Proposal for Air-saving System

Contributes to CO^2 Emissions Reduction

Air Blow

Nozzles for Blowing

Through the use of a smaller diameter nozzle, air consumption can be reduced by **62%**

Pulse Valve

High peak pressure and low air consumption **35%** reduction

Impact Blow Gun

Air consumption **85%** reduction

Vacuum Equipment

Vacuum Ejector

Due to the energy-saving function, air consumption can be reduced by **93%**

Actuators

Air Saving Speed Controller

By simply mounting on your current air cylinder, air consumption can be reduced by **25%**

Air Cylinder

By selecting an optimal size air cylinder, air consumption can be reduced by **29%**

Booster Regulator

Power consumption **40%** reduction

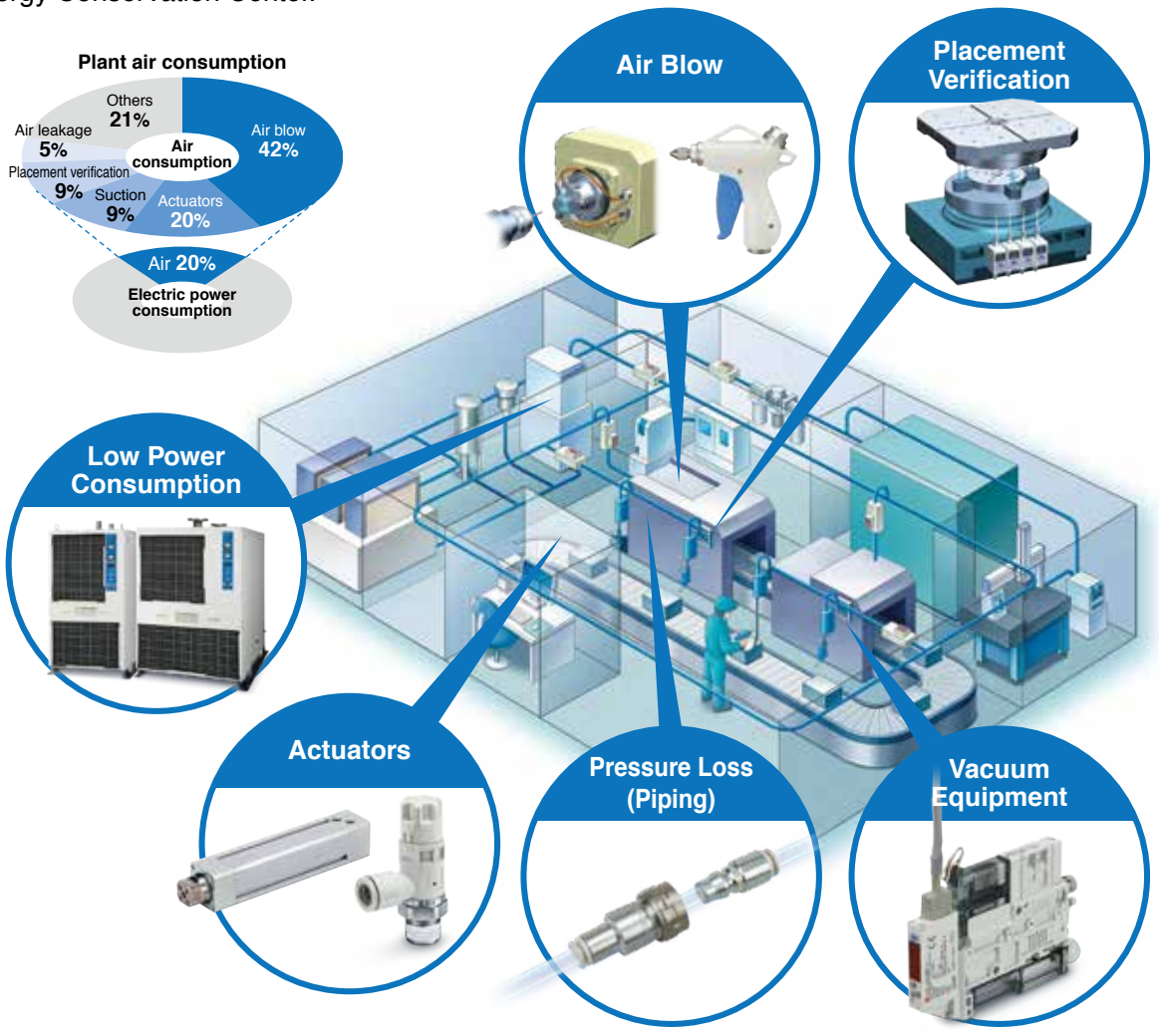
Air Blow | Blowing by Air Gun | Air Purge | Actuators | Vacuum Equipment | Lower Piping Line Pressure | Low Power Consumption

Successful cases of companies that implemented measures for energy saving

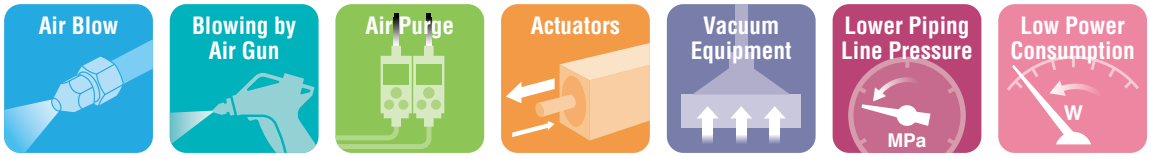
Company A performance		Company B performance	
Electricity	3000 kW ➡ 1400 kW	Electricity	10000 kW ➡ 7000 kW
CO_2	0.9 t reduction/year	CO_2	1.7 t reduction/year
Cost	$752,000 reduction/year	Cost	$1,410,000 reduction/year

We will help you save energy.

- We will help you to improve and standardize your equipment and adopt new equipment.
- We also proactively promote activities through official organizations, such as holding seminars at the Energy Conservation Center.



Energy-saving Themes



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Air Blow

Blowing by Air Gun

Air Purge

Actuators

Vacuum Equipment

Lower Piping Line Pressure

Low Power Consumption

Information

1 mm to 0.0393701 inches
1 m to 3.28084 ft
1 l/min to 0.26417287472922 gpm
1 MPa to 145.038 psi
1 m³ to 35.3147 ft³

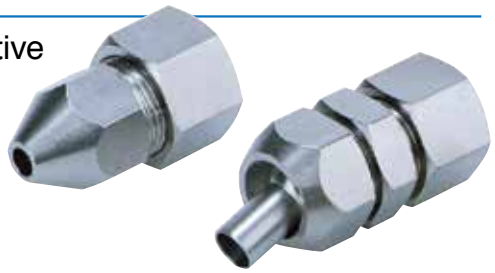
Air Blow

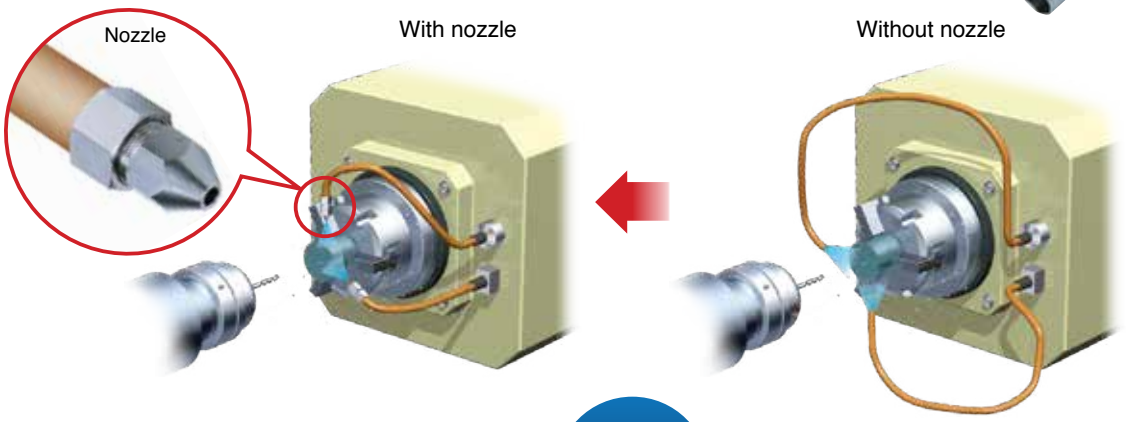
Air consumption

62% reduction

Air consumption can be reduced through the use of a smaller diameter nozzle.

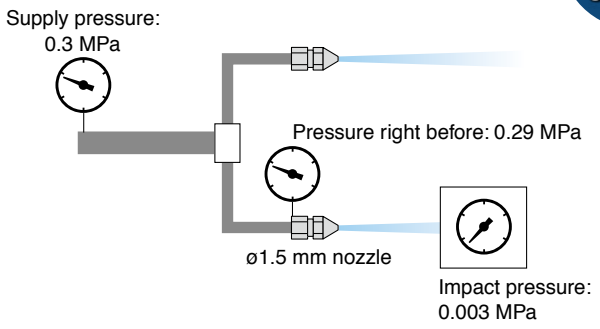
Blow circuit that facilitates effective pressure use





Effects of Energy Saving

Energy-saving Model



Collective piping: TU0805, 2 m
Intermediate and end piping:
TU0604, 0.5 m each
Distance: 100 mm

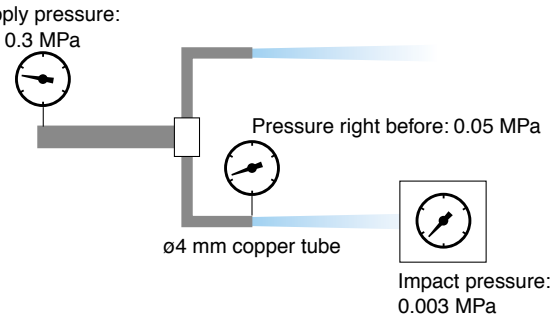
Air consumption per nozzle:
74 L/min (ANR)

Blow time: 2 sec.
Annual operating cycles:
900000

4464 m³/year (ANR)
($63 /year)

($100/year reduction)

Existing Model

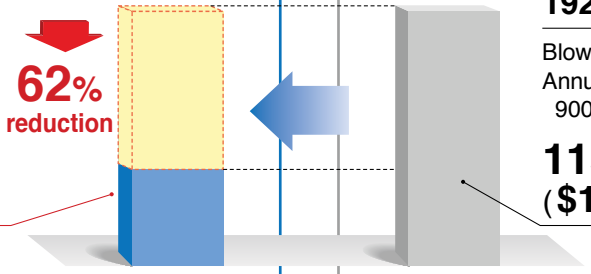


Collective piping: TU0805, 2 m
Intermediate and end piping:
TU0604, 0.5 m each
Distance: 100 mm

Air consumption per nozzle:
192 L/min (ANR)

Blow time: 2 sec.
Annual operating cycles:
900000

11520 m³/year (ANR)
($163/year)



Corresponding value: Air unit $0.014/m³ (ANR)

1 mm to 0.0393701 inches
1 MPa to 145.038 psi
1 m³ to 35.3147 ft³

Air Blow

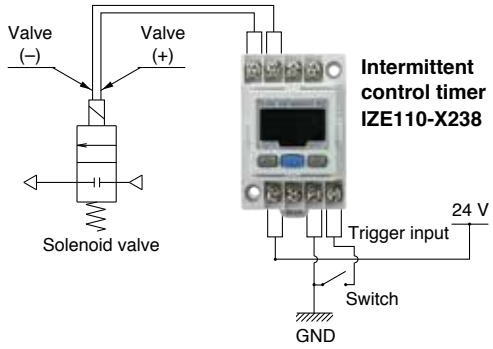
Air consumption

50% reduction

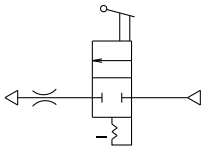
By using intermittent blow based on an intermittent control timer, air consumption can be reduced by 50%.

Intermittent Blow Circuit

[Output under timer control]



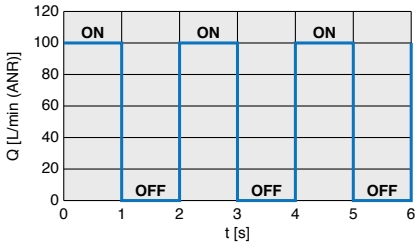
Continuous Blow Circuit



Energy-saving Circuit

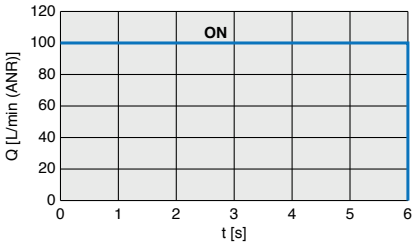
The duty ratio can be freely adjusted.
By setting the duty ratio to one that has the same blow effectiveness, air consumption can be reduced.

Example:



Existing Circuit

The duty ratio is equivalent to 100%.



Effects of Energy Saving

Intermittent Blow Circuit

Pressure right before: 0.2 MPa
Blow time: 10 s
(Frequency: 12 times/h)
One blow operation:
ON for 1 s, OFF for 1 s;
Repeated a total of 5 times
Working hours: 10 h/day
(250 days/year)
Nozzle diameter: 1 mm

318.2 m³/year (ANR)
($4.50/year)

($4.50/year reduction)

50% reduction

Energy-saving Circuit

Existing Circuit

Pressure right before: 0.2 MPa
Blow time: 10 s
(Frequency: 12 times/h)
Working hours:
10 h/day (250 days/year)
Nozzle diameter: 1 mm

636.3 m³/year (ANR)
(**$9.00**/year)

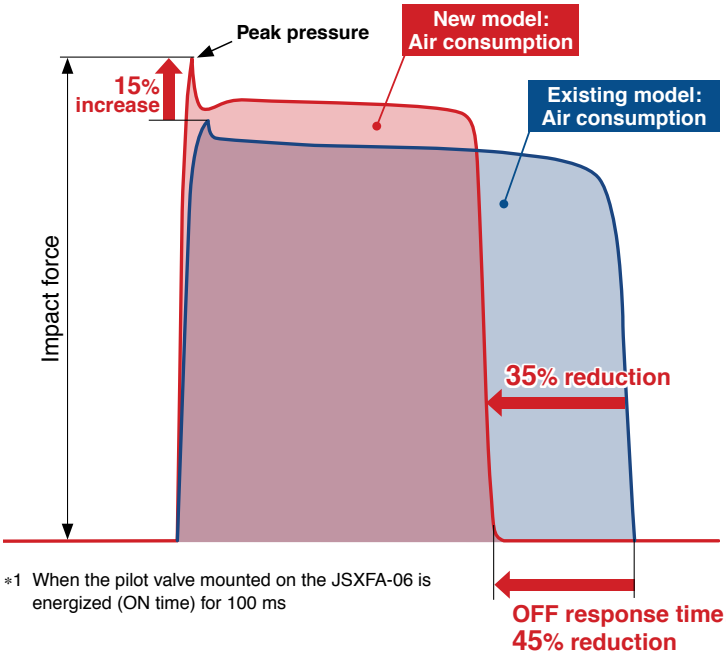
Existing Circuit

Corresponding value: Air unit $0.014/m³ (ANR)

High peak pressure and low air consumption

Peak pressure
15% *1
increase

Air consumption
35% *1
reduction



*1 When the pilot valve mounted on the JSXFA-06 is energized (ON time) for 100 ms

Effects of Energy Saving

Energy-saving Model

·Optimized internal geometry
·Improved response

Injection quantity per cycle:
57 L/cycle (ANR)

Pressure: 0.9 MPa
Energizing time: 100 ms
Annual operating cycles: 240000

13680 m³/year (ANR)
($193/year)

($105/year reduction)

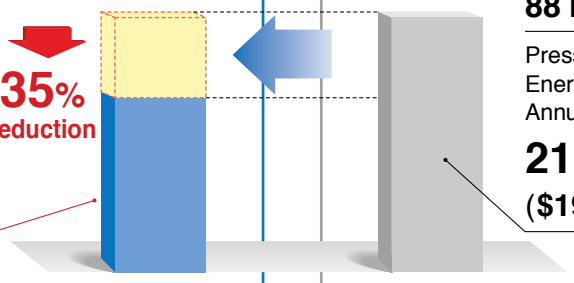
Existing Model

·Flow path construction with a large pressure loss
·Long response time

Injection quantity per cycle:
88 L/cycle (ANR)

Pressure: 0.9 MPa
Energizing time: 100 ms
Annual operating cycles: 240000

21120 m³/year (ANR)
($198/year)



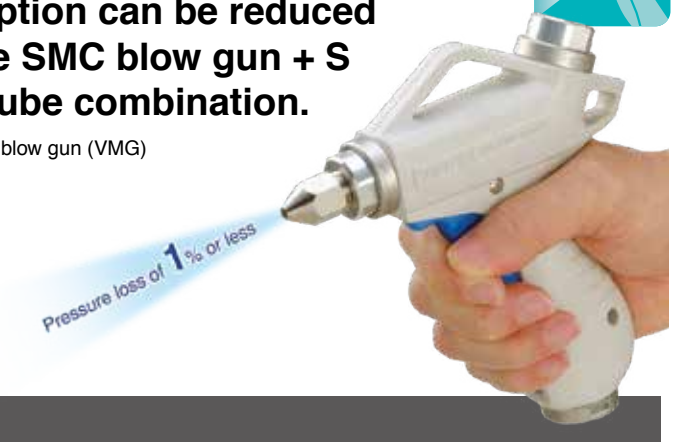
Corresponding value: Air unit $0.014/m³ (ANR)

Power consumption

20% reduction

Power consumption can be reduced by 20% with the SMC blow gun + S coupler + coil tube combination.

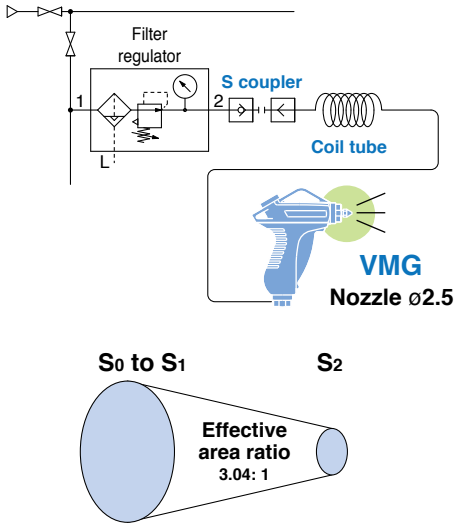
* 10% reduction with only the blow gun (VMG)



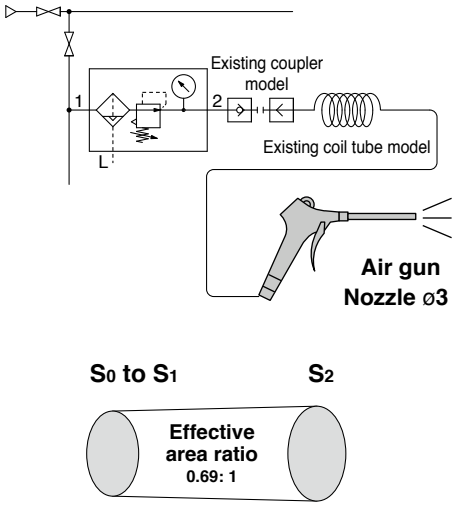
Example of Improvement

Review the blow work and change to the SMC blow gun, S coupler, and coil tube combination to create a larger effective area.

After improvement



Before improvement



Energy-saving Model

Impact pressure: 0.011 MPa (Distance: 100 mm)
Blow time: 10 s (Frequency: 12 times/h)
Working hours: 10 h/day (250 days/year)
Total working hours: 8300 h
Compressor pressure: **0.5 MPa**
Air consumption: **257 L/min** (ANR)

Power consumption by compressor:
1.25 kW
(**$1462**/year)

($362/year reduction)

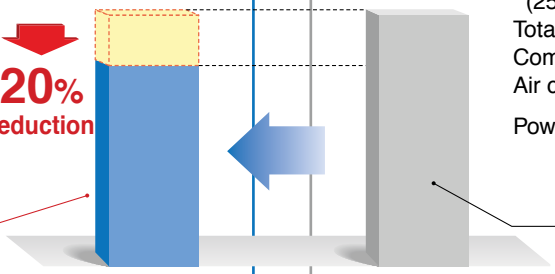
Effects of Energy Saving

20% reduction

Existing Model

Impact pressure: 0.011 MPa (Distance: 100 mm)
Blow time: 10 s (Frequency: 12 times/h)
Working hours: 10 h/day (250 days/year)
Total working hours: 8300 h
Compressor pressure: 0.6 MPa
Air consumption: 287 L/min (ANR)

Power consumption by compressor:
1.56 kW
(**$1824**/year)

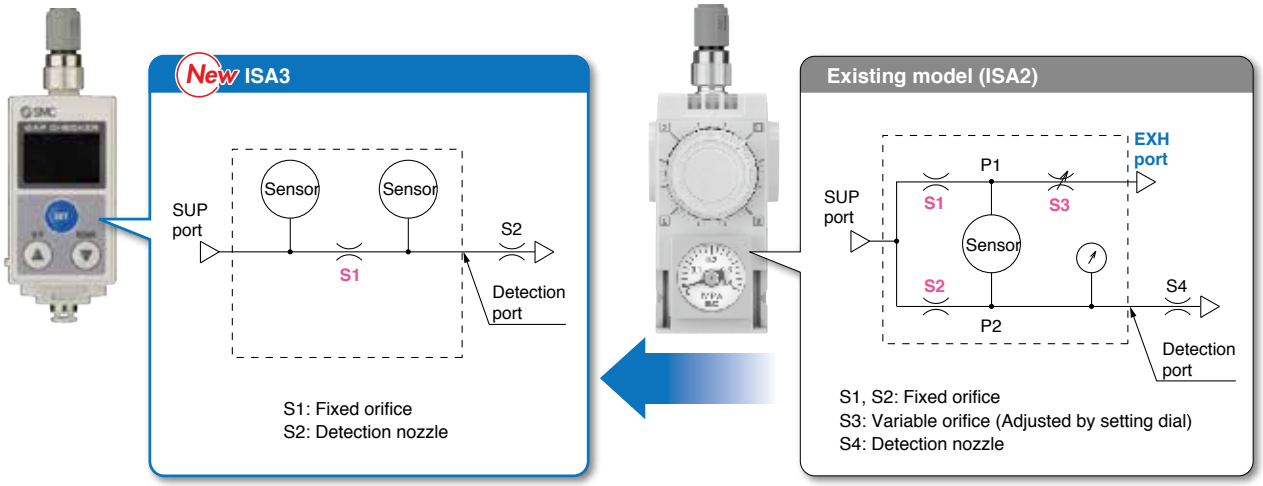


Corresponding value: Air unit $0.14/kWh

Air consumption
60% reduction

Air consumption when a workpiece is seated is now 0 L/min due to the new detection principle.

Comparison of detection circuit



Due to the new detection principle, the need for air to be exhausted from the product has been eliminated. This makes the flow consumption 0 L/min when a workpiece is seated.
The result is a great reduction in air consumption compared with the existing model.

∗ Conditions: Unseated for 5 seconds and seated for 20 seconds (For the G type)

Effects of Energy Saving

Energy-saving Model

·Air consumption
When placed: 0 L/min (ANR)
When not placed: 10 L/min (ANR)
·Air consumption per cycle:
0.83 L/cycle (ANR)
·Annual operating cycles: 860000

Air consumption (When placed):
0 L/min (ANR)

717 m³/year (ANR)
($10/year)

($15/year reduction)

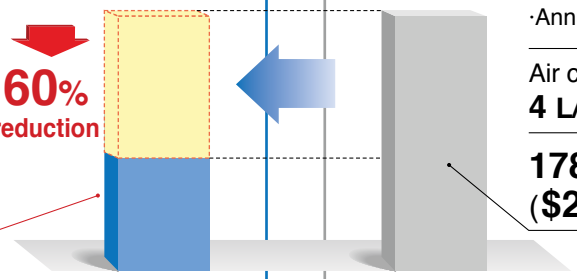
60% reduction

Existing Model

·Air consumption
When placed: 4 L/min (ANR)
When not placed: 10 L/min (ANR)
·Air consumption per cycle:
208 L/cycle (ANR)
·Annual operating cycles: 860000

Air consumption (When placed):
4 L/min (ANR)

1789 m³/year (ANR)
($25/year)



Corresponding value: Air unit $0.014/m³ (ANR)

Air consumption

29% reduction

Air consumption can be reduced by selecting an optimal size air cylinder.

Intermediary Bore Sizes

Air consumption can be reduced by up to 29%

Bore size (mm)	ø40	ø45	ø50	ø56	ø63	ø67	ø80	ø85	ø100
Air consumption L/min (ANR)	1.4	1.8	2.2	2.8	3.6	4.1	5.8	6.6	9.1

Conditions/Supply pressure: 0.5 MPa
Load factor: 50%, At 100 mm stroke

18% reduction | 22% reduction | 29% reduction | 27% reduction

Example Bore size for 85 kg workpieces

Conditions/Supply pressure: 0.5 MPa, Load factor: 50%

Bore size (mm)	Theoretical output (N)	Output for load factor of 50% (kg)	Judgment
ø63	1559	79.5	Not acceptable (Insufficient)
ø80	2513	128.2	Acceptable (Excessive)

When intermediary bore size ø67 is used

ø67	**1763**	**89.9**	**OK**

Existing size: ø80
↓
Could be switched to intermediary bore size ø67

Effects of Energy Saving

Energy-saving Model

Bore size: ø67
Stroke: 100 mm
Pressure: 0.5 MPa
Load factor: 50%

Per single reciprocation:
4.1 L/min (ANR)

When it is operated
1000000 times/year

4100 m³/year (ANR)
($58/year)
($24/year reduction)

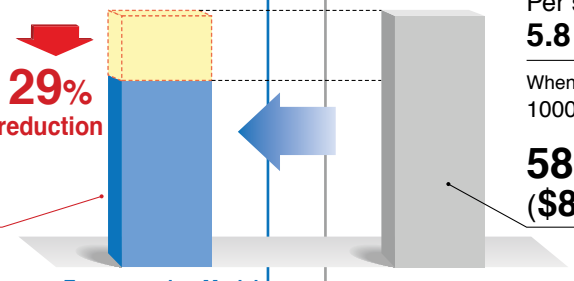
Existing Model

Bore size: ø80
Stroke: 100 mm
Pressure: 0.5 MPa
Load factor: 50%

Per single reciprocation:
5.8 L/min (ANR)

When it is operated
1000000 times/year

5800 m³/year (ANR)
($82/year)



Corresponding value: Air unit $0.014/m³ (ANR)

Air consumption

14% reduction

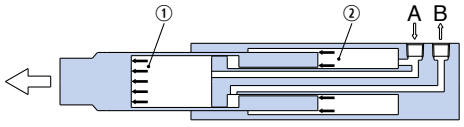
Air consumption can be reduced by 14% due to the reduced cylinder size.

It is possible to reduce air consumption in the retracting direction, compared with a standard cylinder with equivalent output in the extending direction, due to the doubled piston area in the extending direction.

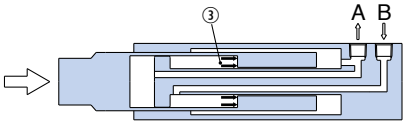
Double extension output power!

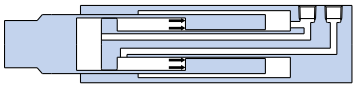
SMC's unique cylinder construction doubles the piston area in the extending direction. This is an ideal air cylinder for lifting and press applications.

Air pressure supplied from A operates on both surfaces ① and ②. (Extension)



Air pressure supplied from B operates on surface ③. (Retraction)



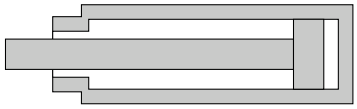


ø63

Piston area
Extension: 5945 mm²
Retraction: 2313 mm²

Increased energy saving and space saving
Reduced cylinder size

Size reduction
ø63 ← ø80



ø80

Piston area
Extension: 5030 mm²
Retraction: 4540 mm²

Energy-saving Model

Bore size: ø63
Stroke: 200 mm
Pressure on the extension side: 0.5 MPa

Theoretical output (Extension side): 2973 N
Per single reciprocation:
9.9 L (ANR)

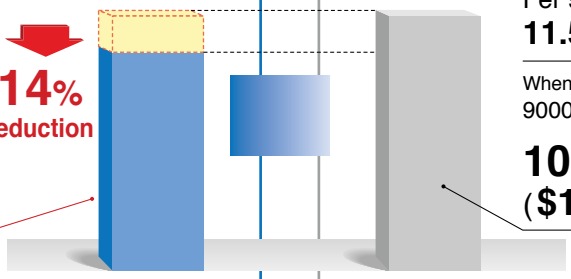
When it is operated
900000 times/year

8910 m³/year (ANR)
($126/year)

($20/year reduction)

Effects of Energy Saving

14% reduction



Energy-saving Model

Existing Model

Bore size: ø80
Stroke: 200 mm
Pressure: 0.5 MPa

Theoretical output (Extension side): 2520 N
Per single reciprocation:
11.5 L (ANR)

When it is operated
900000 times/year

10350 m³/year (ANR)
($146/year)

Existing Model

Corresponding value: Air unit $0.014/m³ (ANR)

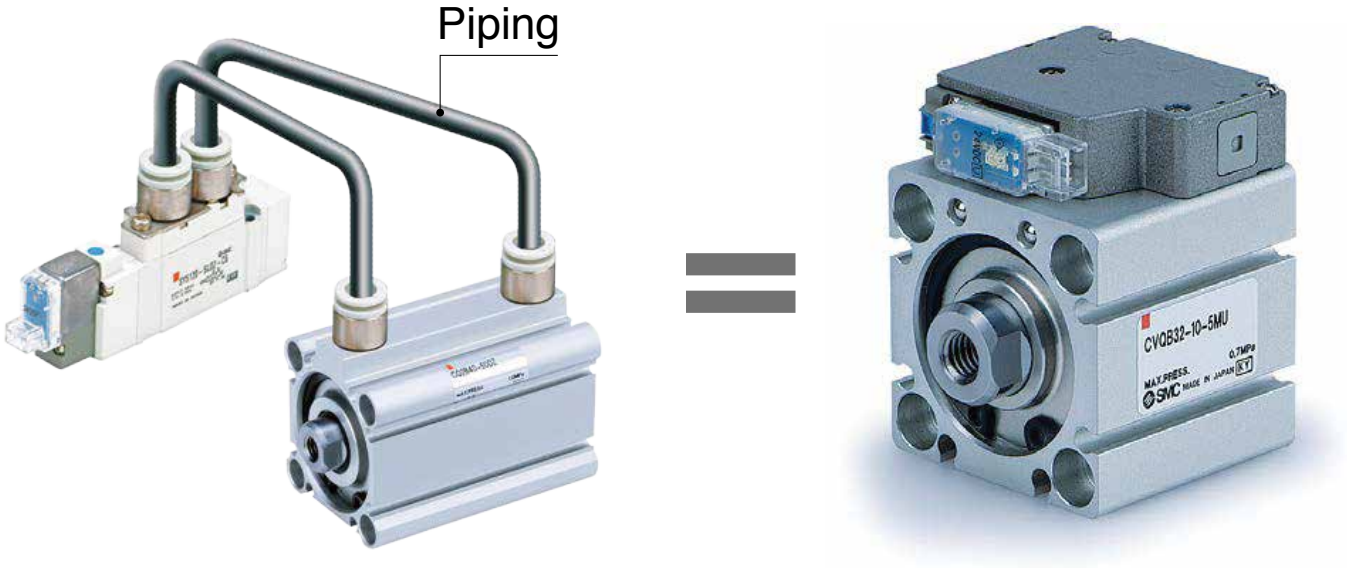
Air consumption

37% reduction

Energy Saving

Air consumption between the valve and cylinder can be reduced by approximately **37%**.

Valve and compact cylinder integrated for compactness



Energy-saving Model

CVQ
Bore size: ø32
Stroke: 50 mm
No piping between the valve and the cylinder
Supply pressure: 0.5 MPa

Per single reciprocation:
0.42 L (ANR)

When it is operated
900000 times/year

380 m³/year (ANR)
(**$5**/year)

($3/year reduction)

Effects of Energy Saving

37% reduction

Energy-saving Model

Existing Model

CQ2
Bore size: ø32
Stroke: 50 mm
Piping bore: 4 mm
Piping length: 2 m (Between the valve and the cylinder)
Supply pressure: 0.5 MPa

Per single reciprocation:
0.67 L (ANR)

When it is operated
900000 times/year

606 m³/year (ANR)
(**$9**/year)

Existing Model

Corresponding value: Air unit $0.014/m³ (ANR)

1 mm to 0.0393701 inches
1 MPa to 145.038 psi
1 L to 0.264172 gal
1 m³ to 35.3147 ft³

Air consumption

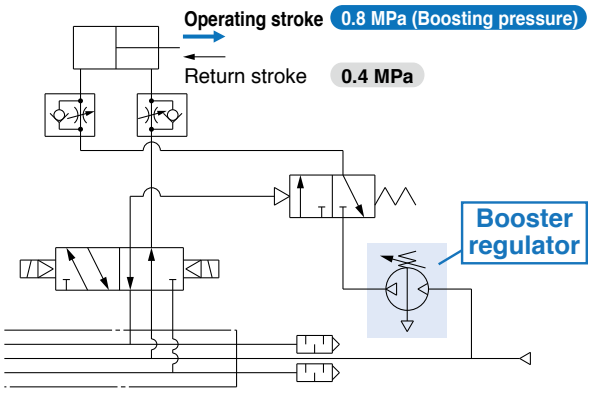
33% reduction

Air consumption can be reduced by 33% due to the optimization of the booster circuit.

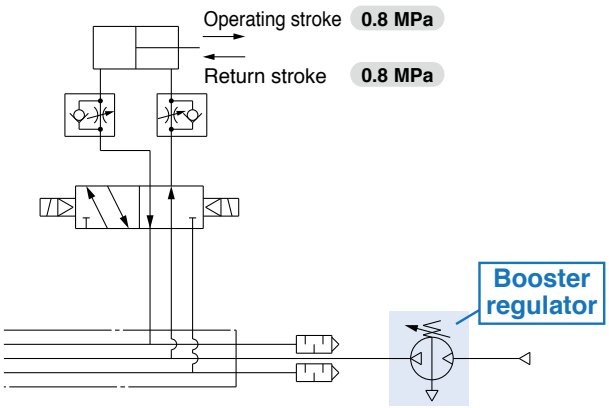
Boost an insufficiently powered portion with a booster regulator

- Optimized booster circuit: Now with a space-saving booster circuit

Example of a one-side booster circuit (Boosting pressure on the operating stroke only)



Example of a two-side booster circuit



Effects of Energy Saving

Energy-saving Circuit

When boosting pressure is on the extension side only
Retraction: 0.4 MPa
Extension: 0.8 MPa (Boosting pressure)

Per single reciprocation:
8.7 L (ANR)

When it is operated
900000 times/year

7830 m³/year (ANR)
($110/year)

($54/year reduction)

33% reduction

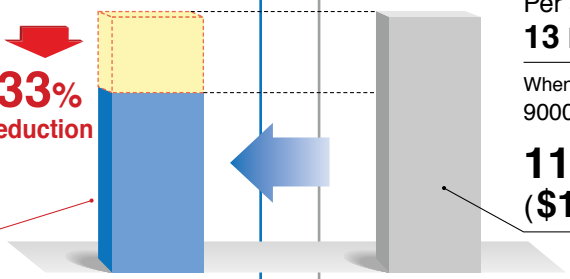
Existing Circuit

Bore size: ø50
Stroke: 200 mm
Pressure: 0.4 MPa
Boosting pressure: 0.8 MPa

Per single reciprocation:
13 L (ANR)

When it is operated
900000 times/year

11700 m³/year (ANR)
($165/year)



Corresponding value: Air unit $0.014/m³ (ANR)

Air consumption

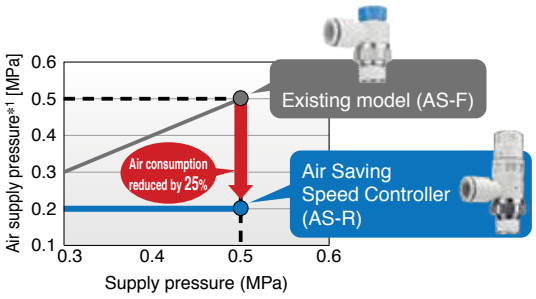
25% reduction

Reduce air consumption just by mounting to your current air cylinder!

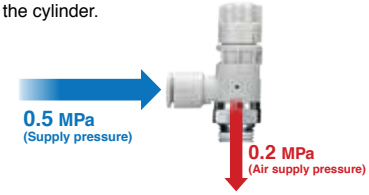
Mounting and operation are
the same as a regular speed controller.

With pressure-reduction function
AS-R Series

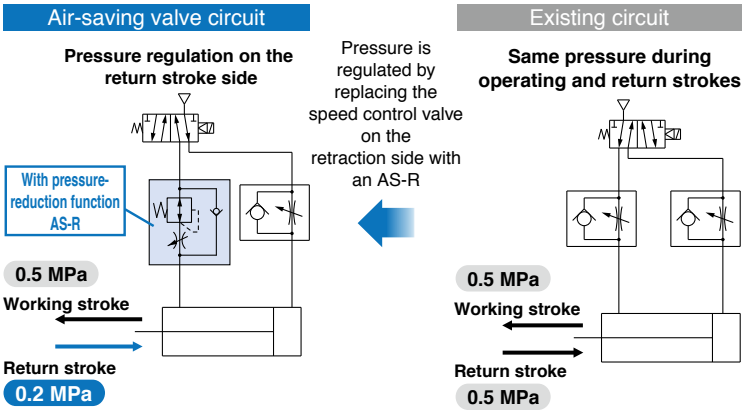
By reducing the pressure on the return stroke to 0.2 MPa, air consumption can be reduced.



*1 Cylinder pressure on the return stroke side
* The air consumption reduction rate indicates the rate for one cycle of the cylinder.



When it is not necessary to apply force at the end of the working stroke, by using a lifter, pusher, etc.



Effects of Energy Saving

Energy-saving Model

Bore size: ø50
Stroke: 200 mm
Pressure on the extension side: 0.5 MPa
Pressure on the retraction side: 0.2 MPa

Per single reciprocation:
3.3 L/min (ANR)

When it is operated
900000 times/year

3011 m³/year (ANR)
(**$42** /year)

(-$12 /year reduction)

Existing Model

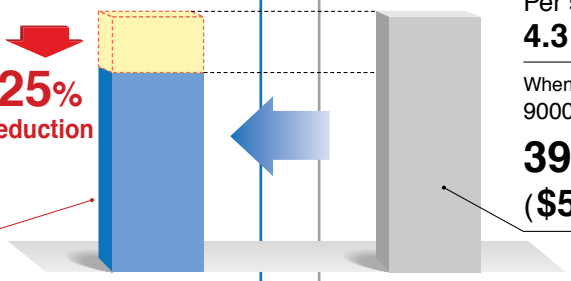
Bore size: ø50
Stroke: 200 mm
Pressure: 0.5 MPa

Per single reciprocation:
4.3 L/min (ANR)

When it is operated
900000 times/year

3902 m³/year (ANR)
(**$55** /year)

25% reduction



Corresponding value: Air unit $0.014/m³ (ANR)

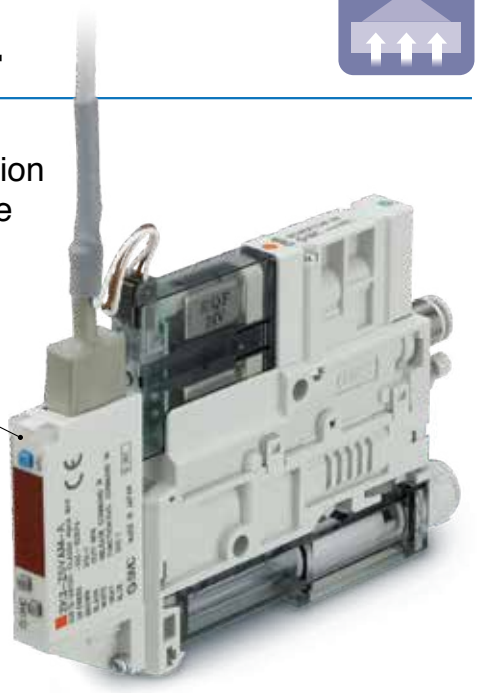
Air consumption

93% reduction[*1]

*1 Based on SMC's measuring conditions

Energy-saving Ejector

The digital pressure switch for vacuum with energy-saving function cuts supply air when the pressure reaches the desired vacuum.

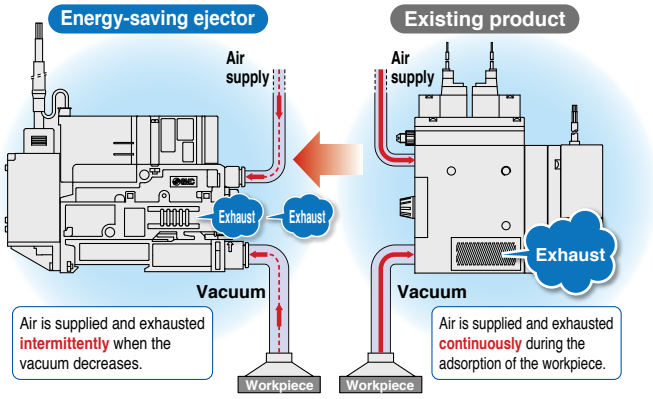


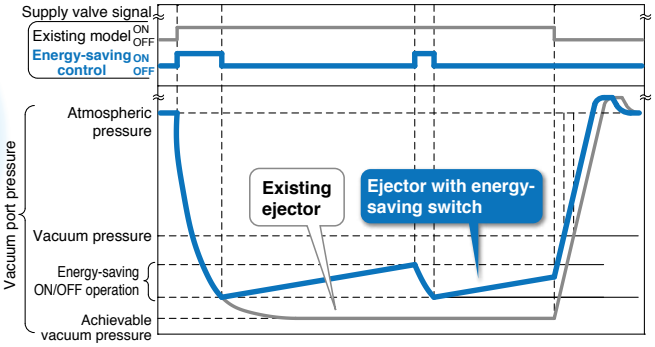
Digital pressure switch for vacuum with energy-saving function

The digital pressure switch with energy-saving function can reduce air consumption by 90%[*2].

*2 Based on SMC's measuring conditions

While the suction signal is ON, the ON/OFF operation of the supply valve is also performed automatically within the set value.





Effects of Energy Saving

Energy-saving Model

·Air consumption: 58 L/min (ANR)
Vacuum suction flow rate: 61 L/min (ANR)
·Vacuum generation time: 0.6 s/cycle
(Vacuum is continuously generated and air is consumed for 6 s (1 cycle))
·Annual operating cycles: 1100000
(450 cycles/h, 10 h/day, 250 days/year)

Air consumption (When placed):
58 L/min (ANR)

638 m³/year (ANR)
(**$9**/year)

($123 /year reduction)

93% reduction

Energy-saving Model

Existing Model

·Air consumption: 85 L/min (ANR)
Vacuum suction flow rate: 44 L/min (ANR)
·Vacuum generation time: 6 s/cycle
(Vacuum is continuously generated and air is consumed for 6 s (1 cycle))
·Annual operating cycles: 1100000
(450 cycles/h, 10 h/day, 250 days/year)

Air consumption (When placed):
85 L/min (ANR)

9350 m³/year (ANR)
(**$132** /year)

Existing Model

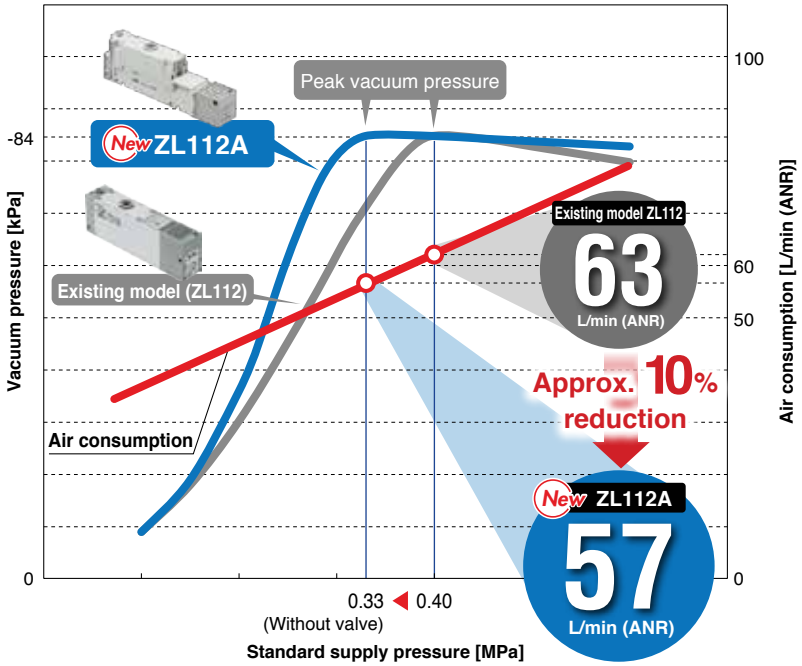
Corresponding value: Air unit $0.014/m³ (ANR)

1 m³ to 35.3147 ft³
1 MPa to 145.038 psi
1 kPa to 0.145038 psi
1 L/min to 0.0353146667 cfm

Air consumption

10% reduction

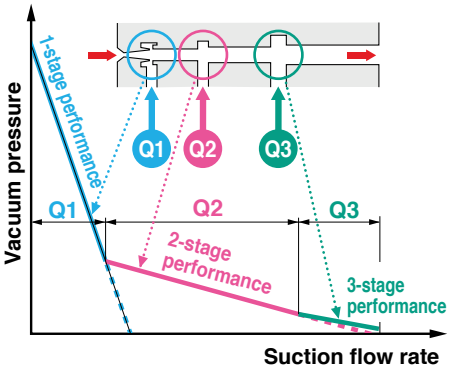
Air consumption can be reduced reduced by 10% due to the optimization of the diffuser flow path.



3-stage diffuser construction

Suction flow rate increased by 250%

(Versus ø1.3, 1-stage model)



Energy-saving Model

Standard supply pressure: 0.33 MPa (Without valve)
Maximum vacuum pressure: –84 kPa
Maximum suction flow rate: 100 L/min (ANR)
Air consumption: 57 L/min (ANR)

When work is carried out for
2500 hours per year,
and 30 minutes per hour

4275 m³/year (ANR)
($60/year)

($6/year reduction)

Effects of Energy Saving

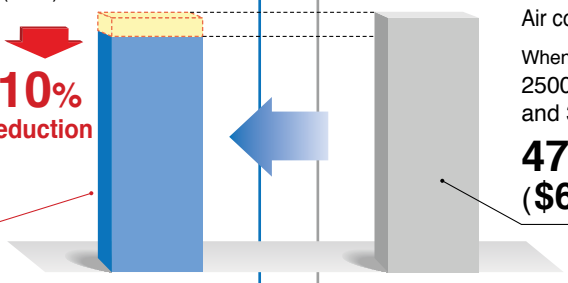
10% reduction

Existing Model

Standard supply pressure: 0.4 MPa
Maximum vacuum pressure: –84 kPa
Maximum suction flow rate: 100 L/min (ANR)
Air consumption: 63 L/min (ANR)

When work is carried out for
2500 hours per year,
and 30 minutes per hour

4725 m³/year (ANR)
($67/year)

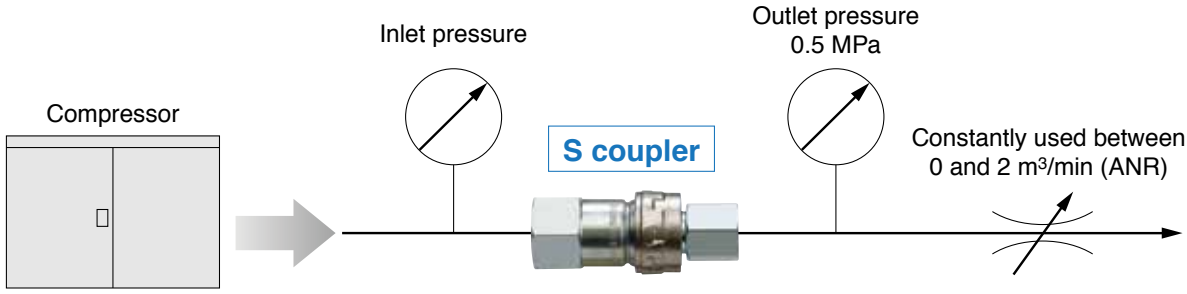


Corresponding value: Air unit $0.014/m³ (ANR)

Pressure loss

7% reduction

The built-in valve is of a special shape, resulting in reduced pressure loss.



Effects of Energy Saving

Energy-saving Model

Operating pressure at the outlet: 0.5 MPa
Compressor efficiency: 0.7
Annual operating time: 2500 hours
Flow rate: 1.2 m³/min (ANR)

Inlet pressure:
0.54 MPa

7% reduction

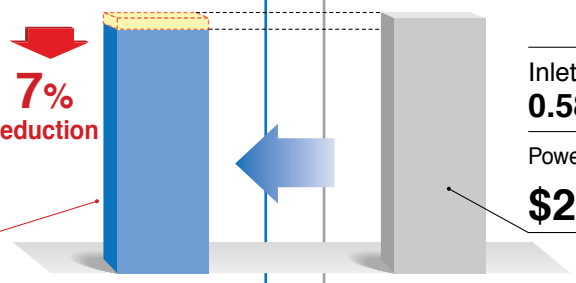
Power consumption by compressor:
$2461/year
($103/year reduction)

Existing Model

Operating pressure at the outlet: 0.5 MPa
Compressor efficiency: 0.7
Annual operating time: 2500 hours
Flow rate: 1.2 m³/min (ANR)

Inlet pressure:
0.58 MPa

Power consumption by compressor:
$2564/year



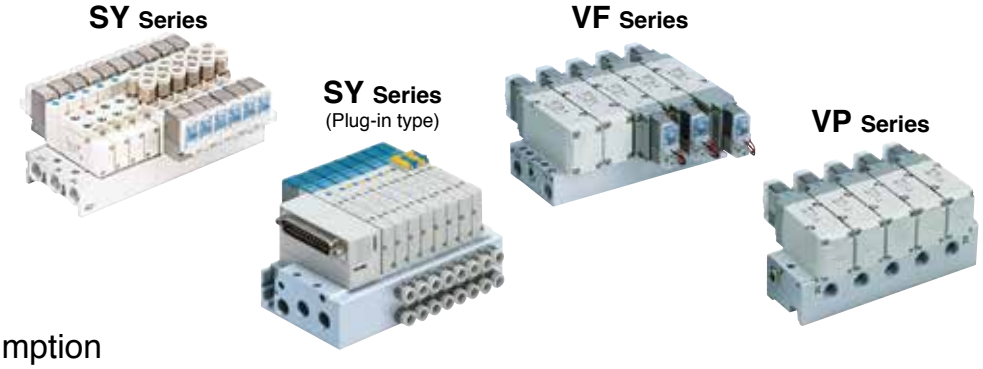
Corresponding value: Air unit $0.014/m³ (ANR)

Low Power Consumption

Power consumption

75% reduction

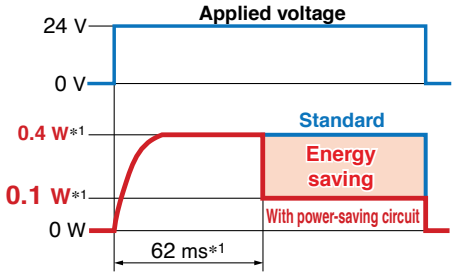
The power-saving circuit can reduce the consumption of electric power when the device is energized.



• Reduces power consumption when energized

Power consumption can be reduced by approx. 1/4 by reducing the wattage required to hold the valve in an energized state. (Effective energizing time is over 62 ms∗1 at 24 VDC.) Refer to the electrical power waveform as shown below.

Electrical power waveform with power-saving circuit



∗1 SY/SYJ series

Low Power Consumption Valve

Energy-saving Product

Type	Model	Power consumption W∗2	
		Standard	With power-saving circuit
4/5-port	**SJ2000**	0.55	0.23
	SJ3000	0.4	0.15
	New SY3000/5000/7000	0.4	0.15
	SY3000/5000/7000/9000	0.4	0.1
	SYJ3000/5000/7000	0.4	0.1
	VF1000/3000/5000	1.55	0.55
3-port	**SYJ300/500/700**	0.4	0.1
	VP300/500/700	1.55	0.55
	V100	0.4	0.1

∗2 With DC light

Effects of Energy Saving

Energy-saving Model

SY: 0.1 W
(With power-saving circuit)

When the energizing time is 8 hours/day, 356 days/year

75% reduction

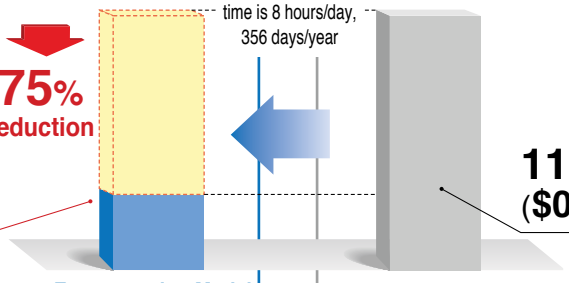
292 Wh/year
($0.04/year)

Power consumption per valve:
($0.12/year reduction)

Existing Model

SY: 0.4 W

1168 Wh/year (ANR)
($0.16/year)

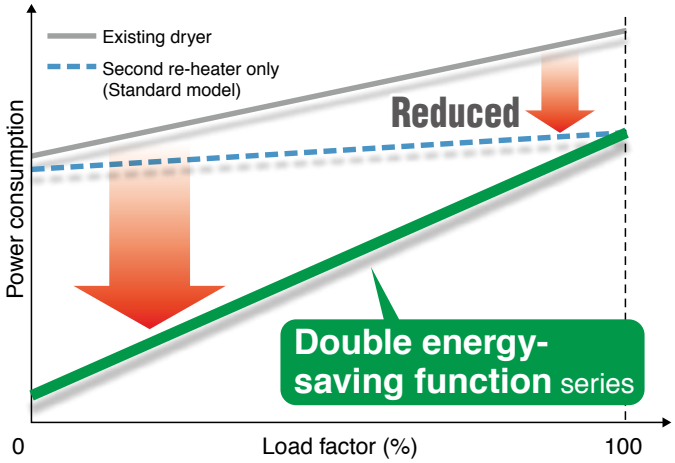


Corresponding value: Air unit $0.014/m³ (ANR)

Double energy-saving function series

Second re-heater | Digital scroll compressor | Stainless steel heat exchanger | Ozone depletion potential ZERO refrigerant

Power consumption
76% reduction



The addition of a second re-heater + digital scroll results in high energy savings.

Energy-saving design

Up to a **76** (1 kW)*1 **% reduction**

*1 Operating conditions: The IDF125FS in energy-saving operation mode
●Ambient temperature 32°C ●Inlet air temperature 40°C
●Inlet air pressure 0.7 MPa ●Air flow rate = Rated flow x 0.4
●Power supply frequency 60 Hz ●Power supply voltage 200 V ●Set dew point = 30°C

$T_{(°C)} \times 1.8 + 32 = T_{(°F)}$

Example 1 year (Spring to Winter) Power consumption Reduced

Compared with the standard model (constant compressor operation), the

Double energy-saving function series

per year **can reduce power consumption by 43%!***1

*1 The IDF125FS was used for this example.

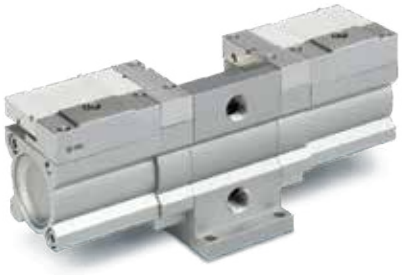
* **[Trial calculation conditions]** Days of operation per year = 240 days (60 days each in spring, summer, autumn, and winter),
Operating hours per day = 12 hours
For details about the dryer operating conditions for each season, refer to the **Web Catalog** (IDF□FS series.).

1 MPa to 145.038 psi
1 L to 0.264172 gal

Air consumption
40% reduction[*1]

[*1] Based on SMC's measuring conditions

- **3 piston construction**
- **The drive chamber on one side can be operated by the exhaust return circuit.**

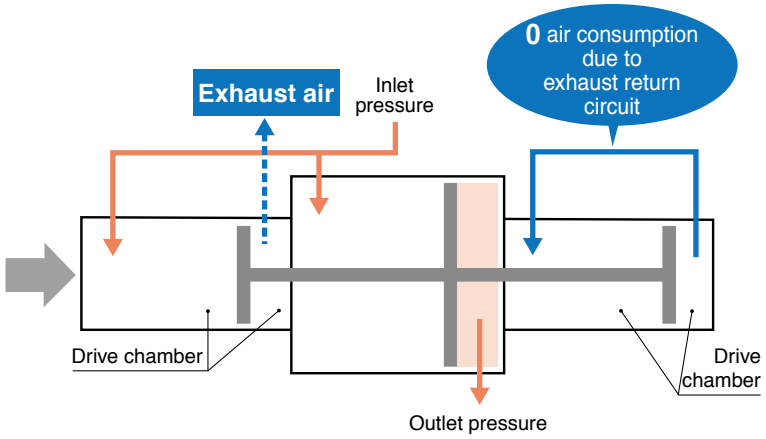


Operation noise: 65 dB (A)[*2]

[*2] Based on SMC's measuring conditions

15 dB (A) reduction compared with the existing model (VBA series)

- Exhaust noise: Reduced noise due to exhaust of reused low-pressure air
- Metal noise: Reduced noise due to the adoption of a construction in which the internal switching part doesn't come into contact with any metal parts



* Please contact your local sales representative for more details.

Increased impact force due to higher peak pressure
Drastic reduction in air consumption and labor time

High peak pressure
3 times or more[*1]
(Compared with the existing model)

Air consumption
85% reduction[*2]

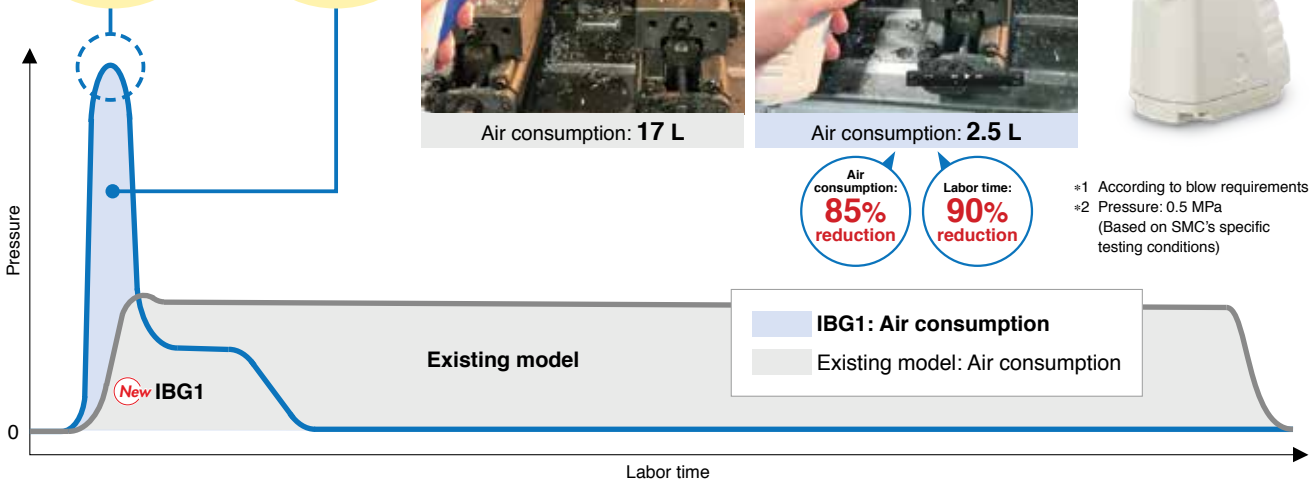
Air consumption: **17 L**

Air consumption: **2.5 L**

Air consumption: **85% reduction**

Labor time: **90% reduction**

[*1] According to blow requirements
[*2] Pressure: 0.5 MPa (Based on SMC's specific testing conditions)



* Please contact your local sales representative for more details.

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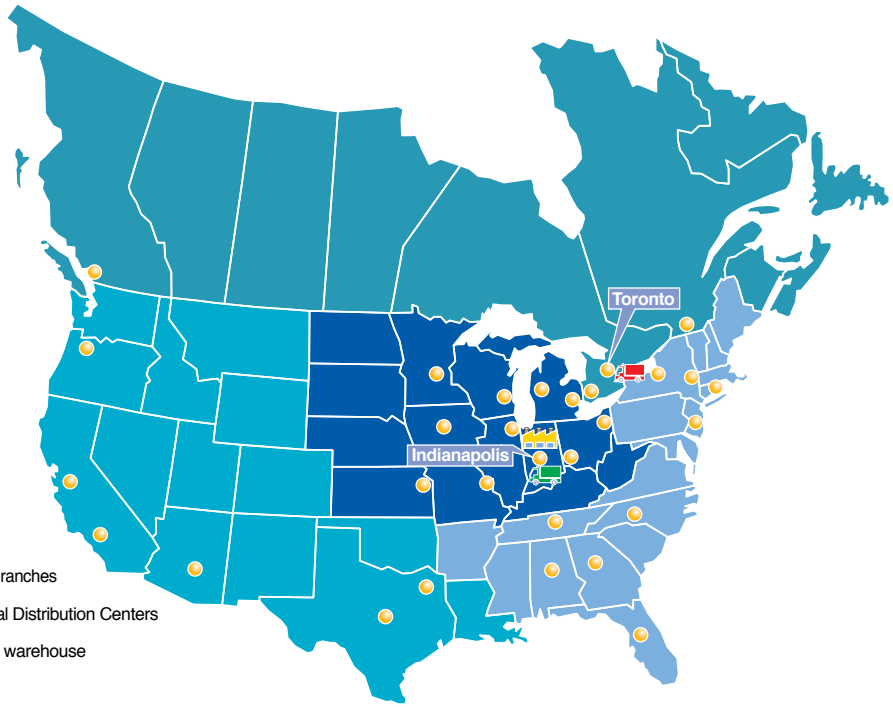

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