

Ingersoll Rand Automation

Air System Control





Ingersoll Rand Industrial Technologies provides products, services and solutions to enhance the efficiency and productivity of our commercial, industrial and process customers. Our innovative products include air compressors, air systems components, tools, pumps, material and fluid handling systems and microturbines.

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Energy/Savings – on Demand!

Ingersoll Rand

As much as 20% to 60% of the energy used to run compressed air systems is wasted due to:

- *Running more compressors than required – whether fully loaded, partially loaded or unloaded;*
- *Maintaining elevated system pressure to provide a safety margin for peak demand.*

Reduce Your Existing Equipment Operating Costs.

The new X4I System Controller from Ingersoll Rand makes it possible to reduce operating costs, while maintaining confidence in sufficient air supply at all times. The system controller works with your existing air compressors in sizes as low as 5.5 kW to help you reduce operating costs without compromising your existing capital equipment investment. It manages up to four fixed-speed compressors from Ingersoll Rand or any manufacturer with the added option of substituting one or more Ingersoll Rand 5.5 kW-30 kW variable-speed compressors to deliver benefits of both efficiency and reliability:

- Operate compressors only as needed and bring standby compressors on-line incrementally during periods of increased demand.
- Operate variable-speed compressors to minimize unloaded fixed-speed compressor run time and cycling.
- Operate compressors at your minimum required pressure without compromising the reliability of your compressed air supply.

In addition to minimizing waste resulting from operating more compressors, and artificial



Ingersoll Rand X4I
System Controller

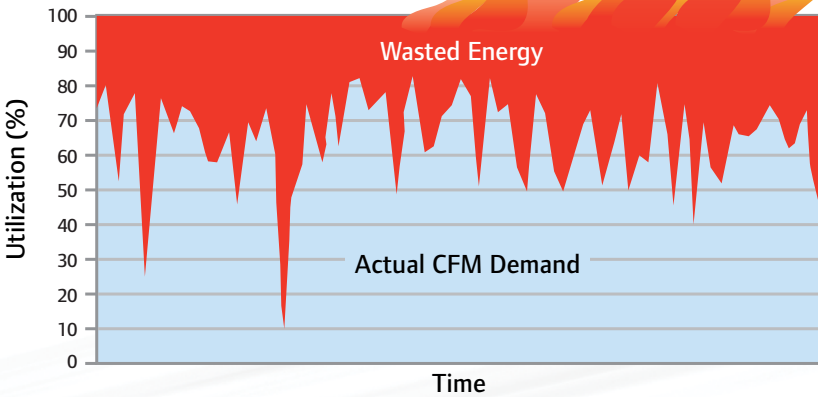
demand from elevated pressures, system control can reduce maintenance costs by extending periodic maintenance intervals.

An Artificially High Cost for "Comfort."

Simply running a compressor in standby mode (unloaded) to assure maximum capacity when needed still uses about 30% or more of the energy required to run that same compressor fully loaded. Additionally, maintaining system pressure above the actual pressure required for your process, in order to provide a comfort factor for periods of sudden demand, consumes more energy and exaggerates the artificial demand (leaks and over-pressurized consumption of poorly regulated air users). The comparison charts on page 3 show how both of these approaches can impact your operating costs and potential savings.

The Big Picture, at a Glance.

Is Your Standby Capacity Costing You Money?



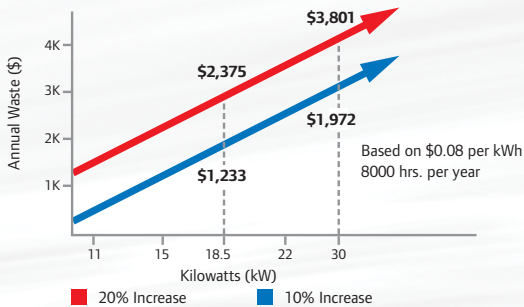
Using the Ingersoll Rand X4I System Controller to manage a multi-compressor system creates opportunities for savings and increased reliability. Keeping compressors off-line until actually needed eliminates unloaded running costs and creates reserve capacity. The example provided shows an annual energy savings of 32%, based on 8,000 hours at 0.08 \$/kWh. This example assumes a typical four 25 hp/18 kW system.

Better for the Global Environment



In addition to making economic sense, the Ingersoll Rand X4I System Controller also makes environmental sense.

How Much are You Paying for Artificial Demand?



These comparisons show the impact on annual costs of operating your air system at elevated pressures. Compensating for artificial demand is costly work. Considering a system pressure requirement of 90 psig (6.2 bar), the annual operating costs increase by 10% and 20% to accommodate pressure increases of 10 psig (0.7 bar) and 20 psig (1.4 bar), respectively.

Saving Green...in Your Environment, and In Your Operating Budget.

In addition to making economic sense, the Ingersoll Rand X4I System Controller makes environmental sense as well.

Every kWh saved through more efficient compressor control represents an average reduction of 0.61 kg of carbon dioxide emissions. Cumulatively, reducing energy consumption by 480 kWh is equivalent to planting one tree. In our example above, the 32% savings would equate to a reduction of 115,437 kWh—that's like planting 240 trees each year! The bottom line is that you burn through less of your operating budget and less of the world's valuable resources, while you help to reduce the impact of global warming.



Minimize Wasted Energy and Costs in Mult

Connectivity, Communication, Control – The Ingersoll Rand X4I System Controller is the Nucleus of Your Air System.

The Ingersoll Rand X4I System Controller is one solution that quickly pays for itself, without compromising any of your previous compressor or air system capital investments. But beyond paying dividends in energy savings, it also provides ancillary savings in terms of labor, maintenance and resource utilization—here's how:

Universal Connectivity – Standardized control interface facilitates connectivity and control for multiple compressors in new or existing installations.

Single-Point Control – Easily program one unit for optimum control in meeting fluctuating demand, instead of running all compressors at full capacity or manually adjusting multiple units.

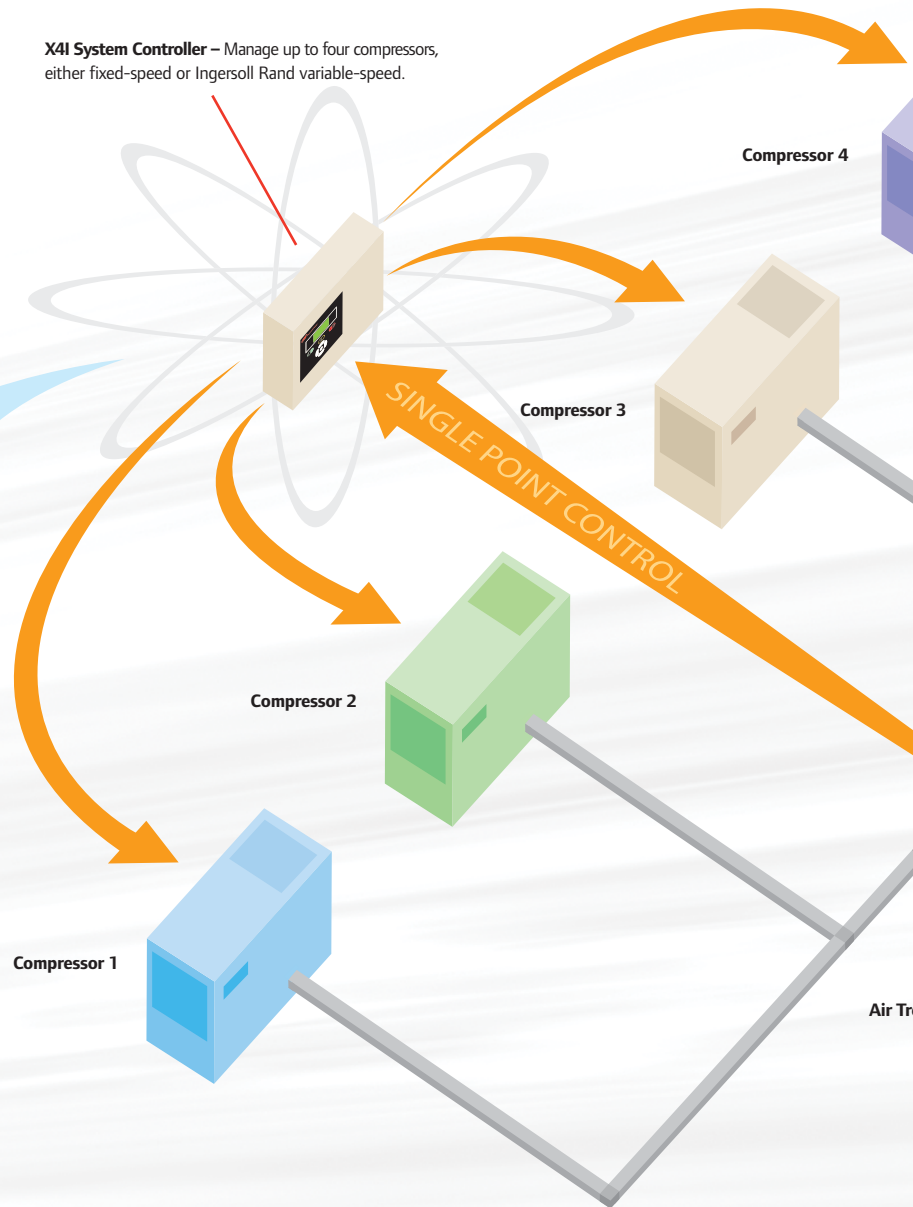
Adapt To Existing Equipment – Connect to any existing air system regardless of manufacturer.

Easy Set-Up and Operation – Improve your ability to optimize air system savings right from the start.

Configurable Auxiliary Inputs/Outputs – Tailor system configuration and operation with external connections ranging from pressure sensors to integrated system components or remote displays and alarms.

Fail-Safe Control – Maintain air system integrity and reliability, even under emergency conditions.

X4I System Controller – Manage up to four compressors, either fixed-speed or Ingersoll Rand variable-speed.

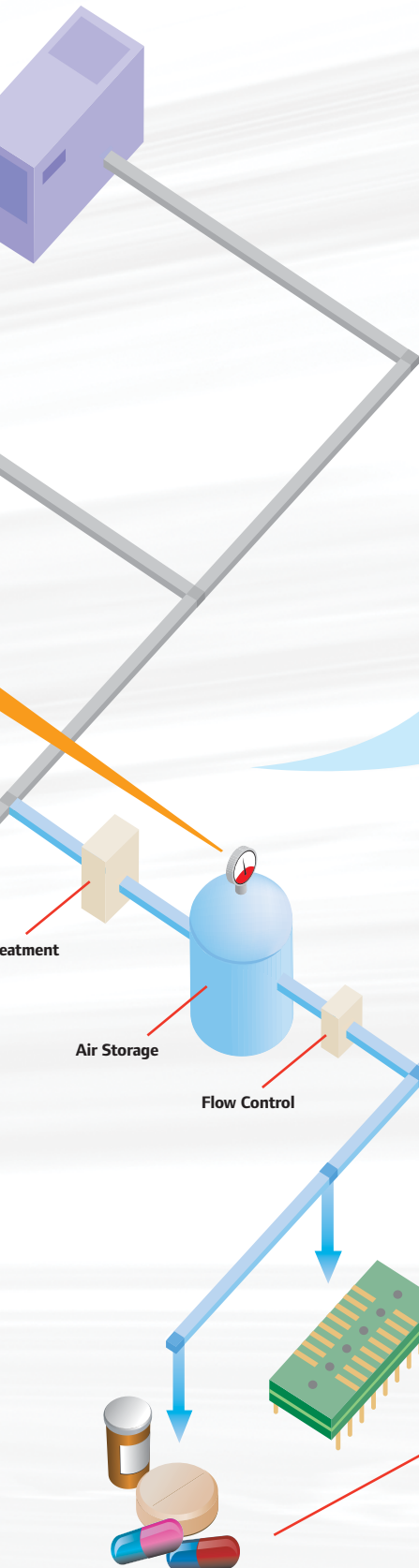


Specifications: X4I System Controller

Max. # Units	4 Compressors	Enclosure	IP65, NEMA 4
Dimensions (LxWxD)	9.45" x 11.45" x 6.0" 241 mm x 291 mm x 152 mm	Power Supply	115 VAC +/- 10% (60 Hz) 230 VAC +/- 10% (50 Hz)
Weight	14 lbs. (6.4 kg)	Temperature	32°F to 115°F (0°C to 46°C)
Mounting	Wall, 4 x Mounting Screws	Humidity	0% to 95% Rh Non-Condensing

Multiple-Compressor Installations.

Optimize Your Compressor Operation



Anti-Cycling – Continuous monitoring of system pressure and rate of change, plus advanced control algorithms, prevent unnecessary compressor cycling.

Priority Compressor Selection – Minimize energy requirements by using your least efficient units only when absolutely necessary.

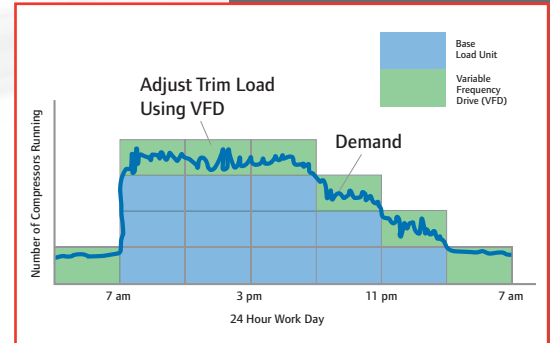
Variable Energy Control – Designate one or more compressors to carry the base load, and let one variable speed compressor adjust the trim load as required.

Equal Hours Control – Ensure equal use of matching compressors regardless of fluctuating demand requirements.

System Standby – Maintain compressors off-line to minimize losses due to system leaks in pressurized systems idle during non-productive periods.

System Pre-Fill – Controlled re-pressurization after shut-down or stand-by periods.

Custom Pressure Selection – Program three different pressure profiles to accommodate fluctuating capacity demands and optimize compressor operation.



In a multi-compressor installation, not every compressor needs to run at full capacity all of the time. The Ingersoll Rand X4I System Controller enables you to balance out compressor operation in proportion to varying demand cycles. It monitors the rate of pressure change in a central receiver tank and automatically brings one or more additional compressors on-line to satisfy the increased need. A smooth, controlled start-up process avoids excessive power spikes or the stress of repetitive cycling.