Plant Air Energy Savings

Proposal for a 50% reduction
— Contributes to CO2 emissions reduction —

Plant air consumption
- Tools 5%
- Other 10%
- Air leakage 15%
- Actuators 20%
- Air blow 50%
- Air 20%
- Electric power consumption

Air Blow
Blows machining chips during processing

Blowing by Air Gun
Low pressure loss blow gun

Air Purge/Air Leakage
Air purging for placement verification
Air supply stops when equipment is not operating

Actuators
Cylinder one side pressure regulation

Low Power Consumption

Air Line Maintenance
Improved visibility

Compressor power

Proposal for a 50% reduction — Contributes to CO2 emissions reduction —

Plant Air Energy Savings

Compressor power

Electric power consumption

Air 20%

Air supply stops when equipment is not operating

Air consumption

Air leakage 15%

Air blow 50%

Air 20%

Electric power consumption

Air consumption

Actuators 20%

Air consumption

Plant air consumption

Air leakage 15%

Tools 5%

Other 10%

Proposed power consumption

Air blow 50%

Air 20%

Electric power consumption

Plant Air

Energy Savings

Compressor power

Electric power consumption

Air 20%

Air supply stops when equipment is not operating

Air consumption

Air leakage 15%

Tools 5%

Other 10%

Actuators 20%

Air blow 50%

Air 20%

Electric power consumption

A diagram illustrating the energy savings in plant air consumption along with various components and operations.
**Example 1: Air Blow**

Reduce air consumption for air blow.

**Before Improvement**
- Filter
- Regulator
- Coiled tube
- S coupler
- Pressure regulation
- Effective area ratio: 0.5 : 1
- Pressure loss: High

**After Improvement**
- Filter
- Regulator
- Coiled tube
- S coupler
- Pressure regulation
- Effective area ratio: 3 : 1
- Pressure loss: Low

Nozzles are attached

**Effect of Energy Saving Improvement**

Air consumption

Before: 100%
After: 75% Reduction

---

**Example 2: Blowing by Air Gun**

Reduce air consumption for air blow.

**Before Improvement**
- Conventional coupler model
- Conventional coiled tube model
- Nozzle ø0.125in (ø3mm)
- Effective area ratio: 0.69 : 1
- Pressure loss: High

**After Improvement**
- Pressure regulation
- Effective area ratio: 3.04 : 1
- Pressure loss: Low

A nozzle is attached to the tip of the blow gun. A regulator is added and pressure control is improved. Fittings and tubing are changed to those with large effective areas.

**Effect of Energy Saving Improvement**

Air consumption

Before: 100%
After: 10% Reduction

---

In the case of air guns, energy saving measures are not typically considered and factory air line pressure is used directly in most cases.
Air Purge/Air Leakage

Reduce air consumption when equipment is not operating.

Before Improvement

Air supply circuit is used only when measuring a workpiece.

Installation of a 2 port valve with a throttle on the air catch sensor

After Improvement

Air continues to blow whether a workpiece is present or not.

Saves energy when not operating

- Stops air supply when not operating using an installed master solenoid valve.
- Controls air supply with a leakage checker

Actuators

Reduce air consumption by regulating the non-operating return-stroke side.

Before Improvement

Air supply to the equipment is stopped when it is not operating.

Because the compressor is in continuous operation even when the equipment is non-operated, air is constantly consumed due to air leakage, purging, etc.

After Improvement

Air supply circuit is used only when measuring a workpiece.

Installation of a 2 port valve with a throttle on the air catch sensor.

 pressure regulation on the return stroke side

Pressure valve

Flow valve

Regulator with check valve + Speed controller

Quick SUP/EXH valve + Speed controller (meter-in, meter-out)

Effect of Energy Saving Improvement

Air consumption

70% Reduction

Air purge

Residual relief 3 port valve

100% Reduction

Effect of Energy Saving Improvement

Air consumption

25% Reduction

Air continues to blow whether a workpiece is present or not.

Example 3

Example 4
Lower Pressure in the Piping Line

Reduce compressor power consumption by reducing pressure loss in the piping line.

85.5 psi (0.59 MPa) ↔ 100 psi (0.69 MPa)

Lowers discharge pressure of the compressor by using S couplers with low pressure loss.

Example 6

Low Power Consumption

Reduce power consumption by using low-wattage devices.

- 5 port solenoid valve
  
  *Series SY*
  
  0.35 W/0.1 W
  
  (Standard) (with power saving circuit)

- 2 port solenoid valve
  
  *Series VXE*
  
  1.5 W to 3 W
  
  (Reduced to one-third compared to existing models)

- Temperature control equipment
  
  Refrigerated thermo-chiller
  
  Double inverter type
  
  *Series HRZ*
  
  1.1 kWh/h
  
  (Reduced by 82% compared to existing models)

Operating conditions: -14°F (-10°C), 0 kW load 50%, 2 kW load 50%

Example 7

Air Line Maintenance

Improve control and visibility of pressure and flow rate.

Flow control of the main line and equipment line

Measuring instruments are used effectively. Flow rate is numerically controlled, and targets and effects are clearly shown.

Digital flow switch

Confirms flow rate and pressure of equipment

Digital pressure switch

Effects of Energy Saving Improvement

Electric power consumption

8% Reduction

Before

After

50% Reduction

Before

After

Energy saving program

PC simulation of energy-saving effects
1 Air Blow

- Blow Gun: Series VMG
- Nozzles for Blowing: Series KN

<Related Equipment>
- Compact Manometer: Series PPA
- Regulator: Series AR
- Direct Operated Precision Regulator: Series ARP
- Pilot Operated 2 Port Solenoid Valve: Series VXD
- S Couplers: Series KK
- Non-contact Sensor for Work-piece Placement Confirmation/Air Catch Sensor: Series ISA2
- Wear-resistant Tubing: Series TUZ

<Environmentally-resistant Products>
- Brass One-touch Fittings: Series KQB
- FEP Tubing (Fluoropolymer): Series TH
- Water Resistant Cylinders

2 Blowing by Air Gun

- Blow Gun: Series VMG
- Nozzles for Blowing: Series KN

<Related Equipment>
- Compact Manometer: Series PPA
- Regulator: Series AR
- Direct Operated Precision Regulator: Series ARP
- Pilot Operated 2 Port Solenoid Valve: Series VXD
- S Couplers: Series KK
- Non-contact Sensor for Work-piece Placement Confirmation/Air Catch Sensor: Series ISA2
- Wear-resistant Tubing: Series TUZ

3 Air Purge/Air Leakage

- Blow Gun: Series VMG
- Nozzles for Blowing: Series KN

<Related Equipment>
- Compact Manometer: Series PPA
- Regulator: Series AR
- Direct Operated Precision Regulator: Series ARP
- Pilot Operated 2 Port Solenoid Valve: Series VXD
- S Couplers: Series KK
- Non-contact Sensor for Work-piece Placement Confirmation/Air Catch Sensor: Series ISA2
- Wear-resistant Tubing: Series TUZ

<Environmentally-resistant Products>
- Brass One-touch Fittings: Series KQB
- FEP Tubing (Fluoropolymer): Series TH
- Water Resistant Cylinders

4 Actuators

- Finger Valve: Series VHK
- Residual Relief 3 Port Valve: Series VHS
- Hand Valve: Series VH
- 3 Port Solenoid Valve Pilot Operated Poppet Type: Series VP
- Air Saving Speed Control Valve: Series ASR/ASQ
- Non-rotating Double Power Cylinder: Series MGZ
- Valve Mounted Compact Cylinder: Series CVQ

<Related Equipment>
- Miniature Regulator: Series ARJ
- Compact Manifold Regulator: Series ARM

5 Lower Pressure in the Piping Line

- S Couplers: Series KK
- S Couplers: Series KK130
Low Power Consumption

- 5 Port Solenoid Valve, Series SY
- Energy Saving Type 2 Port Solenoid Valve, Series VXE
- Refrigerated Air Dryer, Series IDF
- Refrigerated Thermo-chiller, Series HRZ

Air Line Maintenance

- Digital Flow Switch for Air, Series PF2A
- Digital Flow Switch for Water, Series PF2W

SMC pneumatic system energy saving program, downloadable version
This program was developed to enable quantitative tracking of multiple conditions (consumption volume, flow rate, pressure, humidity, etc.) from the air source through the final piece of equipment. It can be downloaded from the www.smcusa.com

A CD-ROM version is also available.

SMC pneumatic model selection program, Web version
This program can be used to automatically select the pneumatic cylinder drive system component equipment. It can be downloaded from the www.smcusa.com.

A CD-ROM version is also available.

SMC Corporation of America
10100 SMC Blvd., Noblesville, IN 46060
www.smcusa.com
(800) SMC.SMC1 (762-7621)
For International inquiries: www.smcworld.com

SMC Pneumatics System Energy Saving Program Ver. 3.1a, Downloadable Version
Description and features of upgrade from Ver. 2 to Ver. 3.1a
1. Multilanguage support
The following eight languages are supported: English, German, French, Italian, Spanish, Chinese, Korean and Japanese.
2. Individual units customizable
The unit for each input and output item can be individually set to match the conventions of the country where the equipment will be used. The currency unit is also selectable. Note that the initial default after installation is SI units.
3. Addition of HTML format output function
A function has been added that allows outputting of all calculation results as an HTML file that can be distributed electronically.
4. Database update
A database of new products has been added.
5. Addition of other useful functions
Conductance synthesis: Direct input to a list is supported.
Air tank selection: Selection only by discharge has been added.
Conductance search: Flow characteristics are now displayed for each flow passage.
Database update: When new products are added, the data can be downloaded from the Web and the database is automatically updated.

SMC Corporation of America, All Rights Reserved.
All reasonable efforts to ensure the accuracy of the information detailed in this catalog were made at the time of publishing. However, SMC can in no way warrant the information herein contained as specifications are subject to change without notice.

NT-10M/PP