Compressed Air Instrumentation Verification & Calibration

Introduction

Compressed air is a critical utility in many industrial and commercial facilities. It is used to power tools, machinery, and other equipment. Compressed air audits can help identify inefficiencies and opportunities for improvement in compressed air systems. However, it is important to ensure that the measurement instrumentation used in compressed air audits is accurate and reliable.
The CALMS platform ensures precise measurements with a feature in the Setup that mandates verification of each sensor's last calibration date. To manage the verification and certification of instrumentation, the Maintenance module keeps a log of all calibration records and sends alerts for timely verification, maintaining the system's efficiency and compliance.

Measurement Instrumentation in Compressed Air for audits and permanent monitoring

Industrial measurement instruments used in compressed air audits, regular checks, verification, and calibration are key to maintaining accuracy and reliability. These instruments typically fall under Class B, as they're not custody meters. Here's a simplified guideline:

Instrument Type	Verification Frequency	Calibration Frequency
Electric Current Transducers/Clamps	Annually	Every 2-3 years
Powermeters	Annually	Every 2-3 years
Flowmeters	Annually	Every 2-4 years
Pressure Transmitters	Annually	Every 2-5 years
Dew Point Meters	Annually	Every 2-5 years
Temperature Transmitters	Annually	Every 2-3 years
Air Quality Transmitters (Oil/Particles)	Annually	Every 2-4 years
Vibration/Ultrasound Leak Detectors	Annually	2-5 years or as recommended

Always check manufacturer guidelines and specific industry standards for each type of instrument. The calibration frequency can vary based on usage intensity, environmental conditions, and the criticality of the measurements in your processes.

Instrumentation Verification

Measurement instrumentation verification is the process of ensuring that the measurement instrumentation used in compressed air audits is accurate and reliable. This process involves comparing measurements with similar device and comparing values which should be in the range of +-5% or as defined by standards. This procedure is low-cost and can normally be done in the field (on site)

Instrumentation Calibration

Calibration is the process of comparing the measurement instrumentation to a known standard, which is a traceable reference meter with much higher accuracy and measure deviation. This standard can be a physical device, such as a pressure gauge, or a mathematical model. The measurement instrumentation is then adjusted until it matches the standard. This procedure is normally done in the Lab based on standard conditions (like ISO17025) or in the field with the maximum permissible error of 3x or 5x.

Testing

Testing is the process of using measurement instrumentation to measure a known quantity. This quantity can be a flow rate, pressure, or temperature. The measurement instrumentation is then compared to the known quantity to ensure that it is measuring correctly.

Benefits of Measurement Instrumentation Verification

Measurement instrumentation verification has several benefits, including:

- Improved accuracy of compressed air audits
- Reduced risk of errors in compressed air audits
- Increased confidence in the results of compressed air audits
- Improved efficiency of compressed air systems
- Reduced energy costs

Conclusion

Measurement instrumentation verification is an important part of compressed air audits and permanent monitoring. By ensuring that the measurement instrumentation is accurate and reliable, compressed air audits can provide valuable insights into the efficiency of compressed air systems.

Routine checking sensors on site

This is where a portable checking device is taken to the sensor measuring point in the process and, in parallel to the live online sensor, corroborates the accuracy of the installed sensor. To be reliable, it is recommended that a minimum of three measuring points are checked across the likely working range of the sensor in the process. This is normally defined as an as found check; not a calibration or recalibration. This is a quick operation that does not disrupt the process; however, it will not be as accurate as the second method, described below.

Calibrating sensors in an approved laboratory

This is where the installed sensor is taken from the process into a stable workshop and, using a calibration reference with an inaccuracy factor lower than the sensor being checked, is calibrated across multiple points, using a controlled process and a trained operator.
This is normally undertaken with an as found check and then (if required) an as left (adjusted) calibration. This takes longer and requires the use of a spare calibrated replacement sensor, to ensure the continuation of the process.

Standards

ISO 8573: Specifies the quality of compressed air, detailing requirements for contaminants like particles, water, and oil. Essential for air quality transmitters and ensuring compliance with purity specifications.
ISO 1217: Focuses on performance testing for displacement compressors, including methods for measuring flow rates. Critical for calibrating flowmeters.
ISO/IEC 17025: A general standard for testing and calibration laboratories, emphasizing competence, consistent operations, and reliable output.
IEC 61557: Pertains to electrical safety in low voltage distribution systems, relevant for calibrating electric current transducers and power meters.
ASME PTC 19.3: Relates to temperature measurement, applicable for calibrating temperature transmitters.
ISO 6789: Concerns the calibration of hand-operated torque tools, relevant for various equipment in industrial settings.
IEC 60770-1: Specifies performance requirements for transmitters in industrial-process control systems, including accuracy, environmental conditions, and testing.