



Energy Saving Device **FORCE**

Business Introduction

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1. Introduction



Manufacturing Company

Company Name	ENPOSS
Year of Establishment	January 2008
Product	Power Saving System(FORCE) Manufacturing & Sales
Location	416, 10th Floor, Room 1031, Hwagok-ro, Gangseo, Seoul Gayang Station The Sky Valley 5th Knowledge Industry Center
Homepage	www.enposs.com

2022 - Updated UL certification

2019 - Acquisition of site for factory establishment (Otama Village Sales Office, Adachi-ku, Fukushima Prefecture, Japan)

2018 - KR classification certification
- Establishment of a local corporation in the United States
- Establishment of a local corporation in Japan
- Establishment of a joint venture in Vietnam

2017 - Launch of 2nd generation FORCE (Approximately 50% improvement in device efficiency compared to the 1st generation)

2016 - Registered a Korean patent related to harmonic distortion
- Passed KTL [High Potential Test of High Voltage], [Electro Magnetic Compatibility Test]

2015 - JQA (Japan) performance certification
- KTC (Korea) performance certification
- Establishment of a local corporation in China

2013 - SGS (Spain) performance certification
- Passed the withstand voltage test standards for high-voltage products

2012 - US patent registration

2011 - USA NLTC (MET) certification

2010 - Obtained CE certification (COC)
- KOREA patent registration (DOC)
- PCT patent registration
- All materials passed ROHS

2009 - ANCE (Mexico) safety certification
- ANCE (Mexico) performance certification
- KTL EML Test

2008 - Establishment of ENPOS Co., Ltd.
- Chinese patent registration
- Vietnam patent registration
- TUV (Spain) certification

2007 - Power improvement device KOREA patent application
- Power improvement device PCT International patent application
- Establishment of own production factory
- Commercialization of power improvement devices

2. Summary of Benefits

I. **5~15% Electricity savings**

II. **Loss Reduction** (Resistance, Impedance)

III. **THD Reduction** (Total Harmonic Distortion)

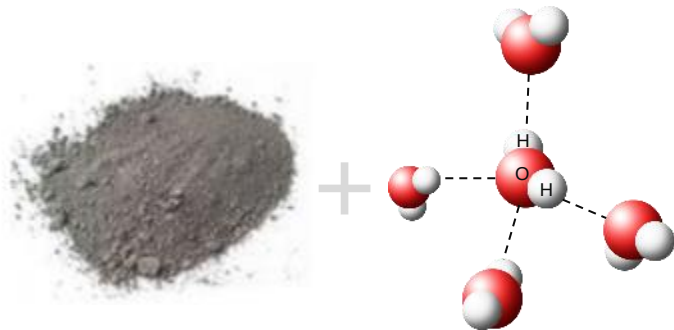
IV. **10~20% Fuel Consumption Savings** (Payback Within 18 months)

V. **Extend the Lifetime Of Equipment**

VI. **No Changes to Existing System & Safety**

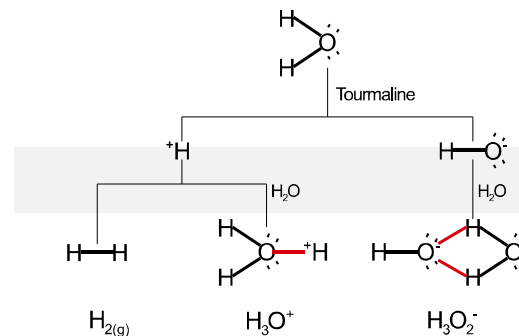


Base	Tourmaline
Longevity	15 years
Specificity	A polar crystal with an asymmetric dipole that has the characteristic of being permanently electro-polarized, when highly heated both ends become positively charged. Under normal conditions, it is negatively charged.



Tourmaline Powder

Water



Negative charge generation
(Free Electrons Source)

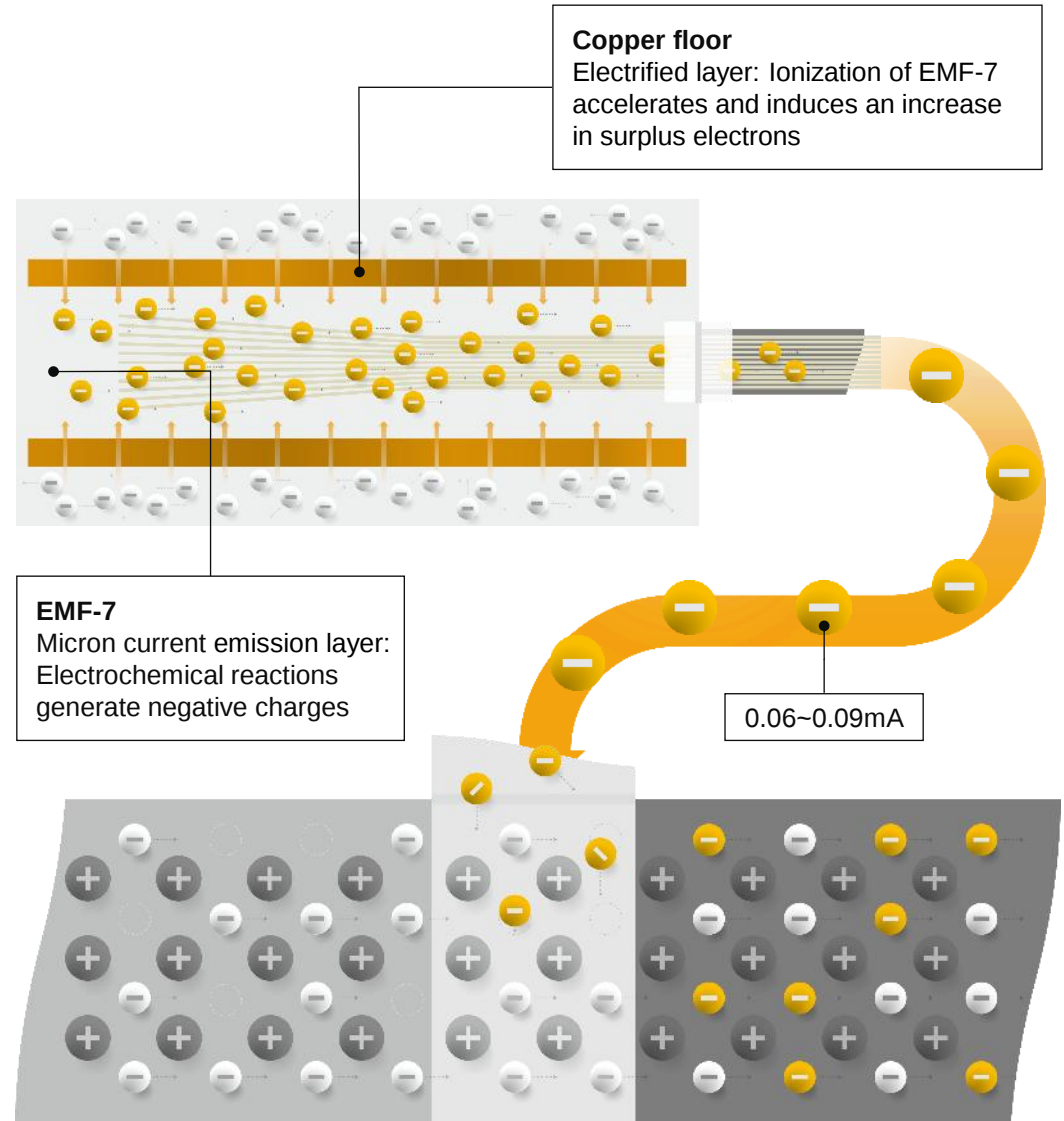
- Electrochemical reactions of minerals
Negatively charged (low current)
- By accelerating the accumulation of negative charges it creates surplus electrons

- An increase in surplus electrons creates improved conductivity, increased electron density, and increased free electrons
- Surplus electron transfer at 0.1~1mm/sec

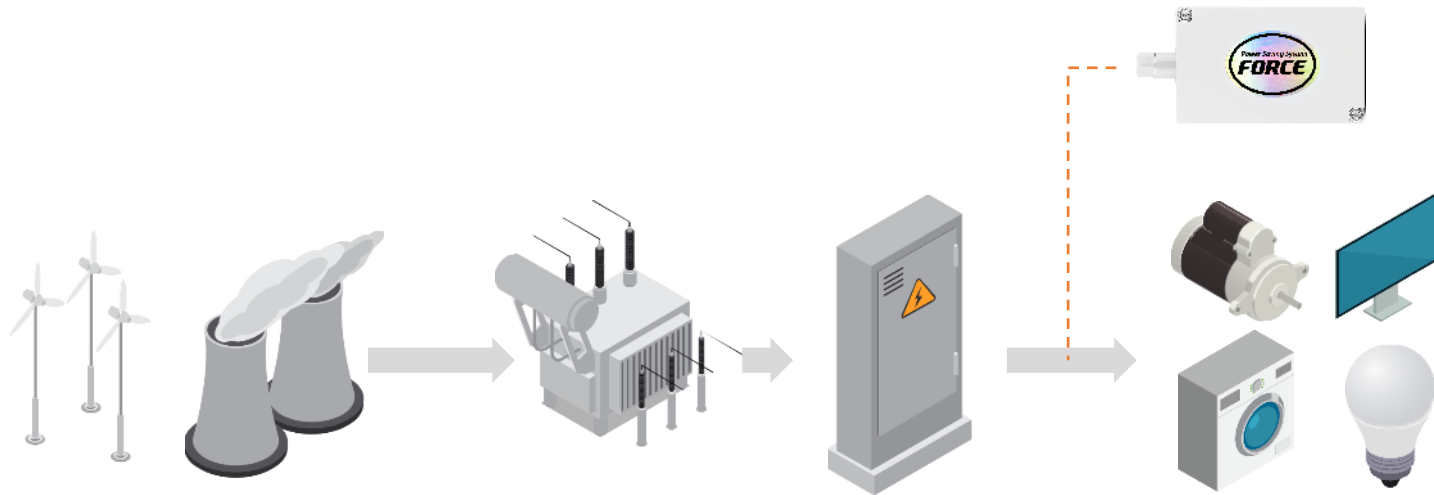
- Improved electrical energy with an increase in electrons, an increase in the delivery efficiency, improved current flow, and a reduction in electrical losses

Electric Power Saving

Reduced Impedance, Heat, Noise, Vibration and Harmonic Distortion

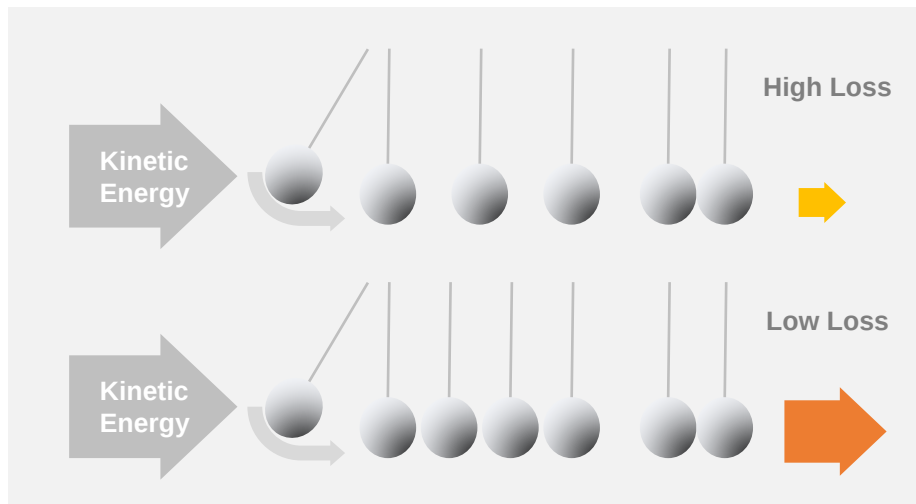


Process of Energy Saving



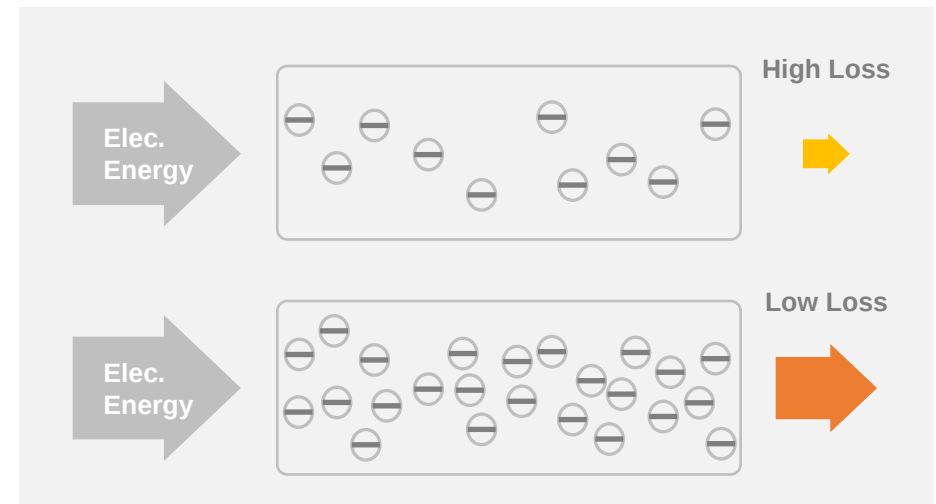
Power Supply & Meter			Transformer		Panel		Load	
Before Installing FORCE	100 kWh	➡	93~98%	➡	97~99%	➡	80~95%	80 kWh
(Power Loss)	-	➡	2~7%	➡	1~3%	➡	5~20%	-
After Installing FORCE	90 kWh	➡	95~99%	➡	98~99%	➡	90~98%	80 kWh
(Power Loss)	-	➡	1~5%	➡	1~2%	➡	2~10%	-

The efficiency of energy transfer is proportional to the density of mediators



Kinetic Energy Movement

The difference in the number of pendulums results in a difference in energy transfer efficiency



Electrical Energy Movement

The difference in the number of electrons is the difference in energy transfer efficiency

Therefore, the number of free electrons in a conductor increases the efficiency of electrical energy transfer

4. Theoretical Background

Definition of Power Saving Effects According to Impedance and Resistance Reduction

If we denote the total impedance as Z , reactance as X , complex representation of applied voltage as V , effective value as V_e , complex representation of flowing current as I , and effective value as I_e , the following equations hold.

$$Z = R + j\omega L + \frac{1}{j\omega C} = R + jX$$

$$V_e = I_e \cdot Z$$

$$V_e = I_e \cdot (R + jX)$$

$$P = IV = I^2 R = I^2 |Z|$$

$$P_e = V_e \cdot I_e \cdot \cos\theta \\ = I_e^2 \cdot Z$$

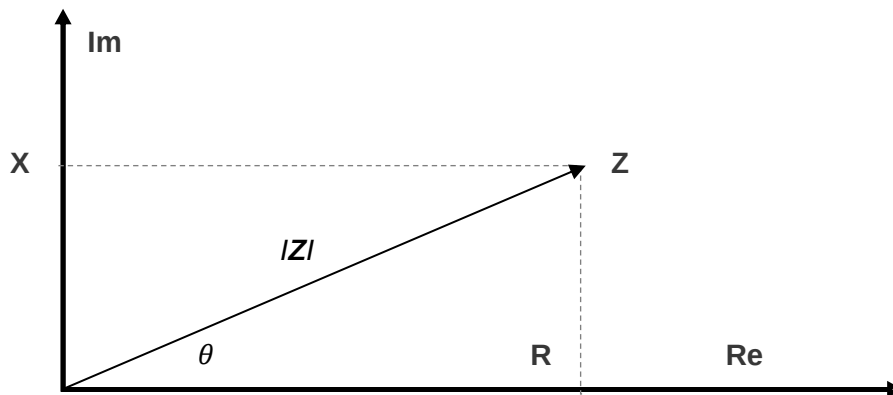
Power consumption before installation

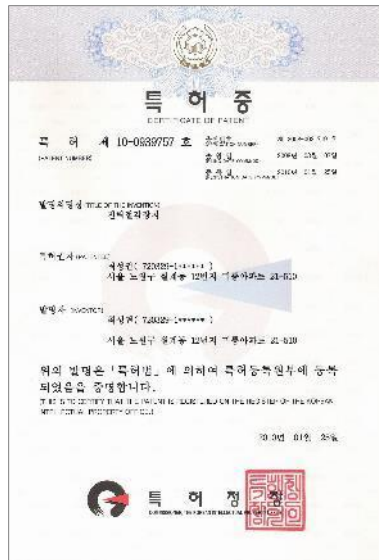
$$P = (100A)^2 \times 1(Z) = 10,000 \text{ W}$$

Power consumption after installation

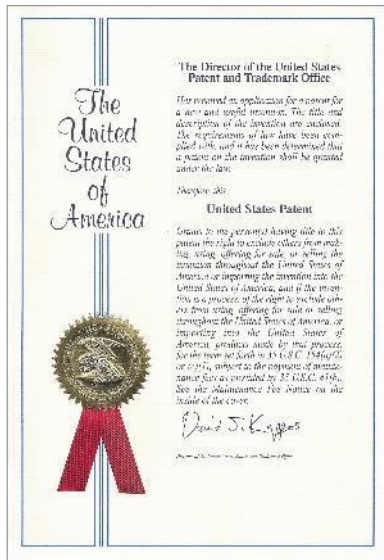
$$P = (100A)^2 \times 0.9(Z) = 9,000 \text{ W}$$

By reducing the impedance (Z) value, the effect of power savings becomes apparent.





Korea



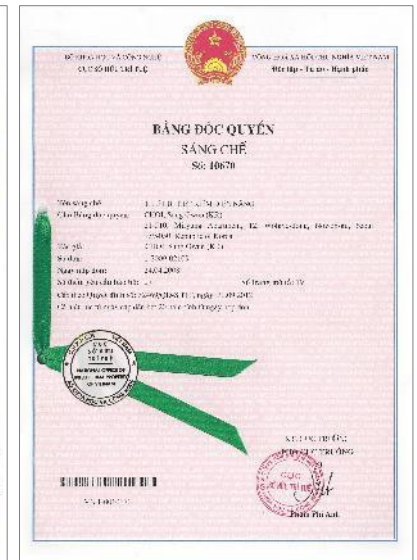
USA



China



Japan



Vietnam

- KR Certificate issued on July 2018
- Radiated Radio Frequency Immunity Test (RS) in accordance with IEC 61000-6-4
- Environment Test Standard: IACS UR E10 Test Specification for Type Approval
- Conducted Emission Test
- Radiated Emission Test
- Electrostatic Discharge Immunity Test
- Electromagnetic Field Immunity Test
- Electrical Fast Transient/Burst Immunity Test
- Surge Immunity Test
- Conducted Immunity Test
- Conducted Low Frequency Test
- Power Supply Variation Test
- Electrical Power Supply Failure Test
- Cold Test
- Dry Heat Test
- Damp Heat Test
- Insulation Resistance Test
- High Voltage Test

[illegible]

KTC

TUV

SGS

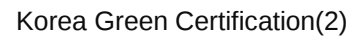
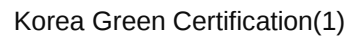
ANCE

JQA

5.4%
power savings
demonstrated

ULCEPOCC

PUBLIC PROCUREMENT
SERVICE



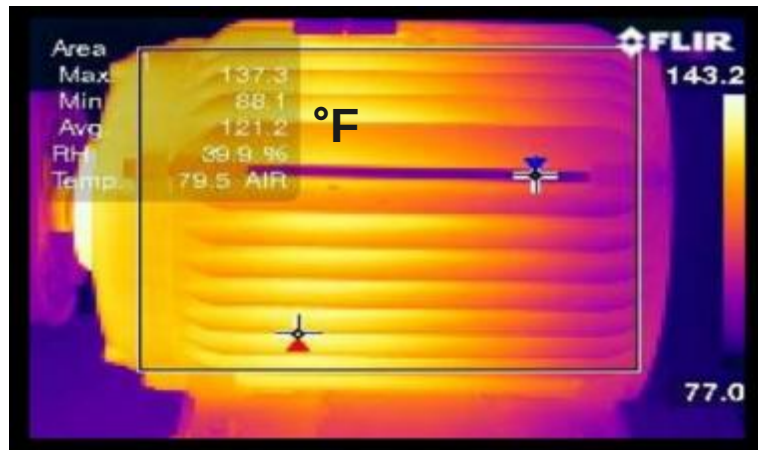
6. Examples of Applications

[Heat]

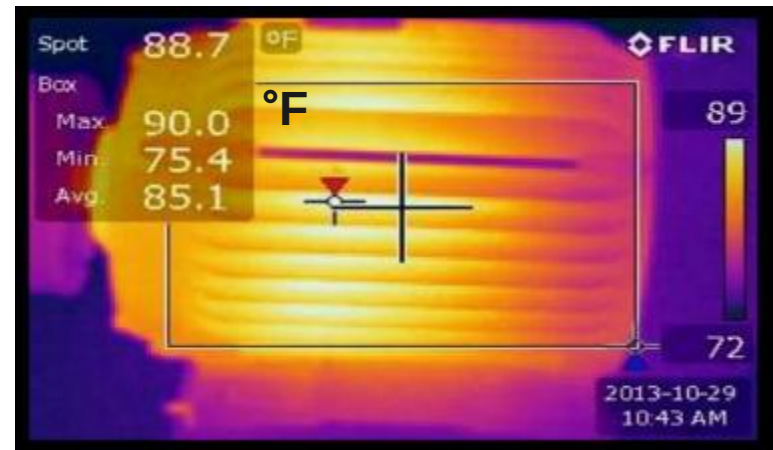
The temperature drop was observed on the surface of the pump motor

Average temperature was reduced from 49.6 °C to 29.5 °C by 29.8%

Before



After



58.5 °C

Max

34.4 °C (34.5% Down)

31.2 °C

Min

24.1 °C (14.4% Down)

49.6 °C

Avg

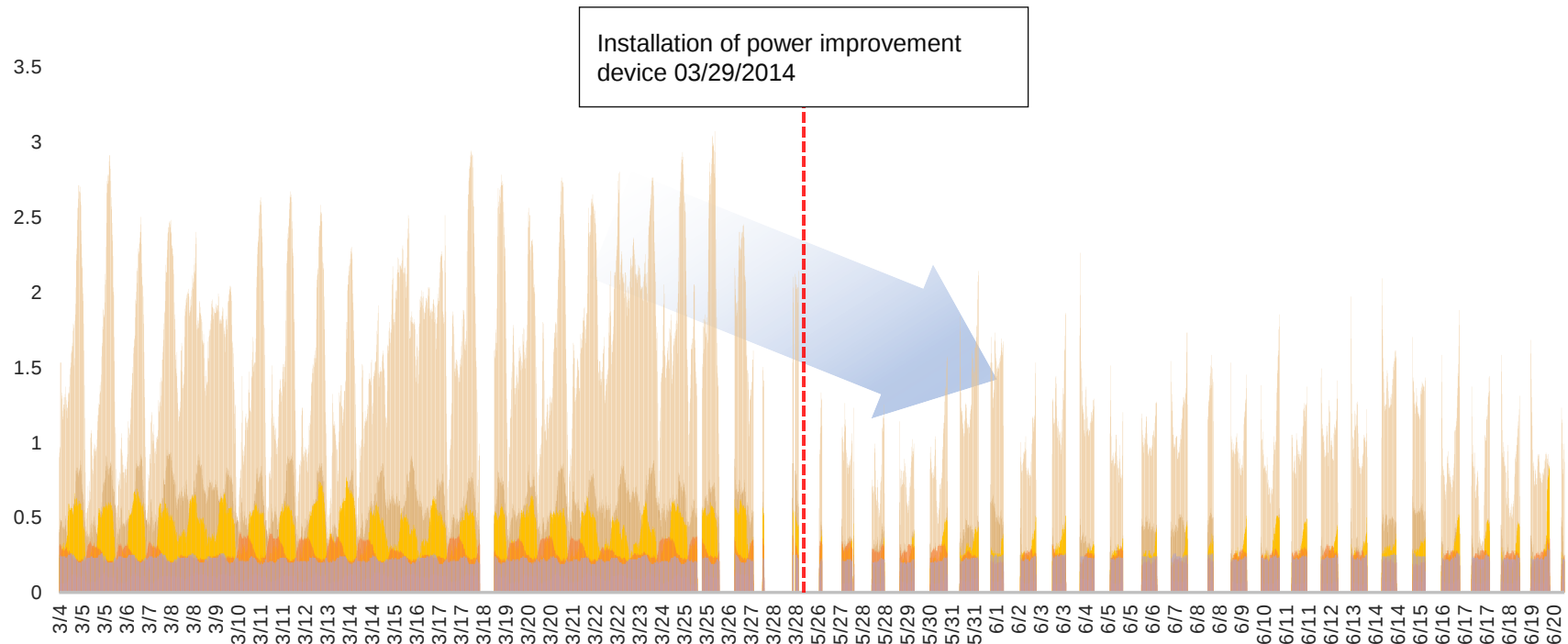
29.5 °C (29.8% Down)

6. Examples of Applications

[Total Harmonic Distortion]

Comparison of circulation pump R-phase harmonics before and after installation

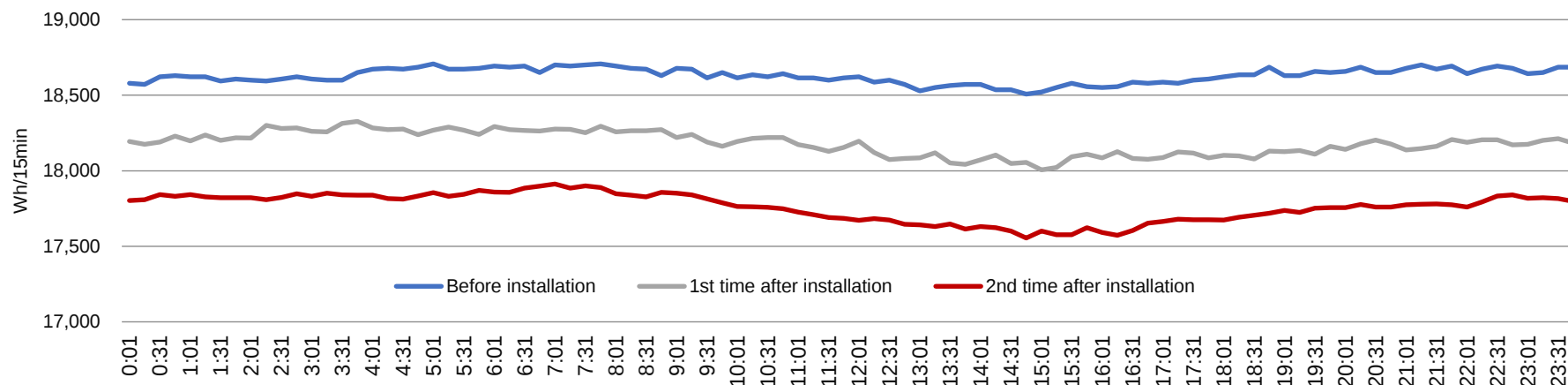
Minimizes losses by reducing power dissipation factors/THD



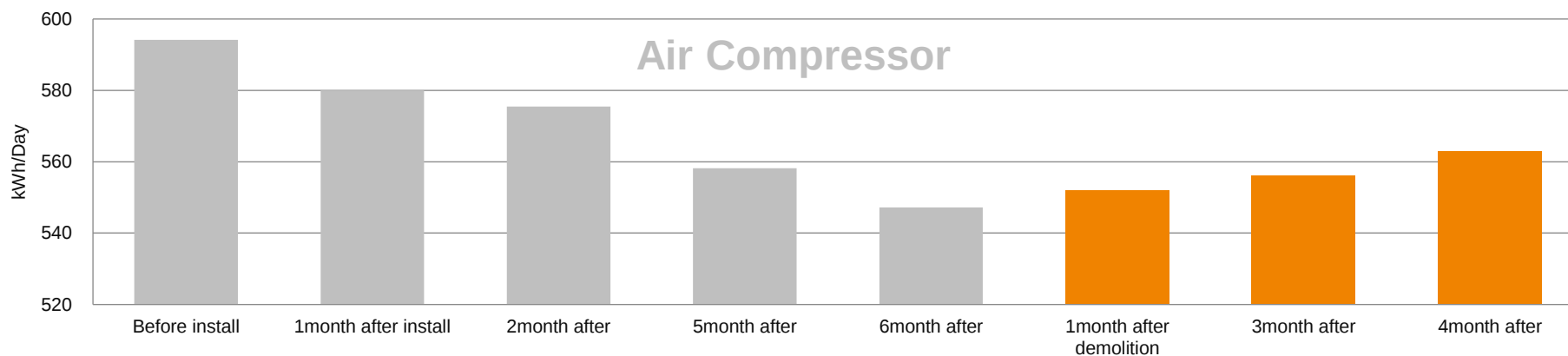
6. Examples of Applications

[Electronic Power]

[Average power usage per 15min before and after installation]



[Average power amount before and after installation and removal of power saver(kWh/Day)]



6. Examples of Applications

[Kyunghee Medical Center]

■ Installation points and capacity

- Kyunghee Medical Center / Circulation pump (ward temperature control)
- Point : Transformer ACB secondary side
- Installed Capacity : Total 1,000 kW (1,000 kW, 1 SET)

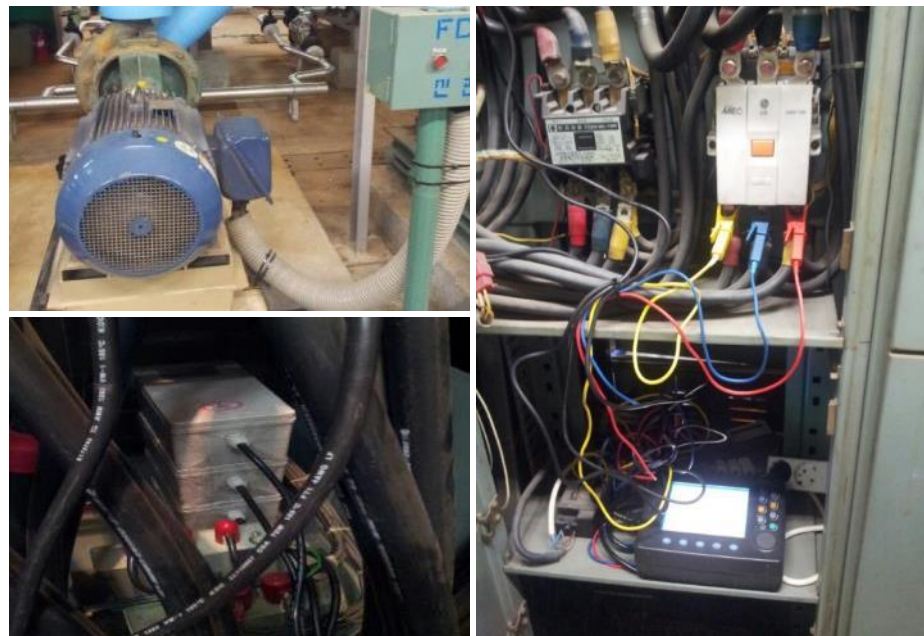
■ Methods of analysis

- Instrument : HIOKI 3169 (Wh/5min)
- Comparison of power consumption before and after installation

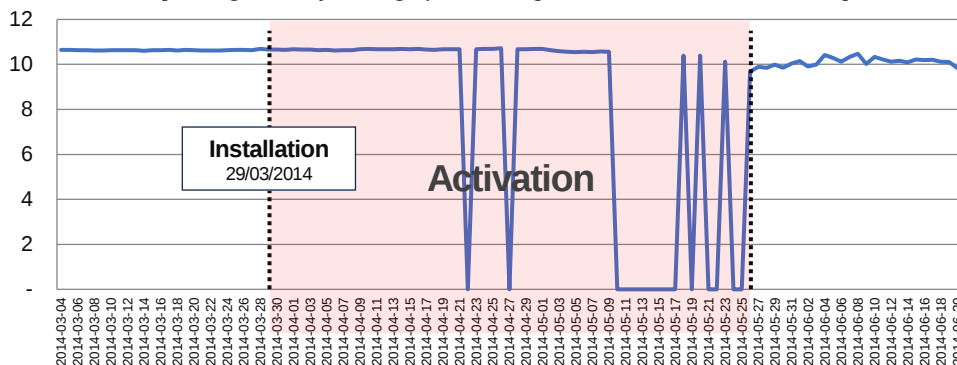
■ Installation results

- Objective : More than 5% less Power consumption than before installation
- Result : **7.63%** Reduction

	Before	After	Saving Ratio(%)
Average Power usage (W/15min)	10,632	9,821	7.63
Harmonics(A)	3.28	2.19	33.11



[Change in daily average power usage before and after installation]

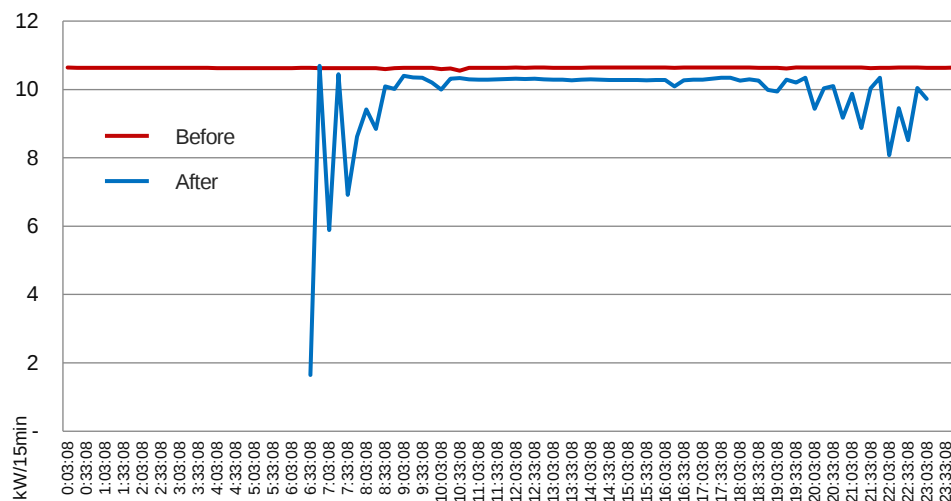


6. Examples of Applications

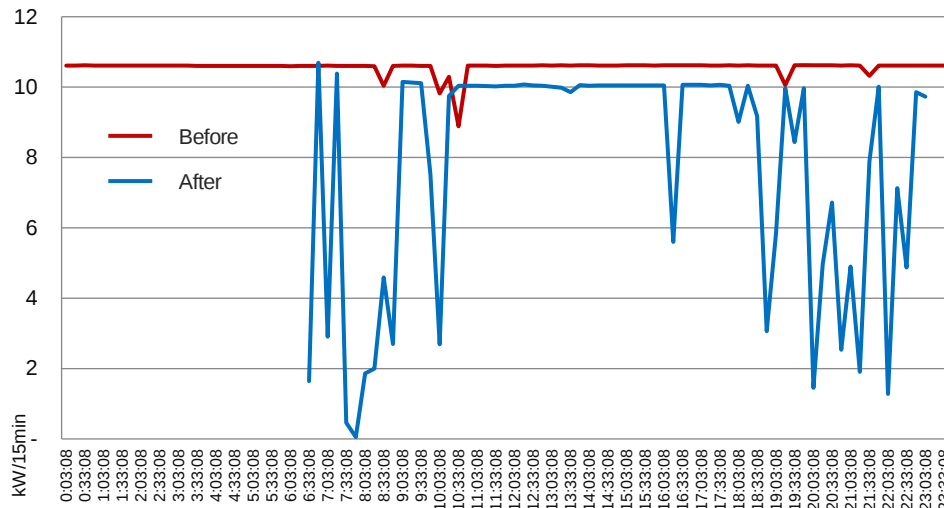
[Kyunghee Medical Center]

Compare	Standard	Average before installation	Average After installation	Ratio	Result
Average power usage	The more it decreases, the better	10,632W/15min	9,821W/15min	7.63%	Reduction
Reactive power		7,115W/15min	7,078W/15min	5.28%	Decrease
5 Harmonic	The lower the better	1.67A	1.04A	37.91%	Decrease
7 Harmonic		0.43A	0.28A	34.47%	Decrease
11 Harmonic		0.27A	0.25A	8.5%	Decrease
Harmonic Sum		3.28A	2.19A	33.11%	Decrease

[Change in average power usage by hour before and after installation]



[Change in minimum power usage by hour before and after installation]



6. Examples of Applications

[Samsung Fine Chemicals]

■ Installation points and capacity

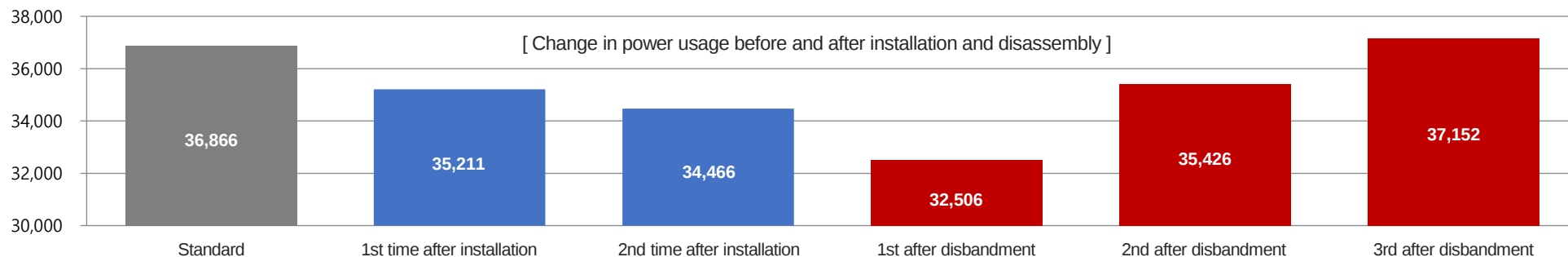
- Samsung Fine Chemicals / Lighting, electric heating
- Point : Transformer ACB secondary side
- Installed Capacity : Total 200 kW (200 kW, 1 SET)

■ Methods of analysis

- Instrument : HIOKI 3169 (Wh/10min)
- Install FORCE → Confirm reduction in power usage →
- Dismantle FORCE → Confirm increase in power usage

■ Installation results

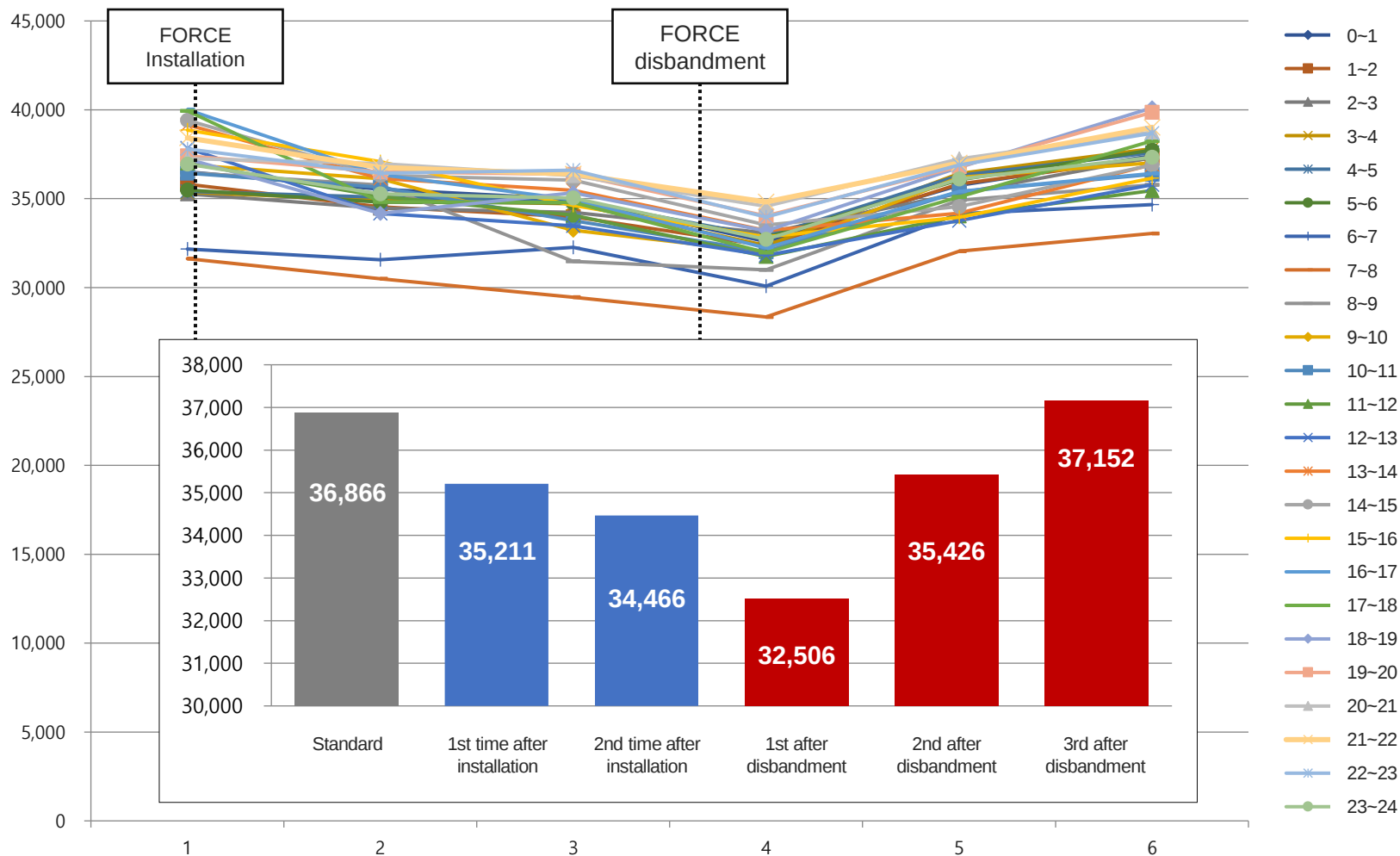
- Objective : More than 5% less Power consumption than before installation
- Result : **6.5% Reduction**



6. Examples of Applications

[Samsung Fine Chemicals]

[Change power usage before and after installation]



6. Examples of Applications

[Bitexco building]

■ Installation points and capacity

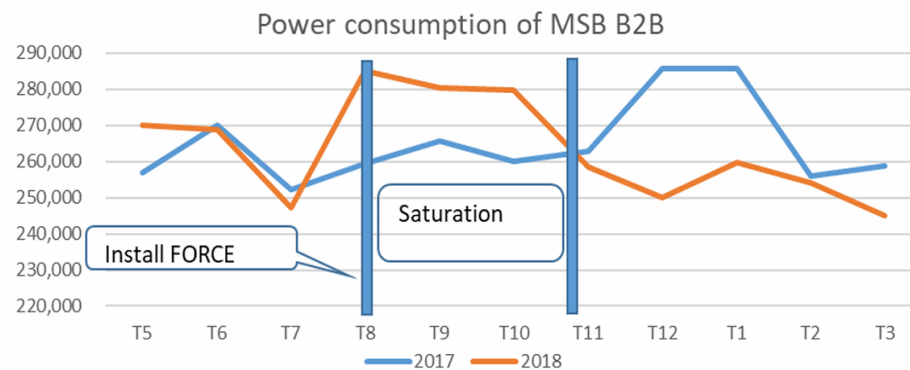
- The Bitexco building
- Point : Transformer ACB secondary side
- Installed Capacity : Total 1,000 kW

■ Methods of analysis

- Instrument : HIOKI 3169 (Wh/5min)
- Comparison of power consumption before and after installation

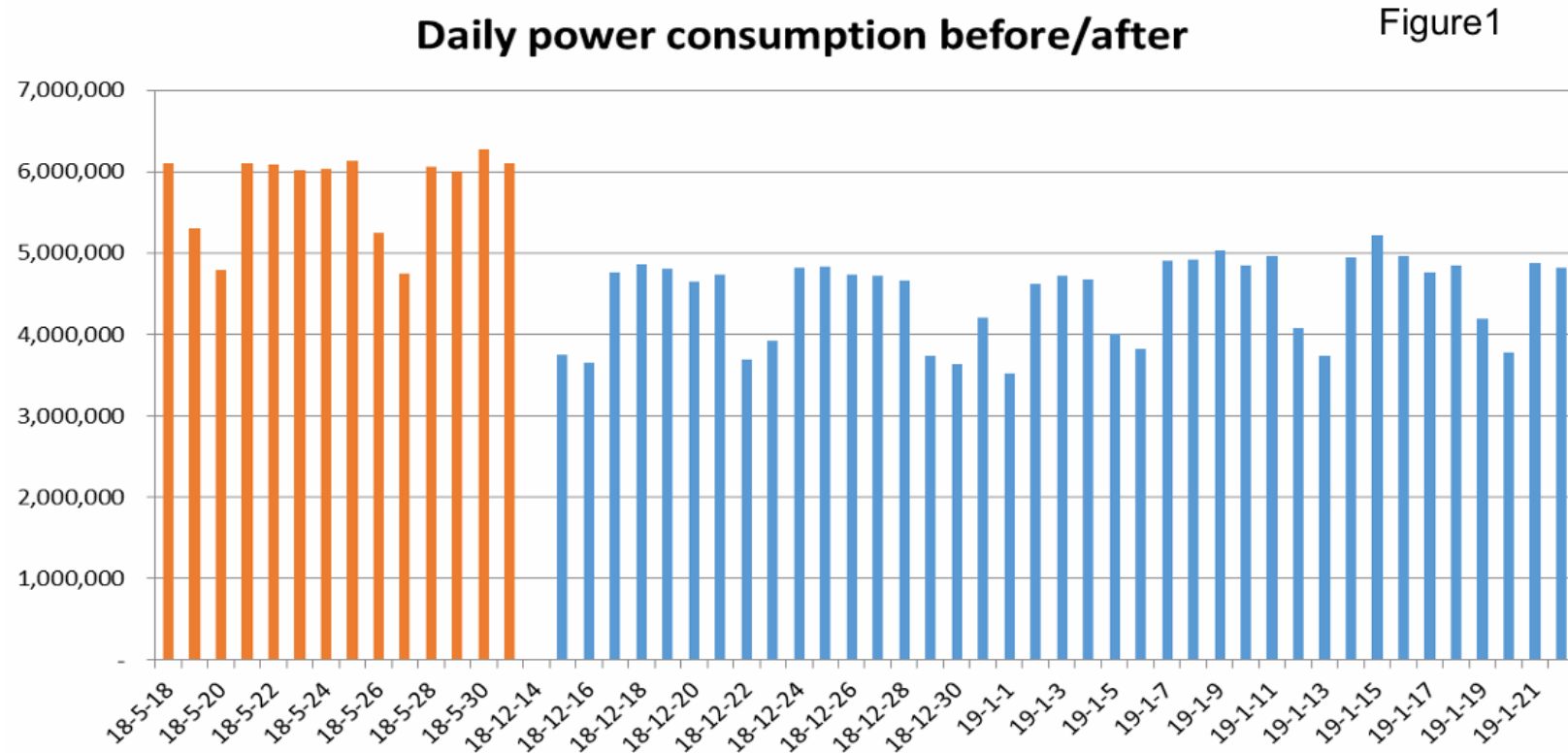
■ Installation results

- Objective : More than 5% less Power consumption than before installation
- Result : **18.3%** Reduction



6. Examples of Applications

[Bitexco building]



6. Examples of Applications

[Marriot Hotel in Hanoi]

■ Installation points and capacity

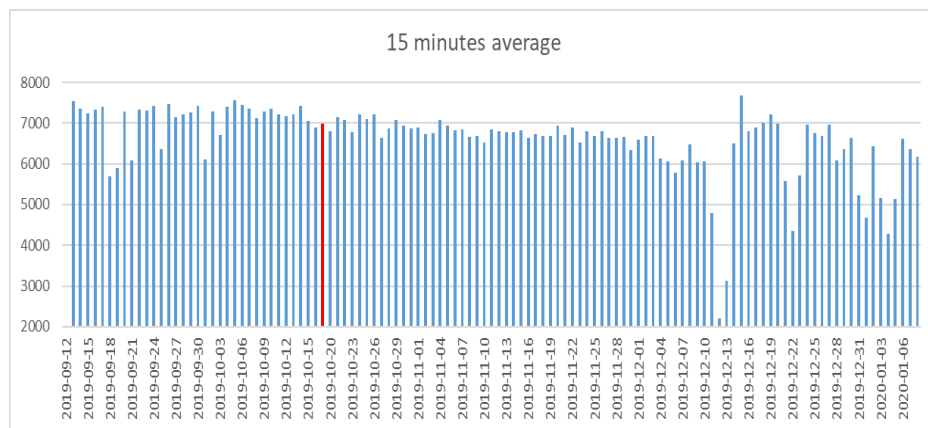
- Marriot Hotel in Hanoi Vietnam
- Point : Transformer ACB secondary side
- Installed Capacity : Total 200 kW

■ Methods of analysis

- Instrument : HIOKI 3169 (Wh/5min)
- Comparison of power consumption before and after installation

■ Installation results

- Objective : More than 5% less Power consumption than before installation
- Result : **9.5% Reduction**



■ FORCE specification calculation method

- Vessel Generator capacity (1,000kw) x Power factor 80% (0.8) x Peak utilization percentage (80~90%)
= Installed FORCE specification (about 1,500kw)

■ Payback period examples based on fuel consumption of 1,000kw load, (1,500 kW FORCE) and average cost.

- Reduction in fuel Usage per day of 8% x 365 days = \$43,800.00 per month (Payback period about 23 months)
- Reduction in fuel usage per day of 10% x 365 days = \$54,750.00 per month (Payback period about 18 months)
- Reduction in fuel usage per day of 12% x 365 days = \$65,700 per year (Payback period about 16 months)

* B-C price : US600\$/ton

■ Commercial and Industrial installations

Company	Installed capacity (kW)
H-Line Shipping	62,900
HMM	1,000
KLCSM	1,200
Lotte Fine Chemicals	1,850
Ottogi Foods	13,550
Finite Kimberley	5,000
Taekwang Business	5,000
Hanwha Total	1,300
Kolon Life Sciences	2,000
Henkel Korea	1,200
Orange Dunes CC	2,000

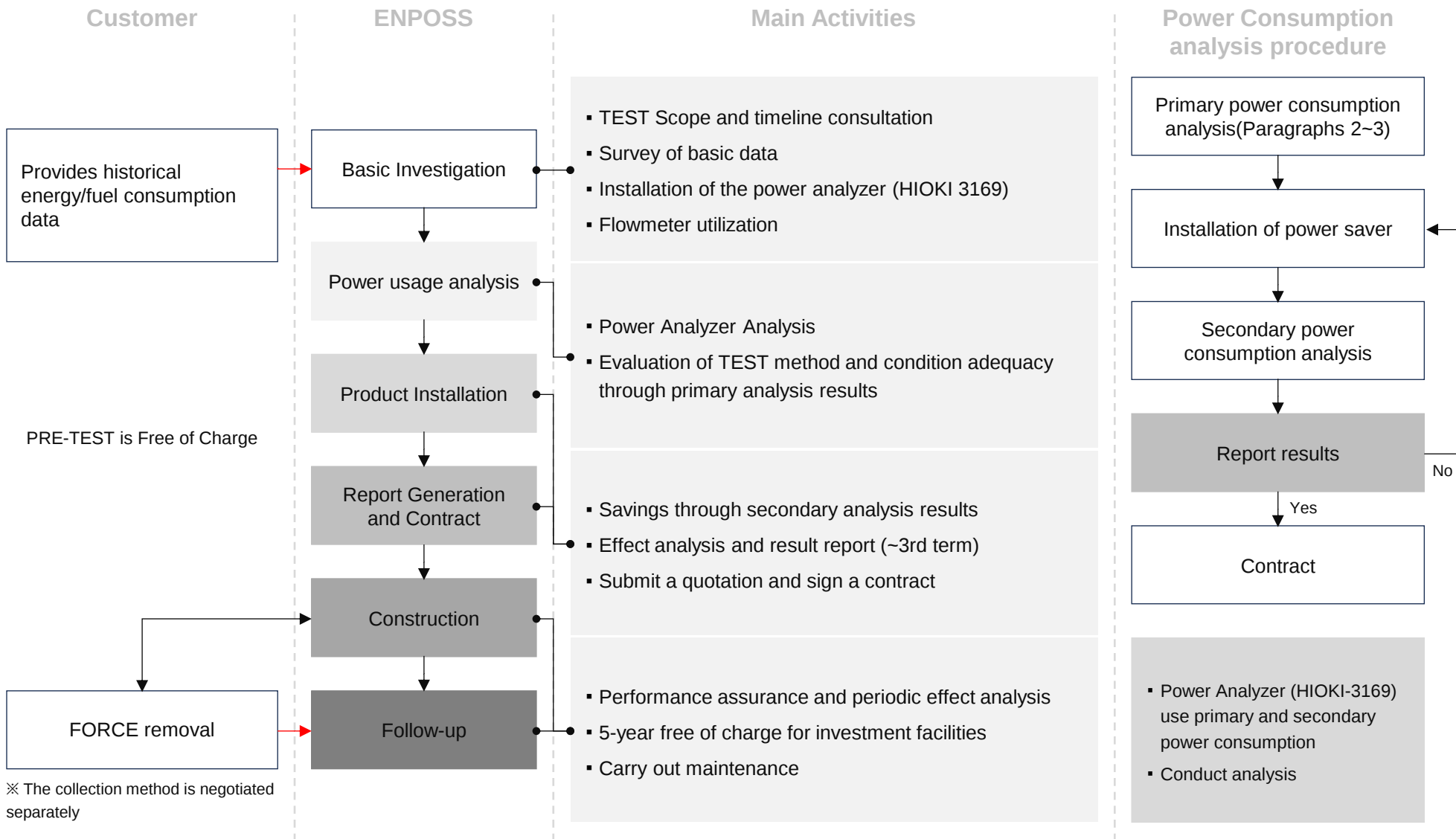
Company	Installed capacity (kW)
Credulity wires	2,870
POSCO	10,550
Ilshin Industrial Metals	2,670
Limcheon Industry	1,200
KEPCO Industrial Development	1,500
Gyeongam Building	1,800
Shinhan Bank	2,500
Daejin Industry	1,000
DYM	1,700
Shinhan Industrial	1,750
Samsung Corning	1,000

■ Vessel installations

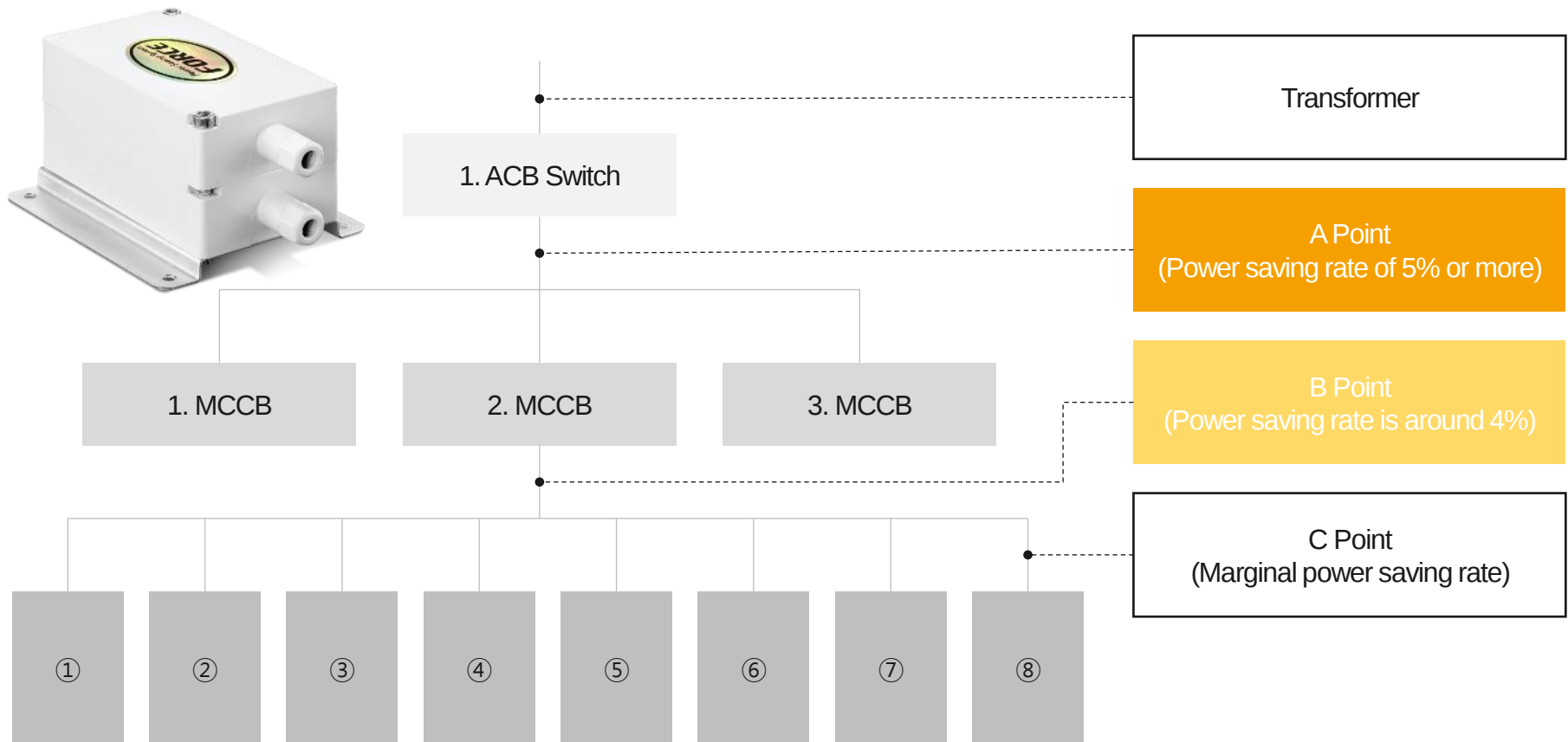
Vessel	Installed capacity (kW)	Vessel	Installed capacity (kW)	Vessel	Installed capacity (kW)	Vessel	Installed capacity (kW)
HL SUCCESS	1,350	HYUNDAI HADONG	1,100	HL BORYEONG	1,200	HL AQUAMARINE	2,000
HL SALDANHA BAY	1,350	SAMCHEONPO	1,100	HL BRAZIL	2,000	SAO PEARL	2,000
HL TUBARAO	2,000	HL PASSION	1,200	HL TAEAN	1,100	HL NAMBU1	2,000
HL IBT	1,100	HL PIONEER	1,200	SAO LOUIS	2,000	HL NAMBU2	2,000
HYUNDAI KOMIPO	1,100	HL PORT WALCOTT	1,200	SAO MASTER	2,000	SK. K TANAN	1,500
HL HARMONY	1,100	HL VENUS	2,000	HL DIAMOND	2,000	FEG SUCCESS	1,000
HL HADONG	1,200	HYUNDAI LEADER	1,000	SAO NEPTUNE	2,000	HL BALIKPAPAN	1,200
HL GLADSTONE	1,100	HL MERCURY	2,000	HL EMERALD	2,000	WP BRAVE	1,200
HL BALTIMORE	900	HL ESPERANCE	1,350	HL ECO	2,000	PAN COSMOS	1,500
HL VISION	1,350	HL DALRYMPLE BAY	1,200	HL PEARL	2,000	Lake Shihwa Ferry	300
HL SHINBORYEONG	1,200	HL PRIDE	1,200	HL GREEN	2,000	-	-
HL SINES	1,350	HL DANGJIN	1,200	SAO OASIS	2,000	-	-
HL PORT HEADLAND	1,350	HL SAMARINDA	1,200	HL SAPPHIRE	2,000	-	-

9. Installation Process

[If tested]



■ Power System Location / Power Saving Rate



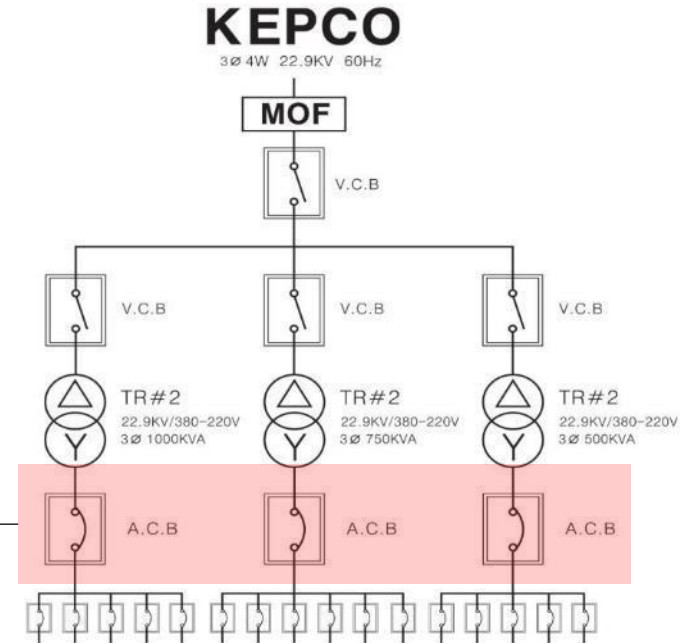
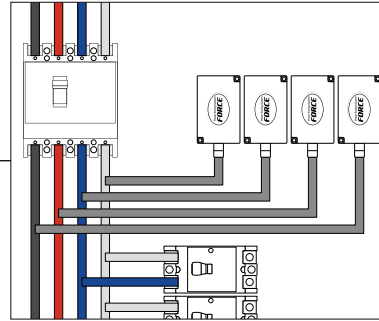
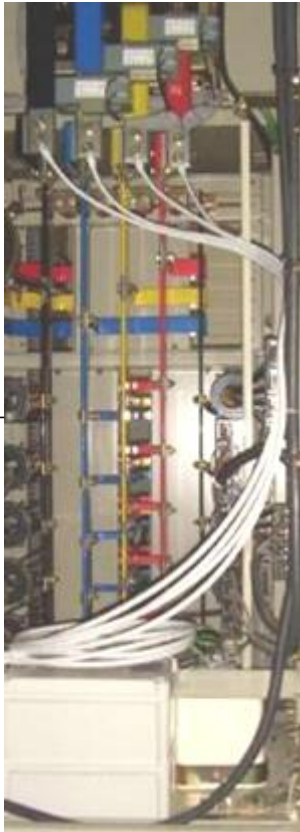
■ Switch Board



Connecting to R,S,T,N
angular phase easy to install



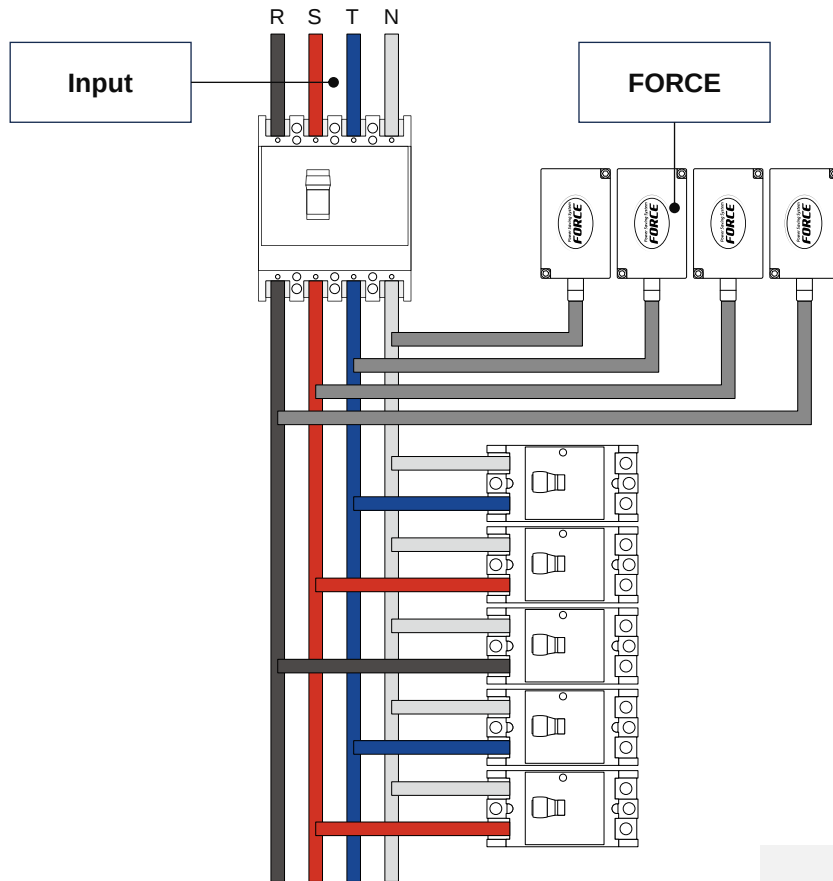
Ultra-small power improvement
device UNIT



Installation Location

Main 2nd stage ACB (Air Circuit Breaker)
parallel connection to R, S, T, N phases

■ Distribution Board



FORCE placement (inside switchboard cabinet)



One for each of the main 2nd stage breakers R, S, T, and N
Parallel connection makes installation very simple and fast

※ FORCE may be installed inside or outside the switchboard cabinet.

Power	Capacity (kW)	Model	Wire	Size (W×L×H)	Weight (kg)
1P 2W	5	F-2005	8SQ	80×130×35	1.5
	10	F-2010		80×110×70	1.8
3P 3W	5	F-3005	14SQ	65×95×55	1.5
	10	F-3010		80×110×70	2.7
	20	F-3020		80×130×70	3.3
	30	F-3030		80×180×70	4.5
	50	F-3050		80×180×85	5.8
	75	F-3070	25SQ	130×175×75	8.6
	100	F-3100		130×175×100	11.0
	200	F-3200		140×230×100	16.6
	300	F-3300		150×245×100	18.8
	400	F-3400		150×250×130	24.7
	500	F-3500		190×280×130	30.9
	750	F-3750		190×380×130	45.8

Power	Capacity (kW)	Model	Wire	Size (W×L×H)	Weight (kg)
3P 4W	10	F-4010	14SQ	65×95×55	2.0
	20	F-4020		80×110×70	3.6
	30	F-4030		80×130×70	4.5
	50	F-4050		80×180×70	6.1
	75	F-4070		80×180×85	7.8
	100	F-4100	25SQ	130×175×75	11.5
	200	F-4200		130×175×100	14.6
	300	F-4300		140×230×100	22.2
	400	F-4400		150×245×100	25.1
	500	F-4500		150×250×130	33.0
	750	F-4750		190×280×130	41.3
	1,000	F-4110		190×380×130	61.1

- Products with a capacity of less than 5kW and more than 750kW are customized as per client's request.
- Depending on the length and thickness of the wire, size/weight may differ from the table.

■ EEXI, Energy (Efficiency Existing Ship Index) Regulatory introduction

A regulation that extends the Energy Efficiency Design Index (EEDI), which applies only to new ships contracted to be built after January 1, 2013. The International Energy Efficiency Certificate (IEEC) must be issued and placed on board from 2023 to operate.

EEXI regulation?

Regulations to expand EEDI, which applies only to new ships contracted for construction after January 1, 2013, to all ships

Number of vessels affected by regulations



20,000~30,000

“ EEXI ” Applicable vessel



Reduce total international shipping greenhouse gas emissions by 50% compared to 2008 emissions by 2050



IMO's greenhouse gas response strategy

“ EEXI ” Official

CO₂ emissions

Volume × Speed

Capacity GT of cruise ships
Capacity DWT of other ships

Shipping's share of global carbon dioxide emissions

2.89%
As of 2018



- If the regulatory standards are not met, IEEC must be issued after meeting the regulatory standards by improving energy efficiency, such as installing an engine output limiter.
- Based on the average energy efficiency value of vessels built from 1999~2009, a reduction rate of 20% is required at 24 years and 30% after 25 years of age.

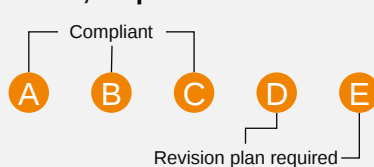
■ CII (Carbon Intensity Indicator) enforcement

The IMO has set a goal to reduce greenhouse gas emissions by 50%, as compared to 2008 by 2050, the CII system to regulate greenhouse gas emissions will be implemented beginning in 2023..

CII regulation?

The ship's efficiency is calculated based on the ship's actual annual fuel consumption and operating distance, and a rating is given based on the level of CII permissible value compared to the CII permissible value required for the ship during the relevant period

In CII, ships are rated A to E



CII is calculated based on each ship, not the entire fleet



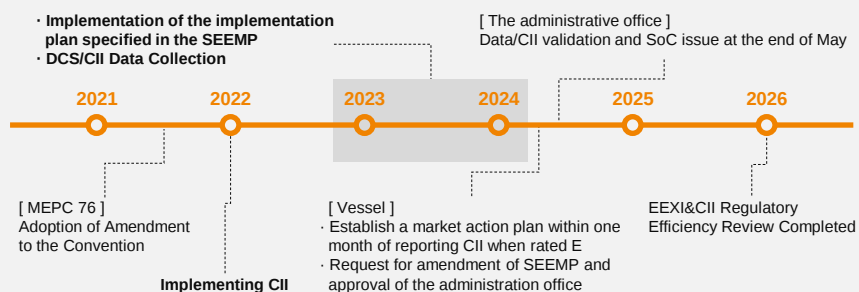
CII Applicable vessel



CII Calculation method

$$\frac{\text{CO}^2 \text{ emissions}}{\text{Volume} \times \text{Distance}}$$

CII Grading system implementation schedule



CII regulatory process

- Ship energy efficiency management plan(SEEMP) → Approved by an accreditation agency
- CII achievement values are reported annually to the administration or ROs
- Assign a carbon intensity rating to a ship based on the achieved value compared to the CII allowable value

- Grade D for 3 consecutive years, Vessels that have been assigned E status for more than one year are operating at low speeds, A low-carbon fuel use energy efficiency improvement plan must be established and approved.
- As the regulatory standards for the reduction rate are strengthened every year, it is necessary to continue efforts to increase energy efficiency..

Thank you



www.enposs.com