MITSUBISHI ELECTRIC

Changes for the Better

Automating the World

FACTORY AUTOMATION

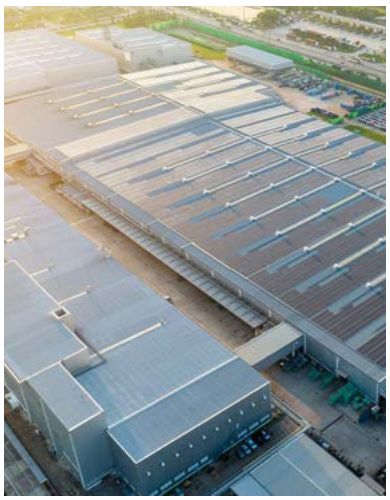
Energy Saving Data Collecting Server EcoWebServer Ⅲ

Simple - Convenient - Compact

Realizing Energy

Visualization and Demand Management

EcoWebServer Ⅲ





Mitsubishi Electric Corporation operates across a wide range of sectors, from home appliances and building systems to railway solutions, factory automation equipment, and satellites and leverages the synergy created by these diverse sectors to address various challenges and provide optimal solutions worldwide.

We, the Mitsubishi Electric Group, will continue to evolve in "carbon neutrality" and a "circular economy" by promoting innovation in products and services and providing integrated solutions through our business activities, all in order to realize a vibrant and sustainable society.

Under "Changes for the Better" which reflects the Mitsubishi Electric Group's commitment to "always strive to achieve something better", Mitsubishi Electric FA will expand the value of its products and services in the FA system business by advancing the provision and expansion of integrated solutions under the slogan "Automating the World" for an even better tomorrow. Through automation technology, we aim to contribute to innovation not only in the manufacturing industry but also across society as a whole.
We stand as your partner in shaping a smarter, more efficient, and more sustainable future.

SUSTAINABLE DEVELOPMENT GOALS

The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society.

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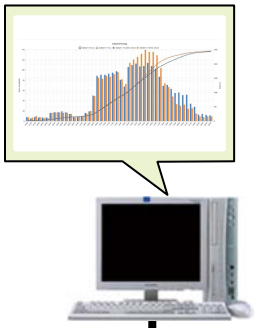
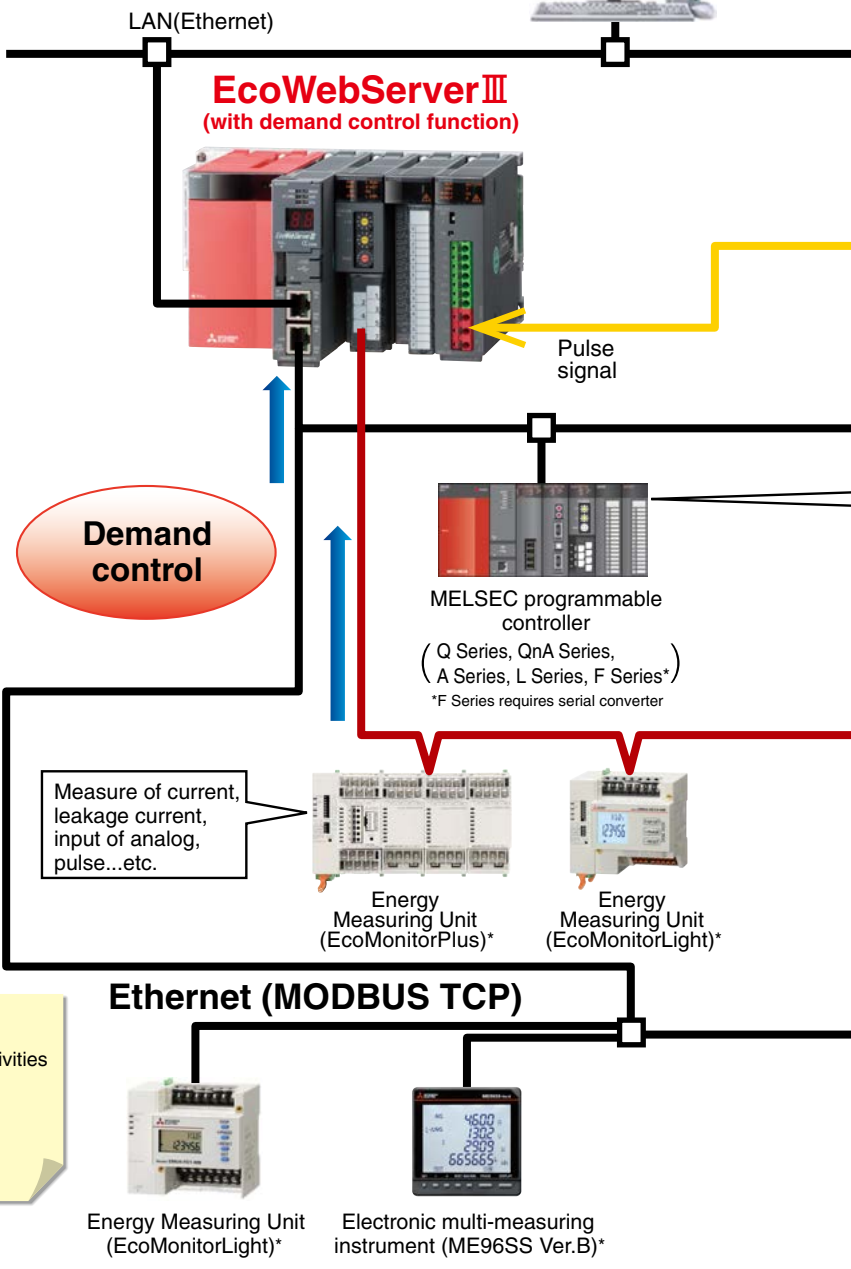
Energy Management System

Energy Saving Data Collecting Server EcoWebServerⅢ

Support factory, building and school energy saving activities.
Build visualized environments and manage energy effectively.
Support to grasp energy conditions at all times and quickly resolve energy loss problems.
Finaly reduce energy loss, increase productivity and cut production costs.





Energy saving method

Plan — Comparatively high specific consumption (waste of energy, negative influence on productivity)
Ex) △kWh of electricity per day can be saved with improvement.

Do — • Facilities start-up too fast
• After investigation and deciding appropriate start-up time, implement countermeasure

Check — Compare data before and after implementing countermeasure (△kWh reduced per day)

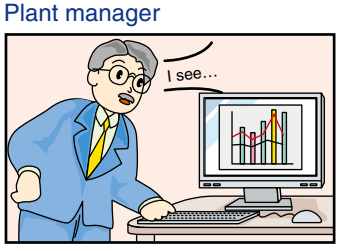
Action — Implement similar countermeasures for other facilities

Support energy saving activities using “Visible Management”

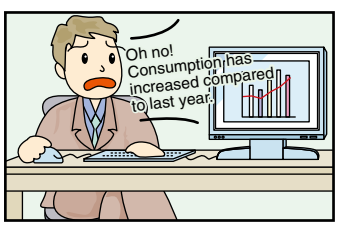
1. Monitor/Manage energy by department
2. Specific consumption-based management of energy saving activities
3. Monthly/Annual target-based management
4. Monitor equipment operating status
5. Manage/Record energy data

Entire factory

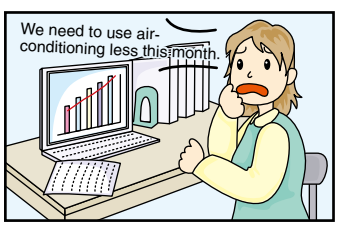
Plant manager



Staff A



Staff B



Transfers files in CSV format
(zoom (1 or 5 min), daily, monthly, annual, facility (daily), specific consumption, demand (daily, monthly, annual), demand alarm, control, operation history, system log file)

E-mail notification
(abnormal upper/lower limits, operating status, target value over specific consumption, over planned energy value, error information)

Acquire time information
Adjust EcoWebServer Ⅲ clock



FTP server
(File server)

SMTP server
(Mail server)

SNTP server
(Time server)

Receving point

Demand measurement

Electronic multi-measuring instrument (ME96SS Ver.B)

Data collection inside inner register

Measurement data written to inner register

Ethernet (MELSEC communication protocol)

Collects production data

Up to 32 units

QE81WH QE82LG

MELSEC-Q Series
Energy measuring module / Insulation monitoring module

MITSUBISHI GOT

Check demand information and alarm records onsite

Network monitoring lamp

Specific consumption management

CC-Link

Collects energy data

Up to 42 units
(refer to P22)

MDU breaker

Electronic multi-measuring instrument (ME96SS Ver.B)*

Analog input
Temperature input
Contact output
(Enables remote control of load at locations far from EcoWebServer Ⅲ)

Air circuit breaker (AE-SW Series)*

Target-based management

MODBUS TCP ⇔ MODBUS RTU
Protocol converter

RS-485 (MODBUS RTU)

Up to 31 units

Electronic multi-measuring instrument (ME96SS Ver.B)

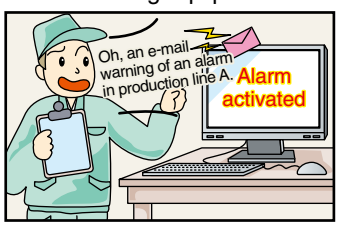
Energy Measuring Unit (EcoMonitorLight)

Energy Measuring Unit (EcoMonitorPlus)

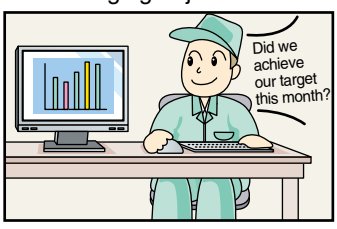
Measure of current, leakage current, input of analog, pulse...etc.

Production line

For monitoring equipment status



For managing objectives



For improvement activities

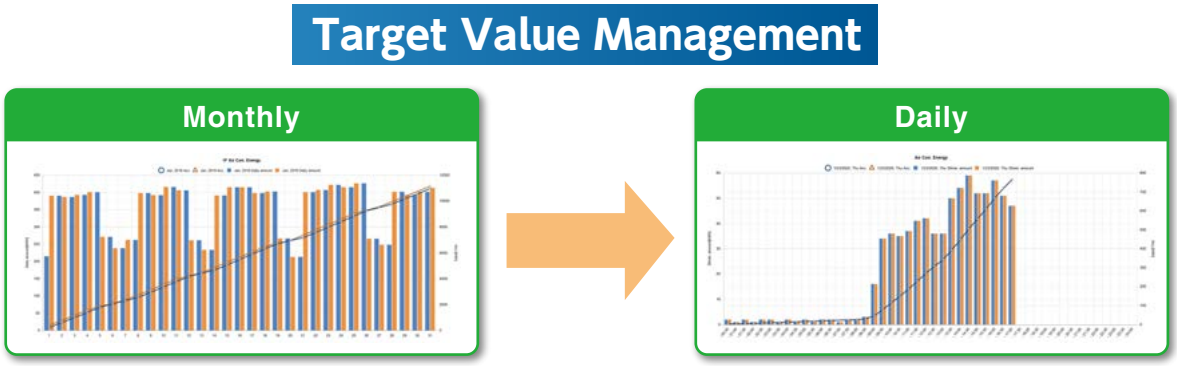
* It needs an optional unit to communicate with server.

Importance of visualizing energy

Essentials Issues for Saving Energy

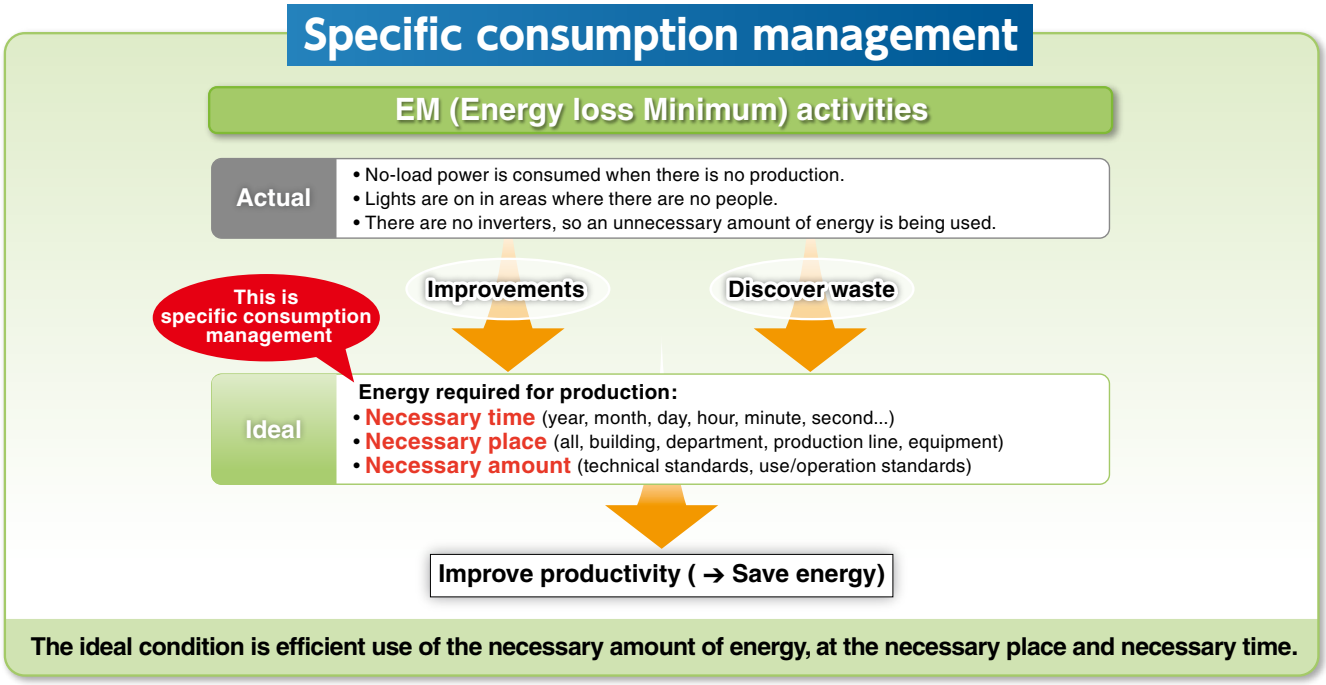
Target Value Management

Managing objectives is a very important issue when practicing energy savings.
“Target value management” is the process of transforming actual conditions into ideal conditions, and thereby requires understanding the actual situation and how much “unseen” waste there is. For this reason, target value management involves performing detailed management of operations, moving from months to days and lines to equipment, and evolving from “seeing” waste to “understanding” it.
Additionally, when using target value management, it is necessary to construct and put into practice an organization that values “people who set objectives (manage),” “people who find things” and “people capable of thinking of improvements and implementing them.”



Specific consumption management

In lines where there is a large difference in production volume, it is difficult to save energy and improve productivity using energy management alone.
By understanding specific consumption —energy consumed per product— waste in energy and production processes can be clarified, and it becomes easier to implement countermeasures.
Rather than simply not using energy, it’s important to use energy efficiently when, where and how much needed.



Importance of Demand Monitoring

Energy Saving by visualizing demand

What is “Demand”....?

Demand is average electric power at a specified period. This period for demand differs for each country and the way of management method.
Electric fee is basically determined based on the highest demand in one year(→contract demand).
The higher contract demand is, the more expensive the electric basic charge.
There are two types of basic demand management method as below.

(1) Fixed block demand management method

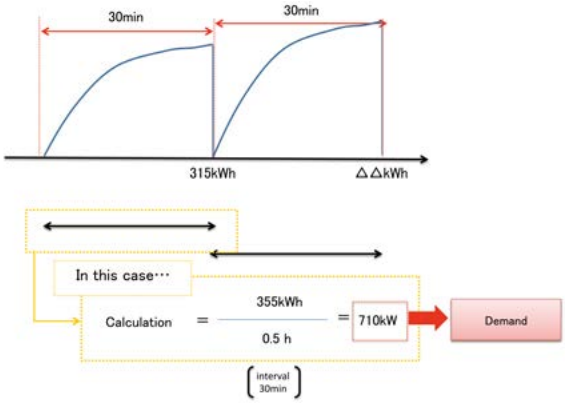
The demand period consists of only an interval.

(2) Rolling block demand management method

The demand period consists of interval and sub interval.
Interval is the period for caluclation of average electric.
Sub interval is the period for updata the calculation.

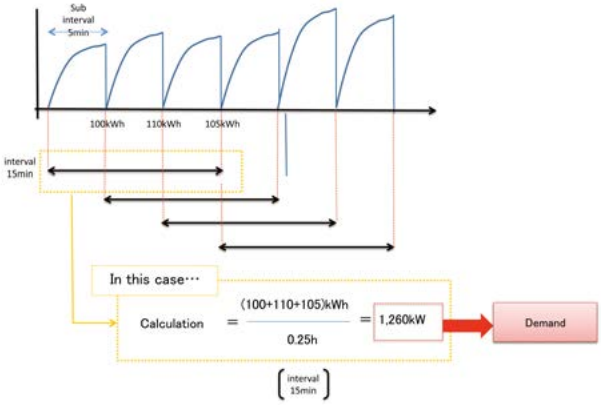
Fixed block demand management

Ex) Interval：30min



Rolling block demand management method

Ex) Interval：15min、Sub interval 5min



EcoWebServer Ⅲ with demand monitoring function comply with the Fixed block demand management method. Interval can be selected from 15min or 30min or 1hour.

Subtotal Volume
- Demand (power demand) is computed and calculated by taking pulses from the multi-measuring meter (transaction meter) for power demand.

Estimation
- The value at the end of the 30-minute time limit is estimated from the measured demand (power demand).

Warning
- Based on the results of the estimation, an alarm is output and a notification sent when the objective demand has been exceeded.
- The alarm notification can be a buzzer, display lamp, etc., which is sent through the contact output.

Load interruption
- Load interruption may be necessary depending on power use.
- A control output signal can be used to automatically interrupt the load.

* In the case fixed block demand management.

Reduce demand

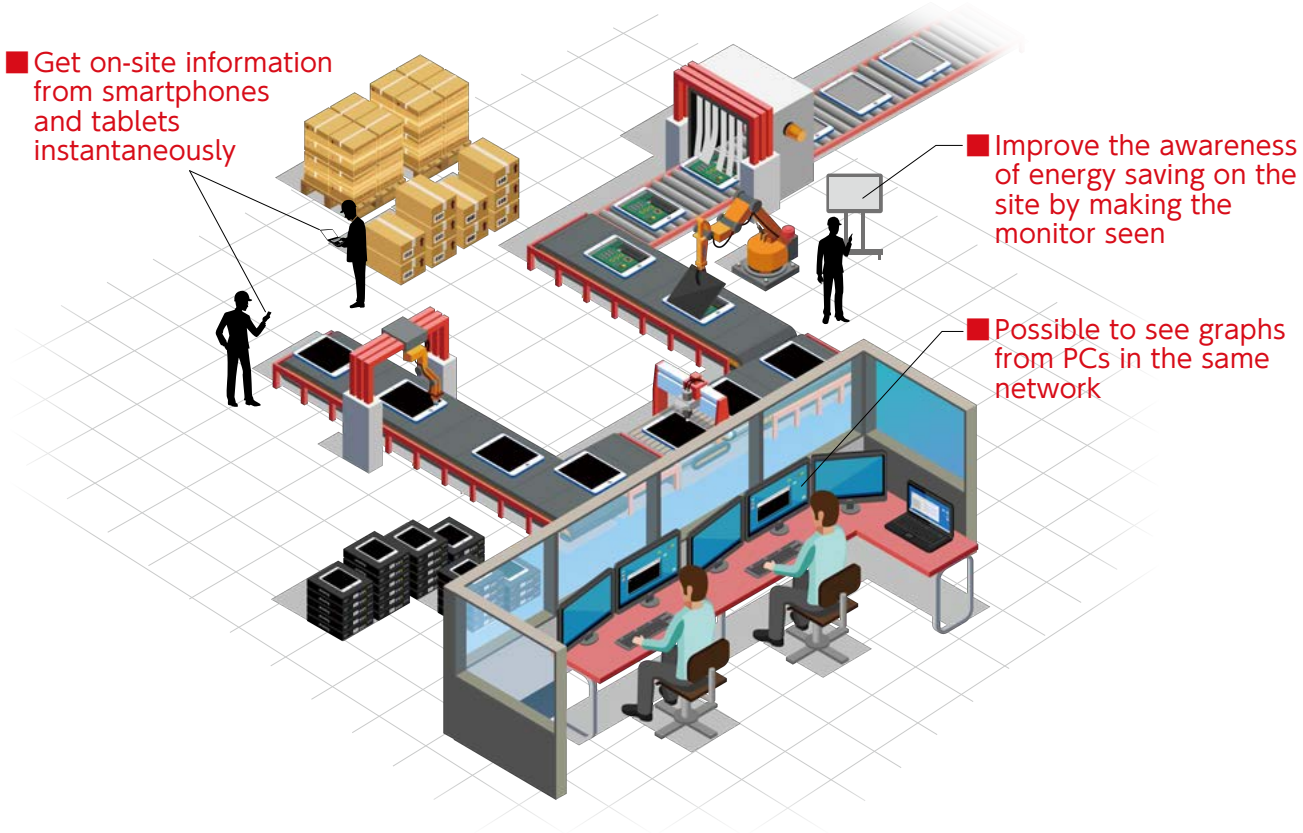
||

Reduce basic free

Realize visualization of energy and demand management with one EcoWebServer Ⅲ.

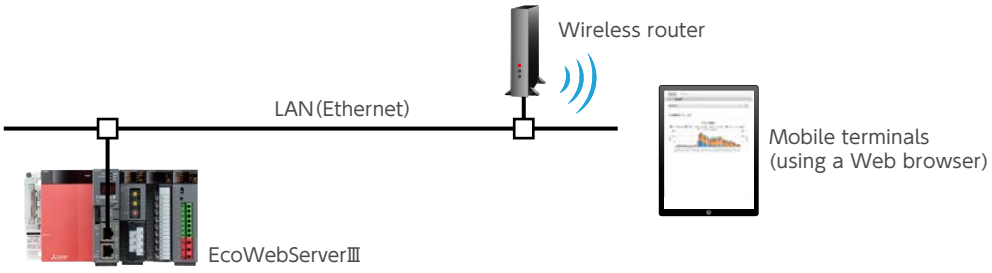
1. Measured Data in Graphs on a Web Browser

- With built-in applications focused on energy saving (including graph functions), it is possible to contribute to energy saving measures in plants.
- By HTTP server functions, the collected data is transmitted via Ethernet across the Intranet so that anyone in the network can check and grasp the energy usage in real-time.

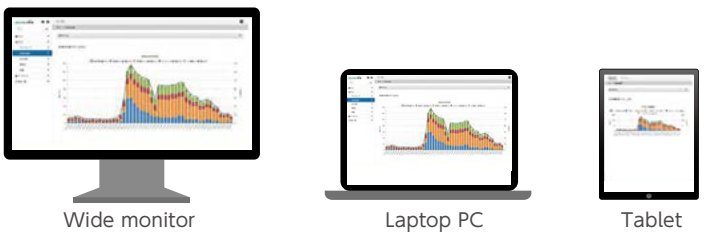


2. Smartphone and Tablet Supported

- It is possible to display graphs directly on a Web browser, so you can see the graphs from mobile terminals including smartphones and tablets as well as PCs.



- In addition, the size and position of graphs are automatically adjusted to the window width of a Web browser and the screen size of a terminal, so now, you can see the screen adjusted to the terminal to use.



3. Easy Setting (programming less, ladder less)

● The minimum registration setting required for measurement is only:

1 Registering measuring terminals → 2 Registering measuring points → 3 Writing a project

Setting Process

1 Measuring Terminal Registration

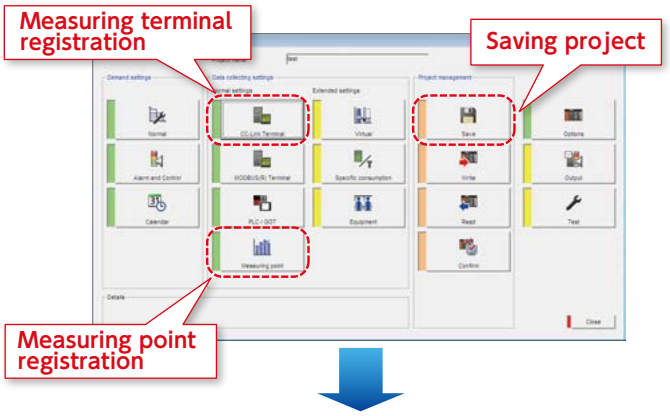
Select a terminal equipment to register to the lower rank in a pull-down system.

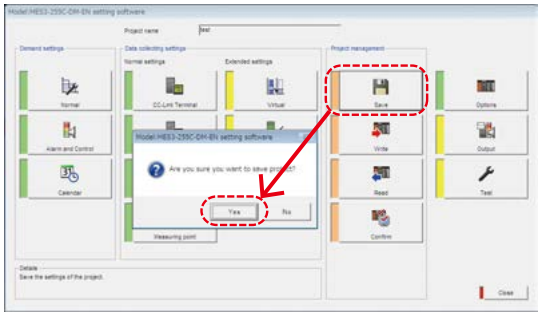
2 Measuring Point Registration

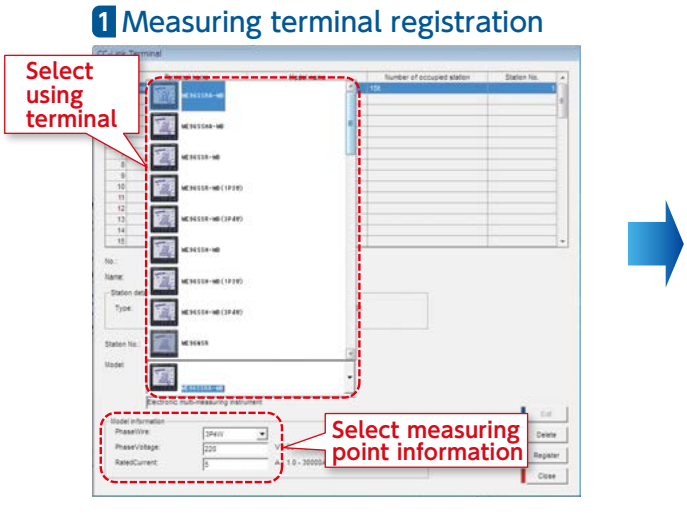
Select measuring items (such as electric current, voltage and energy) in a pull-down system.

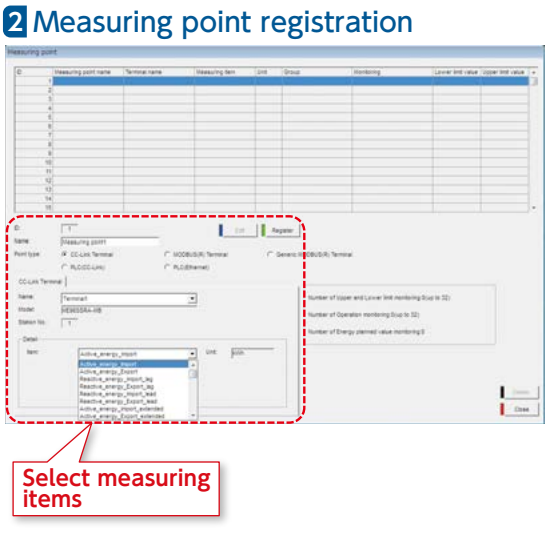
3 Project Writing

Write the registered terminal and measuring point information to EcoWebServerⅢ.









* The example screens and settings belong to MES3-255C-DM-EN.

4. Installed a variety of graphs for Energy Saving Management

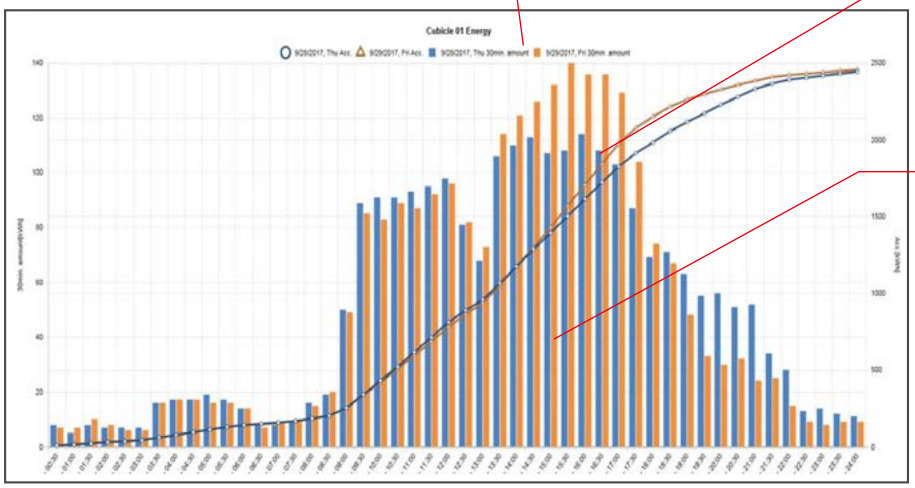
A variety of graph types and functions are built-in, so you can display graphs without drawing details.

Date Comparison Graph

- It is possible to select measuring items and comparison dates to display a graph instantly. You can identify abnormal values, which leads to improvement activities.

Also possible to display daily and monthly graphs

It is possible to display daily and monthly graphs, best suited to finding out a problem.



Visible difference from the date in comparison

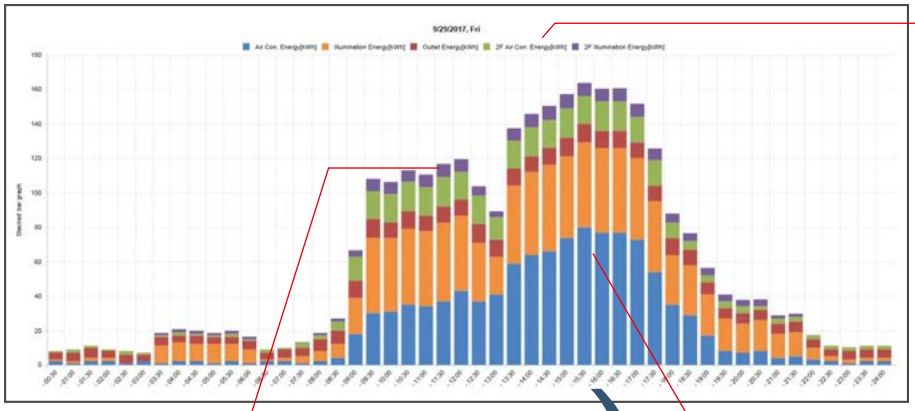
The difference from the date in comparison is visible, so you can find out the cause immediately.

Possible to display tool tips

Put the mouse pointer on the graph, and you will be able to check the detailed values.

Measuring Point Comparison Graph

- It is possible to select measuring point groups and a date, and display a measuring point comparison graph instantly. You can identify the department with a greater effect provided by energy saving measures, which leads to efficient activities.

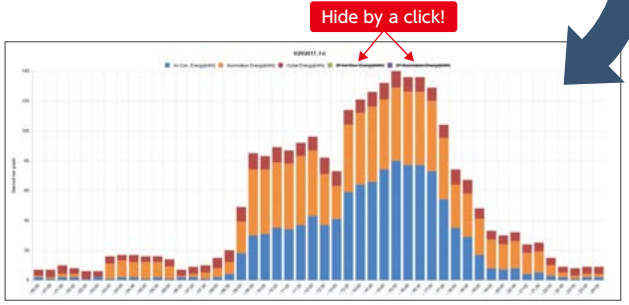


Possible to display up to 12 items

Up to 12 items can be displayed in a graph. It is possible to hide unnecessary items by a click, so you can select only necessary parts to display and make a comparison.

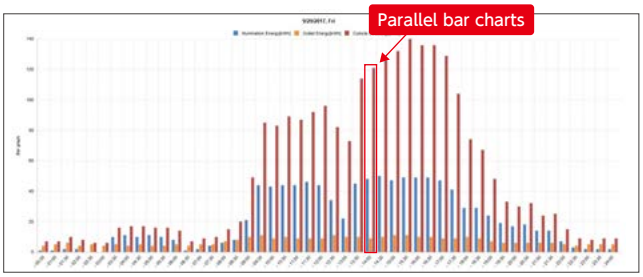
Possible to hide a legend by a click

By clicking a legend, you can hide unnecessary items.



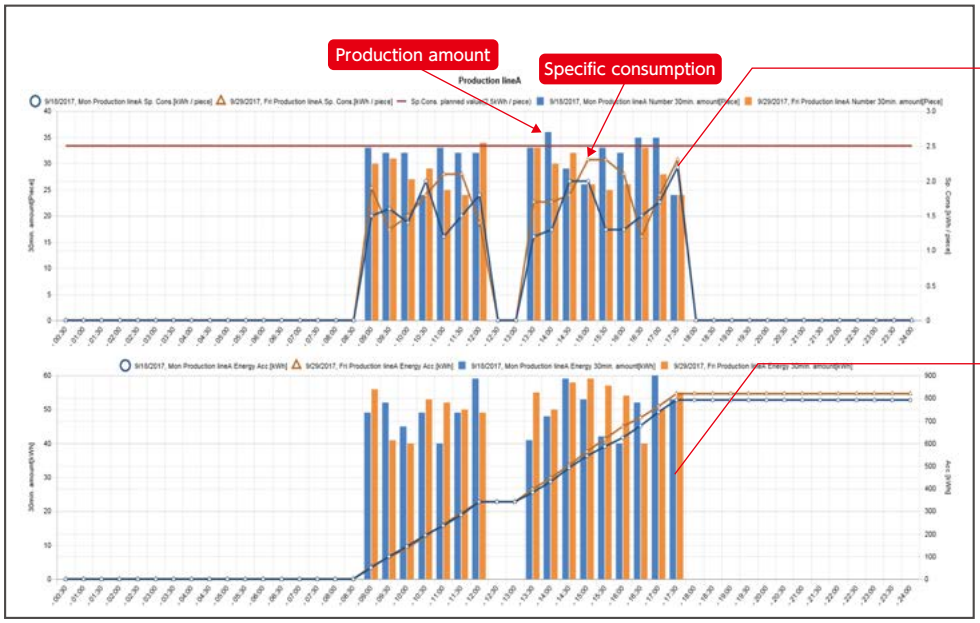
Possible to display more than one bar chart

It is possible to display parallel as well as stacked bar charts. You can use them for the comparison of energy usage in a same facility, and others.



Specific Consumption Graph

● Configure the settings for a specific consumption graph, and a date comparison graph for specific consumption can be displayed instantly. Based on the graph, you can improve the management on the site, which leads to a productivity improvement (see p.18 and 19 for details).



Visible productivity

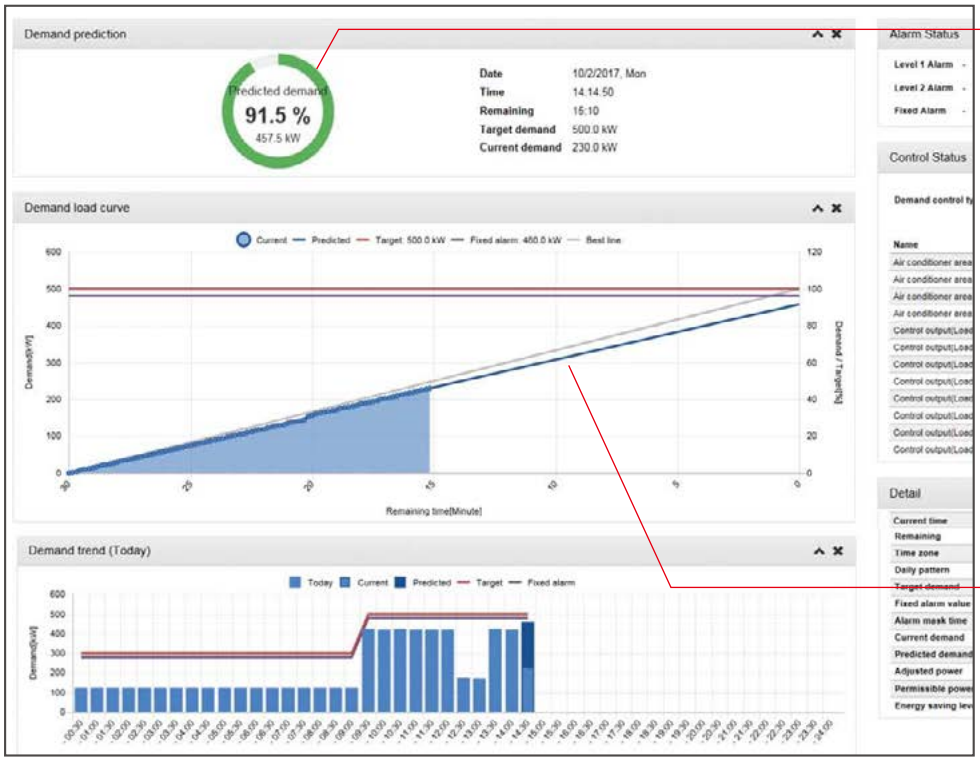
It is possible to display specific consumption in a line graph and in a bar chart, so you can check the part where the productivity is lower at a glance.

Easy to compare dates for facility energy usage

At the same time with a specific consumption graph, a date comparison graph for the energy usage is displayed.

Demand Monitor (MES3-255C-DM-EN only)

● You can check the current condition and shift of demand at a glance.



Current demand condition monitor

The demand value at the end of a 30-minute time limit is forecasted and displayed in a pie chart*. The color is changed according to the current demand condition, so you can check the condition at a glance.

When the demand is normal

When the demand is exceeded

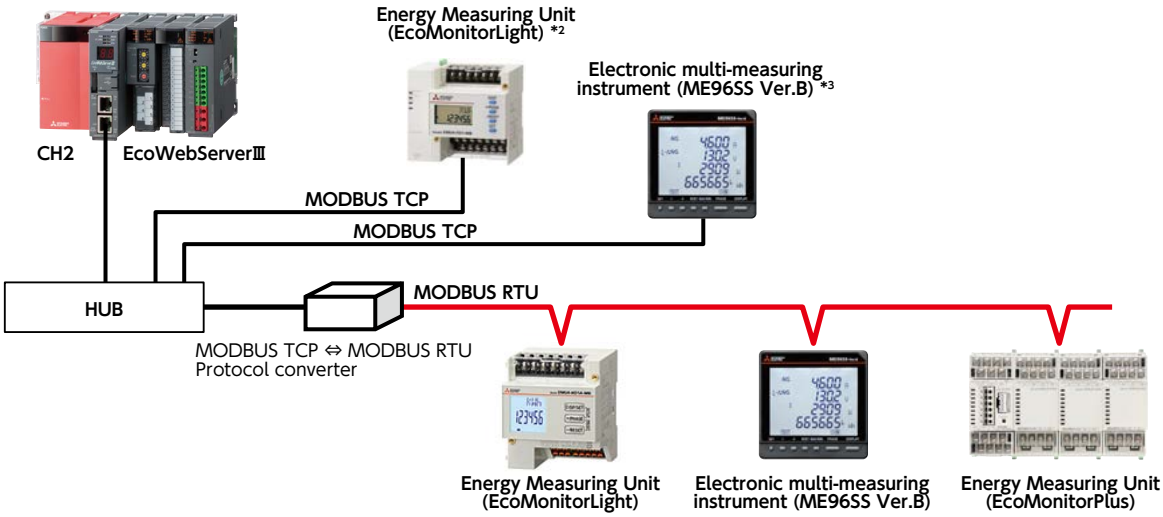
* Interval can be selected from 15min or 30min or 1hour.

Demand load curve

The load curve of the demand condition is displayed. You can check the demand condition relative to the target in a glance.

5. It can be connected at MODBUS RTU/TCP communication

- Using the LAN interface (CH2) of EcoWebServerⅢ, **realize MODBUS TCP communication.** (As with the case of MC protocol communication)
- Using the LAN CH2 of EcoWebServerⅢ, via MODBUS TCP ⇔ MODBUS RTU converter, realize **MODBUS RTU communication.**[*1]

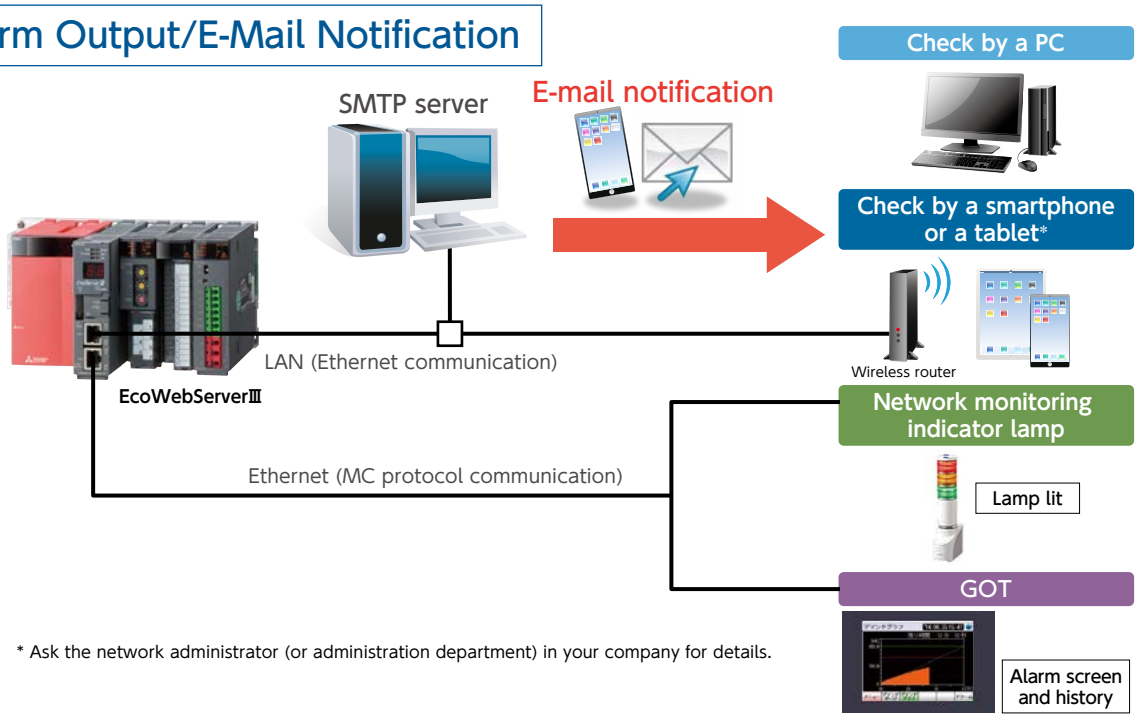


*1 MODBUS TCP ⇔ RTU converter is required for MODBUS RTU communication.
That has been functionally verified is SI-485 MB, SI-485 MB2 by LINEEYE CO., LTD.
*2 Only EMU4-FD1-MB can be connected and it needs an optional unit (Model name: EMU4-CM-MT)
*3 It needs an optional unit (Model name: ME-0000MT-SS96)

6. Detect Target Excess and Facility Abnormality Instantaneously by Alarm Output and E-Mail Notification

- It is possible to send an e-mail notification and an alarm output in case of the occurrence of target excess or facility abnormality, so you can catch a condition change at once. It is possible to accelerate the PDCA cycle from problem finding to measure taking and improve the productivity.
- Smartphones and tablets are supported, so you can check the alarm contents and e-mail notifications on the site.

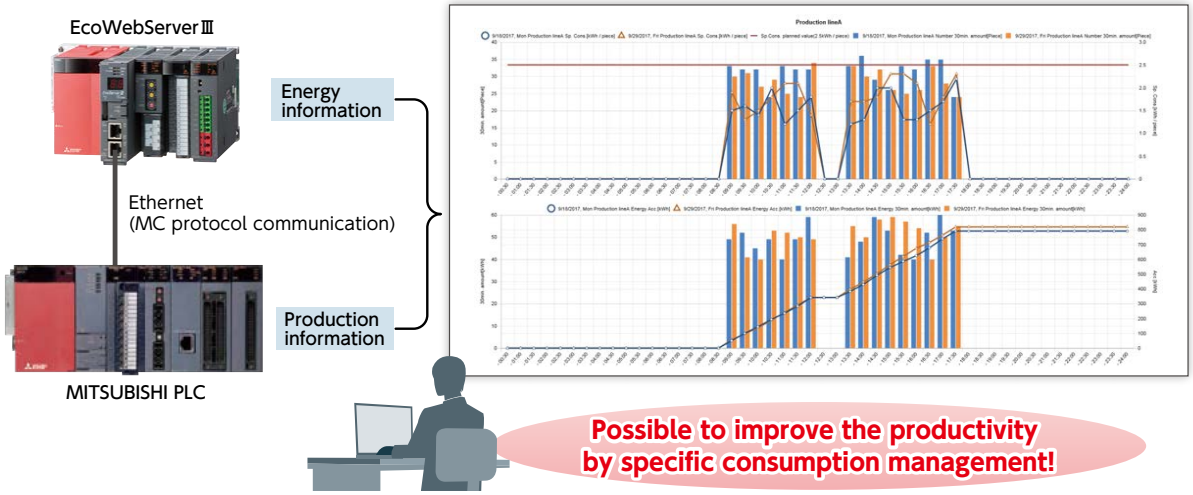
Alarm Output/E-Mail Notification



* Ask the network administrator (or administration department) in your company for details.

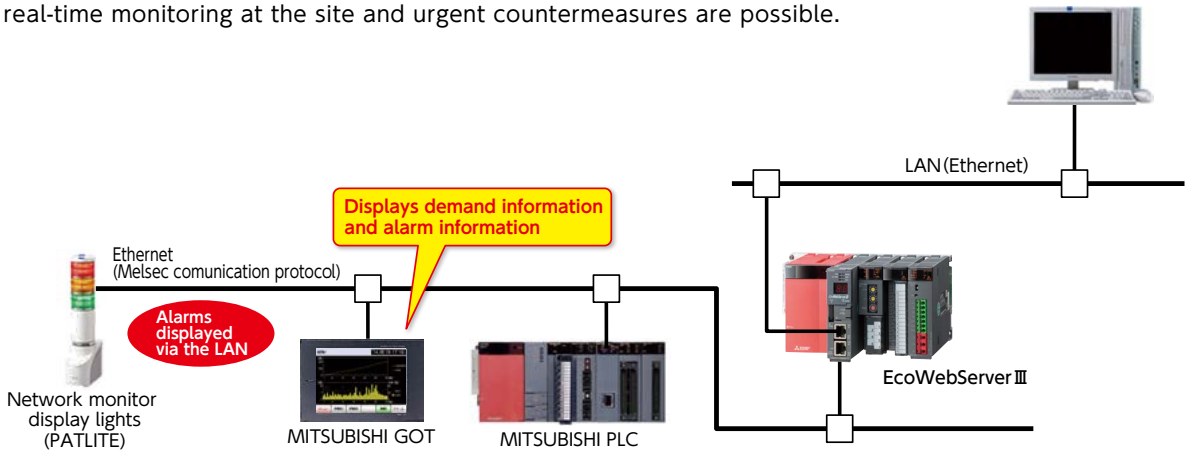
7. Specific Consumption Management in Coordination with a Mitsubishi PLC

- Based on production information in a Mitsubishi PLC and energy information in EcoWebServerⅢ, specific consumption is managed.
- The setting software dedicated to EcoWebServerⅢ enables to read the data in a Mitsubishi PLC easily.
- You can conduct detailed improvement activities for each facility, based on specific consumption data.



8. Connection with Mitsubishi Electric GOT display device.

- Information collected on the EcoWebServerⅢ can be displayed on the GOT.
- By displaying the alarm state/measuring value for energy information/demand, real-time monitoring at the site and urgent countermeasures are possible.

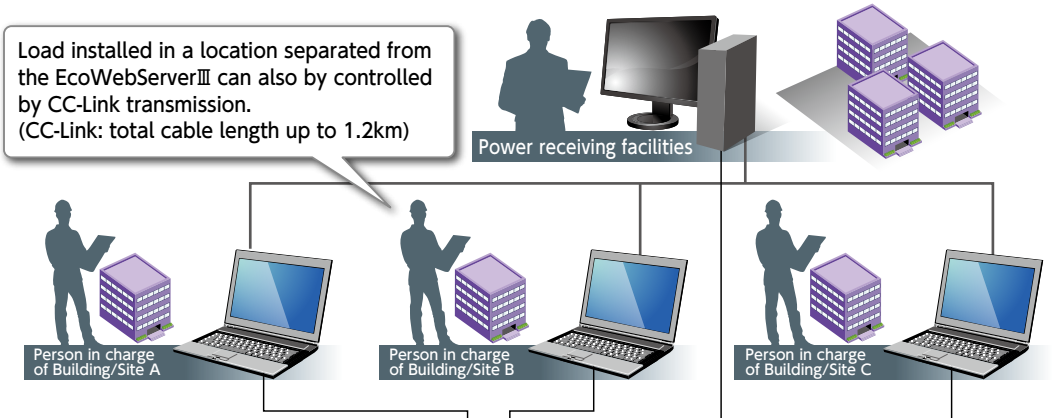


* Demand alarm function can be realized Only MES3-255C-DM-EN.

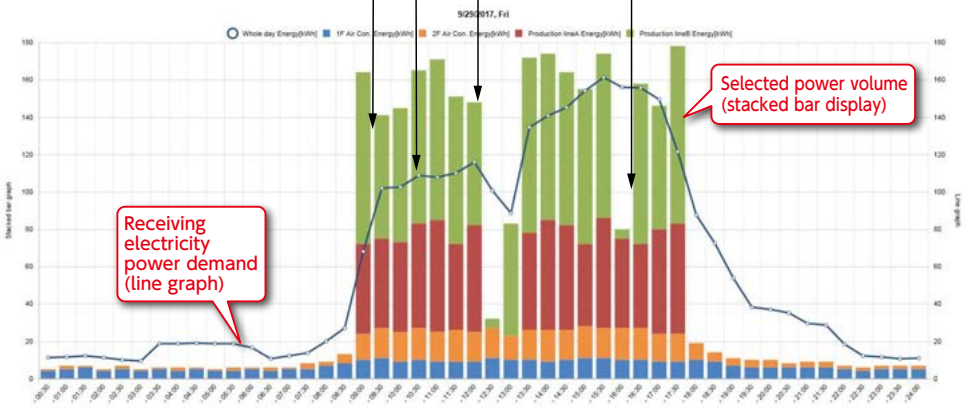
9. Simultaneously visualize demand trends and energy consumption per building/load

Compatible model: MES3-255C-DM-EN only

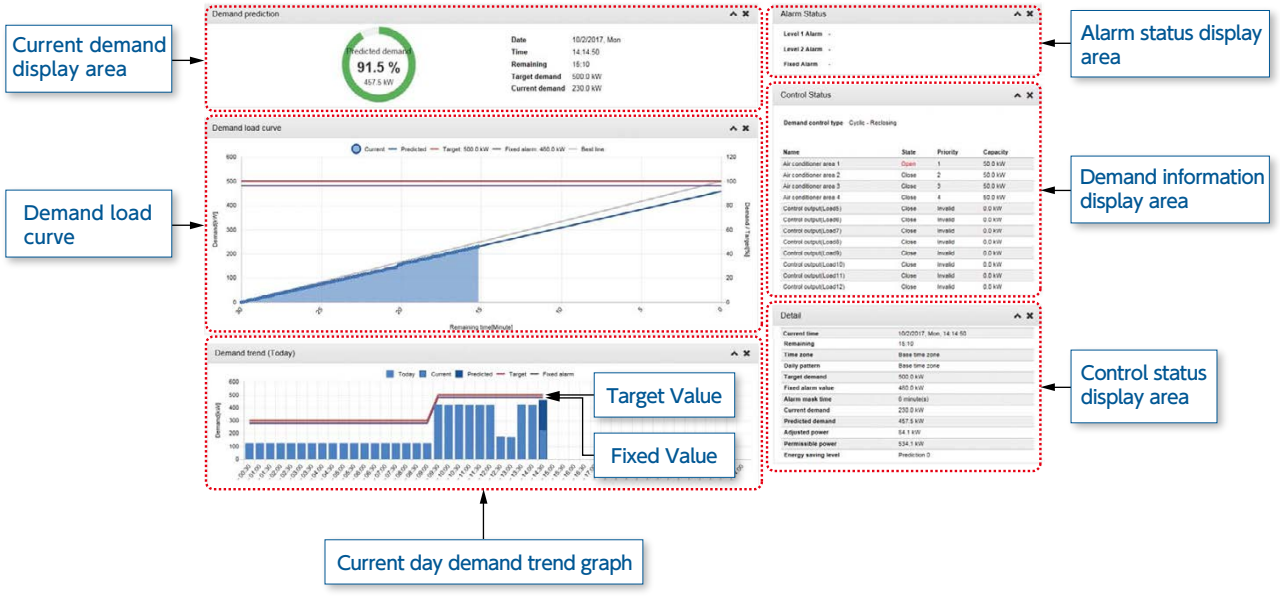
● As the breakdown of power demand (load balance) can be easily understood from the power demand trends and stacked bar graphs for each regional substation and operating equipment can be reviewed, and operations can be planned and proposed based on the analysis results, which enable peak shift/peak cut.



Graph screen example

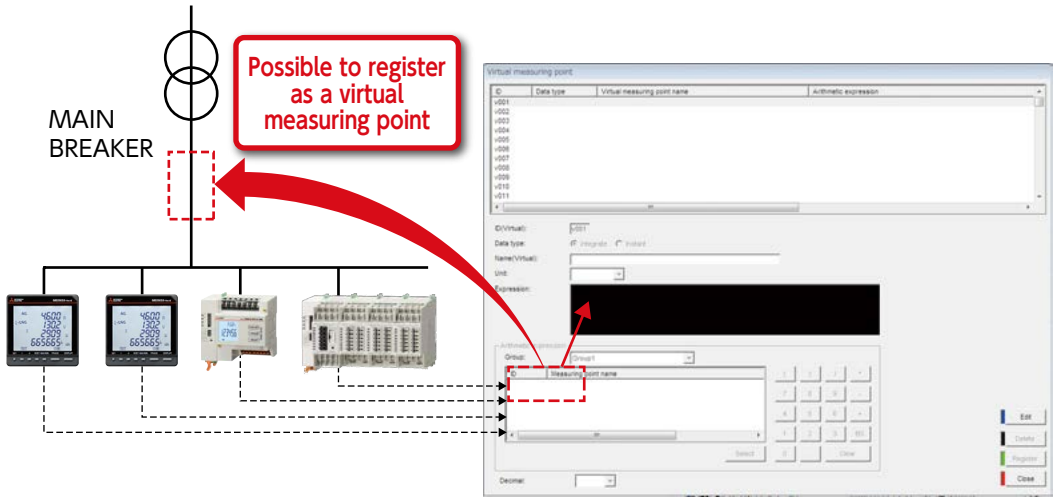


●Demand monitor screen



10. Virtual Measuring Point Function

● A virtual measuring point refers to a measuring point for which the computation result between measuring points is used as virtual measurement data. A **maximum of 128** measuring points (excluding the 255 measuring points) can be registered.



● It is possible to convert into CO_2 or electricity charges.
All you have to do for setting is to input the computing equation of measurement data and input the unit by hand or select it from the list.

Example Convert the energy into CO_2 and display a graph

Computing equation

Select a registered measuring point [Wh] × Input the conversion coefficient = CO_2 equivalent amount (Set the unit [t-CO_2])

Energy Saving Management for the Whole Factory

Use Demand Monitor Measuring Point Comparison Graphs and Reduce Electricity Charges.

Only with demand control function

Best suited to such customers as :

- Have a high ratio of electricity charges in the plant and want to reduce electricity charges.
- Can't monitor the demand condition constantly.
- Can't grasp the conditions or rate of energy usage in each department.

Tips for Electricity Charge Reduction (In the case fixed block demand managemant)

●The reduction of contract demand leads to the reduction of electricity charges.

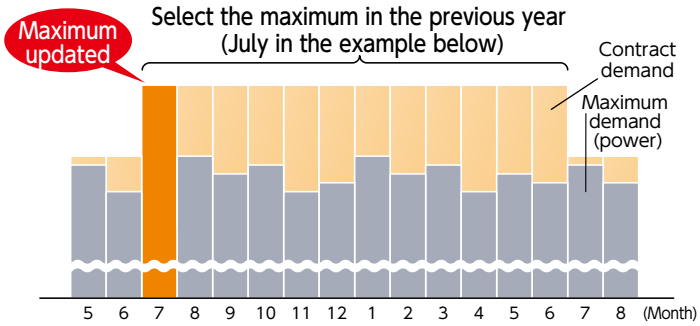
①Electricity charge system

Basic charge | Energy charge

②Basic charge system

Basic charge = Contract demand × Unit price

Calculate based on **the maximum demand (power)** in the previous year



Example: a new maximum demand (power) was established in July and the demand was lowered from the next month.

By lowering the maximum demand in a year, you will be able to reduce the contract demand!

Demand Reduction by EcoWebServerⅢ

1. Set the Target Demand

Use the dedicated software for setting and set the target demand value based on the past conditions of energy usage.

2. Select the Load to Cut Off

Identify the load to control when the target value is exceeded. It is general to select the load of air conditioning or lighting on which a sudden control or cut-off has a smaller influence.

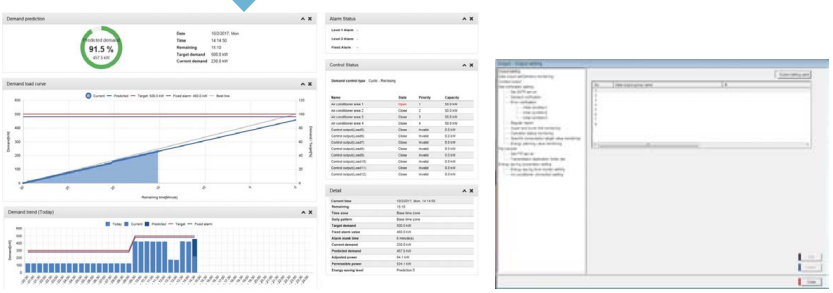
3. Consider the Control Method (Manual or Automatic Control)

EcoWebServerⅢ enables to create a system to control loads automatically when the target value is exceeded (up to 12 loads).

4. Settings for External Equipment Coordination (Automatic Control)

Set the load (capacity) to control automatically by using the dedicated software for setting.

You can configure the settings easily by the dedicated software for setting!

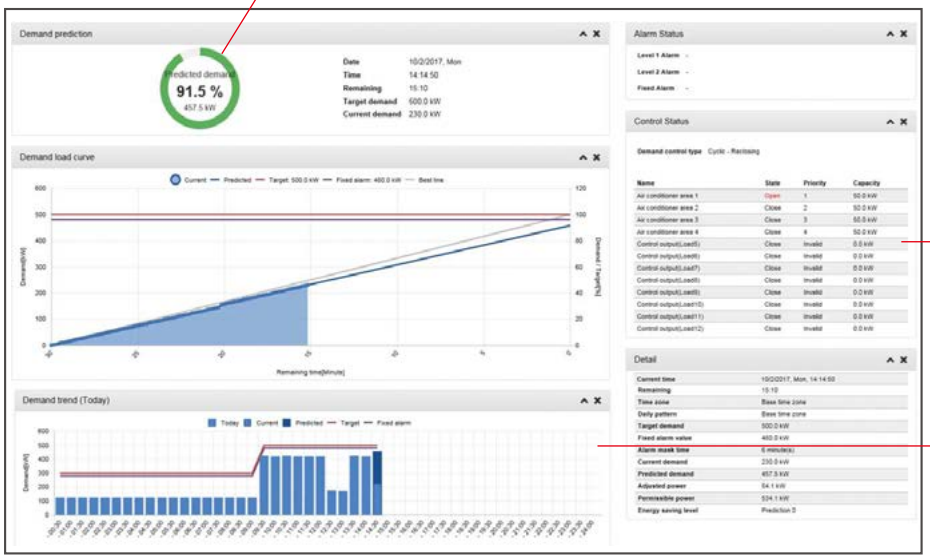


The troublesome creation of ladder or other programs isn't necessary.

5. Check Daily Demand Monitoring and Control Information in Graphs

You can check demand graphs by PCs, smartphones and tablets.

Demand graphs



■Check the demand forecast monitor

Check the demand condition constantly and take a measure when the forecast demand is above. If you control manually, you can cut off the peak energy by controlling the load of air conditioning or others on which the influence is smaller.

■Check control conditions

You can check the control condition of the loads registered in setting.

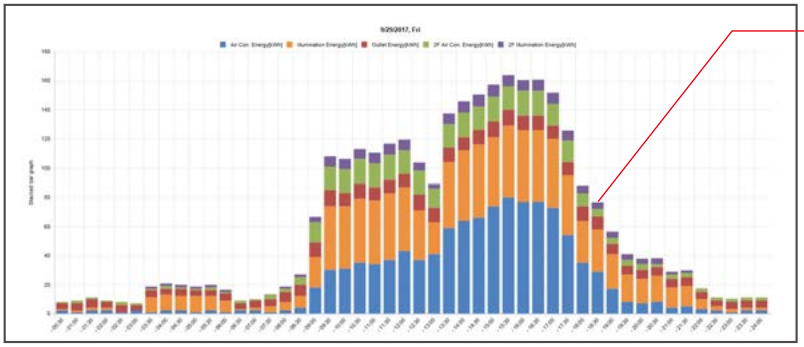
■Check daily demand trend

It is possible to check the peak period at a glance, so you can find out the time period where a lasting measure is necessary.

6. Impose on Departments a Duty to Conduct and Report Energy Saving Improvement Activities

For reducing the contract demand, each department has to conduct improvement activities to lower the demand. Then, it is important to use a measuring point comparison graph to find out the points where an improvement can be expected to have an effect.

Measuring point comparison graph (daily)



■Identify the bottleneck part, based on a stacked bar chart

It is possible to clarify the energy consumption rate in each department in the whole. The department with more energy consumption is visible, so you can conduct efficient energy saving activities.

7. Coordinate with Departments to Improve the Management and Introduce Energy Saving Equipment

See p.19 for details.

8. Check the Effect before and after an Improvement

It is possible to use a date comparison graph to compare the data before and after an improvement. You can check the effect of an energy saving measure at a glance.

Energy Saving Management in Each Department

Use Date Comparison Graphs and Improve the Management in Each Department.

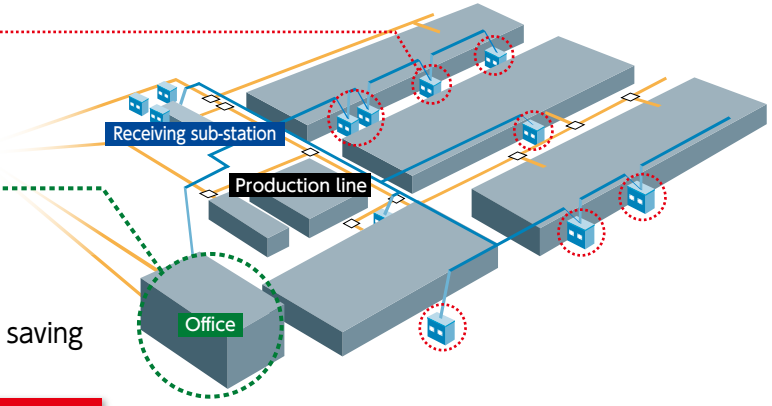
Best suited to such customers as :

- Don't have a person in charge of energy saving in each department and can't conduct energy saving activities in each department.
- Want to introduce energy saving equipment (such as LEDs and efficient transformers), but don't know from where to start the introduction.
- Haven't set the target value of energy usage and don't have the limit of energy usage in each department.

Tips for Operational Management

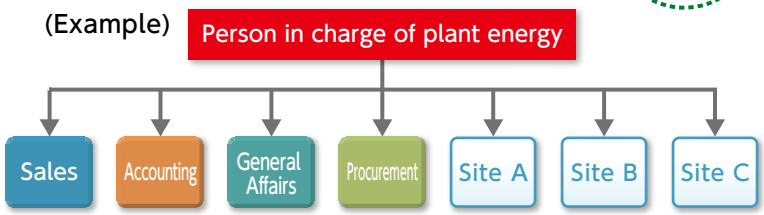
●Assign a person in charge in each department using energy and create the awareness of energy saving.

- **Substation for each building**
  Conduct measurement at each substation and select a person in charge if a substation is disposed for each production site and office building.
- **Panelboard for each department and floor**
  Select a person in charge on each floor and conduct operational management of air conditioning, lighting, OA circuits and others.



●Create a system for managing energy saving targets from the top down.

(Example)



Instruct to manage the target, based on quantitative graph data

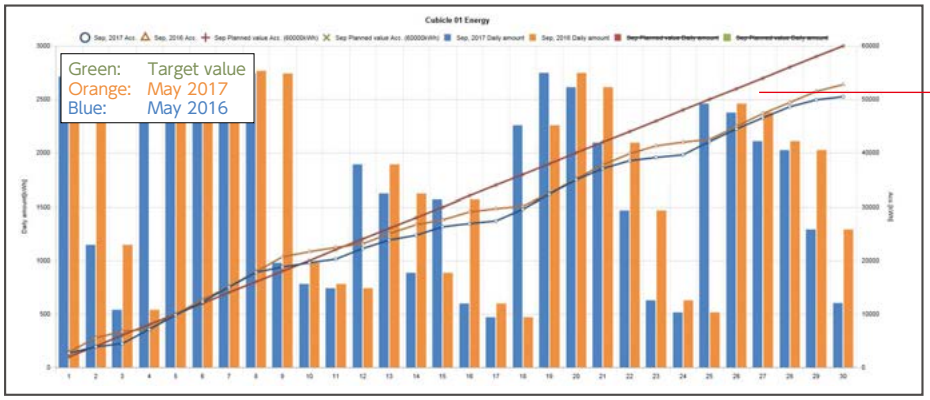
Energy Saving Activities by Improving Management with EcoWebServerⅢ

1. Set the Target Value in Each Department

Set the target (plan) value from the "Target Value" button on the Web screen.

2. Conduct Management Not to Exceed the Target, Based on a Monthly Graph

Check regularly not to exceed the target value at the end of a month.

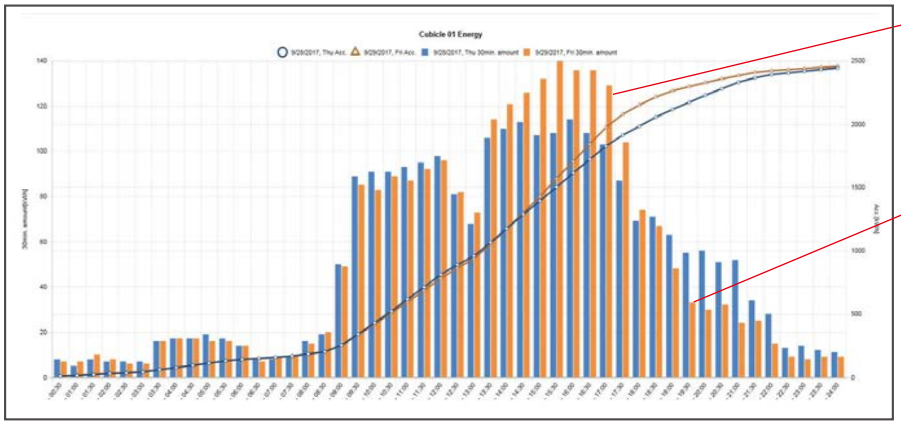


■Visible plan/target value

You can set the target value every month on a Web graph and reflect it on the graph.
Conduct monthly target management based on the information.

3. Find Improvable Points, Based on a Date Comparison Graph

Find out improvement points, based on a date comparison graph.



■ Identify improvement points, based on comparison values

Clarify the point of change from the comparison date and take a measure if energy usage is obviously different in a date comparison.

■ Consider energy consumption measures during a recess and after the fixed time

Take measures including the automatic control of lighting and air conditioning if the energy usage is high during a recess or after the fixed time.

4. Improve the Management and Introduce Energy Saving Equipment at the Level of a Person in Charge

Improve the management and introduce energy saving equipment once the part to take an energy saving measure in is decided.

Examples of Management Improvement **(Buildings and offices)**

- Limiting the time for lighting
- Limiting the time for operating air conditioning (only during the fixed time)
- Turning off the light in a lunch break and turning off the light simultaneously after the fixed time
- Setting the date for going home simultaneously on time and limiting late-night work

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- Reconsidering the time for starting up a facility
- Controlling the operation of ancillary facilities (including a cooling tower incidental to a compressor)

Introduction of Energy Saving Equipment

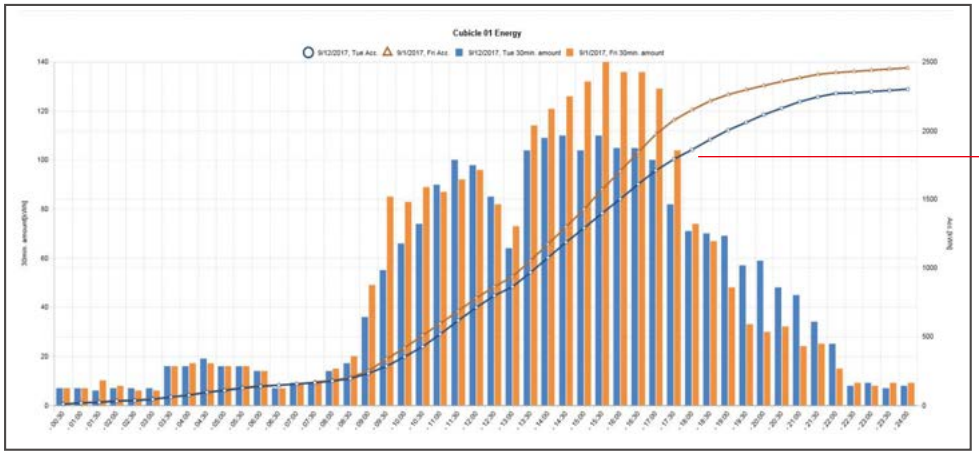
Air conditioning

Efficient motor

LED lighting

5. Check Return on Investment before and after an Improvement

Check the effect of the improvement activities and equipment introduction conducted and use the result for the next improvement plan.



■ Check the effect before and after an improvement

Check the effect and make it a step for introducing equipment in the future when a specified period passes after taking a measure.

Productivity Improvement on the Site

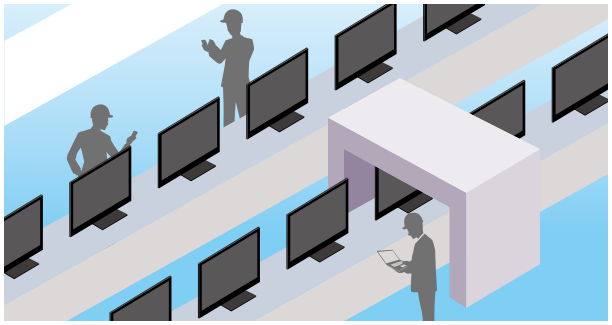
Use Specific Consumption Graphs and Achieve the Productivity Improvement.

Best suited to such customers as :

- Can't show energy usage on the production site quantitatively and haven't achieved an improvement on the site.
- Want to make the information of specific energy consumption visible.
- Can't grasp the specific energy consumption in each facility.

Tips for improving the productivity by specific consumption management

●Select energy saving model lines

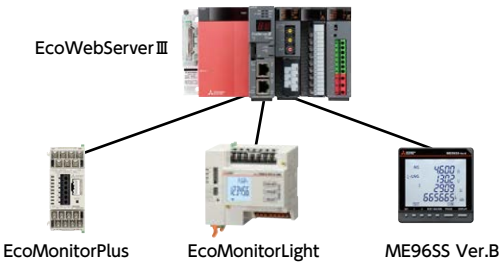


Set the lines with higher energy usage or frequent program changes as energy saving model lines and conduct specific consumption management.

Roll out to other lines if an effect is provided

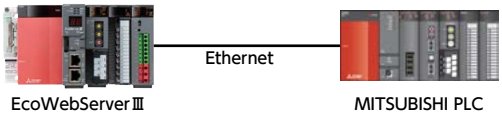
●Various data measurement methods

Energy data

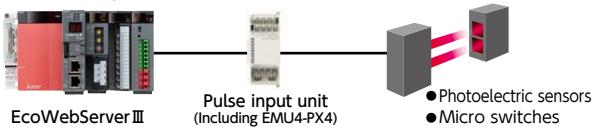


Production amount

Pattern ① : Obtain the production amount from a Mitsubishi PLC



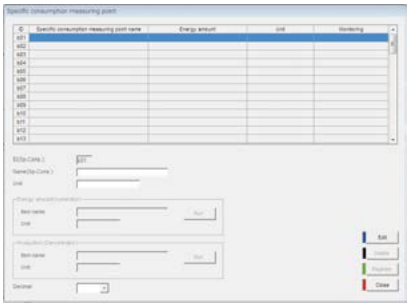
Pattern ② : Input pulse signals for information of a photoelectric sensor and others to EcoWebServerⅢ

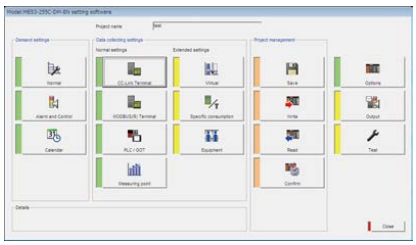


Process for Specific Consumption Management by EcoWebServerⅢ

1. Configure the Settings for a Specific Consumption Graph

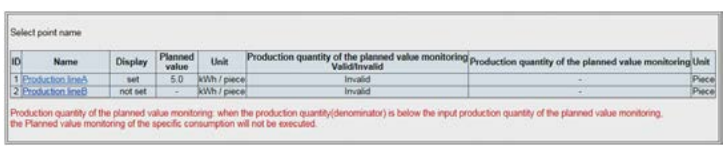
You can configure the settings easily only by using the dedicated software for setting and selecting energy and production amounts.





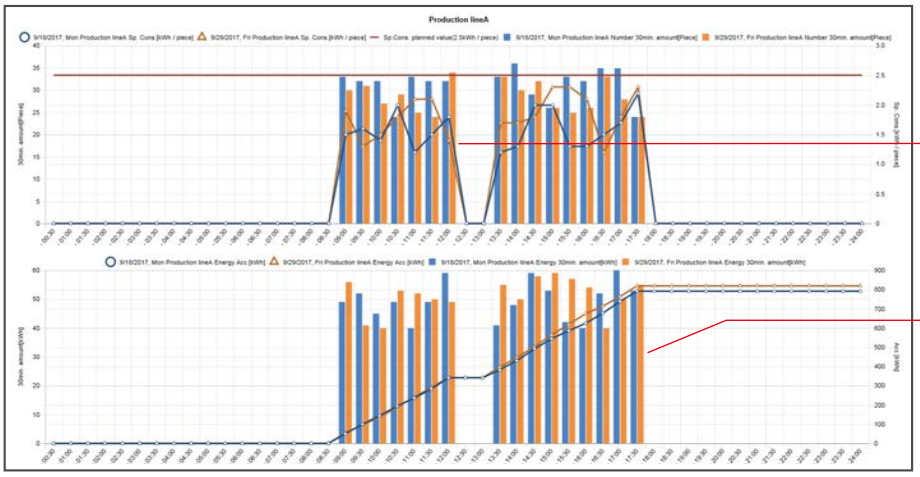
2. Set a Target Value for Specific Consumption

You can easily set from a Web browser.



3. Monitor Specific Consumption graph after Completing the Settings

You can check specific consumption graphs from PCs, smartphones and tablets.



■Identify improvement points, based on specific consumption

Find out the parts where specific consumption is worsened and take a measure after identifying the cause.

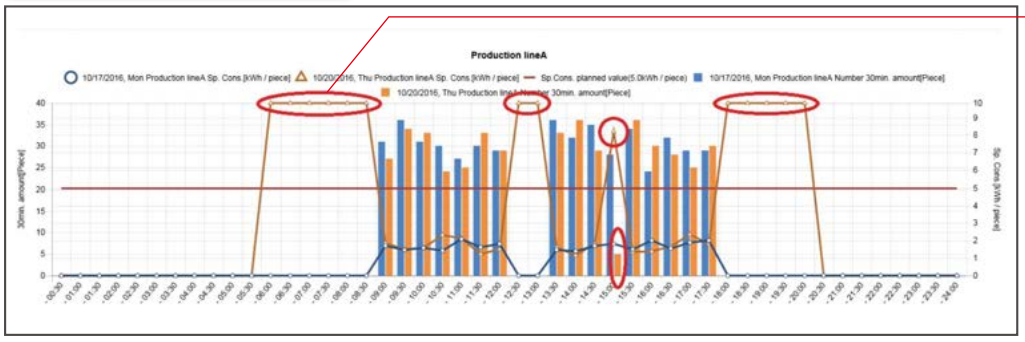
■Monitor facility energy usage

Take a measure after identifying the cause if you find abnormal values because a date comparison graph for facility energy usage is displayed, too.

4. Coordinate with the Site to Conduct Improvement Activities and Introduce Efficient Equipment

Submit an improvement request to the site and improve the management based on quantitative graph data.

Improvement Example **Optimize the time for starting up a facility**



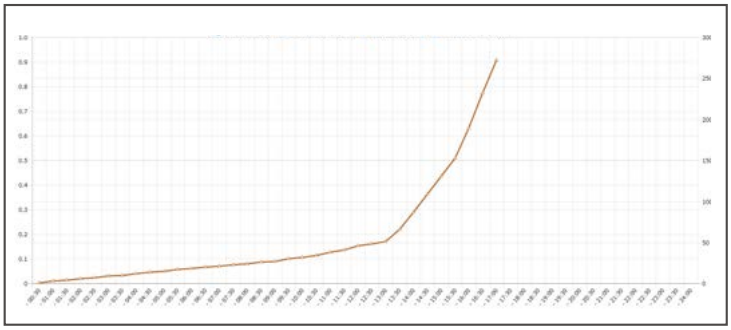
Check abnormal values for specific consumption

When a facility wasn't in operation, the standby time after starting up was long and the specific consumption got worsened. Turning on the facility 30 minutes before the start of operation has led to the reduction of the standby time.

5. Check and Report the Effect before and after a Measure

Check the effect before and after a management improvement in a date comparison graph. Roll out the same measure equipment if an improvement is achieved, and select another equipment if little effect is provided.

Actions for Preventive Maintenance (Extra Actions)



1. Measure the load/leakage current of a motor.
2. Set a target value and output an alarm when the target is exceeded.
3. Detect an abnormality before a trouble and conduct early replacement.

Prevent the production loss caused by a motor trouble and
improve the productivity!

Energy Saving Data Collecting Server EcoWebServerⅢ

Product name	Energy Saving Data Collecting Server
Model name	MES3-255C-EN
Communication	CC-Link, MODBUS (TCP, RTU*)

Product name	Energy Saving Data Collecting Server (with demand control function)
Model name	MES3-255C-DM-EN
Communication	CC-Link, MODBUS (TCP, RTU*)

* MODBUS TCP ⇔ RTU converter is required for MODBUS RTU communication.
That has been functionally verified is SI-485 MB, SI-485 MB2 by LINEEYE CO., LTD.

Network Specifications (CC-Link)

	Item	Specifications
CC-Link communications section *1	Transmission speed	156kbps ／ 625kbps ／ 2.5Mbps ／ 5Mbps ／ 10Mbps
	Max. number of connected units	64 units under the following conditions. 1. Total number of stations a+b×2+c×3+d×4≤64 a : Number of units occupying 1 station, b : Number of units occupying 2 stations, c : Number of units occupying 3 stations, d : Number of units occupying 4 stations 2. Number of connected units 16×(A+D)+54×B+88×C≤2304 A: Number of remote I/O station units ···64 units max. B: Number of remote device station units ···42 units max. C: Number of local station/intelligent device station units···26 units max. D: Number of reserved station units * * Unregistered station numbers between the station number 1 and the last station number are counted as reserved station units.
	Communication method	Broadcast polling method
	Synchronization method	Frame synchronous method
	Encoding method	NRZI method
	Transmission path type	Bus (RS-485)
	Transmission format	HDLC compliant
	Error control method	CRC ($X^{16}+X^{12}+X^5+1$)
	Connection cable	Ver. 1.10-compatible CC-Link dedicated cable

*1 Maximum transmission distance varies depending on communication speed, etc. For details, please refer to the CC-Link Association homepage (http://www.cc-link.org).

MODBUS TCP

Item		Specifications
Interface		1port (10BASE-T/100BASE-TX)
Transmission method		Base band
Number of cascade connection stages *1		Max. 4 stages (10BASE-T) Max. 2 stages (100BASE-TX)
Maximum node-to-node distance		200m
Maximum segment length *2		100m
Connector applicable for external wiring		RJ45
Cable	10BASE-T	Cable compliant with the IEEE802.3 10BASE-T Standard (unshielded twisted pair cable (UTP cable), Category 3 or more)
	100BASE-TX	Cable compliant with the IEEE802.3 100BASE-TX Standard (shielded twisted pair cable (STP cable), Category 5 or more)
Protocol		MODBUS TCP (Port Number 502)

*1 This is the maximum number of cascade connection stages when a repeater hub is used. For the maximum number of cascade connection stages, contact to the manufacturer for the switching hub used.
*2 Length between a hub and a node.

MODBUS RTU

Item	Specifications
Physical interface	RS-485 2wires half duplex
Protocol	RTU mode
Transmission wiring type	Multi-point bus (either directly on the trunk cable, forming a daisy-chain)
Slave address	1～247 (F7)
Response time	1s or less
Distance	1200m
Max. number	31
Terminate	120Ω 1/2W
Recommended cable	Shielded twisted pair, AWG24 to 14 gauge

Note: Baud rate, stop bit and parity are necessary to set in the setting-mode of the each terminal.

MES3-255C-EN、MES3-255C-DM-EN (CC-Link)

Product Name	Icon/type name		Station type	Number of occupying stations
Energy Measuring Unit (1P2W, 1P3W, 3P3W)	EMU4-BD1A-MB		Remote device station	1 station occupied
Energy Measuring Unit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-HD1A-MB		Remote device station	1 station occupied
Energy Measuring Unit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-FD1-MB		Remote device station	1 station occupied
Energy measuring standard model *1	EMU4-BM1-MB		Remote device station	1 station occupied
Energy measuring high performance model *1	EMU4-HM1-MB		Remote device station	1 station occupied
Insulation Monitoring model *1	EMU4-LG1-MB		Remote device station	1 station occupied
Energy measuring extension model for same voltage system *2	EMU4-A2		Remote device station	*3
Energy measuring extension model for different voltage system *2	EMU4-VA2		Remote device station	*3
Energy measuring extension model for analog input *2	EMU4-AX4		Remote device station	*3
Energy measuring extension model for pulse/digital input *2	EMU4-PX4		Remote device station	*3
MDU breaker (WS-V)	MDU(WS-V)	NF250-SEV/HEV with MDU	Remote device station	1 station occupied
MDU breaker (WS)	MDU(WS)	NF400-SEW/HEW with MDU NF800-SEW/HEW with MDU	Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSHB-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSRB-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSH-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSR-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96NSR		Remote device station	1 station occupied
Thermocouple temperature input unit	AJ65BT-68TD		Remote device station	4 station occupied
Platinum resistance temperature sensor Pt 100 temperature input unit	AJ65BT-64RD3		Remote device station	4 station occupied
Analog-digital conversion unit	AJ65BT-64AD		Remote device station	2 station occupied
Terminal block type 24 VDC input unit (8 points)	AJ65SBTB1-8D		Remote I/O station	1 station occupied
Terminal block type 24 VDC input unit (16 points)	AJ65SBTB1-16D		Remote I/O station	1 station occupied
Terminal block type 24 VDC input unit (32 points)	AJ65SBTB1-32D		Remote I/O station	1 station occupied
Terminal block type DC input transistor output combined unit (Input 8 points, Output 8 points)	AJ65SBTB1-16DT		Remote I/O station	1 station occupied
Terminal block type DC input transistor output combined unit (Input 16 points, Output 16 points)	AJ65SBTB1-32DT		Remote I/O station	1 station occupied
CC-Link master/local unit (Local station)	QJ61BT11N		Intelligent device station	1 station occupied
CC-Link master/local unit (Local station)	LCPU/LJ61BT11		Intelligent device station	1 station occupied

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.
*3 Conbination of main unit and extension unit occupied 1 station.

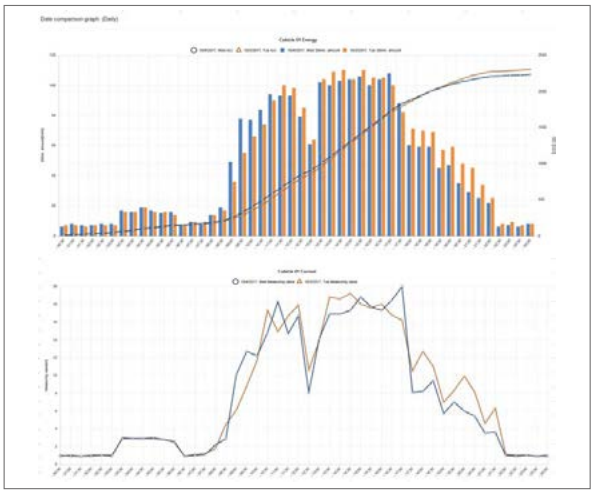
MES3-255C-EN, MES3-255C-DM-EN (MODBUS)

Product Name	Icon/type name
Electronic multi-measuring instrument	ME96SSHB-MB
Electronic multi-measuring instrument	ME96SSRB-MB
Electronic multi-measuring instrument	ME96SSEB-MB
Electronic multi-measuring instrument	ME96SSHA-MB
Electronic multi-measuring instrument	ME96SSRA-MB
Electronic multi-measuring instrument	ME96SSEA-MB
Electronic multi-measuring instrument	ME96SSE-MB
Energy Measuring Unit (1P2W, 1P3W, 3P3W)	EMU4-BD1A-MB
Energy Measuring Unit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-HD1A-MB
Energy Measuring Unit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-FD1-MB
Energy measuring standard model *1	EMU4-BM1-MB
Energy measuring high performance model *1	EMU4-HM1-MB
Insulation Monitoring model *1	EMU4-LG1-MB
Energy measuring extension model for same voltage system *2	EMU4-A2
Energy measuring extension model for different voltage system *2	EMU4-VA2
Energy measuring extension model for analog input *2	EMU4-AX4
Energy measuring extension model for pulse/digital input *2	EMU4-PX4
MDU breaker	MDU_breaker
AE-SW MODBUS	AE-SW(BIF-MD)

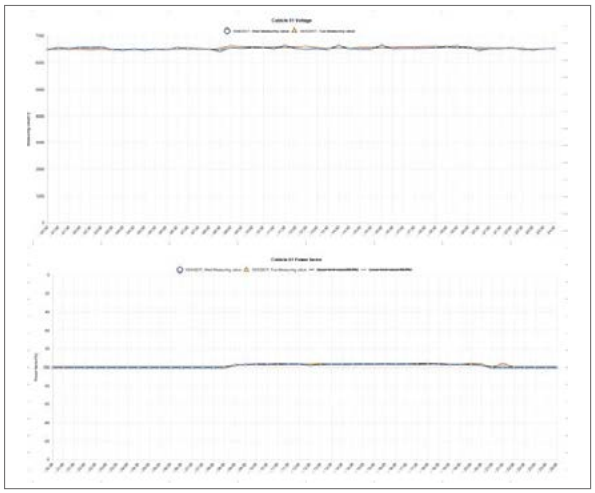
*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.

1. Date comparison graph screen

Electric consumption/current display

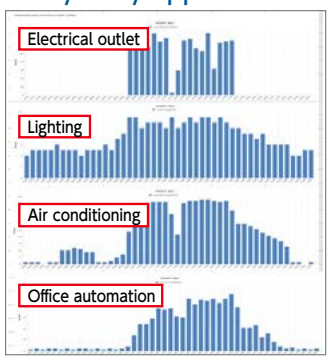


Voltage/power factor display

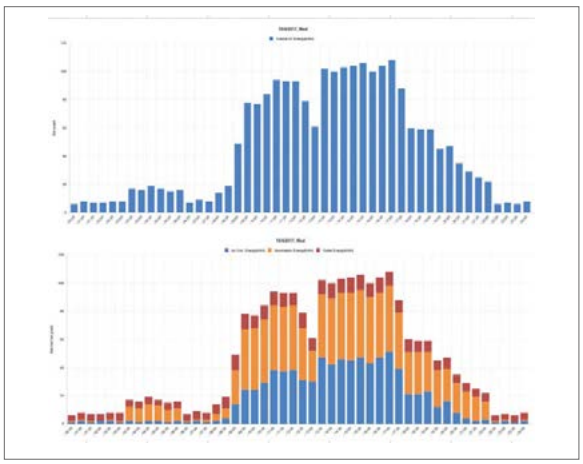


2. Measuring point comparison graph screen

Analysis by application

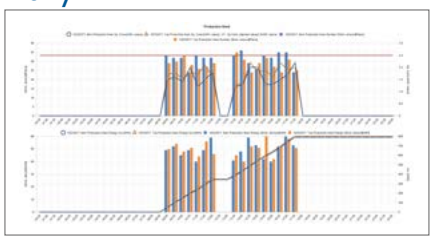


Correlation analysis (graph overlapping)

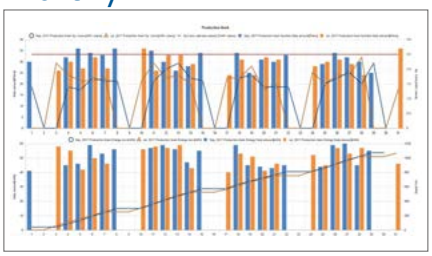


3. Specific consumption graph screen

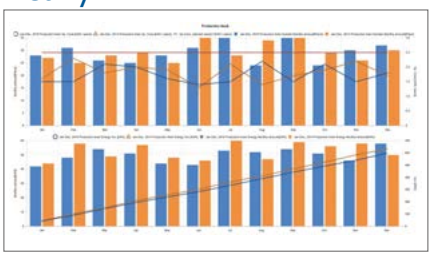
Daily



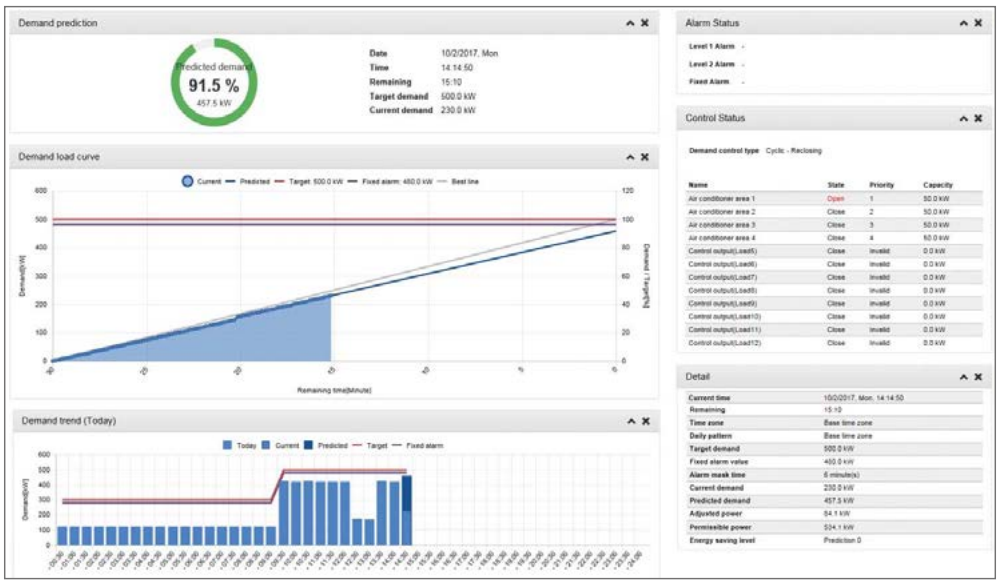
Monthly



Yearly

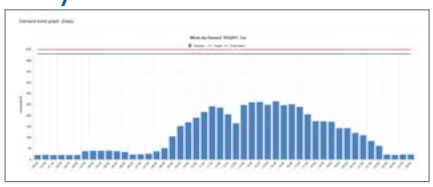


4. Demand monitor screen

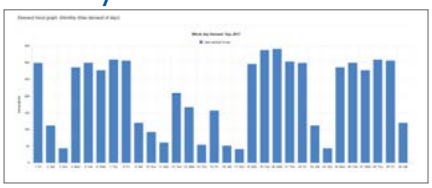


5. Demand trend graph screen

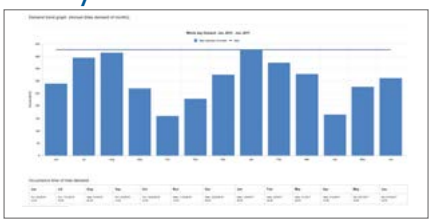
Daily



Monthly

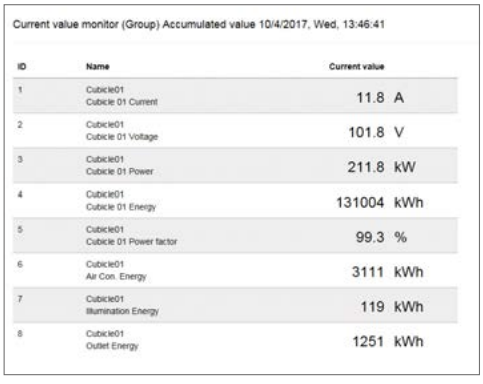


Yearly



6. Current value/contact point output monitor screen

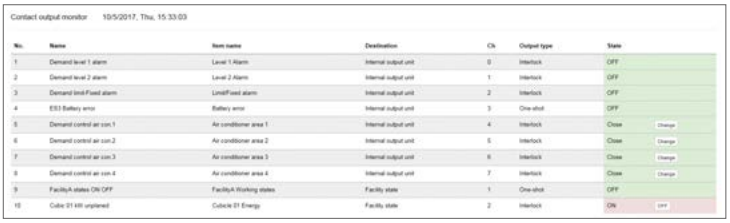
Current value



Current value monitor (Group) Accumulated value 10/4/2017, Wed, 13:46:41

ID	Name	Current value
1	Cubicle01 Cubicle 01 Current	11.8 A
2	Cubicle01 Cubicle 01 Voltage	101.8 V
3	Cubicle01 Cubicle 01 Power	211.8 kW
4	Cubicle01 Cubicle 01 Energy	131004 kWh
5	Cubicle01 Cubicle 01 Power factor	99.3 %
6	Cubicle01 Air Con. Energy	3111 kWh
7	Cubicle01 Illumination Energy	119 kWh
8	Cubicle01 Outlet Energy	1251 kWh

Contact point output



Factories

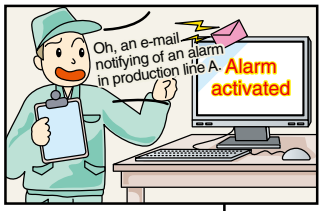
Support Energy saving Activities using “Visible Management”.

1. Monitor/Manage energy by department
2. Specific consumption-based management of energy saving activities
3. Monthly/Annual target-based management
4. Monitoring of equipment operating status
5. Manage/Record energy data

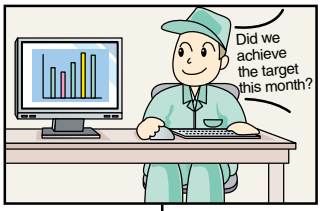
In the office…

Plant manager

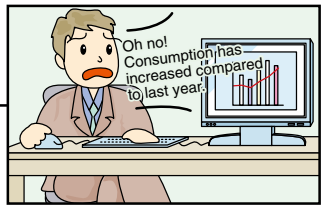
To monitor equipment status



For target management



Employees



LAN(Ethernet)

At production site…

Factory No. 1

CC-Link ← Measurement data

MDU breaker

Energy Measuring Unit (EcoMonitorPlus)

Production Department
- Power/Power consumption
- Power factor
- Consumption of water/steam/air/gas/other
- Specific consumption data
- Production quantity, other

Ethernet communications (MELSEC communications protocol)

PLC

PLC

Office

Administration Department
- Air conditioning
- Lighting
- Office automation equipment
- Electrical outlets
- Water/Gas usage

Factory No. 2

CC-Link

Electronic multi-measuring instrument (ME96SS Ver.B)

MDU breaker

Energy Measuring Unit (EcoMonitorPlus)

MELSEC-Q Series programmable controller

Operating status (contact signal)

Production quantity (pulse signal)

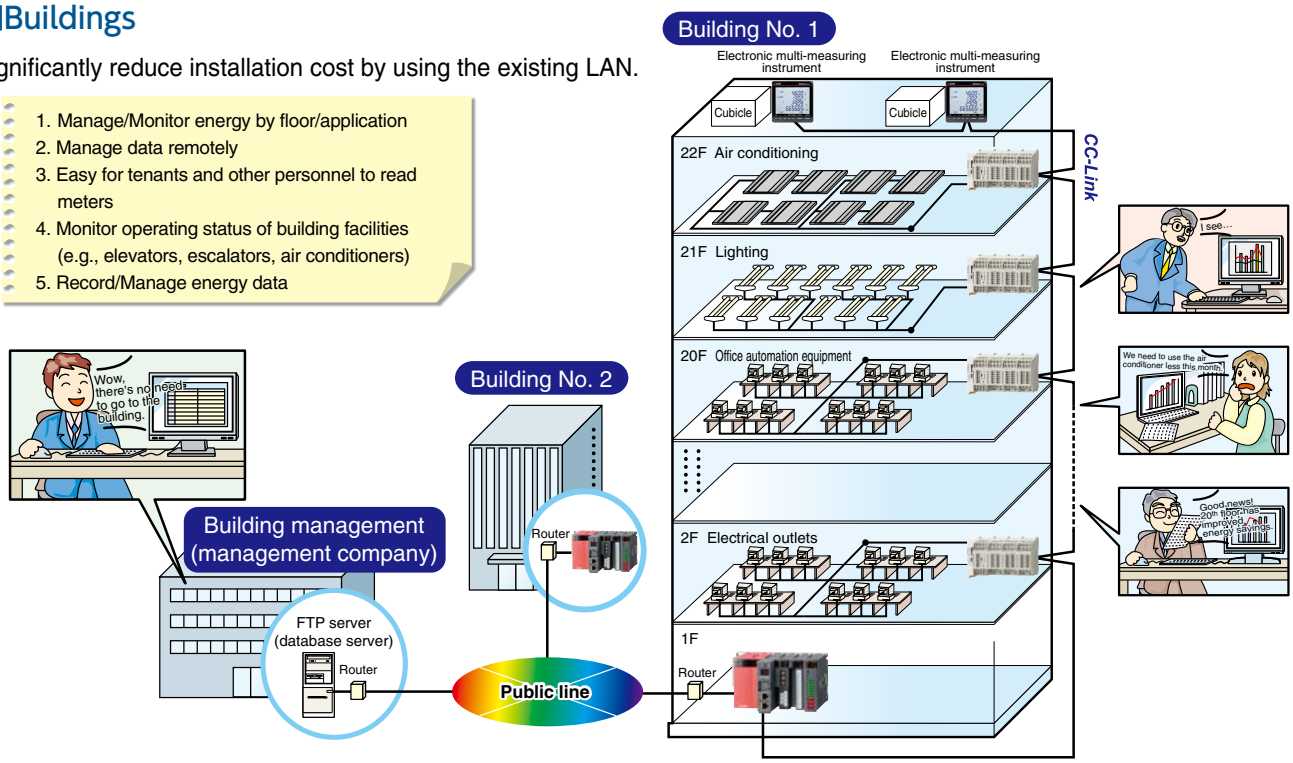
Production equipment

For improvement activities

Buildings

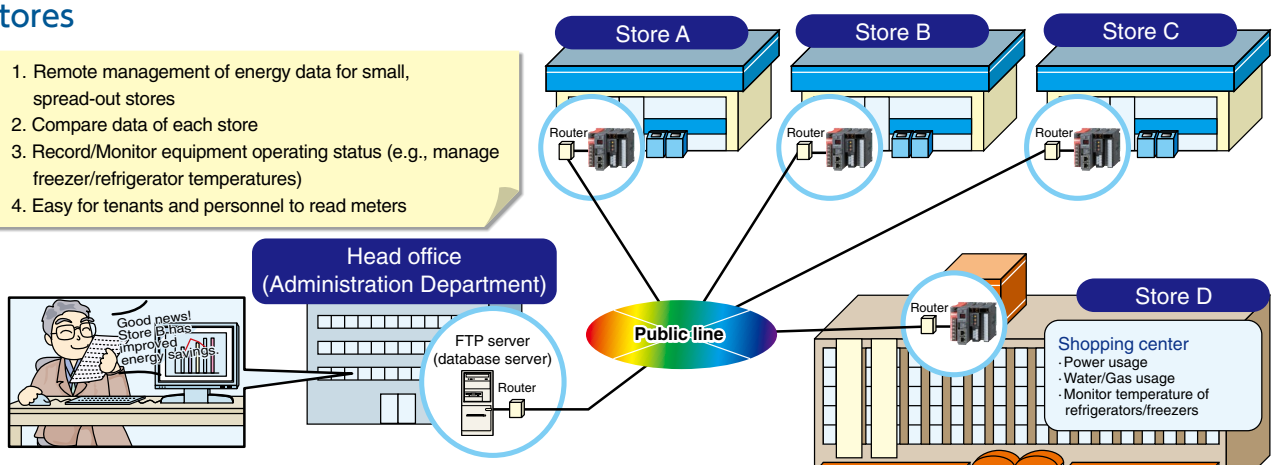
Significantly reduce installation cost by using the existing LAN.

1. Manage/Monitor energy by floor/application
2. Manage data remotely
3. Easy for tenants and other personnel to read meters
4. Monitor operating status of building facilities (e.g., elevators, escalators, air conditioners)
5. Record/Manage energy data



Stores

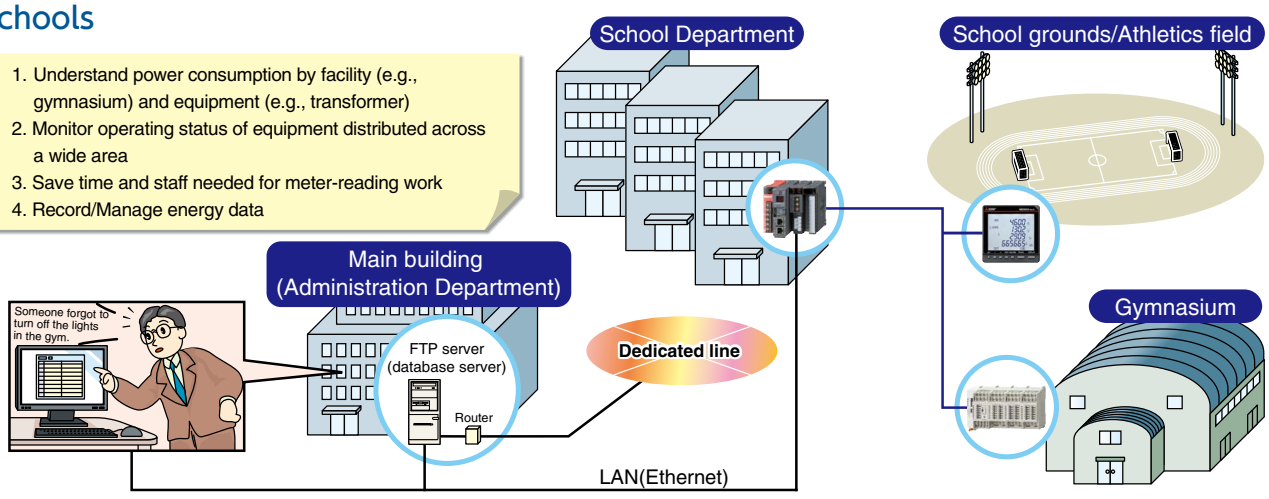
1. Remote management of energy data for small, spread-out stores
2. Compare data of each store
3. Record/Monitor equipment operating status (e.g., manage freezer/refrigerator temperatures)
4. Easy for tenants and personnel to read meters



* When using a public line, a dial-up router is required.
* For use via the Internet, a separate contract with an Internet service provider is required.

Schools

1. Understand power consumption by facility (e.g., gymnasium) and equipment (e.g., transformer)
2. Monitor operating status of equipment distributed across a wide area
3. Save time and staff needed for meter-reading work
4. Record/Manage energy data



■MES3-255C-EN front

7-segment LED display
Displays an error code when an error is detected.
In addition, in IP address display mode, the preset IP address is displayed at start-up.

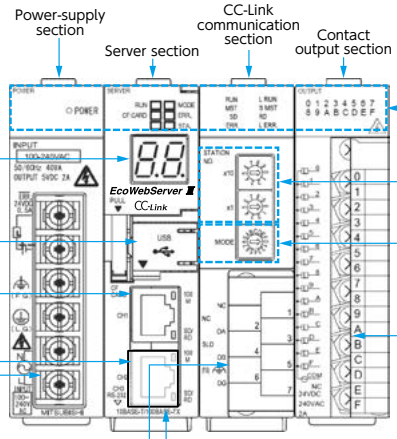
USB interface
Not used.

LAN interface CH1
Use connected to a computer network.

LAN interface CH2
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS communication.

Power-supply terminal block
Connect power supply. (Note 1)

CC-Link terminal block
Connect CC-Link communication cable.



LED display
Display each status.

CC-Link station number setting switch
Set CC-Link station number.

CC-Link transmission speed setting switch
Set CC-Link transmission speed.

Contact output terminal block
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

LED display
Display each status.

■MES3-255C-DM-EN front

7-segment LED display
Displays an error code when an error is detected.
In addition, in IP address display mode, the preset IP address is displayed at start-up.

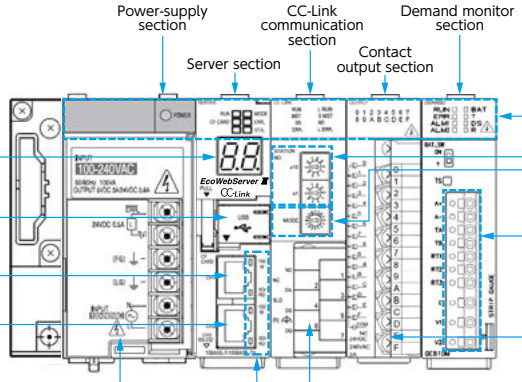
USB interface
Not used.

LAN interface CH1
Use connected to a computer network.

LAN interface CH2
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS communication.

Power-supply panel
When you open the panel, you will see the power-supply connection terminal. (Note 1)

LED display
Display each status.



LED display
Display each status.

CC-Link station number setting switch
Set CC-Link station number.

CC-Link transmission speed setting switch
Set CC-Link transmission speed.

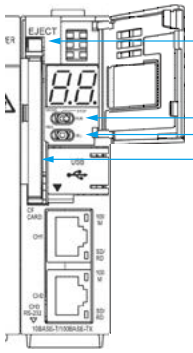
Demand monitor section connection terminal
Connect cable to pulse input, alarm output and control output for demand monitoring. (Note 2)

Contact output terminal block
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

CC-Link terminal block
Connect CC-Link communication cable.

■Front surface (cover of Server section opened)/bottom surface (CC-Link transmission device)

Front surface (cover of Server section opened)



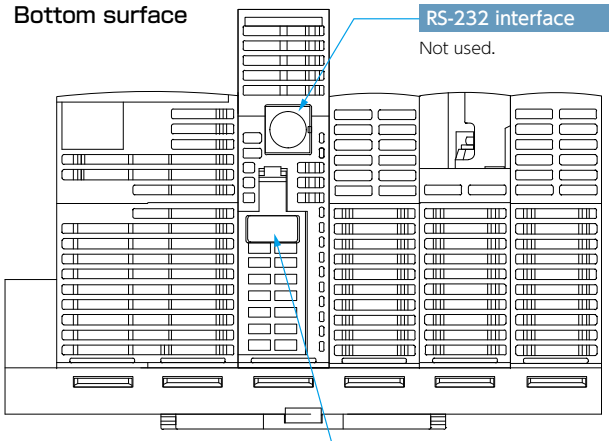
CompactFlash™ memory card EJECT button
Push the button and remove the CompactFlash™ memory card.

MODE/STOP/RUN switch
Normally, used in RUN state.

RESET/SELECT switch
Used when resetting the main unit.

CompactFlash™ memory card
Stores programs for collecting and displaying data. Data collected is also saved to it. (Note 3)

Bottom surface



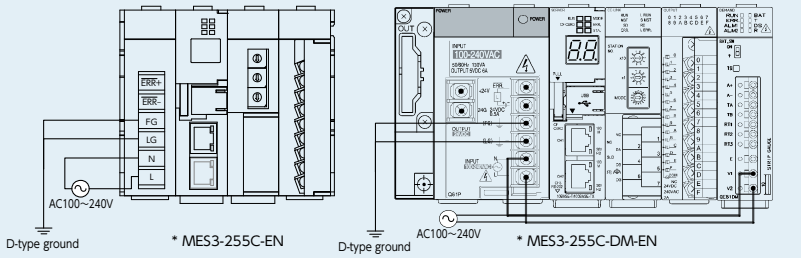
RS-232 interface
Not used.

Battery storage compartment
Store the battery.
Remove the cover and connect the connector. (Note 4)

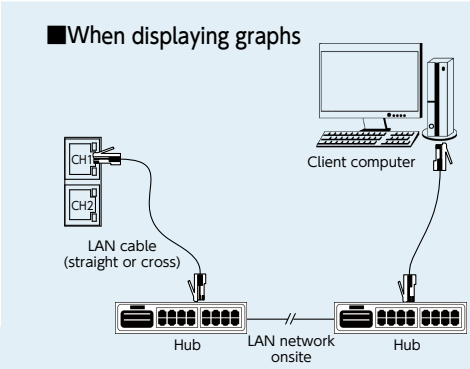
(Note 1) Connect to AC100–240V(+10%, −15%)50/60Hz(±5%). Do not connect to a power supply other than that specified as this may cause an accident.
(Note 2) A separate power supply is required for the demand monitor section when using. When using the main device, AC100–240V(+10%, −15%)50/60Hz power is required for the demand monitor connector terminals V1, V2. It is possible to connect power from the power-supply module.
(Note 3) ・CompactFlash™ memory cards are used in a constantly attached state. If they are removed while the power is on or the memory card is being accessed, this product will malfunction.
・When removing the card from the memory card slot, be sure to place the RESET/SELECT switch in the SELECT position and remove it only after turning off the power supply and the CF CARD LED has turned off.
・Do not use the CompactFlash™ memory card with any other product. This could corrupt the internal data.
・Do not insert a CompactFlash™ memory card other than the one included in the package in this device. If a different card is inserted, the system will not operate correctly.
(Note 4) Be sure to exchange the battery within three minutes after turning off the power. If more than three minutes passes after the battery is removed, the final one hour of data may be lost or the clock may initialize.
(Data or configuration settings from more than one hour before will not be initialized). If the clock initializes, please set again after backing up the data.
Refer to the operating manual (hardware edition) for the battery replacement procedure.

Model: MES3-255C-EN, MES3-255C-DM-EN

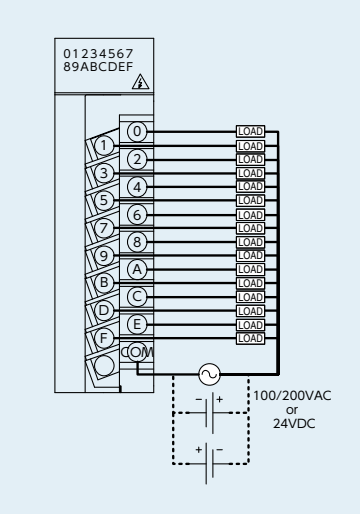
Power-supply section

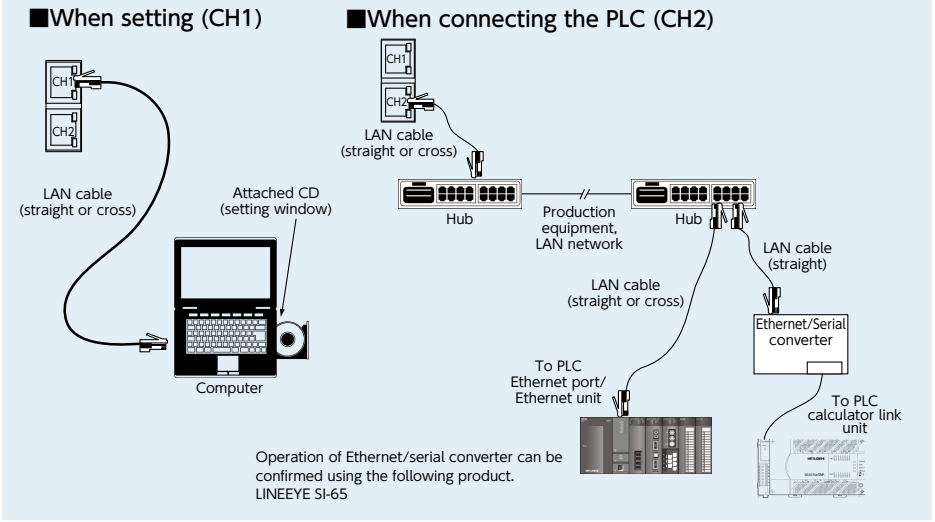


Server communications section (LAN interface)

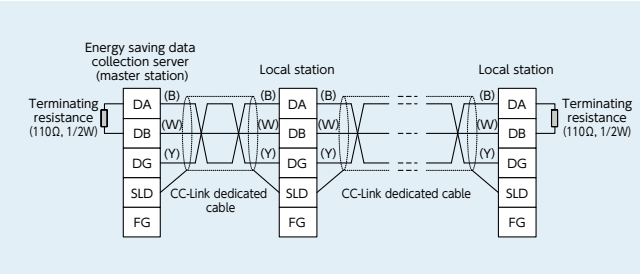


Connecting point output section



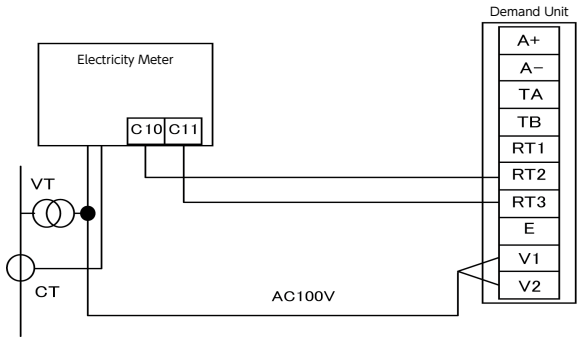


CC-Link communication section



Demand monitor section

(1) Where the transaction meter of the multi-measuring power demand meter is 10,000pulse/kWh



Functions

Product Name			MES3-255C-EN	MES3-255C-DM-EN
Demand function			—	○
Connection device	CC-Link terminal device		Number of remote I/O stations≦64、 Number of remote device stations≦42、 Number of local stations≦26	
	MODBUS terminal device		Number of MODBUS TCP terminals≦255 Number of MODBUS RTU terminals≦31 for each gateway Number of total MODBUS terminals≦255	
	MITSUBISHI PLC, GOT		MC protocol connection (LAN CH2 used) * device read/write CC-Link unit (local) connection * device read	
Number of measuring points	Measuring points		255 points	
		Number of operation measuring points	32 points (includes 255 measuring points)	
	Virtual measuring points		128 points	
	Specific consumption measuring points		64 points	
	Connection point output		32 points	
	Demand monitoring	Receiving demand	—	2 points (fixed) whole day, timeframe 1-10
		Receiving electric energy	—	2 points (fixed) whole day, timeframe 1-10
Data saving function * CSV format	Zoom (every 1min) data		62-day amount	
	Zoom (every 5min) data		14-day amount	
	Daily data (on the hour or every 30min)		186-day amount	
	Monthly data (specified time (00min) once a day)		60-month amount	
	Yearly data (specified time (00min) once a month)		5-year amount	
	Virtual measuring point data (daily)		186-day amount	
	Virtual measuring point data (monthly)		60-month amount	
	Virtual measuring point data (yearly)		5-year amount	
	Specific consumption measuring point data (daily)		186-day amount	
	Specific consumption measuring point data (monthly)		60-month amount	
	Specific consumption measuring point data (yearly)		5-year amount	
	Equipment data (daily)		186-day amount	
	Operating history data		64KB×4 files	
	System log		256KB×8 files	
	Demand data (daily)		—	186-day amount
	Demand data (monthly(daily maximum))		—	60-month amount
	Demand data (yearly(monthly maximum))		—	5-year amount
	Demand alarm/Control log		—	128KB×62 files
Display function	Real-time	Demand monitor	—	・Displays current time limit demand load curve ・Displays graph of same day demand results
		Current value monitor	The current value of the specified measuring points are displayed in the units registered for groups and display lists Displays differential display mode function/differential values for specified measuring points (time differential: amount used from previous hour to present time, daily differential/monthly differential: amount used from previous summary time to present)	
		Connection point output monitor	Displays connecting point output status	
	Graph display	Demand trend graph	—	Displays demand trend graph
		Measuring point comparison graph	Displays comparison of multiple measuring point data for specified display intervals/time displayed	
		Daily comparison graph	Displays comparison of specified measuring points for desired date	
		Specific consumption graph	Displays graph after dividing energy volume by number produced	
		Equipment graph	Displays graph of equipment efficiency, number of defects and equipment energy volume	
	Data file		Download measuring point data, virtual measuring point data, specific consumption data, equipment data, operating history data, system log, demand data *, alarms/control log * (*only for products with demand monitoring functions)	
	Equipment values list		Displays measuring points, connection point output and content of email notifications set for EcoWebServerⅢ	
Monitoring functions	Email notification function		Transmits main unit error notifications, periodic notifications, upper/lower limit notifications, operating status notifications, specific consumption objective value notifications, energy plan value notifications and demand notifications * to the specified SMTP Server (*only for products with demand monitoring functions)	
	Connection point output		Outputs connection points for EcoWebServerⅢ connection point output module or combined CC-Link input/output module	

Hardware specification

Product Name			MES3-255C-EN	MES3-255C-DM-EN
Power supply section	Auxiliary power input & input frequency		100 to 240 V AC (+10%, -15%) 50/60 Hz (±5%)	
	Consumption VA		19 VA (at 110 V AC)	34 VA (at 110 V AC)
			25 VA (at 220 V AC)	46 VA (at 220 V AC)
	Inrush current		20 A, 8 ms or less	
	Allowable momentary power interruption time		20 ms or less (100 V AC or higher)	
	Withstand voltage		AC2000V for 1 minute between all power supply terminals and all input/output terminals *Earth terminals and shield terminals are not included	
	Insulation resistance		10 MΩ or more by 500 V DC insulation tester at the same locations as for withstand voltage	
	Operating ambient temperature & humidity		0 to 55 °C 5 to 95% RH , Daily average temperature exceeds 35℃	
	Storage ambient temperature & humidity		-25 to +75 °C 5 to 95% RH	
	Installation area		Inside a control panel	
	Weight		0.9 kg (Without demand)	1.25kg (With demand)
	Fuse		Built-in (unreplaceable by user)	
Server section	Ethernet		Interface: 10BASE-T 100BASE-TX	
			Transmission method: Baseband	
			Cascade connection limit: 4 levels max. (10BASE-T), 2 levels max. (100BASE-TX)	
			Max. segment length: 100 m	
			Compatible connector: RJ45	
			Functions supported: Autonegotiation (10BASE-T/100BASE-TX automatically detected) Auto MDIX function (straight/crossover cable automatically detected)	
	Clock accuracy	0 to 55 °C	Per day: -10.89 to +8.64 sec	Additional difference of ±0.5 seconds can be produced during power outages.
		25 °C	Per day: -4.32 to +5.25 sec	
	Power-interruption backup *1	Backup data	Backed up by battery. - Clock - Measured data for the last 1 hour Backed up by nonvolatile memory card. - Setting values - Measured data except for the last 1 hour	
	Battery		Type: Lithium manganese dioxide primary battery Initial voltage: 3.0 V Nominal current: 1800 mAh Life when in storage: 5 years at room temperature (actual service value)	
Contact output section	Number of output points		16 points *2	
	Insulation method		Relay insulation	
	Rated switching voltage/current		24 V DC 2 A (resistance load)	
			240 V AC 2 A (COSϕ=1) /1 point, 8 A/1 common	
	Min. switching load		5 V DC, 1 mA	
	Max. switching load		264 V AC 2 A, 125 V DC 2 A	
	Life		Mechanical: 20,000,000 times or more, electrical: 100,000 times or more at rated switching voltage/current	
Demand surveillance section	Pulse input conditions		—	Signal type: No-voltage a-contact/Open collector
			—	Voltage/Current: DC12 V/10 mA
			—	Number of pulses: 50000pulse/kWh or less
			—	Pulse width: 10 ms or more
			—	Pulse interval: 25 ms or more
			—	No-voltage a-contact: under 2000m / Open collector: under 600m (Wire size: CVVS 1.25mm² or more, or use CPEV-S ϕ0.9mm or more)
	Power frequency input		—	AC100 to 240 V, -15% +10%, 50/60 Hz
	Contact output		—	No-voltage a-contact, 250 V AC 1 A
Standard specification			CE,UL *KC, Chinese RoHS is for profit.	

*1 If the product is reset when the battery's power-interruption backup cannot function due to the expiry of the backup time or any other causes, the time will be initialized to the default value (0:00, 1/1/2012). If you change the time of the product in this state, measured data may be deleted. Therefore, be sure to collect necessary measured data before changing the time.
*2 Contact output is possible at up to 16 points, including system alarms, upper and lower limit alarms, energy plan value monitoring, consumption target value monitoring, operating status monitoring, demand alarms, and demand control.

Recommended system environment

[PC]

Item	Description
OS (basic software)	Microsoft® Windows® 10 Pro (32bit or 64bit) (English version) Microsoft® Windows® 11 Pro (64bit) (English version)
CPU	1 GHz or higher Pentium® processor, or compatible microprocessor (DOS/V compatible)
Memory *3	1GB or more
Hard disk *3	Save data collected by EcoWebServerIII to PC, enough disk space for the data is required
CD drive	One or more drives (required to install the setting software)
Display resolution	1,280 × 1,024 pixels or more
Display color	65,536 colors or more
Input device	A mouse and a keyboard
English input system	The system included in OS (English version only)
External interface	10BASE-T / 100BASE-TX Memory card reader (when writing / reading / confirming a project via drive by setting software)
Web browser	Microsoft Edge Google Chrome
.NET Framework	Microsoft .NET Framework 3.5 *4

*3 Note that the required memory and free space of hard disk vary depending on the system environment. *4 Depending on the OS, it may be disabled by default.

[Tablet *5]

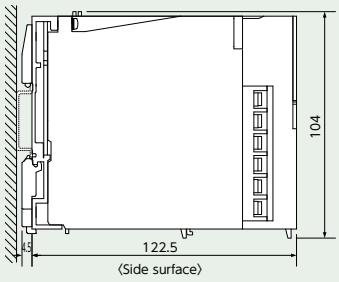
Item	Description	
OS	Android6.0	iOS10
Web browser	Google Chrome	Safari

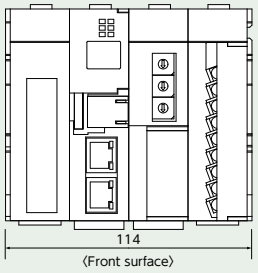
*5 Tablet is only for browsing the web screen. Setting software cannot be used on the tablet.

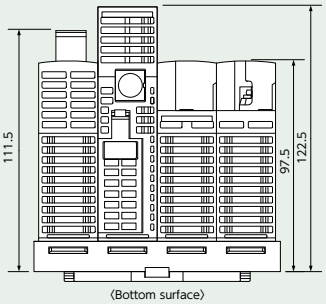
External dimensions

Unit : mm

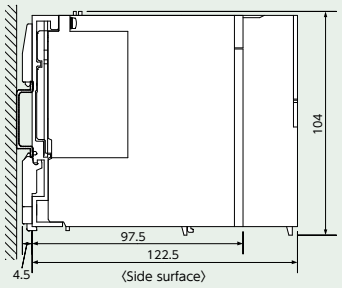
■MES3-255C-EN

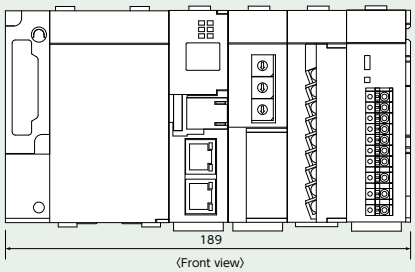


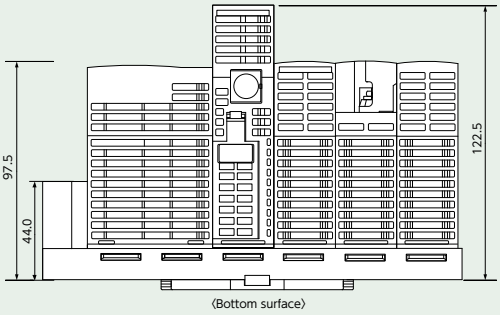




■MES3-255C-DM-EN



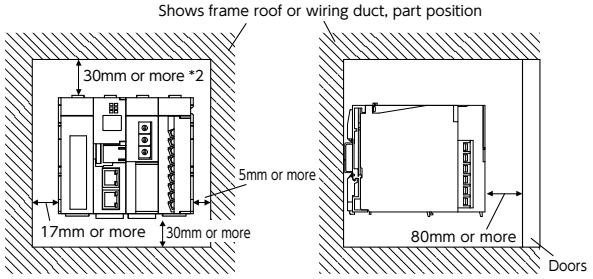




Peripheral installation conditions

■MES3-255C-EN

Peripheral installation conditions *1

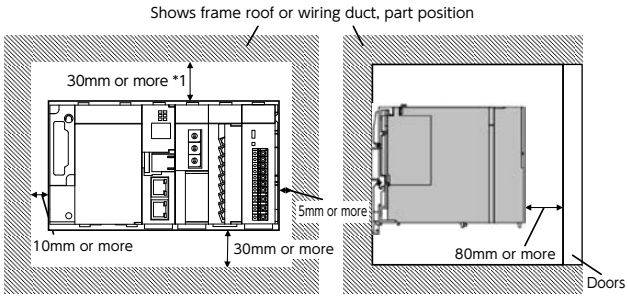


*1 These are the conditions when considering radiation. At the same time, please secure enough space to replace the battery in the lower layer of the main unit.

*2 When height of the wiring duct is 50mm or less. Others are 40mm or more.

■MES3-255C-DM-EN

Peripheral installation conditions



*1 When height of the wiring duct is 50mm or less. Others are 40mm or more.

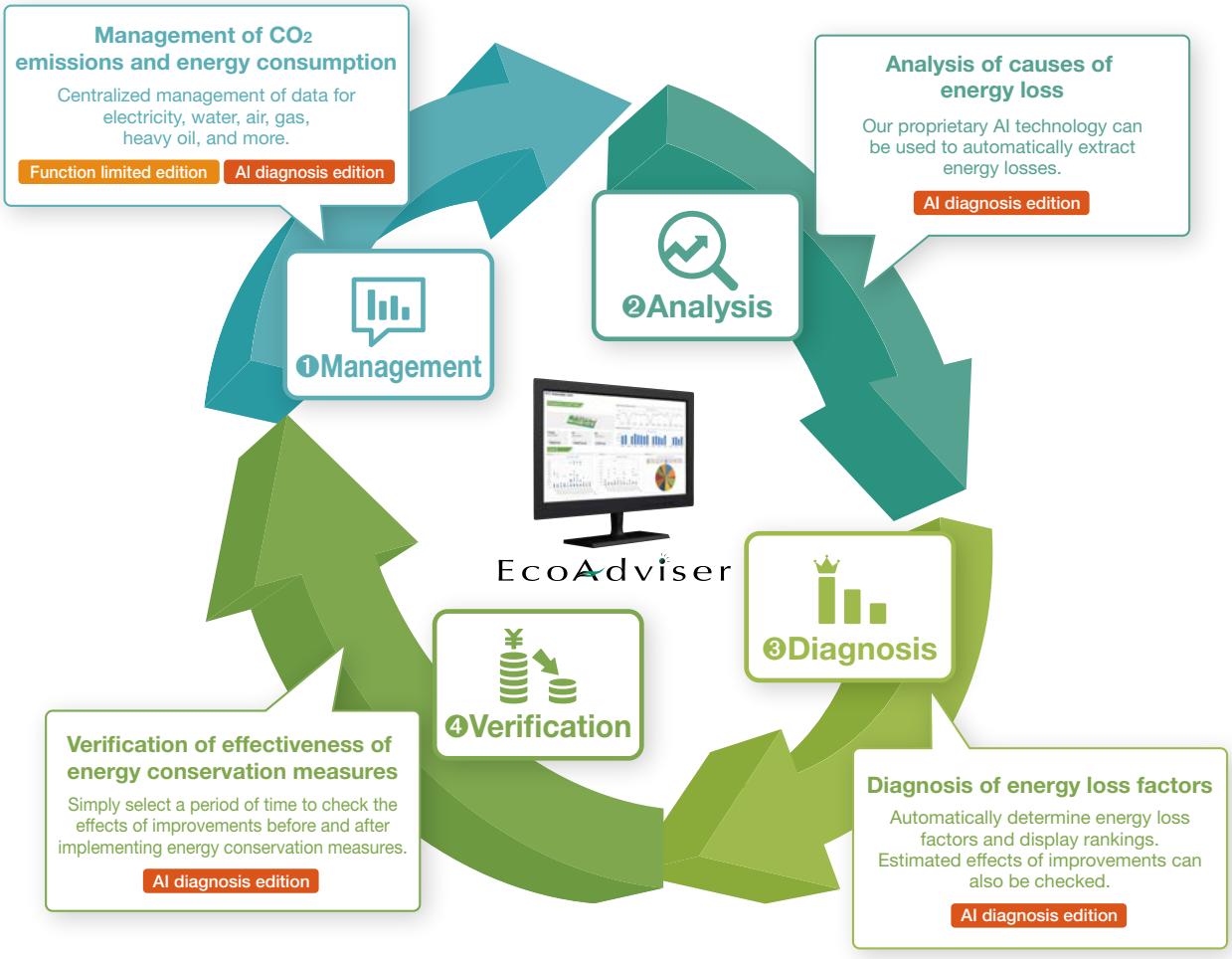
Bundled Products List

Product Name	CC-Link communication product	
	MES3-255C-EN	MES3-255C-DM-EN
Energy Saving Data Collecting Server (main unit)	1	
Memory card (software)	1	
Configuration software (CD-R) -Instruction manual included	1	
Battery (built in the bottom of the main unit server section)	1	
Panel mounting screw (M4×14)	4 (M4×12)	4 (M4×14)
CC-Link termination resistor (110Ω, 1/2W)	Black: 2	
IEC rail mounting adaptor	Small 2 Large 1	
IEC rail mounting screw (M5×10)	2	
IEC rail mounting square washer	2	
IEC rail stopper	2	
Instruction Manual – Hardware	1	

Supporting carbon neutrality by managing and reducing CO_2 emissions!

EcoAdviser

Supporting the shift from CO_2 emissions management to reduction through four activity cycles.



Product Lineup

Function limited edition [❶]

Recommended for customers who:
- Want to manage CO_2 emissions and energy consumption

AI diagnosis edition [❶ to ❹]

Recommended for customers who:
- Want to automatically analyze wasted energy
- Want to improve inefficiencies in production equipment

❶Management

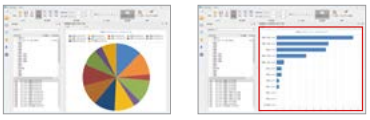
EcoAdviser
Function limited edition | AI diagnosis edition

Use the graphing functions to visualize CO_2 emissions and energy consumption at a glance!

CO_2 emissions can be calculated and displayed by building, production line, or product type.

Comprehensive graph displays enable clear understanding of energy consumption. This reduces the time required to prepare energy-saving reports and daily operational reports that were previously created in Excel.
Visualization also promotes awareness and engagement in improvement initiatives at the workplace level.

Current situation assessment: Visualize CO_2 emissions by area



①Pie chart ②Ranking chart

Pie charts and ranking charts make results immediately clear

Energy intensity management: Manage not only energy but also production volume

③Time-series graph ④Box-and-whisker plot

Productivity deterioration and variability are visible at a glance

For effective visualization and communication within your organization, creating dashboards is highly recommended.

Examples of dashboard use by customers:
- View CO_2 emissions and energy consumption by department and process
- Identify key energy-saving points, and more

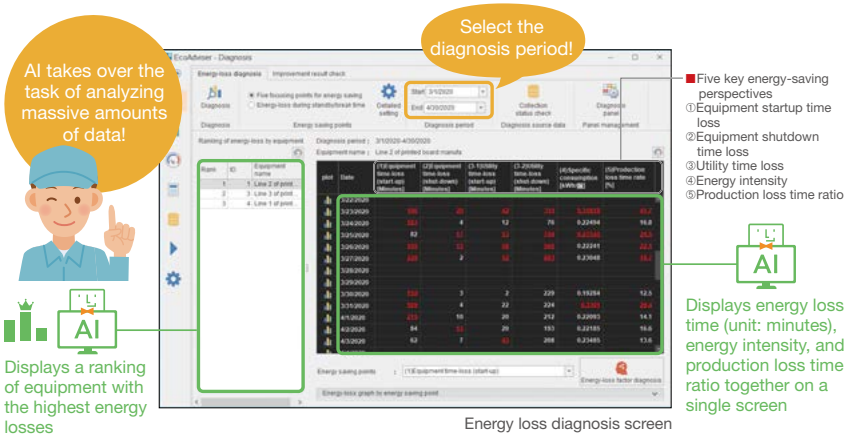
❷Analysis

EcoAdviser
AI diagnosis edition

Automatically identify losses from five key energy-saving perspectives!

To reduce CO_2 emissions, energy losses and their factors are automatically identified.

Utilizing Mitsubishi Electric's AI technology Maisart, this solution is ideal for those seeking a simple approach to reducing CO_2 emissions. By reducing energy losses, it supports both carbon neutrality and enhanced productivity.



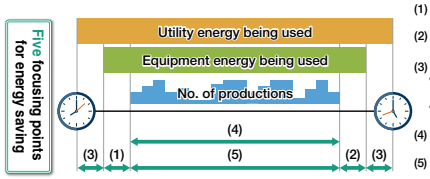
Energy loss diagnosis screen

AI automatically identifies waste

Energy loss identification function

Based on Mitsubishi Electric's long-established expertise, the system focuses on five key energy-saving perspectives and automatically calculates energy losses. This significantly reduces analysis workload.

What are the "Five focusing points for energy saving" of Mitsubishi Electric's knowhow?



(1) Equipment time-loss (start-up)····· Time-loss between production equipment start-up and production start
(2) Equipment time-loss (shut-down)··· Time-loss between production end and production equipment shut-down
(3) Utility* time-loss
• Utility time-loss (start-up)····· Time-loss between utility start-up and production equipment start-up
• Utility time-loss (shut-down)····· Time-loss between production equipment shut-down and utility shut-down
(4) Specific consumption····· Specific consumption between production start and production end
(5) Production loss time rate····· Non-productive time ratio from production start to production end

*Ancillary equipment operated in conjunction with main production equipment (Example: Exhaust fan, Mist collector, Air compressor, etc.)

Maisart

What is Maisart?

"Maisart" is a brand name of Mitsubishi Electric AI technology that stands for "Mitsubishi Electric's AI creates the State-of-the-ART in technology" representing our wish to make things "Smart" with our unique AI technology.

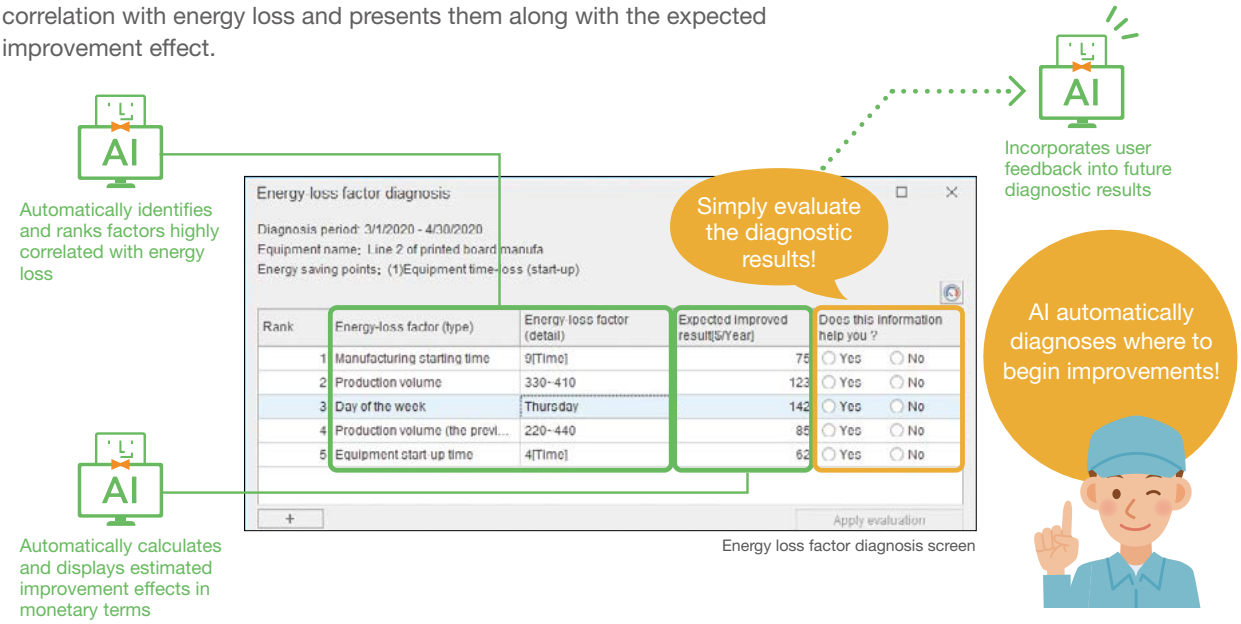
❸Diagnosis

EcoAdviser
AI diagnosis edition

AI automatically identifies energy loss factors

Energy loss factor diagnosis function

Based on date/time and production data, the system ranks items that show strong correlation with energy loss and presents them along with the expected improvement effect.



Energy loss factor diagnosis screen

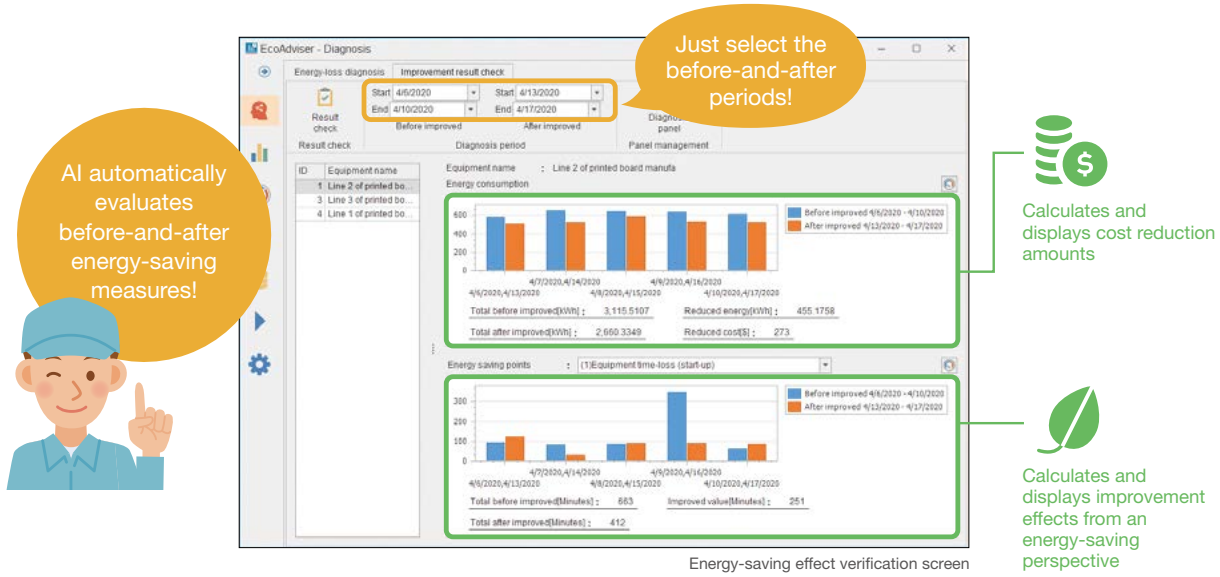
❹Verification

EcoAdviser
AI diagnosis edition

Easily evaluate the results of energy-saving measures

Energy-saving effect verification function

Simply select the periods before and after improvement measures to easily compare power consumption, electricity costs, and energy losses.



Energy-saving effect verification screen

1. Safety Precautions to be Followed at all Times

■Operating Environment/Conditions

Using this product in any of the following environments may cause a malfunction or shorten service life. Do not use in environments where:

- ●Ambient temperature outside the range of 0 to +55˚C
- ●Daily average temperature exceeds 35˚C
- ●Relative humidity outside the range of 5 - 95% or where condensation occurs
- ●Altitude is higher than 2,000m above sea level
- ●Presence of excessive dust, corrosive gas, salt-saturated air or oily smoke
- ●Unit is subject to excessive vibration or physical shock
- ●Unit is exposed to rain or drops of water
- ●Unit is exposed to direct sunlight
- ●Pieces of metal or inductive substances nearby
- ●Presence of strong electromagnetic field or excessive external electrical noise interference

■Installation/Mounting

Be sure to read the user's manual before installing/mounting the product.

⚠CAUTION

- ●For safety, unit installation and all wiring connections should be performed by a qualified electrician.
- ●Be careful of sharp, metal edges; they may cause injury.
- ●When tightening screws or connecting wiring, be sure that small particles or cut pieces of electrical wiring do not get inside the unit.
- ●Check the wiring diagram carefully before making connections. Incorrect connections may cause a malfunction, fire or electrical shock.
- ●Do not perform wiring work using live circuits. Doing so may cause a malfunction, fire or electrical shock.
- ●Use electrical wires of appropriate size. Not doing so may cause a fire due to the possible generation of heat.
- ●Use a solderless terminal that matches the size of the electrical wire. Not doing so may result in disconnected wires or improper electrical contact, thereby causing a malfunction, failure, burnout or fire.

Location	Wire size	Compatible solderless terminal
Power-supply terminal block	0.75 - 2 mm²	RAV1.25-3.5 RAV2-3.5
CC-Link communication terminal block	CC-Link Ver.1.10-compaticable dedicated cable	R1.25-3
Contact output terminal block	0.3 - 0.75 mm²	R1.25-3 (cannot use solderless terminal with sleeve)
Demand monitor block	0.5 - 1.3 mm²	TGV TC-1.25-11T equivalent (Nichifu Co., Ltd.)

- ●Be sure to check that all screws have been tightened. Not doing so may cause a malfunction, failure, burnout or fire.
- ●Tighten screws to the specified torque. Excessive tightening may cause damage to the terminal and/or screws. Failure to tighten properly may cause a malfunction, fire or electrical shock.
- ●When using lines from demand monitor terminal block, twist the heads of the fine lines together so they do not spread before attachment.

Location	Tightening torque
Terminal screws for power-supply terminal block (M3.5 screw)	0.8 - 1.0·Nm
Terminal screws for CC-Link communication terminal block (M3 screw)	0.42 - 0.58N·m
Mounting screws for CC-Link communication terminal block (M3.5 screw)	0.66 - 0.89N·m

Location	Tightening torque
Terminal screws for contact output terminal block (M3 screw)	0.42 - 0.58N·m
Mounting screws for contact output terminal block (M3.5 screw)	0.66 - 0.89N·m
Unit attachment screws (M3×12 screws)	0.36 - 0.48N·m

- ●Be sure to check that the terminal cover has been attached. Not doing so may result in electrical shock.
- ●To prevent induction noise, control wires and communication cables should be installed as far as possible from power lines (wiring should be separated by a distance of at least 100mm).
  Avoid installation inside a panel where high-voltage equipment is used. Use a surge protector for equipment that tends to generate electrical noise.
- ●During actual use conditions, use Class-D grounding (dedicated grounding) for "FG".
- ●Do not connect the FG terminal to a box (ground) when conducting the withstand voltage test or insulation resistance test.

CC-Link

- ●Connect both ends of the CC-Link communication cable shield line to the SLD terminal of each unit.
  Each unit's SLD and FG are connected inside of the modules.
  Please make sure to insulate the shield with vinyl tape or similar.

■Preparations Before Use

- ●Be sure that the installation location complies with the operating environment and conditions.
- ●This product requires setting before use. If setting is not done properly, a malfunction may occur.
- ●Confirm the power-supply rating of the product.
- ●Remove the dust-resistant seal after completing installation and wiring construction.
  Not doing so may cause a malfunction due to the possible generation of heat.
- ●This product is equipped with a lithium battery. As the battery is not connected at the time of shipping, please connect it before use.

■Regarding Use

- ●Use only within rating range specified in the product's instruction manual. Not doing so may cause a malfunction, failure, fire or burnout.
- ●An IP address and other settings are required to connect this product to a network (Ethernet). Before use, use the accompanying setup software to perform network-related settings such as setting the IP address.
- ●The factory default settings are:
  IP address = 192.168.10.1, subnet mask = 255.255.255.0, gateway = none
  No setting changes are required for direct connection to a computer.
- ●This product is equipped with a built-in clock. Before use, use the accompanying setup software to set the current date and time.
- ●Before use, be sure to check that there are no live circuits or bare wires in the vicinity of the product.
  If a live circuit or bare wire is found during use, stop operation immediately and take appropriate measures, such as providing protective insulation.
- ●Please consult with a Mitsubishi Electric sales representative when considering using this product with machinery or systems designed for specialized use such as nuclear power, electric power, aerospace/outer space, medical, or passenger transportation vehicles. (To contact a sales representative, please refer to the end of this document.)
- ●If the power supply is turned on immediately after turning it off (within 5sec), incoming current may exceed the stipulated value (less than 2ms). Please wait more than 5sec before turning the power supply on after turning it off.

⚠CAUTION	
	●Do not disassemble or modify product. Doing so may cause a failure, electrical shock or fire. ●A seal sheet has been placed on the side of this product. If the seal sheet has been removed from the product, the product is out-of-service, such as down for maintenance or malfunction analysis.

■Maintenance/Inspection

●Do not disassemble or modify any part of the product. Doing so may cause failure, malfunction, injury or fire.
●Do not touch terminals when current is flowing. Doing so may cause electrical shock, malfunction or failure of product operation.
●When cleaning the product or tightening attachment screws, please make sure to turn off the exterior power supply, cutting off power to the input power supply. Not doing so may cause malfunction or failure of product operation.
●Use a soft, dry cloth to wipe dust and dirt from the surface of the product.
●Do not let chemicals touch the surface for long periods of time. Clean product surface using pre-treated wipes. Do not use benzene, thinner or forms of chemical cleansers.
●Conduct inspections as follows to ensure correct use of the product and a long service life.
<Daily inspection or check at least once or twice every six months> Check for: ①Product damage, ②LED display abnormalities, ③Abnormal noises, odors and heat.
<Check once a year> ④ Confirm if mounting screws or terminal block wire connections have come loose (be sure to turn off the power before performing inspections).
●The lithium battery in the server block needs to be replaced when the battery charge is depleted (red BAT LED lamp on server block will turn on) or every three years.

⚠CAUTION	●Be sure to turn off the power before checking for loose connectors, mounting screws and terminal block wire connections. ●If a power outage occurs when the battery charge is weak, the clock or data may be initialized. Please reset when required, and then change the battery.

■Storage

●When storing this product, turn off the power supply, disconnect the wiring and place it in a plastic bag.
●When turning the power supply off for long periods of time, disconnect the connector for the battery.
(The cumulative power outage compensation time of the battery is up to 13,700hr (1.57yr). Using the battery outside of the warranty period may result in losing measurement data.)
●Storing the product in one of the environments described below may cause a malfunction or shorten service life. Do not store the product for long periods of time in environments where:

●Ambient temperature is outside the range of -25 - +75°C	●Unit is subjected to excessive vibration or physical shock.
●Average daily temperature exceeds 35°C	●Unit is exposed to rain or drops of water
●Relative humidity is outside the range of 5 - 95% or where condensation occurs	●Unit is exposed to direct sunlight
●Altitude exceeds 2,000m	●Presence of pieces of metal or inductive substances nearby
●Presence of excessive dust, corrosive gas, salt-saturated air or oily smoke.	●Presence of a strong electromagnetic field or excessive external electrical noise interference.

■Disposal

●Dispose of this product following relevant laws and/or guidelines regarding disposal and cleaning (Waste Management Law).
●This product is equipped with a lithium battery. Please dispose of it according to relevant local laws and/or guidelines.

⚠CAUTION	●The lithium battery may still have an electrical charge after it is removed. Store it separately from other metals, as contact with other metals may cause the generation of heat, rupture or fire.

■QR Code displayed on product

●As the QR Code displayed on this product is used for production management, it is not for the customer to use.
There is no guarantee that the QR Code can be read by a commercial code reader, etc.

■Warranty

●Regarding technical inquiries or questions regarding the product, please contact nearest Mitsubishi Electric dealership or distributor.
●Please consult with a Mitsubishi Electric sales representative when considering using this product with machinery or systems designed for specialized use such as nuclear power, electric power, aerospace/outer space, medical, or passenger transportation vehicles.
●This product is shipped under strict quality control and product inspection. In the unlikely in case of any defect resulting from production processes, Mitsubishi Electric will replace the product. Please contact the dealership where the product was purchased. Please note, however, Mitsubishi Electric's warranty doesn't include replacement in the cases of failure and/or damage caused due to natural disasters or improper use.
●Please understand that Mitsubishi Electric will not bear the liability for any system problems caused by a customer or third party, legal issues, failure caused by improper use of or during use of the product, or damage caused by other defects.
●Mitsubishi Electric shall not bear the liability for any damage caused by reasons that are not the fault of the Company, loss of opportunity or loss of income suffered by a customer due to the occurrence of this product's failure, damage or secondary damage resulting from special reasons, regardless of whether or not it was foreseeable, accident compensation or other compensation for any damage caused to products other than those of Mitsubishi Electric, and other services.
●The free warranty period of this product shall be the shorter period, either one (1) year after purchase and delivery to the designated location, or 18 months after shipping from the Company factory (beginning from month and year manufactured).
However, even during the warranty period, if repair is required due to one of the following causes, a fee shall be charged:
1) improper use or 2) improper operation.
Fee-based repairs are available after the end of the free warranty period.
●The free warranty period for repairs shall not be renewed.

■Repairs at the time of failure/abnormality

●If any abnormity occurs in one of the products listed in this catalog, please read the section, "Trouble Shooting," in the instruction manual (operation version) to check for possible reasons of the problem. If there is no description matching the problem found, please contact nearest Mitsubishi Electric dealership.

2. Precautions for Use

■Precautions Regarding Software Use

●Mitsubishi Electric does not guarantee or provide support for FTP server or SMTP server operations.
Additionally, Mitsubishi Electric does not provide technical support for individual servers.
●Please be aware that Mitsubishi Electric does not provide network support. Please contact your network administrator.
●Please be aware that Mitsubishi Electric does not provide support regarding computer hardware, operating systems or operations. Please contact the manufacturer or administrator.
●When it is necessary to secure system safety against unauthorized access attempt from outside, please take measures by the users.
We shall not be held responsible against various problems generated by unauthorized access.
It is recommended to use by being cautious of the following.
1) Use LAN to avoid unauthorized access from outside.
2) When connecting to the Internet, take measures such as firewalls, VPN, etc.
3) Change the account information (login ID and password) from the default one. To avoid the login information from leaking, please setup them by noting the following.
• Avoid easy to figure out phrases such as your name and date of birth, and simple sequence of numbers.
• Set hard to figure out login ID and password consisting of 8 characters or more containing uppercase and lowercase alphabets, and numbers.
●After using the setup software to modify display settings (e.g., a measuring point name), be sure to close and restart the web browser.
Not doing so may cause the changes not to take effect due to the web browser's caching function.

⚠CAUTION
●For monitoring operating status, do not use measures such as inputting alarms that consider human safety or require an emergency response (fire alarm). Doing so may lead to an accident.

3. Trademarks

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●Ethernet is a trademark of Xerox Corporation in the United States.
●MODBUS is a registered trademark of Schneider Electric USA Inc.
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●Trademark symbols such as "TM", "®" etc. may not be specified.

■Service Network

Country/Region	Corporation Name	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
Algeria	Mec Casa	Rue i N 125 Hay-Es-Salem, 02000, W-Chlef, Algeria	+213-27798069
Bangladesh	PROGRESSIVE TRADING CORPORATION	HAQUE TOWER,2ND FLOOR,610/11,JUBILEE ROAD, CHITTAGONG, BANGLADESH	+880-31-624307
	ELECTRO MECH AUTOMATION& ENGINEERING LTD.	SHATABDI CENTER, 12TH FLOOR, SUITES: 12-B, 292, INNER CIRCULAR ROAD, FAKIRA POOL, MOTIJHEEL, DHAKA-1000, BANGLADESH	+88-02-7192826
Belarus	Technikon	Oktyabrskaya 19, Off. 705, BY-220030 Minsk, Belarus	+375 (0)17 / 210 46 26
Belgium	Mitsubishi Electric Europe B.V. Benelux Branch	Nijverheidsweg 23A, 3641 RP Mijdrecht	+31 (0)297 250 350
Brazil	Mitsubishi Electric do Brasil Comércio e Serviços Ltda.	Avenida Adelino Cardana, 293 – 21º Andar, Bethaville, Barueri, SP, Brasil, CEP 06401-147	+55-11-4689-3000
Cambodia	DHINIMEX CO.,LTD	#245, St. Tep Phan, Phnom Penh, Cambodia	+855-23-997-725
	Pump Elctric Solution CO.,LTD.	C19 Street R8, Phnom Penh 120210, Cambodia	+855-12-318-190
Central America	Automation International LLC	7050 W. Palmetto Park Road Suite #15 PMB #555, Boca Raton, FL 33433	+1-561-237-5228
Chile	Rhona S.A. (Main office)	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile	+56-32-2-320-600
China	Mitsubishi Electric Automation (China) Ltd.	Mitsubishi Electric Automation Building, No.1386 Hongqiao Road, Shanghai, China 200336	+86-21-2322-3030
	Mitsubishi Electric Automation (China) Ltd. BeiJing	5/F,ONE INDIGO,20 Jiuxianqiao Road Chaoyang District,Beijing, China 100016	+86-10-6518-8830
	Mitsubishi Electric Automation (China) Ltd. ShenZhen	Level 8, Galaxy World Tower B, 1 Yabao Road, Longgang District, Shenzhen, China 518129	+86-755-2399-8272
	Mitsubishi Electric Automation (China) Ltd. GuangZhou	Rm.1006, A1 Times E-Park, No.276-282, Hanxi Road East, Zhongcun Street, Panyu Distric, Guangzhou, China 510030	+86-20-8923-6730
	Mitsubishi Electric Automation (China) Ltd. ChengDu	1501-1503,15F, Guang-hua Centre Building-C, No.98 North Guang Hua 3th Rd Chengdu, China 610000	+86-28-8446-8030
	Mitsubishi Electric Automation (Hong Kong) Ltd.	20/F,1111 King's Road, Taikoo Shing, Hong Kong	+852-2510-0555
Colombia	Proelectrico Representaciones S.A.	Carrera 42 Nº 75 – 367 Bodega 109, Itagüi, Medellín, Antioquia, Colombia	+57-4-4441284
Czech Republic	AUTOCONT CONTROL SYSTEMS S.R.O	Technologická 374/6, CZ-708 00 Ostrava - Pustkovec	+420 595 691 150
Denmark	BEIJER ELECTRONICS A/S	LYKKEGARDSVEJ 17, DK-4000 ROSKILDE, Denmark	+45 (0)46/ 75 76 66
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab,Cairo - Egypt	+20-2-27961337
France	Mitsubishi Electric Europe B.V. French Branch	FR-92741 Nanterre Cedex	+33 (0)1 55 68 57 01
Germany	Mitsubishi Electric Europe B.V.	Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	+49 (0) 2102 4860
Greece	KALAMARAKIS - SAPOUNAS S.A.	IONIAS & NEROMILOU STR., CHAMOMILOS ACHARNES, ATHENS, 13678 Greece	+30-2102 406000
Hungary	Meltrade Ltd.	Fertö utca 14. HU-1107 Budapest, Hungary	+36 (0)1-431-9726
India	Mitsubishi Electric India Private Limited	3rd Floor, Tower A, Global Gateway, MG Road, Gurugram - 122002, Haryana, India	+91(124)673 9300
	Mitsubishi Electric India Private Limited Pune Sales Office	ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune – 411018, Maharashtra, India	+91-20-68192100
	Mitsubishi Electric India Private Limited FA Center	204-209, 2nd Floor, 31FIVE, Corporate Road, Prahladnagar, Ahmedabad 380015,Gujarat. India	+91-79677-77888
Indonesia	PT. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+62-(0)21-6610651-9
Ireland	Mitsubishi Electric Europe B.V.	Westgate Business Park, Ballymount, IRL-Dublin 24, Ireland	+353 (0)1-4198800
Israel	Gino Industries Ltd.	26, Ophir Street IL-32235 Haifa, Israel	+972 (0)4-867-0656
Italy	Mitsubishi Electric Europe B.V.	Viale Colleoni 7, I-20041 Agrate Brianza (MI), Italy	+39 039-60531
Kazakhstan	Kazpromavtomatika	Ul. Zhambyla 28, KAZ - 100017 Karaganda	+7-7212-501000
Korea	Mitsubishi Electric Automation Korea Co., Ltd	9F Gangseo Hangang xi-tower A, 401 Yangcheon-ro, Gangseo-gu, Seoul 07528 Korea	+82-2-3660-9573
Laos	AROUNKIT CORPORATION IMPORT- EXPORT SOLE CO.,LTD	SAPHANMO VILLAGE. SAYSETHA DISTRICT, VIENTIANE CAPITAL, LAOS	+856-20-415899
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+961-1-240445
Lithuania	Rifas UAB	Tinklu 29A, LT-5300 Panevezys, Lithuania	+370 (0)45-582-728
Malaysia	Mittric Sdn Bhd	No. 5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam,Selangor, Malaysia	+603-5569-3748
Malta	ALFATRADE LTD	99 PAOLA HILL, PAOLA PLA 1702, Malta	+356 (0)21-697-816
Maroco	SCHIELE MAROC	KM 7,2 NOUVELLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Maroco	+212 661 45 15 96
Myanmar	Peace Myanmar Electric Co.,Ltd.	NO137/139 Botahtaung Pagoda Road, Botahtaung Town Ship 11161,Yangon,Myanmar	+95-(0)1-202589
Nepal	Watt&Volt House	KHA 2-65,Volt House Dillibazar Post Box:2108,Kathmandu,Nepal	+977-1-4411330
Netherlands	Mitsubishi Electric Europe B.V. Benelux Branch	Nijverheidsweg 23A, 3641 RP Mijdrecht	+31 (0)297 250 350
North America	Mitsubishi Electric Automation, Inc.	500 Corporate Woods Parkway, Vernon Hills, IL 60061 USA	+847-478-2100
Norway	Scanelec AS	Leirvikasen 43B, NO-5179 Godvik, Norway	+47 (0)55-506000
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch	Blvd. Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Col. Ampliación Granada, Miguel Hidalgo, Ciudad de México, CP 11520, México	+52-55-3067-7511
Middle East Arab Countries & Cyprus	Comptoir d'Electricite Generale-International-S.A.L.	Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon	+961-1-240430
Pakistan	Prince Electric Co.	2-P GULBERG II, LAHORE, 54600, PAKISTAN	+92-42-575232, 5753373
	STRA AUTOMATION	157-F, Block F Phase 1 Johar Town, Lahore, 54782, Pakistan	+92-42-35175265/66
Peru	Rhona S.A. (Branch office)	Avenida Argentina 2201, Cercado de Lima	+51-1-464-4459
Philippines	MELCO Factory Automation Philippines Inc.	128, Lopez Rizal St., Brgy. Highway Hills, Mandaluyong City, Metro Manila, Phillippines	+63-(0)2-256-8042
	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+63-(0)2-634-8691
Poland	Mitsubishi Electric Europe B.V. Polish Branch	Krakowska 48, 32-083 Balice, Poland	+48 12 347 65 00
Republic of Moldova	Intehsis SRL	bld. Traian 23/1, MD-2060 Kishinev, Moldova	+373 (0)22-66-4242
Romania	Sirius Trading & Services SRL	RO-060841 Bucuresti, Sector 6 Aleea Lacul Morii Nr. 3	+40-(0)21-430-40-06
Russia	Mitsubishi Electric (Russia) LLC	2 bld.1, Letnikovskaya street, Moscow, 115114, Russia	+7 495 721-2070
Saudi Arabia	Center of Electrical Goods	Al-Shuwayer St. Side way of Salahuddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454 - Saudi Arabia	+966-1-4770149
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943	+65-6473-2308
Slovakia	PROCONT, Presov	Kupelna 1/, SK - 08001 Presov, Slovakia	+421 (0)51 - 7580 611
	SIMAP	Jana Derku 1671, SK - 91101 Trencin, Slovakia	+421 (0)32 743 04 72
Slovenia	Inea RBT d.o.o.	Stegne 11, SI-1000 Ljubljana, Slovenia	+386 (0)1-513-8116
South Africa	CBI-electric: low voltage	Private Bag 2016, ZA-1600 Isando Gauteng, South Africa	+27-(0)11-9282000
Spain	Mitsubishi Electric Europe B.V. Spanish Branch	Carretera de Rubí 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain	+34 (0)93-565-3131
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia)	Hedvig Möllers gata 6, 223 55 Lund, Sweden	+46 (0)8-625-10-00
	Euro Energy Components AB	Järnvägsgatan 36, S-434 24 Kungsbacka, Sweden	+46 (0)300-690040
Switzerland	TriElec AG	Muehlentalstrasse 136, CH-8201 Schaffhausen, Switzerland	+41-(0)52-6258425
Taiwan	Mitsubishi Electric Automation (Taiwan) Co.,Ltd	3F., No.105, Wugong 3rd Rd, Wugu Dist , New Taipei, 248019,Taiwan, R.O.C.	+886-(0)2-2298-8889
Thailand	United Trading & Import Co., Ltd.	77/12 Bamrungmuang Road,Klong Mahanak Pomprab Bangkok Thailand	+66-223-4220-3
Tunisia	MOTRA Electric	3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia	+216-71 474 599
Turkey	Mitsubishi Electric Turkey A.Ş.	Şerifali Mahallesi Kale Sokak No: 41, 34775 Ümraniye, İstanbul, Turkey	+90-216-969-2666
United Kingdom	Mitsubishi Electric Europe B.V.	Travellers Lane, UK-Hatfield, Herts. AL10 8XB, United Kingdom	+44 (0)1707-276100
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274 Montevideo Uruguay	+598-2-902-0808
Vietnam	Mitsubishi Electric Vietnam Co.,Ltd. Head Office	11th & 12th Floor, Viettel Building, 285 Cach Mang Thang 8 Street, Hoa Hung Ward, Ho Chi Minh City, Vietnam	(+84) 28 3910 5945
	Mitsubishi Electric Vietnam Co.,Ltd. Hanoi Branch	14th Floor, Capital Tower, 109 Tran Hung Dao Street, Cua Nam Ward, Ha Noi, Viet Nam	(+84) 24 3937 8075

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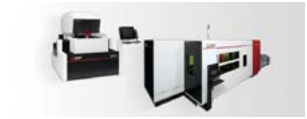

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MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

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