## SMART Factory

SOLUTIONS



SOLUTION



## **GREETINGS**

Since the foundation in 1959, Kunyoung Machinery Co., Ltd. has been specialized in air compressors for over 50 years. We are an energy saving specialist (ESCO) company with multiple air compressor patents such as for energy effective compressor control system and compressor control method with a built-in inverter. Based on our experience in domestic and overseas projects, Kunyoung's skilled employees will provide you with the most suitable and smartest air solution.



SCREW AIR COMPRESSOR ENERGY SAVING TECHNOLOGY

## **HISTORY**

2017. 11.

2018. 03.

1959. 11.	Kunyoung Machinery established in Seoyadong, Joongu, Daegu
2001. 03.	Upgraded to Gunyoung Machinery Co., Ltd. and moved to Soochangdong, Joongu, Daegu
2005. 01.	Screw compressor control device registered as utility model (No. 0374633)
08.	Daegu International Automative Equipment Exhibition (DAMEX2005)
09.	Registered as a clean specialist company of Employment and Labor Office in Daegu and Gyeongbuk area
05.	Electric construction license of Korea Electric Corporation
2009. 10.	Registered as a venture company at Korea Technology Credit Guarantee Fund
2011. 06.	Innovative SME (INNO-BIZ)
2014. 06.	Registered as a specialist company in parts and materials
2015. 08.	Patent registration (No. 10-1544037) for energy-saving compressor operation control system and method
10.	Small and Medium Business Administration Award and registered as an ESCO company
2016. 11.	Company research center registered
12.	Best Award for Study on Dual fire equipment and the Flow Characteristics of a Smart Grid High Efficiency Air Compressor

ISO 9001: Design and development of 2015 air compressor (energy-saving inverter and control system)

(The Korea Industrial Academy Technology Association)

The 39th Korea Energy Efficiency Award (Prime Minister Award)

## Expectation Effectiveness

Energy Saving (E-SAVING) and Energy Management System (EMS) minimize unnecessary energy consumption to achieve 15 ~ 35% energy efficiency.



Energy Saving (E-SAVING)



Energy Management System (EMS

## **Quality System Certificate**



Patent registration (Invert control)



Patent registration (Multi functional energy saving



Patent registration (intelligen air compressor)



Patent registration (Screw compressor control)



Patent registration (on / off control system)



INNO BIZ



Corporate Research Center



ISO 9001:2015

## **100 KUNYOUNG**

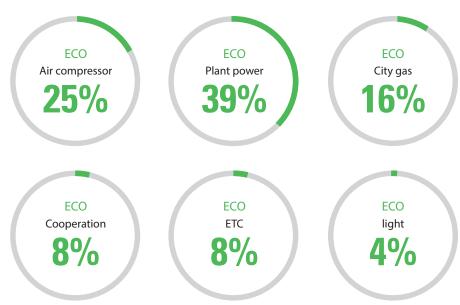
## All about **Compressors Kunyoung Machinery Co., Ltd.**

Since the foundation in 1959, Kunyoung Machinery Co., is making best effort to provide the world-class compressors.

# MAXIMISE YOUR ENERGY SAVING

Pneumatic energy is the most expensive power source.

We have to analyze the industrial energy use to save energy cost. An air compressor consumes more than 25% of the total energy cost, which is why, above all, it needs diagnosis and improvement for energy efficiency.





We will provide you with the optimal operation control system solution that best suits your company, with experience of domestic and overseas projects. Based on our experience in domestic and overseas projects, Kunyoung's skilled employees will provide you with the most optimal operation control system.



### **Business procedures**

#### Selecting a target workplace

0

Analysing a user's operating a three phase induction motor

Estimating energy saving

Ω

Energy diagnosis and optimal operation control system installation

V

Pilot operation and energy saving measurement

Performance evaluation and operation



Energy reduction verification report

#### **Survey report**



Inverter-controlled air compressor

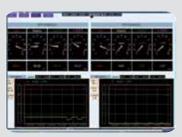


Power meter, flow meter



Gathering Board





Monitoring system



## Oil Free Compressor Solution / Oil Injection Compressor Solution

#### OIL FREE COMPRESSOR SOLUTION

#### Producing environment friendly clean compressed air

· Oil-free screw compressor produces clean compressed air without oil, and can be widely used in industrial applications such as food, pharmaceutical, semiconductor, printing, chemical and precision painting.



#### **Application areas**

#### > Precision parts semiconductor

Clean room facility, cleaning, cooling, drying, post treatment, production line, gas generator

#### Food

Packaging, filling, powder transfer, cleaning, drying, stirring, control drive and steering, etc.

#### > Pharmaceutical

Packing, filling, transfer, production line, cleaning, drying and stirring etc.

#### Medical field

Medical gas supply, Air Vacuum, Dental use

#### **>** Painting

Precision painting

#### > Plant

Gas generator, instrument, dust collector filter cleaning

#### > Printing

Precision printing, binding

#### > Chemical field

Production of chemical products

#### > Fish farm

Dissolver, oxygen depletion system

#### > Agricultural

Cultivation and pisciculture, washing, and production facilities

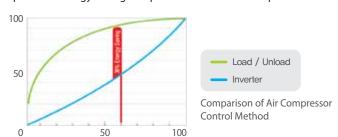
#### OIL INJECTION COMPRESSOR SOLUTION

#### **Direct Drive Type High Efficiency Screw Compressor**

•The screw compressor is equipped with a high-efficiency air-end that minimizes power transmission loss by driving the motor and air-end 1:1, not using the accelerating gears of compressor.

#### **Inverter Drive Type High Efficiency Screw Compressor**

· Up to 30% energy saving compared to a standard compressor.





## **Pneumatic Energy**

#### Pneumatic energy diagnosis and analysis

 $\cdot$  Compressor operating rate analysis is a program calculating the estimated amount of energy saving by collecting data of compressor operation pattern for 1 ~ 7 days.





Operation rate Analysis Screen

Operation rate Report Screen

#### **Energy Diagnostic Analysis Example 75kW (100Hp)**

Category	Unit	Details	NB
Operation rate	%	54	(Load/ No load)x100
Number of working days per year	Day	310	
Unit price of power source	KRW	110	
Cost of load power	KRW	32,600,000	
Cost of no load power	KRW	14,000,000	Energy cost saving amount (saving rate 30%)
Total power cost	KRW	46,600,000	

### Pneumatic energy saving example / textile industry

· Air compressor capacity: 75 kW (100 hp)

• Annual operating time: 24hrs / day \* 320 / year = 7,680hrs

 $\cdot$  Electricity unit price: 120 KRW

· Load ratio: 70%

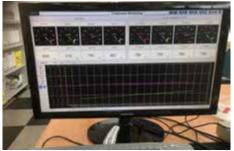
• Load power cost: 75kW x 7,680Hrs x 120 x 0.7 = 48,384,000 KRW/year

• No-load power cost: 37.5kW x 7,680Hrs x 120 x 0.3 = 10,368,000 KRW/year

• Annual energy cost: 48,384,000 + 10,368,000 = 58,752,000 KRW/year

**Energy cost improvement:** 10,368,000 KRW/year



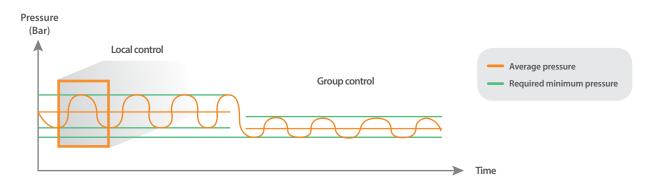




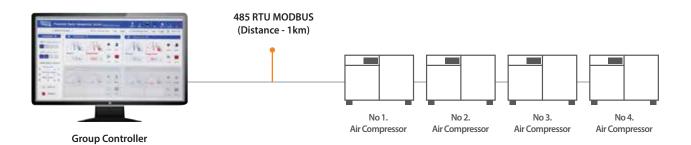
## **Air Compressor Integrated Management System**

#### Air Compressor Integrated Management System

• The problem, when operating multiple air compressors, is unnecessary energy loss from independent operation of the air compressors. The integrated control system becomes the master controller to bring individually operating air compressors under group control and save 15 ~ 35% energy by optimal operation.



#### Air Compressor Integrated Management System Setup



#### Air Compressor Integrated Management System Main Function



## Remote monitoring

Operation status check / Real time pressure monitoring



## Remote control

Individual operation, stoppable



## Backup operation

in case of compressor failure



## Communication base

RS485TU Communication based control / Maximum distance 1km



## Operation rate control

Compressor operation time constantly maintained



## Reduction of maintenance cost

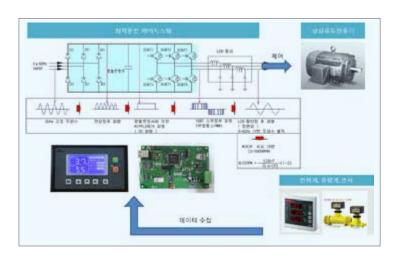
Annual maintenance cost reduced

## **Air Compressor Optimal Operation Control System**

· A sensor(pressure, temperature, flow rate, power) is mounted on a three-phase induction motor (fan, pump, blower, compressor) operating at constant speed in the industrial sector and equipment to collect data for the optimal operation control system reducing unnecessary energy waste and greenhouse gas. Real time monitoring leads immediate checking and control to improve productivity.



Energy Saving (E-SAVING)



Optimal operation control system process diagram

Model	ES22	ES37	ES55	ES75	ES110	ES160			
Compressor rating (HP)	30	50	75	100	150	200			
Compressor rating (kW)	22	37	55	75	110	160			
Compressor rating (A)	45	75	110	152	223	325			
Size (mm)	600(W) x 550(D) x 1500(H)		700(W) x 650	700(W) x 650(D) x 1700(H)		800(W) x 750(D) x 1800(H)			
Major functions	1. Maximum energy saving in application of inverter compressor and communication control  2. PID application for air compressor optimizes compressor torque  3. Stable compressor and inverter control by application of PEMS, inverter controller  4. ECO operation for decrease in air demand  5. Independent temperature sensor, pressure sensor  6. By-pass function for inverter maintenance								



## **Mass Flowmeter for Air Compressor**

- · a flow meter must be essentially installed to measure the air compressor efficiency (non-power)

  Air compressor efficiency (non-power) = defined as the power consumed to produce the flow (kW / m3 / min)
- · In-house development of mass flowmeter to draw the desired amount of energy by the thermodynamic calculation method of the flow computer without the correction coefficient of the fluid under the condition that the temperature and pressure of the compressed fluid changes

#### Mass flow meter for compressed air only



### O Program for flow meter monitoring



## **Air Compressor dedicated Monitoring Program**

·The air compressor data monitoring system transmits the real-time status and data of the optimal operation control system to the web server online and stores the collected data, e.g., status and operating environment and energy consumption of the three-phase induction motor in the database for 5 years.

#### Real-time monitoring screen to display energy use status



#### • Air compressor real-time monitoring screen



## SMART FACTORY

SOLUTIONS

## All about **Compressors**

## Kunyoung Machinery Co., Ltd.

Since the foundation in 1959, Kunyoung Machinery Co., is making best effort to provide the world-class compressors.

