# Reducing the Electricity Consumption of

# Electric Motor-Driven Systems (EMDSs)

**Fieldbus Gateway**
**EKI-1242 series**

By implementing Advantech's Fieldbus solution, traditional factories can be transformed into intelligent green plants. With the features of integration, flexibility, and connectivity, Advantech Fieldbus gateways and WebAccess/NMS and WebAccess/SCADA bring seamless conversion between individual industrial protocols and allow the connection of devices with different protocols for diagnosis, analysis, and management.

## Introduction

EMDSs are widely used in various applications such as industrial, building, and appliance applications. Pumps, fans, air compressors, conveyor belts, lifts, and air conditioning systems are all examples of mechanical operations that benefit from the power-generating ability of EMDSs. However, according to an International Energy Agency survey, one drawback of EMDSs is that they consume a tremendous amount of electricity, accounting for almost 70% of all industrial electricity consumption. This is because EMDSs always run at full spinning speed under continuous power, even when the end device requires very little power. Therefore, variable-frequency drives (VFDs), which first appeared in the early twentieth century, have been utilized to accelerate or deaccelerate the spinning speed of EMDSs.

By varying the voltage and frequency from the utility, VFDs can adjust the power factor to the control motor speed and torque in order to ensure that load requirements are met, thus saving energy and enhancing efficiency.

### Challenge

To properly manage and centralize VFD and EMDS control, a network management system (NMS), SCADA, and PLC are usually utilized to connect to an EMDS and VFD. However, this requires the operator to overcome the problems that are typically encountered when using different protocols; for example, PLCs usually support Ethernet protocols such as EtherNet/IP whereas VFDs tend to use Modbus RTU.

### The Solution

To enable communication between Ethernet and Modbus RTU devices, one of our Fieldbus gateways could be added between a PLC and VFD to allow the PLC to transmit commands to the VFD to control the spinning speed of the EMDS, which would be useful for such applications as pumps and conveyor belts.
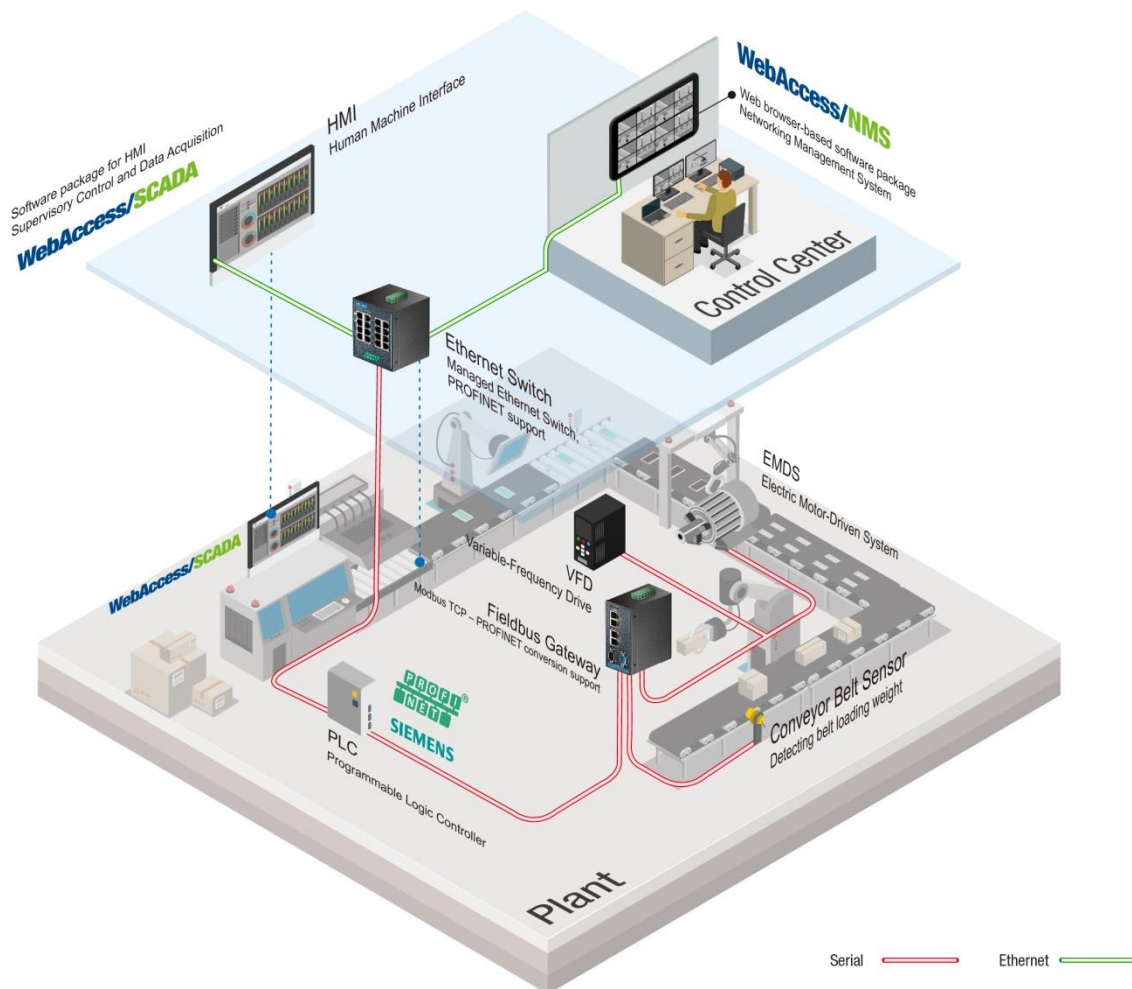
Graphics 1: Product deployment

The procedure is outlined as follows:

1. An operator would be required to define a threshold in SCADA in order to set the conditions under which the conveyor belt would operate at a given speed, as determined from sensor data.

2. Sensors for measuring the belt weight would be required to collect belt loading data for the SCADA system. Whenever the weight exceeds the defined threshold, the system would trigger the PLC to issue commands.

3. The VDF receives the commands from the PLC in order to, for example, adjust the utility voltage and frequency to control the EMDS spinning speed.

4. Based on the spinning speed, the conveyor belt speed is adjusted accordingly.

With the spinning speed and amount of torque being able to be set flexibly, an EMDS would no longer need to run at full power. The seamless process of data acquisition, M2M communication, network transmission, and centralized management promotes intelligent plant operation, which contributes to improving the management of power consumption and plant operations. This also lowers $CO_2$ emissions and ensures long-term sustainability for future generations.

## Features, Advantages, and Benefits

Advantech's ruggedized industrial Fieldbus gateways and protocol switches are complete protocol conversion solutions that can cover all your needs.

| Integration | Flexibility | Connectivity |
| --- | --- | --- |
| ✓ Supports common protocols such as EtherNet/IP, EtherCAT and PROFINET | ✓ Simple wire deployment and software setup | ✓ Fast network communication |
| ✓ Compatible with various PLCs | ✓ Upgrade-ready | ✓ Remote control |
| | | ✓ M2M communication |

### Integration

Different PLCs from different vendors usually support different protocols (e.g., Modbus TCP for Schneider, PROFINET for Siemens, and EtherNet/IP for Rockwell). Although ensuring protocol support might not be a difficult task for small start-up plants, upgrading and integrating a system to accommodate increases in business scale can be complex and costly. Advantech's Fieldbus product line supports various widely used industrial protocols (e.g., PROFINET, EtherNet/IP, and EtherCAT), thus easing the pressure of data conversion from various legacy devices such as VFDs.

### Flexibility

With Advantech's Fieldbus gateways, existing EMDSs, VFDs, PLCs, and original network infrastructure become reusable and upgrade-ready. This makes it possible to "future-proof" any plant because operators would simply need to spend only a little time and efforts on upgrading and can derive the most from the latest technologies. EMDSs currently on the market consume less power yet perform better than ever, resulting in greener plants and providing greater environmental protection.

### Management

The user-oriented design of the various WebAccess packages allows for real-time equipment status review, immediate diagnosis, and smart analysis. Advantech's WebAccess/SCADA can be used to automate complex industrial processes for situations involving remote operations. All the features found in conventional HMI and SCADA software packages can be accessed through a conventional browser, giving access to animated graphics, real-time data control, trends, alarms, and logs. WebAccess/NMS enables industrial-grade centralized networking management and provides a platform developed specifically for monitoring, setting, and maintaining devices via an IP-based network.

**Conclusion**

By implementing Advantech's Fieldbus solution, traditional factories can be transformed into intelligent green plants. With the features of integration, flexibility, and connectivity, Advantech Fieldbus gateways and WebAccess/NMS and WebAccess/SCADA bring seamless conversion between individual industrial protocols and allow the connection of devices with different protocols for diagnosis, analysis, and management.

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## Product Information

| Product Name | **EKI-1242EIMS**<br>Modbus RTUTCP—<br>EtherNet/IP conversion | **EKI-1242PNMS**<br>Modbus RTUTCP—<br>PROFINET conversion | **EKI-1242ECMS**<br>Modbus RTUTCP—<br>EtherCAT conversion |
|---|:---:|:---:|:---:|
| Modbus RTU/TCP | ✓ | ✓ | ✓ |
| EtherNet/IP | ✓ | | |
| PROFINET | | ✓ | |
| EtherCAT | | | ✓ |
| Dual Power Input | ✓ | ✓ | ✓ |
| Protocol Extensibility | ✓ | ✓ | ✓ |
| Build-in Real-Time Diagnostic | ✓ | ✓ | ✓ |