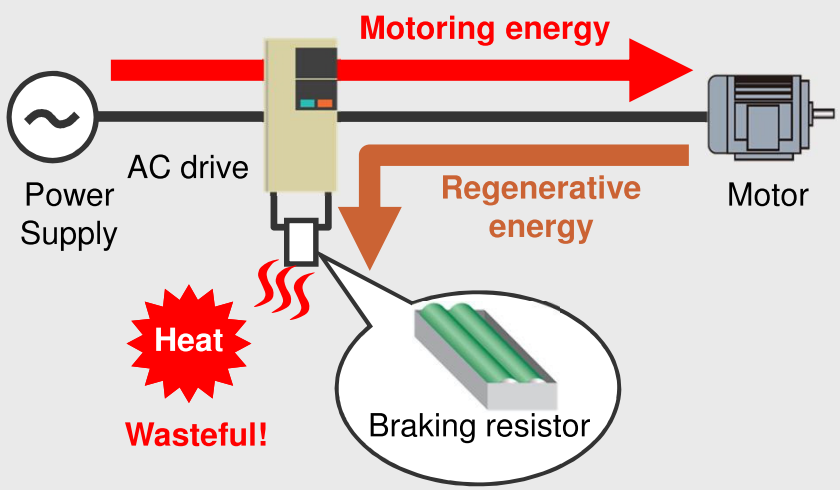
Energy Savings through Regeneration

Efficient Energy Usage

A braking resistor converts the energy as heat; however the regenerative energy can be returned to the power supply to save energy.

Braking Resistor Configuration



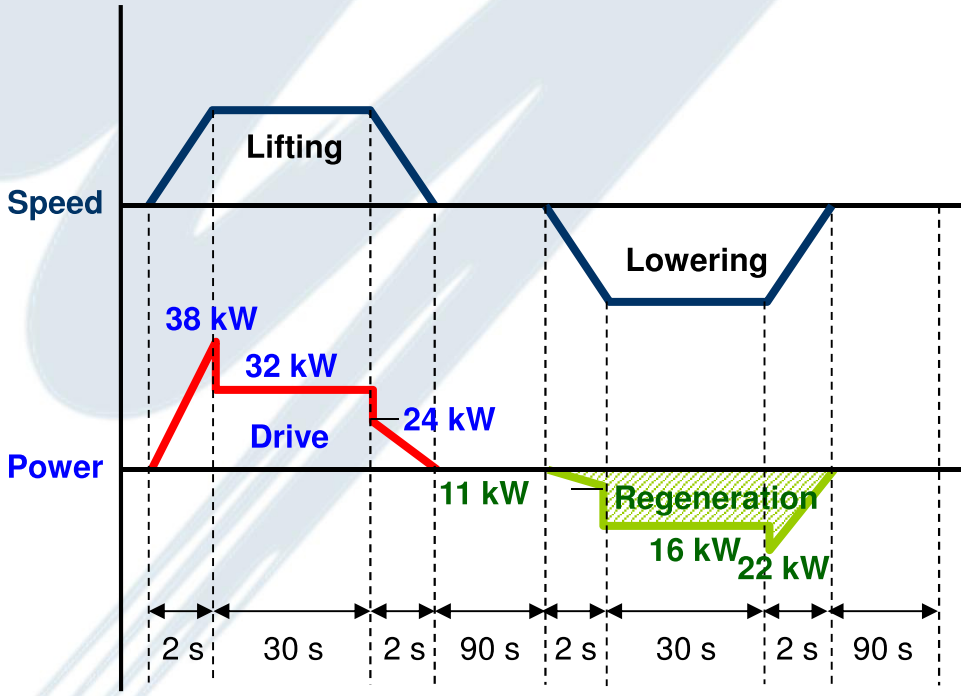
U1000 Matrix

Power regeneration is possible with just this one unit!

Energy Savings through Regeneration

【Example: Energy Savings through Regeneration】

■ Operation Cycle



You Can Save This Much!

Annual Power Consumption

Standard Drive w/Brake Resistor : 10,150kWh

U1000 Matrix Drive : 4,700kWh

Reduction
5,450 kWh

Annual Cost of Power

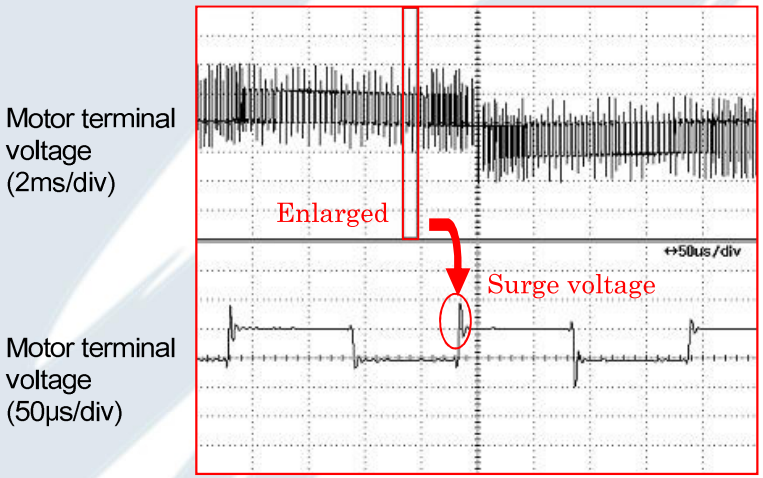
Standard Drive w/Brake Resistor : $2,030

U1000 Matrix Drive : $ 940

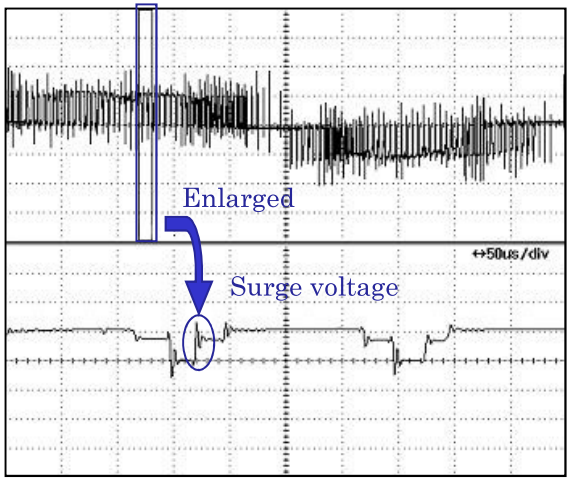
Reduction
$1,090

Regenerative energy is used rather than being discarding as heat!

Low Surge Characteristics



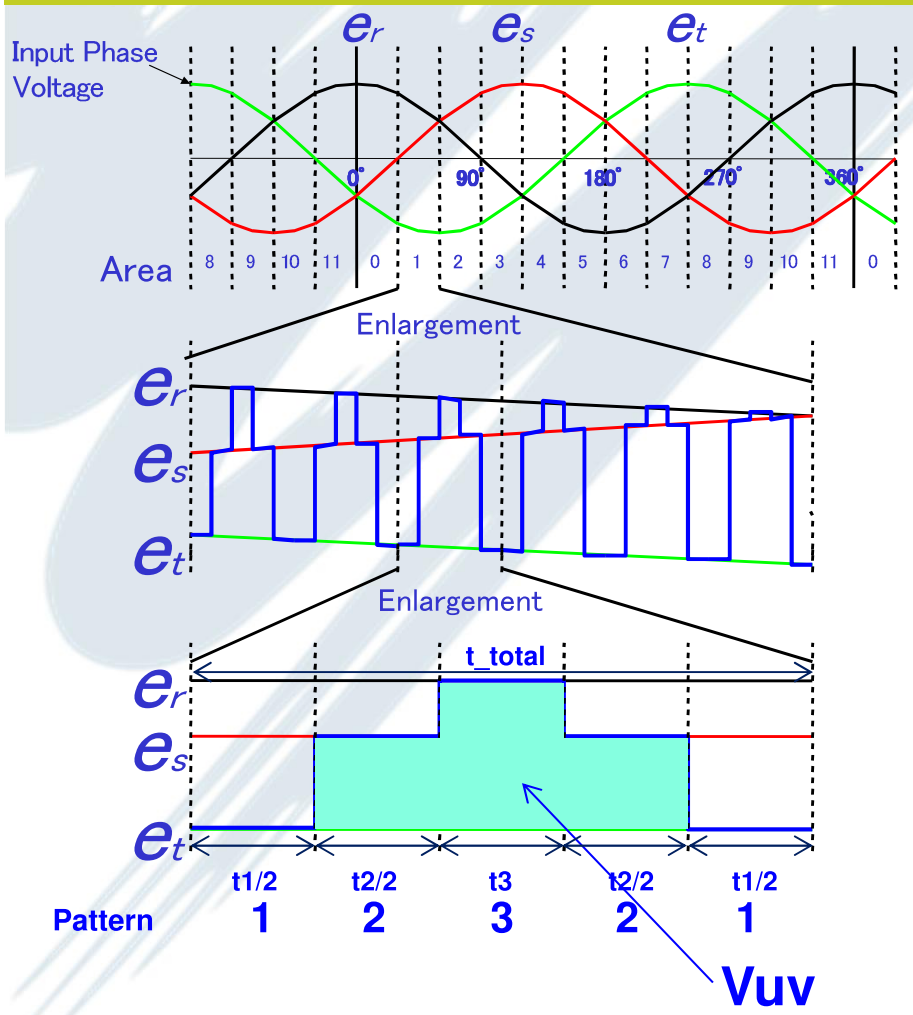
Standard drive
2 level control



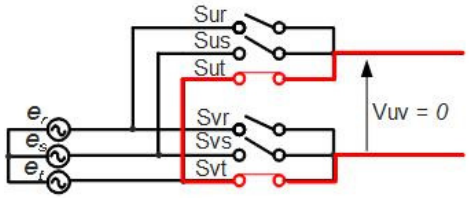
Matrix-converter
(during 3-level)

Average surge value = 0.69 x Standard drive
Maximum surge value = 1.0 x Standard drive
Minimum surge value = 0.5 x Standard drive

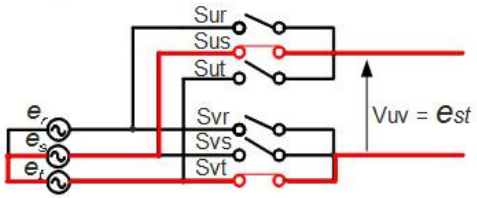
Low Surge Characteristics



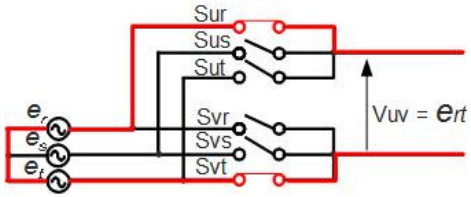
Pattern1



Pattern2



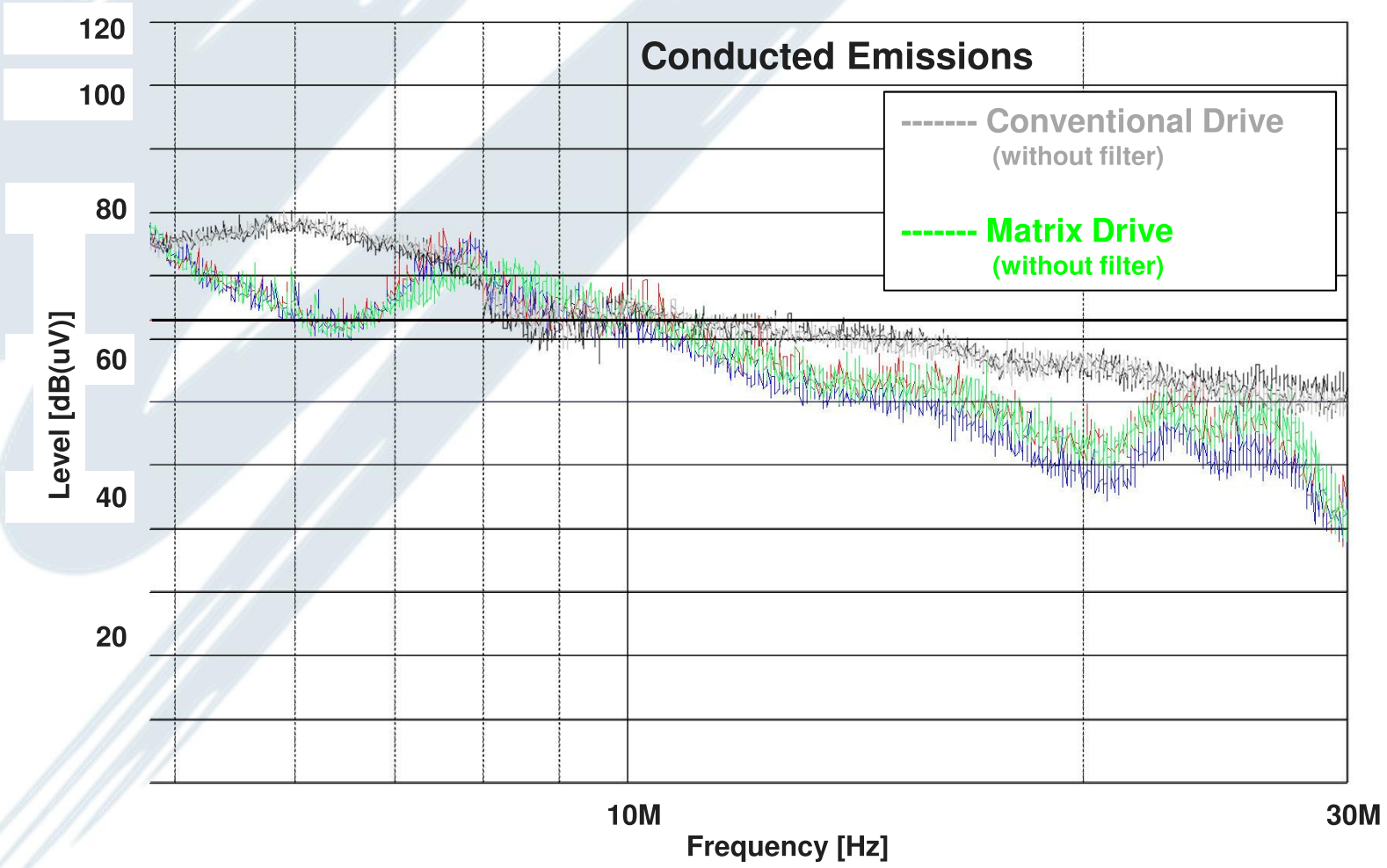
Pattern3



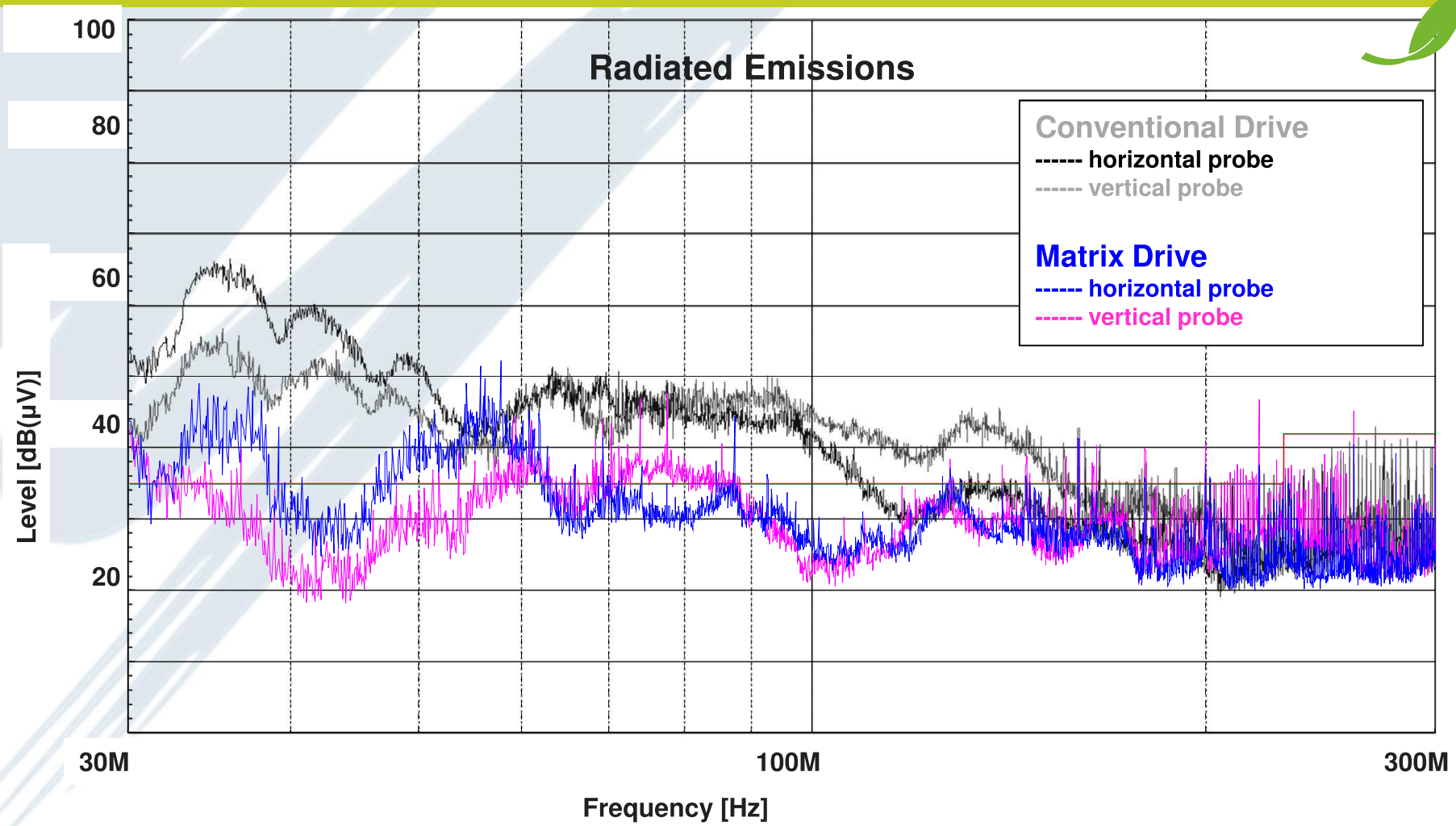
Vuv = (est * t2 + ert * t3) / t_total

- **Each output phase is generated by switching between all 3 input phases.**
- **3 levels are always being produced, but 1st step (e_s) varies between 50% and 100% magnitude**

Electromagnetic Noise



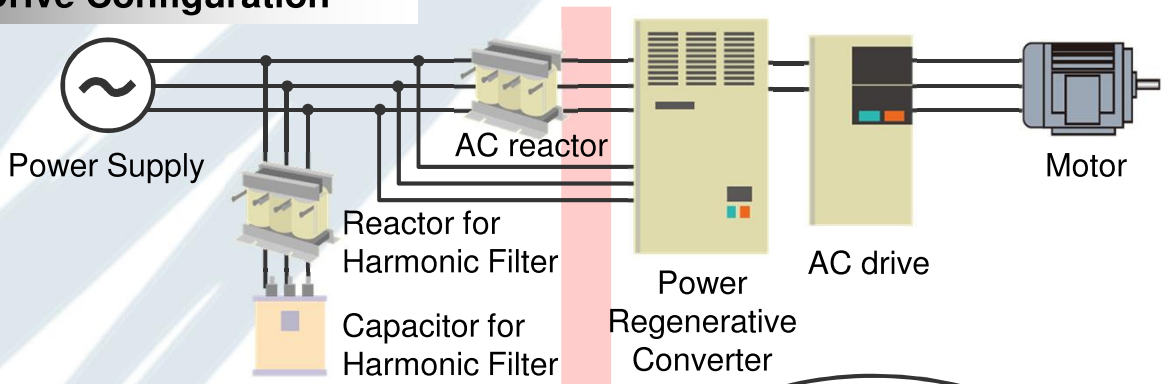
Electromagnetic Noise



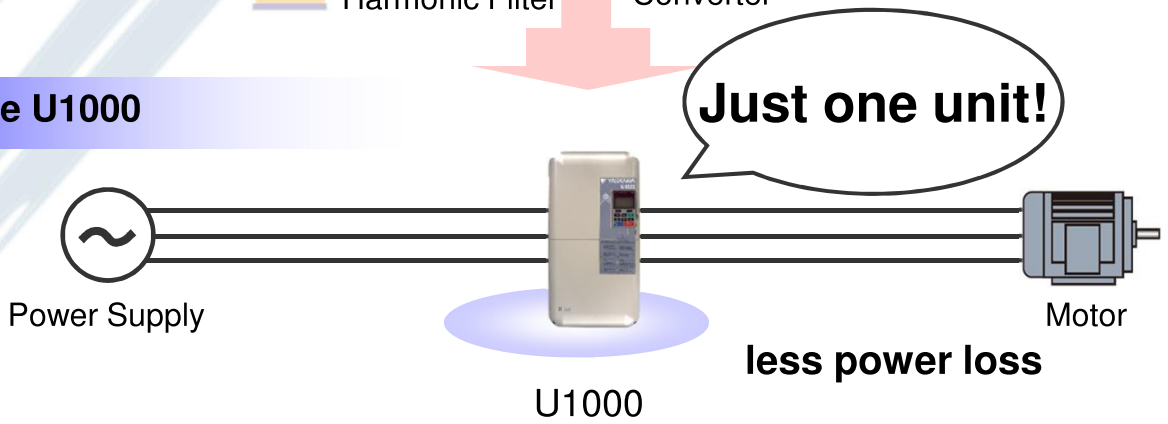
Regenerative Application Comparison

Harmonic countermeasure components; such as, input AC reactors, harmonic filter reactors, and capacitors, are not necessary, which helps you save wiring, space, and energy costs.

Standard Drive Configuration



Matrix Drive U1000



Reduced Wiring 70% (20 → 6)

Reduced Size 65%

Reduced Weight 81%

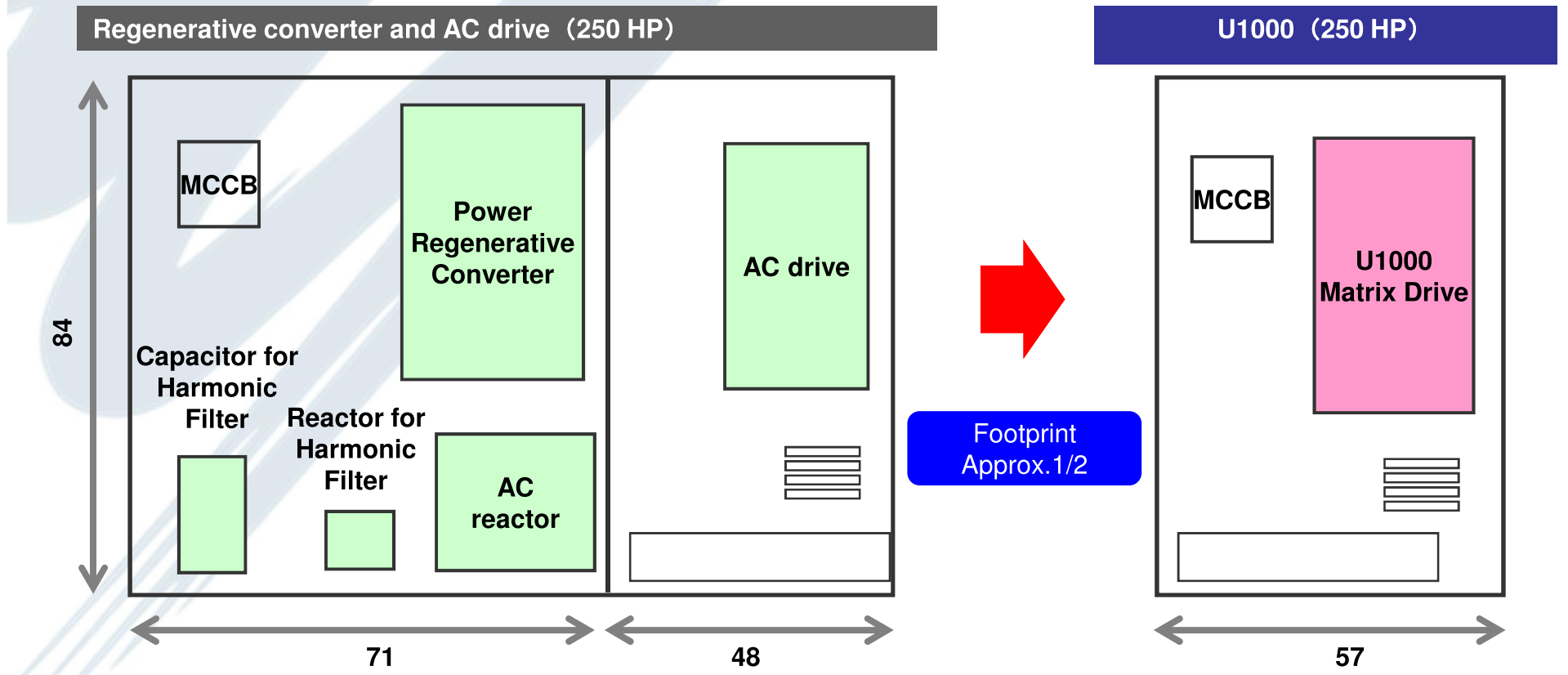
Less Power 19%

*Example for 480 V 30 kW

Regenerative Application Comparison

【Control Panel Configuration Example】 Unit : in

How's This for Compact!



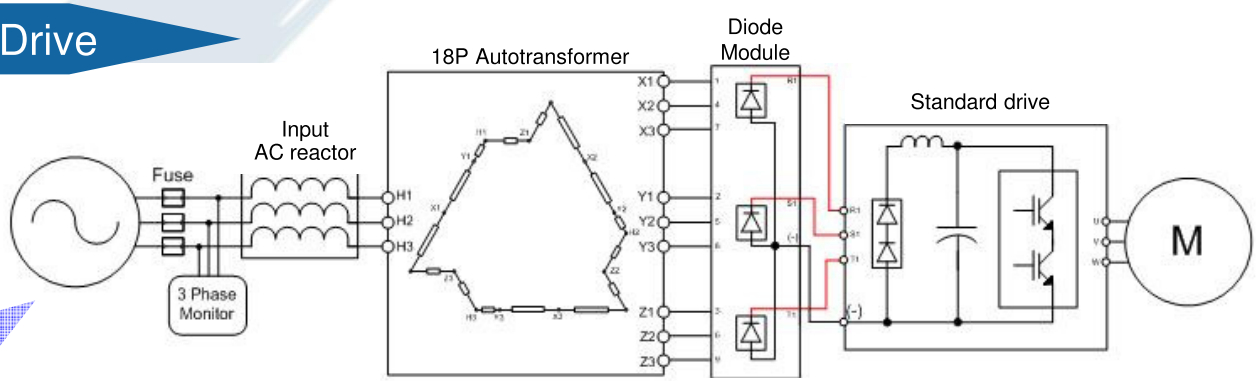
Low Harmonics Application Comparison

Compared with 18P individual components, installation space and weight will decrease.
In addition, wiring also decreases from 25 to 6 wires.

18P System with Standard Drive

Additional components are needed for an 18P system.

- Input AC reactor
- 18P Autotransformer
- Diode Module

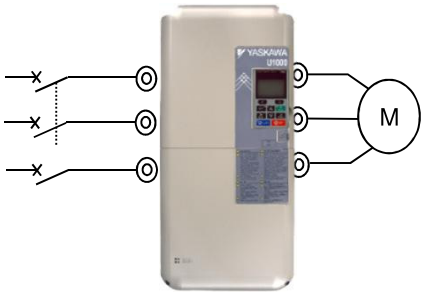


※ The space for standard drive doesn't include the space for installation, which means installation space needs wider than actual space.

U1000 Matrix Drive

The function of converter and inverter is combined.

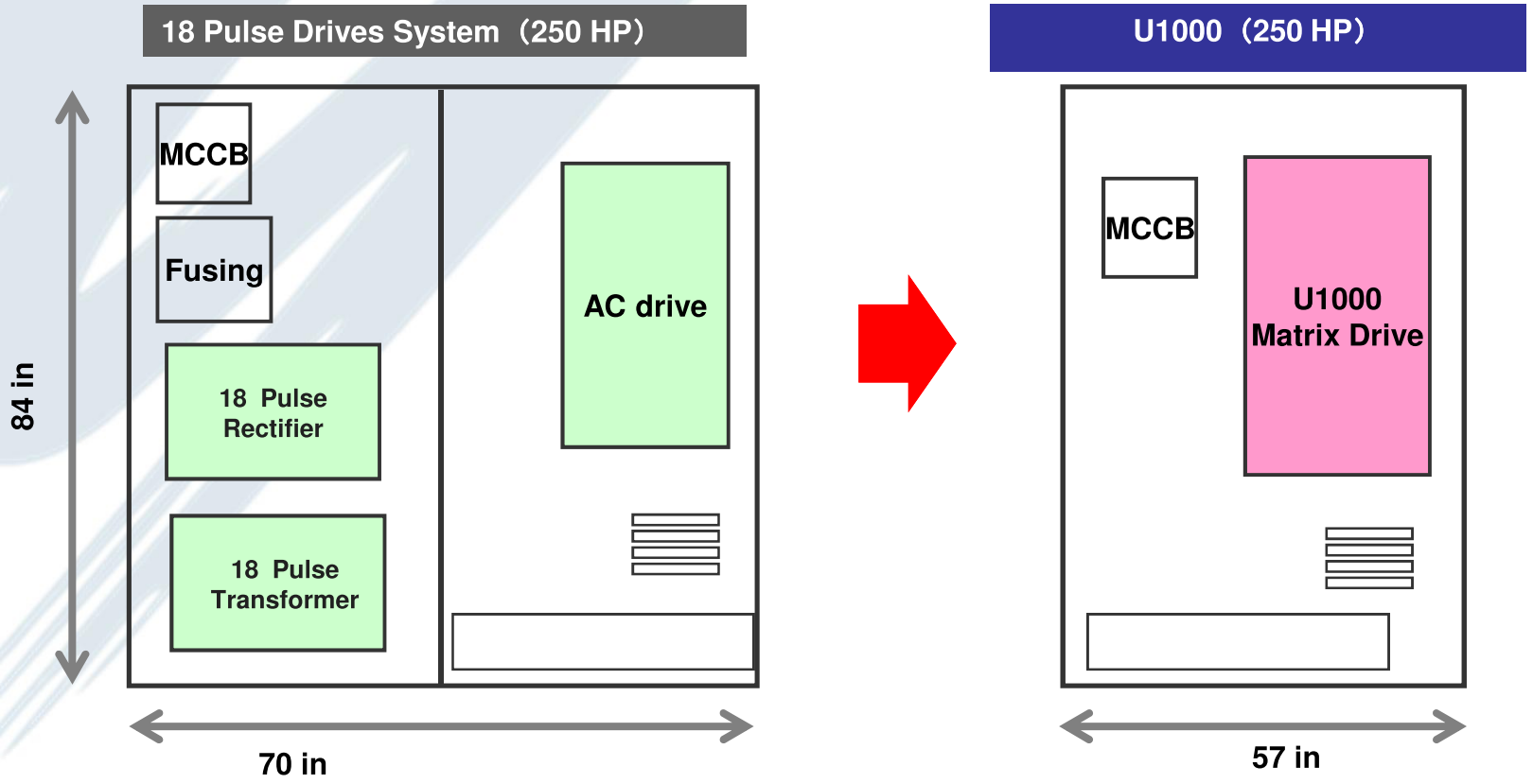
An EMC noise filter (option) can be built-in.



76% reduction in wiring

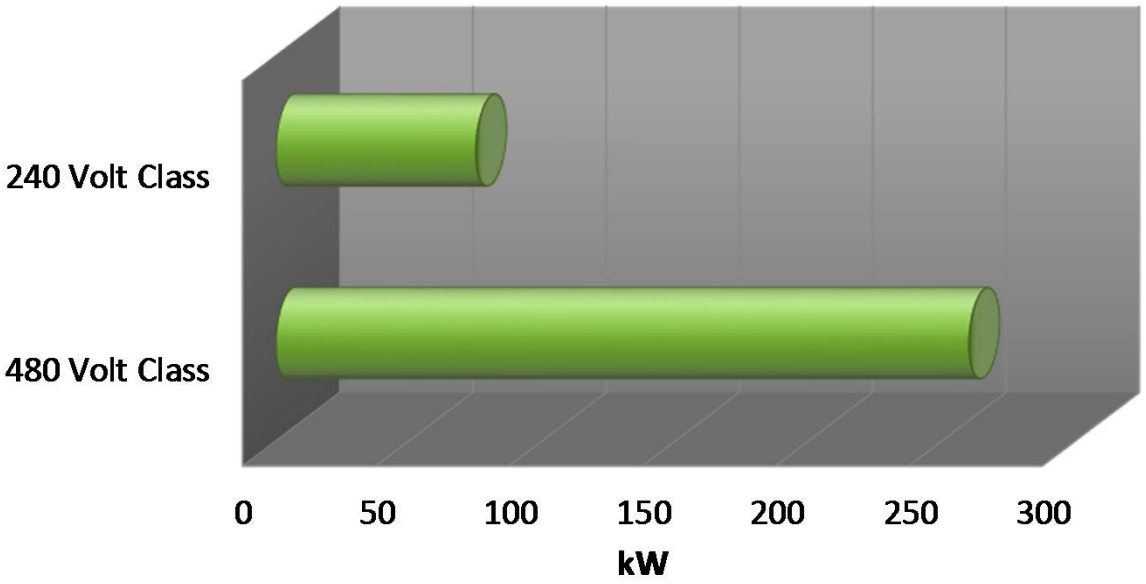
Low Harmonics Application Comparison

【Control Panel Configuration Example】



Power Range

U1000 Matrix Drive



* Future 480V models being investigated

Control for Today's and Tomorrow's Motor Technologies