



# Instrument & Service Air System

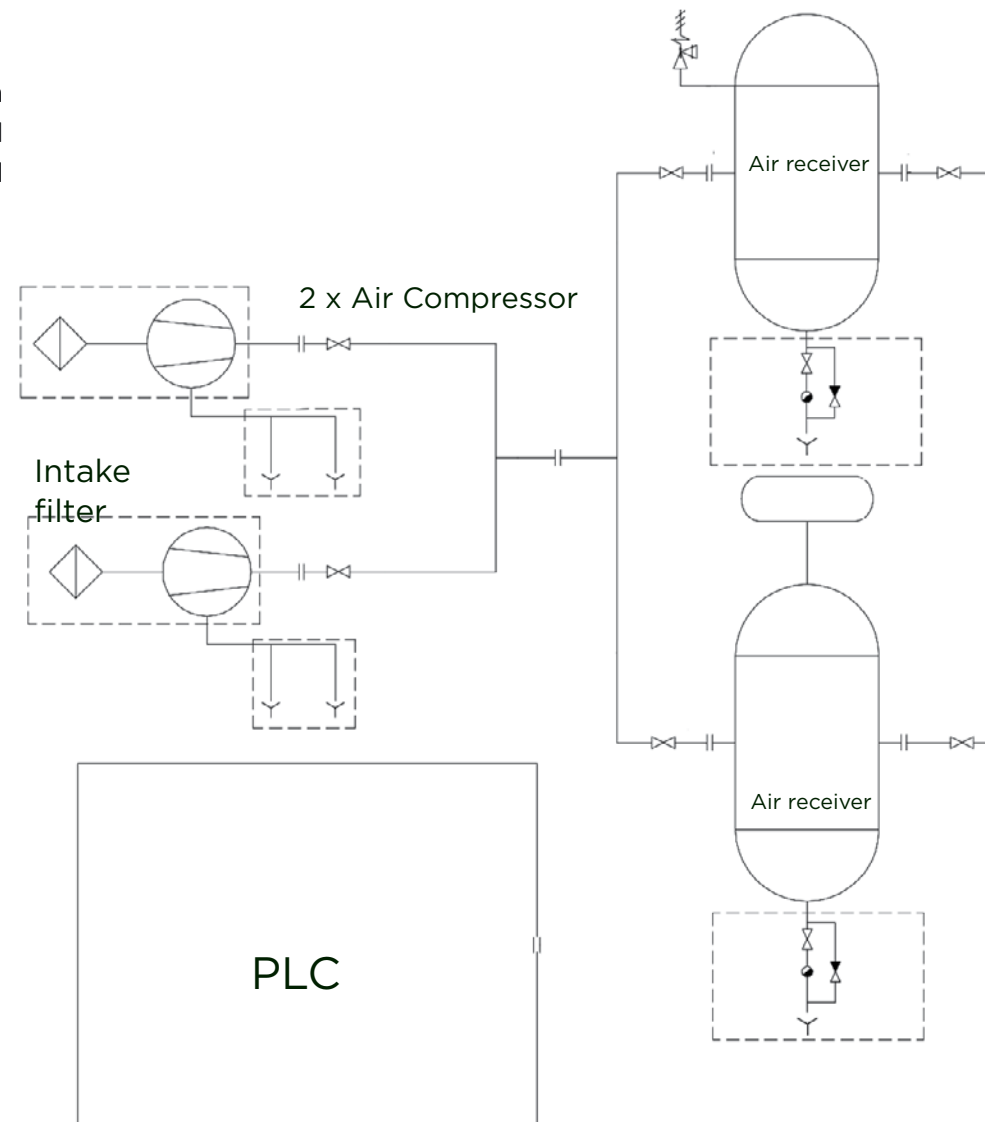
General guideline to choosing the  
right equipment

Engineered Systems and Services (ESS)

# Introduction

Instrument and service air (IA & SA) equipment is used in a wide range of industries, from power generation and oil & gas, to chemical and manufacturing. IA & SA systems generally consist of compressors, dryers, filters, receivers, coolers, and control systems that work together to provide stable and reliable air to variety of plant consumers; some of which are play a critical role in maintaining plant operation and safety. As a result, any equipment or systems used need to be properly designed, and capable of producing the right quantity of quality air required by users.

The following article focuses on IA & SA system and some general considerations to keep in mind when choosing the right solution.



## Main Components

A frequently demanded solution is a fully assembled and integrated Compressed Air station, including all the necessary piping and cabling (power and control) within the battery limits of the package. Such a system would include, at least, the following equipment/components:

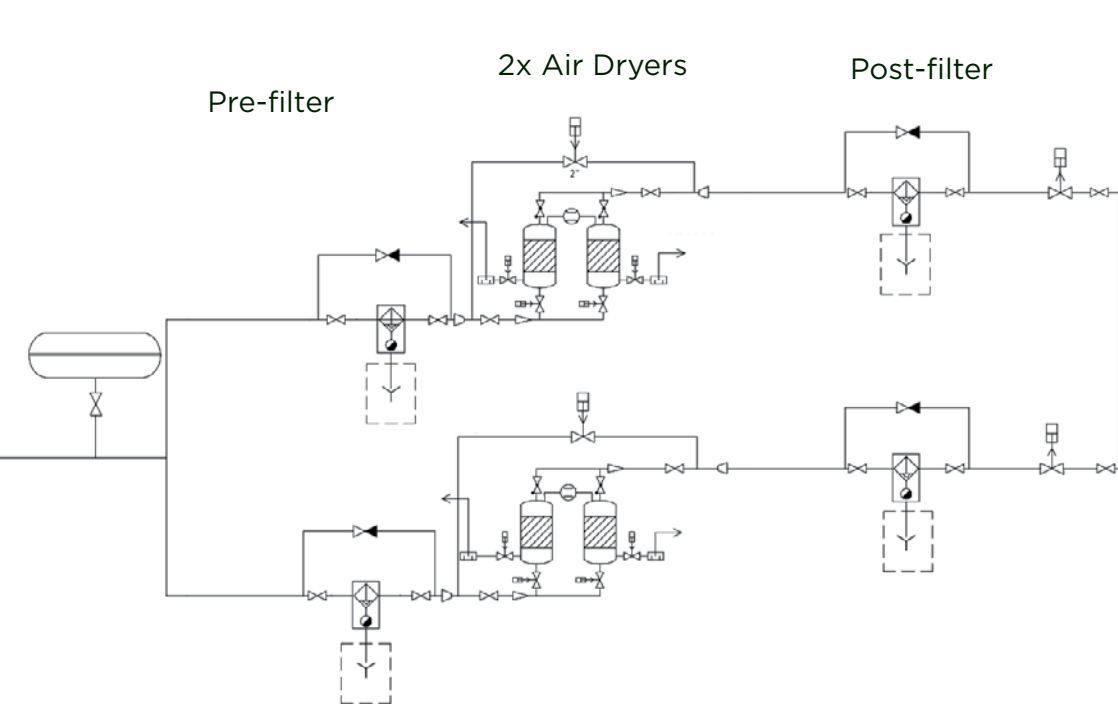
### Air Compressors

Air compressors produce compressed air at the

required/pre-defined pressure. There are a number of different types of air compressors, each utilizing a different technology; including rotary screw, reciprocating, scroll or centrifugal compressors. Due to their compact size, rotary screw compressors are most typically used in smaller plants to instrument air. Provided as a complete package, rotary screw compressors do not have any valves, and are not subjected to any other mechanical forces that can

## Typical P&ID of Instrument Air

A typical P&ID of an Instrument Air system is shown below:



cause the compressor to become unbalanced. This allows rotary screw compressors to provide robust, simple, and reliable operation; and high levels of availability.

### Air Dryers

Air dryers are used to dehumidify compressed (process) air to significantly lessen or eliminate water vapour present in the air stream, or to eliminate contaminated air. Industrial air dryers can be used to reduce the dew point of compressed air to below the lowest temperature obtained at site. While the most common types of air dryers are either adsorption or refrigerant dryers; adsorption dryers are predominantly used for instrument air in EPC contracts.

### Air Filters

Inlet air filters are used to decontaminate atmospheric air, removing particles of dust and debris. Air filtration is paramount to obtain the necessary air quality for the system.

Air filtration is paramount to maintaining the levels of air quality required by both the system and process. Oil and particle filters (on the line) can also be used to eliminate dust and particulates in the oil to reach the correct air quality.

### Air receivers

An air receiver that stores a volume of compressed air. They are used when the compressor is offline, or when the air demand temporarily exceeds the compressor output.

### Control system

The Programmable Logic Controller (PLC) controls the compressor, adjusting it according to process demand, using network pressure as the reference variable. Control systems also feature advanced Model Predictive Controllers (MPC) that communicate with the plant's general control systems, such as Distributed Control Systems (DCS) and Electrostatic Discharge (ESD), providing further control to the compressed air station.



# General guideline to choose the right equipment

When evaluating plant IA & SA systems, operators should be mindful of the following factors to ensure that the system meets the plants process requirements and financial constraints:

## Analysis of Technical Specifications

Careful analysis of a customer’s technical specifications are crucial to the selection and delivery of the right IA & SA system. This includes a thorough understanding of the project, quality standards, environmental certifications, and system requirements. Both systems and vendors also need to be evaluated against requirements to ensure that not only is the right piece of equipment is chosen, but that a vendor with system and application expertise is also selected.

## Product Configuration & Project Integration

In order to maximize cost savings, product configuration should be kept as simple as possible. Operating parameters, power supply, and space required, as well as maintenance and control requirements, also need to be considered to ensure the chosen system meets plant and project needs.

## Engineered Compressor Packages

Engineered IA & SA compressor packages are typically the best option for most customers and/or EPC projects. Custom tailored to meet specific project needs, engineered compressor packages can provide plant operators and EPC’s with a solution that meets the technical, regulatory, budgetary, and safety requirements of the project.

## Air Quality Standards

Air quality standards and requirements can vary greatly, even with each usage point within a plant. The right system needs to have the purification equipment to meet the air quality required by each step of the process. A combination of choosing the right supplier, along with referencing ISO 8573 quality classifications or other international standards like ISA-7.0.01-1996 Quality Standard for Instrument Air, can help to identify the purification equipment required to achieve the quality standards needed.

## Energy Usage

Plants require increasing levels of power. With approximately 10% of industrial energy being used by compressed air systems, it is becoming increasingly important for operators to focus on the energy usage of their equipment. Equipment that can be operated (loaded/unloaded) as required, and technology such as Variable Speed Drives (VSDs), can provide significant savings for plants with fluctuating air demands; however fixed speed compressors may offer better efficiency where demand is constant.

## Choosing a Flexible, Global Supplier

Choosing the right supplier is key to ensuring success. Suppliers with a comprehensive product and project portfolio, extensive application expertise, project management skills, and flexibility can help ensure that they are able to quickly adapt to customer/project requirements, and deliver a robust and reliable solution.

## Project management

IA & SA systems are typically included in EPC (Engineering, Procurement & Construction) contracts, or other complex industrial projects that require significant management and coordination to execute. In each phase, it is important that all suppliers follow established project management practices to ensure the right equipment is designed, delivered, tested, and commissioned as required by the project. Suppliers with dedicated project management teams can provide significant benefits across each phase of the project; from specification, configuration and integration, to manufacturing, testing, delivery, start-up and commissioning.

# Typical IA & SA Package

Ingersoll Rand Engineering Project Solutions has supplied IA & SA packages to a variety of renowned, global international EPC contractors and engineering companies.

We offer an extensive portfolio of products and technologies that are used to provide reliable, high quality air to for projects in a range of industries: from power generation, oil & gas, and mining, to chemical, manufacturing, and water treatment.

Our team of experts will work with you to plan, design, and deliver a custom IA & SA solution to meet the specific needs of your project.



- 2 x Oil Injected Screw / 1 x wet air receiver / 2 x heatless dryers / PLC-based control system
- Power: 2x 160 kW



- 2 containers: 2 x Oil-free screw / 2 x heatless dryers / PLC-based control system
- Power: 2 x 50 kW + 2 x 37 kW



We are the leaders in the EPC markets we serve, by continuously improving all business processes with a focus on flexibility and global supportability.

## About Ingersoll Rand Engineered Systems and Services (ESS)

Ingersoll Rand Engineered Systems and Services (ESS) is dedicated business line to providing market-leading, custom-engineered solutions.

With a portfolio that includes state-of-the-art air and gas compressors, dryers, nitrogen generators, and gas recovery Systems, Ingersoll Rand Engineered Systems and Services (ESS) is committed to pioneering innovation and maintaining the highest standards of engineering excellence. We pride ourselves on managing intricate projects across the globe, employing cutting-edge technology to drive the success of our customers.

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