Ingersoll Rand

X-Series System Automation

Innovation

Reliability

Efficiency

Ingersoll Rand
Industrial Technologies

Energy Savings – on Demand!

Ingersoll Rand

As much as 20% to 60% of the energy used to operate compressed air systems is wasted. This is primarily due to operating more compressors than necessary, operating the wrong combination of compressors or maintaining elevated system pressure.

X12I System Automation

X8I System Automation

X4I System Automation

Now You Can Cut Operating Costs… with Your Existing Equipment!

Ingersoll Rand X-Series System Automation eliminates waste by managing up to twelve positive displacement compressors simultaneously. This includes compressors of different capacities, different types (fixed speed, variable speed and variable capacity), and in any combination or configuration.

Through advanced control functionality and universal connectivity, the X-Series System Automation products will work with your existing compressors, from Ingersoll Rand or any manufacturer, to improve operating efficiency, reduce energy costs and eliminate waste!

Here's how the X-Series products deliver a unique combination of efficiency, reliability and tremendous cost-savings:

- Operate compressors only as needed, bringing standby compressors on-line incrementally during periods of peak demand.
- Manage the compressed air system at your minimum required pressure without compromising air supply reliability.
- Dynamically match the most energy-efficient compressor or combination of compressors with compressed air demand.
- Operate one or more variable-speed compressors to minimize wasted energy due to unloaded compressor run-on time or short cycle operation.

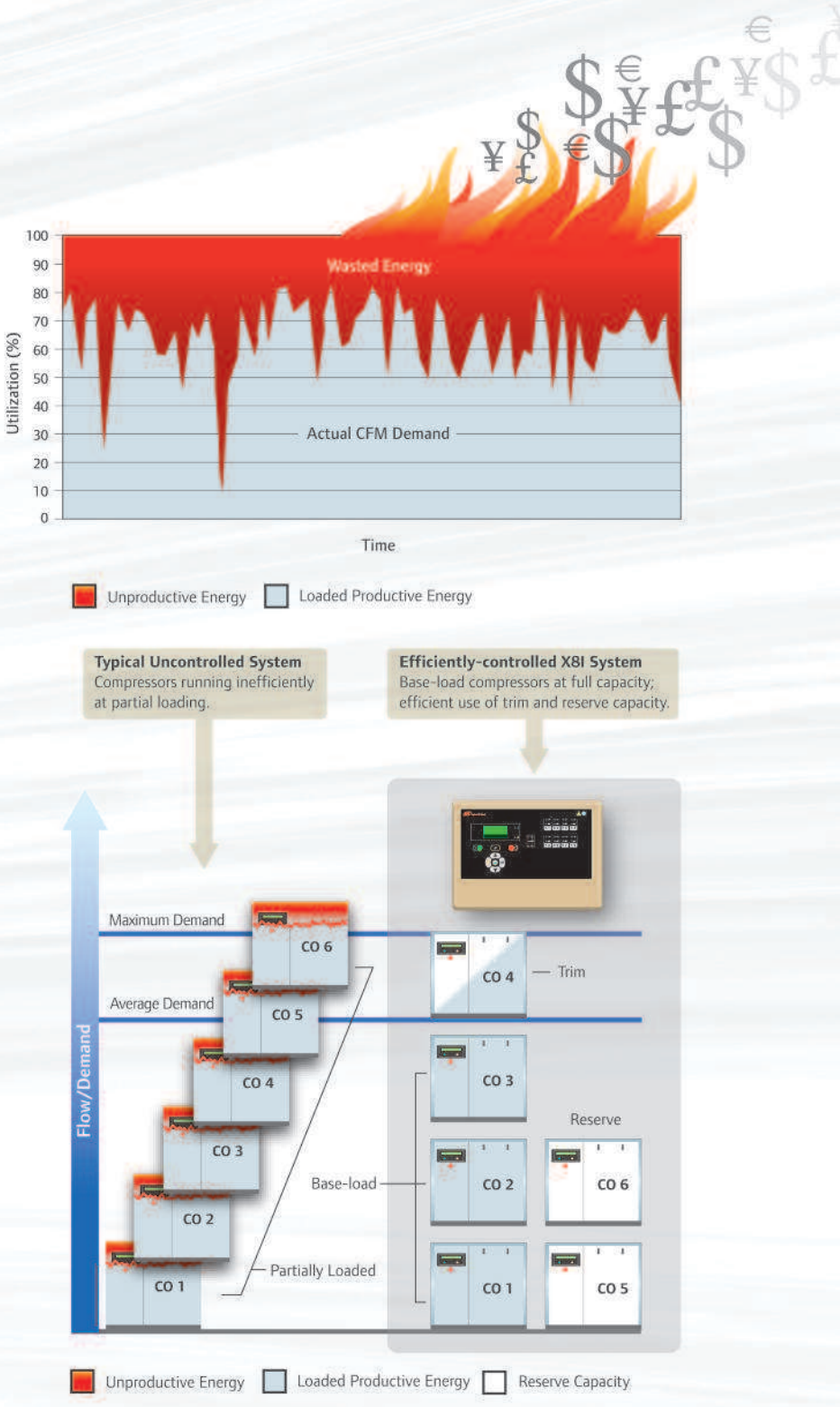
The Big Savings Picture at a Glance

Be Energy Efficient while Increasing Your Reliability

The practice of operating a compressor in standby mode (unloaded), to ensure maximum capacity when needed, uses approximately 30% or more of the energy required to run that same compressor fully loaded. Systems with multiple compressors of varying sizes, types and configurations complicate the task of manually coordinating and maintaining the correct compressor settings.

X-Series System Automation products eliminate the complexity of compressor control coordination and increase energy efficiency. With the X-Series System Automation in control, only the appropriate compressors operate at the proper time. Unnecessary compressors previously used for normal operations will be kept off-line and available for emergency requirements or primary equipment upset increasing system reliability.

In addition to optimizing energy use, efficient compressor utilization reduces costs by reducing downtime…not only is the time between scheduled preventive maintenance extended, but with fewer compressors operating, fewer repairs will be necessary!



Using the Ingersoll Rand X-Series System Automation to manage a multi-compressor system creates opportunities for significant savings and increased reliability. Keeping compressors off-line until needed eliminates unloaded running costs and creates reserve capacity.

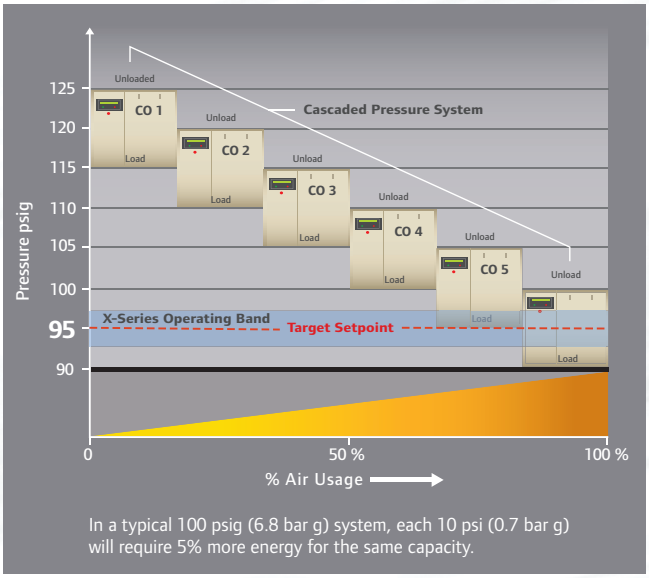
Eliminate the Artificially High Cost for "Comfort"

Through advanced control features, X-Series System Automation **efficiently manages air compressor operation in virtually any configuration.**

Manual coordination of compressor pressure settings to facilitate effective compressor operation can be complicated. Demand fluctuations, air treatment, compressor location, varying compressor capabilities, piping size and design are just some of the variables that impact control settings.

Traditionally, "cascaded" pressure settings over a wide pressure range are utilized to operate compressors more effectively. The result is operating the system at elevated pressures for a majority of the time. Only when the system is at full capacity does the system approach optimum efficiency.

Maintaining system pressure above the optimum pressure in order to provide a comfort factor for periods of sudden demand, or a cascaded pressure control, requires more energy. It also exaggerates artificial demand resulting from the increased air consumption of leaks and poorly regulated air outlets.



X-Series Automation eliminates inefficiency by controlling all compressors in a tight pressure band around a single, optimum system pressure, as illustrated by the blue band in the example above.

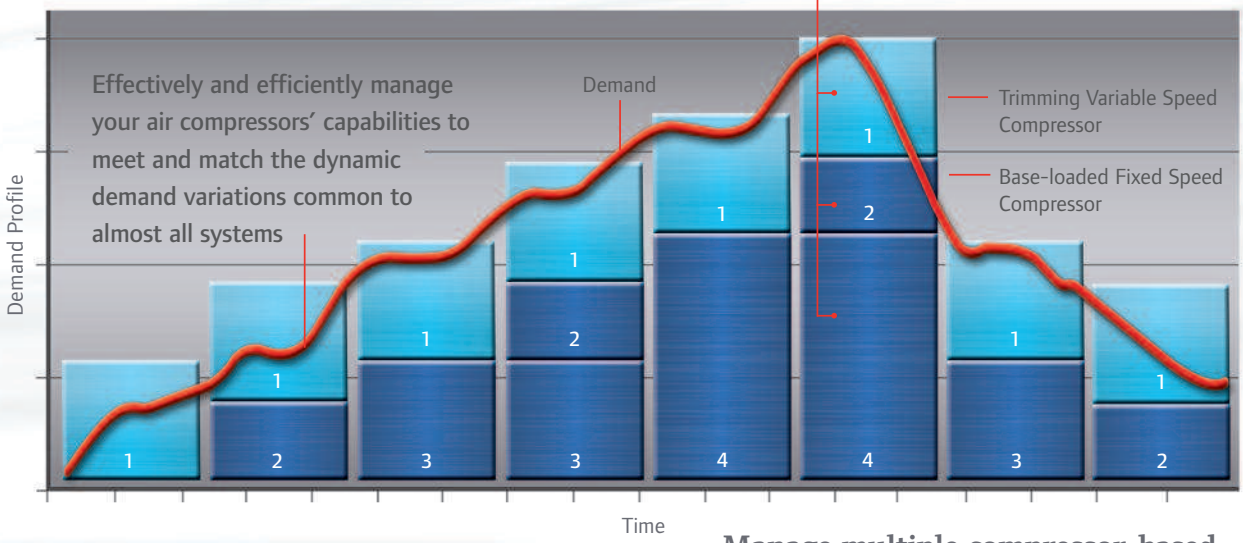
Tailoring Supply to Demand

The X8I and X12I feature **Energy Control Mode** that monitors and "learns" system demand requirements by comparing pressure dynamics with compressor operating capabilities and efficiencies.

The primary functions of Energy Control Mode are to:

- Match compressed air supply to compressed air demand, dynamically
- Utilize the most energy-efficient combination of air compressors to satisfy that demand

Adaptive control logic and advanced control algorithms implement a best fit compressor combination and sequence configuration strategy.



Example:
Available Compressor Capacity Supply

1 — 75 kW Variable Speed Compressor
2 — 55 kW Fixed Speed Compressor
3 — 75 kW Fixed Speed Compressor
4 — 160 kW Fixed Speed Compressor

Manage multiple compressor-based air systems regardless of capacity or type (fixed-speed, variable-speed and variable capacity) from different manufacturers in any combination or configuration

A Better Way to View Your System

Ingersoll Rand X-Series System Automation now offers a **window into your compressed air system** with the introduction of System Visualization.

An Easy Upgrade Makes It Possible

Simply add a VX module to any X8I or X12I network, complete some basic configuration, connect to your Local Area Network (LAN) and view your compressed air system on your PC. No special software is required – just use a standard web browser such as Internet Explorer. With System Visualization you can monitor critical system and equipment parameters, drill down to individual compressors to view operational status and be alerted to any alarm messages. Complete system viewing from a local or remote PC has never been easier.

Integrated Features

- System status and control
- System performance monitoring/reporting
- Equipment status monitoring
- Equipment maintenance scheduler
- Graphing and trending tools
- Reporting tools
- Configurable event logs
- Warning and alarm monitoring
- Email messaging
- Fully field configurable

X-Series Functionality

X-Series System Automation	X4I	X8I	X12I
Number of Compressors	4	8	12
Compressor Integration			
Fixed Speed - On-line/Off-line	X	X	X
IR-VSD 7.5-40 hp Nirvana	X	X	X
IR-VSD 50-300 hp Nirvana		X	X
Other VFD or Variable Capacity Control		X	X
System Pressure			
Standard 0-232 psig (Optional up to 1,000 psig)	X	X	X
Programmable Pressure Profiles	3	4	6
System Control Modes			
Programmable on Elapsed Time	X	X	X
Programmable on Real Time	X	X	X
EHR (Equal Hours - Run Time)	X	X	X
FIFO (First in - First out)	X		
FILO (First in - Last out)	X	X	X
ENER (Energy Control - Auto Sequence Selection)		X	X
Special Control Functionality			
System Standby	X	X	X
System Pre-fill	X	X	X
Program Bypass (Immediate Forward)	X	X	X
Power Outage Restart	X	X	X
Controller Failure, Revert to local	X	X	X
Prioritized Compressor Selection	X	X	X
Anti-cycling Control - Rate of Pressure Change	X	X	X
Pressure Balancing Function			X
Zone Control Function			X
Auxiliary Equipment Pre-start Function			X
System Instrumentation Inputs (4-20 mA)			X
Auxiliary **Input** Contact - Remote Control			
Configurable Remote Control Function	1	1	1
Dedicated Control Functions			9
Auxiliary **Output** Contact - Remote Control			
Configurable Remote Control Function	1	1	5
X-Series Network Integration Options			
Bolt-on or Competitive VFD Integration		X	X
Remote I/O - System Instrumentation/Control		up to 2	up to 12
Remote Communication - System Modbus Gateway		X	X
System Visualization - Hardware and Software		X	X

In addition to making economic sense, Ingersoll Rand X-Series System Automation makes environmental sense as well, by helping to reduce CO_2 emissions created by the generation of electricity. For example, a 75 kW reduction will save you 650,000 kWh per year…this translates into a 450,000 kg reduction in CO_2 emissions!

Total Control For Any Configuration

Progress is greener with Ingersoll Rand

PackageCare is a service contract designed to help customers get the most out of their air system investment. Whether it's Ingersoll Rand equipment or a competitor's, a new compressor or used, with PackageCare customers get hassle-free system reliability, backed by the most comprehensive service program in the industry. We're the only OEM in the industry offering this type of service coverage.

Ingersoll Rand
Industrial Technologies

Ingersoll Rand Industrial Technologies provides products, services and solutions that enhance our customers' energy efficiency, productivity and operations. Our diverse and innovative products range from complete compressed air systems, tools and pumps to material and fluid handling systems and environmentally friendly microturbines. We also enhance productivity through solutions created by Club Car®, the global leader in golf and utility vehicles for businesses and individuals.

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