119,8
26.03.2020	22:00	9,4	24,6	66,78	4.381	32,9	120,7
26.03.2020	23:00	9,5	24,6	67,25	4.381	32,9	121,2
27.03.2020	00:00	9,5	24,8	66,62	4.368	32,9	120,5
27.03.2020	01:00	9,4	24,4	65,49	4.237	32,9	119,4
27.03.2020	02:00	9,3	24,0	64,86	4.313	32,9	118,7
27.03.2020	03:00	9,3	24,2	65,23	4.289	32,9	119,1
27.03.2020	04:00	9,1	24,0	64,05	4.114	32,8	117,9
27.03.2020	05:00	9,1	24,1	63,74	4.107	32,9	117,7
27.03.2020	06:00	9,3	24,0	64,31	4.299	32,9	118,2
27.03.2020	07:00	8,8	24,0	65,35	4.581	32,8	119,2
27.03.2020	08:00	9,0	24,3	66,58	4.641	33,0	120,6
27.03.2020	09:00	9,3	24,3	66,08	4.572	32,9	120,0
27.03.2020	10:00	9,6	24,3	66,42	4.513	32,9	120,3
27.03.2020	11:00	9,7	24,6	66,98	4.564	32,9	120,9
27.03.2020	12:00	10,6	24,6	65,86	4.017	32,9	119,8
27.03.2020	13:00	10,6	24,2	64,74	3.906	32,9	118,6
27.03.2020	14:00	10,9	24,5	65,74	4.156	32,9	119,6
27.03.2020	15:00	10,9	24,9	68,16	4.555	32,7	121,8
27.03.2020	16:00	10,6	25,1	70,98	4.614	32,8	124,8
27.03.2020	17:00	10,5	25,1	71,96	4.748	32,8	125,8
27.03.2020	18:00	10,1	25,1	73,37	4.766	32,9	127,3
27.03.2020	19:00	9,9	24,9	71,29	4.843	31,8	124,1
27.03.2020	20:00	10,0	25,0	70,58	4.852	32,3	123,9
27.03.2020	21:00	9,8	24,9	68,66	4.815	31,8	121,4
27.03.2020	22:00	10,0	24,7	68,14	4.856	31,8	121,0
27.03.2020	23:00	9,7	24,7	67,92	4.848	31,8	120,8
28.03.2020	00:00	10,2	24,6	67,43	4.868	31,9	120,3
28.03.2020	01:00	9,8	24,5	66,90	4.808	31,9	119,8
28.03.2020	02:00	9,6	24,7	67,57	4.899	31,7	120,3
28.03.2020	03:00	9,4	24,8	67,59	4.888	31,5	120,1
28.03.2020	04:00	9,2	24,7	66,87	4.580	31,5	119,2
28.03.2020	05:00	9,5	24,5	65,19	4.512	31,6	117,8
28.03.2020	06:00	9,9	24,3	64,31	4.281	31,5	116,8
28.03.2020	07:00	10,0	24,0	63,65	4.233	31,6	116,2
28.03.2020	08:00	9,5	23,9	64,04	4.279	31,2	116,2
28.03.2020	09:00	9,7	23,8	63,55	4.255	31,2	115,8
28.03.2020	10:00	10,4	23,7	63,89	4.325	31,8	116,7
28.03.2020	11:00	11,2	23,6	63,38	4.298	31,8	116,1
28.03.2020	12:00	11,2	23,7	63,61	4.263	31,5	116,1
28.03.2020	13:00	11,5	24,0	64,54	4.263	31,9	117,4
28.03.2020	14:00	11,9	24,0	63,28	3.759	32,9	117,2
28.03.2020	15:00	10,6	23,6	61,41	3.603	33,0	115,4
28.03.2020	16:00	10,9	23,3	60,16	3.560	32,8	114,0
28.03.2020	17:00	10,4	23,3	60,97	4.256	31,4	113,4
28.03.2020	18:00	10,4	23,9	64,36	4.656	31,4	116,8
28.03.2020	19:00	10,4	24,1	65,60	4.659	31,5	117,5
28.03.2020	20:00	10,5	24,1	65,31	4.617	31,9	118,2
28.03.2020	21:00	10,3	24,1	65,17	4.557	32,1	118,3
28.03.2020	22:00	9,6	24,1	65,94	4.724	31,8	118,8
28.03.2020	23:00	9,5	24,3	66,17	4.904	32,0	119,2
29.03.2020	00:00	9,5	24,6	65,58	2.204	31,4	108,1
29.03.2020	01:00	9,8	25,3	49,35	2.499	32,7	103,1
29.03.2020	02:00	9,9	24,7	60,33	4.367	32,3	113,6
29.03.2020	03:00	9,9	24,3	66,10	5.201	33,7	118,8
29.03.2020	04:00	9,9	25,0	69,14	5.296	34,6	123,7
29.03.2020	05:00	8,8	25,1	70,54	5.261	31,7	123,2
29.03.2020	06:00	9,9	25,0	71,94	5.337	32,7	124,6
29.03.2020	07:00	10,0	24,9	71,28	5.298	31,5	123,8
29.03.2020	08:00	10,3	25,1	71,91	5.350	31,2	124,0
29.03.2020	09:00	10,1	25,0	72,62	5.214	31,6	125,3
29.03.2020	10:00	10,2	24,9	70,40	5.173	31,6	123,0

*Sabri CARMAK*

Sabri CARMAK  
Enerji Uzmanı ve Teknoloji  
Geliştirme Grup Müdürü

HYDROMX PERIOD HOURLY DATA							
Date	Hour	Amb Temp (°C)	Room Temp (°C)	Chiller Consumption (kWh)	MCC Consumption (kWh)	AHU Consumption (kWh)	System Power (kWh)
29.03.2020	11:00	10,0	25,0	71,15	5,208	31,9	124,1
29.03.2020	11:00	10,4	25,0	70,50	5,157	32,0	123,5
29.03.2020	13:00	10,3	24,9	69,54	5,156	32,0	122,6
29.03.2020	14:00	10,9	25,0	69,16	5,122	32,2	122,3
29.03.2020	15:00	10,8	25,0	70,62	5,163	32,3	123,9
29.03.2020	16:00	10,6	25,0	70,06	5,117	32,1	123,7
29.03.2020	17:00	10,0	24,6	65,99	4,818	31,9	118,9
29.03.2020	18:00	10,4	24,3	63,53	4,188	31,9	116,4
29.03.2020	19:00	9,9	24,2	64,20	4,468	31,8	117,0
29.03.2020	20:00	10,3	24,3	63,91	4,351	32,0	116,9
29.03.2020	21:00	10,2	24,1	64,00	4,578	32,2	117,3
29.03.2020	22:00	10,2	24,7	66,24	5,123	32,0	119,3
29.03.2020	23:00	9,9	24,9	67,24	5,081	32,1	120,3
30.03.2020	00:00	10,3	24,8	69,02	5,118	32,0	122,1
30.03.2020	01:00	10,7	25,0	67,63	5,043	32,0	120,6
30.03.2020	02:00	10,2	25,0	68,80	5,085	32,1	121,9
30.03.2020	03:00	10,6	25,0	69,04	4,995	31,7	121,7
30.03.2020	04:00	10,9	25,0	69,02	5,002	31,5	121,5
30.03.2020	05:00	11,2	25,0	68,94	4,923	31,6	121,5
30.03.2020	06:00	11,5	24,9	68,78	4,885	31,6	121,3
30.03.2020	07:00	11,9	25,1	69,00	4,875	31,5	121,5
30.03.2020	08:00	11,1	24,9	68,50	4,809	31,2	120,7
30.03.2020	09:00	11,4	25,0	69,65	4,973	31,6	122,2
30.03.2020	10:00	14,0	25,3	76,84	5,276	32,4	130,2
30.03.2020	11:00	16,4	25,0	87,06	4,854	33,1	141,1
30.03.2020	12:00	17,1	25,1	90,74	4,802	33,9	145,6
30.03.2020	13:00	17,5	25,5	105,56	4,979	38,7	165,1
30.03.2020	14:00	17,2	24,8	97,12	4,851	36,9	155,0
30.03.2020	15:00	16,9	24,9	101,03	4,750	35,7	157,7
30.03.2020	16:00	17,1	25,1	94,74	4,753	36,0	151,8
30.03.2020	17:00	17,3	25,1	100,16	4,720	37,3	158,5
30.03.2020	18:00	17,1	25,0	83,83	4,790	36,6	147,5
30.03.2020	19:00	16,8	25,0	91,80	4,771	35,7	149,5
30.03.2020	20:00	14,4	24,8	84,86	4,402	34,8	140,6
30.03.2020	21:00	13,3	24,4	77,06	4,530	32,9	133,0
30.03.2020	22:00	12,8	25,0	72,75	4,582	32,1	125,9
30.03.2020	23:00	12,0	24,8	72,65	4,535	31,9	125,5
31.03.2020	00:00	10,8	25,0	71,90	4,433	31,9	124,8
31.03.2020	01:00	9,8	24,5	70,16	4,212	31,8	123,0
31.03.2020	02:00	10,0	24,5	69,89	4,366	31,6	122,5
31.03.2020	03:00	10,2	24,4	70,64	4,460	31,6	122,2
31.03.2020	04:00	10,5	24,5	71,72	4,452	31,8	124,0
31.03.2020	05:00	10,0	24,5	71,11	4,517	31,8	124,0
31.03.2020	06:00	9,7	24,5	72,21	4,618	31,8	125,0
31.03.2020	07:00	10,3	24,6	71,66	4,654	31,7	124,4
31.03.2020	08:00	10,5	24,9	72,30	4,695	31,5	124,8
31.03.2020	09:00	10,2	25,0	73,21	4,762	31,6	125,8
31.03.2020	10:00	11,9	25,3	74,86	4,831	31,8	127,7
31.03.2020	11:00	15,4	25,7	89,54	4,845	32,8	143,1
31.03.2020	12:00	16,2	26,2	120,34	5,022	49,5	190,8
31.03.2020	13:00	15,9	25,0	116,45	5,043	51,9	189,3
31.03.2020	14:00	14,9	24,7	111,85	5,017	44,3	177,2
31.03.2020	15:00	12,8	24,9	93,18	4,952	37,7	152,1
31.03.2020	16:00	11,4	24,8	88,93	4,730	37,9	147,9
31.03.2020	17:00	10,5	24,8	85,70	4,596	37,0	143,7
31.03.2020	18:00	10,1	24,9	74,27	4,234	33,6	128,9
31.03.2020	19:00	9,5	24,0	71,07	4,249	31,8	124,9
31.03.2020	20:00	8,9	24,2	69,16	4,123	31,8	121,9
31.03.2020	21:00	9,0	24,2	69,02	4,394	32,0	122,0
31.03.2020	22:00	9,0	25,0	74,71	5,187	31,9	127,7
31.03.2020	23:00	8,6	25,0	76,11	5,100	32,1	129,2
1.04.2020	00:00	8,4	24,6	76,38	5,133	32,1	129,5
1.04.2020	01:00	8,0	24,9	76,62	4,974	32,1	129,7
1.04.2020	02:00	8,0	24,8	72,72	4,668	31,7	125,4
1.04.2020	03:00	7,8	24,7	72,25	4,721	31,6	124,9
1.04.2020	04:00	7,3	24,4	71,02	4,682	31,6	123,6
1.04.2020	05:00	7,2	24,0	69,44	4,686	31,7	122,2
1.04.2020	06:00	7,1	23,8	69,28	4,680	31,7	122,0
1.04.2020	07:00	7,4	23,6	68,50	4,637	31,5	121,0
1.04.2020	08:00	7,3	23,6	68,29	4,576	31,3	120,6

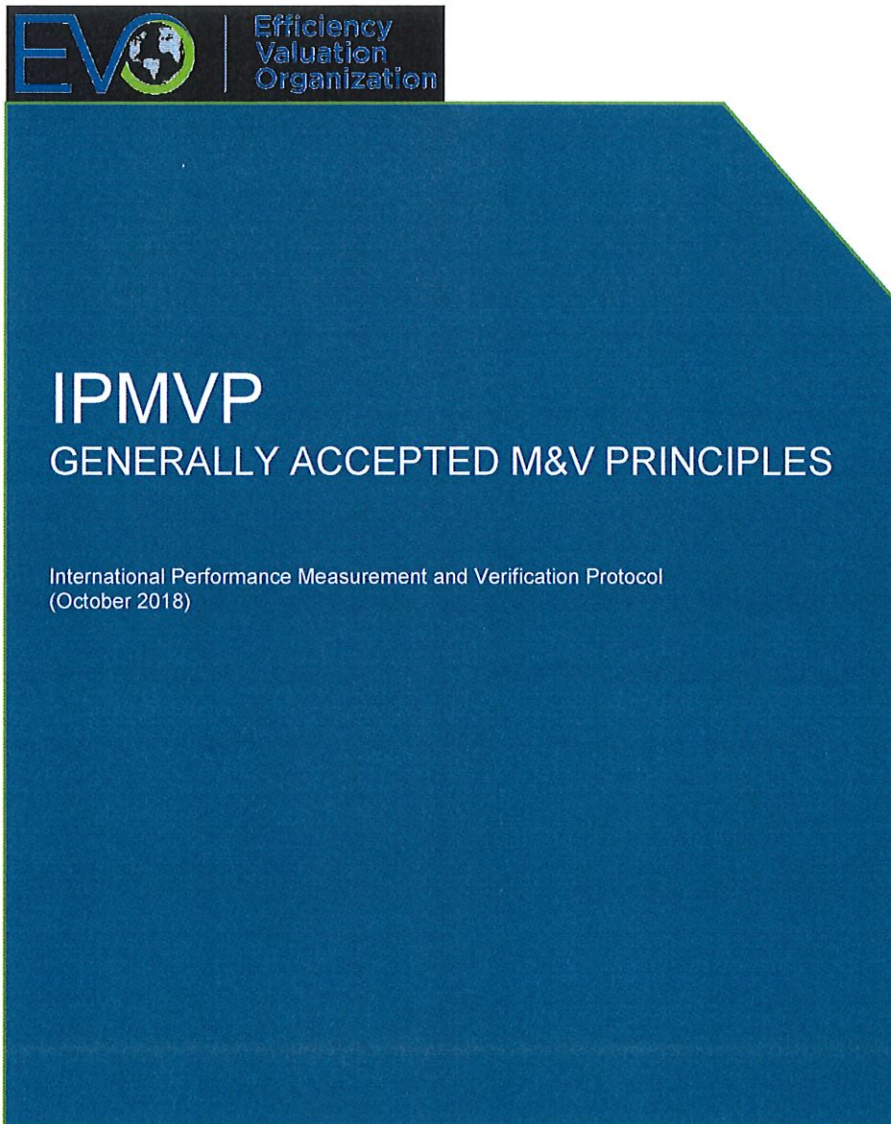
Safa KUMRAL

Sabri CAKMAK  
Ticari Usulün ve Teknoloji  
Danışmanlık Grup Müdürü

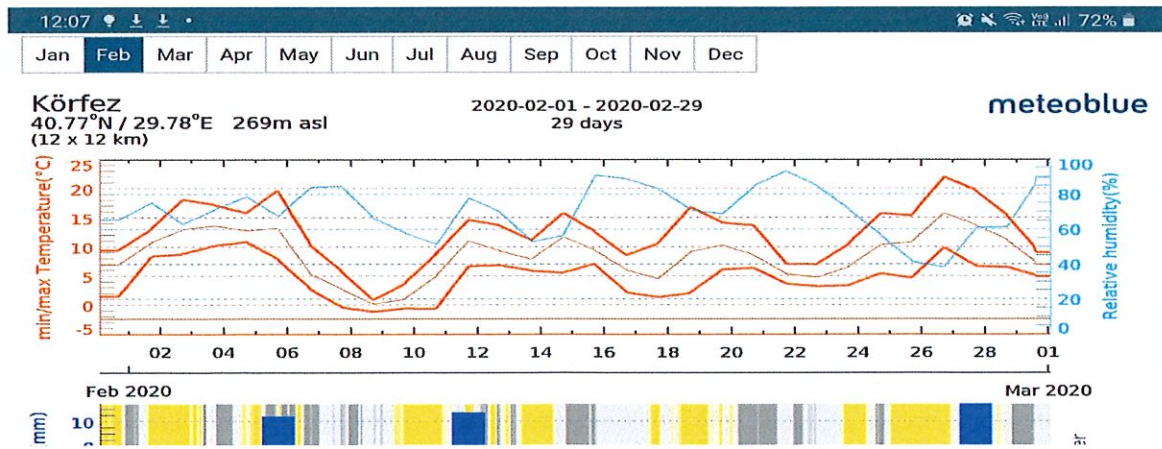
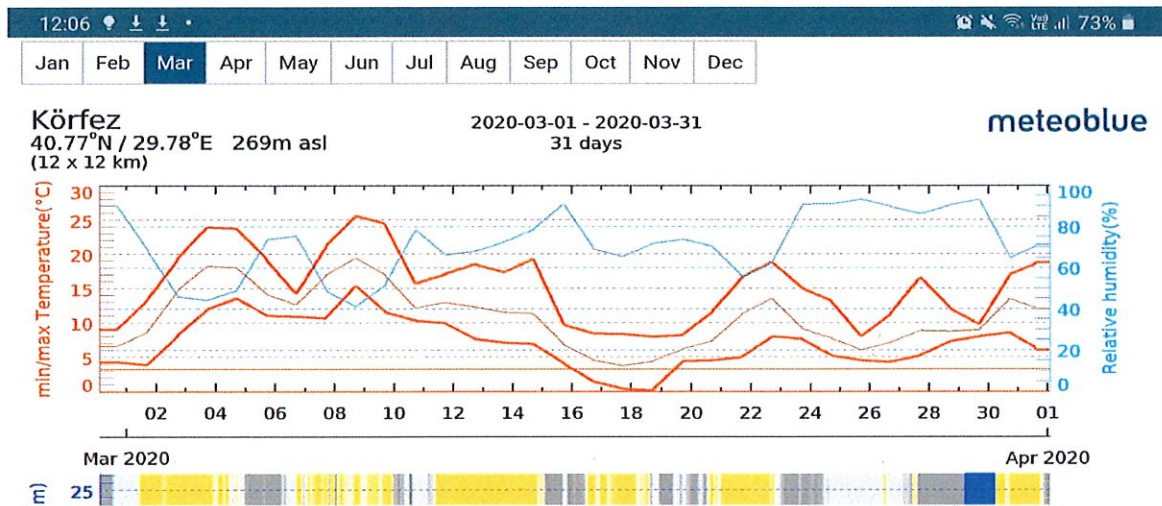
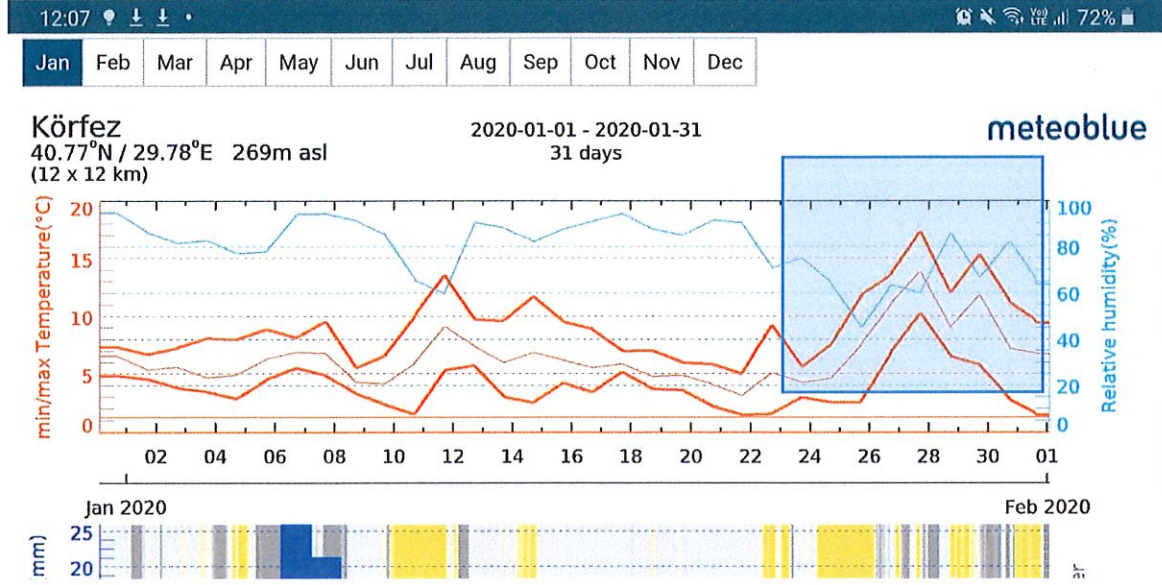
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APPX C International Performance Measurement and Verification Protocol (IPMVP)

[Link to Document](#)



APPX D Relative Humidity Charts



## APPX E- Analyzer Technical Document

[Link to document](#)

**FLUKE**®

# Fluke 430 Series II

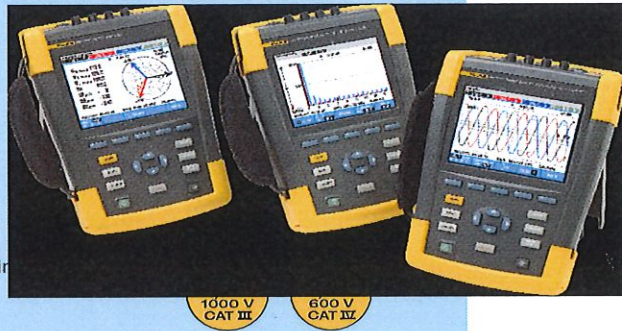
## Three-Phase Power Quality and Energy Analyzers

### Technical Data

More detailed power quality analysis capability, and a new Fluke-patented energy monetization function

The new 430 Series II Power Quality and Energy Analyzers offer the best in power quality analysis and introduce, for the first time ever, the ability to monetarily quantify energy losses.

The new Fluke 434, 435 and 437 Series II models help locate, predict, prevent, and troubleshoot power quality problems in three-phase and single-phase power distribution systems. Additionally, the Fluke-patented energy loss algorithm, Unified Power Measurement, measures and quantifies energy losses due to harmonics and unbalance issues, allowing the user to pinpoint the origin of energy waste within a system.



- Energy loss calculator: Classic active and reactive power measurements, unbalance and harmonic power, are quantified to pinpoint true system energy losses in dollars (other local currencies available).
- Power inverter efficiency: Simultaneously measure AC output power and DC input power for power electronics systems using optional DC clamp.
- PowerWave data capture: 435 and 437 Series II analyzers capture fast RMS data, show half-cycle and waveforms to characterize electrical system dynamics (generator start-ups, UPS switching etc.).
- Waveform capture: 435 and 437 Series II models capture 50/60 cycles (50/60Hz) of each event that is detected in all modes, without set-up.
- Automatic Transient Mode: 435 and 437 Series II analyzers capture 200 kHz waveform data on all phases simultaneously up to 6 kV.
- Fully Class-A compliant: 435 and 437 Series II analyzers conduct tests according to the stringent international IEC 61000-4-30 Class-A standard.
- Mains signaling: 435 and 437 Series II analyzers measure interference from ripple control signals at specific frequencies.
- 400 Hz measurement: 437 Series II analyzer captures power quality measurements for avionic and military power systems.
- Troubleshoot: Analyze the trends using the cursors and zoom tools.
- Highest safety rating in the industry: 600 V CAT IV/1000 V CAT III rated for use at the service entrance.
- Measure all three phases and neutral: With included four flexible current probes with enhanced thin flex designed to fit into the tightest places.
- Automatic Trending: Every measurement is always automatically recorded, without any set-up.
- System-Monitor: Ten power quality parameters on one screen according to EN50160 power quality standard.
- Logger function: Configure for any test condition with memory for up to 600 parameters at user defined intervals.
- View graphs and generate reports: With included analysis software.
- Battery life: Up to 8 hours operating time per charge on Li-ion battery pack.

437 Series II Three-Phase Power Quality and Energy Analyzer will be available in early 2012

APPX F- Graph of Full Periods

